

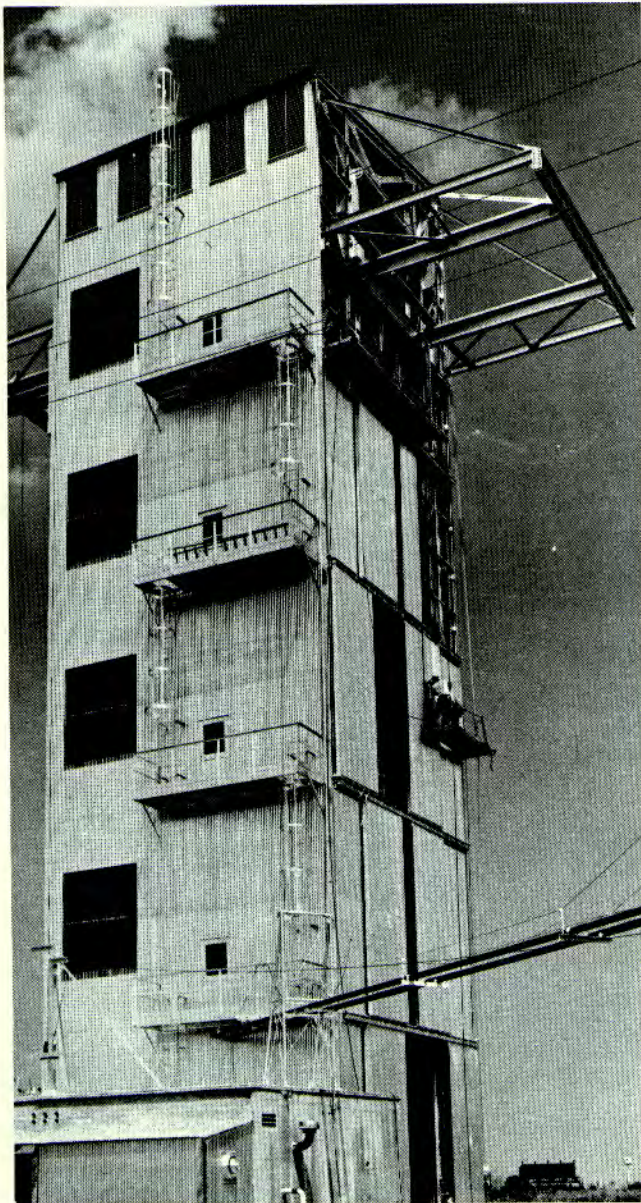
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No. 16

THE PLUM BROOK STORY - A PROGRESS REPORT

(This week ORBIT visited Plum Brook to report on the construction progress of the rocket test facility and the research reactor facility. The first installment is devoted to the rocket project; the second, to appear next month, will cover the reactor. Subsequent stories will be devoted to a number of significant Plum Brook subjects.)



Among the new facilities under construction at Plum Brook is the 117 foot high Dynamics Facility, or "Shake Tower." This silo-like, 30 foot square tower will be used for two types of missile research: structural dynamic testing, and fluid flow investigations.

One of the reasons for failure in missile launchings has been failure of structural components due to compression and bending vibrations of the missile structure which are excited by the rocket motor. For example, steering control gyros, which measure the vehicle attitude can be misled by bending vibrations of the structure. If these bending vibrations are not properly recognized in the design of the steering control the gimbaling motor will re-enforce the bending motion and result in the destruction of the missile.

These vibrations will be simulated in the Shake Tower (left) for study of the problem. The tower is constructed to hold a missile the size of an Atlas, or scale models of larger missiles. Built of structural steel, the tower doors slide open, the beams are dropped out, and the large crane at the top of the tower lifts the missile into place.

Simulating free flight as nearly as possible, the missile will be supported by cables inside the tower and placed on a "soft spring" - one which provides a big deflection with a small weight. The missile will be connected to a large vibration exciter, producing 15,000 pounds force which will excite, or "shake" the suspended missile in a vertical plane. A smaller, 200-pound force exciter will be used for lateral shaking. A power amplifier housed in a concrete block house next to the tower will accuate the exciters.

(Continued on page 2)

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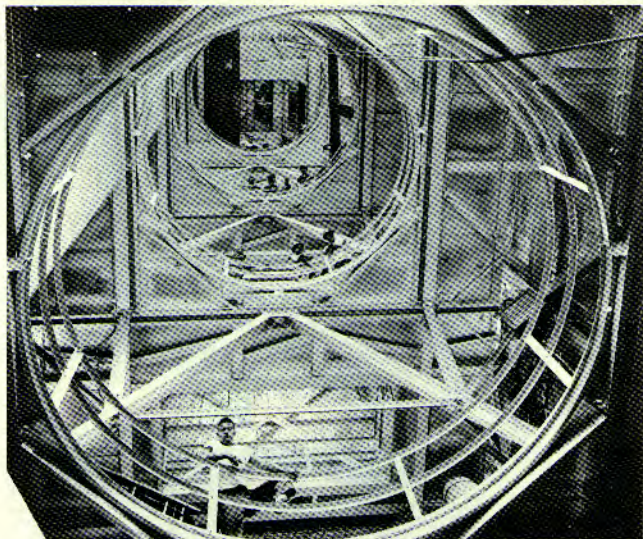
Editor.....Marjorie Hyre

Reporters.....NASA Employees

plum brook (Continued from page 1)

The central control building, which will control all operations, will be located 1000 feet away.

