Cleveland, Ohio, August 20, 1948

2ND ANNUAL INSPECTION PLANS BEGUN

The Cleveland Laboratory will hold its Second Annual Inspection on Tuesday, Wednesday, and Thursday, September 28, 29, and 30, 1948.

The purpose of the inspection is to afford Air Force, Army and Navy officers, executives and engineers of the aircraft industry, and government officials and legislators an opportunity to receive at firsthand reports of recent progress in the field of flight propulsion, and to witness demonstrations of the facilities and methods used here.

The agenda, which was still in the planning stage at the time of this writing, will include eight stops of one-half hour each during the tour conducted for the visitors. Each of the four research divisions will be responsible for the preparation of two demonstrations. For example, the engineers of the Fuels and Thermodynamics Division are planning to present a description of the new fuel tower, called the Jet Propulsion Fuels Building, which has been erected across from the Engine Research Building. A scale model of the tower will be used to show methods of operation.

In anticipation of the large number of prominent visitors the workers of the Buildings and Grounds Branch under Mr. H. O. Fry are embarked on a clean-up campaign covering the entire Laboratory plot. During the next five weeks these men will be repairing sidewalks, clearing away construction debris, washing windows and polishing floors.

The Illustration Section under Mr. L. J. Stitt is engaged in the design and painting of such "props" as posters, signs, placards, charts, and sets or frames for the demonstrations, sculpturing a commemorative plaque and illustrating and reproducing a special brochure.

The personnel of the Mechanical Services Division under Mr. W. E. Dewey will perform such tasks as wiring, piping, and instrumenting the exhibits.

By such over-all cooperation the Laboratory is assured another successful inspection.

Basement

Issued in the interest of the personnel of the Lewis Flight Propulsion Laboratory, NACA

Vol. VI *Cleveland, Ohio, October 1, 1948* *No. 23*

RODERT DAY LAUDS NACA ACHIEVEMENT

Rodert Day, Monday, September 20, was a great and memorable day for the Cleveland Laboratory. Mr. Lewis A. Rodert, 1947 winner of the Robert J. Collier Trophy was presented with a bronze plaque, a symbolic token of the award, which he is to retain as a permanent possession by Mr. Frederick C. Crawford, president of Thompson Products, Inc. and vice president of the National Aeronautics Association. The Trophy itself was displayed for the first time to the entire staff who assembled before the Administration Building for the ceremony.

Dr. Edward R. Sharp, Director, made the introductory remarks in which he expressed his pride in the fact that the Robert J. Collier Trophy, the nation's highest aviation award had come to an employee of the NACA. His remarks were followed by those of Mr. John F. Victory, Executive Secretary of the NACA, who outlined a brief history of the Trophy which was donated by Robert J. Collier and has been awarded yearly by the Collier Trophy judges of the NAA for "the greatest achievement in aviation in America, the value of which has been demonstrated by actual use during the preceding year."

In response to the presentation of the plaque, Mr. Rodert expressed his thanks and appreciation through Mr. Crawford to Mr. Thomas H. Beck, chairman of the board of the Crowell-Collier Publishing Company for providing him with the fine momento.

Mr. Rodert also stated, "I wish to express again my appreciation to the National Aeronautic Association for so highly honoring our work on the icing problem. Since the presentation of the Robert J. Collier Trophy, many expressions of pleasure that our work was so prominently recognized have come from others with whom I have worked on this problem and with whom, as you know, the honor of this award is appropriately and sincerely shared.

"The teamwork between industry, other government agencies, and the NACA and the friendly collaboration between individuals even across international boundaries all combined to make possible the successful conduct of this research and gave to all of us who participated in it a great satisfaction and friendships which I am sure, will last through our lifetime."

The ceremonies were climaxed by an inspiring and enlightening address by Mr. Crawford, a portion of which is published on page 2.

The family of Mr. Lewis A. Rodert join him in admiring the bronze plaque which was presented to him by Mr. Frederick C. Crawford (right) on behalf of the Crowell-Collier Publishing Co. They are shown (left to right) Linda Jean, 8, Mrs. Rodert, Robert, 9, and Charles, 5.

LAB TO OBSERVE OPEN HOUSE SUNDAY, OCT. 3

MESSAGE FOR STAFF

On behalf of the NACA and its officials, I wish to thank the employees of the Laboratory for their excellent cooperation and concerted efforts in planning, preparing, and executing the Second Annual Inspection of the Lewis Flight Propulsion Laboratory.

I especially want to thank all those employees who were responsible for the fine appearance of the Laboratory grounds and buildings, and those who made their personal cars available for transportation service.

The NACA and the Laboratory have received many compliments and much praise from those in attendance. I want to thank all of you for a task well done and a job which has brought much credit to the Laboratory and its staff.

Edward R Sharp.

Edward R. Sharp,
Director.

WORKERS ATTEND EXHIBITS TODAY

Next Sunday, October 3, a Laboratory open house will be observed from 1:00 to 5:00 p.m. for the families and friends of workers.

Although the exhibits and demonstrations of the Annual Inspection will not be given, all buildings will be open. Volunteer attendants will be on duty in all buildings to guide visitors. Restricted areas, such as where new facilities are being constructed, will be roped off for protective purposes. Each employee is to be responsible for the conduct of his guests.

Invitations may be secured from the Employee Relations office in the Administration Building. The employee's name and the names of his guests should be written on the reverse side. The invitation or an automobile decal will admit one carload of guests. No one will be admitted to the grounds after 4:00 p.m.

