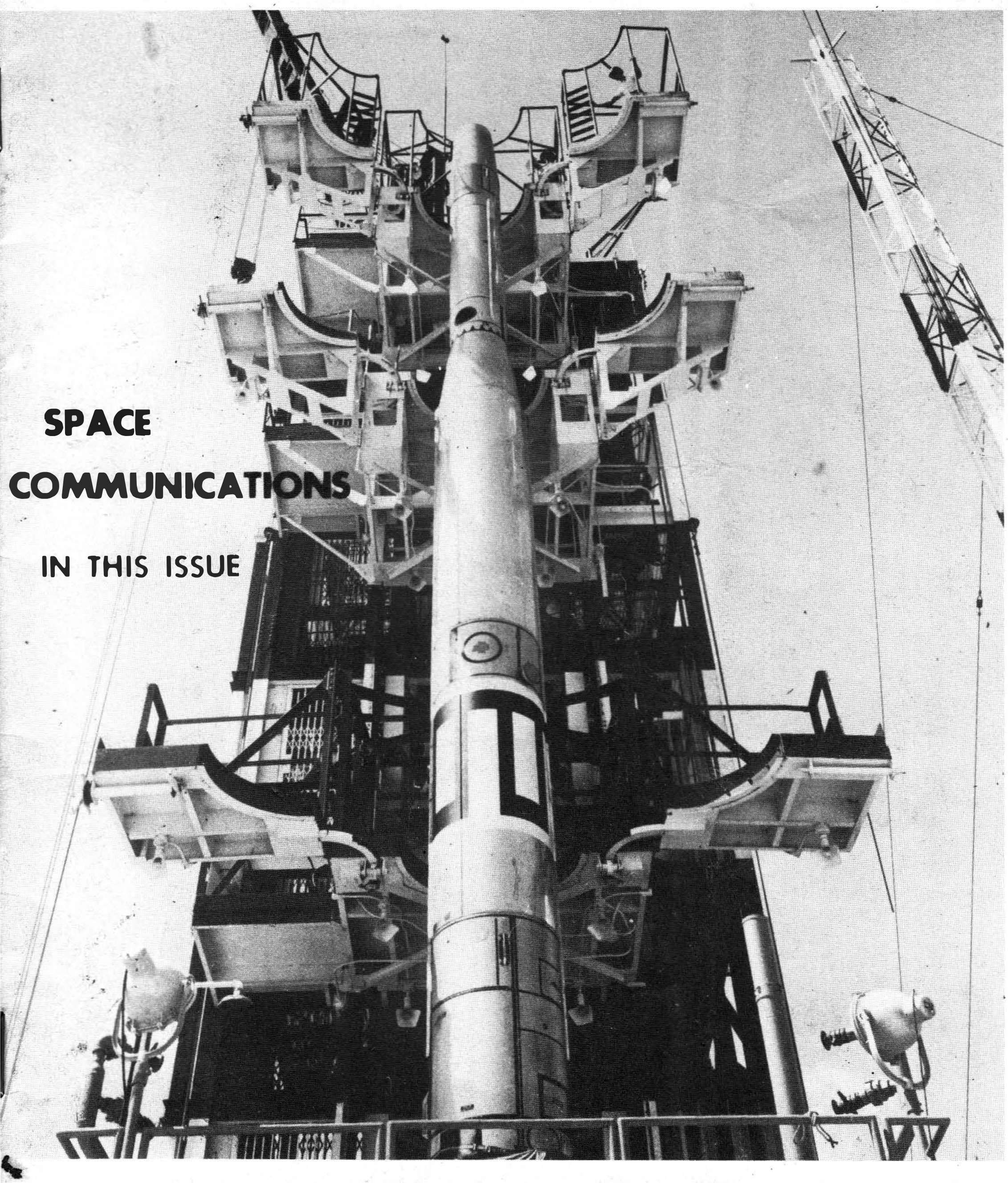
# NAVAL COMMUNICATIONS

UNITED STATES NAVAL COMMUNICATIONS



**SPACE COMMUNICATIONS**

**IN THIS ISSUE**

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# Bulletin

# WINTER 1957-58

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ON THE COVER: Project Vanguard first and second stages in position for test launching.

Photos by U. S. Navy, U. S. Marine Corps, Headquarters Allied Forces Southern Europe, and National Bureau of Standards.

# SEASON'S GREETINGS

In this space in 1956, I addressed the naval communications family as follows -

"Our job in 1956 will be of. . . even greater importance, since the need for rapid, reliable and secure communications. . . grows with each passing year."

1956 was then the hopeful future. Some naval communications activities that year were to carry the highest peaks of traffic in their history, including World War II and the Korean War, continuing the pattern set by 1955, although it was a time of peace.

And 1957? In spite of the traditionally American desire for "peace and good will toward men", that year saw the Middle East and other crises endanger world peace and impose new demands on naval communications.

We cannot forecast the events that will come to the world, the Navy or naval communications in 1958. We can hope that the blessings of good will and friendship will be shared by all men this season and in the years ahead. This prayerful hope, however, does not preclude vigilance, or proficiency, in maintaining "rapid, reliable and secure" naval communications.

As someone once said, "The price of peace is eternal vigilance." Let us naval communicators pay that small price in even greater measure this year.

**RADM H. C. BRUTON, USN**

Director, Naval Communications

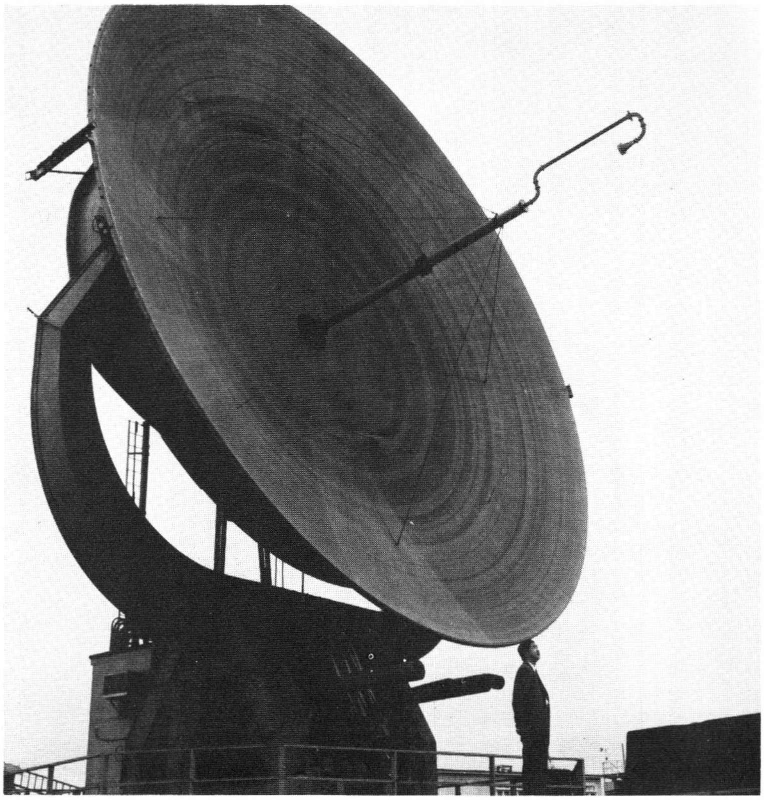
# SPACE COMMUNICATIONS

## *Moon Joins Naval Communications*

"The moon can be used to relay radio signals."

This significant announcement was made recently by the Naval Research Laboratory after six years of experiments. The research was begun by the Navy in 1951 as part of a long-range project to study the moon by radar.

The early experiments involved "bouncing" radar signals off the moon, using pulses only 10 microseconds long. Power was supplied by a 1 megawatt transmitter on a frequency of 200 mcs.



600-inch radar telescope used to "bounce" super-high frequency signals off moon aids Navy scientists to obtain data on earth-moon system.

To obtain an antenna large enough for this relatively low radar frequency, a parabolic excavation, 250 feet in diameter, was scooped out of the earth in southern Maryland. There, a radar telescope with an 84-foot dish antenna was constructed. Use of this installation by Navy scientists proved that the moon is comparatively smooth to radar waves. Optically, however, the moon appears to be rough.

Continued experiments, including round-trip transmissions of voice messages, confirmed the belief that the moon could serve as a relay station for radio communications. Other scientific findings indicate that other types of communications can also utilize the moon for relay.

Encouraged by results of these earlier experiments, radio astronomers of the Naval Research Laboratory then resorted to super-high frequencies, or microwaves, in their investigations into space.

For this purpose, a 600-inch radio telescope was modified. This was accomplished by replacing the radio receiving system with a radar system which operates at a frequency of 3,000 mcs.

It was then that a 3,000 mcs radar signal was bounced off the moon for the first time.

A pulse lasting only 2 microseconds was sent out from the radar transmitter three hundred times a second. Some two and one half seconds later, the radar pulse returned as a weak, but detectable, echo, after a round trip of nearly 500,000 miles.

These experiments by Navy scientists confirmed the earlier discoveries, which were made at lower frequencies, of the distance between the earth and the moon and of the reflecting properties of the surface of the moon for purposes of communications relay. Through the experiments, a value was obtained for the distance from the earth to the moon that differed from the distance which had been calculated optically.

Encouraged by these results of their studies, the radar astronomers of the Naval Research Laboratory are continuing their investigations, in order to obtain additional data on the earth-moon system and the absolute sizes of the earth and the moon.

(See article in Fall 1956 NCB, "Navy Receives First Signals from Mars", for another interesting achievement in naval communications. -Ed.)

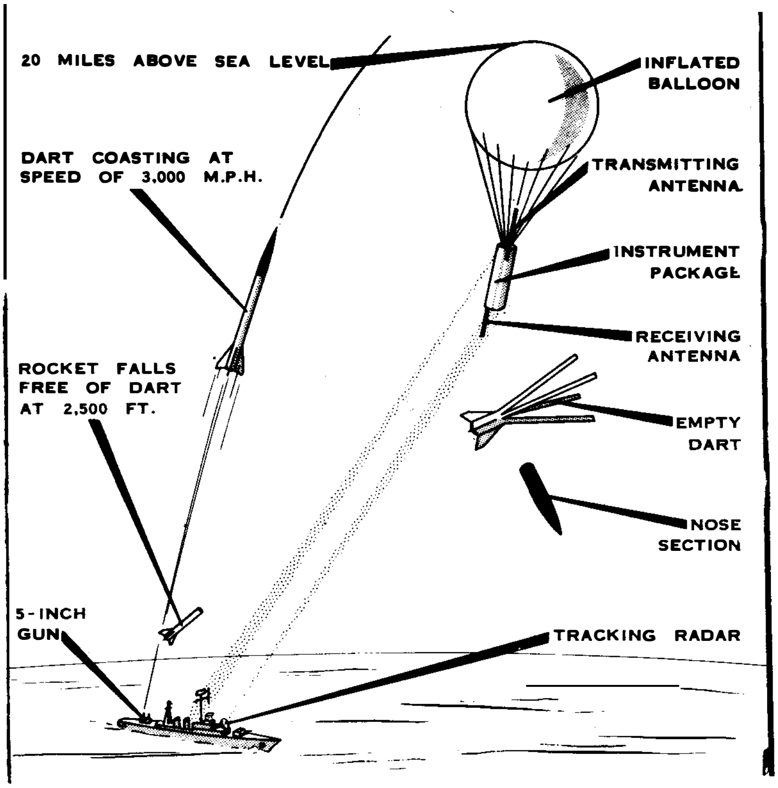
# SPACE COMMUNICATIONS

## Navy Missile Gathers Weather Data

A supersonic antiaircraft missile is being converted by the Naval Ordnance Laboratory to collect weather information miles above the sea.

The telemetering communications equipment aboard the missile transmits information on temperatures and humidity in the layers of air through which it passes.

The transmitted information is received by shipboard electronic computer. At succeeding levels of descent, data is transmitted via radio on wind direction and velocity.