The Dynamics Facility will also be used to study complete rocket systems. The tankage and related pressurization and flow systems, including the turbo pumps, will be investigated. The propellant will not be burned. Combustion chamber pressure will be simulated by a controls device. This will permit studies of the effect of changes of combustion pressures on the flow dynamics. Designed for cryogenic fuels liquid Hydrogen and liquid Oxygen, complete safety features have been incorporated in the design.



Inside the Shake Tower - looking up.

Two Test Facilities Completed At NASA; Experiments Started

By A. L. McCALL

Although the rocket test facilities at Plum Brook are not scheduled for completion before next summer, scientists at the National Aeronautics and Space Administration (NASA) installation are already busy attempting to solve several missile and space vehicle problems.

Two of the test facilities have been completed for some time and are being used each week for experiments and research. Six other installations are nearing completion. The rocket testing facilities are in an area roughly bounded by Taylor, Fox and Ransom-rds. all familiar Perkins-tp thoroughfares of pre-war days.

At the "portable rig" site scale models of rockets or component parts are given tests in one or the other of two bunkers. When a test is being run a trailer is parked about 1,000 feet away. The trailer is connected to the bunkers by means of many cables that carry electrical impulses to start the test and bring back various reports which are recorded from dials and other instruments. Closed circuit television is also used to observe the tests, with cameras in the bunkers and viewing screens in the trailer. The site is off Taylor-rd near Fox-rd.

On Fox-rd west of Taylor-rd is located the "pilot lab" where full scale models of rocket pumps and turbines are given tests based on information received from portable rig experiments. When the "pilot" pumps and turbines are approved they are turned over to manufacturers for production. The full scale model pumps or turbines are made at the NASA Lewis Research Center, Cleveland, "parent" of the local facility.

The fluorine pump testing facility off Taylor-rd is scheduled to be in operation by Jan. 1. Other test sites to be completed between Jan. 1 and next summer are: hydraulics laboratory, turbine testing facility, dynamics facility, pump facility and turbo-pump facility. Each of these six facilities will be connected to a central control and instrumentation building by miles and miles of cable.

During the coming months employees of the Universal Marine Construction Co., Sandusky, will be busy connecting the miles of cable to instrument cabinets and control equipment in the central building. When completed each of the test facilities will be operated and observed by remote control for the protection of NASA scientists. Many types of rocket fuels are to be used in the various tests and extreme safety precautions are being taken to protect employees and equipment.

Approximately 600 control cables will radiate out from the central control lab on Ransom-rd to the six rocket facilities. Nearly 500 pairs of instrumentation cables and eight television co-axial cables will lead

from the various sites to the lab, where experimental data is to be recorded. After installation all of the cables and equipment will undergo countless tests before being put into use.

Another interesting installation of the rocket "lab" is the dynamics facility or "shake tower" as it is known to NASA personnel. The 30-foot square steel building is 117 feet high and will be used for two types of missile research: structural dynamic testing and fluid flow investigations.

Doors at five levels may be opened and beams removed so that a missile the size of an Atlas may be lifted into vertical or launching position by means of an overhead crane. The missile will be connected to a large vibration exciter, producing 15,000 pounds of force to excite or "shake" the test object in much the same manner as on take-off from a launching pad. A smaller, 200-pound force exciter will be used for lateral shaking.

One of the reasons for failure in missile launchings, it was said, has been the failure of structural components due to compressional and bending vibrations of the missile structure which are excited by the rocket motor. Steering control gyros, which measure the vehicle attitude can be misled by bending vibrations of the structure.

The "shake tower" will simulate missile free flight as nearly as possible so that scientists may study the missile or scale model and work out solutions to various vibration problems. The tower will also be used to study complete rocket systems. The tankage and related pressurization and flow systems, including the turbo pumps, will be investigated. The propellant will not be burned, however.

