

Navy ships today communicate in many ways, ranging from the old flashing light to sophisticated electronic gear. Antennas above are on command ship USS Wright.



How To Communicate Navy Style

DURING MOST OF THE 173 years after Captain Thomas Truxton devised a message system for ships at sea, Navy communicators did their thing by hoisting flags, blinking lights and sending messages by carrier pigeon. Late in the 19th century the Navy began using the then-new wireless communication equipment.

About the middle of the 20th century, however, new developments began changing the picture as communicators moved into a world filled with electronic consoles, orbiting satellites and giant dish antennas.

The first big changes to the picture, of course, occurred during World War II when simple communications circuits developed into complex systems which, in turn, became large networks.

For example, new teletypewriter circuits were activated during the war, linking the east and west coasts of the United States and, in 1945, the first overseas radio teletypewriter channel linked Pearl Harbor to the mainland.

Other overseas extensions were inaugurated to



Guam, Balboa, Adak and San Juan and, by 1947, the Navy was ready to establish its first radio teletypewriter broadcasts to ships at sea.

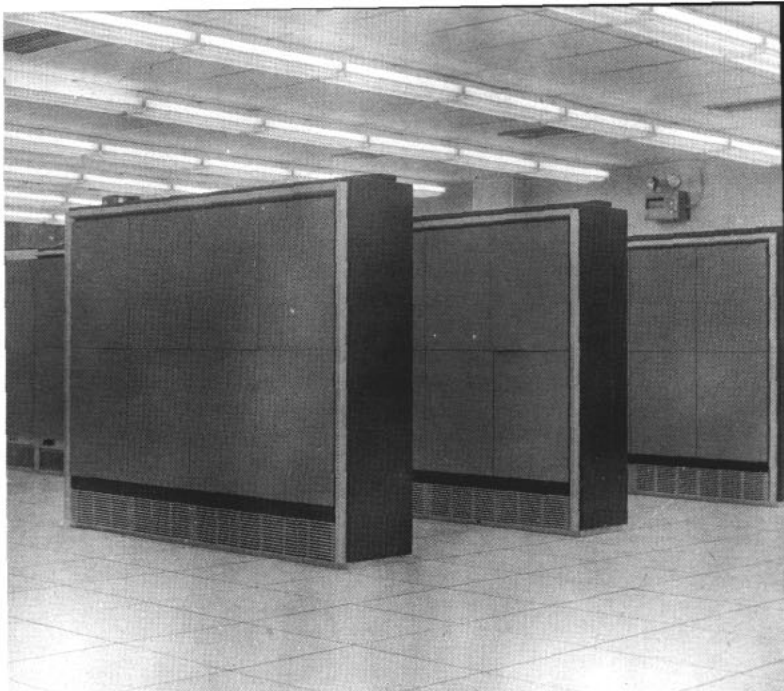
The developments after the Japanese surrender in 1945 make it apparent that naval communications has kept pace with technological advances.

Communications had to cope with new operational requirements and the only answers to the new problems lay in more progress.

ALTHOUGH EACH OF THE more than 25 years since World War II has had its fair share of communications progress, the most significant growth occurred during the 1960s, especially in connection with Vietnam.

It doesn't require a specialist in the subject to deduce that communication is essential between the commanders in Washington and those with the U. S. naval forces in Vietnam. It can also be imagined that, under the circumstances, the east-west flow of information would be formidable.

Most command information concerning Vietnam



The Navy must still send many messages by flag hoist. Others are transmitted less colorfully, but faster, by AESC computers.

passes through the worldwide command and control system which could, if it were desirable, enable the Commander in Chief in Washington to control personally all United States armed forces in the Republic of Vietnam.

Within the larger system, individual networks link national authorities through the command chain to component leaders. Each of these smaller communications systems is compatible to and can be used with others in the large national system.