Renamed the "Hasp" (high-altitude sounding projectile), this missile was selected by the Navy as a vehicle to propel radio transmitting weather instruments to extreme altitudes because it is readily adaptable to shipboard use and is of moderate cost.

Hasp will enable ships at sea to make regular meteorological observations up to altitudes of more than 100,000 feet. Larger balloons than those now used for radar observations would require more than an hour to reach heights attained by Hasp in only 80 seconds.

Hasp is a single-stage rocket which can be fired from 5-inch naval guns. The rocket motor and dart (the small forward part) ascend as a unit to about 2,600 feet, at which altitude the propelling charge is expended. The rocket booster then falls to earth.

The dart climbs to an altitude of nearly 20 miles. A timing device in the nose of the dart opens the casing at the peak of flight and ejects weather instruments which "read" temperature and humidity in the ionosphere. These readings are "radioed" to receivers.

As may be seen from the accompanying diagram, the weather instruments descend under a lowering "bird", or balloon, which automatically inflates when the dart's casing opens.

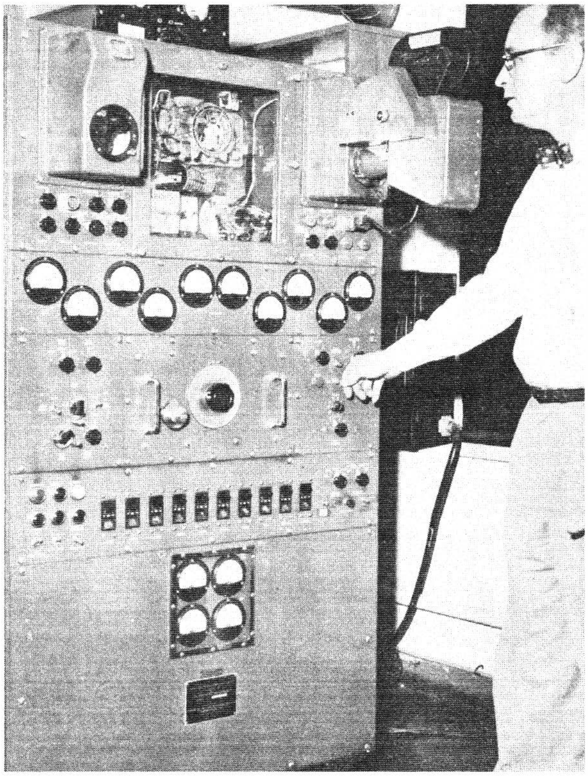
Once inflated, the balloon cuts free of the nose, which drops with the empty casing and rear fin assembly.

At this point, the balloon lowers its payload of weather transmitting instruments from high altitude, at a predetermined rate of descent.

Hasps have been fired and successfully tracked by shipboard-type, fire control radar at the Naval Ordnance Test Station, Chincoteague, Virginia. This was the first time that weather rockets had been launched from a Navy rifled gun for rapid air measurements. Modifications in the rocket launching techniques are expected to aid the Hasp to attain much higher altitudes, possibly over 300,000 feet.

(See article in Spring 1957 NCB, "Radio Now Traverses Oceans in Balloons". -Ed.)

# SPACE COMMUNICATIONS



Now in operation at IGY World Warning Agency, the "Ionosonde" is an instrument for sounding the ionosphere. Ionospheric sounding data will be used in forecasting geophysical activity. Camera at upper right records data on film.

## *IGY World Warning Agency*

When unusual activity in cosmic rays, aurora, earth magnetism, and radio propagation is anticipated, warnings are flashed to scientists throughout the world to aid their scientific observations. The warning service began last year, when the National Bureau of Standards radio forecasting center at Fort Belvoir, Virginia, became the focal point of a world-wide communications network for the International Geophysical Year.

In addition to the NBS station at Fort Belvoir, the international network includes the radio teletypewriter network of the World Meteorological Organization; most of the commercial communications facilities throughout the world; government communication facilities (such as military channels, and, in the U. S., the Civil Aeronautics Administration), and special messages broadcast by stations WWV and WWVH (on the NBS radio propagation forecast channels) and their counterparts in other nations. This elaborate and far-reaching network has been set up so that IGY scientists, no matter how remote the site of their important work--from Arctic outposts to Pacific islands--can conduct their experiments simultaneously. The warning system has been undergoing trial operations a week of each month.

From 1 July 1957 through 31 December 1958, several thousand scientists, representing more than fifty nations, will make simultaneous measurements of the earth's immediate cosmic environment and other measurements. The international enterprise

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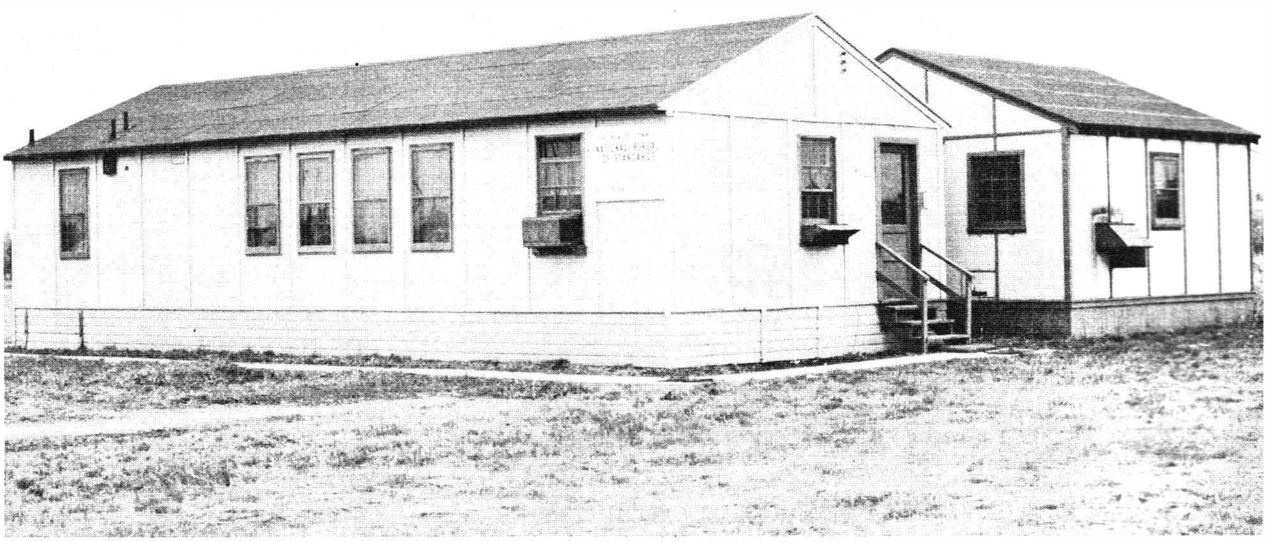


NBS radio forecasting center at Fort Belvoir, Va., selected as World Warning Agency for IGY. Posts supporting antenna systems may be seen in rear. Isolated location of station reduces radio signal interference.

# SPACE COMMUNICATIONS

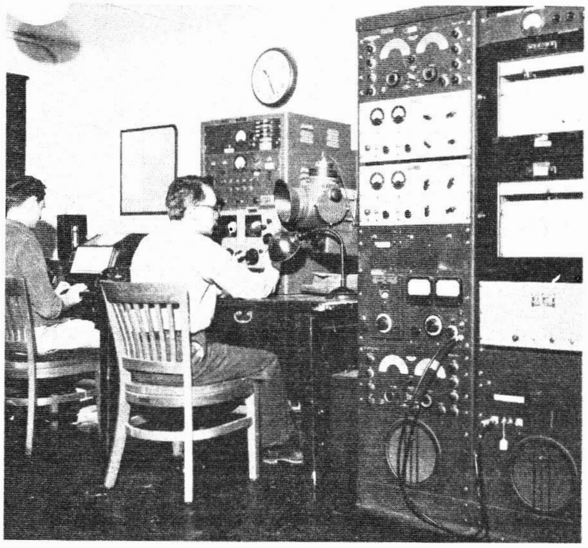
## IGY Warning Agency continued

will also seek the causes of radio "blackouts" and answers to many other questions.

The IGY warnings issued will be based mainly on world-wide observations of the surface of the sun and on soundings of the ionosphere. When there is a strong possibility that a major solar-terrestrial disturbance may begin within 24 hours after the start of the interval, a Special World Interval is called, on about eight hours' notice. The interval ends when the disturbance has subsided.

If solar conditions indicate that calling an Alert or a Special World Interval is justified, then the World Warning Agency (WWA) issues messages to Regional Warning Centers in France, Germany, Japan, The Netherlands, and Russia, and then to Associate Warning Centers in Australia, Antarctica, and Alaska. From these centers, the warnings are then flashed to every IGY field station throughout the world, as an aid to international science.

The Fort Belvoir, Va., forecasting center serves as the Western Hemisphere Regional Warning Center. In the United States, messages are carried by the U. S. Weather Bureau communications system, thus alerting all Weather Bureau stations. It is then the task of each Weather Bureau station to inform all other IGY field stations in its locality. The special radio propagation transmitting stations (WWV and WWVH in the U. S., LOL in Argentina, and JJD in Japan) serve as a secondary means of informing the world-wide IGY stations of Alerts and Special World Intervals.



Equipment at right records intensity of radio waves while incoming teletypewriter messages bring data on solar and atmospheric disturbances to radio forecasting center of IGY World Warning Agency.

## Minitrack Radio Receiving System

Radio equipment so sensitive that it can "hear" far-distant stars is being placed in operation at the Navy's strategically-located earth satellite tracking stations.* The Minitrack radio receiving system, built to track the satellite to be launched by the Navy during the International Geophysical Year, was tested successfully when it tracked Sputniks I and II.

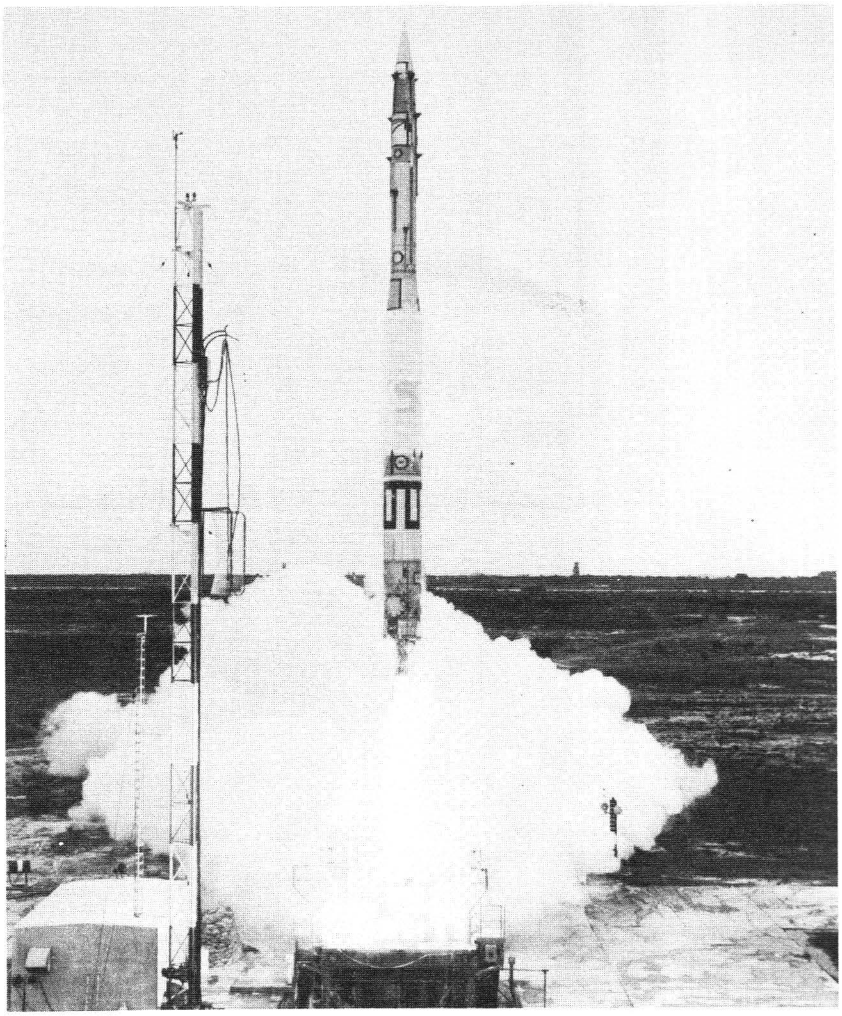
By measuring the minute differences in time required for a satellite's signal to reach each antenna in the system, Minitrack pinpoints the position of the orbiting satellite.

