USCGC GLACIER
WAGB-4

DEEP FREEZE
OPERATIONS IN ANTARCTIC

1979

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

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3123
6 April 1979

From: Commanding Officer, USCGC GLACIER (WAGB-4)
To: Commander, Naval Support Forces Antarctica

Subj: Operation DEEP FREEZE 1979, Cruise Report

Ref: (a) CNSFA OPORD No. 1-79
(b) COMPACAREA COGARD OPORD No. 1-79
(c) COMDT COGARD INST 3123.13

1. GLACIER's report of Operation Deep Freeze 1979 is hereby submitted. This report covers the period from Long Beach departure and return, 15 November 1978 to 6 April 1979.

2. Scientific missions during this deployment, which included bird transects and the XBT program, centered upon two distinct phases; the first - Marine Geologic Survey of the Antarctic Continental Margin - George V Coast (141°E to 175°E) and second - Physical Oceanography of the Western Ross Sea. Both phases were severely curtailed when GLACIER was directed to assist POLAR STAR and later tasked with the annual break in and associated resupply ship escorts. Attempts were made to accomplish as much scientific work as practicable within the exceedingly limited time available.

3. GLACIER's main plant was consistently available to provide 9-10 mains during the 28 consecutive days of backing and ramming to open the channel to Winter Quarters Bay. Unlike, Arctic West Summer 78, where GLACIER suffered catastrophic casualties to her mains (1 out of 10 operable), our major casualties this season were hull and structural related, due to relentless ice operations and vibration. As previously stated in DF '78 and AWS '78 Cruise Reports, "maintenance requirements are extremely high, and massive amounts of repair work must be done to keep GLACIER reliable." With the 400' polar class not yet fully "debugged," the icebreaker fleet is presently limited to GLACIER and NORTHWIND and cannot be ignored financially or mechanically.

B. S. LITTLE

Very uneducated

Copy to:
COMNAVSUPPFORANTARCTICA (10)
COMDT (G-OOO)
COMPACAREA (3)
CCGDELEVEN (3)
ATC MOBILE (2)
ACADEMY (1)
NSF (POLAR) (1)
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CHRONOLOGICAL LIST OF MAJOR EVENTS

13 NOV - HH-52A, CG 1407 & CG 1427 (AVDET 74) arrived COGARD AIRSTA LOS ANGELES, Chop to GLACIER.

15 NOV - RADM H.W. PARKER, CCGD11 arrived/departed. GLACIER underway from Long Beach in hazy weather. CHOP COMPACAREA. Immediately after departure, CG-1407 flew aboard. CG-1427 delayed due to engine problem and flew aboard 4 hours after departure approximately 5 miles from Pier 7. Swung ship to calibrate magnetic compass. Enroute Wellington, New Zealand via Suva, Fiji Islands.

19 NOV - Entered CGD14 waters in position 24°-02.5'N, 134°-32'W.

26 NOV - Crossed equator at 161°-32.7'W Longitude. Appropriate ceremony conducted.

29 NOV - Conducted first flight training operations since departure, over Swain's Island.

1 DEC - Crossed International Dateline at position 13°-41'S, 174°-18'W.

3 DEC - Arrived Suva, Fiji. Anchored overnight then shifted to King's Wharf the following day.

6 DEC - Departed Suva bound Wellington, New Zealand.

8 DEC - Conducted .50 caliber GUNEX in position 26°-27'S, 178°-58'E.

12 DEC - Arrived Wellington, New Zealand. CHOP COMNAVSUPPFORANTARCTICA.

18 DEC - Scientific party embarked for Ross Sea projects (S-202B and S-207).

19 DEC - Departed Wellington bound Oates Coast and George V Coast, Antarctica.

20 DEC - MEDEVAC crewmember stricken with acute appendicitis, via HH-52A, to Dunedin, New Zealand.

21 DEC - Crossed 50°S Latitude.

24 DEC - Crossed 60°S Latitude.

25 DEC - Sighted first Iceberg at position 62°-48'S, 151°-35'E.

28 DEC - Crossed Antarctic Circle at 141^{o}-33'E.

28 DEC - First core taken.

2 JAN - Sighted Giant tabular iceberg at Fisher Bay in position 67^{o}-30'S, 146^{o}-27'E.

3 JAN - Noted unusual water depth of 760 fathoms at Cape Bage coast. Departed Oates/George V Coast area enroute Drygalski Ice Tongue-Cape Washington Area in Ross Sea.

7 JAN - Diverted from Ross Sea Science projects to McMurdo to assist USCGC POLAR STAR with annual channel breakout.

11 JAN - Arrived McMurdo ice edge and commenced channel breakout operations. VADM R.H. SCARBOROUGH, Vice Commandant, USCG, arrived/departed.

16 JAN - S-207 Science party departed.

17 JAN - Primary responsibility for channel breakin assumed by GLACIER.

26 JAN - USNS MAUMEE arrived fast ice edge awaiting favorable channel ice conditions.

26 JAN - Initial channel to Winter Quarters Bay completed.

30 JAN - POLAR STAR departed McMurdo enroute Palmer Station.

3 FEB - Close escort of USNS MAUMEE to Winter Quarters Bay. Lifted 393,544 U.S. gallons DFM from MAUMEE and thirty-nine 55 gallon drums 9250 lube oil from McMurdo station.

5 FEB - USNS BLAND arrived fast ice edge awaiting escort to Winter Quarters Bay.

6 FEB - Science party S-013 embarked.

6 FEB - Close escort of USNS S.O. BLAND to turning basin. During close channel escort, BLAND collided with GLACIER stern, inflicting moderate damage to flight deck and stern; minimal damage to BLAND. Assisted MAUMEE unmoor from ice wharf and BLAND moor. Disembarked 23 volunteer crewmembers to assist BLAND offload.

7 FEB - Close escort of MAUMEE to ice edge. GLACIER proceeded to Ross Sea for 6 day science work on projects S-013 and S202B.

8 FEB - ET3 Raymond PORTER, fatality in forklift accident during BLAND offload.

8 FEB - Both main gyrocompasses malfunctioned. Aborted Ross Sea science, bound for McMurdo to embark Sperry Gryo Technical representative flown from Wellington.

12 FEB - Gyrocompasses repaired.

12 FEB - Moored McMurdo Station alongside BLAND.

12 FEB - Memorial services for ET3 PORTER conducted at McMurdo. Presented GLACIER plaque in his memory to be permanently displayed in new chapel.

16 FEB - Close escort of BLAND to ice edge. GLACIER in Ross Sea to resume S-013 and S202B.

17 FEB - Successfully retrieved first current meter placed in position by USCGC BURTON ISLAND in January 1978.

17 FEB - Attempt to retrieve second current meter unsuccessful.

18 FEB - Attempt to retrieve third current meter unsuccessful. Enroute Campbell Island.

20 FEB - Crossed Antarctic Circle Northbound in longitude 176°-56'E.

21 FEB - Crossed 60° South latitude.

23 FEB - Arrived Campbell Island. Cargo off/onloaded and passengers embarked by HH-52.

23 FEB - Crossed 50° South latitude.

26 FEB - Arrived Wellington, New Zealand. Science party S-202B departed.

4 MAR - Departed Wellington, New Zealand enroute Sydney, Australia. CHOP COMPACAREA COGARD.

9 MAR - Arrived Sydney, Australia.

13 MAR - Departed Sydney, Australia enroute Pago Pago, American Samoa.

16 MAR - Deployed NOAA FGGE Bouy No. 15F68 in position 23° 15.1'S, 175° 24.6'E.

18 MAR - Crossed International Dateline at position 13^{o} 41'S 174^{o} 18'W.

19 MAR - Diverted from Pago Pago transit to Atafu Atoll for MEDEVAC.

21 MAR - MEDEVAC'ed leukemia patient and two other passengers, by helicopter, from Atafu Atoll. Resumed transit to Pago Pago.

22 MAR - Arrive Pago Pago, American Samoa.

23 MAR - Departed Pago Pago enroute Long Beach, California.

27 MAR - Crossed equator at 157^{o} 06.0'W.

2 APR - Entered CCGD11 waters in position 22^{o}06'N, 134^{o} 36'W.

6 APR - AVDET 74 final flyoff enroute CGAS LOS ANGELES. RADM H. W. PARKER, CCGD11 arrived/departed. Arrived Long Beach. CHOP CCGD11.

CHAPTER I

SHIP OPERATIONS

Plate 1. GLACIER breaking channel to McMurdo.

CHAPTER I

SHIP OPERATIONS

1. Narrative Summary.

a. Enroute to DEEP FREEZE 79.

(1) Underway from pier 7, Naval Support Activity, Long Beach on the morning of 15 November 1978 in hazy weather, GLACIER immediately changed operational control to Commander, Coast Guard Pacific Area. The first helicopter landed on board shortly after departure since fly-on is not permitted while moored at the Naval Support Activity. The second helicopter, experienced mechanical difficulties which required an engine change and was delayed at CGAS LOS ANGELES. GLACIER proceeded to Long Beach light to swing ship for adjustment of the magnetic compass. The second helicopter was re-engined and flew aboard approximately four hours after departure.

(2) Appropriate ceremonies attended the crossing of the equator and a few days prior to arrival at SUVA, FIJI, GLACIER conducted the first flight of the deployment over beautiful, lush SWAIN's Island.

(3) Weather to SUVA was favorable. No storms were encountered, however, on the morning of 3 December an extremely heavy rain squall was experienced just hours North of the entrance to SUVA harbor. By the time the pilot embarked, conditions had improved to intermittent light showers during the transit to anchorage. GLACIER anchored first night due to non-availability of berths; a commercial vessel, whose departure had been delayed by the rain squall that morning, occupied the berth reserved for GLACIER at King's wharf and remained there one extra day. GLACIER shifted to King's wharf the following morning. The excellent planning of the American Embassy at Suva assured that, in spite of a Sunday arrival, GLACIER was well received and supported. The embassy's cordiality and ready assistance throughout the visit made it a most enjoyable experience.

(4) Weather from SUVA to Wellington was also favorable and the temperature, enroute, was far more pleasant than at the equator. At approximately the halfway point between Suva and Wellington, a .50 caliber BMG gunnery exercise was conducted.

(5) Arriving at Wellington, New Zealand, on the morning of 12 December 1978, GLACIER changed operational control to Commander, Naval Support Force Antarctica. Bunkering was accomplished upon arrival at Point Howard (old

fuel pier) and later that evening, GLACIER moored at Glasgow Wharf. Scientific parties for projects S-202B and S-207 embarked. The USDAO and staff provided outstanding support and assistance.

b. Science - Antarctic Continental Margin between 141°E and 175°D Longitude (Oates Coast and George V Coast)

(1) The departure from Wellington was delayed by several hours because of last minute arrival of one and one-half truckloads of scientific equipment from Christchurch, NZ.

(2) Two projects were supported during this phase of operations; S-202B, Physical Oceanography of the Ross Sea, Mr. Anthony Amos and S-207, Marine Geologic Survey of the Antarctic Continental Margin between 141°E and 175°E Longitudes, Dr. John B. Anderson. Ship's force conducted the Expendable Bathythermograph program for the Navy and also conducted a continuous sea surface temperature record enroute.

(3) Little more than one day out of Wellington, on 20 December 1978, in position 46°-11'S, 171°-38'E, a crewmember was stricken with acute appendicitis, requiring MEDEVAC. Fortunately, GLACIER was still within easy reach of land, which enabled a slight track diversion and arrival, several hours later, 25 miles from Dunedin, NZ. Ship's helicopters then delivered the crewman to Dunedin airport from which he was transported by ambulance, to WAKARI hospital for successful corrective surgery.

(4) Weather enroute the project area was favorable. 24 December 1978, GLACIER crossed 60° South latitude and, on Christmas day, sighted her first iceberg in position 62°-41'S, 152°-51'E. Sea conditions were excellent and permitted the preparation and enjoyment of a sumptuous Christmas dinner that evening. On the following evening, 26 December, GLACIER entered one to two Oktas pack ice and commenced project S-207 in position 65°-00.2'S, 141°-30.4'E.

(5) During 2 to 3 January 1979, a giant tabular iceberg was sighted (30 miles long, 10 miles wide and 185 feet high) with its logitudinal axis oriented NW to SE and which was centered, apparently grounded, at Fisher Bay in position 67°-30'S, 146°-27'E. During this same period, GLACIER noted that the depth of water, outward from Cape Bage coast to 66°-33.5'S, exceeded 760 fathoms.

(6) During the entire period of 25 December to 3 January, a general eastward advance between 142°E and

Plate 2. Channel break in, 3/4 ship length per ram in 6'-7' fast ice.

Plate 3. Channel break in, going ahead for another ram. Hut Point in background on left.

149°E longitudes was worked before departure from the area. Proceeding along the "outside" route around 500 miles of pack ice extending to 175°E, GLACIER made for Drygalski Ice Tongue/Cape Washington in the Ross Sea for continuation of the project. On 7 January, while enroute, GLACIER was diverted to the McMurdo fast ice edge to assist breakout of Winter Quarters Bay. This diversion ended GLACIER's participation in project S-207.

c. McMurdo Channel Breakout (11 to 26 January 1979)

(1) When GLACIER arrived at McMurdo fast ice edge at 0240 on 11 January, 30.5 miles from Hut Point, USCGC POLAR STAR was hove to 27.5 miles from Hut Point with mechanical problems. The two ships formed Ross Sea Ship Group with POLAR STAR as COMROSSEASHIPGRU. Proceeding into the fast ice through 2.5 miles of POLAR STAR's 3-mile track, GLACIER veered around her and commenced the breakout to Winter Quarters Bay. During the course of the day, the Vice Commandant of the Coast Guard, a guest of CNSFA, visited and departed each of the ships.

(2) By 14 January, GLACIER had advanced to 21 miles from Hut Point and then reran the channel to free the completely refrozen brash ice. GLACIER hove to as she neared POLAR STAR and received her Commanding Officer and Commander, Naval Support Forces Antarctica who joined GLACIER Commanding Officer for the first conference telephone call with COGARD COMDT (G-O) via GLACIER MARISAT. Later that day, POLAR STAR advanced her channel to 24 miles from Hut Point, then hove to, to evaluate her mechanical situation.

(3) Between 15 and 16 January, POLAR STAR advanced to 12.5 miles from Hut Point, where she remained until 21 January. During this same period, GLACIER advanced to the 19.4 mile mark, then reran this channel to again loosen completely refrozen brash ice. Reaching the ice edge, GLACIER conducted an aerial ice reconnaisance by helicopter. Many cracks were identified in Wohlschlag Bay, with notable cracks leading southwesterly from Cape Royds, Barnes Glacier and the southern tip of Tent Island. As of the evening of the 15th, all ice north of Cape Royds was drifting free. GLACIER commenced a secondary channel, "Backdoor Channel" (so named for Backdoor Bay). The objective of this secondary channel was to bisect cracks which extended from shore to the main channel, thereby permitting large ice flows between the channels the freedom to drift to sea. The plan was, initially, for GLACIER to advance Backdoor Channel close aboard Inaccessible Island and Tent Island, while POLAR STAR advanced the main channel. The second channel would then intersect the main channel near this point. This plan was contingent upon

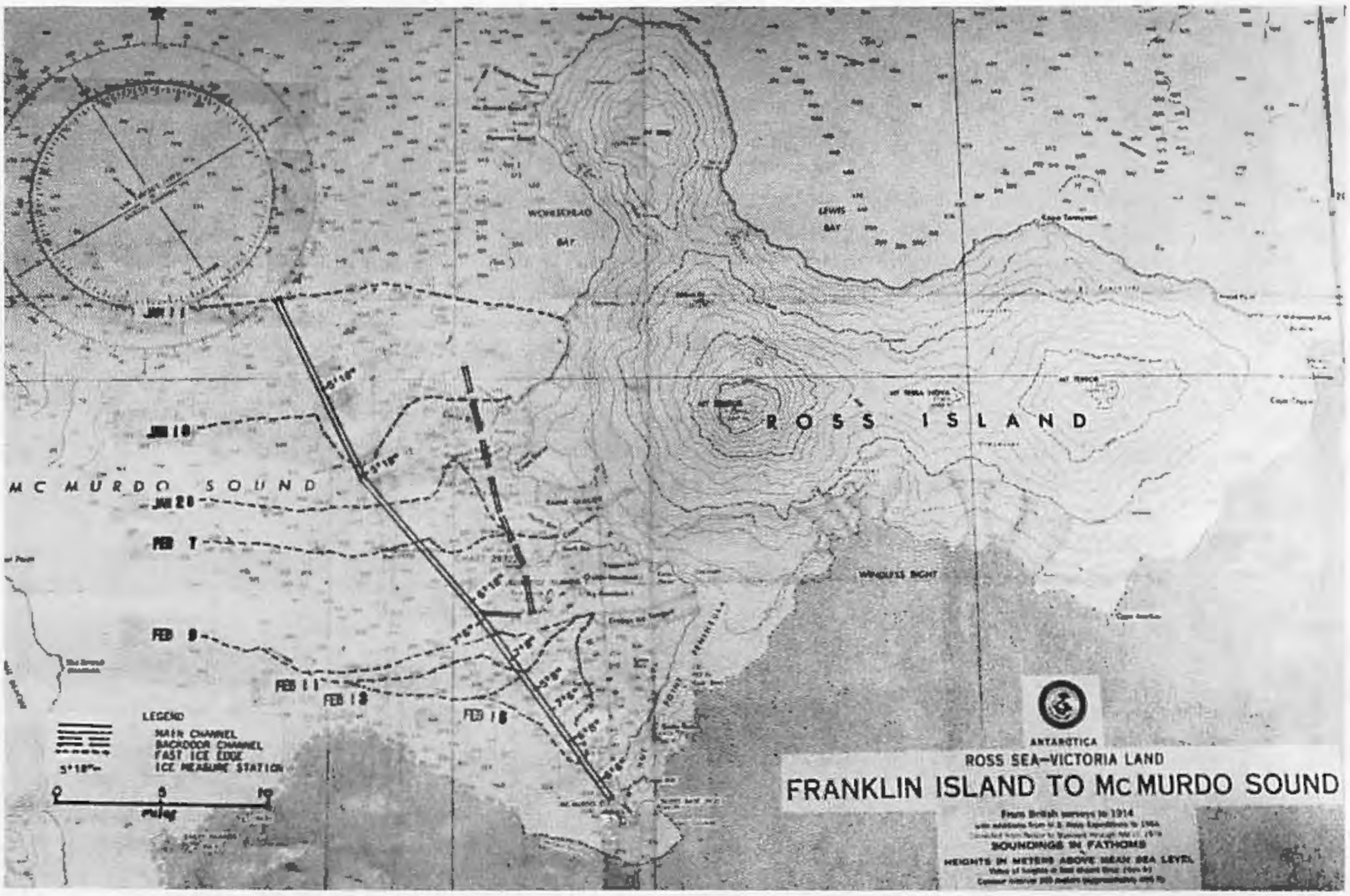


Plate 4. McMurdo channel and fast ice regression.

POLAR STAR's continued advance in the main channel.

(4) By 17 January, POLAR STAR had determined that, while she was still mission-capable, continued channel breaking operations would deteriorate her condition to a point where other Deep Freeze tasks would be jeopardized. Accordingly, primary responsibility for McMurdo breakin was assigned to GLACIER with POLAR STAR remaining on scene as back up, standing by to fuel from USNS MAUMEE. Meanwhile, GLACIER continued operating in Backdoor channel to reach and open a crack extending from the southern tangent of Tent Island and which entered the main channel 4000 yards ahead of POLAR STAR's hove to position. When GLACIER reached the crack, it was under such pressure that it was totally fused and would have required an inordinate amount of time to open it. GLACIER, therefore, backtracked through Backdoor channel (loosening the completely refrozen brash there) and, following the ice edge, re-entered and resumed main channel breakin on 18 January. It was noted that between 11 and 18 January, the ice edge had receded 7 to 9 miles.

(5) From 19 to 20 January, GLACIER advanced to 9.9 miles from Hut Point. With the breakout so far behind schedule, and the estimate that another 10 days, minimum, would be required for GLACIER to reach Hut Point on her own, POLAR STAR again endeavored to advance. By 22 January, having gained 1 additional mile (11.5 miles from Hut Point), POLAR STAR ceased all further icebreaking attempts since her situation rapidly deteriorated and threatened her Palmer Station-Weddell Sea missions. GLACIER continued her unassisted operations, taking time out on 25 January for a well deserved ship's party on the ice surface before arriving at Hut Point on the morning of 26 January.

(6) During the operation, GLACIER conducted ten ice measurement stations, recording 4 hour measured Speeds of Advance through the ice, average ice thicknesses and depth of snow cover. This information, coupled with a record of the number of engines used at time of measurement will provide statistical information regarding the vessel's fast ice breaking capabilities.

d. Channel tending, Ice wharf preparation and Escort.

(1) Having reached Winter Quarters Bay on 26 January, GLACIER devoted several hours to breaking out the turning basin and Winter Quarters Bay and to trimming the ice wharf. Work on the ice wharf was discontinued when GLACIER impact on the facing produced a series of extensive cracks. The wharf had been prepared according to the

original schedule which did not anticipate the delays of the breakin operation. The wharf was blasted on 10 January. This, and the natural deterioration of the ice wharf caused by age from premature preparation made the wharf vulnerable to cracks from otherwise normal icebreaker impacts. While the ice wharf was being strengthened by additional cables, GLACIER resumed channel tending in a totally refrozen main channel. Backing and Ramming was necessary. It is interesting to note that it took eighteen hours to rerun the channel.

(2) On the morning of 27 January, GLACIER, 11.9 miles from Hut Point, hove to in the vicinity of POLAR STAR for another MARISAT conference telephone call and remained there for 18 hours while effecting repairs to a crack in the rudder post trunk. After unsuccessfully attempting repairs externally, with diver application of a DEVCON patch, the crack was sealed internally by filling the surrounding cofferdam with cement (obtained by N.Z.'s Scott Base). On 28 January, GLACIER resumed channel tending and escorted POLAR STAR to the fast ice edge to lift fuel from MAUMEE. Upon completion of refueling, POLAR STAR departed for Palmer Station and ROSSEASHIPGRU was disestablished on 30 January.

(3) During 29 January, GLACIER exited the main channel, proceeding east along the ice edge and reentered Backdoor Channel. There, refrozen brash, cake and block ice were loosened by one complete transit of the channel. On the outbound leg of transit, GLACIER opened a fracture which was perpendicular to Barnes Glacier 13.9 miles from Hut Point and which entered the main channel 15.3 miles from Hut Point. Once transit of this fracture was completed, all ice north of it was free floating. GLACIER then commenced rerunning and widening in 5 mile segments. On 30 January, this plan was altered because, again, the main channel was found to be completely refrozen. GLACIER undertook several complete reruns to correct this situation. On the first rerun, a 12-18" wide fracture, with open water visible within, was sighted. It started from land and extended on a 050 to 060°T axis to main channel, entering it, 4.5 miles from Hut Point. By 31 January, GLACIER had completed 2 and one quarter reruns of the main channel and one of Backdoor channel, widening and straightening where possible. While these efforts were greatly hindered by still heavy brash in the channels, it was noted that refreezing had been largely checked by the process. It was also noted that the east side of the ice edge was now at 15.2 miles from Hut Point and extended on a 070°T axis to Backdoor channel. All waters north of that zone were open.

