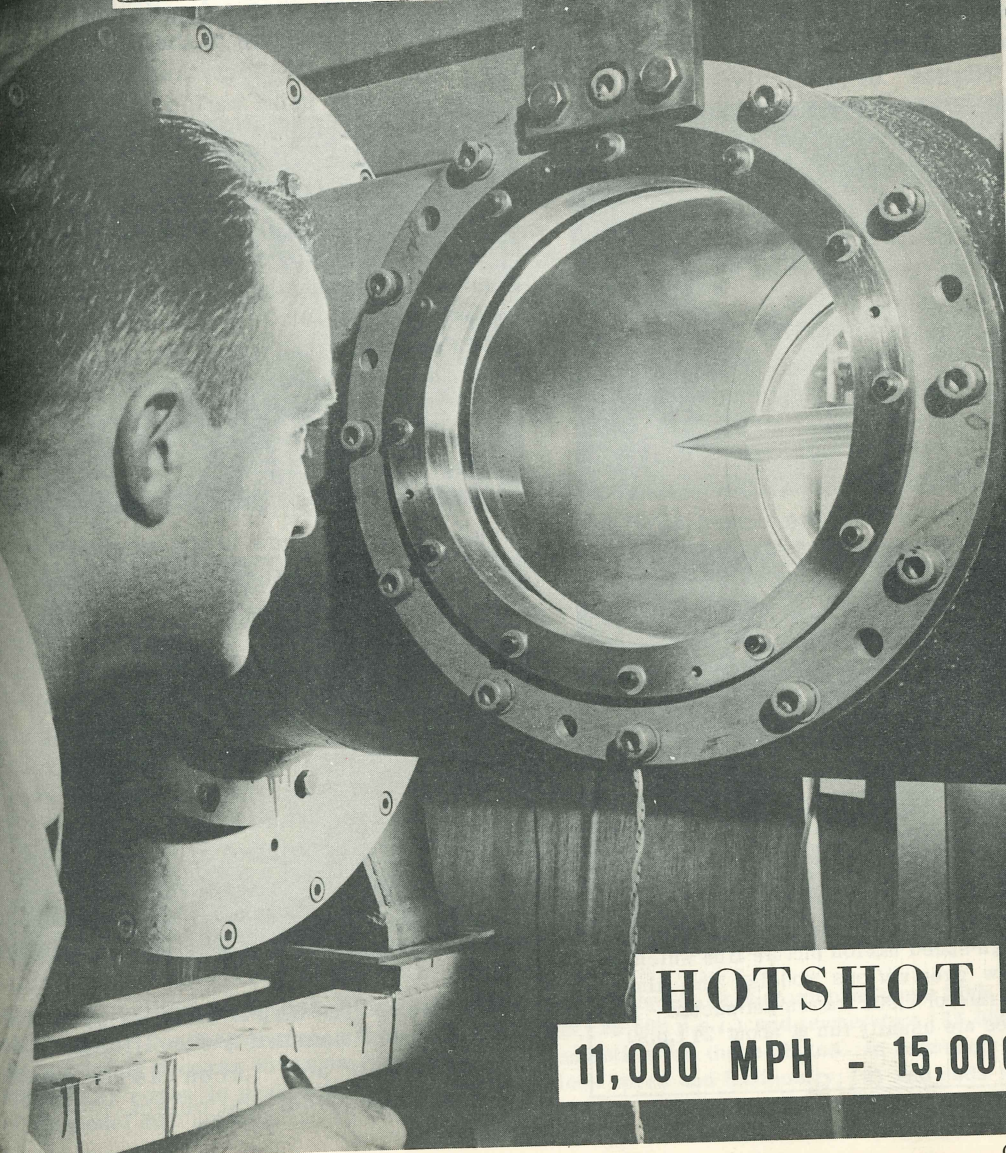


September 1956



HIGH MACH

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HOTSHOT

11,000 MPH - 15,000°F

A new type wind tunnel - capable of realistically simulating the 11,000 mile-per-hour speeds and 15,000-degree temperatures predicted for long-range missiles and aircraft of the future - has been placed in operation at AEDC.

Still higher speeds and temperatures are anticipated for the tunnel in the near future.

Although the tunnel's test runs last only about one-hundredth part of a second, much valuable data has been achieved by "flights" of precisely - scaled aircraft or missile models in its 16-inch-diameter test section.

More than 100 successful test runs have already been made with this new equipment which represents a substantial improvement over devices previously used for this type testing.

The new tunnel, called "Tunnel Hotshot" by the engineers and technicians who developed it, is part of the Gas Dynamics Facility.

It was designed and built by scientists and draftsmen of ARO and will be available for use by the armed services and their contractors.

HOTSHOT - GDF

Test runs in "Hotshot" must of necessity be brief. Longer runs with temperatures greater than those found on the surface of the sun, and with pressures of approximately 20,000 pounds-per-square-inch, are impossible. Handling air at these temperatures and pressures for any periods longer than a fraction of a second would melt portions of the tunnel.

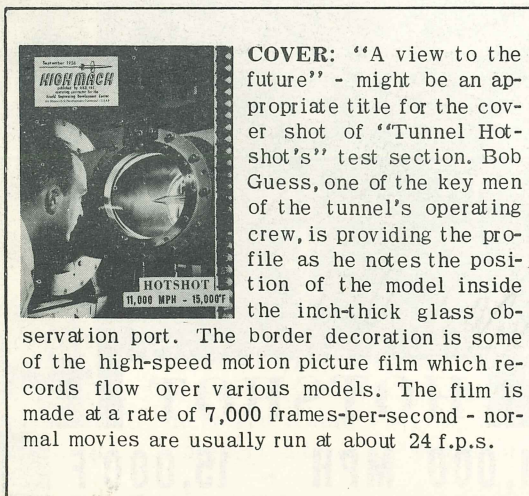
Despite the fact that the flow lasts for this very short period of time, it is of sufficient duration to melt away portions of the nose of some of the models tested.

