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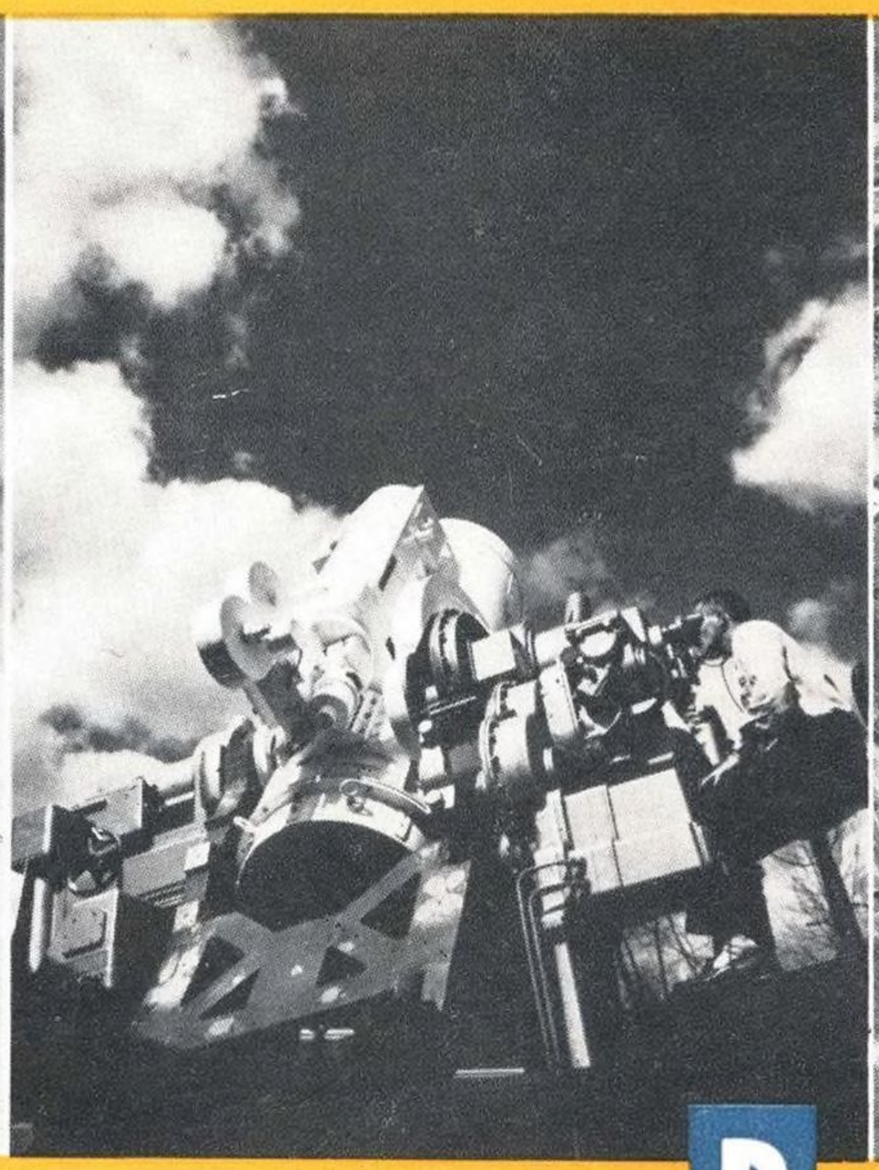




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The 1958 Aviation Week Buyers' Guide was compiled with the cooperation of more than 3,500 representatives of the aircraft and associated industries in the United States and Canada. It is intended to serve as a standard reference on procurement and sales in the aviation industry.

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How to use the 1958 Buyers' Guide

This third annual edition of the Aviation Week Buyers' Guide includes, for the first time, listings of Canadian firms serving the aircraft industry. You will find these companies listed separately in the Manufacturers' and Distributors' Indexes, but integrated alphabetically with U. S. firms in the product listings.

SECTIONALIZED FORMAT . . .

The Guide divides its manufactured products listing into five 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 page 22 and 33, and for the commercial airlines on page E-3.

MANUFACTURERS AND DISTRIBUTORS . . .

An alphabetical listing of manufacturers whose products are featured in this Guide begins on page 34. A similar listing of distributors serving the aircraft industry begins on page F-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 E-28. A special index of advertisers' products beginning on page 57, will help you to obtain complete information on products quickly and easily by referring to the advertising pages.

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: 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.

Abnormalities Dictate ARDC Spending

By Evert Clark

Washington—Pattern of buying for Air Force research and development in the coming year will be one of considerable change and accompanying confusion.

Almost a year of reducing effort, reappraising operating procedures and trying to interpret contradictory budget edicts will be followed by a reversal of this trend.

Impact of Soviet technological achievements in the past year is expected to have a profound effect on the Air Force program, regardless of how many dollars are added to or subtracted from research and development funding.

USAF's research effort has undergone so many abnormal changes—dictated by financial considerations rather than technology—that some observers feel the net result has been to lose a vital year on the research timetable.

Even if the downward trend had continued, readjustment would have taken another six months to a year to complete.

Now, however, a new set of rules is being imposed. Talk of debt limits, expenditure ceilings and reorganization has given way to demands for more and better research to meet the challenge of what some already see as Russian superiority in this field.

Technological Threat

The fact that Air Research and Development Command has tried for several years to convince Air Force, Defense Department, Congress and the public of the seriousness of the Russian technological threat is small comfort for a management machine wracked first by rapid, forced deceleration and now about to undergo unexpected acceleration.

Only the most skillful handling of the problem will prevent USAF from losing the effect of another year of research.

Beginning with the cutbacks in overtime last May, USAF has undergone a number of changes resulting both from budget shifts imposed from outside and confused internal handling of these shifts.

Research and development has felt all of these changes, either directly or indirectly. No command in the USAF family could be expected to absorb all the punishment, so it was spread around. And even though the major cuts late in Fiscal 1957 and so far in Fiscal 1958 were aimed at procurement and production, companies whose economic structure was affected were in most cases research and development contractors also.

By mid-September, Air Research and Development Command was being given careful scrutiny. Reorganization, elimination of centers, or reassignment of their missions were being considered (AW Sept. 16, p. 26).

Complex Problems

Problems ARDC faced included:

- **A $661 million budget.** This might have allowed continuation of the previous year's work if spending ceilings had not been imposed and inflation were not a factor, but it permitted no expansion of effort. In addition, $323 million of the total is eaten up by operations and management.
- **Production program** and engineering support of USAF's combat wings continued to impose a heavy workload on research and development facilities.
- **Continued and still** accelerating demand for new test facilities. While the cost and complexity of new test facilities continued to grow, technological advances nevertheless are overcrowding existing facilities and making new ones necessary.

In the midst of these problems, a wide swing of the budget axe almost cripple the exploratory research program beyond recovery (AW Sept. 16, p. 27). Exploratory research, aimed at providing the knowledge necessary for the Air Force of the near and far future, is the primary mission of Air Force Office of Scientific Research and an appreciable portion of the effort at several other centers.

This misfire, later described as a case of the bookkeepers getting ahead of the planners, was quickly remedied. But one USAF official said living under a spending ceiling still would make exploratory research—like the rest of the Air Force—stoop-shouldered.

Dramatic event that began the reversal of this trend was Soviet Russia's launching of an earth satellite (AW Oct. 14, p. 27, 28). Coming close behind Russia's claim to have a successful intercontinental ballistic missile, it focused attention on U. S. military research efforts more sharply than anyone expected.

Some effects of the new appreciation of research and development forced by Soviet gains already have been seen. But Fiscal 1959 will be the first full budget year to reflect this new attitude.

First key to the future of USAF's research and development efforts will be Administration's presentation of the Fiscal 1959 budget.

Even more important may be the way in which Congress alters it. Third factor will be the way in which Air Force, suffering from the same effects of deceleration and acceleration as the other services, implements it.

Pattern in the past, which should not change drastically in spite of these three factors, has been for Air Force to contract approximately three-fourths of its research and development to industry and scientific and academic institutions through its complex of centers.

Several of these—Flight Test Center at Edwards, Calif.; Arnold Engineering Development Center at Tullahoma, Tenn.; and Missile Test Center at Patrick AFB, Fla.—are primarily test centers, and have a lower level of contracting. The same is true of the Missile Development Center at Holloman AFB, but to a lesser degree.

Point of Contact

Virtually no contracts are written at ARDC headquarters, which was to move to Andrews AFB outside of Washington, D. C., late in January. Point of contact in almost all cases is the contracting or industrial relations office at a particular center. Information on USAF's areas of research interest and other general guidelines to doing business with ARDC are available both at centers, ARDC field offices and at headquarters.

Of roughly $700 million a year in contracting dollars, about 30% of the 4,000 contracts go to non-profit and not-for-profit institutions. These represent about 20% of the total dollar value of contracts. The remainder are placed with industrial firms.

Mid-Year Industry Upswing

Hinged to Defense Boosts

By Robert Hotz

The aviation industry will bounce back during 1958 from the third quarter slump of 1957 caused by pre-Sputnik defense economy policies. Gross sales will be about $11 billion with profit margins down slightly to a return of just over two per cent of gross sales.

Major upswing will get under way by the middle of 1958, stimulated by an estimated three to five billion dollar increase in the defense budget devoted primarily to aircraft, missiles, avionic gear and space research vehicles. First signs of this increase will be a $1 billion supplemental appropriation for Fiscal 1958 which the President is expected to present to Congress shortly after it reconvenes in January. This $1 billion is expected to be devoted primarily to the ballistic missile program and will be followed by other supplementals covering manned aircraft, additional fuel and maintenance funds and air base construction.

Big impact of the new defense policy will come in the Fiscal 1959 Defense Department appropriation bill from which money will become available July 1, 1958. This bill is expected to be two to four billion dollars higher than the Fiscal 1958 $38 billion level.

The production stretchouts and research and development cuts initiated by the Defense Department during the last half of 1957 will be reflected in a continued lower level of aviation industry sales during the first half of 1958. But the effects of these slashes will be more than wiped out by the upsurge in defense activity in the aircraft, missiles, avionics and space fields during the last half of 1958 and the first half of 1959.

PRIME PROBLEMS

This reversal in defense policy is a direct result of the startling Soviet technical advances revealed during 1957 in aircraft, ballistic missiles and satellites. Most important trend now developing in both military and legislative thinking is that defense budget increases must be across the board efforts aimed at solving two problems:

• *First, bolstering our airpower in being* so that it will retain its capacity to devastate swiftly and certainly the resources of any aggressor. This includes strengthening Strategic Air Command, the Navy's anti-submarine warfare capability and building a potent force to handle limited wars.

• *Second, accelerate and expand* our research and development effort to produce the radically new weapons required to maintain superiority five and 10 years hence.

Responsible military and congressional leaders now agree that it would be dangerous to finance new weapons development at the expense of cutbacks in currently producible weapons required to strengthen our forces in being.

Next year will be a tough year for the industry as it will have to adjust radically to new technical, political and economic factors.

The industry is beginning to feel acute growing pains, both technically and financially. In the past five years, aviation technology has made more progress than during the previous 50, and this has complicated the problems of the industry.

SIMPLE TO COMPLEX

For example, fuels are switching from relatively simple gasoline and kerosene to liquid oxygen, boron compounds, nitric acid and uranium. Materials are changing from easily workable aluminum to stainless steel, titanium and magnesium alloys. Controls are shifting; simple systems designed for translation of man's muscular movements to movable surfaces have become the complex automatic control systems that must react many times faster and function much more precisely than the best human capability. Even the environment of flight has moved from the Earth's envelope of atmosphere to the fringes of outer space.

Financially, most of the industry's problems stem from this galloping technology. As Donald Douglas, dean of aviation manufacturers, recently put it, "Our technology has now developed more things to do than we know how to finance." This is the heart of the major money problems facing both the manufacturing and airline segments of the aviation industry.

In the defense field, the problem involves not an actual cutback in money available but how to contain the galloping technology within budgetary limits already established.

In the transport field, it is a matter of financing the jet equipment the airlines need to provide the public with this radically new form of transportation. When it is realized that some airlines are buying quantities of jet transports valued at many times the current net worth of the airline, an idea of the magnitude of this problem can be gained.

There will be a period of significant change in the fortunes of individual firms as the impact of these new technical and financial forces are more extensively felt. Some firms will decline, while others will set new records for sales and profits next year.

However, the industry can still look forward to roughly an $11-billion annual market in the years just ahead. About 90% of this will still be military. It will break down to approximately seven billion dollars for Air Force hardware, $2.5 billion for naval aviation and missiles, about a billion dollars for Army planes and missiles, and another billion in commercial sales. Of the military business, missiles will account for about 25% of the total in 1958, and sometime in the next 10 years, the figure should rise to about half the military total.

The aviation industry was the largest single manufacturing industry in the country in 1957, with a peak of 908,000 workers reached at mid-year. The next largest industry—the automobile industry—has 793,000 workers. A drop of about 100,000 workers is expected in the aviation industry by the end of 1958—mostly production workers rather than engineering-management men.

Airline net earnings suffered the sharpest drop in airline history in 1957, and there are few signs that the downward trend will be arrested in 1958. Many officials are forecasting net losses for the industry next year unless some form of relief is provided.

AIRLINE PROFIT SQUEEZE

Net profits for the domestic trunkline industry during 1957 are estimated at $25 million, a 56% decrease over the $57.7 million profit recorded in 1956. The growing profit squeeze can be attributed almost entirely to a 19% increase in operating expenses during the year compared to 1956. With labor planning heavy campaigns for higher wages and more fringe benefits coupled with rising fuel costs, the airlines can expect little relief from the mounting expense level in 1958.

Although operating revenues climbed 13.7% in 1957—comparing favorably with the 13.6% increase last year—most airlines reported a reversal in the historic traffic growth pattern in the last few months of 1957. It is possible that fourth quarter results represent the first evidence of a leveling-off of annual traffic increases.

As a consequence, load factors may be due for a sharp drop in 1958 since the heavy increase in available seat-miles caused by the delivery of new equipment could quickly outpace traffic volume. Possible results will be increased competitive battles on major routes and attempts to tighten schedule patterns on routes that are not basically productive from a traffic point of view.

Although economy drives will mark overall airline programs in 1958, their effects will be insignificant since increased competition will demand increased expenditures for such improvements as electronic devices for handling passengers and reservations and more modern ground handling equipment to expedite traffic flow.

In addition, the airlines will be faced with the first stages of jet transport aircraft and allied equipment investments. With the Lockheed Electra scheduled to appear on routes of Eastern Air Lines and American Airlines late in 1958 and the Boeing 707 turbojet in 1959 on Pan American's routes, the scheduled airlines will begin to make their first major transition to a new operating technique in 1958.

BUSINESS FLYING

Indications are that in 1958 business flying industry will regain the ground lost, deliverywise, in 1957, which was primarily due to one manufacturer (Cessna) being unable to maintain the high delivery volume it developed in 1956. Caught in an overproduction squeeze, Cessna curtailed output this year, pulling down the industrywide effort. Comparison, in the first nine months of 1956, Cessna delivered some 2,500 business planes; in the same period of 1957, its deliveries were approximately 1,700 aircraft.

This factor was also primarily responsible for industrywide total delivery value slipping from $82 million for the first nine months of 1956 to about $75 million in the same period this year. It is unlikely that the industry will achieve its 1956 record-breaking mark of deliveries valued at $105 million this year.

But introduction of new models in 1958 lines: Beech Travel Air, Piper Comanche and Cessna 175, can be expected to increase the industry's sales volumes in 1958 to at least the 1956 record figure—possibly higher.

Major problem the industry has to lick is developing a high sales volume—particularly sales of aircraft to first-time users. Currently the greater portion of its sales is to people already owning aircraft—in the case of one business plane maker, his first-time sales are only about 25% of his volume.

Aircraft Industry Outlook Lacking

Washington—Dominant factors in U.S. military aircraft programs as 1958 approaches are Russian technological progress and the Federal budget.

Extensive changes in military requirements have combined with a political determination to restrain spending and the result in recent months has been a state of near-chaos in the general area of procurement for the support of airpower.

Orval R. Cook, president of the Aircraft Industries Assn. and former USAF deputy chief of staff for materiel, has summed up the situation:

"Comparative values in weaponry have altered greatly with the march of science and invention.

"Priorities have shifted. The old targets of force levels have been revised downward, and probably will go even lower.

"Things we were in a big hurry for a few months ago don't seem so important now. In the aircraft industry there have been contract cancellations, cutbacks, stretch-outs, reduction in employment and facilities.

"With the program still in a state of flux and on the eve of a new Congressional session there is no yardstick that can be placed on the outlook for the aircraft industry.

"Austerity is with us, there is no doubt, and competition has reached a new level of ruggedness.

"The aircraft industry has known all along that it would not keep up forever the pace of production which peaked in 1953 at 11,000 military aircraft. As a matter of fact, we have been coming down, year-by-year, ever since—9,000 in 1954, 8,000 in 1955 and 6,800 last year. . . .

Turning Point

"We knew that when target strength goals would have been reached we would operate on a considerably lower plateau of production, aimed at maintaining those strength levels with the latest and best equipment.

"We had expected that 1961 would be the real turning point for the industry."

The revised date is 1957, or Fiscal 1958, a financial year now only half gone.

Cook maintains, with considerable justice, that the aircraft industry itself has contributed to the current situation by means of its successful effort to cut lead time.

In the past year, there has been an increasing amount of equipment delivered ahead of schedule.

The original estimate of defense expenditures for Fiscal 1958 was $38 billion but the rate at which money was flowing a few months ago was about $40 billion or more.

In addition to faster-than-anticipated deliveries, other factors were inflation and the increasing cost of more complex weapon systems.

Cook, as spokesman for the industry, has made these observations for the aircraft manufacturers:

- **Nothing cataclysmic** has happened. Despite a sudden, sharp and unexpected drop in business there still is a lot of work to do. There are important readjustments ahead.
- **Determination of** military requirements remains in the hands of the military and industry makes no presumption that it should or could alter this determination. Industry will continue to design, develop and produce any aerial weapon systems for which there is a need.
- **The aircraft industry** recognizes the necessity for economic balance in the building of defenses. It is in favor of guns and butter.
- **The aircraft industry** does not feel that the nation owes it a living. It agrees that aircraft procurement is not intended as a support for prime contractors, sub-contractors or small business.
- **There will be no** slackening of the industry's effort to achieve qualitative superiority for American airpower, at the lowest possible cost.

In the face of these pledges, the industry is hampered by procurement chaos growing out of the Defense Department's desperate effort to keep within the $38 billion spending ceiling.

Not long ago, USAF went so far as to make the urgent suggestion that aircraft manufacturers should continue to deliver on schedule but delay presentation of their bills. This would force the industry to use credit and the idea was advanced—paradoxically—in the face of a determined Federal Reserve policy of restraining credit.

It may well be that the interest dollar is more important than the defense dollar in the budget, that the higher interest rates forced by administration policy in the long run will do more to hurt the defense effort than inflation itself.

To many, it appears clear that U.S. defense and monetary policy are out of step.

Air Force Secretary James H. Douglas explained the situation to aircraft manufacturers in these terms:

"The problem we are facing is brought up in acute form at this time (at the beginning of Fiscal 1958) because of the debt ceiling, the national debt and the fact that Defense Department estimates of expenditures for 1957 and 1958 are substantially too low."

When the federal budget was presented to Congress by President Eisenhower last January USAF estimated its Fiscal 1957 expenditures would run to $16.9 billion. In September, a revised estimate placed the total at $18.4 billion, a jump of $1.5 billion.

Parallel figures for the entire Defense Department were $35.8 billion and $38.4 billion, up $2.6 billion.

Financial Forecasts

So far as USAF is concerned, and the same situation holds for the Army and Navy, there are substantial reasons why the financial forecasts both for Fiscal 1957 and the early months of Fiscal 1958 were in error:

- **Prices are rising.**
- **Shorter leadtimes** have compressed weapon system programs, advanced the date of heavy outlays. Douglas says that until 1956 no weapon system procurement program utilized more than 5% of the authorized expenditure for that system in a single year. In 1956 the newer weapons took 8% of their money. In 1957, 8% was anticipated and the outlay was 15%. And where programs normally took 30% in the second year, they now are absorbing 45% and higher.
- **Ballistic missile program** has used far more money than anticipated. In January USAF's estimated Fiscal 1957 outlay for missiles was $860 million. For the entire Department of Defense it was $1.5 billion. By September these figures were revised to $1.4 billion for the Air Force and $2.1 billion for the Defense Department.

All of the arithmetic used here is for the last Fiscal Year. Fiscal 1958 now is almost half over and the continuing trend toward a faster rate of expenditure has been felt in cutbacks, cancellations and what amounts to federal begging for postponed billings.

Essential Yardstick

By Claude Witze

In the desperate effort to curb outlay in the past six months, USAF has used increasingly blunt language in explaining its plight and its program to contractors of all sizes.

Lt. Gen. Clarence S. Irvine, Deputy Chief of Staff, Materiel, has been the most frank and prolific. The trend toward expenditure control, the general says, should be no cause for panic in the aircraft industry. It will be important, he grants, but perhaps more weight should be placed on the impact of changing weapon system concepts—the shift to missiles—and the crying need for high-quality company management.

Dollar Availability

Here is General Irvine's summary of the impact of dollar availability on the aircraft and supporting industries:

- **Slowdowns, stretchouts** and cancellations will be handled to save only those weapon systems which promise distinct operational advantages for the Air Force. The mission is the primary problem and USAF no longer cares who makes the weapon or any part of it. Neither does it care where the weapon and its components are made.
- **High bay factory** facilities must be curtailed as we move toward production of more missiles and fewer manned aircraft. Surplus will be eliminated and the maintenance of stand-by space will be cut down as a luxury USAF cannot afford.
- **USAF will take** a dim view toward financing new facilities unless they can be justified for a top-priority project and there is no possible alternative.
- **Major repair and overhaul** of second line aircraft both at depots and contractor facilities will be curtailed. More money will be made available for new first-line aircraft by cutting down on the work done to keep obsolescent models in the air.

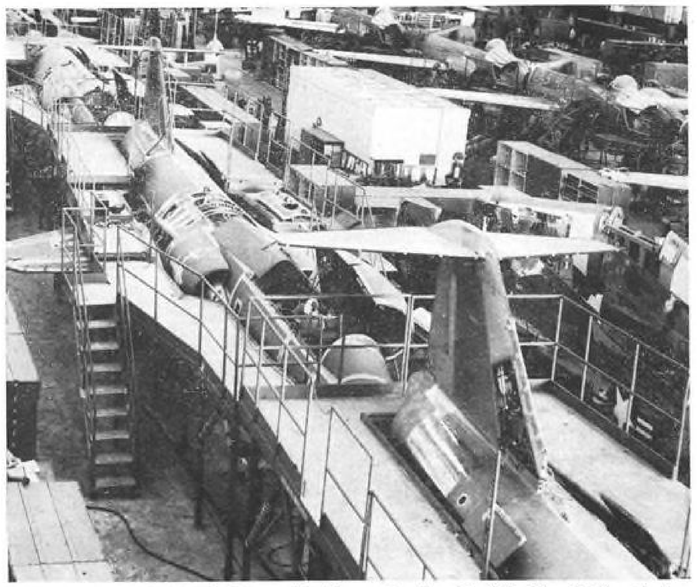
USAF will do what maintenance is possible at local bases, retire older planes when they can't be flown without major repairs.

Along with these simple lines of economy action, there is an increasingly stern attitude toward sloppy management.

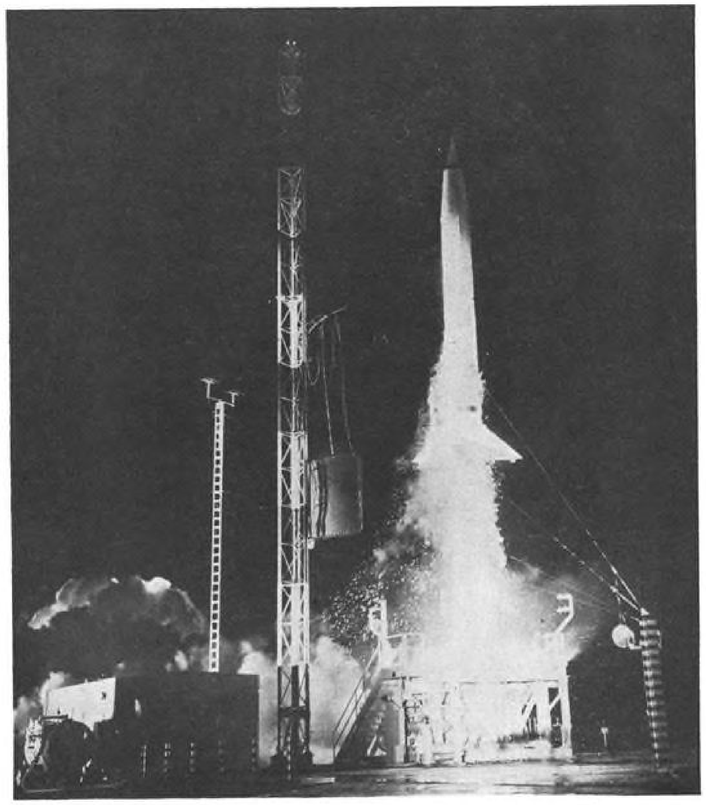
Says General Irvine:

"If expenditures run over the estimates we will reduce the quantity or —if the price per unit goes too high— we may cancel the project.

"The day of over-runs is past. Poor planning, poor estimating—all connote poor management—so some old familiar faces may be missing."



F-104A STARFIGHTER final assembly line at Lockheed's Palmdale, Calif., plant.



VANGUARD test vehicle, indicative of changing weapon system concepts.

Navy Procurement Tied to Budget

Washington—Two factors—an unprecedented defense economy drive, followed by Soviet technological gains—will vitally influence Navy strategy and the resulting procurement policies in the coming months.

In spite of the impetus given the country's defense effort by Soviet missile firings and Sputnik launchings, economy will continue to be a watchword, and emphasis on getting the most for the procurement dollar will be higher than ever.

Basic procurement and contracting procedures are not expected to change as the Fiscal 1959 budget proceeds through Congress. Streamlining efforts begun in the Bureau of Aeronautics' research and development contracting two years ago will continue to influence procurement and should gain in importance as reduction of costs and lead time become more essential.

Launching of Soviet satellites came at what many considered a critical time for the future of a number of aviation firms and research and development organizations.

Budget cuts and spending ceilings had began to slash not only fat but, in some cases, muscle as well. Navy generally had avoided most of pitfalls that trapped Air Force and its contractors—primarily because Navy had budgeted more tightly over the past several years, and because it had surface ships to sacrifice as missile and aircraft costs increased drastically.

Nevertheless, tighter budget restrictions tended to slow developmental progress of anti-submarine and early warning aircraft, missiles, etc.

Now that Soviet achievements have added a new urgency to scientific, technological and military efforts, development and procurement of new weapons are expected to make some jumps over what normally would be the orderly sequence—eliminating some marginal and short-range projects in favor of longer range payoffs.

All this will be done, however, with the dollar sign still a highly important factor in the formula. The Administration has made it clear, and scientists and military men have agreed, that merely opening the cash register will not solve the country's problem.

Navy Secretary Thomas S. Gates, Jr., made some pre-Sputnik observations on weapons costs that still are considered valid, although he spoke before the need for a revitalized defense program became apparent.

". . . I see sea-based air controlling the seas as it has since the airplane came of age," Gates told an Institute of Aeronautical Sciences audience in mid-year. "But to realize all this, we must reduce drastically the costs of hardware and of operations.

"Dollars, of course, are not everything. But in peacetime and in wartime, they are the best measure of manpower, material and effort that we have been able to devise.

"So clearly what we want is military worth—the most military value for the money. Where the military worth is high, we will buy. Where it is not, we won't. It's as simple as that.

"And what is military value? It is that combination of careful, ingenious design, advanced technology and down-to-earth common sense that yields the simplest, lightest, most reliable weapon to do the job. And not one thing more."

Meeting a greater technological challenge than before with continued emphasis on economy will mean considerably greater selectivity in sponsoring weapons systems.

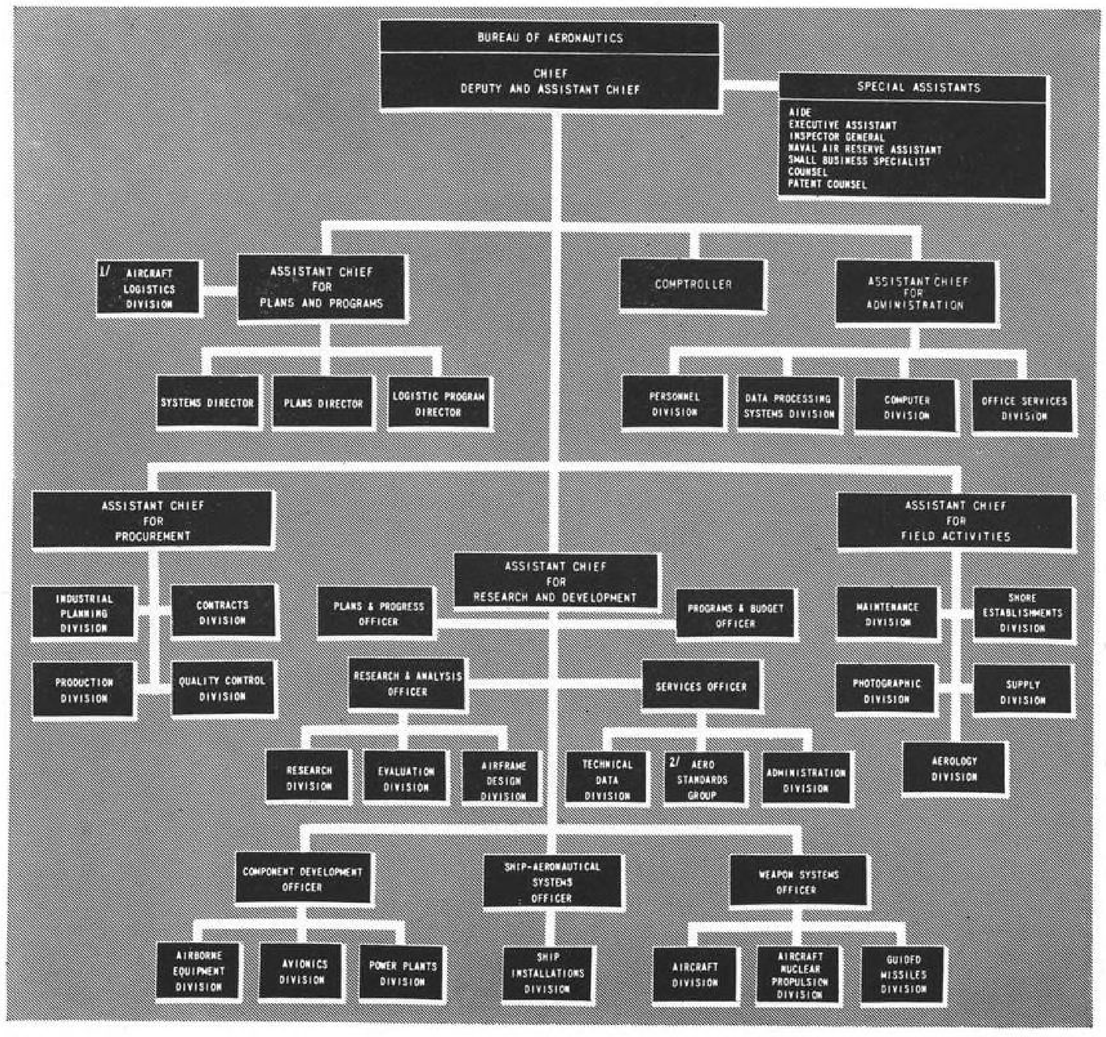
Interest in rocket-augmented aircraft flight, superior missiles, stronger warning and anti-submarine programs and more advanced efforts in the high-altitude and space flight areas should increase more rapidly than they would have without the recent Russian gains.

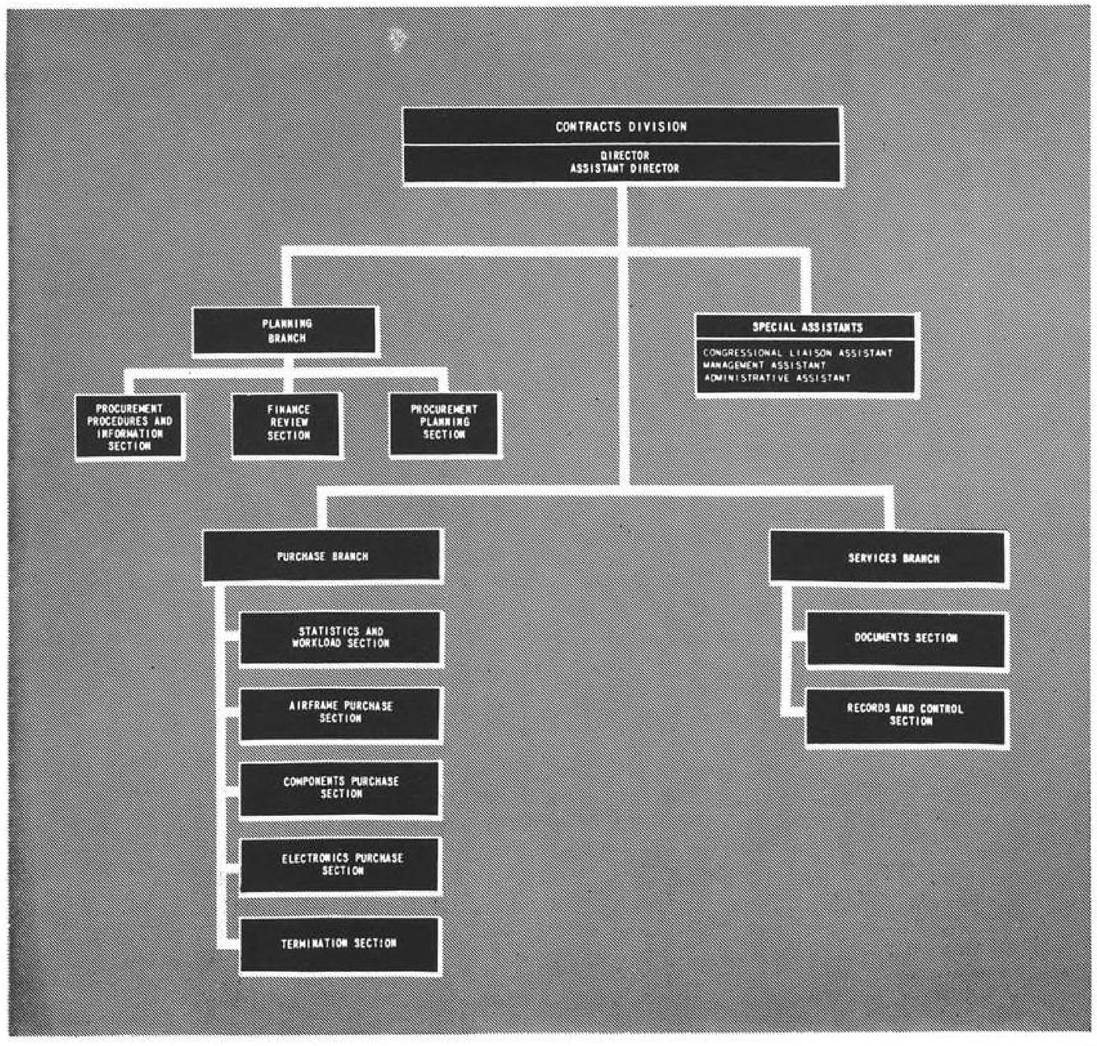
BuAer's reorganization of research and development and procurement have had two general goals—bringing contractors in on more long-range planning for the obvious benefits to both sides, and orienting personnel in all areas of the Bureau to the concept that "procurement is everybody's business, the engineer's, the requirements people, etc." in order to cut down transition time from research to development to test to production.

Both goals are a part of the larger one of getting better weapons, cheaper and quicker.

Key contacts for BuAer procurement discussions are Rear Adm. W. T. Hines, Assistant Chief for Procurement, and the Bureau's small business specialist, Cmdr. Dale S. Good.

Navy Purchasing Office here handles most advertised bidding procurement for larger aircraft items and Aviation Supply Office in Philadelphia handles procurement of smaller items, overhaul, repair and maintenance, replacement quantities, etc.





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 actual 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 quality 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
D. Disadvantages — Identical to Cost-Plus-Fixed-Fee Contracts

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) Administrative work.
   (b) Not as satisfactory legally as a firm contract.

Military Sales: Where to Go, Whom to See

DEPARTMENT OF THE AIR FORCE

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, Oklahoma City Air Materiel Area, Tinker P. O. Box 1395, Baltimore, Md., Attn: Directorate of Procurement.
Basic research. Also research and development for armament and certain other items.

Commander, Oklahoma City Air Material Area, Tinker Air Force Base, Oklahoma City, Okla., Attn: Directorate of Procurement and Production.
Aircraft miscellaneous accessories and maintenance parts (except belts—safety and shoulder harness); aircraft fuel, hydraulic vacuum, oil, and deicer systems.

Commander, Gadsden Air Force Depot, Gadsden, Ala., Attn: Directorate of Procurement and Production.
Air conditioning and refrigeration equipment; heating, ventilating, plumbing, and steam fitting equipment; packaging materials (except paper).

Gentile Air Force Depot, Wilmington Pike, Dayton, Ohio. Attn: Directorate of Procurement and Production.
Electrical lamps and fuses; electrical terminals, connectors, insulators, knobs, dials, capacitors, switches, circuit breakers, relays, contactors, solenoids, coils, transformers, vacuum tubes, and related items; radio crystals; laboratory and shop testing equipment; inspection gages.

Commander, Mallory Air Force Depot, Memphis, Tenn., Attn: Directorate of Procurement and Production.
Anti-friction bearings; special hand tools and tool kits; food services equipment and maintenance parts (except mess and galley utensils); live animals (for laboratory purposes); animal equipment and supplies (except saddlery, harness and whips).

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 electrical 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: Direc-

torate 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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BUYING DIVISION OF PROCUREMENT DIRECTORATE

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Dep. Chief: Mr. L. R. Koepnick, Rm. 101, Blg. 16B, Ext. 32307, 32307.
Admin. Exec.: Col. J. S. Pirruccello, Rm. 101, Bldg. 16B, Ext. 32307.
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Chief, Production Office: Col. R. J. Meyer, Rm. 107, Blg. 16B, Ext. 21100.
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Air Materiel Areas and Air Force Depots are responsible to Headquarters, Air Materiel Command, Wright-Patterson Air Force Base, Ohio. The Air Procurement Districts are responsible to the Air Materiel Areas under which they are listed.

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 Branch, Office of Inspection, Directorate of Procurement and Production, Headquarters, Air Materiel Command, Wright-Patterson Air Force Base, Ohio, (MCPIC), Telephone: CLearwater 3-7111, Extension 33206.

Middletown Air Materiel Area

Middletown Air Material Area, Olmstead AFB, Middletown, Penn.
Commander: Maj. Gen. George R. Acheson
Deputy: Brig. Gen. Charles B. Root
Dir. of Proc. & Prod.: Col. Louis H. Garrett Ext. 6102
Telephone: Whitney 4-5521 Ext. 3225

Boston Air Procurement District, Boston Army Base, Boston 10, Mass.
Chief: Col. Ernest H. Miller
Deputy: Lt. Col. Philip B. Sussman
Telephone: Liberty 2-6000

Newark Air Procurement District, 218 Market St., Newark, N. J.
Chief: Col Guy Richardson
Deputy: Lt. Col. Joseph H. Selliken
Telephone: Mitchel 3-3434

New York Air Procurement District, 111 E. 16th St., N.Y. 3, N.Y.
Chief: Col. W. R. Godard
Telephone: Spring 7-4200

Philadelphia Air Procurement District, 1411 Walnut St., Phil. 2, Penn.
Chief: Lt. Col. Joseph Magdich, Jr.
Telephone: Locust 7-3886

Rochester Air Procurement District, 20 Symington Place, Rochester 3, N.Y.
Chief: Col. Alexander S. Young
Deputy: Lt. Col. John Reid
Telephone: Genesee 1815 Ext 1

Mobile Air Materiel Area

Mobile Air Materiel Area, Brookley AFB, Alabama
Commander: Maj. Gen. Daniel F. Callahan
Deputy: Col. John A. Pechuls—Hemlock 8-5201
Dir. of Proc. & Prod.: Col. Donald A. Olson Ext. 8-5282
Telephone: Hemlock 8-3461

Cleveland Air Procurement District, 1279 W. Third St., Cleveland 13, Ohio
Chief: Lt. Col. E. F. Pezda
Telephone: Cherry 1-7900

Dayton Air Procurement District, Bldg. 70, Area "C", Wright-Patterson AFB, Ohio
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Telephone: Kenmore 7111 Ext. 6-4131

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Telephone: Texas 4-9000

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Chief: Lt. Col. Baird
Telephone: Melrose 2-1561 Ext. 501

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Deputy: Major Kenneth H. Ducat
Telephone: Broadway 2-4093 Ext. 33

St. Louis Air Procurement District, 1114 Market St., St. Louis 1, Missouri
Chief: Col. Paul G. Dolan
Telephone: Main 1-8100 Ext. 2333-2334

Sacramento Air Materiel Area

Sacramento Air Materiel Area, McClellan AFB, Calif.
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Deputy: Col. Herbert H. Tellman
Dir. of Proc. & Prod.: Col. John R. Collidge Ext. 3142
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Telephone: Twin Oaks 3-4100

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Dir. of Proc. & Prod.: Col. D. L. Redd
Telephone: San Bernardino 9-4411

Arizona Air Procurement District, P. O. Box 5555, Helen St. Annex, Tucson, Arizona
Chief: Maj. Charles P. Cato, Jr.
Deputy: Capt. Arthur L. Lovering
Telephone: Tucson 4-2711

Los Angeles Air Procurement District, P. O. Box 2642, Terminal Annex, 1206 S. Maple St., Los Angeles, Calif.
Chief: Col. R. V. Kirkland
Deputy: Lt. Col. Hal T. Walker
Telephone: Richmond 9-4711, Ext. 501

San Diego Air Procurement District, P. O. Box 1548, Old San Diego Station, San Diego 10, Calif.
Chief: Lt. Col. Charles R. Douglass
Deputy: Capt. Samuel E. Fant
Telephone: Cyprus 8-7121

Warner Robins Air Materiel Area

Warner Robins Air Materiel Area, Robins AFB, Georgia
Commander: Maj. Gen. A. V. P. Anderson, Jr.
Deputy: Col. Norman C. Spencer, Jr.
Dir. of Proc. & Prod.: Col. Thomas O. Lawton, Jr. Ext. 473
Telephone: Walker 2-5341, Ext. 204

Atlanta Air Procurement District, 41 Exchange Pl., S.E., Atlanta, Georgia
Chief: Col. Loren A. Bryan, Sr.
Telephone: Jackson 2-4121

Air Force Depots

Maywood Air Force Depot, Cheli Air Force Station, P. O. Box 310, Maywood, Calif.
Commander: Col. Leroy Hudson
Dir. of Proc. & Prod.: L/Col. Charles N. Keppler
Telephone: Angelus 8-5292

Gadsden Air Force Depot, Gadsden AF Station, Gadsden, Alabama
Commander: Col. Lorry N. Tindal
Dir. of Proc. & Prod.: L/Col. James B. Carraway
Telephone: Liberty 6-9271

Dayton Air Force Depot, Gentile AF Station, Dayton, Ohio
Commander: Brig. Gen. Charles A. Heim
Deputy: Col. Alton A. Denton
Dir. of Proc. & Prod.: Col. Robert L. Salzarulo Ext. 505
Telephone: Madison 6551

Shelby Air Force Depot, Wilkins AF Station—Box 524, Shelby, Ohio
Commander: Col. Lester L. Kunish
Dir. of Proc. & Prod.: L/Col. Arthur G. Frankel, Jr. Ext. 201
Telephone: Shelby 3-2010

Memphis Air Force Depot, Mallory AF Station, 3300 Jackson Ave., Memphis, Tennessee
Commander: Col. Charles A. Piddock
Deputy: Col. William T. Kemp, Jr.
Dir. of Proc. & Prod.: Lt. Col. James M. Matthews, Jr. Ext. 262
Telephone: Glendale 8-4411

Rome Air Force Depot, Griffiss AF Base, Rome, N.Y.
Commander: Brig. Gen. Clyde H. Mitchell
Dir. of Proc. & Prod.: Lt. Col. H. E. Greuter
Telephone: 3-200

Topeka Air Force Depot, Topeka AF Station, Topeka, Kansas
Commander: Col. Loran J. Anderson
Dir. of Proc. & Prod.: Lt. Col. Raymond J. Kane, Jr. Ext. 254
Telephone: 5-6211

USAF Small Business Specialists

Assistant for Small Business, AFMPP-SB, Room 4D257, Pentagon, Washington 25, D. C.
Mr. J. K. Weddell
Telephone: Hq, USAF-74126

Executive for Small Business, MCP-5, Room 108, Bldg. 11, WPAFB (Dayton), Ohio
Mr. M. L. Johnson
Telephone: Hq, AMC-23222

Middletown Air Materiel Area

Middletown AMA, Olmsted Air Force Base, Middletown, Pa.
Mr. R. A. Mac Millan
Telephone: Whitney 4-5521, Ext. 72233

Boston Air Procurement District, Boston Army Base, Boston, Mass.
Mr. E. J. Fitzgerald
Mr. R. F. Murray
Telephone: Liberty 2-6000, Ext. 887

Newark Air Procurement District, 218 Market Street, Newark, New Jersey
Mr. V. J. Farrell
Mr. J. Lewis
Telephone: Mitchell 3-3434, Ext. 125

New York Air Procurement District, 111 E. 16th Street, New York 3, N. Y.
Mr. L. N. Koivula
Mr. E. J. Holden
Telephone: Spring 7-4200, Ext. 690-2

Philadelphia Air Procurement District, 1411 Walnut Street, Philadelphia 2, Pa.
Mr. J. A. Walter
Mr. J. Rowbottom
Telephone: Locust 7-3886, Ext. 254

Pittsburgh Air Procurement Office, Old Post Office Bldg., Pittsburgh 19, Pa.

Rochester Air Procurement District, 20 Symington Place, Rochester 3, N. Y.
Mr. H. Huntington
Telephone: Genesee 1815

Buffalo Air Procurement Office, 1021 Main Street, Buffalo, N. Y.

Johnson City Air Procurement Office, 600 Main Street, Johnson City, N. Y.

Mobile Air Materiel Area

Mobile AMA, Brookley Air Force Base, Mobile, Alabama
Mr. L. L. McKean
Telephone: Hemlock 8-3461, Ext. 8227

Cleveland Air Procurement District, 1279 W. Third Street, Cleveland 13, Ohio
Mr. J. B. Colvard
Telephone: Cherry 1-7900, Ext. 228

Dayton Air Procurement District, Bldg. 70, Area "C" WPAFB, Ohio
Mr. P. E. Birkhold
Telephone: Clearwater 3-7111, Ext. 53137

Cincinnati Air Proc. Office, 2nd Floor, Big Four Railroad Bldg., Cincinnati 2, Ohio
Telephone: Dunbar 2200

Detroit Air Procurement District, W. Warren Avenue & Lonyo Boulevard, Detroit 32, Mich.
Mr. Hugh McGowan
Telephone: Texas 4-900, Ext. 143

Grand Rapids Sub-Office, Wurzburg Bldg., 220-232 Monroe Avenue, N-W., Grand Rapids 2, Mich.
Mr. Jesse N. Crofoot
Telephone: Glendale 9-8251

Indianapolis Air Procurement District, 54 Monument Circle, Indianapolis 6, Ind.
Mr. W. L. Bayt
Telephone: Melrose 2-1561

Fort Wayne Air Proc. Office, 826 Ewing Street, Fort Wayne, Ind.
Mr. W. O. Luke

South Bend Air Proc. Office, 521 N. Eclipse Place, South Bend, Ind.
Mr. E. J. Koehler
Telephone: 3-2101

Oklahoma City Air Materiel Area

Oklahoma City AMA, Tinker Air Force Base, Oklahoma City, Okla.
Mr. H. W. Ray
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Chicago Air Procurement District, 5555 S. Archer Avenue, Chicago 38, Ill.
Mr. V. J. Ripp
Telephone: Reliance 5-3000

Milwaukee Air Procurement District, 770 N. Plankinton Avenue, Milwaukee, Wisc.
Mr. R. H. Leitch
Telephone: Broadway 2-4093

Minneapolis Air Proc. Office, 920 Second Avenue, Minneapolis, Minn.

Mr. W. B. Holmberg
Telephone: Federal 3-0115
St. Louis Air Procurement District, 9th Floor, U. S. Court & Customs House, 1114 Market Street, St. Louis, Mo.
Telephone: Main 1-8100, Ext. 2330
Wichita Air Proc. Office, 820 Second Street, Wichita 1, Kansas
Mr. M. W. Odor
Telephone: Amherst 7-0211
Kansas City Air Proc. Office, 601 Hardesty Street, Kansas City, Mo.
Mr. K. M. Thorpe
Telephone: Chestnut 1-7900

Ogden Air Materiel Area

Ogden Air Materiel Area, Hill AFB, Ogden, Utah
Mr. Kurt L. Young
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Denver Air Proc. Office, 3800 N. York Street, Denver 5, Colorado
Mr. S. J. Fill
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Seattle Air Proc. Office, Room 211-212, GSA Bldg., 2460 4th Avenue S, Seattle, Wash.
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Sacramento Air Materiel Area

Sacramento AMA, McClellan AFB, California
Mr. T. M. Spence
Telephone: Wabash 2-1511, Ext. 5112
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San Antonio Air Materiel Area

San Antonio AMA, Kelly Air Force Base, Texas
Mr. Jot E. Neri
Telephone: Walnut 3-5411, Ext. 64192
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Telephone: Riverside 8-5611, Ext. 2388

San Bernardino Air Materiel Area

San Bernardino AMA, Norton Air Force Base, California
Mr. W. J. Dunkerley
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Mr. P. M. Goodwin
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Mr. R. Downing
Telephone: Woodcrest 6611
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Mr. J. W. Gaskins
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Warner Robins Air Materiel Area

Warner Robins AMA, Robins Air Force Base, Georgia
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Atlanta Air Procurement District, 441 W. Peachtree Street, N. E., Atlanta, Georgia
Mr. W. C. Roose
Telephone: Jackson 2-4121, Ex. 580

Air Force Depots

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Telephone: 6-9271, Ext. 131
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Mr. J. P. Broderick
Telephone: Glendale 8-4411, Ext. 276
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Mr. J. J. Dulberg
Telephone: Rome 3200, Ext 71225
Shelby Air Force Depot, Wilkins Air Force Station, Shelby, Ohio
Mr. C. H. Wolfe
Telephone: Shelby 3-2010, Ext. 410
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Mr. H. W. MacNamee
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HQ Air Materiel Command, WPAFB

Hq. AMC, Bldg. 11, Room 108, Wright-Patterson AFB, Ohio
Mr. G. S. Rattenbury
Mr. P. F. Knost
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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.

Alabama

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

Alaska

Eielson AFB, Fairbanks

Arizona

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

Arkansas

Blytheville AFB, Blytheville
Little Rock AFB, Jacksonville

California

Travis AFB, Fairfield
Hamilton AFB, Hamilton
Beale AFB, Marysville
Cheli AF Depot, Maywood
Castle AFB, Merced
Cooke AFB, Lompoc
Edwards AFB, (Near Edwards)
Parks AFB, Pleasanton
George AFB, Victorville
Long Beach Municipal AP, Long Beach
Oxnard AFB, Oxnard
March AFB, Riverside
Mather AFB, Mather Field
McClellan AFB, McClellan
Norton AFB, San Bernardino

Colorado

Ent AFB, Colorado Springs
Lowry AFB, Denver

Washington, D. C.

Andrews AFB
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 AFB, 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, (Warner Robins)

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 Station, 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
Richard-Gebaur AFB, Grandview, Missouri

Montana

Nebraska

Lincoln AFB, Lincoln
Offutt AFB, Omaha

Nevada

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

New Hampshire

Grenier AFB, Manchester
Portsmouth AFB, Portsmouth

New Jersey

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

New Mexico

Kirtland AFB, Albuquerque
Holloman AFB, Alamogordo
Cannon 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

Clinton Co. AFB, Wilmington
Wilkins AF Station, Shelby
Gentile AF Depot, Dayton
Youngstown Mun. AP, Youngstown
Wright-Patterson AFB, Dayton
Wright Air Development Center
Wright-Patterson AFB

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 Station, 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, Randolph Field (San Antonio)
Kelly AFB, San Antonio
Edward 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
Ladd AFB, APO 731, Seattle, Wash. (Fairbanks)
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: Captain John J. Keenan, Jr.
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 Regent 3-3600 X 2231-2232
General Electric Co., Electronics Park, Syracuse, N. Y.
AFPR: Col. Norman J. Beaudrias
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.,

Stratford, Conn.
AFPR: Maj. Charles C. Townsend
Telephone: Drexel 8-6361

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
Deputy: Captain Leonard S. Stone
Telephone: Chapel 9-1100 Ext. 201

Oklahoma City AMA

Allison Div., GMC, Indianapolis, Indiana
AFPR: Col. Thomas B. Ardis
Deputy: Maj. Zack Grey
Telephone: Chapel 4-1541
Boeing Airplane Co., Seattle 14, Wash.
AFPR: Col. Robert J. Walling
Deputy: Lt. Col. Arthur L. Biberstein
Telephone: AXminister 2121
Boeing Airplane Co., Wichita, Kansas
AFPR: Col. Robert E. Lee
Deputy: Lt. Col. George D. Lewis
Telephone: Murray 3-8511 Ext. 6089 or Ext. 6049
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., Evendale Plant, Lockland P. O., Cincinnati 15, Ohio
AFPR: Col. Henry J. Taylor
Deputy: Maj. Harry R. O'Brien
Telephone: Poplar 1-4100 X 1392

Ogden AMA

The Martin Company, Denver, Colorado
AFPR: Col. John P. Gibbons
Deputy: Major Fred J. Zausmer
Northrop Aircraft, Inc., Hawthorne, Calif.
AFPR: Lt. Col. Desider A. Simcoe
Telephone: Oregon 89111 X 1901

Sacramento AMA

Lockheed Aircraft Corp., Marietta, Georgia
AFPR: Col. Edward J. McRay, Jr.
Telephone: 99411 X 3271
Lockheed Aircraft Corp., Factory "A"—P. O. Box 551, Burbank, Calif.
AFPR: Col. Clifford E. Cole
Deputy: Lt. Col. Howard Hutchison
Telephone: Stanley 7-2711 X 81213
North Amrican Aviation, Inc., Los Angeles International Airport, Los Angeles 45, Calif.
AFPR: Col. Daniel A. Cooper
Deputy: Lt. Col. Bert R. Eckstein
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. John C. Grant, Jr.
Telephone: Hudson 1-4931 Ext. 537

San Antonio AMA

Beech Aircraft Corp., 9709 E. Central Ave., Wichita 1, Kansas
AFPR: Major Loren P. Murray, Jr.
Telephone: LD 140
Convair Div., General Dynamics Corp., AF Plant No. 4, P. O. Box 371, Fort Worth, Texas
AFPR: Lt. Col. Leonard J. Hutton
Telephone: Pershing 87311
Convair Div., General Dynamics Corp., P. O. Box 1950, 3165 Pacific Highway, San Diego 12, Calif.
AFPR: Col. George E. Bostwick
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, P. O. Box 865, McGregor, Texas
AFPR: Lt. Col. G. W. McClughan
Telephone: 3330

San Bernardino AMA

Douglas Aircraft Co., Inc., 3855 Lakewood Blvd.—P. O. Box 200, Long Beach 1, Calif.
AFPR: Col. Clair A. Peterson
Deputy: Lt. Col. Donald W. Mack
Telephone: Garfield 9-2441

Warner Robins AMA

Hughes Aircraft Company, Florence & Teale Sts., Culver City, Calif.
AFPR: Lt. Col. B. W. Cowdery
Deputy: Maj. William F. Woolfolk
Telephone: Texas 0-7111 X 2915-2749
The Martin Co., Baltimore, Maryland
AFPR: Lt. Col. Allen Warfield, Jr.
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.

ORDNANCE 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 S. E. Anderson
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 Resources—Brig. General D. R. Ostrander
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—Ltd. Colonel A. L. Thayer
Asst. Chief, Procurement Division—Mr. John Walsh
Contractor Relations & Sources—Mr. S. Milnovsky

Arnold Engineering 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 Proving Ground Center (APGC), Elgin Air Force Base, Florida
Commander—Maj. General R. W. Burns
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 M. F. Cooper
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 J. McKerley
* 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 requirmeents, personnel selection—Classification, training and education, evaluation of personnel proficiency, assessment and control of morale factors.
* Furnishes R&D Procurement support for AFPTRC.

Air Force Special Weapons Center (AFSWC), Kirtland Air Force Base, New Mexico
Commander—Maj. General W. M. Canterbury
Director of Procurement—Major S. W. McDonnel
Air Force components of equipment related to atomic weapons.

Air Force Missile Development Center (AFMDC), Holloman Air Force Base, New Mexico
Commander—Maj. General L. I. Davis
Director of Procurement—Maj. 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—Brig. General D. P. Graul
Director of Procurement—Col. H. Burhanna
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 S. T. Wray
Director of Procurement—Col. J. D. Prodgers
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
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.
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

Curtiss-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
Vertol Aircraft Co., 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.

