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BUDGET REFLECTS NEW WEAPON PROGRAMS

Industry Leads In R & D Workers

The aircraft and parts industry employs about 67 per cent of its total force of 84.900 scientists and engineers in research and development projects, a recent report by the National Science Foundation reveals.

This is the largest number of scientists and engineers assigned to research and development by any major manufacturing industry, and reflects the intensive technological effort of the aircraft and missile industry. In addition, a substantial number of scientists and engineers listed in the "electrical equipment" category are employed on projects directly relating to aircraft, missile and spacecraft projects.

By categories, the survey shows that 75 per cent of the physicists, 74 per cent of the mathematicians, 70 per cent of the chemists and 58 per cent of other scientists in the aircraft and parts industry are engaged in research and development projects.

Tops in Industry

The aircraft and parts industry has assigned 62 per cent of a total employment of 51.500 technicians (skilled personnel assisting scientists and engineers) in research and development projects, highest percentage among all industries. Overall, industry employs 27 per cent of a total force of 594.600 technicians in research and development.

From January 1954 to January 1957, the period covered by the National Science Foundation survey, the aircraft and parts industry increased its employment of scientists and engineers assigned to research and development projects by 105 per cent, the second largest gain registered by any industry. In all activities, the aircraft and missile industry led other manufacturers in the increase of scientific and engineering personnel with 75 per cent gain from January 1954 to 1957. This compares with an increase by all industries of 30 per cent.

Enrollments Drop

Meanwhile, the Department of Health, Education and Welfare reported that freshman engineering enrollments in colleges and universities dropped 11 per cent at the beginning of this school year, the first

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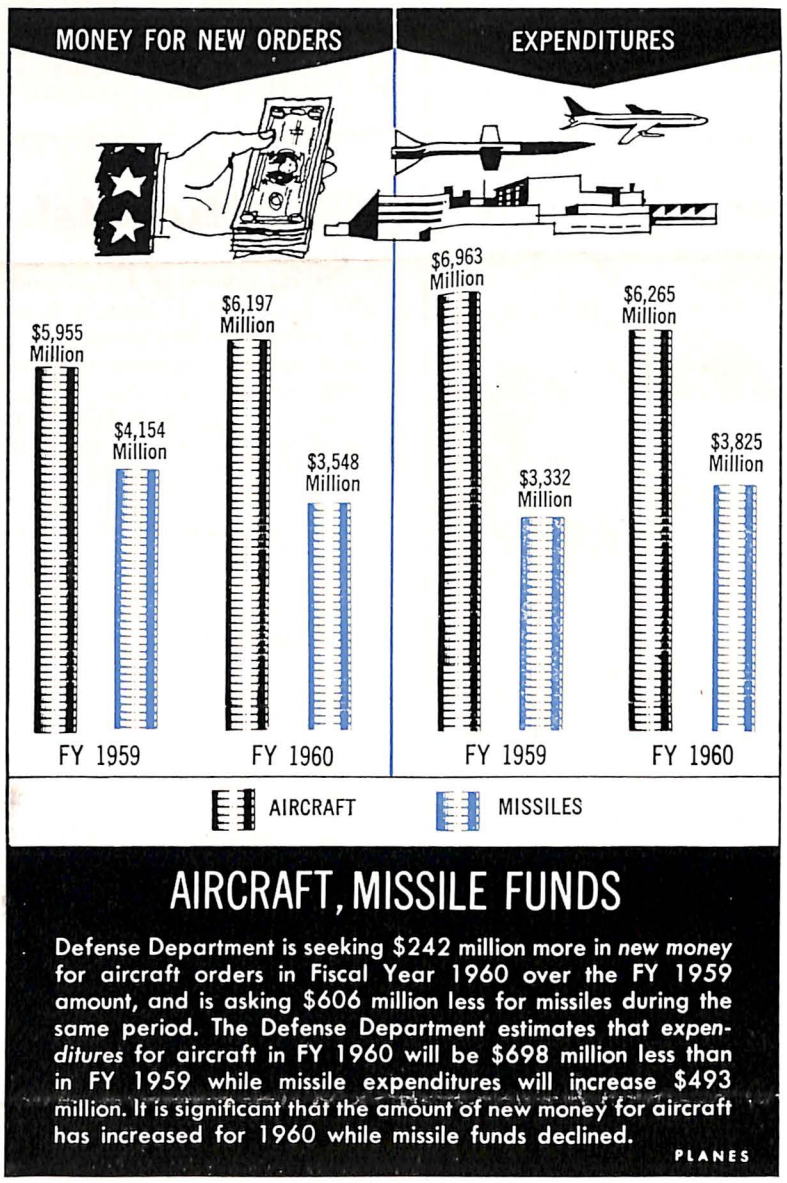


AIRCRAFT, MISSILE FUNDS

Defense Department is seeking $242 million more in *new money* for aircraft orders in Fiscal Year 1960 over the FY 1959 amount, and is asking $606 million less for missiles during the same period. The Defense Department estimates that *expenditures* for aircraft in FY 1960 will be $698 million less than in FY 1959 while missile expenditures will increase $493 million. It is significant that the amount of new money for aircraft has increased for 1960 while missile funds declined.

PLANES

'Waterfall' Pours Out Savings

There's a valuable "waterfall" at an aircraft plant—made of metal. The metallic "Niagara" actually is the business end of a sorting belt on which thousands of mixed standards (nuts, bolts, washers, clamps and other parts) pour off for salvage.

Last year $92.000 worth of clamps alone were rescued and returned to the shops.

Some of the many tons of production mixed standards which arrive annually at reclamation are swept from the factory floor. Some are collected from the bins themselves where different-sized parts have been jumbled together, and others result from employees taking more parts than needed to do the job; when the excess parts are returned, they obviously are in a mixed condition.

This situation is an inevitable part of production throughout the aircraft industry, which has worked constantly, across the years, to hold down the costs of "scrambled" standard parts.

The reclamation operation exists for the purpose of helping to hold down this cost.

Fewer Units Will Be Ordered

The Federal Budget for Fiscal Year 1960 now before Congress is a figure story of the changing nature of new weapon systems for the military services and their effect on the aircraft and missile industry.

The amount of funds requested for aircraft and missile orders stays at a high level—$6.2 billion for aircraft and $3.5 billion for missiles in Fiscal Year 1960 compared with $6 billion for aircraft and $4.2 billion for missiles in FY 1959. However, fewer units will be ordered. This is due to the continuing cost spiral which is made up of two major factors: Increased complexity of weapons and inflation.

Technological Advances

The galloping pace of technology has generated weapons systems of operational capabilities that were beyond prediction only a few years ago. This operational capability came about as a result of advances along a broad front embracing nearly every scientific and engineering specialty. With each advance, weapons become more complicated and, inevitably, more costly. As an example, during its peak production year in 1945, the aircraft industry produced 95.272 planes at a cost of about $13 billion. In Fiscal Year 1960, the three services plan to order 1.610 planes at a cost of $6.8 billion. But the destructive potential of a single fighter-bomber today is equal to that of an entire formation of World War II bombers, and the speed is three times faster and operating altitudes have doubled.

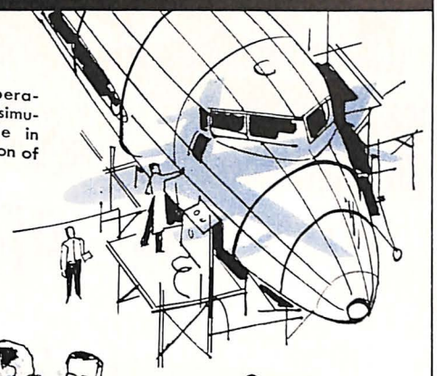
It is inevitable that the trend toward fewer and fewer units will continue. The Air Force during FY 1960 is reducing the number of combat wings, including missile wings, from the 117 in June 1958 to 102 by June 1960. Navy carrier air groups will be reduced by one over the same period.

