ROHR

Magazine

August 1960

ROHR AIRCRAFT CORPORATION

MAIN PLANT AND CORPORATE HEADQUARTERS:
Chula Vista, California

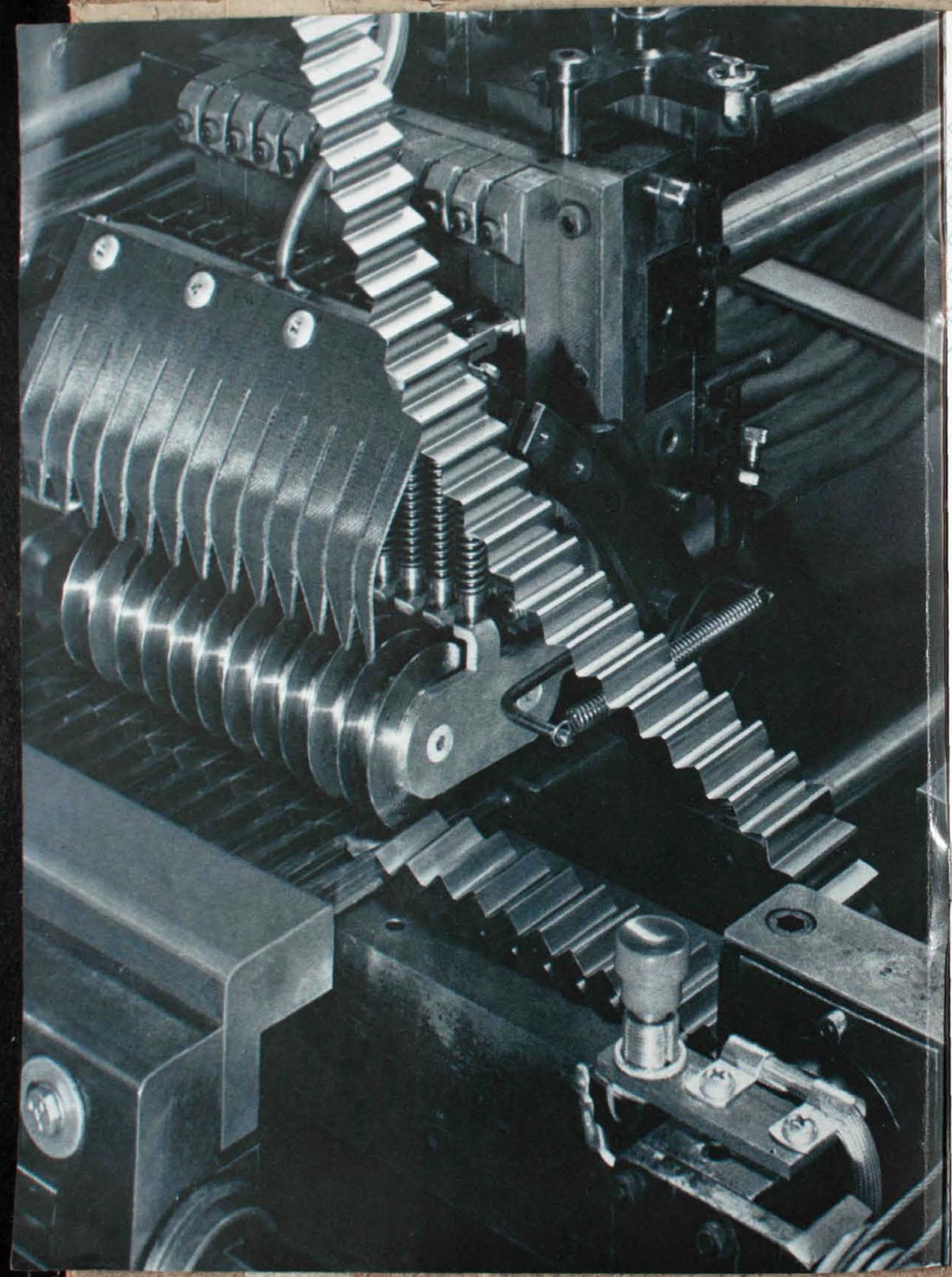
MANUFACTURING PLANT:
Riverside, California

ASSEMBLY PLANTS:
Auburn, Washington and Winder, Georgia

10th ANNIVERSARY

ROHR
AIRCRAFT CORPORATION

1940 – 1960



The heart of Rohr's new honeycomb core machine. Every cell is welded precisely and uniformly.

BEATING THE BEES

Rohr's New Honeycomb Core Machine Eases Production Problems

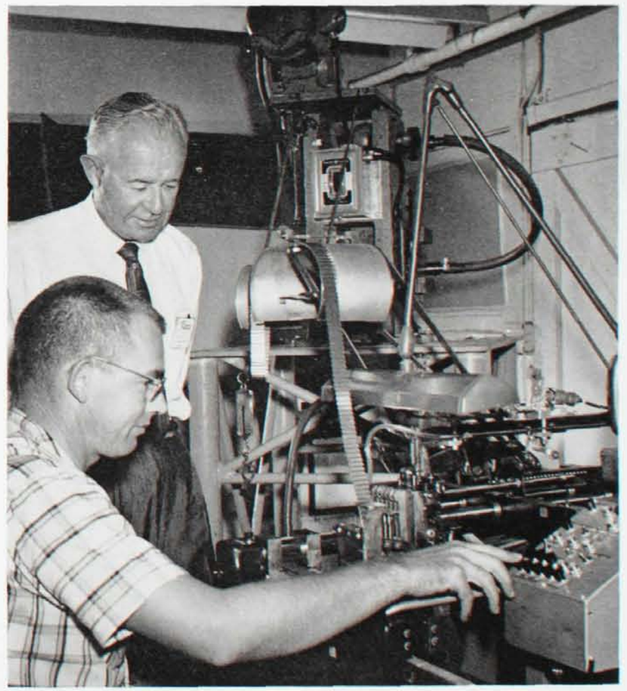
WHEN men started pushing the speed of airplanes up toward the speed of sound it soon became apparent that more than one barrier would be met before aircraft could fly at Mach II or Mach III. They realized that better power plants alone would not suffice to get a plane to supersonic speeds much over Mach I.

It was apparent that even the sturdy structures of the subsonic or Mach I jets would come completely "unglued" at high Mach numbers. The aluminum structures were certain to fail when they encountered the skin friction temperatures generated by such speeds. Sonic vibrations also had to be overcome. And all of this has to be done without substantial increases in weight.

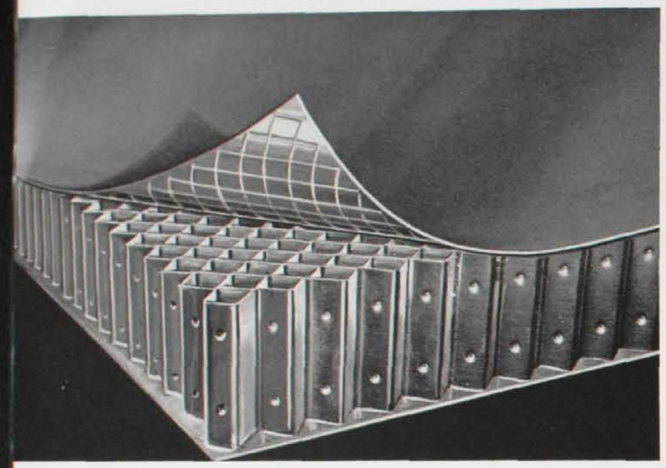
Stainless steel offered the heat resistant qualities and the strength needed at all temperatures but the material was too heavy when used in the same way as lighter metals. Many companies, Rohr among them, experimented with various materials and structures and eventually the brazed stainless steel honeycomb sandwich structure was hit upon as the best solution to the heat, sonic vibration and strength-weight problems.

It was found that strips of stainless steel foil as thin as .005 of an inch could be welded together into a honeycomb and then brazed to thin skins, or face sheets, also of stainless steel to form an extremely strong, light and heat resistant structure. Using this material in the critical heat areas of a Mach II aircraft, the industry learned, would give the required protection.

Rohr and several other companies have been producing stainless honeycomb panels of this kind for some time. Rohr builds such panels for the



Fred H. Rohr, chairman of the board, inspects operations on one of the core machines developed under his personal supervision. They are now in production.



Structurally strong brazed honeycomb sandwich panels require perfectly formed core.

Convair B-58 Mach II bomber and for the McDonnell F4H II Phantom, a Navy interceptor. The Mach III B-70 bomber being developed by North American Aviation will employ substantial quantities of stainless honeycomb sandwich material—a large portion of it from Rohr.

Engineers see many potential applications for the material in the aircraft, missile and space field. But frequently the same engineers have made every effort to avoid using stainless honeycomb structures because of cost and production problems. The core has been difficult and slow to manufacture. Brazing processes have been long and costly. Inspection is difficult. Core dimensions have been limited.

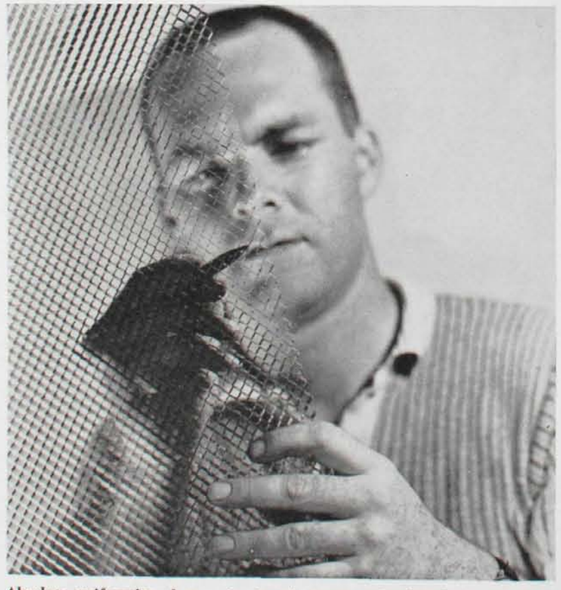
Along with research into new and faster brazing methods—which have resulted in some promising developments—Rohr has had a continuing program for several years pointed at a machine that would make better core faster.