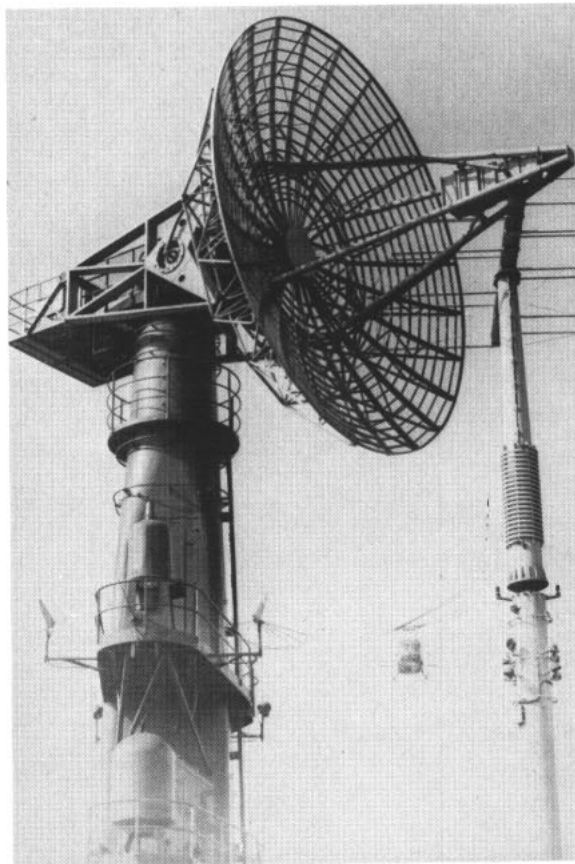
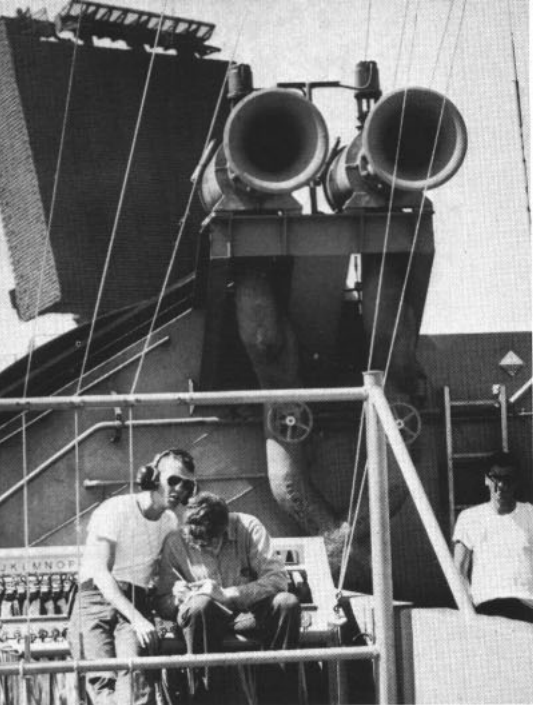
BUT INFORMATION BETWEEN national and local commanders isn't the entire communications show in Southeast Asia. Considerable operational and logistical message traffic passes between Fleet units and the three major communications stations for the Western Pacific located in Japan, Guam and the Philippines.

The ship-to-shore traffic passing through these stations is formidable and serves to emphasize the fact that the shore stations which encircle the globe have become the backbone of naval communications. Such stations are strategically positioned throughout the world and, until comparatively recently, functioned only as relays between ship and shore and from one ship to another.

During the 60s, however, they have played a larger role and additional communications stations in Australia and Vietnam have helped them do so.

The most recent major addition to the worldwide system is the station at Australia's Northwest Cape which provides reliable communications for the allied fleets in the Indian and Pacific Oceans.

The installation, which was named in honor of the late Australian Prime Minister Harold E. Holt, could be a study in superlatives but it will suffice to say that its central antenna mast is the highest man-made structure in the southern hemisphere and that it has



Left: Signalmen take a message at the flagbag of USS John F. Kennedy (CVA 67). Center: Navyman signals by semaphore. Right: Tropospheric scatter antenna aboard command ship Wright.

the world's largest antenna devoted to very low frequency (VLF) transmissions.

