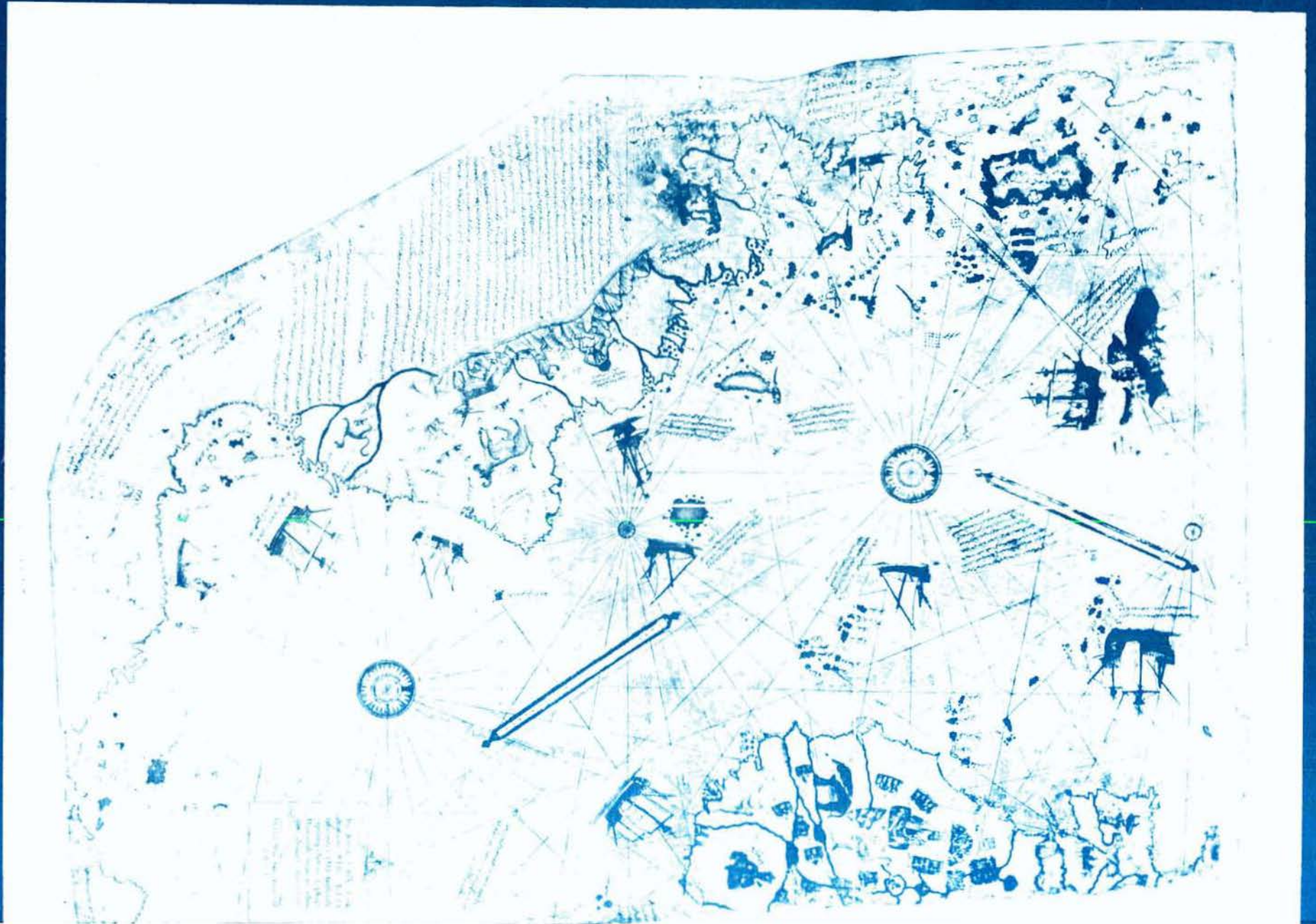
16

Antarctica as it may have been projected on the "Piri Reis-Columbus Map"* of 1513.

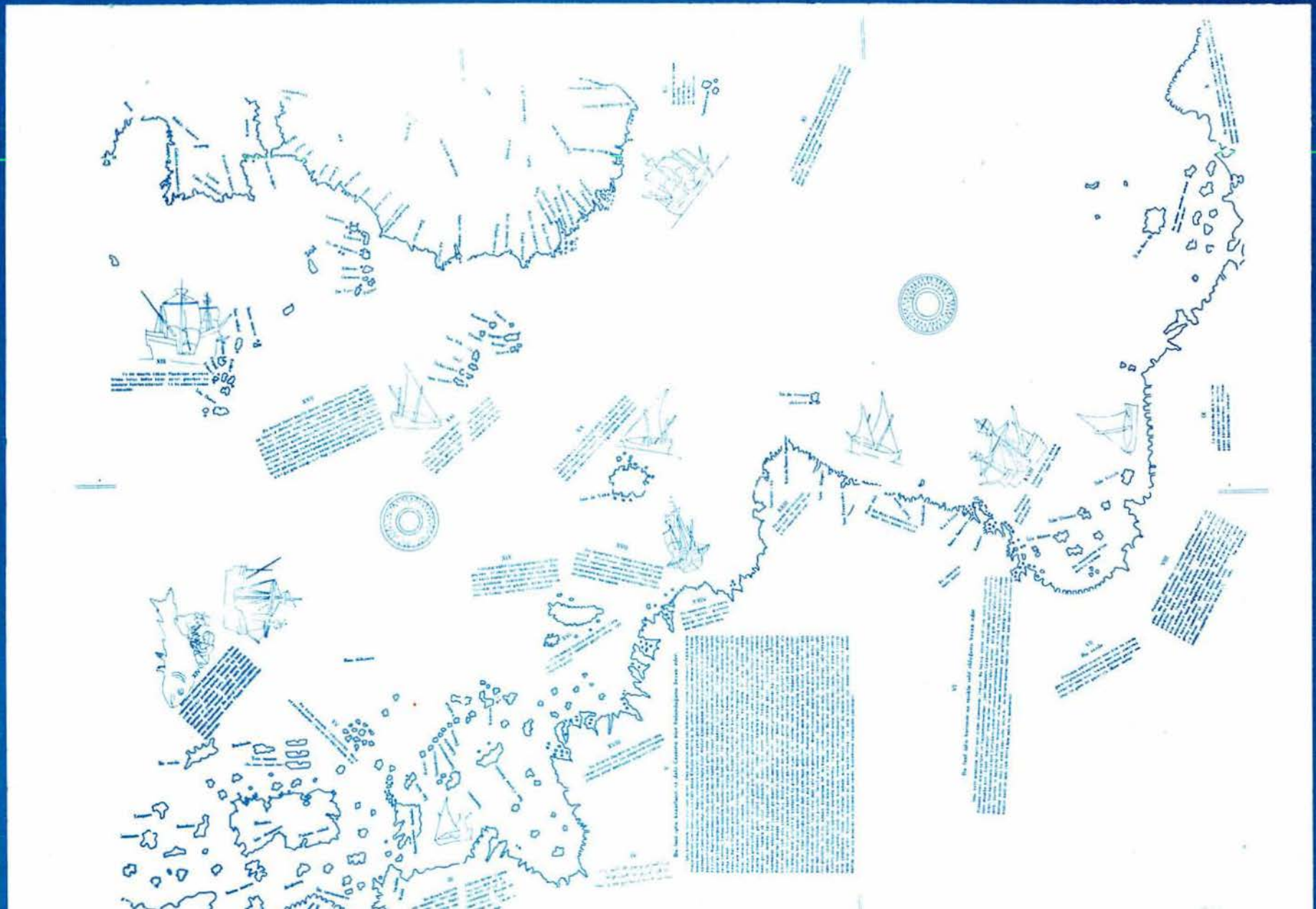
Drawn on gazelle skin and hand-colored, it is a fragmentary copy of a Columbus chart incorporating navigational data from the time of Alexander the Great, and before.



* **PIRI REIS, Turkish naval officer and geographer, lived during the sixteenth century. Capturing a former pilot of Christopher Columbus, the Turk obtained one of Columbus' charts used on his first voyages to the New World. From this "portolano chart" and from other early sources (some dating back three centuries before Christ), Piri Reis compiled a world map of which this is the only known fragment. (The original map is in Istanbul, Turkey.)**

A reproduction of the actual map appears on lefthand page; opposite is an outline chart of coastlines, geographic locations, and notes (in Turkish). The obscurity of the map has baffled modern cartographers. In his study of ancient maps, Arlington H. Mallery claims to have "cracked the code." His interpretation of the ship-studded coastline as that of an ice-free Antarctica about 5,000 years ago, would make this the oldest known map of the continent.

MAP COURTESY OF THE LIBRARY OF CONGRESS MAP DIVISION.



THE STORY OF

TASK FORCE 43

THIRD PHASE: 1957-58

THE STORY OF TASK FORCE 43
AND ITS SERVICE TO SCIENCE
IN THE THIRD—THE CLIMAX—PHASE
OF THE IGY ANTARCTIC PROGRAM

Operation

DEEP FREEZE

1957—1958

Servicing Scientific Equipment Atop Meteorological Mast — PHOTO BY NOONAN

Printed in the United States of America
for the men of Task Force 43
of the United States Navy

NOT PRINTED AT GOVERNMENT EXPENSE

OPERATION DEEP FREEZE

Third Phase: 1957-58

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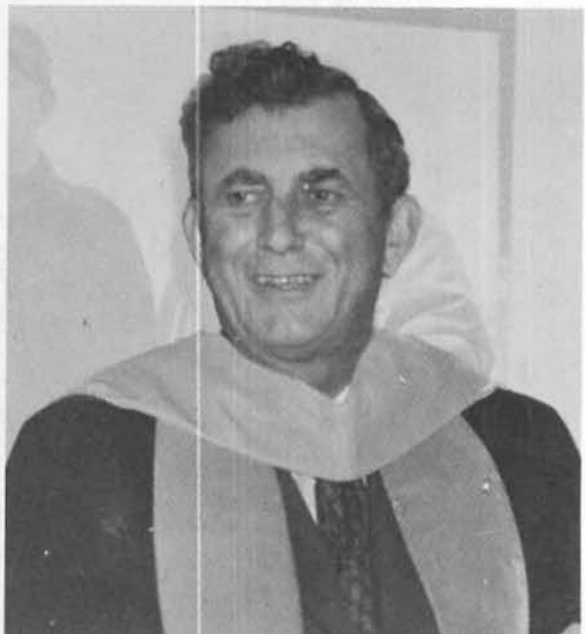
PHOTOGRAPH OF PHILATELIC ANTARCTIC COVERS — BEEBE

ADMIRAL ARLEIGH BURKE, USN
CHIEF OF NAVAL OPERATIONS

ADMIRAL JERAULD WRIGHT, USN
COMMANDER IN CHIEF, U.S. ATLANTIC FLEET

Salute . . . to the Men of DEEP FREEZE III



DR. LAURENCE M. GOULD
CHAIRMAN, USNC ANTARCTIC COMMITTEE
DIRECTOR, USNC ANTARCTIC PROGRAM DIRECTION

IN THE YEARS to come I am sure each of you will have many occasions to refer to this book. Each of you will have different impressions as you leaf through its pages and your impressions will vary according to your memories.

The number of people in the world who actually have a personal part in making history is relatively small. As a member of *Operation Deep Freeze III*, you can look back with pride on your accomplishments. As the years progress, you will find that the privations and sacrifices will become obscured by the contribution you have made to the knowledge of the Antarctic continent.

You were pioneers in the same tradition of those who explored the unknown regions of America in the past. The entire value of your contributions will probably be unknown for many years to come but even in your own lifetime you may see in Antarctica developments which none of us presently can imagine.

The friendships you formed during the operation will remain with you for the rest of your lives and will grow more valuable with the passing of the years. It has always been so. Men who endure adversities together have a respect for one another that cannot be duplicated during the normal course of events. You will find that these associations will far outweigh the self-denial that each of you experienced.

My best wishes to you all. — ADM. ARLEIGH BURKE, USN

DESPITE EXTREME difficulties and hazardous operating conditions, Task Force 43 has established new records of superb accomplishment during the past year. I have watched your activities with great interest. Your efforts in the Antarctic constitute major contributions to scientific knowledge. Your achievements reflect great credit on the U. S. Navy and your can-do spirit has been a source of much pride to your teammates in the Atlantic Fleet. This book will serve not only as a souvenir of your days "down under," it will also be an important documentary of your polar activities and worthy of an important place in the archives of that region. — ADM. JERAULD WRIGHT, USN

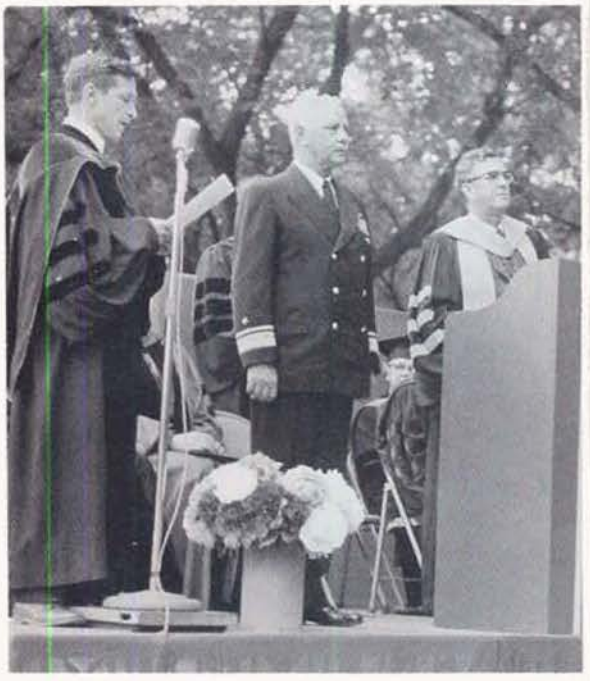
I WELCOME the opportunity to comment upon *Operation Deep Freeze* and its effective leadership under Rear Admiral George Dufek and his able staff. *Operation Deep Freeze III* is a continuation of a co-operative arrangement in behalf of science which is unique in American history.

The IGY program in Antarctica rests, as it were, upon the three legs of a tripod. The scientific program is under the aegis of the National Academy of Sciences. The fiscal agent, which has secured federal funds from Congress for the scientific program, is the National Science Foundation. The vast and complicated task of logistics is under the control of the Department of Defense, which created Task Force 43 of the Navy to carry out this responsibility.

In my associations with Admiral Dufek and his staff, both in Washington and during my two journeys to Antarctica with them, I have been aware of their deep interest in providing the best possible opportunities for the scientific program to proceed. Not only has *Operation Deep Freeze III* carried out the task of transporting our scientific personnel and all of our supplies to Antarctica but it has likewise provided all logistic support personnel so the scientists would be more free to carry out the high objectives of our mission.

A great and distinguished record in polar research is being written in Antarctica. When the long record is complete high credit will go to Admiral Dufek and his staff, without whose friendly co-operation and understanding the scientific program could not have been completed.

Even with the most up-to-date methods of transportation and communication Antarctic exploration and research are bound to be hazardous. Every precaution has been taken to safeguard IGY personnel. It is a remarkable tribute to Admiral Dufek and to Task Force 43 that there have been no serious casualties among scientific personnel. For this and for everything else all of us concerned with the scientific program are profoundly grateful. — DR. LAURENCE M. GOULD



THE UNIFORM on deck and on the dais of learning rates a salute. Admiral Dufek is piped aboard USS BURTON ISLAND (left) while (right) he stands with Dr. Gould, president of Carleton College, to receive honorary Doctor of Laws degree from institution.

Dedicated to

RADM GEORGE J. DUFEK, USN (RET.)

U.S. ANTARCTIC PROJECTS OFFICER
COMMANDER, U.S. NAVAL SUPPORT FORCE, ANTARCTICA

ANTARCTIC record of Admiral Dufek began in Byrd Expedition (left) in 1939-41, included *Operation Highjump* when he was perilously dunked in Bellingshausen Sea (center), and takes in all phases of *Operation Deep Freeze*. He still travels by 'copter!

Triumph OF CO-OPERATION

NAVY AND AIR FORCE leaders in Antarctic assault. CAPT Gerald L. Ketchum, USN, Deputy Commander of Task Force 43 (left), also commanded the task group in the Ross Sea area. COL William G. Forwood, USAF, (right) commanded the 61st Troop Carrier Group which handled the mammoth airlift/airdrop operation.

WINTERING-OVER COMMAND: CAPT W. Mills Dickey, USN, (left) was commander of Naval Support Units Antarctica during 1956-57 season. CAPT Eugene H. Maher, USN, (right) took over command during *Deep Freeze III* for the 1957-58 season. CAPT Dickey and IGY chief Crary operated their command from Little America.

WORK in all scientific disciplines was coordinated by Albert P. Crary, station scientific leader at Little America and the senior U.S. Scientist in Antarctica.

FOREWORD

DUAL ASSAULT FOR PEACE

MANY YEARS AGO America's first "pure scientist," Benjamin Franklin recognized the oneness of the earth and the interrelationship of each branch of science.

International Geophysical Year 1957-58 demonstrated this truth forcibly. IGY Antarctica proved another truth—the mutuality of two highly dissimilar groups, military men and civilian scientists.

When Task Force 43 was organized to implement the IGY program in Antarctica, areas of operation and control were carefully defined. This unprecedented dual performance was a triumph of cooperation. Each group came back from the great white south with a magnificent record of its own, made possible through the efforts of the other, and a high regard for his colleagues.

The third assault on Antarctica, *Operation Deep Freeze*, was made by a formidable force. Ten ships, tampions in guns, made the sea approach. Sixteen aircraft—unarmed—invaded from aloft, eight big Air Force freighters and the rest Navy Air Development Squadron Six planes; 11 helicopters went in via icebreakers. Waiting were 11 other planes that had remained on the ice during the winter night.

More than 4,000 men went south with the naval arm of the Task Force; among them were 72 IGY scientists. Nearly 300 men comprised the Air Force group of flying crews, support personnel, and aerial delivery specialists. Down on the ice were more than 300 others—249 military and 69 IGY scientists—anxiously waiting to be "phased out." These were the "Knights of the Winter Night," those who had raised the curtain July 1, 1957 on the International Geophysical Year. Of this great host three never returned in life.

What did they accomplish, these 4,700-odd men at seven scattered stations on land and in ten storm-tormented ships on the sea? Logistically and scientifically the story is here in word and picture. Read between the lines to learn their greatest accomplishment—their comradely pooling of strength and skill, of military "can-do" and civilian "know-how" to further world scientific knowledge for the good of all men. This is the story of the third—the climax—phase of *Operation Deep Freeze.*

From Sistine Chapel:

Four and one-half centuries ago Michelangelo painted the story of The Creation. Across the arching ceiling of the Sistine Chapel in Rome he flung his magnificent frescoes. In the fourth panel, God—having created Adam—reaches his hand to that of the still inert human . . . another second and man will become "a living soul." But the artist froze the action just as the fingers are about to touch.

From this fresco comes the detail used on the IGY commemorative stamp shown above. The simple yet mystical approach to the "symphony of science" arouses suspense and wonder. What has science learned of Adam's world in 18 months of searching the heavens, the earth, the Poles?

. . . to Antarctic Ice.

♦ TWO TINY MORTALS CONTEMPLATE THE VAST MYSTERIES OF THE ICE SHELF.
LARSEN

Dr. Odishaw (far right) joined his Antarctic colleagues, Admiral Dufek and Dr. Gould, in receiving an honorary doctorate recently.

Antarctica and Science

BY HUGH ODISHAW
Executive Director, US-IGY Committee, National Academy of Sciences

AS PART OF its contribution to the International Geophysical Year, the National Academy of Sciences has planned and is directing a major scientific effort in the Antarctic involving all the scientific disciplines encompassed in the worldwide IGY program. The Academy undertakes this function as the adhering body in the United States to the International Council of Scientific Unions, which inaugurated IGY and set the broad outlines of participation by 66 nations.

The Academy's IGY Committee is well aware that the unprecedented extent of the scientific investigation of Antarctica during IGY would have been impossible without the remarkable logistic support provided by U. S. Navy Task Force 43 under the command of RADM George Dufek. The remote continent presents great challenges for transporting supplies and personnel, maintaining widely scattered stations under the world's most difficult weather conditions, and in general providing the basic "platforms" from which scientific research can be launched.

In expeditions of years gone by scientific work was severely limited because scientists had to expend so much of their energies in solving problems of logistics. Indeed, keeping alive was itself a formidable task. Thanks to the well-planned, imaginative, and generous assistance of the Navy, U. S. scientists going to Antarctica during IGY are able to devote their energies to science. The results are already evident in the vast quantities of valuable data and specimens now back from the first full year of activities data of considerable importance for the progress of science and useful to all mankind.

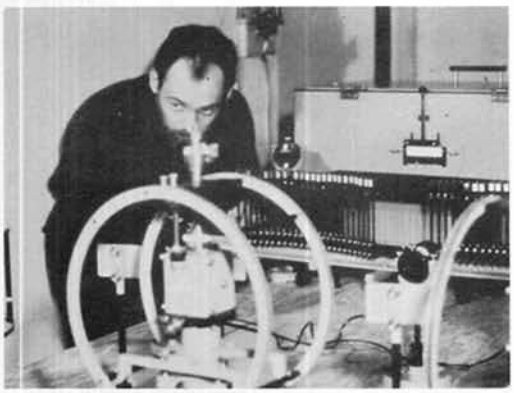
Among our primary scientific objectives in the Antarctic are the study of temperatures and winds and of the electrical, chemical, and magnetic properties of the atmosphere; determination of the thickness, temperature, and age of the icecap; investigation of the topography and seismic characteristics of the underlying rock; and acquisition of data on the surrounding oceans.

We have gone a long way toward filling the void in scientific knowledge of the huge Antarctic continent, but what we have found out only emphasizes how much remains to be learned. In recognition of this fact a special committee of the International Council of Scientific Unions has recommended that Antarctic research be continued after 1958. The National Academy of Sciences has established a Committee on Polar Research to collaborate in such efforts.

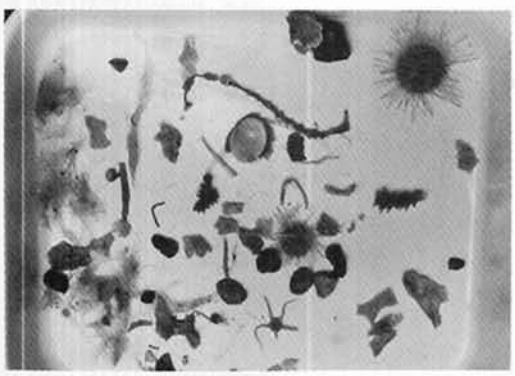
Thus, the foundation laid during IGY may well serve as a basis for further fruitful investigation of the world's southernmost frontier.

The IGY

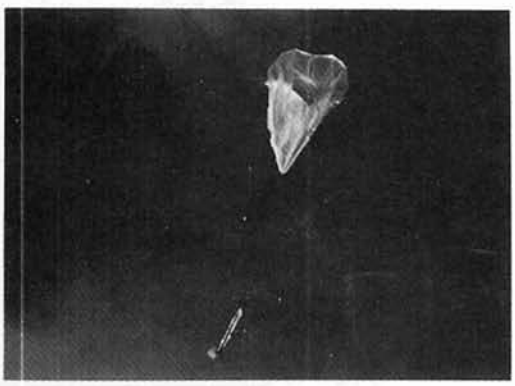
MEASURING EARTH'S GRAVITY FIELD



MEASURING EARTH'S MAGNETIC FIELD



OCEANOGRAPHIC SPECIMENS OF FAUNA

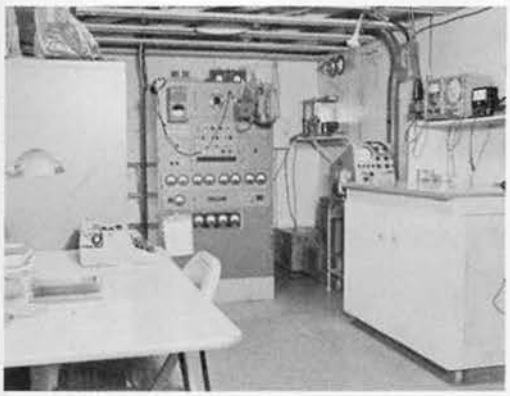


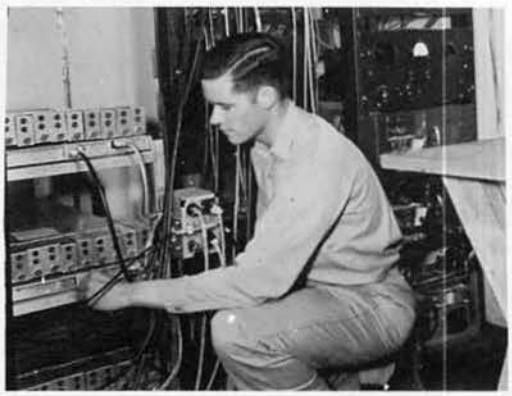
"ROCKOON" RISES TO UPPER STRATA

Studies Antarctica

SEISMOLOGISTS and glaciologists pooled talents to study earth's inner core. Preparing seismic blast (left); determining density of ice (center) by weighing ice core mined from snow pit.

WEATHER CENTRAL at Little America (right) was collection point for all meteorological data made in Antarctica and its environs; here data was processed and integrated into records.





SOLAR ACTIVITY was studied by ionospheric physicists (ionosonde at left), by cosmic ray specialists (cosmic ray telescope and recorder, center), and by aurora specialists (all-sky camera, right). All three fields are related through results of solar disturbances.

IGY Disciplines	LAS	Byrd	South Pole	Hallett	Wilkes		Ellsw'th	McM	Liv	Other
					Base	S-2				
Aurora	X	X	X	X	X		X			
Cosmic Rays					X		X			Ships
Geomagnetism	X	X	X	X	X					
Glaciology	X	X	X		X	X	X			Trav'r.
Gravity Measurements	X	X	X		X		X	X		Trav'r.
Ionospheric Physics	X	X	X	X	X		X			
Meteorology	X	X	X	X	X	X	X	X	X	S & T
Oceanography	X				X					Ships
Rocketry										Ships
Seismology	X	X	X	X	X					Trav'r.
Special Studies	X	X	X	X	X		X	X		

IGY Antarctic Program

The principal scientific objectives of the IGY Antarctic program are the study of temperature and winds; the electrical, chemical, and magnetic properties of the Antarctic atmosphere; the thickness, temperature, and age of the icecap; the topography and seismicity of the underlying rock; new features of the surrounding oceans, and many other phenomena. To accomplish these studies the U.S. National Committee for the IGY set up programs in aurora, cosmic rays, geomagnetism, glaciology, ionospheric physics, meteorology, seismology, gravity, and conducted shipboard rocket launchings and oceanographic studies plus a number of biological and zoological studies.

More than 10 tons of scientific data were brought back from the Antarctic by ship in March 1958. When the full volume of the US-IGY Antarctic data is co-ordinated with similar data from other countries having bases on the seventh continent, many scientific secrets of that inscrutable land should be revealed.

So scientific are some areas of Deep Freeze III that IGY explanatory notes have been inserted through the story to help you enjoy and value it completely.

Story Behind the Story

The story of *Operation Deep Freeze III* is vast in scope, in territory, and in the number of people and places participating. Therefore it is told from many different angles — the sailor's point of view, the airman's, the scientist's, and the press correspondent's. Several important writers appear in the following pages, each well-known to his own profession, one or two well-known to the world.

To *The New Yorker* the men of the Task Force are forever indebted for permission to reprint in full the John Brooks article, "Down to the Ice," and the rib-tickling Peter Arno cartoon.

To United Press International, 21 guns for Charles R. Moore's story of rocking to the roll of GLACIER.

The *London Daily Mail's* colorful foreign correspondent, Noel Barber, has contributed an on-the-spot account of the Fuchs-Hillary continental trek that is really "inside."

And there are the specialists — Lev Richards with his rousing story of the Air Force's contribution to *Deep Freeze;* W. V. Nalls, a marine engineer with a keen sense of the dramatic and a true appreciation of the melon-bellied icebreaker; and Ray Nathan of the IGY with his man-on-the-deck explanation of scientific complexities.

Repeat, the story of *Deep Freeze III* is vast. It is fascinating, too, in its coverage of a tightly intermeshed military-scientific program — the greatest peacetime operation ever launched by the Navy.

IGY Rallied Many Old Hands:

ABOVE, SIR HUBERT WILKINS AND DR. SIPLE.
BELOW, FUCHS AND HILLARY.

Phase III found many Antarctic veterans on the ice: Sir Hubert Wilkins, now deceased, leader of two southern expeditions and first man to fly in Antarctica, was a cold-weather specialist with the U.S. Army QMC . . . Dr. Laurence M. Gould, IGY Antarctic director and Byrd's second-in-command during his 1928-30 expedition . . . Amory H. Waite, one of three that rescued Byrd in 1934, now leader of the Army Signal Corps Antarctic Research Team . . . plus Britain's Fuchs and Hillary, and original Byrd-men Finn Ronne and Paul Siple—now both station scientific leaders in *Deep Freeze III.*

CAPT. RONNE

"BUD" WAITE

DR. GOULD

KNIGHTS OF *The Winter Night*

Lighting Off the Snow Melter to Furnish Water for Station — PHOTO BY NOONAN

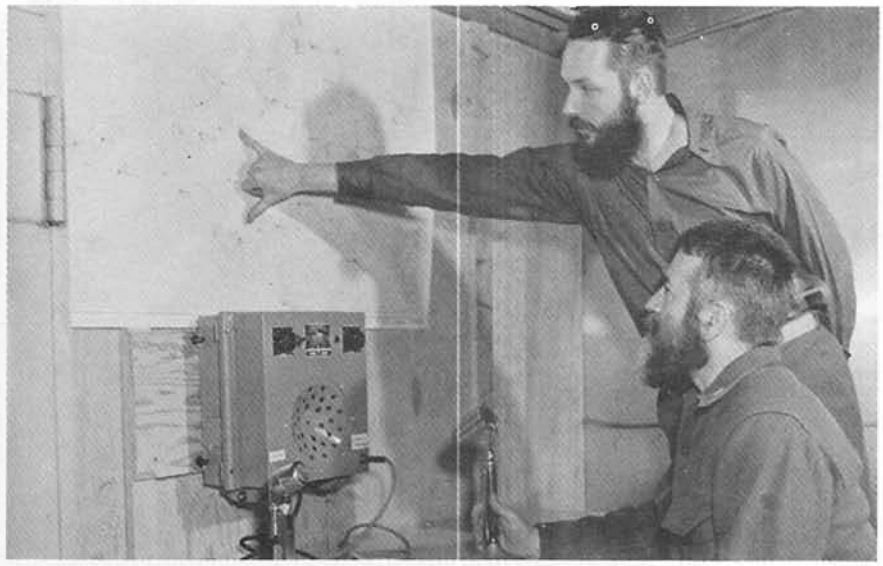
THE MEN OF SCIENCE AND THE MILITARY
WHO WORKED THROUGH THE LONG, LONG NIGHT
OF THE SECOND ANTARCTIC WINTER

WITH FLAGS HALF-MASTED IN MOURNING, MEMORIAL SERVICES WERE HELD IN EACH U.S. ANTARCTIC BASE.

Farewell to the Polar Admiral:

"ADMIRAL OF THE ENDS OF THE EARTH" they called him for he had conquered both poles. Signed cover (below) from the Second Byrd Antarctic Expedition was postmarked Little America. In the familiar fur parka (right) Byrd was best known to all. (This is a rare picture from the United States National Archives.)

RADM RICHARD E. BYRD, USNR IN HIS STUDY



ALL-ANTARTIC conference for U.S. stations in the making. CAPT Dickey (seated) confers with LTJG Peter Raynolds, LAS communications officer, in conference room from which voice cons were held embracing all stations.

THE PALE SUN swung low on the horizon signing off the austral summer. It was early March 1957. A few weeks of light still remained but it was light that grew progressively dimmer as you approached the Pole.

The last Globemaster had long since left. The ships were tracking north; one had already reached home port. But NORTHWIND, no party-pooper, stayed on. She had made a late-season dash from Wellington with a cargo of high-priority cable, fresh vegetables and eggs, and mail for Ross Sea stations. March 9 she arrived Little America, dropped her load, scurried to McMurdo where she cleaned up the job in a day. Another four days and Hallett had been serviced, the broom was run up to the yardarm and, with a last blast of her whistle, NORTHWIND headed home.

DEATH OF A HERO

The 318 men at seven U.S. bases settled to work. Meanwhile from the other side of the world, sad news. RADM Richard E. Byrd was dead. A quiet passing at his home in Boston on March 11, 1957.

Just one short year ago he had been on deck on this very ice shelf. How great an enterprise had grown from that first small beachhead back in December 1928. How great a treasure of knowledge he and his men had mined from the unknown. How great a genius was his.

Over the white barrens he knew and loved the flag whipped midway on its staff. At every station on the icecap memorial services were held. Explorer, adventurer, scientist, sailor, airman, administrator, leader, writer, lecturer, poet—Richard Evelyn Byrd has left so much of himself with us, he will never be away.

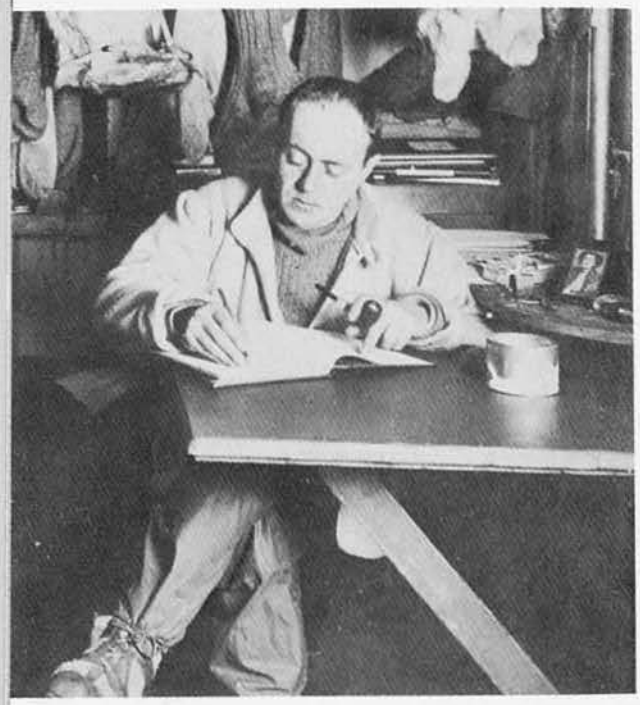
FAR-FLUNG COMMAND

When CAPT Dickey set up command Hq at Little America IGY Station at the end of January 1957, operations were routine. Before the end of his tour of duty "ice-olation" had gripped the continent, yet he had still been able to visit personally all but three of the stations. One inspection was an aerial one but it counted. Ellsworth and Wilkes were completely cut off from land or air ingress for the entire winter.

But not completely cut off. Reaching radio waves carried message and voice into every corner of Antarctica—into the seven U.S. stations and 55 IGY stations of 11 other countries. CAPT Dickey and his IGY counterpart, Deputy Chief Scientist Albert P. Crary, rallied their forces from LAS and maintained a taut ship for the long winter night.

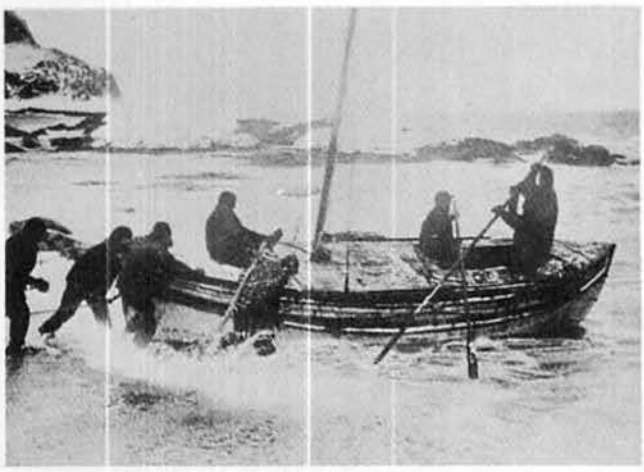
IGY LEADER for seven US bases, Albert P. Crary, was stationed for winter at LAS from which he administered.

Crowning a Half-Century of Exploration



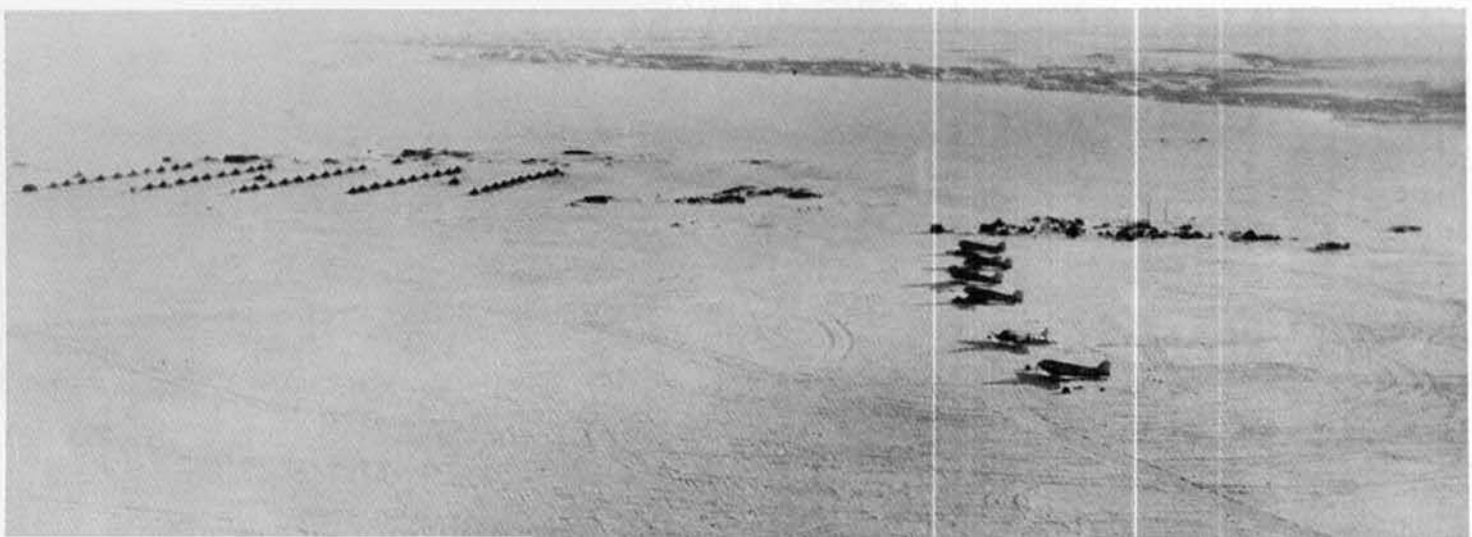
CAPT ROBERT FALCON SCOTT, RN

LEADER of two British Antarctic Expeditions, Scott's 1910-13 race for the Pole ended in death for himself and his four companions (top right). They reached the Pole in January 1912 to find the Norwegian flag flying over it (right); Roald Amundsen had won the race by one month. Scott's men in the TERRA NOVA (center) waited in vain near Hut Point. (Scott, Shackleton photos from Library of Congress.)

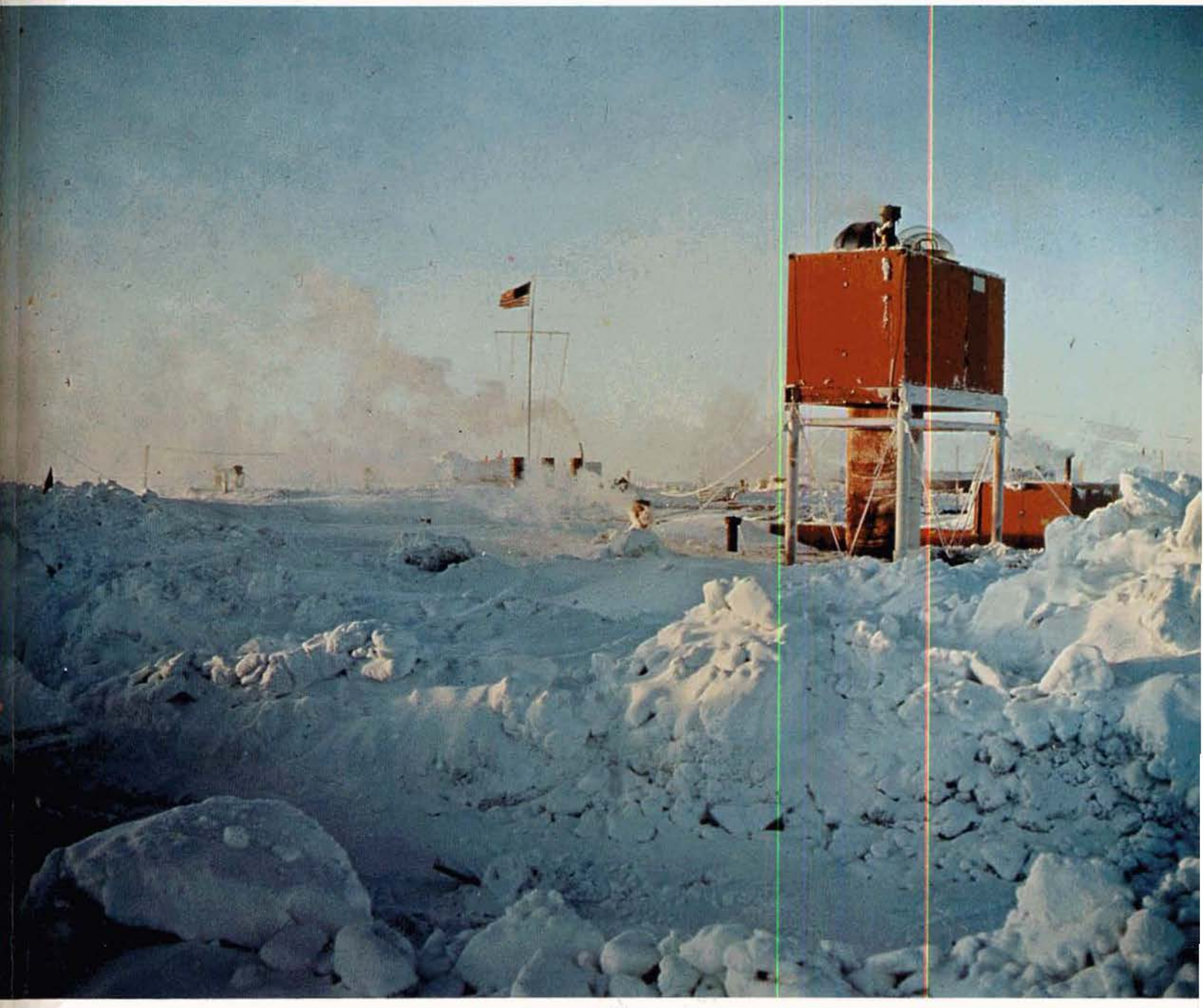


THREE EXPEDITIONS were led by Sir Ernest Shackleton (above): in 1907, 1914, and 1921. He died during the last one. In 1915 the Weddell icepack crushed his ENDURANCE (center) and he and his crew escaped miraculously in an open whaleboat.

BYRD'S LITTLE AMERICA: DAWN OF A NEW ERA IN ANTARCTIC EXPLORATION. A TENT CITY BUT WINGS FOR THE SKIS.

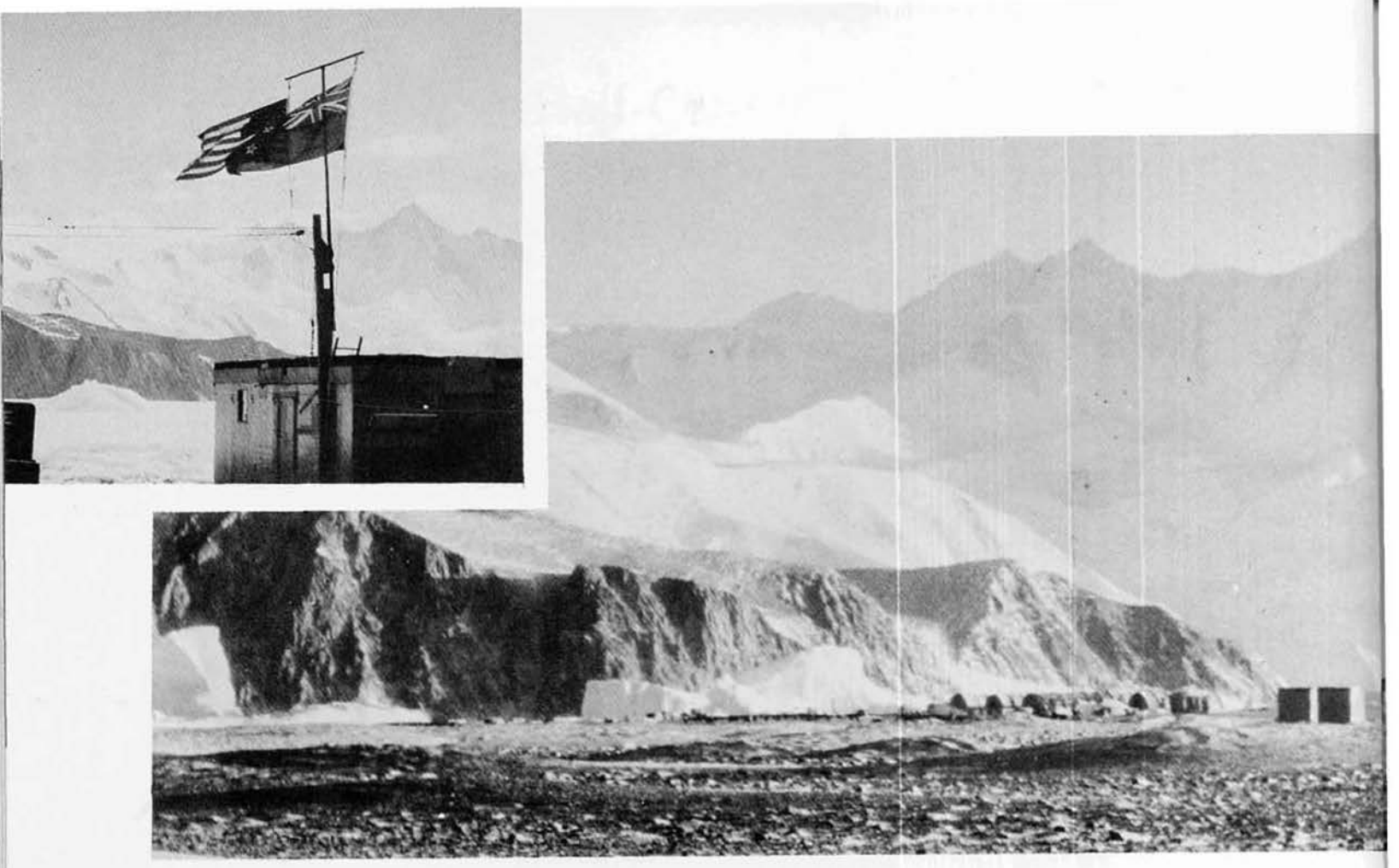


Autumn in Antarctica



Little America IGY Station on Kainan Bay of the Ross Sea —— PHOTO BY HILL

AFTER THE PLANES AND SHIPS HAD GONE
THE FEW WEEKS OF WANING SUNLIGHT WITNESSED
GREAT EFFORTS TOWARD CONSOLIDATION



OVER HALLETT IGY STATION FLY U.S. AND NEW ZEALAND ENSIGNS.

The Sun Begins to Set

So hectic were the final days of hurried farewells as ships and planes scrambled for home that few had time to think of what lay ahead—six long, dark months before another letter, another visitor.

Across the vast area of operations men raced the hands of the clock, the numbers on the calendar. Each day the light grew less, the mercury settled lower in its glass cage, the wind blew higher knottage.

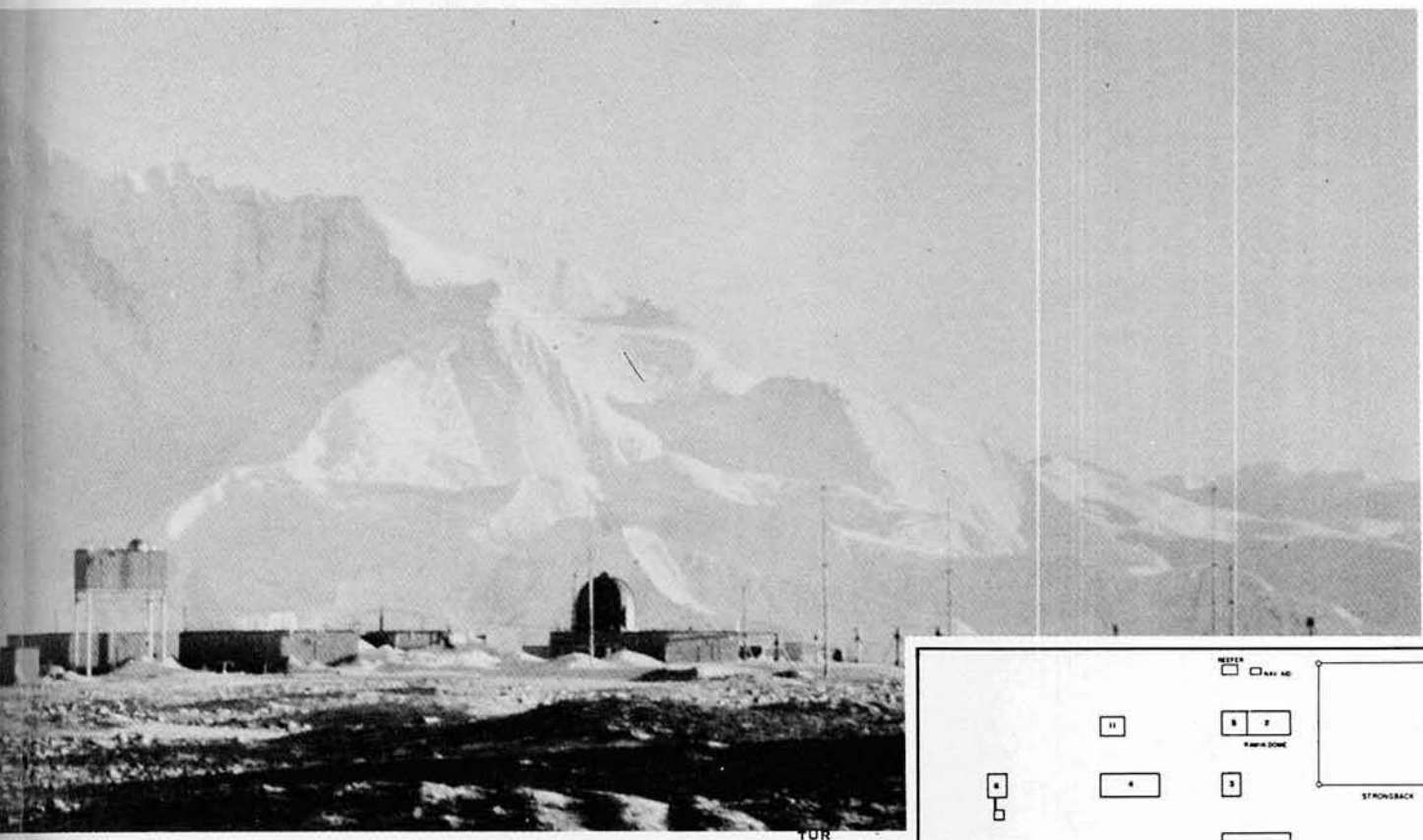
Each base, depending on its location, had a differing allotment of light and dark. Hallett and Wilkes, both in the neighborhood of the Antarctic Circle, were blest with the greatest amount. . . Wilkes falling in the "normal" day-night class. The South Pole Station know only a simple binomial equation—six months of day to six months of night. On the Circle side sunset came in May, sunrise in July; at the bottom of the world taps sounded March 23, reveille September 23.

During "summer tourist" season Antarctica has a cosmopolitan air what with "foreigners" coming and going at all hours. But when the shades of evening are drawn each station begins to show its own unique personality. That personality is compounded of geography, purpose, and people.

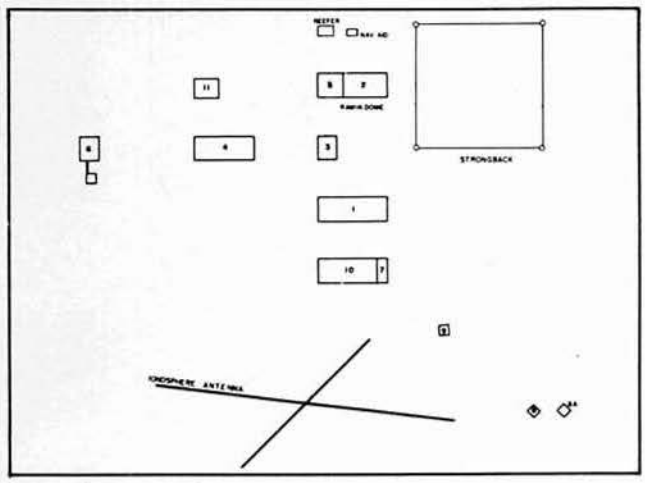
HALLETT ON VICTORIA COAST

Whimsical little Hallett is a striking example. Smallest of the family (14 men), Hallett IGY Station (USA-NZ) is a living contradiction. Its scenic beauty is breathtaking; so, at times, is its guaniferous foundation. (The vengeful spirits of some 7,000 displaced penguins still haunt the premises.) Its weather is relatively mild; yet ferocious surf and tidal action drove back the supply dump from its original location just as the base itself had been forced to move back from Cape Adare, and a late October storm belted the base to a fare-thee-well. The station's IGY personality is split, too—it is under the joint administration of the United States and New Zealand.

With such a background you'd expect to find a droll sense of humor. You do. Based on relatively ice-free ground, Hallett is the only station without a snow tunnel. As a result, complained one message to IGY Washington, "we cannot compose lengthy reports on new extensions to repair tunnels." By popular vote the Halletteers decided to build the best dam' tunnel in Antarctica. Terminus, New Zealand. Replied IGY: "Why stop there? . . warmer Fiji not far beyond."



10,000-FOOT PEAK OF MT. SABINE TOWERS IN BACKGROUND.



. . and Aurora Rises

PICTURESQUE AIROPFAC-TO-BE

Hallett looks like a picture postcard from any approach. Craggy black cliffs hem the base within a semicircle. Behind and beyond soar the snowy peaks of the Admiralty Range. Against this backdrop 11 Americans and three New Zealanders worked the night shift preceding *Operation Deep Freeze III*. Their specialty, meteorology.

While carrying a sizable IGY roster the base really starred in air operations and communications. It stands athwart the flight path between Wigram and NAF McMurdo, just 350 miles north of the ice metropolis. So it was early decided come sunup an emergency way station would be established at Hallett. Complete with radio beacon the new runway would offer safe landings to aircraft of the Ross Sea area that had been fogged out at McMurdo.

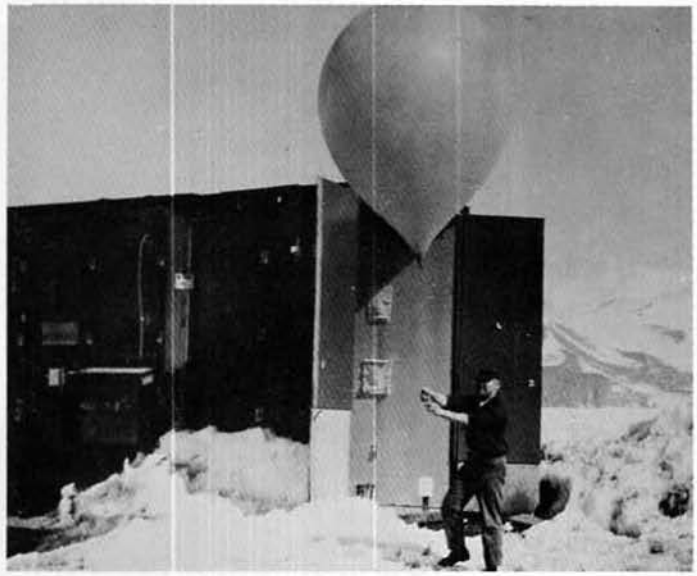
Base construction was well along at Hallett a whole month before NORTHWIND's final flying visit enroute CONUS. With all formal construction completed a utilities building was set up, then the intercom system and outside building lights installed. The ham radio,

(Continued on page 25)

JOINT COMMAND of the US-NZ IGY station was in the hands of two Americans—LT Juan F. Tur, MC, USN of San Juan, P.R., and Dr. James A. Shear of Lexington, Ky. LT Tur doubled as OinC and as station's medical officer. Dr. Shear was in charge of IGY scientific program at Hallett.

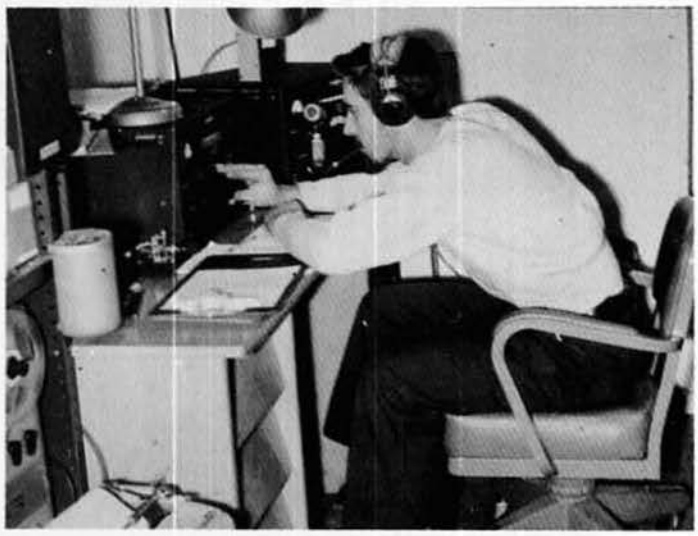
All Halletteers Walk on Two Feet:

NAVY AEROGRAPHERS TEAM UP ON WEATHER DATA.

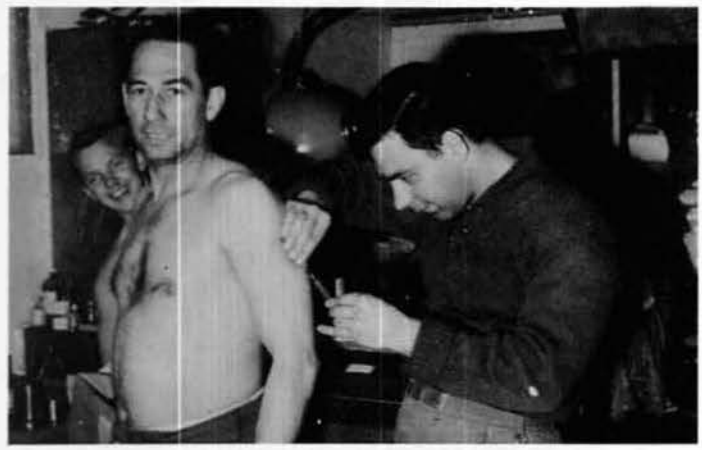


WALK-OUT FOR BALLOON LAUNCH IN EARLY FALL.

NEW ZEALAND SCIENTIST ON THE TRAIL IN WEASEL.

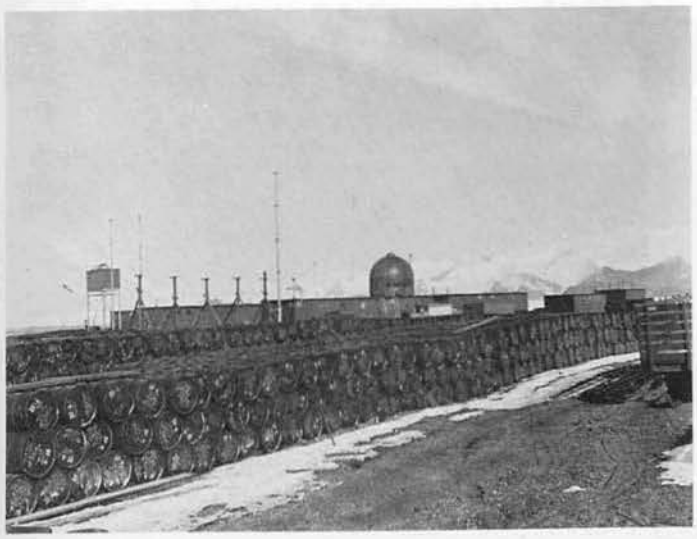


MAINTAINING RADIO CONTACT WITH OTHER BASES.



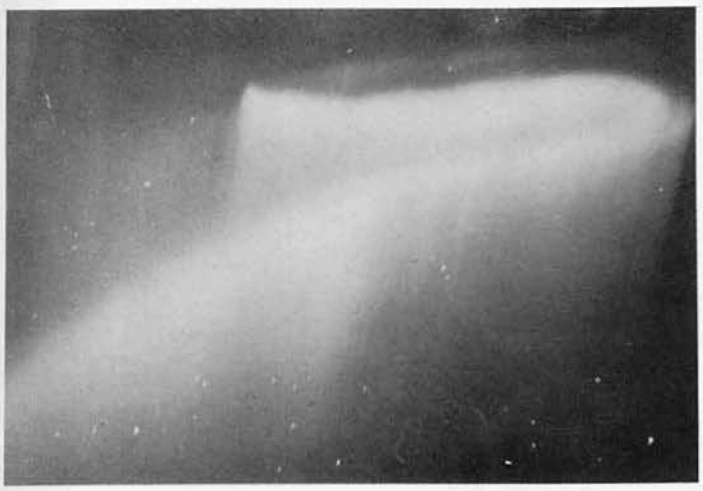
HEALTH RECORDS AT ALL THE BASES STAYED HIGH.

THE PENGUINS WERE MEMBERS OF THE HALLETT FAMILY TOO.



HALLETT'S FENCE OF DRUMMED FUEL OIL STRETCHED LONG.

THE AURORA WEAVES ITS VEILS OF ELECTRICAL MAGIC.



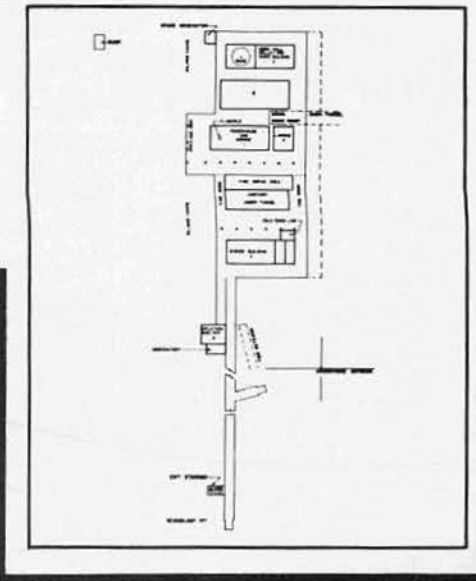
first installed in the radio room, was relocated in spare messhall space. Main supply center was in the Jamesway huts (they had served as temporary camp while permanent quarters were going up) and an emergency cache was constructed about a half-mile from camp.

A few minor irritations cropped up just to keep the balance even. A snow melter had to be improvised because the evaporators refused to work; tidal action —the bogey of Hallett from the very start—put a crimp in suction and the equipment was *hors de combat.* Then all building exhausts to windward had to be removed or covered for, as northerly as Hallett may be, Miami it ain't.

True to form, Hallett's sunset on May 17 was a show-stopper. On that day, sunrise and sunset melted into a single solar production three hours in length. As the flaming ball settled on the horizon, the 14 men gathered to watch the grand *finale*—a glorious crimson and gold extravaganza of radiating shafts of light. As one of the audience put it, "The only sound was the cascade of clicking camera shutters" in an attempt to capture the wild beauty on color film for the folks back home.

WINTERING-OVER group of 14 Americans and New Zealanders: (Back row) Robert Roy; Ernie Lee Bingaman; Ray Camp; Raymond Hennessey; Lt Tur; Roger Evans; James Canavan; Dr. Shear. (Front) Michael Langevad (NZ); Harry King; Bobby Northcutt; Richard Novasio; John Humphries (NZ); Clayton Ingham (NZ). The shirt-sleeve attire indicates how "normal" temperature is in fall.

The Perplexing



BEEBE

AMUNDSEN-SCOTT IGY SOUTH POLE STATION FAR BELOW SEEN THROUGH OPEN CARGO DOORS OF C-124.

POLE LEADERS: Dr. Paul A. Siple (left), IGY leader, began his expeditions at the age of 19 with Byrd's first Antarctic operation, served on all others. LTJG John Tuck, Jr. (right), military leader, wintered over at McMurdo during *Deep Freeze I*, wintered at Pole during Phase II.

Pole (All of them)

When you stand at the South Pole, you're literally standing on your head. *Which* South Pole?—geomagnetic . . . the pole of inaccessibility? . . . or geographic?

What day is it? Where I'm standing, it's Monday; you're a few feet over the International Dateline so where you're standing, it's Tuesday.

What time is it? Whatever your watch says. Your watch has stopped? . . . it's still correct. No doubt about it, the Pole *is* perplexing.

Orientation was one hurdle to be cleared by incoming personnel at Amundsen-Scott South Pole IGY Station and the newcomers were in good hands. The men in charge could explain the most elusive facts in language a man could dig. Dr. Paul A. Siple, Station IGY Scientific Leader, had begun his Antarctic career nearly 30 years before as an Eagle Scout with the first Byrd expedition. LTJG John Tuck, Jr., military commander of the base, was a youthful but seasoned "old pro" in the process of ringing up a total of 23 months on the remote continent. Siple had spent 64 months of his life in the Antarctic. In all, there were 18 Polesters to do a job that would have taken twice as many ordinary men.

A fascinating diary kept during the long polar twilight and night gives many sparkling comments on life and nature at Lat. 90°S.

"The South Pole is the only fixed point on the earth which has only one day and one night all year. The

(Continued on page 28)

THE FIVE SOUTH POLES

GEOGRAPHIC SOUTH POLE — The southern point on the surface of the earth where the 360 degrees of longitude converge. Because longitude is an expression of time as well as of distance, the 24 hours of the day also converge here. (US-IGY Station located here.)

GEOMAGNETIC SOUTH POLE — The point where the lines of the earth's magnetic field converge. Located about 790 miles from Geographic South Pole at 78°S. Lat., 110°E. Long. (USSR-IGY Station located here.)

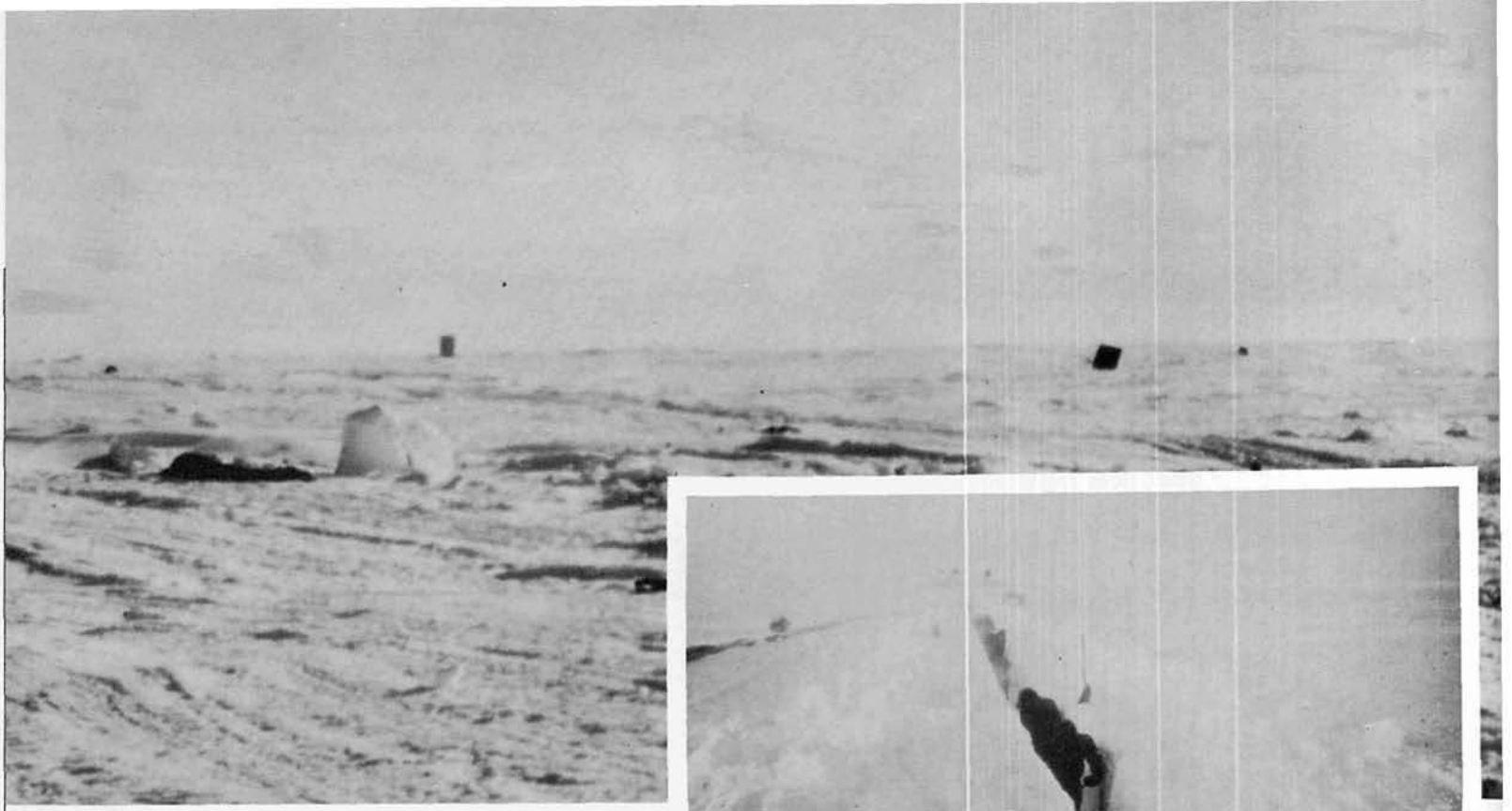
MAGNETIC SOUTH POLE—The spot at which the compass needle (magnetic compass) points straight down. Its location is variable—in 1956 it was located about 1,526 miles from Geographic South Pole at 68°S. Lat., 144°E. Long. (Two French-IGY Stations located near.)

POLE OF INACCESSIBILITY—The point in Antarctica which is farthest inland from all shorelines. Located about 550 miles from Geographic South Pole at 82°S. Lat., 56°E. Long. (USSR-IGY Station proposed at site.)

SPIN POLE — The imaginary point at which earth's axis "protrudes." Due to the slight wobble of the earth as it revolves on its axis the Spin Pole traces a wavering path. (The Spin Pole's geographic position is that of the Geographic South Pole.)

EIGHTEEN MEN WHO MADE HISTORY: FIRST WINTERING-OVER PARTY (AND FRIEND) AT THE SOUTH POLE.

ABERCROMBIE



POLAR PLATEAU viewed from station, is chewed and grooved by vehicles criss-crossing on their missions. Toward it reaches the 1,000-foot roofed-over tunnel, here under construction, ending at pit housing seismic instruments.

SIPLE

sun rises in September and slowly spirals 'round and 'round the sky, not reaching its 'noon' until three months later. In March, the sun sets and there follows six unbroken months of darkness. During the South Pole night, the stars trace circular paths in the sky over a 24-hour period, each at a constant elevation.

"If one walks around the flag which marks the true geographical Pole—even though this may be only a few steps—one has walked around the world and crossed all meridians as they merge at this single point. If one took 24 paces to walk around the flagpole at the South Pole, one should change his watch one hour with each pace.

"If time is strange here, directions are stranger still. At the South Pole any direction is north. There is no east or west. We were forced to solve these problems by using an arbitrary time schedule and a 'grid' system of artificial compass direction.

"Although these technical problems can complicate life at the Pole, the terrain makes up for it with its natural simplicity. The Pole is located on a great plateau more than 9,000 feet above sea level probably surrounded by a rim of high mountains although its periphery is still largely unexplored. The nearest peaks are about 200 miles away so one sees nothing but a flat plain of snow in all directions.

"The surface of the plateau is covered with gracefully curved miniature snow dunes varying from a few inches up to two feet high with long tails extending downwind as much as 50 feet. These 'sastrugi' move restlessly day by day over the surface as the wind and blowing snow continually reshape them.

"The snow varies in hardness from place to place. There are occasional patches of loose powdery snow and rare spots of ice-hard snow but, for the most part, the surface is best described as 'firm.' Under the surface, it becomes progressively firmer and harder; 50 feet down, it is densely packed; at 100 feet it, is like ice. Above the bedrock of the Pole are 8,200 feet of accumulated ice and snow.

"The terrain being neither exciting nor dramatic, the weather makes up for it. During the summer when the sun is up 24 hours a day, the Pole is bright with reflected sunlight and temperatures soar upward in the range of —30° to +50°F. The constant winds from the direction of Africa are mild, usually five to ten miles per hour, so the South Pole is seldom subject to the severe blizzards known to the coastal regions. Blue skies are the rule. There is very little snowfall but the air is frequently filled with minute ice crystals and, because of our altitude, it is almost like being in the center of a cirrus cloud.

"The ice crystals when present in great numbers cause curious and beautiful phenomena. Often during summer the refraction of sunlight off the crystals makes great rainbow-like circles around the sun. At sunset a long, thin dagger of orange light sometimes rises from the horizon high into the sky above the setting sun—a 'sun pillar.'

"Once the sun is down, darkness comes slowly after several weeks of twilight. With the coming of night temperatures slowly fall. Although the night can be

very black the stars are brilliant in the clear atmosphere and the gay, bright veils of the aurora are seen almost daily throughout the winter months. Monthly periods of moonlight highlight the snow dunes and throw shadows around every corner."

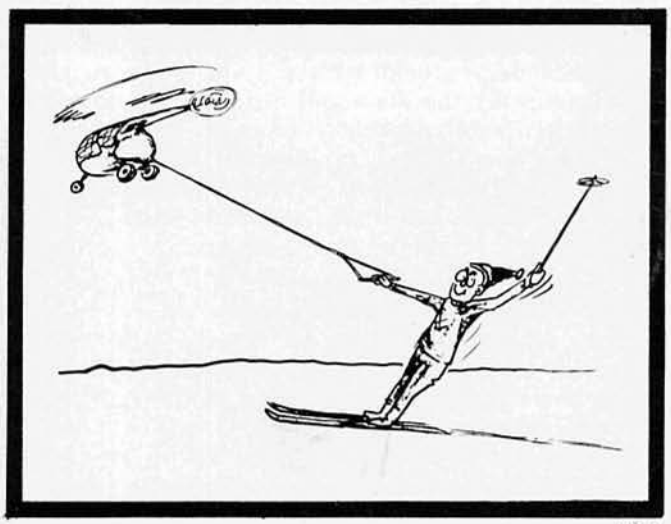
On February 12, a P2V landed with the last six wintering-over personnel and the Pole complement was complete. Although the Air Force continued to 'chute in food and fuel until midmonth, it would be eight months to the day before another plane.

Summer was gone. It had been a time of hard work made harder by the unaccustomed altitude. But there could be no slowdown in hauling materials from the drop area, uncrating, sorting, and storing them in the tunnels. Once night set in, the work would be next to impossible—and night would fall around March 23. The base had to be completed by that date. This, too, was the deadline for the completion of the covered tunnel running from the base to a deep pit out in the snowfield. Six feet deep by 1,000 feet long, it would lead to the housing for the seismic instruments.

During the all-too-short autumn, no one rested. Outside work had top priority but inside work went on too, often in spare time after hours. Willi Hough and Bob Benson had gotten the complicated C-3 ionosphere transmitter in action and, with the help of William McPherson and Cliff Dickey, had raised and guyed the 75-foot ionosphere antenna. Tom Osborne rounded out the tunnel system then started on the interior carpentry that kept him busy the rest of the year. He did a beaut of a job despite the fact that he had to use scrap lumber exclusively.

Arlo Landolt put in long hours keeping his tricky aurora instruments operating and the plastic observation domes clear of frost. Earl Johnson touched up the snow-melting and water-storage systems but put in most of his time struggling with balky heaters. Melvin Havener overhauled the Weasel and D-2 and teamed up with Kenneth Waldron to work most of the bugs out of the 30KW generators, the latter hav-

(Continued on page 30)



HALL

PARACHUTE bags full of snow for melter delivered at the station aboard tractor-drawn sled. This was before snow mine.

SIPLE

SKIJORING behind wind-propelled parachute was popular summer and autumn sport—but oh, that *sastrugi!* Had there been a 'copter around, it would have been a tow.

MANNING HAM Station KC4USN, William McPherson, RM1, contacts Stateside ham preliminary to linking a station "Knight" with his home folks. Everyone at the Pole, regardless of rating, could operate ham rig if qualified.

OINC TUCK (LEFT), IGY LEADER DR. SIPLE.

LT HOWARD C. TAYLOR, MC, STATION DOCTOR.

ing cut out frequently leaving the station blacked out.

Ed Remington set up his equipment in the cold lab and put out his snow markers at varying distances around the station. He was delighted when it was decided to start a "snow mine" just outside the garage to dig germ-free snow blocks for the melter. It meant water procurement could be combined with his studies of subsurface snow and ice.

The South Pole Weather Bureau—Flowers, Guerrero, Hansen, and Johnson—had its hands full not only with setting up weather instruments and radar but also with hourly weather observations. Dr. Taylor was pushing to finish sick bay by twilight although summer had been easy on ailments—all hands had enjoyed the best of health and there had been no snow blindness, no major frostbite.

Dr. Siple was up to his ears co-ordinating the scientific projects and starting the mammoth inventories of IGY equipment; LT Tuck was similarly snowed with resupply problems. And Chester Segers, of course, put in full time preparing three square meals a day. At first the pastry suffered from the high altitude but, after considerable experimentation with the recipes, Chet was producing excellent pastry.

March 23 came. All deadlines had been met and the day was celebrated as a holiday. Now the nine IGY scientists could get down to full-time work and the rest could get in some Monday-morning-quarterbacking. It *had* been rough, no doubt about it. More than 730 tons of construction material and equipment had been earmarked for the Pole, most of it delivered . . . mostly by airdrop. Delicate precision instruments were flown in by shuttle planes. But plenty of requested items never got there. Building materials, one very critical shortage. All hands were early warned to save *everything*. They did. Every bit of scrap was inventoried and used. Austerity of construction was insisted on. Electrical wiring was prefabricated in sections and installed pronto to avoid freezing.

From here on in, the only outside work would be weather observations and snow-mine studies. The four weather men had been on the job since the middle of January when the met instrument shelter had been completed. On March 24 in a brief, bone-chilling ceremony, the flag was lowered at the South Pole. In minus-80-degree cold with a 15-knot breeze and a darkening sky, the Stars and Stripes crept downward for the six-month night.

The otherwise pleasant atmosphere was marred by a minor disappointment. In CONUS, a National Gin Rummy Tournament had been launched, sponsored by LasVegas Charities, Inc., and using Oswald Jacoby Gin Rummy Rules. Undaunted by distance, the base named Chet Segers as its candidate and CAPT Dickey (from LAS) offered a brand new 1957 model king-size tabular iceberg 25 miles long, 10 miles wide, 100 feet above water, then hovering at the edge of the Ross ice barrier as grand prize. Segers was leading Roger Beck of the *Los Angeles Mirror* when ham radio transmission deteriorated forcing cancellation of the match.

SIPLE

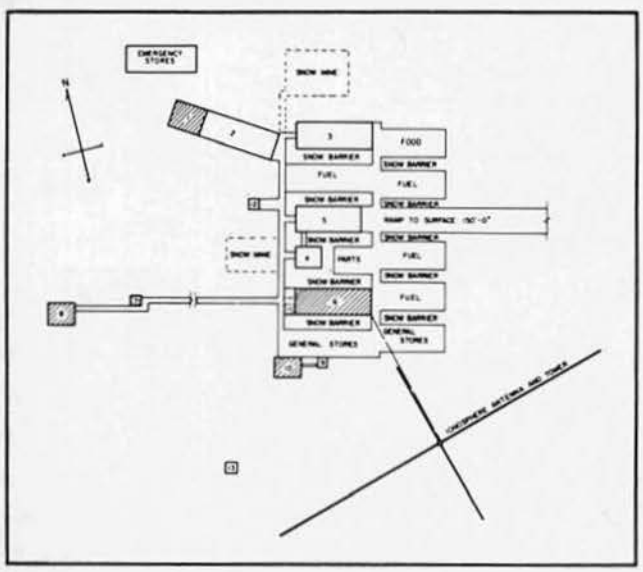
POLISHED SPHERE (LOOKING UP FROM BELOW) ATOP BAMBOO FLAGPOLE REFLECTS SETTING SUN.

SIPLE

EIGHTEEN MEN (AND FRIEND) STAND AT ATTENTION AS THE FLAG BEGINS TO CREEP DOWN ITS POLE.

MARSHALL

WANING LIGHT of autumn illumines station. Beyond domed aurora tower to right are shelters of deep-drilling rig for ice coring; ionospheric sounding mast to left. Wind-vane mast at right marks office where meteorological data was processed.



Lonely is the Word for Byrd

There is a remoteness about Byrd IGY Station far and beyond mere ground distance. It almost seems to belong to another world and, in a sense, it does for Marie Byrd Land is one of the least known corners of Antarctica. Since its discovery in Byrd's 1928-30 expedition, it has beckoned for attention.

Ever since the Scott Expedition of a half-century ago left records of "pressure waves" originating in the neighborhood of 80°S., 120°W., waves that affected weather in remote parts of the world, meteorologists had been itching to study the spot. Byrd himself, in the 1933-35 expedition, pushed deeply into the area at several points. But the deepest penetration at ground level had to wait until *Operation Deep Freeze II* when the advance trail party for the IGY station reached the heart of the area. Supported by aircraft, huge tractor trains bulled their way through treacherous crevasse country to establish the base.

By the end of January 1957, four prefab buildings were up. Wintering-over personnel were planed in to relieve those whose jobs were finished. The second tractor train arrived February 12 bringing more building materials, stores, and scientific gear.

Air support, however, was still on the move. The C-124s were air-dropping fuel and every few days construction had to be interrupted to recover the drops. VX-6 was coming through with critical supplies but with lessening frequency. To top this, one big crate of badly needed clothing was long-gone-John in a 25-knot wind when the Weasel broke a track trying to retrieve it. On March 8 the last R4D flight brought in an important cargo and departed the same day for LAS. This was the last contact with the world of men until October.

With the airdrops out of the way, the Byrdmen could concentrate on building. Or could they? It seemed that every job, no matter how simple, was beset with complications. The fuel haul was a chore —caches were heavily drifted and the drums had to be rolled by hand into the tunnel. Ah, that tunnel! After its completion the snow sled could no longer be drawn close to the melter due to drift so routine was changed to shoveling directly from drift to melter, a backbreaking job. Cave-ins from drifting snow were on a scheduled basis.

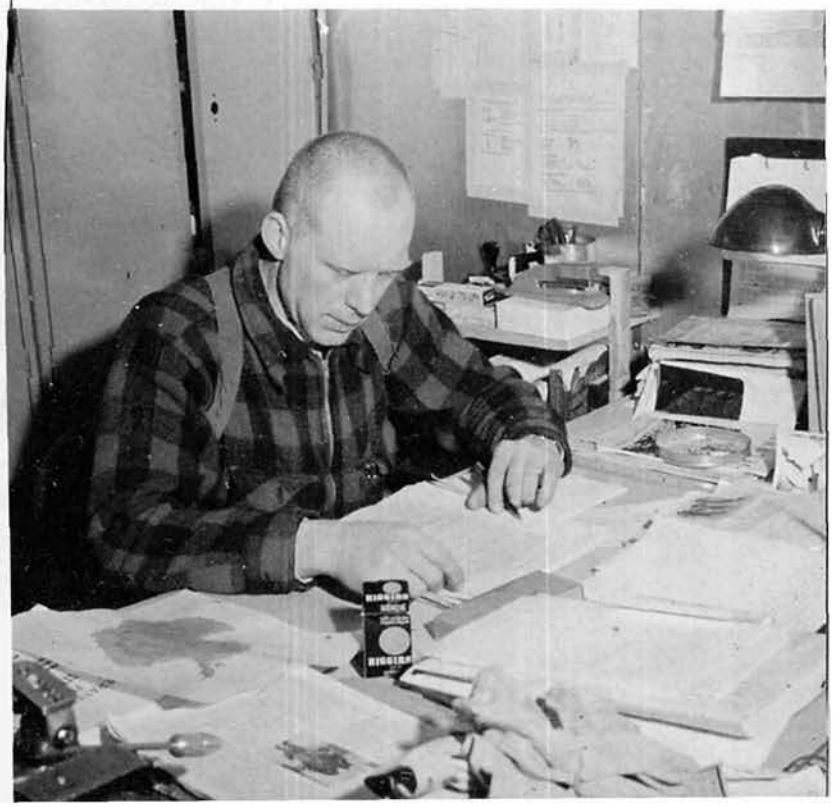
But despite difficulties the buildings went up—the science building, an inflation shelter, two geomagnetism buildings, a rawin dome, and the aurora tower. Tunnels connected these units in time. Two seismology pits were dug and covered to prevent drifting snow. Fuel and supplies were stored in marked caches, fire breaks were made, and the station was in business.

Late in February a traverse party of five scientists had arrived in three Sno-Cats. Their arrival brought the station's complement to full house—10 military under Dr. Brian C. Dalton (who also doubled as station doctor), and 13 IGY personnel under George R. Toney.

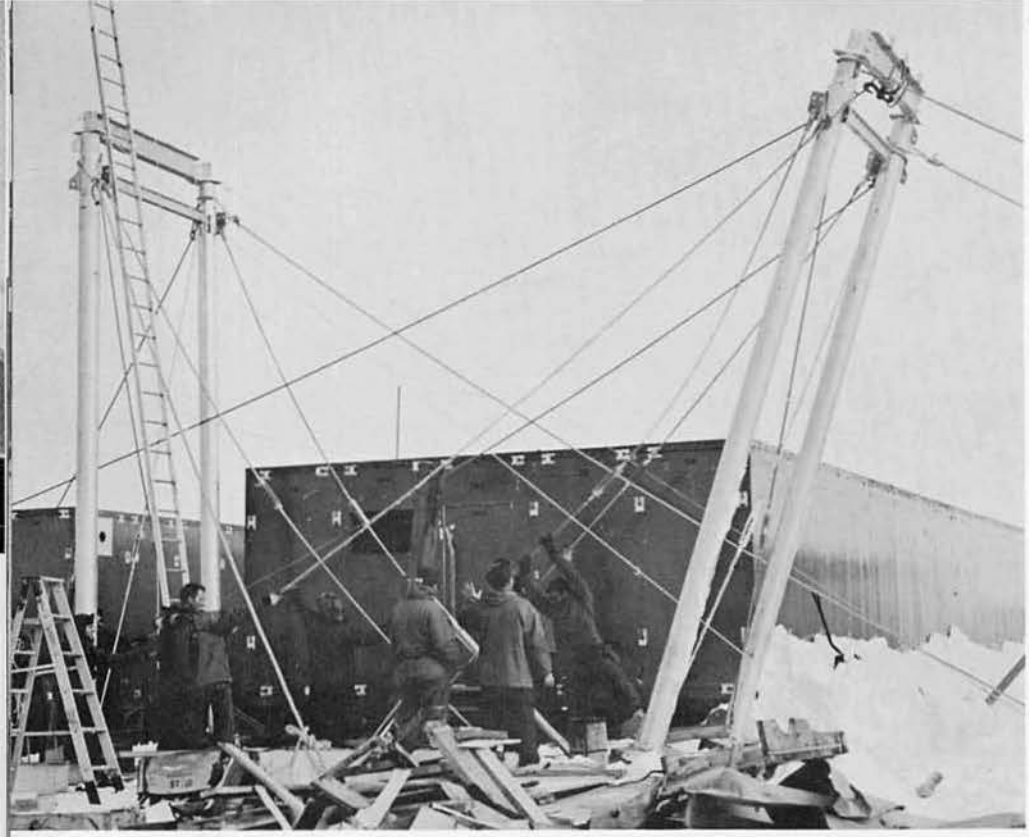
Byrd Station's IGY program is identical in scope with that of the Pole Station. By early April, the scientists had discovered to their surprise that the icecap under their feet reached down 9,750 feet in certain spots. They clung to their belief that the ice rested on land but so far they had found no proof to support it. The glaciological-seismic traverses to be made later were expected to provide many answers.

(Continued on page 36)

STATION COMMAND was in hands of Dr. Brian Dalton, Navy CO of Halifax, Mass. (left), who doubled as station doctor, and George R. Toney, IGY station scientific leader. This was Dr. Dalton's first Antarctic expedition; Mr. Toney was experiencing his first wintering over but had arrived in Antarctica during *Deep Freeze II* summer.



Busy,



USNC-IGY

BUILDING was big job during autumn. Aurora tower is raised on stilt-legged foundations (top) and braced to withstand savage winds experienced at Byrd. More of a cut-and-dried proposition were the panel huts of prefabricated design (left, center above), but pipes and pipe-fitters were needed for all (right). Byrd was whacked by a big storm later in the year.

POWER and communications were vital. A good power distribution system (left) kept the station perking. Electronics technicians like W. D. Welch (center) and radiomen like Gordon Abbey (right) made life a little more liveable for Byrdmen.

Building Byrd

USNC-IGY

FROM SNOW to chow in six moves. Shoveling preceded many a meal at Byrd. Not only was the entrance to station perpetually clogged with snow, so were the storage tunnels (top center) which had to be kept clear. Station cook (left) draws supplies from natural "reefer" (left) and shortly after, there's your meal, sir, and in another wink of the eye it's chow down!

SIDE BY SIDE WORKED SAILOR, SCIENTIST, MILITARY MD.

USNC-IGY

AUTUMN

But the daily grind went on apace. To pretend it was less than aggravating would be to deceive. At times, it was maddening. Living conditions were extremely crowded. Due to late decisions and choice of materials sent via tractor train, there were many shortages. Beer, for example. Such shortages can drive a man to drink.

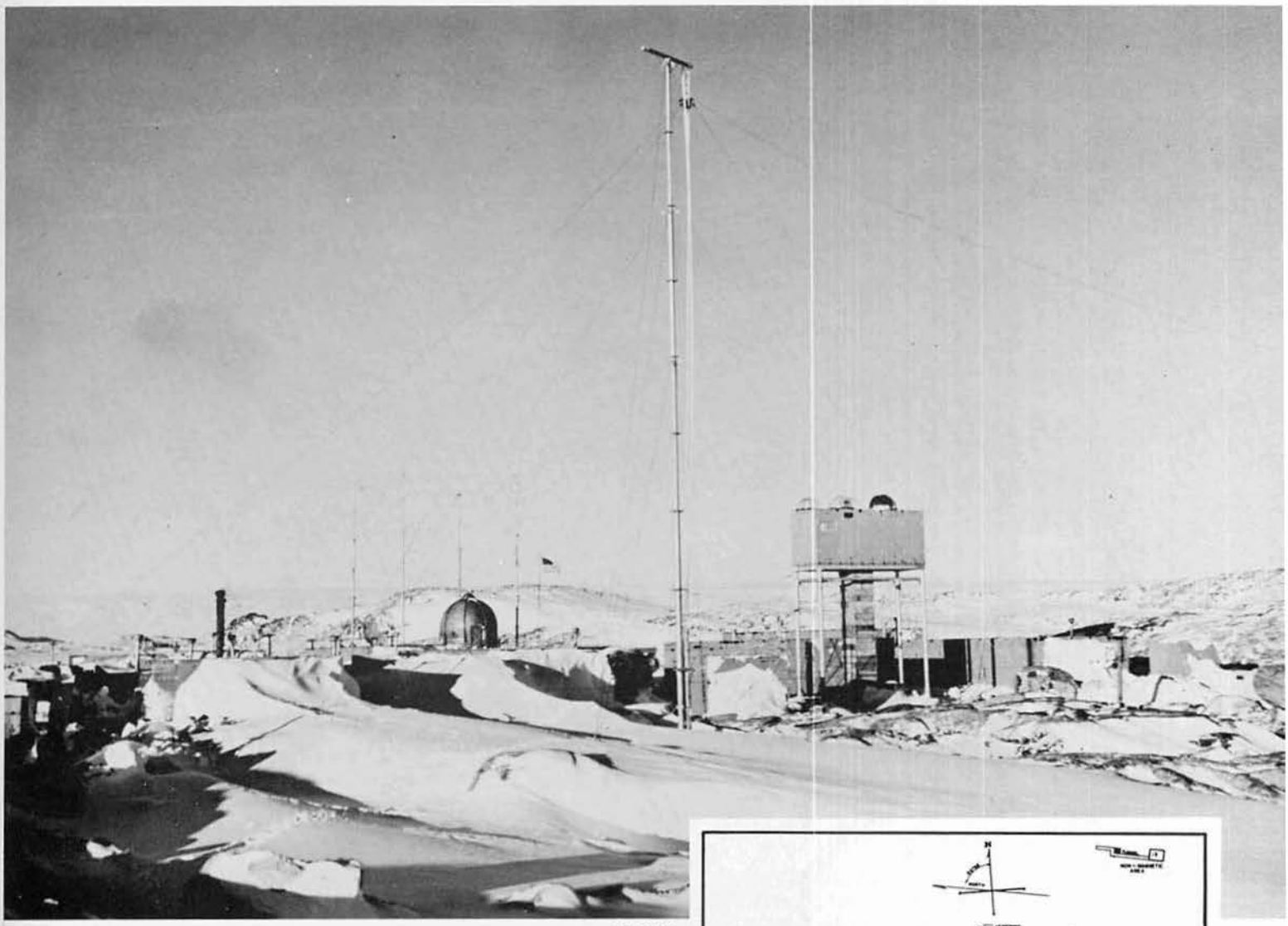
And yet, out of all the frustrating mishmash emerged a well-run station which accomplished its mission in the face of big odds. By sundown, not only had the important chores been done, there was a rhombic antenna for the amateur radio that was bringing in good signals from Stateside hams, the Byrd Station Choir had been organized and was appearing at Sunday religious services with great success, and the entire station was enjoying the increasingly beautiful auroral displays.

The last sunrise of the season came significantly on Easter morning. To and from this isolated station 647 miles west of LAS came special messages for the occasion. At sunset on April 21, as Easter Sunday drew to a close, the flag at Byrd Station was lowered, a tape-recorded taps sounded across the bleak snowfields, and 23 men went back to work.

C.C. BRINTON BREWS SWINGSHIFT COFFEE.

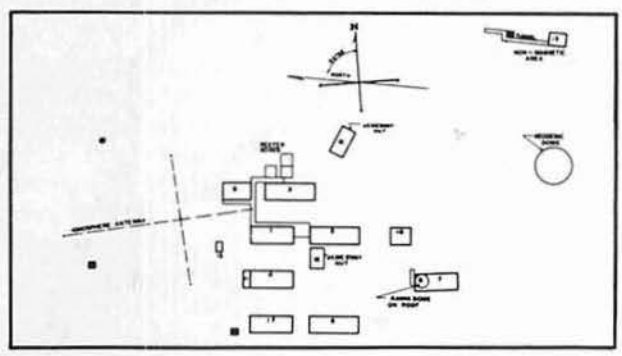
BYRD "KNIGHTS": Back, l. to r.; Morris, Barden, Lowe, Giovinetto, Johns, Penrod, Welch, Abbey, Helfert, Davis, Hale. Middle: Bentley, Anderson, Toney, Dalton, Ostenso, Reynolds, Nichols. Bottom: Brinton, Alf, Morency, Marsh, Blubaugh.

