AUSTRALIA'S FIRST ORBITING SATELLITE

The Package: The unit is 18" x 22" x 6", weighing 35 lbs. It utilises 20 lb. of manganese-alkali batteries from Union Carbide, U.S.A., which will supply for about three months. It is a completely solid-state package, and all components have been supplied free by Fairchild Australia.

Orbit: The expected orbit (approximate and subject to confirmation) is 500 miles circular, 70° inclination, period 100.9 minutes.

Stabilisation: A bar magnet, interacting with the earth's magnetic field, will stabilise the package to reduce fading of signals to antenna movement as the satellite spins. Magnetic hysteresis rods damp motion on two axes, dissipating the earth's magnetic field energy.

SOME TECHNICAL DETAILS

Electronics: V.h.f. 2 metre transmitter design, output 50 mW. on 144.050 Mc. A.m. telemetry modulation, crystal controlled.

H.f. 10 metre transmitter design, output 250 mW. on 29.450 Mc., commandable on/off a.m. telemetry modulation also (180° cut-off phase with v.h.f.).

Limiter: Schmidt trigger circuit limits the I/C audio signal, giving a square wave output with a well-defined peak-to-peak voltage. The peak-to-peak voltage must exceed 1 volt.

Tuned Amplifier: Series feedback voltage amplifier with tuned load converts I/C square wave to sine wave.

Level Detector: Schmidt trigger, which triggers if the input becomes more positive than the threshold. The threshold is set above voltage reached by sine wave due to third sub-harmonic, but is below that reached by correct tone with about 3 : 1 mark-space ratio. The detector provides a square wave output with a well-defined peak-to-peak voltage.

Delay Circuit: Diode pump circuit, with time constant 1000 cycles—i.e. output voltage is 1/e of final voltage after 1000 cycles of input.

Output Trigger: Triggers when input voltage exceeds threshold of Schmidt trigger. Together with the delay circuit, it provides a delay of 1/5 second between the application of a tone and operation of the output trigger. When tone is removed, the 0.47 uF. capacitor is discharged by the forward base current of the left-hand transistor, and takes about five seconds before the trigger resets.

Logic and Bistable: A diode gate produces a positive going pulse whenever both inputs go positive (i.e., both enable and execute tones received within 5 seconds of each other). Pulse turns on a pull-down transistor in bistable, which remembers the last command received. All circuits use either feedback or saturation to ensure that operation of the circuits is independent of transistor characteristics.

Telemetry: Audio tone measures 8-channel parameter, sequentially switched 10 secs. per channel. The channels could be in this order—1, HI in Morse Code identification; 2, 3, 4, horizon sensors (5% field of view); 5, 6, internal and skin temperatures; 7, battery current drain; 8, battery voltage.

HI Keyer: Produces HI in Morse Code, 2 or 3 per 10 secs.

Command Rx: Receives signals, and produces an audio tone which is passed on to the—

Command Decoder which decodes the signal and switches h.f. transmitter on or off.

The entire operation will be supervised by Project Australis, and not available to any Amateur. H.f. transmitter schedules will be published before the launch.

STATEMENT ON PROJECT

Richard Tonkin, Owen Mace and Paul Dunn arrived back from the United States on Saturday, 17th June, after their trip to formally deliver the Australis Amateur satellite to Project Oscar.

Detail discussions were held with Project Oscar personnel. These discussions covered the design and operation of the Australis Oscar satellite and also plans for a second Australis satellite carrying a repeater.

The design and construction of the satellite was highly praised by all Oscar project officials. Some minor improvements in construction techniques will be considered prior to launching. If necessary one or two back-up modules will be constructed and sent to the United States.

The package arrived in perfect condition and to the great amusement of those Americans and Australians present was found to be complete with "Made in Australia" labels and a large sign reading "God Save The Queen".

The satellite was thoroughly checked out in the Oscar laboratory and was found to be operating perfectly.

The hospitality of Project Oscar to the boys was most warm and friendly and thoroughly appreciated by them. They were afforded the opportunity to inspect a number of Aerospace Companies and facilities to observe first hand the latest satellite techniques which will undoubtedly assist in later Australis projects.

At this time, the date of launching is not known. However, it is expected that the announcement will be similar to those applying to previous Oscar launchings.

Adequate notice will be passed to all State co-ordinators.