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ON THE COVER—
Striking geometric patterns in the sky are captured in this worm's eye view of huge antenna towers at NAVRADSTA (T) Cutler, Maine. Now in its third year of operation, the Cutler installation is the most powerful radio complex ever built, with a tested two-megawatt power rating.

Contents

Photographs by U. S. Navy.

FROM THE DIRECTOR

(Adapted form RADM Roeder's comments preceding a panel discussion, "Communications or Chaos," conducted during the 17th Annual Armed Forces Communications and Electronics Association Convention in Washington, D.C. on 4-6 June.)

The dynamic interplay of world events, diplomatic actions, and military reactions place unprecedented severe requirements on adequate communications.

We can no longer accept the more or less leisurely communications of the past. Fighting continued for three months after the War of 1812 was officially ended by the Treaty of Ghent. Admiral Dewey received orders to go into Manila Bay when he sent a packet boat into Hong Kong to see if there were any cables for him — and he reported the results of that battle via the same route, days after it had occurred.

We have made tremendous progress since those days. With this progress, however, we have created new problems and new headaches. Communicators have so shrunk the world, in terms of conveying information, that insatiable demands have evolved for better and better service. So in this regard we are, more or less, our own worst enemies. When messages are delivered in hours, the operators and policy makers say, "Why not in minutes?" When this is achieved, they say, "Can't you do better?" The ultimate, of course, is real time communications — and this must be our goal.

Whether we like the demands placed on us or not, it is our job to devise means to satisfy them — within our economic means.

The importance of adequate communications was vividly demonstrated during the Cuban crisis last October. The situation required sophisticated use of power to achieve our national aims. The delicate interplay of diplomatic and military action necessitated important minute-by-minute decisions to be made by the highest authorities.

Once those decisions were made, they had to be conveyed instantly to the commanders and forces on the scene. Implementing instructions were issued without delay and, of course, it was vital that all concerned "get the news." Reports back had to be handled with equal facility in order to keep higher authorities completely up to date.

This mode of operation imposes severe requirements on the national command and control communications. Very large volumes of communications had to be handled securely, reliably and with utmost speed. This was successfully done — but we are still striving for improvement.

Although no new lessons were learned during the Cuban affair, the three traditional requirements of communications were reaffirmed — with possibly more emphasis on speed, without any sacrifice of security and reliability.

In these days of devestating military power, there is little, if any, margin for error. It is truly an either/or situation.

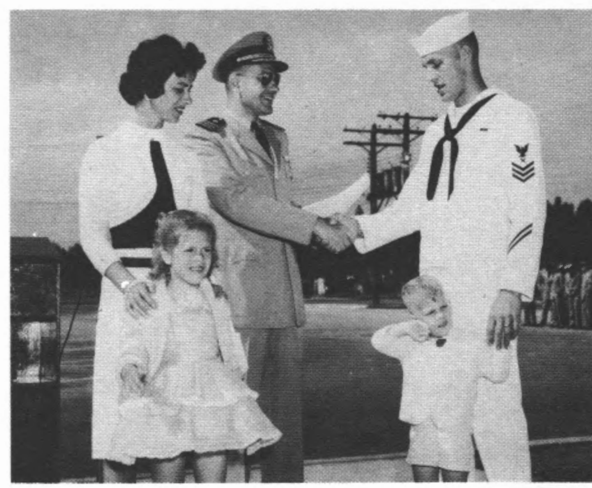
Communications or chaos.

Rear Admiral Bernard F. Roeder, U.S. Navy

NAVCOMM NEWS PHOTOS

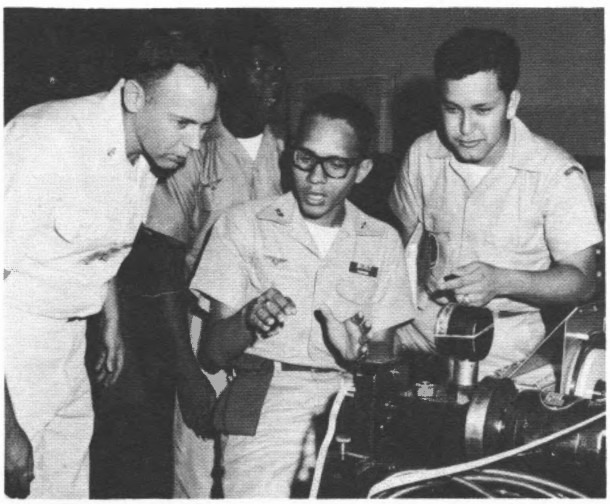
GUAM — Interested Armed Forces Day visitors at Anderson AFB saw several of NAVCOMMSTA Guam's high speed TTY transmitters and receivers in action — sent messages back and forth to each other on two machines set up in series loop. NAVCOMMSTA exhibit was rated "complete success."

WASHINGTON, D. C. — CDR Raymond L. Hoffman, USN, receives Army Commendation Medal from RADM B. F. Roeder, USN, Director, Naval Communications, as Mrs. Hoffman looks on proudly. CDR Hoffman, now assigned as Head, Systems Coordination Branch, Communications Programs Division, was honored by the Army for meritorious performance of duty while "on loan" to U. S. Army Strategic Communications Command (Nov. 1961 — Jan. 1963).



SIDI YAHIA, MOROCCO — Honored for superior performance of duties (1961-62) with Production Organization, National Security Agency, Richard A. Hair, CT1, USN, receives SECNAV Commendation for Achievement from CDR J. E. Renn, USN, Executive Officer, NAVCOMMSTA Port Lyautey, Mrs. Hair, daughter Leslie, 5, and son Daryl, 3 1/2, stand by.

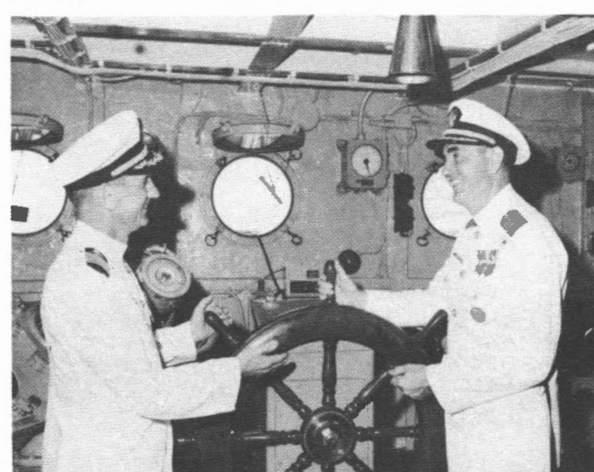
FROM ALL OVER



CANAL ZONE — Visiting personnel from Panamanian Armed Forces question H. Armstrong, RMCS, during guided tour of NAVRADSTA (R) Farfan. NAVCOMMSTA Balboa gives monthly tours of Farfan and NAVRADSTA (T) Summit to students from U. S. Air Force School for Latin America, in connection with ground communication phase of school curriculum.

SPAIN — CDR James L. Mayer, USNR, is CO of new NAVCOMMSTA Rota, now operational with receiver and communications center facilities at Rota, transmitter at Moron. Guest speaker at Rota dedication ceremonies on 1 June was CAPT R. R. Pratt, USN, Deputy Director, Naval Communications for Communications.

WASHINGTON, D. C. — Wigmaker Gloria Hoffman (standing, second from right) showed latest in fashion wigs to NAVCOMM Wives Club of Washington area at April election meeting. Seen here are (from left) Mrs. W. H. Wettlaufer, new secretary-treasurer; Mrs. Allyn Cole, new president; Mrs. J. T. Lyons, past president; Mrs. B. F. Roeder, honorary president. Newly elected vice-president, Mrs. J. T. Vagenas, is not shown.



PEARL HARBOR, HAWAII — In unusual change of command "swap" ceremony, CAPT T. L. Horner, USN (right) relieved CAPT W. E. Westhoff, USN, as CO of USS CHIPOLA (AO-63), while CAPT Westhoff relieved CAPT Horner as Communications Officer and Assistant Chief of Staff for Communications at headquarters of ADM J. H. Sides, Commander in Chief, U. S. Pacific Fleet.

HARRISON NO. 4 TIMEKEEPER EXHIBITED IN WASHINGTON, D.C.

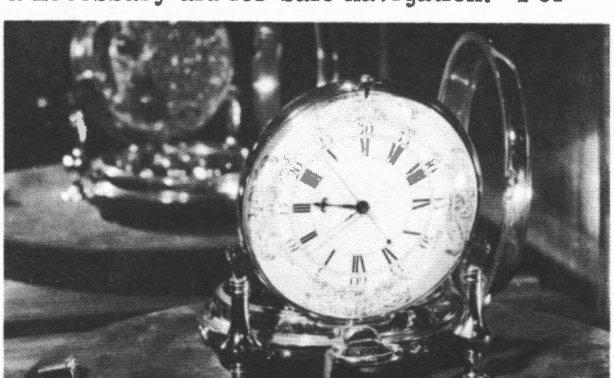
By William Markowitz, Director, Time Service Division U.S. Naval Observatory

Navigation at sea was particularly hazardous a few centuries ago. Latitude could be determined aboard ship by celestial observation but longitude could not. In 1714, the British Parliament offered a prize of £20,000 for a practical solution to the problem of determining longitude at sea. This award was won by John Harrison who constructed a portable marine timekeeper in 1759 of such high accuracy that with it longitude could be determined at sea. On a trial voyage in 1761-62 from England to Jamaica the longitude was determined with an error of only about one mile. The longitude was also determined closely on a second trial, to Barbados in 1764.

Harrison had to go through considerable trouble before he could convince the authorities that the performance of his timekeeper was not a fluke. He did not receive the final half of the award until 1773, at the age of 80.

This celebrated timekeeper, known as Harrison No. 4, is now on display at the U.S. Naval Observatory, Washington, D.C., through the generous loan of the British Admiralty. It was brought to the United States on a British Naval vessel, H.M.S. LOWESTOFT in January 1963, on its third sea voyage in two centuries.

Since the beginning of the 19th century the chronometer has come into wide use as a necessary aid for safe navigation. Formerly, a chronometer could be rated only when in port and the navigator had to depend upon its rate being nearly constant during long voyages. In 1904 the U.S. Navy began the transmission of radio time signals, from the Boston Navy Yard. These were successful and from this experiment there grew the present system of the world-wide transmission of time signals. Chronometers can now be checked daily at sea.



Front View of Harrison No. 4 Timekeeper.

British Ambassador Sir David Ormsby Gore turns over Harrison No. 4 Timekeeper to Secretary of the Navy Fred Korth.

Naval Communication Stations NBA, Canal Zone; NPG, San Francisco; NPM, Hawaii; NPN, Guam; and, NSS, Annapolis, transmit precise time signals, controlled by the Naval Observatory, on high frequencies. NBA also transmits time signals, continuously, on VLF on 18 kcs. Naval Observatory time is also transmitted by radio stations WWV and WWVH of the National Bureau of Standards.

The time and frequency transmissions of the U.S. and the U.K. were coordinated in 1959. This cooperation has been extended to include also transmissions from Argentina, Australia, Canada, Italy, Japan, South Africa, and Switzerland.

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Harrison No. 4 was presented by the British Ambassador, Sir David Ormsby Gore, to the Secretary of the Navy, the Honorable Fred Korth, in ceremonies at the British Embassy on 8 March 1963. On the same day H 4 was transferred to the U.S. Naval Observatory, where it will remain on exhibition until about February 1964.

Navy personnel and their families are invited to see Harrison No. 4, which is kept running, when they are in Washington. Not only is Harrison No. 4 of outstanding importance in the history of navigation, but it is also of interest as a work of art. It is on exhibition at the Naval Observatory during normal working hours. Guided tours of the Naval Observatory are given at 1400 local time. Inquiries for visits by large groups should be made to the U.S. Naval Observatory, Washington 25, D.C.

