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Aviation Week

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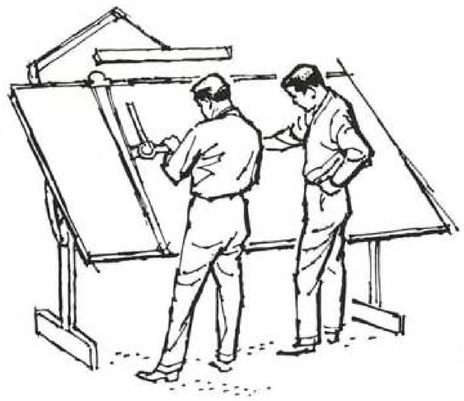
A McGRAW-HILL PUBLICATION

BUYERS' GUIDE ISSUE



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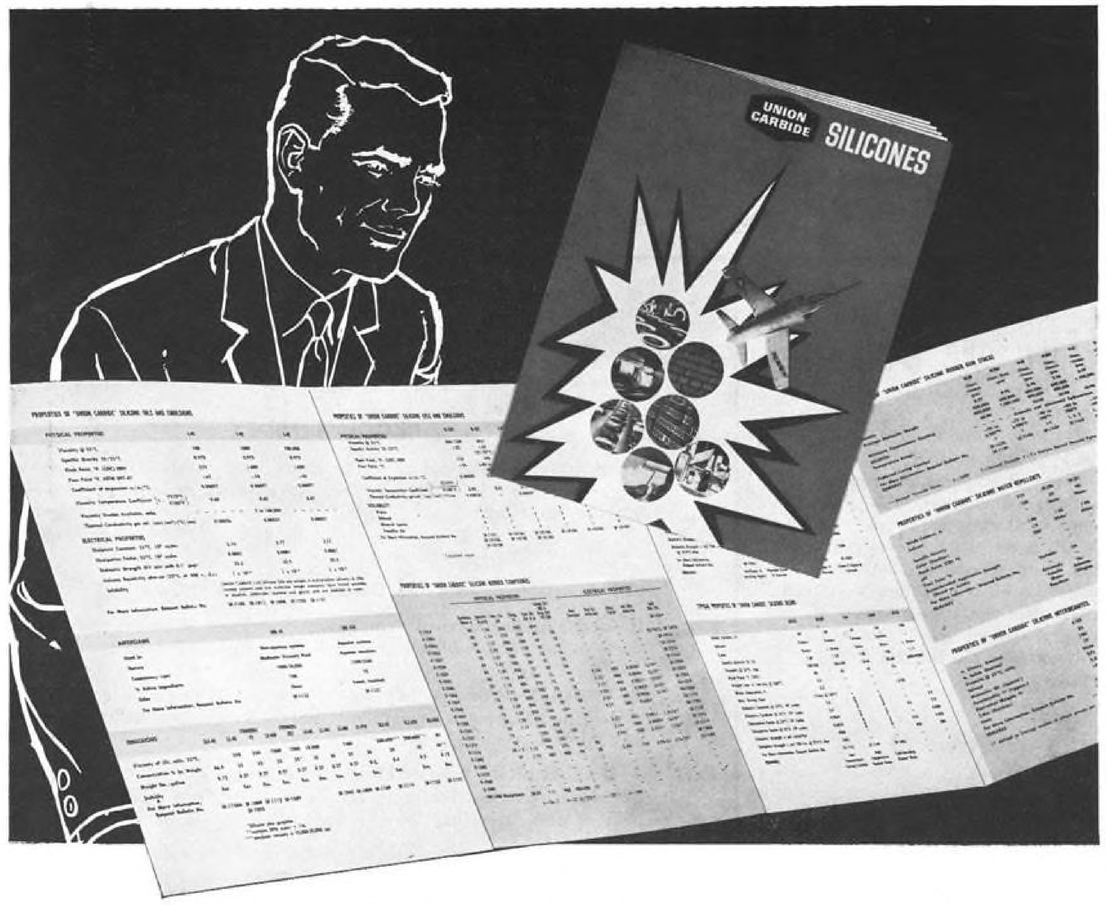

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How to Use the 1961 Buyers' Guide

The SIXTH ANNUAL ISSUE of the AVIATION WEEK BUYERS' GUIDE contains all the information a buyer needs to locate a source of supply for the product he wishes to purchase. Compiled in a logical order of reference sequence, this GUIDE is a source of information on products, manufacturers, distributors and military markets in the aviation industry.

If you are Buying

refer to the alphabetical PRODUCT INDEX to find the page number of each specific product with its manufacturers. Types of one product appear as subheads under the pertinent product heading and are indicated after each manufacturer's address. For the closest source of supply, select your local distributor from the DISTRIBUTORS' INDEX.

☆ ☆ ☆

If you are Selling

you will find the name of buyers of complete systems and components for the military services and the commercial airline in the MILITARY & TRANSPORT section.

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All advertisers in the GUIDE are bold-faced throughout the book and page numbers upon which advertisements appear are shown.

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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 THE GUIDE

PRODUCT INDEX

An alphabetical index of all the products listed in the GUIDE indicating the page on which is found the manufacturers of the product in which you are interested.

PRODUCT LISTINGS

Divided into five separate categories of related interests, this section contains all the products common to the aviation industry.

A: AIRCRAFT—Products that are installed either complete or as major systems in an airplane. Powerplants and such major components as seats or control assemblies are to be found here.

B: SPACE VEHICLES & MISSILES—Products similar to those in category A, but applicable specifically to missiles. Specialized supporting equipment is also listed, but common support items are not included.

C: AVIONICS—The specialized equipment in this category 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: SUPPORT EQUIPMENT & SERVICES—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 support functions.

E: AIRLINE AND AIRPORT EQUIPMENT—Listed are the hundreds of companies, small and large, that sell transportation of people and cargo; the manufacturers of large fixed items such as hangars and runways and lighting systems; and services of airport contractors.

MANUFACTURERS & DISTRIBUTORS INDEX

An alphabetized list of manufacturers whose products are featured in this GUIDE begins on page 10. A similar listing of distributors serving the aircraft industry begins on page 346.

MILITARY & TRANSPORT

A section devoted to the general procurement policies of Department of Defense Agencies; a listing of the Air Transport Purchasing Committee and FAA Repair Stations.

ADVERTISERS INDEX

An alphabetical listing of all advertisers in the GUIDE indicating the page number of their ad will be found on page 360.

Mid-December, 1960

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The 1961 Aviation Week Buyer's 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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General Procurement Policies of DOD Agencies

Methods of Purchase

Purchases are made either by formal advertising or, under certain specified conditions, by negotiation. Formal advertising is conducted in strict accordance with prescribed procedures. A date and hour for bid opening is set in advance, and bids are publicly opened and recorded at that time. Award is made to the responsible bidder whose bid, conforming to the Invitation for Bids, is most advantageous to the Government, price and other factors considered. Upon award, the accepted bid becomes a legally binding contract.

To provide a method of procurement for the armed services when formal advertising does not meet their needs, the Armed Services Procurement Act sets forth conditions permitting procurement by negotiation. The experimental, developmental, or research nature of the item, the urgency of the requirement, the interest of national defense or industrial mobilization or other considerations covered by these conditions may authorize the contracting officer to select this method. The use of the negotiation method does not by any means preclude competition. It is the policy of the Department of Defense under negotiated procurement to assure full and free competition, consistent with the requirements of the procurement by obtaining proposals from qualified sources. The normal negotiation is publicized in advance, competitive proposals are encouraged, and results of the award are made known publicly. Award is made in the best interest of the Government, considering price, delivery, quality of product, and other factors, on the basis of original proposals or as a result of further negotiations with the firm or firms that submitted the most acceptable proposals.

General Instructions For Bidding (Under Formal Advertising)

Bids should be filled out, signed, and submitted in accordance with the instructions accompanying the Invitation for Bids. The utmost care must be used in verifying all entries prior to submission of your bid to the purchasing office. Mistakes discovered after the opening of bids can be very costly to the bidder since the bid as submitted becomes a binding contract upon award. In preparing a bid, the bidder must watch for special conditions relating to materials, packing, packaging, and delivery, which may be included in the Invitation for Bids.

Any bid which does not conform to the essential requirements of the Invitation for Bids will be rejected. All bids may be rejected by the contracting officer (1) when rejection is in the interest of the Government, or (2) when he finds that the bids are not reasonable, or were not independently arrived at in open competition, or are collusive, or were submitted in bad faith. Neither telegraphic nor alternative bids will be considered unless authorized by the Invitation for Bids.

Bids must be submitted in sufficient time to reach the designated office prior to the time fixed for opening. Bids that arrive after the hour set for opening are late bids and are given consideration only if received before award has been made and if the failure to arrive on time was due solely to a delay in the mails for which the bidder was not responsible as determined by the Government. It is important to affix sufficient postage as purchasing offices will not accept mail on which postage is due.

Types of Contracts

The fixed-price contract is generally used for both formally advertised and negotiated procurements. Variations of the fixed-price contract are employed in negotiated contracts to provide for price redeterminations where the performance of the contract may involve large contingencies or uncertainties in costs such as first-time production runs. Cost-reimbursement-type contracts are reserved for certain limited situations and may be awarded with or without a fee. Cost-plus-a-percentage-of-cost contracts are prohibited by law. Letter contracts are preliminary contracts which enable a contractor to commence work pending the negotiation and execution of the definitive contract. They are used only in emergencies or under unusual circumstances requiring maximum reduction of procurement leadtime.

Payment of Invoices

Payments are made in accordance with the provisions of each contract. Invoicing and payment clauses of contracts must be read carefully to make sure that invoices are properly executed and that they are submitted at the right time and to the right office. Government regulations, which protect the taxpayer, require that the contractor submit a bill that is accurate in all respects. When obligations under the contract are fulfilled and invoices properly submitted, the contractor will be paid promptly.

Delay in payment of invoices may be caused by incorrect computations, failure to submit inspection reports, shipments made without inspection, incorrect citation of firm name on contracts, or other failure to comply with contract requirements.

Government Financial Assistance

Contractors are expected to be fully qualified and competent to perform the contract in all respects including financial.

Some contracts may cause a significant drain on a contractor's working funds. Thus, it may be in the best interest of the Government to provide financial assistance. This assistance may take the form of a loan guarantee, progress payments, advance payments, or, in appropriate cases, a combination of two or more of these. A brief description of each type is set forth below. The descriptions are not complete and it is recommended that specific financing problems be discussed with the contracting officer.

Guaranteed Loans, popularly known as "V" Loans, are loans made by private banks to contractors, repayment of which is partially guaranteed by a military department. Procedures have been established whereby the private bank of the contractors' choice may apply to the Federal Reserve bank of its district for the guarantee of the loan.

The Federal Reserve bank makes any necessary credit investigation and forwards the application with a recommen lation to the military department primarily interested. The military department, after determining the eligibility of the contractor, may authorize the Federal Reserve bank to issue a guarantee of the loan on its behalf. The loan is made and administered by the lending bank.

Guaranteed Loans are an especially suitable contract financing device for subcontractors.

Progress payments are predelivery payments based on a percentage of costs incurred, either of total costs or of direct labor and material costs. Progress payments in contracts for construction, shipbuilding, and ship repair are based on estimated percentages of physical completion. Progress payments, under contracts awarded after formal advertising, will be made only if the Invitations for Bids provide for such payment. In negotiated procurements contractors wanting progress payments should, in order to receive consideration, so notify the contracting office when submitting proposals.

Advance payments are payments made to a contractor prior to and in anticipation of future delivery or other performance of a contract. With certain exceptions, provisions for advance payments will not be approved unless no other means of adequate financing is available to the contractor.

Subject to the above considerations, the need for reasonable progress payments or advance payments is not regarded as a handicap or adverse factor in the awarding of contracts.

In addition, the Small Business Administration is authorized to grant loans to small business concerns to finance plant construction, acquisition of equipment, and supply working capital. Such loans may be made directly by the Administration or in cooperation with banks or other lending installations. The SBA provides a valuable service to small business by making available to them technical and managerial aids and publications in the fields of procurement, business management, operation and maintenance of equipment, and opportunities for developing and selling new products.

Inspection and Quality Control

Before material can be accepted and paid for by the military departments, it is usually inspected by a representative of the Government to determine whether it conforms in all respects to the requirements of the contract. The place of inspection is provided for in the contract and generally will be either (1) the place of manufacture, (2) the point of delivery, or (3) destination. Inspection of components, subassemblies, or end items does not relieve the contractor of the respsonsibility of meeting all contract requirements (including material specifications, packaging, and packing).

The increasing use of quality control techniques by industry is recognized by the military departments. Military inspectors may consider the use of such techniques by a contractor in determining whether Government standards are being met.

Bid, Performance, and Payment Bonds

Bids bonds accompany bids and represent a guarantee by authorized sureties that the bidder will, within the time specified, enter into a contract and give proper bond for its performance. Bid bonds are not required unless specified in the Invitations for Bids. They may be required by the Government only when the contract to be entered into is to be supported by a performance bond or by performance and payment bonds.

Performance bonds secure the performance and fulfillment of all the terms and conditions contained in the contract. The Miller Act (40 U. S. C. 270a-270e), as amended, requires that performance bonds be furnished on lump-sum construction, contracts exceeding $2,000 in the amount to be performed within the United States. In areas other than construction, it is not the usual policy of the military departments to require performance bonds. If a performance bond is required, the Invitation for Bid or Request for Proposal will so state, together with the amount to be required.

Payment bonds secure the payment of all persons supplying labor and material in the prosecution of work provided for in the contract. Payment bonds are usually written in conjunction with performance bonds. Payment bonds are required on fixed price construction contracts exceeding $2,000. On contracts other than construction, payment bonds are used sparingly. If a payment bond is required, the Invitation for Bid or Request for Proposal will so state, together with the amount to be required.

Classified Contracts

A classified contract is any contract that requires or will require access to classified information by the contractor or his employees in the performance of the contract, even though the contract document itself may not be classified.

Contractors seeking to participate in classified prime or subcontracts are required to have, or to be granted, a facility security clearance in order to be eligible for such participation.

Action to clear a contractor's facility for participation in a prime contract is initiated by contracting officers of the military departments. Requests for facility security clearances of subcontractors are submitted by the prime contractor.

A facility security clearance granted to a contractor is applicable to any prime or subcontract of equal classification or less and is binding upon all procuring activities of the military departments as well as all Department of Defense prime contractors. In addition, all contractor personnel who require access to classified information must be granted personnel security clearances. Clearances remain in force as long as there is a need for such clearances or until revoked for security reasons.

Complete procedures are contained in the Department of Defense "Industrial Security Manual for Safeguarding Classified Information." Copies of this manual are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., price, 30 cents.

Specifications and Standards

Most supplies used by the military are purchased on the basis of Federal or military specifications which describe quality, size, performance, and other features of the item to be purchased and state requirements for inspection, testing, packaging and packing. When the specifications for an item being purchased are not included in the Invitation for Bids, bidders should apply to the contracting office issuing the Invitation for Bids or to such other source as may be designated in the Invitation for Bids.

Indices of military specifications and standards may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. These indices list specifications by item and by number, and indicate for each the responsible military department (and technical service or bureau).

Qualified Products List

Certain specifications contain a "qualification test requirement," which means that a manufacturer's product must have passed certain tests listed in the specification. Products which have passed the qualification tests are listed on the Qualified Products List (QPL) for that specification, and the manufacturer is assured that he will be allowed to compete for future procurements of the product.

When a product to be purchased is included in a Qualified Products List, this will be so specified in the Invitation for Bids, and only those bids offering products which are on the list or have been approved, prior to the time set for the opening of bids, for inclusion thereon can be considered.

The following criteria are considered in determining whether the qualification test requirement is to be included in a specification:

a. The time required for testing after award would unduly delay delivery of the supplies being purchased.
b. The cost of repetitive testing would be excessive.
c. The tests would require expensive or complicated test apparatus not commonly available.
d. The interest of the Government requires assurance, prior to award, that the product is satisfactory for its intended use.
e. The determination of acceptability would require performance

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data to supplement technical requirements contained in the specification.

Where a Qualified Products List is established, manufacturers are encouraged to submit samples of their products for test and approval, and inclusion on the QPL, since the lists are always open for inclusion of products from additional sources. Each specification requiring qualification contains instructions for the submission of products for such testing.

Agents or Contractors' Representatives

It is not necessary to engage any person or selling agency to obtain Government business although some concerns do so. Bona fide representatives are permissible. The "Covenant Against Contingent Fees" clause, which is included in all defense contracts, is a warranty by the contractor that it has not employed or retained any person or selling agency "to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee." However, the warranty also provides that "bona fide employees or bona fide established commercial or selling agencies maintained by the contractor for the purpose of securing business," even though paid on one of the above bases, may properly represent a firm in obtaining Government contracts. Breach of the warranty contained in the covenant may result in an annulment of the contract or the recovery by the Government of the amount of the fee paid.

Inquiries will be made of, and written representation will be secured from, prospective contractors as to whether they have employed or retained any company or person (other than a full-time employee working solely for a prospective contractor) to solicit or secure the contract, and the contractor shall agree, in writing, to furnish information relating thereto as may be required by the contracting officer. DD Form 119 is used as a basis for obtaining this information, and a copy of this form may be obtained from any military contracting officer.

Gratuities

Certain practices that may be condoned in private business, such as offering gifts or granting gratuities and favors, must be avoided in dealing with the Government. Military procurement is subject to the provisions of public laws which prohibit the offering of such gratuities to, or their acceptance by, Government personnel charged with the responsibility of negotiating or administering Government contracts. Violations may result in criminal prosecution, and, under the provisions of the "Gratuities" clause incorporated in defense contracts, in the termination of the contract. "Kick backs" by subcontractor to prime or higher tier subcontractors are also forbidden by law if the prime contract is negotiated.

When entering into any contract involving the employment of labor, it is the Government's policy to include a provision obligating the contractor not to discriminate against any employee or applicant for employment because of race, religion, color, or national origin. The clause imposes upon the contractor the responsibility for including the provision in most subcontracts. It is the contractor's and, in appropriate cases, the subcontractor's contractual obligation to maintain a labor policy consistent with the requirements of this provision.

Definition of Small Business

For those procurements on which preferential treatment of bids from small business concerns are authorized by the Department of Defense, a bidder must conform to the small business definition in order to receive preference. Congress has given the Small Business Administration the sole authority for the determination as to what concerns shall be considered small business. Use of the following definition of "small business" is mandatory for all procurement agencies in the Department of Defense:

General definition. A small business concern is a concern that (i) is not dominant in its field of operations and, with its affiliates, employs fewer than 500 employees; or (ii) is certified as a small business concern by SBA. SBA has authority to establish industry standards.

Dominance in field of operation. A concern is "not dominant in its field of operation" when it does not exercise a controlling or major influence in an area of business activity. In determining whether dominance exists, consideration shall be given to all appropriate factors including volume of business, number of employees, financial resources, competitive status or position, ownership or control of materials, processes, patents and license agreements, sales territory, and business activity.

Affiliates. Business concerns are affiliates of each other when either directly or indirectly (i) one concern controls or has the power to control the other, or (ii) a third party controls or has the power to control both. In determining whether concerns are independently owned and operated and whether or not affiliation exists, considerations shall be given to all appropriate factors including common ownership, common management, and contractual relationships.

Number of employees. In connection with the determination of small business status, except as SBA otherwise determines in a particular industry or part thereof, "number of employees" means the average employment of any concern and its affiliates based on the number of persons employed during the pay period ending nearest the 15th of the 3d month in each calendar quarter for the preceding four quarters. If a concern has not been in existence for four full calendar quarters, "number of employees" means the average employment of such concern and its affiliates during the period such concern has been in existence based on the number of persons employed during the pay period ending nearest the 15th of each month.

Dealer as small business concern. A dealer who submits bids or offers in its own name, but who proposes to furnish a product not manufactured by itself, shall be considered to be a small business concern when, in addition to meeting the general definition, it agrees to furnish in the performance of the contract, products manufactured or produced in the United States, its Territories or possessions by small business concerns.

Small business certificate. A small business certificate is a certificate issued by SBA pursuant to the authority contained in sections 203 and 212 of the Small Business Act of 1953, as amended, certifying that the holder of the certificate is a small business concern for the purpose of Government procurement and in accordance with the terms of the certificate.

Contracting officers accept at face value (a) a small business certificate issued by the SBA, or (b) a written statement by the bidder that it is a small business concern in accord with the above definition. In the event such a statement is questioned prior to award of the contract, the contracting officer will refer the matter to the SBA for a ruling, and this ruling will be accepted as final.

Any change in the definition of small business will be published by the SBA in the Federal Register, and business firms desiring current information of their status as small business should contact the nearest regional office of the Small Business Adm.

Each military department has an active and continuing program to afford small business concerns an equitable opportunity to compete for defense procurement. In addition, concerns classified as small business are granted certain preferential treatment in some instances in the award of military contracts. Selected procurements may be set aside in whole or in part for exclusive participation of small business.

In the case of equal low bids submitted by a large concern and a small business concern, preference in award is generally given to the small concern. However, if the large business concern will perform the proposed contract in an area of substantial labor surplus, it will receive preference over a small concern which will not perform the contract in a surplus labor area. If equal low bids are submitted by a small business concern and a large business concern, both of whom have agreed to perform the proposed contract in a labor surplus area, preference in award will go to the small business concern.

Liaison With the Small Business Administration

The military departments work closely with the Small Business Administration to maintain a cooperative program to increase small business participation in defense procurement. SBA representatives and military contracting officers jointly screen and select procurements that can be set aside for exclusive small business participation. The Administration has also the authority to certify the competence as to capacity or credit of an apparent low small business bidder or offeror whose competence on a particular procurement is being questioned by the contracting officer. Such certification when made by the SBA is accepted as conclusive by the contracting officer. The SBA reviews military department bidders' lists and endeavors to discover additional potential small business suppliers for such lists.

Subcontracting

Many small firms seeking defense work find it advantageous to investigate subcontracting possibilities. There are certain major items of defense procurement, such as aircraft, ships, and combat vehicles, which generally are unsuited to the production facilities of small firms. This does not exclude small business from participation in such procurement programs, however, since much of the work under these contracts is performed by small firms as subcontractors and suppliers. To insure that appropriate consideration is given to small business concerns as potential subcontractors, each fixed-price and cost-reimbursement-type contract in excess of $5,000 contains a contractual clause requiring the prime contractor to make the maximum practicable utilization of small business concerns as subcontractors. Specific procedures to be followed by concerns interested in obtaining military subcontract work are contained in the Army, Navy, and Air Force sections of this publication. Subcontractors are selected by the prime contractors and deal directly with them, rather than with the Government. However, the Army, Navy, and Air Force have made agreements with their larger contractors wherein each contractor conducts a program designed to provide small business concerns with an equitable opportunity to compete for subcontracts and purchase orders for items within their capabilities. This is known as the Defense Small Business Subcontracting Program, and it has been entered into not only by the large prime contractors of the military departments but by many of their major subcontractors as well.

For subcontracts, concerns should apply directly to the prime contractors, furnishing information on plant facilities, production experience, present products, personnel, and financial status. This program is mandatory for any operator or contractor or subcontractor awarded a contract or subcontract for more than one million dollars.

The names of major prime contractors are listed in the Department of Commerce Synopsis. Small business specialists at military procurement or contact administration offices are also able to assist in locating subcontracting opportunities.

The Army, Navy, and Air Force sections of this booklet describe more particularly the assistance available to small concerns interested in becoming subcontractors or suppliers.

Synopsis of Proposed Procurements

From Monday through Friday of each week, there is published in Chicago by the Department of Commerce the "Synopsis of U. S. Government Proposed Procurement, Sales and Contract Awards." Individuals and interested business firms may subscribe to this publication for $10 per year. A check or money order payable to the Treasurer of the United States should be mailed to the U. S. Department of Commerce, Administrative Service Office, Room 1300, New Post Office Building, 433 West Van Buren Street, Chicago 7, Ill. The Synopsis is also available for inspection at each of the 33 field offices of the Department of Commerce and at approximately 700 cooperating offices including some chambers of commerce. Most unclassified proposed procurements of the purchasing agencies of the Department of Defense, whether being procured by formal advertisement or by negotiation, are listed. Once a week, this publication also lists the awards of contracts in excess of $25,000 that have been made. Other information of value to the prospective contractor or subcontractor will be found in this publication.

Procurement Information Office

If the supplies or services which a firm is qualified to furnish are not listed in this pamphlet and the information cannot be obtained in the local area, an inquiry should be addressed to the Central Military Procurement Information Office, Office of the Assistant Secretary of Defense (Supply and Logistics), the Pentagon, Washington 25, D. C. That office was established in 1949 by the Secretary of Defense to act as a guide service to businessmen in their dealings with the military departments and can assist in locating the offices which buy particular products or services, and will make appointments in the Washington area with the persons in the military departments who can best answer specific inquiries.

The Procurement Information Center, Room 732, Old Post Office Building, 12th Street and Pennsylvania Avenue NW., Washington 25, D. C., receives copies of all formally advertised Invitations for Bids and abstracts of awards from Army and Air Force procurement activities.

Research and Development

The Department of Defense benefits from the ingenuity and know-how of American industry, educational institutions, and nonprofit research organizations, by obtaining, through research and development contracts, new concepts and ideas essential to its present and future requirements.

The Army, Navy, and Air Force are fully aware of the importance of locating and utilizing technically competent research and development organizations. Each recognizes that such competence is not necessarily determined by the size of the organization and has established programs and procedures to insure that all organizations, regardless of size, are given every opportunity to submit research and development proposals. Contracts are awarded to those firms which have the highest competence in the specific branch of science or technology required for the successful conduct of the particular work involved.

Military Sales: Where to Go, Whom to See

WHERE AIR FORCE PROCUREMENT TAKES PLACE

Procurement authority for meeting Air Force materiel requirements is vested in the Commander, Air Materiel Command, Wright-Patterson Air Force Base, Ohio. Regardless of which air command (Strategic Air Command, Air Training Command, Air Research and Development Command, etc.) does the actual purchasing, the controlling procedures are those set forth in the Air Force Procurement Instruction published by the Air Materiel Command.

Contracts and purchase orders placed directly by the Air Force fall into three groups:

Group 1, ARDC Procurement. Research, basic and applied, and development. Procurements in group 1 are handled by ARDC Centers.

Group 2, Central Procurement. Air Weapons, support equipment, and services. Procurements in group 2 are handled in the United States (less Hawaii) by Air Materiel Command at the Aeronautical Systems Center, Wright-Patterson Air Force Base, Ohio, by the Ballistic Missiles Center, Inglewood, California, by the Electronic Systems Center, Bedford, Mass., by the Dayton Air Force Depot, Gentile Air Force Station, Ohio and by nine Air Materiel Area headquarters covering the country. These contracts are administered by administrative contracting officers assigned by the Air Materiel Area Headquarters or by Air Force district offices under those headquarters.

Group 3, Base Procurement. Supplies and services required for daily operations of Air Force bases, world-wide. Procurements in group 3 are handled at each of the 170-odd bases in the United States (less Hawaii) by base procurement officers. Normally, these contracts or purchase orders are administered by the contracting officers.

ARDC PROCUREMENT

The Air Research and Development Command procures Research and Technical Development. Research and development projects differ widely from production or supply requirements. Drawings, specifications and sample items are generally not available. Qualitative requirements are frequently mere descriptions of desired results, and many projects consist of theoretical or experimental studies. Therefore, ARDC cannot always use the standard procurement procedures found in other military agencies which procure production material.

A listing of industrial and scientific agencies qualified to participate in research and development projects is maintained in a specialized file at the various Centers. This file also contains sources of supply for specialized technical and laboratory equipment. Individuals, groups, scientific and industrial organizations interested in participating in the R & D program should complete ARDC forms 220 and submit sufficient copies to Hq ARDC, attn. RDMKS to allow dissemination of a copy to each ARDC Center.

To obtain more detailed information concerning ARDC procurement, a personal call or visit to a Contractor Relations Office at Headquarters or one of the Centers can accomplish the same purpose. If you are not located near Hq ARDC or an ARDC Center, it is possible for you to obtain additional information by visiting any one of a number of Air Force Liaison Offices located in many cities throughout the United States. While these representatives of ARDC do not maintain source files or Contractor Relations Offices, qualified technical personnel are available for discussion of your technical capabilities and assistance in the procedures to be followed.

Contractor Relations

The Contractor Relations Office, which is a part of the Procurement organization established to provide reception and proper guidance, is the initial point of entry for all potential and new contractors. After the initial contact and discussions have been completed with the responsible personnel at the Center or Headquarters, ARDC it is not necessary to clear subsequent visits through this office. However, to assure that the concerned Center or Headquarters personnel are available, or to avoid long delays for interviews, contractors should previously arrange for definite appointments, either direct or through the Contractor Relations Office.

Contractors should understand that security regulations prohibit discussion of classified information without prior security clearance. Action to obtain the necessary clearance may be initiated with the Provost Marshal office at any ARDC installation.

ARDC CENTERS

Hq Air Research and Development Command (Hq ARDC), Andrews Air Force Base, Washington 25, D. C. Telephone: Redwood 5-8900
- Commander—Lt. General B. A. Schriever
- Vice Commander—Maj. General J. Ferguson
- Deputy Commander for Research—Maj. Gen. M. Cooper
- Deputy Commander for Resources—Col. S. Bishop
- Director of Procurement—Colonel J. D. Prodgers
- Deputy Director of Procurement—Mr. R. E. Miedel
- Executive for Small Business—Mr. J. C. Eiden (RDMK-2 Ext. 81104)
- Assistant for Procurement Sources—Mr. L. E. Olson (RDMKS, Ext. 85111)
- Chief, Contractor Relations Division—Major J. Grimes (RDMK-5 Ext. 85102)

Air Force Office of Scientific Research (AFSOR), Washington 25, D. C. Telephone: Lincoln 6-5650
- Commander—Colonel A. Gagge
- Director of Procurement—Lt. Col. A. L. Thayer
- Contractor Relations & Sources and Small Business—Mr. S. Milnovsky (SRKF Ext. 281)
  Exploratory research in aeronautical sciences, bio sciences, and physical sciences.

Arnold Engineering Development Center (Arnold Center), Arnold Air Force Station, Tennessee. Telephone: GL 5-2611
- Commander—Brig. Gen. Homer A. Boushey
- Director of Procurement—Mr. James Fuqua
- Contractor Relations and Sources and Small Business—Mr. J. Moriarty (AEKS Ext. 272)
- Contractor Officer—Mr. C. W. Mastbrook
  Aerodynamics, propulsion, high speed gas dynamics, supersonic and hypersonics aircraft and missiles.

Air Proving Ground Center (APGC), Eglin Air Force Base, Florida. Telephone: Eglin AFB, Fla.
- Commander—Maj. Gen. Robert H. Terrill
- Director of Procurement—Lt. Col. C. Duke (Ext. 29241)
- Contractor Relations, Sources and Small Business—Mr. J. V. Leftwich (PGKZ Ext. 29243)
  Aircraft weapons, ammunition, rockets, bombs, fire control components and systems, Target and Scorer systems.

Air Force Command & Control Development Division (AFCCDD), L. G. Hanscom Field, Bedford, Massachusetts. Telephone: Crestview 4-6100
- Commander—Maj. Gen. K. B. Berquist
- Director of Procurement—Mr. W. J. Irwin
- Contractor Relations, Sources and Small Business—Mr. J. Condon (CCKB Ext. 2244)
  Development and test of electronic systems for command and control of Air Force operations, applied research and human engineering.

Air Force Flight Test Center (AFFTC), Edwards Air Force Base, California. Telephone: Edwards, Clifford 8-2111.
- Commander—Brig. General J. W. Carpenter 111
- Director of Procurement—Lt. Col. James Venable, Jr.
- Contractor Relations and Sources—Mr. Thompson (FTKSA Ext. 29431)
- Small Business Specialists—Mr. Peterson (FTKB, Ext. 27361)
  Testing of aircraft systems, static testing of missiles and rockets, research and development to support these tests, applied research for rocket propulsion.

Air Force Missile Test Center (AFMTC), Patrick Air Force Base, Florida. Telephone: Ulysses 7-2231
- Commander—Maj. General L. Davis
- Director of Procurement—Col. P. R. Cornwall
- Contractor Relations and Sources and Small Business—Mr. Swanson (MTKS Ext. UL 7-6151)
  Test range instrumentation.