(4) 1 February, the Master of MAUMEE, embarked by GLACIER helicopter for a channel transit. Based upon his observations, the decision for MAUMEE to attempt the transit to Winter Quarters Bay on 3 February was reached with GLACIER providing close escort (MAUMEE following close astern in GLACIER's propwash). Until 3 February, GLACIER continued tending and noted that the channel was ice free beyond the 9 mile mark to the ice edge (now 15 miles from Hut Point). From that 9 mile mark to Hut Point, the channel was filled with brash ice. On 3 February, MAUMEE channel transit was completed without incident. Prior to MAUMEE moor, thirty-nine 55 gallon drums of 9250 lube oil were loaded on GLACIER from the ice wharf. Then, GLACIER moored outboard MAUMEE for bunkering (lifted 393,544 U.S. gallons DFM) and "crew rest."

(5) On 6 February, in preparation for USNS BLAND arrival and USNS MAUMEE departure, GLACIER resumed channel tending in a refrozen channel. GLACIER rendezvoused with BLAND at the ice edge and assisted her to Winter Quarters Bay. During the channel escort, close astern, BLAND collided with GLACIER's stern. While transiting, BLAND became beset on three occasions and GLACIER freed her by clearing ice on port and starboard bows. During the final clearing operation, GLACIER became beset and was impacted at the starboard quarter, as BLAND freed at full speed. At the time of impact, BLAND's engines were backing full astern, while GLACIER's were going full ahead. Damage to GLACIER was localized in vicinity of the starboard quarter and included warpage of 40 square feet of flight deck, 4 square feet of flight deck wood surface was splintered, and some structural damage beneath the flight deck; one flight deck safety net was lost and two were irreparably damaged: JP-5 fuel hose was severed (but immediately repaired); Helo electrical power cable was severed (immediately respliced); the wood pudding around the starboard quarter was splintered; a 5 foot section of taffrail was mangled; and miscellaneous deck fittings were damaged. Damage did not affect any operational capability and GLACIER and BLAND continued on to Winter Quarters Bay where BLAND awaited final preparations for mooring. On 7 February after assisting MAUMEE unmoor (by towing astern) and straightening the ice wharf face, the ice was cleared and BLAND moored.

e. Science, Escort and Departure.

(1) With inbound escort of BLAND completed, resumption of science planning envisioned performance of current meter retrievals and CTD programs in Ross Sea during BLAND offload and Drygalski Ice Tongue/Cape Washington work

Plate 5. USNS MAUMEE entering ice choked Winter Quarters Bay after close escort in by GLACIER.

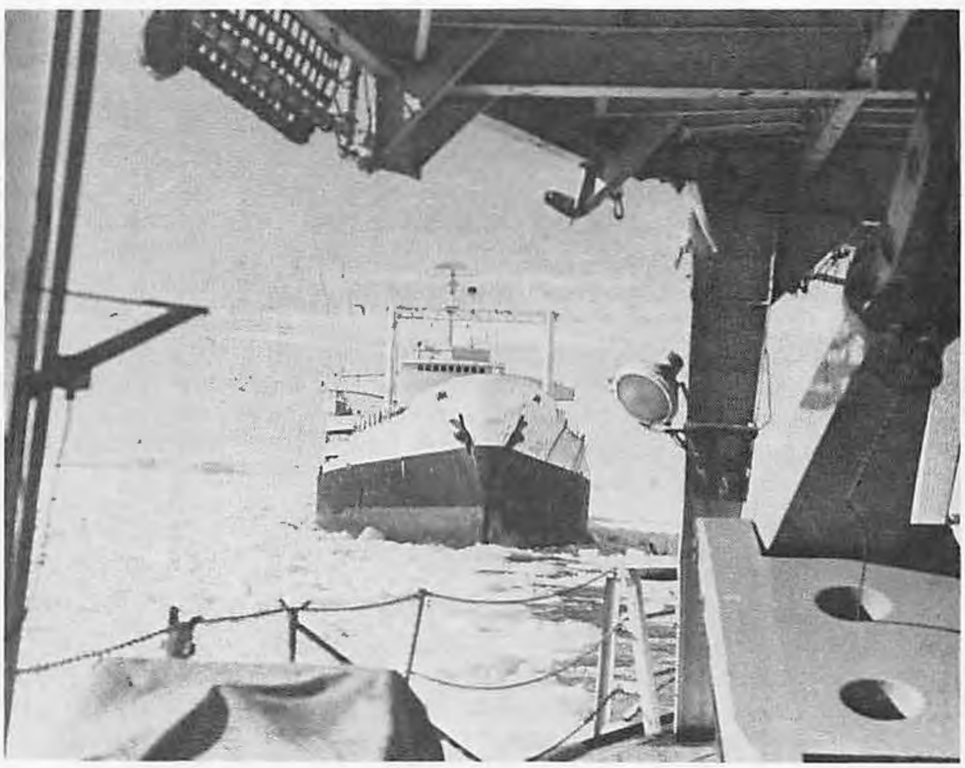
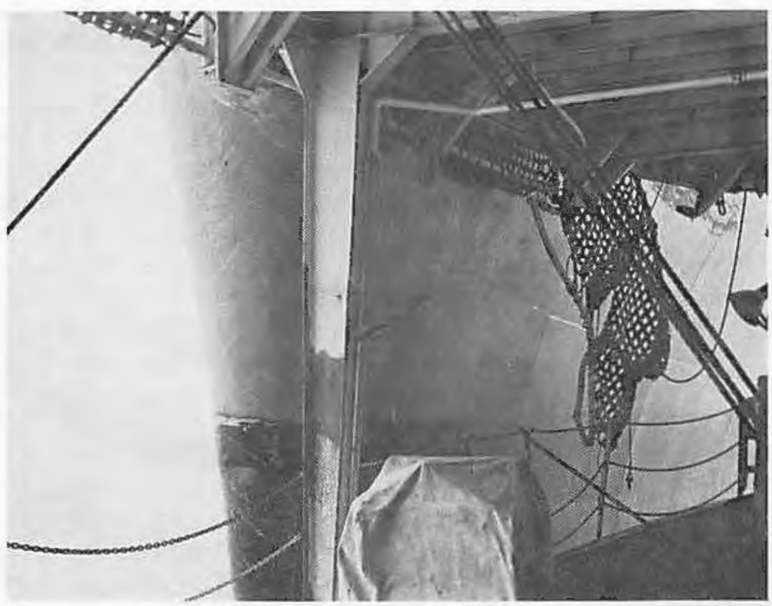


Plate 6. Close escort of MAUMEE from McMurdo to open water.

Plate 7. Backing down on USNS BLAND to clear ice from bow.



Plates 8 and 9. After freeing USNS BLAND, both ships going ahead, GLACIER became stuck and collision resulted.

enroute Wellington at the end of the "season." GLACIER departed on 7 February for six days of science operations (S-013 and S-202B) in Ross Sea, and escorting MAUMEE outbound close astern, leaving 23 volunteer crewmembers behind to help BLAND offload cargo. S-202B involved retrieval of three submerged Current Meter Arrays placed by USCGC BURTON ISLAND in January 1978. Unfortunately, after one day in Ross Sea, along the Ross Ice Shelf, both main gyrocompasses malfunctioned. The complexity of casualties hampered corrective action by ship's force and a Sperry Gyrocompass Technical Representative was flown from Wellington to McMurdo to assist repair. GLACIER unsuccessfully attempted to continue without main gyros but utilizing Helicopter gyrocompasses and ship's magnetic compass which both proved too inaccurate for the precise work of the projects. Unable to salvage the projects, GLACIER aborted further attempts and returned to McMurdo by following the Ross Ice Shelf and Ross Island coastline by radar.

(2) From 9 to 12 February GLACIER engaged in troubleshooting her gyros, conducted S-202B and S-013 tasks along the fast ice edge in vicinity of the channel entrance, performed channel tending, and performed engine maintenance. By this time, consistant favorable southerly winds were being experienced and the ice edge had receded to 7.3 miles from Hut Point and 2 miles of the channel was generally filled with loose brash ice. On 10 February, the technical representative had arrived and by 12 February, both gyrocompasses were working satisfactorily. GLACIER also embarked passengers from McMurdo headed for Wellington and CONUS. On 16 February, several hours later than originally anticipated, BLAND, with GLACIER assistance, unmoored, transited the channel and departed. The ice edge had receded to 2.2 miles from Hut Point. GLACIER then returned to Ross Sea for another attempt at retrieval of S-202B current meters and for S-013 tasks. GLACIER ETA at Campbell Island slipped from the 22nd to the 23rd of February because of delays in BLAND's departure. Also, the Drygalski Ice Tongue/Cape Washington projects were cancelled in favor of current meter retrievals.

(3) On 17 February, the 1st current meter array was successfully recovered in position 78^{o}S, 179^{o}-51'E. That same day, a sweep further east for the second meter in position 78^{o}-14'S, 174^{o}-55'W and then north on 18 February to the third and final meter in position 75^{o}-16'S, 175^{o}-26'W were unsuccessful. The second meter could not be located acoustically and although release commands were transmitted, surfacing was not indicated. The third meter was located and released but due to transmitter malfunction, deteriorating weather, and poor visibility it could not be

sighted in spite of extensive search. In each case, over six hours were devoted, on station, to locate each meter.

(4) 18 February, enroute Campbell Island and arrived on morning of 23 February, picking up, by helicopter, two passengers and cargo for transport to Wellington. The weather was excellent and allowed for the passenger/cargo flights to continue as GLACIER steamed by Campbell Island. GLACIER arrived Wellington 26 February, on schedule, after a Deep Freeze that was most challenging and characterised by continuous changes in schedule and activities.

f. Outchop and homeward passage.

(1) Wellington to Sydney, Australia.

(a) During the March 1979 Wellington inport period, the National Oceanographic and Atmospherics Administration (NOAA) placed a single FGGE (First Global GARP Experiment) buoy in GLACIER for subsequent positioning at sea during the homeward transit. On 16 March, the FGGE Buoy was set adrift in position 23° 15.1'S, 175° 24.6'E. 4 March, with GLACIER's departure from Wellington, operational control was changed to Commander, Coast Guard Pacific Area. GLACIER departed Wellington a few hours later than planned because of delay in the arrival of a technical consultant from Commander, Coast Guard District Eleven (ene) scheduled to ride with GLACIER to Sydney. Departing Wellington in clear weather, one and one half days later GLACIER discovered that the reputation of the Tasman Sea, for roughness, was well founded. Throughout the remainder of the journey, GLACIER experienced 15-40° rolls. It soon became apparent that GLACIER would not meet her original ETA at Sydney since it was necessary to slow and follow a Northwesterly, then southwesterly track in an effort to find a comfortable heading. Rolls were so violent that installed equipment such as the 3 tier galley ovens began to break lose from their mountings. As a consequence, GLACIER ETA slipped one day.

(b) On the night prior to arrival, red and white Icarus type flares were sighted in position 34°-18'S, 152°-14'E. After confirming with Sydney radio that there were no planned operations employing such flares in that position, GLACIER devoted four hours to investigation of the sighting. With no further sightings, nor indications from Sydney of the possibility of a mishap. GLACIER abandoned the investigation and resumed the transit to Sydney, meeting the revised ETA.

(c) GLACIER was treated with great cordiality during the visit. Not only did the city have an abundance of interesting activities available, but the special efforts of HMAS DERWENT (host ship), Flag Officer Commanding Eastern Australia (FOCEA), and the American Consulate there, made the visit unforgetable. On 13 March, GLACIER departed for Pago Pago, American Samoa.

(2) Sydney to Pago Pago.

(a) Weather to Pago Pago was favorable. On 19 March, while still 244 miles southwest of Pago Pago, GLACIER was requested by RCC Wellington to MEDEVAC a female native from Atafu Atoll, 500 miles northwest of American Samoa. Reportedly suffering from leukemia, her condition had deteriorated to such an extent as to exceed the capabilities of the small atoll's medical facilities. Her evacuation to more suitable facilities was considered necessary to save her life. Once directed by PACAREASARCOORD to divert, GLACIER proceeded to a position 40 miles south of the atoll arriving the morning of 21 March. At first light, GLACIER's helicopters evacuated the patient from Atafu Atoll, along with her husband and a registered nurse and resumed transit to Pago Pago. On the morning of 22 March, GLACIER, 50 miles north of Pago Pago, transferred the MEDEVAC party, by helicopter, to Pago Pago International Airport for further transport, by ambulance to Lyndon Baynes Johnson Medical Center. GLACIER arrived inport a few hours later.

(b) GLACIER topped off with potable water which had been depleted by normal attrition during the passage from Sydney. Due to inoperability of one evaporator, GLACIER's water level had reached critical stages. Although GLACIER only remained in Pago Pago overnight, the reception there was characterized by good planning and cordiality. The Coast Guard station provided, ship requested services and arranged excellent entertainment for the crew.

(3) Pago Pago to Long Beach. The transit to Long Beach was routine and uneventfull except for the "Goin' Home Show" held on the fantail on 2 April.

2. <u>Port Information</u>. Port information is included in Chapter III - Navigation.

3. <u>Special or Unusual Operations</u>. None.

4. Deck Operations.

a. Cargo

(1) The HSK, totaling 15 tons, was loaded five days prior to departure.

(2) Approximately 3½ tons of scientific equipment was loaded in two days prior to departure.

(a) All equipment was not available upon departure.

(b) All of the coring equipment was stored on the fantail due to its size.

(3) The only "special handling" cargo was the rotor head. All other cargo required normal handling and securing.

(4) Approximately 250 tons of stores were loaded utilizing a rental Navy mobile crane.

(5) Due to a mix up with the Palmer Station resupply ship, timbers for Palmer Station were loaded aboard GLACIER for transfer to POLAR STAR in Wellington, who would ultimately be calling at Palmer. The timbers were loaded and secured on the starboard quarterdeck.

b. Small Boats

(1) The MSB remained at Base Terminal Island for engine replacement and hull repairs.

(2) The ready boat was the Zodiak, situated on the starboard quarterdeck.

(a) A davit had been installed prior to departure on the forward end of the quarterdeck for the Zodiak Boat.

(3) The Zociak Boat was used exclusively in all operations very successfully.

(4) Boat Hours

a. MSB (left at Base T.I.)

b. LCVP -

c. ASB -

d. SKM - 25 hours

d. Towing Operations: Both resupply ships required assistance in departing the ice wharf in Winter Quarters Bay and in turning around in the turning basin.

(1) USNS MAUMEE (617' tanker). MAUMEE (ballasted down) was towed stern first using an 8" double-braided nylon towing hawser. The nylon hawser parted in the vicinity of the splice while "pulling" MAUMEE stern first through heavy brash ice. The towing cable, 2" 6X19 wire, was then passed. Tow length was approximately 200' with the strain normally between 95% and maximum for the cable and towing winch. With MAUMEE successfully in the turning basin, the towing winch would not reel in the cable. This was believed caused by over torqueing the towing winch. The motor controls are linked to the torque limiting mechanism on the winch, which we suspect is bent, rendering the motor inoperative. Approximately 150' of cable was "burned-off." The entire operation was approximately 4 hours in duration.

(2) USNS BLAND (476' dry cargo). BLAND was also towed stern first using the 8" double braided nylon towing hawser. Proper tow was made away from the ice wharf into the turning basin. The tow line was changed from BLAND's stern to bow and back several times due to the limited size of the turning basin and ice. Approximately 250' of hawser was damaged and discarded due to the pressure applied to the turns on the BLAND and GLACIER's towing bit. This, in effect, reduced GLACIER towing capability to the use of 5½" hawser only.

(3) The towing winch is to be repaired and new 8" towing hawser will be ordered on arrival in Long Beach.

5. <u>Diving Operations</u>.

a. Pre-Cruise.

(1) Prior to deployment on Deep Freeze 79 GLACIER divers made several dives with and for other Southern California military units, as well as GLACIER herself. Tasks included: search and recovery of lost objects, hull and propeller inspections, survey of moorings, hull cleaning and work on aids to navigation. Two qualified divers, who were not part of GLACIER's compliment, but, did much diving with GLACIER, were LT Ken SMITH, USN, of Repair Division, NAVSUPPACT LA/LB, and QM1/DV Keith RAISCH, USCG, a former GLACIER diver presently assigned to the USCGC VENTUROUS. The services of these two men were invaluable in both finding dives to work and in helping to fill the empty spots in GLACIER's dive team during periods when the dive locker was deficient in personnel. LTJG William KELSEY, USCG, while visiting from Headquarters, also made a working dive with the GLACIER dive team. Prior to deployment on Deep Freeze 79 three men were sent to Navy Scuba School. All graduated, thus, bringing GLACIER's diving compliment to five divers. No one was sent to Second Class School, due to time restrictions. While in port all divers and prospective divers participated in a daily fitness program that included running, swimming, and calesthenics

(2) GLACIER's diving compliment for Deep Freeze 79 consists of one SSDO, one second class diver, and three scuba divers. This is one second class short and one scuba long of what GLACIER is alloted. One scuba diver reported aboard in December while GLACIER was in Wellington. The SSDO left on PCS orders from Sydney. GLACIER is expecting a 75% loss due to transfers of divers in the upcoming inport period.

b. Operations

(1) Prior to INCHOP, activities included recreational "free" diving in Fiji and training dives in New Zealand. While operating in the McMurdo Sound area dives were made in an attempt to place a patch over a ruptured weld along the inside of the rudder post trunk. DEVCON U/W compound was used as the patching agent but failed due to divers unfamiliarity with the use and mixing of the product. Instruction has since been given. The other cause for failure was lack of communication between divers and other personnel (either topside or inside the hull) while on scene at the sight of the bad weld. Adequate communications would have improved chances of success. A hull inspection was made at McMurdo and Wellington and training dives were conducted in New Zealand, Australia, and American Samoa.

c. Equipment

(1) Prior to the first dive all scuba bottles received visual internal inspections. Four were found to be pitted, and subsequently were set aside and red tagged to be tumbled and hydrostatically tested upon return to Long Beach. There were no other equipment casualties or problems this deployment.

(2) Instruction was given by DCC HUNTER on the care, use and feeding of the "Posieden Unisuit." All men were checked out in the suits both on land and in the water prior to any work being conducted. The SSDO and DV2 made preliminary dives with the new divers to insure their familiarity with equipment and observe their adaptability to shipboard diving operations. All divers were instructed on the use of the air compressor and air system. An instruction period was held on repetitive dive tables.

d. Recommendations.

(1) That the polar icebreaker diving compliment be changed to include one diving medical techinician (DMT).

(2) That a locator of all Coast Guard divers be established so that divers in non diving billets can have a chance to keep up their qualifications. This would also give districts a reference for finding divers should a job come up that requires them.

(3) That a system be developed to allow non billeted divers to get diving pay, or partial dive pay for dives they perform assisting a diving unit.

(4) That GLACIER be supplied with an MK 1 diving system and support equipment.

(5) That an underwater welding outfit be provided. This would allow more options for u/w repair work.

(6) That since scuba divers don't qualify in 4 & 5 above, that scuba billets be upgraded to second class diving billets.

(7) That diver tours aboard icebreakers be 2 years from date of being assigned DUID. Since most divers are aboard almost a year before being sent to dive school they are only utilized as divers for one year. This would be more cost effective and reduce dive team turnover.

CHAPTER II

AIR OPERATIONS

Plate 10. 1407 preparing to land on fast ice.

CHAPTER II

AIR OPERATIONS

1. Pre-deployment Preparation.

a. On 2 October 1978 Aviation Detachment 74 formed up at Coast Guard Aviation Training Center, Mobile, Alabama. The detachment consisted of four officer pilots (all designated aircraft commanders), and ten rated enlisted personnel. Two HH52A helicopters, numbered 1407 and 1427, were assigned. This year's form-up period was shortened by two weeks. However, during the available four weeks all necessary pre-deployment maintenance, personnel administration and medical requirements were accomplished.

b. On 8 November 1978 both helicopters departed Mobile enroute CGAS Los Angeles. At Lafayette, Louisiana, helicopter 1407 experienced a supervisory panel and generator failure. Darkness had fallen by the time replacement parts arrived from ATC Mobile via a special C-131 flight and repairs effected. Thus, an unscheduled RON was made at Lafayette. The second and third days were uneventful with stops at Houston, Austin, San Angelo (RON), Pecos, and El Paso (RON). On the fourth day, high winds and turbulence were encountered out of Deming, New Mexico requiring another unscheduled RON at Tucson, Arizona to await better weather. Wind gusts in excess of 45 knots and reported moderate turbulence continued throughout the fifth day. On the sixth day the weather improved and the flight continued to CGAS Los Angeles via Yuma and San Diego. Low ceiling and poor visibility were encountered on the last leg. With the arrival of the helicopters at CGAS Los Angeles on 13 November, AVDET 74 chopped to CGC GLACIER. The HSK arrived on 9 November and was loaded aboard GLACIER by an advance team of three crewmembers. The remainder of the AVDET personnel arrived on 11 November.

2. Summary of Operations.

a. The first flight operations were conducted on 29 November in the vicinity of Swain's Island, fourteen days after departure from Long Beach. All equipment including radios and X-band transponders were checked out. One week later, upon departure from Fiji, other flights were conducted to train CIC personnel on low visibility radar approaches.