Weapon Progression

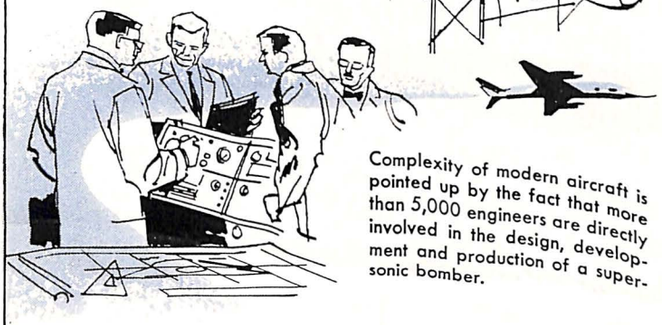
The metamorphosis of this paramount defense industry continues. There has been a logical progression from manned aircraft to missiles. We have gained valuable knowledge in the missile program which is being used in the next phase—spacecraft. The goal now is to put man back into these weapons

(See BUDGET, Page 7)

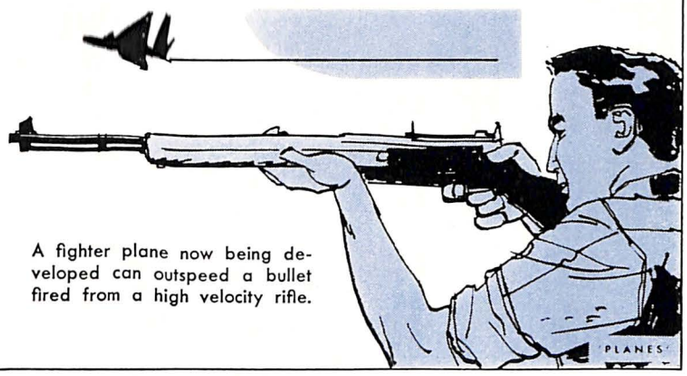
Plane Views



To insure safe airline operations, more than 50,000 simulated flights were made in tests of the fuselage section of a jet transport.



Complexity of modern aircraft is pointed up by the fact that more than 5,000 engineers are directly involved in the design, development and production of a supersonic bomber.



A fighter plane now being developed can outspeed a bullet fired from a high velocity rifle.

PLANES

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Planes is an official publication of the Aircraft Industries Association of America, Inc., the national trade association of the designers, developers and manufacturers of aircraft, missiles, spacecraft, their propulsion, navigation and guidance systems and other aeronautical systems and their components.

The purpose of *Planes* is to:

Foster public understanding of the role of the aviation industry in insuring our national security through development and production of advanced weapon systems for our military services and allies;

Foster public understanding of commercial and general aviation as prime factors in domestic and international travel and trade.

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The Risk of Security

The surge of technological breakthroughs during the past decade in the aircraft and missile industry is unequalled in the history of weaponry.

If three years ago newspapers had reported an award of a contract for the design, development and construction of a space vehicle capable of carrying man into orbital flight around the earth and safely back to earth again, the report would have been ridiculed. And, even less than ten years ago, if someone had said that a thermonuclear warhead of vast destructive potential could be contained in the space of a missile nose cone, there would have been a similar reaction.

The aircraft and missile industry today is designing and testing engine performance that a few years ago existed only in the realm of theory. Most recently, a contract has been let for the development of a rocket engine capable of producing one and a half million pounds of thrust, and work is progressing on nuclear reactor engines for aircraft and missiles.

There are, obviously, unusual risks for contractors in the development and testing of these new powerful weapons. This was recognized by the Congress in the case of contractors working with the Atomic Energy Commission, and a bill granting these contractors indemnification in the event of an accident was approved and became law two years ago.

Contractors for the Defense Department need the same protection for public and corporate security. Even the largest defense contractor literally gambles with bankruptcy every time a major weapon system is tested. Damage claims from an accident could wipe out a corporation.

The Defense Department is clearly aware of these vast risks. The General Counsel of the Defense Department, in explaining the need for indemnification legislation, recently stated: "For instance, defense contractors for some aspects of missile production and testing, defense contractors making some highly volatile fuels, and defense contractors producing vehicles for nuclear weapons are understandably deeply concerned over the possibility that an incident might occur in the course of performing their contracts in which the loss and damage to persons and property would be enormous.

"Their concern extends not only to incidents occurring during the actual course of contract performance, but also to incidents which might occur many years after the contract is completed, but as a result of which the manufacturer might be sued for enormous sums on a theory of product liability."

A bill providing such indemnification (H.R. 4103) has been introduced by Representative Carl Vinson, Chairman of the House Armed Services Committee.

The aircraft and missile industry is unable to obtain commercial insurance to protect them and the public against the great risks they run. The risks do not refer to the probability of their occurring. In fact, the Defense Department has never had experience of any incident involving these very high risks. The safety record of the aircraft and missile industry in developing and testing new weapons is excellent. But the risks arise from the huge potential liability that could arise from an accident.

The proposed indemnification legislation would limit the Government's obligation to $500,000,000 for any one incident with the contractor's liability also being cut off above that amount. The indemnification granted to prime contractors would automatically cover their subcontractors and suppliers.

The Defense Department strikes at the bedrock necessity for this legislation in this statement: "The aim of the proposal is to keep continually available for most important Government contracts all of the best qualified contractors in private industry."

AIR QUOTE

"In these days of international stir and ferment we are seeking to achieve and maintain a decent and durable peace. This is our first and only military objective. It follows then that our military power is a deterrent power. And, in a final sense, and very briefly, the real objective of the U. S. Air Force is the employment of aerospace power in the best national interest.

"We must contribute a major portion of the total U. S. effort to deter general war. We must also provide together with our sister services for the air defense of the United States. This means that we must know the possible threat, assess it realistically, and help achieve so strong a posture as to deter any attempted application of military power against our country.

"I believe you will agree with me that we have been successful in this undertaking. For the past decade, we have deterred armed aggression by our potential enemies by means of superior, ready-to-use, long-range air striking power, coupled with a publicly declared willingness and readiness to use it if necessary."—*Maj. Gen. Ben I. Funk, USAF, Jan. 8, 1959.*

Scrap Plus Ingenuity Equals $49,000

The "do it yourself" approach of one aircraft and missile company has paid off to the tune of $49,000 —with even greater savings to come. For less than $1,000 the company built an electronic test station which would have cost $50,000 purchased on the open market.

Constructed from scrapped and surplus goods gathered and assembled over a five-month period, the test station is used primarily for checking all regular electronic components as they arrive from vendors. This assures an increase in the quality of incoming material, resulting in an important improvement in reliability of the end item. This is where savings are expected to increase substantially.

One of the spectacular features of the test station is a special relay checker, the only one of its type in the company. The relay checker simulates the actual circuitry in an aircraft and by manual manipulation, the operator can introduce various factors including vibration.

This early check assures that a faulty component will not be included in a developmental model, only to break down later at a crucial phase of testing.

