Press Release

October 6, 1947

RESEARCH INDICATES PROMISE OF ULTRA-HIGH SPEEDS WITH RAM JETS

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A demonstration of ram-jet flight research was made here today by NACA pilots before a gathering of leading industrial and military engineers who were invited over a three-day period to inspect the facilities of the NACA's Flight Propulsion Research Laboratory and to be brought up to date on the latest advances in aircraft propulsion research.

The ram-jet engine is one of the simplest means ever devised for propelling aircraft. Frequently dubbed the "Flying stovepipe" if consists in simple form of a chamber, open at both ends containing fuel injection nozzles and a burner similar to a gas burner on a kitchen range. Air is compressed upon entry into the chamber, (the higher the forward speed, the greater the compression) mixed with a spray of fuel and ignited at the burner. The exploded gases are ejected rearward as in jet propulsion causing the aircraft to be propelled forward.

Because compression increases with forward speed, the ram-jet appears most attractive for supersonic flight within the range of atmosphere. In fact, it is indicated from theoretical computations, verified by experimental research, that a simple, very light-weight ram-jet engine

would produce at twice the speed of sound a thrust equivalent to that produced by seven or eight of the largest reciprocating engines with propellers.

Despite the apparent simplicity of the device which holds so much promise for high-speed travel, a considerable amount of intensive, systematic research is required before a practicable ram jet can be developed. Among the problems are: the maintenance of combustion in a high velocity air stream; improvement of combustion efficiency; more effective conversion of velocity energy to pressure energy; and a satisfactory means of getting a ram-jet equipped airplane up to the speed required to efficiently compress air by ram (from 400 mph). Notable advances have recently been made on all these problems causing belief that the ram jet may eventually prove feasible of successful development.

So far, no aircraft has yet been propelled by a ram-jet engine. The NACA demonstrated flight research techique today by suspending a small ram-jet engine beneath the fuselage of a Northrop P-61 airplane. The main purpose of this test arrangement is to study means of starting combustion and controlling the flame in a relatively high velocity airstream.

The particular ram-jet used in the demonstration had a narrow rectangular cross section and was mounted inside a small wing section. The rectangular ram jet engine has several advantages, among them being easier construction of a variable area discharge nozzle, easier construction of the flame holder (a device for keeping the flame from being blown out by the air as it rushes through the engine), and adaptation to location entirely within the wing of an airplane.

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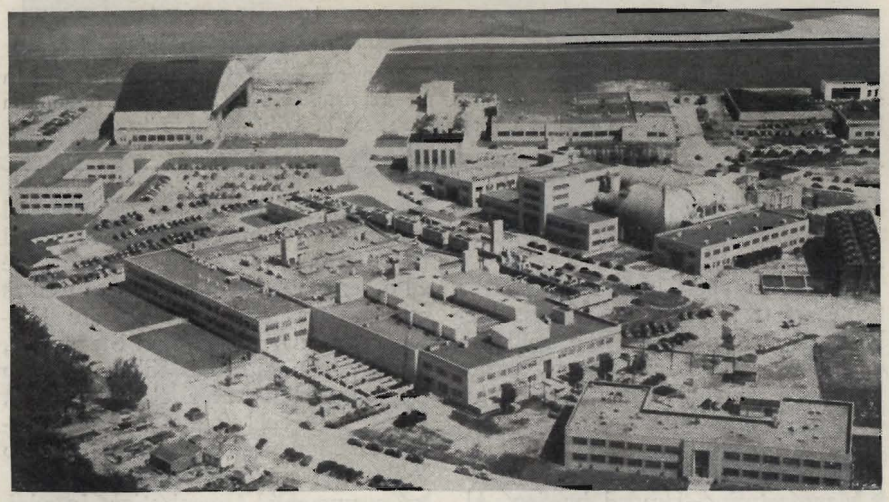
Vol. 47 No. 16

AVIATION WEEK

Oct. 20, 1947

INCORPORATING AVIATION AND AVIATION NEWS



JET ENGINE TEST CENTER: Aerial view of the National Advisory Committee for Aeronautics' flight propulsion laboratory located on the edge of Cleveland Municipal Airport. Largest wind tunnel visible is the altitude tunnel. Largest building in the foreground is the engine research center where new materials, fuels and lubricants for jet engines are under development. (NACA Photo)

Supersonic Compressor, New Ramjets Revealed at NACA Show

First inspection of Cleveland Flight Propulsion Research Laboratory unveils jet engine progress to 1,000 engineers and executives.

By ROBERT HOTZ

Results of the first solid year of intensive research on turbojets, ramjets and rocket engines by the Flight Propulsion Research Laboratory of the National Advisory Committee for Aeronautics were revealed last week in the first annual inspection of NACA's Cleveland, Ohio facilities.

