1957 Buyers' Guide Edition

MID-DECEMBER 1956 $3.00

AVIATION WEEK

A McGRAW-HILL PUBLICATION



A AIRCRAFT

B MISSILES

C AVIONICS

D SUPPORTING EQUIPMENT

E NUCLEAR SYSTEMS

F AIRLINE & AIRPORT EQUIPMENT

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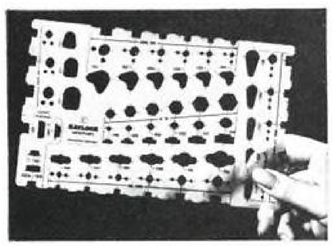
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The 1957 Aviation Week Buyers' Guide was compiled with the cooperation of more than 3,000 representatives of the aircraft and associated industries. It is intended to serve as a standard reference on procurement and sales in the aviation industry.

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How to use the 1957 Buyers' Guide

This second annual edition of the Aviation Week Buyers' Guide is geared to keep pace with the continuing changes forced upon the aircraft industry by the introduction of new and advanced weapon systems.

SECTIONALIZED FORMAT . . .

The Guide divides its manufactured products listing into six separate sections of related interest. This is done for maximum convenience in finding any particular item or service.

IF YOU ARE BUYING . . .

Refer to the alphabetical product index which follows to find the page number of each specific product with its manufacturers. All products in this Guide are indexed by section and page number. For example: Alternators . . . C-4 . . . would be found in Section C, page 4.

IF YOU ARE SELLING . . .

You will find the names of the buyers of complete systems and components for the military services between pages 23 and 36, and for the commercial airlines on page F-3.

MANUFACTURERS AND DISTRIBUTORS . . .

An alphabetical listing of manufacturers whose products are featured in this Guide begins on page 37. A similar listing of distributors serving the aircraft industry begins on page G-1.

BOLD-FACE LISTINGS . . .

Advertisers in the Guide are bold-faced in the Manufacturers' Index, the Distributors' Index and in the Product Listings, and page numbers of their advertisements are shown.

ADVERTISED PRODUCTS . . .

An index of advertisers, with page numbers of their ads, begins on page H-35. A special index of advertisers' products, beginning on page 62, will help you to obtain complete information on products quickly and easily by referring to the advertising pages.

TRADE NAMES . . .

A listing of trade names, compiled from data submitted by manufacturers and other agencies, begins on page H-1. This will aid in determining a manufacturer's name if only a purported trade name is known.

READER SERVICE . . .

Further information on all products advertised in the Guide is quickly available. Use the convenient, postage-paid card inserts, placed throughout the book, which are keyed to advertisements.

SECTIONS OF GUIDE

A: AIRCRAFT. This section lists products that are installed either complete or as major systems in an airplane. Powerplants, major components, such complete units as seats or control assemblies are to be found herein.

B: MISSILES. Listings are similar to those in Section A, but are applicable specifically to missiles. Specialized supporting equipment is also listed, but common support items are not included here.

C: AVIONICS. The specialized equipment listings in this section include all the common parts—tubes, transistors, switches and rheostats—plus the large radars and computers, fire-control systems and specialized units that extend man's knowledge and control of a weapon.

D: SUPPORTING EQUIPMENT. The increasing importance of the task of support of a weapon system is recognized by setting these items apart in a category of their own, including all the hardware items, fasteners, raw materials and services that go into supporting functions.

E: NUCLEAR SYSTEMS. This section lists not only certain tangible items related to nuclear systems, but also the academic and Government centers of training and education in this newest science.

F: AIRLINE AND AIRPORT EQUIPMENT. In this section are listed the hundreds of companies, small and large, that sell transportation of people or cargo; the manufacturers of large fixed items like hangars and runways and lighting systems; and services of airport constructors.

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Weapon System Breeds Specialists

A dual role has been added to the traditional task of the engineer as researcher, developer or designer.

He has now become both salesman and buyer of the technically complex weapon systems that originally sprung from his drawing board and sliderule.

Around the nucleus of the salesman-engineer or the buyer-engineer has formed an outer ring of sales and purchasing specialists to perform many of the important supporting functions in negotiating contracts, establishing prices and schedules, and following through on deliveries.

These combined teams of specialists, working within a framework built by the emergence of the weapon system concept, have developed a unified approach to the buying and selling fields that could not have been achieved under the traditional approach of separation of functions.

These teams owe their existence to the weapon system concept, the complexity of its contemporary design forms and the rapid obsolescence of its technology.

Those factors have made it imperative that the engineer double in brass as a salesman and buyer because:

• **Technical complexity** of new systems —whether a complete missile or a radar component, an airplane or a flight-line starter and air supply cart for a turbine transport—demands that they be sold by engineers to engineers. Only a specialist having complete familiarity with a design can ask the right questions about a jet engine power control using a computer. Only a specialist can have the knowledge to answer questions about the performance change in a missile fuel with RP-1 instead of JP-4.

• **Time can be saved** and misunderstanding avoided by the direct exchange of technical questions and answers during the engineering purchase of engineered systems. The old route, with the salesman and the purchasing agent as middlemen, takes too long to traverse. Questions don't have to be referred back to the home plant for routing to an engineer for answers to be sent back to the salesman in the field to be relayed to the buyer who may have to find an engineer to interpret the answer.

This isn't just because of the engineering dialect. Some engineering concepts, like the classical thermodynamic example of entropy, can only be defined by using integral calculus or even higher math. Either you understand, and sell the system, or you don't. It is as simple as that.

In order to work as a team, the engineer and the salesman or the buyer must know and understand each other's problems. This is not an easy task for such specialists; the engineer has the design technique, but not the lists of the men who might want to buy his design. The salesman has the list, but he doesn't understand what he is being asked to sell.

Bridging the Gap

The 1956-57 AVIATION WEEK BUYERS' GUIDE is planned to help bridge that gap between the specialized knowledge of engineers on one hand and salesmen and buyers on the other.

For that reason, this BUYERS' GUIDE is divided into three major groups of material. The first is a series of articles on the techniques of doing business with the military services and the airlines. The second is a detailed listing of the specific people who buy for the military and airlines. The third is a compact, comprehensive listing of the millions of items that help build missiles, military aircraft, transports, business planes and ground systems.

But more must be done than streamlining the contractors' organizations in order to shorten the development time lag between concept and production. The finest engineering-sales-purchasing teams can make no headway against a hidebound service concept of doing business in the same old manner.

The services have realized that the weapon systems concept would force changes in their procurement and have reorganized their own systems to meet the pace of present-day technology.

More and more of the routine purchasing functions are being mechanized and automated. Computers and punch-card systems are replacing or supplementing human labor in taking inventory and ordering small hardware. Careful study of logistics problems has enabled the services to buy more accurately the needed numbers of line items.

Service-Industry Coordination

At the other end of the scale, the services are sharing their secrets with the contractors, making the military requirements known earlier in the game to the designers who must meet them. This has speeded the purchase of research and development.

Companies also have met the need. They have sponsored and attended courses in purchasing techniques, have had symposia between contractor and sub-contractors, have encouraged contact between the engineers and the specialists in buying and selling.

After a long period of cyclic growth and travail, the aircraft industry has stabilized at a gross sales level approaching $10 billion. It should stay at that level for the next few years, offering an unprecedented market for almost any imaginable manufactured item or proffered service.

This BUYERS' GUIDE is a new approach, born of the weapon system concept, to the understanding and servicing of that huge market.

Continued High-Level Activity

Spurs Healthy Aircraft Industry

By Robert Hotz

The aircraft industry will enjoy another good year in 1957. Gross sales will be close to $10 billion. While the level of industry output will remain close to its post-war peak, the character of the industry's products is changing due to the rapid advances in technology during the past few years.

General outlook for 1957 is for a stable production rate on both military and commercial airframes and gas turbine engines, with a rising output of guided missiles and avionic systems required in both piloted and pilotless airframes.

While gross sales are apt to reach a peacetime peak, profits are due for a slight dip for 1957 due to the heavy expenditures being poured out of earnings into research and development facilities and programs. The aircraft industry clearly recognizes that its future depends on pushing at a maximum rate along the whole perimeter of its rapidly expanding technical frontier, and it is taking a larger portion of its earnings than ever before to invest in this future development.

INCREASED COMPETITION

Another major factor in the 1957 profit picture is the increased competition for military and commercial business that will offer an attractive financial picture for the winners and pose serious problems for the losers of the fierce technical competition for major military weapon systems and commercial transport types. This trend began during 1956, but there will be even wider discrepancies between the profit rates of individual firms in the business than ever before. Profit limiting legislation by Congress or unrealistic application of the renegotiation law do not pose any major threat to the aircraft profit picture, although some individual firms may encounter specific trouble regarding their financial policies.

Military customers—Air Force, Navy and Army—will continue to account for the largest slice of industry sales. Total military sales should be close to $9 billion during 1957 as several major weapon systems, such as the Convair F-102 all weather supersonic interceptor and the Boeing B-52 heavy jet bomber, hit their peak production levels. Top production levels in major weapon systems is reflected in higher sales throughout the industry's extensive sub-contractor and supplier structure. The military services had an unexpended balance of about $24 billion at the end of 1956 earmarked for aerials weapon systems and supporting system procurement. In addition, the aircraft procurement totals for the Fiscal 1958 budget are due for a major increase over Fiscal 1957.

COMMERCIAL SALES

Commercial sales, including both airline transports and business flying aircraft, will run close to the billion dollar mark during 1957, but the major increase in this market will not be felt until the 1958-60 period when more than $2 billion in jet transport orders already on the books are due for delivery.

During this period of increased competition; changing products due to technological pressure; and the exploration of new markets, the industry is also facing major management problems. Time is erasing most of the pioneers who built the aircraft industry primarily through the force of their individual characters, and the size and technical complexity of the industry has increased so much during the past five years that a new type of management structure and system is necessary to successfully cope with these trends. Basic reorganization of management structure for most of the major prime contractors in the aircraft industry is in the cards for the next few years although some firms have already begun this process.

The rising tide of Russian airpower and its growing influence on international affairs; the rapid pace of technical development that is already pushing the industry into the fringes of outer space; and the continued expansion of the international air transport network will continue to be the major influences spurring a healthy aircraft industry.

TRENDS FOR '57

In addition the following trends will be felt strongly during 1957:

• *Weapon system concept.* The development of a complete weapon system delivered combat ready from a manufacturer's plant to an operational unit is firmly established as both an Air Force and Navy policy. Because of a lack of industrial and technically trained management, both services will continue to delegate more of their managerial authority for development and producing complete weapon system to private industry through the weapon system manager program. This is already leading to a markedly different industrial structure within the aircraft industry and places a premium on development of large vertical-type industrial organizations and makes it more difficult for the small business to find a place in the military market. It may also stimulate a series of mergers in which smaller companies combine to compete more successfully with the established giants in the field.

• *More selective buying.* As weapon systems become more complex and complete, it becomes financially difficult to finance competing systems beyond an early design stage. It becomes more necessary to make a sound technical decision in favor of a single system before the huge investment in production and production tooling is required. This will mean more intensive competition than ever before in technical development. It is the major reason why individual firms are investing so heavily in research facilities such as supersonic and hypersonic wind tunnels, rocket propelled model programs, altitude and climatic chambers and supporting data reduction and computing facilities. An individual firm can no longer rely on government financed or operated facilities in this critical phase of technical development and must have control over its own research and development effort if it is to survive in the increasingly fierce technical competition.

• *Expanding technology.* Advent of gas turbine engines and avionics created a major expansion of aviation technologies during the past decade, but already the industry is plunging into new technologies that dwarf the scope of the technical revolution wrought by the gas turbine and avionics. Among major technologies that are firmly linked to the aircraft industry are nuclear physics applied to propulsion, weapons and weapon delivery systems; astronautics for the conquest of outer space; new horizons in metallurgy to meet the requirements of hypersonic flight, and the new era of exotic fuels.

NEW TECHNOLOGIES

During the next three years, the aircraft industry will still be producing military hardware of the types already well developed, primarily manned aircraft—fighters, bombers, transports and trainers, with a slowly rising percentage of missiles. Major impact of the new technologies will probably not be felt in terms of large scale business for another three years, but the research and development foundations on which this new business will be based are being laid now.

Air Force-Army Assess Military Buying Programs

By Claude Witze

Washington—Whatever happens to the Fiscal 1958 Defense Department budget—and it is almost certain to increase from 4 to 6% above this year's $35.5 billion—there are certain inescapable facts that the aircraft industry and its suppliers must accept:

- **Despite what they feel is needed** in development and finished hardware, the U.S. Air Force and Army Aviation will find money a primary controlling factor in their buying programs.
- **Proportion of the total budget** spent on guided missile systems will increase. The number of delivered conventional aircraft weapon systems will be reduced, but the unit cost of these systems will continue to rise.
- **Ease of maintenance,** reliability and performance will be the daily drill. Contractors who fail to meet specifications on these points will suffer penalties. The three factors must be given top consideration in the design and manufacture of everything from a fastener to a fire control system.

Determining Profit

The aircraft industry's customers have a fairly easy way of getting what they want. They control the selection of sources right down through the subcontracting structure, and they have the final voice in determining profit.

Some of the factors considered in fixing profit have been outlined by Dudley C. Sharp, Assistant Secretary of the Air Force for Materiel. They include:

- **Complexity.**
- **Quality.**
- **Adherence to delivery schedules.**
- **Cost control.**
- **Risk assumed.**
- **Government furnished facilities and financing.**
- **Contribution to research, design and development.**

The Air Force by no means can fit these considerations into a formula for determining profit. They do, however, get plus and minus factors that are applied by the contract negotiator.

"Pricing," says Sharp, "including the determination of the profit factor, is an art and not a science."

The margin of profit on air weapon system contracts has received a great deal of attention in 1956 and the industry, along with USAF, came out of a Congressional investigation into the subject with a commendable record. At the same time, the intense interest of the lawmakers—who also appropriate the money—makes the armed services alert in this area.

Most disagreements center on the question of sales or net worth as a basis for calculating profit. Here is what Sharp has told industry:

"We buy, as we must, on a contract-by-contract basis. We have traditionally used the cost of sales approach as a basis for measuring the profit to be allowed under a particular contract.

"This is the manner in which industry submits its quotations and it furnishes a uniform basis of understanding. This conforms to the Armed Services Procurement Act of 1947, which expresses fixed-fees in relation to estimated costs and imposes ceilings on fees measured in relation to such costs.

"It is also consistent with the measurement of profits approach set forth in the Vinson-Trammel Act. It is considered an appropriate measurement of the reward for the work to be done under a contract.

"Sales can be used as a base line for measuring profits on a contract-by-contract basis. On the other hand, net worth, which is determinable for only a specific point in time and varies from day to day, is difficult, if not impossible, to use as a basis for determining profit allowance on a contract-by-contract basis."

Why Air Force Control

USAF also keeps an eye on what industry does with its profits. A contractor who makes substantial reinvestments cuts down on the U.S. requirement to provide facilities and financing. One who puts a good chunk of this money into development projects, anticipating what USAF will need, will be favored by the Air Materiel Command.

There are several reasons why the Air Force insists upon a degree of control over the subcontracting structure. Despite protests from time to time that come out of the mouths of prime contractors, the Air Materiel Command clings to its concept that it is hiring management ability when it signs a prime contract. Like a board of directors, it retains the right to review management decisions.

This does not mean USAF wants to interfere with private business, but it does insure a degree of co-ordination that would be impossible without such a check.

Maj. Gen. David H. Baker, AMC Director of Procurement and Production, says the prime contractor always retains full responsibility "both managerially and technically" and that AMC knows it cannot replace his management with USAF staffing.

"We recognize," the General says, "that private industry exclusively has the ability to gather together in proper balance and numbers the many skills and talents which are required to carry out a production effort. We are willing to support financially such management effort through its contracts and do not desire to reduce or relieve the managerial responsibility of industry in any way.

"However, the Air Force's interest in production extends over a much greater range of products and companies and over a much longer range of time than is significant to any individual company. It is for these reasons that the Air Force must interest itself in seeing that the contractor's performance is aimed towards and consistent with the Air Force's national objectives."

How AMC Decides

Here are some major factors that influence AMC decisions when it reviews a subcontracting structure:

- **Special skills and talents.** AMC recognizes that these abilities, which must be utilized in today's complex weapon systems, are widely scattered and obviously cannot be concentrated in the plants of a few prime contractors. The work must be done by those elements of industry best qualified to carry it out.
- **Production facilities.** They are scattered, just like the talent, and must be put to work. Duplication of these facilities at prime contractor plants cannot be justified economically from the point of view of the industry or the Air Force.
- **Competitive opportunities.** Prime contracts cannot be placed exclusively on a basis of price competition. The number of potential prime contractors has gone down steadily with the increasing complexity of weapon systems. Many parts of the weapon system, however, can be built by subcontractors with price as a major competitive factor.
- **Industrial mobilization potential.** Maximum industrial readiness in the nuclear age calls for a structure that can accelerate production to support airpower in being, not to provide an airpower that is lacking. With subcontractors carrying 30 to 40% of the USAF production load, the mobilization potential is increased, dispersed and economized.
- **Utilization of small business.** It is national policy to spread the production base to firms which employ fewer than 500 persons, so long as they can do the job well and meet the competition pricewise.

Reliability and Maintenance

Aside from these matters of management and policy, the paramount concern of the industry and USAF in 1957 probably will be in the area of reliability and ease of maintenance. A weapon system is useless if it won't work, and early experience with the first Century Series fighters has staggered USAF wing commanders. Keeping their aircraft in a state of combat readiness has seen availability drop to as low as 35%. Just as the Air Force lacks talent to design, develop and build modern weapon systems, it now finds it lacks the talent to maintain them.

Here again, the problem is tossed back to industry. Reliability and ease of maintenance must be designed into the product. Bigger than the Air Force alone, the situation has been tackled by the Defense Department, which has set up a Directorate of Maintenance Engineering in the Office of the Assistant Secretary of Defense for Engineering.

Overall job of this office is "to contribute to the readiness of the military services by improving the effectiveness and economy of maintenance operations." It is surveying the problem in every field of defense activity.

At the USAF level, it is known that one-third of all personnel is busy on maintenance jobs. One piece of complex electronic equipment requires three hours of maintenance for every hour in the air.

Maintenance Cost

In general, the cost of maintaining electronic equipment is twice as much each year as the first cost of the equipment. A Navy estimate says maintenance cost during the life of the equipment is ten times the initial cost.

Gen. Baker has warned:

"Unless significant gains in reliability are made, we may well be approaching the time when we cannot introduce into production those systems which have not been engineered and tested for reliability.

"This will be an extremely difficult decision to make and live with in view of the vital need for the earliest possible superior weapons. However, we must at the same time accept the fact that where we do not have reliability, we do not have the ability to fight."

USAF is working with industry in an effort to have reliability and ease of maintenance designed into the weapon system. Most major prime contractors have in recent months set up special engineering groups to kibitz over the drawing boards and make sure an engine does not have to be removed to replace a fuel line or use a dip-stick on the oil reservoir.

The importance of these factors mounts almost in direct proportion to our progress toward a missile arsenal. Huge strides will be made in this direction in Fiscal 1958, as the transition starts to boil.

"We are at the threshold," says General Baker, "of unmanned aircraft for both offensive and defensive missions. We can readily see that except for certain types of missions the manned combat aircraft will become technically obsolete in the future."

New Demands

It is clear that this is a threshold for industry as well as military tacticians. It is the threshold of a challenge to meet a new list of demands. Here are some of them:

- **Facilities.** For rocket, ramjet and nuclear power plants they must be in new locations and old test grounds must be disposed of, or salvaged, to keep the overhead within reason.
- **Protective construction.** There must be barriers, baffles, shielding and soundproofing for firing sites.
- **Materials.** Temperatures and stresses met by upcoming weapons will outdate the metals and alloys known today. New ones will be needed for both vehicles and power plants.
- **Production technology.** There is a demand for dimensions, shapes and forms that cannot be made in today's factories. Increased automation and numerical control over machine operations are inevitable.

In the face of all this, we must return to costs and the first inescapable fact—that there is a limit to available funds.

The Aircraft Industries Assn., comparing today's aircraft costs with those of World War II, has pointed out that labor costs have gone from an average of $1.22 an hour in 1944 to $2.17 an hour in 1955. The index figure for a metal such as aluminum has climbed from 60.3 to 142.7. And aluminum is being replaced by titanium, which costs $20 a pound as compared with $1 for aluminum.

Engineering Effort

The engineering effort involved in crossing Gen. Baker's "threshold" is staggering and the technological competition, rammed home to complacent politicians by the Soviet air displays of 1955, has put the spotlight on this activity. We are moving only toward the threshold, but here are some facts developed recently by a manufacturer of fighter aircraft:

In 1944, the engineering department employed 1,300 persons with a payroll of $4,052,000. Ten years later, the number of employees was 2,400 and the engineering payroll was $13,462,000. The sales volume is equally significant. It dropped from $217 million in 1944 to $150 million in 1954.

The engineering hours required on a World War II fighter prototype was 123,014. Hours required for a jet fighter prototype now in the active inventory was 492,880. The company estimates that its next production aircraft prototype will require 2,144,360 hours.

USAF spokesmen say frankly that they have arrived at the point where they must be selective. They simply cannot afford to make their choice too late in the program. We are approaching the time when development will be stopped on all but the most promising weapon projects.

The reason is simple: We do not have the money or talent or facilities to produce all of them if they did prove entirely feasible.

This is why industry capability is paramount and only the most worthy will survive. The successful weapon system and the successful component will be the one that provides performance along with economy in initial cost and upkeep.

Navy to Step Up Hardware Buying

Washington—Latest steps in the streamlining of Navy's Bureau of Aeronautics to meet the complexities of modern weapon systems may eventually affect almost every aircraft and component manufacturer.

Although these newest changes are taking place at the research and development end of the spectrum, they are one more indication that nothing in the aircraft-missile industry—from the overall weapon system to its smallest part—remains static for long.

Adoption of the weapon system concept and reorganization of the Bureau's research and development activities will not affect the day-to-day machinery of hardware procurement immediately. But it is almost certain to have an impact in the long run.

Greatest emphasis in this recent reorganization (AW Oct. 1, p. 26) has been placed on long-range planning—and on letting industry know a great deal more about this planning.

"The whole field of contractor relations may come to be viewed in a new light," Rear Adm. William A. Schoech, assistant Bureau of Aeronautics chief for research and development, said recently.

"We may have to redefine and reassess our methods of source selection and our methods of contract award. At this point, it is too early to tell whether substantial changes over existing BuAer practices will occur, or whether there will be only refinement of present procedures."

More Information for Primes

Adm. Schoech had in mind primarily relations with research and development contractors. But it is obvious that a rapid pace of technological development means that what happens on the research and development end vitally affects production and procurement.

Regardless of what happens to source selection and contract awarding, either in the development or production fields, "it appears that the prime manufacturer will come in for a greater share of participation" in long range planning, Adm. Schoech said.

"This begins with giving the contractor more information about the military requirement and its accompanying operational analysis," he said. "It implies a greater sharing of BuAer future plans and, in proportion, places a greater charge of responsibility upon the manufacturer."

These new approaches also are "meant to encourage the contractor to embark upon more basic research of his own to augment normal government and laboratory efforts to find the best solutions to problems in the many fields of air technology."

Adm. Schoech makes it clear that the contractor who hopes to manufacture components in the future should take part in the "stepped up interchange of military and technological information" now—and that the interchange will require the contractor to "establish a single focal point for the exchange and evaluation of this sort of data."

This attempt at improved communications with industry has been under way since the reorganization of BuAer (AW Sept. 5, 1955, p. 12).

The need for it was explained by Rear Adm. Robert L. Swart, vice chief of naval materiel, shortly after the streamlining began, who said that the manufacturing capacity of the U. S. was then 50% greater than at the beginning of the Korean war. He added that it soon would be "100% greater than at the end of World War II.

". . . We can expect more companies to be seeking defense business in the future, and some companies which may have enjoyed a certain amount of security with regard to special segments of defense production may find eager competitors in some of these fields."

Adm. Swart said he had found that the "alert, speculative and well-prepared company got the business when the time came for the Navy to place a contract, especially in a new field of endeavor."

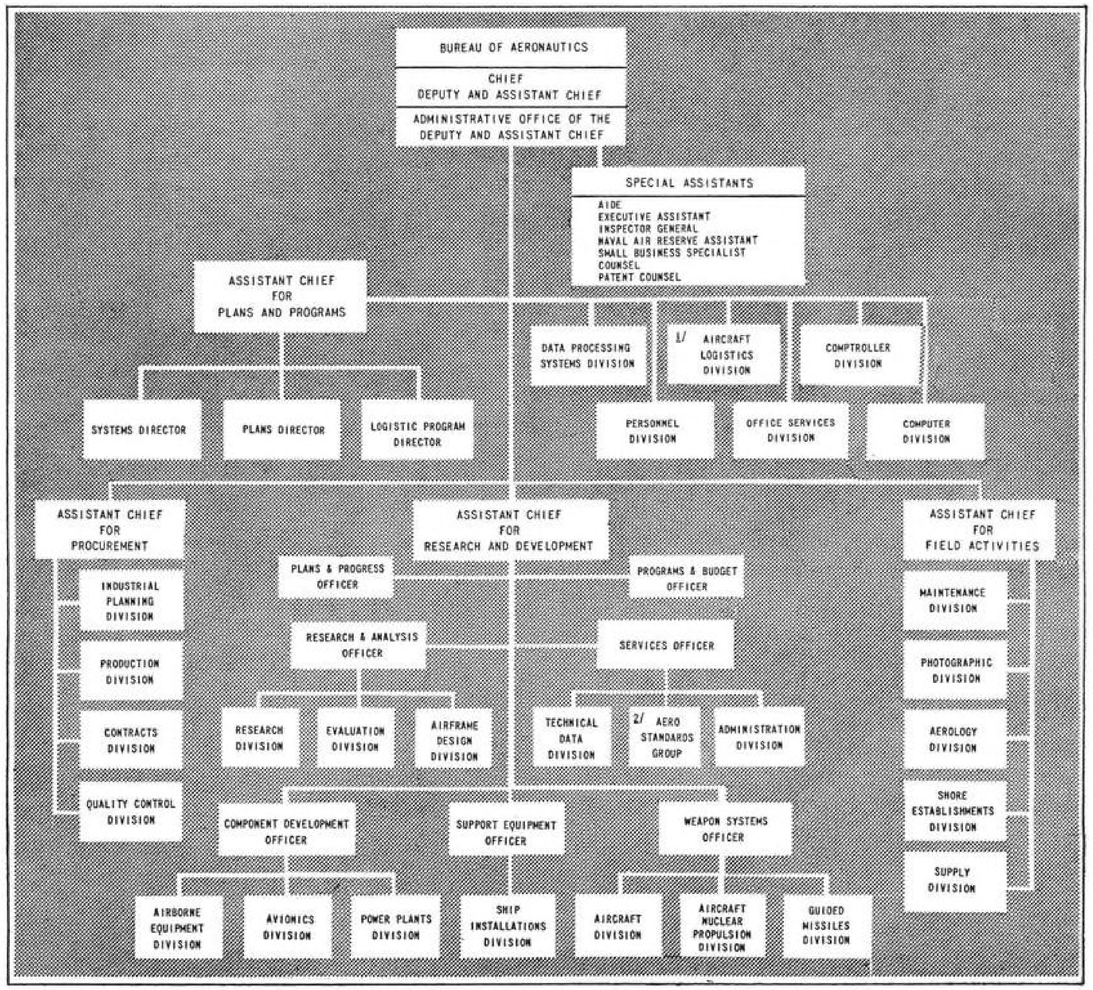
One result of the general BuAer reorganization was the creation of an assistant chief for procurement, now headed by Rear Adm. J. N. Murphy, who would be concerned with contracting, industrial planning, production and quality control.

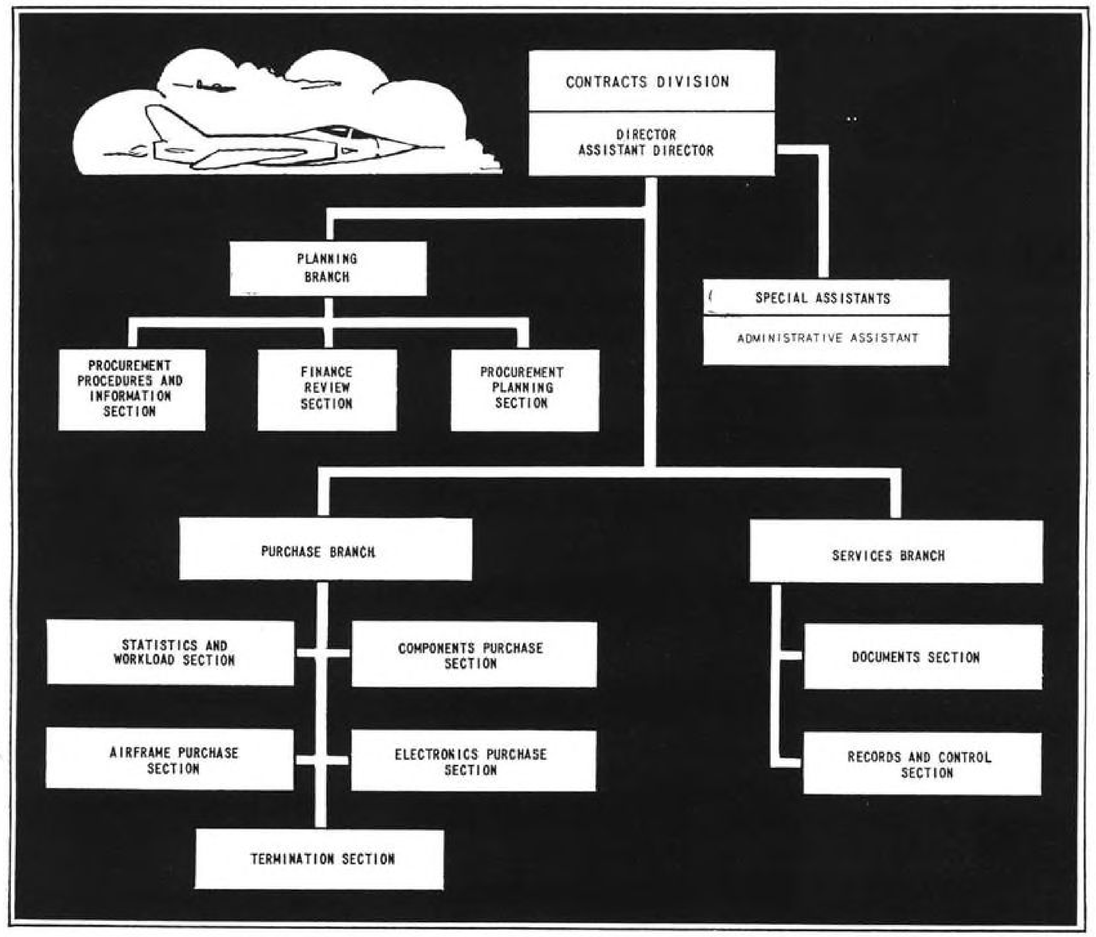
Step Up in Procurement

Adm. Murphy told AVIATION WEEK that procurement procedures have "been speeded up considerably" in the year since reorganization, partly by increasing the contracting staff but primarily by selling the concept "that procurement is everybody's business—the engineer's, the requirements people, etc."

Most advertised bidding procurement for larger aircraft items is handled by the Navy Purchasing Office. The Aviation Supply Office in Philadelphia handles procurement of smaller items, overhaul, repair and maintenance, replacement quantities of smaller items, etc.

Adm. Murphy said BuAer's procurement people are maintaining a close liaison with the USAF Air Materiel Command at Wright-Patterson AFB, Ohio—from the policy level on down.





ARDC Sparks Technological Progress

By Evert Clark

Baltimore—Procurement in the Air Research and Development Command is limited to the short, but vital, creative end of the air weapons spectrum —from ideas to prototypes.

ARDC's mission of providing qualitatively superior airpower in a day when a potential enemy has shown amazing technological progress demands that it procure the highest in technical competence and then use that resource wisely.

To get the best in brainpower and developmental work and to do the most with it, ARDC has made a tremendous effort in the past year and a half to tell science and industry what Air Force's needs are now, what they are likely to be far into the future and how the ARDC-industry team can fulfill them.

This is a two-way street. In addition to telling industry more, ARDC has solicited industry's ideas much more vigorously than in the past.

The necessity for effective communications between ARDC and the scientific talents of the nation is clear. ARDC manpower and personnel experts estimate that industry employs two-thirds of the 250,000 people working at the professional level in the natural sciences and three-fourths of the nation's 700,000 engineers.

Research and Development

Although some of the most important research and development work contributing to a superior Air Force is done at the 11 ARDC centers, more than three-fourths of the ARDC-sponsored effort is done on contract by universities, private research groups and industrial firms.

The centers serve as contact points for contractors, give guidance through the life of the contract and, in many cases, provide facilities where ideas can be explored and developmental prototypes proved.

ARDC breaks its mission down into two broad areas—a Technical Program and an Operational Program. The Technical Program, which begins with research and grows into technical development or exploratory development, deals with weapons and weapon systems needed 10 to 15 years from now. The Operational Program is basically concerned with weapon systems that will go into the Air Force inventory in the next seven or eight years.

To acquaint science and industry with its thinking ARDC uses three relatively new means:

Industry Contacts

• **Technical Program Planning** Documents. These are classified studies that establish and delineate the Air Force's technical requirements and objectives for a period that might be called the intermediate future. They cover 46 broad functional areas such as strategic bombing, missile guidance, electronic countermeasures, etc.

These documents define the job the Air Force will have to do one to two decades from now; evaluate present technical capability in the area with which they deal and note limitations of current materiel and techniques; give pertinent research summaries, proposed innovations and suggested approaches; and present ARDC's technical requirements and performance objectives.

Originally, Technical Program Planning Documents were distributed to contractors selected for ARDC by the Air Materiel Command-ARDC Source Selection Board. Now, however, ARDC is soliciting queries and requests from potential sources of research and development who are not currently contracting with USAF.

Inquiries should be directed to Commander, Air Research and Development Command, P. O. Box 1395, Baltimore 3, Md. Attention: RDTDD, Development Plans and Programs, Director of Development.

• **Weapon Systems Requirements.** These requirements, now being released to qualified contractors within the existing security framework, are an attempt to let industry in on ARDC's planning secrets. ARDC admits it is partially a selfish move—an attempt to get industry to do more of its own research and development. But it also overcomes the old paradox of doing business in classified areas. Formerly, a contractor needed a contract in order to get information, and he needed information in order to get a contract. Distribution of the Systems Requirements Documents depend upon a "need to know," which ARDC defines as integrity, plus a capability to participate in the research and development effort.

ARDC deals with a company's vice president for engineering or his equivalent in discussing the requirements. Conferences may be arranged by writing to the Program Plans and Policies Office (RDZPP) at ARDC headquarters. Requirements attempt to explain what the Air Force wants to know about potential future weapon system areas, and the contractor selects the area or areas in which he thinks he can make a contribution.

• **Technical Program Symposia** and Weapon Systems Conferences. Basically these are implementations of the philosophy behind the TPPDs and WSR—a philosophy of comprehensive, integrated ARDC-industry effort, based on mutual confidence.

Even newer than these methods for improving industry's communications with the Air Force and understanding of its needs is the office of Executive for Small Business, recently created in the Directorate of Procurement at ARDC headquarters.

Headed by John Eiden, the ESB is establishing what amounts to a one-stop counseling service for small businesses at each ARDC center and at four ARDC Field Development offices —New York, Los Angeles, Boston and Chicago. There will be a Small Business Specialist at each location. At the centers, they will be located administratively on the staff of the Director of Procurement.

Small business is defined in this case as a firm that is not dominant in its field of operations and which, together with its affiliates, does not employ more than 500 persons. In addition, ARDC will accept as a small business any firm so certified by the Small Business Administration.

ARDC is constantly looking for new sources of technical competence. Although contractors eventually will deal with a center—where contracts are written and monitored—information on how to join the growing list of ARDC contractors is available both at center and at ARDC headquarters.

Areas of Interest

Lists of Air Force areas of interest in research and development and from questionnaires aimed at learning a company's capabilities can be obtained from Contractor Relations Officers at the centers, from the Office of Industrial Relations in Baltimore or by writing to Commander, ARDC, Box 1395, Baltimore 3, Md. Attention: RDSKM.

To produce superior air weapon systems as a final product, the Air Force must insist on superior raw materials in the beginning. In the case of ARDC, of course, this means primarily the talent of the men in the organizations with which it deals.

The command, the procurement directorate at headquarters and the centers stress both the competence of a potential research and development contractor, his approach to the problem.

Services List Nine Contract Types Governing Buying of Military Items

One of the major responsibilities of the negotiator is the selection of the type of contract best suited to the procurement which he is conducting. His choice will have an important effect on the ultimate cost of the contract, on the incentive given the contractor to use materials and manpower efficiently, and on the nature of the supervision which must be exercised over the performance of the contract. While early agreement between the negotiator and the contractor is desirable, the negotiator should not hurry the decision on the contract type to be used. This decision will be based on a number of factors: the nature of the procurement, the contractor's production and cost experience, the degree of competition present, the availability of comparative cost data, the assumption of business risk, and the extent of the control which can and should be maintained over the contractor's operations. It is doubly important to avoid a premature decision, because the course of the negotiations will be considerably influenced by the type of contract contemplated for use.

Under certain circumstances it may be desirable to obtain greater flexibility in contract negotiations by asking the contractor to quote prices on more than one type. In such circumstances, if only one type of contract is considered and quoted upon and if, during negotiations, this proves unsatisfactory, a new contract proposal undoubtedly will be required, and much time and effort will have been wasted.

If it were always possible to establish firm prices which were fair both to the contractor and the purchaser, the determination of the most suitable type of contract would be no problem. A Firm Fixed Price contract would be used for all procurements. But the determination of fair prices for many items purchased is often a difficult, if not an impossible, task.

For this reason, several major types of contract have been authorized for use by negotiators, as well as a number of specialized types designed to meet specific situations.

I–1 Firm Fixed Price Contracts

A. Explanation
  (a) Supplies or services are furnished at a specified firm price regardless of actual cost of performance.
B. Use
  (a) When sound cost estimates are possible.
    (i) Commercial-type items available from competing sources.
    (ii) Military type equipment previously produced on which relevant production and cost experience are available.
  (b) When a contractor desires to share costs of a Research Contract.
C. Advantages
  (a) Places maximum risk and responsibility upon the contractor; consequently, results in the greatest incentive for cost reduction.
  (b) Easiest and least costly type of contract to administer.
D. Disadvantages
  (a) Price may include excessive allowance for contingencies.

I–2.A. Incentive Fixed Price

A. Explanation
  (a) Supplies are furnished at a tentative base price (target price). Upon completion of the work the price is redetermined based on the contractor's actual costs plus a sliding scale of profit which varies inversely with the cost. The redetermined price cannot exceed the ceiling price stated in the contract.
B. Use
  (a) When production is spread over a relatively long period.
  (b) When difficulty is encountered in negotiating a firm fixed price under the anticipated production conditions
  (c) When target costs can be established initially or at an early interim point with substantial accuracy.
  (d) When reasonable opportunities for cost reduction through contract or efficiencies exist.
C. Advantages
  (a) Not necessary for contractor to include excessive allowances for contingencies.
  (b) Encourages cost reduction by contractor.
  (c) Government shares in contractor's cost reductions.
  (d) Government receives "after-the-fact" cost information valuable in negotiating follow-on procurements.
  (e) By varying the ceiling, the starting profit, and the profit sharing formula, contract can be adapted to fit many situations.
D. Disadvantages
  (a) Contractor has less incentive than under a firm fixed price contract.
  (b) More costly and difficult to administer than a firm fixed price contract.

I–2.B. Maximum Price

A. Explanation
  (a) Supplies are furnished at a maximum price which is redetermined downward only after a specified percentage of the work has been completed. The final price is based on acutal costs incurred to point of redetermination plus estimated costs to complete.
B. Use
  (a) When sound cost estimates cannot be made at the beginning of the work, but can be made after a certain minimum percentage of the work has been completed.
    (i) Repetitive work so that cost experience on first portion permits accurate projection of completion costs.
    (ii) Work extended over a sufficient period of time to permit redetermination before completion of contract.
C. Advantages
  (a) Permits fixed price contracting even when sound cost estimates are not possible at the beginning of the work.
  (b) Final price is based on additional cost information.
D. Disadvantages
  (a) Up until the time of redetermination, contractor has little incentive to keep costs low.
  (b) Because of time lag between point of redetermination and redetermination negotiations, contractor not only has later cost information than negotiators but may have completed a very large percentage of the work.
  (c) More costly and difficult to administer than a firm fixed price contract.

I–2.C. Flexible Fixed Price

A. Explanation
  (a) Supplies are furnished at a tentative price which is redetermined upward (subject to a ceiling) or downward after a specified percentage of the work has been completed. The final price is based on actual costs incurred to point of redetermination plus estimated costs to complete.

B. Use
C. Advantages
D. Disadvantages

Identical to those listed for "Maximum Fixed Price Contract" since only difference is that price can be redetermined upward.

I–2.D. Fixed Price with Escalation

A. Explanation
  (a) Supplies are furnished at a fixed price which is subject to revision on the occurrence of specified contingencies. Applies to

increases in material prices and labor rates and not to the quantity of material or labor required.

B. Use
(a) When increases or decreases in specific costs such as material prices or labor rates are beyond the control of the contractor.

C. Advantages
(a) Government avoids paying for contingencies that do not occur.
(b) Permits fixed price contracting even if certain cost elements are not subject to accurate prediction.

D. Disadvantages
(a) Government assumes part of contractor's risk.
(b) Additional administrative problems.

II–1. Cost-Plus-Fixed-Fee

A. Explanation
(a) Supplies or services are furnished at actual cost plus a fixed fee which is based on a negotiated percentage of the original estimated cost.

B. Use
(a) When it is impossible to estimate costs with any degree of accuracy.
(i) Research and development work.
(ii) Specifications not firm.

C. Advantages
(a) Government avoids paying for contingencies that do not occur.
(b) Profit not based on costs so contractors have no incentive to pad costs.

D. Disadvantages
(a) Contractors have little incentive to reduce costs.
(b) Most costly type of contract to administer.

II–2. Cost-No-Fee

A. Explanation
(a) Supplies or services furnished at actual cost with no fee or profit allowed.

B. Use
(a) When it is impossible to estimate costs with any degree of accuracy. Primarily used with educational and nonprofit organizations.

C. Advantages } Identical to Cost-Plus-Fixed-Fee Contracts.
D. Disadvantages }

III–Letter Contract

A. Explanation

(a) A written preliminary contractual instrument which authorizes immediate commencement of manufacture of supplies, or performance of services, including, but not limited to, preproduction planning and procurement of necessary materials.

B. Use
(a) When interests of national defense demand contractor be given binding commitment so that work can be commenced immediately.
(b) Negotiation of a definitive contract in sufficient time to meet procurement need is not possible.

C. Advantages
(a) Quick contractural coverage.

D. Disadvantages
(a) Competition required, when practicable.
(b) Time lag before conversion to definitive contract.
(c) Government assumes part of contractor's risk.

IV–Notice of Award

A. Explanation
(a) A TWX or letter form that specifies firm pricing terms, deliveries and specifications, but incorporates other clauses by reference. Must be superseded by a definitive contract.

B. Use
(a) When prompt contractual coverage is required and all terms have been agreed upon.

C. Advantages
(a) Prompt contractual coverage.

D. Disadvantages
(a) Additional administrative work.
(b) Not as satisfactory legally as a firm contract.

Military Sales: Where to Go, Whom to See

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Commander, Air Materiel Command, Wright-Patterson Air Force Base, Ohio, Attn: Directorate of Procurement and Production, Procurement Division.
Complete aircraft; gliders; man-carrying power driven aerial targets; complete aircraft engines (combustion and jet); propellers and propeller accessories; towing equipment; gas turbines; aircraft wheels and brakes; aircraft tires and tubes; aircraft navigation, flight, and engine instruments; guided missiles; photographic equipment* (except motion and still picture sensitized materials and photographic chemicals and chemical preparations); airborne radio and radar equipment, aircraft fire and rescue units*; miscellaneous training devices; technical publications, posters, charts, and miscellaneous publications; Government-furnished property; items requiring extensive engineering, and initial spare parts for the foregoing. Research and development for end items.

Commander, Air Research and Development Command, P. O. Box 1395, Baltimore, Md., Attn: Directorate of Procurement.
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Commander, Gadsden Air Force Depot, Gadsden, Ala., Attn: Directorate of Procurement and Production.
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Gentile Air Force Depot, Wilmington Pike, Dayton, Ohio. Attn: Directorate of Procurement and Production.
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Commander, Mallory Air Force Depot, Memphis, Tenn., Attn: Directorate of Procurement and Production.
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Commander, Middletown Air Materiel Area, Olmstead Air Force Base, Middletown, Pa., Attn: Directorate of Procurement and Production.
Aircraft engine fuels and lubricants (except petroleum products); preventive compounds, survival equipment and parachutes; rigid airborne small craft (power and non-propelled—as related to marine life-saving); aircraft, training aids, and miscellaneous instruments and maintenance parts; electrical meters.

Commander, Mobile Air Materiel Area, Brookley Air Force Base, Mobile, Ala., Attn: Directorate of Procurement and Production.
Miscellaneous aircraft engine accessories and maintenance parts (except non-electrical starters); aircraft breathing oxygen equipment; rigid airborne life boats, power-propelled and related equipment (except as assigned to Army and Navy).

Commander, Ogden Air Materiel Area, Hill Air Force Base, Ogden, Utah, Attn: Directorate of Procurement and Production.
Aircraft hydraulic struts and actuating cylinders.

Commander, Rome Air Force Depot, Griffis Air Force Base, Rome, N. Y., Attn: Directorate of Procurement and Production.
Commercial electrical equipment and supplies; flying field night-lighting equipment; electric wire and cable; photographic chemicals and chemical preparations*; motion and still picture sensitized materials*; ground radio, radar and navigational equipment; meteorological equipment and supplies; structural and installation parts for ground communication and electric equipment; telegraph, teletypewriter, and ground radio communications; telephone and wired audio equipment (except military field type wire equipment). Research and development for ground electronics equipment.

Commander, Sacramento Air Materiel Area, McClellan Air Force Base, Sacramento, Calif., Attn: Directorate of Procurement and Production.
Printing, reproduction, binding, and auxiliary equipment.

Commander, San Antonio Air Materiel Area, Kelly Air Force Base, San Antonio, Tex., Attn: Directorate of Procurement and Production.
Aircraft carburetor and ignition systems; explosive and warfare gases especially used by the Air Force.

Topeka Air Force Depot, Topeka, Kans., Attn: Directorate of Procurement and Production.
Commercial and aircraft hardware; fuel and oil handling equipment; composition materials (fiber, plastics, glass, etc.); ferrous and non-ferrous metals; chemicals; special tools and equipment.

Warner Robins Air Materiel Area, Robins Air Force Base, Macon, Ga., Attn: Directorate of Procurement and Production.
Shop machinery and accessories; shop equipment and maintenance parts; abrasives and abrasive materials.

Commander, Wilkins Air Force Depot, Shelby, Ohio, Attn: Directorate of Procurement and Production.
Rubber materials; electrically heated clothing, footwear, and blankets; flying field and hangar equipment; miscellaneous publications, periodicals, commercial technical books and catalogs, blank forms, decalcomanias.

Apply to the nearest Air Force Procurement District to have your firm placed on Bidders' lists. To obtain a copy of a specified bid of specifications, however, apply directly to the purchasing office. Copies of current Invitations for Bids and Requests for Proposals, with specifications, are available for reference at Air Procurement District offices. These offices are located at the following addresses: 760 West Peachtree Street, NW., Atlanta, Ga.; 14 Court Square, Boston, Mass.; 165 North Canal Street, Chicago, Ill.; Big Four Bldg., Cincinnati, Ohio (suboffice); 1279 West Third Street, Cleveland, Ohio; 1407 Ross Avenue, Dallas, Tex.; Building 70, Area C, Wright-Patterson Air Force Base, Ohio; West Warren Avenue and Lonyo Boulevard, Detroit, Mich.; 500 Capitol Avenue, Hartford, Conn. (suboffice); 54 Monument Circle, Indianapolis, Ind.; 2601 Walnut Street, Kansas City, Mo. (suboffice); 155 West Washington Boulevard, Los Angeles, Calif.; 770 North Plankinton Avenue, Milwaukee, Wis.; 910 Second Street, Minneapolis, Minn. (suboffice); 218 Market Street, Newark, N. J.; 780 Broadway, New York, N. Y.; 1411 Walnut Street, Philadelphia, Pa.; 133 West Monroe Street, Phoenix, Ariz.; 20 Symington Place, Rochester, N. Y.; 1114 Market Street, St. Louis, Mo.; 22 Southwest Temple Street, Salt Lake City, Utah (suboffice); 4325 Pacific Highway, San Diego, Calif.; 7755 East Marginal Way, c/o Boeing Aircraft Corporation, Seattle, Wash. (suboffice); 521 North Eclipse Street, South Bend, Ind. (suboffice); 449 West Oliver, Wichita, Kans.; 1515 Clay Street, Oakland, Calif.

* Purchased for all military departments in accordance with single service procurement assignments.

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F-104/T-33 Section: Lt. Col. E. E. Gossett; Dep. Chief: Mr. E. W. Schuessler, Rm. 100A, Bldg. 14, Ext. 20119.

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Communications to an Air Materiel Area or Air Force Depot should be addressed to the Commander. Communications to an Air Procurement District should be addressed to the Chief.

For general procurement information, contact the Contractor Relations and Industrial Liaison Branch, Management Services Office, Directorate of Procurement and Production, Headquarters, Air Materiel Command, Wright-Patterson Air Force Base, Ohio, (MCPAC), Telephone: Kenmore 7111, Extension 32338.

Middletown Air Materiel Area

Middletown Air Material Area, Olmstead AFB, Middletown, Penn.
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Telephone: Tucson 4-2711, Ext. 6151

Warner Robins Air Materiel Area

Warner Robins AMA, Robins Air Force Base, Georgia
Mr. D. W. McCarthy
Telephone: Walker 2-5341, Ext. 6267

Atlanta Air Procurement District, 441 W. Peachtree Street, N.E., Atlanta, Georgia
Mr. W. C. Roose
Telephone: Walnut 4121

Air Force Depots

Dayton Air Force Depot, Gentile Air Force Station, Dayton, Ohio
Mr. N. A. Hess
Telephone: Madison 6551, Ext. 430

Gadsden Air Force Depot, Gadsden Air Force Station, Gadsden, Alabama
Telephone: 6-9271

Memphis Air Force Depot, Mallory Air Force Station, 3300 Jackson Avenue, Memphis, Tenn.
Mr. J. P. Broderick
Telephone: 48-4411, Ext. 276

Rome Air Force Depot, Griffiss Air Force Base, Rome, New York
Mr. J. J. Dulberg
Telephone: Rome 3200, Ext. 2219

Topeka Air Force Depot, Topeka Air Force Station, Topeka, Kansas
Mr. H. W. MacNamee
Telephone: 5-6211, Ext. 257

Shelby Air Force Depot, Wilkins Air Force Station, Shelby, Ohio
Mr. J. E. Giddings
Telephone: Shelby 4-1610, Ext. 410

HQ Air Materiel Command, WPAFB

Hq. AMC, Post F-6, Bldg. 16, WPAFB, Ohio
Mr. G. S. Rattenbury
Telephone: KE 7111, Ext. 24230

Hq. AMC, Post F-6, Bldg. 16, WPAFB, Ohio
Mr. W. A. Oswalt
Telephone: KE 7111, Ext. 24230

Hq. AMC, Post F-6, Bldg. 16, WPAFB, Ohio
Mr. J. W. White
Telephone: KE 7111, Ext. 33270

USAF LOCAL PURCHASES

The term "Local Purchase" denotes the purchase of materials, supplies, and services by an Air Force installation for use and consumption by that installation or other installations assigned to it for issue of materials and supplies.

These items are generally of a housekeeping nature, such as office supplies and so-called "off-the-shelf" items, and usually are bought in small quantities.

All local purchase functions involving appropriated funds are accomplished by Headquarters, Depot, or Base Purchasing and Contracting Officers. Being responsible for all purchase actions at their respective installations, they receive purchase requests from initiating activities and accomplish procurement action by formal advertising or negotiation, generally from firms in close geographical proximity.

The same laws and regulations which apply to central Air Force procurement also apply to local purchase.

Following is a list of Air Force installations at which local purchasing is accomplished. Communications should be directed to the attention of the Purchasing and Contracting Officer at each installation.

Alabama

Gadsden AF Depot, Gadsden
Mobile AMA, Brookley AFB, Mobile
Maxwell AFB, Montgomery
Craig AFB, Selma
Gunter AFB, Montgomery

Arizona

Williams AFB, Chandler
Marana Field, Marana
Luke AFB, Phoenix
Davis-Monthan AFB, Tucson
Yuma AFB, Yuma

Arkansas

Blytheville AFB, Blytheville
Little Rock AFB, Jacksonville

California

Travis AFB, Fairfield
Hamilton AFB, San Rafael
Beale AFB, Marysville
Cheli AF Depot, Maywood
Castle AFB, Merced
Edwards AFB, Muroc
Parks AFB, Pleasanton
George AFB, Victorville
Long Beach Municipal AP, Long Beach
Oxnard AFB, Oxnard
March AFB, Riverside
Mather AFB, Sacramento
McClellan AFB, McClellan
Norton AFB, San Bernardino

Colorado

Ent AFB, Colorado Springs
Lowry AFB, Denver

Washington, D. C.

Bolling AFB
Washington National Airport

Maryland

Andrews AFB, Camp Springs

Delaware

Dover AFB, Dover
New Castle County AP, Wilmington

Florida

Patrick AFB, Cocoa
Orlando AFB, Orlando
MacDill AFB, Tampa
Tyndall AFB, Panama City
Eglin AFB, Valparaiso
Palm Beach Intrnl AP, West Palm Beach
Homestead AFB, Homestead
Miami International AP, Miami
Pinecastle AFB, Orlando

Georgia

Turner AFB, Albany
Dobbins AFB, Marietta
Hunter AFB, Savannah
Spence AB, Moultrie
Moody AFB, Valdosta
Robins AFB, Macon

Idaho

Mountain Home AFB, Mountain Home

Illinois

Scott AFB, Belleville
Chanute AFB, Rantoul
O'Hare Intrnl AP, Park Ridge

Indiana

Bakalar AFB, Columbus

Iowa

Sioux City AB, Sioux City

Kentucky

Kansas

Topeka AF Depot, Topeka
Smoky Hill AFB, Salina
Forbes' AFB, Topeka
McConnel AFB, Wichita

Louisiana

Baton Rouge AF Station, Baton Rouge
England AFB, Alexandria
Lake Charles AFB, Lake Charles
Barksdale AFB, Shreveport

Maine

Dow AFB, Bangor
Loring AFB, Limestone
Presque Isle AFB, Presque Isle

Maryland

Massachusetts

Westover AFB, Chicopee Falls
Otis AFB, Falmouth
Lawrence G. Hanscom Field, Bedford

Michigan

Selfridge AFB, Mt. Clemens
Kinross AFB, Kinross
Willow Run AF Station, Belleville
Wurtsmith AFB, Oscoda

Minnesota

Minneapolis-St. Paul Intrnl AP, Minneapolis
Duluth Mun. AP, Duluth

Mississippi

Columbus AFB, Columbus
Keesler AFB, Biloxi
Greenville AFB, Greenville

Missouri

Whitman AFB, Sedalia
Grandview AFB, Kansas City

Montana

Nebraska

Lincoln AFB, Lincoln
Offutt AFB, Omaha

Nevada

Stead AFB, Reno
Indian Springs AFB, Indian Springs
Nellis AFB, Los Vegas

New Hampshire

Grenier AFB, Manchester
Portsmouth AFB, Portsmouth

New Jersey

Hqs. Newark Transportation Control Depot, 400 Delaney St., Newark
McGuire AFB, Wrightstown

New Mexico

Kirtland AFB, Albuquerque
Holloman AFB, Alamogordo
Clovis AFB, Clovis
Walker AFB, Roswell

New York

Sampson AFB, Geneva
Mitchel AFB, Hempstead
Stewart AFB, Newburgh
Niagara Falls Mun. AP, Niagara Falls
Griffiss AFB, Rome
Suffolk Co. AFB, Westhampton
Plattsburgh AFB, Plattsburgh

North Carolina

Pope AFB, Ft. Bragg

Ohio

Lockbourne AFB, Columbus
Clinton Co. AFB, Wilmington
Wilkins AF Depot, Shelby
Gentile AF Depot, Dayton
Youngstown Mun. AP, Youngstown
Wright-Patterson AFB, Dayton

Oklahoma

Vance AFB, Enid
Ardmore AFB, Ardmore
Altus AFB, Altus
Tinker AFB, Oklahoma City

Oregon

Klamath Falls Municipal Airport, Klamath Falls

Pennsylvania

Greater Pittsburgh AP, Coraopolis
Olmsted AFB, Middletown

South Carolina

Donaldson AFB, Greenville
Charleston AFB, Charleston
Shaw AFB, Sumter

South Dakota

Ellsworth AFB, Rapid City

Tennessee

Mallory AF Depot, Memphis
McGhee-Tyson Mun. AP, Knoxville
Memphis Mun. AP, Memphis
Sewart AFB, Smyrna
Arnold Engineering Development Center, Tullahoma

Texas

Abilene AFB, Abilene
Amarillo AFB, Amarillo
Bergstrom AFB, Austin
Gray AFB, Killeen
Biggs AFB, El Paso
Ellington AFB, Houston
Reese AFB, Lubbock
Wolters AFB, Mineral Wells
Goodfellow AFB, San Angelo
Brooks AFB, San Antonio
Lackland AFB, San Antonio
Carswell AFB, Ft. Worth
Randolph AFB, San Antonio
Kelly AFB, San Antonio

Gary AFB, San Marcos
Perrin AFB, Sherman
James Connally AFB, Waco
Harlingen AFB, Harlingen
Hondo AFB, Hondo
Sheppard AFB, Wichita Falls
Hensley Field, Grand Prairie
Foster AFB, Victoria
Laughlin AFB, Del Rio
Laredo AFB, Laredo
Webb AFB, Big Spring

Utah

Hill AFB, Ogden
Wendover AFB, Wendover

Vermont

Ethan Allen AFB, Winooski

Virginia

Byrd Field, Richmond
Langley AFB, Hampton

Washington

Elmendorf AFB, Seattle
Fairchild AFB, Spokane
Geiger Field Spokane
Larson AFB, Moses Lake
McChord AFB, Tacoma
Paine AFB, Everett

Wisconsin

Truax Field, Madison

Wyoming

Francis E. Warren AFB, Cheyenne

USAF PLANT REPRESENTATIVES

Middletown AMA

Bell Aircraft Corp., Niagara Falls, N. Y.
AFPR: Lt. Col. Frank W. Jarek
Deputy: Capt. Eric J. Chedester
Telephone: Niagara 7851 X 428

Buick Div., GMC, 1051 E. Hamilton, Flint 2, Michigan
Deputy: Capt. Charles E. Pruski
Telephone: Cedar 2-8111 X 2280-2460

Curtiss-Wright Corp., Wright Aeronautical Div., Wood-Ridge, N. J.
AFPR: Col. F. W. Toomey
Deputy: Lt. Col. Frank W. Hobson
Telephone: Prescott 9-5497 or Prescott 7-2900 X 844

Fairchild Eng & Airplane Corp., c/o Fairchild Aircraft Div., Hagerstown, Maryland
AFPR: Maj. Lloyd M. N. Wenzel
Telephone: Hagerstown 3600 X 2231-2232

General Electric Co., Room 327—Bldg 22, 1 River Rd., Schenectady 5, N. Y.
AFPR: Lt. Col. John G. Roylance
Telephone: 2-0495 X 885 or 4-2211-GE X 885

General Electric Co., Electronics Park, Syracuse, N. Y.
AFPR: Maj. Gordon E. Burrell
Deputy: Capt. W. C. Malone, Jr.
Telephone: 3-4320 X 497

Sperry Gyroscope Co., Great Neck, L. I., N. Y.
AFPR: Lt. Col. Everett E. Zweifel
Telephone: Fieldstone 7-3600 X 2200

United Aircraft Corp., Sikorsky Aircraft Div., Bridgeport, Conn.
AFPR: Maj. Charles C. Townsend

General Electric Co., 1000 Western Ave., West Lynn, Mass.
AFPR: Maj. Ralph Foster
Telephone: Lynn 3-6000 X 3068

Mobile AMA

Hayes Aircraft Corp., P. O. Box 2287, Birmingham, Alabama
AFPR: Col. Carver T. Bussey
Deputy: Maj. Billy T. Anderson
Telephone: Lyric 2-9611

Republic Aviation Corp., Farmingdale, L. I., N. Y.
AFPR: Lt. Col. Carrell T. Murrell
Telephone: Chapel 9-1100

Oklahoma City AMA

Allison Div., GMC, Indianapolis, Indiana
AFPR: Col. Stanley A. Dallas
Telephone: Belmont 1541 X 321

Boeing Airplane Co., Seattle 14, Wash.
AFPR: Col. Wm. T. Ensley
Deputy: Lt. Col. Arthur L. Biberstein
Telephone: Mohawk 3333

Boeing Airplane Co., Wichita, Kansas
AFPR: Col. Robert E. Lee
Deputy: Lt. Col. James E. Christenson
Telephone: Murray 6-0941

Douglas Aircraft Co., Inc., P. O. Box 1017, Tulsa, Oklahoma
AFPR: Lt. Col. James C. Arnold
Deputy: Maj. Albert M. Lehner
Telephone: 8-3351 X 682

General Electric Co., P. O. Box 91, Lockland, Ohio
AFPR: Col. Preston Brown
Deputy: Maj. Roger E. Strasburg
Telephone: Poplar 1-4100 X 1392

Lockheed Aircraft Corp., Marietta, Georgia
AFPR: Col. Edward J. McRay, Jr.
Telephone: 99411 X 3271

Ogden AMA

Northrop Aircraft, Inc., Hawthorne, Calif.
AFPR: Lt. Col. Charles W. Tennant
Telephone: Oregon 89111 X 1901

Sacramento AMA

Lockheed Aircraft Corp., Factory "A"—P. O. Box 551, Burbank, Calif.
AFPR: Lt. Col. Charles E. Moore
Deputy: Capt. J. R. Newton, Jr.
Telephone: Stanley 7-2711 X 81213

North American Aviation, Inc., Los Angeles International Airport, Los Angeles 45, Calif.
AFPR: Col. Daniel A. Cooper
Deputy: Lt. Col. Frederick G. Phillips
Telephone: Oregon 8-3011 X 1747

Aerojet-General Corp., Liquid Rocket Plant, P. O. Box 2048, Sacramento 14, Calif.
AFPR: Lt. Col. O. L. Counselman
Deputy: Maj. L. L. Stone
Telephone: Hudson 1-4931

San Antonio AMA

Beech Aircraft Corp., 9709 E. Central Ave., Wichita 1, Kansas
AFPR: Lt. Col. Wm. W. Foster, Jr.
Telephone: LD 140

Convair Div., General Dynamics Corp., P. O. Box 371, Fort Worth, Texas
AFPR: Lt. Col. Leonard J. Hutton
Deputy: Maj. L. P. Murray, Jr.
Telephone: SU 7311 X 5251

Convair Div., General Dynamics Corp., P. O. Box 1950, 3165 Pacific Highway, San Diego 12, Calif.
AFPR: Col. James F. McCarthy, Jr.
Deputy: Maj. D. J. Yockey
Telephone: Cypress 6-6611 X 327

Ford Motor Co., Aircraft Engine Div., 7401 S. Cicero Ave., Chicago 29, Ill.
AFPR: Lt. Col. Harvey E. Moose, Jr.
Deputy: Maj. Lyle W. Stoner
Telephone: Reliance 5-4200 X 2794

Phillips Petroleum Co., Rocket Fuel Div.—AF Plant No. 66, McGregor, Texas
AFPR: Lt. Col. G. W. McClughan
Telephone: 3330

San Bernadino AMA

Douglas Aircraft Co., Inc., 3855 Lakewood Blvd.—P. O. Box 200, Long Beach 1, Calif.
AFPR: Col. Frank E. Wright
Telephone: Garfield 9-2441

Hughes Aircraft Company, Florence & Teale Sts., Culver City, Calif.
AFPR: Lt. Col. B. W. Cowdery
Deputy: Capt. Gerald E. Mann
Telephone: Texas 0-711 X 2915-2749

Warner Robins AMA

Glenn L. Martin Co., Baltimore, Maryland
AFPR: Maj. Allen Warfield, Jr.
Deputy: Capt. J. B. Fagan
Telephone: Murdock 7-3800 X 533-402

Curtiss-Wright Corp., Propeller Div., Caldwell, N. J.
AFPR: Maj. Melvin Berkowitz
Telephone: Caldwell 6-2540 X 219-576

USAF AIR RESEARCH AND DEVELOPMENT COMMAND FIELDS OF INTEREST

AERODYNAMICS
Stability and control, performance, control surfaces, internal flow, boundary layer, airfoils, parasitic components, aerodynamic loads, thermodynamics.

AIRCRAFT INSTRUMENTS
Engine instruments, flight instruments, navigation instruments, indicators, timers, flight test instruments, testing and calibration, automatic flight control.

AIRCRAFT STRUCTURES
Loads, theory, design, testing, weight and balance, stress analysis, structural tests, aeroelasticity.

AIRPLANE DESIGN
Preliminary design, wing group, tail group, body group, landing gear, cockpit, research aircraft.

AIRPORTS AND AIRWAYS
Planning, design and construction, facilities, lighting.

ATOMIC ENERGY
Atomic structure, fission and fission products, radioactivity, isotope separation, reactors, instruments, health and safety, aeronautical applications.

AVIATION MEDICINE
All scientific disciplines pertaining to selection, training, efficiency, and safety of humans in flight.

CHEMISTRY
Inorganic, organic, analytical, physical, bio-chemistry.

COMFORTIZATION
Air conditioning, oxygen systems, noise and vibration, furnishings, interior layout, lighting, protection.

ELECTRICAL EQUIPMENT
Generating equipment, converters, motors and actuators control and protective equipment, distribution equipment, lighting, heating, batteries, storage, electrical theory, testing.

ELECTRONICS
Communications, radar, navigational aids, static and interference, landing aids, electronic controls, television and electronic tubes, antennas, components, testing, telemetering, counter-measures.

FLIGHT OPERATING PROBLEMS
Icing, handling and storage, in-flight refueling, high speed flight, high altitude flight, piloting technique, cruise control, weather hazards, climatization, aircraft maintenance, sanitation.

FLIGHT TESTING
Methods, instrumentation, data evaluation, performance, handling characteristics, propulsion.

FUELS AND LUBRICANTS
Solid, liquid, and gaseous fuels, solid and liquid lubricants, solid and fluid propellants, analysis and testing, storage and distribution, hydraulic fluids.

FLUID MECHANICS
Theoretical and experimental, viscous, ideal, compressible, incompressible.

GEOPHYSICS
Weather forecasting, climatology, radar-meterological relationships, microseismic-meteorological relationships, atmospheric constituents and processes, radiation physics of clouds, atmospheric electricity, ionospheric physics, upper air research, terrestrial magnetism.

GLIDERS
Aerodynamics, airframe, launching and handling, design.

GUIDED MISSILES
Guidance and control, handling and launching, propulsion, aerodynamics peculiar to missiles, warheads, auxiliary equipment, structures, performance, design, testing.

HUMAN ENGINEERING AND PROTECTIVE EQUIPMENT
Design of weapons and control systems for operator efficiency, human factors in ground and flying accidents, personal protective equipment for ground and air crews.

HUMAN RESOURCES
Psychological and social sciences, vocational aptitude, proficiency, learning and transfer of training, training aids and methods, reaction time, work fatigue and efficiency, morale, management, intelligence collection methods and techniques, psychological warfare techniques.

MACHINE ELEMENTS
Fastenings, bearings, gears and cams, drives, mechanisms, springs.

MATERIALS—NON-METALLIC
Ceramics, plastics, rubber, wood, leather and textiles, adhesive and sealants, paints.

MATHEMATICS
Algebra, theory of numbers, theory of equations, theory of functions, calculus, finite differences, infinite series, geometry, trigonometry, statistics, probability.

METALLURGY
Structural metallurgy, refining and reduction, preliminary working, iron, aluminum, magnesium, nickel, copper, lead, precious metals, alloys.

NAVIGATION
Theory, dead reckoning and pilotage, celestial and electronic navigation, special methods, maps and charts, instruments.

ORDANCE AND ARMAMENT
Ammunition, guns, handling equipment, fire control, armor, explosives, bombs and warheads, bombing systems, fuzes, rockets and launchers, ballistics, gun mounts, ammunition feed systems.

PHOTOGRAPHY
Aerial, infra red, ultra-violet, Schlieren, stroboscopic, still cameras, motion picture, sensitized materials, processing, photogrammetry.

POWERPLANTS—JET AND TURBINE
Cooling, induction systems, compressors, combustion, ignition, exhaust system, vibration, fuel system, lubrication, accessories, control, combustion chambers, turbines, components, installation, testing, design, compounding, comparative studies.

POWERPLANTS—RECIPROCATING
Cooling, induction and supercharging, combustion, ignition, exhaust system, vibration, fuel, lubrication, control, components, installation, performance.

POWERPLANTS—ROCKETS
Cooling, control, ignition, exhaust, nozzles, combustion, propellant system, accessories, combustion chambers, installation, design, testing.

PROPELLERS
Aerodynamics, control, components, ice control, performance, testing, design.

PSYCHOLOGY
Experimental, clinical, includes studies in the chemical senses, vision, hearing, skin senses, reflexes and posture, cerebral motor functions, emotion, bodily needs, memory and retention, feeling and emotions, precipitation and predisposition, readjustment.

ROTATING WING AIRCRAFT
Aerodynamics, stability and control, control systems, rotor design, airframe, drive system, testing, design.

SUPPORTING EQUIPMENT
Special purpose vehicles, shelters, ground handling equipment, portable power units.

USAF AIR RESEARCH AND DEVELOPMENT COMMAND

Hq Air Research and Development Command (Hq ARDC), P. O. Box 1395, Baltimore 3, Maryland
Commander—Lt. General T. S. Power
Vice Commander—Maj. General J. W. Sessums, Jr.
Asst for Acft Nuclear Propulsion—Brig. General D. J. Keirn
Deputy Commander for Research & Development—Brig. Gen. M. C Demler
Deputy Commander for Weapon Systems—Maj. General A. Boyd
Deputy Commander for Resources—Brig. General K. M. Landon
Director of Procurement—Colonel L. W. Fulton
Deputy Director of Procurement—Mr. R. E. Miedel
Sources & Contractor Relations—Leroy E. Olson

Air Force Office of Scientific Research (AFOSR), Washington, 25, D. C.
Commander—Brig. General H. F. Gregory
Chief, Procurement Division—Lt. Colonel A. L. Thayer
Asst. Chief, Procurement Division—Mr. John Walsh
Contractor Relations & Sources—Mr. S. Milnovsky

Arnold Enginering Development Center (AEDC), Tullahoma, Tennessee
Commander—Brig. Gen. Troop Miller Jr.
Director of Procurement—Mr. Jim Fuqua
Contracting Officer—Capt. C. L. Houston
Aerodynamics, power plants, high speed gas dynamics, supersonic and hypersonic aircraft.

Air Force Armament Center (AFAC), Eglin Air Force Base, Florida
Commander—Maj. General E. P. Mechling
Director of Procurement—Colonel H. W. Lanford
Guns and other aircraft weapons, ammunition, rockets, bombs, fire control components and systems.

Air Force Cambridge Research Center (AFCRC), L. G. Hanscom Field, Bedford, Massachusetts
Commander—Maj. General William M. Morgan
Director of Procurement—Mr. W. J. Irwin
Deputy Director of Procurement—Mr. J. Rooney
Geophysics, electronics, related physical sciences, human engineering.

Air Force Flight Test Center (AFFTC), Edwards Air Force Base, California
Commander—Brig. General S. J. Holtoner
Director of Procurement—Major J. R. Pugh
Experimental aircraft, aircraft components, power plants and components, aero medical equipment, flight test instrumentation, related equipment.

Air Force Missile Test Center (AFMTC), Patrick Air Force Base, Florida
Commander—Maj. General D. N. Yates
Director of Procurement—Lt. Col. Mark Hall
Deputy Director of Procurement—Mr. T. Larkin
Test range instrumentation.

Air Force Personnel and Training Research Center (AFPTRC), Lackland Air Force Base, Texas
Commander—Colonel H. N. Cowles
* San Antonio R&D Procurement Sub-Office
Air Research and Development Command
P. O. Box 63
Lackland Air Force Base
San Antonio, Texas
Chief—Mr. H. H. Huber
Manpower analysis, manpower requirements, personnel selection—Classification, training and education, evaluation of personnel proficiency, assessment and control of morale factors.
* Furnishes R&D Procurement support for AFPTRC.

USAF

Air Force Special Weapons Center (AFSWC), Kirtland Air Force Base, New Mexico

Commander—Brig General W. M. Canterbury
Director of Procurement—Major S. W. McDonnel

Air Force components of equipment related to atomic weapons.

Holloman Air Development Center (HADC), Holloman Air Force Base, New Mexico

Commander—Brig. General L. I. Davis
Director of Procurement—Major C. La Barr
Deputy Director of Procurement—Mr. T. J. Irvine

Guided missiles, target drones, space biology, test range instrumentation.

Rome Air Development Center (RADC), Griffiss Air Force Base, Rome, New York

Commander—Maj. General S. P. Wright
Director of Procurement—Col. H. Burhman
Acting Deputy Director of Procurement—Mr. R. Becker

Ground electronics systems: radar, automatic flight, missile guidance, data transmission, radio and wire communications, air navigation and terminal aids, counter measures.

Wright Air Development Center (WADC), Wright-Patterson Air Force Base, Ohio

Commander—Brig. General T. L. Bryan, Jr.
Director of Procurement—John B. Prodger
Deputy Director of Procurement—Mr. E. J. Gujer

Aircraft and missile components: guidance & control systems, propellers, power plants, ground equipment, airborne equipment, aero medical equipment, airborne electronics equipment, other aero material.

DEPARTMENT OF DEFENSE AVIATION PLANTS PROCUREMENT ASSIGNMENTS

Aircraft Plants Assigned Air Force

Aeronca Manufacturing Corp., Middletown, Ohio
Beech Aircraft Corp., Wichita, Kansas
Bell Aircraft Corp., Niagara Falls, N. Y.
Bell Aircraft Corp., Kenmore, New York
Boeing Airplane Co., Renton, Washington
Boeing Airplane Co., Seattle, Washington
Boeing Airplane Co., Wichita, Kansas
Chase Aircraft Co., Inc., West Trenton, N. J.
Consolidated Vultee Aircraft Corp., Plant No. 4, Fort Worth, Texas
Consolidated Vultee Aircraft Corp., Plant No. 2, San Diego, Calif.
Cessna Aircraft Co., Hutchinson, Kansas
Cessna Aircraft Co., Wichita, Kansas
Douglas Aircraft Co., Inc., Long Beach, Calif.
Douglas Aircraft Co., Inc., NIR Plant No. 3, Tulsa, Oklahoma
Douglas Aircraft Co., Inc., Long Beach, Calif.
Fairchild Engine and Airplane Corp., Fairchild Aircraft Division, Hagerstown, Maryland
Fairchild Engine and Airplane Corp., Personal Plane Division, Winfield, Kansas
General Motors Corp., Buick, Oldsmobile, Pontiac Assembly Div., Air Force Plant No. 2, Kansas City, Kansas
Hayes Manufacturing Corporation, Aircraft Division, Birmingham, Alabama
Hughes Tool Co., Hughes Aircraft Div., Culver City, Calif.
Kaiser Motors Corp., Willow Run, Mich.
Kaiser Metal Products, Inc., Bristol, Penna.
Kellett Hughes, North Wales, Penna.
Lockheed Aircraft Corp., Plant B, Burbank, Calif.
Lockheed Aircraft Corp., Marietta, Georgia
Lockheed Aircraft Corp., Van Nuys, Calif.
North American Aviation, Inc., Inglewood, Calif.
North American Aviation, Inc., Downey, California
Northrop Aircraft, Inc., Hawthorne, Calif.
Palmdale Production and Testing Center, Palmdale, Calif.
Radioplane Company, Van Nuys, Calif.
Republic Aviation Corp., Farmingdale, N. Y.
United Aircraft Corp., Sikorsky Aircraft Division, Bridgeport, Conn.

Air Force Plant No. 1, Omaha, Nebraska
Air Force Plant No. 8, Chicago, Illinois

Engine Plants Assigned Air Force

Aerojet General Corp., Liquid Rocket Plant, Nimbus Station, Sacramento, Calif.
Aircooled Motors, Inc., Syracuse, New York
AVCO Manufacturing Corp., Bridgeport Lycoming Division, Stratford, Conn.
AVCO Manufacturing Corp., Lycoming Spencer Division, Williamsport, Penna.
Continental Motors Corp., Continental Aviation and Engineering, Corp., 1470 Algonquin Avenue, Detroit, Michigan
Curtiss-Wright Corporation, Wright Aeronautical Division, Woodridge, N. J.
Jet Engine Plant, 16 Mile Road and Van Dyke Ave., Michigan
Fairchild Engine and Airplane Corp., Fairchild Engine Division, Farmingdale, N. Y.
Ford Motor Company, Ford Aircraft Engine Plant, Chicago, Illinois
General Electric Company, Aircraft Gas Turbine Division, Plancor 36, Evendale, Ohio
General Electric Company, Aircraft Gas Turbine Division, Plancor 548, West Lynn, Mass.
General Motors Corp., Allison Division, Indianapolis, Ind.
General Motors Corp., Buick Motor Division, Buildings 43 and 44, Flint, Michigan
General Motors Corp., Buick Motor Division, Building 48, Willow Springs, Ill.
General Motors Corp., Chevrolet Motor Division, Aviation Engine Plant, Tonowanda, New York
Jacobs Aircraft Engine Company, Pottstown, Penna.
Kaiser Motors Corp., Aircraft Engine Div., 12801 East Jefferson, Detroit, Michigan
Packard Motor Car Co., Aircraft Engine Division, Assembly Testing Plant, Utica, Michigan
Studebaker Corp., Aviation Division, Chicago, Illinois
Studebaker Corp., Aviation Division, South Bend, Indiana

Propeller Plants Assigned Air Force

Curtis-Wright Corporation, Propeller Division, Caldwell, N. J.
General Motors Corporation, Aero Products Division, Vandalia, Ohio
Hartzell Industries, Inc., Propeller Division Company, Piqua, Ohio
A. O. Smith Corporation, Milwaukee, Wisconsin
Air Force Plant No. 5, Oklahoma City, Okla.
Air Force Plant No. 27, Toledo, Ohio

Aircraft Plants Assigned Navy

Bell Aircraft Corp, Hurst, Texas
Chance Vought Aircraft Inc., Plant B, Dallas, Texas
Consolidated Vultee Aircraft Corp., Plant No. 1, San Diego, Calif.
Douglas Aircraft Co., Inc., El Segundo, Calif., Santa Monica, Calif.
Edo Corporation, College Point, N. Y.
General Motors Corp., Buick, Oldsmobile, Pontiac Assembly Div., Arlington, Texas
Glenn L. Martin Co., Middle River, Md.
Goodyear Tire & Rubber Co., Goodyear Aircraft Corp., Akron, Ohio
Grumman Aircraft Engineering Corp., Bethpage, New York
Hiller Helicopter, Inc., Palo Alto, Calif.
Kaman Aircraft Corp., Bloomfield, Conn., Windsor Locks, Conn.
Lockheed Aircraft Corp. Plant A, Burbank, Calif.
McDonnell Aircraft Corp., St. Louis, Mo.
North American Aviation, Inc., Columbus, Ohio
Piasecki Helicopter Corp., Morton, Pa.
Ryan Aeronautical Corp., San Diego, Calif.
Temco Aircraft Corp., Plant A, Dallas, Texas

Engine Plants Assigned Navy

Aerojet General Corp.
Azusa, Calif.
Sacramento, Calif.
Chrysler Corp., Dodge Div., Jet Engine Plant, Sterling Township, Michigan
Ford Motor Co., Lincoln-Mercury Div.
Romulus, Mich.
Wayne, Mich.
Reaction Motors, Inc., Rockaway, New Jersey
United Aircraft Corp., Pratt & Whitney Aircraft Div., East Hartford, Conn., North Haven, Conn., Southington, Conn.
Westinghouse Electric Corp., Columbus Works, Columbus, Ohio
Westinghouse Electric Corp., Aviation Gas Turbine Div., Essington, Pa., Kansas City, Mo.