Wilkes—North of the Antarctic Circle

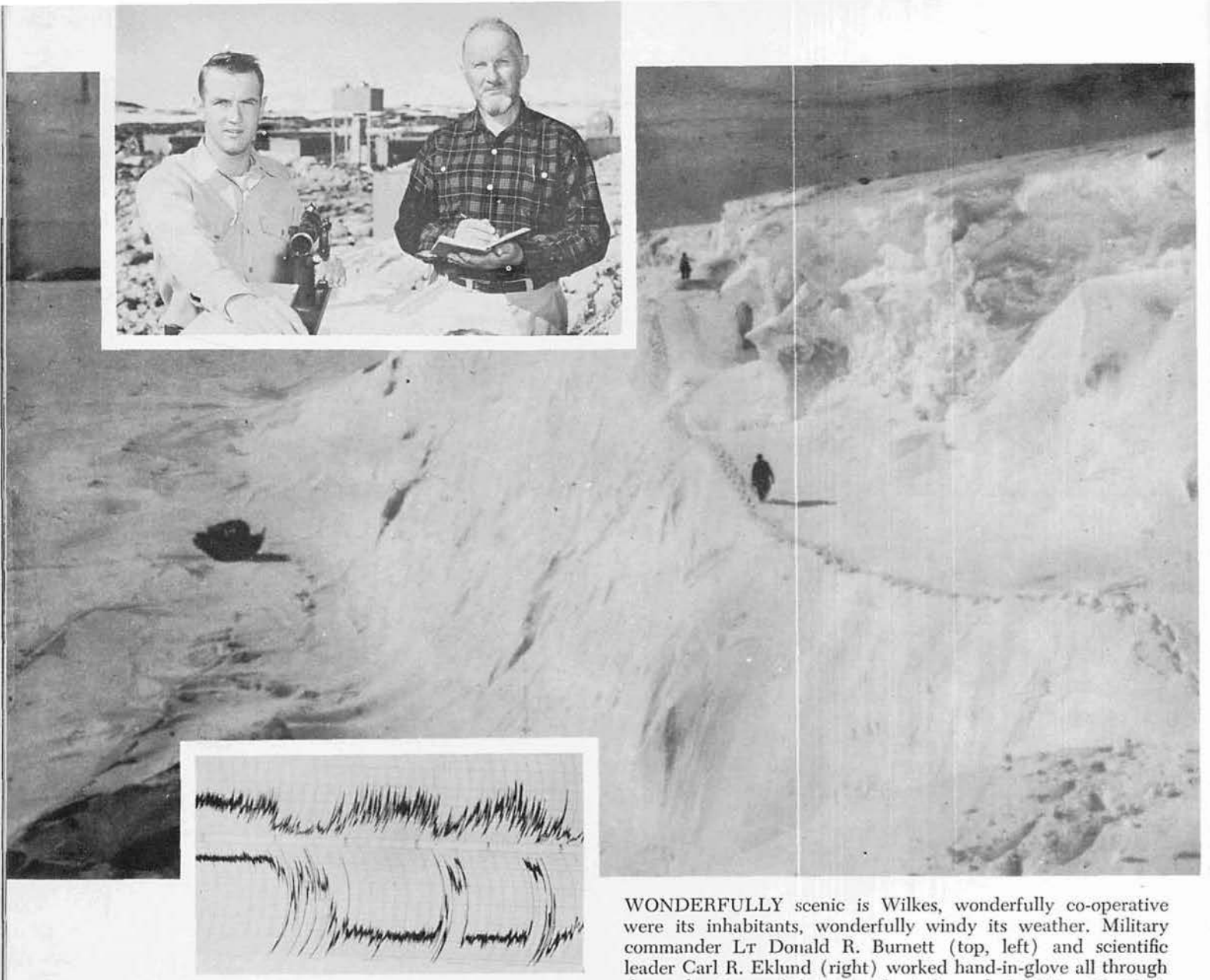


NOONAN

MAIN STATION (ABOVE) ON VINCENNES BAY.



WILKES is a name close to the Navy. LT Charles Wilkes (later RADM) led the first U.S. government sponsored Antarctic expedition in 1838-42 during which he correctly identified the great ice-covered land mass as a continent, the seventh and last, and gave it its name, Antarctica.



WONDERFULLY scenic is Wilkes, wonderfully co-operative were its inhabitants, wonderfully windy its weather. Military commander LT Donald R. Burnett (top, left) and scientific leader Carl R. Eklund (right) worked hand-in-glove all through the night. Lower left, copy of wind graph for May 25, 1957.

Wilkes IGY Station is the northernmost station of the Antarctic chain. It lies about 18 miles outside the Antarctic Circle in the "banana belt." The sun takes no holiday during austral autumn and winter, but rises and sets each day. During Indian Summer, *Operation Deep Freeze II*, temperatures of 30 above zero made construction almost a breeze. You might think Wilkes much like a CONUS assignment. It isn't.

Wilkes Land, at the juncture of the Knox and Budd Coasts, is one of the most extreme and contradictory areas of this perverse continent. Fogs, whiteouts, and blizzards kept the coast anonymous for many years even after its tentative "discovery." Neighboring Sabrina Coast takes its name from a British cutter that went down with all hands in 1839 in a killer storm just offshore. It is a land where winds rise from dead calm to 50 knots within minutes. It is a cruel land that beckons explorers while it buffets them.

The station stands on rocky Clark Peninsula (named for the captain of the USS CURRITUCK taking part in *Operation Highjump*), among the Windmill Islands (named for *Operation Windmill*) frozen tight to the west side of Vincennes Bay (named for Wilkes' flagship)—which brings us back to where we started. The area was an unknown quantity until 1947 when it was examined by helicopter during *Operation Windmill*.

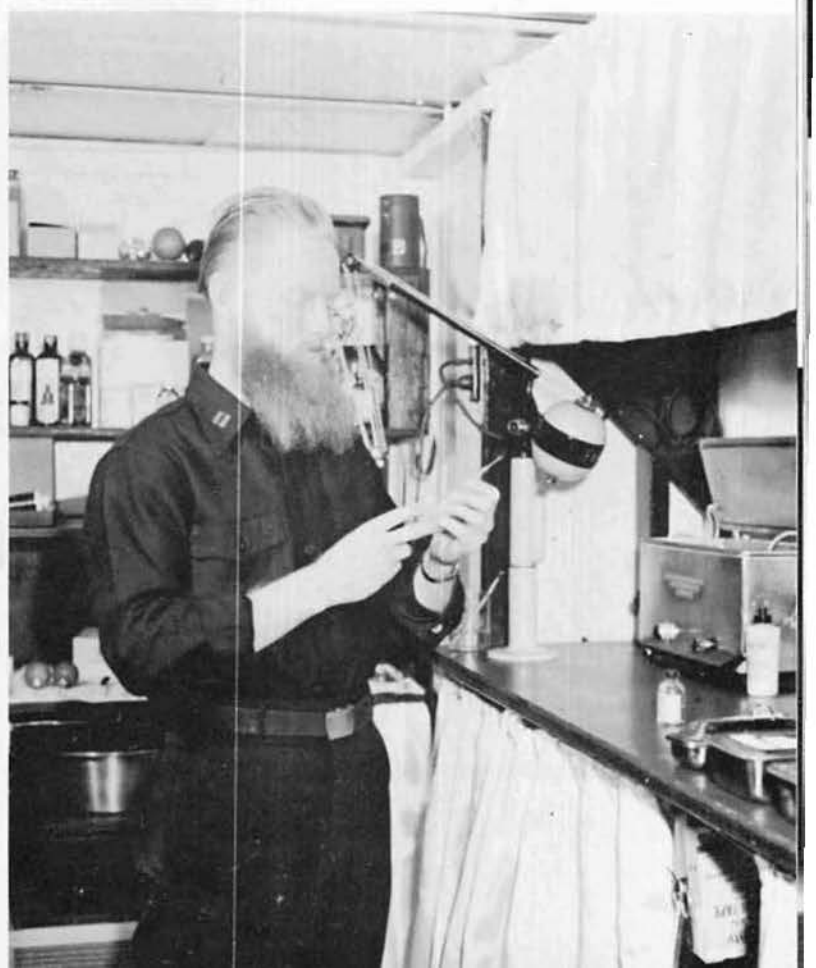
What is Wilkes' lure? First, it rounds out IGY investigations of eastern Antarctica by filling the gap between the French base on Adélie Coast and the Russian bases on Queen Maud Coast. Second, it is a close neighbor to the geomagnetic pole which makes it a good place to study cosmic rays, aurora, and geomagnetism. Third, the station has easy access (*easy!* —what'd he *say*?) to the icecap where glaciological and meteorological data abound. Fourth, Wilkes is based on a rocky foundation where seismology studies can be made. And fifth, being a maritime station, Wilkes is well situated for oceanographic studies. In fact, outside of Little America, Wilkes has the most complete IGY program of the seven stations.

PLUSH DIGGINGS at Wilkes: galley and messhall, and lounge (top left and right) with gleaming waxed floors and soft pastel walls. Below, three-stages in the building of the lavatory. Navy Seabees had charge of station utilities and their improvement but every man in the unit contributed to the decor—curtains, shelving, framed pictures, and good housekeeping.

The Base That Is Something Special

The 27-man station was housed in one of the best appointed diggings on the beat. The housekeeping, pin-neat. The housekeepers, plain old-maid fussy. The job when they finished it, perfection.

It wasn't easy. They got off to a fast enough start with the station set up in one-third the time anticipated. By March 15, 1957 scientific observations were in full swing. During March Vincennes Bay was fairly quiet and free of pack ice but midway in the following month snow had drifted heavily and the station was covered to a depth of 10 feet. There was the usual amount of warps and leaks, the normal trouble with unit heaters, the regulation quota of gripes. The aerographers griped when they found much of their aluminum chips wasted through faulty packing . . . the meteorologists griped over the lack of a walk-out door for releasing weather balloons . . . everybody griped when there wasn't a decent ice-cream maker, an extra record player, a few different movies. Then at the end of April they *got* something to talk to the chaplain about—an 83-knot gale hit and arched the roofs of several buildings and that was nothing compared to what lay ahead. *(Continued on page 40)*



LT SHELDON W. GRINNELL, MC IN HIS HOSPITAL. →

S-2 PIONEERS who established icecap station: John Molholm, Olav Loken, and Carl Eklund, standing; kneeling in front, Dick Cameron, and Paul Noonan. Noonan, who photographed venture, was the only Navy man in crew.

Operation Crampon

Despite the wide swings from mild to wild Wilkes weather failed to scotch the outdoor programs. The most ambitious, establishment of a satellite station inland on the icecap. Geographical and geophysical observations made at the Icecap Station and along the trail would provide loads of scientific data long needed. Later traverses would fan out from the satellite station deep into Wilkes Land. Observations would be made at intervals of 50 to 75 miles in seismology, magnetism, and glaciology; gravity and surface meteorological studies would be made at 10-mile intervals. The site had to be far enough inland for the climate to be representative of the entire icecap, and the snow had to be deep enough for a 100-foot plus glaciological pit.

At dawn on March 11, six men set out from home base in three Weasels and six sleds. They were Carl R. Eklund, (IGY leader), Richard L. Cameron, Rudolf A. Honkala, Olav H. Loken (Norway), and John R. L. Molholm—all IGY scientists—and Paul F. Noonan, Navy photographer. By midday, they had covered 30 miles. Behind them lay the moraine, an accumulation of rocky rubble deposited glacially, that had done its worst to balk their ascent to the 4,200-foot icecap. Late the following day, the outriders had reached their goal. It had been uphill all the way and the Weasels, fast but frail, had conked out several times. Thirteen hours and 51 miles after setting out, a four-panel Jamesway was up and a fire burned in the stove. The scientists erected a mast for meteorological studies, set out ice-movement stakes for glaciological studies.

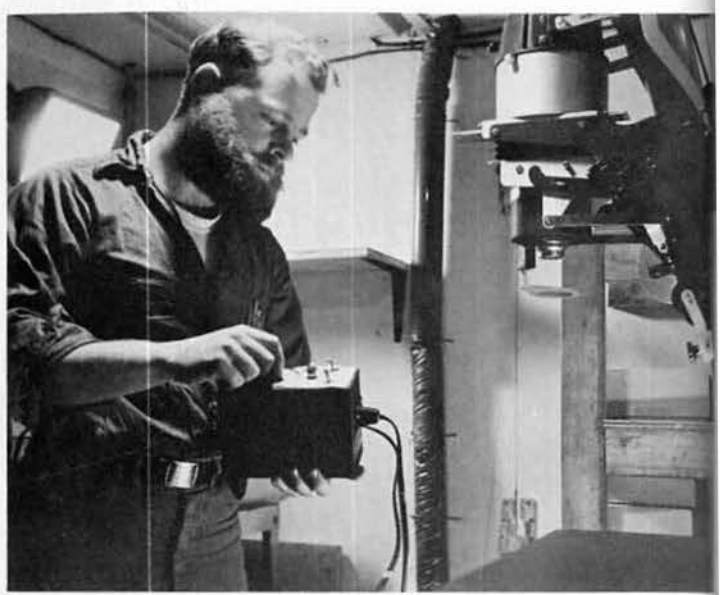
Then willful Wilkes went into action. A whiteout moved in. For three days, the six men sat in the Jamesway talking over the big supply problem. Enormous quantities of fuel would be needed to run S-2; hauling it was a job for the D-4 tractor, not for Weasels. The trek inland was a steeplechase. Your first hurdle was the terminal moraine pushed along by the descending icecap, really a classic glacier. Once past the rocky barrier you were faced with a steep, slick, icy ramp leading to the icecap proper. Beyond this the route over the icecap was easily navigated. But once there, what vistas unfolded to the imaginative scientists! There stretched the horizonless icecap rising gradually to 10,000 feet as it undulated toward the Pole.

By the 16th, the weather had cleared for the return trip. Leaving Cameron and Loken behind to continue their ice studies, Eklund and his three colleagues set out on the downhill journey. When they reached Vincennes Bay, they huddled with the others. It was decided to run tests to see how the D-4s would perform in place of the Weasels. By the end of the week, it was apparent that the heavier unit was in. One of the tractors, with steel cleats welded on the tracks to prevent side-slip, had already ground its way to the

(Continued on page 42)

HALL

"SOMETIMES I HAVE A FEELING OF BEING ALL ALONE IN THE MIDDLE OF NOWHERE..."



PAUL NOONAN, PHOTOGRAPHER, IN DARKROOM.

NOONAN

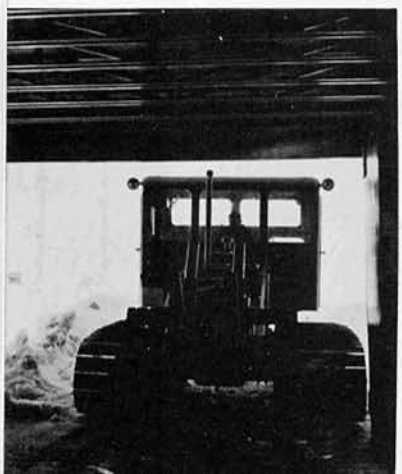
GLACIOLOGY was an important part of IGY program at Byrd and Wilkes Stations. Here is typical snow pit looking up; glaciologist (inset) is making an ice coring. Wilkes S-2 pit, six feet square, was dug to depth of 115 feet, the deepest glaciological pit for stratigraphy studies ever dug in world. At that depth, the ice dated back to the year 1875; later during the winter night, the pit was pushed 85 feet deeper, carrying it to 200 feet, and this ice dated all the way back to the year 1500 A.D.

NOONAN

FIRST tractor train gets under way as LT Burnett, in charge of cavalcade, and Bob McIntyre, prime mover mechanic, climb aboard D-4. Below, McIntyre beside train.

WEASELS equipped with two-way transmitters (left). Travelers were equipped with cold-weather garb (right).

REPAIRS were frequent and numerous as D-4s limped home to be babied by Acy Patterson (below) and others.



Icecap Station to rescue two Weasels that had broken down. The descent down the treacherous ramp had been no picnic but the method had promise. So on April 9, after repeated delay from storms and equipment headaches, the 20-ton tractor train set out.

The trip had a dual purpose. Two 10-ton bobsleds carried 32 drums of fuel for the satellite station and 100 empties to mark the trail. Unfortunately, the cleated tractor was out of operation but it was no sweat until two-thirds of the way up the icy ramp. Trying to pull both sleds at once, the D-4 was balked at every approach. Finally, the sleds were towed up one at a time and from here on the bone-rattling haul to and from "S-2" became routine.

HELLO OUT THERE!

On March 20, 1957, radioman Don Bradford pulled his mike close and spoke, "CQ KC4USK!" In the crowded little radio shack, every man held his breath. Through the faint crackle of static the answer came—"KC4USK . . . K6FCY!" One big grin spread over the whole group. The hams had done it again. Wilkes had called and March Air Force Base ham shack in Riverside, California had answered.

Hardly a day passed that someone at Wilkes did not talk home. Fred Charlton's long hours installing the equipment paid off in soaring morale. Before winter set in, nearly all of the (then) 48 States had been contacted as well as foreign countries. The station's IGY leader held the long-distance record, reaching his family in Chile via Minneapolis and involving four stations and phone patch, the voices traveling about 15,000 miles to and fro. But the best CQ of all was Dick Cameron's DX to his wife in Germany soon after the birth of their son.

At Wilkes, there was a wildlife program not found in any of the other U.S. Stations. Carl Eklund's duties, in addition to those of scientific leader, included zoölogical research. Bird banding, animal population studies, and egg incubation studies were made with highly rewarding results in scientific and entertainment fields.

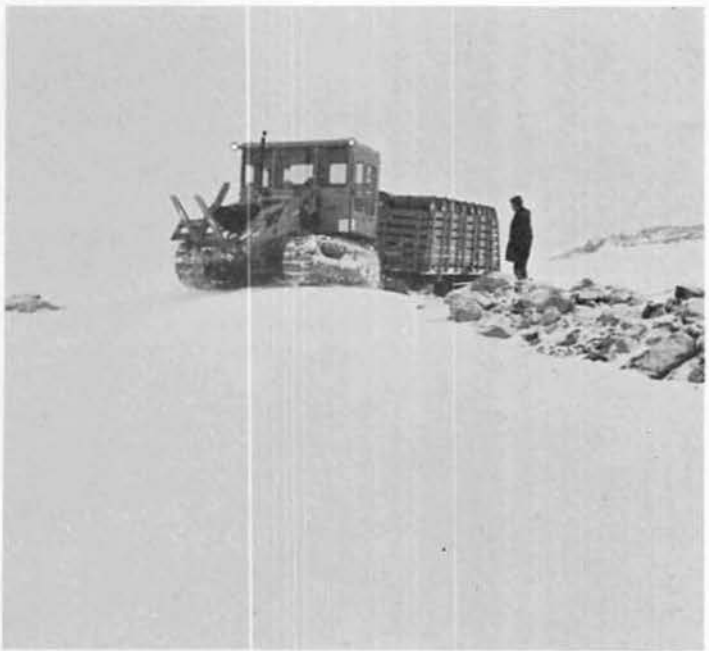
The skua is the killer whale of the bird kingdom. It is predatory, dieting on the peaceable penguin and its eggs; it is brassy, attacking a man without hesitation. In short, it's an unlovable character. So when Eklund set up three cannon, aimed them at a 10° angle, dropped his arm like Wellington at Waterloo, the deafening salvo that followed caused the onlooker to say, "Serves 'em right." But what happened was no decimation of the skua horde. (For what happened, see page 46.)

An aerographer who had been around assured Wilkesites that their barometric variations were the most erratic he had ever experienced, more violent than those of a Pacific typhoon. True, the highest wind gust to date had been only 102 mph but the 150-mile winds of nearby Russian bases were warning enough to batten down everything outdoors. Around the camp guidelines were strongly relied on. The weather was worsening as autumn moved into winter.

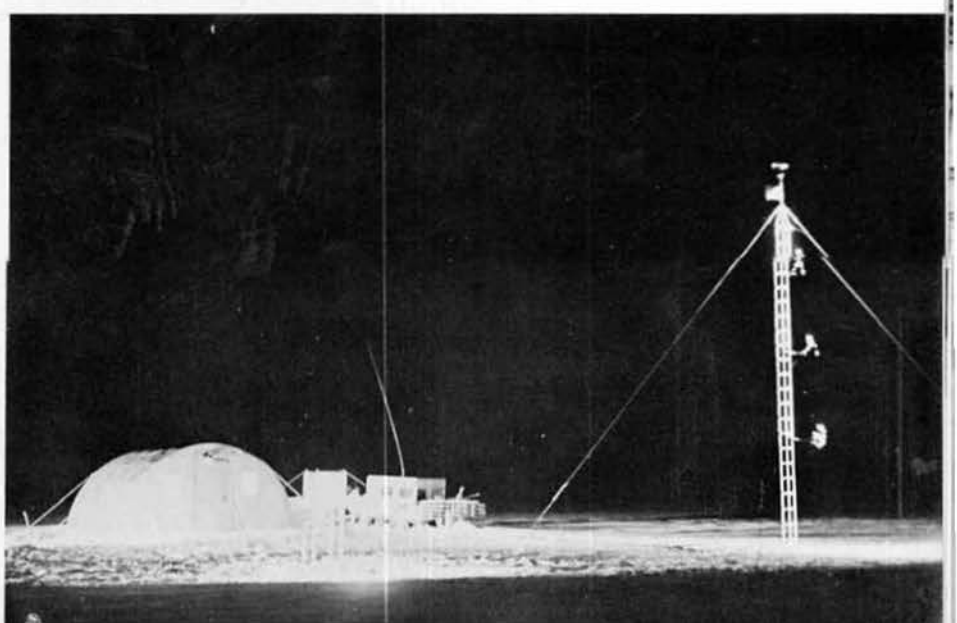
(Continued on page 45)

CATERPILLAR TRAXCAVATOR WITH WEASELS AND SLEDS IN TOW HEAD INLAND ON FIRST TRIP TO SITE #2.

TRAIL markers of empty fuel drums (left) are placed on first trip up icecap. Moraine-laced country (right) made for rough going much of the way. According to one Wilkesite, the moraine looks like a neatly stacked New England fence and the "ramp" a fiendish toboggan.



ON SITE, shelters for living and for instruments were up in hours. Right, multiple open-flash exposure of S-2 at nighttime.



MOLHOLM CHAOTIC SURFACE OF VANDERFORD GLACIER MOVING SEAWARD AT RATE OF ABOUT SEVEN FEET PER DAY.

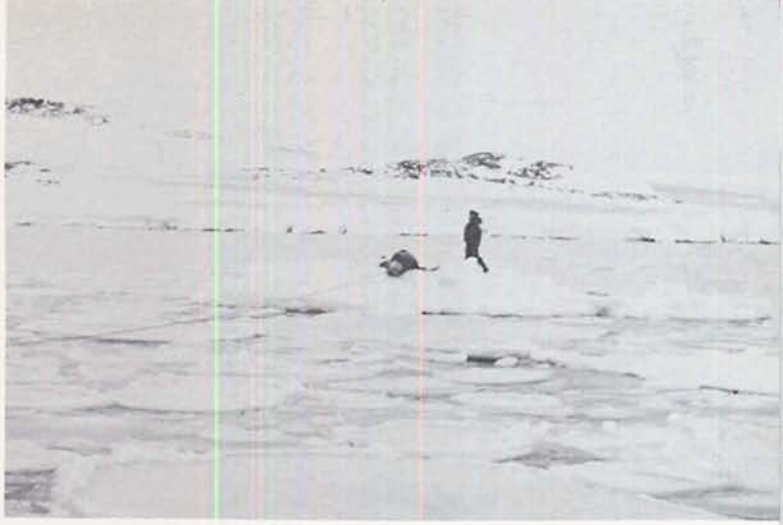
DIETRICH "ICEBERG ALLEY" JUST OUTSIDE VINCENNES BAY, SPECTACULAR SHOWCASE FOR NORTHBOUND BERGS.

But the capturing of a rare Ross seal in nearby Frogman Cove was the triumph of the season. It was a day in April. Olav Loken spotted the seal lying on an ice floe, gave it the double-0 through binoculars, then hurried back to the station to give the word. From a hill overlooking the cove, the men watched as two riflemen, cautioned not to hit the skull, fired. The seal died instantly. Then came the ticklish job of hauling in the carcass before the tide floated the icy bier out to sea.

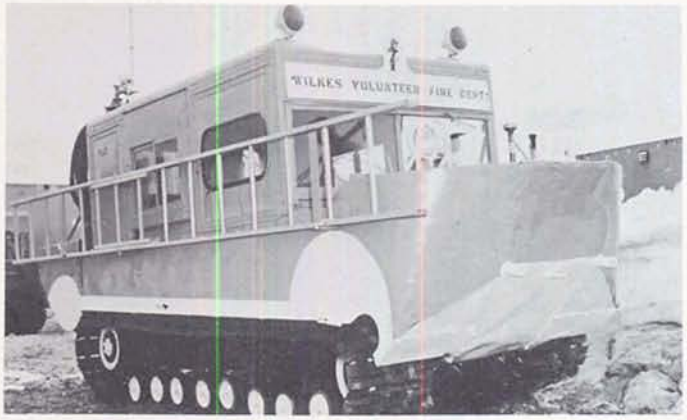
Inching along a ladder shoved out over the thin ice, Rudolf Honkala reached the seal, cut a hole in its jaw and tied a line through it. Those on shore secured the line to a Weasel and, at Honkala's signal, dragged the seal off the floe through the thin ice to shore. The 8½-foot specimen, estimated to be between 700 and 800. pounds in weight, was earmarked for shipment to the National Museum.

IGY men Gilbert Dewart and Dick Cameron flouted the season, however, and set out in two Weasels for Haupt Nunatak about 25 miles down the coast. Their short snort was extended to two long days when their batteries went dead and a blizzard closed in. The weather cleared somewhat so they proceeded with their glaciology work while awaiting the rescue party but it was rigorous. "We don't want to be famous," was their motto, "we just want to be warm."

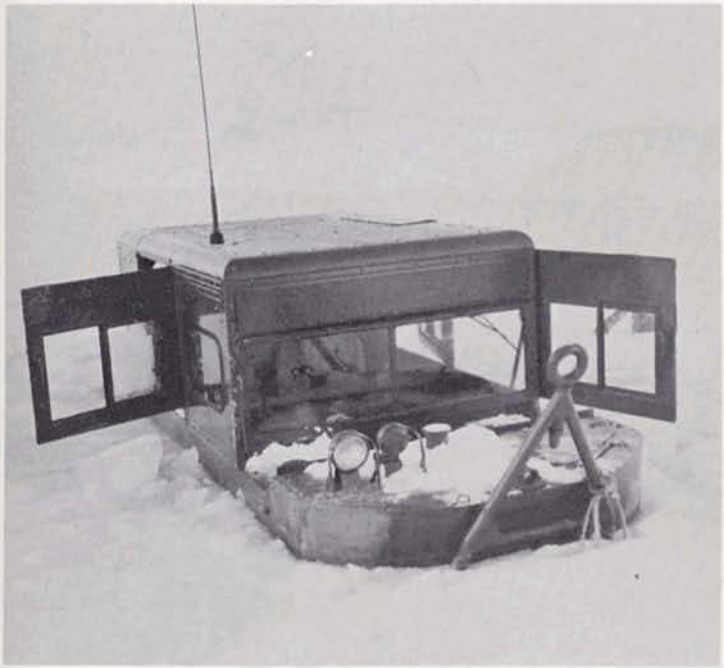
As May advanced, so did the snow depth—now up to 12 feet. "Iceberg Alley" paraded its most magnificent display of 100 bergs, all visible from the station. Then a typically sudden storm which swept the bay clean of floes blew the austral winter into Wilkes.



WEASEL HELPED BRING PRIZE ROSS SEAL ASHORE.



WEASEL FIRE ENGINE SERVED NOBLY AT WILKES.



CLOSE CALL at bay. Three men—Eklund, Molholm, and Lt Grinnell—were crossing 10-inch-thick stretch of bay ice when their Weasel suddenly plunged through. Only one of them got a dunking in addition to nerve jolt but the treachery of the ice put everyone on guard. Weasel was dragged ashore unharmed and unchastened by D-4.

The Animal Kingdom:

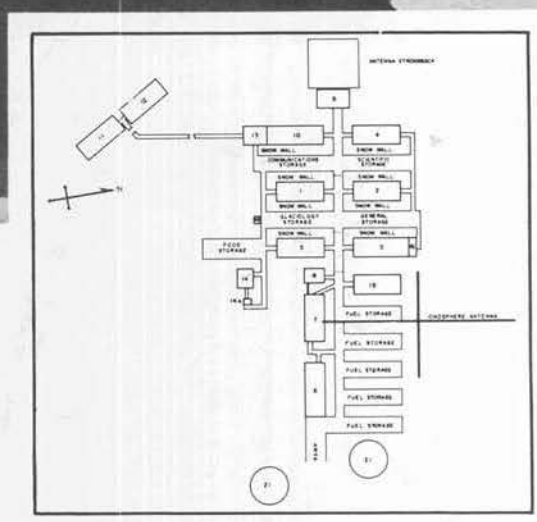
SEAL-BRANDING was a relatively painless, to the seal that is. Recording seal cries (right) was necessary but hard on the ears. Carl Eklund had the assistance of Navy men Lilienthal, Bradford, Hailstorm, Doc Grinnell, and others.

BIRDBANDING project was extensive, taking in penguins too, in attempt to learn living and migratory habits. Skuas were rounded up in the military manner. At the roar of a cannon (being charged, upper left), a huge net billowed out (below) and 1,800 square feet of seine settled over gluttonous skuas feeding on dead seals. As trap was sprung, men came running from all directions, pounced on birds and carried them to Eklund (center) who banded them with colored plastic anklets. They were then weighed (right) and released. By winter, 671 skuas had been banded, 181 more dyed scarlet. First recovery of banded bird was made by Russians 120 miles offshore months later; you guessed it! A scarlet one! Fourteen giant fulmars and 42 Adélies were also marked.

REIMER

ELLSWORTH Station, established by ships in *Deep Freeze II*, nestles about 1½ miles in on the Filchner Ice Shelf on the Weddell Sea side of the Antarctic continent.

ELLSWORTH, on the Filchner Ice Shelf, has as its military CO and IGY scientific leader CAPT Finn Ronne, USNR, son of Martin Ronne who was with Amundsen in 1911 Pole conquest, himself a notable Antarctic explorer.



Ellsworth's Acres

NAVYMEN RAY AND SPEAR ERECT SIGN.

Perched on the sea side of the Filchner Ice Shelf is the Weddell Sea counterpart of Little America—Ellsworth IGY Station. The station is named for the late Lincoln Ellsworth who made WYATT EARP a name to contend with long before the age of TV gunsmoke. His famous ship, his hardworking planes and his own indomitable courage helped peel away several veils of mystery from Antarctica in his four assaults on the continent.

Ellsworth is located east of Gould Bay at Bahia Chica (a deceptively tropical name for such a frigid spot) and is nextdoor neighbor to Argentine's General Belgrano IGY Base. Just down the shelf a piece is another close neighbor, the United Kingdom Shackleton Base, jumping-off point for the Fuchs Commonwealth Trans-Antarctic Expedition.

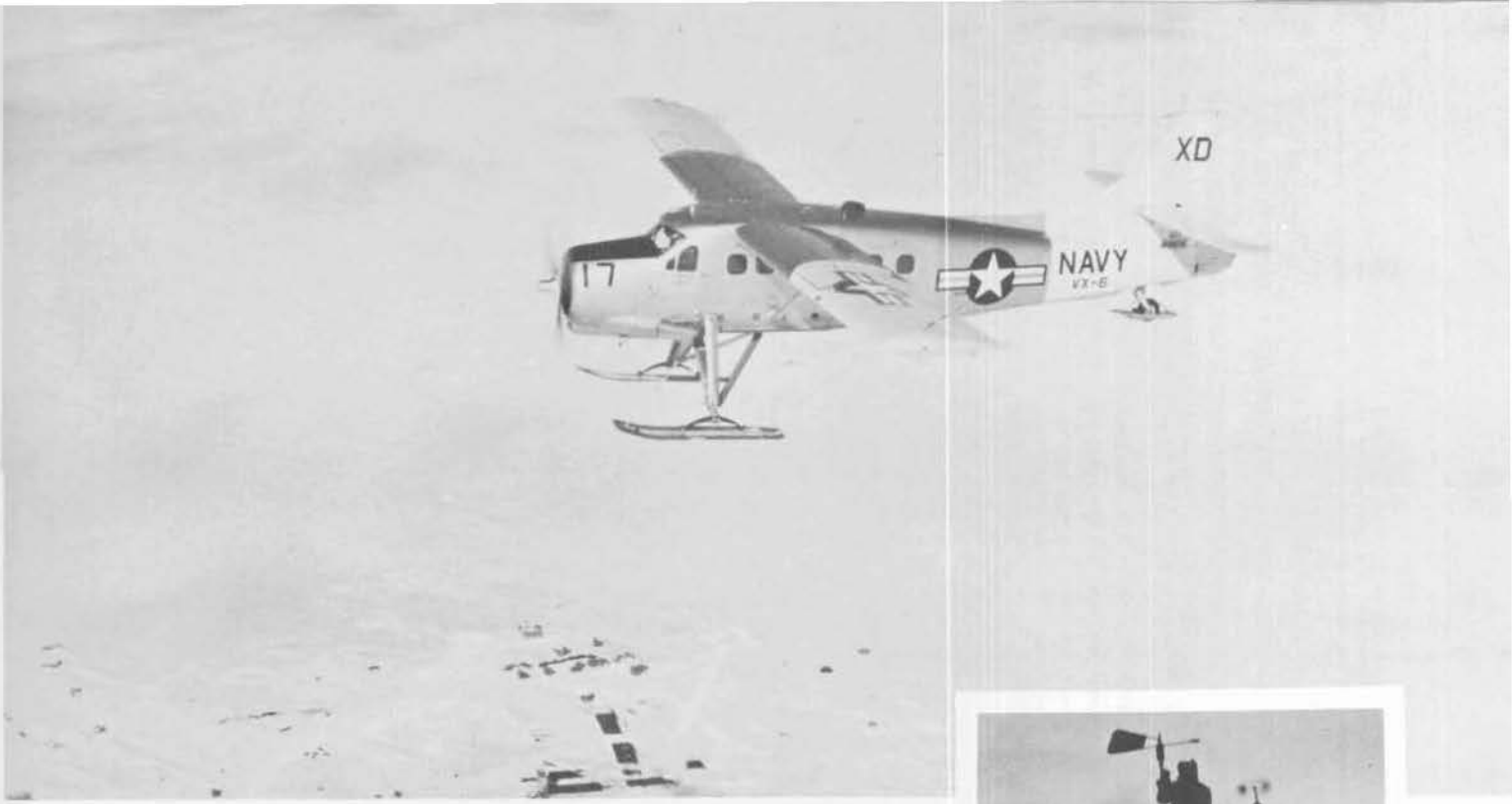
Ellsworth's scientific program, while not as extensive as that of some of the stations, included cosmic ray study. Only one other—Wilkes—had this discipline on the agenda. Ellsworth was also scheduled for important spring traverses which would fan out into the virtually unexplored heart of Edith Ronne Land. CAPT Finn Ronne, IGY station scientific leader and military commander, is one of Antarctica's foremost explorers, holding the 1933-35 Byrd Expedition Medal and the Congressional Gold Medal for his contribution to the U.S. Antarctic Service Expedition. In 1946-47, he led his own expedition to Palmer Peninsula and there wintered with 22 members, including his wife.

When the USS STATEN ISLAND and the USS WYANDOT departed for home around February 11, 1957 leaving the 39-man wintering over party, the station was three-fourths completed. In the two months of remaining light, construction was finished, a fully equipped emergency station set up (in case of fire destroying the main base), and the 11,200,000 pounds of cargo unloaded and stored. In fact, the station was considered completed and operative by April 1. "Indoor customizing" took a little longer.

Airdevron Six had been flying reconnaissance, survey and mapping flights since February 2. A little commuting took place here, too, with frequent flights to Shackleton Base where Dr. Fuchs was planning his great trek. The two bases exchanged mutually valuable information and UK personnel occasionally returned the visit. LCDR Charles J. McCarthy, USNR was *OinC of VX-6. His* air support for *IGY* activities was accomplished by two Otters and one HO4S helicopter and they put in long flying hours before heavy weather socked them in for the winter.

Antarctic flying is a tough job even before you get off the ground. Each flight requires about three hours' work by the flight mechanic prior to take-off: snow must be brushed off the plane, ice melted, engine preheated, and fuel must be pumped in for the most part

FUCHS AND BRITISH COMMONWEALTH TRANS-ANTARCTIC EXPEDITION DINE AT ELLSWORTH.



PRELIMINARIES to flight are long, arduous. Otter (top) finally gets aloft after weather experts (shown far right setting up wind-speed-and-direction tower) have given green light; after VX-6 boys have done a snow job (above); after Lewis and Beiszer (right) have warmed engine with Herman Nelson heater. Then tune-up and go!

by hand. All this, in addition to regular engine checks, is required by the Navy for air safety. In the background, also providing safety to the airmen, were the three aerographers who devoted their time to studying weather conditions. Three eight-hour shifts provided a round-the-clock weather watch and made possible the considerable number of flights—one of them more than 200 miles inland—before winter arrived. This happened far in advance of sundown.

By the end of March, proficiency flights were closed down for the season and the aircraft was secured. The two Otters were snuggled into a U-shaped space created by the placement of the crates in which they had been shipped down.

Ellsworth had more than its share of miracle workers. Every man Jack had a superhuman load to carry and there were some that broke records right

(Continued on page 50)

and left. For example, James L. Hannah, a Seabee from Texas it goes without saying. As the Seabees' only electrician, Hannah was kept busy days and often nights completing the five-generator powerhouse, wiring connections for the 17 buildings, and wiring for the storage tunnel lighting. As a result of his efforts, the station soon had electricity 24 hours a day like any Stateside metropolis.

Another wizard, Robert E. Haskill, kept the station in touch with the rest of the world in the face of huge odds. Before radio operations could begin, five transmitters, seven receivers, and mobile equipment had to be set up. Haskill and Kenneth K. Kent, got the first big job done then "Pepe" became an outside man. With another Merlin, Charles W. Forlidas, he helped raise antennas in temperatures as low as –35°F. With all equipment on the line, you might think that was it. But no. The equipment, intended for ordinary shore installations, had to be adapted to the local conditions. Ice continually building up on the antenna wire had to be removed to cut down transmission difficulties which, heaven knows, were tremendous. (This sector had prolonged periods of radio "blackouts", particularly during the early months of occupation.) But thanks to its super radiomen. who worked around the clock on 12-hour shifts, Ellsworth handled a considerable amount of radio traffic.

But admittedly, the most gone guy in the whole outfit was Navy cook Edward H. Davis. As a morale builder, he was unexcelled. Dave hit the deck at four a.m. to get early breakfast; his day ended at 7:30 in the evening. Six days a week with a half-day off on Sundays . . . and the main thing, his cuisine was the best this side of Luchow's. One VX-6 crewman gained 25 pounds in five weeks but Davis explained it reasonably. The men were eating one and one-half times their normal amount of food, mostly proteins. Protein consumption was twice that of a Stateside base; carbohydrates intake was one and one-half times normal consumption.

The methodical iceshelf chef was serving veal and pork first (because it lost flavor fastest), and saving the beef for last. There was a two-month supply of veal, pork, chicken, and liver after which fresh meat rations would be supplemented by canned foods. There would be no complaints to the management in *this* restaurant.

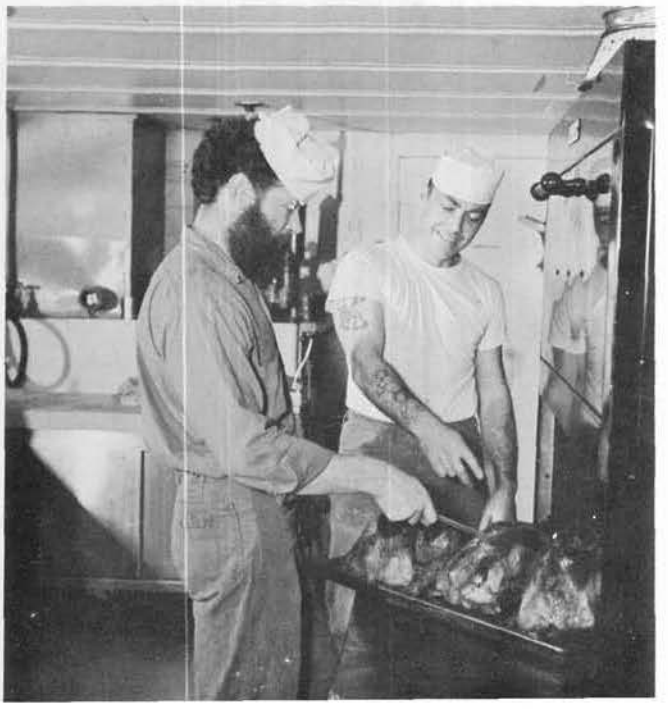
On April 24, 1957, the sun slid below the bleak Weddell horizon for the last time until August brought it back. Those Ellsworthians who braved the 67-below weather witnessed a magnificent sky spectacle—the whole northern heavens flaming with crimson melting into scarlet and fading off into a cold bluish-red. Down came the flag and numb hands folded it. Everyone took a last look out over the pack-ice-filled sea a mile off the shelf, turned toward the heavily drifted station and went indoors.

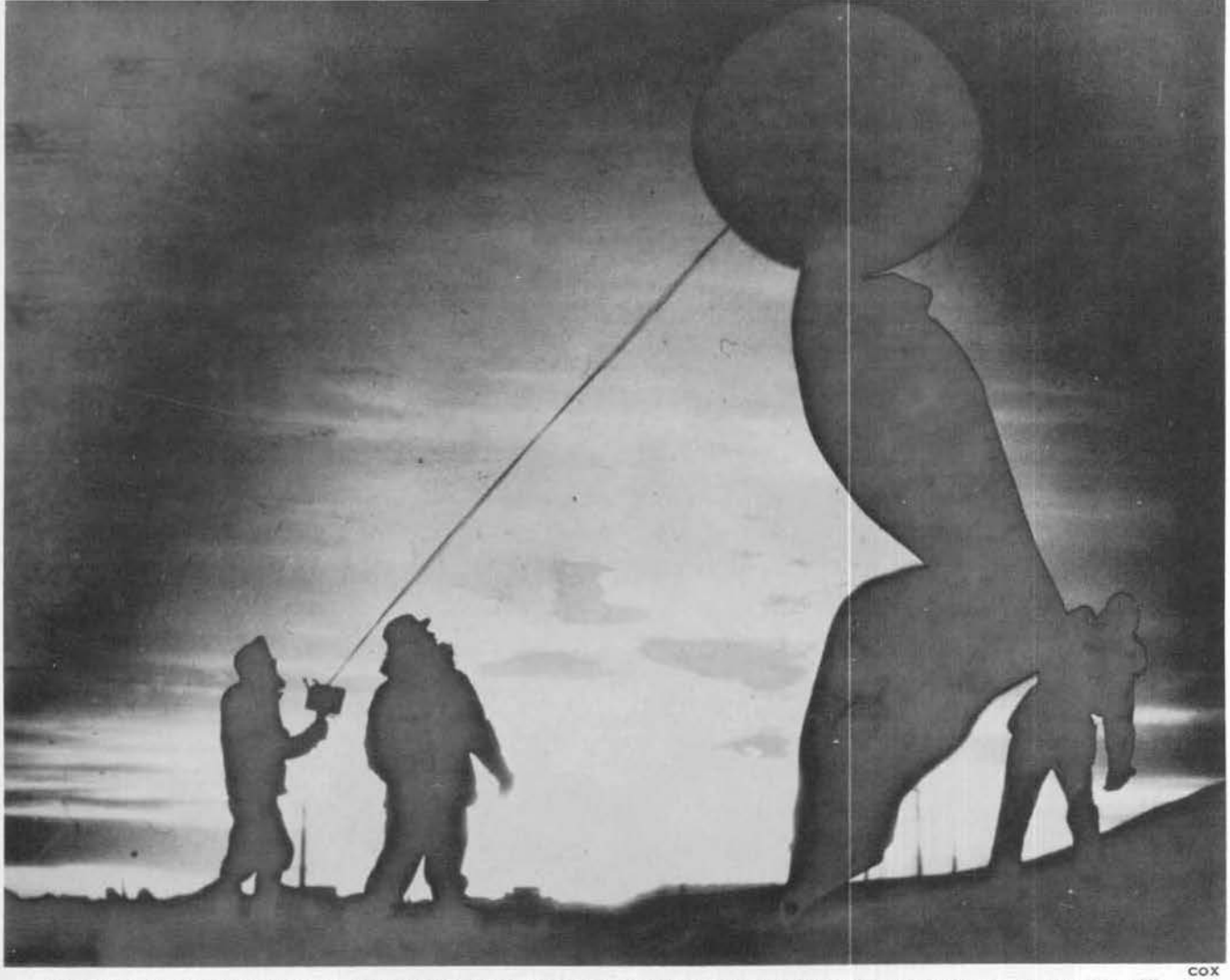
Except for brief excursions on "must" jobs, the outdoor life was ended for the season. The churlish Weddell hurls "normal" winds of 50 miles per hour and "average" temperatures range from –20° to –55°F. So the station with its interconnecting tunnels, its cozy rec building, its comfortable living conditions looked plenty inviting. Movies every evening, pool, ping-pong, shuffleboard, and hobby craft—it all added up to a fair shake for everybody.

The IGY men had begun their operations within two weeks of the ships' sailing and by this time had worked up plenty of momentum. They had an interesting, virtually unscratched sector to probe. The station, built on the 900-foot-thick iceshelf, actually floats on the water about 138 feet above sea level. The nearest land is 80 miles behind the station, the point to which the shelf is attached. Instruments have placed the ocean depth beneath the station at 2,500 feet. In time, the ice shelf to the westward will break loose and form a great iceberg, making nearby Gould Bay 12 miles wider than it now is. But for the time being, the *status quo* is solid and passively awaiting the scientists' examination.

"AND WHEN YOU FINISH CLEARING AWAY ALL THIS SNOW, YOU MAY SECURE . . ." .

ED DAVIS SHOWS DOC MATHIS HOW TO DO IT.

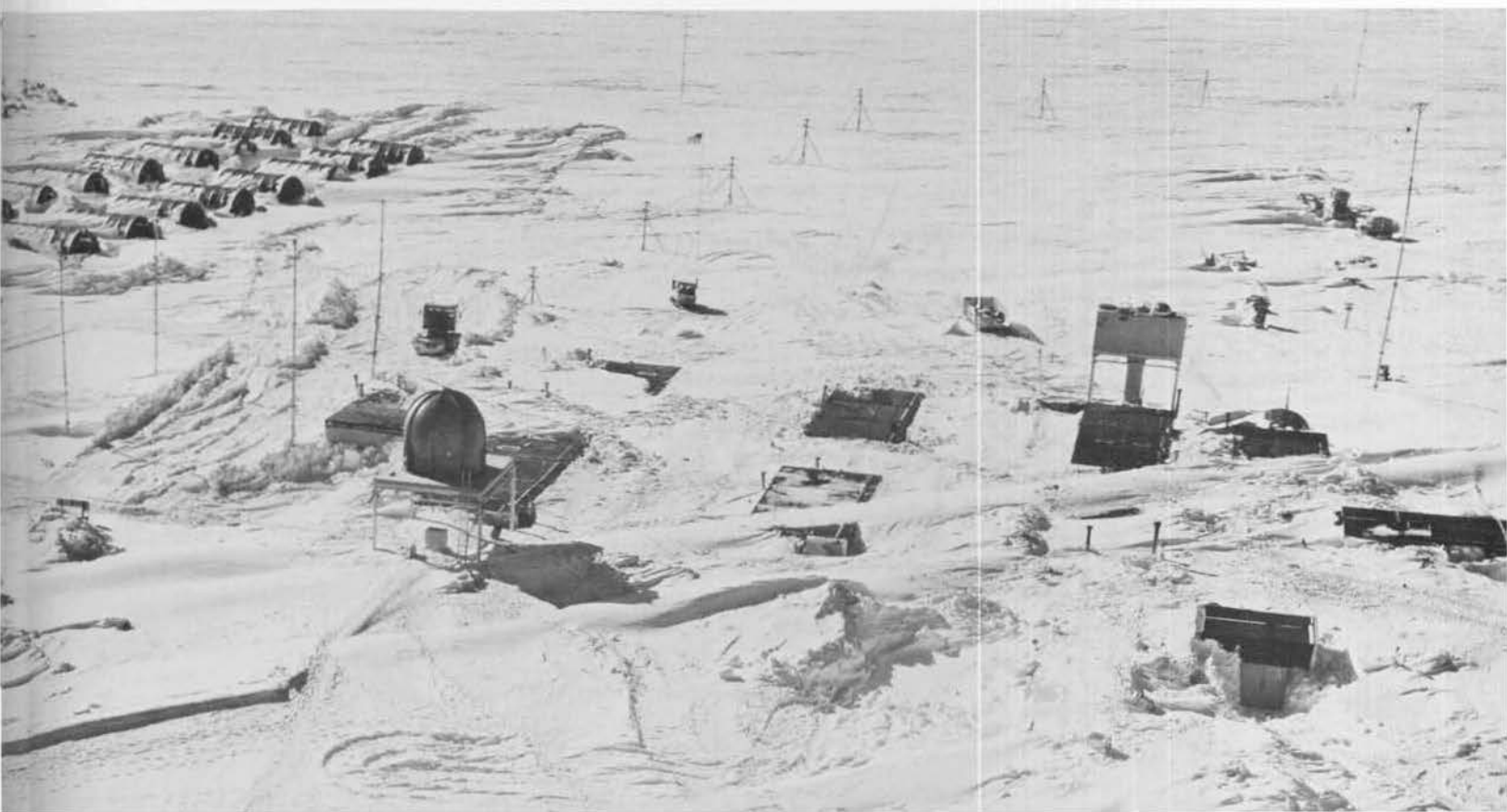




COX

AGAINST AUTUMN SUNSET, MET MEN GET SET TO RELEASE RAWINSONDE BALLOON TO UPPER AIR.

ELLSWORTH STATION AS IT LOOKED JUST BEFORE WEDDELL'S WINTER NIGHT CLAMPED DOWN.



CHARLES J. McCARTHY
LCDR. USNR
OINC, VX-6, Det.

CONRAD J. JABURG
LT, USN

CLINTON R. SMITH
LT, USNR(MC)

WILLIAM H. SUMRALL
LT JG , USNR

IGY Scientists:

Nolan P. Aughenbaugh
Assistant Seismologist

John C. Behrendt
Assistant Seismologist

John B. Brown
Ionosphere Physicist

Gerrard R. Fierle
Chief Meteorologist

J. McKim Malville
Chief, Aurora Program

Hugo A. C. Neuburg
Chief Glaciologist

Donald D. Skidmore
Ionosphere Assistant

Edward C. Thiel
Chief Seismologist

Paul T. Walker
Assistant Glaciologist

Enlisted Men →

Thomas A. Ackerman
AG3, USN, Det Bravo

Ronald D. Brown
AD3, USN, VX-6

John E. Beiszer
AD1, USN, VX-6

Gary C. Camp
AG2, USN, Det Bravo

William A. Butler
AG3, USN, Det Bravo

Walter M. Cox
PH1, USN, Det Bravo

Carl L. Crouse
CDCN, USN, Det Bravo

Frederick F. Dyrdal
AM1, USN, VX-6

Edward H. Davis
CSCA, USN, Det Bravo

Charles W. Forlidas
RM2, USN, Det Bravo

Walter L. Davis
CMCA, USN, Det Bravo

David B. Greaney, Jr.
AE1, USN, VX-6

Richard W. Grob
CS2, USN, Det Bravo

Earl F. Herring
AK1, USN, VX-6

James L. Hannah
CE1, USN, Det Bravo

Allen M. Jackson
AT1, USN, VX-6

Robert E. Haskill
RM1, USN, Det Bravo

Kenneth K. Kent
ETCA, USN, Det Bravo

Larry R. Larson
AT2, USN, VX-6

Walter H. May
AGC, USN, Det Bravo

Atles F. Lewis
ADCA, USN, VX-6

Clyde J. McCauley
BM3, USN, Det Bravo

Melvin Mathis
HM1, USN, Det Bravo

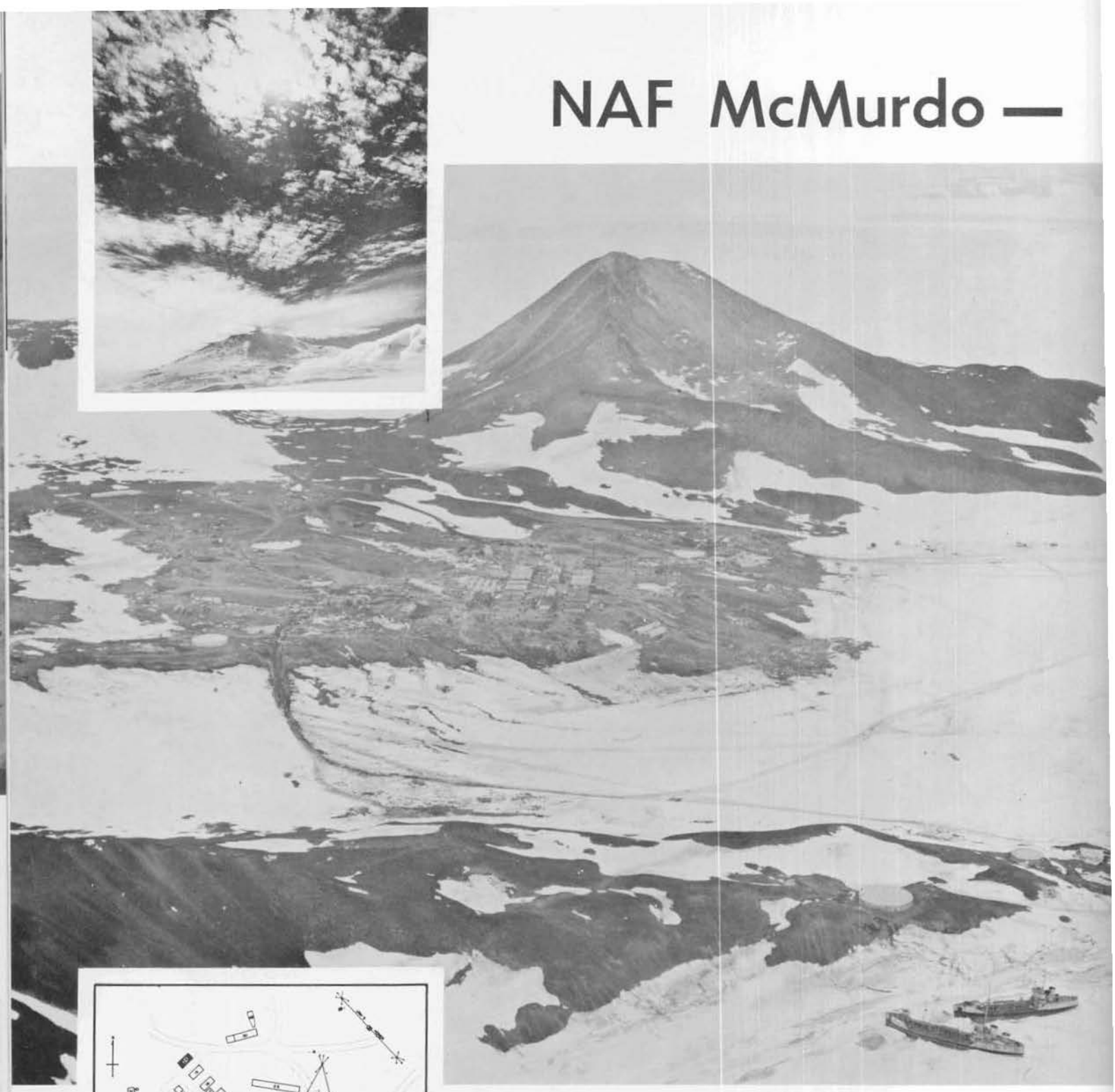
Albert Spear
BUC, USN, Det Bravo

James A. Ray
UT2, USN, Det Bravo

cox

BLOWING snow obscures the sun, wind whips up a 35-knot breeze, temperature drops to 40-below. Here is the making of an Antarctic blizzard at Ellsworth and no one but a meteorologist would be caught out in it.

NAF McMurdo —



GATEWAY TO ANTARCTICA, McMurdo Sound's Naval Air Facility. Smoking Mt. Erebus (top inset) stands shotgun over the sprawling station. Here is NAF during austral summer with rocky, lava-cindered ground showing through the snow covering. Station buildings at center at foot of Observation Hill; lower right, Hut Point where you see two YOGs (oil supply barges) frozen into ice and the big 250,000-gallon tanks for aviation gasoline storage.

Antarctic Manhattan

OFFICERS IN CHARGE at McMurdo; CDR William F. Flynn (left) in charge of MCB(Special),Detachment Bravo, Seabees to you; LCDR Scott W. Marshall, station's OinC.

McMURDO—

Principal port of entry, main air staging base, nerve center . . . no wonder that Naval Air Facility McMurdo has been called "The New York of Antarctica." Strictly speaking, McMurdo is not an IGY station as it had no resident scientist aboard. But without it, there would be no IGY station at any point in Antarctica save possibly the granddaddy of them all, Little America. For McMurdo is an air base and support center extraordinary, communications center, and meteorological center with four or five support aerographers on full-time duty. To sum it up, "McMudhole" is the air hub of the Antarctic universe.

With the final arrivals of Det. Bravo, the base began to be tight at the seams. Seabees, VX-6 and Air Force men elbowed their way through "summer tourists," newsmen, and commuters from other bases on their way back home. If closeness is any measure of understanding, those 300-odd inhabitants got to know each other well.

Realty-wise, McMurdo is largest of the seven Antarctic stations. Its 37 buildings, most of them clustered along the "main drag", Burke Avenue (named for ADM Arleigh Burke), and the ice runway posed a heavy duty problem for the wintering over group. As long as the light held, outdoor work was pushed to the limit. A new transmitter station went up, miles of communications lines were strung, the runway was scraped and renovated.

Around the middle of March what is called the "night-and-day sequence" began, harbinger of the winter night soon to close in. Each day the twilight would deepen until April 20 when the sun would set for the winter.

Already the days were beginning to run out of light. Working hours were long and on a seven-days-a-week basis. Fatigue was showing but work went on. Rushing to hook up a power line to the new communications transmitter building, Charles E. Reed looked up to see an antenna pole swaying over him. Arching slowly it toppled, pinning him beneath it before he could jump clear. One leg was badly smashed. For a pair of months he lay in sick bay where he was treated to all the medical care and social diversions a patient ever received: a record player installed bedside . . . daily movies . . . study materials for rating exams brought by Chaplain Darkowski . . . his portrait sketched . . . Stateside ham radio contacts set up . . . . . and—most touching gesture of all—the green-thumb duo, CDR Flynn and Chief Hanson, presented their prize nasturtium plant.

This was just one instance of the tremendous *esprit de corps* at McMurdo. There were many more too numerous (and humorous) to mention. These hard-working men worked just as hard at housekeeping and recreation as they did on the job. Gracious living at McMurdo depends to a high degree on the "house mouse." The six Clement huts housing 10 to 20 men each are comfortable, oil-heated, and partitioned for a fair amount of liveableness—but if they're not kept

(Continued on page 57)

McMURDO'S ICE RUNWAY (LEFT) IS ON SEA ICE: RIGHT, "MAIN DRAG" WITH OBSERVATION HILL IN BACK.

FAMOUS CASTLE ROCK, THREE MILES NORTHEAST OF HUT POINT, AS PHOTOGRAPHED BY SCOTT.
THE DISAPPEARING SUN HIGHLIGHTS MELT-WATER POOLS AROUND McMURDO'S SEA-ICE RUNWAY.

clean you couldn't lease them to a mud lark. So the daily chores fall to the "house mouse"—one to each area. The policing done by these unsung heroes would make their families back home stare in amazement. Each barracks also has a "house mother," the senior occupant, who rides herd on the crew resident therein. On Mother's Day, each Machree at McMurdo had a special poem dedicated to "her" and published in the station *zeitung*.

That newspaper, a weekly, was another example of the tremendous morale effort exerted by every man at the base. *The McMurdo News* carried national and international news (radio-borne), as well as station scuttlebutt.

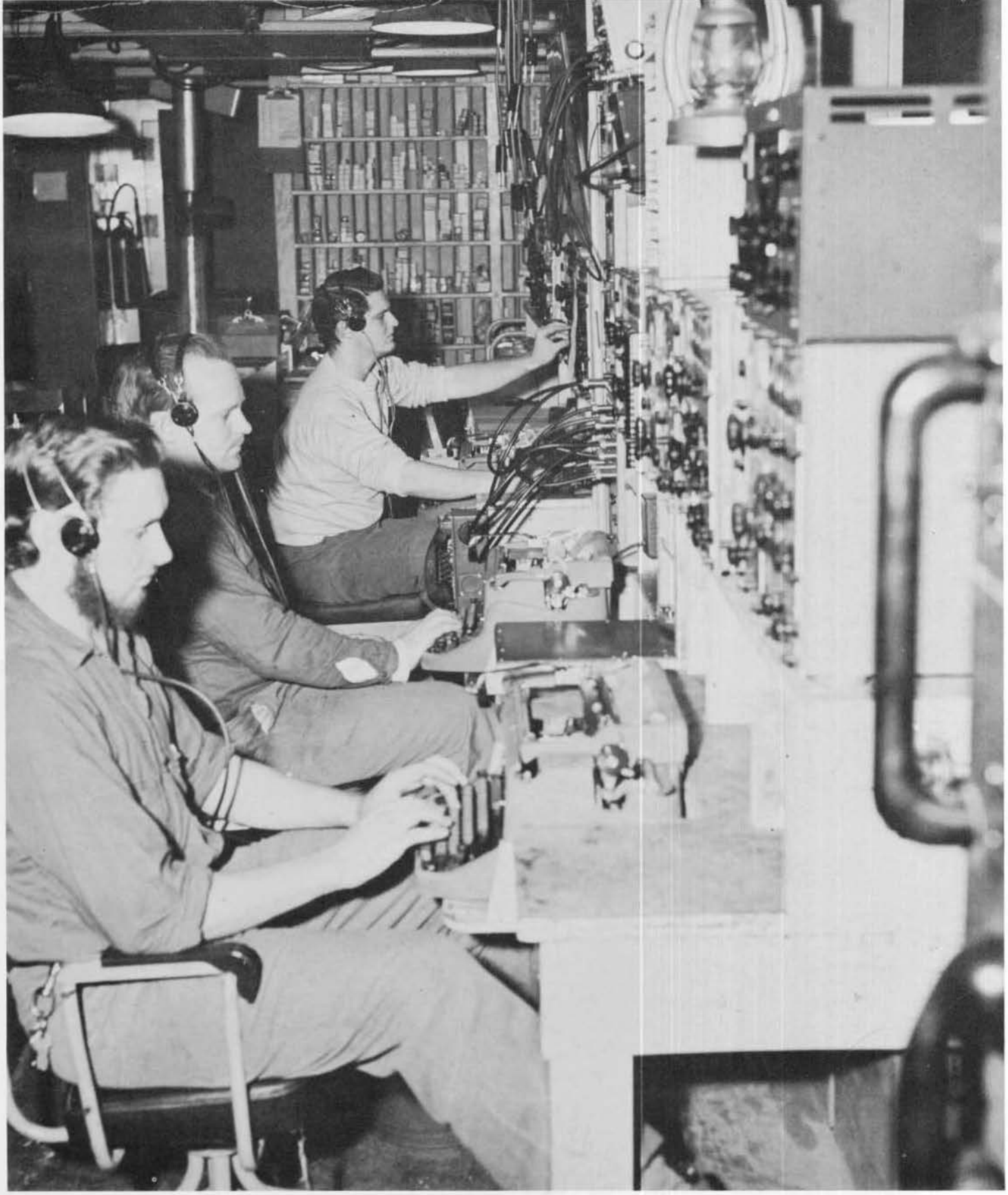
As sundown approached, McMurdoans set up a recreation program in anticipation of the hibernation period. A council of enlisted men went into immediate action. Calling for off-duty volunteers they soon had a spare building converted to a rec hall with pool and ping-pong tables, shuffleboard courts, music, and a reading lounge. An empty quonset hut became a gym complete with weightlifting paraphernalia, mats, and a steambath box operated through a series of coils and an overhead drum.

Nightly movies and weekly bingo were supplemented by Junto-like activities set rolling by a pair of aggressive promoters. "Rocky" Jones conducted a twice-weekly photography class after movie hour for 20 or so men who gladly sacrificed shut-eye for shutter lore. Hobbyists were served by Ed Schenketh who worked long hours to convert an Atwell tent into a hobby shop stocked with building materials, kits, and models.

But the peak of the week by all counts was the Saturday-night social, a one-hour clambake programmed each time by a different hut in a way that would have sent the Shuberts reeling down their alley in dismay.

April had been chilly. The monthly high had been 12° below zero and the low had plunged to 33 below. The ice runway was in good condition and the ice in the channel broken out by GLACIER had reached a thickness of 40 inches. But the neighbors over at Scott Base were undaunted by the weather. The day after sunset, Easter Sunday, brought callers bucketing over the two miles of snowy ice shelf. Eighteen men and their leader, Sir Edmund Hillary, joined the McMurdoans at Easter services and at dinner following. "Our Lady of the Snows" Chapel was decorated with artificial Easter lilies as the two services were held—Catholic mass by Father Leon S. Darkowski and Protestant service by lay leader Robert H. Wakeman. The afternoon was highlighted by movies, a hi-fi concert of Handel's "*Messiah*," and good conversation.

HOLIDAY dinner, Italian style, was sprung on tired Seabees after hard push to beat winter to the punch. A real, homelike spaghetti-and-meatballs spread it was with candlelight, and a little red wine coaxed from the padre.

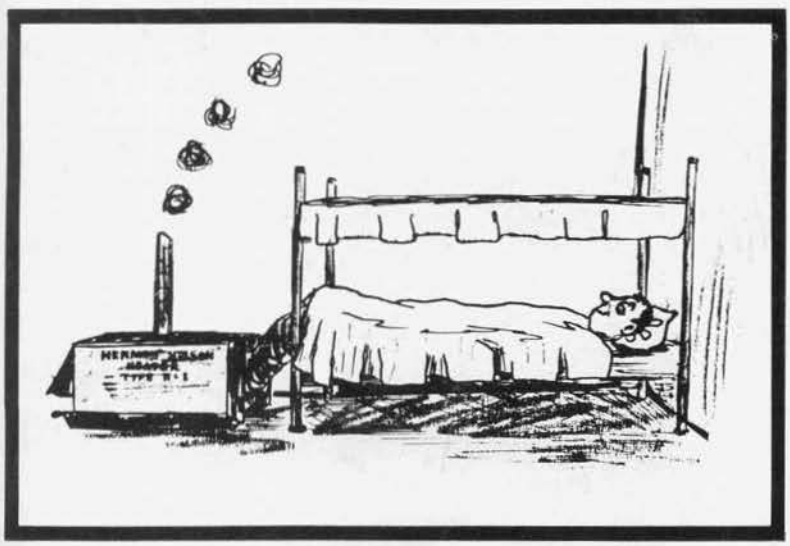


NAF COMMUNICATION CENTER supported Little America in the tremendous job of communications between all Antarctic-based stations and bases, and between the icy continent and the outside world. Three types of facilities operated: radioteletype circuits to the Canal Zone, New Zealand, and Little America; air-ground communications; and radio circuits to certain stations of the mother-daughter network. Transmitting and receiving antennas were set up at quite a distance from camp area. In addition to regular communications equipment, NAF was equipped for facsimile and radioteletype signals, and with direction finder and beacon for aircraft. Above, left to right: R. H. Wakeman, George Street, and W. A. Olsen on duty in the communication center.

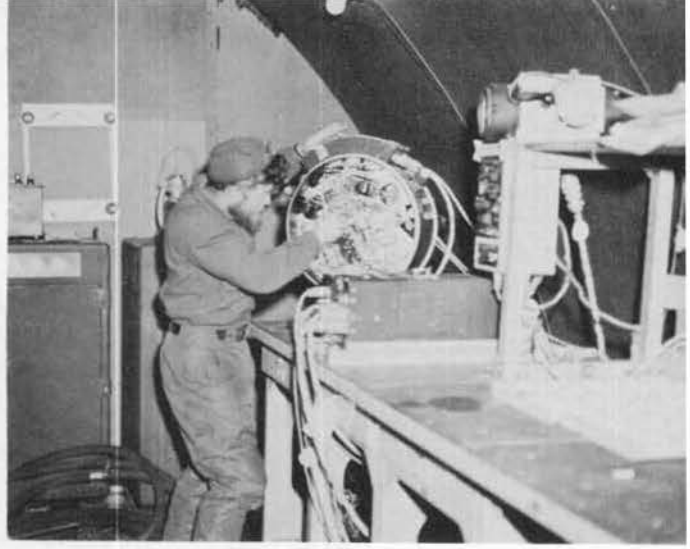
Power and Electronics:

SECURING POWERLINES TO WITHSTAND HIGH WINDS.

RADIO electronic shop with Stan Johnson and Charles Landrum, electronic and radio specialists, hard at work.

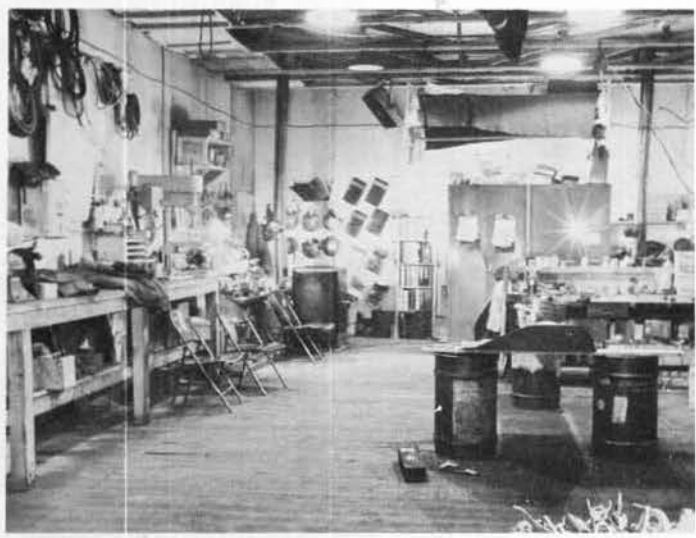


HALL



AVIATION electronics shop with K. L. Alkio, aviation technician, mending an intricate unit.

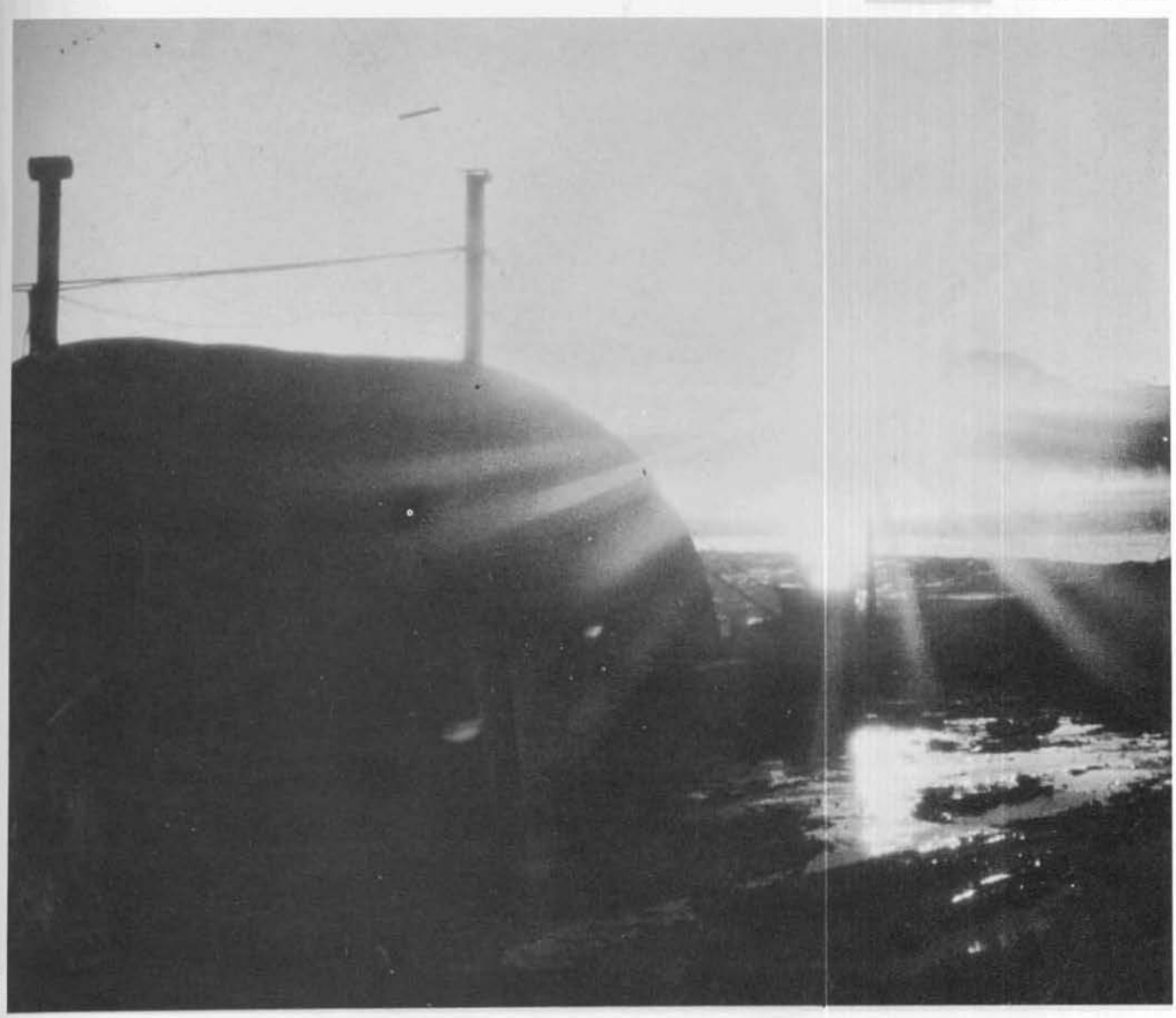
AVIATION maintenance shop: two views of VX-6 hanger area installation that was to be so busy during spring fly-in and summer operations. Above, Marine CAPT Pullen concentrates on a repair job.



RELIGIOUS medallions, Catholic (left) and Protestant (right) were designed by the men of *Deep Freeze II*. (Reverse side of each medal was identical with space for name of owner.) Chaplain Leon S. Darkowski sent a replica of the medal in honor of "Our Lady of the Snows" to Pope Pius XII, receiving the Papal Blessing on *Deep Freeze*, and one to President Eisenhower which was acknowledged by personal letter.

EASTER was celebrated at McMurdo in the home style —morning church services with the little Chapel of the Snows decorated with traditional Easter lilies. The sanctuary (left) is appointed for Catholic services; at right,

Protestant services are conducted by lay leader Robert Wakeman with LT Donald C. Hauck at the organ. Below, "Our Lady of the Snows" shrine in memory of Richard Williams who was killed here during *Deep Freeze I*.



BEEBE

THE LAST SUNDOWN OF THE SEASON CAME THE DAY BEFORE EASTER: THEN TWILIGHT TOOK OVER.

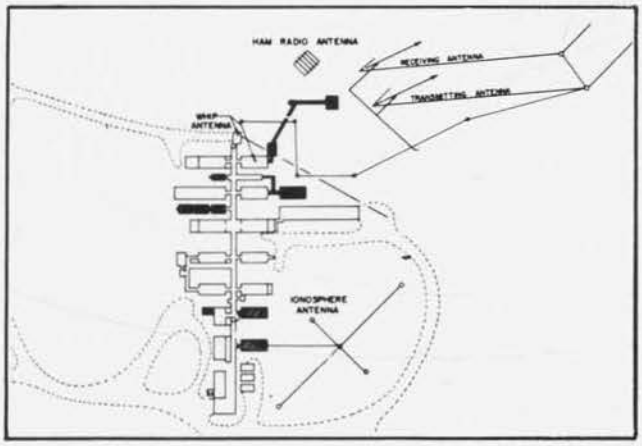
THE MARBLE POINT STORY:

Curtain Going Up!

A new project was also underway. By Deep Freeze III, Marble Point emerged as an important name. At that time, a two year feasibility study was begun by a SeaBee reconnaissance team to determine the suitability of Marble Point as the site for a permanent land runway. Situated due east of Cape Royds across the Sound, Marble Point is a promontory jutting out from Victoria Land near the Wilson Piedmont Glacier. It takes its name from the red marble found in its rocky soil. In the austral autumn of 1957, the Point was just another reconnaissance mission. On one such flight, Marine MAJ S. A. Antos headed toward the glacier behind the Point. Near his target he sighted a strange thing—a huge ice tunnel more than a mile long. He later described it as a "tube that looked as if a draw were frozen over the top of a cavernous hollow formed by melted glacier ice." Just one more Antarctic phenomenon.

Then on March 12, a helicopter took off from McMurdo for Cape Bernacchi, about four miles south of Marble Point and the rallying point for activity in this area. On board were LT Anderson, CEC officer, and a party of five. They landed at the Point where they spent a full week surveying the site. This was the first step toward a survey project that was to come to full flower one year later.

← SURVEY PARTY FURLS CAMP FLAG: FEMININE BEACH SHORTS.



ARNDT

OBLIQUE AIR VIEW OF LITTLE AMERICA FROM SOUTHEAST.

FUEL DRUM SUPPLY DEPOT AT KAINAN.

KIEL FIELD, RUNWAY BEHIND STATION.

Little America—

LAS—

If McMurdo is the New York of Antarctica, then surely Little America IGY Station is the Washington, D. C. For here on the Kainan Bay ice shelf is the absolute center of all that moves in the U. S. Antarctic sphere of influence.

Here at LAS, the fifth Little America since Byrd's first settlement, is headquartered the military chief of the seven stations and the IGY chief. In addition to serving as home base for remote Byrd Station, and for summer traverses during *Deep Freeze III*, Little America is the field scientific headquarters for the entire US-IGY Antarctic program and the headquarters of IGY Antarctic Weather Central. No doubt of it, LAS is the capital of Antarctica.

And there was actually a federal and municipal

ARNDT

LEFT OF RAWIN DOME, ROAD TO BARRIER; ANTENNA FIELD, CENTER; GEOMAGNETISM BUILDINGS, UPPER RIGHT.

government patterned on our own democratic system. The first session of the Little America Senate convened in early April 1957. Nine duly elected senators met to consider the problems of recreation, education, and other community aspects and to pass on their comments and suggestions to the station command. The group was part of a special services organization which included a President, a Supreme Court (three justices), and an appointed Cabinet (five members). The Court, made up entirely of command heads, provided counsel and considered recommendations made by the lower bodies. The President, CAPT Dickey himself, reviewed all acts and in every way encouraged this training field for democracy.

(Continued on page 64)

STATION command: LCDR Howard J. Orndorff, OinC (left), LCDR James E. Waldron, Jr., CO, during winter-in.

Public Works, Construction at LAS:

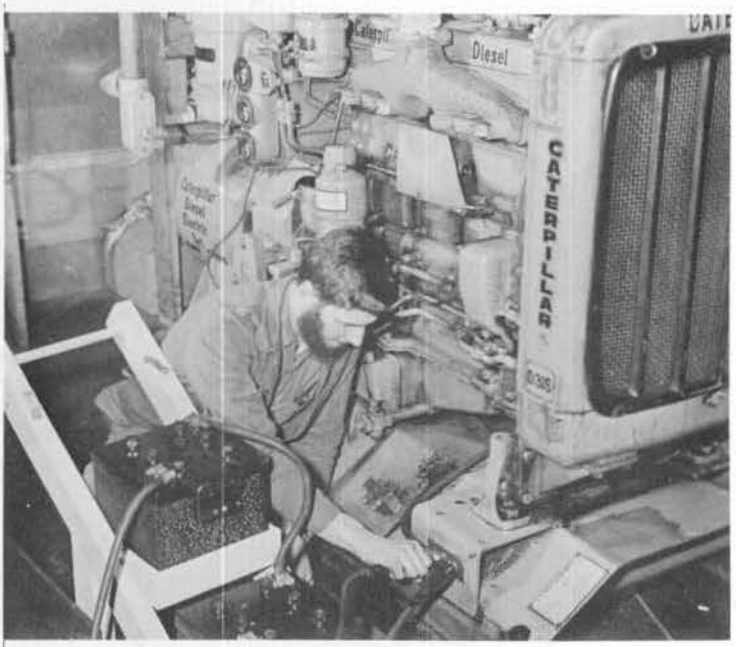
There was also a public works system—"the P.W." —notably like municipal systems in every way but one . . . no strikes. Housekeeping chores had to be done and P.W. did them. From moving tons of snow to washing mountains of dishes, from babying the fleet of Weasels, Sno-Cats, and tractors to maintaining the air strip and all roads leading to it—call on P.W. The outfit even "tailored" the edge of the barrier so off-loading during *Deep Freeze III* would be speeded up.

To illustrate the magnitude of the operation, a few figures will help. Little Americans in the wintering over party numbered 109, 85 of the military and 24 IGY scientists. The base burned 700 gallons of fuel oil a day, used three 20-ton sleds of snow a week for potable water (about 3,000 gallons a day), the powerhouse generated about 1500 kw of electricity a day, and the cook set out enough food for 250 men to feed 109 at each meal!

(Continued on page 67)

MASS FEEDING at station was in hands of experts. William R. Denny (left), and Richard H. Banasiak, senior cook, were just two of a crew of cooks and bakers that kept 109 men at Little America well-stoked with calories.

POWER was the big utility. Seabees K. A. Elliott and G. F. Kaczanowski (below) move heavy generators into position in new extension to power plant necessitated by heavy electrical load. Below right, Dave Cox starts pony engine with portable battery carriage unit.



MAINTENANCE workers kept station snug and warm. Heating ducts being installed (left) by Graham E. Black; Harold Crain still has to thaw out frozen water pipes over stove (center). Reclaimed parachute from Byrd used to roof over spare-parts room (right); work is being done outside in 50-below zero. That's weather!

TRACTORS were grand factotums. D-8 (left) smooths area between two "M" boats (hauled from barrier and converted to beer lockers) for storage space. Steve Muntz and P.W. Officer LTJG Robert K. White work on tractor boom (center) used to raise roof trusses of new garage (right), a valuable facility built of scrap material.

SCIENTIFIC construction got the rush treatment. Meteorologist Samuel Wilson helped set up weather towers (left) while Hans Bengaard of Denmark, ionosphere physicist, watched 75-foot antenna go up (right). Shorter 16-foot antenna (center) nears upright position as men continue to work outdoors in bitterly cold temperature.

Communications:

CORNER OF BUSY COMMUNICATIONS BUILDING AT LAS.

STRINGING ANTENNA WIRE IN ICY AIR.

CHECKING OVER FAX EQUIPMENT.

SOUND-POWERED PHONE TO KIEL.

WEATHER REPORTS ARE COPIED.

BUSY ELECTRONIC TECHNICIANS.

TECHNICIANS MAKE ADJUSTMENTS TO DELICATE RADIO GEAR.

COLLECTING the more than 306,000 groups of weather data each month required a 12- to 18-hour working day. Five weather broadcasts were transmitted each day; all resupply requirements of the seven stations were collected and retransmitted at LAS; more than 1,500 administration and operational messages per month hummed over its transmitters; thousands of CW, RATT, FAX and voice schedules with American and foreign stations, aircraft, and trail parties cut across the limitless miles of icecap. LTJG P. A. Raynolds, USNR, was communications officer.

Consolidation at Kainan Bay

Following NORTHWIND's farewell in early March 1957, the pace at the ice shelf grew feverish. Tons of provisions and fuel were 'coptered and tractored from barrier dumps to campsite. The food tunnel was doubled in size and became a huge warehouse linked to the galley by a passageway.

The radio transmitter building and the new antenna field with 14 antennas were rushed to completion.

Using the Balk Bridge as a deck, a large garage for heavy mobile equipment was reared with a repair wanigan secured alongside to act as heater and electrical repair shop. It proved its worth. Round-the-clock maintenance and repairs regardless of weather were now possible, and the on-time tractor push into Byrd owed its promptness in part to this operation.

Many other utility units were constructed before sundown—a gym, a hobby photo lab, a messhall addition. And much repair work was called for what with leaks caused by warm-ups and heater flare-backs caused by freeze-ups.

Throughout this hectic period, the IGY men had gone about their "disciplines" methodically. A small building was constructed for the physiologist, the geomagnetic building was relocated and a tunnel added, additional power leads were provided to carry the heavy load required by IGY facilities, the ionospheric antenna went up, a scientific photo lab was built. And through it all the men of science took their readings and kept charts with superb detachment.

They did take time out occasionally to hover intently over the incubator that helped the hope of the gourmet. Six fresh eggs, on a hunch, had been selected from a New Zealand shipment received in mid-February. For weeks they were overwhelmed with tender, loving care, warmed in the constant temperature of the deluxe box brooder, and carefully turned each day. The entire base hung in suspense waiting for the hatching of the Easter chicks. The fact that it all ended in disappointment, as several farm-belt boys had predicted, in no way detracted from the excitement while it lasted.

Another drama, a real-life "Medic" drama, took place in the LAS sick bay early in April when LT Pat B. Unger, Navy surgeon, took scalpel in hand, bent over a sheeted patient, and performed a successful appendectomy. It was a toss-up as to who was most pleased—Unger, Allen E. Pracht, the patient, or the hospital assistants, LTJG Robert J. Adams, DC; Harold E. Butler, HM1; Charles W. Jenkins, HM3; and IGY physiologist Fred A. Milan.

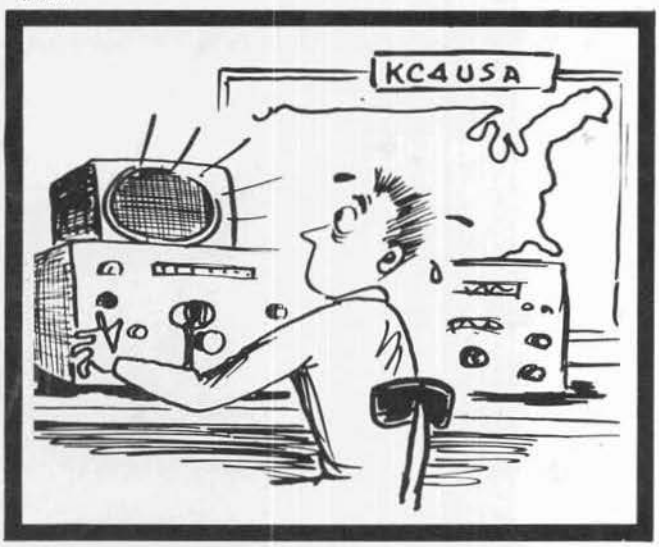
Winter smacked LAS long before the season arrived. March's average temperature had been 14° colder than that of the previous year and April got cracking with a −51°F. record. Weather was announced at reveille so all could dress accordingly for outdoors. As they worked together each man would watch his neighbor for the telltale signs of frostbite. By the middle of the month, aircraft, with the exception of one Otter and one RD4, were battened down. One PH2 found himself virtually immobilized in the 50-below freeze when he jumped from a fuel tank from which he had been snapping pictures, tried to bend his knees, found he couldn't; his cold-weather trousers had frozen stiff. Combustion handwarmers in outside parka pockets went out because the fuel reached a temperature too low to burn. LT Harvey G. Speed, VX-6 pilot, was unable to up skis on his R4D after takeoff; they had frozen. It was clearly time to close the shutters. But not the door. For outside work at LAS continued on a limited basis through the winter.

Indoor recreation began to assume greater importance, however. Weekly bingo parties were in full swing, so were iceshelf vaudeville shows. Nor was news neglected. The voice of the station, an eight-page mimeographed gazette called "The Penguin Post," went to press Saturday evening and was delivered to barracks and officers' quarters Sunday morning. Circulation and readership were *total*. News of the continent and news of the world kept every subscriber as up to date as a Stateside sailor. Special columns matched the most sophisticated metropolitan daily, even down to a "Society Section."

Hamming was getting to be important although the big news didn't break until May when RAGS went into action—but more of that later. One of the IGY men, an ionospheric physicist, did have an unusual contact in early April. Carl O. Wyman, himself a licensed ham and a Marine wartime communications officer, received a call from friends originating from their cabin cruiser off the New Jersey coast. The call came via marine radio-telephone through Julius Madey (K2KGJ, Clark, N. J.) to LAS.

(Continued on page 71)

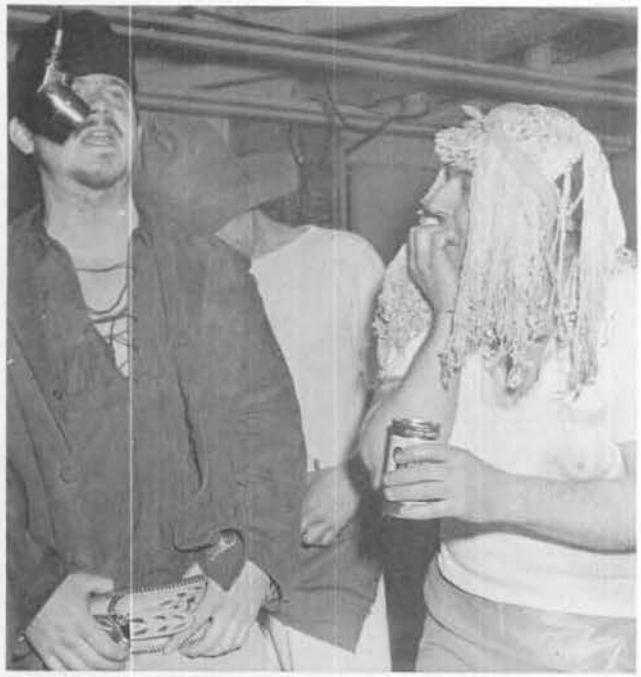
HALL



NOW HONEY, DON'T GET UPSET—BUT YOU DO REMEMBER THAT NEW BABY-BLUE CADILLAC YOU BOUGHT BEFORE YOU LEFT DON'T YOU?... WELL, YESTERDAY ... (BLOOP-BLEEP-WHINE)—

After Hours at LAS:

FOUR NEW chiefs—Tracy, Melton, Long, and McCrea—celebrate by shooting their own picture in hard hats.

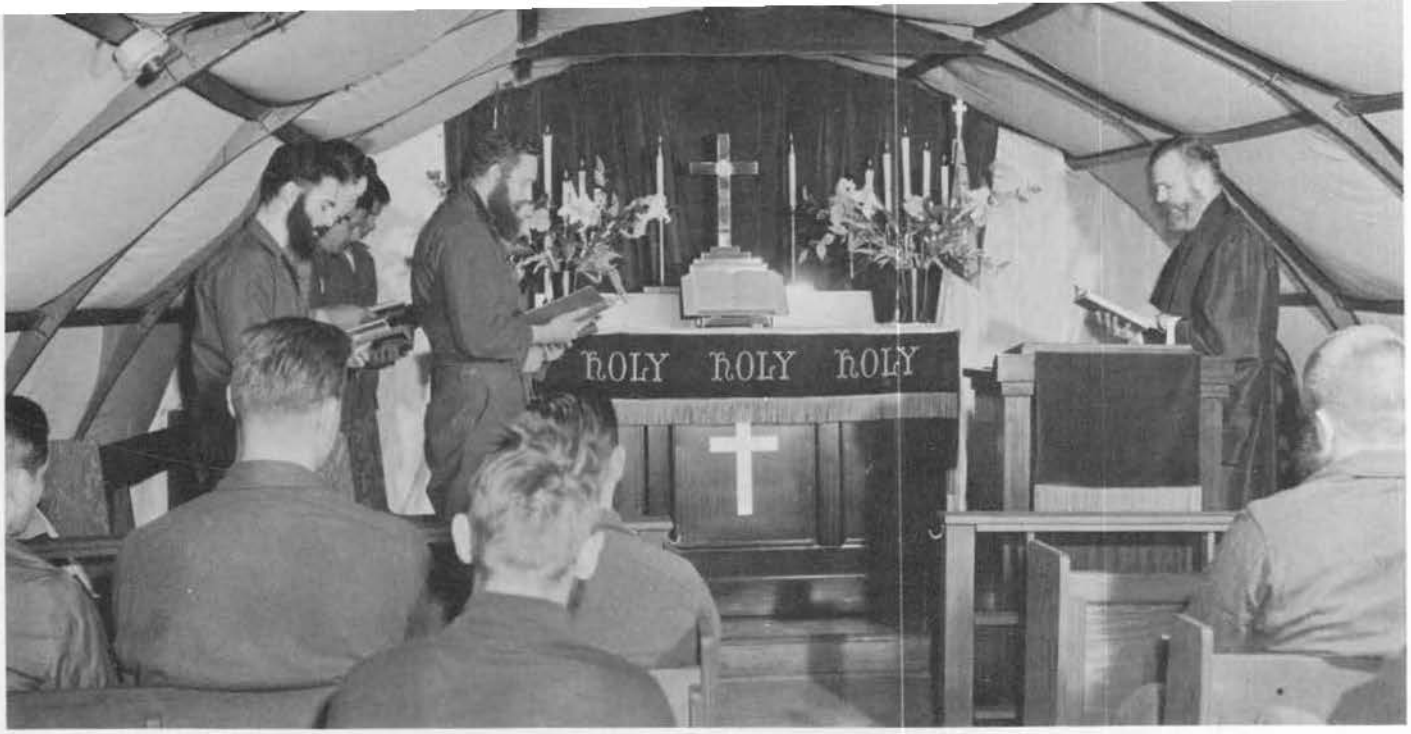


QUIETER diversions were for some. Modelmaking and other hobbies were encouraged by well-stocked hobby shop. Hi-fi phonograph in rec hall with plenty of discs held Harold Crain, Dave Cox, and Robert Jones, Seabees.

SAILOR and scientist, both became mummers on party night. "The Shooting of Dan McGrew" (top) related by William J. Cromie to Richard Banasiak; impromptu quartet (center), Lt Pat Unger, Bill Cumbie, Vladimir Rastorguev, (Russian IGY scientist), and Hector Lett. Below, LAS' own Elvis, Boyd Russell; one of the "Tune Flushers."

ONCE-A-MONTH party at LAS found officers, men, and civilian scientists letting down their back hair. Part of "Cumbie's Combo," favorite musicmakers (left) tune up for the hoedown. Right, CAPT W. M. Dickey and LCDR Hancock sample the shrimp-and-dressing at buffet lunch. Everything from Bingo to charades was order of the day.

"THEATRE OF THE ICE GROUP" BOFFS SRO CROWD. THIS TURNOUT WAS TYPICAL OF SHOWTIME AUDIENCE.



CHAPLAIN JOHN E. ZOLLER LEADS DIVINE WORSHIP IN NEW RICHARD E. BYRD MEMORIAL CHAPEL.

BUILDING was done entirely in free time. Handhewn pews, polished communion rail, altar, and other woodwork were stained mahogany. Walls were light green, olive green framework. The deck, battleship green linoleum; main aisles of green vinyl tile with inlaid cross of white tile. Heavy blue velour hangings set off reversible cross-crucifix, gleaming appointments. Chancel glowed softly with indirect lighting save during service.

Little America's "Knights of the Winter Night"

IGY SCIENTISTS, Left Page

U.S. MILITARY, Right Page

LIBRARY in chapel was well-stocked for all tastes. Classes in algebra and math, technical subjects, and many other courses were held here. Above, Bible study class.

Byrd Chapel Is Dedicated

Easter at LAS was doubly significant. The impressive "sunrise service", beginning at 10:00 a.m. as the sun rose and ending as it set, was non-sectarian and well attended. It was held in the new Richard E. Byrd Memorial Chapel, and dedication was made during the Easter ceremonies.

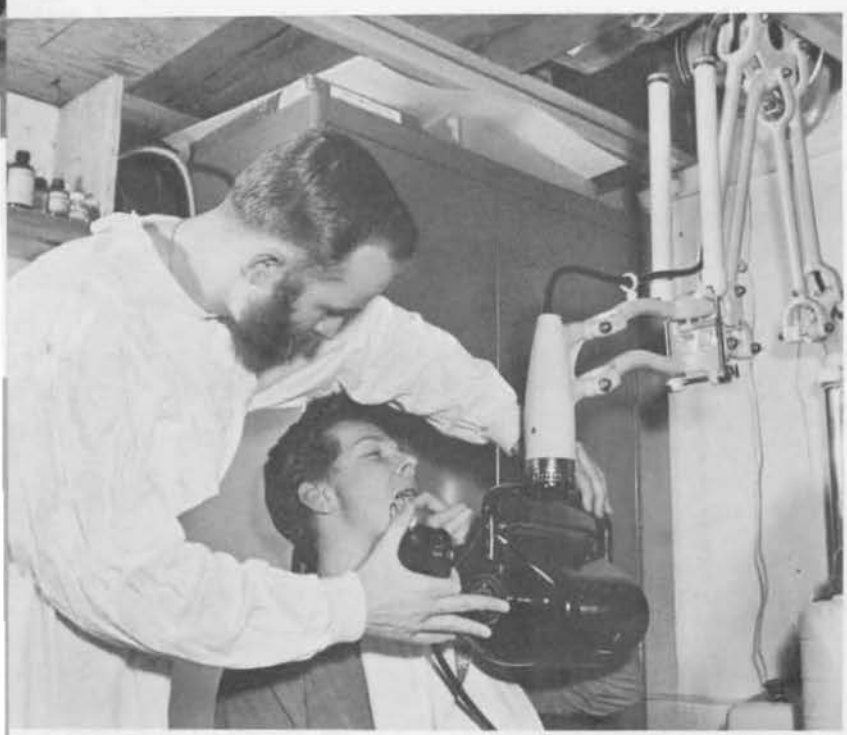
The chapel, a 16 x 40 foot double Jamesway, houses a library and honors the man who put Antarctica on the map for Americans. It was constructed by volunteers who turned clumsy camp materials into a house of beauty for Catholic and Protestant worshippers. "The Admiral of the Ends of the Earth" would surely have been touched by this reverent tribute.