Participating in the inspection were 1,000 aviation executives, engineers and military representatives who also saw Dr. Hugh L. Dryden, new NACA research director, presiding in his new role for the first time.

▶ **Improvements Loom**—The NACA show indicated that while jet and rocket engines are still in a relatively crude state, basic research has progressed considerably farther than is generally realized. As a result substantial gains in the power, durability and produceability of turboprops, turbojets, ramjet and rocket engines loom in the immediate future.

Practically no work is being done on reciprocating engines in the vast research laboratories on the edge of Cleveland Municipal Airport that were originally built to make possible a 4,000 hp. reciprocating engine.

The 4,000 hp. engine required testing facilities to produce 20 lb. of air per second. Jet engines now under test at Cleveland already require 80 lb. of air per second and jets now on the drawing board will require up to 400 lb. per second. As a result an extensive construction program is underway to provide new tools for the high altitude and supersonic testing required by the now well-defined trend in jet and rocket progress.

In addition to two supersonic tunnels already operating, two new ones are under construction, one of which will reach mach number 5. The other will be many times larger than any supersonic tunnel now undergoing construction.

▶ **Supersonic Compressor**—Probably the outstanding development exhibited at Cleveland was the NACA developed supersonic axial flow compressor that has been successfully operated in freon gas and free air at supersonic speeds. This development permits a single stage compressor to do the work that formerly required multi-stage compressors. According to Dr. Dryden the supersonic compressor promises drastic reductions in size, weight and complexity of construction at a cost, at least initially, of some loss in efficiency. The laboratory is also working on mixed flow type compressors.

Among the other fields in which intensive research is under way are:

• **Ramjets**—Speeds up to 1,500 mph. have been attained by 16 inch test model ramjets in drop tests off the Virginia Capes. Five different designs are now under test. Basic research completed to date indicates that ramjet powered, load-carrying aircraft with ranges of from 2,000 to 4,000 miles at speeds of about 1,400 mph. are now possible. Main lines of ramjet research include avoidance of flame blowout at supersonic speeds; improvement of combustion efficiency; better pressure recovery methods and the search for the most efficient means of bringing an aircraft up to the high speed (above 400 mph.) required for initial compression in ramjets.

• **Fuels**—Strong indications are that metallic compounds will replace current types of fuel in jet and rocket engines offering an increase of combustion efficiency per unit up to 20 times that of conventional fuels. Only the eventual use of nuclear energy appears to offer more promise than the metallic compounds based on boron and aluminum.

• **Materials**—Development of a new type of material called Ceremal—a fusing of ceramics and metallic alloys—shows promise for turbine blades. Other developments include coating of metallic alloys with ceramics and considerable progress in working ceramic materials into the intricate shapes required in jet engines.

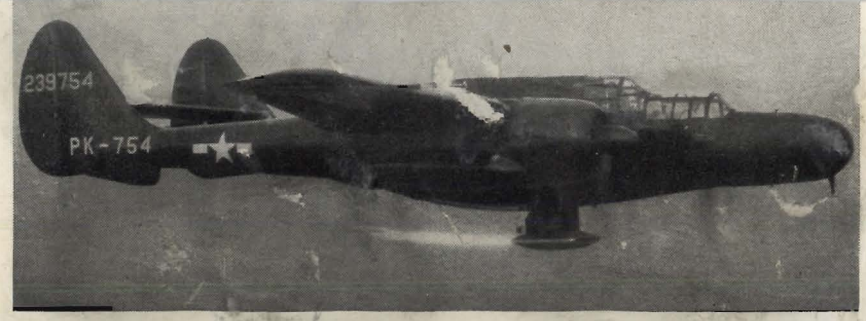
• **Thrust Augmentation**—Three methods of thrust augmentation have reached an advanced state of development—afterburning in the tail pipe; water-alcohol

injection and air bleed-off with secondary combustion and jet. Afterburning appears to be the most economical affording a 15 percent increase in thrust with a fuel flow of 30 gal. an hour. Water-alcohol injection offers a 25 percent increase with 60 gal. per hour additional fuel. Air bleed-off has given the best results—an 85 percent increase in efficiency requiring 150 gal. more fuel per hour. Using air bleed-off it is possible to get 7,000 lb. static thrust for short periods from a normally rated 4,000 lb. jet engine.

• **Icing**—Two methods of combatting the critical intake icing problem in jet engines are being studied: an inertia separator that keeps the heavier supercooled moisture droplets out of the airflow to the compressor; and bleedback of hot exhaust gas to heat the air intake.