Air Force Special Weapons Center (AFSWC), Kirtland Air Force Base, New Mexico. Telephone: Chapel 7-1711
- Commander—Maj. General C. M. McCorkle
- Director of Procurement—Lt. Col. P. M. Packard
- Contractor Relations, Sources and Small Business—Mr. N. Nickerson (SWKSB, Ext. 3966)
  Air Force components and equipment related to atomic weapons.

Air Force Missile Development Center (AFMDC), Holloman Air Force Base, New Mexico. Telephone: Granite 3-6511
- Commander—Maj. Gen. Wm. M. Canterbury
- Director of Procurement—Lt. Col. Turner
- Contractor Relations, Sources and Small Business—Mr. D. P. Hathcock (MDKB Ext. 6761)
  Guided missiles, target drones, space biology, test range instrumentation.

Rome Air Development Center (RADC), Griffiss Air Force Base, Rome, New York. Telephone: Rome FF6-3200
- Commander—Brig. General D. P. Graul
- Director of Procurement—Col. H. Burhanna
- Contractor Relations, Sources and Small Business—Mr. J. Vella (RCKS Ext. 2204)
  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 (WADD), Wright-Patterson Air Force Base, Ohio. Telephone: Clearwater 3-7111
- Commander—Maj. Gen. J. Holzapple
- Director of Procurement—Lt. Col. T. Watkins
- Contractor Relations and Sources—Miss B. J. Weisbrod (WWKAR Ext. 39250).
- Small Business Specialists—Mr. L. Grier (WWKA Ext. 38216)
  Aircraft and missile components, guidance & control systems, propellers, power plants, ground equipment, airborne equipment, aero medical equipment, airborne electronics, and material.

San Antonio Research and Development Procurement Office (WADD) Box 63, Lackland Air Force Base, Texas. Telephone: Walnut 3-3411
- Chief Procurement Office—Mr. M. V. Pfister
- Contractor Relations, Sources and Small Business—Miss Winifred Bell (WWKLS Ext. 2113-2564)
  Personnel research, research and development, procurement support for the School of Aviation, Air University Command, and the Arctic Aeromedical Laboratory, Alaskan Air Command.

The Small Business Program

As part of the Small Business Program of the Department of the Air Force, Small Business Specialists have been assigned to all ARDC Center procurement activities to assist technically competent small research and development concerns in becoming listed in the ARDC Source System. Small Business Specialists will also function in the ARDC Regional Offices. In order to include a small business potential source in the ARDC Source System established in the Contractors Relation Branch at each center, ARDC Source Form 220 should be used. After it is accomplished it should be reproduced so that two (2) copies of it, plus a brouchure on your concern, can be sent to Headquarters ARDC Attn: RDSKS. Duplicate copies should also be sent to the Contractors Relation Branch of each ARDC Center. Small Business policies of the Department of the Air Force are developed by the USAF Small Business Adviser in cooperation with the Small Business Administration and other Governmental Agencies whose activities affect the Small Business Program. The ultimate objective is to assist small concerns in securing a fair share of defense procurement and thereby comply with the policy of the Congress viz: "that a fair proportion of the total purchases and contracts for supplies and services for the Government shall be placed with small business concerns." (Armed Services Procurement Act of 1947, Public Law 413, 80th Congress.)

ARDC Regional Offices & Liaison Offices

Conveniently located throughout the U. S., Regional Offices and Liaison Offices are available to serve you for local technical contacts and information.

While they do no procurement, the office nearest you may be visited or contacted directly to obtain guidance on ARDC policies and procedures; or, as a preliminary step in becoming better acquainted with the activities of ARDC. Such local contacts can minimize the cost of getting the assistance needed.

Staffed with technically qualified engineers, these offices are available to discuss your research and development projects and potential and to otherwise assist you.

A complete list of addresses follows. Please contact only the ARDC Regional Office or Liaison Office nearest your plant location. Do not send source information to these locations unless requested to do so.

ARDC Office, Langley Aeronautical Laboratory (NACA), Langley Air Force Base, Virginia

ARDC Office Naval Air R & D Activities Command, Johnsville, Pennsylvania

ARDC Office, Massachusetts Institute of Technology, 68 Albany Street, Cambridge, Massachusetts

ARDC Office, Bell Telephone Laboratory, Whippany Laboratory, Whippany, New Jersey

ARDC Regional Office, 6331 Hollywood Boulevard, Los Angeles 28, California
- Small Business Advisor—Mr. W. Stalow
- Tel: Hollywood 7-5171

ARDC Office, Ames Aeronautical Laboratory (NACA), Moffet Field, California

ARDC Office, San Francisco Bay Area, 1176 Los Altos Ave., Los Altos, California

ARDC Office, Naval Missile Center, Point Mugu, California

ARDC Office, Naval Ordnance Test Station, China Lake, California

ARDC Office, c/o Boeing Airplane Company, Seattle 24, Washington

ARDC Office, Aberdeen Proving Ground, Aberdeen Proving Ground, Maryland

ARDC Regional Office, 346 Broadway, New York 13, New York
- Small Business Advisor—Mr. H. Stegeland
- Tel: Rector 2-8000, Ext. 784

ARDC Office, Lewis Research Center (NASA) 20100 Brookpart Road, Cleveland 11, Ohio

ARDC Office, Redstone Arsenal, Redstone Arsenal, Alabama

ARDC Office, Room 615, La Salle Bldg., 39 South La Salle Street, Chicago 3, Illinois
- Small Business Advisor—Mr. D. C. Stevenson
- Tel: Financial 6-9181

ARDC Regional Office, Room 3B16, Main Navy Building, Washington 25, D. C.
- Small Business Advisor—Mr. W. Grieve
- Tel: OXford 6-2471

European Office, ARDC

The European Office, Air Research and Development Command functions as a service organization for all of the other Centers of the Command outlined in the foregoing paragraphs. Its scientific interests, therefore, include all of those enumerated. While EOARDC is primarily interested in sponsoring basic or fundamental scientific research, it does enter into development contracts for materials and equipment based upon USAF and ARDC Center requirements.

A secondary, but highly important service performed by EOARDC is promoting the exchange of scientific information between the United States and the free European scientific communities.

CENTRAL PROCUREMENT

To supply the Air Force with the right equipment at the right times and places throughout the world requires a far-flung organization.

The workload of Air Materiel Command is decentralized to its Contact Management Regions, Air Materiel Areas, Centers and Depots. They perform the operational work, providing supply, maintenance, procurement and reclamation of Air Force property. They also look after disposal of Air Force surplus as well as specialize in specific weapon systems and certain classes of supply, which they buy for the entire Air Force.

These buying agencies, their locations and the items they specialize in follow.

> This decentralized procurement responsibility is not to be confused with local purchase or base procurement responsibility, which is that procurement of supplies and services required to support the particular installation, and is to a great extent, for items of a housekeeping nature.

Aeronautical Systems Center, Wright-Patterson Air Force Base, Ohio.
Complete aircraft, missiles and aerial targets. Complete aircraft engines (combustion and jet) aircraft navigation, meteorological, flight, time measuring, testing and engine instruments; automatic pilot mechanisms and airborne gyros; aircraft wheels and brakes, tires and tubes; airborne radio and radar equipment; photographic equipment; propellers and propeller accessories; miscellaneous aircraft accessories and components; gas turbines (airborne type); bombing and gunnery equipment; fire control systems and equipment; launchers, rocket and pyrotechnic weapons, warheads and explosives; miscellaneous training devices; inital spares and ground support and tools/test equipment in support of the foregoing; research and development and service test (non-stock listed items).

Ballistic Missiles Center, Air Force Unit Post Office, Los Angeles 45, California.
Ballistic missiles, space vehicles and equipment and components peculiar thereto such as propulsion systems, guidance systems, related ground support handling equipment, initial spares, tools, test equipment, initial spares, tools, test equipment, etc.

Electronics Systems Center, L. G. Hanscom Field, Bedford, Mass.
Procurement of engineering management and other services for Air Defense Systems such as SAGE, DEW Line/White Alice and Ballistic Missile Early Warning System.

Middletown Air Materiel Area, Olmsted Air Force Base, Middletown, Pa. Attn: Directorate of Procurement and Production.
Airframe structural components (C-46, C-119, C-123, C-134, H-5, H-13, H-19, H-21, H-34, H-43, L-18, L-19, L-20, L-21, L-26, L-27, T-37, T-38); guided missile components (Falcon, Sidewinder) support; aircraft and rocket engine parts; fuels, lubricants, oils, waxes and corrosion preventive compounds; chemicals and chemical products; gases, compressed and liquified and gas cylinders; miscellaneous instruments (other than GFAE) and laboratory equipment; electrical meters and maintenance parts; parachutes and aerial pick-up and cargo tie-down equipment; clothing, textiles and individual equipment ((except single manager (Dept. of Army) clothing and textiles)); service and trade equipment; foor preparation and serving equipment.
Contractual maintenance and modification services for support for commodities listed above and aircraft and missiles and/or engines for which the installation has prime maintenance responsibility.

Mobile Air Materiel Area, Brookley Air Force Base, Mobile, Ala. Attn: Directorate of Procurement and Production.
Airframe structural components and guided missile components support (F-84, F-105, B-66, SA-16, Q-2, Q-4, Jupiter); aircraft air conditioning, pressurizing and breathing oxygen equipment; miscellaneous aircraft and engine accessories and components; mechanical power transmission equipment; containers and packaging materials; construction and building materials; prefabricated structures and scaffolding; hardware and abrasives; hand tools; alarm and signal systems; special industry machinery and equipment except gas generating equipment; rope, cable, chain and fittings, pumps and compressors; refrigeration and air conditioning equipment, furnace, steam plant and drying equipment; valves; plumbing, heating and sanitation equipment; water purification and sewage treatment equipment, pipe, tubing, hose and fittings; lumber, millwork, plywood and veneer; ship and marine equipment; brushes, paints, sealers and adhesives; non-metallic fabricated materials; metal bars, sheets and shapes; ores, minerals and their primary products.
Contractual maintenance and modification services for support for commodities listed above and aircraft and missile and/or engines for which the installation has prime maintenance responsibility.

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Ogden Air Materiel Area, Hill Air Force Base, Ogden, Utah. Attn: Directorate of Procurement and Production.
Airframe structural components (B-17, B-26, F-89, F-101); guided missile components (Bomarc, Snark, Goose Minuteman) support; engine parts; aircraft landing gear, wheels and brakes, tires and tubes follow-on); aircraft hydraulic vacuum and de-icing systems components; training aids and devices except airborne type and items; ammunition and explosives except Army Ordnance assigned items); ammunition maintenance and repair shop specialized equipment; ammunition packaging and special containers; laboratory equipment biological surveillance.
Contractual maintenance and modification services for support for commodities listed above and aircraft and missile and/or engines for which the installation has prime maintenance responsibility.

Oklahoma City Air Materiel Area, Tinker Air Force Base, Oklahoma City, Okla. Attn: Directorate of Procurement and Production.
Airframe structural components (B-29, B-47, B-50, B-52, C-97, C-137, KC-135); guided missile components (Rascal, Quail, Hound Dog, Bullpup) support; miscellaneous engine accessories (aircraft) and maintenance parts aircraft engine cooling systens components; aircraft engine air and oil filters, strainers and cleaners.
Contractual maintenance and modification services for support of commodities listed above and aircraft and missile and/or engines for which the installation has prime maintenance responsibility.

Rome Air Materiel Area, Griffiss Air Force Base, Rome, N. Y. Attn: Directorate of Procurement and Production.
Ground radio, radar and navigational equipment; meteorological equipment, in instruments (except airborne) and supplies; ground communications equipment; structural and installation parts for communications equipment; miscellaneous electric power and distribution equipment; photographic supplies; commercial electrical equipment and supplies; lighting fixtures, airport; lighting fixtures and lamps (except airborne); electric wire and cable.
Contractual maintenance and modification services for support for commoditiy areas listed above. Procurement of systems integration, development, service test and similar functions required for implementation and operation of Electronic Support Systems (ESSPO's). Procurement of engineering and installation of ground electronics equipment, facilities and systems (GEEIA).

Sacramento Air Materiel Area, McClellan Air Force Base, Sacramento, Calif. Attn: Directorate of Procurement and Production.
Airframe structural components (C-121, F-80, F-86, F-94, F-100, F-104, F-108, T-6, T-28, T-33, RM-81); generators and generator sets, electrical; aircraft auxiliary fuel tanks and pylons except fixed type.
Contractual maintenance and modification services for support for commodities listed above and aircraft and/or engines for which the installation has prime maintenance responsibility.

San Antonio Air Materiel Area, Kelly Air Force Base, San Antonio, Tex. Attn: Directorate of Procurement and Production.
Airframe structural components (B-36, B-58, B-70, C-45, C-131, F-102, F-106, L-5, T-29, T-34, WS-125A); aircraft engine fuel and electrical system components; motors and converters; electrical; special weapons and equipment (atomic ordnance); hazard detecting instruments and apparatus; aircraft electric lights and fixtures.
Contractual maintenance and modification services for support for commodities listed above and aircraft and/or engines for which the installation has prime maintenance responsibility.

San Bernardino Air Materiel Area, Norton Air Force Base, San Bernardino, Calif. Attn: Directorate of Procurement and Production.
Airframe structural components. (C-124, C-133) and guided missile components (Atlas, Titan, Thor) support. Contractual maintenance and modification services for support for aircraft and missile and/or engines for which the installation has prime maintenance responsibility.

Warner Robins Air Materiel, Area, Robins Air Force Base, Macon, Ga. Attn: Directorate of Procurement and Production.
Airframe structural components (B-45, B-57, C-47, C-54, C-117, C-118, C-130 and Douglas common parts); guided missile components, (Matador, Mace) support, weapons (guns, chemical and biological) except Army Ordnance assigned items; bearings; metal working, rubber working and textile industries machinery and woodworking machinery and equipment; centrifugals, separators, pressure and vacuum filters; driers, dehydrators and anhydrators; tires and tubes, except aircraft; rescue and safety equipment.
Contractual maintenance and modification services for support of commodities listed above, bombing gunnery and fire control systems and equipment and aircraft and missile and/or engines for which the installation has prime maintenance responsibility.

Dayton Air Force Depot, Gentile Air Force Station, Dayton, Ohio. Attn: Directorate of Procurement and Production.
Airborne radio, radar and navigational equipment and components; airborne communications equipment; electrical and electronic equipment, components; terminals, terminal boards, connectors, fuses, lightning arrestors, capacitors, resistors, switches, circuit breakers, tubes, relays, contactors, solenoids, insulators, knobs, pointers, dials and piezo-electric crystals; laboratory and shop test inspection equipment and maintenance parts; measuring tools; inspection gages; combination and miscellaneous instruments.
Contractual maintenance and modification services for support for commoditiy areas listed above. (*Except GFAE)

2709 AF Vehicle Control Group, Memphis Army General Dept, Memphis, Tenn. Attn: Directorate of Procurement and Production.
Motor vehicles, trailers and cycles, tractors; vehicular equipment components; gasoline reciprocating engines (except aircraft) and components; diesel engines and components; engine fuel systems components, non-aircraft; engine electrical systems components, non-aircraft; engine cooling, systems components, non-aircraft; engine air and oil filter strainers and cleaners, non-aircraft; misc. engine accessories non-aircraft; gas generating equipment (ground); construction, mining, excavating and highway maintenance equipment; materials handling equipment; firefighting equipment; lubrication and fuel dispensing equipment; electric vehicular non-aircraft lights and fixtures.
Contractual maintenance and modification services for support for commodity areas listed above.

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.

CONTRACT MANAGEMENT REGIONS

Central Contract Management Region, Wright-Patterson AFB, Ohio
Telephone: Clearwater 3-7111
Commander: Col. Donald W. Graham, Ext. 5-2208
Deputy: Col. Donald M. Wright, Ext. 5-0295
Eastern Contract Management Region, Olmsted AFB, Middletown, Pa.
Telephone: Whitney 4-5521
Commander: Col. Hugh J. Mattia, Ext. 6102
Deputy: Col. Henry J. Taylor
Western Contract Management Region, Mira Loma AF Station, Calif.
Telephone: Overland 5-5211 (Riverside)
Commander: Col. Gerald F. Keeling, Ext. 355
Deputy: Col. Robert J. Walling, Ext. 356

AIR PROCUREMENT DISTRICTS

Central Contract Management Region

Chicago Air Procurement District, 5555 S Archer Ave., Chicago 38, Ill.
Telephone Reliance 5-3000
Chief: Col. James R. Ourand, Ext. 202
Cleveland Air Procurement District, 113 St. Clair Ave., N. E., Cleveland 14, Ohio
Telephone: Cherry 1-7900
Chief: Lt. Col. William P. Abdallah, Ext. 454
Dallas Air Procurement District, 500 South Ervay, Dallas 1, Texas
Telephone: Riverside 8-5611
Chief: Lt. Col. Guy H. Stallings, Ext. 2371
Dayton Air Procurement District, Bldg. 70 Area C., Wright-Patterson AFB, Ohio
Telephone: Clearwater 3-7111
Chief: Lt. Col. James R. Forrester, Ext. 6-4131
Detroit Air Procurement District, 6233 Concord Ave., Detroit 11, Mich.
Telephone: Walnut 1-4721
Chief: Lt. Col. Leland P. Money
Indianapolis Air Procurement District, 1112 N. Pennsylvania, Indianapolis 2, Indiana
Telephone: Melrose 2-1551
Chief: Lt. Col. Selden L. Baird, Ext. 501
Deputy: Captain Gene L. Pobst
Milwaukee Air Procurement District, 770 N. Plankinton Ave., Milwaukee, Wisc.
Telephone: Broadway 2-4093
Chief: Lt. Col. Kenneth H. Ducat, Ext. 1
Deputy: Major Robert B. Hinck
St Louis Air Procurement District, 1114 Market St., St Louis 1, Mo.
Telephone: Main 1-8100
Chief: Colonel Herbert E. Greuter, Ext. 2333

Eastern Contract Management Region

Atlanta Air Procurement District, 41 Exchange Pl., S E Atlanta 3, Ga.
Telephone: Jackson 2-4121
Chief: Major Winston S. Smith, Ext. 581
Boston Air Procurement District, Boston Army Base, Boston 10, Mass.
Telephone: Liberty 2-6000
Chief: Colonel Ernest H. Miller, Ext. 853
Deputy: Lt. Col. Charles N. Keppler
Newark Air Procurement District, 218 Market St., Newark, N. J.
Telephone: Mitchel 3-3434
Chief: Colonel Frederick W. Toomey, Ext. 101
Deputy: Lt. Col. Frank W. Hobson, Ext. 102
New York Air Procurement District, 111 E 16th St., New York 3, N. Y.
Telephone: Spring 7-4200
Chief: Colonel Lawrence B. Ocamb, Ext. 520
Orlando Air Procurement District, Orlando, AFB, Florida
Telephone: Garden 3-0561
Chief: Lt. Col. Harold J. Larson
Philadelphia Air Procurement District, 1411 Walnut St., Philadelphia 2, Pa.
Telephone: Locust 7-3886
Chief: Colonel Jos. K. Warner
Deputy: Major Joseph B. Owen, Jr., (Actg)
Richmond Air Procurement District. Belt Blvd. & Broad Rock Road, P. O. Box 8868, Richmond 25, Va.
Telephone: Belmont 3-9861
Chief: Major Michael J. Tashjian, Ext. 30
Rochester Air Procurement District, 20 Symington Place, P O Box 1669, Rochester 3, N. Y.
Telephone: Fairview 8-7670
Chief: Colonel Alexander S. Young

Western Contract Management Region

Los Angeles Air Procurement District, 1206 S Maple Avenue, Los Angeles 15, Calif.
Telephone: Richmond 9-4711
Chief: Colonel John R. Medberry, Ext. 501
Deputy: Lt. Col. Arthur L. Singer
Ogden Air Procurement District, Hill AFB, Utah
Telephone: Taylor 5-5215
Chief: Colonel Frank L. Tenney, Ext. 3502
Deputy: Major Peter Sowa, Jr., Ext. 3728
Phoenix Air Procurement District, 2875 Sky Harbor Blvd., Phoenix, Ariz.
Telephone: Bridge 5-5431
Chief: Lt. Col. Ralph B. Rogers
Deputy: Major James B. Trent
San Diego Air Procurement District, 3054 Rosecrans Pl., San Diego 10, Calif.
Telephone: Academy 2-0541
Chief: Lt. Col. Charles R. Douglass, Ext. 1
San Francisco Air Procurement District, Bldg. 1 Oakland Army Terminal, West Grand Ave & Meritime, Oakland 14, Calif.
Telephone: Twin Oaks 3-4100
Chief: Major Robert E. Halls, Ext. 2215
Deputy: Major Stuart M. Sharp, Ext. 2216

AF PLANT REPRESENTATIVE OFFICES

Central Contract Management Region

Allison Div., GMC, Indianapolis 6, Indiana
Telephone: Chapel 4-1511
AFPR: Lt. Col. Zack Gray, Ext. 4249
Beech Aircraft Corp., 9709 E Central Ave., Wichita 1, Kans.
Telephone: Murray 3-7319 (Direct Line) or Murray 3-4681
AFPR: Captain Jack W. Setliff (Actg), Ext. 313
Boeing Airplane Co., Wichita, Kans.
Telephone: Murray 3-8511
AFPR: Colonel Warner E. Newby, Ext. 6089
Deputy: Lt. Col. Charles C. Bliss, Ext. 6049
Convair Division, General Dynamics Corp., P O Box 371, Fort Worth, Texas
Telephone: Pershing 8-7311
AFPR: Colonel Leonard R. Hall, Ext. 2606
Douglas Aircraft Co., Inc., AF Plant No 3, P O Box CC, Admiral Stn., Tulsa 9, Okla.
Telephone: Temple 6-1616
AFPR: Lt. Col. Richard E. Newby, Ext 682
General Electric Co., P O Box 91, Cincinnati 15, Ohio
Telephone: Poplar 1-0948 or 1-4100
AFPR: Major Harry R. O'Brien, Ext. 1392

Eastern Contract Management Region

General Electric Co., Electronics Park, Syracuse, N. Y.
Telephone: Granite 1-4320
AFPR: Colonel Norman J. Beaudrias
Hayes Aircraft Corp., P O Box 2287, Birmingham, Ala.
Telephone: Lyric 2-9611
AFPR: (Deputy) Major Adam Parsons, Ext. 245
Lockheed Aircraft Corp., Marietta, Ga.
Telephone: Marietta 42 4-9411
AFPR: Lt. Col. William A. Harmon. Ext. 3271
The Martin Co., Baltimore, Maryland
Telephone: Murdock 7-3800
AFPR: Lt. Col. George K. O'Neil, Ext. 533
Republic Aviation Corp., Farmingdale, LI., N. Y.
Telephone: Chapel 9-1100
AFPR: Lt. Col. Kermit E. Beary
Sperry Gyroscope Co., Great Neck, LI., N. Y.
Telephone: 516-LR 4-3281
AFPR: Colonel Douglas L. Rundquist
Deputy: Major Vincent V. Zettler, Jr.

Western Contract Management Region

Aerojet-General Corp., P O Box 2048, Sacramento 10, Calif.
Telephone: Yukon 5-5111
AFPR: Colonel William K. Ashby, Ext. 4537
Boeing Airplane Co., Seattle 24, Washington
Telephone: Juniper 6-8211 or 5-5021
AFPR: Colonel William A. Clark
Convair-Astronautic Convair Div., General Dynamics Corp., P O Box 1128, 5001 Kearny Villa Rd., San Diego 12, Calif.
Telephone: Browning 7-8900
AFPR: Colonel Harvey E. Moose, Ext. 1645
Convair Div. (San Diego), General Dynamic Corp., P O Box 1950, 3165 Pacific Highway, San Diego 12, Calif.
Telephone: Cypress 6-6611
AFPR: Lt. Col. Charles W. Atterholt, Ext. 2927
Douglas Aircraft Co., Inc., 300 Ocean Park Blvd., Santa Monica, Calif.
Telephone: Exbrook 9-9311
AFPR: Colonel Clair A. Peterson, Ext. 3558
Hughes Aircraft Co., Florence Ave. & Teale St., Culver City, Calif.
Telephone: Upton 0-7111
AFPR: Colonel James T. McKee, Ext. 3326
Deputy: Lt. Col. Arthur C. Quattlebaum
Lockheed Aircraft Corp., P O Box 551, Burbank, Calif.
Telephone: Triangle 7-2711
AFPR: Lt. Col. Jack M. Kirkland, Ext. 1213
Deputy: Major H. W. Aldridge, Ext. 2750
Lockheed Aircraft Corp., Missiles & Space Div., P O Box 504, Sunnyvale, Calif.
Telephone: Regent 9-4321
AFPR: Colonel Roy W. Gustafson, Ext. 2-5571
Deputy: Lt. Col. Louis C. Renaud
The Martin Co., Denver Div., P O Box 179, Denver 1, Colo.
Telephone: Pyramid 4-5211
AFPR: Colonel Bobbie J. Cavnar, Ext. 2223
Deputy: Lt. Col. Weston H. Price, Ext. 2224
North American Aviation, Inc., L.A. International Airport, Los Angeles 45, Calif.
Telephone: Orchard 2-9151
AFPR: Colonel Sherman E. Ellis, Ext. 1747
Deputy: Lt. Col. Merle H. Culp
Rocketdyne Div., North American Aviation, Inc., 6633 Canoga Ave., Canoga Park, Calif.
Telephone: Diamond 7-5651
AFPR: Colonel John H. Strand, Ext. 2215
Deputy: Lt. Col. Frederick G. Phillips, Ext. 2216
Norair Div., Northrop Corp., Hawthorne, Calif.
Telephone: Oregon 8-9111
AFPR: Colonel Harold T. Marris, Ext. 1901
Deputy: Major Walter F. Stebens, Jr.

AMC TEST SITE OFFICES

Eastern Contract Management Region

AMC Test Site Office (REEE), Eglin AFB, Fla.
Telephone: Eglin AFB.
Chief: Major Burton A. Davis, Ext. 2-8105
AMC Test Site Office, P O Box 4507, Patrick AFB, Fla.
Telephone: Ulysses 7-2906
Chief: Col. R. M. Creechc

Western Contract Management Region

AMC Test Site Office, P O Box 263, Edwards, Calif.
Telephone: Clifford 8-2111
Chief: Maj. R. S. Barstow, Ext. 4-5031
AMC Test Site Office, P O Box 1047, Holloman AFB, N.M.
Telephone: Granite 3-6511
Chief: Lt. Col. R. D. Van Auken, Ext. 3-5315
AMC Test Site Office, P O Box 1525, Vandenberg AFB, Calif.
Telephone: Walnut 5-8651 (Santa Maria)
Chief: Lt. Col. George W. Penman, Ext. 8-5109

AIR MATERIEL FORCES

European Area

AMFEA, APO 10 New York, N. Y., Teletype address: AMFEA, Chateauraux Air Stn France
Commander: Maj. Gen. George E. Price
Deputy: Colonel Joseph O. Fitzgerald
Dir. of Materiel Management: Col. R. A. Gardner
Chief, Maintenance Proc. Branch: Maj. J. W. Tom

Pacific Area

AMFPA, APO 323 San Francisco, Calif., Teletype address: AMFEA, Tachikawa AB Japan
Commander: Brig. Gen. Vincent G. Huston
Deputy: Col. Robert M. Batterson, Jr.
Dir. of Proc. & Pdn: Col. Philip J. Kuhl

AIR MATERIEL AREAS

Middletown AMA, Olmsted AFB, Pa.
Telephone: Whitney 4-5521
Commander: Maj. Gen. Donald L. Hardy
Deputy: Colonel Carlton J. Martin
Dir. of Proc. & Pdn: Col. R. A. Johnson, Ext. 4202
Mobile AMA, Brookley AFB, Ala.
Telephone: Hemlock 8-6011
Commander: Maj. Gen. Daniel F. Callahan
Deputy: Colonel Lawrence F. Loesch
Dir. of Proc. & Pdn: Col. D. A. Olson, Ext. 5281
Ogden AMA, Hill AFB, Utah
Telephone: Taylor 5-5215
Commander: Maj. Gen. Kenneth B. Hobson, Ext. 3206
Deputy: Colonel Victor L. Anderson, Ext. 3208
Dir. of Proc. & Pdn: Col. R. J. Iverson, Ext. 3710
Oklahoma City AMA, Tinker AFB, Okla.
Telephone: Pershing 2-7321
Commander: Maj. Gen. Lewis L. Mundell
Deputy: Brig. Gen. Bertram C. Harrison
Dir. of Proc. & Pdn: Col. S. P. Dillon, Ext. 3900
Rome AMA, Griffith AFB, N. Y.
Telephone: Rome FF6-3200
Commander: Maj. Gen. Charles B. Root, Ext. 7751
Deputy: Colonel Emmett M. Tally, Jr., Ext. 2115
Dir. of Proc. & Pdn: Col. R. V. Kirkland, Ext. 3120
Sacramento AMA, McClellan AFB, Calif.
Telephone: Wabash 2-1511
Commander: Maj. Gen. Robert B. Landry
Deputy: Brig. Gen. Milton F. Summerfelt
Dir. of Proc. & Pdn: Col. J. R. Coolidge, Ext. 2-3110
San Antonio AMA, Kelly AFB, Texas
Telephone: Walnut 3-5411
Commander: Maj. Gen. Wm. T. Hudnell
Deputy: Brig. Gen. Darr E. Newton, Jr.
Dir. of Proc. & Pdn: Col. Roger H. Terzian, Ext. 6-5210
San Bernardino AMA, Norton AFB, Calif.
Telephone: Turner 9-4411
Commander: Maj. Gen. Ben I. Funk
Dir. of Proc. & Pdn: Col. Loren P. Scollay, Ext. 22105
Warner Robins AMA, Robins AFB, Ga.
Telephone: Walker 6-2626 or 6-3278
Commander: Maj. Gen. A. V. P. Anderson, Jr.
Deputy: Colonel Castex P. Conner
Dir. of Proc. & Pdn: Col. T. O. Lawton, Jr., Walker 6-2981

AIR FORCE DEPOT

Dayton AF Depot, Gentile AF Stn., Dayton, Ohio
Telephone: Clearwater 2-6551
Commander: Brig. Gen. Charles E. Jung, Ext. 2-4130
Deputy: Colonel William W. Veal, Ext. 2-7140
Dir. of Proc. & Pdn: Col. R. L. Salzarulo, Ext. 2-5107

AMC CENTERS

AMC Aeronautical Systems Center, Wright-Patterson AFB, Ohio
Telephone: Clearwater 3-7111
Commander: Maj. Gen. Raymond A. Davis, Ext. 2-7214
Deputy: Colonel Monty D. Wilson, Ext. 3-2308
AMC Ballistic Missiles Center, AF Unit Post Office, Los Angeles 45, Calif.
Telephone: Orchard 0-1444
Commander: Maj. Gen. Thomas P. Gerrity, Ext. 1051
Deputy: Brig. Gen. Don Coupland, Ext. 1133
AMC Electronic System Center, L. G. Hanscom Field, Bedford, Mass.
Telephone: Crestview 4-6100
Commander: Maj. Gen. Clyde H. Mitchell, Ext. 2852
Deputy: Colonel Charles C. Segrist, Ext. 2833

BASE PROCUREMENT
(Formerly Called "Local Purchase")

The 170-odd Air Force Bases in United States (less Hawaii) place hundreds of thousands of contracts and purchase orders every year for items and services needed in the daily operations of the bases. In the aggregate, these purchases currently amount to hundreds of millions of dollars each year.