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 propects, 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 activities (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 purchasd 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, Commissionary 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, 18th & Constitution Ave. NW, Room B-205
Capt. F. A. Allis
Mr. M. Questal
Telephone: Liberty 5-6700, Ext. 66053
*Bureau of Aeronautics, Room 2105, Munitions Bldg.
Cdr. D. S. Goods, USN
Mr. G. W. Wilson
Telephone: Liberty 5-6700, Ext. 66558, 66022
*Bureau of Ordnance, Room 3006, 18th & Constitution Ave. N.W.
Mr. Lenahan
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, 18th & Constitution Ave. N.W., Room 1304
Mr. Michael Chemsak
Mr. H. W. Garrard
Telephone: Liberty 5-6700, Ext. 63695
Bureau of Supplies & Accounts, Room 0235, Main Navy Bldg.
Mr. H. G. Fowler
Telephone: Liberty 5-6700, Ext. 64680
Bureau of Yards & Docks, Room 2A65, Yards & Docks Annex
Capt. Will J. Davis, Jr., USN
Telephone: Liberty 5-6700, Ext. 63726
Military Petroleum Supply Agency, Yards & Docks Annex
Mr. R. A. Wightman
Telephone: Liberty 5-6700, Ext. 56104
Military Sea Transportation Service, Room 2206, T-8, 3800 Newark St. N.W.
Capt. R. M. Barnes, USN
Mr. C. D. Taylor
Telephone: EMerson 2-9600 (Code 192), Ext. 120, 449
*Fuel Supply Office, Naval Gun Factory, 1st & M Sts., 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, 11th & N Streets S.E.
Mr. Kensinger
Telephone: Lincoln 7-5700, Ext. 562
Naval Research Laboratory, Bldg. 32, 2nd Floor, 4th Near Chesapeake, S.W.
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
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, Jr., USMC
Telephone: Liberty 5-6700, Ext. 41939

California

Marine Corps Supply Center, Barstow
Maj. Werner J. Van Buren, USMC
Ext. 314, 234
Marine Corps Base, Camp Pendleton
Mr. W. R. Brunbaugh
Telephone: SAratoga 2-4111, Ext. 8004
Marine Corps Air Station, El Toro
Mr. E. T. Wilkins
Telephone: LIncoln 4-1230, Ext. 385
*Navy Purchasing Office, 1206 South Santee Street, Los Angeles
Mr. Bert Friedman
Telephone: Richmond 9-4711, Ext. 1466
*Yards & Docks Supply Office, U. S. Naval Construction Center, Port Hueneme
Mrs. Olive E. Sherman
Telephone: Hunter 6-1651, Ext. 8515
*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. Raymond C. Garfas
Telephone: Prospect 6-2200, Ext. 6266
Marine Corps Recruit Depot, San Diego
Capt. F. B. Morris, USMC
Telephone CYpress 8-3941, Ext. 786

Connecticut

U. S. Naval Submarine Base, New London
Lt. J.G. J. B. Nulty, USN
Telephone: Gibson 2-4411, Ext. 308

Florida

Naval Air Station, Bldg. 110, Jacksonville
Mr. John E. Colvin
Telephone: Evergreen 9-7711, Ext. 613
Marine Corps Air Station, Miami
Lt. Vincent C. Ecoffey, USN
Telephone: Murry 8-3511, Ext. 210
Naval Mine Defense Lab., Panama City
Lt. H. R. Davis
Telephone: Sunset 5-5285, Ext. 342
Naval Air Station, Bldg. 603, Pensacola
Telephone: Glendale 5-3211, Ext. 3195

Georgia

Marine Corps Supply Center, Albany
Lt. Col. F. J. Cermak, USMC
Telephone: HEmlock 5-3451, Ext. 221
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
U. S. Naval Avionics Facility, Indianapolis
Marshall T. Wampler
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: VOlunteer 3-3111, Ext. 201
Naval Academy, Annapolis
Mr. John Peel, Jr.
Telephone: Colonial 3-2611, Ext. 739
Naval Powder Factory, Indian Head
Mr. J. A. Kenlon
Telephone: Riverside 3-2111, Ext. 193
Naval Hydrographic Office, Suitland
Mr. J. R. Newberry
Telephone: Jordan 8-9060, Ext. 205

Massachusetts

Naval Shipyard, Bldg. 149, Boston
Mr. A. J. Dolan
Telephone: Charleston 2-1400, Ext. 206

New Hampshire

Naval Shipyard, Bldg. 153, Portsmouth
Mr. Winfield O. Sprague
Telephone: IDlewood 9-1000, Ext. 424

New York

Military Medical Supply Agency, Brooklyn
Mr. A. Hornbacher
Telephone: MAin 5-4581, Ext. 488
Navy Ships Stores Office, 3rd Ave. & 29th St., Brooklyn
Mr. E. A. Malone
Telephone: STerling 8-5000, Ext. 352
U. S. Navy Purchasing Office, Brooklyn
Mr. Joseph Riemer
Telephone: STerling 8-5000, Ext. 623
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, 433

North Carolina

U. S. Marine Corps Air Station, Cherry Point
Mr. George Mizesko
Telephone: Ext. 22258
U. S. Marine Corps Base, Camp LeJeune

Oklahoma

Naval Ammunition Depot, McAlester
Mr. P. Pettit
Telephone: GA 3-6330, 411

Pennsylvania

U. S. Naval Air Development Center, Johnsville
Mr. G. F. Argetsinger
Telephone: OSborne 5-7000, Ext. 265
Ships Parts Control Center, Mechanicsburg
Mr. Leo A. Yeager
Ordnance Supply Office, Mechanicsburg
Mr. J. A. Woodward
Telephone: Poplar 6-4751, Ext. 774
*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
LCDR Raymond H. Bates, USN
Telephone: Howard 5-1000, Ext. 3695
*General Stores Supply Office, 700 Robbins Avenue, Philadelphia
Mr. S. Charles
Telephone: Pilgrim 2-1000, Ext. 749
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. U. P. Manganato
Telephone: Kingsley 6-2000, Ext. 343
Naval Ordnance Plant, York
Mr. E. J. Yergo
Telephone: York 7821, Ext. 245

Rhode Island

Naval Supply Depot, Bldg. 11, Coddington Cove, Newport
Lillian L. Whitty
Telephone: VI 7-2280, Ext. 588

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. 411

Texas

Naval Air Station, Corpus Christi
Mr. Otto R. Gessling
Telephone: Terminal 5-8211, Ext. 2278
Naval Station, Orange
Mr. W. A. Bruce
Telephone: TUxedo 3-4311, Ext. 215

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
Marine Corps Supply Forwarding Annex, Portsmouth
Mr. S. W. Lankford, Jr.
Telephone: EXport 9-7541, Ext. 60
Norfolk Naval Shipyard
Mr. L. C. Shaughnessy
Telephone: EXport 7-6541, Ext. 2046
Marine Corps Schools, Quantico
LTCOL R. S. Anderson, USMC
Telephone: Quantico 1000

Washington

Puget Sound Naval Shipyard, Bremerton
Lt. E. P. Watt
Mr. Shenenberger
Telephone: Essex 3-5011, Ext. 07-355
Naval Supply Depot, Seattle
LCDR E. E. Bramhall (SC) USN
Telephone: Alder 5200, Ext. 421
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Telephone: Watkins 4-5000, Ext. 470
Cornell Aeronautical Lab., P. O. Box 235, Buffalo 21, N. Y.
Cdr. E. G. Bull, USN
Telephone: Plaza 7500 Ext. 315
The 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.
Cdr. J. F. Rigg, USN
Telephone: Wells 11500—Olympia 8-5300 X-445
Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
Cdr. R. W. Raddatz, USN
Telephone: National 3-1621 Ext. 301
The Kaman Aircraft Corp., Bloomfield, Conn.
LCdr. J. D. Warner, USN
Telephone: Hartford Chapel—24481 Ext. 275
Kollsman Instrument Corp., 80-08 45th Ave., Elmhurst 73, L. I., N. Y.
Cdr. R. L. Smith, USN
Telephone: Newton 9-2900 Ext. 560
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Capt. F. A. Roby, Jr., USN
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Cdr. J. Y. Lichtenwalner, USN
Telephone: Rockaway 9-2323 Worth 4-8244 X205
Vertol Aircraft Corp., Morton, Pa.
Cdr. W. D. Caboury, USN
Telephone: Kingswood 3-4000
Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.
Cdr. E. N. Eisenhart, USN
Telephone: Atlas 8-2000 Ext. 2153
Curtiss-Wright Corp., Wright Aeronautical Div., Wood-Ridge, N. J.
Mr. A. R. Pico
Telephone: Prescott 7-2900 Ext. 504

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RADM J. N. Murphy, USN
Telephone: Kenmore 7111, Ext. 32314
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Telephone: Stadium 4-7127 Ext. 251
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Cdr. W. D. Windley, USN
Telephone: Atlas 4343, Ext. 675
McDonnell Aircraft Corp., P. O. Box 516, St. Louis 3, Mo.
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Telephone: Pershing 1-2121 Ext. 344, 345
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Capt. D. E. Dressendorfer, USN
Telephone: Andrews 2-3211 Ext. 308
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Cdr. K. J. Mathis, USN
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LCdr. S. J. Brocato, USN
Telephone: Yukon 6-4551, Ext. 240-241
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Cdr. R. E. Irons, USN
No. American Aviation, Inc., Los Angeles 45, Calif.
Cdr. D. W. Watkins, Jr., USN
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Industrial mobilization planning: Industrial Mobilization and Procurement Planning Division of the above agency.
Research and development and introduction of new items: Armed Services Medical Material Standardization Committee, 23rd and E Streets, NW., Washington 25, D. C.
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Petroleum and related products.

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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.
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Commanding Officer, Small Arms Ammunition Center, 4300 Goodfellow Boulevard, St. Louis 20, Mo.
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Commanding Officer, Frankford Arsenal, Bridesburg Station, Philadelphia 37, Pa.
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Commanding Officer, Rock Island Arsenal, Rock Island, Ill.
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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.
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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, Sacramento, Calif.

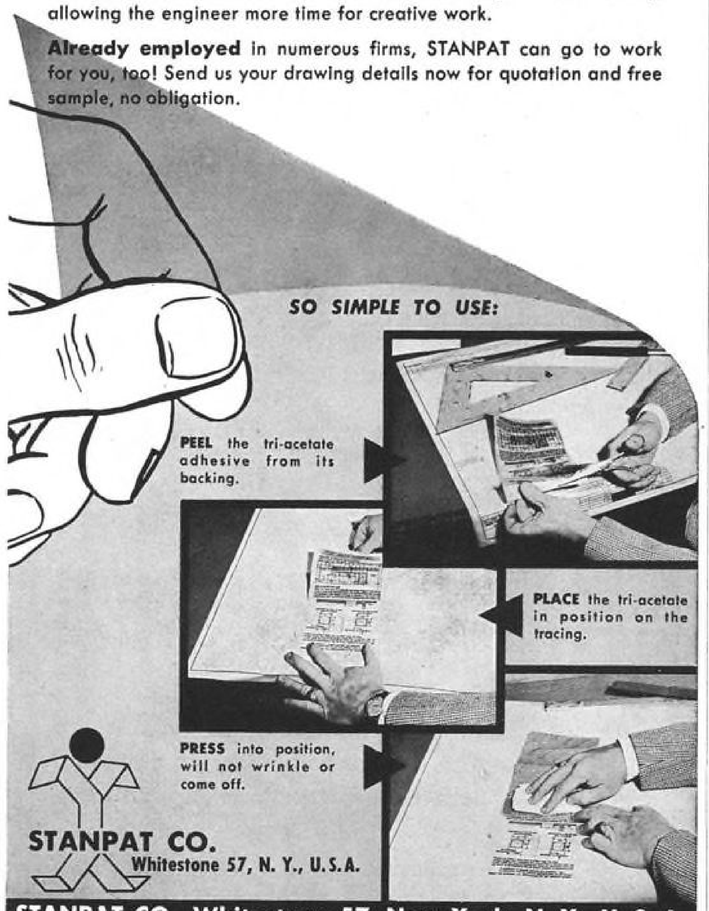
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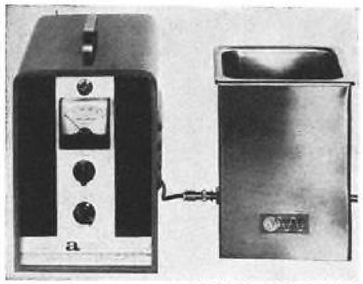
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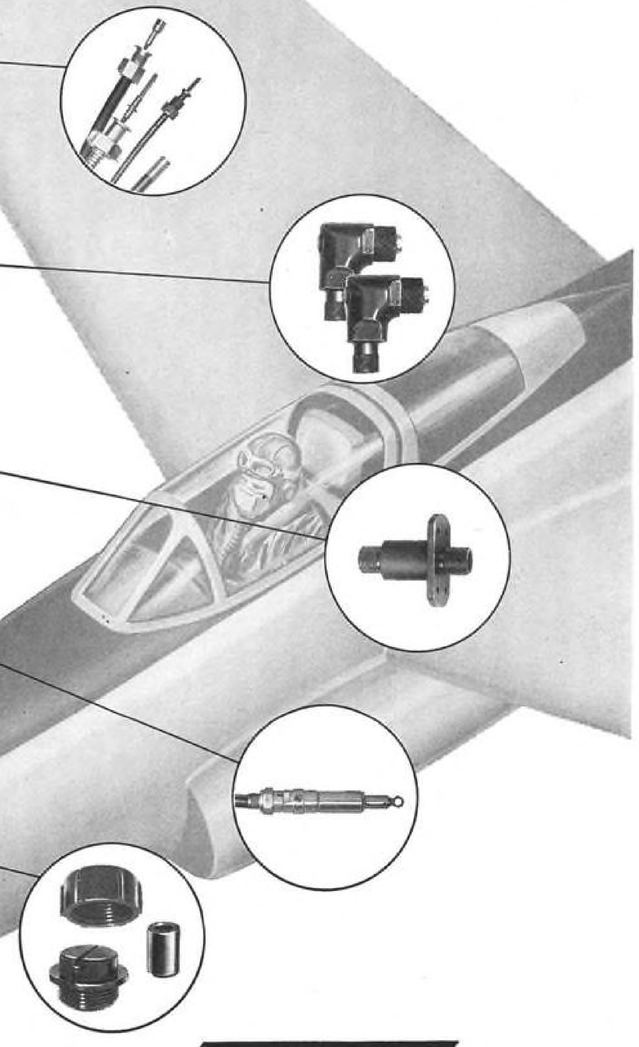
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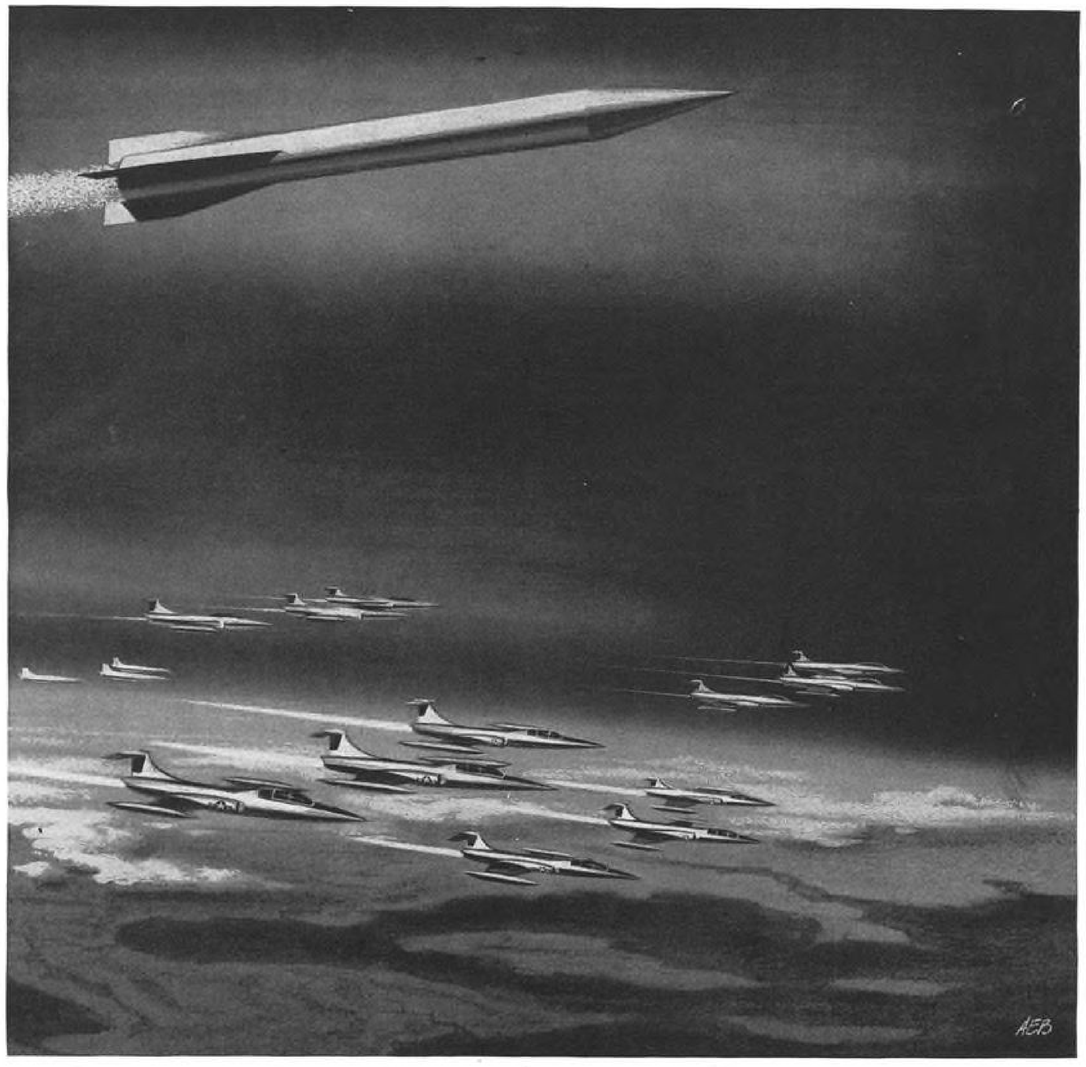


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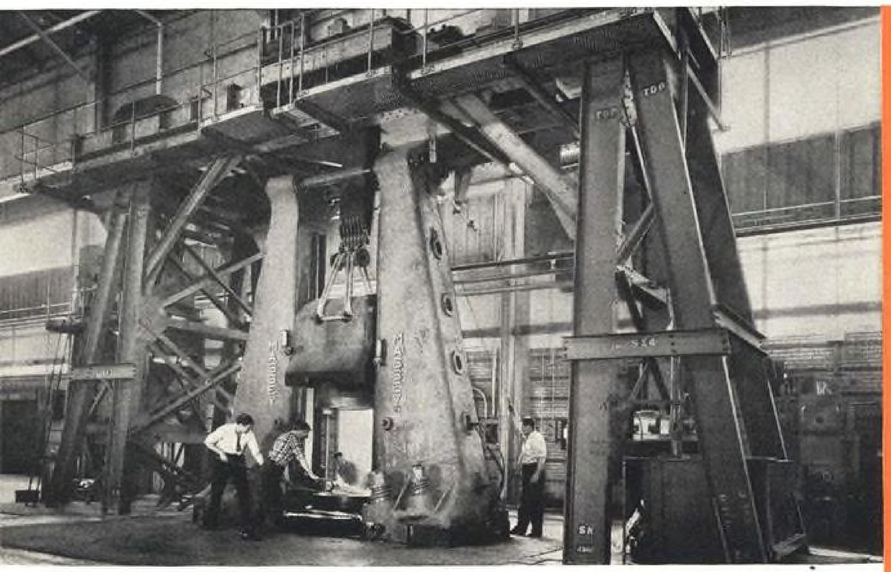
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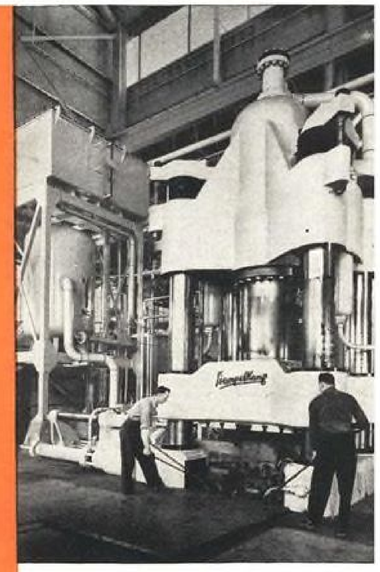
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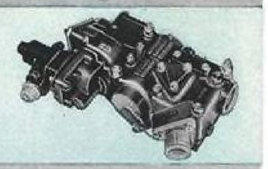
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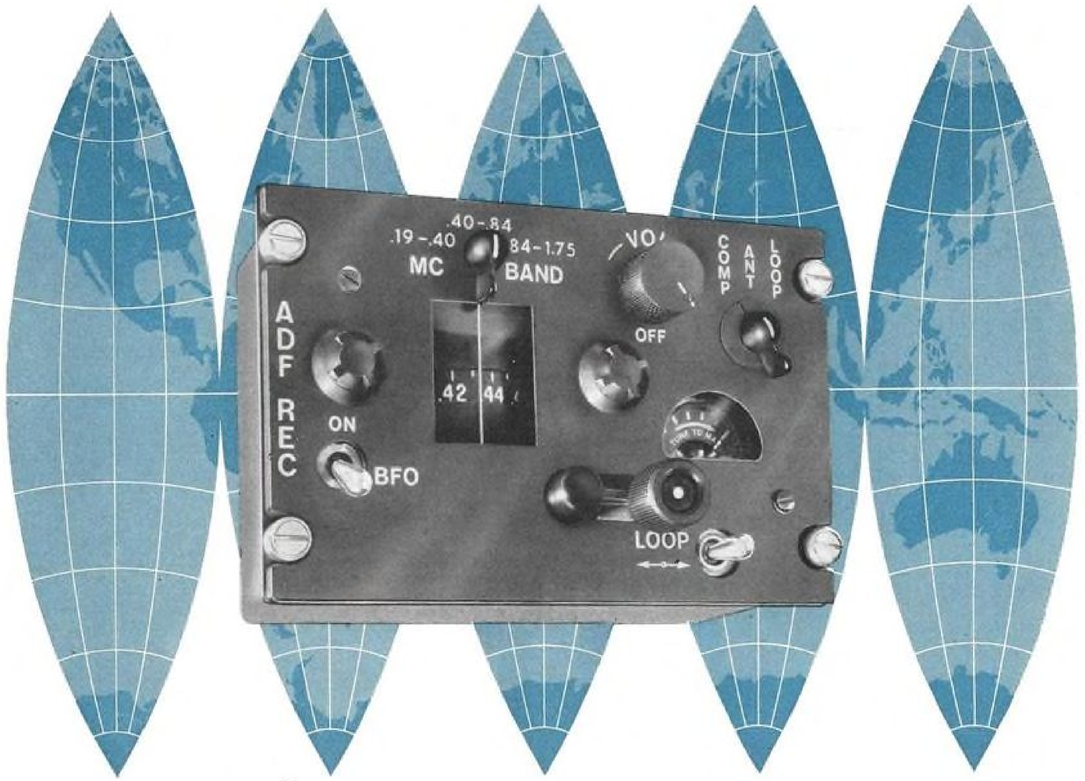
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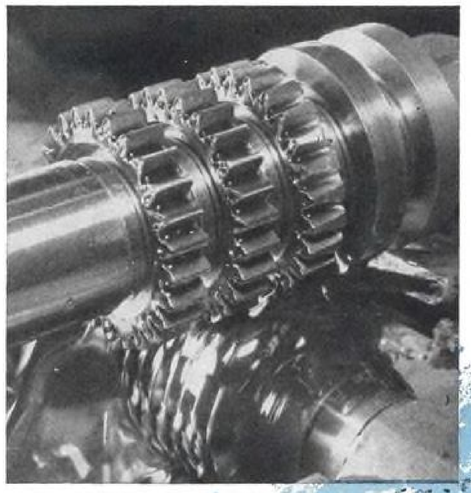


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SECTION **A**

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Selective Buying Stimulates Competition

By Irving Stone

New aircraft must bring substantial hikes in performance and utility to sell in a market made keenly competitive by limited purchasing power in military and civilian buyers. This basic condition demands comparable improvement in product right down the line from chief designer to parts supplier.

Despite greater selectivity by buyers because of limited purchasing power, there will be a distinct market for equipment which can pay its own way. This applies to both military and commercial fields. Outlook for the commercial market undoubtedly looks promising. Substantial military volume is indicated by the recent statement of Maj. Gen. Clarence L. Irvine: ". . . manned bombers and fighter-interceptors will be vital to national defense for a long time to come. . . . I am convinced that the flying Air Force will be the nation's primary deterrent force for as far into the future as we can see."

In one sense, challenge of product improvement in the manned aircraft field is more critical than in missiles. Repetitive manned flight at higher and higher speeds puts a stiff requirement on long life reliability. Missiles, too, demand top reliability, but the one-shot mission involves a relatively short-life for components. And field of manned aircraft, as in the past, probably will continue to be a breeding place for many missile equipment refinements.

Aircraft design project heads don't hesitate to say that segments of supporting industry, with their various products, aren't always completely alert in anticipating future operational demands and should refine or introduce new products accordingly. In this aeronautical era, where obsolescence frequently is a guest at the equipment's operational debut, it's a necessity to keep up with the pace of technical progress. Those that don't frequently find development time too great to meet a critical delivery date.

One way to sense coming operational demands for equipment is to solicit suggestions from aircraft project engineers or others in specialized departments. These leads won't always be capable of translation into practical hardware in time to meet current projects but they can pay big dividends by being phased into model refinements and new aircraft designs.

Informal conversation with project specialists after they have delivered papers at technical meetings frequently reveals valuable requirement details which could not be brought out during the talk for lack of time.

Manufacturing Research

One of the big factors in meeting design requirements for future aircraft and associated items is manufacturing research. This spadework is rapidly stepping up its importance to cut down valuable production time. In some instances manufacturing research will mean the difference between being able to fabricate an item to meet a rigid design requirement or not being able to meet the requirement at all. This could apply to the gamut of details from aircraft structural components through equipment components down to the small, but vital, hardware.

Some aircraft manufacturers have sensed the urgency of this manufacturing research, have given it high priority, projected it to meet design requirements 10 years ahead. Problems to be solved fall into such main categories as machining, forming, welding, bonding, riveting, heat treating and processing control. These same areas can prove fruitful areas of research for subcontractors, and for equipment, component and parts suppliers, to boost the market through faster delivery of a superior product.

Machine tool builder of both large and small units is in a strategic position to aid the aircraft industry with its manufacturing problems. Just as suppliers of components, equipment and parts can profit by anticipation of aircraft design requirements, the machine tool builder can garner invaluable information for coming markets by ferreting out information on what manufacturers of airframes and miscellaneous items would like to be able to do in the shop in the next go-around for advanced aircraft.

Best way to get this information, industry engineering planners point out, is to maintain closer liaison with the various industry segments to promote long-range thinking. This will set in motion ideas for machine refinements, with the result that they will be able to be introduced earlier to a market where new materials of construction will demand new approaches in manufacturing techniques.

Production engineers are quick to point out that manufacturing advances generally haven't kept up with rapid development of weapon systems, that many of the tool refinements and innovations required for the fast-changing aeronautical picture aren't yet within industry's grasp. Radical changes in tools, they say, shouldn't await industry- or government-sponsored competitions.

Simplification

Simplification is a vital characteristic that can't be pursued too energetically according to aircraft users—both commercial and military. Complaint is that aircraft—and almost all things in them—are too difficult to maintain. Frequent result is increased down-time, less utilization. For commercial operators this means more expense, less profits. For military organizations more expense is coupled with lack of overall readiness. Maintenance supervisors remember items that compound initial trouble with difficult remedying.

Operators are putting extra stress on demands for simplification because general trend toward complexity has caused a corresponding rise in levels of technology and skills required for maintenance jobs. Not only does this require unusual specialization, it also becomes difficult to find and then retain skilled personnel.

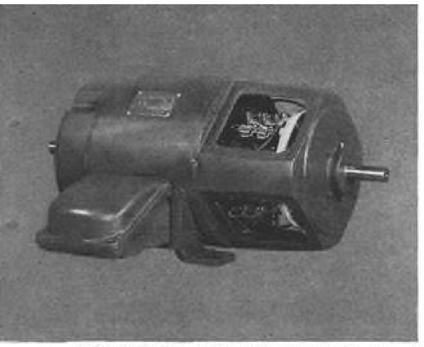
Simplification, wherever possible, has been made a prime goal by designers and manufacturers of the coming models of jet transports. This same accent on simplification will be carried over to succeeding models, and vendors of components, equipment and parts have a large field now and ahead to introduce product simplification to designers and manufacturers.

Added Markets

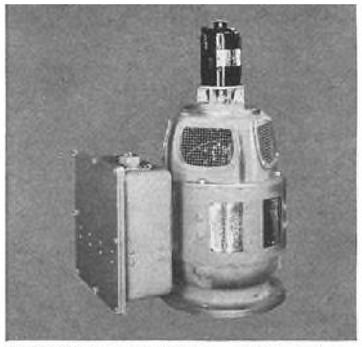
Growth of private and executive aircraft fields offers other fruitful markets where product simplification is translated into less maintenance costs.

On the military side, one aircraft manufacturer five years ago sensed the importance of keynoting simplicity to combat complexity trends. This philosophy was applied all along the line in a particular aircraft, embraced structure, equipment packaging, access. Direct benefits included easier assembly, faster production, simpler maintenance, and less weight.

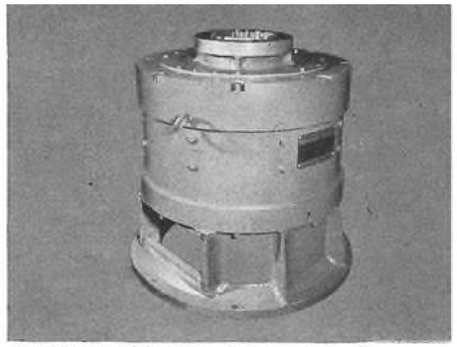
Any supplier of components, equipment or parts who blends with this type of design philosophy and can anticipate it, with respect to its product, years ahead of the time the aircraft becomes operational, gets a quick and worthy reputation in the industry.



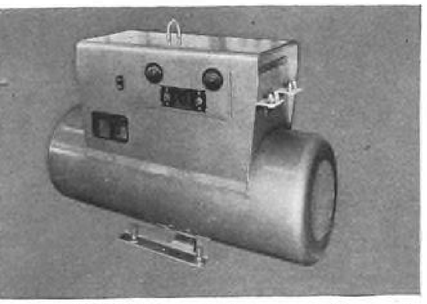
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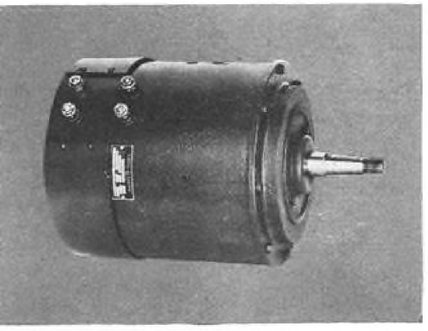
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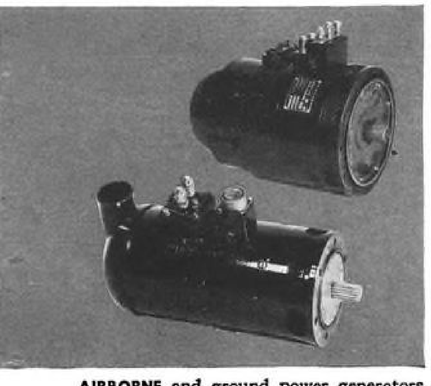
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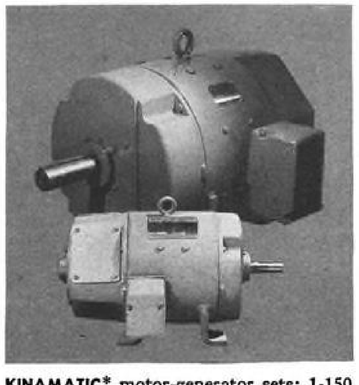
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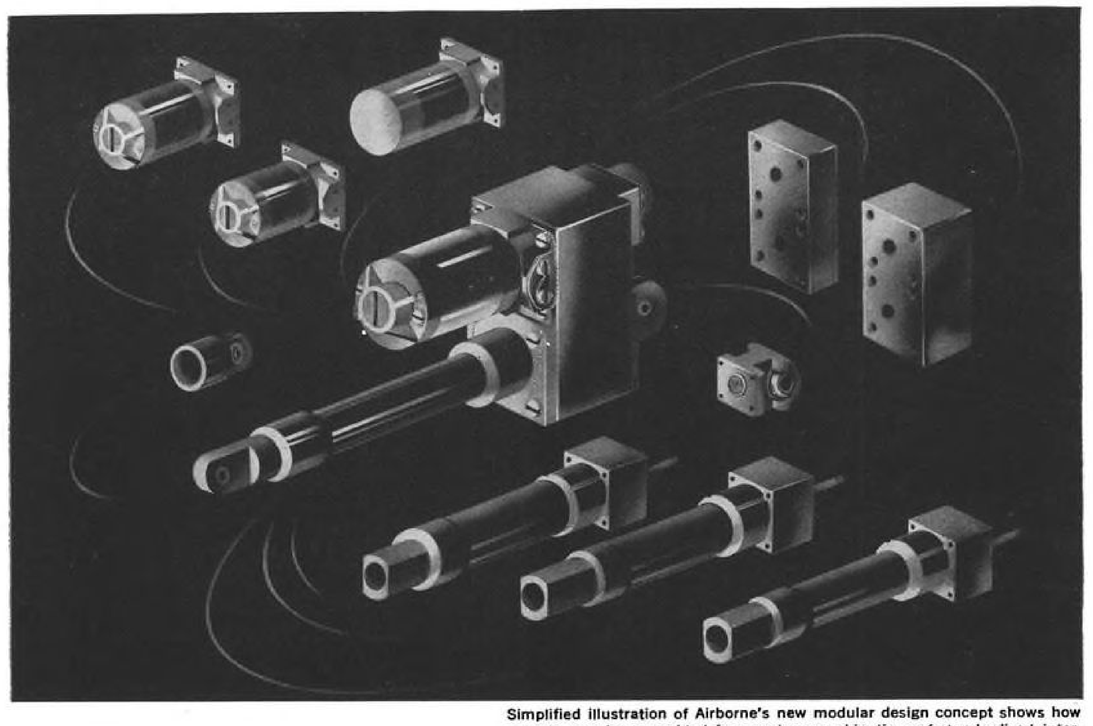
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Simplified illustration of Airborne's new modular design concept shows how actuator can be assembled from various combinations of standardized, interchangeable parts. Components actually available appear in the diagram below.

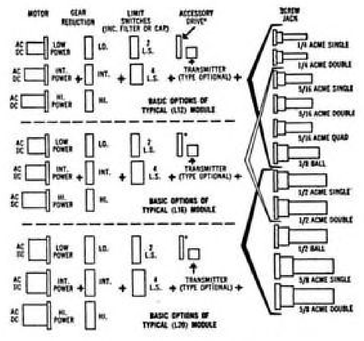
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	L22	4.3307
	L24	4.7244
	L25	4.9213
	L26	5.1181
	L28	5.1118
	L30	5.9055
	L32	6.2992
	L34	6.6929
	205	.9843
	207	1.3780
	209	1.7717
	210	1.9685
	212	2.3622
	213	2.5591
	214	2.7559
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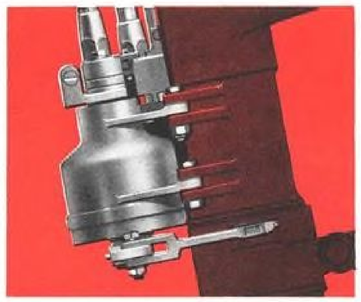
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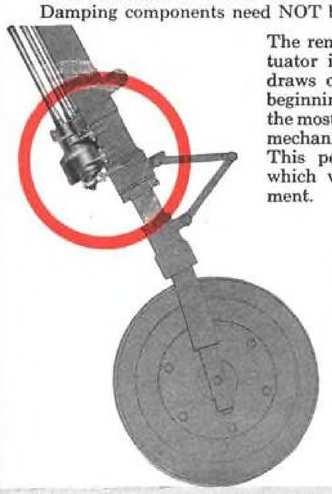


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Woolf Aircraft Products, Inc., 3441 Filbert St., P. O. Box 270, Wayne, Mich.

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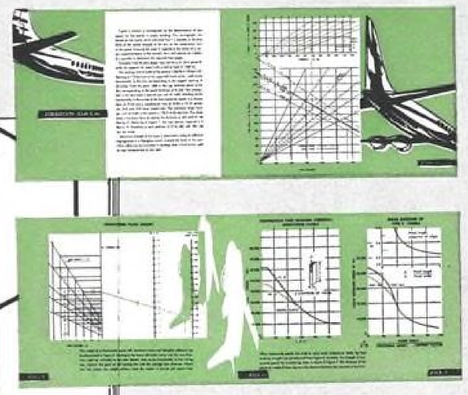
Aviation Products Dept., Goodyear International Corp., 1144 East Market St., Akron 16, Ohio
Chicago Steel Tank Co., Div., U. S. Industries, Inc., 6400 West 66th St., Chicago 38, Ill.
Firestone Tire & Rubber Co., 1200 Firestone Pkwy., Akron 17, Ohio
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(Continued on page A-54)

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G. M. Mfg. Co., 134 West 26 St., New York 1, N. Y.
LEWIS ENGINEERING CO., 52 Rubber Ave., Naugatuck, Conn. SEE ADV. C-97
Rochester Mfg. Co. Inc., 221 Rockwood St., Rochester 10, N. Y.
Scott Aviation Corp., 207 Erie St., Lancaster, N. Y.
S. Smith & Sons (Canada) Ltd., Aviation Div., 105 Scarsdale Rd., Don Mills, Ontario, Canada
Thompson Res. & Mfg. Co., Box 116, Davenport, Fla.
Trans-Sonics, Inc., P. O. Box 328, Lexington 76, Mass.
UNITED CONTROL CORP., 4540 Union Bay Pl., Seattle 5, Wash. SEE ADV. C-107
Weston Electrical Instrument Corp., Subsidiary of Daystrom, Inc., 614 Frelinghuysen Ave., Newark 12, N. J.

Thermos Jugs & Ovens

Cambridge Corp., Lowell Industrial Park, Lowell, Mass.
D-K Mfg. Co., 5059 So. Kedzie, Chicago, Ill.
Mansfield Aircraft Products Co., Municipal Airport, Mansfield, Ohio
Nordskog Co., Inc., 16000 Strathern St., Van Nuys, Calif.
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Axelson Aviation, 7701 Telegraph Rd., Montebello, Calif.
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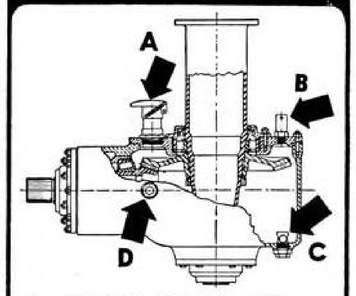
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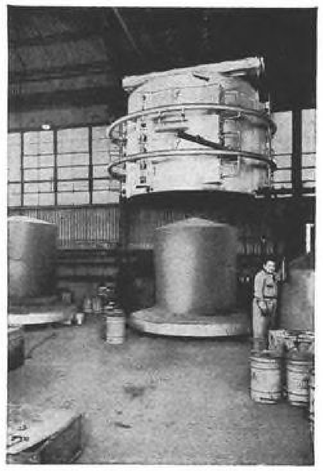
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Kelsey-Hayes Co., 3600 Military Ave., Detroit 32, Mich.
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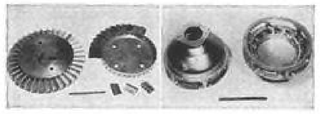
Aerotherm Corp., The, Bantham, Conn.
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WESTINGHOUSE ELECTRIC CORP., P. O. Box 868, Pittsburgh 30, Pa. **SEE ADV. C-88, C-89**

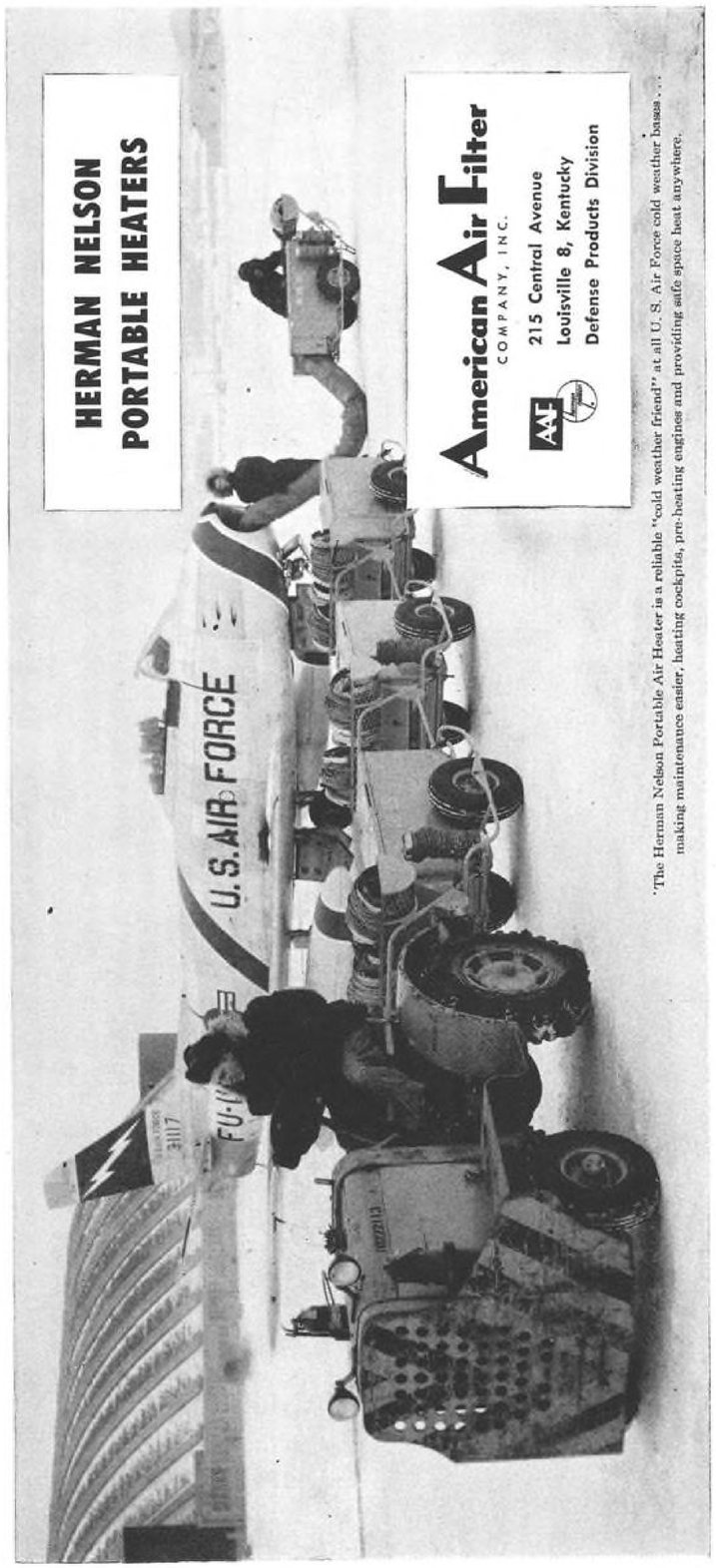
Turbines, Air

AiResearch Aviation Service Div., Garrett Corp., The, 6201 West Imperial Hwy., Los Angeles 45, Calif.
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Eaton Manufacturing Co., 739 East 140 St., Cleveland 10, Ohio
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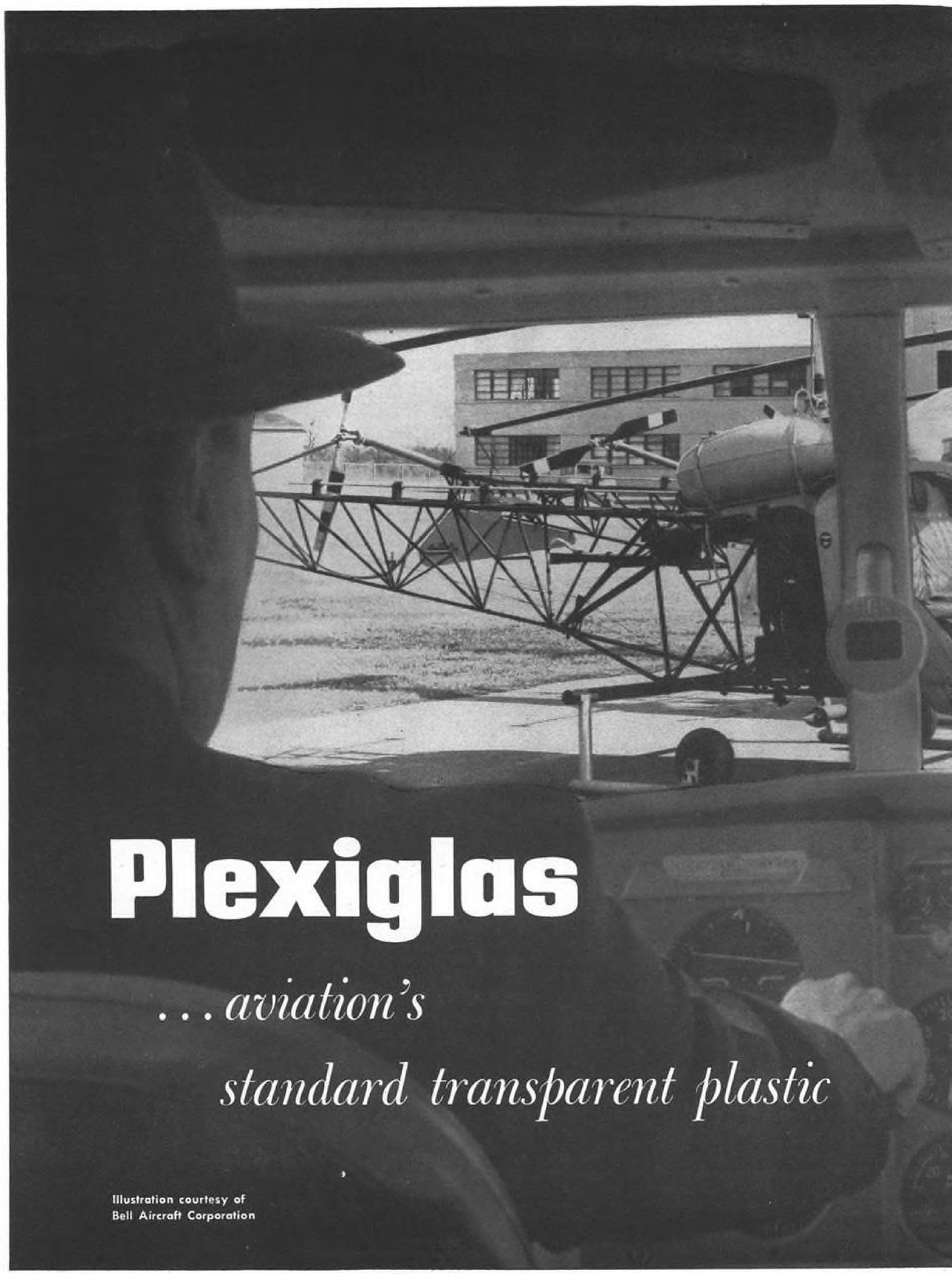
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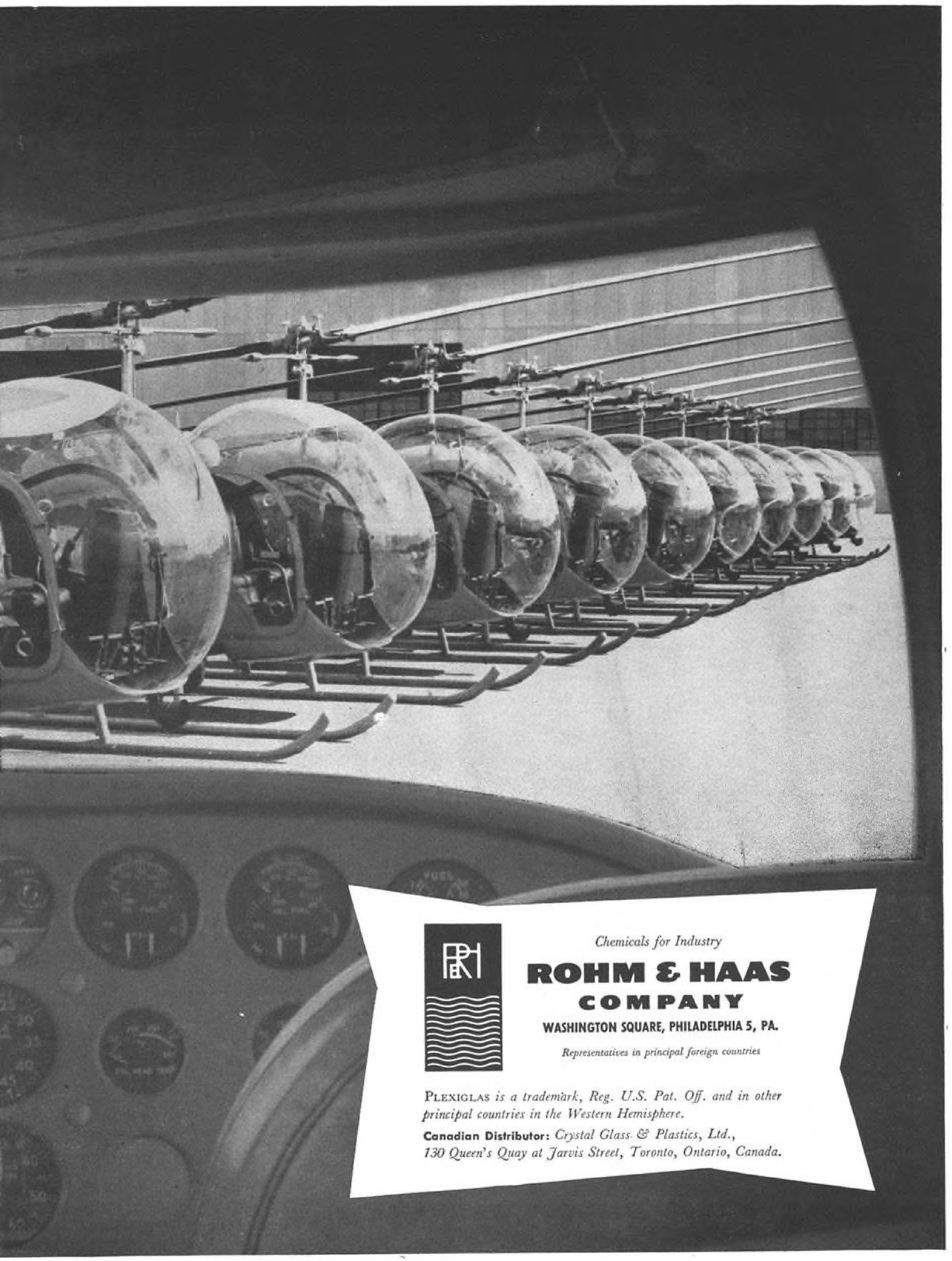
AiResearch Mfg. Div., Garrett Corp., The, 402 S. 36 St., Phoenix, Ariz.
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(Continued on page A-60)



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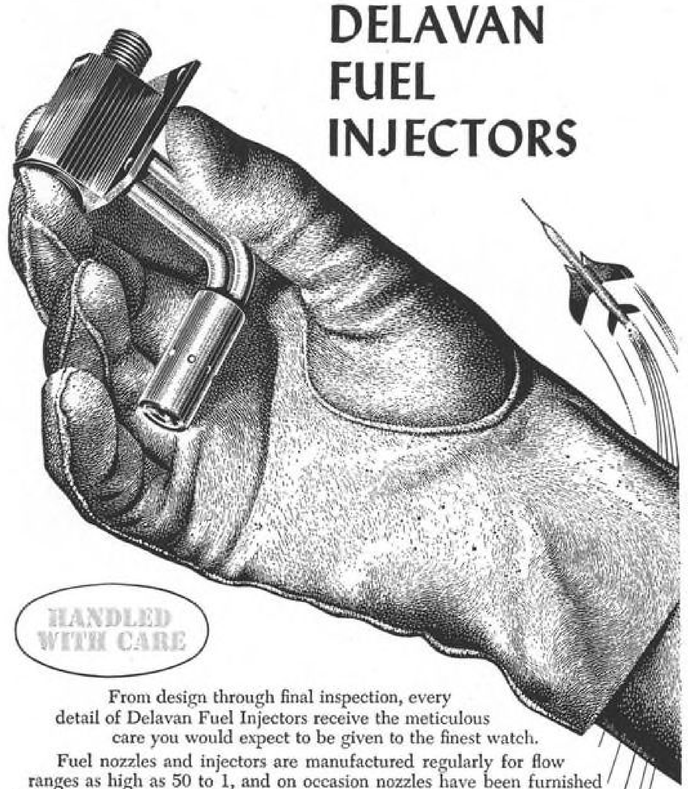
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Kelsey-Hayes Co., 3600 Military Ave., Detroit 32, Mich.
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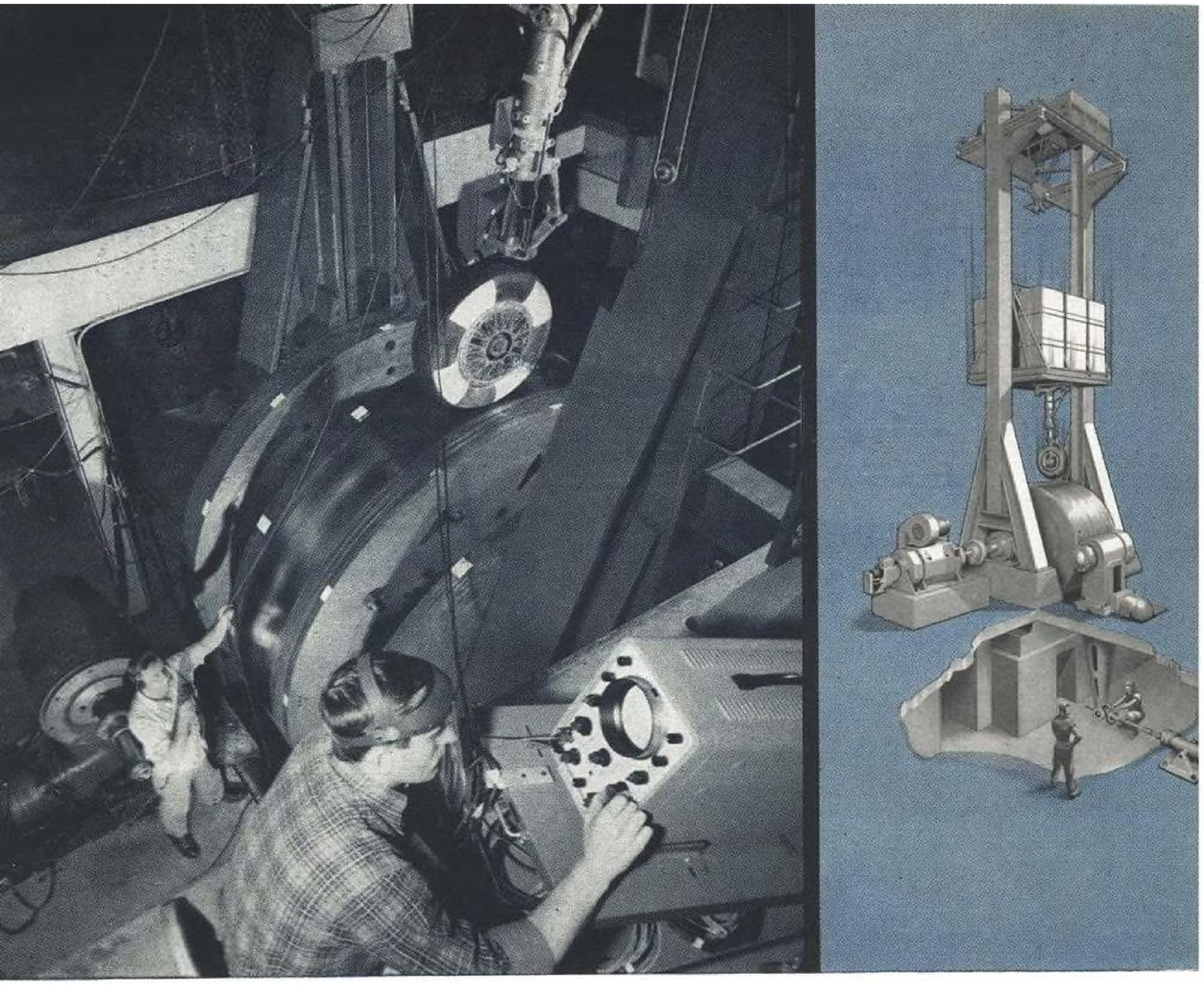
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General Electric Co., Light Military Electronic Equip. Dept., Utica, N. Y.
Goodyear Aircraft Corp., 1210 Massilon Rd., Akron 15, Ohio
Kelsey-Hayes Co., 3600 Military Ave., Detroit 32, Mich.
Nobles Engineering & Mfg. Co., 645 East Seventh St., St. Paul 6, Minn.
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Ryan Aeronautical Co., Lindbergh Field, San Diego 12, Calif.
Townsend Engineered Products, Inc., 805 S. McClay St., Santa Ana, Calif.
Universal Match Corp., Armament Div., P. O. Box 5841, St. Louis 21, Mo.
Vendo Corp., 7400 E. 12th St., Kansas City, Mo.
Waco Aircraft Co., The, Peters Ave., Troy, Ohio
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Last May 25, Jerrie Cobb, youthful veteran pilot, winged her way from Guatemala City to Oklahoma City in an Aero Commander 560-E . . . a World's Non-Stop Distance Class Record of 1,504.74 statute miles! On July 5, she soared to a new World's Altitude Record of 30,351 feet in an Aero Commander Super 680! In each flight, under extreme conditions, her plane was sparked by ACs!

The AC SR-83P spark plug has platinum electrodes for the highest anti-fouling characteristics that reduce carbon and lead deposits—to give you faster starting, smoother idling. All of the exclusive features of AC Aircraft Spark Plugs have been proved in millions of hours of flight in military, airline and private planes.