Several such machines now are in production and the results indicate that the development program—personally supervised throughout by Chairman of the Board Fred H. Rohr—may point the way toward more universal use of this surprising material.

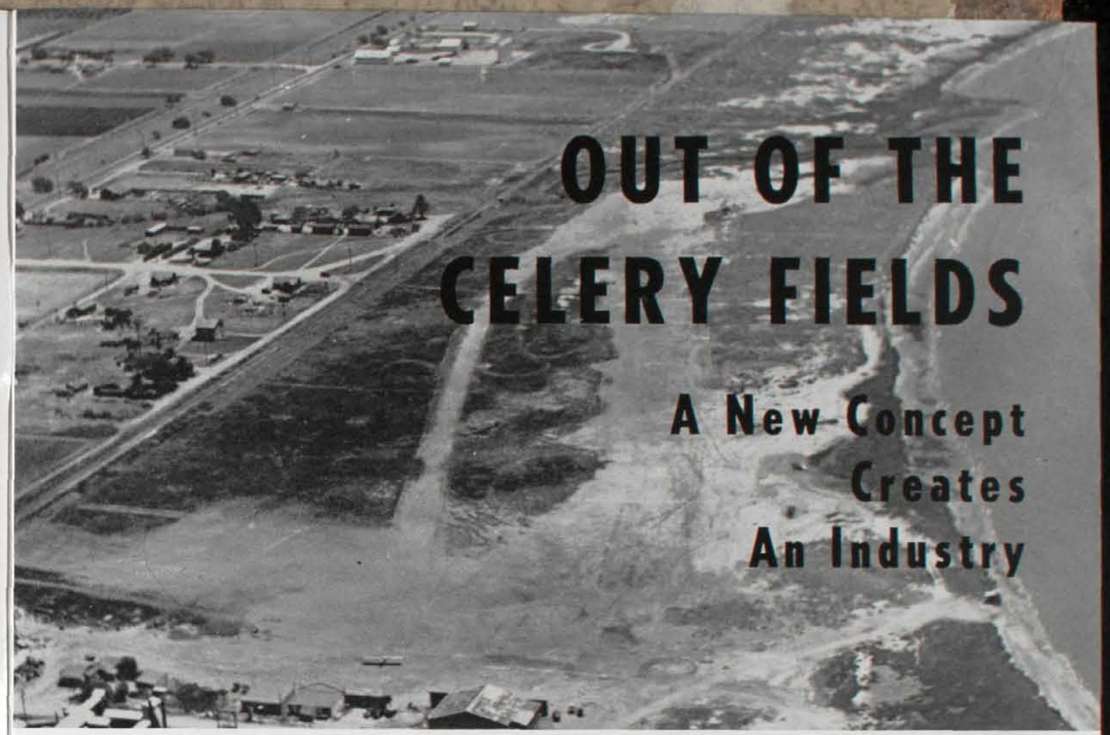
Not only do these new Rohr machines make better core faster, they can make it in continuous sections of almost any desired length or width. This is a decided advantage in the production of large airframe surfaces, since the previous practice of welding together small sections of core increased weight, production time and the possibility of built-in flaws.

Core produced on these new machines has a new degree of uniformity—with each square cell just like the next one—and closer tolerances on thickness. The machine can produce core in any thickness up to five inches and in any cell size from 3/16 inch to ⅜ inch. Core can be perforated where required.

Although the machines have been operating on a production basis a relatively short time, the core has been accepted, after rigid inspection and testing, by several major airframe producers and is being used in sandwich panels being built by Rohr for some of our most advanced aircraft.



Absolute uniformity of core structure is apparent in this close-up view.



OUT OF THE CELERY FIELDS

A New Concept Creates An Industry

A small dirt airstrip between South Bay and Chula Vista farms was the site selected for the main plant and corporate headquarters of the company.

THE Winter of 1940-41 was California's wettest for many years. Reservoirs were filled, the ground was soaked, streams were running bank full, and the hillsides were green with lush grass that sprang up, as if by magic, from hitherto parched and dusty fields. The rain that came down steadily during January and February was welcomed by everyone.

Everyone, that is, except a small contingent of executives and workmen engaged in the interesting task of moving Rohr Aircraft Corporation from a rented building in the wholesale district of San Diego into the first structure on its present site in Chula Vista.

This was a 37,000 square foot factory building, and its vast expanse of floor space caused some of these engaged in the moving task to wonder if perhaps they hadn't over-built. The building was situated in a muddy field at the lower end of San Diego Bay, on the outskirts of Chula Vista, which then had a population of about 5,000. Between the Company's new property and the business district were hundreds of acres of celery and tomato fields, and lemon groves. Sloshing through mud and across duckboard walks, the moving task force carried the last of the Company's equipment and materiel into the new building, and Rohr Aircraft Corporation, five months after its founding—in August, 1940—was in production in its permanent home.

Office space was obtained in a rented barn in an adjoining field, and the patter of winter rain on the corrugated iron roof frequently drowned out the clatter of typewriters and adding machines as the new Company's small office staff recorded the transactions that already were beginning to increase. Greater office efficiency could have been maintained, some of the old timers recall, had the rain stayed outside. But holes in the metal roof let in vast quantities of water, and bookkeepers and typists divided their time between machines and emptying buckets and pans which surrounded them on desks, tables and the floor.

All of which is a far cry from the scene that greets the visitor now, 20 years later, when he visits the Rohr main plant and corporate headquarters, or any of the Company's three other plants. The original building now is but a small part of one of the factory structures, and this, in turn, is surrounded by 40 other buildings, all with a total floor space of 1,351,200 square feet, on 156 acres of land. In addition, the plant at Riverside occupies 645,190 square feet on 95 acres; at Auburn, Washington, 49,271 square feet on 48 acres, and 28,525 square feet at Winder, Georgia. The latter is on land leased from the city of Winder; all the rest of the land occupied is owned by the Company. The total square footage of floor space occupied by the Company is 2,074,186, on 299 acres of Company owned land.

Fred H. Rohr founded the Company on an idea that the aircraft industry needed a "feeder plant," one that furnished parts and assemblies, the creation of which required specialized skills and equipment, to air-

Rohr outgrew these early quarters in the San Diego warehouse district in a matter of months.

The Rohr-Chula Vista plant in 1941 was beginning to look like a sizeable industry.

frame manufacturers. He believed, and later proved, that the Company could provide these specialized components at a cost lower than that for which the prime contractor could produce them.

First products of the new company were cowl panels for the Hudson bomber, then being built by Lockheed. After the Company moved to its new location, it began the manufacture of power packages for the B-24, which was being made by Consolidated Aircraft Corporation (now Convair).

This was the first time a sub-contractor had been entrusted with the manufacture of a power package, but the idea was so successful that by 1945 Rohr had delivered 31,760 units for the B-24, 5,607 for the PB4Y2, and 520 for the PB2Y3, for a total of 37,887.

Power package manufacture then became the Company specialty and since additional factory space was necessary, a continuous building program began. By war's end, more than 600,000 square feet were under roof, and employment had climbed to 9,800.

With the end of the war there came a lull. Government contracts for aircraft were cancelled and Rohr employment immediately dropped to 675. Large areas of the plant were closed down completely. Although the Company had not been formed as a "war baby," like all other manufacturers, in virtually all industries, its facilities had been diverted to military production.

The lull that came with the end of the war had been foreseen by the Company's management and now began exploration of the demand for commercial products. As a step in this direction, the Company joined and became a subsidiary of International Detrola Corporation — which later changed its name to Newport Steel Corporation—and renewed its search for products that it could make. International Detrola was operating five other plants in the middle west, making radios, refrigeration equipment, machine tools, furniture and steel. From this variety of products it was believed that Rohr would be able to participate in a commercial market that would continue to flourish.

It worked out differently, however. Rohr's reputation for quality aircraft products, economical and prompt production, had been observed by airframe builders, several of whom were receiving large orders from the airlines to replace equipment now worn out and obsolete.

Convair, Boeing and Lockheed, all of whom were creating and manufacturing new transports turned to Rohr for power packages and other assemblies, such as exhaust systems, and oil and fuel tanks. The Boeing Stratocruiser, the Convair Liner, the Lockheed Constellation series and, later on, the Douglas DC-7 went into production, and Rohr became so busy with orders that the Company had neither time nor space to consider other commercial products. Employment moved up and sales, which had dropped to $6,069,100 in 1946, from a high of $70,658,893 in 1944, began moving up and in 1949 hit $24,674,488.

At that time, in 1949, Rohr and a group comprised largely of those in active management of the Company, organized a new corporation (bearing the same name) and purchased the assets from Newport Steel Corporation, which then ceased to have an interest in the Rohr organization. Since then, no other Company has owned any part of Rohr Aircraft Corporation.

With the outbreak of the Korean war in 1951, military orders increased rapidly and in 1952 the Company established a second plant at Riverside, California. Then, as an added service to customers—in this case Lockheed at Marietta, Georgia—an assembly plant was opened at Winder, Georgia in 1954. Also, to better serve Boeing, a second assembly plant was opened at Auburn, Washington in 1956.