Each base has a Procurement Office, and in each office there is an individual who performs the functions of a small business specialist as an additionally assigned duty. At those bases, such as Wright-Patterson Air Force Base, at which Central Procurement also takes place, the Base Procurement Office nevertheless maintains its own individuality. All bases come under the fifteen major commands (i.e., Air Defense Command, Strategic Air Command, and so forth). At each of the command headquarters, the Director of Materiel has designated a member of his staff to be the Executive for Small Business for the Command, as an additionally assigned duty. Under the technical direction of the Executive for Small Business of Air Materiel Command, which has operational responsibility for the entire Air Force Small Business Program in the United States (less Hawaii), the Executive's functions are to insure that all parts of the program, within the jurdisdiction of the Command and its bases, are thoroughly understood and effectively carried out. In addition to the purchasing procedures carried out by the Base Procurement Offices appropriate elements of the Command participate in the over-all program of the Department of Defense. Such participation is to help bring about—through conferences, clinics, and exhibits—more knowledge on the part of the smaller concerns as to the opportunities for them in defense procurement, and the steps these concerns must take to obtain consideration. Duties of the specialists at the bases include the following:

1. To serve as the focal point for all small business concerns interested in activities conducted by the base, including construction and repair, maintenance, supply, services, and training.
2. To set aside procurements for the exclusive competion of small business concerns when the buyer considers that there are two or more small concerns from which fair and reasonable prices can be expected.
3. To insure that, on procurements that are not thus set-aside, small concerns receive equitable opportunities to compete in free and open competition with medium-size and large concerns.
4. To insure that all base personnel who are involved in materiel

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functions are thoroughly indoctrinated in the Air Force Small Business Policy and the Program in force to carry out that policy.

5. To make periodic reports to the Executive for Small Business at the Command Headquarters showing the extent of their command activities in the small business program.
6. To call to the attention of the Chief of the Base Procurement office any problems affecting the relations between small business concerns and operations of the base.

USAF Installations in Continental United States

Alabama
Brookley Air Force Base, Mobile
Craig Air Force Base, Selma
Gadsden Air Force Station, Gadsden
Gunter Air Force Base, Montgomery
Maxwell Air Force Base, Montgomery

Arizona
Davis-Monthan Air Force Base, Tucson
Lake Air Force Base, Phoenix
Williams Air Force Base, Chandler

Arkansas
Blytheville Air Force Base, Blytheville
Little Rock Air Force Base, Little Rock

California
Beale Air Force Base, Marysville
Castle Air Force Base, Merced
Chelì Air Force Station, Maywood
Edwards Air Force Base, Muroc
George Air Force Base, Victorville
Hamilton Air Force Base, San Rafael
Long Beach Municipal Airport, Long Beach
March Air Force Base, Riverside
Mather Air Force Base, Sacramento
McClellan Air Force Base, Sacramento
Norton Air Force Base, San Bernardino
Oxnard Air Force Base, Camarillo
Travis Air Force Base, Fairfield
Vandenberg Air Force Base, Lompoc

Colorado
Air Force Accounting & Finance Center, Denver
Ent Air Force Base, Colorado Springs
Lowry Air Force Base, Denver
Peterson Field, Colorado Springs
USAF Academy, Colorado Springs

Delaware
Dover Air Force Base, Dover
New Castle County Airport, Wilmington

District of Columbia
Air Research & Development Command, Washington
Andrews Air Force Base, Washington
Bolling Air Force Base
Washington National Airport

Florida
Bartow Air Base, Bartow
Boca Raton Air Force Auxiliary Field, Boca Raton
Eglin Air Force Base, Valparaiso
Graham Air Base, Marianna
Homestead Air Force Base, Homestead
McDill Air Force Base, Tampa
McCoy Air Force Base, Orlando
Miami International Airport, Miami
Orlando Air Force Base, Orlando
Patrick Air Force Base, Cocoa
Tyndall Air Force Base, Panama City

Georgia
Bainbridge Air Base, Bainbridge
Dobbins Air Force Base, Marietta
Hunter Air Force Base, Savannah
Moody Air Force Base, Valdosta
Robins Air Force Base, Warner Robins
Spence Air Base, Moultrie
Turner Air Force Base, Albany

Idaho
Mountain Home Air Force Base, Mountain Home

Illinois
Chanute Air Force Base, Rantoul
O'Hare International Airport, Chicago
Scott Air Force Base, Belleville

Indiana
Bakalar Air Force Base, Columbus
Bunker Hill Air Force Base, Peru

Iowa
Sioux City Municipal Airport, Sioux City

Kansas
Forbes Air Force Base, Topeka
McConnell Air Force Base, Wichita
Schilling Air Force Base, Salina
Topeka Air Force Station, Topeka

Louisiana
Barksdale Air Force Base, Shreveport
Chennault Air Force Base, Lake Charles
England Air Force Base, Alexandria

Maine
Dow Air Force Base, Bangor
Loving Air Force Base, Limestone
Presque Isle Air Force Base, Presque Isle

Massachusetts
Cambridge Research Center, Bedford
Laurence G. Hanscom Field, Bedford
Otis Air Force Base, Falmouth
Westover Air Force Base, Chicopee Falls

Michigan
K. I. Sawyer Air Force Base, Marquette
Kincheloe Air Force Base, Kinross
Selfridge Air Force Base, Mount Clemens
Willow Run Airport, Belleville
Wurtsmith Air Force Base, Oscoda

Minnesota
Duluth Municipal Airport, Duluth
Minneapolis-St. Paul International Airport, Minneapolis

Mississippi
Columbus Air Force Base, Columbus
Greenville Air Force Base, Greenville
Keesler Training Annex No. 3, Gulfport

Missouri
Aeronautical Chart & Information Center, St. Louis
Air Force Records Center, St. Louis
Malden Air Base, Malden
Richards-Gebauer Air Force Base, Grandview
Whiteman Air Force Base, Knobnoster

Montana
Glasgow Air Force Base, Glasgow
Malmstrom Air Force Base, Great Falls

Nebraska
Lincoln Air Force Base, Lincoln
Offut Air Force Base, Omaha

Nevada
Indian Springs Air Force Base, Indian Springs
Nellis Air Force Base, Las Vegas

New Hampshire
Grenier Air Force Base, Manchester
Pease Air Force Base, Portsmouth

New Jersey
McGuire Air Force Base, Wrightstown

New Mexico
Cannon Air Force Base, Clovis
Holloman Air Force Base, Alamogordo
Kirtland Air Force Base, Alburquerque
Walker Air Force Base, Roswell

New York
Griffiss Air Force Base, Rome
Mitchel Air Force Base, Hempstead, Long Island
U. S. Naval Air Station, Brooklyn, N. Y.
Niagara Falls Municipal Airport, Niagara Falls
Plattsburgh Air Force Base, Plattsburgh
Stewart Air Force Base, Newburgh
Suffolk County Air Force Base, Westhampton Beach, Long Island

North Carolina
Pope Air Force Base, Fort Bragg
Seymour-Johnson Air Force Base, Goldsboro

North Dakota
Grand Forks Air Force Base, Grand Forks
Minot Air Force Base, Minot

Ohio
Clinton County Air Force Base, Wilmington
Gentile Air Force Station, Dayton
Lockbourne Air Force Base, Columbus
Wilkins Air Force Station, Shelby
Wright-Patterson Air Force Base, Dayton
Youngstown Municipal Airport, Youngstown

Oklahoma
Altus Air Force Base, Altus
Davis Field, Muskogee
Tinker Air Force Base, Oklahoma City
Vance Air Force Base, Enid

Oregon
Kingsley Field, Klamath Falls
Portland International Airport, Portland

Pennsylvania
Greater Pittsburgh Airport, Corapolis
Olmsted Air Force Base, Middletown

South Carolina
Charleston Air Force Base, Charleston
Donaldson Air Force Base, Greenville
Myrtle Beach Air Force Base, Myrtle Beach
Shaw Air Force Base, Sumter

South Dakota
Ellsworth Air Force Base, Rapid City

Tennessee
Arnold Engineering Development Center Tullahoma
Mallory Air Force Station, Memphis
McGhee-Tyson Airport, Knoxville
Memphis Municipal Airport, Memphis
Sewart Air Force Base, Smyrna

Texas
Amarillo Air Force Base, Amarillo
Bergstrom Air Force Base, Austin
Biggs Air Force Base, El Paso
Brooks Air Force Base, San Antonio
Bryan Air Force Base, Bryan
Carswell Air Force Base, Fort Worth
Dyess Air Force Base, Abielene
Ellington Air Force Base, Houston
Goodfellow Air Force Base, San Angelo
Gray Air Force Base, Killeen
Harlingen Air Force Base, Harlingen
James Connally Air Force Base, Waco
Kelly Air Force Base, San Antonio
Lackland Air Force Base, San Antonio
Laredo Air Force Base, Laredo
Laughlin Air Force Base, Del Rio
Matagorda Island Air Force Range, Port O'Connor
Moore Air Base, Mission
U. S. Naval Air Station, Dallas
Perrin Air Force Base, Sherman
Randolph Air Force Base, San Antonio
Reese Air Force Base, Lubbock
Sheppard Air Force Base, Wichita Falls
Waco 12th Air Force Headquarters Office, Waco
Webb Air Force Base, Big Spring

Utah
Hill Air Force Base, Ogden
Wendover Air Force Auxiliary Field, Wendover

Vermont
Burlington Municipal Airport, Burlington
Ethan Allen Air Force Base, Winooski

Virginia
Byrd Field, Richmond
Langley Air Force Base, Hampton

Washington
Fairchild Air Force Base, Spokane
Geiger Field, Spokane
George Wright Air Force Base, Spokane
Larson Air Force Base, Moses Lake
McChord Air Force Base, Tacoma
Paine Air Force Base, Everett

Wisconsin
General Mitchell Field, Milwaukee
Truax Field, Madison

Wyoming
Francis E. Warren Air Force Base, Cheyenne

DEPARTMENT OF THE ARMY

Ordnance Corps

The mission of the Ordnance Corps is to provide for the research, development, test, procurement, manufacture, inspection, distribution, supply, maintenance, modification, and disposal of arms, ammunition, artillery, bombs, mines, combat vehicles, transport vehicles, guided missile systems, ballistic missile systems, rocket systems and other assigned weapons systems, mobile repair shops, Army aircraft targets and drones, and parts and accessories pertaining thereto, required for the Army, as assigned with respect to the Navy and Air Force and as prescribed for foreign aid programs.

Ordnance Ammunition Command, Joliet Arsenal, Joliet, Ill.
Procures principally for the production, industrial engineering, and industrial mobilization of Ordnance materiel classified as ammunition, i.e.: Ammunition, artillery; Ammunition, small arms; Explosives and separate explosive ingredients; Explosives processing equipment; Flares; Grenades; Land Mines; Rockets and Signals.

Ordnance Missile Command, Redstone Arsenal, Ala.
Procures principally for the design, research, development, industrial engineering, industrial mobilization, and production of missiles, i.e.: Major combinations or systems or end items of guided missile systems; Aerial target drones; Ground equipment for guided missile systems.

Ordnance Tank-Automotive Command, 1501 Beard Street, Detroit 9, Mich.
Procures for the production, industrial engineering, industrial mobilization, and repair part supply of Ordnance material classified as tank-automotive, i.e.: Automobiles; Combat vehicles; Motorcycles; Trucks; Tanks; Motor scooters; Tractors; Trailers; Tires; Tubes; Batteries and automotive lighting fixtures.

Ordnance Weapons Command, Rock Island, Ill.
Procures principally for the production, development, industrial and engineering, industrial mobilization, repair part stock and supply control of Ordnance materiel, i.e.: Artillery carriages; Artillery mounts; Artillery recoil mechanism; Artillery targets and target materials; Launchers; Machine Guns; Ammunition clips; Ammunition magazines; Small arms, pistols and rifles; Generating equipment, electrical (for seacoast artillery); Seacoast targets.

Aberdeen Proving Ground, Maryland
Procures principally for the equipment and/or professional operations in support of ballistic research, development of protective coatings, engineering tests, and human engineering evaluation.

Diamond Ordnance Fuze Laboratories, Washington 25, D. C.
Principal development and engineering installation for electronic fuzes.

Frankford Arsenal, Bridge & Tacony Sts., Philadelphia 37, Pa.
Procures principally for the development, production, industrial engineering, industrial mobilization, repair parts components, and maintenance of off-weapon fire control systems or major combinations and on-weapon fire control systems or major combinations and on-weapon fire control components, i.e.: Cartridge brass; Fire control equipment; Optical instruments and accessories; Watches.

Office of Ordnance Research, Box CM, Duke Station, Durham, N. C.
Principal fundamental research and basic research installation. Contracts primarily with universities and nonprofit institutions.

Picatinny Arsenal, Dover, N. J.
Procures principally for the research and development, industrial and maintenance engineering support for newly developed items of the type listed under the Ordnance Ammunition Command including nuclear war heads.

Raritan Arsenal, Metuchen, N. J
Procures principally for the industrial engineering, industrial mobilization, maintenance and inventory control of material classified as cleaning, preserving and lubricating items, i.e.: Cleaners; Lubricants; Preservatives; Recoil oil and fluids; Special oils and fluids; Packing and gasket materials; Miscellaneous hardware; Abrasive materials; Non-metallic fabricated materials; Anti-freeze.

Rossford Ordnance Depot, Toledo 1, Ohio
Procures principally for materials, i.e.: Automotive type tools; Tool sets and tool equipment including Ordnance tools, and shop equipment; Vehicular equipment components, i.e.: Tires and tubes; Maintenance and repair shop equipment; Hand tools, measuring tools, and miscellaneous tool material.

Watervliet Arsenal, Watervliet, N. Y.
Procures principally for the development, production, industrial engineering, and industrial mobilization of Ordnance material classified as cannon, i.e.: Artillery Cannon; Mortars; Recoilless Rifles.

White Sands Missile Range, N. Mex.
This installation has responsibility for operations and support of engineering tests and long range research on rockets and guided missiles.

Ordnance Districts

It is not necessary to refer solely to the issuing office for additional data on a bid invitation issued by any of the Ordnance Corps offices. The following Ordnance District offices are the proper points of contact for firms (within their respective geographical areas) seeking contracts. These offices 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. These Offices also distribute requests for proposals, and negotiate certain contracts at the request of the issuing purchasing office.

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

Boston Ordnance District, Boston Army Base, Boston 10, Mass.
Springfield Regional Branch Office, Springfield Armory, Springfield 1, Mass.

Chicago Ordnance District, 623 South Wabash Avenue, Chicago, Ill.

Cincinnati Ordnance District, Swift Building, 230 East Ninth Street, Cincinnati 2, Ohio

Cleveland Ordnance District, Lincoln Building, 1367 East Sixth Street, Cleveland 14, Ohio

Detroit Ordnance District, 1580 East Grand Boulevard, Detroit, Mich.

Los Angeles Ordnance District, 55 South Grand Avenue, Pasadena 2, Calif.

New York Ordnance District, 770 Broadway, New York 3, New York.
Rochester Regional Branch Office, Sibley Tower Building, 25 North Street, Rochester 4, N. Y.

Philadelphia Ordnance District, 128 North Broad Street, Philadelphia 2, Pa.
Pittsburgh Regional Branch Office, 200 Fourth Avenue, Pittsburgh 22, Pa.

St. Louis Ordnance District, 4300 Goodfellow Boulevard, St. Louis 20, Mo.

San Francisco Ordnance District, 1515 Clay Street, P. O. Box 1829, Oakland 12, Calif.

Signal Corps

The Signal Corps has the responsibility to plan, direct and supervise signal communications, electronic, pictorial and crypto logistic activities of the Army; to develop communications, electronic, pictorial and, within the established national policy, communication security systems, services and material; to provide and service signal material for communications and communication security devices, electronic devices (including those for Army Aviation), meteorological devices (except those for which responsibility is assigned to other agencies); and related activities (except for that weather forecasting performed for the Army by the Air Force) required by the Army and, as assigned, for the Navy, Air Force, and other Governmental agencies and for foreign aid programs; and to administer and operate the U. S. Army Alaska Communication System.

U. S. Army Signal Supply Agency, USASSA, 225 So. Eighteenth St., Philadelphia 3, Pa.
Principal purchasing office of the US Army Signal Corps for production type items. Maintains the Signal Corps bidders list.

Laboratory Procurement Support Office, USASSA, Watson Area, Fort Monmouth, NJ.
Maintains bidders' list of firms and organizations who have made application to participate in Signal Corps research and development projects. Procures Research and Development services, studies and pilot production required for telephony, telegraphy, radio, radar, meteorology, radiation, radioactivity, metallurgy, crystalography, photography, television, cosmography, and allied subjects, and related component parts. Procures research supplies, instruments, and supplies for support activities.

Mid-Western Regional Office, USASSA, 615 West Van Buren Street, Chicago 7, Ill.
Contact point for information on Signal Corps new procurement actions. Displays copies of Invitations for Bids and Requests for Proposals. Procures commercial and military type items assigned by USASSA, Philadelphia, Pa., and administers contracts transferred for that purpose.

Army Electronic Proving Ground Procurement Office, USASSA, Fort Huachuca, Ariz.
Procures commercial and military type items of communication equipment for immediate support of activities at the installation and specialized Research and Development support services and materials.

Pacific Coast Agency, USASSA, 125 South Grand Avenue, Pasadena 2, Calif.
Contact point for information on Signal Corps new procurement actions. Displays copies of Invitations for Bids and Requests for Proposals. No procurement is made at this office.

US Army Alaska Communications System, 650 Federal Office Bldg., Seattle 4, Wash.
Procures all commercial and some military type items for the Alaska Communications System. Contact point for information on Signal Corps new procurement actions.

Transportation Corps

The Transportation Corps develops, provides, and services transportation material required by the Army and, as assigned, for the Navy and Air Force, and for foreign aid programs; provides or assures provision of transportation and transportation services required for the movement of persons and things for the Army, and, as assigned, for the Navy and Air Force and other governmental agencies; provides transportation engineering services as required; exercises technical supervision over Army transportation movements world side; and administers the Department of Defense activities pertaining to highways for National Defense.

Office, Chief of Transportation, Washington 25, D. C.
Contact point for all Transportation Corps procurement and procurement information.

U. S. Army Transportation Research Command, Fort Eustis, Va.
Procures research and engineering services, supplies and material required for the design and construction of prototype Transportation Corps equipment. Also contracts for scientific investigations and studies related to military transportation problems. Principal contact point for all Transportation Corps research and development.

U. S. Army Transportation Materiel Command, The Mart Bldg., 12th and Spruce Sts., St. Louis 2, Mo.
Principal contact point for all Transportation Corps procurement of supplies. Procures railroad cars, locomotives, and related equipment, household shipping containers (CONEX boxes), aircraft, aircraft engines and related items (except those procured under Air Force and Navy contracts). Procures secondary items of supply such as wire rope, slings, chain, rubber hose, hooks and shackles, clamps, manila rope, steel plate, strip steel, angles and bars, aluminum sheets, pneumatic tires. Procures, and is principal contact point for, the repair of all TC floating equipment. Procures services required for maintenance of TC principal items of supply.

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U.S. Army Missiles and/or Rockets

The responsibility for the expeditious execution of the U.S. Army Missile Program, so as to realize the earliest possible operational development of the missiles, has been assigned to the U.S. Army Missile Command, Redstone Arsenal, Alabama, under the jurisdiction of the Chief, U.S. Army Ordnance Corps.

Research and development contracts for an entire missile system are usually awarded to one "prime contractor." This prime contractor has the responsibility for initial production of all system components including the missile, launching and handling equipment, guidance, documentation, and test equipment. Depending on the particular capabilities of each prime contractor, various components are procured on subcontract from other manufacturers. In many cases, the dollar volume of subcontracted components exceeds the value of the components manufactured directly by the prime contractor.

Contractor selection for production of missile components is achieved through formal advertising and negotiation. Criteria considered in the selection of industrial contractors include production capability, reliability, costs, quality of the company's commercial or military products, and specific production requirements for the particular item under consideration.

U.S. Army Ordnance Missile Command maintains a source file on industrial firms. These files contain information on commercial and defense products, engineering capability, plant space and equipment, financial statements, and other information that is helpful in determining the full capability of a company. It is important that each company keep the U.S. Army Ordnance Missile Command supplied with up-to-date information. Submission of this material should be addressed to—

Commanding General
U.S. Army Ordnance Missile Command
Redstone Arsenal, Alabama

DEPARTMENT OF THE NAVY

Chief, Bureau of Naval Weapons, Department of the Navy, Washington 25, D. C.
Airframes, aircraft engines (jet and reciprocating), propellers, electronic equipment, aircraft armament target drones, ground handling equipment for aircraft, guided missiles, ammunition, fire-control equipment (including radar), naval guns, gun mounts, missile launchers, torpedoes, mines, depth charges, nets and booms, aviation ordnance.

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

The Quartermaster General Headquarters, U. S. Marine Corps, Department of the Navy, Washington 25, D. C.
Automotive spare parts, engineering equipment and supplies, electronic equipment and spare parts, refrigeration and air-conditioning equipment, household supplies, galley equipment, and laundry equipment.

Officer in Charge, Navy Purchasing Office, Temporary Bldg. D, 4th St. and Independence Ave., S. W., 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, 3d Ave. and 29th St., Brooklyn, New York, N. Y.
Insecticides,* waxes, precision instruments (navigational, optical, electrical-measuring), ecclesiastical items,* silverware (officers' mess gear),* rope, cordage, twine and vegetable fibers; also general procurement for naval activities in the area.

Commanding Officer, General Stores Supply Office, 700 Robins Avenue, Philadelphia 11, Pa.
Hardware and plumbing fixtures; building materials; heating, ventilation, and refrigeration equipment; soap, chemicals, 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; ferrous and nonferrous metal basic shapes and forms, paints and sealers.

Commanding Officer, Aviation Supply Office, 700 Robbins Avenue, Philadelphia 11, Pa.
Aircraft spare pasts, aeronautical instruments, aeronautical electronic equipment, paints and related products, clocks,* marine hardware.

Commanding Officer, Electronic Supply Office, Great Lakes, Ill.
Electronic maintenance and repair parts in support of existing Navy electronic equipment.

Commanding Officer, 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.

Commanding Officer, Yards and Docks Supply Office, Naval Construction Center, Port Hueneme, Calif. Hueneme, Calif.
Construction and excavating equipment and spare parts; automotive spare parts; tires, tubes, and retreading material; automotive repair equipment; pumps; compressors; building materials; prafabricated buildings;* Navy landing pontoons and propulsion units; electrical generating equipment; refrigeration equipment; station and utility repair parts.

Commanding Officer, Submarine Supply Officer, 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 distsibution and control equipment; electric motors; parts and accessories for rotating electrical equipment; electrical quantity-measuring instruments; metal valves and pipe fittings.

Commanding Officer, Fuel Supply Officer, Naval Gun Factory, Washington 25, D. C.
Coal and other solid fuels.*

Commanding 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 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.

Commanding Officer and Director, Naval Training Devices Center, Port Washington, Long Islands, N. Y.
Responsible for the development and procurement of training aids and devices for Navy Personnel.

Commanding Officer, Navy Ships Store Office, 29th Street and Third Avenue, Brooklyn 32, N. Y.
Purchases supplies, equipment, and merchandise for use or resale in Navy Exchanges throughout the world Directs and procurement of supplies, equipment and resale merchandise for Navy Ships Stores (ashore and afloat) and Commissary Stores which are contracted for on a national, regional, or local basis by the Navy Purchasing Office at this same address, or by the area purchasing offices. Local Navy Exchanges, Commissary Stores, and Ships Stores do some purchasing and may be contacted for additional information. The same rules and regulations which govern purchases of supplies and services are applied to Ships Store and Commissary Store purchases, whether for use or for resale. These artivities are operated under appropriated funds. However, since the Navy Exchanges are operated entirely under non-appropriated funds, separate legislation and regulations govern this purchasing operation which is more comparable to private commercial practice.

Commanding Officer, Navy Clothing and Textile Office, U. S. Naval Supply Activities, 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.

Bureau of Naval Weapons Established Representative Offices

Eastern District

Bureau of Naval Weapons General Representative, 252 Seventh Avenue, New York 1, N. Y.
Capt. W. E. Kenna, USN
Tel: Watkins 4-5000, Ext 470

Bureau of Naval Weapons Representatives, The Martin Company, Baltimore 3, Md.
Capt. H. A. Romberg, USN
Tel: Murdock 7-3800, Ext 773

Grumman Aircraft Engineering Corp., Bethpage, L. I., N. Y.
Capt. R. H. Smith, USN
Tel: Wells 1-1500

Bristol, Tenn.
LCdr. J. B. Jolly, USN, Acting
Tel: South 4-1122, Ext. 241

Cornell Aeronautical Lab., PO Box 235, Buffalo 21, N. Y.
LCdr. R. G. Tobin, USN
Tel: Plaza 7500, Ext. 315

Thiokol Chemical Corp., Reaction Motors Div., Ford Road, Denville, N. J.
Cdr. B. A. Fleck, USN
Tel: Oakwood 7-7000

Pratt & Whitney Aircraft Div., United Aircraft Corp., East Hartford 8, Conn.
Capt. R. L. Duncan, USN
Tel: Hartford-Jackson 8-4811, Ext. 8641

Garden City, L. I., 605 Stewart Avenue
Cdr. S. G. Kalemaris
Tel: Axtel 1-4600

Arma Corp., Roosevelt Field, Garden City, N. Y.
LCdr. George B. Bender, USN
Tel: Pioneer 2-2054

Vertol Aircraft Corp., Morton, Pa.
Cdr. H. F. McLinden, USN
Tel: Kingswood 3-4000, Ext. 687

Eastman Kodak Co., 121 Lincoln Ave., Rochester 11, N. Y.
CWO M. A. Reeves, Acting
Tel: Beverly 5-7770, Ext. 398

Johns Hopkins University, Applied Physics Lab., 8621 Georgia Ave., Silver Spring, Md.
Cdr. G. G. Duke, USN
Tel: Juniper 9-7700

Johns Hopkins University, Ordnance Aerophysics Lab., Daingerfield, Texas
Mr. T. K. Ewan, USN
Tel: Lone Star 2211, Ext. 476

Bendix Corp., Eclipse-Pioneer Div., Teterboro, N. J.
Cdr. J. J. Coyle, USN
Tel: Atlas 8-2000, Ext 2153—2104

Pratt & Whitney Aircraft, Florida Research & Development Center, West Palm Beach, Fla.
Cdr. J. C. Jennings, USN
Tel: Victor 4-7311, Ext. 494, 495

United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.
Cdr. G. D. Haines, USN
Tel: National 3-1621, Ext. 301

Kaman Aircraft Corp., Bloomfield, Conn.
LCdr. J. Yeatropoulos, USN
Tel: Hartford-Chapel 2-4481, Ext. 275

Central District

Bureau of Naval Weapons General Representative, Wright-Patterson Air Force Base, Ohio
Capt. R. F. Kane, USN
Tel: Clearwater 3-7111, Ext. 32314

Bureau of Naval Weapons Representatives, Akron 5, Ohio
Cdr. C. H. Grainger, USN
Tel: Stadium 4-7127

Thompson Ramo Wooldridge, Inc., PO Box 3158, Cleveland 17, Ohio
Capt. O. H. Cote, Jr., USN
Tel: Kenmore 1-8760, Ivanhoe 1-7500, Ext. 294

North American Aviation, Inc., Columbus Div., 4300 E. Fifth Ave., Columbus, Ohio
Cdr. R. S. Chandler, USN
Tel: Belmont 1-1851, Ext. 283

Naval Industrial Reserve Aircraft Plant, PO Box 5907, Dallas, Tex.
Capt. A. C. Holt, Jr., USN
Tel: Andrews 2-3211, Ext.-3008, 677

Bell Helicopter Corp., PO Box 482, Fort Worth, Tex.
LCdr. J. H. Arquette, USN
Tel: Atlas 4-1491

Kansas City, Mo., PO Box 5381
LCdr. F. C. Riley, USN
Tel: Delmar 3-7400, Ext. 292

Northern Pump Co., Columbia Heights Branch Post Office, Minneapolis 21, Minn.
Cdr. J. J. Herrick, USN
Tel: Sunset 8-8601

Mishawaka, Ind., 400 So. Belger St.
Capt. L. F. Bassett, USN
Tel: Blackburn 5-2111

McDonnell Aircraft Corp., PO Box 516, St. Louis, Mo.
Capt. R. E. Sorensen, USN
Tel: Pershing 1-2121, Ext. 2731, 2732

Western District

Bureau of Naval Weapons General Representative, 400 Douglas St., El Segundo, Calif.
Cdr. C. A. Tenhagen, USN, Acting
Tel: Oregon 8-8956, Eastgate 2,3234, Ext. 1

Bureau of Naval Weapons Representatives, Aerojet General Corp., 6352 North Irwindale Ave., Azusa, Calif.
Cdr. H. J. Kicker, USN
Tel: Cumberland 3-6111, Ext. 5280

Lockheed Aircraft Corp., Factory "A", Burbank, Calif.
Capt. G. W. Okerson, USN
Tel: Triangle 7-2711

Lockheed Aircraft Service, Inc., Honolulu International Airport, Honolulu, Hawaii
Cdr. J. A. Davis, USN
Tel: Navy 4711, Ext. 43123

Lockheed Aircraft Service, Inc., International Airport, Ontario, Calif.
Cdr. R. E. Hoskins, USN
Tel: Yukon 4-1234, Ext. 240, 241

Douglas Aircraft Co., Inc., El Segundo Division, El Segundo, Calif.
Capt. E. A. Lohmann, USN
Tel: Oregon 8-8211, Ext. 2621

North American Aviation, Inc., Los Angeles 45, Calif.
Cdr. W. R. Wilson, USN
Tel: Orchard 2-9151

Goodyear Aircraft Corp., Litchfield Park, Ariz.
Cdr. H. J. Baird, USN
Tel: Westport 5-9331, Ext. 251, 219

Hiller Aircraft Corp., 1350 Willow Rd., Palo Alto, Calif.
Cdr. J. A. Robinson, USN
Tel: Davenport 5-3241, Ext. 410

Naval Industrial Reserve Ordnance Plant, 1675 W. 5th Street, PO Box 1011, Pomona, Calif.
Cdr. A. R. Brueggemann, USN, Acting
Tel: National 9-5111

Convair, Div. of General Dynamics Corp., San Diego 12, Calif.
Capt. R. L. Savage
Tel: Cypress 6-6611, Ext. 2022

Bureau of Naval Weapons Technical Representative, Tokyo, Japan, c/o Navy Section, Military Assistance Advisory Group, APO 900, San Francisco, Calif.
Capt. G. N. Eisenhart, USN
Tel: Tokyo 48-4226

Bureau of Naval Weapons Rep., Special Project Officers, Lockheed Aircraft Corp., Missile Systems Div., PO Box 504, Sunnyvale, Calif.
Capt. W. A. Hasler, USN
Tel: Regent 94321

Aerojet General Corp., PO Box 1947, Sacramento, Calif.
Cdr. E. G. Newburg, Jr., USN
Tel: Yukon 5-5111

Single Manager Agencies

Military Clothing & Textile Supply Agency, 2800 S. 20th St., Philadelphia 45, Pa.

Military Medical Supply Agency, 3rd Avenue and 29th Street, Brooklyn 1, New York

Military Subsistence Supply Agency, 226 W. Jackson Blvd., Chicago 6, Ill.

Military Petroleum Supply Agency, Yards & Docks Building, Washington 25, D. C.

Small Business Personnel

Washington, D. C.