WORKERS SEE INSPECTION SHOW

Employees are being excused from duty this afternoon in order that they may attend the exhibits and demonstrations which are being restaged.

The eight exhibits and talks are being given beginning 12:45 p.m. and will be run at 32-minute intervals until 4:30 p.m. Here is a schedule outlining the stops.

1. Turbine Research
   Compressor & Turbine Wing
   W-5 and W-7
2. Compressor Research
   Compressor & Turbine Wing
   W-2
3. Combustion Research
   Engine Research Building
   CW-5
   SW-21 (Burner Test Cell)
4. Fuels Research
   Fuels & Lubricants Building
   Jet Propulsion Fuels Tower
5. Supersonic Research
   8-by-6-Foot Supersonic Wind Tunnel
6. Materials & Stresses Research
   Jet Propulsion Static Laboratory
7. Engine Control Research
   Engine Propeller Research Building
8. Turbojet Research
   Altitude Wind Tunnel

Issued in the interest of the personnel of the Lewis Flight Pr

Vol. VI *Cleveland, Ohio, October 15, 1948*

INSPECTION SHOWS 8-BY-6-FOOT SWT

One of the highlights of the recent Annual Inspection, Sept. 28, 29, and 30 was the showing of the 8-by-6-foot Supersonic Wind Tunnel, the largest supersonic wind tunnel in the world, to be placed in operation soon.

After brief lectures dealing with ram-jet performance factors, the boundary layer phenomena, and wind tunnel operation, the visitors were conducted through the tunnel installations where they viewed the test section, the air dryer, the axial-flow compressor, the electric motors which drive the compressor, and the control room.

FULL SCALE ENGINES STUDIED

The test section, which is eight feet high and six feet wide, provides the facility to study full-scale models of turbojet and ram-jet engines in operation at speeds up to twice the speed of sound, under conditions of temperature and pressure simulating flight conditions at an altitude of 35,000 feet.

Atmospheric air is drawn through an air dryer which has the capacity of drying 2,200,000 cubic feet of air per minute to a dew point of -10° F by passing the air through beds of activated alumina.

The dry air is then forced through the tunnel by an 18-foot diameter axial-flow compressor driven by three electric motors having a total rated horsepower of 87,000.

Velocity at the test section is controlled by means of an adjustable throat built of two flexible side walls of stainless steel which are automatically flexed by means of hydraulic jack screws.

Air is discharged to the atmosphere through a large conical diffuser fitted with an exhaust muffler.

SCHLIEREN DEVICE USED

When the tunnel is complete, flow around the models will be observed by a

(Continued on Page 3)

INSPECTION NOTES

On September 29, the second day of the inspection, clouds closed in and the air over the airport was stacked up to 12,000 feet with generals, admirals, etc. trying to get into the Cleveland airport. Some of them had to turn around and go home. The following communique came in about noon from a frustrated officer:

"Just returned to home base after a four-hour plus cruise to nowhere. Cleveland radio discouraged us from entering control zone and advised we land Toledo or hold for two plus hours. Think in future I will stick to my horse equipped with flight propulsion. Sorry miss seeing your show. Regards to all hands."

8-BY-6-FOOT SWT

(Continued from Page 1)

schlieren apparatus through windows in the test-section side walls. The optical equipment for this purpose is so designed that photographic records can be made or the images can be transmitted from the test chamber through periscope or television apparatus to the control room where engineers control the tunnel speed and operating conditions and record research data. Aerodynamic forces on the model are recorded by means of a large balance system located in the test chamber.

LAB RENAMED TO HONOR DR. LEWIS

On Tuesday, Sept. 28, the first day of the Second Annual Inspection, the Laboratory was renamed the Lewis Flight Propulsion Laboratory in honor of the late Dr. George W. Lewis, who served for twenty-three years as the NACA's Director of Aeronautical Research.

The actual ceremony was held in the auditorium of the Administration Building with Dr. Jerome C. Hunsaker, NACA Chairman, officiating. Those present were NACA officials, executives and representatives of the aircraft industry and other guests who were inspecting the Laboratory on opening day of the three-day show.

Following the call to order by Dr. Hunsaker, a commemorative address was delivered by Vice Admiral Emery S. Land, U.S.N. (Ret.), now president of the Air Transport Association and past member of the NACA.

Admiral Land reviewed the laudable and fruitful career of Dr. Lewis from his first association with the NACA in 1919 as its Executive Officer until his retirement from the position of research director in 1947.

In tracing the origin of this Laboratory and the large part played by Dr. Lewis in its development, Admiral Land explained that the need for a research center devoted to power plant development was realized by Dr. Lewis during his European tour in 1939.

"He returned to the United States vastly impressed with the facilities for aeronautical engine research in the countries he visited. He realized full well that unless the United States took immediate steps to expand engine research we were in danger of being overtaken and of losing our heritage of air supremacy. He lost no time in advocatings steps necessary to correct the situation."

The achievements of Dr. Lewis were briefly outlined in Admiral Land's address during which he indicated their comprehensive character.

"His work in flight research, in the handling qualities of aircraft, in engine research, are well-known, for they are epochal contributions to aeronautics. Yet his interest pervaded every phase of flight problems. Thermal ice prevention, coordination of engine and fuselage design, aeronautical meteorology, development of specialized instruments - these are only a few of the phases of the aeronautical arts on which he played the great illumination of his intelligence and experience."