During the war, production had been the main objective but now it was found that the experience gained during those early years could be employed to advantage in the design of components required by major customers. Consequently, there began a steady and consistent expansion of the Engineering Department, with the result that design responsibility was included in an increasing number of contracts. The laboratories also were expanded, and testing and research became of increasing importance as aircraft moved swiftly into a more complex era and the turbojet began replacing the old piston engine.—*continued next page*

This most recent Chula Vista plant photograph shows 20 years of steady growth.

Bank Loans Reduced

Since the beginning of the current fiscal year, August 1, 1959, Rohr Aircraft Corporation has reduced its bank indebtedness by $9,000,000, bringing it down from $40,000,000 to $31,000,000. During the same period the Company also has voluntarily reduced its bank credit line by $10,000,000, from $45,000,000 to $35,000,000.

These reductions in borrowed money and the credit line result in a saving of $567,500 a year in interest costs.

The Company in July paid its 55th cash dividend, the 41st consecutive quarterly dividend since payments were resumed in 1950. In the last four years stockholders received $5,480,393, or slightly more than half the amount paid out as cash dividends in the 19 years, covered in the above table.

20 YEARS OF SALES, EARNINGS, TAXES AND DIVIDENDS

Fiscal Year	Gross Sales	Net Earnings	Federal Taxes	Cash Dividends
1941	$ 1,493,488	$ 295,471	$ 256,885	$ 22,500
1942	6,665,913	429,867	700,926	326,250
1943	39,099,742	883,826	3,073,886	435,000
1944	70,658,893	1,825,703	3,443,483	435,000
1945	53,081,803	1,066,837	3,289,889	435,000
1946	6,069,100	390,043	521,748	—
1947	7,163,483	372,563	214,221	—
1948	7,828,581	503,571	281,000	—
1949	24,674,488	1,233,709	742,000	—
1950	27,869,112	1,455,155	909,000	84,323
1951	26,233,548	968,108	1,442,000	454,707
1952	41,322,184	1,151,811	2,600,000	600,000
1953	63,005,624	1,533,285	3,573,000	600,000
1954	101,604,448	3,510,811	5,175,000	750,000
1955	82,407,804	3,269,009	3,535,000	990,000
1956	90,027,159	3,144,634	3,500,000	1,260,000
1957	115,765,922	3,727,737	4,000,000	1,260,058
1958	147,538,056	4,022,474	3,930,000	1,310,881
1959	191,272,128	2,586,300	2,509,154	1,649,454
	$1,103,781,476	$32,370,914	$43,696,192	$10,613,264

Rolling a Convair PB2Y-3 up the hangar ramp during the early years of World War II (above). The planes were towed down the bay to have the power packs installed at Rohr. Below, the big Navy patrol bomber in flight.

Lockheed's Super Constellation, with Rohr power packs, is still in service around the globe.

As one example of this, the Company realized that with the coming of the jet transport the problem of noise would be a major factor confronting airlines, particularly in the vicinity of airports. Research began on sound suppression, along with studies of thrust reversal systems which would slow down the jet aircraft to a speed that would enable them to land on existing runways.

Meanwhile, other companies, too, were engaged in similar studies. Rohr engineers came up with a combination sound suppressor/thrust reverser. The principles in this design were incorporated in the thrust reverser now being manufactured for and used on the Lockheed JetStar. Boeing came up with its own ss/tr designs for use on the 707 series and because, among other reasons, of Rohr's experience in this field of research, awarded the contract for their manufacture to this Company. The Company also designed and manufactured prototype thrust reversers for military airplanes, and these, too, have met the needs for better control of these high speed aircraft in making a landing approach.

Research in the use of titanium was one of the Company's "firsts," with the result that today Rohr is one of the largest users of titanium in the aircraft industry. This temperamental metal, is was discovered, must be formed at elevated temperatures and to accomplish this Rohr engineers and technicians created special tools for this purpose.

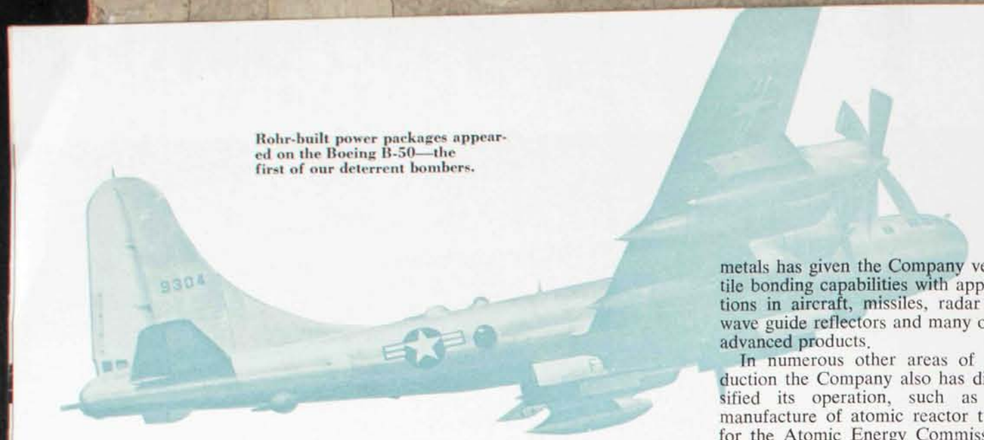
Brazed stainless steel honeycomb was another product in which the Company pioneered. Its light weight, high strength and numerous other advantages of this type of structural panel quickly proved it to be the answer to many aerodynamic problems that confronted designers and engineers. It is extensively used in super-sonic military airplanes and the Company has expanded its facilities to meet growing demands as aircraft speeds increase.

In preparation to meet the increasing use of honeycomb materials the Company, under the personal direction of Fred Rohr, designed and built several core making machines which now are turning out quantities of this material, the production of which has heretofore been limited. These newly designed machines are regarded as an important breakthrough in a field that will permit the Company to keep pace with the demand which surveys indicate will continue to increase as the age of super-sonic flight develops.

The Company also has made rapid strides in the use of numerical controlled machine tools and production methods. In addition to operating nine numerically controlled machines, the Company also has installed an E.C.S. Digimatic Director, and is installing a Univac Solid State 80 computer, which will enable Rohr not only to produce more economically tools and production parts, but to offer flexible and effective programming and numerical control production services to users of numerically controlled machine tools. This service is capable of accepting a customer's blueprints or loft data and producing a complete package, including tool design, tool make, part programming, computer processing, tape or card preparation and part machining.

Rohr's Riverside plant has established a reputation for leadership in the field of adhesive bonding of metals. Extensive research into the properties of adhesives, plastics and

Rohr's Riverside plant was erected to meet a growing need for power packages and other major components.



Rohr-built power packages appeared on the Boeing B-50—the first of our deterrent bombers.

The doughty B-24 of World War II established Rohr's reputation for power packs.

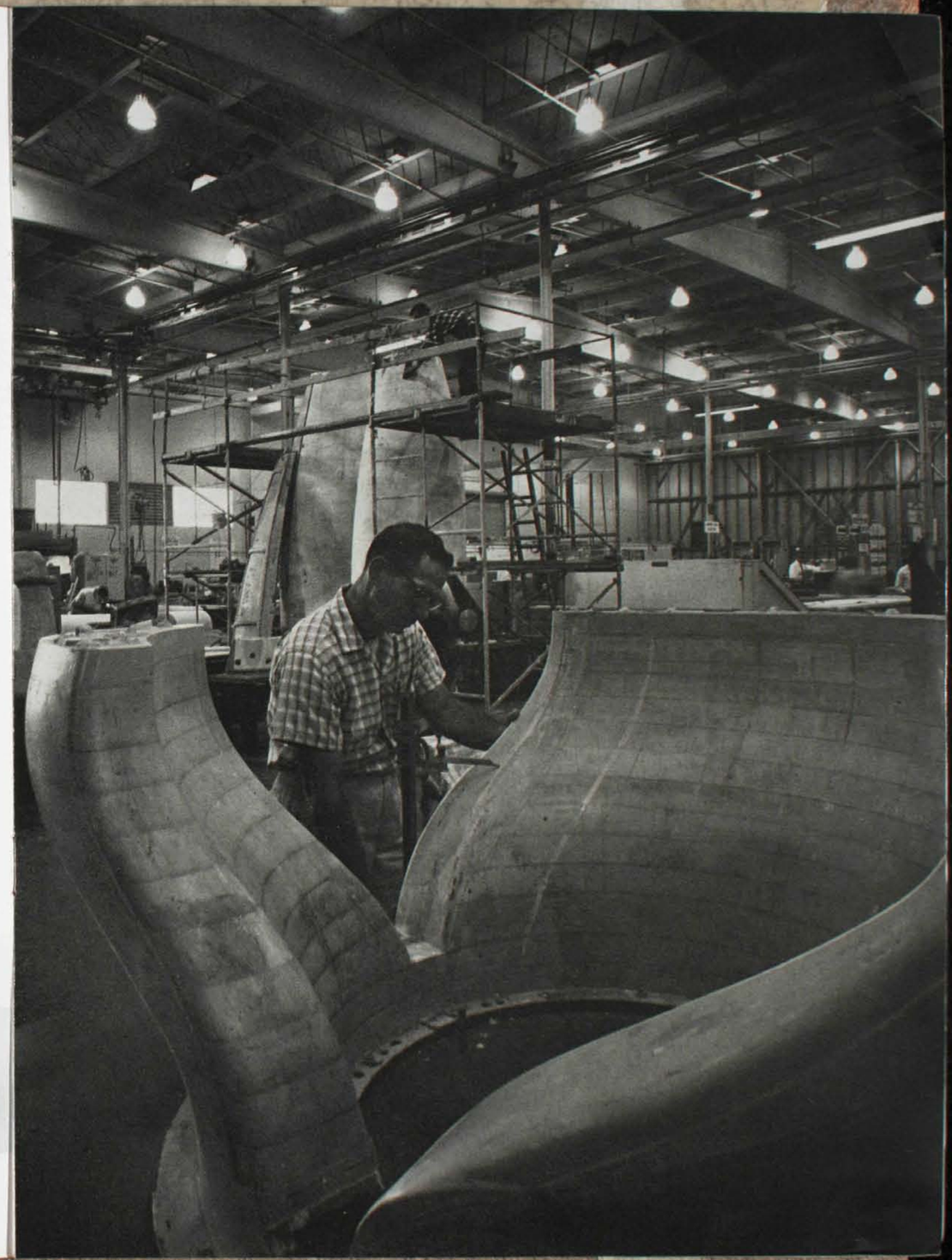
Lockheed's speedy JetStar is the newest plane to carry Rohr jet engine pods.

metals has given the Company versatile bonding capabilities with applications in aircraft, missiles, radar and wave guide reflectors and many other advanced products.