Office of Naval Materiel, 18th & Constitution Ave., NW, Room B-205
Capt. F. A. Allis, (SC) USN
Mr. M. Questal
Telephone: Liberty 5-6700, Ext. 66053

Bureau of Naval Weapons, Room 0310 Main Navy
Cd. D. Spirt, USN
Mr. J. F. Lenahan
Telephone: Oxford 6-6022

Bureau of Naval Personnel, Room 2635, Arlington Annex
Capt. I. N. Hughes
Telephone: Liberty 5-6700, Ext. 42021

Bureau of Ships, 18th & Constitution Ave., N. W., Room 1225
Mr. Michael Chemsak
Mr. H. W. Garrard
Telephone: Liberty 5-6700, Ext. 63695

Bureau of Supplies & Accounts, Room 0235, 18th & Constitution Ave., N. W.
Mr. H. G. Fowler
Telephone: Liberty 5-6700, Ext. 64680

Bureau of Yards & Docks Annex, Room 2A64
Capt. W. J. Davis, USN
Telephone: Liberty 5-6700, Ext. 63281

Military Petroleum Supply Agency, Yards & Docks Annex; Room 2854
Mr. R. A. Wightman
Telephone: Liberty 5-6700, Ext. 56104

Military Sea Transportation Service, Room 2208A Bldg., T-8, 3800 Newark St. N. W.
Capt. T. M. Davis, USN
Mr. C. D. Tylor
Teleshone: Liberty 5-6700, Ext. 69861

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 Weapons Plant, Bldg. 200, 11th & N Streets S. E.
Mr. J. L. Kensinger
Telephone: Lincoln 7-5700 (code 142) Ext. 562

District Public Works Office, Potomac River Naval Command, Bldg. 57, 3rd Floor
Mr. C. B. Stokes
Telephone: Lincoln 7-5700 (Code 142), Ext. 2109

Naval Research Laboratory, Bldg. 32, 2nd Floor, Room 200, 4th near Cheasapeake, S. W.
Mrs. Ilia B. Strife
Telephone: Johnson 3-6600 (Code 172), Ext. 2550

Navy Purchasing Office, Room 136, Tempo Bldg. D, 4th & Independence Ave. S. W.
Mr. E. J. Elwood, Jr.
Telephone: Liberty 5-6700, Ext. 64809

Office of Naval Research, Room 2804, 17th & Constitution Ave., N. W., Tempo 3 Bldg.
Mr. L. O. Lincoln
Telephone: Liberty 5-6700, Ext. 66650

Hq. U. S. Marine Corps, Room 4002, Arlington Annex
Capt. F. B. Morris, USMC
Telephone: Liberty 5-6700, Ext. 41939

Alaska, Kodak District Public Works Office, Navy No. 127 Postmaster, Seattle, Washington
Mr. Robert R. Morrison
NS-Kodak, Ext. 718

California

Marine Corps Supply Center, Barstow
Lt. Col. H. Wallace, USMC
Telephone: Barstow 2171, Ext. 344

Marine Corps Base, Camp Pendleton
Mr. W. R. Brumbaugh
Telephone: SAratoga 2-4111, Ext. 8004

Navy Purchasing Office, 1206 South Santee Street, Los Angeles
Mr. Bertram Friedman
Telephone: Richmond 9-4711, Ext. 1466

District Public Works Office, San Bruno,
LCDR L. H. Edling, JU 3-1640

U. S. Naval Supply Center, Oakland, General Supply Depot, Purchasing Div.
Mr. G. R. Kinnear
TWinoaks 3-4224, Ext. 631

U. S. Naval Supply Center, Oakland
Mr. M. Zermani
TWinoaks 3-4224, Ext. 631

Naval Ordnance Test Station, Pasadena Annex, 3202 E. Foothelll Blvd.
Mr. Clinton Weaver
SYcamore 3-0621

Yards & Docks Supply Office, U. S. Naval Construction Center, Port Hueneme
Mrs. Olive E. Sherman
Telephone: Hunter 6-1651, Ext. 8515

Marine Corps Depot of Supplies, 100 Harrison Street, San Francisco
M. E. Toland
Telephone: Garfield 1-2013, Ext. 222

Military Sea Transportation Service, Fort Mason
Mr. Raymond C. Garfias
Telephone: Prospect 6-2200, Ext. 7105

Marine Corps Recruit Depot, San Diego
CWO. R. E. Pasley, USMC
Telephone: CYpress 8-3941, Ext. 786

District Public Works Office, 1220 Pacific Highway
Mr. B. L. Wade
BE 2-3871, Ext. 732/471

Connecticut

U. S. Naval Submarine Base, New London
D. P. Sullivan
Telephone: Gibson 2-4411, Ext. 555

Florida

Naval Air Station, Bldg. 110, Jacksonville
Mr. F. C. Barnes, Jr.
Telephone: Evergreen 9-7711, Ext. 781

Naval Mine Defense Lab., Panama City
Cdr. J. L. Warden, SC, USN
Telephone: Sunset 5-5285, Ext. 342

Naval Air Station, Bldg. 603, Pensacola
G. L. Hemphill
Telephone: Glendale 5-3211, Ext. 3195

Georgia

Marine Corps Supply Center, Albany
Maj. V. R. Penley, USMC
Telephone: HEmlock 5-3451, Ext. 221

Naval Ordnance Plant, Macon
Mr. G. W. Holcomb
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 Horbor 4711

District Public Works Office (Mail Address—Navy 128, FPO, San Francisco, Calif.)
CDR. T. P. Cocke
DPWO Pearl Harbor, 28194

Illinois

Naval Ordance Plant, 7500 W. Roosevelt Road, Forest Park
Mr. Jason C. VanDyke
Telephone: Easterbrook 8-3800, Ext. 283

Electronics Supply Office, Great Lakes
Mr. R. L. Fitzgerald
Telephone: Delta 6-3500, Ext. 8284

District Public Works Office, Ninth Naval District
Mr. Alfred Yesland
DElta 6-3500, Ext. 345

Naval Supply Depot, Great Lakes
Miss S. Beth Newsom
Telephone: Delta 6-3500, Ext. 8305

Indiana

Naval Ammunition Depot, Bldg. 64, Crane
Mr. P. A. Anderson
Telephone: CRane 2-511, Ext. 5731

U. S. Naval Avionics Facility, Indianapolis
Marshall T. Wampler
Telephone: Fleetwood 7-8311, Ext. 490

Kentucky

U. S. Naval Ordnance Plant, Louisville
Mr. R. S. Loebig

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: Whitehall 5571, Ext. 240

District Public Works Office, U. S. Naval Station
Capt. C. O. McGraw
Telephone: FOrest 6-2311, Ext. 342

Maryland

Naval Air Station, Patuxent River
Mrs. Grace Moore
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 Ordnance Laboratory, Silver Springs

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

District Public Works Office, 495 Summer Street, Boston
Mr. N. F. Flynn
LI 2-5100, Ext. 204

New Hampshire

Naval Shipyard, Bldg. 153, Portsmouth
Mr. W. M. Varrell
Telephone: Idlewood 9-1000, Ext. 424

New York

Military Medical Supply Agency, 84 Sands St., Brooklyn
Lt. W. E. McCorville, MSC
Telephone: MAin 5-4581, Ext. 411

Navy Ships Stores Office, 3rd Ave. & 29th St., Brooklyn
Mr. J. O. Combs
Telephone: STerling 8-5000, Ext. 352

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U. S. Navy Purchasing Office Naval Supply Activities, 3rd Ave. & 29th St., Brooklyn
Mr. Joseph Riemer
Telephone: STerling 8-5000, Ext. 804
Military Sea Transportation Service, Atlantic Area, 58th Street & 1st Ave., Brooklyn
Mr. G. P. Cross
Telephone: Gedney 9-5400, Ext. 5161
U. S. Naval Training Devices Center, Sands Point, L. I.
Mr. Herbert A. Treat
Mr. E .J. Bocchicchio
Telephone: Port Washington 78300, 433
N. Y. Naval Shipyard
Mr. L. H. Strakowsky
District Public Works Office, 90 Church St.
Lt. F. E. Lennox
Telephone: [illegible] 2-9100, Ext. 8389

North Carolina

U. S. Marine Corps Air Station, Cherry Point
Mr. E. J. Beamon
Telephone: Gilbert 7-2111, Ext. 23109
U. S. Marine Corps Base, Camp LeJeune
Mr. E. D. Cleaton
Telephone: Camp LeJeune, Ext. 75566

Oklahoma

Naval Ammunition Depot, McAlester
Mr. D. H. Adams
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
Telephone: POplar 6-4751, Ext. 310
Ordnance Supply Office, Mechanicsburg
Mr. P. J. Horan
Telephone: Poplar 6-4751, Ext. 719
Aviation Supply Office, 5801 Tabor Avenue, Philadelphia
Mr. W. F. O'Connell
Telephone: Pilgrim 2-1000, Ext. 468
District Public Works Office, Bldg. 1, U. S. Naval Base
Mr. R. L. Downey
Telephone: HO 5-1000, Ext. 3657
Naval Air Material Center, Bldg. 76, U. S. Naval Base, Philadelphia
Miss Mildred Miller
Telephone: Howard 5-1000, Ext. 3432
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 Supply Activity, 1100 South Broad Street, Philadelphia
Mr. V. P. Manganaro
Telephone: Kingsley 6-2000, Ext. 343
Naval Ordnance Plant, York
Mr. E. J. Yergo
Telephone: York 7821, Ext. 245
Philadelphia Naval Shipyard, Naval Base
Mr. C. B. Friel
Telephone: HOward 5-1000, Ext. 2418

Rhode Island

Naval Supply Depot, Bldg. 11, Coddington Cove, Newport
Lilliam L. Whittey
Telephone: VI 7-2280, Ext. 8339

South Carolina

Naval Shipyard, Bldg. 7, Charleston
Mr. W. H. Heissenbuttel
Telephone: SHerwood 7-4171, Ext. 2107
District Public Works Office, Naval Base, P. O. Box 365
Mr. T. E. Page
Telephone: SH 7-4171, Ext. 2487
Marine Corps Recruit Depot, Parris Island
Mr. F. E. Hebert
Ext. 5674

Tennessee

Naval Air Station, Bldg 11, North Side, Memphis
Mr. John G. Sells
Telephone: Jackson 6-8851, Ext. 211

Texas

Naval Air Station, Corpus Christi
Mr. H. F. Hale
Telephone: Terminal 5-8211, Ext. 2278
Naval Station, Orange
Lt. (J. G.) E. G. Raborn
Telephone: TUxedo 3-4311, Ext. 281

Virginia

Navy Proving Ground, Dahlgren
LCDR A. B. Jaquay, SC, USN
Telephone: North 3-2501, Ext. 216
Navy Purchasing Office, Bldg. 143, Naval Supply Center, Norfolk
Miss Esther Roberts
Telephone: Madison 2-8211, Ext. 3051
District Public Works Office, Naval Base
Mr. C. A. Goodwin
Telephone: MA 2-8211, Ext. 2926
Norfolk Naval Shipyard
Mr. L. C. Shaughnessy
Telephone: EXport 7-6541, Ext. 2046
Marine Corps Schools, Quantico
Lt. Col. Murray L. Thompson, USMC
Telephone: Quantico 1000, Ext. 9776, 6165

Washington

Puget Sound Naval Shipyard, Bremerton
Mr. R. I. Shenenberger
Telephone: Essex 3-5011, Ext. 07-355
Naval Supply Depot, Seattle
LCDR E. E. Bramhall (SC) USN
Telephone: Alder 5200, Ext. 421, 422
Major Purchasing Offices
Military Sea Transportation Service, North Pacific Subarea—Pier 37
Mr. W. D. Zevenbergen
Telephone: ADler 5200, Ext. 381
District Public Works Office, Seattle Naval Station
Mr. G. L. Moulton
Telephone: ADler 5200, Ext. 337

Research and Development Opportunities

The majority of naval research and development contracts are awarded by the activities listed below. Interested firms should notify the appropriate activity of the specific research or development areas in which they are qualified, giving complete information on available facilities, past experience in Government and commercial work, qualifications of technical personnel and financial status.

Chief, Bureau of Aeronautics, Department of the Navy, Washington 25, D. C.
Issues research and development contracts in the general area of airframes, aircraft engines, propellers, electronic equipment, aircraft armament and fire control systems, aeronautical instruments, target drones, ground handling equipment for aircraft, guided missiles, parachutes, flight clothing, survival equipment, metals, chemicals, plastics, and photographic equipment.
Chief, Bureau of Ordnance, Department of the Navy, Washington 25, D. C.
Issues research and development contracts involving all types of naval ordnance items including guided missles, mines, torpedoes, guns, rockets, launchers, explosives, nuclear weapons, countermeasures, and ammunition.
Chief, Bureau of Ships, Department of the Navy, Washington 25, D. C.
Issues research and development contracts involving ship design, engineering services, fuels and lubricants, chemistry, metals and metallurgy, elastometers, textile and safety equipment, wood products, plastics, ceramics and dielectrics, coatings and preservation, noise, vibration and shock electronic equipment and components, and hull and machinery components.
Chief of Naval Research, Department of the Navy, Washington 25, D. C.
Issues contracts for basic research, including fundamental studies in such fields as electronics, chemistry, and physics, and coordinates the research programs of the technical bureaus of the Navy.

DEPARTMENT OF DEFENSE AVIATION PLANTS PROCUREMENT ASSIGNMENTS

Aircraft Plants Assigned Air Force

Beech Aircraft Corp., Wichita, Kansas
Bell Aircraft Corp., Wheatfield, N. Y.
Bell Aircraft Corp., Tonawanda, N. Y.
Boeing Airplane Co., Renton, Washington
Boeing Airplane Co., Seattle, Washington
Boeing Airplane Co., Wichita, Kansas
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
General Dynamics Corp., Convair Div., Plant No. 2, San Diego, Cal.
General Dynamics Corp., Convair Div., Plant No. 4, Fort Worth, Texas
Hayes Manufacturing Corporation, Aircraft Division, Birmingham, Alabama
Hughes Tool Co., Hughes Aircraft Div., Culver City, Calif.
Lockheed Aircraft Corp., Plant B, Burbank, Calif.
Lockheed Aircraft Corp., Marietta, Georgia
Lockheed Aircraft Corp., Van Nuys, Calif.
North America Aviation, Inc., Inglewood, Calif.
North American Aviation, Inc., Downey, California
Northrop Aircraft, Inc., Hawthorne, Calif.
Northrop Aircraft, Inc. Radioplane Div., Van Nuys, Calif.
Palmdale Production and Testing Center, Palmdale, Calif.
Republic Aviation Corp., Farmingdale, N. Y.
United Aircraft Corp., Sikorsky Aircraft Division, Bridgeport, Conn.

Engine Plants Assigned Air Force

Aerojet-General Corp., Liquid Rocket Plant, Nimbus Station, Sacramento, Calif.
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, Deer Park, 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.

Propeller Plants Assigned Air Force

Curtis-Wright Corporation, Propeller Division, Caldwell, N. J.
General Mortors Corporation, Aero Products Division, Vandalia, Ohio

Aircraft Plants Assigned Navy

Bell Aircraft Corp., Bell Helicopter Corp., Hurst, Texas
Chance Vought Aircraft Inc., Plant B, Dallas, Texas
Douglas Aircraft Co., Inc., El Segundo, Calif., Santa Monica, Calif.
Edo Corporation, College Point, N. Y.
General Dynamics Corp., Convair Div., Plant No. 1, San Diego, Calif.
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.
Martin Co., Middle River, Maryland
McDonnell Aircraft Corp., St. Louis, Mo.
North-American Aviation, Inc., Columbus, Ohio
Ryan Aeronautical Corp., San Diego, Calif.
Temco Aircraft Corp., Plant A, Dallas, Texas
Vertol Aircraft Co., Morton, Pa.

Engine Plants Assigned Navy

Aerojet-General Corp., Azusa, Calif., Sacramento, Calif.
Reaction Motors, Inc., Denville, New Jersey
United Aircraft Corp., Pratt & Whitney Aircraft Div., East Hartford, Conn., North Haven, Conn., Southington, Conn.
Westinghouse Electric Corp., Aviation Gas Turbine Division, Essington, Pa., Kansas City, Mo.

Propeller Plants Assigned Navy

United Aircraft Corp., Hamilton Standard Propeller Division, Windsor Locks, Conn.

Selling to NASA

About 75 percent of all NASA expenditures go to private business, industry and educational and research organizations. NASA intends to continue to support and utilize these resources to the maximum extent.

Although some major contracts and arrangement for routine Headquarters supplies and services are contracted by Headquarters in Washington, the majority of contracts are planned and negotiated in the field. Each Research Center contracts for its own support including procurement of equipment, construction and R & D.

Each Center has its own procurement, contract negotiation, and small business staff. These offices maintain their own bidders or source lists for the supplies, services or research which they require. Any NASA procurement office can provide you with forms you can use to have your organization placed on these lists. Obtain copies, provide all the information called for, and forward one to each of the contracting Centers with which you wish to do business. This is an important step if you wish to be considered when proposals or bids are requested. NASA's decentralized procurement provides "on the scene" control, and helps to insure a diversity of sources. This means economy for the taxpayer and a wider span of business opportunities for you as a prospective contractor.

NASA contracting procedures generally follow the standard Armed Services Procurement Regulations used by the military services or Federal Procurement Regulations used by other Government agencies. However, there may be some differences in particular circumstances where the Armed Service or Federal Regulations would not be practicable or consistent with NASA's mission as established by the Congress. Such departures from standard procedures will be clearly explained in advance.

All NASA procurement offices buy supplies or services in one of these two ways:

FORMAL ADVERTISING BIDS, or *NEGOTIATED PROCUREMENT*.

Here are the essential features of each.

ADVERTISING FOR BIDS

Requests for bids are made whenever the supplies, materials, equipment, construction work or services required can be clearly described in the scope of work, specifications or drawings.

Generally, for such contracts, the purchasing office will send out "Invitations for Bids" to organizations on its "bidders list" for the particular item. That is why it is important for you to obtain, fill out and submit the special forms for this purpose. The purchasing office then knows something of your capabilities and knows that you are interested in bidding on a particular item or service.

On occasion, a bidders list will contain so many names for an item or service it would not be practicable to solicit and examine bids from every potential source. In these cases, the office may send invitations to only part of the list each time it makes a purchase. The names are changed at subsequent purchase invitations, until every listed firm is given an opportunity to bid. This usually applies to common commercial items where there are numerous sources.

Each Invitation to Bid will include technical specifications, delivery or completion dates, place and method of delivery, the nature and number of reports or manuals which may be required, operational tests and instructions, and other items which should be considered in submitting a bid. In addition, the contract clauses, terms and conditions are set forth in detail. There will also be a notice of the date, hour and place when the bids will be publicly opened and recorded.

As you follow the instructions on the Invitation to Bid, consider carefully any special conditions or clauses. Remember that mistakes discovered after the opening of a bid may not be subject to correction and can be costly.

Bids that arrive after the designated hour are "late bids" and will not be considered unless they have been delayed in the mails for reasons over which you have no control. Unless specifically authorized by the invitation to bid or accompanying papers, a telegraphic or alternative bid will not be considered.

NEGOTIATED PROCUREMENT

The technique of negotiated procurement is also employed by NASA under circumstances authorized by law. Negotiated procurement has particuler application in research and development where it is rarely possible to draft detailed specifications.

When NASA employs negotiated procurement it makes use of bidders or source lists. However, the procurement office may not find it feasible to request proposals or quotations from every organization on the list. In such cases, requests may be sent only to firms believed to be most qualified. Requests for proposals are sent to enough suppliers to assure full and free competition. In this way unqualified firms are not encouraged to incur substantial costs in preparing proposals where there is little prospect of award to them. Uninvited proposals, however, are considered.

The appropriate NASA contracting officer will review the various quotations or proposals received. He is authorized to negotiate further with firms which have submitted the most acceptable plans. Award of a contract is generally made by administrative decision based on a thorough analysis of all the facts presented. The contracting officer considers the factors previously mentioned, and in addition such matters as price, delivery, and quality of product.

If your proposal is acceptable to NASA a number of details will be discussed and worked out before a contract is signed. You may, at any stage in the negotiation, be asked to submit a detailed cost summary or breakdown, together with supporting data or other information.

It should be understood that even when the Government requests a proposal, there is no obligation to reimburse a bidder for any costs incurred in submitting the proposal.

RESEARCH PROPOSALS

You don't have to wait for NASA to make a formal request for an R & D proposal. If you have an idea which is original in nature and concept, and which falls within NASA's field of interest, you can submit your plan directly without waiting to be asked.

There is no specific form required for submitting unsolicited R & D proposals. But, here are some of the items you should include:

- Name and address of your organization.
- Number of employees, including totals and qualifications of technical personnel.
- Brief description of your facilities, particularly those which would be used in your proposed R & D effort.
- Brief outline of your previous

work and experience in the field.

- If available, you should include a descriptive brochure and financial statement.
- Title of your proposed research and name of the principal investigator (s).
- A brief abstract of the proposed project.
- A suggestion as to the proposed starting and completion dates.
- An outline of your proposed budget, including information on equipment, facility and personnel requirements.
- Names of any other Federal Agencies receiving this proposal.

Research proposals should be addressed to the National Aeronautics and Space Administration, Washington 25, D.C. marked, Attention: Office of Research Grants and Contracts. You should send 10 copies.

Your proposal is then studied by a special staff. Proposals which would further NASA program and not duplicate existing work to an unreasonable degree are then referred to NASA engineers and scientists in Washington and in the field who will make individual reports and recommendations to the appropriate NASA officials.

You can save time and speed a decision on your proposal by avoiding highly detailed and elaborate information in your initial submission. A complete proposal in final form need be submitted only after it has been determined that the project you propose is relevant to NASA needs and warrants more detailed study. Your informal letter proposal should come first.

NASA RESEARCH CENTERS

NASA Headquarters, National Aeronautics and Space Administration, Washington 25, D. C.
Director, Procurement and Supply: Ernest W. Brackett, Telephone: DU 2-6376
Small Business Advisor and Industry Assistance Officer: Jacob M. Roey, Telephone: DU 2-6814

Ames Research Center, Moffett Field, California, Mountain View, California, Tel: Yorkshire 7-5581
Procurement Officer: A. S. Hertzog
Small Business Specialist: Donald E. Davis
The Ames Research Center, with an extensive background in high-speed aerodynamics, is currently making important contributions in basic and applied research on both aeronautical and space flight problems.
Approximately two-thirds of the Center's programs are directly applicable to space, particularly atmosphere re-entry for manned satellites, boost-glide vehicles, proposed manned interplanetary and lunar craft and ballistic missiles. This includes a wide variety of environmental studies as well as research, both basic and applied, in stabilization and guidance.
The remaining portion of the Ames research efforts is concerned with the fundamentals of hypersonic and supersonic aircraft and the problems of vertical and short take-off and landing aircraft.
Typical projects at the Ames Research Center include: Orbital attitude stabilization of an advanced meteorological satellite; Stabilization and control for an orbiting astronomical observatory; Studies of the ability of a human pilot to control a space vehicle during re-entry; Design approaches for re-entry vehicles; Wind tunnel and flight research on vertical and short take-off and landing aircraft; Instrumentation and simulation techniques and devices and studies of military and civilian aircraft of the future.

Langley Research Center, Langley Field, Virginia, Hampton, Virginia, Tel: Park 2-6341
Procurement Officer: Sherwood L. Butler
Small Business Specialist: Joseph F. Braig
The Langley Research Center is primarily concerned with the conduct of research related to the problems associated with space flight and entry from space into planetary atmospheres, and problems of advanced aircraft.
In the areas of space flight and atmospheric entry, Langley Research Center activities include work on heat transfer, materials, structures, and guidance and control of satellites and spacecraft, ballistic missiles, anti-missile missiles, and boost-glide and winged space vehicles.
Aircraft research problems investigated at Langley are applicable to military and commercial vehicles of all types—missiles, bombers, interceptors, supersonic transports, helicopters, vertical takeoff-landing (VTOL) and short takeoff-landing (STOL) airplanes, and ground effect machines (GEMS) which permit large vehicles to ride on a cushion of air.
Typical projects at the Langley Research Center include: Experimental techniques duplicating the high-speed, high-temperature environment of returning spacecraft; Aerodynamic and structural research related to highspeed airplanes, missiles and spacecraft; Studies of basic fluid mechanics including magnetoplasmadynamics and the characteristics of gases at high temperature; Development of special structures capable of withstanding high temperature or landing impacts; Design and development of specialized research instrumentation and supporting research on specific development projects for both NASA and other Government organizations including Mercury, Minuteman, Polaris, and B-70.

Goddard Space Flight Center, Greenbelt, Maryland, Tel: LIncoln 7-9575
Procurement Officer: Daniel H. Murphey
Small Business Specialist: Harry T. O'Toole
The Goddard Space Flight Center is under construction with completion scheduled for late 1961. It is named for the late Dr. Robert H. Goddard, the "Father of American Rocketry." Pending completion of the permanent facility, personnel are housed in other buildings in the National Capital Area and at the Langley Research Center.
The major role of the Goddard Space Flight Center will be in the fields of scientific earth satellites, manned space flights, and communications and meteorological satellite systems. This will include advanced planning and execution of technical projects including monitoring of contractors in addition to the direct flight activities. The Center is responsible for related tracking data acquisition and data reduction from their flights.
Typical projects of the Goddard Space Flight Center include advanced planning and assistance in formulation of the National Space Program in the space sciences, manned flight, and satellite application areas; Scientific and engineering research necessary to serve as a base for future ideas and applications; Prototype fabrication of components and systems either by NASA personnel or by outside contract and management of operational programs in certain aspects of space communications and tracking including orbital computation, data reduction and interpretation.
One of the major subdivisions of the Goddard Space Flight Center is the Space Task Group which was created in the fall of 1958 to carry out Project Mercury, the NASA program to investigate man's performance capabilities and ability to survive in a true space environment. This program involves a research and development "buildup" and unmanned suborbital and orbital flight and recovery.

Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena 3, California, Tel: SYlvan 0-6811
Procurement Officer: William Vaughn
Small Business Specialist: D. W. Anawald
The task of exploring the moon and the planets is the major responsibility of NASA's Jet Propulsion Laboratory.
Research at JPL is administered through eight technical divisions and covers the broad spectrum of activities associated with space programs, including propulsion, aerodynamics, chemistry, guidance, communications, physics, mathematics, and many other related fields.
Although JPL is operated under contract by the California Institute of Technology, it follows NASA policy which encourages subcontracting tasks to industry. It is expected that in the near future 70 percent of the JPL contract funds will be awarded to outside organizations.

Western Operations Office, 150 Pico Boulevard, Santa Monica, California, Tel: EXbrook 3-9641
Procurement Officer: Earle Sample
Small Business Specialist: Paul E. Ross
Liaison responsibility for NASA contract activities located west of Denver is centered at the Western Operations Office, Santa Monica, California. This office provides liaison on the West Coast for industry and research organizations on one hand, and for NASA headquarters and field installations on the other.
The Western Operations Office administers NASA contracts, performs technical monitoring and liaison on NASA contracts or projects and advises Headquarters on technical developments and capabilities in the area. The office performs associated security, legal and patent services and auditing.

Flight Research Center, Box 273, Edwards, California, Tel. Clifford 8-2111
Procurement Officer: Morris E. Bowling
Small Business Specialist: Lloyd J. Walsh
Full-scale flight research, including such fields as aerodynamics, hot structures, operating problems and the mechanics of flight in the atmosphere is the task of the NASA Flight Research Center.
In addition to analytical programs, the Flight Research Center specializes in extensive flight studies using specially equipped operational and experimental aircraft. A major program at the current time is the X-15, designed to yield new data at extreme altitudes and speeds. A major future program involves technical direction for research instrumentation and participation in the flight program of the joint USAF-NASA Dyna Soar I.
While the major effort at the Flight Research Center is directly associated with the X-15 program, additional research includes: Predication of hypersonic aerodynamic characteristics through analog simulation techniques and correlation with flight; Investigation of the handling qualities of advanced military and commercial aircraft and radar and telemetry support for flight projects.

Wallops Station, Wallops Island, Virginia, Tel: VAlley 4-3411
Procurement Officer: Lewis T. Birch
Wallops Station is a primary center for the launching of research models for the study of hypersonic and space flight problems. This includes basic studies in connection with Project Mercury.
Many multi-staged research missiles are fired from the Wallops Station range facilities each year. Some of these missiles have flown higher than three million feet above the Atlantic Ocean and at speeds in excess of 16,000 miles an hour. NASA also plans the launching of small earth satellites into orbit from Wallops.
Typical projects at the Wallops Station also include flight studies of airplane, missile, or space vehicle "research shapes"; Flight studies of dynamic scale models of actual flight vehicles still in the design stage and research with free-fall instrumented models dropped from aircraft.

Marshall Space Flight Center, Huntsville, Alabama, Tel: JEfferson 6-4411
Procurement Officer: Wilbur S. Davis
Small Business Specialist: J. A. Harrison
The Marshall Space Flight Center consists mainly of facilities and personnel transferred under agreement from the Army Ballistic Missile Agency and other Army organizations at Redstone Arsenal, Alabama. The Center occupies 1,200 acres adjoining the city of Huntsville. Its facilities are valued at approximately $100 million. The Center has charge of developing and operating NASA's launch vehicles, and conducting related research.
Technical functions of the Center are divided among nine laboratories. Activities include investigation of aeroballistics and related sciences; simulation and data reduction; production of experimental model and prototype boosters and research in manufacturing methods and technology; the design and pilot development of guidance and control systems and checkout and launching of boosters and space vehicles.
Typical projects of the Marshall Space Flight Center include: Launching of spacecraft with the JUNO II booster; Modifying Redstone rockets for Project Mercury and development of the Saturn and Centaur vehicles, the F-1 single chamber 1.5 million-pound thrust engine and the 200,000-pound liquid hydrogen-liquid oxygen engines.

Lewis Research Center, 21000 Brookpark Road, Cleveland 35, Ohio, Tel: Winton 1-6620
Procurement Officer: John Biggs
Small Business Specialist: Norman C. Prahst
The Lewis Research Center is primarily responsible for basic and applied research in aeronautical and space propulsion and power generation. The effort is divided into five major areas: airbreathing engines, chemical rocket engines, nuclear rocket engines, electrical propulsion systems and power generation systems. In addition, the Research Center conducts research in materials, lubrication and wear and instrumentation.
Lewis is responsible for the operation of the Plumbrook Research Facility at Sandusky, Ohio. This facility conducts research pertinent to nuclear rocket systems, chemical rockets and power generation systems.
Typical projects at Lewis include: Effect of zero "G" condition on propellant storage and pumping systems; High energy propellants for rocket systems; Propulsion systems for "soft" lunar landings; Direct conversion of heat to electricity; Electrical rocket systems for space propulsion; Materials and heat transfer research related to nuclear rocket systems and analytical and experimental studies of fluid mechanics involving pumps, turbines and heat exchangers.

SECURITY REGULATIONS

NASA, to safeguard its classified contracts, has adopted the Department of Defense Industrial Security Program. This means that if you want to participate in a classified prime or subcontract, you must have, or must obtain, a Department of Defense Security clearance.

Advanced Research Projects Agency

Organization

The Advanced Research Projects Agency (ARPA) was established in February 1958 in response to an urgent need for centralized management of selected research projects which were essential to the security of the United States. As initially established, ARPA was a line agency of the Department of Defense, reporting to the Secretary of Defense. In late 1959, a realignment was effected under which the Director of ARPA is now responsible to the Director of Defense Research and Engineering.

How ARPA Operates

Within program areas assigned by the Director of Defense Research and Engineering, ARPA plans, initiates and directs specific research and development projects. ARPA operates as a small management team having sole responsibility for making decisions with respect to its assigned projects. A member of the pertinent ARPA Technical Office is designated as project manager for each project and he is the official ARPA representative in dealing with contractors and contracting agents.

In accomplishing its assignments, ARPA must determine the present "state of the art" and decide on the courses of action which are consistent with Department of Defense objectives and with available resources. In so doing, ARPA gives consideration to all available knowledge in the field particularly to proposals advanced by individuals, industry and government agencies.

Upon approval of a proposal, ARPA normally issues a work order, (ARPA Order), directly to a subordinate activity of one of the military departments, e.g., Air Research and Development Command, Army Ordnance Missile Command, Office of Naval Research, or to another government agency which acts as contracting agent for ARPA. In certain instances, ARPA may arrange for contracts to be awarded directly to individuals, business firms or educational or research institutions.

Funds necessary for the accomplishment of ARPA projects are made available from the ARPA budget.

How Unsolicited Proposals Should Be Prepared and Submitted

Proposals should be submitted in duplicate to the Director, Advanced Research Projects Agency, The Pentagon, Washington 25, D. C.

It is the desire of ARPA to utilize small business to the maximum extent possible. Therefore, proposals from small business are particularly encouraged.

Before submitting an unsolicited proposal to ARPA, the proponent should make a thorough search of all technical reports, patents and other data pertaining to the subject in order to become thoroughly familiar with the state of the art.

No standard format exists for submission of proposals. However, they should contain the following information (proposals should not normally exceed 25 pages in length):

1. General statement requesting consideration of the proposal.
2. A technical description of the proposed work, including a brief review of the scientific background and of work previously done in the field of the proposals.
3. Statement of the objectives of the project.
4. Technical approaches proposed.
5. Special facilities and equipment required and available.
6. Major phases and action milestones through which the project will progress with estimated dates for each.
7. Estimated cost of the proposal, showing a breakdown of major cost categories.
8. Names and background of principal scientists and engineers who will be used in the project.

To facilitate handling and evaluation of unsolicited proposals, it is recommended that a covering letter list the names of other government activities to which the proposals have been submitted.

