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AIR INDUSTRY FINANCE PROBLEMS CRITICAL

Renegotiation Hits Earnings

By Orval R. Cook

President, Aircraft Industries Association

The aircraft and missile industry today has a critical financial problem. Its resources are badly stretched at a time when unprecedented demands are being made on the industry to achieve a clear-cut technological lead over the Russians.

The present financial difficulties stem from the fact that the aircraft industry, although a manufacturing industry, is capitalized on a "contracting" industry basis to attain greater financial efficiency.

This requires, among other things, that the capitalization of the companies: 1) Provide the ability to support a high level of bank credit; 2) Furnish the working capital and financial strength to support a high level of sales, and yet 3) Avoid the costly burden of over-capitalization during the prolonged periods of low-volume production.

The most economical method of financing for a contracting industry is for the customer to provide part of the necessary funds for the performance of the contract.

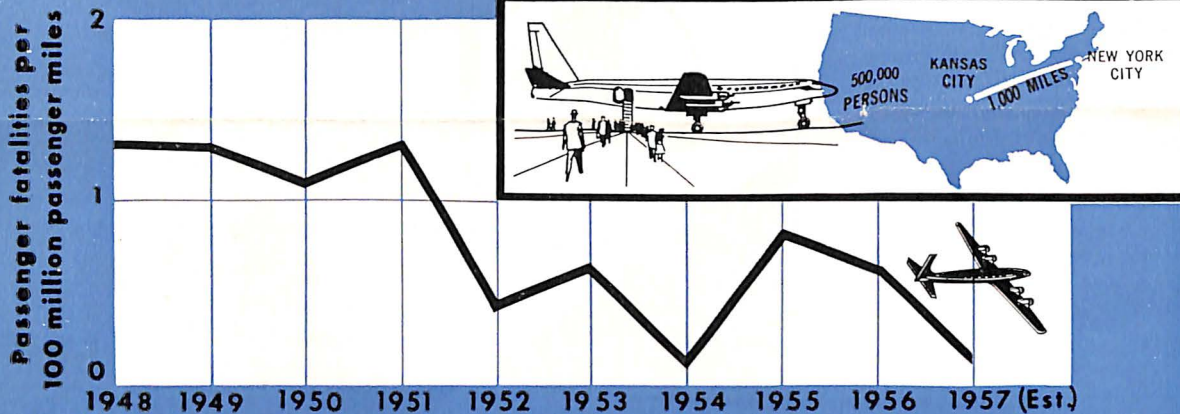
The aircraft industry, whose rate of earnings to sales is less than half that of other industries and whose re-investment rate of earnings is substantially higher than all other manufacturing industries (see chart, Page 3), cannot accumulate cash reserves to finance its complicated products which have production lead times ranging from 19 months to 2 and 1/2 years.

Two capital sources

There are only two basic sources for capital: Earnings and stockholder investments. They are closely related. It is impossible to attract new investors without earnings. The Aviation Securities Committee of the Investment Bankers Association of America recently appraised the position of the industry in the stock market: "Free competition in the investment market has reduced aircraft manufacturers to a low priority for new investment. . . Due to the shifts in Defense Department policy as much as to historic industry problems, the investment community has judged aircraft manufacturers' stability inadequate for the risks involved."

In recent months, government pol- (See WORKING, Page 3)

SAFETY IN THE AIR



The safety record of the domestic scheduled airlines in 1957 is the best since 1954, and barely misses being the safest year in the history of scheduled air carrier operations. The Civil Aeronautics Administration reports there was only two-tenths of a passenger fatality per 100 million passenger miles. This means that the entire population of Kansas City, Missouri (approximately 500,000 persons) could be flown to New York City (approximately 1,000 miles) before a single passenger fatality would occur.

'PLANES'

Unique Machinery and Techniques Utilized To Insure Quality of Aircraft, Missiles

Quality of product is the distinguishing characteristic of America's aircraft industry. To a greater extent than any other major manufacturing industry, the builders of aircraft have devised equipment which insures that each part will function properly.

Electronic machines are widely used. One of these is an ultrasonic test tank which gives inspectors a searching look into the molecular composition of forgings and extrusions.