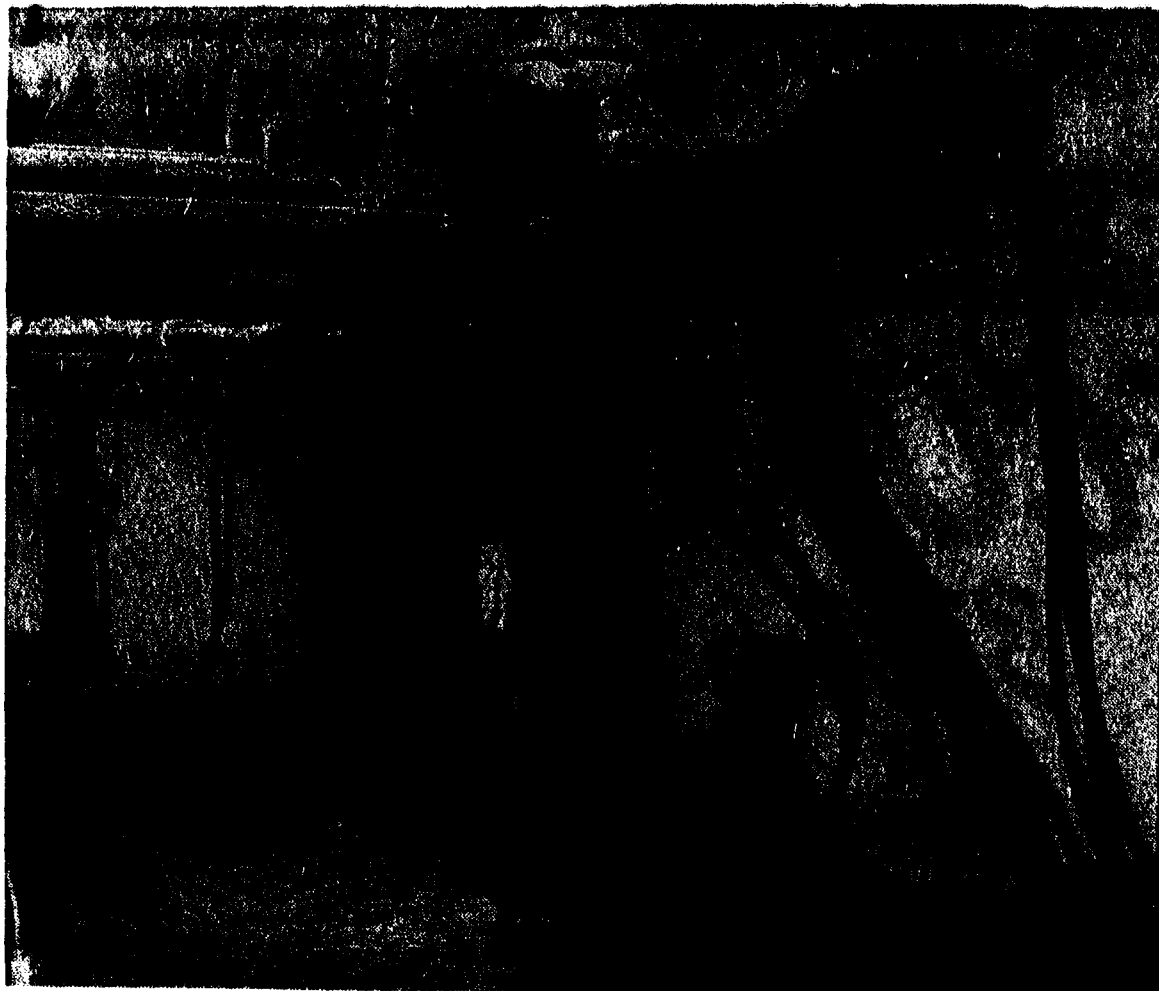
Scientists at Plum Brook and other NASA installations hope to provide the "acorns" from which the future U.S. space program will grow. The scientists are attempting to keep their research program about five years ahead of the current missile and space pace.

Future articles in the Register will keep readers abreast of the research program at Plum Brook, the only installation of its kind in the nation.

Slight Change

LONDON (UPI)—Oops!

This week's edition of the humor magazine Punch contains the following note: "The title of Eric Burgess's thriller, reviewed in last week's issue, is 'Divided We Fall,' not 'United We Stand.'"



—Register Staff Photos

THE DYNAMICS FACILITY or "shake tower" at NASA's Plum Brook rocket laboratory is pictured at right and described in the story. Employees of Universal Marine Construction Co., Sandusky, face the task of hooking individual wires in the above tangle of cables to instrument cabinets in the central instrumentation and control building at the rocket lab. A quarter mile or more away the other ends of the cables will be connected to equipment in six experiment buildings.

Blast, Fire Hits 8 Warehouses At Jersey City

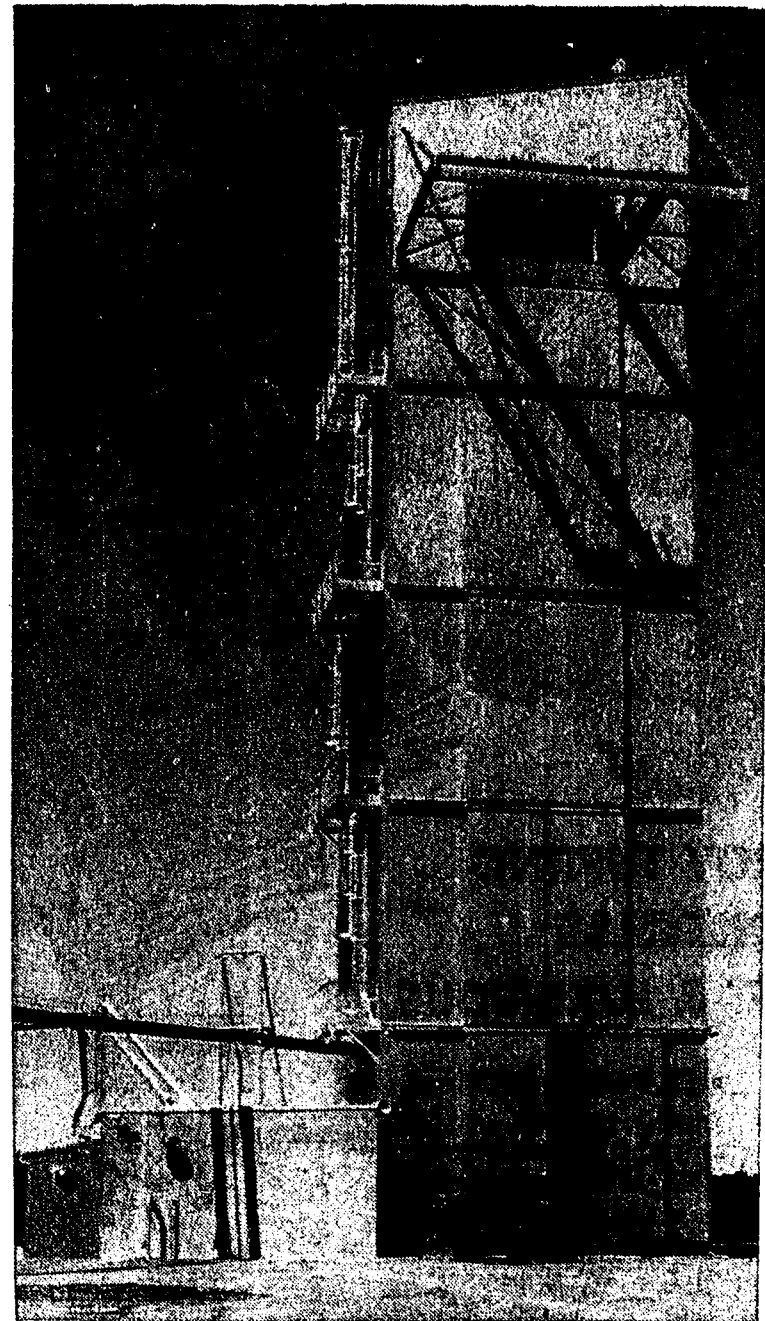
JERSEY CITY, N.J. (UPI)—An explosion and fire swept eight chemical warehouses along the Jersey City waterfront Wednesday, injuring 28 firemen and causing millions of dollars in property damage.

