



# planes

Vol. 8, No. 7, July 1952

OFFICIAL PUBLICATION OF THE AIRCRAFT INDUSTRIES ASSOCIATION OF AMERICA

## World Bids For U.S. Transports At Record High

The U.S. aircraft industry today has a record-breaking backlog of nearly half a billion dollars in domestic and foreign orders for commercial transport aircraft.

A survey just completed by the Aircraft Industries Association reveals that 456 transports—more than a third as many as are presently operated by U.S. airlines—are now on order from four U.S. manufacturers of commercial flight equipment. These planes are expected, when delivered, to increase tremendously the free world's airlift potential in event of war.

### Delivery Schedules

The new transports, representing some 21 million pounds of aircraft with a total sales value of over \$473 million, are scheduled for delivery by the end of 1954, although a few may not be completed until early 1955.

U.S. airlines will get 285 of the new transports while 166—37% of the total now on order—will go to foreign lines. The remaining five have been purchased by private organizations here and abroad.

### American Leadership

American-built aircraft make up about 80% of the world's total airline fleet, and 100% of the transports on the North Atlantic run is of U.S. design. The present large commercial backlog in the air transport manufacturing industry gives "assurance," according to Adm. DeWitt C. Ramsey, president of the Aircraft Industries Association, "that modern American aircraft will continue to outnumber types of foreign origin on world airways in the foreseeable future."

The AIA survey indicates that 130 transports now on order are slated for delivery during the remainder of 1952; 202 more in 1953; and 124 in 1954. Of the total, 244 are four-engined aircraft and 212 are twin- (See TRANSPORTS, page 2)

## Equipment Needs Soar As Bombers Fly Faster

Advances in aircraft speeds, bombloads and firepower in the past 20 years have resulted in tremendous additional requirements for fixed equipment such as armament, oxygen, air-conditioning, navigational and bombing systems.

This fixed equipment in a modern bomber weighs 20 times as much as the equipment carried by a typical Army bomber of the mid-1930's—and is equal to the entire weight of two Army bombers of 20 years ago.

## 'SONIC ERA INCREASES TIME SPAN IN AIRCRAFT PRODUCTION'—DRYDEN

**MORE PUNCH PER PLANE**

**ONE**  
of Today's Planes

**SEVEN**  
World War II Planes

One USAF group today packs more wallop than seven to 10 World War II air groups. Basic reasons: vast increases in bombload, firepower and performance.

"PLANES" SOURCE: DEPARTMENT OF DEFENSE

## NACA Head Cites Research Needs

By  
Dr. Hugh L. Dryden  
Director, NACA

One of the outstanding technical accomplishments of American aviation today is our ability to design, construct and operate supersonic airplanes. For almost five years we have been flying at speeds faster than sound. For almost as long, engineers have been infusing their designs of tomorrow's powerplants and air frames with the requirements for tactical flight at supersonic speeds.

Certainly our thinking has become supersonic.

### Long-Lead Time

But we're in something of the position of the janitor in one of the giant new aircraft plants just inching into production early in World War II, who asked:

"What I can't understand is if we need those big bombers so bad, why doesn't Uncle Sam go out and buy 'em?"

When we were roused from our somnolence by the rape of Korea two years ago, it was only natural that the cry should be raised for a brand new supersonic air armada. Not tomorrow; right now.

We are having to relearn, all over, the facts of life about how to build air power. We are having to realize that instead of shortening the span of time between the first decision to design a new airplane, with its stronger powerplant, of superior performance, we are actually forced to allow even more years before we can expect that new airplane to become operational.

### Planes More Complex

The reason it takes longer today to design and build airplanes is that they've become much, much more complicated. Recently, there has been a much-needed voicing of the thought that we are permitting our airplanes to become too complicated, too loaded with automatic and semi-automatic equipment. Obviously, there is a rare opportunity for simplification, and the rewards of weight reduction are rich indeed.

