



planes

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CONGRESS REGULATES AIRCRAFT COSTS

New Metal Stretcher, Glass Tools Save Plane Makers Time and Money

Aircraft manufacturing, which already has contributed heavily to the consumer industries with development of light-weight materials and streamlined design, now is coming up with some revolutionary production techniques.

Two outstanding recent developments are a machine for "stretch-forming" sheet metal, and a process for making production tools from molded layers of fiberglas cloth.

Until the advent of the stretch-forming machine, many of the odd metal shapes required in planes were turned out by handcraft methods, something like those used in making fine kitchenware. New high-strength metals cannot be shaped by such methods. In addition, strength requirements for new super-speed planes are too exacting for hand-forming techniques. The stretch former not only is faster, it permits control of the strength-weight ratio of the material being formed.

Stretch for Strength

Parts such as skin contours, air scoops, wing tips and engine cowling rings can be produced in a fraction of the time of hand production methods. This not only means considerable savings in die costs, materials, time and labor, it produces stronger parts. In one case, for example, a sheet of metal stretched 12 per cent showed a strength increase of more than seven per cent.

The stretch former pulls the metal to desired length and thickness and wraps it around a mold in one operation. And it can handle sheets of metal up to 14 feet long. Its continuing development is expected to simplify not only production but design of new craft.

Glass Replaces Steel

Plane assembly has been greatly simplified and the cost of production tools is being cut sharply by the development of laminated fiberglas jigs and fixtures. Many of these special purpose tools, once made of steel, now are produced by gluing several layers of fiberglas cloth together and baking them under low pressure around molds. Tools thus made are

—See "Glass Tools" page 2—

Cost Watcher



Senator Tydings

Tydings Cites Profit Limits, Buying Rules

Written especially for Planes

By

Senator Millard E. Tydings
Democrat, Maryland, Chairman
Committee on Armed Services
U. S. Senate

The Congress is deeply conscious of the need for keeping down costs of equipment as expensive as modern aircraft. Since the war, it has instituted several measures which, together with existing controls, attempt to assure the taxpayer a maximum return for his dollar.

Both the present and the preceding Congress have become convinced that air power is our first line of national defense. By actual votes cast last year and by sentiment expressed this year, members of both the Senate and House have evidenced their determination that our air arms should be equipped with an adequate supply of the most modern and up-to-date equipment.

Why Costs Are Up

At the same time, the Congress has shared the concern over mounting defense costs expressed in the recent report of the Hoover Commission to reorganize the government and by the Administration. That explains why Congress proceeded immediately after the war to institute a number of new procedures that would maintain efficiency in the procurement and production of aeronautical equipment.

There are two fundamental reasons why costs of aircraft have risen over the past decade. First, the aircraft industry is just as subject to inflation as are the meat packing, automobile, textile, or any other industries. Aircraft cost more for the same reason that automobiles have more than doubled in price since 1939, and for the same reason that steaks, suits and shirts are more costly.

Vastly Better Planes

In the second place, the cost of aircraft has risen because the performance of new airplanes has been improved so radically and because so many costly and complex instruments must be installed in them to enable them to perform their varied military assignments. The radio, radar, navigational instruments and armament

Civil Air Patrol Shows Flood Areas The High Value of Personal Planes

The Civil Air Patrol, which gained a new respect from people in stricken areas of the U.S. this winter, now is geared up to fight a new menace—floods.

Officials of the CAP, a volunteer

auxiliary of the U.S. Air Force, have prepared their Missouri, Nebraska and Kansas wings particularly for this flood patrol and relief work. Other State Wings are ready to lend their assistance. Spring thaws already are causing new hardships to people in these plains states.