"Hotshot" is being used to explore possible methods for cooling the surface of missiles or aircraft as they encounter speeds in the so-called "thermal barrier area"; or for investigating various methods to withstand these high pressures and temperatures.

This heating is caused by the friction of the air passing over the body of a missile or aircraft. The heat is transferred to the surface of the flying body, and at high speeds in the more dense atmosphere near the earth's surface it tends to cause the objects to burn like meteors.

The physical principles involved in the re-entry of a long-range ballistic missile into the earth's atmosphere at high speed indicate that this friction may generate temperatures high enough to vaporize diamonds. Thus, some means to cool the missile or control its re-entry flight must be devised.

In simplest terms, the operation of "Hotshot" may be described as the process of creating a very powerful electrical explosion and then controlling, stabilizing and measuring the effects of its temperatures and forces as it passes over a scale model test object.



COVER: "A view to the future" - might be an appropriate title for the cover shot of "Tunnel Hotshot's" test section. Bob Guess, one of the key men of the tunnel's operating crew, is providing the profile as he notes the position of the model inside the inch-thick glass observation port. The border decoration is some of the high-speed motion picture film which records flow over various models. The film is made at a rate of 7,000 frames-per-second - normal movies are usually run at about 24 f.p.s.

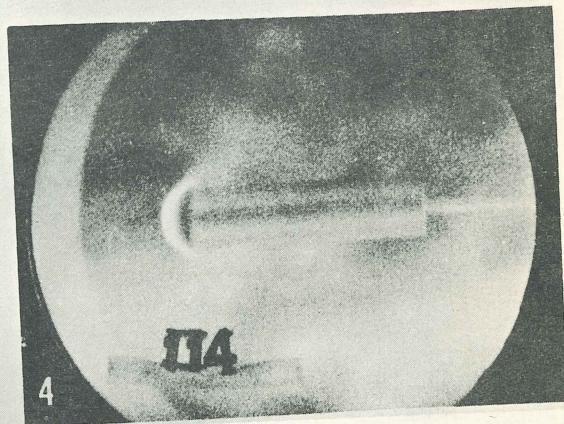
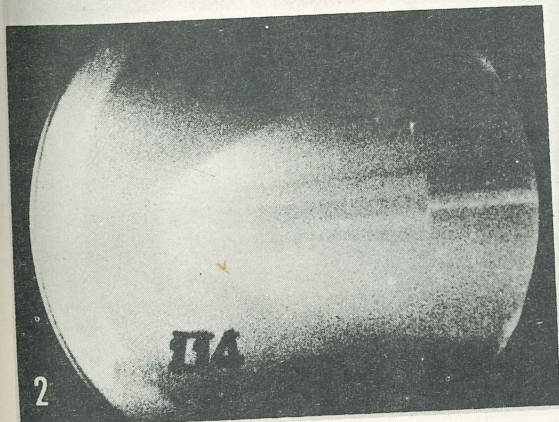
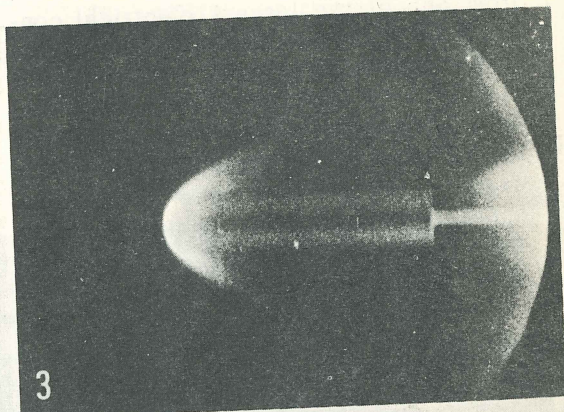
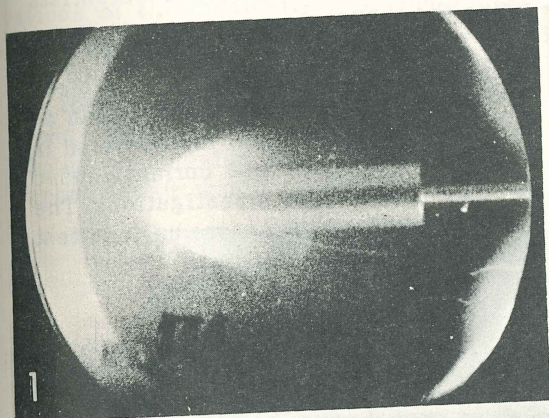
1,000 MPH, 15,000 Degree Tunnel

"HOTSHOT" MAKING HISTORY?

"Tunnel Hotshot" promises to have far-reaching effects in the field of aeronautical science. A few weeks ago one visiting scientist inspected the tunnel; promptly announced that he was, "going to go home; tear down the hypersonic

shock-tube tunnel we have, and start over with a tunnel patterned on 'Hot-shot'".

Widespread interest by the aviation industry is already being expressed, and several companies are requesting test time in the new tunnel.



EFFECTS OF HIGH SPEED AIRFLOW - are shown in this series of photographs from a high speed motion picture of a "Hotshot" test run. At operating pressure (20,000 p.s.i.) and temperature (15,000 degrees F) the air itself becomes luminous, providing the illumination for these photos. In sequence: (1) Airflow starts; (2) comes to peak velocity; (3) begins to lose speed and luminosity; (4) and ends with the nose of the model still glowing.