The parts to be tested are immersed in a tank and subjected to a bombardment from an electrically pulsed crystal. Echoes from the sound waves bounce back from the front or back surface of the forging or extrusion or from any internal defect. An "immerscope" registers the sound waves as they echo from the part, and analyzes the composition of the metal being tested, and pinpoints defects.

The echoes or "pips" are amplified and reflected on a cathode ray tube, similar to a TV picture tube, giving a detailed picture of the

metal's composition. The "immerscope" is equipped with a flaw alarm that gives an audio signal when a defect is discovered.

Another instrument is used to check the quality of small parts, such as bolts. Called a contour projector, this device projects an enlargement of the part (up to 100 times) on a mathematically divided grid. The enlargement enables inspectors to determine immediately whether the specifications have been met.

Quality control efforts in the aircraft industry extend beyond providing the most modern equipment for detection of flaws. Quality control experts pay close attention to the human element. For example, a check revealed that the excessive height of a drill press caused operators to become unduly fatigued which, in turn, led to carelessness in operating the press. Through quality control efforts the machine was lowered and the operator provided with a chair. The result was less fatigue and improved efficiency.

Survey Reveals Need To 'Glamourize' Science Subjects in School

An aviation survey conducted in a Florida high school recently sharply points up the necessity to make science subjects more attractive to young students.

The age group ranged from 13 to 19 years. Here are the results on several key questions:

Would you like to learn to fly? Yes, 757; No, 160; Maybe, 281.

Would you like to study aircraft design and engineering? Yes, 255; No, 616; Maybe, 278.

Would you like aviation as a school subject? Yes, 805; No, 339. "Maybe" was not a choice in this question.

Would you like to study aircraft mechanics? Yes, 297; No, 599; Maybe, 240.

Captain George Sellers (USA-Ret.), who conducted the survey, noted that where the glamour of flying was involved the "Yes" was predominant, but in mathematics and engineering which lack glamour, the "No" answers were far ahead.

"The 'ultimate weapon' is education," Capt. Sellers said. "I think the time has come that some of this 'glamour' be applied in the field of science, starting at the elementary level."

PLANES

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

The purpose of *Planes* is to:

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

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

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The Question Is When

Preparations for man's assault on the infinity of space have reached a state-of-the-art point where manned flight to the Moon and back to Earth and unmanned reconnaissance of Venus and Mars are completely realistic goals. Much of the necessary hardware is being constructed by the aircraft and missile industry. Many of the technical problems have been solved through enterprising, carefully calculated research and development programs jointly carried out by industry and government.

Less than five months ago, this statement of space possibilities would have been largely greeted with skepticism. Today, the same skeptics might claim the statement is too conservative. The Explorer and Sputniks I and II are mainly responsible for this overwhelming switch in opinions.

The essential fact is that our space capabilities did not suddenly materialize in the last five months. The aircraft and missile industry, supported by elements of the military services and other government agencies, has had its sights firmly on space for several years. There was never a question *if* we could fly far beyond the Earth's atmosphere. The only questions were *when* we wanted to do it—*when* we could afford it.

The scientists and engineers directing the ICBM and IRBM programs estimate that 90 per cent of the knowledge acquired in the research and development effort involved in these programs can be applied to space flight. The inertial and celestial guidance systems, the nose cones to resist thermal heating, the exotic fuels, the manufacturing techniques, the highly skilled scientific and engineering teams, and the expert industrial management involved in the military missile programs are all of immediate, direct use in manned and unmanned space flight.

The aircraft industry has made heavy investments totalling *more than \$1 billion* in the past ten years for facilities and research and development programs, and is now engaged in spending at least another \$1 billion within five more years. The first fruits of these investments are apparent in the successful test flights of ICBM's and IRBM's; the series of supersonic Air Force and Navy fighters and fighter-bombers; in supersonic bombers; in intercontinental bombers capable of launching missiles; in a new "chemical" bomber now under development which will be capable of Mach 3 speeds, and performance altitudes that brush at the fringes of space; in plans for nuclear-powered aircraft; in a manned aircraft under construction that is aimed at flight into space and return to Earth. And, of course, the Explorer, which will soon be joined by its brothers and sisters.

