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The Record

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Transit navigational satellite program

Two successful launches have been made to date in the Transit research and development program, and a third Transit experimental package was carried aboard Discoverer XI. According to  the project officer, the R&D problems are essentially 1/3 solved. The major problem that has been solved is the refraction problem, that is the bending of the Doppler signals caused by the ionosphere. By transmitting signals at two or more frequencies, an extrapolation of the results to a vacuum Doppler or unbent condition can be made. Using this method, very accurate position fixing has been accomplished based on known ephemerides (orbit determination was done by tracking).

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The two major problems remaining to be solved are, first, the determination of ephemerides in advance to sufficient accuracy, and, second, computation of position on ground or ship on a real-time basis. At present the state-of-the-art of predicting orbits is only good enough to enable the system to achieve accuracies of 2-3 miles in position fixing. This is comparable to conventional celestial methods, but of course has the advantage of all-weather capability. The present plans are for the system to be operational by the Fall of 1962 and to provide a position-fix accuracy of better than 1/2 mile.

Some thinking has been given toward an operational system that would be available for use by merchant vessels as well as Navy ships. It is not clear at present whether it would be best to do this with a separate series of satellites (4 would be required for 90-minute maximum wait) under the control of NASA but with the Navy maintaining the tracking and injection stations along with their Navy system. Plans are to solve the existing problems, then to back off some on the requirements -- this might result in a simpler single-frequency system with less costly receiving and computing equipment for the commercial system. Navy would then turn the specifications over to NASA. It is thought that a more simplified payload could conceivably be launched by the Scout vehicle.

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