Propeller Plants Assigned Navy

Chrysler Corp., Dodge Div., San Leandro, Calif.
Koppers Co., Inc., Metal Products Div., Baltimore, Md.
United Aircraft Corp., Hamilton Standard Propeller Div., Windsor Locks, Conn.

DEPARTMENT OF THE NAVY

Chief, Bureau of Aeronautics, Department of the Navy, Washington 25, D. C.

Airframes, aircraft engines (jet and reciprocating), propellers, electronic equipment, aircraft armament, aeronautical instruments, target drones, ground handling equipment for aircraft, guided missiles.

Chief, Bureau of Ordnance, Department of the Navy, Washington 25, D. C.

Ammunition, fire-control equipment (including radar), naval guns, gun mounts, missile launchers, torpedoes, mines, depth charges, nets and booms, aviation ordnance, guided missiles.

NAVY

Chief, Bureau of Ships, Department of the Navy, Washington 25, D. C.

Ships and other watercraft, including hull and machinery (propulsion and control equipment);* electronic equipment, including radar, radio, and other communications equipment and accessories; refrigeration equipment and laundry equipment for shipboard use.

Chief, Bureau of Yards and Docks, Department of the Navy, Washington 25, D. C.

Floating dry docks* and floating cranes;* major boiler plants and electrical generators; public utilities services and permanent facilities (including acquisition and disposal of real estate). This Bureau is responsible for the Navy's construction projects, as well as station maintenance and repair. Contracts for such projects, however, are let through the District Public Works Offices.

The Quartermaster General, Headquarters, U. S. Marine Corps, Department of the Navy, Washington 25, D. C.

Automotive spare parts, engineering equipment and supplies, electronic equipment and spare parts, refrigeration and air-conditioning equipment, household supplies, galley equipment, and laundry equipment.

Officer in Charge, Navy Purchasing Office, Main Navy Building, 17th & Constitution Ave. NW., Washington 25, D. C.

Common hand tools,* machine tools, materials handling equipment* (including wood pallets), air-conditioning and refrigeration equipment, ferrous metal basic shapes and forms; also general procurement for naval activities in the area.

Officer in Charge, Navy Purchasing Office, 111 East 16th Street, New York, N. Y.

Chemicals, insecticides,* soap, waxes, precision instruments (navigational, optical, electrical-measuring), ecclesiastical items,* silverware (officers' mess gear),* rope, cordage, twine and vegetable fibers, training devices for Navy personnel; clothing, footwear, textiles, and related items; also general procurement for naval activities in the area.

General Stores Supply Officer, General Stores Supply Office, 700 Robbins Avenue, Philadelphia 11, Pa.

Hardware and plumbing fixtures; building materials; heating, ventilation, and refrigeration equipment; electric light equipment; general household equipment, including electrical appliances; insulation materials; packing materials; shipboard furniture; precision instruments, bearings, valves, pumps, air compressors, navigational and mooring aids; gases; fire-fighting and gas-generating equipment; foundry equipment; nonferrous metal basic shapes and forms.

Aviation Supply Officer, Aviation Supply Office, 700 Robbins Avenue, Philadelphia 11, Pa.

Aircraft spare parts, aeronautical instruments, aeronautical electronic equipment, paints and related products,* clocks,* marine hardware.

Electronic Supply Officer, Electronic Supply Office, Great Lakes, Ill.

Electronic maintenance and repair parts in support of existing Navy electronic equipment.

Officer in Charge, Ships Parts Control Center, Naval Supply Depot, Mechanicsburg, Pa.

Spare parts for shipboard equipment—gasoline engines, Diesel engines, hull equipment, machinery components, searchlights, gyrocompasses and dead-reckoning equipment, navigation equipment.

Yards and Docks Supply Officer, Yards and Docks Supply Office, Naval Construction Center, Port Hueneme, Calif.

Construction and excavating equipment and spare parts; automotive spare parts; tires, tubes, and retreading material; automotive repair equipment; pumps; compressors; building materials; prefabricated buildings;* Navy landing pontoons and propulsion units; electrical generating equipment; refrigeration equipment; station and utility repair parts.

Submarine Supply Officer, Submarine Supply Office, Rittenhouse Square Building, 19th and Walnut Streets, Philadelphia 3, Pa.

Spare parts peculiar to submarines, including components and accessories for air conditioning and refrigeration equipment; hoists, winches, windlasses, and capstans; electrical distribution and control equipment; electric motors; parts and accessories for rotating electrical equipment; electrical quantity-measuring instruments; metal valves and pipe fittings.

Commander, Portsmouth Naval Shipyard, Building 153, Portsmouth, N. H.

Shipboard electrical fittings.*

Supply Officer, Naval Gun Factory, Building 176, M Street and Eighth SE., Washington, D. C.

Ordnance equipment and components; raw materials for the manufacture of ordnance equipment; gages, machine tools, tool-design services; instruction publications.

Fuel Supply Officer, Fuel Supply Office, Naval Gun Factory, Washington 25, D. C.

Coal and other solid fuel.*

Ordnance Supply Officer, Naval Ordnance Supply Office, Mechanicsburg, Pa.

Repair parts for ordnance equipment.

The following have procurement responsibilities of a special nature as indicated:

Chief, Bureau of Supplies and Accounts, Department of the Navy, Washington 25, D. C.

Exercises management control over the field purchasing actitvities (including all of those listed above except the technical bureaus and the Marine Corps) and technical control over such items as food, clothing, and textiles; common-use building materials; and products and services used in connection with the packaging, transportation, and storage of supplies (including materials handling equipment). Inquiries relating to policy matters covering these items may be addressed to this Bureau.

Chief, Bureau of Navy Personnel, Department of the Navy, Washington 25, D. C.

Responsible for procurement of training services from educational institutions and of training publications and aids.

Chief, Bureau of Medicine and Surgery, Department of the Navy, Washington 25, D. C.

Exercises technical control over specifications and determines requirements of medical and dental material purchased for the Navy by the Armed Services Medical Procurement Agency.

Chief of Naval Research, Department of the Navy, Washington 25, D. C.

Responsible for basic research, including fundamental studies in such fields as electronics, chemistry, and physics, and serves to coordinate the research programs of the technical bureaus.

Director, Special Devices Center, Office of Naval Research, Sands Point, Port Washington, Long Island, N. Y.

Responsible for the development and procurement of training aids and devices for Navy personnel. Contracts are negotiated by this office or awarded through formal advertising by the Navy Purchasing Office, New York.

Commander, Military Sea Transportation Service, Department of the Navy, Washington 25, D. C.

Obtains services of private shipping companies to operate Government-owned tankers; charters shipping from private operators; procures services of private ship-repair firms to effect repairs and alterations in Government-owned M. S. T. S. vessels. Material requirements are met through utilization of existing Navy stocks and Navy purchasing facilities.

Officer in Charge, Navy Ships Store Office, 29th Street and Third Avenue, Brooklyn 32, N. Y.

Effects procurement of supplies, equipment, and merchandise for use or resale in Ships Stores, Commissary Stores, and Navy Exchanges through national contracts processed by the Navy Purchasing Office, N. Y. Merchandise for these resale activities may also be purchased locally by the individual stores or ordered from contracts entered into by the following:

Navy Purchasing Offices in New York, N. Y., San Francisco, Calif., Los Angeles, Calif., and in the Naval Supply Center, Norfolk, Va.; Naval Shipyards in Boston, Mass., Philadelphia, Pa., Charleston, S. C.; Marine Corps Air Station, Miami, Fla.; and Naval Supply Depot, Seattle, Wash.

Clothing Supply Officer, Clothing Supply Office, U. S. Naval Supply Activities, New York, 29th Street and Third Avenue, Brooklyn 32, N. Y.

Determines requirements for standard articles of the naval uniform and special clothing for climatic protection. This office can furnish information concerning specifications and requirements.

*Purchased for all military departments in accordance with single service procurement assignments.

The activities listed below purchase general-use items, as well as items of a technical nature, to fulfill their own special requirements or those of other naval activities in their geographical area for which they perform the purchase function. Most important of these are the Navy Purchasing Offices.

Officer in Charge, Navy Purchasing Office, 1206 South Santee Street, Los Angeles, Calif.
Officer in Charge, Navy Purchasing Office, 180 New Montgomery Street, San Francisco, Calif.
Officer in Charge, Navy Purchasing Office, Bldg. 143, Naval Supply Center, Norfolk, Va.
Commanding Officer, Naval Supply Depot, Naval Base, Newport, R. I.
Commanding Officer, Naval Supply Depot, Great Lakes, Ill.
Commanding Officer, Naval Supply Depot, Seattle, Wash.
Commander, Boston Naval Shipyard, Bldg. 149, Boston, Mass.
Commander, Philadelphia Naval Shipyard, Bldg. 83, Philadelphia, Pa.
Commander, Charleston Naval Shipyard, Bldg. 7, Charleston, S. C.
Commander, Puget Sound Naval Shipyard, Bremerton, Wash.
Commanding Officer, Naval Air Station, Patuxent River, Md.
Commanding Officer, Naval Air Station, Jacksonville, Fla.
Commanding Officer, Naval Air Station, Pensacola, Fla.
Commanding Officer, Marine Corps Air Station, Miami, Fla.
Commanding Officer, Naval Air Station, Memphis, Tenn.
Commanding Officer, Naval Air Station, Corpus Christi, Tex.
Commanding Officer, Naval Air Station, Dallas, Tex.
Commanding Officer, Naval Ordnance Plant, 1st and Arlington Avenue, Indianapolis 18, Ind.
Commanding Officer, Naval Ordnance Plant, 7500 West Roosevelt Road, Forest Park, Ill.
Commanding Officer, Naval Ordnance Plant, York, Pa.
Commanding Officer, Naval Ordnance Plant, Macon, Ga.
Commanding Officer, Naval Ammunition Depot, Crane, Ind.

Commanding Officer, Naval Ammunition Depot, McAlester, Okla.
Commanding Officer, Naval Station, Algiers, New Orleans 14, La.
Commanding Officer, Naval Station, Orange, Tex.
Superintendent, Naval Academy, Annapolis, Md.
Commanding Officer, Naval Submarine Base, New London, Conn.
Commander, Naval Air Material Center, Naval Base, Philadelphia 12, Pa.
Commander, Naval Proving Grounds, Dahlgren, Va.
Commanding Officer, Navy Mine Countermeasures Station, Panama City, Fla.
Director, Naval Research Laboratory, Anacostia, Washington 25, D. C.
Hydrographer, Navy Hydrographic Office, Suitland, Md.
Commander, Naval Ordnance Laboratory, White Oak, Md.
Commanding Officer, Naval Powder Factory, Indianhead, Md.
Depot Quartermaster, Marine Corps Depot of Supplies, 1100 South Broad Street, Philadelphia 46, Pa.
Also clothing, footwear, textiles and related items.
Depot Quartermaster, Marine Corps Depot of Supplies, 100 Harrison Street, San Francisco 6, Calif.

General information concerning Navy procurement, as well as possible subcontracting opportunities, may be obtained from the Industry Cooperation Officers in the Navy's field inspection offices, particularly those located in the following cities: Atlanta, Boston, Chicago, Cleveland, Dallas, Kansas City, Minneapolis, New York, Los Angeles, Philadelphia, San Francisco, and Seattle. Copies of bid sets on unclassified proposed procurements in excess of $25,000, suitable for performance by small business concerns, are available for your reference at the regional and branch offices of the Small Business Administration. These include Army and Air Force as well as Navy procurements.

USN SMALL BUSINESS PERSONNEL

Washington, D. C.

Office of Naval Materiel, Room 2224, Main Navy Bldg. Cdr. N. W. Curtin
Mr. M. Questal
Telephone: Liberty 5-6700, Ext. 66322
*Bureau of Aeronautics, Room 2105, Munitions Bldg.
Cdr. J. S. Paretsky
Mr. G. W. Wilson
Telephone: Liberty 5-6700, Ext 66558, 66022
*Bureau of Ordnance, Room 3006, 18th & Constitution Ave. N.W.
Mr. Lenehan
Mr. S. Tatigan
Telephone: Liberty 5-6700, Ext. 64972, 64452
Bureau of Naval Personnel, Room 2633, Arlington Annex
Capt. C. G. McKinney
Telephone: Liberty 5-6700, Ext. 42240
*Bureau of Ships, Room 1023, Main Navy Bldg.
Mr. Michael Chemsak
Mr. H. W. Garrard
Telephone: Liberty 5-6700, Ext. 63695
Bureau of Supplies & Accounts, Room 0223, Main Navy Bldg.
Mr. H. G. Fowler
Telephone: Liberty 5-6700, Ext. 64680
Bureau of Yards & Docks, Room 2A65, Yards & Docks Annex
Cdr. A. M. Egeland
Telephone: Liberty 5-6700, Ext. 63726
Armed Services Petroleum Purchasing Agency, Room 1339, Yards & Docks Annex
Mr. R. A. Wightman
Telephone: Liberty 5-6700, Ext. 78545
Military Sea Transportation Service, Room 2206, 2203, T-8, 3800 Newark St.
Capt. R. M. Barnes
Mr. C. D. Taylor
Telephone: Liberty 5-6700 (Code 192), Ext. 120, 304
*Fuel Supply Office, Naval Gun Factory, M at 8th St. S.E., Bldg. 213, 4th Floor
Mr. Richard M. Bishop
Telephone: Lincoln 7-5700 (Code 142), Ext. 2231
*Naval Gun Factory, Bldg. 200, 2nd Floor, Wing 1N.
Mr. Kensinger
Telephone: Lincoln 7-5700, Ext. 562
Naval Research Laboratory, Bldg. 32, 2nd Floor, 4th Near Chesapeake, S.W., D. C.
Mrs. Margaret Moore
Telephone: Johnson 3-6600 (Code 130), Ext. 464
*Navy Purchasing Office, Room 136, Tempo Bldg. D, 4th & Independence Ave. S. W.
Mr. R. G. Busby (Acting)
Telephone: Liberty 5-6700, Ext. 64809
Office of Naval Research, Room 2804, T-3 Bldg.
Mr. L. O. Lincoln
Telephone: Liberty 5-6700, Ext. 66650
Hq. U. S. Marine Corps, Room 4004, Arlington Annex
Capt. E. C. Dresbach
Telephone: Liberty 5-6700, Ext. 41939

California

Marine Corps Supply Center, Barstow
Capt. R. W. Sinclair
*Navy Purchasing Office, 1206 South Santee Street, Los Angeles
Mr. Bert Friedman
Telephone: Richmond 9-4711, Ext. 1414
*Yards & Docks Supply Office, U. S. Naval Construction Center, Port Hueneme
Mrs. Olive E. Sherman
Telephone: Hunter 6-1651, Ext. 3815
*Navy Purchasing Office, 180 New Montgomery Street, San Francisco
Mr. L. S. Tuft
Telephone: Exbrook 2-6820, Ext. 371
Marine Corps Depot of Supplies, 100 Harrison Street, San Francisco
Mr. G. B. Whitehead
Telephone: Garfield 1-2013, Ext. 222
Military Sea Transportation Service, Fort Mason
Mr. E. B. Beckwith
Telephone: Prospect 6-2200, Ext. 6266

Connecticut

Submarine Base, Bldg. 87, New London
Lt. J. L. Jones
Telephone: Gibson 2-4411, Ext. 536

Florida

Naval Air Station, Bldg. 110, Jacksonville
Mr. John E. Colvin
Telephone: Evergreen 9-7711, Ext. 613
Marine Corps Air Station, Miami
Lt. J. G. Paul H. Kelly
Telephone: Murry 8-3511, Ext. 624
Naval Mine Defense Lab., Panama City
Lt. J. G. H. R. Davis
Telephone: Sunset 5-5285, Ext. 342
Naval Air Station, Bldg. 603, Pensacola
Mr. James A. Kenyon
Telephone: Glendale 5-3211, Ext. 7127

Georgia

Naval Ordnance Plant, Macon
Mr. Clyde E. Rogers
Telephone: Macon 3-5401, Ext. 215

Hawaii

Navy Purchasing Office, Bldg. 475, Naval Supply Center, (Mail Address) Navy 128, Fleet Post Office San Francisco, Calif.
Mr. T. H. Sunn
Telephone: Pearl Harbor 4711

Illinois

Naval Ordnance Plant, 7500 W. Roosevelt Road, Forest Park
Mr. Jason C. VanDyke
Telephone: Easterbrook 8-3800, Ext. 283
*Electronic Supply Office, Great Lakes
Mr. A. J. Dowe
Telephone: Delta 6-3500, Ext. 8284
Naval Supply Depot, Great Lakes
Miss S. Beth Newsom
Telephone: Delta 6-3500, Ext. 8305

Indiana

Naval Ammunition Depot, Bldg. 64, Crane
Mr. James W. Hudson
Telephone: Depot 2511, Ext. 5731
Naval Ordnance Plant, 21st & Arlington Avenue, Indianapolis
Mr. S. H. Dragoo
Telephone: Fleetwood 7-8311, Ext. 490

Louisiana

Naval Station, Bldg. 11, New Orleans
Mr. G. H. Shepard
Telephone: Forest 6-2311, Ext. 265
Military Sea Transportation Service, Gulf Subarea, 4400 Dauphine Street
Mrs. C. H. Wiesendanger
Telephone: Crescent 5571, Ext. 240

Maryland

Naval Air Station, Patuxent River
Mr. Francis Albert
Telephone: Great Mills 3111, Ext. 201
Naval Academy, Annapolis
Mr. John Peel
Telephone: Colonial 3-2611, Ext. 739
Naval Powder Factory, Indian Head
Mr. J. A. Kenion
Telephone: Riverside 3-2111, Ext. 193
Naval Hydrographic Office, Suitland
Mr. J. R. Newberry
Telephone: Jordan 8-9061, Ext. 205

Massachusetts

Naval Shipyard, Bldg. 149, Boston
Mr. Charles H. Ryan (Deputy)
Telephone: Charleston 2-1400, Ext. 405

New Hampshire

Naval Shipyard, Bldg. 153, Portsmouth
Mr. Winfield O. Sprague
Telephone: Kettery 3000, Ext. 424

New York

*Navy Purchasing Office, 111 East 16th Street, New York
Mr. M. Callahan
Telephone: Sterling 8-5000, Ext. 614
Military Sea Transportation Service, 58th Street, Brooklyn
Mr. G. P. Cross
Telephone: Gedney 9-5400, Ext. 5161
Office of Naval Research Special Devices Center, Sands Point, L. I.
Mr. H. B. Macartney
Telephone: Port Washington 78300

Oklahoma

Naval Ammunition Depot, McAlester
Mr. P. Pettit
Telephone: GA 3-6330

Pennsylvania

Ships Parts Control Center, Mechanicsburg
Mr. Leo A. Yeager
Telephone: Poplar 6-4751
Ordnance Supply Office, Mechanicsburg
Mr. Walter Hirsch
Telephone: Poplar 6-4751
*Aviation Supply Office, 700 Robbins Avenue, Philadelphia
Mr. Clayton Vogel
Telephone: Pilgrim 2-1000, Ext. 468 or 410
Naval Air Material Center, Bldg. 76, U. S. Naval Base, Philadelphia
Lt. J. G. R. G. Flantt
Telephone: Howard 5-1000, Ext. 3490
Naval Shipyard, Bldg. 83, Naval Base, Philadelphia
Mr. Charles B. Friel
Telephone: Howard 5-1000, Ext. 2418
*General Stores Supply Office, 700 Robbins Avenue, Philadelphia
Lt. R. G. Fabian
Telephone: Pilgrim 2-1000, Ext. 271
Submarine Supply Office, Rittenhouse Square Bldg., 19th & Walnut Streets, Philadelphia
Mr. John T. Howard
Telephone: Locust 7-5778, Ext. 229
Marine Corps Depot of Supplies, 1100 South Broad Street, Philadelphia
Mr. Martin West
Telephone: Kingsley 6-2000, Ext. 444
Naval Ordnance Plant, York
Mr. E. J. Yergo
Telephone: York 7821, Ext. 245

Rhode Island

Naval Supply Depot, Bldg. 11, Coddington Cove, Newport
Mr. H. C. Clarke
Telephone: Newport 2280, Ext. 9392

South Carolina

Naval Shipyard, Bldg. 7, Charleston
Mr. W. H. Heissenbuttel
Telephone: Charleston 4-5321, Ext. 2107

Tennessee

Naval Air Station, Bldg. 11, North Side, Memphis
Mr. A. C. Wilder, Jr.
Telephone: Jackson 6-8851, Ext. 410

Texas

Naval Air Station, Corpus Christi
Mr. Otto R. Gessling
Telephone: Terminal 5-8211, Ext. 2278
Naval Air Station, Dallas
Mrs. Agnes F. Curly
Telephone: Andrews 2-5161, Ext. 240
Naval Station, Orange
Mr W. A. Bruce
Telephone: 8-4311, Ext. 319

Virginia

Navy Proving Ground, Dahlgren
Lt. N. M. Crowder
Telephone: North 3-2501, Ext. 216
*Navy Purchasing Office, Bldg. 143, Naval Supply Center, Norfolk
Miss Esther Roberts
Telephone: Madison 2-8211, Ext. 3051

Washington

Puget Sound Naval Shipyard, Bremerton
Lt. E. P. Watt
Mr. Shezenberger
Telephone: Essex 3-5011, Ext. 271, 355
Naval Supply Depot, Seattle
Lt. Cdr. G. D. Russell
Telephone: Alder 5200, Ext. 421
*Major Purchasing Offices

USN BUREAU OF AERONAUTICS REPRESENTATIVES

Eastern District

Bureau of Aeronautics Gen. Rep., E. D., 252 Seventh Avenue, New York 1, N. Y.
Capt. H. W. Keopka, USN
Telephone: Watkins 4-5000, Ext. 470
Cornell Aeronautical Lab., P. O. Box 235, Buffalo 21, N. Y.
Cdr. O. H. Cote, Jr., USN
Telephone: Plaza 7500 Ext. 315
Glenn L. Martin Co., Baltimore 3, Md.
Capt. R. F. Kane, USN
Telephone: Murdock 7-3800 Ext. 773
Grumman Aircraft Engineering Corp., Bethpage, L. I., N. Y.
Capt. C. J. Eastman, USN
Telephone: Wells 11500—Olympia 8-5300 X-445
Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
LCdr. J. E. Stewart, USN
Telephone: National 3-1621 Ext. 301
The Kaman Aircraft Corp., Bloomfield, Conn.
LCdr. H. L. Donald, Jr., USN
Telephone: Hartford Chapel—24481 Ext. 275
Kollsman Instrument Corp., 80-08 45th Ave., Elmhurst 73, L. I., N. Y.
LCdr. J. Steinberger, USNR
Telephone: Newton 9-2900 Ext. 560
Pratt & Whitney Aircraft Div. United Aircraft Corp., East Hartford 8, Conn.
Capt. F. A. Roby, Jr., USN
Telephone: Hartford-Jackson 8-4811 Ext. 7891
Reaction Motors, Inc., Ford Road, Denville, N. J.
Cdr. J. Y. Lichtenwalner, USN
Telephone: Rockaway 9-2323 Worth 4-8244 X205
Sperry Farragut Company, Division of Sperry Rand Corp., Bristol, Tenn.
Capt. E. L. Simpson, Jr., USN
Telephone: South 5100 Ext. 241
Vertol Aircraft Corp., Morton, Pa.
Cdr. W. D. Caboury, USN
Telephone: Swarthmore 6-4000 Ext. 687
Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.
Capt. R. L. Savage, USN
Telephone: Atlas 8-2000 Ext. 2153
Curtiss-Wright Corp., Wright Aeronautical Div., Wood-Ridge, N. J.
Mr. G. W. Ball
Telephone: Prescott 7-2900 Ext. 337-504
Wright-Patterson Air Force Base, O.
RADM. W. T. Hines, USN
Telephone: Kenmore 7111 Ext. 32314

Central District

Akron Municipal Airport—Plant D, Akron 6, O.
Cdr. E. W. Steffen, Jr., USN
Telephone: Stadium 4-7127
Bell Aircraft, P. O. Box 482, Fort Worth, Tex.
Cdr. W. D. Windley, USN
Telephone: Atlas 4-1491
McDonnell Aircraft Corp., P. O. Box 516, St. Louis 3, Mo.
Capt. J. P. Sager, USN
Telephone: Pershing 1-2121 Ext. 344
Naval Industrial Reserve Aircraft Plant, P. O. Box 5907, Dallas, Tex.
Capt. C. A. Briggs, USN
Telephone: Andrews 2-3211 Ext. 308
Naval Industrial Reserve Aircraft Plant, P. O. Box 2459, Detroit 31, Mich.
Capt. J. O. Taylor, USN
Telephone: Jefferson 9-2000 Ext. 215
No. Amer. Aviation, Inc., Columbus Div., 4300 E. Fifth Ave., Columbus 16, O.
Cdr. D. S. Crockett (Acting), USN
Telephone: Douglas 1851 Ext. 283
Thompson Products, Inc., Cleveland, O.
Cdr. J. E. Hoch, USN
Telephone: Kenmore 1-8760
Westinghouse Elec. Corp., P. O. Box 288, Kansas City, Mo.
Cdr. T. A. Thompson, USN
Telephone: Delmar 3-7400 Ext. 292

ARMY

Western District

Bureau of Aeronautics Gen. Rep., W. D., 1206 Santee St. (Seventh Floor), Los Angeles 15, Calif.
RAdm. J. B. Pearson, Jr., USN
Telephone: Richmond 9-4711 Ext. 235-236

Aerojet-General Corp., 6352 No. Irwindale Ave., Azusa, Calif.
Cdr. J. F. Daniels, Jr., USN
Telephone: Cumberland 3-6111, Ext. 5280

Convair, A Div. of General Dynamics Corp., San Diego 12, Calif.
Capt. F. K. Slason, USN
Telephone: Cypress 6-6611 Ext. 2022

El Segundo Div., Douglas Aircraft Co., Inc., El Segundo, Calif.
Capt. W. C. Fortune, USN
Telephone: Oregon 8-8211 Ext. 621

Factory "A", Lockheed Aircraft Corp., Burbank, Calif.
Capt. T. M. Adams, USN
Telephone: Stanley 7-2711 Ext. 8-2585

Goodyear Aircraft Corp., Litchfield Park, Arizona
LCdr. C. E. Busby, USN
Telephone: Westport 5-9331 Ext. 251

Hiller Helicopters, 1350 Willow Rd., Palo Alto, Calif.
Cdr. K. J. Mathis, USN
Telephone: Davenport 5-3241 Ext. 410

No. American Aviation, Inc., Los Angeles 45, Calif.
Cdr. D. W. Watkins, Jr., USN
Telephone: Oregon 8-3011 Ext. 2531

Santa Monica Div., Douglas Aircraft Co., Inc., Santa Monica, Calif.
Cdr. J. A. O'Neil, USN
Telephone: Exbrook 4-3241 Ext. 279

JOINT AGENCIES

Chief, Armed Services Medical Procurement Agency, 84 Sands Street, Brooklyn 1, N. Y.
Medical, dental, surgical, and veterinary supplies and equipment.

Industrial mobilization planning: Industrial Mobilization and Procurement Planning Division of the above agency.

Research and development and introduction of new items: Armed Services Medical Procurement Agency, Room 1707-A, Main Navy Building, Washington 25, D. C.

Executive Officer, Armed Services Petroleum Purchasing Agency, Washington 25, D. C.
Petroleum and related products.

DEPARTMENT OF THE ARMY

Ordnance Corps

Commanding Officer, Detroit Arsenal, Center Line, Mich.
Limited quantities of components of combat vehicles and tanks for manufacture at the Arsenal and for research and development purposes.

Commanding General, Ordnance Ammunition Center, Joliet, Ill.
Artillery ammunition, cal. .60 and above.

Commanding General, Ordnance Tank Automotive Center, 1501 Beard Street, Detroit 9, Mich.
Tanks and combat vehicles, motor vehicles,* civilian and military types, including spare parts and accessories, tires and tubes, and automotive lighting fixtures.*

Commanding Officer, Small Arms Ammunition Center, 4300 Goodfellow Boulevard, St. Louis 20, Mo.
Ammunition items, less than cal. .60.

Commanding Officer, Frankford Arsenal, Bridesburg Station, Philadelphia 37, Pa.
Artillery,* small arms ammunition,* optical instruments, and watches.*

Commanding Officer, Picatinny Arsenal, Dover, N. J.
Newly developed items of explosives.

Commanding Officer, Raritan Arsenal, Metuchen, N. J.
Hardware, cleaning and preserving materials and maintenance equipment for Ordnance items.

Commanding Officer, Redstone Arsenal, Huntsville, Ala.
Rockets and guided missiles.

Commanding Officer, Rock Island Arsenal, Rock Island, Ill.
Artillery carriages* and small arms.*

Commanding Officer, Springfield Armory, Springfield 1, Mass.
Small arms,* automatic weapons,* and ammunition magazines.

Commanding Officer, Watertown Arsenal, Watertown, Mass.
Artillery carriages* and mounts.*

Commanding Officer, Watervliet Arsenal, Watervliet, N. Y.
Artillery cannon.*

The following District offices are the proper points of contact for firms (within their respective geographical areas) seeking contracts. They have available for distribution copies of all Invitations for Bids issued by the purchasing offices and maintain current bidders' lists of firms within their districts. They also distribute Requests for Proposal and negotiate certain contracts at the request of the purchasing offices:

Birmingham Ordnance District, 2120 North Seventh Avenue, Birmingham, Ala.

Boston Ordnance District, Boston Army Supply Base, Boston 10, Mass.

Chicago Ordnance District, 209 West Jackson Boulevard, Chicago 6, Ill.

Cincinnati Ordnance District, Big Four Bldg., Cincinnati 2, Ohio.

Cleveland Ordnance District, 1367 East Sixth Street, Cleveland 15, Ohio.

Detroit Ordnance District, 574 East Woodbridge Street, Detroit 31, Mich.

Los Angeles Ordnance District, 55 South Grand Avenue, Pasadena 1, Calif.

New York Ordnance District, 180 Varick Street, New York 14, N. Y.

Philadelphia Ordnance District, 1500 Chestnut Street, Philadelphia 20, Pa.

Pittsburgh Ordnance District, 200 Fourth Avenue, Pittsburgh 22, Pa.

Rochester Ordnance District, Sibley Tower Bldg., Rochester 4, N. Y.

St. Louis Ordnance District, 1016 Olive Street, St. Louis 20, Mo.

San Francisco Ordnance District, 1515 Clay Street, Oakland, Calif.

Springfield Ordnance District, Springfield Armory, Springfield 1, Mass.

Quartermaster Corps

Chief, Research and Development Division, Office of The Quartermaster General, Washington 25, D. C.

Commanding General, New York Quartermaster Purchasing Agency, 111 East 16th Street, New York 3, N. Y.
Paper products,* office supplies,* chemicals, clothing, footwear, textiles, and related items, emblems,* military insignia,* embalming supplies and equipment,* and miscellaneous mortician's goods.*

Office of the Quartermaster General, Department of the Army, Washington 25, D. C.
Live animals.*

Chief, Army Orthopedic Footwear Clinic, Boston Army Base, Boston 10, Mass.
Orthopedic footwear.

Quartermaster Supply Officer, Columbus General Depot, Columbus 15, Ohio.
Spare parts for special purpose vehicles and special purpose equipment.

Commanding Officer, Chicago Quartermaster Depot, 1819 West Pershing Road, Chicago 9, Ill., Attention: Quartermaster Purchasing Division.
Fabricated metal and mechanical and wood products, such as laundry, bakery, and refrigeration equipment; equipage items used in field operations; cooking utensils and tableware,* athletic equipment,* caskets and casket hardware.*

Commanding General, Headquarters, Quartermaster Market Center, 226 Jackson Boulevard, Chicago 6, Ill.
All subsistence.

Industrial mobilization planning is done through the following offices: A-60, A-63, A-64, the Atlanta Quartermaster Procurement Service Office, 50 Seventh Street NE., Atlanta 5, Ga., and Quartermaster Activities, Boston Army Base, Boston 10, Mass.

Signal Corps

Commanding General, Signal Corps Supply Agency, 225 South 18th Street, Philadelphia 3, Pa.
Fixed and mobile communications equipment (except airborne), including radio, radar, telegraph, telephone and related equipment.

Chief, Laboratory Office, Signal Corps Supply Agency, Watson Area, Fort Monmouth, N. J.
Research and development.

Chief, Photographic Center Office, Signal Corps Supply Agency, 35-11 35th Avenue, Long Island City 1, N. Y.
Motion pictures and still pictures.

Minor procurement of Signal Corps items also by Regional Offices (below). Copies of Invitations for Bids and Requests for Proposal, with specifications, are available for reference purposes only, as follows: Regional Offices of the Signal Corps Supply Agency at 70 East 10th Street, New York 3, N. Y.; 615 West Van Buren Street, Chicago 7, Ill.; Parkway Bldg., 117 East Colorado Street, Pasadena, Calif.; Alaska Communications System, 550 Federal Office Bldg., Seattle 4, Wash.; Baltimore Signal Depot, 2800 Broening Highway, Baltimore 22, Md.; Decatur Signal Depot, Decatur, Ill.; Lexington Signal Depot, Lexington, Ky.; Sacramento Signal Depot, Sacramenta, Calif.

Industrial mobilization planning: A-70.

*Purchased for all three military departments in accordance with single service procurement assignments.

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A special service designed to provide readers with quick guide to the product information contained in advertisements throughout this Buyers' Guide.

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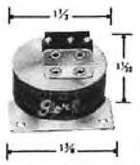
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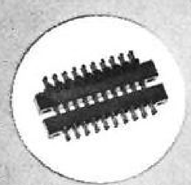
quick reference chart
for most often specified

GORN SWITCHES & CONNECTORS

A Complete* Line of Tested Pressure and Float Switches for Missiles and Aircraft	Vacuum & Absolute Pressure Switch	Altitude Switch	Differential Pressure Switch	Low Pressure Switch	Medium Pressure Switch	High Pressure Switch	Horizontal Float Switch
							
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Weight	2.3 oz.	1.8 oz	16 oz.	8.5 oz.	7 oz.	4.5 oz.	7.5 oz.
Actuation Setting Range of Tested Available Models	3 to 25 psia	5000 to 60,000 feet	1" W.C. to 10 psig differential	1 to 100 psig	1 to 800 psig	75 to 3000 psig	On Horizontal Center Line
Max. Oper. Press. Proof Pressure Burst Pressure	30 psia 45 psia 60 psia		10 psig 20 psig 30 psig	100 psig 200 psig 600 psig	800 psig 1200 psig 2400 psig	3000 psig 4500 psig 7500 psig	
Electrical Rating	SPDT 18-30 VDC 2.5A. Ind.	SPDT 18-30 VDC 2.5A. Ind.	SPDT 18-30 VDC 2.5A. Ind.	SPDT 18-30 VDC 5A. Ind.	SPDT 18-30 VDC 2.5A. Ind.	SPDT 18-30 VDC 2.5A. Ind.	SPDT 18-30 VDC 2.5A. Ind.
Temperature Ratings Available	–65 to 160F –65 to 275F –65 to 400F**	–65 to 160F –65 to 275F –65 to 400F**	–65 to 160F only at present	–65 to 160F –65 to 275F –65 to 400F**	–65 to 160F –65 to 275F –65 to 400F**	–65 to 160F –65 to 275F –65 to 400F**	–65 to 160F –65 to 275F –65 to 375F
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Explosion Ratings to Specification	MIL-E-5272A	MIL-E-5272A	MIL-F-8615	MIL-F-8615	MIL-F-8615	MIL-E-5272A	MIL-F-8615

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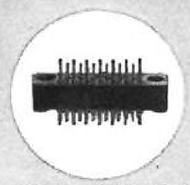
GMRD Series SNAP-LOC — Available in GM series; for quick snap-action, separation and harness locking; contacts 7 to 50.



GH Series — Hex Miniature available with lock ring, spring and nut; hood and cable clamp; from 18 to 20 AWG; contacts 4, 5, 7, 9; also hermetically sealed.



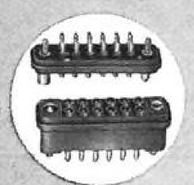
GPC Series — Printed Circuit; will mate with printed circuit boards from .061 to .071 thick; with solder and solderless terminations; contacts 6, 8, 10, 12, 15, 18, 22.



GM Series—Miniature Rack and Panel from No. 18 to 20 AWG; contacts 7, 8, 9, 14, 18, 20, 21, 26, 34, 41, 50; also hermetically sealed.



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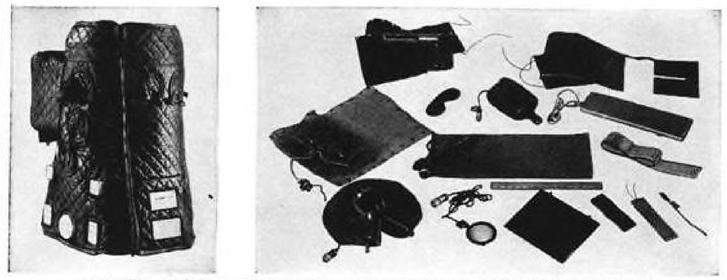
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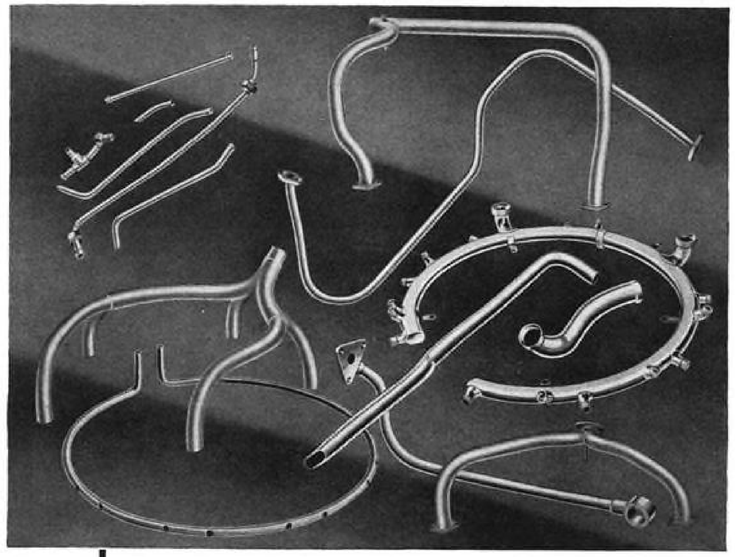
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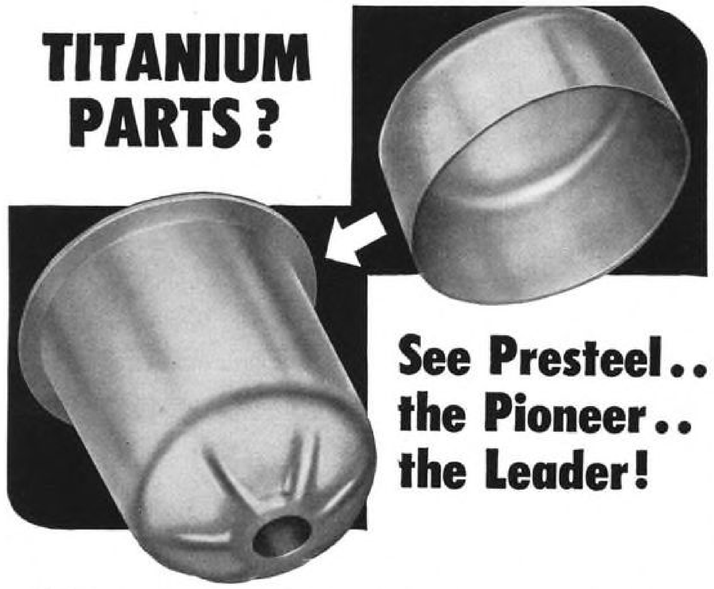
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SILICON

Sarkes Tarzian area type silicon rectifiers are made by a special process that provides optimum forward to reverse ratios and long useful life. Current ratings for half wave application range from 500 milliamperes dc to 15 amperes dc and voltage ratings per unit range from 50 to 400 volts peak inverse. Small size coupled with high efficiency and allowable high ambient temperatures make silicon rectifiers the practical component for most applications that require dc power. Our staff of competent power conversion engineers is ready to consider your application for prompt recommendations. Write, wire or phone.

Type M silicon rectifiers are rated at 500 milliamperes dc with peak inverse voltage ratings of 100 to 400 volts. Connection is made by means of end ferrules that fit standard fuse clips. Low cost holders are available.

Type N—Four basic terminal arrangements are available in the N series of silicon rectifiers. (1) Axial leads, (2) Axial stud and lead, (3) Axial stud and lug, (4) Axial studs. The convection cooled current rating is 500 milliamperes and the conduction cooled rating is 1 ampere provided an adequate heat sink is used. Voltage ratings range from 50 to 400 volts peak inverse.

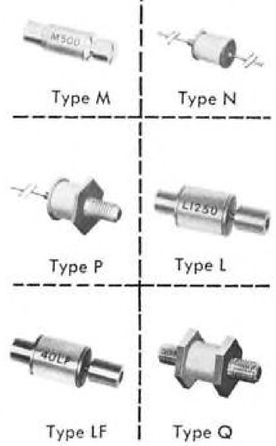
Type P—The P series of silicon rectifiers includes the same end terminal designs as the N series. The dc current ratings, however, are ⅓ amperes with convection cooling and 5 amperes when a heat sink is used. Voltage ratings range from 50 to 400 volts peak inverse.

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Write for complete information

Type LF—Use of a special heat sink arrangement and hardware allows a current rating of 5 amperes dc from the Type L rectifier. Precautions must be taken, however, to provide adequate cooling area to limit case temperature. Voltage ratings range from 100 to 400 volts peak inverse.

Type Q—The Q series of rectifiers is provided with axial studs only, however, it is possible to attach special end terminals. The current rating is 7.5 amperes in convection cooled applications and 15 amperes when a heat sink is used. Peak inverse voltage ratings range from 50 to 300 volts.



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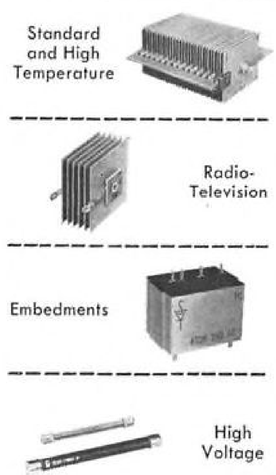
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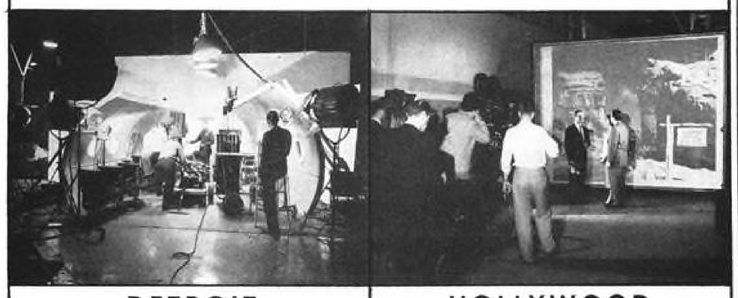
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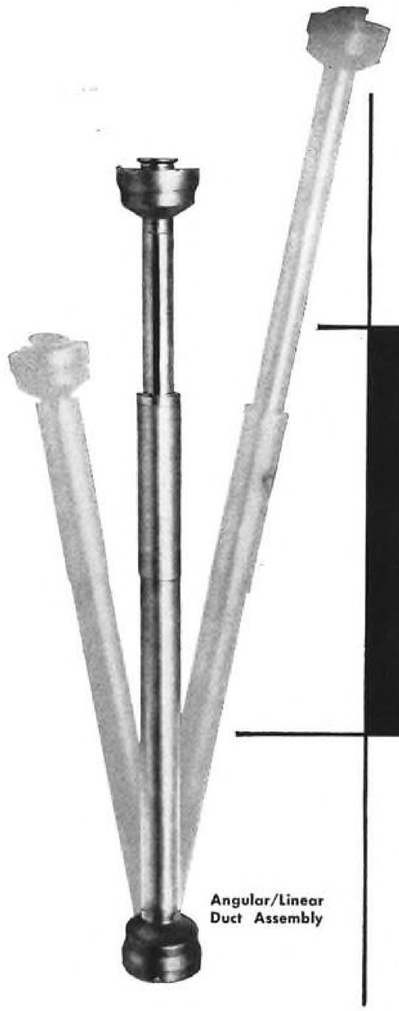
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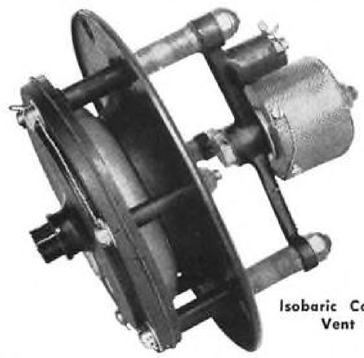


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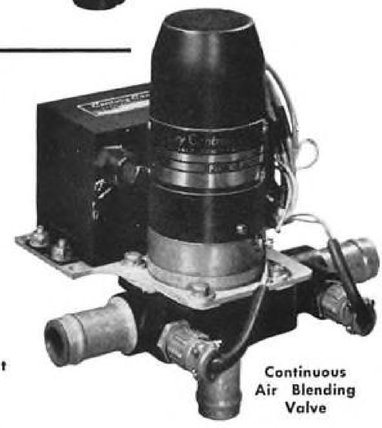
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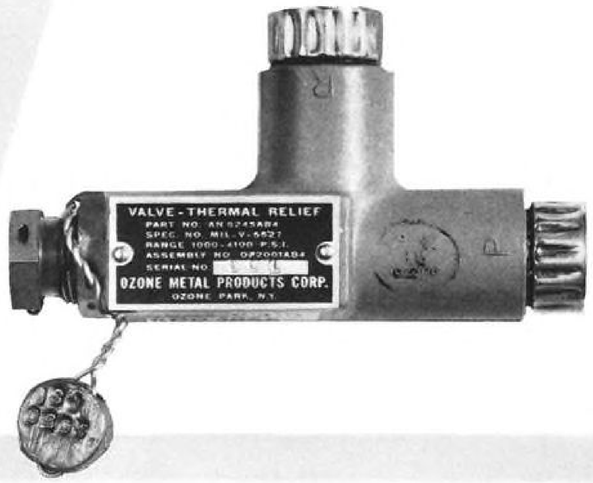
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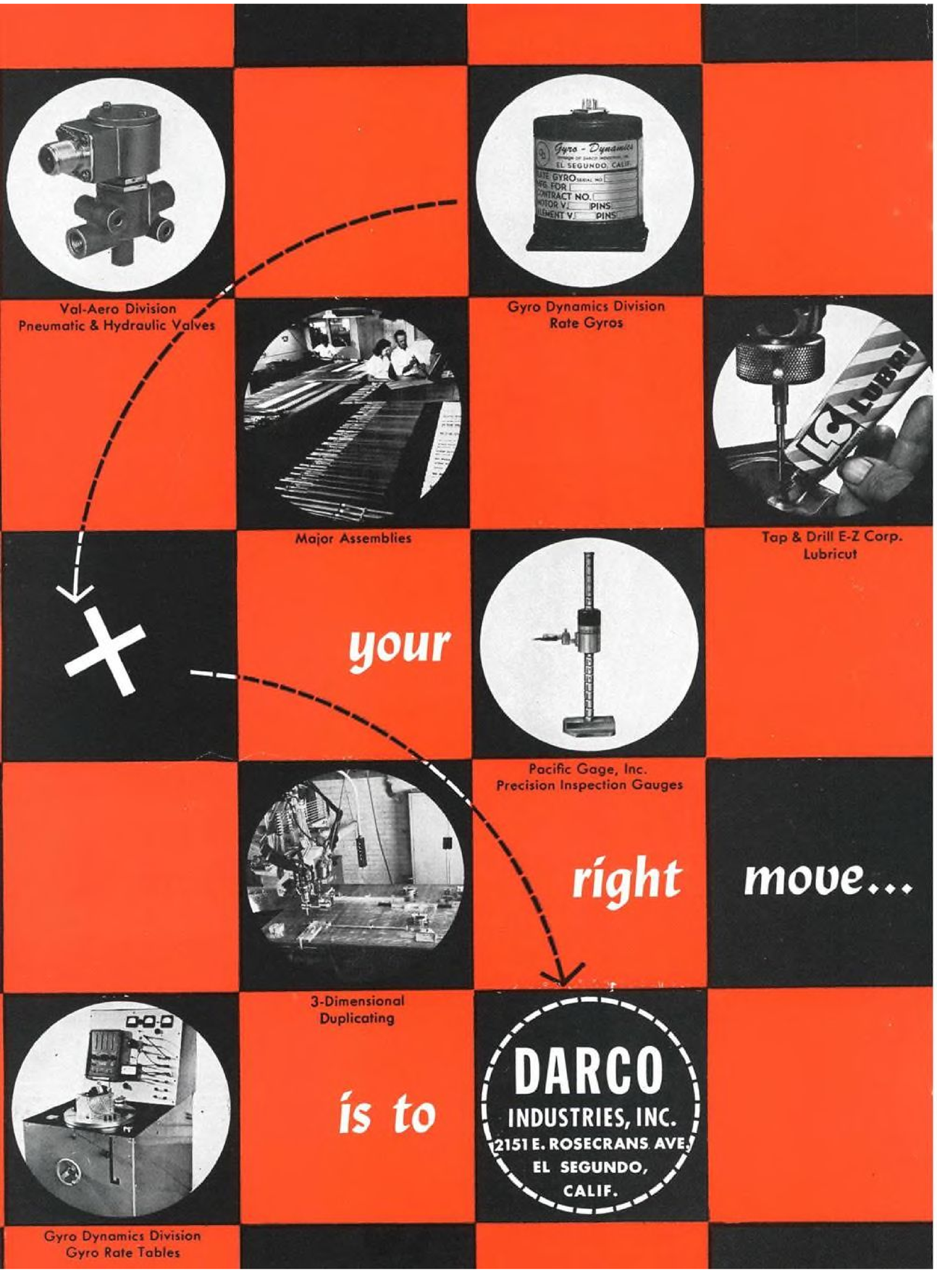
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AIRCRAFT

CONVAIR B-36, FLANKED BY BOEING'S B-47 AND B-52

1957 AVIATION WEEK BUYERS' GUIDE | SECTION A



Speeding Air Weapons Development

By Paul A. Wilbor

Assistant to Deputy Director, Procurement and Production
Headquarters, Air Materiel Command

Because of the increasing importance of the time factor in the development of our airpower programs and to the continuance of our aerial weapons superiority, and because of its import to the aircraft industry, Aviation Week publishes this analytical and comprehensive summary.

All of us who have taken part in the aeronautical advancements over the past several years are aware of their impact upon our scientific, engineering, manufacturing and managerial skills.

We have seen the increases in performance requirements pull into our programs an ever-widening span of effort. Our inventive genius has been stretched to substitute electronic processes for human calculations and reactions. The speeds, altitudes, penetration and kill probabilities of our weapons have made this necessary. This has required bringing together, on a most intimate basis, separate schools and disciplines of science, knowledge, engineering and development.

The advance in weapons performance has done several things to our historic approach to weapons development and production. First, and most importantly, is the vigorous pushing of the state of the arts to achieve our performance goals. This has been characteristic of our activities across all the sciences—aerodynamics, thermodynamics, physics, electronics and metallurgy.

In working so close to the frontiers of knowledge we have had to make many extrapolations and predictions which have involved uncertainty of success and high risks of time and funds investment.

Major Changes

This has resulted in a sharp increase in the number of articles required for testing and evaluation.

Consequently, we can no longer prove out a weapon with only one or two test vehicles. We must initiate lost production almost concurrently with development in order to get the necessary 12 to 20 vehicles for test. These numbers are required so that we can concurrently evaluate each separate technical advance necessary for mission performance.

A second major change in the historic pattern is the fact that the development-production time-spans for the more complex sub-systems such as fire-control systems, bombing-navigation systems and offensive and defensive armament are much longer taken than those for the air vehicle itself. Our failures to recognize and get on top of this problem earlier than we did led to many deficiencies in the quality of our inventory aircraft. It also has seriously aggravated our reliability problems through the pressures to regain lost time.

A third relatively new factor in the total situation is the emergence of missile technology. We are having to carry forward development and production for both manned and unmanned weapons. This has produced multiple loads at both the government and industry levels. In addition to multiplying the project lead it has increased tremendously the number and span of inter-industry and industry-government coordination points. This, too, has added to the length of time of our total processes.

Within these broad contours of our problem, let us turn to the specifics of what has been done and what remains to be done.

Within the past two years the Air Force has introduced many changes and innovations to speed up its part of the work and to open the door to improvements by industry.

Research and Development

Our first efforts have been in the area of research and development. Here we see the problems as being two-fold. First, we must widen the base of talent and skills devoted to airpower technical problems. Secondly, we must guide and direct that talent towards both general and specific goals in meeting our requirements.

We are making available to any qualified individual, firm or institution our long-range planning of technical requirements. We are furnishing our documents which show our estimates of the present state of the art, the direction of additional research and development and the expected levels of performance to be required over the next several years.

Headquarters ARDC at Baltimore would be more than pleased to furnish complete details on this program.

Paralleling this program, ARDC is also distributing to our major weapons producers the advance planning for future systems requirements. From these the new generations and families of new weapons will be born.

To reinforce and support these plans and requirement releases, ARDC is holding periodic Technical Symposia at various locations throughout the country. The purpose of these Symposia is to provide a forum for the cross-exchange of progress and development information and of new trends in requirements.

These data and conference innovations will provide us the opportunity to assure that our needs for advancements are met on a timely basis. If we take maximum advantage of them we should save months and perhaps years in accelerating our programs.

Selecting Weapon Systems

A further radical change we have made is in the manner of initiating new major weapon systems. Our former practice of getting a new weapon was roughly this:

When a new requirement was established we placed with all interested companies design study contracts directed toward the requirements. As these were completed, we undertook to evaluate them in our laboratories and by this program selected the most promising designs. This design was then offered competitively to industry for submission of development proposals.

From these development proposals the most promising—from the standpoint of meeting our requirements for performance time and cost—was selected and the contract awarded.

This process consumed from two and one-half to five and one-half years. Aside from the unacceptability of these extended time spans other things were happening to us. Throughout this time there were continuous changes in the state of the art and frequent changes in requirements growing out of these advances. The result was that we seldom built the aircraft burdens of reflecting all this in specifications contracts, work statements, change orders and other paper work.

Today, for our important systems, we are going about it in this way:

• **When a new requirement** is established, the ARDC and the AMC join hands, through the Source Selection

Board, and evaluate—from a technical, management and production standpoint—the companies with general qualifications to develop and produce the system.

• **This initial selection** process takes advantage of all that is known to the two commands about companies' capabilities, past performance and areas of specified knowledge. Those companies considered fully qualified—generally from five to a dozen—are then solicited for a general management proposal for undertaking the program through construction of a prototype.

This management proposal presents, in summary form, the technical approach to the weapon, including a preliminary design concept, the broad outlines of a master plan, a recommended testing program, a manufacturing plan, a production schedule and an estimated cost breakdown for each phase of the program.

• **These proposals are evaluated** and ranked by the strongest and most experienced specialists available to the two commands. From this review the best of two or three contractors are chosen and approved by general officers of the two commands.

• **Contracts are then placed** with the finally selected contractors to proceed with their proposal, towards construction of a prototype. It is clearly understood, at this point, that one contractor will finally carry the entire program. Who that contractor will be depends entirely upon the rate and quality of progress toward the hardware goal.

Joint Evaluation

This evaluation is carried out jointly by the ARDC and AMC again with our top-level specialists—through on-site surveys of the competing contractors.

We are fully convinced that this new way of launching major weapons programs can lead to time savings of from 18 months to two years.

Perhaps the greatest single feature of this change is the fact that it allows the powerful and compelling force of competition—this backbone of our free industrial economy—to have full play in forcing progress and reducing time.

Along with these changes in practices we have made others, which, while perhaps not so radical, are of a time-saving character.

We have taken steps and are developing further plans to interlock and mesh the programming of Research and Development funds and Production funds. This will lead not only to better financial planning of our programs but will help considerably in assuring a steady flow of money to our contractors to support their optimum rate of progress.

We are using performance specifications wherever possible, to free the contractor from the time-consuming minutae of detailed engineering compliance. We have had top-level management consultants looking into our entire processes and all of our methods to find areas for speed-up and acceleration. This work has been done by the Robertson Committee headed by the Assistant Secretary of Defense.

Managerial Practice

Now, what about time-savings in industry? Because of our dealings with so many companies in our various programs we have had an unique opportunity to observe the entire spectrum of managerial practice and techniques in planning for the carrying out of our contracts.

The accretion of this knowledge has generally developed from several origins. One of these is generated by the extremely complex and high cost systems we have achieved and presently have under way. In these programs it is usually two to three years before we can see hardware or concrete results. During this period expenditures in the hundreds of millions are being made.

Having the public responsibility of defending these programs before they mature, we quite logically must be informed of their progress, of the validity of the estimates and projections, and the plans for future work.

Another source of this knowledge is through the evaluation work we must carry out in comparing different company proposals.

A final source has been in those infrequent and rare occasions where contractors have failed to perform and we were headed for program failure and have had to get at the root of causes.

All, or practically all, of the opportunities of reducing calendar time lie in the period before production commences.

Once in production, it is true that we encounter delays, but on close analysis of the reasons behind the delay, we find deficiencies in the get-ready period, which have caused the majority of them. So that it is towards the area of planning that we must turn—to look for better and earlier performance.

We have found that where there is a strong master planning effort—supported by top management—the subsidiary plans are much more likely to be complete, realistic, and on time. The master planning, if properly executed, will provide the rate, amount, and time phasing of efforts that must go into each major and subsidiary task for the program.

Next, look to the area of earlier planning. It is imperative that planning start for all phases of the program as concurrently as possible. There have been serious time gaps discovered between major departmental or functional planning areas. Some companies have assumed that manufacturing planning could be deferred until detailed design is essentially complete. They then later have discovered that many long lead-time items would delay the program during the production phase.

Or in other cases assumptions have been made that purchasing of components required no pre-planning and subsequently procurement has been called upon to perform last-minut miracles which no one could accom plish.

These things sound elementary and obvious—and they are. But the important thing is that they are happening in well-managed companies.

Another rather widespread weakness in planning is the matter of how it is organized.

There are several principles that must be observed if planning is to serve its true role of guiding and controlling actions.

• **It must have access** to top management. The structure should provide this.

• **It must not be subordinated** to operational responsibilities. The structure should protect against this.

• **It must have a ready** and continuous access to results of action and be responsive to inter-departmental adjustment. The structure must insure this.

Planning is, unfortunately, a totally unglamorous subject. Equally undramatic is the job of getting it done. It calls for hard, grinding, detail work, in reducing to plans the combined knowledge and experience of specialists, technicians, managers, and scientists.

But it is the area of payoff in time reductions and is the mechanism through which our outthinking the Russians can become a reality.

Collective Effort

If we really make the big time savings—as we must—we all must recognize that this will be the result of both individual and collective effort. Therefore, if each of us accepts the urgency and real meaning of our time problem, he will approach his own work, that of his co-workers and associates and that of the contractors giving him support, with these key questions persistently in mind:

How can we do it faster? How can we do it better?

These ideas must be built in and become second nature in our approach to our work, our determination to carry it out and to personally guarantee that we have done our utmost to cut time spans.

The reduction of calendar time is an urgent problem calling for solutions of vital import to our continued air superiority.

We have done some constructive work. We must do more.

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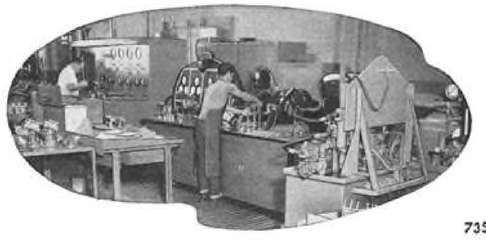


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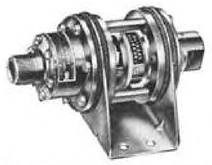
High Temperature (650° F.) PRESSURE SWITCH, Type 6576

CONSTRUCTION: All-welded stainless steel. Precision stacked-capsule sensing element. **TEMPERATURE RANGE:** —65° F. to 650° F. **ADJUSTMENT RANGE:** 20 to 75 psia. **RESET VALUE:** 2 psi. **CONTACTS:** 1 amp inductive snap action. **DIMENSIONS:** Diameter 1¼"; length 3½".



Differential PRESSURE SWITCH, Type 6580

DIFFERENTIAL ADJUSTMENT RANGE: 4" to 125" of water. **SYSTEM PRESSURES:** up to 60 psi. **RESET VALUE:** 1" to 3" of water (proportional to operating point). **EXTERNAL ADJUSTMENTS:** Separate adjustment of operating point and reset value. Alternate style provides two adjustable operating points with fixed reset values.



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Pneumatic Exhaust Nozzle Actuator, Type 141F14

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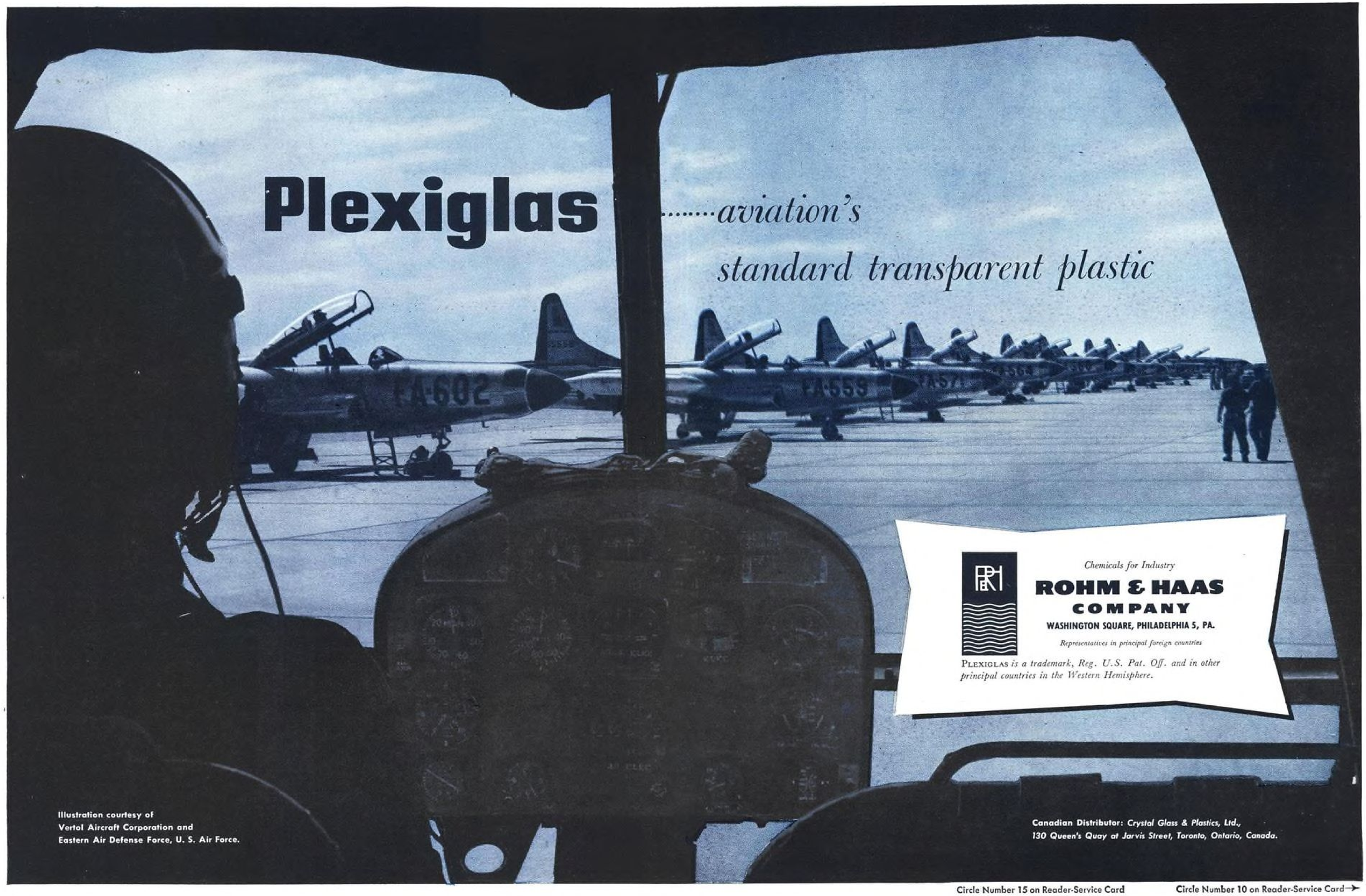
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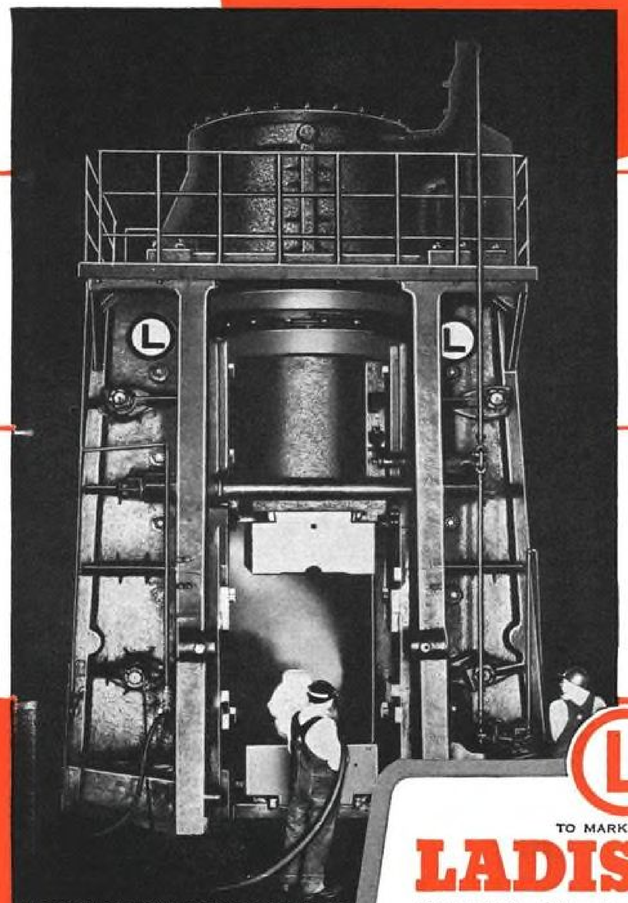
LADISH

OFFERS GREATER LATITUDE IN THE DESIGN OF LARGE COMPLICATED PARTS

Ladish pioneering in tremendous closed-impression-die forgings offers engineers new freedom in extending the inherent advantages of the drop forging process to intricately shaped parts weighing as much as *10,000 pounds*. Drop Forging close-to-finish dimensions materially reduce metal and machining costs . . . while improvement in dynamic strength and toughness makes possible substantial reductions in dead weight . . . and higher factors of safety.

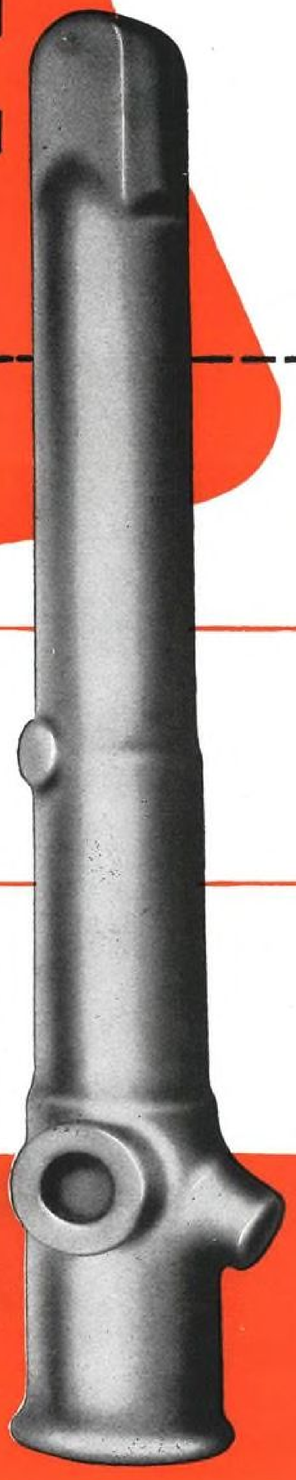
A discussion of your products with a Ladish forging engineer will provide specific data on the ultimate economy and improvement in design you can impart to your own products by specifying forgings . . . Ladish Controlled Quality forgings.

WITH CLOSED-IMPRESSION-DIE DROP FORGINGS WEIGHING UP TO 10,000 LBS.



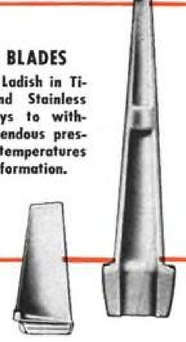
WORLD'S LARGEST FORGING HAMMER

80,000 MKG counterblow forging hammer, the most powerful known in the world, is estimated to be equivalent to 100,000 pound one way steam drop hammer if such were available.



TURBINE BLADES

Forged by Ladish in Titanium and Stainless Steel Alloys to withstand tremendous pressures and temperatures without deformation.

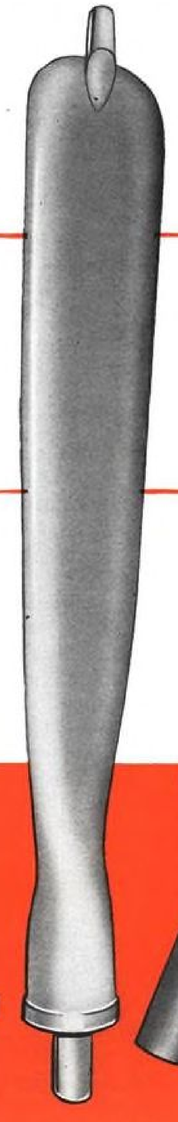


LANDING GEAR

Outstanding example of Ladish heavy drop forgings: 8500 pounds, 132 inches in length. Drop Forging saved material and machining cost for 5000 pounds of Chromium-Nickel-Molybdenum alloy steel.

TITANIUM PROPELLER BLADE

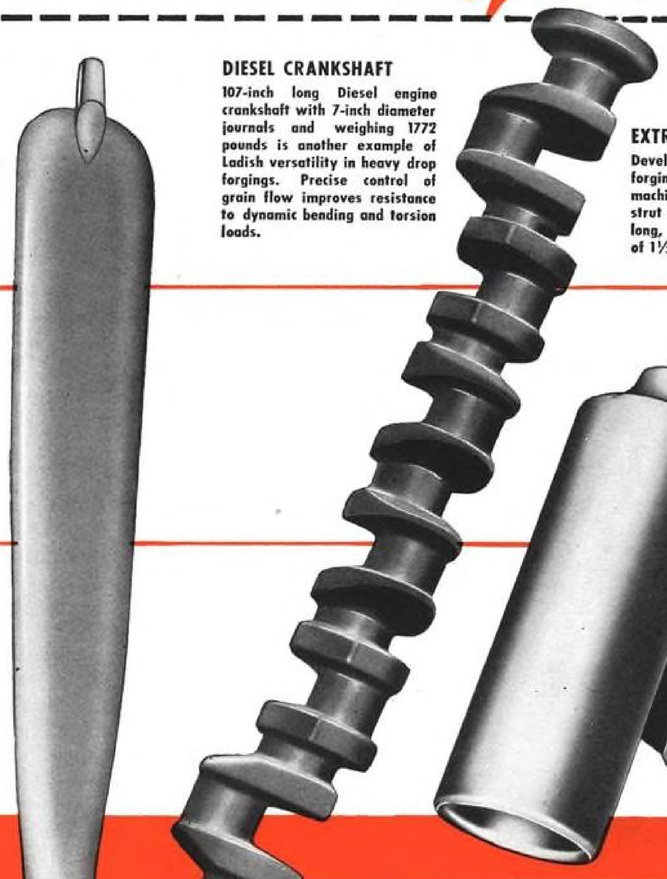
Again Ladish pioneers with the largest known Titanium forging produced in closed-impression dies. 40% saving in weight realized by forging this 100-inch blade in "wonder metal" Titanium.



WIND TUNNEL BLADE

2550 pound stainless steel drop forging measures 70 inches in length. Used in a wind tunnel to simulate flight speeds for jet aircraft.





DIESEL CRANKSHAFT

107-inch long Diesel engine crankshaft with 7-inch diameter journals and weighing 1772 pounds is another example of Ladish versatility in heavy drop forgings. Precise control of grain flow improves resistance to dynamic bending and torsion loads.

EXTRUDED LANDING GEAR

Developed by Ladish as an extruded forging to save valuable metal and machining time, this 44-inch long strut has an extruded hole 36 inches long, and a forged wall thickness of 1½ inches.

TO MARK PROGRESS

LADISH CO.

CUDAHY, (Milwaukee Suburb) WISCONSIN

Controlled Quality

DROP FORGINGS UP TO 10,000 POUNDS,
WELDED AND SEAMLESS ROLLED RINGS UP TO 60,000 POUNDS

REGARDLESS OF SIZE, CONTOUR OR MATERIAL...YOU CAN DEPEND ON LADISH

FOR COMPLETE SERVICE IN FORGINGS

LADISH FORGING ENGINEERS AVAILABLE FOR CONSULTATION ON USE OF FORGINGS TO IMPROVE PRODUCT DESIGN.

LADISH CO.
Cudahy, Wisconsin

We're interested...have Ladish Forging Engineer call to discuss application of forgings in our products.

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Our Products AW

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Marco Annunciator Lights feature:

1. Compulsory acknowledgement of signal—and instant reset. **2.** Non-reflective surfaces. **3.** Excellent sunlight visibility. **4.** Concealed legends legible only when indicator is energized. **5.** Hinged units remove need for indexing. **6.** Flexible design permits individual use or combination in any desired number and array of indicators. **7.** Optional mounting features.

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PRECISION CONTROLS
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world's first multi-jet sea bomber, developed for the United States Navy by the Glenn L. Martin Co., utilizes Kohler Precision Controls.

Manufacturers of jet engines, commercial and military aircraft specify Kohler Precision Controls for their exacting hydraulic, fuel, pneumatic and airframe application requirements.

Kohler Co. maintains in one plant a precision-skilled organization with complete facilities for forging, casting, machining and finishing.

Kohler engineers will gladly assist in developing controls to specification for volume production. Write for complete information.

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Kohler Co., Kohler, Wisconsin. Established 1873

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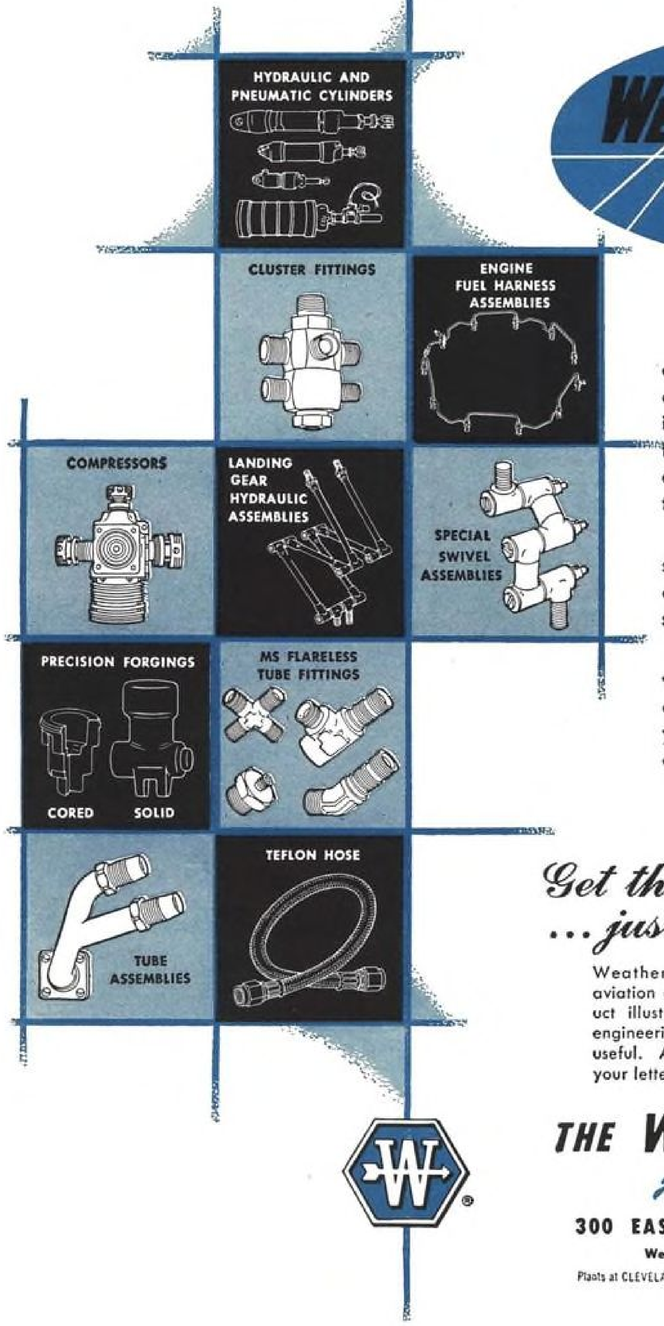
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WHICH FENWAL PRODUCT CAN SOLVE YOUR AIRCRAFT TEMPERATURE PROBLEM?

FENWAL FIRE AND OVER-HEAT DETECTORS

Fenwal Fire and Over-Heat Detectors protect every type and size aircraft. Made for single-wire and double-wire loop circuits, Fenwal Detectors in a loop circuit act independently in the event of accidental breakage in the electrical conductor. One push-button checks continuity of wiring in either type of circuit.

