

# HIGH MACH

Vol. 21, No. 10

ARO, Inc., Operating Contractor

Arnold Air Force Station, Tennessee 37389

## From AEDC's scrapbook...



*from ETF files*

The photos of captured German test equipment were made in post-war Germany prior to shipment of the parts to the U.S. for use at AEDC.

## ...some unusual footnotes to our past

See pages 6, 7

# One Man Put Some Colorful Footnotes in AEDC's History While 'Shopping' for Equipment in Post-war Germany

•A slip-up in communication which might have caused some of the equipment now being used at AEDC to end up in the Soviet Union after WW II...

•A jeep chase across Germany hunting for a trainload of wind tunnel parts...

945 •A memo, written aboard a military transport aircraft crossing the Atlantic in 1954, which provided the initial impetus for establishment of AEDC...

## 25 Years Ago

The year was 1949. Louis Johnson succeeded James Forrestal as secretary of defense; the B-36 bomber and the F-80 "Shooting Star" jet fighter were the Air Force's first-line aircraft; the newest experimental military aircraft included the YF-86 Sabrejet, the XF-90 and XF-91 fighters, the SB-47 Stratojet bomber, and the C-119 twin-tail transport.

On October 28, President Harry S. Truman signed the Unitary Wind Tunnel Act: legislation which provided \$252.6 million for ground test facilities for NACA (NASA's predecessor), the Navy and educational institutions.

The act also authorized the first \$100 million for construction of what was then called "the Air Engineering Development Center," today's Arnold Engineering Development Center.

Things moved quickly after that with the announcement on Nov. 9 of Camp Forrest as the site for AEDC and the subsequent formation of an Army Corps of Engineers district office to supervise construction of the center.

With subsequent legislation, a total of \$437 million was authorized for the original construction and later expansion of the center's test facilities. But if these buildings and equipment were to be replaced at today's inflated prices, it would cost an estimated \$920 million. ■

All of these are colorful footnotes in AEDC's history. And all have involved Dr. Frank Wattendorf, an internationally recognized aeronautical scientist who was one of AEDC's pioneer planners and who continues his association with the center today as an ARO consultant.

*High Mach* interviewed Dr. Wattendorf when he visited the center last month on the eve of his departure for Paris, where he was to be awarded the 1974 Von Karman Medal: an award that has been made for the past three years by NATO's Advisory Group for Aeronautical Research and Development (AGARD).

Dr. Wattendorf is the second U.S. scientist to receive the award, which went to three recipients the first year and two the second. Dr. Courtland Perkins, then chairman of the USAF Scientific Advisory Board, was one of those who received the medal in 1972. Dr. Wattendorf is the sole recipient this year.

It is especially appropriate that he receive such an honor because of his association since 1926 as a colleague of the late Dr. Theodore von Karman, who also played a major role in the initial planning of AEDC.

To appreciate the "footnotes" mentioned above, one has to turn back the pages of history to the days immediately following World War II, when the late Gen. H. H. "Hap" Arnold — for whom AEDC is named — dispatched top aeronautical scientists to Germany to locate and inspect R&D equipment which might be seized as the "spoils of war" and shipped to the U.S. for use by the Army Air Forces.

The first "footnote" involves a rumor that the Bavarian Motor Works automobile factory at Munich — which contained a jet engine test facility — had been allocated to Russia after the AAF's request for the test facility had been approved.

The Allied Forces had agreed that the U.S.S.R. was to receive the automobile production equipment which comprised most of the plant. But, through a reported oversight, this almost included the jet engine test unit which the Germans were operating at the plant.

It included compressors, exhausters, expansion turbines and motor drive systems that are now in daily use in our Engine Test Facility. (It has since, of course, been combined with other, more modern equipment).

Dr. Wattendorf, accompanied by Lt. Col. Frank Williams (who was later to be the first Air Force test facility director for ETF), visited the BMW engine test plant in October 1945 to observe some tests being conducted by British engineers.

"A Navy lieutenant was at the site," Dr. Wattendorf recalled, "because the U.S. Navy also wanted to do some testing in the facility. This lieutenant knew the Air Force request for the facility had been approved, but then he told me a new element had come up: that the whole BMW plant had been allocated to the Russians in the war reparations agreement. The Russians badly needed an automobile plant; they were going to take the whole BMW plant lock, stock and barrel to Russia, and the jet engine facility would go with it.

"That was one thing the U.S. could equally trade, because we already had plenty of automobile factories. I wrote a memo to the Air Force saying they'd better do something in a hurry. So the deactivation of the BMW plant, and the crating and shipping of jet engine test equipment to the U.S., were hurried up after my memo."