Mr. John F. Victory, Executive Secretary of the NACA read an extract from Committee minutes in which the resolution to rename the Laboratory was adopted. He also delivered the verbal tribute of all employees to the former director.

The ceremonies were brought to a fitting close by Dr. Hunsaker who unveiled a bronze plaque displaying a bas-relief profile of Dr. Lewis. The plaque will be placed in the foyer of the auditorium.

Basement

WING TIPS

Issued in the interest of the personnel of the Lewis Flight Propulsion Laboratory, NACA

Vol. VI *Cleveland, Ohio, October 29, 1948* *No. 25*

WB EMPLOYEES GET PAY RAISE

The NACA Wage Board in Washington, D.C. has approved a wage increase for approximately 900 wage board employees of this Laboratory.

The new pay rates which become effective on October 31, will be included in the pay checks distributed November 23.

The table printed on the insert sheet shows the new rates on a per annum scale. Hourly rates can be obtained by dividing the per annum rate by 2080 hours. The lower figure marked "N" is the night rate which is based on the shift differential of 7 cents per hour.

THRUST AUGMENTATION CONFERENCE HELD HERE

A conference on turbojet engine thrust augmentation research was held here yesterday.

A series of talks, given by engineers from the Fuels and Thermodynamics Division and the Wind Tunnel and Flight Division summarized the work done at the Laboratory on thrust augmentation.

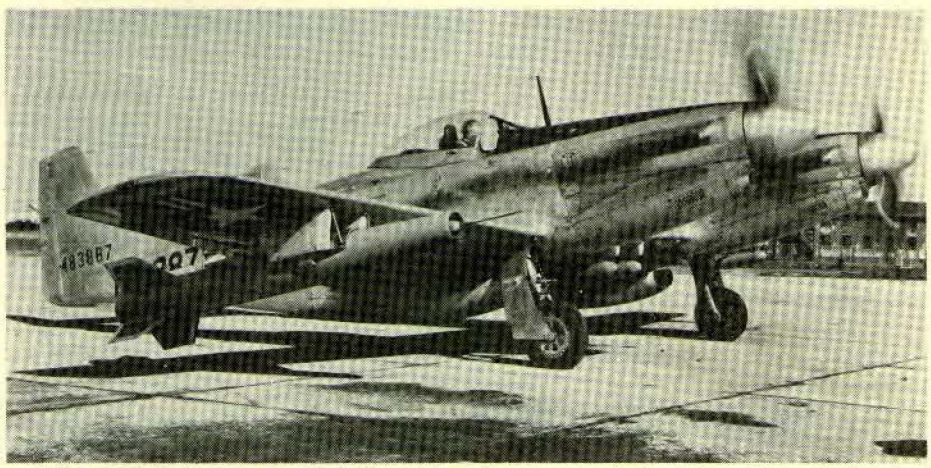
Speakers were: E. J. Manganiello; A.W. Young, W.A. Fleming, W. K. Koffel, E. C. Wilcox, B. T. Lundin, D.S. Gabriel; and E. W. Hall.

Guests included representatives of the military services, aircraft industries and universities.

COMING EVENTS

Work Holiday - Nov. 11, Armistice Day
Square Dance - Nov. 12, Auditorium
Work Holiday - Nov. 25, Thanksgiving
NicNACA Semi-formal - Dec. 19, Westlake Hotel

RAM-JET FLIGHT RESEARCH REACHES SUPERSONIC SPEEDS



The ram-jet drop model is shown here mounted under the wing of a F-82 modified North American Twin Mustang.

During tne recent inspection of the Laboratory it was revealed that a 16-inch diameter ram-jet engine, enclosed in a configuration that may be used for supersonic flight, has provided performance information in free fall at speeds up to 1.4 times the speed of sound. The test engine is mounted under the wing of a modified F-82 Twin Mustang and carried up to 30,000 feet to be dropped. The ram-jet was originally carried to high altitudes and dropped by the B-29.

The long needle in the nose of the ram-jet is a telemetering antenna through which temperature and pressure data are beamed to the ground. The central compartment located within the inlet section houses radio transmitter, fuels and controls. Four fins at the rear end of the tube provide aerodynamic stability.

With the exception of the rocket, the ram-jet is probably the simplest conceivable engine. It has no large moving parts and consists principally of three elements; an inlet to slow down and compress the incoming air, a combustion chamber where fuel is injected and burned, and an exhaust nozzle where the gases are accelerated to provide thrust.

The biggest problem now is the control of shock waves forming around the ram-jet inlet of supersonic speeds. Shock waves that occur ahead of the inlet cause large losses in compression. Research will be continued both in flight and in supersonic tunnels to provide detailed information on the relationship between combustion chamber performance and efficiency of the air inlet and on control of the shock wave formation at the inlet.

STATUS OF AIRCRAFT PROPULSION SYSTEMS

The following address, "The Status of Aircraft Propulsion Systems," was delivered by Mr. Carlton Kemper, Executive Engineer to guests attending the Second Annual Inspection held here on September 28, 29, and 30. The purpose of Mr. Kemper's speech was to provide appropriate background information to government officials, high-ranking military personnel and industrial leaders before they began their inspection tour of the Laboratory.

The first portion is reprinted here; the conclusion will be published in the issue of November 12. Ed.