Another advantage Fenwal's unit system allows is that electrical isolation of one Detector does not affect the remaining units. Any Detector can be quickly removed and replaced without disturbing or removing the whole installation. Wt. in lbs.: .125 to .203. *Catalog on request.*

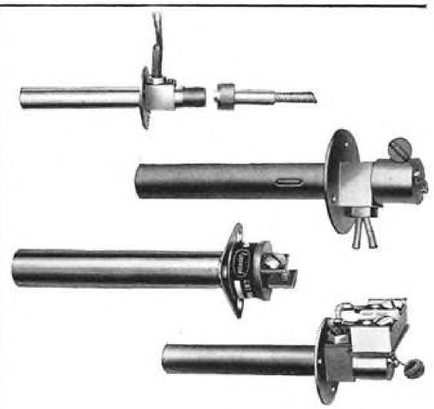


FENWAL HEATER CONTROLS

Compact, easy to install, Fenwal Aircraft Heater Controls are highly resistant to shock, vibration and extreme temperatures.

As in all Fenwal THERMOSWITCH® units, the outer shell is the temperature-sensitive element that activates internal contacts the instant set point is reached.

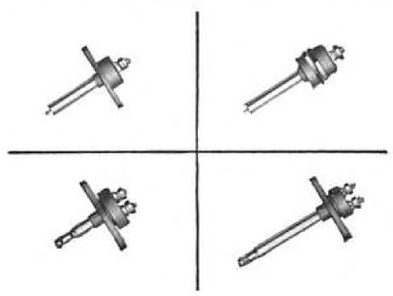
Fenwal offers a large variety of Aircraft Heater Controls covering a wide range of aircraft applications. Wt. in lbs.: .150 to .256. Hermetically sealed units are also available. *Catalog on request.*



FENWAL GAS TURBINE THERMOCOUPLES

Precision-engineered Fenwal Thermocouples are compact, easy to install, and extra sensitive for accurate response.

Wherever safe engine operating temperature must be maintained Fenwal Thermocouples are being used in increasing number. Their exclusive "Header" design reduces the effects of vibration and results in longer life of the unit. Many other exclusive and special features make Fenwal Thermocouples ideal for nearly every type of American jet engine. Wt. in lbs.: .10 to .28. *Catalog on request.*



FENWAL'S NEW BUTTON TERMINALIZATION THERMOCOUPLE AND HARNESS

Ideal for indicating and/or controlling engine temperature, Fenwal Thermocouples and harnesses can be used on any size aircraft engine.

A new ease of installation is allowed — all thermocouples are keyed — and can only be installed in one way. Only *two* bolts mount the Thermocouple to the harness and the harness to the engine. And maintenance is just as easy!

Fenwal's new Button Terminalized harness is semi-flexible so that differential expansion will not cause difficulties. Fenwal's Thermocouple and harness also offer you a great electrical advantage, through balanced resistance circuitry. *Catalog on request.*

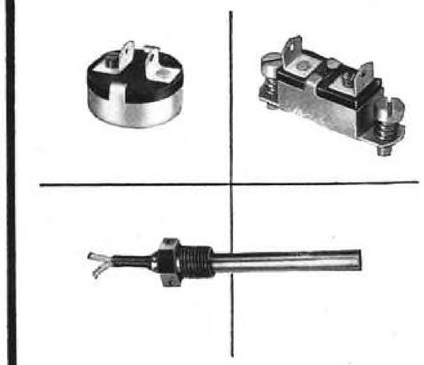


FENWAL MIDGET AND MINIATURE ACCESSORY CONTROLS

Fenwal Midget and Miniature THERMOSWITCH® units are precision engineered to assure maximum accuracy of temperature control in minimum space. Extremely compact and easy to install, they meet the needs of a wide range of important aircraft and guided missile applications.

Like the larger THERMOSWITCH units, their shell or casing is the temperature-sensitive element that actuates internal contacts the instant set point is reached. And their unfailingly accurate response enables constant, positive temperature control under severest service.

Fenwal Midget and Miniature Accessory Controls are highly resistant to shock, vibration and extreme temperatures. Wt. in lbs.: .019 to .240. Temperature range −50 to +500°F. *Catalog on request.*

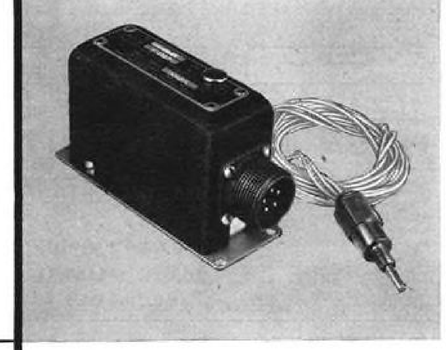


FENWAL THERMISTOR OVER-HEAT DETECTOR

The Fenwal 81000 Thermistor Over-Heat Detector gives quick, dependable response to temperature changes in a wide variety of aircraft applications. It is compact, light weight and conforms to applicable military specifications.

The 81000 Thermistor Over-Heat Detector consists of a black crackle finished aluminum housing with a five pin male receptacle for connecting the power supply, a thermistor probe, and an indicating device. The unit features a tiny thermistor probe which gives instant response and can be fitted into tight spots.

The adjusting range of the unit is 170°F ± 10°F, to 270°F ± 10°F. Wt. is 0.5 lbs. *Catalog on request.*

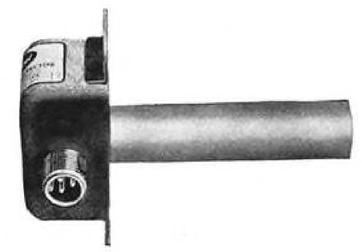


FENWAL'S NEW COOLING EFFECT DETECTOR

Fenwal's #18801-0 Cooling Effect Detector has many aircraft applications. The unit accurately senses insufficient cooling and actuates an indicator or alarm circuit to warn against the condition.

The #18801-0 Cooling Effect Detector is so designed that it senses the same cooling effect as the equipment being protected — including variable factors, such as ambient temperature and air flow and gives warning at the critical point.

With suitable relays, the Fenwal #18801-0 can control motor operated valves to switch from ram air to turbine air when cooling is insufficient. *Catalog available on request.*



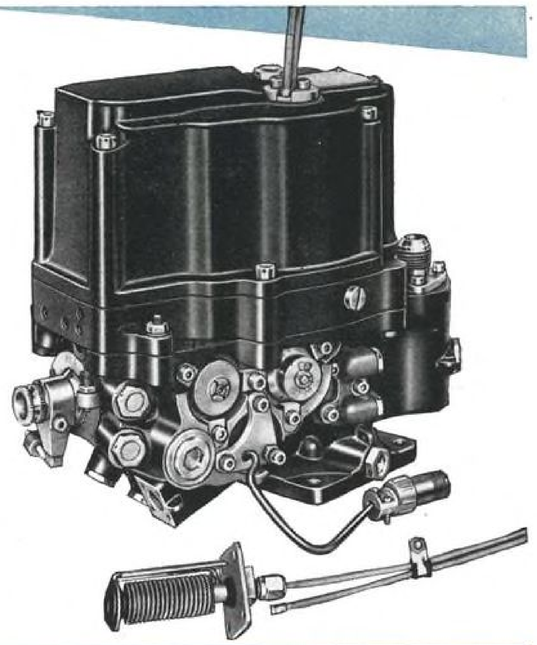
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Controls Temperature . . . *Precisely*

Fenwal Incorporated, Aviation Products Division

105 Pleasant Street, Ashland, Mass.

THE COMPLETE, UNITIZED SYSTEM



Proved by past performance, CECO Fuel Control Systems have helped make possible many of the barrier-shattering achievements in aviation history. CECO design — maintained in advance of the field by an endless program of intensive research — plus CECO precision manufacture will make Chandler-Evans *always* the logical source for the latest and the finest.

Remember, *only* Chandler-Evans produces complete, unitized fuel control systems which include multi-element pumps, main controls and manual controls, with all components engineered and manufactured to function together as a perfectly integrated team. Here *today* to provide the equipment to meet tomorrow's needs is *one* source, *one* responsibility, *one* unbeatably high standard of product quality and performance.

CECO

FUEL CONTROL SYSTEMS

THESE COMPONENTS IN ONE SYSTEM



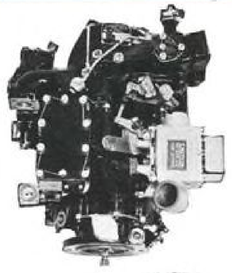
GEAR TYPE FUEL PUMPS

Pump fuel at pressures up to 1500 psi. Provide efficient operation at ambient temperatures from −65°F to +650°F. Produced in both single and multi-element units with integral boost . . . available with pressure regulating valves. Super-precision manufacturing techniques give high volumetric efficiency over a wide range of discharge pressures.



AFTERBURNER FUEL CONTROLS

The first afterburner fuel controls in the aviation industry were developed and produced by Chandler-Evans. The basic CECO Afterburner Control is a by-pass type regulator operating on a constant metering head across a variable orifice. Size of the orifice is regulated by the airflow parameter. Throttle modulation is available by providing for manual variations in either metering head or orifice size.



MAIN FUEL CONTROLS

Provide automatic metering of fuel for all conditions of rpm, altitude and airplane speed. Manually selected engine thrust is automatically controlled so that the desired thrust is attained in the shortest possible time consistent with conditions for proper engine operation.

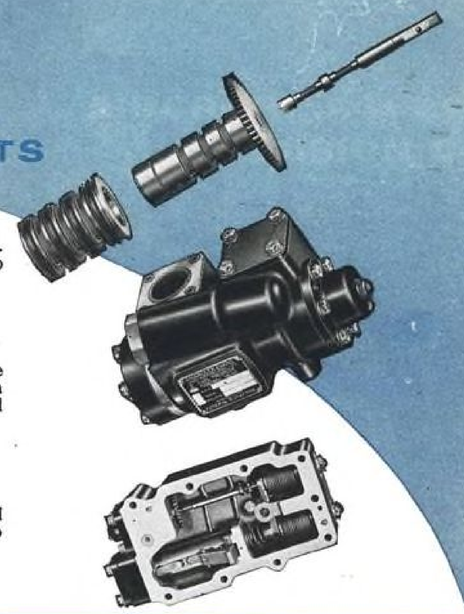


EMERGENCY FUEL CONTROLS

Cut in manually or automatically, this element takes over the essential functions of the main fuel control in the event of battle damage or other emergency. Like many main fuel controls, this is a pressure regulating by-pass system.



AIRCRAFT ACCESSORIES . . . PRECISION COMPONENTS



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High precision essential to modern performance standards. Tolerances between critical mating parts are often held to .00008".

CONTROL VALVES

Piston-type variable by-pass valves operated by pressure differential. For such applications as location between fuel filter and main fuel pump to provide a scheduled fuel pressure to the engine.

SENSING MECHANISM

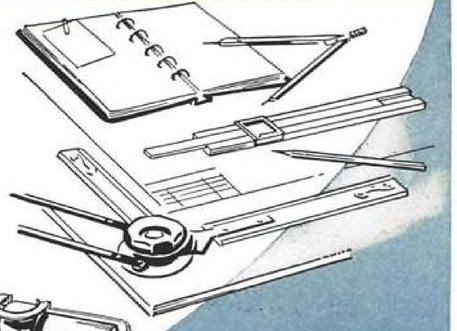
Variations in speeds, temperatures, pressures, altitude and other factors are automatically sensed and translated into mechanical motion to either engine or aircraft controls.

READY TODAY . . . FOR TOMORROW'S PROGRESS

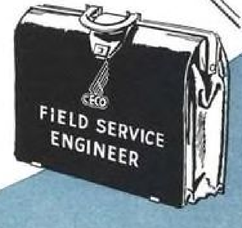


the CECO Service Story

FROM DRAWING BOARD TO FLIGHT LINE



Complete CECO Service starts at the drawing board stage with CECO Development Engineers working in the closest possible cooperation with aircraft engine designers to develop and produce CECO Fuel Control Systems integrated into the engine design requirements. Accepting a continuing responsibility to maintain CECO-equipped aircraft always at optimum performance levels, CECO follows through in the field . . . sending CECO Service Engineers onto the flight lines to incorporate all improvements and new developments.



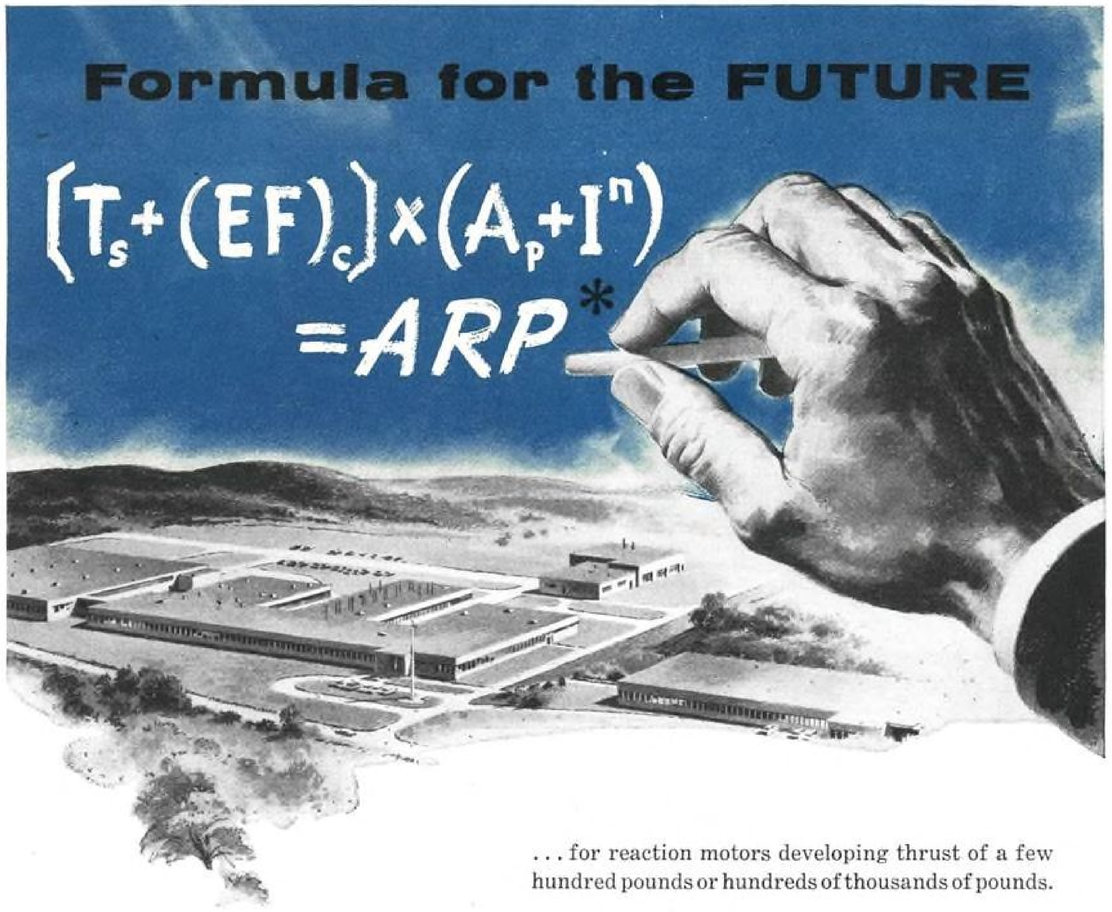
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*** KEY**

T_s . . . . . skilled technicians

$(EF)_c$. complete equipment and facilities

A_p . . . . past accomplishment

I^n . . . . . unlimited imagination

ARP . . advanced rocket power

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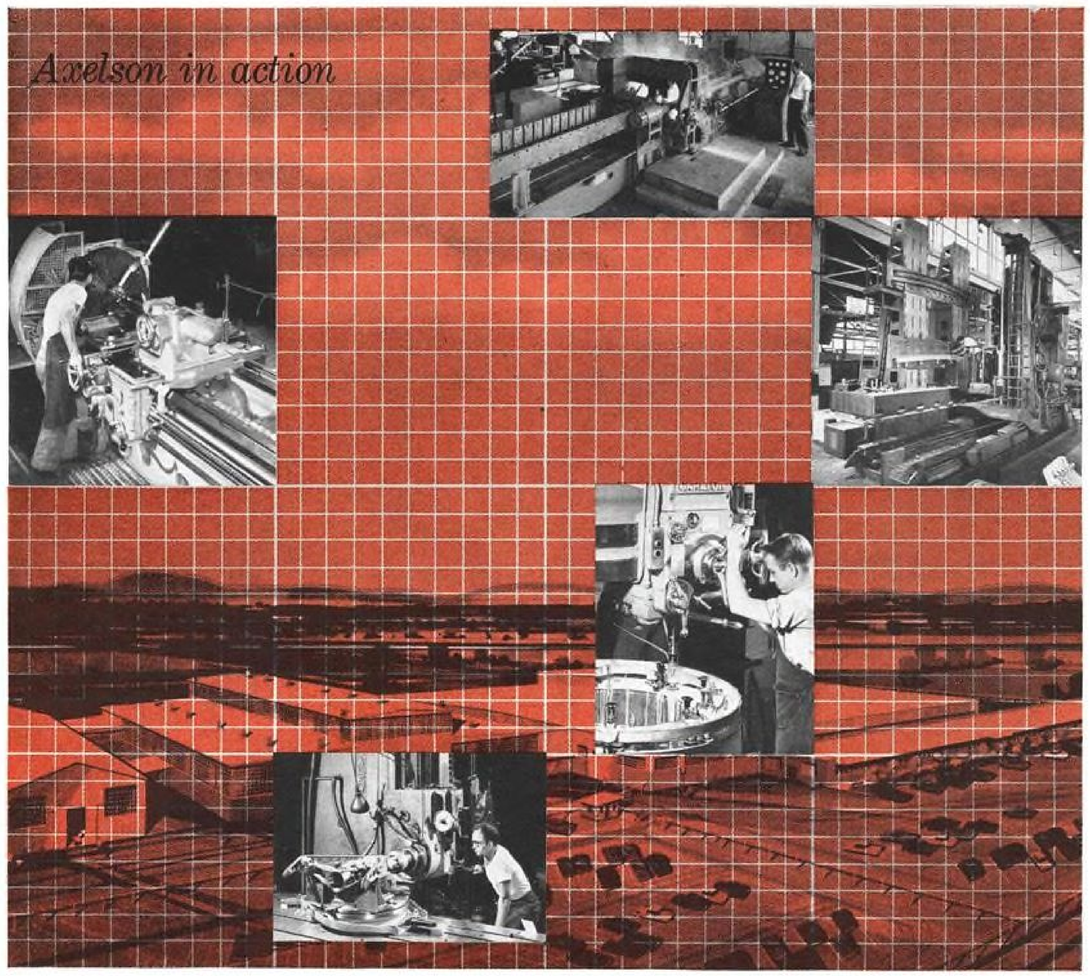
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Design and development engineers, desiring to work on advanced aircraft projects, contact Director of Engineering.

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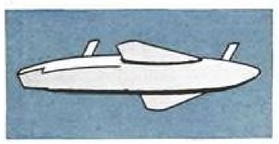
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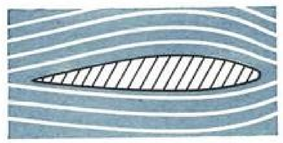


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Pantobase — When designed into an aircraft the Stroukoff Pantobase system enables the plane to land and take off from many types of surface without changes or additional landing equipment.



BLC — Boundary layer control as developed by Stroukoff increases the effective lift and delays stalling of the wing, thereby reducing required speeds and distances for take-offs and landings.

Achievement is a tradition at Stroukoff. Leaders in the development and design of cargo and transport aircraft, Stroukoff offers challenging opportunities to creative engineers.

STROUKOFF AVITRUC

Extending the Frontiers of Aircraft Performance

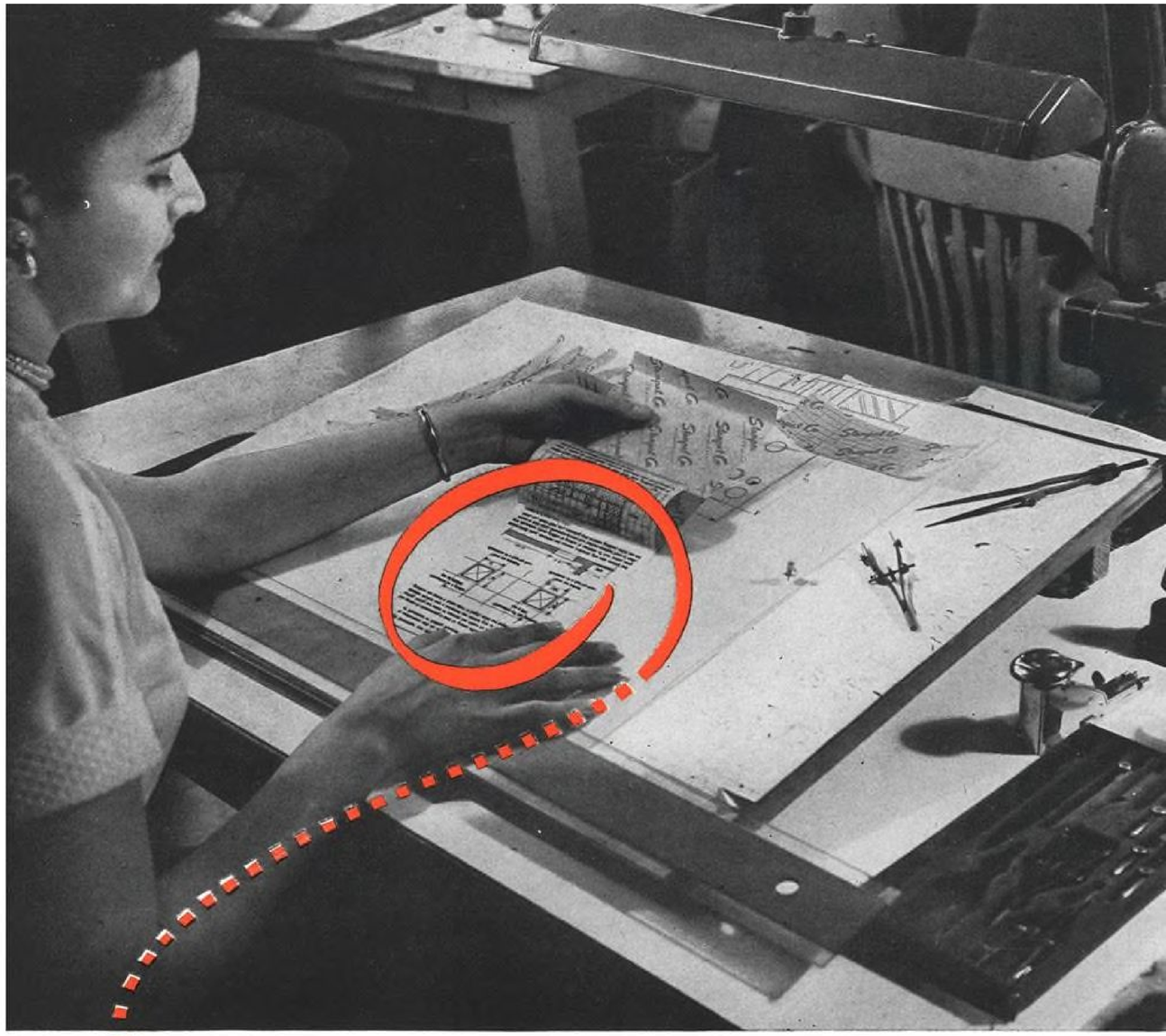
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on the wing
OF THE LOCKHEED SUPER G CONSTELLATION

PLUS OVER 30,000 OTHER DIFFERENT AIRCRAFT PARTS.

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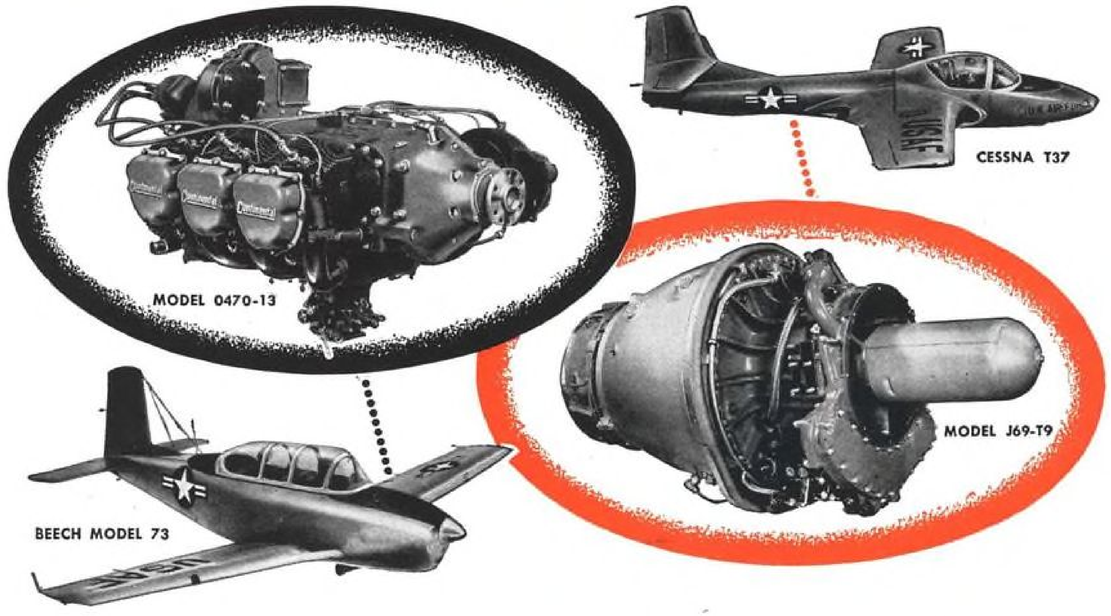
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AIRCRAFT CORPORATION
Chula Vista and Riverside, California

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...Dependable Aircraft Power



Look ahead ...join the air force

Continental Motors and its CAE subsidiary are successfully meeting a wide variety of aircraft power requirements. Dependable Continental engines of piston or turbine type now power not only leading makes of fixed wing utility and trainer aircraft, but modern high-performance helicopters as well. Engine-building experience dating from 1902 clinches the "rightness" of the engine with the Continental name.

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"Our recent Payroll Savings Campaign at Northrop demonstrated the belief of our personnel and our company in the basic fundamentals of American good citizenship—staunch support of our Country and personal thrift.

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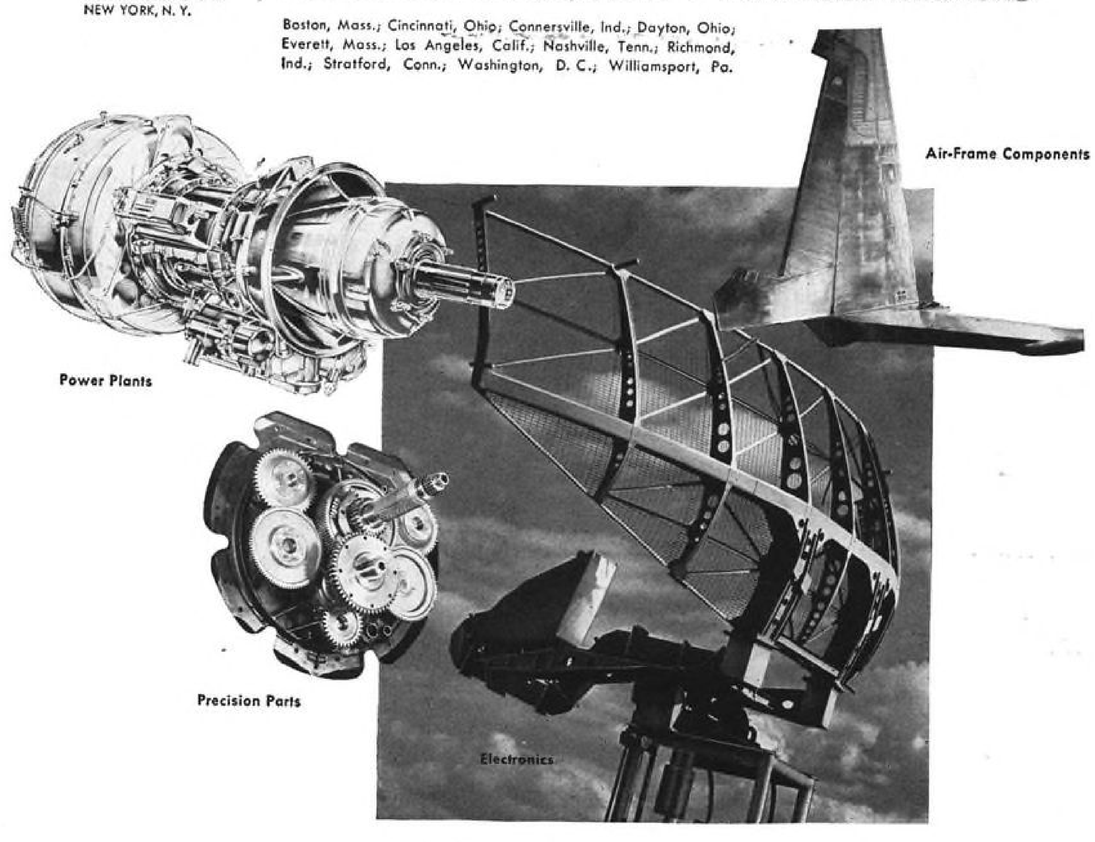
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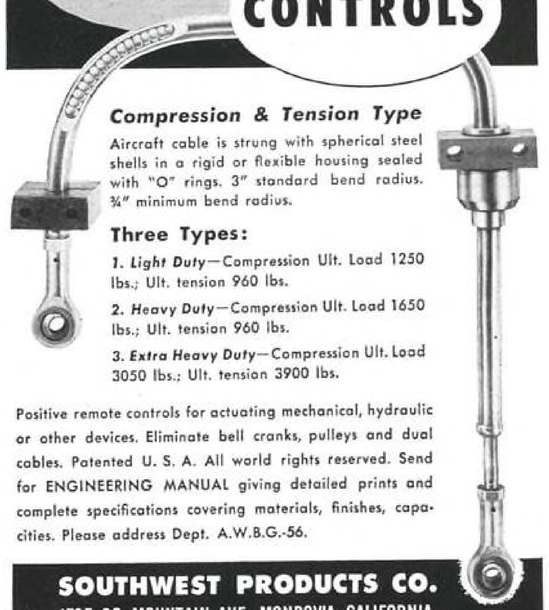
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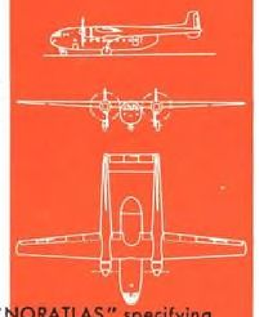
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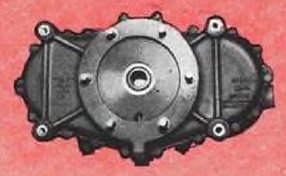
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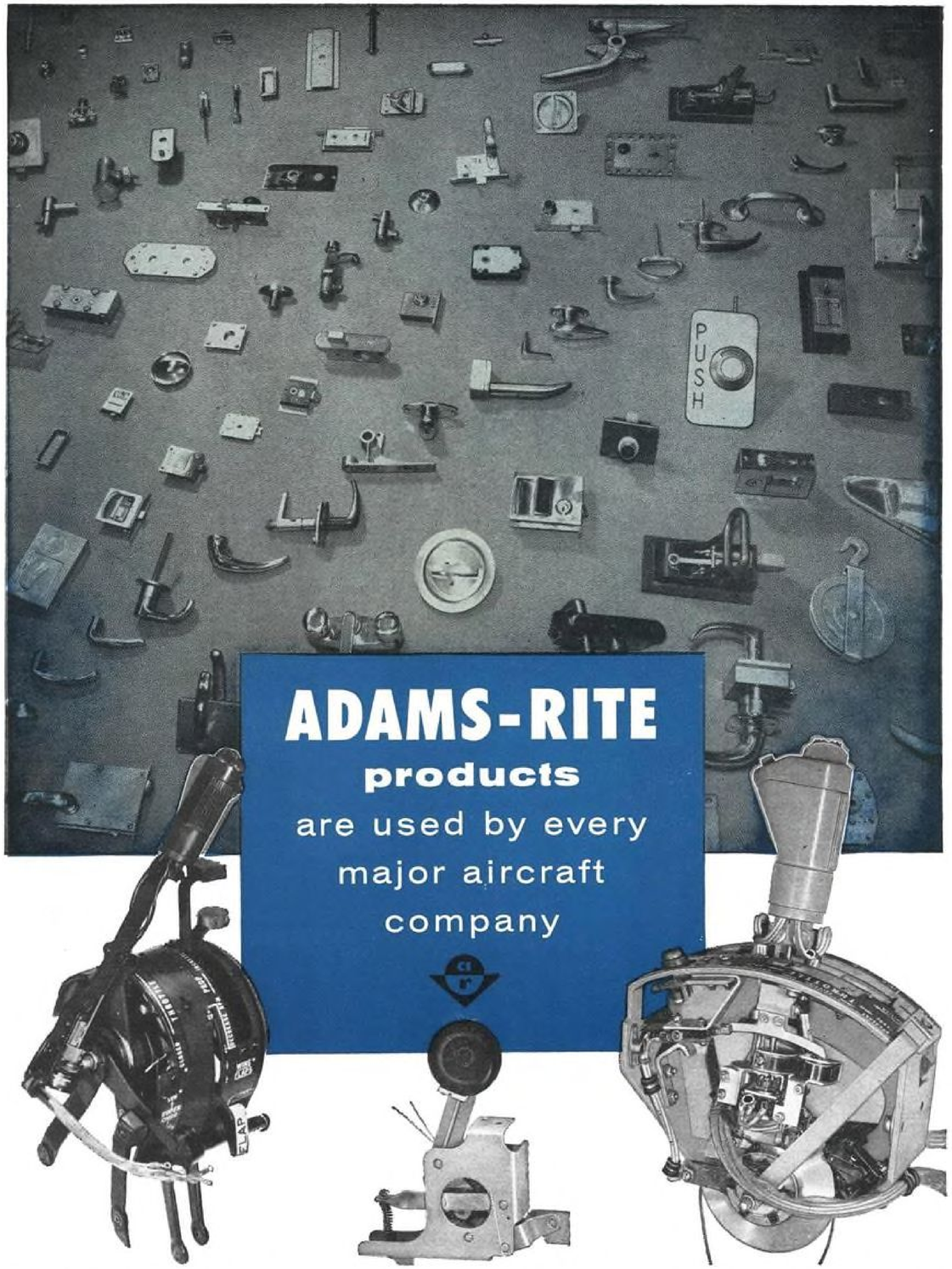
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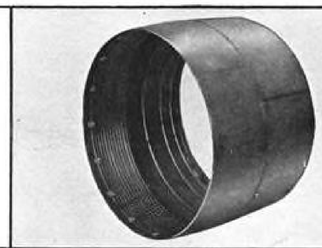
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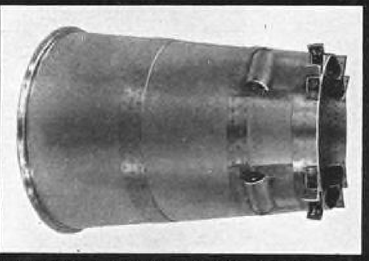
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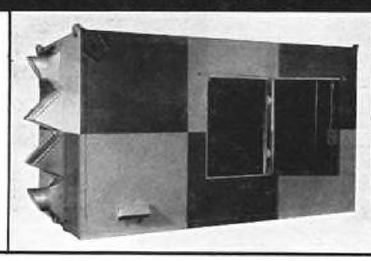
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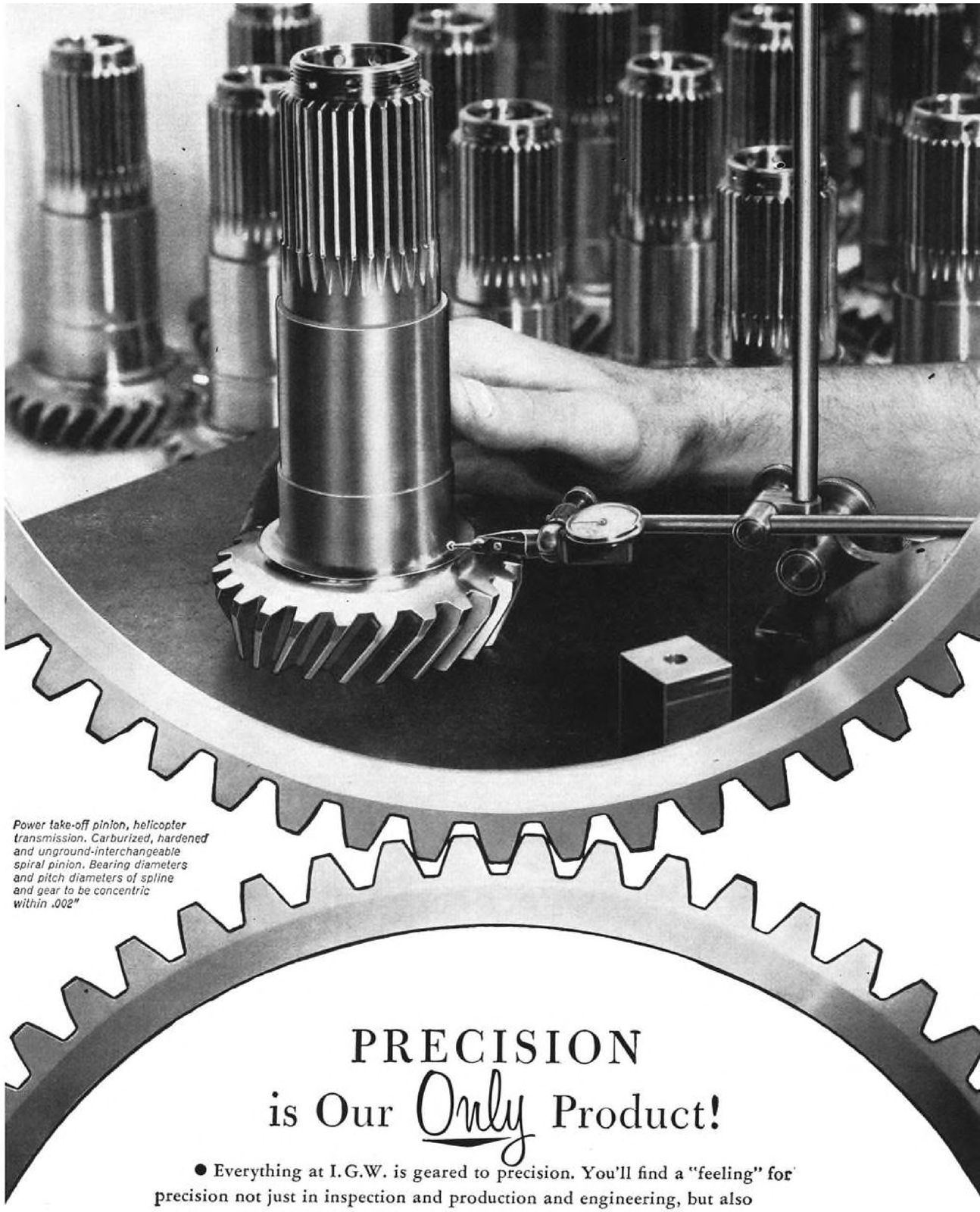
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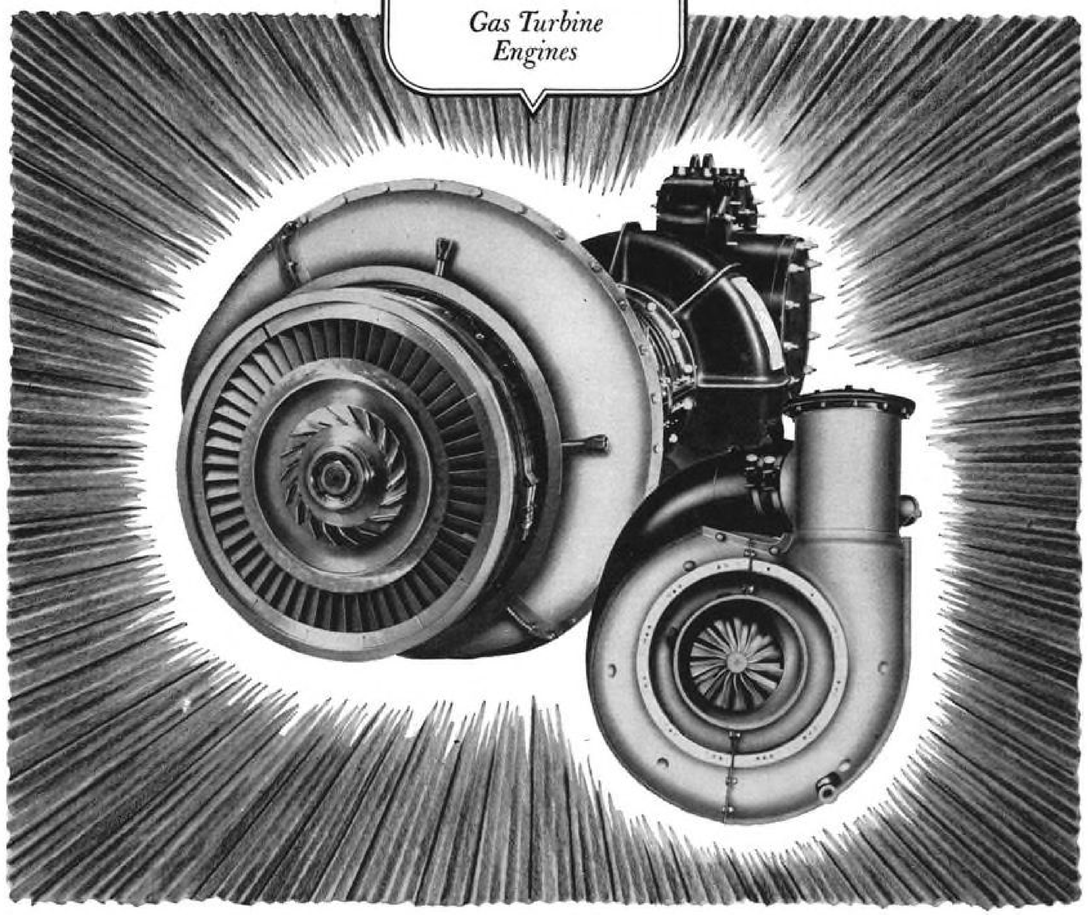
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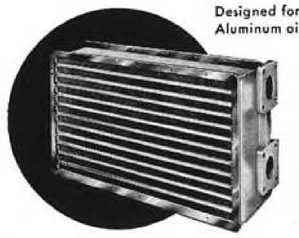
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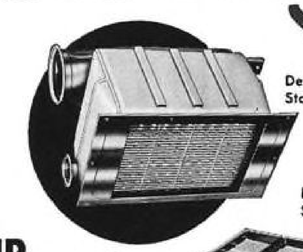
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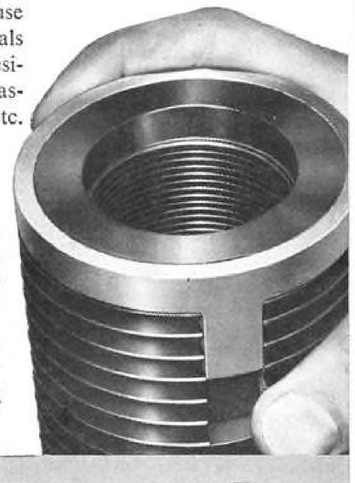


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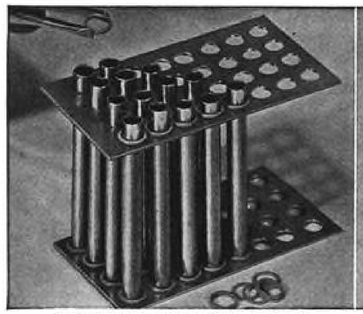
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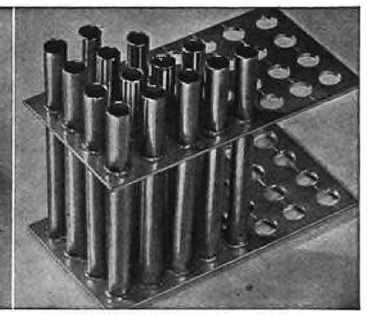
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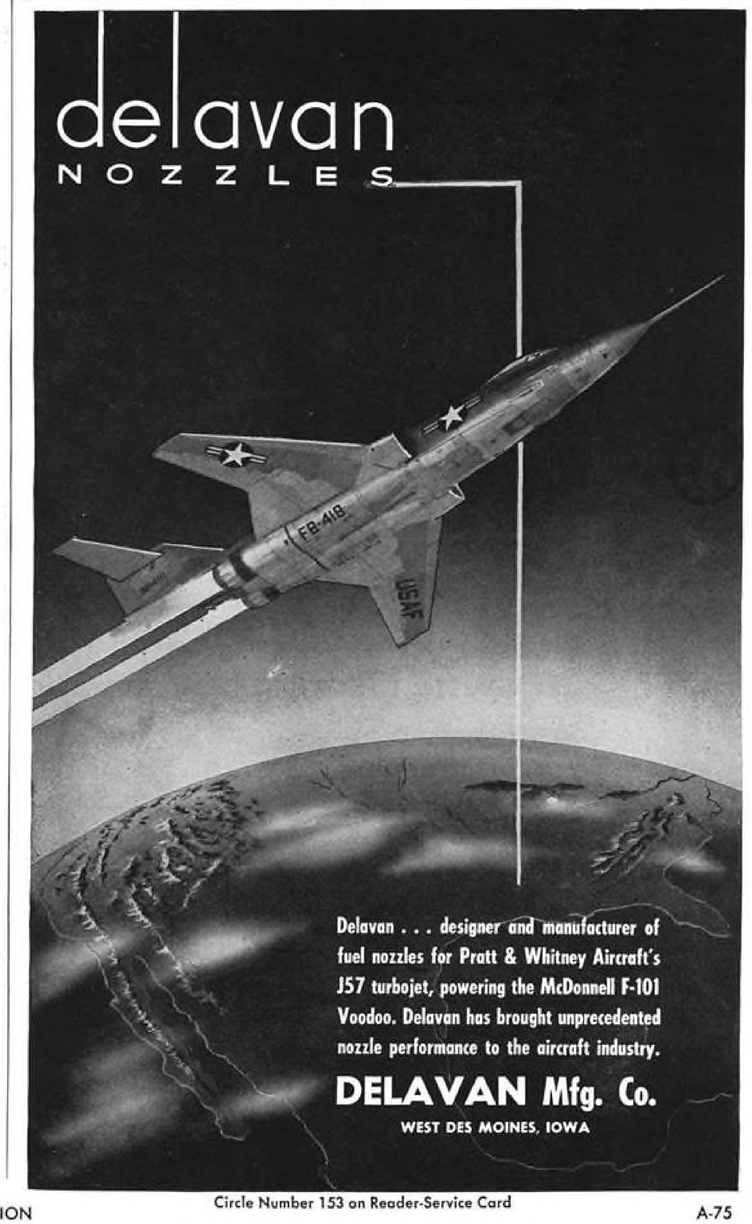
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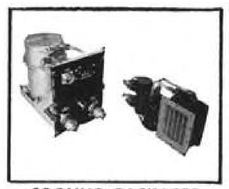
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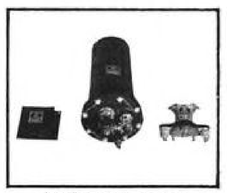

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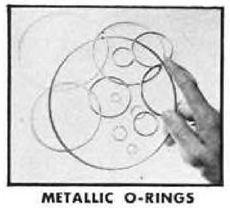

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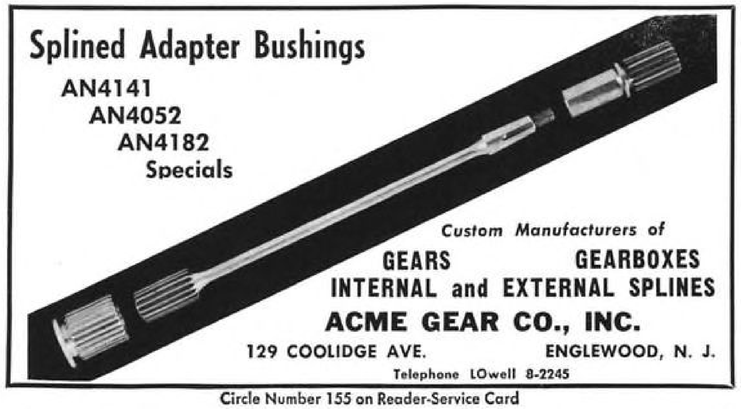
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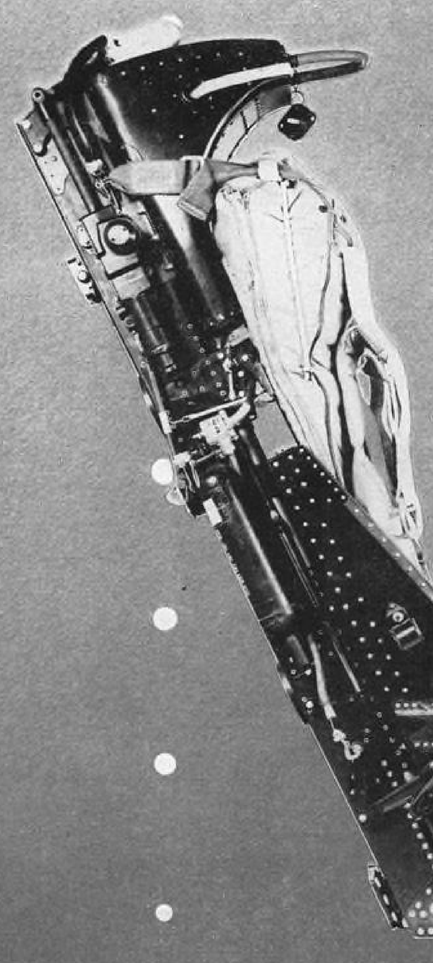
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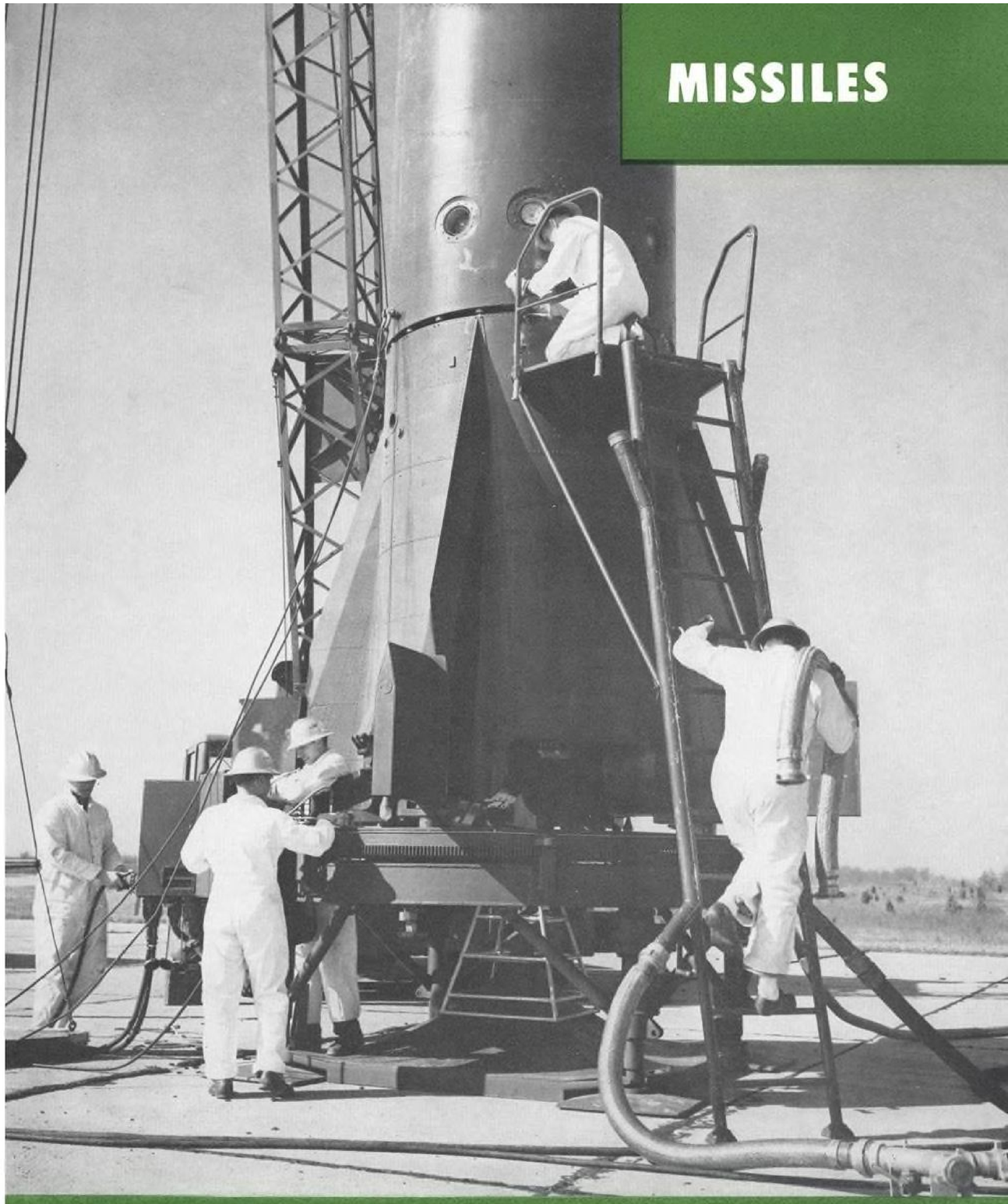
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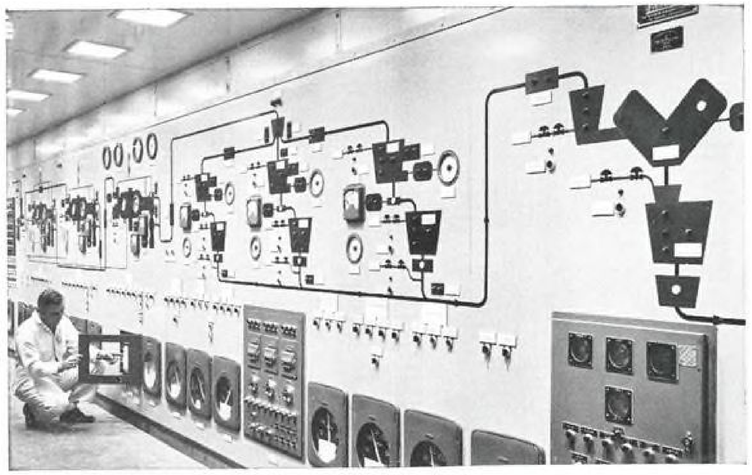


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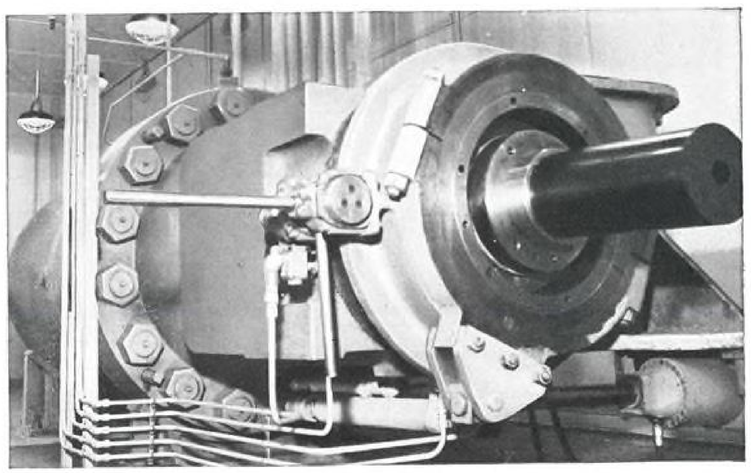




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Missile Development Hinges on Ideas

By David A. Anderton

The military services don't buy missiles; they buy ideas that will someday become missiles.

Failure to understand this particular approach to the purchasing and sales of technically complex weapons has left more than one hopeful contractor no longer hopeful.

The biggest mistake made by suppliers of the thousands of "hardware" items that go into a missile or a conventional aircraft is that they delay too long. Instead of meeting with the designers while the aircraft is in the design stage, they wait until production has started and then try to climb on board. The result: All the components and hardware have long since been specified and unless something goes wrong with one of them, there are no future orders.

This situation is a very real one. Only recently one of the nation's biggest manufacturers of a diverse product line made a survey of the guided missile portion of the aviation industry. Their aim was to ". . . get in on the ground floor of the missile business." What they didn't realize was that they would have to hurry to grab some space near the roof.

The situation is not unique for missiles. It applies to any complex, scientifically sophisticated weapon system or transportation system. It holds for the turbojet powerplant and the rocket engine, the ICBM and the early-warning radar.

For example, the Douglas Thor IRBM is in the testing stage; the first round was scheduled for firing earlier this month. By the time the test program is completed, the results have been analyzed and the missile evaluated against the Army's Jupiter IRBM, one year will have passed. The tooling, buildup to production and the like will take another year or more. By the time the missile is in production, it may be 1960.

But the parts going into the missile in 1960 were specified and committed in 1955.

Production Program

Another little-understood aspect of the missile field is the rate of build-up of production. Most missiles start life as prototypes which are fired and followed by a few more prototypes. Each of these is a hand-built vehicle, sometimes completely different from the one just before it, sometimes only slightly different.

Rarely will any two be alike.

During the life of this development program, the entire missile design is in a shifting state. Components are replaced, redesigned, reworked, removed. But gradually the missile prototypes settle down into a form that will define the ultimate production model.

When the order is given to go from prototype to production, the missile is frequently fixed at that stage of its design, with no changes to be made until a subsequent batch is ordered into production.

Here again, those vendors and suppliers who worked and sweated through the prototype development, losing money and sleep over the engineering changes, are most likely going to be the vendors and suppliers who are asked to stay with the production program.

The current rate of military spending for missiles and their supporting services approximates one billion dollars. Like other rates of military spending, this is only an estimate. The reason is that it is almost impossible to amortize research and development costs against specific projects or even kinds of projects. Another factor is that, in some cases, missile procurement is lumped in with aircraft, or even ammunition.

It has taken more than a decade to reach the billion-dollar mark. Barring unusual circumstances, the level of military spending for missile systems should rise over the next few years to an estimated $2.5 billion in 1960. There should be a shift in funds from research and development to production as the more advanced systems, today in test, become production weapons.

Of this money, the smallest portion is earmarked for actual missiles. The biggest chunk—estimated as high as 50%—goes for the complex avionic gear required to identify targets and close on them. Another large allotment goes to the supporting systems that are needed to make the missile an operational weapon instead of a laboratory test vehicle.

Current emphasis is on procurement of existing weapons such as the Army's Nike and Corporal, the Air Force's Snark and Matador, and the Navy's Sparrow and Terrier.

The military services have integrated some of these new weapons into field service use and are rapidly amassing operational training experience that will be the necessary foundation of more complex systems to come.

The Air Force, for example, is equipping its interceptors with the Hughes Falcon, an air-to-air homing missile that has demonstrated high kill power. The Martin Matador, a medium-range surface-to-surface tactical missile, has been worked into squadron use and deployed in Germany with tactical air power.

The Navy has equipped two cruisers and one destroyer so far with missiles. By 1958, its first ship will be equipped to handle the Bendix Talos, long range surface-to-air missile for area defense of the fleet. Within five years the Navy will be operating five of these Talos-equipped ships, and an additional fleet of 17 cruisers with Convair Terrier batteries and 22 smaller ships—probably destroyers—with Convairs Tartar missiles.

The Army, operating Nike batteries at more than 100 sites over the U. S., has sent field artillery battalions to Europe equipped with the Firestone-built Corporal surface-to-surface missle. Honest John field artillery rockets have also been deployed overseas with the Army. The Chrysler-built Redstone, 200-mile ballistic missile, is almost ready for issue to the troops.

In the Works

To come are the intermediate-range ballistic missiles (IRBM) now being developed for the Air Force by Douglas (Thor) and for the Army by the Army Ballistic Missile Agency (Jupiter). The Jupiter program was a joint effort by ABMA and Navy to develop a missile that would meet the requirements of both the Army and the Navy. The recent directive issued by Secretary of Defense Wilson has removed operational responsibility of Jupiter from the Army.

After these, or perhaps parallel to them, will be the big ones—the intercontinental ballistic missiles (ICBM). Convair's Atlas and Martin's Titan are both being carried through the development phases for the Air Force. In the future a choice will be made between the two.

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Welded Steel Fab. Co., Inc., P. O. Box 148, Tonawanda, N. Y.
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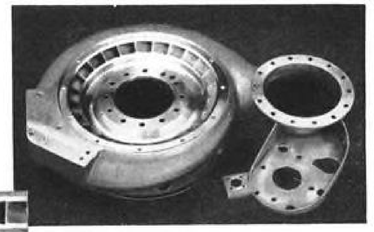
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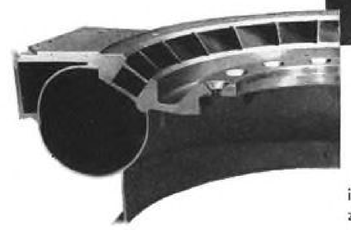
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ABOVE: Completed Power Scroll.
LEFT: Cross-Section showing intricate fabrication details.

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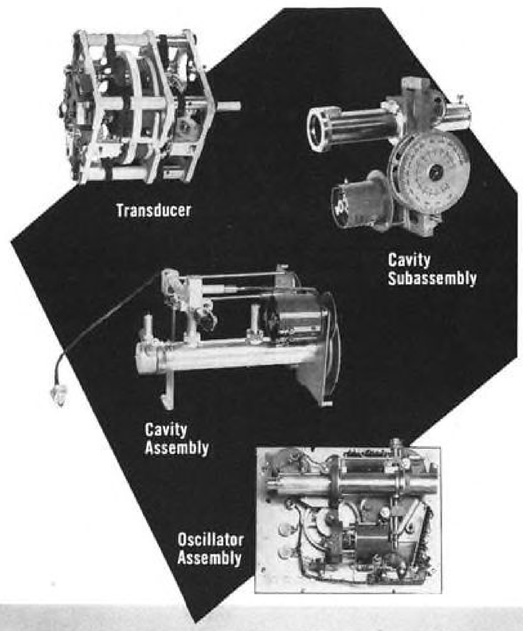
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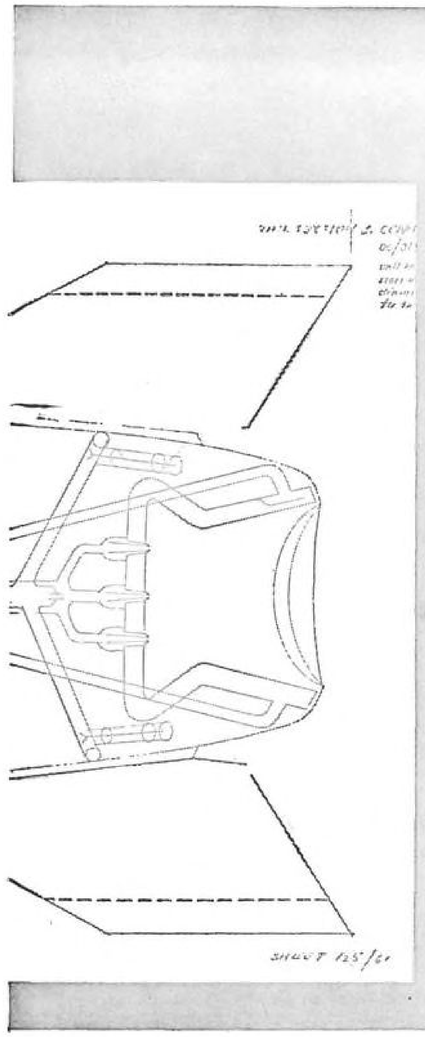
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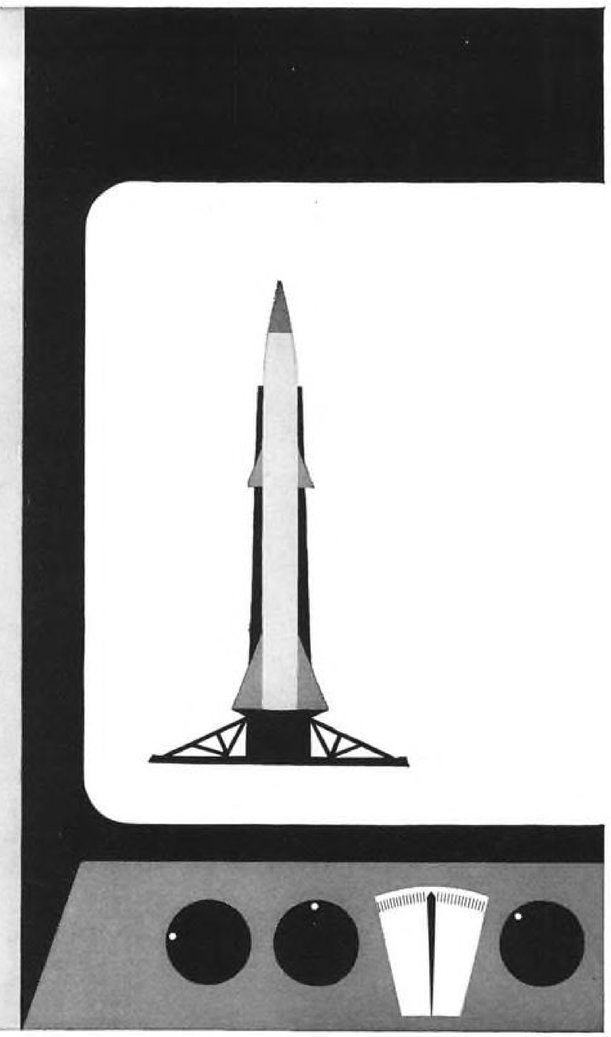
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Avionics: Industry Talent Not Utilized

By Philip J. Klass

Large avionics manufacturers, wildly beating the bushes for more engineers to expand their research and development effort, may be overlooking a more immediate, and possibly more rewarding, solution.

This is to farm out more of their small sub-system and component developments to the dozens of small avionics firms which are competent in specialized fields.

A few examples will illustrate the fact that this approach is not being fully exploited:

• **One division of a large** avionics company is seeking digital computer engineers to build up its own competency in this field for use in a new navigation system under development. Meanwhile, one of its sister divisions in the same company, with considerable experience in the airborne digital computer field, is out searching for work. The justification: It's "too much trouble" to coordinate the development because the sister division is 2,500 miles away.

• **A major avionics company** is developing its own altitude-airspeed sensor for a new flight control system, though there are more than a dozen small firms in this field. Their justification: There was nothing available that would meet the required accuracy.

Justifications

These justifications of "too much trouble to coordinate" and "nothing suitable available" are the ones most often heard. Behind these explanations may be another which is seldom voiced: A large company's corporate pride makes it reluctant to sub-contract out a small sub-system development when it has the competence, or believes it could quickly accumulate the competence, to perform the task itself.

In some instances avionics industry giants have recognized that in a time of engineer shortage it is not a question of whether they can do the job. Rather it is a question of whether a competent job could be done outside, freeing company engineers for more fruitful efforts.

For example:

• **Westinghouse Air Arm Division** several years ago recognized the trend to digital computers for fire control systems and its own lack of experience in this field, and sub-contracted out the development of an airborne digital computer to the then-small Ramo-Wooldridge Corp.

• **General Electric's Light** Military Electronic Equipment Dept. decided to sub-contract the development of the inertial portion of its new Doppler-inertial navigation system to a small company named Dynatrol, near Boston, despite the fact that there was inertial know-how within GE.

Face the Facts

During the past month, AVIATION WEEK has talked with five large avionics manufacturers who reported that they were seeking a collective total of 3,500 new engineers during the coming year. Only in one department of a large company did AVIATION WEEK find a surplus of research and development talent, and this because of a sudden cancellation of several major programs, coupled with a geographical shifting of some activities.

If the USAF decides to shift more of its funds from production to research and development, as suggested recently by Richard E. Horner, Acting Asst. Secretary of the Air Force for Research & Development (AW Nov. 5, p. 27.), the already critical demand for engineers and scientists is bound to increase.

Sooner or later avionics companies must face up to the fact that the vast numbers of new engineers they seek are not going to be found and that they must look for other ways to amplify the efforts of their engineering staffs.

The concept of "amplification"—using a small signal to control the useful output of a much larger one—is the cornerstone of all avionics equipment. Yet many large avionics companies have been slow to exploit this same concept to amplify the effort of their own engineering staffs.

Diversion of Effort

Diversion of some engineering effort from the laboratory into the management of research and development activities sub-contracted to smaller firms could provide this amplification of a company's own engineering effort.

It must be recognized that any R & D engineer worth his salt likes the challenge of tackling a new type of problem. When, in the course of developing an advanced complex system the need for new component or sub-system development becomes evident, it is all to easy to launch such development within the company.

It requires close engineering supervision to spot these forks in the development program road where work could be sub-contracted, and judgment to determine whether this added development burden should be shouldered in the company or farmed out.

One important consideration in making such a decision is whether the characteristics of the component or subsystem can be adequately defined or whether they may change as the rest of the overall system develops. The latter situation makes sub-contracting of research and development more difficult, but certainly not impossible.

Some aircraft manufacturers have argued that they ought to develop the automatic flight control system for their own aircraft because the system's characteristics must be closely tailored to airplane characteristics and form factors, both of which may change frequently during airframe design.

Despite this, many avionics companies have successfully bridged the difficult coordination problem to provide compatible automatic flight control systems. This suggests that design coordination, even when parameters are difficult to fix, is largely dependent upon the desire of both parties and their ability to provide close management of the R & D effort.

Specialization

Although it is only natural for a large avionics company to believe that its vast corporate know-how and resources should enable it to do a better job in developing a new "gizmo" than a small firm with only a few dozen engineers, this may not be the case at all. The small firm may, because of its experience in a specialized field, outperform the large one in both quality and speed. In some cases it may be able to produce the desired sub-system or component with only minor modifications of an earlier development for some other contractor.

If the avionics industry is to make maximum strides in its research and development effort, it must put less emphasis on engineering everything possible under its own roof and make better use of the nation's total engineering capability spread among thousands of companies of every size.



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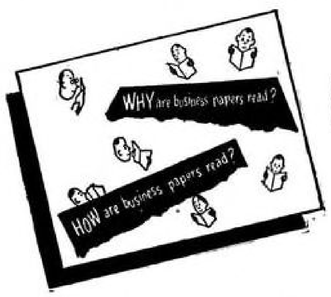
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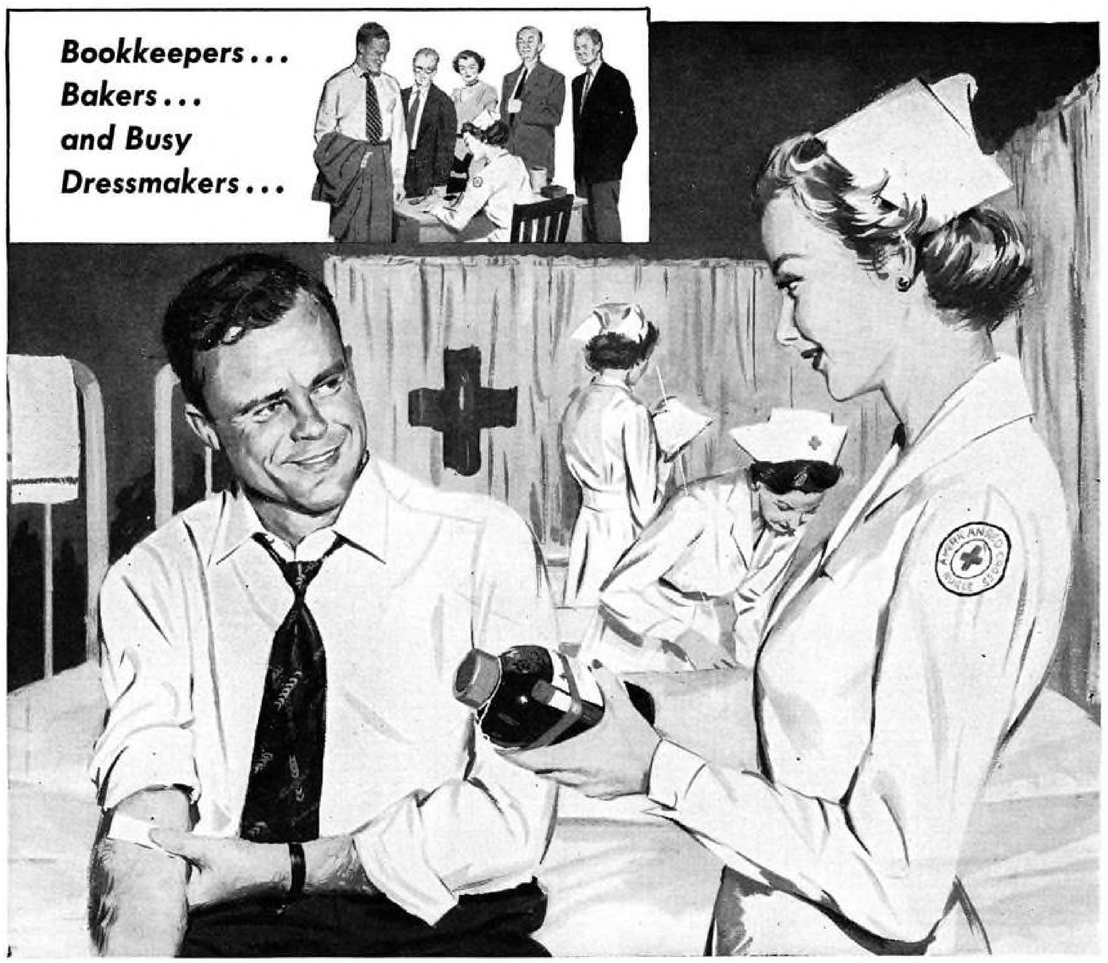


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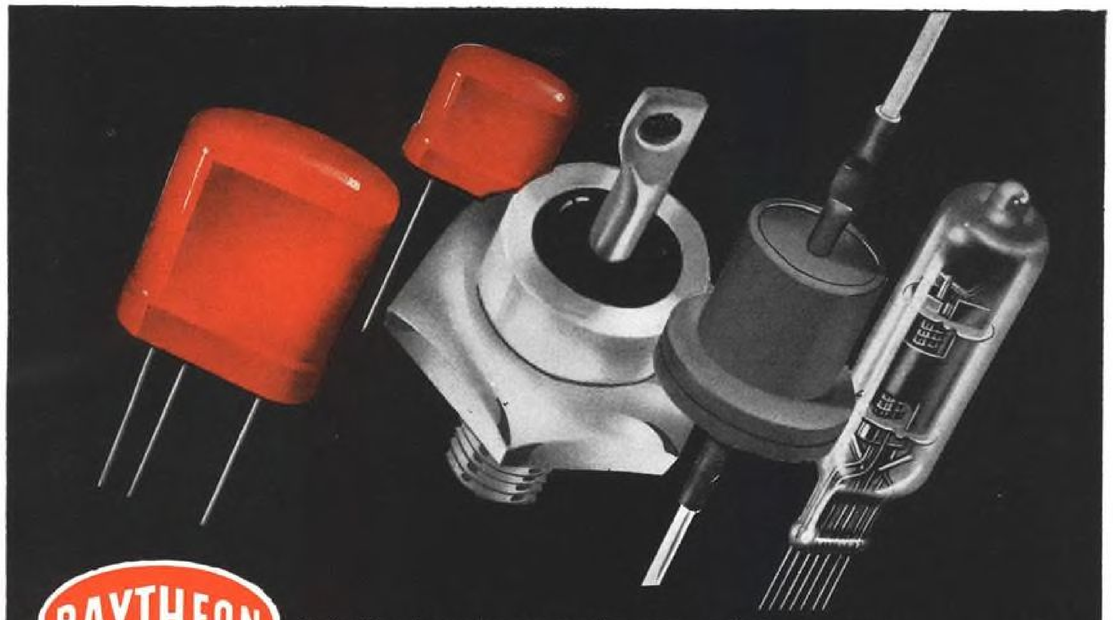
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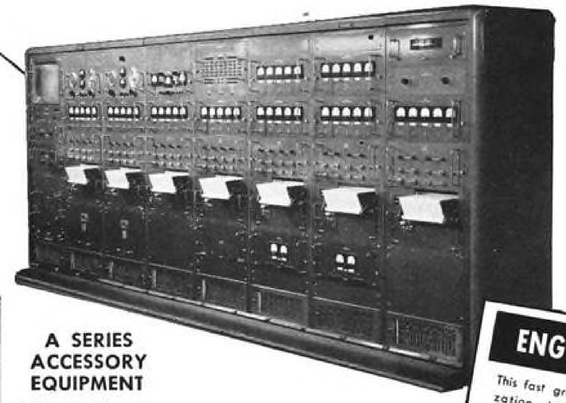
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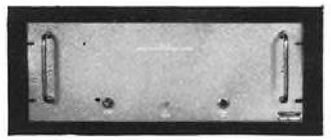
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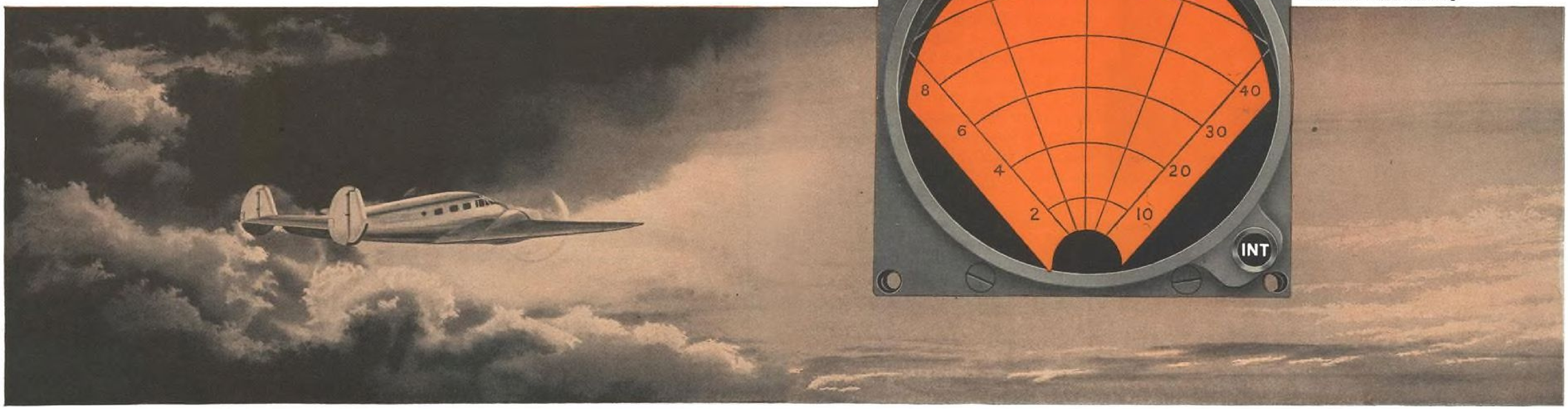
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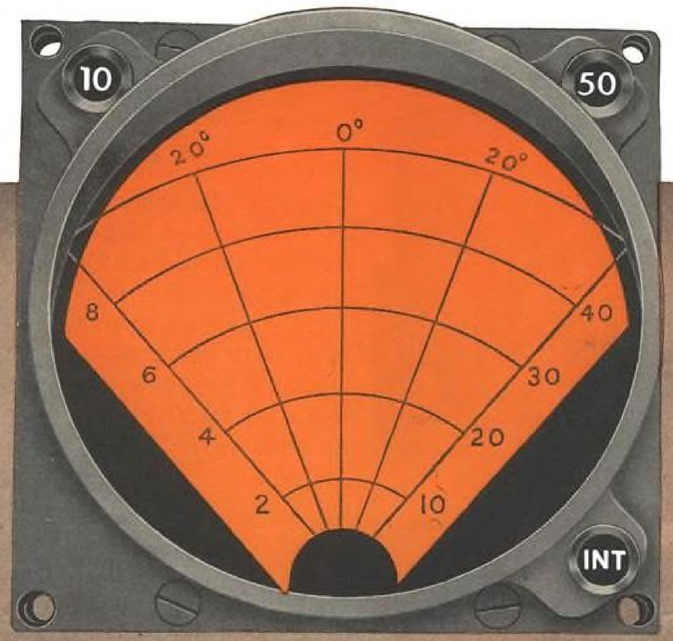
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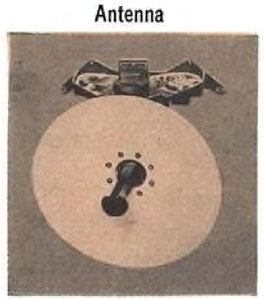
Accessory Unit



Receiver-Transmitter



Antenna



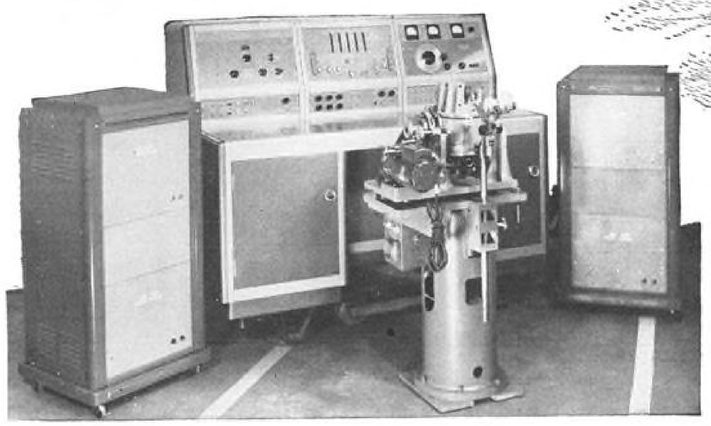
Typical Antenna Installation in Beech D-18

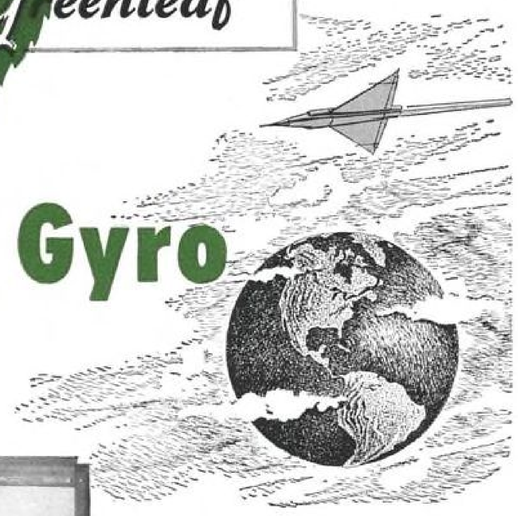


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ANOTHER FIRST BY Greenleaf

Dynamic Integrating Gyro Servo Table





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The Gyro Servo Test Table can measure the following characteristics:

1. The drift rate of the gyro unit.
2. The current product angular velocity sensitivity ratio.
3. The characteristic time.
4. The angular velocity input voltage rate output sensitivity.
5. Minimum rate detectable.
6. High limit angular velocity deviation of performance.
7. Low limit angular velocity deviation.
8. Signal generator linearity.
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10. Spin motor excitation frequency.
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READING BATTERIES DIVISION

THE ELECTRIC AUTO-LITE COMPANY

READING, PENNSYLVANIA, U.S.A.