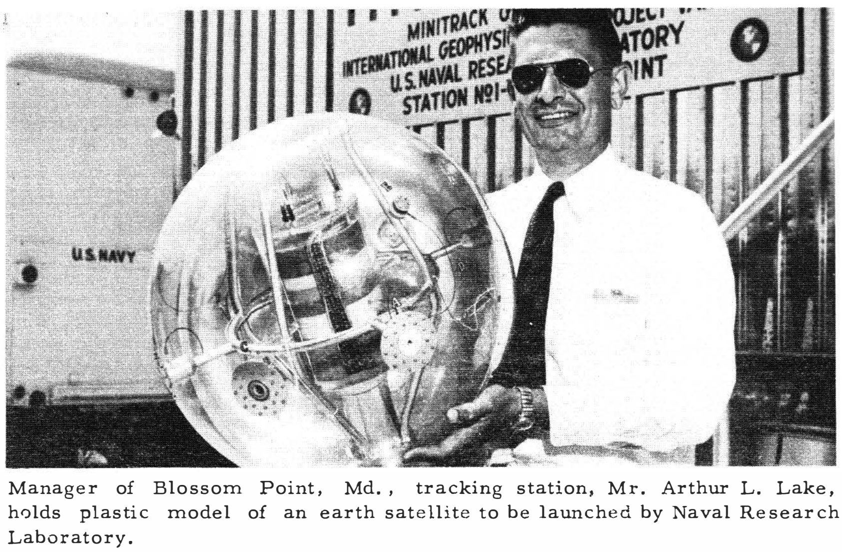
The Navy-launched satellite has a 12-ounce transmitter, which transmits a radio signal on a frequency of 108 mcs. This is done with a power of 10-50 milliwatts, which is 1/10,000th of the power consumed by a 100-watt light bulb. Sensitive enough to pick up these signals, the Minitrack radio receiving system can also listen to radio "noise" originating on the sun and detect the presence of stars that emit no visible energy.

SFC Harvey Holbert, USA, receives instruction in operation of Minitrack recording device from Mr. William M. Hocking of NRL, preparatory to Holbert's assignment to a Minitrack tracking station.

* (See article in this issue, "The Navy's Earth Satellite Tracking Stations". - Ed.)

# SPACE COMMUNICATIONS






Manager of Blossom Point, Md., tracking station, Mr. Arthur L. Lake, holds plastic model of an earth satellite to be launched by Naval Research Laboratory.

## *The Navy's Earth Satellite Tracking Stations*

The first U. S. radio tracking station to be erected for the purpose of detecting and measuring the paths of scientific earth satellites is the Navy's Test Facility at Blossom Point, Maryland.

Blossom Point is being operated by the Naval Research Laboratory to evaluate components of the Minitrack radio tracking system* and to train personnel in the operation of the other stations which are to operate during the International Geophysical Year (IGY).

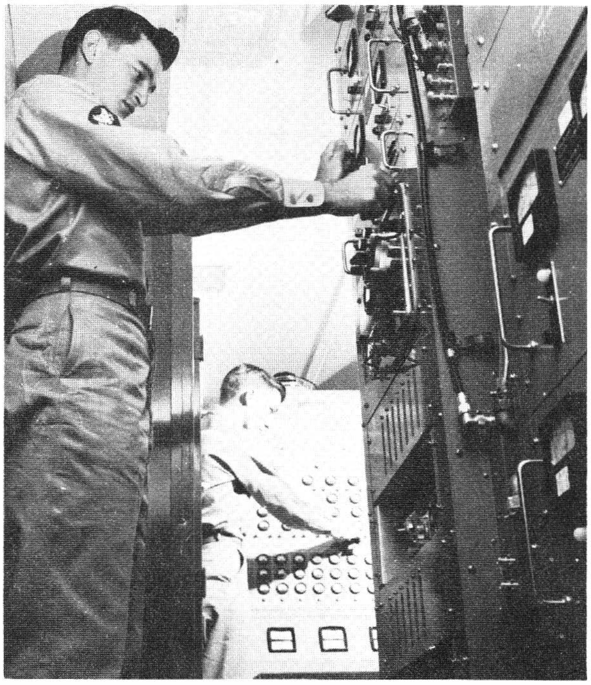
The tracking antennas at Blossom Point were first tested with aircraft for calibration purposes. Since then, these same antennas have provided exceptionally accurate radio astronomy data on stars and successfully tracked Sputniks I and II in their orbits. Minitrack radio receivers have also made possible the study of the sun's radio profile.

Other Minitrack stations which will be in operation during the IGY will be located at: Santiago and Antofagasta, Chile; Ancon and Lima, Peru; Quito, Ecuador; Havana, Cuba; Fort Stewart, Georgia; Antigua, B.W.I.; San Diego, California, and Woomera, Australia.

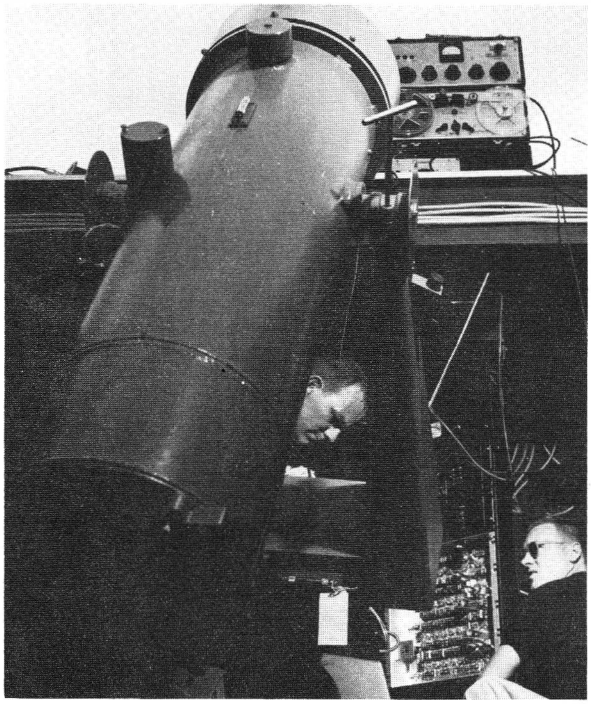
Navy scientists are looking to earth satellites to provide information never before available on such subjects as solar radiation and its effects on communications and weather; characteristics of interplanetary space; cosmic rays; density of dust and micro-meteorites in outer space, and exact data on the earth's size and shape.

* (See article in this issue, "Minitrack Radio Receiving System". -Ed.)

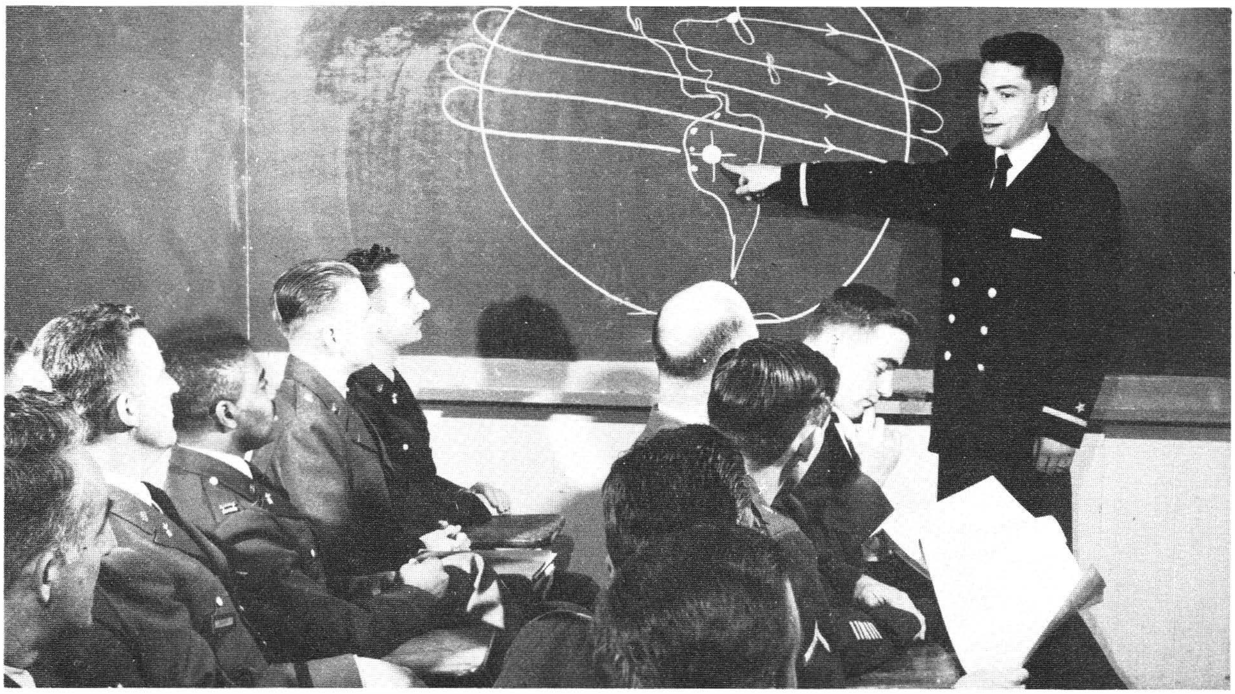
# SPACE COMMUNICATIONS



Satellite tracking van at Blossom Point, Md., is complete with control panels, monitors, and receiving and recording equipment to record positions of satellites. Army enlisted specialists are being trained by Navy as station operating personnel.



Calibration camera at Navy's satellite tracking station, Blossom Point, Md., orients station with stars. Tape recorder in background records data obtained during calibration.



ENS Jerome Taube, USN, of Naval Research Laboratory, instructs Navy-trained Army personnel in operation of earth satellite tracking stations.

# COMMUNICATIONS ADMINISTRATION

## Some Solutions to Administration Problems

By RADM Frederick L. Hetter, USN
Commanding Officer, Aviation Supply Office
U.S. Naval Supply Depot Bayonne, N.J.

Nowhere do overall problems that develop in a large naval shore establishment appear more strikingly than in the communications office. The mission of this group is to serve the entire installation with a means of rapid transmission of information to and from other dispersed activities with related functions. Thus, communications becomes the focal point for many matters affecting the personnel served. By fixing its attention on the communications office, command can readily develop an insight into the entire activity based on cross-sections observed in one small area.

Since Korean hostilities, use of naval teletypewriter messages has greatly expanded. Whereas use of a dispatch was a minor event years ago, the increased need for rapid communications observed during war years resulted in changed habits. Since Korea, messages transmitted by ASO/NASD and other activities have considerably increased. Use of dispatches to transmit comparatively minor information of dubious immediacy became increasingly evident. World-wide communications facilities were taxed and their efficiency hampered. Naval messages have become the ordinary rather than the rapid means of communication. Buried in the deluge of unnecessary traffic have been the essential messages whose flow has been impeded.

This problem has been particularly acute in ASO/NASD. The volume of incoming and outgoing message traffic increased 50% within the past two years, climaxing in August 1955, when the level exceeded the Korean peak by 10%. Communications personnel were literally deluged with messages and backlogs considerably increased. Management nearly reorganized its personnel to cope with the situation but to no avail.