But even if we reverse the trend and design our new airplanes with (See DRYDEN, page 4)

## Airframe Profits Cut in Half in '51 Despite 42.6% Jump in Sales Volume

The nation's defense buildup has meant more sales—but far less profits—to the 12 largest U.S. airframe manufacturers.

The companies which build most of America's military planes earned only half as much during the "boom" year of 1951 as they did in 1950—despite the fact that sales jumped a hefty 42.6%.

These facts are revealed in a survey of the financial status of 12 major companies, recently completed by the Aircraft Industries Association.

### Higher Taxes

Summarizing the 1951 financial picture, the AIA report said the year showed "increased sales, higher taxes and drastically reduced profits."

Net earnings after taxes in 1951 sank to a low of \$30.9 million, far

under the \$62.6 million earned in 1950 before the impact of Korean War Defense spending was felt. For each \$100 of sales in 1951, this gave these airframe manufacturers an average \$1.60 profit—compared with a national average for all manufacturing industries of about \$6.20. Federal taxes amounted to \$68 million, and absorbed 69% of income before taxes.

### Borrowing Necessary

To finance their expanded operations during 1951, major aircraft manufacturers were forced to establish extensive lines of bank credit, the AIA reports says. "Additional borrowing may be necessary until this expanded production effort reaches the delivery stage."

The report added that "the financial strain of carrying these expand- (See LOW PROFITS, 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.

Publication Office: 610 Shoreham Building, Washington 5, D. C.

New York Office: 350 Fifth Avenue, New York 1, New York.

Los Angeles Office: 7660 Beverly Boulevard, Los Angeles 36, California.

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

## Industry's Right to Its Ideas

By DeWitt C. Ramsey (Admiral, U.S.N., Ret.)  
President, Aircraft Industries Association

In the past, the people of the United States have become inclined to view the American lead in inventiveness, in production methods, and in industrial capacity with a matter of fact attitude. Many have considered the tremendous industrial might of this nation as a panacea for all our international ills, as a basic factor which could swing the balance in any world-wide commercial or military contest.

It is true that the United States leads the world both in production efficiency and capacity.

The vast production teams of American industry can be geared to spew forth the implements of modern war. During World War II, for example, our aircraft industry at its peak was producing a complex military plane every five minutes—an achievement unequalled by any other nation in world history.

This enviable production potential is still a national possession, the product of a free enterprise system which has placed a high premium on efficiency, rapidity, quality and economy of manufacturing output.

*We do not, however, hold a monopoly—or even an equivalent lead—in the field of new ideas.*

And it is in the field of new ideas that America must retain a consistent and decisive advantage if we are to survive as a nation.

For this reason, it is highly important that Government and industry work together to establish a national climate in which creative ideas are encouraged to the greatest possible degree by protection of the rights of their originators.

The aircraft industry, charged with pioneering the aeronautical frontier of man's knowledge, is gravely and constantly concerned with this problem. The companies which manufacture military planes are asked to produce not only a specified number of aircraft within specified time limits—but also to build the world's best aircraft.

In the aircraft industry, this production challenge is accentuated by the problem of proprietary rights—by the fact that it is a patriotic necessity, under conditions of extreme national emergency, for American manufacturers to make available the product of their companies' ingenuity and know-how for the preservation of the security of the nation.

It is nonetheless true, under the system of free enterprise, that these discoveries, inventions and creations are private property—and should not be subject to confiscation.

To preserve a national atmosphere in which manufacturers of military aircraft can afford to continue developmental and experimental operations, leading to aircraft superiority and to production economy, it is necessary that adequate recognition be given to companies which offer private property in furtherance of the national welfare.

Under conditions of extreme necessity, the aircraft industry has been happy to license appropriate Government contractors for the manufacture of their products when alternate sources are needed to meet production requirements or to broaden the base for emergency expansion. If, however, the relinquishment of proprietary rights and background patents is made a condition to the award of Government contracts, the incentive of industry to sponsor research and development of the type most needed by the Government will inevitably be reduced.

Certainly, both in the political field and in the economic field, we have come to accept as a self-evident truth the fact that no nation can long endure under a system which protects mediocrity and fails to encourage excellence.