At 11:15 on the morning of April 24, the colors were lowered for the four-month winter night. There would be a short "Indian Summer"—a period of soft twilights —then the dark would close down completely. The men of the station stood at attention (those not on duty indoors) as the wind-tattered flag was folded and presented to Capt Dickey. Following a prayer by Chaplain Zoller, the CO spoke briefly. It was a bitter 40 below. The setting sun's orange rays, nearly horizontal, cast long purple shadows.

Following the ceremony, the rest of the day was declared "rope-yarn Sunday." Special Orders for the Night were promulgated, some of them carrying heavy penalties for their breach: "Personnel caught casting lights into the sky or in any other way competing with aurora studies shall be guilty of prefabricating auroras and shall be known as aurora specialists." Never again would the horseplay of the 1933-35 Byrd Expedition be repeated when a joker lighted a bundle of papers and blew their sparks across the observatory windows nearly driving the scientists delirious with the "flaming meteors."

The Sundowners

FLAG LOWERING CEREMONIES: CHIEFS VERBONCOEUR AND CAMP OFFICIATE IN BONE-CHILLING COLD.



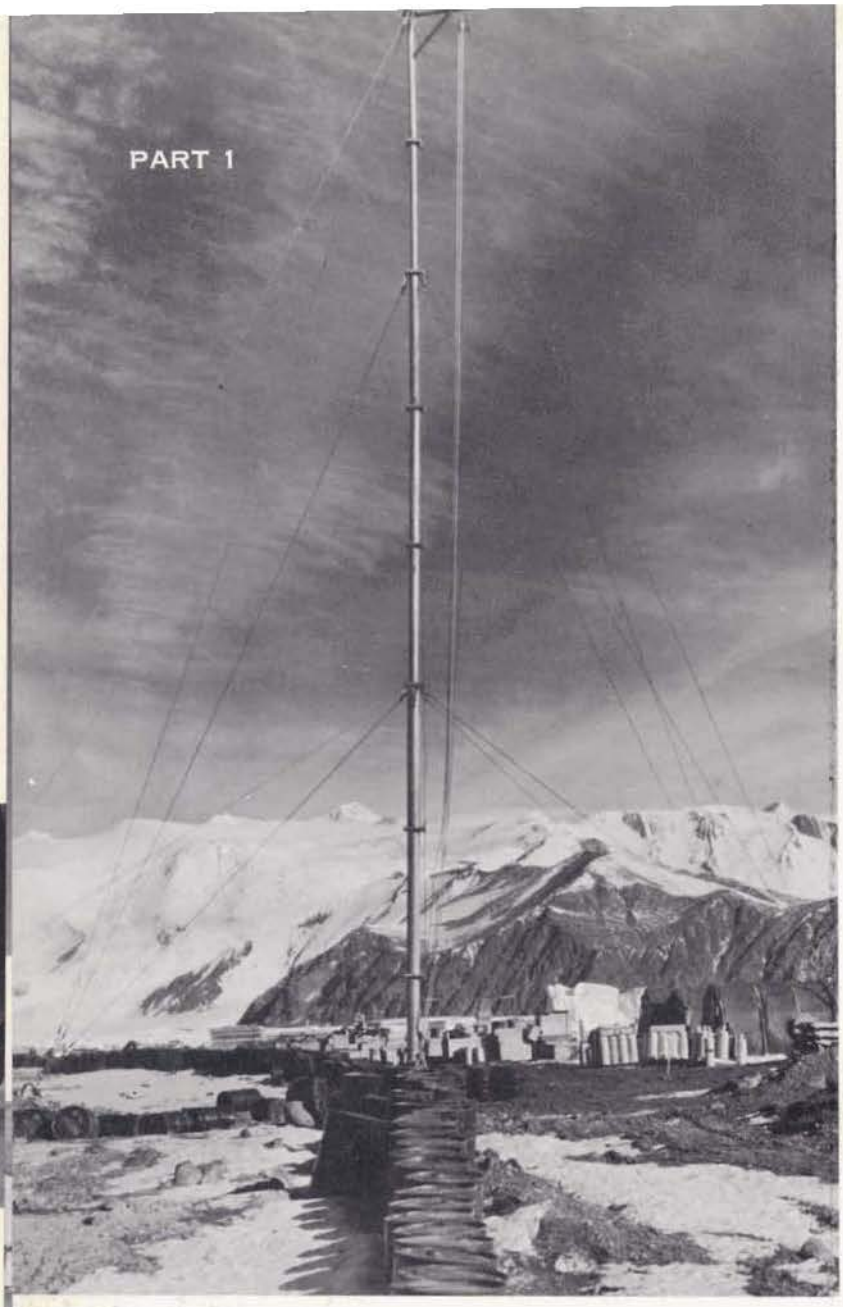
CORNERED at last, station occupants were fair quarry for "gum count," X-rays, and other prying activities. LT R. J. Adams, DC, station dental officer aims the seeing ray at bibbed patient (left). LT Pat Unger, MC, station's medical, safety, and sanitation officers, ponders X-ray negative. LAS medical department had equipment and supplies sufficient to establish it as a field hospital capable of handling any emergency at all.

The Winter Night

Meteorology Office of IGY Station Where Raw Data Is Processed — PHOTO BY COX

COMPLETE "ICE-OLATION" SURROUNDED
EACH OF THE SEVEN U. S. ANTARCTIC STATIONS
FOR THE DURATION OF AUSTRAL WINTER

PART 1



EMPTY FLAGPOLE MUTE EVIDENCE OF WINTER.

THIS, THEN was "the heart of the matter." The long, dark, chill winter night was actually the time of enlightenment.

The International Geophysical Year began July 1, 1957. Everything had to be ready for the scientists by that date—equipment installed and operating, support personnel clued in, schedules and routine formalized. It was like a marathon in a way. Each time the baton was passed from military to science and back again it was a new race with final success depending on how each man ran his lap. It was tight, tense, tough.

PICTURESQUE HALLETT

Hallett's night was short, windy, profitable to science. As said before, there were no tunnels. That meant after every storm that swooped down from Mt. Sabine dumping tons of snow, the tiny base had to be excavated.

The local "Bob and Ray Show"—Bob Northcutt and Ray Camp—went into their act after each blizzard. Aboard powerful D-4s, headlights blazing, they would grade away eight-foot drifts to permit fueling and provisioning. Mobile equipment was used only when necessary, the light Weasels being garaged.

But indoors it was snug. Food was good, company lively. The unused evaporators were given the heave-ho and vacant space converted to a rec room. Movies were screened regularly until early spring when the skittish projector died and the cinema closed down. Beard-growing contests flourished. (Bill Ingham, senior New Zealand scientist, was leading at mid-July by a hair.) So did the "Antarctic Sweepstakes"—an interstation contest to send the most radiosonde balloons highest. A walk-out release shelter extension was added to the inflation building permitting overhead release of weather balloons which did nothing to handicap the Hallett sweepstakers.

SCIENTISTS from New Zealand: John G. Humphries (left) at his ionospheric studies; Clayton Ingham working on seismic and geomagnetic disciplines (center), "Papa-Lagi" Harry King, CE1, helped to keep them in business.

Hallett's relatively short IGY roster was more than offset by the depth of investigations, and by the unusualness of some of its equipment.

A special three-component seismograph built by Lamont Geological Observatory was in operation there, a similar unit at Wilkes. In the field of geomagnetism Hallett probed the elusive problem of sudden variations of the earth's magnetic field. The Pole Station, perched near the peak of the icecap, complemented low-lying coastal Hallett's findings.

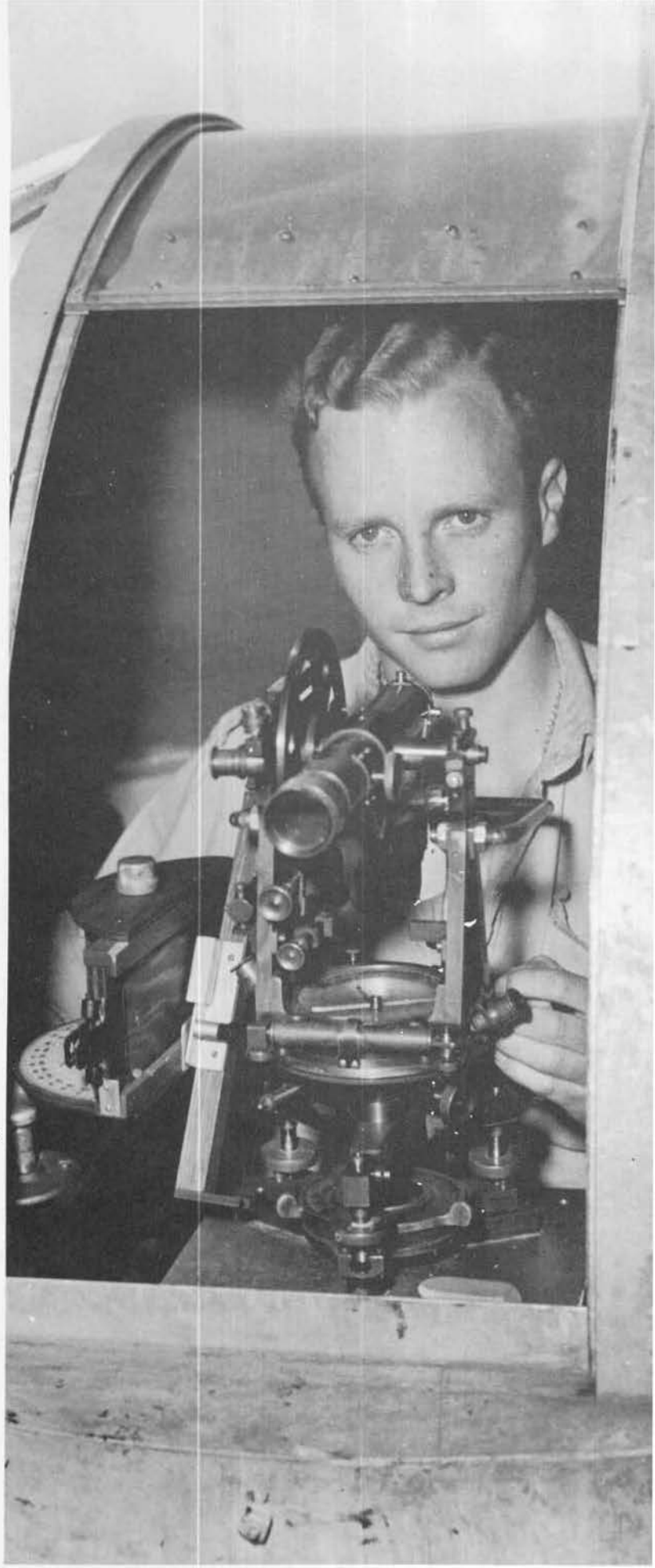
In the coming summer Hallett's scientists would roam neighboring foothills collecting rock specimens for paleontological studies. During the winter they did not lack kibitzers at the nightly auroral displays which required no PhDegree to appreciate the beauty.

An interesting sideline, psychological research, was followed. LT Tur, doubling as OinC and base physician, collected intimate personal data consisting of written and taped voice records of reactions to Antarctice life which should prove helpful to future Antarctic planners.

It was in meteorology that Hallett won its stripes. Equipment was extensive for such a tiny station. Like clockwork its schedule moved: every three hours standard synoptic observations; every 12 hours weather balloons released into upper atmosphere were tracked by "ears" in the rawin dome; at most *any* hour IGY quizmasters would check air, snow, sunshine, barometric pressure, wind, wind, and wind. Their findings would be put to early use for during October little Hallett's air facility figured in *Deep Freeze III* fly-in.

Hallett's weather wasn't all bad. During July temperatures swung from –38° to 1° above zero with wind gusts around 78 knots. Then true to back-country lore, "As the days begin to lengthen the cold begins to strengthen," August mercury flopped to 44 below and winds climbed to 80 knots to show they could.

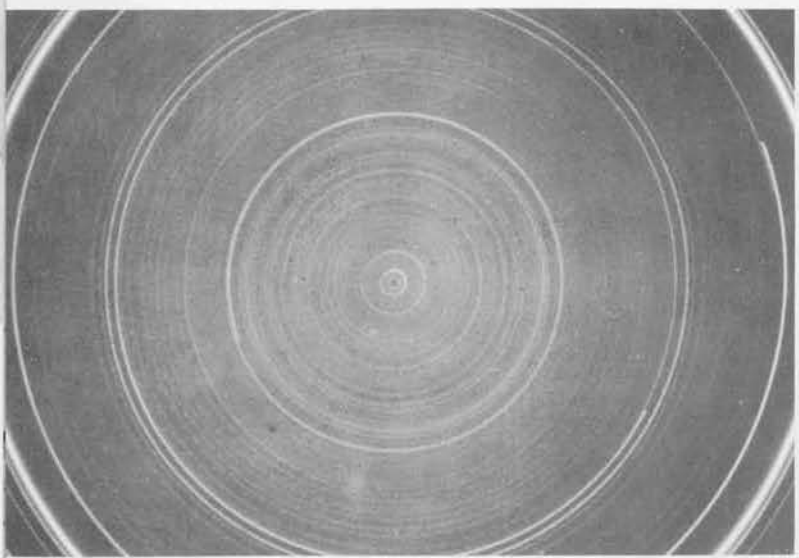
But it was getting light and that made the big difference. Sunup came July 29 and spirits rose with the flag at the rocky cape.

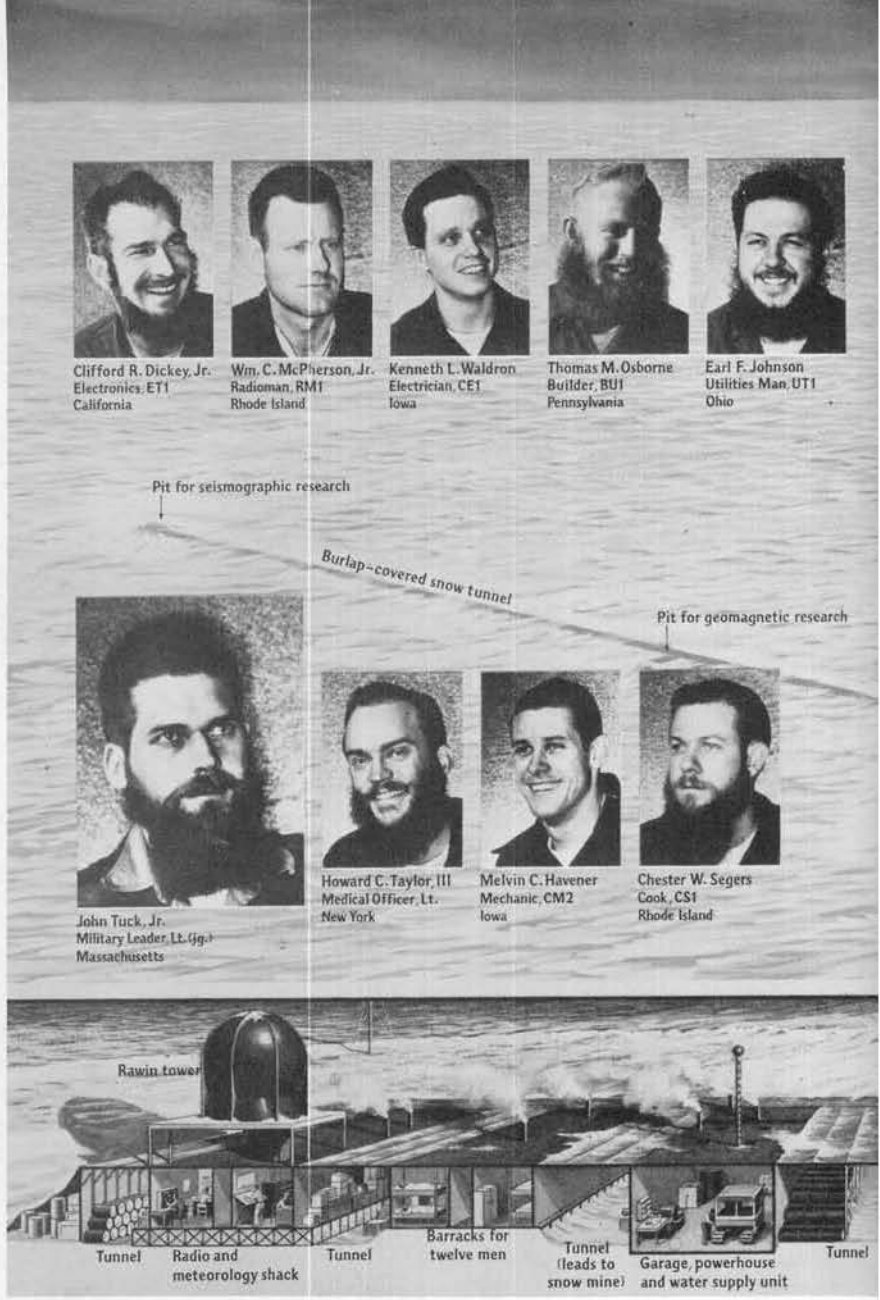


ELECTRONICS technician Michael W. Langevad (N.Z.) → takes sight from open observatory dome in aurora tower.

METEOROLOGY was a rough business. Top met man Ed Flowers computes radiosonde balloon path indoors (above) but has to go outside to check instruments on day of lowest temperature at Pole.

FIRST STARS appeared March 31; as days went by more and more popped out. Daylight problem of getting accurate "fix" was gone with return of the sailors' friends. Below, 24-hour exposure shot through aurora dome shows perfect concentric circles traced by stars as they made complete circuit.





Science at

"Great God! this is an awful place." Thus did Robert Falcon Scott describe the South Pole in January 1912. His reaction—compounded of physical suffering, disappointment, possibly a premonition of the death that waited two-and-a-half months ahead—did not haunt the men who wintered at the Amundsen-Scott South Pole Station, named for the two men who pioneered its discovery within one short month. Today's pioneers had warmth (indoors), good regular meals, radio contact with the world outside, and they had 45 intervening years of Antarctic know-how as a bulwark against the agony endured by Scott.

And knowledge was what everyone was here for. The Pole Station reached in all directions for that knowledge—up to the sky, studying aurora and ionosphere, into the earth to research glacial conditions,

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SNOW MINE reached 90 feet in depth, was entered by tunnel (above) sloping at 18° angle stretching about 270 feet in length. As downgrade got steeper, man-hauled sleds gave way to motor-powered winch engineered by Havener, Johnson, and Waldron. Snow blocks went directly to snow melter in garage; melted water flowed into 1,000-gallon tank next to melter, from there it was pumped as needed into smaller tanks in head and galley. Line won't freeze if it is carefully drained.

FALSE SUN in sky previewed genuine sun on horizon. Climbing shakily, mirage sun rose and set for several days thereafter instead of following horizon in circle as proper Antarctic sun should.

Earth's Bottom

across the flat icefields. The station was terminus on the international pole-to-pole lines of meteorolgical stations.

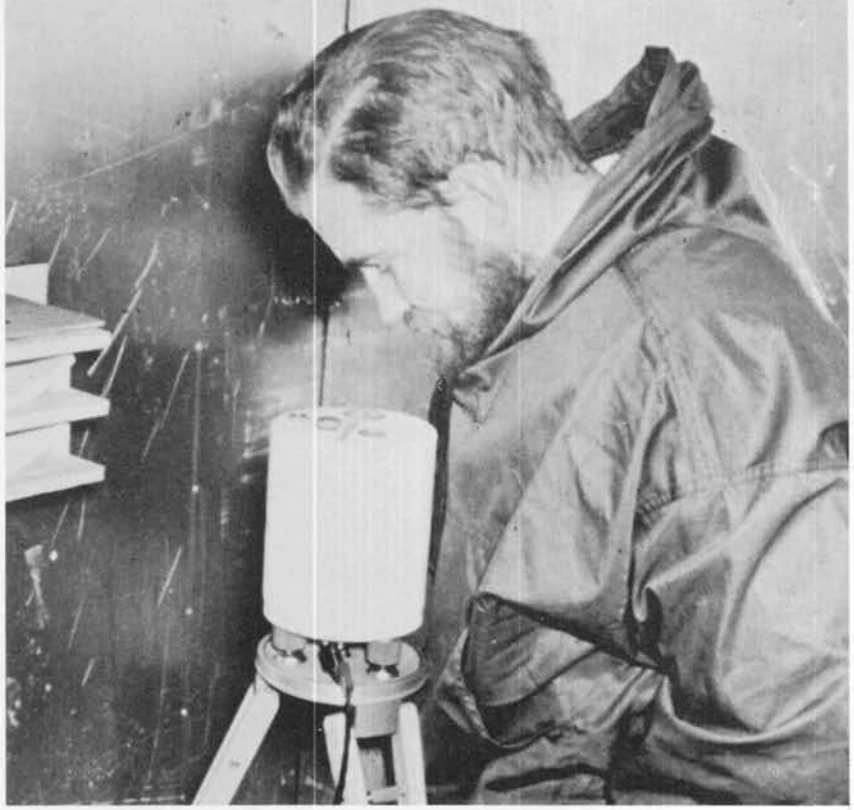
Two weeks after sunset limited outside work went on. The sun, circling the Pole a little below horizon, caused the earth to cast its shadow in the form of a black semicircle along the horizon opposite the sun's azimuth. The 24-hour twilight, faint as it was, permitted such work as man-hauling 150 cubic feet of snow per day (the tractors had been put to bed for the night), and meteorological checks that would go on all through winter. Even at 80° below some men had been working outside up to three hours at a stretch but it was hard on lungs and exhaled breath sounded like escaping steam.

SIPLE

GEOMAGNETISM

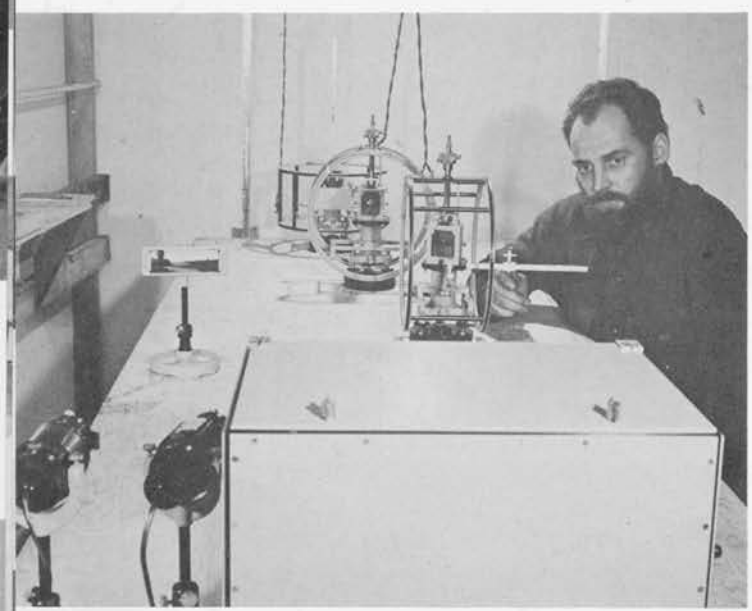
Magnetism, as a force, operates in and around the earth very much like a bar magnet—opposite poles attracting and like poles repelling. In fact, the earth's hot liquid core is thought to contain electric currents that make that core a "bar magnet." Space, too, has its electric currents. (It is now thought that there are three rings of magnetic current girdling the earth called "electrojets"—one at each pole, one at the equator.) So inner earth, outer space form our *geomagnetic field*.

Geomagnetism, although studied for centuries, is ever new because the earth's magnetic field is constantly changing: that of outer space changes sometimes violently, that of the earth's core very slowly. The very location of the South Magnetic Pole changes over the years. Geomagnetism is an important study for its own sake and because it affects—and is affected by—other phenomena. For example, the magnetic field influences (and often determines) the paths of charged particles entering our atmosphere from outside; therefore geomagnetism studies are directly related to cosmic ray and aurora studies, gravity measurements, and even such extremes as ionospheric physics and seismology.

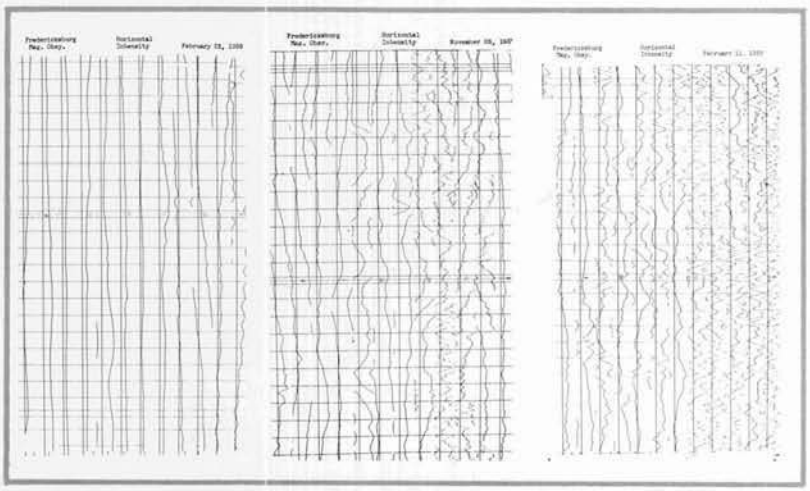


USNC-IGY

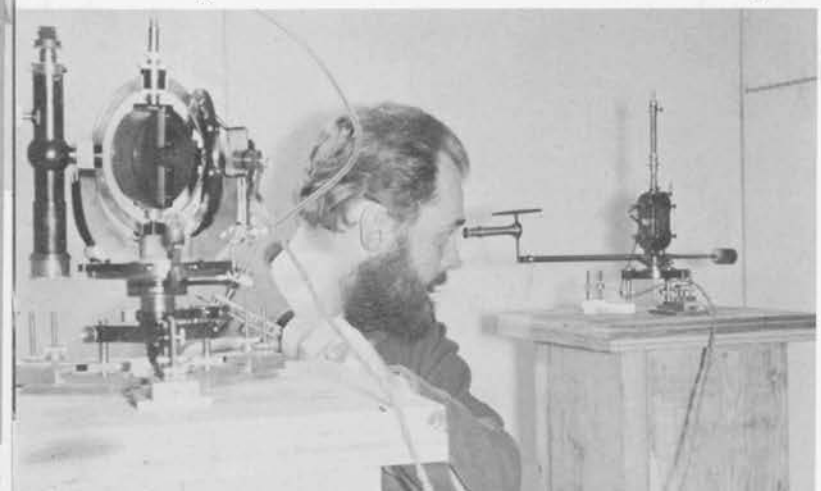
MAGNETOMETER (portable type for traverses) measures and records direction and intensity of magnetic forces in earth's field.

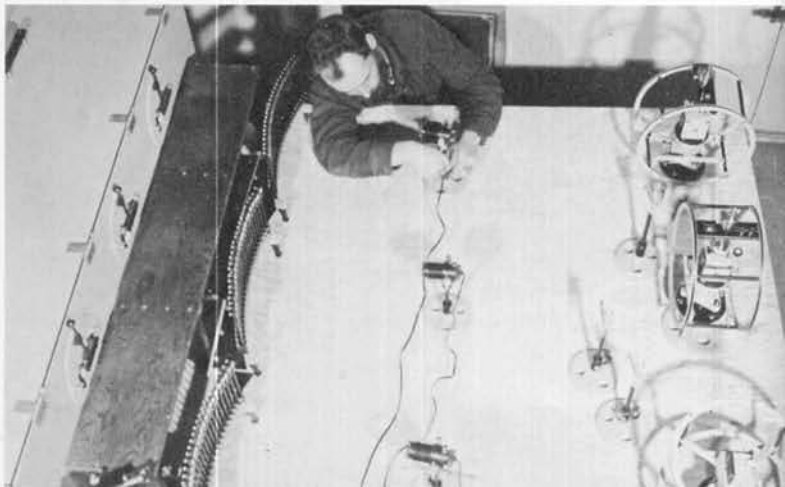


MEASURING changes in direction, strength of earth's magnetic field. Absolute values of field were found by instruments such as earth inductor (below, left) measuring dip angle. Relative and absolute values were obtained.



MAGNETOGRAMS (l. to r.) of magnetically quiet day, moderately disturbed day, day of severe magnetic storm. Rapid-run magnetograms show changes in horizontal intensity of earth's magnetic field during 24-hour periods.





Every man had more than enough work to do, one reason for the Pole being a *happy* station. It was a democratic station, too. Limited in number as it was each man—military and scientist—had three jobs in addition to his regular job: mess duty, "house-mouse" hitch, and working the snow mine. No one was excused, no one tried to duck.

For diversion hobbycraft rated high but movies were the mainstay. Because of a local shortage of projector bulbs flickers were shown three times a week instead of nightly. "Happy hour" came Saturday night.

On April 2 a new low was hit by the mercury, –89°F. It exceeded the lowest ever recorded in North America, only missed the world record by one degree. Sporting blood ran high. After coming so far everyone was anxious to get the most out of the Pole and was bucking for a record-breaking cold spell.

Tunnel temperature lagged a little behind outside but not by much. It was a clammy –72°; the men's breathing caused dense fog reducing visibility to a matter of yards. Outside air was clear and crisp, and the moon silvered the snow. For most of the year a grid northeast wind blew at about 10 to 15 knots. On May 11 the South Pole copped the record at 100° below zero and, true to form, tried to break its own record which it did four months later.

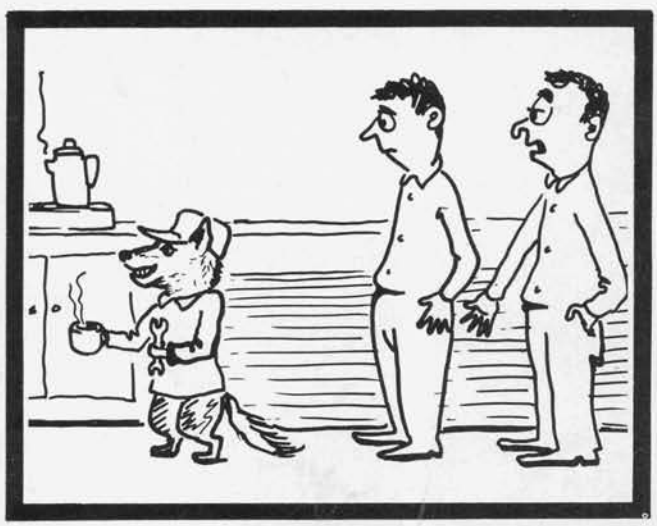
Strangely enough, IGY studies revealed the coldest part of Antarctica (probably of the earth) is a spot about 400 miles from the Pole in the direction of Australia. The Russian station, Sovietskaya, is in this region and well along in 1958 reported a new world record of –114°. During *Deep Freeze III* LAS meteorological data revealed a significant warming trend of about 5°F. in its own area since 1912.

The snow mine was the Carlsbad Caverns of the Pole Station. It served a double purpose—to furnish snow for water supply and to provide a pit for glaciology studies.

Digging began April Fool's Day, significant only as a time indicator. A four-man shift worked weekly assignments around the batting order, then around again. Their tools, a Swiss ice ax and a coal scoop for excavation. As snow chunks fell free the miners would saw them into blocks and load them on small man-hauling sleds, each toting 150 to 200 pounds. Daily requirement for 200 gallons of water averaged 10 sledloads. Each time the saw stuck in the snow the men would hopefully bet they had struck Amundsen's tent or a Scott relic—but no dice.

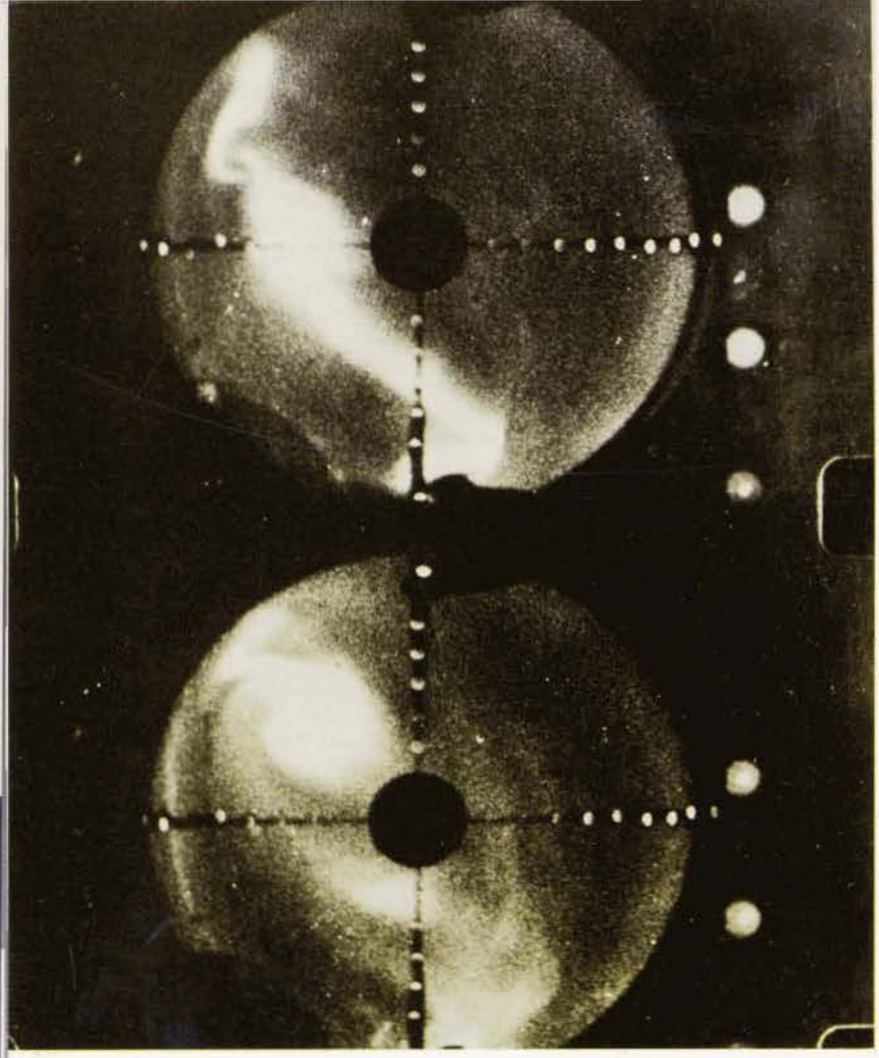
Midwinter Day—June 22—was a holiday highlighted by a banquet. The traditional celebration marks the middle of the "sunless six" and reminds everyone that from here on it is "all downhill." The dinner, begun with grace by Protestant lay leader, LT Taylor, and concluded with champagne toasts, was an epicure's dream: shrimp cocktail, roast turkey, fresh frozen vegetables, pie, ice cream. The chef, Chet Segers, was man of the hour for the feast was one more proof of his superb cookstove artistry. The candle lit banquet was topped off by a box of Havana cigars airdropped in the summer, courtesy of Admiral Jerauld Wright. The bubbly was imported from CONUS by IGY's Ed Remington.

July 1 kicked off the IGY officially. July 4 kicked off one lonely firecracker; it made itself heard, although the seismometer failed to register even a squiggle. Bob Benson had set up his delicate instrument 1,000 feet distant from the station so that slamming doors, machinery vibrations, and firecrackers in the camp area would not trigger it. A recording unit took down all the 'meter dictated—and there were quite a few rumblings. The thick ice cushion did not, as had been feared, dissipate earthquake tremors from other parts of the world; minor Antarctic disturbances



WE CAN'T CONVINCE HIM THAT HE'S ONLY A DOG.

BRAVO, Pole's youngest inhabitant, celebrated first birthday August 14. Malemute Husky was born at Dogheim, McMurdo, only survivor of litter of seven; he flew to Pole with adopted master, LTJG Tuck, was "spoiled" mascot.



AURORA AUSTRALIS: two frames of 16mm film from all-sky camera taken 60 seconds apart with exposure of 10 seconds on Tri-X film at f/1.4. Words cannot describe eerie fluttering of green and red veils of light, the swirling vortices, the writhing, undulating waves of nature's most subtle, spectacular display of cosmic beauty.

COSMIC RAYS

The origin and nature of cosmic rays are largely a mystery. They are energy-loaded particles that bombard our earth from outer space at tremendously high speed and penetrate deeply into the earth. Primary cosmic rays, probably smashing themselves against other particles in space, enter our atmosphere as secondary cosmic rays having a much shorter life. Therefore to get complete information on these mysterious charged particles, the scientist must send up equipment-carrying balloons or rockets

The polar regions are ideally suited to cosmic ray study because the geomagnetic field at the pole does not deflect the rays as it does elsewhere on the earth's surface, and because the studies can be made at the same time as auroral studies.

AURORA

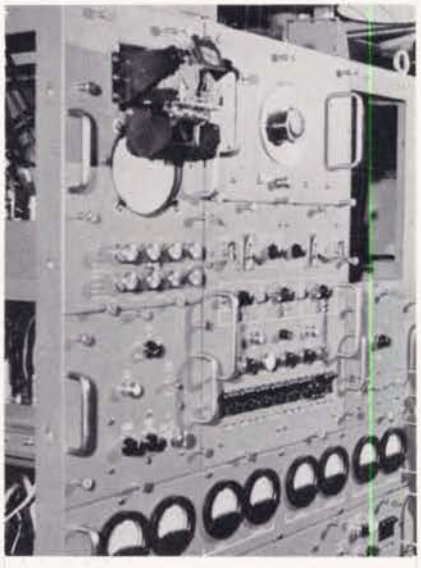
Aurora, colorful sky shows seen mainly in north and south polar regions during March and September, are familiarly known to the northern hemisphere as "northern lights" *(aurora borealis)* and to the southern hemisphere as "southern lights" *(aurora australis)*. IGY observations indicate that they occur at about the same time in both polar areas.

Auroral arcs in the Antarctic were often aligned in a north-south direction rather than in the customary east-west orientation. The reason for this is not yet known but scientists expect to learn more about it from their IGY findings in Antarctica—they even hope to learn what really causes auroras! The theory, in simple terms, is this: The sun hurls charged particles of hydrogen gas at the earth; the positively charged parts strike molecules in our atmosphere, causing them to glow and then, slowed down by the collision, the positive parts are themselves charged by negative electrons and glow.

IONOSPHERIC PHYSICS

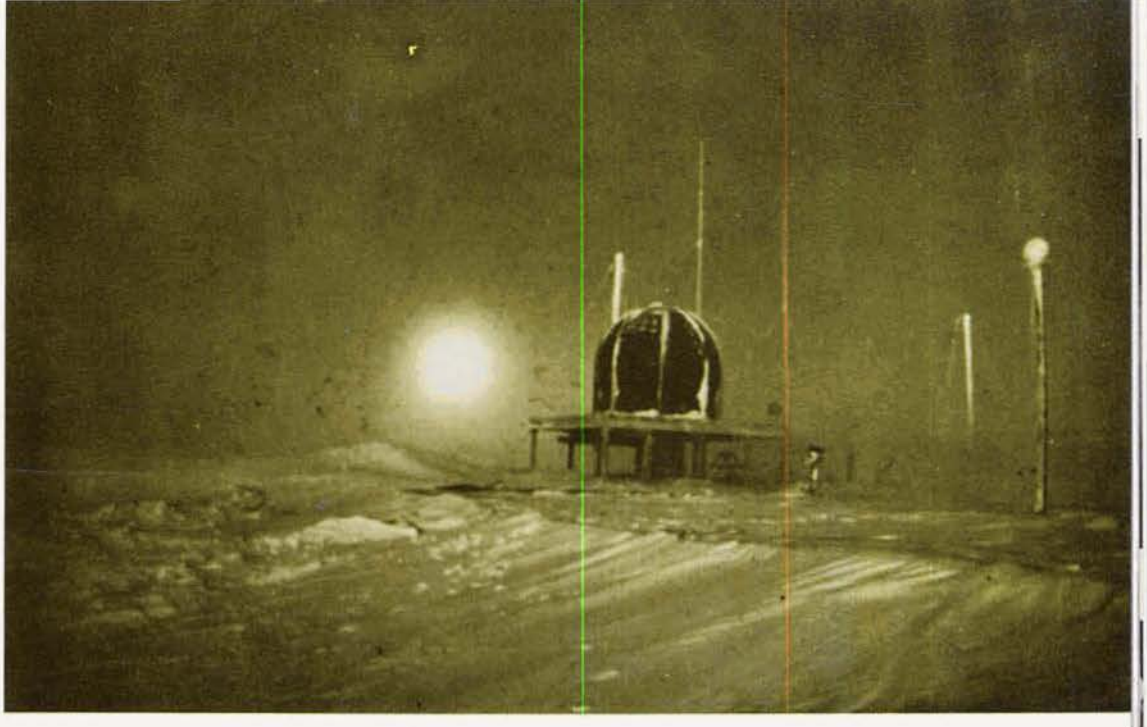
The ionosphere is that part of space around us that begins at about 50 miles altitude and reaches about 260 miles beyond; it consists of layers of electrically charged (or "ionized") particles. Short-wave radio broadcasting is possible only through its utilization: radio waves are beamed at the ionosphere which, in turn, reflects them back for reception.

For years scientists have thought the ionosphere primarily under the control of solar radiation. One evidence of this control was the effect of solar disturbances (sunspots, flares, etc.) on radio reception: they would apparently upset the ionospheric layers so greatly that radio waves would be dissipated therein and radio "blackouts" would result. During the IGY in Antarctica an unexpected discovery was made. Studies made during the long winter night showed high electron concentrations and significant daytime variations; although the sun was gone almost the same conditions prevailed in the ionosphere as were found when the sun was present. The condition is still unexplained. The findings may lead to an altered concept of ionization and recombination in the high atmosphere.

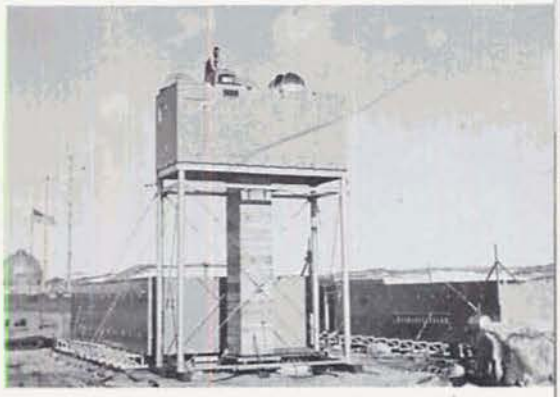


IONOSPHERIC research tools are mainly a sounder, sending radio signal to ionosphere, and a recorder, making film and tape records.

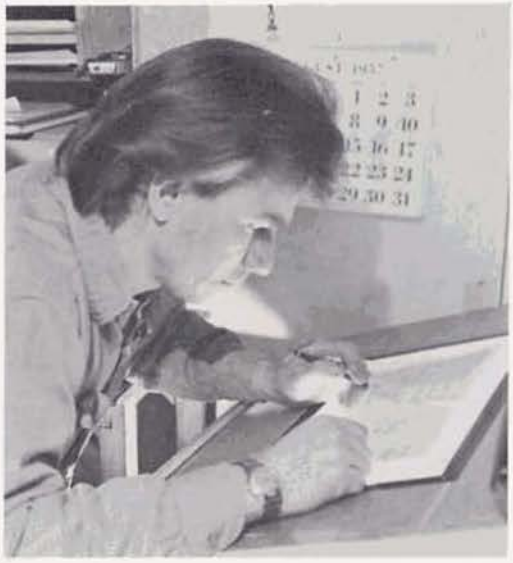
POLAR night was preceded by long, clear twilight during which sky was studied by special patrol spectrograph. On turntable, making one rotation a day, spectrograph broke down light into its various colors and studied it; scientists hoped to learn more of physical attributes of atmosphere from auroral effects.



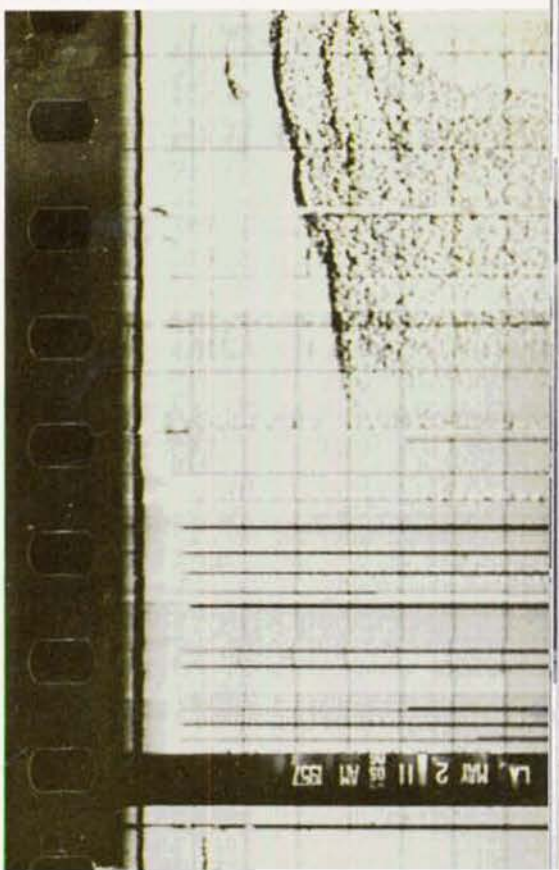
ALL-SKY CAMERA photographed 360 degrees of horizon, was automatically put in action by light or aurora.



Clear domes of aurora tower had to be polished, kept free of ice so camera (in plastic bubble, center) could function.



FILM RECORDS from ionospheric recorder are scaled, evaluated. Far right, portion of ionosphere trace as recorded on film by photoelectronic equipment.



were picked up, too, and may have been due to massive ice shifts, avalanches, and so on.

Benson also worked on aurora research and ionospheric studies with Willi Hough, ionospheric physicist. Every quarter-hour around the clock around the week around the month a radio signal was triggered automatically from the 75-foot antenna just beyond the observatory. Out into space it went and its echoes, bouncing back from the ionosphere, were recorded.

Arlo Landolt manned the aurora tower, making hourly observations and policing his all-sky camera and spectrograph. On occasions when the cavalcade of lights was on a real kick, Landolt scraped through on two hours' sleep a night.

The four-man weather team, largest scientific group at this small station, had the real deal. Working in pairs they practiced their own specialties—Ed Flowers, U.S. Weather Bureau veteran; Floyd Johnson, weather man from a U.S.-Canadian station; Herbert Hansen, rawinsonde specialist; John Guerrero, electronics technician. Most observations could be made inside but two jobs had to be done outside and often. The first, a three-hourly check of equipment at the instrument exposure site 100 yards from the camp. Fall guy for that shift bundles up, picks way over snow and antenna guywires, flashlight in hand, opens thermometer shelter to take readings, (holding breath so warmth will not affect sensitive instruments and frost vapor will not cloud vision), closes shelter after resetting needle, takes fast look at other instruments to see that they are operating properly, turns back home.

The second outdoor chore comes up every 12 hours. The big, hydrogen-filled balloon dangling a radio meter is due for launching. An hour before "black noon" or "black midnight" balloon man lights gas engine adjoining inflation shelter (heater not permitted in shelter because of explosion danger). Tube carries heat to warm the shelter. Then into gas generator goes ten gallons of water, several handsful of caustic soda and aluminum chips, ingredients for hydrogen gas. After much valve manipulation gas begins to seep out and balloon man inflates his unwieldy space traveler.

Getting the monster out of the release bay is frustrating: for every balloon safely aloft sometimes three are inflated, the other two shredded by wind or the delicate radio meter smashed.

Once aloft, the other met man is alerted, via squawk-box, of the airborne balloon and soon sets up contact with it by radio direction finder. For the next hour or so temperatures, pressures, humidities, winds upstairs are telemetered, recorded. Precision-timed buzzes and rattles are autographically recorded onto yards of unrolling chart paper. Met men decipher data (whisper who dares!), type radio code message to be beamed to IGY Weather Central at LAS. From this and other reports which flow into the Ross Sea station from IGY stations all over Antarctica, the daily weather map is made.

Unlike Bravo, most of the men at the Pole lost weight prior to winter. The extremely heavy workload at high altitude and low temperatures took its toll; men initially weighing over 175 pounds lost an average of 20 pounds and even lighterweights lost proportionately. But when winter put an end to much exertion, and good food and rest brought living closer to normal, the caloric spread returned.

Around the first of September a faint glimmer of light appeared. So began a period the coldest of the winter. *Average* temperature for the first 17 days of the month was −83°; for 93 hours the thermometer hovered below −90°; then it took the final plunge. On September 18, 1957 a new official world record low was racked up — 102° below zero — to stand for nearly one whole year. Those at the Pole who had anticipated a possible −120° drop were perfectly satisfied and no one asked for a recount.

Everyone went outside to celebrate the big freeze and scenically it was rewarding. Dawn was splashing its first brilliance across a sky that still held stars. Exotic cloud formations appeared. Camera tripods were set up and shutterbugs were in full cry. A strange phenomenon was witnessed by Dr. Siple and LTJG Tuck—a series of light flashes, brilliantly colorful and in continual motion near the sun's position on the horizon. Whether it was a mirage went unanswered, crowded aside by the appearance of a "genuine" mirage: a "false sun" began to rise!

The full beauty of a polar sunrise broke on September 23. This was the real thing and there was a South Pole banquet to prove it. After festivities the true geographical pole—a point 2,400 feet from the base on bearing 334° grid and accurate within 100 feet—was the scene of flag-raising ceremonies. Up went ensign, up went 18 arctic-mitted right hands in salute. The long *long* night was over. For the first time in history men had wintered over at the South Pole.

BEEBE

POLE STATION SITS DOWN TO BIG BANQUET

USNC-IGY

BYRD STATION LIGHTED EERILY BY OPTICAL ILLUSION OF SUN AND FULL MOON IN DARKENING EASTERN SKY.

Byrd's Hibernation

The winter night on Rockefeller Plateau was quiet, routine in contrast to its rugged summer and aggravating autumn. Housekeeping chores were assigned to all hands, fuel was hauled every tenth day, the scientists bent over charts and instruments.

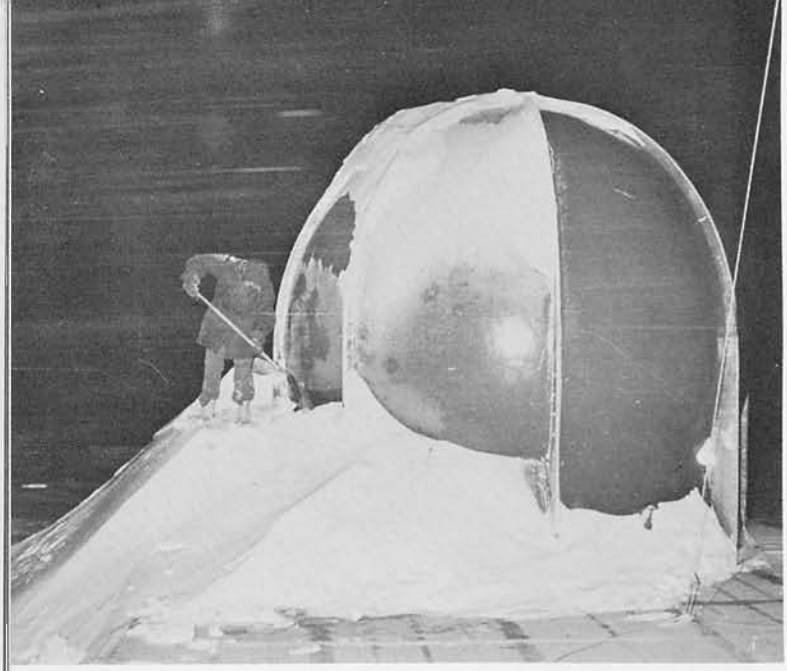
The workday was shortened after completion of outside duties. Only two meals a day were served—brunch in the morning, dinner at 5:00 p.m.—with an early afternoon coffee break. According to Lt Dalton, station doctor and military leader, there was no cut in nutrition for sedentary indoor work requires fewer calories.

Midwinter Day was observed with a gala, a costume affair with large amounts of music, larger amounts of refreshments. The costume competition was taken by Jack Penrod for his libelous portrayal of a shore patrolman. The station's scientific leader, George Toney, carried off a carton of cigarettes for his somewhat risquè modifications to a suit of "long Johns." Ed Alf came as an Abner Dean caricature, swathed in a weather balloon. Mario Giovinetto, Argentine glaciologist, masked as a menacing executioner. Dan Hale was a "spelunker." And so it went.

The bingo session was clouded by deep mistrust. One individual cornered four successive prizes donated by ships' store. After a more equitable distribution was made suspicion slowly dissipated. The dinner by candlelight, a chef's triumph, featured dishes named for favorite movie stars, local geography, and familiar Antarctic bylines. Evening movies (double feature) wound up a good day for 23 Byrd men.

With the beginning of IGY on July 1 the men began to catalog the reasons why they chose to immure themselves in this white monastery for a whole year. Reasons ranged wide: adventure, saving money

(Continued on page 84)



USNC-IGY

WEATHER data radioed back from "bugged" balloons high in sky are picked up by parabolic antenna inside rawin dome. Plastic dome is kept free of snow to allow reception of radio signals. Below, John and Noble work on meteorological data before releasing it to IGY Weather Central.

USNC-IGY

METEOROLOGISTS RELEASE PILOT BALLOON.

for college, the urge to travel, career advancement, basis for a doctoral thesis, and just plain curiosity. Anthony Morency, gravity physicist, just couldn't resist a third trip south—he had already been down with the 1939-41 Byrd Expedition and with *Operation Highjump*—and had decided for a second wintering over, next time at LAS.

The IGY men knew why they had come. There were big questions to be answered. Byrd Station, near the edge of the maximum auroral zone, made visual as well as photographic observations. Its isolated situation permitted an additional ionospheric project—recording of atmospheric radio noise to give radio-noise mapmakers a checkpoint. Equipment was housed in a separate hut 500 yards from camp to further insulate it from background noise.

Like Pole Station, Byrd utilized a three-component galvanometric recording seismograph; this in addition to portable units that would go out with the traverse party in the spring.

In Byrd's long winter evenings many topics of conversation were worn to threads. But one was an evergreen. A quartet of IGY men banded together to enjoy vicariously the thrills of cave crawling. The West Antarctica Speleological Society consisted of Edward Alf, Virgil Barden, Mario Giovinetto, and Daniel Hale. Over coffee cups they exchanged reminiscences and plans.

On August 1 at the stroke of midnight IGY meteorologist Wesley Morriss and his crew released their weather balloon. As telemetered data came back from

← OBSERVING aurora with alidade. Dan Hale, auroral physicist, peers through grid of instrument which divides sky into definite areas and permits observer to pinpoint location and direction of pulsating, shimmering lights.

the radiosonde flight it flashed a warning. A jetlike flow of air at the 27,000-foot level reached 77 knots: that meant storm en route. By next evening gusts of 41 knots were registering on ground instruments. It grew steadily worse. For seven days the base rocked under gale winds that rose to 72 knots, drove snow into every cranny, slashed snow-knives across faces. Finally at the storm's height a 36-hour order went out restricting all personnel to the tunnel and adjoining buildings. Only those replenishing the snow melter were free to roam, and they had to go in pairs.

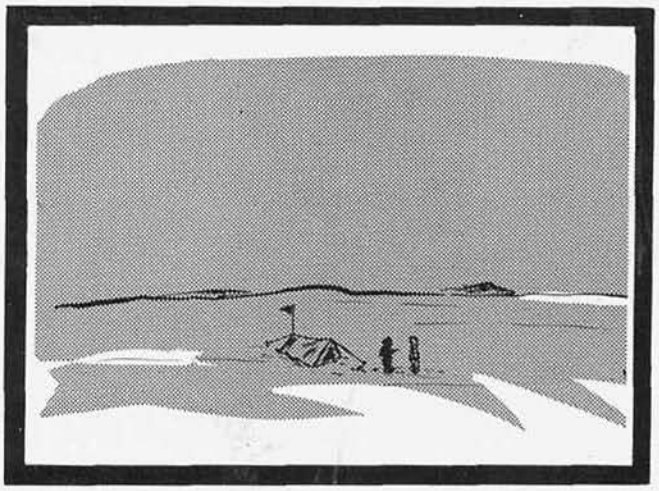
Coming from the northeast the storm was the worst so far in the brief history of Byrd. Visibility was at absolute zero. Fuel supplies diminished, water consumption was restricted, IGY activity lapsed. Huge snow drifts engulfed everything. At last the violence slackened, then ceased. Surprisingly, storm damage was negligible. Tunnel and stowage areas had to be reinforced but it took little time.

The real concern had been for the 31-foot-high auroral observatory, believed the tallest building ever erected in the interior of Antarctica. Aurora physicist Dan Hale had dismounted part of his $10,000 equipment to prevent possible damage; he had also removed valuable cameras and lenses to the science building below the tower. But the tower, stabilized by a system of 16 cables, rode out the storm.

On August 26 the first operational plane flight of the season was made from LAS, a reconnaissance tour that took in Kainan Bay and scouted part of the long, long trail to Byrd. Only about 60 miles of Army-Navy Drive were scouted but the R4D returned to Little America with the news that last year's marker flags and fuel caches were clearly visible. In all probability the tractor trains could follow the old trail, a time-saving factor indeed.

On this hopeful note sunrise came to Byrd August 30. There was a straining at the leash. Spring and summer would bring the traverse for which everyone had been preparing.

(Continued on page 86)



HALL

ANY MORE SKYLARKING, SMEDLEY, AND YOU'RE ON RESTRICTION!

GLACIOLOGIST Giovinetto checks snow accumulation stakes (above), reads snow temperatures (below); latter information obtained by electric thermometers deep in ice.

USNC-IGY

FOOD for thought is prepared by J. R. Penrod as his chief, R. D. Marsh, watches *cordon bleu* technique approvingly.

Wilkes Dons

PARASELENE OCCURRED MAY 15 AT STATION.

LEFT SEGMENT OF PARHELION (SUN DOG) WHICH

COSMIC SURPRISES

On these pages appear several sky phenomena: one solar, one lunar. *Parhelia* are mock suns appearing in symmetrical arrangement near or opposite the sun, possibly caused by ice crystals in the atmosphere. (Also called "sun dogs.") *Paraselenes* are mock moons caused by the same haloing conditions. Antarctica is dramatic!

PHILATELIC MAIL GOES THROUGH CANCELLING MACHINE.

Snow and blow made up for the good fortune of having a vestige of sun all year 'round. Each trip inland to the icecap satellite station had to be slipped in sideways between blizzards.

The aims of the glaciological party at Site Two (S-2) were to study nourishment and melting of the ice cover in the Budd Coast area, to study past climatic conditions by means of a show pit, and to study glacial geology of the Windmill Islands. It was a lonely vigil 51 miles inland. Carl Eklund, Fred Charlton, and Paul Noonan made a special trip up the hill to install a Vee antenna improving communications considerably thereby.

While there they assisted Dick Cameron in taking a series of celestial observations to determine the exact location of the outpost. (Well, here we are . . . now where *are* we?) Their stay was made enjoyable by the temperature dropping to –51°, all the more jolting after the 42-above heat wave they had experienced a few weeks before back home.

At the station on Vincennes Bay the scientists were well ahead of schedule. Dick Berkley had completed adjusting his recording magnetometer; his "house of mirrors" was now complete after weeks of carpentry, wiring, tilelaying, sun and star shooting; the maze ultimately provided a continuous record of changes in direction and strength of the earth's magnetic field. (At Wilkes magnetic north was almost due *west* which made for some confusion—particularly in bridge.)

Many scientific records were photographically recorded and photo lab facilities operated at peak capacity the entire winter. Film processing and scal-

Its Nightcap

OCCURED JULY 31, 1957; ABOVE, RIGHT SEGMENT.

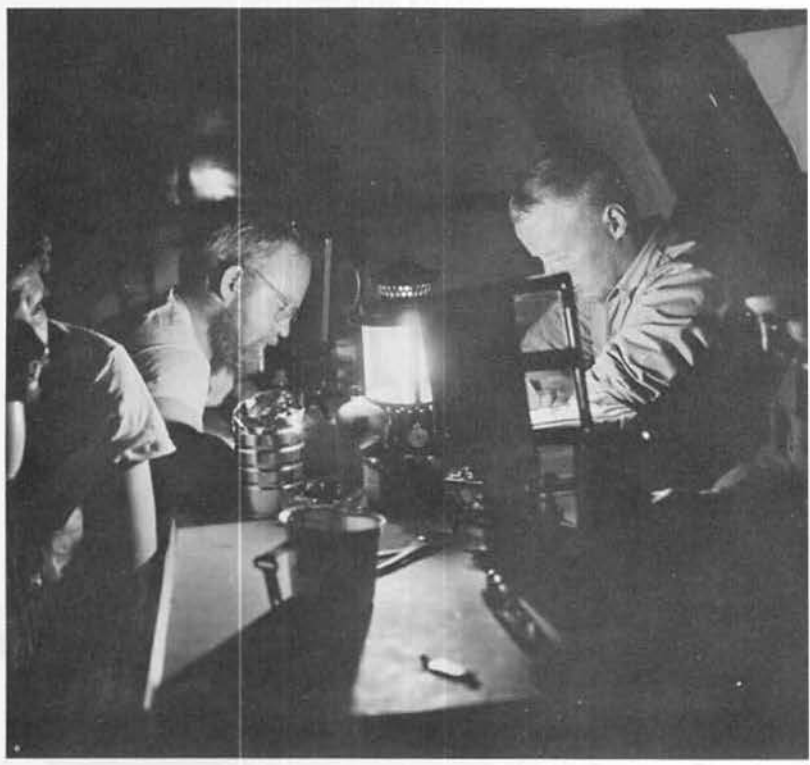
SLING psychometer reading, determining humidity, is taken from inside instrument shelter atop aero shack by Navy aerologist Lilienthal during hours of dark at Wilkes.

ing data from film records were done daily to keep up with the parade. Garth Stonehocker, chief ionosphere psysicist, and his assistant, Bob Long, alternated in processing film and data relating to ionospheric and cosmic ray study. Luckily the antenna that pulled down the data from the ionosphere was only slightly damaged during the year although it caught the full force of Wilkes' wild winds.

Cosmic ray studies were made at only two Antarctic US-IGY stations (beside shipboard observations)—Wilkes and Ellsworth. A meson telescope was in operation at Wilkes. Mostly supervised by Bob Long, it took a heap of doing to get it working just right. The meson telescope consists of several horizontal rows of glass tubes on a rack with recording apparatus of the type used back home for counting traffic. Its purpose, to count (by 60 Geiger counters) and record the changing number of cosmic rays hitting the earth. An August 30 low count was later correlated with a cosmic-ray decrease in northern latitudes.

Three special three-component seismographs built at California Institute of Technology (similar to Hallett units) were under supervision of Gilbert Dewart. (Portable units went with traverse and S-2 parties.) These instruments and those of the other stations measured ground motion in north-south, east-west, and vertical directions and yielded the first earthquake data ever to come out of Antarctica. Wilkes also served as a control point for locating earthquakes in the southern hemisphere.

(Continued on page 89)



SITE 2 up on icecap of a winter's evening: John Molholm, Rudi Honkala, Dick Cameron, Olav Loken check instruments, make entries in logs. One Wilkesite, unimpressed by scenic grandeur of locale of S-2, called it easiest country in world to describe: "You just say it's white."

USNC-IGY

SEISMIC explosion (above) sends shock waves downward to bedrock below ice; echoing back to surface they are picked up by electronic receiver (top right) which amplifies and records shock data. Time interval between shock and sound's return indicates thickness of ice. Glaciologists (lower left) auger hole for seismic "shot." Station seismograph (directly above) records earthquakes for determining Antarctica's seismicity, for indicating average depth of icecap, for "previewing" formation of crevasses, for completing southern seismographic network.

USNC-IGY

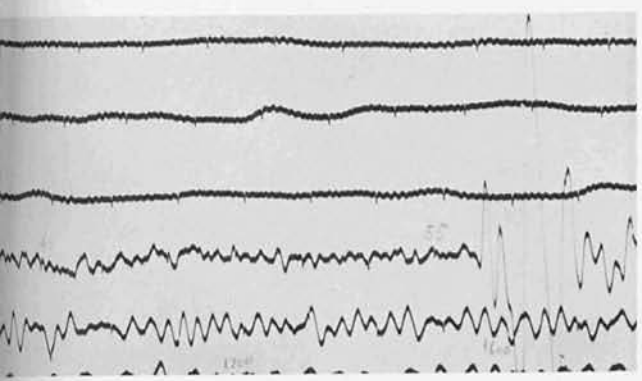
GRAVITY MEASUREMENTS

Gravity is the pull exerted by the earth on all bodies within its field; the force of the attraction is called weight. Gravity values vary at different parts of the earth. The pull is greater at the poles than at the equator because our earth is not a perfect sphere—it bulges slightly at the equator. Mountains and lowlands cause variations. The rise and fall of ocean tides in response to lunar pull have a corresponding action, "earth tides," but they are not simultaneous.

Gravity and seismic measurements were combined by Antarctic traverse parties to learn the depth of the icecap and the nature and topography of the land beneath it.

SEISMOLOGY

Seismic studies relate to earthquakes and man-made explosions whose waves are reflected and refracted by the varying substances that form our earth. Shock waves can be measured and recorded. Antarctic scientists used seismic explosions to gauge thickness of the icecap and the composition of the earth beneath. They studied the southern seismic belts and spotted a number of quakes that would not otherwise have been known. Ice movements leading to crevasse formation were measured and excellent microseismic recordings were made contributing to the correlation studies between meteorology and microseismology.



← VISUAL record of an earthquake (above) is checked by seismologist. Moving-coil seismometer have recording apparatus for film or paper records (or both). Portable seismographs were used on oversnow traverses.

A basic meteorology program was conducted at Wilkes as at all US-IGY stations. But Wilkes was *different*. The wind data *it* fed into IGY Weather Central at LAS must have blown papers all over the office. Where South Pole winds accompanying the annual average temperature of –59°F. blew a mere 10 to 20 mph, and warmer Byrd (annual average –18°F.) averaged 23 mph with gusts of 80.5 mph, Wilkes danced up a storm. Wind velocities in the neighborhood of 100 miles an hour were almost routine, and one storm during the coming summer was to hit 133 mph at its peak.

In addition to regular observations Wilkes' Navy aerographers made other investigations requested by the U.S. Weather Bureau: climatic conditions in outlying areas; solar radiation intensities, noctilucent clouds, and optical phenomena in the fields of auroral field and mirage; collection of air samples for the geochemistry program; snow samples and an extensive study of snow crystals.

June 21, Midwinter Day, was celebrated by a big bash. Outstanding feature was Ross Seal steaks. The rec building was gaily decorated for the occasion. With the evening movie went a special "Burton Holmes Lecture" by Sidney Green, Carl Bailey, Billie Lilienthal, and Gil Dewart who showed slides of the trip down to the Antarctic, scenic shots, and construction progress of Wilkes Station. It was a real nice clambake.

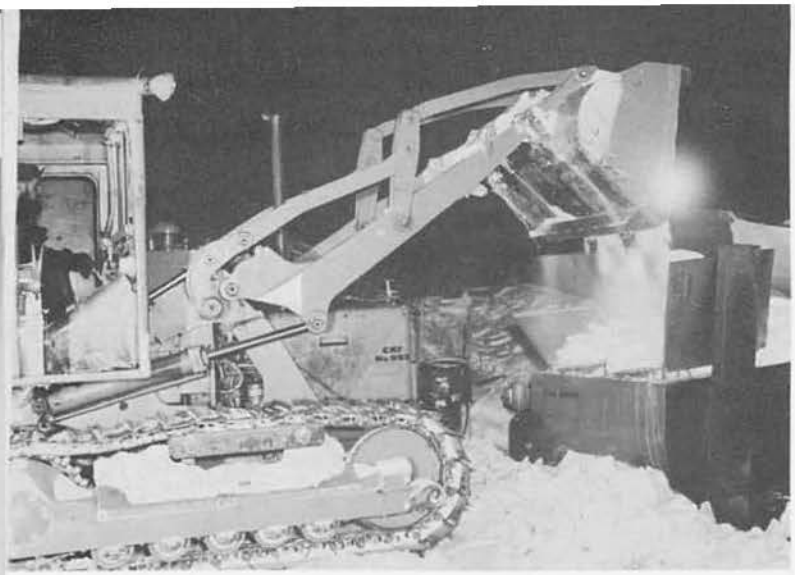
And Pookey was doing well—that was good news. One of the sledge dogs, Pookey had a few days before given birth to the first pup to enter the world at Wilkes . . . Mukluk by name. Its twin was stillborn.

With almost total darkness, Wilkes' snow melting job was not pleasant. That is, until Acy Patterson installed a floodlight near the snow melter so Ed Bousquet could see what he was doing. The only hitch, when the aurora went *on* off went the floodlight.

In a little world of its own yet a part of the mother station, Site 2 was set up to wrench scientific facts from the vast icecap. Big feature of the tiny base was its deep snow pit. It began as a neat excavation 6 feet square inclining downward to a depth of 115 feet, 15 feet from vertical. At the bottom a hole was drilled another 85 feet. Total depth, 200 feet. Glaciology specialists could study ice layers at various levels and read history through their microscopes; annual layers could be distinguished as the age of a tree is measured by its rings, and climatic pictures could be seen in the thicknesses of various layers indicating the amount of melting that occurred. Other activities at the icecap station included three-hourly weather observations and a study of the relative movement of the ice for an 11-month period.

As the pit inched along the glaciologists had to keep the generator running almost constantly to furnish light for digging. This drained the fuel supply which was further depleted by the Weasel's appetite. (The Weasel hauled snow from the excavation.) So toward the end of June the Seabees hitched up their pants for another D-4 fuel run up the hill to S-2. With

(Continued on page 90)



UNSUNG hero "Frenchy" Bousquet was responsible for large part of Wilkes' gracious living: fresh drinking water, hot showers, toughest supply in water-poor continent.

FUEL and chow kept wheels turning. Duane Wonsey (left) fuels building heaters with portable pump. Texas Dave Daniel rustled over 1,000 meals (square) at station.

AEROGRAPHERS Lilienthal, Powell, and Wyche (l. to r.) work up rawinsonde (upper air sounding) as data comes in from small balloon-borne transmitter high in the sky.

them went Rudolf Honkala to install home recording instruments for the "exiles."

At this time the pit depth stood at 33 feet and a "pit-o-meter" kept visual tabs for the benefit of those making book back at Wilkes. The D-4 with Robert McIntyre and Duane Wonsey driving, Honkala supercargo, arrived in time to keep the job moving. They made the trip without much trouble.

But a later trek by Charlton and Honkala proved more complicated. About five miles out of Wilkes a sudden furious storm swamped them. They turned back. About three miles from home they met Gil Dewart in a Weasel on his way to the weather recorders. By now they could see nothing but enveloping whiteness so the three huddled in the first Weasel. With engine running and heater on they bided their time. All afternoon, all night. About 8:00 the next morning the storm subsided and the three weighed anchor. Rudy climbed into the second Weasel, kicked the starter. Black smoke poured from the engine. A hand extinguisher quickly doused the blaze and the sick Weasel was towed home. After 16 hours marooned only three miles from home the three were back where they started.

Despite severe maintenance problems Wilkes vehicles traveled more than 8,500 miles during *Deep Freeze III*.

And despite severe stores the three-man team at S-2 had chopped to a depth of 72 feet in the pit by late July. The Cameron-Loken-Molholm combine confounded detractors who were laying odds against their reaching the 100-foot level, by overshooting it 15 feet. Their estimate of the lowest layer—200 feet—was that it dated back to the late 1500s.

Thousands of messages bearing scientific and administrative data, news, etc., passed through the radio center during the year. Scheduled exchanges were

LINK with home and greatest morale factor, KC4USK. Radioman Ken Hailstorm at mike; everyone had turn two days a month operating ham radio here. Dr. Paul Z. Haus, W2VH, Chappaqua, N. Y., adopted Wilkes and read hometown newspapers beside handling hundreds of messages.

maintained with S-2 and with its trail parties greatly increasing the safety of the men.

But the "hamateur" radio station, KC4USK, was a boon and a credit to the co-operation of the hams around the world. Late in June amateur radio conditions were below par and contacts decreased. Then about the middle of July Garth Stonehocker's 65-watter made contact with the Australian station at Vestfold Hills—not a far reach, but an enjoyable half-hour chat was had with the five-man Davis Station.

Trying for headlines, the galley put on a spectacular little fire that did scant damage but gave the Wilkes Volunteers plenty of action while it lasted. It proved two things—the alarm buzzers had to be upped in decibels, and the smoke-eaters of Vincennes Bay were really on the ball.

The radiomen had another workout toward end of winter. Carl Eklund, nothing daunted by his close call several months before when his Weasel went through the ice, set out with Fred Charlton in a Weasel to determine two things: Could bay ice support their weight? . . . Would the portable direction finder work at considerable distances from home?

The ice had been hardening in the bay for a long, undisturbed period, had reached average thickness of about 30 inches. Eklund had learned this from dog-team sled trips. He felt the two-ton Weasel would be safe but he wanted to be sure before the coastal mapping survey, before seal-branding. Setting out, he and Charlton stopped every 1,000 yards and take an ice-thickness reading; at the same time they would radio home calling for the code letters to be beamed to them. This went on for five miles out to sea on the bay ice, Charlton's direction finder picking up the signal without a hitch. The portable unit looked accurate anywhere from 25 to 50 miles, adding another safety factor to travel in this uncharted area.

INSTALLING DF (direction-finding) equipment. Antenna is man-hauled to top of mast (above) in stiff breeze as Fred Charlton (below) wires receiver to pull in signals.

AURORAL physicist Ralph Glasgal, akin to lighthouse keeper, kept lonely vigil for unpredictable aurora. He gets a look at sun here, but most of his waking hours were spent in darkness of observation tower, long tedious hours with charts, alidade, all-sky camera, and spectrograph.

GIL DEWART, SEISMOLOGIST, AT EARTHQUAKE CHART.

WINTER

Bagpipes at Bahia Chica

Credit Kenneth Kent with most unusual hobby at Ellsworth—playing bagpipes. As the man responsible for radio communications here—and an ardent ham—he had reason enough for this offbeat occupation. Radio being what it is at Ellsworth, a man had to have some outlet for aggravation and the doodlesack was just the outlet.

Thanks to aurora and ionospheric disturbances, radio communications are bad in almost every section of Antarctica at some time. But Ellsworth's situation is acute. Due to location far from open waters and its situation on the fringe of the auroral zone, Ellsworth catches the blackout hex from all sides. The aurora often appears when an extra dense ionospheric layer absorbs radio waves, weakens radio communications. But it's an ill wind that blows no good. When communications men are steeped in gloom, ionospheric and auroral physicists and cosmic ray specialists ride high.

John Brown, chief of ionospheric studies, had more projects going than the sky had stars. Ellsworth had some unique projects. "Whistlers," for example. The study of whistlers is relatively new and is expected to explain some upper atmosphere problems in ionospheric physics and geomagnetism. Whistlers are low-frequency radio signals that scientists believe are usualy a by-product of lightning. When a bolt strikes in middle latitudes static caused by it soars far out into space, following the earth's magnetic field, turns and loops back to earth in the corresponding southerly (or northerly) latitude in the opposite hemisphere. It comes back in the form of a low drugstore-cowboy whistle. Ellsworth was the only US-IGY Antarctic station to have whistler equipment; its findings were re-

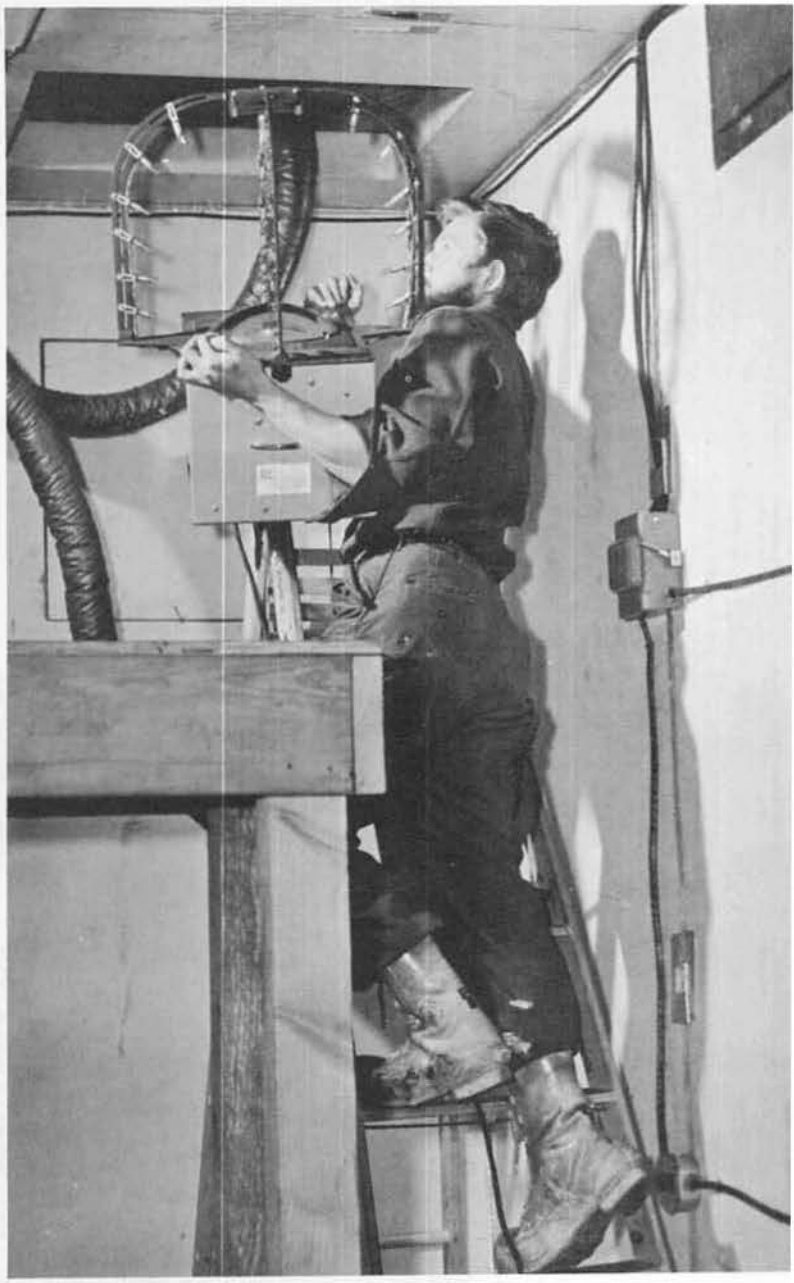
LAST GLIMMERING RAYS OF SUN TOUCH STATION.

REMOVING snow from glaciology pit by man-hauling. On May 10 Ellsworth's temperature dropped to −64°F.; snow temperature was found to measure −40° by IGY scientists.

TRAVERSE preparation began immediately: Hugo Neuburg (left) mends sleeping bag; John Behrendt checks seismology equipment (center) and gyro-compass with Paul Walker, (right) before installing units in Sno-Cats (opposite page). During coming spring and summer five-man team made first scientific recordings in this part of world.

SCIENCE AND PREPARATIONS FOR SPRING BEGAN.

AURORA specialist "Kim" Malville installs all-sky camera → in observation tower (right), checks 16mm motion-picture film of aurora, series of 60-second exposures above.



OVERLAND travel was by aluminum-cabbed Tucker Sno-Cat (above) driven by 180-hp engine. Otters provided air shuttle service here being mapped out by CO and VX-6 "airedales." CAPT Ronne (right) discusses British traverse plans with Dr. Vivian Fuchs (standing at right) during brief visit to Ellsworth from nearby UK Shackleton Base.

WORLD SERIES VIA SHORTWAVE DRAWS BALL FANS.

WELL-STOCKED hobby shop, library, and record stack filled the few available leisure hours with real enjoyment.

Ellsworth's After-

corded for correlation with those in Labrador. The remainder of the scientific program was co-ordinated with those of neighboring Belgrano and Shackleton.

The neutron monitor, the only one at the seven US stations, acted as terminus of a meridional monitor chain observing cosmic rays. This chain of stations studied primary rays (least familiar of the cosmic rays) and their variation at different parts of the geomagnetic field.

Glaciology studies at Ellsworth were mainly concentrated in spring-summer traverses but much data was also collected during the winter night.

Ellsworth's aerology department did yeoman work. Four Navy aerographers and one IGY met man stood 24-hour watch on weather, and old man Filchner made plenty available. It sneaked up from behind: April's weather was mild (average temperature −9°F.), but it swung wildly from a high of 24.8° above to a low, less than a week later, of −34°; June averaged −27° for the month and winds reached 37 knots; August temperature hit a low of −60° with winds around 60 knots.

Head of the weather-data department was Walter May, veteran of many a Pacific typhoon. His equipment was identical with that of Hallett and Byrd Stations; in other words, Ellsworth was pretty big punkins.

Ellsworth's posh recreation center was well patronized. There were hobbies as unique as IGY equipment and disciplines. Barbells, weightlifting, photography, leathercraft flourished. But there were also pitching duels and model aircraft races in the tunnels, and "jet-powered" auto races across the rec hall deck (the "jet," a small CO_2 cylinder).

"The Chamber Music Society of Upper Ellsworth" was organized about midwinter. It met three nights

ELLSWORTH'S FINE REC HALL WITH GAMES, BOOKS, HI-FI RECORDINGS WAS CROWDED ON SATURDAY NIGHTS.

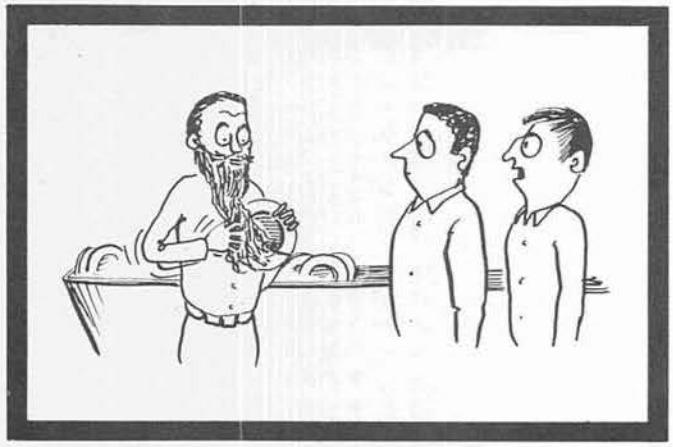
Dark Was Very Bright

a week, studied classical music, and literally wallowed in hi-fi. It was what the doctor ordered for the group was rallied round the metronome by LT Clinton R. Smith, the station's medical officer. C.M.S.U.E. meetings began with a lecture and wound up with recordings illustrating the subject of that lecture. They followed chronological order for the most part, begin ning with earliest recorded music, progressing through the classical period, and moving at last into contemporary fields of opera and modern symphony.

The first of August LCDR McCarthy, boss of AirDev Ron, led his men to a 30-foot snowdrift and with faith in their souls they began to dig. Through lengthening twilight the shovel brigade worked aided by a bucket nosed D-4. Breaks were taken each hour to go inside for warmth; it was 51° below zero on the exposed "airdrome." Finally the Otter stood revealed. Preparations were made to get the plane in shape for spring.

The day following two days of backbreaking toil a 35-knot Weddell whirlwind completely obliterated the Otter with white stuff. In sheer disgust the entire station turned out that night for the biggest party of the season. Ed Davis, Dick Grob, Melvin Mathis, and John Beiszer rustled refreshments (solid); potations were handled by Walter May. This served to clear the air of gloom and the airedales resumed their digging.

A D-8 with pusher blade mounted on front was drafted into service to work on the two Otters at once. Carl Crouse gave an exhibition of finesse, carefully but forcefully moving tons of snow from the planes without disturbing so much as a rudder tab. The D-4 assisted in the clearing process, then men with hand shovels moved in for the more delicate removal job around the fuselage. This time Weddell & Filchner, Inc. withheld wrath and the Otters stood ready for assembly and tune-up.



I TOLD YOU NOT TO PUT SMED ON DRYING DETAIL!

REGULAR MONTHLY BIRTHDAY PARTY BIG BLOWOUT.

IT TOOK MANY A JOB TO KEEP STATION GOING.

GLACIOLOGY

The study of glaciers is a "natural" in Antarctica for the entire continent is covered by one vast glacier creeping seaward in all directions. IGY studies included the volume of ice, topography of its surface, growth or shrinkage of the ice mass, age of the ice, and the land underneath.

Because of the hugeness of the subject, studies were made in two shifts: by station observations chiefly during the winter, and by over-snow traverse parties mainly in spring and summer. Station studies were conducted at all US-IGY stations (except the joint NZ-US Station at Hallett); deep pits were dug and ice cores drawn up to study ice age and to analyze ice crystals. Three major traverses covering more than 4,000 miles took place during the summer of 1957-58; geology, gravity measurement, meteorology, and seismology were combined with glaciology in these traverses.

Glaciers, Crevasses, Caves:

LINEHAN

GLACIERS of Antarctica are mostly active, moving at rate of 5 to 7 feet a day. Taylor Glacier in Dry Valley, however, and one near Wilkes have come to a halt leaving before them rocky terminal moraine.

Ice Coring:

CORES of ice are studied for crystalline structure, stratigraphy, geochemical composition, particulate analysis, density measurements, and isotopic analyses. Microscopic examination reveals dust, pollen, micrometeorites embedded at various levels of depth.

DRIVING CORING AUGUR DEEP.

ICE CORE DRAWN FROM CORE BARREL.

CORE STRATIGRAPHY STUDIES.

Other Snow and Ice Observations:

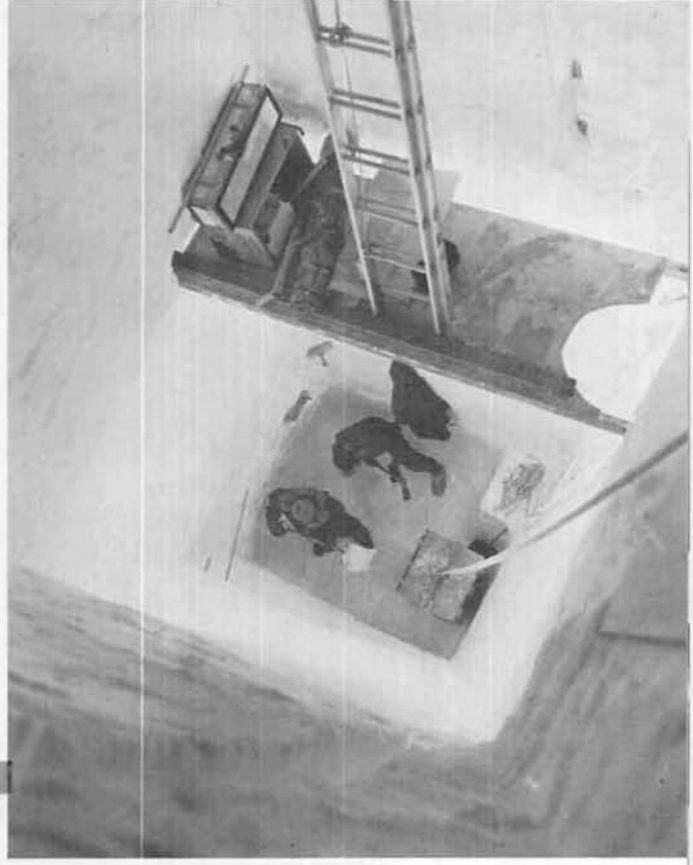
USNC-IGY

USNC-IGY

SNOW is collected (left) for precipitation chemistry studies; snow stakes (center) help determine snow accumulation or depth. Rammsonde penetrometer (right) records depth of penetration of rod into ice, indicates hardness.

USNC-IGY

ICE movement and wind form snowcaves (left) and crevasses (right), both sources of data on stratigraphy and petrofabrics of ice and snow. Glaciologist descends into crevasse to study ice at great depths.



DEEP PIT FOR STUDY OF PAST ACCUMULATION.

THESE deposits form age lines similar to age rings of tree, tell year each level was deposited; they indicate atmospheric currents an density. The 3″ cores are packed in tubes for transportation to U.S. laboratories where they will be further studied in cold rooms.

CORES ARE SAWN INTO SAMPLES, MARKED, WEIGHED.

CRYSTALS STUDIED BY MICROSCOPE, PHOTOGRAPHED.

SNOW crystals as microphotographed, at station lab, by replica method: a polyvinyl resin solution is used to saturate crystals, produces a lasting plastic cast. Infinite varieties of crystals produced in nature alter in structure with changes in water vapor content, air temperature.

WINTER

Moon Over McMurdo

A faint turquoise twilight was all that was left of sun. But outdoor work continued at Hut Point; there was still lots to do before blackout.

Sunday morning, April 28, 1957 (it was about 6:15) fire alarms sounded. Every man rolled out. Rallying point was the garage and public utilities building several hundred feet from the nearest barracks. How long the fire had been in progress no one knew, but it was soon out of control. For four and one-half hours it raged and was with great effort confined to the single building for a good stiff breeze was aloft. Afterward damages were totaled up: the building and all in it were a complete loss amounting to about $125,000—one 35-ton D-8 Cat tractor, one 5 kw floodlight trailer, tools, portable heaters, a half-mile of cable, supplies—all of which would handicap vehicle maintenance. But there was one big plus: not a man was seriously injured.

A combination panel and quonset rib and canvas lean-to building was immediately begun. The Seabees set themselves a brutal five-day schedule in which to complete the first replacement building for garage, carpenter and machine shops, welding and electrician shops, and spare-parts room. They worked around the clock in shifts and met their deadline in spite of heavy weather and a shortage of tools and materials.

The spectacular fire eclipsed the record radiosonde balloon flight. At first thought an *Antarctic* record, it later proved to apply only to McMurdo, but it was still impressive. Navy aerologists had sent their noon balloon up, tracked it for four hours when the signal finally faded due to battery failure, 70 miles distant. The hydrogen bubble rose to 96,272 feet.

On May 14 a blizzard blew into town. For 28 hours winds ripped through at 38 knots, peak gusts hit more than 82 knots. Hardest hit were wires and antennas; part of the rhombic farms was a shambles. Rueful estimates placed repair time at three weeks—at least.

Memorial Day brought an impressive service at Our Lady of the Snows Chapel attended by Sir Edmund Hillary and men from Scott Base. Full military honors were rendered outside the chapel to all who had given their lives in defense of country, particularly the eight who paid "their last full measure of devotion" in Antarctica.

June was busy. Two Jamesways were packed for delivery to Liv Auxiliary Naval Air Facility which was to be relocated in spring. Plans were set moving for the coming influx of "summer tourists"; a peak load of 350 was anticipated. Radio transmission was back to normal once more and the new transmitter building in full operation. The radiomen were seasoned, ingenious, and gluttons for work: Lou Maher, Don Walker, Carl Johnson; supervisors Bill, Jack Lohr ("the fastest big man in camp"), and Press; Landrum,

(Continued on page 100)

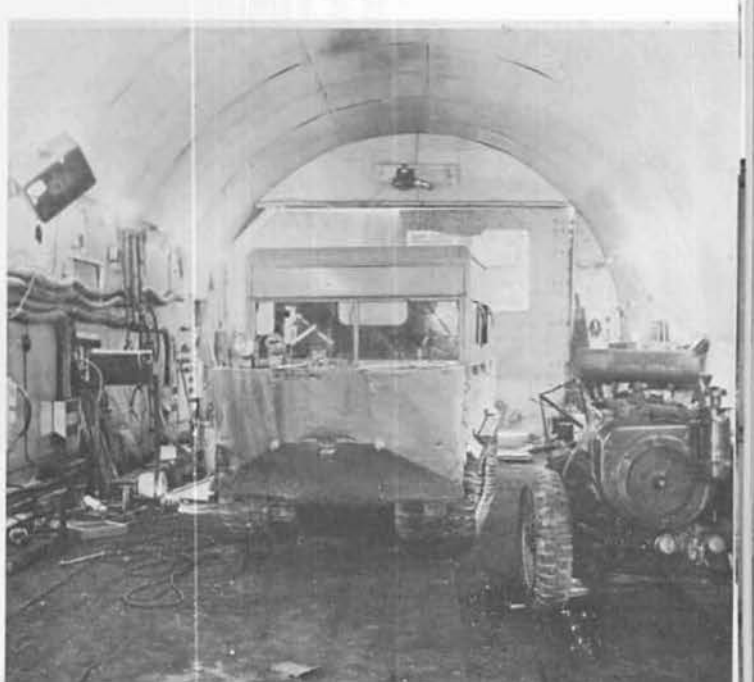
FIREFIGHTERS AT HEIGHT OF RUINOUS BLAZE:

BEFORE ASHES COOL NEW BUILDINGS RISE UP.

NAF GARAGE, REPAIR SHOPS A COMPLETE LOSS.

MORNING-after sight was dismal (above) with charred D-8 standing amid debris. (C-124 chassis at right was not involved in fire; a former wreck, it had been used as toolshed.) Right, new garage was soon in operation.

LIFE goes on as before: Yeckley feeds his dogs, Blankenship does his wash, Jones clicks his shutter, Bowman finds every silver lining has its cloud, Riley makes chief, and Erdei and Beavers say "I do" to Uncle Sam as LCDR Marshall officiates and Chaplain Darkowski witnesses.



Nelson R. Cole

MEMORIAL SERVICE CONDUCTED BY CHAPLAIN DARKOWSKI.

FLAMING CRASH THAT TOOK COLE'S LIFE.

THE CREW: CAPT PULLEN, LT McNEILL, LTJG FRIDOVICH, LT ANDERSON, AIRMAN SCARBROUGH (L. TO R.)

Two Blizzards Wallop NAF, Liv:

MAROONED almost, Merwyn Beavers emerges from quarters at McMurdo after storm. Liv Station had hardly been set up when a stinger lashed in capsizing a tent, blowing huge fuel tank 150 feet, immobilizing Estil Miller's head.

—Antarctic Hero

Stan Johnson ("the night owls"); "Six Bob" Burleson, "Bobo" Bordeaux, Street, Glanz, Poteet Anglin, Logan, and other Marconis who kept the icy airwaves warm.

Then on June 13 the station was paralyzed for nearly five days with the worst blizzard to smash the area. Gusts up to 97 mph tore at buildings and piled snowdrifts into mountainous peaks or whipping it clean off the ground. CDR Flynn, CO of MCB Special, and LCDR Marshall, OinC, had to be shoveled out of their quarters.

The first day of the storm John Knoll, on duty in the isolated transmitter building, was brought back to camp; the power line was out and could not be repaired during the storm so the building was secured. Two days later the storm foxily subsided, luring everyone out for cleanup. No sooner had a fair start been made when the wind howled again and work was stopped. The following morning, same thing: after tricking shovelers into action the storm roared in like an express train. This kept up through Monday, finally coming to an end after 114 hours.

The Fourth of July celebration at McMurdo was a dinger. Fireworks, under the supervision of demolition experts, were climaxed by a Chef Pavlischak banquet. Roast turkey, baked ham, potato puffs, corn, topped off by ice cream made it a real holiday. An old-fashioned civic program in the rec hall with speeches, prayer, and the singing of the national anthem made the day just like home, sweet CONUS.

July 12, 1957 Nelson R. Cole, AD2 became the ninth victim of Antarctica's whim during *Operation Deep Freeze*. It was a calm moonlit morning, clear, cold, with visibility 30 miles. The helicopter, out on a routine flight, had turned back to refuel. About one-half mile from the station LT J. W. McNeill, the pilot, found his windshiled frosted considerably and ice crystals in the atmosphere seriously impairing his vision; he found it always impossible to judge distance. Beside him in the co-pilot seat was MAJ George D. Pullen, Jr., USMC; behind in the body of the 'copter were four others. Coming in to land the craft crashed into the ice and burst into flames.

All except Cole succeeded in crawling from the wreckage. The cold-weather clothing of LT Richard E. Anderson and LTJG Bernard Fridovich had caught fire and was burning furiously. Navyman Leslie L. Scarbrough, McNeill, and Pullen succeeded in smothering the flames, then Pullen tried to re-enter the plane to look for Cole.

By this time MAJ Antos, Alfred Swetokos, and Estile Miller had come from the station. Together they managed to break off the damaged tail section but the intense heat of the flames prevented entry. Fire equipment arrived and the fire was extinguished. The critically injured Fridovich, Anderson, and Scarbrough were hurried to sick bay where they remained in grave condition for several weeks. Two rescuers who sustained injuries were also treated. Chaplain Darkowski offered prayers as the body of Cole was recovered from the cooling wreckage.

NELSON R. COLE, AD2, a member of AirDevRon Six, died in helicopter crash at McMurdo Sound. Plaque in chapel bears inscription: "Nothing is more certain than death; nothing is more uncertain than its how."

McNeill and Pullen received first- and second-degree burns of hands and face while rescuing their crew. Fridovich, most seriously injured, had a broken back and burns on his left hand. Anderson's leg injuries were serious and later complicated by infection. Scarbrough's injuries, while serious, healed in relatively short time. Facial burns were, fortunately, not permanently disabling and eye damage was held to the minimum.

The station doctor, LT Charles L. Novosad, Jr., and his staff were aided by volunteers. One, the medical officer of New Zealand's nearby Scott Base, Dr. George W. Marsh of England, came to offer consultation and assistance to Dr. Novosad.

Sick bay, overloaded by the accident, was enlarged to occupy the entire Administration Building and a drainage system was improvised. Administrative offices were moved into the library. The best possible care was given the injured men and they responded well. Scarbrough was the first back on his feet. On July 22 LT Anderson progressed from critical to serious, followed three days later by Fridovich. Early air evacuation to New Zealand was planned for the latter two.