EDUCATION AND THE U.S. NAVAL COMMUNICATOR

By Peter J. Azzole, CT2P1, USN,
U.S. Naval Security Group Activity, Winter Harbor, Maine

(Note: This article has been selected as the second place winner in the BULLETIN's 1962-63 Article Writing Contest. The first place award goes to LTJG Daniel O'Neill, USNR, Communication Officer, USS FRANK E. EVANS (DD-754) for his article, "A Dangerous Friend," which will be published in BULLETIN No. 73. Both Azzole and LTJG O'Neill will receive a Certificate of Award signed by the Director, Naval Communications. No contest is currently underway, but contributions from readers are welcomed at all times.)

The advancement of Naval Communications during the past 20 years has been staggering, and educational facilities for the technical men in this field have been overwhelmed. Some examples of the way communications is expanding and changing are such projects as TRANSIT/LOFTI, TIROS, TELSTAR, Moon Relay Communications (CMR) and Data Communications (NTDS). With communicators aiding in developing, manning, improving and maintaining these new modes, an entire new area of educational background will be required. Measures to increase our capabilities, understanding and value in new fields must be undertaken — and the primary responsibility falls on the communicator himself.

Service schools for Naval Communications are filled to capacity, but cannot produce enough "polished" technicians in advanced communications. Fortunately, professional training opportunities do not end with the formal school. The communicator embryo produced by formal training in CLASS A and CLASS B schools (or their equivalent) can be further developed by on-the-job training and off-duty education.

On-the-job training places the individual in a position where knowledge acquired through formal education can be applied directly. The mere impregnation of the individual's mind does not produce the technician. In effect, the more extensive the background obtained in on-the-job training, the higher the individual's caliber of practical skill and competence will be.

Off-duty education comes in many forms, but the three considered most desirable for the Naval Communicator are the U.S. Armed Forces Institute (USAFI), Naval Training Courses, and the services offered by colleges, universities and other educational institutions which come under the provisions of the Tuition Aid Program.

USAFI provides military personnel with opportunities to continue their education while on active duty. Instructional material, tests and exams are supplied, and programs include group study or individual correspondence courses. To be eligible, you must have been on active duty with the Army, Navy, Air Force, Marines or Coast Guard for 120 days or more, or be a student at one of the service academies.

In addition to some 200 courses directly available, more than 6,000 courses are available through USAFI with extension divisions of 44 leading colleges and universities.

Continued on next page

They are offered at reduced rates to military personnel under terms of contract agreements between the Federal Government and the schools.

Courses available through USAFI with direct communications applications include Fundamentals of Electricity, Electronics, Radio, Television, Radio Engineering and Mathematics — each on varying levels from high school to college.

The U.S. Navy Enlisted Correspondence Course Program, free of charge, provides background for all rates, and courses to strengthen both basic and technical training. The communicator will find no advanced courses within this program, but he can obtain the foundation necessary for advanced courses offered elsewhere. The courses for Basic Electricity and Electronics, Electronics Technician, and Radioman provide excellent background for advancement in rating exams. In many cases, one or more is a requirement.

Officer Training Courses are made available to enlisted men on recommendation of commanding officers. Courses of major importance to the communicator are: The Communication Officer, Naval Electronics, Operational Communications, Shore Based Communication, and Security of Classified Information. The Naval Security Group has eight special communication courses available to its personnel - both officer and enlisted — providing the applicant holds sufficient security clearance for the specified course.

Detailed instructions for the Tuition Aid Program available to all military personnel, are contained in BUPERS Instruction 1560.10C. In brief, the program provides partial payment (up to 75 per cent) of tuition for voluntary off-duty courses, excluding correspondence courses, taken with the commanding officer's concurrence at approved institutions. The program is broad enough to bar few from participating, whether the applicant seeks a high school diploma, an additional baccalaureate, or just one particular course.

Cultivating our education by every means, within every interest, offers tangible rewards in terms of advancement in rank or rate, formal recognition, and future status. The most important reward, however, is the satisfaction of contributing to an increasing worldwide defense capability. In today's electronic environment, with its growing demands and requirements, it is not enough just to serve and to perform "only the minimum."

USS WRIGHT (CC-2) COMMISSIONED

USS WRIGHT (CC-2), the U.S. Navy's second fully-equipped mobile command post, was commissioned 11 May at Puget Sound Naval Shipyard, Bremerton, Wash.

WRIGHT's mission is to provide command and control capability through the ship's world-wide communications facilities. WRIGHT will go to sea with the most extensive communications facilities ever put on board ship. Her "voice of command," designed for use by top echelon commands and staffs, can be sent to any ship, aircraft or station anywhere in the world.

Included in WRIGHT are the largest, most powerful transmitting antennae ever installed in a naval vessel. More than 200 officers and men are assigned to operate and maintain these antennae and their associated radio and communications equipment. In all, more than 1,720 personnel are expected to man WRIGHT when she joins the Fleet, including prospective commands and staffs.

The ship's 100 wpm teletypewriter printers occupy an entire room. WRIGHT is capable of handling as many messages in a day as a major shore-based communication station.

USS NORTHAMPTON (CC-1) is currently operating with the Fleet. Work is underway on USS SAIPAN (CC-3) at Mobile, Ala. WRIGHT and SAIPAN were formerly auxiliary aircraft transports.

SPACE COMMUNICATIONS A MAJOR TOPIC AT CCIR GENEVA MEETING

By V.G. Stingley, Assistant Director for Frequency Plans

Navy Radio Frequency Spectrum Division

Office of Naval Communications

The Xth Plenary Assembly of the CCIR (International Consultative Committee on Radio) was held in Geneva Switzerland, from 16 January to 15 February. The CCIR provides technical guidance to the International Telecommunications Union (ITU) on radio communication matters. The last previous Plenary Assembly (IXth) was held in Los Angeles in 1959.

CCIR's 14 study groups cover all phases of radio communications - transmitters, receivers, wave propagation, time signals, frequency standards, space, etc. Each group produces technical reports and recommendations based on various study programs, resolutions and questions. These proceedings are published by the ITU after each Plenary for ready reference by ITU member nations. The technical guidance of the CCIR is heavily relied on in formulation of the International Radio Regulations.

Sixty-three of the 116 ITU member nations were represented at the Geneva meeting. Some 500 delegates and industry representatives, plus 43 permanent staff members of the CCIR and ITU, participated. The U.S. delegation was composed of 44 representatives from government and industry. The U.S. military had two representatives, Mr. James McNaul of the Army Satellite Communications Agency, Fort Monmouth and Mr. V.G. Stingley, OPNAV (Naval Communications), Washington, D.C.

CCIR Study Group IV, created in 1959 to deal with Space Radio Communications, aroused interest at the Xth Plenary and was the center of greatest activity. This was due to two factors - world-wide interest in space matters, and convening of the Plenary just eight months prior to an ITU Extraordinary Administrative Radio Conference (EARC) meeting in October 1963 to consider frequency allocations for Space Radio Communications. This report covers the most important recommendations and reports of study Group IV, as approved by the Assembly.

Communications Satellites

Study Group IV recommended that communications satellite systems can share frequency bands with terrestrial line-of-sight radio relay systems in the frequency range 1-10 Gigacycles, providing power limitations are placed on satellites and terrestrial radio relay system transmitters. The power limitations recommended are:

1. For communication satellites employing wide deviation FM, the flux density at the surface of the earth should not exceed -130 dbW/M^2 for all angles of arrival. Such satellites should be continuously modulated, by a special wave form if necessary, especially during periods of light circuit loading, so that the flux density at the surface of the earth for all angles of arrival does not exceed -149 dbW/M^2, per 4 Kc bandwidth. For satellites employing other types of modulation, the flux density at the surface of the earth should not exceed -152 dbW/M^2, per 4 Kc bandwidth, for all angles of arrival.

2. For terrestrial radio relay system transmitters, the effective radiated power from the antenna should not exceed 55 dbW (316 kilowatts) and the power delivered to the antenna should not exceed 13 dbW (20 watts).

All of the foregoing values are provisional pending further study, and are to be reviewed at the CCIR Plenary Assembly in 1966.

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Communication Satellite Frequency Sharing

It is recognized that international coordination and planning by Administrations are essential to ensure compatibility between communications satellites systems and terrestrial radio relay systems from a mutual radio interference standpoint. The coordination distance for possible interference to terrestrial radio relay stations and earth stations in the communications satellite service should be determined on the basis of the effective radiated powers likely to be used in various directions from the earth station and the maximum antenna gains and receiver sensitivity likely to be used at the terrestrial station concerned.

Channelling versus Preferred Reference Frequencies

Conversely, the coordination distance for possible interference to earth station reception should be determined on the basis of the expected range of effective radiated powers from terrestrial radio stations and the antenna and receiver characteristics likely to be used at the earth station concerned.

The coordination distances in the above cases should be determined on the basis of appropriate propagation data for overland and oversea paths given in a CCIR report, "Frequency Sharing Between Communications Satellites and Terrestrial Radio Services," and the allowable interference power for telephone channels in the base band of receiving systems given in other CCIR recommendations.

A concerted effort by the United Kingdom in Study Group IV to establish rigid frequency channelling plans for communication satellite systems was defeated. The U.S. concern in this matter was that future communication satellite systems might be hampered in development by agreeing to a rigid channel plan at this time which would inhibit use of various modulation schemes (such as spread spectrum) and coordination of the most appropriate frequencies which may be dictated by technical limitations encountered in systems planning.

In lieu thereof, the U.S. introduced the concept of preferred reference frequencies to provide scope for the development and use of various types of communication satellite systems, allow for multi-station access and minimize interference between communication satellite systems and line-of-sight radio relay systems, so as to facilitate the planning of both type systems on a coordinated basis. The preferred referenced frequencies should interleave as effectively as possible with line-of-sight radio relay system channel arrangements, contained in appropriate CCIR recommendations, and should make provision for high capacity, low capacity systems utilizing both large and small earth stations.

Additionally, the designation of the preferred reference frequencies must be determined in the light of decisions of the space EARC to be held in October, with regard to the frequency bands and directions of transmission adopted for the communication satellite service.

Earth Space and Space/Space Links

Six important recommendations were made on Near Earth Research, Deep Space Research, Manned Space Research, Space/Space Communications, Re-entry Communications and Telemetering, Tracking and Telecommand.

For near earth and deep space research, recommended frequencies are between 100 megacycles and 10 Gc/s, with protective criteria specified for various frequency portions of this range. For manned space research, frequencies in the same range were specified plus the recommended addition of HF frequencies between 3 and 30 Mcs and VHF/UHF (100-600 Mcs) frequencies for voice communications.

For re-entry communications, plasma sheath and atmospheric attenuation should be taken into account in the selection of frequencies. The space research bands above 15 Gc/s are technically suitable for some types of re-entry communications.

For space to space communications, the frequency region between 10 and 150 Mcs is technically suitable for spacecraft with omnidirectional antennas; the region between 300

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to 3000 Mcs for one spacecraft with a directional antenna and one with an omni-directional antenna, and the region between 1-10 Gc/s for both spacecraft having directional antennas.

For telemetering, tracking and telecommand, the frequency region below 1 Gc/s, preferably below 600 Mcs, is technically suitable for maintenance telemetering, tracking and telecommand of developmental and operational satellites. The frequency region between 1 Gc/s and 10 Gc/s is technically suitable for these same functions for high altitude satellites and frequncies above about 10 Gc/s are technically suitable for these same functions during the re-entry of satellites into the earth's atmosphere.