AVIA planes
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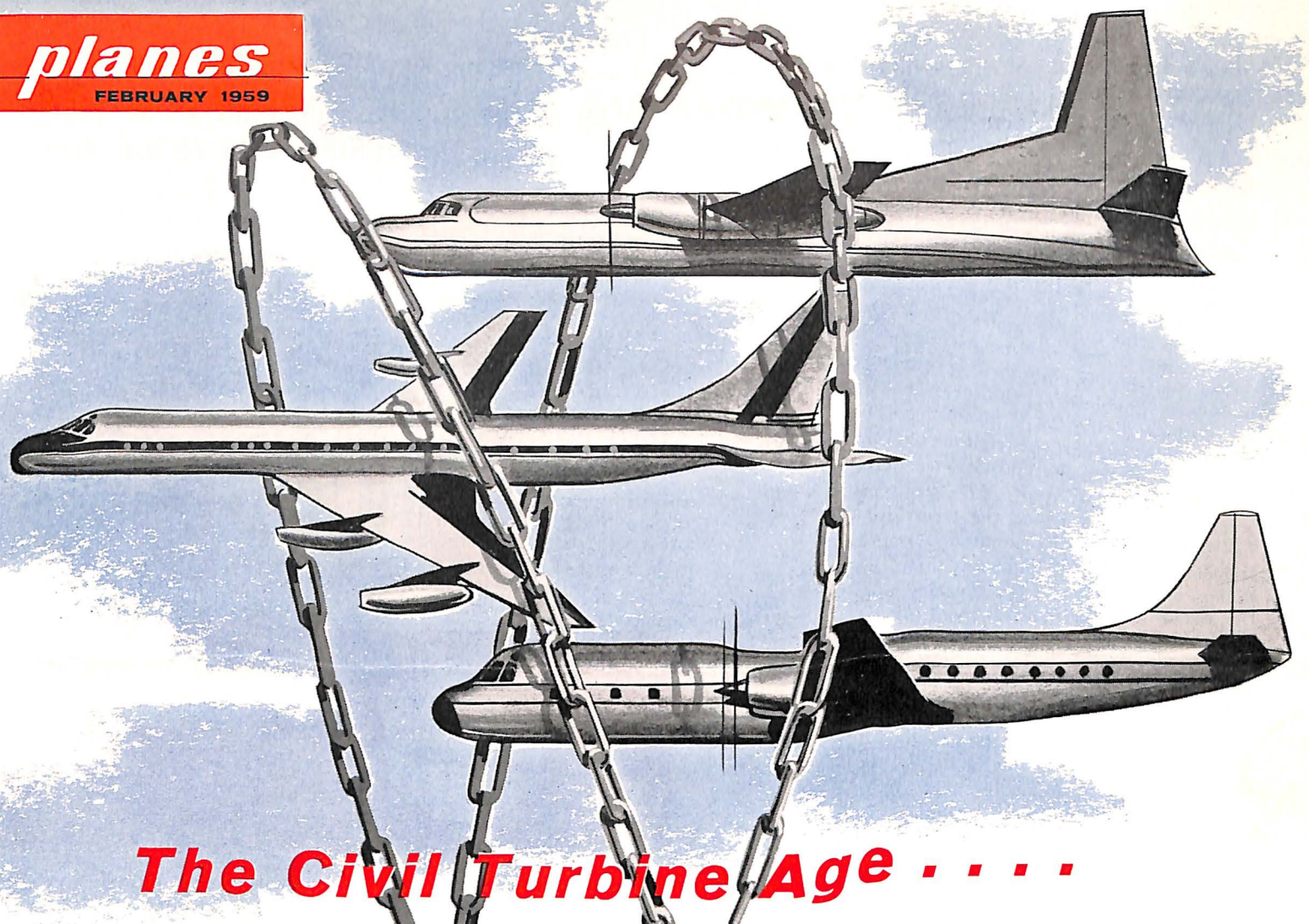
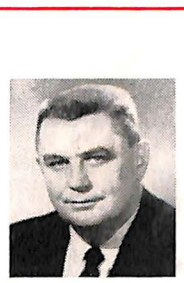


The Civil Turbine Age . . . .

A SHACKLED PROMISE



JAMES J. HAGGERTY, JR., an authority on military and civil aviation, and formerly with Look and Collier's magazines, has been active in aviation since his service with the 15th Air Force during World War II. A contributor to two encyclopedias, he is also editor of the Aircraft Year Book, official publication of the Aircraft Industries Association. In addition, he serves as editorial consultant to AIA. Mr. Haggerty is a former president of the Aviation Writers Association.

"The requisite for aviation industry success is a partnership status whereby Government regulation allows the industry the earning power, stability, growth potential, and incentives to attract the necessary capital, management, and resources in our highly competitive economy. Successive earnings declines in both segments of the industry, chronic over-regulation, mounting capital shortages — all are warning signs that the necessary relationship has not been achieved. Recurrent Soviet aviation firsts—in earth satellites, in intermediate range rocketry, in production of commercial jet and propjet transports, in inauguration of worldwide commercial jet service—all warn that we are in danger of losing the larger competition."—AVIATION SECURITIES COMMITTEE OF THE INVESTMENT BANKERS ASSOCIATION.

By James J. Haggerty, Jr.

OVER the past few months, the turbine era of commercial air transportation in the United States has been building up momentum. Several airlines are now flying, in scheduled operations, American-built turbine-powered planes of either the turboprop or turbojet variety, and during 1959 the conversion to pistonless power will reach impressive proportions.

This long-awaited Civil Jet Age, or to be more specific, the Civil Turbine Age, offers a great deal of promise to a variety of interests. To the national economy, it offers the potential of an expanded and more efficient air commerce. To the traveler, it means speedier and more luxurious air transportation. To aircraft and component manufacturers, heavily engaged in Government work, it offers an expanded commercial market and less dependence on fluctuating military requirements. To the military services, the new turbine fleet provides a considerably greater emergency airlift capability.

To the airlines, the new planes offer not only more efficient operation but promise of expanded revenues in the years to come, for turbine equipment has the dual attraction of more comfortable flight and schedules so vastly superior to any form of surface transportation that it cannot help but lure large numbers of travelers who have not yet been converted to air transportation.

All of this promise, however, is overshadowed by a mass of problems that threaten the stability of the air transport industry. The problems are various and widespread. Some

of them are new, brought on directly by airline conversion to the new aircraft. Others are holdovers from the piston-power era, accentuated in the turbine age. They loom so large that there is serious question whether some of the potential benefits of the turbine re-equipment program will be realized.

First is the problem of paying for the new equipment. It is expensive, for, aside from the inflationary spiral, modern airline transports are large and complex pieces of machinery, and complexity means cost.

The massive re-equipment program now under way involves expenditures by American airlines of close to $3 billion for 480 aircraft, their supporting equipment on the ground, maintenance provisions, terminal facilities and a variety of other requirements.

To a nation to which the term "billion" has lost its sense of magnitude because of tremendous national budgets, three billion dollars no longer seems a staggering sum. To the airline industry, harassed and beset by a plague of economic problems in the face of declining revenues, it is a disturbingly impressive sum.

Obviously, expenditures on such a scale could not be made from accumulated earnings. Instead, the airlines are buying the new planes and their supporting equipment on what amounts to a grand-scale installment plan, with payments to come from anticipated future revenues.