Coincident with increased administrative message traffic and the subsequent watering-down of the importance of individual messages, a further complication developed. Increased message volume caused less concentrated attention throughout ASO/NASD on the construction of the message. There was a disintegration in quality, clarity, and detail of messages. Construction of messages became loose and shoddy. Communications was burdened with not only transmittal of messages but editing prior to transmission. Instead of primary devotion to expediting message flow, communications personnel effort was being diverted to this additional complication. Communications officers inaugurated lecture campaigns on proper use of the naval message system to indoctrinate message originators. These lectures accomplished only a small and temporary improvement despite the scope of the campaign. The moment campaign emphasis diminished personnel redeveloped old habits and reabused the message form. Operating components pressed by their own problems disregarded the communications problems.

A third problem which almost resulted in a complete breakdown of the communications system was the habit formed by top supervisors responsible for releasing messages. Daily messages were allowed to accumulate throughout the day while they attended to other supervisory responsibilities. Toward the close of the work day they signed all accumulated messages and forwarded them to the communications office. Efforts to combat this inertia were unsuccessful. Communications receipt of such messages at the end of the day shift placed the burden of transmission on evening and mid-watches. This, along with other factors, resulted in large backlogs the following morning which lasted until late next day or the entire next day.

On the surface it appeared that communications was faced with its own insurmountable problem. The foregoing analysis was based on general observations as follows:

(a) Heavy message volume was causing communications to run from 12 to 30 hours behind normal transmission schedules.

(b) Field activities were placing responsibility for delayed messages directly upon the communications office.

A critical analysis of the situation was justified and when made revealed the following:

(1) Though not purely a communications problem, the difficulties could be corrected by the communications office through effective coordinative action.

(2) Abuse of rapidity of communications requirements by personnel implied possible abuse of other specific functions for specific purposes.

(3) Loose and ineffective message preparation and format by personnel implied possible transmittal of such inaccuracies to other areas.

(4) Delayed release of important messages by personnel implied possible delay in other important functional areas.

(5) There evidently existed a management problem of some magnitude involving 4,000 individuals spread over 26 buildings on a compound almost one-mile square.

(6) Since the problem was easily detected in the communications office it was logical to initiate corrective action at that focal point on the theory that a flow may best be controlled in the region of smallest section.

(7) What was not within the authority of correction by communications could be controlled by broadening the scope of communications authority.

Continued on next page

# COMMUNICATIONS ADMINISTRATION

## *Solutions to Problems continued*

Command gave necessary authority for correction of the problem areas to the communications office. It was first authorized to establish time limits in order to reduce delays in message traffic from areas far removed from communications. A two-hour limit was established, based on the time a message was actually written and time of arrival in the communications office. This served to emphasize:

(1) The purpose of a naval message--speed.

(2) The subsequent necessity for speed in handling of the naval message.

(3) The necessity for an even flow and distribution of work throughout the organization both for naval messages and (implied) all other work.

Simultaneously with the new emphasis on the importance of speed in handling naval messages, an extensive series of lectures was initiated throughout the compound designed to reach each individual employee who composed or released messages. The lectures strongly emphasized need for communications improvement. The purpose and use of the message form was developed and a folio of material (abbreviation lists, instructive outlines, etc.) was distributed. The effectiveness of this lecture series compared to the previous ones was immediately apparent. Lecturers presented a planned overall program and did not speak in general and abstract terms.

Most important of all was the discretionary authority given to communications offices to accept or reject messages based on delays, quality, format, and necessity for transmission. To assist in this program supervisors of areas of greatest message output were directed to participate, for one day, on a rotating basis, in the operations of a communications office. They were able to assist communications personnel in making decisions regarding rejection based on first-hand knowledge of operational procedures, to gain insight into "communications" problems, and to take corrective action by means of liaison with their own organizational component.

The refined procedures have been in operation for five months. It should be noted that compared to average total transmission time of 22 hours in August, the December overall average was 9 1/2 hours.

Less calculable by graph but equally significant is the improved quality, clarity, and legibility of messages received for transmission. These factors greatly contribute to the ability to accomplish more rapid processing of messages. Ironic is the fact that rejection of messages has been rare. This is the measurement of interdepartment cooperation with communications.

The results discussed herein are not final. The lectures and present improvements have served to ferret out other areas in which local operating level habits must be coordinated with overall management requirements. Further, past failure proves the need for periodic refreshment and indoctrination of personnel. These are present and future programs which will keep the thousands of users of communications facilities alert to the importance and limitations of the services rendered to them, and the need of their own efforts in the assembly-line of information processed through such facilities.

Thus, problems affecting the operations of a large establishment may be analyzed through observation of one small segment of that organization. Experience developed through critical examination of this activity's communications problems has enabled wide-spread improvement in the overall operations. Consciousness of critical areas within an organization, such as communications, which serve as the pulse for the efforts of the activity as a whole, is essential to effective management.

## *On the Lighter Side...*

ATOMIC AGE NAVY?

After four destroyers steamed into Faharda Roads off Puerto Rico, a flashing light message was dispatched to the division leader from the flagship, inquiring, "WHAT IS YOUR SPEED?" The numerals became transposed in the reply, which was flashed to the flagship as, "MIKE SPEED NINE TWO". A quick reply from the flagship read, "EXCELLENT. CIRCLE FLEET THREE TIMES AND TAKE OFF."

★ ★

IS THAT ROGER?

During NATO exercises a Netherlands destroyer wanted to let the French flagship know that her sonar was not operating. After three attempts and failures to pass the message, the destroyer's TBS operator made a last try and finished his transmission by saying, "IS THAT ROGER?" The immediate reply was "MAIS NON, THEES ESS NOT ROGER, I AM MAURICE."

★ ★

STICK TO NAVAL COMMUNICATIONS!

A Navy pilot based in Germany is having trouble explaining to his wife back in the States just how it happened. After enjoying a few days of well-earned rest, he sent his wife a cablegram. The cable office dropped a letter from the message so that it read, "HAVING A WONDERFUL TIME. WISH YOU WERE HER."

★ ★

# GENERAL COMMUNICATIONS

## *Communications Vital to NATO--Part II*

By D. R. Reilly, JOC, USN

HQUSAFSOUTH

In the Spring 1957 issue of the NAVAL COMMUNICATIONS BULLETIN, "Communications Vital to NATO" outlined briefly some of the problems and communications activities of the Headquarters Allied Forces Southern Europe in support of NATO.

Many problems in communications at CINCSOUTH, for example, are beyond the operator's and maintenance man's ability to solve. In the central and northern commands of NATO, landlines are generally used to ensure rapid, effective communications. But in the southern region, geography prohibits widespread use of landlines. Rugged terrain and separating seas force reliance on radio as the primary means of communication. Many relay stations are needed to get through to Athens and Turkey with VHF and failures at any station close the circuits.

Serious shortages of qualified and trained electronics personnel in the southern NATO countries plus mountain-top weather make these failures not uncommon. Communications-wise, Europe is crowded, and lately NATO has not been assigned the best available frequencies, which further complicates the CINCSOUTH communication center's operations.

AFSE communicators, like their NATO partners, have been battling a day-in, day-out fight to keep their circuits in operation. They have come a long way. General Gruenther best summarized the progress of NATO's communications when he reported: ". . . in January, 1951, I attempted to telephone Oslo from Paris. I was told by the operator to bear in mind that the telephone line went through the Soviet zone, and we would have the assistance of Soviet operators in putting the call through. The operator said it would take eight hours, but it actually took twelve hours. Whether this was because of Soviet help we don't know. Now, four years later, we can get our calls through promptly. I left Paris Friday evening; that afternoon I called to Oslo and we got through in three minutes, and I am sure, without Soviet assistance . . . We now have a going set-up."

Antenna guy wires are set up by a NATO outside maintenance crew.

Staging of large-scale maneuvers and exercises is one of the most important aspects of CINCSOUTH planning. CINCSOUTH has annually developed comprehensive maneuver and exercise programs. These programs provide a means of valuable training in joint and combined operations, as well as in operations of primary interest to one service. The first large-scale exercise, named Operation Grand Slam, teamed the naval might of five fleets and four nations -- the largest modern naval force ever assembled in the Mediterranean. Other maneuvers have followed and more are planned, each pointing up training and readiness with particular emphasis on communications.

Command post exercises such as "Dry Run" and "Oprex Four", held during 1956, were designed to test the mobile readiness of CINCSOUTH's communications. Communicators were ordered away from the headquarters on short notice. With the initial signal tons of equipment and hundreds of personnel took to the Italian highways for undisclosed sites.

Almost immediately after their moving into a new area, communications were established with headquarters at Naples. Then a series of tests began, as communication officers attempted to set up every conceivable problem that might confront their unit under wartime conditions. Communication circuits such as the one from Allied Land Forces Southeastern Europe at Izmir, Turkey, normally handled by the permanent facilities at Naples, were taken over by the men and equipment at the temporary site, as were the circuits from SHAPE in Paris.

Much has been gained through training from these exercises, but CINCSOUTH continues to re-evaluate its programs. The Signal Division has directed its efforts toward these goals:

1. A primary and short-range program to enable NATO headquarters to communicate with each other and to provide the nucleus of a system required in case of an early emergency. With a few exceptions, this aim has been achieved.

2. A second and continuing task of keeping track of the states of readiness of the signal units or activities within the several national combat forces and coordinating such complex matters as radio frequency assignments, cryptographic systems and communications procedures.

3. A third and long-range program is to improve civilian communication networks in Italy, Greece and Turkey so that they can support the military demands in time of war.

Two major factors affect communications in AFSE's area. Geographically, as far as communications are considered, Italy, Greece and Turkey are three island areas. The interconnection between them is almost as difficult to effect as are transatlantic communications. Social and industrial factors find Greece's and Turkey's electronic industries able to provide ready-made communication nets for war use, but there is no

Continued on next page

# GENERAL COMMUNICATIONS

## Traffic Report from San Francisco

By Carlton C. Carroll

Communication Relay Supervisor

NAVCOMMSTA San Francisco

A study of particular interest to NTX primary relay stations has been conducted at NAVCOMMSTA San Francisco to determine the specific causes of non-deliveries.

During 1956 the NTX primary relay station "RBWP" handled 6,454,166 message tapes by NTX, with 242 claims of non-delivery. Of the 242 non-delivery claims, "RBWP" accepted responsibility for only 18 lost messages. In the entire year, it was unnecessary for the station to accept responsibility for delayed delivery on a single message tape. These totals reflect a .0000027 non-delivery percentage, which is below minimum standards set by the Chief of Naval Operations.

The analysis study at "RBWP" showed the most common causes of non-delivery to be as follows:

| | |
|---|---|
| Lost tapes unaccounted for | 2 |
| Dispatcher and checker's error | 3 |
| Tapes accidentally pulled from tape grid before transmission when packing transmitted tape bin | 4 |
| Multiple addressed tape handled as single | 2 |
| Supervisor gave wrong go ahead number after circuit outage | 1 |
| Army indicator omitted when processing into routing line segregation | 1 |
| Garbled or incomplete first routing indicator | 2 |
| Multiple addressed tape fell from dispatcher's desk before manufacture of additional tape | 2 |
| Monitor reels operator cancelled transmission and failed to obtain re-run | 1 |

It is also evident that a reduction in the number of mis-routings and follow-up services required could be effected by requiring that routing personnel who must use JANAP 117(B) refer to this publication before assigning routing indicators. Based on these findings, steps are being taken at "RBWP" to further reduce non-deliveries and their contributing causes.

## NATO continued

industrial pool of native personnel to maintain equipment.

The radar and air defense electronic network is the responsibility of the Signal Division. Many elements of this vast network were completed in the last two years.

A very high priority is being given to the completion of a full-coverage radar and air control network on NATO's southern flank. Its operation and maintenance problems are still pioneering problems as unique as those of the "DEW-LINE".