Inventiveness, ingenuity and research are essential if this nation is to maintain its military effectiveness. Only by protecting private rights can we assure the flow of ideas upon which our national security depends.

## PLANE VIEWS

### BIG WHEELS



THE LANDING GEAR ALONE ON A MODERN NAVY CARRIER PLANE WEIGHS MORE THAN AN ENTIRE NAVY FIGHTER PLANE OF THE 1930'S.

### LITTLE HERCULES



TINY MOTORS THAT MOVE THE CONTROL SURFACES OF A JET FIGHTER GENERATE TWICE AS MUCH HORSEPOWER AS MUCH TO PROPEL THE WRIGHT BROTHERS' FIRST AIRPLANE!



### THE SPACE PROBLEM

A SINGLE AIRCRAFT MANUFACTURER TODAY USES MORE FLOOR SPACE THAN THE ENTIRE AIRCRAFT INDUSTRY OCCUPIED WHEN WORLD WAR II BROKE OUT IN EUROPE.

by Aircraft Industries Association of America

## FACTS and FIGURES

Extended flight above 35,000 feet, now commonplace, would be virtually impossible without silicone rubber—a chemical product which remains flexible after long exposure to such extreme temperatures as 350° above zero or 67° below zero. One modern bomber requires 300 feet of extruded silicone rubber gasket just to seal its bomb bay doors.

\* \* \*

One U. S. aircraft manufacturer now has 18 pilots assigned to flight testing a single model all-jet swept-wing bomber.

\* \* \*

A large aircraft corporation is currently conducting a new series of parasite fighter tests for the Air Force. Several air launchings of a fighter from an intercontinental bomber have been made to date in the latest program to provide bombers with their own fighter escorts.

\* \* \*

Thousands of production man-hours are being saved by a leading aircraft manufacturer with a two-story-tall drilling tool used in production of jet transports. The tool, which weighs 30,000 pounds, fabricates magnesium floor plates for a modern Navy transport.

## TRANSPORTS

(Continued from page 1)

engined types.

The U.S. scheduled airline fleet today includes approximately 1,270 operational aircraft, of which some 505 are four-engined. About 65% of the four-engined planes, representing about \$275 million worth of equipment, are earmarked for immediate use by the Air Force in support of military operations in event of a national emergency.

Describing the vital role of commercial aircraft in time of war, as an adjunct of the military airlift, an airlines spokesman says the acquisition of scores of new high-performance air transports by the airlines could prove tremendously important to the national security.

"The more aircraft the airlines have," says Adm. E. S. Land, president of the Air Transport Association, "the greater reserve the military has. Within the next two years, it is probable, considering the airplanes now on order by the airlines, that the scheduled airlines will be capable of doubling their potential contribution to national defense."

The Air Transport Association head added: "The more aircraft the airlines have, the greater reserve the military has. No longer is there any danger that the United States may develop a first-rate combat Air Force supported by second-rate transport."



## Electronic Revolution Brings Key to Flight At Supersonic Speeds

The aircraft industry in the past few years has undergone a revolution in use of electronics, and has reached the point where electronic aircraft components are the key to most essential flight operations.

The electronic gremlins created by aircraft engineers have taken over operation of aircraft in many respects, with the science of aeronautical electronics reaching the stage where in the near future almost all present "pilot" operations will be completely or partially automatic.

### Does Many Jobs

Today, electronic equipment can guide planes to landings through overcasts. Other electronic equipment can aim, compute ranges, and fire aircraft guns. Even in overcast and clouds, electronic devices can aim and release bombs accurately. Electronic navigation devices guide planes to targets and back home. Automatic pilots actually fly aircraft under conditions when human pilots are incapable of the feat.

A recently-developed automatic pilot built by a U.S. manufacturer has been designed to relieve flyers of 90% of ordinary "stick and rudder" work. The new auto-pilot, reports the manufacturer, "does about everything a human pilot can do, except actually take the plane off the ground and land it."