Any information contained in a proposal which concerns a basic or major improvement and which is considered to be of a proprietary nature should be clearly identified. A differentiation should be made between proprietary data and patent data when one or both are contained in a proposal. (The Armed Services Procurement Regulations (ASPR), Section 9-201(b) gives the definition of proprietary data. These may be seen at the office of any contracting officer of the Department of Defense or they may be obtained from the Superintendent of Documents, Government Printing Office.)

The government is not obligated for reimbursement of costs incurred in preparing and submitting proposals.

Who May Be Contacted

Correspondence regarding ARPA activities should be addressed to the Director, Advanced Research Projects Agency, The Pentagon, Washington 25, D. C. Acknowledgment will be made of the receipt of all proposals, together with a statement of application to ARPA fields of interest.

Following issuance of an ARPA Order and establishment of a contract, contacts should be generally with the contracting agent (the addressee of the pertinent ARPA Order). Where this is not feasible, contact may be made with ARPA's Technical Offices which will be familiar with the status of the Order.

Project assignments held by ARPA are described in a brochure which may be obtained by writing the Advanced Research Projects Agency, The Pentagon, Washington 25, D. C.

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The most widely used product reference book of the Aviation Industry

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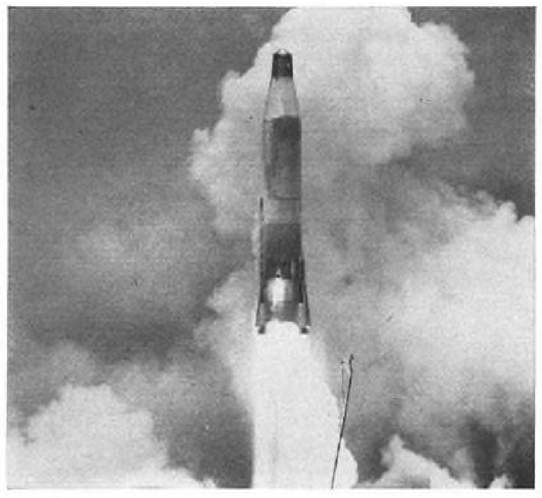

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The high strength, light weight and exceptional insulation qualities of *Aircomb* have caused its present and potential uses to multiply.

Makers of tanks for transportation of materials at cryogenic temperatures (approximately −300°F) have discovered that *Aircomb* can reduce wall thickness and weight more than 50% over present methods. Applications include tankers, tank cars, tank trucks and storage tanks. This Douglas product insulates against temperature changes – relative to thickness – better than any other known material and maintains its integrity in the process.

Another recent use of *Aircomb* is in piggyback cylinders for outer space research. *Aircomb* cylinders may be produced with gun-barrel smooth interiors in diameters up to 66 inches and lengths to 20 feet.

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To meet the specific needs of customers, Douglas will supply *Aircomb* core material... panels... partial products... products which incorporate customer-furnished equipment... or finished products.

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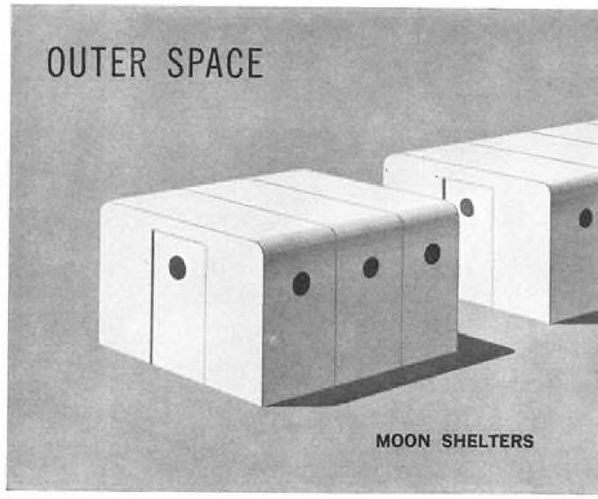
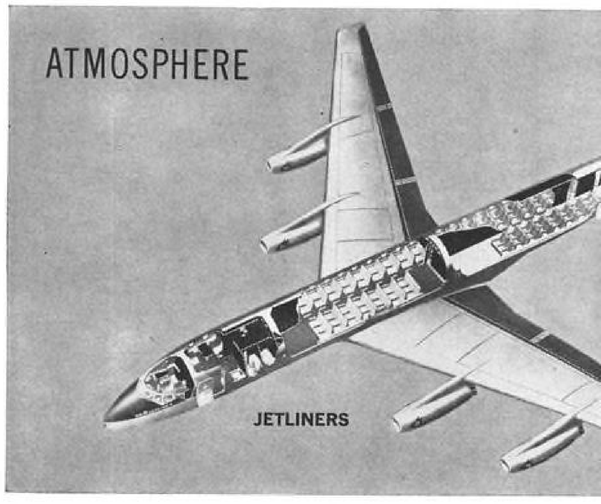
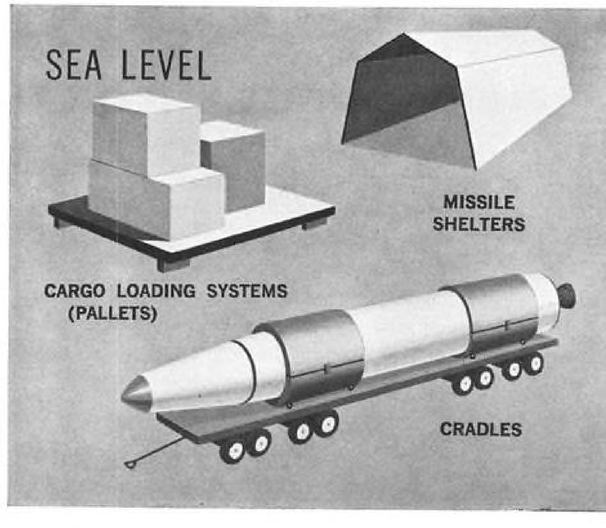
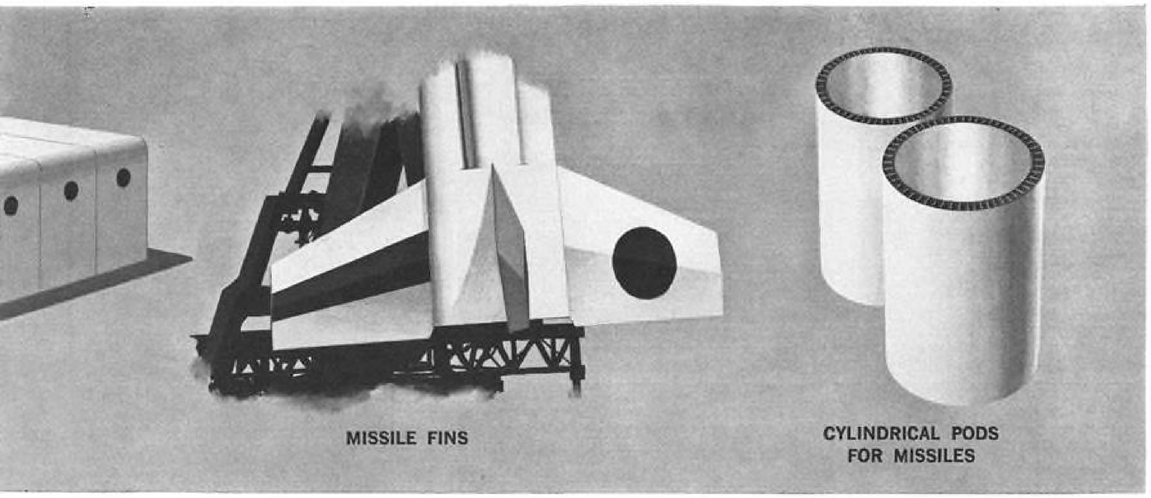
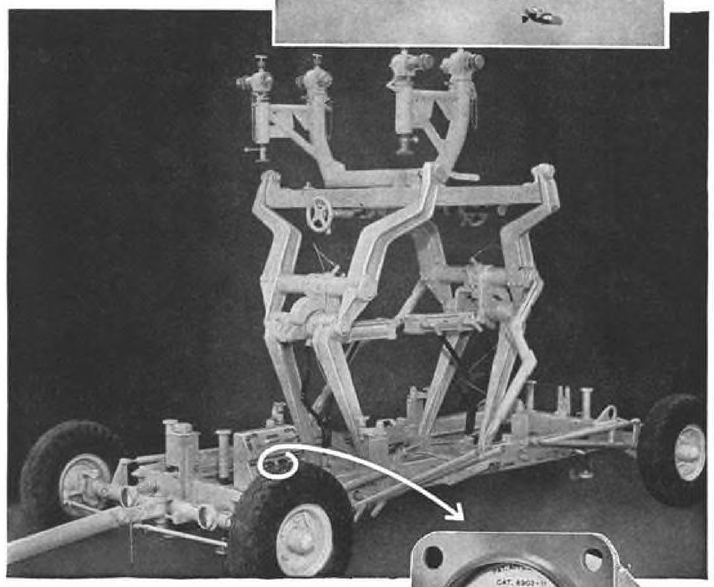








At the right a McDonald *Green Quail* Missile is being launched from a B-47. The *Green Quail* ground support trailer is shown below.



Trailer mounted RMC-Lindsay pressure gauges give fast, dependable systems check for unerring flight of Green Quail

Fast, because they are designed for maximum readability and quick response. Dependable, because of their simple direct-drive operation and precise construction.

The RMC-Lindsay gauge is completely different from the usual pressure gauge. Instead of the common "C" type bourdon tube, the RMC pressure element is a helical bourdon coil which offers greater resiliency and longer accurate cycling life. Instead of the pointer being actuated through the usual linkages, gears, hair springs and the like, the RMC pointer is attached directly to the end of the helical bourdon pressure element. This eliminates waver and lag, wear and slippage; provides exceptional resistance to the destructive effects of vibration, shock and pulsating pressures.

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Davenport 1-2414

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Benson Engineering Co.
2514 West Mockingbird Lane
TEXAS, Dallas 35
Fleetwood 2-7541

Rod Hanson
The Thorson Company
1767 15th Ave. S.
WASHINGTON, Seattle 44

Aircraft | Section A

Formation of Northrup Two-cockpit T-38As Going Through USAF Testing at Edwards AFB.

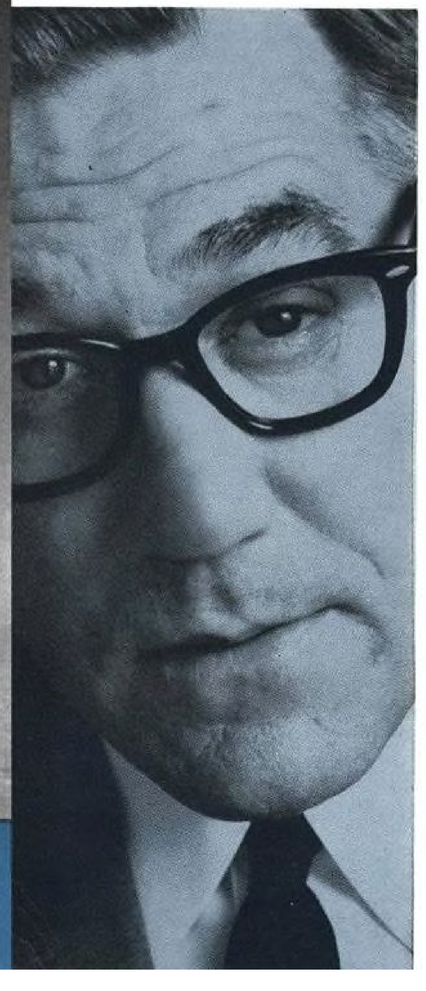
BUYERS' GUIDE FOR 1961

Circle Number 52 on Reader-Service Card

THREE REASONS WHY BENDIX BRAKES ARE BETTER

SAVE MONEY
SAYS THE CONTROLLER.

By their own careful accounting, airlines have found that Bendix® brakes combine economy with performance. Cost records kept by those airlines which are using the new jet transport aircraft equipped with Bendix brakes prove that they offer sure savings along with sure stops.



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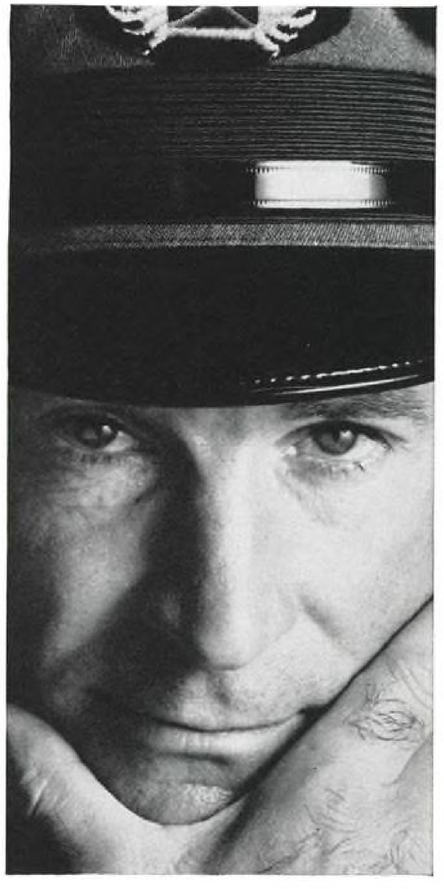
SAYS THE PILOT.

When 150 tons of aircraft touches down at jet-landing speed, Bendix experience pays off for the pilot in safe, sure braking control. This better performance is possible because of the superior materials and designs developed by Bendix—world's most experienced brake manufacturer.



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SAYS THE MAINTENANCE CHIEF.

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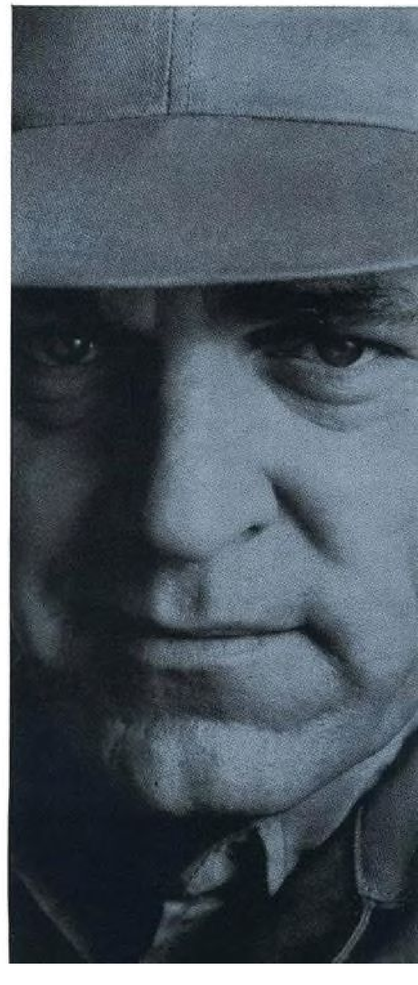

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Combine "Monoball"® Engineering Advantages with Life-Time Lubrication

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1. **LOWER COEFFICIENT OF FRICTION**
...ideal where lubrication is impossible or undesirable.
2. **WITHSTAND EXTREME VIBRATION**
...perfect performance under shock load conditions.
3. **WILL NOT "COLD-FLOW"**
...even under extreme load conditions.
4. **IMPERVIOUS TO KNOWN CHEMICAL SOLVENTS**
...eliminates corrosion problems.
5. **FAIL-SAFE** ...due to "Monoball"® design.

Request Engineering manual No. 551.

In addition, due to their two-piece "MONOBALL"® design and plastic alloy insert, "DYFLON"® bearings have a long cycle life. Alignment and installation problems are minimized. Oil-free for life means lowest possible maintenance costs.

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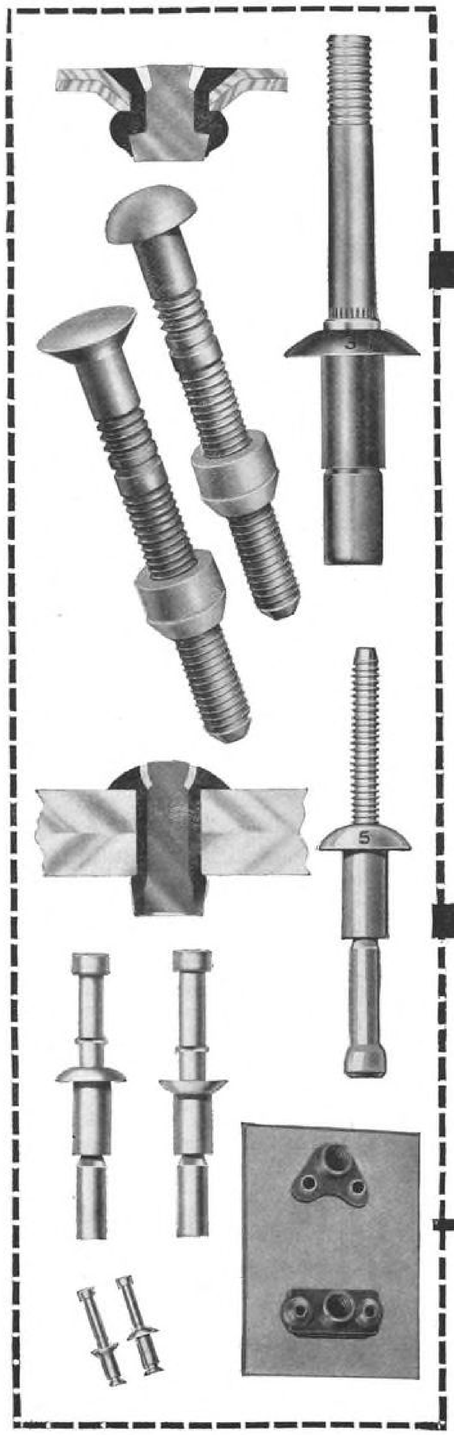

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Cherry High Clinch Rivets

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Cherry Rivet Division

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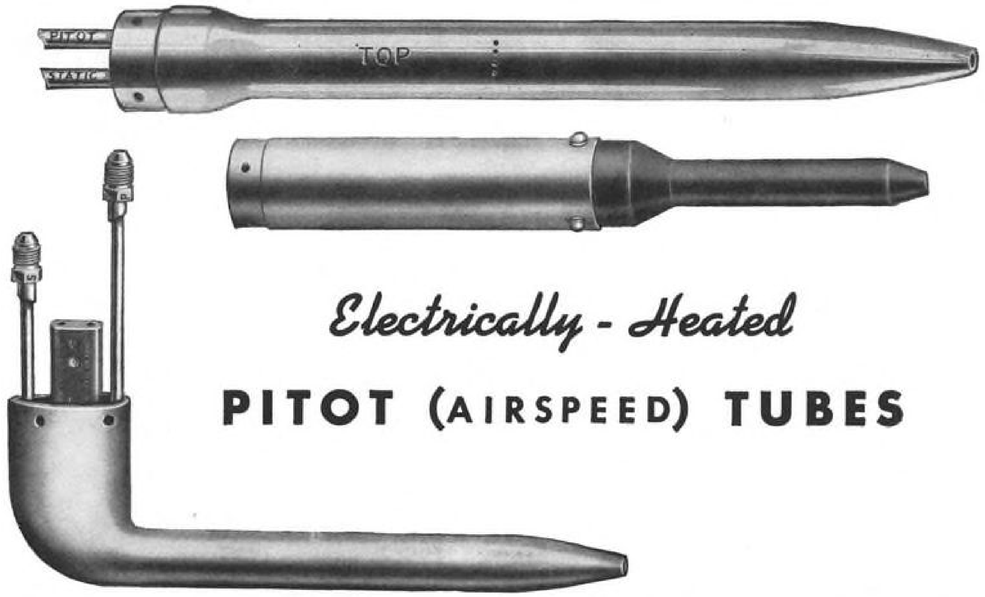

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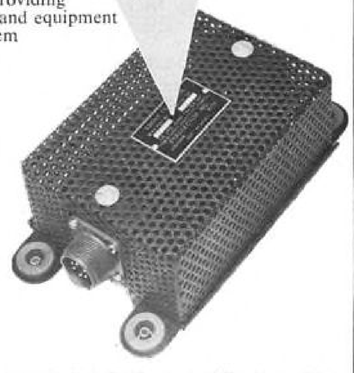

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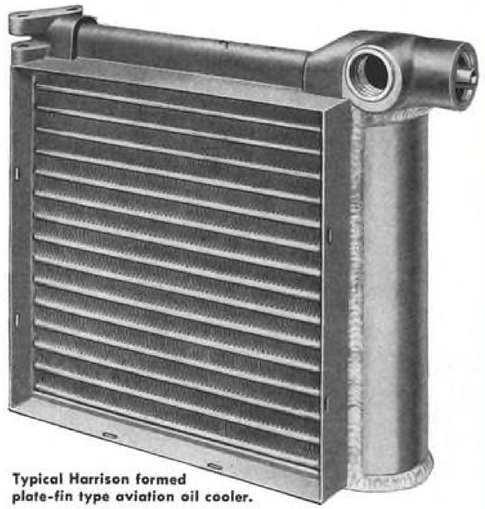
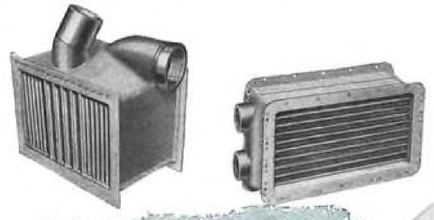
From General Motors...Temperatures Made to Order

GM HARRISON KEEPS GRUMMAN MOHAWK HUMMIN'



Typical Harrison formed plate-fin type aviation oil cooler.



Harrison heat exchangers—quality products of General Motors Research and Engineering—offer high reliability for aircraft, space and missile applications.

Harrison Heat Exchangers Cool Engine Oil for All-Weather Turbine-Powered Observation Plane

Day or night, in any kind of weather, the Army can rely on the Mohawk—with its visual, photo, radar, or infrared equipment—to observe battle areas and locate missile targets. And this high performance aircraft, powered by two Lycoming T-53L3 turbine engines, relies on Harrison heat exchangers to keep oil temperatures under surveillance. Harrison's brand of reliability—"measurable excellence"—results from an "initial design to end use" concept which makes Harrison heat transfer products perform as intended—assuring complete dependability and peak efficiency under the most severe operating conditions. This reliability is built right into every one of Harrison's 15 basic types of heat transfer construction—a complete line of designs, incidentally, which permits the selectivity that assures the *right* heat exchanger for every application. To save time and money on your temperature control problems—and to get a *reliable* solution—call in a Harrison Sales Engineer at the design stage.

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This is systems capability at NAA-Columbus

Many of the significant advances in electromechanics, electronics systems, environment systems, and other areas, were originated and brought to fruition at the Columbus Division of North American Aviation. A complete center of advanced systems technology, the Columbus Division has the minds and facilities to convert original concepts into practical hardware with economy and efficiency. This is true systems capability... this is the Columbus Division.

THE COLUMBUS DIVISION OF
NORTH AMERICAN AVIATION, INC.
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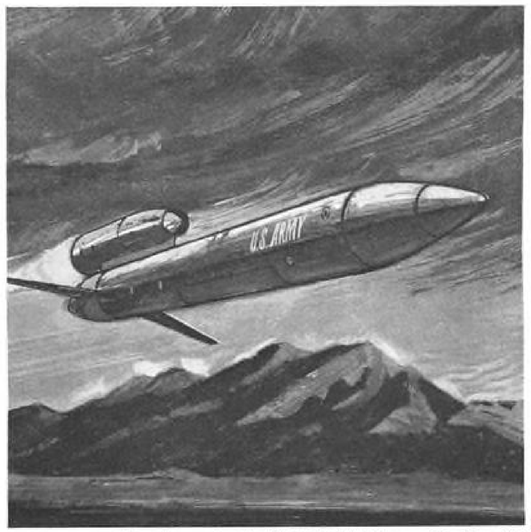
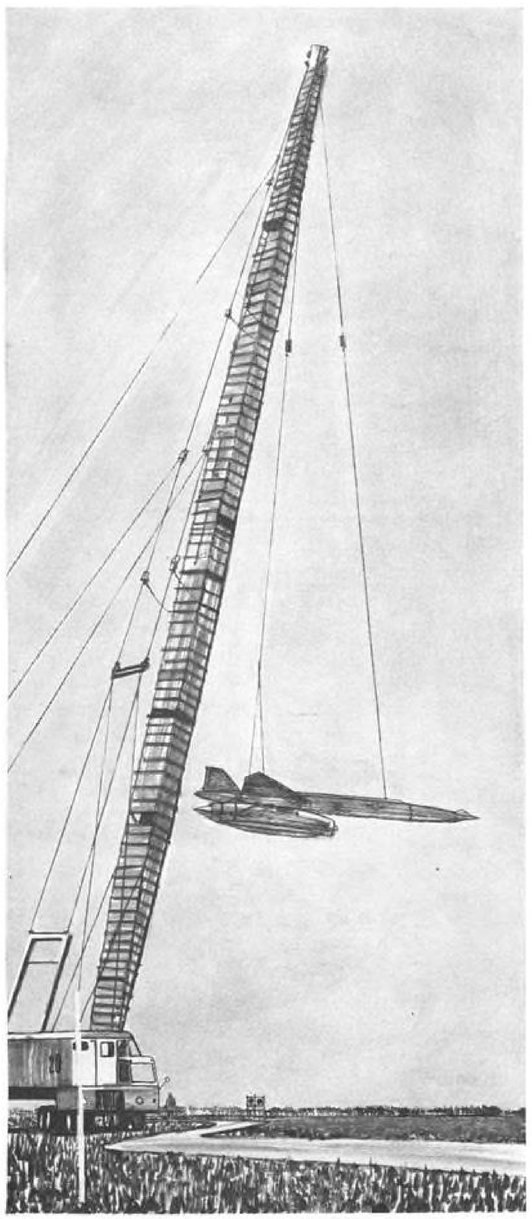
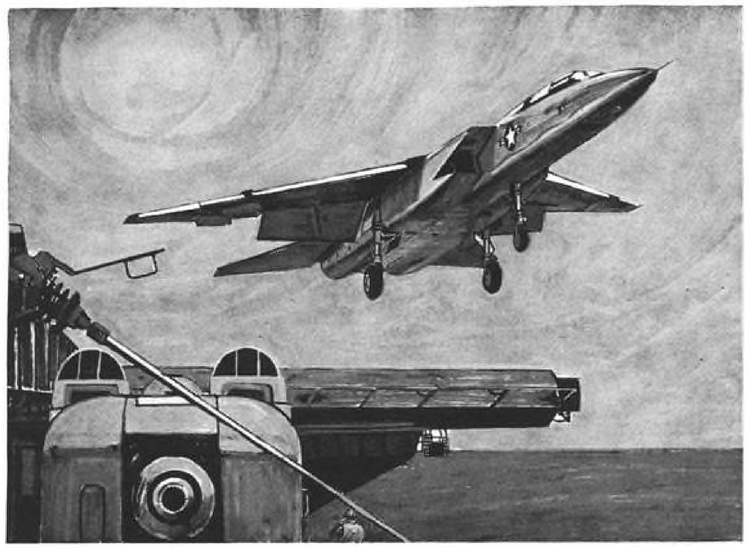


TWO IN ONE. New target missile NA-273 (Army Redhead/Roadrunner), designed by Columbus, can fly high or low, at subsonic through Mach 2 speeds. It is launched by solid propellant booster rocket, and ramjet powered.



ELECTRONIC TESTING. Air Force's GAM-77 Hound Dog, on 120-foot crane, undergoes stringent radar reflectivity tests at Columbus as part of research projects in both airborne and ground support electronic systems.



A3J VIGILANTE. World's most versatile Mach 2 airplane, the A3J is small enough to land on a carrier deck, yet potent enough to pack a heavyweight punch. The A3J can perform attack, interception, or reconnaissance missions at deck level or up in the stratosphere. It is being built for the Navy by the Columbus Division.

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BENDIX PRODUCTS DIV., BENDIX CORP., 401 N. Bendix Dr, South Bend 20, Ind., a. **SEE ADV. P. 52**
Bendix Corporation, Fisher Building, Detroit 2, Mich., a, b
Caterpillar Tractor Co., Industrial Engine Plant, Peoria, Illinois, b
Champion Aircraft Corp., Osceola, Wisc., b
Chance Vought Aircraft, Inc., Aeronautics Division, P. O. Box 5907, Dallas, Texas
CORNELIUS CO., THE, 550 39 Ave., N. E., Minneapolis 21, Minn., a. **SEE ADV. P. 198**
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General Electric Co., Aircraft Accessory Turbine Dept., 950 Western Ave., West Lynn 3, Mass., a
General Electric Co., Direct Current Motor & Generator Dept., 3001 East Lake Road, Erie, Pa., a, b
Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn., a
Hupp Aviation Division, Hupp Corporation, 6633 West 65 St., Chicago 38, Ill.
Jack & Heintz, Inc., P. O. Box 6719, Cleveland 1, Ohio, a, b
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KELLOGG DIV., AMERICAN BRAKE SHOE CO., 97 Humboldt St., Rochester, N. Y., a. **SEE ADV. P. 276**
Lockheed Aircraft Corporation, Georgia Division Dept. 69-04, 86 So. Cobb Drive, Marietta, Ga., a
Lucas-Rotax Ltd., Box 115, Station H., Toronto 13, Ontario, Canada, a, b
Missile Division, North American Aviation, Inc., 12214 Lakewood Boulevard, Downey, Calif.
North American Aviation, Inc., International Airport, Los Angeles 45, Calif., a
Parmatic, Inc., Municipal Airport, Watertown, N. Y., a, b
Pyronetics, 11973 E. Slauson, Santa Fe Springs, Calif., a
Randall Engineering Corp., 5933 Bowcroft St., Los Angeles 16, Calif., a
Rocketdyne Div., North American Aviation, Inc., 6633 Canoga Ave., Canoga Park, Calif., a
A. V. Roe Aeronautical Group, Div. A. V. Roe Canada Ltd., Suite 121, 8921 Sepulveda Blvd., Los Angeles 45, Calif., a
Solar Aircraft Co., 2200 Pacific Highway, San Diego 12, Calif., a
Stratos Div., Fairchild Engine & Airplane Corp., Bay Shore, N. Y., a
SUNDSTRAND AVIATION, DIVISION OF SUNDSTRAND CORP., 2421 Eleventh St., Rockford, Ill., a. **SEE ADV. P. 287**
Synchro-Start Products, Inc., 8151 North Ridgeway Avenue, Skokie, Illinois, a, b
Task Corp., 1009 East Vermont Ave., Anaheim, Calif., a
Vickers Incorporated, Division of Sperry Rand Corporation, 882 Willis Ave., Albertson, L. I., N. Y.
Vickers, Inc. Div., Sperry Rand Corp., Administrative & Engrg. Center, Detroit 32, Mich., a
WATERTOWN DIV., THE NEW YORK AIR BRAKE CO., Starbuck Ave., Watertown, N. Y., a. **SEE ADV. P. 319**

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Garrett Manufacturing Ltd., 4 Racine Rd., Rexdale, Ontario, Canada, a, b
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Dunbar Kapple, Inc., North Island Ave., Batavia, Ill.
Gentz Industries, Inc., 23566 Schoenherr, Warren, Michigan
Hoosier Metal Fabricators, Inc., 1001 Evans Rd., Gas City, Ind.
Jervis Corporation, 2900 Wilson Ave., Grandville, Mich.
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Lockheed Aircraft Corp., California Div., P. O. Box 551, Burbank, Calif.
Marquardt Corporation, The, 16555 Saticoy St., Van Nuys, Calif.
Meco Incorporated, 1401 South Marshall, Paris, Ill.
National Utilities Corp., 135 E. Railroad, Monrovia, Calif.
North American Aviation, Inc., International Airport, Los Angeles 45, Calif.
Portland Copper & Tank Works, Inc., 80 Second St., South Portland, Me.
Republic Aviation Corporation, Farmingdale, L. I., N. Y.
A. V. Roe Aeronautical Group, Div. A. V. Roe Canada Ltd., Suite 121, 8921 Sepulveda Blvd., Los Angeles 45, Calif.
ROHR AIRCRAFT CORP., Foot of H. St., Chula Vista, Calif. **SEE ADV. P. 81**
RYAN AERONAUTICAL COMPANY, Lindbergh Field, San Diego 12, Calif. **SEE ADV. P. 84**
Solar Aircarft Co., 2200 Pacific Highway, San Diego 12, Calif.

