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ANNUAL APPROPRIATIONS BILL OPPOSED

Single Year Funding Would Handicap Industry Efforts To Speed Weapons

By George Hannaum

Director of Industry Planning Service, Aircraft Industries Association

Proposed legislation now before the House of Representatives for appropriating funds on an annual accrued expenditure basis, if passed, would hamstring vital defense projects, and cause costly delays in getting these programs under way again.

The bill, H.R. 8002, provides that appropriations for the estimated cost of goods and services, advance payments, progress payments and other payments in defense programs be made for a *single fiscal year*. At the end of the fiscal year any excess appropriations would lapse. On the other hand, if funds are exhausted before the end of a fiscal year, no provision is made for funding contracts for the remaining days or months.

Let's examine how this bill, if it becomes law, will affect a top priority defense project, such as an antimissile missile.

First, in this type of project the contractor is dealing with many intangibles. Technological breakthroughs or advances govern its progress. These gains, or failure to achieve them on a rigid schedule, cause the program to be accelerated or decelerated. There is no method of determining, a year in advance, just what our scientists and engineers will discover in their probings of technological frontiers.

If an unexpected breakthrough is made, funds are not available to exploit this advance simply because they were not requested in the estimate. The breakthrough must be shelved until another fiscal year rolls around and an estimate of the money required to prosecute the scientific advance can be made and then appropriated.

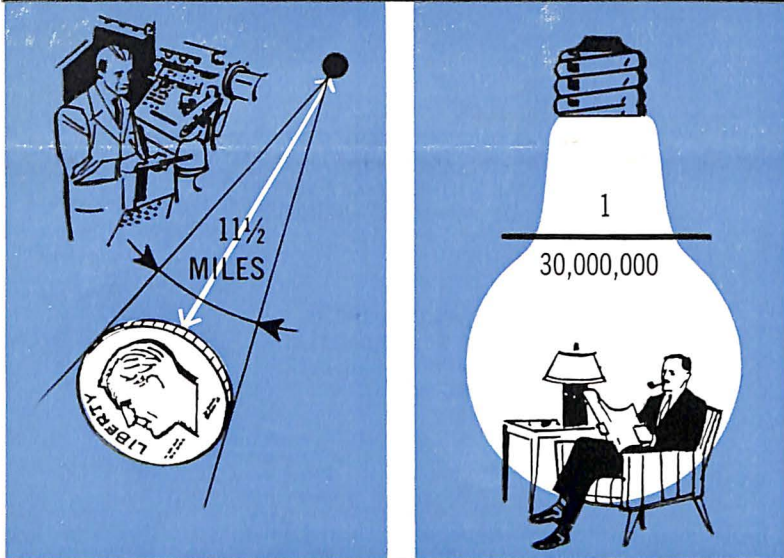
The alternative is to return to Congress, request a supplemental appropriation which requires additional hearings and floor debate before the money becomes available.

This means we will have deliberately forged a set of handcuffs for our defense projects at a time when the aircraft industry needs freedom to move boldly and resolutely in its efforts to achieve and retain qualitative superiority over the Russians.

It has been conservatively estimated that delays of three to nine months could be incurred in a new

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MEASURING PERFORMANCE



High performance aircraft and missiles have made extraordinary demands for precision equipment in manufacturing these weapons. For example, one metering instrument used by the aircraft industry must measure the arc of an angle to two-tenths of one second. This is equivalent to the width of a ten cent piece at a distance of eleven-and-a-half miles. Another instrument measures current within one thirty-millionth of the current in a 100-watt reading bulb in your home. Development of these instruments insures the operational reliability of new aircraft and missiles.

PLANES

Missile Orders Increase 100-Fold Since 1947; ICBM, IRBM Obligations To Drop in 1959

Orders for missiles in fiscal year 1959 will be \$5,729,000,000 compared with \$5,060,000,000 during fiscal 1958, a new Department of Defense report shows.

This is an increase of almost 100 times over the total programmed obligations in fiscal 1947, and a four-fold increase since 1955.