The Chapel in the Snow overlooking the crash site was setting for memorial services a few days after the tragedy. Chaplain Darkowski conducted the service and the entire station paid respects to Nelson Cole. At the close the chapel bell tolled, taps sounded. A similar service was held at Little America and expressions of sympathy and regard came in from all USS-IGY Antarctic stations. Young Cole had been married only one month prior to departure for Antarctica.

Credit the medical men for their excellent care. Also the NAF dental officer, LT Donald C. Hauck, who set himself the goal of sending each man back home with improved dental health. He singlehandedly set up a dental office that would be the envy of any Stateside dentist: cabinets, built-in fixtures, indirect lighting, woodwork decorations. Dr. Hauck, a gifted pianist and composer, organized and directed many camp talent shows.

The lovely twilight glow on the northern horizon became more spectacular as July melted into August. Every noon an increasingly pronounced light would outline surrounding hills, making visible mountains 50 to 60 miles away.

Sunrise was a washout at McMurdo. A low overcast and blowing snow blotted out every vestige of official dawn. The days just before August 20 were bright and beautiful and cameras had been loaded for the big show. But the calendar didn't have a cloud to mar it—and the calendar said *spring!*

PETER SHOECK RAISES ONE OF AURORA DOMES.

GEOPHYSICISTS doublecheck: Carl Wyman eyes ionospheric film, Ronald Viets calibrates geomagnetic piers.

PHYSIOLOGIST Fred Milan used Paul Dalrymple as subject for cold-weather experiments, temperature recordings.

Big Job for

IGY Weather Central was hub of Antarctica met data with spokes reaching to all parts of Antarctica. It had been established at the request of the international IGY committee and was operated by an international team of scientists. A master weather chart was compiled here. In addition to regular analyses and forecasts, studies were made of storm movement into the continental region and blizzard conditions in the Ross Sea area. Although the 65 widely scattered stations could only scratch the surface of Antarctica's more than five million square miles, this marked the first time in history that its weather was collected simultaneously making possible the development of a reliable meteorological program.

Kainan Bay's weather was spicy, if variety is the spice of life. The setting sun brought falling temperatures; average mean temperature for April was four degrees colder than the previous year, seven degrees colder than the alltime average. A May heat wave and 60-mile gale winds made life outside rough-and-tumble, inside extremely drippy. Crazily, on the same day the South Pole was establishing its −100° May record Little America thermometers registered 30° *above zero*—a difference of 130 degrees within about 700 miles!

One mile from LAS on the road to the ice barrier was a mysterious creeping crevasse. Within the space of four months its gaping cavity had been packed with hundreds of tons of snow eight times.

Finally late in April the oceanographic study group reported a crack 18 inches wide, right across the roadway. Next day a repair group under LCDR Orndorff, OinC, converged at the opening with dynamite and a D-8. Most of the men were crevasse and ice experts with many hours of Byrd Station trail duty. The "ice dentists" proceeded to open and clean out the cavity preparatory to filling. Blast after blast was detonated. To their horror the eighth blast laid open a yawning chasm that only hours before had been the well-traveled barrier road.

DICK HILLS (LEFT) SHOT OUTSIDE IGY OPERATIONS (CENTER, RIGHT) WITH BATTERY-WARMED CAMERA.

Little America

Then Charlie Darter mounted his big Cat, clicked on the floodlights, backed a little, began to push a mountain of snow toward the gulch. As it cascaded into the abyss below, he reversed his tractor for another load. With the huge hole at last filled, the 38-ton tractor was run back and forth over the new "filling" until it was safe and solid.

Only LAS and Wilkes had oceanography on their IGY rosters. Most work in this field was conducted aboard ships during summer operations. Kainan Bay scientists carried out studies under severely adverse conditions, doing most of their work at the barrier during early winter.

IGY men, with assists from Seabee specialists, measured tides and currents, sampled sea water at various depths to determine temperature, density, salinity. They found the sea around Kainan almost 2,000 feet deep with a temperature, constant from surface to bottom, of 28.5°F.

Gaudy specimens of marine life were raised—vivid pink miniature shrimp swimming four feet below the ice, phosphorescent plankton, colonies of microscopic animals that glowed in the watery depths.

A problem in glaciology—measuring movement of the Ross Ice Barrier—was part of the oceanography program. IGY men believed that this 160,000-square-mile sheet of ice moved seaward at the rate of about five feet per day, pushed by the greatest glacier in the world—the Antarctic icecap. To check this measurement an anchor tied to a line was placed on sea bottom at the foot of the barrier. The distance the barrier moved was determined by measuring the length of line played out over a given time; angle of the line showed direction of movement.

The month prior to the opening of International Geophysical Year 1957-58 a meeting was scheduled in Paris—the *Comité Spécial de l'Année Géophysique Internationale,* world committee of IGY. LAS radioman William J. Williams, Jr. was struck by the idea

(Continued on page 106)

UNITED for science: Jose Alvarez (Argentina), Vladimir I. Rastorguev (Russia), and Bruce J. Lieske, U.S. meteorologist, spend working and leisure hours in company.

METEOROLOGISTS William Moreland and Joseph Krank at work in IGY Weather Central where all Antarctic weather was assembled, transmitted to stations on icecap.

WEATHER pressure map is plotted by Gene Harter. Regular weather analyses and forecasts were transmitted by radio, and a few weather maps via facsimility machine.

FACSIMILITY MACHINE GETS STATESIDE NEWS.

ANTARCTICA: Places, Events

THE INSERT opposite is both map and chart. It gives place names, base locations, relief contours, and other geographic data; it also shows the ocean depths and rises of the navigator's chart. It will be of great interest and guidance to readers of the account of *Operation Deep Freeze III.*

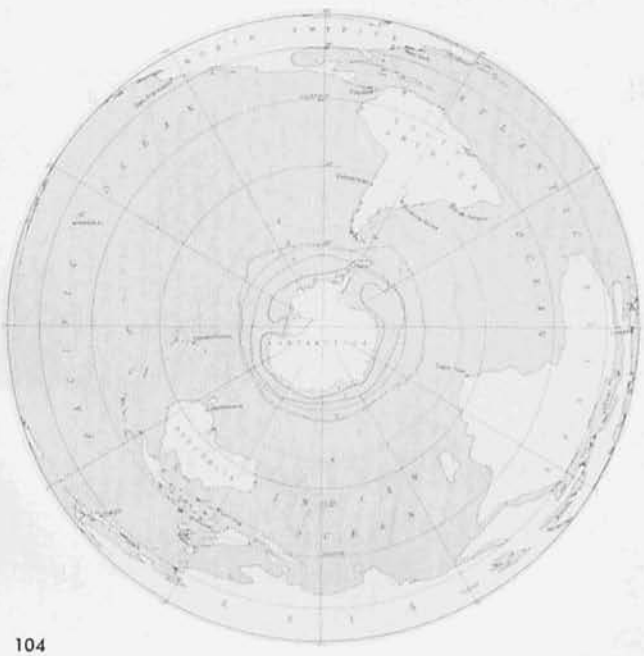
IGY STATIONS — The 66 U.S. and foreign IGY stations and bases are indicated by ● with the nation's initials and, in the case of the U.S., the name of the station. Stations and bases can be identified by referring to Index (right) which gives latitude-longitude bearings.

RELIEF CONTOURS — Ice-free land areas appear in yellow; icecap's contours indicated by shading and screening (screened area denoting greater land elevation beneath icecap); ocean contours and depths in fathoms, dark green denoting deeps, light green denoting shallows.

ROUTES — Includes ships' tracks; U.S. traverses; Fuchs Commonwealth Transantarctic Expedition; Byrd trail; air distances to various points.

CREDITS — Relief Chart of the Antarctic Region, U.S. Navy Hydrographic Office; Richard C. Hosier. Orientation Map, courtesy National Academy of Sciences and American Geographical Society. Station Listing, USNC-IGY, U.S. Navy.

ORIENTATION MAP: ANTARCTICA IN RELATION TO OTHER CONTINENTS



UNITED STATES

NAF, McMURDO SOUND Lat. 77°50′S	Long. 166°36′E
LITTLE AMERICA V Lat. 78°11′S	Long. 162°10′W
BYRD Lat. 80°00′S	Long. 120°01′W
AMUNDSEN-SCOTT SOUTH POLE Lat. 90°00′S	
WILKES Lat. 66°15′S	Long. 110°31′E
HALLETT (Jointly with N.Z.) Lat. 72°18′S	Long. 170°18′E
ELLSWORTH Lat. 77°43′S	Long. 41°08′W
NAAF, LIV (Foot of Beardmore Glacier)	

ARGENTINA

GENERAL BELGRANO Lat. 77°59′S	Long. 38°44′W
ORCADAS Lat. 60°45′S	Long. 44°43′W
MELCHIOR Lat. 64°20′S	Long. 62°59′W
PRIMERO DE MAYO Lat. 62°59′S	Long. 60°42′W
SAN MARTIN Lat. 68°08′S	Long. 67°07′W
ALMIRANTE BROWN Lat. 64°53′S	Long. 62°52′W
ESPERANZA Lat. 63°16′S	Long. 56°49′W
TENIENTE CAMARA Lat. 62°36′S	Long. 59°57′W
*USHUAIA Lat. 54°48′S	Long. 68°19′W
*RIO GRANDE Lat. 53°48′S	Long. 67°47′W

AUSTRALIA

*MACQUARIE ISLAND Lat. 54°29′S	Long. 158°58′E
MAWSON Lat. 67°36′S	Long. 62°53′E
DAVIS Lat. 68°35′S	Long. 77°58′E

BELGIUM

KING BAUDOIN Lat. 70°00′S	Long. 20°00′E

CHILE

BERNARDO O'HIGGINS Lat. 63°19′S	Long. 57°54′W
GONZALEZ VIDELA Lat. 64°49′S	Long. 62°52′W
ARTURO PRAT Lat. 62°29′S	Long. 59°38′W
AGUIRRE CERDA Lat. 62°56′S	Long. 60°36′W
YANKEE BAY Lat. 62°32′S	Long. 59°49′W
COPPERMINE COVE Lat. 62°22′S	Long. 59°45′W
*DIEGO RAMIREZ Lat. 65°30′S	Long. 68°45′W
*PUNTA ARENAS Lat. 53°10′S	Long. 70°55′W
*EVANGELISTAS Lat. 52°25′S	Long. 74°55′W

FRANCE

DUMONT D'URVILLE Lat. 66°40′S	Long. 140°01′E
CHARCOT Lat. 69°22′S	Long. 139°02′E
*ILES DE KERGUELEN Lat. 48°40′S	Long. 69°14′E

JAPAN

SHOWA (Abandoned 1958) Lat. 69°00′S	Long. 39°35′E

NEW ZEALAND

SCOTT Lat. 77°51′S	Long. 166°45′E
HALLETT (Jointly with U.S.A.) Lat. 72°18′S	Long. 170°18′E
*CHRISTCHURCH Lat. 43°32′S	Long. 172°37′E
*INVERCARGILL Lat. 46°25′S	Long. 168°19′E
*CAMPBELL ISLAND Lat. 52°32′S	Long. 168°59′E

NORWAY

PRINCESS MARTHA COAST (Location) Lat. 70°30′S	Long. 02°32′W

UNION OF SOUTH AFRICA

*MARION ISLAND Lat. 46°51′S	Long. 37°52′E
*TRISTAN ISLAND Lat. 37°03′S	Long. 12°19′W
*GOUGH ISLAND Lat. 40°20′S	Long. 10°00′W

U. S. S. R.

MIRNY Lat. 66°33′S	Long. 93°00′E
OAZIS Lat. 66°16′S	Long. 100°44′E
PIONERSKAYA Lat. 69°44′S	Long. 95°30′E
KOMSOMOLSKAYA Lat. 72°08′S	Long. 96°35′E
VOSTOK Lat. 78°00′S	Long. 110°00′E
SOVIETSKAYA Lat. 78°00′S (Approximate Location)	Long. 88°00′E

UNITED KINGDOM

HALLEY BAY Lat. 75°31′S	Long. 26°36′W
"A" PORT LOCKROY Lat. 64°49′S	Long. 63°30′W
"B" DECEPTION ISLAND Lat. 62°59′S	Long. 60°34′W
"D" HOPE BAY Lat. 63°24′S	Long. 56°59′W
"F" ARGENTINE ISLAND Lat. 65°15′S	Long. 64°16′W
"G" ADMIRALTY BAY Lat. 62°05′S	Long. 58°25′W
"H" SIGNY ISLAND Lat. 60°43′S	Long. 45°36′W
"J" FERIN HEAD Lat. 66°00′S	Long. 65°24′W
"N" ANVERS ISLAND Lat. 64°45′S	Long. 64°05′W
"O" DANCO COAST Lat. 64°44′S	Long. 62°32′W
"W" LOUBET COAST Lat. 66°54′S	Long. 66°48′W
"Y" HORSESHOE ISLAND Lat. 67°49′S	Long. 67°17′W
*PORT STANLEY Lat. 51°42′S	Long. 57°52′W
*SOUTH GEORGIA Lat. 54°16′S	Long. 36°31′W
SOUTH ICE (Abandoned 1958) Lat. 81°56′S	Long. 29°30′W
SHACKLETON Lat. 77°57′S	Long. 37°16′W

*Base not shown on map

INDEX OF STATIONS ▶


130° W
120° W
110° W
140° W
150° W
160° W
170° W
2500
2000
3000
2000
2500
2500
1500
2000
SOUTHWESTERN PACIFIC
EASTER ISLAND (PACIFIC-ANTARCTIC RIDGE)
CORDILLERA
BELLI
Iselin Seamount
33

RELIEF CHART OF THE ANTARCTIC REGION

GION


70°W
60°W
50°W
40° W
30° W
20° W
10° W
0°
MERIDIAN
ARGENTINE
BASIN
Burdwood Plateau
Falkland
Trough
SCOTIA
RIDGE
WEST SCOTIA
BASIN
EAST
SCOTIA
BASIN
RIDGE
SOUTH GEORGIA
RISE
Barth Seamount
USS BURTON ISLAND
USS WYANDOT
USCGC WESTWIND
USCGC WESTWIND USS WYANDOT
S. AFR. STATIONS
SOUTH POLE TO NORTH
CHI
UK
ARG
NOR
2452
1094
274
157
251
4518
4430
3750
100
500
1000
1500
2000
2500
3000
3500

CONTOURS AND DEPTHS INDICATED IN FATHOMS

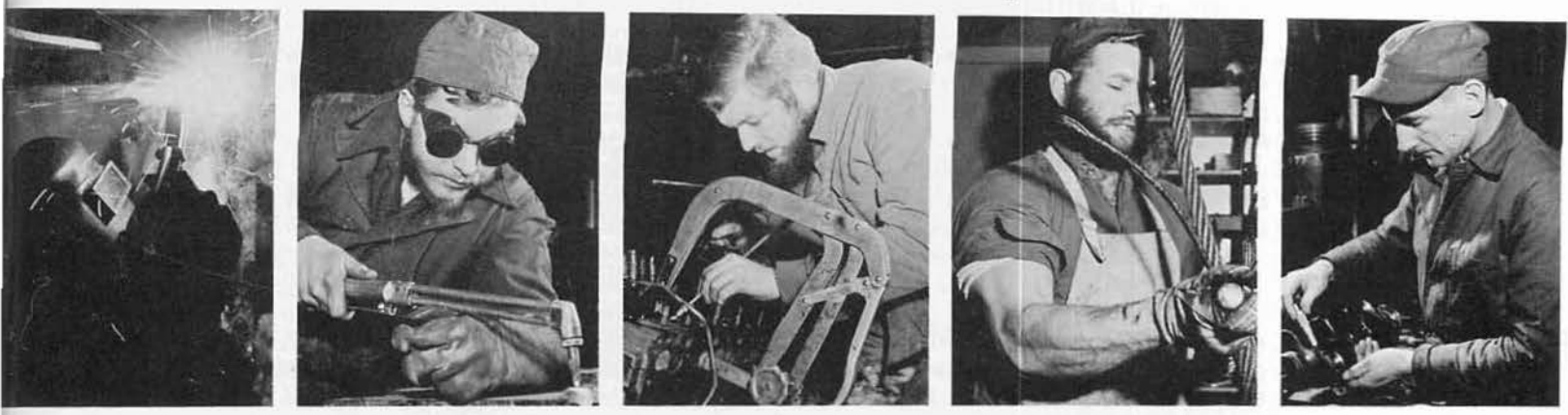

AIR ROUTE
LIV STA. USA
AIR ROUTE 840 ST. MILES
SOUTH POLE
AMUNDSEN SCOTT STA. USA
NAF
McMURDO
USA
NZ
ANTARCTICA
USSR
USSR
FRA
USSR
AUS
USSR
AUS
WILKES STA.
USA
USSR
USSR
USS BURTON ISLAND
USS BURTON ISLAND
USS ARNEB
ANTARCTIC BASIN
CENTRAL
INDIAN
RISE
110°E
100°E
90° EAST
80°E
70°E

Fig. 78


SOUTH POLE TO NORTH POLE 10,800 MILES
WYANDOT
Maud Seamount
Seamount
GREENWICH
0°
10° E
20° E
30° E
40° E
70° E
60° E
50° E
BEL
JAPAN
USS BURTON ISLAND
SOUTH POLE TO CAPE OF GOOD HOPE 3350 MILES
SOUTH AFRICA
ATLANTIC-INDIAN RISE
ATLANTIC-INDIAN-ANTARCTIC BASIN
VALDIVIA
3134
Agulhas Basin
2000
2500
3000
1500
1000
500

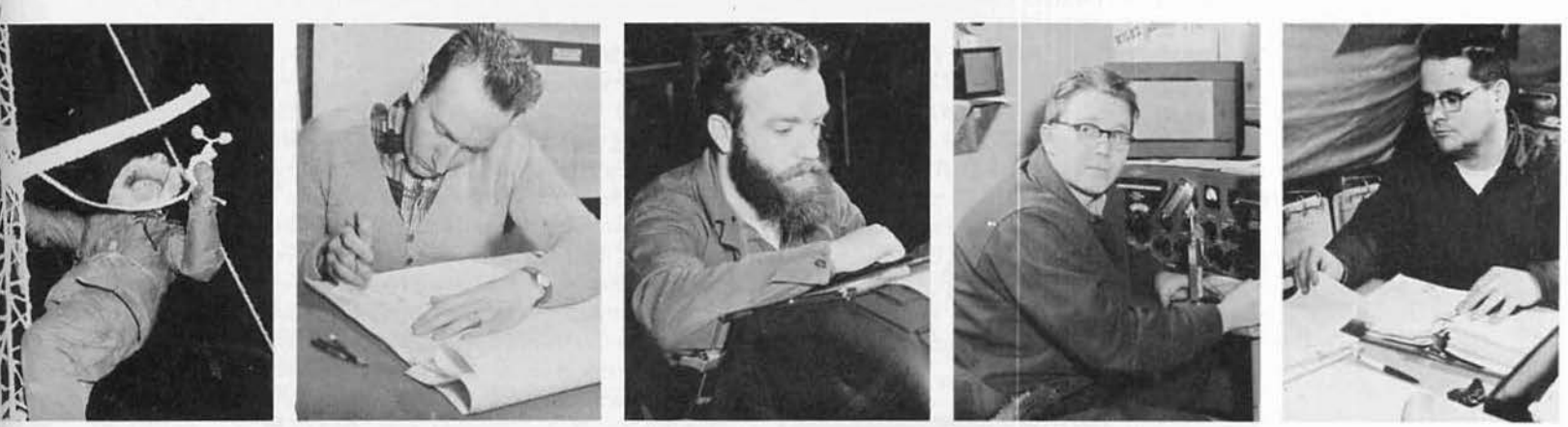
Little America Kaleidoscope:

WINTER



(L. TO R.) DUANE CAMBELL, RUSSELL GUENTHER, HECTOR LETT, KENNETH ELLIOTT, EDWARD CAMP IN THE SHOPS.

THOMAS GERINGER, ROBERT MOLLA IN POWER HOUSE; JACK REES, STEVEN MUNTZ, AND ROCCO TAURISANO.



IGY MEN PAUL DALRYMPLE, JOSE ALVAREZ; WILLIAM KRAUT; RONALD TAYLOR (IGY); HARRISON GILBERT.

CHAPLAIN, JOHN REILLY, BERNEST MELTON, B. VERBONCOEUR, RICHARD CHAPPELL, VLADIMIR RASTORGUEV.

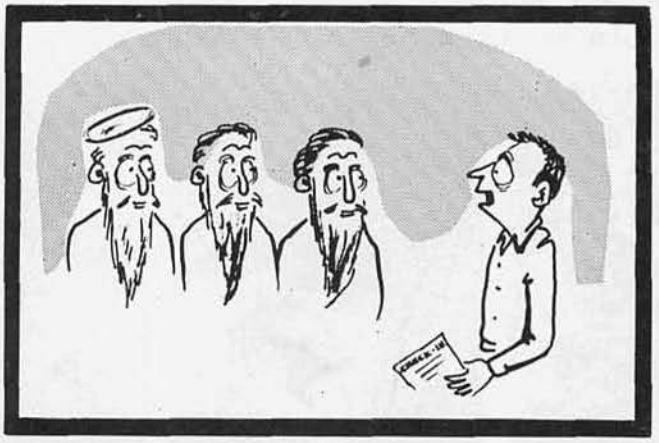
of sending a radio facsimile of IGY weather maps transmission, via Washington, to the Paris conference. His idea was forwarded to Washington by LTJG Peter A. Raynolds, who strongly recommended it. The idea was OKd and work began.

Working at top speed to meet the June 3 deadline, LAS electronics technicians redesigned and built transmitter components from equipment on hand. Four weather maps were prepared. On the scheduled day the pictures were transmitted to Washington, and were received in excellent condition over 8,000 miles. This was the scientific application of the great morale builder, "Operation Baby Face."

LAS Radio Central, operated on split-second timing. Eight radiomen stood 12-hour watches seven days a week. First-watch section, made up of northerners, answered to the name of "Yankees." Second watch-section, by the same token, was called "Rebels." Weather data collection for LAS Weather Control involved hourly interception from Australia and New Zealand, sometimes from South Africa and South America; a continuous weather broadcast issued from McMurdo and one every three hours from Byrd Station. "Yankees" and "Rebels" were in stiff competition to collect the "mostest" data with the winner each month being given a party.

An interesting situation resulted from time differentials. Washington received messages from LAS *before* they were sent, Little America being in the farthest reaches of the Western Hemisphere. The weekly situation report dispatched Monday afternoon was received on the Potomac Monday morning.

Ham equipment, morale builder chiefly, also figured in scientific operations. On June 9, a Sunday evening, Franklin Stackhouse talked with KG1DT located on floating ice island T-3. Site of an IGY station, the island was at that time approximately 400 miles south of the North Pole, 500 miles northwest of Thule. Next day William Williams contacted KL7FBE on a tiny ice island (IGY Station Alpha) then about 600 miles south of the Pole, 700 miles north of Point Barrow. During the latter conversation Dr. Hoinkes, Austrian meteorologist, talked with a fellow countryman on the ice floe. (This was the station evacuated in November 1958 when serious leads in the ice developed.)



HALL

"WHICH ONE OF YOU GUYS IS THE CHAPLAIN?"

The morale record was impressive. In nearly six months of the winter night a total of 876 "hamgrams" (telegrams sent via ham hook-ups) were completed; 464 "phone patches" (ham hook-ups between receiver and telephone) were processed in the same time.

The April 28 fire that wiped out McMurdo's garage sparked fire protection at LAS. The large sprawling installation at Kainan Bay was vulnerable and took a well-planned step to avoid repetition of the McMurdo loss. Chemical extinguishers were given complete maneuverability by fitting them to wheeled carts, a triumph of Seabee ingenuity. First a prototype was built. This was turned over to production detail who built six squat, sturdy wheeled units like unto it, complete to grease fittings. Each unit was placed strategically in the main interconnecting access tunnel, that ran from garage to head, within immediate range of any possible fire in the station. A unique byproduct of the operation was a bell crafted from the upper section of a discarded steel oxygen bottle plus a 6-inch bolt for a clapper. Fire gong? No, indeed. The clear-toned bell was destined for the Byrd Memorial Chapel!

Little America Station was the most heavily populated IGY station; it also carried one of the heaviest scientific schedules and concentration of scientific equipment. Aurora received particular attention; so did meteors. A scanning spectrometer observed and recorded subtle colors, some not visible to the eye, in sweeping vails of the aurora; low-power radar equipment was turned on aurora and meteors for study.

Geomagnetism was studied at LAS in close association with ionospheric physics and auroral studies. LAS, Byrd, and Wilkes shared a nearly identical program in this field. Little America had, in addition to standard equipment, a variometer photographically recording magnetic changes which also indicated the beginning and ending of unusual activity.

LAS did much work on glaciology — ice crystal studies, transfer of energy between meteorological surroundings and the icecap, deep-drilling studies of ice cores, surface movements of ice. But the big push would start in spring when the entire Ross Ice Shelf would come under the scientists' scrutiny backed by air reconnaissance and photography. Already the garage crew was overhauling equipment and the IGY group packing food in five-day units.

Another IGY study was in physiological research using Navy volunteers. Frederick A. Milan, IGY physiologist, was at LAS to observe effect of cold on the human body and adjustment made by the body to cold. His tests were nearly as tough as actual living conditions on the ice shelf—lying for two hours (wearing apparel, shorts!) in room temperature 62°F. with thermocouples attached to various parts of the body to record skin temperature; holding one finger one-half hour in ice water with recording device to note temperature; stepping on and off a 20-inch height rapidly for three minutes at a time.

Nutrition studies matched food intake with energy output to learn if higher caloric intake is required under cold conditions. LAS personnel studies revealed

average caloric intake of its citizens slightly in excess of 3,000 calories. A random sampling of weights indicated an average gain of seven pounds among the men.

IGY activities were under the blinking eye of the camera of Calvin Larsen, seasoned combat photographer. (Larsen's motion picture footage has wound up in such movies as "The Caine Mutiny," "Torpedo Alley," and Murrow's "See It Now" TV program.) Assisted by veteran photographer Richard Hills, Larsen covered indoor and outdoor work with movie and still cameras. Outdoor moviemaking employed a Weasel mounting five 1,000-candlepower lights for floods and resulted in dramatic documentary.

Moving into July pressure mounted on all fronts—early flights for McMurdo, establishment of the new Liv Station, early shove-offs for spring traverses. Everything was early. A minor fire scare, ignited fumes from an empty antifreeze drum, was followed in late July by a real "hairy one." Working the night shift in the garage, Bob Molla was cutting the track of a D-8 tractor with an oxygen torch. Standing by with fire extinguisher, standard procedure for such operations, was Ed Camp. A spark jumped. Instantly Molla's oil-soaked trousers flamed up, enveloping his body and singing his heavy beard. Camp triggered the extinguisher. Nothing! As he wheeled to grab the other extinguisher Molla turned and fled. Camp, fearing he had panicked, dashed after him with the second extinguisher. He found Molla sitting in a snowbank in which he had smothered the flames. Thinking his burns minor, Molla was with difficulty persuaded to go to sick bay. Fast treatment by the medics helped prevent more serious injury.

By early August five R4D and three UC-1 flights had been racked up. The winter was still quite dark but purpose of the flights was to familiarize pilots with Antarctic night flying and to practice GCA (ground control approach) landings. Only clear, calm "days" were scheduled and flying radius was limited.

Many hours of preparation went into each flight. AirDevRon personnel hopped the Sno-Cat to Kiel Field, a mile-and-a-half away early in the morning. Preheating engines for three hours, removing snow and ice, digging free skis, making regulation pre-flight check—all this ran into time. Sometimes D-8 jockeys had to level snowdrifts and scrape the runway. They set out flame pots at 100-foot intervals to mark both sides and one end of the landing strip.

Actual takeoff was fairly routine. Then began the most hazardous part of the flight—climbout after takeoff. The plane leaving the illuminated area was immediately plunged into blackness. The pilot was thrown completely on instruments: no point of reference, no landmarks, no horizon. Normal depth perception was not to be trusted. Flying in temperatures sometimes as low as −45°F., frost would build up over the entire aircraft slowing the plane and calling for more power to maintain flying speed. Coming in for a landing on the well-marked runway was the easiest and most normal part of the flight.

The IGY meteorology department provided the exact minute the sun would appear for sunrise on August 20, 1957. It's good it did. Otherwise the flag-raising salute would have missed by a mile. This was *an "almanac sunrise." Temperature was 26° below,* an eight-knot wind was blowing, and heavy clouds obscured the sun. As the flag was raised and two-blocked, all hands executed a snappy salute in spite of heavy parkas and fur-trimmed hoods. The chaplain offered a brief prayer and CAPT Dickey spoke appreciatively of accomplishments and co-operation of all. The night was over. Long live the day!

—AND ON THE OTHER SIDE

Lest anyone think the CONUS side was a pink tea, be advised it was not. Washington—Task Force 43 headquarters and IGY offices—grew more hectic as 1957 wore on.

Donaldson Air Force Base where MATS nested its big birds . . . Davisville, Rhode Island where everyone went slowly mad looking at mountains of supplies to be loaded into tiny ships . . . Quonset Point, AirDevRon's rendezvous . . . Norfolk, Newport, Boston, Seattle where ships settled lower in the water as holds grew heavier . . . Washington whence issued detailed communiqués on every scientific subject, ending characteristically "Odishaw sends."

On July 15, 1957 something happened that surprised no one. President Eisenhower designated RADM George J. Dufek, USN (Ret.) U.S. Antarctic Projects Officer replacing the late RADM Richard E. Byrd. He would continue as Commander of Task Force 43, the only retired officer of the Navy currently authorized to command at sea.

It was the day before spring, it was a new phase—*Operation Deep Freeze III,* climax of the entire Antarctic program.

OPERATION BABY FACE, courtesy of RAGS (Radio Amateurs of Greater Syracuse), sent via ham facsimile transmission from W2KCR pictures of newly born children to proud papas wintering over at LAS and McMurdo. First "Fax" transmission was received at LAS May 5, at NAF on May 30, 1957. Paul P. Blum, guiding light of program, cues in RADM Dufek as Rev. Daniel Linehan listens in Antarctic exchange. Right, Calvin Larsen holds radio-photo of family. Blum handled more than 20,000 "hamgrams" and 9,000 special greetings since 1955 to and from Antarctica, invested many hours and dollars in project.

METEOROLOGY

Weather studies — temperatures, atmospheric pressure, precipitation, wind velocity and direction, etc.—comprised a major portion of the US-IGY Antarctic program. Long ago scientists realized that weather is basically not local but worldwide in origin and effect. Antarctica, "the home of the blizzard," is clearly an important breeding ground for all weather.

The more than 55 IGY Antarctic stations were so located that from their data it will now be possible to prepare atmospheric cross-sections and surface and upper-air meteorological charts for the entire South Polar region.

ROCKETRY

Rocketry investigations of the atmosphere were also conducted on shipboard. The GLACIER launched "rockoons" into the ionosphere to gather data on cosmic rays, aurora, and geomagnetism; a Skyhook balloon lifted an instrument-bearing rocket to a height of about 70;000 feet where it was fired by remote control, reaching a final altitude of 75 to 100 miles in space.

Meteorological Instruments:

BAROGRAPH, self-registering barometer, is adjusted (top left). Instruments for measuring, recording intensity of radiant energy (radiometer, top right); sun radiation; radiation and temperatures.

Weather Balloons:

HUMIDITY, temperature, pressure of upper air are telemetered by miniature radio transmitter to rawin tower (far left). Top (l. to r.), balloon that carries transmitter is launched: hydrogen generator is charged, balloon filled; transmitter checked in test box, attached to balloon and launched. Rawin "ears," parabolic antenna, in dome (lower left); automatic weather recording machine (center) with aerologist computing record; weather map prepared and analyzed (right).

Spring Comes to Antarctica

Trailblazing Otter Swoops Low Over Traverse Party of IGY — PHOTO BY COX

WITH THE SUN'S RISING CAME MORE—
PLANES, NEW FACES, LETTERS FROM HOME,
AND THE APPROACHING END TO A JOB

Spring Is in the Air

SOON, VERY soon the close-knit group — the men who had forsaken the comforts of civilization to winter over — would be diluted by outsiders, "summer tourists."

To register and maintain identity a society was organized. "The Royal Order of Winter Knights," one of the most exclusive fraternities in the world, counted as its members the 484 military men and IGY civilian scientists who had wintered over during *Operation Deep Freeze I* and *II*. Each "Knight" received a handsome scroll signed by RADM Dufek and by "His excellency Emperor Aptenodytes" (CDR Herbert W. Whitney, USN), senior member of the wintering-over party. The scroll was designed by Walt Disney Studios.

As in *Operation Deep Freeze II* the monstrous C-124 Globemasters of the Military Air Transport Service were on the line for airlift and airdrop during the summer of 1957-58. Eight of them hulked in their hangers near Greenville, S.C. waiting for the word.

Backing flying crews and support personnel were the men of the 1710th Aerial Port Squadron commanded by LTCOL Michael C. Zinkovich. These were the airdrop specialists who could boast of one inland station completely supplied by vertical delivery . . . of the first parachute jump at either pole . . . of a load of fresh eggs dropped at the South Pole without a single crack! . . . "the best damn bunch of men in the Air Force," according to their CO, COL "Z."

There were close to 300 officers and enlisted men aboard the C-124s as they lumbered into the Carolina sky, heading westward, every few days beginning September 1, 1957. Next stop, Travis AFB in California, then on to Hawaii, Canton Island, Fiji, and finally Christchurch, New Zealand.

On September 4 at dawn two R4D-8 Skytrains and a P2V-7 Neptune left the runway at Quonset Point and roared west, winging their way to the bottom of the earth to join their four "birds of a feather" that had been left on the ice over the winter. Their skis added an exotic touch to the New England skyline.

The men of the VX-6 (Air Development Squadron Six) were volunteers all. One of the planes of "The Potent Penguin Squadron" carried a sign indicating the adventurousness of the crew — "Have Gum, Will Travel." Aboard the Neptune was CDR Vernon J. Coley, Jr., USN in command of VX-6. The two Skytrains were piloted respectively by CDR E. J. Frankiewicz and LCDR Conrad S. Shinn. The flight, strictly routine, brought them into Christchurch on schedule.

The lead Globemaster reached Christchurch September 10, touching down at Harewood Airport after an uneventful trip. Harewood was the main operating base; operations spilled over into N.Z. Air Force's Wigram Airdrome.

Each aircraft had its maintenance team consisting of crew chief and three assistants. During airlift operations the team flew with its plane, performing maintenance required for drop missions. On return to Harewood it would ready the plane for the next Antarctic flight. Aerial port personnel spent a month in New Zealand packing 'chutes, cutting and banding "honeycomb" to pallets, processing incoming cargo. When in early October the main group moved into McMurdo for drop missions a small contingent was left behind to run the passenger and freight terminal.

As in *Operation Deep Freeze II*, the USS BROUGH, destroyer escort vessel, stood its lonely watch between New Zealand and Antarctica. Providing weather data, communications guard, and homer navigational facilities for southbound and returning planes, the BROUGH played an important part in the success of the massive air operation. She left Newport late in August and by September 30 was on station at 60°C., 170°E.

On August 19 Naval Support Unit III, Antarctica — the 1958-59 wintering-over group, was formally commissioned at Davisville, R.I. The 21 officers and 193 enlisted men began to move out via Quonset Point in groups, the first leaving shortly after the arrival at Davisville of the new wintering-over IGY scientists; the latter, who would relieve their brothers in calculus down on the ice, came for orientation.

The Seabees battalion was under the command of CAPT Eugene H. Maher, USN. A special Seabee reconnaissance unit under LCDR H. E. Stephens had been formed to work in the field in the McMurdo Sound area.

Admiral Dufek and part of his staff planed out of NAS Quonset Point in an R5D Skymaster September 10, 1957, shifting his flag to Christchurch four days later. The CTF would operate all staff functions from this rear base, commuting to and from the ice as conditions required. The remoteness of the seven stations from each other made this a highly workable arrangement, one which was repeated in *Deep Freeze IV*.

On September 23 GLACIER led the ice argosy south. Departing Boston she was followed at irregular intervals by GREENVILLE VICTORY from Davisville, ATKA from San Diego, NESPELEN from Norfolk, BURTON ISLAND from San Diego, TOWLE from Davisville, WESTWIND from New York, WYANDOT from Norfolk, and ARNEB from Davisville. Port Lyttelton was halfway house for GLACIER, GREENVILLE VICTORY, ATKA, NESPELEN, BURTON ISLAND, TOWLE, and ARNEB; from there they would disperse to Antarctic destinations. WESTWIND and WYANDOT, however, headed to Dakar, West Africa since their operations would lie in Weddell and Bellingshausen areas.

SEASON'S FIRST GLOBEMASTER TAXIS IN AT NAF.

(Continued on page 112)

PART of the 53rd "Blackjack Squadron:" Back, l. to r., LtCol Dixon J. Arnold, its commander; Capt Jack H. Wrinkle, aircraft commander; and crew.

DOWN the ramp come the itinerants of *Deep Freeze III* and those who will replace scientists and military men during the third wintering over.

The AIR FORCE Task Unit

BEEBE

A SUMMARY OF THE MAMMOTH AIRLIFT AND AIRDROP OPERATION OF THE U.S. AIR FORCE'S C-124S

By LEVERETT G. RICHARDS
USAF INFORMATION SPECIALIST
(Assisted by M/Sgt Gordon W. Mayhew)

DEEP FREEZE III will be known as the year of adversity in Antarctic Air Operations.

Nature did her worst to hamper the airlift and airdrop operations. High winds, sudden storms, soft ice and vanishing runways threatened the project repeatedly.

These contingencies had been foreseen in advance planning, however, and the aerial mission was completed well ahead of schedule, without injury or damage to man or plane.

Responsible for this remarkable record were Col William G. Forwood, commander of the 61st Troop Carrier Group and commander of the Air Force Task Unit in *Deep Freeze III;* and LtCol Dixon J. Arnold, commander of the 53d Troop Carrier Squadron, backbone of the task unit.

The C-124 Douglas Globemasters of the Air Task Unit, biggest piston-engine operational air transports, were able to fly only 36 days out of the six months they were assigned to the project. But in these 36 days they flew 55 sorties, dropping 795 tons of supplies and equipment.

Twenty-two sorties were flown to the South Pole station where 300 tons was airdropped, of which 97 per cent was recovered. At Byrd Station 32 sorties were flown and 481 tons dropped, of which 99 per cent was recovered. This is considered a record for this type of operation. One drop of 14 tons of equipment and supplies was made to help establish Liv Camp on the Ross Ice Shelf halfway to the South Pole from McMurdo.

Eight C-124s, constituting the task unit, made the 10,000-mile flight from Donaldson Air Force Base, S. C. to Christchurch, N. Z. during September, airlifting nearly 300 personnel and all the supplies and equipment required to set up and operate a maintenance base at Harewood Airport and tent camp at Camp Weedons.

All were ready to take off for McMurdo Sound by October 1, 1957. The first Globemaster took off October 3, piloted by Col William G. Forwood, and landed the same day. This was the first MATS plane to land on the Antarctic ice. The Globemasters of the 63d Troop Carrier Wing, commanded by BrigGen E. Wade Hampton, had just been transferred to the Continental Division of the Military Air Transport Service, commanded by MajGen R. L. Waldron. This first landing was 17 days earlier in the season than the first Globemaster landing of *Deep Freeze II.*

Colonel Forwood, who received the Legion of Merit for this mission, reported the runway surface smooth and in excellent condition but not quite up to the standards of width and length agreed upon. He wired Gen Hampton for a waiver to operate on the existing runway.

General Hampton arrived in Christchurch October 6 and took off for McMurdo as soon as weather permitted. After

inspecting the runway he gave the order for flights to begin. First task was the airlifting of 263 tons of vital supplies and equipment and 438 high-priority personnel.

While this airlift was under way COL Forwood made the first drop of the season at the South Pole, delivering 20,000 pounds of fuel oil and 1,000 pounds of welcome mail, eight months to the day since the last airdrop. The next day COL Forwood made the first drop of the season at Byrd Station.

To save time and money a new system of "stabilized drops" was used under the supervision of the 1710th Aerial Port Squadron of the 63d Troop Carrier Wing. Ribbon-type deployment parachutes were used to "aim" rather than decelerate platforms of oil drums weighing one and one-half tons. The shock of landing was absorbed by especially designed cardboard "honeycomb." Only building materials, equipment, and supplies such as food were dropped by conventional cargo parachutes. Some 80 tons of rigging and parachutes were required to deliver the 795 tons of supplies, a total gross weight actually airdropped of about 875 tons.

The "Year of Adversity" began soon after the first Globemaster landed at McMurdo. One of the worst blizzards of the year, with winds up to 80 miles an hour, closed the runway and paralyzed the base.

On the second drop at the Byrd site, CAPT Victor G. Stianchi, his Globemaster loaded with 13 tons of fuel oil, had to feather a propeller halfway to his destination. He continued, making the first three-engined heavy drop in history in the Antarctic, then returned for a "routine" landing on three engines at McMurdo.

Meantime CAPT Vincent J. DeCesare, taking off from Christchurch for McMurdo with a load of weapons carriers which could not be jettisoned, lost one engine then had trouble with a second and landed safely back at Christchurch on two engines, with an assist from an air rescue plane flown by COL Arnold. For this "superior display of professional skill" he was awarded DFC by General Waldron. Within ten days he was forced to make another two-engined landing on the ice runway at McMurdo Sound.

CAPT James W. Thomas was awarded the Distinguished Flying Cross for his courage, flying skill and sound judgment in a series of crises that arose in the course of a flight to Byrdland on Friday, November 1. He took off in clear weather. By the time he was due to return the runway at McMurdo had been blotted out by one of the sudden, unpredictable blizzards for which this area is famous. Less than 100 miles from McMurdo CAPT Thomas had to feather the propeller on one engine and began to have trouble with a second engine. About that time he encountered heavy wing icing, a rarity in the Antarctic. Thomas was able to climb above the layer of icing, however, and Colonel Arnold directed him to attempt a landing on the sea ice at Cape Hallett 350 miles to the north where an emergency runway was staked out. But the weather had closed in there, and No. 5178's number 4 engine was giving trouble. Captain Thomas had no choice but to attempt a landing through the howling blizzard at McMurdo Sound, with the aid of a crack Navy GCA team.

Three times he let down through the violent storm, trying to line up with the runway. Three times the violent turbulence and rapidly changing winds up to 57 mph thwarted his attempts. Finally on the third pass he caught a glimpse of the New Zealand pine trees planted at the end of the runway for better depth perception. He set the big 70-ton plane down without actually seeing the runway.

Altogether the troop carrier pilots flew four search and rescue intercept missions and had eight "aborts" of airborne flights. They made 19 engine changes, five of them at McMurdo Sound under field conditions that tasked the ingenuity and determination of the maintenance men, who sometimes had

HALLETT'S Novasio and Hennessey set transit and stake markers during marking of emergency runway.

BITTER cold winds could not crimp the "Blackjack" maintenance men's work on McMurdo-based C-124s.

THRILL-chill Globemaster crew: CAPT Thomas (rear left) and men involved in November 1 drama.

Hallett's Spring Fever

Spring came to Hallett on tiptoe . . . then hauled back and let 'er have it but *good*. There seemed nothing premeditated about the storms on the Cape — they were completely impromptu and instant.

The word had come through that spring fly-in would be early. This pointed up the need of a crash and rescue vehicle. One of the Weasels was earmarked; a 150-pound sled-mounted fire-extinguisher was placed in the left rear seat area and the mobile unit stationed in readiness.

Next on the agenda, the emergency air facility. Hallett, 350 miles nearer New Zealand than NAF McMurdo, had been fingered as the place for the airstrip. By early September work was underway. A runway was measured out on smooth bay ice six miles southwest of the station; the 300-foot-wide strip was graded; its two-mile length was marked with red trail flags (later replaced by empty diesel drums) every 150 feet. So well was the job done that later inspection proved the runway, originally planned for wheeled aircraft, was also suitable for ski-equipped planes. The airstrip was completed as the first planes — three Navy VX-6 craft — streaked south.

From then on the air path between New Zealand and Antarctica became as deeply grooved with travel as the old back road. So engrossed in their work were the Halletteers that rising winds hardly caught their notice. On the 22nd the big storm slammed in. So *this* was spring! Wind-lashed gravel from the beaches grated paint off the windward side of buildings and equipment. A peak gust of 114 miles an hour lifted Clements panels from storage piles, sailing them 30 feet through the air as though they were cardboard. One smashed through the side of a Jamesway. The supply dump was a shambles.

Sir Hubert Wilkins, famed Antarctic explorer who dropped in at U.S. stations later in the season, suggested harnessing of such tempests for power. The men of Hallett suggested their outlawing.

So drew to a furious close an otherwise amiable season at the rugged headland on the lee side (hah!) of Victoria Land.

During these early days the two groups of VX-6 — those in New Zealand and those on the ice — worked like fiends. Wintering-over Naval Support Unit was putting last touches on the McMurdo strip as well as those at LAS, Byrd, and Pole Stations; they were resupplying fuel caches on the Byrd trail; they were setting up Liv Glacier AS.

On October 1 an R5D, an R4D-8, and a P2V-7 took off from Harewood, destination McMurdo. CDR Frankiewicz's R4D-8 and LCDR Hanson's R5D were accompanied by the Neptune, CDR Coley at the controls. Behind them they left the other R4D-8 — stalled with hydraulic and electrical troubles — and its pilot, LCDR ("Gus") Shinn, first man to land a plane at the South Pole.

Aboard the three planes were passengers and high-priority cargo including 550 pounds of personal mail and fresh foods. Hanson's Skymaster touched down at McMurdo October 1, 1957 after a 12-hour flight; he was followed 21 minutes later by Coley in the Neptune and by Frankiewicz in the Skytrain one hour later . . . all on schedule. It was the earliest aerial penetration of Antarctica in history. The arrival kicked off *Deep Freeze III* and brought the first mail seen in more than six months. Three days later the first Globemaster of the season rumbled in and subsequent flights brought all remaining VX-6 aircraft in New Zealand into Antarctica safely.

The first C-124 had CAPT Jack H. Wrinkle at the controls; with him was COL Forwood. The AFTUC found the runway in better condition than it had been the year before but still not up to established dimensional criteria; he therefore suspended incoming flights. The Globemaster returned to New Zealand with the body of young Nelson Cole, killed in the helicopter crash.

The same day, the Skymaster, first to arrive, had made the first flight of the season out of Antarctica. Aboard were 10 wintering-over personnel, all sick and injured from McMurdo station, bound for CONUS.

October 13, after inspection of the entire facilities, Brigadier General Hampton directed the airlift to proceed. Meanwhile he had been joined on the ice by Admiral Dufek who had celebrated Columbus Day in a most fitting way.

"BIGGEST SKUA GULL I'VE EVER SEEN!"

Polar Spring

Early in September VX-6 flights out of McMurdo had succeeded in pinpointing a spot for the relocated Liv base. This was followed with much interest by the 18 Polesters as it meant the shadows of big planes would soon fall across the snowfields.

Liv Glacier Auxiliary NAF was as slippery as its name. During *Deep Freeze II* the base, located at the foot of Liv Glacier, had been called Beardmore Station. In *Deep Freeze III* the little outpost was relocated 122 miles to the east at the foot of Beardmore Glacier — and was now named Liv Station.

During the rest of the month Amundsen-Scott dusted up for visitors. The wintering-over group began packing preparatory to phasing out. All equipment was put in apple-pie order. The garage entrance was dug out for mobile equipment would soon be needed to retrieve airdrops.

Shortly before noon October 17, 1957 the men, dressed to the teeth, moved out of the station onto

(Continued on page 114)

POLE drops came in by 'chute (left), and by free fall (center) for lumber and building materials. A seven-ton D-2, dropped from about 2,000 feet, plummeted down as 'chute cords broke and buried itself 30 feet in the ice. The station seismograph registered the crash. Tractor (partly showing at right), wrecked, was left where it fell.

the bitter-cold Polar Plateau. Every eye looked skyward. From McMurdo had come a radio message that a Globemaster was en route. It was on time. Just a speck in the sky at first. Then larger and clearer, and the hum of its four motors grew to a roar.

Iridescent cloth panels had been spread on the snow to mark the drop zone. On came the plane. The pilot eyed the tiny station in the whiteness below and ahead. There was a click in his earphones: "We can see you now, MATS 5184!" It was LTJG John Tuck. "You look nice and big and beautiful!" COL Forwood at the controls could well understand the jubilant greeting. Behind him in the plane was another man who could appreciate the excitement in the tiny isolated station: Sir Hubert Wilkins, now cold-weather expert of the Army Quartermaster Corps, who had made the first Antarctic plane flight in 1928. [EDITOR'S NOTE: The news of Sir Hubert's death on December 1, 1958 reaches us as we go to press.]

There were other VIPs aboard for this show-opener; the American Ambassador to New Zealand and New Zealand's Minister of Labor. But the most important people in the cargo belly of the ship were CAPT Victor Stanchi's crew – SGT McNamara holding his knife at the ready as the elevator doors opened; M/SGT Lee, dropmaster, cocking his ear to the countdown; Bruce, the loadmaster; Beckwith, the engineer; and all the rest. Down the hatch went 18,000 pounds of supplies . . . drums of fuel; food; spare machine parts. Then down went the mail nearly landing on top of the Weasel scuttling across the snow to retrieve it.

"This was the beginning of the end," said Dr. Siple of the first airdrop. Although there was still much to be done before change of command and phasing out, every man was already winging home in imagination. Those letters did it.

About a week later the South Pole Station was agog with what would be its last cosmic display for the season. A partial eclipse of the sun lasting for about 20 minutes brought out the entire camp.

First relief personnel arrived October 26 from McMurdo, bringing the colds and sniffles of "civilization" that had been so long absent from the antiseptic Polar Plateau. They arrived aboard a P2V-7 piloted by CDR Coley, stepping out into a cold reception – 60 below zero. Coley had intended only a two-hour stay but the Pole had its way as usual and the skis of the Neptune remained on the ice crust for 40 days. Engine trouble so serious it could not be repaired held plane and crew immobilized. It took one month to fly in a new engine; it took two days to replace the power unit.

As October slid into November more and more visitors came and went or came and stayed. During November most of the personnel changeover was completed. Summer was "icumen in"– but no cuckoos, loud or otherwise.

Byrd's Big Push

Early in September a new ski runway was laid out, graded, and marked for the first VX-6 flight of the season. Weasel and Sno-Cats were dug out and readied for the traverses. Preparations were made to receive callers from Little America: the first tractor train of the season was gassing up at Kainan Bay.

At high noon on October 1, 1957 the train got under way, the third such to make the hazardous trip since the trail was blazed in November 1956. Then it took 42 days to cover the treacherous crevasse-laced wilds; this year it was to take just half the time.

Seven D-8 Cats drawing nine 20-ton and three 10-ton sleds, and three wanigans; two Weasels; 300,000 pounds of cargo and fuel; 19 men. This comprised the train. The train moved steadily ahead stopping only for fuel and vehicle maintenance at caches along the trail. Trail flags spaced one-fifth of a mile apart guided the way. The big hazard – seven miles of crevassed area untried since February when the last train had moved over it – lay between Mile 183 and Mile 190 of Army-Navy Drive. Aerial reconnaissance and surface probing indicated the trail was safe but as an added precaution the command Weasel was fitted with an electric crevasse detector; it was dropped off at Mile 190 to be picked up on the return

The big train made good time for the first 222 miles. It had passed safely through the danger fields by October 5 and was well into the second third of

(Continued on page 116)

DR. SIPLE RAISES FLAG AT POLE STATION.

CONGRESSMEN and other v.i.p. on polar junket flew over both poles, observed *Deep Freeze* first-hand. Representative Saylor of Pennsylvania (below with USAF crew) was first congressman over S. Pole.

"I WOULDN'T LIKE THIS PLACE EVEN IF THERE WERE WOMEN HERE."

to work in bare hands at freezing temperatures. But in 3390 hours of time aloft they never put a scratch on an airplane or a passenger.

Besides seven days of unflyable weather the operation was plagued by seven days of radio blackouts – the worst recorded to date. For another nine days the operation was held up by runway problems. Yet the resupply by air was completed December 4, 1957 in record time.

Six Globemasters then returned to Donaldson Air Force Base, S. C. in time for Christmas, while two remained for emergencies and air rescue alerts. One made a flight to the melting ice runway at McMurdo to bring high priority supplies and Christmas mail. It was forced to leave the weakened ice immediately. All operations by wheeled aircraft were then suspended. Again on February 11, Col Forwood made a flight to McMurdo to bring in last-minute supplies for the South Pole. The ice was freezing hard again but continued to crack. Every day more ice broke off and floated northward, ice that had remained solidly in place for an estimated ten years.

While cargo was being offloaded and preparations were being made to load up for a flight to the Pole cracks began to develop rapidly. Open water appeared between Williams Air Operating Facility and the ice runway. Helicopters had to be called in to ferry Navy personnel to the waiting Globemaster, which then took off from the cracking ice February 16 with a capacity load of heroes of the Antarctic returning to civilization after a year below zero.

The last C-124 departed Christchurch for the States March 3, 1958, marking the end of the Air Force support of the Navy's Task Force 43 in *Deep Freeze III*.

"Once again the Air Force Task Unit has distinguished itself by performance outstanding in peacetime history," said Admiral Dufek. "Despite the worst weather and radio blackout conditions ever recorded, supplies and equipment vital to continuance of the IGY program at these stations has been delivered in 36 operational days. The manner in which this most difficult and hazardous of peacetime airlift and airdrop missions has been accomplished on schedule is a credit to the nation and to the United States Air Force," Admiral Dufek messaged USAF headquarters.

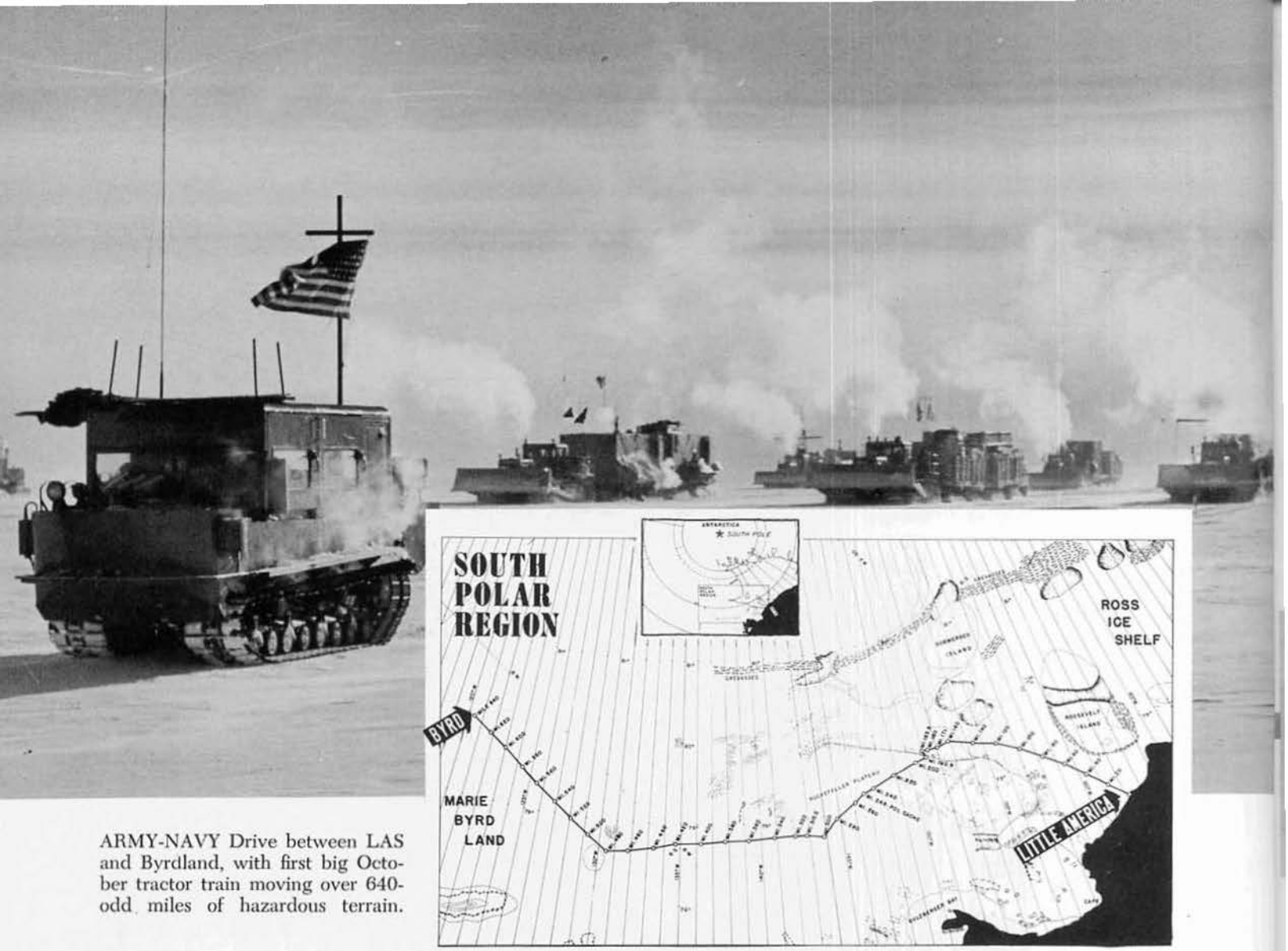
In the course of accomplishing their principal mission the Task Unit aircraft also helped write a few "firsts." Representative John P. Saylor of Pennsylvania, first congressman to visit the Antarctic, was the first to fly over the South Pole on a drop mission in a Globemaster November 16, 1957. (He was a member of the Committee on Interior and Insular Affairs.)

On November 24 the first congressional committee made the same flight. Included were Representative Oren Harris, Arkansas, chairman of the Interstate and Foreign Commerce Committee of the House; Robert Hale, Maine; Torbert H. MacDonald, Massachusetts; Samuel N. Friedel, Maryland; John J. Flynt, Jr., Georgia; and Steven B. Derounian, New York. Dr. Laurence Gould, chairman of the Antarctic IGY program, accompanied the congressmen.

The Air Force Task Unit made history of another kind in *Operation Hitchhiker* – the airlift of 67 Antarctic penguins. This was the first time in history emperor and Adélie penguins, found only on the Antarctic ice, had been airlifted successfully direct from the Antarctic to the States, where they were consigned to major zoos and to Johns Hopkins School of Medicine.

They were captured by Jack Marks, superintendent of the Portland Zoo with the aid of Navy aircraft and Navy personnel and held on the ice at McMurdo until they could hitchhike on a Globemaster that would otherwise have returned empty.

The penguins proved a big attraction to personnel at McMurdo during their wait – but not as popular as the MARS radio stations established both at McMurdo and at Christchurch. These stations handled 2,485 phone calls from Air Force men to their families on the other side of the world, 436 messages, and 151 official calls. —Leverett G. Richards.



ARMY-NAVY Drive between LAS and Byrdland, with first big October tractor train moving over 640-odd miles of hazardous terrain.

the passage when a raging blizzard swept down from the mountains. The train was stopped dead in its tracks for several days.

At Mile 380 one of the D-8s had engine trouble. A radioed call for a mechanic arranged for repair; it would be picked up on the return trip. Its sleds, distributed among the other tractors, weighed heavily on them and the helmsmen were ordered to drive in second gear. Even with resulting speed reduction, the train pulled into Byrd Station on October 22, just 21 days on the road.

It was close to being a turnaround trip: four days after arrival the big tractor train was on its way back. Nine days later it was safely past the crevasse hazards and on November 7 the train pulled into Little America — less than 13 full days out of Byrd!

Meanwhile Byrd had other diversions. On October 18, just before arrival of the tractor train, the first C-124s had swooped low over the station dropping supplies and oh-so-welcome mail from home. The starting gun had banged October 13 when GEN Hampton called in the Globemasters from New Zealand. In five days' time the Pole and Byrd Stations had welcomed their first airdrops.

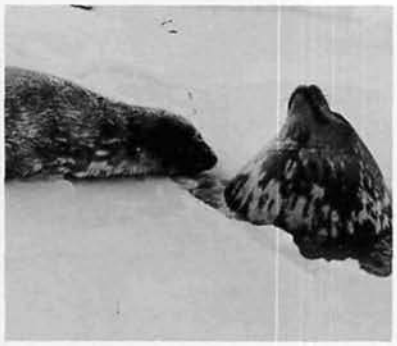
During the first week of November two Navy R4Ds from LAS landed at Byrd's airstrip, first touchdown of the season. Out hopped IGY and military personnel to aid summer operations and to relieve wintering-over "Knights." On November 10 one of the Skytrains made an aerial reconnaissance flight over Ellsworth Highland following the proposed route of the coming traverse. Part of the rough terrain had been seen previously only by Lincoln Ellsworth in his 1935 expedition. At the controls was LCDR Harvey G. Speed, the man who has logged more Antarctic flying hours than any other pilot. With him, charting terrain and plotting the safest traverse route, was MAJ Merle R. Dawson, USA, CO of the trail party that had bulldogged its way to Marie Byrd Land in *Operation Deep Freeze II*.

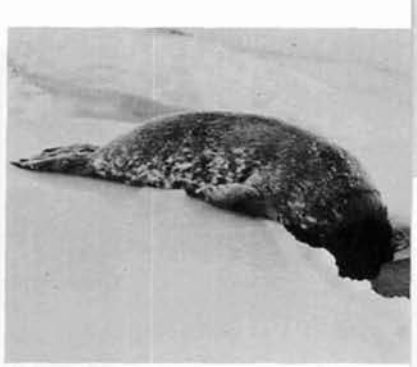
The recco flight took in 210 miles before returning. November 19 the Byrd traverse party departed on the perilous 1,200-mile trip that would keep it far from home for three long months.

Wilkes Winds Down

On Vincennes Bay warming weather gave the signal for pouring it on in the zoölogy department. This was a sideline, taking second place to geophysical research and coastal survey,

ROPED TOGETHER FOR JUST THIS SORT OF RISK, THREE WILKESITES CROSS VANDERFORD GLACIER.





YOUNG Weddell seal gets first swimming lesson at age of two weeks: mother seal saws ramp in ice with teeth for baby to slide down, then coaxes patiently until the sprout gets up courage to inch into water head-first.

Returning home at the end of a day of surveying, Eklund, LTJG Burnett, and Paul Noonan discovered some yearling seals on the bay ice. Eklund took along his seal-branding gear the next day. As soon as survey work was over the ranch hands rounded up a seal and went to work with Eklund's branding ideas. Completely humane, Carl fired a dope-laden dart into the seal with a shotgun to tranquillize it. Over a small primus stove he heated the branding iron; when the Bar-X glowed red the brand was applied to the groggy seal.

Next day the seal, none the worse for singeing, would be back with a friend. As the branding approached perfection Eklund enlisted the services of an expert cowpuncher for an especially pugnacious seal. This seal wanted no part of tranquillizing or bulldogging. He left his teeth marks on Eklund's shotgun barrel, belted Billie Lilienthal with his flippers. When a rush was made to put the hot brand on him the seal slithered toward the water and not even Nebraska-bred Billie could rassle down a legless slippery "bronc."

The return of the Adélies posed another problem. As anxious to keep tabs on the frivolous little penguins as on the rambunctious seals, Carl had kept a continuous census of nearby rookeries to learn the rate of seasonal return. The pompous emperors took the beak-counting with grave tolerance but the Adélies just would not behave. Sideshow acts were always interrupting the count – a leopard seal chasing an Adélie into the water, the penguin hopping up on a floating ice cake, the seal tipping the ice over and dumping the penguin into the drink, both swimming out to sea—that sort of nonsense. It was a tough job to count closely grouped identical birds, even tougher when they charged and pecked at the legs of the census taker.

But Carl Eklund was as stubborn as any member of the animal kingdom. By the time the ships arrived he and his assistants had banded several hundred skuas, had branded scores of seals, had surveyed eleven Adélie rookeries on the Windmill Islands, and had even achieved the intimacy of recording the temperatures of incubating penguin and skua eggs.

Gil Dewart, concerned with the more violent side of nature, marvelled at his seismographic records of the Mexican earthquake that had taken place during the winter night; the strength of the waves as recorded at Wilkes was impressive.

Wilkes weather, however, clobbered many IGY projects. Thinking spring meant what it said, three scientists – Eklund, Cameron, and Molholm – and Fred Charlton set out one bright morning for a hike to Cape Poinsett, northernmost point on the Budd

(Continued on page 118)

Coast. The foursome had waited out a storm – but not long enough. The wind had not yet blown itself out and six miles from the station the group radioed it was in a storm. They were advised to stay put. After an hour the weather worsened and they began the return trip. Visibility dropped to zero.

Knowing the party was trying to head home, the base turned on all floodlights in hopes they could be seen through the storm. As the four inched their way back along the coast the lights broke through. This was the *only* real break of the trip.

Ellsworth Off

The VX-6 men at Ellsworth-on-Filchner-by-the-Weddell were completely out of their element during the dragging months of night. Although limited flights continued well into winter it was not until late September that operational flights began – September 24, to be exact.

Two days later both Otters were in the air beating the bushes in a rescue mission. A British Auster had gone down somewhere on the ice between Shackleton Base and Halley Bay and the Navy pitched in to help their good neighbors down the coast. The mission was successful, the ending happy.

For nearly a month the Otters bobbed up and over rugged terrain, swooping down to take closer looks into ugly gashes in the snow beneath. Recco flights angled southwest to spy out routes for the IGY traverse. On October 28 the traverse party shoved off, its departure overshadowed by the world-rousing British Commonwealth Transantarctic Expedition under the leadership of Dr. Vivian Fuchs. Just three weeks before, Fuchs had led his small "route-proving" expedition out of Shackleton to inland South Ice Base, first tentative step in the 99-day trek across the continent. Ellsworth's traverse, while on a more modest scale, had the same basic scientific purpose.

The five-man party – leader Dr. Edward C. Thiel, Hugo A. C. Neuberg, Paul T. Walker, John C. Behrendt, and Nolan B. Aughenbaugh – set out in two Tucker Sno-Cat Freighters each pulling a large sled crammed to the brim with equipment. The cavalcade headed in a southeasterly direction and at last dipped out of sight beyond a rise of the barrier.

A reconnaissance flight had early showed an impassable area near the station: crevasses stretched about 50 miles south and west ending in a giant rift 250 feet deep. The whole area ringing the station was one mass of cracks, potholes, canyons, and humped-up wedges of pressure ice. Bringing back pictures and reports to the station, AirDevRon scouts dashed hopes of easy access to the inland plateau. The traverse party realized even if it succeeded in negotiating the treacherous crevasses it would be stranded among the pressure ridges. More flights went aloft.

Finally a safe and easy trail was spotted from the air and this was the direction taken by the party. An even more important long-range discovery was made on this same flight. Pushing deep into Edith Ronne Land, the Otter climbed out of a haze approaching whiteout proportions. Up, up, up to about 10,000 feet. Suddenly the haze broke. Straight ahead towered a mighty mountain range never before charted.

The Otter skimmed alongside the peaks, some rocky and bare, others soaring to a snow-capped height of 11,000 feet. The foothills about them were 5,000 feet high. The chain stretched in unbroken continuity for about 100 miles from east to west then continued south toward the Pole. This great find was later visited by the traverse party.

The five men in the two Sno-Cats made camp 30 miles inland from the station. By detouring 65 miles around the eastern end of crevassed terrain, they made it safely to the barrier. The party was resupplied by the Otters and a helicopter.

Moving east the traverse party struck out for Mt. Hassage near the southwest end of Orville Escarpment where the Palmer panhandle attaches to the continent. Here they were to make a scientific station for a tie with the traverse party from Byrd Station coming from the opposite direction the following year.

ELLSWORTH TRAVERSE PARTY HITS CREVASSE.

NAF Holds Breath

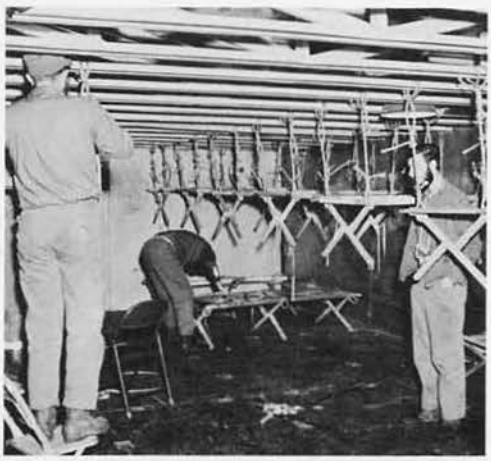
Early October. The first planes had arrived. But the big parade was yet to come . . . 250-odd passengers, some who would work and some who would watch them work . . . 250-odd tons of equipment, provisions, and supplies to be airlifted in advance of the even greater flood of seaborne cargo. McMurdo held its breath in anticipation.

Admiral Dufek arrived on the ice October 12. His first hours were crowded with a seven-months' synopsis telescoped into minutes. He heard of the latest accomplishment, re-establishment of Liv Station during September's filthy weather. How the first flight between LAS and McMurdo had been made on the third of the month, of Capt Dickey's presence on early reconnaissance flights, of offloading supplies at Beardmore in –32° temperature, of Jim McCue taking over there (the man who had tended store during *Deep Freeze II*), and of the "hairy" one that hit a resupply mission on the ice shelf.

(Continued on page 120)

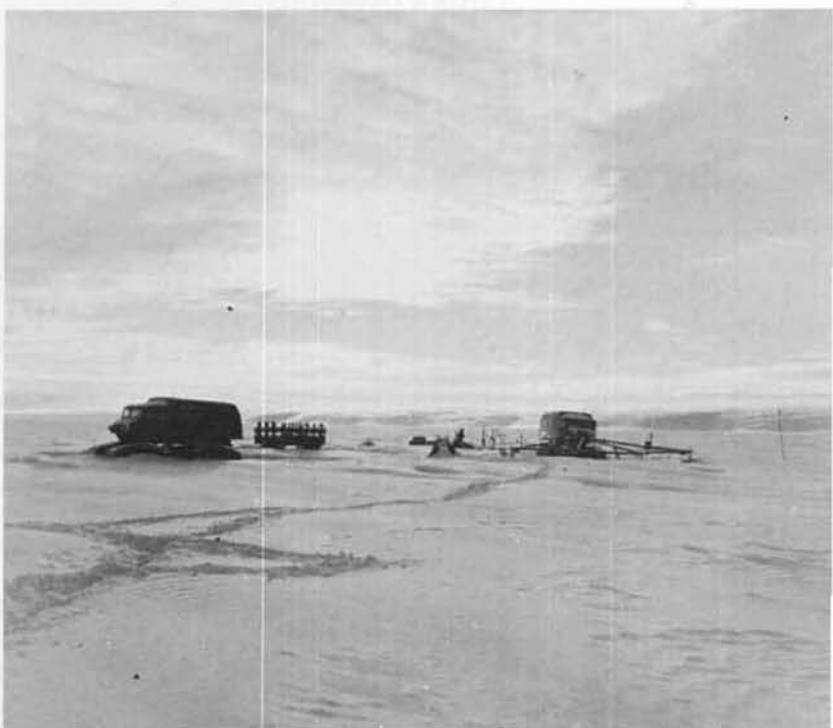
Signs of Spring

HUSKIES (RESCUE STANDBYS) GET WORKOUT AS AIRMAN AWAITS "TAXI" TO NAF FLIGHT LINE.



LITTLE AMERICA DIGS OUT, THAWS OUT, AND ADDS BUNKS FOR THE "TOURIST" SEASON.

LAS EMBARKS ON TWO PROJECTS: ICE DEFORMATION STUDY (LEFT), AND ROSS SHELF TRAVERSE.



It seems two R4Ds were en route to Liv each carrying several thousand pounds of cargo, one piloted by LCDR Speed, the other by LCDR Anderson. The latter turned back to McMurdo when his oil gauge indicated a leak. At NAF he found it was only a faulty gauge. Meanwhile Speed had radioed he was down on the ice shelf. Anderson had cargo offloaded and went to the rescue. He found Speed had made a forced landing, safely, with a dead engine due to ice in fuel lines.

Two Navy mechanics and the crews of both planes turned to and, working in –36° cold, cleared the fuel line. Less than four hours after the forced landing the plane was airborne with a JATO kickoff. Five minutes later the same engine died and Speed landed on the ice shelf again, Anderson sitting down beside him. Once more the fuel system was cleared and this time Speed's cargo was unloaded.

Two tons lighter, Speed took off once more and a half-hour later was back at McMurdo. Not so Anderson. As he tried to taxi for a takeoff he found his skis frozen to the ice. After 20 minutes of shoveling they came unstuck and he, too, headed for home leaving the cargo to be recovered later. Less than an hour after return, McMurdo was blanketed by an impenetrable white mist shutting down all flying!

Communications got two boosts from Richard Martin. During the winter night he had perfected a relay system, via low-powered transmitters and receivers, for hi-fi music so men in all parts of the station could hear their favorite recordings without long, cold outside walks to the base library. Martin then set up what may have been the longest international telephone line in Antarctica: with Peter Mulgren, of the Royal New Zealand Navy, he hand-carried and strung wire over rugged, hilly terrain between NAF and Scott Station at Pram Point to link the two bases.

The first commercial type plane to land on the continent set down on the 6,000-foot "ice concrete" runway Oct. 15,1957. Pan American's Boeing Super Stratocruiser, following the flight path of US-Antarctic flyins, carried 37 passengers including Seabees and civilian technicians, several VIPs and two PanAm airline hostesses—the first gals to visit *Deep Freeze* stations and the first to travel that far south.

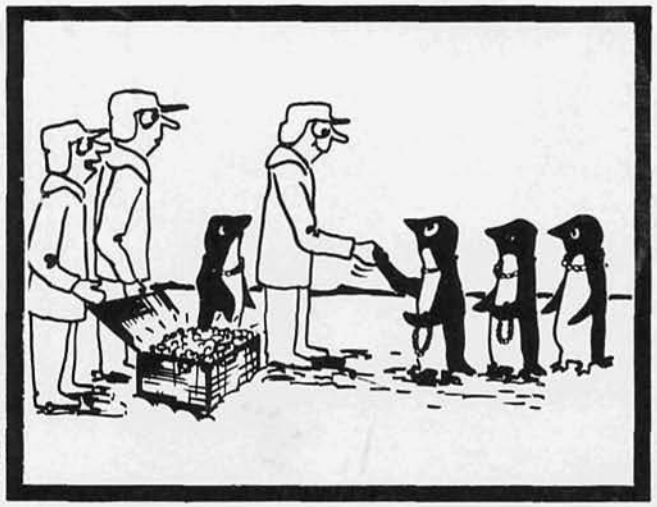
The four-hour stopover crammed in sightseeing, a beard-judging contest, and plenty of old-fashioned gadding while the plane was being refueled. Two of the supercargo remained behind – J. K. McAlpine and F. H. Russell – to fly the first South Pole airdrop of the season which took place two days later.

By that time McMurdo's population had approached 350. To handle the crowds additional Jamesways were erected, cots were brought in from Hallett. It never got to the point of "hot bunking" but there were no private bedrooms either.

"Capitol of Antarctic Sun"

The first VX-6 operational flight out of Little America late in August had several objectives, one of which was to locate a safe route to be followed by the forthcoming IGY traverse party along Ross Ice Barrier. LT Speed and his crew of the R4D inspected the barrier for about 100 miles from the Bay of Whales to Okuma Bay.

They found to their surprise open-water conditions comparable to November of the previous year. Turning inland the Skytrain scouted a possible traverse route to Roosevelt Island and mapped a safe course through the crevasses fanning out around the ice-locked island.



"SMEDLEY JUST PURCHASED ROOSEVELT ISLAND."

On October 24, 1957 the Ross Ice Shelf Traverse got underway when Albert P. Crary led his seven-man party out of LAS in three Sno-Cats towing three 2½-ton sleds. They headed in the direction of McMurdo Sound on the first leg of the traverse, taking scientific readings as they went.

Just three weeks later another party set out headed due south. This also was a scientific team under the direction of Dr. James H. Zumberge, University of Michigan professor of geology. The six-man scout party traveling in two Weasels, one with an electronic crevasse detector and the other pulling a one-ton supply sled, was on its way to Roosevelt Island. The initial trip was to mark a safe trail threading the crevasses that abound near the island. They returned to LAS after reconnaissance, rallied their forces, and set out about a week later on the real thing – setting up Camp Michigan near the ice-embedded island for the IGY Ice Deformation Study program.

The old isolation was gone. Antarctica, since those first October days when the throb of heavy motors had cut the icy air, was beginning to shrink a little. *Operation Deep Freeze III was underway.* It needed only the arrival of the ships to get into high gear and they were coming closer each day. Already GLACIER had entered the Ross Ice Pack; it was October 26. Ship penetration was later than during *Deep Freeze II* but there was a different slant to the operation this year: Phase III was primarily a resupply mission. And Task Force 43 purred along like a well-kept engine.

SEAPOWER SUPPORTS *Science*

The USCGC WESTWIND Snubs Her Nose Against the Ice Shelf — PHOTO BY COX

THE SUMMER TASK FORCE MOVED IN WITH SUPPLIES AND REINFORCEMENTS FOR IGY, NAVY, AIR FORCE, AND ARMY

PART 2

Seapower Supports Science

THE TEN ships of *Deep Freeze III* boasted some grand Antarctic veterans. With the ice-hardened five — GLACIER, ARNEB, GREENVILLE VICTORY, WYANDOT, and NESPELEN — who were opening their third season (plus ATKA, outrider of the operation) was BURTON ISLAND. Old AGB-1, on her first *Deep Freeze* tour, had a golden past: one of 13 ships of Task Force 68 of *Operation Highjump* (1946-47), she had starred in *Operation Windmill* the following season and had given her name to a glacier near Wilkes Station.

The flotilla operated as two widely separated groups. Task Group 43.4, the Ross Sea-Knox Coast team, was under command of Antarctic veteran CAPT Gerald L. Ketchum, USN and included GLACIER, ATKA, BURTON ISLAND, the AKAs and an AOG. Task Group 43.6, commanded by CAPT E. A. McDonald, USN, operated in Weddell Sea-Bellingshausen Sea areas with WESTWIND and WYANDOT.

The Ross Sea group had an almost ideal season operations-wise. The December 1 arrival at Kainan enabled all cargo to be offloaded on bay ice without the big heave-ho over the barrier. Hallett and Wilkes, as usual, were approached only with difficulty but they *could* be had. ATKA and GLACIER got their lumps but battered the full ten rounds.

Crusty Weddell turned on the charm for Task Group 43.6 and, to everyone's surprise, WESTWIND and WYANDOT reached Ellsworth a day ahead of schedule on January 9, 1958. So smoothly did offloading go that there was time for probing "the last great challenge to ship operations in the Antarctic" — the Bellingshausen. GLACIER, originally slated as WESTWIND's partner, was forced out of the tour by broken propeller blades and WESTWIND went it alone.

Bellingshausen's weather was as harsh as Weddell's had been kindly. WESTWIND was rebuffed at every turn. Finally on February 4, the lone 'breaker reached its southernmost point — 69°54'S, at 81°40'W. Further dogged attempts to push deeper into the earliest explored — and least explored — Antarctic sea met with failure, partly due to a damaged rudder and a dead engine, mostly to beastly weather and ice conditions. The latter paid its way with some valuable scientific data.

With this unfinished business ringing its challenge, *Deep Freeze III* ship operations came to a close.

EIGHT OF THE TEN SHIPS OF DEEP FREEZE III STAND GUARD IN McMURDO SOUND BEFORE EREBUS.

SUMMER SUPPORT FORCE MOVES INTO ANTARCTIC

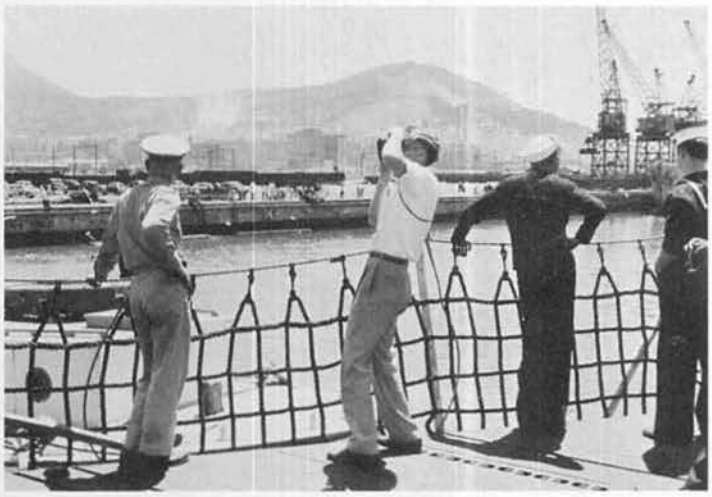
Some interesting duties and special projects were encompassed by *Deep Freeze III* – GLACIER's rockoon program, oceanographic studies by all four ice-breakers, radar charting of elusive coastline – in addition to land and air operations. The CB Reconnaissance Unit's Marble Point project was of vital importance. The study of bay-ice fatigue at Kainan Bay, while primarily a logistics aid, was beneficial to science, too.

There were newsworthy "Antarctic Firsts" – first wheels-on-dirt landing on the continent, first facsimile news picture transmission from Antarctica, first seismic soundings at the South Pole, first transcontinental foot traverse, and more. There were interesting good-will calls at foreign bases – Argentine's General Belgrano Station, Russia's Mirny Base, and several UK and NZ neighbors, and an errand of mercy to beset Japanese cargo ship.

Never before in the *Deep Freeze* operation was mutuality of effort and reward so apparent. Good management, good luck, and good weather joined to yield a most profitable summer for science, for the Navy, and for all participating units.

THE ADMIRAL GREETED BY SONS AT CHRISTCHURCH.

PORT LYTTELTON HARBOR (LEFT) WITH ATKA AND GREENVILLE VICTORY. WESTWIND IN CAPETOWN (RIGHT).



MASS IS CELEBRATED ABOARD WYANDOT (LEFT) AS BROUGH (RIGHT) ENTERS OTAGO HARBOR, DUNEDIN, N. Z.

MOVING SOUTH, GLACIER BEGINS TO PILE ON ICE; BLOCK AND BRASH ICE LATER REDUCED SHIP'S ROLL.

Coldest Newsbeat

WORLD news coverage was in hands of 35 correspondents. First *Deep Freeze* distaff journalist was Sue Seay, *San Diego Union,* who handled Christchurch beat. She talks (above) with Great Britain's Prime Minister Macmillan and LCDR Boney, CO of BROUGH, Dunedin.

ANTARCTIC Press Club: Back, l. to r., LTJG Morton Beebe, Assistant PIO; Rennie Taylor, AP; Rolla Crick, *Oregon Journal;* Geoffrey Lee Martin, *Aukland Herald;* Charles Moore, UP; Bill Becker, *New York Times.* Front, CDR Merle Macbain, PIO; Thomas Abercrombie, *National Geographic;* Dennis Wederall, *Christchurch Press.*

CORRESPONDENTS WITH UK'S HILLARY, FUCHS.

DRAWING BY PETER ARNO; © 1957 THE NEW YORKER MAGAZINE, INC.

DOWN TO THE ICE

By JOHN BROOKS

BEYOND ANY possible doubt, the region of the earth least hospitable to every form of life—from man on down to the humble amoeba—is Antarctica, a bleak, frigid, forbidding, yet oddly attractive continent almost twice as large as the United States. Much of it is unremittingly buried under thousands of feet of densely packed ice and snow, which have piled up over uncounted centuries. This is true, for example, of the South Pole itself, which—unlike the North Pole, a point on an ice-covered sea—is on firm ground. No one has ever seen this firm ground, though, for it is thoroughly protected from prying eyes by an icecap eight thousand feet thick. With negligible exceptions, no plant life other than some small lichens, mosses, and algae has ever been found anywhere on Antarctica; the few birds and beasts that frequent the place at all—seals, penguins, and sea birds—live on fish and plankton from the surrounding oceans, and seldom venture far inland. As far as is known, no human being set foot on the continent until 1895, when the members of a Norwegian whaling party landed briefly near Cape Adare, in Victoria Land, and no human being lived through one of its venomously cold and continuously dark winters until 1899, when a party led by the Norwegian explorer Carsten Egeberg Borchgrevink did so. The very name Antarctica is still so new that its proper pronunciation is unsettled: while dictionaries decree that the difficult first "c" should not be slighted, most people who use the word familiarly waver between dutifully choking over it and leaving it silent.

(Continued on page 126)

The number of these people is rapidly growing, for technological advances in recent times have made the curious charms of Antarctica accessible to, and endurable by, more and more members of the perverse, warm-blooded human race. Up to 1946, when the United States began an ambitious attempt to map the region, only six or seven hundred people had ever visited the place. Now, however, this number has been multiplied many times. Most of the tourists are of recent vintage. Since the start of the eighteen-month International Geophysical Year on July 1, 1957, nearly a dozen of the sixty-four nations participating in this scientific study of the earth and its surroundings have sent expeditions down there. Antarctica's summer, lasting — in terms of temperature — roughly from early November until the end of January and characterized by almost every color but green, is naturally its most hospitable season, and during the summer just ended the continent was host to groups of scientists, and their entourages, from Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, the United Kingdom, the United States, and Russia. This invasion alone—counting trippers who spent most of their time circling the icepack aboard ships — increased the number of people who have visited the continent by something like ten thousand. A notable milestone in Antarctica's progress toward becoming a vacation resort was passed last November, when six American congressmen spent a few days there and were flown over the South Pole. Indeed, things have reached the point where any normally sedentary civilian lucky enough to be invited to drop in can sojourn there in comparative safety, if not in ducal comfort, and last February, under the auspices of the Navy and Air Force, I did just that myself.

In the past, whenever I'd thought about Antarctica at all, I'd pictured it as only slightly less remote than outer space from any point in the civilized world that I was familiar with. When the Air Force thinks about Antarctica, I learned, it pictures it as twelve thousand miles from Greenville, South Carolina, via the Pacific. The most direct route, via South America, is some four thousand miles shorter, but because the United States' main base in Antarctica—on McMurdo Sound, a part of the Ross Sea —is almost due south of New Zealand, the Air Force customarily takes the trans-pacific route. Greenville, which at first struck me as a curiously arbitrary spot from which to measure the distance to anything, is the site of Donaldson Air Force Base, where transports take off for Antarctica, with stopovers at Travis Air Force Base, north of San Francisco; Hickam Field, in Honolulu; Canton Island, a joint American and British possession some two thousand miles southwest of Hawaii; Nandi, in the British colony of Fiji; and Christchurch, New Zealand. The Navy promised to supply me in Christchurch with all the cold-weather equipment I would need, and pointed out that since a good deal of the flight would be through the tropics, I would do well to bring along summer clothing. Accordingly, I cast rationality aside and packed a couple of suitcases with sports shirts, light slacks, and bathing trunks, and set out one blustery afternoon from LaGuardia Field, en route to Antarctica.

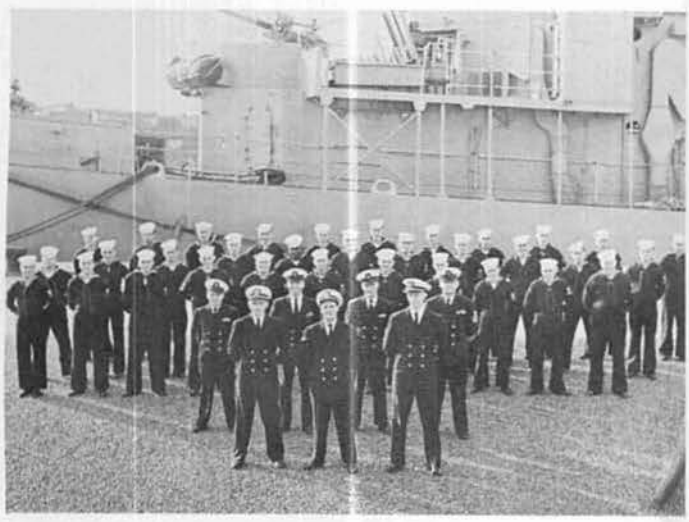
Donaldson Air Force Base owes the honor of being the jumping-off place for McMurdo Sound to the fact that it is the headquarters of the 53rd Troop Carrier Squadron. The Air Force and the Navy are jointly responsible for the air support of Operation Deep Freeze, as the military phase of this country's current assault on Antarctica is quaintly named, and the Air Force's share of the job is handled by the 53rd Squadron, which is equipped with a species of four-engine aircraft known as the C-124, or Douglas Globemaster — a massive piece of machinery that has been out of production since 1954 but still does the bulk of the Air Force's cargo and troop carrying and is the indispensable work horse of the American supply line to Antarctica. I arrived at Donaldson shortly after dark, had dinner at one of the messes on the base and an abbreviated night's sleep in the visitors' billet, and showed up on the flight line the

(Continued on page 127)

First on the Line

CRICKET fundamentals are explained to LCDR B. E. Boney, BROUGH CO (standing), LTJG Goulette, LTJG Dole, and LTJG Deutermann by New Zealand cricketeer.

FIRST DIVISION OF USS BROUGH (DE-148).

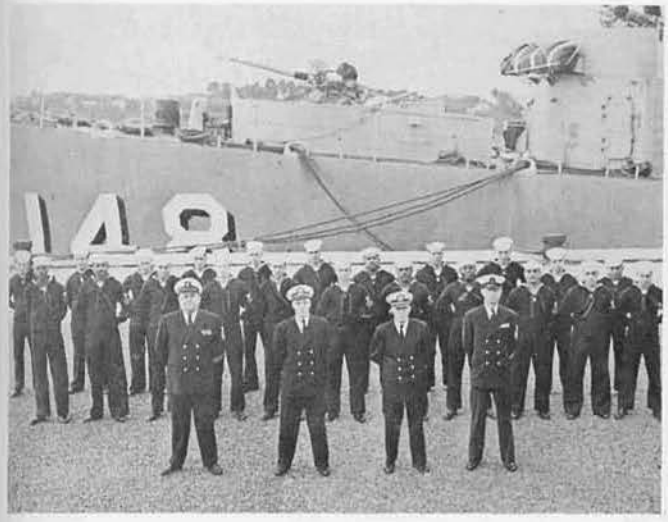


OPERATIONS DIVISION OF THE "BEAM" SHIP.

Was BROUGH

BROUGH XO Lt R. A. Vollertsen slams a run for his team as the DE's officers "defeat" a local Dunedin cricket team at their equivalent of our own baseball.

ENGINEERING DIVISION OF THE BROUGH.



SUPPLY DIVISION (INCLUDING MEDICS).

next morning with plenty of time to spare before eight o'clock, my scheduled hour of departure. Out on the runway, I met Lieutenant Colonel Dixon J. Arnold, commanding officer of the 53rd. He told me that he wasn't going along on the impending flight; he had just come out to see it off. I wasn't surprised to learn, however, that he had spent a good deal of time in Antarctica over the past couple of years. "I really like the place," he said, with genuine feeling. "Someday, I'm going to build a tourist hotel on the Beardmore Glacier—right on the air route from McMurdo Sound to the Pole, and one of the most beautiful spots I've ever seen. It's remarkable how well known Antarctica is getting to be these days. When I was in New York not long ago, I got talking to a fellow in a bar, and it turned out that he has a cousin who has a mountain down there named after him. I didn't happen to know the mountain, but I've made a note to look it up the next time I'm down that way."

My Globemaster was beginning to take on passengers, so I boarded it, too, by way of a ramp lowered from its nose. Seen from the flight line, the plane had looked like any conventional four-engine airliner, only somewhat larger, but the interior proved to be an entirely different matter, having obviously been designed with an eye to utility rather than comfort. The more or less cylindrical cabin, some fifteen feet in diameter and seventy feet long, could be swiftly adjusted to carry a payload of either passengers or freight, or any combination of the two. As it happened, our load consisted of about twenty thousand pounds of cargo and nineteen passengers. The cargo was strapped down fore and aft, and nineteen tubular-steel-and-canvas-webbing bucket seats were set up in between, facing the center of the plane; part of the cargo, I noticed, was a spare Globemaster engine, some pneumatic rafts, some cans of paint, two parcels labelled "Important Papers, Do Not Destroy," and a couple of enormous metal aircraft-maintenance platforms, extending from the floor almost to the top of the cabin.

It seemed inconceivable to me that with all this freight, animate and dead-weight, the plane could fly, but fly it did. At eight on the dot, it took off—laboriously, to be sure, yet with a certain efficiency—and set a course for the West Coast. Almost immediately, I began to learn that bucket seats and Spartan surroundings are not the only aspects of Globemaster travel that differ from regular airline travel. For one thing, the cabin isn't pressurized, and in trying to avoid bumpy areas the pilot often flies at altitudes where the atmosphere is a bit too rarefied for the beginner. "A Globemaster doesn't fly by aerodynamics," our flight engineer remarked, in a tone of affection, later on. "It flies by brute force." The most striking manifestation of this brute force is the vibration and roar of the engines in the uninsulated cabin. The noise, indeed, makes conversation impossible in anything less than a screaming shout. Occasionally, the engines change pitch—or the cargo-lifting pulleys shift position, or something—and the incessant roar is heightened by a deafening racket like that of coal going down a chute. Still, the experience grows on one. During the first day of it, I felt generally miserable; at the end of the second day, I disembarked feeling rather proud of myself for not being in worse shape than I was; by the third or fourth day, I had imperceptibly achieved a state of tolerance that enabled me to accept travelling by Globemaster as the human condition.

A problem faced by all Globemaster passengers, of course, is how to pass the time in a cabin where anything like normal conversation is wholly out of the question. Of my fellow-passengers—all of them Air Force men except for one British newspaper correspondent—some solved it by playing blackjack hour after hour, using the top of a packing case for a card table, and one managed to spend the better part of the morning polishing his shoes. Behind every second bucket seat is a small window, like a porthole, and I spent most of my time staring out at the earth below. Now and then, a moment's diversion would be provided by a visit from one of the crew members, come

(Continued on page 129)

Timetable for The Biggest Freeze

1957

August 26: **USS BROUGH** (DE-148) sails from Newport, R.I.: LCDR B. E. Boney, CO.

September 23: **USS GLACIER** (AGB-4) departs Boston, Mass.; CDR Bernard J. Lauff, CO.

September 24: **BROUGH** arrives Dunedin, N.Z.; leaves 4 days later; on station, September 30.

October 21: **USNS GREENVILLE VICTORY** departs Davisville, R.I.; Knud T. Mortensen, Master.

October 30: **USS ATKA** (AGB-3) departs San Diego, Calif.; CDR Charles Bulfinch, CO.

November 9: **GLACIER** arrives Port Lyttelton, N.Z.

November 11: Task Group 43.4, CAPT G. L. Ketchum commanding, formed.

November 12: **USS NESPELEN** (AOG-55) departs Norfolk; LT George C. Supp, CO.

November 16: **GREENVILLE VICTORY** at Port Lyttelton.

November 17: **ATKA** arrives Port Lyttelton.

November 20: **USNS J. R. TOWLE** (TAK-240) departs Davisville; John Wiis, Master.

November 21: Task Group 43.4 sails for Little America.

November 24: **USS BURTON ISLAND** (AGB-1) departs San Diego; CDR H. J. Brantingham, CO.

November 25: **USS ARNEB** (AKA-56) departs Davisville; CAPT R. M. Hinkley, CO.

November 27: **USCGC WESTWIND** (WAGB-281) departs New York; CAPT W. J. Conley, Jr., CO.
USS WYANDOT (AKA-92) departs Norfolk; CAPT F. M. Smith, CO.

November 30: Task Group 43.4 arrives Little America.

December 14: **BURTON ISLAND** arrives Port Lyttelton.

December 15: **NESPELEN, TOWLE** arrive Port Lyttelton; depart four days later for McMurdo with BURTON ISLAND.

December 21: **WYANDOT** arrives Capetown, Africa.

December 22: **WESTWIND** arrives Capetown; departs 4 days later with WYANDOT for Ellsworth.

December 27: **BURTON ISLAND, NESPELEN, TOWLE** arrive McMurdo Sound.

1958

January 2: **ARNEB** arrives Port Lyttelton; leaves five days later for Cape Hallett.

January 9: **WESTWIND, WYANDOT** arrive Ellsworth.

January 13: **ARNEB** arrives Cape Hallett.

January 16: **TOWLE** departs Hallett for home.

January 18: **WESTWIND** departs Ellsworth for Bellingshausen. WYANDOT leaves for home.

January 20: **TOWLE** arrives Port Lyttelton; leaves for home January 23.

January 28: **BURTON ISLAND** visits Mirny; departs following day for Prince Harald Coast.

January 31: **ATKA** departs Wilkes, homeward bound; likewise ARNEB. WYANDOT arrives Buenos Aires, homebound.

February 1: **WESTWIND** reaches Bellingshausen.

February 3: **NESPELEN** leaves LAS for home. WYANDOT leaves Buenos Aires for Santos.

February 4: **GREENVILLE VICTORY** leaves McMurdo. WESTWIND reaches deepest penetration of Bellingshausen.

February 8: **ARNEB** arrives Sydney, Australia. BURTON ISLAND reaches Lutzow-Holm Bay area to aid SOYA MARU.