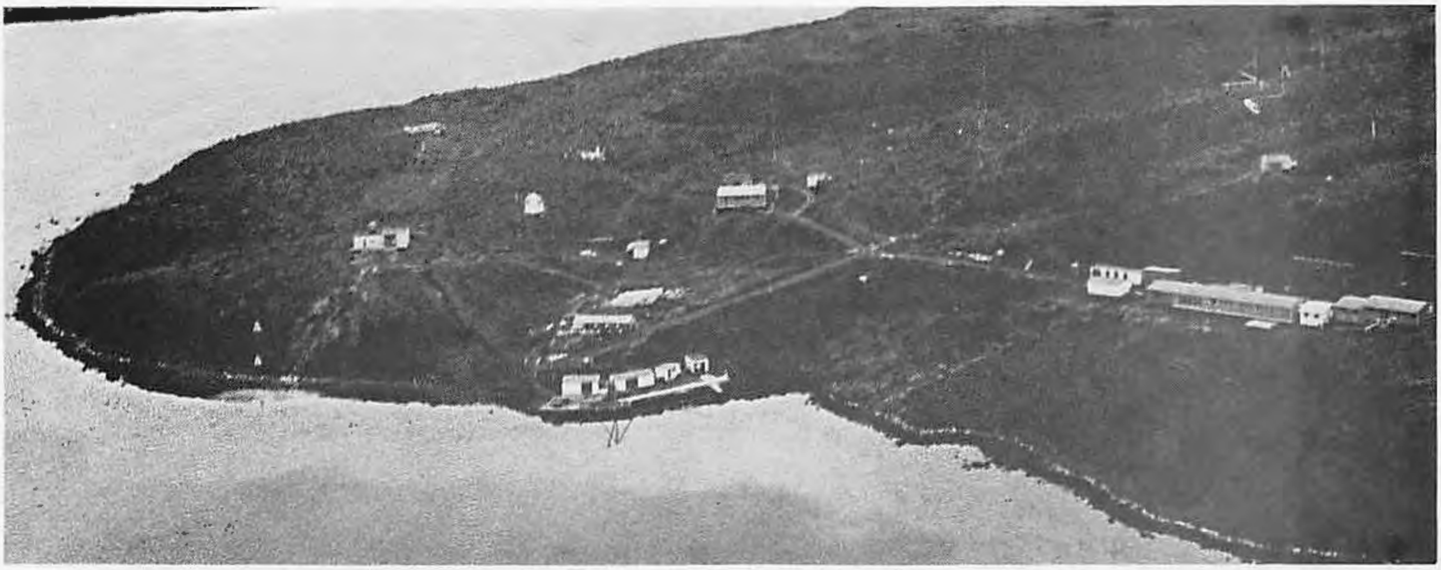
b. On 20 December, a GLACIER crewman with acute appendicitis was medevaced to the hospital in Dunedin, New Zealand, twenty-five miles away.

c. Helicopter operations played a minor role in this year's Deep Freeze. None of the science projects assigned to GLACIER were programmed for helicopter support by CNSFA OPORD NO. 1-79. However, when in the vicinity of George V Coast, 16.5 hours were flown for scientific observation of icebergs and glaciers. On 7 January, GLACIER was directed to assist in the breakout of the McMurdo channel. Flights then became limited in scope. There was minimal tasking by CNSFA for helicopter operations and missions were sought simply to provide flight time for deployed crewmembers. They consisted mainly of short passenger shuttles to Williams Field and passenger/cargo deliveries to the ship. On 22 January, helos were staged at McMurdo to alleviate the ship's icebreaking time being consumed for flight quarters. On 23 and 24 January, aviation department personnel participated in a two day Antarctic survival training school. On 7 February, after the USNS BLAND was alongside the ice wharf, the helicopters were recovered and GLACIER departed for science operations in the Ross Sea. About one and a half days out, the ship's gyro compass failed. With the skies overcast, even the sun was unavailable for use as a reference. The helicopter's gyro compass was energized by external power and aviation personnel provided heading information to the bridge for the next 21.5 hours. Some precession of the gyro was noted making directional information not sufficiently precise enough for the scientific work scheduled. GLACIER returned to McMurdo using the helicopter gyro, radar, and visually following the ice shelf and coastline of Ross Island.

d. February 10 saw the last helicopter operation in Antarctica. GLACIER headed north on 16 February. On 23 February, resupply/off load of Campbell Island was accomplished by helicopter. The helo pad at Campbell Island is a 20' X 20' metal grid, red with white circle, located approximately 200 years west of the weather station buildings. Approach and departure is limited only by a hill to the north. A red/white telephone pole located forty yards to the east is the only obstruction (see photograph).

OPERATION DEEP FREEZE 79 FLIGHT STATISTICS

	NOV	DEC	JAN	FEB	MAR	APR	TOTAL
PAX/MAIL/CARGO	-	-	58.3	21.0	-	-	79.3
ICE RECON	-	6.6	11.9	2.3	-	-	20.8
TRAINING	4.1	7.4	-	4.7	11.4	-	27.6
SCIENCE OPS	-	8.4	8.1	-	-	-	16.5
MEDEVAC	-	1.2	-	-	5.0	-	6.2
TEST	0.3	0.4	-	-	-	-	0.7
FLY ON	0.7	-			-	-	0.7
TOTALS	5.1	24.0	78.3	28.0	16.4	-	151.8



Plates 11 and 12. New Zealand weather station at Campbell Island (NOTE Helicopter pad)

3. Maintenance Summary.

a. During the form-up period at ATC Mobile both helicopters underwent pre-deployment CMS maintenance. Helicopter 1427 was assigned to the Gold Maintenance Team just five weeks before deployment and required extensive corrosion control work, all of which was completed prior to departure for Long Beach.

b. The cross-country flight to Los Angeles started on 8 November. At the first refueling stop, Lafayette, Louisiana, a generator and supervisory panel failed on helicopter 1407. Replacement parts were flown in by C-131 and the helicopter repaired. During preflight of helicopter 1407 on 15 November, prior to flying to the GLACIER, the power turbine drain tube broke off the engine. A quick engine change was completed with the assistance of CGAS Los Angeles personnel. While in transit to Suva, Fiji, the flight deck was repainted with non-skid. Though the instructions called for spraying, the paint had to be rolled on as the proper spray equipment was not available. The non-skid coverage was not uniform, but was an improvement. On 7 December, while folding the blades on helicopter 1407, one blade was dropped, damaging the leading edge and tip cap. The blade was replaced 12 December in Wellington with one of the spare blades. On 23 December, the spare blade boxes being stored on top of the hanger broke loose in heavy weather. With difficulty they were resecured, but not until one box had received damage to the underside. Fortunately the blade inside escaped damage. On 27 December the MA-1 directional gyro on helicopter 1407 failed in flight. No replacement is carried in the HSK so a waiver was requested to fly the helicopter with the ASE yaw channel disengaged. The waiver was received the next day and the helicopter flown in that condition until parts were received in McMurdo. On 6 February, while being escorted through the channel, the USNS BLAND struck the GLACIER on the starboard side of the flight deck. The deck itself was deformed, three nets were substantially damaged and the D.C. power cable and fuel hose were severed. The D.C. power cable was temporarily spliced back together but must be replaced this inport. The damaged portion of the fuel hose was removed shortening it to fifty feet. It, also, must be replaced this inport. On 10 February the left chin bubble on helicopter 1427 was broken when an engine plug was dropped during preflight. As no replacement chin bubble is carried in the HSK, the window was taped over with ordnance tape until the part was received.

c. The return trip from the operating area was uneventful. CMS maintenance continued and the helicopters were prepared for the return cross-country flight to Mobile.

4. Comments and Recommendations.

a. The ship-to-air communications continues to be a significant problem area. Both ship and helo have facilities to operate on HF, UHF, VHF and VHF-FM frequencies. However, only the HF and VHF-FM were reliable. The ship has only one VHF receiver which was tuned to 121.5, VHF guard, and therefore unusable except in emergency. Additional equipment is needed. The UHF radio continued with the same incompatability problem as reported last year and was seldom usable for more than 5 to 10 miles. (See Cruise Report Deep Freeze 78). Installation of systems more compatible with the aircraft, such as the AN/ARC-51A UHF radio and the AN/ARC-84 VHF radio, is recommended. Maintenance of these components could be conducted by the Aviation Department's Avionics technicians, without requiring additional training.

b. Navigation equipment also continues to be a problem. The X-band transponders (in conjunction with the surface search radar), the low frequency radiobeacon, and the air-to-air tacan DME (distance measuring equipment) are available for navigation.

(1) The X-band transponder has proven to be quite effective to 30 miles at altitudes above 1000 feet once the radar and transponders are on frequency. Transponders are tuned by the manufacturer with no provisions for tuning in the field. Without a properly operating transponder, the ships radar is ineffective for tracking the helicopter. To enable use of the transponder this cruise, the ship's radar had to be detuned. This reduces the effectiveness of the radar for other uses and is undesirable. Recommend the necessary procedures/equipment be developed/procurred to enable fine tuning of the transponder while deployed. Additionally, there is no way to test the transponders to ensure they are working. It is recommended equipment be procurred so as to check the transponder prior to departing ATC Mobile.

(2) The radiobeacon is satisfactory when operating but, it still has a tendancy to trip off the line unnoticed. There is no monitor capability nor alarm system on the ship to indicate proper operation. As the radiobeacon is the only directional reference available to the helicopter in a lost comms condition, the ship must have a method of insuring its operation. A solid state time and "state of the art" radiobeacon with monintor and alarm system should be installed on all polar icebreakers.

(3) The current Tacan system rigged on the ship provides only distance information (See Cruise Report Deep Freeze 78). While the POLAR STAR was in the vicinity of the GLACIER, its tacan transmitting station was available for use and provided a welcomed ability for the helicopter to determine its own distance and azimuth information.

c. COMDTINST 6410.1 dated 15 December 1978, requires concurrence by a flight surgeon or aviation medical officer before grounded aviation personnel can be returned to flying duty. As neither is available on board WAGB's, there is a significant problem while on long deployments in isolated areas of the world. All physician's assistants assigned to icebreakers should be qualified aviation medical officers.

d. The seepage of light water from the hangers overhead sprinkler system onto the helicopter became an annoying problem. In rough seas it became necessary to wash off the corrosive light water 4 and 5 times a day. After experimenting with the positioning of different valves, it was discovered that by closing the fire main pressure to one tank and then positioning that tanks "Y" gate valve to the "hose" position (the other tanks "Y" gate was on "sprinkler") that the leaking stopped. Although, in this configuration only one light water tank is immediately available to the sprinkler system, it is considered adequate. This leaves the second tank available for back up as necessary - hose or sprinkler.

e. Recommend that during flight deck repairs this inport, that the fuel hose well on the flight deck be completely overhauled and refurbished.

f. The flight deck drain system continues to get clogged with debris. During cold weather water backs up and freezes in the star openings preventing tie down of the helicopter. Recommend that during flight deck repairs this inport that:

(1) Larger drain piping be installed.

(2) All drain manifolds serving the flight deck be located so as to be assessible from a star opening on the flight deck.

(3) All drain pipe openings be fitted with a screen to help prevent clogging.

g. An athwartship landing was a procedure utilized on this and previous deployments but not discussed in earlier cruise reports. It has limited utilization in that it can safely be done only when the ship is firmly in the ice with no way on. It is under these conditions, though, that the ship may not be able to maneuver to provide a relative wind for normal landing. An athwartship landing is the only alternative. It is recommended that athwartship landing procedures for WAGB's be developed and added to CG-419.

CHAPTER III

NAVIGATION

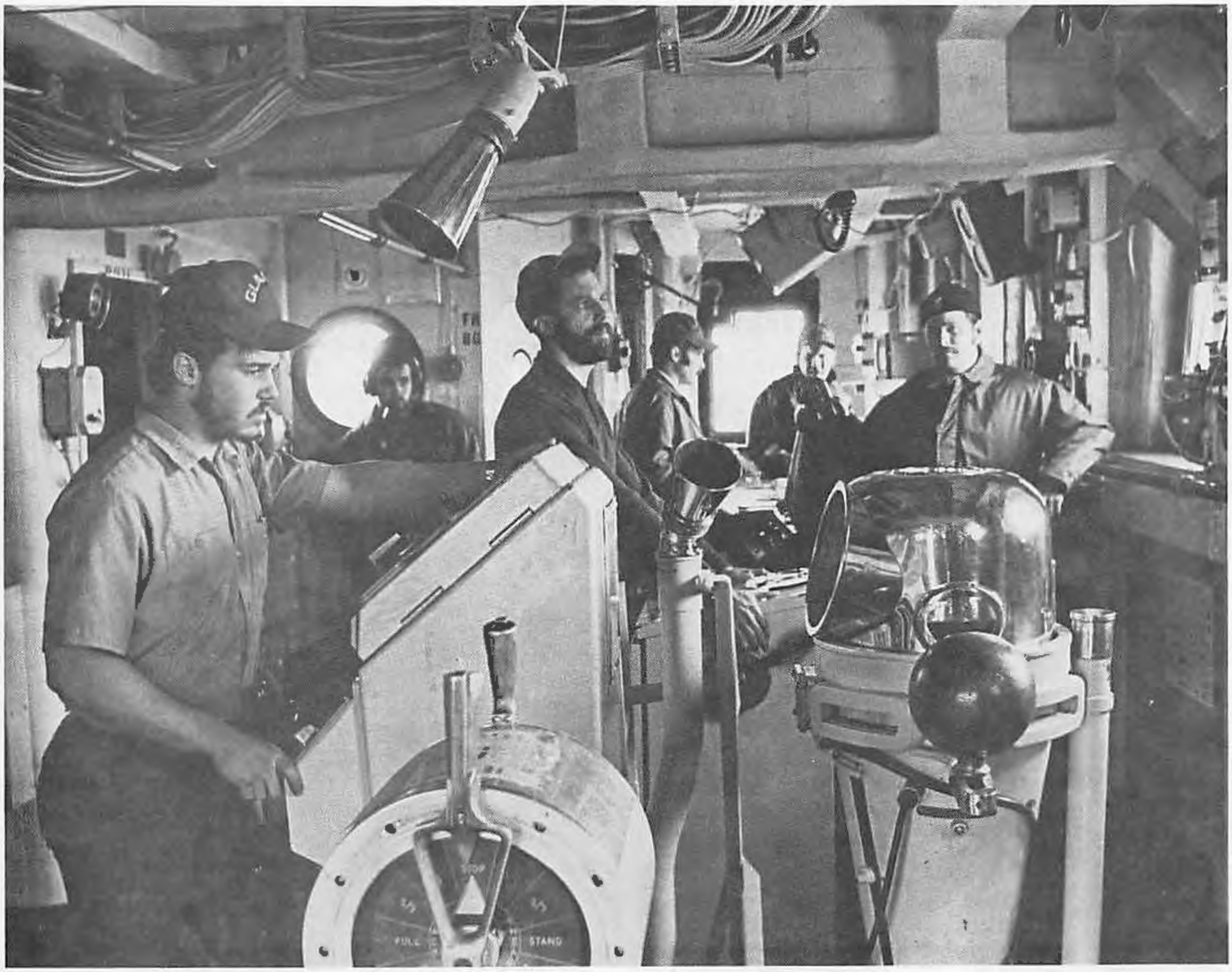


Plate 13. Bridge "gang," maneuvering with pilot house control.

CHAPTER III

NAVIGATION

1. Pre-Deployment Preparation.

a. Due to the short inport prior to Deep Freeze 79, most of the available time was utilized for material maintenance. Tracklines were laid, charts sorted, publications inspected, and routine tasks necessary to the trip were accomplished. STD-5 came to GLACIER and provided all operations personnel with training in piloting, maneuvering board, and SAR.

2. Navigation by transit section.

a. Long Beach to Wellington, New Zealand via Suva, Fiji.

15 November - 12 December

Miles traveled:	Long Beach - Suva, Fiji	4816 nm
	Suva, Fiji - Wellington, NZ	1550 nm

Methods of Navigation

- Radar
- Loran-C
- Omega
- NAVSAT
- Celestial
- Visual

(1) Long Beach to Suva, Fiji. AT 0904 on 15 November 1978 GLACIER brought in her last line and departed Pier 7, NAVSUPPACT, Long Beach to begin Operation Deep Freeze 1979. Time was taken in the LA outer harbor to swing ship and compensate the magnetic compass. The time was made available due to the late arrival of one helicopter. Soon GLACIER was off on the first leg of her journey. GLACIER entered the realm of NEPTUNUS REX at 1010 on the 26th of November at longitude 161°-32.7'W. The first land fall after leaving Long Beach was made on the small American owned SWAIN's Island. This occured at 1128 on the 29th of November. The lookout spotted the tops of the palm trees breaking the horizon as GLACIER rose to the top of the swells. On the first day of December at 2216 GLACIER crossed Internationl Dateline into the Domain of the Golden Dragon. Our position at this time was 13°-41.0'S, 174°-18.0'W. We had already compensated for this event by cancelling the 30th of November earlier. Early in the morning of 3 December, GLACIER encountered some heavy weather while transiting the the islands and reefs just northeast of Fiji. We were in

very heavy rain squalls. The visibility dropped to zero and the radar was continually blanked out by the heavy rain. We reduced our speed and DR'ed while keeping a close eye on the fathometer for the next hour and a half. The weather cleared as sunrise approached. At 1147 the Suva, Fiji harbor pilot boarded GLACIER for our entrance to the harbor. We anchored at position 18°-07.62'S, 178°-25.39'E. The bottom was mud. The depth of the water was 9 3/4 fathoms and we had three shots of chain on deck. Pier space was not available and we remained at anchor until the following day when at 0708 we weighed anchor and moored starboard side to Kings Wharf, Suva, Fiji.

(2) Suva, Fiji to Wellington, New Zealand. GLACIER departed Kings Wharf, at 0905, 6 December enroute Wellington, New Zealand. First land fall on New Zealand was made at East Cape at 0120, 11 December at a range of 30 miles. The next day GLACIER passed abeam of Cape Palliser Light and moored port side at Point Howard Fuel Pier at 0809. We took on 204,970 gallons of DFM, at 2007 GLACIER departed the fuel pier, with a pilot aboard, for a 49 minute run across the harbor and moored Glasgow Wharf, Wellington, at 2056, 12 December.

b. Wellington, New Zealand to Wellington, New Zealand via Antarctica.

19 December - 26 February

Miles Traveled:	Wellington to Antarctica	6088 nm
	Antarctica to Wellington	2147 nm

Methods of Navigation

Radar
LORAN C
OMEGA
NAVSAT
Celestial
Visual

(1) Wellington, New Zealand to Antarctica. GLACIER departed Glasgow Wharf, Wellington, New Zealand at 1108, 19 December to begin the operational phase of Operation Deep Freeze 1979. GLACIER left Baring Head Light 5,540 years abeam and set a course to the south, southwest and the open ocean at 1218. GLACIER entered the Indian Ocean at 150°E just prior to midnight on Christmas day. At 2251, at position 65°-02.5'S, 141°-30.4'E we took our first science station. We crossed the Antarctic Circle at 1735, 28 December at Longitude 141°-33.1'E. At 0930, 5 January at position 65°-41.25'S, 146°-38.8'E, we took our last station in the area of George V Land; and at 1239 we were underway enroute

Cape Washington for continuation of science operations. While enroute Cape Washington, we received orders to proceed to the fast ice edge at McMurdo Sound to assist the POLAR STAR in breaking out the channel. All science operations were held in abeyance pending the outcome of the channel breakin. At 0240, 11 January, we arrived at the fast ice edge in McMurdo Sound and commenced the channel breakin. On the 26th of January at 0515, after fifteen days, two hours, and thirty five minutes of almost continuous backing and ramming, GLACIER arrived abeam of Hut Point, McMurdo Sound. Our average speed through ice was 0.075 knots. During the period 26 January - 16 February we continually worked the channel to keep it open. We escorted the USNS MAUMEE and USNS S.O. BLAND in and out of McMurdo via the channel. While the USNS BLAND was offloading, GLACIER departed Winter Quarters Bay for the Ross Sea in order to conduct science operations and recover three current meters set last year by the BURTON ISLAND. On 8 February, while attempting science operations in the Ross Sea, we experienced a total failure of both master gyros. Science operations were cancelled. We returned to McMurdo using radar ranges to the ice shelf, NAVSAT, visual, and the helicopter gyros for reference as navigational aids. A technician from Wellington was flown down to Antarctica to assist ships force in repairing the gyros. The problems were soon corrected, however, the Sperry Gyro technician opted to remain on board GLACIER for the return trip to Wellington. At 0343, 16 February, GLACIER entered open water after successfully escorting USNS BLAND out of McMurdo. We set a course to the Ross Sea in another attempt to recover the current meters. At 1555, 18 February GLACIER got underway, departing the Ross Sea enroute Campbell Island and Wellington, New Zealand. Only one current meter was recovered.

(2) Antarctica to New Zealand. At 0630, 23 February, Campbell Island was sighted at a range of 17 miles. At 1006 we departed Campbell Island enroute Wellington after offloading cargo and picking up scientific cargo and passengers. At 0915, 25 February land fall was made on Bank Peninsula, New Zealand, at a range of 42 miles. At 0825, 26 February GLACIER entered the main channel at Port Nicholson and at 0948 we were again moored starboard side at Glasgow Wharf, Wellington, New Zealand.

c. Wellington, New Zealand to Long Beach via Sydney, Australia and Pago Pago, American Samoa.

4 March - 6 April

Miles Traveled:	Wellington to Sydney	1310 nm
	Sydney to Pago Pago	2380 nm
	Pago Pago to Long Beach	4163 nm

Methods of Navigation

Radar
LORAN-C
OMEGA
NAVSAT
Celestial
Visual

(1) Wellington, NZ to Sydney, AS. At 1147, 4 March, GLACIER departed Glasgow Wharf and at 1231 we cleared the harbor enroute Port Jackson, Sydney, Australia. While enroute we encountered some heavy weather and our arrival was delayed from 8 March to 9 March. On the night of 8 March, several flares were sighted and an expanding square search of the suspected area of origin of the flares was conducted. At 0355, 9 March the search was secured and we proceeded to the pilot pick-up point just outside Port Jackson. At 0855, the pilot was on board and at 0954 we were moored starboard side to Walsh Bay, berth number 1.

(2) Sydney, Australia to Pago Pago, American Samoa. At 0904, 13 March we departed Walsh Bay, Berth number 1, and at 0943 we cleared Port Jackson enroute Pago Pago, American Samoa. The transit was routine until the morning of 19 March. At 0941 GLACIER changed course to Atafu Atoll in response to an emergency MEDEVAC request by RCC Wellington, NZ. On the morning of 21 March, approximately 40 miles off Atafu, GLACIER launched both helicopters. The helicopters flew to Atafu, embarked the patient and returned to GLACIER. We set our course again for Pago Pago and arrive at noon on 22 March.

(3) Pago Pago, American Samoa to Long Beach. GLACIER departed Pago Pago at 1016 on 23 March. The final track homeward is a great trial. The nearest land enroute is Christina Island. Initially, our speed of advance was slow due to the heat and fighting the typical currents. The situation improved slightly once we crossed the equator. The remainder of the trip was routine.

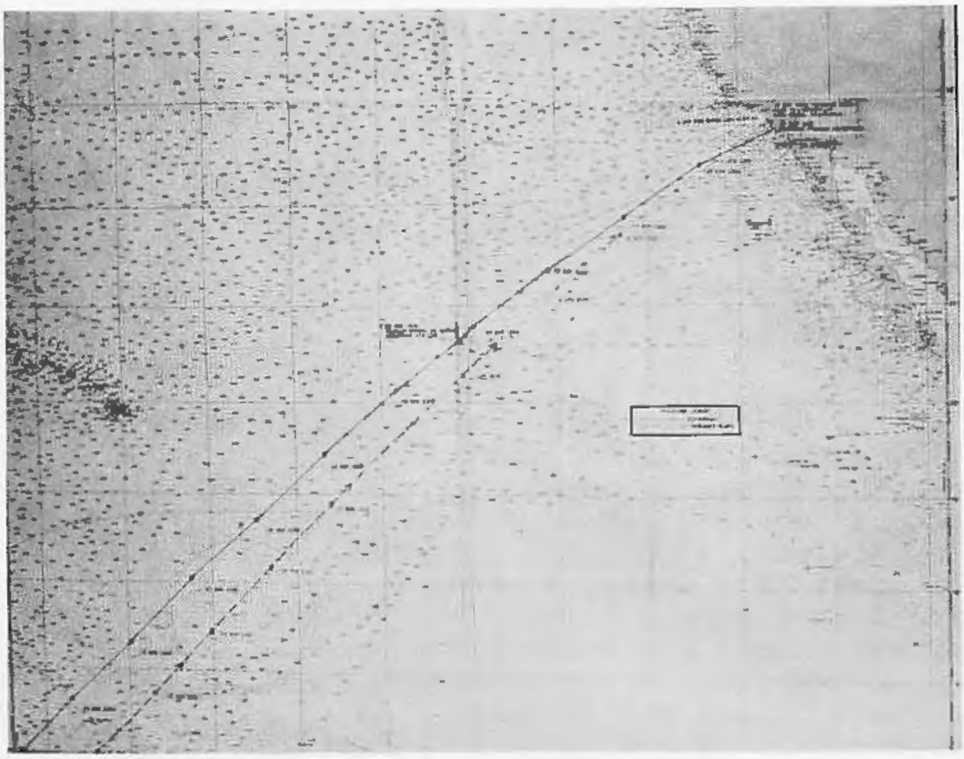


Plate 14. Track chart - Long Beach South and return.