## Failure Reports

An effective system of graphically recording the number of failure reports submitted has been originated at U.S. Naval Communication Facility (R), Port Lyautey, F. M.

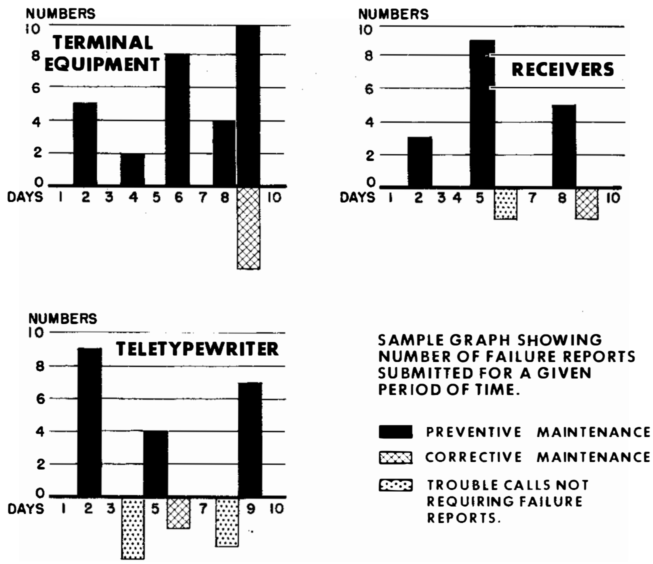
Here's how it works: a graph is plotted with days of the month against the number of failure reports submitted for each day. The various electronic repair sections appear on different sections of the graph from top to bottom.

This system shows at a glance the effectiveness of the preventive maintenance program and how many failure reports are being submitted daily. It also indicates whether the failure report was submitted as a result of preventive maintenance or corrective maintenance, making obvious to any observer the advantages of a preventive maintenance program.

Originated by A. J. Johnson, ETC, USN, the new system has had favorable comment from the Director of Naval Communications and CINCNELM.

NUMBER OF FAILURE REPORTS

1 - 10 JULY



# GENERAL COMMUNICATIONS

## *Telegraph Signal Distortion--Part I*

It is essential that all controllers and maintenance personnel concerned with telegraph systems learn to interpret the system performance through distortion measurement. We cannot afford either the time or the money to transmit repeatedly the same message just to ascertain that the message is being received correctly. Consider the "on-line" (encrypted) transmission. What other means is there for such a system's operating and maintenance personnel to check system performance except possibly at the distant receiving station?

It has been a common practice among teletypewriter maintenance and operating personnel to adjust the teleprinter "range" scale to the optimum point for the circuit and equipment. This practice has usually acted as a camouflage for existing circuit difficulties. How well the signal prints on a particular printer is unimportant when considering a complete system. It is more important to know the fidelity of the signal being passed to line at any point in the system. Signals transmitted to line should be printable on any properly adjusted receiving telegraph equipment. Therefore, fidelity of the receive signal must be given prime consideration.

There are four fundamental types of distortion which adversely affect fidelity of telegraph signals.

(1) Bias distortion. Uniform lengthening or shortening of the mark or space elements, one at the expense of the other.

(2) Fortuitous distortion. Random displacement, splitting, and/or breaking up of mark and space elements.

(3) End distortion. Uniform displacement of mark to space signal transitions with no significant effect on space to mark transitions.

(4) Characteristic distortion. Repetitive displacement or disruption peculiar to specific portions of a signal.

The total of these four forms of signal distortion is known as the cumulative distortion of the signal. A signal having mark bias in one link of a telegraph system and space bias in another portion of the system could actually have less cumulative distortion at the distant receiving point than at test points along the system due to the cancellation effects of bias distortion. It must be realized that characteristic distortion cannot change anywhere in the system itself unless the signal is regenerated in some manner and that the effects of end distortion in one link in the system can be offset by bias distortion in another portion of the system, but the fortuitous distortion components will continue to rise as the number of links away from the sending point is increased unless signal regeneration takes place. It should be obvious that if one can easily separate these various forms of distortion into separate entities, it will simplify the job of finding the trouble, and improving the fidelity of the signal.

For many years the rule of thumb for acceptable distortion for start-stop telegraphy has been thirty-five percent distortion. The kind of distortion has not been specified. However, only twenty percent fortuitous distortion will produce an entirely different effect on the receiving equipment.

Suppose a teletypewriter is caused to wait 30 percent due to fortuitous distortion during the start impulse. The next element received may have practically no distortion. Then the next element may be thirty percent early due to fortuitous distortion. Under these conditions the second code element would be printed incorrectly due to the fact that the receiving equipment is showing this element as either sixty percent late or forty percent early in selection time. Telegraph signal distortion causes the elements to occur either earlier or later than that of a perfect signal, and the total distortion present is the cumulative effect of the earliest arrivals to that of the latest arrivals.

In start-stop telegraph signaling fortuitous distortion is much more detrimental to the receiving equipment than other types of distortion. With start-stop signaling any displacement of the stop-to-start time will be reflected throughout the entire character being selected, and as the distortion occurs at random, it may aid some code elements but damage others.

For this reason, with start-stop telegraph systems, only fortuitous distortion that is one quarter or less the total range of the receiving device can be regenerated or detected with any degree of reliability. In general, electronic stop-start selecting devices can cope with up to twenty-four percent fortuitous distortion for reliable printing.

Synchronous systems have a marked advantage over start-stop systems in that the detection capabilities of synchronous systems are primarily determined by the accuracy of the synchronizing devices, and the width of the pulse selecting the line signal condition (mark or space). If the selecting pulse is one percent of total signal pulse width, then the receiving device will detect fortuitous distortion correctly up to forty-nine and a half percent early or late. This then would be a total fortuitous distortion component of ninety-nine percent. In fact, there are systems presently working which are capable of accomplishing this under controlled laboratory conditions. However, when the fortuitous component on a working circuit rises to a figure as high as this, the circuit for all practical purposes is useless, because the system has been degraded to almost one hundred percent fortuitous distortion. Failures will appear in traffic each time the fortuitous distortion exceeds forty-nine and a half percent early or late.

Continued on next page

# GENERAL COMMUNICATIONS

## *Distortion continued*

It should be kept in mind that any system that exceeds its normal fortuitous distortion figure is cause for alarm. Fortuitous distortion is practically uncontrollable in nature; therefore, it must be minimized even if it means rerouting and/or reengineering the system. If a telegraph system is made up of groups of equipment and links, such as radio and landline facilities, a percentage breakdown of all distortion figures for each link and each piece of equipment on the circuit should be known. There is no way for maintenance personnel on any telegraph system to evaluate performance of a working telegraph system except through distortion figures.

Itis, of course, assumed that the distortion figures have been proved within capabilities of the particular working system. If traffic passing on this system is shown to be outside these limits, it should be standard practice of the sending end of the "VF link" in question to measure the signal being introduced into the system. If the distortion of the signal being introduced into the system is normal but the receiving end of the link is receiving traffic with a distortion figure which exceeds the total of the input signal distortion plus the inherent link distortion, then there is cause for alarm and corrective action must be taken immediately. If the signal being introduced into the system has a high distortion figure, then there is cause for investigation of the signal being introduced into the VF system.

Notice how pointless it would be to place printing monitoring equipment on such a channel if the traffic were anything but clear text. And even if it were clear text, suppose there were high bias distortion in the particular monitor in use. In this case, the monitor might, with its range scale, indicate that there was a lowered operating margin. Now, as the monitor cannot indicate whether there is bias, fortuitous, end, characteristic or speed distortion, the maintenance man is no better off than before. All he knows is that he has a lowered operating margin, but as to what to do with it, he really has no clue, except trial and error methods that take much time to produce a questionable answer and occupy too much channel traffic time. If maintenance personnel will use distortion measurements on working circuits, they will know at all times exactly how well the systems are working.

Special test equipment for this purpose has been procured and disseminated throughout the Naval Communications System. A list of equipment types can be obtained from the Shore Electronics Test Equipment Allowance List (NAVSHIPS 3791), Equipment Category 34. One or more of these equipments is aboard your station. Identify it; learn to operate and use it. Not only will communications become better, but your maintenance problems will be reduced.

Part II of this article will expand upon the causes and effects of the four types of distortion. The widest possible dissemination should be made to technical personnel. The recognition, identification, and correction of distortion is one of our primary problem areas in teletypewriter communications. Comments and recommendations from the field, based upon experience in this area, will be welcomed.

## *New Coast Guard Distress Frequency*

The U. S. Coast Guard has announced that the new frequency for distress and other marine calls to the Coast Guard is 2182 kilocycles, effective 1 January 1957.

Also on that date, the Coast Guard discontinued listening continuously for calls on the old frequency of 2670 kilocycles.

## *Visual Training in the Fleet*

### By LT R. J. Hollingsworth, USN
**USS KIDD DD-661**

Early in World War II, a task force would complete an entire action with two voice radio circuits and visual signals; today, a four-day type training schedule for one destroyer division requires a minimum of four voice circuits, and as many as six may be used when aircraft services are required.

Radio, like radar, has become a "crutch". An officer of the deck on the mid-watch of a destroyer steaming in column with his division all but panics if the surface search radar fails, because he relies on CIC and his radar repeaters to maintain station. Seldom on his watch does he attempt to use his eyes and imagination to maintain station. With his radar out, he is lost.

A similar and probably more dangerous situation exists with radio failure. The Unit Commander knows at once that he must resort to visual signals to maneuver his unit if radio fails; at night he knows he has flashing light and the executive method. The difficulty is that few OOD's or signalmen are familiar with this method of maneuvering.

Although we now have available a myriad of radio transmitters and receivers, the cold facts are that we do not have the trained personnel to keep this equipment operating at all times. Furthermore, our newer-type of equipment is so delicate in regards to mechanism and integral parts that our storerooms are sometimes not large enough to hold all of the required repair parts.

We must, then, institute a rigorous training program for officers and signalmen to permit use of effective tactical signals by flashing light. Units in company at sea should take advantage of every opportunity to exercise at maneuvering by flashing light tactical signals.

# RADIO

## RATT System Operation

By Harold L. Johnson, CWO, USN

Radio Section

Naval Communications Division

The cryptographer is the only one who can answer this:
"DKIE"%JKDLM GJKKS" or should it have been "KSJ$(-&HKDEMMS"..?

Jumbled characters mean nothing to the radio teletypewriter circuit operator. However, the addition or deletion of a single character may mean many hours of extra labor to cryptoboard personnel and may actually mean that the RATT circuit operator will not get the message intended for the ship.

Satisfactory operation of any radio circuit depends upon the correct performance of all of the parts of the circuit. This includes equipment as well as the personnel who operate it.

Let's leave the crypto operator out of the picture for the moment and have a good look at some of the major causes of circuit malfunction of a radio teletypewriter frequency shift circuit. If we first consider the transmitting terminal we find two sources of troubles. The primary problems encountered with the transmitting equipment stem from the frequency shift keyer. Over-compensation of the keying signal with the waveshaper will cause erratic operation and can make QSA 5 circuit give a readability of QRKO. The minimum setting of the waveshaper, to give a clean frequency shift output, is the most desirable.

Another source of trouble, and perhaps the most common one, is incorrect frequency shift of the transmitted signal. Satisfactory radio teletypewriter operation depends on the shift of the emitted carrier from 425 cycles above (for a marking condition) to 425 cycles below the emitted carrier for a spacing condition. Too wide or too narrow a shift is a very common operational error that may be difficult to ascertain at the transmitting end due to high RF voltages present. The frequency spread should be checked at the transmitting source with the lowest practicable RF power output of the transmitter before full power is utilized.