At the height of the blaze, a 1,000-foot wall of flames stretched along the waterfront across the bay from Manhattan and within sight of the Statue of Liberty.

Two thunderous explosions which set off the blaze reduced eight corrugated metal warehouses to rubble and shattered windows in homes a half mile from the scene. Flames, feeding on liquid anti-freeze, refrigerants and other highly volatile materials, shot hundreds of feet into the air at the center of a thick column of black smoke.

SHIMMY'S LEGAL AGAIN

JAMESTOWN, N.Y. (UPI) — After more than 30 years, the bunny hug and the shimmy are legal again in Jamestown. They were banned during the jazz-age '20's by the outraged townfolk. Recently, the dances were removed from the prohibited list by the city council.



Ohio Recreation Meet Dates Set

COLUMBUS—The annual Ohio Recreation Association will hold its conference here on Wednesday, Thursday, Friday, Nov. 4, 5 and 6. Headquarters will be in the Neil House.

Many of the sessions will cover the field of parks and recreation. To highlight the conference, topflight speakers are being con-

tacted, including Dr. Arthur Fleming, director of national health; the Rev. Robert Richards, Olympic champion, and Dr. R. C. Anderson, Ohio state director, Ohio Mental Hygiene Department. President of the Ohio Recreation Association is William "Bill" Willis. Convention chairman is Nick J. Barack and program director is Harry H. Feldman.

LOOK AT TODAY'S PICTURES



SANDUSKY REGISTER

WEATHER

Clear and quite cool tonight with the low about 56 near the lake and 45 inland. Friday sunny and pleasant, high 70 to 75.

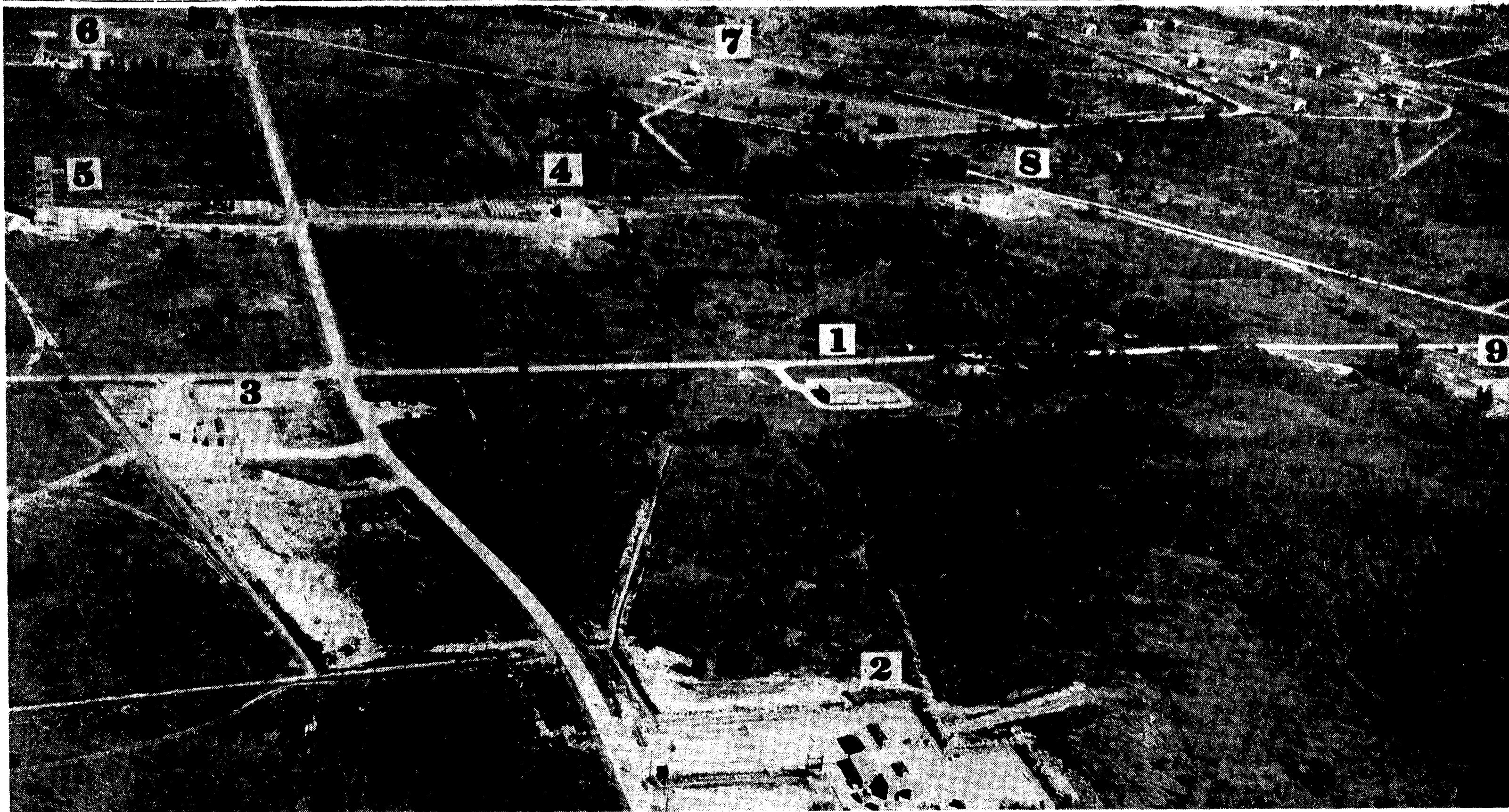
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See Story, Pictures Page 22)