For better performance and lower maintenance, install new AC Platinum Electrode Spark Plugs in your plane!



flying starts with AC AIRCRAFT SPARK PLUGS

AC THE ELECTRONICS DIVISION OF GENERAL MOTORS

GM FORWARD FROM FIFTY



A-62

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JET AND MISSILE MINDED ▲ JET AND MISSILE EXPERIENCED

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SERVICING THE AIRCRAFT AND MISSILE INDUSTRY

MAJOR AIRFRAME ASSEMBLIES

Leading jet manufacturers have found Hussmann Aircraft their reliable source for major airframe components:

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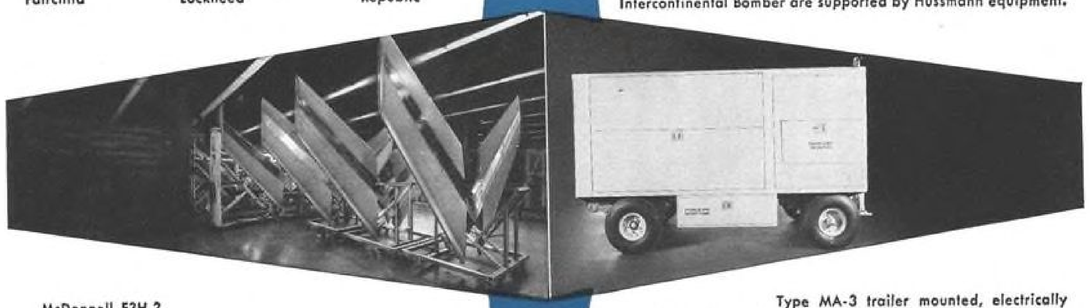
McDonnell F3H-2
Stabilator Assembly
Wing Sections
Fuselage Sections
Control Surfaces
Missile Sections
Fuel Tanks
Nacelles

Our complete metal forming and fabrication, welding, processing, heat treat, magnaflux, zyglo and similar facilities are at your service—to meet *all* your requirements.

WITH

GROUND SUPPORT EQUIPMENT

Trailer mounted air conditioner units designed and built by Hussmann . . . high in favor with such firms as Convair at Fort Worth, Texas, and Boeing at Wichita, Kansas, where ramp and maintenance programs for B-58 Supersonic Bomber and B-52 Intercontinental Bomber are supported by Hussmann equipment.



Type MA-3 trailer mounted, electrically powered, self-mobile air conditioner unit now in use at Ft. Worth, Texas, as support equipment for the B-58 Hustler. First unit of this type designed, built, delivered and accepted by Convair within 120 days of purchase order date.

Designs furnished for air conditioner units for both piloted aircraft and missiles in accordance with customer specifications as well as air starter units, heater units and other types of ground support equipment.

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"MONOBALL"®
Self-Aligning Bearings



CHARACTERISTICS

ANALYSIS	RECOMMENDED USE
1 Stainless Steel Ball and Race	For types operating under high temperature (800-1200 degrees F.).
2 Chrome Alloy Steel Ball and Race	For types operating under high radial ultimate loads (3000-893,000 lbs.).
3 Bronze Race and Chrome Steel Ball	For types operating under normal loads with minimum friction requirements.

Thousands in use. Backed by years of service life. Wide variety of Plain Types in bore sizes 3/16" to 6" Dia. Rod end types in similar size range with externally or internally threaded shanks. Our Engineers welcome an opportunity of studying individual requirements and prescribing a type or types which will serve under your demanding conditions. Southwest can design special types to fit individual specifications. As a result of thorough study of different operating conditions, various steel alloys have been used to meet specific needs. Write for revised Engineering Manual describing complete line. Address Dept. AW-57.

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push-pull CONTROLS



Compression & Tension Type

Aircraft cable is strung with spherical steel shells in a rigid or flexible housing sealed with "O" rings. 3" standard bend radius. ¾" minimum bend radius.

Three Types:

1. *Light Duty*—Compression Ult. Load 1250 lbs.; Ult. tension 960 lbs.
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Positive remote controls for actuating mechanical, hydraulic or other devices. Eliminate bell cranks, pulleys and dual cables. Patented U. S. A. All world rights reserved. Send for ENGINEERING MANUAL giving detailed prints and complete specifications covering materials, finishes, capacities. Please address Dept. A.W.B.G.-57.

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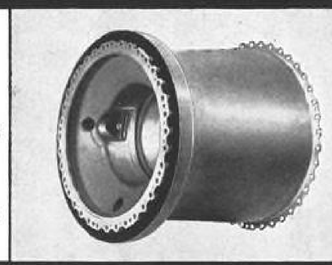
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ENGINE MOUNTS





PRECISION WELDED AND MACHINED SHEET METAL PARTS AND ASSEMBLIES

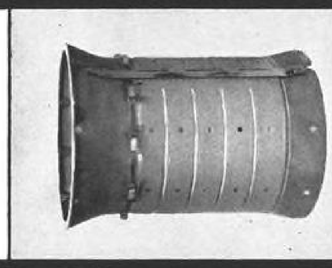
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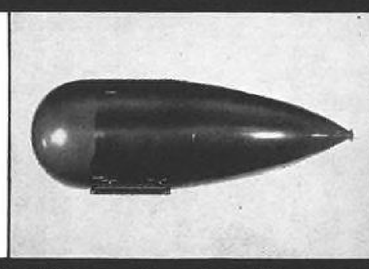
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Lavelle's services include engineering production planning, tool making, machine shop and sheet metal facilities . . . inert gas, resistance and metallic arc welding, inspected by X-Ray, Zyglo or Magnaflux, painting, anodizing and quality control.

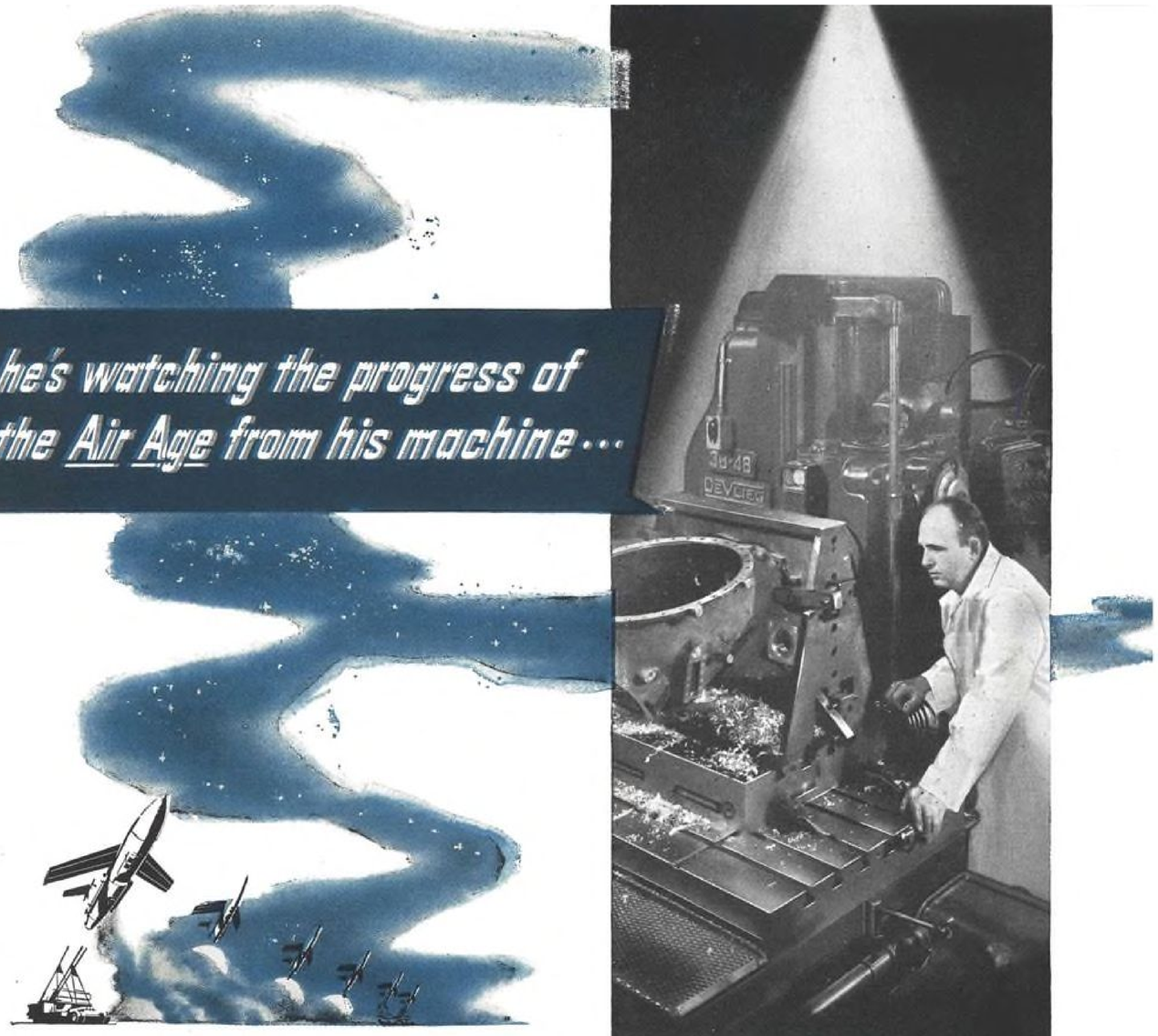
Lavelle

Lavelle Aircraft Corporation • Newtown, Bucks County, Pa.
Between Philadelphia, Pa., and Trenton, N.J.

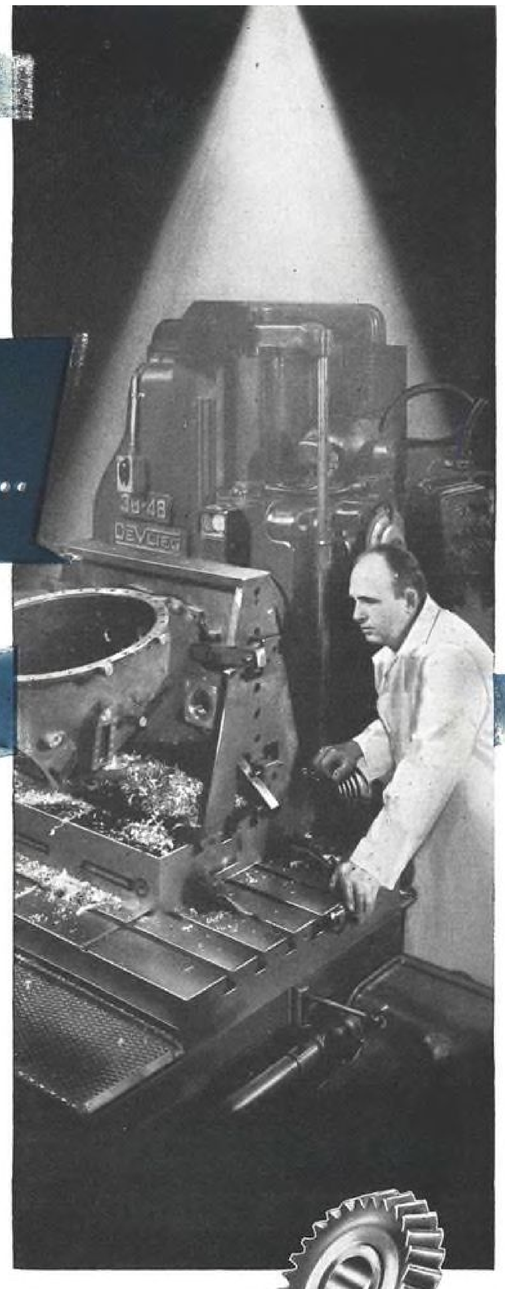
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At Foote Bros., yesterday's technology, methods and standards of precision are obsolete. Today, these men are working with new metals in new ways, with greater precision, to produce lighter, stronger and more reliable gearing, power transmission and actuating mechanisms for the air age of tomorrow.

It is the willingness to innovate, the ability to anticipate, and the determination to excel that have helped Foote Bros. engineers and production men keep pace with, and earn the confidence of, the aviation industry.



We may be able to help solve your problems involving precision gearing and actuating mechanisms, and would welcome the opportunity of talking with you.

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FOR UNIFORM ACCURACY

When you call on HYATT to build your jet engine bearings, they'll *all* measure up—not merely to your minimum specifications, but to your *highest expectations*. HYATT has the facilities and know-how to maintain uniform accuracy from the approved prototype to the end of the production schedule. This unwavering uniformity assures smoother, vibration-free operation and longer life in every single application.

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This B-52 is powered by PRATT & WHITNEY J-57 ENGINES with HYATT bearings in the power section and accessory drives.

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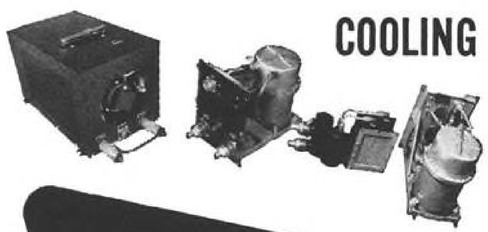
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AIRCRAFT QUALITY VALVES



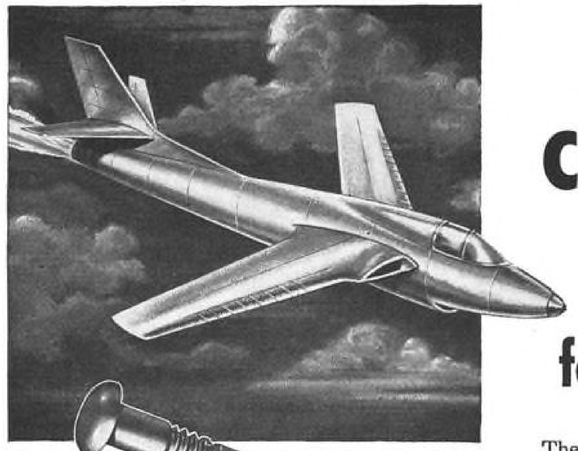
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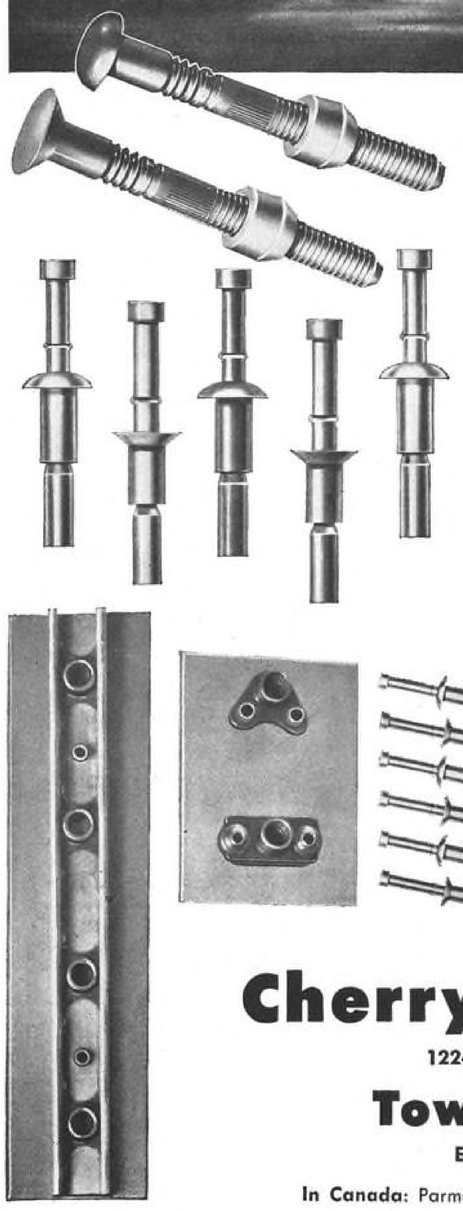
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A-67







Cherry Research
in fasteners
for the aircraft industry

The Cherry Research and Development program operates on a single objective—to provide better fasteners and tools for the aircraft industry.

Blind rivets and lockbolts* with installation tools and accessories are developed and manufactured in the Santa Ana, California plant of the Cherry Rivet Division, Townsend Company—a plant completely equipped and devoted to the production of aircraft quality parts, which includes heat treating, plating and all finishing operations.

Recent Cherry Research additions to the full line of Cherry self-plugging and pull-thru rivets, lockbolts, tools and accessories:

The Cherry "700" Rivet** — high clinch, positive hole fill, wide grip range, uniform pin retention.

The Cherry "600" Rivet** — stainless steel (A286) rivet provides high strength at high temperature.

The Cherry 3/32" Monel Rivet — a hollow pull-thru rivet with high shear strength.

*Licensed under Huck patent nos. RE 22,792; 2,114,493; 2,527,307; 2,531,048; 2,531,049; 2,754,703.
**Patents issued and pending.

For technical information write:

Cherry Rivet Division

1224 East Delhi Road, Santa Ana, California

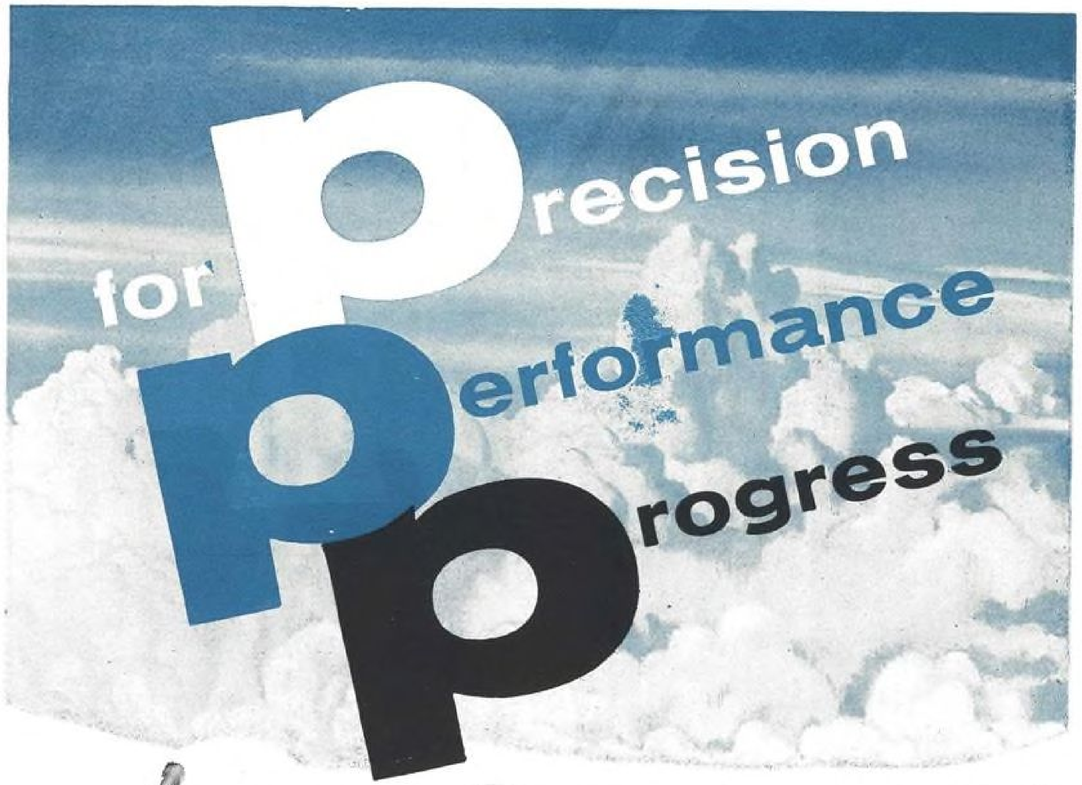
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A-68

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Simmonds SU Fuel Injection Systems: The only advanced type fuel injection system now in production for medium h.p. gasoline engines, the SU System has been proven in field tests to give economies up to 25%. Eliminates icing problems, gives improved cold starts.

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THE TARGET

Intricate, vastly capable mechanisms of uniform dependability and unusual quality

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CECO
SYSTEMS CONTROLS



MAIN FUEL CONTROL SYSTEMS

CECO was the first to combine several normally separate fuel system components into one "unitized package". *Representative* of this philosophy is the new Small Engine Fuel Control series for target drones and missiles. Some models in this series, even though they incorporate integral fuel pumps, actually weigh less than 8 lbs.



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CECO's basic afterburner fuel control is a regulator of the by-pass type. It operates on a constant metering head across a variable orifice whose size is regulated by the air flow parameter. Throttle modulation is available by providing for manual variations in either metering head or orifice size.



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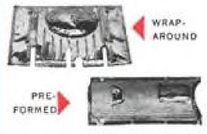
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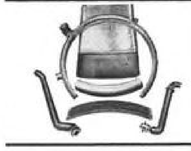




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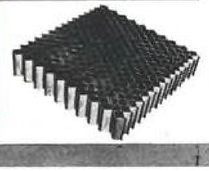
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Formed High-Density Fiberglas is designed for Thermal and Acoustical Insulation, and is a versatile protective insulation Material for a variety of Aircraft and Missile applications.





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In Stainless Steel and a variety of other materials. Various thicknesses, core sizes and foil gages can be combined to meet your special requirements.



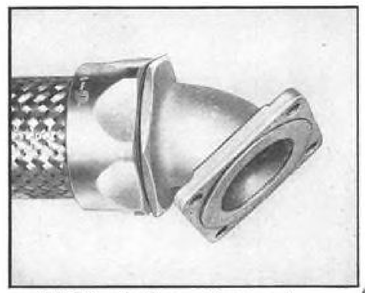
AVICA

flexible METAL TUBING ASSEMBLIES

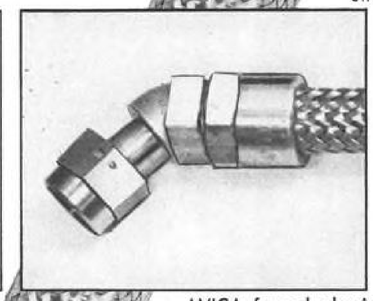
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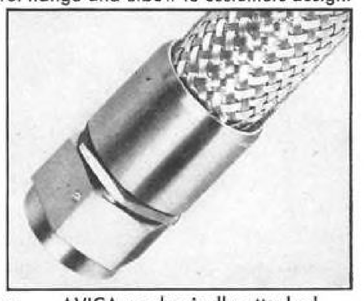
AVICA flexible tubing assembly with AN756 swivel flange and elbow to customers design.



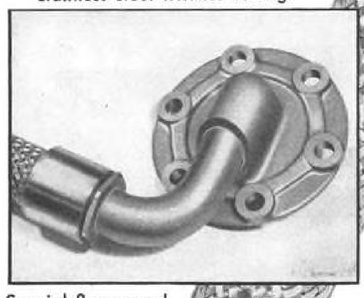
AVICA aluminum elbow and swivel flange with 2 inch stainless steel flexible tubing.



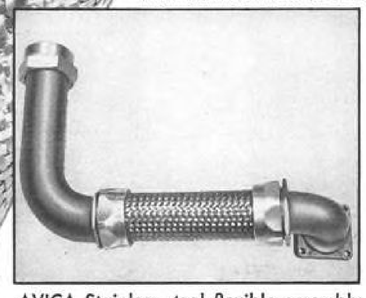
AVICA forged aluminum elbow end fitting with ½ inch stainless flexible tubing.



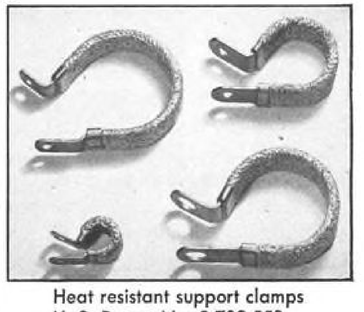
AVICA mechanically attached end fitting with swivel nut.



Special flange end fitting to customers design.



AVICA Stainless steel flexible assembly with aluminum elbows and fittings.



Heat resistant support clamps U. S. Patent No. 2,709,558.



AVICA stainless steel flexible assemblies with mechanically attached end fittings and swivel flanges in stainless steel or aluminum are suitable for fuel, oil, hot air and other fluid systems. They can be supplied to customers design in all I.D. sizes from ¼" to 4".

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A-73

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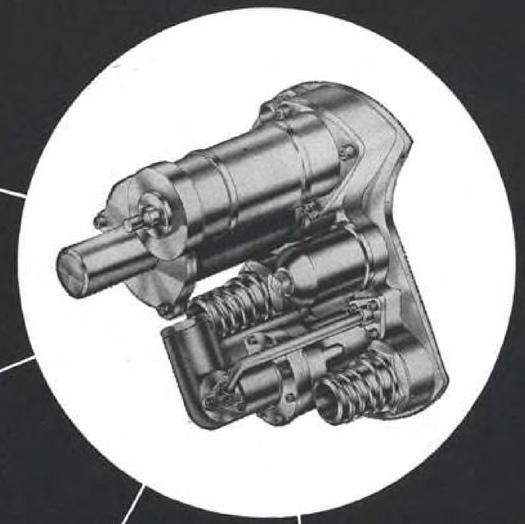
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HYDRAULIC PUMPS



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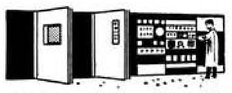
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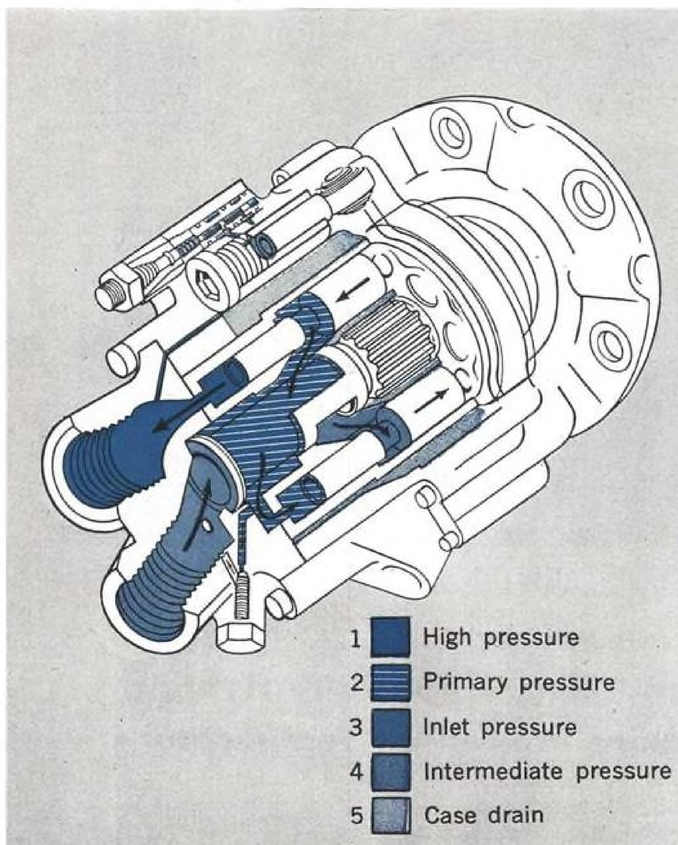
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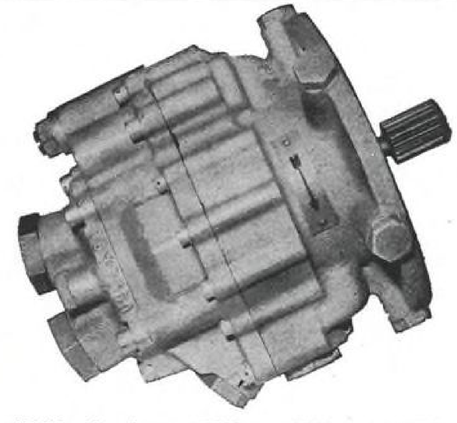
These units are two-stage, cam-actuated axial piston pumps. Compounding is accomplished by two-diameter pistons. Oil is drawn from the inlet into a pintle in the center of the cylinder barrel. The primary stage, ported from the pintle, consists of the large diameter of the pistons. The oil is then delivered around the back side of the pintle at approximately 100 psi, through porting in the port cap to the small diameter of each piston.

The pistons are supported on an inclined cam by hydraulically balanced shoes. The internal drive shaft passes through the cam plate and drives the cylinder barrel, which is supported radially by a roller bearing.

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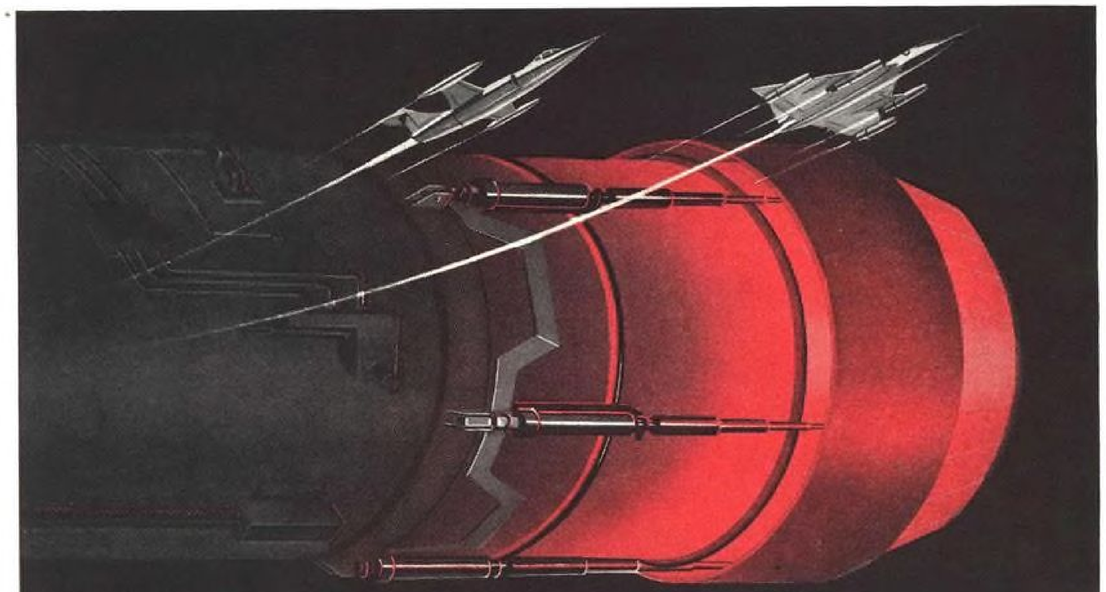
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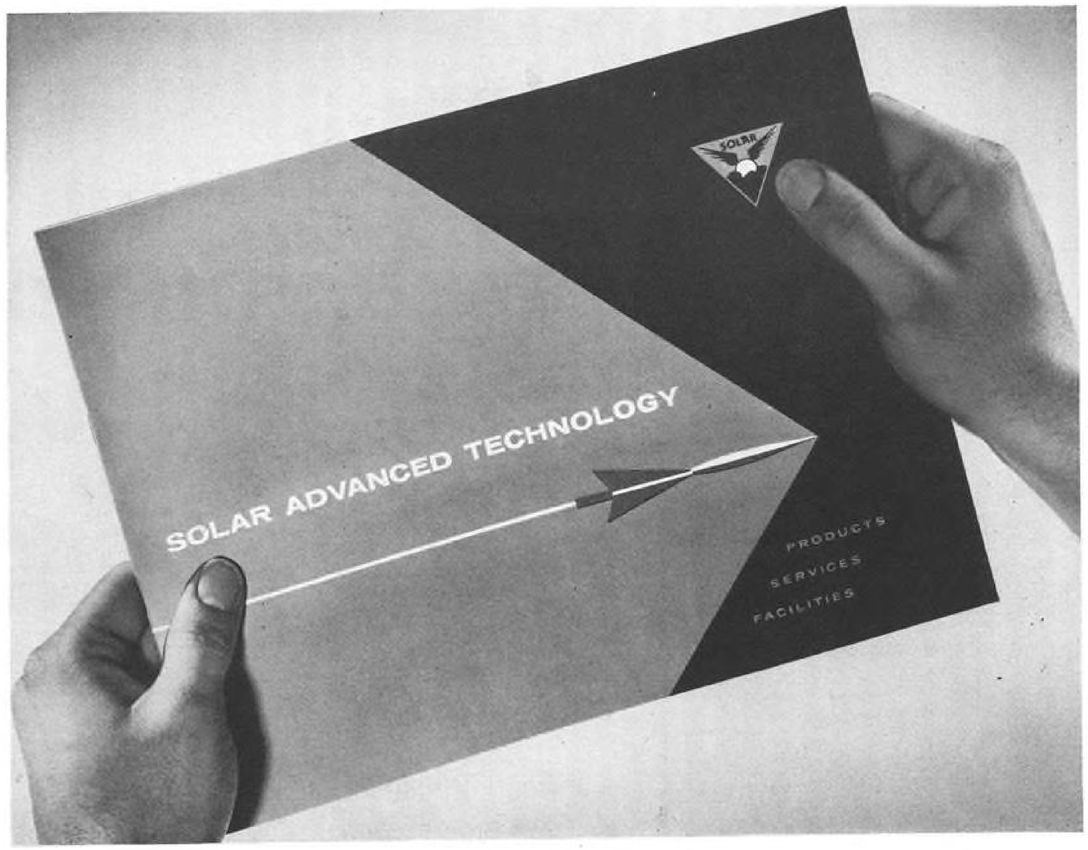
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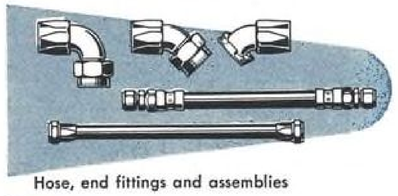
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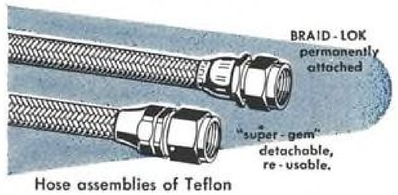
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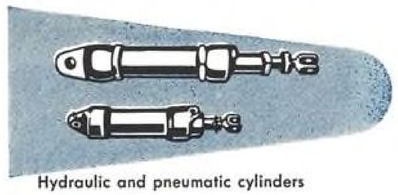
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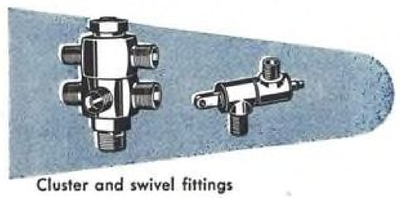

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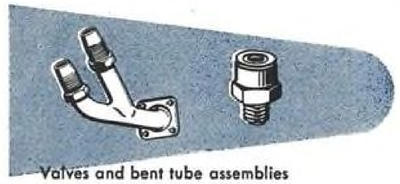


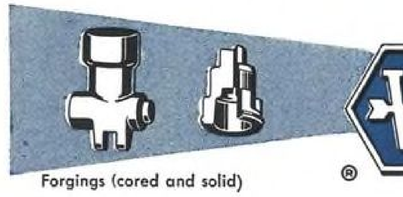
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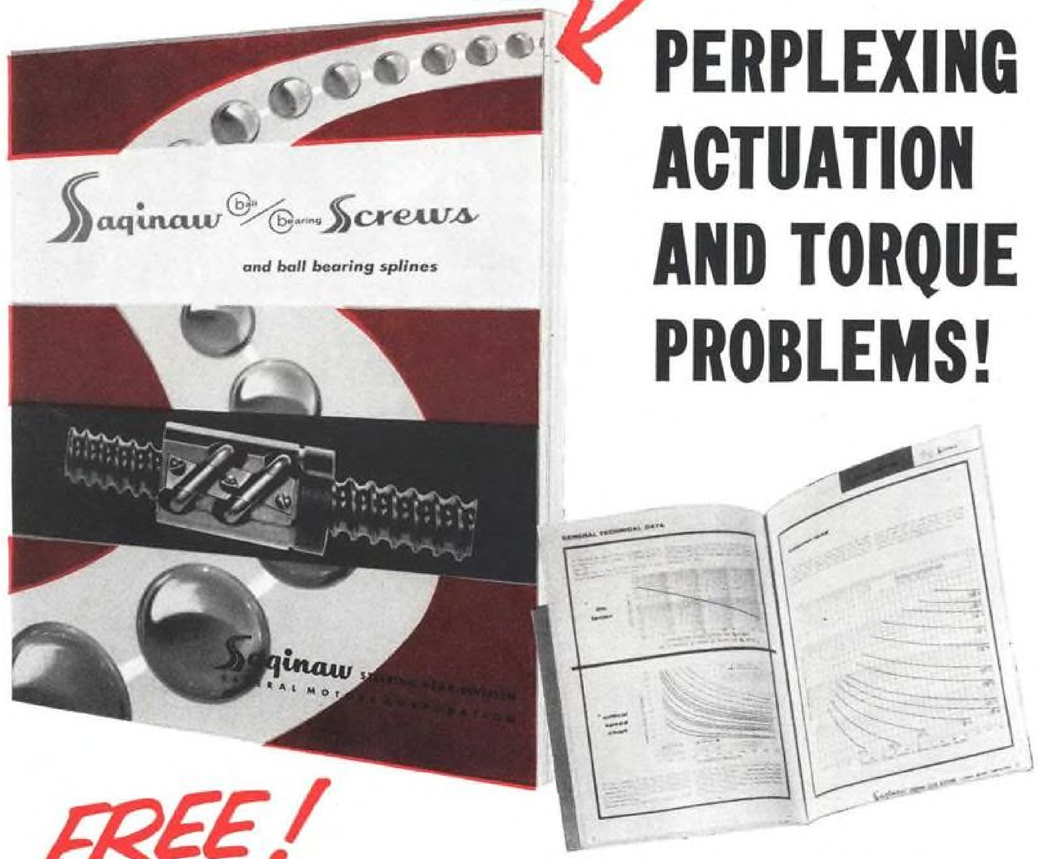


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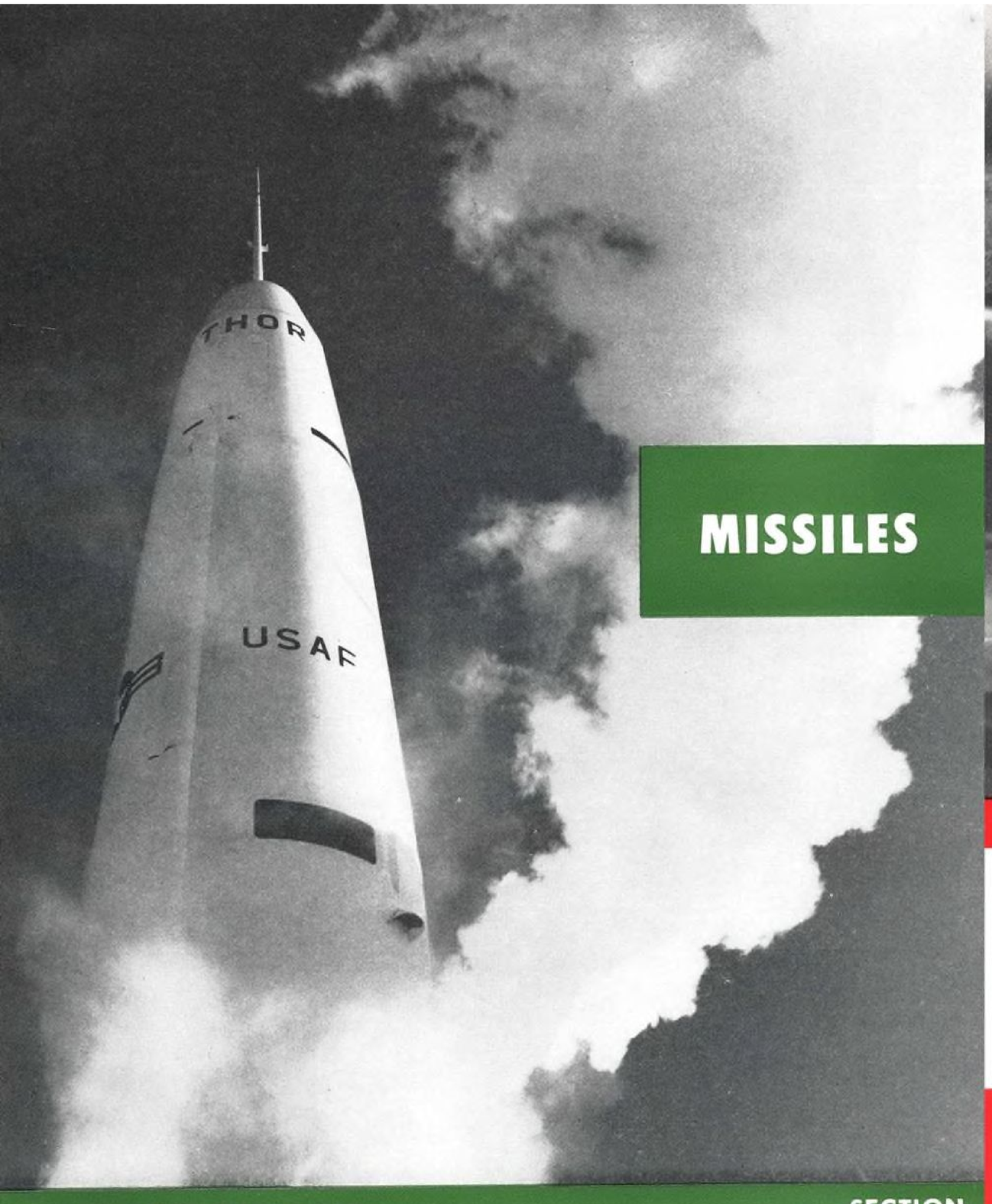
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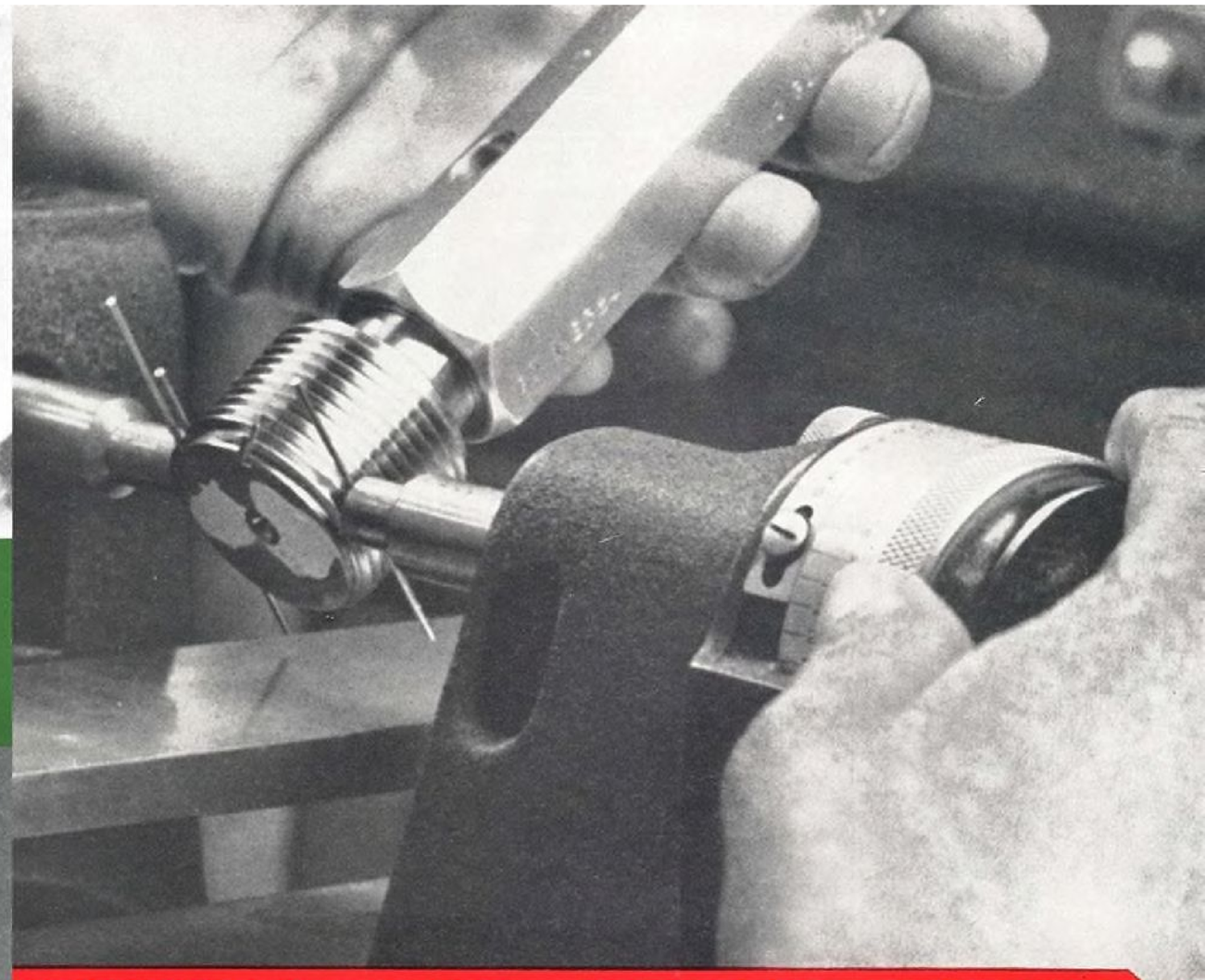
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Missile Programs Keyed to Reliability

By J. S. Butz, Jr.

Directors of the government's missile programs are faced with learning "infanticide" rather than "adolescenticide" if they are to stay within the Administration's fiscal ceiling and perhaps keep from bankrupting the economy. This statement paraphrases Dr. Clifford C. Furnas, former Assistant Secretary of Defense, and has found agreement among missile leaders as representing the future direction of government policy.

Its most important meaning for contractors is that there will be a marked reduction in the number of missile development programs. There will be fewer prime contracts to go around even though these projects will receive a growing share of the defense dollar.

Missile development has grown so complicated and costly that it is no longer possible to pursue many parallel approaches to a given weapon requirement. The decision to choose one weapon system for each combat task will have to be made almost as soon as the task arises. The immense cost of continuing several closely related projects through adolescence has been adequately emphasized during the recent cutbacks.

The Navaho supersonic cruise missile, for instance, could be said to have reached manhood before it was done away with. It had consumed over $700 million before the decision was reached that it wasn't really necessary to the current defense scheme.

Planning Groups

The task of the government's planning and policy making groups in the Defense Department is clearly to enlist competent technical assistance to aid in implementing planned and selective infanticide among the myriad missile system proposals which show promise. The percentage of error allowed these planning groups will approach zero for if their judgment proves faulty there will be no alternate system to fall back on to meet a weapon requirement.

There will probably always be certain areas in which infanticide will be impossible or dangerous because of a lack of technical understanding. But the feeling is growing among experts that the knowledge is available to safely eliminate parallel weapon systems in many fields. The only ingredient lacking is the management to properly use the knowledge.

The current military approach to making early decisions more competent is to acquaint more people with the problems. Long range planning has become a part of all of the services. The idea is to get experts concerned with missile design, development, construction, training, operation, supply, maintenance, etc., to give their opinion of the feasibility of the long-range plans.

One of the main problems facing such dissemination of classified material is security restrictions. Success of the plan to date has been great enough to bring requests for a widening of the select group asked to comment on future plans. It is felt that this type of planning is necessary to produce completely acceptable weapon systems.

Competitive outlook for the missile industry is for rougher going. The number of potential prime contractors is increasing as the last few aircraft firms make their bid and the automobile manufacturers enter the field. The number of component and equipment manufacturers is also growing rapidly.

Keypoint of the competition in every phase of missile design and with every type of missile equipment will be reliability. Reliability specifications are becoming part of the contract requirements that manufacturers will be called upon to meet. Terms defining reliability are becoming more stringent as experience grows.

Another urgent military demand is for simplification in the operation and maintenance of a weapon system. This requirement is often at variance with the sophistication necessary to perform elaborate maneuvers and missions in the face of counteractions and in a wide range of environments.

The government entrusts these extremely complicated and valuable machines to personnel whose average experience is slightly above the apprenticeship level. It also pays to have people wrestle with the contrasting sophistication-simplification problems instead of spending any money to keep a permanent operating force of high average competency. Therefore the field is doubly fertile for any company which can meet the simplification requirements.

Electronic guidance and control systems which account for over 50 per cent of the normal missile cost, minus warhead, have basic requirements in addition to reliability and simplicity. One of great current importance is an immunity against countermeasurements. These range from all efforts to distract or mislead the guidance system through efforts actually to seize control of the missile. The effectiveness of present electronic countermeasures has caused a large portion of every design effort to be spent protecting against them.

The pressing need for reliability and simplicity of operation and maintenance is bringing about some major changes in guided missile propulsion systems. Solid propellant rocket engines are replacing liquid fuel rockets in many missile applications. This is especially true for all weapon systems in which the hard to handle, high energy propellants for the liquid engine must be transported by tactical units and then pumped into the missile under combat conditions. The constant readiness of the solid fuel rocket cuts the powerplant ready time to zero.

The level of skill necessary to operate and maintain this type of rocket is also near zero when compared to the liquid fuel engine. The cost of the solid fuel engine is also below that of the liquid when made in quantity.

Long-Range Missile

The last real stronghold of the liquid fuel rocket is the long-range ballistic missile. These missiles require the absolute maximum in efficiency and thrust controllability from their engines. Until recently liquid fuel motors answered this need, but the advances being made in the solid field have been sufficient to make the solid propellant long-range ballistic missile technically feasible. Development has been initiated on the Navy's Polaris, a solid fuel IRBM, on the strength of this.

Most of a missile's development problems are concerned with some very small and seemingly minor component according to the experts. Exhaustive testing is done on the ground because of the difficulty of monitoring all of the missile's parts during flight. As valuable as this testing is it is never enough to simulate completely the whole missile in flight. It comes down to the point that one small component may keep a complete system from being effective.

From the troubles that have been experienced with faulty components to date it would seem that the manufacturer which has a record for reliability would enjoy a long and profitable stay in the missile business.



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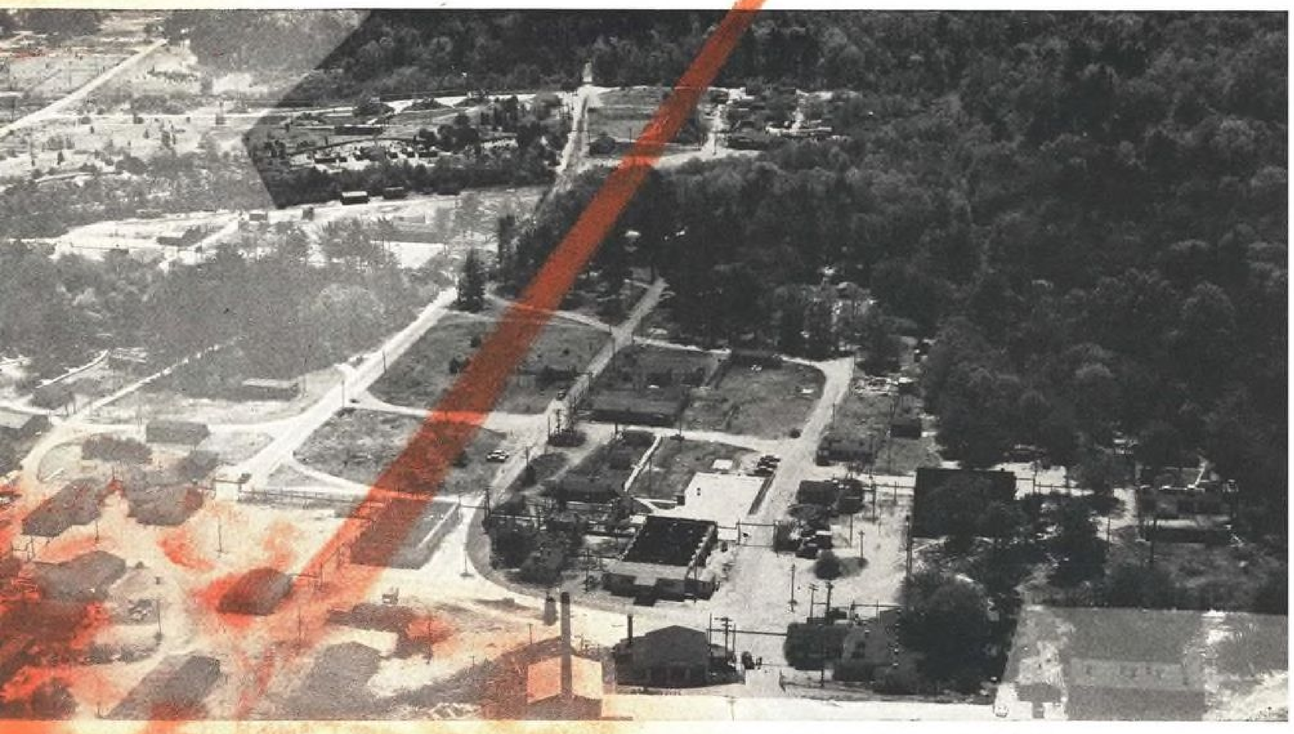


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specify VICKERS® - WATERBURY hydraulic pumps, motors, transmissions for MISSILE handling, launching and tracking systems...

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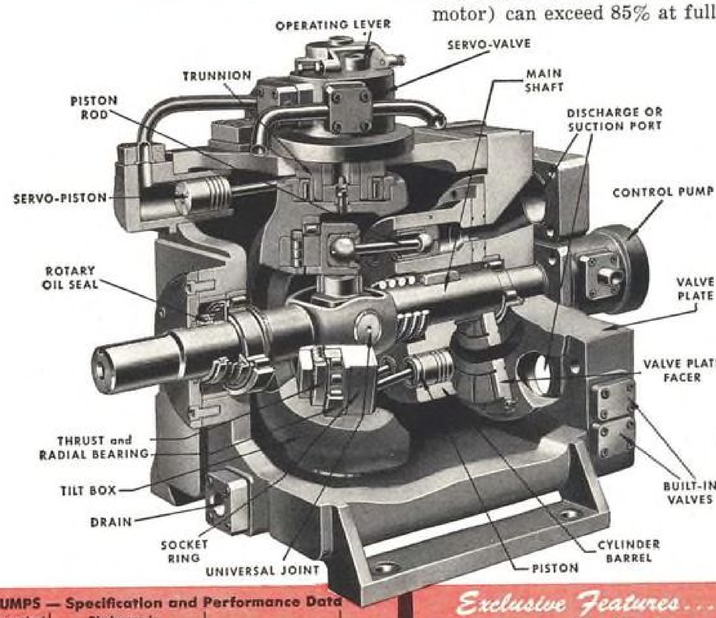
1 extremely fast acceleration and reversal
2 precise speed control.....,

These axial-piston pumps and motors are particularly suitable for marine and ordnance drives where precise control of torque, acceleration and deceleration, speed or reversal are important.

The pump is a factory-assembled power package with built-in auxiliary pump (provides super charging, control pressure and forced circulation for cooling), replenishing and relief valves.

Transmissions are usually combinations of variable delivery pumps with axial-piston fixed displacement fluid motors. Peak output is at 3,000 psi from 45 to 3,600 hp.

Overall mechanical efficiency of these hydraulic pumps or motors exceeds 91% at full load; volumetric efficiency is 97% at 3,000 psi; torque efficiency, when used as a hydraulic motor, exceeds 95% at rated pressure; overall mechanical efficiency of a hydraulic transmission (pump and motor) can exceed 85% at full load.



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HEAVY DUTY PUMPS — Specification and Performance Data

Heavy Duty Size	Rated Speed	Theoretical Maximum Displacement	Discharge in Gallons per Minute at Rated Speed* (Supercharged)			Horsepower Input*			Approx. Weight
			1000 psi	2000 psi	3000 psi	1000 psi	2000 psi	3000 psi	
	rpm	cu. in./rev.							lbs.
1¼ A HD	1200	5.65	29.1	28.9	28.4	20	38	56	390
2½ A HD	1200	11.3	58.4	57.8	56.9	40	76	112	450
5A HD	1200	22.6	117	116	114	79	152	224	620
10A HD	900	45.2	175	173	170	119	227	334	1100
15A HD	720	67.8	210	208	205	142	273	403	1600
20A HD	600	90.4	233	231	227	158	302	446	2000
35A HD	600	158.2	408	404	398	277	529	782	4900
50A HD	514	226	500	495	487	340	648	957	6600
75A HD	514	339	750	743	731	508	974	1437	9000
150A HD	450	678	1314	1301	1281	891	1706	2519	27000
300A HD	400	1356	2336	2313	2277	1585	3031	4478	43000

*3,000 psi tabulation is an intermittent rather than continuous duty rating, and is recommended only where the specific application and duty cycle have the approval of our engineering department.

Exclusive Features...

1. Largest capacity (up to 2,300 gpm) and highest horsepower (up to 4,000 hp) in the oil-hydraulic industry.
2. Fastest straking . . . in less than .03 seconds, the Size 5 Heavy Duty Pump can go from zero to full delivery.
3. Ultrafine control . . . training and elevating of large gun turrets, missile launchers, etc., have been handled by axial-piston transmissions with exceptional accuracy at speeds controlled to 1 rpm.
4. Most compact unit for large capacity equipment . . . a 2,300-gpm pump occupies only a six-foot cube.
5. Extreme ruggedness and reliability with exceptionally long life . . . many axial-piston units have been in operation for 20 to 25 years, some without overhaul.
6. Very rapid acceleration and deceleration and reversals with remarkable smoothness.
7. Controls, valving and auxiliary pumps can be incorporated directly in, or on, the units.

MO-209A

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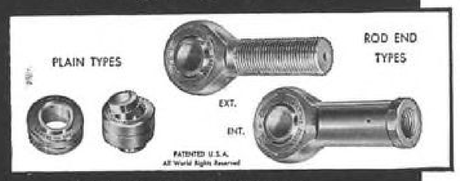
(*Continued from page B-28*)

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NOW, CLEMCO ANNOUNCES NEW FEATURES WHICH COMPLETELY REVOLUTIONIZE ROTARY ACTUATOR PERFORMANCE!