It was further recommended that as meteorological, radio navigational and communication satellites become more fully developed, frequencies within the band used for data transmission or communications be also used for maintenance telemetering, tracking and telecommand if feasible. No recommendations or reports were made which support the need on a technical basis for exclusive frequency bands for space research. However, the protection criteria developed will make it difficult from an administrative standpoint to provide for sharing of space research bands with other radio services.

Meterological Satellites

The frequency range 30-30,000 Mcs is technically suitable for narrow band and wide band meteorological transmissions. As meteorological satellites become more fully developed, frequencies within the bands used for meteorological satellites are technically suitable for tracking and maintenance telemetry. Frequencies at about 10 Gc/s are suitable for precipitation detection radar and at about 35 Gc/s for cloud detection radar.

Navigational Satellites

For Doppler, Time Measuring and Path Differences Systems, narrow band techniques should be employed. The frequency range 30-3000 Mcs is technically suitable for navigational satellites. Where feasible, telemetering signals should be accommodated on frequency channels provided for radio navigation signals. For Doppler systems, two frequencies should be provided, preferably harmonically related. For Radio Sextant type systems, frequencies in the 35 Gc/s area are technically suitable, with frequencies in the 10 to 20 Gc/s area suitable for systems requiring lower accuracy.

Radio Astronomy

No specific recommendations were made for radio astronomy, but three important reports were prepared. One indicated the need for frequencies in the 30 to 300 Gc/s range for certain line frequency measurements, and for continuum measurements in the atmospheric windows in this range. The second outlined the difficult problem of frequency sharing with other radio services in view of the extreme sensitivities of radio astronomy receivers and the weak signals emanating from galactic sources. The third covered the field of RADAR astronomy and concluded that this activity could be accomplished in allocated radiolocation bands and in or adjacent to other bands wherein high powered components have been developed.

Additional Recommendations

Additional recommendations of Study Group IV are as follows:

1. That Administrations ensure that spacecraft be capable of ceasing radio emissions by the use of appropriate devices, e.g. battery life, timing devices, ground command or similar devices that will ensure positive cessation of emissions.

2. That radio emissions from spacecraft be identified in accordance with present Radio Regulations or, where this is not practicable for certain spacecraft, Administrations exchange to the maximum extent practicable, advanced and current information relative to the identification of spacecraft (ephemeris and signal characteristics).

3. That a one-hop basic hypothetical reference circuit be established for active communication satellite systems. The performance for at least a portion of international connections should take account of the need to connect two and sometimes three links in tandem. The circuit should include one pair of modulation and demodulation equipments

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for transmission from a base band to the radio frequency carrier and from the radio frequency carrier to the base band respectively.

Summary

1. The CCIR has concluded that it is technically feasible for communication satellites and line-of-sight radio relay systems to share frequencies in the same band provided power limitations are placed on the satellite and on radio relay system transmitters, and that due account of mutual interference between the two is taken in the siting of communication satellite earth stations.

2. All of the CCIR Study Group IV's technical papers support the current U.S. Draft Proposals for Frequency Allocations for Space Radio Communications.

3. There was considerable support indicated by the Administrations present to have the subject of radio astronomy on the agenda of the Space EARC in October 1963.

4. The need for exclusive space research and radio astronomy frequency bands was not conclusive from a technical standpoint. However, in order to provide the required radio frequency protection for these services from an administrative standpoint, such exclusivity is clearly indicated.

BRASS POUNDERS, FLAG WAVERS, AND TAPE PUSHERS CORNER

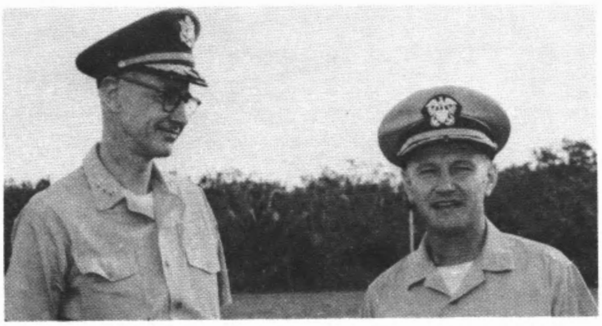
So that all members of the Society of Brass Pounders, Flag Wavers and Tape Pushers get the word, the following information is furnished on the changes which have taken place in the field of Communications-Tactical (COMM-TAC) publications since NAVAL COMMUNICATIONS BULLETIN No. 71 went to press.

ACP 100	Effective date indefinite, change No. 2 in preparation.
ACP 100 US SUPP-1	Effective date indefinite, change No. 2 in preparation.
ACP 100 CAN SUPP-1	Effective date indefinite, change No. 2 in preparation.
ACP 100 NATO SUPP-1	Effective date indefinite, change No. 1 in preparation.
ACP 101, 102, 103, 104 and 114	A moratorium has been placed on further printed changes to these ACPs.
ACP 119	Now in distribution, tentative effective date 18 August 1963.
ACP 121(C)	Last change was No. 5
ACP 124(B)	Change No. 6 in preparation.
ACP 124 SUPP-1	Last change was No. 1.
ACP 126	Last change was No. 6.
ACP 127(C)	Tentative effective date is 1 September 1963 and will supersede ACP 127(B).
ACP 127 US SUPP-1	Tentative effective date is 1 September 1963.
ACP 147(C)	Change No.6 now in distribution.
ACP 148(A)	Last change was No. 1.
DNC 26(A)	Last change was No. 4.
JANAP 119(F)	Change No. 5 in preparation.
JANAP 195(G)	Change No. 3 now at printers.*
NWP 16(A)	Effective. (Supersedes NWP 16 and NWIP 16-1)

*Once a publication or change is sent to the printer, it takes a minimum of 45 days to complete printing and U.S. distribution. Distribution to all holders may take 90 days.

Marianas Islands

NAVCOMMSTA GUAM:
DCA DIRECTOR TOURS



LTGEN Alfred D. Starbird, USA (left), Director, Defense Communications Agency, got a first-hand look at NAVCOMMSTA Guam's complex systems and operations during a recent visit to the island. He is shown here with the station's Commanding Officer, CAPT.R. F. SHOEMAKER, USNR, who conducted the briefing and familiarization tour.

CALIENTE NAVCOMMERS VISIT

Communications personnel from USS CALIENTE (AO-53), touring NAVCOMMSTA GUAM, get the word on station equipment and operations from ENS Robert D. Trees, USN (pointing at left), Assistant Head, Operations Department. The visiting CALIENTE communicators are (front row, from left) J. C. Leahan, RMSN; A. R. Gabor, RMSN; J. E. Hale, Jr., RMC; J. C. Jeffries, Jr., RM3; (middle row) B. F. Burrows, Jr., RM3; LT G. P. Fitzgibbons; G. R. Lout, RM3; (back row) D. E. Chomley, RM3; R. L. Smith, RM3; ENS C. F. Knight; and ENS D. F. Petersen.

Hawaii

'PEOPLE TO PEOPLE' PROGRAM IN FULL SWING AT NAVCOMMSTA HONO

A varied, active public relations program at U.S. Naval Communication Station Honolulu is catching the eye of forward looking communications personnel ashore and afloat.

Here, under the command of CAPT J.W. Newland, Jr., USN, the term "communications" is interpreted in its broadest meaning. The NAVCOMMSTA Honolulu approach emphasizes personal contact and understanding between people, as well as the mechanical means of transmitting messages. In carrying out its "People to People" program, this command encourages and receives visitors from both civilian and military groups, and especially from the activities which it serves.

CAPT John W. Newland, Jr., USN. Since this article was written CAPT Newland has left NAVCOMMSTA Honolulu for his new duty assignment as Assistant Chief of Staff for Communications on the Joint Staff of CINCPAC.

There are three basic ways in which personal contact at all levels is maintained — through conferences, exchange visits, and training programs. Here is how the program operates:

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First are the CINCPACFLT briefings and debriefings for ships. Present at all such conferences is a NAVCOMMSTA officer who provides first hand information and answers questions arising in any problem areas.

Second is the DCO quarterly communications conference, attended by personnel from staffs, ships and shore activities. These conferences may deal with subjects ranging from TELSTAR to point to point circuits and the personnel status of the PACFLT.

Finally, informal and personal contacts give CAPT Newland and the officers of the station an opportunity to meet their counterparts in the other services. In addition they meet the staffs of CINCPAC, CINCPACFLT, COMFOURTEEN, COMSUBPAC, COMSERVPAC, COMASWFORPAC and others. Meetings occur frequently on an informal as well as a formal basis, providing a welcome opportunity for exchanges of ideas.

In conducting his program of exchange visits, it is CAPT Newland's policy to send a personal letter to all ships passing through the HAWSEAFRON, home ported fleet units, activities, and subscribers.

With this letter goes a questionnaire which he asks be answered as fully and as frankly as possible. An evaluation of the service provided by NAVCOMMSTA Honolulu, as well as specific recommendations for improvements of service, is also solicited. The answers and evaluations are used in helping to determine if the primary missions of the station are being achieved.

The personal touch is expanded further by inviting visiting officers and communications personnel to visit the communication station. Tours are arranged by the station's operations officer. In response to the Commanding Officer's invitations, more than 200 visitors, including officers, enlisted and civilian personnel, are guests of NAVCOMMSTA Honolulu each month.

In his capacity as District Communications Officer, CAPT Newland heads an inspection team which visits and assists field activities in the 14th Naval District. During these inspections, methods of improving communications performance and security are determined. In a recent eight-month period, CAPT Newland personally visited and inspected all the major commands and many smaller commands within the District.

It is a bi-weekly practice for an experienced communications officer from the station to visit home ported ships, keep them posted on the NAVCOMMSTA's available facilities, and provide any assistance required. This same service is also provided to transient ships upon arrival. In addition, officers from the Message Center at Pearl Harbor and the Primary Relay at Wahiawa visit subscribers and tributaries regularly to offer assistance.

Training is readily available at NAVCOMMSTA Honolulu, and many Navy men in the area make good use of this opportunity. A crypto school is conducted for personnel from the ships and activities in the 14th Naval District. Approximately 250 students attend this school each year. This training is recognized as a substitute for the C-811 course given at San Diego.

There is also a "Ship Rider Program" conducted by NAVCOMMSTA officers for fleet personnel from ships and submarines in the Pearl Harbor area. Training consists of general communications security practices.

"Training Visits" are made by station personnel on request by fleet and shore activities. These visits are made for the purpose of evaluating and making suggestions concerning security practices.

A planned new program in the training series will give NAVCOMMSTA operators the opportunity to receive shipboard training underway, giving them a better understanding of working problems encountered on board ship.

Key NAVCOMMSTA personnel are placed in ships and shore activities to assist in the successful completion of high priority projects, such as MERCURY and JTF 8, and to help train personnel for future projects. They also assist shipboard personnel in the installation, maintenance and operation of specialized shore equipment required for special operations.

NEW ASSIGNMENT FOR RADM WEEKS

RADM Robert H. Weeks, USN, a former Deputy Director, Naval Communications for Communications, recently relieved RADM Theodore A. Torgerson, USN, as Director, Communications-Electronics, Joint Staff, Commander in Chief, United States European Command.

RADM Weeks, who had been serving as Commander, Cruiser-Destroyer Flotilla TEN, was relieved by RADM Harry Hull, USN, formerly Commander, Military Sea Transportation Service, Atlantic Area.

RADM Weeks served as Deputy Director, Naval Communications for Communications from January 1959 to March 1962. His selection for flag rank was approved in 1961.

FLAG RANK FOR CAPT R.R. PRATT

CAPT Richard R. Pratt, USN, Deputy Director, Naval Communications for Communications, was among 20 U.S. Navy Captains of the regular line recently selected for promotion to Rear Admiral during FY 1964. CAPT Pratt, a 1936 Naval Academy graduate, was assigned to his present billet in August 1962. (See NAVAL COMMUNICATIONS BULLETIN No. 69, page 24.)