February 9: **GREENVILLE VICTORY** arrives Port Lyttelton. WYANDOT leaves Brazil for home.

February 10: **NESPELEN** arrives Port Lyttelton; departs for home four days later. WESTWIND departs Bellingshausen Sea. ATKA arrives Port Lyttelton.

February 12: **GREENVILLE VICTORY** leaves Wellington.

February 18: **WESTWIND** arrives Montevideo, Uruguay.

February 24: **BURTON ISLAND,** after assisting Japanese at Showa, heads for home.

February 25: **ARNEB** arrives Melbourne.

February 28: **BROUGH** departs Dunedin, headed home.

March 6: **ATKA** leaves Wellington for home.

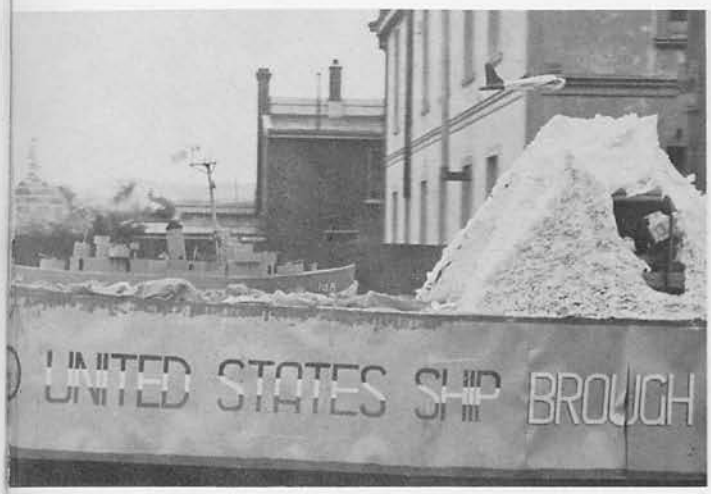
March 10: **BURTON ISLAND** arrives Valparaiso, Chile.

March 12: **GLACIER** arrives and departs Hallett, homeward bound; leaves Port Lyttelton.

March 24: **ARNEB** leaves Melbourne for Durban, South Africa, thence to Montevideo.

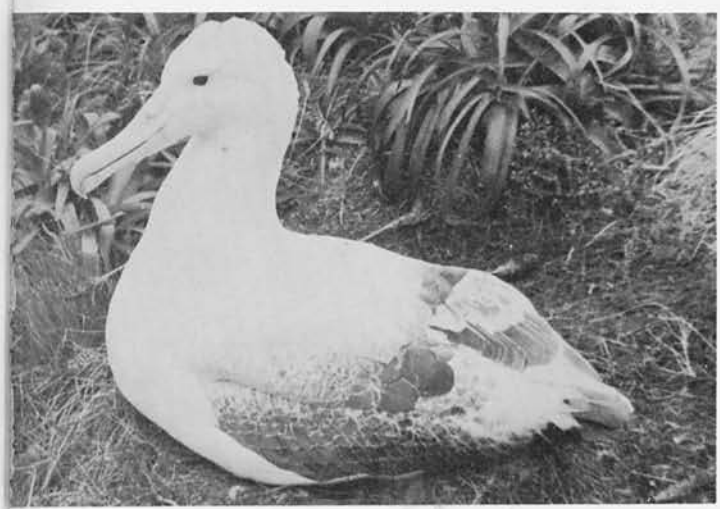
♦ CARGO HOLD OF GREENVILLE VICTORY.

BROUGH at 60° S.



FLOAT sponsored by visiting BROUGH takes part in the annual festival week parade in Dunedin, New Zealand.

FAUNA of Campbell Island (in vicinity of BROUGH weather-station beat) vary somewhat from Antarctic varieties. Rockhopper penguins (left) sport jazzy feather eyebrows; sea lions are heavily furred.



GRACEFUL black and white Royal Albatross, native to southern Pacific Ocean, is found on Campbell Island where its nesting and breeding grounds are abundant.

back from the cockpit to stretch his legs. Sometimes the visitor would be our pilot himself, Captain Jack Wrinkle, a man who impressed me as having developed the traditional pose of the aircraft pilot—casualness combined with an air of competence—to a point where it didn't seem a pose at all. "We're fighting headwinds!" he bellowed into my ear on one occasion. "Nuisance! Keeps our ground speed under a hundred and fifty miles an hour. The gross weight of this thing, loaded, is a hundred and eighty-five thousand pounds. Not easy to haul! We'll get you there, though."

Captain Wrinkle got us to Travis at about six o'clock that evening, California time, and, after we had all had a night's sleep, wafted us off to Honolulu, where we arrived early the following evening. The rest period there was twenty-eight hours. While the crew slept in preparation for the next leg of the journey, I joined three or four other passengers in renting a car, and drove around the island of Oahu, looking at the drippingly lush scenery, breathing the steam-bath air, and stopping from time to time for refreshments at hibiscus-fringed *lanais*. Considering our destination, all this seemed enticingly topsy-turvy—even, perhaps, a bit immoral. But it was only the beginning. Fourteen hours after we left Honolulu—or, rather, fourteen hours plus one day, since the International Date Line lies between those two points-we were at Nandi, Fiji, propitiating the ninety-degree heat by sitting motionless under ceiling fans in the lobby of the Fiji Mocambo Hotel or taking a swim in its tepid pool. By then, however, my sense of the anomalous was beginning to lose its sharpness, for we had already passed the place where the through-the-looking-glass quality of our trip reached its height. That was Canton Island, a tiny coral atoll near the equator, where the Air Force and several commercial lines share the use of an airstrip and its facilities for repairs and refuelling. Canton has no inhabitants, except for the people who work at the base, and no shade trees, except for a few forlorn palms, evidently planted by someone with a misplaced trust in the fertility of the place. It was just daybreak when we landed on Canton for a half-hour refuelling stop, and a gaudy black-and-gold tropical sunrise was in the making. An Australian airliner bound for San Francisco and New York had been grounded there for a day and a half while one of its engines was being repaired, and its passengers had been billeted in squat little emergency cabins. As we came in, some of them, grateful for any form of diversion, emerged into the dawn and wandered up to the edge of the airstrip. They were barefoot and wearing only their pajamas. The sight of these people broke the last of my ties to the world as I had known it three days before. My sense of identity with New York and reasonable calendars and reclining lounge seats and uniformed airline hostesses had vanished. This, I thought, was just the sort of thing to see on the way to Antarctica.

It took us an easy eight hours to fly from Nandi to Christchurch, on our fifth day out of Donaldson by elapsed time. On landing at Harewood, the Christchurch airport, we pulled up beside two other Globemasters belonging to the 53rd Squadron. A blustery wind—nowhere near as biting as the one I had left at LaGuardia, but hardly reminiscent of the Fiji Mocambo lobby, either—was blowing as we trooped into the immigration office. There a Navy man was waiting for me with word about the outlook for the rest of the trip to Antarctica. "The chances are that a plane will be going down to McMurdo three days from now—taking off at 10 P.M. on Monday, the tenth of February," he said. "It will be the first flight south in over a month. Since early January, the runway has been soft and full of potholes. But lately the weather's been turning colder down there, and the operations people have radioed us that the runway looks all right now. The Navy wants everybody who's making the trip to come to its headquarters here in Christchurch on Sunday afternoon for a briefing, and on Monday morning we'll want to issue you your Antarctic gear, but other than that, your time's your own."

(Continued on page 130)

The three-day layover meant finding a room in a hotel. It developed that Christchurch not only was playing host to a sheepherders' convention but was anticipating a visit of the Queen Mother, and its big hotels were all filled. I ended up in a small one called the Star and Garter. The Star and Garter exemplified a phenomenon of New Zealand life—the hotel that is really a pub. The law allows only licensed hotels to serve alcoholic drinks; proprietors who are by inclination more publican than hotelkeeper comply with the statute by keeping a minimum of rooms for rent and concentrating on the bar trade. As a result, there are lots of hotels in Christchurch that have more bars than rooms. At the Star and Garter it's a standoff—four rooms and four bars—but when I was there this delicate equilibrium was about to be disturbed, for a new wing was under construction in which there would be two bars and no rooms at all. I had not been at the Star and Garter long before I came to understand the need for the addition. On Friday afternoon, shortly after my arrival, a tank truck drew up and began pumping what I supposed must be fuel oil into a tap beside the building. I soon learned better, though, when the driver told me that the truck was pumping not oil but beer—five hundred and fifty gallons of it—into a basement tank that served all four of the Star and Garter's bars. Business was brisk that weekend, and on Monday morning the tank truck was back, pumping in another five hundred and fifty gallons.

I did my bit to stimulate business in the Star and Garter's bars, but I spent most of my time that weekend having a look around Christchurch. It is a sprawling city of two hundred thousand, and what most forcibly catches a traveller's eye is the contrast between its spruce, ubiquitous, and colorful gardens and its generally rather shabby frame houses. With its tradition of serving as a takeoff point for polar expeditions—dating back to such famous British pioneers as Robert Falcon Scott and Sir Ernest Shackleton — Christchurch is extremely Antarctica-conscious. A statue of Scott, who reached the South Pole in January, 1912—only a few weeks behind Roald Amundsen, the first man ever to get there—and then died on the return journey, dominates one of the city's most popular parks; each of the city's two newspapers carries at least one Antarctica story almost every day; the amours and other off-duty exploits of Operation Deep Freeze personnel are chronicled, or at least conjectured about, in a local gossip magazine; and Rear Admiral George J. Dufek, the over-all boss of American activities in the Antarctic, is unquestionably a Christchurch hero. (Also unquestionably, and understandably, he is less of a Christchurch hero than Sir Edmund Hillary, who last January led the third overland expedition ever to reach the South Pole. Sir Edmund is a New Zealander, and thus close to Christchurch's heart, even though he comes from Auckland, seven hundred miles to the north.) It might be supposed that after years of watching explorers of all sorts and nationalities pass through their city on the way "down to the ice," the residents of Christchurch would have become blasé about the whole business, but I found that even I—a hothouse adventurer if there ever was one—attracted considerable interest when I mentioned that I was on my way to Antarctica. Their interest was tinged by an aura of heady excitement; the spirit was contagious, and I began to feel as though I were going off on a military campaign without the unpleasant prospect of being shot at.

The Navy headquarters in Christchurch is in a building that used to be a brewery, and the Navy people, unable to resist the hilarity of this circumstance, have kept the old designation. When I arrived at the brewery for the Sunday-afternoon briefing, there were several dozen men milling around in an auditorium on the second floor. Only a few of them were in uniform, but that didn't necessarily mean that the others were civilians, for in Christchurch both the Navy and the Air Force are capricious in the matter of military vs. civilian dress. One of those present, and unmistakably in uniform—with an admiral's stripes

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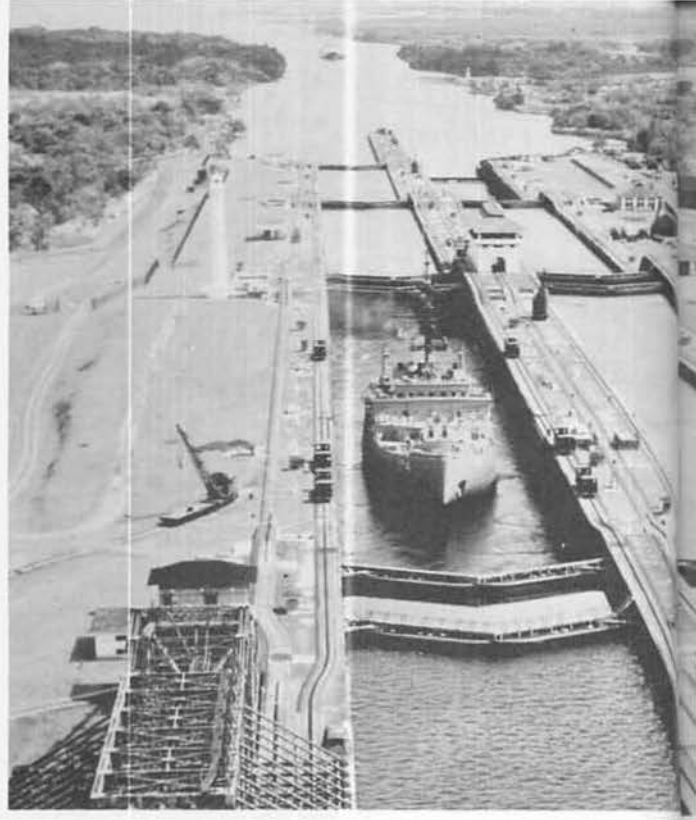


GLACIER TRANSITS CANAL ON SEPTEMBER 30;

GLACIER—The

FUELS, TOPS OFF CARGO, LEAVES OCTOBER 2.

Ice Queen—Sails

MERCY flight by RAF plane from Christmas Island airdropped emergency medical supplies to ship in middle of Pacific. Larry Darling, fireman, stricken with near-fatal malady, was saved by drop and transferred back to States. Above, LT Michael Christy, ship's MD, checks paradropped supplies on GLACIER's top deck.

← SKIPPERS, future and current. CDR Joseph A. Houston (left) who relieved CDR Bernard J. Lauff (right) in southernmost change of command afloat, off LAS.

on his sleeves—was a bluff, no-nonsense sort of man with kinky silver hair. He was Rear Admiral Dufek, the big boss. Presently, he stepped to the front of the room and set about explaining, in a bluff, no-nonsense way, the scope and purpose of Operation Deep Freeze. Its be-all and end-all, he said, is to provide bases and logistic support for the American scientists in Antarctica who are participating in the International Geophysical Year. The operation got under way in November, 1955, and it will formally come to an end, along with the I.G.Y. itself, next December 31st. (The United States, however, has announced that it intends to hang on to some of its Antarctic installations, including its South Pole Station, beyond that date, and, of course, something will have to be done about supplying and maintaining them.) Around two thousand Americans, the Admiral said, took part in Deep Freeze during its first year and more than thirty-five hundred during its second year; its third, and current, phase required more than four thousand. A hundred and sixty-six men spent the winter of 1956 in Antarctica, and three hundred and nineteen spent the winter of 1957 there; three hundred and forty are staying over this winter. So far, the debits of the operation in terms of human life are nine men killed—six in aircraft accidents, one by falling into a hidden crevasse, and two by drowning when the tractors they were driving fell through ice offshore. The credits are six major Antarctic stations, as well as several small outlying camps: Little America V, on the edge of the Ross Shelf Ice, some forty miles from the famous Little America originally established by Byrd in 1929; Byrd Station, in the interior of Marie Byrd Land, five hundred and fifty miles from Little America; Ellsworth Station, far over on the opposite shore, south of Argentina; the South Pole Station, perched on the plateau of ice directly over the geographical pole; Wilkes Station, on the shore south of the Indian Ocean; and Hallett Station, on a shoulder of the coast that points toward New Zealand and reaches so far north that it has come to be known as the Banana Belt. The place we were all headed for, Admiral Dufek went on, is properly known as Williams Air Operating Facility, having been named in honor of Driver Third Class Richard T. Williams, who drowned there on January 6, 1956, when ice on the nearby sound broke under the weight of his tractor, but since it is on the shore of what has been called McMurdo Sound for more than half a century, it is generally spoken of as McMurdo. The chief distinction of McMurdo is that the ice on the sound is thick enough to serve as a runway for heavy aircraft. The McMurdo runway is the only heavy-aircraft landing strip in all Antarctica; no hardground runway has yet been built anywhere on the continent, although one could be, and doubtless will be eventually. Under favorable conditions, light Navy ski planes can land at or near several of the other United States bases, but Globemasters are too heavy to use skis. McMurdo's unique runway has established it as the general headquarters and supply depot for the South Pole and Byrd Stations, the Admiral said; although Globemasters cannot land at either of those stations, they can fly over them and disgorge by parachute anything from a sack of mail to a prefabricated building, and then return to their runway of floating ice.

As Admiral Dufek neared the end of his briefing, an almost embarrassed look of intense feeling came over his face. "Let me tell you this about Antarctica," he said. "A lot of the time you're down there, you're miserable. No question about it. Every man who comes out swears he'll never go back. But a lot of people *do* go back—and as volunteers, too. It's a funny thing. Well, that's all I've got to say. I'm going to turn you over to Commander John Mirabito, our aerology officer. He'll tell you about Antarctic weather."

Commander Mirabito proved to be a smiling man of forty or so, with a slightly oracular air, and no wonder, since in Antarctica everyone hangs on the words of the weatherman. "Your weather at McMurdo during the next couple of weeks isn't going to be too bad," he began reassuringly. "It's autumn

(Continued on page 132)

there; winter isn't actually closing in yet. However, there's getting to be some twilight, around midnight. I'd better explain about that. In the Antarctic regions, of course, just as in the Arctic regions, the sun shines continuously all summer and never appears at all in winter. During the in-between seasons, it rises and sets daily. Right now, for example, the sun still gets well up in the sky each day, circling in a counterclockwise direction, and dips down fairly close to the southern horizon in the middle of the night. Toward the end of February, the dip will be lower and lower, until the sun is out of sight for a period of time each night. This period of time will get progressively longer, until the sun is *up* for only a short time each day. Finally, around April 20th, it will disappear for good—or, rather, until around August 20th, when it will make its first appearance of the spring. It won't be up on a twenty-four-hour-a-day basis until a couple of months after that.

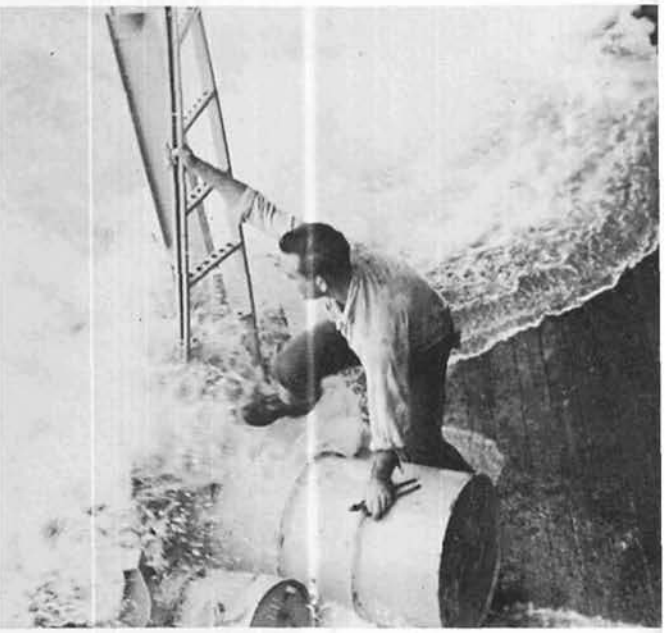
"Now for temperatures. Our coldest station, not surprisingly, is the one at the Pole. In the time we've been keeping records there, which is a little over one full year, the highest temperature recorded has been plus seventeen degrees Fahrenheit—that was one day early in December of '56—and the lowest minus a hundred and two and one-tenth degrees, on last September seventeenth. The average down there at this time of year runs around minus thirty. On that record cold day, by the way, two men volunteered to remain outdoors—one for three hours and the other for four—to see how they would respond. No ill effects were noted, except a feeling of dizziness after sleeping. McMurdo isn't nearly as cold as the Pole, you may be glad to hear. For one thing, it's over eight hundred miles to the north, and, for another, it's built on bare black lava ash that absorbs heat from the sun. The annual temperature range at McMurdo is from about minus forty to about plus forty. When you get there, I'd expect it to be somewhere around plus twenty-five. But it will be dropping quite fast. All the McMurdo temperatures I've just given you, by the way, are up at the base, on the lava ash. Down on the ice, where the runway is, you can expect it to be ten degrees colder."

While I was trying to translate these statistics into how I was going to feel in Antarctica, Commander Mirabito passed on to a new topic—and an arresting one. "It doesn't snow much in Antarctica, except in some of the warmer peripheral areas," he said. "Blizzards are caused as much by drifting snow as by falling snow, and it's very difficult to tell one from the other. Figuring the best we can, we estimate that the snowfall in the interior averages no more than three to six inches a year; at the Pole you're much more apt to get a light fall of ice crystals —'down,' they call it—than actual snow. But very little of what falls ever melts, and that's how the icecap gets built up. As I say, maybe it doesn't snow much, but all over Antarctica the wind certainly does blow. Although McMurdo is one of the warmest of our stations, it is also one of the windiest. A good cold-climate rule of thumb is that as far as the human body's reactions are concerned—the cold you feel, in other words—each knot of wind speed is equal to a one-degree drop in temperature. So bundle up on gusty days. Keep your ears covered, particularly. When there's danger of frostbite, the ears are usually the first to go."

On that stimulating note, Commander Mirabito ended his discourse and Admiral Dufek declared the briefing over. The room hummed with talk as those of us who had never been to Antarctica tried to find out more about what we were getting into. From one old Antarctic hand I learned, for example, that anyone who is lucky enough to get hold of a bootleg bottle of whiskey at McMurdo—only beer is officially available there—customarily drinks it without ice, since there is no fresh-water ice handy outdoors and refrigerators are unknown. I learned, too, that the National Board on Geographic Names has cracked down on American explorers' custom of naming their Antarctic finds after their wives; fortunately, the decree is not retroactive,

(Continued on page 133)

Hep GLACIER



AVGAS barrels broke loose on deck, had to be scuttled to prevent explosion. Jim Reney, one of volunteers who risked injury to puncture and jettison runaway drums, grabs for ladder as mountainous wave breaks over well-deck station and rolls all with it.

Rockoons & Rolls

← ROCKOON launching: helium-inflated plastic balloon takes shape, rises; gas is pumped in until balloon reaches maximum height. Rocket attached is borne to 80,000 feet where it is launched still higher by remote control, radios back atmospheric data from space.

DAVE DRZIK MAKES ANALYSIS OF SEA WATER.

so atlases will be able to preserve such chivalrous tributes as Marie Byrd Land and Edith Ronne Land, along with dozens of Mount Annes, Mount Bettys, Mount Emilys, and so on. Mrs. Ronne, I was told, is an American woman who wintered over in Antarctica one year with her husband, Finn; she is not only one of the very few women to have accomplished that feat but one of the very few to have been to Anarctica at all. At present, the Navy generally refuses to allow women to visit McMurdo; the rule was relaxed once, last September, when a chartered airliner carrying Seabees and I.G.Y. scientists stopped there for three hours and the two stewardesses on board were permitted to disembark.

After picking up these piquant, if not especially useful, tidbits, I managed to corner Admiral Dufek and extract a few words of autobiography from him. Off the rostrum, the Admiral drops his abrupt, factual manner and becomes an expansive and engaging conversationalist. An old-time naval aviator, from Rockford, Illinois, via Annapolis, class of 1925, he first became involved in Antarctic work when—out of boredom as much as anything else, he said—he volunteered for Byrd's 1939-40 expedition. "I was one of four volunteers selected. I felt really set up, until I learned that there had been four volunteers," the Admiral said. Except during the Second World War, when he served on Admiral Hewitt's staff in the Mediterranean, and the Korean War, when he was in command of the aircraft carrier Antietam in the Pacific, he has been on Antarctic duty pretty much ever since. He took part in the Navy's 1946-47 mapping expedition, called Operation Highjump, and has been in the thick of Deep Freeze from its beginning; last July, President Eisenhower appointed him to succeed Admiral Byrd, who had died four months earlier, as United States Antarctic Projects Officer. Dufek told me that he maintains headquarters at both Christchurch and McMurdo, and ordinarily spends the summer months more or less commuting between the two points, but that he did not plan to go down to the ice again this season. Later, I learned from other sources that, far from being a chair-borne rear-echelon commander, he holds the distinction of having twice survived plunges into the Antarctic seas—once as a result of a helicopter accident, and once when a cable snapped as he was being conveyed from one ship to another.

I pressed the Admiral for an explanation of the seductive pull of Antarctica that he had spoken of in his briefing. "I guess it's because there's tragedy, beauty, and starkness in the place," he said. "There's also good, rousing, old-fashioned adventure. When I was a youngster in Rockford, I used to love poems about the Arctic regions. 'The Shooting of Dan McGrew'! 'The Face on the Barroom Floor'! Well, I've always thought that equally rousing poetry could be, and ought to be, written about the *Ant*arctic regions. I'd like to send a poet down there, and get him to do for the southern ice what Robert W. Service did for the north country. Used to bring up my poet idea in staff meetings, but I was laughed down so many times I began to feel kind of sheepish about it. What's the pull of Antarctica? Frankly, I don't know. But when you're there, you feel you're *doing* something. Talk to Trigger Hawkes, our staff air adviser and just about the most experienced Antarctic flier in the world. Get Trigger to tell you about flying conditions down there, and you'll know what I mean about adventure." A wiry, alert-looking Navy captain with flier's wings on his uniform was standing nearby, and he turned at the sound of his name and joined us. Admiral Dufek introduced him to me.

"About Antarctic flying," I said.

"Well, it's not quite the hazardous pursuit it's sometimes claimed to be," Captain Hawkes said deprecatingly, "Maybe there are more accidents and close shaves per flying hour down there than in balmier parts of the world, but polar fliers have at least one clear-cut advantage—most of them use planes equipped with skis and can land almost anywhere the minute trouble develops."

(Continued on page 134)

"And the disadvantages?" I asked.

"Oh, yes, there are disadvantages," he said. To begin with, he went on, navigation is always something of a problem over Antarctica, partly because there are no radio beams or beacons, and partly because proximity to the South Magnetic Pole (which is some fifteen hundred miles from the geographical one) causes a plane's compass to swing wildly and erratically. Then, too, the skis that are the polar flier's one asset are terribly heavy, compared to wheels. So is the average Antarctic air traveller, compared to an airborne businessman at LaGuardia. The polar passenger and his gear weigh in at something like five hundred pounds, and the plane's skis add another half ton of dead weight. But an even more serious problem is the effect of the numbing polar cold on the engines. At temperatures below minus forty, the contraction of metal, the hardening of rubber, and the congealing of oil make it almost impossible to start an engine without first warming it up by means of an elaborate and clumsy device called a Herman-Nelson heater, which has to be dragged out to the plane before each takeoff. Ground crews have to work on engines at temperatures so low that the touch of metal on a man's bare hand can cause a bad burn. Still another hazard—and a far too common one—is a frightening meteorological phenomenon called a whiteout. Although a whiteout, as opposed to a blizzard, is accompanied by no precipitation —indeed, the visibility is good—it can be more devastating than a blizzard, for the snow on the ground merges into a solid white overcast of clouds, with no visible point of junction. A pilot in a whiteout tends to lose all sense of orientation and to feel himself moving—whether up, down, or sidewise he has scarcely any idea—in a vast white void. The sunlight filtering through the clouds is reflected off the snow, Captain Hawkes said, and then off the clouds again, as though caught between two mirrors. The effect is blinding—worse than being transfixed by a searchlight, because the overpowering glare comes from all sides and every direction. Pilots who have safely flown thousands of hours in fog and at night have crashed in whiteouts.

Captain Hawkes recalled the first aircraft landing ever made at the South Pole—on October 31, 1956. It was a few weeks before the present station was established there, and Admiral Dufek wanted to spy out the land as a preliminary to moving in men and equipment. Captain Hawkes elected to give the pilot's seat on the historic flight to a younger man—Lieutenant Commander Conrad S. Shinn—and modestly assigned himself the position of co-pilot. "We were flying a Skytrain—that's the Navy's version of the old, familiar DC-3—and naturally we had ski landing gear," Captain Hawkes told me. "Well, we found the Pole, all right, with the help of a Globemaster that flew along with us and then circled overhead while we were on the ice. The Globemaster took fixes with its sextant and we took fixes with ours, and between us we decided where the Pole was. Nothing there to mark it at the time, of course; the markers Amundsen and Scott put up in 1911 and 1912 had long since been buried, and so had the flag that Admiral Byrd dropped when he flew over the Pole in 1929. We made a good ski landing, and everybody in the plane piled out and walked around, though we made sure that one of us was always in the cockpit, keeping the engines running. It was minus fifty-eight degrees, and if the engines had stopped, we wouldn't have had a chance of getting them started again. The Admiral stuck a flag in the ice and found out what he wanted to know about the site, and after spending forty-nine minutes at the Pole we revved up the engines and got ready to leave. But we found that we couldn't move. Our skis were frozen to the ice. All we could do was to start firing our JATOS—jet-assisted-takeoff bottles, full of a powerful solid jet fuel. Each one gives you a quick burst of power for thirty seconds. Four of them provide about as much power as one engine running wide open, and we had fifteen of them attached to the underside of our fuselage. Only thing is, JATOS are a bit dangerous; sometimes the terrific heat they generate

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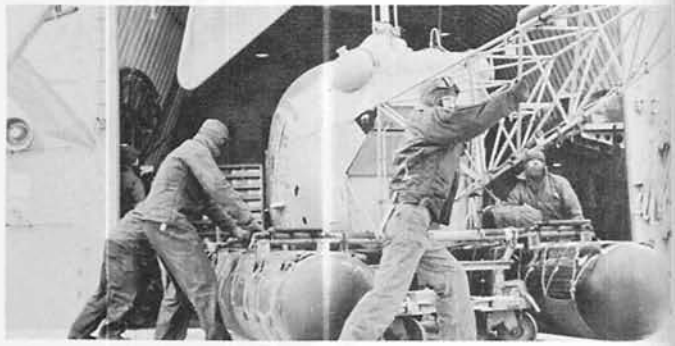
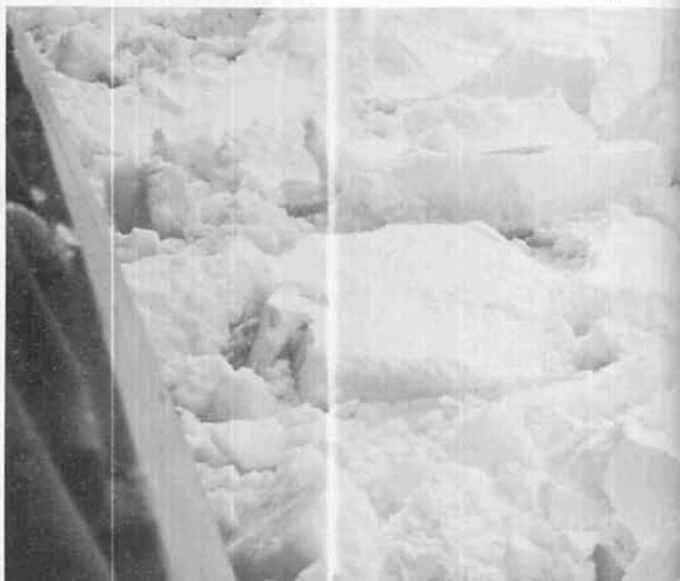
ATKA, GREENVILLE



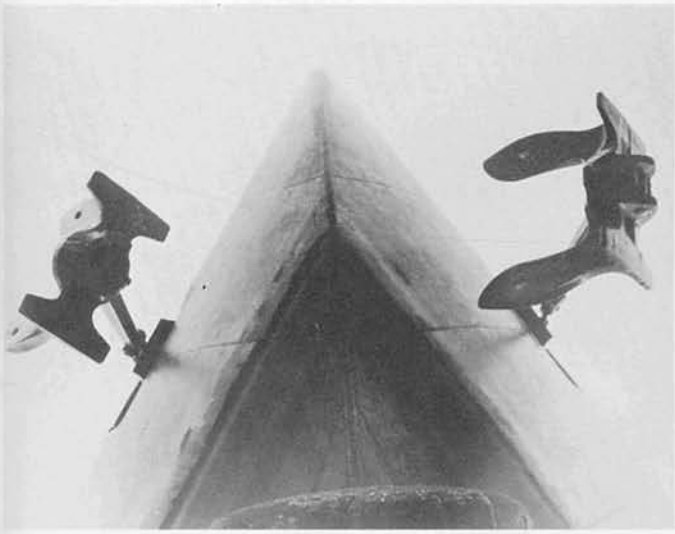
SOUTHBOUND GLACIER sent out its helicopter to case the icepack ahead as ATKA weighed anchor (right) in San Diego. An accident in after-steering compartment of ATKA took the life of Richard Oppegaard on November 8, just over the equator. Memorial services were held on ship's fantail by Chaplain Paul Reigner.

STRETCHER case, A. G. Ward, is passed from GREENVILLE VICTORY to GLACIER for medical treatment. Transfer was made just south of tiny Scott Island.

BESET in grinding pressure ice (below), ATKA and GREENVILLE VICTORY were sprung from their trap by GLACIER shouldering aside icepack close to ships.



VICTORY Follow



← It was thought GLACIER lost a propeller blade in this tricky maneuver. Leaning against icy winds, John Halsey (above) takes meter reading in the pack.

reflects off the ice you're standing on and burns up your tail assembly. With no tail assembly, you don't fly. Well, Shinn fired four JATOS. Nothing happened, so he fired four more. That time, she came unstuck and moved forward a few feet. Then Shinn fired the seven others, and off we went. The JATOS' flames made such a show that the people in the Globemaster overhead thought we were burning up. Matter of fact, we *did* burn our tail tire a bit, but the assembly was still there, and we were flying." Captain Hawkes permitted himself a slight dramatic pause before adding, "To tell the truth, when it's as cold as it was that day, we'd prefer not to fly—to the Pole or anywhere else."

The next morning, Monday, the Navy issued me my Antarctic uniform—long woollen underwear, woolen socks, fur-lined leather flying boots, rubber thermal boots, inner and outer trousers, inner and outer parka jacket, anti-glare goggles, fur-lined cap, and fur-lined detachable parka headpiece. At nine that evening, after wrestling all this into a canvas seabag, and the seabag into a taxicab—with considerable sweat, since in Christchurch it was plus sixty-five degrees—I arrived at Harewood in time for an Air Force briefing, which turned out to be of a more ad-hoc character than the Navy's at the brewery had been. The passengers due to fly to McMurdo that evening were herded into a tent, where a lieutenant described the emergency equipment they would find stored in the plane and instructed them in its use. "In case you're told during the flight that you're going to have to ditch the plane, first put on your exposure suit [a head-to-toe outfit made of heavy yellow rubber] and then your inflatable life jacket Rubber life rafts will be provided. Avoid going into the water at all, if possible. A man can survive in Antarctic water for only about eight minutes. However, we've never had to ditch a Globemaster on this trip yet. The distance to McMurdo is about twenty-two hundred miles, and the flight time ought to be about eleven hours. You should get your first look at Antarctica at around seven o'clock tomorrow morning, when you pass Cape Adare. Have a good trip."

I hauled my duffelbag out to our Globemaster and up the loading ramp, and as I did so, I noticed a group of perhaps a dozen young women standing nearby—the New Zealand sweethearts of some of the Navy and Air Force men bound for McMurdo, to judge by their parting salutations. After the ramp had been raised and the engines warmed up, we took off, to the accompaniment of a final frenzy of waved farewells from the New Zealanders, and as we headed south and gained altitude, I could see the Pacific, almost black in the fading twilight, and the lights of Christchurch. It seemed to me that the whole journey thus far had had the distinct air of a lark.

When we had levelled off for the long haul ahead, I took a good look around the cabin. There were the same number of passengers as there had been on the Donaldson-to-Christchurch trip—nineteen in all, twelve of them military men and the rest either I.G.Y. scientists or press correspondents. This time, however, we were carrying a much bulkier load of cargo, including a large number of packing cases, everyone's bag of cold-weather equipment, and a consignment of cut pine trees for marking the limits of the McMurdo runway. Since we were not yet in the latitude of around-the-clock sun, darkness presently fell, and many of the passengers craftily deployed themselves here and there among the jumbled seabags or nestled on heaps of pine trees to get some sleep. I stretched out on a row of three bucket seats and got some myself.

When I awoke, my watch showed 3 A.M. There was light in the sky, and I realized that I would not see night again until I left Antarctica. While no ice was yet visible in the water below, the cabin had become colder. A few of my fellow-passengers had roused themselves and begun digging in their seabags for warmer clothes. The rest were still asleep; one of the men on the pine trees was clinging to a paperback book entitled "Bodies in Bedlam." I dug a jacket from my seabag

(Continued on page 136)

and sat staring out my window. I was not rewarded by anything but a sunrise—colder and more forbidding than the one at Canton but no less spectacular—until around six o'clock, when pieces of broken ice, looking like the parts of a jigsaw puzzle, began to appear in the water. The sky was clear except for a few small, fleecy clouds. As we flew along, the pieces of ice became larger and floated closer together. Almost on the dot of seven, Cape Adare appeared, far to the right of our course. There were a good many icebergs in the water now; near the shore the sea was frozen solid, and beyond the vast expanse of the ice rose black cliffs, topped with snow. Beyond *them* rose higher mountains, entirely snow-covered and palely golden in the sunlight. It all looked exactly like the pictures of Antarctica that everyone has seen. Perhaps because of this, the scene did not seem real; it had no impact on me at all. I didn't feel lacking in sensitivity for long, though, because a few minutes later we entered a cloud bank and the cabin became really cold, and along with everyone else, I began digging in earnest for more clothes. We were all thoroughly bundled up when, shortly before nine, the pressure in our ears informed us that the Globemaster was coming down for a landing. A moment later, the plane dropped below the clouds, and there lay McMurdo—a cluster of huts on a black, largely snowless shore—and, not far from it, a marked-off runway on the frozen surface of the sound. After circling the sound, we landed on the ice—amid a furious cloud of snow kicked up by the propellers—with hardly a bump.

The plane was immediately surrounded by a welcoming crowd that had come down to the runway from McMurdo to greet the first messengers from civilization in more than a month. With the other passengers, I descended the plane's ramp and stepped out onto the ice. It was a gray day, with a gusty wind carrying a few snowflakes—honest snowflakes, not South Pole "down"—but whether they were falling or just drifting I couldn't tell. It wasn't especially cold—twenty-six degrees at the base, somebody told me, which would mean about sixteen on the runway—and I felt let down; Antarctica, it seemed to me, should not be so much like New York on an inclement February day. I could not help wondering what, as a matter of fact, the temperature was in New York at that moment. (Since my return I have looked into this and found that in New York the temperature just then was twenty.)

We were soon all loaded into a truck for the haul to McMurdo. What with the grayness of the morning and the fact that the only view from the truck was a backward one, I didn't see much of the countryside during the mile-and-a-half trip; my first impression of McMurdo at close range was what it had been from the plane—a cluster of huts standing on a stark patch of black ground. On arriving, we were assigned to billets. Mine turned out to be in a semicylindrical structure shaped much like a Nissen hut except that it consisted of heavy, insulated cloth fitted securely over a wooden framework; like a Nissen, its only windows were two small ones, at either end. It was lighted electrically and heated by an oilstove. My fellow-tenants (there were about a dozen of them, mostly British newspaper correspondents) welcomed me; told me I was in a Jamesway hut, whose special feature is that it can be dismantled and dropped by parachute; and pointed out the building's main idiosyncrasy, just as I was becoming aware of it myself—a tendency to be twenty or thirty degrees colder down around your ankles than at head level. Once I had settled in, I asked where I could get some breakfast and was directed to the mess hall, a large, substantial frame building right in the center of the camp. Inside, I found officers, enlisted men, and civilians eating together; obviously, the traditional Navy caste system had not penetrated to McMurdo. What struck me most about the men was that nine out of ten of them wore luxuriant beards. This prevalence of hairy chins made me feel right at home; in Greenwich Village, where I live, a good half of the coffee shops harbor enough bearded men to take on what I shall henceforth think of as the McMurdo look.

(Continued on page 137)

While the Season

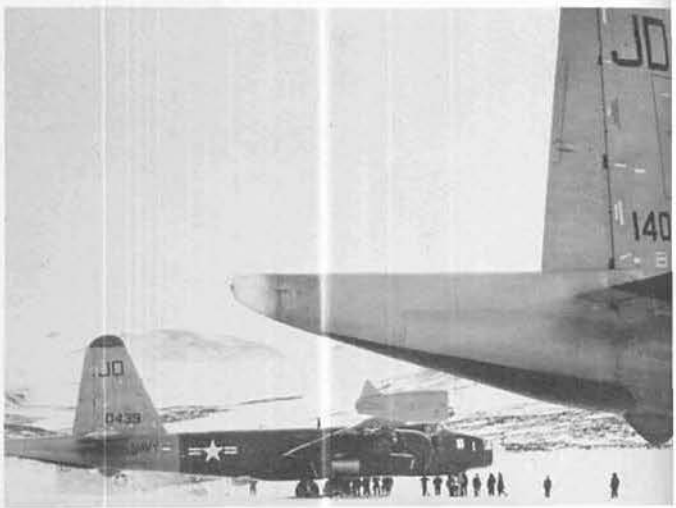
OCTOBER 14, 1957:

SENDOFF at Scott Base: Admiral Dufek wishes Sir → Edmund Hillary pleasant journey as he begins his support-party trek to lay down fuel and supply bases for Fuchs' Commonwealth Transantarctic Expedition.

OCTOBER 15:

FIRST commercial plane to land in Antarctica (above) → carried Navy CBs, v.i.p., and two PanAm stewardesses, first women to visit a *Deep Freeze* station in history.

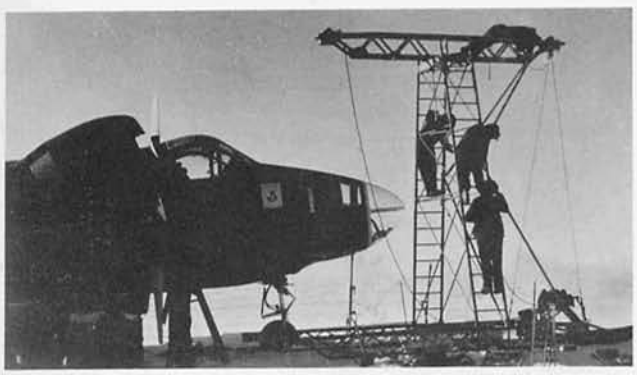
OCTOBER 26:



Was in Full Swing

← While Dick Conger, Navy lensman, aims his 16mm Avricon at the departing group. The New Zealand farm tractors began their long plow toward the South Pole more than a month ahead of Dr. Fuchs' final departure.

← Beard-judging contest was presided over by Ruth Kelley (above, with Robert Farman). PIO Beebe (right) interviews Pat Hepinstall and Ruth Kelley at McMurdo.



← FIRST plane to land at Pole this season, a P2V (left) was stranded there until new engine was flown in.

BROOKS CONTINUED

After breakfast, I attended one more briefing—the last of my Antarctic journey. This was a Navy affair, conducted by Lieutenant Commander Emmert E. Ludeman, the base commander, and was designed to acquaint the new arrivals at McMurdo with some of the elementary facts about the place. He wore a truly patrician beard, like that of an ancestor in a portrait. Ludeman told us that McMurdo, like every installation for hundreds of miles around, was on land claimed by New Zealand. New Zealand, however, did not object to the United States' maintaining bases there and was, in fact, one of the nations supporting a current movement to internationalize the whole of Antarctica. (At present, the United States is claiming none of the continent and recognizes none of the claims of other nations.) Switching from international affairs to more homely matters, Ludeman said that hot showers were available at McMurdo, but that because of a water shortage—all the water at the base comes from melted snow, and snow was in short supply just then—they were being informally rationed to one per man per week. "Another thing—blizzards," Ludeman went on. "Around here, it can change in half an hour from a perfectly clear day to what we call Condition Zero, which means weather so bad that you can get dangerously lost right in the middle of the camp. If Condition Zero is announced over the intercom, don't leave the building you're in."

At the end of the briefing, I suddenly realized that the long trip from Christchurch and the nearly sleepless night had caught up with me. Night and day being about alike at McMurdo, the fact that it was shortly before noon didn't seem to matter, so I decided to go to bed. On the way back to my Jamesway hut, I struck up a conversation with a man of about thirty who told me he was Lieutenant Frederick W. Ackroyd, the McMurdo medical officer. Or, rather, he added, smiling and taking a puff on a cigar, he was the McMurdo Pooh-Bah, being also sanitation officer, cryptographic officer, public-information officer, and personnel officer. Dr. Ackroyd, who seemed a singularly young man to be wearing so many hats, was old enough to be wearing a beard, but, unlike Commander Ludeman's, it stressed delicacy rather than austerity. As we walked along, I asked him about morale at McMurdo.

"Morale in a place like this is of great interest to the medical man," he said. "You have to distinguish between ordinary griping and real morale problems. The difficult people here are mostly of one kind—men who don't know how to use leisure time. But even among these men you can tolerate some forms of aberration. What's bad is hostility—when the leisure time goes into building up hostility. When that happens, little things assume immense proportions. If there's somebody a man doesn't like, he can't get away from him. Morale problems are one thing in the summer. But the summer's ending now. It hasn't got long to go. And the winter . . ." Dr. Ackroyd puffed silently on his cigar, as if to say that morale problems in winter were too big a subject to take up during a stroll across the base. Making a mental note to seek him out later and pursue the subject, I went into my hut, lay down on my cot, and was asleep in five minutes.

It was nearly midnight when I awoke. Although still a bit groggy, I decided to get up and have a look at the midnight sun. Outside, I found that at the moment this was impossible, since the sun was still obscured by clouds; even so, the sky had brightened enough to make me glad to put on my anti-glare goggles. Buttoning up my parka headpiece against the wind, which was somewhat more biting now, I walked down the hill from the camp to the edge of the sound and looked out toward the runway, where our Globemaster still stood. Beyond it, to the south, the improved visibility revealed a low range of snow-covered mountains. A few hundred feet out on the ice, on the side of the runway nearer me, a small penguin was waddling along at a great rate, now and again slipping and falling down ignominiously, like a novice skater, and then clumsily picking

(Continued on page 138)

itself up again. I was thinking that its performance didn't say much for experience as a teacher when I was joined by a man who had evidently come down the hill behind me. He was not bundled up as thoroughly as I was, so I could get a good view of his beard; it was neither awe-inspiring, like Ludeman's, nor delicate, like Ackroyd's, but straggling and unkempt, like a prophet's.

"Got the big eye, man," he said a little wildly. "You got the big eye, too?"

I replied that I didn't know what the big eye was.

"Came in on the Globemaster, eh?" he said. "Well, you'll know what the big eye is before long. Sooner or later, you'll have it, the way everybody else does. The big eye is the Antarctic insomnia. In summer you get it because the sun never goes down, and in winter you get it because the sun never comes *up*. Either way, you get it. I hear there's a theory that it's got to do with pituitary reactions to constant light or darkness. Or something like that—nobody knows for sure. What they do know is what happens. You work all day, or all night, and then you go to bed. But you can't sleep. You just lie there and think. If you have anything to think about, that is. If you don't, you haven't got anything to do but just lie there. Next day, or next night, you're not especially tired. And next night, or next day, you've probably got the big eye again."

"What's the origin of the term?" I asked.

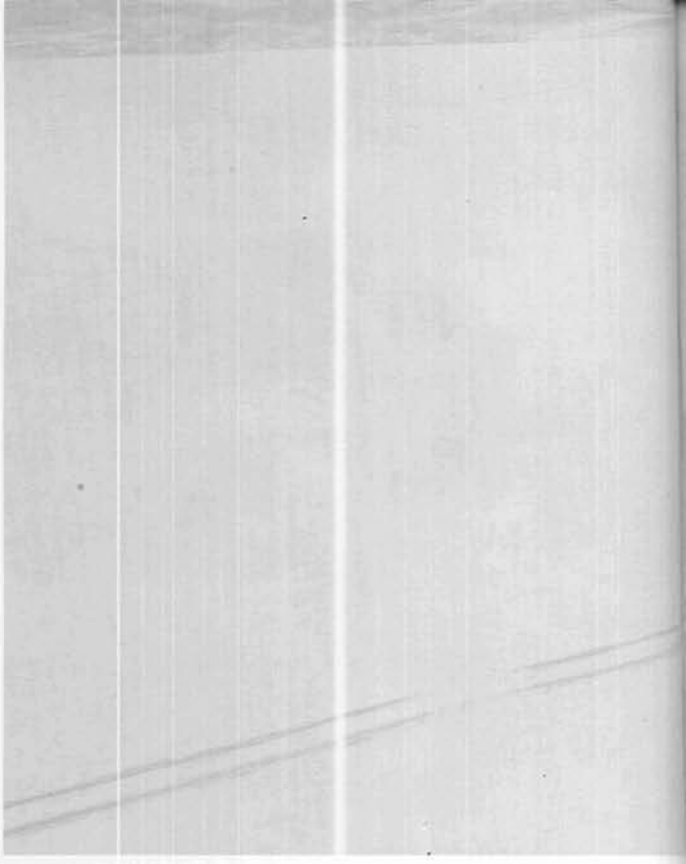
"Well, it *might* mean this," the man said, pointing to one of his eyes, "but down here it more likely means that," and he pointed to the sun, which now shone palely through the clouds —a yellow disc suspended above the mountains to the south. "I just don't know. Well, I might as well go back to the hut and lie there for a while. Good night."

I went back to my own hut and slept soundly the rest of the night, dreaming of things that were long ago, and of things that never were. At least, the big eye had not got me yet.

It was colder but brilliantly clear the next day, and I spent the morning familiarizing myself with the camp's layout and surroundings and asking questions of some of the old-timers. McMurdo, I learned, isn't actually on the Antarctic continent but on the southern tip of Ross Island. The island, about fifty miles in diameter, lies a few miles off the coast of Victoria Land, at the point where the waters of the Ross Sea, relatively ice-free in summer, lap against the northern edge of the Ross Shelf Ice, which has never been anything but shelf ice—almost as firm and permanent as solid ground—since man first came upon it. However, McMurdo's being on a coastal island does not mean that it is on the outskirts of Antarctica. Ross Island is in an indentation in the coastline that cuts five hundred miles into the continent, which puts McMurdo only eight hundred and forty miles from the Pole—nearer to it than two-thirds of the rest of Antarctica. Back of McMurdo, to the north, is Mount Erebus, thirteen thousand feet high and the only active volcano that has been discovered in Antarctica. It is not visible from McMurdo, because some of Ross Island's snowless black foothills are in the way. The best view from McMurdo is to the south, across the runway and a section of the Ross Shelf Ice, to some mountains along the shore of Victoria Land. In the clear morning air, whole ranges that had been hidden by mist the previous day stood revealed—Mount Discovery, a nine-thousand-foot, sun-drenched snowpeak some forty miles from McMurdo, and, at more than twice that distance but as clearly visible as if they were no more than half a day's easy walk away, the higher peaks of the Worcester and Royal Society Ranges.

The McMurdo base consists of forty buildings (some of corrugated metal, some wooden, like the mess hall, and some cloth-covered, like my Jamesway hut) lining two parallel, rutted thoroughfares called Burke Avenue and Forrestal Avenue. At one end of the two avenues stands the base chapel, a trim white structure with a while picket fence in front of it; but for its weirdly plantless environs, it might be part of some old New

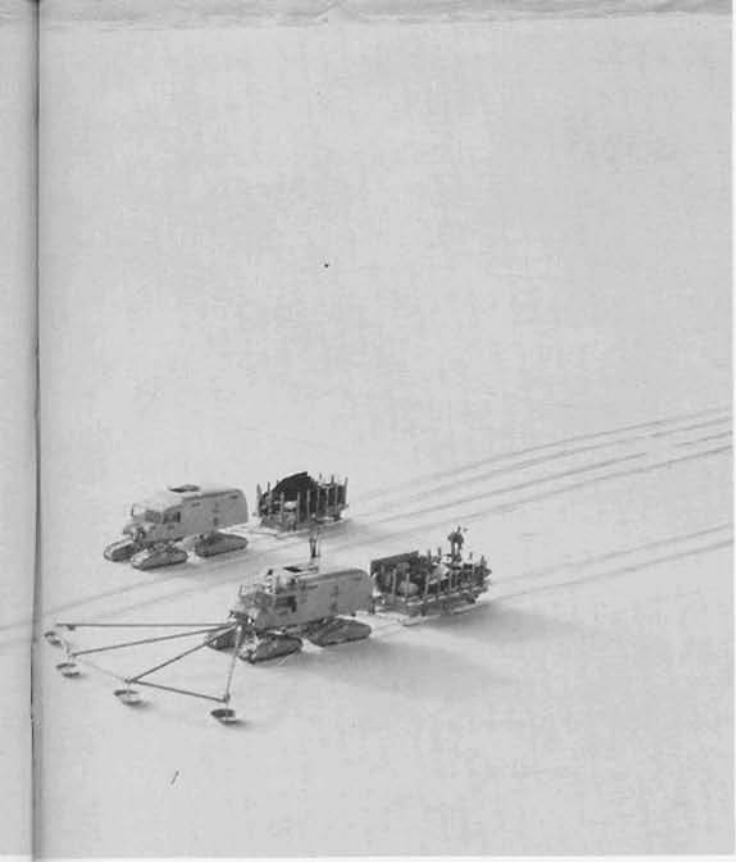
(Continued on page 139)



IGY SNO-CATS MOVE INTO CREVASSE TERRAIN;

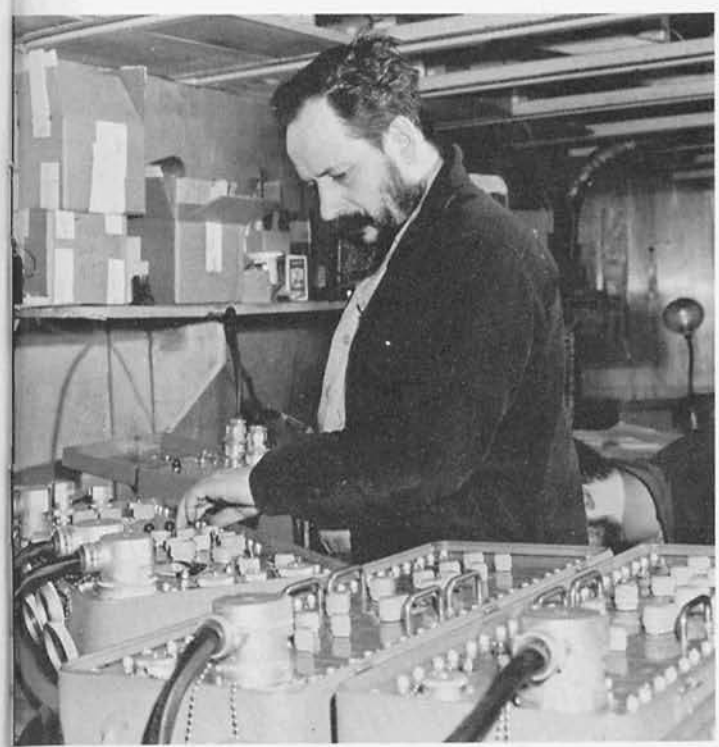
SUMMER TRAVERSES: CRARY

IGY TRAVERSE ROUTE AROUND ROSS ICE-SHELF.



MIDWAY IN FOUR-MONTH ICE-SHELF TRAVERSE.

Shoves Off, LAS



← PREPARATIONS for Ross Ice Shelf traverse were quickly concluded with glaciologist Bill Cromie giving a last twist to a nut on IGY Sno-Cat (far left) and leader Albert Crary giving a last thorough check to seismic equipment before installation into vehicle.

England village. At the other end, the avenues trail off into nothing more than a steep slope leading down to a little inlet of the sound. On the slope is a building known as Dogheim, which houses a team of Huskies kept ready to be sent out with rescue parties. (In line with a tradition set by Scandinavian pioneers in Antarctica, the names of several of the buildings at McMurdo bear the suffix "heim;" thus, there is not only Dogheim but Pressheim, the correspondents' working quarters, and Chowheim, the mess hall.) When the dogs of Dogheim howl, as they often do, they add a lonely obbligato to the wind's wail. On the ice in the inlet lie the shattered pieces of a Globemaster that crashed at McMurdo last year on its return from a supply-dropping mission to the Pole; whether the melancholy fragments have been left there as a reminder of the difficulties of Antarctic flying or simply because it would be too much trouble to cart them away, I never heard. They are not, in any case, the only refuse that is plainly visible around McMurdo; the shore of the sound in the vicinity of the base is littered with wastepaper, empty cans, broken crates, and other trash. The Navy is sometimes accused of being a poor housekeeper at McMurdo because it tends to regard the place as a ship, and simply throws things overboard. The truth is that, far from presenting a ship's easy answer to the disposal problem. Antarctica is a region where it is practically impossible to get rid of anything except by burning it. Nothing can be buried without using dynamite; for most of the year nothing can be thrown in the water, because the water is covered with ice; and nothing can be left to decay, because nothing *will* decay. (Some biscuits left by Scott in a hut near McMurdo on his first Antarctic expedition, in 1902, are still in good condition. I didn't sample them, but some of the Navy men had tried them out and assured me that they tasted fine.) Even without the mess made by McMurdo's settlers, the camp would be a dirty place; unanchored by any vegetation and constantly whipped by wind, the lava ash settles on everything in sight, like New York soot, and even filters into the tightly sealed buildings at a fearful rate.

But this condition is strictly local; one need venture only a short distance away from the base to find the antiseptic spotlessness commonly associated with Antarctica, as I discovered that afternoon, when I made the most daring overland trek of my trip. This was a two-mile walk to Scott Base, a New Zealand station that was then being used as a supply and support center for the trans-Antarctic expedition led by the British pioneer, Dr. Vivian Fuchs. (Dr. Fuchs triumphantly completed *his* overland trek on March 2nd, when he reached Scott Base. That was after I had left Antarctica; while I was there, he was still out on the Ross Shelf Ice, several hundred miles away.) Before setting out from McMurdo for Scott Base, the thing to do is to check with the aerology office to make sure there are no signs of blizzard conditions around; if there are not, you then find one or more experienced Antarctic hands to show you the way. Since it was a pleasant afternoon (though quite cold), and since most of the McMurdo people know and like the New Zealanders at Scott, I had no trouble rounding up two guides. Leaving our camp, we took a road leading east, past an unscenic cache of gasoline tanks, which marked the end of McMurdo and the beginning of Antarctica in its natural state. Beyond this point, the road climbed rather steeply toward a pass between two of the island's hills. Once we entered the pass, we left the black earth and its lava dust behind and were in a world of snow and ice. On a bright day like this, it was an extraordinarily gay world. The rays of the sun, reflected from the frozen crystalline formations on the ground, shone in dazzling prismatic blues, yellows, and reds, shading off into any number of delicate combinations of color. From the summit of the pass, where the road became a mere trail across the snow, we looked down a slope at another section of the sound's shore, which, because it presents a different face to the prevailing winds than McMurdo, is always snow-covered. The ice forma-

(Continued on page 140)

tions on the water there were more spectacular, too. At the point where the firm shore ice encountered the shifting bay ice, great pileups occurred, forming fantastic castles and caves, twenty or thirty feet high. From the pass, the path led down to this shore. The slope was gradual, but the going was so slippery that we constantly had to watch our footing. Well trod, safe, and short though the way was, the walk from McMurdo to Scott gave in miniature some sense of what an Antarctic overland journey must be like. Comfortably warmed by exercise and heavy clothes, I found that the cold and the rather gaudy scene seemed unreal, as if I were half participating in it and half watching it in a travelogue. I tried to imagine what this pleasant little trip would be like in a whiteout; with no visible object on which to fix one's attention, I supposed, the only reality would be the slight tug of gravity exerted by that gentle incline. It was easy to imagine how, in the absence of a horizon or any other point of reference, a man would lose all sense of balance and find himself floundering wildly, until at last he would be unable to stand up at all.

The second mile to Scott Base lay over bay ice, past an expanse of heaped-up castles. On this leg, looking backward, we had a fine view of Mount Erebus; from here its square, granitic head could be clearly seen, topped by a pall of condensed steam that looked like a small, permanent cloud. It was also on this leg that I had my first and only opportunity to get a good look at an example of the Antarctic crevasse. A characteristic Antarctic crevasse is a huge crack in the ice, generally caused by the slow but inexorable movement of a glacier; it may be wide enough to swallow up an entire tractor party without the slightest ceremony, and often it extends all the way down to the bottom of the icepack. What makes crevasses sinister is the fact that they are frequently covered by bridges of snow, blown so smooth as to camouflage them completely. They have done as much as anything to give Antarctica its reputation as a place where man was never intended to be.

The crevasses on the miniature trek from McMurdo to Scott Base are quite appropriately miniature crevasses, only a few inches wide. Technically, they qualify as crevasses, but because they are caused by the action of tides rather than glaciers, old Antarctic hands generally speak of them—not without a certain contempt—as "tide cracks." Crossing one tide crack, I paused to peer down into it. It was about five inches wide, and from inside it came a deep-blue glow, so luminous that it might almost have been an emanation from the subterranean fires that caused the cloud over Mount Erebus. I mentioned this extravagant fancy to my companions, and one of them replied that the glow was caused by diffused light coming through the surrounding ice from the sun and sky. Even so, he said, the crack was, in a way, practically bottomless; it certainly went all the way through ice down to the waters of McMurdo Sound, and in certain places—some of them as near shore as this—McMurdo Sound is so deep that its bottom has never been found.

Scott Base, like McMurdo, has a runway on the ice (for ski planes only), and its buildings are on lava. It differs from McMurdo in many ways, though—principally in size. At Scott, there are only four or five buildings, and when I visited it, there were only twenty men, as compared to some three hundred at McMurdo. It had only three planes—tiny single-engine craft, hardly more substantial than Piper Cubs. A man was standing on the runway watching some playful seals as we approached, and he greeted us warmly. He turned out to be the Scott Base commander—a soft-spoken, clean-shaven squadron leader in the New Zealand Royal Air Force named John Claydon. He invited us up to the base for a cup of tea, and I soon perceived that Scott has one distinct advantage over McMurdo in that its buildings are linked by tunnels; a Scott man might conceivably spend an entire winter there without ever having to brave the Antarctic night. As we drank our tea, Claydon told us that a few weeks earlier he had flown Sir Edmund Hillary out to Depot 700, a

(Continued on page 141)

SUMMER TRAVERSES: CONTINUED

OCTOBER 24, 1957:

SELF-CONTAINED living in three Sno-Cats and three → sleds was augmented by VX-6 supply missions that landed about every 10 days with fuel, food (right).

SEISMIC and glaciological studies, magnetic observa- → tions, weather and wild life studies were made on traverse at regular intervals. Above, John Renback, Navy mechanic, assists seismologist Hugh Bennett.

OCTOBER 31:

BEEBE

← IGY scientists Walter Boyd and Peter Shoeck test the density of snow with ramsonde equipment (left) as Al Crary drills for core samples of the vast ice shelf. Crevassed areas were source of data on stratigraphy.

MAN-EATING TRAIL CREVASSE (SEE PAGE 142)!

supply point that many miles from Scott Base, to join the Fuchs party and help guide it in; more recently, he and his fellow-pilots had been flying reconnaissance and support missions to Hillary and Fuchs. I asked whether he found planes as small and apparently as fragile as his rather trying to fly, and he nodded slightly. "There are violent drafts over Mount Discovery, both up and down," he said, in a soft voice. "Not to scare one, of course, but there are times when there is danger of your aircraft falling apart."

When we had finished our tea, we thanked Claydon and started back to McMurdo. By the time we reached the top of the pass, we were overheated, so we lay down in the snow for a few minutes to cool off. The sensation was perfectly delightful.

As my companions and I drew near McMurdo, we saw a group of perhaps a dozen men standing on the brow of a hill overlooking the runway. During our absence, the Globemaster that had brought me down to McMurdo had left for Christchurch, but there was an air of tension about these men that made it clear that this was not just the tail end of a bon-voyage gathering. My friend Big Eye was in their midst, and I asked him what was up. "Look there," he said, and gestured toward a patch of water that now lay between the shore and the runway. It wasn't really a big patch, but it had ominous implications, for it was roughly in the shape of a clenched hand with a forefinger pointing at the road that led over the ice between the runway and the base.

"What's it mean?" I asked.

"Only that we may lose the runway," he said. "That's all. It could happen. The ice in McMurdo Sound went out completely in 1902, and again in 1914. And there are lots of other years when it may have gone out, too, but you can't tell, because nobody was here. Anyhow, there are two things that could happen. The inshore ice may break up, cutting us off from the runway except by helicopter, and that would be fairly bad, or the runway itself may break up and float away, and that would be really bad."

"But it's autumn—it's getting colder," I said. "Why should the ice break up now?"

"That's the funny thing," my friend said. "In the middle of summer, you can't use the runway, because melting causes surface potholes. Then, at the end of summer—now, in other words—maybe you can't use it because of a different trouble, and a much worse one. What happens is that the summer temperatures soften up the ice all over, and then the tides start nibbling away at it from underneath. That ice out there is soft now. Sure, the weather's getting cold, but it won't be cold enough for some weeks yet to do much good." He gave me a rather distraught look. "Anybody who wants to get out of here before winter closes in had better start praying for that ice to hold," he said.

The threat to the runway brought an immediate change in the tempo of life at McMurdo; a mood of urgency and anxiety settled over the little community. Each of the next few days was colder than the previous one, and in spite of Big Eye's sensible explanation, I couldn't help wondering at the paradox of everyone's worrying about the melting of the runway at a time when the onrush of winter was becoming more insistent every hour. The wind was rising, too; it fluttered the cloth covering of my Jamesway hut and tugged relentlessly at the door. I began to appreciate both the bright and the dark sides of day-to-day life at McMurdo—the exhilaration induced by the crisp, generally dry air, and the vague feeling of unease, deriving from many things, no doubt, but mostly, I suspected, from the total absence of vegetation.

Feeling that I didn't fully understand the implications of the runway affair—or perhaps that I understood them all too fully—I sought out Dr. Ackroyd in the dispensary one morning and bearded him, figuratively speaking, in his capacity as public-information officer. He leaned back in his chair and

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raised a calming hand. "Let's get one thing straight," he said. "Even if the whole runway should break up, no one who isn't scheduled to spend the winter here is going to have to. A Navy icebreaker—the Glacier—ought to be able to make the run between McMurdo and Christchurch until sometime around the end of March. After that, there's no denying that the icepack would be too thick. But it takes the Glacier only six days to get from Christchurch to here, so it would have plenty of time to make two round trips, if necessary."

"And after that?" I asked.

"After that, the wintering-over party at McMurdo, like all the other wintering-over parties in Antarctica, will be isolated until mid-October," he said. "But everybody's known that all along."

"Any chance of a plane getting in—or out—after the lock-up?" I asked. "I don't mean a Globemaster—a ski plane."

"Well, theoretically, a ski plane might be able to fly from Christchurch to McMurdo during the Antarctic night, but the storms, cold, and darkness would make it suicidal," he said. "Anyway, no such flight has ever been attempted. Altogether, you can take it as fact that there's no way a man can get out of Antarctica during the six winter months."

After pausing to take a puff on his cigar and let that sink in, Dr. Ackroyd explained the wintering-over system. Everyone who winters over, whether a civilian or a service man, does so voluntarily, and, with very few exceptions, no one is allowed to winter over for two successive years. (The military members of the summer support party, who had arrived last October and November and were now about to leave, were not necessarily volunteers.) The hundred and twenty-one men who were to winter over at McMurdo this year—among them the Doctor himself—had all been there since early in the summer season. All the members of the previous winter party had left last October and November; they had stayed on just long enough to impress upon their replacements some of the hard facts about wintering over. I asked Dr. Ackroyd whether a man who had impulsively volunteered to winter over many months ago and had since changed his mind would have to go through with it. Only if there were no volunteer replacements to be found among the men in the summer support party, he replied, but at the moment there were a couple of volunteers standing by, ready to step into just such a breach. His own guess was that they wouldn't be needed.

The Doctor's words served as a reminder that for those of us who did not care to winter over, it would soon be time to get going, and they impelled me to mention the fact that, as a mere tourist, I was particularly anxious to fly over the South Pole; how did the chances look? "Not too bad," he said. "There's a Globemaster supply-and-equipment drop at the Pole scheduled, and as far as we know, it will go off. As a matter of fact, on account of the runway trouble they've decided to make it sooner than expected. The latest dope is that a Globemaster will arrive here from Christchurch tomorrow and go on down to the Pole as soon as it can get loaded up. They'll probably be willing to take you along for the ride. But I'd better explain that the drop is optional. That is, the Pole Station already has its minimum supply requirements for the winter. They can get through all right down there even if this drop isn't made, so it doesn't *have* to be made, and if our runway goes on deteriorating, it won't be." He gazed intently at me, and continued, "Let me tell you something about the Antarctic. You don't count on things. You plan, yes. In the rest of the world, things work out so that routine plans usually materialize more or less on schedule. Not here. You learn to live with the fact that you're a long way from being master of your environment. In Antarctica, plans are always tentative."

I settled down to wait for the Pole flight. McMurdo was full of scientists and engineers who had converged on the base by ski plane from stations all over the continent and were now

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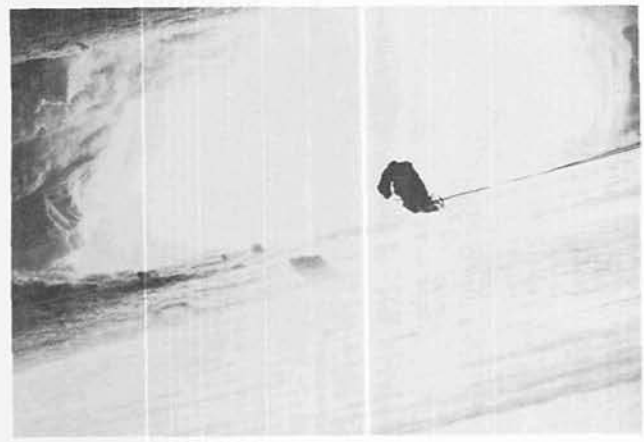
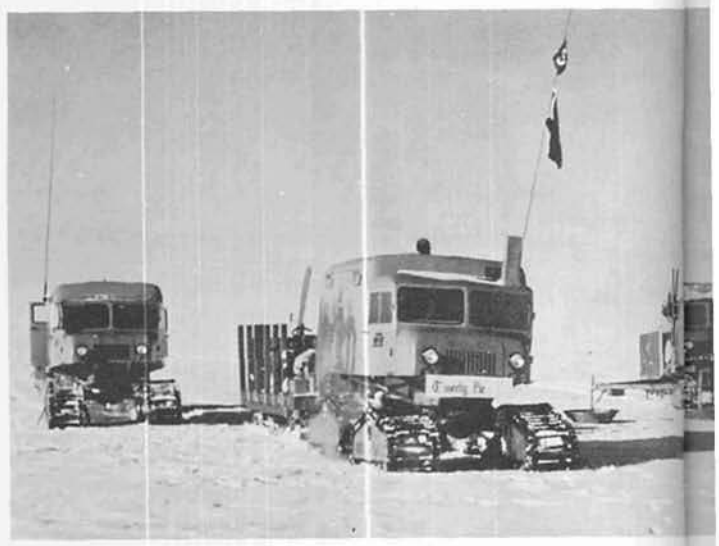
SUMMER TRAVERSES: CONTINUED

IGY Glaciologist



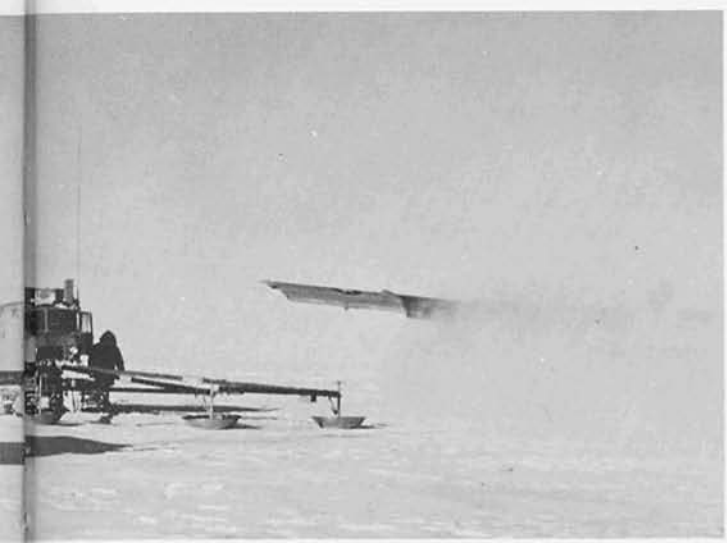
PLUNGING 60 feet into crevasse of unknown depth, Peter Shoeck was seriously injured. Hugh Bennett, roped securely, went down into the weird emptiness.



OTTER, immediately dispatched from LAS, makes daring landing alongside traverse party at site of accident. →

Hurt in Crevasse

← On the surface rescue party anchors lifelines, prepares to bring both men safely to mouth of gaping hole. Meanwhile SOS was radioed back to LAS, 70 miles away.



← Taking off with Shoeck, little bushhopper flew him back to Kainan Bay for emergency medical treatment.

← INJURED scientist is rushed to sick bay (left) and five days later is evacuated to McMurdo via R4D for transfer home via New Zealand. Filthy weather and communications blackout postponed takeoff of mercy mission (above) but Shoeck was already improving.

on their way home. At lunch one day, I had shared a table with seven of the transients—five service men and two civilians—who had spent the past few months at Byrd Station, core-drilling a thousand feet down through the ice. They were taking home short sections of the core, each sample packed in a refrigerated container marked with the depth at which it had been found, and these were to be analyzed for age by a laboratory in Illinois. The members of the party told me that they had also done extensive core-drilling in Arctic ice—in Greenland and northern Canada—and, in fact, most of them had been shuttling between the two polar areas since 1954. "After a while, it grows on you," one of them remarked.

But it was not the homebound scientists who were getting the most attention at McMurdo just then; it was the members of the prospective wintering-over party. One afternoon, I ran across Lieutenant Harold V. Heaney, the base chaplain—a rugged, two-fisted explorer padre—and he plunged right into the subject, which was plainly uppermost in his mind. "For the winter party, the moment of truth is approaching," he said. "You can guess what I mean by that—the moment when the last plane and the last ship have gone and the remaining men are locked in for the winter. That runway situation—it serves to dramatize the fact that the moment of truth *is* approaching. Some of the men are a bit nervous. The last Globemaster brought a big load of mail, and several of them got letters that made them very unhappy. They're at the stage now where they read things into casual phrases in their letters from home, and that isn't good. I have a feeling that things will improve after we're locked in. No more letters, and no possibility of backing out."

By now, I knew who a good many of the members of the prospective wintering-over party were, and as I walked around the base, I searched their faces. Perhaps it was the concealment of their beards, but I could detect no signs of nervousness or anxiety. By now, too, I knew that at McMurdo there is a mystique associated with wintering over. In the camp's social system, caste lines are drawn less on the basis of officers vs. enlisted man than on the basis of wintering-over volunteer vs. summer-support-party recruit. The current aristocrats were the prospective winterers-over. It was apparent that the new crop of volunteers had asked enough questions of the departing winter crowd to get a pretty good idea of what they were in for. In some ways, one of them told me casually, he thought the winter was going to be a lot pleasanter than the summer had been. The base population would be greatly reduced, and that would mean more living and recreation space. And there would be no idle hands; the whole bunch of them would have to pitch in and help keep the base's mechanical equipment running during the bitter weather. Moreover, the food would be better, because the McMurdo cooks had a way of dishing out canned goods during the summer months and saving the fresh-frozen delicacies for winter. At lunch one day, I asked another member of the winter party whether he thought he'd be homesick. "They tell me that's not much of a problem," he replied. "After a couple of months of winter, they say, you push the rest of the world out of your mind—family, love, sex, everything. McMurdo—or Byrd Station, or Little America, or wherever you happen to be—becomes your world for the winter." Then a chink appeared in his armor as he added, "And if you do want to talk to people at home, you can do it by ham radio."

Back in New York, of course, I'd read about this informal means of chatting with Antarcticans, but I hadn't thought to ask about it at McMurdo. "How does it work?" I asked.

"The place to see it is down at the ham shack," he said. "They've got a special radio setup there—separate from the official Navy one—that's used for nothing but personal calls. They operate it whenever communications men can be spared from other duties. I think it's working now." I followed him from Chowheim to a small Jamesway hut not far from the camp

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chapel. Inside, two Navy men were presiding over a complicated array of radio equipment while half a dozen others stood around—waiting, it turned out, for their turn to talk to people in the States. My guide approached a man whose face sported an almost startling decoration—a neat, dapper mustache—and introduced him to me as Lieutenant Commander Theodore M. Slabey, the base communications officer, explaining that I was curious to see the ham rig in operation. Slabey prefaced his demonstration by telling me a little about how it all works. To put a call through, he said, an operator at McMurdo gets in touch with a ham operator somewhere in the States; the ham, after taking down the name and telephone number of the person being called, rings up the number and then—using a device known as a patch—plugs the telephone line into his radio connection with McMurdo. The ham monitors the conversation, and when it is over, he disconnects his patch and is ready to put through another call from McMurdo. The person receiving the call pays only the cost of a regular telephone call from the ham's house to his—or, more likely, hers. The ham's services as a go-between are purely voluntary. Consequently, if the McMurdo radioman succeeds in making contact with a ham who lives only a few miles from the person being called, the charge for a call from Antarctica to, say, Bangor, Maine, may be no more than ten cents. Slabey said that amateurs in almost every state of the Union have coöperated in making "ham patches" for McMurdo men, but that the most reliable one—and the one they work through most frequently—is a teen-ager named Jules Madey, who operates amateur station K2KGJ, in Clark, New Jersey. "Jules is on just about every night, and he spends most of his time making patches for us," Slabey told me. "In fact, I think Jules is making a patch for us right now."

We walked over to one of the operators and found that he was indeed exchanging a few pleasantries with Jules. When they had finished passing the time of day, he gave Jules a name and telephone number in Connecticut. There was a pause of a minute or so, and then Jules came back on. "You're through to her, McMurdo," I heard him say, and one of the men in the hut eagerly stepped forward to a transmitter. At the Connecticut end was a girl who—as everyone soon knew—was the caller's wife. The conversation was painfully public; in addition to Jules, in Clark, New Jersey, not only the McMurdo radio operator but everybody else in the hut couldn't help hearing it all. Furthermore, the setup worked on the one-way-at-a-time principle, and this intensified the stilted quality of the tête-à-tête. The McMurdo man started out by making a long and rather formal speech, detailing recent developments at the base, his financial status, and his intention of being home by next Christmas. Finally, he touched very lightly on his feelings toward his wife. Then he said "Over," and she came on. Her voice was so clear as to be shocking; it did not sound like a telephone voice but like that of a person speaking over an intercom from the next room. She described a few banal happenings at home and assured him, as warmly as possible under the circumstances, that she loved him. Then she said "Over and out," like an expert, ending the call. I felt somewhat guilty at having eavesdropped, and said so to Slabey. He nodded, and told me that he and his men were planning to build a booth in a corner of the hut that would give the caller at least the illusion of privacy, even though both the McMurdo radio operator and the Stateside ham would still have to listen in.

My experience in the radio hut haunted me the rest of the afternoon. The voice of the girl in Connecticut rang in my ears until it began to seem spooky. It occurred to me that in winter, when Antarctica is isolated to the extent of being detached from the rest of the planet, such a cozy conversation with a loved one might have distinctly unpleasant overtones. That reminded me that I wanted to have a talk with Dr. Ackroyd about what it is that impels men to volunteer for an Antarctic winter. After dinner, I went around to the dispensary and was fortunate

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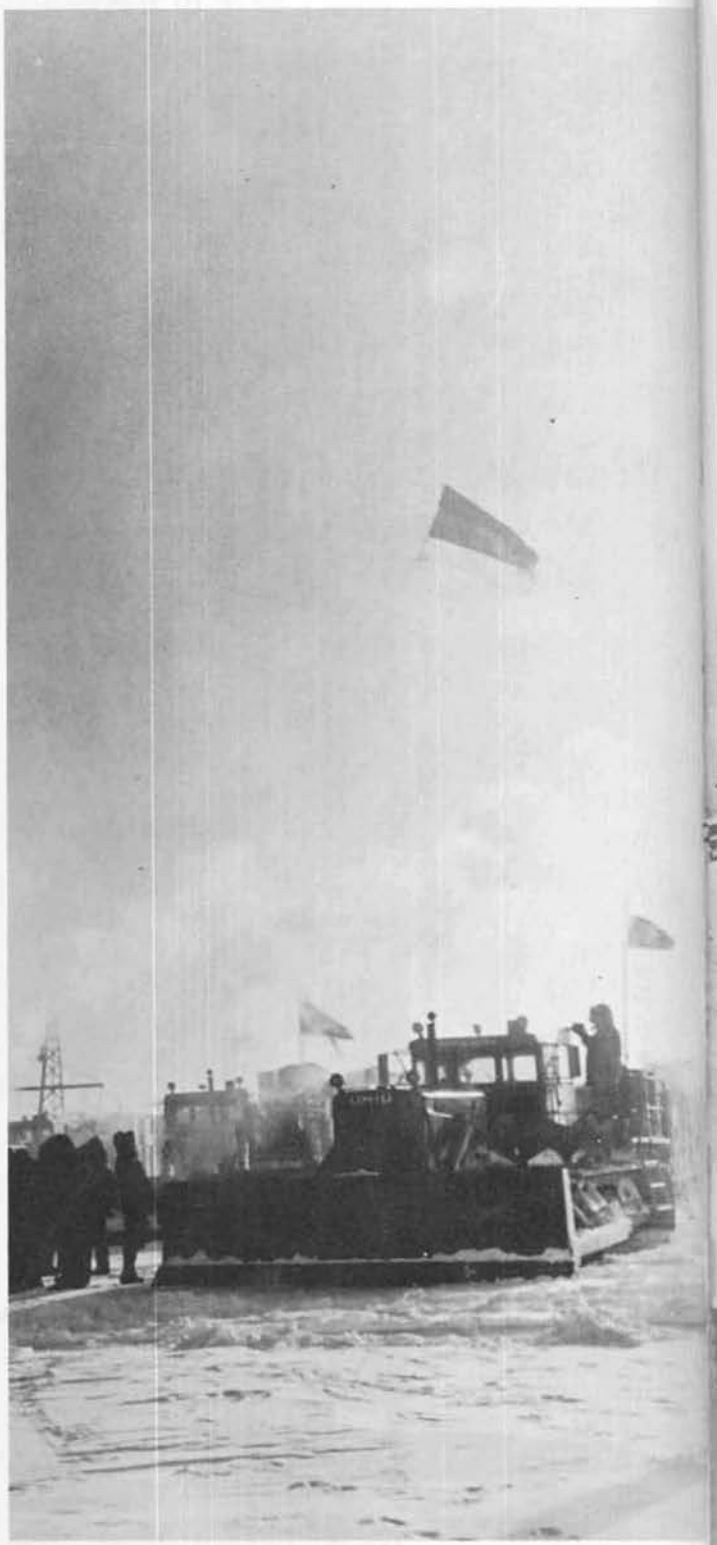
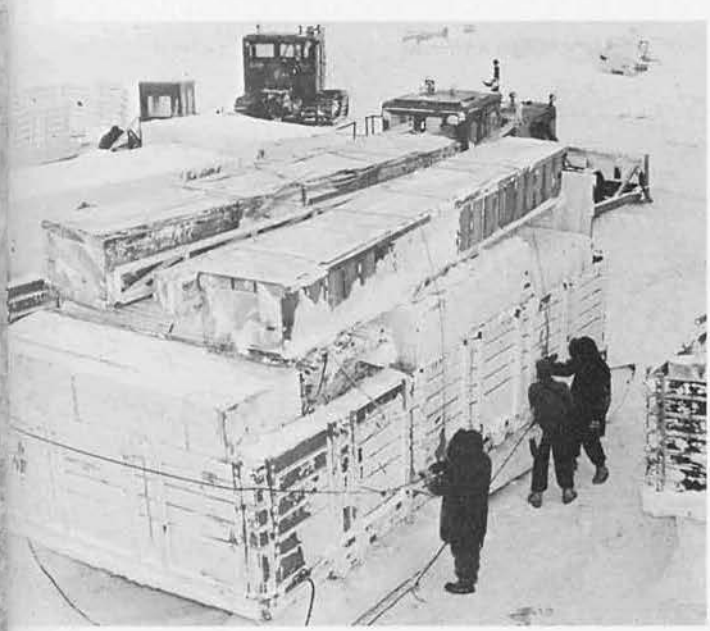
History-making



TWO BIG tractor trains ground out the nearly 1,300 miles (round trip) between LAS and Byrd during *Deep Freeze III*. The first, loaded with 160 tons of cargo, spread from October 1 to November 7, 1957. The second train departed January 20, 1958 with 196 tons of payload which had been brought in by the ships; this train – seven D-8s, 12 20-ton sleds, three wanigans, one Sno-Cat and sled, one Weasel crevasse detector – reached Byrd February 1 in a record run.

Tractor Train

COMMANDERS of Byrd tractor trains: Lt Thomas K. Jones (left) in charge of major part of trail operations; Chief Bernard F. Verboncoeur, train commander on first return trip of season, holds Antarctic petrel captured 100 miles inland on ice shelf on return to LAS.



SECURING CARGO FOR FIRST SEASONAL TRIP.

UP ARMY-NAVY DRIVE HEADED FOR BYRDLAND.

enough to find the Doctor alone at his desk. I put my question to him, and he leaned back and offered me a cigar, which I accepted. "So you like cigars," he said. "Why don't you winter-over with us? Of cigars we have plenty—and good ones, too," When I didn't leap at the idea, he grinned. "You want to know why we do it," he said. "Well, everybody has his own guess about that. I'll give you mine. We do it for a number of reasons—some good, some bad. I'm just talking about military men now, mind you. The scientists have their own reasons, and I'd say that plain scientific curiosity is the main one. All right, good reasons first. You have Navy men who are out to distinguish themselves in the hope of being promoted. That's true of some enlisted men, but it applies chiefly to middle-grade officers—career men of around thirty, who've come to a time in their lives when they know they'd better do something special right away if they're ever going to get to the top. Whatever volunteering for Antarctic duty may not do, it *does* get you noticed by higher authority. I imagine that's one reason nobody has any trouble understanding. Then there's a more complicated one, but equally valid—the old explorer instinct. Now I'm talking about enlisted men of the upper grades, mostly, who have no particular ambition to become officers—chief petty officers, happily married, over thirty-five, don't drink excessively. They just have the itch to do something out of the ordinary. It's the speculator in them. If there weren't Antarctica to go to, it might be—what? I don't know. Anyhow, men like that are the backbone of this base, and of the other Antarctic bases, too, I suppose. Now for some bad reasons. Throughout the Navy, Antarctica in general, and McMurdo in particular, have the reputation of being easy duty, especially if you can't stand authority. Men of the lazy or rebellious type hear that the bars are down here—or, rather, that they've never been raised. Officers and enlisted men eat together, everyone carries his own duffel, and so on. Well, that attracts them. Those men become problems, especially when it comes to getting work done. But there's a still worse motive, and a more complex one. A man who constitutionally can't adjust to life at home comes down here thinking he will find a form of society that will be more sympathetic to him. And what happens? As soon as he gets here, he sets about doing everything he can to rebuild the image of the society he left at home—and before long, naturally, he finds this one unsympathetic, too."

The Doctor walked over to a thermos jug on a side table and poured us each a paper cup of coffee. Then, back in his chair, he relit his cigar, and continued, "That's the sort of man who turns out to be sub-par in both personality and work. A 'loser,' he's called in Navy slang. We've had remarkably few of them here this summer, and, from what I've been told, there were even fewer during the past two winters. Of course, all volunteers for winter duty in Antarctica are carefully screened by psychiatrists. That's how the really bad types have been kept out—the ones who might be impelled to volunteer by a real urge to flee reality. Considering the conditions here in winter after the base is cut off from the rest of the world, the record is extraordinary. At the end of last winter, for example, eight men were sent out of McMurdo on high medical priority—and the majority of them were just routine medical cases of injury or illness. In the two winters of Deep Freeze, out of a total of almost five hundred Americans wintering over, only one became such a bad psychiatric problem that he had to be confined. Pretty good, I'd say."

That night I had an attack of the big eye. I lay awake for what seemed like hours, thinking about what winter at McMurdo, or anywhere else in Antarctica, must be like; four months of seeing no sunlight, no plant, no woman, no child, no mail from home; of constantly hearing the howl of the wind, punctuated now and again by the howls from Dogheim; and of knowing that the nearest civilized community is across two thousand miles of ice-clogged sea, and that, as far as the chance

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of reaching it before spring goes, it might as well be two million miles of space. The sound of the woman's voice from Connecticut—so real, yet so unreal—kept coming back to me. Finally, at around midnight, I followed the example of the wild prophet and sought surcease from the big eye by going out and looking at the sound.

The runway situation, I could see, was getting worse, although it did not seem to be desperate yet. The open-water area near the shore had broadened and lengthened, and the pointing finger now extended almost to the road over the ice, but the runway itself appeared to be holding firm. It was a gusty night, with a partly cloudy sky. The sun was noticeably lower than it had been at midnight six days earlier, on my first night at McMurdo, but it was still clearing the top of Mount Discovery by a comfortable margin. On the opposite side of the heavens, above the Ross Island foothills, a pale half moon hung, and I found it a reassuring sight. For a moment, I could not figure out why, and then I realized that it was because seeing the moon way up there at least proved that I was not on it; nothing else about the abstract landscape of McMurdo could quite offer logical proof of that. Whether it was the comforting sight of the moon or my walk in the open air, I soon got sleepy, and headed back to my hut, cured of the big eye for the night.

In the morning, the wind was blowing viciously, and the temperature was down near zero—the coldest weather I had encountered in Antarctica. After breakfast, I went out for another look at the runway. I could hardly have anticipated what I saw. The expected Globemaster had arrived from Christchurch; it stood ponderously on the ice, with a little cluster of men and bundles beside it. But the startling thing was that the patch of open water near the shore had more than doubled in size since midnight, bisecting the road between the runway and the base with a blue canal some fifty feet wide, and cutting the runway off entirely from the land. I wondered how the men from the plane were going to get ashore, until I saw that two helicopters were plying back and forth between the runway and a small area of hard, level ground behind the McMurdo chapel, bringing up the men and supplies disgorged by the plane. I beat my way against the wind over to the helicopter landing area and there was delighted to find Captain Wrinkle. "Got to hurry up and get some sleep," he said, in apology for not stopping to chat with me. "We've been flying eleven hours, and tonight we've got to fly eight more. To the Pole and back. Want to get that supply drop squeezed in before the runway goes out completely. See you later."

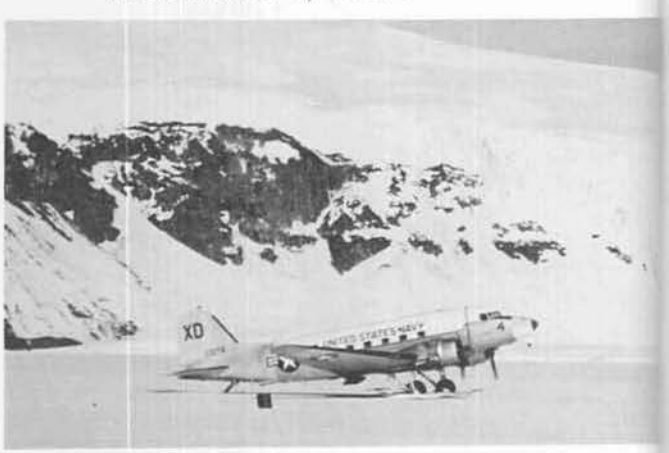
On my way down Forrestal Avenue shortly afterward, I ran into Dr. Ackroyd. "You're in," he told me. "I talked to Air Operations, and they said there would be room for you on the Pole drop tonight. The plane will be loaded by helicopter, of course. Be ready at midnight—out behind the chapel, where the helicopters land. I advise you to dress warmly, even though you won't be leaving the plane. It gets cold in that cabin when they open the doors for the drop."

All day long, the helicopters shuttled between the runway and the base, bringing ashore the Globemaster's cargo from Christchurch and carrying out to the runway the food, scientific equipment, and other supplies that were to be dropped at the Pole. Since I knew that, at best, I would get only a fleeting glimpse of the Pole Station as we passed over it, I spent the rest of the day asking questions about what it was like, so that my glimpse would at least be an informed one. McMurdo, it developed, was full of people who had visited the Pole Station back in November and December, when ski planes had been landing there quite frequently. I even turned up a couple of Antarctic archivists who could tell me something of the Pole Station's history. It was established during November and December of 1956, not long after Admiral Dufek's exploratory landing, which so nearly became a permanent one. In the absence of overland transport between McMurdo and the Pole,

(Continued on page 147)

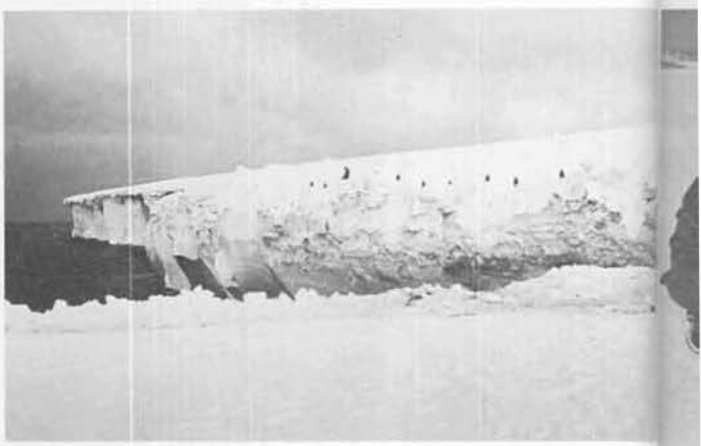
ANTARCTIC

NOVEMBER 5, 1957:



FIRST landing in history on new emergency ice runway at Cape Hallett is accomplished by Navy R4D-8 November 5. Takeoff was from NAF McMurdo Sound.

NOVEMBER 12:



BLASTING of Kainan barrier for alternate offloading dock is begun as ships near continent. Stevens shaped charges are placed at edge of barrier (above) and wired for firing (right) by team of demolition experts.

NOVEMBER 19:

BYRDLAND IGY TRAVERSE GETS UNDER WAY.

DAYBOOK

NOVEMBER 10:

AERIAL reconn mission for IGY Byrd traverse party took MAJ Merle (Skip) Dawson, USA over route to be followed on 1,200-mile traverse of Marie Byrd Land.

NOVEMBER 24:

FIRST EVACUATION OF LAS WINTER GROUP.

the entire station—prefabricated buildings, tractors and their fuel, scientific instruments, and food—was dropped from Globemasters. The first residents arrived by ski plane, and on the day they got there, a collapsed Jamesway hut, complete with oil-stove, was parachuted down to them, assuring them a heated building to sleep in until they could set up the rest of the toy village. Eighteen scientists and military men wintered over at the Pole Station in 1957. The scientists busily studied the aurora, geomagnetics, seismology, meteorology, and so on, while the military men kept the base running; both groups shared the task of cutting blocks of snow to be melted for water, and all hands—after surviving an initial period of sickness caused by a shortage of oxygen, the station being ninety-two hundred feet above sea level—had a grand time. For the winter now beginning, the station's complement is again eighteen. None of them are repeaters from 1957.

The scenery at the Pole is less than inspiring—just level snow and ice as far as the eye can see in all directions. Soundings taken last December, by setting off charges of dynamite and measuring the elapsed time before the shock waves reached rock, established that at ground level the Pole is only nine hundred and three feet above sea level, leaving a bit more than eight thousand feet of icepack. At present, the base consists of two dormitories, a mess hall, a garage for tractors, a combined photographic laboratory and laundry, two reasearch buildings, and a recreation center; five of the structures are of wood and the others are Jamesway huts. All eight buildings, like those at Scott Base, are close together and connected by tunnels. Inevitably, a pole, striped like a barbershop's, was put up early in the game; rising from the roof of the garage, it marked what was at first thought to be the exact location of the Pole. Later, there was some difference of opinion about the matter—not surprisingly, since the tolerances of celestial-navigation equipment and the fact that the earth wobbles slightly on its axis make it almost impossible to pinpoint either of the geographical poles within a few hundred yards. The dissenters contended that the real South Pole was some eight hundred yards from the barbershop pole, and in deference to them an American flag was planted on the spot of their choice and surrounded with a ring of oil drums for better visibility. I would have no trouble seeing the flag from the Globemaster, I was told, although I might not be able to see the barber pole, which is retained out of respect for what is now minority opinion.

Wintering over at the Pole is an even more drawn-out affair than it is at McMurdo, because the period of total darkness is six full months, rather than McMurdo's four. Even so, the Pole Station was described to me as a busy and happy one. Morale among the residents is sustained not only by the drama of being where they are and by what is said to be the best food in the Antarctic but also by a billiard table and excellent libraries of both books and phonograph records. Like McMurdo, the station is equipped for making unofficial radio contacts with the United States. Individual hobby-riding flourishes, too. The lieutenant in charge of the present military contingent, for example, was a California farmer before he joined the Navy, and he went to the Pole determined to start an indoor garden there. He took along a supply of New Zealand earthworms, some Californian cotton seed, and a ton of garden soil, and announced his intention of setting up a four-by-eight-foot plot, to be called El Rancho Algodón de las Nieves—the Cotton Ranch of the Snows. What reports I could garner at McMurdo about the success of El Rancho were fragmentary and conflicting. Some men said that the cotton had sprouted, all right, but backwards—roots up and leaves down; others said that nothing of the sort had happened. There did seem to be general agreement, though, that *something* had sprouted.

The Pole, I gathered, had had a busy summer, what with the much publicized meeting of Hillary and Fuchs and visits from a dozen or more correspondents, who landed by ski plane.

