

The Use of Satellites in Broadcasting

Since the 1974 Toronto Conference Session on the above subject was reported in the previous, February 1975, issue of the *Journal*, along with two papers from the Session, the following group of four papers has been released in final publication form with special cooperation of the authors. For a full description of the ATS-6 Spacecraft, readers are directed to the paper "ATS-6 Spacecraft Design/Performance" by William N. Redisch of NASA/GSFC and Ralph L. Hall of Fairchild Industries. It is available as paper No. 44, pp. 44, 44A-44G, *Conference Record of EASCON '74*, from Single Copy Sales, Institute of Electrical and Electronics Engineers, 444 Hoes Lane, Piscataway, NJ 08854.—Edit.

Investigation of the Applications of Advanced Communications Satellites

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An experimental communications satellite will be launched later this year to flight-test various subsystems and to investigate the applications throughout society. By agreement in 1971 between Canadian and U.S.A. agencies, Canada is responsible for designing and building the spacecraft and the U.S.A. for supplying the high-power traveling-wave tube, launch vehicle and environmental test and operational support. The investigation will (1) flight-test and evaluate a traveling-wave tube with an efficiency greater than 50% and a saturated power output of 200 W at a frequency of 12 GHz; (2) flight-test a lightweight extendible solar array with an initial power output greater than 1 kW; (3) flight-test a 3-axis stabilization system; and (4) experiment with the use of the 12- and 14-GHz bands. Almost a score of agencies, universities and hospitals will participate in this experiment.

THE COMMUNICATIONS TECHNOLOGY SATELLITE (CTS) (Fig. 1) is an experimental communications satellite that is due to be launched in late 1975. It is being developed jointly by the Canadian Department of Communications and the U.S. National Aeronautics and Space Administration (NASA) under an agreement between Canada and the U.S. signed in 1971. The agreement provides for Canada to design and build the spacecraft and for the U.S. to furnish the high-power traveling-wave tube (TWT) and associated power conditioning and thermal control, the launch vehicle, and environmental test and operational support. The use of the

Presented on 14 November 1974 at the Society's Technical Conference in Toronto by B. C. Blevis (who read the paper) and N. G. Davies, Dept. of Communications, Communications Research Centre, Ottawa, Ont., Canada K1N 8T5. (This paper was received on 14 October 1974.) *Note:* This material was also presented in substance to the United Nations Panel Meeting on Satellite Broadcasting Systems for Education held in Tokyo 26 February-7 March 1974, with publication as Report No. 27 by the ITU Association of Japan, Inc., Yutaka Minakawa, Mgr. of Research and Meetings Dept. 6-19, 1-chome, Azabudai, Minatoku, Tokyo, Japan.

satellite for technological and communications experiments will be shared equally between the two countries. Subsequently the European Space Research Organization (ESRO) became a participant under an agreement with Canada to provide certain spacecraft components including a 20-W TWT, a parametric amplifier (paramp) and development of the solar array blankets.

CTS responds to the increasing need to develop the additional channel capacity for satellite communications and broadcasting allocated by the International Telecommunication Union at the World Administrative Radio Conference on Space Telecommunications in 1971. The 12- and 14-GHz frequency bands offer some considerable advantages over the present 4- and 6-GHz frequency bands, particularly in areas of North America and Europe where terrestrial systems are developed extensively. There are no power flux density limitations imposed on the use of the 12-GHz band, permitting the use of earth stations having smaller antennas. Also, because of the absence of terrestrial services in the band, there is no difficulty in

the coordination of the locations of transmitting and receiving earth stations. This should allow earth stations to be located in major population centers.

The principal technological objectives of the CTS program are:

(1) to develop and flight-test a traveling-wave tube having an efficiency greater than 50% and a saturated power output of 200 W at a frequency of 12 GHz;

(2) to develop and flight-test a lightweight extendible solar array with an initial power output greater than 1 kW;

(3) to develop and flight-test a 3-axis stabilization system to maintain accurate antenna boresight positioning on a spacecraft having large flexible appendages; and

(4) to conduct satellite communication systems experiments using the 12- and 14-GHz bands.

There are thus two aspects to this program. The first involves the design, construction and launch of a satellite to flight-test various subsystems which will be needed to satisfy the future requirements for satellite communications and broadcasting systems operating in the 12- and 14-GHz bands. The second aspect is the development and coordination of an integrated program of communications experiments to be carried out using the Communications Technology Satellite. These experiments will permit investigation not only of the applications of new technology to communications problems but also of the social, cultural and economic impact of the eventual introduction of services