Nine buildings and other installations of the rocket testing facility of the National Aeronautical and Space Administration (NASA) at Plum Brook south of Sandusky are shown in this aerial picture taken by Dale Sprague, Register staff photographer, while riding in an airplane piloted by Harry Griffing. The view is towards the east.

Building 1 at center along Ransom-rd is the central control and instrumentation building from which is operated by remote control six other installations in the vicinity. Closed circuit television will be used at times to permit scientists to observe tests under way a quarter mile or more from where they are situated in the control building. No. 2 is the hydraulic laboratory. No. 3 is the turbine

test facility. No. 4 is the rocket pump testing center. No. 5 is the dynamics test tower. No. 6 is the pilot laboratory now in operation. These installations are beside Fox-rd. No. 7 is the portable rig site along Taylor-rd, which has been used for several months. No. 8 is the fluorine pump testing facility scheduled to be completed by year's end. No. 9 at the intersection of Taylor and Ransom-rds is the

turbo-pump test site.

At upper right are former TNT production buildings of Area B which have stood idle since the end of World War 2. About a half mile to the left of the above photo is located the multi-million dollar nuclear reactor facility of NASA, which is scheduled to be in operation late this year or in early 1960.

Plum Brook In The Space Age

Research Facility Has Varied Chores

"Bugs" which blow up some of America's brightest rocket hopes within a few feet of the launching pads may be eliminated by experiments planned at Sandusky's Plum Brook research center, a facility of the National Aeronautics and Space Administration.

A 117-foot high "shake tower" will be the key to spotting defects in missile hardware before they cost the nation mil-

lions of dollars in wasted effort—and uncountable damage in "space-race" prestige.

Believed to be the only full-size rocket-shaker of its kind in the country, the Plum Brook tower will subject full-size missiles to the same kind of vibration they would encounter on "blast off." Defects which show up after this pummeling can be corrected before the "live" rocket is launched at

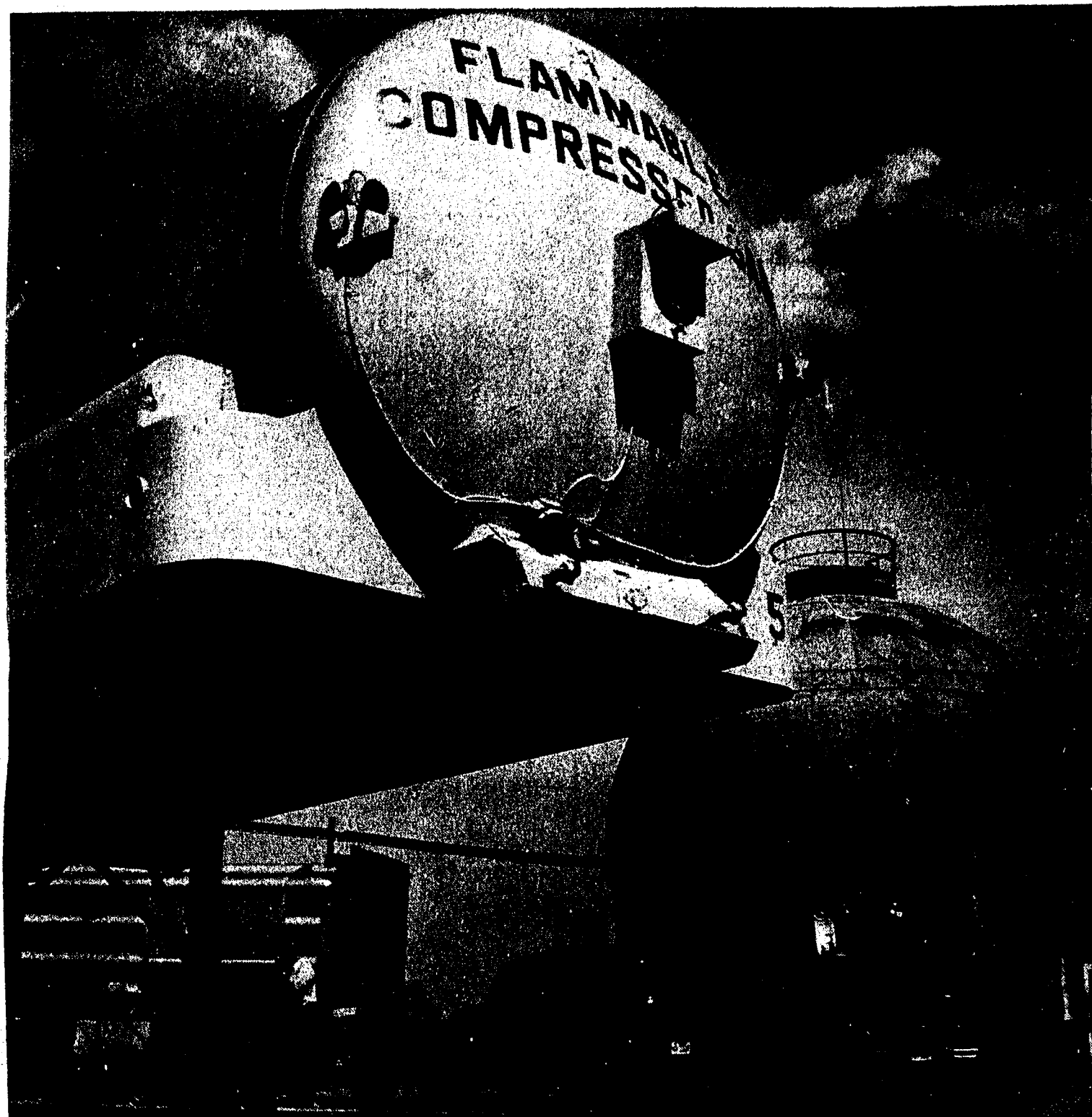
Cape Canaveral or elsewhere.