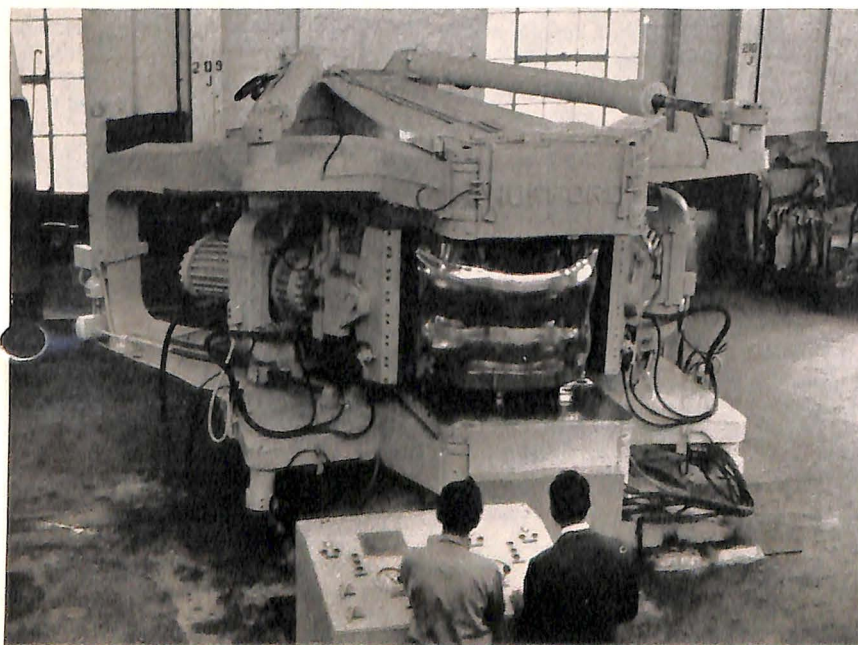
Experts who have worked in the snow areas this winter say it will take a miracle of good weather to thaw the deep snows so gradually as to avoid floods. In the Chadron area of Nebraska, for example, these snowfalls reached 61.2 inches during the month of January alone.

Hedge-hopping CAP pilots, cruising over flooded areas, will be able to gauge the movement of flood crests and fly ahead and drop warnings to people in the likely path of water, as well as performing rescue, evacuation and supply missions. During the 27-day blizzard emergency, these personal plane pilots were out often from daylight to dusk, dropping messages containing emergency instructions wrapped around old spark plugs and trailing gaudy streamers, picking up snow-bound autoists and injured persons, as well as dropping food to humans and animals.

During the recent heavy snows many minor accidents and narrow escapes were daily fare of these men. In February, two men, Warrant Officer John Huff and Observer William O'Brien, lost their lives when their plane struck an unseen wire while

—See "Flood Patrol" page 4—

Tough Metal Meets Tougher Machine



Above photo shows stretch-former converting a sheet of metal into an engine cowling ring.

—See "Tydings" page 4—

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.

AIA was founded in 1919 as the Aeronautical Chamber of Commerce, and the name changed to Aircraft Industries Association in 1945.

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ALL MATERIAL MAY BE REPRODUCED—MATS OF ALL CHARTS ARE AVAILABLE

Skilled Aircraft Labor— A Priceless Resource

Skilled labor is the keystone of any industry and any nation. Without competent and trained labor, no industry can compete successfully in world markets. From the standpoint of national security, the nation possessing an adequate supply of skilled aircraft labor has a priceless national resource because this labor force is its key to actual survival.

Few, if any, industries require as highly skilled personnel as do the plants making airframes, aircraft engines, propellers, and the many instruments and accessories used in the airplane of today. The modern airplane is a carefully machined instrument, many parts of which require jewel-like precision and tolerances associated with a fine watch. The first impression of the spectator who examines the parts of a modern aircraft engine or modern aircraft instrument is amazement—that so careful a degree of machining is possible. What has so long been true of the engine and the instruments is now becoming true of the airframe itself as we go into speeds above that of sound. Since an airplane must be aerodynamically "clean," every part of the airframe must fit with a precision comparable to that hitherto associated with engines or instruments.

Obviously the precision attained in any part of the airplane depends upon the skilled workman who builds it. For this reason it has been a basic policy of the aircraft industry to inform the nation of the need for maintaining aircraft production at a level that will attract and retain within the industry this type of highly skilled workers.

In addition to the high degree of skill required, this industry probably requires a greater variety of skills than does almost any other. A walk through a modern airframe plant takes you along from seamstresses and upholsterers through welders, riveters, jig and tool makers, die sinkers, carpenters, electricians, and on to the wide variety of skilled technicians required by the aircraft engineering departments.

There is, of course, one other characteristic or attribute that aircraft skilled labor must possess. It must be able to produce in quantity, efficiently, and at low cost. Since the aircraft industry is probably the most carefully regulated and supervised of any large modern manufacturing industry, there can be no waste, and production schedules must be met. As proof that workers have met this challenge, one engine manufacturer recently passed the \$300,000 mark in payments to employes under a suggestion award plan.