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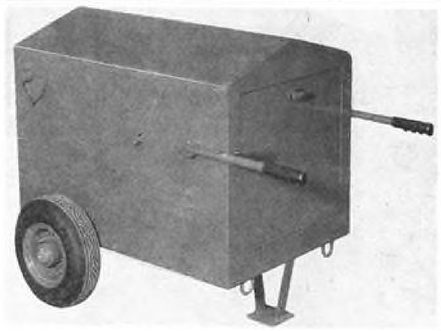
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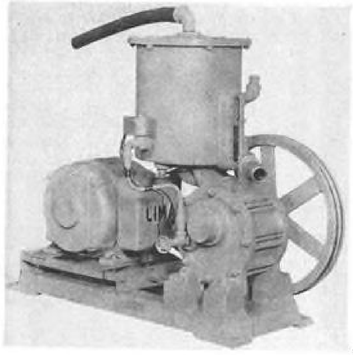
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Ultimate vacuum: 10 microns absolute (with Tricresyl Phosphate)*
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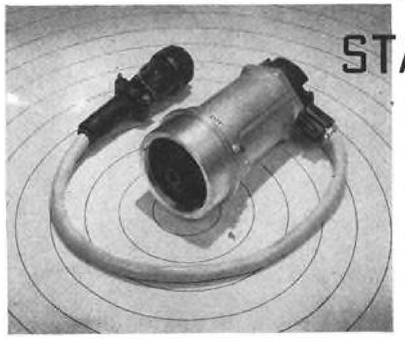
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what are your missile power problems?

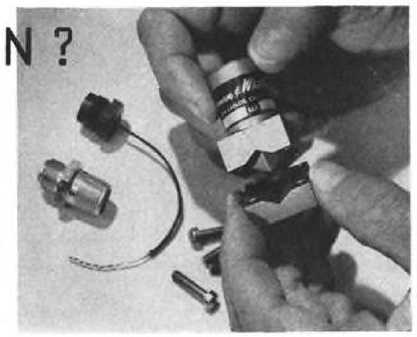


STARTING?

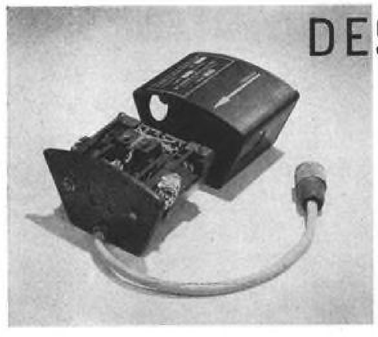
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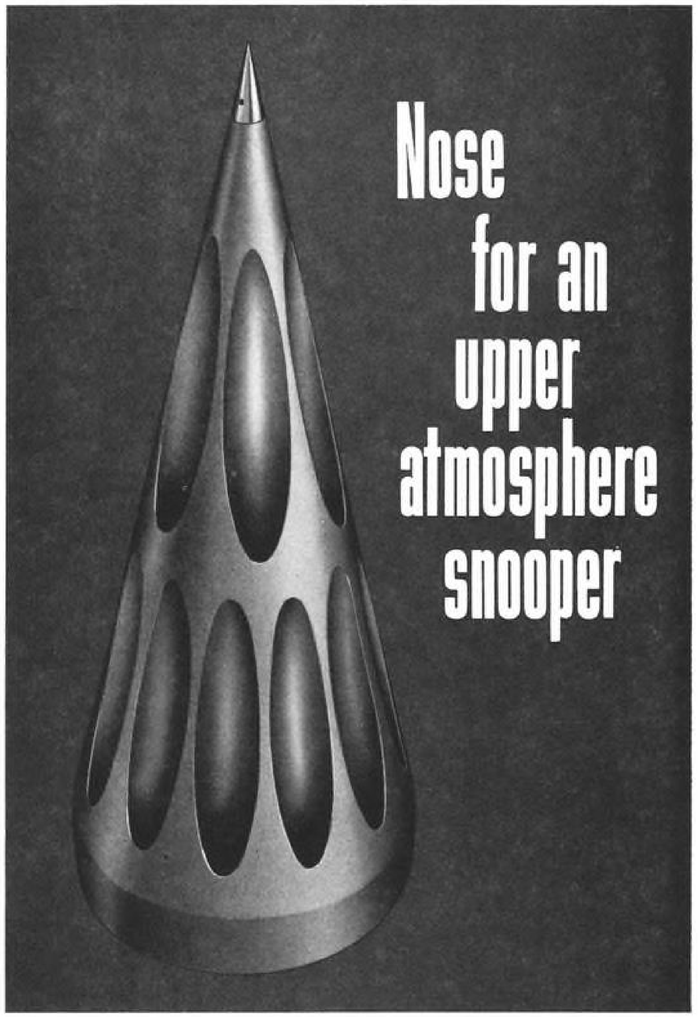
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Titanium Fabricators Inc., 3906 Cohasset, Burbank, Calif.
Western Gear Corp., P. O. Box 192, 2600 East Imperial Hwy., Lynwood, Calif.
WESTINGHOUSE ELECTRIC CORP., P. O. Box 868, Pittsburgh 30, Pa. **SEE ADV. C-88, C-89**

Turbines, Air

AiResearch Aviation Service Div., Garrett Corp., The, 6201 West Imperial Hwy., Los Angeles 45, Calif.
AiResearch Mfg. Div., Garrett Corp., The, 402 S. 36 St., Phoeniz, Ariz.
All American Engineering Co., du Pont Airport, Wilmington, Del.
AMERICAN MACHINE & FOUNDRY CO., DEFENSE PRODUCTS GROUP, 1101 North Royal St., Alexandria, Va. **SEE ADV. D-195**
Bendix Aviation Corp., Utica Div., Utica, N. Y.
Curtis-Wright Corp., Research Div., Quehanna, Pa.
Eaton Manufacturing Co., 739 East 140 St., Cleveland 10, Ohio
GENERAL ELECTRIC CO., APPARATUS SALES DIV., 1 River Rd., Schenectary 5, N. Y. **SEE ADV. A-47, A-75, D-185**
Marquardt Aircraft Co., 16555 Saticoy St., Van Nuys, Calif.
McGREGOR MFG. CORP., 2785 East Maple, Birmingham, Mich. **SEE ADV. B-37**
North American Aviation, Inc., Autonetics Div., 9150 East Imperial Highway, Bell Flower, Calif.
Rheem Manufacturing Co., Aircraft Div., 11711 Woodruff Ave., Downey, Calif.
Rocketdyne Div., North American Aviation, Inc., 6633 Canoga Ave., Canoga Park, Calif.
Ryan Aeronautical Co., Lindbergh Field, San Diego 12, Calif.
Stratos Div., Fairchild Engine & Airplane Corp., Bay Shore, N. Y
Summit Roberts Products Inc., 830 New York Ave., Toledo, Ohio
THERM-ELECTRIC METERS CO., INC., Ithaca, N. Y. **SEE ADV. C-94**
Thompson Products, Inc., 23555 Euclid Ave., Cleveland 17, Ohio
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AiResearch Mfg. Div. Garrett Corp., The, 402 S. 36 St., Phoenix, Ariz.
All American Engineering Co., du Pont Airport, Wilmington, Del.
AMERICAN MACHINE & FOUNDRY CO., DEFENSE PRODUCTS GROUP, 1101 North Royal St., Alexandria, Wa. **SEE ADV. D-195**
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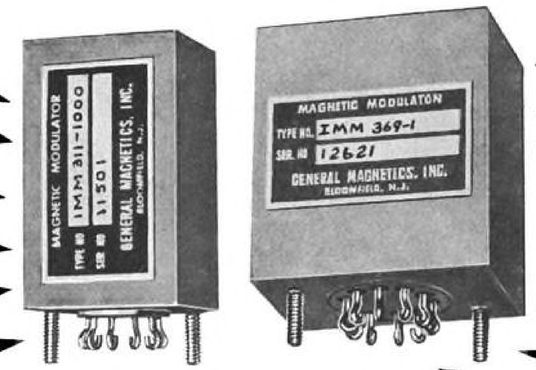
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INPUT INFORMATION

PHOTO CELL
THERMOCOUPLE
ANALOG DATA
STRAIN GAUGE
MAGNETOMETER
MICROSEN
LOW LEVEL DC VOLTAGE



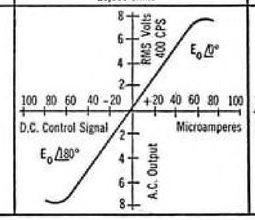
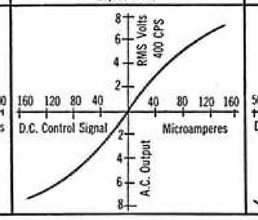
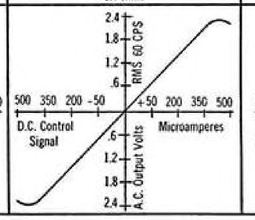
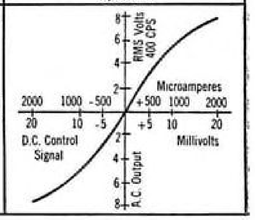
ACTUAL SIZE

OUTPUT INFORMATION

SERVO AMPLIFIERS
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SPEED CONTROL
FLIGHT CONTROL
FIRE CONTROL
TEMPERATURE CONTROL
AUTO POSITIONING
VOLTAGE, CURRENT, FREQUENCY CONTROL

The MAGNETIC MODULATOR is designed to convert low level dual polarity DC signals into AC signals of corresponding amplitude and phase sense.

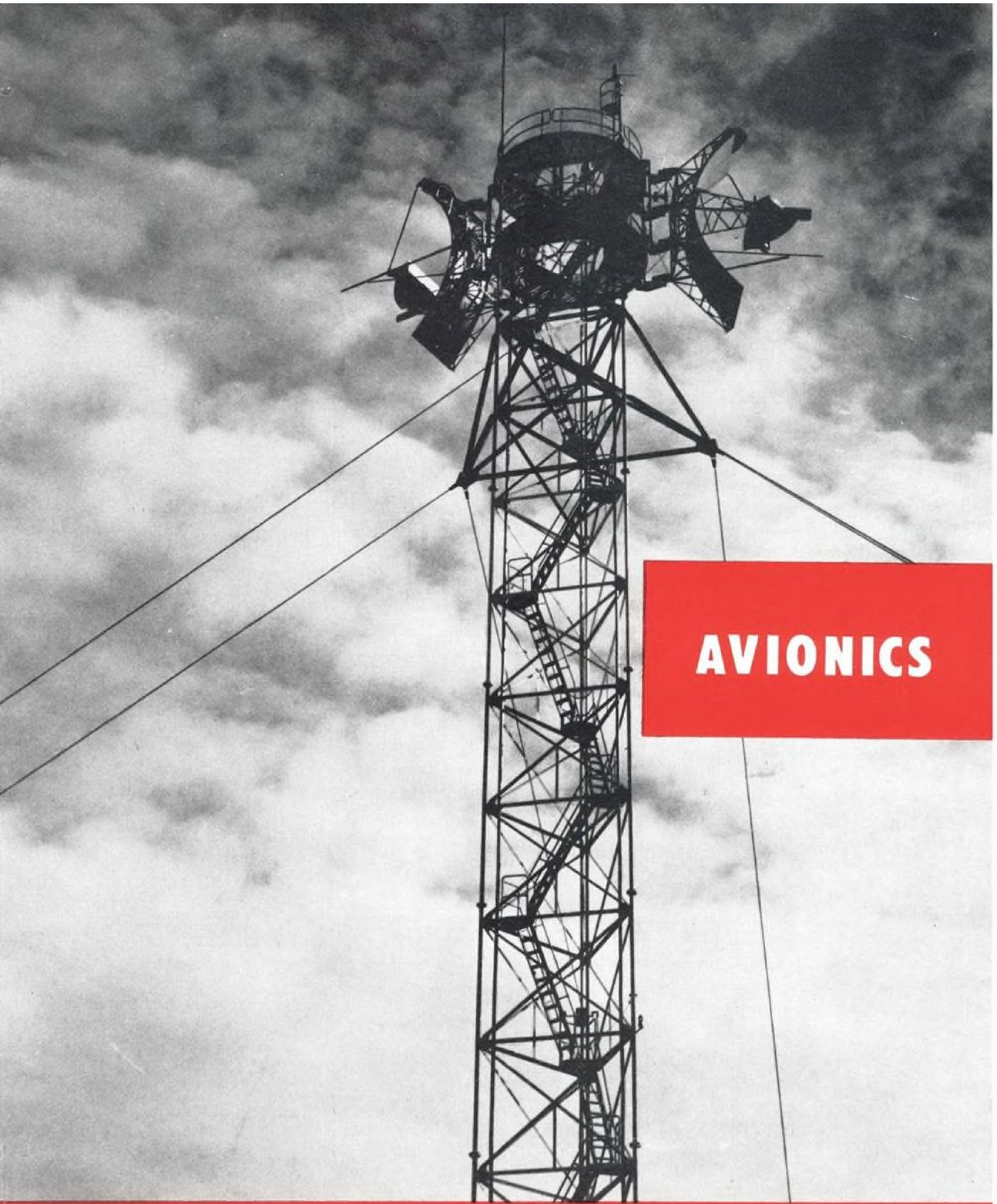
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PARAMETER	INPUT MODULATORS			THERMOCOUPLE CONVERTERS
Type No.	IMM—336—1	IMM-311-1000	IMM-369-1	MTC-336-10
Excitation Frequency	360—440 CPS	360—440 CPS	60 CPS	360—440 CPS
Signal Winding DC Res.	9K ± 10%	1000 ohms	800 ohms ±10%	10 ohms ± 10%
AC Excitation Volts	115V	5.0 Volts RMS	3V RMS	6 Volts RMS @ 400 CPS
Input Signal Range	0—± 70 μA	0— ± 200 μA	0—± 500 μA	0—±20 Millivolts
AC Output	0—8V RMS Phase Rev. 400~	0—7V RMS 400 CPS Phase Rev.	0—2.4V RMS Phase Rev.	0—7.5V RMS Phase Rev.
Overall Dimensions	1" x 1 1/16" x 1¾"	1" x 1 1/16" x 1¾"	1½" x 1⅝" x 1¾"	1" x 1 1/16" x 1¾"
Null Amplitude	25MV RMS Maximum	30MV RMS Maximum	20MV RMS Maximum	20 Millivolts
Output Impedance	20,000 ohms	20,000 ohms	5K ohms	20,000 ohms
Response Curve				

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Big Contracts Spark Avionic Combines

By Philip J. Klass

Increasing share of the nation's defense budget will be spent for avionics in the next several years, but growing numbers of avionics manufacturers are asking: How do we go about getting our share of this increased market?

Immediately following the now-famous Air Force briefing in June of top industry representatives on future AF procurement trends, avionic company officials emerged smiling, in sharp contrast to the grim looks on the faces of jet engine and airframe officials. There appeared to be ample justification for this optimism.

Air Force officials reported that by 1962 guided missile procurement would be up about 500% over 1956 and would exceed dollars spent for aircraft. This, of course, was before Sputniks I and II which have pushed up the schedule. Average of about 50% of a missile's cost goes for avionics, compared to only about 25% for aircraft. Furthermore, avionics expenditures not identified with a specific airframe or missile (like SAGE air defense system) would reach $1.3 billion in 1962, almost double the 1956 figure.

Extreme optimism began to fade when avionic company officials returned home and took a look at the aircraft missile mix of their current production and development. In many companies the production mix was predominantly aircraft.

Not too many companies can boast of as high a 50/50 aircraft/missile mix in current developments–which will determine production mix in the 1960-62 period.

Recent General Electric analysis, for example, shows that only 25% of its defense electronics development programs are specifically pointed toward missiles, although 90% of the products or techniques have missile applications.

Contracts Getting Bigger

Another uncertainty factor, less dramatic but equally important for the avionics manufacturer, is the trend toward larger, more complex weapon systems. Recent GE study revealed that average size of its defense electronics contracts had increased 400-500% during past 10 years.

Trend is significant for both industry giants and the many more medium-size firms, with annual sales of perhaps $20-80 million. The major weapon system contracts normally go to the giants. To many medium-size firms this is a hard, and disappointing, fact of life. But some of the giants are now beginning to recognize the situation as a mixed blessing. This is particularly true as the Defense Department economy axe falls on major weapon system programs, such as the North American Navaho missile.

There is obvious business advantage, and glamour, in being selected as prime contractor on a large complex weapon system. But such programs consume large chunks of the prime contractor's engineering staff and facilities. The prime risks most of his chips on what may prove to be an also-ran, leaving his factory bare of production.

North American's Navaho is an example. The company's Autonetics division has one of the oldest and largest inertial guidance groups in the country. If this group had not been up to its ears in the Navaho program, it seems probable that it would have been selected to supply inertial guidance for one of the ballistic missile programs. Today it is looking for business.

The trend toward fewer, but more complex weapon systems is forcing the giants to be more selective. It may also lead weapon system primes to contract out more of the subsystems work in order to hedge their bets. One weapon system prime contractor, for example, with moderate in-house capability in both flight control and inertial guidance, recently sought to subcontract out this portion of the weapon system.

The trend toward large complex weapon systems has produced even greater repercussions within the ranks of medium-size avionics companies. Companies that in former days were prime contractors on major subsystems, find their relative stature slipping as weapon systems grow more complex.

Size Factor

These companies are, by themselves, too small to win a major weapon system prime. But they are too large to be content with "handouts" on a catch-as-catch-can basis from the weapon system primes. This is leading to coalitions or combines of medium-size firms, either in formal or informal arrangements, a trend first reported by Aviation Week (May 6, p. 69).

For example:

• **Emerson Radio & Phonograph Co.** has formed a loose federation of about a dozen other firms with specialties in complementary fields (such as rocket propulsion and airframe design). When a new military requirement comes up, management and technical committees are formed for the project, with representatives from each firm whose skills will be required. Committee decides which company will function as prime contractor for the project and submits joint proposal in its name.

• **Hoffman Electronics Corp.** has sounded out other medium-size avionics and non-avionic companies about setting up new company which would perform system management function for participating members and submit joint proposals on weapon system programs.

• **Stavid Engineering Corp.,** Radioplane division of Northrop Aircraft and Librascope division of General Precision Equipment Corp. have joined hands to bid on a specific Air Force requirement.

Coalition

In some cases the government is suggesting that smaller firms form coalitions to bid on a major program. Recent example is the Airways Modernization Board's new traffic control data processing and display system development. (AW Sept. 30, p. 29.)

Other companies, like Daystrom, which have acquired a number of smaller companies during recent years, are now seeking to integrate them in order better to harness their individual talents in a bid for major systems and sub-systems.

The interesting result of these formal and informal coalitions is that it frequently places a medium-size company in the position of competing with industry giants who are also customers, or "cuspetitors," as one industry official calls them.

But there are others, like Servomechanisms, Inc. for example, who believe in sticking to their subsystem specialties. Although many companies of its size have set up systems groups, Servomechanisms intentionally retains "subsystem" in the name of one of its major divisions to emphasize that it does not seek to compete with its customers.

On the other hand, Servomechanisms does not hestitate to diversify downward and compete with its own vendors. For example, company now makes its own precision film potentiometers whereas it formerly purchased pots from outside suppliers. Company's research into new vacuum-evaporation processes and high temperature materials for potentiometers has vaulted it into the field of basic components (AW Sept. 30, p. 70).

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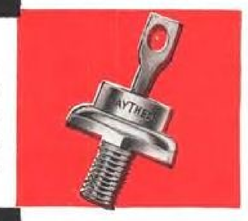
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NEWS for design engineers



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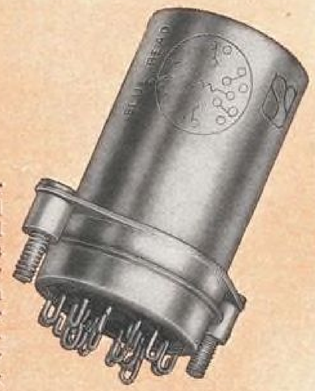
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DIGITAL INDICATOR

A new lightweight Digital Indicator for data display has been developed by Union Switch & Signal that has many uses in aviation and other industries. It is designed for either local or remote use, on a direct wire basis, and responds to binary code. The indicator reads out directly and has a non-dissipating storage facility. Data can be printed out if necessary. Write for Bulletin 1011.

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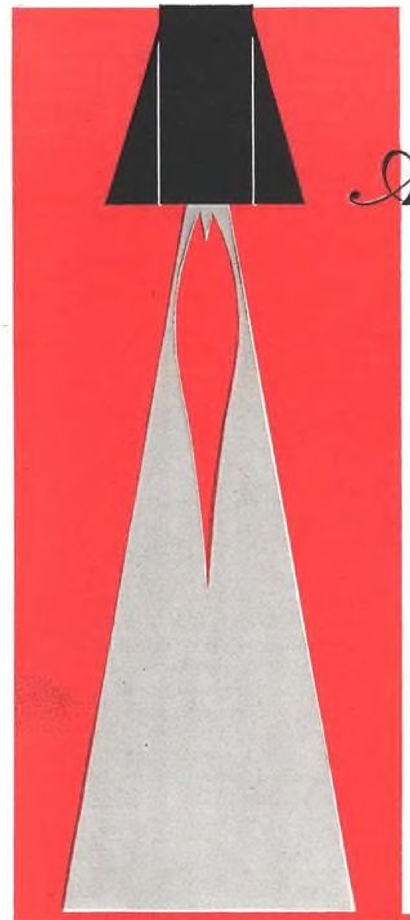
Coil resistance runs up to 13,500 ohms, vibration resistance up to 2000 cycles at 30 G's, and shock in excess of 50 G's. Write for Bulletin 1012.



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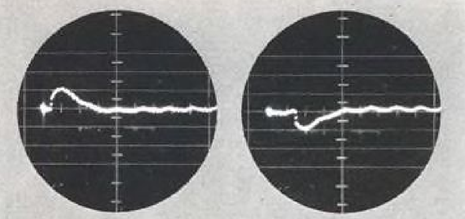
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DESIGN—When time dictates, available equipment can be adapted to your specifications. But you receive custom design, *beyond the expected*, when you need it. For example, the transistorized MAGAMP power supply (right). This unit provides a faster response time . . . a lower overshoot and undershoot . . . and remote regulation at longer distances than has ever been achieved before with this type of power supply.

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This transistorized MAGAMP power supply delivers a 27V to 42V output at 0 to 300 amperes, *regulated at a load up to several hundred feet away.*



The MAGAMP has a surge capacity of 400% overload for 2 seconds. Regulation at the load is 1% or better. Recovery time is less than 50 milliseconds. Overshoot and undershoot are less than 25%, with a 30% change in load. (Scale in above photos: 5V/CM and 10MS/CM.)

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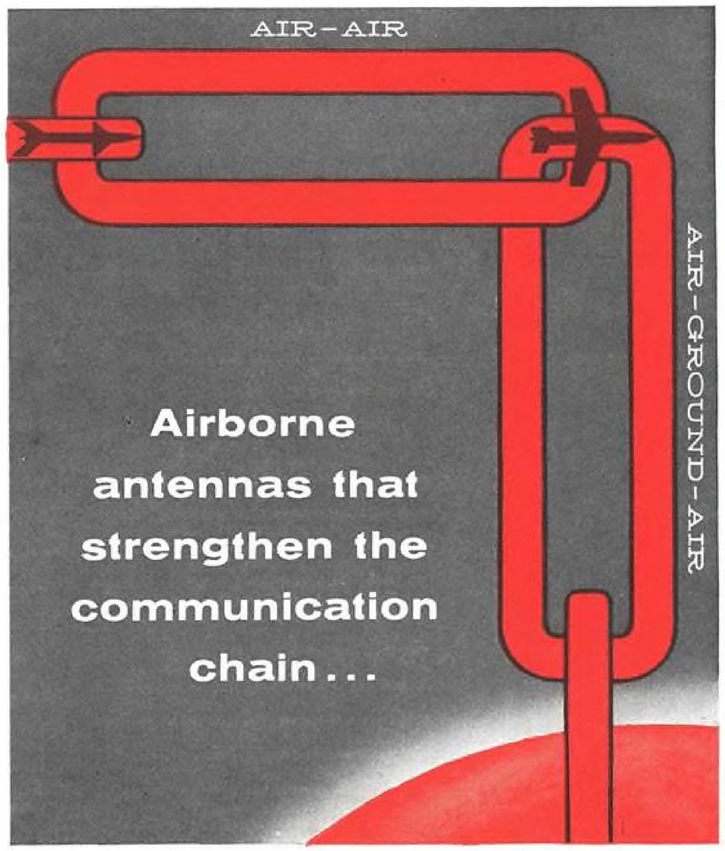
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Sprague Electric Co., North Adams, Mass.
Standard Television Products Ltd., 108 Sydney St. S., Kitchener, Ontario, Canada
Sterling Transformer Corp., 297 North Seventh St., Brooklyn 11, N. Y.
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.
Technitrol Engineering Co., 1952 E. Allegheny Ave., Philadelphia 34, Pa.
Telechrome Mfg. Corp., 28 Ranick Drive, Amityville, N. Y.
Telectro Industries Corp., 36-16 37th St., Long Island City 1, N. Y.
Telex, Inc., Telex Park, Minneapolis, Minn.
Texas Instruments Inc., 6000 Lemmon Ave., Dallas 9, Texas
Transformers Inc., 200 Stage Rd., Vestal, N. Y.
Tresco, Inc., 3824 Terrace St., Philadelphia 28, Pa.
Triad Transformer Corp., 4055 Redwood Ave., Venice, Calif.
United Transformer Corp., 150 Varick St., New York 13, N. Y.
WESTINGHOUSE ELECTRIC CORP., P. O. Box 868, Pittsburgh 30, Pa. **SEE ADV. C-88, C-89**
Wheeler Insulated Wire Co. Inc. Div., Sperry Rand Corp., 150 East Aurora St., Waterbury 20, Conn.

Transistors

Amperex Electronic Corp., 230 Duffy Ave., Hicksville, N. Y.
Avnet Electronic Supply Co. Inc., 36 North Moore St., New York, N. Y.
Bendix Aviation Corp., Red Bank Div., Red Bank, N. J.
CBS-Hytron Div., Columbia Broadcasting System, Inc., 100 Endicott St., Danvers, Mass.
Clevite Transistor Products Div., Clevite Corp., 241-257 Crescent St., Waltham, Mass.
Commercial Casting Co., 8855 Santa Monica Blvd., Los Angeles 46, Calif.

(Continued on page C-76)



A most reliable link in communication from air to air, or ground to air. Keeping pace with man's conquest of space, Dorne and Margolin's research and development programs have produced over 100 different types of antennas to meet specific needs. Functionally designed, these antennas are developed for compatibility with the particular aircraft or missile—structurally, aerodynamically and electronically.

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High Speed UHF Blade, Type DM C-7

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West Coast: 1434 Westwood Boulevard, Los Angeles 24, Calif.

Circle Number 74 on Reader-Service Card
Circle Number 75 on Reader-Service Card →

cppc



SIZE 8
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Dia. .750 in.
Actual Size



SIZE 10
Weight 50 gms.
Dia. .937 in.
Actual Size



SIZE 11
Weight 82 gms.
Dia. 1.062 in.
Actual Size



SIZE 15
Weight 126 gms.
Dia. 1.437 in.
Actual Size

for ALL Types

STANDARD UNITS — ROTOR AS PRIMARY — STATOR AS PRIMARY

SYNCHRO FUNCTION	CPPC TYPE	Input Voltage (400 ~)	Input Current (Amps.)	Input Power (Watts)	Output Voltage (Volts)	Sensitivity (MV/deg.)	Phase Shift (deg. lead)	Input Voltage (400 ~)	Input Current (Amps.)	Input Power (Watts)	Output Voltage (Volts)	Sensitivity (MV/deg.)	Phase Shift (deg. lead)
Torque Transmitter	CGC-8-A-7	26	.100	.5	11.8	206	8°	–	–	–	–	–	–
Control Transformer	CTC-8-A-1	–	–	–	–	–	–	11.8	.090	.23	23.5	410	8.5°
Control Transformer	CTC-8-A-4	–	–	–	–	–	–	11.8	.029	.08	22.5	390	8°
Torque Receiver	CRC-8-A-1	26	.100	.5	11.8	206	8°	–	–	–	–	–	–
Electrical Resolver	CSC-8-A-1	26	.039	.43	10.6	185	20°	11.8	.084	.27	23.2	400	11°
Control Differential	CDC-8-A-1	–	–	–	–	–	–	11.8	.085	.21	11.8	206	9°
Vector Resolver	CVC-8-A-1	26	.057	.34	11.8	206	10.2°	–	–	–	–	–	–

STANDARD UNITS — ROTOR AS PRIMARY — STATOR AS PRIMARY

SYNCHRO FUNCTION	CPPC TYPE	Input Voltage (400 ~)	Input Current (Amps.)	Input Power (Watts)	Output Voltage (Volts)	Sensitivity (MV/deg.)	Phase Shift (deg. lead)	Input Voltage (400 ~)	Input Current (Amps.)	Input Power (Watts)	Output Voltage (Volts)	Sensitivity (MV/deg.)	Phase Shift (deg. lead)
Torque Transmitter	CGC-10-AS-4	26	.142	.61	11.8	206	5	–	–	–	–	–	–
Control Transformer	CTC-10-AS-1	26	.033	.23	11.2	200	10	11.8	.081	.19	23.5	410	8
Control Transformer	CTC-10-AS-4	26	.009	.06	11.2	200	10	11.8	.021	.05	23.5	410	8
Control Differential	CDC-10-AS-1	11.8	.082	.23	11.2	200	11	11.8	.080	.19	10.8	195	8
Torque Receiver	CRC-10-AS-1	26	.086	.42	11.8	206	6.5	–	–	–	–	–	–
Electrical Resolver	CSC-10-AS-1	26	.036	.35	11.8	206	18	11.8	.072	.21	24	418	25
Vector Resolver	CVC-10-AS-1	26	.049	.25	11.8	206	7	11.8	.092	.33	22.8	398	12
Vector Resolver	CWC-10-AS-1	26	.040	.28	11.8	206	10	11.8	.080	.26	21.0	365	10.5

STANDARD UNITS — ROTOR AS PRIMARY — STATOR AS PRIMARY

SYNCHRO FUNCTION	CPPC TYPE	Input Voltage (400 ~)	Input Current (Amps.)	Input Power (Watts)	Output Voltage (Volts)	Sensitivity (MV/deg.)	Phase Shift (deg. lead)	Input Voltage (400 ~)	Input Current (Amps.)	Input Power (Watts)	Output Voltage (Volts)	Sensitivity (MV/deg.)	Phase Shift (deg. lead)
Torque Transmitter	CG-11-B-2	26	.168	.69	11.8	206	4	–	–	–	–	–	–
Control Transmitter	CG-11-B-7	26	.089	.36	11.8	206	3.5	–	–	–	–	–	7
Torque Transmitter	CG-11-B-6	115	.042	.71	11.8	206	3.4	–	–	–	–	–	–
Control Transformer	CT-11-B-2	26	.058	.32	11.8	206	6	11.8	.138	.29	23.5	410	5
Control Transformer	CT-11-B-8	–	–	–	–	–	–	11.8	.098	.18	23.5	410	5
Control Transformer	CT-11-E-7	26	.015	.102	11.8	206	6	11.8	.035	.09	22.7	400	5
Control Differential	CD-11-B-2	–	–	–	–	–	–	11.8	.150	.38	11.8	206	5
Torque Receiver	CR-11-B-2	26	.095	.41	11.8	206	4	–	–	–	–	–	–
Electrical Resolver	CS-11-B-2	26	.050	.32	12.4	220	8.5	12.6	.092	.23	23.5	410	5.5
Vector Resolver	CV-11-B-2	3	.108	.36	3.1	54	3.5	3.2	.072	.05	24.5	427	8.5

STANDARD UNITS — ROTOR AS PRIMARY — STATOR AS PRIMARY

SYNCHRO FUNCTION	CPPC TYPE	Input Voltage (400 ~)	Input Current (Amps.)	Input Power (Watts)	Output Voltage (Volts)	Sensitivity (MV/deg.)	Phase Shift (deg. lead)	Input Voltage (400 ~)	Input Current (Amps.)	Input Power (Watts)	Output Voltage (Volts)	Sensitivity (MV/deg.)	Phase Shift (deg. lead)
Torque Transmitter	CG-15-D-1	26	.221	.75	11.8	206	3.0	–	–	–	–	–	–
Torque Transmitter	CG-15-D-4	26	.100	.35	11.8	206	3.5	–	–	–	–	–	–
Torque Transmitter	15CX4a	115	.067	.70	90	1560	2.5°	–	–	–	–	–	–
Torque Transmitter	CG-15-MS-1	115	.067	70	90	1560	2.5°	–	–	–	–	–	–
Control Transformer	CT-15-D-1	–	–	–	–	–	–	11.8	.125	.24	23.4	410	4.5°
Control Transformer	CT-15-D-4	–	–	–	–	–	–	11.8	.032	.06	23.4	410	4.5°
Torque Receiver	CR-15-D-1	26	.100	.35	11.8	206	3.5°	–	–	–	–	–	–
Electrical Resolver	CS-15-D-1	26	.055	.31	11.8	206	7.5°	11.8	.110	.25	23	400	5°
Vector Resolver	CW-15-D-1	32	.005	.03	15	260	5.0°	15	.010	.03	28.5	495	5.5°
Control Differential	CD-15-D-1	11.8	.122	.33	10.8	188	9°	11.8	.120	.24	11.0	192	4.5°

CLIFTON PRECISION PRODUCTS
CLIFTON HEIGHTS,

# of SYNCHROS

D.C. RESISTANCE		IMPEDANCE			ACCURACY			
Rotor (Ohms)	Stator (Ohms)	Zro (Ohms)	Zso (Ohms)	Zrs (Ohms)	Max. Null Voltage (MV)	Max. Error (Min.)	Max. Error Spread (Min.)	Length in Inches
37	12	54+j260	12+j45	80+j20	30	7	14	1.240
143	25	220+j740	28+j110	246+j60	30	7	14	1.240
389	64	560+j1860	90+j340	640+j190	30	7	14	1.240
37	12	54+j260	12+j45	80+j20	30	—	30	1.240
230	27	280+j600	38+j136	70+j136	30	7	14	1.240
36	25	38+j122	27+j120	48+j14	30	7	14	1.240
78	27	103+j440	8+j30		30	7	14	1.240

D.C. RESISTANCE		IMPEDANCE			ACCURACY			
Rotor (Ohms)	Stator (Ohms)	Zro (Ohms)	Zso (Ohms)	Zrs (Ohms)	Max. Null Voltage (MV)	Max. Error (Min.)	Max. Error Spread (Min.)	Length in Inches
16	7.2	35+j180	8+j31	47+j16	30	—	12	1.241
140	24	205+j752	32+j128	234+j81	30	—	15	1.241
566	100	807+j2950	115+j481	945+j325	30	—	15	1.241
32	25	34+j119	31+j123	57+j17	30	—	15	1.281
34	12	58+j300	13+j51	80+j27	30	—	30	1.241
215	28	273+j668	41+j159	308+j71	1 mv/v	—	15	1.281
68	28	107+j527	40+j123	170+j59	1 mv/v	—	15	1.241
111	28	177+j625	91+j143	215+j70	1 mv/v	—	15	1.241

D.C. RESISTANCE		IMPEDANCE			ACCURACY			
Rotor (Ohms)	Stator (Ohms)	Zro (Ohms)	Zso (Ohms)	Zrs (Ohms)	Max. Null Voltage (MV)	Max. Error (Min.)	Max. Error Spread (Min.)	Length in Inches
10.4	3.6	24+j153	5+j24	28+j14	30	—	12	1.600
18	7.7	45+j288	9+j48	48+j22	30	—	12	1.600
180	3.8	410+j2700	5+j24	50+j21	100	—	12	1.600
45	8.5	94+j436	15+j72	81+j40	30	—	12	1.600
47	13	100+j620	19+j100	—	30	—	12	1.600
196	35	454+j1670	74+j283	320+j163	30	—	12	1.600
12	8.5	14+j67	17+j66	62+j28	30	—	12	1.640
20	8.5	40+j260	10+j40	50+j21	30	—	30	1.600
80	13.6	128+j503	27+j136	126+j43	1 mv/v	—	12	1.640
18	64	39+j293	10+j41	—	1 mv/v	—	12	1.600

D.C. RESISTANCE		IMPEDANCE			ACCURACY			
Rotor (Ohms)	Stator (Ohms)	Zro (Ohms)	Zso (Ohms)	Zrs (Ohms)	Max. Null Voltage (MV)	Max. Error (Min.)	Max. Error Spread (Min.)	Length in Inches
6.5	3	12+j115	3.9+j19	28+j11	30	—	10	1.600
15.5	5.7	35+j260	7.1+j40	40+j23	30	—	10	1.600
65	161	163+j1690	175+j894		125	12	24	2.000
65	161	163+j1690	175+j894		75	—	10	2.000
37	10	80+j490	15+j80	74+j50	30	—	10	1.600
180	37	360+j1870	63+j320	338+j203	30	—	10	1.600
15.5	5.7	35+j260	7.1+j40	40+j23	30	—	30	1.600
74	13	110+j520	23+j120		1 mv/v	—	10	1.640
540	156	1100+j6300	300+j1600	1180+j602	1 mv/v	—	10	1.600
17	9.2	22+j81	17+j83	27+j13	30	—	10	1.640

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NAVY BuOrd SYNCHROS



½ Actual Size

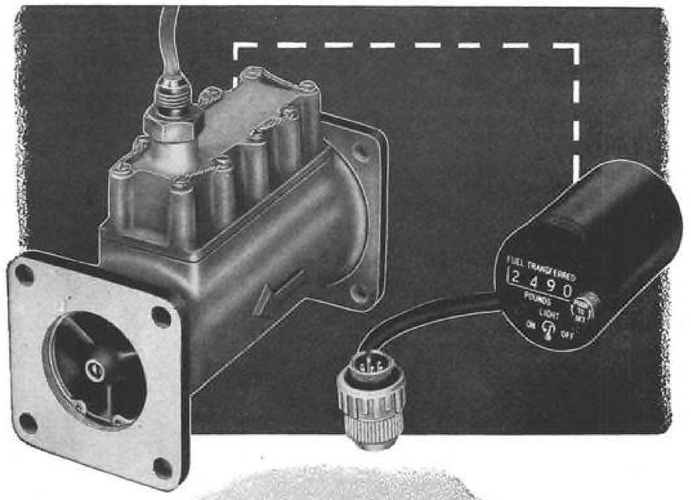
Contact Clifton Precision for standard Navy BuOrd units. If your specification requires conformance to BuOrd drawings and your system can take advantage of exceptional accuracy, CPPC can hold extra close error spread and accuracy tolerances. See CG-15-MS-1 in the tables.

PRECISION RESOLVERS

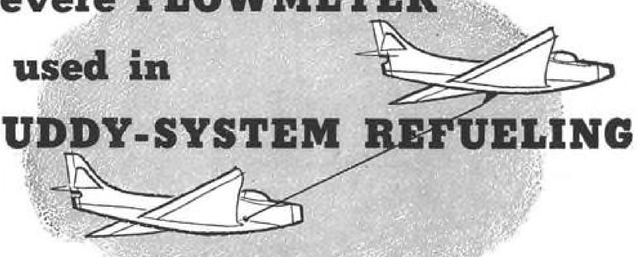
Precision Computing Resolvers with functional accuracies of the order of .1% and transformation ratios 1:1 are currently being constructed in the size 15 class for special applications. Contact CPPC for applications involving the use of Precision Resolvers in all sizes.



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Revere FLOWMETER used in BUDDY-SYSTEM REFUELING



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Buddy-system inflight refueling means greatly increased range and striking ability for carrier-based aircraft. The Revere Flowmeter System, used in this new method of mid-air refueling and now being produced for two Navy prime contractors, *totalizes flow accurately and dependably without the use of "black boxes" or vacuum tubes.*

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Various impulse-flow ratios, flow rates to suit your totalizing applications. Rate of flow indication also available.

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(Continued from page 73)

DEFENSE ELECTRONICS PRODS. ADV., RADIO CORP. OF AMERICA, Front & Cooper Sts., Camden, N. J. SEE ADV. C-126
Delco Radio Div., General Motors, Kokomo, Ind.
GENERAL ELECTRIC CO., APPARATUS SALES DIV., 1 River Rd., Schenectady 5, N. Y. SEE ADV. A-47, A-75, D-185
General Electric Co., Semiconductor Products Dept., 1224 W. Genessee St., Syracuse, N. Y.
General Transistor Corp., 91-27 138 Place, Jamaica 35, N. Y.
Hoffman Semiconductor Div., Hoffman Electronics Corp., 930 Pitner Ave., Evanston, Illinois
Hughes Aircraft Co., Culver City, Calif.; International Airport Station, Los Angeles 45, Calif.
Lansdale Tube Co., Div. of Philco Corp., Lansdale, Pa.
Minneapolis-Honeywell Regulator Co., Aeronautical Div., 2600 Ridgway, Minneapolis 13, Minn.
MOTOROLA, INC., 8201 McDowell Rd., Phoenix, Ariz.; 4545 West Augusta Blvd., Chicago, Ill. SEE ADV. C-122
Philco Corp., Government & Industrial Div., 4700 Wissahickon Ave., Philadelphia 44, Pa.
Radio Development & Research Corp., 100 Pennsylvania Ave., Paterson 3, N. J.
RAYTHEON MFG. CO., RECEIVING & CATHODE RAY TUBE OPER., 55 Chapel St., Newton 58, Mass. SEE ADV. C-68
Sperry Gyroscope Co., Div., Sperry Rand Corp., Marcus & Lakeville Rds., Great Neck, N. Y.
Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.
Texas Instruments Inc., 6000 Lemmon Ave., Dallas 9, Texas
Transitron Electronics Co., Wakefield, Mass.
Tung-Sol Electric, Inc., 95 Eighth St., Newark 4, N. J.
WESTINGHOUSE ELECTRIC CORP., P. O. Box 868, Pittsburgh 30, Pa. SEE ADV. C-88, C-89

Transmitters, Fuel Flow

Bendix Aviation Corp., Montrose Div., S. Montrose, Pa.
A. Biederman, Inc., Precision Instruments Labs., 1045 Airway, Glendale 1, Calif.
Decker Aviation Corp., 1361 Frankford Ave., Philadelphia 25, Pa.
Fischer & Porter Co., 790 Warminster Rd., Hatboro, Pa.
GENERAL ELECTRIC CO., APPARATUS SALES DIV., 1 River Rd., Schenectady 5, N. Y. SEE ADV. A-47, A-75, D-185
KEARFOTT CO., INC., SUB. OF, GENERAL PRECISION EQUIPMENT CORP., 1378 Main Ave., Clifton, N. J. SEE ADV. C-93
Norden-Ketay Corp., Commerce Rd., Stamford, Conn.; Instrument & Systems Div., Wiley St., Milford, Conn.
Pace Engineering Co., North Hollywood, Calif.
PIONEER-CENTRAL DIVISION BENDIX AVIATION CORP., Davenport, Iowa. SEE ADV. C-91
REVERE CORP. OF AMERICA, 845 North Colony Rd., Wallingford, Conn. SEE ADV. C-76
Waugh Engineering Co., Van Nuys, Calif.

Transmitters, Fuel Pressure

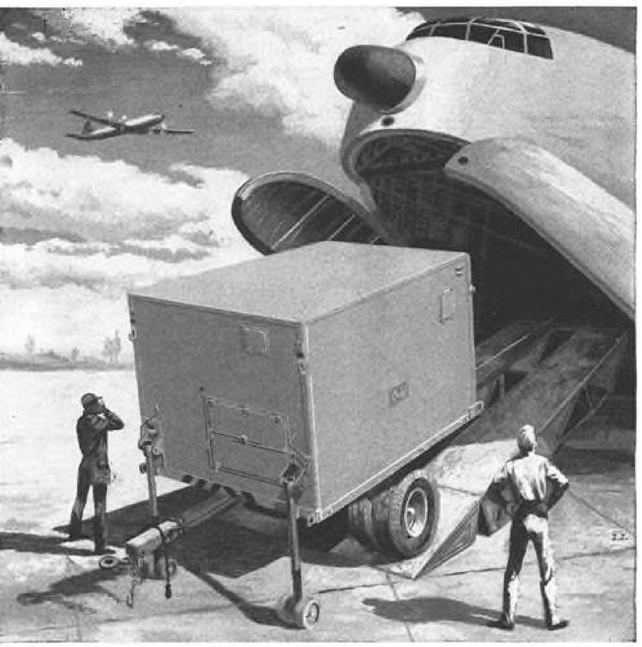
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A. Biederman, Inc., Precision Instruments Labs., 1045 Airway, Glendale 1, Calif.
Decker Aviation Corp., 1361 Frankford Ave., Philadelphia 25, Pa.
Fischer & Porter Co., Hatboro, Pa.
GENERAL ELECTRIC CO., APPARATUS SALES DIV., 1 River Rd., Schenectady 5, N. Y. SEE ADV. A-47, A-75, D-185
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KEARFOTT CO., INC., SUB. OF, GENERAL PRECISION EQUIPMENT CORP., 1378 Main Ave., Clifton, N. J. SEE ADV. C-93
Norden-Ketay Corp., Instrument & Systems Div., Wiley St., Milford, Conn.
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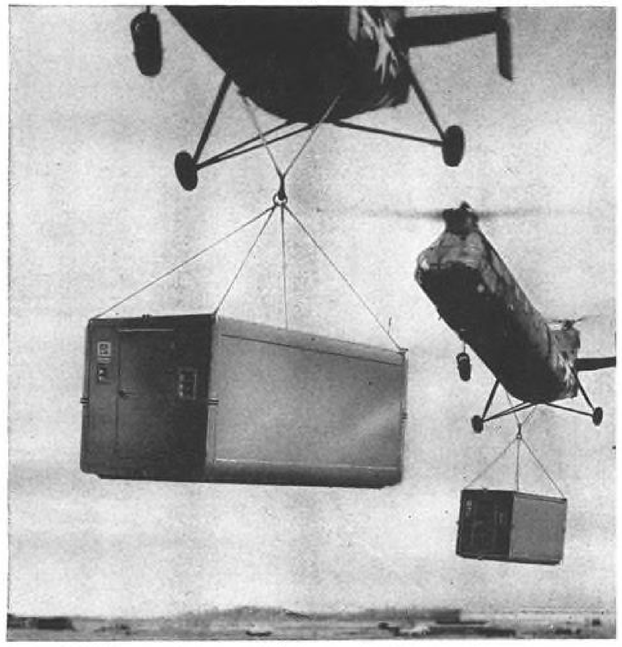
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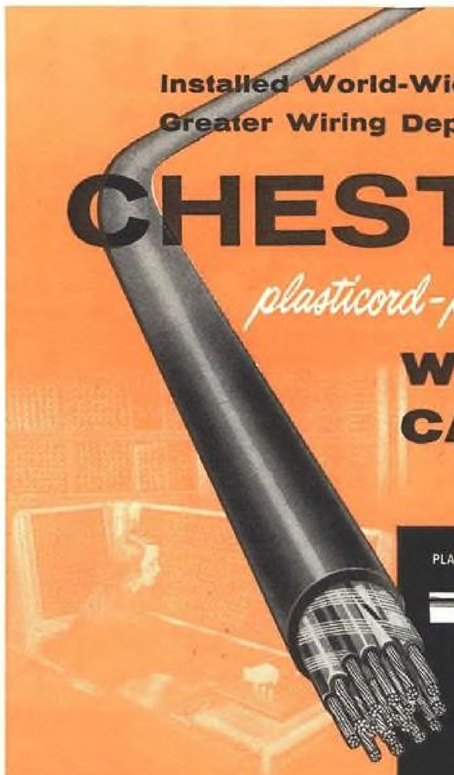
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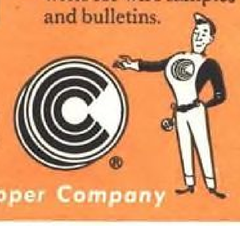
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Transmitters, Hydraulic Pressure

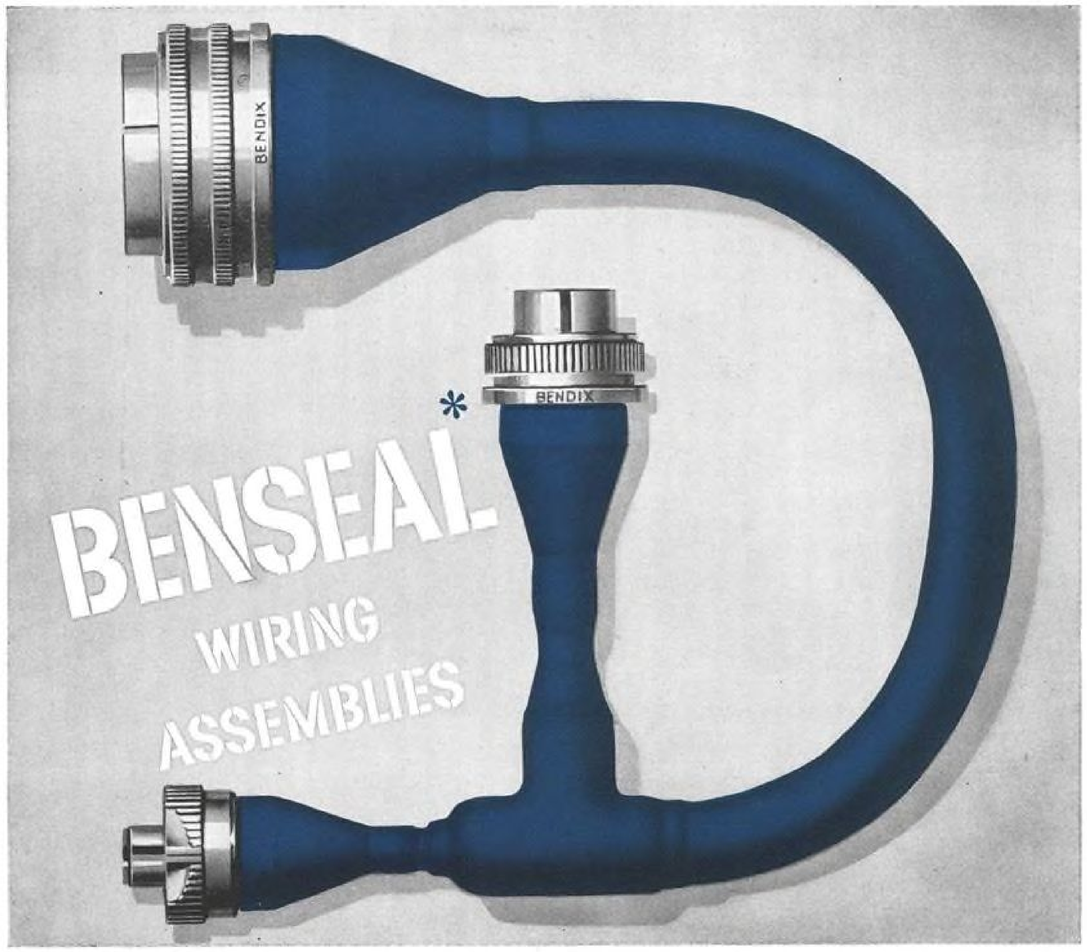
BJ Electronics, Borg-Warner Corp., 3300 Newport Ave., P. O. Box 1679, Santa Ana, Calif.
Bendix Aviation Corp., Montrose Div., S. Montrose, Pa.
A. Biederman, Inc., Precision Instruments Labs., 1045 Airway, Glendale 1, Calif.
Decker Aviation Corp., 1361 Frankford Ave., Philadelphia 25, Pa.
Fischer & Porter Co., 790 Warminster Rd., Hatboro, Pa.
GENERAL ELECTRIC CO., APPARATUS SALES DIV., 1 River Rd., Schenectady 5, N. Y. SEE ADV. A-47, A-75, D-185
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Physical Measurements Corp., 1650 19th St., Santa Monica, Calif.
U. S. Gauge Div., American Machine & Metals, Inc., Sellersville, Pa.