This particular auto-pilot is capable of controlling a jet plane with accuracy at speeds of over 700 m.p.h.

### One Pound Marvel

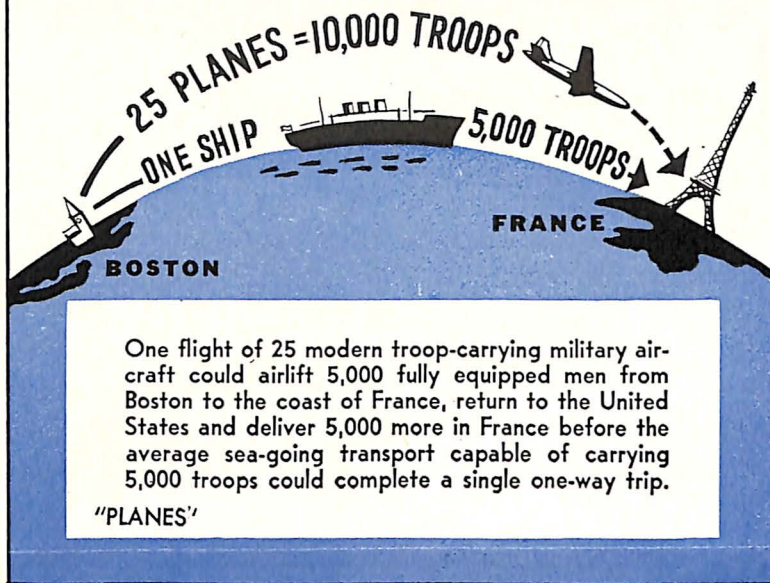
An auto-pilot developed by another leading American manufacturer contains a one-pound servo motor, small enough to hold in one's hand. Capable of responding to more than 100 signals a second, this servo motor is designed to move control surfaces on supersonic and other high-speed aircraft. The vast complexity of design contained in this motor (about the size of two packs of cigarettes) is reflected in the fact that it required 31,500 engineering determinations to completely specify its parts, performance and applications.

The tremendous increase in electronics use and requirements since World War II has been pointed out by a builder of jet fighters. This manufacturer's latest jet fighter-interceptor—almost wholly automatic—carries 1,200 pounds of electronics, compared with 168 pounds of radio equipment in a World War II fighter.

### Has 70,000 Parts

Typical of other electronic marvels is the modern bombsight computer, with nearly 70,000 parts. This electronic brain is capable of digesting such facts as the plane's ground speed, magnetic variation, and effects of wind on the plane and on falling bombs thereby enabling it to work out automatically and continuously the problems of navigating long distance anywhere, miles above the earth, and determining the split second at which bombs must be dropped.

## AIR TRANSPORT—FIRST WITH THE MOST



## Four-Pound Device Licks Unusual Jet-Age Problem

A leading aircraft manufacturer has solved one of the latest problems of high-speed flight—snowstorms, icy rain and fog inside crew compartments in jet planes.

The hazard, caused by excessive moisture in the air blown into cabins by air-conditioning systems, has been licked by a four-pound mechanical midget, nicknamed "Gushing Gertie."

The device, developed by a bomber manufacturer, is a centrifugal-type water separator with a cyclonic rotor attachment. It dries the air and collects the separated water in a trap.

Proved 80% efficient after thorough testing, "Gushing Gertie" is earmarked for early installation in medium jet bombers.

## PLANE FACTS

- A jet bomber flying 600 m.p.h. develops the equivalent of 55,680 h.p.
- More than 35,000 separate tools are required to build a modern patrol bomber.
- An aircraft bombing system contains 259 miles of wiring.
- One jet bomber has over 1,500 electronic tubes.
- More than three million engineering hours went into design of a late-model Air Force bomber.

## PLANES QUIZ ✈️

Seventy per cent score on this quiz is excellent. Sixty per cent is good. Answers on Page 4.