(Continued on page 148)

For a while, one of the principal diversions of the men stationed there was acting as tourist guides. Another of their diversions, which must have worn thin after a while, was figuring out the correct time. Officially, the station is on New Zealand time, because that is the time used by the supply base at McMurdo, but actually all time zones converge at the Pole, and the International Date Line ends there, so you can quite properly take your choice of either of two dates, and of absolutely any time of day or night that you like.

All at once, in midevening, I became aware that something had happened at McMurdo. Men were moving around at a pace just under a dogtrot and communicating at a pitch just under a shout. The mood of urgency and anxiety had changed to one of crisis. The two helicopters had ceased their loading operations. Catching up with a couple of men who were staggering down Burke Avenue with duffelbags on their shoulders, I asked what was up. "Better get it direct from Air Operations," one of them said. "Things are happening so fast that the word may have changed since we got it."

I hurried over to the Air Operations office and found it humming. A couple of dozen men were huddled around a tall, gray-haired officer, who was talking earnestly. Somebody on the edge of the throng said that the officer was Commander Charles D. Robinson, and that it was his responsibility to decide where the Globemaster would go, and when, and whom it would carry. After waiting my turn for a quarter of an hour or so, I got to the Commander and asked him what the excitement was all about. "The runway's breaking up," he said. "Cracks in it. It's still safe at the moment, but it might not be eight hours from now, and that's how long it takes to get to the Pole and back. So the Globemaster's heading straight for Christchurch, leaving just as soon as we can get the Pole supplies off her and the homebound people on her. No Pole flight tonight—and no more Pole flights until October, at least. Too bad you couldn't get down to have a look at the station, but don't grieve for the men there. They have ample supplies. And there obviously won't be any more Globemasters coming in here this season, so unless you want to go out by icebreaker two or three weeks from now, this is the flight to take. We've got a mob going, but we can carry one more. Want to go?" I said I guessed I did.

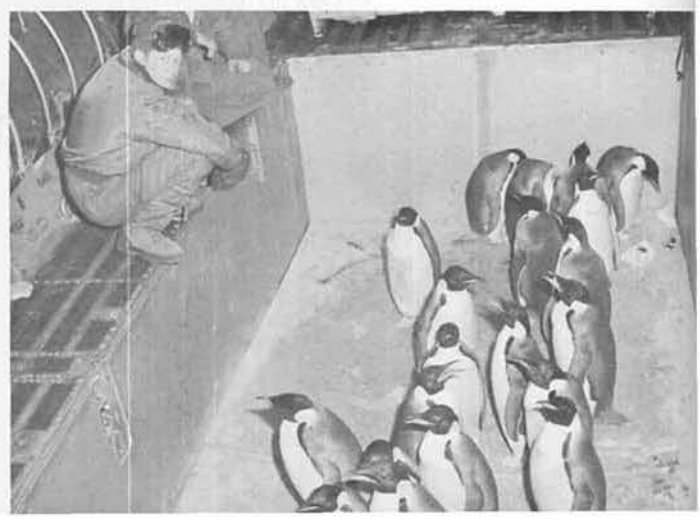
So I never got to the South Pole; at the very hour I had expected to be on my way there, I was packing up for the return to Christchurch. My disappointment at not achieving the obvious goal of Antarctic tourists—the equivalent of seeing Buckingham Palace in London, I suppose, or the view from the top of the Empire State Building—was lessened by the realization that my very frustration was a characteristic Antarctic experience. After all, as Dr. Ackroyd had said, in Antarctica plans are always tentative. I could hardly have asked for a more convincing confirmation of that statement. Nor, for that matter, could the Navy and the whole of Operation Deep Freeze, because the deterioration of the ice eventually reached the state of utter dissolution. Two days after my departure, the cracks in the McMurdo runway got so bad that it was declared unusable for the rest of the season. Ten days later, the whole thing broke up and drifted out to sea. While there were still patches of firm ice near McMurdo where ski planes could land, nothing remotely resembling a runway fit for Globemasters was left anywhere in the vicinity. Three possibilities now remain. Over the winter, McMurdo Sound may freeze to a depth of more than five feet—the minimum required for Globemaster operations—in which case a new runway can be built from scratch next spring. Failing such coöperation from nature, a heavy-duty runway can perhaps be built on the Ross Shelf Ice, some miles south of McMurdo. If this should prove to be impracticable or too dangerous, the only course left—since McMurdo could no longer be used as a supply base—would be to evacuate the Pole and Byrd Stations by ski plane and abandon them, thereby putting a serious crimp in American Antarctic operations for a long time to come.

(Continued on page 149)

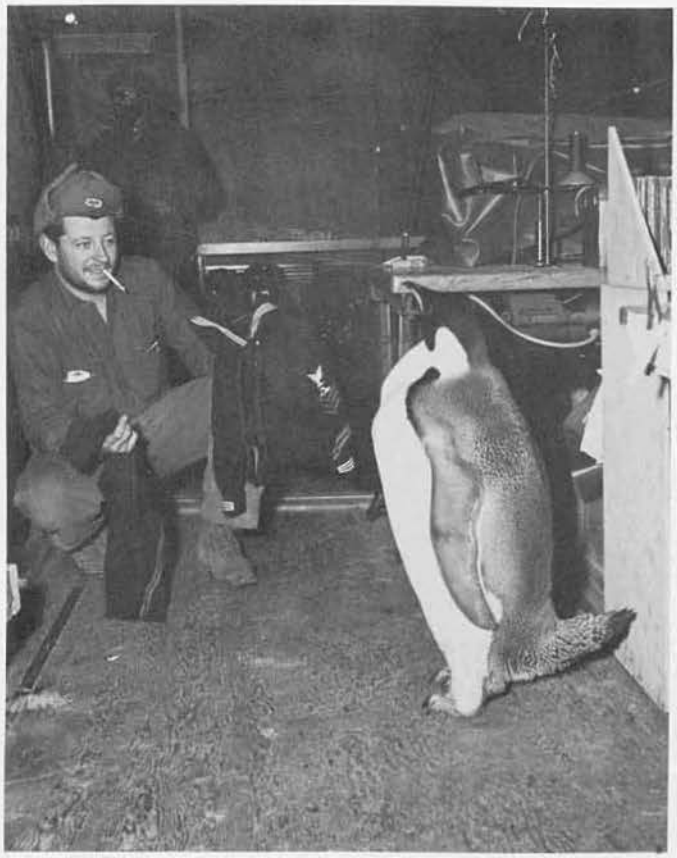
"Operation

PENGUIN colony transported by Globemaster to CONUS was rounded up in colorful style by Jack Marks, superintendent of Portland, Oregon Zoo with the aid of Navy flight crew. Otter-borne group landed on sea ice; flightless birds were quickly and painlessly netted with "penguin persuaders" (canvas straitjackets) and loaded into plane. "Flipper," handsome emperor, gives CAPT Headblom a piece of his mind before joining his confreres in northbound Globemaster corral.

BEEBE



Hitchhiker"



FLIPPER Penguin gets fitted with his set of dress blues tailored for him by George R. Gowen (above). A real ham, he took the spotlight wherever he went, even stealing the show from welcoming committees. At Harewood Airport stopover in Christchurch, Flipper is aired by keeper K. C. Meyer whose entire attention is riveted on his fishy charge.

BROOKS CONTINUED

JOHN BROOKS, a native New Yorker, turned the inquiring eye and ear of a seasoned journalist/novelist toward Antarctica and set down the things he knew would interest fellow cosmopolites. Formerly a contributing editor of *Time*, he is now on the editorial staff of *The New Yorker*. Four volumes have come from his pen.

After I had shouldered my bag and was on the way to the helicopter terminal, I realized that my breath was freezing in my nostrils, and, just for the record, I stopped in at the aerology office to find out what the temperature was. It was six degrees above zero, which, according to Commander Mirabito's rule of thumb, meant four below out on the runway—a heat wave for the Pole Station but cold enough for a tourist. By fives and sixes, the prospective passengers converging at the terminal point were flown out to the now ominously cracked runway. Once there, under the direction of Captain Wrinkle we pitched into the task of unloading the last of the boxes that had been destined for the Pole Station and pushing them out of the way of our takeoff. On entering the Globemaster's cabin, I saw that this was to be almost exclusively a passenger flight; there were some seventy of us. "Big load, but she'll fly," Wrinkle remarked reassuringly as he climbed up into the crew compartment. It was two o'clock in the morning.

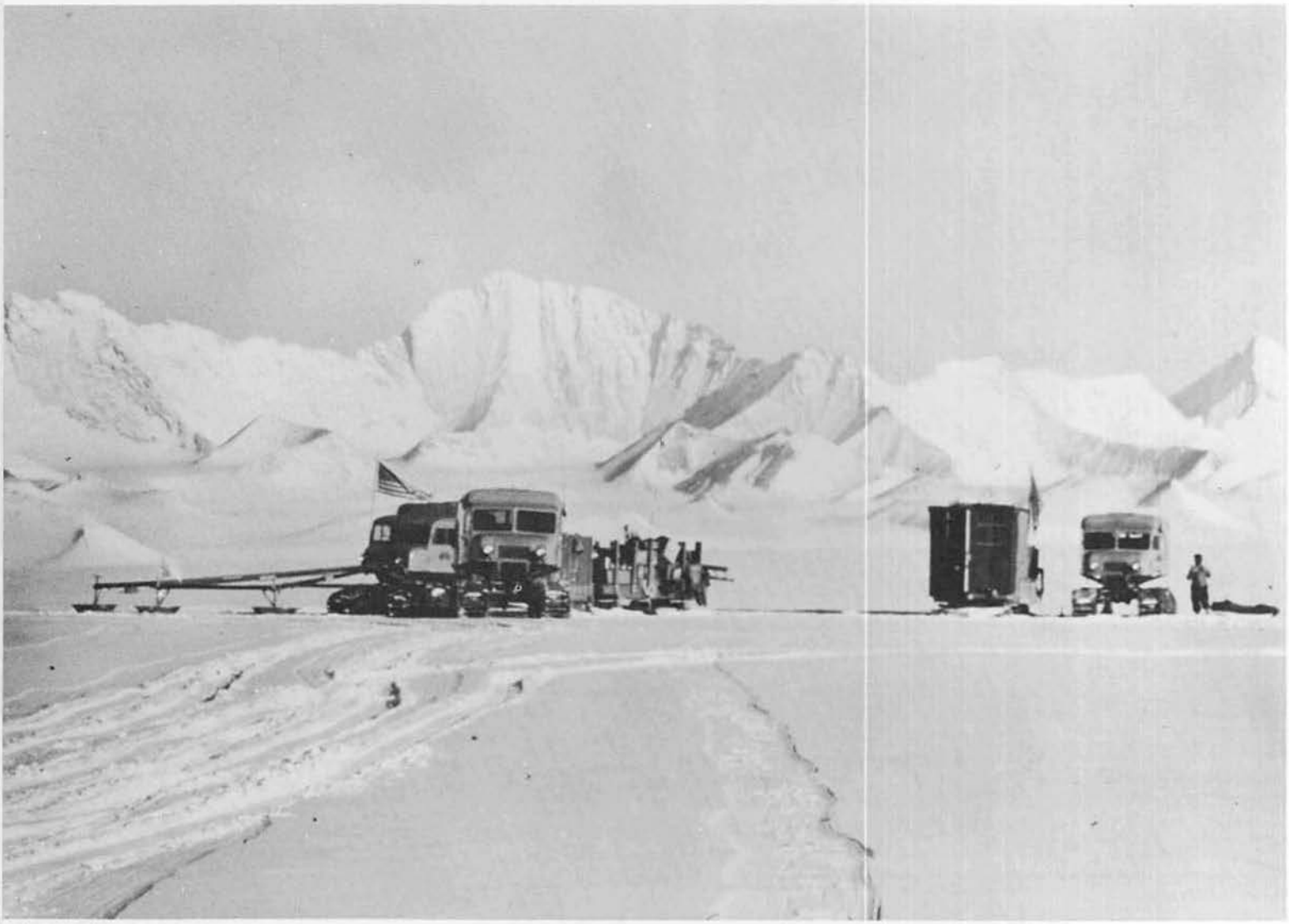
She flew, but without any great margin to spare. On takeoff, we covered the entire length of the runway before leaving the ice; not only that, but we neatly knocked over the row of pine trees that had been set up to mark the end. When we had gained a few hundred feet of altitude, Wrinkle, knowing that he wouldn't see McMurdo again for at least eight months, swung the plane around in a steep bank and gaily buzzed the base. It was a lonely-looking place. I made out a little group of men standing near the shore and staring up at us. Naturally, I could not see their expressions.

As the plane (and I, too) recovered from Wrinkle's maneuver, I caught a glimpse of the sun. It was a pale and ineffectual yellow, and so low that it seemed almost to be resting on the slope of Mount Discovery. Its chilling message was unmistakable: The Antarctic night was coming, and coming soon.

—JOHN BROOKS

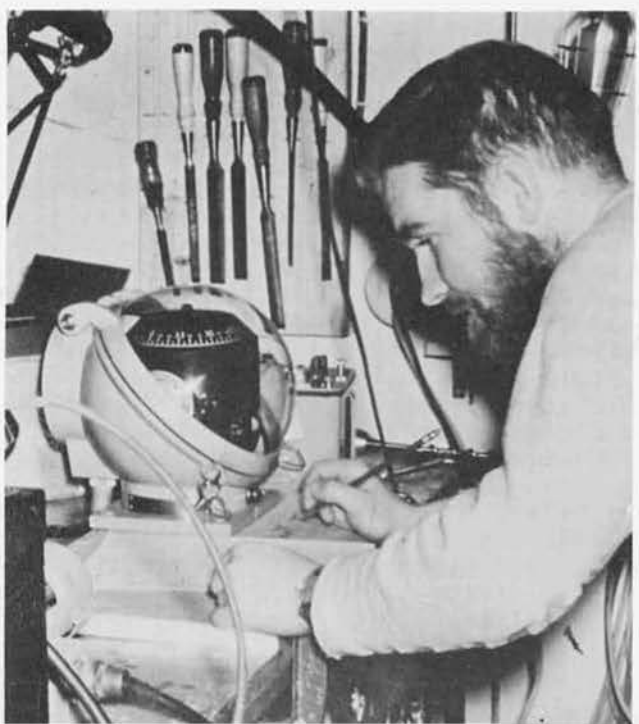
SUMMER

Two Traverses Head toward



USNC-IGY

BYRD IGY TRAVERSE PARTY AT SENTINEL MOUNTAINS ORIGINALLY DISCOVERED BY LINCOLN ELLSWORTH.



USNC-IGY

← N. A. OSTENSO CHECKS GYRO-COMPASS.

VX-6 RECONNAISSANCE flights spearheaded both Byrd and Ellsworth IGY traverses. They accomplished their purpose—to scout a safe route—and they also uncovered some valuable geographic finds.

The seven Byrd Station scientists under Dr. Charles R. Bentley set out November 20, 1957 on their 1,200-mile triangular traverse: about 350 miles out toward Ellsworth Highland, then 350 miles back into Byrd Land, finally back to home station. Three Tucker Sno-Cats, each pulling a 2½-ton sled loaded with provisions and scientific materials, were home to the party for two and one-half months. The sleds carried food and fuel for ten days; at the end of the rations, supplies were planed in by VX-6 aircraft. The lead Sno-Cat poked a crevasse detector ahead sniffing electronically for deadly snowtraps. One of the sleds was enclosed for use as a messing wanigan; the men slept in their sleeping bags inside the heated Sno-Cats.

(Continued on page 196)

Highlands of West Antarctica

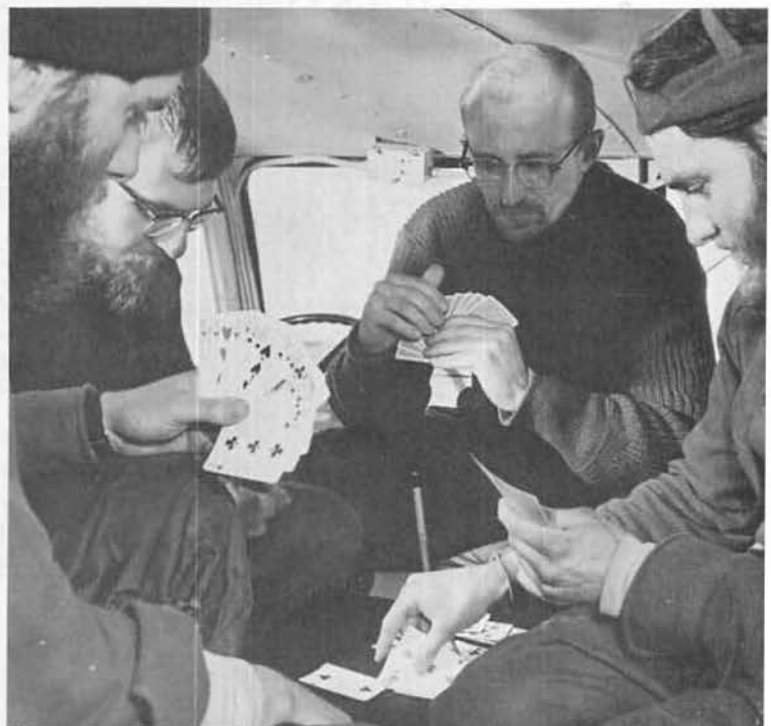
USNC-IGY

ELLSWORTH IGY TRAVERSE PARTY NEAR DUFEK MASSIF, PENSACOLA RANGE, IN EDITH RONNE LAND.

ELLSWORTH's traverse party got under way nearly a month prior to Byrd's and was back home by about the same margin. In contrast to Byrd's simple triangular course, Ellsworth's traverse was as convoluted as a conch shell. The five-man scientific party under the leadership of Edward C. Thiel, seismologist, first headed due south, made a right-angle turn and drove deep into western Edith Ronne Land, retracing its steps then shooting off at a flirtatious tangent back toward Ellsworth Highland after a detour to make geological studies along the newly discovered mountain range.

VX-6 out of Ellsworth flew out fuel and supplies, flew advance recon missions, and on January 16 (after delay due to bad flying weather) its planes brought back the five-man team in time for them to board the departing ships. All vehicles were left in the field to be reclaimed during *Deep Freeze IV* when the traverse would be resumed at that point.

(Continued on page 196)



SCIENTISTS WAIT OUT BLIZZARD IN "CAT." →

A Diary Story of life on an ice-breaker as recounted by a world-traveling newsman, an honored member of Antarctic Press Club.

Southbound on the GLACIER

By CHARLES R. MOORE

CORRESPONDENT, UNITED PRESS INTERNATIONAL

Aboard USS GLACIER *approximately 500 miles south of New Zealand, 23 November 1957*

Hi Kids—

If I can run a typewriter while standing alternately on left and right ears will try to bring you up to date on Daddy's travels.

Left Port Lyttleton yesterday at 8 a.m. on gorgeous spring day. Almost tropical cruising all day, thank goodness, and quite smooth. Health of some none too good at sailing and rough day undoubtedly would have crowded rails. But glazed bloodshot eyes had chance to unglaze before new action began.

Current gag when someone mentions such eyes: "*You* think they look bad! You ought to see them from *this* side!"

Later in morning rained lightly but still fairly smooth. By midafternoon sky cleared and ocean was at its best South Pacific blue. But getting rough.

Now we are learning about peculiar motions for which GLACIER, although only three years old, is famous among naval men.

They're motions old matrons like LURLINE, QUEEN MARY either never knew or have long forgotten.

If this had been done purposely by designers, their plans probably would have been censored. But they were concerned only with building a ship that could break through 15 to 20 feet of solid ice.

So Miss GLACIER, has a rounded bottom instead of a deep keel, sloping gently upward at the bow so she can ride up on ice and break it down as well as smash into it.

She weighs about 8,600 tons and is pushed along with twin screws driven by 21,000 horses of diesel-electric power.

You've heard of rock 'n roll with a Spanish motion. She does that and also twists, squirms, slides, shudders, moans and goes through what one officer describes as "plain old belly wallow."

They tell me this is just the beginning. She adds bumps and grinds when she hits the ice.

Maximum roll in past storms was 42 degrees. At this point many aboard about convinced she's going to roll clear over and some wish she would. They say massive weight of machinery at lowest level makes complete flip impossible but at times this story not too convincing.

Otherwise accommodations almost everything you could desire. No bars, swimming pools or traveling secretaries, but there's no lack of comfort. Startling, pleasing contrast from such recent residences as "Beverly-Hilton" — Quonset #9 — at McMurdo, Antarctica.

(Continued on page 156)

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Byrd Party's 3-Leg

MOUNTAIN RANGE REDISCOVERED BY VX-6 R4D-8.

AIR EYES spotted and recorded landmarks. USMC navigator R. E. Laner installs periscope sextant (top right) and Navy photographers J. D. Reimer and P. B. Dickson pass aerial camera and magazines into P2V-7 (lower right) prior to VX-6 takeoff. Above, Dickson operates radar altimeter and photographic computer during photographic flight over monotonous icy terrain.

Course Ellsworth Group Zigzags

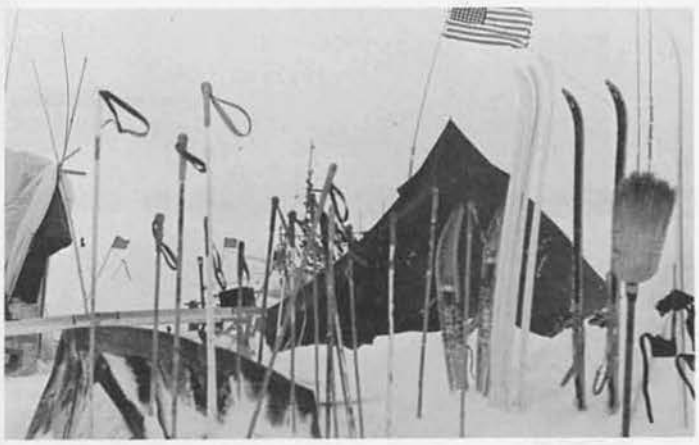
ON BYRD TRAVERSE RECON.

ELLSWORTH traverse party made brief stop every five miles along trail to collect scientific data (upper photos) and specimens, later to be studied at Ohio State University Research Foundation. Hugo Neuberg concentrates on solar fixes in Sno-Cat "office" while "Big John" Behrendt whips up soufflé in outdoor galley (center photos). Fuel and Christmas dinner are loaded aboard Otter for trail run (bottom) but dinner was never delivered; whiteout forced plane back.

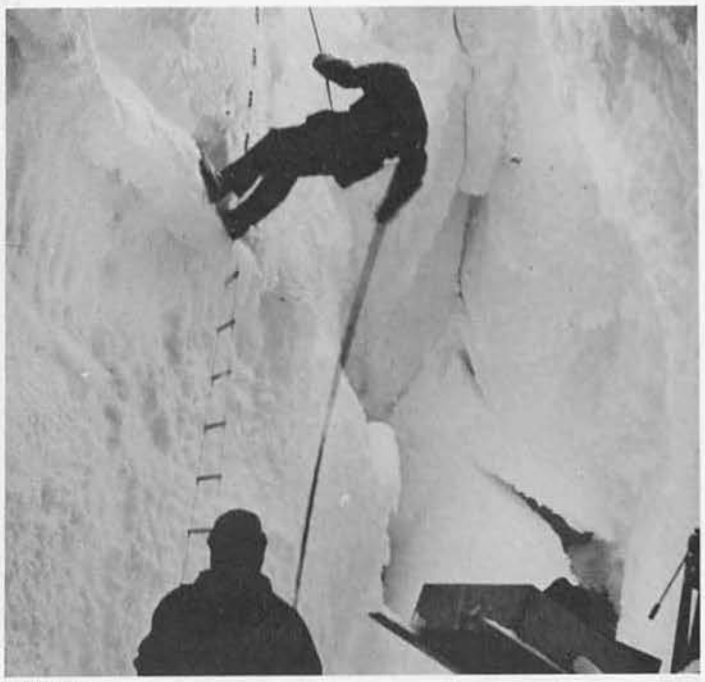
ELLSWORTH traverse sightings. Dufek Massif (above), part of Pensacola Range, viewed from south; highest peak of range, 9,000 feet, is just right of center; Spear Spur (lower right of photo) projects southeast from main mass. Large lake (below) is located in one of the dry valleys on north side of range near northeastern end; lake contains abundant plant life and may be southernmost lake in world—480 miles from South Pole, 340 miles inland.

LAS Annex at Camp Michigan

COMMUNION in crevasse at IGY ice deformation study site, Camp Michigan. Camp was set up 50 miles in from Little America near ice-locked Roosevelt Island on Ross Ice Shelf for glacial study.



GLACIOLOGISTS descend into 70-foot crevasse to learn effects of stress on structure of glacial ice (below). Dr. James Zumberge, leader of party, lines up base line with surveying instrument (right); stakes placed at intervals in straight line indicate speed and direction of ice movement as glacial march to sea warps alignment. Camp site, a tent city, is shown in photograph above. →



USNC-IGY

USNC-IGY

MOORE CONTINUED

Have cabin with one other man, Doug Mackenzie of Christchurch *Star-Sun*. Other passengers IGY scientists or Navy replacements for Antarctic stations.

Two other ships with us, running abreast on either side. Smaller icebreaker ATKA and cargo ship GREENVILLE VICTORY also carrying people and supplies for Antarctica. Will cruise in line, GLACIER leading, when reach ice.

Other company so far porpoises, albatrosses, smaller seabirds.

Dinner Saturday night with Skipper, CDR Bernard J. Lauff (born Detroit, parents Miland, Mich., wife visiting relatives Oslo, Norway).

Almost finished before roll of ship began sliding food all way from one end of table to other.

SUNDAY, NOVEMBER 24

When man said it would get rougher he wasn't just barking at the seals.

Had 40° roll today, just two off record, along with new shimmies.

They tried serving breakfast as usual but by noon even veteran Antarctic salts had to admit things no longer routine.

Nine men to table in officers' wardroom—four down each side and one at end. Other end against bulkhead. In one rolling swoop practically everything on table landed in lap of end man.

They broke out foul-weather racks and now each man has small individual pen for food so can't slide into neighbor's territory.

You may have seen item about gas barrels. Twenty in well-deck broke loose and were flying around like bowling balls. Weigh about 400 pounds apiece.

Three men hurt, several others shook up before finally axed holes in them, drained most gas and tossed drums overboard. Did this under streams cold water from fire hoses with sea water coming over side. Cold job.

Got initiated into shipboard club somewhat similar to our FOYA—flat on your back—of the ice country. Another man and I on flight deck when big swell hit. Both went down and went sculling across deck like scared, upsidedown penguins. I ended up against gun mount and he latched on to something. Taught me never to wear leather-soled shoes out there.

MONDAY, NOVEMBER 25

Getting steadily colder. Light sprinkles during day, threatening to become snow at any hour. Should see first pack ice late tomorrow. Seems incredible tremendous seas we saw yesterday could be tamed by few degrees change in temperature. But that is cold fact.

Speaking of ice. Heard today that Little America going five feet up-down every day with tides. Sort of hinge action with cracks toward rear of Ross Ice Shelf. Also understand Little America could bust off and go to sea some day, like Upper Lower Slobbovia. Will have to check this when arrive. Might even find sister of General Bullmoose's girl friend.

Almost 10 p.m. yesterday before got dark. Another day or two and nights will be gone. One prettiest sights on return to Christchurch was full moon.

Hundreds of birds around today, and we must be 1,000 miles from nearest land. Albatrosses joined by flocks of smaller birds. Little fellows glide along something like albatrosses except much faster. Use quick burst of power from wings every so often to maintain higher speed. Otherwise skim waves just like big ones.

TUESDAY, NOVEMBER 26

Night is behind us until we return north, or unless wait for Antarctic night. Haven't reached pack ice but it's reaching for us. Driving snow leaving slushy coating over ship.

New motion by Miss GLACIER. She has added a long pitch to previous rolls, etc. Bow and stern up and down like elevator. Picture model ship on full pivot like camera tripod, then move every which way except upside down. Should give some idea.

(Continued on page 157)

ANTARCTIC

NOVEMBER 12, 1957:

NESPELEN SAILS FROM NORFOLK, VIRGINIA.

CONGRESSMAN Oren Harris (opposite page) visits → with Denar E. Ward, fellow Arkansan (left), and IGY ionospheric physicist Carl O. Wyman (right) at LAS.

NOVEMBER 26:

HALLETT Station receives first visit of season from Admiral Dufek, center. On his left, Dr. Gould, LT Tur; right, Father Daniel Linehan, seismologist.

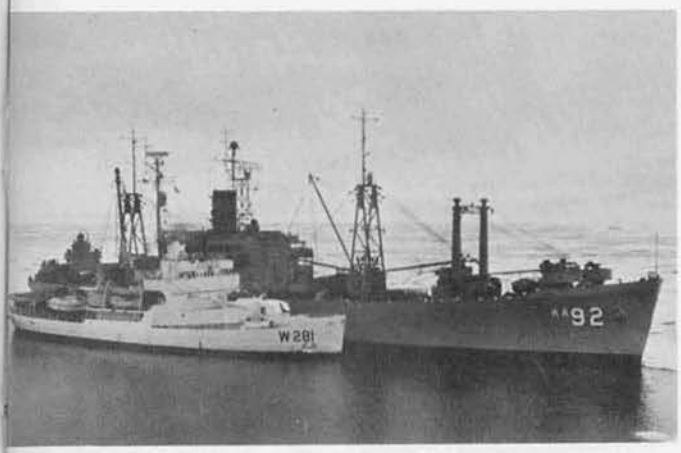
NOVEMBER 28:

CHANGE OF COMMAND AT McMURDO AND LAS. →

DAYBOOK

NOVEMBER 25:

NOVEMBER 27:



WEDDELL twins, USCGC WESTWIND and USS WYANDOT, make their departures from New York and Norfolk respectively, to rendezvous in West Africa's Dakar.

Stepped out on deck in early ayem and hit in face with hatfull of water. Thought it was raining but soon found it was coming over bow.

Crawled up through mast to "Aloft Conning Station" for pictures. Best view on ship. Mast and gratings enroute barely large enough for large-size correspondent. Had to unsling cameras and push them up ahead. Keep that belly down, Steve, if you're thinking of the Navy.

Several huge tubular bergs went by during evening. Eighty to 100 feet high and may be many miles across. Radar picks them up and we make careful detours.

At 11:58 p.m. run into first light pack ice.

WEDNESDAY, NOVEMBER 27

Noticeable undercurrent of excitement among ship's crew when we enter ice. Veteran chief apparently sums up general feeling:

"It's good to be back. We're at home now, in the ice."

Possible human urge to smash things has something to do with it. Boy restrained at home from heaving bricks through plate-glass windows may steer GLACIER in crashing charge against ice.

Ice obliges by breaking up beautifully. Jagged, mile-long cracks streak lightning-like ahead of ship. Huge blue-green chunks hurled outward from bow. They tumble past ship and churn in turbulent wake.

More wild life. Solitary emperor penguin torn between curiosity and fear of this noisy monster. He edges sideways few steps, then flops on belly and scoots for open water.

A few seals watch us go by. Some practically disinterested. Others panic and flop away at top speed.

Albatrosses deserted at edge of ice. Now only Antarctic petrels, darting brown-white birds about size of small gull, and snow petrels.

Snow petrels pure white – almost invisible against ice even when only few yards away.

Water full of tiny pink shrimp. Feed on plankton, other microscopic life in sea water. Surprisingly, experts say Arctic-Antarctic waters teem with life, far more so than tropics. Plankton discolors bottom of ice to dirty yellow-brown.

Gush of water from GLACIER's bow frequently tosses shrimp onto ice where they lie squirming. Fish eat them, penguins and seals eat fish, killer whales eat penguins and seals. The Antarctic chowline.

After dinner and movie just before midnight helicopter HU-2 squadron sends up first flight of trip.

With Skipper Lauff as passenger, it lifts off flight deck and whirls ahead to scout easiest route.

Fairly hazardous assignment. Many places where chopper could land on ice, but also flies over much open water and thin ice where failure of single engine would mean immediate dunking.

If in ordinary clothing, with reasonable layer fat on him, man can survive about eight minutes in water. If he's skinny, time is shorter.

Crewmen wear "poopy suits" watertight at ankles, wrists, neck. They hope these give them half hour in water.

Magic of radar tracks helicopter as disappears miles ahead of ships.

Helicopter deck crew chief, ADC Victor Davis (Frontenac, Kan.), is in dimly-lighted Combat Information Center looking over shoulder of radar man.

Also there is LCDR Lloyd Sternberg, GLACIER executive officer.

"You sweating her out too?" asks Davis.

"Who, me? Naw, just happened to be going by."

THURSDAY, NOVEMBER 28 (THANKSGIVING)

Still lakes of open water, but ice pack getting thicker, rougher.

(Continued on page 158)

Our trail a narrow one, choked with broken ice. Even after GLACIER has blazed way, GREENVILLE VICTORY and ATKA both stick from time to time.

Finally ATKA—an icebreaker herself—sticks so firmly we must return and free her.

GLACIER rides through ice, as one officer put it, "like hay wagon over frozen cornfield."

Had expected usual rough ride during Thanksgiving dinner but timely generator breakdown left us sitting calmly. Turkey, ham, trimmings.

Add whales to wild life, Several appeared in patches of open water. And didn't hear anyone say, "thar she blows."

FRIDAY, NOVEMBER 29

Ice, like gold, is where you find it.

Skipper Lauff told me this in reply to question as to where might be heaviest. You'd think would gradually get thicker as you go south.

That's not necessarily true. After crunching through heavy pack ice for two days, have been running for hours through clear water and occasional slushy patches.

But we have new motion by Miss GLACIER, memento of drive the heaviest pack.

Won't know for sure until some one goes down with glass-bottom box, but apparently a propeller blade's gone. Ship vibrates like trolley with flat wheel.

SATURDAY, NOVEMBER 30

First glimpse of spectacular edge of Ross Ice Shelf. Sheer cliff of ice about 70 feet high.

Beautiful clear day, first since first couple of days out of New Zealand.

I take helicopter trip with Skipper Lauff, scouting best route for last miles to Kainan Bay. Million-dollar view. Well worth two-man, half-hour job squeezing me into "poopy suit."

Pilots LT Harold E. Sterrett, Jr., (Cape Girardeau, Mo.) and ENS Leonard C. Dursthoff, Jr. (Chelmsford, Mass.), finally get me stuffed in and zipped up.

LTJG Robert L. Will (Bridgewater, Va.), and LT Don Martin, senior pilot, complete helicopter pilot roster.

About time we get back GLACIER noses into bay ice. Job now is to carve out harbor so ships can be offloaded at shelf.

Tougher than it looks. All three ships immediately stick fast, GLACIER canted at 10 degrees or so, and stay there.

Suspect that, it being Saturday night, someone high up decided to hell with it for a few hours.

RADM George J. Dufek, commander of *Deep Freeze III*, comes aboard by helicopter from Little America. Ships still two and one-half miles from shelf and about five from Little America.

Engineers confirm GLACIER missing a propeller blade, tribute to the ice.

SUNDAY, DECEMBER 30

Blade loss reduces effective power considerably but GLACIER and ATKA back off and attack ice once more. Both stick again and officers call for high explosive from shore.

Blasts help free ships and also weaken long crack in ice to ease further progress. But six-foot ice still so tough engineers consider putting trail on bay ice instead of breaking all way in for offloading.

First serious accident of trip. Helicopter on ATKA tries to take off with one tiedown cable still attached. The expectable happens. Aircraft goes up few feet and crashes back onto deck. Gas tanks explode. Three men burned, one seriously.

Another chopper ferries Little America-bound personnel, correspondents, to base.

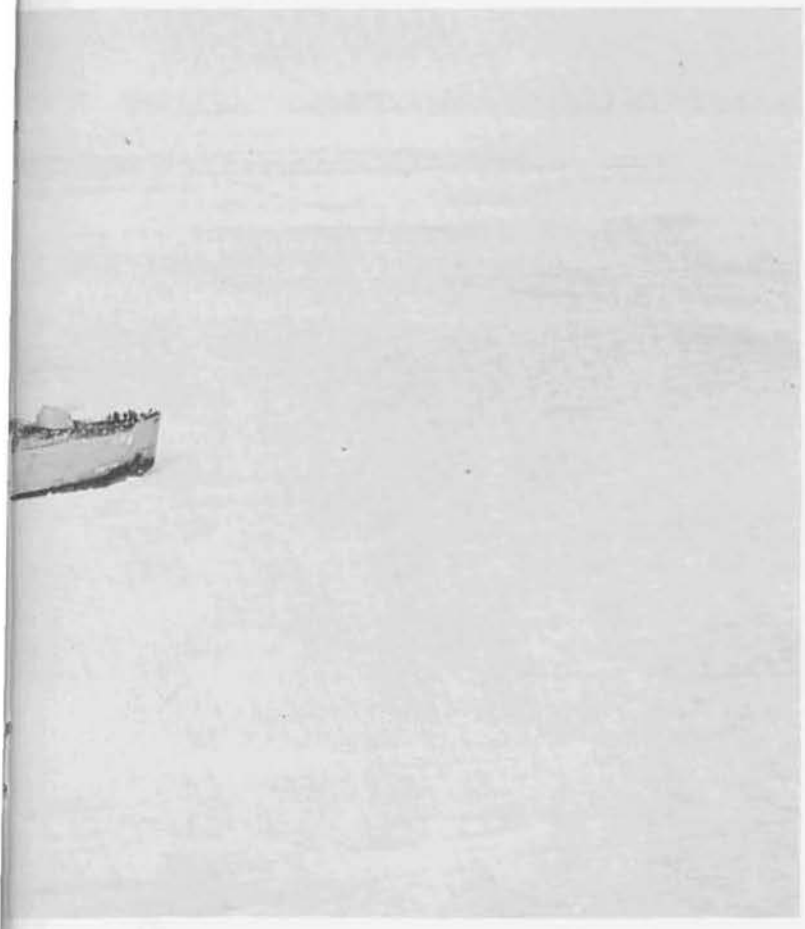
Ice shelf seems to have peculiar motion. Am assured this will halt after been off ship few hours.

Happy New Year to all.

And Here

THE ARRIVAL AT ICE-PACKED KAINAN BAY:

Come the Ships: TG43.4



GLACIER (FORE), ATKA BREAK CHANNEL UP TO LAS.

ROSS SEA Task Group 'breakers begin breaking six-mile-long channel through snow-covered bay ice 8 to 10 feet thick. GLACIER, hampered by loss of port propeller blade, was guided by helicopter reconnaissance of MAJ Dawson and a shore party. Wedging into a tidal crack, GLACIER split off huge section of ice — 2½ million tons of ice (1,700,000 square yards) — which floated out to sea, truly a record ice movement (in solid form) by an icebreaker.

← STERKEL COYNE WEAVES CARGO NET AT LAS.

ICEBREAKER ATKA, STEM AND STERN.

The Way of Icebreakers Is Hard!

By W. V. NALLS

Marine Engineer, Bureau of Ships, Navy Department
(Technical Observer, Project Co-ordinator)

I TOYED with the idea of calling this article "A 90-Day Ride on a Roller Coaster." The largest roll the ATKA took on the trip down was 45°; in addition the ship began to pitch 6 to 7 degrees. (This makes for a corkscrew motion.)

Eating becomes a major task, providing you still have an appetite. It is necessary to erect boards on sides of mess tables to keep dishes off the deck; the tablecloth is thoroughly wet down so dishes will stick; your chair is hooked to the table. You then try to eat.

I am convinced you must have a pretty good sense of humor to serve on an icebreaker. When she rolls (and they say an icebreaker rolls even in dry-dock) your chair tries to turn over, silver slides, coffee spills, food cascades, you catch-as-catch-can.

It might be well to explain why icebreakers roll so badly. The bottom is just like a spoon: it has no keel, as such. Since the ship breaks ice by riding up on it and crushing through by sheer weight, a keel would prevent this. A keel would also hamper "heeling." (An icebreaker has heeling tanks located on either side. To break the hold of ice on ship's sides water is pumped from port to starboard tanks inducing a roll of about 5 degrees.)

When we ran into pack ice we stopped rolling, much to our relief. Pack ice moves in to and away from the continent depending on the wind. We met it about 250 miles off the coast of Antarctica. It consisted of a belt 150 to 200 miles across; thickness of the ice varied from two to four feet on the trip south. Two months later (in January, 1958) we discovered that pack ice no longer existed here.

On arrival at Kainan Bay we found the bay ice between four and six feet thick and covered with snow to a depth of about four feet. The Ross Ice Shelf, truly a beautiful sight, rises in the background 50 to 150 feet above water. (About 7/10 of total thickness of ice is submerged.)

(Continued on page 160)

We were advised that a tidal crack ran the width of the bay ice from the barrier to about one mile ahead. This meant we must break out the ice to this crack. To offload on the seaward side of the crack would court the danger of the entire section splitting off and going to sea.

GLACIER and ATKA set to work. There was little success at first. Both ships were at times stranded with their bows up on the ice and heeling tanks were called on. Blasting brought only limited results. Then for one week the two 'breakers just butted that ice for 24 hours a day until a channel was made.

When breaking ice you go approximately three ship lengths ahead at full power, hit the ice which stops you dead, then you back up and do it all over again. With the vibration caused by its broken propeller, GLACIER (to which I had transferred by helicopter) gave us a rough ride.

GLACIER, having finished breaking the channel, got underway for McMurdo Sound leaving ATKA at Little America to assist in off-loading GREENVILLE VICTORY and then conduct her to Hut Point. At Marble Point we ran the bow up on the ice and spent three days unloading 70 tons of cargo. Cranes lifted loaded cargo nets from the hold to the flight deck; helicopters, hovering over the deck but not landing, hooked up the load and carried it ashore. The two helicopters assigned to the ship could carry 1,200 pounds each; they were assisted by a Husk-type 'copter from McMurdo.

In addition to general cargo 140 drums of oil, each weighing 467 pounds, had to be offloaded to the ice alongside ship, loaded on sleds, and pushed (by hand) one-half mile. Two Otters waited on smooth ice for the drums and flew them in to the Marble Point base.

If I have seemed to imply that icebreaking is solely a matter of brawn, let me correct that impression quickly. There is a technique and finesse to it when done by experts that tends to be overshadowed by the spectacular results. Since the main purpose of cutting a channel is to get ships close to the station for offloading, the channel must be straight and fairly wide. The mouth has to be wider than the channel itself so ice will not jam at the outlet. A two-mile-wide swath was cut in the offshore bay ice to begin. The channel (and I am

(Continued on page 162)

STUB OF BROKEN PROPELLER BLADE.

CRASHED 'COPTER CATCHES FIRE ON ATKA'S DECK.

CDR BULFINCH, CO; LCDR BRAZZELL, XO.

THE CAPTAIN CARVES AT THANKSGIVING.

ATKA's HutRon One Sees Hot Action

HELICOPTERS, three HUS-1As and an HO4S, were operated by VX-6 from the ships in tandem with two at LAS, one at McMurdo, and one at Ellsworth. They ferried passengers to and from ships (and elsewhere) and offloaded many tons of supplies and equipment. On December 1 a chopper taking off from ATKA smashed back to the deck and injured two passengers, LCDR Paul W. Reigner, CHC, and CDR William F. Flynn, CEC. The chaplain, who was to have relieved LCDR Zoller at LAS, was flown back to CONUS for hospitalization. ENS Samuel E. Walling was at controls.

The Men of the ATKA:

(L. TO R.) HUTRON ONE, UNIT 30; FIRST, SECOND, AND THIRD DIVISIONS; E AND M DIVISIONS.

O DIVISION; S DIVISION; MEN OF ALL DIVISIONS STANDING WATCH AT TIME PHOTOS WERE TAKEN.

GLACIER BREAKING ICE, OVERHEAD VIEW.

now describing the one cut at McMurdo) was 12½ miles long and 700 feet wide running through ice four to 10 feet thick. The procedure was to charge ice straight ahead, back up, charge ice with full right rudder, back up, charge ice with full left rudder. By this method large pieces were cut.

However, with no wind to move the ice floes out of the way, breaking operations slowed. Ice would pile up astern and the ship could not back up for fear of breaking a propeller blade. Then a different technique was called upon—washing. The icebreaker would go back to the mouth of the channel, stick the bow in ice at a 30° angle to channel, keep the propellers turning, and just sit there as the turbulence of the churning water washed the ice chunks astern.

In this way the McMurdo channel was cut and cleared of about 27 million tons of ice. On GLACIER'S second trip down from New Zealand (following drydock repairs which I will describe later) we found this channel completely gone and a relatively ice-free Sound all the way in.

While breaking ice up to 10 feet thick at McMurdo Sound vibration became excessive and it was noticed some power was lost on the starboard shaft. Noise and runout measurements indicated a blade on the starboard propeller was probably missing; this evened it up with the port propeller. So GLACIER sailed on December 30 for Wellington.

When we had cleared the ice belt en route north it was decided to lower a boat over the side to check the starboard propeller. The captain, engineering officer, and I confirmed the suspected damage.

With one blade missing there had been quite a bit of vibration especially around the mast. With one gone from each propeller vibration was very bad at any speed, even the 10 knots we traveled. On January 2, 1958 more than 10 feet of mast broke off and hung suspended, held only by electrical wires. In trying to lower the broken section to the deck, the ragged edges of the mast cut the lowering rope and the mast fell into the stack. As there are about 12 exhaust pipes in the stack, making a pretty solid cushion, no damage was done. So it was decided, as the sea was rough and we were rolling badly and as the mast was not interfering with any of the pipes, to leave the wreckage in the stack.

In drydock we found one blade missing from each propeller leaving only an 8" stub. The other two blades on the port propeller and one on the starboard propeller had cracks from one to six inches in length. There were four spare blades on hand in Wellington. Boston Naval Shipyard, alerted by

(Continued on page 163)

ANTARCTIC

NOVEMBER 30:

DECEMBER 1:

SOUTH POLE baton changes: Dr. Siple, IGY leader for *Deep Freeze II*, is relieved by Palle Mogenson. Right, a D-2 tractor was successfully airdropped at Pole.

DECEMBER 4:

CTF congratulates COL Forwood on Pole and Byrd airdrops, completed in record time by eight C-124s in 54 flights.

DECEMBER 7:

GLACIER'S CDR Lauff (at mike) is relieved by CDR Houston (right); LCDR Zoller, CAPT Maher, former CO, center.

DAYBOOK

NOVEMBER 30:

CRIPPLED R4D with Admiral Dufek, 16 others aboard comes in at LAS for crash landing. Starboard ski jammed in air, starboard engine caught fire. Inspired piloting by CDR Vernon Coley effected safe landing. Passengers included Father Linehan, CDR Macbain, and two newsmen.

DECEMBER 7:

DECEMBER 9:

VX-6 stars: LCDR Kenneth Snyder makes 440-mile flight from LAS to NAF in 4 hours and 40 minutes, possibly longest helicopter flight in Antarctic. Right, P2V-7 made first point-to-point jet flight in Antarctic history, McMurdo to LAS in 1 hour, 29 minutes. Piloted by LCDR Daniel A. Miller, plane also carried Admiral Dufek.

DECEMBER 8:

WYANDOT crew, nearing Dakar, listens to CAPT Smith discuss customs and foreign relations in African port.

ATKA IN WELLINGTON'S DRYDOCK.

BuShips, dispatched two more spares by plane to Wellington, one of which proved less than perfect. It was decided to leave the one good blade intact, replacing the other five.

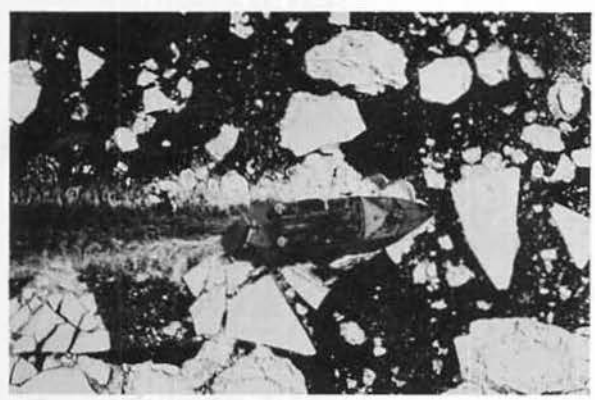
While in drydock GLACIER's captain sent two officers and myself to visit the Russian oceanographic survey ship VITIAZ. A German fruit ship, she was converted in 1947. The ship has about 10 labs and many types of deep-sea winches with other oceanographic survey equipment. It is not believed, however, that she is fitted to work in ice. We were not able to get into the engine room but we understood it to be a diesel electric-drive ship.

GLACIER left drydock January 23 and, after refueling at Port Lyttelton, departed for McMurdo Sound. We entered the Sound at 5:30 a.m. February 1. There was no pack ice, just a few floes in fairly clear water. Suddenly the ship was stopped dead in its track. Everyone was jarred awake. We had hit a piece of floe ice. It looked like any other piece of floe ice which we had been pushing through at 14 knots. But it wasn't.

On sounding the peak tank it was found to contain 50,000 gallons of salt water and we knew the floe had cut a hole. The bow of the ship was run up on the ice. There it was, a gash 8 feet long by 2½" wide running horizontally along 1⅝" plating—and *not* in a seam. In the port side of the peak tank, it ran between frames 3-9 at the 25'-0" waterline. The plating had been dished in also and interior longitudinals had buckled badly.

The heaviest plating aboard was ¼" mild steel. McMurdo, however, had a sheet of ¾" mild steel plate and a number of 4" and 6" I-beams. We

(Continued on page 164)



GLACIER AMONG EREBUS BAY ICE FLOES.

CHALKMARKED CRACK IN GLACIER'S BOW.

used a blow torch to clear out the hole and to cut at ends of cracks to stop cracking. We then welded the hole inside and out and used the ¾" plate on the exterior. Inside we placed I-beams from the area of the crack to centerline with cross-bracing to prevent further damage by ice or rough seas. When temperature rose above freezing we poured 1:2:4 concrete mix in damage area. The officers and men of GLACIER are to be commended for their fine repair job done under very adverse conditions.

On February 9 we sailed for Little America to deliver supplies taken on in New Zealand. We arrived two days later to find the channel there had also vanished and we sailed right up to the barrier for offloading.

After nearly three months "down south" I decided it was time to return to my office to assist in formulating plans for repairs to ships. After some anxiety over the ice airstrip at McMurdo I finally got aboard a C-124 and headed home.

Before leaving the Antarctic I had begun to receive damage reports from other ships. ATKA had broken two blades from her port propeller; WESTWIND damaged her rudder and one engine was put out of commission; TOWLE bent three blades on her four-bladed propeller; GREENVILLE VICTORY bent one blade; ARNEB had to replace three rows of tubes in one of her boilers. This year had been pretty rough insofar as damage to ships was concerned. A lot of hard work lay ahead of us to get them back in shape.

—W. V. NALLS.

BURNING OUT CRACK FOR REPAIR PATCH.

NAVY VX-6 NEPTUNE ON POLAR PLATEAU.

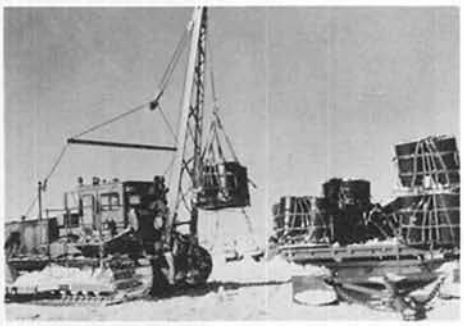
Wings Across Antarctica

SUMMER

Story of an Airdrop:

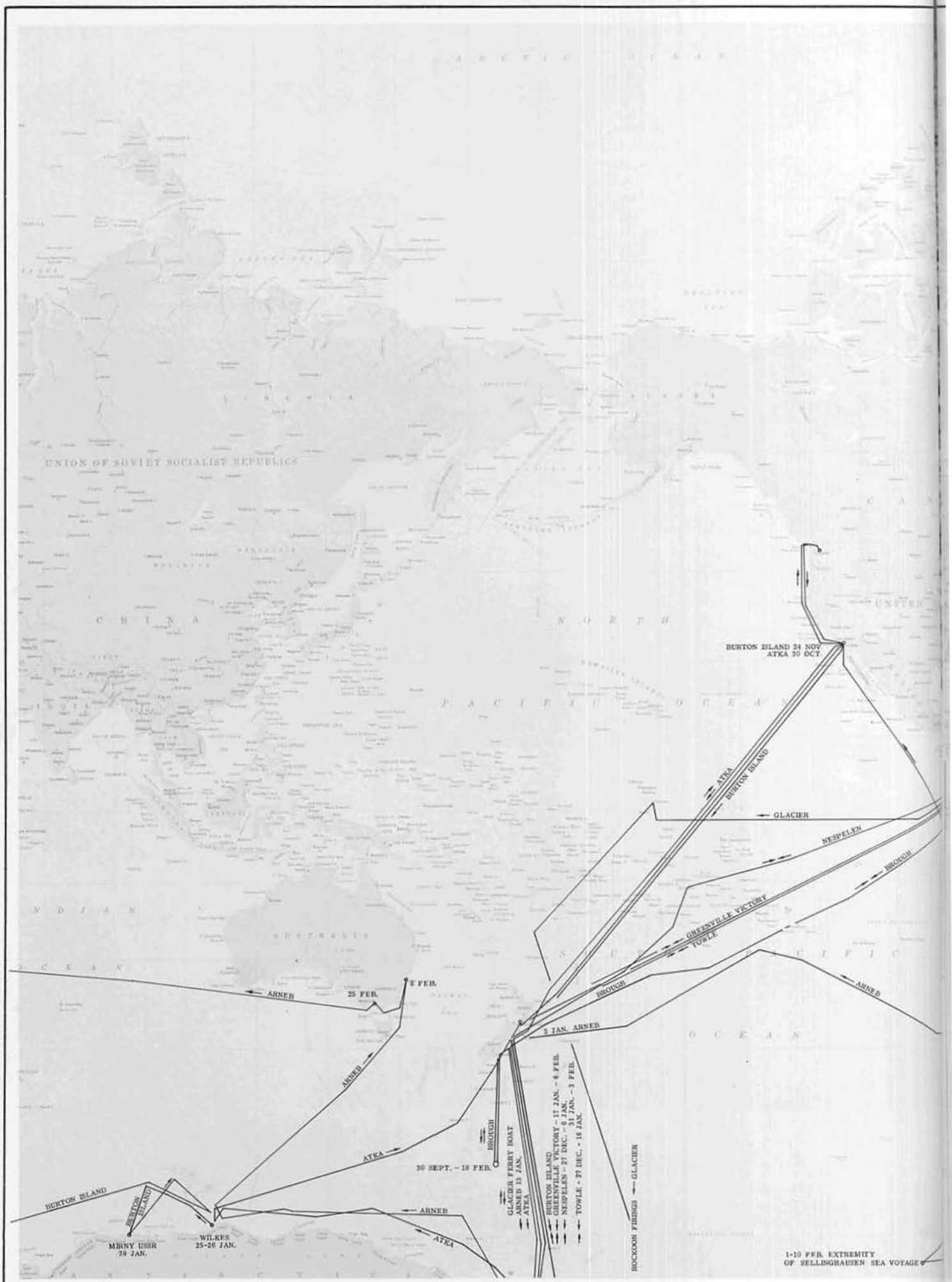
NEW METHOD of vertical delivery was devised for *Deep Freeze III:* ribbon-type extraction parachutes aimed, stabilized the load so it landed on "honeycomb" crash padding. Below, 'chuted pallet descends as retriever runs to drop area; retriever marks location of drop with trail flag, salvages parachute. Bottom row, Crane-equipped tractors move in to consolidate load on sleds, tow them back to station. Over 1,300 parachutes of all types, 800 plywood pallets came south in Globemasters. It takes about a ton of 'chutes, rigging to drop 14 tons of material.

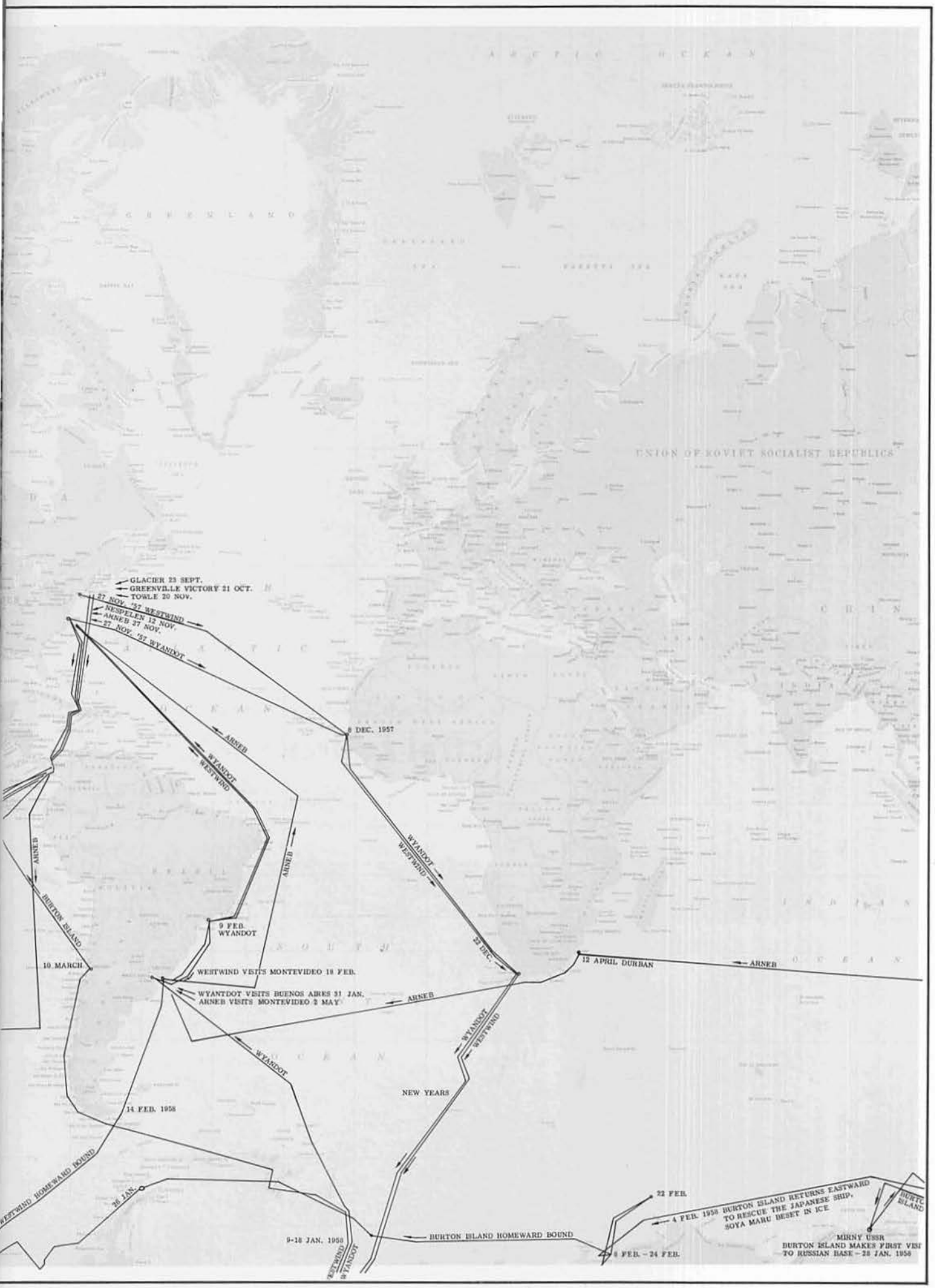
53RD TCS GLOBEMASTER FLIGHT LINE AT NAF.



A Para-Rescue Drop:

PARA-SEARCH and Rescue teams (part of the VX-6, CBU, and USAF group, far right) stood by for action constantly. On December 29 and 30 ten jungle-grey silk canopies billowed over McMurdo's icefields as the first mass jump was made in Antarctica. Jump was made to requalify members of team. Wind drift was checked first by dropping parachuted dummy from Otter (left). Center, paratroopers begin to bail out as companion Otter flies cover. First chutist lands flat on his back as other Navymen stand by to render assistance in case of accident. It was believed to be the first group of paratroopers to leave an Otter. (Personnel: front row, P. W. Beal, P. D. Parry, G. R. Gowen; back row, D. M. Bagley, W. W. Penney, H. R. Kacek, R. J. Patton, W. A. Fitzgerald, latter two USAF.)


UNION OF SOVIET SOCIALIST REPUBLICS
CHINA
INDIA
AUSTRALIA
PACIFIC OCEAN
INDIAN OCEAN
ANTARCTICA
BURTON ISLAND 24 NOV.
ATKA 30 OCT.
ATKA
BURTON ISLAND
GLACIER
NESPELEN
BROUGH
GREENVILLE VICTORY
TOWLE
ARNEB
8 FEB.
25 FEB.
ARNEB
2 JAN. ARNEB
ATKA
30 SEPT. – 18 FEB.
BROUGH
GLACIER FERRY BOAT
ARNEB 13 JAN.
ATKA
BURTON ISLAND
GREENVILLE VICTORY – 17 JAN. – 4 FEB.
NESPELEN – 27 DEC. – 6 JAN.
31 JAN. – 3 FEB.
TOWLE – 27 DEC. – 16 JAN.
BURTON ISLAND
BURTON ISLAND
MIRNY USSR
29 JAN.
WILKES
25-26 JAN.
ARNEB
ATKA
ROCKOON FRINGS — GLACIER
1-10 FEB. EXTREMITY
OF BELLINGHAUSEN SEA VOYAGE

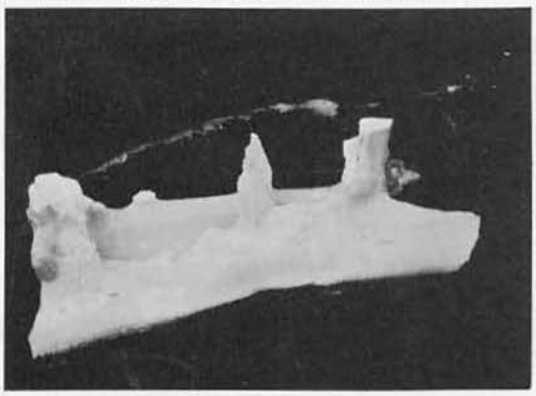

GLACIER 23 SEPT.
GREENVILLE VICTORY 21 OCT.
TOWLE 20 NOV.
27 NOV. '57 WESTWIND
RESPELEN 12 NOV.
ARNEB 27 NOV.
27 NOV. '57 WYANDOT
8 DEC. 1957
ARNEB
WYANDOT
WESTWIND
ARNEB
ARNEB
BURTON ISLAND
9 FEB.
WYANDOT
10 MARCH
WESTWIND VISITS MONTEVIDEO 18 FEB.
WYANTDOT VISITS BUENOS AIRES 31 JAN.
ARNEB VISITS MONTEVIDEO 2 MAY
ARNEB
WYANDOT
WYANDOT
WESTWIND
22 DEC.
12 APRIL DURBAN
ARNEB
NEW YEARS
14 FEB. 1958
WESTWIND HOMEWARD BOUND
26 JAN.
9-18 JAN. 1958
WESTWIND
WYANDOT
BURTON ISLAND HOMEWARD BOUND
6 FEB. – 24 FEB.
22 FEB.
4 FEB. 1958 BURTON ISLAND RETURNS EASTWARD
TO RESCUE THE JAPANESE SHIP,
SOYA MARU BESET IN ICE
MIRNY USSR
BURTON ISLAND MAKES FIRST VISI
TO RUSSIAN BASE – 28 JAN. 1958

OCEANOGRAPHY

The study of oceans employs many techniques used on land—meteorology, geology, chemistry, biology, and zoölogy. Scientists on eight ships of Task Force 43 made observations of weather, ocean surface and bottom, ice conditions, marine life, and many other phenomena.

Ice Conditions:

KAINAN'S ICE PACK, SHELF IN BACK.



GIANT STORM-ERODED TABULAR BERG.

PROGRESSIVE BAY ICE FORMATION AT WILKES.

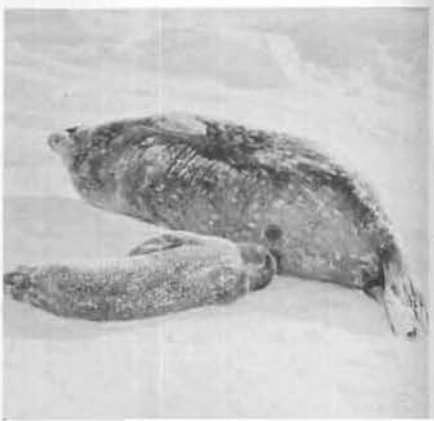
Observing Air, Sea:

HYDROGRAPHIC sampling: oceanographer holds Nansen bottle (top left) which is lowered into sea to collect water samples from various depths; scientist seals sample bottles with wax (left, below). Bathythermograph about to be launched (top right) to obtain water temperatures at various depths. Current meter (lower right) for measuring ocean currents is adjusted.

Austral Fauna:

PENGUINS of three species: emperor (left), Robert Island penguin (South Shetlands), bearded ringneck. Killer whale (lower left) and Weddell seals, natives of Antarctica's coasts.

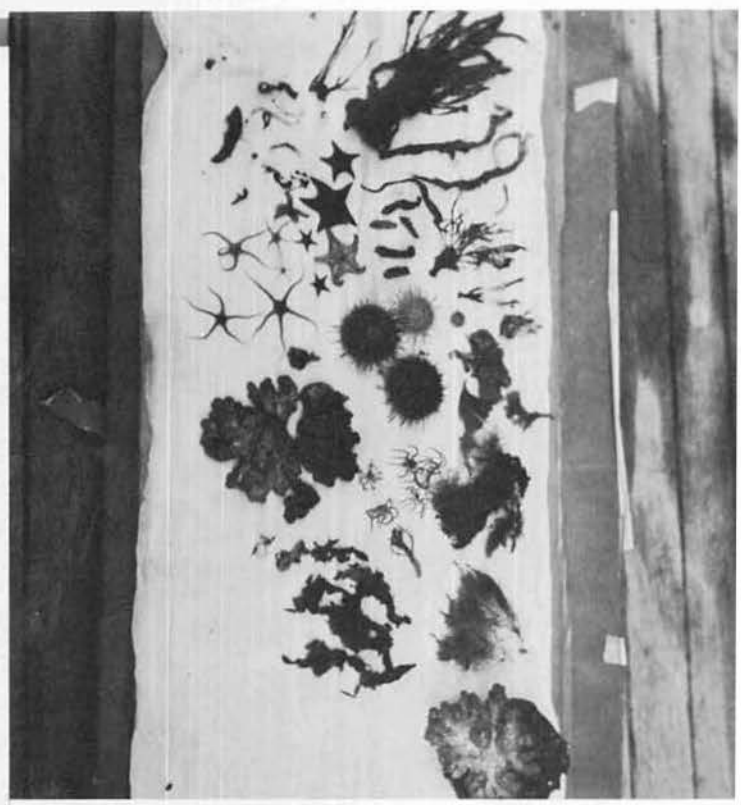
BEEBE



NAVAL AEROGRAPHERS RELEASE RADIOSONDE BALLOON; BOXED RADIO TRANSMITTER IS TOSSED.

Life Under the Sea:

SPECIMENS from ocean bottom are sorted from mass of seaweed trawled up (left) as CAPT Maher, CDR St. Alban, and William Littlewood (of U.S. Hydrographic Office) inspect unique ones.

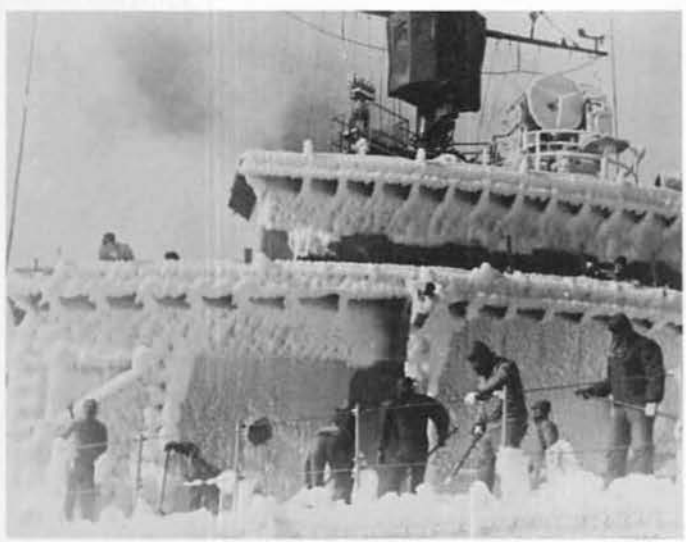


SEA LIFE FROM BAY BOTTOM AT HALLETT.

BURTON ISLAND LEADS WAY THROUGH ROSS SEA PACK ICE AS ATKA AND CARGO-BEARING ARNEB FOLLOW.

Beauty of the Ice

SHADDIX



NAVYMEN CHIP ICE FROM THE GLACIER.

← WESTWIND ESCORTS WYANDOT THROUGH PACK ICE.

ROSS SEA FLEET INCLUDED ICEBREAKER GLACIER SHOWN BELOW CARVING CHANNEL IN KAINAN BAY, LAS.

as Seen through the Sailor's Eye

RECTOR

To Make the

MARBLE POINT at foot of receding glacier (left) is subject of two-year feasibility study to learn its value as permanent airfield replacing McMurdo's ice runway. CBRU camp set up for 28-man unit in mid-December.

BIG QUESTION is whether glacier, which feeds 6 million gallons of water per day in summer into stream, has underground outlet as well as one ending in McMurdo Sound. Seismic soundings were made to determine subterranean characteristics of area. Father Linehan declared he would discontinue survey if early findings were unfavorable; at end of season work still continued and preliminary airstrip was staked out and graded.

Five Men in a Jamesway:

LIV Naval Auxiliary Air Facility, established by Smittle, McCue, CAPT Pullen, Larsen, Oswalt (above) was weather reporting facility on route to Pole.

← BEARDMORE, WORLD'S LARGEST GLACIER.

Sky Trails Safe

SURVEYING site are Richard Allard (left), James Armstrong (right). Navy-financed survey brought 24 Seabees, four IGY scientists, Navy engineers and technicians, and Rev. Daniel Linehan, Boston College seismologist in to base at foot of Wilson-Piedmont Glacier for intense study.

FIRST wheels-on dirt landing in Antarctica in history was made January 31, 1958 by Otter. LCDR Henry E. Stephens, CO of Seabees Reconnaissance Unit, waits to welcome party as Admiral Dufek congratulates pilot, CDR Vernon Coley, and Sir Edmund Hillary, guest passenger, beams.

AFTER permafrost dam was breached by dynamite to form channel (opposite page) temporary runway for supply purposes was completed. The D-9 Caterpillar tractor (left) heaviest made in the U.S., ripped and graded the rocky

terrain to smooth strip. Runway appears in upper left photo on opposite page, running diagonally from bottom of picture toward meltwater creek. (Mountains in that photo are foothills of Royal Society Range in Victoria Land.)

DENTISTRY and aerology were on roster. Planes flying to Pole follow Beardmore Glacier as it permits lower-level travel between flanking mountains.

TWO R4Ds AIRLIFTED MEN, MATERIALS INTO LIV AAF.

Task Unit 43.4.1 Is Formed, Moves In

About mid-December with BURTON ISLAND and NESPELEN in Port Lyttelton and TOWLE in Wellington taking on cargo for New Zealand's Scott Base, TU43.4.1 was formed and, upon TOWLE's joining the unit, it steamed for McMurdo.

Rendezvous at Beaufort Island took place December 27 between the Task Unit and ATKA. GLACIER had completed a channel to Hut Point but it was heavily packed with brash ice and the thin-skinned cargo and oil ships had to be eased in by the three icebreakers. Another meeting took place at the end of the month at McMurdo when HMNZS ENDEAVOUR pulled in from New Zealand to back up the Fuchs-Hillary CTE already underway.

The Task Unit was more than welcome. Not only did it bring sacks of mail, NESPELEN brought 650,000 gallons of 115/145 avgas which was in critically short supply at NAF McMurdo.

ALL-HANDS party at LAS was treated to entertainment by current and emeritus Commander of Naval Units, Antarctica—CAPT E. H. Maher (center) and CAPT. W. M. Dickey (slap bass)— stand by as G. J. Gordon plays a chorus.

BURTON ISLAND

MEETING between CAPT Kirkwood (left), CO of ENDEAVOUR, RADM Dufek, ComNavSupFor Antarctica, and CDR H. J. Brantingham, CO of BURTON ISLAND, took place on that icebreaker at McMurdo Sound. GLACIER, also moored nearby, was making its getaway for departure to Wellington and drydock, after grueling bout with bay ice at LAS and NAF.

Change of Station Command

LITTLE AMERICA IGY STATION —

Nov. 28, 1957 — LCDR H. J. Orndorff to LCDR T. N. Thompson
Albert P. Crary, IGY, remains for Deep Freeze III

McMURDO SOUND NAF —

Nov. 28, 1957 — LCDR S. W. Marshall to LCDR E. E. Ludeman

ELLSWORTH IGY STATION —

Jan. 16, 1958 — CAPT Finn Ronne to LT Paul Tidd
Jan. 16, 1958 — CAPT Finn Ronne, IGY, to Dr. Matthew J. Brennan, IGY

WILKES IGY STATION —

Jan. 30, 1958 — LTJG D. R. Burnett to LT R. S. Sparkes
Jan. 30, 1958 — Carl R. Eklund, IGY, to Dr. W. L. Tressler, IGY

BYRD IGY STATION —

Dec. 8, 1957 — LT Brian C. Dalton, MC to LT Peter Ruseski, MC
Dec. 8, 1957 — G. R. Toney, IGY, to S. Barnes, IGY

AMUNDSEN-SCOTT SOUTH POLE IGY STATION —

Nov. 19, 1957 — LTJG John Tuck, Jr. to LT V. N. Houk, MC
Nov. 30, 1957 — Dr. Paul A. Siple, IGY, to Palle Mogensen, IGY

HALLETT IGY STATION —

Jan. 16, 1958 — LT Juan J. Tur, MC to LT R. C. Bornmann, MC
Jan. 16, 1958 — Dr. James A. Shear, IGY to Kenneth J. Salmon,* IGY

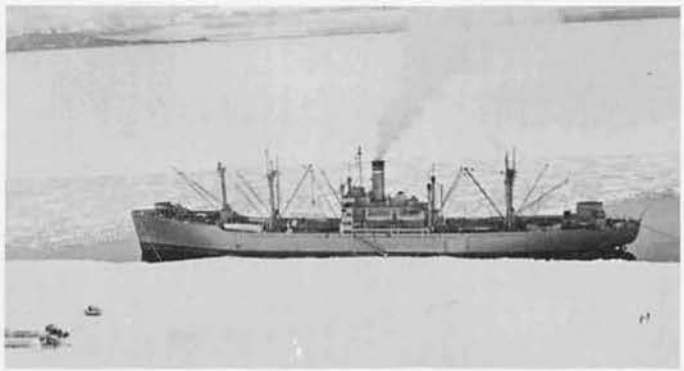
NAVAL UNITS, ANTARCTICA —

Nov. 28, 1957 — CAPT W. M. Dickey to CAPT E. H. Maher

* New Zealand

Leads TOWLE, NESPELEN South

ICE CHANNEL OFF HUT POINT BEGINNING TO WIDEN UNDER POUNDING OF MANY SHIP PASSAGES.



USNS TOWLE TIES DOWN FOR UNLOADING.

BURTON ISLAND, ENDEAVOUR BUNKED AT NAF.

BIG OILER NESPELEN EASES INTO BERTH. →

IGY SCIENTISTS HOLD OPEN FORUM AT DAY'S END.

Summer and Science

The IGY was to end officially December 31, 1958 and studies during austral summer were intensified. Free of the shackles imposed by the iron cold, the scientists took to the icefields, to the rookeries, to the air high above the now sunlit continent, to the peregrinating ships, to the mountains, to the barrier's edge. Oblivious to the wild confusion of summer operations, they plied their trades alongside Navy and Air Force men until they became almost lost in the melee. And yet out of chaos came cosmos — or at least a deeper insight into it.

The Icecap Priest

Rev. Daniel Linehan, S.J., Director of Weston Observatory of Boston College, is a world-famous seismologist.

The first Catholic mass ever to be offered at the South Pole was celebrated on December 5, 1957 by Reverend Daniel Linehan, S. J.

The first seismic soundings ever to be made at the South Pole were taken by Reverend Daniel Linehan, S.J. on that same day. Father Linehan was a member of all three phases of *Deep Freeze* and contributed heavily to seismic knowledge.

In a McMurdo press conference the day following his Polar project Father Linehan described it in detail. Three seismic echo soundings were taken: they indicated that the Pole stands on 8,197 feet of ice over 903 feet of underlying rock, an altitude of about 9,100 feet above sea level. Exploding TNT charges produced an echo which traveled 6,000 feet per second for the first 77 feet, 10,000 feet per second for the next 20 feet, and 12,500 fps for the last 8,200 feet due to increased compaction.

Since average precipitation at the Pole is only about one inch per year, this tremendous featherbed must have taken many thousands of years to build up. In passing, a few comments of Dr. Herfried Hoinkes, Austrian IGY scientist who visited the Pole, might be noted. He stressed the fact that the Polar plateau is not shrinking even though it receives more energy from the sun during the austral summer than does any other place on earth. The reason: between 84 and 93 per cent of this potential is lost by reflection from the intensely white surface (it is the *whitest* snow yet found) with the small amount of heat absorbed limited to a depth penetration of only two feet. Since the temperature never rises above freezing, melting does not occur and the only decrease of snow and ice is through evaporation.

Father Linehan's equipment included a special seismic recorder particularly adapted to ice-thickness measurements. Following his Polar assignment he was stationed at Marble Point probing the rocky terrain with his trusty TNT. Many preliminary decisions — in fact, the decision as to whether to continue the feasibility study itself — hinged on his seismic findings. When he blows up, people listen!

Another Jesuit seismologist, Reverend Edward A. Bradley, IGY seismologist of Cincinnati, is in the wintering-over group at Ellsworth.

Antarctic Glossary

"Airedale" — Member of Navy air arm (AirDevRon, or VX-6).
AirDevRon — Air Development Squadron, Navy air arm (VX-6).
AvGas — Aviation gasoline (high octane).
"Cat" — Nickname for Caterpillar tractors (D-2, D-4, D-8, D-9).
CBRU — Construction Battalion Reconnaissance Unit.
CO — Commanding Officer, highest command in unit, or ship.
ComNavSupFor — Commander, U.S. Naval Support Force (Specifically RADM Dufek, ComNavSupFor Antarctica).
CONUS — Continental United States.
Foehn Winds — Warm, dry winds blowing down mountainside.
GCA — Ground Control Approach: navigational aid from ground level to planes landing "blind" by means of radio signals.
HutRon — Helicopter Utility Squadron, Navy air arm.
IGY — International Geophysical Year (July 1, 1957 — Dec. 31, 1958).
MATS — Mobile Air Transport Service (of U.S. Air Force).
MCB-Special — Material Construction Battalion Special.
Mukluks — Sealskin boots worn in Arctic and Antarctic regions.
NAAF — Naval Auxiliary Air Facility. (Liv Base).
NAF — Naval Air Facility. (Williams Air Operations Facility).
Nunatak — Rocky outcropping protruding from snow or ice fields.
OinC — Officer in Charge (generally second in command of station).
POL — Petroleum products: diesel oil, fuel oil, lube oil, etc.
Polynya — Small lake of navigable water in midst of icefields.
Sastrugi — Snow formed by prevailing winds into low dunes.
Sno-Cat — Cargo-carrying tracked vehicle for oversnow travel.
Wanigan — A "house on wheels" for messing, sleeping on trail.
Weasel — Four-passenger tracked vehicle for rough terrain.
XO — Executive Officer, second in command to CO.

CHRISTMAS EVE SERVICES IN McMURDO'S CHAPEL OF THE SNOWS CONDUCTED BY FATHER DARKOWSKI.

White Christmas

With summer temperatures climbing higher each day, Christmas in Antarctica was still a white one. In each of the seven stations and in tiny auxiliary bases it was "everywhere, everywhere Christmas."

The two Navy chaplains, LT Leon S. Darkowski, Catholic, and LT John E. Zoller, Protestant, set out together to cover as many of the stations as possible during Christmas week. The circuit riders, traveling mostly by Skytrains, covered about 2,500 miles in that time. Wherever they called they conducted Advent Services for each faith.

Except for WESTWIND and WYANDOT, sojourners in the warm African clime en route south, it was the whitest Christmas many of the men will ever know.

F. J. (SANTA) GLAWSON ARRIVES NAF.

Panorama

THIS BEAUTIFUL reproduction is a duotone suitable for framing. It is a panoramic photograph of the rugged Admiralty Range along the northeast coast of Victoria Land just behind Hallett IGY Station. Mount Sabine, 10,000-foot queen of the lofty range, rises at the center of the picture. The photograph was made by J. S. Halsey PH 2, USN and is an Official U. S. Navy photograph.

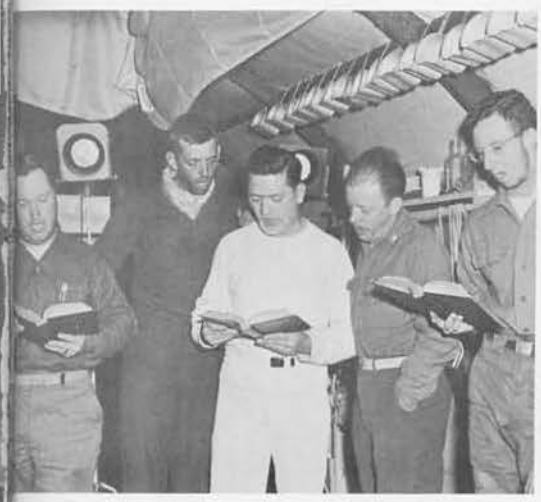
ADDITIONAL COPIES (UNCREASED) OF PHOTOGRAPH AVAILABLE AT 50C EACH.

WRITE: THE DORVILLE CORPORATION, PAOLI, PENNSYLVANIA.

GIVE NAME, MAILING ADDRESS AND ENCLOSE CASH OR MONEY ORDER.

FOUR-COLOR SEPARATIONS COURTESY COLLINS RADIO CORPORATION

ELLSWORTH had a real back-home celebration beginning with Christmas mail (first in over a year!) flown in by MAJ Lassiter (here handing out packages to a tense crew) and ending with lighted tree trimmed by Dyrdal and Fierle.



ASHORE and afloat, it was Christmas! Christmas carols at Marble Point (left) are sung by Lipsey, Smith, Mohalloy, Conger, and Dean. Carl Eklund (center) opens a lively package at Wilkes as a mischievous Santa reveals more than ornithological interest in bird-banding operations. Christmas dinner aboard BURTON ISLAND was celebrated among the bergs and growlers just north of Scott Island en route south. (right). CDR Brantingham, CO of AGB-1 (right in photo) celebrates the day in the crew's mess beside gaily decorated Christmas tree.

CIRCUIT riding Chaplains Zoller (left) and Darkowski (right) carried the Christmas message many a cold mile.

SEASON'S GREETINGS ON AURORA TOWER. ➧

Task Group 43.6– WESTWIND

CAPT E. A. McDonald, CTG 43.6, led his assault on the Weddell Sea from the direction of South Africa in *Deep Freeze III*. Experience from Phase II plus study of earlier expeditions led to this decision; a later start to benefit from easier ice conditions was also agreed on. Both moves paid off well.

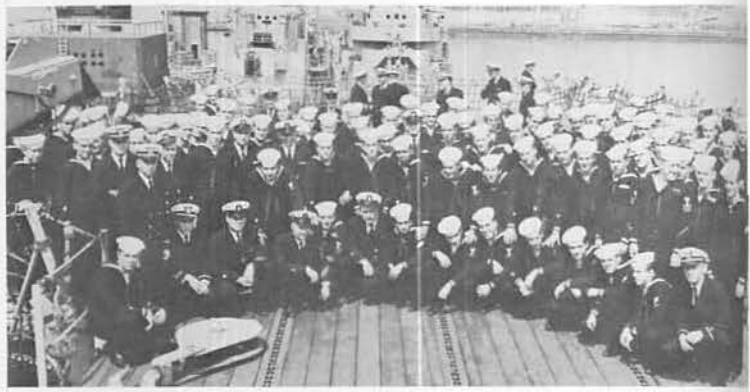
Arctic-wise WESTWIND, under command of CAPT W. J. Conley, Jr., USCG, was making her debut in the Antarctic but Weddell-scarred WYANDOT, commanded by CAPT F. M. Smith, USN, was on her third *Deep Freeze* tour. Her hull strengthened by an additional layer of steel over vulnerable areas, her propeller protected by iceguards, and her rudder protected by an iceknife, WYANDOT was ready for a fight.

WYANDOT carried some 2,200 tons of cargo for Ellsworth, scientific and Naval support personnel for relief of the station, an MCB unit, and a supercargo made up of U.S. and foreign observers and the press. WESTWIND carried a Navy HU-2 detachment and an oceanographic team.

A very rough passage ensued between Capetown and Bouvet Island, that "child of the mist" only five miles by four miles in size but great in legend. On New Year's day WESTWIND sent out a helicopter on a photographic reconnaissance. The volcanic isle, uninhabited though claimed by Norway, was favorably reported as possible site of a meteorological station.

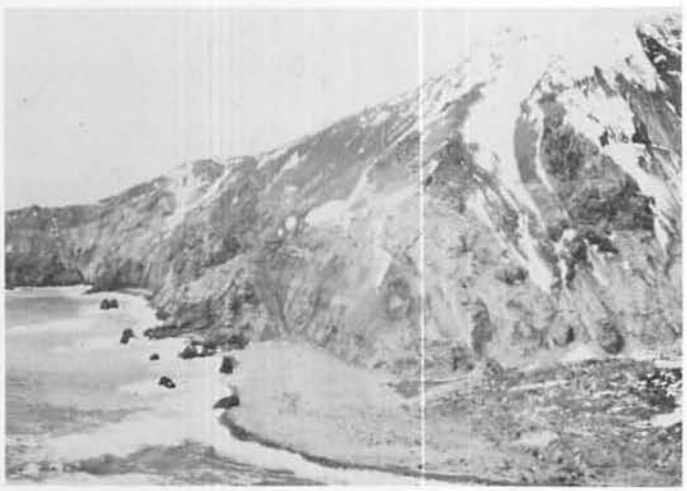
Squired by penguins paddling alongside, the ships moved to and through the Weddell Sea pack. As the pack thickened WYANDOT was hard pressed and sustained a minor casualty—a bent propeller blade. With helicopters in the van WESTWIND bulled a path with only minimum icebreaking required and, on the afternoon of February 6, 1958, the two Ws emerged from the pack. The gleaming white cliffs of Filchner came in view the following afternoon and the Task Group turned right, following the curve of the ice shelf, plotting its outline by radar.

En route to Ellsworth a friendly call was paid to the British IGY base at Halley Bay and to a neighboring emperor penguin rookery. Then the Task Group sailed for Ellsworth arriving on the 9th, a day early!



WESTWIND'S officers, men and (opposite page) its CO, → the "Red-headed Irish Icebreaker," CAPT W. J. Conley, Jr.

BOUVETOYA, tiny island in South Atlantic-Indian Ocean, → (below and in background above) was subject of first aerial photo reconnaissance in history by WESTWIND.



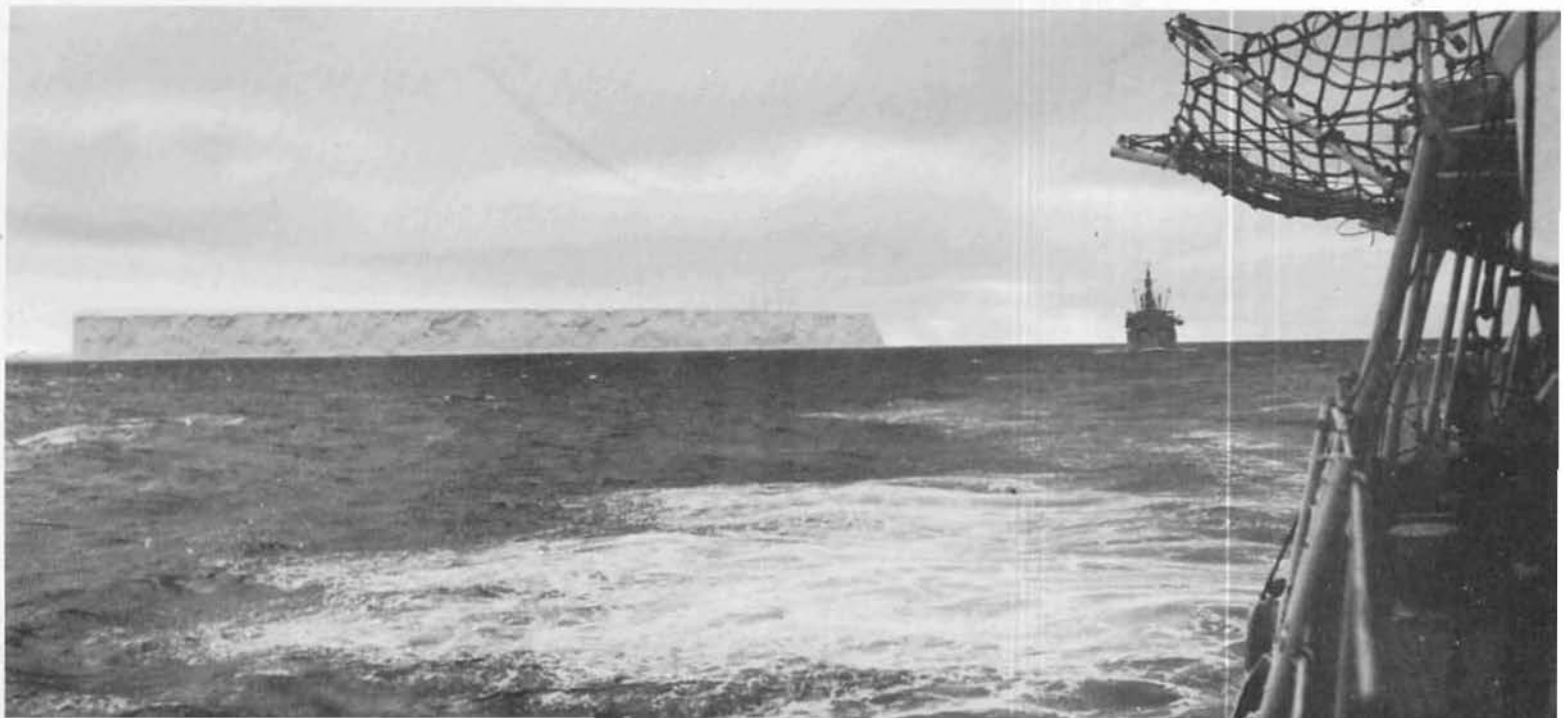
← TASK GROUP commander, CAPT E. A. McDonald, meets with other officers to discuss Weddell operations: (left to right), LT Tidd, CDR Wordell, CAPT Smith, the CTG, CAPT J. M. Hermanson, Dr. Brennen, unidentified officer.

. . . WYANDOT and Weddell

CONSUL General at Capetown, South Africa comes aboard WYANDOT for official visit. CDR Wordell (center) explains KA-92's compass to Dr. Dater, LT Margalet (Argentine Navy), LCDR Jarpa (Chilean Navy), Glorces Dhonneur (French CIU).

HALLEY BAY VISIT TO SNOOTY PENGUINS, FRIENDLY UK IGY MEN.

WYANDOT, PASSING TABULAR BERG, FOLLOWS WESTWIND TO ENTER WILD, TREACHEROUS WEDDELL SEA.



SUMMER

And Then Came Big ARNEB, Solo

With CAPT Robert M. Hinckley, Jr. in command, the veteran of World War II's Pacific campaign and of two previous *Deep Freeze* expeditions headed south. Steaming through waters unsailed and uncharted for 50 years, ARNEB got down to business pronto . . . IGY business.

In addition to conducting cosmic ray research (in which she was to engage for the rest of the cruise) ARNEB recorded changes in the hydrographic features of the South Pacific.

In Port Lyttelton where the big cargo ship arrived early in January, RADM Dufek shifted his flag to ARNEB for the trip to the ice. A full schedule lay ahead—the supplying of Hallett, then on to Wilkes (a journey of more than 1,000 miles through perilous waters), finally home by way of Australia, Africa, South America, and what have you in order to conduct the very extensive scientific program.

At midday January 18 the magnificent mountains behind Hallett were sighted through the mist and ARNEB, which had traveled in company with GREENVILLE VICTORY from New Zealand, dropped anchor in glass-still Mowbray Bay. The relatively ice-free bay and favorable winds aided the offloading operation and took only 72 hours to land 900 tons of supplies and 15 wintering-over personnel for the station.

ARNEB and ATKA then linked arms and sailed off in company to Vincennes Bay to deliver 900 more tons of supplies and 27 relief personnel. Even with chronic boiler trouble old KA-56 could do a day's work!

ARNEB'S OFFICERS, CAPT HINCKLEY (CENTER).

LCDR SLAYTON, OPERATIONS DEPARTMENT: →

LT MOSLEY, ENGINEERING DEPARTMENT: →

LT WALSHE, DECK DEPARTMENT: (LEFT) →

LT HAMILTON, SUPPLY DEPT.: "S" DIVISION.

LT BARRETT, NAVIGATION; MEDICAL DEPT.

ARNEB'S DIVISION CHIEFS. ➧

"OC", "OI", AND "OE" DIVISIONS, OPERATIONS.

ARNEB'S CREW WEAR HEAVY CAMPAIGN RIBBONS.

(READING FROM OPPOSITE PAGE) "A," "B," "E," "F," AND "R" DIVISIONS OF ENGINEERING.

FIRST DIVISION; SECOND, THIRD, FOURTH, AND "X" DIVISIONS, ARNEB.

7,000-TON ARNEB RIDES AT ANCHOR AFTER ARRIVAL OFF CAPE HALLETT; ADMIRALTY RANGE, BACKGROUND.

LIBERTY ARCH FORMED BY ARNEB SAILORS.

EXPERIENCES of 30 years' exploration are recounted to men of ARNEB by Sir Hubert Wilkins, noted Australian polar explorer during his last trip "south."

CTF43 PIPED ABOARD ARNEB AT LYTTELTON.

THE SUMMER SUPPLY STORY:

How They

It took ten days of rough icebreaking to bring GREENVILLE VICTORY alongside the unloading site at Kainan Bay; it took five days to empty the holds of LAS cargo. That was the way the season began at Little America—the worst came first. From then on at the Ross Sea side of Antarctica it was routine.

After the first wave of offloading, GLACIER and ATKA moved out of port for McMurdo and points east, ATKA convoying "The Big Green" through the still dangerous ice.

Early in January 1958 ATKA returned bringing NESPELEN with 150,000 gallons of avgas. The channel had perversely blockaded itself with huge ice floes (some 6,000 square yards in size) and three days were spent waiting for a lead to open in the bay ice. When it did, NESPELEN got through its job in only 13½ hours, bade farewell, and returned to New Zealand in filthy weather with conked-out radar.

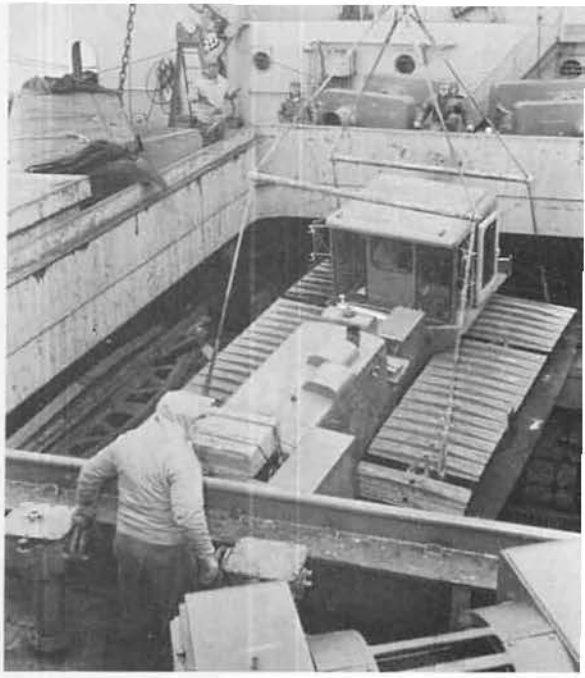
One whole month went by before another visitor arrived. Then NESPELEN, having delivered the final gasoline cargo to NAF, arrived with 50,000 gallons to top off Little America. It was a quick turnaround trip, done within the space of two days, the oiler mooring directly to the barrier's edge as the bay ice had all gone to sea.

GLACIER, the show opener, rang down the curtain. She returned to LAS on February 10 after two months' absence. Her icebreaking capabilities now temporarily suspended, the GB-4 was running a "ferry service" between LAS, McMurdo, Hallett, and New Zealand carrying cargo and passengers. She unloaded cargo and diesel fuel to the barrier. Her March 8 visit was the kiss-off and, after an exchange of cargo and passengers, GLACIER sailed and Little America V took in the sidewalks for another season.