Another mixup in communication resulted in the jeep chase, an experience Dr. Wattendorf calls a "great adventure" in tracking down equipment suitable for the AEDC he envisioned.

Dr. Wattendorf sort of hijacked a convoy of 21 freight cars carrying misappropriated parts of a large wind tunnel after chasing the train across Bavaria.

The wind tunnel in question had been requested by the Army Air Forces. When Dr. Wattendorf went to the site to locate all the parts and to prepare them for shipping, he discovered that a subsequent request for "scrap steel" by another allied country had been honored, and that the parts were already headed for that country on a freight train.

Dr. Wattendorf immediately set out in pursuit of the train, again accompanied by Lt. Col. Frank Williams. Their chase, from railway station to railway station across Germany, finally ended at a freight yard in Stuttgart. They had the shipping orders changed, and the wind tunnel was shipped to the U.S. But the tunnel was eventually to end up in the country that had made the second request, and it is still in operation.

The third "footnote" actually preceded the other two. It centers on a flight westward across the Atlantic in June of 1945 when Dr. Wattendorf's work as a member of the AAF's Scientific Advisory Group mission to the European Theater of Operations was interrupted by the news that his father had died. He was returning to attend the funeral.

Situated in a bucket seat of a C-54 (still painted in its olive drab WW II camouflage colors), Dr. Wattendorf drafted a memo to Brig. Gen. Franklin O. Carroll, chief of the Engineering Division of the Air Technical Service Command at Wright Field, then the center of the AAF's R&D work.

The memo reported on the various "targets" — German R&D installations that had been checked for possible use by the AAF — and was concluded by this recommendation:

"5. Consideration be given to the planning of a new high-powered A.A.F test laboratory for large-scale, high-speed aerodynamic tests; testing of complete engines; testing of component parts such as compressors, turbines, combustion chambers; very high Mach number tunnel for long-range rocket



Larry Horn, left, and Ernie Bordenet of ETF are shown with one of four large German compressors in use in the Engine Test Facility. This one, a three-stage compressor with an operating speed of about 4,400 rpm, was delivered in 1942 to the Daimler-Benz test facility at Stuttgart-Unterturkheim, Germany, but was never installed. It was discovered in storage at a spinning and weaving mill at Wurttemberg and was delivered to the U.S. in 1948 along with two others that had been planned for the Stuttgart facility. The fourth ETF compressor was put into service at the BMW plant in 1941.



This 1945 photograph provides an overall view of the Bavarian Motor Works (BMW) plant which produced military vehicles for the German army. Tucked away in one section was a jet engine test unit with two high-altitude cells. One began operation in 1943, and the other was nearing completion as the war ended. A duplicate facility had nearly been completed at Stuttgart at this time.

development. Hydraulic power is recommended, and a new location such as Boulder Dam, Grand Coulee, etc., should be considered since the Wright Field area is now too restricted and the power is too limited. This would be especially desirable if German materiel could be made available to the AAF."

That, as far as historians can determine, was the first written form of a concept that eventually led to the establishment of AEDC — not near the western power resources, but close to the TVA resources in Middle Tennessee.

*In talking about the German testing facilities, Dr. Wattendorf mentioned that most of them were discovered near the end of the war as the Allies took over the regions where they were located.*

"The Germans kept these facilities very well secreted," he explained. "One whole installation — a complete, up-to-date aeronautical establishment — had been built in the middle of a forest. The buildings all had trees on top of them so that, from the air, it just looked like a forest."

Much of the equipment Dr. Wattendorf requested was earmarked for the proposed U.S. Army Air Forces research and development center. He recalls that there was a struggle, however, to get congressional approval for the center.

"The reason for the resistance — and we have the same sort of situation today," he said, "was that, after the war, people were relieved and figured they didn't have to think about anything for a while. At the idea of spending money on new facilities, people

thought: 'Why bother with that? We won the war. Everything's going to be peaceful.'

"But here is where the presence of a strong man like Gen. Arnold, and his making the statement he did, was important."

The statement Dr. Wattendorf is referring to, made by Gen. Arnold at a press conference in August 1945, is this:

"Most important of all, we will need an ably staffed, adequately financed and properly equipped research and development program. I say *most important of all* because, if we fail to keep not merely abreast, but ahead, of technological development, we needn't bother to train any force, and we needn't make plans for an emergency expansion; we will be totally defeated before any expansion could take place."

"That is quite a significant idea," Dr. Wattendorf said. "We still have this requirement to keep ahead of technological advancements. I'm against being second best. Inflation is unfortunate — for everybody — but it has to be faced; it's a fact of life. I think it's a tragedy to have something nontechnical like inflation spoil our technological advances."