An even more dramatic increase is shown in the obligations for intercontinental and intermediate range ballistic missiles since fiscal 1951. During fiscal 1950 no money was obligated for ICBM's and IRBM's. In fiscal 1951, \$500,000 was programmed compared with \$2,070,000,000 in orders scheduled for fiscal 1958, an increase of more than 4,000 times. The total amount programmed since fiscal 1951 through fiscal 1959

is \$6,070,000,000. The grand total programmed for all types of missiles since fiscal 1956 (and prior) through fiscal 1959 is \$23,515,000,000.

Percentage-wise, the Defense Department's latest report shows that funds scheduled for IRBM's and ICBM's, compared with total missile obligations, jumped from less than 1 per cent in 1951 to 41 per cent in 1958.

However, orders for IRBM's and ICBM's in fiscal 1959 reveal the first time that obligations for ICBM's and IRBM's will decline, both in the actual amount of money and in percentage comparison to total programmed obligations. In fiscal 1959, \$1,941,000,000 (34 per cent of the total) is scheduled compared with \$2,070,000,000 (41 per cent of the total) in fiscal 1958.



Mr. Hannaum

PLANES

Planes is published by the Aircraft Industries Association of America, Inc., the national trade association of the manufacturers of military, transport, and personal aircraft, helicopters, flying missiles and their accessories, instruments and components.

The purpose of *Planes* is to:

Foster a better public understanding of Air Power and the requirements essential to preservation of American leadership in the air:

Illustrate and explain the special problems of the aircraft industry and its vital role in our national security.

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Theories and Production

The aircraft industry today is meeting the stiffest challenge ever posed in modern manufacturing. Production of hypersonic long-range missiles and space craft has brought problems that are unique in an industrial history crowded with change.

Technological gains have snowballed to an extent that unmanned reconnaissance of Venus and Mars, and manned flight around the moon and back to Earth are completely realistic prospects. The aircraft industry has solved most of the technical problems—some of them many years ago—and much of the needed hardware currently is being built, aimed at these astounding goals.

The theories of scientists and ideas of engineers have captured the headlines and the imagination of most of the world. Regard for their talents has partially obscured one of the most important points in the adjustment era in which the aircraft industry finds itself. Management competence, the ability to plan realistically and develop the "know-how" to produce these startling new aerial vehicles efficiently, is equally important as engineering competence.

The industry which brought the manned aircraft to its present advanced state is best prepared to produce missiles and space craft at the lowest cost and within the time schedules.

The great production problems to be faced in the next ten years have been anticipated and the industry is finding solutions today.

All major airframe, aircraft, missile and engine companies and most of the major suppliers of equipment and material are members of the Aircraft Industries Association. AIA is concerned with the industry-wide aspects of research, development and production. This Association attempts to find out cooperatively among the membership and with government agencies the answers to problems of mutual interest. Some of the knottiest problems are centered in the manufacturing committee of AIA. The membership of this committee is made up of the top production men for companies building aircraft or missiles, powerplants, and major components of missiles or aircraft. Composite talents represented on this committee are unequalled in the field of aircraft and missile production.

The tools required to cut, drill, or form the new, harder materials dictated for future aircraft and missiles have created particularly knotty problems. Design engineers flatly state that the materials we will soon be using will have the same strength as the *tools* used to work today's materials.

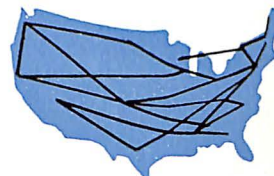
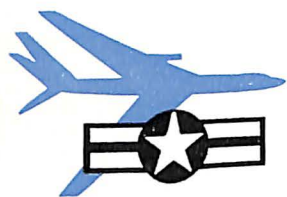
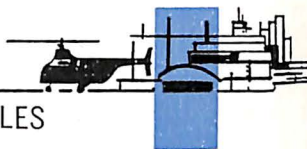
Higher horsepower, more rigid machines, tool holders and work-holding equipment are required. AIA has a manufacturing equipment committee to bring about a better understanding between users and machine tool builders. This committee has determined the industry's requirements for conventional milling machines, spar mills, skin mills and stress presses. Standards have been issued and the committee works closely with machine tool builders to see that the required equipment is available. One example of the committee's progress is a horizontal knee mill. The new mill has four times the horsepower, greater rigidity and faster loading features than the mill previously available. And it produces the same quantity of parts in two hours that the old mill produced in 16 hours.