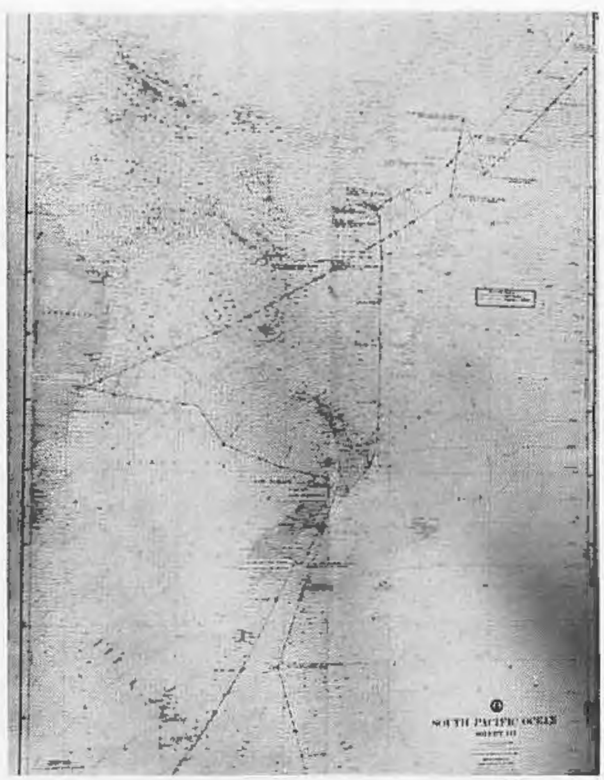


Plate 15. Track chart - Suva, Wellington and South, return Wellington, Sydney, Atafu Atoll and Pago Pago.

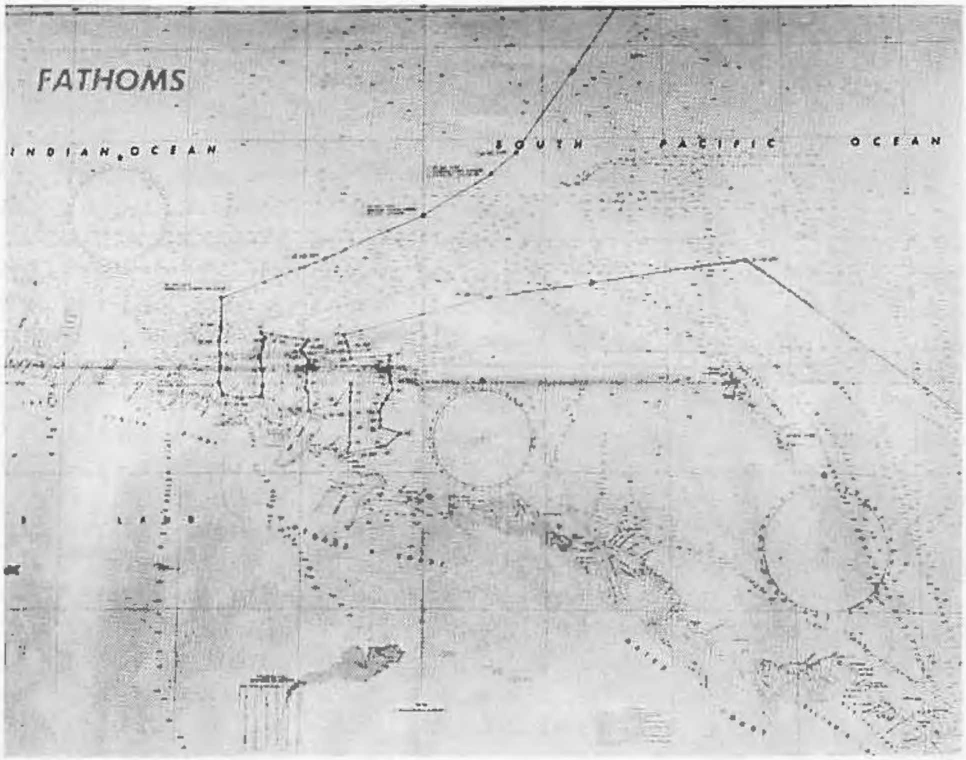


Plate 16. Track chart - George V Coast Antarctica science project area.

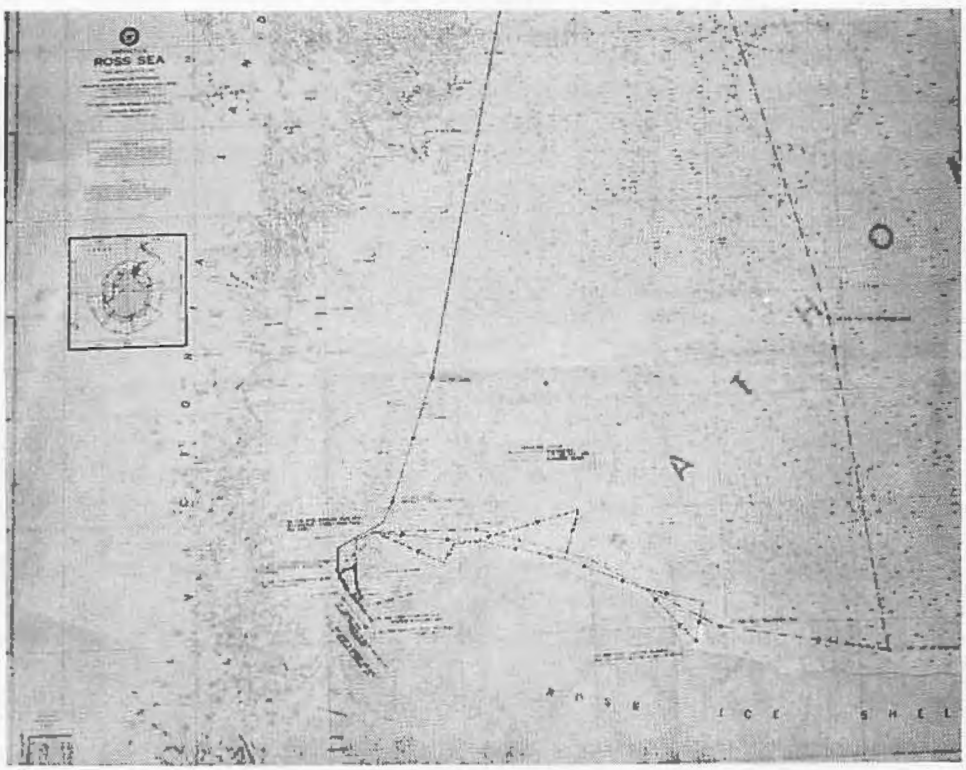


Plate 17. Track chart - Ross Sea and McMurdo.

3. Port Information.

a. Suva, Fiji - Suva keeps -12 time and does not go on daylight savings time at any time of the year. The charts of Suva and the description in the sailing directions are excellent. There are two wrecks that show above the reef, however, investigation revealed that wrecks are common and usually only last a year or two before either being washed away or broken up by the heavy surf action. The wrecks are usually "replaced" by others. The old saying "beware the lee shore" certainly holds true in these waters. The pilots are competent and English is the normal language. Most of the inhabitants speak English also. Military vessels will find that they may not always have pier space available since priority is given to commercial vessels. Adequate anchorage is available. The bottom is mud. During the day, transit of the harbor is easy since it is well marked. Entering or leaving port poses no special problems either since the passage is well marked and the shoals are easily seen. At night, however, it would definitely be more difficult due to the abundance of marks, buoys, and lights in the harbor area. We anchored out our first night at Suva. The night was uneventful as far as the anchor watch went. Liberty for the crew was made possible by hiring a 100 passenger tour boat to serve as a liberty launch. The service was excellent, possibly due to side concessions in operation on the boat. The next morning we moored at King's Wharf which provided excellent access to the town.

b. Wellington, New Zealand (Port Nicholson). Wellington keeps -12 time. Daylight Savings Time (-13) is kept from late October to early March. The charts of the area are excellent and no special navigational problems exist. The pilots are excellent and the barbor is well managed. The fuel pier at Point Howard has two piers. GLACIER utilized the "short" pier. The transit time from the fuel pier to our berth at Glasgow Wharf was 55 minutes. High winds are common in the harbor, however, both times we moored during this deployment the winds were negligible.

c. Sydney, Australia (Port Jackson). Sydney keeps -10 time. The charts of the area are excellent and no special navigational problems exist. The pilots are excellent. The harbor is very spacious and well marked. Tugs are used for mooring. There are many commercial berths available, in addition to those at the Australian Navy Base. The harbor is very busy with many pleasure craft, ferry boats and hydrofoils operating. On weekends and holidays the harbor has hundreds of sail boats of various sizes throughout.

d. Pago Pago, American Samoa. Pago Pago keeps +11 time. The charts of the area are excellent, however, the harbor entrance is a little tricky, even with a pilot. The pilots are adequate and speak English. The pilot used the NAV detail and frequently asked for bearings on specific points. There are many shoals on the approach to the harbor. We experienced some difficulty in locating the bearing objects which had been selected. The topography of the area was the primary factor. There are three wharves in Pago Pago. We utilized the main pier directly in front of the Coast Guard station.

4. Chart Coverage. Generally the chart coverage for various transits was good. A problem still exists in the actual operating areas off the coast of Antarctica. Since most of the charts are small scale, it is difficult to pilot when operating in close. We undertook a program to make our own charts of the area using radar and precision navigation. We intend to send this information to OMAHTC for possible use in printing updates of the areas. The approach to Port Jackson, Sydney, Australia could be made easier if the charts did not jump from a small scale to an extremely large scale. A medium scaled chart of the entrance to Port Jackson would be of great benefit. Coastal navigation in the vicinity of Mahia Peninsula, North Island of New Zealand could be improved if a chart was available for an area bounded by 39° 30.0'S, 178° 30.0'E; 35° 0.0'S, 179° 10.0'E. This would allow deep draft vessels to transit the area and utilize visual references.

5. Discussion.

a. The precision navigation that was utilized during this deployment was the most reliable ever provided for a Deep Freeze deployment. This was made possible with the aid of a Magnavox MX1107 Dual Channel Satellite Navigator. The Magnavox provided excellent fix capability, in addition to a constant DR position output while operating in the ice. The system uses an input from the gyro and our doppler speed log to automatically update the DR position between fixes. The Magnavox accomplished this with much better accuracy and ease than any quartermaster or OOD could hope to do. With the Magnavox and radar we successfully mapped the Mertz and Ninnis Glacier tongues and the ice edge along the continent within our science operating area. The many features of the system, such as range and bearing to a desired latitude/longitude, and set and drift allowed us to precisely position the ship for science operations. We were also able to determine our drift rate while on station. A remote video display of the MX1107's navigational outputs was installed in aloftconn. This provided the ice conning officer with constant navigational data while maneuvering through the ice. This permitted the OOD to determine instantaneously what the direction and distance was to the next science station or reference position. While operating in the Ross Sea during our dual gyro failure, the MX1107 was indispensible for determining what course we were making good and to enable us to relocate the ice shelf inorder to radar navigate safely back to McMurdo. A fix can be obtained as often as every 15-20 minutes in the polar regions. A Magnavox MX1107 or similar system is highly recommended for all icebreakers. We feel it is an indispensable aid to the scientific program and proved invaluable to our operations. We also had a prototype precise navigation system on board for evaluation. This new system is intended to replace the old DDP-516 Honeywell system. This prototype PNS can not come close to a favorable comparison with the performance of the MX1107. The prototype incorporates OMEGA and LORAN-C with a dual channel satellite receiver. While operating in the Antarctic, the only system available is the satellite system. LORAN-C coverage is non-existent outside the Coastal Confluence Zone of the United States and OMEGA is inaccurate and unreliable near and south of the equator. No coverage exists in the Antarctic regions. We recommend that an integrated system such as the prototype PNS not be developed in light of the commercial systems that are available. The MX1107 is also useful in computing great circle and rhumb line courses between points and determining exact ETA's, during open ocean transits. In our opinion, this type of system is all that is necessary to provide the precision navigation required for science operations and general mission support for icebreakers.

b. OMEGA - the OMEGA navigation system proved to be almost entirely useless once we approached the equator and while we were south and in the Antarctic. The coverage in erratic and the fixes obtained were very inaccurate. Perhaps when the Australian station is operational, the coverage will improved, however, the system accuracy leaves much to be desired. The navigational precision required of our scientific mission precludes the use of OMEGA. OMEGA's inclusion in a Precise Navigation System is in conflict with the 2-4 nautical mile system accuracy and the use of the word precise.

c. LORAN C - LORAN-C coverage is available only along the U.S. coast and in specific areas in the Northern Hemisphere. We did have some skywave coverage while enroute Wellington from Long Beach, however, the LORAN-C receiver that is part of the prototype Precise Navigation System was designed for use in the 1:3 signal to noise ratio area of the U.S. Coastal Confluence Zone. Its inclusion in the Precise Navigation System seems self defeating for a favorable evaluation of the integrated system. A 10:1 signal to noise ratio receiver would have provided extended LORAN-C coverage, however, LORAN-C is non-existent in the Antarctic regions.

d. Celestial navigation - The weather during our transit from Long Beach to Wellington via Suva, Fiji, was for the most part "gentle breezes, following seas, and clear skies." Celestial fixes were obtained most every morning and evening with the OOD's using running fixes during the day. Once we departed Wellington for the ice, the weather was generally overcast and somewhat rough. Celestial fixes were not as available. Once we began science operation, our requirement for frequent fixes caused us to rely on electronic navigation. Whenever the sun was available, sun lines, LAN, and azimuths were taken for positioning and gyro error determination. Again, on the transit from Wellington back to Long Beach, the weather was favorable. Morning and evening stars became the routine along with sun lines and azimuths.

CHAPTER IV

COMMUNICATIONS AND ELECTRONICS

1. Communications - Pre-Deployment Preparations.

a. Electronics.

(1) During the approximate 90 day inport period prior to Deep Freeze 79, little preventative maintenance or badly needed electronic repair work was accomplished.

(2) The primary reason for this was the redesign of the Secure TTY Room which was implemented during this period, and the installation of the new MARISAT terminal.

(3) The Secure TTY Room was reconstructed to accommodate the new Navy Satellite Communication Package which will be installed in the Spring of 1979.

(4) GLACIER was chosen to test the civilian Marine Satellite Communication System (MARISAT) for the Coast Guard. Primary interest was to be in the fringe areas of coverage by the satellites, the polar regions. The main terminal for the system was installed in Radio Central, with a remote voice unit on the bridge.

(5) The reasonable degree of readiness obtained prior to departure can only be attributed to the hard work and long hours put in by the electronics and radio gang work forces during the last few days inport.

b. Publications.

(1) All three communication publication systems aboard were reviewed and those pubs deemed unnecessary or non-essential to GLACIER's operation in Deep Freeze were removed to safe storage at the NAVSUPPACT LA/LB vault.

(2) The CMC, CMS, and COMTAC libraries will all be returned to the ship at the end of Deep Freeze 79.

2. Narrative.

a. General.

(1) GLACIER departed Long Beach on 15 November 1978, shifting radio guard to Coast Guard COMMSTA San Francisco, CA (NMC) at 151600Z. Communications with NMC during the transit to Fiji were good to excellent, utilizing A04.01 EASTPAC Radioteletype (RATT/10.3F1) uncovered, using appropriate frequencies from CG-233-1. Voice back-up and coordination was maintained on A03.03 EASTPAC HF SSB Radioteletype (Voice/ 2.8A3J).

(2) While in Fiji, 3-6 December, communications were maintained on daily schedules of 0800Z, 2000Z, 2400Z, and 0400Z with NMC.

(3) Full period communications were maintained with NMC during the transit from Fiji to Wellington, NZ, with only minor problems.

(4) Upon arrival in Wellington, 12 December, GLACIER shifted communications guard to Defense Communications Unit, Wellington. Excellent service was provided during our inport period.

(5) Upon departure from Wellington, 19 December, guard was shifted to NMC, enroute the Ross Sea. On 21 December GLACIER began experiencing communication difficulties with NMC. These difficulties continued through 27 December when, after a period of virtually no communications, a 48 hour MARISAT test was initiated.

(6) On 29 December, guard was shifted to McMurdo Station, Antarctica (NGD), full duplex using US-14 and US-16. No communication problems were experienced, and service was excellent. This excellent service from NGD continued throughout GLACIER's time in the McMurdo area, including the period 1-20 February, when manning levels were reduced for the Austral Winter.

(7) During the period 25 January to 16 February, communication support was provided to USNS MAUMEE and USNS BLAND with great success.

(8) On 14 February, guard was shifted to NMC, for the transit to Wellington. However, firm communications were not established with NMC until 21 February. During this period of poor communications, a 48 hour MARISAT test was conducted to help clear the back log of traffic which had accumulated.

(9) Upon arrival Wellington, 26 February, guard was again shifted to Defense Communications Unit, Wellington.

(10) Departing Wellington on 4 March, guard was shifted to NMC. However, soon thereafter, NMC directed GLACIER to shift guard to Coast Guard COMMSTA Honolulu, HI (NMO) and maintain there until arrival in Sydney, AS.

(11) Upon arrival in Sydney, GLACIER shifted guard to the Australian Naval Communications Center, Sydney for the duration of her stay in Sydney.

(12) Departing Sydney on 13 March, guard was again shifted to NMO for the transit to Pago Pago, American Samoa.

b. Air to Ground Communications.

(1) Air to ground communications were maintained utilizing two circuits, air to bridge, and air to combat. Air to bridge frequencies were 381.8 MHZ, primary launch and recovery control; 5696 KHZ, secondary control; and CH-22 VHF-FM, tertiary control. Air to combat frequencies were 250.8 MHZ, primary flight control; CH-22 VHF-FM, secondary control; and 5696 KHZ, tertiary control. Radio beacon was 534 KHZ under normal steaming and flight condition, and 414 KHZ while working jointly with the POLAR STAR in the McMurdo area.

(2) A brief period of confusion as to air to ground communications frequency usage while in the McMurdo area was resolved after several informal discussions with POLAR STAR. The result was the maintaining of GLACIER's normal air to ground communications set up, with the exception of the radio beacon.

c. Traffic

(1) Message traffic totals were as follows:

	RATT	VOICE	MARISAT	CW	OTHER	TOTAL
SENT	1676	06	545	34	00	2261
RCVD	1932	01	129	16	03	2081

d. Amateur Radio.

(1) Amateur radio operations were excellent during DF '79, running over 300 patches. 3 ham operators were aboard; WB4FTD, WB6WWW, and WB6PPP. One antenna (20/40 meter vertical) was carried away by heavy weather. A recommendation for future operations is the installation of a filter system to eliminate cross interference between radio central and ham operation.

e. MARS

(1) The MARS station aboard GLACIER (NNNONXO AP) was run with much success for the beginning of the deployment, with over a hundred MARSGRAMS sent in the first two months underway. During this period the station worked primarily on the frequency MD-4 (14383.5) with MARS stations in Hawaii and Southern California. Another frequency used quite often was MG-5 (19956.5). Stations worked were NNNOGKA SCA, NNOIZK, and NAV8 in Honolulu, HI. NNNONXO received over 30 messages for crewmembers during this period also.

(2) Communications started to falter after crossing the Antarctic Circle. Propagation was one problem. The largest inhibition to communications though, was that the directional antenna at MARSTA NNNOGKA was out-of-commission during this period of time. Both stations therefore lacked the benefit of this antenna, resulting in weak and unreliable RATT communications. Voice communications fared a little better, but were too weak to pass traffic. During DF '78, when the directional antenna was in operation, only irregular loss of communications due to propagation was experienced. Throughout the period of early January to mid February, repeated attempts to establish a regular schedule failed resulting in MARSGRAMS being sent via U.S. Mail. A regular schedule was established again after GLACIER headed north.

f. MARISAT Test Program.

(1) The MARISAT Commercial Satellite Communications System was installed prior to deployment on DF '79. Purpose of the test program was to evaluate the efficiency of the MARISAT system as opposed to HF communications. The effectiveness of the system in the "fringe" areas of the satellite footprint, how well the unit would withstand the rigors of icebreaking operations and the climate.

(2) With the exception of mechanical failures, the MARISAT system worked as designed. It allowed fast and efficient communications regardless of radio propagation. From a communications standpoint, it performed superbly. It operated in the fringe areas with no problem, attaining an azimuth level of 00 to 01 the entire period that GLACIER was in the ice. The only time it failed to operate was in Winter Quarters Bay when moored at the ice wharf. The satellite bearing was such that the antenna was beamed through Hut Point, rendering it useless. At all other areas of the ice channel there were no problems encountered.

(3) The unit experienced one failure when a gyro tracking card failed. The unit continued to function, but the antenna would not automatically track the satellite. Communications were maintained by manually tracking the antenna. As long as no radical course changes were performed, this proved satisfactory. Once the ship entered areas of concentrated icebergs and manuevered to avoid them, the unit was continuously down due to having "lost lock" on the satellite. The ship's course was changed faster than the RMOW could follow.

(4) This failure was rectified upon arrival at McMurdo. COMMSAT Service Center had diagnosed the probable cause of failure and had sent a replacement circuit board. Upon insertion of this board, the unit performed satisfactorily the rest of the deployment.

(5) Some difficulties experienced when the ship's gyros failed. Mainly these were in satellite tracking. However, "lock" was maintained on the satellite through most of the period of gyro failure.

(6) 17 personal calls were made by the crew. For the most part, the calls were of good quality. There were several where the satellite link was good, but the landline quality was poor.

(7) COMMSAT operators were very helpful, especially the one who set up the call to the American Embassy in Wellington concerning the MEDEVAC of a crewmember.

(8) Fritz Sitte, the Austrian Journalist, made several calls to Austria. These consisted of interviews that were taped at the received end. He stated that the quality was excellent on these overseas calls, "like they were standing in the next room."

(9) Difficulties encountered: At 01 and 00 degrees azimuth, the antenna autosteer attempted to fine tune the antenna below the stops on the antenna mount, resulting in a "thumping" sound from the antenna dome. Securing the autosteer switch eliminated the noise, and also disabled the fine tuning. The antenna was then in a coarse tune and some minor variations were required by the RMOW for maximum signal strength. The keyboard is slightly different from the standard teletype keyboard, especially in the upper case mode. This caused some operator confusion, and required some changes in message format. The slow speed, compared to the 75 BAUD 100 WPM Radio-Teletype, slowed down the processing of several messages at a time. Phone calls were hampered by the high ambient noise level in Radio Central. Several persons mentioned having difficulty in hearing the other party due to the high background noise. MARISAT operators also noticed this, and a noise suppressor for the handset was sent to Wellington. This cut down the amount of background noise picked up by the handset mouthpiece. It did not alleviate the problem the user had in Radio Central.