The shake-tower is only one of several major facilities under construction or completed at Plum Brook, being honored by the Chamber of Commerce this evening as the newest addition to Sandusky's industrial complex.

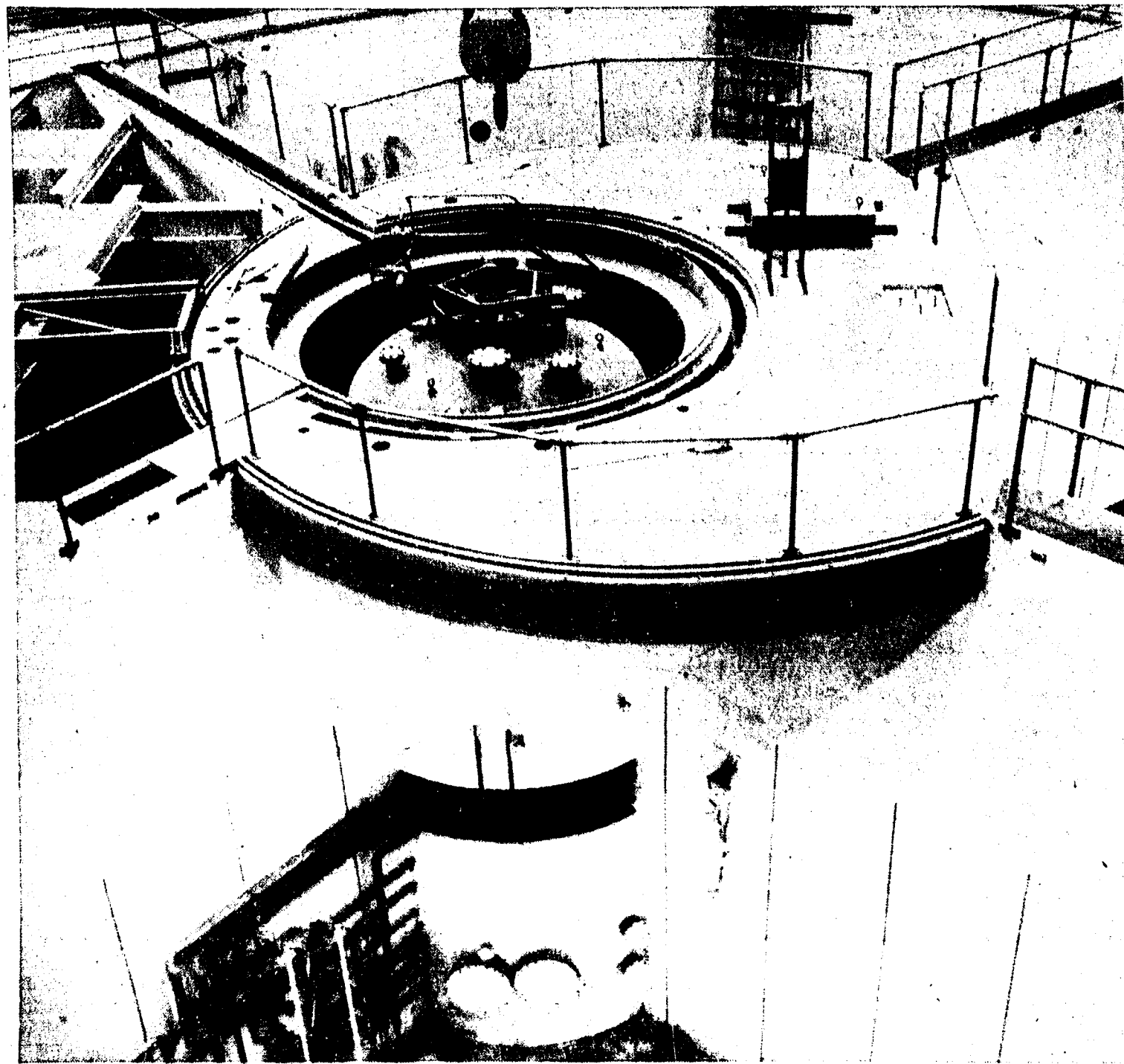
Although much has been written about the atomic reactor now nearing completion on the NASA property, many Sandus-

ky area residents are only slightly aware of the rocket test facilities.