1. Latest intelligence estimates indicate the Russians have approximately (a) 20,000 aircraft, (b) 30,000 aircraft, (c) 40,000 aircraft.
2. What is the highest altitude at which man has flown? (a) 15 miles, (b) seven miles, (c) one mile.
3. The anti-icing and cabin heating systems of one jet bomber have a capacity of 1,800,000 BTU's. That's enough to heat (a) 2 five-room houses, (b) 22 five-room houses, (c) 10 five-room houses.
4. How many instruments and controls are in a typical jet fighter? (a) 10 instruments and 11 controls, (b) 5 instruments and 50 controls, (c) 24 instruments and 100 controls.
5. At the beginning of 1952, more than 54,000 civil aircraft were active in the United States. True or false?
6. At the height of World War II, 1.4% of a typical aircraft company's plant space was devoted to research and testing laboratory facilities. Today a typical aircraft company uses (a) 5%, (b) 12%, (c) 20%.
7. In December, 1941, when the Japanese attacked Pearl Harbor, the U. S. aircraft industry produced 2,461 planes. In June, 1950, when the North Koreans attacked South Korea, the U. S. aircraft industry built approximately (a) 1,114 military planes, (b) 215 military planes, (c) 546 military planes.
8. In 1949, before the Korean War started, the average aircraft worker earned \$63.32 per week. Today, he earns (a) \$79.83, (b) \$69.83, (c) \$66.83.
9. The Joint Chiefs of Staff have reported that the minimum air strength necessary for U. S. security is 143 Air Force wings in being by (a) 1954, (b) 1955, (c) 1956.
10. How many separate tools does it require to build one modern patrol bomber? (a) 35,050, (b) 15,050, (c) 1,505.

## Aircraft Builders Find New Uses for Ceramics, Plastics

Ceramics, an art known to the ancients, and plastic tooling, relatively new to industry, are proving a boon to aircraft manufacturing—cutting costs and expediting production of plane parts while conserving critical materials.

By using heat-resistant ceramic coatings, low-grade metal alloys can now be substituted for critical and more expensive high-temperature alloys in the fabrication of aircraft engine and exhaust components, saving money as well as scarce metals.

### Save Critical Materials

For example, jet engine parts made of Inconel, a product 70% nickel at minimum, can be manufactured from a type of stainless steel containing only 8% to 11% of critically short nickel if a ceramic coating is applied. Similarly, critical columbium, cobalt, and tungsten can be conserved by ceramics.

A leading builder of heat- and corrosion-resistant plane equipment and a metal enameling company report continuing progress toward maximum toughness and adherence in the manufacture of ceramic coatings.

Already, this team has produced a product which will perform under continuous temperature of 1,800°, remain unaffected by thermal shocks in exhausts between -70° and 1,700°, and sustain a surprising amount of mechanical impact without damage.

### Plastic Tools Cheaper

Further economies of money and materials are being achieved in the aircraft industry by plastic tooling. Plastic tools are cheaper to build and repair, and require considerably less time and labor to manufacturer than their metal counterparts.

Recently, a manufacturer was called on to produce a single test canopy for an Air Force trainer in the shortest time possible. Ordinarily, tooling would have required weeks. A plastic tool that can be produced in days, and at less cost, proved a successful solution.

This manufacturer, who already uses plastic router jigs, plastic drill jigs and stretch press dies made from the resin product, also reports experiments with plastic dies for heavy drop hammer applications.

## Air Safety Record

Constantly increasing dependability and efficiency of modern air transports is reflected in latest safety figures of U.S. domestic scheduled airlines.

During the year ended June 30, the carriers recorded one of the lowest passenger fatality rates in airlines history (.79 per 100 million passenger miles).

In this 12-month period, passengers on domestic scheduled airlines were more than three times as safe as passengers in family automobiles.



## Air Quotes

"The threat represented by the air power of the Soviet Union has brought about an important change in this country's concept of defense. We realize today that weakness invites aggression. We have learned that lesson the hard way. . .