Tailskids

Alton Iron Works, Inc., 1205 38th Street, Brooklyn 18, N. Y.
Associated Company, Inc., 1441 McLean Blvd., S., Wichita 13, Kansas
Champion Aircraft Corp., Osceola, Wisc.
Downer Aircraft Industries, Inc., P. O. Box 46, Alexandria Municipal Airport, Alexandria, Minn.
Dowty Equipment of Canada Limited, Ajax, Ontario, Canada
Goodyear Tire & Rubber Co., Aviation Products Division, 1144 E. Market St., Akron 16, Ohio, c, d

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b. Auxiliary Drop **d. Self-Sealing**

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Aeronca Mfg. Corp., Middletown, Ohio, a, b
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Airconductors, 367 East Alondra, Gardena, Calif., b
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Associated Company, Inc., 1441 McLean Blvd., S., Wichita 13, Kansas, a, b
AVCO CORP., NASHVILLE DIVISION, Nashville 1, Tenn., a, b. **SEE ADV. P. 167**
Avro Aircraft Ltd., Div., A. V. Roe Canada, Ltd., Box 4004 Terminal "A", Toronto, Ontario, Canada, a, b, c
Beech Aircraft Corp., Aerospace Division, Wichita 1, Kan., a, b, c
Bristol Aero-Industries Ltd., Winnipeg Division, P. O. Box 874, Winnipeg, Manitoba, Canada, a, b, c
Champion Aircraft Corp., Osceola, Wisc., a, b, c
Chicago Bridge & Iron Co., 332 S. Michigan Ave., Chicago 4, Ill., c
Doman Helicopters, Inc., P. O. Box 603, Danbury, Conn., a, c
Downer Aircraft Industries, Inc., P. O. Box 46, Alexandria Municipal Airport, Alexandria, Minn., a, c
Executive Aircraft Service, Inc., Redbird Airport, Dallas, Texas, a, c
Fairchild Engine & Airplane Corp., Hagerstown 10, Md., b
Firestone Tire & Rubber Co., 2525 Firestone Blvd., Los Angeles, Calif., a, c, d
Firestone Tire & Rubber Co., 1200 Firestone Pkwy., Akron 17, Ohio, a, b, c, d
General Metals, Inc., 858 Goldsboro St., Greensboro, N. C., a, b
B. F. Goodrich Aviation Products, A Div. of The B. F. Goodrich Co., 500 South Main St., Akron 18, Ohio, c, d
Goodyear Aircraft Corp., 1210 Massillon Road, Akron 15, Ohio, a, b, d
Goodyear International Corp., Aviation Products Div., 1144 East Market St., Akron 16, Ohio, d
Helio Aircraft Corporation, Norwood, Mass., a
Ludwig Honold Mfg. Co., Chester Pike & Folcroft Ave., Folcroft, Pa., a, b, c
Jervis Corporation, 2900 Wilson Ave., Grandville, Mich., c
Kellett Aircraft Corp., Box 35, Willow Grove, Pa., a, b, c
LAVELLE AIRCRAFT CORP., Newtown, Bucks County, Pa., a, c. **SEE ADV. P. 321**
Lockheed Aircraft Corp., California Div., P. O. Box 551, Burbank, Calif., a, b
Lockheed Aircraft Corporation, Georgia Division Dept. 69-04, 86 So. Cobb Drive, Marietta, Ga., a, b, c
McDonnell Aircraft Corp., St. Louis 66, Mo., a
Meco Incorporated, 1401 South Marshall, Paris, Ill., a, b
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ROHR AIRCRAFT CORP., Foot of H. St., Chula Vista, Calif., a, b, c. **SEE ADV. P. 81**
Royal Jet, A Div. of Royal Industries, Inc., 1035 Westminster Ave., Alhambra, Calif., a, b
RYAN AERONAUTICAL COMPANY, Lindbergh Field, San Diego 12, Calif., a, b. **SEE ADV. P. 84**
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Shaw Metal Products Corp., 101 Third Ave., Garden City Park, N. Y.
Solar Aircraft Co., 2200 Pacific Highway, San Diego 12, Calif.
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U. S. Steel Corp., 525 William Penn Place, Pittsburgh 30, Pa., c
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Woolf Aircraft Products, Inc., 3441 Filbert St., P. O. Box 270, Wayne, Mich., c
ZENITH PLASTICS COMPANY, SUB. OF MINNESOTA MINING & MFG. CO., 1600 W. 135 St., P. O. Box 91, Gardena, Calif., a, b. **SEE ADV. P. 120**

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Champion Aircraft Corp., Osceola, Wisc.
Daystrom, Incorporated, Weston Instruments Div., 614 Frelinghuysen Ave., Newark 12, N. J.
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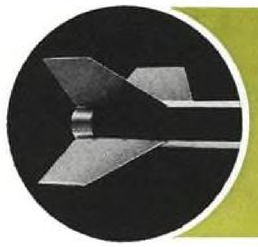

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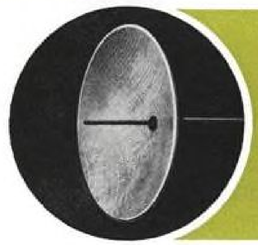

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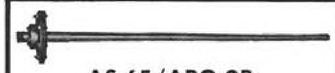

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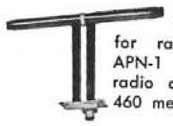

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Pacific Scientific Co., P. O. Box 20019, Los Angeles 22, Calif.
ROCHESTER MFG. CO., INC., 96 Rockwood St., Rochester 10, N. Y. SEE ADV. P. 50
Stewart Warner Corp., South Wind-Aircraft Products Dept., 1514 Drover St., Indianapolis, Ind.
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FENN MANUFACTURING COMPANY, P. O. Box 235, Hartford, Conn. SEE ADV. P. 290
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Champion Aircraft Corp., Osceola, Wisc.
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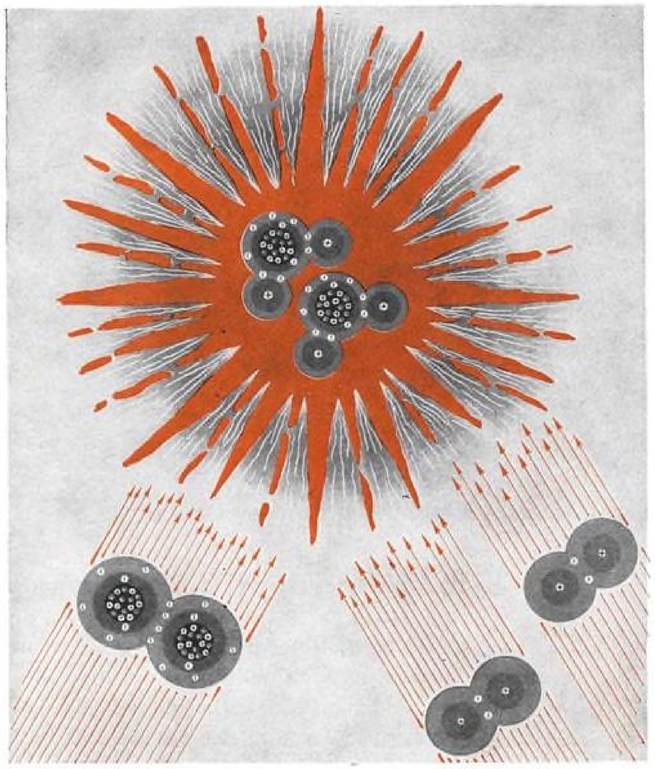

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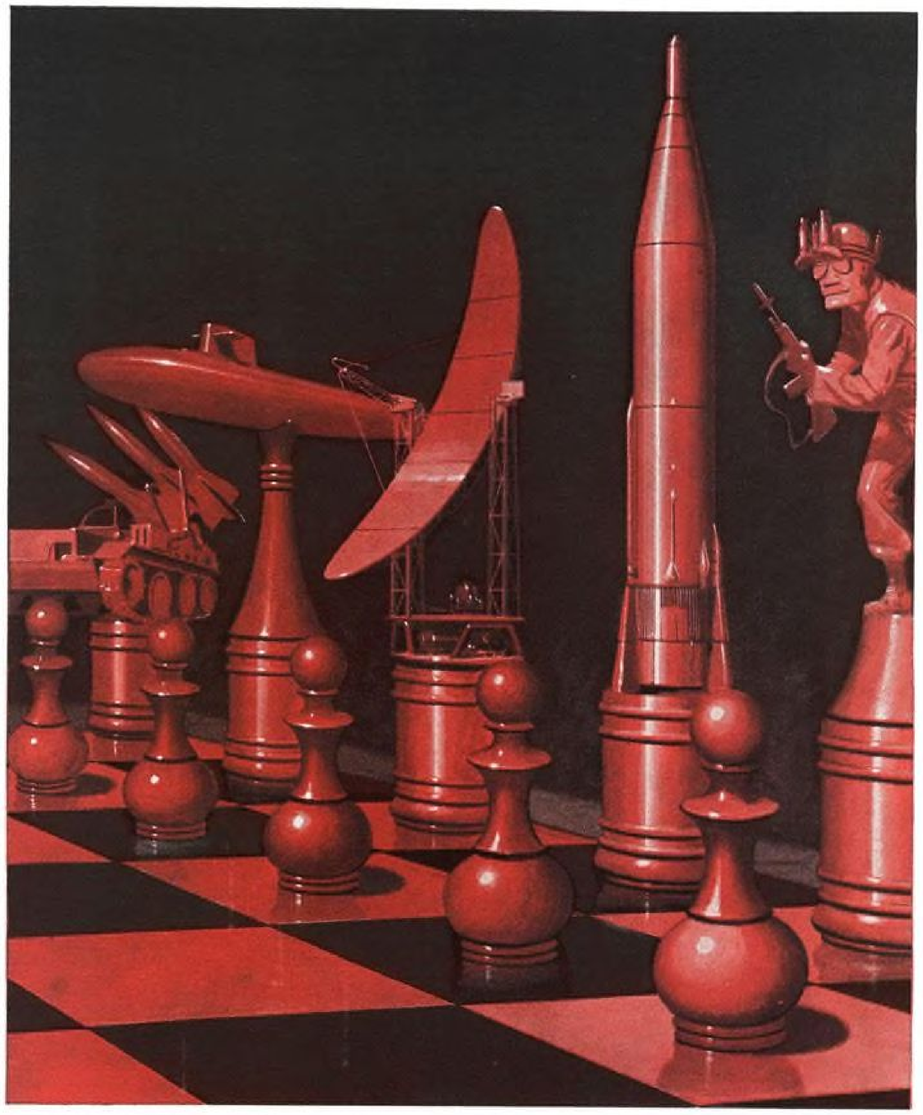

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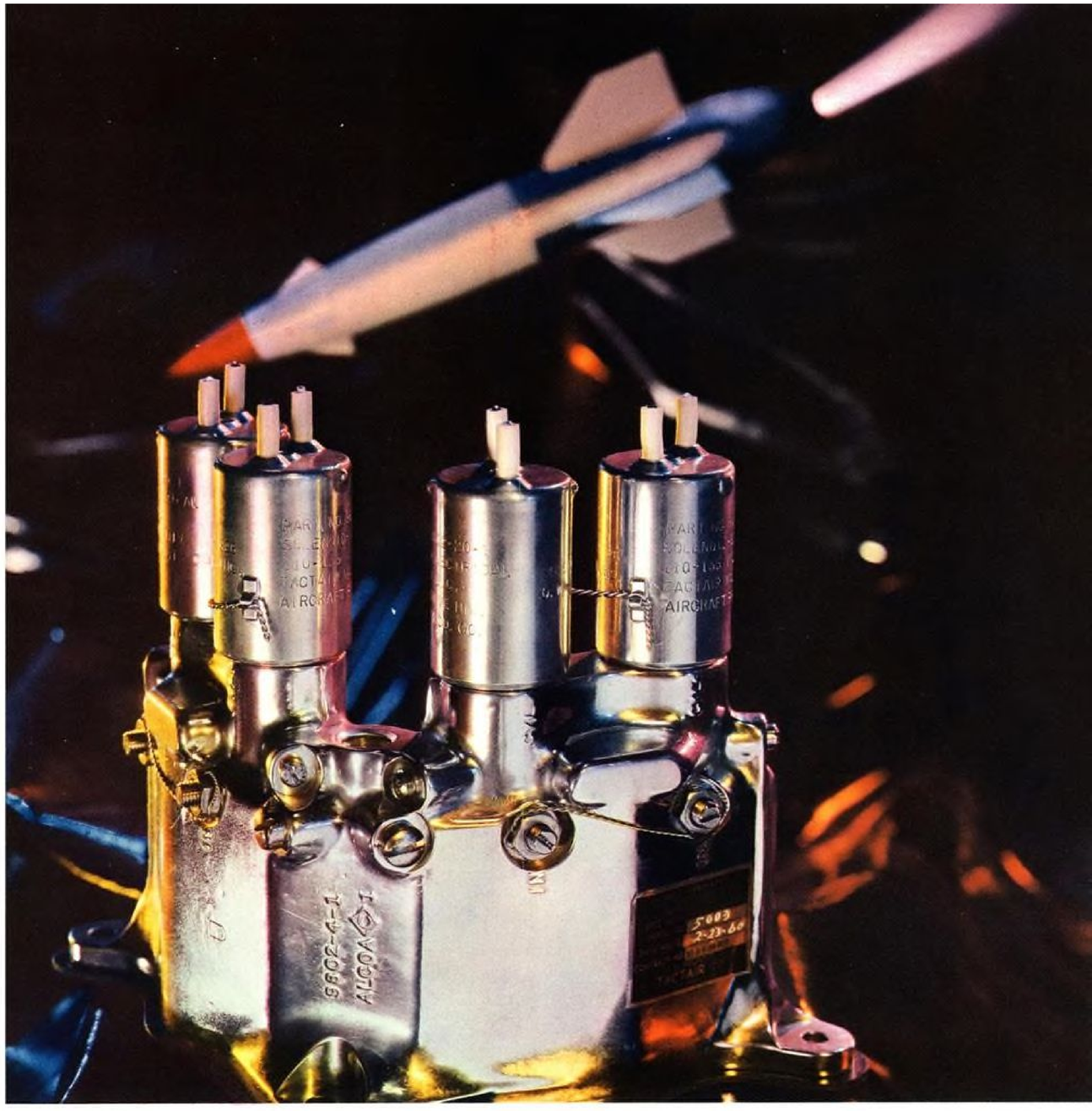

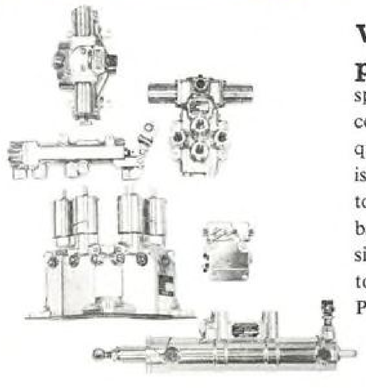

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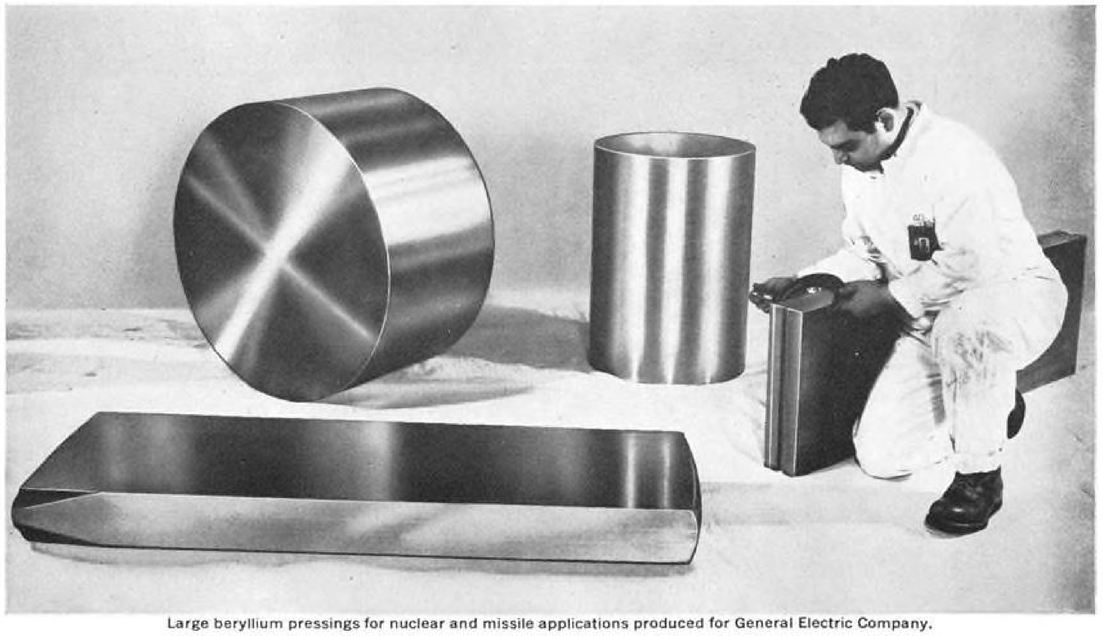

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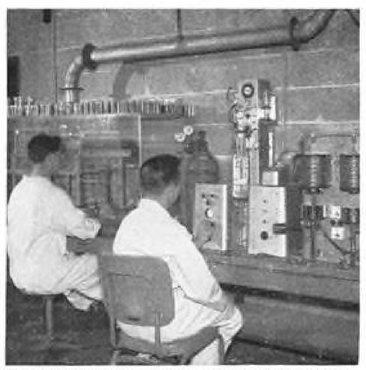

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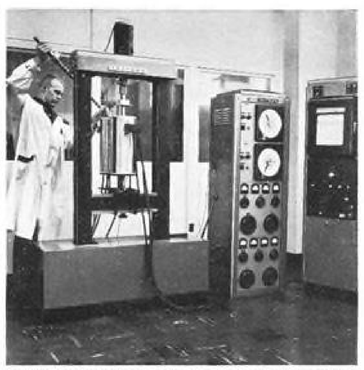

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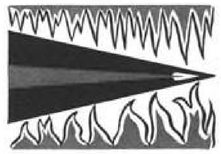

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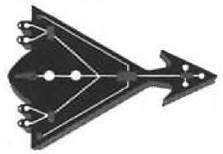

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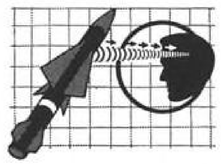

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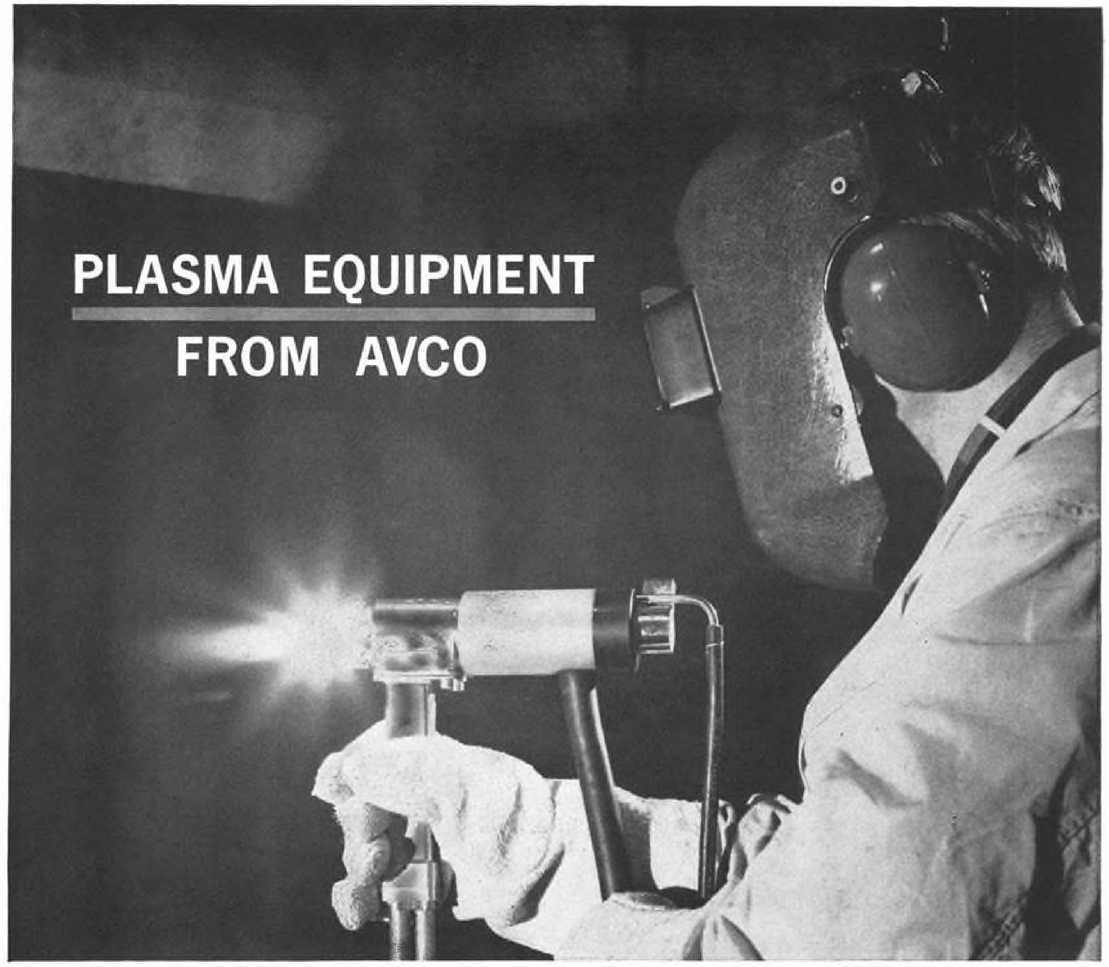
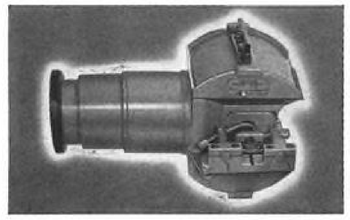
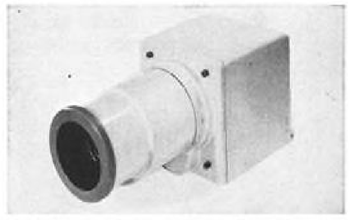
PLASMA EQUIPMENT FROM AVCO



AVCO PLASMAGUN. Avco's advanced PG-030 is easily controllable, highly reliable, exceptionally versatile. Deposits high-melting-point refractories, ceramics and metals on a wide range of materials by producing higher temperatures than conventional equipment. Achieves controllable temperatures from 3500 to 30,000°F., and produces enthalpies from 250 to 123,000 Btu/lb. Can be used for plasma arc cutting, as a high-temperature heat source, for ablation investigations, spectroscopic and materials studies, chemical syntheses, in the laboratory or on production lines. You may choose from a variety of PlasmaGun mounts and nozzles.



AVCO ROTATING MIRROR CAMERA—an accurate, easy-to-use instrument for saving time in measuring velocity of events in the hypersonic range. Event velocity is easily determined by three-step data reduction. Hexagonal mirror, rotating at 3000 rps, records on extra-wide 2¾-inch film strips.



AVCO ROTATING DRUM CAMERA—for accurate position-versus-time recording of hypervelocity events. Compressed air driven, drum rotates at 600 rps for a writing speed of .19 mm/μsec. With spectrograph, will record variations in spectral intensity. (With Schlieren System, can be used as high-speed framing camera.)

Represented by local agents throughout the United States and the world, these products are fully use-proven in research and development laboratories.

For more information write: Industrial Products Subdivision, Research and Advanced Development Division, Avco Corporation, Wilmington, Massachusetts.

AVCO *Research & Advanced Development*

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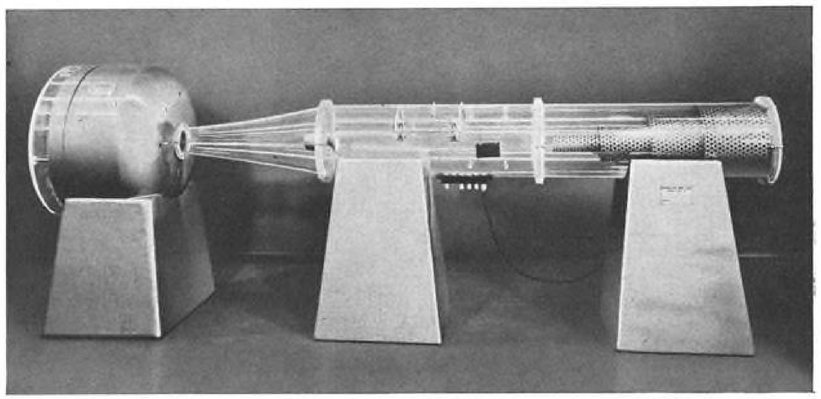
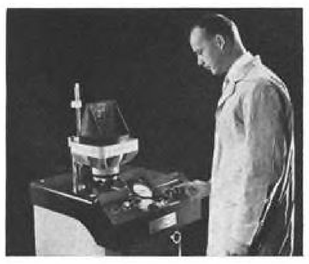
Use-proven RESEARCH TOOLS from AVCO

ACOUSTIC NOISE EQUIPMENT

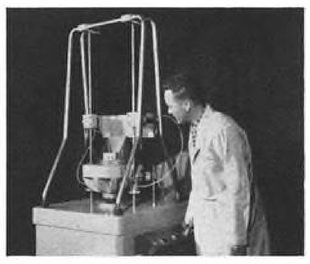
ACOUSTIC NOISE GENERATOR AG-012 simulates the random noise of rocket engine firing. Other Avco noise test systems available in a variety of configurations to meet specialized requirements. Systems available with random noise ouputs of 163, 150, 140 and 120 db. Complete capability and experience available to build custom systems for individual requirements through the utilization of standardized components.



SHOCK TEST EQUIPMENT



AVCO's SM-005, a compact, pneumatically controlled shock test machine for component testing. Provides sawtooth, triangular and half-sine pulses to 3000 g's force, extra capability to meet new pulse needs. Recycles automatically. 30-lb. capacity (50-lb. with special impact devices). High degree of repeatability.



SM-010 SHOCK MACHINE. Widest variety of pulse shapes available for faster environmental tests with unmatched repeatability. 100-lb. capacity. Exclusive design rebound brake a standard feature. Provides shock pulses up to 3000 g's for transistor testing. Patented carriage design permits controlled sawtooth pulses.

SM-030 SHOCK MACHINE. This precision-engineered shock machine is particularly useful in handling specimen loads up to 500 pounds for testing complete systems for half-sine and sawtooth pulses. The SM-030 incorporates many features of smaller machines, including high degree of repeatability.

ENVIRONMENTAL TEST FIXTURES

TF-006 is designed for use as an integral part of such environmental test equipment as vibration exciters, shock machines and centrifuges. Permits simultaneous testing of components in each of three mutually perpendicular planes. Virtually resonance-free up to 2000 cps.

Represented by local agents throughout the United States and the world, these products are fully use-proven in research and development laboratories across the nation.

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Titanium Huckbolt fasteners are available in tension or shear types, countersunk or protruding heads and in pin diameters and grip lengths as desired.

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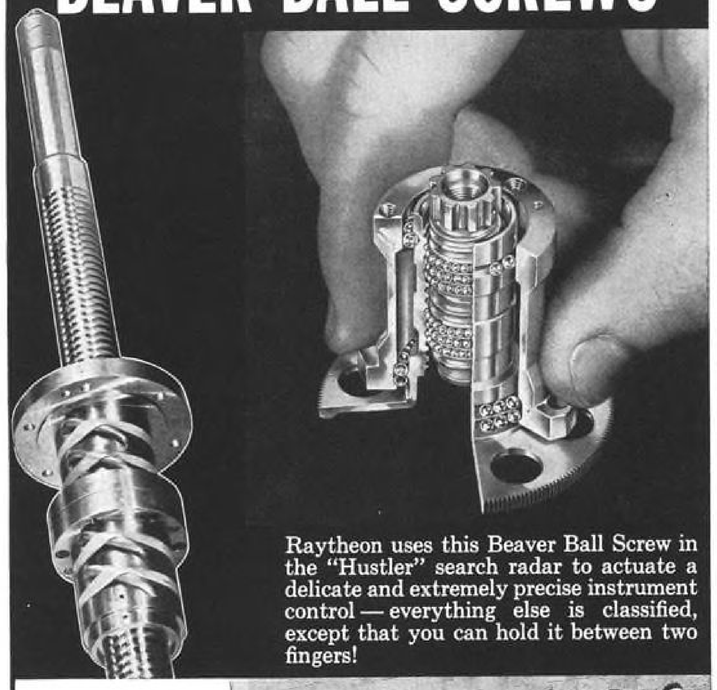
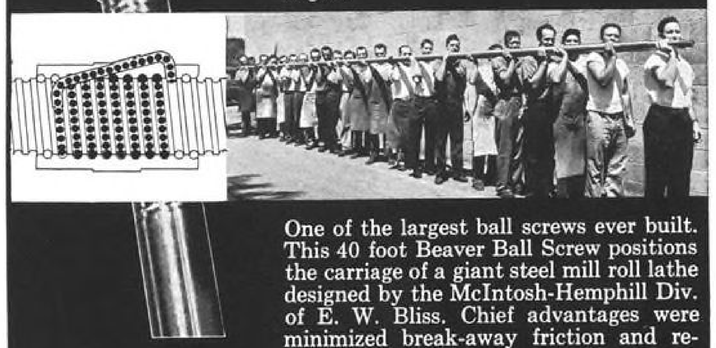
but the demand for positioning accuracy determines the need for

BEAVER BALL SCREWS



Raytheon uses this Beaver Ball Screw in the "Hustler" search radar to actuate a delicate and extremely precise instrument control — everything else is classified, except that you can hold it between two fingers!



One of the largest ball screws ever built. This 40 foot Beaver Ball Screw positions the carriage of a giant steel mill roll lathe designed by the McIntosh-Hemphill Div. of E. W. Bliss. Chief advantages were minimized break-away friction and reduced power.

Our engineers will be glad to work with you in determining if ball screw actuation belongs in your product as opposed to hydraulics or pneumatics. Call on us.