(11) Recommendations: Standardize the keyboard. Increase speed to 100 WPM. Place voice unit in a quiet location. Place remote voice unit in cabin rather than on the bridge.

(12) The unit enabled GLACIER to maintain communications during the most severe propagation disturbances. This was a 100% improvement over last years communications. The RM's did tend to rely on it more than HF communications, because it was so reliable. It would be desirable to have one on a full-time basis. It would improve communications magnificently, however, due to cost considerations, it is recommended that the terminal be rented during Deep Freeze deployments only. Communications during Arctic deployments are generally reliable and the year round rental of MARISAT terminal equipment could prove cost prohibitive.

g. Postal Operations.

(1) The post office began Deep Freeze 79 with a $4613.15 stamp stock and $386.85 in cash.

(2) In addition to the regular stamp inventory, the GLACIER post office offered Eagle post cards and international Aerogrammes. The Eagle post cards proved to be very popular as the 250 in stock were sold within two months after the cruise began.

(3) The following statistics relate types of services rendered by the post office during DF '79:

(a)	NR Registered in*	24
(b)	NR Registered out*	24
(c)	NR Certified in	15
(d)	NR Certified out	30
(e)	NR Insured in	136
(f)	NR Insured out	80
(g)	Total mail in	304 Bags/6305 lbs.
(h)	Total mail out	133 Bags/2015 lbs.
(i)	Value of Stamps sold	$2445.87
(j)	Money orders sold	640/$58,145.08

(k) Number of philatelic envelopes sent to and processed by GLACIER (cancellation & 2 cachets), 1,327 from 37 countries.

* Registered mail can be sent and received through Suva, Fiji; Wellington, N.Z.; Sydney, Australia; Pago Pago, American Samoa and McMurdo Station. The American Embassy at Suva and Wellington can handle a limited number of registered mail. The post office at McMurdo Station cannot handle classified registered mail.

(4) Statistics relating to mail sent and received are as follows:

PORT		#BAGS/LBS	DATES
Suva,	IN	32/828	3,4 DEC
Fiji	OUT	13/174	4,6 DEC
Wellington,	IN	42/1164	12-14 & 18 DEC
New Zealand	OUT	13/250	13,18 & 19 DEC
McMurdo,	IN	168/2818	10,11,15,18-21,24,26-28,31 JAN
Antarctica			1,2,4,9,11,12,14 & 15 FEB
	OUT	81/1037	10,11,15,18-20,22,24,25,27-29 JAN
			31JAN, 1-3,5-7,9-12,14 & 15 FEB
Wellington,	IN	38/956	26,27 FEB; 2 MAR
New Zealand	OUT	11/228	26 FEB; 2 MAR
Sydney,	IN	8/167	9 MAR
Australia	OUT	10/244	9 MAR
Pago Pago,	IN	16/372	22 MAR
Am. Samoa	OUT	5/82	23 MAR

(5) Training. Training of collateral duty postal clerks has been a problem in the past that hopefully will be solved prior to Deep Freeze 80. Quotas have been requested for the Postmaster School (33 days) at Fort Benjamin Harrison. This school, plus a few days TAD at CBC Port Hueneme, working with the Deep Freeze postal clerks should provide GLACIER, for the first time, with fully trained and qualified postal clerks.

3. Problems and Recommendations.

a. General.

(1) Due to the limited inport time, and the special projects conducted during that time, virtually no work was done on the electronic equipment in Radio Central. Some discrepancies were those created or discovered during AWS '78. The general equipment status upon departure from Long Beach was below that required for Deep Freeze operations. The Secure TTY Room, and all equipment in it were inoperable due to the incomplete status of the

renovation project. This left Radio Central with only one operating TTY.

(2) The VHF-AM equipment was operational, but limited to only two frequencies due to lack of XTALS. Three out of four UHF-AM transceiver sets were operational, but limited to certain frequencies on each unit due to tuning problems. Both the VHF and UHF need to be replaced with equipment comparable in sophistication to that carried in the helicopters if future mission communications requirements are to be met with reliability.

(3) Three of the four HF units were operational, but hampered by serious problems; i.e. two of the units would not tune to certain frequencies, and the third had a gas leak in its coupler.

(4) Most of the electronics problems were corrected before departure from Wellington, with the exception of the VHF/UHF problem of limited capabilities due to age. Hard work and long hours put in by the electronics and radio work groups, as well as favorable weather conditions contributed in allowing GLACIER to CHOP to COMNAVSUPPFORANTARCTICA with an operational radio room. Had weather precluded this badly needed repair work, GLACIER would have been hard pressed to meet the operational communications requirements set forth in the OPLAN. This would have underscored the need to utilize GLACIER's inport time for required maintenance of electronic equipment as well as special projects.

(5) All TTY's need a complete overhaul. At no time were all TTY's operational, and at-sea repair is very difficult, if not impossible. There were no operational spares available and the only work done was enough to keep them operational.

(6) The radio beacon unit on GLACIER is old and unreliable. Due to this, the unit should be replaced by a more modern and reliable one.

(7) Also, when two vessels with helo capabilities are working in the same area, as in the case of the break out of the channel in McMurdo, an alternate MF radio beacon frequency should be provided for in the OPORDER.

4. <u>Electronics</u>

a. General.

(1) During the inport period prior to departing on Deep Freeze 79, several new electronic systems were installed for evaluation during the Antarctic deployment.

(a) A complete solid state prototype Precise Navigation System was installed. The system configuration was an antenna, Magnavox 702A-3 satellite receiver, Navidyne Alpha-Omega receiver model ESZ 1001A, Teledyne model 708 LORAN-C receiver, Hewlett-Packard 21MX series computer, GCF-RWL-2307 Gyro-EM log interface and an ELGARD uninterruptable power supply, all rack mounted. Located separately was a Hewlett-Packard 2645A Data Terminal with tape reader and entry keyboard, and a hard copy printer. Located on the bridge was a remote video display.

(b) A Magnavox MX 1107 Dual Channel Satellite Navigator was installed on the bridge and interfaced with our SDR 201 Sonar-Doppler Speed log and gyro. A remote video display was located in the aloft conning station.

(c) A long range commercial satellite communications system (MARISAT) was installed. A disc antenna with fiberglass dome was mounted on the barbette and the console was installed in Radio Central.

(2) Along with the installation of new electronic systems during the inport, the model 35 teletype for the DDP-516 navigation computer was de-installed and replaced with a model Silent 700 Solid State Teletype and rack. The DDP-516 computer and teletype used for scientific operations in the instrument lab was de-installed. Routine preventive maintenance and alignment of ship's equipment was performed and procurement of spare parts was accomplished throughout the inport. At time of departure from Long Beach, all electronic equipment was operational with the exception of one AN/SRC-21 and one AN/WRC-1.

(3) Training: Two technicians were able to attend class "C" schools during the inport. One technician attended DDP-516 computer maintenance and programming, and one technician attended AN/SPS-64 radar theory and operation school. The video cassette electronics training program has been used to some extent along with training on ship's electronic equipment theory, operation, adjustment and casualty control. The transistor course, digital electronics course, and microprossesor courses were made available to individuals for use on their own time.

(4) Personnel: Two technicians have PCS orders and will depart shortly after arrival in Long Beach. Two technicians are due to report aboard approximately two months after arrival in Long Beach. GLACIER is getting trainees from ET "A" school and LORAN stations rather than experienced technicians who have attended numerous class "C" schools. We have requested quotas for the following

equipment schools for this inport: AN/URT-23 HF XMTR, AN/SRC-20,21 UHF tranceivers, AN/SPS-64 radar, AN/SRN-9 NAVSAT receiver, and PNS system.

(5) ERPAL: A complete inventory of ERPAL stores was performed underway and deficient items ordered. A newly revised and updated ERPAL listing will be available upon our arrival in Long Beach.

b. Equipment Performance.

(1) The AN/SPS-64 radars have functioned very well during this deployment. The only electronic failure occured in MTR#1, which was discovered to be a fault in the power module. Inspection of antenna #2 revealed a frayed and cracked drive belt which was replaced. Problems in alignment of MTR's were encountered while attempting to install field changes four and five. The indicators were aligned twice and the MTR's were aligned once while underway. The indicator EBL switching circuits were in particular need of alignment each time. A problem still exists with antenna #2. During heavy seas the forward port mast stay sways close enough to contact the antenna if it is rotating, causing the antenna to be secured during rough weather to prevent damage. Relocation of the antennas is desired during the scheduled inport.

(2) AN/UQN-1 Fathometers. Due to the age and transducer configuration of these units, they were a constant maintenance problem. The receiver strip tubes and PA tubes were replaced twice during the deployment along with having to align the unit quite often to obtain a high enough signal-to-noise ratio to be used with the PDR-UGR-196C recorder. The transducer configuration seems to reduce the range of the unit to half of its capability.

(3) PDR-UGR-196C recorder. The recorder performed quite well when the AN/UQN-1 was operating at its peak performance. A failure occurred in the Grid Mark Board and the paper drive motor had to be removed and lubricated as it would run erratically.

(4) AN/SRN-9 satellite receiver. This unit operated with no problems.

(5) DDP-516 computer. Due to many new lines run alongside the computer for the new PNS system, interference was being induced on the fathometer transducer lines which interfered with the scientific recording program. The computer was secured during the scientific operations because of this. The problem was not completely solved. Computer raw data output began showing 20 per cent misprints,

corrected by cleaning SRN-9 satellite interface cards. The tape handler began snapping program tapes. Two control lines from tape reader to tape handler were found shorting to ground, also rectifier bridge in tape handler shorted. The EM log/gyro input interface failed due to a blown fuse. A long standing problem of computer turn on tripping out the Elgard Power Supply was found to be due to incorrect phase input power wiring to OMEGA receiver.

(6) AN/SPN-45 Loran Receiver. The antenna and antenna cable were replaced along with a new indicator which was used very seldom during this deployment due to lack of LORAN-C coverage in our assigned operating area.

(7) COL-ADF-100T RDF Receiver. Broken sense antenna was replaced during inport period. Fault occured causing dim CRT display and poor or no receive capabilities. the problem appears to be associated with wiring. Due to inadequate information provided in the equipment service manual, it was unable to be repaired underway.

(8) AN/UPX-12 IFF Transponder. An arc internally in the receiver module between the power supply rectifier and a nearby resistor caused failure of the two components. The parts to repair the unit were not on board and had to be ordered.

(9) GSB-900 Tranceiver. This unit worked exceptionally well. The sensitivity and audio clarity are outstanding. The only failure involved the coupler wiring, which stemmed from maintenance personnel error.

(10) AN/URT-23 Transmitters. Failures occured in all transmitters and couplers, however, down time was minimal. These failures were limited to transistor and tube failures. The only major problem was with unit #4, the 400Hz inverter failed and the transformer needed was not carried in ERPAL stores. A replacement was ordered and a spare 400Hz power supply was used externally to keep the unit operational until the replacement transformer was received and installed to restore the unit to normal operation.

(11) R-1051/UR HF Receiver. One failure occured, this was the loss of one internal frequency standard.

(12) AN/URT-20A and AN/SRA-48 coupler: Two failures occurred,one was the loss of a PA tube in #2 transmitter and the other was a loose connection in the starboard coupler.

(13) AN/SRC-20,21 UHF tranceivers: Failures occurred in all tranceivers, these were on the most part alignment problems. Down time was minimal. Two RF/PA amplifiers, one first IF amplifier, and one FMO were replaced.

c. Electronic Navigation.

(1) Precise Navigation - The two primary missions of Coast Guard Icebreakers, when deployed,are to provide ice-breaking and escort assistance for maritime supply and support missions; and to provide a platform for the conduct of scientific missions, including hydrographic, oceanographic, and meteorological studies. Precise navigation and positioning is a very important, if not vital, element of our support, especially to the scientific mission. GLACIER has been plagued for many years with a precise navigation system that did not meet full mission requirements. This system, the Honeywell DDP-516 system, has a history of failure and expenditure of man hours that is well documented in previous cruise reports and CASREPS. Lack of precise navigation and positioning capability while operating in the polar regions, where all other means of conventional navigation are inadequate, reduces the quality of most scientific data collected and thereby reduces our support of the mission. The DDP-516 system is to be replaced. A Solid State Hewlett-Packard computer based system was installed on board GLACIER for evaluation during this deployment. The performance of the prototype Precise Navigation System was far from perfect. It is our opinion that the prototype Precise Navigation System, as presently configured, is not the best way to proceed. An icebreaker's longest deployment is in an area where OMEGA and LORAN-C coverage are non-existent. While operating south of the equator and especially in the Antarctic regions, celestial and NAVSAT are the only reliable systems. Celestial is limited by the weather and lacks the precision required of the assigned mission. That leaves the navigation satellite system. An integrated system (NAVSAT-OMEGA-LORAN) such as the prototype PNS and the old DDP-516 system is essentially reduced to a single fix satellite system while in the antarctic. A precise navigation system would be of more use in the Arctic regions where LORAN-C coverage is available. In the areas where LORAN-C is uncalibrated, a precise navigation system could effectively provide a demand fix capability by computing the necessary corrections to the received LORAN-C signal. LORAN-C is an inherently stable system. The inclusion of OMEGA in a Precision navigation system is contrary to the limitation of the OMEGA system itself. The system design accuracy of OMEGA is 2-4 nautical miles. The primary limitation on OMEGA system accuracy is due to propagation errors. These errors vary from place to place and with time of day and season in any given place. These errors can be reduced by the application of average propagation corrections which are published. The average corrections, however, cannot account precisely for all temporal or spatial error variations. The same principles hold true for computer generated

correction applied to the OMEGA information within a precision navigation system. The only time that OMEGA can give a user a fix that resembles an accurate or precision fix is at the exact time the correction is computed and applied by the computer program. This is also the time when a user does not need an OMEGA fix since a NAVSAT fix is available. The OMEGA position computed by the precise navigation system is again subject to the propagation errors which limit the system accuracy. We recommend that OMEGA not be part of any precise navigation system designed for use on Coast Guard Icebreakers.

We recommend that the Coast Guard investigate utilizing "off the shelf"navigation systems. A Magnavox MX1107 Dual Channel Satellite Navigator was installed on the bridge of the GLACIER for use by the OOD's. The system was installed as a backup to the precision navigation system on board. This small self contained system is an ideal system for use in the Polar regions. The frequency of satellite passes can provide a vessel with a fix as often as every 15-20 minutes. The model satellite receiver we had was the MX1107. It is a dual channel (high and low channels) satellite receiver. The console weighed 75 pounds and was mounted on the bridge above our chart table. The system was completely self contained except for the antenna. The console had all the electronics necessary to furnish continuous position information. It contained a dual channel TRANSIT satellite receiver, a data entry keyboard, a CRT video display, and a digital processor. The navigation program for the digital processor is stored in read-only memory (ROM) which eliminates the requirement for paper or magnetic tape loading devices. The program also contains several subroutines which provides the user with much useful navigational information. Between satellite fixes the MX1107 automatically dead reckons based on inputs of the ships speed and heading. The speed and heading can be entered manually with an appropriate keyboard code or automatically if an automatic speed and heading option is installed. We utilized the automatic speed and heading capability with an input from our SDR 201 Sonar - Doppler speed log and an input from our master gyro. The Sonar-doppler speed log is useable while in the ice since no protrusion through the hull is required. The sonar-doppler speed log can also distinguish when the vessel is going ahead or backing. The MX1107 is capable of using this infromation to adjust the DR position accordingly when backing or during backing and ramming situations. Gyro error could also be applied to the automatic heading input which increased the accuracy of the automatic DR feature. This automatic DR feature is also used by the digital processor to describe the vessels motion during a satellite pass. The DR position is automatically updated after each good satellite pass. The accuracy of the DR can be made more accurate with set and drift compensation which can be applied manually or automatically as calculated internally between successive fixes. The other navigational features which make this system ideally suited for polar operations are the intercept program (waypoint range and bearing); information about the last fix including time, date, latitude, longitude, elevation angle of the satellite, number of iterations, number of data counts, satellite ID number, magnitude and direction of the update; and a code which describes why no automatic update was applied, if applicable. Another useful feature is the satellite pass prediction which displays information which includes the rise time of the satellite, estimated maximum elevation angle of the pass and satellite ID number. This information was very useful since it gave us the capability to plan certain science operations which required precision positioning to coincide with available satellite passes. There are various other features of this system which provides the user with information such as ETA at a specified location, speed of advance, course of advance, total distance run, and accurate GMT. All these features are available in many "off the shelf" satellite navigation receivers. The cost has to be considerably less than the cost of the system we evaluated as the prototype precise navigation system which was virtually useless while we were operating in the ice. We strongly recommend that a system similar to the MX1107 satellite navigator be utilized for polar navigation. We were able to remote the display to our aloft conning station which provided the ice OOD with continuous navigation information required to precisely navigate through the ice and take station as required by the science mission. The equipment requires no special training and utilizes the module system for casualty correction. Enough spares can be carried to provide virtually complete redundany to guarantee 100% availability and reliability during a deployment. Icebreakers are a unique operational endeavour and unique set of operational parameters to the Coast Guard. It seems only prudent to utilize all the means available to accomplish our assigned mission. It also seems that the Coast Guard is investing a lot of money and time in development of a navigation system that is available on the commercial market; perhaps at a savings, when all the R&D is considered.

(2) Sounding Program. The AN/UQN-1H fathometers are a constant source of trouble. Many man hours are required to keep them at their optimun operating levels to facilitate the precision depth recording program. We recommend that an additional solid state depth recorder system be installed which would be compatible with the

Raytheon Precision Depth Recorder (PDR-UGR-196C). There are several commercial models available that are compatible or part of a Precision Navigation System and include automatic programmable event marking, position and ships course speed, time, etc.

d. Communications.

(1) Ship to air - We experienced many problems with the patching of RPU's to the bridge, aloftconn, and CIC during flight operations. Control of the helicopters during launch, recover, and while airborne is very critical and not having direct control of frequencies on the bridge and in CIC has resulted in confusion, delays, and loss of communications during critical periods. The switching system in Radio Central is old and should be replaced. Ideally the HCO on the bridge and CIC should have VHF-UHF communications system similar to what is in the aircraft, thus allowing the HCO and CIC to exercise direct control of communications during flight operations. We recommend that an AN/ARC-51 UHF and AN/ARC 81A VHF system be procured and installed. One each on the bridge and CIC. These systems are the same as what are currently used in the HH-52 aircraft. Maintenance would be no problem since the AVDET has personnel and spares to provide proper maintenance. These systems would also eliminate the incompatibility problem that now exists between the UHF equipment currently installed for helicopter operations, and the equipment on board the aircraft.

(2) MARISAT - A commercial long range satellite communications system, known as MARISAT, was installed on board GLACIER for an operational evaluation in the Antarctic regions. The results were excellent as discussed in the Communications section of this report. From a maintenance point of view, the MARISAT system was virtually trouble free. A total failure of communications capability was never experienced. There is very little operational maintenance required of shipboard personnel. Once a week a check is made of the motor drive belts located inside the fiberglass antenna dome. The failures, or problems experienced were as follows:

(a) Gyro interface card - during the first week underway, the MARISAT antenna failed to automatically track the satellite during course changes. This caused only minor problems since we could manually lock on the antenna to the satellite whenever communications was necessary. The problem was quickly diagnosed as the gyro interface card, by COMSAT General Maintenance, via the MARISAT terminal. A replacement interface board was awaiting us when the first mail pickup was made at McMurdo.

(b) Thumping noise - While operating in McMurdo Sound a "thumping" noise was heard and traced to the antenna assembly. It seems that the MARISAT antenna system is designed to depress no lower than 5° for satellite tracking. The satellite elevation while operating in McMurdo was 0°-3°. This low elevation did not reduce the quality of communications. The system performed perfectly. The "thumping," was caused by antenna being at its mechanical stops and the clutches in the elevation motor slipping. The problem was corrected by disabling the automatic follow up control. Lock was maintained with no loss of signal quality.

(c) Low noise amplifier - This unit is located in the antenna dome and is part of the antenna system. Upon our departure from Wellington, NZ enroute Sydney, AS, the MARISAT began experienceing intermittent loss of lock. The COMSAT General Maintenance representative in Sydney diagnosed the problem as the low noise amplifier. A spare was ordered for our arrival at our next port of call, Pago Pago, American Samoa. The low noise amplifier basically amplifies the received signal for use in the terminal.Communications was not lost, we were temporarily inconvenienced. If MARISAT is used on future deployments, and we recommend that it be used, a complete set of spare circuit boards and modules should be provided. A brief training session for maintenance personnel would also be beneficial. As long as communications are maintained, service by COMSAT General is outstanding.

e. Aircraft control.

(1) It is inconceivable to have similar ships with the same mission not equally equipped to do the job safely. Therefore, we recommend that a TACAN, air to ground system, similar to what is installed on the 400' class polar icebreakers, be installed to facilitate the safe return of aircraft to the ship when deployed. The X-Band is range and altitude limited. The ability of the ship to provide vector information is unreliable when the aircraft is beyond 25 miles or below 1000 feet. A TACAN can easily be maintained by the AVDET thus requiring no special training of shipboard personnel. The X-Band, our primary means of controlling the aircraft when airborne is not efficient. Our AN/SPS-64 radars must be detuned to optimize the range of the X-Band transponder in the helicopters. This adversely effects the detuned MTR and reduces our shipboard radar navigation capabilities.

An additional workload is created. The situation is entirely unsatisfactory. A method must be established to permit on board adjustment of the X-Band transponder to the prescribed frequency. A concerted effort by POPDIV must be taken to rectify this situation. The MF radio beacon used for helicopter operations is old and requires many man hours to maintain. It should be replaced with a new solid state beacon complete with monitor and alarm circuitry. We also recommend that an automatic direction finder that utilizes the VHF-FM frequency band and VHF-AM aircraft band be installed to provide a backup system for aircraft control. This would provide an additional safety margin for SAR. A system similar to the AN/SRD-22 is recommended.

f. Recommendations.

(1) That all icebreakers be equipped with a sonar-doppler speed log.

(2) That all icebreakers be equipped with an "off-the-shelf" satellite navigation system such as the MX1107 or similar.

(3) That the requirements for a Precise Navigation System as currently installed and under evaluation be cancelled.

(4) That the ships current AN/UQN-H fathometer be augmented with a state of the art commercially available precision depth recording system.

(5) That a TACAN, air to ground system be installed on board GLACIER and the remaining windclass icebreakers.

(6) That the RPU patching system in Radio Central be updated with a new state of the art system.

(7) That a separate bridge and CIC controlled VHF-UHF communication system be installed for aircraft operations.

(8) That equipment and procedures be developed or provided to permit onboard adjustment of the helicopter installed X-Band transponders.

(9) That the MF radio beacon on board be replaced with a modern state of the art system which includes a monitor and alarm system.

(10) That a VHF-FM/AM automatic radio direction finder be installed aboard GLACIER to provide backup for aircraft operations and SAR.

(11) That a fourth UHF antenna be installed to permit all UHF equipment to be on line and ready for use.

(12) That the current IFF system installed aboard GLACIER be replaced with a modern state of the art system.

(13) That the AN/SPS-64 radar antenna presently located on top of aloftconn be relocated to the old AN/SPS-6C platform.

(14) That the waveguide runs for both MTR's be replaced.