The aircraft industry is moving forward with confidence to overcome the production barriers of the future.

Plane Views



ONE HELICOPTER TAXI SERVICE FLIES A DISTANCE EQUAL TO 1½ TIMES AROUND THE WORLD MONTHLY; YET ITS 'COPTERS ARE NEVER MORE THAN 16 MILES FROM THEIR BASE.



AT ANY GIVEN INSTANT THE U. S. AIR FORCE HAS 1150 PLANES IN THE AIR—ALMOST EQUAL TO THE TOTAL PLANE INVENTORY OF ALL U. S. AIRLINES.

AIRPORT CONTROL TOWERS IN THE U. S. HANDLED APPROXIMATELY 25,262,000 TAKE-OFFS AND LANDINGS IN 1957—48 EVERY MINUTE OF THE DAY AND NIGHT.



PLANES



Electronic 'Eye' Catches Flaws in Forgings

An electronic "detective" has cracked the case of forging flaws.

More formally known as an ultrasonic reflectoscope, the fully automatic machine tracks down flaws in rough forgings before costly machining is started to shape the forgings into finished turbine wheels. It eliminates the human error previously present in manually-operated versions.

Circular tapes resembling phonograph records, but with inked lines instead of grooves, take information from the scanner and reproduce on paper the smallest deviation from perfection, while sound waves, emanating from an energized quartz crystal, penetrate the forging through a water couplet.

The unit scans at the rate of 300 inches per minute and can test an average of 22 forgings every eight hours. It is in operation 97 per cent of each working day, shutting down only for routine maintenance and forging changes.

This "all-seeing eye" is typical of the modern equipment used in the aircraft industry to insure high quality standards for performance and reliability.

AIR QUOTE

"Since its inception in 1946, the Strategic Air Command has been the principal contributor to the deterrent posture of the free world because the combination of its organization, men and weapon systems gave it an unchallenged retaliatory capability. This capability was well known to the Soviets, which has undoubtedly been a major factor in preventing a general war between the free and the communist worlds to this date.

"I am confident that our deterrent strength, as represented by SAC's current retaliatory capability, is still great enough today to discourage the Soviets from precipitating a general war. For in spite of their advances in military technology and their claim of successes with experimental ballistic missiles, their capability for waging aggression has not yet reached the point where they could reasonably expect to prevent SAC from inflicting unacceptable damage upon them in retaliation." — Gen. Thomas S. Power, Commander in Chief, Strategic Air Command, December 16, 1957.

Funding Bill Denies Flexibility

(Continued from page 1)

fiscal year before funds would again flow to contractors. These gaps can only be bridged by asking contractors to shoulder financial burdens which, in many cases, they would be unable to do, or to assume risks they are unable to take. If such gaps could not be bridged the damage to the defense program would be tragic because experienced research and development and production teams would be broken up. Whenever the momentum of the production line is stopped or cut back, unit prices invariably increase.