"WHEN THEY TOLD HIM HE WAS GOING TO L.A. HE THOUGHT THEY MEANT CALIFORNIA!"

Offloaded at LAS

'COPTERS SPEED UNLOADING AS DEMOLITION EXPERTS CONFER.



GREENVILLE VICTORY UNLOADS CAT.

GREENVILLE VICTORY MOORED TO ICE.

ALVIN MILLER DIRECTS OFFLOADING OF CARGO.

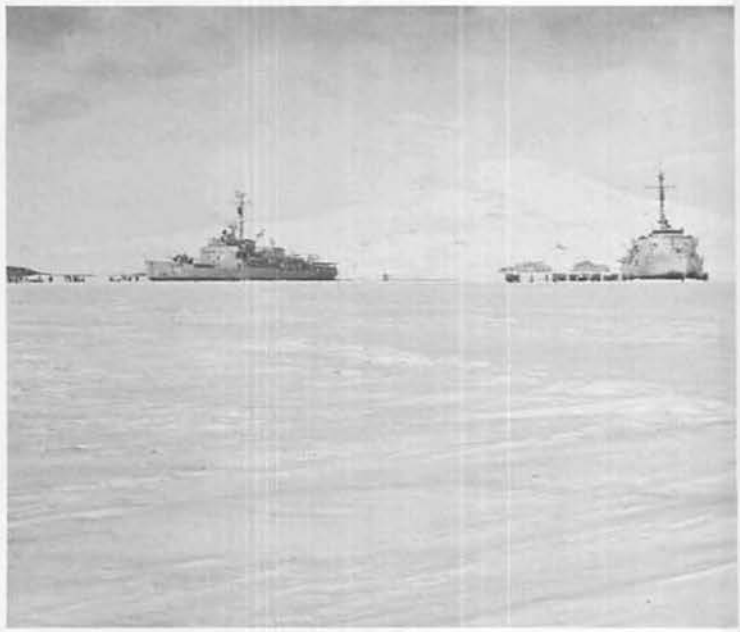
DEEPLY RUTTED ROADS TO LAS FROM BARRIER.

SUMMER

. . . And Then at Hut Point

Unloading at McMurdo was routinely hectic. At one time there were six ships berthed in the vicinity —ATKA, BURTON ISLAND, GLACIER, NESPELEN, TOWLE, and the New Zealand supply ship for Fuchs and Hillary, ENDEAVOUR. McMurdo was a terminal both for gasoline and POL storage and for ships traveling to other points—Hallett, Marble Point, Wilkes, and New Zealand's Scott Base at Pram Point.

At the beginning of the season the stubborn resistance of the bay ice necessitated ATKA shuttling some GREENVILLE VICTORY cargo up channel to Hut Point and from time to time ice conditions there were troublesome but beatable. On March 11 McMurdo closed maritime operations as GLACIER left.



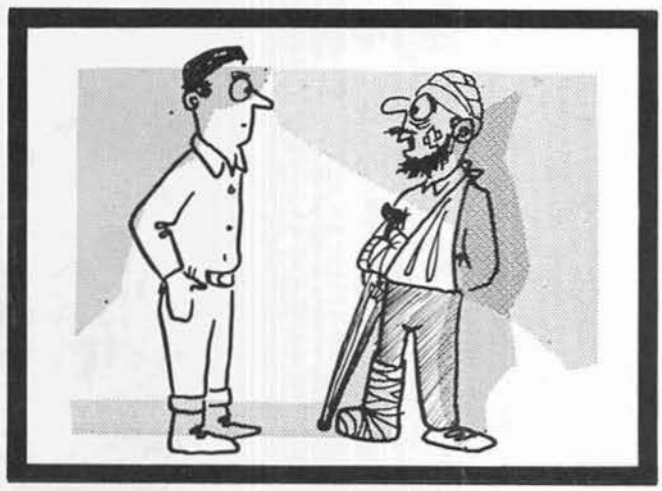
BURTON ISLAND, ATKA TIE UP AT McMURDO.

ATKA UNLOADS TO SLEDS AND HELICOPTER: →

AT LAS:

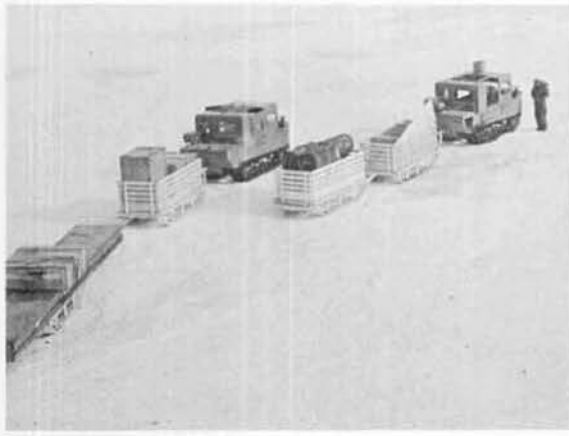
ED CAMP CHECKS D-4 BOOM AT WARM-UP.

UNLOADING, RECORDING ON 24-HOUR BASIS.



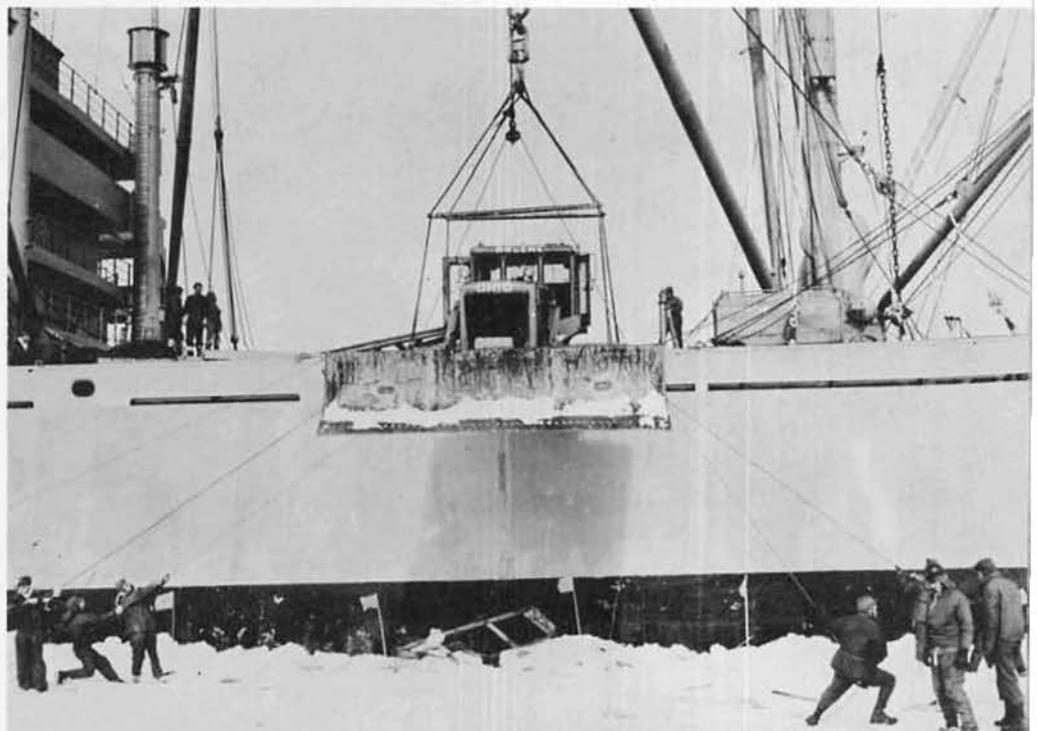
"—AND THEN ALONG ABOUT AUGUST I SAID TO MYSELF: 'CHEER UP, THINGS COULD BE WORSE.' . . . SO I CHEERED UP . . . AND SURE ENOUGH— THINGS GOT WORSE!"

ATKA LEADS NESPELEN THROUGH CHANNEL PAST INACCESSIBLE AND TENT ISLANDS AFTER UNLOADING.



← TRACTOR-, WEASEL-DRAWN SLEDS ARRIVE EMPTY, RETURN LOADED FROM BAY-ICE OFFLOADING SITE.

ESTIL MILLER DEFROSTS INDOORS.



D-8 COMES OVER SIDE OF TAK-237. ⏵

DRUMMED DIESEL FUEL OFFLOADED TO BARRIER.

THE SUMMER SUPPLY STORY:

Oil for the Lamps

The story of oil—fuel and lubricating oil, diesel oil, and aviation gasoline—bulks large in the story of *Deep Freeze*. The very lives of participants depend on oil and gasoline—travel by land, sea, and air, heating, cooking, melting water, generating power, operating equipment take huge quantities of petroleum products.

Practically every ship and plane converging on Antarctica as part of Task Force 43 carried POL in some quantity. The fleet tanker NESPELEN with its 600,000-plus gallons capacity carried bulk aviation gasoline to replenish the huge storage tanks at LAS and NAF and the frozen-in YOGs at Hut Point. The rest of the bottoms, including the Weddell Sea fleet, held drummed fuel and avgas.

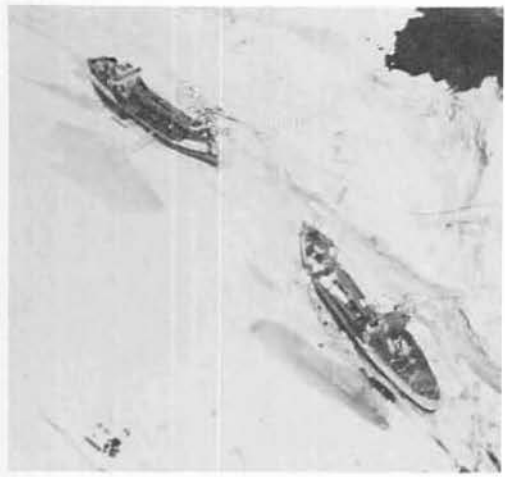
Here is a cross-section of the Antarctic oil story showing in picture and word what it took to keep the galley stoves cooking, the four-cache Byrd Trail moving, the Otters flying deep into Edith Ronne Land, the four scientists safe and warm on Wilkes Icecap.

TRANSFER of diesel fuel for station use was a tedious job. Left, fuel is pumped from 55-gallon drums into sled tanks on barrier for transfer to station storage tanks.

Refueling tractors (center) from central storage. Filling galley fuel tank (right) from tractor-drawn "tanker" was a prize job during winter night and blizzards.

BYRD TRAIL posed major logistics problem. Navy R4Ds with huge interior tanks (center, being filled) were flown from LAS or Byrd Station to caches along tractor trail in Byrd Land. Fuel caches consisted of 3,000-gallon rubber tanks (right, being serviced) buried in the snow and marked by trail flags for easy spotting in featureless icecap.

# of IGY—Fuel, Lube, Diesel and Avgas, Too



NESPELEN offloads avgas. Oiler is moored to ice by deadmen (far top). Fuel line is passed from ship to shore where it is hitched to 250,000-gallon storage tanks (at LAS and NAF) or to YOGs (at McMurdo). Two YOGs, towable tankers, were moored safely (as was thought) in permafrost of hill on north side of Hut Point (righthand picture).

PLANES were gassed up on runway (right) by big tank trucks which got their supply of avgas from three-mile fuel line extending from storage tanks to flight line.

TRAIL and traverse parties received fuel and lube oil in drums by overland tractor-drawn sleds (Wilkes' S-2 ice-cap base) or by air delivery (Ellsworth traverse party).

TRACTOR train halts at Mile 380 where VX-6 laid fuel cache; train took on 5,400 gallons at this call. Note trail flags marking tanks, valved standpipe emerging from tank. Automatic portable pump (right) is used at Mile 120 to fuel tractors. Liv Base was similarly equipped with buried tanks for emergency Pole-bound plane landings.

NEW TYPE INFLATABLE FENDERS FOR SHIPS.

Fueling Mission

EXCERPTS FROM NESPELEN INDIVIDUAL UNIT REPORT

AT MCMURDO: "The fueling hose had already been laid to the edge of the fast ice, a distance of about four miles from Hut Point storage tanks. Army Signal Corps telephones . . . were set up along the fuel line for communications between the ship and booster stations and provided an easy and excellent hookup. Pumping off avgas commenced immediately after the telephones were tested and continued slowly due to booster-pump breakdowns and leaks in the hose. Fifty-two hours were required to pump 495,000 gallons."

AT LITTLE AMERICA: "On 5 January . . . the prepared mooring site was reached. A steel pipeline having been laid, offloading commenced at once. The bay ice to which the ship was moored was far from firm, with a large crack opening slowly, and a marked crevasse a short distance from the stern. The 150,000 gallons of gasoline were transferred in 13½ hours, but by that time the crack had opened wide and the bay ice had started to move seaward. To avoid having to suddenly break the pipeline, the ATKA held back the loose ice floe with her bow. Immediately after completion of offloading and embarking three passengers, the NESPELEN exited Kainan Bay."

AT NEW ZEALAND: "The entire return to New Zealand was made in very rough weather. . . On 15 January the NESPELEN reached Port Lyttelton, where word was first received that it would be necessary to pick up part of our cargo in Auckland. 445,805 gallons of gasoline were loaded at Lyttelton while the ship reprovisioned and the radar was repaired with the assistance of an ETC attached to the Task Force headquarters.

"Leaving Lyttelton for Auckland on 18 January, the NESPELEN . . . reached Auckland on 20 January. Standard Oil Company was ready to load us with the remaining 200,000 gallons of gasoline, and our stay in Auckland was brief. Before departing on 23 January frozen foods and spare parts for the ENDEAVOUR and 2,000 pounds of mail for Antarctic stations were loaded aboard."

AT MCMURDO: "Our arrival at McMurdo coincided with the return of the GLACIER from Wellington, but the two ships did not come in sight of each other until within the vicinity of Beaufort Island. Ice conditions at McMurdo were found to be vastly changed; all the fast ice had moved out, leaving a ready access directly to the YOGs. However the outboard YOG had broken loose and had to be returned and moored before transfer of fuel could commence. The exciting events which surrounded

(Continued on page 190)

THE SUMMER SUPPLY STORY:

Offloading

HAZARDOUS Hallett's constantly shifting icepack and capricious weather outwitted ATKA's first try at ice reconnaissance. Second attempt succeeded and by January 12 BURTON ISLAND, TOWLE, ATKA, ARNEB, GREENVILLE VICTORY were anchored there. Unloading commenced the following day and was completed by the 16th when all ships departed, TOWLE (opposite page) to New Zealand, ARNEB (below) and ATKA to Wilkes, others to NAF.

ATKA offloads by "Mike" boat to low-lying rocky beach. It was crew's first land liberty after 51 days' icebreaking, escort.

at Hallett

VISITORS included CTF43 and Cdr Merle Macbain, PIO (left), a Seabee survey party (center), and a geological survey group of eight New Zealanders (right) with Sir Hubert Wilkins (rear, second from left) and station Co, Lt Tur (rear, second from right). Towle and Arneb departed with relieved personnel, including Dr. Shear, in mid-January.

Then Off to Wilkes for ATKA, ARNEB

A Tribute to the GLACIER

When GLACIER completed the tremendous task of cutting the 14-mile-long channel from Cape Royds to the vicinity of Hut Point in December 1957 she had her foot inside the icebreakers' "hall of fame." Gouging through solid bay ice from six to eight feet thick —a two-week's job—cost only one blade from her starboard propeller. (One was already gone from her port screw.) In the words of Admiral Dufek: "That such a task was completed with so little damage speaks well for the design of the GLACIER . . ."

When, after drydock repairs in Wellington had restored her, GLACIER holed her bow on the return voyage on a relatively small ice floe, recovered from a major operation sealing up the wound, and stayed on to the bitter end doing yeoman service in the thickest weather encountered—she was all the way in the place of immortals. It was irony that a puny ice chunk did to GLACIER what more than 100,000,000 tons of flint-hard ice could not do. Engineers would probably call it metal fatigue—the weariness that comes from the terrible pounding of three seasons of Antarctic ice. But another season called and GLACIER answered. She is "down south" again. Gentlemen, rise! . . . to *The Queen of the Ice!*

PUTTING FINISHING TOUCH ON NEW BLADES.

NESPELEN CONTINUED

the capture of the YOG were summed up . . . in the following dispatch: '. . . IN NINE HOURS NINETEEN MINUTES ON 1 FEBRUARY TANKER DELIVERED 600,000 GALLONS GASOLINE TO NAF FUEL DEPOT AT HUT POINT, PUMPING IN TEMPERATURES RANGING 15°—25° WITH 22-KNOT WINDS. 100,000 GALLONS STORED IN AIROPFAC TANKS, BALANCE IN TWO YOGS FROZEN IN SINCE 'DEEP FREEZE I. ON ARRIVAL NESPELEN FOUND YOG-70 FLOATING FREE DUE COMPLETE BREAKUP FAST BAY ICE. RUNAWAY YOG CAPTURED IN SCATTERED ICE FLOES AND RETURNED TO MOORING SITE. YOG THEN TOOK TREACHEROUS STARBOARD LIST AND WAS STABILIZED BY STRATEGIC LOADING. NESPELEN PRESENTLY ENROUTE LITTLE AMERICA TO DELIVER LAST 50,000 GALLONS.' "

AT LITTLE AMERICA: "This time in Kainan Bay the ship was moored directly to the barrier edge, which had been levelled to a height of six feet above our highest deck. . . .

"An attempt to utilize two large rubber barrier-type fenders was aborted because the ship was unable to inflate them, and the fenders were left at Little America. The NESPELEN completed transferring the remainder of its cargo in seven hours.

"On 10 February we arrived for the last time at Port Lyttelton. . . The NESPELEN had spent 22 days and 17 hours south of the Antarctic Circle, and upon return to its home port will have steamed close to 29,000 miles on *Deep Freeze III.*"

—LT GEORGE C. SUP, USN.

They Also Serve—

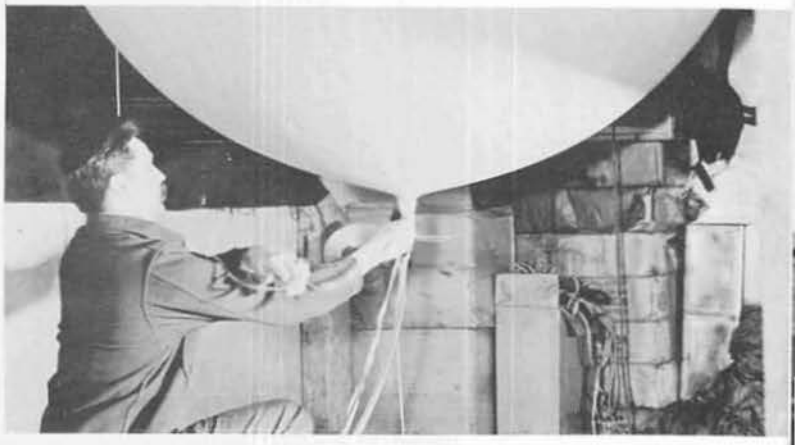
WITHOUT the lift that comes from service on the ice, men of the Air Force that served in New Zealand "behind the lines" deserve much credit for a job well done. These few are singled out to stand for the group: Val Marshall and John Robert (GCA Unit), John Griffin and Roger Laramee (lower left), men of Weedons base (right).

ANTARCTIC DAYBOOK

DECEMBER 23:

BAY-ICE runway at McMurdo was closed indefinitely to wheel aircraft operations due to deterioration. Hazardous pot holes up to two feet deep became progressively worse.

DECEMBER 30:



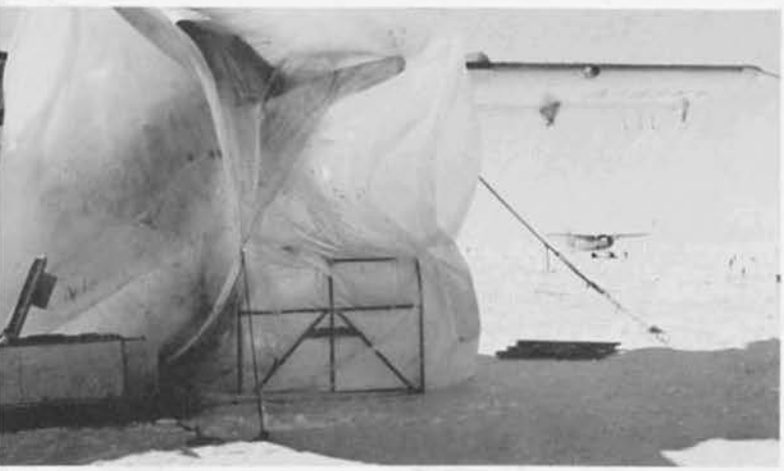
RECORD high for Antarctic radiosonde balloon was reached by South Pole Station entry: 20 miles. Previous altitude record for the continent was held by Byrd Station.

JANUARY 4-6, 1958:

FIRST overland journey to Pole since Scott's in 1912 was completed January 4 by Sir Edmund Hillary, four others.

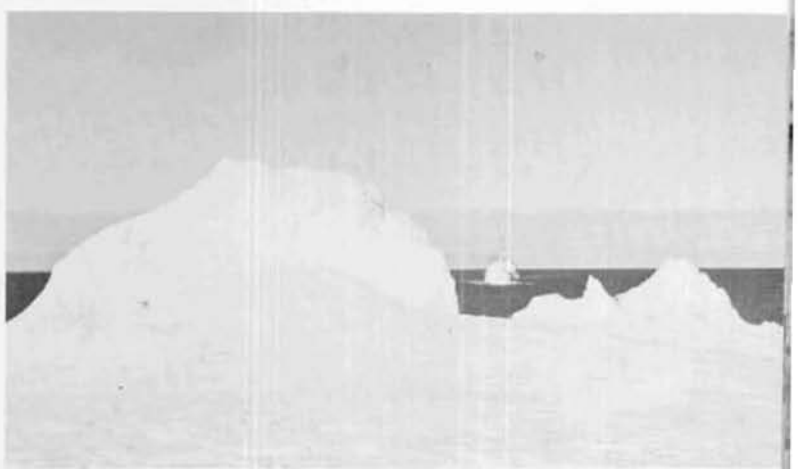
Hillary (with Admiral Dufek, center) flew back to McMurdo on the 6th (right) to await Fuchs' arrival at Pole.

JANUARY 6:



RAF pilot John Lewis landed at Scott Base after completing the first crossing of Antarctica in single-engine plane, an Otter; he took off from UK Shackleton Base.

JANUARY 9:



WESTWIND leads way to Ellsworth's ice shelf to smooth mooring site for following WYANDOT. Transit through pack was fast, relatively painless, arrival was early.

THE SUMMER SUPPLY STORY:

How They Offloaded at Weddell

HELICOPTER, ship-based, flew ahead to recco ice conditions (above) and to bring CTG 43.6 in advance to pick mooring site. Sun is at lowest point for 24-hour period.

At 2010 on January 9, 1958 WESTWIND slid alongside Ellsworth's ice shelf and, as wintering-over personel waved and shouted encouragement, carved out a mooring site for WYANDOT.

Offloading began early next morning: booms were rigged, heavy equipment was put ashore, cargo was loaded on sleds and hauled to the station some two miles in on the ice shelf. Work was continuous for five days with Army specialists unloading and 40 men from WESTWIND stowing cargo at the station. The job was finished just in time as the shelf opposite #4 and #5 holds began to deteriorate. Careful planning had paid off. LT Clifford Calais, Task Group Cargo Officer, had supervised WYANDOT's loading with an eye to the rule "first in, last out" and everything dovetailed perfectly.

While work proceeded in the mildest of weather (temperatures ranging from 15° to 41°!) wintering-over parties were transferred, experimental ice demolition was practiced, WYANDOT succeeded in burning off bent portion of propeller blade, grand tours of Ellsworth Station were arranged for crews of both ships, and CAPT McDonald took a group by helicopter to visit Argentine's General Belgrano Base 30 miles to the east where a disastrous fire had destroyed most of the scientific records of a year's work.

With unloading practically finished WESTWIND pushed south and west gathering oceanographic data, returning to the shelf January 16. Change of com-

(Continued on page 195)

COAST GUARD CUTTER WESTWIND WITH CAPT McDONALD AND STAFF ABOARD APPROACHES LANDING SITE.

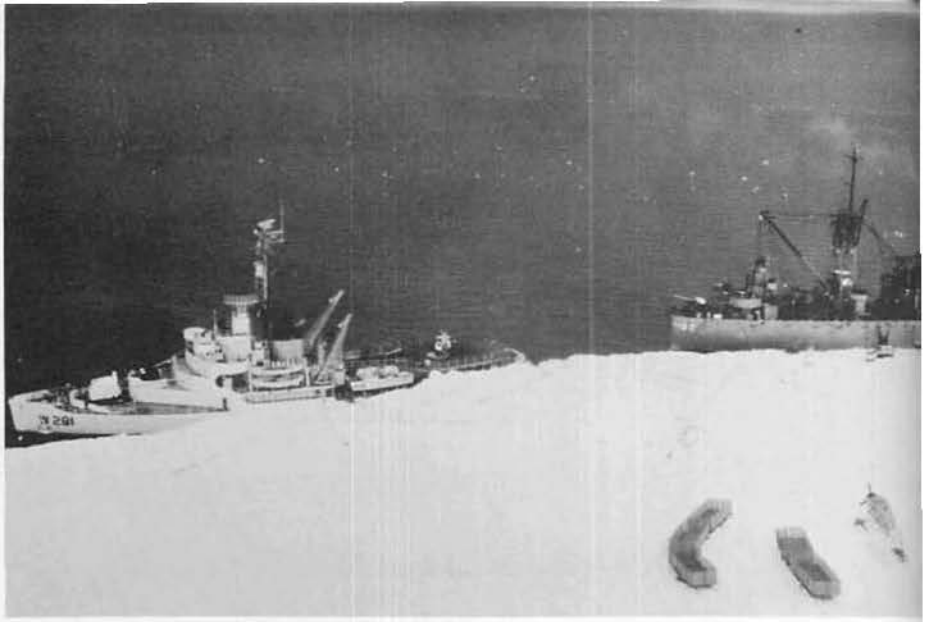
MOORING operations for Wyandot: As WESTWIND waits offshore, M-boats ease cargo ship against barrier (top) and tractors hold her steady for anchoring deadmen. Below, ship snugged to shelf by icebreaker, offloading begins.

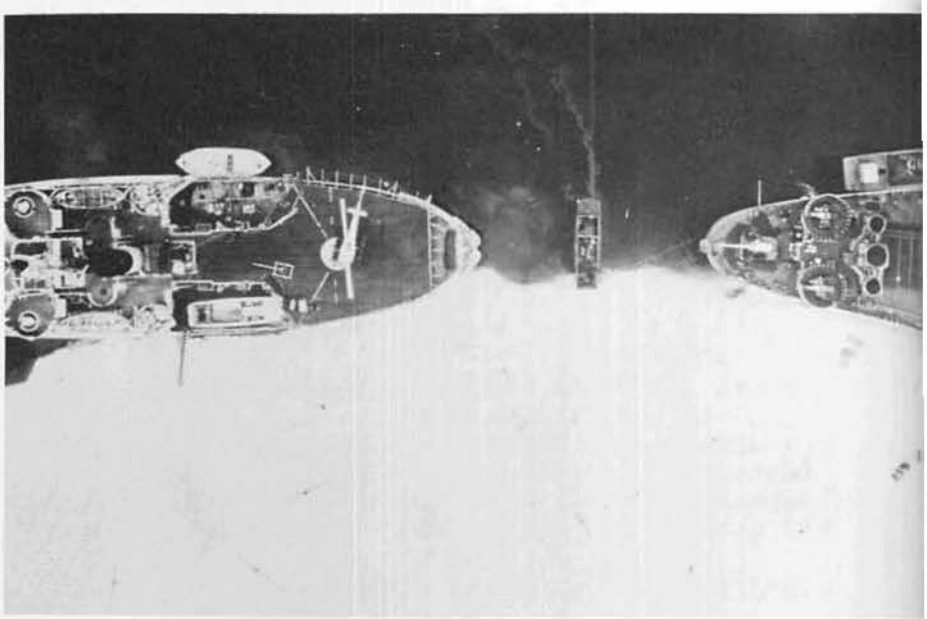
ELLSWORTH MEN EAGERLY WELCOME NEWCOMERS.

POINTING out suitable mooring site to CAPT Ronne, CAPT McDonald (right) says, "We'll put her right there."

UNLOADING BEGINS EARLY MORNING JANUARY 10.

WRANGLING CARGO AROUND THE CLOCK.

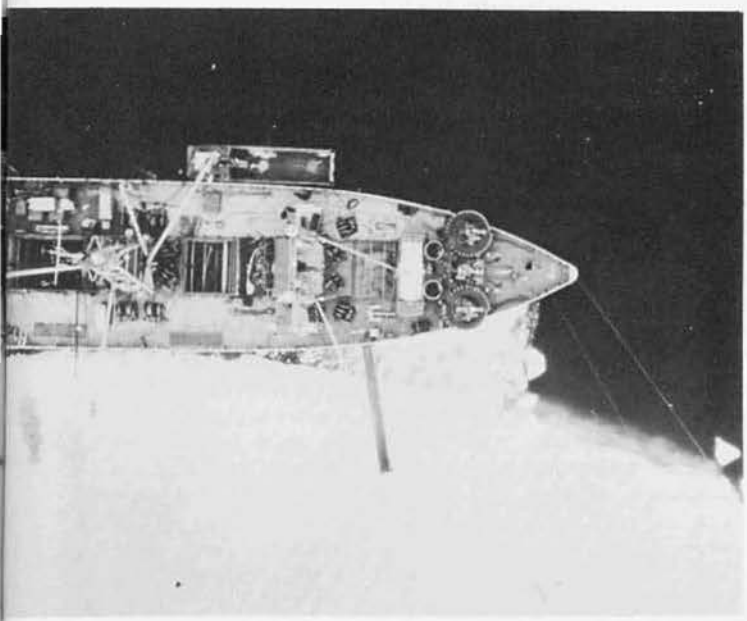




OFFLOADING views from side and directly overhead show WESTWIND at left, WYANDOT at right, deadmen-anchored lines crisscrossing on ice. Ice shelf held up fairly well under tremendous pressure of unloading.

HELICOPTER-EYE VIEW OF ELLSWORTH STATION.

"NOTICE ANY CHANGE IN THE WINTERING-OVER PERSONNEL SINCE LAST JANUARY?"



However during seven days of 'round-the-clock pounding, steep slope and cracks in shelf necessitated winching sleds from tractors which stood well back from edge of ice.

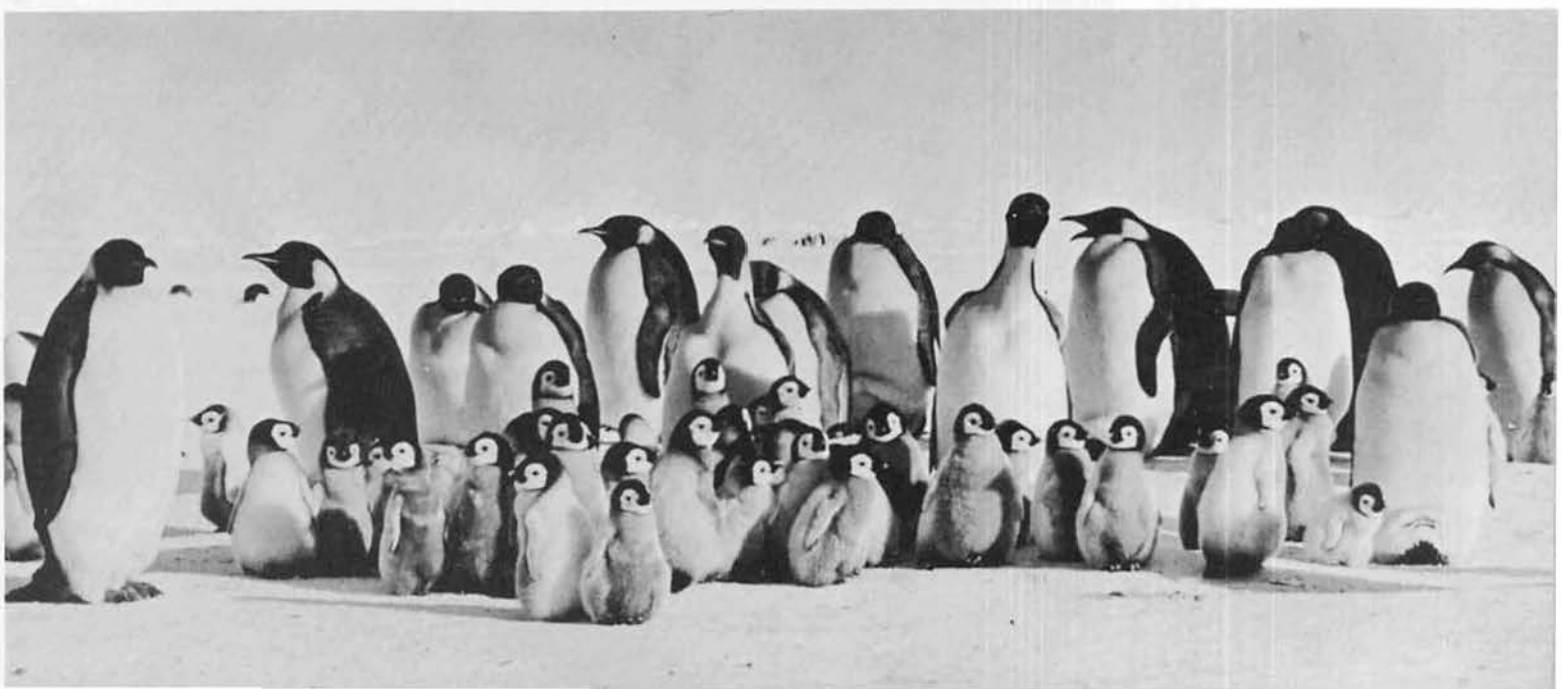
mand ceremonies took place, at her return, in front of the station where CAPT McDonald and Dr. M. G. Morgan spoke briefly on behalf of the Navy and USNC-IGY and CAPT Ronne turned the station over to his successors, Dr. Brennan and LT Tidd.

It was time to leave—but there was a hitch. More than 200 miles from Ellsworth in Edith Ronne Land were several members of the traverse party who were due to depart with the ships. Bad weather prevented their being picked up by air until the morning of January 17 when two aircraft got through. The entire party was hoisted out of the wilderness leaving tractors and other equipment behind to be recovered at a later date. Finally at 2130 of the same day Task Group 43.6 pulled away from the Filchner Ice Shelf with a gala send-off – waving, cheering, and colored flares.

The return course paralleled that of entry. As the ships passed Halley Bay a helicopter went in and picked up last-minute mail for England from the UK base. Then a turn to the north and TG 43.6 reentered the pack with WESTWIND leading. Again it was fairly easy going (in spots) and two days sufficed for transit. By noon of January 22 the pack had been cleared and the double-W team parted company, WYANDOT proceeding to Buenos Aires and WESTWIND to greater glory in the Bellingshausen Sea. Weddell Sea operations for 1958 were ended with a successful completion of the mission – and not an important casualty to man or ship.

After the party broke up and the company was gone Ellsworth hands hove to and stowed the rest of the 2,200 tons of equipment and supplies. The ten civilian scientists and 30 Navy men who were to winter over took keen interest in the Air Force's Electronic Test Unit. This group of 10 men under MAJ Lassiter were rushing to complete their "raydist" system to provide accurate positioning for aerial photography by electronic instruments precisely located in a pattern of predetermined control points.

HANDSOME EMPERORS WITH GOLD-HUED PATCHES ON NECK OFTEN GROW TO HEIGHT OF FOUR FEET.



BELGRANO Base, close neighbor to Ellsworth, maintained close and friendly relations. Here visitors from Argentine base discuss operations with CAPT Ronne.

DISASTROUS fire at Belgrano two days before Christmas destroyed one of its buildings, burning most of the scientific records compiled during a whole year of hard work — plus a supply of spirits. Ellsworth "tourist" inspects snowed-over wreckage of building.

FRIENDLY visit to Belgrano by Ellsworth men found IGY man "Kim" Malville astride snow-cycle (left). Farewell gift from Argentines to men of Ellsworth was "Gina Lollobrigida," winsome sled dog puppy (right). The base used tough Huskies for local transportation. Needless to say, "Gina" became the pampered pet of Ellsworth, had no part of work harnesses.

SUMMER TRAVERSES

Brief Summary of

THE USNC-IGY Committee has provided interesting scientific highlights of purposes and results of the major *Deep Freeze III* traverses. Says the report:

BYRD IGY TRAVERSE

"The Byrd traverse party covered 1,180 miles from November 19, 1957 to February 20, 1958. The purpose of this 90-day traverse was to determine the general nature of the ice and protruding mountains in Marie Byrd Land and in the Ellsworth Highland east of Byrd Station.

"One year earlier a traverse party had traveled along the 650-mile trail from Little America to Byrd Station, taking measurements of the ice thickness and properties on the Rockefeller Plateau.

"From the Ross Ice Shelf-Rockefeller Plateau boundary to the end of the first leg of this year's Byrd Station traverse, the picture is generally uniform. The underlying topography is alpine, with ice thickness varying between 2,000 and 9,000 feet. All but a few of the peaks of the rock floor are below sea level, and the major portions far enough below to be underwater even if the ice were removed and the land allowed to rise without its heavy ice burden.

"The second leg of the Byrd Station traverse shows quite a different picture with a smooth bottom, great ice thickness of 7,500 to more than 11,000 feet, and broad gravity anomalies.

"The underlying rock along the final leg of the traverse, southwest and then west from the Sentinel Mountains, shows still another character. Surfaces there are very rough and mostly above sea level, in several places breaking the ice surface to form nunataks. One hundred miles east of Byrd Station, ice 14,000 feet thick was found resting on a rock bed 8,200 feet below sea level. This is believed to be the thickest ice layer measured anywhere in the world."

The Sentinel Mountains referred to above are an Ellsworth Highland range discovered and photographed from the air in November 1935 by Lincoln Ellsworth. During *Deep Freeze III* exploration they were found to be more extensive than had previously been reported. Both VX-6 aerial reconnaissance mapping and IGY ground traverse records have added great sheafs of data to geographical knowledge of this area. The IGY report continues:

ELLSWORTH IGY TRAVERSE

"The Ellsworth traverse investigated the Filchner Ice Shelf and the inland ice of Edith Ronne Land. In addition to its glaciological studies, the Ellsworth party also investigated mountains and rock outcrops in and near its route of travel. One important goal of this traverse was to occupy a point that could be reached by the Byrd Station traverse of 1958-59 *(Deep Freeze IV)*, thus providing a link across which data could be correlated.

"The party traveled 1,250 miles in 81 days, between October 28, 1957 and January 16, 1958. It deviated about 120 miles from the planned route to make

Accomplishments

geological studies and collect rock specimens at a newly discovered mountain range at 82°30'S and between longitudes 50° and 54°W, which may be part of the Pensacola Range. Black stratified bands were noted high on the mountains and a 5,000-foot escarpment was discovered on the southern side. Evidence of mineralization was present as abundant green malachite stains. Some of the bright green stains were visible at 100 yards distance.

"Large ice-free areas also were found along the northern foot of the mountain range. One of these dry valleys contained a fresh-water lake about 100 yards in diameter, partly ice-free, caused undoubtedly by melting of snow in contact with the dark ground which heats rapidly in the brilliant sunshine. The lake contained abundant plant life and specimens were collected for botanical analysis.

"A 2,500-foot-high, ice-covered island extending for about 230 miles south and west from Gould Bay was discovered. Seismic soundings near its eastern extreme showed the land surface beneath the island's ice mantle to be at about sea level. Other islands, whose contours were not fully delineated, were seen still farther westward."

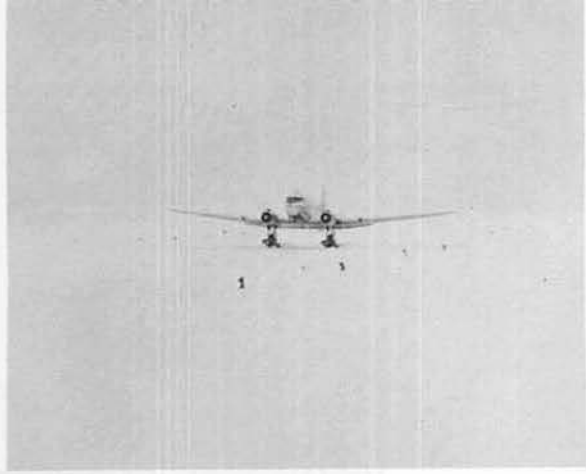
Discovery of the Pensacola Range is a Navy accomplishment with the great chain of peaks first sighted on the ninth—and last—flight of *Deep Freeze I*. A McMurdo-based Neptune made a transcontinental round-trip flight, via the Pole, 3,400 miles in total; during this significant flight the new range was discovered and photographed. A large segment of the chain named for the *Deep Freeze* leader, Dufek Massif, was first visited on surface by the Ellsworth traverse party December 10, 1957.

Describing the lengthiest traverse during which the scientists made 34 seismic soundings and 179 supplementary gravity readings, IGY says:

ROSS ICE SHELF IGY TRAVERSE

"The Ross Ice Shelf traverse party out of Little America Station traveled 1,440 miles in 113 days (October 24, 1957 to February 13, 1958). The party found that the shelf varies in thickness from 800 to 950 feet near LAS to 1,000 to 1,100 feet west of Roosevelt Island, gradually increasing to 1,400 feet near Beardmore Glacier.

"The shelf floats but is grounded at Roosevelt Island and probably in other shallow areas. The ocean depth varies from 2,000 feet at LAS to 2,600 feet near Minna Bluff. Ice temperatures 30 feet below the surface at Little America were found to be slightly warmer than at the surface because of the influence of ocean heat transported through the ice. As the scientists moved inland they found that ice temperatures slowly decreased; but at the foot of Liv Glacier — 400 miles nearer the Pole than Little America—temperatures rose again until they equalled those found at the station. This surprising result is probably caused by warm "Chinook" or "Foehn" winds blowing down the glaciers from the southeast."



USAF C-47 ARRIVES AT ELLSWORTH.

The "Raydist" System

When MAJ James Lassiter, USAF touched down at Ellsworth's ice strip in November 1957, his C-47 and the one to follow a week or so later were the largest aircraft ever to operate on the Weddell Sea side of Antarctica, the first to cross the Antarctic Circle from South America.

Lassiter's Electronic Test Unit had a unique task: to set up and operate a "raydist" system providing ground control for aerial mapping and making aerial photographs taken on previous Antarctic expeditions more useful for mapmaking.

The first job was to establish base positions in the field, a total of 13 control sites in the Ellsworth sector lying within a rectangle 150 miles by 40 miles. This was done by astronomical fixes. Each site was marked by brightly colored parachutes anchored atop 10-foot snow cairns; these bright spots showed up clearly on aerial photographs, gave cartographers visible control points.

The next job was to set up two field stations having 60-foot-high aluminum masts for relaying radio signals. The photographic plane sends out a radio impulse while in flight; the first control tower receives the signal, transmits it to the second control tower which, in turn, relays the signal back to the plane where the impulses are recorded and measured by the engineer. From the distances and times when a photograph is taken, highly accurate geodetic locations can be obtained.

Later in the summer season ETU moved west to Palmer Peninsula to establish 16 control points of the "raydist" system in that area.

ETU GROUP WORKED FOR MAPMAKERS.

"CONFOUNDED CHEEK! . . . THEY'RE GIVING US A TICKET FOR SPEEDING."

Man's Last Great Polar Journey

By NOEL BARBER

FOREIGN CORRESPONDENT, LONDON DAILY MAIL

AT A TIME when hundreds of U.S. Navy men and scientists were engaged in opening up Antarctica beyond the wildest dreams of man, two puny teams of explorers drawn from the British Commonwealth started out from opposite ends of the seventh continent and made their way on land to the South Pole.

Incongruous when set against modern methods of exploration, derided by some as a "boy scout" adventure, the Commonwealth Trans-Antarctic Expedition was in fact man's "last great Polar journey," to use the words of Shackleton, the great explorer who attempted and failed the trip in 1915 after his tiny vessel ENDURANCE had been crushed for 15 months in the ice of the Weddell Sea.

The leader of this extraordinary adventure was Dr. Vivian ("Bunny") Fuchs, English son of a German farmer who emigrated to Britain, and who is now Sir Vivian. His second in command was Sir Edmund Hillary, famed conqueror of Everest. Both men became known to hundreds of Navy men at the Pole and at McMurdo — the stocky, almost suave-mannered Fuchs, the ebullient, rangy, deep-chested Hillary with his never-ending stock of physical energy.

Fuchs had dreamed of conquering Antarctica for 20 years, but not until after World War II was he able to raise the necessary cash ($750,000) to finance the enterprise. It was one of the greatest living Englishmen, Sir Winston Churchill, who was directly responsible for interesting the various countries of the Commonwealth in advancing funds. Hillary was chosen to lead a support party from Scott Base, near McMurdo, while Fuchs set off from the Weddell Sea. My job was the more humdrum one of reporting both ends from the middle — in other words, "watching" each party advance across the polar plateau from my vantage point at the Pole itself.

Right from the start things went badly for Fuchs, leader of the entire expedition, travelling with the main party from the Weddell Sea. After nearly two years of preparation including two trips by ship with supplies from London, the main party with Otter aircraft in support left on its journey across Antarctica on November 24, 1957. Already it was three weeks later than planned — a hazardous three weeks of delay because of the ever-present danger of approaching winter if they did not keep up a steady average.

Many things had contributed to the delay — violent storms which had wrecked most of their buildings and washed away many stores, preliminary troubles during the Antarctic winter of '57 — but get away they did, with their Sno-Cats, Weasels,

(Continued on page 200)

THE SUMMER SUPPLY STORY:

How They

BURTON ISLAND AT BAT, ATKA IN FIELD.

Offloaded at Wilkes

WILKES rendezvous for ATKA, BURTON ISLAND, ARNEB took place January 24 after ATKA had probed pack for lead. (Left, ATKA leads ARNEB to anchorage for offloading, above.) Station (far right) was ice-free, showing rocky underpinnings not often visible. Below, (l. to r.), loaded "M" boats, guided by beachmaster, land cargoes which are hauled by "Cats" up steep grade to station. For eight days boats plied bay waters to complete successful mission.

STABLEMATES BURTON ISLAND, ATKA TETHERED AT WILKES.

. . . Then to Mirny —

GB-1'S CO AND USSR SCIENTISTS.

LONDON DAILY MAIL

NOEL BARBER is one of Fleet Street's best known roving correspondents. As foreign correspondent for the *London Daily Mail* he was the first Englishman to reach the South Pole since Captain Robert Scott's party. His recently published book *White Desert* is an account of his experiences with *Deep Freeze III*.

one Muskeg, and two teams of dogs. As they battered their way in vile weather towards South Ice, advance base nearly 500 miles from the Pole, Hillary and his team of New Zealanders started to climb the Skelton Glacier. Fuchs and Hillary had decided this would be a better route than via Beardmore Glacier, known so well to U.S. pilots, and which Scott had taken on the Pole trip which cost him his life in 1912.

As luck would have it, Hillary made phenomenal progress, Fuchs lagged behind. Hillary's job was primarily to lay an important stock of stores and fuel at Depot 700 on the plateau, meet Fuchs there after he had traversed most of the plateau (and incidentally passing the Pole), and use his (Hillary's) specialized knowledge to guide Fuchs back to Scott Base via the Skelton. But by mid-December, with Fuchs halted by whiteouts before South Ice, Hillary had reached Depot 700 with at least a month or more to wait for Fuchs.

To sit on the ice was inconceivable. And so Hillary decided to make a dash with his Ferguson tractors to the Pole just over 500 miles away. The decision aroused some controversy. Many critics said he was stealing his leader's thunder. But it is hard to see what else Hillary could have done. Anyway he did it. Shortly before Christmas, while I was at the Pole partaking of the festivities, Hillary sent his famous message "Hellbent for the Pole." I waited at the Pole to greet him.

It is not the function of this article to describe the South Pole base but I cannot let the opportunity pass without saying how thoroughly I enjoyed my three trips to this manmade white oasis at the bottom of the world. I was accredited as correspondent to *Deep Freeze III,* and so luckily for me made firm friends with all the boys both at the Pole and elsewhere. And if I may digress, somehow or other I got a reputation at the Pole of having the biggest appetite ever known there. When Christmas Day was celebrated with a massive meal Stan Greenwood, the radio operator, typed a special menu for me including such libellous remarks as "Caviar (Barber ate it all)" or "Roast Turkey — Barber really got down to this" and ending up with the phrase, "Meal over — Barber complained to cook not enough chow."

Old reputations die hard. When I finally left the Pole I promised the boys I would cable them on June 22, longest day of the year. I did so and said in the course of my message that I hoped to return one day. Back like a flash, surmounting all radio blackouts (and incidentally reaching me in Lebanon where I was covering the "war"), came a long cable: "Is your return a threat or a promise stop please give us two months warning to lay in extra stocks of food." [EDITOR'S NOTE: The Pole marker itself, a striped mast, was referred to as "Barber's Pole" by British newspapers.]

As Hillary advanced to the Pole, Stan Greenwood acted as a sort of liaison officer between Fuchs and Hillary who were using the Pole station for transmitting messages. His frequent voice contact with the Commonwealth boys had a startling effect on this laconic young American. After a few days of eager talk I would go into the radio shack and there would be Stan talking to Ralph Lenton, say, of the Fuchs team and ending up, "Well, cheeri-ho, old chap. Jolly good fun talking

(Continued on page 201)

LONDON DAILY MAIL

SIR EDMUND ("EVEREST") HILLARY.

Commonwealth Trans-

SCOTT Base, near McMurdo NAF, (above) was point from which Hillary set out to establish two depots to Pole for advancing Fuchs party (opposite). →

FUCHS CT-AE GREETED 2 MILES FROM POLE →

BEEBE

SIR VIVIAN ("BUNNY") FUCHS.

Antarctic Expedition

BEEBE

BEEBE

← CT-AE and IGY men describe trek to Congressman J. P. Saylor (second from left, opposite) at Scott Base. Racing time, "the Fuchs eleven" pushed on.

BY US PARTY, ADMIRAL DUFEK AND HILLARY.

BARBER CONTINUED

to you. See you tomorrow, eh, old boy. Toodle-oo." Once I even heard him say, "Well, toodle-oo, pip-pip and all that sort of thing."

On January 1, 1958 while waiting for Hillary, Vern Houk (whose mother was English and wrote Chet Segers, the Pole's chef, telling him how to make tea for the British boys) decided to hold a picnic. We planned to cook hot dogs in the snow and eat them outside. Temperature minus something-or-other, I believe 22. The picnic was only a partial success as the beer froze, so did the mustard, and it was never possible even to cut up the ice cream.

Hillary arrived on January 3, his tiny string of ramshackle old Fergusons grinding across the snow just before lunch. What a moment to relive in memory — those specks on the white desert that stretched 500 miles in every direction, gradually getting larger, and finally that big barrel-chested explorer with his shy grin above his beard, climbing stiffly out. The Pole leaders, Houk and Palle Mogenson, made him very welcome even though they did feel that his secrecy in approaching was a little unnecessary: it had meant standing allnight watches when Hillary, getting ever closer, refused to answer the Pole radio signals.

Hillary flew out after talking to Fuchs and I flew back to the Ross Sea with him. Two weeks or so later and it was Fuchs who was getting nearer the U.S. base. I was at McMurdo. The weather was not too good. Jack Coley, in charge of VX-6 said with a thankful note he could ill-disguise, "No Pole runs — weather too lousy." The scarlet-tipped Neptunes stood at ease on the ice runway. But we all had reckoned without Admiral Dufek!

A couple of nights before Fuchs was due at the Pole the Admiral gave a small cocktail party in his office — whiskey on snow, gin on snow, take your pick — and suddenly we realised we had missed dinner. So he sent for some spaghetti and meatballs which we ate off cardboard plates. After dinner the Admiral suddenly stood up and said "Well, boys — here's to Bunny Fuchs — and what say (with a twinkling look at Jack Coley) we all fly up and meet him?"

Which is just what we did, getting there a day before the British explorer arrived on January 19. Fuchs stayed three days at the Pole. It took the party all of the first day to read the fan mail (including at least one income tax demand for an explorer which had followed him across the world). They were great boys. It was with a curious feeling of imparted loneliness that we flew off and watched them below, specks in the snow, girding themselves for the second half of the great adventure in weather that was gradually getting worse.

But Fuchs the magnificent made astonishing progress, beating all estimates, and it wasn't long before he was approaching 700. Hillary prepared to fly up and meet him at this lonely spot marked only with a few gasolene drums and a cache of food.

On the way across the Polar cap disaster nearly struck the expedition and it was only thanks to prompt action by VX-6 that a man's life was saved. One of the scientists with Fuchs was taken seriously ill with carbon monoxide poisoning. They radioed Scott Base but could get no reply. Finally Fuchs called McMurdo on the emergency wavelength. Admiral Dufek held a brief conference. Jack Coley took to the air again and, with a sister Neptune hovering over in case of forced landing, paradropped to the expedition enough oxygen and the necessary mask and apparatus to save the man's life.

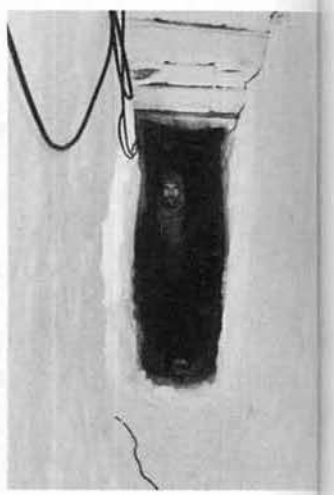
Fuchs ran into some difficulties with crevasses just short of Depot 700, but made it all right. Hillary flew up to meet him, and then they set off for the Skelton, got down safely, landed on the Ross Ice Shelf, and finally drove into Scott Base on March 2, 1958, 99 days after setting out.

It was a great trip and though, of course, in scientific value it cannot compare with the painstaking work of the IGY

(Continued on page 204)

Beauty and Utility

SURVEYING FILCHNER ICE SHELF NEAR ELLSWORTH FOR MAPPING.



BASE AND TUNNEL AT WILKES ICECAP STATION (SITE 2 OR S-2).

USNC-IGY

DEEP PIT at Byrd reached 60 feet (left, center). Glaciologists descended by rope, came out by ladder. Ellsworth pit (right), dial thermometers in wall.

# of Ice Science

SUMMER

IGY SCIENTISTS FROM WILKES PUT-PUTTING ON RESEARCH TOUR.

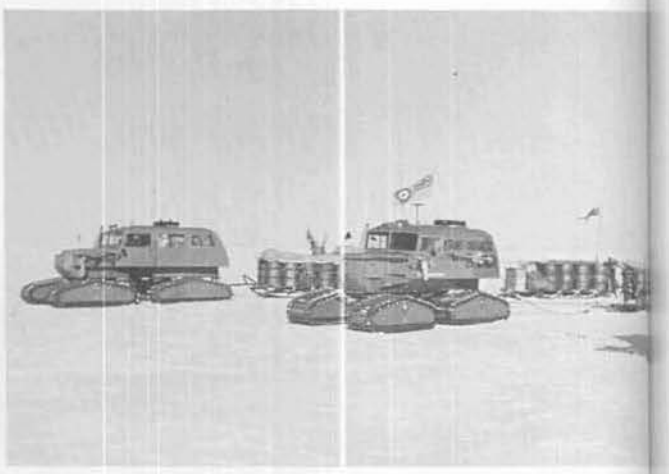
SURVEYING CREVASSE AREA, CAMP MICHIGAN (ICE DEFORMATION).

USNC-IGY

SHALLOW PIT on Byrd traverse was three meters deep (left). Ellsworth traverse party (right) stops to take snow samples from shallow pit dug in ice shelf.

POLE arrival brought Hillary (center), Fuchs (right) together for first time in months with Admiral Dufek to welcome both. CT-AE Sno-Cats and sledges (right) pull up at Pole after 950-some-mile-trek from Shackleton and with about 1,300 miles yet to go. Hillary, returning to Scott, waited for Fuchs to reach Depot 700, then flew there and guided party down Skelton Glacier to Depot 480 (480 miles from Scott), thence to Pram Point. Expedition from Weddell to Ross took 99 days, one under par.

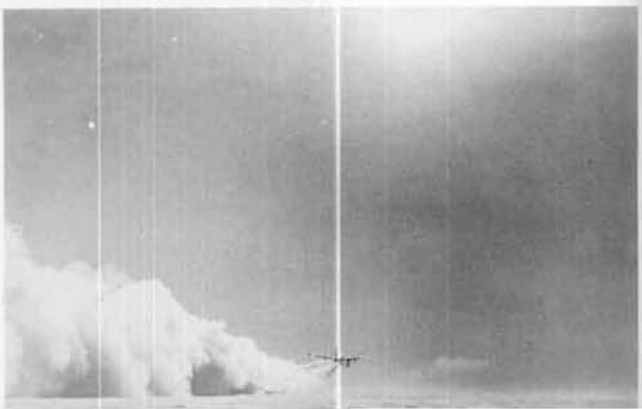
CT-AE



POLE LEADERS, CTF43 WITH FUCHS.

FUCHS PARTY READS MAIL AT POLE.

HILLARY, CTF LEAVE POLE FOR McMURDO.



BARBER CONTINUED

men dotted over Antarctica, it did have some real value in painting for the first time a portrait in depth, so to speak, of the terra firma of Antarctica. Fuchs is a scientist before he is an explorer and throughout all the ordeals he resolutely refused to abandon his seismic soundings and other scientific work the results of which proved, apart from any other findings, that his entire route across Antarctica was made on solid ground.

Fuchs was the first man to pay genuine and spontaneous tribute to the help he received from *Deep Freeze III*. It is true that he was prepared to "go it alone" and the plan he had envisaged for 20 years before he raised the money never depended on any outside help. But though he did the journey in the grand manner of yesterday, the U.S. Navy was of incalculable help in scores of ways – the Pole facilities for repairing his machines and, even more important, resting his men who were on the point of exhaustion; flying his dogs out; saving a man's life on the trail; using the Pole radio as an intermediate link with Hillary. Always prepared to carry on without any facilities whatsoever, Fuchs had this great added advantage plus the knowledge, the inner feeling, the secret assurance that his team (he never bothered about himself) could never as Scott's team did, perish so near yet so far from base.

Fuchs didn't ask for a thing from the U.S. Navy. But he accepted gratefully its many kindnesses. In the face of some criticism about continuing and in the teeth of steadily worsening weather, he had the moral support of knowing that if disaster overtook him on the plateau, there was a fairy godfather in the background – with planes and crack pilots ready to do anything – even at the risk of life and limb – to get him out of a jam.

—Noel Barber.

at Pole, Then On to Scott

COASTING over Ross Ice Shelf, party brought with it data from daily seismic soundings proving that Antarctica is an unbroken continent across the entire route it traveled. On March 2, 1958 the bone-weary party rolled into Scott.

DR. FUCHS WELCOMED AT SCOTT BASE.

LCDR LUDEMAN (CENTER) WITH WEARY FUCHS AND HILLARY.

ENDEAVOUR EVACUATES TAE PARTY.

TRIUMPHANT CT-AE AT SCOTT BASE.

UPBEAT for NAF Philharmonic is given by Father Heaney, Chaplain, with the order, "Don't play good, just play loud!" Rousing welcome at Scott included contingent from McMurdo NAF with huge cake.

SUMMER

The Adventures of BURTON

At USSR's MIRNY on McDonald Bay:

176-MAN MIRNY BASE, 93° EAST ON QUEEN MARY COAST.

CARTWRIGHT

RUSSIAN TRACTOR, AN-2 SKI PLANE.

BEEBE

PIN-UPS at Mirny: classical bust of Lenin looks down on visitors (right); earthy art on wall panel (left) proves appreciation of "les girls" here, too.

← RUSSIAN scientists explain to US IGY men workings of radiometer gear. Right to left, Carl Eklund, Dr. Shear, Bill Becker (*New York Times*), US meteorologist Gordon Cartwright who wintered over at base with Russians and wrote appreciatively of his experiences there and of Russian co-operation.

At JAPAN's SHOWA on Lutzow-Holm Bay:

BESET in ice, 1500-ton Japanese icebreaker SOYA MARU sent out call for help; AGB-1 answered. Above, CDR Brantingham, CO and LCDR Reynolds, XO confer with CAPT Matsumoto and Dr. Nagata, Japanese expedition leader, on relief operation to Showa Base. →

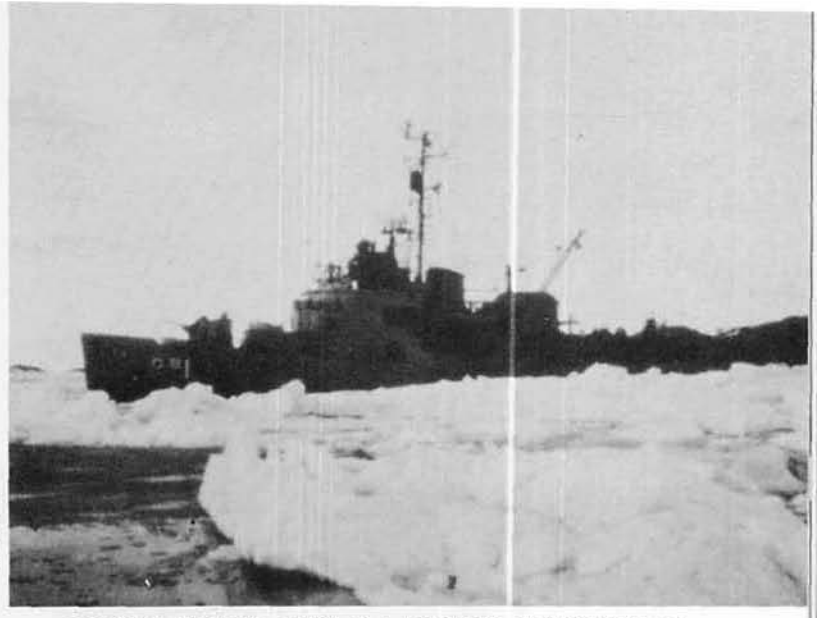
ISLAND

On January 27, 1958, having settled ARNEB to her task of unloading at Wilkes, BURTON ISLAND weighed anchor for Queen Mary Coast and a visit to the neighbors down the block at Mirny, CAPT Ketchum, CTG 43.4, aboard. Early on the morning of January 29 GB-1 helicopters were over the base and in minutes were landing to a warm Russian welcome.

The language barrier proved no handicap with Gordon Cartwright and Mort Rubin as mentors. Cartwright had wintered over at Mirny as U.S. Weather Bureau meteorologist for IGY; Rubin was his successor for the following season. And there was TASS representative, Almir Koshinkin, surprisingly fluent in English who acted as spokesman during the 16-hour visit. To wind up the day nearly the entire crew of Mirny trooped aboard BURTON ISLAND for a return visit.

After returning to Vincennes Bay to lead ARNEB through the pack, BURTON ISLAND transferred CTG 43.4 to the cargo ship and sent them on their way home. Then the icebreaker was directed to go to the aid of the Japanese expedition ship SOYA MARU which, as in the previous season, was ice-locked off Showa Base on Ongul Island, Prince Olav Coast.

By February 9, after two rough days in the pack, BURTON ISLAND was able to usher SOYA to within 50 miles of the base. Weather was vile. SOYA's seaplane and GB-1's chopper were socked in for two more days. Finally the plane got through to Showa with much-needed cargo and brought out four of the 11 wintering-over group. During the next week the rest of the cargo was delivered, personnel transfer effected, and Showa's sled dogs rescued—but it took 17 long days. In February Dr. Nagata, expedition leader, cancelled the remainder of the operation and BURTON ISLAND at long last headed home via Valparaiso.



BEEBE

BURTON ISLAND, CTG 43.4 ABOARD, ENTERS PACK.

VISIT is returned when more than 100 Russians came on board BURTON ISLAND. Helicopter rotor blade is explained to group by ENS David Steward as Eagle Scout Dick Chappell (center) co-hosts. It was a real "red-letter day."

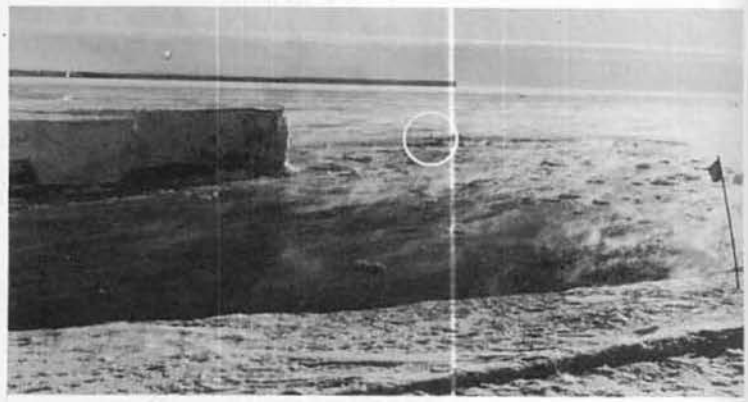
DOUBLE duty at Showa: to release SOYA from ice, and to transit pack to base for offloading supplies and transferring personnel. Light Japanese plane reconnoitered with GB-1 helicopter, shuttled fuel in (left). BURTON ISLAND transferred tractors, supplies across channel at loading site, finally warped SOYA into her "pier."

Some "Hairy Ones"—

The photograph at the left illustrates how narrow the margin for safety in Antarctica A road sliced in two by a crevasse, a sudden whiteout obliterating horizon line for airman, a storm-rotted ice shelf giving way beneath a single man after allowing a 30-ton tractor to pass—these are "strictly routine."

PILOTED by LCDR Conrad S. Shinn, first to land a plane at Pole, an R4D-8 making last run of year to Pole was forced down by oil leak on Hollick-Kenyon Plateau. Skidding to a stop, the port landing gear collapsed. No one was hurt and a rescue plane from LAS soon arrived with replacement parts and installation crew. After repairs both planes made JATOs and returned cold but safe to LAS.

ELLSWORTH spring traverse (five-man party of scientists above) were ambushed by crevasses in Edith Ronne Land. Led by Otter, party's lead Sno-Cat plunged through unseen crevasse, rear pontoons dangling over nothingness. →



BARRIER section, crumbling beneath his feet, spilled IGY leader Albert Crary into icy Kainan Bay. Getting aboard ice floe he was being swept out to sea (above) when →

McMurdo's Runway — Scare of the Season!

← GROSS weights up to 185,000 pounds took their toll of NAF ice runway. Pot holes caused suspension of wheel aircraft operations in late December 1957. New runway was cleared southeast of old one, opened to traffic on February 9, 1958. But in mid-February new one deteriorated also and was closed. Day by day probing finger of bay dug deeper into AirOpFac area (top left), finally put roadway from station to airstrip under water, necessitating helicopter-lift to planes. VX-6 planes were evacuated to emergency skiway at Scott Base (opposite) and in early March entire runway (lower left) went to sea. →

Anthology of Chills

← Death-trap was an ugly hole big enough to have swallowed an airliner (above). Pilot of repair plane, landed beside party, took short walk on ice field and disappeared into another crevasse — luckily surviving a 20-foot fall.

← rescue team (including CAPT Maher, IGY man Charles Wilson) reached him in rubber life raft. Helicopter lift quickly brought him in from raft to warmth, safety.

BEEBE

PENGUINS and PEOPLE

By science and subterfuge a biologist takes a penguin's temperature.

TEMPERATURE telemeter placed in penguin eggshell tells scientists incubating heat of nesting penguin. Carl Eklund (above, right) and assistant Fred Charlton of Wilkes prepare "bugged" egg, slip it under co-operative bird, orient antenna, read panels of telemeter (shown above).

SUMMER

Bellingshausen Bucks WAGB-281

By Dr. HENRY M. DATER, Historian

AT NOON on January 22, 1958 WESTWIND and WYANDOT parted company, the latter tracking toward Buenos Aires. Task Group 43.6 – now consisting of WESTWIND only–steamed toward the Bellingshausen Sea through Bransfield Strait.

The strait, which separates the South Shetlands from Palmer Peninsula, was fogbound but occasionally the atmosphere cleared briefly to give a view of the ruggedly beautiful island chain. A few whalecatchers were seen pursuing the Antarctic's only profitable industry. Late in the day came an unforgettable sight: the setting sun cutting through the thin haze revealed hundreds of massive icebergs solemnly bobbing up and down.

The weather was to prove as unfavorable here as it had been favorable during the Weddell Sea operation. But it was typical. The Bellingshausen Sea and the neighboring Amundsen Sea constitute one of the challenges of exploration, perhaps the last great challenge to ships in the Antarctic. Only one–the BELGICA –has ever penetrated far into the area and she did not do so of her own free will: locked in the grip of the ice she helplessly drifted for more than a year.

Aerial reconnaissance in previous years had discovered open water about Charcot Island. It was decided, therefore, to attempt penetration just west of Charcot, then proceed westward along the ice shelf. Should this prove unsuccessful, another try further to the west would be made. On the morning of January 28 the first penetration attempt was begun at 68°S, 74°W. The weather quickly closed in, the pack grew dense, the ship finally came to a stop. For 17 hours she waited in the ice on the chance that the wind would clear the overcast and loosen the pack. It grew worse. Next morning WESTWIND extricated herself and steamed westerly along the edge of the pack. At the 81st meridian another probe was made. It was like plowing through a bowl of consolidated mush.

On January 31 while backing and ramming through 10/10 ice, WESTWIND became lodged on a large floe. Heeling was resorted to: the pumps moved 400 tons of water from port tanks to starboard and back every 90 seconds, the shifting weight rocked the ship 10 degrees each way and loosened it from the ice's grip.

A slight improvement in visibility on the following day permitted helicopter reconnaissance but the news was bad. For at least 40 miles ahead there was no thinning of the ice. So WESTWIND turned around. But it was no easier to get out than it had been to get in –if anything, more difficult because of pressure within the pack. February 2 brought more bad news, this time from below: the rudder was bent, the rudder post lifted and twisted to the right. (It was usable, but on the bias.)

A weather change being predicted by aerologists, the ship stopped to await more favorable conditions and took advantage of the rest to replenish the water supply by collecting ice for the ship's thaw tank. When the promised change came, a south wind relieving pressure in the pack, WESTWIND had drifted to its southernmost point–60°54'S, 81°40'W. This was the limit, the farthest south WESTWIND would be permitted to penetrate the Bellingshausen. The date was February 4.

Led by the helicopters, WESTWIND moved slowly but steadily toward the edge of the ice, twisting and turning to take advantage of the best leads. Oceanographic stations were taken at 50-mile intervals; as the ship lay to, miles of steel wire were lowered over the side with devices to obtain water and bottom samples, temperatures, fathometer tracings, marine life specimens, and to photograph the ocean floor.

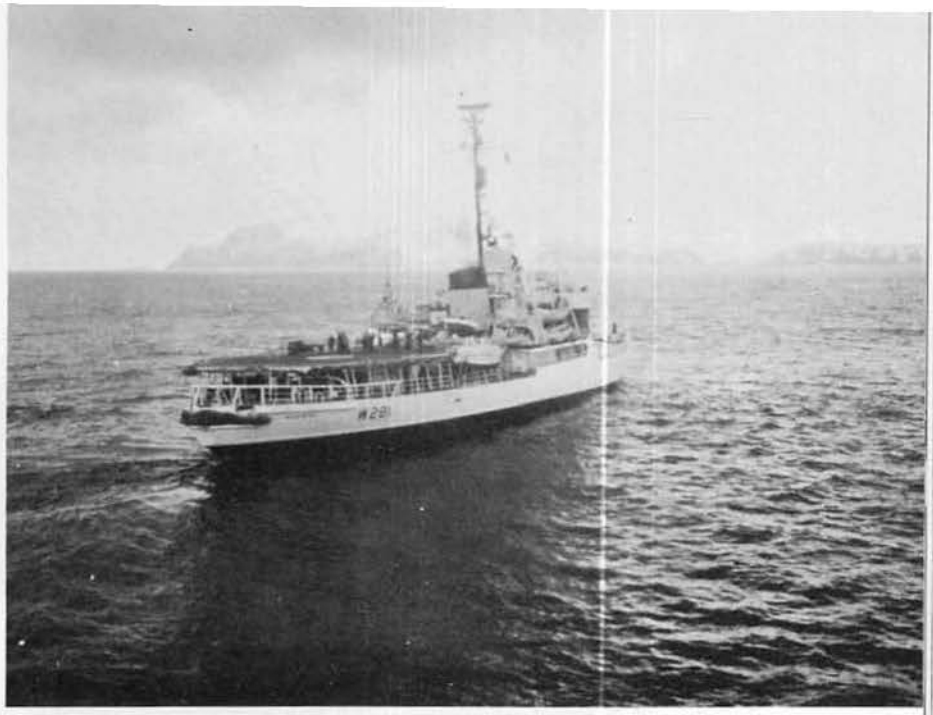
Just before WESTWIND emerged into open water on February 5 an explosion shook the ship. A piston in No. 1 Main Engine shattered causing fire in the forward engine room. The fire was quickly extinguished with no injury to the crew but No. 1 was inoperable, the ship's power seriously reduced.

Indications, based on meager past experience, pointed to the west for better weather and ice conditions and WESTWIND headed in that direction. The first objective, Peter I Island. The feeling was that even if the Task Group might not reach the shore of the continent it could at least contribute its share of data to the all-too-meager collection relating to the Bellingshausen Sea area. Careful records of ice and weather conditions were kept; the Navy oceanographic unit under J. Q. Tierney continued its work (begun at 80°W) all the way to the crossing of the Antarctic convergence on the way home.

Peter I Island, lovely sentinel in an ice-clogged sea, was reached on the evening of February 8. One of the few times the sun shone occurred as WESTWIND approached. The helicopters flew down the eastern side of the island for reconnaissance and photographs. CAPT McDONALD, TG43.6 commander, had landed at that spot several years before and Norwegians, even earlier, had established a cache there for stranded mariners. This time no landing was made. WESTWIND pushed on in its westward course. The hope still lingered of being able to reach 70°S before entering the pack for northbound transit. This hope was backed up by historical records showing that some of the closest approaches to the continent in open water had occurred in this general area. Navigating the pack around Peter I Island revealed that the ice fell away to the southwest. A few minutes before midnight WESTWIND was on that course with open water ahead. Suddenly a voice came over the public address system: "We are going home!"

A message had come through directing the Task Group to abandon its effort. At 69°20'S, 99°26'W WESTWIND put about and turned her bow to the northeast.

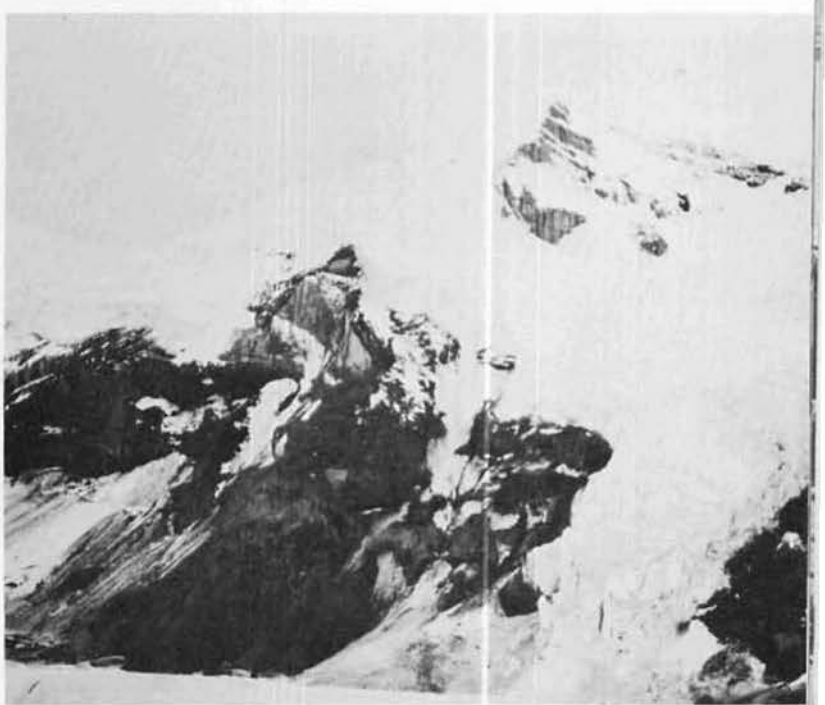
CAPT McDONALD DISCUSSES OPERATION.



WESTWIND ENTERS BRANSFIELD STRAIT.

ALONE in operation after GLACIER's accident prevented her participation, WESTWIND made first attempt by modern icebreaker to penetrate Bellingshausen Sea. At Robert Island in Bransfield Strait 15 drums of avgas were cached (left) for use of future Antarctic expeditions; penguins on that rocky island (center) were snapped, too. Proposed visit to Deception Island had to be scratched because of poor visibility and ship continued down Palmer Peninsula.

PETER I Island, dramatic pile of ice-capped rock, rises 4,000 feet out of South Pacific, extends 14 miles in length, five miles in width. Discovered by Bellingshausen in 1821.



ANTARCTIC SCRAMBLE

Summer support operations start with a rush in September and accelerate to Mach 1.31 by early February. The heavy work load is further complicated by overpopulation. (During the Fuchs-Hillary visit to the Pole Station 57 humans were aboard; McMurdo's summer population totaled 350 men.) The vagaries of wind and weather make hash of schedules. Result, a well-disciplined bedlam here suggested in random shots from Phase III.

Events are popping simultaneously: As Fuchs arrives at the Pole in mid-January the last tractor train of the season sets out for Byrd, TOWLE arrives in New Zealand en route home, and GLACIER is trying out her new propellers. As Scott Base welcomes Fuchs and Hillary in early March the tractor train is pulling into LAS on the return run, ATKA is northbound, likewise NAF's ice runway. So, here goes—catch a ring!

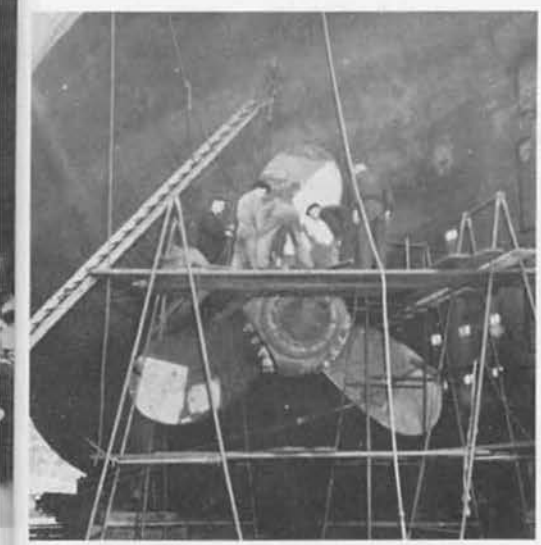
JANUARY 22: Homeward bound, WYANDOT was heading into stormy seas. By end of month she anchored in Buenos Aires.

FEBRUARY 8: Sydney, Australia hosted ARNEB for two weeks, Melbourne nearly a month (for boiler repairs). In honor of visit to Melbourne of Britain's Queen Mother, ARNEB dresses ship (left); (center) crewmen call at Royal Children's Hospital. In Montevideo, Uruguay (right) throngs of visitors board ship during three-day stop in May.

FEBRUARY 18: Admiral Dufek radios Pole, Byrd Stations to "button up" for winter, no more flights. One month later he shifted his flag from New Zealand to Washington.

MARCH 1: BROUGH pulls out of New Zealand as Byrd tractor train pulls into LAS backyard. Train (right) set new record, making return trip in 8 days, 11 hours, 20 minutes.

JANUARY 22: Construction at McMurdo included giant "elephant" huts, largest building job on continent during summer operations, Phase III. LCDR Ludeman, NAF Co, CDR Witherall, senior CB officer in Antarctica, and Admiral Dufek discuss problems (left). VX-6 group (right) inspect their NAF "Birdaire Storaway." All are storage facilities.



FEBRUARY 12: ATKA's stay in Wellington's Jubilee Drydock for repair of port screw ended March 1; one week later this friendly city gave the icebreaker a rousing sendoff.

FEBRUARY 13: Crary and Ross Ice Shelf traverse party return to LAS (right) after 4-month absence. They left March 25 on final traverse of season into Marie Byrd Land.

MARCH 11: McMurdo bids GLACIER goodbye for last time during *Deep Freeze III* (left); two days later, choked with ice, big 'breaker departed Hallett, last ship to leave continent (center). March 18 Port Lyttelton turned out to wish them well on homeward journey. The biggest summer operation for IGY was drawing to a successful conclusion.

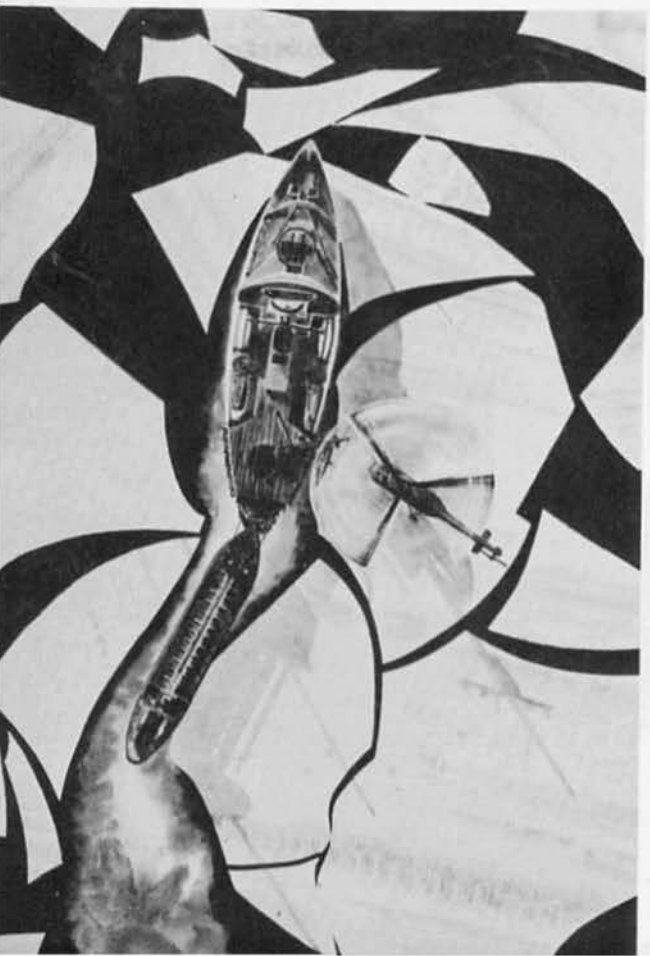
"...the essence of the image of Antarctica"

Operation Deep Freeze was "covered" by an artist as well as by photographers and news correspondents. CDR Standish Backus, Jr., USNR, Official Navy Combat Artist, combined art with war duties during the Pacific phase of World War II and brought back a rare collection of combat art. In 1955 he left professional work to volunteer for Navy duty with *Deep Freeze I.* His vivid portrayals of Antarctica have joined his combat art in the famous U.S. Navy *Operation Palette,* traveling exhibit that has toured the U.S.A. since 1946 and has gone abroad.

CDR Backus has worked in casein, watercolor, gouache, drybrush, on canvas, watercolor paper, illustration and scratch boards. In his own words, he has sought "to extract the essence of the image of Antarctica as it remains imprinted on my mind." He has succeeded.

His work here shown is published by courtesy of Combat Art Section, Office of Information, Navy Department, Washington 25, D.C. (Requests for exhibit may be addressed to Chief of Information.)

WATERCOLORS illustrate setting out trail flags (upper left, combining drybrush technique); aerial view of icebreaker towing cargo ship through ice with hovering 'copter (lower left); midsummer at McMurdo (just below). Scratchboard and colored ink (bottom) portrays "deadman" chore.



Antarctic INTERMISSION

Departing Globemasters on McMurdo's Ice Runway Lit by Departing Sun — PHOTO BY BEEBE

"WHAT'S PAST IS PROLOGUE"—
THE END OF THE THIRD PHASE IS THE BEGINNING
OF THE FOURTH, THE PROMISE OF THE FIFTH

Antarctic Intermission

GLACIER, first ship to arrive and last to leave, slipped wearily out Moubray Bay March 13, 1958. Two and a half weeks later ComNavSupFor Antarctica transferred headquarters back to Washington, D.C. *Operation Deep Freeze III* (Summer Support) officially ended on March 31.

Left behind on the ice were 325 Navymen, IGY scientists, technicians, and (at least) one disgruntled penguin. The winter group was tearing up the pea-patch. Outside work had to be finished, not all the 15 million pounds of supplies and equipment that arrived during the summer had been stowed, and IGY was only at the *halfway* mark.

On March 22 Colors were struck at South Pole for the six-months' night. At Kainan Bay Al Crary and four-man party raced the sun on a final traverse. Between March 25 and April 8 the IGY leader planned to complete a series of observations (begun in February 1957) along Byrd Station Trail. Seismic, gravity, and glaciological data would be collected on the nigh side of Mile 190.

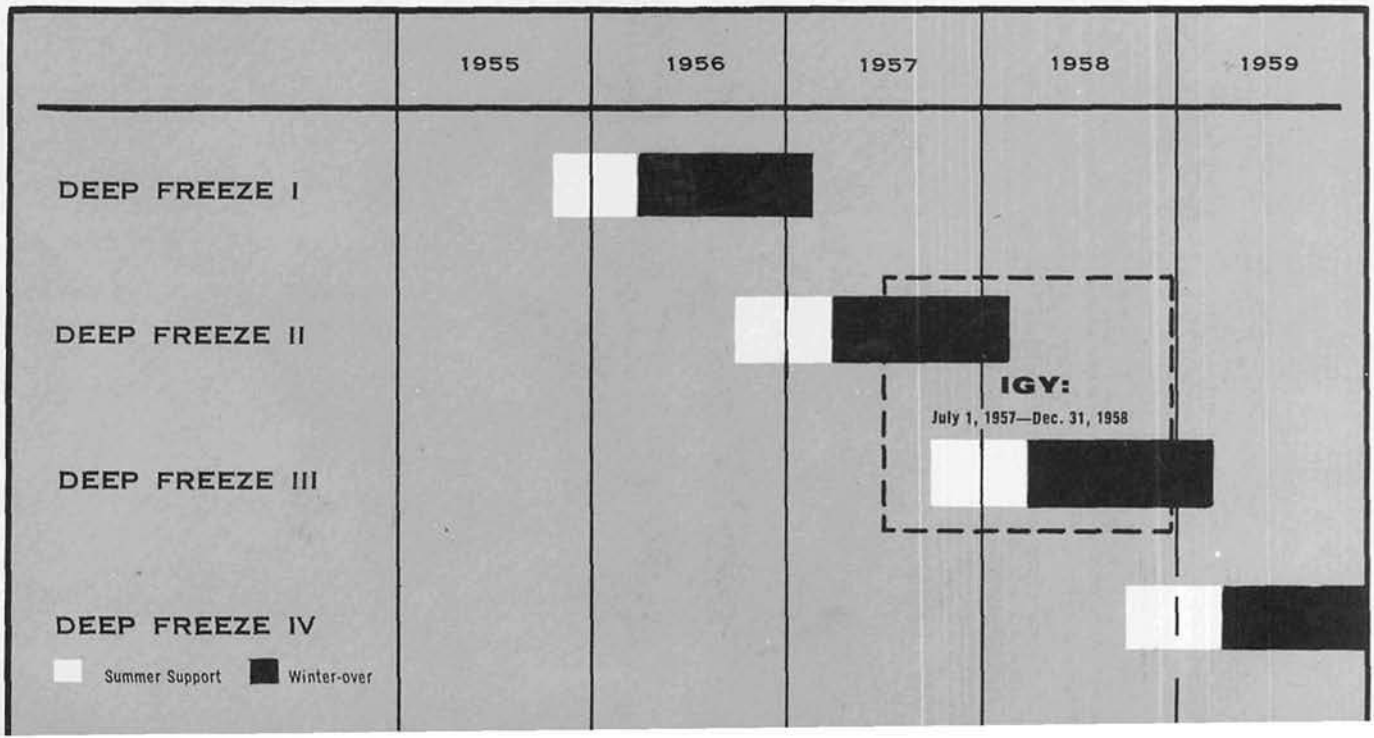
On both sides of the Antarctic Circle military men and civilian scientists took a long ponder on events and accomplishments. Seven US-IGY stations had been resupplied and personnel exchanged without a single major delay or accident. For the first time in *Deep Freeze* not a life had been lost on the ice during summer support activities. (The four tragic deaths that darkened the picture were of another place, another time: Nelson Cole, helicopter crash victim, died during *Deep Freeze II* Wintering-over; Richard Oppegaard was killed en route Antarctica aboard ATKA; two Navymen died in motor accidents while on homecoming liberty – Max Denton in early February at Buenos Aires, Gerald Davis in March at Christchurch.) The huge resupply mission itself was clear of disaster, a matter of deep satisfaction to the command.

Despite sluggish cargo arrival during staging, surface lifts kept pace with schedules. The cargo airlift, making its earliest Antarctic entry in history, was in the hands of that unbeatable combo—USAF's 53rd Troop Carrier Squadron, 1710th Aerial Port Squadron, and Navy's AirDevRon SIX. In less than a month of operational days more than 220 tons of cargo had been airlifted into McMurdo's terminal and more than 713 tons had, in turn, been airdropped at Liv, Byrd, and the Pole.

VX-6 racked up a mighty record: it flew 3,365 hours, mapped 638,274 square miles, toted nearly 50,000 pounds of mail and 2,778 passengers in and around the continent. The impressive record of the ships in miles traveled is best summed up in the world track chart on pages 166-167.

(Continued on page 218)

THIS CHART GIVES SOME IDEA OF TIME SPAN, CONTINUITY, AND IMPORTANCE OF WINTER GROUPS.

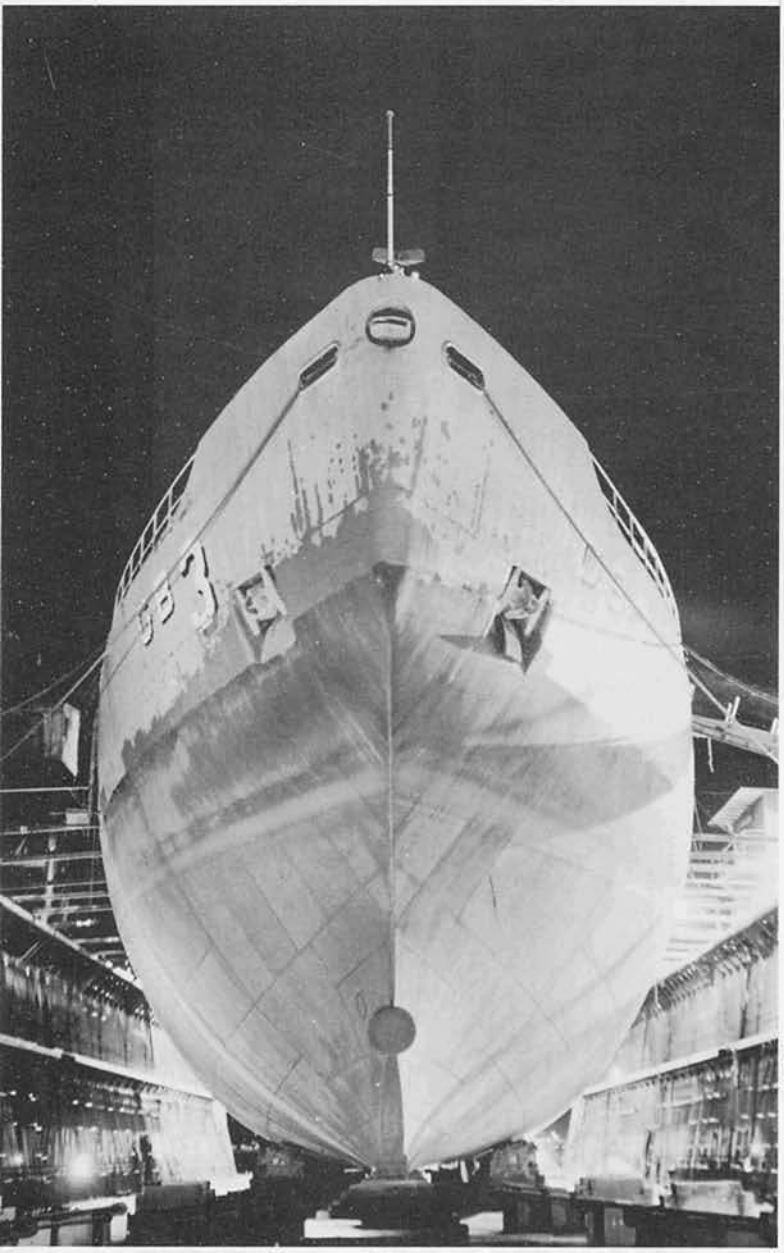


USNC-IGY

SUNSET and Taps and the lowering of the flag. With the sun goes light and warmth. Pyrheliometer at LAS (above), measuring incoming and reflected thermal radiation, is silhouetted against the darkening sky and "sun pillar."

ANTARCTIC REVEILLE IN THE WINTER NIGHT.

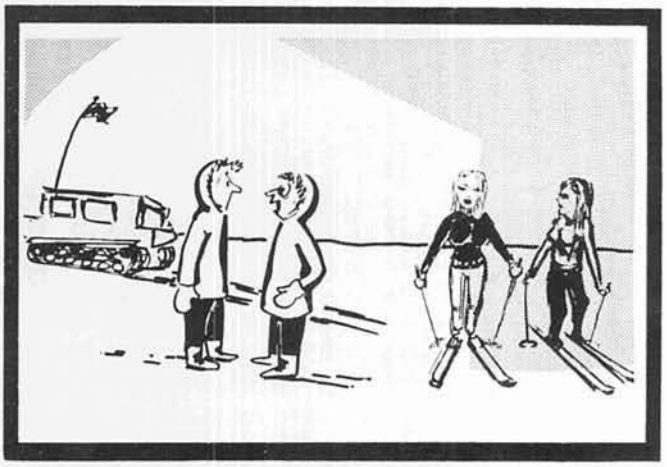
LAS MASCOT "CLEM" IN A NOSTALGIC MOOD.



ATKA IN WELLINGTON DRYDOCK FOR REPAIRS.

There were events of major and minor importance. The first commercial type plane to land in Antarctica, the first wheels-on-dirt landing in Antarctica at Marble Point, the first land crossing of the continent by Fuchs and Hillary, the first point-to-point jet flight over Antarctica, the first seismic soundings at the South Pole, the first FAX transmissions between Antarctica and other continents, the first mass paradrop on the southern continent, and many more significant events described in this volume.

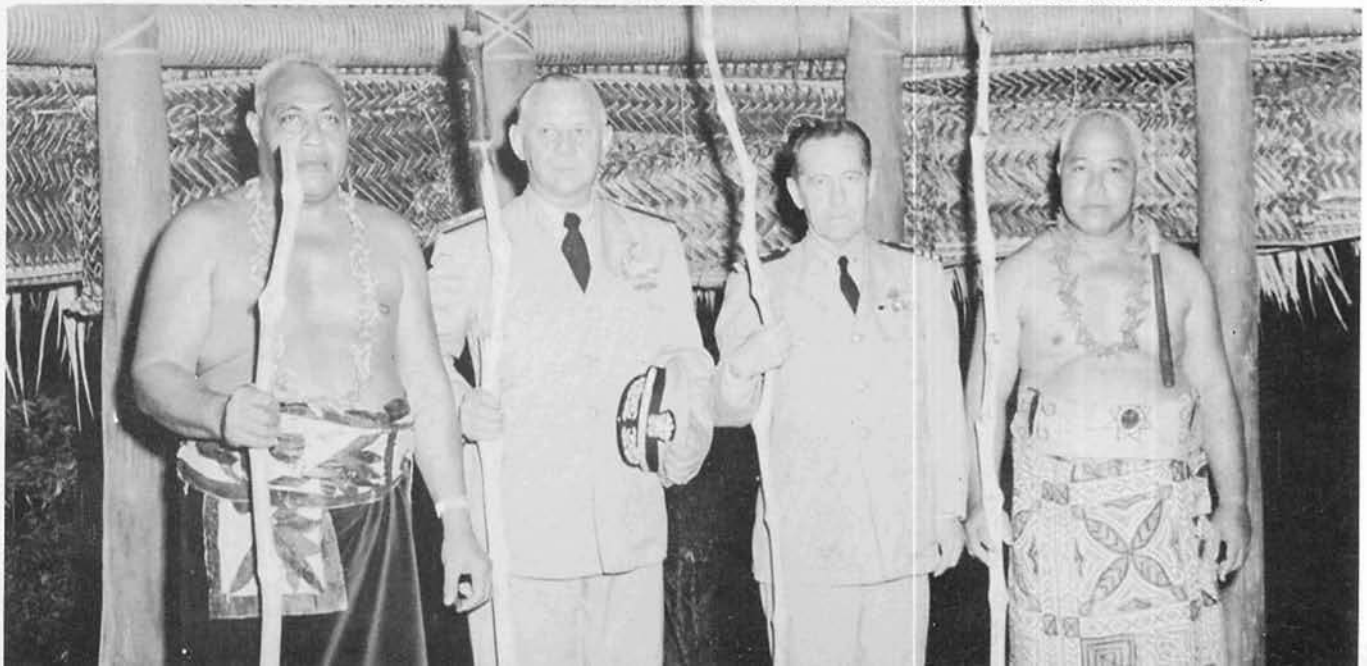
Deep Freeze III was perhaps the most completely reported operation of its kind in history. Thirty-five accredited press correspondents filed stories for world-wide coverage. Governmental officials, US and foreign, paid visits, two US Ambassadors and a Congressional subcommittee being the most noteworthy. The latter, six-member Subcommittee on Transportation and Communications of the House Committee on Interstate and Foreign Commerce, made a five-weeks' survey of the Arctic and Antarctic regions in the light of its legislative interest. Congressman John P. Saylor of the House Interior Committee also visited Antarctica.