(15) That an equipment rack be installed in the ET shop to facilitate repair and checkout of the following equipment: T-827/URT, AM-3924(P)/URT and power supply PP-3916/UR, and R-1051/UR.

(16) That a complete set of spare boards and modules be provided for the MARISAT if the system is used on future polar deployments. The system is highly recommended as a primary communications system for the polar regions.

CHAPTER V

MARINE SCIENCE OPERATIONS

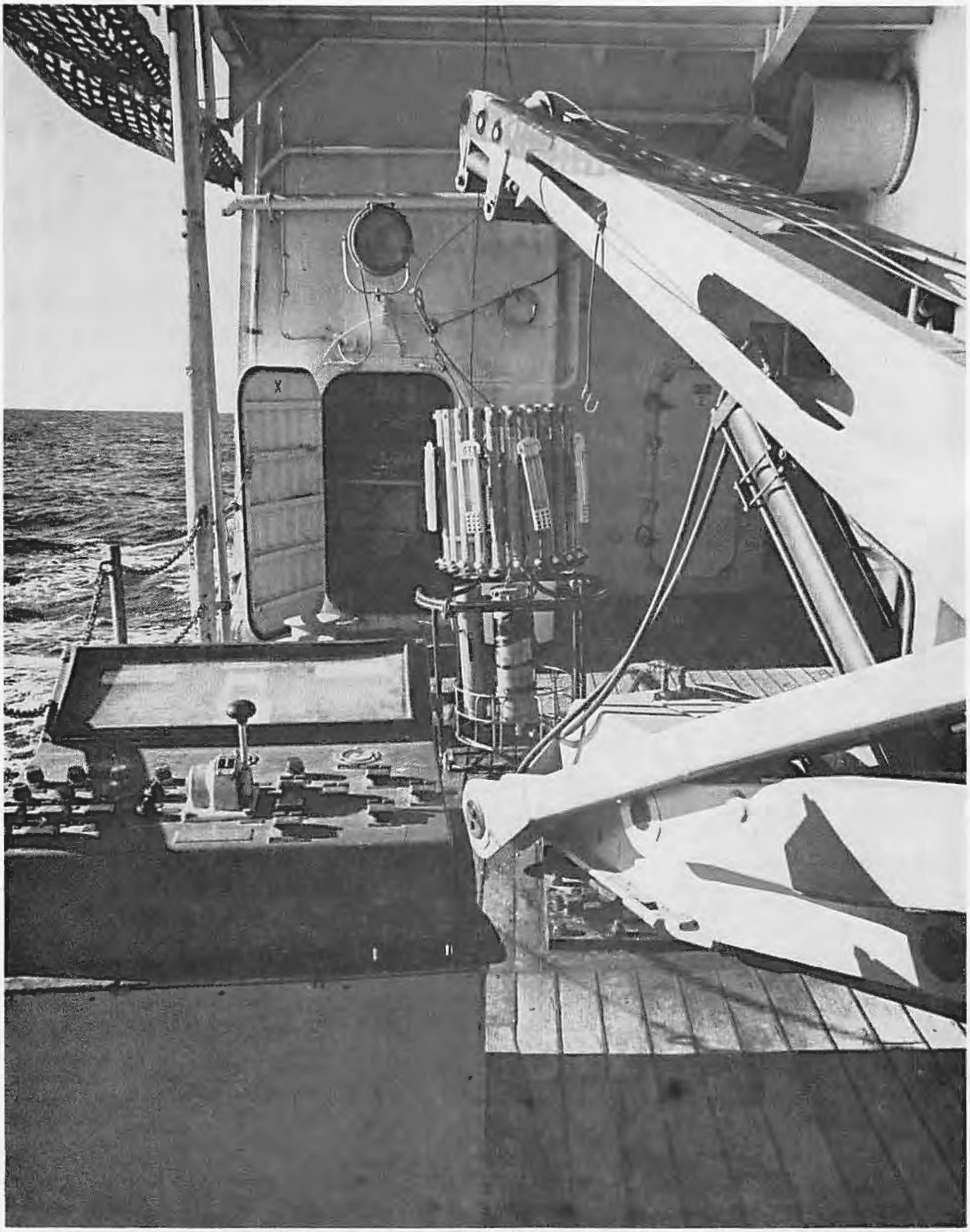


Plate 18. CTD equipment and oceanographic winch.

CHAPTER V

MARINE SCIENCE OPERATIONS

1. <u>Pre-Deployment Preparation</u>.

a. The Executive Officer attended NSF conference in Washington D.C. Project leaders for projects S-207, S-202, S-013 attended. Project support and equipment stowage were discussed.

b. Scientific gear and equipment arrived on various dates in early November 1978 and was stored temporarily at NAVSUPPACT LA/LB facilities before being loaded onboard GLACIER.

c. Scientific gear unable to be delivered prior to sailing date met CGC GLACIER in Wellington, N.Z.

2. <u>Enroute to Suva, Fiji</u>.

a. 68 Surface weather observations, transmitted to appropriate data centers.

b. 65 XBT soundings, transmitted to appropriate data centers.

c. 17 Daily forecasts for shipboard use.

d. 129 seabird census transects in association with project S-013.

3. <u>Suva, Fiji to Wellington, N.Z</u>.

a. 23 Surface weather observations.

b. 20 XBT soundings.

c. 6 Daily forecasts.

4. <u>Wellington N.Z. to McMurdo Station</u>.

a. Project S-207 Piston Coring George V Coast and Ross Sea.

(1) Personnel embarked:

Dr. John Anderson
Miss Kathy Balshaw
Mr. Dennis Kurtz
Miss Robyn Wright
Mr. Gene Domack
Mr. Robert Milam

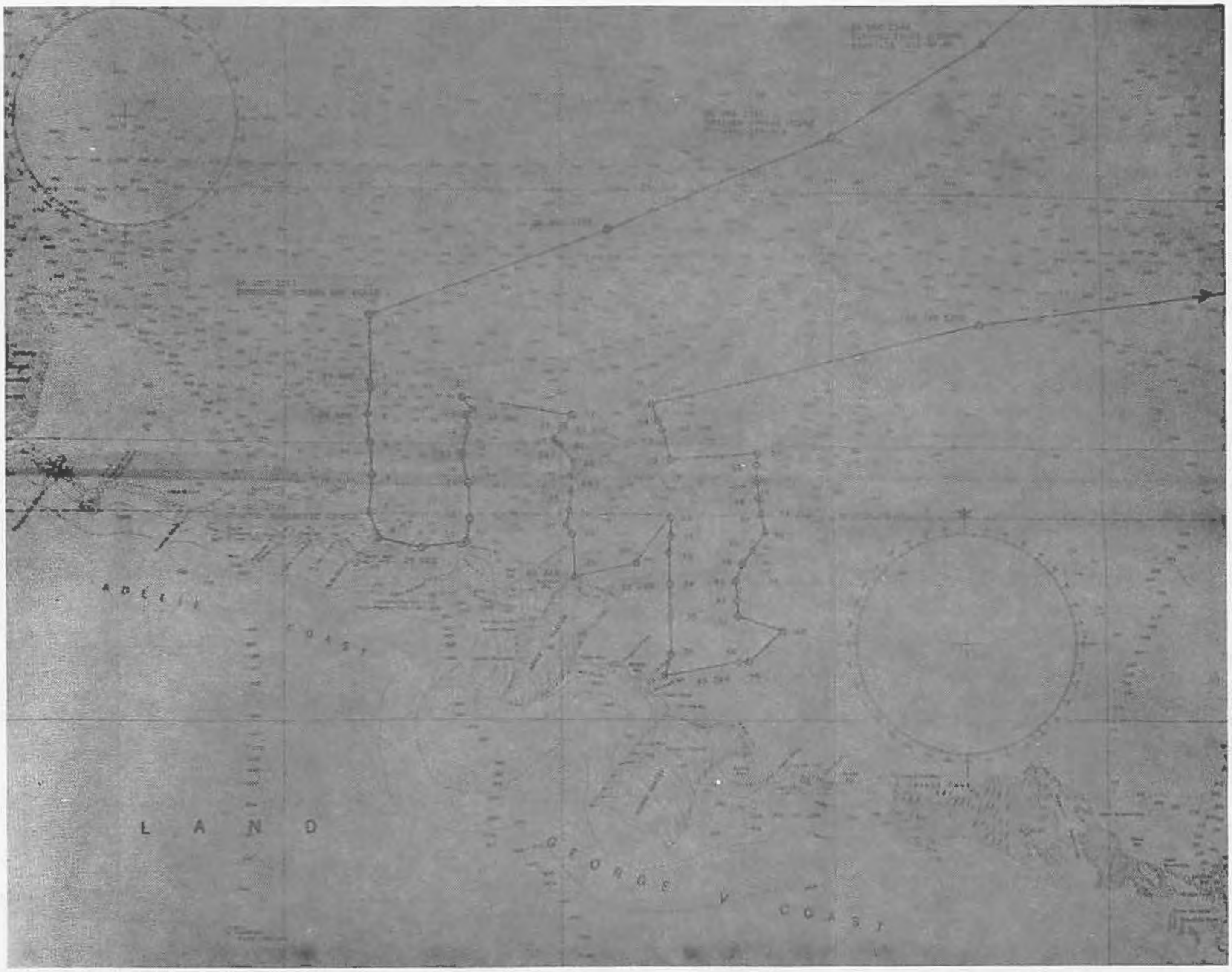


Plate 19. George V Coast piston coring stations.

(2) The principal objective was to obtain a concentrated survey of continental margin sediment distribution in selected areas of the Antarctic Coast and Ross Sea. The area selected was most accessable due to light ice conditions.

(3) Sampling was accomplished by piston core, trigger core, and clamshell snapper bottom grab. Often grab samples were taken prior to piston coring in order to access the likelihood of successful penetration, as gravelly bottoms were less likely to result in good core samples.

(4) In total, 36 piston cores, 5 trigger cores, and 59 bottom grabs were taken at 56 stations. In some cases samples were not obtained due to the consistency of the sediment, and equipment malfunction.

(5) Preliminary analysis of the piston core samples was taken by X-ray utilizing the towing winch room as the working area.

(6) On three occasions ice samples were taken using GLACIER Helicopters and a clamshell snapper bottom grab.

(7) Coring gear previously on board GLACIER and new gear purchased by NSF was all in excellent condition prior to the first coring station. Damage to coring gear was not major with the exception of pipes. Three pipes suffered major bends, probably unrepairable, and three received minor bends which may be repairable. One pipe was lost due to being improperly secured to the coring weight. Several cutting heads and core catchers were damaged on impact with hard bottom material. A few of the cutting heads were repaired by machine shop personnel, but at least four were damaged beyond repair. The inventory is still sufficient in these items. The arm of one trigger release mechanism was bent. There are two spare trigger release arms available and the damaged arm may be repairable. Leather piston washers were used in unexpected large quantities.

(8) The coring winch, in general, performed well. The idler sheave, installed prior to coring, held up and performed its function of preventing cable wear on the tensiometer pivot point. The level wind sheave, which has not turned freely for several cruises, was investigated and found not to be repairable underway but can be repaired during the next inport. The damaged cable retainer associated with the level wind sheave was satisfactorily repaired. The line tension gauge does not work. Repair of this gauge would be of value especially during deep cores as the moment of bottom penetration is otherwise undetectable. Proper detection of bottom penetration could result in fewer bent pipes. One hydraulic line in the control console ruptured while in operation resulting in the console flooding with hydaulic fluid. Spare parts were available and Engineering

Plate 20. Bottom grab

Plate 21. Piston core.

Plate 22. Examining piston core head.

Department response was rapid and effective. 50 meters of cable was removed and two (2) fiege fittings were put on.

b. Project S-202 Physical Oceanography George V Coast and Ross Sea.

(1) Personnel embarked:

Mr. Anthony Amos	Pt. Aransas Biological Sta.
Mr. Jan Szelag	Columbia University (Lamont-Doherty)
Mr. Paul Woodroffe	Columbia University (Lamont-Doherty)

(2) The principal objective was to obtain comprehensive oceanographic data from selected sites in conjunction with S-207.

(3) Sampling.

(a) Sampling was accomplished by CTD cast with Rosette sampler for taking water samples at selected depths. The rosette bottles were equipped with oceanographic reversing thermometers supplied by GLACIER. Water samples drawn were to be analyzed for salinity, nutrients, oxygen 18, and dissolved oxygen, clorophyll-2, and particulate-protein-nitrogen.

(b) XBT soundings were taken at intervals between stations.

(c) 1 Liter surface samples were taken at intervals and filtered. The samples are to be analyzed for salinity, temperature, nutrients and composition of the organic material filtered out.

(d) Sea Surface Temperature was monitored by surface probe.

(4) In total 40 CTD casts were taken, 220 filtration samples and 95 XBT soundings were also taken.

(5) Ice samples by bucket were taken on occasion for oxygen 18 analysis.

(6) Winch operation was without mishap except that the line counter for winch no. 2 was inoperative.

(7) Bathymetric Data was taken by PDR between stations.

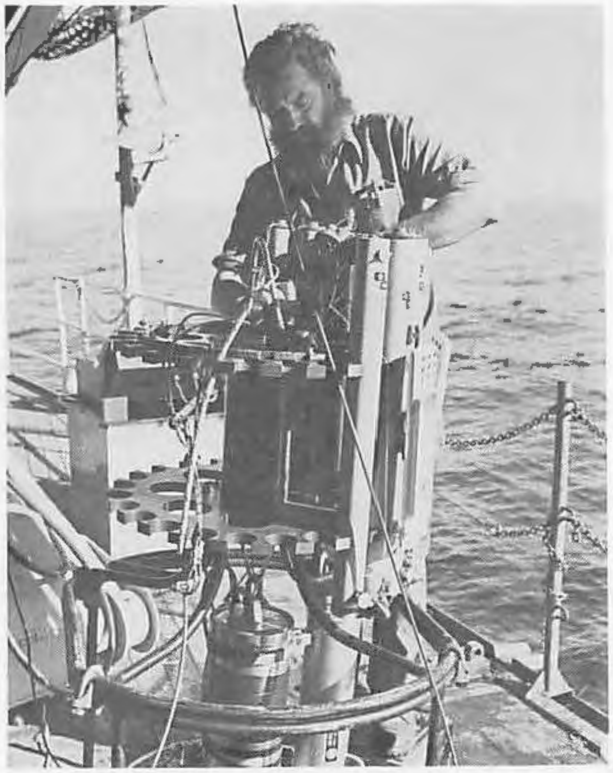


Plate 23. CTD array being readied for a cast.

Plate 24. Sea water analysis.

Plate 25. Current meter recovery.

c. Routine Observations.

(1) 184 Surface weather observations.

(2) 65 XBT soundings.

(3) 156 Sea Ice observations.

(4) 47 Daily forecasts.

(5) 29 Flight weather briefings.

(6) 17 Ice messages received and plotted.

c. Listing of Oceanographic Stations.

STA. #	Latitude	Longitude	Remarks
1	65-23 S	141-32 E	CTD,CR,TCR
2	65-32	141-31	CTD,CR,TCR
3	65-45	141-43	CTD,CR,TCR
4	65-47	141-29	CTD,CR,TCR
5	65-59	141-32	GB
6	66-16	141-15	CTD,CR,GB
7	66-32	141-32	CR,GB
8	66-44	141-42	GB
9	66-43	141-42	CR,CTD,GB
10	66-47	142-30	GB
11	66-44	143-20	CTD,GB
12	66-31	143-12	CR,CTD,GB
13	66-19	143-19	CR,CTD,GB
14	66-05	143-14	CR,CTD,GB
15	65-52	143-24	CR,CTD,GB
16	65-47	143-23	CR,CTD,GB2
17	65-44	143-24	CR,CTD,GB2
18	65-37	143-08	CR,CTD,GB
19	65-48	145-12	CR,GB
20	65-52	145-03	CTD,CR,GB
21	65-56	144-54	CR,GB,CTD
22	65-59	144-53	CR,GB
23	66-00	144-58	CR,CTD,GB2
24	66-08	145-13	CTD,GB
25	66-16	145-11	GB
26	66-26	145-08	CTD,CR,GB
27	66-32	145-07	GB
28	66-38	145-06	GB
29	66-41	145-12	CTD,CR,GB
30	67-00	145-14	CTD,CR,GB
31	66-53	146-22	CTD,CR,GB
32	66-33	147-00	CTD,CR,GB,TCR
33	66-47	146-38	GB
34	66-49	146-59	CTD,CR,GB
35	67-03	147-00	CTD,CR,GB

STA. #	Latitude	Longitude	Remarks
36	67-16 S	146-59 E	CTD,CR,GB
37	67-33	147-01	CTD,CR,GB
38	67-42	146-54	CTD,CR,GB
39	67-36	148-15	CTD,CR,GB
40	67-36	148-26	GB
41	67-25	148-57	CTD,CR,GB2
42	67-17	148-14	GB
43	67-10	148-14	CTD,GB
44	67-03	148-12	GB
45	66-54	148-19	GB,CTD
46	66-49	148-32	GB
47	66-39	148-44	CR,CTD,GB2
48	66-33	148-42	GB
49	66-24	148-47	CTD,CR,GB
50	66-18	148-35	GB
51	66-09	148-35	CTD,GB
52	66-04	148-35	CR,CTD,GB2
53	66-07	147-05	CTD,CR,GB
54	65-53	146-51	CTD,GB
55	65-52	146-40	CTD,CR,GB2
56	65-40	146-29	CTD,CR,GB

KEY - CR = Piston Core
CTD = CTD Cast
GB = Bottom Grab
TCR = Trigger Core

5. McMurdo to Wellington.

a. Project S-202 (resumed after interruption for breakout of Winter Quarters Bay and resupply ship operations).

(1) Personnel: In addition to the above listed personnel the following embarked in McMurdo.

Miss Susan Patla	Columbia Univ.(Lamont-Doherty)
Mr. David Woodroffe	" " " "

(2) The objectives were the same as previously outlined, however, time allowed was limited due to GLACIER assuming the primary icebreaking duty.

(3) Sampling: The sampling procedures were similar to those previously described. In addition attempts were made to recover three current meters. Only one was successfully recovered.

(4) In total 13 CTD casts were taken, an additional 180 filter samples and an additional 140 XBT soundings between stations.

(5) Bathymetric data was taken by PDR as before with MST's assisting in the watchstanding.

b. Project S-013 The Structure of Antarctic Bird Communities

(1) Personnel embarked:

Dr. David Ainley	Point Reyes Bird Observatory
Mr. Ed O'Connor	" " " "

(2) Objective: To investigate community structure by examining the relative density and biomass of species, habitat partioning, and division of food resources by differences in feeding behavior and prey selection.

(3) Sampling: It was intended to do census transects while underway and collect specimens in the vicinity of CTD stations and other specified locations, however, as stated previously, time was limited by icebreaking responsibilities. Specimens were taken when possible, using the GLACIER Zodiak boat, and census transects were taken during daylight hours underway. Eight (8) Skuas and twelve (12) Snow Petrals were collected at 2 stations.

c. Routine Observations.

(1) 71 Surface weather observations.

(2) 49 XBT Soundings.

(3) 50 Sea Ice observations.

(4) 4 Flight weather briefings.

(5) 2 Ice information messages receive and plotted.

(6) 21 Daily weather forecasts.

Listing of Oceanographic Stations - McMurdo to Wellington

STA. #	Latitude	Longitude	Remarks
57	77-45 S	166-20 E	
58	77-45	166-20	
59	77-41	165-28	
60	77-33	164-54	
61	77-32	165-27	
62	77-33	166-22	

STA. #	Latitude	Longitude	Remarks
63	77-45 S	166-22 E	
64	77-42	166-24	
65	77-42	166-25	
66	77-42	166-25	
67	78-00	179-45	Current Meter
68	78-12	175-03	Current Meter
69	75-18	175-34	Current Meter

6. Wellington To Long Beach, CA via Sydney, Australia, and Pago Pago, American Samoa.

a. Surface samples for filtration in association with project S-202 were taken by MST personnel.

b. Sea Bird census transects were continued in project S-013 with Mr. Ed O'Connor departing and Mr. Robert Boekelheide reporting.

c. Routine Observations.

(1) Surface weather observations.

(2) XBT soundings.

(3) Daily forecasts.

7. General Remarks.

a. The Magnavox 1107 precision navigation system was reported by the science parties to be an excellent addition and urge it to remain aboard. The ability of instantaneous fix information is a real time and fuel saver for routine stations and more especially for current meter deployment and retrieval operations. The ability of the system to give range and bearings to each station greatly assisted in making the station taking more efficient.

b. Ice data supplied by FWF Suitland and McMurdo station was very good. It is believed that ice information could be improved. One such method would be LANDSAT1. GLACIER maintains the capability to receive any information transmitted via facsimile. If the FWF could obtain LANDSAT coverage of certain areas upon request and then transmit the same to GLACIER via facsimile, it would help to improve both our scientific abilities and navigational abilities by allowing for better planning of track lines, etc. The use of the LANDSAT system by the icebreakers in Antarctica offers the potential for saving many hours and fuel in manuevering through or around the ice.

CHAPTER VI

ENGINEERING

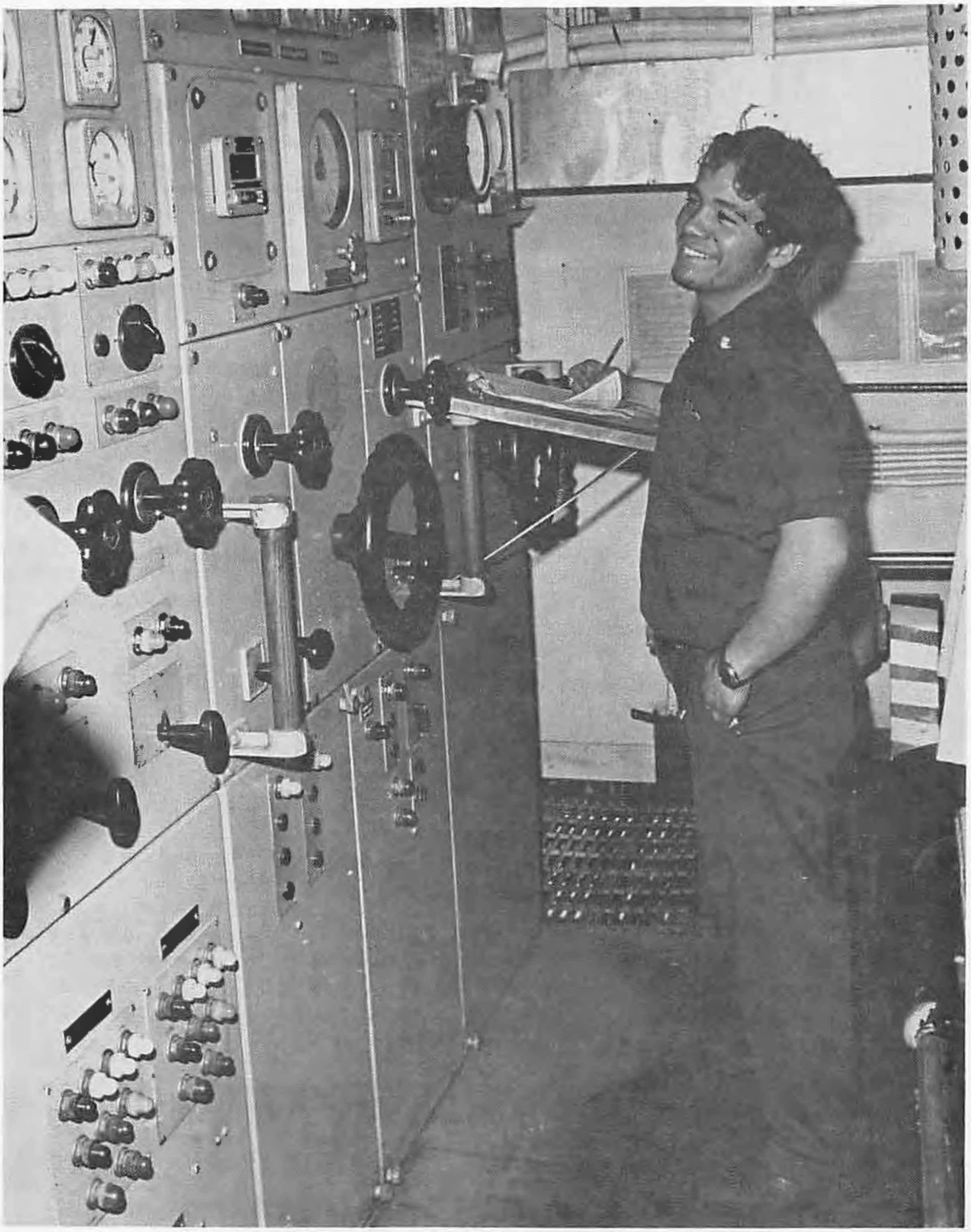


Plate 26. Starboard Motor Room watchstander.