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the people, the brain-power, the skills, the facilities,



the nearness to the market...to create, develop and produce quality electronic products and make on-time deliveries.



RESEARCH DEVELOPMENT PRODUCTION

Packard-Bell is now producing for Military and Industry **...Electronic Equipment and Systems:** communication, navigation, radar, identification, sonar, missile guidance and missile handling equipment.

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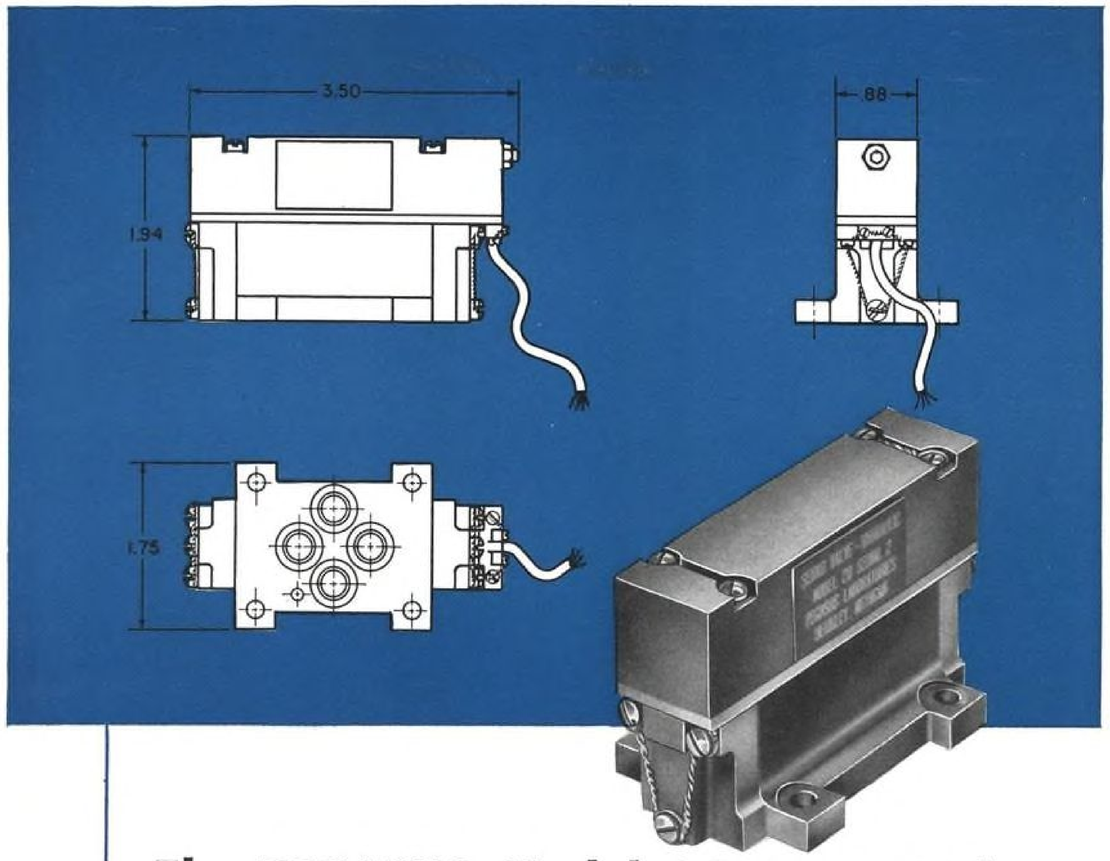
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Packard-Bell
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Los Angeles 64, California

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THE UNIT incorporates high pressure strain barriers to isolate the electrical and magnetic areas of the valve from the hydraulic oil, and uses stainless steel throughout in its construction. The balanced boost drive provides full spool differential pressure for as low as one tenth of the maximum differential current, insuring maximum sensitivity and minimum balance shifts.

WE WOULD BE PLEASED to submit more information, quotations to your specifications, or prototypes of this unit upon your request.

SPECIFICATIONS

Weight	.95 pounds
Differential Current	± 8 m.a.
Coil Resistance	1500 ohms
Coil Inductance	2 henries
Flow Rating	20 in. 3 sec.
Null Leakage	.4 in. 3 sec.
Operating Pressure	500 to 3000 p.s.i.
Operating Temperature	−65 to 450°F.

PEGASUS LABORATORIES, INC.
DESIGNERS AND MANUFACTURERS OF ELECTRO-HYDRAULIC SERVOMECHANISMS
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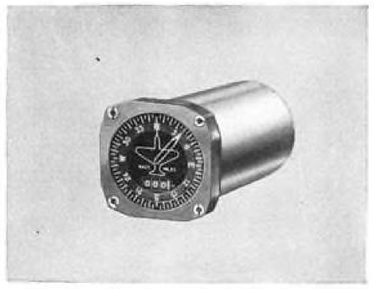
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FICo

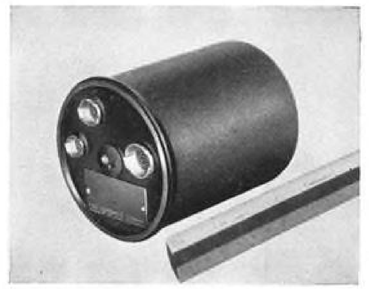
Aeronautical Systems, Subsystems and Related Equipment

The latest in navigational systems, radar techniques, instrumentation, data processing equipment—and many other types of projects are Ford Instrument Company's contributions to the field of aeronautics. FICo engineers are in the process of carrying out research studies, developing advanced systems, and overseeing the quantity production of some of the most superb equipment available anywhere.

TYPICAL FICo AERO PRODUCTS



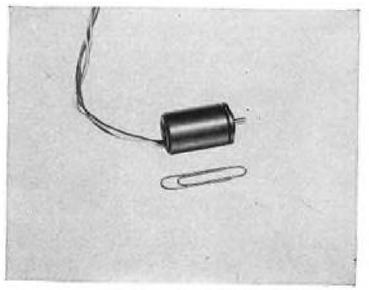
Indicator Unit of ASN-7
a dead-reckoning computer that displays course and distance.



Analog-to-Digital Converter
for airborne sensing application.



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automatically compensates for variations in earth's field.



5/8" Servo Motor
a high precision subminiature unit highly applicable to aero equipment.

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A MIDWESTERN OSCILLOGRAPH
for every recording application

This tabulation shows the many types of MIDWESTERN recording oscillographs available today.



SPECS

Model	Maximum Trace Capacity (1)	Dimensions Inches (2)	Weight Pounds (3)	Record Speed Range Inches/Sec	Record Width Inches	Magazine Capacity Feet (5)	Power Requirements	Timing Lines Sec/Line	Optical Arm Inches	Temperature Range °F	Maximum Acceleration G's	Model
560	14	5¾ x 6⅝ x 7	9	.375 To 8	3.625	50	26 Volts d.c. 3 Amps Max.	—	6.921	0 to + 160	20 (6)	560
580		7⅝ x 7⅞ x 13½	22.5	.50 To 44.75 (4)		100	28 Volts d.c. 15 Amps Max.	.01 And/Or .10	7.375	—65 to + 190	20	580
581		7⅝ x 7⅞ x 15⅜	28.5									581
544	36	11½ x 12⅞ x 20	75	1 To 50	8	200	28 Volts d.c. 10 Amps Max. or 115 Volts, 60 cps 3 Amps Max.		14.469	+ 32 to + 160	1	544
570	50	11½ x 16⅞ x 20	97		12							570
590	36	11 x 11⅝ x 21⅞	90	.082 To 129.9	7	150	(6)	(7)	11.00	—65 to + 160	15	590
591	50	11 13/16 x 16 13/16 x 24¾	130		12	250						591

FEATURES

Model	Record Numbering	Trace Identification	Automatic Record Length	Timing Line Intensity Control	Galvo Lamp Intensity Control	Record Used Indicator	Recording Malfunction Indicator	Galvo Lamp Burnout Indicator	Timing Lamp Burnout Indicator	Rotary Scanning	Remote Control	Model
560	—	—	—	—	√	—	—	—	—	—	—	560
580	—	√	—	√	√	√	—	√	√	—	√	580
581	√	√	√	√	√	√	√	√	√	—	√	581
544	√	√	√	(9)	√	√	√	√	(9)	√	√	544
570	√	√	√		√	√	√	√		√	√	570
590	√	√	√		√	√	√	√		√	√	590
591	√	√	√		√	√	√	√		√	√	591

NOTES
(1) Using MIDWESTERN 102 Galvanometers.
(2) Dimensions include all external controls and fittings but do not include mating electrical connectors or shock-mount base.
(3) Weight does not include shock-mount base.
(4) A low speed version of these models is available with all recording speeds reduced by a factor of 60.
(5) Listed magazine capacities are with Kodak Linagraph #809 Paper. Other standard recording paper or film may also be used. Larger capacity magazines are available for the 580, 581, 590, and 591 Models.
(6) May be operated from 28 volts dc, 15 amps max.; or 115 volts, 60 or 400 cps single phase, 5 amps max. by means of interchangeable plug-in power supply units.
(7) Timing lines of .001 and/or .01; .01 and/or .10; or .10 and/or 1.0 seconds intervals, by means of interchangeable plug-in units.
(8) A special version of this model is available which will withstand shock accelerations in excess of 1000 gravities.
(9) Timing lines are produced by electronic flasher-tubes. Due to their much longer operating life, warning indicators are not required; and because of their flash illumination characteristic, intensity adjustments are not necessary.

for complete details on the above oscillographs — and other MIDWESTERN test recording instruments and servo components — write

MIDWESTERN INSTRUMENTS

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Circle Number 50 on Reader-Service Card →

Hallicrafters announces a great new laboratory for

RELIABILITY EVALUATION

of guided missiles

From the first guided missile, the problem of adequate reliability has ranked high among the serious developmental problems facing both missile and component manufacturers.

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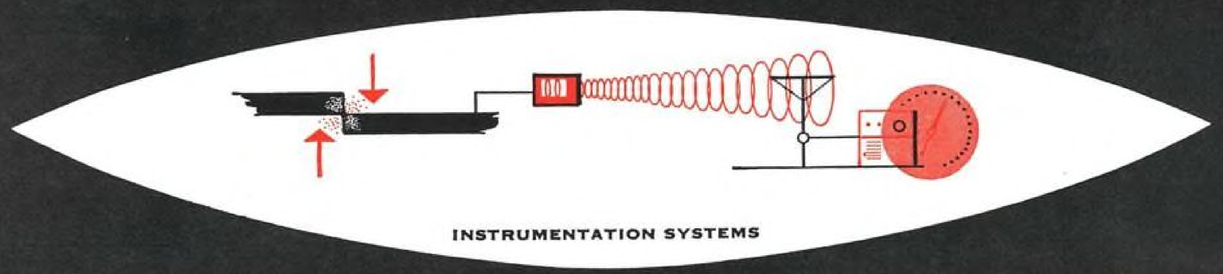
The hallicrafters Company

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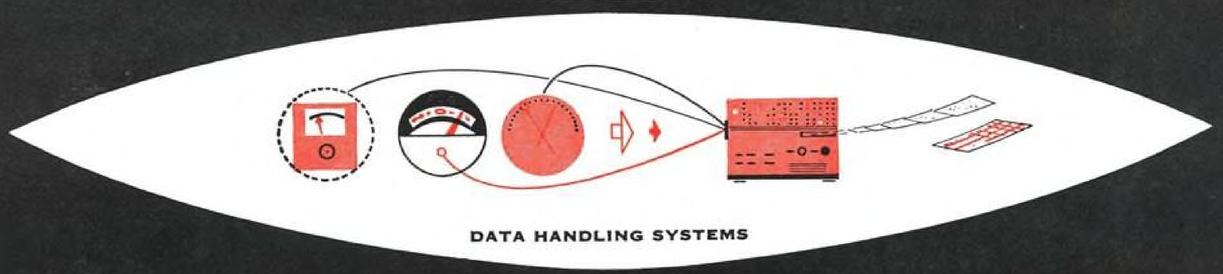
The Hallicrafters Company is Experienced and Active in: *Guided Missile Control Equipment • Communications Equipment • Countermeasures Equipment • Mobile and Fixed Radio and Teletype Stations • Micro Wave Equipment • Radio Relay Systems Portable Communications • Airborne Radar • Loran and Navigational Aids*

ELECTRONIC SYSTEMS

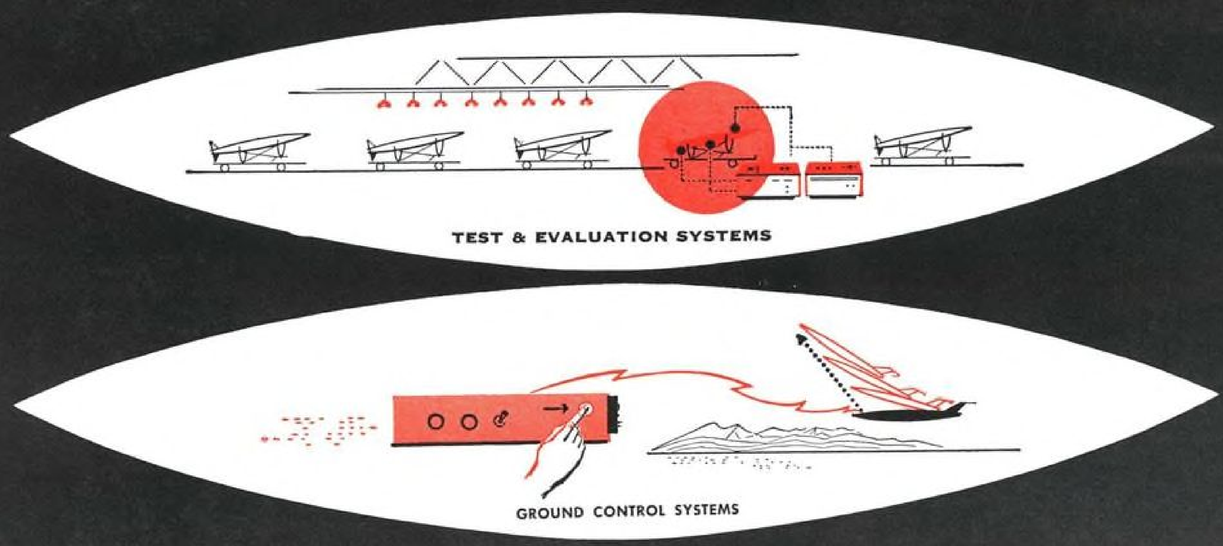
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TEST & EVALUATION SYSTEMS

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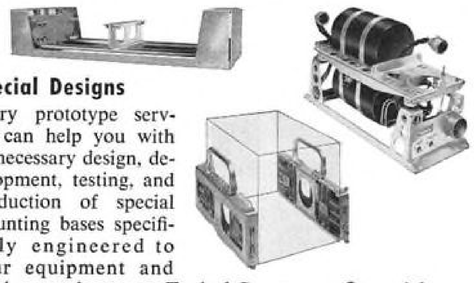
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2,000 electronic wire items IN STOCK!

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- **High Temperature Wire**
- **Sub-Miniature Wire**
- **MIL-W-5086 Aircraft Wire**
- **MIL-C-7078 Aircraft Wire**
- **MIL-W-16878B Hook-up Wire**
  - Type B
  - Type C
  - Type D
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  - Type MW
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  - Type MW Glass Braid
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- **RG-Coaxial Cable**
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- **PVC-105 Plastic Tubing per Spec. MIL-I-631B, ASTM-D876, ASTM-D922**
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Aircraft Controls

custom-engineered or standard types for a wide range of applications



TEMPERATURE CONTROLS

Cycling, full proportional, floating, electronic transistor, magnetic amplifier, polarized relay . . . for military, commercial, and business aircraft.



MOTORS

Permanent magnet and split-series d-c motors up to 1/10 hp. Also, gear heads, blowers, tach generators.



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Rotary and linear types featuring a wide range of gear reductions, switching, mounting details.



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Complete line of wire and thermistor sensing elements for use in resistance bridge control circuits.



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Integrated electric or electronic systems designed to your specifications. Anti-hunt feature provided by unique circuitry.

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Rate
Tach
Reference
Power
Damping

GENERATORS

to your precise specifications.

MANUFACTURED UNDER CLOSE QUALITY CONTROL INCLUDING 100% ELECTRICAL INSPECTION.

TYPE GENERATOR	SIZE	OSTER TYPE	MOUNTING	LENGTH INCHES	MOTOR: Power Supply	MOTOR: Min. Stall Torque oz-in	MOTOR: No Load Speed RPM	MOTOR: Total Watts Input At Stall	MOTOR: Rated Voltage: Fixed Phase	MOTOR: Rated Voltage: Control Phase	GENERATOR: Output Voltage Gradient Volts/1000 RPM No Load	GENERATOR: Linear Up To RPM	GENERATOR: Excitation Voltage	GENERATOR: Null Voltage Millivolts	GENERATOR: Phase Shift
A.C. Tachometer	10	10-MTG 6227-01	Face	2-9/16	400~	.1	9,500	10	115	115	12.5 200~ at 6000RPM	—	—	—	—
Rate	10	10-MTG 6226-02	Syn-chro	2-9/64	400~	.3	6,500	—	26	26	.24	4500	26V 400~	23	—
Rate	10	10 6677-01	Face	1-3/8	Mech. Driven	—	—	—	—	—	.41	8000	18V 400~	50	—
Rate	10	10-MTG 6231-01	Syn-chro	2-3/16	400~	.26	19,400	14	26	26	.34	8000	26V 400~	23	7°
Rate	10	10-MTG 6226-04	Syn-chro	2-15/16	400~	.3	6,500	6.2	26	26	.45	4000	18V 400~	50	—
Rate	10	6229-03	Syn-chro	2-1/8	400~	.25	10,500	6.0	26	26	.3	4000	18V 400~	12	—
Rate	10	6229-02	Syn-chro	1-5/8	400~	.25	10,000	6.0	26	26	01-5.5 ø2 .115	4000	18V 400~	12	0±5°
Rate	10	6229-05	Face	2-1/8	400~	—	10,000	6.0	26	26	.3	4000	18V 400~	12	—
Tachometer Squirrel Cage Rotor	10	10-TG 6676-01	Syn-chro	1-1/16	Mech. Driven	—	—	—	—	—	.3	4500	6.3V 100~	—	—
Tachometer Squirrel Cage Rotor	15	15 5151-01	Syn-chro	1-13/64	Mech. Driven	—	—	—	—	—	1.3	4500	115V 400~	50	—
A.C. Tachometer D.C. Motor	15	15-MTG 6276-01	Syn-chro	3-7/16	D.C.	2	11,000	—	28 D.C.	—	.25	5000	115V 400-1200~	25	15°
Damping	21	D 5851-01	Face	2-11/16	400~	3.5	7,500	40	115	115	.022	6500	26V 400~	—	—
D.C. Tachometer	12	12-D 8301-02	Face	2-1/4	Mech. Driven	—	—	—	—	—	2.7	8000	P.M.	—	—

	SIZE	OSTER TYPE	MOUNTING	LENGTH INCHES	Phase 1 Output Voltage	Phase 1 Output Current	Phase 2 Output Voltage	Phase 2 Output Current	Output Frequency	Speed At Rated Output	Type Rotor	Torque Input
Dual Output	10	6702-01	Syn-chro	1-5/8	67	.011 A	1.4	.150 A	400~	12,000	P. M.	—
A.C. Power	17	6951-03	Syn-chro Spec.	1-9/16	24	.85 A	24	.85 A	420~	12,600	P. M.	3.5 oz.in.
Reference	25	23-TG 6776-01	Syn-chro	4	40	.0375 A	40	.0375 A	35~	2,100	P. M.	—

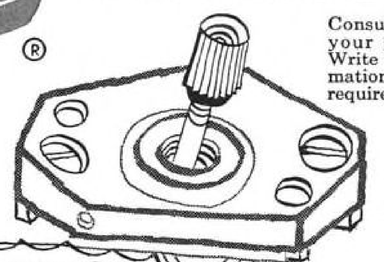


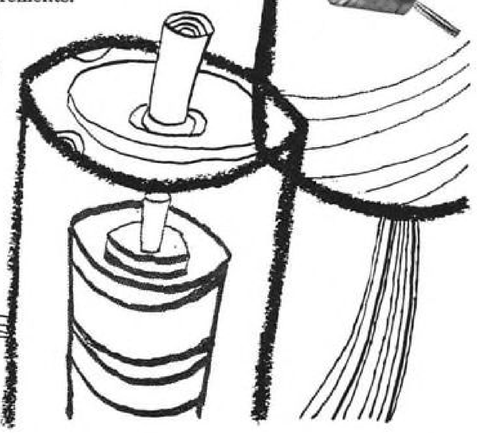
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EXCITATION VOLTAGE • OPERATING TEMPERATURE RANGE • INPUT AND OUTPUT • IMPEDANCE • PHASE SHIFT • HUMIDITY RESISTANT • FUNGUS RESISTANT • MIL SPEC TO BE MET • GEAR TRAIN AVAILABLE • BRAKE AVAILABLE •

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Consult Oster specialists on your generator problems. Write today for further information, stating your detailed requirements.





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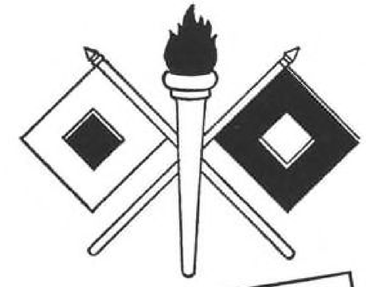
Avionic Division Racine, Wisconsin

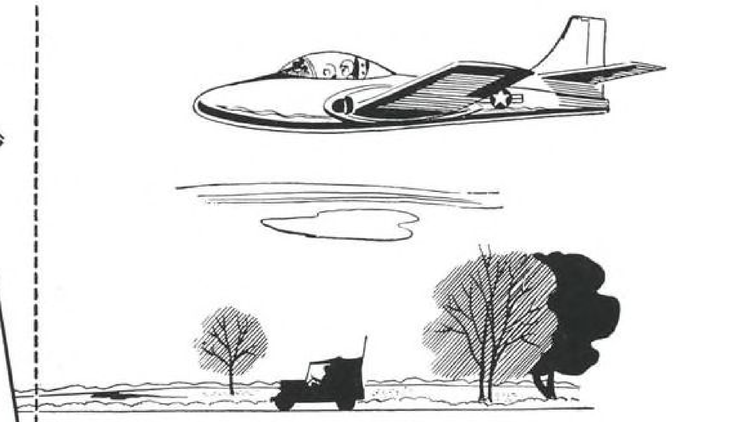
BURTON BROWNE ADVERTISING

Circle Number 57 on Reader-Service Card

Winco dynamotors qualify

for Signal Corps Reduced Inspection Plan





MEMO

TO: Dynamotor Users—
We ran this Advertisement in June, 1955, Now—18 months later—
Wincharger Still is the only Dynamotor Manufacturer qualified under the Signal Corps' Reduced Inspection Quality Assurance Plan!

The Wincharger Corporation's long history of producing dynamotors *equal to or better than the Acceptability Quality Level established by the government* has resulted in the Signal Corps' selection of Winco dynamotors for its Reduced Inspection Quality Assurance Plan.

As of this writing, *Wincharger is the only manufacturer of dynamotors qualified under RIQAP.* Only those suppliers who have consistently furnished material of the highest quality level and who maintain quality control and inspection methods and procedures acceptable to the Signal Corps are considered for this honor.

This new Signal Corps plan places more responsibility for maintenance of quality on the manufacturer by reducing the amount of government inspection. It is an honor inspection program.

What does Wincharger qualification for RIQAP mean to you — further evidence that you can depend on Winco Products.

WINCHARGER CORPORATION
Sioux City 2, Iowa
Subsidiary of Zenith Radio Corporation

WINCO®

Power for the nation's mobile communications

C-100

Circle Number 58 on Reader-Service Card

ULTRASONIC CLEANING BY THE SQUARE FOOT

Recent improvements in ultrasonic power-generating equipment, and the perfection of hermetically-sealed transducers operating at 40 kc/sec., have now made it economically feasible to apply ultrasonic cleaning to areas measured by the square foot.



The large, uniform radiating surface of the transducers makes them particularly suitable for the removal of buffing compounds, radioactive contamination, soldering flux, plaster, carbon smut, etc. The transducers can also be used for other processes such as quenching, plating, pickling, descaling and dyeing. The cleaning action penetrates deeply into blind holes and other areas difficult or impossible to clean by conventional methods.

The Branson LF-15 Transducers have a radiating surface 2⅝" x 6" with thick barium-titanate driving elements that transmit the energy through the top of the stainless-steel housing directly into the cleaning solvent. The modular design of the transducers facilitates a wide choice of flushed and focused arrangements of transducers.

Generator-Transducer combinations are available with radiating areas from ¼ to 4 square feet:

SONOGEN® MODEL	TRANSDUCER CLEANING AREA
AP-25B	¼ sq ft
APT-100B	1 sq ft
APT-400B	4 sq ft

ULTRASONIC GAGING TO THE 10/000th

The Branson Vidigage®, with 14" or 21" Cathode-Ray Screen and infinite choice of direct-reading scales between 0.005" and 2.5" of steel, gages with an accuracy between 0.1% and 1.0%. Measures from one side; detects laminar flaws. Extension cables up to 1000 ft. for testing in remote locations.

BRANSON ULTRASONIC Corp.
12 Brown House Road
Stamford, Connecticut

Circle Number 59 on Reader-Service Card



BOURNS now offers an expanded line of

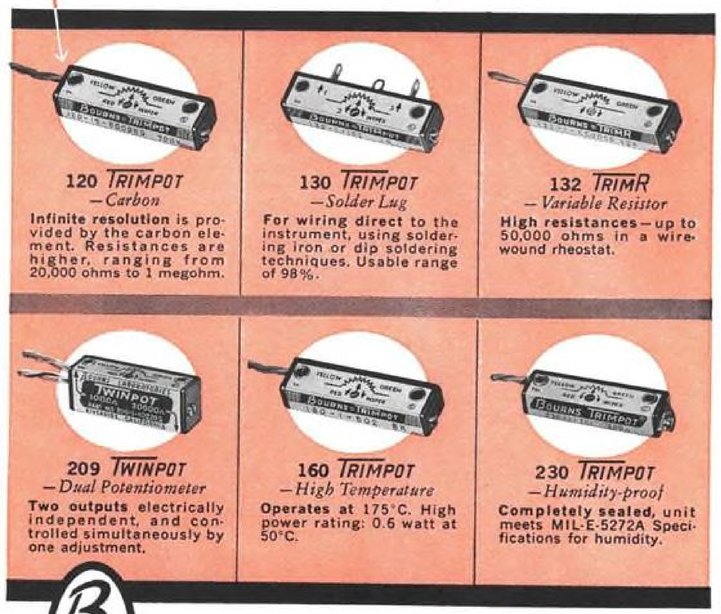
TRIMPOTS®

...7 stock models of sub-miniature potentiometers to serve many special needs—at no extra cost!

First there's the 120 Wirewound *TRIMPOT*, with features common to all other BOURNS *TRIMPOTS*. It's a 25-turn potentiometer, easily adjusted, and weighing only 0.1 oz. Rectangular in shape, it fits readily into miniature electronic circuits. You can mount it individually, or stack it compactly with standard screws. Mountings are interchangeable with those on all other *TRIMPOTS*.

The self-locking shaft holds stable settings under extreme environmental conditions. All parts are corrosion resistant. Every unit is inspected 100% for guaranteed specifications. Resistances: 10 to 20,000 ohms, with resolutions as low as 0.2%.

Now, to give designers greater latitude, BOURNS has developed and is manufacturing the following standard models—variations of the Model 120.



120 *TRIMPOT*
—Carbon
Infinite resolution is provided by the carbon element. Resistances are higher, ranging from 20,000 ohms to 1 megohm.

130 *TRIMPOT*
—Solder Lug
For wiring direct to the instrument, using soldering iron or dip soldering techniques. Usable range of 98%.

132 *TRIMR*
—Variable Resistor
High resistances—up to 50,000 ohms in a wirewound rheostat.

209 *TWINPOT*
—Dual Potentiometer
Two outputs electrically independent, and controlled simultaneously by one adjustment.

160 *TRIMPOT*
—High Temperature
Operates at 175°C. High power rating: 0.6 watt at 50°C.

230 *TRIMPOT*
—Humidity-proof
Completely sealed, unit meets MIL-E-5272A Specifications for humidity.

Write for literature on the BOURNS TRIMPOT line.

BOURNS LABORATORIES
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Plants: Riverside, California—Ames, Iowa

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C-101

communication navigation control

Collins new airborne electronic system

Engineered for those customers who require the finest equipment obtainable —Collins new Airborne Electronic System is as advanced as the Jet Age. A complete package installation in communication, navigation and control is *Lightweight*—savings up to 65%, *Compact*—volume reductions of up to 60%, *Efficient*—power reductions of 50% or more, and *Modularized*—for complete flexibility on any multi-engined aircraft—piston or jet.

more reliable

less weight

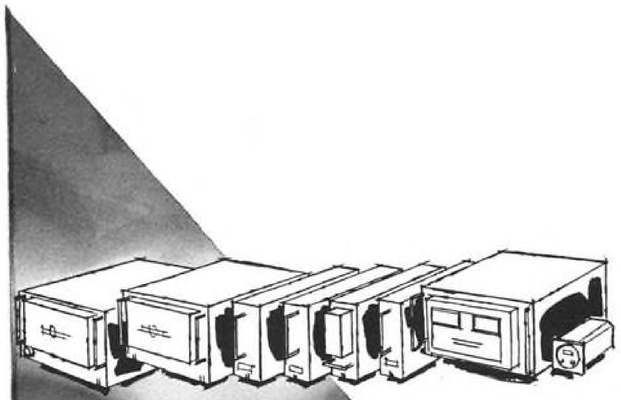
more compact

less power

more flexible

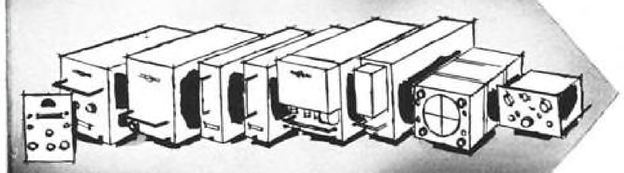


Top Shelf: Dual Integrated Flight System; 2nd shelf: dual VHF Xmtrs and Rcvrs, dual Selcal; 3rd shelf: Automatic Pilot, dual VOR/LOC Rcvrs, SSB HF Rcvr; 4th shelf: dual SSB HF Xmtr, dual Glideslope Rcvrs; 5th shelf: second SSB HF Rcvr, ATC Beacon Transponder, Radar Synchronizer; Bottom shelf: dual ADF, Interphone Amplifier, Marker Rcvr, and R/T of Radar.



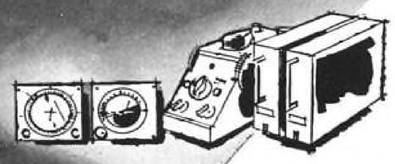
COMMUNICATION

Only Collins offers such a complete line of communication equipment—VHF, HF, HF SSB, Interphone and Selcal. Modularized, transistorized, each with an integral, removable power supply. The latest unit, the Collins new SSB 1 KW transmitter-receiver, will set the new standard in global operations.



NAVIGATION

Collins, as always, the leader in navigation equipment, brings this new package which includes ADF, VOR receiver and instrumentation, ATC Beacon Transponder, Marker and Glideslope Receivers, and Weather Radar. Representative of the new lightweight navigation equipment is the 15 pound ADF Receiver built to ARINC Characteristic 530A.



CONTROL

Using Collins control package, smooth, precise, flight control is achieved with Collins tubeless, modularized Automatic Pilot. Outstanding instrumentation is provided by Collins Integrated Flight System—the original; the IFS also gives excellent manual flight control.



Call the nearest sales office for information, or write for the new Airborne Electronic System brochure.

Collins CREATIVE LEADER IN AVIATION ELECTRONICS

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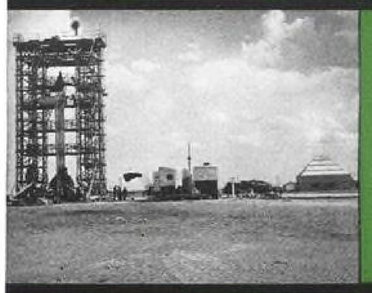
SYSTEM DESIGN

In your own plant our engineers can specify and design cable and cable components to meet your exact SYSTEM requirements.

SYSTEM FABRICATION

At this modern cable plant we build custom-made cable with facilities for fabricating and molding multi break-out harnesses and attaching and "potting" connectors so that a complete SYSTEM hook-up is provided.



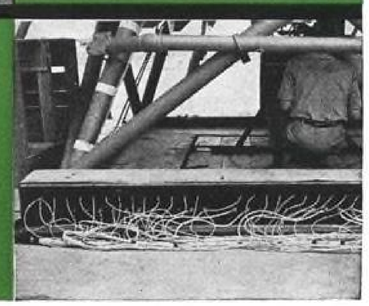


SYSTEM INSTALLATION

On-site installations in trailers and block houses of our custom-made cables and components are supervised by our field engineers to provide complete SYSTEM integration.

SYSTEM CHECK-OUT

Testing of on-site installations for circuitry by Pacific Automation Products engineers assures functional reliability of the electrical SYSTEM.



Write for Bulletin 161

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C-104



These 3 Sensing "Fingers"

Convert Motion to Electrical Signals

New Electro Energy Transducers for Extra Sensitivity, High Temperature and Limited Space Requirements

Without mechanical contact, these magnetic pickups produce AC voltage proportional to the rate of motion or speed of any nearby ferrous metal object. Voltage can be used to "automate" electrical operations or actuate counting, measuring or indicating instruments. Low price permits use in original equipment.

3015HT—Miniature model for high temperatures up to 500° F. $19.50 list

3010 AN—Standard model with Army-Navy connector. $22.50 list

3030 HTAN—For high temperatures up to 500° F. Army-Navy connector. $29.50 list

Complete Line of Transducers for Speed, Control, Counting Measurements! Send for Bulletin Telling How They Can Work For You!

Electro

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ruggedization

-that goes BEYOND today's frontiers!



E-I COMPRESSION TYPE PLUG-IN CONNECTORS

Exclusive E-I compression construction provides super-rugged seals that withstand the most gruelling operating environments

These time-proven E-I seals have demonstrated their ability to withstand the most severe environments encountered in today's critical applications. Highly resistant to shock and vibration, E-I compression plug-in connectors provide maximum immunity to humidity and wide temperature fluctuations. In thousands of commercial and military components, rugged E-I compression seals have been proven to possess electrical and mechanical characteristics that exceed requirements.

Your nearest E-I field engineer will gladly supply complete information on—

- SPECIAL APPLICATION and CUSTOM SEALS
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- DIODE and TRANSISTOR CLOSURES
- MULTI-LEAD HEADERS
- SINGLE LEAD TERMINALS • END SEALS

Octal Plug-in Connectors

Keyed and gaged for use with RETMA octal type sockets. Terminations supplied to meet practically any requirement.



Vibrator and Special Connectors

Designed for vibrator, chopper and lock-in sockets. Except for lock-in types, orientation by pin arrangement eliminates locating key need.



Noval Plug-ins

Gaged for precise fit in standard type noval sockets.



Miniature types

Same super-rugged construction as large connectors.



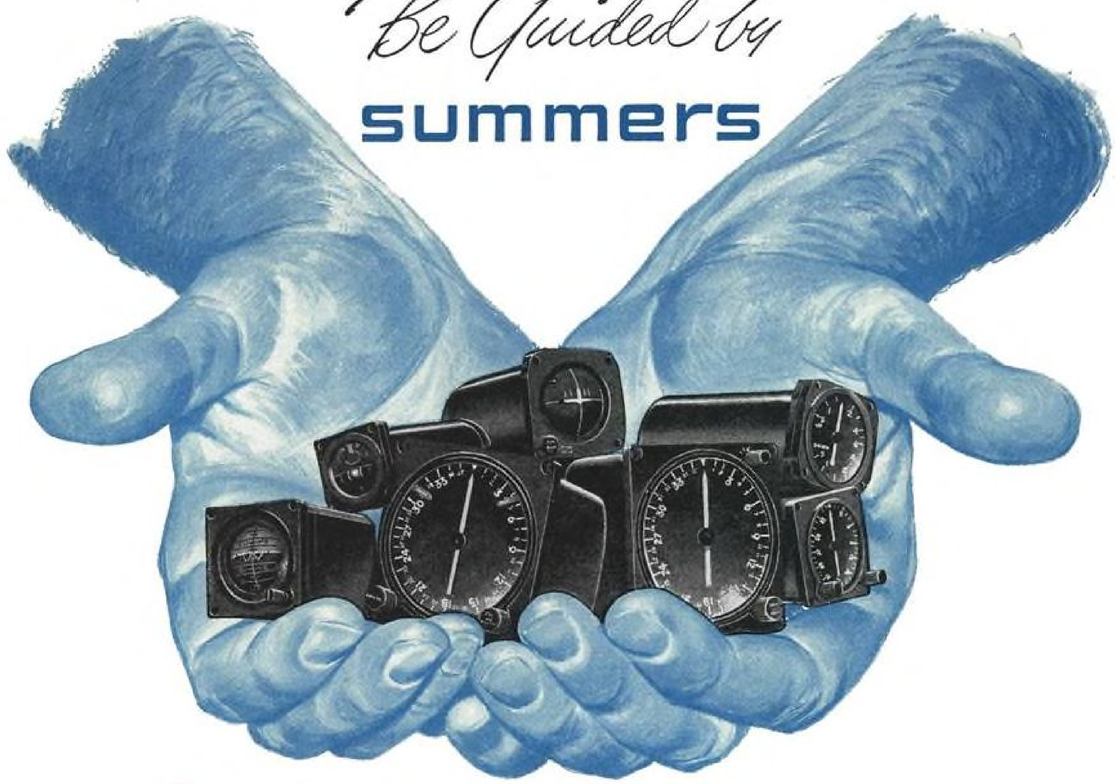
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Vertical Gyro Indicator (VGI)	MM-1, MM-2, K-4B: ~~MIL-I-25058, MIL-C-6585B~~
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Circle Number 65 on Reader-Service Card

PSP SOLENOIDS COVER THE FIELD!

What do you want in SOLENOID PERFORMANCE?



HIGH PRESSURE TYPES?

PSP high pressure DC solenoids, engineered in accordance with aircraft solenoid specification MIL-S-4040A, will withstand internal fluid burst pressures to 7,500 psi, operate at pressures to 1,500 psi in the plunger cavity, withstand ambient temperatures to 500°F! Other features: dynamically balanced plungers, precision adjustable plunger stroke, continuous duty operation on 30 Volts DC.

HIGH TEMPERATURE TYPES?

PSP "hot" solenoids incorporate special wiring, special insulation and high temperature switches to operate without fail in ambient temperatures to 600°F. and beyond. Engineered to provide positive, reliable actuating force in applications where heat is a problem. Made in single and double coil and push or pull types.





HIGH VOLTAGE TYPES?

PSP provides DC solenoids in the 60-300 Volt range for electronic control systems on computers, missiles and aircraft. Important advantages: the same power can be obtained with less current . . . savings in weight can be realized . . . units will operate directly in electronic equipment without special circuits.

MINIATURES?

These little PSP solenoids can do **big** jobs in computers, memory units, gyros and other avionic controls! They are made in a range of types for all applications requiring short strokes.





CO-AXIAL VALVES?

This miniature co-axial solenoid-operated valve uses the plunger of the solenoid as a means of admitting and shutting off flow of air. Model shown has $\frac{1}{16}$" flow orifice, operates on continuous duty and under opening and closing pressures to 200 psi with 14-30 Volts DC applied, at ambient temperatures to 500°F.

PSP engineers will be glad to recommend one or more of 400 standard solenoids to fit your needs—or work with you toward solution of your problem.

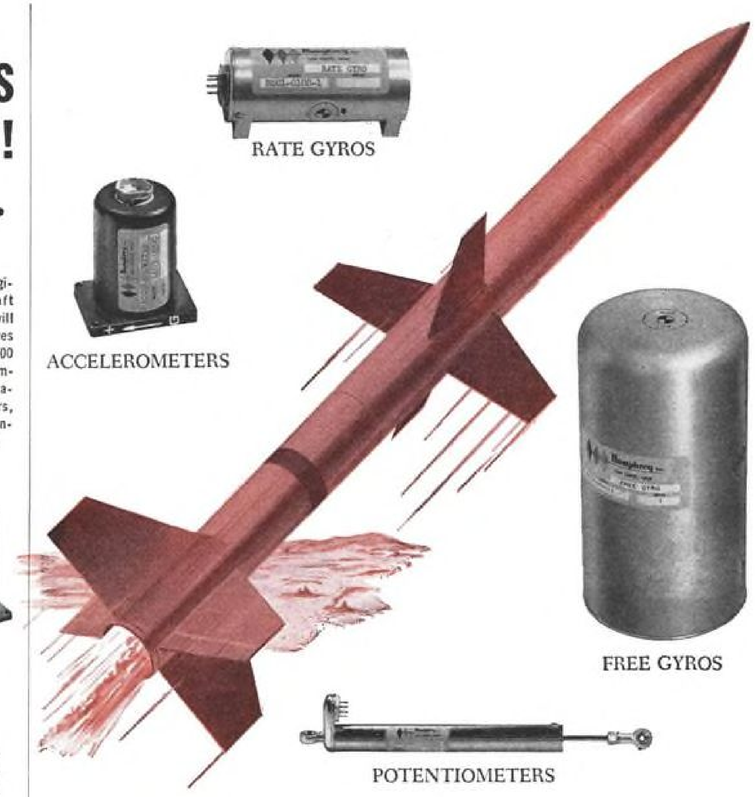
YEARS OF ENGINEERING KNOW-HOW, PERFORMANCE-PROVEN DEPENDABILITY AND THE HIGHEST STANDARDS OF QUALITY ARE BACK OF EVERY PSP SOLENOID MANUFACTURED.

PSP SOLENOIDS

Send for the informative PSP catalog!

PSP ENGINEERING COMPANY
DIVISION OF INDUCTION MOTORS
8608 Otis Street, South Gate, California

Circle Number 66 on Reader-Service Card



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TAKCAL



• • • Reads Jet Engine Speed to Guaranteed Accuracy of 10 RPM in 10,000 RPM (±0.1%)

Checks Tachometer System

Adapts to any Frequency Problem

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The new B&H TAKCAL incorporates a refinement of the frequency meter principle. It operates in the low (0 to 1000 cps) range, reading the frequency of the tachometer generator on a scale calibrated in percent RPM corresponding to the engine's RPM. In addition, the TAKCAL checks the tach system. The TAKCAL circuit and tachometer are parallel so that readings can be made simultaneously to determine the accuracy (or inaccuracy) of the aircraft's tach system. The TAKCAL operates during the engine run to properly set up engine controls for maximum economy and safety.

The TAKCAL's component parts are identical with those used in the J-Model JETCAL Analyzer. They are here assembled as a separate unit tester and for use with all earlier models of the JETCAL Tester.

The TAKCAL operates accurately in all ambient temperatures from −40°F. to 140°F. Low in cost for an instrument of such extreme accuracy, it is adaptable to application in many other fields.

Explosion-proof TAKCAL for special applications. Measures 200 to 7500 RPM, direct reading, with ±0.1% accuracy.



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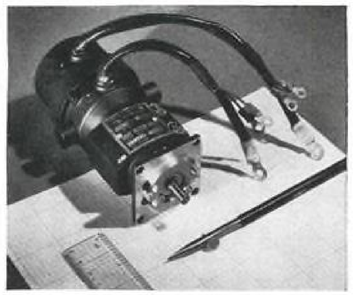
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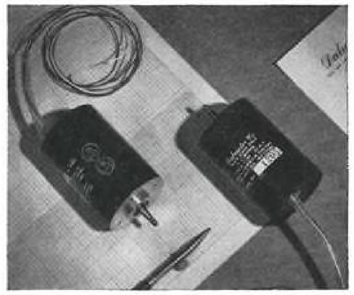
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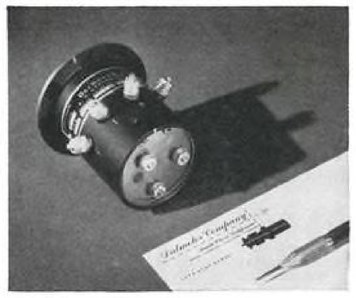
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cppc

for ALL Types of SYNCHROS

SIZE 8



Weight 32 gms.
Dia. .750 in.
Actual Size

STANDARD UNITS — ROTOR — STATOR — IMPEDANCE

SYNCHRO FUNCTION	CPPC TYPE	Input V. 400cy	Input Amps.	Input Watts	Ohms (DC)	Output Rotor	Sensitivity (MV/deg.)	Output Volts	Sensitivity (MV/deg.)	Input Volts	Input Amps.	Input Watts	Ohms (DC)	Zro	Zso	Zrss
Torque Transmitter	CGC-8-A-7	26	.100	.5	37	—	—	11.8	200	—	—	—	12	54+j260	12+j45	76.4+j19.6
Control Transformer	CTC-8-A-1	26	.050	.25	143	24	410	11.8	200	11.8	.090	.23	25	220+j740	28+j110	246+j60
Control Transformer	CTC-8-A-4	—	—	—	381	24	410	—	—	11.8	.037	.09	60	508+j1680	67+j270	640+j190
Control Differential	CDC-8-A-1	—	—	—	36	11.8	200	—	—	11.8	.085	.21	25	38+j122	27+j120	48.6+j13.8
Electrical Resolver	CSC-8-A-1	26	.039	.43	230	23.2	400	10.6	180	11.8	.084	.27	27	280+j600	38+j136	70+j136
Torque Receiver	CRC-8-A-1	26	.100	.50	37	—	—	11.8	200	—	—	—	12	54+j260	12+j45	85.1+j20.4

Phase Shift R-S	Phase Shift S-R	Nulls (MV)	Possible Error	Possible Spd.	Length in inches
8°	—	30	7′	14′	1.240
	8.5°	30	7′	14′	1.240
—	9.2°	30	7′	14′	1.240
—	9°	30	7′	14′	1.240
20°	11°	30	7′	14′	1.240
8°	—	30	30′	30′	1.240

SIZE 10



Weight 50 gms.
Dia. .937 in.
Actual Size

STANDARD UNITS — ROTOR — STATOR — IMPEDANCE

SYNCHRO FUNCTION	CPPC TYPE	Input V. 400cy	Input Amps.	Input Watts	Ohms (DC)	Output Rotor	Sensitivity (MV/deg.)	Output Volts	Sensitivity (MV/deg.)	Input Volts	Input Amps.	Input Watts	Ohms (DC)	Zro	Zso	Zrss
Torque Transmitter	CGC-10-AS-4	26	.160	.71	17.5	—	—	11.8	200	—	—	—	7.5	29+j165	7.6+j28	47+j16
Control Transformer	CTC-10-AS-1	26			135	26.0	450	11.8	200	11.8	.081	.18	25	206+j756	28+j122	234+j81
Control Transformer	CTC-10-AS-4	—	—	—	99	23.0	400	—	—	11.8	.022	.062	550	910+j2770	126+j448	945+j325
Control Differential	CDC-10-AS-1	—	—	—	35	10.8	195	—	—	11.8	.080	.23	25	52+j152	38+j115	57+j17
Torque Receiver	CRC-10-AS-1	26	.088	.44	34	—	—	11.8	200	(11.8 V. Transmitting Stator)			12	57+j289	13+j49	80+j27
Electrical Resolver	CSC-10-AS-1	1-26	.037	.38	220	21.0	365	11.2	195	11.8	.074	.22	28.5	262+j650	39+j156	308+j71
Vector Resolver	CVC-10-AS-1	1-26	.055	.32	70	—	—	11.8	200	11.8			28	109+j460	39+j108	170+j59
Vector Resolver	CWC-10-AS-1	1-26	.040	.28	111	21.0	365	11.8	200	11.8	.080	.26	28	177+j625	91+j143	215+j70

Phase Shift R-S	Phase Shift S-R	Nulls (MV)	Possible Error	Possible Spd.	Length in inches
5.8°	—	30	12′	12′	1.241
	8.5°	30	15′	15′	1.241
—	9.0°	30	15′	15′	1.241
—	9.2°	30	10′	15′	1.281
5.2°	—	30	30′	30′	1.241
18.4°	10.5°	1MV/V	15′	15′	1.281
8.1°	14.2°	1MV/V	15′	15′	1.241
	10.4°	1MV/V	15′	15′	1.241

SIZE 11



Weight 82 gms.
Dia. 1.062 in.
Actual Size

STANDARD UNITS — ROTOR — STATOR — IMPEDANCE

SYNCHRO FUNCTION	CPPC TYPE	Input V. 400cy	Input Amps.	Input Watts	Ohms (DC)	Output Rotor	Sensitivity (MV/deg.)	Output Volts	Sensitivity (MV/deg.)	Input Volts	Input Amps.	Input Watts	Ohms (DC)	Zro	Zso	Zrss
Torque Transmitter	CG-11-B-2	26	.170	.71	11	—	—	11.8	200	—	—	—	3.8	24+j147	5+j24	27.8+j13.6
Control Transmitter	CG-11-B-7	26	.085	.33	20	—	—	11.8	200	—	—	—	8.5	48+j313	12+j55	484+j225
Torque Transmitter	CG-11-B-6	115	.042	.71	180	—	—	11.8	200	—	—	—	3.8	405+j2700	5+j24	49.6+j21
Control Transformer	CT-11-B-2	26			46.5	23	400			11.8	.140	.30	8.6	97+j422	15+j71	81+j40
Control Transformer	CT-11-B-8	—	—	—	47	23	400	—	—	11.8	.098	.18	13	100+j620	19+j100	
Control Transformer	CT-11-E-7	—	—	—	185	23	400	—	—	11.8	.036	.08	34	390+j1650	60+j275	320+j163
Control Differential	CD-11-B-2	—	—	—	12	11.8	200	—	—	11.8	.150	.38	8.5	14+j67	17+j66	62+j27.6
Torque Receiver	CR-11-B-2	26	.100	.43	20	—	—	11.8	200	(11.8 V. Transmitting Stator)			7.5	40+j260	10+j40	49.8+j21
Electrical Resolver	CS-11-B-2	1-26	.050	.33	75	23.5	405	12.6	220	12.6	.094	.26	14	130+j500	28+j130	126+j43
Vector Resolver	CV-11-B-2	3	.730	.55	.7	3.2	55	23.4	410	26	.100	.36	18	1+j4	36+j260	

Phase Shift R-S	Phase Shift S-R	Nulls (MV)	Possible Error	Possible Spd.	Length in inches
3.9°	—	30	12′	12′	1,600
2.5°	—	30	12′	12′	1.600
3.4°	—	100	12′	12′	1.600
	4.9°	30	12′	12′	1.600
—	5°	30	12′	12′	1.600
—	5.5°	30	12′	12′	1.600
—	5°	30	10′	12′	1.640
4°	—	30	30′	30′	1.600
8°	8°	1MV/V	12′	12′	1.640
9.5°	4°		12′	12′	1.600

SIZE 15



Weight 126 gms.
Dia. 1.437 in.
Actual Size

STANDARD UNITS — ROTOR — STATOR — IMPEDANCE

SYNCHRO FUNCTION	CPPC TYPE	Input V. 400cy	Input Amps.	Input Watts	Ohms (DC)	Output Rotor	Sensitivity (MV/deg.)	Output Volts	Sensitivity (MV/deg.)	Input Volts	Input Amps.	Input Watts	Ohms (DC)	Zro	Zso	Zrss
Torque Transmitter	CG-15-D-1	26	.225	.8	6.4	—	—	11.8	200	—	—	—	3.2	14+j110	4+j18	28+j11
Torque Transmitter	15CX4a	115	.067	.7	65	—	—	90	1560	(This Unit Weighs 174 gms.)			161	163+j1690	175+j894	
Torque Transmitter	CG-15-MS-1	115	.067	.7	65	—	—	90	1560	(This Unit Weighs 174 gms.)			161	163+j1690	175+j894	
Control Transmitter	CG-15-D-4	26	.100	.4	16	—	—	11.8	200	—	—	—	6.5	36+j270	8+j44	40+j23.1
Control Transformer	CT-15-D-1	26	.055	.23	37	23.9	410	11.4	195	11.8	.125	.24	10	80+j490	15+j80	74+j50
Control Transformer	CT-15-D-4	—	—	—	180	23.0	400	—	—	11.8	.032	.06	37	360+j1870	63+j320	338+j203
Control Differential	CD-15-D-1	—	—	—	19	10.8	195	—	—	11.8	.125	.22	10	22+j80	15+j80	27+j13
Torque Receiver	CR-15-D-1	26	.100	.36	16	—	—	11.8	200	(11.8 V. Transmitting Stator)			6	36+j270	8+j44	40+j23.1
Electrical Resolver	CS-15-D-1	1-26	.055	.31	74	23	400	11.8	200	11.8	.110	.25	13	110+j520	23+j120	
Vector Resolver	CW-15-D-1	1-32	.005	.03	540	28.4	495	15	260	15	.010	.03	156	1100+j6300	300+j1600	1181+j602

Phase Shift R-S	Phase Shift S-R	Nulls (MV)	Possible Error	Possible Spd.	Length in inches
3°	—	30	10′	10′	1.600
2.25°	13.5°	125	12′	24′	2.0
2.25°	13.5°	75	10′	10′	2.0
3.5°		30	10′	10′	1.600
4°	4.5°	30	10′	10′	1.600
—	4.5°	30	10′	10′	1.600
—	5°	30	10′	10′	1.640
3.5°	—	—	30′	30′	1.600
7.5°	5°	1MV/V	10′	10′	1.640
	5.5°	1MV/V	10′	10′	1.600

★ Extreme Reliability ★ Light Weight
★ Highest Accuracy ★ Tight Coupling
★ Environmentally Qualified ★ Low Nulls
★ Low Phase Shift ★ High Torque
★ Matched Impedances ★ Low Friction
★ Low Heat Rise ★ Early Delivery
★ Special Units ★ Cost No More

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In addition to the wide variety of standard units shown, we also produce an equally large number of special units on special order in production quantities for which we are already tooled.

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NAVY BuOrd SYNCHROS



½ Actual Size

Contact Clifton Precision for standard Navy BuOrd units. If your specification requires conformance to BuOrd drawings and your system can take advantage of exceptional accuracy, CPPC can hold extra close error spread and accuracy tolerances. See CG-15-MS-1 in the tables.

PRECISION RESOLVERS

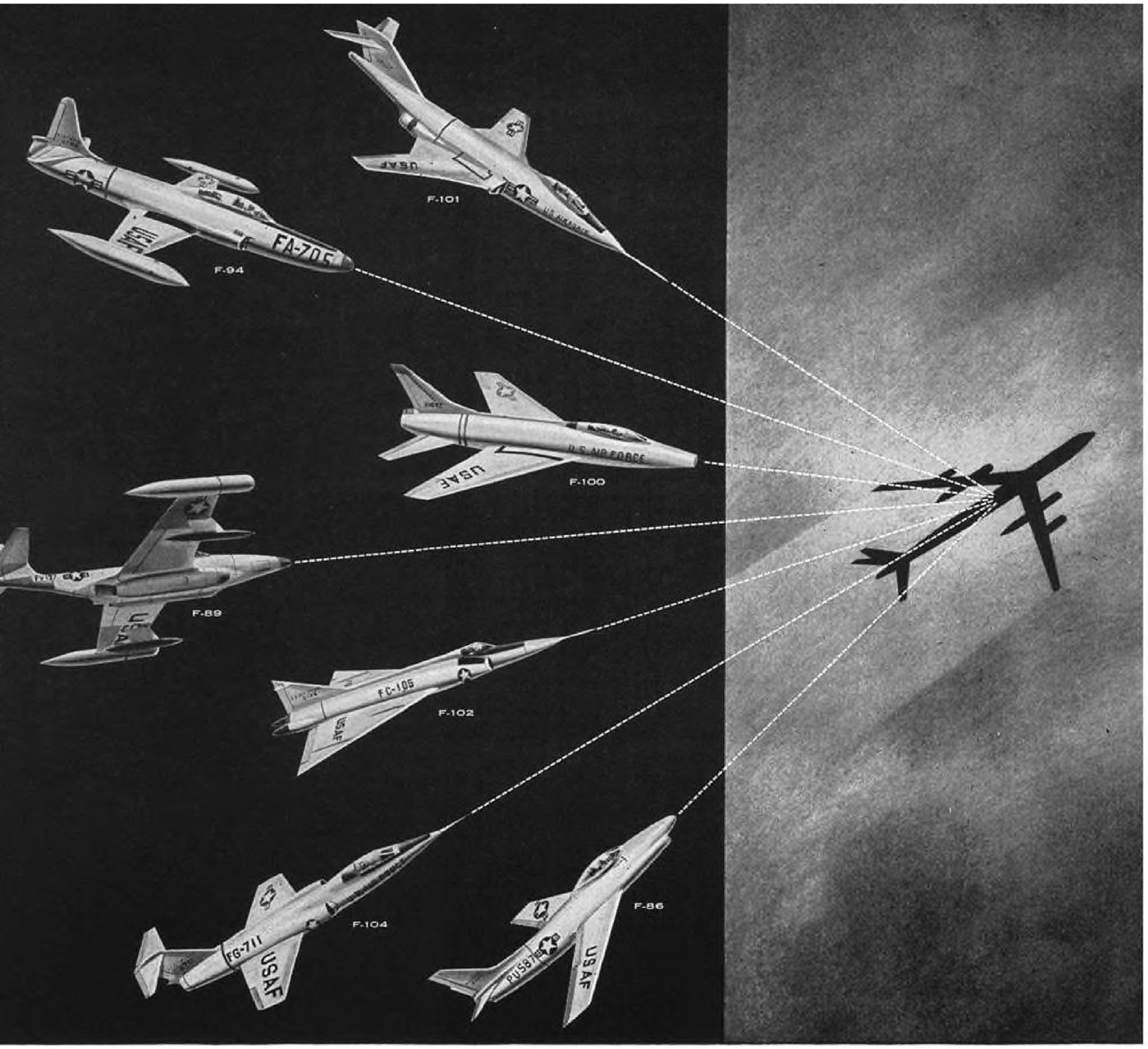
Precision Computing Resolvers with functional accuracies of the order of .1% and transformation ratios 1:1 are currently being constructed in the size 15 class for special applications. Contact CPPC for applications involving the use of Precision Resolvers in all sizes.



½ Actual Size

CLIFTON PRECISION PRODUCTS COMPANY, INC.

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Fire control radar tells... / WHERE TO AIM WHEN TO FIRE!

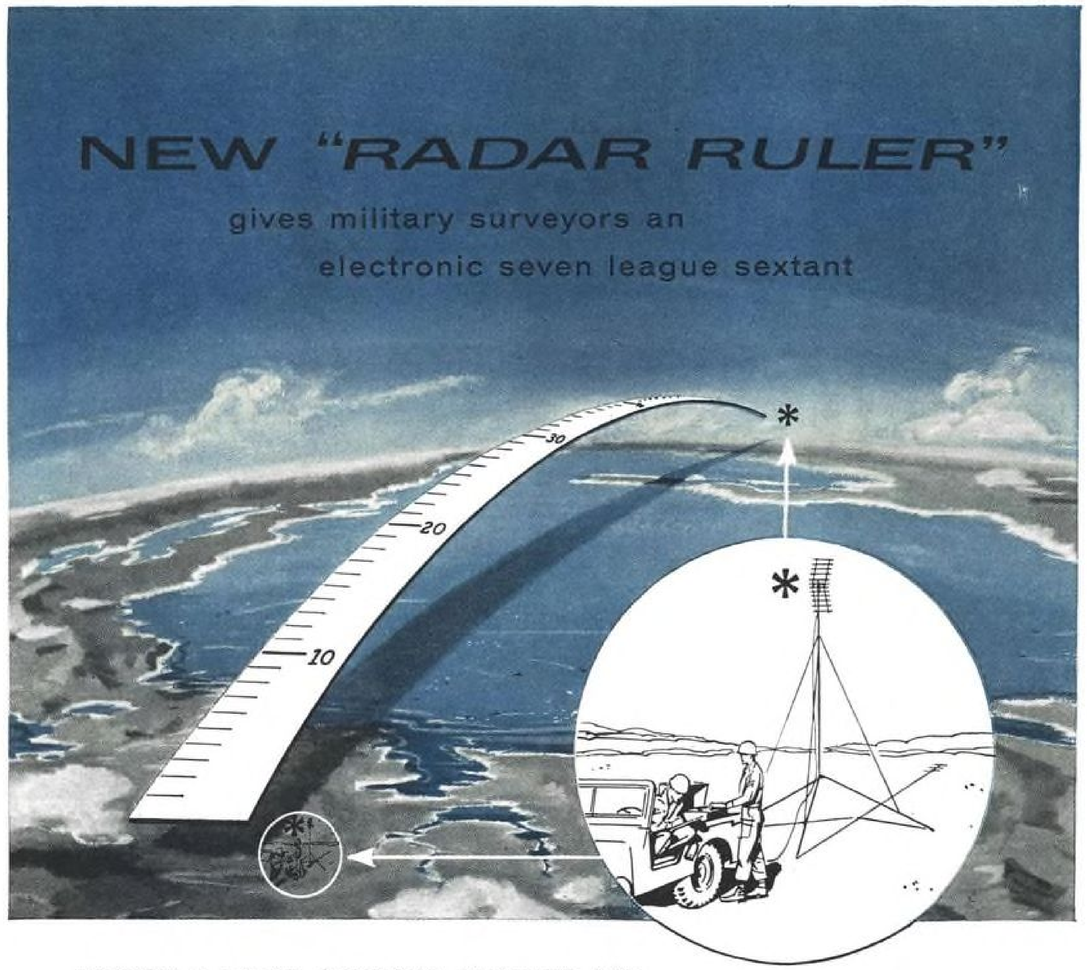
All-seeing radar pinpoints the target for these Air Force planes. Whatever armament they carry—guns, rockets or missiles—fire control radar tells them *where* and *when*. It provides the far-sighted vision necessary for modern long-range combat operations.

Today's modern fighter plane is an electronic wonder, with fire control radar-computer systems supplying a continuous flow of information about target position in terms of range and rate of closing.

RCA is a major supplier of airborne fire control equipment to the Armed Forces. It has produced, and in several instances developed, these systems for many of the latest aircraft. Some of these are illustrated above.

Defense Electronic Products
RADIO CORPORATION of AMERICA
Camden, N.J.

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PORTABLE RADAR STATIONS MEASURE AND DOUBLE CHECK 50 MILE READINGS IN SECONDS

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This self-calibrating system uses two identical portable radar stations which bounce a signal back and forth thousands of times each second. High-speed computers automatically provide the data necessary to measure off the distance.

Here is just one more example of the equipment now being developed by Motorola for many varied military applications.



3 suitcases and 25 ft. collapsible antenna comprise the entire equipment

navigational devices • radar • countermeasures • microwave systems • communications equipment
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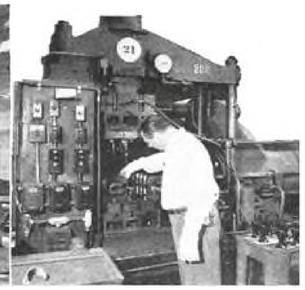
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Unsurpassed press facilities provide economical solutions for the most complex requirements. Working pressures: 20 to 3000 tons. Platen areas: 18" x 16" to 192" x 84". Maximum Press Openings: 19" to 117". Preform press capacity: 8000 lb. per hour. Advanced electronic preheating equipment.

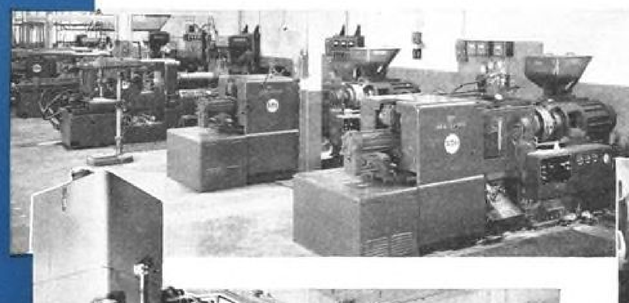


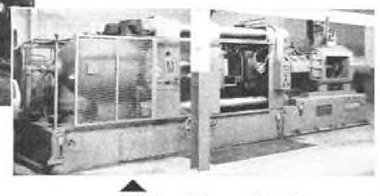


Compression molding division includes such extraordinary equipment as this side angle press, capable of producing highly complicated parts.

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Battery of newest type presses ranging from 4 oz. to 80 oz. make possible efficient handling of wide variety of jobs.





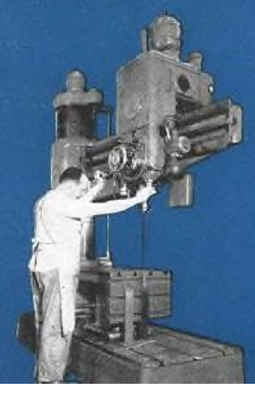
Daddy of them all is this giant 80 oz. injection press. Special cooling equipment provides for low-cost high-speed operation.

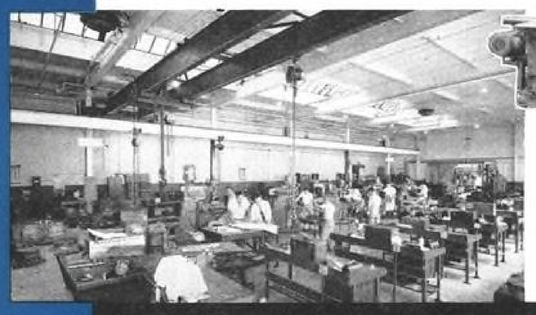
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Working pressures: 50 to 3000 tons. Platen areas: 18" x 16" to 192" x 84". Maximum press openings: 19" to 117".

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The MPc tool room is equipped with the newest types of machine tools . . . such as this radial drill . . . and has a 10-ton fully motorized overhead crane for handling heavy molds.







Fiberglass reinforcements are produced by the use of modern semi-automatic preform equipment.

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JR	0.25%	.01°/sec.	10°/sec. to 1000°/sec.	up to 125 cps	15G to 2000 cps	100G	−67°F to 185°F	—	2 1/16" Dia. 4⅛" long	1.95 lb.
GNAT	<1%	.01°/sec.	10°/sec. to 570°/sec.	up to 125 cps	15G to 2000 cps	60G	−67°F to 185°F	—	1" Dia. 2.2" long	4 oz.

All Gyros have synchronous, hysteresis-type motors, variable reluctance pickoffs, and controlled viscous damping.

2. LOW LEVEL D-C AMPLIFIERS →



MODEL	INPUT RANGE	INPUT IMPEDANCE	FREQUENCY RESPONSE	GAIN	LINEARITY	ZERO DRIFT* (max.)	NOISE LEVEL (max.)	OVER-RANGE	OUTPUT
2HLA-3	1-100 MV	1 Megohm/Volt	0-20 cps	10,000	≦1 %	1%	0.5%	1.5V	10V into 1500 Ω
2HLA-4	0.1-100MV	1000-100,000Ω	0-60 cps	100-100,000	0.1-10%	1%	0.5%	1.5V	10V into 1500 Ω
2HMA-2	0-5MV	2200Ω	0-400 cps (.5 millisec. rise time)	1,000	0.5%	0.2%	3%	1.5V	0 - 5V
C23125	0-10MV	1700Ω	50 millisec. rise time	5,000	0.1%	0.1%	0.25%	1.5V	50V into 500,000 Ω
2HDH-1	0-5MV	1700Ω	0.5 cps	100	0.1%	0.1%	0.1%	1.5V	.5V into 100,000 Ω
2HDH-2	0-5MV	1700Ω	0.25 sec. rise time	100	0.1%	0.1%	0.1%	1.5V	.5V into 100,000 Ω

*Room Ambient

3. 400-CYCLE SERVO MOTORS →



DOELCAM TYPE NUMBER	GOVERNMENT DESIGNATION	FRAME SIZE	STALL TORQUE MINIMUM	NO LOAD SPEED	RATED VOLTAGE: FIXED PHASE	RATED VOLTAGE: CONTROL PHASE (SERIES)	RATED VOLTAGE: CONTROL PHASE (PARALLEL)
SM-070	MK 7 MOD 0	15	1.45 oz. in.	4800 RPM	115	115	57.5
SM-071	MK 7 MOD 1	15	1.45 oz. in.	4800 RPM	115	115	57.5
SM-072	MK 7 MOD 2	15	1.45 oz. in.	4800 RPM	115	230	115
SM-080	MK 8 MOD 0	18	2.35 oz. in.	4800 RPM	115	115	57.5
SM-081	MK 8 MOD 1	18	2.35 oz. in.	4800 RPM	115	115	57.5
SM-082	MK 8 MOD 2	18	2.35 oz. in.	4800 RPM	115	300	150
SM-142	MK 14 MOD 2	11	0.60 oz. in.	6200 RPM	115	115	57.5
SM-143	MK 14 MOD 3	11	0.60 oz. in.	6200 RPM	115	180	90

1. RATE GYROS. Doelcam K, JR, and Gnat rate measuring gyroscopes combine extreme ruggedness with high precision in applications where accuracy and superior dynamic response are essential. They are proven components in many missile homing, fire control and autopilot systems.
Write for Gyro Bulletin-11B

2. LOW LEVEL D-C AMPLIFIERS. Doelcam D-C Amplifiers excel in linearity and stability in proportionally amplifying low level d-c voltages for measurement and control applications. Isolated input and wide-band response, outstanding features of all Doelcam D-C Amplifiers, are achieved by use of the exclusive Doelcam Second Harmonic Magnetic Converter as the input modulator instead of a mechanical chopper.
Write for Amplifier Bulletin-11B

3. 400-CYCLE SERVO MOTORS. The extremely high torque-to-inertia ratio of Doelcam servo motors provides the fast dynamic response required in high performance servo systems. These servo motors comply with the rigid specifications of MIL-S-17087. They are available with internally or externally threaded gear pinion shafts. Doelcam servo motors can be equipped with gear heads to meet customer requirements.
Write for Servo Motor Bulletin-11B

4. SYNCHROS. (115 volt, 400 or 60 cycle) Doelcam synchros are proven components in numerous military servo systems. Their accuracy, reliability, and over-all performance characteristics are guaranteed to equal or surpass the stringent requirements of MIL-S-16892, FXS-1066, MIL-S-12472, and MIL-S-17245. All types are available with either splined or keyed shafts.
Write for Synchro Bulletin-11B

4. SYNCHROS → (115 volt, 400 or 60 cycle)



GOVERNMENT DESIGNATION	FUNCTION	FREQUENCY	MAX. ELECTRICAL ERROR	MAX. DYNAMIC RECEIVER ERROR
CONTROL UNITS				
15CDX4a	DIFFERENTIAL TRANSMITTER	400	10′	
15CT4a	TRANSFORMER	400	10′	
15CX4a	TRANSMITTER	400	12′	
16CT84a*	TRANSFORMER	400	10′	
16CX84a*	TRANSMITTER	400	12′	
18CT4a	TRANSFORMER	400	8′	
18CX4a	TRANSMITTER	400	8′	
18CT6a	TRANSFORMER	60	8′	
19CT84a*	TRANSFORMER	400	8′	
19CX84a*	TRANSMITTER	400	8′	
23CDX4a	DIFFERENTIAL TRANSMITTER	400	8′	
23CDX6a	DIFFERENTIAL TRANSMITTER	60	8′	
23CT4a	TRANSFORMER	400	6′	
23CX4a	TRANSMITTER	400	8′	
23CT6a	TRANSFORMER	60	6′	
23CX6a	TRANSMITTER	60	8′	
*EQUIPPED WITH BEARING MOUNTED STATOR				
TORQUE UNITS				
15TDX4a	DIFFERENTIAL TRANSMITTER	400	10′	
15TR4a	RECEIVER	400	12′	60′
18TR4a	RECEIVER	400	8′	60′
23TDR4a	DIFFERENTIAL RECEIVER	400	8′	60′
23TDR6a	DIFFERENTIAL RECEIVER	60	8′	60′
23TDX4a	DIFFERENTIAL TRANSMITTER	400	8′	
23TDX6a	DIFFERENTIAL TRANSMITTER	60	8′	
23TR4a	RECEIVER	400	8′	60′
23TR6a	RECEIVER	60	8′	60′
23TX4a	TRANSMITTER	400	8′	
23TX6a	TRANSMITTER	60	8′	
31TX6	TRANSMITTER	60	8′	

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AUTOMATIC . . . pinpoints type and location of all kinds of errors . . . *automatically.*

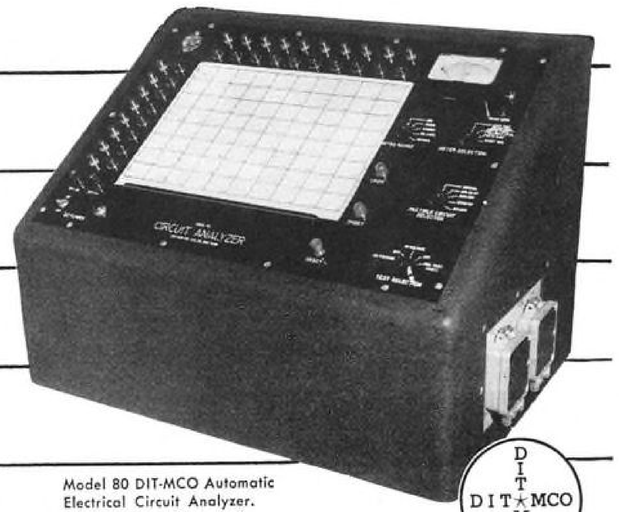
VERSATILE . . . tests any cabling system or panel assembly without modification.

UNIVERSAL . . . tests for all types of errors resulting from incorrect connections, short resistance, and insulation resistance.

SIMPLE . . . ordinary, non-technical personnel can master its operation in thirty minutes or less.

ACCURATE . . . detects and measures resistance impossible to find with most equipment.

FAST . . . checks circuits in 1/10 second each. Makes tests in minutes which once required hours.



Model 80 DIT-MCO Automatic Electrical Circuit Analyzer. This machine will test 80 circuits in 8 seconds.

DIT-MCO Automatic Electrical Circuit Analyzers

Save Time and Money in Production, Maintenance and Overhaul of Aircraft, Guided Missiles, Telephone Systems, Computers and Radar . . . Wherever Complex, Multiple Circuitry is Used!

Here is the first real solution to the production and maintenance bottleneck of testing out complex electrical circuitry. The DIT-MCO Automatic Electrical Circuit Analyzer makes all other circuit testing methods obsolete.

Where present hand and machine testers are laborious and complicated, the DIT-MCO Analyzer is fast and simple. DIT-MCO's exclusive matrix chart pinpoints errors without reference to manuals or diagrams. Non-technical personnel can easily spot the location and nature of errors on a front matrix panel, and go directly to the trouble spot for correction.

The DIT-MCO Analyzer is wonderfully versatile. It can be moved from one circuit testing job to another *without modification*. To prepare for a new test, the operator merely plugs in a simple, straight-forward adapter cable. The machine itself requires no changes at all to test any electrical cable system at any stage of production, modification, or maintenance. This even includes circuits connected together in various ways by switches, relay contacts, or a common point at a terminal such as a grounding lug. The circuits in the unit under test can be rearranged by switching mechanisms in the unit, and the tester will *automatically* test the new arrangement. The analyzer can functionally test external devices like relays, solenoids, actuators, and panel lights. The almost unbelievable accuracy of this new tester eliminates hit-or-miss testing for continuity or short resistance. Unlike meters, lights, or buzzers, the DIT-MCO Analyzer defines these errors with absolute accuracy. Continuity is closely defined with this test equipment to the point of rejecting ½ ohm continuity resistance as an open circuit at currents up to 2 amperes. Leakage resistance is closely defined to the point of rejecting zero ohms to 200 megohms as a direct short. These values are pre-set as desired.