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UNITED CONTROL CORP., 4540 Union Bay Pl., Seattle 5, Wash. SEE ADV. C-107
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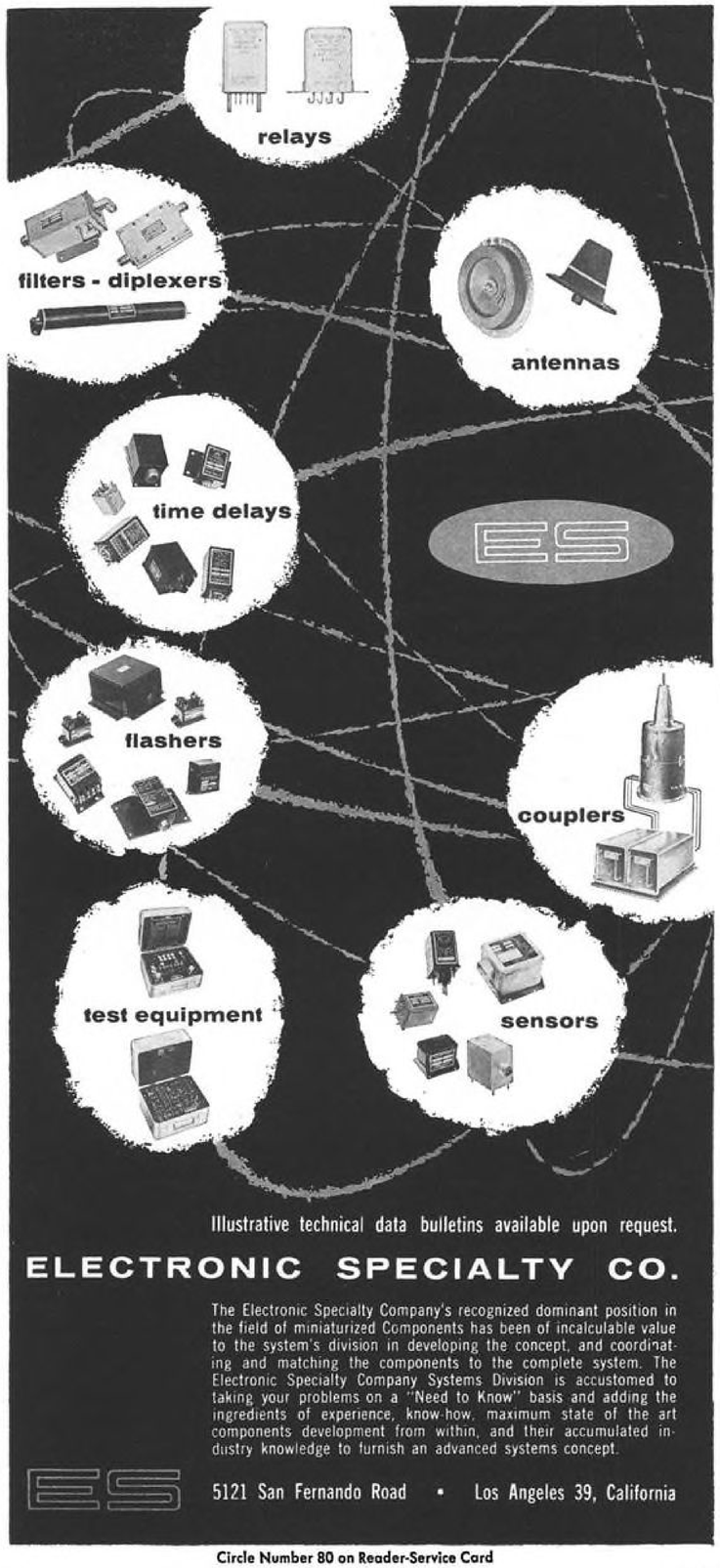
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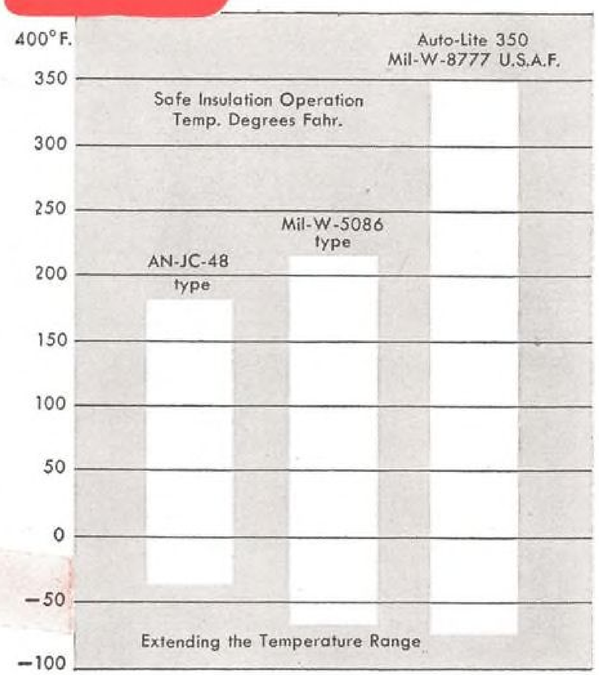
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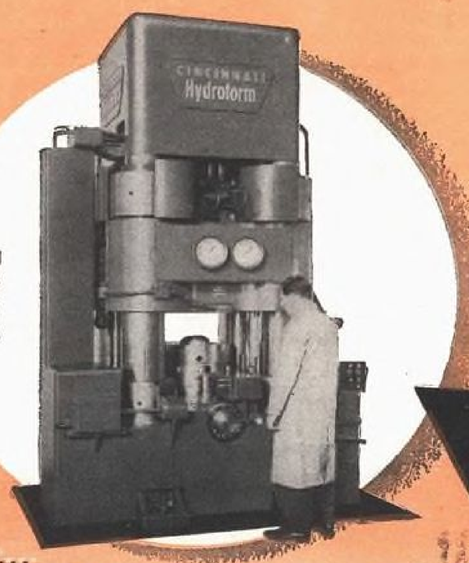
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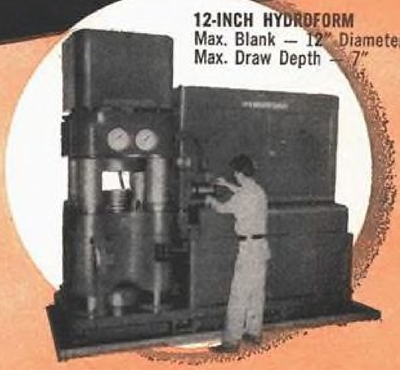
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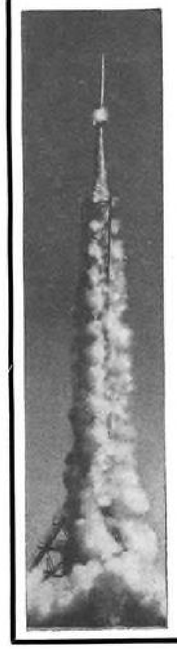
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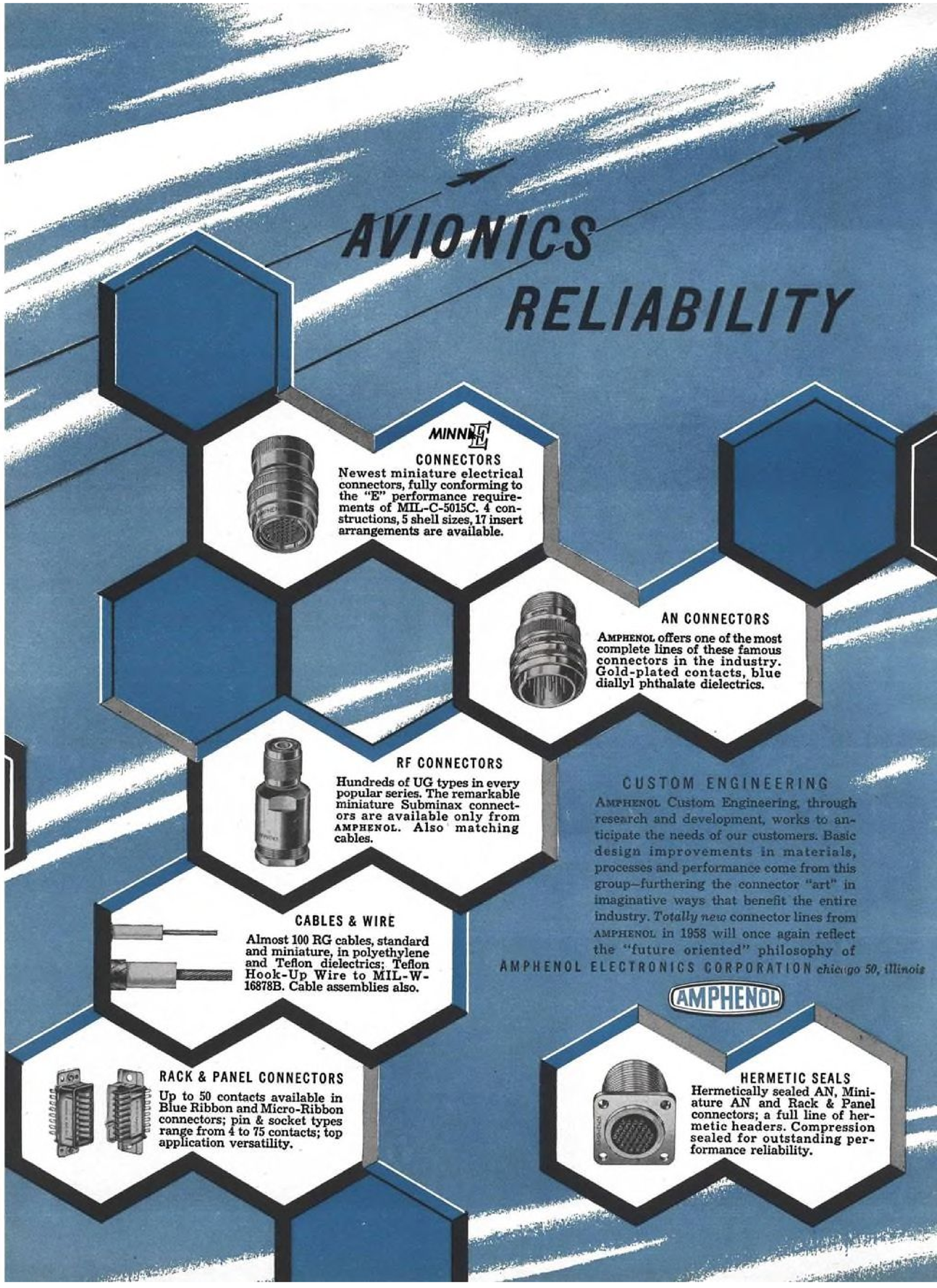
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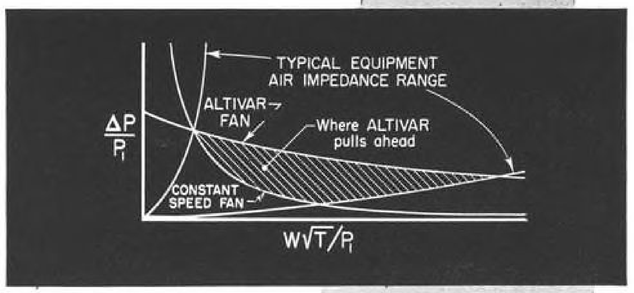
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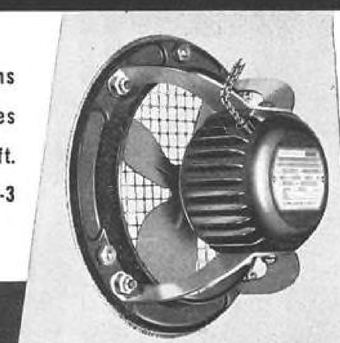
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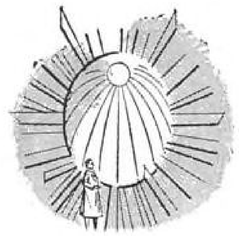
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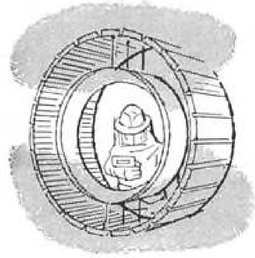
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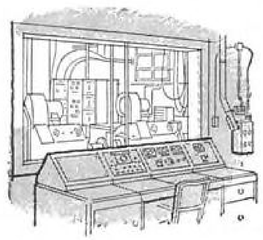
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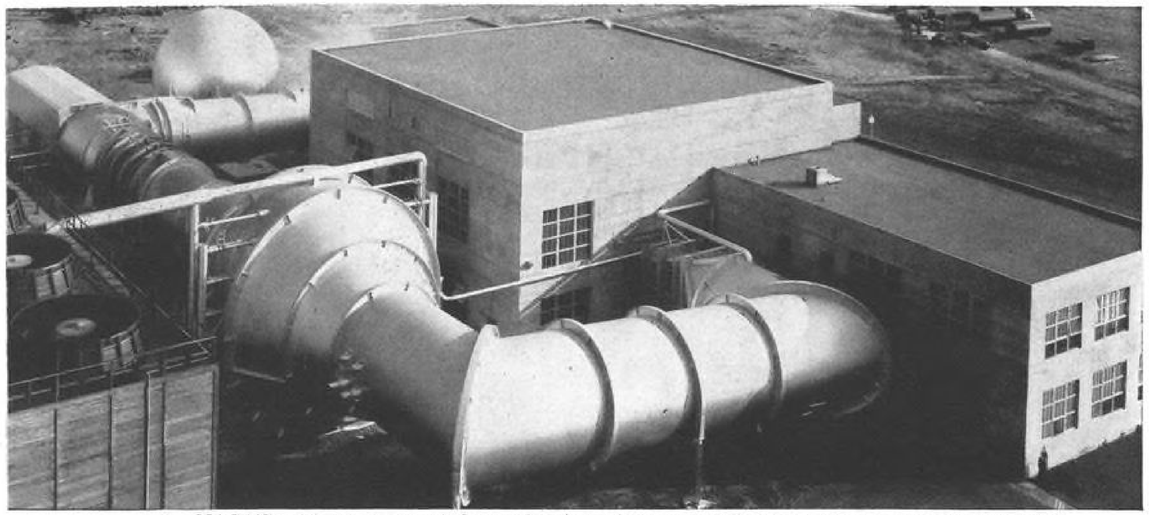


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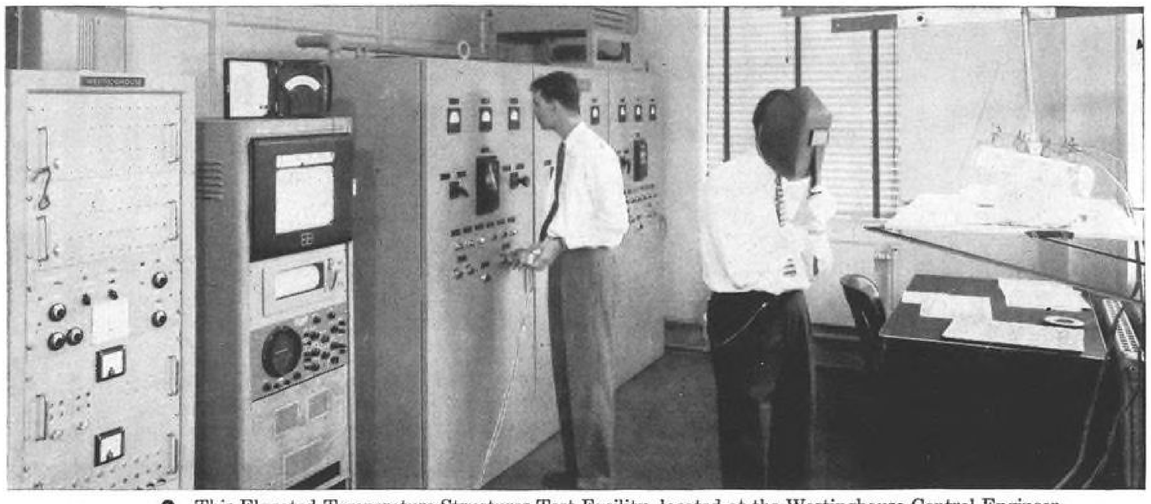
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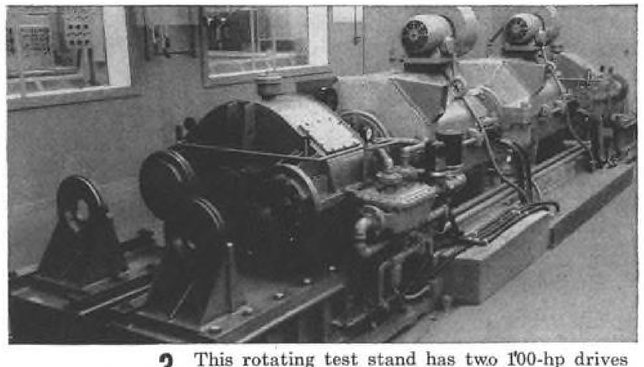
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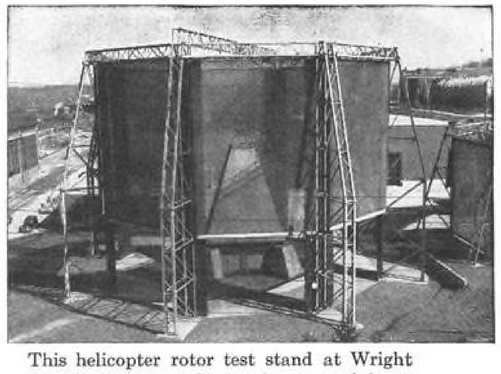
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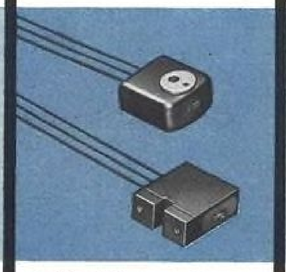
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Magnetic Storage Drum... for medium storage applications; capacity 131, 072 non-volatile bits; drum speed 3800 rpm; clock frequency 130 kc.



Read-Record Heads... for high frequency, non-contact recording applications in magnetic memory systems; high read back signals.



Planimeters... for miniature strip chart recorders for simple integration with variable speed control; 2 models: square root and linear.

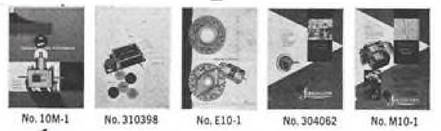
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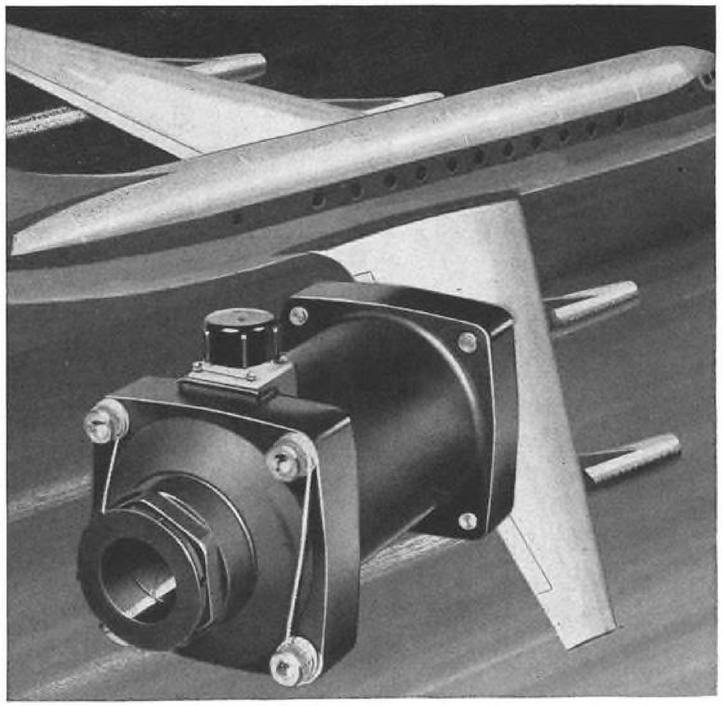
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(*Continued from page* C-87)

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(*Continued on page* C-97)

PIONEERING is our business



NEW BENDIX TRUE MASS FUEL FLOW SYSTEM APPLIES ANGULAR MOMENTUM PRINCIPLE WITH SINGLE TURBINE

Increased accuracy and greater reliability are the two big advantages of the new Bendix *Single-Turbine* Mass Fuel Flow Transmitter designed for systems application in both single- and multiple-engine jet aircraft. (Type 9151 Transmitter is shown above).

The accuracy of the Single-Turbine Type Mass Fuel Flow Transmitter is *within 1% of actual flow*, regardless of flow rate, type of fuel, or environmental conditions. The new, single turbine is responsible for this greater accuracy because of its reduced friction, reduced fluid coupling, and insensitivity to aircraft accelerations.

The simplified design and fewer parts of this Bendix angular momentum transmitter also make possible longer, more trouble-free service life, and *its use to measure flow in either direction.*

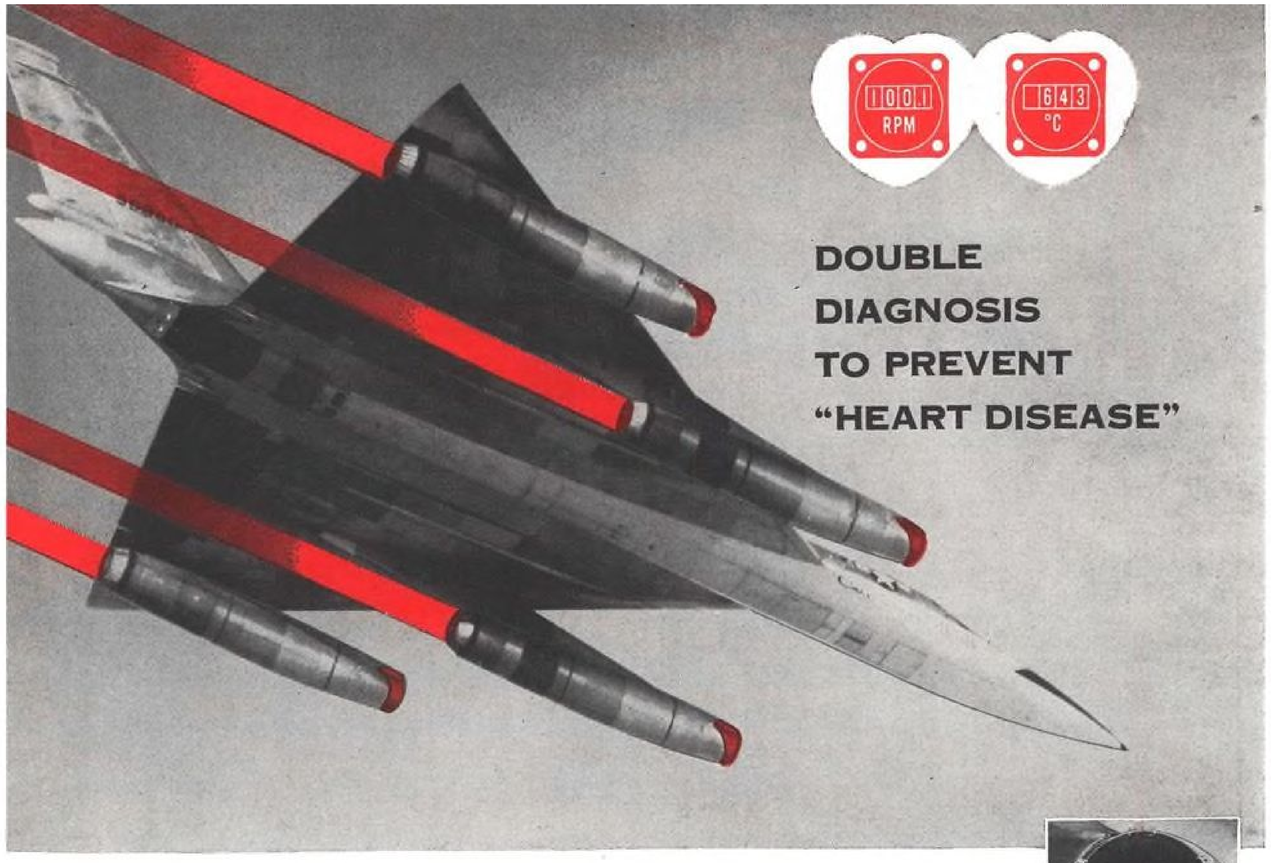
Other advantages: low pressure drop, light weight, available in a variety of flow ranges to fit the application.

While this transmitter is new, it fits into a variety of systems—both new and old. Ask us for publication No. 56-217. PIONEER-CENTRAL DIVISION, BENDIX AVIATION CORPORATION, DAVENPORT, IOWA.

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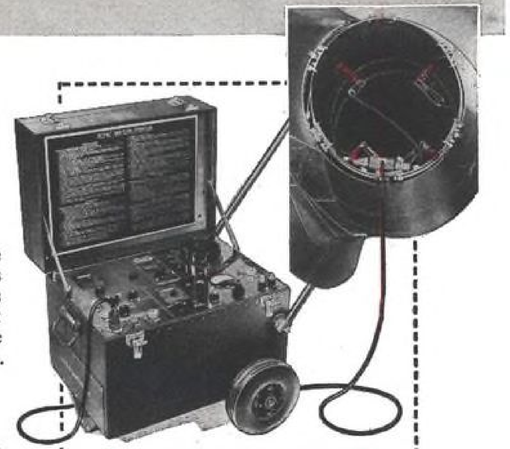
...BY THE B&H JETCAL® ANALYZER

Two of the most important factors that affect jet engine life, efficiency, and safe operation are *Exhaust Gas Temperature (EGT)* and *Engine Speed (RPM)*. Excess heat will reduce "bucket" life as much as 50% and low EGT materially reduces efficiency and thrust. Any of such conditions will make operation of the aircraft both costly and dangerous. The *JETCAL Analyzer* predetermines accuracy of the EGT and (interrelatedly) Tachometer systems and isolates errors if they exist.

The JETCAL ANALYZES JET ENGINES 10 WAYS:

1) The JETCAL Analyzer *functionally* tests EGT thermocouple circuit of a jet aircraft or pilotless aircraft missile for error *without running the engine or disconnecting any wiring.* GUARANTEED ACCURACY is ±4°C. at engine test temperature.
2) Checks individual thermocouples "on the bench" before placement in parallel harness.
3) Checks thermocouples within the harness for continuity.
4) Checks thermocouples *and* paralleling harness for accuracy.
5) Checks resistance of the Exhaust Gas Temperature system.
6) Checks insulation of the EGT circuit for shorts to ground and for shorts between leads.
7) Checks EGT Indicators (in or out of the aircraft).
8) Checks EGT system with engine removed from aircraft (in production line or overhaul shop).
9) Reads jet engine speed while the engine is running with a guaranteed accuracy of ±0.1% in the range of 0-110% RPM. Additionally, the TAKCAL circuit can be used to trouble shoot and isolate errors in the aircraft tachometer system.
10) JETCAL Analyzer enables engine adjustment to proper relationship between engine temperature and engine RPM for maximum thrust and efficiency during engine run (Tabbing or Micing).

ALSO *functionally* checks aircraft Over-Heat Detectors and Wing Anti-Ice Systems (thermal switch and continuous wire) by using TEMPCAL Probes.. Rapid heat rise . . . 3 minutes to 800°F! Fast cycling time of thermal switches . . . 4 to 5 complete cycles per minute for bench checking in production.



Tests EGT System Accuracy to ±4°C at Test Temperature
(functionally, without running the engine)

Tests RPM Accuracy to 10 RPM in 10,000 RPM (±0.1%)

The JETCAL is in worldwide use . . . by the U. S. Navy and Air Force as well as by major aircraft and engine manufacturers. Write, wire or phone for complete information.

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Kearfott Systems include 3 gyro, 3 and 4 gimbal platforms. They provide precise azimuth and vertical reference. Also Directional Gyro Compass Systems.



The Gyro Guide System shown provides Latitude Corrected Gyro and Magnetic Slaved Heading information. Weighs 20 lbs. Max. random drift 3°/hour.

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Kearfott produces a complete line of gyros, servo motors, and synchros to satisfy every aircraft control requirement.



FLOATED INTEGRATING GYRO

3 Gyro Platforms, Floated Rate Integrating Gyros, Vertical, Free, Directional, Rate Gyros and Gyro operated rate switches—compact, lightweight, hermetically sealed.



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High torque, low inertia Servo motors, Servo-motor-Generators, inertial and viscous damped Servo motors 3/4" to 1-3/4" diameter, Synchro Transmitters, Control Transformers, Resolvers, Repeaters and Differentials in size 8, 11 and 15.

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Kearfott offers engineering-design service, manufacturing facilities and a wide experience in the production of microwave components and test sets.



COMPONENTS

Including attenuators, directional couplers, crystal mixers, twists and tees for S, C, Xb, X and Ku bands.



TEST SETS (for X, C, and Ku)

A four-in-one instrument for functional testing of radar or beacon. Includes Wavemeter, Spectrum Analyzer, Power Monitor, and signal generator.

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C-93

Precision Products



BY *Greenleaf*

FOR TODAY'S PROJECTS—TOMORROW'S PLANS



HIG-3 MODEL 2 INTEGRATING GYROSCOPE

This smallest integrating Gyro is dimensionally 1½"x1½"x2¾" including heater block and is being used in fire control and navigation systems. Has viscous damping, single degree of freedom and a maximum drift rate of .2 milliradians/second.



PRESSURE SENSING DEVICES

Used for the measurement of absolute, differential and gage pressures. Accuracies within ± 2% or better throughout entire operating range.



HIG-4 MODEL 2 GYRO

Greater accuracy, including low drift rate, is a feature of this HIG-4 Gyro, now being used for missile guidance and fire control systems. The design and development phases of this Gyro have long been completed and it is now a production item.



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For telemetering, missile guidance, inertial guidance and navigation. Whatever your gyroscope requirements, Greenleaf has the accurate, economical answer.



ACCELEROMETERS

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A DIVISION OF MANDREL INDUSTRIES, INC.

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To Mil-W-16878B, Types E and EE. Solid Colors and Stripes. Parallel wrapped, Spiral wrapped and Extruded Insulation. AWG sizes 8 thru 32.

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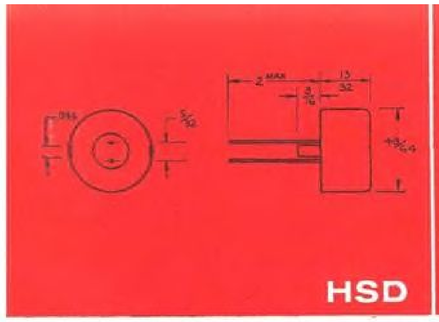


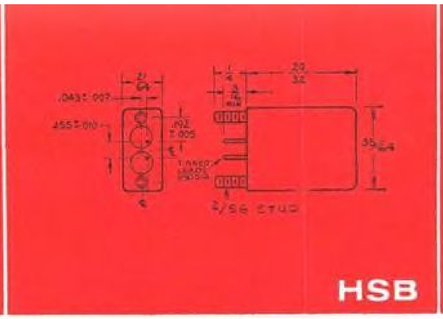
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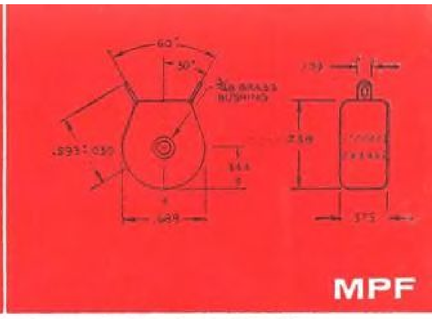
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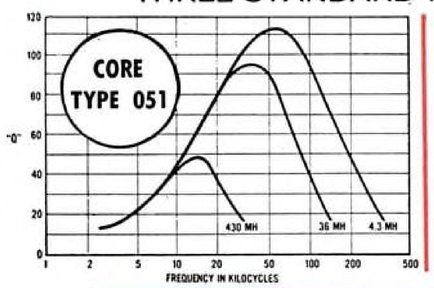
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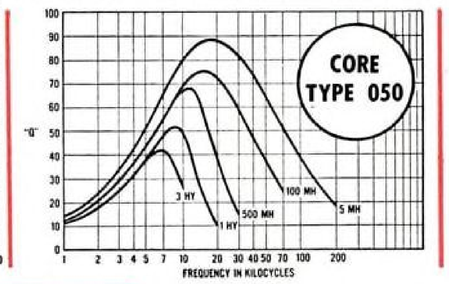


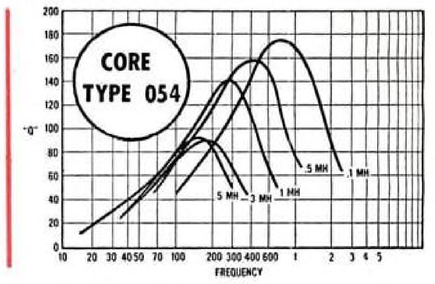




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MOLDED and CASED TOROIDS

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–1	5.0 MH	1.0 MH	.05 MH
–2	6.0	1.2	.06
–3	7.2	1.5	.072
–4	8.6	1.75	.086
–5	10.0	2.0	.100
–6	12.0	2.4	.120
–7	15.0	3.0	.150
–8	17.5	3.6	.175
–9	20.0	4.3	.200
–10	24.0	5.0	.240
–11	30.	6.0	.300
–12	36	7.2	.360
–13	43	8.6	.430
–14	50	10.0	.500
–15	60	12.0	.600
–16	72	15.0	.720
–17	86	17.5	.860
–18	100	20.0	1.0
–19	120	24.0	1.2
–20	150	30.0	1.5
–21	175	36.0	1.75
–22	200	43.0	2.0
–23	240	50.0	2.4
–24	300	60.0	3.0
–25	360	72.0	3.6
–26	430	86.0	4.3
–27	500	100	5.0
–28	600	120	6.0
–29	720	150	7.20
–30	860	175	8.6
–31	1.0 HY	200	10.0
–32	1.2	240	
–33	1.5	300	
–34	1.75	360	
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C-122

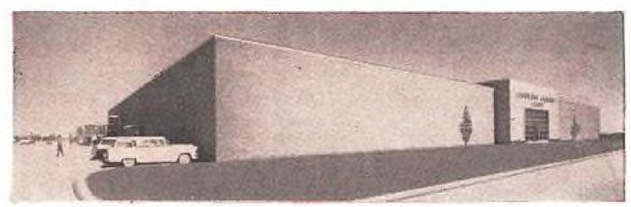
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(*Continued from page C-91*)

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High Temperature and Moisture Resistant Electrical Cable. Lewis "EXFLEX" Cable, single and multi-conductor, superior for circuits on hinged or pivoted parts. Resistant to abrasion and temperaures to 500°F.

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with nickel-chrome conductor and laminated insulation for operation at 500°F. extensively used by central stations to maintain proper temperatures in pipe lines exposed to wide variations in ambient temperature.

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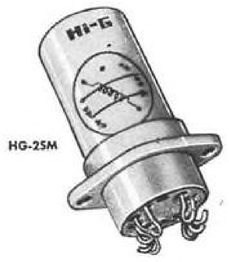
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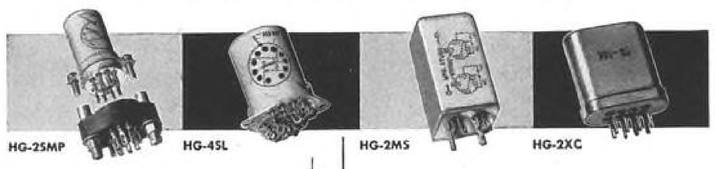
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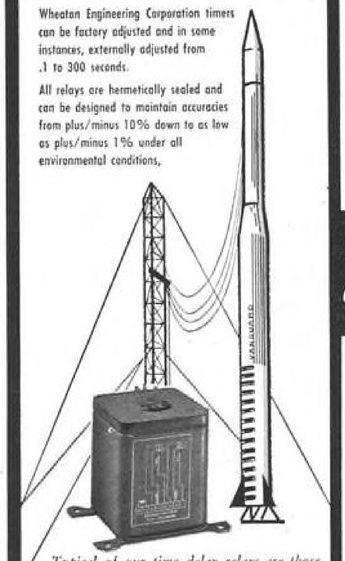
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(Continued on page C-104)



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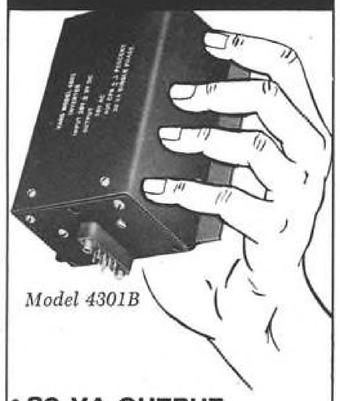
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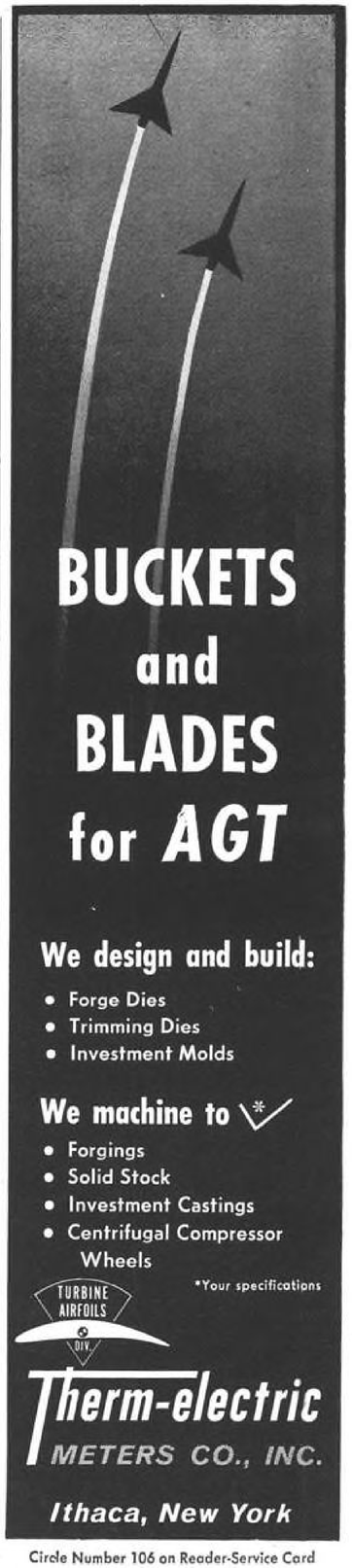
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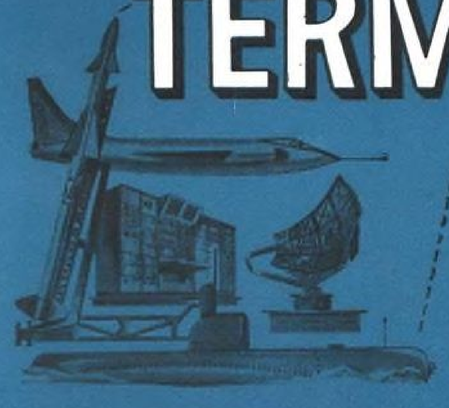
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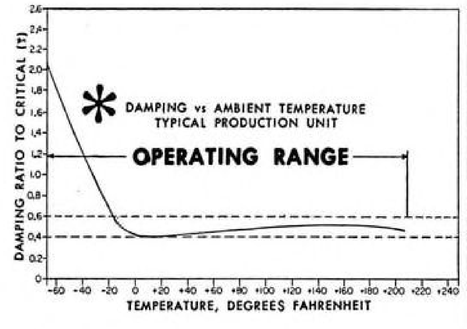


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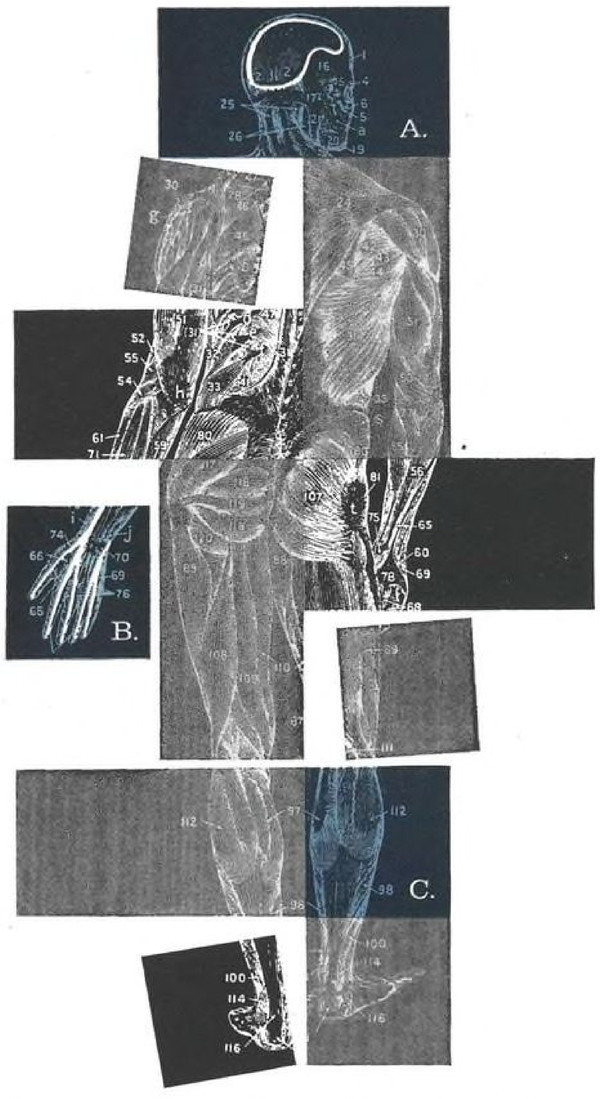
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Canadian General Electric Co. Ltd., 189 Dufferin St., Toronto 3, Ontario, Canada
DEFENSE ELECTRONICS PRODS. ADV., RADIO CORP. OF AMERICA, Front & Cooper Sts., Camden, N. J. **SEE ADV. C-123**
Eitel-McCullough, Inc., San Mateo Ave., San Bruno, Calif.
Federal TeleCommunication Labs., Div., International Telephone & Tel. Corp., 500 Washington Ave., Nutley, N. J.
General Electric Co., Electronic Components Div., Owensboro, Ky.
Huggins Laboratories, Inc., 711 Hamilton Ave., Menlo Park, Calif.
Kuthe Laboratories, Inc., 730 South 13th St., Newark 3, N. J.
Mackay Research Lab., R. R. 2 Box 401, McHenry, Ill.
Philco Corp., Government & Industrial Div., 4700 Wissahickon Ave., Philadelphia 44, Pa.
Raytheon Canada Ltd., 61 Laurel Street E., Waterloo, Ontario, Canada
RAYTHEON MFG. CO., MICROWAVE & POWER TUBE OPERATIONS, Waltham 54, Mass. **SEE ADV. C-68**
RAYTHEON MFG. CO., RECEIVING & CATHODE RAY TUBE OPER., 55 Chapel St., Newton 58, Mass. **SEE ADV. C-68**
Resitron Labs., 2908 Nebraska, Santa Monica, Calif.
Sperry Gyroscope Co., Div., Sperry Rand Corp., Marcus & Lakeville Rds., Great Neck, N. Y.
Vacuum Tube Prods. Co., Inc., 2020 Short St., Oceanside, Calif.
Varian Associates, Tube Div., 611 Hansen Way, Palo Alto, Calif.
WESTINGHOUSE ELECTRIC CORP., P. O. Box 868, Pittsburgh 30, Pa. **SEE ADV. C-88, C-89**

Tuning Units, Antenna

Aeronautical Communications Equip., Inc., 3090 S. W. 37 Ave., Miami 33, Fla.
Airtron, Inc., 1011 West Elizabeth Ave., Linden, N. J.
Amelco, Inc., 2040 Colorado Ave., Santa Monica, Calif.
Belock Inst. Corp., 111-01 14 Ave., College Point 56, N. Y.
C. G. S. Labs., Inc., 391 Ludlow St., Stamford, Conn.
Collins Radio Co., 855 35th St., N.E., Cedar Rapids, Iowa
Collins Radio Co., 1930 Hi Line Dr., Dallas, Tex.
Dayton Aviation Radio & Equip. Corp., Dare, Inc., Hangar No. 2, Dayton Municipal Airport, Vandalia, Ohio
Diamond Antenna & Microwave Corp., 7 North Ave., Wakefield, Mass.
Hallicrafters Co., The, 4401 West Fifth Ave., Chicago 24, Ill.



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TUNING UNITS

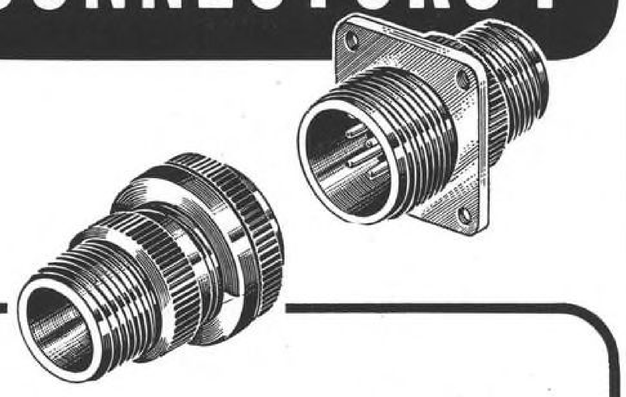
Hoffman Electronics Corp., 3761 South Hill St., Los Angeles 7, Calif.
E. F. Johnson Co., 224 Second Ave., S. W., Waseca, Minn.
Lane Electronics Mfg. Corp., 7254 Atoll Ave., North Hollywood, Calif.
Lear, Inc., 3171 S. Bundy Drive, Santa Monica, Calif.
Pacific Mercury Television Mfg. Corp., 8345 Havenhurst Ave., Sepulveda, Calif.
Press Wireless Laboratories, Inc., 25 Prospect Place, West Newton 65, Mass.
Sierra Electronic Corp., 3885 Bohannon Dr., Menlo Park, Calif.
James S. Spivey, Inc., 4908 Hampden Lane, Washington 14, D. C.
Taffet Radio & Television Co., 27-05 Brooklyn-Queens Expressway W., Woodside 77, N. Y.
Technical Appliance Corp., Sherburne, N. Y.
Telectro Industries Corp., 36-16 37th St., Long Island City 1, N. Y.

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Collins Radio Co., 855 35th St., N.E., Cedar Rapids, Iowa; 1930 Hi Line Dr., Dallas, Tex.
Collins Radio Co. of Canada, Ltd., 11 Bermondsey Rd., Toronto 16, Ontario, Canada
ELECTRONIC SPECIALTIES CO., 5121 San Fernando Rd., Los Angeles 39, Calif. **SEE ADV. C-80**
Hallicrafters Co., The, 4401 West Fifth Ave., Chicago 24, Ill.
Hoffman Electronics Corp., 3761 South Hill St., Los Angeles 7, Calif.
Lear, Inc., 3171 S. Bundy Drive, Santa Monica, Calif.
MOTOROLA, INC., 8201 McDowell Rd., Phoenix, Ariz. **SEE ADV. C-122**
National Aeronautical Corp., Commerce Drive, Fort Washington, Pa.
Otis Elevator Co., Electronic Div., 35 Ryerson St., Brooklyn 5, N. Y.

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AMERICAN MACHINE & FOUNDRY CO., DEFENSE PRODUCTS GROUP, 1101 North Royal St., Alexandria, Va. **SEE ADV. D-195**
Ballantine Labs., Inc., Fanny Rd., Boonton, N. J.
Beckman Helipot Corp., Div., Beckman Instruments, Inc., Newport Beach, Calif.
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Bristol Co., The, P. O. Box 1790-A. W., Waterbury 20, Conn.
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Allen B. DuMont Lab., Inc., 760 Bloomfield Ave., Clifton, N. J.
Electro Instruments, Inc., 3794 Rosecrans, San Diego 10, Calif.
Flow Corp., 85 Mystic St., Arlington 74, Mass.
GENERAL ELECTRIC CO., APPARATUS SALES DIV., 1 River Rd., Schenectady 5, N. Y. **SEE ADV. A-47, A-75, D-185**
Greibach Instruments Corp., Associate of Gulton Industries, Inc., 212 Durham Ave., Metuchen, N. J.
Kay Electric Co., 14 Maple Ave., Pine Brook, N. J.
Gerard G. Leeds Co., Inc., 12 Crampton Lane, Great Neck, N. Y.
Marion Elec. Inst. Co., Manchester, N. H.
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F. L. Moseley Co., 409 North Fair Oaks Ave., Pasadena, Calif.
Non-Linear Systems, Inc., Del Mar Airport, Del Mar, Calif.
Phaostron Instrument & Electronic Co., 151 Pasadena Ave., South Pasadena, Calif.
Precision Apparatus Co., Inc., 70-31 84 St., Glendale 27, N. Y.
Sensitive Research Instrument Corp., 310 Main St., New Rochelle, N. Y.
Servo-Tek Products Co., 1086 Goffle Rd., Hawthorne 1, N. J.
Sierra Electronic Corp., 3885 Bohannon Dr., Menlo Park, Calif.
Simpson Electric Co., 5200-18 West Kinzie St., Chicago 44, Ill.
Southwestern Industrial Electronics, Inc., 2831 Post Oak Rd., P. O. Box 13058, Houston 19, Tex.
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Sun Electric Corp., Chicago Aeronautical Div., Harlem & Avondale, Chicago 31, Ill.
Telectro Industries Corp., 36-16 37th St., Long Island City 1, N. Y.
Teletronics Laboratory, Inc., 54 Kinkel St., Westbury, N. Y.
Texas Instruments Inc., 6000 Lemmon Ave., Dallas 9, Texas
Trio Labs., Inc., 4025 Merrick Rd., Seaford, N. Y.
WacLine, Inc., 35 South St. Clair St., Dayton 2, Ohio
WESTINGHOUSE ELECTRIC CORP., P. O. Box 868, Pittsburgh 30, Pa. **SEE ADV. C-88, C-89**
Weston Electrical Instrument Corp., Subsidiary of Daystrom, Inc., 614 Frelinghuysen Ave., Newark 12, N. J.

Waveguide

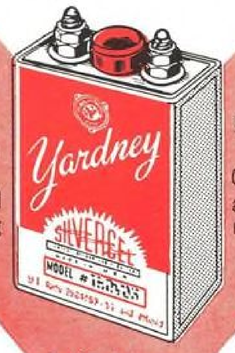
Aircom, Inc., 354 Main St., Winthrop, Mass.
Airtron, Inc., 1011 West Elizabeth Ave., Linden, N. J.
AMERICAN MACHINE & FOUNDRY CO., DEFENSE PRODUCTS GROUP, 1101 North Royal St., Alexandria, Va. **SEE ADV. D-195**

(Continued on page C-112)

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1/10 Ampere hour to 300 Ampere hours and larger



Yardney SILVERCEL® helicopter battery weighing under 10½ pounds.



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Wherever weight, space and severe current drains are critical factors . . . Yardney SILVERCEL® Batteries will solve your power problems! Small, lightweight, these power-packed batteries have surpassed stringent requirements of Spec MIL-E-5272A.

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We can assemble batteries of any size, of any capacity to your specifications . . . from advanced-design, test-proved cell models ranging from 0.1 AH to 300 AH, or specially-built models of much larger capacity.

For your medium and low rate applications, ask about the Yardney SILCAD*, our new silver-cadmium battery!

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- **MINIMUM WEIGHT AND SIZE** — six times lighter and five times smaller than conventional batteries of equal capacity
- **LOW INTERNAL RESISTANCE** — designed to meet high current discharge requirements
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- **HIGH SAFETY FACTOR** — Spillage and leakage hazards eliminated; no fumes during charge and discharge cycles
- **MECHANICAL STRENGTH** — High resistance to shock, vibration, rapid acceleration and deceleration
- **WIDE TEMPERATURE RANGE** — Efficient at 160° F. and as low as −60° F.

Table of Yardney High-Rate Models

Yardney Silvercel	Nominal Capacity	Peak Pulse Discharge	Weight (ounces)	H. (all in inches)	W.	D.	Typical Applications
HR 01	0.1 AH	3 amps	0.15	1.38	.61	0.20	Instrumentation
HR 05	0.5 AH	30 amps	0.70	1.52	1.10	0.55	Telemetering
HR 1	1.0 AH	45 amps	0.79	1.98	1.08	0.54	Motor-Driven Recorders
HR 3	3.0 AH	75 amps	2.98	2.86	1.72	0.59	Tow-Target Drones
HR 5	5.0 AH	75 amps	4.24	2.95	2.08	0.80	Photo-Flash, Camera Drives,
HR 10	10 AH	220 amps	7.88	4.78	2.32	0.74	Portable Lights, Missile Guidance
HR 15	15 AH	350 amps	9.70	4.93	2.31	.81	Helicopter Starting
HR 20	20 AH	500 amps	13.82	4.28	2.05	1.73	Missile Power Sources and
HR 21	20 AH	500 amps	15.02	7.56	2.31	0.81	Servo Controls
HR 40	40 AH	600 amps	23.20	7.0	3.25	0.99	Torpedo Propulsion
HR 60	60 AH	1000 amps	31.85	4.50	2.75	2.38	Portable TV
HR 85	100 AH	1900 amps	52.30	9.44	2.81	1.81	Aircraft Power Sources
HR 90	100 AH	1800 amps	51.40	7.0	3.25	2.16	Tow-Target Drones
HR 100	100 AH	2000 amps	44.10	4.78	3.43	2.79	
HR 200	200 AH	3000 amps	102.50	11.31	5.87	1.31	Portable Power Station
HR 300	300 AH	3500 amps	148.00	17.5	4.19	1.78	Portable Power Station

*Trade Mark

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"PIONEERS IN COMPACT POWER"
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FIRST Really New RELAY

TO MEET TODAY'S RIGID REQUIREMENTS
PERFECTED BY THE

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.



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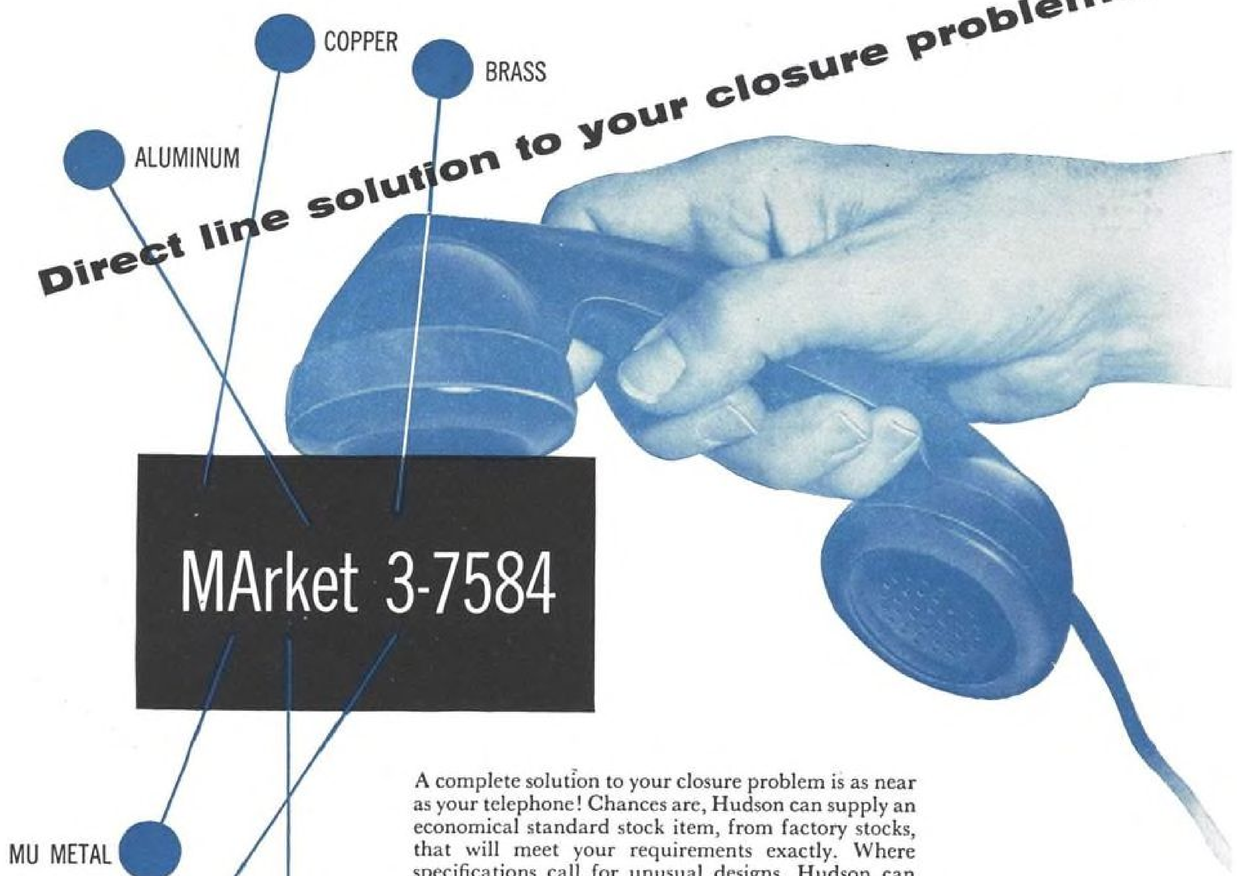


20-30 Volts DC. Precision Movement — Electrical Reset Temperature Range −65°F to 185°F. Option on mounting and electrical termination. Write for Bulletin AWH ET 700.

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WAVEGUIDE

(Continued from page C-108)

Andrew Corp., 363 E. 72 St., Chicago 19, Ill., and, 941 E. Maryland Ave., Claremont, Calif.
Bristol Aircraft (Western) Ltd., P. O. Box 874, Stevenson Field, Winnipeg, Manitoba, Canada
Budd-Stanley Co., Inc., 43-01 22nd St., Long Island City 1, N. Y.
Cascade Research Corp., 53 Victory Lane, Los Gatos, Calif.
Chemalloy-Electronics Corp., Santee, Calif.
Cooper Development Corp., Monrovia, Calif.
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Curtiss-Wright Corp., Metals Processing Div., Buffalo, N. Y.
Dalmo Victor Co. Div., Textron, Inc., 1515 Industrial Way, Belmont, Calif.
Decade Instrument Co., Box 153, Caldwell, N. J.
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Diamond Antenna & Microwave Corp., 7 North Ave., Wakefield, Mass.
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Federal Mfg. & Engrg. Co., 1055 Stewart Ave., Garden City, N. Y.
Federal TeleCommunication Labs., Div., International Telephone & Tel. Corp., 500 Washington Ave., Nutley, N. J.
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John Gombos Co. Inc., 107 Montgomery Ave., Irvington, N. J.
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Kay Electric Co., 14 Maple Ave., Pine Brook, N. J.
KEARFOTT CO., INC., SUB. OF, GENERAL PRECISION EQUIPMENT CORP., 1378 Main Ave., Clifton, N. J. **SEE ADV. C-93**

ANTENNAS by CANOGA

COMMUNICATIONS and MISSILE GUIDANCE

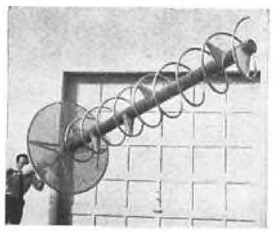


At left is an example of an Airborne UHF-VHF communication and navigation antenna with built-in dual channel filter.

At right is shown a Broad-band, High-power Nutating, Tracking and Guidance Antenna for Missiles and Aircraft.



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The antenna pictured is a Telemetering Antenna for 200 Mc. We also design and manufacture antennas for many other frequencies. We offer experience in design, development, manufacturing, field installation and service of antennas, antenna mechanisms and reflectors, with emphasis on obtaining the best combination of microwave, electrical and mechanical properties to meet performance specifications and high reliability.

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BEACONS
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MICROWAVE LINKS
NAVIGATION
RADAR
TELEMETERING

RADAR SEARCH and TRACKING



Shown at left is a Circularly Polarized Search-Acquisition-Track Antenna for Missile Instrumentation. Remote push-button control of polarization to horizontal or vertical is provided.

Shown at right is an antenna installation in a Canoga Mobile Instrumentation Radar System.



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☐ TEST EQUIPMENT ☐ MICROWAVE COMPONENTS
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Kurman Electric Co., Inc., 191-193 Newel St., Brooklyn 22, N. Y.
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Phalo Plastics Corp., 25 Foster St., Worcester 8, Mass.
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Telectro Industries Corp., 36-16 37th St., Long Island City 1, N. Y.
Unifectric, Inc., 405 S. Sixth St., Milwaukee 4, Wisc.
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Whitaker Cable Corp., 1301 Burlington Ave., North Kansas City 16, Mo.

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Philips Electronics, Inc., Instruments Div., 750 South Fulton Ave., Mt. Vernon, N. Y.
Picker X-Ray Corp., 25 South Broadway, White Plains, N. Y.
Resitron Labs., 2908 Nebraska, Santa Monica, Calif.
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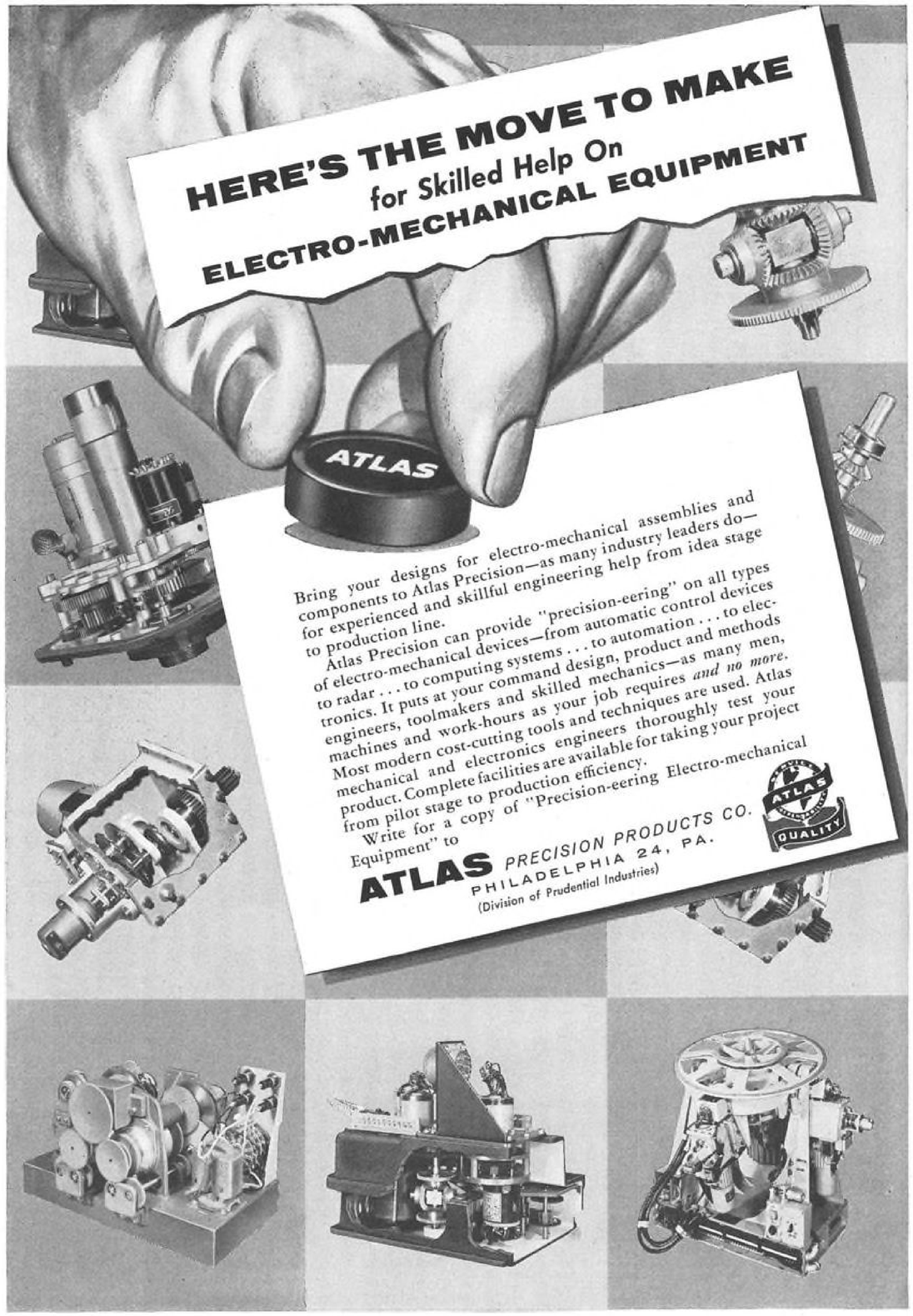
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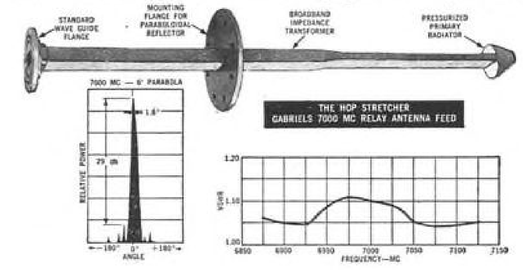
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The HOP-STRETCHER feeds offer higher gain, lower sidelobe levels and more desirable beam-widths for center-fed parabolic antennas. This feed was developed for S, X, K_u and K_a bands.