• **Diffusers**—Experiments are under way with three types of diffusers for turbojet and ramjet air intakes to minimize shock waves effects on the air flow. Spike diffusers aim to keep the shock waves well in advance of the air intake flow while perforated and convergent-divergent diffusers are designed to keep the shock waves out of the main flow to the compressor in turbojets and burners in ramjets.

Among other problems under investigation are high altitude blow out, lubrication, fuel distribution controls and sweat cooling for rocket engines.



EXPERIMENTAL RAMJET: Flight testing of an experimental rectangular ramjet is shown at the National Advisory Committee for Aeronautics Cleveland flight propulsion laboratory. Other NACA ramjets have attained a speed of 1,56[illegible] in free flight.

In his talk, Mr. Lundin said 40% increase with tail-pipe burning for a fuel flow of 3 pounds per second to the tail-pipe burner (3 lbs/sec. is 1850 gallons per hour) He also said 26% increase with water-alcohol injection for a liquid consumption of 6 lbs/sec. The maximum augmentation obtained with the bleed-off system was over 80% for a liquid consumption of 15 pounds per second. (9250 gallons per hour)

Congressional Group Splits for Studies

The Congressional Airy Policy Committee and its 15-member Industry Advisory Council, now dispersed over the U. S. and Europe, last week evidenced little likelihood of action before the reconvening of Congress in January, although the group's chairman, Sen. Owen Brewsted (R., Me.) has summoned the wandering membership to Washington Oct. 24.

After inspection tours of the carrier Midway at Norfolk, Maxwell Field at Montgomery, Ala., and Eglin Field, Fla., under Brewster's plans, the four subcommittees that have been appointed would immediately set to work in their specialized fields. It appears unlikely, however, that a sufficient number of committee members and advisors will return to Washington for group action.

Key subcommittee on combat aircraft, designated to draw up the national defense aviation program which may largely determine the future of civilian as well as military aviation, is headed by Rep. Carl Hinshaw (R., Calif.). In addition to its primary objective of ascertaining combat plane requirements, the subcommittee will

CLEVELAND NEWS
OCTOBER 9, 1947

U. S. Rocket Plane Hits 1,700 MPH

BY ROBERT S. BALL
Staff Correspondent of the Detroit News

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DETROIT (AP)—American robot rocket planes have crashed the sonic barrier at blistering speeds in the neighborhood of 1,700 miles an hour, a high government official revealed today.

The flights have been carried on for months from a lonely island off the Virginia coast, where the National Advisory Committee for Aeronautics (NACA) has a small experimental station.

This disclosure of American progress in the field of supersonic flight—whcih is flight faster than the speed of sound—was prompted by publication Wednesday of accounts from England of the 900-mile-an-hour flight of pilotless rocket craft.

As in the English experiments, the American focket ships are launched at high altitude from a fast-flying bomber. Their controls are pre-set to send them diving into the sea after a flight of 20 to 30 miles.

Telemetering devices installed in the robot automatically transmit pertinent data to observers aloft and on the ground. Radar also is used to track the rocket plane throughout its brief but sensational flight.

"It will not be many months before we have a piloted aircraft break through the sonic barrier (750 miles an hour at 30,000 feet), although he will be flying a turbojet plane with a rocket boost," the Government spokesman said.

It was revealed that great progress had been made in recent months in perfecting controls for the supersonic aircraft, whose wings are so sharply swept back that they resemble a "V."

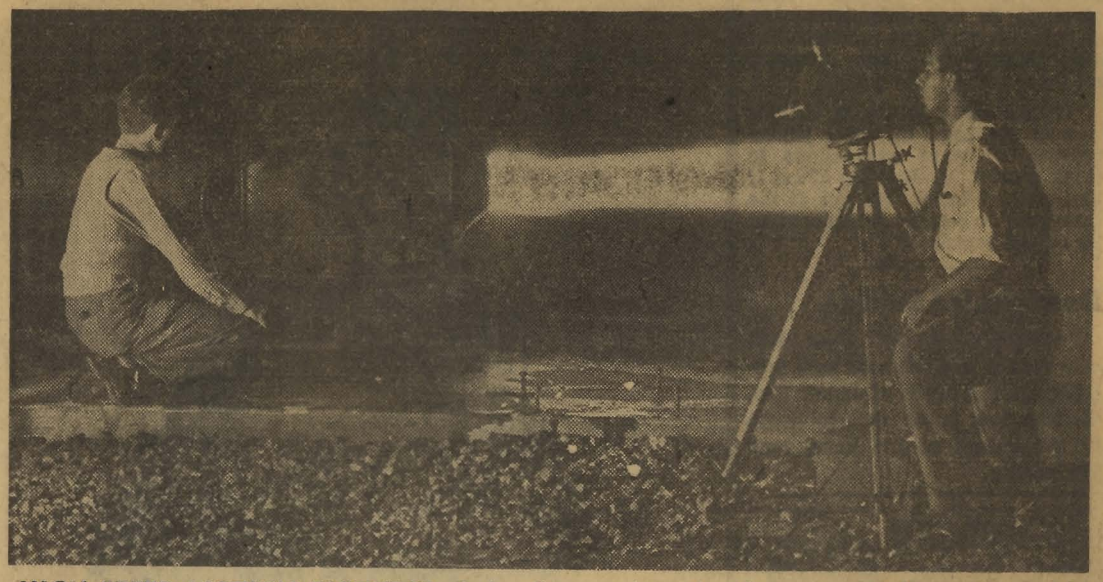
Today's disclosures coincided with, but were not a part of, the first annual inspection by military and civilian engineers of the NACA's flight propulsion research laboratory at the edge of the Cleveland Municipal Airport.