Mr. Carlton Kemper Executive Engineer

The high speeds currently attained by research and military aircraft is a measure of our knowledge concerning the laws of aerodynamics and flight propulsion, and of the extent to which this knowledge has been applied to the design of a particular aircraft. It is truly astounding that in a short period of one year the Air Force and Naval Aviation have flown a research airplane at a speed in excess of the speed of sound and a production model military fighter airplane at 670 miles per hour. The fundamental knowledge that makes possible this high-speed performance was obtained from a cooperative research and development program of the Air Force, Naval Aviation, the aircraft industry and the NACA. The necessary research work on this program was started by the Committee in 1942. The high speeds obtained in 1948 are the culmination of this research effort.

In 1942 the jet engine in this country was classified as top secret. At the request of the Duran Committee, which was the group then in charge of jet-engine research, the NACA was asked to investigate the heat release of a combustion chamber for a special jet engine. The results obtained showed that a heat release in excess of one million Btu per hour per cubic foot per atmosphere could be obtained. The Committee is now investigating a combustion-chamber design having a heat release of 50 million Btu per hour per cubic foot per atmosphere which is more than five times that of current jet engines. Possible methods of cooling non-strategic metals to temperatures at which they will have good strength characteristics is a companion research project to the one on combustion.

Most of the current jet engines have multistage axial-flow compressors, can-type or annular-type combustors, and single or multistage turbines. The thrust developed by those jet engines is from 3500 to 6500 pounds. The jet engines use a 30-70 mixture (by volume) of methyl alcohol and water to obtain increased thrust for take-off. In engines having centrifugal compressors, the alcohol-water mixture is injected into the inlet of the compressor. With the axial-flow compressor, no satisfactory method of injecting the mixture into the compressor inlet has been found because the compressor blading throws the alcohol-water mixture onto the compressor case. The mixture is therefore injected into the combustion chamber. This method of injecting the alcohol-water mixture gives a 20 percent increase in jet thrust. Although the consumption of the liquid mixture is high during take-off, the necessary additional injection equipment is relatively light in weight. No great weight penalty is imposed during the flights because the alcohol-water mixture is used up during the take-off.

(To be continued)

FOR SALE

Two RCA public address speakers, complete with horns and mounting fixtures, permanent magnet type, in good condition. $9 each. C. Podlesak, 2163.

1948 refrigerator, Philco Deluxe Conservador, 8½ cubic ft., used 3 weeks. Stroller and play pen. Frank, 2139.

1948 Stewart-Warner custom gas heater and defroster blower, used one month, $43 value, will sell for $25. Stopera, 3236.

Keuffel and Esser 7-piece drawing set, in good condition. T. Stickney, 3127.

1941 Oldsmobile club coupe, model 66, K. Coughlin, EDison 0091.

Eureka vacuum cleaner, perfect condition. No extra attachments. $10. H. H. Foster, 2116, or CLearwater 5972.

Beaver-dyed Mouton coat, size 14, in excellent condition. Parson, 2132, or WInton 2695.

Dining room set, Grandfather's clock, upright piano, and other furniture. Busch, 3148 or SHadyside 1551.

ROCKET MISSILE'S ERA HELD DISTANT

NACA Engineer Says Further Research Is Needed

(Photo on Picture Page)

BY JAMES D. HARTSHORNE

Intensive research on fuels and controls will be necessary before a stepped-up rocket can be expected to have a range sufficient to reach any point on the earth's surface, aviation leaders were told as the second annual inspection of the propulsion research laboratory of the National Advisory Committee for Aeronautics opened at Cleveland Airport yesterday.

Addressing the first of more than 1,000 military and civilian visitors who were invited to attend the three-day inspection, Carlton Kemper, N. A. C. A. executive engineer, indicated the era of the rocket missile may still be some distance in the future.

"Through the sponsorship of the military services, the basic physical characteristics of high-energy fuels, their combustion characteristics and methods of handling, storing and using the fuels are being obtained," he said.

Short Service Life

"The combustion characteristics of new fuels having specific impulses approximately one and a half times that obtained from the combustion of alcohol with oxygen, as used in the German V-2 rocket, are being studied at this laboratory. The relative range obtained with these new fuels will be approximately three times greater than that of the German V-2 rocket."

As an indication of the research and development yet to be done to make the rocket motor a practical affair Kemper said the jet engine that had seen military use for more than three years was only now "becoming a reliable aircraft power plant."

"The reliability of the jet engine is reflected in the relatively short service life and in the large number of replacement parts which must be provided for military service," he said.

Laboratory Role Shown

The engine using a propeller driven by a jet turbine, on which the British are spending so much effort, is "receiving little attention in this country" because the range possible of attainment with present turbine-propeller engines "is not attractive when compared with that of the jet engine and the compound reciprocating engine," Kemper continued.

"The design and the construction of large-diameter propellers capable of absorbing 5,000 brake horsepower at 35,000 feet altitude is still a difficult development problem," he said.

Also indicative of the present status of jet development was Kemper's statement that the reciprocating engine is still the only aircraft power plant with which the extreme ranges required by the military services can be obtained.

