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SIMULATING SATELLITE TEMPERATURES

A COMPACT ANALOG COMPUTER used in conjunction with an environmental test chamber and heat exchanger, provides engineers at Ford Motor Co.'s Aeronutronic Div. with detailed pre-launch data on the effect of varying temperatures on an orbiting space vehicle.

Temperature of a satellite payload may vary as much as 275° (or from −160°F to +115°F) during one orbit, depending both on its distance from the sun, and its entry into and departure from the earth's shadow.

To determine the effect on satellite performance, a 24-amplifier analog computer Model AD-1-24, supplied by Applied Dynamics, Inc., Ann Arbor, Mich., generates curves corresponding to temperature differentials encountered by the satellite. Translated into signals, the curves are then fed into a heat exchanger which controls the temperature within an environmental test chamber containing the satellite. The computer signals also are fed into an X-Y plotter for immediate visual verification.

Measured temperature data from the test chamber is relayed back to the computer for comparison with desired conditions so that modified signals may be introduced as necessary.

Use of the analog computer permits significant simplification of test procedures and compression of environmental test time. It also confirms predictions and computations as to the actual influence which temperature variations will have on performance of the payload.