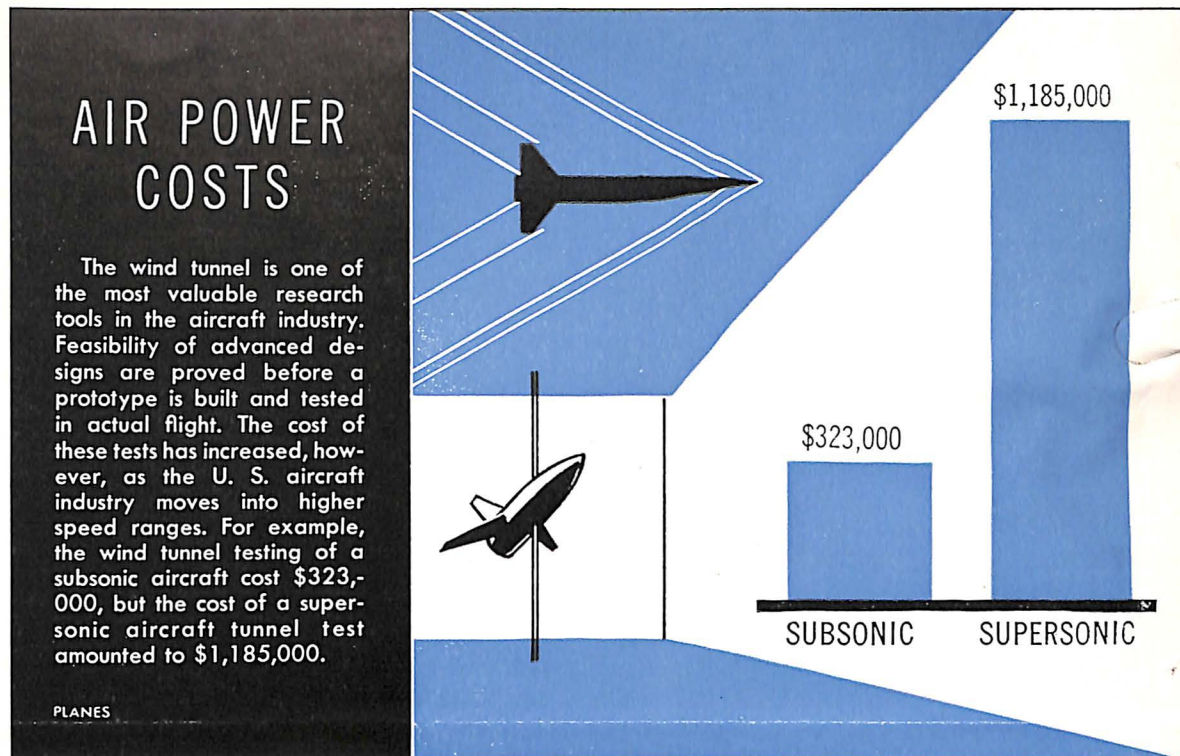
The equipment provided by the aircraft industry is constantly subject to improvement and refinement throughout its production as well as its development cycle. Engineering change orders are commonplace. These result in improved performance, greater safety and reliability. Incorporating these changes into the finished product at the earliest possible date frequently requires rescheduling of production and a re-evaluation of costs.

Unrealistic Approach

The effectiveness of such a law as currently proposed in H.R. 8002 would depend entirely upon an exact coincidence between contract estimates and contract expenditures. This is unrealistic, denying any element of flexibility in these projects. Long, hard-won experience shows conclusively that contractors cannot avoid variations in contract schedules, especially on complex long lead time items. The prime contractor for a weapons system is dependent on thousands of subcontractors and suppliers with the pace necessarily geared to the slowest. The difficulty of maintaining strict schedules is apparent. And it is not possible to anticipate such factors as strikes and other labor shortages, price and wage increases, changes in money rates and changes in procurement techniques which all cause delays.

The complexities of administering such a law would be enormous. With thousands of contracts involved, appropriation for each must be made on estimates for the next year. If the fund provided for a single contract is exhausted early in the fiscal year, there is no provision for further funding the contract even though it may be a long lead time item extending over several years. The military service making the purchase cannot continue funding the contract until Congress has appropriated new money for the following fiscal year after July 1.

The simple fact that a new set of books is started on each of these contracts at the beginning of each new fiscal year does not assure an immediate flow of funds. The Federal Budget must be prepared and presented to Congress. Next, the Congress must provide appropriations which may or may not coincide exactly with those recommended in the Budget. On numerous occasions the appropriations do not become



law until after the fiscal year has started. Whenever the money appropriated does not match the recommendations in the Budget request, more time is lost while the agencies re-examine their programs.