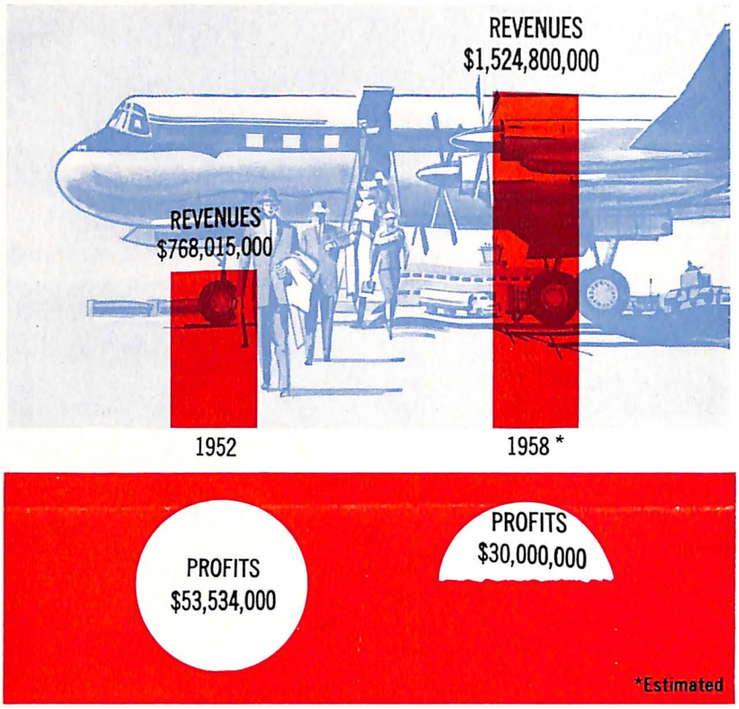
THE American public knows a lot about installment plans. It has become a national way of life. The average American thinks nothing of hocking a portion of his expected income to buy a new car, furniture or clothing. He knows, too, that there is a limit to his credit; he has to prove to the finance company that he is capable of repaying. Therein lies one of the airlines' major problems: demonstrating to investors their ability to repay the heavy sums they must borrow.

An airline's income is, first of all, subject to stringent Government restrictions, yet its cost of operation continues to climb like other commodities. These factors have brought about a rather substantial deterioration of airline earnings. A parallel decline in the rate of air traffic growth has caused investors to be rather wary of air carrier financing.

As a result, several hundred million dollars worth of the planned orders for new turbine equipment remains unfinanced today. Unless this money can be obtained, there will be widespread deleterious effect. Some airlines, representing about one quarter of the industry traffic volume, might have to continue to operate slower and less attractive to the passenger piston-engine equipment, placing these airlines in a poor competitive position and slowing the projected climb of the air traffic volume curve because the new turbine airplanes are an important factor in any prediction of traffic growth.

At the same time, there would be a corollary effect on the aircraft manufacturing industry. Cancellations or cutbacks of planned equipment purchases would have a serious impact on this segment of the aviation industry whose earnings are traditionally low. Further, there would ensue resultant damage to the national economy, in terms of reduced employment among the builders of commercial equipment.

THE TRUNK AIRLINES DID TWICE AS MUCH BUSINESS IN 1958 AS IN 1952 —BUT THE NET PROFIT WAS ABOUT HALF



Thus, inability to finance the remaining portion of the re-equipment program will put a tarnish on the gleaming promise of the turbine age. But financing alone, important as it is, will hardly restore the sheen, because it is only one of many problems awaiting solution.

It would appear to the casual observer that there is one obvious solution to the finance question: raise the price of the product. If a manufacturer of any other commercial product finds that rising production costs have made it impossible for him to sell his product at the going price, he sets a new price. He has found that a price raise has little impact on his sales volume, for the public has become inured to higher prices. The consumer has shown little resistance to increased cost when the product is a needed one.

Airline operators will agree that a new fare rate would help solve some of their problems. Unlike the commercial manufacturer, however, they are powerless to do anything about it, because the fare structure is regulated by the Government, specifically by the Civil Aeronautics Board.

Virtually every large trunk airline has filed application for fare increases ranging from 12 to 17 per cent, and with what air carrier executives consider good reason. They point to a six-year financial statement for the period 1952-1957.

In 1952, the trunk airlines had total revenues of slightly more than three quarters of a billion dollars. Their combined profit in that year was over $53,500,000.

In 1958, gross revenues totaled more than a billion and a half dollars, but profits were down to $30,000,000. In other words, the trunk carriers did twice as much business in 1958 as they did in 1952 but made little more than half the profit. The entire 1958 profit, incidentally, would not quite buy six of the jet transports the airlines are now acquiring.

The airline fare structure approaches the ridiculous. Airline rates today, based on average revenue per mile, are only about seven per cent higher than they were in 1938. The average for other consumer price increases is 98 per cent.

A direct comparison with other forms of transportation again points up the inequity in the airline fare level. During the same two-decade period, commercial bus fares went up 37 per cent and first class railroad fares climbed 46 per cent.

During the period of comparison, airline operating costs continued to climb while fares remained practically constant. The main tool of the airlines is, of course, the airplane. A 1938 transport cost about six dollars per pound. The first post-World War II airliners went for $13 a pound. More modern equipment purchased in the early 1950's ran close to $30 a pound. Turbine aircraft now being purchased range from $35 to $42 per pound.

The other costs of operating a commercial air service have similarly gone up, and they have gone up faster than have general consumer prices. To take a more recent comparison, general consumer prices have increased 22 per cent since 1947. During the same period, the cost of fuel and oil for airline operation has increased 41 per cent; maintenance materials have gone up 44 per cent; and airline salaries have climbed 78 per cent.

Despite these impressive statistics, the Government has continued to "look the other way" on the subject of airline fares. During the post-war era, two modest fare increases were granted. In 1952, the CAB permitted an

increase of one dollar per airline ticket. In early 1958, fares were again increased by four per cent plus one dollar a ticket. The combined increases amounted to an over-all increase of 6.6 per cent, but they did not compensate for cost increases.

The timely and comprehensive Cherington Report, prepared by Dr. Paul W. Cherington of Harvard's Graduate School of Business Administration, had this to say about the interim fare increases:

"The fare increases over this period (1949-58) added nine per cent to the price of the average ticket. In terms of constant dollars, adjusted for interim price level changes, the real cost of the average ticket *declined* by nine per cent. Other transportation costs have risen much more substantially. For example, the cost of automobile ownership and operation rose over 19 per cent in current dollars between 1949 and the end of 1957."

In the spring of 1956, the Civil Aeronautics Board started a General Passenger Fare Investigation intended to determine a "reasonable" level of domestic airline fares. Suspended twice during 1957, it is still in progress, with conclusions expected in the first half of this year. Needless to say, the result is of critical importance to the economically harassed airline industry.

The Civil Aeronautics Board has taken the position that one solution to the economic problem is to further "promote" air travel and thereby fill a greater proportion of the increased number of seats the large turbine aircraft will make available.

The airlines resent the implication that they have not been adequately "promoting." A spokesman pointed out that an increase in the number of passengers carried annually from 16,000,000 to 49,000,000 within a ten year period was strong evidence of the industry's ability in the promotional area.

"It is interesting to note," he added, "that last year the airlines, which take in less than one-fifth the total revenue of the nation's railroads, spent $24,000,000 in passenger advertising in newspapers alone, or four times as much as the railroads."

Airline executives admit that there is an unquestioned need for a continuing promotional campaign at a high level of activity. Paul Cherington's report pointed out that the "airline market remains limited in terms of the number of *individuals* who travel."

"Estimates of the number of different domestic passengers who travel in any one year range from three million to six million persons," the report states. "It is generally agreed that repeat travelers account for the bulk of air travel."

To achieve the promise of the turbine age, it is obviously necessary to make a greater penetration of the mass market. Thus, one of the big questions pertinent to any discussion of fare increases is this: Will a fare rise hinder development of the mass market?

Airlines think not, but a supporter of the airlines' position might add another question:

Will even a hundredfold increase in passengers carried help the economic situation if fares remain fixed and operating costs continue to rise?