In spite of its hairline accuracy and its ability to make fine measurements, the DIT-MCO Circuit Analyzer is a rugged, practically foolproof machine. Its component parts are the same as those used for years on automatic telephone systems, and most parts are pluggable. In laboratory tests, production line machines have been kept in operation for the equivalent of 10 years with no breakdowns at all.

The tremendous speed and accuracy of this machine plus its adaptability and capacity to test for all kinds of errors, make it a "must" for companies which manufacture, maintain, or overhaul products which include complex electrical circuitry. Basic sizes are built to test 80 to 200 circuits with multiplier sections to provide as much as 1600 circuits capacity.

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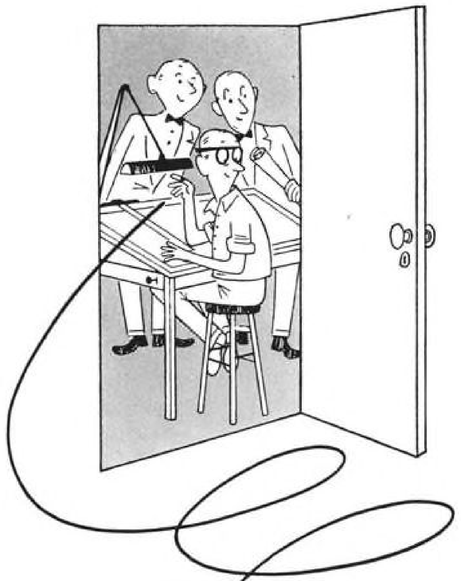
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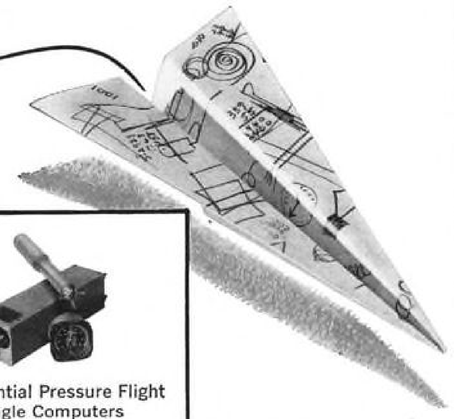
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C-120

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AMPEX TAPE RECORDERS FOR EVERY DATA RECORDING NEED

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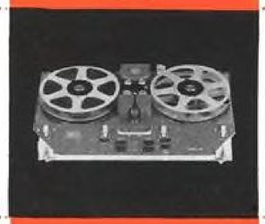
VERSATILE



FR-100 – Overall performance specifications are the best of any magnetic tape recorder now in production. Modular design provides broad scope for experimentation and development of advanced data techniques. The FR-100 is also the best instrument for reproducing flight-test tapes.

6 tape speeds 1⅞ to 60 in/sec; D-C to 100,000 cycle/sec. frequency response; choice of 3 recording methods on any track by plug-in interchangeable amplifiers.

MOBILE



800 – For flight-test data acquisition this recorder combines excellent performance specifications with ruggedness, compactness and light weight. It is also resistant to shock, vibration and environmental extremes. Tapes from the 800 are most easily reproduced on the FR-100.

4 tape speeds; D-C to 30,000 cycle/sec. frequency response; choice of 3 recording methods on any track by plug-in interchangeable amplifiers.

DIGITAL



FR-200 – This magnetic tape transport fulfills the fast start-stop requirements of digital handling. It also provides a unique single loop threading feature which greatly simplifies tape change and minimizes chance for faulty threading by inexperienced personnel.

Tape attains full speed or full stop within less than 5 milliseconds; standard machine has 15 and 30 in/sec. tape speeds and 7 tracks on ½-inch tape; other combinations on order.

REPEATABLE



FL-100 – The endless tape loop handled by this transport serves a number of special needs: time delay, repeating signal for analysis, monitoring with "infinite" time limit, and various programming functions. Loop length is continuously variable from 3½ foot minimum to 25, 50 or 75 foot maximum.

Available for ¼, ½ or 1-inch tape; same tape speeds, heads and other characteristics as Ampex reel-to-reel recorders.

DEPENDABLE



FR-1100 – As successor to Ampex's long established 300 series recorders, the FR-1100 is comparable in cost and provides similarly reliable performance. Its improvements are four tape speeds, interchangeable plug-in amplifiers, interchangeable heads, pushbutton controls and better performance specifications.

Interchangeable plug-in amplifiers are identical to those of the FR-100 and provide Direct, FM carrier or PWM recording or reproduction on any track.



A mark of the Ampex leadership in magnetic tape recorders is the fact that every machine produced equals or exceeds all published performance specifications. A general tape instrumentation brochure and descriptive literature on various models are available on request. Write Dept. UU 2788

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INSTRUMENTATION DIVISION
AMPEX CORPORATION

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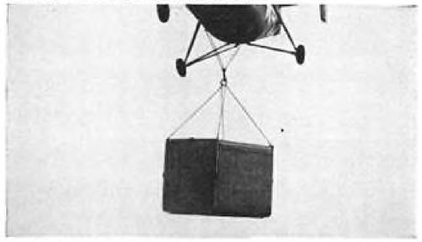
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C-121

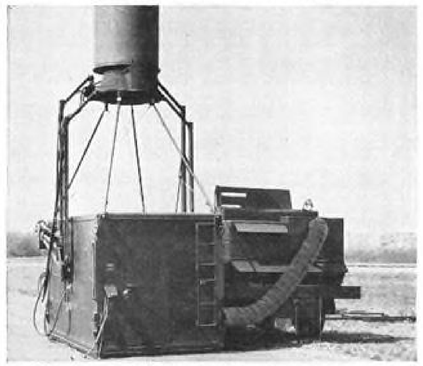
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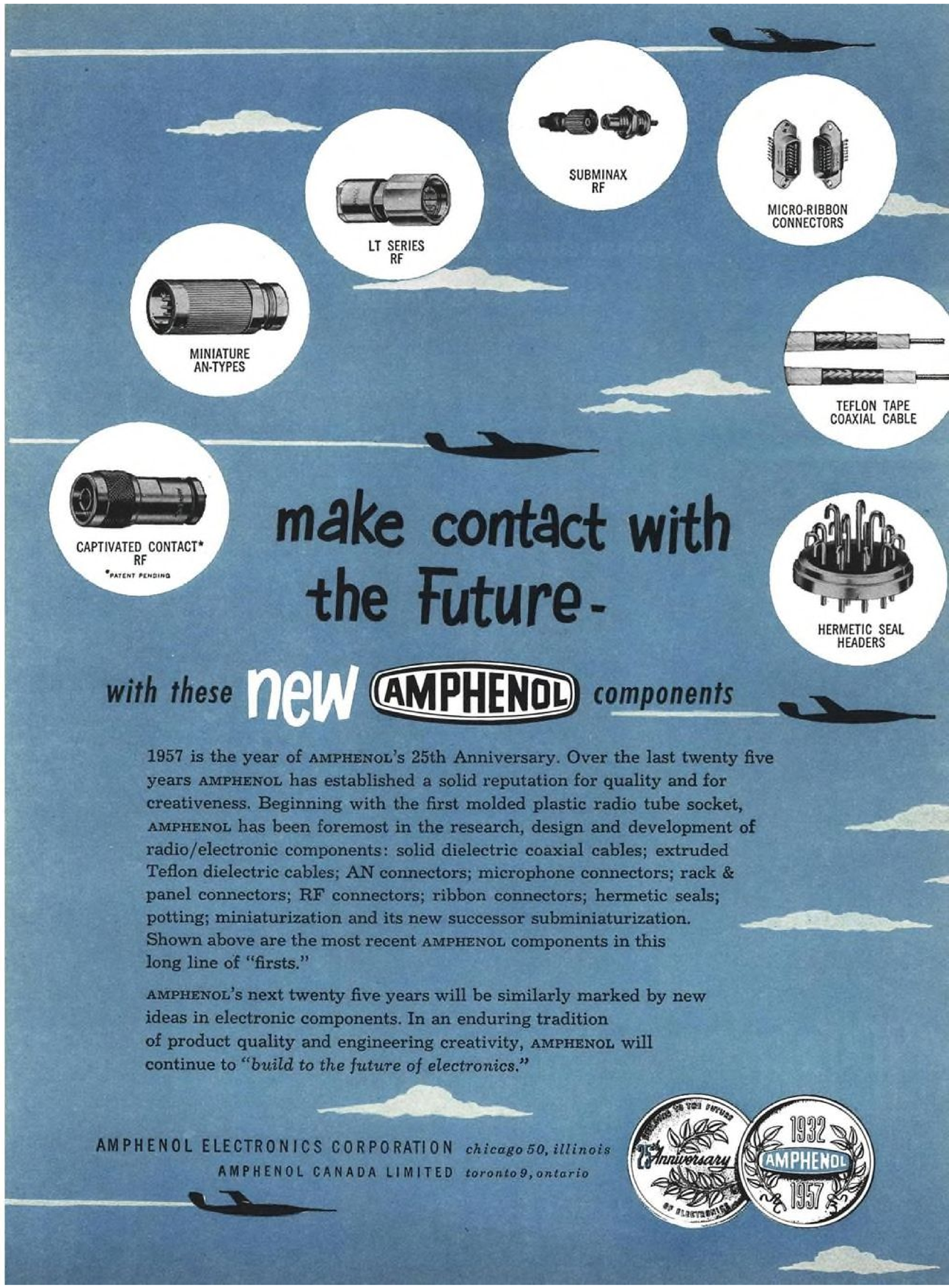
CABINETS

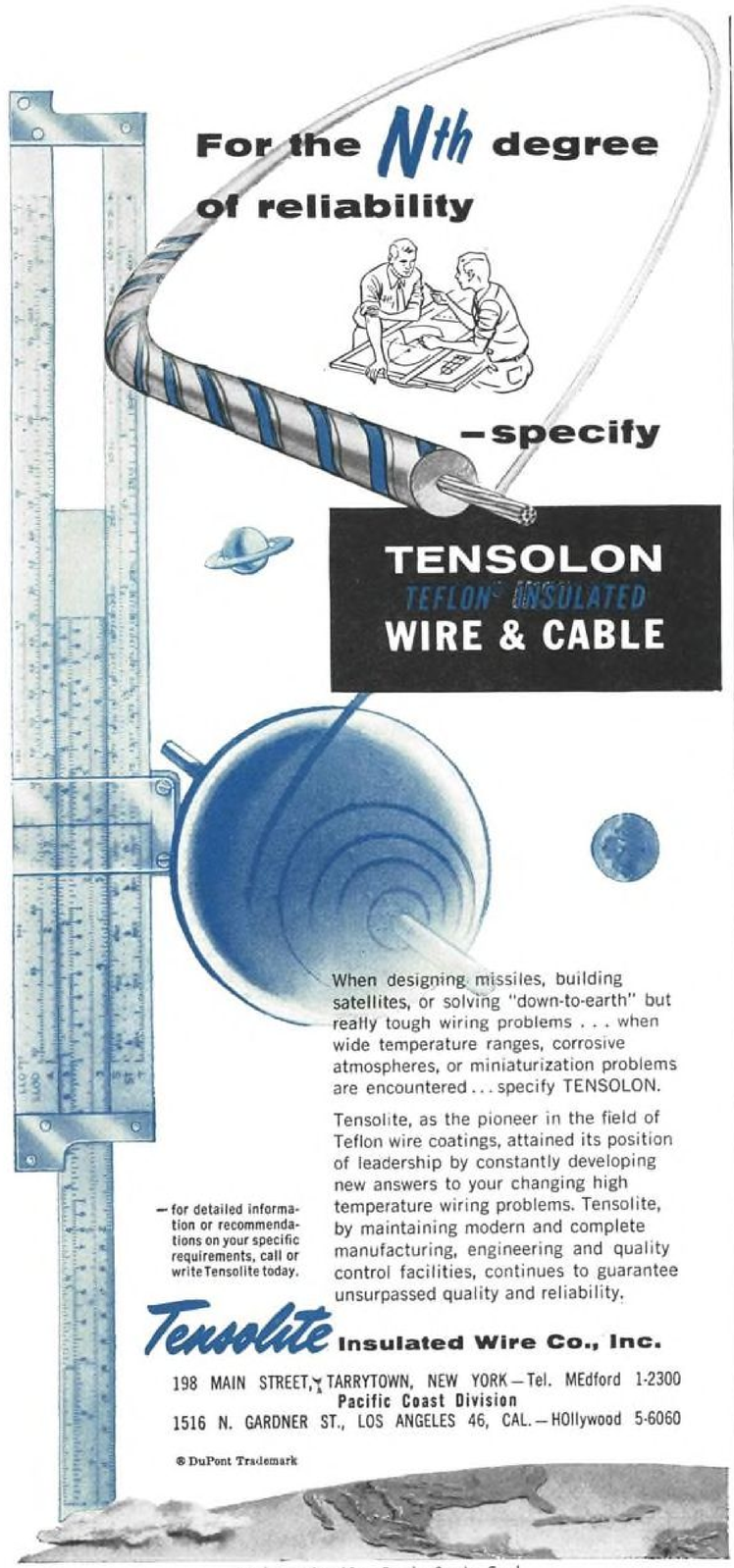


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Here are only five of the more than 40 basic P & B relays. Each of the 40 can be modified in a wide variety of ways. This means there is a P & B relay for nearly every conceivable application. Custom modification of relays to exact specification is a P & B specialty—thus you have one dependable source for ALL your relay needs. P & B offers you:

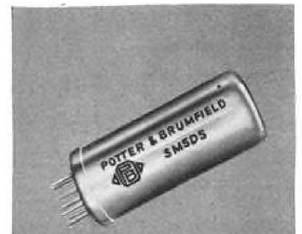
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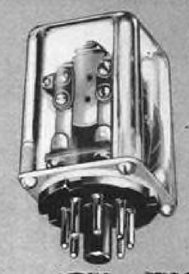
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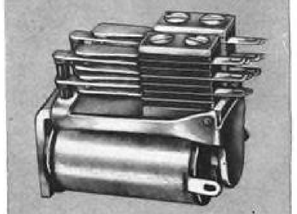
SM SERIES
(In both voltage and current actuated models.) (Sensitivity 75 M.W. for current actuated models.) Medium cost, light weight, hermetically sealed relay for light contact load application. Size: ¾" diameter 1 5/16" high (above standard 7-pin miniature tube socket).

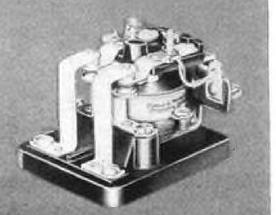




KRP SERIES
Versatile, multi-contact arrangements. Enclosed in polystyrene dust cover. Contacts: rated 5 amperes. Dimensions: 1 13/32" x 1 13/32" x 2" high (above standard 8 or 11 pin octal style socket.) Weight: 3 oz.

MH SERIES
Extremely fast acting and long life. DC models available up to 10 g—500 cps vibration and 30 g shock. Available 4 form C contacts and variety of mtg. arrangements. Maximum size 1 5/8" x 25/32" x 1 5/16" high.





PR SERIES
Heavy duty relay with screw terminal for all industrial control applications. All AC models can carry UL label. Size: 2½" wide x 3 3/16" long x 2 7/16". Mounting: Two holes 3/16" dia. on 1 7/8" centers. Contacts: Capacity, 15 amperes single break and 20 amps double break.



KA SERIES
A small, low cost, highly efficient general purpose relay with 5 amp. silver contacts. Can be insulated to meet UL requirements. Size: 1 5/16" x 1 27/32" x 1¾". Mounting: One No. 6/32 stud and locating tab.

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STABLVOLT* DC COMPUTER POWER SUPPLY

Dual magnetic regulation—line transient-free

Stablvolt d.c. power supply provides line transient-free, precision-regulated d.c. output voltage, meeting the strict requirements for analog and digital computer applications. Flux oscillator controlled. Very low ripple, excellent dynamic and static regulation. Extremely low internal impedance. Maintenance-free. Ultra-fast response. Short-circuit proof. Available in a wide range of voltage and current levels.

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5 VDC transient-free output

Dual magnetic system isolates line voltage transients from the output, regulates d.c. to 0.1% accuracy. Does not distort line voltage wave form. Use of 2306-55 Cannon connector permits unit to carry 115 VAC up to 60,000 feet. A 25-turn Trimpot has 5 millivolt resolution, provides 0.5 volt output adjustment. Mounts easily in any position. Rugged, compact, short circuit-proof. Current capacity, 1 amp. Vibration tested with 15g up to 2,000 cps. Hermetically sealed; all components cast in thermosetting plastic. Meets MIL-T-27 and MIL-E-5272-A specs.

For full data, request Engineering Bulletin EB-5-1

ALL-MAGNETIC AIRBORNE PULSE GENERATOR MP 414

For commercial radar and digital computer uses



Uses only 1 watt of power, provides 250V pulse into 500 ohms. Pulse width: 4.5 microseconds; repetition rate: 400 pps. Weighs only 14 ounces, is hermetically sealed, and operates on 115V-400 cycle supply. No tubes, no moving parts. Short circuit-proof. Units available in ranges from .1 to 10 megawatts to replace conventional hydrogen thyratron pulse modulators in radar systems.

For full data, request Engineering Bulletin EB-204

MICROMAG* LOW-LEVEL MAGNETIC DC SIGNAL AMPLIFIER

Drift-free—for thermocouple and strain gauge applications in telemetering systems

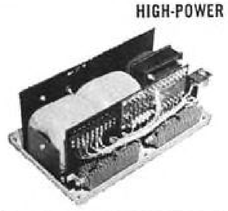


Provides ripple-free 5 VDC output from 1 millivolt d.c. input, with extremely high gain stability. Response time: 40 milliseconds. No pick-up—no shielding required. No tubes, no warm-up time. Withstands extreme vibration and shock without introducing spurious noise. Reliable in high environmental temperatures. Operates on 400 cycles. Also useful for temperature and strain measurements in industrial and medical work. Weighs less than 7 oz.

For full data, request Engineering Bulletin EB-201-A

HIGH-POWER INDUSTRIAL MAGNETIC SERVO AMPLIFIERS

For servo systems in automatic control



Operate on standard commercial 50-to-60 cps power. Amplifiers are entirely static with power outputs from 0.1 to 5 kw. Compact, rugged units provide maintenance-free, reversible a.c. or d.c. control for high-power a.c. or d.c. servo motors. Transistor or tube control. These single and two-stage magnetic amplifier units require less than 1 watt of control signal power. Response time: Less than 25 milliseconds. Long life, low cost.

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For complete data, request Magnestat Series engineering bulletins.*

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ideal for transistor work



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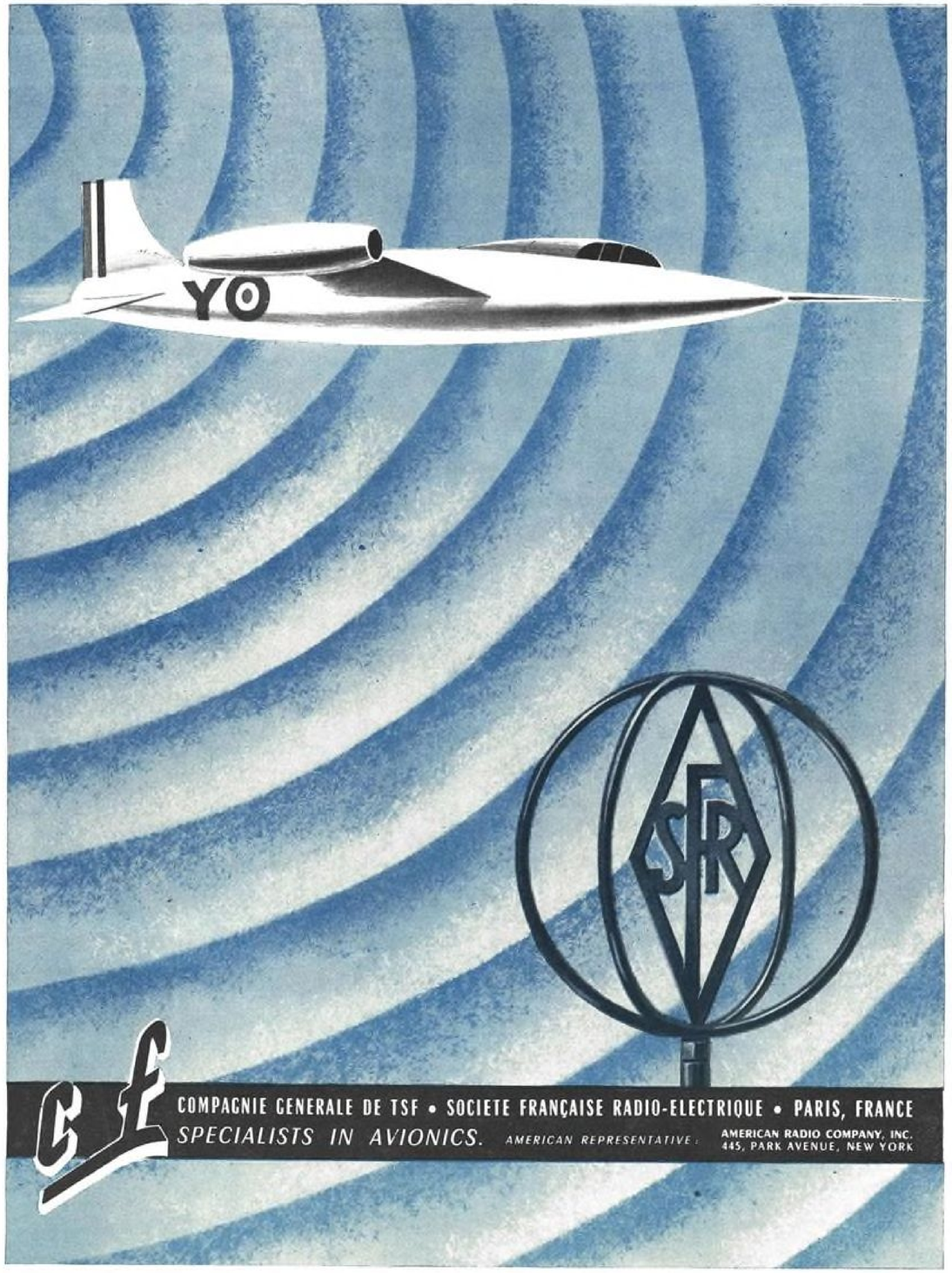
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Circle Number 88 on Reader-Service Card



An incremental synchro positioner before wiring to header and hermetic sealing. The synchro rotor is stepped in one or fifteen degree increments clockwise or counterclockwise ,depending upon which of four coils is momentarily energized by a d-c pulse. The synchro can be rotated any number of degrees or revolutions. Cylindrical member next to the synchro resets it to electrical zero if a pulse is applied to "reset" circuit.



Type 9 motor-driven induction generator driving two Type 11CT synchros through gear train having ratio of 1500:1. Slip clutch permits one control transformer to operate when second control transformer has shaft restrained by stops. Cams close two switches during specified degrees of synchro rotation.



SERVO ASSEMBLY—Type 9 motor-driven induction generator driving a Type 11 synchro through a gear train having a ratio of 12,000:1. Rear shaft of synchro carries contact arm which restricts shaft rotation against adjustable stops and closes switch during the specified arc.

control problems like yours

...with but one solution

Typical of all Transicoil solutions are the three illustrated here. They "do the job right" because each is designed for a single application . . . by a company whose major function is to provide complete servo assemblies precisely engineered and manufactured to solve individual servo control problems.

Of course, if you want servo *components*, you'll find Transicoil's control motors, motor-gear train combinations, motor-gear train-generator combinations, and servo amplifiers built to the highest order of precision and accuracy. But it is in the "package" engineering of unique assemblies that Transicoil's experience and creative imagination offer the greatest value. And in most cases, these assemblies cost no more than the individual components would purchased separately. *That's why it pays to check your servo control problems out with Transicoil first.* For further information, call your nearest Transicoil representative.

looking for miniaturization?

If you have a problem in miniaturization of a control system, chances are Transicoil can solve it for you. For just as Transicoil's introduction of plate-to-plate wiring eliminated the transformers once necessary in servo systems, the company is now marking new milestones in system miniaturization with its new Size 8 motors, motor-driven induction generators, and transistor amplifiers. This engineering ability can be put to work on your projects—with no obligation. You pay only for results—on a fixed fee basis for equipment delivered and performing properly. Transicoil is a manufacturer, not a research and development organization.

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C-130

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Dynamic Measuring Equipment



FREQUENCY MODULATED OSCILLATORS

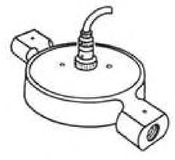
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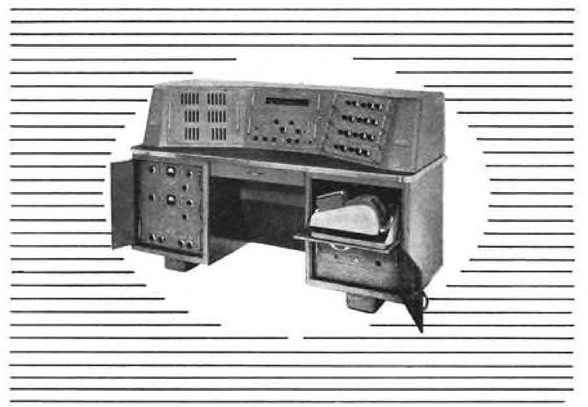
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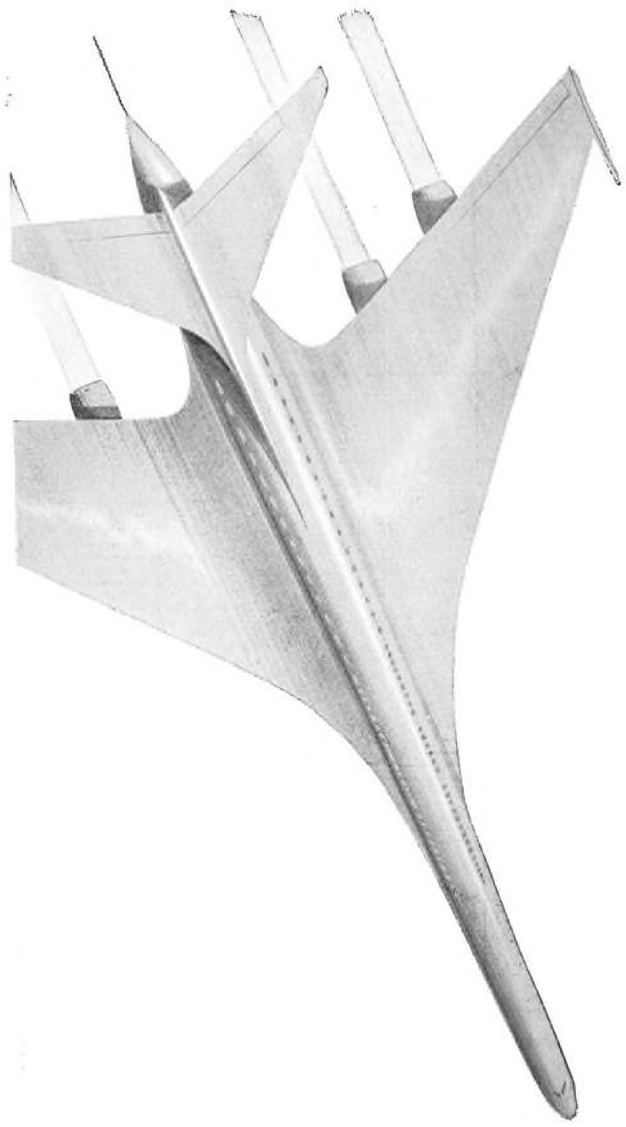
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Differentials—synchronous and servoed systems
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Transmitters—1, 4 and 20 power

BENDIX 60-cycle Synchros

(Frame sizes: 1, 3, 5, 6, 11, 15, 18, 23, 31, 37)

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Control Transformers
Control Transmitters
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- Miniature Differential Gear Assemblies
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BENDIX Miscellaneous

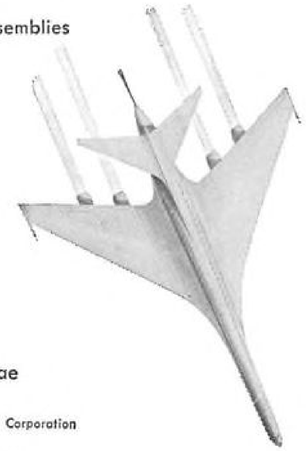
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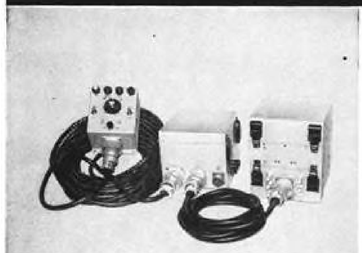
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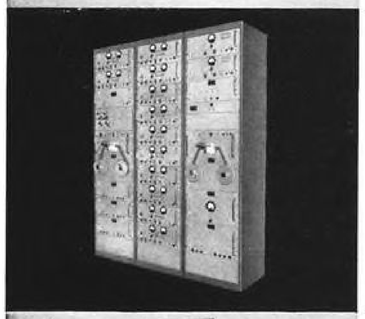
Circle Number 96 on Reader-Service Card

DAVIES magnetic tape equipment . . . . . for instrumentation



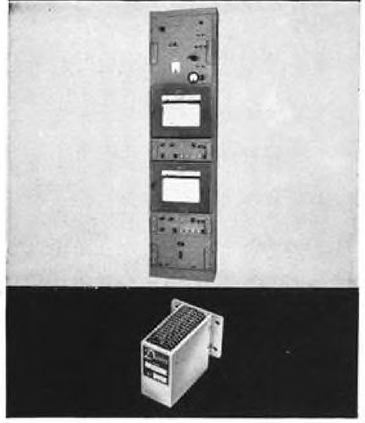
AIRBORNE RECORDERS

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Heterodyne type analyzer provides completely automatic fourier analysis (amplitude versus frequency) of vibration, seismic, power line, transient, noise, shock, and similar data. When necessary, an amplitude versus time plot for a given frequency can be obtained. Suited for operation from any source supplying a repetitive signal, such as a magnetic tape loop. Frequency range 3 to 2000 cps, variable bandwidth ½ to 45 cps, amplitude accuracy ±5% of reading on logarithmic scale, frequency accuracy ½% of reading, output voltage range 60 db, input impedance 2½ megohms. Analysis recorded, and up to 14 inputs can be handled and selected automatically. Bulletin 9100.

STANDARD HEADS

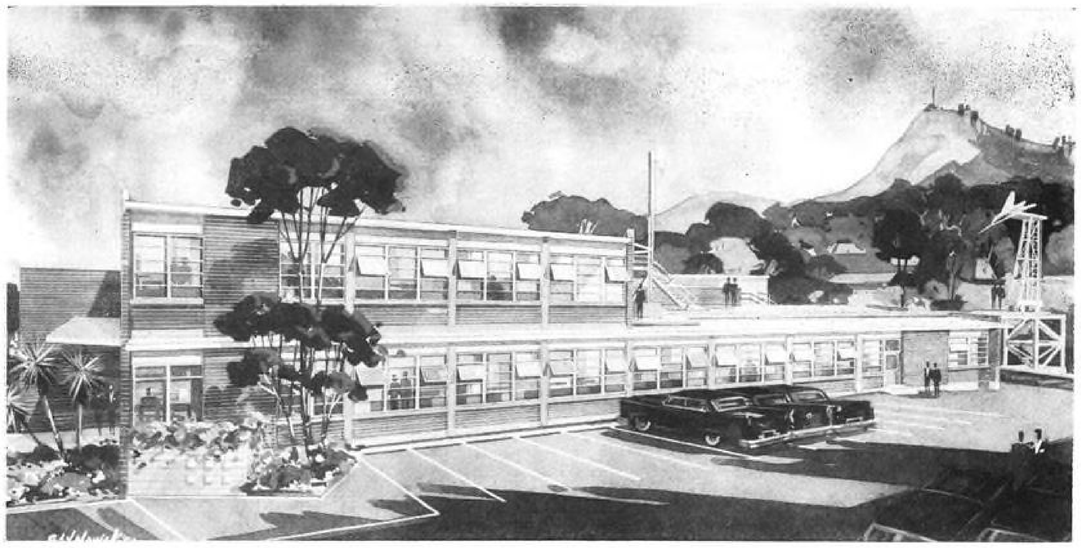
Series	Tracks Width	Tracks C.toC.	L mh. Max.	R ohms	Cross-talk Rejection	Number of Tracks for Various Tape Widths ¼″	½″	¾″	1″	1¼″	1½″	1¾″	2″
700	.050	.140	70	55	50+ db	2	4	5	7	9	11	13	14
800	.040	.125	57	55	50+ db	2	4	6	8	10	12	14	16
1000	.040	.100	63	55	50+ db	3	5	8	10	13	15	18	20
1300	.026	.078	35	55	30 db	3	6	10	13	16	19	22	26
1400	.040	.072	30	36	45 db	3	7	10	14	17	21	24	28
S1400	.032	.070	67	55	34 db	4	7	11	14	18	21	25	28
2000	.020	.050	5.7	18	22 db	5	10	15	20	25	30	35	40

Precision multi-track instrumentation heads, developed to meet the rigid standards set for our equipment. Precise gap alignment (total scatter 0.2 mil per inch of tape width), maximum shielding for minimum cross-talk, completely encapsulated in thermosetting resin. Gaps from ¼ mil to 2.5 mil. Table shows standard series, including inductance and resistance for ¼ mil gap—lower inductances available in all except 2000 series. Special designs can be furnished. Bulletin 3300 gives complete details.

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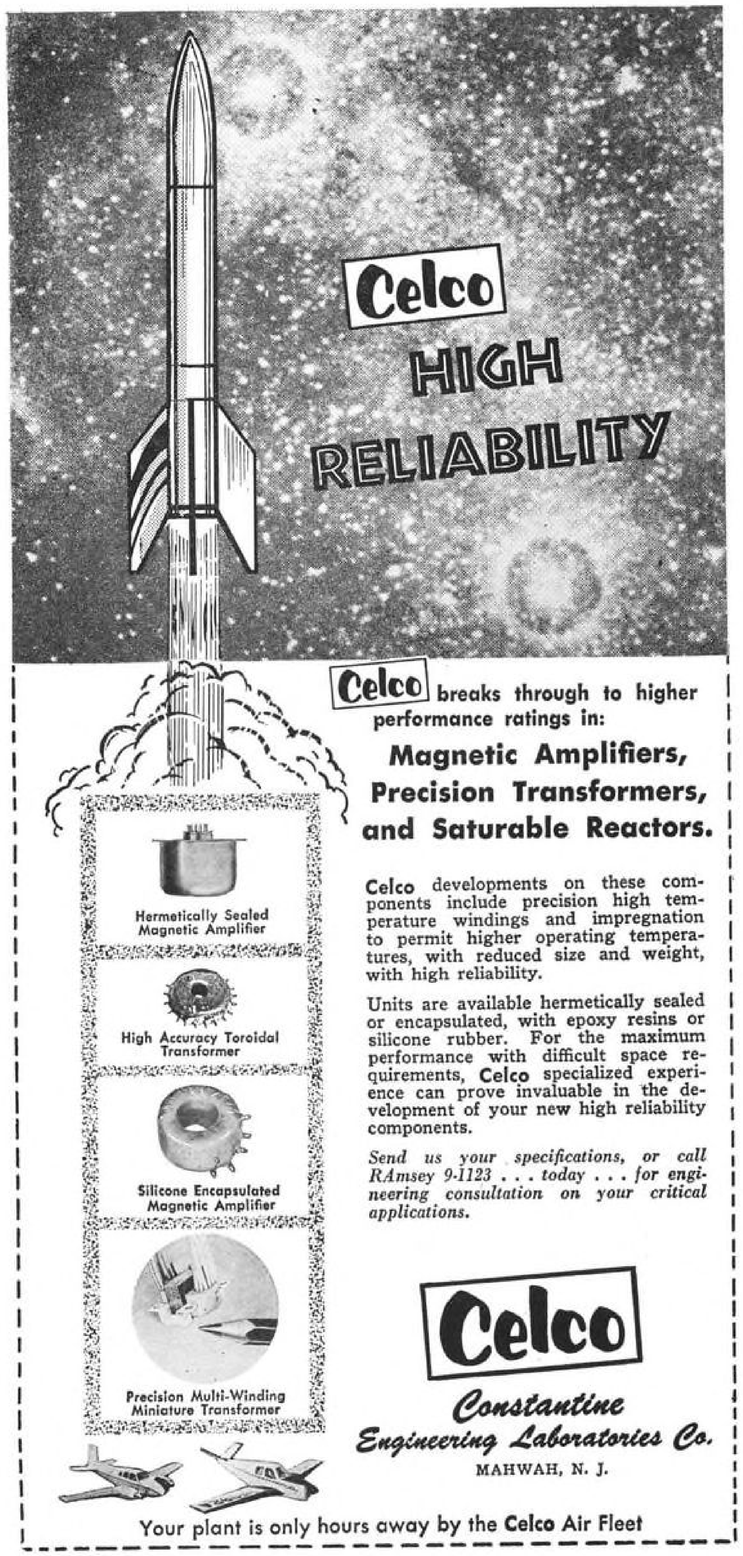
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ELECTRONIC SPECIALTY COMPANY

5121 San Fernando Road, Los Angeles 39, California CHapman 5-3771

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Celco developments on these components include precision high temperature windings and impregnation to permit higher operating temperatures, with reduced size and weight, with high reliability.

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(Continued from page C-78)

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Transmitters, Water Pressure

Aircraft Inst. Sales, United States Gauge Div., American Machine & Metals Inc., Sellersville, Pa.
APPARATUS SALES DIV., GENERAL ELECTRIC CO., 1 River Rd., Schenectady 5, N. Y. SEE ADV. 63, C-129
Automatic Temperature Control Co. Inc., 5212 Pulaski Ave., Philadelphia 44, Pa.
Bendix Aviation Corp., S. Montrose, Pa.
ECLIPSE-PIONEER DIV., BENDIX AVIATION CORP., Teterboro, N. J. SEE ADV. C-132, C-133
Fischer & Porter Co., 790 Warminster Rd., Hatboro, Pa.
General Precision Equipment Corp., 92 Gold St., New York 38, N. Y.
The Hagan Corp., 323 Fourth Ave., Pittsburgh 22.

Transponders

ADMIRAL CORP., 1191 Merchandise Mart, Chicago 54, Ill. SEE ADV. C-116
APPARATUS SALES DIV., GENERAL ELECTRIC CO., 1 River Rd., Schenectady 5, N. Y. SEE ADV. 63, C-129
BJ Electronics, Borg-Warner Corp., 3300 Newport Ave., P. O. Box 1679, Santa Ana, Calif.
Cal-Tronics, Corp., 11307 Hindry Ave., Los Angeles.
Electronics Div., The Ralph M. Parsons Co., 151 S. DeLacey Ave., Pasadena, Calif.
Engrg. & Prod. Div., Dynamic Electronics-New York, Inc., 73-39 Woodhaven Blvd., Glendale, N. Y.
Eng. Prod. Div., Radio Receptor Co., 240 Wythe Ave., Brooklyn 11, N. Y.
General Precision Equipment Corp., 92 Gold St., New York 38, N. Y.
Hallamore Electronics Co., 8352 Brookhurst Ave., Anaheim, Calif.
Hall-Scott, Inc., Electronics Div., 2950 N. Ontario St., Burbank, Calif.
Hazeltine Electronics Corp., 59-25 Little Neck Parkway, Little Neck 62, L. I., N. Y.
Hoffman Laboratories, Inc., 3761 South Hill St., Los Angeles 7, Calif.
LIGHT MILITARY ELECTRONIC EQUIP. DEPT., GENERAL ELECTRIC CO., Utica, N. Y. SEE ADV. 63, C-129
MOTOROLA, INC., 4545 West Augusta Blvd., 2710 Clyborn Ave., Chicago, Ill. SEE ADV. C-113
PACIFIC DIV., BENDIX AVIATION CORP., 11600 Sherman Way, North Hollywood, Calif. SEE ADV. A-47
Resdel Engineering, 330 S. Fairoaks Ave., Pasadena.
Stavid Engineering Co., Route U. S. 22, Plainfield, N. J.
STEWART WARNER ELECTRONICS DIV., Stewart Warner Corp., 1300 North Kostner Ave., Chicago 51, Ill. SEE ADV. A-71
Telephonics Corp., Park Ave., Huntington, L. I., N. Y.
United Electrodynamics Div., United Geophysical Corp., 1200 S. Marengo St., Pasadena, Calif.

Tubes, Receiving

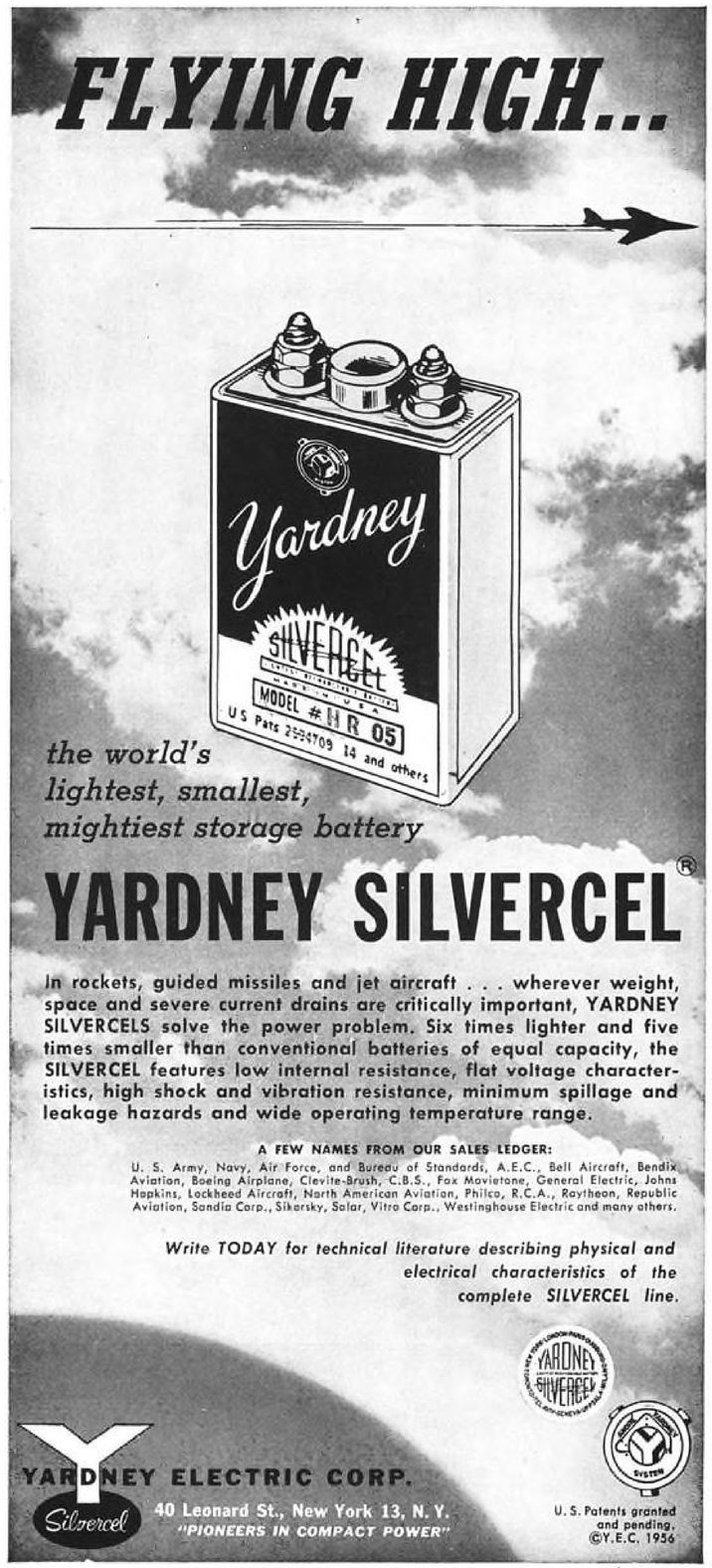
Bomac Laboratories, Inc., Beverly, Mass.
Chatham Electronics Division, Gera Corp., 630 W. Pleasant Ave., Livingston, N. J.
CBS-Hytron Div., Columbia Broadcasting System, Inc., 100 Endicott St., Danvers, Mass.
Eitel-McCullough, Inc., San Mateo Ave., San Bruno, Calif.
Electronics Tube Div., Westinghouse Electric Corp., Box 284, Elmira, N. Y.
Farnsworth Electronics Co., Div. of International Tel. & Tel. Corp., 3700 E. Pontiac St., Fort Wayne, Ind.
Huggins Laboratories, Inc., 711 Hamilton Ave., Menlo Park, Calif.
Kip Electronics Corp., 29 Holly Pl., Stamford, Conn.
Lansdale Tube Co., Lansdale, Penn.
National Union Electric Corp., 350 Scotland Rd., Orange, N. J.
RAYTHEON MFG. CO., 55 Chapel St., Newton 58, Mass. SEE ADV. C-79
Red Bank Div., Bendix Aviation, Red Bank, N. J.
State Laboratory, Inc., 649 Broadway, New York, N. Y.
Tube Sales, General Electric Co., 3001 Campbell Ave.-Bldg. No. 267, Schenectady, N. Y.
Tung-Sol Electric, Inc., 95 Eighth St., Newark 4, N. J.
Varian Associates, 611 Hansen Way, Palo Alto, Calif.
Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.

Tubes, Transmitting

Amperex Electronic Corp., 230 Duffy Ave., Hicksville, N. Y.
Bomac Laboratories, Inc., Salem Rd., Beverly, Mass.
CBS-Hytron Div., Columbia Broadcasting System, Inc., 100 Endicott St., Danvers, Mass.
Eitel-McCullough, Inc., San Mateo Ave., San Bruno, Calif.
Electronic Systems Div., Sylvania Electric Products, Inc., 100 First Ave., Waltham, Mass.
Electronics Tube Div., Westinghouse Electric Corp., Box 284, Elmira, N. Y.
Farnsworth Electronics Co., Div. of International Tel. & Tel. Corp., 3700 E. Pontiac St., Fort Wayne, Ind.
Federal Telephone & Radio Co., 100 Kingsland Rd., Clifton, N. J.
Huggins Laboratories, Inc., 711 Hamilton Ave., Menlo Park, Calif.
Lansdale Tube Co., Lansdale, Pa.
Lewis & Kaufman, Ltd., 17320 El Rancho Ave., P. O. Box 337, Los Gatos, Calif.
McKay Research Laboratories, Rural Route #2, McHenry, Ill.
MICROWAVE & POWER TUBE OPERATIONS, RAYTHEON MFG. CO., Waltham 54, Mass. SEE ADV. C-79
National Union Electric Corp., 350 Scotland Rd., Orange, N. J.
SPERRY GYROSCOPE CO., DIV., SPERRY RAND CORP., Marcus & Lakeville Rds., Great Neck, N. Y. SEE ADV. C-114, C-115
State Laboratory, Inc., 649 Broadway, New York, N. Y.
TUBE SALES, GENERAL ELECTRIC CO., 3001 Campbell Ave., Bldg. No. 267, Schenectady, N. Y. SEE ADV. 63, C-129
Tung-Sol Electric, Inc., 95 Eighth St., Newark 4, N. J.
U. S. Engrg. Co., Inc., Components Div., Litton Industries, 5873 Rodeo Rd., Los Angeles 16, Calif.
Varian Associates, 611 Hansen Way, Palo Alto, Calif.
Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.

Tubes, Vacuum

Amperex Electronic Corp., 230 Duffy Ave., Hicksville, N. Y.
Anton Electronic Labs, 1226 Flushing Ave., Brooklyn 37, N. Y.
Chatham Electronics Division, Gera Corp., 630 W. Pleasant Ave., Livingston, N. J.
CBS-Hytron Div., Columbia Broadcasting System, Inc., 100 Endicott St., Danvers, Mass.
Eitel-McCullough, Inc., San Mateo Ave., San Bruno, Calif.
Electronic Systems Div., Sylvania Electric Products, Inc., 100 First Ave., Waltham, Mass.
Electronic Tube Div., Burroughs Corp., Box 1226, Plainfield, N. J.
Electronics Tube Div., Westinghouse Electric Corp., Box 284, Elmira, N. Y.
Farnsworth Electronics Co., Div. of International Tel. & Tel. Corp., 3700 E. Pontiac St., Fort Wayne, Ind.



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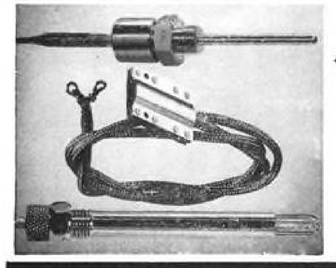
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Hughes Prods. Div., Hughes Aircraft Co., 5200 West 104 St., Los Angeles 45, Calif.
Kip Electronics Corp., 29 Holly Pl., Stamford, Conn.
Kuthe Laboratories, Inc., 730 South 13th St., Newark 3, N. J.
Lansdale Tube Co., Lansdale, Pa.
Lewis & Kaufman, Ltd., 17320 El Rancho Ave., P. O. Box 337, Los Gatos, Calif.
McKay Research Laboratories, Rural Route #2, McHenry, Ill.
MARCO INDUSTRIES CO., 207 South Helena St., Anaheim, Calif. SEE ADV. A-46
National Union Electric Corp., 350 Scotland Rd., Orange, N. J.
Polarad Electronics Corp., 43-20 34 St., Long Island City 1, N. Y.
RAYTHEON MFG CO., 55 Chapel St., Newton 58, Mass. SEE ADV. C-79
Red Bank Div., Bendix Aviation, Red Bank, N. J.
State Laboratory, Inc., 649 Broadway, New York, N. Y.
TUBE SALES, GENERAL ELECTRIC CO., 3001 Campbell Ave., Bldg. No. 267, Schenectady, N. Y. SEE ADV. 63, C-129
Tung-Sol Electric, Inc., 95 Eighth St., Newark 4, N. J.
Vacuum Tube Prods. Co., Inc., 506 South Cleveland St., Oceanside, Calif.
Victoreen Instrument Co., 5806 Hough St., Cleveland, Ohio
Waterman Products Co., Inc., 2445-63 Emerald St., Philadelphia 25, Pa.

Tuning Units, Antenna

Andrew Corp., 363 East 73 St., Chicago 19, Ill.
DEFENSE PRODUCTS GROUP, AMERICAN MACHINE & FOUNDRY CO., 1101 North Royal St., Alexandria, Va. SEE ADV. B-22
Engrg. & Prod. Div., Dynamic Electronics-New York, Inc., 73-39 Woodhaven Blvd., Glendale, N. Y.
Gates Radio Co., Quincy, Ill.
THE HALLICRAFTERS CO., 4401 West Fifth Ave., Chicago 24, Ill. SEE ADV. C-93
Hoffman Laboratories, Inc., 3761 South Hill St., Los Angeles 7, Calif.
Lear, Inc., 3171 S. Bundy Drive, Santa Monica, Calif.
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Allied International Co., 230 Park Ave., New York 17, N. Y.
Aviation Electronic Props., Bendix Radio Div., Bendix Aviation Corp., 1400 Taylor Ave., Baltimore 4, Md.
COLLINS RADIO CO., 855 35th St., N. E., Cedar Rapids, Iowa. SEE ADV. C-102, C-103
Dayton Aviation Radio & Equip. Corp., Dare, Inc., Hangar No. 2, Dayton Municipal Airport, Vandalia, Ohio
ELECTRONIC DIV., OTIS ELEVATOR CO., 35 Ryerson St., Brooklyn 5, N. Y. SEE ADV. C-88
ELECTRONIC SPECIALTY CO., 5121 San Fernando Rd West, Los Angeles 39, Calif. SEE ADV. C-135
Engrg. & Prod. Div., Dynamic Electronics-New York, Inc., 73-39 Woodhaven Blvd., Glendale, N. Y.
Federa. Mfg & Engrg. Co., 1055 Stewart Ave., Garden City, N. Y.
General Precision Equipment Corp., 92 Gold St., New York 38, N. Y.
Government Div., Webcor, Inc., 816 North Kedzie Ave., Chicago 51, Ill.
THE HALLICRAFTERS CO., 4401 West Fifth Ave., Chicago 24, Ill. SEE ADV. C-93
Hoffman Laboratories, Inc., 3761 South Hill St., Los Angeles 7, Calif.
Lear, Inc., 3171 S. Bundy Drive, Santa Monica, Calif.

LIGHT MILITARY ELECTRONIC EQUIP. DEPT., GENERAL ELECTRIC CO., Utica, N. Y. SEE ADV. 63, C-129
Manufacturing Div., Electronic Equipment & Aviation Supplies, Air Associates, Inc., Teterboro Air Terminal, Teterboro, N. J.
MOTOROLA, INC., 2710 Clyborn Ave., Chicago, Ill. SEE ADV. C-113
National Aeronautical Corp., Commerce Drive, Fort Washington, Pa.
National Electronics Labs., Inc., 1713 Kalorama Rd., N. W., Washington 9, D. C.
Research & Development Div., Air Associates, Inc., 511 Joyce St., Orange, N. J.
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Telectro Industries Corp., 36-16 37th St., Long Island City 1, N. Y.

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Aviation-Electronic Props., Bendix Radio Div., Bendix Aviation Co., 1400 Taylor Ave., Baltimore 4, Md.
COLLINS RADIO CO., 855 35th St., N. E., Cedar Rapids, Iowa. SEE ADV. C-102, C-103
Dayton Aviation Radio & Equip. Corp., Dare, Inc., Hangar No. 2, Dayton Municipal Airport, Vandalia, Ohio
Engrg. & Prod. Div., Dynamic Electronics-New York, Inc., 73-39 Woodhaven Blvd., Glendale, N. Y.
Federal Telecom Labs., 500 Washington Ave., Nutley, N. J.
Federal Telephone & Radio Co., 100 Kingsland Rd., Clifton, N. J.
General Precision Equipment Corp., 92 Gold St., New York 38, N. Y.
Government Div., Webcor, Inc., 816 North Kedzie Ave., Chicago 51, Ill.
THE HALLICRAFTERS CO., 4401 West Fifth Ave., Chicago 24, Ill. SEE ADV. C-93
Lavoie Laboratories, Inc., Matawan-Freehold Rd., Morganville, N. J.
Lear, Inc., 3171 S. Bundy Drive, Santa Monica, Calif.
LIGHT MILITARY ELECTRONIC EQUIP. DEPT., GENERAL ELECTRIC CO., Utica, N. Y. SEE ADV. 63, C-129
Lytle Engineering & Manufacturing Co., 1404 San Mateo Blvd., S. E., Albuquerque, N. M.
Manufacturing Div., Electronic Equipment & Aviation Supplies, Air Associates, Inc., Teterboro Air Terminal, Teterboro, N. J.
Maryland Electronic Mfg. Corp., 5009 Calvert Rd., College Park, Md.
Mitchell Industries, Inc., Municipal Airport, Box 17, Mineral Wells, Texas
MOTOROLA, INC., 2710 Clyborn Ave., Chicago, Ill. SEE ADV. C-113
National Aeronautical Corp., Commerce Drive, Fort Washington, Pa.
National Electronics Labs., Inc., 1713 Kalorama Rd., N. W., Washington 9, D. C.
Research & Development Div., Air Associates, Inc., 511 Joyce St., Orange, N. J.
Telectro Industries Corp., 36-16 37th St., Long Island City 1, N. Y.

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Acton Lab., Inc., 533 Main St., Acton, Mass.
Aircraft Equipment Div., The Bristol Co., P. O. Box 1790-A. W., Waterbury 20, Conn.
APPARATUS SALES DIV., GENERAL ELECTRIC CO., 1 River Rd., Schenectady 5, N. Y. SEE ADV. 63, C-129
Assembly Prods., Inc., Chesterland 39, Ohio
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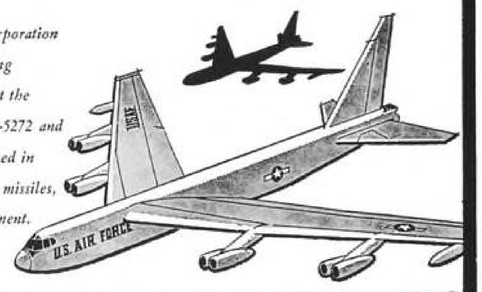


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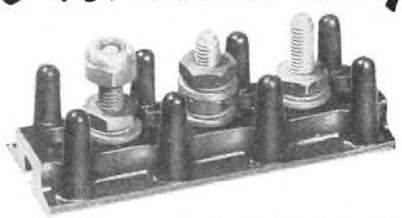
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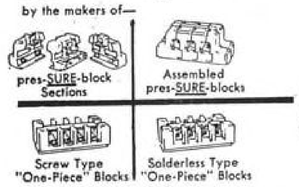
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Texas Instruments Inc., 6000 Lemmon Ave., Dallas 9, Texas
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Triumph Mfg. Co., 1829 South 55th Ave., Chicago, Ill.
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Chemalloy-Electronics, Inc., Gillespie Airport, Dantee, Calif.
COLLINS RADIO CO., 855 35th St., N. E., Cedar Rapids, Iowa. SEE ADV. C-102, C-103
Co-Operative Industries, Inc., Chester, N. J.
Decade Instrument Co., Box 153, Caldwell, N. J.
Diamond Antenna & Microwave Corp., 7 North Ave, Wakefield, Mass.
Douglas Microwave, 252 East Third St., Mt. Vernon, N. Y.
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Gabriel Electronics Div., The Gabriel Co., 135 Crescent Rd., Needham Heights 94, Mass.
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General Plate Div., Metals & Controls Corp., 41 Forest St., Attleboro, Mass.
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Goodyear Aircraft Corp., 1210 Massilon Rd., Akron 15, Ohio
KEARFOTT CO., INC. DIV., GENERAL PRECISION EQUIPMENT CORP., Little Falls, N. J. SEE ADV. C-89
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Ryan Aeronautical Co., Lindbergh Field, San Diego 12, Calif.
Sterling Precision Corp., 34-17 Lawrence St., Flushing 54, N. Y.
Telectro Industries Corp., 36-16 37th St., Long Island City 1, N. Y.
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Waveguide, Inc., 14837 Oxnard St., P. O. Box 486, Van Nuys, Calif.
Waveline, Inc., Passaic Ave., Caldwell, N. J.

Wiring Devices

American Res. & Mfg. Corp., Rockville Pike & Halpine Rd., Rockville, Md.
Assembly Prods., Inc., Chesterland 39, Ohio
BURNDY ENGRG. CO., Norwalk, Conn. SEE ADV. D-171
Dashew Business Machines, Inc., 5886 Smiley Dr., Culver City, Calif.
Duramatic Products, 5912 Noble St., Van Nuys, Calif.
The Ericson Mfg. Co., 5209 Euclid Ave., Cleveland 3, Ohio
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The Hart Mfg. Co., 110 Bartholomew Ave., Hartford, Conn.
Holub Industries, Inc., 413 DeKalb Ave., Sycamore, Ill.
Ideal Industries, Inc., 1437 Park Ave., Sycamore, Ill.
Javex, P. O. Box 646, Redlands, Calif.
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Leviton Mfg. Co., Inc., 236 Greenpoint Ave., Brooklyn 22, N. Y.
PACIFIC AUTOMATION PRODUCTS, INC., 1000 Airway, Glendale 1, Calif. SEE ADV. C-104
Piqua Engrg. Co., 112 E. Ash St., Piqua, Ohio
PIX Mfg. Co., Inc., 75 Hudson St., Newark 3, N. J.
Ralph C. Robinson Company, P. O. Box 3494, North Sacramento 15, Calif.
Stromberg Carlson, 100 Carlson Rd., Rochester 3, N. Y.
TENSOLITE INSULATED WIRE CO., INC., 198 Main St., Tarrytown, N. Y., 1516 North Gardner St., Los Angeles 46, Calif. SEE ADV. C-124
Thermo Electric Co., Inc., Saddle Brook, N. J.
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A. W. HAYDON CO.

This miniature, hermetically-sealed, general purpose relay has been designed with increased magnetic force to provide higher contact pressures and greater travel than are usually found in this type. Special care has been taken to assure reliable operation in low level circuits.

Rated Load: 2 amperes, 28 Volts DC, resistive. Ambient Temperature Range: −65°C to + 125°C. Vibration: 15g to 2,000 cps — no contact chatter. Shock: 50g, 11 milliseconds — no contact chatter. Write for Bulletin AWH RY 1001.



TYPE 300 COUNTERBALANCED RELAY
WITH SEPARATELY SEALED CONTACT CHAMBER

Uniquely designed with contacts isolated from coil. Contacts can never become contaminated with vapors or gas from organic insulating materials.

TIMING AND CONTROL DEVICES BY THE A. W. HAYDON COMPANY ARE RECOGNIZED AS THE MOST DEPENDABLE PERFORMERS IN THE FIELD.

400 CYCLE MOTORS

Reversible — Light weight (8 ounces). 115 volts ± 10%; 55 milliamps. Torque: 0.025 oz-in at 3000 rpm. Meet Military Requirements. Write for Bulletin AWH MO 803.



GOVERNED DC MOTORS



The A. W. Haydon Company now offers 3 series of Chronometrically Governed DC Motors. Each designed to do the same job in a different application.
5700 Series — non-military applications where extreme temperature, vibration and shock are not experienced.
5600 Series — Aircraft and military applications where extreme temperature and moderate vibration and shock are encountered.
5800 Series — Aircraft and missile applications where extreme temperature, vibration, and shock are encountered.
Write for Bulletin AWH MO 800, -801, -802, -804.

MINIATURE HERMETICALLY SEALED TIMERS

Supplied in 2½" diameter housing. Optional mounting and electrical termination.

TIME DELAY RELAYS
Single or multiple switching. Delay periods from 2 seconds to 3 hours. Write for Bulletin AWH TD 400.

REPEAT CYCLE TIMERS
Single or multiple switching. Wide Range of Time Cycles. Write for Bulletin AWH RC 200.



SPECIAL TIME DELAY RELAY



Supplied in 2.2" diameter housing. Precision unit: ± 1% accuracy. Meets military requirements. Adjustable over wide range. Write for Bulletin AWH TD 500.

PROPORTIONAL DELAYED RESET TIME DELAY RELAY

Provides a controlled reset rate. Designed to meet special applications. Hermetically sealed or enclosed in dust cover. Meets military requirements. Write for Bulletin AWH TD 402.



STOP CLOCKS



20-30 Volts DC. Precision Movement — Electrical Reset Temperature Range −65°F to 185°F. Option on mounting and electrical termination. Write for Bulletin AWH ET 700.

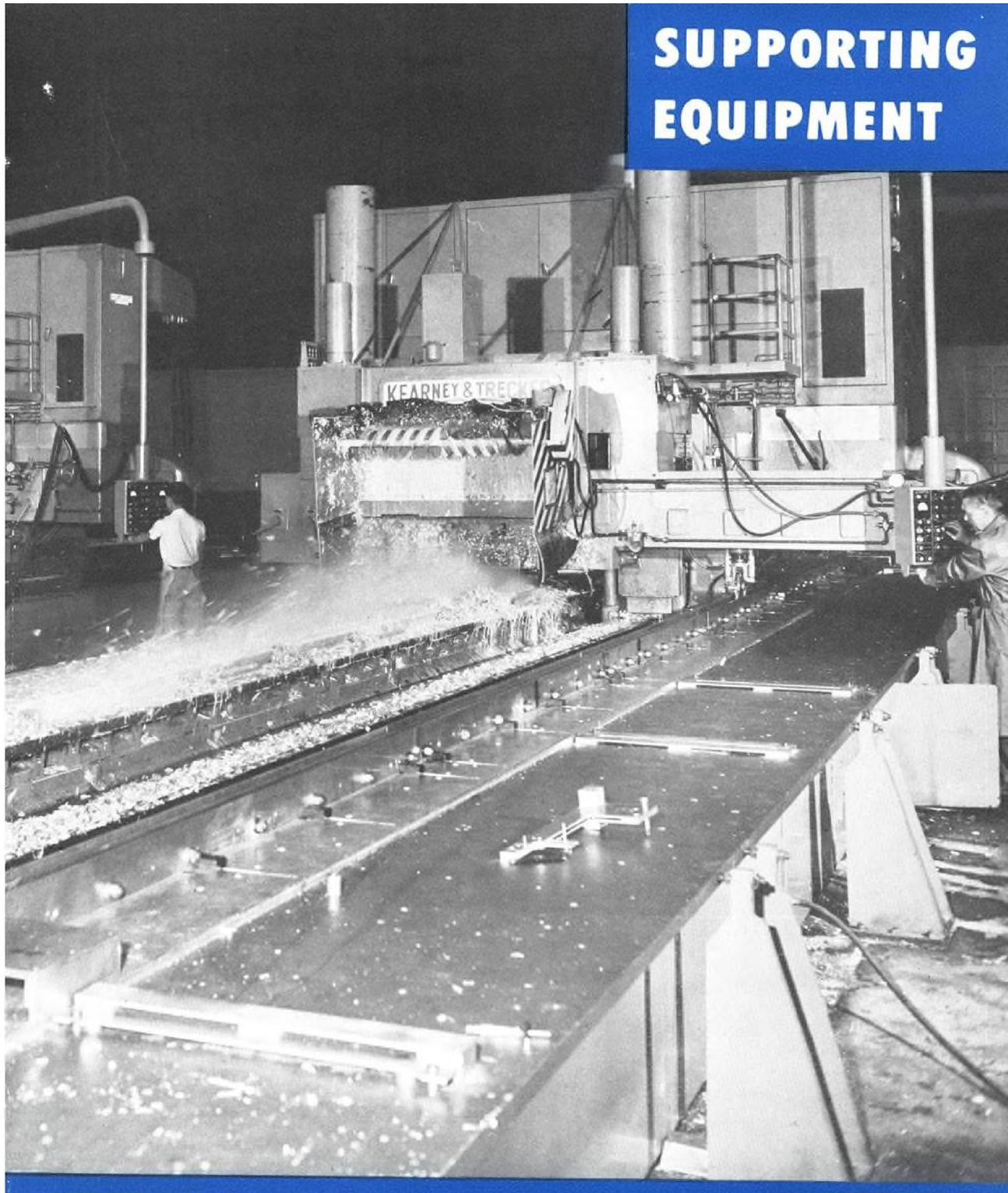
FOR FULL PARTICULARS ON COMPLETE LINE OF THE A. W. HAYDON COMPANY'S ELECTRO-MECHANICAL DEVICES, WRITE FOR CATALOG Dept. AWBG.

The A. W. HAYDON COMPANY
222 NORTH ELM STREET
WATERBURY 20, CONNECTICUT

Design and Manufacture of Electro-Mechanical Timing Devices

C-142

Circle Number 106 on Reader-Service Card



SUPPORTING EQUIPMENT

SKIN MILLS AT LOCKHEED'S MARIETTA, GEORGIA, DIVISION

1957 AVIATION WEEK BUYERS' GUIDE

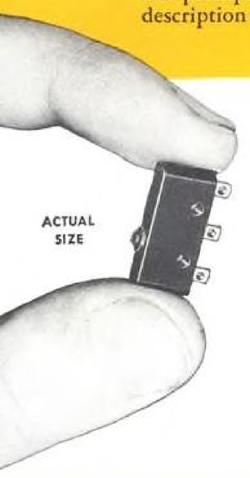
SECTION D

Electro-Snap Switches Can Be Adapted to Almost Any Job — Quickly, Easily, Economically

Just choose the Electro-Snap Basic Switch that meets your electrical requirements, add the proper actuator — and presto! — you have a tailor-made precision switch that exactly fits your application. Electro-Snap makes a wide variety of stock actuators to fit almost any requirement. And our engineering department is at your service if a standard combination "won't fill the bill."

For prompt action on your switching problems, send us a brief description and rough sketch of the switch you need.

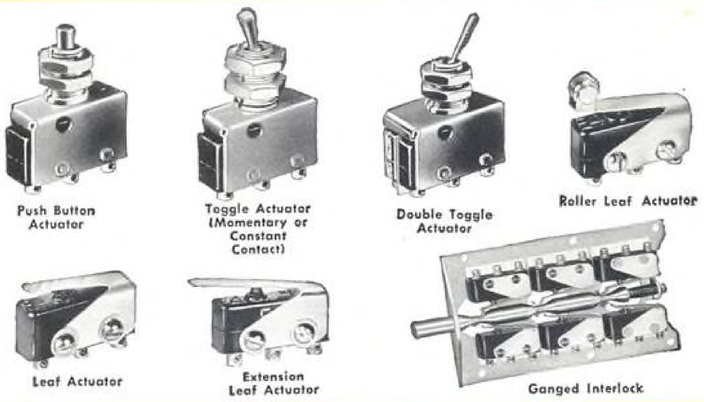
Switching Problem?



SUB-MINIATURE SWITCHES TYPE E-4

S.P.D.T., 1 circuit; 5 amps, 125/250 v. AC
Operating force 150 grams max.
Exceptionally vibration-resistant.
Special model E4-7 is stabilized for — 65° to + 350° F. operation.

Write for data sheet EM-12

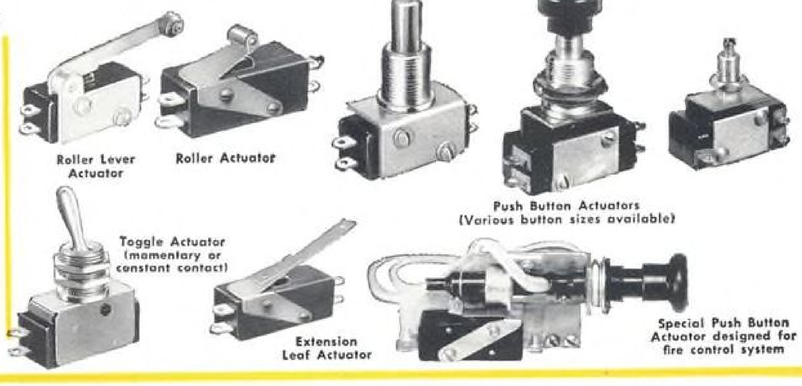


TYPE S SWITCHES Series S1



S.P.D.T., 2 circuit; 10 amps, 125/250 v. AC/ 30 v. DC. Ind. Screw or solder terminals on ends or one side of switch. Also available with reset button at bottom of switch or in Type S-100 Make-Before-Break Series where switch completes a new circuit before interrupting old one.

Write for data sheet STM-12





Write for data sheet DM-12

DOUBLE-POLE SIMULTANEOUS ACTION TYPE D-8

D.P.D.T., 4 Circuit
15 amps, 125/250 v. AC.
10 amps, 30 v. DC Ind.
Eight terminals and four separate circuits which operate simultaneously permite switch to reverse 3-phase motors, replace expensive relays, etc.



HERMETICALLY-SEALED DOUBLE-POLE SWITCH

Write for data sheet HJM-12



D.P.D.T., 4 circuit 10 amps, 125/250 v. AC/30 v. DC.

ELECTRO-SNAP SWITCH & MFG. CO. 4232 West Lake Street, Chicago 24, Illinois

MANUFACTURERS OF A COMPLETE LINE OF PRECISION SWITCHES FOR INDUSTRY AND AVIATION

Support Items Vital to Development

By George L. Christian

The soundness and reliability of aircraft equipment and systems—hydraulic and pneumatic, electrical and cartridge-actuated—must be of the same high order of integrity as the basic airframe or engine in today's supersonic fighters and multi-million-dollar bombers.

Failure of this equipment, or one of several portions of the systems they power, can be catastrophic. The rupture of a simple hydraulic fitting can have the same disastrous results as the crumbling of a wing's main spar or the disintegration of the powerplant.

As an engineer for one of the country's largest equipment manufacturers put it, "a statistical approach to the design of equipment is no longer tolerable when dealing in human life and in weapons systems which are as complex and costly as those flying today and those which will fly tomorrow."

For instance, missiles worth several hundreds of thousands of dollars, capable of searching out the most elusive, high-flying bomber, or pinpointing targets a thousand or more miles behind enemy lines with nuclear warheads, will be totally impotent without all the paraphernalia incident to their correct launching. This is made up of a vast array of men and machines. Included in a missile's retinue are vehicles to transport the missile, its fuel (which is often highly dangerous), its launching gear, control devices, and highly trained servicing and operating personnel to the desired launching site.

Chain of Support

Once established at the launching site, all the support equipment must function efficiently to allow the servicing personnel to give it a thorough check-out, fuel it, and position it. Then the launching crew will take over, fire the missile and perhaps guide it part or all the way to target. If a single link in this long and complicated chain of support equipment and specialized personnel fails, the missile's mission most probably aborts.

Therefore, the prime contractor for a weapon system finds himself embroiled in much more than merely designing and manufacturing a highly complex airframe.

He has to produce—or at least be responsible for—all the support equipment and train the personnel to such a high degree of proficiency that personnel failure is as remote as equipment failure.

The problems which "support equipment" must solve are highlighted by this dilemma: How do you train a man to launch a missile as lethal, complex, and costly as, say, the ICBM? Because of the cost and range of the missile, test launchings are impractical. So some sort of trainer or simulator must be devised. The machine must be so faithful in its reproduction of all the circumstances and events which take place in the period of checking, pre-launching and launching the ICBM that a man's transfer of thought and action from simulator to the real thing will be unhesitating and accurate to the minutest detail. He must be completely conversant with all panic-button details.

Nor are weapon systems problems isolated to guided missiles. The very same headaches exist, varying only in degree, in all weapon systems, including those which are man carrying, such as the fighters, interceptors and bombers of today and tomorrow.

Here are examples of how simple system failures can destroy a multi-million dollar aircraft:

- **Hydraulic system** failure can paralyze a plane's hydraulically-powered flight control system, making it impossible for the pilot to fly his ship.
- **Pneumatic failure** on such planes as the B-52, F-102 or F-105, where all or part of the accessory systems, such as hydraulic and electrical, air-powered, can be as disastrous as failure of the primary structure.
- **Electrical malfunctions** may quickly start fatal fires.
- **Cartridge actuated devices,** if they fail to eject a pilot or jettison certain stores, can cause destruction of pilot and plane.

Because this essential character has been bestowed on accessory equipment and systems, new design criteria and techniques have had to be evolved, and new emergency power sources conceived to make the systems function in case of equipment failure. Among the latter are the pop-out type of air-driven hydraulic pump and/or generator which the pilot can snap into the slip stream to supply the vital hydraulic or electrical power which is necessary to enable him to fly the plane and make a safe landing.

The David & Goliath relationship between accessory and weapon systems is underlined by the first fatal B-52 crash last Feb. 23. The giant jet was knocked out of the sky by a tiny turbine wheel disintegrating, parts of which blasted through one of the plane's fuel tanks. (The turbine was powered by the B-52's low-pressure pneumatic system and drove one of the electrical system's many alternators).

The high degree of reliability required of ancillary equipment used on today's fighting planes and tomorrow's commercial jets has imposed additional demands on equipment manufacturers in the form of protective devices for system power sources.

In hydraulic systems, for instance, pump efficiencies had to be improved to make the units small and light enough to squeeze into modern jet fighters.

This led to pump parts being made to extremely close tolerances—some are lapped to tolerances of one-half millionth of an inch.

As a result, the hydraulic fluid has to be kept free of dirt, chips and other foreign matter. To strain the fluid of all contaminants down to 10 microns, new filters had to be devised which would do the job, yet not impose undue pressure drops on the system. This was accomplished by a variety of porous or finely woven metal filters.

Weapon Systems

With the implementation of the weapon systems in the Air Force, came a whole family of support items for the weapon system, not as closely related as ancillary equipment and systems, but equally important to the weapon completing its mission successfully.

The entire weapon system concept, including sometimes dozens of support items, has assumed such a degree of importance that the airframe itself—whether airplane or missile—slides into a position of secondary importance compared to the overall weapon system.

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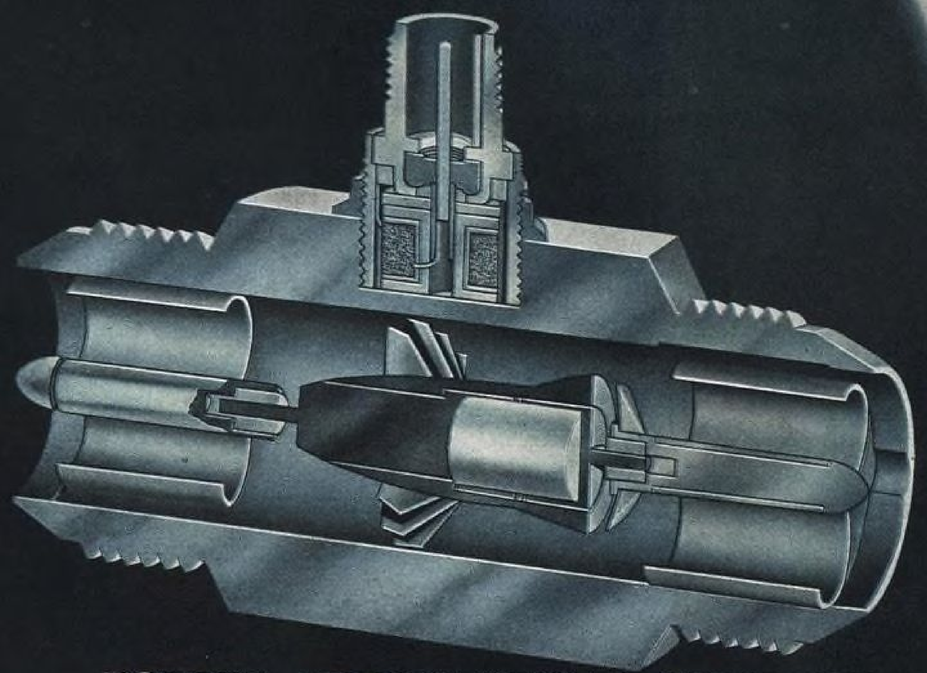
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Flow Control by POTTERMETER



In every major development project using liquid propellants, such as long range rockets, satellite launching vehicles, high performance aircraft—Pottermeters are used for precise flow control. Potter flow meters are accurate and reliable even under extreme conditions of temperature, pressure, vibration and shock.

Potter, pioneers in precision flow control, may be able to assist you in your flow metering or flow control problems.

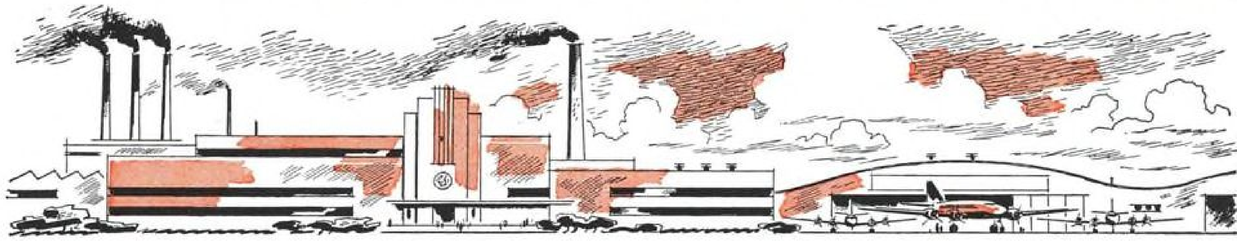
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FROM FACTORY TO FLIGHT...





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SINCLAIR CUTTING OILS AND COOLANTS

TRUKUT®—Water-soluble cutting and grinding oil.

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MARQUENCHOL – a quality product for full marquenching of critical parts.