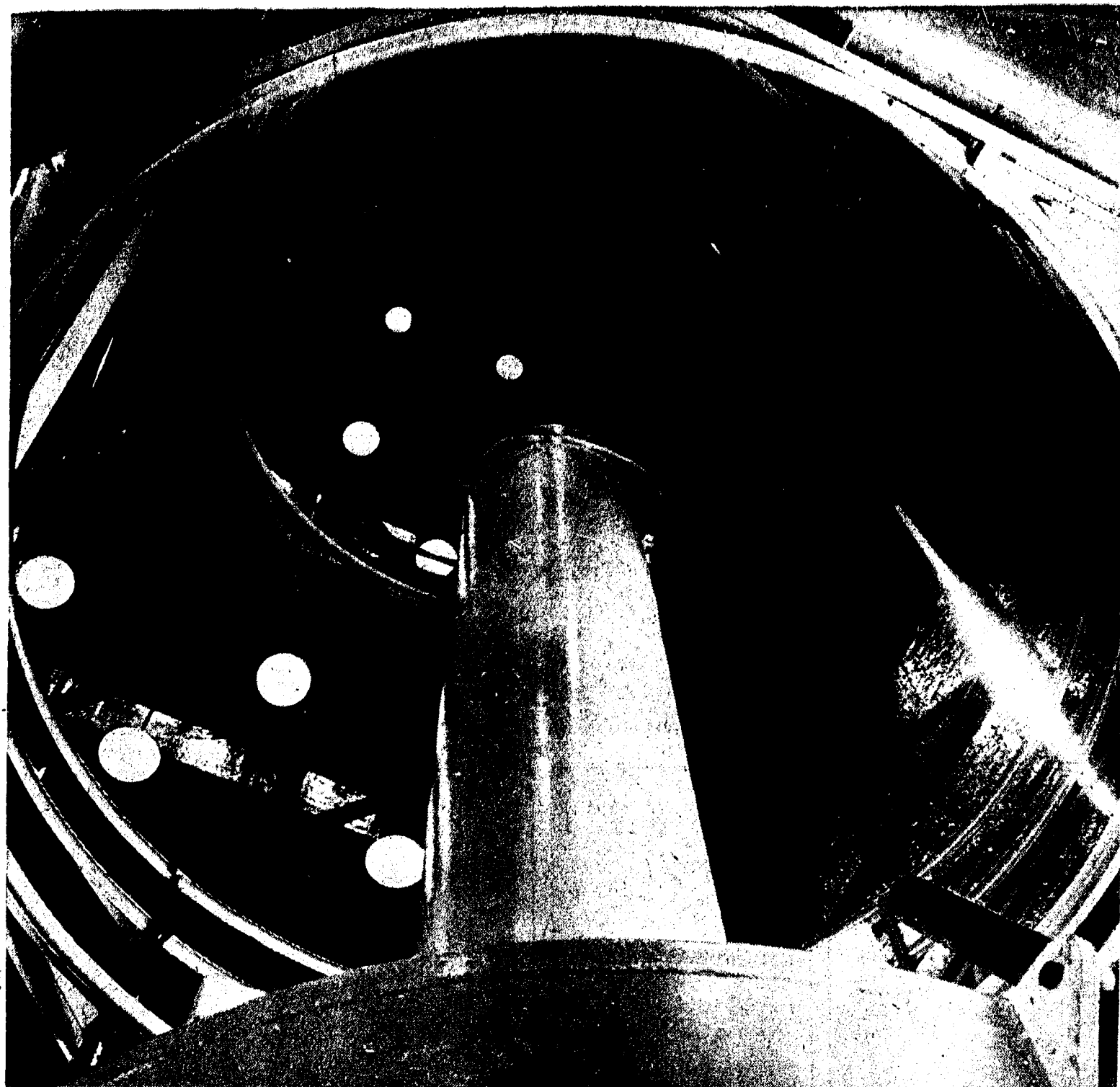
During World War II much rocket study was conducted at the Lewis Flight Center at Cleveland Hopkins Airport by the NACA scientists, predecessors to NASA. After the Plum Brook property became available it was decided to establish a rocket testing facility at Sandusky to supplement the work



CRYOGENIC FUELS—Fuels producing very low temperatures for rocket component testing are transported to the local NASA facility in the two tank trucks at left. A Horton sphere, used at the former TNT plant, is now set up at right for housing some of the experiments being carried on by the space scientists. (Register Staff Photos)



"HOT STUFF"—Uranium, such as is used to power the U.S. atomic submarines and provides the warheads of many weapons, will be placed in the bottom of the steel tank in the center of the research reactor at the Plum Brook Facility of NASA. The reactor will soon be made "hot" and countless research projects started, leading to atomic powered airplanes and space craft.



GOING IN CIRCLES—Various floors of the NASA "shake tower" make a circular pattern around a piece of test equipment. Equipment in the tower will simulate missile free flight as nearly as possible for scientific study. Complete rocket systems may be "ground tested" in the building.

being carried on at Cleveland. Now a "space age village" has been constructed on former farm land. There are eight centers of study plus the control and instrumentation building in the "village" around the triangle formed by Ransom, Fox and Taylor Roads.

Rapidly expanding is the "portable rig site" which has been in operation for some time. Experiments started in Cleveland are put on semi-trailers and brought to the Plum Brook site, where various tests are performed. Cryogenic fuels (liquid oxygen, liquid hydrogen and others) that produce very low temperatures are used in many of these studies.

Pilot Lab

A "pilot lab" is located near the "portable rig site" and has also been used for some time in scientific work. Here scale models of rocket pumps and turbines are studied. A gas generator rig is also located at the site to provide hot gas used in turbine research.

A short distance away from the "pilot lab" is located the dynamics facility or five level "shake tower." The 30-foot square steel building is 117 feet high with doors at each level which may be opened to admit a missile the size of an Atlas. Vibration exciters shake the test missiles in much the same way they are shaken in actual take-offs.