THERE is, air transport industry executives feel, an effective compromise, one wherein a badly needed fare increase could be granted without materially changing the actual cost of the ticket to the passenger. This is by eliminating a 10 per cent transportation excise tax now imposed on tickets.

The original purpose of this tax was, in part, to discourage wartime passenger travel, but it has been continued to date. In fiscal year 1958, it brought about $100,000,000 in Government revenue. Obviously, the repeal of any tax in these days of mounting national debt is a subject that will be strenuously debated, but if it is possible, it represents a method of solving the problem of increasing fares without the passenger's being aware of the increase.

Another tax problem plaguing the airlines is the question of "user charges," which refers to payment for use of the airway and air navigation facilities provided by the Government. There is general agreement that all users of the airways system should pay a fair share of the cost of operating the system. The question is what is a fair share.

Until now, the airlines have been paying two cents tax per gallon of gasoline. In 1957, this tax yielded to the Government $24,800,000, a sum the airlines figure is quite a reasonable share in view of the fact that they operate fewer than 2,000 planes compared with close to 100,000 military and civilian aircraft to which the facilities are available.

The fiscal 1960 budget recently sent to Congress calls for an increase of this charge to four and one half cents a gallon, to be applied to both gasoline and jet fuel. The budget states that this will yield $85,000,000 in fiscal 1960 and "somewhat larger amounts in subsequent years." (The airlines estimate it could be as much as $167,000,000 a year.)

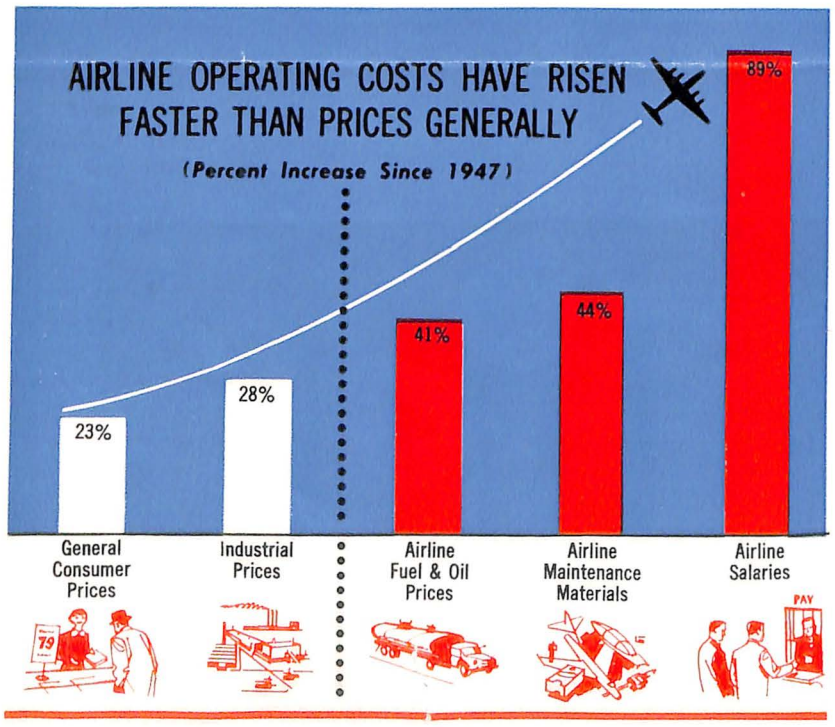
The budget indicates that this tax should be passed on to the "ultimate user," or the airline passenger. If it is, the passenger will be paying a 10 per cent tax for his transportation and another tax on top of it for the fuel which makes possible the transportation.

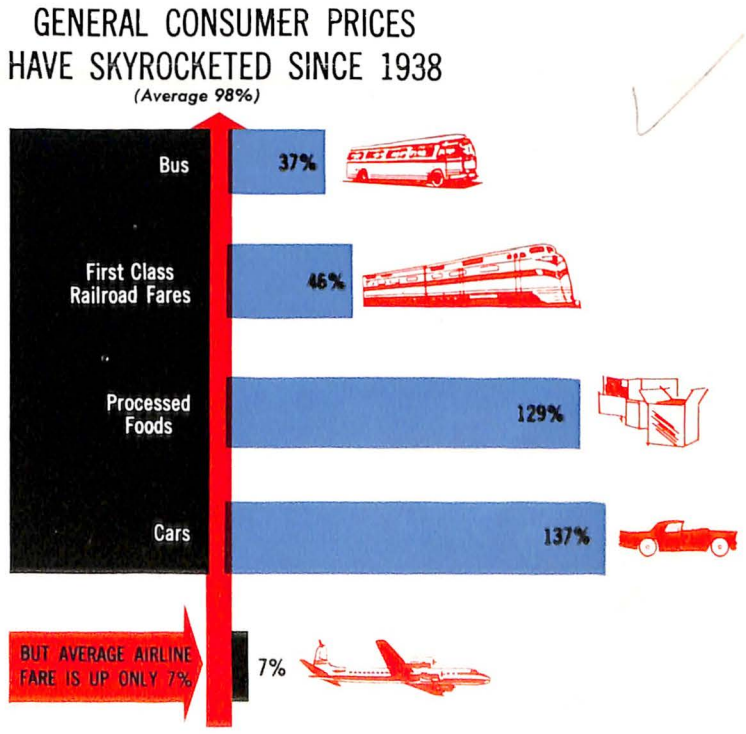
Early estimates indicate that this new tax will average out to about five per cent. What effect this tax proposal will have on the General Fare Investigation remains to be seen.

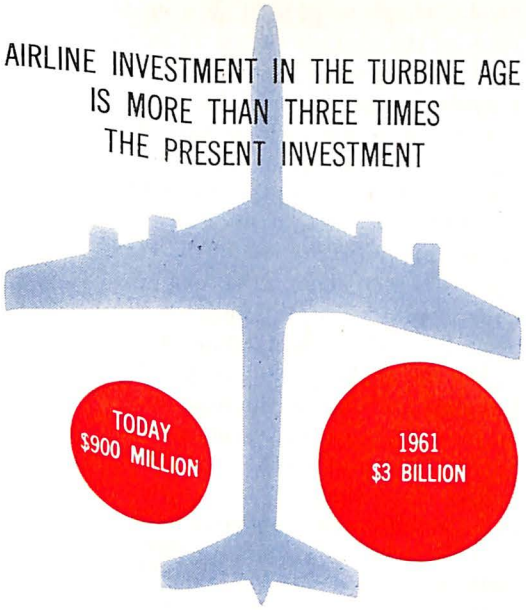
On top of fares and taxes, there is another problem area — labor. The problem stems from what airline officials call an imbalance at the bargaining table.

As stated earlier, the airlines, though a highly competitive industry, are tightly regulated by the Government. They cannot adjust fares without approval, and are not even allowed to hold joint discussions on rate structures. In collective bargaining with unions, they are badly handcuffed.

Part of the problem exists because of the 22-year old Railway Labor Act, under which negotiations are conducted. This law was written to offset what was considered at that time an inferior bargaining position on the part of labor. The law is still applicable, but, say industry officials, the conditions which







prompted it are not.

They cite examples: One assumption in the Thirties was that the average productive life of a pilot was well below that of other professions. One airline recently took inventory and found that 80 per cent of the pilots it employed in 1937 are still on the payroll.