This $50,000,000 government research plant, which Detroit sought in 1940, has been operating at a constantly accelerating pace for five years. It now has a staff of more than 2,000 technicians.

Among the 270 civilian engineers who toured the vast laboratories Wednesday was Charles A. Lindbergh, who headed the NACA committee which originally planned the facility in 1940. It was his first visit.

CLEVELAND PRESS
October 10, 1947

Experts View Supersonic Devices



HIGH SPEED MOTION PICTURES of the flame exhausting from a special burner used for the study of thrust augmentation in jet engines at the Flight Propulsion Research Laboratory enable scientists to study the operation.

By CHARLES TRACY
Aviation Editor

Behind guarded gates of NACA's Flight Propulsion Research Laboratory at Cleveland Airport, America's top aeronautical brains reviewed for the last three days developments toward one of avaition's major goals—supersonic flight.

The saw a $50,000,000 research center and the 2000 technicians and scientists it employs struggling to produce power plants and fuels to drive planes beyond the speed of sound—763 miles an hour.

Although rocket and ram-jet missiles have been flown at speeds up to 1700 miles an hour, NACA's function is to furnish data which will make supersonic flight safe, reliable and useful.

During tours through the plant they witnessed elaborate demonstrations of new materials and methods.

Whirling Turbines

In darkened test cells they saw whirling turbines, cherry red from 1800-degree heat, watched by television as supersonic shock waves reacted on models in the high-speed wind tunnel and saw thundering rocket engines spit flames in actual test runs.

Goals are to increase reliability, life and performance of wartime-developed jet engines.

The visitors were told of new fuels being investigated—fuels a hundred times more powerful than current high test aviation fuel.

If research objectives on ram-jet engines are attained NACA officials said, it soon may be possible for planes leaving New York at noon to arrive on the West Coast an hour before noon, Pacific time. That would be coast to coast in three hours.

A demonstration of this powerful new engine was made by NACA pilots. With a small ram-jet suspended beneath the fuselage of a Northrop P-61, they passed low at high speed across the airport. Flames streaking from the model indicated its operation and illustrated how actual flight research is carried out.

"Flying Stovepipe"

NACA scientists said the ram-jet is one of the simplest means ever devised for propelling aircraft. Frequently dubbed "the flying stovepipe" it consists of a chamber, open at both ends, containing fuel-injection nozzles and a burner similiar to a gas burner on a kitchen range.

Because compression increases with forward speed, the ram-jet appears most attractive for supersonic flight within the range of the atmosphere. Research has indicated that a simple, light-weight ram-jet engine would produce, at twice the speed of sound, a thrust equivalent to that of seven or eight of the largest conventional engines with propellers.

Current models are being tested from Wallop Island on the Virginia coast where they are launched by speeding bombers and followied by telemetering instruments which record flight characteristics.

CLEVELAND PLAIN DEALER
OCTOBER 8, 1947

ARROW JET PLANE PICTURED ON WAY

Gas Men Hear Prediction of NACA Official

Supersonic jet airplanes of the future may be shaped to resemble an age-old weapon, the arrow, according to John F. Victory, executive secretary of the National Advisory Committee for Aeronautics.

Speaking yesterday before a section meeting in Hotel Hollenden at the 29th annual convention of the American Gas Association, Victory predicted that "really high speed flight" of around 1,500 miles an hour would "require extremely thin wings of such radical sections as diamond or circular arc shapes."

Most promising of the various jet engines now undergoing development is the "ram-jet" under investigation at the Cleveland laboratory of the NACA, Victory said.

"Aside from its fuel control, the ram-jet has not a single moving part," he explained. "It is a simple tube into which the air is rammed and compressed by the forward speed of the airplane, and in which fuel is supplied and burned.

