

A NEW ERA IN WORLDWIDE TACTICAL COMMUNICATIONS

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Summary The Fleet Satellite Communication System (FLEETSATCOM) now under development will provide the first U. S. military satellites designed from the start as operational transponders for tactical communications with and among mobile users. FLEETSATCOM is a logical outgrowth of earlier experimental projects, principally the Tactical Satellite Communication (TACSATCOM) project of the late 1960's. When the globe-girdling system goes operational in calendar year 1976 it will quite literally revolutionize both Air Force and Navy tactical communications by providing availability and reliability of over-the-horizon communications that can never be matched by conventional high-frequency circuits.

Introduction The history of Navy Fleet Communications began on January 5, 1776. On that day the Naval Committee of the Continental Congress instructed Commodore Esek Hopkins, our first Navy Commander-in-Chief, "To give out to the Commander of every ship such signals and other marks and distinctions as may be necessary for their direction." These directions consisted of a few tactical maneuvers and battle orders. Manipulation of sails or the positions from which pennants, the ensign or other national flags were flown provided combat direction in 1776. Lights and flares at night served a similar purpose. From that time until the present, Navy communications has traditionally served as the voice of command.

Fleet Communications --by which I mean the line of communications to, from, and among naval ships on the high seas--have been marked by repeated instances of unsatisfactory performance. Each unsatisfactory performance has been documented by naval commanders in clear and unmistakable terms. For instance, as early as 1923 ADM Hilliary P. JONES, Commander-in-Chief, U. S. Fleet, following a major fleet exercise, said:

"The Commander-in-Chief considers that rapid communications within the Fleet, between the Fleet and its bases, and between the Fleet and the Navy Department is neither satisfactory nor reliable. The maneuvers of the United States Fleet off Panama during both 1922 and 1923 have demonstrated this fact in the most profound manner; and although there has been some improvement during the past two years, the Commander-in-Chief believes

that the subject of communications still warrants the serious and immediate consideration of the Department.”

In 1923 the United States Fleet consisted of over 600 ships, including two carriers, 26 battleships, 31 cruisers, 316 destroyers, 102 submarines, and an auxiliary force of 157 ships. USS CALIFORNIA, typical of the battle line of that day, was equipped with a communications suite of eight receivers and three transmitters. It is interesting to compare this with the 56 transmitters and 84 receivers to be found in today’s modern aircraft carrier.

Admiral JONES’ report resulted in the establishment of a board of investigation which found, among other things, that “Too much was being attempted with too little by poorly qualified people.”

Too much with too little plagued Fleet Communications before ADM JONES’ time and has continued to plague it since. The first board to look into circumstances surrounding a Fleet Communications problem was convened by President Theodore ROOSEVELT in 1906. As a result, order and discipline were introduced into a field wherein before chaos prevailed routinely. It was said at the time that in few fields of national endeavor were public funds invested more wisely than in developing wireless telegraphy in the United States Navy.

Many boards and committees made their marks on the Navy between 1906 and 1972 when the Chief of Naval Operations Civilian Industrial Advisory Committee on Telecommunications referred to as “The CIIACT,” made its report. It was no surprise to many of us that the board found essentially the same problems of attempting to try to do too much with too little.

Although the CIIACT shares a common heritage with its many predecessors in that it was formed to study Fleet Communications problems, the similarity ends there. The CIIACT has shown the way in which Fleet Communications can break the vicious cycle of unsatisfactory performance followed by a Board of Investigation finding the Navy trying to do too much with too little.

How do we propose to break the cycle? The greatest single innovation, which we are now in the process of introducing is to use satellite relay as our primary mode of tactical communications. Today we are in the process of developing a satellite-based fleet communication network called Fleet Satellite Communication System, or FLEETSATCOM. FLEETSATCOM will give us many improvements, not the least of which will be a great reduction in our present nearly total dependence on high frequency channels for over-the-horizon communications. The vagaries and problems of HF radio

were first experienced by a fleet commander in 1906 and have been redocumented with monotonous regularity after every fleet exercise since.

The Navy's first attempts to exploit space technology for Fleet Communications used passive relays. In 1959 we established an operational two way teletype link between Naval Communications Stations in Honolulu and Washington, using the moon as a passive reflector.

By 1964, the Navy was participating in the SYNCOM Satellite project. The first ship-to-ship satellite communications link which was established in January 1965 between USS CANBERRA and USS MIDWAY, helped to prove the feasibility of reliable long-range communications links with forces afloat by means of satellites. SYNCOM led to Navy participation in the Joint Tactical Satellite Communications Program that has been very successful in both the Atlantic and Pacific Fleets.

In 1971 a plan for a Navy UHF satellite communications system was approved and FLEETSATCOM became a reality. FLEETSATCOM is designed to provide worldwide high priority UHF communications for both the Navy and the Air Force. The Space and Missile Systems Organization (SAMSO) of the Air Force is the contracting agency for the satellites. Four three-axis stabilized satellites will be placed into geosynchronous equatorial orbit to provide worldwide coverage except for the polar regions.

The first satellite will be launched from Cape Kennedy in late 1975. The spacecraft will weigh 3800 pounds at lift off and 1850 pounds in orbit. Design life is five years. The satellite is an eight foot hexagon 50 inches high with a 16 foot deployable parabolic UHF antenna, powered by solar cells in two panels extended north and south. An SHF horn, and an S band omni-directional antenna are also on board. With the seven by thirteen foot solar panels extended the span of the spacecraft is approximately thirty-six feet.

The communication subsystem will provide more than thirty voice and twelve teletype channels for mobile users. The Navy will be served by a one-way shore-to-ship broadcast channel having SHF uplink and UHF downlink and by nine two-way UHF-UHF channels. The Air Force will be served by twelve narrow-band and two wide-band two-way UHF-UHF channels. Telemetry and control will be accomplished by S band channels.

Operational control of the satellites will be exercised by the Air Force through their extensive worldwide tracking and telemetry system.

Automation of message handling aboard ship will be made possible by a family of computer based information and data exchange systems currently under development.

Prototypes of one of the most complex exchanges have been successfully tested in actual use in the Fleet.

Radio teletype was introduced to the Fleet in 1944 and is now the backbone of Fleet Communications. Fleet Broadcast capacity has grown from a single channel, 60 word a minute, non-secure link to a multi-channel operation which has served the Fleet well under normal operating conditions. We have, however, reached the point where HF radio teletype format is inadequate for command and control. A system capable of operating at much higher speed with much greater capacity and with very nearly 100% reliability is required.

We in the United States Navy see in FLEETSATCOM the means to achieve significant improvements in Fleet Communications and look forward to its introduction.