CHAPTER VI

ENGINEERING

1. Pre-Deployment Preparations.

a. Pre-deployment preparations were hindered by the massive casualty effort as a result of AWS '78. Spare part procurement, receiving, and stowage were anything but routine. Keeping track of expenditures and inventories was a monumental task. Ship's force maintenance of main propulsion auxiliaries (purifiers, transfer pumps, etc.) had to be deferred due to conflicts with contracted and ship's force main engine work. GLACIER sailed on 15 November 1978 with four main engines fully operational, five main engines in various stages of break-in, and MDG 2C plagued with a serious arcing problem that has existed since 1977.

b. Fueling, in contrast to other pre-deployment preparations, was without major incident. 419,771 gallons DFM, 9130 gallons JP-5, 18,900 gallons 9250 lube oil, and various drums of other oils were loaded at our home pier.

2. Major or Unique Engineering Problems.

a. Again it should be reiterated that GLACIER's ability to successfully complete assigned missions is not due to the reliability of her machinery but rather the hard work of the Engineering Department.

b. Efforts during the first part of DF '79 were directed towards completion of break-ins and required checks of the five main engines that had undergone major overhauls during the short inport. All five engines were ready for operation by 8 December 1978. MDE 2A was CASREP'D on 24 November 1978 due to overheating. Five cylinder liners were found to have severely clogged cooling water jackets. These liners were changed and the engine was placed back in operation on 23 January 1979. MDG 2C had been CASREP'D upon departure due to the arcing problem. The arcing was found to be reduced to an acceptable level when the generator was run at three-fourths of full load or less. MDG 2C was operated under heavy loads during the break-out of McMurdo Station, such that small amounts of copper were burned off the commutator bars.

c. On 10 January 1979, GLACIER commenced 28 days of icebreaking requiring continuous 8 to 10 MDE operation. Lube oil consumption became excessive due to fuel oil dilution from faulty injection nozzles. It is suspected that injection nozzle failure was due to moisture in the fuel.

use your DOP's!

GLACIER's fuel oil day tanks are not heated and moisture contamination of fuel can occur. On 6 February 1979, lube oil contamination of jacket water in MDE 1B was found. This was traced to a ruptured gasket in the lube oil cooler. Further examination of the engine revealed number 14 and the thrust face of number 13 lower main bearings to be wiped. Heavy wear was observed on remaining bearings, decreasing in severity toward the control end. Number 13 lower main bearing had been hand fitted prior to departure. MDE 1B remained out of commission for the duration of DF '79. MDE 1A developed a high rate of jacket water leakage on 15 February 1979. Number 3 cylinder to jacket water seal was fractured; all rings on numbers 1, 2 and 3 cylinders were broken, and all bearings in the lower crank were flashed. MDE 1A remained out of commission for the duration of DF '79. On 22 January 1979, number 3 ship's service generator pedestal bearing failed, badly scoring the shaft journal and also placing it out of commission for the remainder of DF '79.

d. Auxiliary machinery problem areas included both boilers, both distilling plants and all four fire and flushing pumps. The primary cause of the various casualties that occurred was the age of the equipment.

e. Several structural failures were encountered during the 28 days of heavy icebreaking. Two days after the fore peak tank was ballasted with salt water, the engineering storeroom aft of the fore peak tank was flooded with 4 feet of salt water. A cracked weld was discovered in the after bulkhead of the tank at the shell. Additionally, a cracked weld was discovered in the rudder trunk leaking salt water into void 3-203-0-V. This crack was successfully patched by filling a cofferdam around the cracked weld with concrete. A salt water leak developed in cofferdam 6-174-0-J which surrounds the JP-5 storage tanks. The source of the leak was traced to the starboard side of the cofferdam in the area of the starboard shaft bossing but was never pinpointed. Excess water was pumped from the cofferdam every few days with the installed eductor system. Void 4-174-1-V became completely flooded with fresh water suspected to have leaked through a cracked weld in a common bulkhead with fresh water tank 6-193-0-W. The main sewage tank was fractured along the port lower corner and was successfull patched using shoring. Each of these failures was probably due to a combination of deteriorating welded seams subjected to constant pounding, shaking and shuddering associated with heavy icebreaking.

3. <u>Fuel and Lube Oil Consumption</u>.

1,190,000	DFM
4,000	JP-5
29,700	9250 Lube Oil

4. <u>Recommendations</u>.

a. Coalescing filters should be installed on all MDE's and SSG's, such as the United Engine Life Fuel Dehydrator model EFD-1002. This would greatly prolong injector life.

b. COMNAVSUPPFORANTARCTICA is changing all machinery over to synthetic lubricating oil from 9250 lube oil and does not plan to stock 9250 lube oil at McMurdo once the present supply is exhausted. Arrangements should be made to continue to stock 9250 for icebreaker use.

CHAPTER VII

ADMINISTRATION

1. Personnel General.

a. Pre-Deployment.

(1) GLACIER departed Long Beach with a permanently assigned crew of 183 enlisted and 20 officers. Of this amount, 6 were left behind; 4 for medical purposes an 2 for TAD for various schools. Two naval sea cadets once again joined GLACIER. To alleviate the last minute rush of transfers, 3 personnel were discharged or RELAD on 10 November. Also assigned TAD at the time of deployment were 4 officers and 10 enlisted personnel which comprised the aviation detachment in addition to 1 - CWO(COMM), 1 - MST1, 1 - BM2 and 1 - FNMK. CCGD11(dl) helped to smooth the legal complications of anyone desiring their assistance shortly prior to departure. These actions helped to make for a very orderly transition from shore to sea, which is no small task on a 5 month deployment.

b. Significant personnel actions while deployed.

(1) During the deployment, 2 enlisted personnel and 1 officer were transferred to new units. A total of 6 enlisted personnel reported aboard during the deployment in various foreign ports. Their travel to meet the GLACIER involved a cost of roughly $3,000. It is believed this cost could have been negated if orders were issued to personnel prior to deployment. Two Navy personnel, a PH3 and FNHT joined GLACIER, in Wellington and McMurdo respectively, and remained on board during the remainder of the trip.

(2) Three personnel departed on emergency leave during the deployment - one in Suva, one in McMurdo and one in Wellington on the return trip. All were assigned TAD upon completion of their leave and did not rejoin GLACIER during the deployment. Two enlisted personnel were returned to CONUS for medical reasons,one from Suva and one from Wellington. One enlisted man was hospitalized in Dunedin, New Zealand after being MEDEVACed by one of GLACIER's helos due to acute appendicitis. He was operated on immediately and was able to rejoin GLACIER at McMurdo for the remainder of the trip.

(3) A most unfortunate accident occured at McMurdo station during resupply operations in which one of GLACIER's enlisted crewmembers was killed in a forklift truck accident. A memorial service was held at the National Science Foundation chalet at McMurdo and every effort was made to keep his next of kin constantly appraised on any developments

Plate 27. Memorial Service for ET3 Raymond Porter in NSF Chalet.

Plate 28. Ship's Plaque presented to CNSFA in memory of ET3 Raymond Porter during Memorial Service.

c. GLACIER's excellent training program was continued by means of rate training and all hands lectures. Voluntary evening courses were also held in math, navigation and ship design.

d. Mail service was improved somewhat this deployment in comparison with recent deployments due to GLACIER's extended proximity to McMurdo. The longest period without mail was between Wellington and McMurdo, a period of 22 days. Dial-a-Billet messages, received weekly, played a very important role in helping personnel choose their future assignments. Two of these messages led directly to two personnel receiving orders to the units of their choice.

e. Phone patches between MKCM DAVIS, GLACIER/RMCM JACKSON, CEA-CCGD11, kept the crew informed of any news on upcoming transfers and other pertinent data. The addition of the MARISAT phone system was extremely useful in emergent situations.

2. Morale.

a. The working daily routine was accompanied by an evening video tape show and a nightly movie with popcorn served, and music broadcast through the ship's entertainment system. Sunday morning video taped cartoons were shown.

b. Ham Radio - Telephone Patches were a success as was the continuing MARS program. Class "E" Messages were popular and the addition of the MARISAT provided excellent communications for those who could afford the $10/min rate (3 minute minimum).

c. Cribbage tournaments were held but response to other tournaments was small. Flight deck activity included the popular Jokari and the innovative stringed frisbee. Slot cars were popular until the track was disassembled in a roll during heavy weather.

d. Live entertainment included the line crossing ceremony, several Friday evening mess deck performances by local stars, and an all night New Year's Eve Jam Session.

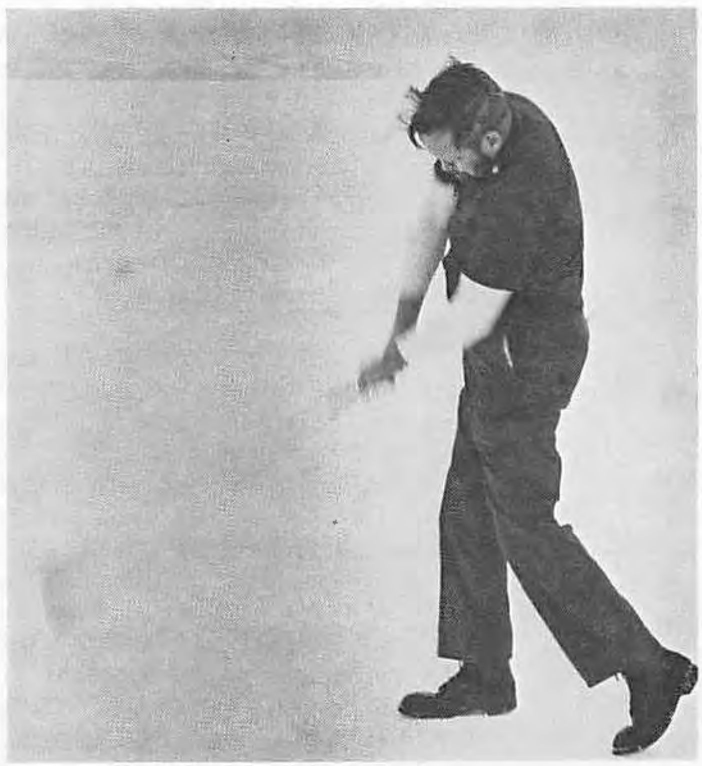
e. There were two ice parties. The first all hands not on watch were permitted to go on the ice to stretch their legs and photograph the GLACIER breaking ice. The second, "the hump day beer party," all hands were permitted to go on the ice for an issue of two Lion Brown beers and visit the portable Kiwi exchange, some sun bathing and wrestling ensued.

Plate 29. Santa finds GLACIER sailors.

Plate 30. One of many fantail cookouts.

Plate 31. Reno Day on Mess Deck in relaxed tropical uniform.

Plate 32. EM3 Daniel S. Jones - Sailor of the Cruise.



Plates 33 and 34. Ice party, one reenlisted and another played golf.

f. Christmas was a festive time, the ship was appropriately decorated and all hands were visited by the GLACIER Santa bearing gifts generously contributed by the "Golden Future" Girls Explorer Post, San Pedro, CA.

g. The "goin' home" show was held on the fantail on 2 April 1979 with several musical acts participating.

h. Three different devotional services were provided on Sunday by volunteer Lay Leaders.

3. Discipline. No serious disciplinary problems were encountered during this deployment. A total of 18 captain's mast were held at sea.

4. Servicewide Examinations/Institute Services.

a. Servicewide examinations (March 1979 SWE) were ordered and received prior to deployment. A sufficient amount of end-of-course tests were also on board at the time of deployment so that any personnel desiring to complete their courses were afforded the opportunity to do so. The only problem encountered was the length of time involved in receiving EOCT results. In some instances, in excess of six weeks was required to learn of the results. In one case, an individual reenlisted as an E-4 rather than E-5 because his EOCT results were not known, resulting in a financial loss to the individual. Soon after this reenlistment, word was received that he had passed his E-5 EOCT, but by that time it was too late. It would be of great benefit if EOCT results were relayed via message as soon as they are known to alleviate the above mentioned problems.

b. A total of 46 enlisted personnel were advanced during this deployment. Education and educational benefits are continually emphasized on GLACIER as evidenced by the large number of advancements.

5. Recommendations.

a. That personnel transfers should be kept to a minimum 10 days prior to departure to reduce an extra administrative burden at a time when the workload is generally quite hectic. Transfers during deployment should be avoided, if at all possible.

b. That the MARISAT telephone system should be kept on a permanent basis. ISee separate evaluation comments).

c. That all EOCT results should be forwarded by CGINST via message when known. Some type of symbol should be affixed to the outside of envelopes when deployed ships mail EOCT's to alert CGINST that those tests should be given priority when being graded.

6. <u>Sailor of the Cruise</u>. Electrician's Mate Third Class Daniel S. JONES was selected by the Chief Petty Officers from nominations submitted by the First Class and below. Petty Officer JONES will accompany the Commanding Officer to the Hollywood Council, Navy League luncheon in May where he will be presented with an engraved watch. The Hollywood Council has provided appropriate recognition to the individuals selected for the past several years.

CHAPTER VIII

SUPPLY/LOGISTICS

1. Pre-Deployment Preparations.

a. Agent Cashier Functions. $413,618.48 cash was obtained in sufficient denominations the week prior to departure. Photo copies of available pay records were obtained from the district office prior to sailing.

b. General Supplies. Loading for DF '79 deployment with a 13 week inport period was considered adequate. A large portion of required supplies were ordered while deployed on AWS 78 and were received before deployment. GLACIER was loaded and secured for sea to meet sailing deadline of 0900, 15 November 1978.

c. Clothing and Small Stores. Clothing items in the amount of $1,286.86 were picked up from Alameda clothing locker on 16 October 1978. GLACIER departed Long Beach with an inventory of $3,461.13 worth of clothing items on hand. Again, certain uniform items were not available, most importantly the CG blue work trousers. If the Coast Guard cannot support the required uniform items through small stores, it ought to allow for civilian purchasing of like items.

d. General Mess. Approximately $15,000.00 worth of commissary supplies ordered from Naval Supply Center, San Diego, CA were cancelled. The following were installed: Hot water booster was added to the dishwasher. Hobart potato peeler was installed in the galley. Jet spray juice was installed on the mess deck. Approximately 250 tons of commissary supplies were on board upon departure, with approximate value of $172,000.00.

e. Fuel and Oil Purchases. 438,312 gallons of Marine diesel fuel, 18,389 gallons of Lube Oil, and 9,130 gallons of JP-5 fuel were purchased prior to departure. The DFM was received from Navy YO's while moored at pier 7. Lube Oil and JP-5 were purchased and delivered by tank truck.

2. Deployment Operations.

a. Agent Cashier Functions. The Bi-Monthly payroll averaged $30,000.00. Crew members were allowed to save pay while deployed or draw all pay as earned.

b. General Supplies. Logistic support was very good. Various types of material were ordered by message from CCGD11(f) and received in ports of call. 203,505 gallons of Marine Diesel Fuel and 13,462 gallons of Lube Oil were received in Wellington, N.Z., 373,026 gallons of Marine Diesel Fuel was received from the USNS MAUMEE, and 1,638 gallons of 9250 Lube Oil (in 55 gal. drums) from McMurdo while in Antarctica.

c. Clothing and Small Stores. Total sales during deployment was $921.50.

d. General Mess. Additional commissary supplies in the amount of $5,705.60 were received from Wellington, N.Z. (Dec), $117.24 from CGC POLAR STAR, $2,304.01 from the Navy in McMurdo, $5,079.09 from Wellington, N.Z. (Feb-Mar) and $3,477.22 from Sydney. Inoperative equipment while underway: Hobart Mixer-drive belt broke and no spares were available on board. Belts were ordered from CCGD11 and were installed upon delivery. Elevator shafts, Messdeck-forward-access to engineer and dry store spaces. During heavy weather, the cable jumped the pulley numerous times thus causing an inconvience for the breaking out of stores. The cable wore through the firemain causing limited flooding of the elevator shaft. CO2 soda machines located in the CPO mess, Wardroom and Messdeck were inoperative at various times due to CO2 leakage and syrup blockage. The CO2 system will be redesigned. Events while underway: Pizza was prepared and served every Saturday night by a different division. Cookouts on numerous occasions (weather permitting) were held on the fantail. Thanksgiving Day: Turkey, Ham and trimmings were served. Christmas Eve: MKCM DAVIS performed the duties of Santa Claus, handing out gifts that were prepared by the Girl Scout Troop in San Pedro, CA. Christmas Day: Filet Mignon/Lobster Tail and all the trimmings were served. New Years Day: Steam Boat Round and all the trimmings were served.

3. Recommendations. None

4. Exchange.

The ship sailed with over $30,000 in merchandise for the store and 1500 cases of soda valued at about $6,500. While enroute we received $14,678 worth of merchandise. In an effort to assure the crew, of McMurdo Souveniers, two large purchases, totaling $4,615.50, were made at the Mc-Murdo exchange prior to our arrival. It is unfortunate that the McMurdo exchange charged full price to GLACIER exchange. A larger variety of Antarctic type souvenier items will be carried during subsequent Deep Freeze deployments purchased direct from the McMurdo exchange vendors.

The store was robbed on the early morning of 17 February 1979. Cash and merchandise stolen totaled $2,960.82. Entrance was gained through the adjoining air recirc. compartment, apparently by using wire clippers and a hacksaw. Two days later a thorough search of the ship and personal lockers commenced. All the goods and cash were recovered except for $191.00 worth. This was all found in a personal locker. An investigation has been convened.

Very few foreign coins were found in the vending machines. We had also been warned about counterfeit U.S. $20's being passed in Wellington.

5. Transactions in Foreign Countries.

a. Suva, Fiji. Pilot services were required for entering and departing Suva. Total cost was $1,067.61. Local currency exchangers met the ship. A total of seven purchase orders were issued while in Fiji.

b. Wellington, New Zealand. We arrived in Wellington mid-December and again in late February. Pilots were required for entering and departing. USDAO representatives met GLACIER on arrival and provided listings of local contractors capable of handling engineering repairs and logistic services. Seventeen purchase orders were issued with USDAO processing payment. Purchase orders were issued for fuel, lube oil and commissary supplies and various engineering parts. Local bank authorities met GLACIER for exchanging money to local currency.

c. Sydney, Australia. Pilot and tugs were required for entering and departing Sydney. A total of three purchase orders were issued. Currency was provided on arrival.

d. Pago Pago, American Samoa. Pilot was required for entering and departing Pago Pago. A total of six purchase orders were issued while inport. Vendors prefer to be paid in cash.

6. Fuel and Lubrication Oil Replenishment.

PORT	DFM	LUBE OIL	COST
Wellington, N.Z.	203,505		$135.20 Metric Ton
Wellington, N.Z.		13,462	$23,610.26
USNS MAUMEE	373,026		$167,488.67
CNSF McMurdo		1,638	$3,843,06

CHAPTER IX

MEDICAL

1. Pre-Deployment Preparation.

a. Prior to departure, medical supplies and equipment were inventoried and all medical records were reviewed. Contrary to policy, many crewmembers continue to report aboard without overseas physicals causing undue last minute confusion both for the medical department and the individual.

b. The general medical, dental, and psychiatric condition of the crew was considered good.

c. The medical library was considered adequate and contains standard references in many medical and surgical fields.

d. Medical supplies were supplimented before departure to insure that adequate amounts were available during the intended long deployment.

2. General Comments.

a. The overall health of the crew during Deep Freeze 79 has been excellent. Many predictable ailments such as venereal disease and shipboard trauma have been far less than expected. However, the statistically improbable occurance of two cases of acute appendisitis served to remind us that the unexpected serious illness is always possible on a long voyage and should be prepared for as much as possible.

b. The ability of the crew to adapt emotionally to the inherent stresses of prolonged deployment is considered by the Medical Officer to be remarkable. Although minor neurotic behavior and psychosomatic illnesses were easily found throughout the trip, examples of frank decompensation or gross immaturity were not displayed. With the exception of two isolated instances, members of the crew seemed highly supportive of their shipmates and always worked well as a team. This speaks highly of Coast Guard recruitment and training efforts

c. An itemizing study of drugs carried onboard showed a need to re-evaluate GLACIER's actual pharmacological requirements and how well they are satisfied by the Medical Allowance List (MAL). It is thought that such an evaluation would best be initiated by GLACIER's medical department. Proposed changes resulting from such a study will be forwarded to COMDT (G-K) for consideration for change of the MAL.

d. Throughout the Coast Guard, efforts are made to insure that personnel assigned to flying duty have available to them a medical officer with special training in aviation medicine. Icebreakers assigned to polar operations, with their aviation detachments, present a notable exception to that policy. It was well noted on this trip that, along with predictable illnesses, prolonged deployment generates unusual stresses with inflight significance of which conventionally trained medical personnel are unaware. And although radio communications with a flight surgeon was usually available during periods of highest flight activity, a distant concurrence can not equal the onscene evaluation of a medical officer with proper training. Additionally, as per COMDTINST 6410.1, dated 15 December 1978, a person assigned to flying duties may be grounded upon the recommendation of the ship's medical officer. However, the commanding officer may authorize the resumption of flying duties only on the recommendation of a flight surgeon or aviation medical officer. At the present, with the medical officer onboard being a PYA who is not an aviation medical officer, this necessary concurrence can at best be but a distant yes or no decision given on another's evaluation.

e. Efforts of a continuing nature during this deployment included the following:

(1) Procedures and schedules for testing ships water supply were standardized.

(2) All health and dental records were verified and brought up to date.

(3) Pest control continued in the form of spraying for roaches bi-weekly.

(4) Routine physical exams were done with the exception of chest X-rays and audiograms.