Effective Compression Ratio

"The ram-jet system promises to be an efficient form of propulsion for flight at 1,500 miles an hour. At that speed its compression ratio will be about eight to one, approximately the same efficiency as is now obtained in the best reciprocating engines."

Victory pointed out that the extremely thin wings needed in the future "will severely limit the room in which adequate internal strength can be developed. But the structure of future high-speed airplanes will have to be enormously stronger, yet lighter and of small dimensions."

When the jet age finally arrives, planes will probably fly either at speeds of less than 600 miles an hour or more than 800 miles an hour, according to Victory. In the "transonic region" between those two speeds, stresses are created which form dangerous shock waves.

In earlier talks before the convention, two other government officials renewed warnings of a "winter of concern" ahead for suppliers of natural gas, oil and even coal.

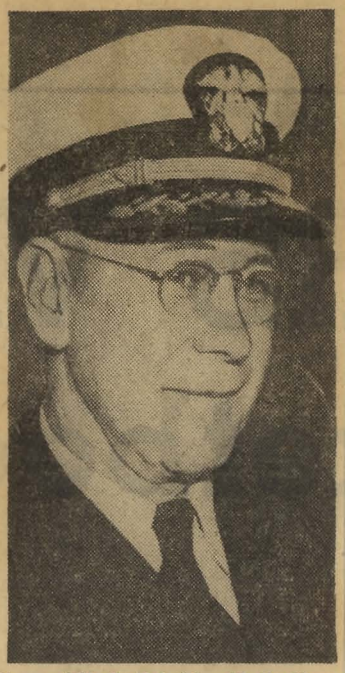
Barring unseasonably warm weather, there will be shortages of fuel this winter throughout the area from the Appalachians to the Rockies, according to Max W. Ball, director of the oil and gas division of the Department of the Interior.

During the next five years, Ball said, supplies of fuel oil will probably continue to be inadequate to meet vastly increased demand. Natural gas supplies will gain steadily, while after this year coal will be relatively plentiful unless great amounts are exported.

Nelson Lee Smith, chairman of the Federal Power Commission, called on the industry to impose its own "sensible restrictions" at the distribution level to meet the prospective curtailment of supplies this winter.

Ralph A. Sherman, assistant director of the Battele Memorial Institute in Columbus, said he believed that use of atomic energy for producing electricity would have little effect on the demands for gas.

Cleveland News October 8, 1947



Capt. W. S. Diehle, U. S. Navy

Airport Lab's Secrets Open For First Time

Hitherto secret precincts of the sprawling NACA flight propulsion laboratory at Cleveland Airport were thrown open to 300 aircraft industry executives and research experts today for the first time since the laboratory was opened in 1942.

During the next three days more than 1,000 of the nation's leading aviation experts, both military and civilian, are to view demonstrations of the developments and research projects under way at the laboratory.

Hosts at the three-day invitational open house were John F. Victory, executive director of the National

J. W. Crowley, assistant director o research, NACA

Advisory Committee for Aeronautics, and E. R. Sharp, director of the Cleveland facility.

Also on hand for the mass inspection were Dr. Jerome C. Hunsaker, chairman of NACA, and Dr. Hugh Dryden, NACA director of aeronautical research.

Schedule of events for the day included a preliminary statement and exposition of the experimentation now being carried forward, particularly in the field of jet and rocket fuels, by Sharp and Victory.

The inspecting group today was composed largely of representatives of the aircraft manufacturing industry. Tomorrow's guests will be Army, Navy and Marine aviation experts. Friday the laboratory will be visited by representatives of Cleveland industry, especially those engaged in the manufacture of aircraft parts and accessories.

CLEVELAND NEWS

VOL. 106—NO. 238
FIVE CENTS

THURSDAY, OCTOBER 9, 1947

Wirephotos — Exclusive Evening News of the Associated Press, International News and Reuters

Top 1,400 M.P.H. in U.S. Jet Engine Tests

BY WALLACE R. KATZ

Speeds in excess of 1,400 miles an hour have been recorded by United States Navy ram-jet engines in tests off the Virginia capes, government officials disclosed here today.

The disclosures were made public as the second group of 300 visitors—mostly military—went through the Cleveland laboratory of the National Advisory Committee for Aeronautics on the second day of the big facility's first annual open house.

• • •

A recent estimate from England places the speed of a British engine at 900 miles an hour in a drop test.

In commenting upon that here, officials who asked not to be identified, said that if that represents the peak of achievement, the British are "far behind" both the Navy and the NACA, which now has under way an extensive drop test program with ram-jet engines, with speeds expected to reach up to 2,000 miles an hour.