Technical features of X-band antenna • Sidelobes at least 24 db down on 4, 6, 8 and 10 ft. reflectors • High gain efficiency, 65-70%





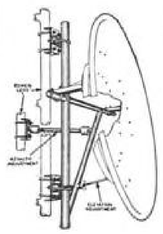
The new hi gain 3 kmc Cylindrical Coaxial Feed provides similar E and H-plane patterns, minimum side and backlobes, and negligible squint. Rear-mounted, with easy polarization adjustment to any angle.



7000 mc Offset Antenna. Ideal for installations where passive reflectors are utilized — VSWR less than 1.10:1 over 5900-8500 mc — Sidelobes at least 24 db down — gain is 41 db at 7000 mc. Elliptically shaped reinforced fiberglas reflector.

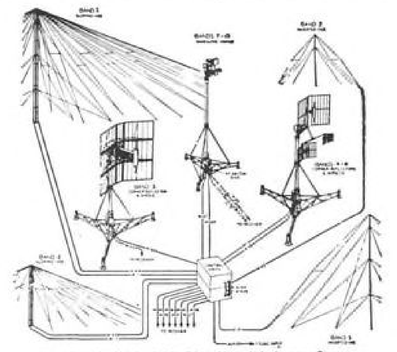


The new X-band parabolic antenna with standard feed. Features variable polarizing adjustment, 0 to 90°. Manually locked in position.



The new universal 3-point suspension mounting bracket for 2, 4, 6, 8 and 10 ft. parabolic reflectors.

Features • Independent azimuth adjustment. • Independent elevation adjustment. • Adaptable for mounting in all locations.



Broadband, HF-to-SHF, Directional Antenna Group — Remotely controlled.



Low-drag Airborne Flush-mount Antenna.
Beacon — Countermeasures — Homing — Navigation

Missile Antennas — Telemetering, Destruct, Guidance
ICBM, Surface-to-Air, Air-to-Air, and Surface-to-Surface.

Radar Antennas
- Shipborne Search
- Harbor Control
- Airborne Height Finding
- Land Base Search



Designed, developed, and constructed to military specifications with improved strength-to-weight ratio and component reliability.



Aleutian Line—Dew Line
Low loss, heavy duty duplex feed horns for Tropospheric Scatter Radio Communication Systems.



Motorized Passive Reflector
For maximum point-to-point transmission in microwave relay links. Fast, accurate, easy adjustment from remote location. Manually adjusted reflectors also available.



GABRIEL'S STANDARD MICROWAVE PARABOLIC ANTENNAS

. . . Contributing millions of trouble-free operational hours for industry and the military.

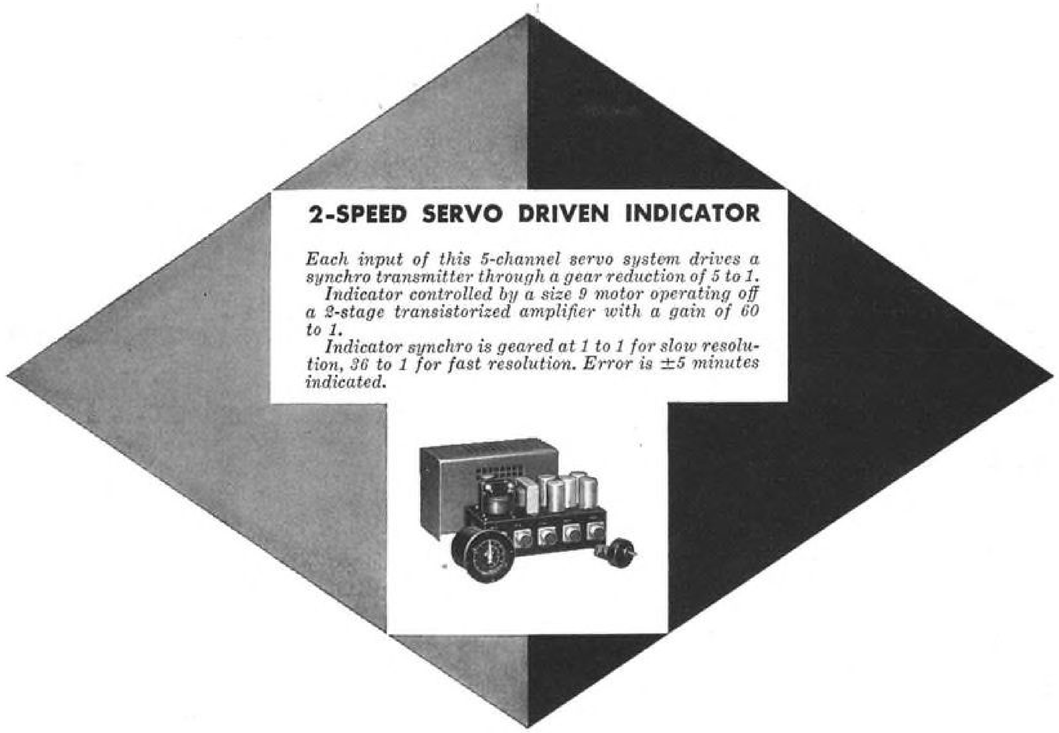
- 7000 mc — Broadband (5925-7425 mc) high gain > 40 db low sidelobes — low VSWR < 1.13:1 over band.
- 4000 mc — Narrow-beam broadband (3700-4200 mc) — low VSWR < 1.2:1 — gain > 37 db.
- 2000 mc — Available in offset and center-fed feeds. Narrow-beam broadband (1750-2110 mc) — high gain > 28 db low VSWR < 1.3:1 over band
- 940 mc — All weather radome covered feed — gain > 22 db low VSWR < 1.25:1.

The Gabriel Electronics Division is one of the world leaders in microwave relay link antennas, and the more complex antennas. They are dedicated to improve and extend the state-of-the-art in antennas and antenna components.

Call or write to GABRIEL ELECTRONICS DIVISION for counsel on your antenna needs.

Gabriel

135 CRESCENT RD., NEEDHAM HEIGHTS 94, MASSACHUSETTS — phone NEedham 3-0005



servo problems stock units can't solve

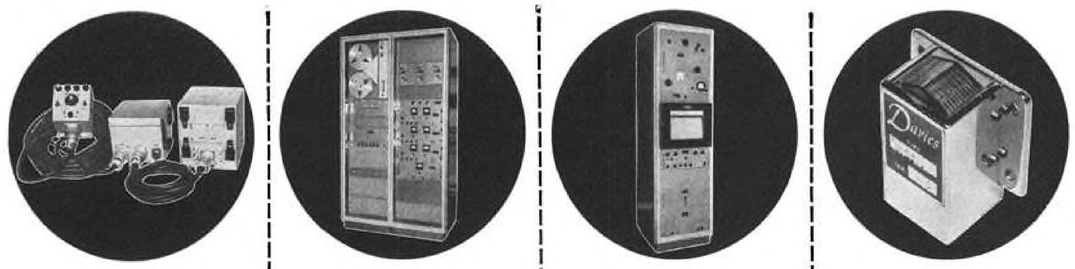
This equipment "does the job right" because it was especially designed for a single application . . . by a company whose major function is solving individual servo control problems with complete, precisely engineered and manufactured servo assemblies.

Of course, if you just want servo *components*, Daystrom Transicoil can provide them to the highest order of precision and accuracy. But it is in the "package" engineering of unique assemblies that Daystrom 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.

Check out your next servo problem with Daystrom Transicoil first. Ask for the new gear-motor availability guide if you haven't yet received a copy.

DAYSTROM TRANSICOIL CORP.
A Subsidiary of Daystrom, Inc.
Worcester • Montgomery County • Pennsylvania

Circle Number 117 on Reader-Service Card



Record, Reduce, and Analyze Data on Magnetic Tape

ON-THE-SCENE RECORDING

Getting the data on tape is generally just as difficult as the available space is limited. But standard recorders available from the Davies Laboratories Division can meet even the severe restrictions of missile flight. Recorders for airborne, mobile, and other uses characterized by limited space and severe environmental conditions range from a complete six track system in a seven inch cube illustrated, to a 10½" reel recorder with 14 or more tracks. Electronic Housings contain complete power facilities, while interchangeable plug-in cards provide recording circuitry for direct, FM, PWM, or digital pulse techniques on each track. Operating on 28 volts DC and/or 115 volts, 400 cps, recorders provide tape speeds from ½ to 60 ips. All include provision for electronic wow and flutter compensation perfected by the Davies Laboratories Division. *Standard portable recording equipment is described in Bulletin 2602.*

UNIVERSAL SYSTEMS RECORD/REPRODUCE IN THE LABORATORY

Universal Magnetic Tape Systems combine the ready to use trouble-free qualities of a "package" with the precision, accuracy, and flexibility of the far more expensive custom designs. Systems available provide up to thirty tracks of data capacity, interchangeable plug-in direct, FM, or PWM recording electronics for each track, electronic compensation for wow and flutter, plus numerous other features proved through years of service in jets, missiles, and on the ground. Features never before available in a "package" system include a choice of six tape speeds at the flip of a switch, automatically switched components to match tape speed, and precise time coincidence of data across the tape. Custom systems are readily available for those few applications for which a Universal System is not suited. *Write for Bulletin 2701.*

AUTOMATIC WAVE ANALYZERS SPEED DATA REDUCTION . . . IMPROVE STATISTICAL RELIABILITY

Feed data from magnetic tape or other steady state sources into a Davies Laboratories Division Automatic Wave Analyzer and a complete Fourier series is automatically plotted and printed in permanent record form as either *amplitude* versus *frequency* or *power* versus *frequency*. Model 9020A analyzes frequencies from 3 cps to 2 kc, and Model 9050A has a frequency range of 3 cps to 10 kc. Both have a "quick look" facility for a fast picture of major frequency components, and both are characterized by high amplitude accuracy, wide voltage range, high resolution, and adjustable bandwidths. Multichannel inputs permit simultaneous analysis of up to six data channels. *Write for Bulletin 9001.*

MULTI-TRACK RECORD/REPRODUCE HEADS

Head styles are available from the Davies Laboratories Division to satisfy all of the major considerations of data recording, including precise data coincidence among tracks across the tape, maximum number of tracks per inch of tape width, high speed stop/start operation, special pulse system requirements, and efficiency in low speed recording. Inline head stacks for data coincidence, interleaved head stacks for high track density, and "pointed" head stacks for high speed stop/start pulse systems are constructed for maximum accuracy under the most adverse environmental conditions. *Write for Bulletin 3300.*

* * *

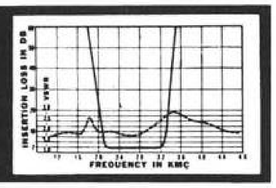
Space does not permit coverage of more than a few kinds of Davies Laboratories Division equipment for data recording, reduction, and analysis. Chances are, whatever your tape requirements, Davies Division is experienced in satisfying them. Tell us what they are, and we'll be happy to send you whatever literature is available, or have a representative at your door at your convenience. If you'd like a general rundown of magnetic tape data recording, and the techniques available for getting your data accurately on tape, write for Bulletin 1001, "The Role Of Magnetic Tape In Data Recording". Minneapolis-Honeywell Regulator Company, Davies Laboratories Division, 10721 Hanna Street, Beltsville, Maryland. WEbster 5-2700.

MINNEAPOLIS **Honeywell**
DAVIES LABORATORIES DIVISION

Circle Number 118 on Reader-Service Card



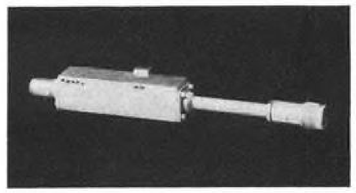
Continuously matched filter network. The impedance is approximately 50 ohms, resistive in the stop bands. Provides VSWR of 2.5:1 max. near cut off frequencies. Low and high pass filters can be manufactured with similar characteristics from VHF through X-band frequencies.



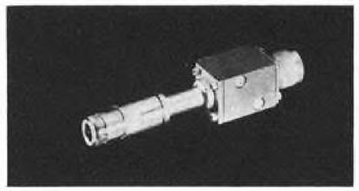
MICROPHASE R. F. FILTERS FOR AIRCRAFT, MISSILES

• FLEXIBILITY OF DESIGN
• HIGH PERFORMANCE
• RELIABILITY . . .

Meet your critical filter needs, including severe shock and high temperature requirements. These are typical examples.



BAND PASS – Exceptionally-wide band in X-band range. Provides 15% rise to 60 db at upper and lower cutoff frequencies. Maximum insertion loss in pass band is 2.0 db. Provides DC return path at output for use with crystal detectors that require DC bias.



BAND PASS – Narrow-Band Coaxial in X-band region. Exceptionally sharp rise – less than 5% to 60 db. Insertion loss in pass band is 1.5 db maximum. Band width can be accurately controlled and the pass band placed anywhere in X-band.



BAND PASS – Special L-band for airborne applications. Size 2 x 4 x 1/4 inches. Weight 3 1/2 oz. Also available in VHF through X-band. Sharp rise characteristics on special request.



BAND PASS – S-band three-section tunable cavity type. Approximately 1% band width at the 3 db points, a 1% rise to 60 db from center frequency. Tuning range, 2 to 3 kmc. Insertion loss is approximately 2.5 db.



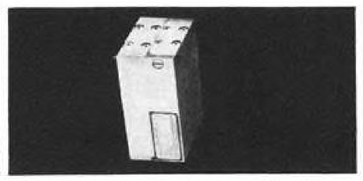
LOW PASS – Primarily for telemetering isolation purposes, provides greater than 60 db. isolation over 100 mc range with insertion loss less than 1 db. in pass band. Weight only 4 1/2 oz.



LOW PASS – Primarily for telemetering isolation purposes, provides over 60 db isolation in 100 mc range with insertion loss less than 1 db in pass band. Weight only 4 1/2 oz.



TRIPLEXER – Divides UHF, VHF and L-Bands with 40 db isolation. Whole frequency spectrum is usable because power is divided equally at crossovers with negligible loss. Unit has maximum VSWR less than 2.6:1, weighs 14 oz., comes with choice of connectors. Unit is available with 60 db isolation in slightly larger size.



DIPLEXER – Telemetering Diplexer provides minimum of 60 db. isolation between two adjacent channels 5% apart, with insertion loss of less than 1.0 db. Ruggedized and temperature compensated to –70°C with no appreciable drift, for airborne, high-altitude use. Special shapes available.



DIPLEXER – VHF-TACAN Antenna Diplexing filter, improved version of the standard Microphase Type CB-2245 with improved VSWR. Isolation in the TACAN band is 90 db. capable of handling 2 kw peak power.

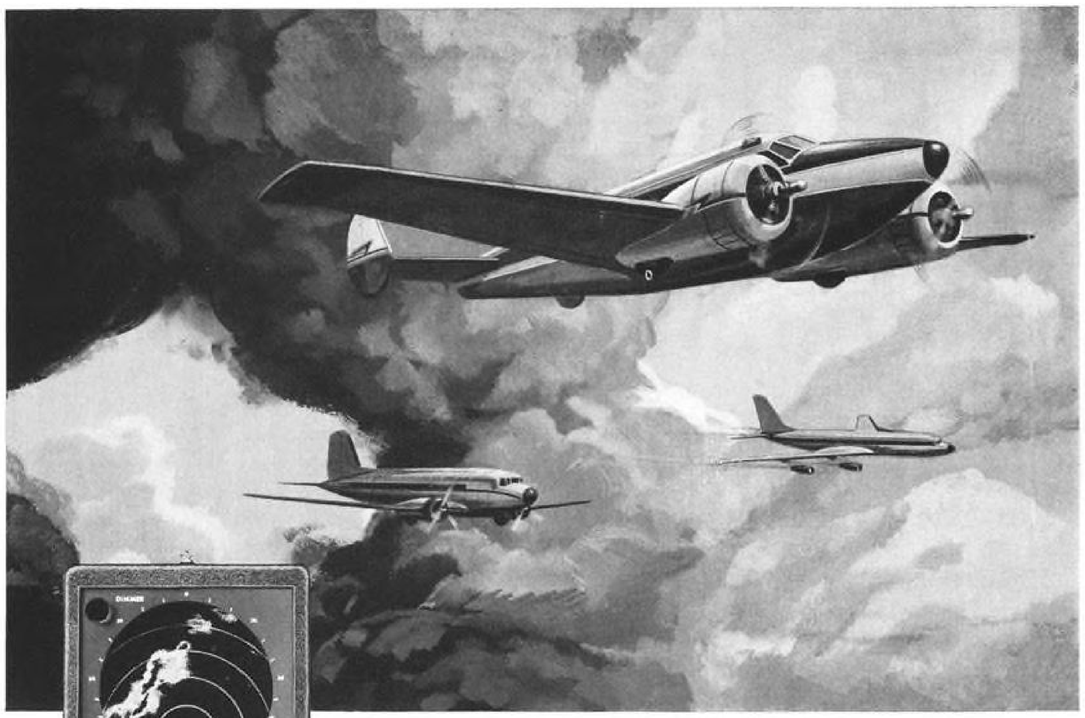
MC μ/φ **MICROPHASE CORPORATION**

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Circle Number 119 on Reader-Service Card

C-117





This is a typical storm as it appears on pilot's indicator. The dark holes indicate areas of high turbulence. Thus warned, pilot can select a safe, comfortable flight path through or around storm area.

FIRST "150-MILE" WEATHER RADAR THAT FITS ALL THREE!

There's a big difference in the size of the aircraft shown above. There's a big difference, too, in the jobs they are required to perform. But one thing they do share in common—an ability to fly safely and smoothly either through or around storm fronts or other dangerous weather conditions. For all three are equipped with the new Bendix* RDR-1D Airborne Weather Radar System.

Substantial weight and size reductions, without impairment of quality or performance, now enable Bendix to offer this 150-mile-range, airline type weather radar equipment to a much wider variety of business and commercial aircraft.

Performance equals that of present commercial weather radar systems requiring twice the amount of electronic rack space. Total system weight is now approximately 85 pounds. For aircraft lacking sufficient space for the larger 22- and 30-inch "dish" antennas, new 15- and 18-inch sector scanning antennas will be available.

What's more, the new components are interchangeable with Bendix' famed, time-tested veteran of the global airways, the RDR-1B X-Band System. In addition to its primary function, this new RDR-1D system matches its famous counterpart for ground mapping and terrain avoidance.

For complete information, write to Bendix Radio, Aviation Electronic Products, Baltimore 4, Maryland. Or West Coast—10500 Magnolia Blvd., N. Hollywood, Calif.; Export—Bendix International Division, 205 E. 42nd St., N. Y. 17, N. Y. Canada—Computing Devices of Canada Limited, P. O. Box 508, Ottawa 5, Ont.

*REG. U.S. PAT. OFF.



RDR-1D Transmitter-Receiver
SYN-1B Synchronizer-Power Supply

New RDR-1D Transmitter-Receiver weighs only 26 pounds . . . Synchronizer-Power Supply only 21 pounds. Total rack space for complete system is only 1-ATR.

Bendix Radio Division
BALTIMORE 4, MARYLAND

Bendix AVIATION CORPORATION

C-118

Circle Number 120 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 CORP.
6058 Walker Avenue, Maywood, California
PRECISION SCIENTIFIC PRODUCTS

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AMERICAN ELECTRONICS, INC.

5 TO 1

these odds are in your favor!



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INSTRUMENT DIVISION



AUDIO AND RECORDATA DIVISION



REED-CURTIS NUCLEAR DIVISION



ELECTRO-MECHANICAL DIVISION

American Electronics, for years a prime electronic component supplier consists of five divisions . . . each with its own engineering and production facilities. This is why, when you specify AEI products, you get individualized attention, prompt engineering service, production according to specifications and deliveries on time.

Almost every item that American makes is designed and produced to meet the customer's particular problem. The next time you need a dependable source for the electronic components and related products listed below, submit your needs to American Electronics, Inc., then relax. Full technical information available on all products.

AC or DC Drive Motors • Actuators • Air Conditioner Ground Support Equipment • Alpha Chambers • Alternators and Inverters • Atomic Reactor Control Systems • Blowers • Clutches • Electrical Ground Support Equipment • Induction Potentiometers • Intervalometers • Leak Detection Systems (Radiflo) • Magnetic Amplifiers • Motor Alternators • Neutron Absorption Analyzers • Rate Meters • Recordata Systems (data tape recordings) • Resolvers • Resolver Amplifiers Scalers • Scintillation Counters • Servo Motors Servo Systems • Spectrometers • Static DC Power Supplies • Sub-Systems • Synchros • Tachometers Tachometer Generators • Transceivers

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Have you heard about the amazing engineering opportunities at AMERICAN?

Circle Number 122 on Reader-Service Card

C-119



BASIC "150" assemblies housed in either vertical mobile cabinets or separate portable cases are available in 1-, 2-, 4-, 6- and 8-channel models. Each is equipped with driver amplifiers of current feedback design and regulated power supplies for *each* channel, and a recorder featuring *nine* extremely accurate paper speeds on 2- to 8-channel models, five on single channel units. Appropriate plug-in preamplifiers quickly and efficiently equip a basic assembly for recording virtually any 0-100 cps phenomena.

new 6- and 8-channel analog readout systems

In addition, complete Sanborn systems from 2- to 8-channels are available for recording analog computer outputs. These are equipped with dual-channel DC amplifiers, for single-ended or push-pull signals — input impedance 5 megohms each input lead to ground — drift less than 0.5 mm/hr. — frequency response down 2 db at 60 cycles for all amplitudes to 4 cm peak to peak. Newest of the computer readout recorders are the 6- and 8-channel console systems (8-channel illustrated — "A" at left). The Model 183 Programmer in a Model 184 case ("B" at left) is optional for use with the 6- and 8-channel consoles. The Programmer automatically turns on chart drive, feeds calibrated signals to all channels, reads computer DC levels, determines the length of record, and shuts off the paper drive.

SANBORN

oscillographic recording equipment



3 UNIT INSTRUMENTS







All Sanborn Preamplifiers and Recorders, as well as various other units, are available separately for specialized applications or use as "original equipment" in other apparatus. Instruments include the Model 150-300/700 Wide Band Driver Amplifier and Power Supply, for use with low power galvanometer elements, a 'scope and/or panel meter. When equipped with suitable "150" preamplifier, this amplifier provides a portable indicator for strain, force, pressure, temperature, AC watts, audio level, etc. Other units include the Model 150-1900 Master Oscillator Power Amplifier: Model 150-3100 Triplexer; Model 601 and 602 galvanometers; Model 150-2900 Dual-Channel DC Amplifier.



2 PREAMPLIFIERS

A choice of *twelve* "150 Series" plug-in preamplifiers is now available, to equip systems for any of numerous recording problems. Improved control of input signals results from attenuator ratios of 1, 2, 5, etc., and calibrated zero suppression on AC-DC, Carrier, and Low Level DC Coupling, Frequency Meter, and Chopper Stabilized DC models. Other "150" preamplifiers include: Servo Monitor, Log-Audio, AC Wattmeter, RMS Volt/Ammeter, 400 cycle Frequency Deviation, and Triplexer.

Added to these three aspects of Sanborn Oscillographic Recording Equipment are the basic advantages of inkless recording in true rectangular coordinates, to provide accurate, easily interpreted records; high torque galvanometer (10 ma develops 200,000 dyne cm.); one percent linearity resulting from current feedback driver amplifiers and high torque galvanometers (maximum error is ¼ mm in middle 4 cm of chart, ½ mm across entire chart); controls for timing, manual and remote coding.

Take advantage of the scope and flexibility of Sanborn equipment to answer your recording requirements. Sanborn engineers will be glad to provide further information and application assistance whenever you wish. Contact your local representative or write to the main office below.

SANBORN COMPANY
INDUSTRIAL DIVISION
175 WYMAN ST. WALTHAM 54, MASS.

C-120

Circle Number 123 on Reader-Service Card

Time Division Multiplexers by ASCOP



TELEMETERING SENSOR SAMPLER

Type A: Sub-miniature 2 pole, 30 contacts per pole switch provides 60 channels in make-before-break operation. A filtered 27.5 volt DC motor rotates the switch at 2.5 RPS providing a sampling rate of 150 samples per second. Solid block construction permits satisfactory operation under random noise vibration of from 36 to 2000 cycles at 18 G's RMS, 160 G's impact for 2 milliseconds and a steady state acceleration of 100 G's.



LOW LEVEL COMMUTATOR

Type AS: The ASCOP Type AS multi-channel rotary sampling switch is designed specifically for airborne telemetering applications where precision high-speed sampling with the utmost reliability is necessary for accurate data. 3 poles 27 channels @ 2.5, 5 or 10 rps. 27.5 VDC governed drive. Proven reliability in 25,000 hours of life testing.

HERMETICALLY SEALED RADAR DISPLAY



Type AN: This multichannel sampling switch is designed for use in a target designation system for fighter aircraft. The metal on metal hermetically sealed switch housing provides a dust-proof, moisture-proof, explosion proof enclosure to allow the switch to run properly at high altitudes over extreme temperature ranges.

INDUSTRIAL MULTIPLEXER



Type AU: This multipole sampling switch has been designed for the flexibility of application, ease of servicing and long life required for automation and control applications in industry. Speeds from 1 to 1800 RPM, 30 to 250 channels per pole, 1 to 20 poles. Years of service free operation.



THERMOCOUPLE COMMUTATOR

Type Y: Samples 40 independent low level sensors with a noise level below 20 microvolts. By reducing noise and leakage to a minimum, temperature variations smaller than 1°F can be detected when sampling copper-constantan thermocouples.

ASCOP

ELECTRO-MECHANICAL DIVISION

HIGH LEVEL SAMPLING SWITCHES • LOW LEVEL SAMPLING SWITCHES • DISPLAY COMPONENTS • CONTROL EQUIPMENT • COMPARATORS • SENSING SYSTEM ELEMENTS
FUNCTION GENERATORS • TELEMETERING MULTIPLEXERS AND CALIBRATORS • DRIFT COMPENSATORS • THERMOCOUPLE SAMPLERS • MECHANICAL OSCILLATORS

APPLIED SCIENCE CORPORATION OF PRINCETON

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Plainsboro 3-4141

15551 CABRITO ROAD, VAN NUYS, CALIFORNIA
State 2-7030

1 NORTH ATLANTIC AVENUE, COCOA BEACH, FLORIDA
Cocoa Beach 3900

Circle Number 124 on Reader-Service Card

C-121

Guiding a missile, or speeding flight and flight environmental data back to control and tracking centers, is too much of a job for conventional communication systems. Supersonic speeds call for lightning fast data communications, coupled with the utmost reliability.

Capitalizing on the ease of converting messages into digital form, Motorola scientists and engineers have developed a number of Data Link Communications Systems suitable for piloted aircraft, as well as missiles.

NERVE CENTER FOR DATA LINK SYSTEMS



With Data Link Systems, messages that have been translated into on-off pulses can be transmitted by any of the common modulation schemes with a suitable carrier. The transmitter can be air-borne, ship-borne, or land-based. Received messages are amplified, decoded, and transformed into a form suitable for display, or stored for some future time, or used for direct control through auto pilots, for example.

One of the Data Link Systems designed at Motorola utilizes an all-transistor converter-coupler, packaged in modular form. The total system consists of eight modules, each approximately 4" x 8" x 1½". The fully transistorized circuitry is of the highly reliable diode-matrix type logical circuitry used in many digital computers. The switch type transistors employed are a product of the Motorola Semi-Conductor Division. Indicative of the stringent testing program to which the transistors are subjected is a 1000-hour life test at 85° C.

For another Data Link program, Motorola has designed a system featuring resolver-type outputs. A single time-shared servo amplifier positions anyone of the five resolvers in accordance with commands from the ground transmitter.

These two Motorola Data Link Systems aimed at solving one of the important communication problems of the missile age are examples of the complex programs conducted by Motorola for varied military needs.

MOTOROLA INC.

MILITARY ELECTRONICS DIVISION

Chicago Area Center • 2710 N. Clybourn Ave. • Chicago, Ill.

Western Area Center • 8201 McDowell Road • Phoenix, Arizona

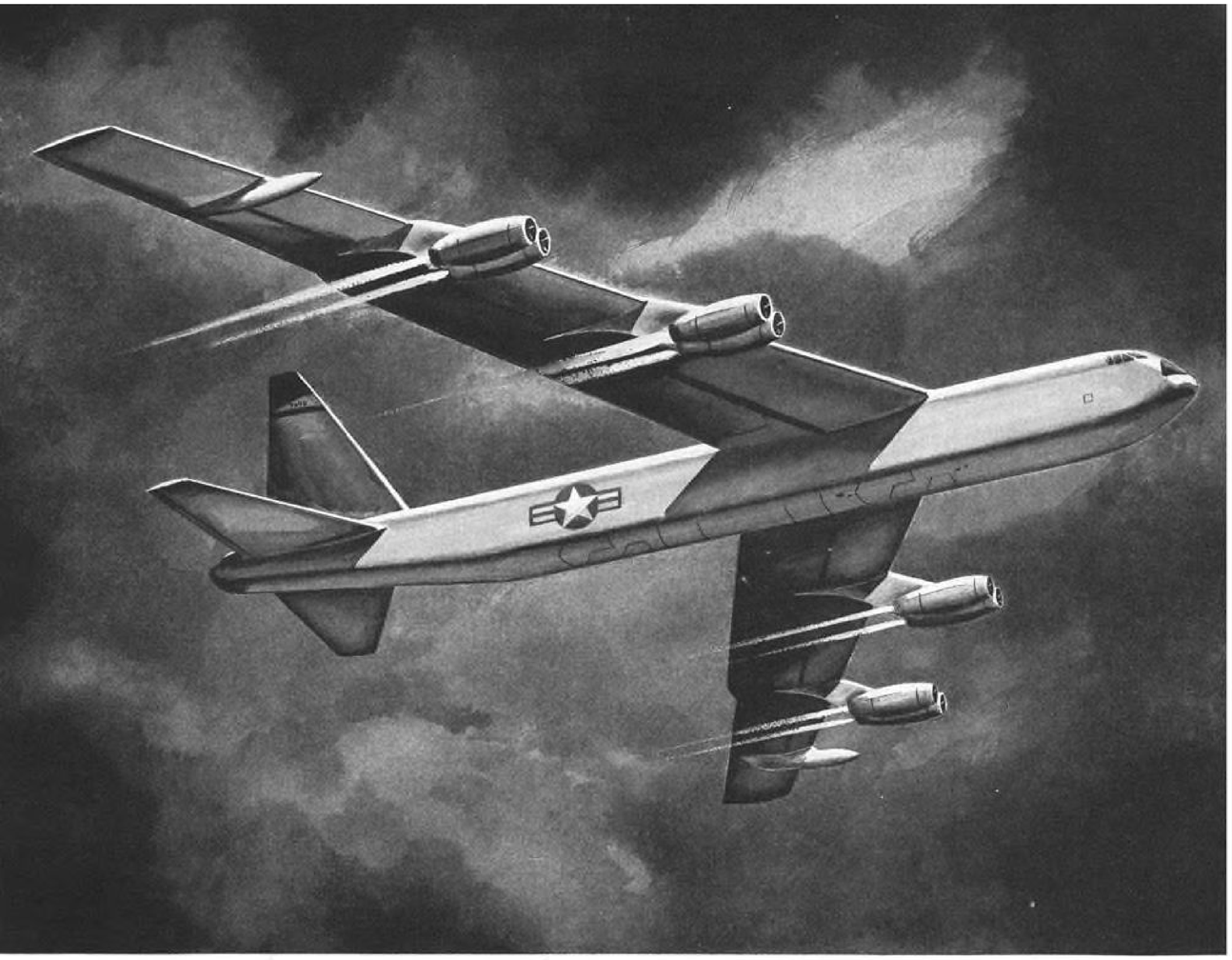
Positions open to qualified Engineers and Physicists



Communications · Component Design · Navigational Systems · Electronic Countermeasures · Field Engineering · Radar · Equipment Design and Modernization · Missile Systems and Components · Solid State Physics · Beacons

C-122

Circle Number 125 on Reader-Service Card



Its mission...THE PREVENTION OF WAR!

Alert, skilled, prepared, on the job...
SAC expresses America's desire for peace with honor and justice. For SAC's far-ranging aircraft, RCA provides the priceless asset of complete and instantaneous communication.

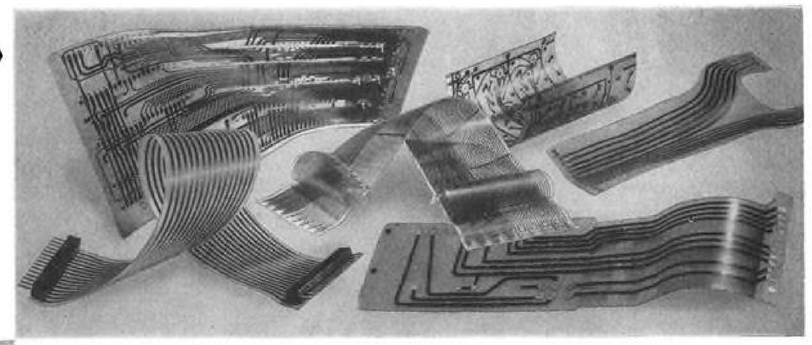
RADIO CORPORATION of AMERICA
Defense Electronic Products
Camden, N. J.

Tmk (s) ®

Circle Number 126 on Reader-Service Card

For Dependable Components – SANDERS ASSOCIATES, Inc.

FLEXIBLE PRINTED CIRCUITS – A new concept in wiring and harnessing, Sanders flexible printed circuitry eliminates wiring errors and reduces assembly costs. Flexible circuits and cables can be made in single–or multi-layer form for use in electronic systems, computor harnesses, switchboards and appliances. Multi-layer construction takes up to 65% less space than conventional wiring, and in some applications has reduced weight by 75%.





"MINICUBE" BLOWER – A compact, high-velocity blower and motor, in a 1" cube. Designed for use in guided missiles, aircraft, etc. Rugged construction assures reliable performance over a wide range of environmental conditions. Wt: 1 oz.; Input: 400 cps, 4 watts; Output 3 C.F.M.

"Consistently dependable". That's the national reputation established by the electronic, electro-mechanical and hydraulic components engineered and produced by Sanders Associates.

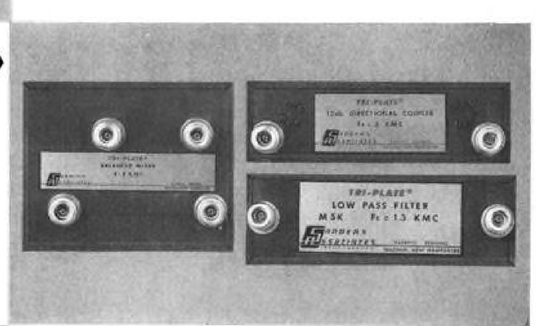
Sanders offers a complete engineering service — including departments for systems engineering, research aerodynamics, modular electronics, microwave engineering, electromechanics and hydraulics, commercial development, special purpose tubes, and complete type test facilities. Extensive manufacturing facilities available.

PHASE COMPARATOR – A versatile, full-wave bridge comparator for use as a modulator, demodulator, or switch. Frequency Response: 0-5000 cps; Max. Reference Voltage: 120V. rms; Max. OutputVoltages = ± 50V. DC; Dynamic Range = 46 db. Hermetically sealed.

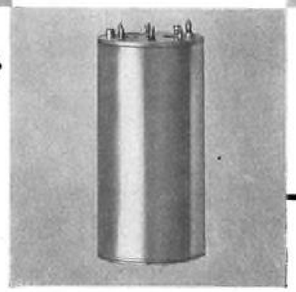




TRI-PLATE MICROWAVE COMPONENTS – The bulk and weight of conventional microwave systems can be substantially reduced with Sanders TRI-PLATE components, including variable attenuators, balanced mixers, hybrid rings, directional couplers, low pass filters, power dividers and receiver front ends. Low cost, low leakage and high reliability. Complete systems can be designed for specific application.



RATE GYROSCOPE – A precision subminiature device for converting rate into an A.C. signal. Meets requirements of sensitive control and stabilizing systems for aircraft and missiles. Features include: • Lifelong Hermetic Sealing • Excellent Resolution • High Sensitivity • Small Size: 2 5/16" long x 15/16" Diameter • Light Weight: 3-½ oz.



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West Coast Field Office: 1608 West Centinela Boulevard
Inglewood, California

C-124

Circle Number 127 on Reader-Service Card



10 Mc
Crystal Filter
shown approx. ¾ size

CRYSTAL FILTERS in the 10 Kc to 30 Mc range

The accompanying table shows a partial list of standard Hycon Filters. Custom units may be engineered to your particular specifications of center frequency, bandwidth, selectivity, and impedance level. *Write for Crystal Filter Technical Bulletin.*

SYMMETRICAL BANDPASS

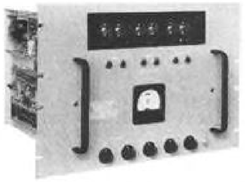
MODEL NO.	CENTER FREQ.	BANDWIDTH (6-db)	BANDWIDTH (60-db)	MAXIMUM INSERTION LOSS	MAXIMUM PASSBAND VARIATION	IMPEDANCE (NOMINAL)	CASE SIZE
100 KPA	100 kc	50 cps	200 cps	3 db	± ½ db	8200	3 15/16" L x 2¾" W x 2" H
2215 KA	2215 kc	2.8 kc	12 kc	3 db	± ½ db	4000	2 9/16" L x 1 5/16" W x 1¾" H
2215 KB	2215 kc	250 cps	1000 cps	3 db	± ½ db	4000	2 9/16" L x 1 5/16" W x 1¾" H
9 MA	9 Mc	3 kc	12 kc	3 db	± ½ db	1000	1 61/64" L x 19/32" W x 15/16" H
13 MA	13 Mc	30 kc	54 kc	6 db	± 1 db	1500	3 9/16" L x 1" W x 1½" H
13 MB	13 Mc	15 kc	27 kc	6 db	± 1 db	750	3 9/16" L x 1" W x 1½" H

SINGLE SIDEBAND

MODEL NO.	CENTER FREQ.	SIDEBAND	PASSBAND	MINIMUM ATTENUATION (UNWANTED SIDE)	MAXIMUM INSERTION LOSS	MAXIMUM PASSBAND VARIATION	IMPEDANCE (NOMINAL)	CASE SIZE
100 KUC	100 kc	upper	300 to 6000 cps (2 db)	60 db	10 db	± ½ db	8200	5 3/8" L x 3" W x 2 3/8" H
100 KLC	100 kc	lower	300 to 6000 cps (2 db)	60 db	10 db	± ½ db	8200	5 3/8" L x 3" W x 2 3/8" H
3 MUA	3.2 Mc	upper	300 to 3000 cps (3 db)	40 db	3 db	± 1 db	1600	2 9/16" L x 1 5/16" W x 1¾" H

RAPID ACCESS in Analog Data Reduction Systems

DIGITAL TIMING GENERATOR



MODEL 201 for Tape Indexing generates numerically coded timing signals which are recorded on the magnetic tape throughout the data recording periods, providing a precise digital index in terms of elapsed time.

Write for Technical Bulletin TSG

MODEL 206A IS A MILITARIZED AIRBORNE VERSION OF MODEL 201.

MAGNETIC TAPE SEARCH UNIT

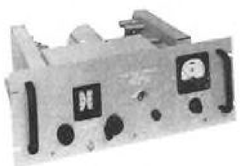


MODEL 202 for Tape Searching operates during data reduction periods. This instrument automatically locates and selects for controlled playback the tape data included between a "sequence start time" and a "sequence end time" specified by panel dial settings. Model 202 may be modified to search for timing formats other than those originated by Model 201.

ULTRA STABLE OSCILLATOR

One Megacycle Signal Source

STABILITY: 1 PART IN 10^9 PER DAY



For precise time measurements or frequency control, Model 101C features include: A crystal oven without moving parts that is stabilized to better than 0.01°C. by temperature-sensitive resistance bridge, and dissipation in oscillator crystal which is stabilized at a power level of less than one microwatt. MULTIPLIERS and DIVIDERS are available for other frequency values with corresponding stability. *Write for Bulletin USO.*

HIGH POWER TELEMETERING DIPLEXERS

for Severe Environment



These instruments feed signals from 2 - 100 watt transmitters into a single missile antenna system and are designed to satisfy military requirements for use in test missiles and supersonic aircraft. Frequency Range: fixed-tuned between 215 to 250 Mc/s; Attenuation: less than 0.3 db; Size: each cavity approx. 3" x 4"; Weight of total system: 3.7 pounds, (2 diplexers + circuitry). *Write for Bulletin 1231.*

Please call or write for name of Hycon Eastern Representative in your area. (Telephone: Cambridge, Mass., UNiversity 4-7200)

HYCON EASTERN, INC.

75 Cambridge Parkway Dept. WB Cambridge 42, Mass.

Affiliated with HYCON MFG. COMPANY, Pasadena, California

TURBO BRAND

ELECTRICAL AND ELECTRONIC WIRE AND CABLE

HOOK-UP WIRE

Three types of general purpose, vinyl insulation hook-up wire are listed in each of the two military specifications currently in use. MIL-W-76A, which has superseded JAN-C-76, covers wires rated for 80°C operation (90°C when nylon jacketed); MIL-W-16878B covers wires rated for 100°C operation (110°C when nylon jacketed). Both specifications provide for braids, shields, jackets or any combination of these. The NAS-702 specification is an industry standard requiring nylon coverings, either extruded or braided, and provides for the optional use of shields.

SPECIFICATION	TYPE OR CLASS	SIZE RANGE	VOLTAGE RATING	TEMP. RATING, °C	OUTER COVERINGS[1]
MIL-W-76A	LW	#30 to #20	300	80[2]	Opt-R, G, L, N
	MW	#24 to #12	1000	80[2]	Opt-R, G, L, N
	HW	#22 to #16	2500	80[2]	Opt-R, G, L, N
	HW	#14 to # 6	600	80[2]	Opt-R, G, L, N
MIL-W-16878B	B	#32 to #16	600	100[2]	Opt-R, G, L, N, J
	C	#24 to #14	1000	100[2]	Opt-R, G, L, N, J
	D	#24 to # 6	3000	100[2]	Opt-R, G, L, N, J
NAS-702	A	#26 to # 8	1000	105	Req-N or L
	B	#26 to # 8	2500	105	Req-N or L
	C	#26 to #16	600	105	Req-N

AIRFRAME WIRE

Both polyvinyl chloride and silicone rubber are used as primary insulation in airframe wires. Vinyls are used in Navy BuAer's MIL-W-5086A, a 105°C wire, and in the Air Force's MIL-W-5274A, a 60°C wire. The Air Force's 150°C wire, MIL-W-8777A, has a highly specialized construction requiring silicone rubber insulation and double textile overbraid. The well-known "sandwich" construction, a glass braid between two vinyl layers, is called out by Type III of MIL-W-5086A and Type II of MIL-W-5274A. These wires are available with shields meeting MIL-C-7078A.

SPECIFICATION	TYPE OR CLASS	SIZE RANGE	VOLTAGE RATING	TEMP. RATING, °C	OUTER COVERINGS[1]
MIL-W-5086A	I	#22 to #12	600	105	Req-N
	II	#22 to #12	600	105	Req-G and N
	II	#10 to #4/0	600	105	Req-G and L
	III	#22 to #12	600	105	Req-G, J, and N
	III	#10 to #4/0	600	105	Req-G, J, and L
MIL-W-5274A	I	#22 to #12	600	60	Req-N
	II	#22 to #12	600	60	Req-G, J, and N
MIL-W-8777A	MT	#22 to #12	600	150	Req-G (double braid)
MIL-C-7078A	I	#22 to #4/0	600	*	—
	II	#22 to #4/0	600	*	Req-N (over shield)

**MIL-C-7078A covers shielded one-to seven-conductor cables. Individual conductors meet MIL-W-5086A or MIL-W-5274A.*

[1]*Opt-optional, Req-required, G-glass braid, J-vinyl jacket, L-nylon braid, N-nylon jacket, R-rayon braid.*

[2]*10°C higher when covered with a nylon jacket.*

COAXIAL CABLE

In addition to supplying cables to both JAN-C-17A and MIL-C-17B, William Brand has designed coaxial cables with specified electrical characteristics to perform under stated environmental conditions. Cables can be manufactured with single or parallel inner conductors; where the inner conductor is bare, tinned, or silver-plated; of copper, copper-covered steel or resistance wire. Virgin polyethylene is used in the solid or air-spaced cores. Single or double shields are braided from bare, tinned or silver-plated copper. Where non-standard cables are necessary to attain performance requirements, the William Brand Engineering Department will draw on their accumulated experience to recommend the most economical and functional cable.

MULTICONDUCTOR CABLES

The various wires listed above can be assembled in any combination of numbers, sizes and types to form flat or round multiconductor cables. Most designs specify twisted, rather than parallel conductors, because round cables in addition to being more flexible, permit a better control of electrical properties through positioning or grouping of the individual components.

Flat or Parallel Conductors. Three types are available:

(1) 300 Ohm or Rip-Cord Type — Individual conductors are covered simultaneously with a common single-color insulation. Polarity identification is achieved through a contrasting colored stripe or a ridge along one edge, or by using both tinned and bare copper conductors in the cable.

(2) Jacketed Type — Conductors are individually insulated and color coded. Vinyl jackets are so applied that they may be stripped without damage to the underlying conductor insulation. Shielded wires may be incorporated in this type of cable.

(3) Turbo Ribbon Cable® — Individually insulated wires, color coded, are bonded together with excellent adhesion yet rip-cord qualities. There is no outer jacket. Where the individual conductors are nylon jacketed, shielded wires (with overall nylon jackets) can be incorporated. Turbo Ribbon Cable is especially useful where limited space exists. It can be bent along a small radius and will follow the contour of any surface.

Twisted Conductors. Round cables are formed on two types of equipment:

(1) Bunchers — The several wires are twisted together in random arrangement; the individual components do not necessarily lie in a fixed pattern. The bunchers at William Brand & Co. can twist any number of conductors with a maximum cabled diameter of ½".

(2) Planetary Cablers — The most versatile type of cabling equipment. Any number of shielded, overbraided or vinyl covered singles, pairs, cabled groups or combinations of these can be helically laid in a predetermined sequence. Concentric layers can be applied over a single wire or a cabled core, with the direction of lay of each layer varied at will.

Both types of round cable can incorporate textile or plastic fillers to produce finished cable with circular cross section. Binders, wraps, tapes, shields or textile braids can be applied over each layer as required. Outer coverings can be of extruded plastic or braided textile yarns.

The William Brand engineering staff has had extensive experience in the multiconductor cable field. Their collective knowledge is at your disposal. Turbo Engineers will assist you in developing a suitable cable, or given electrical and physical requirements, will design a functional and economical product.

We invite you to make full use of our services in the solution of any wire and cable problem.

TURBO BRAND

ELECTRICAL INSULATING TUBING

TUBING

Two general classes are manufactured by William Brand & Co. — extruded polyvinyl chloride, and textile braids impregnated and coated with insulating varnish. The plastic tubings fall into three categories — general purpose, and high and low temperature types. The coated tubings also fall into three temperature classes: A, B, and H, each with its specific operating temperature limit. All tubings are available in sizes #24 to 2½" I.D. and in all MIL-STD-104 colors. Plastic tubings can also be furnished in transparent. Generally speaking, plastic tubings are supplied in continuous lengths on spools or coils; coated tubing is furnished in 36" or 42" lengths.

PLASTIC TUBING

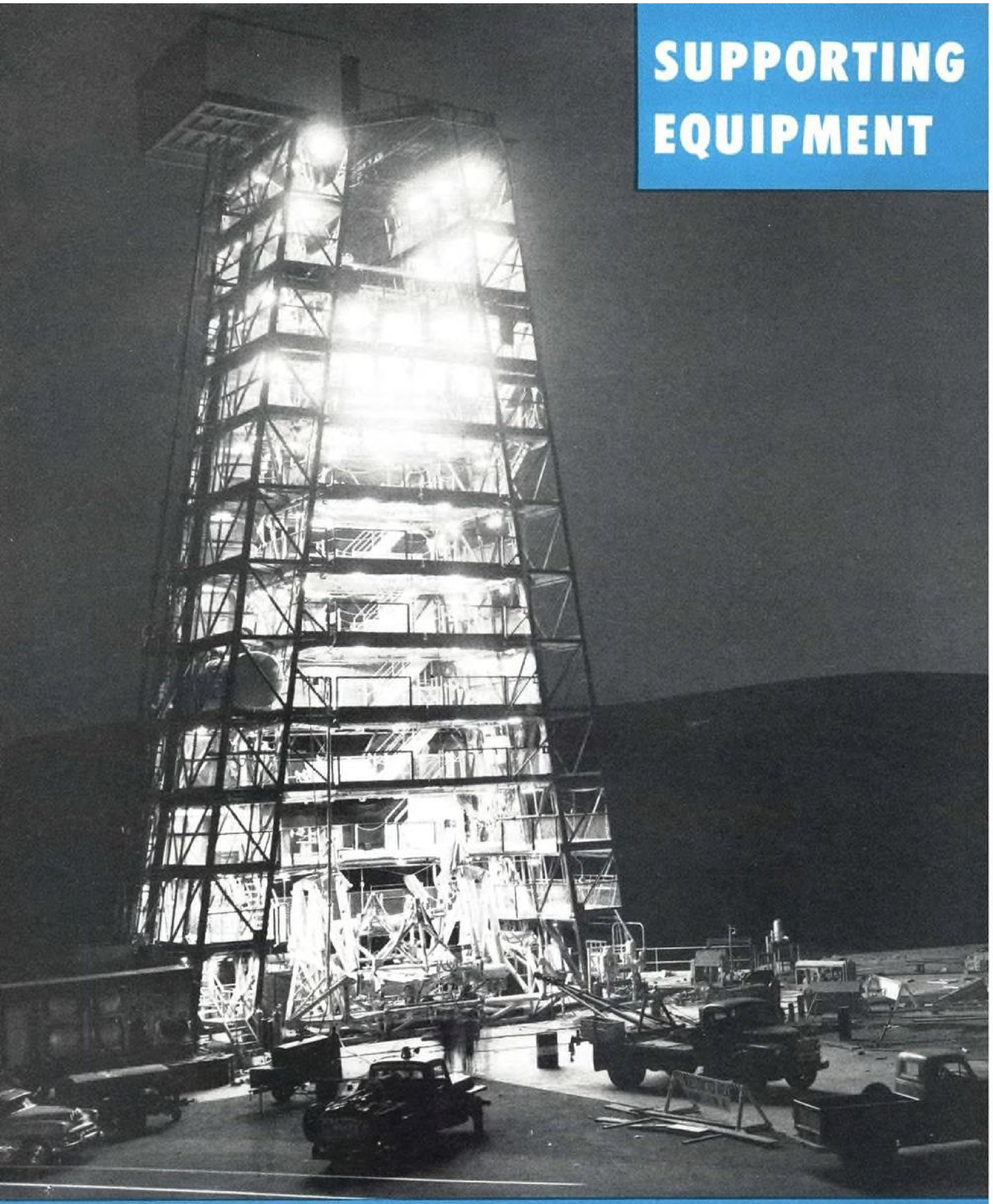
SPECIFICATION	TYPE	TEMP. RANGE	BRAND DESIGNATION
MIL-I-631C	Grade c, Class II, Category 1 and 2	−10° to +105°C	Turbotrans 105
MIL-I-631C	Grade b, Class II, Category 1 and 2	−46° to + 60°C	Turbolex 55
MIL-I-631C	Grade a, Class I and II, Category 1 and 2	−30° to + 80°C	Turbolex 76
MIL-I-7444A(2)	Range I, II and III	−68° to + 80°C	Turbozone 40

COATED TUBING

SPECIFICATION	TYPE	COMPOSITION		TEMP. RANGE	BRAND DESIGNATION
		BRAID	COATING		
MIL-I-3190A	A-A-1, A-B-1, A-C-1	Cotton or Rayon	Organic Varnish	−10° to −105°C	Turbo Varnished Tubing
MIL-I-3190A	B-A-1, B-B-1, B-C-1	Glass	Organic Varnish	−10° to +130°C	Turboglas Varnished Tubing
MIL-I-3190A	B-A-1, B-B-1, B-C-1	Glass	Vinyl Varnish	−10° to +130°C	Turbotuf Tubing
MIL-I-3190A	H-A-1, H-B-1, H-C-1	Glass	Silicone Varnish	−10° to +200°C	Turbosil Tubing
MIL-I-3190A	H-A-1, H-B-1, H-C-1*	Glass	Silicone Rubber	−75° to +200°C	Turbo 117 Tubing

**Silicone rubber coated tubing not covered by specification. Turbo 117 will meet all performance requirements of MIL-I-3190A.*

WILLIAM BRAND & CO. INCORPORATED TURBO BRAND WILLIMANTIC 4, CONNECTICUT



SUPPORTING EQUIPMENT

ATLAS MISSILE TEST TOWER

1958 AVIATION WEEK BUYERS' GUIDE | SECTION D



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WEAPON SYSTEM
A3J

NORTH AMERICAN
JET TRAINER
T2J

Typical aircraft with Hoover flight control actuators

Circle Number 130 on Reader-Service Card

New Projects Hypo Support Development

By George L. Christian

With Mach 2 tucked safely under its wing, USAF is lifting its aircraft sights to Mach 4–2,720 mph. To assure the availability of aircraft equipment capable of operating at the blast furnace temperatures developed by such speed–up to 1,000F on most of the airframe–Air Force has set up several projects.

Among them are contracts with:

• **Republic Aviation Corp.** for development of a 1,000F hydraulic system. This includes coming up with a surface control actuator capable of operating at 1,200F ambient.

• **Lockheed Aircraft Corp.,** Georgia Div., for design development and functional test of a pneumatic system up to 1,000F.

• **North American Aviation, Inc.,** Los Angeles Div., for development of an airborne electrical power generation system capable of withstanding 600F for prolonged periods of time. Program is not aimed at any specific plane but is designed for the benefit of the Air Force and industry generally (AW Oct. 21, p. 59).

1,000F Fluids

Major obstacle to very high temperature hydraulic systems–fluids which will not break down at temperatures of 1,000F–is being overcome. Some fluids which are being considered for a use in 1,000F hydraulic systems are:

• **Bis Para Phenoxy Phenyl Ether**–said to be one of the more promising fluids, its primary disadvantage is a high melting point, about 200F. However, if the fluid shows promise and resists breakdown at the upper temperature limits, ways may be found to lower the melting point substantially. A lot of research is being done in the entire field of ethers.

• **Liquid metal–NaK_{77}**–so called because it is composed of 23% sodium and 77% potassium. Feature of the fluid is that it remains liquid at temperatures ranging from 20F to approximately 1,000F. Major drawback of the liquid metal is that it is highly explosive and corrosive.

Other fly fluids being investigated for possible use in 1,000F hydraulic systems are called Silphenylene and Terphenyl.

Finding a fluid that will operate satisfactorily at 1,000F is only half the battle.

Next problem will be to determine how to make the fluid remain liquid at temperatures down to −65F. It is possible that some sort of compromise will have to be reached at the low end of the temperature scale.

Very high temperature hydraulic system seals will have to be metallic or lap fits since it does not appear that any elastomers will be able to operate at 1,000F.

Pumps, valves and components will probably be made of superalloys such as Haynes #25, chromium carbide or possibly tool and die steels.

Lines for a 1,000F hydraulic system could be made of Inconel.

Very close tolerances–and sometimes lap fits–which are becoming increasingly common in valves, actuators and pumps used in modern hydraulic systems demand hygienic cleanliness throughout the hydraulic system. As one engineer put it, "today's hydraulic systems have to be pristine and gleaming throughout."

Vulnerable point of high pressure (3,000 psi.) high temperature (275F) systems in today's planes are the pumps. Reason is that they have to do more work under increasingly high temperatures.

Before the introduction of hydraulically powered flight controls, hydraulic pumps worked at takeoff and landing to raise and lower gear and flaps, and occasionally to adjust cowl flaps. During most of the flight they merely coasted. Today, they are in constant operation to supply pressure to the hydraulically-powered flight control system.

At least one major airframe manufacturer has developed a "patch test" to check cleanliness of newly delivered pumps and just-completed hydraulic systems to assure the degree of cleanliness necessary for proper operation.

Patch Testing

Patch testing involves putting samples of fluid from the hydraulic system on patches of chemically-treated paper to determine how much silt and other foreign matter it contains. Darkness of hydraulic fluid spot on the paper determines whether system or pump is acceptable or not.

Incoming pumps are patch tested twice, at 2½-hour intervals, to eliminate short duration pumps.

The company's engineers said that sometimes new pumps arrived with enough contamination to cause their own destruction.

Premature pump failures are being countered by these moves:

• **Closer inspection** prior to installation on the airframe, using such techniques as the patch tests.

• **Careful construction** of clean hydraulic systems which are patch tested with external hydraulic power source prior to pump installation.

• **Cleaning up** pump construction details such as substituting shrink fits for press fits since the latter could result in metallic slivers getting into the pump's mechanism.