CAPT HEMLEY NEW CO NAVCOMMSTA JAPAN

CAPT Eugene A. Hemley, USN, has assumed command of U.S. Naval Communication Station Japan, Yokosuka, Japan. He relieved CAPT Walter H. Kreamer, USN.

CAPT Kreamer has been assigned to the National Security Agency at Fort Meade, Md.

CAPT Eugene A. Hemley, USN

CAPT Walter H. Kreamer, USN

CHIEF SIMPSON RETIRES; WAS SECOND SENIOR RM

Russell W. Simpson, RMCM, USN, (second from right), retiring after 22 years' Navy service, is congratulated by CAPT R. R. Pratt, USN (right), Deputy DNC for Communications, and (from left) CAPT F.L. Brand, USN, and CAPT J.D. Linehan, USN, Assistant Director and Director, respectively, of the Communications Operations and Readiness Division. CAPT Pratt presented the Chief with a Letter of Commendation. Before transfering to Fleet Reserve on 4 March, Simpson was the second senior RM still on active duty — he was one of eight RMCM's in the first group (1958) of E-9's, and is the seventh to retire. Assigned to the Operations Branch (Op-943C) for more than two years, Simpson had previously served at NAVCOMMSTA Washington, at Headquarters, COMTRALANT, Norfolk, Va., and in USS CHARLES P. CECIL (DDR-835), USS PUTNAM (DD-757) and USS DUPONT (DD-941). A native of Belpre, Ohio, he now lives in Vienna, Va.

AN/WRC-1 RADIO SET IS SMALL, SIMPLE, STABLE

By W. R. Thomas, RMC, USN

Communications Programs Division, Office of Naval Communications

The Navy's AN/WRC-1 is a service approved, single sideband HF radio set for general purpose shipboard, submarine and shore installation communications.

The radio set consists of a separate receiver and 100W PEP transmitter. Associated with this system is an antenna coupler, capable of matching such antennas as 15-foot, 25-foot and 35-foot whips to the RF amplifier. The coupler may be located as far as 300 feet from the set.

The AN/WRC-1 provides reception and transmission on 56,000 channels spaced 0.5 kc apart in the 2-30 mc frequency range. The receiver also includes a vernier control for tuning between the 0.5 kc increments, permitting compatibility with less stable equipment presently in use. Modes of operation include upper sideband, lower sideband, independent sideband, CW, AM (compatible) and FSK.

The set offers high stability, simplicity of operation, tuning speed, and ease of maintenance in an extremely small package. A significant advance in size and weight reduction is indicated by the fact that receiver, transmitter and 100W amplifier occupy only 21 inches of standard rack height.

True digital tuning contributes to ease and speed of operation while minimizing the possibility of operator error. Operators simply select the proper digit on each of six front panel knobs for automatic frequency selection. Maximum tune time is five seconds.

The highly linear amplifier employs broadband driver and output circuits which are automatically set by information from the driving transmitter. Tuning is accomplished without any manual controls. High reliability results from elimination of servo motors, discriminators, slug racks and other similar moving parts.

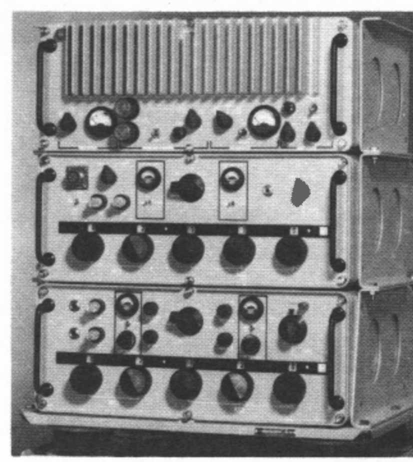
A self-contained frequency standard provides equipment stability exceeding one part in 10^8 per day.

Because of the high degree of transistorization, the set employs only two tubes each in the receiver, transmitter and linear amplifier, resulting in low power input requirements and high equipment reliability.

Heat sink cooling permits operation with the equipment completely sealed from the environment. The system employs no blowers.

Extensive use of plug-in modular assemblies aids ease of maintenance without compromising operational characteristics.

Future development of 1KW and 5KW power amplifiers will greatly increase the capability of the AN/WRC-1 and other low power HF transmitters.



The AN/WRC-1 provides 56,000 digitally-tuned, positive-locking frequencies in the 2.000 to 29.9995 mc. range, with .5 kc increments. Set is 21 inches high, 17 3/8 inches wide and 18 1/8 inches deep. It weighs 187 pounds.

A REMINDER:

Trained technicians are not included in the shipment boxes of new electronic equipment. It is a command responsibility to insure that trained men are on board when the equipment is placed in operation. Check BUPERS and Fleet directives on "C" School quotas. A little forethought now may prevent a lot of embarrassment later.

7,366 NAVY CONTACTS ON ARMED FORCES DAY

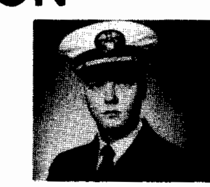
On 18 May 1963 the Annual Armed Forces Day Communication Tests were a resounding success. The two Navy participating stations "NSS" and "NPG" had a total of 7,366 contacts with amateur radio operators throughout the world.

The QSL cards shown have been sent to every contact that could be identified in the CALLBOOK magazine. Were you one of the recipients? If not, plan now to join the increasing number of Navymen who are enjoying HAM radio and participating in these CNO sponsored events.

Approximately 200 Navy ships now have authority to operate amateur radio stations on board. OPNAV Instruction 2070.2F contains the procedures for obtaining this specific privilege. The complete list of ships and authorized call signs will appear in an early issue of the BULLETIN.

Armed Forces Day CW and RATT competition entries are being processed and a complete report on the results will appear in the next issue.

COMMUNICATION SUBSPECIALIZATION FOR THE CAREER OFFICER



By LCDR E.H. Monroe, Jr., USN, Head, Military Personnel Branch, Office of Naval Communications

"Career Management concepts for unrestricted line officers should be altered so as to require greater channelization of an officer's duty assignments into billets relating to his technical specialty training. This method of increasing an officer's value to the Navy shall be fully recognized in personnel administration and in selection board criteria."

This statement appeared in May 1959, as one of the Secretary of the Navy's decisions resulting from the report of the Franke Committee on Organization of the Department of the Navy. Although far from the beginning, this decision marked a highly significant turning point in the growing recognition throughout the Navy of the need for subspecialist unrestricted line officers in both the technical and management areas.

In July 1962, the Chief of Naval Personnel defined subspecialization as a qualification in a particular field of Naval endeavor, other than Naval Warfare, obtained through any combination of formal education, functional training, and practical experience. At the same time, BuPers noted "it has become increasingly obvious that background knowledge in any one technical or management area is about the most any single officer can maintain in addition to his primary specialty, Command at Sea."

One of the most challenging areas, and consequently most self-rewarding, is Naval Communications. The officer who chooses Communications Subspecialization can look

Continued on next page

forward to unlimited geographical horizons, increased opportunities for promotion, ample chances to qualify for Command at Sea, and the truly rare opportunity to keep pace with skyrocketing technological and operational advances in modern Communications.

Officer shortages, as in many other technical areas of the Navy, are severe. While the major criteria for regular promotion is performance, statistics show that officers whose performances meet selection board standards, and who are subspecialists in Communications, are consistently selected in greater percentages than the percentages indicated for "overall" officer selection. The increasing importance of Naval Communications as a major element in modern command and control concepts of national defense insures a continued, and probably even greater selection opportunity for communicators. In addition to Command at Sea, the Communication billet spectrum offers command ashore, duty with joint and allied staffs, geographically unlimited choices for assignments, and advanced education in Communications Engineering, electronics and operations.

The Navy has firmly adopted the subspecialty concept and is committed to it. It behooves every career officer, and potential career officer to examine the subspecialties available, and choose, early in his career, the subspecialty which he will endeavor to follow. In communications, individual subspecialization usually becomes well defined during the senior Lieutenant years, a result of either (1) selection for Communications engineering Post Graduate training, or (2) the accumulation of practical experience and training in Communications derived from earlier tours of duty and assignment in the fields of sea, shore, or technical communications.

In the case of selection for Post Graduate training, officers should reflect their interest in Communications on their next preference card by requesting Communication Engineering PG school. Officers attending the Basic Science Course at Monterey also have an opportunity to move into Communications Engineering when they complete the Basic Science course with sufficiently high grades to indicate an ability to master studies in this field. Opportunities for selection, in either case, are excellent for qualified officers.

More important, perhaps, than the PG selection method of determining subspecialization in Communications is the accumulation of practical experience and functional training, usually reflected in a series of Naval Officer Billet Codes, by which the vast majority of communicators build their foundation for recognized subspecialization. Quota limitations preclude PG training for every Communicator, but expanding Naval Communications at sea and ashore provide ample opportunity for an interesting and varied career in Communications for an ever-increasing number of officers.

In recognition of subspecialization with and without formal PG education, the Manual of Navy Officer Billet Classifications (NAVPERS 15839) including the Communication Group (NOBCs 9500-9599), is presently under revision for greater accuracy and more specific definition of duties where applicable.

It can be safely assumed that extensive revision to the Officer Fact Book will be forthcoming in the foreseeable future, when career patterns for the many areas of subspecialty have been thoroughly evaluated. Meanwhile information appears regularly in the BuPers Line Officer Personnel Newsletter, and many other professional publications. Highly recommended reading for all officers is the article "Distribution of the Line Officer" by CAPT R. J. Badger, USN, which appears in the United States Naval Institute Proceedings, February 1963. CAPT Badger points out: "Officer subspecialists in the future will be detailed between sea tours to repeated tours in their subspecialty, ensuring that each tour offers greater responsibility and provides for individual growth."

An "ideal" career assignment pattern for an 11XX Communications subspecialist is reproduced here for information only, as an example of some of the many paths a career in Communications could follow, to provide a full command at sea capability coupled with school eligibility and continued functional training and experience in modern U.S. Naval Communications.