Thereafter, appropriations are subject to analysis and apportionment by the Bureau of the Budget, by the Department of Defense and by the military agencies and bureaus. Decisions must be made on distribution to departments, and which contracts will be reduced or accelerated and which new contracts will be started. This must be followed by writing or amending thousands of contracts.

Control Machinery Exists

The House Committee on Appropriations had expressed its disapproval of H.R. 8002 with the comment that it "has disadvantages and offers no improvement." Advocates of the legislation claim that it will permit closer control of expenditures by Congress. But adequate administrative machinery for control of expenditures already exists. It was brought into play during the last eight months of 1957 when the administration decided that expenditures were proceeding at such a rate that the national debt ceiling would be exceeded. The brakes were applied with great force and employment dropped with dramatic speed. This, in turn, would have lowered the production rate and the rate of expenditures.

It is the conviction of the Aircraft Industries Association that this bill would add nothing of value. But, as now written, it possesses the power to disrupt completely and jeopardize national defense programs.

People in Congress best qualified to judge are opposed to the bill. Any bill so controversial should be subjected to careful scrutiny to determine whether it really is needed. We cannot afford at this time to gamble with an untried system when we are faced with an overriding necessity to get ahead with the job.

Metallurgists Turning to Niobium as Solution to Requirement for Heat-Resistant Metal

Metallurgical science is turning niobium, a metal largely ignored by industry for more than 100 years, into one of the most important metals of the century to the aeronautical industry.

Because of its ability to withstand higher temperatures than metals now in use, niobium offers exciting possibilities in the fields of jet aircraft engine and guided missiles manufacture, as well as in atomic energy equipment manufacture.

The importance of niobium to the aircraft industry, and in particular to jet engine manufacture, stems from the fact that jet engine gas turbines are getting close to the upper limits of operation using high-temperature materials currently available. This is roughly about 1,650 degrees Fahrenheit.

Alloys incorporating niobium, however, will allow the design of the turbine blades and other "hot engine" components to operate at temperatures up to 2,200 degrees. High temperature operation of jet aircraft engines is important because the higher the temperature a jet engine can develop, the more thrust per unit of engine weight it can turn out.

'Pocket' Radio Sends 70 Messages at A Time

A radio—small enough to fit in a coat pocket—is used to transmit as many as 70 "messages" at one time describing to engineers on the ground exactly what is happening during test flights of a new bomber. The "messages" are electrical impulses which are "scrambled." Instruments in a telemetering station on the ground "unscramble" the signals and convert them into valuable information.

The company charged with applications research of niobium says that the toughest problem to be overcome will be in learning how to forge and machine the metal, just as similar problems had to be overcome in learning how to use titanium.

Strangely enough, pure niobium is extremely soft and a bar of the metal could be cold-rolled into foil only one-thousandth of an inch thick without heating. But, it is in this pure form that niobium oxidizes most readily. However, industry research scientists have found that by alloying the metal with other materials, tremendous strength and resistance to oxidation are possible.

Atlantic Air Travel Hits New High

International air travel between nations soared to a new record high in 1957 with nearly one million passengers flying between the United States and Europe.