John H. Weeks, chief of rocket systems operations, said today that the "shake tower" is expected to be in operation in the near future. A vast network of wires runs from the tower to the central control and instrumentation building.

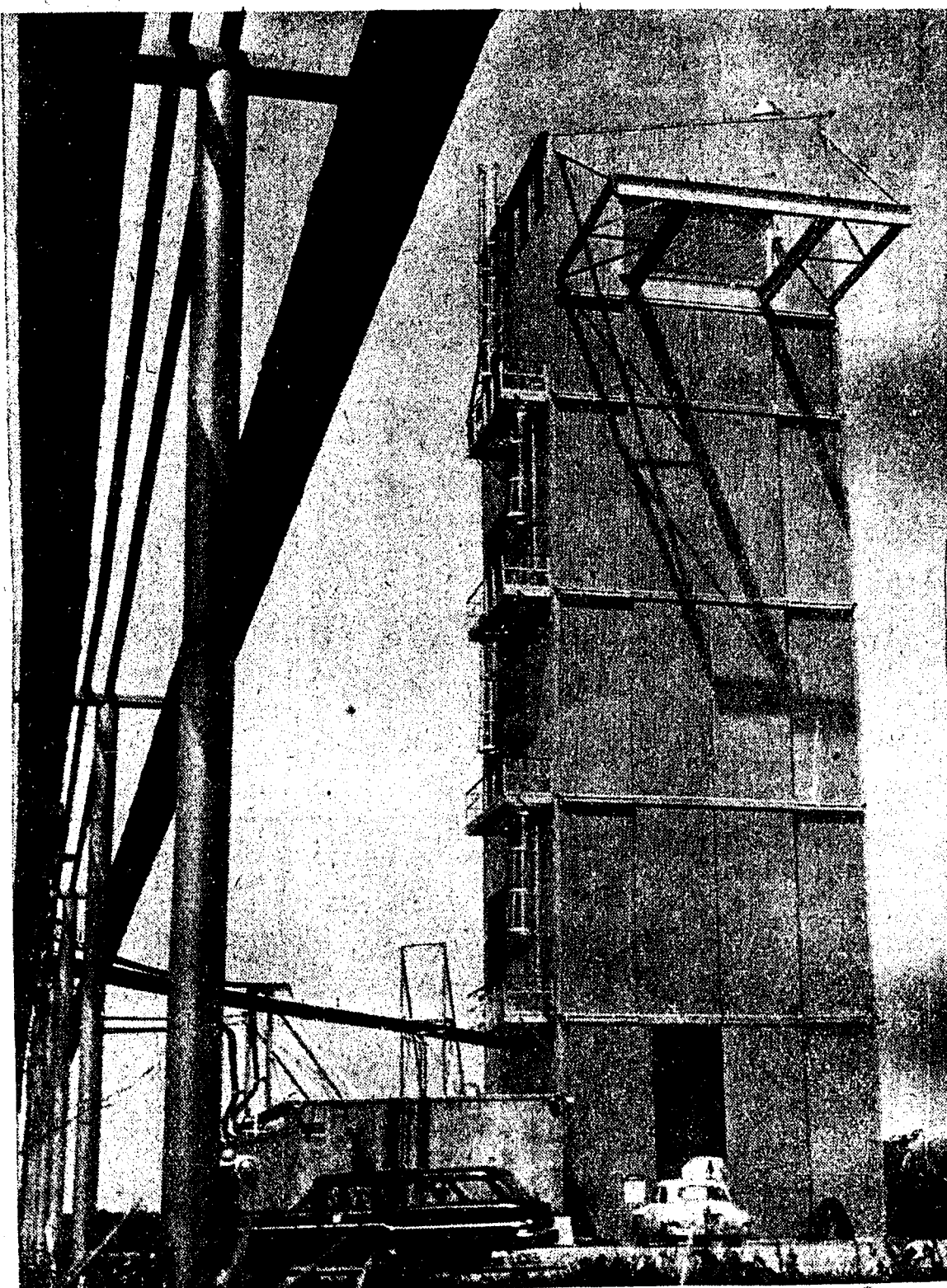
After an experiment has been set up in the tower the various operations will be carried on by remote control from the central building, using part of the wires to start and stop the tower equipment. Results obtained during the test will be recorded on various instruments in the central building. Closed circuit television will also be used to visually observe the tests being carried on several hundred feet away from the scientists.

Other Centers

Other "centers" of rocket research will be in the following buildings: hydraulics laboratory, turbine testing facility, pump facility, turbo-pump facility and fluorine pump testing facility. When present contracts are completed at these five centers in the near future, "dry runs" will be made before experiments begin.

Weeks pointed out that various types of liquid rocket fuels are and will continue to be used in the many Plum Brook studies of rockets. All experiments here will be ground tests rather than actual launchings. NASA now has several launching centers, the most famous of which is located at Cape Canaveral, Fla.

Pumps, turbines, turbo-pumps, fuel tanks, gas generators, piping systems and various fuels used in rockets will be under scientific study at the Plum Brook facility for years to come, according to Weeks.



DYNAMICS FACILITY—Nearing the operational stage is this dynamics facility or "shake tower" at the Plum Brook Facility of the National Aeronautics and Space Administration. At left overhead are hundreds of control and instrumentation wires connecting the tower and the operations building.



"COLD STUFF"—Emil Napholz, an NASA mechanic, is holding a special test tube in which moisture from pipe lines has been collected and frozen. At the portable test rig high pressure gas is used for some operations and the lines must be free of moisture, with liquid nitrogen being used to freeze the moisture.