IDEAL CAREER ASSIGNMENT PATTERN

(11XX) -

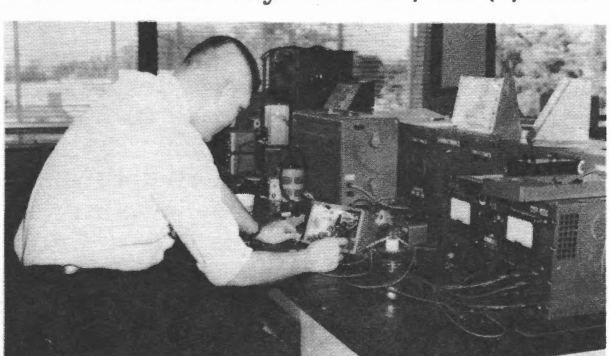
COMMUNICATIONS SUBSPECIALIST

GRADES	YEARS	TOTAL	PERIODS	PHASES	ASSIGNMENT AFLOAT	ASSIGNMENT ASHORE
ENS	1.5	/1.5	Fundamental Professional Development Period	First Operational Phase	1st Tour Assignment to Ops with training in: Cryptology, Electronics, Comm Watch Off, OOD under-way	Functional Comm Courses
LTJG	2.5	/4		Technical and Profes-sional Edu-cational Phase	2nd Tour Comm Off, Dept Head, Electronics Off, Qualify as OOD - Small Combatant	Functional Comm Courses Technical: Commence PG schooling at 3rd yr. Professional: Comm duties in shore estab-lishment
LT	6	/10		Second Operational Phase	Comm Off, Electronics Off, Asst Comm Off (Heavy), Comm duties afloat staff	Technical Bureaus and Offices, Comm System Activities, OPNAV(DNC) (Continue eligibility PG schooling)
LCDR	6	/16	Advanced Professional Development Period	First Advanced Educational Phase	CO, XO, small combat-ant, Comm duties afloat Staff, Comm Off (Heavy)	COMMOPS/XO COMM-STA/UNIT, OINC COMM UNIT, Staff duties in DNC & Technical Bureaus, Joint Staff, duty with DCA (Commence eligibility service colleges at 10th year)
CDR	6	/22		Second Advanced Educational Phase	CO DD- type, Dept Head (Heavy), Afloat staff Operations or Plans Off, Fleet or Force Comm Off	CO/XO Comm system shore activities, Section/ Branch Head OPNAV/ DNC, DCA (Continue eligibility Sr. service colleges)
CAPT	4	/26	Final Professional Development Period	Second Advanced Operational Phase, Final Advanced Educational Phase	Major and deep draft Commands & Staffs Afloat	CO Major COMMSTAs, Branch Head/Div Head OPNAV/DNC, DCA (Continue eligibility Sr. service colleges)

POSTGRADUATE EDUCATION IN COMMUNICATIONS ENGINEERING

The Navy's increased emphasis on postgraduate education is reflected by an ever expanding student input to the Communications Engineering curriculum at the U. S. Naval Postgraduate School, Monterey, California. The highly complex communications sytems now in existence or being planned for the Navy demand the supervision of officers educated beyond the normal college level in the fields of electronics, mathematics, and the basic sciences. The goal of the postgraduate Communications Engineering curriculum is to provide technically qualified officers conversant in the areas of modern communications systems, computer technology, and information and control systems, including the application of these subjects to modern naval warfare.

The two-year Communications Engineering curriculum consists of a nucleus of courses in fundamentals of electronics, systems engineering, and mathematics. A student completes about 36 courses in a normal two-year program. An outline of the courses undertaken is listed in the U. S. Naval Postgraduate School catalogue. Prerequisites and method for indicating preference for the Communications Engineering curriculum are listed in this catalogue and the effective BUPERS Notice 1520 on the Postgraduate Educational Program. In general, to be eligible, an officer must: (1) be a graduate of the U. S. Naval Academy or its equivalent, with an accredited baccalaureate degree; (2) have studied college physics and college mathematics through calculus; and (3) have indicated his preference on the Officer Data Preference card. The curriculum is open to officers in the rank of LTJG, LT, and LCDR, having designators 11xx, 13xx, 161x, 601x, and 64xx, including some Reserve officers. Members of the U. S. Coast Guard and U. S. Marine Corps also may be ordered to this curriculum.



LT Leroy E. Brenner, USN, checks out a multivibrator unit which he built for part of a laboratory project in a course on receivers and transmitters.

Successful completion of the two-year curriculum leads to a Bachelor of Science degree in Communications Engineering. Since 1959, when degrees were first awarded, 68 officers have graduated from this course, including 35 USN 11xx, 20 USN 13xx, four USN 64xx, five USCG, and four USMC officers. Forty-eight officers are enrolled this year, and present plans call for doubling this figure in 1963. As needs increase, the program will expand.

Officers selected and reporting in March to the one-year Science curriculum may be offered the opportunity to transfer into the Communications Engineering curriculum after two terms of the Science program. Some placements also have been made from one-year Science entrants in August.

Subjects covered in the two-year curriculum include Electronic Circuits, Servomechanisms and Special Electrical Machinery, Electron Devices, Analog and Digital Computers, Transmitters and Receivers, Communications Theory, Physics, Differential and Integral Calculus, Partial Differential Equations, Vector Analysis, Probability, Electronic Measurements, Electromagnetics, Theory of Propagation, Transmission Lines, and Antennas.

In 1960, the Communications Engineering and Engineering Electronics curricula were combined under a single curricular officer in the interest of better management and administration of two closely interrelated programs. Electronics and Communications Engineering students now pursue the same basic program for the first year and a half, and differ only by elective subjects taken during the last half year. Students who are academically qualified and available

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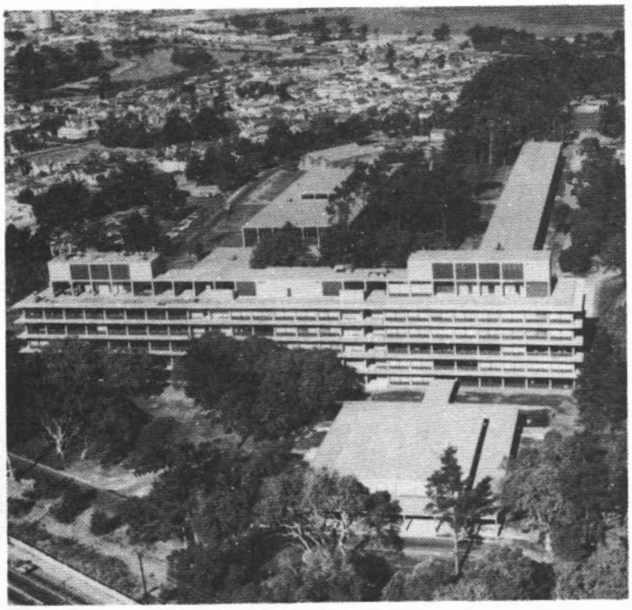

Aerial view of some of the academic buildings at Postgraduate School, with part of Monterey community and Monterey Bay in background.

1962 graduates of the Communications Engineering curriculum are (front row, from left) LT R. G. Higgins, USN; LT K. W. Larabee, USN; LTCOL M. A. Skeath, Jr., USMC; LCDR S. L. Wilson, USCG; LT E. J. Kasnicki, USN; LT G. B. Wilson, USN; (second row) LT J. C. McCoy, Jr., USN; LT B. F. Hollingsworth, USCG; LCDR R. T. Duncan, USN; LT R. H. Engelbrecht, USN; (third row) LCDR J. A. Schader, USN (presently assigned to the Office of Naval Communications); LCDR C. H. Pogson, USN; LT R. E. Sardeson, USCG; LT K. D. Wiecking, USN.

for an additional year of study may be selected for a three-year program, usually in the option field of Information and Control Systems. Successful completion of the third year entitles them to a Master of Science degree in Engineering Electronics.

Classrooms and laboratories are in modern, academic buildings on the site of a former hotel. Courses are conducted by highly qualified civilian and military professors. The school has a large computer center, including a CDC 1604 computer, an IBM 1401, and ancillary equipment. The laboratories have an inventory of about 10 million dollars' worth of unique industrial test equipment and operational electronics equipment. Operational equipment is used to demonstrate circuitry and for experimentation, covering a wide range of operating frequencies, power outputs and modulation methods. It is not used to teach repair and maintenance. The laboratories exemplify techniques ranging from conventional transmitters and receivers through the latest developments in the field of lasers.

The school is on the Monterey Peninsula, about 199 miles south of San Francisco. The area's moderate climate is con-

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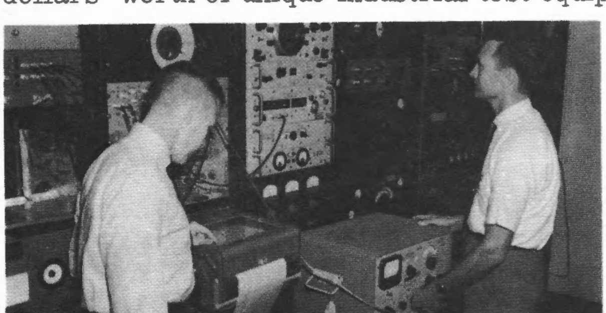
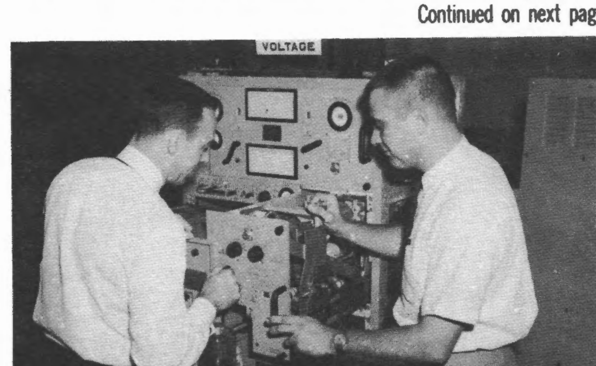
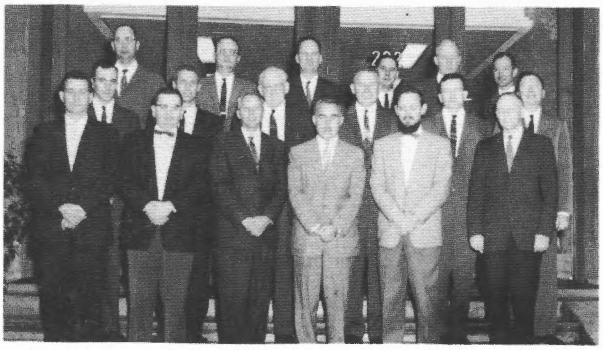


At work in laboratory, LT J. O. Tuttle, USN (left), and LT C. E. Hamilton, USN, take readings on frequency comparison and standardization equipment. Both have since been ordered to duty with the Office of Naval Communications.



LT Ronald P. Wylie, USN (left), and LT Ralph L. Spaulding, USN, examine one of the demonstration transmitters used in conjunction with Communications Engineering instruction.



Department of Electronics faculty members at USNPS are (front row, from left) Dr. G. A. Gray, S. Breida, Jr., Dr. W. M. Bauer, A. Sheingold, M. L. Cotton, R. G. Giet (Fellow), (second row) ENS F. G. Rea, USNR, R. M. Johnson, Jr., R. S. Glasgow (Dean Emeritus of the Postgraduate School), R. L. Miller, W. E. Norris, Dr. G. H. Marmont, (third row) C. F. Klamm, Jr.,. Dr. C. H. Rothauge (Chairman of Department), P. E. Cooper, D. A. Stentz, R. P. Murray, D. B. Hoisington. Others, not shown, are J. G. Chaney, G. M. Hahn, C. E. Menneken, J. B. Turner and Dr. H. A. Titus.

ducive to the hard study required of all Postgraduate School students.

Housing in the Monterey area is at a premium. However, about half the students are accommodated in public quarters provided under the Wherry and Capehart programs. The housing area is called La Mesa Village, and is about 1 1/2 miles from the school grounds. A BOQ in the main Administration Building houses the majority of unmarried officers.

The life of the Communications Engineering student is completely focused on his studies. He can expect to spend four to five hours daily in class or laboratory, and another eight hours studying. A Curricular Officer provided the necessary guidance and counseling. The academic year is divided into 10-week terms, commencing in the first week of August. A student normally takes four terms per year, with leave periods at Christmas and during the month of June. Between the first and second years, all Communications Engineering students are required to take one-month courses in Financial Management, Economics, and Speech, given at the Postgraduate School. At the end of the second year, they take a short field trip to various military and civilian communications installations on the West Coast.

While the curriculum is demanding, the rewards for successful completion are substantial. The B.S. degree in Communications Engineering is fully accredited by the Western Colleges Association, representing the National Colleges Association, and by the Engineering Council for Professional Development. A program graduate is recognized as having received the fundamental education necessary to become a sub-specialist in Communications Engineering, and is granted the opportunity while in school of mixing intellectually and socially with about 1,300 of his contemporary officers. Statistics show that graduates enhance their promotion selection opportunities as the years go by. The rewards, therefore, are the personal satisfaction of achieving an increased academic stature through acquiring an engineering degree, and the professional satisfaction of being better prepared to do the type of work which will lead to a more satisfying Naval career.