But even this is not all that is required of aircraft skilled labor. When, as, and if a national emergency occurs, the skilled labor then at work becomes a nucleus for the expansion that has to take place. The most skilled are graded upward and become foremen. Others become instructors. All have to help train the raw recruits who pour into aircraft plants when an emergency expansion gets under way.

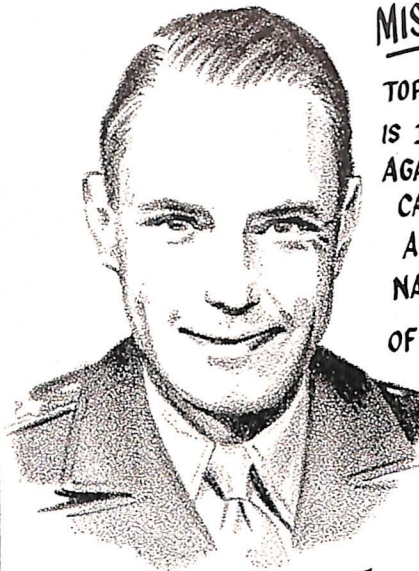
No nation concerned over its survival can afford to dissipate its resource of skilled labor. No nation thoughtful of its national security can fail to plan how best to maintain at all times an adequate supply of employes trained in and practicing the latest aircraft production techniques.

L. D. Webb

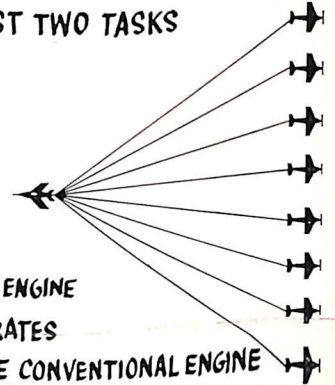
Vice-President, Aircraft Industries Association of America, Inc.

PLANE VIEWS

from A.I.A.



MISSION OF USAF, SAYS ITS
TOP GENERAL HOYT S. VANDENBURG
IS 1. IMMEDIATE OFFENSIVE
AGAINST ENEMY'S WAR-MAKING
CAPACITY 2. WARD OFF AIR
ATTACK 3. SUPPORT ARMY,
NAVY TO EXPLOIT SUCCESS
OF FIRST TWO TASKS

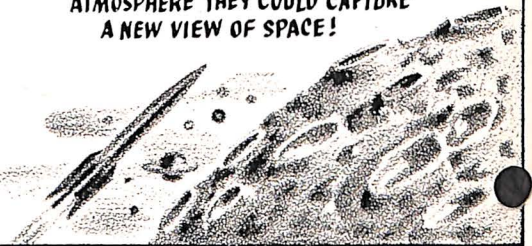


SINGLE ROCKET ENGINE
IN OUR FIRST SUPERSONIC PLANE GENERATES
8 TIMES MORE POWER THAN BEST WARTIME CONVENTIONAL ENGINE



LESS THAN
10% OF
GOVERNMENT
PLANE CONTRACTS
ARE ON A COST-
PLUS BASIS—
THESE ARE MOSTLY
EXPERIMENTAL
WHERE COST IS
HARD TO PREDICT

AIR POWER DIVIDEND—
AIRBORNE TELESCOPES MAY MAKE EARTH-
BOUND ASTRONOMY OBSOLETE—ABOVE THE
ATMOSPHERE THEY COULD CAPTURE
A NEW VIEW OF SPACE!



'Planes'

GLASS TOOLS

(Continued from page one)

well nigh unbreakable, light-weight, and can be repaired in a few minutes.

A glass laminate tool can be modified in a few minutes. This greatly simplifies the problem of incorporating little design changes while a plane is in production.

Among the production devices one company is making from glass are drill jigs, and checking, routing and assembly fixtures. These range in size from a few inches square to 14 feet in length.

While admitting that this process is in the early stages of development, pioneers in this field see many new applications for it. One company points to a 60 per cent saving in manufacturing such tools, citing a saving of \$100,000 for the first year of their use.

USAF Cadet Program Opened to Husbands

The Air Force announces the start April 4, 1949 of a new schedule for its Aviation Cadet program and for the first time since early days of cadet training will accept married men.

According to Lieutenant General Idwal H. Edwards, personnel chief of the Air Force, classes this year will be smaller but more frequent, beginning every six weeks. Last year only three classes were taken. The program offers men between 20 and 26 years old a \$35,000 training course.