Although pneumatic systems are attractive power sources for many ancillary functions aboard an airplane, an unsolvable problem which knocks them out of very high altitude airplanes is the lack of air to be compressed at altitudes of 70,000 ft. or more. At least, compressor-driven pneumatics is not practical at such altitudes.

Compressed air bottles are satisfactory for a one- or two-shot emergency type pneumatic operation but they cannot supply air on a continuous basis. They also involve a considerable weight penalty.

Mono-Propellants

Mono-propellants, such as propyl nitrate, may provide the means of operating a pneumatic system in an airless atmosphere.

Pneumatic engineers think that a mono-propellant's exhaust might be used to drive a high temperature electrical system, for example.

Another airframe manufacturer is considering how to inert automatically aircraft fuel tanks–particularly empty ones –in planes flying so fast that tank heat may be hot enough, over 500F, to explode the combustible mixture which may be in the tank as it becomes empty.

Such a potential explosive combination could exist in a plane that has been flying very fast at high altitudes, burns up the fuel in some of its tanks, then descends rapidly, causing air to rush into the tanks.

High speed of the plane may have heated the fuel tank's more massive components–such as valves–to the point where they would retain the heat sufficiently to ignite the fuel/air mixture in the tank.

Studies are under way to come up with a means of inerting the tanks–probably with nitrogen–before such a dangerous situation comes into existence.

The problem is to perform the inerting automatically and to have inerting last only during the dangerous period to avoid the weight and space penalty of carrying enough nitrogen to inert the tank for the long periods of time when it contains enough fuel to be perfectly safe.

hold everything!



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Circle Number 131 on Reader-Service Card

DESIGN ACHIEVEMENTS WITH SUPRAMICA* ceramoplastics

SUPRAMICA ceramoplastics . . . . . .

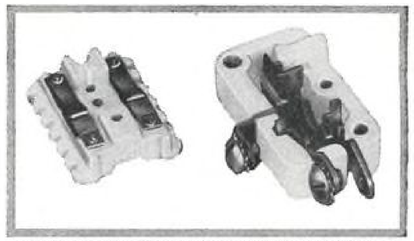
MOLDED OR MACHINABLE HIGH TEMPERATURE INSULATION

Supramica ceramoplastics, the world's most nearly perfect high temperature insulations, are formulated with SYNTHAMICA* synthetic mica. Supramica possesses high temperature and thermal shock resistance, and complete dimensional stability. Thermal expansion coefficients are the same as steel. They have low electrical loss, excellent arc resistance, high dielectric strength, and are impervious to moisture, oil and organic solvents, with permanent resistance to radiation.

SUPRAMICA* 560 — New insulation for **continuous operation** at 500° C (932° F). Lightweight material can be precision molded with fragile inserts . . . specified for conditions **which no other material can meet!** Specific gravity similar to that of aluminum or mineral-filled polyesters . . . perfect for relay bases, connectors, radomes, tube sockets and other components for high temperature use.

SUPRAMICA* 555 — Precision-molded ceramoplastic having high-temperature endurance up to 750° F. Moldable with or without inserts.

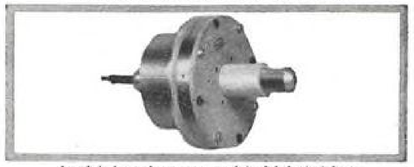
SUPRAMICA* 500 — Compression-molded ceramoplastic sheets and rods for use at temperatures up to 900° F. Readily machinable; not precision moldable. Inserts must be cemented.



High-temperature relay and switch parts precision molded of SUPRAMICA 560 ceramoplastic



Stable tuner base precision molded from SUPRAMICA 555 ceramoplastic with fragile silver ribbon insert



Insulated spark gap cover plate fabricated from SUPRAMICA 500 ceramoplastic

MYCALEX* glass-bonded mica . . .

MOLDED OR MACHINABLE ELECTRICAL INSULATION

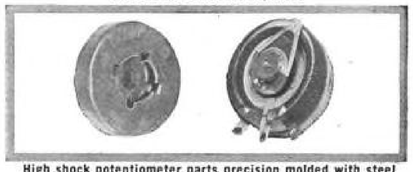
Mycalex glass-bonded mica formulations have been recognized for many years as high-temperature, high-frequency insulation . . . impervious to oil and water, resistant to high temperatures, with total, permanent dimensional stability and thermal expansion coefficient equivalent to that of insert metals . . . resistant to radiation.

MYCALEX 410* Glass-bonded mica precision-molded with or without inserts, for applications involving temperatures up to 650° F.

MYCALEX 400* Standard compression molded glass-bonded mica for operating temperatures to 850° F. Readily machinable, but not moldable. Inserts must be cemented.

MYCALEX* 385 Glass-bonded mica with excellent resistance to circuit breaker arcing and thermal shock, for continuous operating temperatures up to 700° F. Readily machinable, but not moldable in intricate shapes.

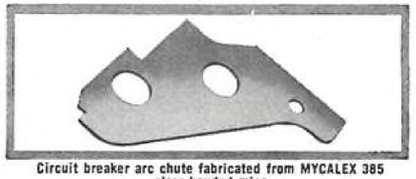
MYCALEX* K (machinable) and KM (moldable) Glass-bonded mica capacitor dielectrics with higher dielectric constant indicated by numbers 10, 20, 30.



High shock potentiometer parts precision molded with steel supporting inserts — MYCALEX 410 glass-bonded mica



Radar insulating parts fabricated from MYCALEX 400 glass-bonded mica



Circuit breaker arc chute fabricated from MYCALEX 385 glass-bonded mica

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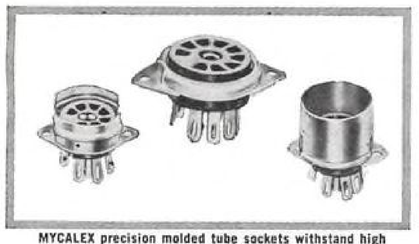
AND MYCALEX* glass-bonded mica . . . . . .



MYCALEX TM Commutation Switch with commutator plates precision molded of SUPRAMICA 555 ceramoplastic. Plate is CP-346, 2-poles, 360 contacts.



Crystals of SYNTHAMICA synthetic mica



MYCALEX precision molded tube sockets withstand high temperatures and rugged service. Standard miniature and subminiature types.

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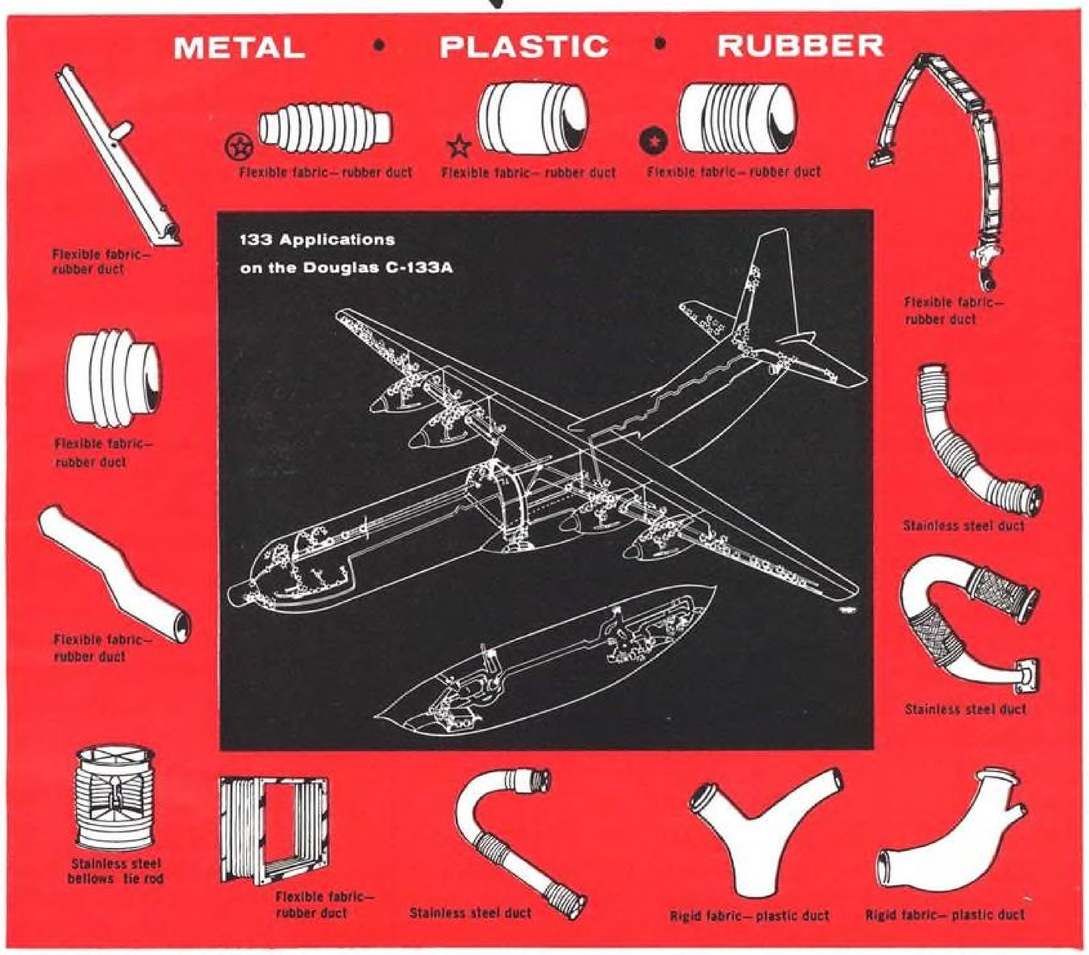
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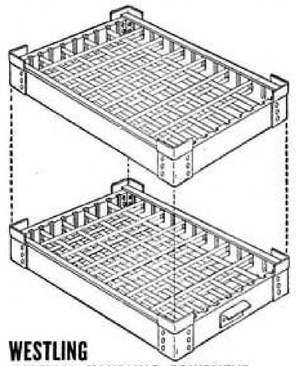
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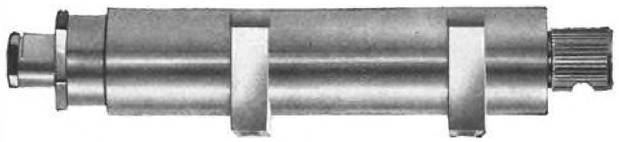
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1.75	3.81	70	0-750**	235,000
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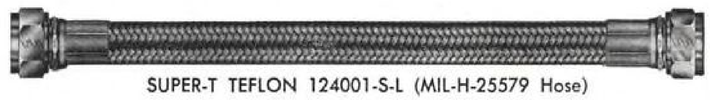
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Electronic Wire & Cable Co., 515 S. Varney, Burbank, Calif.
National Wire & Cable Corp., 136 San Fernando Rd., Los Angeles 31, Calif.
New England Electrical Works, Inc., 365 Main St., Lisbon, N. H.
Plastoid Corp., 42-61 24 St., Long Island City 1, N. Y.
Warren Wire Co., Pownal, Vt.

Wire, Brass

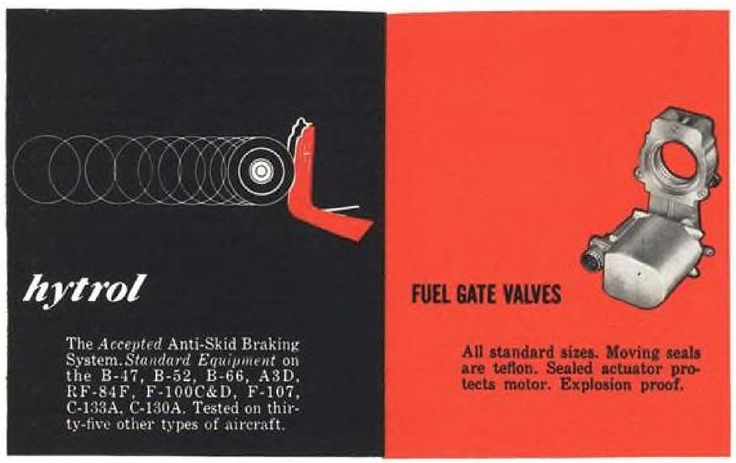
Bram Metallurgical-Chemical Co., 820 65th Ave., Philadelphia 26, Pa.
Bridgeport Brass Co., 30 Grand St., Bridgeport, Conn.
Chase Brass & Copper Co., 236 Grand St., Waterbury, Conn.
Copperweld Steel Co., Flexo Wire Div., Oswego, N. Y.
Corbin Products Div., Ohlson International Corp., Crescent Plaza Bldg., Long Island City 1, N. Y.
Customer Service Div., Titan Metal Mfg. Co., Bellefonte, Pa.
The Gilbert & Bennett Mfg. Co., Georgetown, Conn.
Inso Products, Ltd., 404 Fifth Ave., New York 18, N. Y.
Mueller Brass Co., 1925 Lapeer Ave., Port Huron, Mich.
Riverside-Alloy Metal Div., H. K. Porter Co., Inc., Riverside, N. J.
Scovill Mfg. Co., 99 Mill St., Waterbury 20, Conn.
Stenor Inc., 10 Bridge St., New York 4, N. Y.
Warren Wire Co, Pownal, Vt.

Wire, Ceramic Insulated

Aero Research Instrument Co., 315 N. Aberdeen St., Chicago 7, Ill.
ELECTRIC AUTO-LITE CO., THE, Champlain & Mulberry Sts., Toledo, Ohio. **SEE ADV. C-81, D-173**
GENERAL ELECTRIC CO., APPARATUS SALES DIV., 1 River Rd., Schenectady 5, N. Y. **SEE ADV. A-47, A-75, D-185**
Haveg Industries Inc., 900 Greenbank Rd., Wilmington 8, Del.
Rome Cable Corp., Rome, N. Y.
Sprague Electric Co., North Adams, Mass.
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Wire, Copper

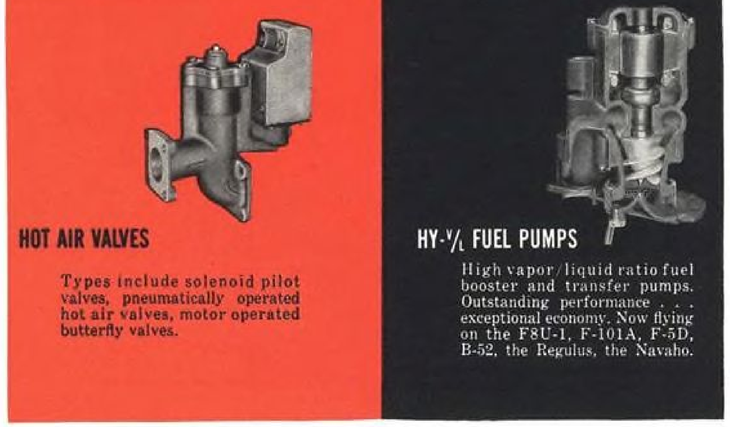
American Super-Temperature Wires Inc., 24 W. Canal St., Winooski, Vt.
Bram Metallurgical-Chemical Co., 820 65th Ave., Philadelphia 26, Pa.
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ELECTRIC AUTO-LITE CO., THE, Champlain & Mulberry Sts., Toledo, Ohio. **SEE ADV. C-81, D-173**
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General Cable Corp., 420 Lexington Ave., New York 17, N. Y.
Inso Products, Ltd., 404 Fifth Ave., New York 18, N. Y.
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New England Electrical Works, Inc., 365 Main St., Lisbon, N. H.
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Scovill Mfg. Co., 99 Mill St., Waterbury 20, Conn.
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TENSOLITE INSULATED WIRE CO., INC., 198 Main St., Tarrytown, N. Y.; 1516 North Gardner St., Los Angeles 46, Calif. **SEE ADV. C-95**
United States Steel Corp., 525 William Penn Pl., Pittsburgh 30, Pa.
Vacuum Metals Corp. Div., Crucible Steel Co. of America, P. O. Box 977, Syracuse 1, N. Y.
Warren Wire Co., Pownal, Vt.
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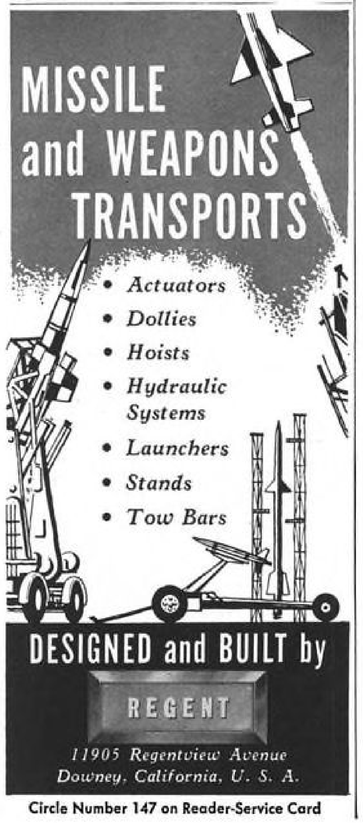
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Division Lead Co., 7742 W. 61 Pl., Summit, Ill.
ELECTRIC AUTO-LITE CO., THE, Champlain & Mulberry Sts., Toledo, Ohio. **SEE ADV. C-81, D-173**
General Cable Corp., 420 Lexington Ave., New York 17, N. Y.
National Lead Co., 111 Broadway, New York 6, N. Y.
National Wire & Cable Corp., 136 San Fernando Rd., Los Angeles 31, Calif.
New England Electrical Works, Inc., 365 Main St., Lisbon, N. H.
Warren Wire Co., Pownal, Vt.
Western Insulated Wire Co., 2425 East 30th St., Los Angeles 58, Calif.

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Corbin Products Div., Ohlson International Corp., Crescent Plaza Bldg., Long Island City 1, N. Y.
Crucible Steel Co. of America, Henry W. Oliver Bldg., Mellon Sq., Pittsburgh 30, Pa.
Driver-Harris Co., 201 Middlesex St., Harrison, N. J.
Wilbur B. Driver Co., 1875 McCarter Hwy., Newark 4, N. J.
New England Electrical Works, Inc., 365 Main St., Lisbon, N. H.
Stenor Inc., 10 Bridge St., New York 4, N. Y.

Wire, Nickel

American Nickel Alloy Mfg. Corp., 30 Vesey St., New York 7, N. Y.
J. BISHOP & CO. PLATINUM WORKS, Malvern, Pa. **SEE ADV. D-204**
Bram Metallurgical-Chemical Co., 820 65th Ave., Philadelphia 26, Pa.
Colonial Alloys, Ridge Ave. & Crawford, Philadelphia, Pa.
Copperweld Steel Co., Flexo Wire Div., Oswego, N. Y.
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Driver-Harris Co., 201 Middlesex St., Harrison, N. J.
Wilbur B. Driver Co., 1875 McCarter Hwy., Newark 4, N. J.
Inso Products, Ltd., 404 Fifth Ave., New York 18, N. Y.
International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
Riverside-Alloy Metal Div., H. K. Porter Co., Inc., Riverside, N. J.
Vacuum Metals Corp. Div., Crucible Steel Co. of America, P. O. Box 977, Syracuse 1, N. Y.

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Crucible Steel Co. of America, Henry W. Oliver Bldg., Mellon Sq., Pittsburgh 30, Pa.
National-Standard Co., 555 Lincoln Ave., Secaucus, N. J.
Stenor Inc., 10 Bridge St., New York 4, N. Y.
United States Steel Corp., 525 William Penn Pl., Pittsburgh 30, Pa.

Wire, Precious Metal

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C. S. Brainin Co., 320 Washington St., Mt. Vernon, N. Y.
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Sigmund Cohn Corp., 121 S. Columbus Ave., Mt. Vernon, N. Y.
Joseph B. Cooper & Sons Inc., 25 West 47 St., New York 36, N. Y.
Wilbur B. Driver Co., 1875 McCarter Hwy., Newark 4, N. J.
Goldsmith Bros. Smelting & Refining Co., 111 North Wabash Ave., Chicago 2, Illinois
Handy & Harman, 82 Fulton St., New York 38, N. Y.
Metals & Controls Corp., General Plate Div., 41 Forest St., Attleboro, Mass.
National Wire & Cable Corp., 136 San Fernando Rd., Los Angeles 31, Calif.
J. M. Ney Co., P. O. Box 990, Hartford 1, Conn.
Western Gold & Platinum Co., 525 Harbor Blvd., Belmont, Calif.

Wire, Stainless Steel

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh 22, Pa.
American Chain & Cable Co., Inc., Page Steel & Wire Div., 1st & River St., Monessen, Pa.
American Steel & Wire Div., U. S. Steel Corp., Rockefeller Bldg., Cleveland 13, Ohio
Armco Drainage & Metal Products, Inc., 703 Curtis St., Middletown, Ohio
J. BISHOP & CO. PLATINUM WORKS, Malvern, Pa. **SEE ADV. D-204**
Bram Metallurgical-Chemical Co., 820 65th Ave., Philadelphia 26, Pa.
Carpenter Steel Co., 128 West Bern St., Reading, Pa.
Chase Brass & Copper Co., 236 Grand St., Waterbury, Conn.
Colonial Alloys, Ridge Ave. & Crawford, Philadelphia, Pa.
Copperweld Steel Co., Flexo Wire Div., Oswego, N. Y.
Crucible Steel Co. of America, Henry W. Oliver Bldg., Mellon Sq., Pittsburgh 30, Pa.
Driver-Harris Co., 201 Middlesex St., Harrison, N. J.
Wilbur B. Driver Co., 1875 McCarter Hwy., Newark 4, N. J.
Drummond, McCall & Co., Ltd., 930 Wellington St., P. O. Box 219, Montreal, Quebec, Canada
The Gilbert & Bennett Mfg. Co., Georgetown, Conn.
National-Standard Co., 555 Lincoln Ave., Secaucus, N. J.
National Wire & Cable Corp., 136 San Fernando Rd., Los Angeles 31, Calif.
Peirce Wire Recorder Corp., 5900 N. Northwest Hwy., Chicago 31, Ill.
Republic Steel Corp., 3100 East 45th St., Cleveland 27, Ohio
Riverside-Alloy Metal Div., H. K. Porter Co., Inc., Riverside, N. J.
Joseph T. Ryerson & Son, Inc., 16 & Rockwell Sts., P. O. Box 8000A, Chicago 80, Ill.
Stenor Inc., 10 Bridge St., New York 4, N. Y.
United States Steel Corp., 525 William Penn Pl., Pittsburgh 30, Pa.
Vacuum Metals Corp. Div., Crucible Steel Co. of America, P. O. Box 977, Syracuse 1, N. Y.

Wire, Steel

American Chain & Cable Co., Inc., Page Steel & Wire Div., 1st & River St., Monessen, Pa.
American Steel & Wire Div., U. S. Steel Corp., Rockefeller Bldg., Cleveland 13, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Crucible Steel Co. of America, Henry W. Oliver Bldg., Mellon Sq., Pittsburgh 30, Pa.
Drummond, McCall & Co., Ltd., 930 Wellington St., P. O. Box 219, Montreal, Quebec, Canada
The Gilbert & Bennett Mfg. Co., Georgetown, Conn.
Inso Products, Ltd., 404 Fifth Ave., New York 18, N. Y.
National-Standard Co., 555 Lincoln Ave., Secaucus, N. J.
Philadelphia Steel & Wire Corp., 5250 Belfield Ave., Philadelphia 44, Pa.
Republic Steel Corp., 3100 East 45th St., Cleveland 27, Ohio
John A. Roebling's Sons Corp., 640 S. Broad St., Trenton 2, N. J.
Stenor Inc., 10 Bridge St., New York 4, N. Y.
United States Steel Corp., 525 William Penn Pl., Pittsburgh 30, Pa.
Wickwire-Spencer Steel Div., Colorado Fuel & Iron Corp., The, 575 Madison Ave., New York, N. Y.

Wire, Stitching

Acme Steel Co., 134 & Perry, Chicago 27, Ill.
American Chain & Cable Co., Inc., Page Steel & Wire Div., 1st & River St., Monessen, Pa.
American Steel & Wire Div., U S. Steel Corp., Rockefeller Bldg., Cleveland 13, Ohio
Bostitch, Inc., Briggs Dr., East Greenwich, R. I.
Crucible Steel Co. of America, Henry W. Oliver Bldg., Mellon Sq., Pittsburgh 30, Pa.
National-Standard Co., 555 Lincoln Ave., Secaucus, N. J.
Riverside-Alloy Metal Div., H. K. Porter Co., Inc., Riverside, N. J.

Wire, Miscellaneous

American Chain & Cable Co., Inc., Page Steel & Wire Div., 1st & River St., Monessen, Pa.
American Steel & Wire Div., U. S. Steel Corp., Rockefeller Bldg., Cleveland 13, Ohio
Belmont Smelting & Refining Wks. Ind., 330 Belmont Ave., Brooklyn 7, N. Y.
BIRNBACH RADIO CO., INC., 145 Hudson St., New York 13, N. Y. **SEE ADV. C-99**
Bram Metallurgical-Chemical Co., 820 65th Ave., Philadelphia 26, Pa.
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Crucible Steel Co. of America, Henry W. Oliver Bldg., Mellon Sq., Pittsburgh 30, Pa.
Driver-Harris Co., 201 Middlesex St., Harrison, N. J.
Wilbur B. Driver Co., 1875 McCarter Hwy., Newark 4, N. J.
ELECTRIC AUTO-LITE CO., THE, Champlain & Mulberry Sts., Toledo, Ohio. **SEE ADV. C-81, D-173**
Electronic Wire & Cable Co., 515 S. Varney, Burbank, Calif.
Elgin National Watch Co., 107 National, Elgin, Illinois
GGG Metal Stamping Co., Inc., P. O. Box 114, Warren, Pa.
General Cable Corp., 420 Lexington Ave., New York 17, N. Y.
The Gilbert & Bennett Mfg. Co., Georgetown, Conn.
Goldsmith Bros. Smelting & Refining Co., 111 North Wabash Ave., Chicago 2, Illinois
Hitemp Wires Inc., 1200 Shames Dr., Westbury, N. Y.
Inso Products, Ltd., 404 Fifth Ave., New York 18, N. Y.
International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
National Lock Washer Co., 40 Herman St., Newark, N. J.
National-Standard Co., 555 Lincoln Ave., Secaucus, N. J.
New England Electrical Works, Inc., 365 Main St., Lisbon, N. H.
Phalo Plastics Corp., 25 Foster St., Worcester 8, Mass.
Phelps Dodge Copper Products Corp., 300 Park Ave., New York 22, N. Y.
Plastoid Corp., 42-61 24 St., Long Island City 1, N. Y.
Republic Steel Corp., 3100 East 45th St., Cleveland 27, Ohio
Riverside-Alloy Metal Div., H. K. Porter Co., Inc., Riverside, N. J.
Stenor Inc., 10 Bridge St., New York 4, N. Y.
Surprenant Mfg. Co., 172 Sterling St., Clinton, Mass.
Thermo Electric Co., Inc., Saddle Brook, N. J.
United States Steel Corp., 525 William Penn Pl., Pittsburgh 30, Pa.
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Millers Falls Co., 57 Wells St., Greenfield, Mass.
New Britain Mach. Co., Hand Tools Div., East St. & South St., New Britain, Conn.
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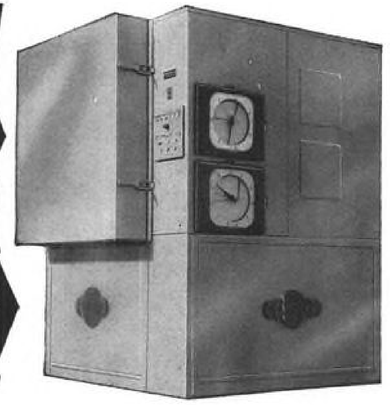
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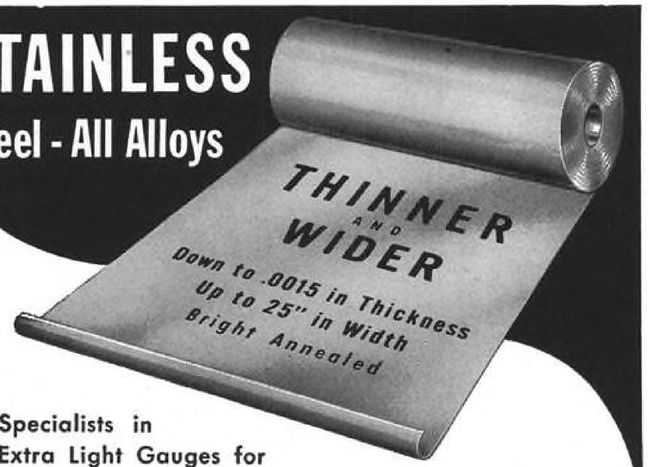
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Metals & Controls Corp., Neclear Products Div., 41 Forest St., Attleboro, Mass.
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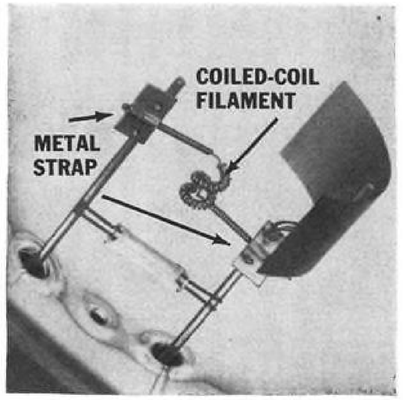
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The Aviation Week

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G-E 600-watt Landing Lamp has...



3 ADDED FEATURES AT NO ADDED COST!

LONGER SERVICE LIFE—G-E's new coiled-coil filament is rigid, needs no support wires to prevent sagging. This means there is no sawing action between support wires and the filament, eliminating this cause of premature lamp failure.

CONSTANT BEAM AIM—G-E Landing Lamp No. 4559 uses a new method of "anchoring" each filament end to a lead-in wire. This calls for precision spot-welding of two metal straps, insuring rigid support between the filament and the lead-in wires.



IMPROVED BEAM PATTERN—The precision design and location of the filament guarantee a circular beam pattern of more even intensity. Earlier types had "egg-shaped" beam patterns that were less uniform.

For more information on General Electric Landing Lamps, or any of the other General Electric Aircraft Lamps, call your G-E Lamp Distributor, or write: General Electric Co., Miniature Lamp Dept. AW-87, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

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AIRCRAFT TUBING

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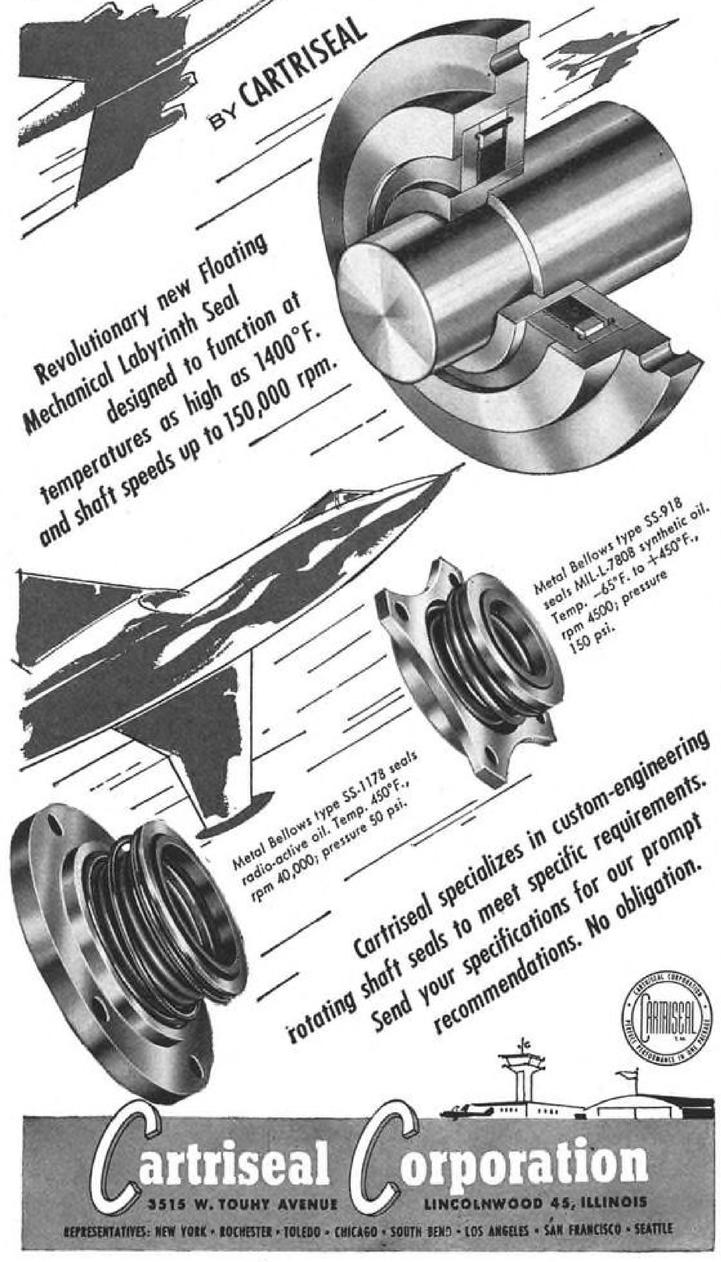
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D-185

rotating shaft Seals FOR AIRCRAFT

BY CARTRISEAL



D-186

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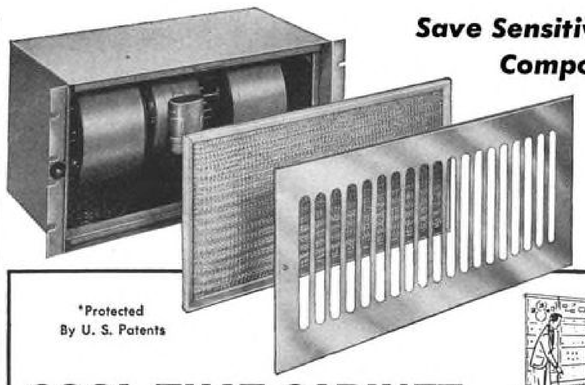
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RACK MOUNTED FOR EASY ASSEMBLY • FIT STANDARD 19" RACKS
STANDARD MODELS FOR OTHER RACK WIDTHS AND ANY ANGLE OF AIR DISCHARGE

Over 15 models available in panel heights of 3½" to 12¼" in increments of 1¾" . . . range 80 to 1200 CFM

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Now the Satellite Era is Here.

This old harness company does not claim it can saddle satellites or harness atomic energy, but Boyt has used these engineering and production facilities to make such devices as *heavy webbing assemblies for runway barriers, aerial drop equipment, artillery covers* and *Air Force safety belts.* With such experience, perhaps we can solve some of your problems.

The Boyt plant has Air Force Quality Control and the know how to produce items to military specs.

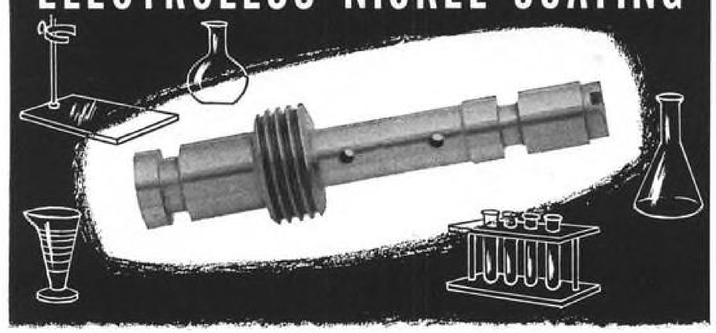
Are we in YOUR orbit? If so, write or phone

CONTRACT SALES DIVISION

THE BOYT HARNESS COMPANY
P. O. BOX 1355 PHONE: CH 3-4188
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ELECTROLESS NICKEL COATING



Production Electroplating Under Laboratory Control

Electroless Nickel Coating alone will provide high resistance to corrosion, heat and abrasion, afford excellent solderability and at the same time maintain close dimensional tolerances.

For the highest possible protection from corrosion we recommend combination coatings involving nickel together with either tin, copper, lead, cobalt, silver, gold, rhodium or cadmium in any combination our laboratory analysis has shown to be desirable.

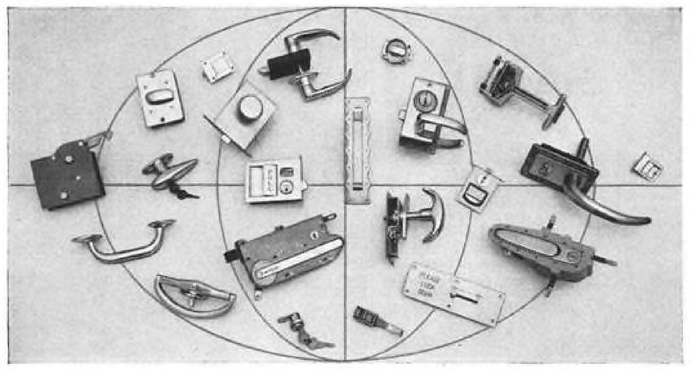
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for **LESS LEAD TIME, LOWER COST, PROVEN DESIGNS, CONTRACT PERFORMANCE**

Over 90% of America's military and commercial aircraft door and latch closure devices, including all types of locks, latches, handles and tie-down fittings, are manufactured by Adams-Rite. Designed by Adams-Rite's own engineering team and developed to exacting specifications, many may be suitable for your current projects without modification.

A proven way to effect economies and cut costs is to procure standardized components from an experienced, reliable source. Adams-Rite, for over 50 years a supplier of fine hardware, has long taken pride in providing such a source for the aircraft industry. For information, write:

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R&D production *for* quality

- valves
- switches
- solenoids



Proven in countless military applications, K-W components combine problem solving development and adaptation with perfection in production . . . here are just a few:

HIGH PRESSURE, HIGH TEMPERATURE VALVE



Normally open or closed, for jet fuel, oil or air, 500 psi. operating pressure, −65° to 350° F., 17 to 30 volt DC operating voltage.

HIGH PRESSURE FUEL VALVE

Normally open, annular ported valve, for oil, air or fuel to 1500 psi. max. pressure, 14 to 30 volt DC operating voltage, −65° to 400° F. ambient range.



THREE-WAY, HIGH PRESSURE FUEL VALVE



Annular inlet and outlet, bottom hole vent, for fuel, oil or air to 1500 psi., −65° to 400° F. ambient range, 14 to 30 DC voltage, .7 amps. DC drain.

High Pressure Air or Hydraulic Solenoid Valve

Where space and quality count, closely spaced ports, separated by face sealed "O" rings, 3000 psi. max. pressure, for fuel or air, −65° to 165° F. range.



HIGH PULL, LOW CURRENT SOLENOID



Rugged actuating solenoid, low current drain, best for exacting heavy duty, 14 to 29 volt DC voltage, .7 amps. drain, −65° to 250° ambient range.

The Koontz-Wagner Manufacturing Division offers facilities for prototype and production work in valve, switch and solenoid components, calling on vast experience with the aviation industry.

MANUFACTURING DIVISION

KOONTZ WAGNER ELECTRIC COMPANY INCORPORATED

518 N. Michigan St. • South Bend, Indiana

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Chemical Resistance plus KNOTTING POWER

Ben Har Lacing Tapes—Teflon/Fiberglas*

New aircraft fuels are hot and corrosive — demand lacing tapes that can "take it". Ben Har Lacing Tapes can! . . . they're especially formulated of two highly inert materials . . . Teflon and Fiberglas. In Ben Har Tapes the Fiberglas is Teflon coated before braiding to give the braid a "tooth". Ben Har Tapes will not slip after knotting. There are these additional features: Ben Har Tapes will not shrink, never cut through insulations. Pliable from —100°F to 500°F. Wax-free, will not support fungus. Non-absorbent.

Available in four sizes and nine colors — write for prices and samples.

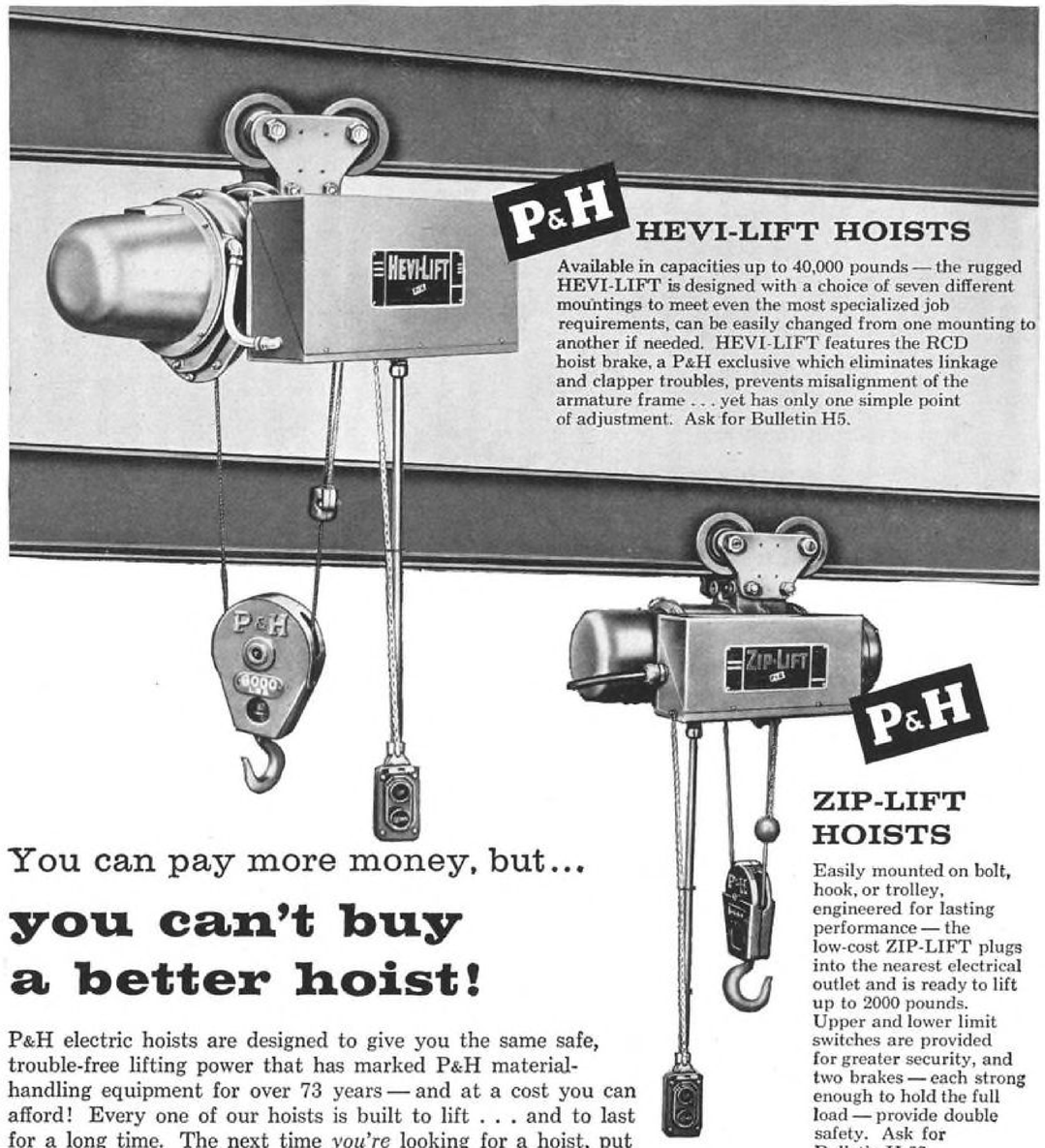
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BENTLEY, HARRIS *Flexible* **LACING TAPES**

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D-189



HEVI-LIFT HOISTS

Available in capacities up to 40,000 pounds — the rugged HEVI-LIFT is designed with a choice of seven different mountings to meet even the most specialized job requirements, can be easily changed from one mounting to another if needed. HEVI-LIFT features the RCD hoist brake, a P&H exclusive which eliminates linkage and clapper troubles, prevents misalignment of the armature frame . . . yet has only one simple point of adjustment. Ask for Bulletin H5.

ZIP-LIFT HOISTS

Easily mounted on bolt, hook, or trolley, engineered for lasting performance — the low-cost ZIP-LIFT plugs into the nearest electrical outlet and is ready to lift up to 2000 pounds. Upper and lower limit switches are provided for greater security, and two brakes — each strong enough to hold the full load — provide double safety. Ask for Bulletin H-39.

You can pay more money, but...

you can't buy a better hoist!

P&H electric hoists are designed to give you the same safe, trouble-free lifting power that has marked P&H material-handling equipment for over 73 years — and at a cost you can afford! Every one of our hoists is built to lift . . . and to last for a long time. The next time *you're* looking for a hoist, put your money where it will buy the most in operating safety . . . in assured performance . . . in quality construction . . . in modern, low-maintenance design — order a P&H Zip-Lift or Hevi-Lift.

See the yellow pages of your phone book under "Hoists" for the name of your local P&H distributor. He'll give you free application help and fast delivery. Or write to Dept. 215H, Harnischfeger Corp., Milwaukee 46, Wisconsin.

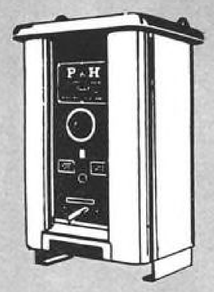
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P&H ... quality and service for 73 years.

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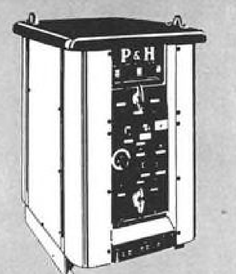


America's most complete line of arc-welding equipment and electrodes...



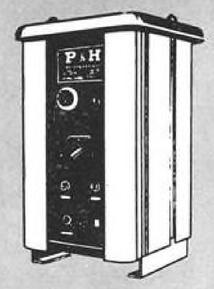
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Available in full range of sizes up to 680 amps. All connectable to 230 or 460 volts... special voltages on request. Dial-lectric Remote Control gives you any heat you want... right at the work.



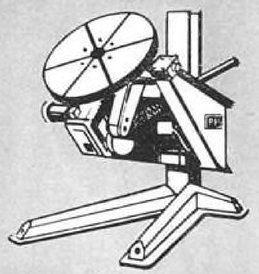
A. C. - D. C. Welders

A. C. or D. C. welding current at the flip of a switch! Dial-lectric Control for instantaneous heat selection. Available with high frequency, spot gun, and gas and water controls as shown.



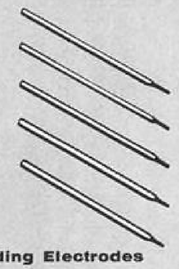
D. C. Rectifier Welder

Four sizes... 200, 300, 400 and 500 amps. No bearings, brushes, commutator, etc.... no moving coils. Fingertip Dial-lectric heat control. Automatic open-circuit voltage.



Welding Positioners

For faster, economical downhand welding. Standard models have 360° rotation, 135° tilt, and power elevation, enabling largest weldments to be handled with ease. Capacities from 500 to 100,000 lbs.



Welding Electrodes

Whatever the job, there is a P&H Electrode to give you cleaner, sounder welds at lower cost: Iron Powder, Low Hydrogen, mild steel, alloy steel, stainless, and Hard Surfacing.

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WELDERS • ELECTRODES • POSITIONERS

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D-191



Model 47J Bell Helicopter

Garlock KLOZURES* Specified on Bell Helicopters for 10 years

Since 1947 Bell Helicopter Corporation engineers have consistently specified Garlock KLOZURE Oil Seals for twelve different sealing functions. These KLOZURES serve in both low speed and high speed capacities contributing in no small measure to the outstanding performance and leadership of Bell Helicopters in that industry. Bell reports these seals have a minimum satisfactory life exceeding the required 600 hour overhaul.

The standard sealing element in a Garlock KLOZURE Oil Seal is a unique synthetic material molded to very accurate dimensions. It is non-abrasive, free-running; resistant to oil, grease, heat, and cold; impervious to water, mild acids, and alkalies. It is also extremely durable and resilient. For unusual service requirements sealing elements made of silicone rubber for temperature extremes or Teflon for resisting strong acids and other chemicals can be obtained.

A long list of satisfied users is added assurance that Garlock KLOZURES provide trouble-free bearing protection . . . sealing-in lubricants . . . sealing out abrasive dust and dirt. If you have a sealing problem, why not ask your Garlock representative for his recommendation from "The Garlock 2,000" . . . two thousand different styles of packings, gaskets, and seals for every need. The only complete line in the industry.

*Registered Trade Mark

THE GARLOCK PACKING COMPANY, Palmyra, New York

For Prompt Service, contact one of our 30 sales offices and warehouses throughout the U.S. and Canada.



Cross-section of Model 51 Garlock KLOZURE Oil Seal designed for medium-speed rotary service and low pressure reciprocating service. This seal is used in the Transmission Assembly and in the Tail Rotor Gear Box of the 47J Bell Helicopter.



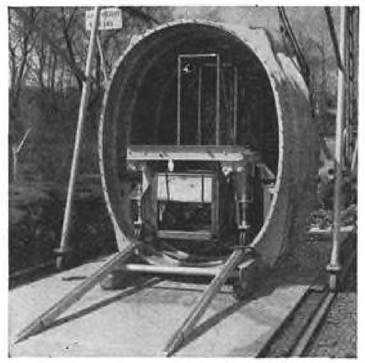
WRITE on company letterhead for new KLOZURE Catalog 20. 79 pages of helpful information on oil and grease seals for bearings.

GARLOCK

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Packings, Gaskets, Oil Seals, Mechanical Seals, Rubber Expansion Joints, Fluorocarbon Products

DAMAGE PROBLEMS
in transport or storage
SOLVED



2750 lb. container for 3800 lb. computer



Damage problems were solved by HONOLD-ENGINEERED and fabricated reusable aluminum alloy shipping containers which met or exceeded strictest military and customer specifications.

Representative of Honold's skill in sheet metal fabrication is this 10 psi oval container built to house and protect in transport a control computer for a missile project.

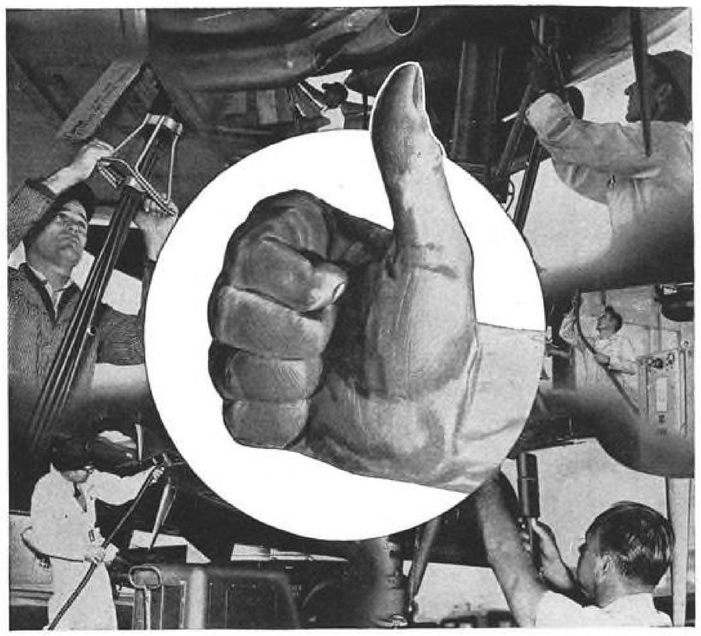
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60,000 sq. feet of complete facilities for aircraft and electronic sheet metal fabrication, engineering, testing and quality control. Write today for our illustrated facilities catalog.

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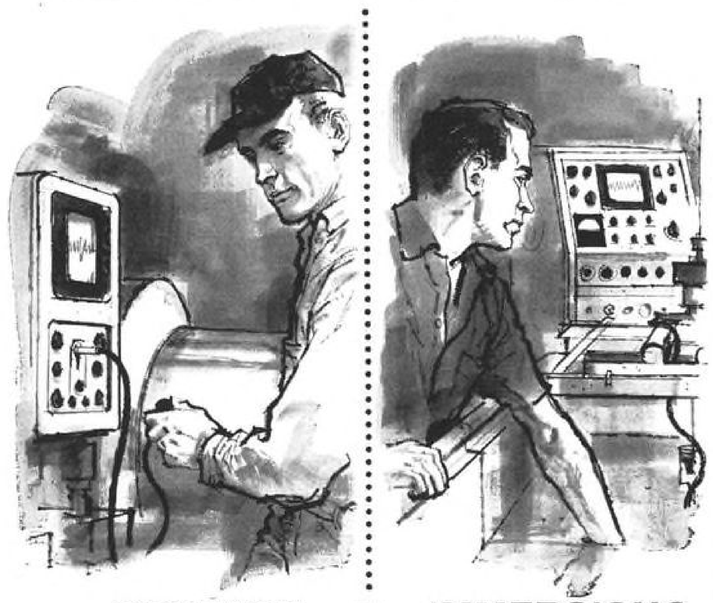
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ULTRASONIC TESTING–



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Either way, you're served best by the Sperry Reflectoscope

Both ultrasonic immersion and contact testing serve flawless purposes... the type to use is the one that serves your operation most effectively. The *equipment* to use to inspect your material or product for internal flaws is something we know a lot about.

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Complete Immersion Testing Systems, available at low cost, ready to use in the production line and laboratory. Call or write for specifications and descriptive literature.

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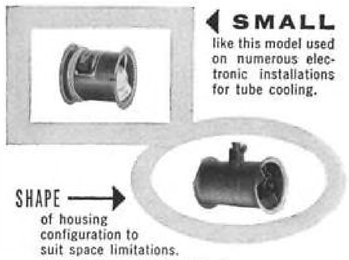
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What's your blower problem?



BIG like this model used in the Stratocruiser



SMALL like this model used on numerous electronic installations for tube cooling.

SHAPE of housing configuration to suit space limitations.

Models for: 27 Volt, D. C.
115/200 VAC, 400 cps
115 VAC, 60 cps

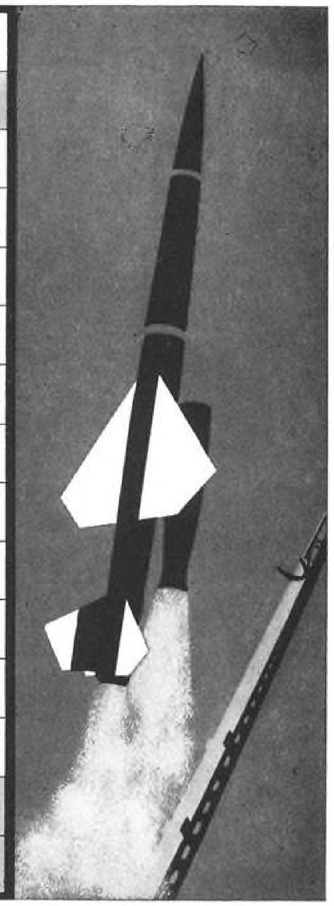
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SPECIALISTS IN AIRCRAFT AND ELECTRONIC BLOWER APPLICATIONS

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AMF has missile experience you can use

• Building a reliable missile system introduces problems at every step . . . the kind AMF solves daily. From drawing board to target, AMF is constantly bridging the gap between missile concept and performance. • This wealth of experience, gained as a leading contributor to numerous major missile programs, can produce the solution to your particular problem. • For a full description of AMF engineering and production facilities in the missile field, as well as a review of their performance, contact the AMF Defense Products Manager in any of the cities listed below.

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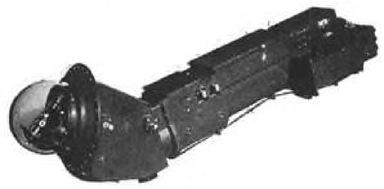
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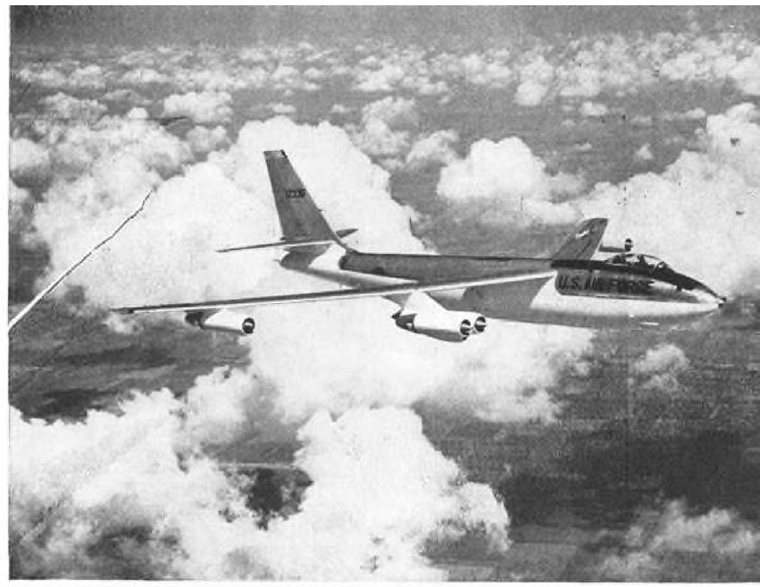
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1 B-47 STRATOJET

While building more than 1,500 Y-4 bombsights for B-47 Stratojets, we improved original design, exceeded USAF specifications. Thorough testing at all stages of production assured perfect assemblies. *We delivered on schedule!*

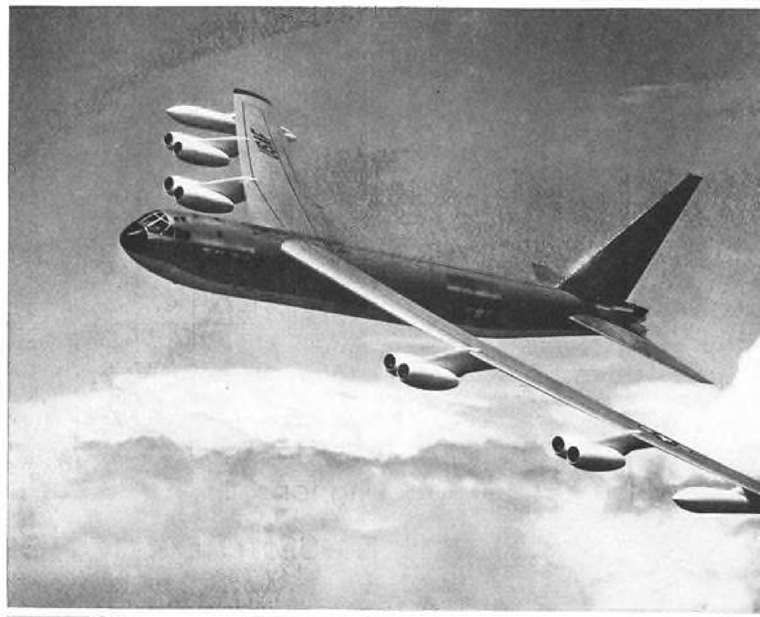




2 B-52

We make Hemisphere Sights for the MD-9 tail defense system in the B-52 Intercontinental bomber. This optical gunsight has a high degree of electronic automation. It calls for exacting manufacturing and environmental testing.