At yesterday's first demonstrations at the laboratory's first inspection, four newspapermen present were cautioned orally and in writing that they could not report anything of what they saw or heard without approval of Washington officails.

Today, apparently, the lid came off. International News Service quoted M. B. Ames, chief of NACA's aerodynamics branch, as saying "flying stovepipe" ram-jet guided missiles launched from B-29s have reached speeds up to 1,700 miles an hour.

continued on next sheet

Full-Page Spread on Pg. 1, top of page

"2 h 1400 MPH. in U.S. Jet Engine Tests" (continued)

In its only test thus far, the Associated Press reported, the NACA, using the least powerful of several sizes of ram-jet engines, hit a measured speed of nearly one and a half times the speed of sound, or slightly more than 1,000 miles an hour.

• • •

Another test with a somewhat more powerful modification of the same engine is scheduled shortly at its testing station north of the Virginia capes, with an expected speed of 1,200 miles an hour.

More powerful engines of the same overall diameter are being readied for subsequent tests, with expected speds of 1,800 to 2,000 miles an hour.

This particular type engine is taken to altitudes of around six miles under the belly of a B-29 and dropped into the Atlantic.

The Navy's tests, which have been under way at least two years, are more spectacular in that the ram-jet engine is launched from shore by having attached to it our huge rocket motors. These rockets bring the engine up to the speed necessary to provide the ram effect, which enables the engine to fly by itslf.

The United States holds the world's speed record for piloted aircraft at 650 miles an hour. Combat-type airplanes now are being designed and built for speeds exceeding 90 per cent of the speed of sound. That puts them into the trans-sonic range, the unexplored area where the problems of both sub-sonic and supersonic flight are encountered.

The speed of sound normally is considered 760 miles an hour,

Turn to Page 7, Column 6

1,400 M.P.H.

Continued from Page 1

but this varies 100 miles an hour in both directions with change in temperature.

The Virginia project has been known as the "Bumble Bee." The engine was shot off the New Jersey coast into the ocean.

Both the Navy and the NACA get actual in-flight recordings from their high-speed missiles by means of telemetering, the automatic radio reporting to ground stations of the recording instruments in the missile. These records also are checked by radar measurements.

No Moving Parts

A ram-jet engine has no moving parts, except itself. The compression of air needed to burn fuel is attained by the engine's own forward speed. Because of that, it cannot operate below 400 miles an hour. For economic operation a considerably higher speed is desirable. The faster the movement, the more efficient the engine.

Another limitation of the ram-jet is altitude, since it must stay within the range of the earth's atmosphere. The higher it goes, the higher its speed must be to obtain the needed volume of oxygen.

Engineers are not willing to predict any early achievement of supersonic speed in piloted aircraft, the simple fact being that nothing properly described as an aircraft has yet exceeded the speed of sound in flight.

"Missile" Experiments

The tests in this country as well as the ones in England are more properly described as being "missile" experiments, since they do not involve the use of aerodynamics to obtain lift.

Tomorrow the NACA will entertain another group of 300 guests, most of them Cleveland manufacturers allied with the aircraft industry as makers of parts and accessories.

The well-organized and tightly-timed tour will take the visitors to 16 demonstrations and lectures and will show in details, never previously revealed to a civilian group, how the Cleveland laboratory is expanding the nation's aviation research and know-how.

Today's guests included Brigadier General E. P. Sorenson of Wright Field; Rear Admiral W. G. Tomlinson, office of the chief of naval operations; Colonel J. B. Jacob, secretary of the Research and Development Board of the new unified services, and Charles A. Lindbergh. Lindbergh was a member of the original committee that planned the Cleveland laboratory but this was his first visit to the research center.

CLEVELAND NEWS, FRIDAY, OCTOBER 10, 1947

Supersonic Speed Given Lab Preview

Awed by the disclosure that the U. S. Navy and the National Advisory Committee for Aeronautics have pierced the curtain of supersonic speeds with their tests of ram-jet engines, a hushed crowd of 300 Cleveland aircraft parts and accessory manufacturers today watched demonstrations on the final day of the first annual inspection of the NACA's Flight Propulsion Laboratory at Airport.

A "technical revolution" is on, Dr. Hugh L. Dryden, director of aeronautical research for the NACA, told today's visitors, many of whom had never before been admitted through the gates of the mammoth research center.

Tells of Goal

That "revolution," Dr. Dryden said, is a development of the wartime use of jet engines and rockets. One of NACA's major goals, he related, is the attainment of supersonic flight (above 763 miles an hour), of "piloted and pilotless aircraft."

The function of the NACA, he explained, is to furnish the basic scientific and technical data which will make supersonic flight "not only possible but safe, reliable and useful."