HALSEY

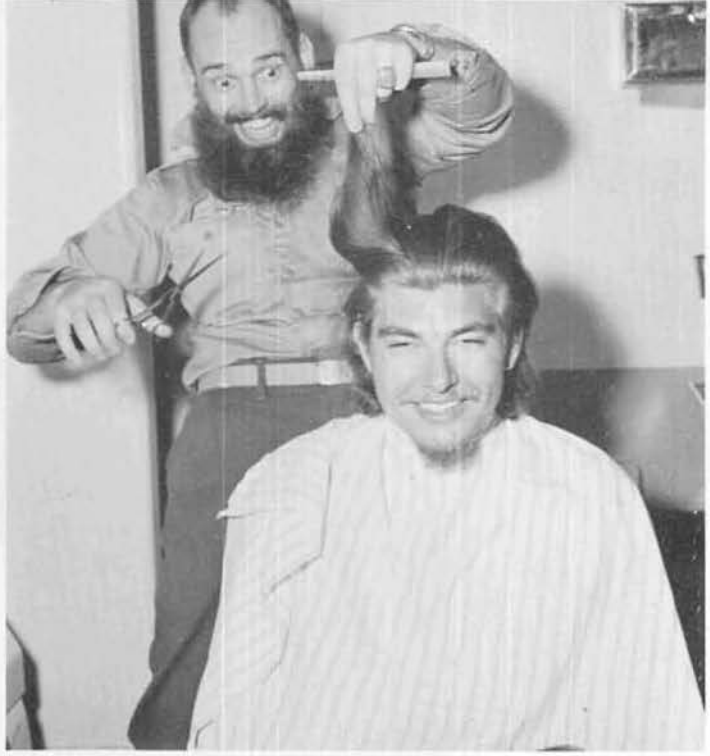
"THEY WANT DIRECTIONS BACK TO THE SKI LODGE AT LAKE TAHOE!"

RADM DUFEK AND CDR MACBAIN ATTEND CEREMONY IN AMERICAN SAMOA EN ROUTE HOME.



To try to summarize in this volume the scientific findings of the IGY scientists and their military colleagues would be presumptuous. A fragmentary collection of facts, features, and photographs is all that this book can attempt. Much of the data has not even today been completely evaluated. And, the world being what it is, no sooner does a discovery seem to point to a conclusion than another discovery is made upsetting that conclusion. For example, is Antarctica a monolithic continent or is it two or more large islands cemented together with ice? Explorers and scientists have puzzled that for years. During the summer of *Deep Freeze III* the Fuchs party found evidence that the ground under its feet all the way from Shackleton to Scott was in one solid piece. Almost simultaneously the Ellsworth traverse, starting from the same side of Antarctica as did Fuchs, found a deep trough extending inland from the Filchner Ice Shelf to the Dufek Massif; scientists have wondered if this trench extends to the Ross Sea. A similar basin found in Marie Byrd Land strengthens this suspicion. This is the area where was found what

(Continued on page 220)



THE HAIRCUT, NECESSARY FOR HOMECOMING.

"QUARTERS" ABOARD WESTWIND BACK IN NEW YORK HARBOR AFTER A BIG JOB WELL DONE.

CAMERAS ranged from German Arriflex (top left) to 16 mm Auricon (top right), Bell & Howell 70 KM (center left), Cine-Special II (right), K-100 (lower left), and full line (lower right) demonstrated by TF43 photographers.

is believed the thickest ice ever measured in the world—14,000 feet of ice resting on a rock bed 8,200 feet below sea level. A four-inch ice core obtained here to a depth of 1,013 feet was estimated to be 1,000 years old at its deepest point. Is it any wonder that one IGY scientist called the 6,000,000 square miles of continent "the place for the perfect marriage of science and adventure?"

For this reason there was general rejoicing when, in February 1958, the announcement was made of the continuation of US scientific operations in Antarctica beyond the current International Geophysical Year. Post-IGY programs would be under the auspices of the National Science Foundation, Department of Commerce, Department of the Interior, and other agencies with a scientific interest in Antarctica. Navy support, continuing under Admiral Dufek, would again be assisted by Air Force, Army, and Coast Guard.

Four stations would be maintained, as before, beyond December 31, 1958 (the end of IGY): South Pole, Byrd, Hallett, and McMurdo NAF. Little America's Kiel Field would be kept up as an alternate landing strip but the station would be deactivated. About midyear further announcements came that Wilkes and Ellsworth would also continue in operation as scientific stations beyond December 31, 1958: Australia and the United States to co-operate in maintaining operations at Wilkes, Argentina and the United States to co-operate in maintaining operations at Ellsworth.

So ends the story of *Operation Deep Freeze III*. Ends? . . . that is hardly the word. There is no end to science, to adventure, to Antarctica. Rather say: "So begins the story of *Operation Deep Freeze IV!*"

FILMING MAINTENANCE JOB BY LIGHT OF 5KW GENERATOR MOUNTED IN WEASEL, "ROVING AURORA."

Credit

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COX

Roster, Operation Deep Freeze III

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Czerwinski, J. J., Jr.	SN
Dawson, M. R.	MAJ, USA
Dean, R. J.	RMSN
Dennee, F. A.	PH1
Deschon, W. T.	AGAN
Dickey, W. M.	CAPT
Dreeke, A. F.	RM2
Dufek, G. J.	RADM
Duncan, P. D.	AG2
Fetter, N. L.	RM2
Fredian, T. V.	LT(jg)
French, W. H., Jr.	LT
Gillies, T. A.	AK1
Glezen, G. F.	LCDR
Gustafson, E. F.	WO1
Halsey, J. (n)	PHA2
Halverson, R. L.	LCDR
Hartley, J. F.	HMC
Hawkes, W. M.	CAPT
Heath, W. E.	RM2
Hedblom, E. E.	CAPT
Hermanson, J. M.	CAPT
Higby, T. L.	ETC
Hoffman, G. E.	CDR
Hulse, J. W.	AG2
Jerome, E. R.	RM3
Johns, E. H.	YN1
Hones, J. T.	YNT3
Kelly, H. J.	SN
Ketchum, G. L.	CAPT
Knapp, J. F.	PNC
Knowles, C. H.	LT(jg)
Kretzchmar, G. A., Jr.	TE1
Littleton, R. (n)	RM2
London, C. F.	CAPT, USA
Lorenzo, J. V.	SK3
McDonald, E. A.	CAPT
Macbain, M. (n)	CDR
Mahon, J. J.	SK2
Marshall, J. C.	ET1
Martin, L. J.	RM1
Martin, J. B.	AK1
Martin, M. L.	YNT3
Melanson, E. J., Jr.	LT(jg)
Miller, D. D.	JO3
Miller, G. J.	LT(jg)
Mirabito, J. A.	CDR
Montgomery, T. T.	RM1
Morris, G. L.	SDC
Morrison, R. L.	SK1
Myers, D. E.	LCDR
Norton, E. (n)	RMSN
Norval, M. H.	PFC, MC
Page, H. C.	RMCA
Panteleon, A. A.	SD2
Porter, G. W.	LT(jg)
Prieto, M. (n)	YN1
Ravenell, F. (n)	TN
Rector, H. C.	PHC
Reese, C. V., Jr.	LT
Robinson, C. D.	LCDR
Ronne, F. (n)	CAPT
Rowlands, G. E.	SK3
Rubia, F. A.	TN
Ruiz, T. F.	DK3
Samuels, J.	TN
Sanders, S. (n)	LT(jg)
Sanders, W. R.	AG1
Schmucker, L. E.	DK1
Schlosser, H. F.	JOC
Scholzen, J. J.	JOCA
Shaddix, B. B.	PH1
Sievers, W. C.	AG3
Simmer, M. M.	LCDR
Simmons, W. L.	TE1
Soriano, W. S. J., Jr.	TN
Sullivan, R. (n)	AG1
Sullivan, T. J.	YN3
Thomsen, C. F.	RM3
Thompson, L. J.	CDR
Timmerman, D. C.	PH1
Traczyk, C. J.	ETCA
Trilling, W. J.	PH3
Turner, V. R.	TN
Ullrich, A. J.	AG3
Villamor, D. (n)	SDC
Walters, E. A.	OM1
Whitney, H. W.	CDR
Williams, R. H.	RM3
Williams, T. I.	RMCA
Wilson, D. E.	PHC
Wilson, W. J.	SD3
Witcher, S. (n)	SD3
Zeller, L. S.	AGC

WINTERING-OVER PARTY, DEEPFREEZE II

Abbey, G. (n)	RM1, USN
Ackerman, T. A.	AG3, USN
Adams, J.	LT(jg), USNR
Alf, E. A.	Meteorologist
Alkio, K. L.	AT3, USN
Alvarez, J. A.	Meteorologist
Anderson, R. E.	LT, USN
Anderson, R. G.	LT, USN
Anderson, R. W.	ET3, USN
Anderson, V. H.	Glaciologist
Anglin, R. D.	RMSN, USN
Antos, S. A.	MAJ, USMC
Arnol, L. E.	HM2, USN
Aughenbaugh, N. B.	Geologist
Aygarn, R. S.	ENS, USNR
Bailey, C. T.	AG3, USN
Baldwin, A. W.	RMC, USN
Ballou, R. S.	RM3, USN
Banasiak, R. H.	CS1, USN
Barden, V. W.	Ionospheric Physicist
Barry, R. P.	LT(jg), USNR
Beavers, M. W.	AM1, USN
Beavers, M. M.	ATC, USN
Behrendt, J. C.	Seismologist
Beiszer, J. E.	AM1, USN
Bengaard, H.	Ionospheric Physicist
Bennett, H. F.	Seismologist
Benson, R. F.	Geomagnetism
Bentley, C. B.	Seismologist
Berkley, R.	Geophysicist
Bingaman, E. L.	ET3, USN
Black, G. E.	SW3, USN
Blackburn, R. H.	UT3, USNR
Blankenship, D. E.	BU1, USN
Blubaugh, D. D.	CM3, USN
Bordeaux, C. S.	RMSN, USN
Bousquet, E. A.	UT3, USN
Boyd, W. W.	Glaciologist
Bradford, D. L.	RM1, USN
Bradley, W. H.	CM3, USN
Brinton, C. C.	UT2, USN
Brown, J. B.	Ionospheric Physicist
Brown, R. D.	AM3, USN
Buckner, G. W.	CS1, USN
Burleson, R. L.	TE1, USN
Burnett, D. R.	LT(jg), USNR
Burns, W. R.	RM3, USN
Burton, C. L.	AE2, USN
Butler, H. E.	HM1, USN
Butler, W. A.	AG3, USN
Caldwell, P. R.	CMCN. USN
Cameron, R. L.	Glaciologist
Camp, E. W., Jr.	CMC, USN
Camp, G. C.	AG3, USN
Camp, R. H.	UT2, USN
Canavan, J. R.	AG3, USN
Canzoneri, A. (n)	PR3, USN
Castaneda, D. (n)	AD3, USN
Chappell, R. L.	Scientist Aide
Charlton, F. E.	ETC, USN
Cole, J. D.	AN, USN
*Cole, N. R.	AD3, USN
Cooke, R. H., Jr.	CMCN, USN
Covington, B. W.	AK3, USN
Cox, D. N.	CE3, USN
Cox, W. M.	PH1, USN
Coyne, S. L.	CD3, USN
Crain, H. D. K.	UT3, USN
Crary, A. P.	Sta Scient Leader
Creacy, A. T.	AG3, USN
Creaney, D. B., Jr.	AE1, USN
Cromie, W. J.	Glaciologist
Crouse, C. L.	CN, USN
Cumbie, W. A., Jr.	AT2, USN
Custer, J. E.	MR1, USN
Dalrymple, P. C.	Glaciologist
Dalton, B. C.	LT MC, USN
Daniel, D. (n)	CS3, USN
Darchuk, D. (n)	AM2, USN
Darkowski, L. S.	LT ChC, USN
Darter, C. M.	CDC, USN
Davis, E. H.	CS1, USN
Davis, L. E.	Geomagnetism Geophys
Davis, W. L.	CM1, USN
Deeks, H. J.	CMG1, USNR
Denney, W. R.	CS2, USN
Dewart, G. (n)	Seismologist
Dickey, C. R., Jr.	ET1, USN
Dickey, W. M.	CAPT, USN
Durnell, F. E.	SK1, USN
Dyrdal, F. F.	AM1, USN
Dzema, J. (n)	ATC, USN
Eklund, C. R.	Sta Scient Leader
Elliott, K. A.	CD1, USN
Erdie, E. A.	AG1, USN
Evans, E. R., Jr.	AG2, USN
Fancher, B. D.	AG3, USN
Farnam, R. L.	AE1, USN
Fellows, A. W.	CM3, USN
Fierle, G. R.	Meteorologist
Flowers, E. C.	Meteorologist
Flynn, W. F.	CDR CEC, USN
Forlidas, C. W.	RM2, USN
Fridovich, B. (n)	LT(jg), USN
Gehringer, T. E.	CE3, USN
Gerber, R. A.	AN, USN
Gilbert, H. R.	YNC, USN
Giovinetto, M. B.	Glaciologist
Glanz, W. A.	RM3, USN
Glasgal, R. (n)	Auroral Physicist
Green, S. E.	CD3, USN
Grice, B. F.	RM1, USN
Grimes, G. W.	RM3, USN
Grinnell, S. W.	LT MC, USNR
Grob, R. W.	CS1, USN
Gudmunson, J. P.	BUC, USN
Guenther, R. R.	SW2, USN
Guerrero, J. F.	Meteorologist
Gutierrez, J. (n)	AM2, USN
Hackett, R. W.	AT3, USN
Hackney, W. L.	AC3, USN
Hailstorm, K. J.	RM3, USN
Hale, D. P.	Aurora & Airglow
Hancock, R. E.	LTCDR
Hannah, J. L.	CE1, USN
Hansen, H. L.	Meteorologist
Hanson, M. M. K.	CDC, USN
Harden, R. D.	ACC, USN
Harlin, B. W.	Meteorologist
Harter, G. L.	Meteorologist
Haskill, R. E.	RM1, USN
Hauck, D. C.	LT DC, USN
Havener, M. C.	CM3, USN
Helfert, N. F.	Meteorologist
Hennessey, R. W.	AG1, USN
Herring, E. F.	AK1, USN
Hilditch, J. M.	SK1, USN
Hill, G. A., Jr.	RM1, USN
Hillis, E. R.	ENS, USNR
Hills, R. (n)	PH2, USN
Hoinkes, Dr. H. C.	Meteorologist
Honkala, R. A.	Meteorologist
Hough, W. S.	Ionospheric Physicist
Hricsina, J. A.	CMCN, USN
Humphries, J. G.	Ionospheric Physicist
Ingham, C. E.	Aurora & Airglow
Ingles, E. R., Jr.	AD3, USN
Ives, C. J.	CM3, USN
Jaburg, C. J.	LT, USN
Jackson, A. M.	AT1, USN
Jarratt, J. J., Jr.	RM3, USN
Jenkins, C. W.	HM3, USN
Jobe, E. G.	BU1, USN
Johns, R. H.	Meteorologist
Johnson, C. H.	RM1, USN
Johnson, E. F.	UT2, USN
Johnson, S. G., II	ET3, USN
Johnson, W. F.	Meteorologist
Jones, M. F.	PH1, USN
Jones, R. E.	CD2, USN
Jones, W. R.	CD1, USN
Kaczanowski, G. F.	CE3, USN
Kanzenbach, W. E.	RM3, USN
Kennedy, J. K.	AT3, USN
Kent, K. K.	ETC, USN
Kieffer, J. (n)	ET3, USN
King, H. C.	CEG1, USNR
Knoll, J. R.	RMC, USN
Krank, J. P.	Meteorologist
Kraut, W. F.	RM1, USN
Landolt, A. U.	Aurora Physicist
Landrum, C. D.	RM1, USN
Langevad, M. W.	Radio Technician
Larsen, C. L.	PHC, USN
Larson, L. R.	AT3, USN
Lavris, W. C.	Meteorologist
Leighton, C. W., Jr.	CD2, USN
Leischner, J. C.	AT3, USN
Lett, H. K.	CD3, USN
Lewis, A. F.	AM1, USN
Lieske, B. J.	Meteorologist
Lilienthal, B. R.	AG3, USN
Logan, D. R.	RM3, USN
Lohr, J. (n)	RM1, USN
Loken, O. (n)	Glaciologist
Long, F. A., Jr.	AD1, USN
Long, R. L., Jr.	Ionospheric Physicist
Lowe, W. E.	RM1, USN
Lupkin, R. B.	UTC, USNR
Magee, G. E.	BU1, USN
Maher, L. R.	ETC, USN
Malla, J. J.	CE2, USN
Malville, J. McK.	Aurora & Airglow
Mann, J. F.	UT3, USN
Marsh, R. D.	CS1, USN
Marshall, S. W.	LCDR, USN
Martin, R. C., III.	AT3, USN
Mathis, M.	HM2, USN
May, W. H.	AGC, USN
McCarthy, C. J.	LCDR; USNR
McCarty, E. W.	CMCN, USN
McCauley, C. J.	SN, USN
McConnel, T. J.	QMC, USN
McCrea, D. R.	AD1, USN
McCue, J. A.	RMC, USN
McIntyre, R. (n)	CM2, USN
McNeill, J. W	LT, USNR
McPherson, W. C., Jr.	RM1, USN
Melton, B. G	AD1, USN
Meyer, K. C.	PH2, USN
Milan, F. A.	Physiologist
Miles, W. S., Jr.	ADC, USN
Miller, A. L.	CD2, USN
Miller, E. G.	AN, USN
Miller, J. J.	AC3, USN
Molhom, J. (n)	Glaciologist
Molla, R. L., Jr.	CM3, USN
Moore, L. E.	CDCN. USN
Moreland, W. B.	Meteorologist
Morency, A. J.	Gravity Physicist

* DECEASED

Morris, W. R. ..... Meteorologist
Muniz, S. (n) ..... CD2, USN
Neuburg, H. A. C. ..... Chief Glaciologist
Nichols, W. L. ..... CM1, USN
Noonan, P. F. ..... PH1, USN
Northcutt, B. G. ..... CM3, USN
Novasio, R. A. ..... RMC, USN
Novosad, C. L., Jr. ..... LT MC, USN
Olson, W. A. ..... RM2, USN
Orndorff, H. J. ..... LTCDR, USNR
Osborne, T. M. ..... BU2, USN
Ostenso, N. A. ..... Seismologist
Oswalt, W. B. ..... AB1, USN
Palmer, R. W. ..... AG2, USN
Patterson, A. H. ..... CE3, USN
Pavlischak, C. J. ..... CS1, USN
Pearson, W. E., Jr. ..... AK1, USN
Penrod, J. R. ..... BU3, USN
Poteet, T. M. ..... RM2, USN
Powell, J. T. ..... AGC, USN
Pracht, A. E. ..... BU3, USN
Press, J. T. ..... RM1, USN
Pullen, G. D., Jr. ..... MAJ, USMC
Rastorguev, V. I.
(Russian Observer, Meteorologist)

Ray, J. A. ..... UT2, USN
Raynolds, P. A. ..... LT(jg), USNR
Reed, C. E. ..... CE2, USN
Rees, J. C. ..... CD2, USN
Reilly, J. E. ..... BU1, USN
Remington, B. F., Jr. ..... Meteorologist
Remington, E. W. ..... Glaciologist
Renback, J. P. ..... CM3, USN
Reynolds, C. E. ..... CE1, USN
Rhoden, J. P. ..... MAJ, USMC
Riley, M. Y. ..... CD1, USN
Robertson, J. W. ..... SW1, USN
Ronne, F. (n) ..... CAPT, USNR
Roy, R. R. ..... CS2, USN
Russell, B. D. ..... RM3, USN
Scarbrough, L. L. ..... AD3, USN
Schenketh, E. C. ..... PR1, USN
Schick, W. S. ..... ENS, USNR
Schoek, P. A. ..... Aurora & Airglow
Segers, C. W. ..... CS1, USN
Shear, J. A. ..... Scientific Leader
Siple, P. A. ..... Scientific Leader
Skidmore, D. D., Sr. ..... Ionospherics
Smith, C. R. ..... LT MC, USN
Smith, P. M. ..... T/SGT, USMC

Smith, T. A. ..... YNC, USN
Smittle, E. E. ..... HM1, USN
Spear, A. (n) ..... BUC, USN
Speed, H. G. ..... LT, USN
Spry, K. C. ..... CMCN, USN
Stackhouse, F. O. ..... ATC, USN
Stewart, G. H. ..... AD2, USN
Stisser, W. J. ..... RMSN, USN
Stonehocker, G. H.
Chief Ionospheric Physicist
Street, G. W. ..... RM2, USN
Sumrall, W. H. ..... ENS, USNR
Sutton, W. C. ..... Meteorologist
Swetokos, A. J. ..... AD3, USN
Taurisano, R. A. ..... CS1, USN
Taylor, H. C., III ..... LT MC, USN
Taylor, R. C. ..... Meteorologist
Thiel, E. C. ..... Chief Seismologist
Toney, G. R. ..... Scientific Leader
Tracy, E. (n) ..... AE1, USN
Tuck, J. (n), Jr. ..... LT(jg), USN
Tur, J. J. ..... LT MC, USNR
Unger, P. B. ..... LT MC, USNR
Varner, L. J. ..... CS3, USN
Verboncouer, B. F. ..... QMC, USN

Viets, R. L. ..... Geophysicist
Vigil, M. L., Jr. ..... AD2, USN
Wakeman, R. H. ..... RM2, USN
Waldron, J. E., Jr. ..... LT, USNR
Waldron, K. L. ..... CE3, USN
Walker, D. K. ..... RMC, USN
Walker, J. L. ..... AE3, USN
Walker, P. T. ..... Assistant Glaciologist
Ward, D. E., Jr. ..... CD1, USN
Ward, R. I. ..... CWO, USMC
Welch, W. D. ..... ET3, USN
Welk, E. L. ..... CMCN, USN
White, R. K. ..... LT(jg), USN
Whittle, G. D. ..... RMSN, USN
Williams, F. A., Jr. ..... CM3, USN
Williams, W. J., Jr. ..... RMC, USN
Wilson, S. A. ..... Meteorologist
Wonsey, D. J. ..... CMCN, USN
Wray, J. C. ..... AM2, USN
Wyche, P. A. ..... AG1, USN
Wyman, C. O. ..... Ionospheric Physicist
Yeaton, J. B. ..... ET2, USN
Yeckley, J. A. ..... AB3, USN
Zoller, J. E. ..... LT ChC, USN

WINTERING-OVER PARTY, DEEPFREEZE III

Ackroyd, F. W. ..... LT, MC, USN
Allemand, L. J. ..... CDC, USN
Allen, M. O. ..... LCDR, USN
Allison, W. L. ..... Ionospheric Phys
Alt, J. ..... French IGY Observer
Alvis, R. E. ..... RMSN, USN
Annexstad, J. O. ..... Geomagnetist
Arruiz, A. J. ..... LT, Argentine Obs
Asher, B. F. ..... CE2, USN
Astapenko, P. ..... Russian Met Obs
Axtell, W. R. ..... CSC, USN
Bagley, D. M., Jr. ..... PR3, USN
Bailey, J. K. ..... BU1, USN
Baker, C. E. ..... AT2, USN
Ball, L. W. ..... CD2, USN
Barber, S. A. ..... PH2, USN
Bargh, R. A. ..... Geomagnetist
Barkasy, F. G. ..... CD3, USN
Barnes, H. C. ..... AD2, USN
Barnes, S. S. ..... Scientific Leader
Barrett, H. P., Jr. ..... YNC, USN
Barsoum, A. H. ..... LT, MC, USN
Baulch, D. W. M. ..... Meteorologist
Bednarz, D. F. ..... ETC, USN
Behney, R. J. ..... CM3, USN
Bell, B. E. ..... CS2, USN
Bell, C. E. ..... RM1, USN
Benes, N. S. ..... Meteorologist
Benlein, F. J. ..... CD3, USN
Benson, R. L. ..... CD1, USN
Bentley, C. R. ..... Seismologist
Berquist, R. M. ..... PHC, USN
Berreitter, J. A. ..... RM2, USN
Berrie, W. E. ..... LT(jg), USN
Birkenhauer, Rev. H. F., S.J. ..... Seis
Bissonette, R. E. ..... SN, USN
Blystone, J. M. ..... RM1, USN
Boardman, K. M. ..... AM2, USN
Bocks, R. A. ..... CSC, USN
Bornmann, R. C. ..... LT, MC, USN, Mil Lead
Borrello, S. R. ..... Geomagnetist
Bourikas, G. N. ..... BU1, USN
Bowman, G. V., Jr. ..... ENS, USN
Boyles, C. V. ..... CD1, USN
Bradley, Rev. E. A., S.J. ..... Seis
Brennan, Dr. M. J. ..... Scien Lead
Brown, J. W. ..... CE1, USN
Brown, L. E. ..... CM2, USN
Brown, L., Jr. ..... AD2, USN
Brown, R. A. ..... Meteorologist
Bryant, A. M., Jr. ..... CS1, USN
Bunnell, R. L. ..... CD1, USN
Burnham, J. B. ..... Ionospheric Physicist
Byard, J. J., Jr. ..... AD2, USN
Calder, R. E. ..... SW2, USN
Carlson, J. A. ..... ATC, USN
Carlson, J. H. ..... RM2, USN
Carlson, K. R. ..... BU1, USN
Carney, N. L., III ..... CDC, USN
Casey, H. F., Jr. ..... QMC, USN
Chandler, P. G. ..... CS1, USN
Childs, J. H. ..... BUC, USN
Churchill, R. W. ..... RMC, USN
Clarke, W. E. ..... RMSN, USN
Clarkson, W. R. ..... AE2, USN
Cochran, H. B. ..... Meteorologist
Cockrell, W. E. ..... ATC, USN
Collins, J. J. ..... ETC, USN

Connors, W. J. ..... AG2, USN
Cook, G. H. ..... CE1, USN
Cooley, J. ..... AKC, USN
Cornely, J. R. ..... RM1, USN
Coulter, L. G. ..... CMC, USN
Craig, C. N. ..... RM1, USN
Crary, A. P. ..... Deputy Chief Scientist
Cronk, C. ..... Glaciologist
Cressey, R. N. ..... SK2, USN
Cullity, W. M. ..... ABC, USN
Curtis, D. A. ..... RMSN, USN
Dalrymple, P. C. ..... Glaciologist
Dandrea, F. A. ..... LCDR, USN
Darling, F. L. ..... Meteorologist
Dasinger, J. R. ..... LT(jg), USN
Davis, J. C. ..... BU3, USN
Dawson, J. A. ..... Aurora and Airglow
Deegan, R. K. ..... AG3, USN
Den Hartog, S. L. ..... Glaciologist
Denison, D. ..... Aurora and Airglow
De Vaney, J. J. ..... MRC, USN
Dewit, L. B. ..... CSC, USN
Dixon, T. L. ..... CS2, USN
Dowd, G. P. ..... LT(jg), USN
Downs, B. S. ..... AC1, USN
Drew, J. W. ..... CEC, USN
Du Bois, G. R. ..... CMC, USN
Duncan, D. R. ..... SK1, USN
Eberth, R. L. ..... ETC, USN
Edgerton, R. E. ..... SW1, USN
Edgerton, T. H. ..... LT(jg), USN
Edman, D. ..... Ionospheric Physicist
Edwards, C. R. ..... CMC, USN
Eldred, D. T. ..... CD2, USN
Ely, D. O. ..... RM2, USN
Epler, C. F., Jr. ..... SKC, USN
Errickson, L. E. ..... CMC, USN
Evans, R. L. ..... CE2, USN
Eyres, D. L. ..... ENS, USN
Ezell, J. F. ..... AK1, USN
Fadden, D. E. ..... UT1, USN
Fairless, B. H. ..... CD1, USN
Farragut, F. F. ..... ADC, USN
Fazekas, S. P. ..... Glaciologist
Feldkotter, H. J. ..... AEC, USN
Ferrell, J. T. ..... CM3, USN
Fisher, W. B. ..... RM3, USN
Flynn, R. A. ..... RM1, USN
Fopay, C. F. ..... Meteorologist
Foreman, D. L. ..... AD2, USN
Foster, H. L. ..... CMC, USN
Francis, E. L. ..... AG2, USN
Francis, H. S., Jr.
Executive Assistant Scientific Leader
Franke, J. W. ..... LCDR, USN
French, W. T. ..... ETC, USN
Fry, H. W. ..... RM1, USN
Gagnon, G. N. ..... ACC, USN
Gallagher, J. T. ..... CE1, USN
Garczynski, C. J. ..... AG3, USN
Giovinetto, M. B. ..... Glaciologist
Glawson, F. J. ..... PHC, USN
Gniewek, J. ..... Geomagnetist
Goode, H. E. ..... CS2, USN
Goodwin, R. J. ..... Glaciologist
Gordon, G. J. ..... AD2, USN
Graf, J. G. ..... ENS, USN
Gray, T. I., Jr. ..... Micrologist

Gray, W. B. D. ..... ADC, USN
Greene, C. R., Jr. ..... Ionospheric Physicist
Greenwood, R. A. ..... CMC, USN
Greenwood, S. C. ..... RMC, USN
Grieve, D. W. ..... CD1, USN
Griffith, R. B. ..... FPC, USN
Griffith, W. H. ..... DCC, USN
Grimes, P. D. ..... CDC, USN
Guarcello, D. ..... Meteorologist
Hammer, J. A. ..... SK2, USN
Hannah, E. L. ..... AM1, USN
Hanson, K. J. ..... Meteorologist
Harper, D. J. ..... AG1, USN
Harper, R. B. ..... ETC, USN
Harris, J. H. ..... CD3, USN
Hartley, R. D. ..... RM1, USN
Hasty, J. D. ..... RM1, USN
Hayes, J. H. ..... RMSN, USN
Haynes, R. C. ..... CM1, USN
Heany, H. V. ..... LT ChC, USN
Heid, B. L. ..... AT2, USN
Henry, J. T. ..... ET2, USN
Hershberger, P. R. ..... AT3, USN
Highlands, W. H. ..... AG2, USN
Hobbs, J. W. ..... ENS CEC, USN
Hoffman, D. ..... IGY Mechanic
Hollin, J. ..... Glaciologist
Holt, J. R. ..... PH1, USN
Houghtaling, A. J. ..... CD1, USN
Houk, V. N. ..... LT MC, USN
Hudson, P. M. ..... AD1, USN
Hyde, W. H. ..... Ionospheric Physicist
Jacobs, G. B. ..... HM2, USN
John, O. F. ..... SW1, USN
Johnson, E. K. ..... FPC, USN
Johnson, H. J. ..... RMC, USN
Johnson, K. L., Jr. ..... CD2, USN
Johnson, L. A. ..... Meteorologist
Jones, J. G. L. ..... LT(jg), USN
Jones, T. K. ..... LT, USN
Jorgensen, A. E. ..... Meteorologist
Kaminski, F., Jr. ..... AG2, USN
Kaschak, J. P., Jr. ..... AD1, USN
Keeler, A. J. ..... AG2, USN
Kelley, H. O. ..... RM1, USN
Kelly, B. L., Jr. ..... SW2, USN
Kelly, M. W. ..... RMSN, USN
King, G. A. N. ..... Geomagnetist
Kinsella, W. R. ..... AT2, USN
Klemkosky, R. R. ..... AC1, USN
Knack, J. V. ..... Meteorologist
Knapp, L. A. ..... CD3, USN
Kohlman, L. H. ..... CE2, USN
Kruger, E. J. ..... RM1, USN
Kunschman, P. ..... UTC, USN
Kvarnstrom, W. R. ..... CM3, USN
Lane, L. A. ..... CD2, USN
Langford, L. G., Jr. ..... BU2, USN
Latham, T. L. ..... CM1, USN
Lawrence, N. E. ..... AD1, USN
Layman, F. C. ..... IGY Mechanic
Layne, W. W. ..... AN, USN
Leitner, R. F. ..... AD3, USN
Le Schack, L. ..... Seismologist
Long, J. B. ..... Glaciologist
Long, W. E. ..... Glaciologist
Luck, G. D. ..... AD2, USN
Ludeman, E. E. ..... LCDR USN, OinC

Lynsky, J. E. ..... BUC, USN
Mackemer, F. W. ..... AG3, USN
Maher, E. H. ..... CAPT, USN
Mann, J. E. ..... AN, USN
Martin, M. W. ..... RM2, USN
Mast, C. W. ..... CD3, USN
Matthews, R. A. ..... TERM1, USN
MAY, W. J. ..... ETC, USN
McCarthy, W. J. ..... RM1, USN
McClelland, P. A. ..... RM3, USN
McCoy, R. L. ..... AC1, USN
McDonald, D. D. ..... RM2, USN
McGinnis, L. D. ..... Seismologist
McKeown, A. ..... AT2, USN
Meads, E. C. ..... CD3, USN
Mersinger, D. A. ..... TEC, USN
Mervin, C. J. ..... ACC, USN
Miller, D. A., Jr. ..... LCDR, USN
Milton, P. G. ..... AD2, USN
Moffat, R. J. ..... CE1, USN
Moffett, J. M. ..... UT2, USN
Mogensen, P. ..... Scientific Leader
Monson, D. M. ..... RM1, USN
Montgomery, C. L. ..... CD1, USN
Montroy, J. J. ..... HM1, USN
Morrison, J. L. ..... RM1, USN
Morley, K. ..... Meteorologist
Mozetic, R. E. ..... ET1, USN
Murphy, G. D. ..... RM2, USN
Murphy, J. W. ..... RM1, USN
Nelson, N. G. ..... CE2, USN
Nebeling, R. ..... AC1, USN
Nervo, G. W. ..... RM1, USN
Newhouse, T. H. ..... TE(RM)2, USN
Noble, W. C. ..... Meteorologist
Norman, D. E. ..... CE1, USN
O'Dell, W. R. ..... TE(RM)C, USN
Olson, E. B. ..... UT1, USN
Ommundson, A. ..... IGY Mechanic
Pageau, G. E. ..... BU1, USN
Patrick, F. M. ..... AG1, USN
Paul, H. M. ..... CSC, USN
Peairs, B. A. ..... AD3, USN
Pepper, C. G. ..... HMC
Perlitsh, M. J. ..... LT DC, USN
Perry, O. N. ..... EN1, USN
Person, I. J. ..... LCDR, USN
Peters, N. L. ..... Meteorologist
Peterson, L. G., Jr. ..... LT, USN
Pickering, H. E. ..... AT1, USN
Pirrit, J. ..... Glaciologist
Ply, J. F. ..... ET1, USN
Poe, D. W. ..... HM1, USN
Pollard, R. S. ..... RM2, USN
Poteat, C. L. ..... CD1, USN
Ramsey, R. E. ..... AK1, USN
Reabold, M. J., Jr. ..... AG3, USN
Reed, D. R. ..... Ionospheric Physicist
Reed, F. E. ..... AKC, USN
Renwick, L. R. ..... CD1, USN
Rickman, C. I. ..... RM1, USN
Rivas, M. G. ..... RMC, USN
Roach, W. M. ..... YN1, USN
Robbins, E. J. ..... AG2, USN
Robertson, R. ..... Glaciologist
Robicheau, H. J. ..... CD1, USN
Roden, C. E. ..... RM2, USN
Rodgers, C. L. ..... CD1, USN

Ropar, N. J., Jr. — Meteorologist
Ruseski, P. P. — LT MC, USN
Saeger, A. R. — LT ChC, USN
Sain, J. R. — PH2, USN
Salmon, K. J. — Scientific Leader
Sanderson, L. B. — SKC, USN
Sayles, M. L. — AD2, USN
Schaefer, K. E. — ET1, USN
Schilling, F. G. — AN, USN
Schneider, R. P. — AMC, USN
Schulz, R. L. — CM1, USN
Seay, W. K. — UT1, USN
Semingson, R. R. — RM2, USN
Semprebon, L. C. — Ionospheric Physicist
Sherburne, E. W. — YN3, USN
Sherwin, J. S. — Ionospheric Physicist
Shoemaker, D. A. — Meteorologist
Shotwell, J. A. — RM1, USN
Shumate, F. L. — CM1, USN
Slabey, T. M. — LCDR, USN
Slagle, T. D. — CAPT MC, USN
Smith, B. G. — CM2, USN
Smith, E. H. — AG1, USN
Smith, R. E. — AG2, USN
Smith, S. C. — UT3, USN
Socks, J. A. — ETC, USN
Sparkes, R. S. — LT MC, USN, Mil Lead
Spencer, D. J. — Ionospheric Physicist
Spengler, G. L. — ET2, USN
Stockton, F. M. — HMC, USN
Stokes, F. G. — LT(jg), USN
Sturgis, J. S. — CDC, USN
Swan, J. R. — AG2, USN
Taylor, W. J. — CS1, USN
Thomas, R. W. — CM3, USN
Thompson, C. W. — SK3, USN
Thompson, T. N. — LCDR USN, OinC
Thompson, W. F. — CS1, USN
Tidd, P. — LT USN, Military Leader
Todd, M., Jr. — Aurora and Airglow
Toro, M. E. — SW2, USN
Tracy, G. F. — RMC, USN
Tressler, Dr. W. — Scientific Leader
Troyer, J. A. — CM3, USN
Trusty, V. J. — CDCN, USN
Turcotte, T. F. — Seismologist
Urban, V. D. — Meteorologist
Van Gunst, P. I. — CM2, USN
Vannatta, W. A. — ET1, USN
Vermilion, N. L. — LT DC, USN
Viner, E. F. — RM1, USN
Walters, M. J — LT, USN
Ward, J. H. — AE2, USN
Warnock, J. L. — ETC, USN
Warren, A. D. — Aurora and Airglow
Wasko, F. — LCDR, USN
Watson, W. A. — CM2, USN
Weight, L. S. — PR3, USN
Wentworth, T. H. — SN, USN
West, C. E. — CS1, USN
Weyant, W. S. — Meteorologist
White, E. L. — UT1, USN
Whitman, L. C. — CM2, USN
Whitman, R. A., Jr. — RM1, USN
Williams, C. E. — Meteorologist
Willson, D. L. — Meteorologist
Wilson, C. R. — Aurora and Airglow
Wilson, N. D. — ET1, USN
Wilson, P. M. — RM1, USN
Witherell, R. G. — CDR, USN
Wojcik, J. C. — CM3, USN
Wright, M. H. — LT(jg), USN
Wright, R. D. — CS1, USN
Wright, T. N. — AE2, USN
Yunger, E. M. — BU3, USN
Zimmerman, J. R. — Meteorologist

DEEPFREEZE III SUMMER SUPPORT IGY PERSONNEL

Austin, W. T. — Glaciology
Cahill, L. J. — Rocketry
Campbell, J. B. — Geomagnetism
Coffmen, H. J. — Drilling Team
Cook, J. C. — Seismology
Croll, W. G. — Geology
Field, W. O. — Glaciology
Forbes, J. C. — "Rat" Vehicle Representative
Gartlein, C. W. — Cosmic Rays
Goldthwait, R. P. — Glaciology
Goodale, E. E. — IGY Representative
Gooday, L. A. — Drilling Team
Gould, L. M. — Director, USNC-IGY Antarctic Program
Gow, A. C. — Geology
Hamilton, J. H. — Drilling Team
Harrington, H. J. — Geology
Hartigan, W. B. — IGY Photographer
Hearfield, B. — Geology
Heine, A. J. — Geology
Helliwell, R. A. — Cosmic Rays
Henebry, W. M. — Cosmic Rays
Humphrey, P. A. — Meteorology
Kryger, A. H. — Drilling Team
Llano, G. A. — Botany
Lenson, G. J. — Geology
Marshall, E. W. — Glaciology
McKeller, I. C. — Geology
Morgan, M. G. — Ionosphere
Patenaude, R. W. — Glaciology
Pewe, T. L. — Glaciology
Reid, J. R., Jr. — Glaciology
Rivard, N. R. — Glaciology
Robinson, E. S. — Glaciology
Shapley, A. H. — Project Scientist
Smith, P. M. — Glaciology
Sparkman, J. K. — Gravity
Spilhaus, A. F. — Project Scientist
Tedrow, J. V. — Glaciology
Tiniski, W. — Glaciology—Drilling Team
Turnbull, G. — Geology
Van Allen, J. A. — Rocketry
Vickers, W. W. — Glaciology
Washburn, A. L. — Glaciology
Wexler, H. — Chief Scientist
Wood, B. L. — Geology
Wood, E. A. — IGY Representative
Zumberge, J. H. — Glaciology
Van Loon, H. — South African Representative, LAS Weather Central

OFFICERS AND MEN, AIR DEVELOPMENT SQUADRON SIX (VX-6)

Abhau, J. E.
Achlin, W. C.
Ackman, L. H.
Alexander, E. S.
Allen, F. M., Ltjg
Allsup, C. C.
Anderson, S. P., Ltjg
Baker, B. M.
Ballenger, D. J.
Barfield, E. B.
Baronick, M. (n)
Bautista, M. (n)
Beal, P. W.
Beardman, J. M.
Bennett, E. H.
Beyers, P. H.
Binkley, B. J.
Blackburn, W. J.
Blodgett, A. A., Jr.
Bodine, T. A., Lt
Bolling, R. L., Lt
Bracken, H. J.
Branston, R. E.
Brown, C. (n), Jr.
Brown, W. O.
Buckley, J. A.
Caines, T. C.
Campbell, A. B.
Carley, F. F.
Carter, J. C.
Chapman, R. A.
Clackum, J. H.
Clauson, T. W.
Coley, V. J., Cdr
Colson, J. G., Jr., Ltjg
Conner, R. F.
Conover, W. G.
Copper, I. H.
Coppula, P. C.
Copola, G. B.
Cowart, E. A.
Cox, F. J.
Creech, W. Y., Ltjg
Crowe, B. A.
Daughenbaugr, O. R.
Davies, R. F.
Davis, N. E., Ltjg
Davis, R. G., Ltjg
Day, A. (n)
Dickson, P. B.
Downs, H. J.
Drabkin, J. W., Lt
Dryfoose, E. D., Lt
Ducharme, M. A., Jr.
Ebert, R. J.
Edwards, U. L., Jr.
Elrod, H. J., Jr.
Epperly, R. M., Lt
Eves, F. A.
Fanjoy, S. L.
Favreau, R. D.
Findley, R. H.
Fisher, H. C., Cwo
Frankiewicz, E. J., Cdr
Franzoni, J. A.
Gann, E. H.
Garneau, R. (n)
Gardner, H. E., Ltjg
Gay, A. F., Jr., Lt
Golden, J. A.
Goodlin, J. B.
Goodell, R. (n)
Gowen, G. R., Jr.
Gray, I. E.
Hall, R. E., Lt
Hames, W. R., Jr.
Hanson, H. G., Lcdr
Harman, J. S.
Harrington, J. J.
Henke, M. F.
Henning, J. A., Lcdr
Inderrieden, S. K.
Jones, A. W., Cdr
Jones, R. M.
Kacer, A. R.
Kemp, W. R.
Kenney, L. S., 1st Lt
Kent, P. E.
Kilburn, W. R.
Kingen, E. L.
Koch, R. A., Lt
Laner, R. E.
Liptak, L. H.
Lishness, A. L.
Loczowski, S. (n), Jr.
Long, J. W.
Long, W. H., Jr.
Luck, G. D.
MacAlpine, K. D., Ltjg
Martinez, A. H.
Marvin, R. C.
Mayo, W. M.
McCann, J. (n)
McDonald, O. R.
Meskin, H. (n)
Miles, D. R.
Miller, R. E.
Morrell, G. W.
Moslo, B. S., Jr.
Munker, L. D., Ltjg
Murray, J. R.
Newman, J. C., Jr.
Nolan, G. L.
Ogren, E. E., Cdr
O'Sullivan, P. A.
Packard, R. N.
Parry, P. D.
Pello, D. (n)
Penny, W. W
Peregory, L. W.
Phelps, W. B.
Pietrczak, W. (n)
Polley, A. W.
Porter, J. D.
Prince, J. F.
Purtell, J. M., Ltjg
Purvis, R. S., Ltjg
Quinlan, P. (n)
Rainey, R. T.
Ramsey, R. E.
Ratliff, C. E.
Ratzlaff, Q. S., 1st Lt
Reeves, M. E.
Reimer, J. D.
Rietz, A. H.
Riley, J. J.
Roberts, E. K.
Robinson, H. (n)
Robinson, R. L.
Roelle, W. B.
Rosenberg, P. (n)
Ryder, E. H., Jr.
Satterfield, T (n)
Sauer, C. A., Lcdr
Schuon, J. J.
Scoggin, C. W.
Seiver, M. T., Ltjg
Shinn, C. S., Lcdr
Siegel, E. (n)
Silbermann, E. J.
Simkovich, J. A.
Small, B. L.
Smallwood, W. L., Ltjg
Smith, G. E.
Snyder, K. P., Lcdr
Southwick, T. E.
St. Marie, J. W., Lt
Stone, R. P., Ltjg
Sullivan, C. M.
Sullivan, D. J.
Tackett, J. A.
Thomas, D. R.
Thompson, E. B.
Thorpe, R. W.
Valenciano, B. (n)
Wallace, R. E.
Wilcocks, C. R.
Wilson, J. A.
Winters, R. R.
Wood, M. J.
Young, L. R.

OFFICERS AND MEN, NAVAL SUPPORT UNIT THREE, ANTARCTICA

Aasland, M. A.
Alexander, A. J.
Alexander, B. L.
Barr, N. E.
Beaulieu, J. E.
Bennett, J. E.
Blankenship, G. P.
Borhnhorst, H. (n), Jr.
Booth, G. W.
Branum, H. L.
Bravo, H. C.
Brewer, W. A.
Bringanti, R. J., Jr.
Brinker, L. E.
Brown, C. L.
Brown, T. M.
Calder, R. E.
Cameron, W. C.
Cardone, G. A.
Carney, N. L., III
Carter, D. H.
Cashman, J. B.
Casto, R. D.
Clay, M. M.
Clem, R. L.
Clements, J. T.
Concilla, N. L.
Costello, R. J., Jr.
Coombs, W. A.
Crum, M. R., Jr.
Crumpton, W. O.
Cotton, A. J.
Davis, G. F.
Davis, G. R.*
Davis, J. G.
Delacey, G. L.
Dell, D. D.
Deschamps, R. V.
Dillon, G. R.
Doige, J. E.
Dube, C. V.
Dugger, H. H.
Durgin, L. A.
Earle, A. R.
Eden, S. R.
Enos, J. L.
Fahie, J. O.
Fairless, B. H.
Felton, H. D.
Fillyaw, W. L.
Finck, R. W.
Fitzwater, D. N.
Foster, R. C.
Francisco, L. K.
Frisbee, A. C.
Gaskell, J. E., Jr.
Gardiner, J. E.
Gargiulo, D. J.
Gilbertson, D. D.
Gill, F. B., Jr.
Gladstone, B. (n)
Goldsworthy, J. (n)
Goodwin, L. T.
Gormley, J. (n)
Graser, J. (n)
Graver, R. W.
Grover, D. E.
Hall, G. A.
Hall, R. M.
Halloran, B. L. J.
Hare, P. (n)
Hayes, H. D.
Head, E. E.
Hearn, R. H.
Hear, J. E.
Herda, J. L.
Hightower, A. G.
Hissong, E. B.
Holland, J. T.
Holland, W. W.
Holman, S. F.
Horner, G. L.
Hovind, L. L.
Howard, C. M.
Huskins, J. (n)
Ingraham, R. B.
Irish, W. W.
Isenbarger, J. R.
Janiskee, A. P.
Johnson, L. F.
Kasper, N. O.
Kauffman, K. V.
Killian, J. T.
Kleckner, D. A.
Klingensmith, W. R.
Koch, W. H.
Kohn, R. L.
Kohlman, L. H.
Kresge, R. E.
Langston, R. L.
Lanni, T. (n)
Laubenbauch, R. W.
Ledington, B. D.
Leth, M E.
Lewis, A. W.
Lipski, J. E.
Long, R. L.
Love, J. E.
Ludovico, J. J.
Lucas, R. L.
Lundy, C. C.
MacArthur, C. R.
Marshall, J. G.
Matawa, G. R.
Mayer, J. K.
McCuistion, J. P.
McFarlane, A. F.
McKinney, R. D.
McManious, G. D.
McMillen, C. G.
McPhee, W. A.
Mogk, W. J.
Morgan, J. B.
Mund, G. K.
Mumford, L. S.
Nelsen, J. D.
Nelson, R. W.
Nelson, T. R.
Oliver, R. (n)
O'Leary, P. D.
Orsborn, S. G.
Pawlowski, J. (n)
Pease, L. L.

* DECEASED

Perez, S. M.
Perruzzi, R. J.
Powell, D. J.
Proffitt, C. R.
Pryor, M. (n)
Quesenberry, T. B.
Ramsey, M. E.
Randall, J. A.
Rhodes, T. J.
Richards, K. M.
Richards, K. P.
Richardson, E. E.
Roberson, D. G.
Robinson, W. E.
Rogers, R. S.
Rowe, J. D.
Runnestrand, W. C.
Spangler, P. G.
Samolinski, M. J.
Sauro, N. (n)
Schaar, R. L.
Scott, R. L.
Schreiner, N. D.
Seaboy, J. H.
Seeds, J. W.
Sherburne, E. W.
Shockley, J. M.
Shubert, R. L.
Smith, E. B.
Spanoghe, J. W., Jr.
Steffes, F. E.
Stockman, H. O.
Stone, W. M.
Tallon, J. C.
Taylor, D. J.
Taylor, J. M., Jr.
Themes, C. P.
Thompson, V. D.
Thorpe, D. (n)
Tollett, W. C.
Toro, M. E.
Vance, R. (n)
Vier, W. B.
Volz, L. C.
Wages, J. C.
Watson, W. A.
Walsh, T. (n)
Wehn, R. C.
Williams, C. C.
Williams, J. A.
Williams, R. M.
Willett, R. N.
Wilson, D. T.
Witty, F. (n)
Wojcik, J. C.
Woody, C. K.
Wright, R. J.
Wrona, J. F.
Wyatt, M. T.
Young, B. L.
Zegers, J. E.
Zia, J. (n)

OFFICERS AND MEN, DETACHMENT #1, 53RD TROOP CARRIER SQUADRON

Forwood, W. G. — COL
Arnold, D. J. — LTCOL
Zinkovich, M. — LTCOL
Blan, K. W. — CAPT
Burnett, F. O., Jr. — CAPT
Cox, G. G. — CAPT
Decesare, V. J. — CAPT
Garrison, R. R. — CAPT
Stianchi, V. G. — CAPT
Thomas, J. W. — CAPT
Wrinkle, J. H. — CAPT
Egnot, E. J. — 1st LT
Garbrick, R. C. — 1st LT
Jackson, R. B. — 1st LT
Jenkins, J. H., Jr. — 1st LT
Johnson, A. K. — 1st LT
Kull, W. E. — 1st LT
Partridge, A. — 1st LT
Richardson, L. R., Jr. — 1st LT
Stewart, J. P. — 1st LT
Broderick, W. P. — CAPT
Nisker, M. — CAPT
Bissett, R. L. — 1st LT
Cook, W. M. — 1st LT
Defonce, F. X. — 1st LT
Hadley, D. N. — 1st LT
Jowers, T. D. — 1st LT
Kuhn, F. J. — 1st LT
Rand, D. E. — 1st LT
Roth, L. R. — 1st LT
Taylor, J. L. — 1st LT
Taff, A. B. — MAJ
Pinon, M. A., Jr. — MAJ
Embree, H. A. — MAJ
O'Neill, T. A. — CAPT
O'Callaghan, J. M. — 1st LT
Scoggins, J. B. — 1st LT
Wokoun, E. R. — 1st LT
Hardy, R. D. — 1st LT
Greenlee, R. J. — 1st LT
Copsey, R. L. — 1st LT
Hatfield, T. R. — CAPT
Briscoe, R. J. — CAPT
Jocs, L. A. — 1st LT

Anglin, J. A. — M/SGT
Baker, C. A. — M/SGT
Barentine, W. F. — M/SGT
Blair, E. — M/SGT
Buell, L. J., Jr. — M/SGT
Friedel, F. F. — M/SGT
Harbour, R. O. — M/SGT
Lee, T. A., Sr. — M/SGT
Mayhew, G. W., Sr. — M/SGT
Morgan, R. P. — M/SGT
Roberts, J. A. — M/SGT
Smith, K. S. — M/SGT
Wilson, R. L., Jr. — M/SGT
Woertz, F. A. — M/SGT
Beckwith, R. L. — T/SGT
Becraft, D. R. — T/SGT
Bennett, C. J. — T/SGT
Bennett, E. — T/SGT
Bice, R. B. — T/SGT
Bradley, G. E. — T/SGT
Byrd, W. H. — T/SGT
Chastain, W. B. — T/SGT
Couture, L. A. — T/SGT
Delgado, E. P. — T/SGT
Fetterman, D. E. — T/SGT
Fordham, J. K. — T/SGT
Fullen, R. N. — T/SGT
Hall, H. E., Jr. — T/SGT
Herron, W. L. — T/SGT
Hogan, H. R. — T/SGT
Holland, D. G. — T/SGT
Hooper, N. D. — T/SGT
Kershow, J. J. — T/SGT
Lasater, W. M. — T/SGT
McMeekin, G. A. — T/SGT
McNamara, G. D. — T/SGT
Marshall, V. D. — T/SGT
Patton, R. J. — T/SGT
Pease, G. L. — T/SGT
Peterson, D. W. — T/SGT
Powers, M. C. — T/SGT
Roberts, M. C. — T/SGT
Robertson, R. J. — T/SGT
Rodden, E. C., Jr. — T/SGT
Sain, G. N. — T/SGT
West, S. A. — T/SGT
Alderman, R. E. — S/SGT
Allen, C. M. — S/SGT
Allen, J. T. — S/SGT
Barber, R. D. — S/SGT
Bauer, M. L. — S/SGT
Baxter, J. L., Jr. — S/SGT
Bell, L. L. — S/SGT
Blackledge, J. F. — S/SGT
Boineau, J. R. — S/SGT
Broach, M. L., Jr. — S/SGT
Brock, D. L. — S/SGT
Bugbee, J. H. — S/SGT
Carlton, A. D. — S/SGT
Cassidy, S. T. — S/SGT
Causey, L. — S/SGT
Clark, J. E. — S/SGT
Coleman, H. E. — S/SGT
Douthit, L. F. — S/SGT
Draper, R. E. — S/SGT
Featherstone, C. T. — S/SGT
Fitzgerald, W. A. — S/SGT
Funderburk, J. R. — S/SGT
Gaede, O. E. — S/SGT
Garren, B. G. — S/SGT
Garren, J. O. — S/SGT
Garza, R. R. — S/SGT
Gould, R. L. — S/SGT
Gross, W. H. — S/SGT
Hinson, E. F. — S/SGT
Hinton, P. A., Jr. — S/SGT
Hodge, R. D. — S/SGT
Howard, J. W. — S/SGT
Kennedy, L. Z. — S/SGT
Lamar, H. L. — S/SGT
Ledbetter, T. N. — S/SGT
McAlister, J. C. — S/SGT
McCorkle, D. L. — S/SGT
McGirr, R. E. — S/SGT
McNabb, B. E. — S/SGT
Malinauskas, J. C. — S/SGT
Matthews, J. D. — S/SGT
Moll, J. W. — S/SGT
Miller, C. R. — S/SGT
Murton, W. N. — S/SGT
Nagle, W. T. — S/SGT
Neary, J. E. — S/SGT
O'Donald, J. F. — S/SGT
Phillips, J. A. — S/SGT
Pitlik, G. — S/SGT
Pitts, H. H. — S/SGT
Quinn, J. D. — S/SGT
Schilt, K. W. — S/SGT
Schrantz, R. E. — S/SGT
Simmons, A. O. — S/SGT
Stevens, R. E. — S/SGT
Stewart, J. A. — S/SGT
Sutcliffe, R. D. — S/SGT
Teal, J. D. — S/SGT
Thomason, R., Jr. — S/SGT
Trout, W. H. — S/SGT
Underwood, C. S., Jr. — S/SGT
Watson, J. R. — S/SGT
Wilson, D. E. — S/SGT
Wilson, E. W. — S/SGT
Wright, J. R. — S/SGT
Adkins, V. — A1C
Bigford, R. J. — A1C
Buls, R. B. — A1C
Bunton, L. L. — A1C
Cain, R. C. — A1C
Chestnut, R. B. — A1C
Dunn, F. J., Jr. — A1C
Dunn, W. E. — A1C
Flynn, W. P. — A1C
Frye, W. M. — A1C
Hardin, R. H. — A1C
Hatley, F. J. — A1C
Hesse, W. H. — A1C
Holloman, C. R. — A1C
Howell, O. V., Jr. — A1C
Hyland, G. D. — A1C
Johnson, C. W., Jr. — A1C
Lyda, E. J. — A1C
Mace, D. B. — A1C
Miller, D. — A1C
Mixon, J. A. — A1C
Morris, C. L. — A1C
Pitts, E. I. — A1C
Potts, J. R. — A1C
Presnell, A. B. — A1C
Queen, D. G. — A1C
Raines, C. J. — A1C
Reeves, R. E. — A1C
Scott, J. L. — A1C
Sones, G. L. — A1C
West, R. A. — A1C
Stephens, M. S. — A1C
Stewart, M. D. — A1C
Thomason, H. B. — A1C
Tillman, S. F. — A1C
Turner, C. R. — A1C
Von Bokern, S. J. — A1C
Weis, J. D. — A1C
Whittington, E. A. — A1C
Bain, K. L. — A2C
Beauchamp, C. H. — A2C
Bennett, D. B. — A2C
Blalock, R. E. — A2C
Bowken, M. E. — A2C
Browning, D. B. — A2C
Wick, R. E. — A2C
Bruce, B. H. — A2C
Burger, F. L., Jr. — A2C
Byrd, N. O. — A2C
Carver, J. A. — A2C
Chacon, R. E. — A2C
Clark, F. W. — A2C
Cooney, D. L. — A2C
Costa, F. — A2C
Costello, C. E., Jr. — A2C
Day, V. L. — A2C
Doth, H. D. — A2C
Duncan, T. W. — A2C
Evans, B. C. — A2C
Evanski, C. W. — A2C
Fernandez, A. T. — A2C
Fraser, R. S. — A2C
Garick, J. R. — A2C
Greene, E. L. — A2C
Griffin, J. G. — A2C
Hardy, D. S. — A2C
Holcomb, J. L. — A2C
Isbell, G. G. — A2C
Kitzman, K. A. — A2C
Jasper, T. — A2C
Johnes, B. B. — A2C
Kauffman, C. W. — A2C
Korastinsky, R. — A2C
Kuehne, J. J. — A2C
Langham, R. D. — A2C
Laramee, R. J. — A2C
Lewis, R. L. — A2C
Long, R. L. — A2C
Lowery, G. F. — A2C
McClany, C. S. — A2C
McKinney, W. A. — A2C
Maney, F. — A2C
Moore, L. T. — A2C
Munson, S. L. — A2C
Newcomb, P. L. — A2C
Ogan, D. C. — A2C
Page, A. R. — A2C
Phillips, G. D. — A2C
Powers, J. — A2C
Proctor, F. D. — A2C
Puckett, F. A. — A2C
Purvis, V. R. — A2C
Reese, N. J. — A2C
Roberts, R. E. — A2C
Robey, W. G. — A2C
Robichauz, L. — A2C
Rogers, P. M. — A2C
Rosile, V. — A2C
Russo, A. L. — A2C
Rust, D. E. — A2C
Sanders, F. V. — A2C
Self, K. S. — A2C
Semones, D. G. — A2C
Shumal, L. — A2C
Sidoti, J. A., Jr. — A2C
Slone, K. — A2C
Sparkman, O. D. — A2C
Stanley, J. L. — A2C
Smalley, A. R. — A2C
Stevens, W. R. — A2C
Swank, A. G. — A2C
Taylor, J. S. — A2C
Timbs, R. G. — A2C
Turner, G. — A2C
Vojtush, A. P. — A2C
Ward, B. K. — A2C
Williams, C. — A2C
Williams, W. T. — A2C
Wireman, C. E. — A2C
Worley, M. E. — A2C
Zercher, L. W. — A2C
Zimmerman, P. D. — A2C
Bracey, O. C., Jr. — A3C
Colle, B. W., Jr. — A3C
Ladd, G. P. — A3C
Miller, C. — A3C
Pinson, W. H. — A3C
Rader, L. F. — A3C
Semn, J. R. — A3C
Setzke, C. F. — A3C
Spears, G. D. — A3C
Speicher, P. A. — A3C
Stichler, H. D. — A3C
Tedford, J. E. — A3C
Turner, D. E. — A3C

SEABEE RECONNAISSANCE UNIT AT MARBLE POINT

Allard, R. N.
Anderson, C. W.
Armstrong, J. B.
Armstrong, W. E.
Bass, B. B.
Crosbie, S. F.
Dean, A. T.
Homewood, G. J.
Kavanaugh, F. H.
Liosev, M. V.
Miskinis, R. A.
Mohalley, P. R.
Smith, M. C.
Smithers, W. O.
Spina, C. G.
Stephens, H. E.
Stockton, M. M.
Surko, A.
Tate, J. T.
Wallace, G. G.
Waltrip, C. B.

OFFICERS AND MEN, USS GLACIER

Campbell, P. A. ..... Ship's Boatswain
Care, E. A. ..... Main Propeller Assistant
Christy, M. G. ..... Medical Officer
Dudley, R. L.
Durshoff, L. C. ..... Helicopter Pilot
Evans, W. A. ..... Electrician's Officer
Friedman, M. H. ..... Dental Officer
Goodchild, R. M. ..... Supply Officer
Houston, J. A.
Commanding Officer (Captain)
Marks, C. C. ..... Navigator
Matthews, P. Y., Jr. ..... Engineering Officer
Martin, D. M. ..... Helicopter Pilot
Merrill, G. C. ..... Communications Officer
O'Sullivan, J. F. ..... Assist. Gunnery Officer
Pauken, D. J. ..... 1st LT
Schenck, B. H.
Seidel, J. L. ..... Disbursing Officer
Sternberg, L. V. ..... Executive Officer
Sterrett, H. E. ..... Helicopter Pilot
Thomas, G. C.
Assistant Engineering Officer
Thomas, R. S. ..... Personnel Officer
Will, R. L. ..... Helicopter Pilot
Wilson, S. O. ..... Operations Officer
Williams, R. M. ..... Gunnery Officer

Abbott, J., Jr. (n)
Adair, P. (n)
Adams, S. J.
Alexander, W. J.
Alvine, A., Jr. (n)
Andrew, E. L.
Armbrust, D. P.
Baete, F. G., Jr.
Barney, M. R.
Barretto, L. M.
Bartha, E. J.
Bencito, M. A.
Blevins, E. L., Jr.
Blevins, V. A.
Blowers, R. L.
Bonta, J. H.
Bonievich, W. R.
Bouthiller, J. F.
Boyer, D. J.
Brainerd, H. B.
Branch, W., Jr. (n)
Brauer, J. D.
Brenenstuhl, R. J.
Brewer, J. C.
Brogan, E. (n)
Brown, D. (n)
Brown, D. L.
Brown, E. L.
Brown, J. L.
Brownawell, G. E.
Buchanan, R. L.
Buchanan, W. H.
Bunker, H. W.
Burgis, F. A.
Butler, D. S.
Cain, G. A.
Calastrini, C. A.
Caldwell, R. W.
Campbell, F. M.
Campbell, I. (n)
Carden, F. R.
Cardenas, R. (n)
Carlson, J. A., Jr.
Carver, R. G.
Chappell, J. A.
Chappell, W. H.
Childrey, T. T., Jr.
Chummey, G. H.
Cocke, A. R., Jr.
Colestock, H. H.
Collier, P. (n)
Corres, R. R.
Craig, E. C.
Critchley, W. R.
Daly, J. H.
Darnell, D. L.
Davis, C. S.
Davis, E. (n)
Davis, H. R.
De Castro, F. R.
Derr, T. J.
De Wolf, T. H.
Digiovanni, J. G.
Dixon, G. E.
Dooling, J. T.
Drizk, D. P.
Dubois, R. (n)
Dunmire, P. H.
Dunn, F. W.
Dunkin, H. R.
Emory, W. W.
Estebar, R. B.
Estey, J. E.
Fairweather, W. E.
Feeser, C. E., Jr.
Ferenczi, E. R.
Ferrens, T. L.
Ferrer, E. (n)
Ferrucci, J. M.
Fine, W. E.
Finney, L. J.
Fisher, J. W., Jr.
Fleming, L. H.
Flinn, D. L.
Flowers, W. N.
Flynn, P. J.
Foote, D. L.
Forshee, C. L.
Fox, L. L.
Freeman, R. W.
Frey, J. G.
Garner, L. O.
Gates, H. V.
Gibney, J. (n)
Gilbert, L. J.
Gilligan, J. R.
Goff, N. C.
Goguen, L. L.
Gordon, W. C.
Gosserand, F. J.
Grindstaff, K. L.
Gumber, C. S.
Hammond, P. J., Jr.
Hackworth, F. C., Jr.
Hann, E. L.
Hardy, E. C.
Hedges, C. M.
Hodges, R. (n)
Holloway, D. B.
Hoffee, R. M.
Hosack, H. L.
Ignacio, L. (n)
Isenberg, R. J.
Jarrett, R. L.
Jenkins, C. J., Jr.
Jobin, C. R.
Johnson, R. L.
Johnson, J. E.
Jones, W. L., Jr.
Jossart, D. J.
Kaminski, C. F.
Keaser, F. W.
Keating, R. N.
Keene, P. S.
Killala, M. E.
King, R. G.
Klenke, E. J.
Knitter, A. G.
Knouse, J. S.
Kopras, H. J.
Korynsel, R. J.
Koval, J. T.
Kritzer, J. (n)
La Corte, R. M.
Lake, H. L.
Lanhan, R. N.
La Papa, B. W.
La Fleur, B. (n)
Lee, J. A.
Loehner, J. W.
Loper, E. L.
Lozano, L. D.
Lord, R. H.
Lynn, T. A.
Mason, C. A.
Maglio, J. L.
Marino, P. (n)
Marx, J. L.
Matikonis, W. P.
McCall, A. (n)
McDonald, J. C.
McKinnis, P. (n)
Miller, C. J.
Minor, J. D.
Mitchell, C. E.
Moore, W. E., Jr.
Moslo, B. J.
Moynihan, R. E.
Morrill, D. S.
Nunn, C. E.
Oberdorf, C. B.
O'Grady, T. W.
Pace, J. C., Jr.
Patten, A. D.
Petterson, B. D.
Phillips, C. C., Jr.
Pintyr, J., Jr. (n)
Pondok, F. A.
Pringle, R. L.
Pullin, B. D.
Rabehl, J. L.
Reed, R. A.
Renox, J., Jr. (n)
Reval, I. D., Jr.
Richardson, E. B.
Ridley, A. L.
Roberson, W. H.
Romulus, D. L.
Rummel, R. S.
Sarkis, J. (n)
Schambureck, D. E.
Schick, D. F.
Schmidt, R. J.
Schmidt, J. (n)
Sechio, F. M.
Sessor, D. I.
Shaw, D. R.
Shields, R. R.
Shoemaker, D. E.
Shrauger, J. H.
Slabaugh, D. D.
Slezak, E. M.
Smith, E. R., Jr.
Smith, G. F.
Smith, J. M.
Speaks, J. W.
Springer, J. W.
Stekeete, P. F.
Stewart, J. W.
Stumpo, A. (n)
Sullivan, R. J.
Stevens, D. R.
Swartz, W. J.
Sword, G., Jr. (n)
Taylor, A. R.
Tinch, J. A.
Tomasello, J. A.
Toney, D. E.
Troia, V. L.
Turner, D. H., Jr.
Usher, D. H.
Vala, J. (n)
Vandenhoop, R. G.
Vinzon, A. C.
Vitale, S. (n)
Wallace, C. R.
Wanzo, P. C.
Weant, J. B.
Weeks, T. C., III
Welch, J. W.
Wells, J. F.
Wells, T. W.
Welton, B. (n)
Wheeler, W. R.
Whitt, B. (n)
Willette, D. C.
Williamson, W. P.
Wilson, P. J., Jr.
Wilson, W. H.
Witte, J. J.
Wosiewicz, F. S.
Wright, H. L.
Wright, M. E.
Zager, A. S.
Zenzen, C. G.

OFFICERS AND MEN, USS WYANDOT

Capt F. M. Smith ..... Commanding Officer
Cdr H. T. Wordell ..... Executive Officer
Lcdr W. F. Doyle ..... Chaplain
Lcdr H. T. Currin ..... Operations
Lt G. A. Jackson ..... Supply
Lt W. C. Smith ..... Doctor
Lt(jg) K. C. Brasted ..... Engineering
Lt(jg) W. A. Kearns ..... Deck
Lt(jg) R. W. Anderson ..... Electronics
Lt(jg) J. W. Kuhl ..... Gunnery
Lt(jg) J. J. Markovich ..... Communications
Lt(jg) P. R. Nestler ..... Disbursing
Lt(jg) J. J. Heirholzer ..... Navigator
Ens M. C. Mathis ..... Damage Control
Ens S. W. Brookhart ..... Communications
Ens R. Cross ..... Deck
Chelec T. C. Smith ..... Engineering
Chmach D. C. Douglas ..... Engineering
Bosn R. L. Nettles ..... Deck

W. V. McClain ..... BMC
H. J. Wilson ..... BMC
G. F. Davis ..... GMC
J. H. Butler ..... SMC
L. Bumpus ..... RMC
H. F. Payton ..... SKC
P. J. Alvino ..... CSC
J. N. Crull ..... FPC
J. F. Lewandowski ..... BTC
H. Weaver ..... MMC
J. A. Meadows ..... HMC
A. J. Moore BM1
D. K. Harmier BM1
W. J. Slacum BM1
E. A. Godfrey BM1
E. N. Henry BM2
J. A. Nelson BM2
A. Bonner BM2
W. N. O'Brien BM2
J. E. Ford BM3
R. E. Young BM3
F. Baumann BM3
L. E. Hawley BM3
W. A. Brothers BM3
D. F. Kollman BM3
L. R. Hare ..... SN
J. L. Elkins ..... SN
A. J. Scher ..... SN
C. L. Hearn ..... SN
R. J. Trimmer ..... SN
W. L. Delaney ..... SN
G. L. Jackson ..... SN
J. W. Logan ..... SN
J. L. Haines ..... SN
J. J. Counadis ..... SN
C. H. Alvey ..... SN
C. R. Taylor ..... SN
C. R. Hensley ..... SN
N. P. Rossman ..... SN
J. Bracewell ..... SN
G. L. Beall ..... SN
G. Dearman ..... SN
C. E. Smathers ..... SN
A. J. Zahler ..... SN
M. G. Mullen ..... SN
T. B. Jacobs ..... SN
R. A. Nason ..... SN
C. T. Bacon ..... SN
N. D. Jones ..... SN
J. Moran ..... SN
T. F. Cronin ..... SA
R. S. Hopkins ..... SA
L. A. Sansoni ..... SA
L. H. Ketelhohn ..... SN
J. R. Rice ..... SN
A. Clary GM1
L. Staniewicz FT1
L. Cowan GM2
W. B. Lusk FT2
G. S. Beals FT3
G. T. Cronin GM3
R. C. Bilardi ..... SN
O. Burkhalter ..... SN
J. C. Ezell ..... SN
C. J. Van Winkle ..... SN
J. C. Delauter QM1
J. W. Deuberry QM2
W. Katzenburger QM2
R. J. Provencal QM3
C. O. Henry QM3
W. C. Hossler QM3
R. W. Kobs ..... SN
D. P. Dick TE1
D. E. Baldock YN1
C. D. Finzel RD1
B. L. Prowett ET1
S. W. Clowney SM2
W. A. Culp RM2
R. L. Gore RM2
R. C. Lear YNT2
E. D. Richardson ET2
C. R. Hulse SM3
R. L. Krawezewski RM3
F. R. Krentzel RM3
G. E. Muise RM3
D. Oreka SM3
C. L. Wilson RM3
D. Dansbury YN3
J. H. Gaine RD3
J. W. Milstead RD3
G. A. Rosemeir PN3
R. E. Wagaman RD3
D. H. Stam JO3
J. S. Cameron ..... SMSN
L. R. Gowdy ..... RMSN
N. V. James ..... SMSN
G. W. Monette ..... RMSN
R. E. Riker ..... RMSN
B. J. Tucker ..... RMSN
N. C. Smith ..... RMSN
J. D. Williams ..... SN
D. E. Amos ..... ETSN
P. S. Billings ..... PNSN
W. W. Perry ..... RDSN
W. M. Puramen ..... ETSN
C. P. Weathersbee ..... RDSN
R. A. Hendrickson ..... SA
A. W. Webb SH1
M. Padilla SD1
A. Strusienski DK1
R. L. Hoyt SK1
M. W. Kraesig CS1
E. Turner SD1
R. L. Nicdao SK3
H. R. Yiengst CS2
J. E. Charlton CS2
T. Nario SD2
B. T. Mardis SK2
T. L. Blankenship SH2
Z. Monk SD2
L. Judice SD2
O. V. Merry SH2
N. R. Davenport SH3
F. H. Behm SK3
B. R. Swift SH3
J. F. Farbis SH3
E. B. Henry SD3
D. J. Steen SK2
D. E. Hogan SK2
R. A. Joya SK3
J. A. Candler CS3
L. E. Hargrave CS3
J. C. Kass SK2
J. S. Lewis CS3
F. Santos SD3
E. J. Gallagher CS3
A. Smith SH3
J. Person CS3
L. Oliva SH3
J. L. Hulett ..... TN
T. C. Balbin ..... TN
H. D. MacKay ..... CSSN
B. Yago ..... TN
S. S. Clark ..... TN
A. W. Mays ..... TN
P. A. Depasupil ..... TN
Y. Schlaegel ..... SN
J. W. Johnson ..... SN
J. P. Hurd ..... SN
J. R. Wright ..... SN
J. S. Mallari ..... TN
A. B. Manding ..... TN
L. E. Singleton ..... SN
J. Gillard ..... SN
M. C. Pugeda ..... TN
W. Cottle MM1
P. Raker MM1
R. J. Smith MM1
O. Barto BT1
J. Cosson BT1
R. I. Adams EM1
P. Hinshaw EM1
D. Krueger IC1
J. Martin DC1
G. Threadhill FP1
L. J. Bellman MM2
G. A. Ford MM2
J. C. Hill MM2
T. O'Nall MM2
A. R. Rahe MM2
B. Williams MM2
R. G. Buzzeo BT2

R. Mayette BT2
*M. B. Denton EN2
A. Hill EN2
F. E. Smith EM2
P. Whaley EM2
J. A. Winslow EM3
J. A. Alex DC2
M. Benoir ME2
M. Lindsey ME2
G. Madore FP2
L. Prine DC2
I. Zuniga DC2
R. A. Angeles MR3

B. Jackson MM3
R. Pacca MM3
R. M. Sigler MM3
R. M. Virgin MM3
W. Webb MM3
R. N. Birch BT3
S. Rowe BT3
H. E. Sowders BT3
P. L. Smith EN3
E. G. Tinch EN3
L. R. Alford EM3
B. Lewis EM3
T. F. Murray IC3

J. Russell EM3
J. I. Smith EM3
W. P. Widdecomb IC3
R. Deason DC3
D. Kampa ME3
W. F. Schmidt DC3
J. M. Baugh ..... FN
P. Hickerson ..... FN
D. Stegall ..... FN
J. Veltcamp ..... FN
R. Yates ..... MMFN
H. C. McGaha ..... FN
P. E. Peckinpaugh ..... BTFN

R. Reynolds ..... FN
H. E. Mietz ..... BTFN
J. Young ..... BTFN
H. L. Moore ..... FN
J. Ruiz ..... FN
P. C. Trogden ..... FA
T. Bennett ..... FA
D. L. Felt ..... FA
G. Kraus ..... ICFA
R. H. Canedy HM1
P. V. Schmidt HM2
G. R. Huffer HM2

OFFICERS AND MEN, USS ATKA

Abbott, L. D.
Adarna, G. C.
Agcarao, V. B.
Agrelia, W. W.
Armes, L. G.
Austin, W. E.
Barnhart, C. L.
Baysinger, C. E.
Beaman, N. J.
Berkebile, A. D.
Best, D. E.
Besta, R. J.
Bittner, R. J.
Brazzell, R. J.
Brewer, D. P.
Brock, R. C.
Brown, R. M., Jr.
Brownell, E. O.
Brock, R. C.
Brunner, R. E.
Buck, H. J.
Bulfinch, C.
Bundy, R. R.
Burkhart, C. D.
Burkholder, G. J.
Burlingame, W. H.
Burrow, R. S.
Cadle, J. W.
Calimlin, A. M.
Calton, J. A.
Campbell, C. N.
Carraway, P. A.
Cates, R.
Chernich, P. M.

Christopher, W. C.
Clark, R. D.
Clemons, J. E.
Coffey, J. L.
Collins, J. L.
Connelly, R. G.
Conover, G. M.
Crews, W. C.
Dale, D. W.
Dato, B. B.
David, W. J.
Dehetre, R. L.
Delano, L. N.
Delusque, H. J.
Demonte, A. J.
Dendooven, T. J.
Dickson, R. L.
Diehl, R. E.
Dobbs, F. R.
Dodge, D. L.
Dolan, T. P.
Douglas, J. D.
Dunmire, P. E.
Dunn, L. L.
Ebenezer, E. J.
Ebersbenger, P. W.
Ehly, D. C.
Ehrhart, L. J.
Ellis, L., Jr.
Evans, D. L.
Evans, R. D.
Fairbanks, J. R.
Faith, C. B.
Finger, G. A.

Finley, R. L.
Fiorentino, A. F.
Fischer, E. J.
Fleming, H. J.
Flores, F. U.
Fontilea, S. C.
France, D. M.
Francisco, L. G.
Freeman, J. L.
Frey, D. C.
Fries, D. R.
Funck, G. F., Jr.
Furchner, L. A.
Gansbauer, J. E.
Garner, G. D.
Gilmore, R. L.
Gleason, G. A.
Godbold, J. C.
Goll, M. L.
Gorton, E. T.
Grabowski, G. C.
Gravitt, L. G.
Haebe, B. M.
Halsey, J. S.
Hatfield, R. L.
Hering, H. J.
Hernke, P. J.
Heyniger, C. L.
Hickey, C. R.
Hobgen, G. S.
Hopson, J. C.
Houlik, H. A. M.
Houtz, L. F.
Howanietz, A.

Hunt, H. K.
Huntley, N. C.
Johnson, D.
Johnson, W. N., Jr.
Jones, J. M.
Jones, F. R.
Jones, W. F.
Jordan, H. P.
Joubert, L.
Kahakua, S. B.
Kerns, G. O.
Kerschbaum, R. J.
Kontonickas, L.
Kremenak, C. R., Jr.
Lane, E. J., Jr.
Leach, R. L.
Lewis, W. J.
Lord, W. H.
Lupton, G. E.
Lees, R. E.
Leibowitz, D.
Madison, W. E.
Malicdem, A. C.
Martin, K. E.
Mathers, J. J.
Mathews, J. D.
McCarthy, T. J.
McCoy, J. F.
McCoy, J. F., Jr.
McGlane, R. D.
McGraw, T.
McKinnon, R. L.
McLaughlin, J. S.
McQuillen, M. M.

Meadows, J. A., Jr.
Meyer, G. P.
Milligan, M. R.
Miner, R. F.
Mingus, C. C.
Minshall, R. J., Jr.
Mitchell, O. W.
Montague, R. J.
Moralee, W. R.
Mixon, C. S.
Morrow, J. E.
Murphy, H. F.
Nelson, R. H.
Nicholson, L. W.
Nikolich, D.
O'Brien, L. B.
*Oppegaard, R. D.
Orias, E. U.
Ouillette, L. G.
Overstreet, R. M.
Pabst, D.
Page, A. R.
Patlan, R.
Perkins, G. W.
Perry, R. L.
Picard, R. R.
Pickenpaugh, R. E.
Pigg, J. E.
Pollard, T. O.
Posey, G. G.
Poston, J. H.
Purkey, J. O.
Ralph, J. L.
Ranau, A. L.

Rector, H. C.
Reed, M.
Rehder, J. E.
Remboldt, G. C.
Riley, B. D.
Ringle, T. C.
Rittich, E. A.
Robinson, H.
Robinson, L. E.
Rowe, D. S.
Salausa, F.
Samson, K. G.
Sanderson, H. J.
Samtos, J. B.
Schiewe, L. A.
Schuler, J. F.
Schullinger, J. N.
Shelley, G. M.
Simpson, M. A.
Simpson, R. R.
Slattery, T. R.
Sloss, W. C.
Smith, C. P.
Smith, D. A.
Snell, M. H.
Soule, W. C.
Sowards, J. O.
Spencer, E.
Spina, J. J.
Staehler, R. J.
Staub, N. J.
Steen, S. H.
Stilwell, D. C.
Stone, W. I.

Swan, E., Jr.
Tankersley, A. L.
Taylor, D. C.
Tedder, J. W.
Terry, D. R.
Tenorio, J. A.
Thompson, B.
Tinsley, L. S.
Toves, J. R.
Turner, B. U.
Turpin, D. L.
Valdez, L. G.
Vann, R. M.
Vaughn, H. M.
Villers, C. E.
Villi, T. L.
Walling, S.
Ward, E. J.
Watson, R. E.
Watson, T. D.
Wheatley, G. G.
Whipple, F. E.
Williams, S. B.
Williams, W. M.
Wilson, E. D.
Woodley, W. M.
Woodward, F., Jr.
Wyer, R. E.
Yoden, G. W.
Zander, W. C.
Baitmun, A.
Clinton, H. J.

OFFICERS AND MEN, USS ARNEB

Sedgebeer, D. E. EN3
Rand, K. MM3
Goodwin, H. M. EN3
Carper, E. W. EN3
Stanish, T. F. ..... ENFN
Madelein, W. S. ..... SN
Grenier, D. R. ..... FN
Normand, L. G. ..... FN
Robinson, R. J. EN3
Willis, J. E. EN2
Baker, G. R. ..... ENCA
Olsen, A. ..... WO/W1 SHIPREPTECH
Payne, P. O. ..... MMCA
Engle, J. E. D., Jr. EN2
Anders, Elwood MM1
Anderson, W. ..... FN
Creamer, W. E. EN3
Hale, L. E. ..... FN
Jeanroy, D. L. MM2
Kida, T. P. ..... PNSN
McMillan, W. P. EN3
Neyrinck, D. W. ..... FN
Ricker, W. G. EN3
Harriston, J. W. ..... SDC
Long, R. L. ..... MMC
Sheraer, J. L. ..... DCC
Bishop, J. L. ..... SKC
Hinton, D. H. ..... HMC
Jacobs, J. R. ..... FPC
Lorchak, S. ..... BMC
Payne, P. O. ..... MMC
Andrew, C. S. ..... ETCA
Benson, C. E. ..... EMC
Bueter, J. S. ..... YNC
Baker, G. R. ..... ENC
Davis, W. L. ..... BMC
Bass, E. L. ..... RMC
Parmley, N. D. ..... CSC
Mungin, L. L. SM1
Picard, J. E. SK1

Dietz, G. W. RM1
Salvatore, E. J. EM1
Runyan, R. D. SK1
Bentley, F. E. HM1
Shuford, R. E. BM1
Vitocolonna, G. J. BM1
Rand, V. A. MM1
Masterson, T. R. FT1
Hyman, J. E. SH1
Rhodes, H. (n) SD1
Williams, F. C. ..... TE(YN)1
Haddy, T. H. BM1
Ely, A. J., Jr. QM1
McBride, C. P. GM1
Gamela, S. (n) BM1
Coleman, E. A. IC1
Anders, E. MM1
Bennett, J. G. BT1
Silas, L. E. BT1
Risher, Q. R. RD3
Mourlas, J. C. RD3
Judy, F. P. RD3
Huber, C. S., III RD3
Spraker, H. C. RD1
Long, D. E. RD2
Stampfli, D. M. ..... ENS, USN
Calhoun, W. R. RD2
De Angeles, P. J., Jr. RD2
Ford, M. E. ..... SN
Ferron, E. G. ..... SN
Grebenstine, A. L. ..... SN
Bohl, W. R. ..... SN
Stewart, C. W. ..... SN
Desrocher, E. J. ..... SN
Smith, J. T. ..... SN
Williams, I. T. YN3
Farabella, W. E. ..... SN
Lucas, E. J. ..... SN
Walshe, M. J. ..... SN
Hickey, P. W. ..... SN

Childress, M., Jr. BM2
Vitocolonna, G. J. BM1
Seesholtz, J. R. ..... LT(jg), USN
Mahn, D. T. BM2
Neaves, T. D. BM3
Dayak, J. ..... SN
Schroeder, R. N. ..... SA
Braden, T. E., Jr. ..... SA
Grosso, R. A. BM2
Lafata, A. D. ..... SN
Scherer, J. ..... SN
Crader, R. C. BM3
Adair, B. BM2
Sawyers, D. L. ..... SA
Johnson, H. E. ..... SN
Langton, T. M. ..... SN
Patterson, J. F. ..... SN
Zinkewicz, E. BM3
Hughbanks, M. W. ..... SN
Parrish, L. W., Jr. BM3
Hill, T. J. BM2
Ohl, R. C. ..... ENS, USN
Haddy, T. H. BM1
Berthelot, F. G. BM2
Cain, C. E. ..... SN
Gooch, S. H., Jr. ..... SN
Mayberry, S. E. ..... SN
Comport, A. R. ..... MEFN
Woody, B. L. FP3
Lightfoot, R. W. ..... FN
Rickard, R. R. ..... FN
Walter, D. J. ..... FN
Thompson, W. P. ..... SN
Othmer, J. A. FP2
Decker, W. B. ..... FN
Bonesteel, D. W. DC3
Kelly, J. DC3
Kiefer, D. B., Jr. ..... FN
Vezendy, S. L. ..... MEFN
Curry, J. L. ME2

Spears, J. G. DC2
Olsen, A. ..... WO/W1, SHIPREPTECH
Shearer, J. L. ..... DCC
Weeber, J. C. FP2
Parker, P. M. DC3
Sauers, W. J., Jr. ..... FN
Johnson, R. ..... SN
Magness, D. J. BM3
Davenport, R. L. ..... SN
Spears, C. E. ..... SN
Schockman, W. A. ..... SA
Gray, J. H. BM2
Hlebak, J. E. BM2
Koabel, D. W. ..... SN
McVay, C. C. BM2
McLean, J. W. ..... SN
Washburn, F. J. ..... SN
McClelland, D. M. ..... SA
Owen, T. B. ..... BMSN
Humfleet, J. L. ..... SN
Searcy, J. B. ..... BMSN
Parris, J. L. ..... BMSN
Lorchak, S. ..... BMC
Huddleston, L. H. ..... CWO/W2, B'OSN
Shuford, R. E. BM1
Rigsbee, A. B. ..... SN
Childress, J. W. BM3
Goodrich, C. W. ..... SA
Harsla, C. R. ..... BMSN
Rudel, F. ..... SN
Hale, M. L. ..... FN
Diasa, R. E. BT2
Reynolds, P. BT2
Correa, M. M. BT3
Frolio, N. J. ..... FN
Kieran, S. BT3
Langille, E. W. ..... FN
Curran, A. E., Jr. BT2
Stone, T. W. BT2
Palmer, R. G. ..... FN

* DECEASED

Perez, E. T.	FN
Hawk, A.	ENS, USN
Jacobs, J. R.	FPC
Silas, L. E.	BT1
Bennett, J. G.	BT1
Singleton, J. L.	FN
Young, H. L.	FN
Whitburn, R. J.	TE(RM)2
Williams, F. C.	TE(YN)1
Selby, D. P.	RM3
Blanchett, R. D., Jr.	RM2
Maness, M. T.	RM3
Mollaun, R. J.	RMSN
Adams, H. J.	RM3
Bell, R. K.	SN
Hope, G. B., Jr.	SMSN
Clarke, J. W., Jr.	RM3
McAllister, R. C.	LT(jg), USN
Dietz, G. W.	RM1
Steiner, R. J.	RM3
Sexton, V. E.	SMSN
Bass, E. L.	RMc
Burstrom, S. C.	RM2
Daria, S. A.	RM3
Francischelli, E. A.	RM3
Gilligan, P. R., Jr.	RM3
Kristiansen, H.	RM3
Long, P. R.	RMSN
McDonald, S. J.	RMSN
Mungin, L. J.	SM1
Myers, L. J.	SN
Schreckengost, E. S.	SM3
Schomp, W. V., Jr.	RMSN
Wilder, W. J.	RMSN
Coleman, E. A.	1C1
Stefanik, G. M.	EM3
Garmany, J. T.	EMFN
Rushing, J. M., Jr.	EM3
Dennis, G. E.	FA
De Klein, P. R.	FN
Salvatore, E. J.	EM1
Mengle, R. M.	LT(jg), USN
Benson, C. E.	EMC
Ellis, R. H.	EM3
Groff, J. S.	FN
Komosa, S.	EM3
Luongo, C.	EMFN
McNerney, C. A.	IC3
Moore, H. S.	EM2
Quinlan, G. T.	EM2
Welcome, R. T.	EMFN
Wells, E. C.	IC2
Haranda, R. L.	FN
Lacobie, L. J.	FN
Rhea, T. J.	MMFN
Balevre, R. H.	FN
Leo, H. J., Jr.	FN
Woodie,	
Shields, J. L.	MR3
Roomsburg, J. F.	MM2
Ellis, J. B.	FN
Parham, L. G.	MM3
Rand, V. A.	MM1
Young, R. D.	MM2
Hawk, A.	ENS, USN(R)
Long, R. L.	MMC
Gardner, L. D.	FN
Bell, H. L.	MRFN
Bowser, R. A.	MM3
Dalton, N. J., Jr.	FN
Greer, R. E.	FN
Parr, R. A.	MMFN
Shay, E. E.	MMFN
Young, E. D.	MM2
Burton, Floyd D.	SK3
Hodge, D. D.	CS2
Padgett, J. C.	SH3
Lucas, R. L.	CM1
Peede, J. W.	SK2
Wood, Grant H.	DKSN
Hyman, J. E.	SH1
Hatfield, H. E.	SK2
Burcar, C. T.	SK2
Waters, J. F.	SH2
Fonte, J. R.	SH2
Spears, J. M.	CSSN
Schloesser, G. J.	SK2
Adams, P. G.	SK2
Andrews, R. T.	SH3
Samuel, W. R.	CS3
Dugger, H. H.	CM1
Allen, D. E.	CS2
Quintana, F. S.	DK2
Barna, C. F.	SH2
Bishop, J. L.	SKC
Coleman, F. B., III	LT(jg) SC, USN
Runyan, R. D.	SK1
Sherman, F. E.	SHSN
Humphey, L. J., Jr.	SN
Corpus, R. A.	SN
Cotton, S.	TN
Soriano, W. S. J., Jr.	TN
Berube, G. E.	CS3
Clements, J. T.	CD3
Harriston, J. W.	SDC
Parmley, N. D.	CSC
Abalos, I. U.	SD2
Arnaldo, F. M.	SD3
Asuncion, T. J.	SHSN
Bates, B. (n)	TN
Beard, W. (n)	SD3
Camarce, A. F.	TN
Cannon, C. R.	SHSN
Dennett, R. W.	BM2
Devlin, J. B.	CS3
Ecal, C.	SD3
Fischer, C. G.	CS3
Griffin, E. G.	TN
Messineo, A. V.	SHSN
Nichols, R. H.	TN
Panella, F.	CS2
Picard, J. E.	SK1
Reed, C.	SD2
Rhodes, H.	SD1
Robertson, S.	TN
Rodgers, A. L.	CSSN
Salisbury, W. L.	CS2
Sanares, A. P.	TN
Truley, G. D.	TN
Walton, L. R.	SD3
Williams, P. J.	CS3
Wilson, W.	SD3
Kofroth, R. I.	QMBM3
Ryan, T.	QMSN
Ely, A.	QM1
Barrett, G. S.	LT, USN(R)
Kermeen, D.	QM2
Spivey, D.	QM3
Conrad, E.	SN
Winebrenner, D. R.	QM3
Galen, R.	PN2
McElreath, D.	YN3
Cremieux, W. L.	SN
Stone, R. A.	JO3
Stockman	CD3
Swanson, R. D.	YN3
Toop, C.	PNSN
Vertreese, G. W., Jr.	YN3
Noonan	CM2
Gamela, S.	BM1, (MAA Force)
Miller, S. B.	BM2, (MAA Force)
Bueter, J. S.	YNCA
Klein, P. M.	LT(jg), USN
Davis, W. L.	BMCA, (CMAA)
Brickhouse, R.	BM2, (MAA Force)
Hausenfluck, G. H.	HM2
Torres, W. L.	SN
Ables, J. P.	HM2
Bentley, F. E.	HM1
Dellinger, R. E.	LT. (M.D.), USN(R)
Hinton, D. H.	HMCA
Budrevich, A. D.	SN
Black, H. J.	FTM3
Colin, R. D.	FTASN
McBride, C. P.	GM1
Leding, C. R.	GM3
Masterson, T. R.	FT1
Fisher, G. J.	ENS, USN
Kelly, B. W.	GM2
Martin, I.	SN
Dietl, F., Jr.	ETSN
Wall, J. A.	ETR3
Jeffery, J. A.	ETNSN
Smith, N. E., Jr.	ETN3
Andrew, C. S.	ETCA
Stampfli, D. M.	ENS, USN
Brown, D. W.	ETN3
Finn, R. M.	SN

OFFICERS AND MEN, USCGC WESTWIND

Capt W. J. Conley, Jr.
Cdr K. N. Ayers
Lcdr F. J. Hancox
Lt D. B. Russell
Lt R. M. White
Lt N. C. Venzke
Lt G. M. Davis
Ens R. P. Hartgen
Ens J. (n) Canzoneri
Ens R. A. Blackford
Ens J. B. Lynn
Ens L. K. Bragaw, Jr.
Ens R. N. Westcott
Ens T. F. Budinger
Ens J. (n) Block
Ens C. A. Knight, Jr.
Spck I. J. Anderson
Mach F. C. Spruill
Sads E. D. Oakes
Sas E. L. Jones

Alberti, A. J.
Alfonso, R. A.
Alnas, V. (n)
Alter, S. G.
Anderson, J. T.
Arbour, G. A.
Arno, R. J.
Auty, W. E.
Baer, W. C.
Baker, N. J., Jr.
Baker, R. R.
Barber, J. L.
Barfield, O. L.
Bernhardt, T. H., Jr.
Bhend, R. A., Jr.
Bik, E. J.
Bowden, J. L.
Bridenstine, D. F.
Brown, J. P., Jr.
Brown, W. E.
Buanno, F. R.
Busteed, R. E.
Bustraan, N. H.
Byars, J. M.
Calvin, E. (n)
Camposanto, L. T.
Carpenter, R. L.
Carter, C. E., Jr.
Castor, M. R.
Clark, R. W.
Collett, J. A.
Cook, P. L.
Cruz, A. C.
Davis, J. W.
de Castro, R. B.
DiVeglio, R. J.
Dreyer, J. L.
Dudley, T. F.
Dumont, C. R.
Durant, M. (n)
Eason, P. H., Jr.
English, R. F.
Ennis, E. S.
Erm, E. V., Jr.
Fallon, G. F.
Ferguson, H. M., Jr.
Finger, F. J.
Fischer, P. L.
Fitch, R. J.
Florence, W. F.
Flores, C. J., Jr.
Force, T. M.
Foster, C. B.
Fratterola, J. R.
Friesma, C. A.
Grady, R. E.
Green, E. (n)
Grode, K. L.
Haggett, W. M.
Hanze, R. E.
Harlow, R. F.
Hasselmayer, O. (n)
Hayes, E. E.
Haynoski, D. A.
Henderson, R. S.
Hess, D. T.
Hevrin, L. N., Jr.
Hill, W. C.
Hiller, E. J.
Hoffman, H. R.
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Anno 1531.

Antarctica

as projected in the year 1531 by the distinguished French geographer and mathematician, Oronce Finé (Orontius Fineus). Then only a theoretical continent, Antarctica was called "Terra Australis" — the southern land. The ornate world map with its double cordiform (heart-shaped) projection, is surprisingly familiar; delineation of the Ross Sea concavity suggests more than mere intuition.

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