3. Number of illnesses listed by type during deployment:

ENT: (Upper Respiratory)	181
Dermatological Complaints	49
Ophthamological Complaints	16
Neurological Complaints (Including motion sickness and headaches)	75
GI Complaints	40
Orthopedic Problems	33

GU Complaints (Including VD)	25
Dental	15
Lacerations, Foreign Objects, I&D, Abrasions, Contusions	60
Allergy Shots and Allergic Reactions	39
Burns	15
P.E.	56
Substitution of Physical Exams	20
Hypertension	2
Cold Injuries	1

4. Interesting Cases.

Case #1 (MEDEVAC)

Diagnosis: Acute Appendicitis

Treatment: Appendectomy

NARRATIVE: 21 year old white male presented with six hour history of increasing right lower abdominal pain, anorexia, intermittent vomiting and leucocytosis. All symptoms worsened over a six hour period of observation. A working diagnosis of acute appendicitis was made and the ship's course altered to allow him to be medevaced by helicopter to civilian facilities in Dunedin, New Zealand. There he underwent an appendectomy. Recovery was uneventful and he was subsequently flown to McMurdo where he rejoined the ship. Note here that although the patient was medevaced to Dunedin airport, we found out later that a helicopter landing could have been made nearer the hospital at Logan Park thus saving at least an hours time in transporting the patient.

Case #2

Diagnosis: Abdominal pain and leucocytosis of questionable etiology.

NARRATIVE: 27 year old white male presented with a twelve hour history of abdominal pain progressively localizing in his right lower quadrent. He denied anorexia, nausea or vomiting and had a normal bowel movement twenty four hours previously. His temperature was 99 degrees oral and his WBC 13,500 with a shift to the left on differential. Physical exam, including rectal, was completely within normal limits except for right lower quadrent abdominal tenderness on deep palpation with positive rebound pain. Acute appendicitis was considered. The patient was put at bed rest and his vital signs, WBC, physical symptons and fluid intake/output was closely monitored. Because of geographic isolation, medical evacuation was not possible for for some days and preparation for surgical intervention was made should it have become necessary. Radio communication was established with McMurdo and consultation obtained with the support force Medical Officer. During the next twelve hours there was little or no change in the patient's condition. Because he remained afebrile and maintained an adequate fluid intake and output, no intravenous or antibiotic therapy was given. At the end of that observation period the patient began to notice a lessening of abdominal discomfort. At the same time his white count began to return toward normal values. From that time he continued to improve and at the end of forty eight hours was asymptomatic and allowed to return to duty.

DISCUSSION: In many ways this case is typical of acute appendicitis and it is doubtful that the patient would have been observed for such an extended time if normal surgical facilities had been available. In cases such as this the Medical Officer should be guided by COMDTINST 6460.1C, and, of course, his own appraisal of the situation. For example, in this case, a stable operative platform could easily have been obtained by driving the ship into an adjacent ice flow; a fact not easily covered by printed guidelines but crucial to any decision to operate.

Case #3

Diagnosis: Possible deltoid ligiment tear, right ankle.

Treatment: Casted with 10 degree inversion for three weeks.

NARRATIVE: 21 year old white male while attending to this duties in heavy weather slid across the top of the hanger and prevented himself from going overboard by jamming his right foot into a stanchion. At that time he was wearing high laced "hiking" boots. Unable to walk without pain, he was assisted to sickbay where he was thought to have a badly sprained ankle. X-rays taken at that time revealed no obvious fractuve. However, conservative treatment of rest, elevation and cold application failed to promote expected improvements. And three days after the injury the patient was still unable to walk without experiencing pain now localized along the deltoid ligament which was made markably worse by everting the foot. Possible deltoid ligament tear was suspected and his ankle was casted in position of function, but with 10 degree inversion which resulted in immediate relief of all discomfort. Because of particular conditions of shipboard living, a walking heel was applied the next day and necessary weight bearing was allowed. After three weeks the cast was replaced with a "jelly-boot" which was worn for another week during which time he was allowed to walk as tolerated with a cane. This, in turn, was replaced with high laced boots and he was allowed to return to work five weeks after the original injury. Thirty days follow up showed a normal ankle without residual weakness.

DISCUSSION: The actual extent of this injury is unknown. However, this case may demonstrate successful non-surgical treatment of a ligament injury necessarily abbreviated and modified for shipboard application.

Case #4

Diagnosis: Micturation Syncope

NARRATIVE: A 23 year old white male in previous good health but suffering a mild form of exhaustion awoke from a four hour afternoon sleep with an uncomfortably distended bladder. After emptying his bladder and while still standing he became dizzy and noted a feeling of unreality. He remembered nothing more until he became aware that he was wedged in a squatting position between the toilet bowl and the bulkhead. He related no previous episodes of syncope or head injury and denies incontinence, tongue biting or a preceding aura. A second party observed the patient in what he described as typical tonic-clonic seizure activity. When examined in sickbay a few minutes after the episode the patient was alert, orientated, frightened and neurologically intact. He had a mildly elevated systolic blood pressure and a rapid pulse, which returned to normal in a short time, but displayed no postural hypotension. His HCT was 47. He was observed for a relatively short time and then returned to normal routine. There has been no recurrent episodes.

DISCUSSION: What may, in the absence of other obvious pathology, be considered a case of micturation syncope is clouded by the attending grand mal symptons. In this case, these were considered to be caused by the fact that the victim was "wedged" in a semi-upright position which did not allow return of cerbral perfussion as quickly as the usual resulting prone position would have. It is possible that this is an over simplification and a specialized evaluation is in order on our return to Long Beach. However, this case is a good example of imperfect conclusions which must often be made on long deployment when other alternatives are not realistically available.

5. <u>Recommendations</u>.

a. That GLACIER's PYA be trained to qualify as an aviation medical officer before the ship's November '79 deployment to Operation Deep Freeze; and that in the future all PYA's assigned to icebreakers on polar operations be trained as aviation medical officers.

CHAPTER X

PUBLIC RELATIONS

1. Pre-Deployment.

a. The preparations for Deep Freeze 79 saw a fresh update on the Fleet Home Town News hold file in which 83 forms were properly completed and forwarded for release with a master story. Several press packets were assembled and sent to LT J. SLEMMONS, USCGR whom assisted in publicizing GLACIER's arrival in Suva, Fiji Islands and Pago Pago, American Samoa. District Eleven (dpa) also assisted in arranging coverage of GLACIER's departure on her twentieth Deep Freeze deployment. Excellent press coverage included a several minute video of our departure from Long Beach on local television and additionally favorable coverage of our arrival by Australian television and press. GLACIER has obtained video cassettes of all new coverage for the formation of a video journal of Deep Freeze 79. Three GLACIERGRAMS were sent out to allow friends and relatives to keep track of our progress.

2. Ports of Call.

a. General.

(1) All ports received GLACIER most favorably. All ports had excellent press coverage of the arrival and activities of GLACIER. All open houses were successful.

(a) Suva, Fiji. Suva held special meaning for many crewmembers of GLACIER who on their own liberty time, went up to Our Lady's Home of Campassion Orphanage and provided the man power and skills needed to make repairs. The roof, porch, beds and grounds were all in bad need of repair. The crew responded well to the need and did an outstanding job of repairing.

(b) Wellington, New Zealand. Wellington was called on twice, once heading into the ice and once leaving. On the first call a cash donation was made to the orphanage, "Our Lady's Home of Compassion." A joint donation by the crew and the post crews of the BURTON ISLAND. This has been done traditionally by icebreakers calling on Wellington over the past several years. LTJG J. BONITIO, USCG of the Twelfth Coast Guard District organized the BURTON ISLAND end of the venture. On the second call to Wellington, the commanding officer presented two letters of appreciation on behalf of the Commandant.. The first was to the Wellington Harbor Board and the second to the New Zealand Defense Communication Center, both for outstanding

Plate 35. Suva Orphanage volunteers putting in fence posts.

Plate 36. Suva Orphanage volunteers putting beds together.

support to the Coast Guard icebreakers over the past several years. A story and photos were forwarded to Commandant (G-APA) for possible publication.

(d) Sydney, Australia. Sydney was an outstanding port for press coverage and the American Consulate did an excellent job of arranging coverage of our arrival. The news media covered all aspects of GLACIER and her tasks. GLACIER's entry into Sydney, interview with commanding officer, and shots of ship, including icebreaking appeared on three national Australian television networks. A video tape of television coverage was presented to the ship and the Coast Guard and GLACIER was most favorably treated during our stay. Over 1000 visitors stopped by to see the ship during open house on a Sunday afternoon.

(e) Pago Pago, American Samoa. News media covered our arrival and GLACIER was greeted by native dancers. Our arrival was more noteworthy than usual due to the recent MEDEVAC from Atafu Atoll. This was covered by a page 1 article of the Samoa News. Open house was held the day of arrival and over 300 people attended.

CHAPTER XI

PERSONNEL EMBARKED

1. Permanently assigned Coast Guard personnel:

a. Officers

CAPT BRUCE S. LITTLE
CDR PAUL R. TAYLOR
LCDR ALEXANDER T. POLASKY
LT DAVID C. NELSON
LT RICHARD D. PHILLIPS
LT GERALD BOWE
LTJG STEPHEN R. JUDSON
ENS THOMAS G. BERSTENE
ENS MANSON K. BROWN
ENS WILLIAM T. DAVIS (DPTD 3/11/79)
ENS EGBERT DE JONG
ENS RICHARD P. FORNASERI
ENS ROBERT C. JONES
ENS WILLIAM P. LAYNE
ENS STEPHEN A. RUTA
ENS GEORGE W. WOOD III
CWO4 VINCENTE B. AGOR
CWO2 RUSSELL G. GLENDENNING
CWO2 JOHN D. MERRILL
CWO2 FRANK E. RATE

b. Enlisted Personnel

QM2 DAVID W. ALCANTARA
SN DOUGLAS H. AMBERSON
MK3 JAMES B. AMSTER
EM3 GLENN W. ANDERSON

QM2 ROBERT J. BACKHAUS
MK3 STEVEN R. BAKER
MKC CHARLES R. BARBER
SA NORMAN E. BAUMAN
DC2 MICHAEL L. BARNES
BM2 CHRISTOPHER M. BARRETT
GM2 JAMES E. BARRETT
FA CRAIG W. BATTENBERG
BMC ALAN C. BEAL
SN JAMES S. BELL
SN MICHAEL A. BIRD
SN ALLEN J. BOLLSCHWEILER
MK3 ROBERT A. BOWYER
MK3 BRUCE M. BRODERICK
BM2 LARRY D. BROOKS
FN CHARLES G. BURNETT (DPTD 3/11/79)

RMC GEORGE I.O. CARPENTER
SK2 JOHNNIE R. CARRINGTON
FA JON R. CARSON
SN MARK D. CEDENO
FA MARK C. CISNEROS (TAD BASE TERMINAL ISLAND)
MK3 ROBERT CLAY
ET3 JOSE A. COLLAZO-RODRIGUEZ
QM2 JOHN J. COLLETT
DC2 RICHARD A. CONTI
MST2 THOMAS M. CORDOCK
FN KIM D. COX
MK3 MICHAEL W. CURRY

SN MICHAEL A DALE
MKCM ELLIS M. DAVIS
EM1 MELCHER M. DELOS REYES
FN MICHAEL J. DEQUATTRO
FA NOEL J. DEROVIN
EM1 BERT N. DEVITERBO (RPTD 3/9/79)
SN WILLIAM C. DIAMANTI
FA JERRY E. DIAMANTIDES
FA WAYNE N. DIAMOND
MKC JAMES J. DRISCOLL
SR DANIEL C. DUCKETT

SN DAVID M. FADELL
SA WILLIAM L. FIELDS

SS1 JEROME P. EJAN
FA DAVID A. ELLIOTT
QM3 GEORGE D. EVERSON

FN PERRY F. GEIGER
MK1 JAMES C. GIBEAUT
DC3 VICTOR GONZALEZ
RM2 WILLIAM R. GOSLIN (DPTD 1/15/79 TAD STA CHANNEL ISLAND)
TT2 DALE W. GRAHAM
SNRD JOHN M. GRAHAM
FN MARTIN J. GRAINGER
MK1 EDWARD A. GRIFFIN
SA ROSS C. GRIFFIN IV
FA ROBERT D. GUSTAFSON

MK3 THOMAS L. HACKETT
SS3 EDWARD S. HAEN
SN STEVEN E. HANSON (TAD BASE TERMINAL ISLAND 12/5/78 - 3/7/79)
MK1 ROYLESTER HAY
MST3 GARRETT B. HEBEL
FA HAROLD A. HEBERT, JR. (RPTD 12/13/79)
SN FREDERICK L. HEISTUMAN (DPTD 3/22/79)
FA RONALD E. HERNDON
SN LAWRENCE H. HOFFMAN
YN3 DENNIS A. HOGG
DCC CARL E. HUNTER

FA RONALD JACKSON
SKC RAYMOND P. JENSEN
EMCS ARLAN L. JEPPSON
RD2 MICHAEL R. JOHNSON
EM3 DANIEL S. JONES

FA GLEN B. KAWAMURA
FA CHARLES KEEGAN, JR.
FNDC SCOTT R. KIMEL (RPTD 2/27/79)
EM1 JOHN B. KLINE
FAMK BRET K. KNOPF
DC3 JANUSZ L. KOMOROWSKI
RM2 KEITH A KUCZKA

FA STEVEN F. LANG
EM3 JOHN M. LANGLEY
DC3 LARRY W. LARSON
SN KEVIN A. LAUGHON
SN JOHN W. LECORNU
SA JAMES M. LEHNER (RPTD 2/27/79)
SN WESLEY S. LEMBECK
MST2 MICHAEL R. LEMON
SS3 JULIO S. LETO
FN RICHARD D. LEVESQUE
HM2 JOHN M. LEWIS
MK1 JACK W. LIMBAUGH
FN KYLE R. LITTLEFIELD
FAMK DAVID R. LOCKHART
FM2 WILLIAM J. LONG, JR.
MST2 TODD M. LOCHMOELLER

RM2 DOUGLAS M. MACDOWELL
SA RICKY R. MADDUX
SSC HARRY G. MADISON
EM3 CARL A. MAYFIELD
SS1 FELIPE S. MARCELINO
RM3 RICHARD E. MAGNUSON
MST3 JOHN B. MATHESON
BM2 KEVIN J. MCDEVITT (DPTD 12/12/78)
RM1 ROBERT B. MCDOLE
FNEM JAMES D. MCMEANS
SN HENRY E. MEDINA
RM3 JOEL B. MESSICK
MK3 MARK J. MEYER
SN DUANE C. MEYER
EM3 TONY F. MEZA
MK2 PHILIP J. MILDREN
SA JEFFREY MILES (RPTD 2/27/79)
EM2 GORDON L. MINTER
MK2 JOHN L. MOORE
SN DAMON P. MORA
QMCS RICHARD D. MORGAN
BM3 THOMAS C. MORRIS

SS2 DEAN P. NAEGELE
MKC TROY E. NARRON (DPTD 1/15/79)
SK3 LARRY O. NASH
FA GLENN A. NELSON
SN JIM R. NICHOLSON

SA GILBERT H. ODTOHAN
MK3 JOSEPH A. ORLANDO
SN LARRY K. OXNER

SNRD ERNEST J. PAPPAS
SASS WILLIAM E. PARK
FA ERIC B. PARKS
SN EDWIN F. PECK
FAMK EDGARDO PEREZ
EM3 STEPHEN H. PEREZ
MK1 JOHN T. PLAGEMAN
RD3 FREDERICK E. POPPLEWELL, JR.
ET3 RAYMOND C. PORTER, JR. (FATALLY INJURED 2/8/79)

MK2 NORMAN H. RAGLAND
MK2 CRAIG H. RIDNOUR
ETN2 ROBERT Y. RIEGEL
DC3 TODD E. RODIN
EM3 GEORGE ROLDAN
MSTCS ROBERT P. ROMZEK
SS2 HONESTO R. ROSANTINA
DC1 GARY D. ROTH
MK3 LEONARD W. ROWE III

MK1 WILLIE R. SAENZ
SSC GENE C. SAPIDA
ET1 JESSE R. SCARBROUGH
DC2 JEFFREY L. SCHWEIZER
BM3 WILLIAM C. SHERETZ
SK3 PETER D. SIEBERT
SN STEVEN R. SIMCHEN
SN SCOTT M. SIMPSON
SS3 DENNIS A. SIMS
BM3 LAURANCE P. STANCIL
ET3 WILLIAM F. STEIN
ETC GARY C. STILLMAN
SA GEORGE J. SCHWARZ III
HMC BRIAN M. STROHECKER
EM3 JOEL S. SUAREZ
FN DAVID H. SULOUFF
MK3 KIRK A. SUNDBERG
QM3 ERIC M. SWANSON

FN MARK R. TATE
SA MICHAEL F. THOMAS
EM3 TIMOTHY W. THOMAS
ETC RICHARD L. TOCHTROP
DC1 JESS W. TOWNSEND
YN1 ROBERT E. TREDWAY
RDC MIKAELE P. TUPUOLA (DPTD 2/27/79 TAD BASE TERMINAL ISLAND)

SASS ROBERT H. VAN MECHELEN
QM3 PHILIP A. VEEK
EMC TOBY D. VICE
SS3 TROY W. VICKERS
EMC JOSE R. VIRAY (DPTD 1/15/79)

SN DAVID L. WALKER
EM2 WILLIAM D. WALSH
MK2 JAMES A. WARD
SASS DAVID J. WEBER (RPTD 2/26/79)
RM2 JOSEPH R. WESP
MST3 DOUGLAS E. WEST (RPTD 3/9/79)
MST2 WENDELL W. WHITE
SS3 JOHN C. WILSON (DPTD 12/4/78 TAD BASE TERMINAL ISLAND)
FA IRVIN WILLIAMS
YN2 PATRICK H. WILLIAMS
SN KELLY H. WOOD
MKCS RAYMOND D. WORLEY

SK2 CLIFFORD W. YARRINGTON

SA JAMES R. ZWASCHKA

2. TAD Coast Guard Personnel

a. Aviation Department

LCDR GARRAN C. GROW
LT DENNIS R. MCLEAN
LT WILLIAM R. MILLER
LT JAMES L. ROHN

ATC JACKIE W. BURTON
AD1 LARRY R. HAMMOND
AE1 MITCHELL S. HERRING
AM1 DAN L. TITUS
AT1 DENNIS A. WEATHERLY
AM2 BEN F. HARNEY
AD2 JOHN A. HENNEMAN
AE3 SCOTT M. BLAKEMORE
AD3 LAMONT D. LITTLE
ASM3 ANDREW J. RATLIFF

b. TAD Personnel

CDR JOHN N. NAEGLE	04 MAR 79 - 09 MAR 79
CDR DAVID B. MICHEL, USCGR	27 FEB 79 - 13 MAR 79
LT JAMES B. SLEMONS II, USCGR	03 DEC 78 - 14 DEC 78
	09 MAR 79 - 23 MAR 79

CWO4 DARRELL L. COLLIER	15 NOV 78 - 12 DEC 78
MST1 STEPHEN A. STOLL	13 NOV 78 - 28 FEB 79
BM2 JAMES A. CLEWS, JR.	
MK3 EDWARD F. SORRENTINO, USCGR	
PH3 DAVID T. THOMPSON, USN	17 DEC 78 - 06 APR 79
FNHT KENT G. MITCHELL, USN	14 FEB 79 - 06 APR 79
JAMES E. MALMBERG, NAVAL SEA CADET	
JONATHAN E. DAVIS, NAVAL SEA CADET	

3. Scientists

MR. ANTHONY F. AMOS	14 DEC 78 - 27 FEB 79
MR. JAN SZELAG	15 DEC 78 - 27 FEB 79
MR. PAUL WOODROFFE	16 DEC 78 - 27 FEB 79
MISS KATHERINE BALSHAW	16 DEC 78 - 14 JAN 79
MR. EUGENE DOMAK	16 DEC 78 - 14 JAN 79
MR. ROBERT W. MILAM	16 DEC 78 - 14 JAN 79
MR. DENNIS D. KURTZ	16 DEC 78 - 14 JAN 79
MISS ROBYN WRIGHT	16 DEC 78 - 14 JAN 79
DR. JOHN B. ANDERSON	17 DEC 78 - 14 JAN 79
MISS SUSAN M. PATLA	18 JAN 79 - 27 FEB 79
MR. ED O'CONNELL	30 JAN 79 - 27 FEB 79
DR. DAVID AINLEY	30 JAN 79 - 06 APR 79
MR. DAVID WOODROFFE	04 FEB 79 - 27 FEB 79
MR. ROBERT BOEKELHEIDE	28 FEB 79 - 06 APR 79

4. Civilians

MR. FRITZ SITTE	15 DEC 78 - 26 FEB 79
MR. LES WRIGHT	12 FEB 79 - 26 FEB 79
MR. ALLAN BERRY	14 FEB 79 - 27 FEB 79

CHAPTER XII

RECOMMENDATIONS

1. Commander, Naval Support Force Antarctica action:

a. That separate aircraft beacon frequencies be assigned for WAGB's when operating in the same vicinity. (page 45)

b. That ice data be available from LANDSAT. (page 66)

c. That 9250 lube oil continue to be available at McMurdo. (page 70)

2. Commandant action:

a. That WAGB's diving compliment be changed to include one diving medical technician (DMT). (page 18)

b. That a locator of all Coast Guard divers be established. (pages 17 and 18)

c. That authority be obtained to allow non-billeted divers to obtain partial/full diving pay for services performed. (page 18)

d. That the MK1 diving system and support equipment be provided. (page 18)

e. That diving tours be 2 years from date of being assigned DUID. (page 18)

f. That an AN/ARC-51A UHF radio and an AN/ARC-84 VHF radio be installed on GLACIER to improve ship-air communications. (pages 24 and 52)

g. That a solid state "state of the art" radiobeacon, with monitor and alarm system, be installed. (pages 24 and 45)

h. That Physicians Assistants assigned to WAGB's be Aviation Medical Officer trained. (pages 25, 82 and 86)

i. That a precision navigation system, similar to the Magnavox MX 1107 Dual Channel Satellite Navigator be permanently installed. (pages 36, 46, 49 and 66)

j. That the prototype PNS and old model be removed and the project cancelled for WAGB's. (pages 36 and 49)

k. That a MARISAT terminal/equipment be leased for Deep Freeze deployments.(page 41 and 52)

l. That the AN/UQN-1H fathometer be augmented with a precision depth recording system. (pages 47 and 51)

m. That a VHF-FM/AM automatic radio direction-finder be installed. (page 54)

n. That the current IFF system be replaced with a modern state of the art system. (page 55)

3. Aviation Training Center action:

a. That X-Band transponders be checked-out prior to departure from ATC. (pages 24 and 53)

b. That an athwartship landing procedure for WAGB's be developed and included in CG-419. (page 25)

4. District action:

a. That a new flight drainage system be installed. (page 25)

b. That the RPU patching system in radio central be updated. (page 52)

c. That the AN/SPS 64 radar antenna located on top of aloft conn be relocated to the old AN/SPS-6C platform. (page 47)

d. That coalescing filters be installed on all MDE's and SSG's. (page 70)

5. Unit action:

a. That the flight deck fuel hose well be completely overhauled and refurbished. (page 25)