Another station at Cam Ranh Bay, about 186 miles north of Saigon, was also built in the 60s as a focal point for naval communications in Vietnam. This station has operational network circuits to all major Navy commands in Vietnam and a Fleet broadcast for ships in the South China Sea and Tonkin Gulf.

These new installations have enhanced the Navy's ability to respond to the command of national authorities and for Washington to be constantly in touch with the Fleet.

SO THAT NAVAL COMMUNICATIONS ashore can more effectively follow the Fleet, the world has been divided into eight major naval communications areas each of which concentrates on its own message needs. Each area has a master station to coordinate the activities of its local stations.

Direct high speed teletype circuits link the master stations with Fleet commanders, adjacent stations and all area stations so that the Fleet's needs can be acted upon immediately.

As mentioned earlier, the idea of naval communications following the Fleet in this manner has changed the traditional role of the shore communications station in Southeast Asia.

Stations no longer act merely as relay stations. Instead, they have become an actual and active participant in Fleet operations. They are, in fact, the hub of Fleet operational communications.

THE NEW IMPORTANCE of shore stations has also added to their responsibilities. Their communications circuits must be tended constantly and they must evaluate the development and progress of an operational situation.

This places a heavy burden of responsibility on the men who direct the stations' message traffic because their decisions could conceivably affect the course of operations having national and international importance.

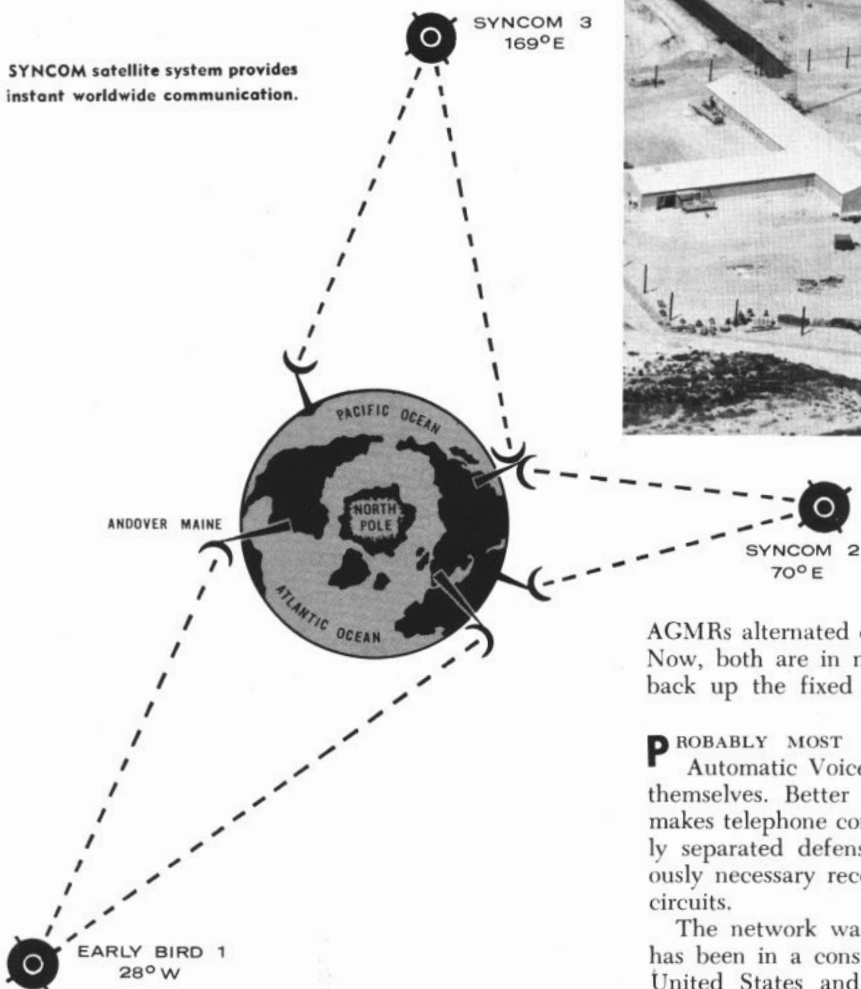
Although the role of the shore station in Southeast Asia has changed considerably, the first change noted aboard ship was the soaring message traffic.

