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A. W. EADE

Mr. Eade and Mr. Fraizer are with the Meter and Instrument Department

"... Today you commonly read of experimental aircraft flying much faster than 760 mph, the speed of sound at sea level.

Accomplishing this in the short span of 50 years has called for some highly advanced thinking in terms of air frames and engines. And hand-in-hand with their remarkable development has been the growth of aircraft instrumentation.

At the high speeds military planes fly today, the pilot simply doesn't have time to read indicators and co-ordinate information presented to him. To offset this situation, many new flight-control systems are presently undergoing development.

A good example of what is taking place is the automatic jet-engine control system developed by G.E. for the North American F86D Sabrejet. Here seven separate measurements are integrated, allowing the pilot to increase or decrease his thrust by simply moving a throttle; there's no danger of his overspeeding or overheating the engine.

Many proposals have been made to consolidate instruments so that one indicator would serve where formerly three or four were needed. Again, for example, an engine-performance indicator has already been proposed that will replace four separate indicators. This single indicator will at a glance show engine speed and temperature and oil and fuel pressure. The fuel and oil pressure portions of this gage would merely be OFF-ON devices, with a green flag indicating safe, and a red flag unsafe, pressure ranges. On the surface this appears to be a particularly good feature, for airmen often only glance at an accurately marked gage to check the pointer's relative position.

The progress made in the first 50 years of flight has been nothing short of astonishing. And there's reason to expect that it will continue to be even more so in the future. So far as instrumentation is concerned, you can look for a greater consolidation of instruments as the speed of flight moves upward and more use of flight-control systems in place of individual instruments and controls.

F. E. CREVER

Mr. Crever is Manager—Engineering and Projects Department—Knolls Atomic Power Laboratory

T. TROCKI

Mr. Trocki is Manager—Coolant Systems Sub-Section, Knolls Atomic Power Laboratory

"... Ship propulsion appears to be the earliest practical application for a mobile atomic power plant and consideration of some fundamentals of a nuclear power plant will make the reasons apparent. As conceived today, a nuclear power plant differs from a conventional plant mainly in the method of heat production and heat transfer to a thermodynamic fluid, which is expanded in turbo-machinery to produce power in the conventional way. In a plant using steam as the thermodynamic fluid, the nuclear reactor and steam generation equipment will replace the boiler and its accessories. Although the reactor core itself can be of relatively small dimensions, the shielding required around it increases the over-all volume and weight of a reactor by a considerable factor. Furthermore, the reactor coolant and heat transfer fluid is made radioactive in passing through the reactor and all of the machinery through which it flows must be shielded. The shielding around the reactor core proper is called the primary shield, and the shield around the heat transfer equipment, the secondary shield. As the amount of shielding is practically independent of power output, a nuclear power plant of low power will be penalized excessively with respect to its power output. As the power output of a reactor-steam generation plant is increased, the equipment volume and shielding around it does not increase in direct proportion to the power; hence, a more favorable relationship is reached between power output and plant space and weight. Power plants for propulsion of larger power ocean-going vessels (of the order of 10,030 HP and above) are of sufficiently large power output to fall within the favorable range for a nuclear power plant of current design.

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G-E Review

May 7, 1954

1 A
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