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Largest manufacturers of precision ball screws
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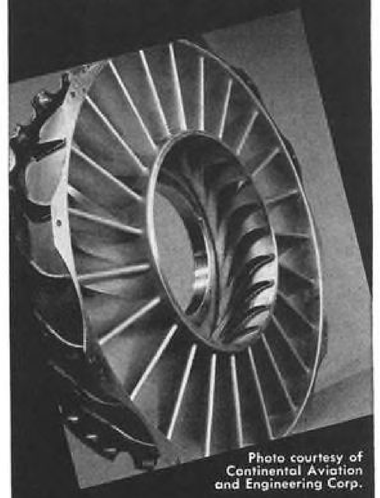

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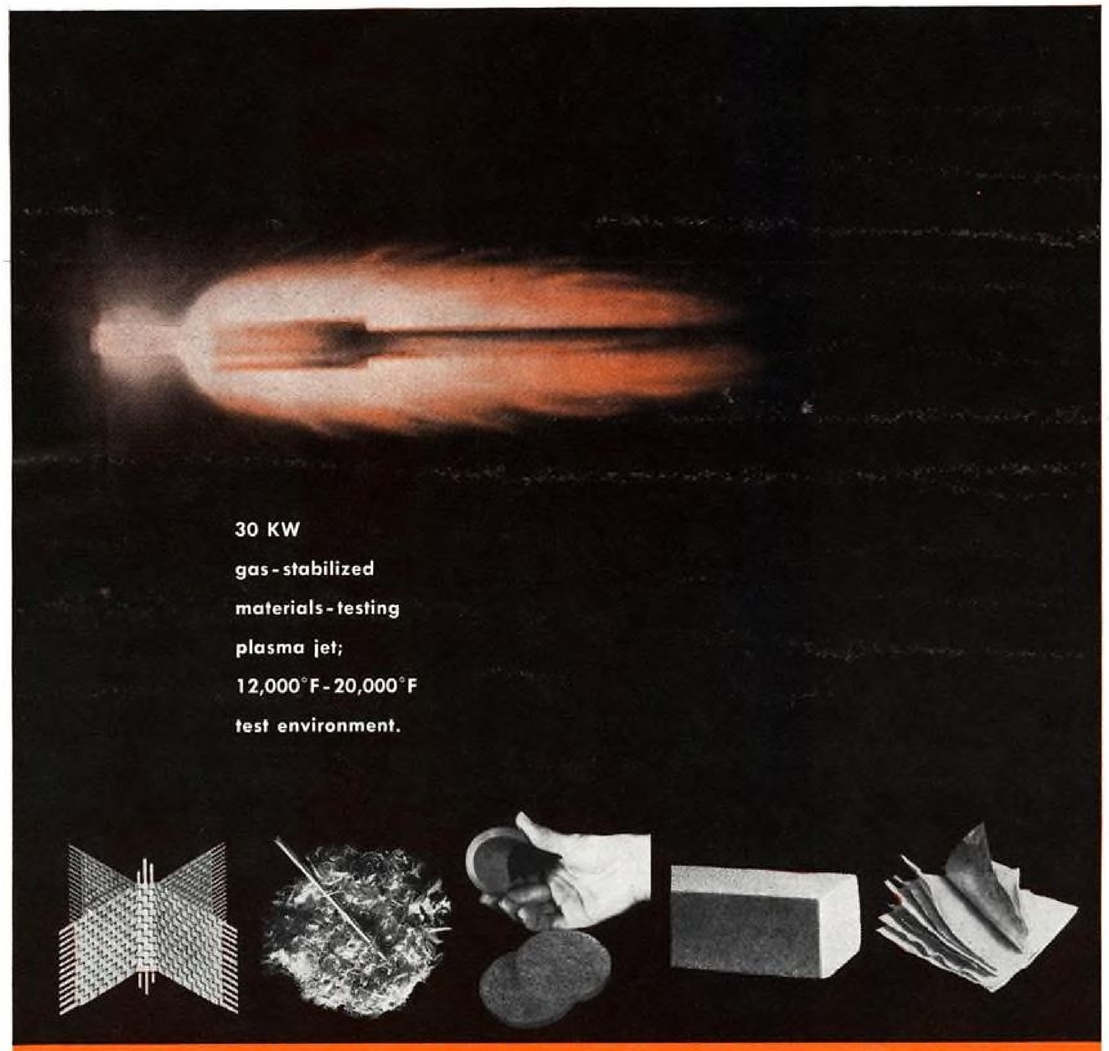

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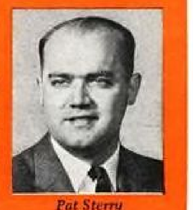

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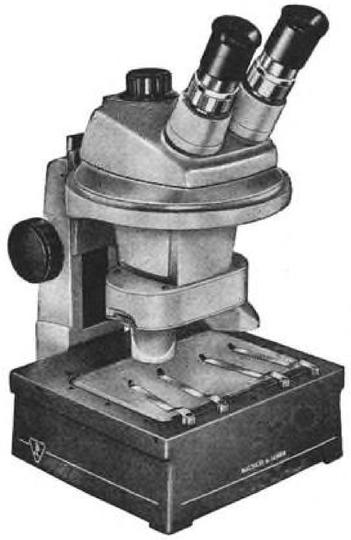

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Matching magnification to the resolution of the film?

The new Zoom "70" Stereoscope zooms to the *exact* power necessary to deliver sharp, clear detail in 3-D . . . magnification commensurate with the film's resolution. The 7X-60X range of continuous power provides magnification to spare—far greater than the resolving power of today's fastest 70mm films; more than enough for the faster films of tomorrow. And there's no image blackout, loss of focus, or change of working distance.

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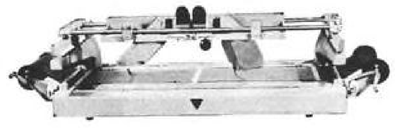

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B&L Scanning Stereoviewers transport roll film rapidly for 3-D scanning, with complete facilities for stop-motion study at low, medium or high magnification. Choice of models for 5" x 5", 9" x 9", and larger formats. Interchangeable magnification sets: 2½X, 6X and 12X; or 3⅓X, 8X and 16X.

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MAIN CHARACTERISTICS

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Span	11.15 ft.
Length	17.71 ft.
Diameter of fuselage	2.16 ft.
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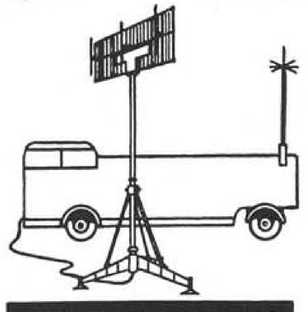

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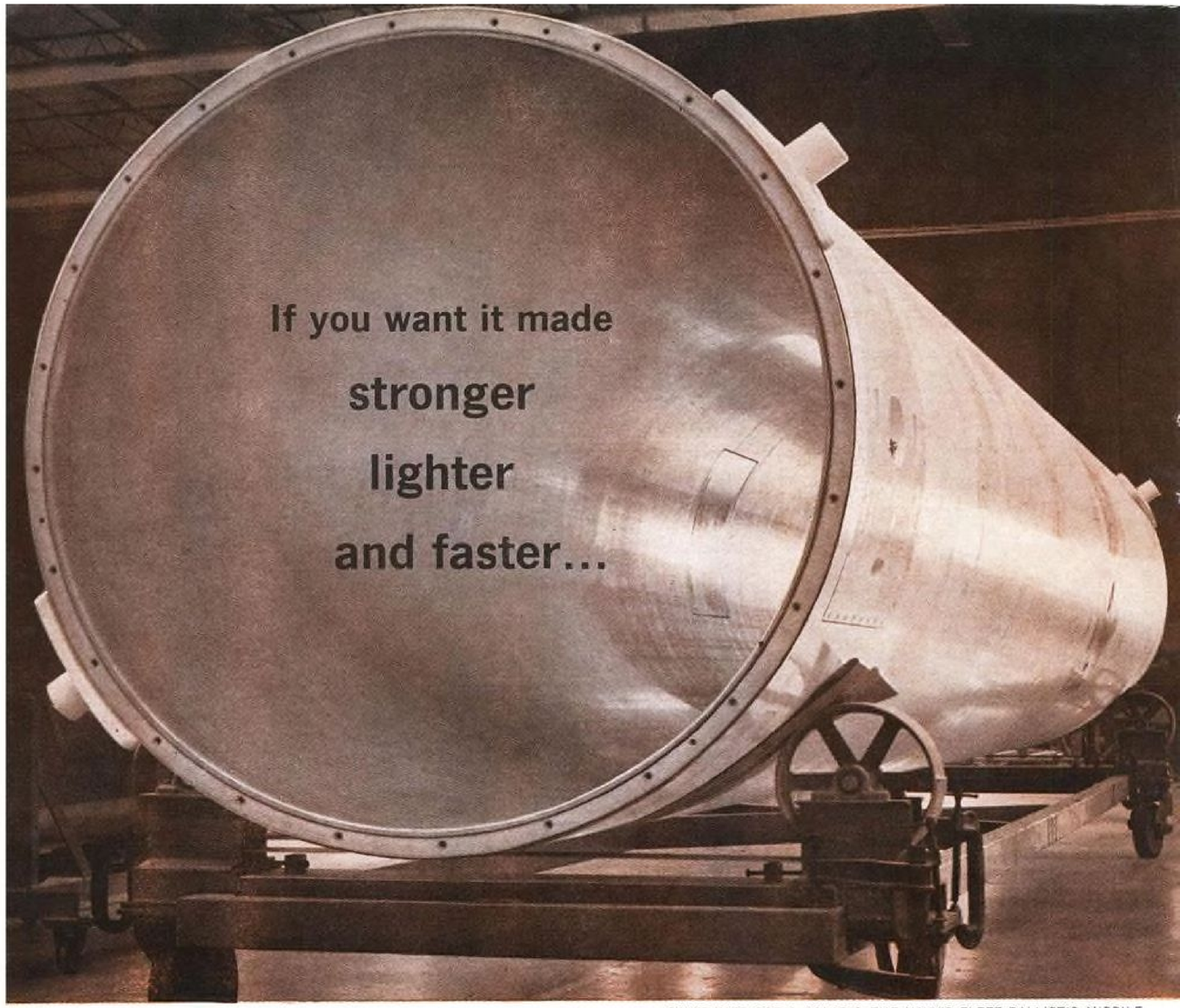

CONTAINER FOR A POLARIS, THE NAVY'S FLEET BALLISTIC MISSILE

...it's a job for Zenith Plastics

This missile container, approximately 30 feet in length, was originally planned for other material. Zenith engineers proved that resin-bonded glass fiber could do the job better. And here you see the first reinforced plastic wound structure ever made on so large a scale.

Time after time, Zenith has been able to demonstrate the superiority of reinforced plastics over other materials—in strength, lightness, thermal qualities, and in actual cost.

For example, Zenith has developed a "magic million" plastic structure ideal for rocket motor cases. It now has a strength-to-weight ratio in excess of 1,000,000 inches, the "magic million" that has been sought for years by missile makers. A case made of it would be 25% lighter than if made of steel, at a cost 35% less. And Zenith has R & D projects that involve advances even more dramatic.

Zenith thrives on this kind of progress. We've learned to form resin-bonded glass fiber into virtually every shape and size. And to turn out precision components on a production-line basis. Almost always, the use of reinforced plastics results in simplified design and more economical tooling.

Isn't this modern material just the thing for the component *you're* interested in? We'll be glad to talk it over with you... and give you all the facts about our research, engineering, and production capability.

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1600 West 135th St., Gardena, Calif., Subsidiary of Minnesota Mining and Manufacturing Company

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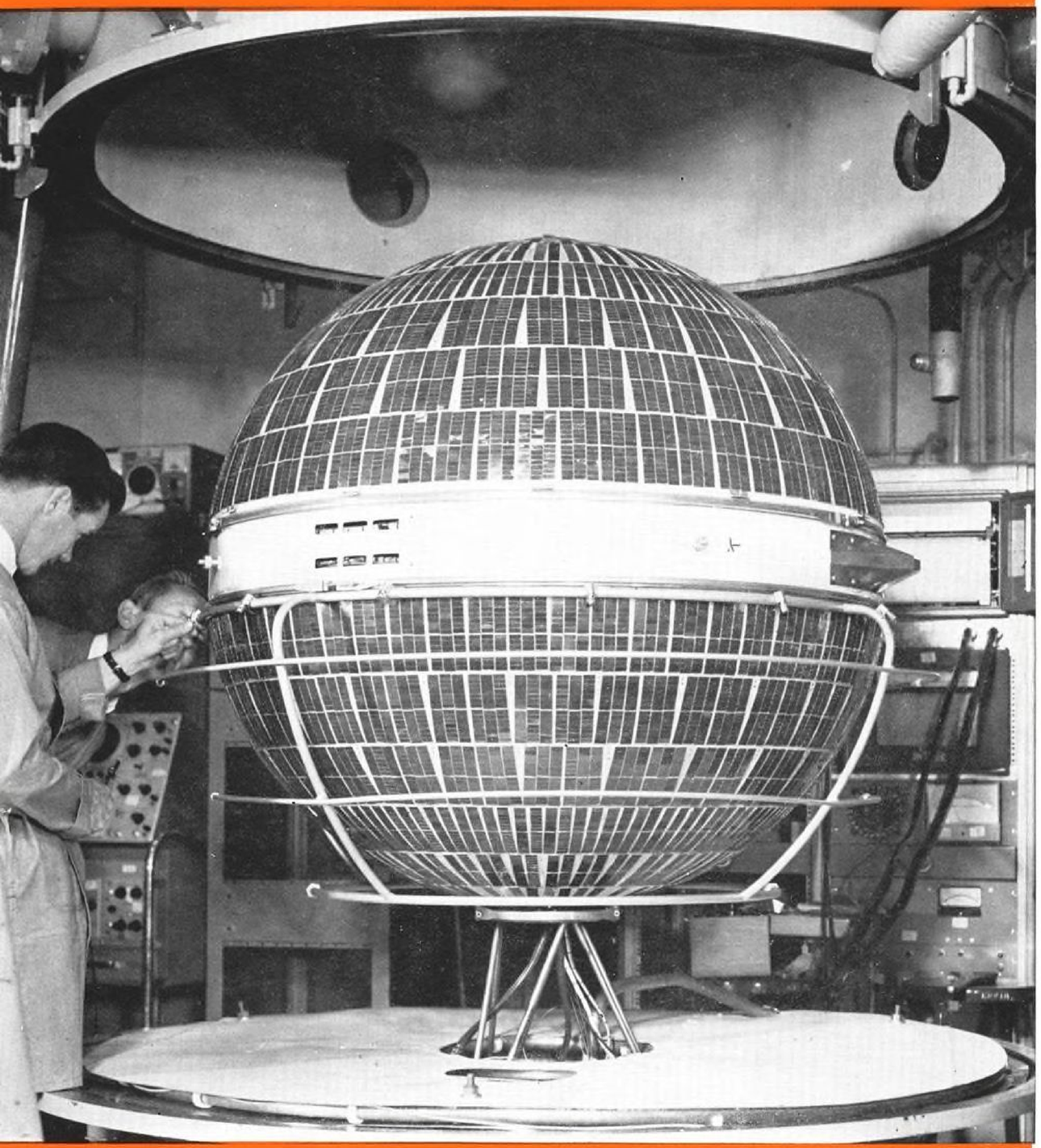

Philco Scientists Conducting One of the Tests on Courier Communication Satellite.

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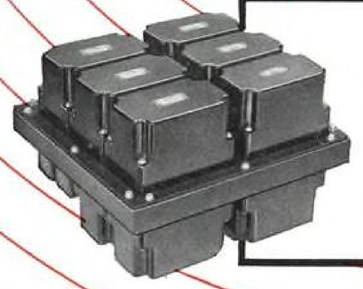
in heat control systems

Extremely compact proportional and switch-type heat control systems from Magnetic Controls Company are accurate to within .01° F. and are available in models to handle a wide variety of output requirements. Typical applications include gyros, inertial platforms, jet aircraft windshield anti-icing and anti-fogging systems, aircraft cabins, and guidance shipping containers.



in voltage monitoring systems

The thousands of critical voltages in computers — which must be monitored in order to track missiles accurately — led to the voltage monitoring systems developed by Magnetic Controls Company. Use of highly sensitive, rugged magnetic amplifiers in these systems assures super-accurate response from varying load currents and line voltages.

in power supplies

Ultra-reliable static power supplies from Magnetic Controls Company utilize magnetic amplifier circuitry for extreme ruggedness, stability and high efficiency. These supplies can be styled for 19" relay rack or custom mounting to meet the requirements of ground computer or airborne applications.

MEC

If you have applications requiring super-accurate heat regulating, voltage monitoring or power supply systems, it will pay you to contact Magnetic Controls Company. Write or phone today for complete information.

MAGNETIC CONTROLS COMPANY

6407 CAMBRIDGE STREET, MINNEAPOLIS 26, MINNESOTA • WEst 9-4691

Heat Control Systems • Static Inverters • Voltage Monitoring Systems

122

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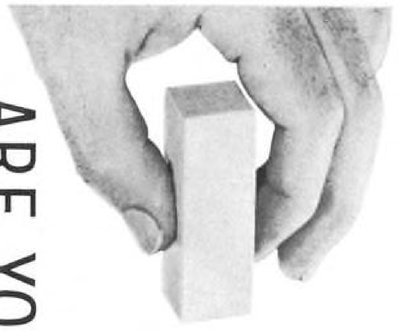
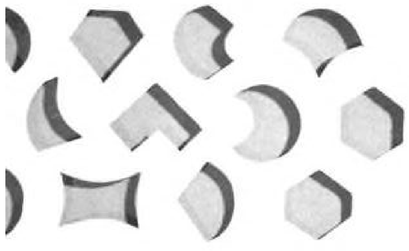
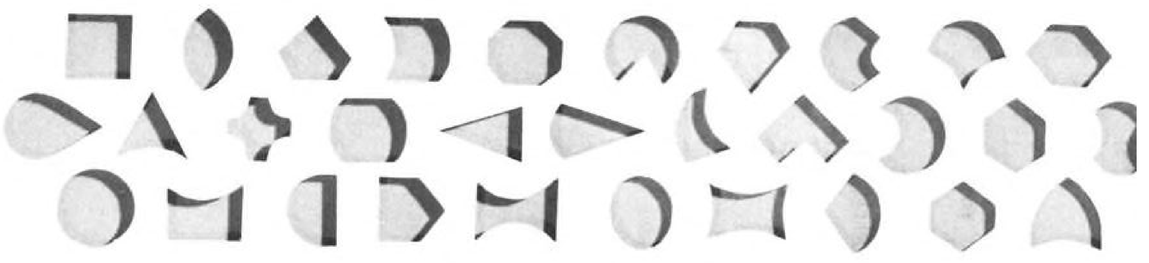
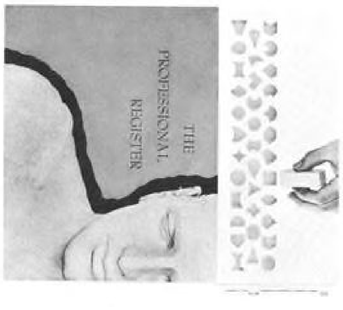


ARE YOUR TALENTS BEING RECOGNIZED?







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PROFESSIONAL REGISTER EMPLOYMENT INQUIRY *(Strictly Confidential)*

Please complete this card, fold, staple and mail. The information you give constitutes the first phase of the Professional Register Program and will enable our professional staff to make a preliminary evaluation of your abilities. All inquiries will be answered immediately. When you complete the Program, the inventory of your talents and capabilities will be recorded on over 20 electronic data-cards available for instant use in guiding your future progress at HUGHES-FULLERTON.

Name_____

Address_____

City_____ State_____ Telephone_____

Education:	BS	MS	PhD	Date (s):		BS	MS	PhD	Date (s):
EE	☐	☐	☐	_____	Physics	☐	☐	☐	_____
ME	☐	☐	☐	_____	Other:_____	☐	☐	☐	_____
Mathematics	☐	☐	☐	_____	_____	☐	☐	☐	_____

School (Highest Degree)_____

FOLD

AREAS OF PROFESSIONAL EXPERIENCE:
(please check boxes)

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- ☐ Electron Tubes
- ☐ Electronic Circuitry
- ☐ Telemetry
- ☐ Circuit Theory
- ☐ Radar
- ☐ Power Generation
- ☐ Power Transmission
- ☐ Servomechanisms
- ☐ Microwaves
- ☐ Solid State Physics
- ☐ Electromechanical Systems
- ☐ Other:_____

FUNCTIONS PERFORMED:
(please check boxes)

- ☐ Research
- ☐ Development/Design
- ☐ Technical Writing
- ☐ Project Management/Supervision
- ☐ Administrative Staff Support
- ☐ Systems Analysis
- ☐ Testing/Process Control
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- ☐ Operations Research
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Are your talents being recognized?

Most engineers have had to face an unpleasant fact. Often an employer will hire from outside to fill a supervisory post. Entirely qualified men "inside" are passed over. The problem is generally one of communication. The employer simply does not have adequate knowledge of his employees' abilities and promise.

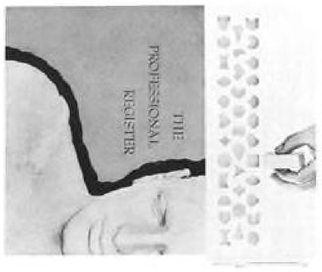
Hughes-Fullerton's new Professional Capabilities Register reflects the complete engineering-orientation of this fastest-growing Hughes activity. (From 800 to nearly 6,000 people since 1957. Planned, *scheduled* growth.)

The Register makes instantly available a complete record of every individual's abilities, interests and accomplishments. Previously hidden talents can now be put to use. Often these can mean the difference when reassignments or promotions are being made. Your potentials become a very real resource of Hughes-Fullerton Research and Development Staff.

Areas covered in the Register range from language skills through patents to books and articles published. It includes teaching experience, professional affiliations. All data is kept up-to-date and handled by automatic data processing equipment for utmost efficiency.

Hughes-Fullerton's philosophy of giving precedence to the needs of engineers has worked well. Hughes-Fullerton was first with three-dimension radar...a major breakthrough in the state of the art. Other vital areas of interest include advanced data processing and electronic display systems.

These are a few reasons why you should investigate Hughes-Fullerton. Openings exist at several experience levels for a variety of engineering specialties. For full information fill out the post card and mail it today!



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Engineered and manufactured under the tightest standards of performance and reliability, gyros from Nortronics — rate, integrating, navigational — set industry marks. Terrier, Tartar, Bomarc, Nike Zeus and Polaris all get a hand on the helm from Nortronics.

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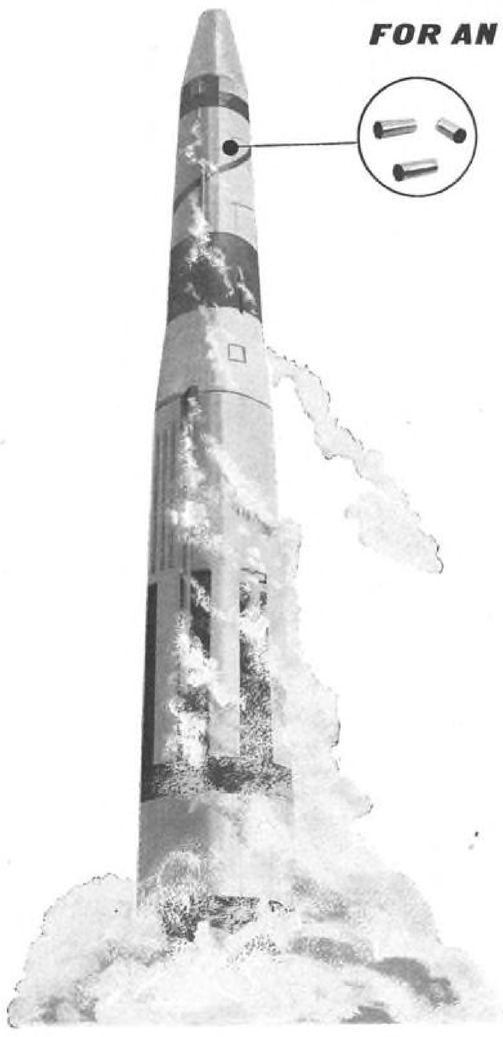

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Inland d-c torque motors

From 0.1 to 3000 pound-feet

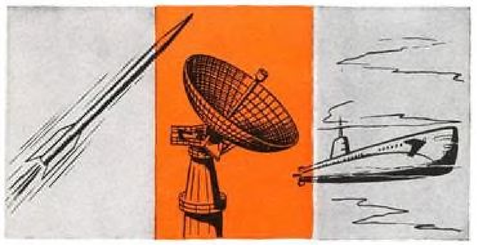
High torque-to-inertia *at the output shaft*

A typical stabilization application requiring a peak torque of 60 ounce-inches now uses an Inland torquer with a torque-to-inertia ratio of 5350 radians/sec.^{2}. This torquer replaces a gear train servo motor that had a ratio at the output shaft less than *one-tenth* that of the Inland torquer.

Direct drive promotes system accuracy

Direct drive without servo motor gear trains reduces friction and eliminates backlash and elasticity, leading to better over-all system accuracy.

COMPACT PANCAKE SHAPE now available in d-c torquers through exclusive Inland design



Exclusive commutator and brush rigging design

Patented features enable Inland to combine the compact pancake configuration with low-power input —high-torque output characteristics of a d-c torquer.

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	T-1321-D	T-1321-B	T-1321-C
PEAK TORQUE, OZ.-IN.	20	20	20
VOLTS AT PEAK TORQUE, STALLED AT 25°C	31.4	24.8	39.6
AMPS AT PEAK TORQUE	1.82	2.25	1.46
TOTAL FRICTION, OZ.-IN.	0.5	0.5	0.5
ROTOR INERTIA, OZ.-IN. SEC.^{2}	.001	.001	.001
WEIGHT, OUNCES	5	5	5

Inland Power Amplifiers

Inland makes a complete line of power amplifiers for systems duty with Inland torquers whether in airborne, shipboard, or ground service. Specification sheets available on request.

For complete data on these or other d-c pancake torquers up to 3000 pound-foot output, address Dept. AW, Inland Motor Corporation of Virginia, Northampton, Massachusetts.

Factory: Radford, Virginia

INLAND MOTOR CORPORATION OF VIRGINIA

A SUBSIDIARY OF KOLLMORGEN CORPORATION

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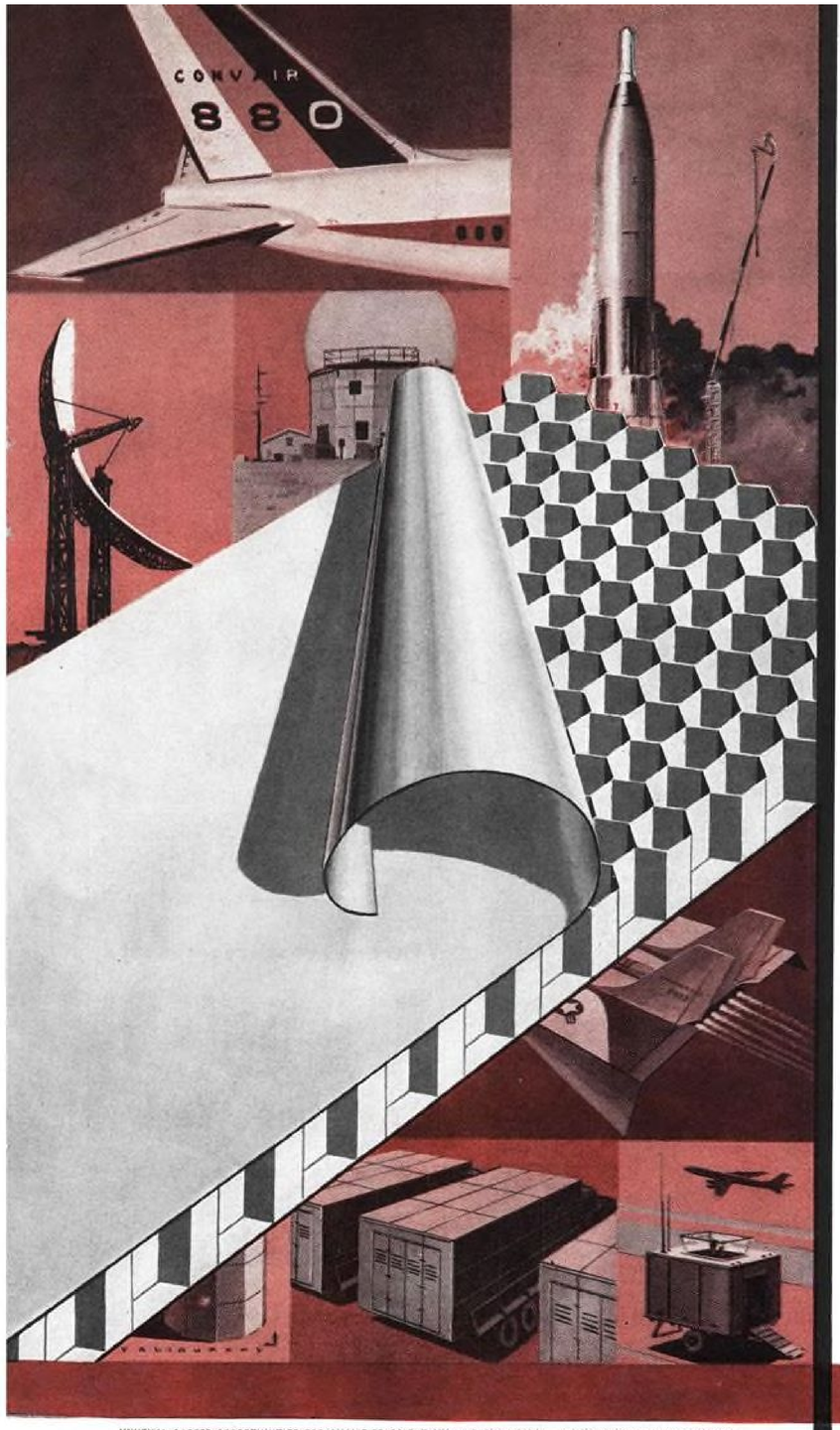

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Avco/Nashville specializes in applying engineering imagination to a wide variety of structural problems. One result is an exciting new family of structures offering features that go far beyond the limitations of the original materials.

Nashville Division is now producing honeycomb structures that have unusual strength and heat resistance, yet are light enough to float on water. Employing its new *Avcoramic* process, Nashville Division makes *Avcomb* stainless steel panels for the B-70 supersonic bomber. It also produces aluminum honeycomb components for Convair 880 and 600 jet transports, and radar reflectors of fibre glass, aluminum and stainless steel sandwich construction.

Although the first applications for these jet-age materials have been in missiles and supersonic aircraft, Avco development engineers are actively investigating new uses. These include communications shelters, droppable buoys, lightweight ground support equipment, and many other applications requiring a high strength/weight ratio.

The engineering staff of the Nashville Division is ready to assist you in adapting new methods and new materials to meet your requirements for lightweight structures.

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For full information, write General Marketing Manager—Structures, Nashville Division, Avco Corporation, Nashville 1, Tennessee.

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The CS-17 Force Calibrator with direct digital readout is the heart of completely instrumented hydraulic test stands used to calibrate load cells. Dead weight machines with a wide range of capacities are available for lab work.

WEIGHT AND CENTER OF GRAVITY
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PRECISE ■ RELIABLE ■ COMPACT ■ THE A.W. HAYDON COMPANY DESIGNS AND MANUFACTURES EVERY TYPE AND SIZE OF PRECISION TIMING DEVICE. ONLY A FEW OF OUR STANDARD MODELS ARE SHOWN HERE. THERE ARE MANY OTHERS, AS WELL AS CUSTOM DESIGNS TO MEET THE MOST RIGID SPECIFICATIONS. IF YOU HAVE A SPECIFIC TIMING PROBLEM, WHY NOT GET IN TOUCH WITH US.

