ENGINEERING

# Keep America in Lead

**Ordnance, science and industry must continue to work together to keep us prepared as the best assurance against another war.**

➤ IT TAKES TIME to develop and manufacture the materiel required by modern war, declared Maj. Gen. G. M. Barnes at the meeting of the American Society of Mechanical Engineers in New York. "We may not be so fortunate in the future with respect to time as we have been in the past," he commented.

"We believe that the best insurance against war is to be prepared," Gen. Barnes emphasized. "This will require much long-range research and development work, looking to weapons the future may demand. These reasons are sufficient to compel all of us to continue the close association of ordnance, science and industry, who have together produced the weapons in this war and who, working together in time of peace, will keep our country always in the lead."

An appropriation of $1,250,000,000 for the Army Ordnance Department, made in 1940, rendered it possible to manufacture weapons for the British, who used our tanks and ammunition to stop the Germans at El Alamein, he said. The money made it possible for the Department to release its plans for the industrial mobilization of the country, worked out during the preceding 20 years.

It was immediately seen that new and more effective weapons must be developed, he stated. It was realized that the task could not be done by Army officers alone. "The only hope," he declared, "was to place the program with the scientific and engineering talent of the country, where facilities suitable for this purpose were available. This became the policy of the Ordnance Department."

"During the past three and a half years," he explained, "more than 1,000 new items of ordnance were so developed, tested at the Ordnance proving ground, again tested by the combat arm which was to use the weapon, accepted by them, standardized and placed into quantity production."

## Science Research Vital

➤ "MANY FUTURE epochal developments in such fields as the harnessing of atomic energy and its employment aboard ship, radar and electronics, supersonic speed, the rocket and the jet for the propulsion of missiles and aircraft, are dependent upon increased emphasis on scientific study and training," declared Rear Admiral Harold G. Bowen, USN, at the same meeting.

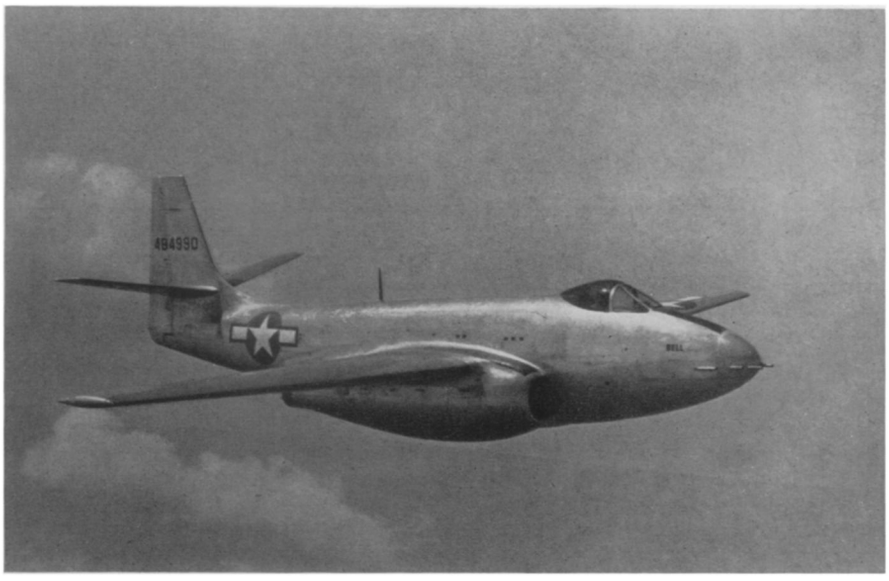
Referring to the alarming deficiencies created by the war in the supply of potential scientists and technical men, the Admiral said that this lack must be made up and the general level of technical knowledge must be raised.

"With good men we can expect greater scientific achievements, and therein lies the future of our country," he emphasized.

As one example of scientific progress in the Navy, Admiral Bowen told the hitherto unrevealed story of how the Navy reached the decision to use high-pressure, high-temperature steam. "High pressure, high-temperature is an inadequate expression for this development," he said, "because much more transpired than raising pressure aboard ship to 600 pounds and the temperature of the steam to 850 degrees. It represented a complete break with the past. It indicated that engineering in the Navy had arrived at its maturity and had entered an independent existence."

"The introduction of these pressures and temperatures was accompanied by a complete re-engineering job of every ship that the new Navy was building. By using turbines of American design, we were able to reduce the number of blades in one instance from 17,000 to 1,700 and produce a much more rugged, reliable turbine. Turbine speeds were greatly increased until we reached 10,000 r.p.m. for an idling cruising turbine. Entirely new boiler designs were adopted which embodied superheat control, economizers, air casings and a capacity for 40% overload. Feed systems with oxygen removers were installed. Double reduction gears were required due to the high speed of the turbines and space limitations. Emergency Diesel electric generators were adopted. The whole electrical system was changed from D.C. to A.C. Flame-proof cable was employed. Steam piping without slip joints made its appearance and alloy steel replaced carbon steel for heavy duty.

"The result of this program was, that by the time of Pearl Harbor, the Navy had completely redesigned, proved at sea and standardized, all of its machinery for both surface ships and submarines."



***LONGER RANGE—The newest in turbojet planes, is the XP-83, longest range jet-propelled airplane in the world. Developed by the Bell Aircraft Corporation, it has demonstrated a high speed in excess of 500 miles per hour and possesses aerodynamic characteristics suitable for extreme speeds.***