School Officials Ask Air Program

Every school in America soon will have an aviation education program if a proposal now before the American Association of School Administrators is followed.

The proposal was made recently in San Francisco at the first of a series of three annual meetings of the AASA. It asks appointment of a national committee of educators to survey school programs and recommend how best to expedite the "air conditioning" of our schools. This would aim not so much for technical courses but for implementing standard curricula with aviation materials and meanings.

Aviation "workshops" were on the programs of all three AASA meetings, latter two of which were scheduled for St. Louis and Philadelphia.

"Jail Break"

When a cargo plane landed recently at La Guardia Field, attendants had to spend several hours rounding up its cargo—300 monkeys enroute from India to Warm Springs, Ga.

According to the pilot, somewhere between India and the U.S. the simians picked the lock on their cages and ran wild in the baggage compartment.

AIA's Technical Service Trims Away Red Tape

Since 1908, when the Wright Brothers' first plane was purchased by the Army with a four-page contract, design requirements have mushroomed until the contract for a new jet bomber takes up more than 8,000 pages, eight times the bulk of that hefty volume, "Gone With the Wind."

Planes and their specifications have so increased in complexity that blueprints alone for a current medium bomber would cover a four-lane highway for a distance of 20 miles. Control of such paper work has become a big problem for the aircraft industry.

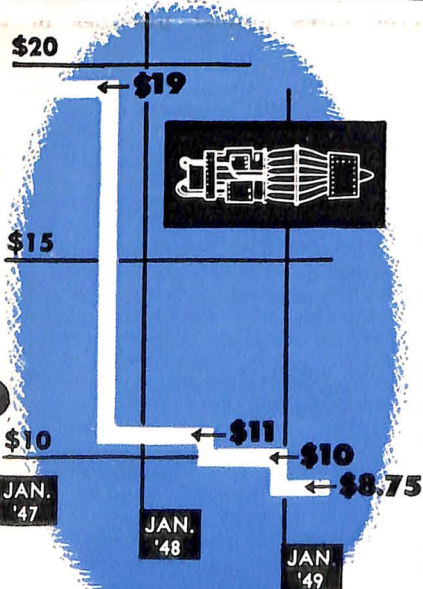
In order to help the government keep this costly paper work to a minimum and at the same time pool engineering know-how on industry-wide problems, some years ago the plane makers set up a Technical Service in their trade association, the AIA. This technical staff since has spent many thousands of hours in conference with government administrators, scientists and engineers.

Cooperation Pays

Cooperation between industry and government engineers has paid big dividends in streamlined procedures. Hundreds of duplicating service specifications have been consolidated. An index of materials and parts suppliers has recently been completed. And liaison with the military services has prevented innumerable hitches that might have meant costly production delays.

For years this task has been com-

As jet engines are improved, buyer gets more power per dollar



Typical turbo-jet engine cost per lb. of take-off thrust

"Planes"

Continuity in production reduces unit plane costs

WHEN 1ST PLANE COSTS
\$5,000,000

100TH PLANE COSTS
\$800,000

200TH PLANE COSTS
\$650,000

500TH PLANE COSTS
\$500,000

Productivity increases with volume

"Planes"

plicated by the fact that separate arms of the service have had individual specifications for many items. Equipment approved by one service still is not always useable by the other. Cooperation between the military, the Commerce Department and industry has narrowed this problem appreciably but goal of both industry and government is to cut paperwork requirements in half.

AIA's Technical Service has contributed much to solution of some knotty engineering problems. Headquartered in Washington, its effectiveness is rooted in the expert engineering forces of AIA member companies.

Frequent Meetings

Following six years of meetings and coordinating of know-how, for example, non-flammable hydraulic fluids soon will go into service, a very important safety feature for both civilian and military aviation. In another case, industry propeller and engine specialists spent about 5,000 hours over a period of seven years in study and conference to develop standards for propeller control clearance.

With the help of the paint industry, studies now are being made to produce a fire and heat-resistant paint for planes. And a recent New York meeting ended a year of idea exchange and tests to solve a problem of engine oil leakage.

In such a rapidly-changing technology as aviation, a whole new range of performance and utility can be opened with the solution of seemingly small, specialized problems, such as those with which AIA's Technical Service continually wrestles.

Materials Ordered Months In Advance

Raw materials going into our newest and fastest Air Force jet fighter were ordered as much as 10 months ago, the builder of this craft reports.