Turn to Jets

Confirming a report contained in an exclusive News story from Langley Field a week ago, Dr. Dryden told his Cleveland visitors that "little work" is now being done here on reciprocating engines because "they already have reached an advanced state of development."

Less than 5 per cent of the laboratory's current research is being directed to reciprocating engines. The big job of the present—and the future—is with turbo-jets, rockets and the ram-jet. The latter, Dr. Dryden said "is in a somewhat earlier state of development and use."

He divided the "speed spectrum" of NACA test engines as follows:

TURBO-PROPS, for speeds up to those at which high propeller efficiencies can be maintained—450 to 550 miles per hour.

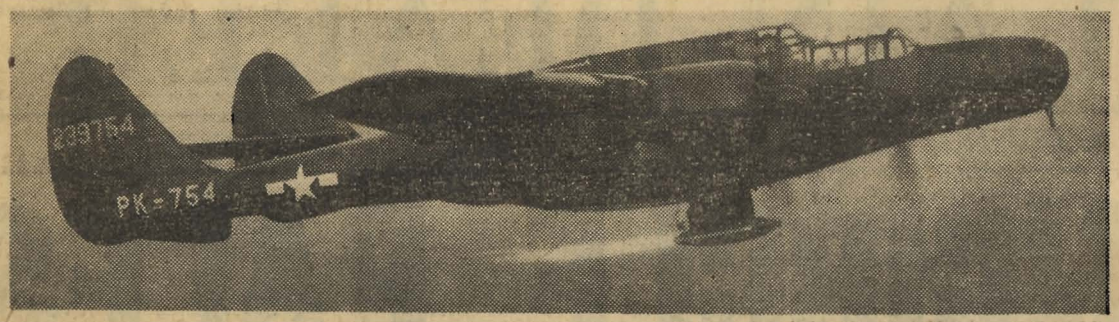
TURBO-JETS, for speeds from 500 miles to speeds of one and a half times the speed of sound.

RAM-JETS, for speeds from 763 miles an hour to "several times" such speeds.

ROCKETS, for "extremely high" speeds with bursts of power in flights outside the earth's atmosphere.

To those close to NACA developments but whose mouths have been closed by reasons of military security, Dr. Dryden's revelations did not constitute news. Speeds of more than 1,000 miles an hour were attained at an isolated Virginia station by NACA two years ago. A speed of 2,000 miles an hour "may be expected soon," officials said.

CLEVELAND PLAIN DEALER, FRIDAY, OCTOBER 10, 1947



RAM-JET RESEARCH with an airplane serving as a flying test bed was demonstrated here yesterday when a P-61 Black Widow fighter plane carrying a model ram-jet engine suspended under the fuselage was flown for the benefit of visitors to the inspection of the flight propulsion research laboratory of the National Advisory Committee for Aeronautics at Cleveland Airport. The ram-jet engine is started only after high speeds are attained and its starting characteristics — thrust, fuel consumption and combustion efficiency — are then determined at various altitudes.

HEAR ROCKET WILL GIVE SUPER-SPEED

Air Lab Visitors Told 1,500 M. P. H. Is Only Start

Speeds of 1,500 miles an hour which have been attained by pilotless aircraft or missiles launched experimentally by the United States Navy may be exceeded by a wide margin in the not too distant future when rocket engines replace the ram jet engines with which the navy's missiles were powered, it was indicated here yesterday.

Rocket engines already have reached a "state of practical utility" and research effort will greatly expedite their development, military representatives attending the second day of the first annual inspection of the flight propulsion research laboratory of the National Advisory Committee for Aeronautics were told.

In the "speed spectrum" of the various types of jet engines, the rocket should be placed at the top as the engine for "extreme high speeds, for short burst of power, or for flight outside the earth's atmosphere," Dr. H. L. Dryden, N. A. C. A. director of aeronautical research, told the visitors.

The ram jet engine should be given a position secondary to that of rocket engines in the speed range, Dr. Dryden said. He said the ram jet promised most in the range from sonic speeds, roughly 700 miles an hour, to speeds several times that of sound.

England Behind U. S.

The ram jet, Dr. Dryden added, is in an earlier state of development and use than the rocket or the turbine-jet engines. He described it as the most attractive power plant for speeds in excess of about 1,000 miles an hour where reasonable flight distances are required.

Scientists attending the inspection were besieged with questions as the result of an announcement that the British had obtained a speed of 900 miles an hour from a pilotless aircraft dropped from a Mosquito bomber.