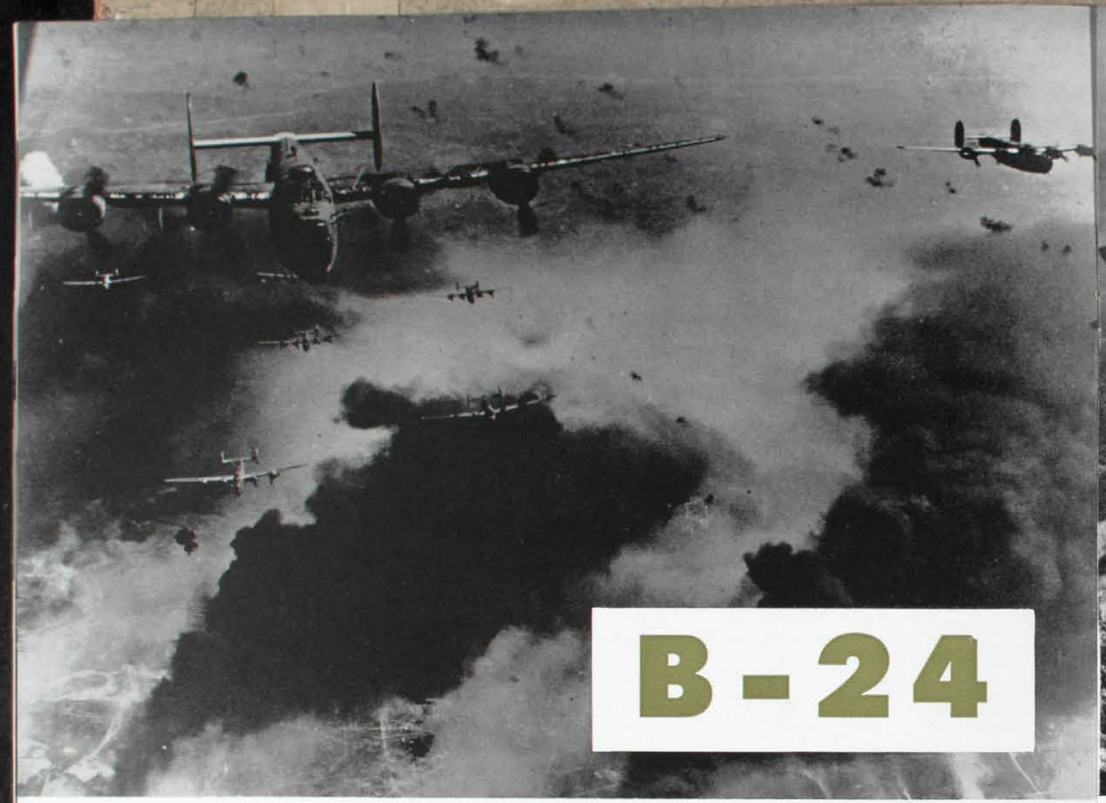
In numerous other areas of production the Company also has diversified its operation, such as the manufacture of atomic reactor tubes for the Atomic Energy Commission, the re-conditioning of gun barrels for the Army, missile and rocket components, and electronic harness for the Mercury "man in space" project.

In addition to the Company's research and development programs for specific production projects, it also maintains continuous research into methods of manufacture, with the result that in this rapidly developing era of aerospace activity it is ready to meet the challenges that arise. Rohr Aircraft Corporation has been for 20 years, and continues to be a manufacturing and service organization for the vitally important aerospace industry.

It is interesting to note, too, on the Company's Twentieth Anniversary, that the men who sloshed through the mud in the rainy winter of 1940 to establish a new factory, still are active in its mangement. In addition to Fred Rohr, now chairman of the board, there are J. E. Rheim, president; B. F. Raynes, senior vice president; A. F. Kitchin, vice president, administration; F. E. McCreery, vice president, engineering; F. H. Rohr Jr., assistant vice president; I. Dagan, manager of quality control; Guy M. Harrington, treasurer; and scores of others who have risen to responsible positions in the Company. To name them all would be impossible under existing space limitations.



No abstract sculpture here. Master models in Rohr's pattern shop are as precise as modern methods can make them. These master models are used to translate engineering drawings into actual dimensions and configurations.



Two Convair Bombers Span Twenty Years Of Rohr Contribution To Military Aviation

MORE B-24 Liberator bombers were used in World War II than any other type of four-engined bomber. Approximately 18,000 of the bombers were built.

For these sturdy planes Rohr built 37,887 power packs. This first and largest power package contract established the reputation of the company as a major aircraft subcontractor and also proved the soundness of the Rohr concept of subcontracting complex major assemblies. Rohr built power packages around the Pratt & Whitney engines for all of the various B-24 models.

Formations of B-24s were used on the extremely long-range bombing missions in all theaters of the war—dropping an impressive total of 634,831 tons of bombs. They pounded enemy installations in Europe and Africa, dropped tons of bombs throughout the Pacific zone and played a major role in the successful battle of the American and British navies against enemy submarines.

The Navy flew the Liberator as the PB4Y and a transport version used to carry military personnel and equipment all over the globe was known as the C-87.

Maximum speed of the B-24 was slightly more than 300 miles an hour and the cruise speed was about 230 miles an hour. Operating gross weights ranged from 56,000 to 66,000 pounds — small by today's standards.

The Liberators were heavily armed to enable them to fight off the swarms of fighters that met them in the big raids over Europe. Four power operated turrets carried two .50 caliber machine guns each and two guns were mounted in the waist.

Liberators played their role in thousand plane missions through skies filled with flak and enemy fighters, on solitary submarine patrol over vast and empty oceans, on low level surprise attacks in the Mediterranean and on long raids against Japanese island fortresses in the Pacific.

The Liberator's maximum range was 3,300 miles and she could haul 8,000 pounds of bombs 2,400 miles. On a short haul the B-24 could pack up to 10 tons of payload.

While the Liberator's performance ratings were not too impressive, even for her time, the durable aircraft earned a reputation for reliability, for a capacity to take punishment and still deliver the payload and get the crew home safely. No single aircraft played a bigger part in the destruction of the military and economic strength of Nazi Germany. Long since out of service, the Liberator occupies a prominent place in the annals of military aviation—and in the memories of thousands of World War II airmen.

AMERICA'S newest operational bomber, the Convair B-58 Hustler, no more resembles the World War II bomber than the latter did an aircraft of the Wright brothers.

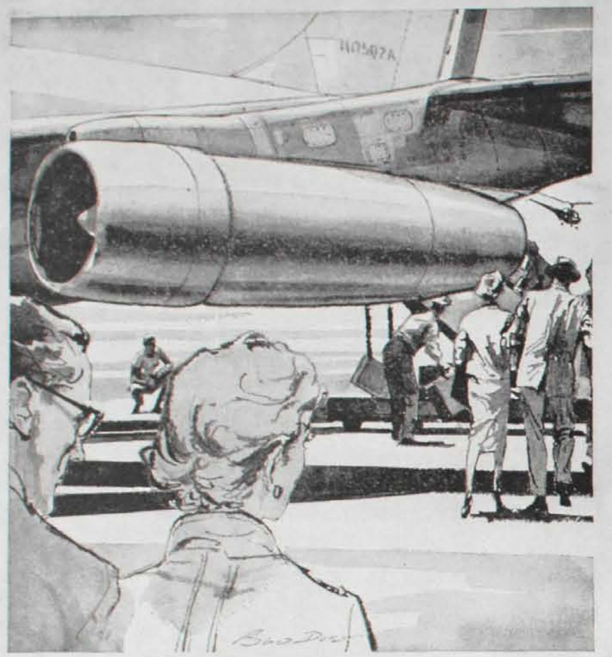
So fast has the state of the art advanced in flight sciences during the past decade and a half that very few similarities remain. Appearance, performance, construction and even missions have changed drastically. Rohr's participation in the B-58 points up several of these differences —illustrating requirements not even anticipated seriously in the war days of the early '40s. The stainless steel honeycomb sandwich structures Rohr builds for the Hustler must withstand skin friction temperatures generated by speeds "in excess of Mach 2." Today many schoolboys could explain that Mach 2 would be 1,324 miles an hour at the 35,000 foot operational altitude of the Hustler.