Graduates can expect to be assigned to fleet units and shore installations in billets which will make good use of their acquired knowledge. However, the course serves the needs of the line officers' career pattern equally as well as it serves those specializing in engineering and special duty.

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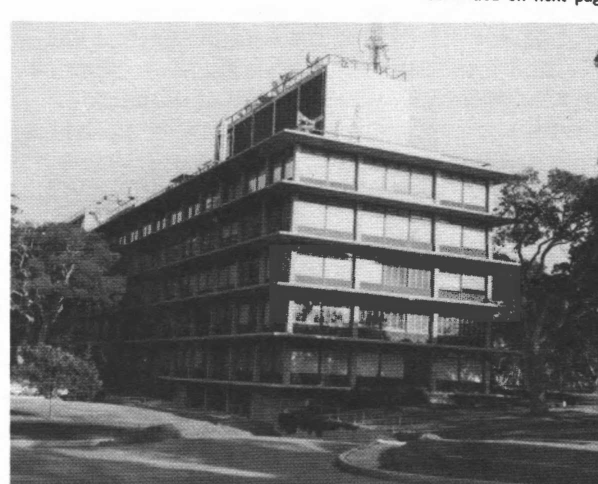
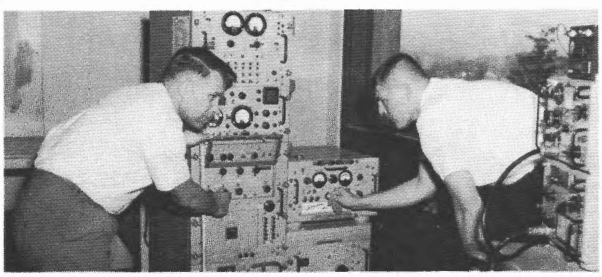
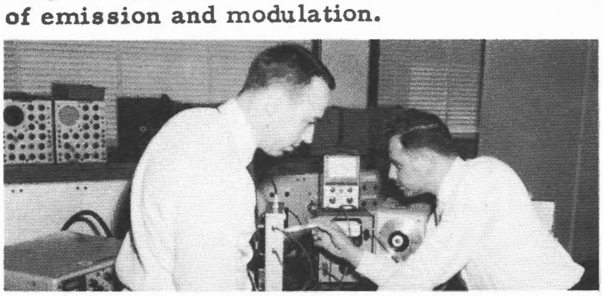


Spanagel Hall houses Electronics and Communications Engineering laboratories, a computer center, physics and chemistry laboratories, classrooms and office space. Note antenna installations on roof.

Communications Engineering students graduating in 1963 include (front row, from left) LT J. O. Tuttle, USN; CDR B. Q. Ryan, USN; LCDR S. A. Irlandi, USN; LT C. E. Hamilton, USN; (second row) LT R. L. Spaulding, USN; LT L. E. Brenner, USN; LT R. P. Wylie, USN.



CDR Bayliss Q. Ryan, USN (left), and LT Leroy E. Brenner, USN, adjust an MF transmitter. Several standard transmitters are available for laboratory work in observing design practices used for various types of emission and modulation.



LT Ronald P. Wylie, USN, and LCDR Santo A. Irlandi, USN, test an oscillator unit they designed and constructed.

Dr. George H. Marmont, Professor of Electronics (center), discusses operation of wave analyzer with LCDR John H. McNally, USN (left) and LT Ronald G. Malone, USCG.

CAPT John F. Morse, USN (center), Curricular Officer for Electronics and Communications Engineering Programs, confers with assistants and principal faculty advisors. They are (from left) LCDR Paul R. Byrd, USN, Curricular Assistant; Dr. Charles H. Rothauge, Chairman, Electronics Department; Dr. Glenn A. Gray, Academic Associate for Communications Engineering Programs; and LCDR Donald F. Milligan, Curricular Assistant. CAPT Morse, LCDR Byrd and LCDR Milligan are all graduates of Communications programs at the Monterey school.

LT Ralph L. Spaulding, USN, designed and built the high-power linear amplifier he is testing here.

LT Alan D. Dworski, USN (foreground) and LT Kent W. Larabee, USN, are at work in the school's well equipped computer center.

Improved Use of the High-Frequency Spectrum:

RADIO FREQUENCY PROPAGATION DETERMINATION AND PREDICTION SYSTEM

By LCDR James A. Madigan, USN, Head, Radio Wave Propagation and Frequency Management Branch, Office of Naval Communications

Communicators readily acknowledge that communicating effectively in the high-frequency (HF) radio spectrum is becoming an increasingly arduous task. The following discussion is a sequel to LCDR E.I. Finke's "Countering Decreasing Solar Activity Effects" (NAVAL COMMUNICATIONS BULLETIN No. 66) and serves to underscore the importance of a reliable Radio Frequency Propagation Determination and Prediction System.

Vital national command and control HF communication links are subject to the undermining effects of low solar activity and the vicissitudes of sudden solar-geomagnetic disturbances.

LOW SOLAR ACTIVITY. Low solar activity causes an electron density decrease of the earth's ionospheric layers. Consequently, these layers fail to adequately reflect the higher HF band frequencies. As a result, communicators must try to accommodate long range communications by fewer usable frequencies. The current solar cycle is approaching its minimum activity period, and expectations are for the status quo to remain unchanged until after 1965. Then, the solar cycle will again increase its exerting influence on the ionosphere.

SOLAR-GEOMAGNETIC DISTURBANCES. Another astronomical phenomenon which affects our communications potential is the solar-geomagnetic disturbance. These disturbances are caused by solar flares - nuclear explosions in the proximity of the sun. They have been catalogued into a number of discrete phenomena according to their origin and effect on radio wave propagation. The more extreme disturbances have been dubbed "sudden ionospheric disturbances (SIDs)," and have been correlated with strong fluctuations in the earth's magnetic field and optical observations of solar flares at any point in the visible solar disc. Following solar flares, radio circuits await restoration until either nature restores the equilibrium or successful alternate routing is accomplished through a time-consuming and/or trial-and-error process. Because afloat units do not have landline or cable communication facilities, the alternate routing process is further complicated. So far as high-frequency communications are concerned, the short-wave fadeout, generally associated with a SID, is of prime importance, because of the totality of its impact and its unpredictability. In the future, however, it is possible to foresee short-wave fadeout warning satellites telemetering impending fadeouts to communications users.

RADIO FREQUENCY PROPAGATION DETERMINATION AND PREDICTION SYSTEM. We can ascertain from the foregoing that there is a vital need for an instrumental system designed to furnish fleet and shore naval forces with an improvement in the RELIABILITY, SURVIVABILITY and VERSATILITY of HF communications. This requisite will be satisfied by providing radio wave propagation data on an instantaneous basis, thus improving frequency assignment techniques and enabling optimum use of frequency resources (a major objective set forth in Presidential Executive Order 10995, dated 16 February 1962). The Radio Frequency Propagation Determination and Prediction System has been established to meet this demand.

Prior to considering the various components which comprise this system, let us enumerate the objectives which resulted in the establishment of this complex program. As conceived, this system was designed to provide for:

a. instantaneous radio frequency data.

b. optimum frequency assignment for any circuit.

Continued on next page

c. determination of the time of commencement, duration and expected effect of solar-geomagnetic disturbances on communications systems.

This program responds to the concepts of increased importance of continuity of command, decreased reaction time and increased severity of the consequences of erroneous decisions resulting from delay in receipt of vital information. The underlying theme is the development of a synchronized best frequency selection system to improve the overall reliability of naval communications.

A profile of past developments in the frequency guidance field shows significant achievements, but these achievements are interposed with may deficiencies in current propagation and prediction programs. Present frequency assignment methods are based on long-term propagation conditions. Inability to determine short-term propagation conditions is a major causative factor of communications circuit outages. Through the use of higher transmitter power and improved engineering techniques, the average reliability of point-to-point circuits has been improved, although it is still below that required in an era when instantaneous command and control capability is the basic requirement for national survival. In summary, our past applications of the radio spectrum have been subject to:

a. limited and untimely propagation information which leads to trial-and-error frequency selection.

b. lack of timely and effective warning of communications disturbances which delays any remedial action contemplated.

c. wasteful redundancy of frequency assignments. The present median value predictions in current use force assignment of more frequencies than are actually used.

The Radio Frequency Propagation Determination and Prediction System has been implemented.

FACSIMILE MAP SYSTEM. In June 1962, the program began gaining momentum through a new device, the facsimile propagation map, which was introduced into the Atlantic Fleet at that time. This FAX map (example on next page) provides through the use of transmitted FAX broadcast contour maps, ships at sea with up-to-date information on optimum usable ship-to-shore frequencies during a specified period. The large figures on the map represent the megacycle band to be employed while contacting shore stations (appearing on the map as being ringed by dark contour lines). While these predictions are forecast for 1600 to 1900 local time (heavy traffic period) at the shore stations indicated, they are made for ionospheric conditions indicated on the map and vary with the distance between the ship and appropriate shore terminals. A general 48-hour radio condition forecast is included as an intregal part of the FAX map. The Pacific Fleet was provided with a similar map in April 1963. This system represents a significant improvement over DNC 14, "RECOMMENDED FREQUENCY BANDS AND FREQUENCY GUIDE," wherein the predictions are predicated upon data which is based on undisturbed ionospheric conditions (actually existing about 85% of the time), and is six months old prior to the effective date of the publication.

EMPHASIS TO COMPUTER PROGRAMS. Eventually, the frequency selection data will be coordinated into a computer complex, and outline of which appeared in LCDR Finke's article. Computer programs are already available to aid in determining Maximum Usable Frequency (MUF), Lowest Usable Frequency (LUF), and Optimum Traffic Frequency (FOT). the FOT is the predicted frequency with a 90%-plus probability of success during quiet or undisturbed days.

Another project being developed under this system is the backscatter/oblique ionospheric sounding system (initially being installed at NAVCOMMSTAs Washington and Honolulu).

BACKSCATTER RECEPTION. The backscatter principle provides for an initial transmission on a discrete frequency and the return of this signal from the reception area over relatively the same path along which it was transmitted. Projecting this theory, we might think of this transmission as being a radar pulse transmitted in the HF band. The information gleaned from the transmission is portrayed on various electronic scopes

Continued on next page

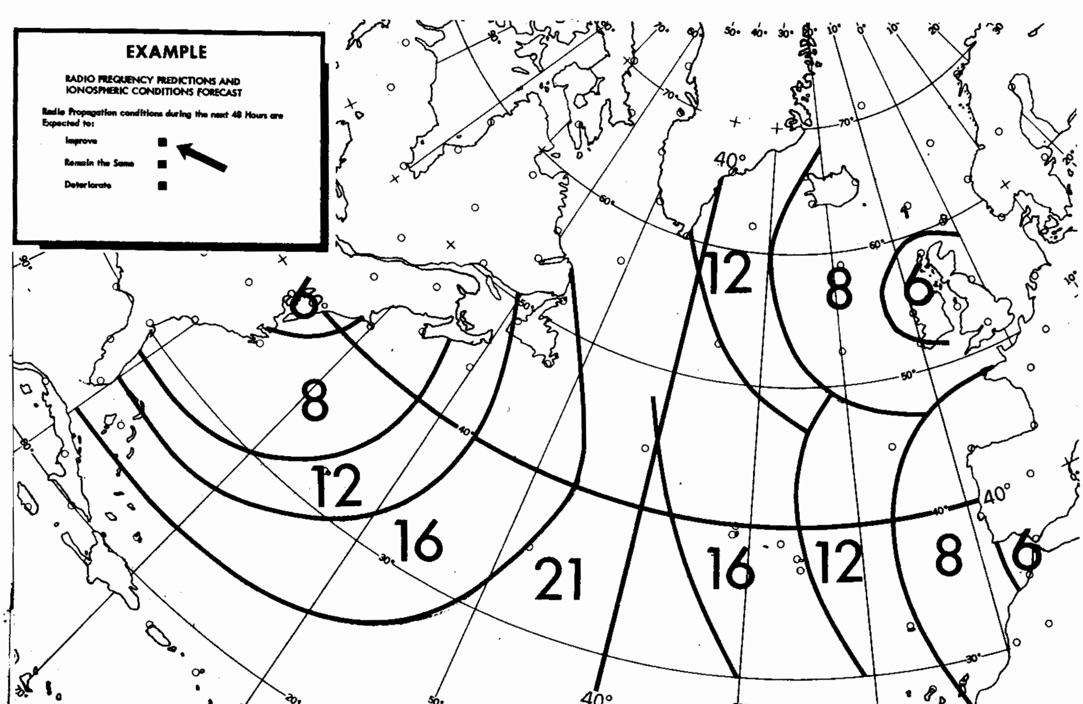
which give a visual presentation of the signal amplitude and signal illustration area (estimated frequency coverage). The backscatter technique promises to provide a fleet broadcast station with instantaneous information regarding the adequacy of its transmissions and to provide the basis for decisions on assignment or reassignment of frequencies, depending upon whether the area of intended coverage was inadequately and/or redundantly covered.