Another example is a decision which provided compensation for pilots for increased productivity resulting from adoption of new types of aircraft. An industry spokesman had this to say:

"The method of relating pay to the productivity of a single piece of equipment, such as a new airplane, does not take into account the over-all company experience with the new equipment. It ignores increased maintenance costs, capital outlay and all other related factors. By relating pay to the specific productivity of one piece of equipment, the pay of a select few may, without any effort on their part, suddenly skyrocket to extreme and disproportionate heights."

THE payroll is the airline industry's biggest item of expense. It amounts to about 46 per cent of the total expense of running the airline system. The average wage is $5,474, well above the average of other modes of transportation and the nation generally. The highest paid are the pilots. Curiously the CAB, until recently, recognized for rate making purposes a figure of $20,000 as maximum salary for a local service airline president. At the same time, there were more than 700 pilots drawing a bigger pay check.

The imbalance at the bargaining table of which the airlines speak consists of the fact that they are tightly bound by restrictive Government regulations on the one hand and on the other, are subject to other Government regulations which give the unions all the advantages in collective bargaining.

The rash of strikes in late 1958, which slowed the introduction of turbine equipment, pointed up this fact. During that labor turmoil, six airlines signed a "mutual aid" agreement under which a member company shut down by a strike would receive compensation from the other member airlines equal to the dollar volume of increased business they received because of the strike. The agreement applied only "where a strike has been called to enforce demands in excess of or opposed to the recommendations of emergency boards appointed by the President, or before all procedures of the Railway Labor Act have been exhausted, or a strike which is otherwise unlawful."

At the same time, the union which had struck three major airlines announced increased financial help for striking members. The Government required no filing of this program and asked no approval. On the other hand, the CAB is now conducting an exhaustive review of all details and ramifications of the airline agreement, permitting opposing arguments from all labor organizations.

The pilots' union called the airline pact a "war chest for a strike fund." The same union has the most lucrative strike benefit plan in all organized labor, one under which striking members can receive up to $650 a month.

An airline executive put it succinctly: "We bear all the burdensome regulation of a monopoly utility and yet enjoy none of the economic windfalls that flow from a monopoly."

There is still another major problem, one which affects both segments of the aviation industry, the aircraft manufacturers as well as the airlines. This is the task of disposal of surplus equipment.

In earlier re-equipment programs, disposal of older aircraft was not a problem. Planes of commercial transport capability were in strong demand and they brought good prices. In recent years, however, the market has slimmed and prices declined.

The increased lift capacity of the new turbine planes will make surplus a large number of piston-powered transports. In some cases, turbine manufacturers are taking trades; in others, the airlines are trying to dispose of their equipment. In either case, some use must be found for the planes.

There is a considerable market for second-hand aircraft in under-developed foreign countries, but these countries are unable to finance the purchases, and agencies in charge of loan assistance have shown a reluctance to provide loans for this purpose. Since these planes still represent a considerable investment, it is one more financial problem which will become more acute as more turbine planes are delivered.

With solution of these problems, the promise of the turbine era is bright. The speed and comfort of the new planes, a growing acceptance of air transport and the growth in population and economy combine to forecast a tremendous growth in air traffic volume.

A Civil Aeronautics Administration estimate made last year predicted the airlines will carry 66,000,000 domestic passengers in 1960 (compared with 45,000,000 in 1958), 93,000,000 by 1965 and 118,000,000 by 1970.

THE new turbine aircraft, plus the piston aircraft which will be retained for a few years, will be adequate to handle this volume and the airlines are confident that they can meet or better these projected figures. But a large volume of passenger traffic alone is not sufficient to give the industry the stable financial structure it needs to perform in the public interest. The industry needs broader recognition of its problems and a certain degree of assistance from the Government, not in subsidy payments, but in enlightened policies which will permit it to operate efficiently in the free enterprise climate.

Here is what air transport industry consensus wants in the way of support:

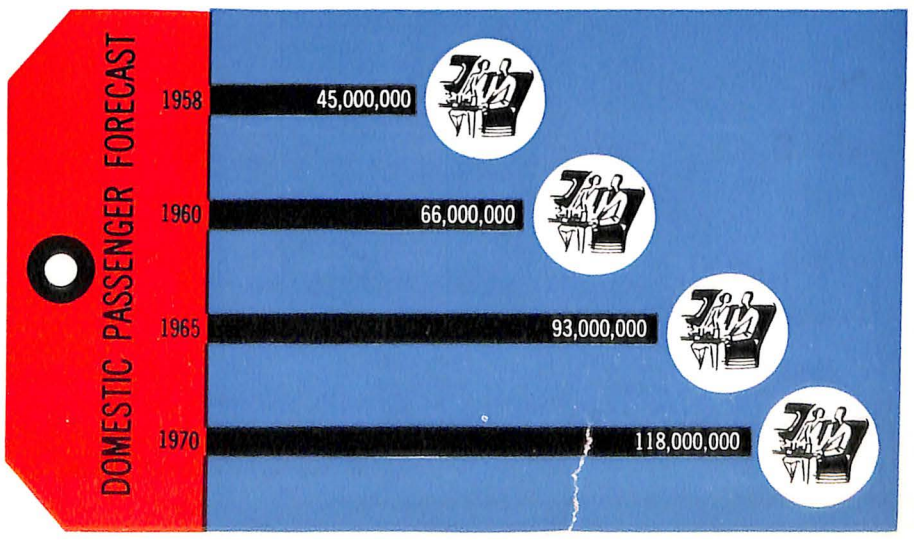
1. Freedom to adjust fares to a level sufficient to operate efficiently and finance constant improvement, a requirement in any industry, and elimination of Government interference in marketing planning.

2. The 10 per cent transportation tax should be eliminated and any discussion of "user charges" should take into consideration the degree of military use of the air traffic control system and its value to the defense posture and national commerce.

3. The Government should permit efforts by industry to correct the imbalance at the bargaining table in labor negotiations.

4. There should be a vigorous effort on the part of the Government to encourage a world-wide market for second-hand aircraft and provide financial assistance for their purchase, which would serve the dual purpose of helping both segments of the aviation industry out of a problem and put American-built aircraft in new areas.

5. In summary, the Government should develop a coherent, coordinated policy designed to encourage the economic growth of the air transport industry, which cannot fail but serve the public interest.



Aircraft Industries Association of America, 610 Shoreham Building, Washington 5, D. C.

Budget Declines for Procurement

(*Continued from Page* 1)

to obtain the one vital factor lacking in automated weapons systems—human judgment.

A new account has been added to the FY 1960 budget—military astronautics — which reflects the increased emphasis on space projects. Funds for the Dyna-Soar, a manned orbital bomber program, are contained in this account. Request for direct obligations in FY 1960 for military astronautics amounts to $309 million for the Defense Department. Civil space projects are directed by the National Aeronautics and Space Administration. The NASA is seeking $485 million for its 1960 programs with $333 million earmarked for research and development.