Many aircraft "raw materials" are really processed or semi-finished, hence they must be scheduled many months before they are to be used. They come in many different forms—sheet, bar, tubing, wire, castings, forgings, etc.

Into each of this fighter type go 4,850 pounds of aluminum, 1,300 pounds of steel, plus plastics and other materials. These are used to make 165,000 individual fabricated parts, fastened together with about 315,000 rivets.

Lucky Lady Proves Value of Airlines

Air Force officials point out that the recent non-stop world girdling flight of the B-50 bomber, Lucky Lady II not only demonstrated the feasibility of in-flight re-fueling on long-range flights but also proved the value of global air-route support facilities.

But for the existence of a world network of routes as developed by U. S. civil and military air transport operators, world-ranging flight never would have been accomplished, the Military Air Transport Service believes.

MATS' support sources—All Weather, Airways, Communications, and Air Base—in cooperation with the Signal Corps, along the entire route kept the crew of the Lucky Lady in hourly contact not only with the bases en route but also with their Carswell headquarters in Fort Worth, and Strategic Air Command Headquarters in Omaha.

Vinson Bill

Contrary to popular belief, the "70-Group" air force bill introduced by Rep. Carl Vinson (D., Ga.) does not order the building of a 70-group Air Force. It would authorize the Air Force to build up to 70 groups. It would define broad makeup of such a force. Actual attainment, however, depends on funds appropriated by Congress.

The difference is like that between design and financing of a new home. Once the architect's plans are approved, financing must be arranged. In this case, Mr. Vinson is the architect and Congress the financing agency.

The following is an outline of major provisions in the Vinson "70 Group" bill:

H. R. 312 authorizes a first-line force of 70 groups, plus 22 specialized squadrons, supported by 61 reserve groups and auxiliaries; a uniformed personnel strength of 502,000 officers and men; a complement of 24,000 planes or 225,000 air-frame tons; procurement of 5200 planes or 42,500,000 air-frame tons per year; expenditure of funds over a five-year period.

PLANES QUIZ

Seventy per cent score on this quiz is excellent. Sixty per cent is good. Answers on page four.

- How many parts, including rivets, engine, etc., would you guess, are contained in our fastest jet fighter (a) 150,000; (b) 200,000; (c) between 500,000 and 600,000?
- How many pounds of aluminum in a B-29 (a) 1,200; (b) 27,000; (c) 61,000?
- In the demobilization following VJ-Day, the Air Force dropped from 243 war-strength groups to (a) 48; (b) 15; (c) 51 groups.
- For what purpose did President Truman create his Temporary Air Policy Commission in 1947?
- True. False. In one day La Guardia Field consumes as much gasoline as

- the Berlin Airlift requires in a month.
- What are "elevons"?
- What is the highest recorded altitude reached by a human (a) 59,492 feet; (b) 61,960 feet; (c) 72,395 feet?
- During fiscal year 1948 the Air Force received (a) 73 per cent; (b) 27 per cent; (c) 52 per cent of total funds appropriated for the three defense establishments.
- True. False. A Frenchman named Garnerin is credited with the first free-flight parachute jump in Paris in 1797.
- True. False. Research rockets have been sent more than 200 miles straight up from the United States.



TYDINGS

(Continued from page one)

in a 1949 bomber cost more than a complete bomber, including the few instruments then required, supplied to the Air Force in 1934 or 1935. Everything about the modern plane is far more costly. The giant jet engine, producing the equivalent of 5,000 horsepower, costs many times the reciprocating engine of 1933-34, which turned out less than 1,000 horsepower. Plane speeds have tripled in that period.

Three Steps

While these examples explain why the cost of aircraft purchased by the military services has mounted, they do not diminish the responsibility of Congress to make certain that costs are held at a minimum. To fulfill this responsibility the Congress already has taken three important steps and is considering a fourth.

Last year, for example, Congress completed the Military Procurement Act. This law completely revised the statutes governing the procurement of such equipment as aircraft. It provides business-like, flexible procurement procedures. Yet, it also retains all of the checks on purchasing that have been proven to contribute to efficiency and economy.

Congress last year also adopted the Renegotiation Act of 1948. It requires all current contracts for aircraft and other military equipment to be subjected to renegotiation procedures similar to those followed during the war. This renegotiation procedure insures a careful scrutiny of all costs and expenditures made by the aircraft companies while engaged in the production of equipment for the Armed Services. It also guarantees that any excessive profits earned on military contracts will be returned to the government.