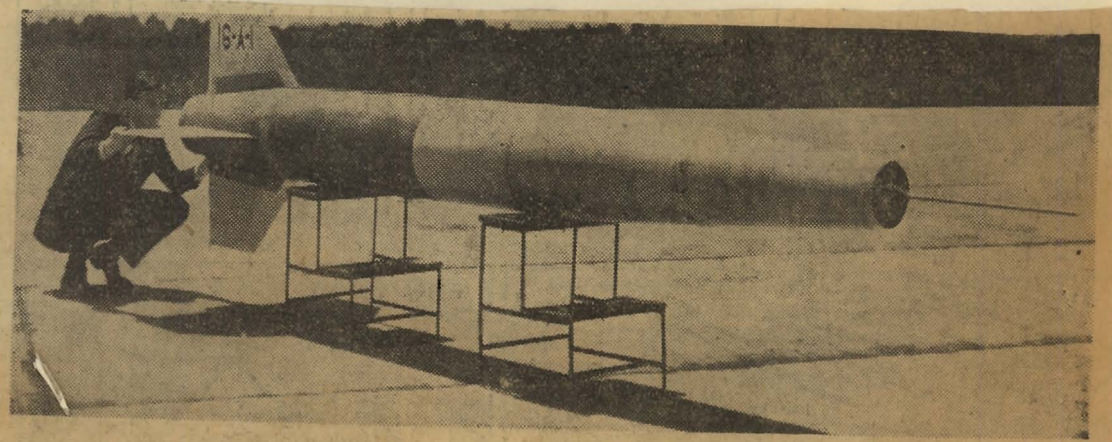
How the Cleveland laboratory, which yesterday was renamed the Lewis Flight Propulsion Laboratory in honor of the late Dr. George W. Lewis, long-time NACA director of aeronautical research, is performing a vital role in pushing along research trails leading to human flight at speeds in excess of sound was shown in the demonstrations and lectures arranged for the visitors.

Everything seen and heard was restricted, reporters were informed, except for material released in formal handouts, which described three of the laboratory's numerous research activities. They were:

THE WORLD'S LARGEST supersonic wind tunnel, in which large models of turbo-jet and ram-jet engines can be studied in operation at speeds up to 1,500 miles an hour in a test section measuring eight feet high by six feet wide. Three electric motors coupled together on a single shaft provide 87,000 horsepower to drive the huge compressor which provides the air stream for the tunnel. Under construction for three years, the tunnel is due to be completed soon.

USE of a 16-inch diameter ram-jet engine, enclosed in a shell suitable for supersonic flight, for study of combustion and performance in free flight. The ram-jet is dropped from a plane at 30,000 feet altitude and attains speeds up to 1,700 miles an hour as it shoots earthward under the push of its ram-jet engine and the pull of gravity. A radio-telemeter apparatus beams temperature and pressure data to the ground during the flight.

DEVELOPMENT of a supersonic compressor for jet engines which indicates that the power output of present jet engines might be achieved with a smaller, lighter compressor or that the power might be greatly increased by using present sizes of compressors. The compressor is so designed that shock waves encountered when the tips of the compressor blades are traveling at more than 1,000 miles an hour are used to compress the air instead of retarding the process of compression as happens in current types of compressors.



AP Wirephoto

RAMJET TEST MISSILE. Shown above is a 16-inch diameter ramjet test missile which has been clocked at more than 1,600 miles an hour in drop tests. The disclosure was made yesterday by the National Advisory Committee for Aeronautics.

World's Largest

Supersonic wind tunnel unveiled by NACA has 6x8 ft. test section.

By Robert Hotz

Largest supersonic wind tunnel in the world was unveiled by the National Advisory Committee for Aeronautics during an inspection of the newly-named Lewis Memorial Laboratory at Cleveland.

Test section of the new tunnel is 8 ft. high and 6 ft. wide. It is designed for testing full scale models of turbojets and ramjets up to Mach 2 under conditions of temperature and pressure equivalent to flight conditions at 35,000 ft. This new tunnel compares with the 6 x 6 ft. test section at NACA's Ames (Calif.) Laboratory designed to test aerodynamic shapes up to Mach 1.6.

▶**Discharges Air**—Unusual feature of the Cleveland tunnel is discharge of its air from the test section into the atmosphere. Most wind tunnels recirculate their air. Contamination and increase in water content resulting from operation of jet engines within the tunnel make it impractical to recirculate the air in this equipment. Air from the tunnel is discharged through a large conical diffuser fitted with an exhaust muffler to reduce noise. The diffuser is enclosed in a concrete structure.

The Cleveland tunnel also features an adjustable throat with two stainless steel side walls automatically flexed to the desired width by means of hydraulic jack screws. The flexible throat makes it possible to vary the speed to the flow through the test section.

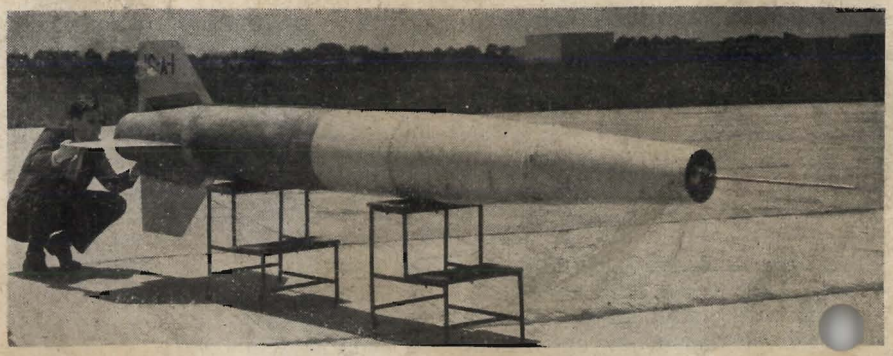
▶**87,000 Horsepower**—The tunnel is powered by three electric motors coupled on a single shaft to provide a total of 87,000 hp. The motors drive an 18 ft. diameter, seven-stage axial-flow compressor at speeds from 770 to 880 rpm. The compressor has more than 1000 blades.