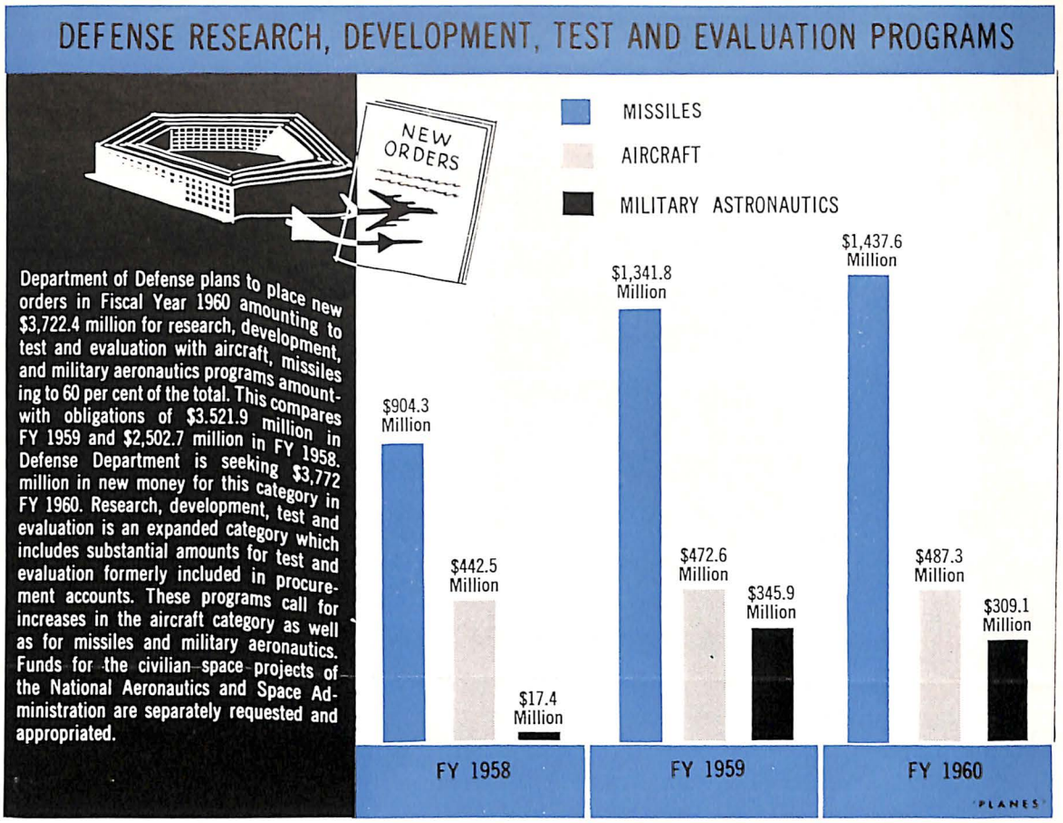
Over-all, new money for orders requested by the President and estimated orders to be placed by the Defense Department are less for FY 1960 than the previous fiscal year. The budget request for new money in FY 1960 is $40.9 billion compared with $41.1 billion in FY 1959.

Other budget highlights:

- New money for procurement is down $1.2 billion from FY 1959.
- Direct obligations for equipment procurement are down $800 million in FY 1960 from the previous year.
- Procurement expenditures will drop $300 million in FY 1960 from FY 1959.

New money for the expanded category of Research, Development, Test and Evaluation increased $300 million in FY 1960 to $3.8 billion from $3.5 billion in FY 1959. The 1959 figures have been adjusted to reflect the transfer of test and evaluation funds from procurement accounts. The aircraft and missile procurement accounts, prior to the FY 1960 budget, contained large amounts for test and evaluation.

Direct obligations for the new research account is estimated at $3.7 billion in FY 1960 compared with $3.5 billion during the previous year. Aircraft, missiles and military astronautics programs account for 60 per cent of the total direct obligations for research, development, test and evaluation.



New Device Prevents Destruction of Aircraft Parts in Pressure Testing

An aircraft company has now come up with a unique device which safeguards airplane parts during pressure tests.

Called a manometer, the instrument permits proper testing but doesn't let the pressure go beyond the capacity of the structures being tested.

Prior to development of this cost-saver, existing safety devices were not adequate to meet every conceivable type of human error.

The manometer uses water as its measuring agent. If the area being tested receives too much pressure, the water spouts whalelike, through the tubing of the manometer, automatically releasing air. If the test functions properly, no water blows.

Even if the test-bench measuring gauges are off base, the new device can prevent a costly blowup of a wing or other part.

Manometers come in two basic forms. The most common is a 14-foot-high fuel-cell with capped U-shape tubing for attachment to the air hose. Air pressure then forces water out.

The body-section testing system, which is shaped like a flag staff, utilizes a well-like container in which air pressure forces water up the tube. A red safety light offers a warning for crane operators.

In spite of their size, both units are highly mobile. The fuel-cell manometer pivots on its base and can be moved handily to any location. The body-section device can be dismantled for moving.

Small Ideas Add Up To Big Payoff

A cost-savings idea need not be spectacular to pay off where it counts—in improved efficiency and operations.

Items selected at random include a pneumatic screw driver used to work fragile materials. Used on a jet transport's floor panels, farings, linings and plastics, savings on 100 jet airliners are estimated at $55,000.

Using plastic-faced dies in place of steel and kirksite not only is less expensive but takes less finishing work in tooling. About 150 hours' fabrication time was saved, which, added to the other, produced a one-time saving of $10,680.

Filing information of inactive production tooling on punch cards has made possible the saving of $36,983 in production engineering. Machine methods for screening tool investigation and disposition reports is the key which saves more than 8,000 man-hours a year in this regard.

6,414 Personal Planes Shipped During 1958, AIA Survey Shows

Shipments of personal and executive aircraft during 1958 increased by 296 units over 1957 with 6,414 planes sold having a retail value approximating $135,000,000, according to a recent survey by the Aircraft Industries Association.

This production achievement is particularly significant in view of the general decline during 1958 of other manufacturing industries. A major factor in this encouraging growth is the increasing acceptance of the small private or corporately-owned aircraft as a means of business transportation. There is every indication that this growth will continue during 1959.

Utility aircraft production has increased steadily since 1954. Both the unit and dollar value of 1958 shipments are more than double those of 1954. This past five-year period of steady industry growth also has seen the introduction and ready acceptance of a number of new models, including several new models of twin-engined aircraft, sales of which increased from 354 units in 1954 to 870 in 1958. There also has been a trend, especially evident last year, toward higher horsepower engines in both single and twin-engined aircraft resulting in improved performance.

The leading manufacturers of general type aircraft estimated they would achieve retail sales totaling about a billion dollars in the five-year period 1958-1962, and that the industry would also expend almost $100,000,000 in research, development, facilities, and equipment during this five-year period.

Engineering Graduate Courses Gain

(*Continued from Page* 1)

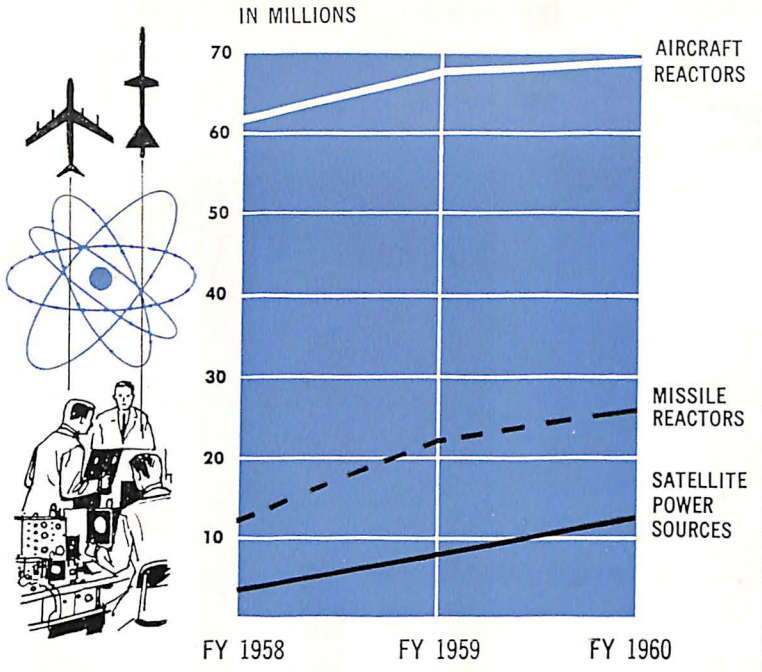
reversal after seven years of steady increases.