All of these accomplishments, and the present more advanced research and development programs of the aircraft and missile industry are propelling us into man's greatest adventure—space.

What can we definitely expect?

1. A hypersonic manned bomber launched like a missile which will be boosted to an initial speed of 18,000 miles per hour at an altitude of several hundred thousand feet. The bomber could circumnavigate the globe and glide back to Earth.
2. A counter-missile for ICBM's and satellite interceptors.
3. Man will orbit around the Earth in a recoverable satellite. Unmanned satellites will keep the globe under surveillance in an orbiting reconnaissance—a space police station.
4. A permanent small space station.
5. A vehicle for lunar landing parties and eventual interplanetary reconnaissance.

These are well within the technical grasp of the aircraft industry. Only two key points of space flight remain unresolved: Making the decision and then backing that decision with the necessary funds.

Plane Views

A CAMERA USED TO PHOTOGRAPH DETONATION WAVES CREATED BY FUEL EXPLOSIONS CAN TAKE 25 PICTURES IN 1/15,000 OF A SECOND.

25 PICTURES IN 1/15,000 OF A SECOND

99.99999999%
PURE



THE SILICON FOR TRANSISTORS, PRODUCED IN LABORATORIES, IS 99.99999999 PER CENT PURE.

48 DAYS

2 YEARS

DIGITAL COMPUTERS ACCOMPLISHED IN 48 DAYS THE CALCULATIONS THAT WOULD HAVE TAKEN 1,300 MATHEMATICIANS TWO YEARS TO DO WITH DESK CALCULATORS.

PLANES

AIA Protests Proposal To Boost Rail Rates

The Aircraft Industries Association, seeking to keep the cost of aircraft at the lowest possible level, is protesting a five per cent increase in rates for aircraft, engines and parts filed by the railroads with the Interstate Commerce Commission.

Harry R. Brashear, Director of AIA's Traffic Service, pointed out to the ICC that aircraft parts are the highest rated of all articles of comparable tonnage carried by the railroads today. For one aircraft company with plants located in the Midwest and Far West, the proposed increase would boost rail charges for only part of its shipments by \$45,000 a year.

The AIA executive stated that while there are other commodity groups in the tariff which are assessed 10 per cent increases and at least one with a 20 per cent increase, the low base rate for these commodities produces actual increases which are very much less than those on airplane parts.

Mr. Brashear said the "rates resulting from such increases are unjust, unreasonable and in violation of the Interstate Commerce Act."

AIR QUOTE

"... it is important to realize that the aircraft industry is the missile industry. The arts and sciences which have brought manned flight from the 42 mph of the 'Wright Flyer' to the supersonic aircraft of today are the same arts and sciences which, with greater refinement and sophistication, have made the guided missile a reality.

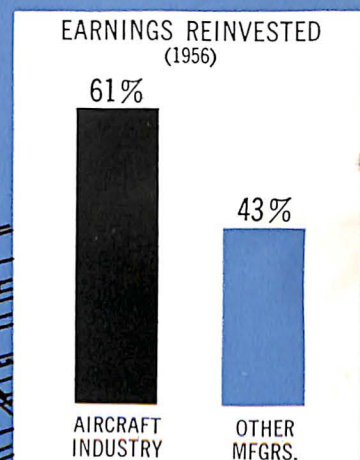
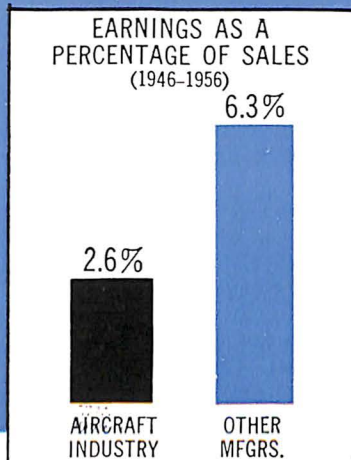
"As to the place of the manned weapon system in future air operations, it will continue to play important roles in combination with guided missiles. . .