GAO Checks

In past years Congress established at least two other extremely important checks that still control costs of aircraft and other military equipment. It set up the Government Accounting Office, which surveys and reviews all aircraft contracts in which costs are paid directly by the government. The other check on costs is the investigative powers of the Congress.

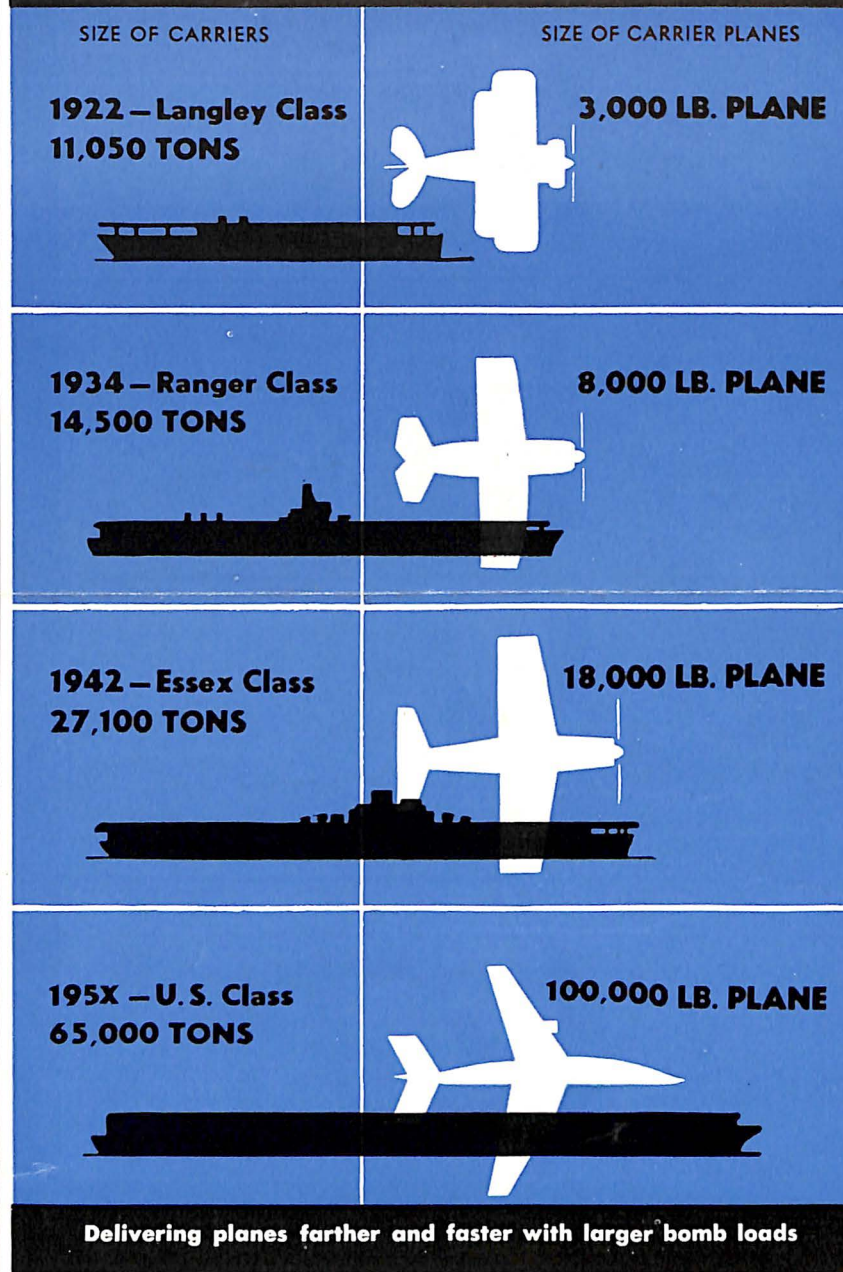
The House and Senate Armed Services Committees meet regularly when Congress is in session and often authorize extensive surveys into the operation and accomplishments of the Armed Services to be conducted when Congress is in session. In addition, the House and Senate Committees on Expenditures in Executive Departments both maintain continuing full-time reviews and surveys of the operation of all the executive departments, including the Armed Services.

No Scandals

In this connection, it is well to recall that there have been no scandals uncovered in the purchasing or production of aircraft during the past decades even though billions of dollars were expended for aircraft during the war. I have also noted with considerable interest that the searching investigations of the Hoover Commission contain no criticism of the procurement of aircraft, even though aircraft is easily the most expensive single item of equipment required for our national defense.