3 B-58 HUSTLER

The B-58 Hustler, the world's first supersonic bomber, carries a series of key assemblies engineered and produced by the Mechanical Division under sub-contract for Emerson Electric Corporation. Military security prevents detailed description of these ultra-precise electro-mechanical units.

CLASSIFIED









3 GOOD REASONS

for investigating our engineering and production capabilities

The top three United States Air Force jet bombers employ bombing or fire control systems produced in part by the Mechanical Division of General Mills.

Our exceptional combination of engineers and technicians, working as a unified team, can start from any stage in aircraft and missile systems and sub-systems: scientific research, development and design, production engineering or precision manufacturing.

Our other immediate activities encompass development and production of guidance systems for missiles, including the Matador II. We are also doing developmental work in underwater ordnance, radar and infrared.

We'd like to tell you more about how we combine conception with completion to provide *complete* service on major assemblies and sub-systems. We're anxious to answer your questions. Write for descriptive literature.

MECHANICAL DIVISION General Mills

Creative Research and Development • Precision Engineering and Production

Minneapolis, Minnesota

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HELI-COIL® INSERTS... PART OF AMERICA'S SUPERSONIC "SUNDAY PUNCH"!

Heli-Coil Screw-THREAD and Screw-LOCK Inserts are used throughout Convair's B-58 "Hustler". They help combine lightness with exceptional strength and rigidity in the power plant, fuselage, wings, control surfaces and electronic equipment. This adds up to rock-solid structural security for the nation's newest and fastest bomber.

HELI-COIL Screw-THREAD Insert . . . provides stainless steel threads that permanently resist wear, corrosion, stripping, galling and seizing . . . hold fast under vibration and shock. Conforms to military standards and all standard commercial and industrial thread forms.

HELI-COIL Screw-LOCK* Insert . . . new one-piece design provides all the advantages of the Screw-THREAD Insert *plus* an exclusive internally integrated locking feature that eliminates need for lock-nuts and lock-wiring . . . permits repeated disassembly and reassembly with locking action remaining unimpaired. Meets military specifications for locking torque and vibration.

*Pat. App. For

Write for detailed information.

HELI-COIL CORPORATION

2912 Shelter Rock Lane, Danbury, Conn. *(A Division of Topp Industries, Inc.)*

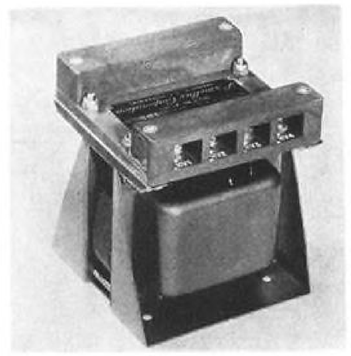
In Canada: W. R. WATKINS CO., Ltd., 41 Kipling Ave., S., Toronto 18, Ont.

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D-198

. . . hear this!

Transformer 'WISE' . . . .
it's Permoflux MIL-T-27



Aircraft power up to 10 KVA 400 C.P.S. open or sealed, MIL-T-27—Single and 3ϕ—High efficiency—Good regulation

AUDIO 'WISE' . . . .
Permoflux again provides HI-QUALITY IN:

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Headset and microphone—For the military-impedance matching—binaural to monoaural

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Miniature transistorized—300 milliwatt—headset output level—MIL approved for any aircraft intercom system

I. C. S. Systems
For the Military—For commercial aircraft—Up to 20 stations—Voice and radio monitor

Audio Switches
No moving parts—solid switches to suit your requirements

Black Boxes
Give us your electronic package problem

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Permoflux is a long established and widely known manufacturer of Hi-fidelity speakers and speaker systems

PERMOFLUX PRODUCTS COMPANY
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The catalog sheets shown here are descriptive of HOBART power supplies available to aviation and avionics industries!

Only at HOBART... can you get such a wide range of units to meet any type of ground power requirement.

Hobart machines are available to match the new requirements of today's aircraft, whether 400 cycle a.c., 28 or 112 volt d.c. In addition to the airlines and corporate users, airframe, powerplant, component part, helicopter and guided-missile manufacturers look to Hobart to meet their power supply needs.

It will pay to look into this! You can get your operations under way sooner and keep costs down when you use Hobart power supplies. 50 to 1500 amperes are available with wide continuously adjustable 26 to 31 volt range for either reciprocating or jet engine starting and testing. For the new jet aircraft and missile check-out and launching there are in the Hobart line, 400 cycle generators in capacities ranging from 3.75 to 125 KVA. This equipment is available in electric motor or engine driven designs and in the type of mounting you need. In other words, no matter what kind of equipment you're looking for, you can get it at one source—Hobart!

The company planning ahead in the fast-moving aviation field will do well to check into Hobart Power Supplies. Your inquiry will promptly bring complete literature and information on the equipment of interest to you. WRITE, PHONE, or WIRE today!

Hobart — Motor Generator Corporation, Troy, Ohio — Auxiliary Power Units

MOTOR GENERATOR CORPORATION
Hobart Brothers Affiliate
Box AV-127, Troy, Ohio

Circle Number 167 on Reader-Service Card

Whatever your clamping need for aircraft or aircraft-component manufacturing

there's a DE-STA-CO Toggle Clamp to fit your need . . . just as if it had been designed and produced to your special order!

more than 100 models in 12 basic styles

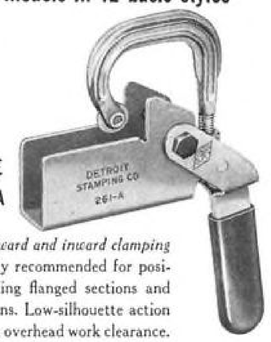


VERTICAL HANDLE HORIZONTAL-BAR TYPE
MODEL 558 (Illustrated at right)

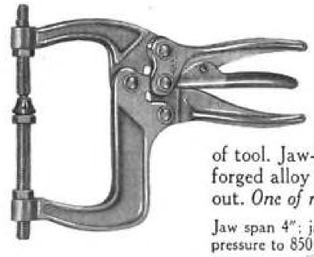
A brute for tough holding jobs. All parts forged steel and completely replaceable. High holding-pressure with minimum effort. *One of many models of this type.*

Height 11"; length 6 7/16"; bar moves 150°; holding pressure to 4,000 lbs.; weight 4¾ lbs.

VARIABLE POSITION LATCH-TYPE MODEL 261-A



Its unusual *downward and inward clamping action* is especially recommended for positioning and holding flanged sections and similar applications. Low-silhouette action provides excellent overhead work clearance. Plastic Handle-Grip. Handle reversible for mounting on horizontal surface. Height 3¾"; base length 3"; bar moves 110°; holding pressure 400 lbs.; weight 1 lb.



PORTABLE PLIER TYPE
MODEL 484 (Illustrated at left)

Equipped with trigger-release for quick, easy, one-handed removal of tool. Jaw-handle components of heat-treated forged alloy steel. Hardened bushings throughout. *One of many similar-type models.*

Jaw span 4"; jaw depth 2 9/16"; overall length 6"; holding pressure to 850 lbs.; weight, 2 lbs.

OTHER BASIC DE-STA-CO TOGGLE-CLAMP STYLES

Illustrated below are representative models of the basic styles indicated. Many more models of each style are available.



VARIABLE POSITION LATCH TYPE
Model 201
Light-Medium Duty. Holding pressure, 375 lbs. Length, 8 5/8"; height, 1 3/4"; drawing movement, 3 1/2". Weight, 12 oz.



VARIABLE POSITION THRUST TYPE
Model 101
Light duty. Holding pressure, 200 lbs. Height, 1 3/8"; base, 1½ x 1"; clamping range 113°. Weight, 5 oz.



HORIZONTAL-TRAVEL PLUNGER TYPE
Model 650
Heavy duty. Overall length, 11¼"; height, 4¾"; base, 4¾" x 3"; 3" plunger travel. Holding pressure, 4,000 lbs. Weight, 5 lbs. 10 oz.



VARIABLE POSITION REMOVABLE-BASE TYPE
Model 228
Medium duty. Holding pressure 750 lbs. Length 5"; height 7 7/8". Bar moves 125°; handle moves 75°. Weight 1 lb. 4 oz.



T-HANDLE HORIZONTAL-BAR TYPE
Model 210-TS
Medium duty. Holding pressure, 750 lbs. Bar moves 100°; handle, 55°. Weight, 1 lb. 4 oz.



HORIZONTAL-AND-VERTICAL-BASE MOUNTING TYPE
Model 507-U
Light duty. Low silhouette and complete working area clearance. Holding pressure, 375 lbs. Bar moves 185°; handle, 60°. Weight, 12 oz.



HORIZONTAL HANDLE-AND BAR TYPE
Model 235-U
Medium duty. Holding pressure, 600 lbs. Permits both lateral and vertical bolt adjustment. Bar moves 90°; handle 55°. Weight, 1 lb. 4 oz.



ADAPTABLE ADJUSTMENT SPINDLES
Part No. 210206
Adaptable Adjustment Spindle Assembly with swivel cap. Wide range of other spindle assemblies available—some with bonded-Neoprene caps, others with swivel-tip metal caps. Spring-type Pressure-matic assemblies also available.



AIR-OPERATED TYPE Model 810-U
Rugged, compact, versatile. Each operation triggered by air. Length 12"; height 5 3/4"; width 3 1/4"; holding pressure 750 lbs. on 90 lbs. air-line pressure.

TRACING TEMPLATES
Available to engineers, draftsmen in full-, half- or quarter-scale. Specify desired scale for Kit.

40-PAGE DE-STA-CO CATALOG IS YOURS FOR THE ASKING! WRITE TODAY FOR CATALOG AND NAME OF NEAREST STOCKING DEALER!



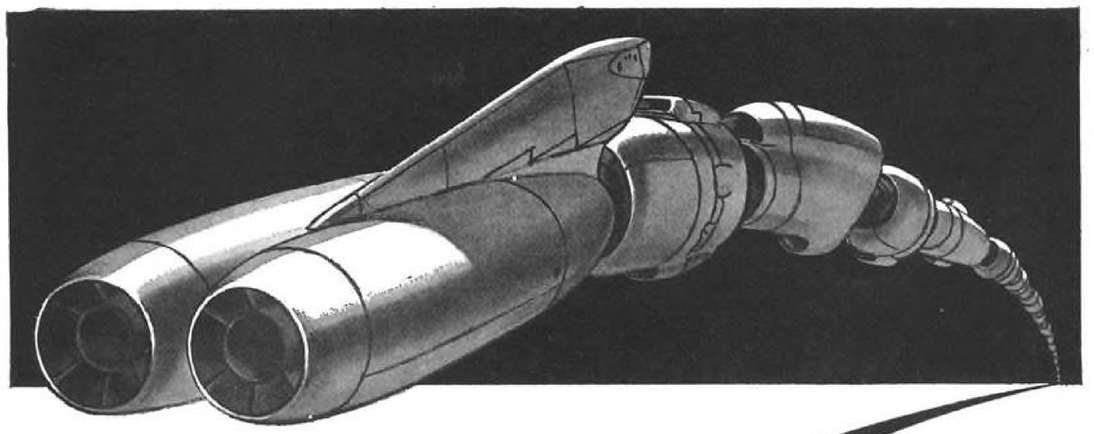


DE-STA-CO

DETROIT STAMPING COMPANY
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MANUFACTURER OF AMERICA'S FIRST LINE OF TOGGLE CLAMPS

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ROHR AIRCRAFT CORPORATION

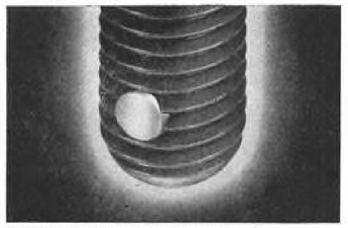
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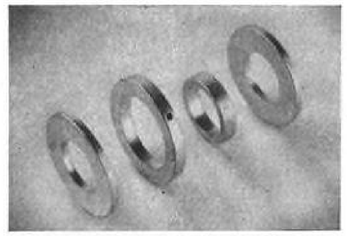
D-201



SELF-LOCKING SPS FASTENERS (WITH THE NYLOK* LOCKING DEVICE)

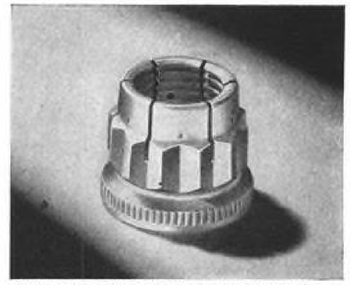
All male-threaded SPS aircraft fasteners can now be supplied with the Nylok self-locking device built in. The tough, resilient nylon locking pellet forces mating threads together, locking them positively and securely. This device eliminates need for auxiliary locking units, such as lockwashers and cotter 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.

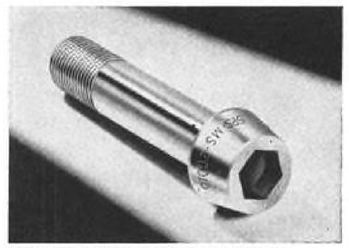
sps fasteners for the



SPS NAS 144 SERIES INTERNAL WRENCHING BOLTS

¼-28 through 1½-12
Procurement Specification NAS 159

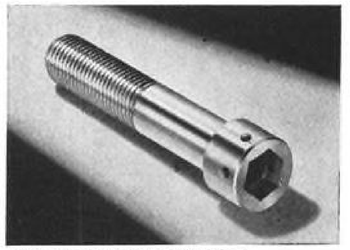
Made of aircraft alloy steel. Heat treated to 160,000-180,000 psi. Threads are fully formed by rolling after heat treatment.



SPS MS 20004 SERIES INTERNAL WRENCHING BOLTS

¼-28 through 1½-12
Procurement Specification MIL-B-7838

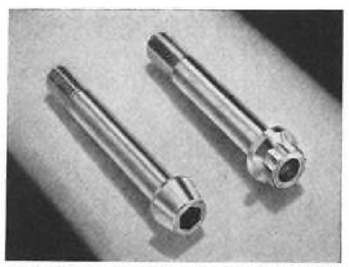
Made of aircraft alloy steel, heat treated to 160,000-180,000 psi tensile. Head to shank fillets are cold worked for greatly increased fatigue life. Threads are fully formed by rolling after heat treatment. Supplied undrilled or with drilled head.



SPS AN STANDARD 6-DIGIT ENGINE BOLTS

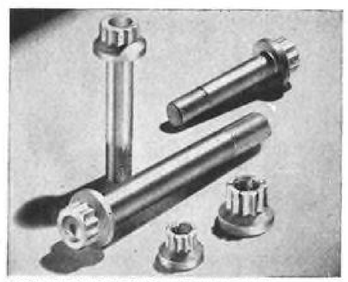
All sizes

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.



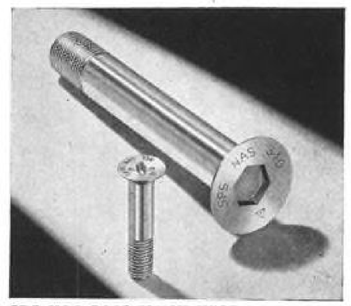
SPS HI TI TITANIUM AIRCRAFT BOLTS

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.

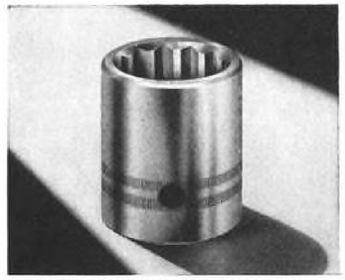


SPS NAS 100° FLUSH HEAD SHEAR BOLTS

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.

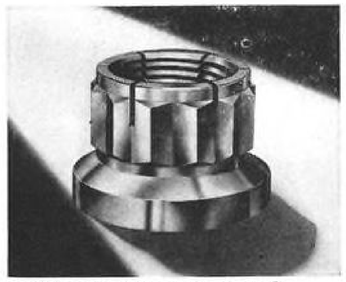
D-202



SPS NAS INTERNAL WRENCHING LOCKNUTS

¼-28 through 1¼-12
Procurement Specification AN-N-5 except as noted on NAS 443

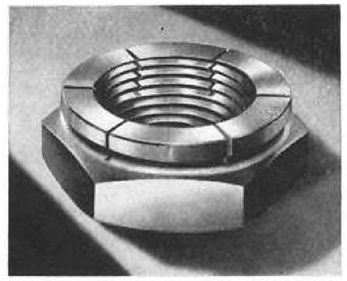
Made of aircraft alloy steel, cadmium plated. They are self-locking units with positive locking provided by two non-metallic plugs inserted through the body of the nut and contacting the threads of the bolt.



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.

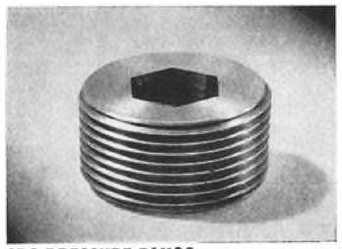


FLEXLOC SELF-LOCKING NUTS, THIN, AN 364

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.

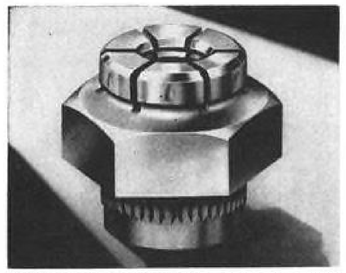
aircraft industry



SPS PRESSURE PLUGS

1/16 through 1¼ ANPT
Procurement Specification MIL-F-5509

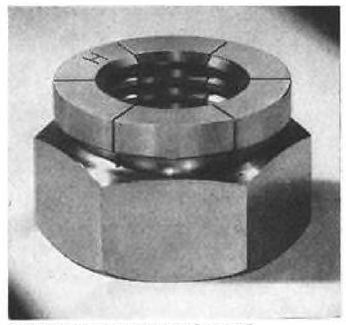
Made of heat treated alloy steel, aluminum alloy or magnesium. Threads are fully formed to provide positive sealing without compound. Alloy steel plugs are cadmium plated in accordance with QQ-P-416 or zinc plated in accordance with AN-P-32. Aluminum plugs are anodized. Magnesium plugs are unplated.



FLEXLOC SELF-LOCKING CLINCH NUTS

4-40 through ¼-28

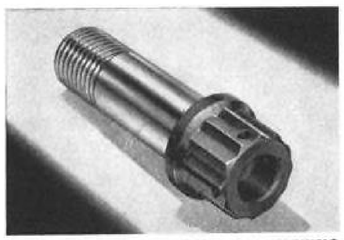
Made of steel, cadmium plated. They are self-contained units, incorporating the positive self-locking of regular FLEXLOC locknuts. Have knurled hollow shanks for fastening to material in which nut is to be used. For use on aircraft equipment and component parts such as instrument mountings and electrical 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

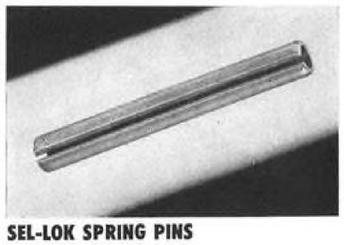
High-strength bolts with tensiles up to 220,000 psi. Threads are fully formed by single pass rolling after heat treatment. High temperature bolts are made from all the newer alloys, such as AMS 5735. Also made to MS9038 Series.

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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Because *BISHOP* small diameter tubing is not excelled in accuracy of I.D. and O.D. . . . in dimensional precision . . . in tolerances . . . in finish.

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Wherever tubing is needed to meet corrosion, heat, shock, stress, psi pressure resistance and vibration . . . for highest quality and performance *specify* BISHOP tubing, at comparable prices.

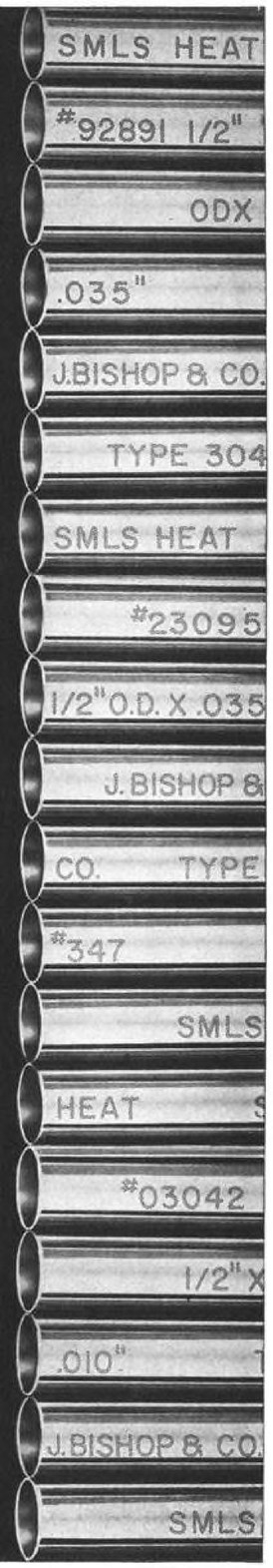
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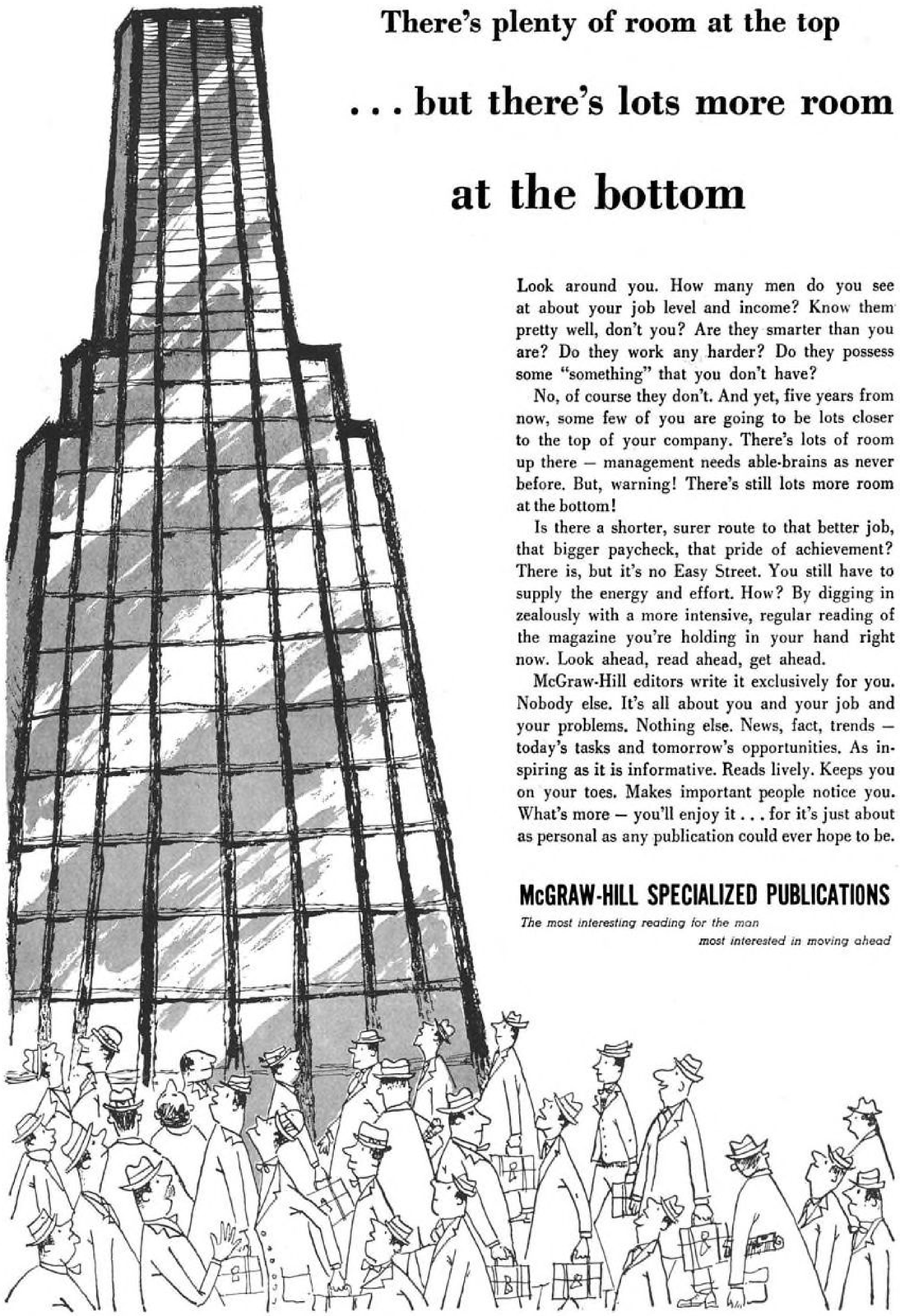
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STAINLESS STEEL PRODUCTS DIVISION

J. BISHOP & CO. Platinum Works

Malvern, Pennsylvania



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. . . but there's lots more room at the bottom

Look around you. How many men do you see at about your job level and income? Know them pretty well, don't you? Are they smarter than you are? Do they work any harder? Do they possess some "something" that you don't have?

No, of course they don't. And yet, five years from now, some few of you are going to be lots closer to the top of your company. There's lots of room up there — management needs able-brains as never before. But, warning! There's still lots more room at the bottom!

Is there a shorter, surer route to that better job, that bigger paycheck, that pride of achievement? There is, but it's no Easy Street. You still have to supply the energy and effort. How? By digging in zealously with a more intensive, regular reading of the magazine you're holding in your hand right now. Look ahead, read ahead, get ahead.

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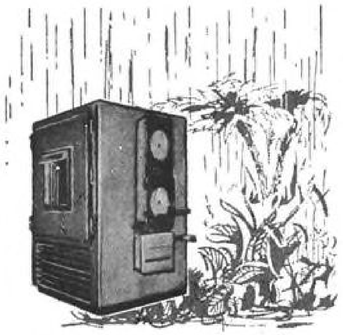
D-205

WITH Tenney ENVIRONMENTAL TEST EQUIPMENT . . .

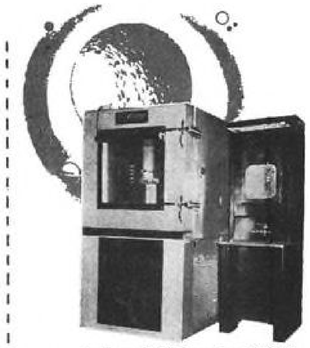
you are there



. . . at altitudes of 100,000 ft. and temperatures of minus 100° F!

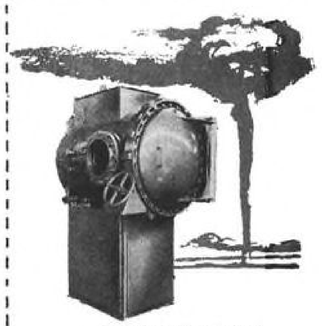


. . . at programmed relative humidity from 20 to 100%!



. . . at minus 120° F or plus 500° F!

. . . at minus 150° F!



. . . in a violent explosion!

Tenney Environmental Test Equipment simulates these and *many* other climatic conditions. The largest engineering staff in the industry insures advanced-design, performance-proven test chambers to meet the most exacting specifications.

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For more complete information about Tenney products and specialized engineering counseling service, write today.



Economical Low-Cost TENNEY-MITE Chamber —40°F, —100°F, —120°F Heat to 240°F (optional)

Tenney ENGINEERING, INC.

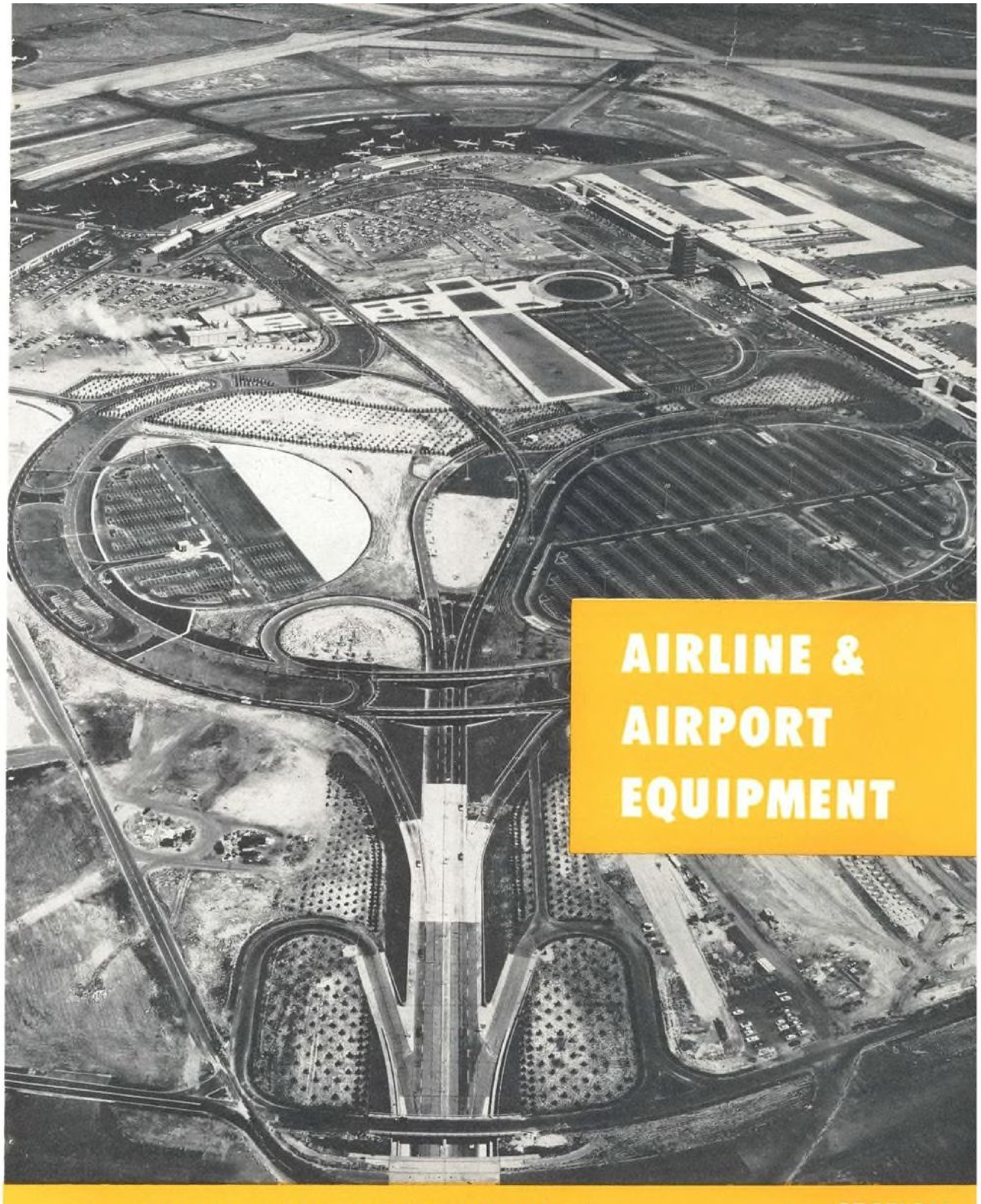
DEPT. AB-12 1090 SPRINGFIELD ROAD, UNION, N. J.
Plants: Union, N. J. and Baltimore, Md.

Member of Environmental Equipment Institute

ENGINEERS AND MANUFACTURERS OF REFRIGERATION AND ENVIRONMENTAL TEST EQUIPMENT

D-206

Circle Number 173 on Reader-Service Card



AIRLINE & AIRPORT EQUIPMENT

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CROUSE-HINDS

aviation lighting equipment

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.



A Complete Line of **Lighting Equipment**

Type DCB Rotating Beacons (CAA Spec. 291)

High Intensity Runway Lights



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

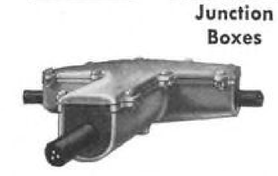
Type WC-36 (Spec. MIL-I-7854) and Type WC-18 (Spec. L-807)

Wind Instruments

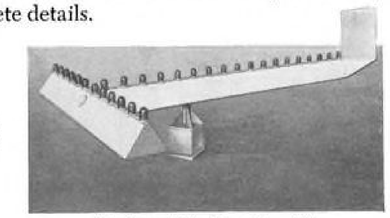
Wind transmitter assembly and direction and velocity indicators



Type PTS **Portable Traffic Signals** (Spec. MIL-L-6617)

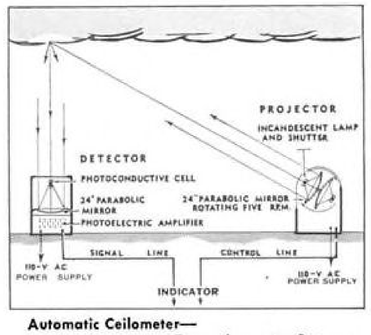


Type UGA **Underground Junction Boxes**



Illuminated Wind Tee, Type WT

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.



Automatic Ceilometer— Transmissometer Systems

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.

The photoelectric Transmissometer system provides an exact measurement of visibility in the runway approach regardless of tower location. Even if the tower is encircled in fog or several miles distant from the approach, the tower operator is still always sure if a safe landing can be made when he uses the Crouse-Hinds Transmissometer system.

CROUSE-HINDS COMPANY

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Crouse-Hinds Company of Canada, Ltd. Toronto, Ont.

Circle Number 174 on Reader-Service Card

Jet Components Swell Airline Purchases

New York—Only major change in airline purchasing procedures during the last year is an increase in buying items never before in inventory.

Approaching advent of the commercial jet age is being felt increasingly in the purchasing departments of the world's airlines which are nearing the day when Boeing 707s, Douglas DC-8s, and Convair 880s will start moving through their overhaul shops. Lockheed Electras, late model Vickers Viscounts, and Bristol Britannias are also coloring the purchasing picture.

New Entries

To accommodate the gas turbine power plants, new items never before listed on airline inventories, such as fuel/air starters, electric cabin sidewall heaters, compressor bleed air controls, wing spoilers, and a host of other items, are appearing on airline purchase orders, and soon will be moving into airline inventories.

Airline purchasing differs not in procedure, but in organization. Two basic practices are: centralize all purchasing activities in one office; or maintain two major purchasing centers, each for specific categories of items.

Example of the first system is Pan American World Airways' Services of Supply headquarters in Long Island City, New York, which is the central purchasing office. Organization is divided into sections which buy all items needed in seven commodity categories; airframe and airframe accessories, engines, engine accessories, and propellers; radio, radar, and electrical; ground and shop equipment; hardware; commissary; printing, stationery, and office equipment. Aircraft fuel and oil is a separate category handled by the Fuel Manager.

Example of the second system is American Airlines' Tulsa Overhaul and Supply Depot which buys all equipment and supplies needed for its shops, such as machinery, tools, parts, paints, and liquids; all aircraft and powerplant spares and equipment required to keep AA's fleet airworthy; and items needed by the stations over and above the certain designated small items that stations are allowed to buy independently.

American's LaGuardia supply office buys virtually everything else except airframes and aircraft fuel and oil.

International Purchasing

Trans World Airlines' system resembles Pan American's, except that TWA maintains an International Purchasing Office at Orly Field, Paris, which buys Europe-originated supplies.

United Air Lines, like American, has executive headquarters in Chicago and its main overhaul base in San Francisco, each with certain purchasing responsibilities.

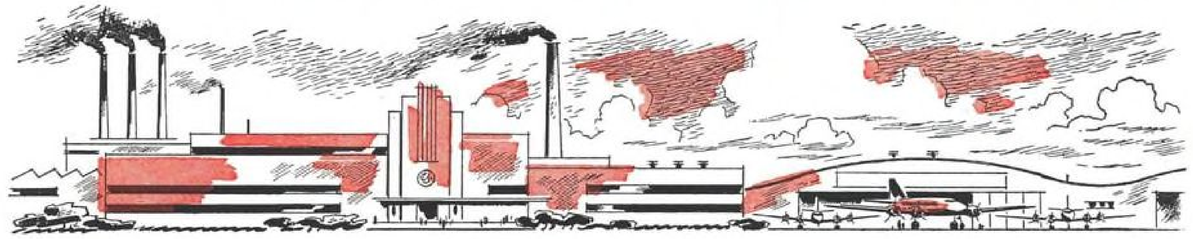
Smaller airlines usually follow the centralization system, concentrating all executive, overhaul and maintenance, and purchasing activities in one location.

Foreign airlines for the most part have purchasing offices in New York through which they procure aircraft and engine spares, system accessories, and instruments for their U. S. aircraft. Some foreign lines also maintain purchasing offices on the West Coast.

AIR TRANSPORT ASSOCIATION PURCHASING COMMITTEE

Alaska Airlines, Inc.
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Alaska Coastal Airlines
O. F. Benecke, Co-Manager, 2 Marine Way, Juneau, Alaska
Alleghany Airlines, Inc.
R. C. Gudikunst, Director of Supply, National Airport, Washington 1, D. C.
American Airlines, Inc.
Robert A. Goebel, Asst. V. P., Purchasing and Sales, 100 Park Ave., New York 17, N. Y.
Bonanza Airlines, Inc.
Earl E. Hall, Supt.-Purchasing & Stores, P. O. Box 391, Las Vegas, Nevada
Braniff Airways, Inc.
H. Bolding, V. P., Purchasing & Stores, Love Field, Dallas 9, Texas
Canadian Pacific Airlines, Ltd.
J. A. Mooney, Purchasing Agent, Vancouver Airport, 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
Continental Air Lines, Inc.
R. G. Schorling, Director of Purchasing & Property, P. O. Box 9063, Denver 16, Colorado
Cordova Airlines,
P. O. Box 1488, Anchorage, Alaska
Delta Air Lines, 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
The Flying Tiger Lines, Inc.
Larry Ignasiak, Lockheed Air Terminal, Burbank, California
Frontier Airlines, Inc.
B. E. Foster, Purchasing Agent, Stapleton Airfield, Denver 7, Colorado
Lake Central Airlines, Inc.
C. L. Desterbecque, Purchasing Agent, Weir Cook Municipal Airport, Indianapolis, Indiana
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, P. O. Box NAL, Int'l Airport, Miami 48, Florida
North Central Airlines, Inc.
Gordon E. Bullis, Dir. of Procurement, 6201 34th Avenue South, Minneapolis 23, Minnesota
Northeast Airlines, Inc.
G. C. Donley, 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, Director of Supply, 28-19 Bridge Plaza North, Long Island City 1, New York
Piedmont Airlines
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
Slick Airways, Inc.
J. M. Mask, Director of Purchasing, 3145 Cedar Springs Rd., Dallas, Texas
Southern Airways, Inc.
R. C. Suttles, Purchasing Agent, Municipal Airport, Atlanta, Georgia
Southwest Airways Company
L. W. Slater, Dir. Purchases & Material Control, San Francisco Int'l Airport, San Francisco, California
Trans-Canada Air Lines
K. E. Olson, Director, Purchasing & Stores, International Aviation Building, Montreal, Quebec, Canada
Trans-Texas Airways
W. C. Leatherwood, Purchasing Agent, Houston Int'l Airport, Houston 17, Texas
Trans World Airlines, Inc.
W. F. Griffith, Director of Domestic Purchasing, 400 E. Donovan Road, Kansas City 15, Missouri
United Air Lines, Inc.
W. O. Buehler, Staff Supt., System Purchasing, 5959 South Cicero Avenue, Chicago 38, Illinois
Western Air Lines, Inc.
K. W. Kendrick, Director of Purchasing, P. O. Box 45,005, Airport Station, Los Angeles 45, California
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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.

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LITHOLINE MULTI-PURPOSE GREASE – A special lithium soap grease for multi-purpose use.



AIRBORNE EQUIPMENT



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MICA LUBRICANT AA – An anti-seize spark plug thread lubricant.

SINCLAIR REFINING COMPANY



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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.

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(Continued from page E-15)

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Shell Oil Company of Canada Ltd., P. O. Box 400, Terminal, Toronto 1, Ontario, Canada
SINCLAIR REFINING CO., 600 Fifth Ave., New York 20, N. Y. **SEE ADV. E-16, E-17**
Socony Mobil Oil Co. Inc., 150 East 42 St., New York 17, N. Y.
Standard Oil Co. of California, Western Operations, Inc., 225 Bush St., San Francisco 20, Calif.
Standard Oil (Ind.), 910 S. Michigan Ave., Chicago 80, Ill.
Texas Co., The, 135 E. 42 St., New York 17, N. Y.
Union Oil Co. of Calif., 617 West Seventh St., Los Angeles 17, Calif.

Fuels, Rocket

AEROJET GENERAL CORP., A SUBSIDIARY OF GENERAL TIRE & RUBBER CO., THE, 6352 Irwindale Rd., Azusa, Calif. **SEE ADV. B-34**
Curtiss-Wright Corp., Research Div., Quehanna, Pa.
Esso Export Corp., Aviation Dept., 60 W. 49th St., New York 20, N. Y.
Food Machinery & Chemical Corp., P. O. Box 760, San Jose 6, Calif.
General Chemical Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, New York
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Grand Central Rocket Co., P. O. Box 111, Redlands, Calif.
Olin Mathieson Chemical Corp., Explosives Div., E. Alton, Ill.; Industrial Chemicals Div., Baltimore 3, Md.
Ordnance Res. & Dev. Co., ORDCO Div. Bermite Powder Co., 11120 Cumpston St., N. Hollywood, Calif.
Reaction Motors, Inc., Ford Rd., Denville, N. J.
Rocketdyne Div., North American Aviation, Inc., 6633 Canoga Ave., Canoga Park, Calif.
Shell Oil Co., 50 West 50 St., New York 20, N. Y.
Socony Mobil Oil Co. Inc., 150 East 42 St., New York 17, N. Y.
Standard Oil Co. of California, Western Operations, Inc., 225 Bush St., San Francisco 20, Calif.

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Pacific Scientific Co., P. O. Box 22019, Los Angeles 22, Calif.
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Warren Brothers Mfg. Div., Warren Brothers Roads Co., 32 Potter St., Cambridge, Mass.
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Acme Precision Products, Inc., 215 North Findlay St., Dayton 3, Ohio
ADVANCE GEAR & MACHINE CORP., 5851 Holmes Ave., Los Angeles 1, Calif. **SEE ADV. A-2**
Advance Industries, Inc., 640 Memorial Dr., Cambridge 39, Mass.
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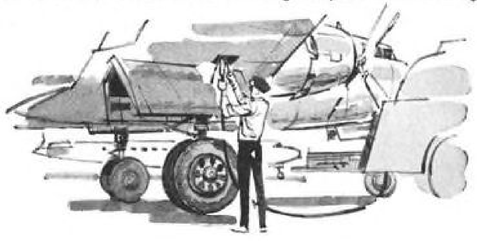
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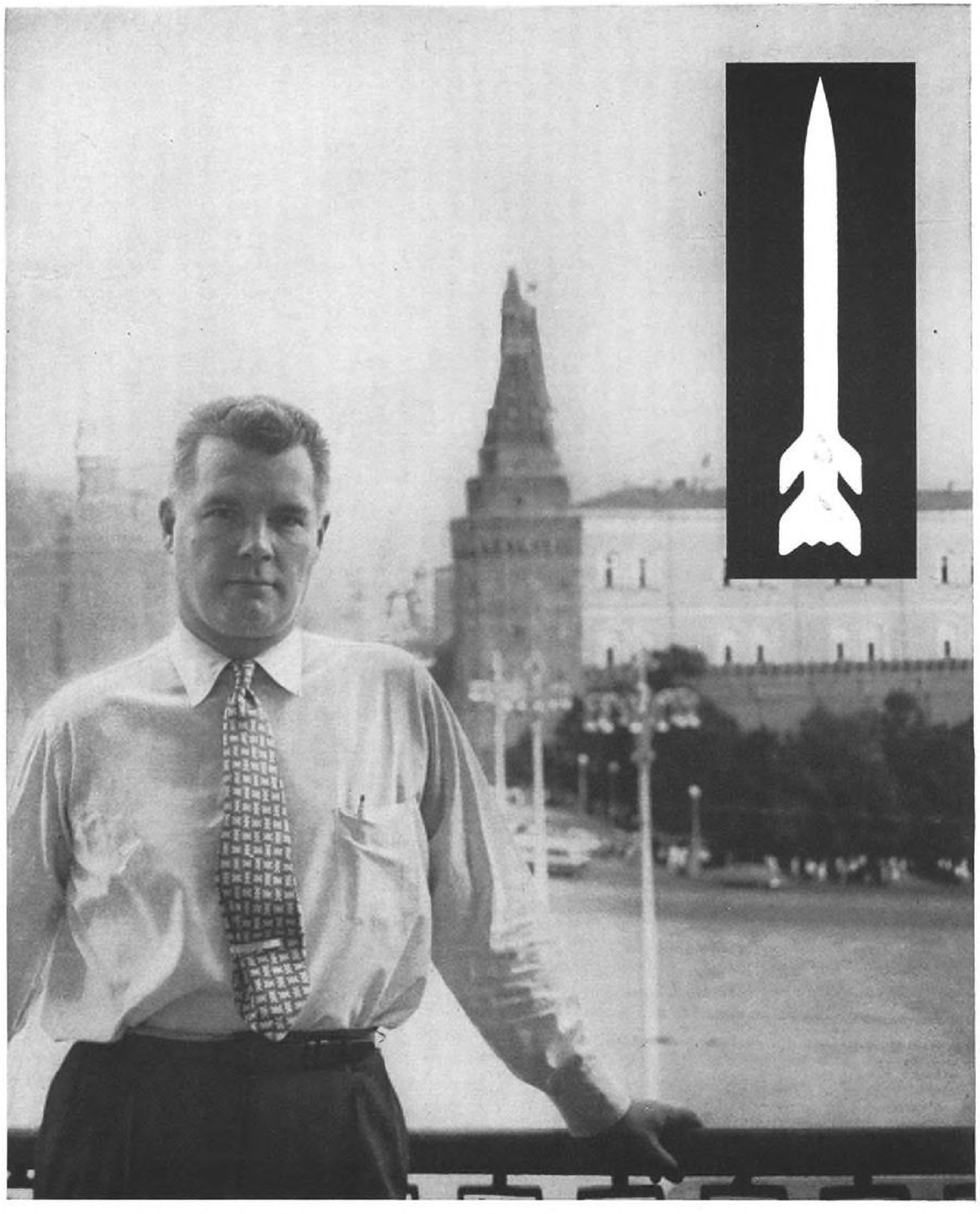
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E-22

Circle Number 177 on Reader-Service Card



INSIDE RUSSIA—Bob Hotz on a balcony of the Hotel National in Moscow, while covering the 1956 USAF inspection trip to Russia. In the background you see the Kremlin. Since 1948 Bob has covered practically every national and international air show . . . visited aircraft factories, research facilities and military installations throughout the United States, in NATO countries, South America and Asia. He has reported on all this and more in the pages of AVIATION WEEK.

Smashing the Iron Curtain

Bob Hotz, Editor of AVIATION WEEK, is first again with missile and aircraft data from behind the Iron Curtain.

It was AVIATION WEEK, in the person of Editor Bob Hotz, that first reported to the Western World that the Soviets had fired the Intercontinental Ballistic Missile (ICBM) in the May 20, 1957 issue... first to report the firing of the Intermediate Ballistic Missile by the Soviets, too (Feb. 1956)... first to report that the Russians had long-range jet bombers.

In 1956, Bob covered the team of top-ranking U. S. Air Force Commanders on their official inspection trip to Russia. Here he met with the heads of the Russian Air Force, top aircraft designers, and the chiefs of Aeroflot (the Russian commerical airline). Again, AVIATION WEEK was first with the facts!

Born in Milwaukee, Bob started his writing career with the Milwaukee Journal after graduating from Northwestern in 1936. Taking up flying in 1939, he came to New York to head the Journal's news bureau in 1940. In the fall of 1941, he began his Air Force service on the staff of General Hap Arnold ... then to the Air Transport Command. Later, Bob served on the staff of General Claire L. Chennault in China, where he flew combat missions in B-25's.

After the war, Bob became news editor for AVIATION WEEK ... covered the Korean war, *in person* ... became editor of AVIATION WEEK in 1955. He has written, and still writes, outstanding books on aviation.

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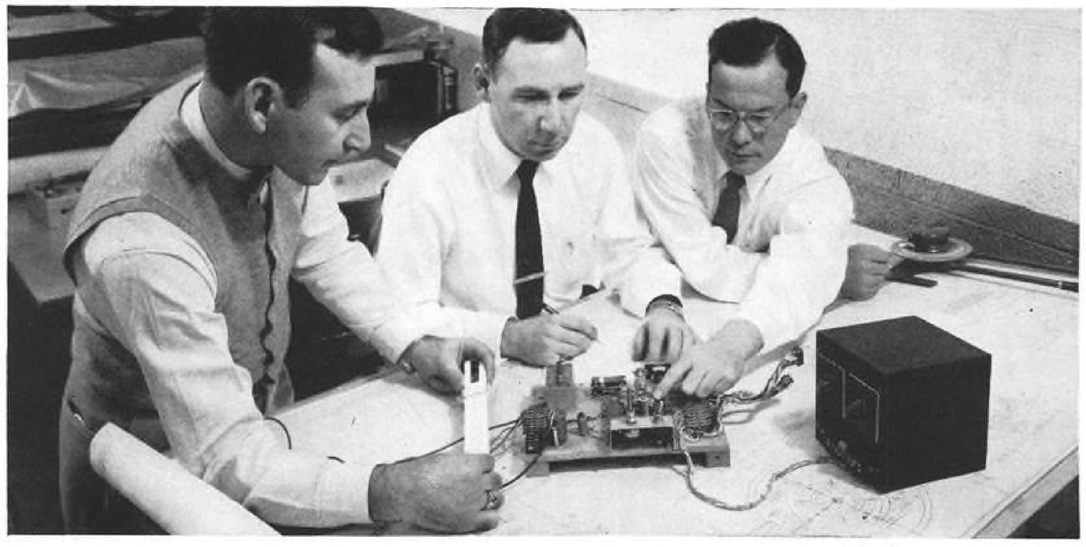
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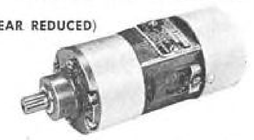
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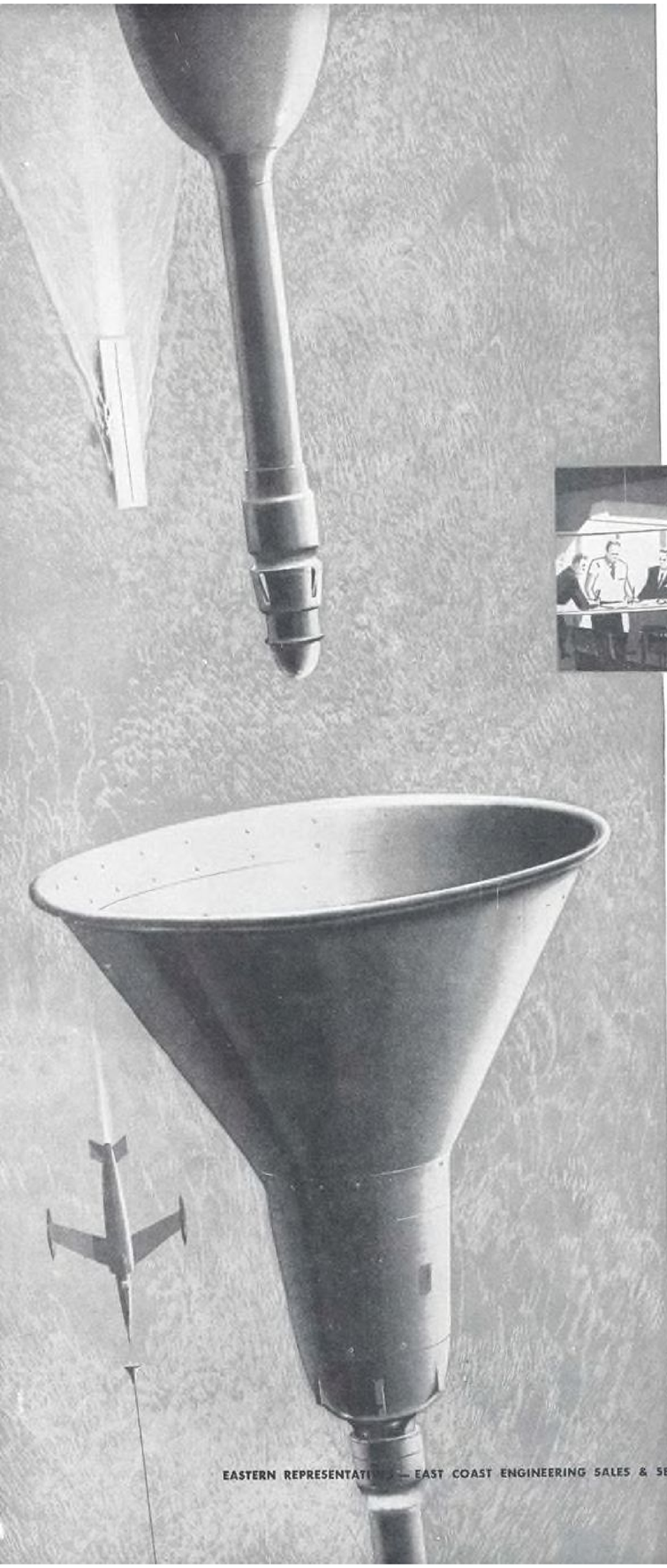
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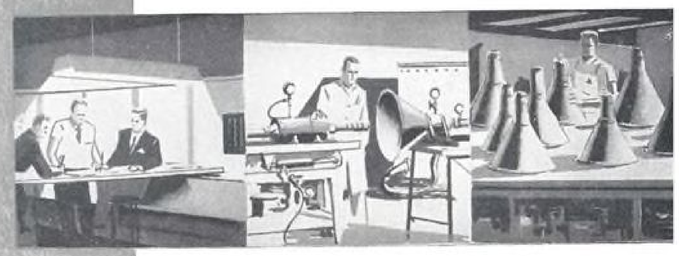
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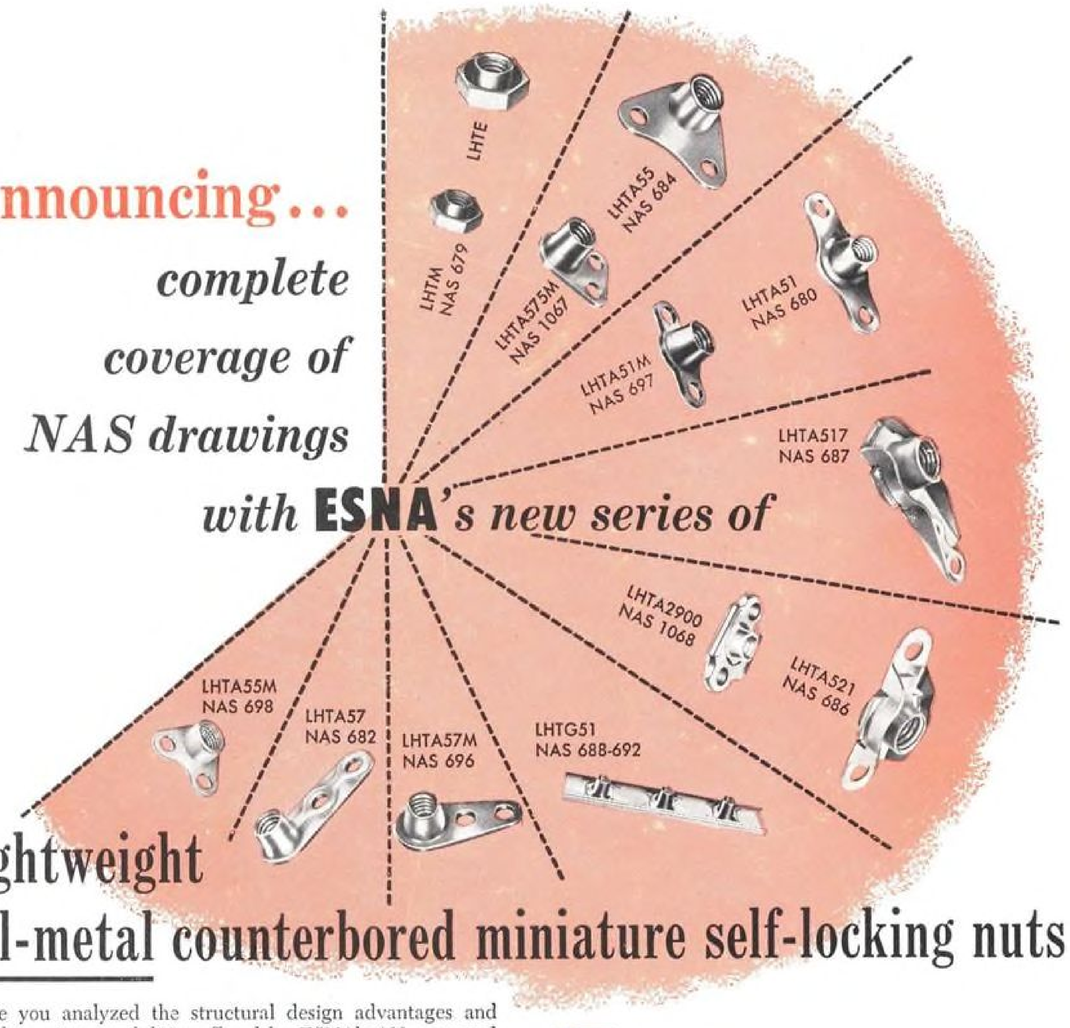
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