"To many, the best weapon system means the ballistic missile which often has been described as the ultimate weapon system. I'm not sure that this thinking is sound. If the enemy had to prepare a defense for but one type of weapon system—even one as potent as the ICBM—his problem would be considerably simplified. In fact, the Yankees might well be World Champions again if Lew Burdette had used but one pitch—his best pitch during the recent World Series."—Lt. Gen. S. E. Anderson, Commander, Air Research & Development Command, Nov. 7, 1957.

INVESTMENT IN SECURITY

The record of the 12 major airframe companies in re-investment of earnings and payment of dividends to stockholders reflects the competitive demands of the aircraft and missile industry. This industry must re-invest increasingly larger proportions of its earnings to maintain the swiftly-moving technological pace. Earnings, based on sales, during the 1946-1956 period were less than half the amount earned by all other manufacturing industries. The aircraft and missile industry re-invested 61 per cent of its earnings compared with 43 per cent for other manufacturers.

PLANES



Working Capital At New Low

(Continued from Page 1)

iciencies on payments for contracts have compounded an historically precarious financial situation.

1. Reimbursements for costs incurred on cost-plus-fixed-fee contracts has been cut from 100 per cent to 80 per cent. This action is unprecedented in the long history of government-industry relations.

2. Progress payments on fixed-price contracts, previously cut from 90-95 per cent of total costs to a maximum of 75 per cent, have been further reduced to 70 per cent. The industry is fast approaching the limit of its ability to obtain bank credits to finance the difference between costs incurred and payments received.

Victim of paradox

These payments are *not* advances. They are made for work accomplished.

The aircraft and missile industry today is the victim of a paradox. The military services and the Defense Department are demanding that the industry step up its tempo of privately-financed research and development, furnish a larger share of the capital assets needed for development and production, and substantially more of the working funds necessary to pay the bills during the expensive, lengthy time period from development to product delivery.

These demands run head-on into the present policies of the Renegotiation Board, an agency independent of the Defense Department and the services, which is armed with broad powers to determine unilaterally just

how much the industry should earn on defense contracts.

The Renegotiation Board is not involved in awarding contracts. This is done by the procurement personnel in the military services who have broad experience in buying weapons. They know the factors involved in carrying out the contract and work intimately with the contractor throughout the history of the order.

Demonstrated savings

For example, the services have developed incentive-type contracts under which target costs are established and, if reduced, the contractor is permitted to retain a percentage of the difference between the target price and actual price. The percentage usually amounts to about 20 per cent of demonstrated savings on first production runs. The 80 per cent saved reverts to the government. There are, of course, financial penalties to the contractor if he runs over the target price.

However, as long as four years after work has been performed on these contracts, the Renegotiation Board enters the picture. Under the current interpretation of the Renegotiation Act by a five-man board the profits earned as a result of substantial past reductions under an incentive-type contract can be reclaimed from the contractor as "excessive profits."

This is the heart of the paradox. Incentive is discouraged and earnings are denied through arbitrary interpretation of the Renegotiation Act which is inconsistent with other objectives of the Federal Government.

The present interpretation of the Renegotiation Act coupled with restrictive payment policies strike at the very foundation of the industry's financial structure. An industry's financial capability cannot be increased by draining its financial resources.

Re-Styled Aircraft Year Book Features Industry Accomplishments During Year

A pictorial record of the outstanding aviation events of 1957, a year during which man flew faster, higher and farther than ever before, is featured in *The 1957-58 Aircraft Year Book*, official publication of the Aircraft Industries Association, just off the press.

Dramatic improvements are evident throughout this 39th edition of *The Aircraft Year Book*, first under the publishing banner of American Aviation Publications, Inc. Page size has been increased to 8 x 11; photographs and art work have been used liberally in a new format designed for easy assimilation.

Included in this 432-page, fully indexed annual are reviews of individual company activities; photos, three-view drawings and specifications of all planes and engines in production; a comprehensive pictorial report on all missiles in development and production; aviation activities of the Department of Defense and other government agencies; research and development progress during the year in military and civil aviation; a summary of airline activities; the general aircraft and helicopter picture for the year; a complete bibliography of aviation books published in 1957; historic

and current chronologies; and a listing of official records established during the year.