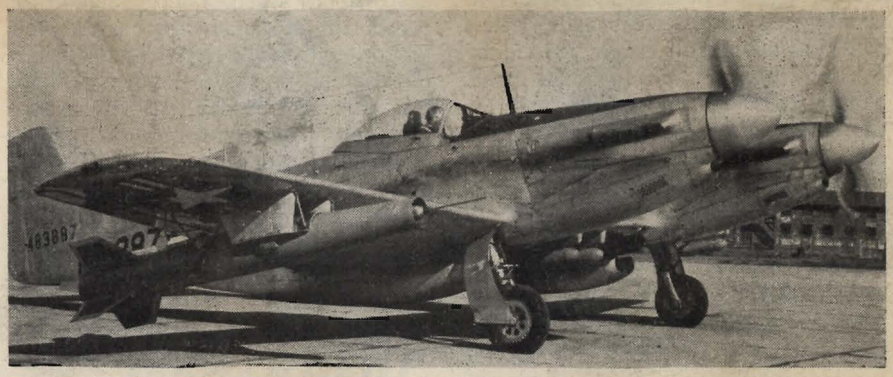
Air for the tunnel is drawn through the largest air dryer to be built in this country. It is capable of drying 2,200,000 cubic ft. of air per minute down to a dew point of minus 10 deg. Fahrenheit by passing through beds of activated alumina. Heated air passed through the drying beds for several hours at a time reactivates the alumina.

▶**Supersonic Compressor**—NACA also revealed more details of its supersonic compressor (AVIATION WEEK, Oct. 20, 1947) that promises increased efficiency and weight savings in jet engine construction. The experimental compressor consisting of a single row of rotating blades operating at supersonic speeds can do the work of a conventional axial-flow compressor's five rows of blades operating at subsonic speeds. Shock waves forming on the leading edge of conventionally designed compressor blades have barred operation at supersonic speeds.

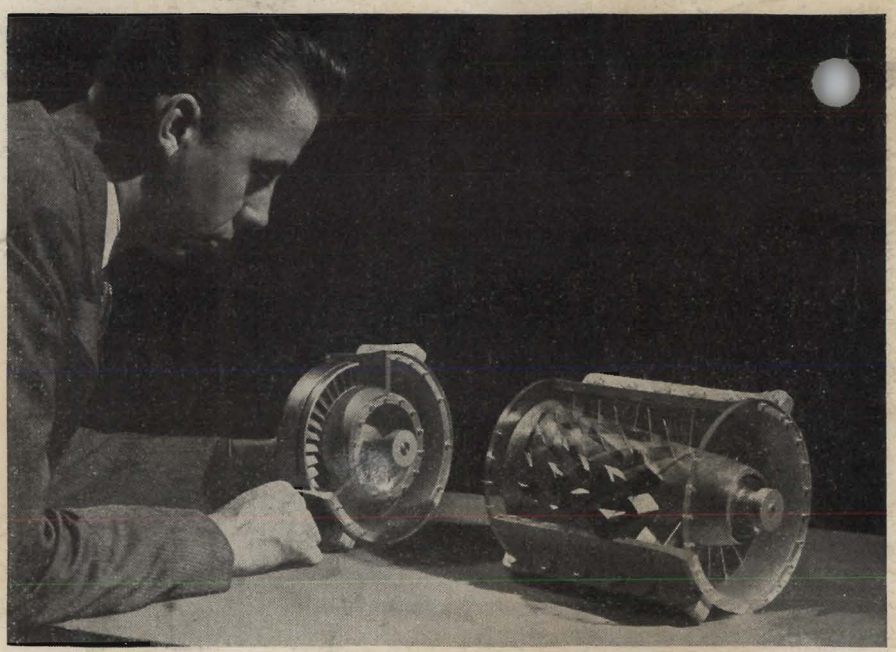
Design of the supersonic compressor blades shifts the shock waves from the leading edge of the blades to well inside the compressor where t[illegible] do not interfere with blade operation. These blade tips can travel more than 1000 mph. with little loss in efficiency.

▶**Use Shock Energy**—Energy absorbed by the shock waves instead of jamming the compressor blades is used further to compress the air to the desired high pressures required. Use of the supersonic type compressor on production





This 16-in. diameter ramjet (above) has been dropped by NACA from 30,000 ft. to obtain performance data up to speed of Mach 2.4. Ramjet is mounted under wing of an F-82 (below). Long needle in nose of ramjet is telemeter antenna through which data are transmitted to receiver which is located on the ground.



NACA also revealed more facts on its supersonic compressor (left), shown in comparison with conventional compressor (right). Weight and space savings are apparent and supersonic compressor does the same amount of work.

SEE OTHER SIDE

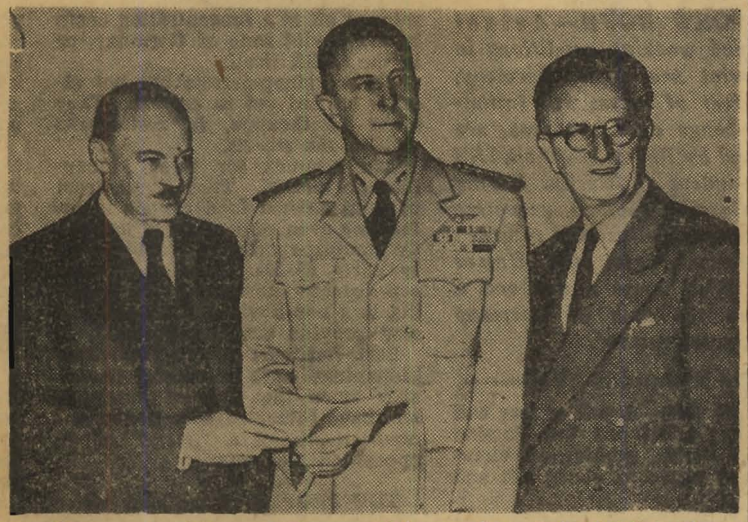
model jet engines is expected to result in considerable reduction in the length and weight of future jet engines.