QUENCHOL® 500 SERIES QUENCHING OILS – Premium products with unusual properties of quenching performance and long life.

SINCLAIR HYDRAULIC AND MACHINE OILS

DURO – High viscosity index oils containing rust, oxidation and foam inhibitors.

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COMMANDER® – General purpose, straight mineral oils.

SINCLAIR GEAR OILS

PENNANT® EP – High viscosity index, lead napthenate type oils, for heavy and shock loads.

OPALINE® MULTI-PURPOSE GEAR LUBRICANT – Extreme pressure lubricants for hypoid and other gearing.

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CADET® – Low viscosity, straight mineral oils.

LILY WHITE – Light color, low viscosity mineral oils; also available with additives to provide extra protection against rust and wear.

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LITHOLINE® INDUSTRIAL EP GREASES – Special lithium soap greases with an extreme pressure additive; for multi-purpose industrial use.

DUROLUBE GREASES – Premium quality extra long life greases for electric motors or sealed bearings.

BEARING GREASES AF – Sodium-calcium soap greases of anti-friction bearing quality.

OPALINE PRESSURE SYSTEM GREASES – Calcium soap greases specially adapted to centralized lubrication.

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AIRBORNE EQUIPMENT



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AIRCRAFT 100 STAR OIL (Made especially for American Airlines).

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AIRCRAFT OILS, Grades 65, 80, 100, 120 – Quality piston engine lubricants refined to meet the exacting requirements of aviation. Available in quart cans.

AIRCRAFT TURBO 5 OIL – An approved lubricant for turbo-prop and turbo-jet engines.

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BEARING GREASE AF No. 2 EP – High quality, extreme pressure grease for anti-friction bearings.

BEARING GREASE AFG No. 2 – An anti-friction bearing grease containing graphite for special applications.

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MICA LUBRICANT AA – An anti-seize spark plug thread lubricant.

SINCLAIR REFINING COMPANY

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Sinclair serves the Aviation Industry with Top Quality Petroleum Products



GROUND EQUIPMENT

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EXTRA DUTY MOTOR OIL – (For Services MS-DG-DM) Sinclair's outstanding motor oil for severe services: provides extra-ordinary engine cleanliness, freedom from ring and hydraulic valve lifter sticking, and a reduction in wear heretofore not believed possible with a motor oil.

EXTRA DUTY TRIPLE X MULTI-GRADE MOTOR OIL–(For Services MS-DG) An extra duty quality motor oil in the new multi-grades (SAE 10W-30 and 5W-20), for maximum protection in all driving ranges, and under all temperature and climate conditions.

TENOL®–(For Services MS-DG) An excellent fleet motor oil which provides high film strength, minimum engine wear, high engine cleanliness and full power with long engine life under moderate conditions.

SUPER TENOL – (For Services MS-DG-DM) An outstanding fleet motor oil for severe operating conditions. Reduces acid and mechanical wear, guards against ring and valve sticking, cuts total oil consumption, prolongs high power output of engine, and cuts maintenance and downtime to a minimum.

TENOL EXTRA S-3 – (For Service DS) A superior lubricant (Series 3 oil) for the most severe Diesel operations.

SINCLAIR GREASES, TRANSMISSION AND GEAR LUBRICANTS

LITHOLINE MULTI-PURPOSE GREASE – A special lithium soap grease, for the complete grease lubrication of all automotive equipment including chassis, wheel bearings, and other parts.

OPALINE CHASSIS LUBRICANT – A NLGI No. 1 consistency tacky calcium soap grease, for chassis lubrication.

SINCOLUBE® GREASE – A short fiber grease resisting throwout, bleeding or hardening; specifically recommended for automotive wheel bearings.

OPALINE MULTI-PURPOSE GEAR LUBRICANT – Recommended for all hypoid and conventional gearing in all classes of automotive equipment.

AUTOMATIC TRANSMISSION FLUID – Qualified and approved for all passenger car automatic transmissions. Recommended for power steering systems where this type product is required.

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POWER-X GASOLINE with X-CHEMICAL – a Super-Premium gasoline which does what no other gasoline ever did before. Increases power – cuts operating costs. Eliminates power-robbing engine deposits.

HC GASOLINE – A quality gasoline at regular gasoline prices for all-around superior performance. Contains RD-119® to prevent fuel system rust.

DIESEL FUELS – High cetane quality fuels, for all types of light and heavy duty Diesel engines. Anti-rust protection with RD-119.

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SOLVENTS–General purpose solvents for aircraft, engine and ground vehicle parts washing.

Listed here are but a few of the many service-proved products that Sinclair supplies in quantity to the Aviation Industry. Their superiority has been sustained in over 35 years of constant application to aviation needs . . . in manufacturing, and in ground and aircraft equipment maintenance. For further information on any specific product, contact your local Sinclair Representative, or write Sinclair Refining Company, Aviation Sales, 600 Fifth Avenue, New York 20, N. Y.

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your best source of
STAINLESS STEEL BELLOWS
and
DUCTING COMPONENTS
. . . ARROWHEAD



STAINLESS STEEL BELLOWS
Made in sizes ranging from 1" to 15", Arrowhead stainless steel bellows are available with single and multi-ply walls for handling compressed (bleed) air at temperatures up to 900°F. and pressures to 250 psi.



PRESSURE COMPENSATORS
There are three kinds of Arrowhead pressure compensating chambers – Internal Pressure Type, Internal Restraining Type and External Pressure Type. Each is designed to solve specific problems of duct thrust.



INTERNAL TIE-RODS
DOUBLE PIVOT TYPE
The bellows tie-rod assembly shown above employs two pivot points on the bellows center line to anchor the ends of the bellows. Fabricated in all diameters from 1" to 8".



DUCTING COMPONENTS
Arrowhead manufactures all types and shapes of ducting components for countless applications requiring the handling of compressed air at temperatures up to 900°F. and pressure to 250 psi.



BRAIDED BELLOWS
Special construction of Arrowhead bellows braid assemblies eliminates wear on the end convolutions. Available in standard sizes from 1" to 15".



INTERNAL TIE-RODS
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This bellows tie-rod assembly anchors the ends of the bellows at a single point along the bellows center line. Manufactured in all diameters from 1" to 8".

Arrowhead is the one manufacturer in the United States with the knowledge and facilities to develop and produce both metal and rubber-fiberglass ducting components. It offers the only complete product line of flexible rubber-fabric and metal ducting for aircraft and industrial use.

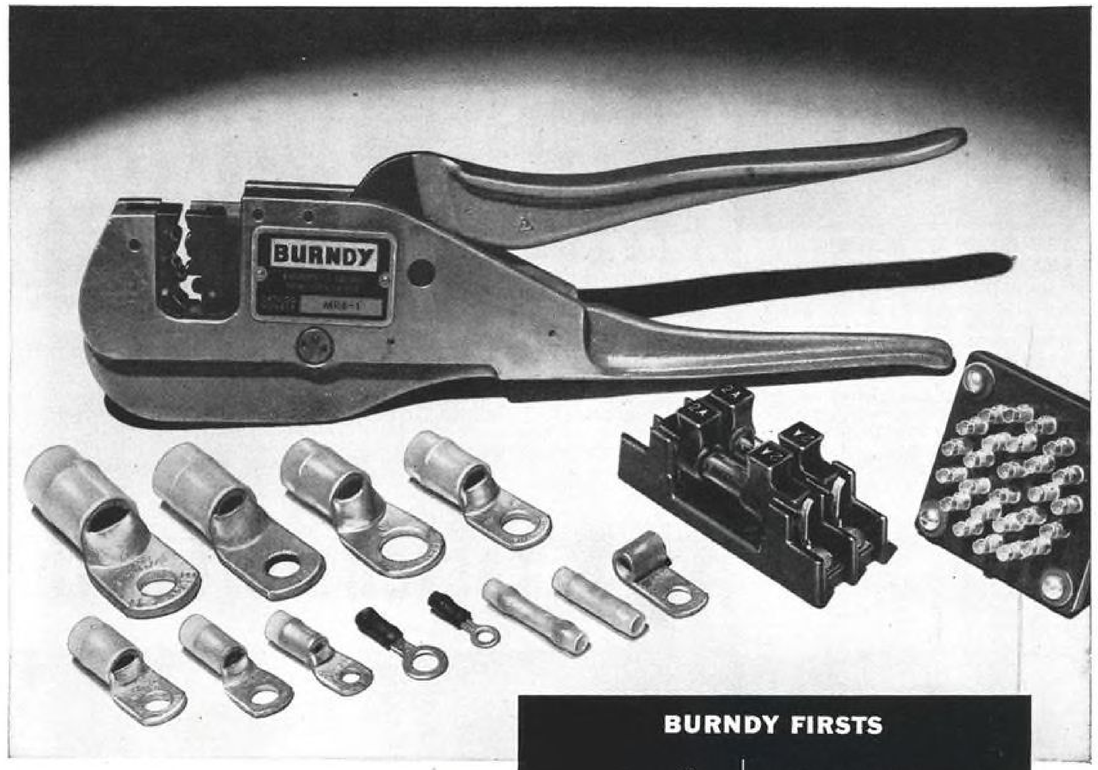
Arrowhead know-how is based soundly on experience. Arrowhead originated rubber-fiberglass ducting . . . pioneered the fabrication of silicone rubber . . . and was the first commercial manufacturer of precision "O" rings.

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ARROWHEAD PRODUCTS / *Division of Federal-Mogul-Bower Bearings, Inc.*

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FIRST

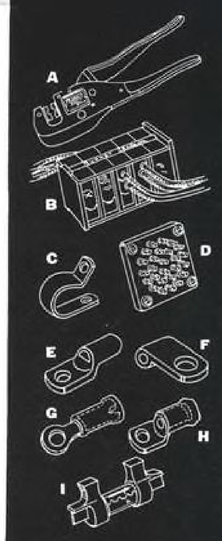
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B—Crablok multiple disconnect terminal strip. Bull. CB50.

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F—Flag type compression terminals. Bull. 51Y4.

G—Insulated compression terminals thru 2/0. Bull. 53Y4.

H—Insulated aluminum compression terminals thru 1/0. Bull. 53Y4.

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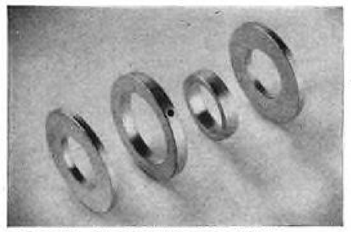
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SELF-LOCKING SPS FASTENERS (WITH THE NYLOK* LOCKING DEVICE)

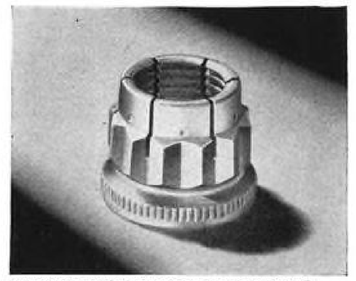
All male-threaded SPS aircraft fasteners can now be supplied with the Nylok self-locking device built in. The tough, resilient nylon locking pellet forces mating threads together, locking them positively and securely. This device eliminates need for auxiliary locking units, such as lockwashers and cotter pins, makes cross drilling of head and shanks and lockwiring unnecessary.

*T.M. Reg. U.S. Pat. Off., The Nylok Corporation



PRELOAD INDICATING WASHERS

New devices permit installation of threaded fasteners with precisely correct preload. Fastener is tightened properly when compressible inner ring is plastically deformed to same thickness as thin outer ring. Provide greater accuracy than torque wrench measurements, because friction between mating threads is not a factor in their operation. Available in a complete range of standard sizes; calibrated to develop specified stress levels for individual applications.

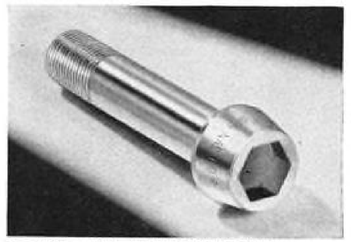


FLEXLOC HIGH-TEMPERATURE NUTS

119 FW 10-32 through ½-20

Made of corrosion-resistant stainless steel and silver plated, these self-locking nuts withstand temperatures up to 1200°F without losing their high tensile strength. They resist galling and seizing even after repeated exposure to high temperatures. They were designed specially for use in jet engine manifolds, afterburners and hot spots.

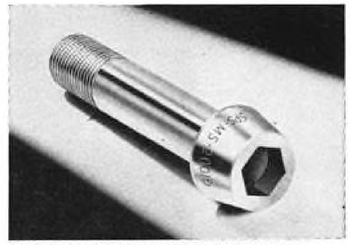
sps fasteners for the



SPS NAS 144 SERIES INTERNAL WRENCHING BOLTS

¼-28 through 1½-12
Procurement Specification NAS 159

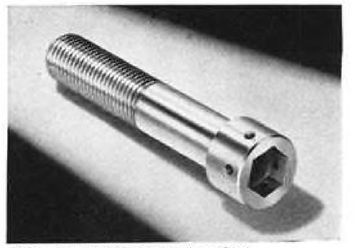
Made of aircraft alloy steel. Heat treated to 160,000-180,000 psi. Threads are fully formed by rolling after heat treatment.



SPS MS 20004 SERIES INTERNAL WRENCHING BOLTS

¼-28 through 1½-12
Procurement Specification MIL-B-7838

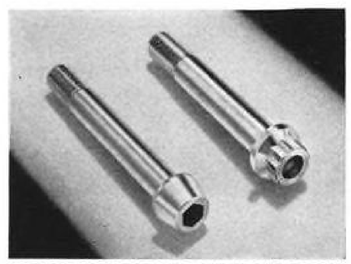
Made of aircraft alloy steel, heat treated to 160,000-180,000 psi tensile. Head to shank fillets are cold worked for greatly increased fatigue life. Threads are fully formed by rolling after heat treatment. Supplied undrilled or with drilled head.



SPS AN STANDARD 6-DIGIT ENGINE BOLTS

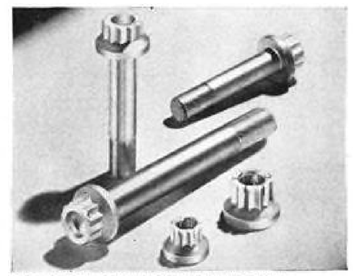
All sizes

External hexagon head type or internal hexagon socket head type. Made of aircraft alloy steel or corrosion-resistant steel. Supplied with drilled head or drilled shank.



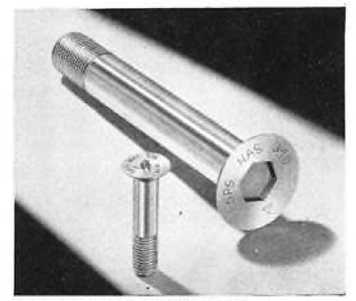
SPS HI TI TITANIUM AIRCRAFT BOLTS

Now made in both tension and shear types, these titanium fasteners are just as strong and fatigue resistant as comparable steel bolts, but weigh only 57% as much. Manufactured in many configurations to government and aircraft industry specifications.



SPS HIGH-STRENGTH EXTERNAL WRENCHING AIRFRAME FASTENERS

Specially designed EWB-22 airframe bolts are rated at 220,000 psi tensile strength. Completely new configuration, new materials, new heat treating methods, and new thread form make high strength possible. Special EWN-22 self-locking SPS nuts of comparable strength are available for use with these bolts.



SPS NAS 100° FLUSH HEAD SHEAR BOLTS

Phillips Cross Recess or Internal Hexagon Head
10-32 through ⅜-18
Procurement Specification NAS 498

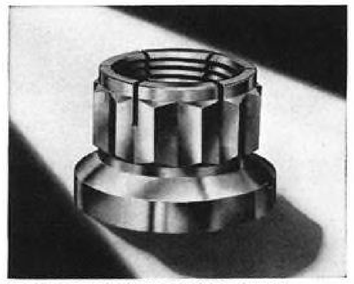
Made of aircraft alloy steel, cadmium plated. Supplied undrilled or with drilled shank.



SPS NAS INTERNAL WRENCHING LOCKNUTS

¼-28 through 1¼-12
Procurement Specification AN-N-5 except as noted on NAS 443

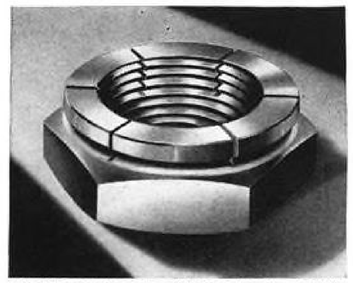
Made of aircraft alloy steel, cadmium plated. They are self-locking units with positive locking provided by two non-metallic plugs inserted through the body of the nut and contacting the threads of the bolt.



FLEXLOC EXTERNAL WRENCHING LOCKNUTS

42 FW
¼-28 through 1½-12
Procurement Specification AN-N-10a and NAS 353 or any other specification that may apply.

Made of aircraft alloy steel. One-piece, all-metal lock and stop nuts. Locking is accomplished when the slotted section is fully engaged. Approved to 550°F.

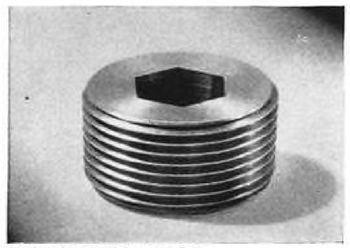


FLEXLOC SELF-LOCKING NUTS, THIN, AN 364

6-32 through 1¼-12
Procurement Specification AN-N-5b

Made of steel, cadmium plated. They are one-piece, all-metal lock and stop nuts. Positive locking is accomplished by the slotted locking section which locks on the threads of the bolt. Designed for temperatures to 550°F.

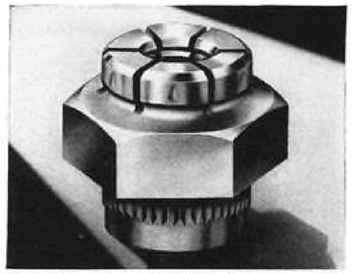
aircraft industry



SPS PRESSURE PLUGS

⅛ through 1¼ ANPT
Procurement Specification MIL-F-5509

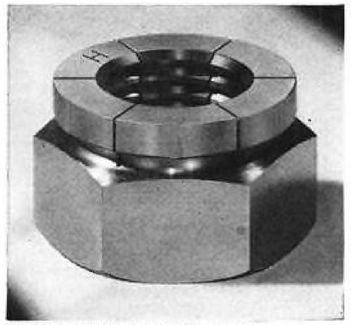
Made of heat treated alloy steel, aluminum alloy or magnesium. Threads are fully formed to provide positive sealing without compound. Alloy steel plugs are cadmium plated in accordance with QQ-P-416 or zinc plated in accordance with AN-P-32. Aluminum plugs are anodized. Magnesium plugs are unplated.



FLEXLOC SELF-LOCKING CLINCH NUTS

4-40 through ¼-28

Made of steel, cadmium plated. They are self-contained units, incorporating the positive self-locking of regular FLEXLOC locknuts. Have knurled hollow shanks for fastening to material in which nut is to be used. For use on aircraft equipment and component parts such as instrument mountings and electrical equipment. Also available in micro sizes, 0-80 to 4-48.



FLEXLOC SELF-LOCKING NUTS

AN-363 6-32 through ¾-16
AN-363C 6-32 through ¾-16
AN-365 4-40 through 1¼-12
Procurement Specification AN-N-10a and AN-N-5b

AN-363 and AN-365 nuts are made of steel, cadmium plated. They are designed for temperatures to 550°F. AN-363C nuts are made of corrosion-resistant steel, silver plated. They are designed for temperatures to 800°F. All are one-piece, all-metal lock and stop nuts of regular AN height. Positive locking is accomplished by the slotted locking section which locks on the threads of the bolt. Also available in micro sizes, 0-80 to 4-48.



SPS 12-POINT EXTERNAL WRENCHING ENGINE BOLTS

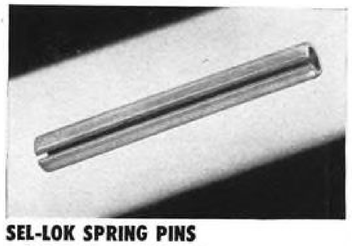
High-strength bolts with tensiles up to 220,000 psi. Threads are fully formed by single pass rolling after heat treatment. High temperature bolts are made from all the newer alloys, such as AMS 5735. Also made to MS9038 Series.

For complete information about SPS fasteners for the aircraft industry, write STANDARD PRESSED STEEL CO., Jenkintown 3, Pa.

STANDARD PRESSED STEEL CO.

SPS

JENKINTOWN PENNSYLVANIA



SEL-LOK SPRING PINS

MS 9047 and MS 9048
MS 171401 through MS 171900
Nominal diameter—.062 through .500 in.
Material specifications—AMS 5506, AMS 5120 or AMS 5121

Available in corrosion-resistant steel or carbon steel, zinc or cadmium plated, or phosphate coated.

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AERONAUTICAL INSTRUMENTS

FIRE AND OVERHEAT DETECTION SYSTEMS

Continuous Cable Fire Detection



SPECIFICATIONS

FIRE DETECTOR
Length: 1 ft. to 20 ft. sections (max. length per circuit: 100 ft. approx.).
Diameter: .070 inch.
Weight: 0.01 lb. per foot (approx.).

CONTROL ASSEMBLY
Voltage: 28 volts d-c*.
Dimensions: 3½ x 2½ x 1⅜ inches (approx.).
Weight: 0.8 lb. (approx.).
*also available for 115 v. a-c 400 cycle power.

CABLE CLAMP
Available in various sizes.
Weight: .01 lb. (approx.)

FIREPROOF CONNECTORS
Available in various configurations.
Weight: .04 lb. (approx.).

Overheat Warning



SPECIFICATIONS

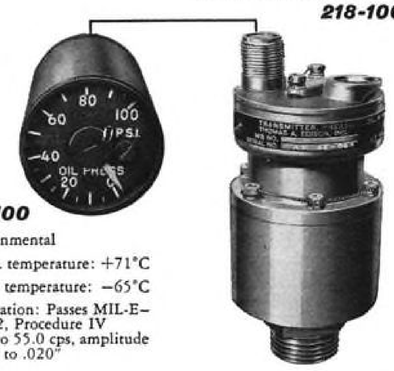
CONTROL ASSEMBLY
Voltage: 28 v. d-c.
Dimensions: 3½ x 2½ x 1⅜ inches (approx.).
Weight: 0.8 lb. (approx.).
For use with any EDISON resistance temperature detector and matching indicator.

PRESSURE INDICATING SYSTEMS

SPECIFICATIONS

SYSTEM
Power: 26 volts single phase 400 cps
Accuracy: ±2.75% full scale
Pressure altitude: 85,000 ft. (0.65" Hg)
Distance between components: 500 ft. of AWG20 lead wire between indicator and transmitter will affect reading no more than 1.0%

Transmitter, Model 218-100



Power consumption: 0.9 watt max.
Weight: 2.0 lbs.
Diameter: 2 3/16"
Length: 4 13/16" overall
Pressure range: 0 to 50 & 0 to 100 psi

Environmental
Max. temperature: +232°C
Low temperature: −65°C
Vibration: Passes MIL-E-5272, Procedure II 5.0 to 500 cps continuously changing
Acceleration: 20 g

Indicator, Model 217-100

Power consumption: 0.6 watt max.
Weight: 0.5 lb.
Dial: standard 2-inch diameter
Length: 2½" overall
Pressure range: 0 to 50 & 0 to 100 psi

Environmental
Max. temperature: +71°C
Low temperature: −65°C
Vibration: Passes MIL-E-5272, Procedure IV 5.0 to 55.0 cps, amplitude .018 to .020"

TEMPERATURE INDICATORS



Single, dual, triple Edison Temperature Indicators are available in temperature ranges between −70° and +300°C.
Hermetically sealed 2" dial
Weight: 0.7 lb.
(MIL-I-6614A, 7075, 7077 and 7112)

ENGINE GAGES

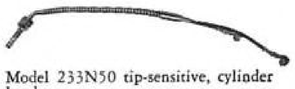


Model 195 Engine Gage Unit
(MIL-G-7090)
Weight: 1.25 lbs. (approx.)

RESISTANCE TEMPERATURE DETECTORS



Model 232N90-2 & 4 (MIL-B-7990) hermetically sealed, stem-sensitive.
Temp. range: −70 +300°C



Model 233N50 tip-sensitive, cylinder head.
Temp. range: −50 +300°C

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Touchdown...

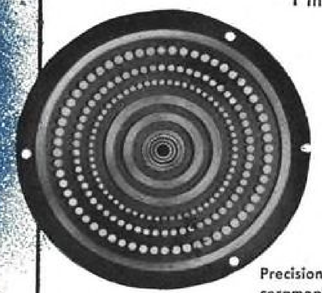
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Monitored perfectly by MYCALEX® TM55 switches with SUPRAMICA® 555 ceramoplastic commutation plates

At 10 feet of 100,000 feet, test teams rely upon telemetering for flight performance data. When signals fail vital information is lost forever.

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Individually designed to your specifications. Write to Dept. 448 for complete information.



Precision-molded SUPRAMICA® 555 ceramoplastic commutation plate

SUPRAMICA is a registered trade-mark of MYCALEX CORPORATION OF AMERICA for ceramoplastic material.



MYCALEX® TM55 commutation switch

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...for reliable quality
...for engineering service

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LOCKHEED F-104A STARFIGHTER



THE SHAPE OF THINGS...

To lighten the load and lower the cost, Firestone developed the revolutionary drape-type fuel tank assembly, using collapsible cells of 2-ply nylon fabric impregnated with Buna N rubber. Seven years of success in pace-setting aircraft confirm the superiority of this forward-looking drape design.

But the challenge never ends. Currently, Firestone designers are developing fuel cells that will withstand the tremendous extremes of temperature encountered by today's far-advanced aircraft.

For the shape of better things to come...we invite you to Look to the Future with Firestone.

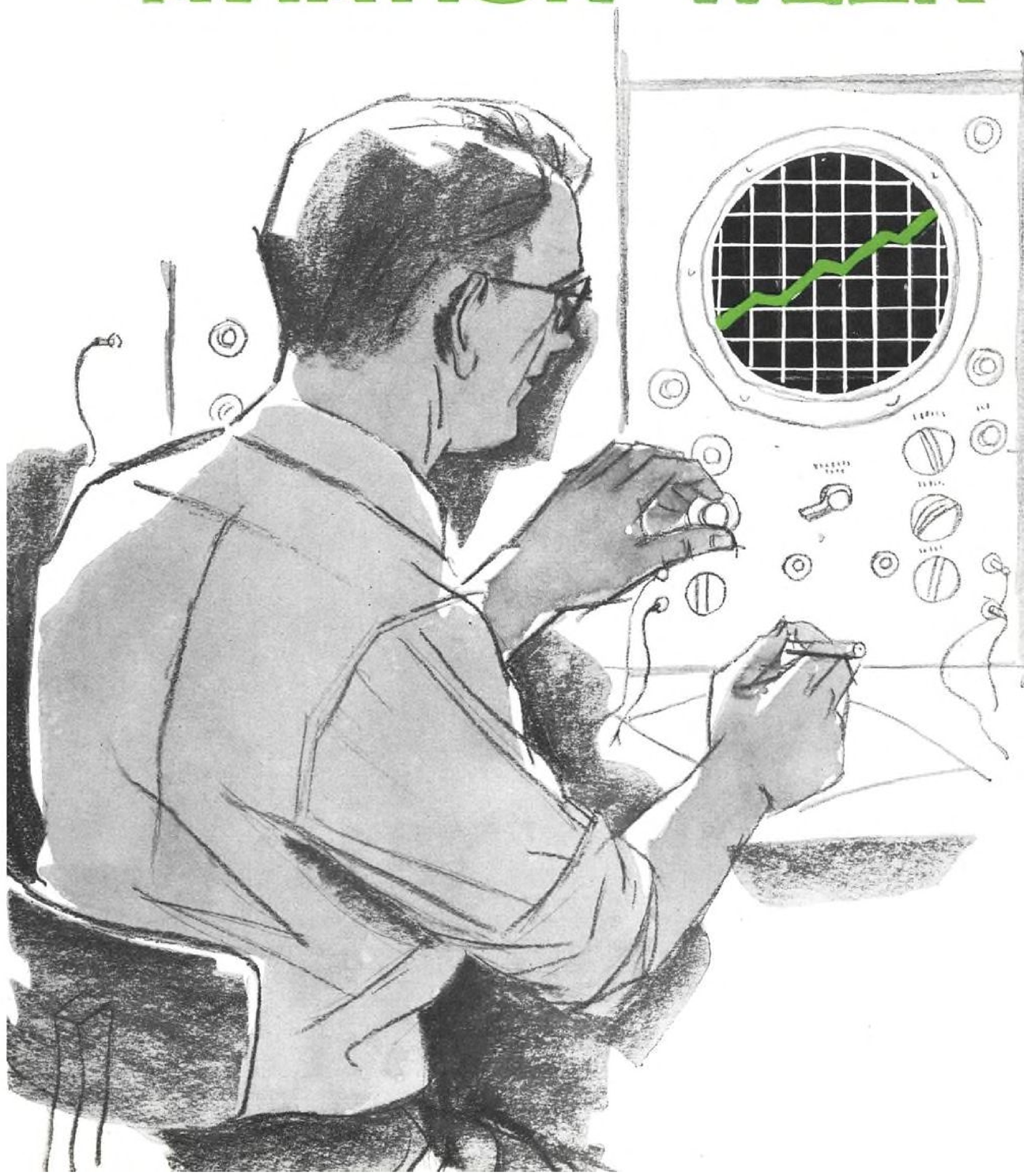
Firestone *TIRE & RUBBER COMPANY*
AIRCRAFT DIVISION...LOS ANGELES 54, CALIFORNIA

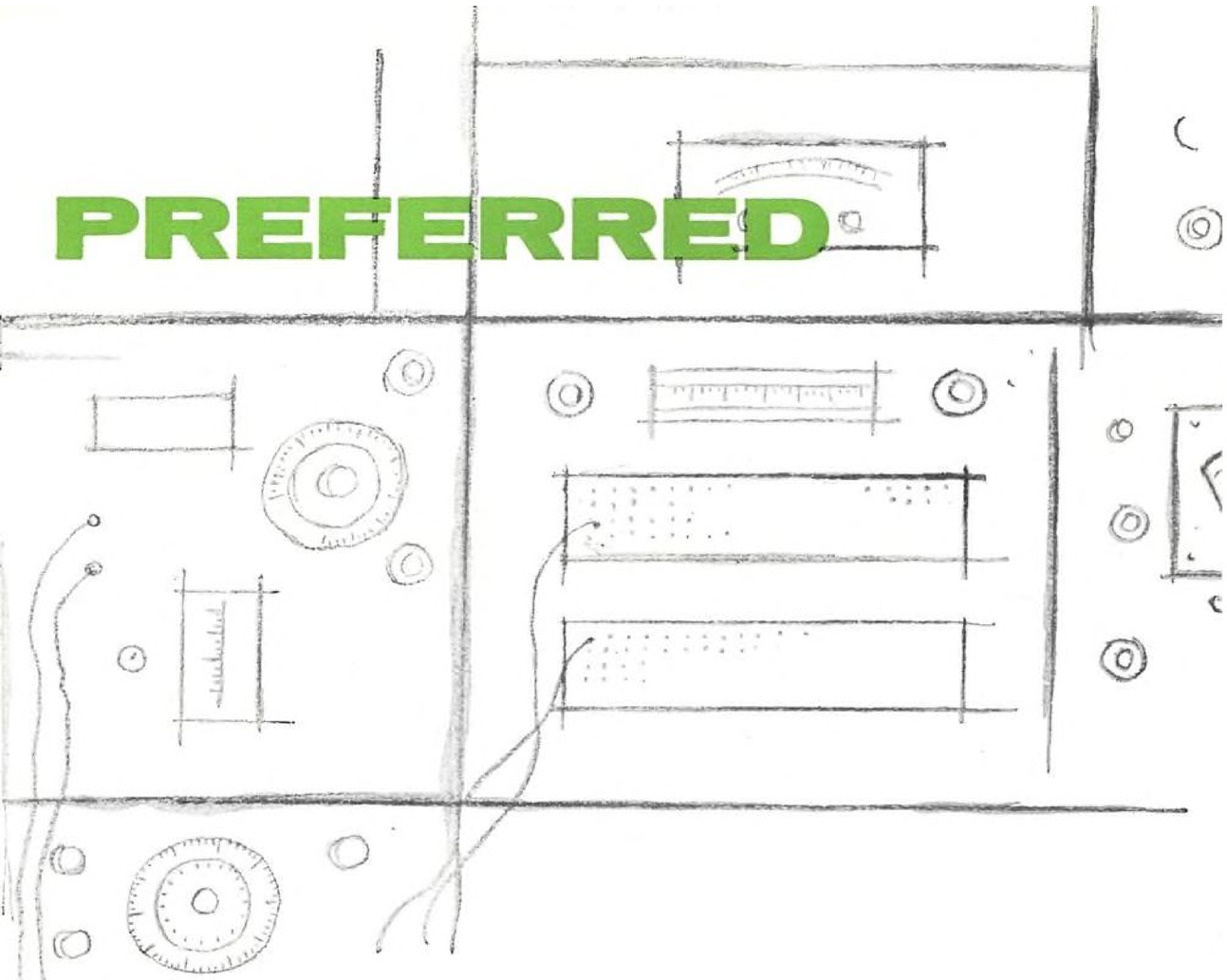
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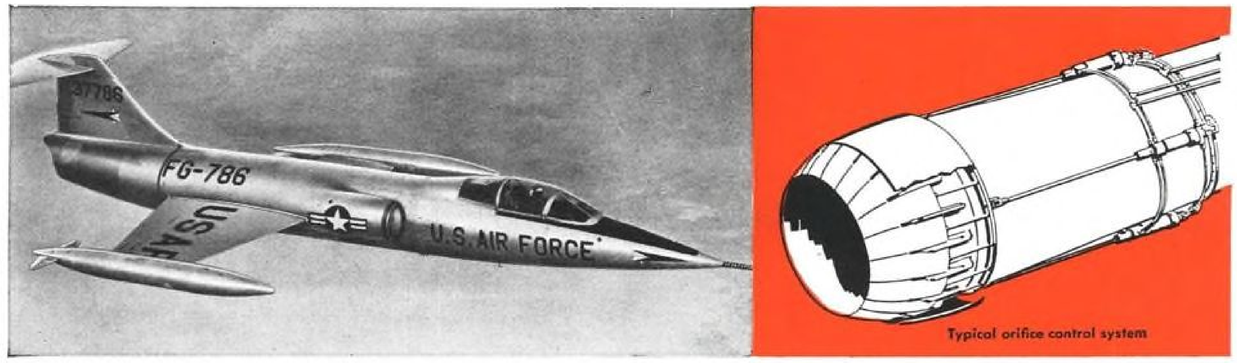
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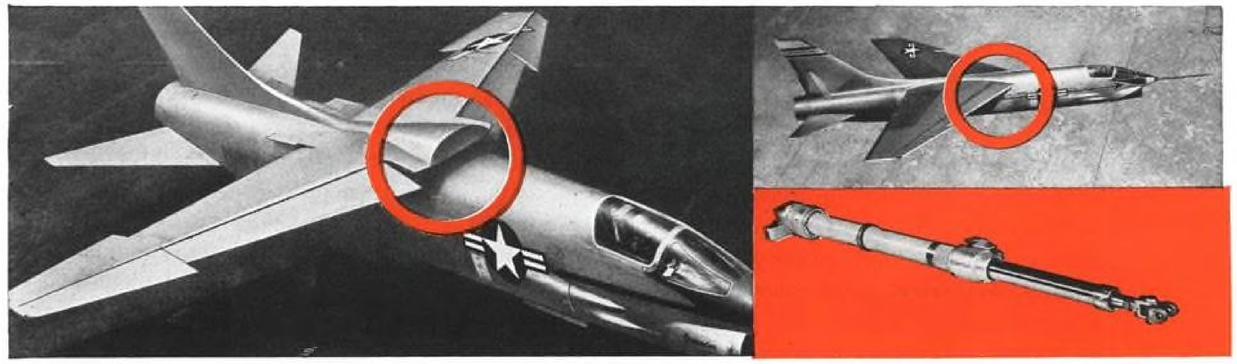
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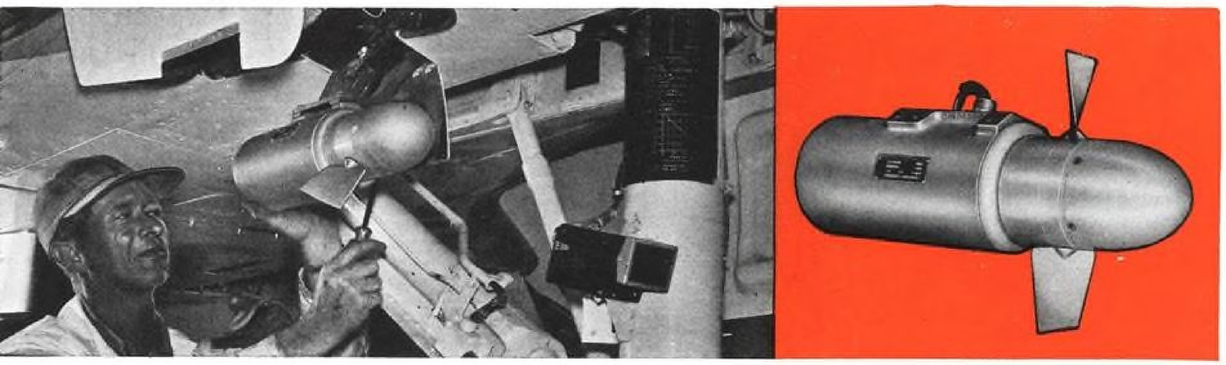
Vital accessories for the fastest fighters



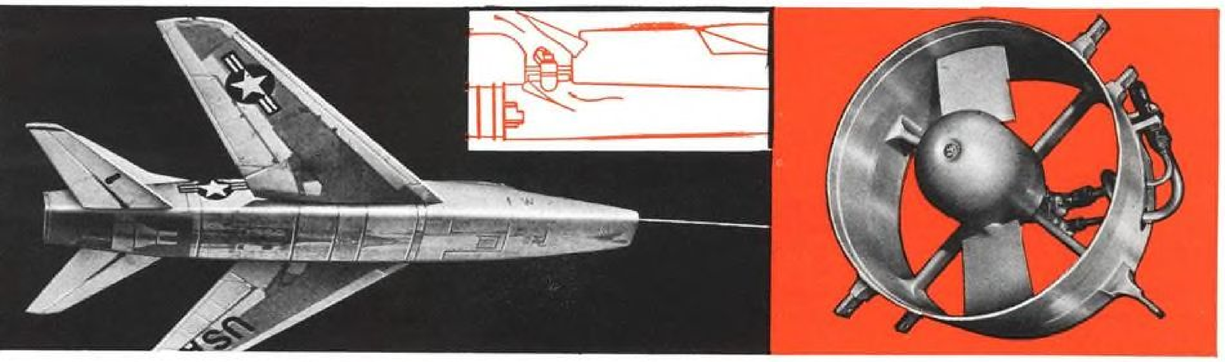
AFTERBURNER ACTUATORS — *the Lockheed F-104A Starfighter,* world's fastest fighter plane, has four Aeroproducts actuators on the afterburner for orifice control of its J79 engine. Designed for extremely high temperature operation, these hydraulic actuators are synchronized to co-ordinate in perfect unison, providing instant, positive control of the afterburner nozzles. This patented feature of mechanical synchronization provides precision positioning by incorporating flexible shafting within the hydraulic tubing to co-ordinate the linear travel of the actuator pistons. Another safety factor is a stroke limiter which prevents the tail cone from closing completely in the event of hydraulic failure.



WING INCIDENCE ACTUATORS — *the Chance Vought F8U-1 Crusader,* world's fastest Navy fighter plane, showing its unique two-position incidence wing in "up" position for take-off. Inset shows normal flight position. First operational plane to incorporate this principle, the F8U-1 has an Aeroproducts self-locking hydraulic actuator which controls the angle of attack of the wing. Changing the wing angle permits the Crusader to land level with the runway of the carrier deck, giving the pilot better visibility and permitting use of shorter, lighter landing gear.



RAM AIR-DRIVEN GENERATORS – *in the Douglas A4D Skyhawk* – Aeroproducts emergency air-driven generator is first production application of ram air-driven equipment. Suspended beneath the fuselage, this lightweight unit (22 lbs.) gets up to speed in less than 1/10th second and develops 1.7 KVA @12,000 R.P.M. to operate radio, lights, instruments, trim tab and elevators. It has successfully performed in emergencies and has been dropped out many times on flight tests. Using a simple blade pitch changing mechanism, the unit governs its output frequency within plus 10% and minus 5% over a very wide range of airspeed, altitude and load conditions. This unit also has application in tow targets to generate power for scoring mechanisms.



AIR-DRIVEN HYDRAULIC PUMP – *the North American F-100D Super Sabre* is equipped with an Aeroproducts air-driven hydraulic pump which produces sufficient hydraulic pressure for flight controls in case of either engine or hydraulic failure. This lightweight ram air pump is mounted back of the cockpit, where air from engine air inlet ducts can be directed by the pilot to drive the turbine-pump in emergencies.

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- Jet Engine Thrust Spoilers and Reversers
- Engine By-Pass Door Control

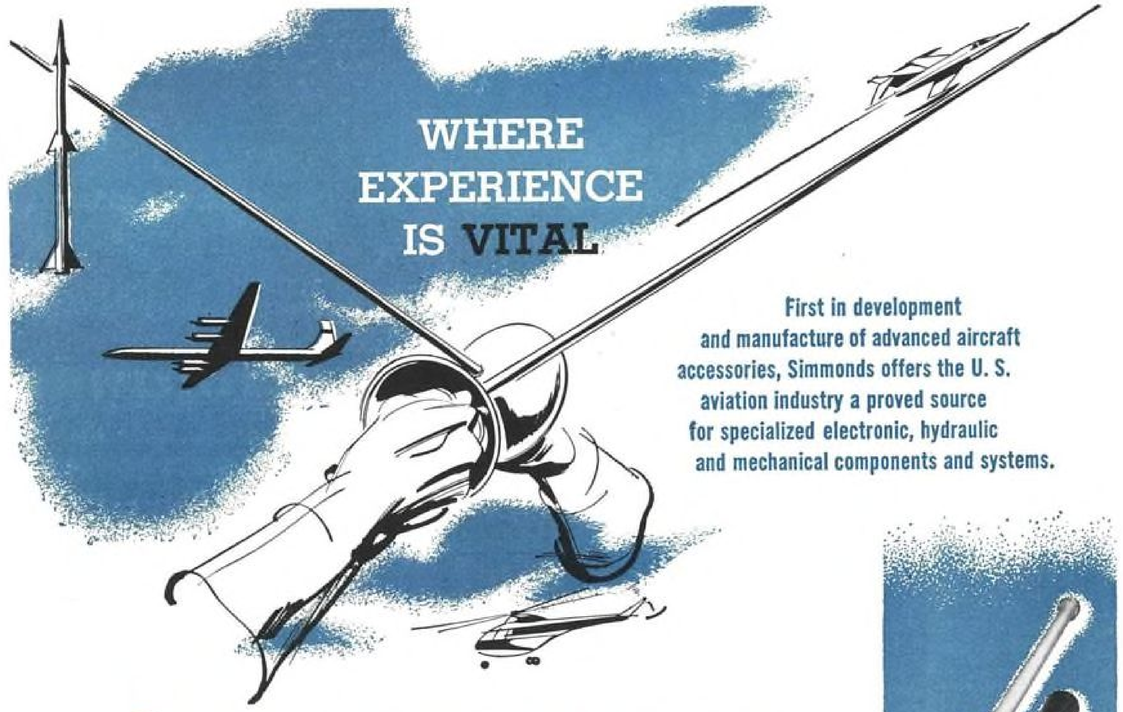


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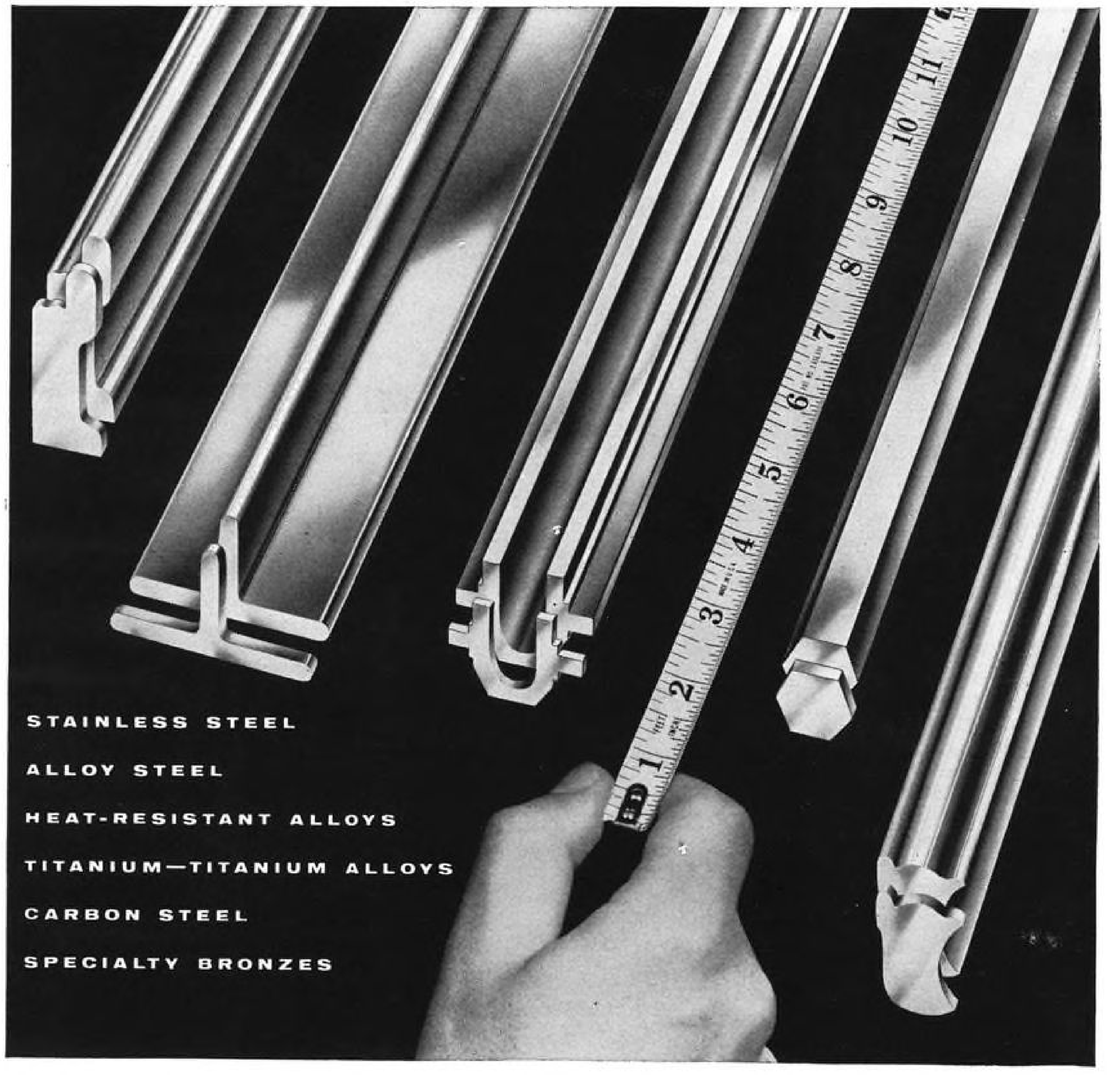
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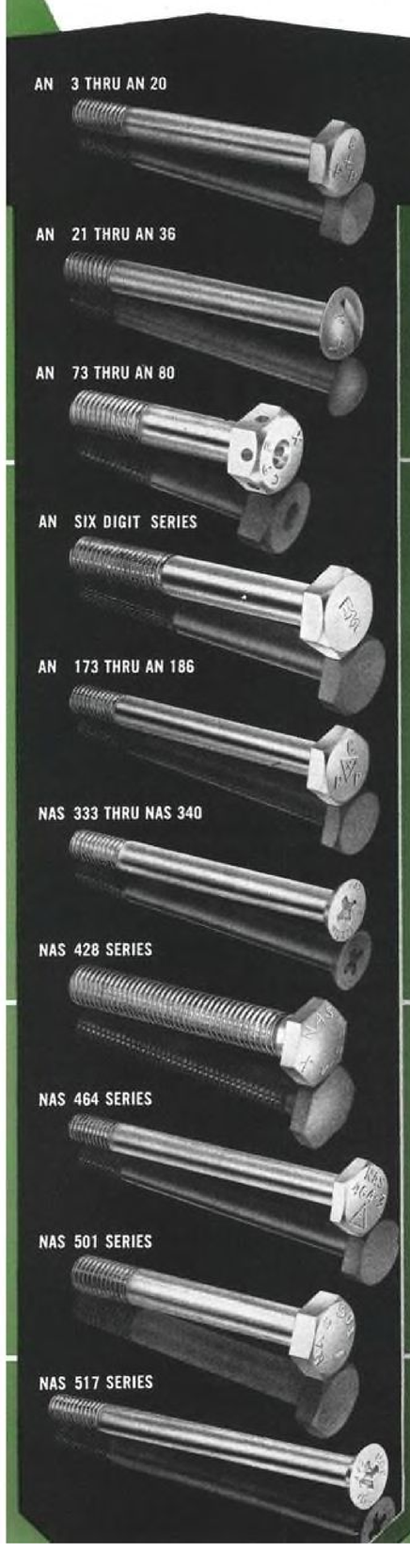
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AN 3C-4A	84000
AN 12C-43	325
AN 3DD-4A	34000
AN 8DD-35A	1300
AN 23-8A	45000
AN 30-50	450
AN 73-2	11500
AN 80-15	385
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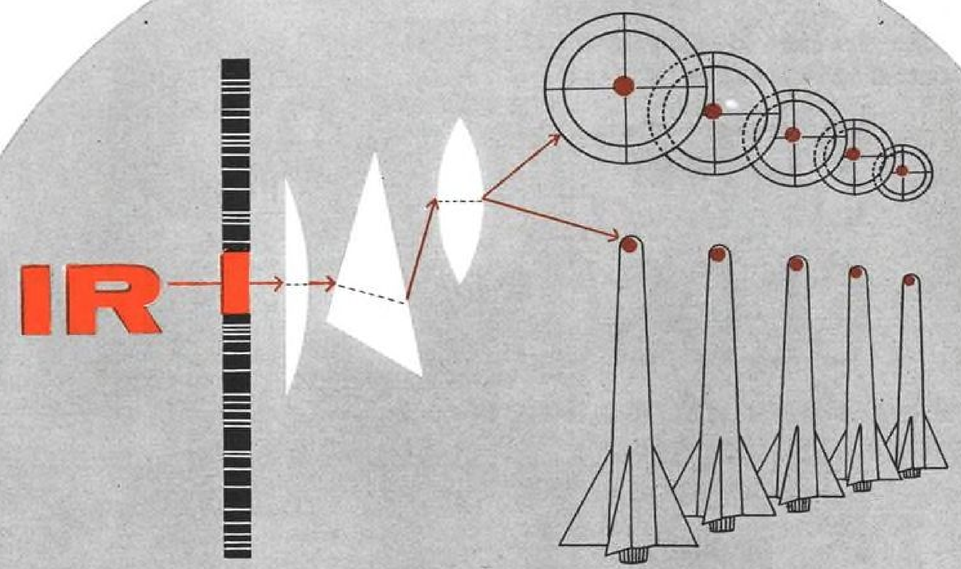
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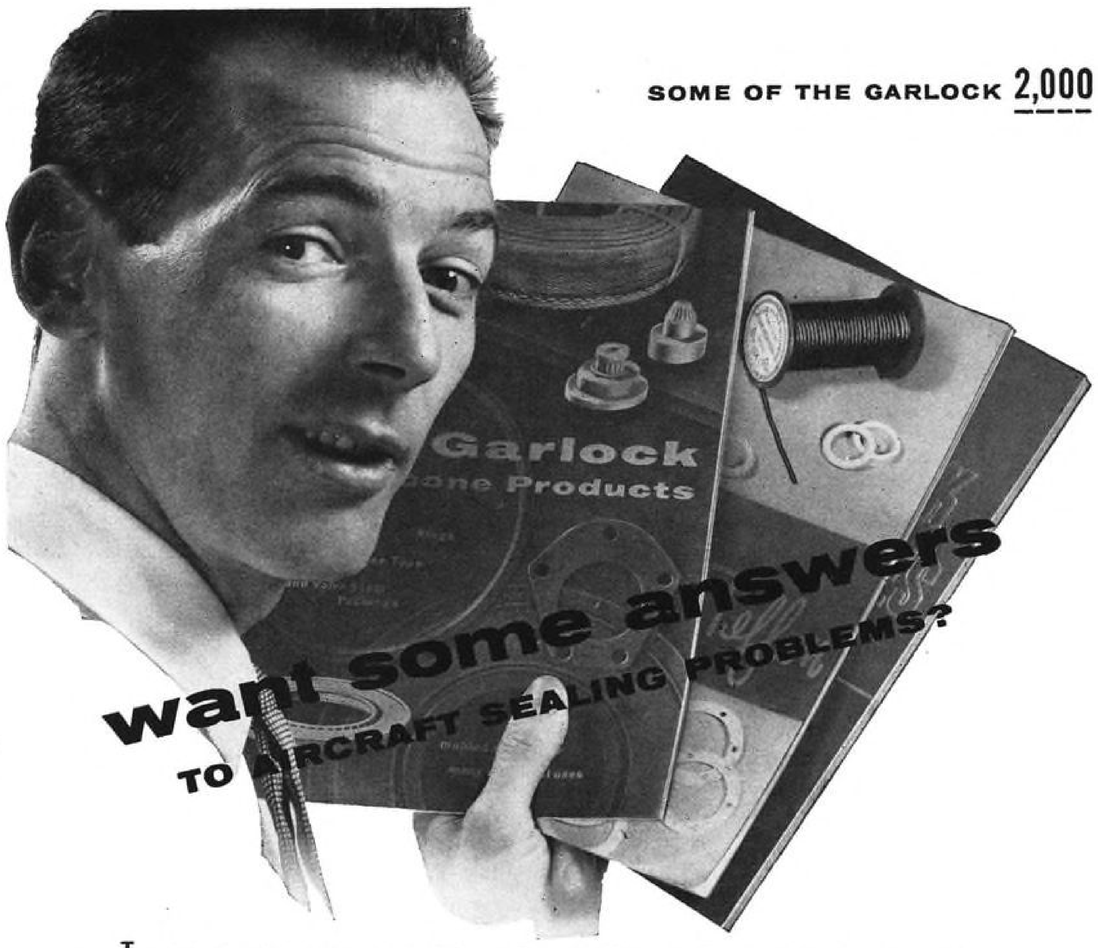
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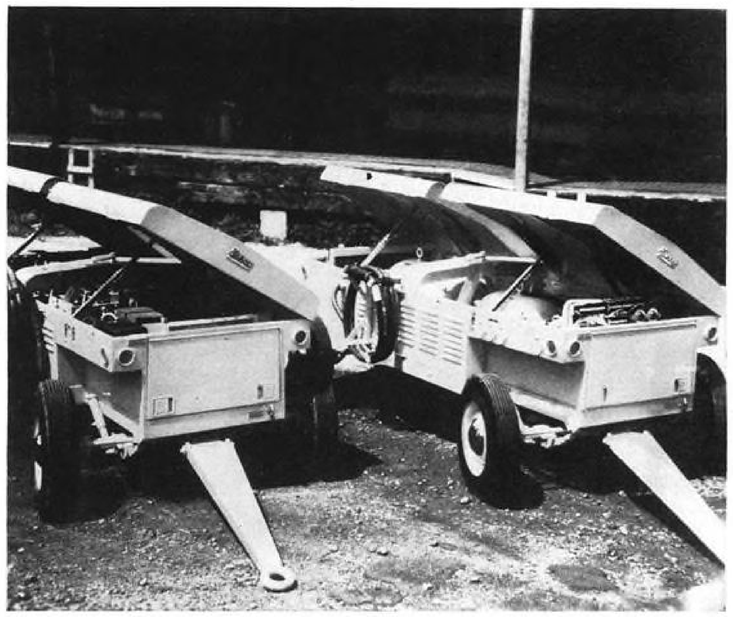
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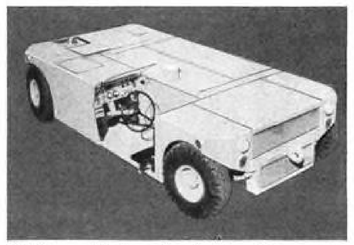
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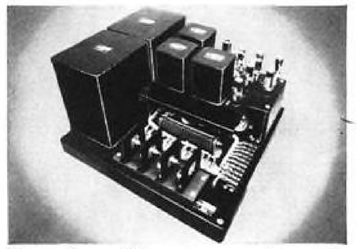
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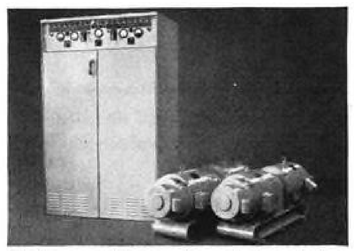
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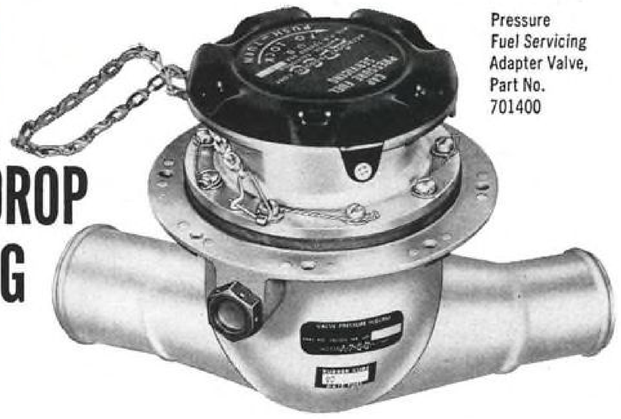
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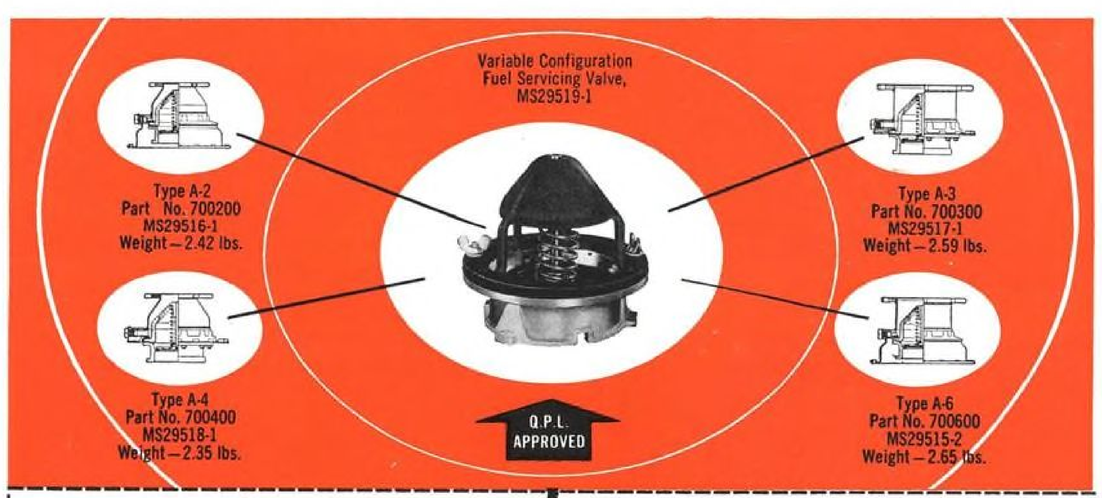
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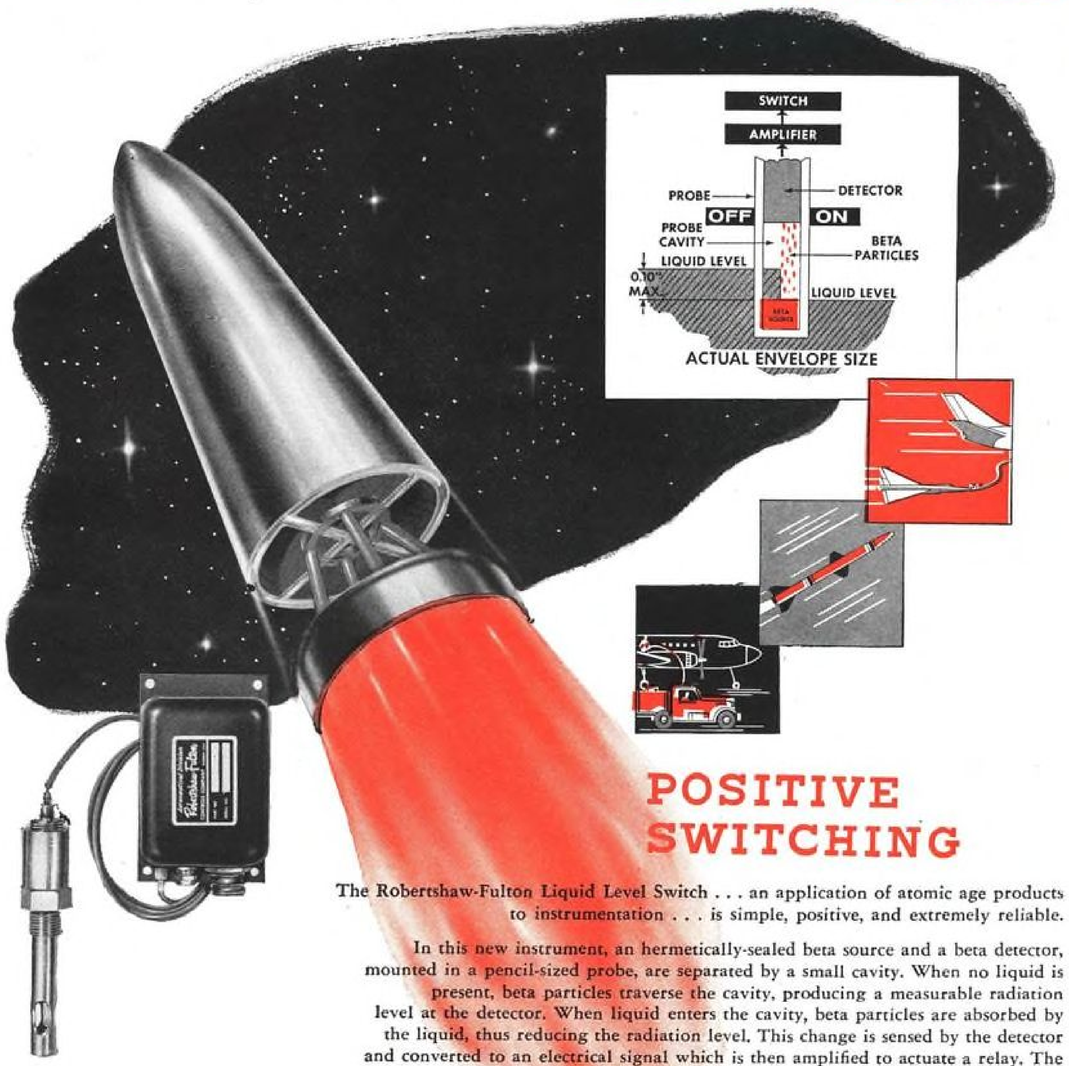
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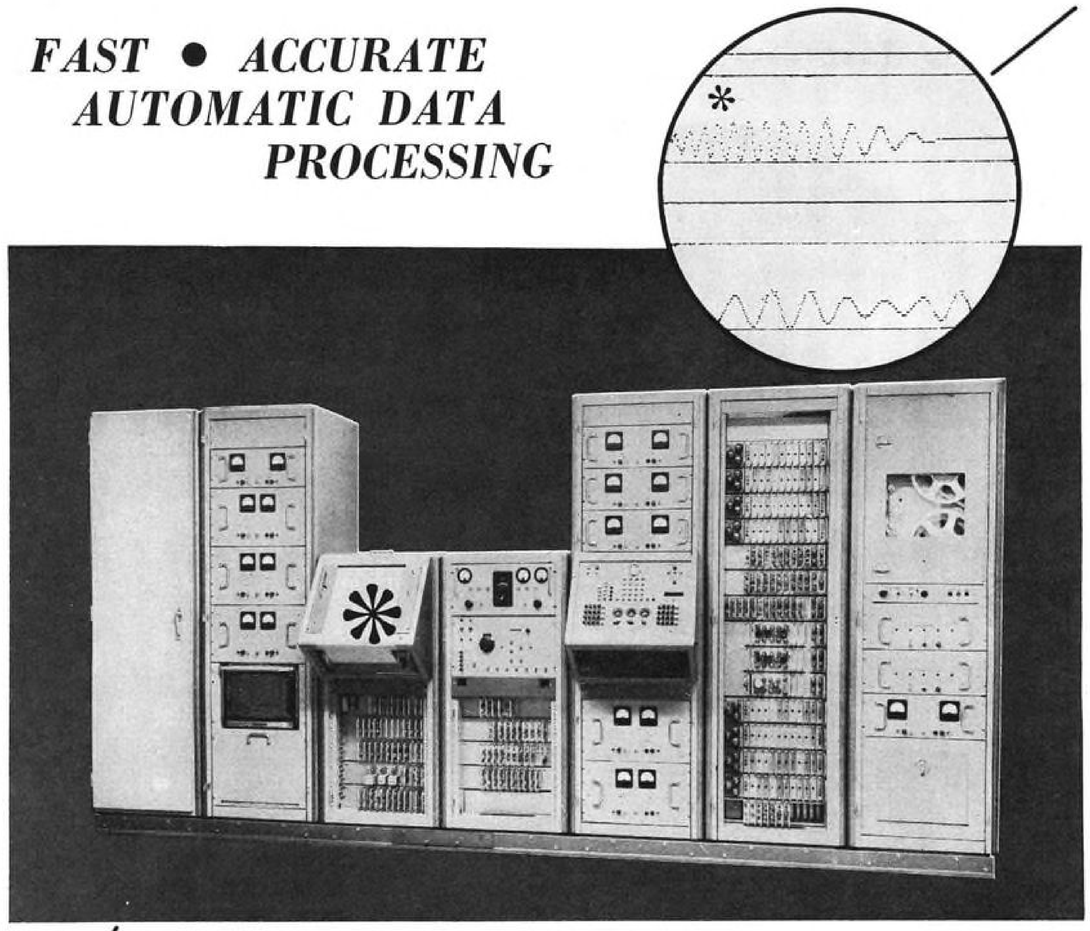
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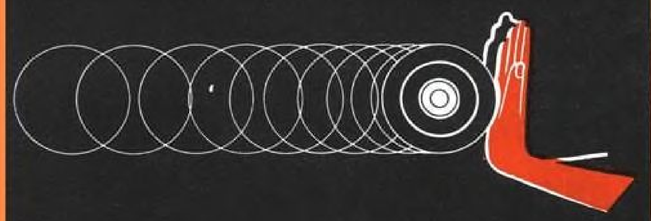
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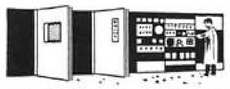
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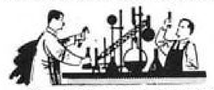


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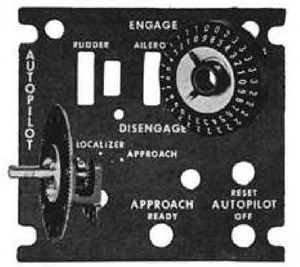
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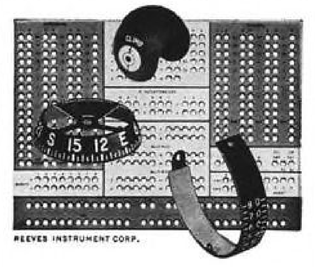
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or do specs call for

SHEET STOCK PANELS?

Produced in metal or plastic in a wide variety of configurations and finishes. For applications ranging from computer arrays and aircraft control to domestic radio panels and control dials for kitchen blenders. Luminous and multi-colored finishes and markings available. Facilities for complete fabrication from raw materials permit consistently high degrees of angular and dimensional accuracy. For data, write dept. AW-12P

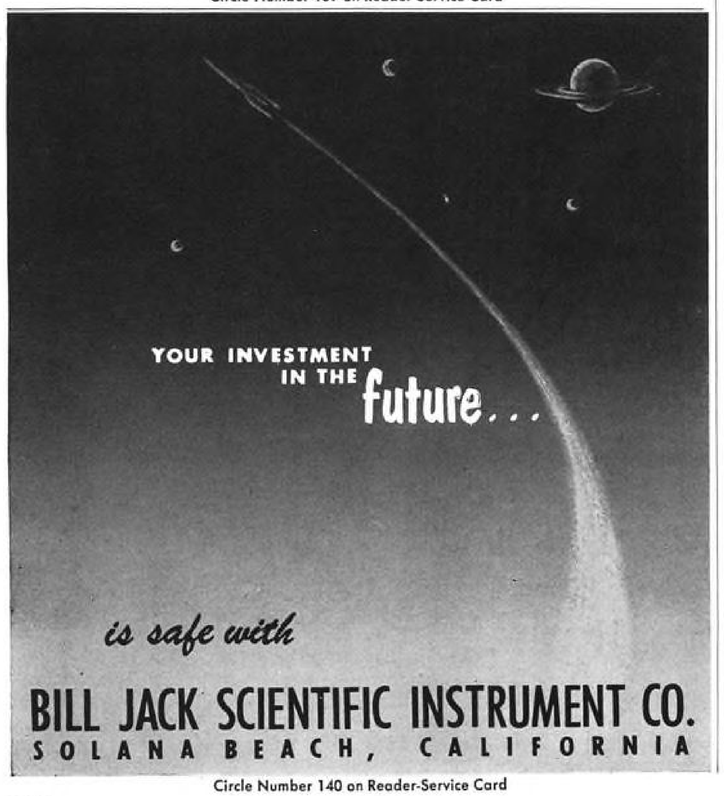
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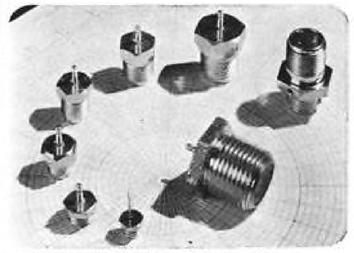
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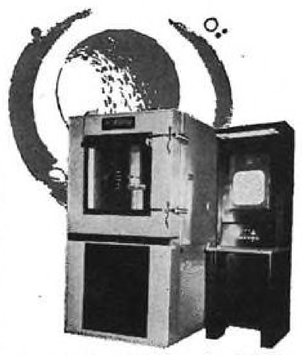
you are there



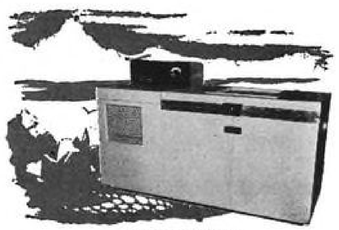
. . . at altitudes of 100,000 ft. and temperatures of minus 100° Fl



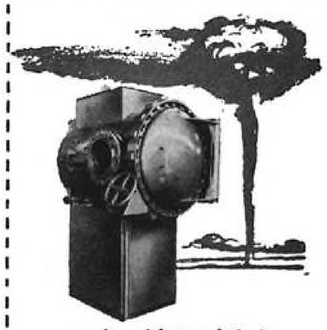
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. . . at minus 120° F or plus 500° Fl



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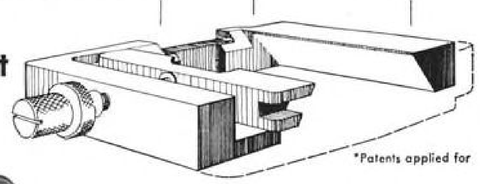
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Sealed against moisture, lubricants, and most hydraulic fluids. Withstands differential pressures up to 15 psi. High-pressure plunger has scraper to clear external icing. Ideal for use in landing gear, bomb-bay, and flap controls. *10 a. 28 vdc; 10 a. 125 vac; 5 a. 250 vac.*

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Exceptionally compact, fully enclosed, single-pole, double-throw snap-acting switch. Easily ganged. Sturdy, flat terminals handle up to #18 wire. 5 a. 125/250 vac; 4 a. 30 vdc resistive; 2½ a. 30 vdc inductive.

AN TYPE SWITCHES

Complete line of single-pole double-throw, snap-acting switches conforming to MIL-S-6744 and MIL-S-6743.



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Choice of seven actuator types, two terminal styles, and four contact separations in construction conforming to JAN-S-63.

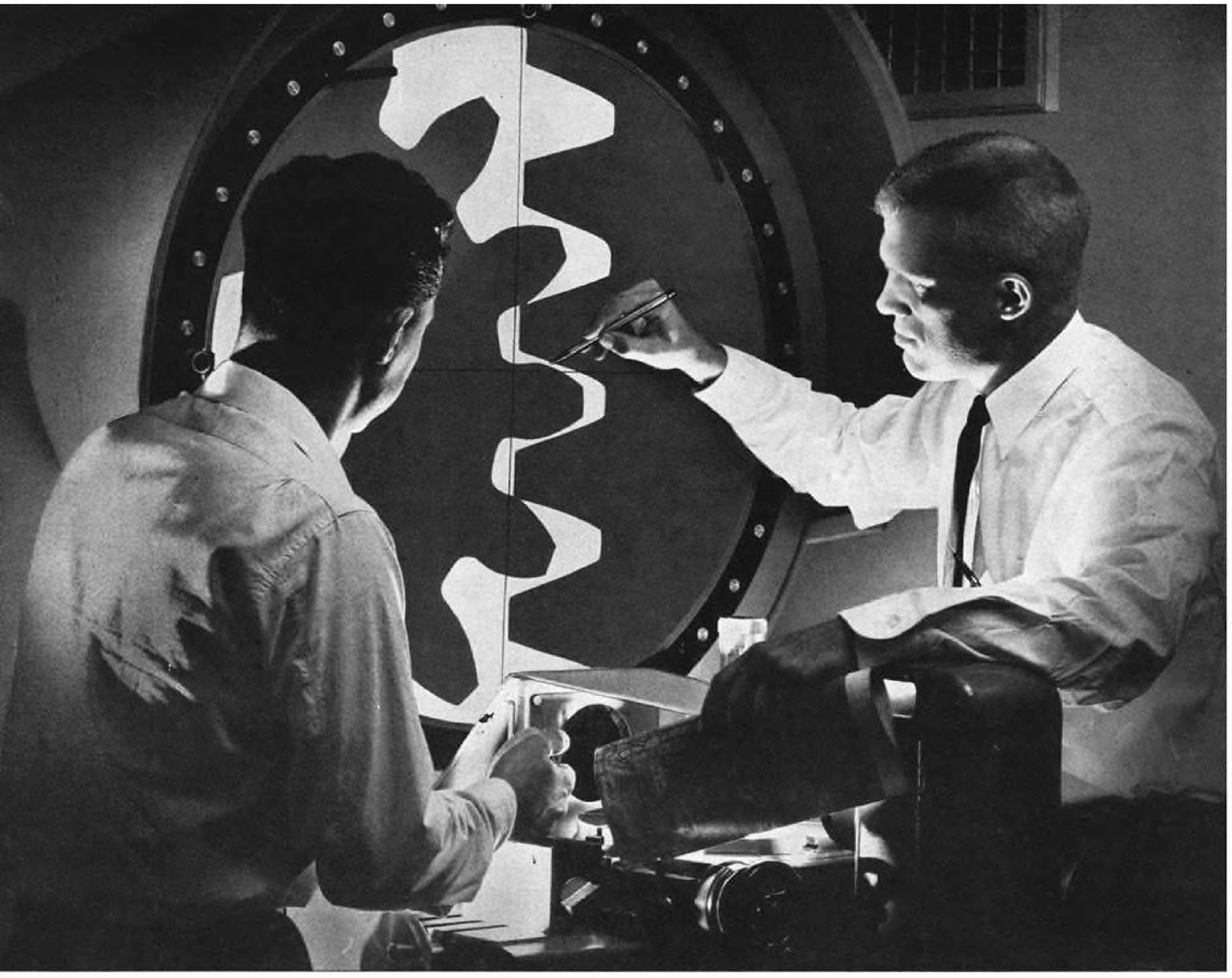
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Gear teeth get in line when he takes a hand

R. L. Thoen, right, explains faulty tooth conformation on a minute gear which has been enlarged 100 times in this king-sized projector. Gear specialist on the engineering staff of the Mechanical Division of General Mills and author of numerous technical papers, Thoen makes gear trains perform with uncanny accuracy. He helps design and build the special machines which make such accuracy routine work at the highly specialized plant.

Next to its men, General Mills is most proud of its machines. For it is this combination that mass produces gear trains with nearly imperceptible backlash, total cumulative error of 0.0002 inch, angular tolerances within 40 seconds of arc, positioning accuracy within 0.01 percent.

This typical General Mills precision production is possible only because men like Thoen have improved standard tools, created special machines, devised ingenious attachments. Some equipment is operated under strict temperature-humidity control. All is backed with the finest inspection devices. You can use these machines and the men that created and operate them to produce your precision products. You'll profit. A simple request brings more facts.



Booklet Tells More—Send Today

Learn how our men and machines eliminate irksome production problems. Write Dept. BG57, Mechanical Division of General Mills, 1620 Central Ave. N.E., Minneapolis 13, Minn.

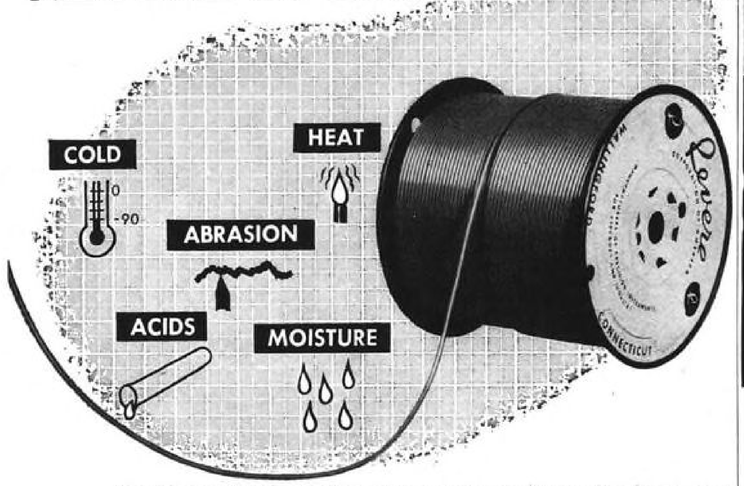


General Mills Pioneers Scientific Frontiers One of General Mills' numerous research projects involves the behavior of metals in space flight. Here a scientist determines the "sputtering" or disintegration rate of molybdenum at 200 miles above the earth. The metal is under fire from atoms moving at 25,000 m.p.h.

MECHANICAL DIVISION OF General Mills

CREATIVE RESEARCH AND DEVELOPMENT + PRECISION ENGINEERING AND PRODUCTION

Insure Product Performance...
REVERE SPECIALTY WIRES



For those tough design jobs where ordinary hook-up and thermocouple wires die from the heat, get brittle in cold, abrade and corrode . . . Revere SPECIALTY wires stand up. Built to MIL and customer specifications, Revere's wide range includes:

HOOK-UP WIRES

For High Temperatures

REVCOTHENE—(Extruded Monochlorotrifluoroethylene) —40°F to +275°F, AWG 28 to 10, silver plated copper conductors, inert, excellent dielectric strength, no volatile plasticizers, non-flammable, thin wall, abrasion and moisture resistant.