General Orval R. Cook, president of AIA, summarizes in his foreword to the book: "The year 1957 has been one of transition for the industry. It has marked a levelling out in production of aircraft and engines for military application. At the same time, the year has seen a record \$2.5-billion in orders placed by the world's airline network as it begins transition from piston engine aircraft to powerful turbojet and propjet aircraft. The year also has marked a major shift in emphasis from manned aircraft to missiles and rockets in our array of weapons for national defense."

The 1957-58 Aircraft Year Book can be purchased for \$6.00 from American Aviation Publications, Inc., 1001 Vermont Ave., N.W., Washington 5, D. C.

Graphite Blocks Used To Produce Aircraft

Six of the largest blocks of high-grade graphite ever made are being used at an aircraft industry plant to turn out stainless steel parts for a supersonic bomber.

The graphite blocks, weighing two and a half tons each, are machined into precise shapes; then the steel components are fitted glove-tight into the area and are furnace-brazed at extremely high temperatures.

Graphite, which is somewhat like pencil lead, is the only acceptable material for the brazing operation because of its stability and resistance to shock at high temperatures.

Use of these huge blocks of graphite is typical of the demands placed on the aircraft industry in producing new weapons.

Automatic Welder

The largest automatic fusion welding machine in the United States is now in operation at an aircraft company. The machine is capable of running a continuous, perfect weld a horizontal distance of 19 feet. The welding head is electronically controlled, and can follow contours within a vertical range of 14 inches. Theoretically, the machine could manage a barber pole spiral if anyone happened to want one.

Spare Parts Reporting Is Revolutionized

Electronic Processing Plan to Save Millions, Speed Data Flow

By T. G. Haertel

Secretary, Spare Parts Committee, Aircraft Industries Association

A Logistics Study Group, composed of members of the Aircraft Industries Association and representatives of the military services, is streamlining the ponderous spare parts paperwork passing between the aircraft contractors and the services through utilization of electronic data processing equipment.

The planning which the Study Group is now doing will permit the instantaneous exchange of large masses of data between the electronic machines of the contractors and the military bases through direct telephone wire hook-up. The savings due to elimination of conventional lists, forms and reports are conservatively estimated at millions of dollars. The increase in efficiency is incalculable.

The savings possible through adoption of new techniques for spare parts is illustrated by the fact that in another field, the Air Force "Hi-Valu" item management system has contributed substantially to a reduction from 43 per cent of the aircraft program to 23.5 per cent in the past six years. The dollar requests for initial spares have been \$6.3 billion less than would have been requested had the 1952 level of 43 per cent been maintained. And, most important, support was at an unprecedented high during this period.



Mr. Haertel

The supply and maintenance of modern aircraft and missiles on a global basis is one of the knottiest problems facing the military services. Wherever aircraft are to be serviced there must be applicable spare parts, special tools, ground handling and test equipment, trained mechanics and facilities. As aeronautical products become more complicated and sensitive, the facets of the broad problem of logistics become more numerous and serious. The AIA-military service Study Group is primarily concerned with expediting and increasing the accuracy of communication of spare part information between the manufacturers and using services thus permitting more precise management of the global military supply and maintenance operations, and of their vast resources of spare parts.

\$20 million daily cost

The cost of maintenance of weapons and equipment is about \$20 million a day, and requires about 750,000 military and civilian maintenance personnel. Utilization of the new tool of electronic data processing will cut these costs.

Under the conventional system, the military service, after awarding a contract for production of an aircraft model, furnishes the manufacturer with necessary planning information including, among many other items, projected test and op-

erational programs, mobilization reserve requirements, and geographical dispersion, so that the manufacturer can recommend quantities and types of spares. Such lists are reviewed by the service, and orders are generated. Then, follow provisioning parts catalog; and unpriced and priced spare parts lists and other information. Meanwhile, design changes are occurring constantly in the spare parts as improvements are made and this information must be recorded. In the case of a bomber, a stack of papers seven feet high was required for the preparation of the parts catalog alone.

In many cases some of the same basic information is furnished on several sets of documents. The efficient and accurate handling of this amount of paperwork under existing methods is almost beyond human capability.

'Expedites' expensive

It is virtually impossible to have all the most recent information recorded promptly on the service records because of the sheer bulk. In many cases this results in requests for "expedited" delivery of spares simply because the exact status of an order cannot be determined without delay.

