



**TESTING GUNS IN EXTREME COLD**—Braving 70-below-zero cold to test guns and ammunition, these Navy ordnancemen are loading a 50-caliber machine gun. Almost all gear is electrically operated by remote control. The suits worn by the men contain electric heating units and the guns are fired through quick opening ports.

## ORDNANCE

## Cold Armor Plate Tested

► TESTING armor plate, cooled to extreme low temperatures, for the effects of gunfire is one of the projects conducted at the Naval Proving Grounds, in Dahlgren, Va.

Five-inch thick armor steel plate is subjected to minus 70 degrees Fahrenheit in one of the Navy's cold chambers for 24 hours. Then it is packed in dry ice and rushed to a nearby range where it is peppered with shells to test its resistance at extreme cold.

Not all temperature testing at this station is at the lower end of the thermometer scale. High heat is also used, including tropical temperatures up to 140 degrees. The range from plus 140 to minus 70 degrees is thought to be un-

equalled by nature at any one location.

The equipment includes two cold chambers large enough to accommodate a five-inch gun, and a high-altitude chamber which permits simulation of conditions at 50,000 feet above sea level. In all, the controlled temperature facilities include the altitude chamber, an instrument test chamber, a gun test room, and a tank test room. This latter is used particularly by the Army. It is 37 feet long, 15 feet wide and 16 feet high. Its temperature range is from 125 degrees above to 67 below zero Fahrenheit. Although no firing can be done in this room, it makes possible a number of studies in the climatic adaptability of equipment.

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## AERONAUTICS

## Seaplane Tests Radar

► THE departure from New York to Germany of an all-cargo plane with a radar nose and improved radar equipment marks the beginning of a year of

testing to determine the most practical uses of this navigation aid in over-ocean flying. Many transports on over-land routes are now using radar.

This test project is with a Douglas DC-4 plane of the Pan American World Airways, and is being conducted jointly with American Airlines. Findings will be available to the U. S. Navy which requested the undertaking. The regular nose of the plane has been replaced with a plastic dome to contain the radar antenna.

The installation will enable a pilot to "see" on his radarscope the ocean surface below or the area ahead for some 40 miles in spite of heavy overcast weather. It will enable him to detect cloud formations that spell bad weather or turbulence so that he can make a detour. This contributes to safety and smooth flying.

Installations of radar altimeters have recently been completed in 109 planes of the United Air Lines as well as in many planes of other companies. These instruments, sometimes called terrain clearance indicators, transmit radio signals to the ground and receive back reflected signals that give a continuous reading of the contour below and also a warning signal if the plane approaches too close to the earth for safety.

All planes of the Trans-World-Airline (TWA) are now equipped with the relatively new Howard Hughes radar anti-collision device. This can be set to give automatic warning of mountains ahead or earth below at either 2,000 or 500 feet away. It is a radar transmitter-receiver set, weighing 15 pounds, which obtains power from the plane's battery at 28 volts.

The development of light-weight radar makes these installations in commercial planes possible. The wartime types used by the armed services were too heavy for commercial planes, took up too much room and required too many operators.

At the close of the war, the Air Force Materiel Command, in collaboration with other agencies including radar manufacturers, set about making light-weight radar. A set weighing 125 pounds, one-fourth the standard Army type weight, was completed. General Electric, one of the collaborators, later announced an apparatus weighing from 100 to 150 pounds, with a gyroscopically stabilized antenna, which was eight times more powerful than the previous Air Force model.

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Rubber in chlorinated form is used in special types of protective coatings made by paint manufacturers for use where a high degree of resistance to acids and alkalis is essential.