It is incumbent upon the receiver operator to further ascertain that the RATT signal being received has the correct frequency spread. This can be accomplished by numerous means, as outlined below:

a. With the transmitting end sending test tape, use a frequency meter and a receiver and measure the frequency on both limits of the deviation. This difference should be 850 cycles.

b. If an oscilloscope and audio oscillator are available, inject the audio tone output of the receiver to one set of deflection plates of the scope, and the audio output of the audio oscillator to the other set of deflection plates of the same scope. When a Lissajous circular pattern can be observed (remembering that the keyed signal is deviating between its limits so this pattern will not be a steady one), record the frequency on the audio oscillator. WITHOUT TOUCHING THE RECEIVER readjust the audio oscillator approximately 850 cycles until the same pattern can be observed. The difference between the readings will give the frequency spread of the transmitted signal.

c. A slight deviation from the procedure outline in b. above can be accomplished if the receiver is zero-beated to one limit of the frequency shift and the audio oscillator set for approximately 850 cycles to give the single Lissajous pattern on the other limit. The frequency shift then is read directly from the audio oscillator.

Once the radio teletypewriter circuit operator has properly performed his duties to see that the incoming signal is correct, and that teletypewriter converter is properly set up, then, and only then, can he be sure that he has done his job and eased the job of the crypto operator.

As an added sideline, the BUSHIPS Journal for December 1956 included an article on frequency shift carrier transmission. BUSHIPS further advises that a POMSEE publication is in preparation for distribution in FY 1959 which will go into detail on correct operation of the complete teletypewriter transmission system.

Training films prepared by the Bureau of Ships which require approximately 1 hour to view are arranged in four parts as follows:

MN 8099A "RADIO TELETYPE SYSTEMS AFLOAT, General Principles of Operation"

MN 8099B "RADIO TELETYPE SYSTEMS AFLOAT, Tone Modulation System"

MN 8099C "RADIO TELETYPE SYSTEMS AFLOAT, Carrier Frequency Shift Transmitter System"

MN 8099D "RADIO TELETYPE SYSTEMS AFLOAT, Carrier Frequency Shift Receiver System".

Copies of these films may be procured in accordance with OPNAV INSTRUCTION 1551.3A.

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## How's Your Voice?

By MSGT C. W. Gregory, Sr., USMC

Headquarters

Fleet Marine Force Pacific

The Headquarters Battalion of the Fleet Marine Force, Pacific, is taking advantage of an infrequently used training aid, the tape recorder, to instruct radio operators in correct voice procedure.

Although most radio operators received their technical training in excellent service schools, many have had no training in proper speech. Recognizing this deficiency for one that could be overcome, the radio chief at FMF obtained a tape recorder and promptly put it to work.

With the tape recorder, examples of typical voice transmissions are prepared in advance for classroom periods and the tapes labeled and filed for future use. To allow the student to recognize his mistakes in speech, sessions are held in which the student records his own transmission and plays it back. During these playback sessions, the instructor is able to point out errors made by each student at the time they are made. A question-answer period has also proved helpful at this time.

Value of the tape recorder training was recently proved during an operation in which wire section personnel who had received the training were utilized exclusively as radio operators.

# AMATEUR RADIO

## Shipboard Amateur Radio

By CDR J. J. Zammit, USN
**Head, Naval Reserve Liaison and Amateur Radio Unit Naval Communications Division**

Amateur radio stations have been authorized by the Chief of Naval Operations in the following ships:

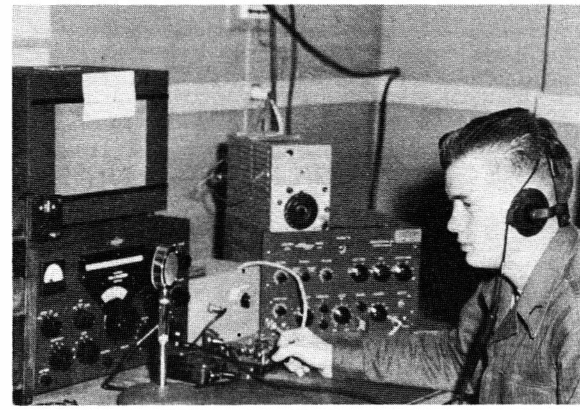
| Ship | Operator | Call Letters |
|---|---|---|
| USS ELDORADO (AGC-11) | Stalnaker, LCDR | W4CMF |
| USS ELKHORN (AOG-7) | Snyder, B., LTJG | W6EOV |
| USS BURTON ISLAND (AGB-1) | Dennis, R. N., FT2 | W4VEI |
| USCGC WESTWIND (WAGB-281) | Schmick, A., RM2 | W3VDN |
| USCGC BRAMBLE (WAGL-392) | Regler, RM1 | K0ACD |
| USCGC SPAR (WAGL-403) | Dietz, D., EMC | W1WIN |
| USNS CHELAN COUNTY (T-LST542) | Harris, D. | W7RM |
| USNS LINDENWALD (T-LSD6) | Freeman, R. | K2JCK |
| USNS ALATNA (T-AOG81) | Bennett, C. | K2GHL |
| USNS T-AKL29 | Lyons, W. T. | KA8WL |

Operators of each of the shipboard amateur radio stations are regularly assigned crew members and also licensed amateur radio operators. Each station was recommended for operation by the ship's commanding officer and approved by the task force commander in each case.

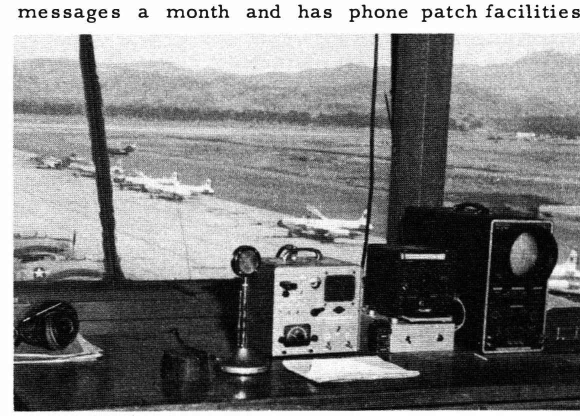
Special consideration has been given to unusual morale factors in isolated ships on duty in remote areas. Authority granted for operation of these shipboard amateur radio stations is limited to the period while the ships involved are engaged in their unusual missions. While underway, the ships operate maritime mobile, and, when on station, use the appropriate mobile call indicator for their area of operation.

Most of these ships are, or were, engaged in OPERATION DEWLINE re-supply activities in the Arctic area. Upon completion of this mission, some of the ships will deploy to Antarctica for participation in OPERATION DEEP FREEZE III.

## Marine Amateur Radio Stations



PFC Larry Bollinger, USMC, of Vista, Calif., at operating position of KH6AJF, at Camp H. M. Smith, Oahu, T. H. KH6AJF handles an average of 500 messages a month and has phone patch facilities.



W6FCS at MCAS El Toro (Calif.) is supervised by CAPT H. S. McClung, USMC. Operated by 12 licensed "hams", W46FCS handles an average of 250 messages a month, including phone patches.

S/SGT E. H. Epperle, USMC, of Fallbrook, Calif., at 20-meter operating position of W6IAB at Camp Pendleton, Calif. Approximately 2,000 messages and 300 phone patches are handled by W6IAB each month.

# AROUND THE WORLD IN

## *Jim Creek Antennas*

By D. G. Robertson
NAVCOMMSTA Seattle

Maintenance of antennas at the Navy's 1,000,000-watt VLF radio station located on Jim Creek, in the state of Washington near Arlington, is a complex job which required many innovations to meet local conditions.

Size of the maintenance job is indicated by the number of man-weeks required to lower and re-rig one of the antenna spans. At the U. S. Naval Radio Station (T) Jim Creek, Oso, Washington, four weeks of working time by twenty-seven men, or a period equal to more than two years of man-hours, are consumed in lowering and re-rigging one of ten antenna spans.

There are many reasons why the work is complex and difficult. For example, at Jim Creek the terrain is steep to the point of vertical rock inclines and elsewhere is extremely rough and encumbered with large stumps and rock outcroppings.

Length of spans adds to the difficulty. The ten catenary antennas span from 5,800 feet to 8,900 feet. Each span is divided into four sections.

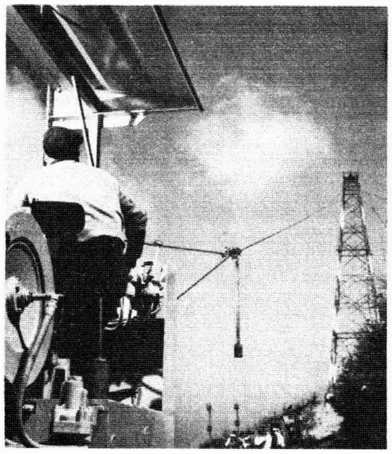
Diameter statistics give an insight into the size of the job. In the four sections of an antenna span, the two center or active parts of the antenna are made of 37-strand one inch diameter copperweld steel cable with downlead connected near midpoint. End sections of the antenna span are 37-strand one inch galvanized cable separated from the copperweld by 22-foot insulator assemblies and 4-foot diameter aluminum corona rings.

The type of construction employed, together with the rugged characteristics of the local terrain, prevent laying cable on the ground. Instead, the cable must be worked by paying it out over a 200-foot tower on one mountain and taking it up over an identical tower on another mountain.

In working Jim Creek's great spans, equipment is one of the big problems. From the original construction two large model BX-142 logging winches were left behind. These were modified and put to work.

A series of conferences and letters eventually established satisfactory rigging methods and equipment modifications. Another big problem was that of mounting the winches so that they could be moved from tower to tower in all kinds of weather and, once moved, positioned accurately. This problem, too, was solved.

Two very large mobile tractor-mounted cranes were obtained from Army surplus. The tracks were approximately 1 1/2 times the length and width of those used on the largest bulldozers in general service. Their heavy weight and exceptionally rugged construction provided units on which to mount the winches. The cranes were also of sufficient size to obviate the necessity of dogging them down while working the antenna spans. Large outriggers operated by hydraulic power were mounted to assist in anchoring the units in position.



Tractor winch hauls in the one-inch antenna cable, using specially-fabricated clamp.

A design was then made, using the existing winches and the surplus tractor cranes, and then modifying the winches as planned. This was a design of integral units, using materials on hand, rather than a design for simple placement of winches on tractor-mounted bases. Subsequently, a contract was negotiated resulting in two tractor-mounted winches. The equipment has only one control position, from which the operator can perform all functions necessary to control running gear, cable drums and diesel engines.

Jim Creek's winches can be transported to almost any position to the rear of the antenna towers to be worked. The dead weight of each complete unit is approximately 55 tons. A maximum pull (span tension) of approximately 16 tons is required.

The innovation at Jim Creek is superior to the usual system of using skid-mounted winches that must be pushed and pulled into position on a concrete pad with a bulldozer, then dogged down to deadmen to hold them. Another important feature is the hydraulic torque converter used in lieu of gear transmissions for both the running gear and the cable drums. An operator has only to engage the forward or reverse gear of the function desired and control is achieved with the throttle. This accomplishes smooth and close control for the rigging method used whereby one inch wire rope is paid out over the tower from one mountain and the antenna taken up on another.

Some of the more important features of the Jim Creek winches are as follows:

- Weight--approximately 55 tons
- Length--22 feet
- Height--13 feet
- Width (with outriggers down)--17 1/2 feet
- Travel Speed--3.36 mph maximum
- Main Drum Speed--212 feet per minute maximum
- Main Drum Pull--55,500 pounds maximum
- Haulback Drum Speed--795 feet per minute maximum
- Haulback Drum Pull--14,750 pounds maximum
- Engine--DA-844 Diesel.

In addition to the foregoing, a "bull" or utility drum is provided which has a maximum pull greater than the main drum, located at the lower front of the unit, and a "strawline" drum with fairlead for light general work is located high on the

Continued

# NAVAL COMMUNICATIONS

## NAVCOMMU 3-- Asmara

When it was first learned in Port Lyautey, Morocco, that NAVCOMMU THREE, in Asmara, Eritrea, was to be "beefed up", officers who had previously visited the Unit were immediately called into conference by the Commander Communication Facilities, Mediterranean and Middle East, for discussion of every phase and minute detail of future operations with a view to anticipating, as nearly and clearly as possible, the requirements which would be placed upon the command at both NAVCOMMU THREE and NAVCOMMFAC Port Lyautey. Kept in plain view were budgetary requirements.