These "expedites" are expensive, since they interfere with orderly production and further complicate already complicated records.

There are numerous problems involved in utilizing electronic data processing equipment. Typical of these problems are incompatibility of the contractors' and services' data processing equipment, lack of uniformity in expressing part numbers, and lack of agreement over the legality of unsigned information transmitted from tape to tape in lieu of the traditional contractual paperwork.

The Study Group is actually writing a "dictionary" of terms to overcome some of the barriers.

The electronic data processing will work this way: A tape on a specific spare part order will be made up by the manufacturer which will contain up to 200 related pieces of information on the spare part number, stock number, part name, shipping in-

The basic objective of electronic data processing is to employ record techniques for spare parts that will produce optimum logistics support by:

1. Reduction in reporting and documentation data;
2. Increased speed and accuracy of data transmission;
3. Increased system responsiveness to program changes;
4. Improved efficiency and economy of operation.

structions, quantity on order, price, number delivered and the other numerous details involved in a part. These pieces of information will be assigned locations on the tape, and current information quickly added. This calls for a high degree of compatibility for the contractor and military service electronic data processing machines.

The speed of the machines is such that they operate at a rate of 15,000 characters per second. The density of recording is 200 characters per inch, permitting permanent files of data to be compressed onto a 10½-inch diameter reel, holding 2,400 feet of magnetic tape.

Cooperation is key

The adoption and perfection of the use of electronic data processing will be one of the most important steps ever made in the handling of parts information. The number of different items in the Air Force catalog alone has increased since 1952, from 725,000 items to about 1,200,000. And the rate of increase is about 400 to 500 new items each day.

The Logistics Study Group is composed of logistics experts and data processing experts of the Air Force Air Materiel Command, the Naval Aviation Supply Office, the Army Transportation Supply and Maintenance Command and about a score

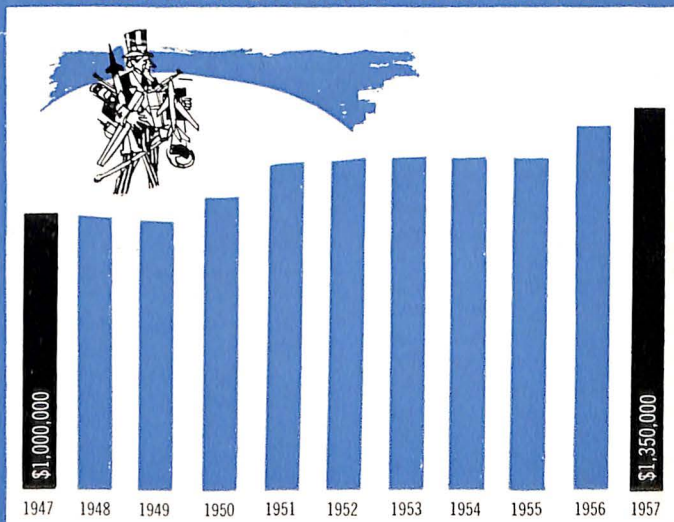
of the larger aircraft and equipment manufacturers—all of which are harmoniously working together to achieve better logistics support of aeronautical products. This is an outstanding example of government and industry teamwork in anticipating—and doing something about—new methods of doing old jobs better.

Smooths transition

These Logistic Study Group members deserve a major share of the credit. The work they are now doing, in advance of the broad industrial and government use of large electronics equipment for logistics use, should smooth the transition from "mountains" of traditional paperwork to instantaneous exchange of data.

The Air Force recently paid tribute to the work done by the Spare Parts Committee. "The accomplishments of the Logistics Study Group are gratifying. The actions taken to resolve the many and varied problems inherent in the development of electronic data processing application for the interchange of data between AMC and industry are producing positive results. This success is largely due to the cooperation and assistance provided to the services by the AIA and industry members," the Air Force said.

INFLATION AND DEFENSE



The cost of goods and services purchased by the federal government, principally national defense, has increased 35 per cent since 1947. This means that for each \$1,000,000 expended in 1947, we would have to expend \$1,350,000 today to buy the same goods and services. Inflation has been a major reason for the increased cost of national defense.

'PLANES'