All of these factors must be considered in the design and construction of such planes as the Hustler. Rohr's stainless honeycomb panels are constructed to the most rigid specifications to meet these demands of modern flight. At every step in production it is necessary to maintain the most exact controls so that no flaw in the structure can endanger the plane, its crew or the ultimate mission.

For the B-58 is much more than a bomber as we knew bombers in the B-24 era. It is a complete strategic bomber-reconnaissance weapon system. In the disposable armament pod below the Hustler's fuselage may be a nuclear bomb, a number of conventional bombs or an array of photographic equipment for reconnaissance missions. Special electronic gear also may be mounted in the pod, or a portion of the aircraft's fuel supply may be carried there along with the mission payload. With the destructive load dropped and the fuel used up, the Hustler can drop the pod.

The array of electronic and mechanical control systems is so advanced that the B-58 requires only a three man crew — pilot, navigator-bombardier and defensive system operator. Thus the larger, much heavier B-58 is operated by a crew less than a third the size of that required for the B-24. Electronic defensive systems have eliminated the waist gunners, belly gunners and tail gunners who took such a toll of the Messerschmitts and Zeros.

A look at the two aircraft tells the story. The Liberator was the blunt and sturdy club needed to smash the military and industrial power of Nazi Germany. The Hustler is the sleek and deadly arrow designed to deliver a decisive retaliatory blow anywhere in the world. Both show Rohr's ability to meet the needs of the times.



New package for tomorrow's jet power!

Greater jet thrust, faster climb, longer range, and more operating efficiency . . . at lower sound level. That's the story of tomorrow's new jet engines now in production. Rohr's role is the production of complete, ready-to-install jet pods to house these mighty engines. Such complex units are but one of the many major aircraft assemblies built by Rohr — the world's largest producer of components for flight.

ROHR AIRCRAFT CORPORATION

Shown above is the famous Boeing 707 — soon to fly with the new Pratt & Whitney JT3D-1 turbo fan jet engines.

World's largest producer of components for flight • Main plant and headquarters: Chula Vista, Calif. • Plant: Riverside, Calif. • Assembly plants: Winder, Ga., Auburn, Wash.

TIME, FORTUNE, NEWSWEEK, NATION'S BUSINESS, U. S. NEWS & WORLD REPORT, THE WALL STREET JOURNAL, BARRON'S, FORBES—the publications of the business world, the financial world and of current events carry Rohr's advertising message to potential customers and investors. A more direct sales message appears in such publications as AVIATION WEEK, AEROSPACE ENGINEERING, SAE JOURNAL and WESTERN AVIATION among others.

Since Rohr's customers and potential customers are limited in number and specific in their requirements, the advertising message is aimed where it will do the most good — at the people who are in a position to buy.

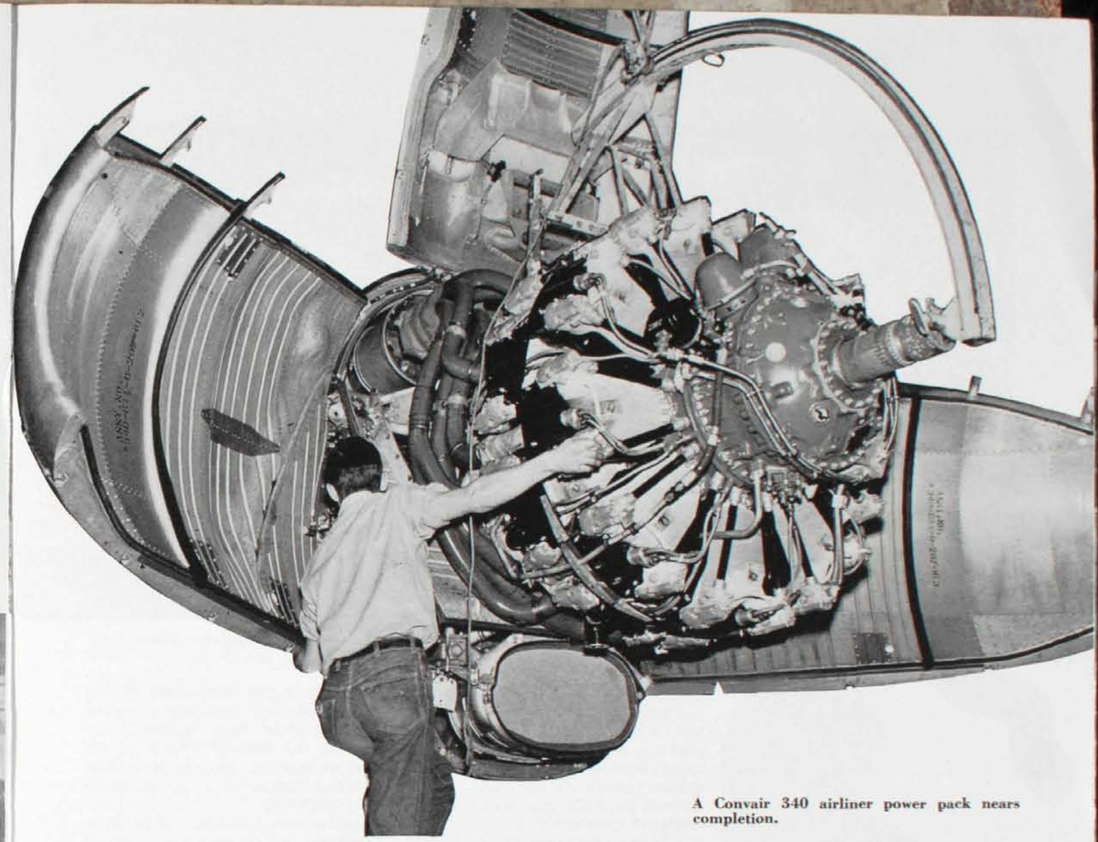
Rohr's advertising stresses the company's capabilities over a wide range of manufacturing effort. It shows the physical facilities and technical skills that enable Rohr to meet the needs of any prime contractor in the aerospace industry, and the diversified talents that pave the way to wholly new products in an even wider field.

ROHR'S ADVERTISING GIVES MESSAGE OF WIDE RANGE PRODUCTION CAPABILITIES

PACKS and PODS

Twenty Years of Aviation History Spell Out On Rohr's Production Line

B-24 Liberator power packs were built by the thousands during the war years.



A Convair 340 airliner power pack nears completion.

OF all of the thousands of reports generated by a modern industrial establishment, perhaps none presents so revealing a picture of an industry as does the Rohr Power Pack Accumulation Report.

While engine power packs today represent only a portion of Rohr's production and sales, this report tells a concise story of the company's growth—and also of the transitions in the aircraft industry as a whole over the past 20 years.

The initial entry in the Power Pack Report shows not just the construction of 31,760 power packs for the Consolidated (now Convair) B-24 bomber but also tells a story of the idea on which the company was based and upon which it grew. For Rohr generated the idea that major, specialized aircraft assemblies could be produced more efficiently and economically by a subcontractor than by the airframe producers. The company's formation and subsequent growth in facilities, employment and sales resulted from this concept.

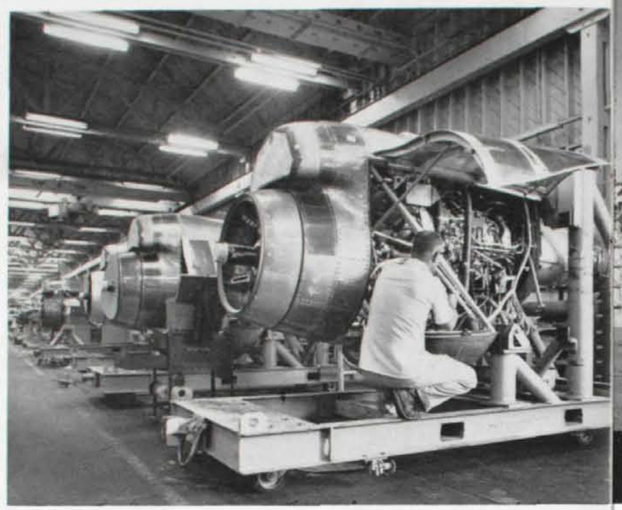
A Rohr-built power package or pod includes all of the engine build-up components — fuel, oil and air lines, ducting, electrical harnesses and engine auxiliaries—as well as the complex sheet metal structure that surrounds the engine. Jet pods are built for mounting on struts that extend below the wings and these struts, too, are Rohr products.

In the early days of aviation virtually every part of an aircraft was manufactured by the firm whose name the airplane carried. But as aircraft grew more complex and production called for a higher level of mechanical skills and facilities—and as aircraft construction changed from wood and fabric to metal—it became more practical to "farm out" some of the production operations.

Today's "weapon system" concept wherein a single firm serves as weapon system manager and coordinates the activities of thousands of subcontractors is a logical outgrowth of this original Rohr idea. A fairly recent estimate indicated that some 15,000 firms would be involved in the production of the North American B-70 Mach III bomber. Rohr is one of these but the Rohr contribution in this case is not a power package but high strength, heat resistant stainless steel honeycomb sandwich structures. The engine lines have changed through the years with advances in propulsion systems, while the company's operations have become increasingly more diversified. But a major part of the company's business still involves jet engine pods and propjet and internal combustion power packs.