OBLIQUE RECEPTION. Stations throughout the world will utilize oblique sounder equipment (transmitter and receiver), which will provide a visual display yielding information at the receiver site concerning the optimum usable frequency. Signals will be sent by a transmitter calibrated to automatically scan the HF band, at increments of about 200 KCS. An oblique sounder receiver, in synchronization with the transmitter, will provide the visual display and consequent best frequency information at the distant end.

FREQUENCY CONTROL CENTER SYSTEM. Ultimately, computer techniques will be employed to record and intercept backscatter/oblique sounding data, thereby establishing short-term propagation trends. Selected NAVCOMMSTAs and fleet units throughout the world will, through an instrumentation system, be able to correlate prerecorded data with a control computer located at the frequency control center. This computer will coordinate and assign frequencies while continuously monitoring the ionosphere with its associated sounding devices.

PROPAGATION DISTURBANCE WARNING. The propagation disturbance warning portion of the system will include instrumentation to provide advance prediction of solar-geomagnetic disturbances which affect communications. As previously mentioned, a major area of deficiency in high-frequency communications lies in lack of adequate, timely warning of disturbed propagation conditions to permit correct alternate routing. Propagation conditions can be considered normal or near normal only part of the time. These conditions are more complex in the Polar regions, where disturbances are more frequent and pronounced. There are also complicated diurnal, seasonal and cyclic effects which are not fully understood. The Navy program calls for prediction of the onset of a magnetic storm accurate to within 60 minutes, the duration of a storm accurate to within 120 minutes, and a prediction of the degree of disruption to HF communications. The Central Radio Propagation Laboratory (CRPL), Boulder, Colorado, a subsidiary of the National Bureau of Standards, is presently used as the central coordinating and

Continued on next page



computing facility, with optical, spectrographic, geomagnetic and electromagnetic data being forwarded from data gathering stations.

CONTROL CENTER OPERATING CONCEPT. Eventually, the system will include equipment for automatic correlation of operational requirements, radio wave propagation information, solar-geophysical indices, communications equipment characteristics, and frequency assignment factors. Following a request from the operating forces for information, expressed in terms of traffic load, bandwidth requirements, and time of desired operation, the center will correlate the requirements with available data, such as station equipment characteristics, propagation prediction and ionospheric-disturbance data, ship movement information and available frequencies. This computer process will culminate in the assignment of a discrete portion of the spectrum to the operating unit in question. Following this assignment, the resulting circuit will, when necessary, be monitored by sounding instruments in the geographical regions concerned, thus ensuring that the assigned frequency within that portion of the spectrum is optimum. In addition, decision processes in the computer system will determine whether or not any adjustment in the propagation inputs will be necessary. Corrective information, if required, will then be provided the operating unit.

APPLICATIONS OF THE RADIO FREQUENCY PROPAGATION DETERMINATION AND PREDICTION SYSTEM. The overall RFPDPS program will provide:

1. COMMSTAs and forces afloat with an advanced warning of disturbed ionospheric conditions.

2. Manual interpretation of backscatter/oblique ionospheric sounding information to selected NAVCOMMSTAs.

3. Concurrent ionospheric sounding reception capability to specified major fleet units.

4. Facilities to establish a Navy-wide frequency prediction planning service, employing electronic data processing and computer techniques.

5. Instantaneous frequency prediction and reliable circuit control data to all major combatant ships.

6. Independent propagation and selection of optimum frequencies by major fleet units under all conditions.

7. A completely operational automated system permitting the exchange of coded information (computer to computer exchange) between designated fleet units so as to provide optimized reliable communications.

We are currently employing many sophisticated techniques, such as communications by satellite relay, tropospheric scatter and meteor burst, to provide reliable and versatile world-wide communications on a continuous basis. However, for compelling reasons of flexibility, simplicity of operations and economy, the high frequency spectrum will continue to play the most vital role in naval communications--underscoring the importance of a reliable RADIO FREQUENCY PROPAGATION DETERMINATION AND PREDICTION SYSTEM.

SUN TO BE "QUIET" IN 1964–1965

The earth's sun will be radio-quiet in 1964-1965, according to the predictions of radio propagation specialists. As a result, ionospheric disturbances are expected to be at a low ebb with solar activity quiescent.

The solar change coming up is so pronounced that the period is already dubbed the "International Year of the Quiet Sun."

Radio propagation specialists now are planning research, study and observation projects for the IYQS. Preliminary planning is in progress at University College of Wales, Aberystwyth, Wales.

The world-wide scientific study program is including emphases on disturbances to communications from solar activity.

Radio communicators world-wide are looking forward to a year of a 'quiet' sun for a welcome change.

DATA-ENCOMPUTALATOR: NEW TECHNICAL MARVEL

By Harris Vennema

(Mr. Vennema, Editor of "Eastern Banker," reports on a machine "now in use at the Automated Accounting Center of a bank in Connecticut." Readers of "Delaware Announcer," where this account first appeared, were told they might find it "more than a little superficial," but were reminded that "it was a case of simplifying and tailoring technological abstractions to the lowest common denominator, in this case a mere banker investing a half-million or so in the data-encomputalator." Possible communications applications of this significant technological development should be readily apparent to NAVAL COMMUNICATIONS BULLETIN readers.)

For a number of years now, work has been proceeding in order to bring perfection to the crudely conceived idea of a machine that would not only supply inverse reactive current for use in unilateral phase detractors, but would also be capable of automatically synchronizing cardinal grammeters. Such a machine is the "Data-Encomputalator." Basically, the only new principle involved is that instead of power being generated by the relative motion of conductors and fluxes, it is produced by the modial interaction of magnetoreluctance and capacitive directance.

The original machine had a baseplate of prefabulated emulite, surmounted by a malleable logarithmic casing in such a way that the two spurving bearings were in a direct line with the pentametric fan. The latter consisted simply of six hydrocoptic marzelvanes, so fitted to the ambifacient lunar waneshaft that side fumbling was effectively prevented. The main winding was of the normal lotus-o-conductor being connected by a non-reversible tremie pipe to the differential gindlespring on the up end of the grammeters.

Forty-one manestically spaced grouting brushes were arranged to feed into the rotor slip-stream a mixture of high S-value phenylhydrobenzamine and five per cent reminative tetryliodohexamine. Both of these liquids have specific pericostites given by P-2.5cn6.7 where "n" is the diahetical evolute of retrograde temperature phase disposition and "C" is Cholmondeley's annular grillage co-efficient. Initially, "n" was measured with the aid of a metopolar refractive pilfrometer (for a description of this ingenious instrument, see L. E. Rumpelverstein in "Leitschrift fur Elektrotechnistatischs-Donnerblitz" vol. VIII), but up to the present nothing has been found to equal the transcendental hopper dadoscope. (See "Proceedings of the Peruvian Academy of Skatological Sciences," June 1914.)

Electrical engineers will appreciate the difficulty of nubbing together a regurgitative purwell and a supramitive wennel-sprocket. Indeed, this proved to be a stumbling block to further development until, in 1942, it was found that the use of anhydrous nagling pine enabled a kryptonastick bolling shim to be tankered. It is obvious that this permits G-15 D versatility of simplified programming for nearly all engineering calculations.

The early attempts to construct a sufficiently robust spiral decommutator failed largely because of a lack of appreciation of the large quasipiestic stresses in the gremlin studs; the latter were specially designed to hold the roffit bars to the spamshaft. When, however, it was discovered that wending could be prevented by a simple addition to the living sockets, almost perfect running was secured, using management by exception concepts, even for production control applications. The operating point is maintained as nearly as possible to the h.f. rem peak of constantly fromaging the bitumogenous spandrils. This is a distinct advance on the standard nivelsheave in that no dramcock oil is required after the phase detractors have processed through 5, 6, 7 or 8 channel punched paper tape or magnetic ink encoded documents.

Undoubtedly, the data-encomputalator has now reached a very high level of technical development. It has been successfully used for operating nofer trunnions. In addition, whenever a barescent skor motion is required, it may be employed in conjunction with a drawn reciprocating dingle arm to reduce sinusoidal depleneration.

HERE'S THE ANSWER

Question

If a unit commander is succeeded in command according to Navy Regulations, article 1322, by an officer not a flag officer, is this officer entitled to fly the command pennant automatically, as the next senior in line? Or, must the unit commander or higher echelon promulgate a message stating that this officer will temporarily succeed to command? (Refer to U. S. Navy Regulations, article 2171, paragraph 2, article 2175, paragraph 1, and article 1322.)

H. W. Cruise, SMC, USN
Staff, COMDESRON FOUR

Answer

If a unit commander has been succeeded in command by an officer of the Navy, not a flag officer, the successor may display a broad or burgee command pennant as appropriate. The authority for display of a command pennant is derived from article 2171, U. S. Navy Regulations, and is not dependent upon promulgation of a message concerning the change in command. However, when circumstances permit, timely notification of the change in command should be made to ensure that all concerned are aware of it.

It should be noted that the foregoing pertains to a situation in which the unit commander has been succeeded in command. The regulations concerning succession to command may be found in articles 1370 through 1380, U. S. Navy Regulations.

Question

We would like to know whether the use of odd-numbered date-time-groups to designate classified traffic and even-numbered date-time-groups to designate unclassified traffic, to facilitate handling of references, would constitute a practice dangerous to security, since this practice would be subject to traffic and crypto analysis. Can you tell us where we can find something definite on this subject? We have been unable to come up with anything on this in DNC 5(B), ACP 122B, or the security manual.

G. Madrid, RMC, USN
C. L. Portewig, RM1, USN
R. Butt, RM1, USN
U. S. Naval Facility, Navy No. 141

Answer

Establishment of any system in the assignment of date-time groups, from which a definite pattern may be detected by traffic analysis, is considered to be a security violation. There are no written instructions covering this particular subject, except ALCOM 74/59.

Question

OPNAV Instruction 2110.17A provides an example showing the various components of a message text as it would appear on a teletypewriter set for single line feed. This example shows double spacing between each of the components and paragraphs of the message. Other than the underlined portion of the title, I cannot find any reference to double spacing in the Instruction. I note that some stations are beginning to use double spacing. The Instruction example would seem to indicate that double spacing is intended. Does the Instruction actually intend that double spacing should be used exactly as shown in the example? If this is true, the usage rate on azograph reproduction mats and paper used here will be increased by about 50% which represents a considerable increase in operating costs.