If shipboard message centers were to handle it all, the communications facilities had to be improved and one of the more useful improvements of the 60s was the ability to handle several channels of communications at 100 words per minute. Before this development, afloat message centers were plodding along on only one 100-word per minute radioteletypewriter channel.

The multichannel broadcast conversion program for the Pacific was completed in 1966. The first multichannel broadcast for the Atlantic Fleet was activated in January 1968.

The complete changeover will make all Navy ships

SYNCOM satellite system provides instant worldwide communication.



Transmitter at Naval Communications Station Cam Ranh Bay is vital to Vietnam operations.

AGMRs alternated on station in the South China Sea. Now, both are in mothballs but they stand ready to back up the fixed shore systems whenever needed.

PROBABLY MOST NAVYMEN are familiar with the Automatic Voice Network and many have used it themselves. Better known as AUTOVON, the network makes telephone conversations possible between widely separated defense installations without the previously necessary recourse to commercial long distance circuits.

The network was begun in 1964 and, since then, has been in a constant state of expansion within the United States and, last year, switching stations in Hawaii, Europe, Panama and Guam were inaugurated.

As AUTOVON's users know, the network's circuits are limited even in the United States. Overseas trunk lines are even more limited and only certain persons may use them. All but the highest priority callers may have their message interrupted by a preempt signal which warns them to relinquish the line immediately.

AUTODIN is another network which is probably less familiar to most Navymen than AUTOVON. AUTODIN, which stands for Automatic Digital Network, was designed to transmit record data communications at speeds as high as 3000 words per minute. During the past 10 years, it has become a primary carrier of message traffic within the Defense Department.

The network is a computerized system linking defense facilities in Europe, the U. S. and Vietnam.

There are 20 automatic electronic switching centers (AESCs) in the worldwide AUTODIN network.

The AESC is something like a telephone switching center except that there are no telephone operators.

capable of receiving at least two teletype circuits on frequencies in use, with most ships able to handle at least four channels and larger ships having access to eight.

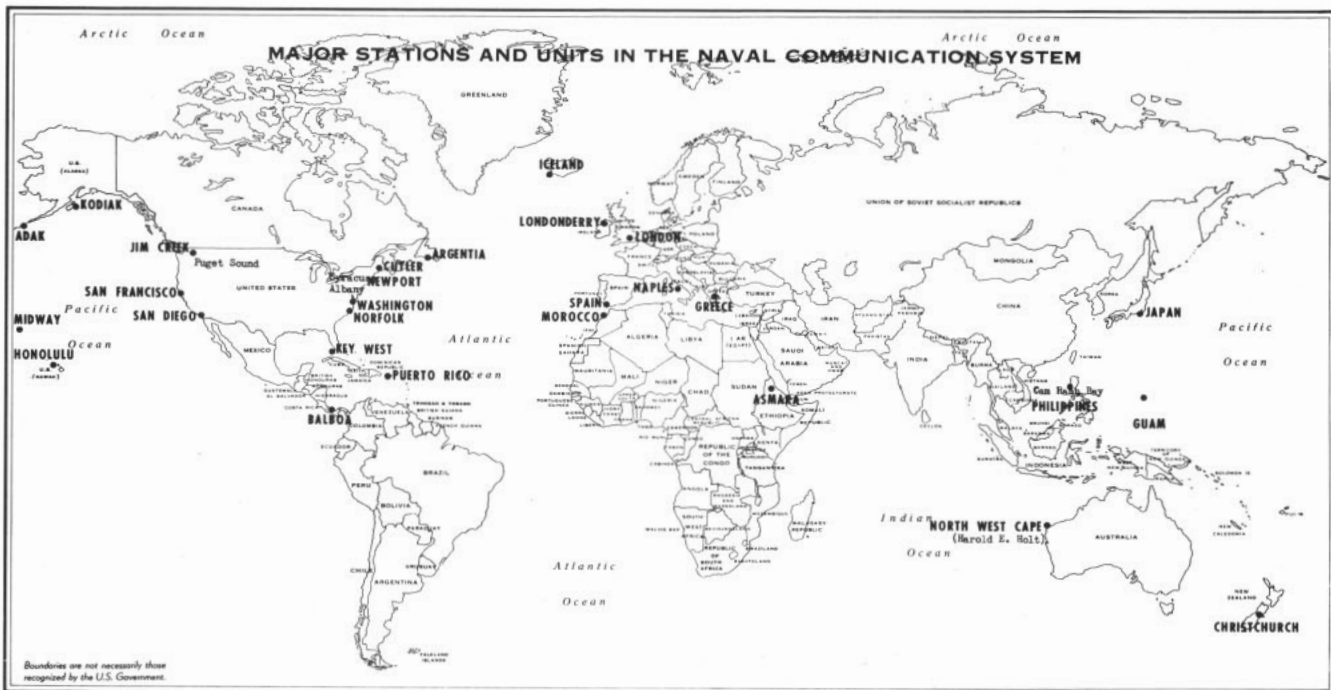
ALSO OF CONSIDERABLE IMPORTANCE aboard ship—the increased message traffic could be processed without a corresponding increase in transmitters, frequencies or receivers. In fact, almost no additional shipboard equipment was needed.