Some more wraps also were removed from the 16 in. diameter experimental ramjet engines (AVIATION WEEK, Oct. 20, 1947) used by NACA to obtain test data on this type engine at speeds up to Mach 2.4. This ramjet, originally dropped from a B-29, is now carried to test altitudes of 30,000 ft. in a modified North American twin Mustang (F-82).

Combustion chamber of this experimental ramjet is 14 ft. long and 16 in. in diameter. Central compartment located within the inlet section houses radio transmitter, fuel and controls. Four fins at the rear end of the tube provide aerodynamic stability. Big problem now under study by NACA is control of the shock waves forming around ramjet inlets at supersonic speeds.

During the inspection, the Cleveland Flight Propulsion Laboratory was formally renamed the Dr. George E. Lewis Memorial Laboratory in honor of the late NACA director of aeronautical research (AVIATION WEEK, July 19).

Rename Air Lab to Honor Lewis



Among the visitors at the annual inspection of the NACA laboratories at Cleveland Airport today were, left to right, Dr. Jerome C. Hunsaker, chairman of NACA; Admiral T. C. Lonnquest, assistant chief of the Navy Bureau of Aeronautics, and T. P. Wright, vice president of Cornell University and a member of NACA. The laboratory was renamed to honor the late George W. Lewis, flight propulsion pioneer.

Jet Engine Made Here Hit Speed of 1,600 Mph.

Revolutionary strides in supersonic speed engine research, including a ram-jet missile clocked at more than 1,600 miles an hour, were disclosed here today as the huge National Advisory Committee for Aeronautics laboratory at Cleveland Airport was renamed in honor of the late George W. Lewis, NACA research director for 27 years.

Henceforth the sprawling research facilities will be known as the Lewis Flight Propulsion Laboratory. Lewis, who died last July, was largely responsible for the selection of Cleveland as the site of the engine research center.

The research developments, unveiled to approximately 500 top aviation and military officials, included:

ONE—A 16-inch diameter ram-jet engine, enclosed in a configuration that may be used in supersonic flight, which has provided performance information at speeds up to almost two and one-half times the speed of sound. The ram-jet engine was described by Carlton Kemper, NACA executive engineer, as the only power plant now known which shows promise of practical application in propelling aircraft at extremely high speeds.

TWO—Development of a supersonic compressor for turbo-jet engines in which a single row of blades does the work of five rows of ordinary blades. This means that the size of present jet engines may be decreased without loss of power, or that more power can be produced in engines without changing size.

THREE—Unveiling for the first time to public inspection the world's largest supersonic wind tunnel, capable of testing aircraft at speeds up to twice that of sound under temperature and atmosphere conditions met at 35,000 feet.

In renaming the $37,000,000 propulsion research center for the late Dr. Lewis, the NACA paid tribute to one of the pioneer advocates of aviation research. Participating in the ceremony were Dr. Jerome C. Hunsaker, NACA chairman, and Vice Admiral Emory Land (Ret.), president of the Air Transport Association.

"I believe I am safe in saying," Admiral Land told the assembled aviation experts, "that should we not have this great physical plant, and the efficiently organized team of 6,000 participants in its work, the United States would not now have the measure of security in the air that could come only with such effort as this laboratory affords."

CLEVELAND NEWS, TUESDAY, SEPTEMBER 28, 1948

THE CLEVELAND PRESS, Tuesday, Sept. 28, 1945

1800-MPH Ram-Jet Engine Unveiled at NACA Lab

A new ram-jet engine that traveled at a speed of nearly 1800 miles an hour in drop tests was unveiled here today by U. S. flight experts.

Business executives in the nation's aviation industry and top military leaders were introduced to the "flying stove pipe" at the annual inspection tour of the National Advisory Committee for Aeronautics flight propoulsion research laboratory at Cleveland Airport today.

This multi-million-dollar test unit was renamed the Lewis flight propulsion laboratory in ceremonies by NACA leaders at the opening of the three-day inspection tour.