"One thing is certain—we are faced with a situation that we have faced twice before in our lifetime. We were not properly prepared in 1917, and we were equally unprepared in 1941. Then, unlike today, we were a relatively safe distance from our enemies. But despite that, our lack of preparedness cost us in excess of a million lives and untold billions of dollars. Our very survival as a nation now depends upon our instant preparedness to resist aggression."—Gen Curtis E. LeMay, Commanding General, USAF Strategic Air Command, June 22, 1952.

## Clock-like Assembly Used For Jet's 52,000 Parts

Using clock-like precision methods developed during World War II, a large U.S. aircraft manufacturer today is building an advanced jet bomber on a "multi-line" system first developed during the mass production days of the 1940's.

Essentially, this system calls for assembly of the bomber's 52,000 parts (exclusive of rivets, bolts and engine components) into comparatively few large and medium-sized parts. Later, in the final assembly area, these major parts are fitted together in the finished aircraft.

The proved efficiency of this method speeds production, the manufacturer reports, despite the fact that today's jet bombers use new and heavier materials, installations have multiplied in complexity, parts must be produced to more exacting tolerances, and external surfaces must be mirror-smooth.

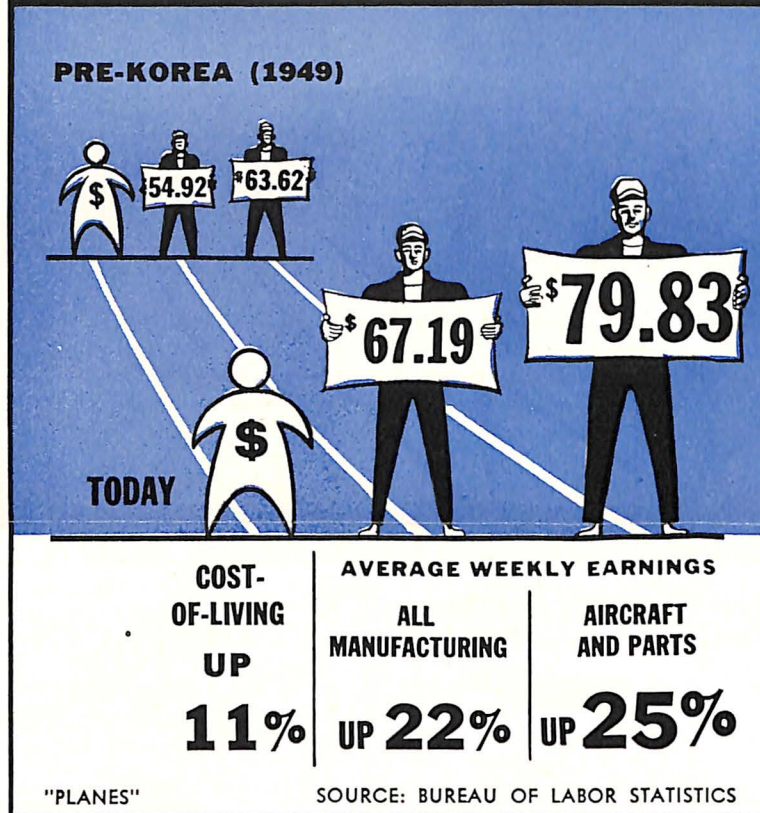
## More Engineers Needed; U.S. Supply Dwindles

The average U.S. aircraft manufacturer needs 150 times as many engineers today as in 1927—25 years ago.

Complexity of modern aircraft has multiplied requirements for all engineering skills. In 1927, the average aircraft engineering department employed 15 to 20 engineers and draftsmen; today, the number has swelled to 2,000 to 3,000 specialists in over a score of engineering fields.

The problem is heightened by the constantly-decreasing number of engineering graduates in the U.S. It is estimated the 1953 graduating class will number less than half that of 1950.

## AIRCRAFT WAGES RISE FASTER THAN COST-OF-LIVING



## NACA's Dryden Cites Research Problems

(Continued from page 1)

a bare minimum of equipment, we must realize that they still will be as different from yesterday's models as the newest transatlantic liner from a tramp steamer. From the hard-headed standpoint of dollars and cents, all will agree that it is better to produce the best airplanes we know how, for they alone can be depended on to combat successfully enemy craft, and return to home base.