For Extremely High Temperatures

Fiber glass (to 700°F), asbestos (to 900°F), pure silica glass fiber (to 1500°F) wrapped or carded with outer braid and saturant as required by application.

MULTI-CONDUCTOR CABLES

A variety of telemetering and other multi-conductor cables constructed to customer specifications. Polyethylene, polyvinyl, nylon, glass, Revcothene, asbestos insulations for singles and jackets. Twisting, braiding, shielding, color coding to suit conditions.

THERMO-COUPLE WIRES

Iron-constantan, copper-constantan, Chromel-Alumel conductors, AWG 36 to 14, various insulation combinations and protective braids, temperature range from —100°F to +1500°F, constructed to rigid tolerances.

Saturants for flame and abrasion resistance, metallic braids for severe service and electrical shielding. Color coding in fourteen solid colors and stripes.

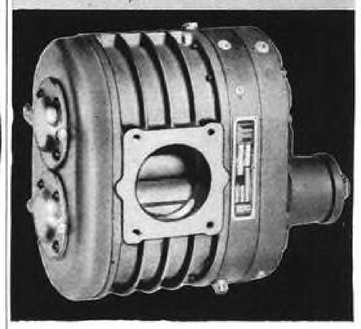
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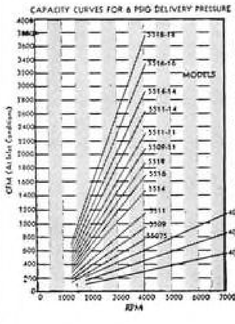
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How Miehle-Dexter Blowers supply air for your product



PROBLEM: Design any product requiring a blower—up to 14 psig. of air (or gas). Do not increase size, weight or cost of product.

SOLUTION: Only Miehle-Dexter Blowers solve this problem. Exclusive 3-lobe construction provides maximum air in minimum size blower. Units require little or no maintenance. Hundreds of applications. Now used as powerful new jet engine starters in mobile ground power equipment. Used for pneumatic conveying, agitation, aeration cooling, ventilating, supercharging. For more facts, write for new Bulletin 255.



Typical capacity curve for 6 psig. delivery pressure. Standard sizes available up to 4000 cfm. Vacuum to 15" hg. Pressures up to 14 psig. (90 psig. by multi-staging.)

MIEHLE md DEXTER

Supercharger Division of

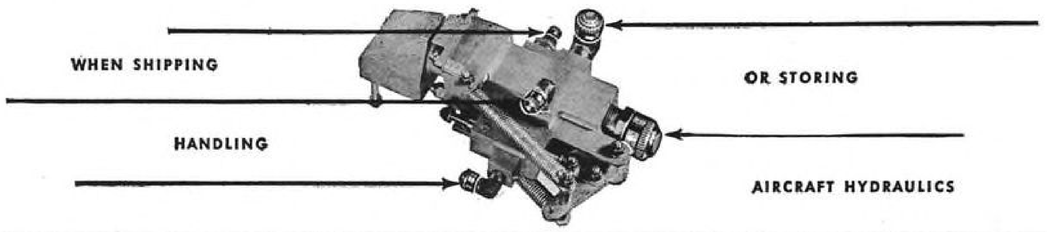
The Christensen Machine Co.

116 Fourth St., Racine, Wisconsin

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D-202

Important Points To Be Remembered





AN-Type Steel or Aluminum Shipper Plugs and Caps
Designed to conform to all applicable specifications.
Gaskets for plugs are ordered separately. These
closures will seal hand tight on fittings of 37° nose taper.

AN-Type Cadmium Plated Steel Caps and Plugs
Caps are designed for units with external threads and plugs are for internal threaded service connections. Both conform to all applicable specifications and will seal hand tight on fittings of 37° nose taper.

AAF-Type Cadmium Plated Steel Seal Caps and Plugs
These caps and plugs conform to AAF specifications and
are reusable many times.



AN-Type Cadmium Plated Steel Boss Plugs
Gaskets are included but not installed. They are designed for gasket sealed bosses and are manufactured to AN and AAF thread specifications.



Aluminum Shipper Plugs for ERMETO Fittings
These are new plugs designed specifically for the increasingly popular Ermeto type fittings for aircraft.



Aluminum Pipe Caps and Plugs
Caps have dry-seal threads. Plugs seal with gaskets on flush threaded openings.

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CATALOGUE AND
PRICE LIST



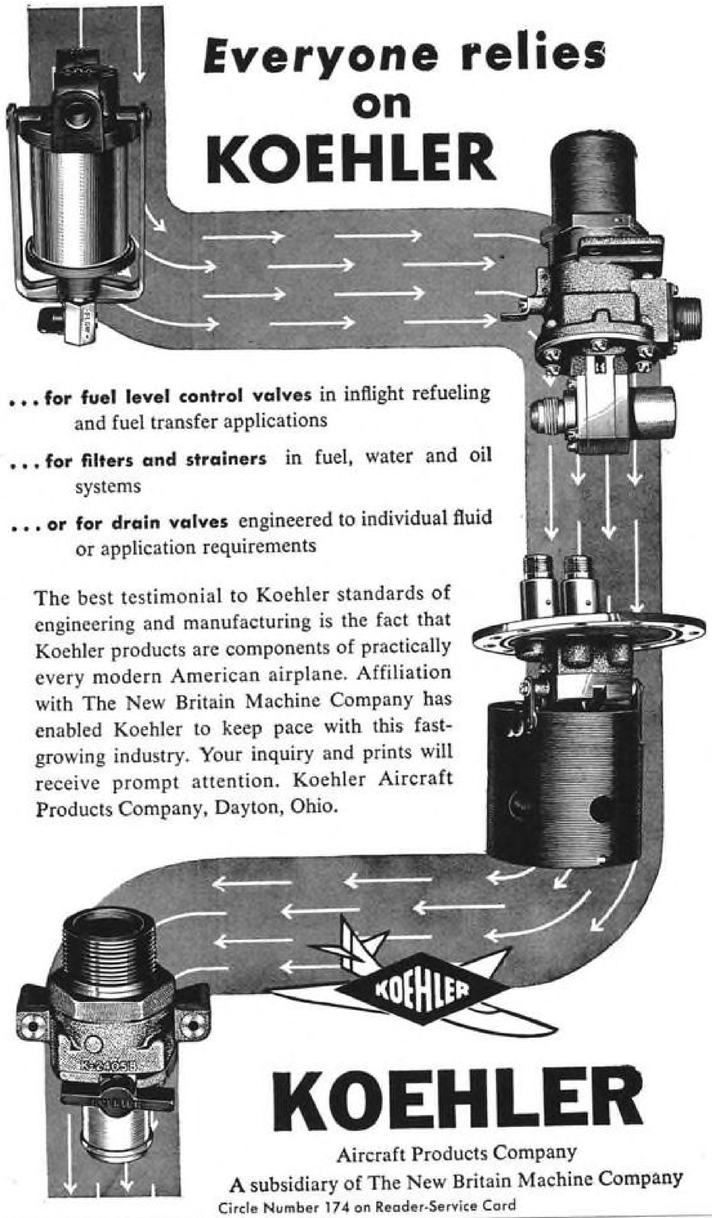
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808 WEST SANTA ANITA
SAN GABRIEL, CALIFORNIA

EASTERN OFFICE:
428 NEW CENTER BLDG.
DETROIT 2, MICHIGAN

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D-203



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. . . or for drain valves engineered to individual fluid or application requirements

The best testimonial to Koehler standards of engineering and manufacturing is the fact that Koehler products are components of practically every modern American airplane. Affiliation with The New Britain Machine Company has enabled Koehler to keep pace with this fast-growing industry. Your inquiry and prints will receive prompt attention. Koehler Aircraft Products Company, Dayton, Ohio.

KOEHLER

Aircraft Products Company
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D-204

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SPECIAL AIRCRAFT PUMPS



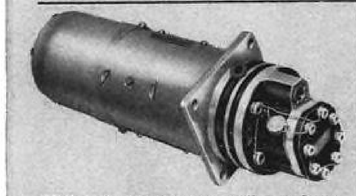
Eastern Aircraft Pumps are extremely small in size and light in weight. They are built to meet all appropriate government requirements under exacting conditions.
Six series of Eastern pumps described are representative models from the entire range of Eastern units, and provide a wide choice of performance characteristics.
Special model pumps or completely new units can be custom-made to your project.



THE 1700 SERIES is the *smallest* and *lightest* line of pumps ever made for delivering a small, yet accurate, volume of fluid against high pressures while operating at high speeds. When close-coupled to high speed motors, the size of the motor and pump combination remains small and light in weight. They are designed to meet rigid military specifications governing aircraft installations. Listed are a few of the many special pumps tailored to meet special requirements.



THE 1200 SERIES was designed to meet the requirements for greater flow than the 1700 Series. The displacement of the smallest pump in this series is 0.0154 cubic inches per revolution. The largest pump has a displacement of 0.0768 cubic inches per revolution. This series operates satisfactorily between a temperature range of —65°F to +160°F. They handle pressures as high as 1,000 p.s.i. and can be driven at speeds up to 6,000 R.P.M.



THE 1100 SERIES has similar performance characteristics to the 1700 Series. The displacement of the smallest pump in this series is 0.00838 cubic inches per revolution.
1101-5 is flange-mounted pump. *1102-108* is specially constructed of corrosion resistant materials; bronze housing, bronze gears, monel shafts, carbon bushings and synthetic rubber seals—designed to handle degreasing liquid.



THE 1400 SERIES Pumps are multi-element units of minimum weight and size designed to perform satisfactorily under severe conditions of low temperature and high altitude. These pumps have an aluminum housing, steel gears and shafts, synthetic rubber seals, and carbon bearings. The multi-element pumps are designed to meet requirements for scavenging and lubricating.



THE AR SERIES are commonly used as emergency stand-by fuel pumps. Motors are 1/50 H.P. aircraft type, 4500 R.P.M., available for 12 or 24 volt D.C. Size 6" x 4-3/8" x 2-3/4". Weight is approximately 2-1/4 lbs. Pumps are constructed of aluminum, and have mechanical rotary seals.



THE 100 SERIES is a continuation of the 1200 Series for still greater flow requirements. The displacement of the smallest pump in this series is 0.104 cubic inches per revolution. The largest pump in this series has a displacement of 0.365 cubic inches per revolution. Operates between a temperature range of —65°F. to +160°F. and pressures up to 1800 p.s.i.g.; speeds up to 3450 R.P.M.

Eastern INDUSTRIES, INC.
100 SKIFF STREET
HAMDEN 14, CONN.

Write for Aviation Products Bulletin 330.

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S. S. White

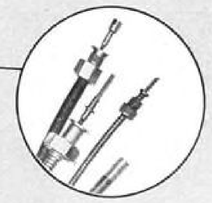
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S. S. White Aircraft Accessories have been tested and approved for use in practically every major military, commercial and private plane. Developed in close collaboration with the aircraft industry, they have proved to be the answer to many critical weight, space and performance problems.

ENGINEERING COOPERATION is always available in applying any S. S. White product to your needs. There's no obligation and all details will be held in strict confidence.

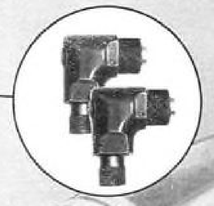
FLEXIBLE SHAFTS
- For remote control or power drive of instruments, parts and accessories.
- A complete range of sizes and characteristics for every service.
- Fully dependable, long lasting, easy operating.

Write for Bulletin 5601



ANGLE ADAPTERS
- Facilitate the attachment of flexible shafts to parts where space limitations prevent a direct connection.
- Available in 90°, 135° and straight styles for either remote control or power drive applications.

Write for Bulletin 5403



PRESSURE BULKHEAD FITTINGS
- For use with flexible shaft controls passing through pressurized cabins.
- Low operating torque, light weight, high degree of pressure tightness.

Write for Bulletin 5403



MECHANICAL SCREW JACKS
- For use with flexible shafts or direct motor drive.
- Provide safe operating axial load of 390 lbs.
- Precision-made, low in weight, minimum end shake.

Write for Bulletin 5403



PROTECTIVE PLASTIC PLUGS and CAPS
- Protect threaded and unthreaded openings and studs against damage, dirt, dampness or loss of lubrication.
- Available with N.P.T., Machine Screw or Metric threads or in plain, unthreaded types.
- Low-cost, easy to apply or remove.

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Circle Number 150 on Reader-Service Card



NUCLEAR SYSTEMS

TOWER SHIELDING FACILITY, OAK RIDGE NATIONAL LABORATORY

1957 AVIATION WEEK BUYERS' GUIDE | SECTION E

Nuclear Powerplant Nears Reality

The first airborne reactor developing design data for tomorrow's nuclear-powered airplanes is flying today in the nose of a modified Convair XB-36H.

Purpose of the low-power reactor is to get radiation data, to confirm ground-based reactor data and to obtain experience in handling and controlling a reactor in an aircraft.

This is one of the many facets of a major research and development program aimed at getting a nuclear-powered airplane into the air by 1960. That airplane—designated the WS-125A—is a bomber with an expected speed over the target of Mach 2.

Two Programs Under Way

Two parallel programs are under way on the 125A, with a possible third in the offing. Convair division of General Dynamics Corp. is teamed with General Electric Co. on one concept. A second kind of powerplant plus airplane is being worked out by Lockheed Aircraft Corp. and Pratt & Whitney Division of United Aircraft Corp.

Final choice of powerplant and configuration is uncertain. It's on an "and-or" basis; either or both might be chosen for following through to the production model. It is certain that the WS-125A program will call for a number of experimental aircraft, probably all identical externally.

The WS-125A bomber system is closer to reality than is generally realized. Many of its sub-systems and components have been built and tested in the peculiar environment in which they will work.

The list of tangible accomplishments is a formidable one. Progress to date includes:

- **Tests of representative systems** of typical aircraft. Designers now can find out what happens to all parts of a landing gear, including the tires (they get spongy) and the hydraulic fluid. Similar data is available for standard radars and associated systems. These results are based on the "go, no-go" philosophy.
- **Knowledge of the behavior** of conventional structural materials under conditions of elevated temperatures plus radiation.
- **Useful life data for many components.** Transistor life, to cite one example, has been established quite precisely.
- **Heat exchanger system tests.** The first sub-system experiments at very high temperatures have been concluded long ago. During one of these, a centrifugal pump ran at yellow heat while boosting molten metal through its spinning interior. There was not even a gas leak.

Much remains to be done before any of these systems can be considered completely understood. Most of the data has been gathered with the idea of establishing limits: either the unit worked or it didn't. Either it was accepted for the airplane or it was rejected.

The aircraft industry is involved with several other phases of the nuclear program in this country. To cite one example, North American Aviation's work with reactor studies has won that firm a contract for a power reactor, now being built in the Santa Susana mountains behind Los Angeles.

From this reactor NAA will produce heat power which can be readily converted to electrical energy to supplement the power output of the local system. Although the NAA reactor is a very different kind of engine than an airborne powerplant, the company scientists and engineers should gain much valuable experience in fabricating and operating this new powerplant.

Special Reactors

Another facet of the atomic jewel is the work done with materials. Special reactors have been built and are in use, subjecting a wide variety of materials to the bombardment of the radiation products from the fission process.

Ther are two aspects to the program. The first is to determine the detrimental effects on the structural materials used to build reactors, to encase the fuel, and to handle the heat transfer medium. The second is to find—sometimes by accident—how to strengthen or improve materials by subjecting them to atomic radiation.

The world of the atom is a new one that offers enormous potentialities in weapons development, as a power source and as a means to improve materials. These courses, and others yet to be discovered, lie ahead.

1957 AVIATION WEEK BUYERS' GUIDE

SECTION E: NUCLEAR SYSTEMS

Controls, Electronic

A.R.F. Products, Inc., 7627 Lake St., River Forest, Ill.

Abrams Instrument Co., 600-62 E. Shiawassee, Lansing, Mich.

Actuation Research Corp., 416 North Glendale Ave., Glendale 6, Calif.

ADMIRAL CORP., 1191 Merchandise Mart, Chicago 54, Ill. **SEE ADV. C-116**

Advanced Electronics, Inc., 94 Silas Deane Highway, Rocky Hill, Conn.

Aeroflex Laboratories Incorporated, 34-06 Skillman Ave., Long Island City 1, N. Y.

Aeronautical Div., Minneapolis Honeywell Regulator Co., 2600 Ridgeway, Minneapolis 13, Minn.

Aircraft Equipment Div., The Bristol Co., P. O. Box 1790-A W., Waterbury 20, Conn.

AIRCRAFT PRODUCTS DIV., Cline Electric Mfg. Co., 3405 West 47th St., Chicago 32, Ill. **SEE ADV. C-124**

AIResearch Mfg. Div., The Garrett Corp., 9851 Sepulveda Blvd., Los Angeles 45, Calif.

American Bosch Arma Corp., Roosevelt Field, Garden City, N. Y.

American Res. & Mfg. Corp., Rockville Pike & Halpine Rd., Rockville, Md.

APPARATUS SALES DIV., GENERAL ELECTRIC CO., 1 River Rd., Schenectady 5, N. Y. **SEE ADV. 63, C-129**

Associated Missile Prods. Corp., 2709 North Garey, Pomona, Calif.

Automatic Temperature Control Co. Inc., 5212 Pulaski Ave., Philadelphia 44, Pa.

Atomics International Div., North American Aviation, Inc., 21600 Vanowen, Canoga Park, Calif.

Autonetics Div., North American Aviation, Inc., 9150 East Imperial Highway, Bellflower, Calif.

Avion Div., ACF Industries, Inc., 299 State Hwy., Route 17, Paramus, N. J.

BJ Electronics Borg-Warner Corp., 3300 Newport Ave., P. O. Box 1679, Santa Ana, Calif.

Babcock Radio Engineering, Inc., 7942 Woodley Ave., Van Nuys, Calif.

Bell Aircraft Corp., Niagara Falls Blvd., Niagara Falls, N. Y.

Bendix Computer Div., Bendix Aviation Corp., 5630 Arbor Vitae St., Los Angeles 45, Calif.

BENDIX PRODUCTS DIV., BENDIX AVIATION CORP., South Bend 20, Ind., **SEE ADV. A-62**

Berkley Dexter Lab., Inc., 50 Frankfort St., Fitchburg, Mass.

Berkeley Div., Beckman Instruments, Inc., 2200 Wright Ave., Richmond, Calif.

Bernco Eng. Corp., 2320 South Tibbs Ave., Indianapolis, Ind.

Burroughs Corp., 6071 Second Ave., Detroit 32, Mich.

Cal-Tronics, Corp., 11307 Hindry Ave., Los Angeles 45, Calif.

Chicago Aerial Industries, 332 S. Michigan Ave., Chicago, Ill.

Chicago Aerial Industries, Inc., 1980 Hawthorne Ave., Melrose Park, Ill.
Clarostat Mfg. Co., Inc., Dover, N. H.
Computer-Measurements Corp., 5528 Vineland Ave., North Hollywood, Calif.
FRANK R. COOK CO., 26 South Santa Fe Drive, Denver 23, Colo. SEE ADV. C-78
Crown Engineering, 3821 Commercial, N. E., Sta. B, Box 6127, Albuquerque, N. M.
Dale Products, Inc., Columbus, Nebr.
Dbm Research Corp., Stoddard Bldg., P. O. Box 521, Cocoa Beach, Fla.
Dukane Corp., St. Charles, Ill.
Ebert Electronics Co., 212-26 Jamaica Ave., Queens Village 28, N. Y.
Electronic Control System, 2136 Westwood Blvd., Los Angeles, Calif.
ELECTRONIC DIV., OTIS ELEVATOR CO., 35 Ryerson St., Brooklyn 5, N. Y. SEE ADV. C-88
ELECTRONIC SPECIALTY CO., 3456 Glendale St., Los Angeles, Calif. SEE ADV. C-135
Electronics Corp. of America, One Memorial Drive, Cambridge 42, Mass.
Electronics Div., The Ralph M. Parsons Co., 151 S. DeLacey Ave., Pasadena, Calif.
Electronics Div., Thompson Products, Inc., 2196 Clarkwood Rd., Cleveland 3, Ohio
Electronics & Instrumentation Div., Baldwin-Lima-Hamilton Corp., Waltham 54, Mass.
ELECTRO-SNAP SWITCH & MG. CO., 4218 West Lake St., Chicago, Ill. SEE ADV. D-2
Essex Wire Corp., 1601 Wall St., Fort Wayne 6, Ind.
Fairchild Camera & Instrument Corp., Robbins Lane, Syosset, N. Y.
Fairchild Electrotechnics Div., Fairchild Engine & Airplane Corp., 118 E. 16th St., Costa Mesa, Calif.
Farnsworth Electronics Co., Div. of International Tel. & Tel. Corp., 3700 E. Pontiac St., Fort Wayne, Ind.
Federal Mfg. & Engrg. Co., 1055 Stewart Ave., Garden City, N, Y.
Federal Telecom Labs., 500 Washington Ave., Nutley, N. J.
Femco, Inc., Irwin, Pa.
Ferranti Electric Inc., 30 Rockefeller Plaza, New York 20, N. Y.
Fischer & Porter Co., 790 Warminster Rd., Hatboro, Pa.
Gates Radio Co., Quincy, Ill.
General Precision Equipment Corp., 92 Gold St., New York 38, N. Y.
Gordon Enterprises, 5362 North Cahuenga Blvd., North Hollywood, Calif.
Gray Mfg. Co., 521 Fifth Ave., New York 17, N. Y.
Guardian Elec. Mfg. Co., 1621 West Walnut St., Chicago 12, Ill.
The Hagan Corp., 323 Fourth Ave., Pittsburgh 22, Pa.
Hallamore Electronics Co., 8352 Brookhurst Ave., Anaheim, Calif.
Hall-Scott, Inc., Electronics Div., 2950 N. Ontario St., Burbank, Calif.
Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
Hartman Electrical Mfg. Co., 175 North Diamond St., Mansfield, Ohio
Hazeltine Electronics Corp., 59-25 Little Neck Parkway, Little Neck 62, L. I., N. Y.
Instrument & Systems Div., Norden-Ketay Corp., Wiley St., Milford, Conn.
Kay Lab, 5725 Kearny Villa Rd., San Diego, Calif.
KEARFOTT CO., INC. DIV., GENERAL PRECISION EQUIPMENT CORP., Little Falls, N. J. SEE ADV. C-89
Walter Kidde & Co., Inc., 256 Main St., Belleville 9, N. J.
Kollsman Instrument Corp., Subsidiary of Standard Coil Prods. Co., Inc., 80-08 45th Ave., Elmhurst 73, N. Y.
Lear, Inc., 3171 S. Bundy Drive, Santa Monica, Calif.
The Leland Electric Co. Div., American Machine & Foundry Co., 1501 Webster St., Dayton 1, Ohio
Librascope, Inc., 808 Western Ave., Glendale 1, Calif.
LIGHT MILITARY ELECTRONIC EQUIP. DEPT. GENERAL ELECTRIC CO., Utica, N. Y. SEE ADV. 63, C-129
LORAL ELECTRONICS CORP., 794 East 140 St., New York 54, N. Y. SEE ADV. C-90
Magnetic Amplifiers, Inc., 632 Tinton Ave., New York 55, N. Y.
Magnavox Research Laboratories, 2255 South Carmelina, Los Angeles 64, Calif.
Manufacturing Div., Electronic Equipment & Aviation Supplies, Air Associates, Inc., Teterboro Air Terminal, Teterboro, N. J.
THE W. L. MAXSON CORP., 475 10th Ave., New York 18, N. Y. SEE ADV. B-21
Military Sales, Hayes Aircraft Corp., P. O. Box 2287, Birmingham, Ala.
MOTOROLA, INC., 2710 Clyborn Ave., Chicago,, Ill. SEE ADV. C-113
Munston Mfg. & Service Inc., Beech St., Islip, N. Y.
National Electronics Labs., Inc., 1713 Kalorama Rd., N. W., Washington 9, D. C.
Non-Linear Systems, Inc., Del Mar Airport, Del Mar, Calif.
North Electric Co., 553 S. Market St., Galion, Ohio
Opad Electric Co., 69 Murray St., New York 7, N. Y.
Pacific Mercury Television Mfg. Corp., 8345 Havenhurst Ave., Sepulveda, Calif.
Pacific Scientific Co., P. O. Box 22019, Los Angeles 22, Calif.
Parameters, Inc., 195 Herricks Rd. New Hyde Park, N. Y.
Peschel Electronics, Inc., 13 Garden St., New Rochelle, N. Y.
Photobell Co., Inc., 43 Vesey St., New York 7, N. Y.
Photographic Products, Inc., Anaheim, Calif.
Polarad Electronics Corp., 43-20 34 St., Long Island City 1, N. Y.
Polyphase Instrument Co., 701 Haverford Rd., Bryn Mawr, Pa.
Potter Instrument Co., Inc., 115 Cutter Mill Rd., Great Neck, N. Y.
Press Wireless Laboratories, Inc., 25 Prospect Place, West Newton 65, Mass.
Reeves Instrument Corp., 215 East 91 St., New York 28, N. Y.
Reliance Electric & Engrg. Co., 1088 Ivanhoe Rd., Cleveland 10, Ohio
Research & Development Div., Air Associates, Inc., 511 Joyce St., Orange, N. J.
Rheem Mfg. Co., 9236 East Hall Road, Downey, Calif.
Robertshaw Fulton Controls Co., 401 No. Manchester, Anaheim, Calif.
W. C. Robinette Co., 802 Fair Oaks, South Pasadena, Calif.
The Roflan Co., Cor. Rt. 1 & Camp Meeting Rd., Topsfield, Mass.
J. P. Seeburg Corp., 1500 Dayton St., Chicago, Ill.
Servo Corp., of America, 2020 Jericho Turnpike, New Hyde Park, N. Y.
Servo-Tek Products Co., 1086 Goffle Rd., Hawthorne 1, N. J.
Specialty Control Dept., General Electric Co., Waynesboro, Va.
SPERRY GYROSCOPE CO., DIV., SPERRY RAND CORP., Marcus & Lakeville Rds., Great Neck, N. Y. SEE ADV. C-114, C-115
James S. Spivey, Inc., 4908 Hampden Lane, Washington 14, D. C.
Standard Electronics Corp., 285 Emmet St., Newark 5, N. J.
Stavid Engineering Co., Route U. S. 22, Plainfield, N. J.
Stephen-Douglas Co., Inc., 1650 21st St., Santa Monica, Calif.
Sterling Precision Corp., 34-17 Lawrence St., Flushing 54, N. Y.
Stromberg Carlson, 100 Carlson Rd., Rochester 3, N. Y.
Taller & Cooper, 75 Front St., Brooklyn, N. Y.
Telechrome Mfg. Corp., 28 Ranick Drive, Amityville, N. Y.
Telectro Industries Corp., 36-16 37th St., Long Island City 1, N. Y.
Telephonics Corp., Park Ave., Huntington, L. I., N. Y.
Thompson Products, Inc., 23555 Euclid Ave., Cleveland 17, Ohio
Topp Industries, Inc., 5255 West 102 St., Los Angeles 45, Calif.
TRANSICOIL CORP., Worcester, Montgomery County, Pa. SEE ADV. C-128
TRIO LABS. INC. 4025 Merrick Rd. Seaford, N. Y. SEE ADV. C-132
Triumph Mfg. Co., 1829 South 55th Ave., Chicago.
United Control Corp., 4540 Union Bay Pl., Seattle 5, Wash.
Vacuum Tube Prods. Co., Inc., 506 South Cleveland St., Oceanside, Calif.
Varo Manufacturing Co., Inc., 2201 Walnut St., Garland, Texas
Vickers Electrical Div., Vickers, Inc., 1815 Locust St., St. Louis, Mo.
WacLine, Inc., 35 South St. Clair St., Dayton 2.
Waldorf Instrument Co., Park Ave., Huntington Station, New York, N. Y.
The Warner & Swasey Research Corp., 34 West 33rd St., New York 1, N. Y.
Western Design & Mfg. Corp. Div., U. S. Industries, Inc., Building 344, Santa Barbara Airport, Goleta, Calif.
Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.
White Rodgers Co., 1209 Cass Ave., St. Louis 6, Mo.
WICKES ENGRG. CORP., 12 & Ferry Sts., Camden, N. J. SEE ADV. F-20
G. C. Wilson & Company, 1915 Eighth Ave., Huntington, West Va.
Wind Tunnel Instrument Co., Inc., 180 Needham St., Newton Upper Falls 64, Mass.
Yellow Springs Instrument Co., Inc., P. O. Box 106, Yellow Springs, Ohio

Controls, Heat Transfer

Aircraft Equipment Div., The Bristol Co., P. O. Box 1790-A. W., Waterbury 20, Conn.
AiResearch Mfg. Div., The Garrett Corp., 9851 Sepulveda Blvd., Los Angeles 45, Calif.
APPARATUS SALES DIV., GENERAL ELECTRIC CO., 1 River Rd., Schenectady 5, N. Y. SEE ADV. 63, C-129
Automatic Temperature Control Co., Inc., 5212 Pulaski Ave., Philadelphia 44, Pa.
Cox & Company, Inc., 115 East 23rd St., New York, N. Y.
Electrotherm Co., 8813 Ardendale Ave., San Gabriel, Calif.
HYDRO-AIRE, INC., 3000 Winona Ave., Burbank, Calif. SEE ADV. D-194
JANITROL AIRCRAFT-AUTOMOTIVE DIV., SURFACE COMBUSTION CORP., 400 Dublin Ave., Columbus 15, Ohio. SEE ADV. C-106
Parameters, Inc., 195 Herricks Rd., New Hyde Park, N. Y.
ROBERTSHAW FULTON CONTROLS CO., 401 N. Manchester, Anaheim, Calif. SEE ADV. 191
SALES DEPT., CENTURY CONTROLS CORP., Allen Blvd., Farmingdale, N. Y. SEE ADV. 69
UNITED METALLIC O RING CORP., Box 1035, Dayton 1, Ohio. SEE ADV. A-76
Vapor Heating Corp., 80 East Jaskson, Chicago 4.
The Warner & Swasey Research Corp., 34 West 33rd St., New York 1, N. Y.

Controls, Servo

Aero Supply Mfg. Co., Corry, Pa.
Aeroflex Laboratories Incorporated, 34-06 Skillman Ave., Long Island City 1, N. Y.
Aeronautical Div., Minneapolis Honneywell Regulator Co., 2600 Ridgway, Minneapolis 13, Minn.
Aeronca Mfg. Corp., Middletown, Ohio
Aircraft Armaments, Inc., Cockeysville, Md.
AIRCRAFT CONTROLS DIV., BARBER-COLMAN CO., 14 Rock St., Rockford, Ill. SEE ADV. C-98
Aircraft Equipment Div., The Bristol Co., P. O. Box 1790-A. W., Waterbury 20, Conn.
AiResearch Mfg. Div., The Garrett Corp., 9851 Sepulveda Blvd., Los Angeles 45, Calif.
American Bosch Arma Corp., Roosevelt Field, Garden City, N. Y.
American Electronics, Inc., 655 W. Washington Blvd., Los Angeles 15, Calif.
American Res. & Mfg. Corp., Rockville Pike & Halpine Rd., Rockville, Md.
APPARATUS SALES DIV., GENERAL ELECTRIC CO., 1 River Rd., Schenectady 5, N. Y. SEE ADV. 63, C-129
Arma Div., American Bosch Arma Corp., Roosevelt Field, Garden City, N. Y.

Associated Missile Prods. Corp., 2709 North Garey, Pomona, Calif.
Atomics International Div., North American Aviation, Inc., 21600 Vanowen, Canoga Park, Calif.
Automatic Temperature Control Co. Inc., 5212 Pulaski Ave., Philadelphia 44, Pa.
Autonectics Div., North American Aviation, Inc. 9150 East Imperial Highway, Bellflower, Calif.
Avion Div., ACF Industries, Inc., 299 State Hwy., Route 17, Paramus, N. J.
Bernco Eng. Corp. 2320 South Tibbs Ave., Indianapolis, Ind.
Bowmar Instrument Corp., 2415 Pennsylvania St., Fort Wayne, Indiana
CHANDLER EVANS DIV., PRATT-WHITNEY CO., INC., Charter Oak Blvd., West Hartford, Conn. SEE ADV. A-42, A-43
Chicago Aerial Industries, 332 S. Michigan Ave., Chicago, Ill.
Chicago Aerial Industries, Inc., 1980 Hawthorne Ave., Melrose Park, Ill.
Cleveland Pneumatic Tool Co., 3871 East 77 St., Cleveland 5, Ohio
FRANK R. COOK CO., 26 South Santa Fe Drive, Denver 23, Colo. SEE ADV. C-78
Daystrom Instrument Div., Daystrom Inc., Archbald, Pa.
DEFENSE PRODUCTS GROUP, AMERICAN MACHINE & FOUNDRY CO., 1101 North Royal St., Alexandria, Va. SEE ADV. B-22
Denison Engrg. Div., American Brake Shoe Co., 1160 Dublin Rd., Columbus 16, Ohio
ECLIPSE-PIONEER DIV., BENDIX AVIATION CORP., Teterboro, N. J. SEE ADV. C-130, C-131
THOMAS A. EDISON, INC., 49 Lakeside Ave., West Orange, N. J. SEE ADV. D-174
Electric Regulator Corp., Norwalk, Conn.
Electrol, Inc., Kingston, N. Y.
Electro-Mechanical Div., General Riveters, Inc., 785 Hertel Ave., Buffalo 7, N. Y.
ELECTRONIC DIV., OTIS ELEVATOR CO., 35 Ryerson St., Brooklyn 5, New York. SEE ADV. C-88
ELECTRONIC SPECIALTY CO., 1521 San Fernando Rd. West, Los Angeles 39, Calif. SEE ADV. C-135
Electronics Div., Thompson Products, Inc., 2196 Clarkwood Rd., Cleveland 3, Ohio
Endevco Corp., 161 East California St., Pasadena 1, Calif.
Farnsworth Electronics Co., Div. of International Tel. & Tel. Corp., 3700 E. Pontiac St., Fort Wayne, Ind.
Federal Telephone & Radio Co., 100 Kingsland Rd., Clifton, N. J.
FORD INSTRUMENT DIV., SPERRY RAND CORP., 31-10 Thomson Ave., Long Island City 1, N. Y. SEE ADV. C-91
General Precision Equipment Corp., 92 Gold St., New York 38, N. Y.
General Precision Laboratory, Inc., 63 Bedford Rd., Pleasantville, N. Y.
The Hagan Corp., 323 Fourth Ave., Pittsburgh 22, Pa.
Hydraulic Research & Mfg. Co., 2835 North Naomi St., Burbank, Calif.
Industrial Products Div., Westinghouse Air Brake Co., P. O. Box 36, Wilmerding, Pa.
Instrument & Systems Div., Norden-Ketay Corp., Wiley St., Milford, Conn.
KEARFOTT CO., INC., DIV., GENERAL PRECISION EQUIPMENT CORP., Little Falls, N. J. SEE ADV. C-89
The Lee Co., P. O. Box 418, Westbrook, Conn.
Librascope, Inc., 808 Western Ave., Glendale 1, Calif.
Liquidometer Corp., 36 & Skillman Ave., Long Island City 1, N. Y.
Lytle Engineering & Manufacturing Co., 1404 San Mateo Blvd., S. E., Albuquerque, N. M.
Magnetic Amplifiers, Inc., 632 Tinton Ave., New York 55, N. Y.
Magnetic Research Corp., 200 Center St., El Segundo, Calif.
Military Sales, Hayes Aircraft Corp., P. O. Box 2287, Birmingham, Ala.
Moog Valve Co., Inc., Proner Airport, East Aurora, New York
National Water Lift Co., Div., The Cleveland Pneumatic Tool Co., 2220 Palmer Ave., Kalamazoo, Mich.
Newbrook Machine Corp., Silver Creek, N. Y.
Non-Linear Systems, Inc., Del Mar Airport, Del Mar, Calif.
Norden Ketay Corp., Commerce Rd., Stamford, Conn.
North Electric Co., 553 S. Market St., Galion, Ohio
NORWOOD CONTROL, DETROIT CONTROLS CORP., 934 Washington St., Norwood, Mass. SEE ADV. A-68
Ordnance Div., Minneapolis-Honeywell Reg. Co., 2753 4th Ave. S., Minneapolis 8, Minn.
Pacific Scientific Co., P. O. Box 22019, Los Angeles 22, Calif.
Parameters, Inc., 195 Herricks Rd., New Hyde Park, N. Y.
PEGASUS LABORATORIES, INC., 3690 W. Eleven Mile Rd., Berkley, Mich. SEE ADV. C-87
Peschel Electronics, Inc., 13 Garden St., New Rochelle, N. Y.
Pierce Governor Co., Inc., 1625 Ohio Ave., Anderson, Ind.
Polarad Electronics Corp., 43-20 34 St., Long Island City 1, N. Y.
Reeves Instrument Corp., 215 East 91 St., New York 28, N. Y.
Retron Corp., 717 North Lake Ave., Pasadena, Calif.
ROBERTSHAW FULTON CONTROLS CO., 401 N. Manchester, Anaheim, Calif. SEE ADV. D-191
W. C. Robinette Co., 802 Fair Oaks, South Pasadena, Calif.
Servo Corp. of America, 2020 Jericho Turnpike, New Hyde Park, N. Y.
Servo-Tek Products Co., 1086 Goffle Rd., Hawthrone 1, N. J.
Sesco Manufacturing, Inc., Henderson & Shoemaker Rds., Bridgeport, Pa.
Specialty Control Dept., General Electric Co., Waynesboro, Va.
SPERRY GYROSCOPE CO., DIV., SPERRY RAND CORP., Marcus & Lakeville Rds., Great Neck, N. Y. SEE ADV. C-114, C-115
Stephen-Douglas Co., Inc., 1650 21st St., Santa Monica, Calif.
Sterling Precision Corp., 34-17 Lawrence St., Flushing 54, N. Y.
Stromberg Carlson, 100 Carlson Rd., Rochester 3, N. Y.
SUMMERS GYROSCOPE CO., 2328 Broadway, Santa Monica, Calif. SEE ADV. C-106
Sweetland Engineering Co., 940 North Fair Oaks Ave., Pasadena 3, Calif.
Telectro Industries Corp., 36-16 37th St., Long Island City 1, N. Y.
Thompson Products, Inc., 23555 Euclid Ave., Cleveland 17, Ohio
Topp Industries, Inc., 5255 West 102 St., Los Angeles 45, Calif.
TRANSICOIL CORP., Worcester, Montgomery County, Pa. SEE ADV. C-128
Vapor Heating Corp., 80 East Jackson, Chicago 4, Ill.
Vickers Electrical Div., Vickers, Inc., 1815 Locust St., St. Louis, Mo.
VICKERS, INC., Detroit 32, Mich. SEE ADV. A-59
WacLine, Inc., 35 South St. Clair St., Dayton 2, Ohio
Waldorf Instrument Co., Park Ave., Huntington Station, New York, N. Y.
The Warner & Swasey Research Corp., 34 West 33rd St., New York 1, N. Y.
Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.
Weston Hydraulics, Ltd., 10918 Burbank Blvd., North Hollywood, Calif.
White Rodgers Co., 1209 Cass Ave., St. Louis 6, Mo.
Woodward Governor Company, 5001 North Second St., Rockford, Ill.

Counters, Geiger

ADMIRAL CORP., 1191 Merchandise Mart, Chicago 54, Illinois. SEE ADV. C-116
Air World Manufacturing, 4641 Hollywood Blvd., Los Angeles 27, Calif.
Anton Electronic Labs, 1226 Flushing Ave., Brooklyn 37, N. Y.
Baird Associates-Atomic Instrument Co., 33 University Rd., Cambridge 38, Mass.
Berkeley Div., Beckman Instruments, Inc., 2200 Wright Ave., Richmond, Calif.
Fairchild Camera & Instrument Corp., Robbins Lane, Syosset, N. Y.
Hoffman Laboratories, Inc., 3761 South Hill St., Los Angeles 7, Calif.
NRD Instrument Co., 6425 Etzel Ave., St. Louis 14, Mo.
Nuclear Instrument & Chemical Corp., 225 W. Erie, Chicago, Ill.
Nuclear Measurements Corp., 2460 North Arlington Ave., Indianapolis 13, Ind.
Triumph Mfg. Co., 1829 South 55th Ave., Chicago.
Universal Atomics Co., 19 East 48th St., New York, N. Y.
Veeder-Root, Inc., Hartford 2, Conn.
Victoreen Instrument Co., 5806 Hough St., Cleveland, Ohio

Detector, Radioactivity

Air World Manufacturing, 4641 Hollywood Blvd., Los Angeles 27, Calif.
American Electronics, Inc., 655 W. Washington Blvd., Los Angeles 15, Calif.
Anton Electronic Labs, 1226 Flushing Ave., Brooklyn, 37, N. Y.
BJ Electronics, Borg-Warner Corp., 3300 Newport Ave., P. O. Box 1679, Santa Ana, Calif.
Baird Associates-Atomic Instrument Co., 33 University Rd., Cambridge 38, Mass.
Chatham Electronics Division, Gera Corp., 630 W. Pleasant Ave., Livingston, N. J.
DEFENSE PRODUCTS GROUP, AMERICAN MACHINE & FOUNDRY CO., 1101 North Royal St., Alexandria, Va. SEE ADV. B-22
Detectolab, Inc., 6544 N. Sheridan Rd., Chicago, Ill.
Isomet Corp., 118 Union St., Palisades Park, N. J.
MOTOROLA, INC., 2710 Clyborn Ave., Chicago, Ill. SEE ADV. C-113
NRD Instrument Co., 6425 Etzel Ave., St. Louis 14.
Nuclear Instrument & Chemical Corp., 225 W. Erie, Chicago, Ill.
Nuclear Measurements Corp., 2460 North Arlington Ave., Indianapolis 13, Ind.
Ohmart Corp., 2236 Bogen St., Cincinnati, Ohio
Patterson Moos Div., Universal Winding Co., Inc., 90-28 Van Wyck Exp., Jamaica 18, N. Y.
Radiation Count Lab., 5122 Grove St., Chicago, Ill.
Stromberg Carlson, 100 Carlson Rd., Rochester 3, N. Y.
Telectro Industries Corp., 36-16 37th St., Long Island City 1, N. Y.
Triumph Mfg. Co., 1829 South 55th Ave., Chicago.
Universal Atomics Co., 19 East 48th St., New York, N. Y.
Victoreen Instrument Co., 5806 Hough St., Cleveland, Ohio

Installations, Research and Development (Nuclear)

Ames Laboratory (Iowa State College, contractor), Ames, Iowa.
Argonne Cancer Research Hospital (University of Chicago, contractor), Chicago, Ill.
Argonne National Laboratory (University of Chicago, contractor), Chicago, Ill.
Participating institutions:
- Battelle Memorial Institute
- Carnegie Institute of Technology
- Case Institute of Technology
- Illinois Institute of Technology
- Indiana University
- Iowa State College
- Kansas State College
- Loyola University (Chicago, Illinois)
- Marquette University
- Mayo Foundation
- Michigan College of Mining and Technology
- Michigan State University of Agriculture and Applied Science
- Northwestern University
- Ohio State University
- Oklahoma Agricultural and Mechanical College
- Purdue University
- St. Louis University
- State University of Iowa
- Washington University (St. Louis, Missouri)
- Wayne University
- Western Reserve University
- University of Chicago
- University of Cincinnati

University of Illinois
University of Kansas
University of Michigan
University of Minnesota
University of Missouri
University of Nebraska
University of Notre Dame
University of Pittsburgh
University of Wisconsin

Bettis Plant (Westinghouse Electric Corp., Atomic Power Division, contractor), Pittsburgh, Pa.

Brookhaven National Laboratory (Associated Universities, Inc., contractor), Upton, Long Island, New York.
Participating Institutions:
Columbia University
Cornell University
Harvard University
Johns Hopkins University
Massachusetts Institute of Technology
Princeton University
Yale University
University of Pennsylvania
University of Rochester

Knolls Atomic Power Laboratory (General Electric Co., contractor), Schenectady, N. Y.

Los Alamos Scientific Laboratory (University of California, contractor) Los Alamos, N. M.

Mound Laboratory (Monsanto Chemical Co., contractor), Miamisburg, Ohio.

Oak Ridge Institute of Nuclear Studies (contractor), Oak Ridge, Tenn.
Sponsoring universities:
Agricultural and Mechanical College of Texas
Alabama Polytechnic Institute
Catholic University of America
Clemson Agricultural College
Duke University
Emory University
Florida State University
Georgia Institute of Technology
Louisiana State University
Meharry Medical College
Mississippi State College
North Carolina State College
North Texas State College
Rice Institute
Southern Methodist University
Tulane University of Louisiana
Tuskegee Institute
Vanderbilt University
Virginia Polytechnic Institute
University of Alabama
University of Arkansas
University of Florida
University of Georgia
University of Kentucky
University of Louisville
University of Maryland
University of Mississippi
University of North Carolina
University of Oklahoma
University of Puerto Rico
University of South Carolina
University of Tennessee
University of Texas
University of Virginia

Oak Ridge National Laboratory (Carbide & Carbon Chemicals Co., Division of Union Carbide & Carbon Corp. contractor), Oak Ridge, Tenn.

Radiation Laboratory (University of California, contractor), Berkeley, Calif.

Raw Materials Development Laboratory (National Lead Co., contractor), Winchester, Mass.

Rochester Atomic Energy Project (University of Rochester, contractor), Rochester, N. Y.

Sandia Laboratory (Sandia Corp., contractor), Sandia Base, Albuquerque, N. M.

University of California, Los Angeles, Atomic Energy Project (University of California, contractor), Los Angeles, Calif.

University of California, Medical Center, Radiological Laboratory (University of California, contractor), San Francisco, Calif.

National Reactor Testing Station, Idaho Falls, Idaho.
Nevada Test Site, Las Vegas, Nev.

Eniwetok Proving Ground, Marshall Islands.

Reactor Development

Aircraft Armaments, Inc., Cockeysville, Md.

American Electronics, Inc., 655 W. Washington Blvd., Los Angeles 15, Calif.

Atomics International Div., North American Aviation, Inc., 21600 Vanowen, Canoga Park, Calif.

Daystrom Instrument Div., Daystrom Inc., Archbald, Pa.

DEFENSE PRODUCTS GROUP, AMERICAN MACHINE & FOUNDRY CO., 1101 North Royal St., Alexandria, Va. SEE ADV. B-22

Farnsworth Electronics Co., Div. of International Tel. & Tel. Corp., 3700 E. Pontiac St., Fort Wayne, Ind.

FORD INSTRUMENT DIV., SPERRY RAND CORP., 31-10 Thomson Ave., Long Island City 1, N. Y. SEE ADV. C-91

Greer Hydraulics, Inc., N. Y. International Airport, Jamaica 30, N. Y.

Industrial Div., Minneapolis-Honeywell Reg. Co., Wayne & Roberts Ave., Philadelphia 44, Pa.

Isomet Corp., 118 Union St., Palisades Park, N. J.

Lavoie Laboratories, Inc., Matawan-Freehold Rd., Morganville, N. J.

Montibella Fabricating Div., Kaiser Steel Corp., 7301 Telegraph Rd., Los Angeles 22, Calif.

Patterson Moos Div., Universal Winding Co., Inc., 90-28 Van Wyck Exp., Jamaica 18, N. Y.

Research Div., Curtiss-Wright Corp., Clifton, N. J.

ROBERTSHAW FULTON CONTROLS CO., 401 N. Manchester, Anaheim, Calif. SEE ADV. D-191

Stromberg Carlson, 100 Carlson Rd., Rochester 3, N. Y.

Thompson Products, Inc., 23555 Euclid Ave., Cleveland 17, Ohio

United Transformer Co., 150 Varick St., New York 13, N. Y.

Vard, Inc., 2981 East Colorado St., Pasadena 8, Calif.

Reactors, Nuclear

AEROJET GENERAL CORP., A SUBSIDIARY OF THE GENERAL TIRE & RUBBER CO., 6352 Irwindale Rd., Azusa, Calif. SEE ADV. A-68

APPARATUS SALES DIV., GENERAL ELECTRIC CO., 1 River Rd., Schenectady 5, N. Y. SEE ADV. 63, C-129

Atomics International Div., North American Aviation, Inc., 21600 Vanowen, Canoga Park, Calif.

Daystrom Instrument Div., Daystrom Inc., Archbald, Pa.

DEFENSE PRODUCTS GROUP, AMERICAN MACHINE & FOUNDRY CO., 1101 North Royal St., Alexandria, Va. SEE ADV. B-22

FORD INSTRUMENT DIV., SPERRY RAND CORP., 31-10 Thomson Ave., Long Island City 1, N. Y. SEE ADV. C-91

Isomet Corp., 118 Union St., Palisades Park, N. J.

Montibella Fabricating Div., Kaiser Steel Corp., 7301 Telegraph Rd., Los Angeles 22, Calif.

Patterson Moos Div., Universal Winding Co., Inc., 90-28 Van Wyck Exp., Jamaica 18, N. Y.

Radiation Count Lab., 5122 Grove St., Chicago, Ill.

Ray Proof Corp., 513 W. 54th St., New York, N. Y.

Vard, Inc., 2981 East Colorado St., Pasadena 8, Calif.

Tube, Gamma Detector

Anton Electronic Labs., 1226 Flushing Ave., Brooklyn 37, N. Y.

NRD Instrument Co., 6425 Etzel Ave., St. Louis 14, Mo.

RAYTHEON MFG. CO., 55 Chapel St., Newton 58, Mass. SEE ADV. C-79

Victoreen Instrument Co., 5806 Hough St., Cleveland, Ohio

U. S. NUCLEAR REACTORS HIGH TEMPERATURE

Military Prototypes and Experiments

Completed and in Being:
Submarine Thermal Reactor, Mark I, NRTS, Idaho (1953)
Submarine Intermediate Reactor, Mark A, West Milton, N. Y. (1955)

Under Construction:
Army Package Power Reactor-1, Fort Belvoir, Va. (1957)
Large Ship Reactor Prototype (2 reactors), NRTS, Idaho
Submarine Advanced Reactor, West Milton, N. Y.

Planned:
Argonne Low Power Reactor, NRTS, Idaho
Small Submarine Reactor Prototype, Windsor, Conn.

Civilian Power Reactor Experiments

Completed and in Being:
Boiling Reactor Experiment-3 (being modified to BORAX-4), NRTS, Idaho (1955)
Los Alamos Power Reactor Experiment-1, Los Alamos, N. Mex. (1956)
Experimental Breeder Reactor-1, NRTS, Idaho (1950)
Homogeneous Reactor Experiment-2, Oak Ridge, Tenn. (1956)

Under Construction:
Los Alamos Power Reactor Experiment-2, Los Alamos, N. Mex. (1956)
Sodium Reactor Experiment, Santa Susana, Calif. (1957)
Experimental Boiling Water Reactor, Argonne Nat'l Lab. (1957)
Organic Moderated Reactor Experiment, NRTS, Idaho (1957)
Boiling Reactor Experiment-4, NRTS, Idaho (1956)

Planned:
Gas Cooled Reactor Experiment, NRTS, Idaho (1958)
Los Alamos Molten Plutonium Reactor Exp., Los Alamos, N. Mex. (1959)
Experimental Breeder Reactor-2, NRTS, Idaho (1959)

Civilian Power Reactors

Under Construction:
General Electric Co. and Pacific Gas & Electric Co., Near Livermore, Calif. (1958)
AEC and Duquesne Light Co. (Pressurized Water Reactor), Shippingport, Pa. (1957)
Power Reactor Development Co., Inc., Monroe, Mich. (1960)

Planned:
Consolidated Edison Co. of New York, Indian Point, N. Y. (1960)
Commonwealth Edison Co. (Nuclear Power Group), Dresden, Ill. (1961)
Yankee Atomic Electric Co., Rowe, Mass. (1960)
Consumers Public Power District, Beatrice, Nebr. (1960)
Rural Cooperative Power Association, Elk River, Minn. (1960)
Wolverine Electric Cooperative, Hersey, Mich. (1959)
Pennsylvania Power & Light Co., Eastern Pennsylvania (1962)
Florida Power Corp., Florida Power & Light Co., and Tampa Electric Co., Florida (1962)
Chugach Electric Association, Inc., and Nuclear Development Corp. of America, Anchorage, Alaska (1962)
City of Piqua, Ohio, Piqua, Ohio (1960)

U.S. NUCLEAR REACTORS, LOW TEMPERATURE

Research and Test (For Research)

Completed and in Being:
Argonne Research Reactor (AEC), Argonne Nat'l. Lab (1954)
Low Intensity Test Reactor (AEC), Oak Ridge, Tenn. (1950)
Brookhaven Research Reactor (AEC), Brookhaven Nat'l. Lab. (1950)
Oak Ridge Graphite Reactor (AEC), Oak Ridge, Tenn. (1954)

Pennsylvania State University, University Park, Pa. (1955)
Super Power Water Boiler (AEC), Los Alamos, N. Mex. (1951)
North American Aviation Water Boiler, Neutron Source (AEC), Downey, Calif. (1952)
Raleigh Research Reactor (North Carolina State College), Raleigh, N. C. (1953)
Livermore Water Boiler (AEC), Livermore, Calif. (1953)
Armour Research Foundation, Chicago, Ill. (1956)
Naval Research Laboratory, Washington, D. C. (1956)
Omega West Reactor (AEC), Los Alamos, N. Mex. (1956)

Under Construction:
Livermore Pool Type Reactor (AEC), Livermore, Calif. (1956)
University of Michigan, Ann Arbor, Mich. (1956)
Oak Ridge Research Reactor (AEC), Oak Ridge, Tenn. (1956)
MIT Research Reactor, Cambridge, Mass.
Brookhaven Medical Reactor (AEC), Brookhaven Nat'l. Lab. (1957)
Aerojet-General Nucleonics, San Ramon, Calif. (1957)
Battelle Memorial Institute, West Jefferson, Ohio (1956)

Planned:
Washington State College, Pullman, Wash.
UCLA Medical Reactor, Los Angeles, Calif.
Industrial Research Laboratories, Inc., Plainsboro, New Jersey
Watertown Arsenal, Watertown, Mass.
The Prosperity Co., Coral Gables, Fla.
Dow Chemical Co., Midland, Mich.
University of Washington, Seattle, Wash.
University of Buffalo, Buffalo, N. Y.
Gamma Corporation, Mansfield, Mass.
Stanford Research Institute, Palo Alto, Calif.

Research and Test (For Specialized Testing)

Completed and in Being:
Savannah River Test Pile 305 (AEC), Savannah River, S. C. (1953)
Hanford 305 Test Reactor (AEC), Hanford, Wash. (1944)
Process Development Pile (AEC), Savannah River, S. C. (1953)
45' Thermal Test Reactor (AEC), Savannah River, S. C. (1953)
Bulk Shield Test Facility (AEC), Oak Ridge, Tenn. (1950)
Tower Shielding Facility (AEC), Oak Ridge, Tenn. (1954)
Ground Test Reactor (USAF), Fort Worth, Texas (1953)
Aircraft Shield Test Reactor (USAF), Fort Worth, Texas (1954)
Thermal Test Reactor (AEC), Schenectady, N. Y. (1951)
Special Power Excursion Reactor Test-1 (AEC), NRTS, Idaho (1955)
Thermal Test Reactor (AEC), Hanford, Wash. (1955)
Kinetic Experiment on Water Boilers (AEC), Santa Susana, Calif. (1956)

Under Construction:
Special Power Excursion Reactor Test-2 (AEC), NRTS, Idaho (1957)
Special Power Excursion Reactor Test-3 (AEC), NRTS, Idaho (1957)
Nuclear Engineering Test Reactor (USAF), Dayton, Ohio (1958)

Planned:
Shield Mockup Reactor (AEC), Oak Ridge, Tenn. (1958)
CANEL Test Reactor (USAF), Middletown, Conn. (1958)
Radiation Effects Reactor (USAF), Fort Worth, Texas (1957)
Radiation Effects Reactor (USAF), Georgia (1958)
Tower Test Reactor (USAF), Georgia (1958)
Test Reactor (Bell Lab.) (USAF), New Jersey

Critical Experiments and Zero Power Reactors

Completed and in Being:
Zero Power Reactor-3 (AEC), NRTS, Idaho (1955)
ORNL Critical Experiment Facility-1 (AEC), Oak Ridge, Tenn. (1950)
ORNL Critical Experiment Facility-2 (AEC), Oak Ridge, Tenn. (1950)
Fast Exponential Experiment (AEC), Argonne Nat'l. Lab. (1954)
Physical Constants Test Reactor (AEC), Hanford, Wash. (1955)
PWR Flexible Critical Assembly (AEC), Pittsburgh, Pa. (1954)
PWR Mockup (AEC), Pittsburgh, Pa. (1954)
Two Region Critical Experiment (AEC), Pittsburgh, Pa. (1953)
Preliminary Pile Assembly (AEC), KAPL, Schenectady, N. Y. (1948)
Alco Criticality Facility, Schenectady, N. Y. (1956)

Under Construction:
Army Package Power Reactor—Critical (AEC), Oak Ridge, Tenn. (1956)
Babcock & Wilcox Co., Lynchburg, Va. (1956)
Battelle Memorial Institute, Columbus, Ohio (1956)
General Electric Co., Livermore, Calif. (1957)
Nuclear Development Corporation of America, Pawling, N. Y.
Westinghouse Elecric Corp., Westmoreland Co., Pa. (1957)

Planned:
Zero Power Reactor-5 (AEC), Argonne Nat'l. Lab. (1957)
Zero Power Reactor-6 (AEC), Argonne Nat'l. Lab.
Lockheed Aircraft Co., Palo Alto, Calif. (1957)
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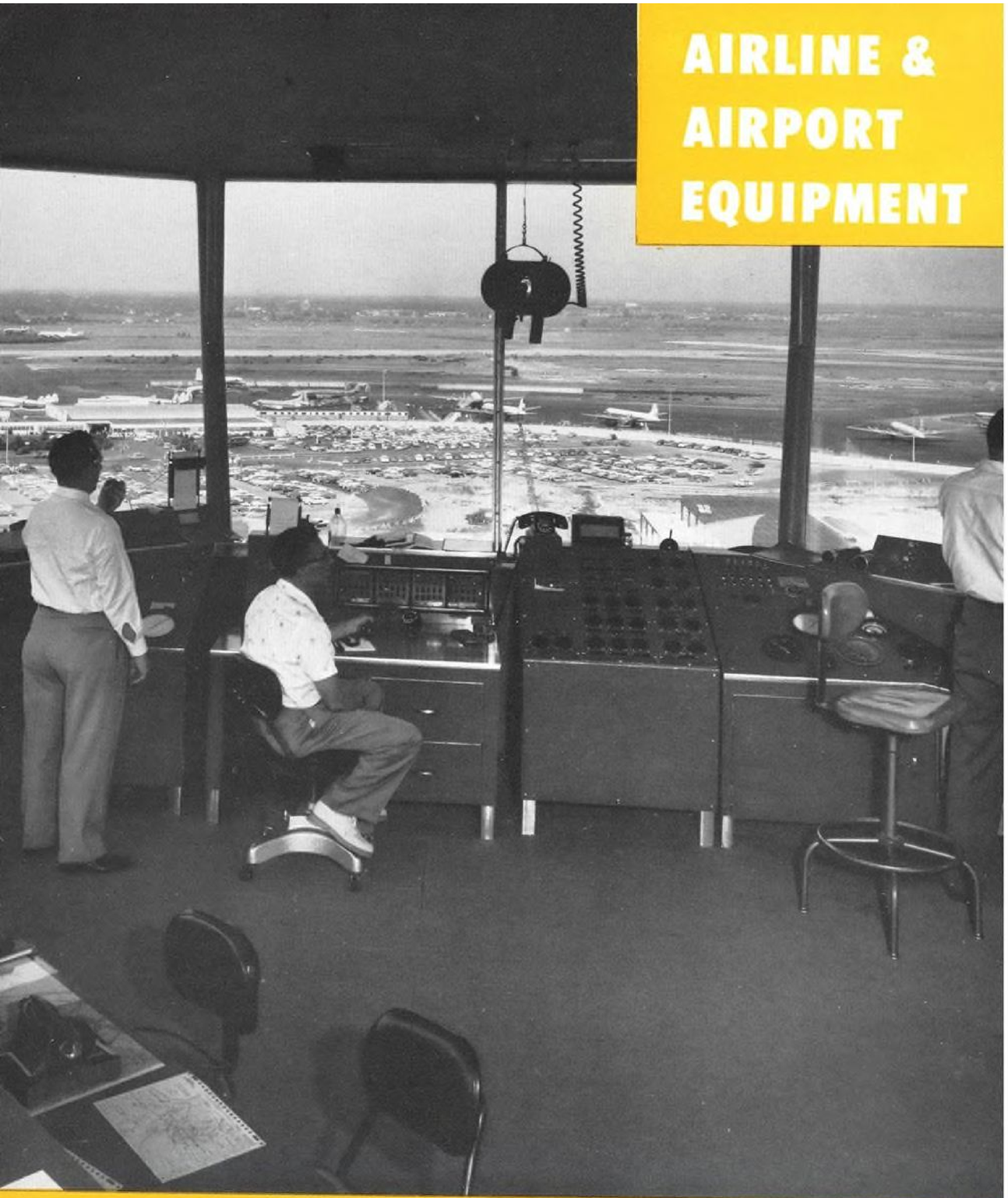
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Wherever pilots fly, for over a quarter of a century they have depended on Crouse-Hinds aviation lighting and weather equipment to guide them safely. Crouse-Hinds has grown up in partnership with the aviation industry — anticipating its demands for better and more specialized lighting equipment — until today Crouse-Hinds offers you the most complete line of aviation lighting equipment in the world. Only a small portion of it can be illustrated here. Contact your nearby Crouse-Hinds office for complete details.



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Type HRC Bi-Directional-Movable Beam (CAA Spec. L-818)

Type HRL Bi-Directional-Fixed Focus (CAA Spec. L-819)

Type HSL Uni-Directional-Fixed Focus (CAA Spec. L-820)



Type ERL Medium Intensity **Marker Lights** (CAA Spec. L-802) Taxiway Lights same design, but with blue globe (CAA Spec. L-822)

Obstruction Marker Lights Type VAW (Spec. MIL-L-7830) and Type EOL (Spec. L-810)



Type TGS **Taxi Guidance Signs**

Because of ever-increasing ground traffic, larger fields and increased activity under reduced visibility, Crouse-Hinds has led the field in developing a fully approved system of illuminated signs to help pilots to their destination quickly and safely.

A Complete Line of **Weather Equipment**

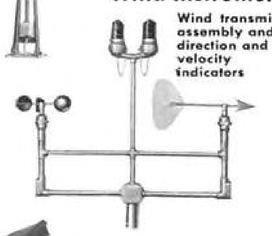


Illuminated Wind Cones

Type WC-36 (Spec. MIL-I-7854) and Type WC-18 (Spec. L-807)

Wind Instruments

Wind transmitter assembly and direction and velocity indicators

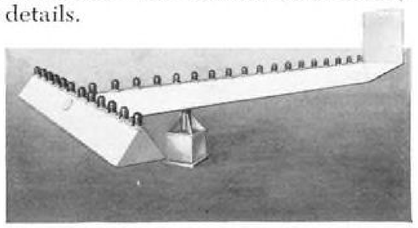




Type PTS **Portable Traffic Signals** (Spec. MIL-L-6617)

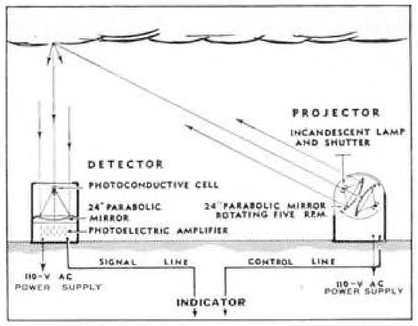
Type UGA **Underground Junction Boxes**





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Only Crouse-Hinds offers you wind tees to serve as a continuous night and day indicators of wind direction and preferred landing position. Wind tees can be free floating or remotely controlled, as desired.



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Crouse-Hinds' rotating beam Ceilometer system not only provides accurate night and day ceiling readings in the runway approach, but also reads automatically every 6 seconds giving frequent, accurate observations of cloud height at the point where they are most vitally needed.

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Airline Buying Follows Set Patterns

New York—Purchasing procedures of both U. S. and foreign airlines have not changed appreciably during the post-war era, even under the impact of multimillion-dollar purchasing commitments for turbojet and turboprop aircraft. However, as delivery of the completely new-type planes draws near, certain, unspecified changes will undoubtedly take place.

Some airlines, such as Pan American World Airways, are establishing new procedures for jet procurement, but they are relatively minor and fit neatly into the framework of the airline's existing purchasing organization.

Others say jet purchases will have no influence at all on their procurement policies.

Two Different Patterns

Airlines have set two basically different types of purchasing patterns:

A central purchasing location which takes care of all procurement requirements for the airline, except, possibly, for very small amounts of local purchasing which is authorized for line stations. PanAm has such an organization in its Services of Supply at Long Island City, N. Y.

The same practice is usually followed by smaller airlines which centralize executive offices, overhaul and maintenance base, and purchasing all in one location.

Trans World Airlines, the other U. S. transatlantic operator, has a purchasing organization quite similar to PAA's, except that TWA also established an international purchasing office in Paris to buy most of the supplies which originate in Europe.

The second scheme is to have two major purchasing centers, each for certain, specific categories of items. Two large carriers which are proponents of this type of purchasing organization are American Airlines and United Air Lines.

Both AA and UAL split their procurement between their executive offices and main overhaul bases—for American, New York and Tulsa; for United, Chicago and San Francisco.

Both airlines concentrate the procurement of all in-flight equipment for aircraft and powerplants in the overhaul bases, while most of the other items (except air frames, the procurement of which is a top management decision) come under the purchasing departments located at executive headquarters.

Foreign Airlines

Since all foreign airlines operating into the U. S. fly American-built aircraft which mount American engines, propellers, and almost 100% American equipment and accessories, these carriers have established purchasing offices in the U. S.

Though most of the transatlantic foreign airlines have placed orders for either the Boeing 707 or Douglas DC-8 turbojet transports, the impact of these costly aircraft has not yet been felt by their procurement departments because delivery is still too far in the future.

AIR TRANSPORT ASSOCIATION PURCHASING COMMITTEE

Alaska Airlines, Inc.
R. Foss, Director of Purchases, Paine Field, Everett, Washington

Alleghany Airlines, Inc.
R. C. Gudikunst, Director of Supply, National Airport, Washington 1, D. C.

American Airlines, Inc.
B. W. Trussell, Director-Warranty Contracts, LaGuardia Field, New York Airport Station, N. Y.

Bonanza Airlines, Inc.
Earl E. Hall, Supt.-Purchasing & Stores, P. O. Box 391, Las Vegas, Nevada

Braniff Airways, Inc.
H. Bolding, Dir. of Purchasing & Stores, Love Field, Dallas 9, Texas

Canadian Pacific Airlines, Ltd.
William S. Lewis, Supt. of Stoes, Vancouver A.M.F., British Columbia, Canada.

Capital Airlines, Inc.
George M. Porter, Director of Procurement & Supply, National Airport, Washington 1, D. C.

Caribbean Atlantic Airlines, Inc.
Dinisio Trigo, President, P. O. Box 6035, Loiza Street Station, Santurce, Puerto Rico

Central Airlines, Inc.
William Lawson, Purchasing Agent, Meacham Field, Fort Worth, Texas

Colonial Airlines, Inc.
Edwin H. Haskins, Supervisor-Purchasing & Stores, New York Airport Station, New York, N. Y.

Continental Air Lines, Inc.
R. G. Schorling, Director of Purchasing & Property, Stapleton Airfield, Denver 7, Colorado

Cordova Airlines,
P. O. Box 1499, Anchorage, Alaska

Delta Airlines, Inc.
K. T. Wilson, Director of Procurement, Atlanta Airport, Atlanta, Georgia

Eastern Air Lines, Inc.
L. J. McLeod, General Purchasing Agent, Miami International Airport, Miami 48, Florida

Frontier Airlines, Inc.
B. E. Foster, Purchasing Agent, Stapleton Airfield, Denver 7, Colorado

Hawaiian Airlines, Ltd.
J. H. Walsh, Purchasing Agent, Inter-Island Building, Honolulu 1, T. H.

Lake Central Airlines, Inc.
C. L. Desterbecque, Purchasing Agent, Weir Cook Municipal Airport, Indianapolis, Indiana

Alaska Coastal Airlines
O. F. Benecke, Co-Manager, 2 Marine Way, Juneau, Alaska

Los Angeles Airways, Inc.
Box 10155, Airport Station, Los Angeles 45, California

Mohawk Airlines, Inc.
Glenn W. Irish, Purchasing Agent, Cornell University Airport, Ithaca, New York

National Airlines, Inc.
R. C. Robertson, Purchasing Agent, 3240 N. W. 27th Avenue, Miami 42, Florida

North Central Airlines, Inc.
Gordon E. Bullis, Dir. of Procurement, 6201 34th Avenue South, Minneapolis 23, Minnesota

Northeast Airlines, Inc.
W. J. Logue, Director of Purchasing & Stores, Logan International Airport, Boston 28, Massachusetts

Northern Consolidated Airlines, Inc.
Howard G. Fowler, Purchasing Agent, International Airport, Anchorage, Alaska

Northwest Airlines, Inc.
J. D. Vars, Purchasing Agent, Holman Field, St. Paul, Minnesota

Ozark Air Lines, Inc.
Rex Creighton, Purchasing Agent, Lambert Field, P. O. Box 6007, St. Louis, Missouri

Pacific Northern Airlines, Inc.
Walter R. Anderson, Purchasing Agent, 1626 Exchange Building, Seattle 4, Washington

Pan American-Grace Airways, Inc.
T. J. Kirkland, Vice President-Operations, Miami International Airport, Miami 48, Florida

Pan American World Airways, Inc.
H. M. Blackwell, Purchasing Director, 28-19 Bridge Plaza North, Long Island City 1, New York

Piedmont Airlines, Inc.
W. W. Barber, Purchasing Agent, Smith Reynolds Airport, Winston-Salem, North Carolina

Reeve Aleutian Airways, Inc.
Robert C. Reeve, President & Supt.-Operations, 420 D Street, Box 559, Anchorage, Alaska

Resort Airlines, Inc.
John P. Simpson, Secretary, 1346 Conn. Ave., N. W., Washington 6, D. C.

Riddle Airlines, Inc.
P. O. Box 535, Miami Int'l Airport, Miami 48, Florida

Southern Airways, Inc.
R. C. Suttles, Purchasing Agent, Atlanta Airport, Atlanta, Georgia

Southwest Airways Company
A. J. Sundell, Purchasing Agent, San Francisco Int'l Airport, San Francisco, California

Trans-Canada Air Lines
H. C. Cotterell, General Manager, Puchasing & Stores, 1080 University Street, Montreal, Quebec, Canada

Trans-Texas Airways, Inc.
W. C. Leatherwood, Purchasing Agent, Houston Int'l Airport, Houston 17, Texas

Trans World Airlines, Inc.
W. F. Griffith, Director of Domestic Purchasing, 10 Richards Road, Kansas City 6, Missouri

United Air Lines, Inc.
Richard A. Young, Purchasing & Stores, 5959 South Cicero Avenue, Chicago 38, Illinois

Western Air Lines, Inc.
K. W. Kendrick, Director of Purchasing, 6060 Avion Drive, Los Angeles 45, California

Wien Alaska Airlines, Inc.
Fritz Wien, Vice President-Operations, Box 649, Fairbanks, Alaska

Slick Airways, Inc.
Joe Amorelli, Director of Purchasing, 3000 North Clybourn Ave., Burbank, California

The Flying Tiger Line, Inc.
Larry Ignasiak, Lockheed Air Terminal, Burbank, California

CONSOLIDATED LISTING OF CAA APPROVED REPAIR STATIONS

(AS OF JULY 1, 1956)

This listing is divided into CAA regions, each region being further divided alphabetically by states. Requests for information relative to CAA approved repair stations should be directed to the Regional Administrator, CAA, at the address shown at the head of the regional listing.

Foreign repair stations are rated in the same general manner as domestic stations; however, all ratings, unlike domestic ratings, are subject to specific limitations imposed by the Administrator. For further information regarding such limitations, it is suggested that communications be directed to the Washington office of the Civil Aeronautics Administration, attention IR-1.

A limited rating indicates that the repair station specializes or chooses to be rated for some particular product or specialized technique. The privileges of such stations are the same as a class type station but only in respect to the product or service for which it is rated. Class type stations usually cover a broader field of activity than a station with a limited rating.

The detailed limitations of all certificated repair stations are stated on the Operations Specifications, Form ACA-390.1, pages 1 and 2, which is required to be prominently displayed on the premises of the station.

For further information regarding repair station requisites and privileges, refer to Civil Aeronautics Manual 52, Repair Station Certificates, which is on sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, 25, D.C., for $1.00 per copy.

Coding

- **A-1** Airframe, Class 1
- **A-2** Airframe Class 2
- **A-3** Airframe, Class 3
- **A-4** Airframe, Class 4
- **P-1** Powerplant, Class 1
- **P-2** Powerplant, Class 2
- **P-3** Powerplant, Class 3
- **PR-1** Propeller, Class 1
- **PR-2** Propeller, Class 2
- **R-1** Radio, Class 1
- **R-2** Radio, Class 2
- **R-3** Radio, Class 3
- **I-1** Instrument, Class 1
- **I-2** Instrument, Class 2
- **I-3** Instrument, Class 3
- **I-4** Instrument, Class 4
- **AC-1** Accessory, Class 1
- **AC-2** Accessory, Class 2
- **AC-3** Accessory, Class 3
- **L-A** Limited Airframe
- **L-P** Limited Powerplant
- **L-PR** Limited Propeller
- **L-I** Limited Instrument
- **L-R** Limited Radio
- **L-AC** Limited Accessory
- **L-LGC** Limited Landing Gear Component Overhaul and Repair
- **L-F** Limited Float Overhaul and Repair
- **L-M&P** Limited Magnetic and Penetrant Inspection
- **L-EE** Limited Emergency Equipment Overhaul and Repair
- **L-RB** Limited Rotor Blade Overhaul and Repair
- **L-AF** Limited Aircraft Repair Work
- **L-XR** Limited X-Ray Inspection
- **L-OS** Limited Oxygen System

Region 1

Federal Building, New York International Airport, Jamaica, Long Island, New York

Name and Ratings:

Connecticut

New England Propeller Service, Inc., Bradley Field, Windsor Locks, Connecticut. PR-2, L-PR, AC-1, 2

Putnam Technical School, 28 Providence Street, Putnam, Connecticut. L-A, L-P

Taloa Overhaul, Division of Flight Enterprises, Incorporated, Bradley Field, Windsor Locks, Connecticut. A-1, 2, 3, 4, I-1, 2, L-1, L-R

Usher Aviation Radio Division, Municipal Airport, Burr Street, New Haven, Connecticut. R-1, 2, 3

Delaware

Atlantic Aviation Service, Inc., P. O. Box 1709, Wilmington, Delaware. L-A, R-1, 2, L-AF

District of Columbia

Allegheny Airlines, Inc., Hangar #12, Washington National Airport, Washington, D. C. L-A, R-1, 2, I-1, 2, L-1, AC-1, 2

Butler Aviation, Hangar #9, Washington National Airport, Washington 1, D. C. L-A, R-1, 2

Capital Airlines, Inc., Washington National Airport, Washington 1, D. C. PR-2, I-1, 2, 3, 4

Kentucky

Aircraft Radio Laboratory, Bowman Field, Louisville, Kentucky. R-1, 2

Falls City Flying Service, Inc., Bowman Field, Louisville 5, Kentucky. P-1, PR-1, AC-1, 2, L-PR

Maine

None.