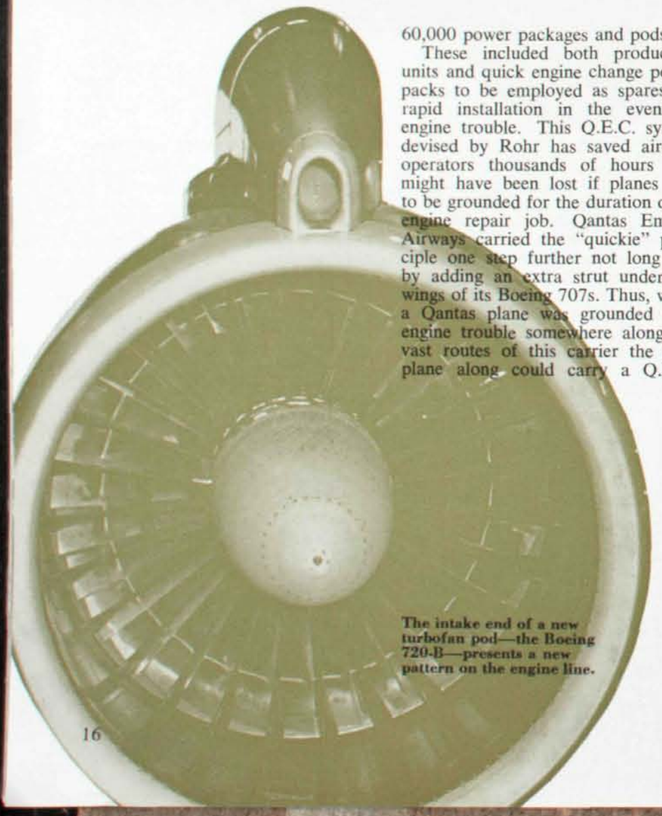
In the years since the first B-24 power pack rolled off the production line Rohr has delivered more than

Boeing KC-97 tanker power packs at Riverside.



Lockheed Electra propjet power packs in production at Chula Vista.

Flight testing of prototype turbofans for the new B-52H, with pods built by Rohr, followed this rollout of a fan equipped B-52G at Boeing-Wichita.



The intake end of a new turbofan pod—the Boeing 720-B—presents a new pattern on the engine line.

60,000 power packages and pods.

These included both production units and quick engine change power packs to be employed as spares for rapid installation in the event of engine trouble. This Q.E.C. system devised by Rohr has saved aircraft operators thousands of hours that might have been lost if planes had to be grounded for the duration of an engine repair job. Qantas Empire Airways carried the "quickie" principle one step further not long ago by adding an extra strut under the wings of its Boeing 707s. Thus, when a Qantas plane was grounded with engine trouble somewhere along the vast routes of this carrier the next plane along could carry a Q.E.C. unit to it on the extra strut. Within an hour, in some cases, the grounded plane could be back in the air — carrying the troubled engine on its own spare strut. Boeing, Rohr and Qantas collaborated in the design of this equipment.

Spares and "quickies," then, have accounted for a major portion of Rohr's power pack and pod business through the years. Many operators will not put an aircraft into service without having a Q.E.C. unit standing by for immediate installation. The Q.E.C. concept was developed during the days of piston engine predominance and has continued into the era of the propjet and turbojet.

Power packages have changed in many ways since the days of the B-24. There were 1,486 Rohr-built parts in the B-24 power package. More complicated reciprocating engines like those for the Boeing B-50 or the French SE-2010 called for more than 3,000 Rohr-built parts in the engine buildup and nacelle structures. Today Rohr builds some 5,000 parts for the average jet engine pod.

The transition has come through more than two dozen different aircraft models — with a number of power pack or pod variations for almost every model. The B-24 programs involved several variations, including the original prototype LB-30 model and the PB4Y2 Navy version. In all, Rohr built 37,887 pods for the various B-24 models.

During the same wartime era Rohr built more than 500 power packs for the Consolidated PB2Y3, a big four-engine Navy flying boat used extensively as a patrol bomber. Another early job was the Wright-Rohr conversion of a dozen power packs for Chicago Southern Airlines. Rohr also participated as a subcontractor to Pratt & Whitney in the construction of power packs for the French SE-2010.

The C-49, a military transport, and 049 commercial liner power pack contracts started a long string of participation in Lockheed multi-engine programs. This series advanced through the 649, 749, 1049 and 1649—the famous Constellation and Super Constellation series. This series of "Connies" accounted for some 4,600 production power packs and spares.

The giant Boeing B-50 long range bomber employed huge Rohr-built power packs weighing some 6,000 pounds each. More than 1,600 of these units were built in the late 1940s.

Convair entered the transport picture in the early '50s with the 240-340-440 series and the military sister ships the C-131 Samaritans and the T-29 "Flying Classroom."

During the same era Rohr built power packs for the Chase and Fairchild C-123 troop carrier and for the Boeing KC-97 aerial tanker. The KC-97 is used as an aerial refueling tanker by the Strategic Air Command and as a military cargo plane under the C-97 designation. Power packs for both of these planes were among the first produced at Rohr's new plant at Riverside, California.

Also during this period Rohr started construction on power packages for the Wright turbo-compounds used in the Navy's P2V-5, 6 and 7 patrol bombers. Still under construction as spares and Q.E.C. units on the Chula Vista engine line these Neptune power packs have helped pile up an unusual record of reliability and endurance. The Neptune still holds the record for the longest unrefueled flight and this Lockheed-built workhorse—with turbojet pods added to the turbo-compounds—is employed operationally as an anti-submarine craft and in several other capacities. Rohr's Q.E.C. units received an unsolicited testimonial during the recent International Geophysical Year activities when one of the assemblies was installed on a downed plane at the South Pole.

Another long production run started in 1953 when the Douglas DC-7 series power packs were phased into the Rohr engine lines. The last of the "Seven Seas" power packs was delivered in 1958 and in all Rohr built 1,858 production units and spares for the series. The last of the Lockheed Super Constellation power packs also phased out in 1958 as production started shifting over to the propjets and turbojets. Rohr built some 3,000 power packages for the Connies. With the phase-out of the DC-7s, the Connies and the KC-97, the venerable P2V remained the only piston engine power package job in the Rohr plants.

The transition to jets and propjets by commercial airlines followed several years behind the military shift. Rohr was producing the huge twin pods for Boeing B-52 turbojet engines as early as 1953. After several modifications through the years, the B-52 is now in the "H" (turbofan) version and Rohr still is manufacturing the pods and struts for this long range, "missile platform" bomber. The Lockheed C-130 was the first of the propjets in which Rohr was involved. The pods for the Hercules' Allison engines have been manufactured at Chula Vista and mated with

Delivery of the first Lockheed JetStar pods to a Lockheed-Marietta representative.

Pods for the C-130B Hercules troop carrier are assembled at Rohr's Winder, Georgia facility.

the engines at Rohr's assembly plant in Winder, Georgia — near Lockheed's Marietta facility. Recently a larger part of the C-130B operation was shifted to Winder.

Most of Rohr's engine line facility today, however, is devoted to propjet and turbojet pods for the new generation of commercial transports. A large part of Rohr's Riverside operation is devoted to the production of turbojet pods for the various members of the Boeing 707 jet airliner family, and for the Boeing KC-135 jet tanker—a military version of the basic 707 design. Currently the new turbofan engines are making their appearance at Riverside for the "B" versions of the famous Boeing liners. The pods produced at Riverside are assembled and mated with the Pratt & Whitney engines at Rohr's Auburn, Washington assembly plant just a few miles from Boeing's Transport Division operation at Renton.

At Chula Vista today Rohr is building the turbojet pods for the Convair 880—latest of the jet transports to go into scheduled service—and for Lockheed's propjet airliner, the Electra. The 880 pods and struts are built around General Electric turbojets, while the Electras are powered by Allison propjets. A Navy version of the Electra known as the P3V-1 anti-submarine plane also is in production.

The newest pods on the engine line are the little "Siamese Twin" units for the Lockheed JetStar, an executive-military transport. The high performance JetStar is powered by four Pratt & Whitney JT-12 engines mounted in the twin pods on either side of the aft fuselage. The plane is designed to carry ten passengers in the executive configuration or can be adapted to a variety of configurations for specialized military or civilian usage.

This JetStar program serves as an illustration of Rohr's increasing versatility, in that the pods were designed by Rohr to meet a customer requirement. Similarly, the thrust reversers for this aircraft were designed entirely by Rohr engineers. Through the years Rohr has expanded its capabilities to include an entire design-production package on several power package or pod programs. Many of the programs still involve production to a customer's design and specifications but Rohr now is in a position to offer the entire package where required.

Jet pods and pylons for the Convair 880 are built at Rohr, Chula Vista.

Jet Age DEPARTMENT STORE

If We Don't Have It We'll Build It

This reflector for an airborne radar unit is one of many new Rohr research developments.

The best testimonials are unsolicited.

At the end of an extended visit to the Rohr-Chula Vista plant some time ago, an engineer from another firm told several of his associates at Rohr:

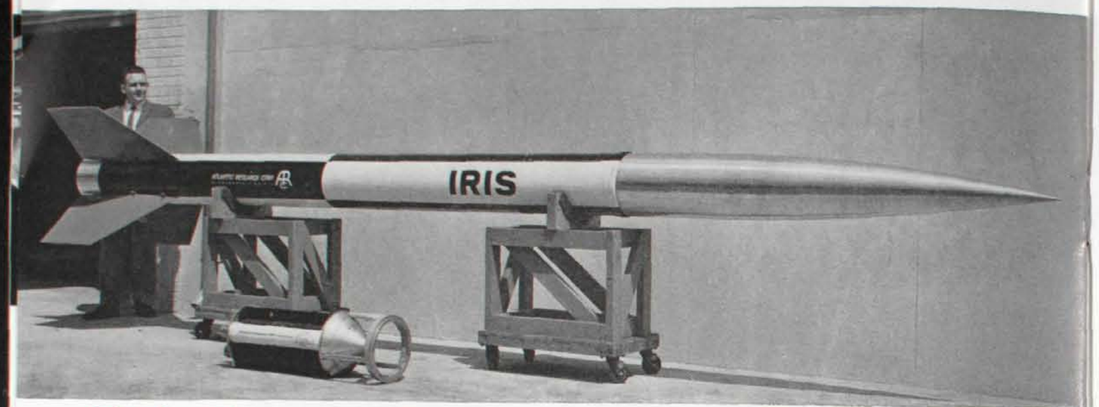
"I don't know quite how you do it, but I'm convinced you guys can build anything."