It is much easier to talk about what we have got to do than to accomplish it. Only by intensive, often discouraging, research effort can we learn the basic new knowledge which will enable us to design lighter, cheaper engines that will produce more power from less fuel. The same is true respecting the aerodynamics of the airplanes these new engines will power.

### Variety of Needs

By research I mean the gamut of scientific investigations, ranging from the basic exploration of new fields and the search for more complete understanding of older fields, on which the NACA concentrates, to the application of new information into tomorrow's designs. Yes, even further to the research which enables the user of tomorrow's airplanes, the military, to make the wisest decisions about how to employ their new equipment.

Largely as a consequence of the headlong pace of aeronautics during the past decade or so, our aviation industry has been forced to apply

research methods to development problems and to acquire elaborate facilities with which to study the complicated and difficult problems which daily arise in their development work. Such facilities are expensive tools, but if they permit accomplishment of the ultimate goal—better airplanes—then their cost can be justified.

Discounting entirely what has happened to the purchasing power of the dollar, the fact remains that tomorrow's 1,000-m.p.h. airplanes are going to be far more costly than any we have built to date. But if only they enable us to keep our way of life, then the price is not too high.

### Researching the Future

Beyond all this on the time scale is aeronautical progress to the point where the stuff of today's dreams can first be catalyzed into the more tangible fragments of a realizable vision and finally, when the last required element is in hand, distilled into practical accomplishment. Global transport at 2,500 miles per hour, silvered satellites circling the earth, flight to our sister planets—such goals today are probably in the transitional stage between dreams and visions.

Such accomplishments may well require further broadening and deepening of knowledge beyond the capabilities of our generation. But when they materialize, they will spring from pioneering research in progress today. And in the years between there will be a spectacular acceleration of man's ability to hurl himself through the air, faster and farther, for good or evil.

We in America have the choice. To lead or be led.

## 'Elevated Railway' Speeds Production At Aircraft Plant

An "elevated railway" to speed production of a modern patrol aircraft is one of the most recent innovations on the assembly line at a major aircraft manufacturing plant.

Riding on the elevated track, fuselages are shifted from station to station along assembly lines in only 30 minutes—cutting 2 hrs. 30 min. from the time previously required. The fuselages are attached to lightweight frames that roll along tracks several feet off the factory floor.

In addition to time-saving, the new system speeds manufacturing and cuts costs by (1) giving complete accessibility to the assembly, (2) making possible a step-saving system of nearby tool and parts supply, (3) making more floor space available, (4) simplifying utility service, and (5) enabling more persons to work simultaneously on the same fuselage.

Previously, each piece of fuselage was mounted on a bulky dolly which was rolled along the floor.

## Low Profits

(Continued from page 1)

ed inventories could become even more acute if aircraft delivery schedules were again extended or 'stretched-out.' This would be a particularly serious problem from the standpoint of the myriad subcontractors and small suppliers presently supporting the aircraft production program."

Heavy production requirements during the year made it necessary for the 12 companies to add \$41.6 million in plant facilities—the largest increase since 1941 in company-owned facilities. The AIA report says this \$41.6 million investment may "involve a considerable financial risk to the individual companies if the need for these facilities does not continue for a five-year or longer period."

Expansion in 1951 was financed for the most part by \$15.1 million in long-term borrowing, \$5.3 million in retained earnings, a \$13.2 million decrease in net working capital, and \$43 million in additional capital stock.

### Answers to Planes Quiz

- (c) Consensus of Allied intelligence is that the USSR has about 20,000 planes in organized units, and almost the same number in reserve. Answer: 40,000.
- (a) A U. S. rocket-powered research aircraft has flown higher than 79,000 feet—nearly 15 miles.
- (b)
- (c)
- True
- (c)
- (b)
- (a) Average weekly earnings in the aircraft industry today are \$79.83, which is \$12.64 more per week than the average for all U. S. manufacturing industries.
- (a)
- (a)