To supplement its chain of shore stations, the Navy use of major communication relay ships (AGMRs) had an impact, particularly in Southeast Asia.

The first such ship was *USS Annapolis* (AGMR 1) which had about 25 transmitters and 60 receivers to augment shore communications stations.

The second was *USS Arlington* (AGMR 2) which was larger and faster than *Annapolis* and had improved communications equipment and an extensive and specially designed antenna field.

Until both ships were retired recently, the two



Above: AUTODIN operations area at NCU Albany, N. Y.

Computer and data processing experts control two independent sets of computers in the center. The duplication is necessary in case of a breakdown.

This, to put it simply, is how an AUTODIN switching center works: A main computer called the Communications Data Processor (CDP) works with an Accumulation Distribution Unit (ADU) which receives and organizes messages, then feeds them to the CDP which checks message security level, corrects routing indicators and does other routine jobs. After the CDP has done its work, it returns the message to the ADU for proper forwarding.

This is done either by storing and forwarding the data or by direct user-to-user forwarding. Whichever method is used would depend upon traffic conditions at the time of transmission and the precedence of the message.

The Automatic Digital Network spreads over 21 states, the District of Columbia, the Canal Zone, Bermuda and Canada and is used not only by the armed forces but also by other organizations such as NATO agencies and the Red Cross. Information passed to

and from Vietnam passes through Hawaii and the Philippines.

The accuracy of the system is nothing less than astounding. It is about 99 per cent correct and, when one station alone processes from two to three million messages a month, that is pretty impressive.

THERE CAN BE NO DOUBT that naval communications have taken giant steps during the past decade. Although surefire predictions for the future are impossible, it would probably be safe to bet on an increase in satellite communications during the 70s.

The Navy's satellite communications began in 1954 when the first voice communication circuit was completed using the moon as a reflector. Since then, it has used the *Echo* and SYNCOM satellites for communications.

During the 60s, USNS *Kingsport* (T-AG 164) was accepted by the Military Sea Transport Service to become the world's first satellite communications ship. During the 70s many Navy ships may be equipped for satellite communications. At least that was the recommendation of a report forwarded to the Secretary of the Navy in 1969.

Lasers, too, might be in the Navy's immediate communication future. The laser was first announced in 1960 and, in telephone, television and data transmission, it may become a vehicle for progress during the 70s.

The idea of using light for communication transmission isn't new. Alexander Graham Bell transmitted a voice by light waves in 1880 and light beams have been used to imprint sounds as tracks on movie film to be reconverted into sound in the theatre.

Although the laser is still in its infancy, it is an exciting possibility and may prove comparable to the development of radio in the world of naval communications.

—Robert Neil