While all of these laws and procedures are vital forces for economy, Congress is considering still other

Development of Carriers and Naval Planes Since 1922



"Planes"

methods of reducing defense costs. Just now both the Senate and the House are considering a long-term aircraft program such as was recommended last year by the Congressional Aviation Policy Board and the President's Air Policy Commission. After extensive surveys and studies, both of these groups reported that a long-term program of aircraft procurement was by far the most important single step that could be taken to hold down aircraft costs. I am hopeful that the Congress will adopt such a program this year so that every possible measure for economy that can be put into effect has indeed been enacted.

By all of these steps the Congress has clearly shown its concern over defense costs and particularly the cost of aircraft equipment. I believe that the Air Force and those in charge of procurement for Naval Aviation and the aircraft company managements all are deeply conscious of their responsibility to hold down costs. The combined efforts of the Congress, of the Armed Services and the industry are required to achieve the maximum in economy, because without such economy the country may not be able to afford the air power it must have for survival.

Facts and Figures

An American test-pilot recently performed a complete loop with a helicopter. It was the first such maneuver in a helicopter.

A new model jet fighter contains 7,000 feet of electrical wiring, 1500 feet of tubing.

A Pennsylvania flying school has offered free flying instruction to anyone over 60.

A leading plane producer has announced a new 300 mph cargo plane with a direct operating cost, one stop coast-to-coast, of 4.6 cents per ton mile.

Capacity of a new freight plane is so great that 60 of them could take the place of 210 standard Berlin Air Lift planes.

Since the Wright Brothers' first flight, there has been a seven-fold increase in efficiency of planes.

It took 40 years to progress from the simple Wright Brothers' engine to a 3,000 h.p. engine. In the last five years, however, power has increased from 3,000 to 10,000 h.p.

Production of a typical new fighter plane requires about 13,500 special tools.

Answers to Planes Quiz

- (c).
- (b).
- (b) And aircraft production dropped from an annual rate of 100,000 planes to 1330.
- President Truman asked his commission for "an evaluation of the course which the United States should follow in order to obtain . . . greatest possible benefits from aviation." He emphasized danger to our security and welfare from lowered plane production.
- True. Average daily consumption is 175,000 gallons.
- "Elevons" are movable control surfaces on flying-wing type aircraft. Located along the trailing edge of the wing, they combine function of elevator and aileron.
- (c) In a balloon ascension in 1935 by Anderson and Stevens.
- (b).
- True. He jumped from a balloon at 2,000 feet.
- True.

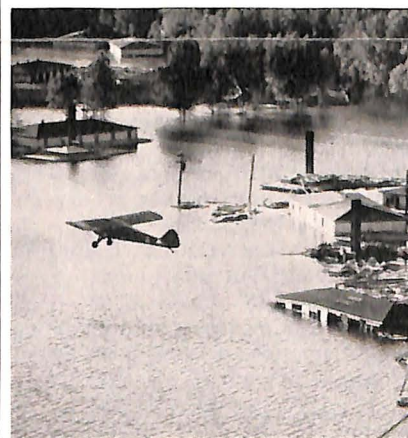
while attempting to evacuate a marooned family. This devotion to duty, incidentally, carries with it no promise of disability payments or pensions from the government. All the CAP receives is the gas and incidental supplies needed for the job.

Snow Rescue

Typical of the heroic missions carried out in snow-swept Nebraska was the time a CAP pilot spotted a distress signal at a school house almost buried in the snow. After the hazardous landing, he discovered a teacher and two pupils huddled in the doorway. Together, they tramped a runway in the snow and he hauled them out.

In these relief missions, however, it isn't just the pilots who work around the clock to help sufferers. Supporting those light planes are ground crews. In the Nebraska emergency these ground crews worked with shovels, tractors, and power plows to keep runways open. At Scottsbluff, one of the hardest hit areas, the whole town quit work for two days and pitched in with the CAP to dig a path to the airport and clear the runway.

Mercy Wings



Typical of scenes being reenacted this spring is this photo of a CAP plane patrolling a flood area.

FLOOD PATROL

(Continued from page one)

dropping a message at a farmhouse near Alliance, Nebraska.

On another occasion, Captain Matt Brennan received a broken arm, ankle and concussion in a mishap