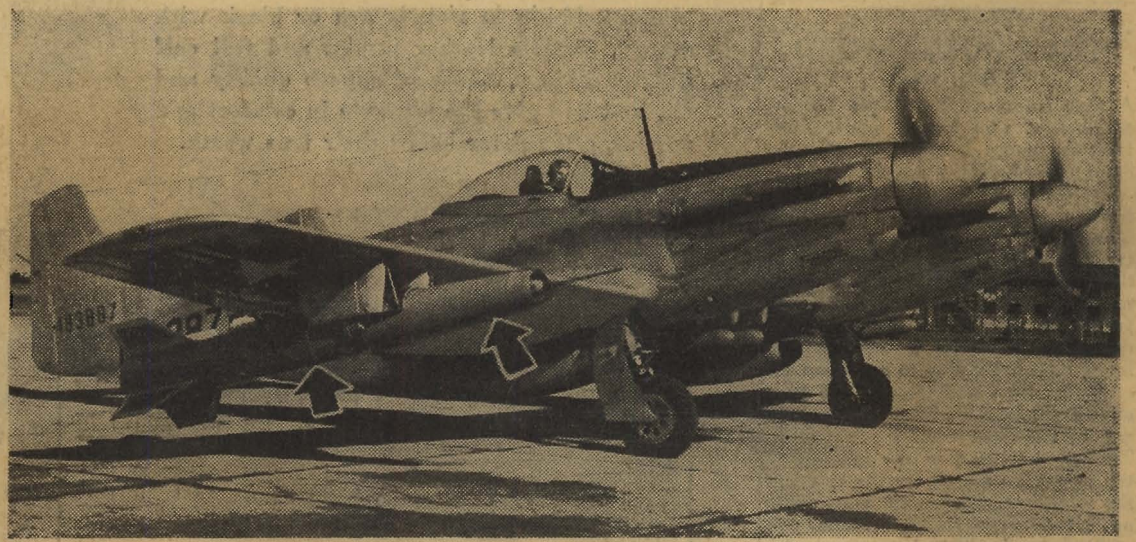
Other highlights of the inspection tour included:

FIRST SHOWING of the largest supersonic wind tunnel in the world, which goes into operation here soon.

DEVELOPMENT of an experimental air compressor which promises to decrease the size of jet engines without loss of power, or produce more power without change in size.

NACA laboratories here and at Langley Field, Virginia, developed the ram-pet engine.

It was taken from here, carried to above 30,000 feet over the ocean off Virginia before being dropped. It reached the 1800 miles per hour speed while diving toward the water.



HOW THE NEW RAM-JET ENGINE (arrows) is attached to a plane to achieve planned speeds of almost 1800 miles an hour.

The ram-jet engine is as simple as a rocket but is able to produce more power for the fuel it spends.

It is a long tube with no moving parts. The front inlet slows down and compresses incoming air. Fuel burns and expands the incoming air in the combustion chamber. The exhaust nozzle accelerates escaping gases to provide push.

Both turbo-jet and ram-jet engines will be studied at speeds of about 1400 miles per hour in the new supersonic wind tunnel at the Cleveland laboratory. This doubles the speed possible in the previous wind tunnel.

The test section, eight feet high and six feet wide, can duplicate flight temperatures and pressures up to 35,000 feet altitude.

Dry air for the tunnel tests is provided by the largest air dryer ever built in this nation. Laboratory experts said it could dry 2,200,000 cubic feet of air per minute.

Cleveland Press Oct 7, 1948

Today's Business—
John W. Love

Metals have been used in engines so exclusively for so long—ever since we've had engines—that it is hard to imagine substances coming in to take their place, or even part of their place. But others begin to do so, and they are so new they have to have a new word. The word is ceramels.

At the Lewis Flight Propulsion Laboratory, new name for the Cleveland laboratory of the National Advisory Committee for Aeronautics, a good deal is being done with ceramels. Much of it isn't talked about, but enough has been getting out from various sources to fill a few paragraphs in the technical journals.

Ceramels, as the reader readily guesses, are materials made up by mixing ceramics and metals. They have the ability to resist extraordinarily high temperatures, and this is what commends them to the technicians who are working on the various types of the heat engine —turbo-jet, ramjet and rocket.

Ceramics, in the form of earthenware, and metals, beginning with bronze, have both been used since the dawn of civilization. Comes the jet engine, and for the first time in thousands of years these two fundamental materials begin to be mixed to form one substance.

There is more than the suggestion that they will eventually open up a world of power generation at super-temperatures. To begin with, they will serve the planes of supersonic speeds. "Super-duper alloys," Metal Progress calls them in a recent editorial. Everything about them is super, or beyond. Time will come when the specialists grow more definite, but with international affairs in the shape they are, that day may be distant.

There are people who say civilization itself won't stand up under the temperatures which can be generated today. They may, if they wish, use the possibility that the wedding of ceramics and metals, now brought about after 10,000 years or so, could facilitate the catastrophe. As metallurgists would say, that is beyond the scope of this paper.

Ceramels Are New Substances in New World of Jet Engine

The generation of atomic power is a field in which these alloys, or rather mixtures, is likely to be valuable. The question remains, however, whether anything can be found which will withstand a really broad range of the temperatures possible in atomic fission.

Used in parts of an engine, the ceramels appear to be able to maintain their shapes and strengths at temperatures which would melt ordinary carbon steel. They are not in the same proportion superior to the alloy steels employed in aircraft engines, of course, but they do represent a significant step forward. The advance has been expressed as one of 800 degrees.

Long after the parts of an old-fashioned steam engine would have bent and even melted, for example, parts made of ceramels perform at highest efficiency.

The ceramels consist of several hundred formulas or recipes. One of the first and simplest was that material for cutting tools which reached this country after the First World War, tungsten carbide. It wasn't called a ceramel, but it meets the definition.

In the main the new technique consists of bonding nonmetals, such as oxides and carbides, with pure metals or their alloys in smaller proportions. Aluminum oxide, for example, is mixed with a metal like titanium. This is one direction in which the metallic titanium now being manufactured by du Pont is being employed in research.

The manufacturing processes include a good deal of the art of working in powdered metals which has been coming forward in the last 10 years.

Besides the Lewis laboratory in Cleveland, the Office of Naval Research and New York State College of Ceramics are working in the field. Several private companies are in it, also, such as Kennemetal of Latrobe, Pa.