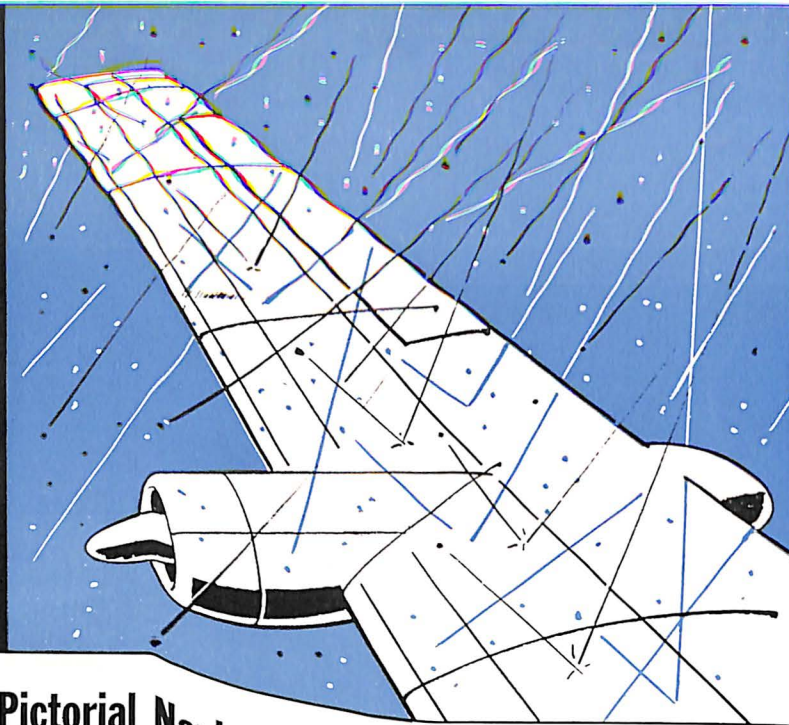
Acceptance by the travelling public that air travel is the fastest, safest and most economical was borne out in 1957 by the fact that during the year approximately 885,000 passengers flew between the United States and Europe as compared with 738,933 in 1956.

The greatest gain to the international airlines came in westbound traffic—from Europe to the United States. Approximately 493,000 persons flew to America in 1957 for an increase of 23 per cent over the 1956 total of 400,182 passengers. An airlines spokesman said that a new special "immigrant fare," 40 per cent lower than the one-way tourist fare and which was put into effect in November 1956, was largely responsible for the increase in westbound traffic.

SAFETY IS THE AIR WORD

Wing panels of a luxurious, new jet transport have been subjected to man-made, 600 mile-per-hour hail storms to test the wings' resistance to bullet-like hail that might be encountered in actual high speed flight. The wings, of course, came through with flying colors with scarcely a dent to the heavy gauge wing skin. This is but one example of the thousands of rigorous tests to which U. S. aircraft manufacturers subject these new jet airliners to assure safety and comfort for the air travelling public.

PLANES



Evaluation Tests of Pictorial Navigation Device for Helicopters Planned

An exhaustive evaluation of a simplified pictorial navigation device for helicopters will get under way in the New York City area shortly, according to General Elwood R. Quesada, Special Assistant to the President and Chairman of the Airways Modernization Board.

The dramatic growth and potential of helicopter operations demands intensive effort to provide adequate navigational and air traffic control capabilities for these aircraft, Quesada declared.

New System Speeds Cargo Handling

Ground handling of air cargo will soon move with speeds comparable to high speed cargo aircraft.

A pushbutton system developed by the aircraft industry will load 35,000 pounds of cargo into a new turbo-prop air freighter in 40 seconds. And the system works in reverse to yank cargoes from the aircraft at the same speed.

Tests show that the new loading system will produce a 40 per cent reduction in manpower required to prepare and load freight, and a spectacular reduction of 90 per cent in idle ground time now necessary for the transports while cargo is being loaded and unloaded.

The new system features cargo tied to individual pallets in loads up to 7,000 pounds each. These pallets rest on rollers at the dock or warehouse and can be moved onto trucks which have rollers on the truckbed. The pallets are then pulled by electric winch into the air cargo hold of the aircraft which also has rollers on the floor.

The new system could potentially provide savings running into millions of dollars in the movement of military and civil cargoes, in addition to the great military advantage of moving cargoes swiftly.

For purposes of the evaluation, a modified television device will be carried on scheduled helicopter flights of New York Airways to give helicopter pilots a pictorial presentation of their position with relation to the routes established for New York Airways.

The helicopter pilot will see his position displayed on a map, scaled to 850 feet to the inch, mounted in the cockpit. Quesada said that New York Airways helicopters will continue to operate in accordance with all applicable regulations of the Civil Aeronautics Administration and the Civil Aeronautics Board.

Present standards of safety will be maintained during the experiment, Quesada declared, and observation of the navigational display will not distract the pilots from their regular duties.