As Commander Communication Facilities, Mediterranean and Middle East, CAPT F. R. L. Tuthill assigned top people to specific tasks. As Operations Officer, LCDR (now CDR) John Greksouk was responsible for effecting liaison with DNC and the OIC of NAVCOMMU THREE on all phases of the ensuing operation. LTJG Richard G. Higgins was assigned responsibility for the electronic phases and the Chief Staff Officer, CDR I. J. Schuyler, responsibility for the augmentation of the entire logistics support required through local and area sources.

Upon receipt of the "go ahead" from CNO (DNC), the groundwork had already been accomplished so that it was only a matter of implementing the plans to get the "show on the road". All officers and men selected to accompany Commander COMMFACMEDME were then briefed as to the tenor of the mission prior to embarking on the special flight which had been arranged to take personnel and tons of equipment to Asmara.

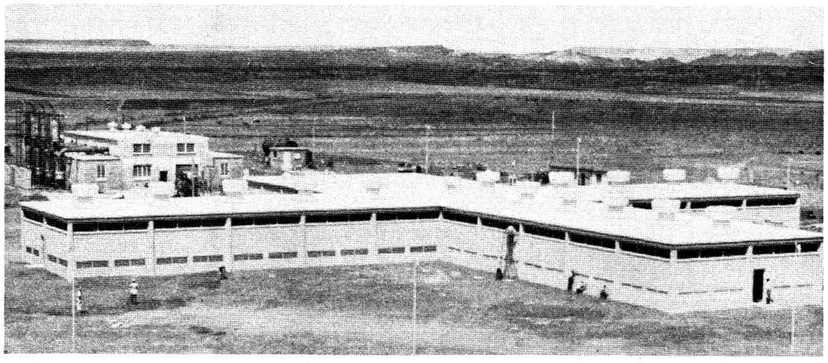
Many people think of Port Lyautey and Asmara, being in Africa, as only a short "hop" between cities. Unfortunately, this is not the case, as scrutiny of any map or chart will reveal that the two locations are separated by approximately 3150 air miles, requiring 17 hours flight time. Refueling stops are required at Malta and either Cairo, Khartoum or Port Sudan. Much to the disappointment of the majority of the men, the names "Cairo" and "Port Sudan, " on this trip, were applicable only to the airports. Commander COMMFACMEDME had issued orders that no one leave the airports, thereby avoiding possible security leaks and also providing for the physical safeguard of equipment on the plane. Other than the normal fatigue accompanying any long flight, the trip to Asmara was without mishap, thanks to the Commanding Officer of VR-24, CAPT R. C. Knowles.

Upon landing at the site's 7800-foot altitude, the plane was met by COL Charles, Commanding Officer of Kagnew Station. He was briefed on the Navy mission, while the airplane's passengers, assisted by the Army ground crew, unloaded the equipment from the airplane. After seeing that all men were provided with breakfast and adequately berthed, Commander COMMFACMEDME briefed the U. S. Consul General by providing a broad outline as to the possible communications operations which might be anticipated in the Persian Gulf and Indian Ocean areas.

Following lunch, all officers and men of NAVCOMMU THREE, as well as those who accompanied Commander COMMFACMEDME to Asmara, were assembled so that explanation of the mission and how the "crash" operation was to be conducted could be made clear to all hands. To emphasize the task assigned, charts and maps were utilized in this briefing. At the completion thereof, everyone was assigned to a "task unit" with instructions that each unit would report daily to the special operations officer, LTJG Higgins, USN.

The work began immediately with gusto. Long hours were spent at the transmitter station which worked closely with the U. S. Army Signal Corps. Additionally, almost nightly, Commander COMMFACMEDME and his special operations officer were on a conference circuit with NAVCOMMFAC Port Lyautey, keeping abreast of events and effecting any liaison necessary between the units.

The Army Signal Corps group, under the leadership of CAPT Pienatero, gave superb cooperation throughout the entire mission and it was indeed a pleasure to observe the teamwork displayed by officers and men of both services. It also became evident that the Army Signal Corps had observed the "esprit de corps" and "can do" which manifested itself among the Navy men. Army personnel were somewhat astonished at the way in which the Navy met obstacles, surmounted them, and continued for long hours of trial and tribulation until the mission was finally completed.



**Transmitter building at NAVCOMMU 3, in Asmara, Eritrea.**

Being mindful of representing the Navy overseas with tact and diplomacy, the Commander Communication Facilities, Mediterranean and Middle East, upon his departure, offered on behalf of the Director, Naval Communications, his thanks to the U. S. Army Signal Corps for its cooperation in helping to accomplish the mission 8 days ahead of schedule. Commander COMMFACMEDME expressed his appreciation to the men of NAVCOMMU THREE for their untiring efforts in saying, "Once more naval communications has proved its tremendous capabilities under the most stringent and economical conditions in accomplishing a difficult and arduous task. Well done to all concerned and our heartfelt thanks to COL Charles and the U. S. Army Signal Corps for their fine support".

# COMMUNICATIONS EDUCATION

## *Radiomen--Your Class "B" School*

**By LCDR C. E. Preble, USN**
**Officer in Charge, Radioman Schools**
**Service School Command**
**U.S. Naval Training Center Bainbridge**

Your Class "B" School is the first real break afforded radiomen since "Old Bellevue" was a requirement for chief. Years ago - before World War II - the only rating qualified to operate and service communication equipment was the radioman. With the advent of "RT", followed by "ET" ratings, radiomen drifted away from normal maintenance and repair of their own equipment, until today there are few RM's in the fleet or the shore establishment who are qualified in communication equipment maintenance. The average radioman has lost touch with the finer points of understanding his equipment, although the standards of communications throughout the Navy have been maintained at their high level of efficiency.

Today, the term "communicator" means more than just knowing code and circuit procedure. We, here at the Class "B" Radioman School at Bainbridge, Md., feel that our school, new as it is, presents an excellent opportunity for radiomen to become really expert communicators. We convene experienced radiomen and graduate expert communicators, who not only excel in their knowledge of naval communications, but who have a practical understanding of the circuitry and repair techniques for all types of communication equipment. It is also the mission of the school to dispel the mysteries of the Naval Communications System as a whole. To the relatively isolated shipboard radioman, the far-reaching ramifications of modern naval communications remain a mystery.

It is characteristic of all progressive schools, naval or otherwise, that certain seemingly incurable problems present themselves. Our school is no exception; however, one of our major problems is not incurable. In fact, by soliciting the aid of prospective students we hope to minimize this one difficulty. We have found that the majority of radiomen who come to the school have one thing in common, a weak background in basic mathematics. Since the study of any physical science naturally implies a basic knowledge of mathematics as a tool, prospective students should become as proficient as possible in the use of this necessary implement. In the 30 weeks allotted to the course, no attempt is made to formally teach mathematics as such, since a great deal of material concerning communications and electronics must be presented. Therefore, all prospective students are urged to take it upon themselves to brush up on mathematics prior to reporting to the school. Many fine courses in arithmetic and mathematics are available to radiomen at all levels.

"USAFI Basic Mathematics I and II" are excellent comprehensive courses and are recommended. For those who prefer to study from a text on their own, many mathematics texts are available. One such text, which is highly recommended, is "Mathematics for Electricians and Radiomen", by Nelson M. Cooke (The Cooke Book).

During the 30-week course we teach, comprehensively, advanced phases of communications, and repair and maintenance of communication equipment. The communication phase of the course includes advanced training in such fields as Commercial Traffic Handling, Task Force Communications, Operational Communications, the Movement Report System, NTX System, and such support items as are necessary for the development of an expert communicator.

The materiel phase of the curriculum embodies Basic Electricity, Basic Electronics, and Communications Equipments. Basic Electricity is primarily concerned with direct and alternating current circuits and AC/DC rotating machinery. A majority of the material covered in this section of the materiel phase can be found in Volumes I through IV of the Bureau of Naval Personnel publication, Basic Electricity, NAVPERS 92021 through 92024. The basic theory of electricity is taught as a necessary foundation for the more complex study of electronics and electronic equipments. Basic Electronics treats with power supplies, audio amplifiers, video and r.f. amplifiers, oscillators, transmitters, receivers and special circuits. Again, most of the material in the Basic Electronics section is covered in Volumes I through VI of the Bureau of Naval Personnel publication, Basic Electronics, NAVPERS 91882 through 91887.

Following this comprehensive treatment of basic electronic theory, a detailed study of major types of communication equipment operation, circuitry, and trouble-shooting, occupies the majority of the remaining curriculum time. In the equipment section, such representative communication equipments as transmitters, receivers, VHF/UHF, RATT/FAX, single sideband and various communication systems are studied intensively, to give the radioman a complete understanding of the functions and circuitry of the equipment, as well as a foundation in trouble-shooting. With the growing emphasis on single sideband and associated equipments in modern naval communications, it should be of great interest to progressive radiomen that they have the opportunity to attend a complete course in the operation and function of this advanced equipment at their Class "B" School.

No communication system is better than the people who are running it. Radiomen and electronics men can do much to make an already excellent Naval Communications System an outstandingly efficient organization by improving their own abilities and knowledge. The Class "B" School offers this opportunity

Continued on next page

# COMMUNICATIONS EDUCATION

## *Radio School continued*

and, by doing so, justifies its existence in "service to the fleet".

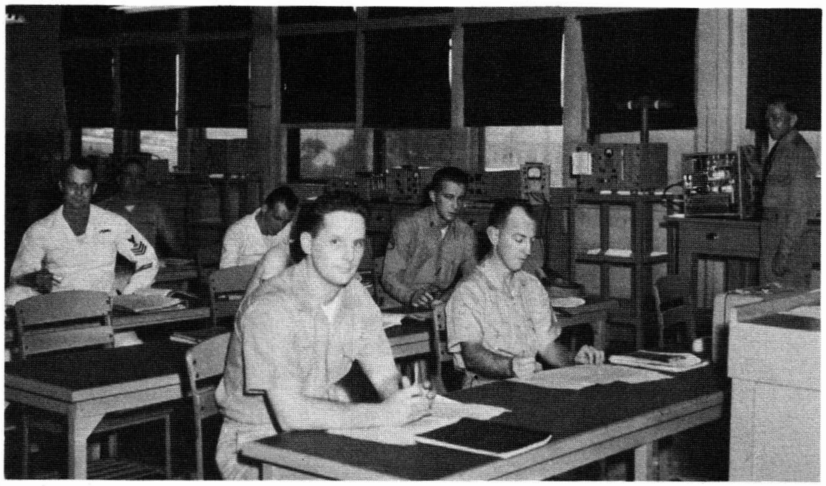
(Information concerning the Class "B" Radioman School is contained in Catalog of U. S. Naval Training Activities and Courses, NAVPERS 91769-C, page 63. Convening dates in 1958 are given in BUPERS INSTRUCTION 1500.25C of 18 June 1957, page C-16. Assignment to Radioman Class "B" School will normally be made to coincide with SEAVEY/SHORVEY rotation. Request for school should be included in the pertinent SEAVEY/SHORVEY card. -Ed.)