LCDR H. M. Young, USN
Communication Officer
U. S. Naval Air Station
Pensacola, Fla.

Answer

It is not the intent of OPNAV Instruction 2110.17A to require that double spacing be used within the text of a message. The double spacing which appears between various elements of the same message text shown in enclosure (1) of OPNAV Instruction 2110.17A is in error and will be corrected by a forthcoming change to this instruction. The example should be single spaced throughout.

HERE'S THE ANSWER

Question

1. Use of LIMA in relay; refer to DNC 5, article 12002.2, and ACP 129(A), paragraph 510c. If the originator does not insert LIMA in the transmission instructions, may he subsequently come back and ask the first relaying ship INT LIMA or should he use the appropriate operating signal?

2. In calling two destroyers by flaghoist, which call is proper, Dp3 TACK p4 or Dp3 TACK Dp4?

3. Refer to USN Addendum to ACP 175(A), page 3. Is UAC INT 1 a proper signal?

4. Regarding the use of YANKEE for the alongside transfer method: If my ship desired a high-line/jackstay, I would hoist YANKEE THREE. To acknowledge my signal and indicate readiness to come alongside, would the other ship hoist YANKEE TWO, or would he answer my hoist flag for flag? If a heaving line would suffice, would both ships hoist YANKEE ONE, or would I hoist YANKEE ONE and the ship coming alongside hoist YANKEE?

Earl M. Lee, SMC, USN
Staff, COMDESRON 32
USS MULLINNIX (DD-944)

Answer

1. We are assuming in this question that the relay responsibilities are automatic. Using this assumption, the originator may ask the first relaying ship, by using the signal INT L, if he has relayed the message. There is no operating signal which will convey the meaning that is contained in the signal INT L.

2. The second example (Dp3 TACK Dp4) is correct. Your first example, Dp3 TACK p4, means destroyer no. 3 and "This line." See article 204.c, ACP 118(D).

3. From a procedural point of view, the signal UAC INT 1 is in proper form. However, a signal is valid only if its meaning is clear. In this case a request to put a bow anchor out of commission is not apt to be understood unless the addressee is aware of the circumstances which have prompted such a request.

4. (a) If your ship is the delivery ship and hoists YANKEE THREE, the receiving ship should hoist YANKEE alone to indicate her status.

(b) Again as delivery ship, if you decide that a heaving line will suffice, you would hoist YANKEE ONE and the receiving ship would hoist YANKEE alone to indicate her status.

(c) The signals YANKEE ONE, TWO and THREE were designed for the delivery ship only, with the receiving ship using YANKEE alone to answer the signal and to indicate her status.

Question

When changing frequencies on a ship-to-shore circuit, is it necessary to change logs if you are still working the same shore station? The closest article we can find to answer this question is DNC 5(B), article 3012.2(C), which states: "In addition to showing a complete and continuous record of all emissions transmitted or heard, the radio log shows operating conditions which occur during the day. The log should include such additional data as the following:

(a) Time of opening and closing of the station
(b) Causes of delay on the net or circuit
(c) Adjustments and changes of frequency."

Roland G. Harding, RM1, USN
USS HISSEM (DER 400)

Answer

The several frequencies that are listed under the A1 designation are assigned to one specific circuit and in effect are alternate frequencies, not individual circuits. Therefore, it is not necessary to begin a new log sheet for each frequency when changing frequencies on a ship-shore circuit and working the same station.

HERE'S THE ANSWER

Question

1. I would like to know the size of colors to be flown by DLGs, CVAs, DLs, DDs, AVBs, LSTs, and AGCs at the following times:

DAILY	DRESS
HOLIDAY	FULL DRESS

2. Is the ensign displayed at the mast of a ship during full dress the same size as the ensign displayed at the flagstaff? Article 311, DNC 27, states that the largest ensign which the ship is furnished with shall be flown at the flagstaff, but it does not define the size to be flown by different size ships.

M. L. Daughtery, SM2, USN
O Division
USS TALLAHATCHIE COUNTY
(AVB-2)

Answer

1. The Flag Requirement Tables published by the Bureau of Ships specify the size of colors to be flown as follows:

	DLG	CVA	DL	DD	AVB
DAILY	9	7	9	9	9
HOLIDAY	7	6	7	7	7
DRESS	7	6	7	7	7
FULL DRESS	7	6	7	7	7

	LST	AGC
DAILY	9	7
HOLIDAY	7	6
DRESS	7	6
FULL DRESS	7	6

2. When dressing or full dressing a ship, the National Ensign flown at the flagstaff shall be the largest carried on board. The Ensign flown from mastheads should be of a smaller size.

The meaning of "uniform", as used in Article 311.1, DNC 27, is interpreted to require that in ships having two or three masts, the National Ensigns flying from these mastheads shall be of equal size.

Question

Neither U. S. Navy Regulations nor DNC 27 specifically defines how the National Ensign should be displayed on a U. S. naval vessel underway, during a period when the National Ensign is to be displayed at half-mast.

Article 2191, U. S. Navy Regulations, states that the National Ensign is to be half-masted by "all ships and stations". Also, many general messages applicable to half-masting the National Ensign, state that "all ships and stations" will half-mast the ensign. The term "all ships and stations" can be interpreted to mean that both ships underway and ships not underway are to display the ensign at half-mast. Also, it has been interpreted to mean only ships that are not underway are to display the ensign at half-mast and that ships underway are to hoist the ensign to the peak.

What is the intent regarding half-masting of the National Ensign by vessels underway? Is it anticipated that this particular point will be covered in a future change to DNC 27?

Carl H. Wernke, SMCS, USN
Command Department
U. S. Naval Academy
Annapolis, Md.

Answer

The term "all ships and stations of the Department of the Navy," as used in articles 2191 and 2192, U. S. Navy Regulations, should be interpreted to mean all ships both underway and in port. Note, however, that article 2192 also prescribes certain conditions in which the ensign is half-masted only by ships not underway.

Since the content of DNC 27 is determined by U. S. Navy Regulations, no changes concerning half-masting of the ensign are contemplated for DNC 27.

SPEED KEY CERTIFICATES AWARDED

Type commanders are invited to submit name, rate and command of newly qualified operators.

USS ADROIT
Pattinson, C. D. RM2

USS ANTARES
Nay, N. E. RM2

USS AUCILLA
Fike, T. F. RM2

USS BAILEY
Matthews, E. L RMSN

USS BARTON
Dieco, J. B. RM3
Foster, D. L. RM2

USS BOSTON
Dougherty, J. R. RM2
Foust, J. W. RM2
Fenton, R. R. RM1
Davis, R. E. RMSN

USS CAMP
Ondishin, R. J. RM3

USS CHARLES H. ROAN
Martjnoli, W. L. RM3
Semcheski, E. RM 3

USS ENHANCE
Anderton, J. C. RM3

USS FARRAGUT
Perniciaro, D. W. RM1

USS FRANK KNOX
Ripley, D. W. RM2

USS HAYNSWORTH
Wallrich, R. L. RM3

USS HYMAN
Songer, J. L. RM2

USS IMPLICIT
Tatro, W. B. RM3

USS INDEPENDENCE
Erickson, A. J. SN
Scop, J. RMSN
Cohen, R. H. RMSN
Williams, J. R. RM2
Nichols, W. F. RM1
Greager, L. E. RMSN

USS ROOSEVELT
Clemence, R. A. RMSN
Snyder, R. L. RMSN
Nichols, G. S. RM2

USS SAMUEL B. ROBERTS
Allwelt, R. L. RM3

USS SHANGRI-LA
Adams, R. W. RM2
Barczak, J. S. RM2
Jernigan, J. R. RM2
Staas, T. J. RM2
Hagan, R. F. RMSN
Hannan, J. M. RMSN
Jones, J. H. RMSN

USS SPRINGFIELD
Benton, D. S. RM3
Hovis, S. D. RM2

USS SUMNER
Stafford, G. P. RM3
Pritchett, J. M. RMSN

USS TURNER
Shuff, J. E. RM3
Bayliss, J. G. RM3
Pennella, P. RMSN
Hadden, T. RM1

USS WILLIAM M. WOOD
Chilton, W. C. RM2
Treinen, D. E. RM3

USS WILKINSON
Hurst, H. L. RM1

USS WINDHAM COUNTY
Richardson, J. R. RM2

USS YOSEMITE
Green, J. B. RM3

USS ZELLARS
Burnette, D. D. RM3

USS ENTERPRISE
Mang, C. R. RM3

USS GOODRICH
Au, D. E. RMSN

USS INTREPID
Moeck, W. W. RM2

USS LAKE CHAMPLAIN
Chamberlain, T. RM3

USS LEXINGTON
Garrett, A. RM3

USS MISSISSINEWA
Gould, C. L. RM3

USS TRUCKEE
Bishop, R. W. RMSN

COMDESDIV 142
Leville, W. C. RMC

USS VULCAN
Renner, P. G. RMC
Brett, J. D. RM1

COMFAIRWING 3
Johnson, A. L. RM1
Buirge, W. C. RM3
Connor, T. R. RM3
Staat, D. A. RM3

COMFAIRWINGSLANT
Todd, C. E. RM2
Knott, J. G. RM2

COMFLETRAGRU GTMO
Scammell, J. G. RM1

USS GUIDE
Wiley, O. E. RM2

COMPHIBPAC
Warris, J. E. RM3
Eden, J. E. RM2

COMNAVSUPPFOR ANTARCTICA
Davis, H. E. RM2
Nixon, G. W. RM3
Holmes, H. R. RM2
Ohl, J. F., Jr. RM3
Herman, A. W. RM3
Wick, H. J. RM2
Muse, L. G. RM3
Newby, L. J. RM3

USS INGRAHAM
Rouse, J. D. RM2

USS JOHN W. WEEKS
Walther, J. L. RM3

USS LITTLE ROCK
Huyghue, F. RMSN
Morehouse, R. RM2
Hayes, W. C. RM2
Hart, D. E. RM3
Ready, T. A. RM3
Wagner, P. P. RM3

USS LOWE
Ellis, B. G. RM3
Nelson, D. T. RMSN

USS LOWRY
Winslow, W. G. RM1

USS NEREUS
Christopher, D. L. RM3

USS NEWPORT NEWS
Gambrell, C. B. RMCS
Tydingco, C. L. RMC

USS MASSEY
Worland, W. RMC
Dafonseca, R. RM3
Tubbs, L. V. RM2
Hanlon, J. J. RM3
Conners, G. E. RM3
Allphin, J. W. RMSN
Starr, R. R. RMSN

USS NOA
Combs, N. L. RM3

USS POWER
Laird, J. E. RM2
Miller, J. F. RM2
Dugo, J. V. RM2
Lyle, L. K. RM2
Stephens, J. E. RM3

USS RANGER
Casteneda, R. RMCA

USS REMEY
Corcoran, R. F. RM2

USS ROBISON
Braswell, G. B. RM2

COMSERVFORSIXFLT
Brannon, T. F. RM3

COMSEVENTHFLT
Clay, R. E. RMSN

COMSIXTHFLT
Barger, E. B. RM2

COMSUBFLOT 2
Keating, J. P. RMC(SS)

COMSUBFLOT 6
Dunagan, W. A. RM1(SS)

COMSUBRON 6
Satcher, H. R. RMC(SS)

NAVCOMMCEN SANGLEY POINT
Hardman, N. G., Jr. RMSA
Mayse, G. E. RM1

NAVCOMMSTA PORT LYAUTEY
Anderson, L. J. RMSN

NAVFAC NICOSIA
Garner, R. E. CTCA

NAVSTA BERMUDA
Stephenson, R. N. RM2
Deisch, L. G. RM3