Maryland

Baltimore Aero Service, Hangar 2, Harbor Field, Baltimore 22, Maryland. L-A

Hinson Aero, Hangar 5, Harbor Field, Baltimore 22, Maryland. PR-2

Pan-Maryland Airways, Inc., Friendship International Airport, Baltimore, Maryland. L-A

Massachusetts

Boston University College of Industrial Technology, 395 Maverick Street, East Boston 28, Massachusetts. A-1, 3, P-1, PR-1, AC-1, 2, L-PR

W. J. Connell Company, Inc., Winged Instrument Division, 210 Needham Street, Newton, Upper Falls, Massachusetts. I-1, L-1

Arnold Green & Company, P. O. Box 425, Cambridge 39, Massachusetts. L-M&P, L-XR

Massachusetts Air Industries, Municipal Airport, New Bedford, Massachusetts. P-1

Revere Airways, Inc., 339 Squire Road, Revere, Massachusetts. A-1, 3, P-1

E. W. Wiggins Airways, Inc., Norwood, Massachusetts. A-1, 3, P-1

New Hampshire

Bowman Flying Service, Inc., Dillant-Hopkins Airport, Keene, New Hampshire. A-1, 3, L-P

New Jersey

Airwork Corporation, Millville Municipal Airport, Millville, New Jersey. P-1, 2, AC-1, 2

Atlantic Aviation Corp., P. O. Box 146, Hasbrouck Heights, New Jersey. L-A

Atlantic Aviation, Inc., P. O. Box 158, Hasbrouck Heights, New Jersey. A-3, L-A

The Babb Company, Inc., Route 1, Linden Airport, Linden, New Jersey. P-1, L-P, PR-1, 2, AC-1, 2, 3, L-M&P

CAA APPROVED REPAIR STATIONS

H. J. Burke Company, Inc., 49-57 Washington Avenue, Little Ferry, New Jersey. R-1, L-R, I-1, 2, L-I
Consolidated Instrument Co., Inc., Teterboro Air Terminal, Teterboro, New Jersey. I-1, 2, 3, AC-2
Continental Can Company, Inc., Air Transport Department, Box 791, Morristown, New Jersey. L-A
Curtiss-Wright Corp., Caldwell Wright Division, Passaic Avenue, Caldwell, New Jersey. P-2, L-A
Essex County Vocational & Technical High School, 209 Franklin Street, Bloomfield, New Jersey. L-P, L-AF
Kearfott Company, Inc., 1150 McBride Avenue, Little Falls, New Jersey. I-2, L-1
Magnaplate Testing Laboratories, Inc., 135 Orange Street, Bloomfield, New Jersey. L-M&P
Mattituck Airbase Corp., Linden Airport, Linden, New Jersey. A-3, L-A
Midway Aircraft Instrument Co., 185 Berger St., Wood-Ridge, New Jersey. I-1, 2, 3, 4
Newark Air Service, Inc., Hangar #7, Newark Airport, Newark, New Jersey. L-A
Radio Aircraft Company, Teterboro Air Terminal, Teterboro, New Jersey. R-1, L-R
Safair Flying Service, Inc., Teterboro Airport, Teterboro, New Jersey. L-P, L-AC
Smith-Meeker Engineering Company, Teterboro Airport, Teterboro, New Jersey. R-1, 2

New York

Academy of Aeronautics, LaGuardia Airport, Flushing 71, New York. L-A, L-P
Aero Trades, Inc., MacArthur Airport, Ronkonkoma, L. I., New York. A-1, 3, L-A
Air Instro, Inc., 152-17 Rockaway Blvd., Jamaica, New York. I-1, 2, 3, L-AC
Aircraft Instrument Development Service, Inc., 84-60 259th Street, Floral Park, L. I., New York. I-1, 2, 3, 4
Airmar Radio Service, Inc., New York International Airport, Jamaica 20, New York. R-1, 2, L-R
Airmar Radio Service, Inc., MacArthur Airport, Ronkonkoma, New York. R-1, 2
Airponents, Inc., 660 Rockaway Turnpike, Lawrence, L. I., New York. AC-1, 2
Butler Aviation-LaGuardia, Hangar 7, La Guardia Airport, Flushing 71, New York. A-1, 3, L-A, R-1, 2
Central Aviation & Marine Corp., MacArthur Airport, P. O. Box 300, Sayville, New York. AC-1, 2, L-AC, L-M&P, L-EE
Collens Instrument Company, 56 Cooper Square, New York 3, New York. L-EE
Durham Aircraft Service, Inc., 56-15 Northern Boulevard, Woodside 77, New York. I-1, 2, 3, 4, AC-1, 2, 3
Durham Aircraft Service, Inc., 199 East Second St., Mineola, L. I., New York. L-P, L-AC
General Electric Company, Flight Test Center, 130 Saratoga Road, Schenectady, New York. L-A
Instrument Associates, 351 Great Neck Road, Great Neck, New York. I-1, 2, 3, 4, L-AC
Instrument Service, 76-14 Woodside Ave., Elmhurst, New York. L-I
International Aviation Industries, Inc., Westchester County Airport, White Plains, New York. A-1, 3, L-A
Johns-Manville Corp., Westchester County Airport, White Plains, New York. L-A
Liberty Products Corp., Motor Avenue, Farmingdale, New York. L-F, L-AF, L-M&P
Linea Aeropostal Venezolana, New York International Airport, Hangar #2, Jamaica 20, New York. L-PR
Link Aeronautical Corp., Tri-Cities Airport, Endicott, New York. L-A
Lockheed Aircraft Service International, Inc., Hangar #7, New York International Airport, Jamaica 30, New York. A-1, 2, 3, 4, R-1, 2, L-R, I-1, 2, 3, L-I, AC-1, 2
Manhattan High School of Aviation Trades, 220 East 63rd Street, New York 21, New York. L-AF
Mars Aircraft Radio Service, Inc., New York International Airport, Hangar #1, Jamaica, New York. R-1, 2, L-R
Mattituck Airbase, Inc., Mattituck Airport, Mattituck, L. I., New York. L-A
Mohawk Airlines, Inc., Cornell University Airport, Ithaca, New York. R-1, 2, L-A
Pester's Propeller Service, Inc., 99 State Street, Westbury, L. I., New York. PR-1, 2, L-AC
Republic Aviation Corp., Farmingdale, L. I., New York. L-A
Simmonds Aerocessories, Inc., 105 White Plains Road, Tarrytown, New York. L-AC
S. M. S. Industries, Inc., New York International Airport, Jamaica 30, New York. AC-1, 2
S. M. S. Instrument Sales & Service, Inc., New York International Airport, Jamaica 30, New York. I-1, 2, 3, 4
Smith-Meeker Engineering Company, Hangar D, Westchester County Airport, White Plains, New York. R-1, 2
Standard Aircraft Equipment Co., Inc., P. O. Box 271, Mineola, L. I., New York. I-1, 2, 3, 4, AC-1, 2, 3, L-OS
Unipak Aviation Corporation, 24-68 47th Street, Astoria 3, L. I., New York. AC-1, 2, 3
E. A. Wildermuth, Inc., 1102 Atlantic Avenue, Brooklyn 38, New York. AC-2

Ohio

Aircraft Instrument Repair Station, c/o North American Aviation, Inc., 4300 East Fifth Avenue, Columbus 16, Ohio. I-1, 2, 3, 4
Aircraft Service, Inc., Cleveland Hopkins Airport, Cleveland 11, Ohio. R-1, L-R
Chamberlain Aviation, Inc., Hangar #1, Municipal Airport, Akron 6, Ohio. A-1, 3, L-A, P-1
Cleveland Aero Products, Inc., 13801 Triskett Road, Cleveland 11, Ohio. AC-1, L-AC
Clydesdale Aircraft Corp., 3850 East Fifth Avenue, Columbus, Ohio. L-AC, L-P, L-M&P
Dayton Aviation Radio & Equipment Corp., Cox Municipal Airport, Vandalia, Ohio. R-1, 2, L-R
General Air Motive Corp., Cleveland Hopkins Airport, Cleveland 11, Ohio. I-1, 2, 3, AC-1, 2
The Goodyear Tire & Rubber Co., Inc., Flight Operations, Akron Municipal Airport, Akron 6, Ohio. R-1, L-R
Instrument Laboratory Service, 10701 Briggs Road, Cleveland 11, Ohio. I-1, 2, 3
Nicholson Instrument Company, Hangar #1, Municipal Airport, Akron 6, Ohio. I-1, 2, 3
Ohio Aviation Company, P. O. Box 305, Dayton Municipal Airport, Vandalia, Ohio. A-1, 2, 3, L-A, P-1, L-P, R-1, 2
Tuscarawas County Aviation, Inc., Municipal Airport, New Philadelphia, Ohio. A-1, 3, P-1, L-AC
Youngstown Airways, Inc., Municipal Airport, Youngstown, Ohio. R-1, L-R

Pennsylvania

Decker Aviation Corp., 1361 Frankford Avenue, Philadelphia 25, Pennsylvania. I-1, 2, 3, 4
DeWeese Aircraft Instrument Service, North Philadelphia Airport, Philadelphia 36, Pennsylvania. I-1, 2, 3
F & S Instrument Repairing, 382 Oak Hill Drive, Middletown, Pennsylvania. I-1, L-I
Karnish Instrument Sales & Service, Box 271, Lock Haven, Pennsylvania. I-1, L-I, L-AC
Kutztown Aviation Service, Inc., Kutztown Airport, R. D. #3, Kutztown, Pennsylvania. L-AF
Reading Aviation Service, Inc., P. O. Box 1201, Reading, Pennsylvania. A-1, 3, L-A, PR-2, L-PR, R-1, 2, L-R, L-I, AC-2
Rodon, Inc., Instrument & Engineering Lab., P. O. Box 11, Neshaminy, Pennsylvania. I-1, 2, L-I
Scholter Aviation Company, Graham Field, R. D. #6, Butler, Pennsylvania. L-A, L-P
Sensenich Corporation, Box 1168, Lancaster, Pennsylvania. PR-1, 2
Frederick B. Vietig, d/b/a Columbia Aircraft Services, Bloomsburg Municipal Airport, Bloomsburg, Pennsylvania. A-1, L-A, P-1
Williamsport Technical Institute, Williamsport Airport, Montoursville, Pennsylvania. P-1, L-A

Rhode Island

New England Helicopter Service, Inc., State Airport, Hillsgrove, Rhode Island. L-A, L-PR

Virginia

Aircraft Radio Service, Box 116, Sandston, Virginia. R-1, L-R
Aviation Maintenance, Inc., 1101 Lee Highway, Arlington, Virginia. AC-1, L-LGC
Carter Aviation, P. O. Box 6097, Richmond, Virginia. A-1, 3, L-P
Virginia Propeller Service, P. O. Box 543, Alexandria, Virginia. L-PR

West Virginia

None.

Vermont

None.

Region 2

P. O. Box 1689, Fort Worth 1, Texas
Name and Ratings

Alabama

Gulf Coast Airmotive, Mobile Municipal Airport, Hangar No. 3, Spring Hill, Alabama. L-P, L-AC
The Glenn E. Messer Company, 524 South 56th Street, Birmingham, Alabama, I-1, 2, L-I

Arkansas

None.

Florida

Aaxico Service, Inc., Bldg. C-7, International Airport, Miami, Florida. AC-1, 2
Accessories Service Company, Inc., Building Number 2101, Miami International Airport, Miami, Florida. AC-1, 2
Aero Maintenance, Incorporated, Communications Department, Building 251, 20th St. Airport, Miami, Florida. L-R
Aerodex, Incorporated, Miami International Airport, Miami 48, Florida. AC-1, 2, L-P
Aerosmith, Incorporated, 4060 N. W. 29th Street, Miami, Florida. L-I
Air Accessories, Inc., 3610 N. W. 64th Avenue, Miami 48, Florida. AC-1, 2
Air Carrier Engine Service, Inc., Miami International Airport, Miami, Florida. P-2, AC-1, 2
Aircraft Instrument Corporation, 3976 N. W. 28th Street, Miami, Florida. I-1, 2, 3
Aircraft Oil-Cooler Service, 3240 N. W. 27th Avenue, Miami 42, Florida. L-AC
Aircraft Survival Equipment Corp., 3230 N. W. 38th Street, Miami, Florida. L-EE, L-OS
American Airmotive Corporation, Miami International Airport, Miami, Florida. P-2, L-P, PR-2, L-PR, AC-1, 2, L-AC, L-A, L-R, L-I
American Industrial Sales Corporation, 4101 N. W. 25 Street, Miami 42, Florida. AC-1, 2, L-AC
A. R. M. Service Corporation, 5363 N. W. 36th Street, Miami Springs, Florida. R-1, 2, L-R
Barfield Instrument Corporation, 4101 N. W. 29th Street, Miami, Florida. I-1, 2, 3, 4
Belk's Aircraft Fabric Repair Station, 901 East Main Street, Pahokee, Florida. L-AF
Eighth Air Depot, Inc., Sebring Air Terminal, Sebring, Florida. P-2, L-AC
Embry-Riddle Company, 3240 N. W. 27th Avenue, Miami, Florida. A-1, 3, L-P, L-AC
Florida International Engine Service, Inc., Building 403, Miami International Airport, Miami, Florida. L-P
General Hydraulics Company, 2440 N. W. 38th Court, Miami, Florida. L-AC
Hendrickson Aeromar, Incorporated, Building 116, Broward County International Airport, Ft. Lauderdale, Florida. L-R
Independent Air Service, Inc., Buildings 2003 and 2004, International Airport, Miami, Florida. L-M&P
Pan American Carburetor Service, Inc., Bldg. 704, 715, and 717, International Airport, Miami, Florida. L-AC
Pan Avion, Inc., Building T 143, Miami International Airport, Miami, Florida. L-EE, L-OS
Peninsular Armature Works, Inc., 3525 N. W. 51st Street, Miami, Florida. AC-2, L-AC
Propeller Service of Miami, Inc., Building 252, Miami International Airport, Miami, Florida. PR-1, L-PR, L-AC
Sentinel Magneto Service Corp., 3947 N. W. 26th Street, Miami, Florida. AC-2, L-AC
L. B. Smith Aircraft Corporation, International Airport, Miami 48, Florida. L-A, L-R, AC-1, 2, L-AC
Southern Air Transport, Inc., Radio Division, Bldg. #354—20th St. Airport, Miami, Florida. L-R

CAA APPROVED REPAIR STATIONS

Sunny South Aircraft Service, Inc., Broward County International Airport, Ft. Lauderdale, Florida. A-1, 3, P-1
Thompson Aircraft Tire Corporation, International Airport, Miami 48, Florida. AC-1
Wiley's Aircraft Service, Inc., Bldg. 430, International Airport, Miami, Florida. L-F

Georgia

Aero Corporation, Atlanta Airport, Atlanta, Georgia. A-3, L-A, PR-2, R-1, 2, L-AC
Airwork Corporation, 814 North Main Street, College Park, Georgia. L-AC
Barfield Instrument Corporation, Atlanta Shop, Municipal Airport, Atlanta, Georgia. I-1, 2, L-I
Southern Airways Company, Atlanta Municipal Airport, Atlanta, Georgia. A-3, L-PR, L-M&P
Southern Airways, Inc., Municipal Airport, Atlanta, Georgia. L-A, L-AC

Louisiana

Pan Air Corporation, New Orleans Airport, New Orleans, Louisiana. A-1, 2, 3, L-A
Southern Aviation Corporation, Downtown Municipal Airport, Shreveport, Louisiana. L-PR, L-AC

Mississippi

None.

North Carolina

Cannon Aircraft Sales & Service, Inc., Cannon Airport, Charlotte, North Carolina. A-1, 3, P-1
Charlotte Aircraft Corporation, Delta Air Base, Hangar #2, Charlotte, North Carolina. L-AC
Piedmont Aviation, Inc., Smith Reynolds Airport, Winston Salem, North Carolina. A-1, 3, L-A, P-1, L-P, R-1, 2, L-R, L-PR, AC-1, 2
Southern Flight Service, Inc., Municipal Airport, Charlotte, North Carolina. A-1, 3, L-A, PR-1, 2, P-1, AC-2, L-AC

Oklahoma

Aero Precision Industries, Inc., 4400 Newcastle Blvd., Oklahoma City 7, Oklahoma. I-1, 2, 3, AC-1, 2, L-LGC, L-M&P
Aerotron Radio Company, Municipal Airport, Tulsa, Oklahoma. R-1, 2, L-R, L-I
Aircraftsmen, Inc., Hangar #2, Will Rogers Field, Oklahoma City, Oklahoma. A-1, 3, P-1, L-P, L-PR, AC-1, 2, L-AC
CAA Aeronautical Center, Aircraft Standardization & Maintenance Division, Will Rogers Field, Oklahoma City, Oklahoma. I-1, 2, L-I, L-PR
H. & E. Aircraft, Inc., 4029 N. Barnes, Oklahoma City, Oklahoma. AC-1, 2, L-AF
Page Aircraft Industries, Cimarron Field, Yukon, Oklahoma. P-1, 2, AC-1, 2
Pan Instrument Lab., Brown Airport, Tulsa, Oklahoma. I-1, 2, L-I
Frank Say Airmotive Company, Inc., 906 U. S. 66 Drive, Clinton, Oklahoma. I-1, 2, 3, AC-1, 2
Spartan Aircraft Company, Aviation Service Division, Municipal Airport, Tulsa, Oklahoma. A-1, 2, 3, L-A, P-1, 2, PR-1, 2, R-1, 2, I-1, 2, 3, AC-1, 2, 3
Standard Products Inc., 2208 N. Sheridan, Tulsa, Oklahoma. I-1, 2, L-I
Stanolind Oil and Gas Company, Tulsa Municipal Airport, Hangar #11, Tulsa, Oklahoma. R-1, 2, L-R
Tulsair Distributors, Inc., Hangar 8, Municipal Airport, Tulsa, Oklahoma. R-1, 2, PR-2, L-I

South Carolina

Hawthorne Flying Service, Charleston Municipal Airport, Charleston, South Carolina. L-P, L-PR, L-AC, L-AF

Tennessee

Dixie Air Associates, Inc., Memphis Municipal Airport, Hangar #3, Memphis, Tennessee. L-AC

Texas

Aero Accessory Company, Houston Municipal Airport, Houston, Texas. AC-1, 2, 3, L-AC
Aero Instrument Supply, Incorporated, 8512 Denton Drive, Dallas 19, Texas. I-1, 2, L-I
Aero Prop Shop, 3762 Pleasanton Road, San Antonio, Texas. PR-1, L-PR
Aircraft Carburetor Repair, RR #2, Box 244, Jupiter Road, Garland, Texas. L-AC
Aircraft Instrument Service, Guddihy Field, Corpus Christi, Texas. I-1, 2, L-I
Aircraft Sales Company, Meacham Field, Fort Worth, Texas. A-1, 3, P-1, L-PR, L-AC
Airline Instrument Repair, Inc., Meacham Field, Fort Worth, Texas. I-1, L-I
Airnews, Inc., International Airport, San Antonio, Texas. A-1, 3, L-A, PR-1, 2, R-1, 2, AC-1, 2, L-AC
Alamo Aviation, Incorporated, International Airport, San Antonio, Texas. A-1, 3, P-1, L-AC
Allied Instument Laboratories, Municipal Airport, Houston, Texas. I-1, 2, L-I
Associated Airmotive, Inc., Hangars #1 and #2, International Airport, San Antonio, Texas. A-3, L-A, R-1, 2, AC-1, 2
Associated Radio Service Company, Love Field, Dallas, Texas. R-1, 2, L-R
CAMAIR Division—Cameron Iron Works, Inc., Municipal Airport, Galveston, Texas. I-1, 2, L-I
Carruth Laboratories, 2726 Lombardy Lane, Dallas, Texas. I-1, 2, 3, L-I
Continental Radio Company, Inc., National Guard Hangar, Municipal Airport, Houston, Texas. R-1, 2
Coopers Accessory and Propeller Repair, 8324 Denton Drive, Dallas, Texas. L-PR, L-AC
Dallas Aero Service, 3300 Love Field Drive, Dallas, Texas. A-1, 2, 3, 4, P-1, L-P, PR-2, R-1, 2, AC-1, 2, I-1, 2, L-I
Dallas Airmotive, Incorporated, 6114 Forest Park Road, Dallas, Texas. P-1, 2, AC-2, L-AC
Executive Aircraft Service, Garland Airport, P. O. Box 7307, Dallas 9, Texas. A-1, 3, L-A
Ford's Carburetor Sales & Service, Love Field, Dallas, Texas. L-AC
Gano Propeller Company, 2754 South Riverside Drive, Fort Worth, Texas. L-PR
General Electric Company, Dallas Aircraft Service Shop, 1135 South Lamar Street, Dallas, Texas. L-I
Vernon G. Gillette Company, Meacham Field, Fort Worth, Texas. I-1, 2, 3
Hou-Port Aviation, Inc., LaPorte Municipal Airport, LaPorte, Texas. A-1, 3
Howard Aero, Incorporated, International Airport, San Antonio, Texas. A-1, 3, L-A, PR-2, L-PR, I-1, 2, L-I AC-1, L-AC
J. B. Instrument Company, 106 Neuhaus Street, Houston 17, Texas. I-1, 2, L-I
Intercontinental Manufacturing Company, Incorporated, Curtis Field, Brady, Texas. A-1, 3
Masco Instrument Company, Love Field, Dallas, Texas. I-1, 2, 3, AC-2
McAfee's Aircraft Instrument Shop, Love Field, Dallas, Texas. I-1, 2, L-I
National Aircraft Sales, Inc., 9215-A Weiss Street, Love Field, Dallas, Texas. AC-1, 2, L-P
Pan American World Airways, Inc., Rio Grande Valley International Airport, Brownsville, Texas. A-3, 4, P-2, PR-2, L-PR, R-1, L-R, I-1, 2, L-I, AC-1, 2
Precision Aeromotive Corporation, Municipal Airport, Houston, Texas. P-1, 2, PR-1, 2, AC-1, 2
Ritchey Flying Service, Inc., Meacham Field, Fort Worth, Texas. A-1, 3, P-1, L-P, L-AC
Slick Airways, Inc., San Antonio International Airport, San Antonio, Texas. L-P, L-AC
Southwest Airmotive Company, Love Field, Dallas, Texas. A-1, 2, 3, L-A, P-1, 2, PR-1, 2, I-1, 2, L-I, AC-1, 2, L-AC
Temco Aircraft Corporation, Majors Field, Greenville, Texas. A-1, 2, 3, 4, L-PR, R-1, I-1, 2, L-I, AC-1, 2
L. L. Walker Company, 609 South 80th Street, Houston, Texas. PR-1, 2, L-AC

Region 3

9th Floor, 911 Walnut Street, Kansas City 6, Missouri
Name and Ratings

Illinois

Aircraft Propeller Sales & Service, Sky Harbor Airport, Northbrook, Illinois. PR-1, 2, L-PR
Anderson Propeller Company, Butler Hangar, Midway Airport, 4848 West 63rd Street, Chicago 38, Illinois. PR-1, 2, L-PR, L-AC
Automotive Utilities, Inc., 2226 North Racine Avenue, Chicago 14, Illinois. L-AC
Bohling Aircraft Corporation, 5324 West 63rd Street, Chicago 38, Illinois. I-1, 2, 3, AC-1, 2, R-1, L-R
Butler Aviation, 4848 West 63rd Street, Chicago 38, Illinois. R-1, 2, L-A
Capitol Aviation, Inc., Capitol Airport, Springfield, Illinois. A-1, 3, L-A, P-1, R-1, 2
Helicopter Air Service, Inc., 5036 West 63rd Street, Chicago 38, Illinois. L-A, L-AC
Lutz Aircraft Instrument Shop, 9602 Franklin Avenue, Franklin Park, Illinois. I-1, 3
Mobile Communications, 5634 West 63rd Street, Chicago 38, Illinois. R-1, L-R
Parks College of Aeronautical Technology of St. Louis University, Parks Airport, East St. Louis, Illinois. A-1, 3, P-1, PR-1, I-1, 2, 3
Schneck Engine Service and Supply, 190th and Burnham Avenue, Lansing, Illinois. P-1, L-P, AC-1, 2
Skymotive, Incorporated, P. O. Box 448, Park Ridge, Illinois. A-1, 3, L-A, R-1, 2
University of Illinois, Institute of Aviation, 318 Civil Engineering Hall, Urbana, Illinois. A-1, 3, P-1, PR-1, 2, I-1, 2, AC-1, 2, L-A, L-P, L-PR L-R
Walston Aviation, P. O. Box 271, Civic Memorial Airport, East Alton, Illinois. A-1, 3, P-1, PR-1, 2, R-1, L-R, L-AC

Indiana

Central States Aeronautical Service, Inc., Bob Shank Airport, Indianapolis 44, Indiana. L-PR
Muncie Aviation Corporation, Muncie Airport, Muncie, Indiana. A-3
Purdue Aeronautics Corporation, Purdue University Airport, West Lafayette, Indiana. PR-1, 2, L-PR, R-1, L-R, L-A, L-P, L-AC
Roscoe Turner Aeronautical Corporation, Weir Cook Municipal Airport, Indianapolis 44, Indiana. A-3, P-1, L-P, R-1, 2, L-R

Iowa

None.

Kansas

Aero Instruments, Inc., 1018 East English Street, Wichita 7, Kansas. I-1, 2, 3
Aviation Electronics Incorporated, 1026 North Mosley, Wichita, Kansas. R-1, 2
Beech Aircraft Corporation, 9709 East Central, Wichita 1, Kansas. I-1, 2, 3, L-I
Garwin, Inc., 918 Dooley, Wichita, Kansas. I-1, 2, 3, AC-1, 2
Mahons Boot Hill Flying Service, P. O. Box 249, Dodge City, Kansas. L-A, L-P, L-AC
S & A Corporation, 110 West 5th Street, Pittsburgh, Kansas. R-1
Standard Products, Inc., P. O. Box 695, Wichita, Kansas. I-1, 2, 3, AC-1, 2
Standard Products, Inc., 3041 Fairfax Road, Kansas City, Kansas. I-1, 2
Yingling Aircraft, Inc., Rural Route 8, New Municipal Airport, Wichita, Kansas. L-PR

Michigan

Anderson Aircraft Radio Company, Detroit City Airport, Detroit 13, Michigan. R-1, 2, L-R
Beacon Instrument Service, Inc., Bay #9, Detroit City Airport, Detroit 13, Michigan. I-1, 2, 3
Flotterp Manufacturing Company, Kent County Airport, Grand Rapids 8, Michigan. L-PR
General Motors Air Transport Section, Bay #1, Detroit City Airport, Detroit 13, Michigan. R-1, 2, L-A
Great Lakes Airmotive, Inc., Ypsilanti, Michigan. L-A Michigan. L-PR, L-AC
H & S Prop Shop, 25210 Ryan Road, Centerline, Michigan. L-PR, L-AC
Magnaflux Corporation, 2777 East Grand Boulevard, Detroit 11, Michigan. L-M&P
Servair, Incorporated, Instrument Division, Detroit City Airport, Bay 13, Detroit 13, Michigan. I-1, 2, 3
Superior Instrument Service, 1525 Airport Road, Pontiac, Michigan. I-1, 2, 3

Minnesota

Gopher Aviation, Incorporated, Lobb Field, Rochester, Minnesota. A-3, R-1, 2, I-1, 2, 3, L-A, L-P, L-PR, L-AC
Maxwell Aircraft Service, Crystal Airport, Robbinsdale 22, Minnesota. PR-1, 2, L-PR
Minnesota Airmotive, Inc., Wold Chamberlain Field, Minneapolis 23, Minnesota. A-3, L-A, R-1, 2, L-R, I-1, L-I

Northwestern Aeronautical Company, Holman Field, St. Paul 1, Minnesota. R-1, 2, AC-1, 2, L-A, L-P, L-I

Van's Air Service, Inc., P. O. Box 31, Winona, Minnesota. L-A, L-P, L-PR, L-R

Wey Accessory Service, 11020 France Avenue, South, Minneapolis 20, Minnesota. L-AC

Williams Instrument Service, 8001 Hickory Lane, Minneapolis 20, Minn. I-1, 2, L-I

Missouri

Engine Works, Incorporated, P. O. Box 8, Lambert Field, St. Louis 21, Missouri. P-1, L-P, L-AC

Executive Aircraft Company, 334 Richards Road, Municipal Airport, Kansas City, Missouri. A-1, 3, L-AC

Interstate Airmotive, Inc., Lambert Field, St. Louis 21 Missouri. A-1, 2, 3

Kansas City Flying Service & Air College, Inc., 600 Richards Road, Kansas City 6, Missouri. A-1, 3, 4, AC-1, 2, L-AC, P-1, 2, PR-1

Remmert-Werner, Inc., Lambert Field, St. Louis 21, Missouri. A-1, 3, R-1, 2, L-A, I-1, 2, 3, 4, L-PR, L-AC

Nebraska

None.

North Dakota

None.

South Dakota

None.

Wisconsin

Anderson Air Activities, 1011 East Layton Avenue, Milwaukee 7, Wisconsin. A-1, 3, P-1, R-1, 2, L-PR, L-AC

Aviation Radio Company, 9305 W. Appleton Ave., Milwaukee 16, Wisconsin. R-1, 2, L-R

Gran-Aire, Incorporated, 9305 W. Appleton Avenue, Milwaukee 16, Wisconsin. A-1, 3, P-1, I-1, 2, L-1

Region 4

5651 West Manchester Avenue, Los Angeles 45, California
Name and Ratings

Arizona

Aero Electronics, Inc., 2402 Airline Way, Phoenix, Arizona. R-1, L-R

Anderson Aviation Company, Inc., P. O. Box 5175, Phoenix, Arizona. P-1

The Babb Company, Inc., 3131 East Buchanan, Phoenix, Arizona. I-1, 2, L-I

Jordon-Ottosen Propeller Service, 2536 East Harrison St., Phoenix, Arizona. PR-1, 2

California

Acme Aircraft Instrument Company, Lindbergh Field, Zone 1, San Diego 12, Calif. L-I

Aero Engines, Inc., 3030 Coolidge Avenue, Los Angeles 39, California. P-1, L-P, AC-1, 2

Aero Sales & Service, Inc., Chandler Field, Fresno, Calif. L-A

Aero Technical Services, 5444 West Imperial Highway, Los Angeles 45, Calif. AC-1, 2

Aeronautical Electronics Service Co., 3323 Pico Boulevard, Santa Monica, Calif. R-1, L-R

A. I. R. Corporation, Oakland Municipal Airport, Oakland, California. I-1, 2, 3, 4, L-EE

Aircraft Associates, 2611 East Spring St., Long Beach 6, California. P-1, L-P

Aircraft Carburetor Company, 2801 Empire Avenue, Burbank, California. L-AC

Aircraft Engineering and Maintenance Company, Oakland Municipal Airport, Oakland, California. A-1, 2, 3, 4, PR-1, 2, I-1, 2, 4, L-I, AC-1, 2, 3

Airepair, Inc., 8066 Lankershim Boulevard, North Hollywood, California. L-AC, L-I

Airesearch Aviation Service Company, Division of Garrett Corporation, 6201 West Imperial Highway, Los Angeles 45, California. A-1, 2, 3, 4, R-1, 2

Airmotive Carburetor Company, 1711 South Victory Boulevard, Glendale, California. L-AC

Air-Oasis Company, 2601 East Spring Street, Long Beach 6, California. A-3, P-1, L-R

Airotary Supply Company, 10615 Burbank Blvd., North Hollywood, California. L-AC

Airpower Overhaul, Inc., 676 Hegenberger Road, Oakland, California. P-1, 2, PR-2

The Allen-Scott Company, Inc., 5736 Camille Avenue, Culver City, California. I-1, 2, 3, L-I

Atwood Aviation, Inc., 236 Geil Street, Salinas, California. P-1, L-P

Aviation Power Supply, Inc., 3111 Kenwood Street, Burbank, California. P-2

Avion Instrument & Repair Corporation, 8501 Steller Drive, Culver City, California. I-1, 2

B-G Detection Service, 1024 West Burbank Boulevard, P. O. Box 65, Burbank, California. L-M&P, L-XR

Erle L. Bacon Corporation, 2550 Airport Avenue, Santa Monica Municipal Airport, Santa Monica, California. AC-1, 2

Bates Aviation, Inc., 490 North Prairie Avenue, Hawthorne, California. P-1

Bayaire Avionics, Inc., Box 1, Oakland Airport, Oakland, California. R-1, 2, L-R

Fred A. Becker, Palo Alto Municipal Airport, P. O. Box 702, Palo Alto, California. R-1

A. Biederman, Inc., 1045 Air Way, Glendale 1, California. I-1, 2, 3, 4, L-EE

Bridgeford Flying Service, 1493 Lindbergh St., Stockton, California. L-AC

C-A Aero Oil Cooler Service, 4551 Century Boulevard, Inglewood, California. AC-1

California Eastern Aviation, Inc., (Airways Division) Hangar 27, Oakland Municipal Airport, Oakland, California. A-1, 2, 3, 4, AC-1, 2, 3, R-1, 2, L-R

California Eastern Instrument Service, Hangar 27, Oakland Municipal Airport, Oakland, California. I-1, 2, L-I

California Fritzen Propeller Company, 5075 West Imperial Highway, Inglewood 2, California. PR-1, 2, L-PR

California State Polytechnic College, Box 321, San Luis Obispo, California. A-1, 2, 3, 4, P-1, PR-1, 2, L-P

Captive-Air, Inc., 515 North Victory Boulevard, Burbank, California. AC-1, 2

Central Air Repair, 3333 Burton Avenue, Burbank, California. AC-1, 2

Clover Field Radio Supply Company, 3200 Airport Avenue, Santa Monica, California. R-1, 2

Consolidated Vultee Aircraft Corp., 3202 Pacific Highway, San Diego, California, I-1, 2, 3, 4 AC-2

Custom Aircraft Finishing, 2961 Junipero Avenue, Long Beach 6, California. L-AF

Dascomp Aircraft Sales Co., P. O. Box 67, Oakland Airport Station, Oakland, California. AC-1, 2

Duschak's Helicopter Rotor Service, 22597 South Western Avenue, Torrance, California. L-RB, L-PR

Engineering Modification Company, 6850 Vineland Avenue, North Hollywood, California. AC-1, 2, L-I

E. F. Felt & Company, Bldg. 604, Oakland Airport, Oakland, California. AC-1, 2, 3, L-M&P

The Flying Tiger Line, Inc., Lockheed Air Terminal, Burbank, California. A-1, 2, 3, 4, I-1, 2, L-I, AC-1, 2, 3

Friedkin Aviation Engines, P. O. Box 772, San Diego, California. P-1, 2, L-AC

Garrish Brothers Aircraft Engine Service, P. O. Box 328, Huntington Beach, California. P-1, L-P

Grand Central Aircraft Company, 1310 Airway Drive, Glendale 1, California. A-1, 2, 3, 4, P-1, 2, PR-2, L-PR

Great Lakes Airlines Maintenance Corp., Hangar #3, Lockheed Air Terminal, Burbank, California. A-3, 4

H. N. H. Instrument Company, 1901 Embarkadero, Palo Alto, California. I-1, 2, L-I

Hagelin Aircraft Motors Company, 933 Airway Drive, Glendale 1, California. P-1

Hensley Radio Electronics, 490 North Prairie Avenue, Hawthorne Municipal Airport, Hawthorne, California. R-1, L-R

Robert D. Hodge, Aircraft, 704-706 South Victory Boulevard, Burbank, California. L-LGC

Hughes Aircraft Company, Florence & Teal Streets, Culver City, California. I-1, 2, A-3, 4, L-1, R-1, L-R

Hunt Aviation Company, d/b/a Air Oasis Company, Chandler Field, Fresno, California. L-A

Ideal-Aerosmith, Inc., 12909 South Cerise Avenue, Hawthorne, California. I-1, 2, 3, 4, AC-1, 2, 3

INESCO, 7339 Varna Avenue, North Hollywood, California. I-1, 2, L-I

International Aircraft Maintenance Co., Hangar 3, Lockheed Air Terminal, Burbank, California. L-A, L-R

Interstate Engineering Corporation, 2250 East Imperial Highway, El Segundo, California. AC-1, 2, 3

Bill Johnson Aircraft Instrument Service, 2945 North Hollywood Way, Burbank, California. I-1, 2, 3, 4

Richard E. Kettler Aircraft, Propeller Service, Santa Monica Municipal Airport, Santa Monica, California. PR-1, 2, L-AC

Lear, Incorporated, Aircraft Engineering Division, Lear Hangar, Santa Monica Airport, Santa Monica, California. A-1, 3, 4, R-1, 2

Lockheed Aircraft Service, Inc., Ontario International Airport, Ontario, California. A-1, 2, 3, 4, R-1, 2, I-1, 2, 3, 4, AC-1, 2

Long Beach Aeromotive, 2735 East Spring Street, Long Beach 8, California. A-1, 3, L-A, P-1, L-P

Lush Aircraft Radio, 312 E. Imperial Highway, El Segundo, California. R-1, L-R

Magnaflux Corporation, 5148 Alcoa Avenue, Los Angeles 58, California. L-M&P

Mainten-Aire Corporation, 11841 Sherman Way, North Hollywood, California. L-AC

Marlor Aviation, Inc. d/b/a, Santa Monica Aviation, Municipal Airport, Santa Monica, California. L-I, L-R

Martin School of Aviation, P. O. Box 986, Santa Ana, California. A-1, 3, P-1

Metropolitan Instrument Company, Inc., 16022 Arminta Street, Van Nuys, California. I-1, 2, L-I, L-AC

National Aircraft Corp., Aircraft & Manufacturing Division, 7801 Woodley Avenue, Van Nuys, California. A-3, L-A

Northrop Aircraft, Inc., Northrop Field, 1001 East Broadway, Hawthorne, California. A-1, 2, 3, 4

Nystrom Aviation, Inc., 1901 Embarcadero Road, Palo Alto, California. A-1, 3, P-1, L-P, PR-1, 2, L-PR, AC-1, L-AC

Oakland Aircraft Engine Service, Inc., Hangar 2-D, Municipal Airport, Oakland, California. P-1, 2

H. J. Olney Company, Hangar 28, Oakland Municipal Airport, Oakland, California. AC-1, 2, L-AC

Orr's Inspection Service, 1901 Embarcadero Road, Palo Alto, California. L-M&P

Otto's Instrument Service, Ontario International Airport, Ontario, California. I-1, 2, 3, L-R

Pacific Airmotive Corporation, 2940 North Hollywood Way, Burbank, California. A-1, 2, 3, 4, P-1, 2, PR-1, 2

Pacific Airmotive Corporation, P. O. Box 577, Chino, California. A-1, 2, 3, 4, R-1, L-R, AC-1, 2

Pacific Airmotive Corporation, P. O. Box 38, Oakland Airport, Oakland, California. I-1, 2, L-I

Pacific Helicopters, Oakland International Airport, Oakland, California. L-A

Pacific Scientific Company, 1430 Grande Vista Avenue, Los Angeles 23, California. I-1, 2, 3, 4

Pesco Pacific Service Center, Box 205, North Hollywood, California. L-AC

Planeservice, Inc., 7240 Hayvenhurst Avenue, Van Nuys, California. A-3

Potter Aircraft Service, Inc., 2627 No. Hollywood Way, Burbank, California. A-3, 4

Qualitron, Inc., 2945 Hollywood Way, Lockheed Air Terminal, Gate 119, Burbank, California. R-1, 2, L-R

R. W. S. Electrical Accessory Service, 3210 San Fernando Boulevard, Burbank, California. AC-1, 2, 3

Radio Electronic Service Company, Bldg. 645, Municipal Airport, Oakland, California. R-1, L-R

Ryan Instrument Shop, Ryan Aeronautical Company, Lindbergh Field, San Diego, California. I-1, 2, 3

Sacramento Sky Ranch, Inc., Route 1, Box 3305, Sacramento, California. A-1, 3, P-1, L-AC, L-M&P

San Jose Avionics Company, Municipal Airport, San Jose, California. R-1, 2

San Jose Instrument Service, Municipal Airport, Hangar T-4, San Jose, California. I-1, 2, L-I,

Santa Barbara Flying Service, Inc., P. O. Box 296, Goleta, California. A-1, 3, P-1, L-A, L-P

Scientific Enterprise, 3603 Palomares Road, Hayward, California. I-1, 2, L-I

ServicAir Company, 1841 Flower Street, Glendale 1, California. PR-2, L-PR, L-AC

Social Machine Products Manufacturing Co., Inc., 11674 McBean Street, El Monte, California, I-1, L-I

South Bay Welders Supply, 150 Main Street, El Segundo, California. L-OS

Southern California Aircraft Corp., P. O. Box 433, Ontario, California. A-1 2, 3, 4, AC-1, 2, I-1, 2, R-1, 2, L-R, L-I

Southwest Helicopters, Inc., 7614 Hayvenhurst Avenue, Van Nuys, California. L-A

Steward-Davis, Inc., 13501 South Western Avenue, Gardena, California. P-1, 2, L-AC

Superior Aircraft Electronics, Hangar #3, Lockheed Air Terminal, Burbank, California. R-1, L-R

Thompson Aircraft Tire Corporation, 18th and Minnesota Streets, San Francisco 7, California. AC-1, L-AC

Transient Aircraft Maintenance Service, Inc., P. O. Box 32, Oakland Airport, Oakland, California. A-1, 3

Twentieth Century Aircraft, Inc., Lockheed Air Terminal, Burbank, California. A-1, 3, 4, R-1, 2, P-1, 2, L-R L-I

U. S. Propellers Inc., 3270 East Foothill Boulevard, Pasadena 8, California. L-PR

United Air Lines, Inc., P. O. Box 3000, South San Francisco, California. A-1, 2, 3, 4, P-1, 2, PR-1, 2, R-1, 2, 3, I-1, 2, 3, 4

Valley Air Industries, Inc., 822 Arroyo Avenue, San Fernando, California. P-1, L-P

Valley Hydraulic Company, 7127 Vineland Avenue, North Hollywood, California. L-AC, L-LGC

West Coast Propeller Company, 1101 Chestnut Street, Burbank, California. PR-1, 2

Western Propeller Repair, 12953 Sherman Way, North Hollywood, California. L-PR

Zep Aero, 113 Sheldon Street, El Segundo, California. L-EE, L-OS

Colorado

Aircraft Mechanics, Inc., 3200 North Nevada, Colorado Springs, Colorado. L-M&P

Aircraft Radio & Accessory Company, Hangar 4, Stapleton Airfield, Denver 7, Colorado. R-1, 2, L-R, L-I.

BeMM Aircraft Instrument Service, Stapleton Airfield, Denver 7, Colorado. L-I

Continental Air Lines, Stapleton Airfield, Denver 7, Colorado. I-1, 2, L-I, L-PR

Denver Airplane Supply, Division of Clinton Aviation Company, Stapleton Airfield, Denver, Colorado. L-I, L-R

Universal Aircraft Industries Inc., Sky Ranch Airport, P. O. Box 5306, Terminal Annex, Denver 17, Colorado. A-1, 3, P-1, L-P, PR-1, 2, L-PR, R-1, L-R, AC-1, 2, L-I

Idaho

Aircraft Service Company, P. O. Box 829, Boise, Idaho. A-1, 3, P-1, R-1, AC-1, 2

Egelston Radio & TV Service, 115 South 11th Street, Boise, Idaho. L-R

Montana

Johnson Flying Service, Inc., Box 1382, Missoula, Montana. A-1, 3, P-1, L-A, L-P

Sky Repair, P. O. Box 218, Glendive, Montana. A-1, 3, L-P, L-AC

Nevada

None

New Mexico

None

Oregon

Flightcraft, Inc., 6200 N. E. Marine Drive, Portland, Oregon. L-PR, L-A, L-P

General Airways, Inc., 10000 N. E. 47th Avenue, Portland 13, Oregon. R-1, L-R

Karpurk Electronics Service, 6000 N. E. Marine Drive, Portland 13, Oregon. R-1, L-R

Klamath Aircraft Service, 6000 Summers Lane, Klamath Falls, Oregon. P-1, L-P

Oregon Air Motive, 6200 N. E. Marine Drive, Portland 13, Oregon. I-1, 2, 3

Skyways, Inc., Portland-Troutdale Airport, Troutdale, Oregon. A-1, 3, P-1, PR-1, R-1, L-PR, L-AC

Utah

Thompson Flying Service of Salt Lake, Salt Lake Airport No. 1, Salt Lake City 16, Utah. A-1, 3, P-1, PR-1, R-1, I-1, AC-1, 2

Washington

Aircraft Carburetor Service; Inc., Box 49, Boeing Field, Seattle 8, Washington. L-AC

Airline Services, Inc., Box 13, Boeing Field, Seattle 8, Washington. R-1, L-R

Alaska Airlines, Inc., P. O. Box 1014, Paine Field, Everett, Washington. A-1, 2, 3, P-1, AC-1, 2, L-A, L-P, L-PR

Don R. Carmichael, E. 14613 Longfellow, Trentwood Branch, Spokane, Washington. R-1

Glover Radio and TV Service, 8 North 4th Avenue, Yakima, Washington. R-1

Northwest Propeller, Inc., Boeing Field, Box 28, Seattle 8, Washington. PR-1, L-PR, L-AC

Pacific Airmotive Corporation, Seattle Branch, Box 10, Boeing Field, Seattle, Washington. AC-1, L-AC

Pacific Propeller Company, P. O. Box 6133, River Heights Branch, Seattle 88, Washington. PR-1, L-PR, L-AC

Sutherlands, Inc., Box 25, Boeing Field, Seattle 8, Washington. I-1, 2, AC-1, 2, L-I

Transocean Air Lines, Northwest Division, P. O. Box 29, Boeing Field, Seattle, Washington. A-1, 2, 3, 4, AC-1, 2, L-AC

Wallace Airmotive, P. O. Box 2203, Spokane, Washington. P-1, 2, PR-1, 2, AC-1, 2, L-PR

Wesco Air Service, Division of Westcoast Aircraft, Sales and Service, Inc., Box 41, Boeing Field, Seattle 8, Washington. P-1, AC-1, 2, L-P

Western Airways, Box 5044, Calkins Field, Station C, Spokane, Washington. A-1, 3, P-1

Art Whitaker, Pearson Airpark, Vancouver, Washington. PR-1, L-PR, A-1, 3, P-1, R-1, L-AC

Wyoming

Natrona Aircraft Service, P. O. Box 193, Casper, Wyoming. L-A

Region 5

P. O. Box 440, Wilhoith Bldg., 6th & C Street, Anchorage, Alaska
Name and Ratings

Anchorage

Alaska Airlines Instrument Repair Shop, International Airport, Anchorage, Alaska. I-1, 2, 3, 4

Alaskan Aircraft Equipment Supply Company, P. O. Box 557, Anchorage, Alaska. I-1, 2, 3, 4, AC-1, 2, 3

Anchorage Propeller Service, Merrill Field, Anchorage, Alaska. PR-1, 2

Northern Consolidated Airlines, Inc., International Airport, Anchorage, Alaska. R-1, 2

Reeve Alaska Airmotive, 2424 East 5th Avenue, Merrill Field, Anchorage, Alaska. P-1, 2, AC-1, 2

Fairbanks

Wien Alaska Airlines, Inc., International Airport, Fairbanks, Alaska. I-1, 2, 3

Juneau

Alaska Coastal Airlines, Inc., 2 Marine Way, Juneau, Alaska. A-1, 3, PR-1, 2, R-1, 2, 3, I-1, 2, 3, AC-1, 2, L-P

International

Building T-4, Room 2317, IR-1, 17th and Constitution Ave., N.W., Washington 25, D. C.

Name and Ratings

Air France, Centre de Revision de Courbevoie (CRC) 112, Boulevard de Verdun, Courbevoie, France. P-2, AC-1

Air France—Centre D'Orly, Boite Postale 124, Orly-Seine, France. A-4, PR-2, I-1, 2, 3, AC-1, 2, 3

Airway Radio Electric, Radio Division, Aerovias Sud Americana, Inc., Pinellas County Airport, St. Petersburg, Florida. L-R

Asiatic Aeronautical Company, Ltd., Tainan Airfield, Tainan, Taiwan, and Kachsiung Harbor, Kachsiung, Taiwan. A-4, PR-2, R-1, 2, 3, I-1, 2, 3, 4, AC-1, 2, 3

Bedek Aircraft Limited, LOD Airport, Israel. A-1, 3, 4, P-1, 2, PR-1, 2, R-1, 2, I-1, 2, 3, 4, AC-1, 2, 3

Bristol Aviation Services Pty. Limited, P. O. Box 4, Bankstown, Sydney, N.S.W., Australia. P-2, AC-1, 2

British Overseas Airways Corporation, Treforest Industrial Estate, Pontypridd, Glamorgan, South Wales, U. K. P-2, AC-1, 2, 3

Compania Cubana de Aviacion, S. A., Aeropuerto "Jose Marti," Rancho Boyeros, Havana, Cuba. A-4, P-2, PR-2, I-1, 2, 3, AC-1, 2

Compania Mexicana de Aviacion, S. A., Balderas No. 36, Mexico City, Mexico. A-4, P-2, PR-2, I-1, 2, 3, 4, R-1, 2, AC-1, 2, 3

S. A. Empresa de Viacao Aerea Rio Grandense (VARIG), Avenida Borges de Medeiros, 410-16° and Porto Alegre, Rio Grande do Sul, Brazil. A-4, P-2, PR-2, I-1, 2, 3, R-1, 2, AC-1

Hindustan Aircraft Limited, Dumlar Road, Bangalore, India. A-3, 4, P-2, PR-2, R-1, 2, I-1, 2, 3, 4, AC-1, 2, 3

Japan Aircraft Maintenance Company, Limited, c/o Tokyo International Airport, Edomi-cho, Haneda, Ohta-Ku, Tokyo. A-4, P-2, PR-2, R-1, 2, 3, I-1, 2, 3, 4, AC-1, 2, 3

KLM Royal Dutch Airlines, Directorate Production, Schiphol Airport, Amsterdam, Netherlands. A-4, P-2, PR-2, R-1, 2, 3, I-1, 2, 3, 4, AC-1, 2, 3

Mitsugishi Heavy Industries, Reorganized, Ltd., No. 988 Okinaka, Diako-cho, Higashi-ku, Nagoya, Japan. P-2, AC-1, 2

Panair do Brasil, S. A., P. O. Box No. 694, Rio de Janeiro, Brazil, DF, Brazil, S. A. A-4 P-2, PR-2, I-1, 2, 3, 4, AC-1, 2, 3

Pan American World Airways, Inc., Miami Overhaul Base, P. O. Box 817, Miami 31, Florida. A-3, 4, P-2, PR-1, 2, I-1, 2, 3, 4, AC-1, 2, 3

Pan American World Airways, Inc., New York International Airport, Jamaica 20, New York. A-1, 2, 3, 4, PR-2, R-1, 2, 3, L-M&P, L-EE

SABENA-Belgian World Airlines, 35 rue Cardinal Mercier, Brussels, Belgium. A-3, 4, P-1, 2, PR-2, AC-1, 2, 3, R-1, 2, 3, I-1, 2, 3, 4

Scandinavian Airlines System (SAS), Region Denmark, Copenhagen Airport, Kastrup, Denmark. A-4, P-2, PR-2, I-1, 2, 3, 4, R-1, 2, AC-1, 2, 3

Scandinavian Airlines System, Region Norway, Fornebu Airport, Oslo, Norway. A-4, P-2, PR-2, I-1, 2, 3, 4, AC-1, 2, 3, R-1, 2, 3

Scandinavian Airlines System, Region Sweden, Bromma Airport, Stockholm 40, Sweden. A-4, P-2, PR-2, R-1, 2, 3, AC-1, 2, 3, I-1, 2, 3, 4

Servicios Aerotechnicos Latino Americanos, S. A. (SALA), La Sabana Airport, P. O. Box XX, San Jose, Costa Rica. A-1, 2, 3, 4, P-1, 2, PR-1, 2, I-1, 2, 3, R-1, 2, AC-1, 2

Swissair Technical Department, Zurich Airport, Kloten, Switzerland. A-1, 2, 3, 4, P-1, 2, I-1, 2, 3, 4, PR-1, 2, AC-1, 2, 3

Tokyo Aircraft Instrument Co. Ltd. (Tokyo Kokukeiki Kabushiki Kaisha), 1600, Izumi, Komae-Machi, Kitatama-Gun, Tokyo, Japan. R-1, 2, 3, I-1, 2, 3, 4, AC-1, 2

Tokyo Keiki Seizosho Company, Ltd., 31, 4-Chome, Higashikamata, Ota-Ku, Tokyo, Japan. I-1, 2, 3, 4, AC-1, 2, 3

Transocean Air Lines, Oakland Municipal Airport, Oakland 14, California. A-1, 2, 3, 4, R-1, 2, I-2, 4, AC-2, 3, L-EE, L-R

Transports Aeriens Intercontinentaux, Orly Airfield, B. P. 118, Seine, France. A-4, P-2, PR-2, R-1, 2, 3, I-1, 2, 3, 4, AC-1, 2, 3

United States Overseas Airlines, Inc., Cape May County Airport, P. O. Box 234, Wildwood, New Jersey. R-1, 2, L-A, L-R

TRUCKS, FIRE

Fabricated Steel Service, Inc., 7400 Laurel Canyon Blvd., North Hollywood, Calif.
Fire Div., Cardox Corp., 307 North Michigan Ave., Chicago 1, Ill.
Four Wheel Drive Auto Co., Clintonville, Wisc.
Marmon-Herrington Co., Inc., 1511 West Washington St., Indianapolis 1, Ind.

Trucks, Fork-Lift

Allis-Chalmers Mfg. Co., P. O. Box 512, Milwaukee 1, Wisc.
Automatic Transportation Co., 101 West 87 St., Chicago 20, Ill.
The Baker-Raulang Co., Subsidiary of Otis Elevator Co., 1250 West 80th St., Cleveland 2, Ohio
Big Joe Mfg. Co., Wisconsin Dells, Wisc.
The Buda Div., Allis-Chalmers Mfg. Co., 1135 South 70th St., Milwaukee 1, Wisc.
Elwell-Parker Electric Co., 4513 St. Clair Ave., Cleveland 3, Ohio
Hyster Co., 2902 N. E. Clackamas St., Portland 8, Ore.
Industrial Truck Div., Clark Equipment Co., 24 St., Battle Creek, Mich.
Lewis-Shepard Products, Inc., 695 Walnut St., Watertown 72, Mass.
The Mercury Manufacturing Co., 4044 South Halsted St., Chicago 9, Ill.
Origins, Inc., 47-31 Place, L. I. City, N. Y.
Silent Hoist & Crane Co., 855 63rd St., Brooklyn 27, N. Y.
Spaulding Fibre Co., Inc., 310 Wheeler St., Tonawanda, N. Y.
Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15, Pa.

Trucks, Fueling

Associated Missile Prods. Corp., 2709 North Garey, Pomona, Calif.
Butler Mfg. Co., 7400 East 13 St., Kansas City 26, Mo.
Four Wheel Drive Auto Co., Clintonville, Wisc.
Garsite Products, 4045 Merrick Rd., Seaford, N. Y.
The Heil Co., 3000 West Montana St., Milwaukee 7, Wisc.
The Frank G. Hough Co., 976 Sunnyside Ave., Libertyville, Ill.

Trucks, Industrial

Aero-Industrial Equipment Manufacturers, 1224 Indianola St., Bowling Green, Ky.
Automatic Transportation Co., 101 West 87 St., Chicago 20, Ill.
The Baker-Raulang Co., Subsidiary of Otis Elevator Co., 1250 West 80th St., Cleveland 2, Ohio
William Bal Corp., 2 Johnson St., Newark 5, N. J.
Big Joe Mfg. Co., Wisconsin Dells, Wisc.
Dayton T. Brown, Inc., 1305 Strong Rd., Copiague, N. Y.
The Buda Div., Allis-Chalmers Mfg. Co., 1135 South 70th St., Milwaukee 1, Wisc.
Elwell-Parker Electric Co., 4513 St. Clair Ave., Cleveland 3, Ohio
The Fairbanks Co., 393 Lafayette St., New York 3, N. Y.
Fletcher Aviation Corp., Rosemead, Calif.
Gould-National Batteries, Inc., Trenton 7, N. J.
Harbo Division, Service Metal Fabricators Co., 1752 Cloverfield Blvd., Santa Monica, Calif.
Harbo Mfg. Co., 4210 Del Rey Ave., Venice, Calif.
The Frank G. Hough Co., 976 Sunnyside Ave., Libertyville, Ill.
Hyster Co., 2902 N. E. Clackamas St., Portland 8, Ore.
Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.
Lewis-Shepard Products, Inc., 695 Walnut St., Watertown 72, Mass.
Mercer-Robinson Co., 395 Allwood Rd., Clifton, N. J.
The Mercury Manufacturing Co., 4044 South Halsted St., Chicago 9, Ill.
National Vulcanized Fibre Co., P. O. Box 311, Wilmington 99, Del.
Nutting Truck & Caster Co., 1201 West Division St., Faribault, Minn.
Silent Hoist & Crane Co., 855 63rd St., Brooklyn 27, N. Y.
Steiner-Ives Co., Springfield Rd., Union, N. J.
Tobey Aluminum Div., Magnesium Co. of America, P. O. Box 26, El Segundo, Calif.
Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15, Pa.

Trucks, Tank

Butler Mfg. Co., 7400 East 13 St., Kansas City 26, Mo.
Fabricated Steel Service, Inc., 7400 Laurel Canyon Blvd., North Hollywood, Calif.
Four Wheel Drive Auto Co., Clintonville, Wisc.
The Heil Co., 300 West Montana St., Milwaukee 7, Wisc.

Warning Systems

Aero Div., General Bronze Corp., Stewart Ave., Garden City, N. Y.
Aerosonic Instru. Corp., 528 Reading Rd., Cincinnati, Ohio; Clearwater, Fla.
Arma Div., American Bosch Arma Corp., Roosevelt Field, Garden City, N. Y.
Avion Div., ACF Industries, Inc., 299 State Hwy., Route 17, Paramus, N. J.
Electronics & Instrumentation Div., Baldwin-Lima-Hamilton Corp., Waltham 54, Mass.
Bristol Engineering Co., Bristol, Pa.
California Piasteck, Inc., 225 East Fourth St., Los Angeles 13, Calif.
Carma Mfg. Company, 1879 Millin Ave., Torrance, Calif.
Earl S. Condon Co., Los Angeles 5, Calif.
Consolidated Engrg. Corp., 300 North Sierra Madre Villa, Pasadena, Calif.
Eastman Kodak Co., 343 State St., Rochester, N. Y.
Electronic Laboratory, Rheem Mfg. Co., 9236 East Hall Road, Downey, Calif.
ELECTRONICS SPECIALTY CO., 3456 Glendale St., Los Angeles, Calif. SEE ADV. C-135
Electronics Systems Div., Sylvania Electric Products, Inc., 100 First Ave., Waltham, Mass.
Fairchild Electrotechnics Div., Fairchild Engine & Airplane Corp., 118 E. 16th St., Costa Mesa, Calif.
Electrotechnics Div., Fairchild Engine & Airplane Corp., 118 E. 16th St., Costa Mesa, Calif.
General Precision Equipment Corp., 92 Gold St., New York 38, N. Y.
Guided Missiles Div., Fairchild Engine & Airplane Corp., Wyandanch, N. Y.
Industrial & Defense Prods. Div., The Magnavox Co., 2131 Bueter Rd., Ft. Wayne, Ind.
MOTOROLA INC., 2710 Clyborn Ave., Chicago, Ill. SEE ADV. C-113
National Aircraft Corp., 3411 Tulare Ave., Burbank, Calif.
Photobell Co., Inc., 43 Vesey St., New York 7, N. Y.
Pre-Fab Heater Co., Inc., 103-B Boston St., Guilford, Conn.
Reed-Curtis Nuclear Ind. Inc., 9459 Jefferson Blvd., Culver City, Calif.
Taller & Cooper, 75 Front St., Brooklyn, N. Y.
Telectro Industries Corp., 36-16 37th St., Long Island City 1, N. Y.
United Control Corp., 4540 Union Bay Pl., Seattle 5, Wash.
Univox Corp., 102 Warren St., New York 7, N. Y.
Vickers Electrical Div., Vickers, Inc., 1815 Locust St., St. Louis, Mo.

Weather Station Equipment

Aircraft Components Inc., Benton Harbor, Mich.
Aircraft Equipment Div., The Bristol Co., P. O. Box 1790-A. W., Waterbury 20, Conn.
Askania-Werke, A. G., U. S. Branch Office, 4913 Cardell Ave., Bethesda, Md.
BECKMAN & WHITLEY CO., 985 San Carlos Ave., San Carlos, Calif. SEE ADV. B-20
Burton Mfg. Co., Colorado Ave. at 26th St., Santa Monica, Calif.
Cardo Co., 6867 Farmdale Ave., North Hollywood, Calif.

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CRAIG SYSTEMS, INC., 90 Holton St., Danvers, Mass. SEE ADV. C-122
CROUSE-HINDS CO., Syracuse 1, N. Y. SEE ADV. F-22
Friez Instrument Div., Bendix Aviation Corp., Towson, Baltimore 4, Md.
Ideal-Aerosmith, Inc., Cheyenne, Wyo.
Industrial Div., W. & L. E. Gurley, Troy, N. Y.
The Instruments Corp., 4 N. Central Ave., Baltimore 2, Md.
Jobber Div., Durkee-Atwood Co., 215 North East Seventh St., Minneapolis 13, Minn.
Research & Devel. Dept., Emeco Corp., Hanover, Pa.
Times Facsimile Corp., 540 W. 58th St., N. Y., N. Y.
Westberg Mfg. Company, Napa, Calif.

Winches

Air Cargo Equip. Co., 1121 E. Colorado Ave., Glendale 5, Calif.
All American Engineering Co., du Pont Airport, Wilmington, Del.
American Ladder & Scaffold Co., Inc., 5507 N. W. Seventh Ave., Miami, Fla.
Breeze Corporations, Inc., 700 Liberty Ave., Union, N. J.
Chicago Pneumatic Tool Co., 6 East 44 St., New York 17, N. Y.
Fulton Co., 1912 South 82 St., Milwaukee 14, Wisc.
Hyster Co., 2902 N. E. Clackamas St., Portland 8, Ore.
Kelsey-Hayes Wheel Co., 3600 Military Ave., Detroit 32, Mich.
LeTourneau-Westinghouse Co., 2301 North Adams St., Peoria, Ill.
R. G. LeTourneau, Inc., Longview, Tex.
Link Belt Co., Prudential Plaza, Chicago 1, Ill.
MANNING, MAXWELL & MOORE, INC., AIRCRAFT PRODS. DIV., Shelter Rock Lane, Danbury, Conn. (West Coast Plant; Inglewood, Calif.) SEE ADV. A-40
Mercer-Robinson Co., 395 Allwood Rd., Clifton, N. J.
Montibella Fabricating Div., Kaiser Steel Corp., 7301 Telegraph Rd., Los Angeles 22, Calif.
New Hudson Mfg. Co., 56849 Grand River, New Hudson, Mich.
Robbins & Myers, Inc., 1345 Lagonda Ave., Springfield, Ohio
Silent Hoist & Crane Co., 855 63rd St., Brooklyn 27, N. Y.
O. E. Szekely Assoc., P. O. Box 269, Commerce, Ga.
VICKERS, INC., Detroit 32, Mich. SEE ADV. A-59
WESTERN GEAR CORP., P. O. Box 192, 2600 East Imperial Hgwy., Lynwood, Calif. SEE ADV. A-65

Wind Instruments, Airport

Aircraft Components Inc., 755 Woodland Ave., Benton Harbor, Mich.
CROUSE-HINDS CO., Syracuse 1, N. Y. SEE ADV. F-22
Friez Instrument Div., Bendix Aviation Corp., Towson, Baltimore 4, Md.
The Hickok Electrical Instrument Co., 10514 Dupont Ave., Cleveland 8, Ohio
Industrial Div., W. & L. E. Gurley, Troy, N. Y.
Westberg Mfg. Company, Napa, Calif.

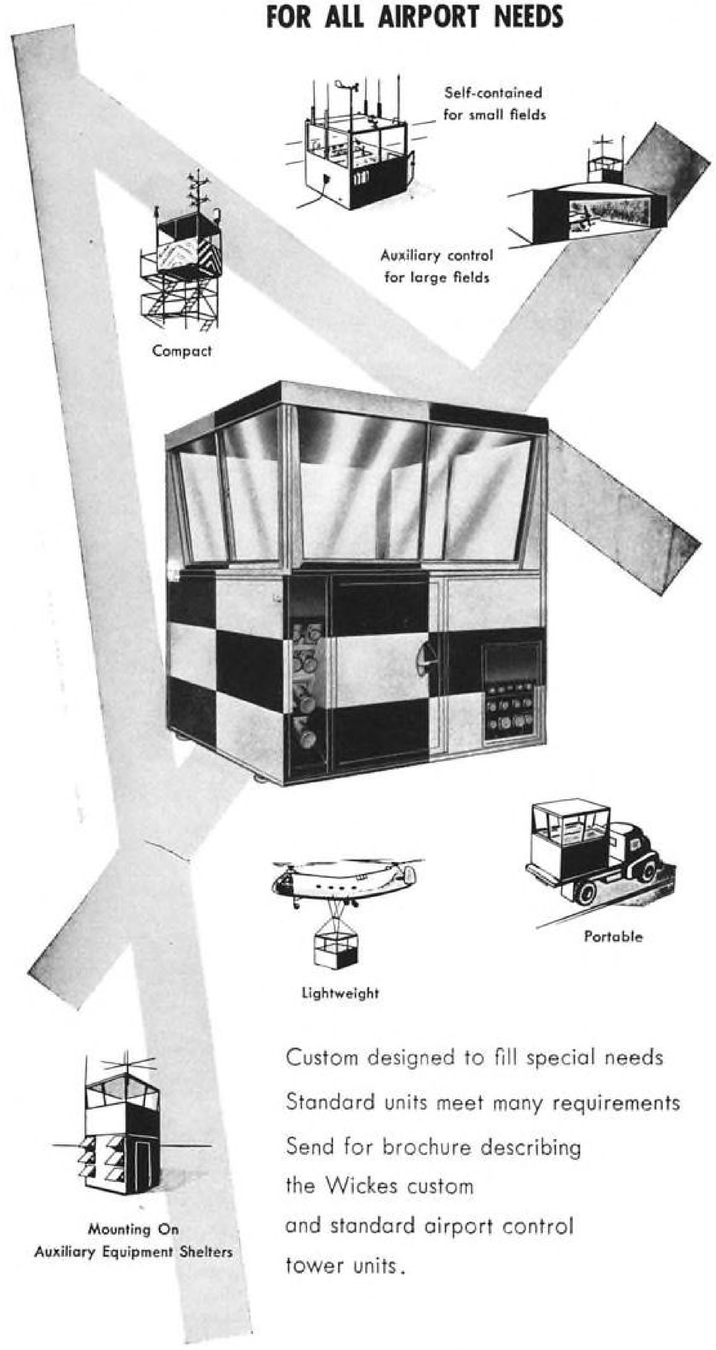
Wind Socks & Cones

Aircraft Components Inc., 755 Woodland Ave., Benton Harbor, Mich.
The Boyt Co., 303 New York Ave., Des Moines 5, Iowa
CROUSE-HINDS CO., Syracuse 1, N. Y. SEE ADV. F-22
McLean Mfg. Co., Inc., P. O. Box 64, Sussex, N. J.
L. Potter, Inc., 4040 Bethpage Turnpike, Bethpage, N. Y.
Security Parachute Co., 295 West 141 Ave., San Leandro, Calif.
The Wagner Awning & Mfg. Co., 2658 Scranton Rd., Cleveland 1, Ohio
Wichita Ponca Canvas Products Co., 611 East Central Ave., P. O. Box 2177, Wichita 1, Kan.

Wind Tees & Tetrahedrons

CROUSE-HINDS CO., Syracuse 1, N. Y. SEE ADV. F-22

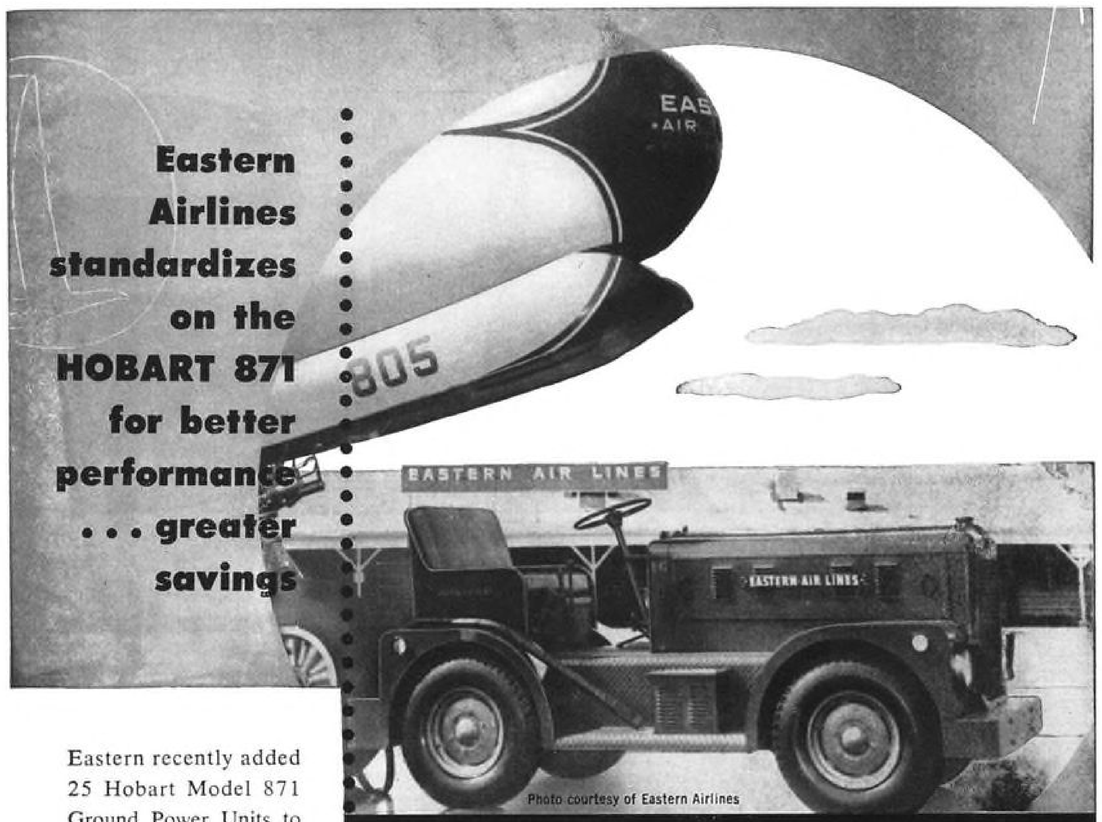
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Acme Battery Mfg. Co., 1465 South Vandevanter, St. Louis, Mo.

*Adams Aircraft Engineering Co., Bradley Field, Windsor Locks, Conn.

Aero-Industrial Equipment Manufacturers, 1224 Indianola St., Bowling Green, Ky.

Aero Publishers, Inc., 2162 Sunset Blvd., Los Angeles 26, Calif.

*Aero Service & Supply Co., Municipal Airport, Birmingham 6, Ala.

Aero Spares Company, Inc., 6906 Woodside Ave., Woodside 77, N. Y.

Aero Trades, Inc., MacArthur Airport, Ronkonkoma, N. Y.

Aetna Plywood & Veneer Co., 1731 North Elston Ave., Chicago 22, Ill.

*Air Accessories, Inc. (AMC Supply Division and Delta Products Division), 1400 Henderson St., Box 1440, Fort Worth, Texas

*Air Associates, Inc., (Home Office) Teterboro, N. J.

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5315 West 63rd St., Chicago 38, Ill.
3214 Love Field Drive, Dallas 9, Texas
1231 Air Way, Glendale, Calif.
P. O. Box 241, International Arpt. Branch, Miami 48, Fla.
Arpt. Station, Atlanta Municipal Arpt., Atlanta, Ga.
Industrial Ave., Teterboro, N. J.

Air Associates, Inc., 5315 West 63rd St., Chicago 38, Ill.

Air Frame Inspection Inc., 10801 Sessler St., South Gate, Calif.

*Air Parts International, 3104 West Vanowen St., Burbank, Calif.

Air Speed Tool Co., 1502 West Slauson Ave., Los Angeles 47, Calif.

Aircraft Components Inc., 755 Woodland Ave., Benton Harbor, Mich.

AIRCRAFT CONTROLS CO., DIV., GORN ELECTRIC CO., 837 Main St., Stamford, Conn. SEE ADV. 61

Aircraft Div., On Mark Engineering Co., 7929 Havenhurst Ave., Van Nuys, Calif.

Aircraft Div., United Supply Co., 3676 S. Broadway Place, Los Angeles 7, Calif.

Aircraft Hardware Mfg. Co., Inc., 810 Edgewater Rd., New York 59, N. Y.

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Aircraft Sales & Brokerage Co., Long Beach Municipal Airport, Long Beach 6, Calif.

Aircraft Tools, Inc., 9030 Bellanca Ave., Los Angeles 45, Calif.

Aircraft Dynamics Corp., 545 Fifth Ave., New York 17, N. Y.

Aircraft Engine & Parts Corp., 345 Madison Ave., New York 17, N. Y.

Aircraft Radio Industries, Inc., 15 East 40th St., New York, N. Y.

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Arnhold Ceramics, Inc., 1 East 57th St., New York 22, N. Y.

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Associated Technical Sales Co., 1926 E. Siebenthaler Ave., Dayton, Ohio

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Atlas Brass Foundry, 1901 Santa Fe Ave., Los Angeles 21, Calif.

Atlas Screw & Specialty Co., 450 Broome St., New York 13, N. Y.

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Aviation Div., Smith Kilpatrick & Co., Inc., 47 Beaver St., New York 5, N. Y.

AVIATION & GUIDED MISSILES DIVS., FIRESTONE TIRE & RUBBER CO., 2525 Firestone Blvd., Los Angeles 54, Calif. SEE ADV. D-177

Aviation Lubricants Co., 1921 India St., San Diego 12, Calif.

Aviation Sales Dept., Jeppesen & Co., Stapleton Airfield, Denver 7, Colo.

*Aviation Supply Corp. of Florida, 1544 N. Franklin St., Tampa 2, Fla.

Aviation Supplies Div., Air Associates, Inc., Teterboro, N. J.; Chicago, Ill.; San Francisco, Calif.; Glendale, Calif.; Dallas, Tex.; Atlanta, Ga.; Miami, Fla.

Aviquipo, Inc., 25 Beaver St., New York 4, N. Y.

Avnet Electronics Supply Co., Inc., 34-36 North Moore St., New York 13, N. Y.

B & B Distributors, 222 Fulton St., New York 7, N. Y.

Baker Steel & Tube Co., 1540 Calzona, Los Angeles 23, Calif.

Beam Instruments Corp., 350 Fifth Ave., New York 1, N. Y.

Beemer Engineering Co., 401 North Broad St., Philadelphia 8, Pa.

Bell-Wilson Aircraft Supplies, P. O. Box 64, 409 Harmon St., Brooklyn 37, N. Y.

Bond Metal Co., 321 Canal St., New York, N. Y.

Boonton Radio Corp., Fanny Rd., Boonton, N. J.

Bowsteel Distributors Corp., 601 East Linden Ave., Linden, N. J.

Arthur Brown & Bros., 2 West 46th St., New York 36, N. Y.

Brown-Line Corp., 111 Main St., El Segundo, Calif.

Burklyn Co., 3429 Glendale Blvd., Los Angeles 39, Calif.

CG Electronics Corp., 305 Dallas St., N. E., Albuquerque, N. M.

C. & S. Construction, Inc., P. O. Box 881, El Paso, Texas

Cadillac Electronic Co., 53 Worth St., New York 13, N. Y.

Cawley Aircraft Supply Co., Inc., Whitestone, N. Y.

*Central Aero Supply, Inc., N. Philadelphia Airport, Philadelphia 36, Pa.

Central Aircraft, Inc., P. O. Box 1364, Yakima, Wash.

Central Sta. Alarm Co., 610 N. Askard St., Dallas, Texas

Columbian Commerce & Credit Corp., 1 East 53rd St., New York, N. Y.

Commercial Controls, 1 Leighton Ave., Rochester 2, N. Y.

Earl S. Condon Co., 3460 Wilshire Blvd., Los Angeles 5, Calif.

Connector Supply Co., 721 S. Victory Blvd., Burbank, Calif.

*W. J. Connell Co., 201 Needham St., Newton Upper Falls, Mass.

Cooper Industries, Inc., 3722 West North Ave., Chicago 39, Ill

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Cosa Corp., 405 Lexington Ave., New York 17, N. Y.

Joe Crane & Co., Box 164, Mineola, N. Y.

Dakota Aviation Co., Municipal Airport, Huron, S. D.

Dale Products, Inc., Columbus, Neb.

H. L. Dalis, Inc., 35-35 24th St., Long Island City 6, N. Y.

Dallas Airmotive, Inc., Dallas, Texas

The Darcoid Co., Inc., 145 Sixth Ave., New York 13, N. Y.

Joe Davidson & Associates, P. O. Box 108, South Gate, Calif.

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Empire State Aluminum Corp., 136 Liberty, New York, N. Y.
Eng. & Product Div., Pacific Airmotive Corp., 2940 Hollywood Way, Burbank, Calif.
Engineers Book Service, 3011 Ave. K., Brooklyn 10, N. Y.
Eng. & Product Div., Pacific Airmotive Corp., 2940 Hollywood Way, Burbank, Calif.
Engis Equipment Co., 431 South Dearborn St., Chicago 5, Ill.
English & Lauer, Inc., 1978 S. Los Angeles St., Los Angeles, Calif.
Epic, Inc., 154 Nassau St., New York, N. Y.
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General Scientific Equipment Co., 7516 Limekiln Pike, Philadelphia 50, Pa.
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Seamless Products Co., 120 11 Ave., New York, N. Y.
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ServicAir Co., 1841 Flower St., Glendale 1, Calif.
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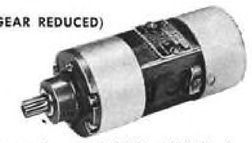
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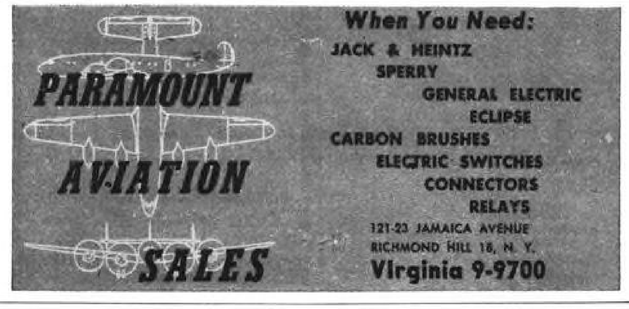
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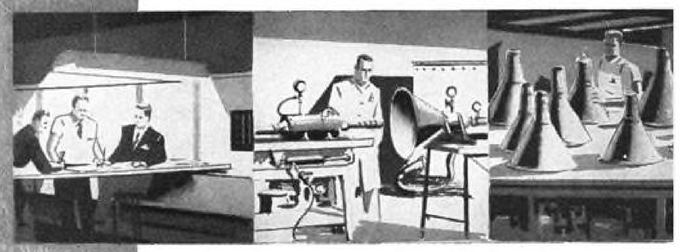
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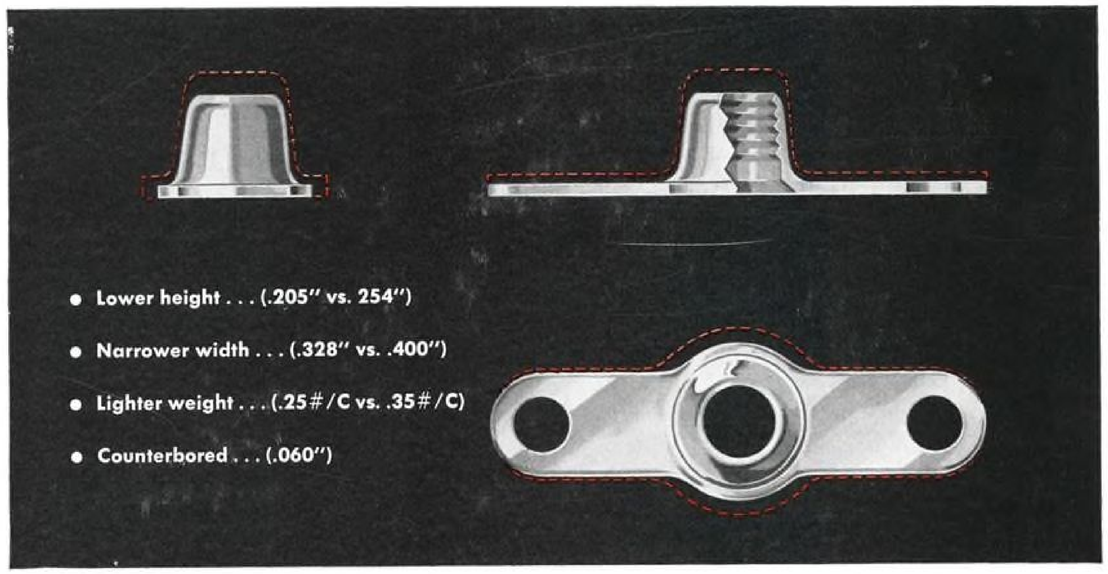
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New Low-Height Counterbored Locknuts Conform with NAS Drawings

The new ESNA LHTA51 series of self-locking nuts was designed to meet the requirements of the recently released NAS679-695 drawings for low-height counterbored nuts. Intended for structural use, and developing the full tensile strength required by Spec MIL-N-25027 (ASG), they perform satisfactorily at temperatures up to 550°F. These parts have also been approved to AN-N-10 and drawings AN362 and AN366.

The LHTA51 series offers several special advantages to the designer:

Minimum envelope dimensions and weight compatible with performance to the tensile, vibration, twist-out and push-out requirements of MIL-N-25027 (ASG).

Reduced height permitting use of 160,000 psi heat treat short length NAS bolts to still further cut down weight of nut and bolt assembly.

Counterbore in the base of the nut assures that bolt threads will not be in bearing. This eliminates the weight of an extra shim in many applications.

Repeated use and reuse without loss of efficiency.

CHOOSE THE SOLUTION TO YOUR FASTENING PROBLEM FROM A COMPLETE LINE OF NUT SHAPES!


One lug Floater
(#8 through 5/16")


Hex nut
(#4 through 5/16")


Two lug "Floater"
(#8 through 5/16")


Gang Channel
(#8 through 5/16")

(and others not illustrated here)

ELASTIC STOP NUT CORPORATION OF AMERICA



MAIL COUPON FOR DESIGN INFORMATION

Dept. N18-1082, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send me the following free fastening information:

☐ Spec Sheets on New LHTA51 Series

☐ Here is a drawing of our product. What type of self-locking fastener would you suggest?

Name_____ Title_____

Company_____

Street_____

City_____ Zone_____ State_____

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