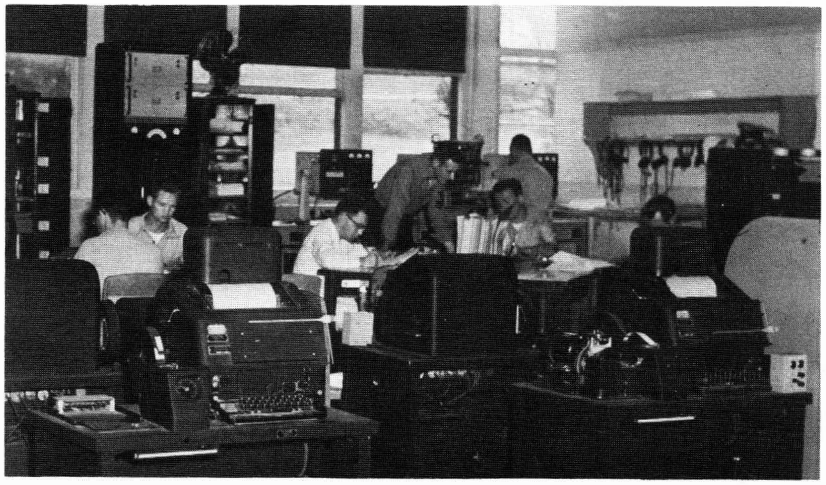
## *Jim Creek continued*

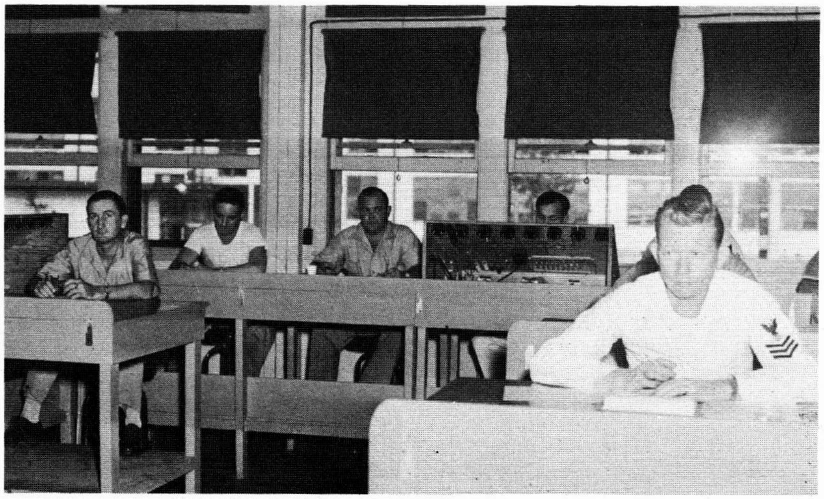
outside. A one-inch antenna cable with a special clamp fabricated by the Puget Sound Naval Shipyard allows "soft" reeling of the antenna cable on a small power reeling device. It is normally located in front of the main winch. This method of taking up the antenna cable prevents scoring or other damage which would result if it were to be taken up directly on the main drum under tension.

The cost of providing these tractor winches, delivered to the Jim Creek Radio Station, was considerably less than was originally allotted to modify the existing winches and construct concrete anchor pads behind each tower.

These winches were used for the first maintenance lowering and rerigging of a Jim Creek antenna span during April and May of 1956. All concerned with this job and others who observed the new winches in action were more than satisfied with their performance.


G. C. Amerson, RMC, USN, (right) instructs a class in AN/URR-35 circuitry.


A class in communication systems is instructed by M. S. Cogan, RMC, USN, (bending over student's desk).


A "B" School class in basic electricity.

# HERE'S THE ANSWER

## Question

1. In regard to use of AA in the case of both stations being unknown, article 506 of ACP 129 and article 7021b1 of DNC 5(A) do not seem to agree. I believe article 7021 to be the best solution.

2. Article 313C of ACP 129 and article 7034.6b of DNC 5(A) do not seem to agree on giving group checks of a coded message containing over a hundred groups. I think ACP 129 has the best solution, but would like to have it clarified.

3. Is it correct to ask for AB-TO, or would you have to ask for AB BT when requesting repetition of more than one component of a heading?

4. In reference to article 7609, example B, in the use of alarm procedure (relay), shouldn't WTSY indicate a flash for original call?

5. Article 152 of DNC 27 states in the example where the speed pennant should be flown. However, elsewhere, it only indicates where best seen. Which is correct?

6. Can Mike, Zero, Absentee Indication be flown underway "In Port"? If so, please give reference.

7. Can you give a reference, if any, indicating color of adapter for night signaling use?

8. Attention should be brought to all signalmen in the proper use of Y-1 and Y-2. My interpretation is that for use while coming alongside both Y-1 or Y-2 and Romeo will be flown. Am I correct?

O. D. Piercy, SM1, USN
Flag Allowance
COMCRUDIV THREE

## Answer

1. The only difference in the procedures for establishing communications when the identity of each ship is unknown to the other is that DNC 5(A) indicates that the challenged ship should repeat the "AA", while ACP 129(A) omits that step. It is no longer considered that it is necessary for the challenged ship to repeat the "AA". The use of the procedure described in paragraph 506a of ACP 129(A) is preferred. DNC 5(B), now in preparation, will not require a repetition of the prosign "AA".

2. The procedure contained in DNC 5(A), using the first, eleventh, twenty first, etc., groups, should be used. ACP 129(A) will be changed accordingly when the next change is issued.

3. It is correct to use AB-TO. A repetition may be requested of all that portion of the heading preceding or following a prosign, or that portion of the heading between any two prosigns.

4. Yes.

5. The procedure described in article 152 of DNC 27 should be used by U. S. naval ships. ACP 175(A) indicates that SPEED may be displayed where best seen because some of the Allied navies do not follow U. S. Navy procedure.

6. No. The meanings assigned are intended for use when not underway. When change 2 to ACP 175(A) is promulgated, it will contain provisions to change the term "in port" to "not underway" and "underway" vice "at sea" to indicate precisely what is intended.

7. There is no effective reference that specifies the color of adapters. The use of adapters is prescribed in article 423 of NWIP 16-1, but the choice of color is left to the discretion of the OTC.

8. There is no reason why flag "Y" should be used in combination with flag "R" to indicate a transfer of mail or other light material. To avoid misinterpretation, a more complete breakdown of the use of the flag "Y" will be contained in change 2 to ACP 175(A).

## Question

1. Since arriving at NAVCOMMU FIVE for duty, I have been continually heckled with the problem of messages misrouted to Philadelphia which should have been sent to the Philippines. These misroutes are due to misunderstanding on the part of Message Centers as to the proper decode of the abbreviation, "PHIL". The problem could be solved by changing the authorized abbreviation of Philippines from "PHIL" to "PHILIP". The problem is a very real one, and, if the volume of misrouted supply messages received here is an indication, it could very well be Navy-wide.

J. E. Adams, RMC, USN
U. S. Naval Communication
Unit FIVE

## Answer

1. Specific instructions regarding the method used to formulate compound abbreviations are set forth in JANAP 169. When employed properly by all concerned, these instructions should prevent the type of misinterpretation resulting in the problem cited in your question. In July 1955 the Chief of Naval Operations noted the injudicious and widespread use of abbreviations by the Navy and placed a restriction on their use. This restriction was disseminated in NAVOP 9, which established a policy on the use of abbreviations. This policy emphasized that clarity in all forms of communication is mandatory. The solution you present is not exactly the answer to the problem. Rather, the application of greater diligence and more attention to detail by communication personnel serving the originator and also those handling messages enroute to their destination would eliminate this type of error, thereby generally improving the efficiency of the Naval Communications System.

# HERE'S THE ANSWER

## Question

1. Current directives state that a message being introduced into a tape relay network will carry a filing time, and that nothing in the original preamble, address, text or message ending may be changed when the message is readdressed. In the past, readdressed messages have often been received with additional filing times added after the filing time of the message being readdressed (one additional filing time for each readdressal). Although unable to find any justification for the use of this procedure in either the examples or explanatory texts of current publications, I have also used this form when the date-time group assigned by the command originating the readdressal was considerably earlier than the time the message was received by the communication center for transmission. Current directives also state that the address will either be in plain language or "Class A" form and will in no case be mixed. Is it then considered correct or incorrect form to place an additional filing time at the end of a message being readdressed providing that the original preamble, address, text, and message ending are in no other way changed? And when a message previously received with a "Class A" address is readdressed to an activity which has neither a call sign nor an address group assigned, is it correct procedure to change the original address to plain language form?

John H. Nicholson, TEC, USN
VR-24, Box 123, FPO NY

## Answer

1. In reply to your first question, article 7601 of JANAP 127(A) states, "a message cannot be readdressed if ANY alteration is made. . .". Applying a strict interpretation, this would prevent the addition of a separate time of file by the readdressing station. However, when a message is readdressed the command readdressing is in effect originating a new message. Under these conditions, although not specifically stated, it would be permissible to include the time of file of the readdressing station below the original ending. Chapters 6 and 7 of JANAP 127(A) are being revised for inclusion in ACP 127, and, when completed, will clarify this point. In reply to your second question, refer to articles 6222 and 6239 of DNC 5(A). Article 6222 pertains to the readdressing of messages and states that a message "cannot be readdressed if any alteration is made to its original preamble, address, prefix or text". Considerable discussion has arisen as to the interpretation to be placed on the word "alteration" in the quoted article, i.e., whether its meaning is confined to an actual altering of addressees or if it should be construed to include any altering of the form of addressees. The prevailing opinion is that the latter interpretation is correct and that, accordingly, it would not be correct procedure to change an original "Class A" address to a plain language form. In view of the numerous inquiries on this point of procedure, a forthcoming change or revision to DNC 5 will clarify the intended meaning.

## Question

1. This is a request for clarification of responsibility of communication guard duties. Reference is made to NWIP 16-1, articles 602(g), 603(e), 613(a)6, and 617(i). The communication center here at NAS Brunswick furnishes communication support for the patrol squadrons based here. For example, a squadron is deploying for Malta, and the squadron commanding officer files a departure report in accordance with article 617(i), including mail arrangements but no communication arrangements. At what time does the communication center at the point of arrival assume responsibility for the squadron's traffic? And when does the communication center at point of departure drop the squadron from its guard list? If the departure point dropped the squadron upon departure and the arrival point picked up the squadron guard upon filing of an arrival report, there is the possibility of a lapse of up to 30 hours when no station is handling their traffic, since aircraft squadrons do not guard broadcast frequencies when enroute. Furthermore, if the departure point maintains the guard until an arrival report is received, as implied by article 617(i)2(C)(3), then considerable traffic must be re-routed to the squadron's destination. And if the traffic arrives before the squadron, it is often sent back - ZUG ZKP. My interpretation is that the new base of the squadron should assume guard as of time of departure and that the movement report should indicate as much. The problem of routing traffic for deploying squadrons comes up quite often and is the cause of much discussion and message servicing.

Daniel L. Buckley, TEC, USN
U. S. Naval Air Station
Brunswick, Maine

## Answer

1. The articles contained in NWIP 16-1 dealing with aircraft movements do not specifically include the requirement for communication information, nor do they prohibit the detailing of such arrangements. When a complete squadron is changing bases, positive guard arrangements are definitely required. In this event, article 617b8 of NWIP 16-1 should be construed to include aircraft. The originator of the movement report should include "communication guard shifts to Malta at 121000Z", or similar wording specifying when guard arrangements change. Inclusion of this statement then places the burden on the movement report system to pass the information to the commands concerned. The new base should automatically assume guard at the stated time. The old base should maintain the required communications overlap to ensure that all messages addressed to the squadron are received, and should relay those received during the overlap period. When only a section or portion of the squadron is being moved, the admin will normally remain at the old base. Under these circumstances, the original base shall continue to guard for the departed group. The next printed change to NWIP 16-1 will be amended to reflect the above and to clarify the existing applicable portions of the text.

## Honor Scroll

**Some commands that have accomplished marked improvement in messages originated, in response to the directives issued by CNO relative to reduction in message traffic:**

*COMCRUDESPAC REP, PEARL*

*NAVSTA COCO SOLO*

*NAS AGANA*

*NAS, COLUMBUS, OHIO*

*NAS, QUONSET POINT*

*NAS, ST. LOUIS*

*INSMAT, FT. WAYNE*

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