HEW Secretary Arthur S. Flemming stated: "The drop in engineering enrollments is the more disturbing in view of the fact that enrollment in institutions of higher education this year is substantially higher than last year."

In the fall of 1957, first-year college enrollments in engineering had climbed to 78,757. Last fall, such enrollments dropped to 70,129. Total undergraduate enrollment in engineering last fall was 256,995, compared with 268,761 in the fall of 1957, a decrease of 4.4 per cent.

However, in graduate courses the upward trend in engineering enrollments was maintained. Graduate students working for the master's degree in engineering increased from 24,136 in the fall of 1957 to 28,154 last fall while those preparing for doctorates in this field rose from 4,180 to 4,778.

REACTOR PROGRAMS



The Atomic Energy Commission in Fiscal Year 1960 will place orders amounting to $106.7 million for research and development programs on aircraft and missile propulsion reactors and satellite power sources. This exceeds the FY 1959 programs by $8.2 million and the FY 1958 programs by $29 million. Sharpest gain has been in satellite power sources which has increased nearly four times from FY 1958 to FY 1960.

'PLANES

Aircraft Industry Turns The Heat On— Three Times Hotter Than Sun's Surface

The heat's on in the aircraft and missile industry with the rapid advent of the space age making it necessary to test materials at continually rising temperatures produced by hypersonic speeds.

One company has installed a machine which produces a jet of energy nearly three times as hot as the surface of the sun. The machine makes available for the first time a continuous source of controlled temperatures as high as 30,000 degrees Fahrenheit. The apparent surface temperature of the sun is approximately 11,000 degrees F.

The jet of ionized gas produced by the machine, from 3/16 inches to ½ inch in diameter and 1 inch to 6 inches in length is so hot it can vaporize any element in the world. Since no material will withstand the heat of the jet, it is held suspended in a magnetic field.

The machine will play an important role in the further utilization of nuclear energy. In fission and fusion, temperatures are in the range of millions of degrees, and it is necessary to explore areas of extreme heat in order to build components for power plants that will control this energy. The machine also will be used to test metals, alloys, ceramics and other protective coatings, and materials used in the construction of power plant and fuselage assemblies for missiles.

In high temperature coatings, the machine offers possibilities for bonding of materials and alloying of metals via the vapor phase. Metals may be vaporized separately and then allowed to condense together. Extremely high temperature materials may be vaporized and sprayed onto the surface of less critical and more easily formed and fabricated materials to give greater life to missiles and space vehicles at hypersonic speeds.

Another company has devised a method for getting a lot more power out of standard quartz heat lamps for the quick heating needed to simulate conditions of high-speed flight in the laboratory. Engineers arranged 30 quartz lamps in a circle with a copper waterjacket cooling system around them. The inner surface is gold plated, as gold is the best reflector at high temperatures. Material to be tested is held inside.

The cooling system allows the quartz heat lamps to be operated at twice their rated voltage and keeps the lamps from melting. In just 90 seconds a temperature of 3,500 degrees F. can be reached inside the quick-heat furnace.

Power comes through a pair of Ignitrons—electronic power regulators—permitting immediate control of heat and time required to reach operating temperatures. Although most materials testing is programmed for a constant temperature, the Ignitrons permit heat cycling if desired. This unique application of a cooling system to standard quartz heat lamps has been used mainly for tensile and bearing tests.

Air Flow Photo Costs Reduced Through New Ray Technique

Schlieren air flow tests to insure top turbine performance were conducted recently in an aircraft laboratory at a cost of $100.

The test enables the company to determine the flow characteristics of supersonic gas and make design changes in turbine wheels and nozzles, eliminating disturbing shock waves.

Although use of Schlieren tests to determine the flow characteristics of air is not new, the ingenuity to produce the test rig at such a low cost is remarkable, and more so when the results are considered.

The inexpensive Schlieren test rig consists of an ordinary light source, several lenses, a knife edge, camera, test section and a source of high pressure gas.

Light rays are condensed through a slit to obtain a high intensity, pin point beam of light, which is reflected through a test section in which all rays are parallel. These rays are then condensed to a focal point on a knife edge which blocks them from entering a camera.

A turbine nozzle is mounted in the test section and supersonic gas is forced into the test section perpendicular to the light rays. As the light passes through regions of varying density of gas—caused by the shock wave disturbances—it is refracted off its parallel path and misses the focal point on the knife edge. Position of the knife edge controls the definition of the image of the disturbance at the camera.

The camera records on film regions of varying density which appears as either a darker or lighter area. Density changes which are strong enough to be recorded indicate the existence of shock waves.

From the filmed recordings, engineers learn if excessive shock waves interrupt the flow of air through a turbine wheel or turbine nozzle. Normal shock wave patterns reduce the speed of air from supersonic speeds to subsonic speeds and result in a loss of the turbine's power or energy output.

By redesigning the turbine blade or nozzle, engineers eliminate normal and excessive oblique shock waves and are assured that the air flow remains supersonic throughout its contact with the turbine wheel. Thus, aerodynamic designs providing maximum efficiency are obtained.

'Windjammer' Technique Used in Machining

To aircraft industry machinists a "windjammer" has nothing to do with a sailing craft. It is a time-saving device adapted by ingenious tooling engineers to hold parts during machining.

Used on spindle shapers and routers, the windjammer fixture is actually a neoprene-dacron hose operated by air pressure. It eliminates weight and adjustment problems of fixed position clamps formerly used on holding fixtures.

With the windjammer fixture, no replacement or shifting of clamps is necessary. The hoses are positioned along the full length of the part and air pressure holds the part firmly against a block.

Tests show it cuts machine time in half and tooling costs by one-third. Machinists like it—and so do company cost accountants.

Civil Aviation Flights Reach New Peak

The continued phenomenal growth in civil aviation is outlined in the 1958 edition of the Statistical Handbook of Civil Avaition, published by the Federal Aviation Agency.

The booklet points out that during 1957, airlines of the U. S. continued to establish new levels of activity. Revenue passenger miles flown by the domestic scheduled airlines in 1957 increased to 25.3 billion from 22.4 billion in 1956, and increased by nearly three and one-half times the number flown ten years ago in 1947.

International airline passenger miles also showed an increase, from 5.3 billion in 1956 to 6.0 billion in 1957.

Total domestic air cargo ton-miles in 1957 increased 15 per cent over the previous year, totaling 474,034,000.

Sales of civil and military aircraft, engines, and accessories amounted to almost $11.8 billion, a 24 per cent increase over the $9.5 billion reported for sales in 1956. The total of 6,745 civil planes produced in 1957 represented a drop of 460 in plane production, but civil aircraft manufacturers had their largest dollar volume in history with shipments amounting to $682.3 million, an increase of 50 per cent over the previous year.

The booklet reports that more than 75,000 student pilot certificates were issued during the year, compared to 45,036 issued in 1956, with the civil pilot population reaching a total of 702,519.

New Tunnel To Test Dyna Soar Capsule

An escape capsule for the Dyna Soar space travel program will be the first model tested in a new $4,000,000 high-speed wind tunnel built by an aircraft and missile manufacturer.

The tunnel, which took two years to build, will be used to test models involving supersonic high altitude and space projects under design and development.

The new facility can handle both subsonic and supersonic tests with a test range from as low as 380 miles an hour up to 3,800 miles an hour.

These expensive facilities are necessary in weapons development programs being carried forward by the aircraft and missile industry.