Several scientists, who asked not to be identified, asserted that the British experiment showed England was two years behind America in work on missiles or pilotless aircraft. The NACA instituted a missile research program some three years ago and, a year later, the first craft was launched from the ground at the pilotless aircraft research station at Wallops Island, off the coast of Virginia, they pointed out, adding that the craft attained a speed exceeding 1,000 miles an hour or about one and one-half times the speed of sound.

A Reuters dispatch from London quoted British circles as asserting that the "latest British type of robot rocket plane" would be capable of much higher speeds than the scheduled 900 miles an hour.

"But this speed has been considered sufficient for the preliminary experiments and the required boost was not given to the rocket motor," the Reuters dispatch stated.

The British were not surprised at reports that American robot jet planes have reached speeds of 1,500 miles an hour.

"It will be recalled that the German V-2 accomplished over 3,000 miles a hour but that was, of course, purely a rocket and not a model plane," the Reuters dispatch quoted a "ministry of supply spokesman" as saying.

A talk on the difficulties of maintaining a flame in a jet engine combustion chamber at high altitude was supplemented with a visual demonstration in which a P-61 Black Widow fighter plane carrying a rectangular ram jet engine beneath the fuselage made several fly-bys at low altitude with the characteristic ram jet flame marking its passage.

The P-61 serves as a flying test bed for determining the starting characteristics, thrust, fuel consumption and combustion efficiency of the ram jet at various altitudes. The ram jet is started only after the P-61 has attained high speeds on its regular reciprocating power plant.

U. S. Wingless Rocket Flies at 1500 M.P.H.

WASHINGTON, Oct. 9—(UP)—The National Advisory Committee for Aeronautics said today that a wingless ram jet missile developed a speed of more than 1500 miles an hour in a recent test off the Virginia coast.

The missile, launched from a B-29, was pilotless. It followed a predetermined course and then dropped into the sea.

M. B. Ames, chief of the NACA aerodynamics research branch, said the next step will be to provide the missile with an auto-pilot mechanism which can be controlled remotely from an airplane or a land base. The NACA does not at the moment have any plans for piloted aircraft powered with a ram jet engine, Ames said.

CLEVELAND PRESS
October 9, 1947

For Release A.M., October 10, 1947.

RESEARCH INDICATES PROMISE OF ULTRA HIGH SPEEDS WITH RAM JETS

Cleveland, Ohio, October 10. The possibility of leaving New York at noon and arriving in San Francisco an hour before noon, Pacific time, is in the offing if research objectives on the ram-jet aircraft engine are attained, it was suggested early yesterday by scientists of the NACA.

A demonstration of ram-jet flight research was made here today by NACA pilots before a gathering of leading industrial and military engineers who were invited over a three-day period to inspect the facilities of the NACA's Flight Propulsion Research Laboratory and to be brought up to date on the latest advances in aircraft propulsion research.

The ram-jet engine is one of the simplest means ever devised for propelling aircraft. Frequently dubbed "the flying stovepipe" it consists in simple form of a chamber, open at both ends, containing fuel-injection nozzles and a burner similar to a gas burner on a kitchen range. Air is compressed upon entry into the chamber, (the higher the forward speed the greater the compression) mixed with a supply of fuel and ignited at the burner. The exploded gases are ejected rearward as in ordinary jet propulsion causing the aircraft to be propelled forward.

Because compression increases with forward speed, the ram jet appears most attractive for supersonic flight within the range of the atmosphere. In fact it is indicated from theoretical computations, verified by experimental research, that a simple, very light-weight ram jet engine would produce, at twice the speed of sound, a thrust equivalent to that produced by 7 or 8 of

the largest reciprocating engines with propellers.

Despite the apparent simplicity of the device which holds so much promise for high-speed travel, a considerable amount of intensive, systematic research is required before a practicable ram jet can be developed. Among the problems are: the maintenance of combustion in a high velocity air stream; improvement of combustion efficiency; more effective conversion of velocity energy to pressure energy; and a satisfactory means of getting a ram-jet equipped airplane up to the speed required to efficiently compress air by ram (from 400 mph). Notable advances have recently been made on all these problems causing belief that the ram jet may eventually prove feasible of successful development.

So far, no aircraft has yet been propelled by a ram-jet engine. The NACA demonstrated flight research technique today by suspending a small ram-jet engine beneath the fuselage of a Northrop P-61 airplane. The main purpose of this test arrangement is to study means of starting combustion and controlling the flame in a relatively high velocity airstream.

The particular ram-jet used in the demonstration had a narrow rectangular cross section and was mounted inside a small wing section. The rectangular ram jet engine has several advantages, among them being easier construction of a variable area discharge nozzle, easier construction of the flame holder (a device for keeping the flame from being blown out by the air as it rushes through the engine), and adaptation to location entirely within the wing of an airplane.