*"Our requirement to keep ahead is what is so important about plans for two major new facilities proposed for AEDC — the Aeropropulsion Systems Test Facility (ASTF) and High Reynolds Number Tunnel (HIRT). I'm very much in favor of these two facilities. I think the need for them has been very well established."*



Dr. Wattendorf

74-1469

Dr. Wattendorf, asked how well AEDC has lived up to his expectations of almost 30 years ago, said the center "has kept up remarkably well with the times." He added: "When we were planning AEDC, we didn't have concrete ideas of what it would look like or how it should be equipped 30 years from then. When you visualize something like this, you don't visualize anything concrete. If you plan too carefully, you can box yourself in. When you plan for the future you must plan in concept, not concrete."

"But I think AEDC has been fortunate to have had such a dedicated group of people. And I think the location here and the nature of the facility makes for a community effort and community spirit you wouldn't have otherwise."

Dr. Wattendorf, who as honorary vice chairman of NATO's AGARD has been in touch with scientific leaders of European nations, says the Europeans think of AEDC as a unique facility.

"They have great respect for AEDC," he said; "the whole aeronautical industry does. In fact, of any large-scale testing facility, they consider AEDC as the authority."

## AFA To Hear of Pioneer Days

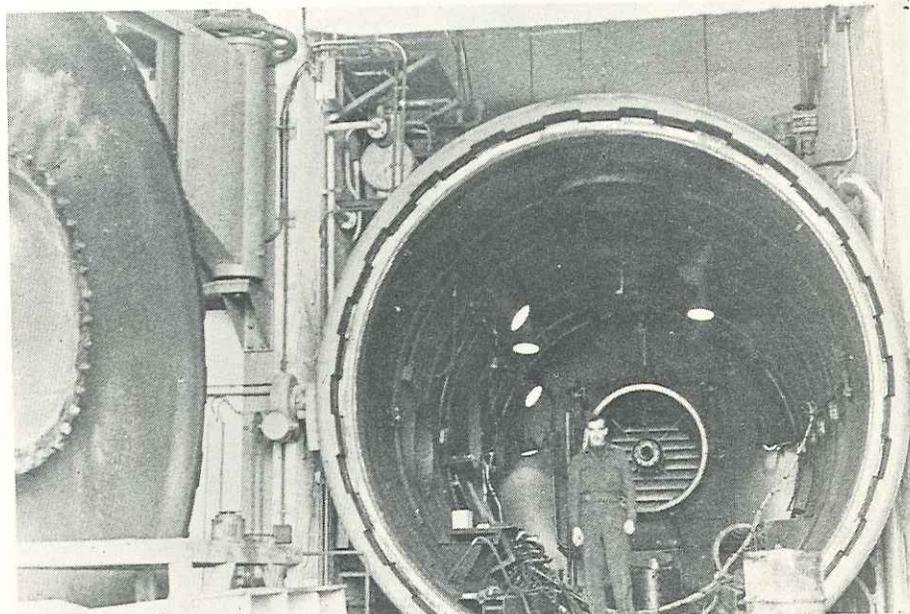
The pioneer days of AEDC will be discussed by Gen. L. J. Sverdrup, chairman of ARO's board of directors, at a dinner meeting of the H. H. "Hap" Arnold memorial chapter of the Air Force Association Nov. 14 at the Officers' Open Mess.

The theme for the talk was suggested by the fact that 25 years have passed since the late Gen. Arnold and the group of aeronautical R&D specialists he had banded together succeeded in gaining congressional approval for the construction of AEDC. (see other box)

Since Sverdrup & Parcel, ARO's parent firm, was responsible for drawing up the original plans for the center and for conducting surveys of the various sites considered for the center, Gen. Sverdrup was deeply involved with activities that led to creation of AEDC.

Several others who played important roles in laying the groundwork have also been invited. They include Gen. Bernard Schriever, former commander of Air Force Systems Command; Dr. Frank Wattendorf (story above); Elmer Johnson, director of USAF's fluid dynamics lab at Wright-Patterson AFB; and Steve Leo, a member of the ARO board of directors.

Chapter members and their guests are invited to the meeting, to be preceded at 6 p.m. by a social hour. Reservations may be made by calling Bob Boyles, extension 532, by Nov. 11. The individual charge for the dinner is \$3.75.



Another 1945 photo shows one of the two high-altitude cells at the Munich BMW plant. Engines having up to 4,400 pounds of thrust could be tested at conditions simulating Mach number 0.8 (about 525 mph) at 55,000 feet. Inlet air supply totaled 55 pounds per second.

69-264