A look at the list of current contracts makes it apparent that the visiting engineer was very nearly correct. The growing complexity of aircraft and the expanding horizons of the flight industry have wrought surprising changes in a company devoted to serving that flight industry.

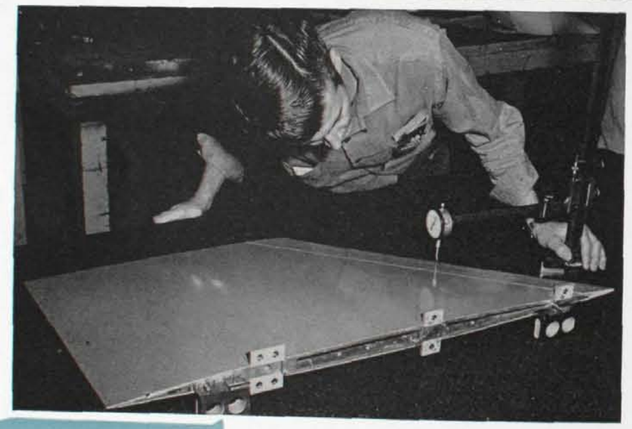
Today, along with its traditional production of aircraft components of all kinds, Rohr is building a variety of assemblies for rockets, missiles, space programs and the array of electronic gadgetry that operates, supports or monitors the various vehicles. Some of these products are in the research and development stages but most of them are being manufactured to meet specific customer requirements.

Constant research—on both improvement or expansion of present product lines and development of new products and capabilities—keeps the array of Rohr products growing steadily.

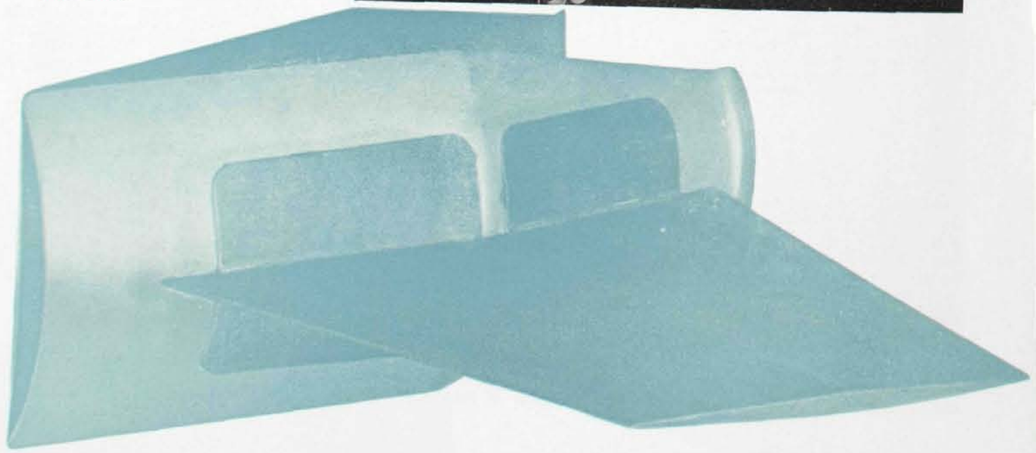
Research into advanced bonding methods at the company's Research and Development Laboratory at Riverside has led Rohr into active participation in some of the newest space programs. Construction of fins



Rohr workman, right, checks critical tolerance on production fin for Iris sounding rocket above.



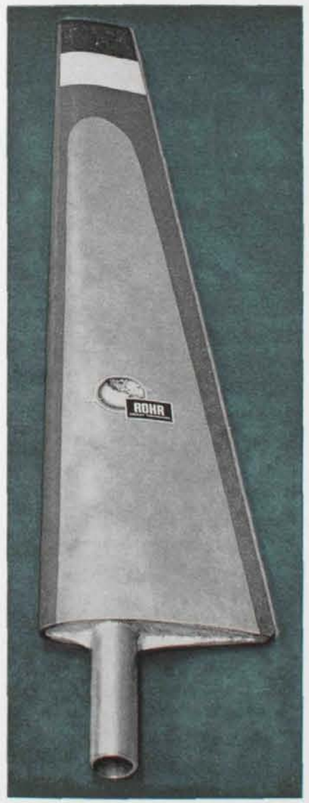
Below a smaller adhesive bonded rocket fin now under study.



for the Atlantic Research Corporation's new Iris rocket—a sounding rocket for NASA—spurred further research into new manufacturing processes for products of this type.

Rohr's advanced adhesive bonding techniques also have resulted in construction of prototype radar reflectors, wave guide system components and other structural portions of radar, telemetering and communications systems.

One of the most promising recent products of Rohr research is development of bonded helicopter rotor and tail rotor blades, some with honeycomb core. Tests have indicated a promising potential for these strong, light and precise blades.



An experimental helicopter tail rotor assembly.

Rohr has for some time been building adhesively bonded structural components for the North American Aviation Hound Dog Missile pylon and recently produced an extremely complex electrical harness for use in connection with the Project Mercury "man in space" program.

Nor are all of the advanced products aimed at the conquest of space. In recent months Rohr has built several components for the General Electric Company's atomic reactor projects for the Atomic Energy Commission. These large and complex assemblies called for extremely precise welding. Work for U. S. Army Ordnance has included production of parts for artillery weapons, as well as heat treating of 76 MM rifle barrels.

An electrical circuit analyzer for "ringing out" complex wiring harnesses was developed by the company's engineers and Electrical Department as a proprietary product and present plans call for offering this unit for sale in the near future.

Precision welding on a nuclear reactor fuel tube.

While most of Rohr's products fall into the "hardware" category, the company has embarked recently upon a new type of service. Rohr's leadership in the numerical control programming of machine tools has received recognition through the industry and the Numerical Control Department now is performing programming services for other firms. Under this program, Rohr can take the customer's blueprints or drawings and turn out finished magnetic tapes or cards ready for use on a machine tool director unit, can carry the job through to the finished parts or can provide any portions of this service.

Such numerical control programming service is considered a valuable offering to firms capable of providing their own machine tools but unable for several possible reasons to set up the necessarily elaborate and highly specialized programming facilities. Programming services are being made available not just to other aerospace firms but to any manufacturing concern in a position to utilize Rohr's advanced programming techniques.

The company also is experimenting with a number of entirely new manufacturing processes aimed at contracts in areas heretofore untouched. One of these is the development of filament winding techniques for production of non-metallic rocket engine cases. The Riverside Research and Development Laboratory has conducted these studies and has produced highly encouraging results.

Along with research and development work aimed at new products, Rohr's efforts also are aimed constantly at new and better ways of producing the items in the current product line.

An outstanding example of this type of development is the advancement made in the production of brazed stainless steel sandwich structure. Rohr has been producing stainless honeycomb sandwich panels for several years. Currently these strong, heat resistant assemblies are being manufactured for Convair's Mach II B-58 bomber—now a part of the

A missile afterbody section now under development.

Boeing sound suppressor-thrust reverser unit being mounted at Rohr-Auburn.

Strategic Air Command's deterrent bomber force — and the high performance McDonnell F4H-II. The F4H-II Phantom is one of the Navy's new supersonic fighter-interceptors. Rohr also holds a contract to produce stainless honeycomb components for the North American B-70, a bomber now in the developmental stage designed for full mission operation at three times the speed of sound.

Rohr has developed new brazing methods to reduce the long brazing and curing cycle now essential to production of the type of structures needed for high performance aircraft. A new core machine also aimed at production of better and more economical honeycomb core is discussed elsewhere in this issue.

Introduction of the new turbofan engines for commercial and military aircraft has brought Rohr's engineering and production talent into play in the development of new pod and strut designs and new types of thrust reversers.

A panorama view of production sequence on 43-foot aft fuselage sections for the Boeing jet airliners.

Rohr is producing turbofan pods for the Boeing B-52H "missile platform" bomber and the fan versions of the Boeing 707 series airliners, as well as the conventional turbojet pods for Boeing's popular airliners and the KC-135 jet tanker.

The company also is building turbojet pods for Lockheed's new JetStar military-executive transport and for the Convair 880 commercial transport now entering service.

Propjet power packs are being manufactured for the Lockheed Electra commercial transport and for the Lockheed C-130B Hercules troop carrier. The Lockheed P2V Neptune patrol bomber piston engine power packages also occupy bucks on the Rohr engine line.