The multi-engine helicopter is here and the multi-engine turbine-powered helicopter will be flying in the very near future. If navigational aids are not to restrict the full utilization of these machines, we must act now to determine the best methods of navigation and air traffic control, Quesada said.

Destruction Tests Prove Bonded Panel Strength

Bonded sandwich panels used in a supersonic aircraft are being systematically destroyed to discover better ways to improve the quality.

The panels selected for destructive testing are deliberately frozen to make them brittle and thus easier to break up. However, power chisels are still required to peel the skin from the honeycomb core of the bonded panel.

The exposed surfaces show how improvements can be made in the adhesive process, in tools or in the panel's detail.

Village Smithy Today Plies Trade Beneath Spreading Delta Wing

There's a blacksmith in the Southwest, and he's not plying his trade beneath a spreading chestnut tree. Our village smithy has abandoned horses for aircraft and is more likely to be found near the spreading delta wing of a supersonic bomber now in production.

His tools are the good old-fashioned variety—a brick forge, a big hammer, and a battered iron anvil.

What does a blacksmith do around an aircraft plant?

"Mostly I bend things," he says, "such as tubular parts of aircraft assembly jigs."

For certain jobs in this jet-propelled age, a blacksmith is better than a machine.

Tow Target Boom Gives Realistic Practice

A low-cost tow target boom developed by the aircraft industry will enable jet pilots to engage in realistic gunnery practice at supersonic speeds equal to those likely to be encountered in future aerial combat.

The new device enables the Air Force for the first time to use conventional supersonic fighter planes to tow targets at speeds above Mach 1 (the speed of sound).

The boom is 10 feet long, two inches in diameter and made of chrome molybdenum alloy steel. It is fastened in place of an inspection door on the underside of the fuselage about a third of the way forward of the tail. In flight, it lowers to about a 60-degree angle to snatch the target rope.

It swings up against the plane's belly when not in use, and can be recoiled in the air. The boom can be easily removed to restore the aircraft to other operational uses.

Tunnel Duplicates 15,000 mph Speed

A new supersonic wind tunnel, to be used in testing one of this nation's newest guided missiles, requires in a fraction of a second 1,000 times the peak electrical power demand of a city of 50,000 population.

The new wind tunnel, now under construction for an aircraft manufacturer, will be able to churn up air speeds of 15,000 miles per hour and temperatures of 18,000 degrees—6,000 degrees hotter than the sun's surface!

This "fastest and hottest" missile tester is 44 feet long and six feet high. In operation, a 20 million kilowatt jolt of electricity fires a small chamber of highly compressed air at one end of the tunnel, heating it instantly to 18,000 degrees Fahrenheit. The superheated air then charges through the tunnel in less than one-thousandth of a second to blast at the surfaces of the missile component being tested at a rate of speed of 15,000 miles per hour.

Each test, because of the tremendous heat, must be limited to one twenty-fifth of a second, or the tunnel itself would melt under the extreme temperature.

Despite the short duration of the tests the missiles are completely instrumented and very high speed electronic cameras are used to photograph the experiments which will aid in maintaining U. S. aeronautical superiority in the coming missile age.

Scale Jet Model Needs 2,000 Tiny Parts

The wind tunnel test model of a new jet transport built to 1/20th scale required nearly nine months of work and 2,000 parts—but it will duplicate accurately structural detail, torsional rigidity and strength of the full-size aircraft.

One problem encountered at the start was the fractional thickness of the skin that would be required if aluminum were used. By using magnesium, skin thickness was increased one-third. But even with magnesium some of the skin is only .005 inches thick (or thin). It was necessary to use the new chemical milling process to reduce commercial magnesium to the required thickness.

Tiny stringers, spars, bulkheads and formers had to be placed in the wing to duplicate the wing sections of its larger counterpart. White gloves were worn by the model builders and tweezers were used to put the parts in place since perspiration and skin oils would damage the small parts.

A remotely controlled vibration exciter was mounted inside the fuselage to induce vibration during wind tunnel "flights." The tunnel flutter tests will eliminate many hours of in-flight testing of the actual aircraft.