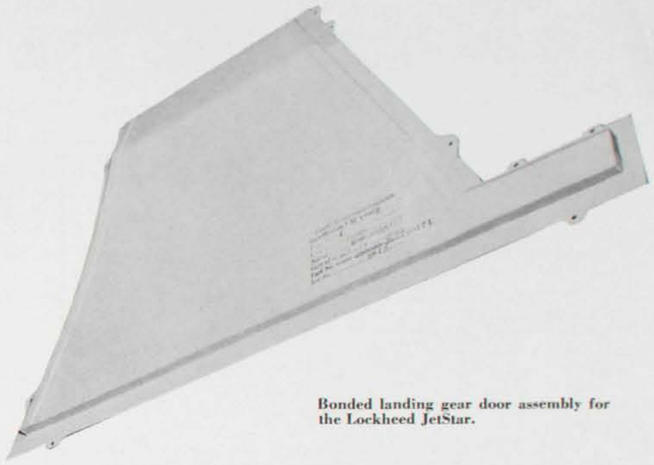
Rohr's long research into the problems of sound suppression and thrust reversal has brought design and production contracts, along with the production orders on customers' designs. Rohr's engineers designed and tested the thrust reversal equipment for the Lockheed JetStar, which now is in production. The company is building turbojet and turbofan thrust reversal equipment for the Boeing 707s, as well as sound suppressors for Boeing's commercial turbojets.

A variety of other major components for the most advanced and successful military and commercial aircraft are shipped from Rohr's manufacturing and assembly plants. Among these are the 43-foot aft fuselage sections and the horizontal and vertical stabilizers for the Boeing 707s and stabilizers for Boeing's KC-135.

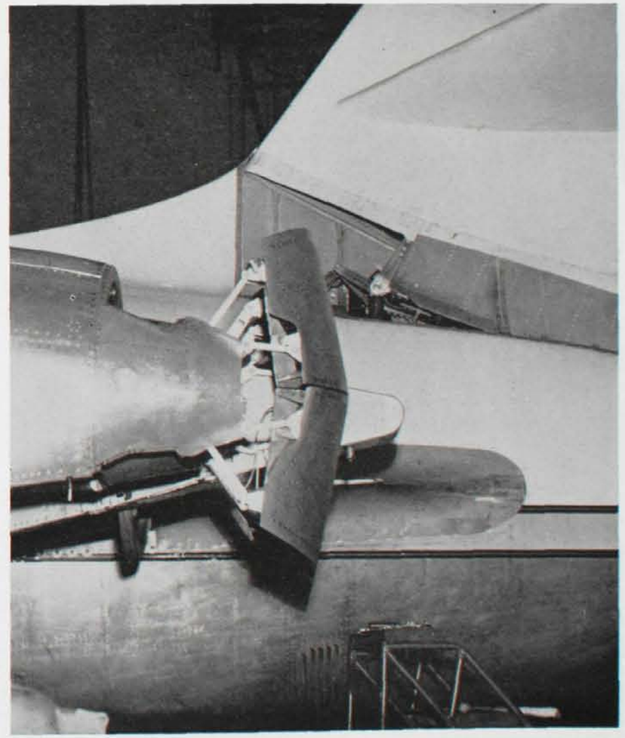
Highly precise control tabs for the 707s and KC-135 are manufactured in Rohr's adhesive bonding facilities at Riverside.

A wide variety of smaller assemblies are produced at both manufacturing plants, including such high strength weldments as the B-52 flaptracks, small conventional assemblies such as landing gear doors and wing rib chords and many others.

The variety of products grows constantly, while Rohr's production, engineering and research personnel work to stay ahead of developments in an industry making daily technological advances.



Bonded landing gear door assembly for the Lockheed JetStar.



Rohr designed and built pods and thrust reverser mounted on the JetStar.

The Logbook

TWENTY YEARS ago this month France had fallen and was out of the war, the Nazis had invaded Netherlands, Belgium and Luxembourg, Chamberlain had resigned as prime minister and Churchill had the heart-breaking task of rallying a British fighting force after the disastrous Dunkerque evacuation. The United States was trying, with growing impatience, to remain neutral.

The point in recalling these events is to bring to mind the tremendous changes that have taken place in two decades. Whole concepts of government have undergone drastic changes in many parts of the world and at least half of the population is seething with unrest. Twenty years is but a moment in history, and if the period from 1940 to 1960 is a foretaste of what is to come, this planet could be unrecognizable in another like span of years.

Trying to compare the foregoing with the twenty-year development of the aircraft industry may be a great deal like trying to add apples and oranges and come up with an intelligible answer, but nevertheless there is to some extent a common denominator in linking flight to geo-politics. It is the airplane that has wiped out barriers that once separated continents and peoples, and now the rocket and missile era is shrinking the globe still tighter.

This being the twentieth anniversary of the founding of this Company, it is timely to glance back twenty years. But one has to do it quickly, because to take one's eye off the road for even a moment is to risk missing the direction signs that point to the future.

Twenty years ago the turbojet airplane was a dream on a drawing board, something the military designers hoped would give them a better weapon. It was not until near the end of the war that a few jet fighters began scooting around. And it was 14 years after the war ended before an American jet transport began carrying passengers. The British had tried their Comets, but they developed a bad habit of blowing up in flight, and were withdrawn from service for several years.

When Rohr Aircraft Corporation was founded, as related elsewhere in this issue in greater detail, its first major contract was for B-24 power packages. Compared with those that came along when the jets replaced the old piston engines, the B-24 was simple. True, it had Rohr-made parts, but when the war broke out the design was more or less frozen and engineers were discouraged from monkeying with the original concept, which enabled the builders to set up production lines and shell out completed aircraft like peas from a hulling machine.

Compare one of those airplanes with those of today and you get a picture comparable to trying to compare a 1940 model to the Wright Brothers' contraption of bamboo and baling wire that took off on the sand dunes at Kitty Hawk and flew a distance less than the wingspread of a modern bomber.

Review the last 20 years, note that speeds now are calculated in Mach numbers rather than miles, recall how startling all this would have sounded in 1940, and then try to predict what flying will be like by the year 1980. Man alive, the industry has just gotten started.—ETA.

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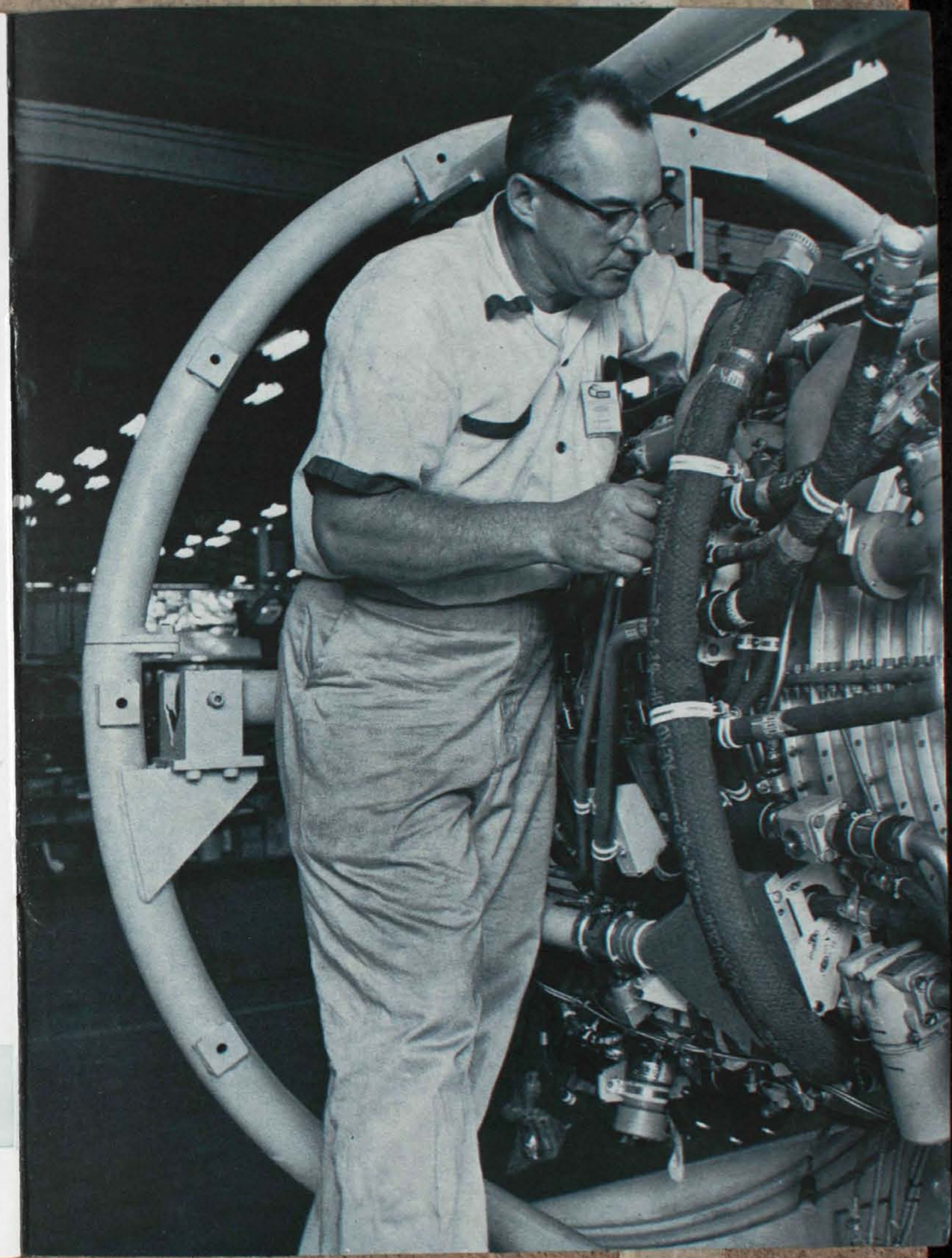
ROHR AIRCRAFT CORPORATION

Main Plant and Headquarters, Chula Vista, California; Manufacturing Plant, Riverside, California; Assembly Plants, Auburn, Washington • Winder, Georgia



On the engine line at Chula Vista a skilled Rohr workman installs engine buildup equipment on a General Electric power plant for the Convair 880.