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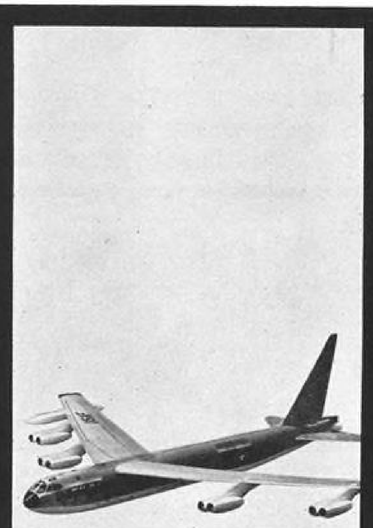
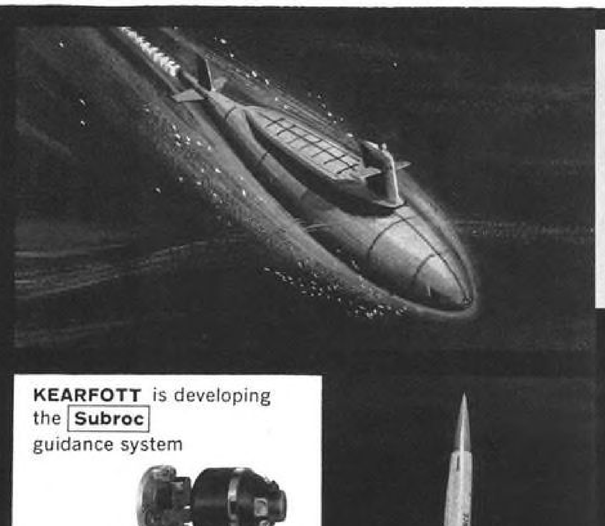
KEARFOTT engineered and now produces the stabilized phase follow-up system for **Talos**



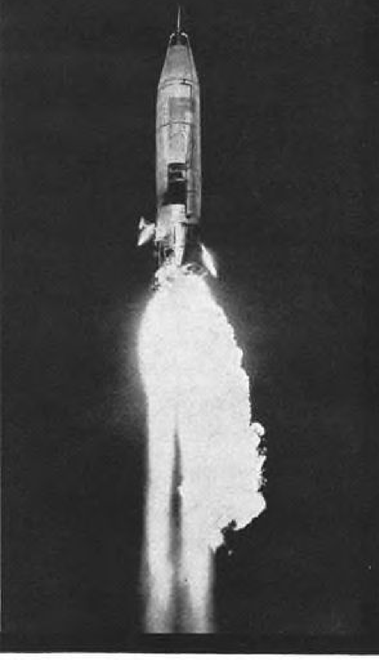
KEARFOTT developed and now produces precise heading and vertical reference systems for the **B-52** aircraft

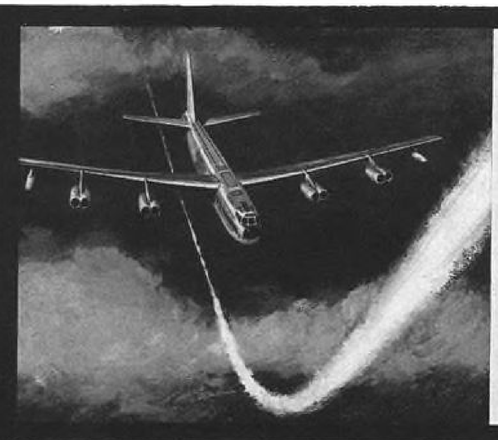


KEARFOTT is developing the **Subroc** guidance system

KEARFOTT developed and now produces the **Bomarc-B** all-attitude mid-course guidance system

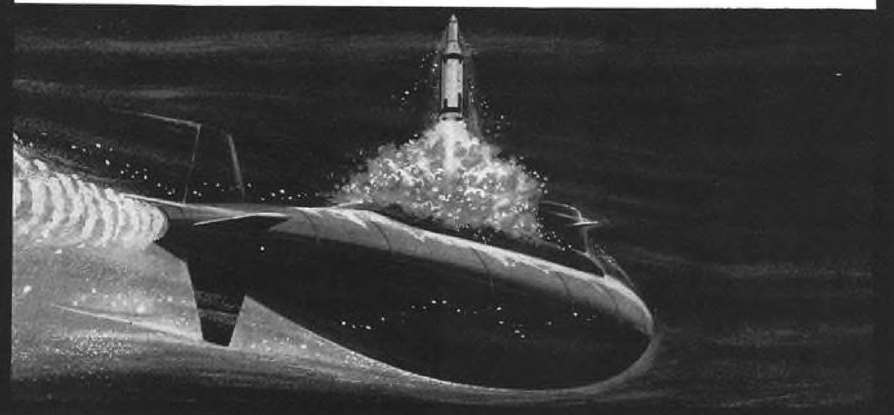
KEARFOTT developed and now produces precision floated gyros for the **Atlas** missile





KEARFOTT is developing precision floated gyros for the **Skybolt** missile

KEARFOTT produces precision floated gyros for the **Polaris** missile



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NEXT QUESTION . . .

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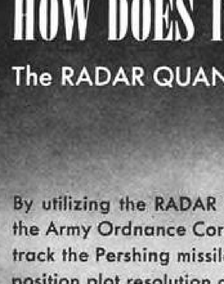
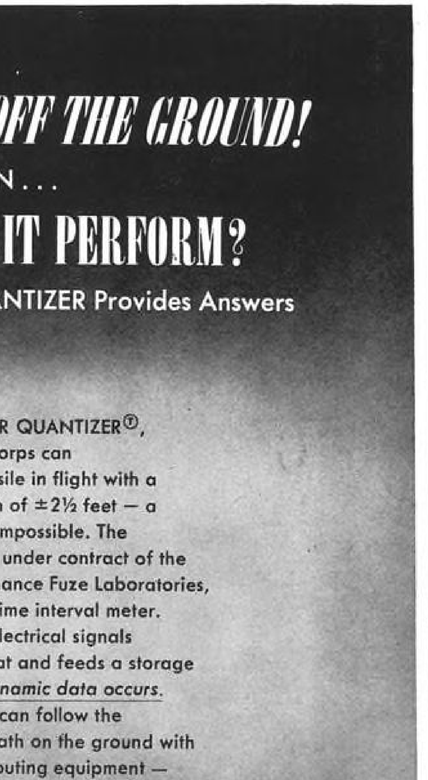
The RADAR QUANTIZER Provides Answers

By utilizing the RADAR QUANTIZER®, the Army Ordnance Corps can track the Pershing missile in flight with a position plot resolution of ±2½ feet — a resolution heretofore impossible. The Quantizer, developed under contract of the Army's Diamond Ordnance Fuze Laboratories, is a millimicrosecond time interval meter. It converts the radar electrical signals into digital code format and feeds a storage tape, *as fast as the dynamic data occurs.* As a result, engineers can follow the missile's exact flight path on the ground with the aid of digital computing equipment — making optimum use of the radar equipment's full capability, down to the Quantizer's instantaneous resolution of ±10 millimicroseconds!

If you have data processing requirements where it is desirable to measure time intervals down to ten millimicroseconds or less, and read the result out in digital format *while the data occurs,* contact Computer Equipment Corp. for full details on how the QUANTIZER can be applied to your system.





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INERTIAL COMPONENTS

HONEYWELL

SUB-SYSTEMS AND FLIGHT TEST EQUIPMENT

RATE GYROSCOPES

TYPE M-100 is the latest in Honeywell's family of miniaturized high performance rate gyros. It features constant damping (0.6 at −65°F) over a wide operating temperature range without the use of heaters.

TYPE GN or "Golden Gnat" is another of Honeywell's high performance gyros and has been in full production in a wide variety of miniature rate packages over the past three years.

TYPE JR, another rate gyro of proven reliability, features a unique quadri-lever spring suspension for high sensitivity and a wide full range under severe environmental conditions; TYPE JRT is available with heaters for those critical applications requiring constant damping; TYPE K Rate Measuring Gyro features a linear output signal that is proportional to the input rate within 0.25% full scale.

INERTIAL SUB-SYSTEMS

F-102 THREE-AXIS RATE GYRO SYSTEM Instantaneous detection of aircraft turning rates about the roll, pitch, and yaw axes is accomplished by three Model JR gyros. The resulting output signals teamed with other equipment, make possible uniform pilot control response for all flight conditions.

F-106 THREE-AXIS TURN RATE TRANSMITTER This sub-system features three Gnat miniaturized gyros that detect rate of turn about the roll, pitch, and yaw axes and responds with an output signal to provide polarity reversing D-C outputs proportional to the corresponding input rate.

CONTRACT ENGINEERING AND MANUFACTURING

Honeywell's Boston Division will design from customer specifications or prototypes, or manufacture to customer's drawings. Typical of the completed programs in this area are: CN-100 Compass-controlled Stable Reference Platform for a bombing system (shown at left), and Displacement Gyros for the A1A/BNC Bombing Navigational Computer.

ACCELEROMETERS

TYPES LA-100, LA-300 are low cost, rugged, linear, non-pendulous units with potentiometer outputs.

TYPE LA-200 is a miniaturized, pendulous, linear accelerometer which is fluid-damped and mechanically compensated. Output signal is provided by a variable reluctance signal generator.

TYPE LA-500 is a linear, non-pendulous, fluid-damped potentiometer output device that features constant damping, linear response, (−65° and +175°F).

TYPE LA-600 is a linear, non-pendulous A-C accelerometer in which pick-off friction is eliminated to permit resolution of extremely low level inputs. This accelerometer features magnetic damping for near constant damping ratio (−65°F to +250°F).

TYPE LA-700 linear, non-pendulous accelerometer is a complementary unit to the LA-600 for those applications requiring a high full-scale range combined with a low natural frequency.

TEST EQUIPMENT

HONEYWELL RATE GYRO TEST SET designed for use by field personnel for the static analysis of rate gyros, rate gyro demodulator amplifier, and three-axis rate gyros packages. This equipment meets the design requirements of MIL-T-945 and environmental test requirements outlined in MIL-E-4970.

SPECIALIZED TEST EQUIPMENT such as Radar Range Servo Test Sets, Frequency Response Analyzers, and other electronic equipment can be designed and manufactured to meet your requirements.

FLIGHT TEST EQUIPMENT

TYPE DV-4 POWER SUPPLY-DEMODULATOR (115 volt, 400 cycle, single-phase primary power available) energizes 1 to 3 Honeywell Rate Measuring Gyros, Type K, and translates the gyro output signals to a form suitable for use with recording oscillograph galvanometers or tape recorders.

Write to Minneapolis-Honeywell, Boston Division, Dept. 11B, 40 Life Street, Boston 35, Massachusetts.

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Honeywell

H Military Products Group SINCE 1885

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TOUGH connector problems are our meat

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Because of the self-aligning feature of the unique ball-and-socket pins, multiple contacts can be easily made with low insertion pressures. Proved reliability. Low tooling costs make it practical to design special connectors for your specific needs. Write or phone for help on your connector problem.

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Chosen by Convair for the Atlas

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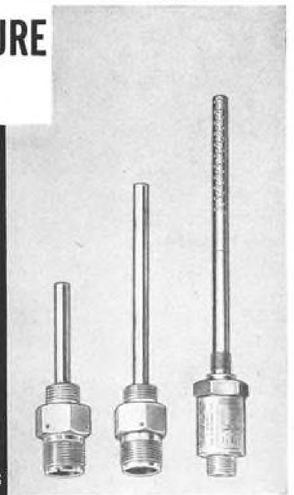
RESISTANCE *type* TEMPERATURE DETECTORS By LEWIS



QUALIFIED, precisely-wound, individually calibrated units that meet or exceed the requirements of:
MIL-B-8598 (ASG)
MIL-T-25446B (USAF)
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SPECIALLY DESIGNED temperature detectors for use in modern jet and piston-powered aircraft, made to the Airframe Manufacturer's specifications for sensing the temperatures of:
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HEATER DUCTS
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PLATINUM-WOUND TRANSDUCERS for use in MISSILES, to measure the temperatures of:
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and other media to customer's specifications

for AIRCRAFT and MISSILES

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NAUGATUCK, CONNECTICUT
Specialists In Temperature Measurement

solve your insulation and permeability problems with SMR

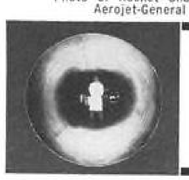
Stoner's SMR has broken through the thermal sealant barrier that has faced the missile and rocket industry for many years.

The varied shapes and forms that this versatile material has taken includes: chamber sealants; liners; insulation for head closures; high temperature insulation; prefabricated proofed sleeves and bladders, as well as other critical applications for rocket components.

SMR is also being used to advantage in plastic molding compounds and pre-preged laminates.

*SMR is a special Silicone Modified Rubber produced by Stoner Rubber Company, Inc.

Photo of Rocket Chamber courtesy of Aerojet-General Corporation



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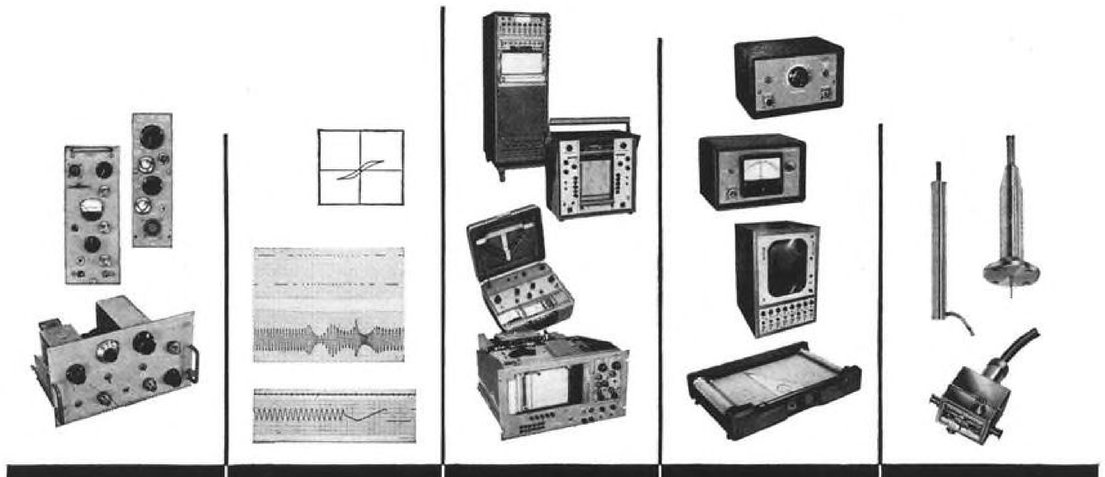
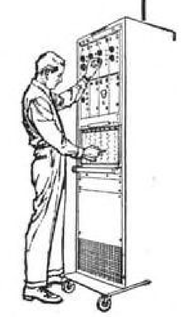


INPUTS	FREQUENCY RESPONSE (WRITING METHOD)	PACKAGING NO. OF CHANNELS	ACCESSORIES	TRANSDUCERS
INTERCHANGEABLE PLUG-IN PREAMPS "850", "350", "150" STYLE Carrier . . . Phase Sensitive Demodulator . . . DC Coupling . . . Low Level types **"350", "150" STYLE** 400 cycle Frequency Deviation . . . Logarithmic types **"150" STYLE** AC-DC . . . AC Wattmeter . . . RMS Volt /Ammeter . . . Frequency Meter . . . Stabilized DC . . . Triplexer types **SINGLE-CHASSIS 6- OR 8-CHANNEL AMPLIFIERS** "950" series high and low gain types . . . "650" medium gain type for Sanborn or other optical recorders.	**DC TO 150 CPS** with heated stylus traces on rectangular coordinate charts. **DC TO 5000 CPS** with new "650" optical instant readout recorder. **X-Y RECORDING** at writing speeds up to 2500"/sec with the Model 670 optical X-Y recorder.	**PORTABLES**–single channel, 21-lb "brief case" systems — either DC amplifier (Model 299) or AC strain gage amplifier (Model 301). **MODEL 320** separate DC amplifiers, 4-speeds, 50 mm wide channels. **RACK-MOUNTED** 2-channel Model 297 system with plug-in preamps. Mounts in 10½" rack space or separate portable case. **1- TO 16-CHANNEL MOBILE SYSTEMS**—"150", "350" and "850" series with plug-in preamps . . . "950" system with 6- or 8-channel amplifier . . . "650" system with 6- or 8-channel amplifier and optical recorder.	Chart Viewer . . . 8-channel, 17" Monitoring Oscilloscope . . . Monitor Meter . . . Phase Shifter . . . 4- to 32-channel event recorders.	For Linear displacement — Linearsyn, Miniature "probe-style" units . . . Linear velocity — LVsyn, many standard or special models . . . small, single-ended or differential pressures — 267, 268 Series.



Complete details of Sanborn recording instruments are available from Sanborn Sales-Engineering representatives located in principal cities throughout the United States, Canada and foreign countries . . . or write

SANBORN COMPANY INDUSTRIAL DIVISION

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FAIRCHILD DIFFUSED SILICON TRANSISTORS

Providing an unmatched combination of speed, power and reliability in computer switching and in RF and video amplifiers and oscillators. Today's widespread preference for diffused silicon transistors in high-performance, high-reliability applications has resulted from their unique combination of characteristics: very high gain-bandwidth product, large power dissipation, low saturation resistance, uniformity of parameters and outstanding reliability (300°C stabilization is standard Fairchild production practice). Their high performance applies over a very wide range of current, frequency and temperature, hence one Fairchild type can replace numerous earlier, more restricted types. Fairchild pioneered large-scale production of diffused silicon transistors and today offers the broadest line.

Types	Description	JEDEC Outline	f_T Typical	P_C @ 25°C Case Temp.	P_C @ 25°C Free Air Ambient	h_{FE} Min.	h_{FE} Max.	h_{FE} Cond. I_C	h_{FE} Cond. V_{CE}	V_{CER}††	V_{CBO}	V_{EBO}	V_{BESAT} (Max.)	V_{BESAT} Cond. (I_C)	V_{BESAT} Cond. (I_B)	V_{CESAT} (Max.)	V_{CESAT} Cond. (I_C)	V_{CESAT} Cond. (I_B)	I_{CBO}** (Maximum) @25°C	I_{CBO}** (Maximum) @150°C
2N696† & 2N697†	General purpose types for switching RF and DC applications over a wide current range	TO-5	90 mc 120 mc	2 watts	0.6 watt	20 40	60 120	150mA 150mA	10V 10V	40V	60V	5V	1.3V	150mA	15mA	1.5V	150mA	15mA	1.0μA	100μA
2N1420	High gain general purpose types for switching RF and DC applications over a wide current range	TO-5	160 mc	2 watts	0.6 watt	100	300	150mA	10V	30V	60V	5V	1.3V	150mA	15mA	1.5V	150mA	15mA	1.0μA	100μA
2N698 & 2N699	High voltage types particularly suited to video amplifiers and RF oscillators	TO-5	90 mc 120 mc	2 watts	0.6 watt	20 40	.. 120	150mA 150mA	10V 10V	80V	120V	5V	1.3V	150mA	15mA	5V	150mA	15mA	2.0μA	200μA
2N706†	Logic transistor for very high speed switching in low current saturated circuits	TO-18	400 mc	1 watt	0.3 watt	20	..	10mA	1.0V	20V	25V	3V	0.9V	10mA	1mA	0.6V	10mA	1mA	0.5μA	30μA
2N707	VHF oscillator type	TO-18	45% @ 100 mc*	1 watt	0.3 watt	9	..	10mA	15V	28V	56V	4V	0.9V	10mA	1mA	0.6V	10mA	1mA	5μA	
2N1131 & 2N1132	PNP complements to the 2N696 and 2N697 suitable for identical uses in opposite polarity	TO-5	50 mc 60 mc	2 watts	0.6 watt	15 30	45 90	150mA 150mA	10V 10V	−30V	−40V	−5V	−1.5V	150mA	15mA	−1.5V	150mA	15mA	1.0μA	100μA
2N1252 & 2N1253	Low storage types optimized for high current saturated switching circuitry	TO-5	80 mc 100 mc	2 watts	0.6 watt	15 30	45 90	150mA 150mA	10V 10V	20V	30V	5V	1.3V	150mA	15mA	1.5V	150mA	15mA	10μA	600μA
2N717 & 2N718	General purpose types for switching, RF and DC applications over a wide current range. (Small package)	TO-18	90 mc 120 mc	1.5 watts	0.4 watt	20 40	.. 120	150mA 150mA	10V 10V	40V	60V	5V	1.3V	150mA	15mA	1.5V	150mA	15mA	1.0μA	100μA
2N719 & 2N720	High voltage types particularly suited to video amplifiers and RF oscillators. (Small package)	TO-18	90 mc 120 mc	1.5 watts	0.4 watt	20 40	.. 120	150mA 150mA	10V 10V	80V	120V	5V	1.3V	150mA	15mA	5V	150mA	15mA	1.0μA	200μA
2N1613	A UNIVERSAL TYPE: Fast switching (logic and high current) Amplifiers (low level, low noise, wideband, VHF power).	TO-5	100 mc	3 watts	0.8 watt	40 35 20 20 20	.. ..	150mA 10mA 0.1mA 500mA 10mA (−55°C)	10V 10V 10V 10V 10V	50V	75V	7V	1.3V	150mA	15mA	1.5V	150mA	15mA	10mμA***	10μA
2N1711	Very high beta universal type: Similar to 2N1613	TO-5	120 mc	3 watts	0.8 watt	100 80 35 50	300	150mA 10mA 0.1mA 500mA	10V 10V 10V 10V	40V	60V	7V	1.3V	150mA	15mA	1.5V	150mA	15mA	10mμA†	10μA

†These transistors to military specification requirements. *Oscillator Efficiency **I_{CBO} measured at 50% of V_{CBO} ***I_{CBO} measured at 60V ††For all types R ≦ 10Ω

A number of additional high performance types are scheduled for announcement in the near future.

FAIRCHILD SEMICONDUCTOR CORPORATION

ADDITIONAL DATA AVAILABLE ON INDIVIDUAL SPECIFICATION SHEETS

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FAIRCHILD DIFFUSED SILICON PLANAR DIODES

You can now get volume delivery — in any quantity — on all types in the Fairchild diode catalog. Even the very highest performance types are now immediately available as a result of Fairchild's Planar Structure development and manufacturing breakthroughs. The combination of Fairchild's high-conductance Planar FD200 (100 mA at 1.0V; 50mμsec recovery) and Planar FD100 (2mμsec reverse recovery) will cover advanced switching applications at high and low current levels and speeds. The FD300 Low Leakage Diode is ideal for applications where speed is not of prime importance. New diffusion techniques developed by Fairchild successfully reconcile high conductance with fast switching, low capacitance and uniformity of parameters. Fairchild's Planar Structure with surface passivation assures you the ultimate in reliability in the entire Fairchild diode line.

INDUSTRY'S NEWEST, MOST ADVANCED TYPES (FD100, FD200 & FD300) PLUS THIS BROAD RANGE OF ESTABLISHED 1N NUMBERS*

Type	Description	Reverse Recovery Time (Max.)	Reverse Recovery Time (Cond.)	Maximum Power Dissipation	Capacitance at 0 Volts Bias (Max.)	Capacitance at 0 Volts Bias (Cond.)	Breakdown Voltage (Min.)	Breakdown Voltage (Cond.)	Reverse Current (Max.)	Reverse Current (Cond.)	Forward Voltage Drop (Max.)	Forward Voltage Drop (Cond.)
FD100	Ultra-fast computer diode	2mμsec	@ $I_f = I_r = 10mA$, $V_R = -6V$	250 mw	2.0μμf	@ $V_R = 0V$	75V	@ $I_R = 5\mu A$	0.1μA 100μA	@ $V_R = -50V$, 25°C @ $V_R = -50V$, 150°C	1.0V	@ $I_F = 10mA$
FD200	A UNIVERSAL TYPE High conductance, ultra fast	50mμsec	$I_f = I_r = 30mA$	250 mw	5.0μμf	@ $V_R = 0V$	200V	@ $I_R = 100\mu A$	0.1μA 100μA	@ $V_R = -150V$, 25°C @ $V_R = -150V$, 150°C	1.0V	@ $I_F = 100mA$
FD300	High conductance low leakage diode			250 mw	6.0μμf	@ $V_R = 0V$	150V	@ $I_R = 100\mu A$	0.001μA 3.0 μA	@ $V_R = -125V$, 25°C @ $V_R = -125V$, 150°C	1.0V	@ $I_F = 200mA$

*ALL THESE SILICON PLANAR DIODES AVAILABLE FROM STOCK

ULTRA-FAST SWITCHING PLANAR DIODES

1N903	1N906	1N914†	FD114
1N903A	1N906A	1N914A	FD115
1N904	1N907	1N916	FD116
1N904A	1N907A	1N916A	FD117
1N905	1N908	FD100	FD200
1N905A	1N908A	FD101	

Reverse recovery times from 2.0mμsec to 50mμsec
Forward conductance to 100mA at 1.0V
Capacitances 0.8μμf to 5.0μμf
Breakdown voltages up to 200V

VERY-FAST SWITCHING PLANAR DIODES

1N251†	1N927
1N252	1N928
1N925	FD237
1N926	

Reverse recovery times from 75mμsec to 150mμsec
Forward conductance to 100mA at 1.0V
Breakdown voltages up to 120V

FAST SWITCHING PLANAR DIODES

1N643†	1N792	1N808	1N843	FD251
1N643A	1N793	1N809	1N844	FD252
1N658	1N794	1N811	1N845	FD253
1N659	1N795	1N812	1N891	FD254
1N660	1N796	1N813	1N892	FD255
1N661	1N797	1N814	1N893	FD256
1N662†	1N798	1N815	FD241	FD257
1N662A	1N799	1N818	FD243	FD258
1N663†	1N800	1N837	FD244	FD259
1N663A	1N801	1N837A	FD245	FD260
1N778	1N802	1N838	FD246	FD262
1N779	1N803	1N839	FD247	FD263
1N789	1N804	1N840	FD248	FD264
1N790	1N806	1N841	FD249	FD265
1N791	1N807	1N842	FD250	

Reverse recovery times from 0.2μsec to 0.5μsec
Forward conductance to 200mA at 1.0V
Breakdown voltages up to 240V

SWITCHING PLANAR DIODES

1N625	1N934	FD214	FD219	FD228	FD233	Reverse recovery times of 1μsec
1N626	FD112	FD215	FD220	FD229	FD234	Forward conductance to 100mA at 1.0V
1N627	FD113	FD216	FD221	FD230	FD235	
1N628	FD212	FD217	FD222	FD231	FD236	
1N629	FD213	FD218	FD227	FD232	FD266	Breakdown voltages up to 200V
					FD267	

GENERAL PURPOSE PLANAR DIODES

1.0 to 50mA		51 to 150mA			
1N456	1N890	1N456A	1N482B	1N486	FD318
1N457†	FD322	1N457A	1N483	1N486A	FD319
1N458†	FD323	1N458A	1N483A	1N486B	FD320
1N459†	FD324	1N459A	1N483B	FD311	FD321
1N461	FD325	1N461A	1N484	FD312	
1N462	FD326	1N462A	1N484A	FD813	
1N463	FD327	1N463A	1N484B	FD314	
1N464	FD328	1N464A	1N485	FD315	
1N619	FD329	1N482	1N485A	FD316	
1N622		1N482A	1N485B	FD317	

Over 150mA		
1N676	FD338	FD348
1N678	FD339	FD349
FD330	FD340	FD350
FD331	FD341	FD351
FD332	FD342	FD352
FD333	FD343	FD357
FD334	FD344	FD358
FD335	FD345	FD359
FD336	FD346	FD360
FD337	FD347	FD361

Forward conductance to 250mA at 1.0V
Reverse leakage as low as 5mμA
Breakdown voltages up to 260V

†These Diode types to military specification requirements.

In addition to these 200 units, Fairchild silicon diodes are available to particular specifications for special customer requirements.

A number of additional high performance types are scheduled for announcement in the near future.

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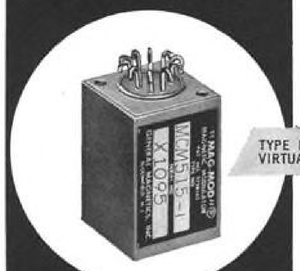

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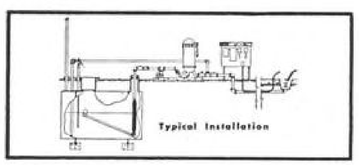

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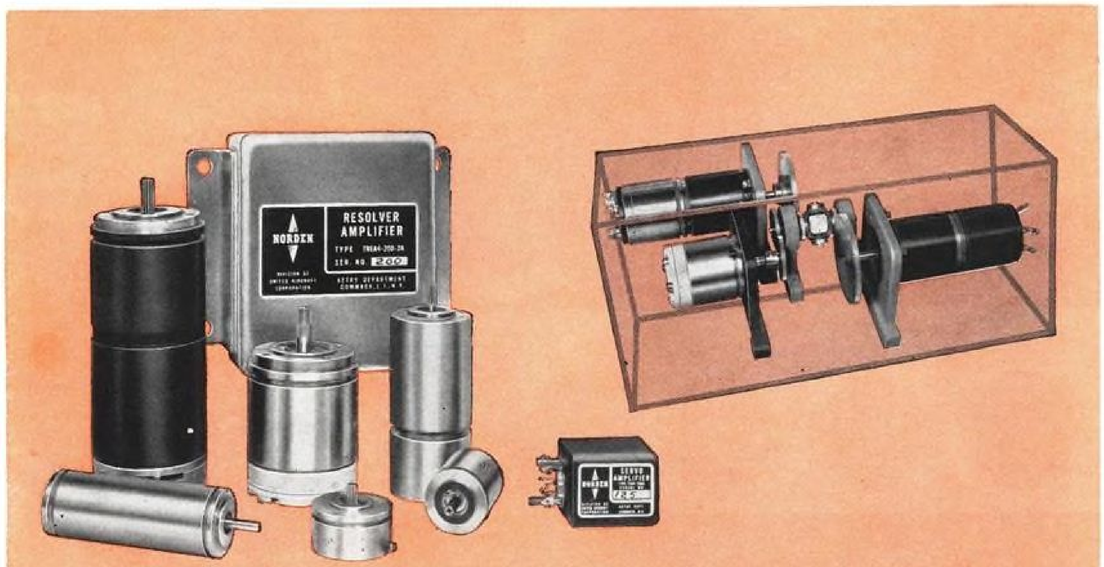

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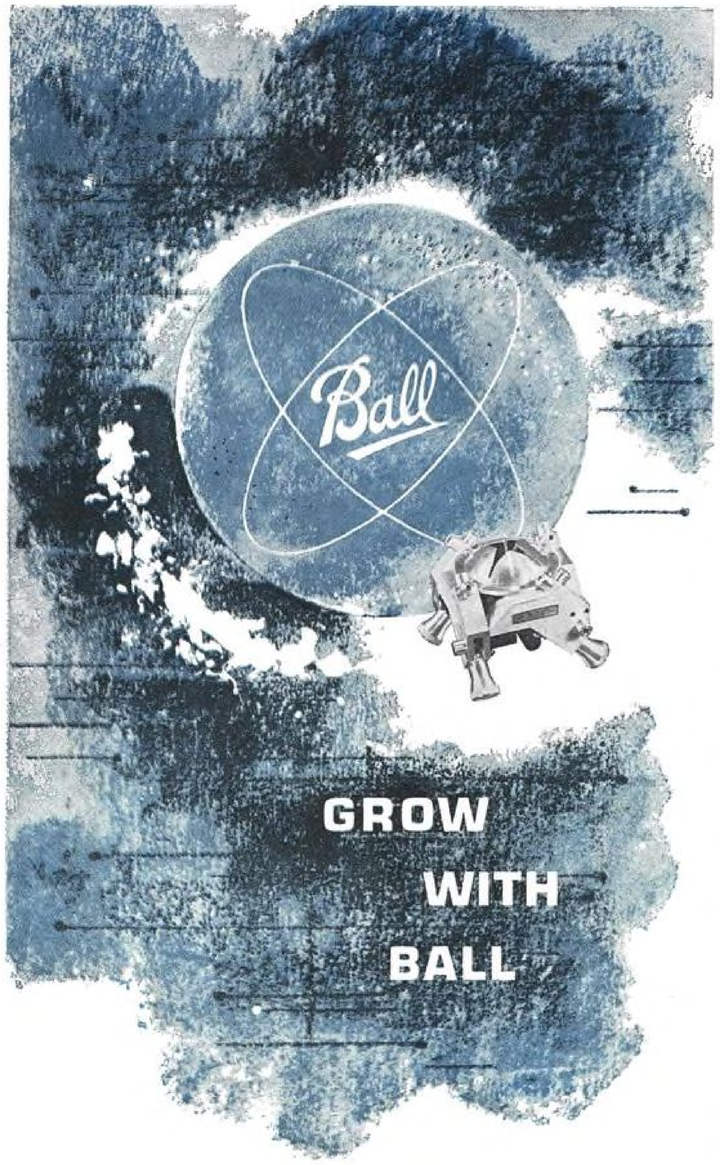

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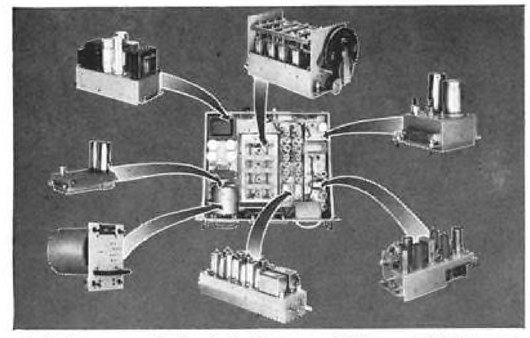

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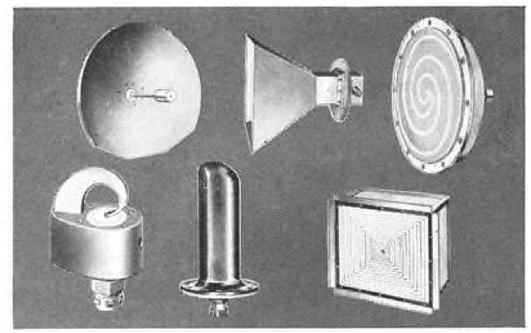

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There are Hartman miniature relays and contactors ranging in size from 2 to 50 amp. A telephone call or letter will bring you prompt and complete information.

SPECIFICATIONS

Contacts:	TYPE DH-7B
Arrangement	3PDT
Rating, current	50 amp.
Rating, voltage	115/200V.-400c
Coil Voltage	28V. DC
Coil Current	.15 amp.
Construction	Hermetically Sealed
Vibration	Over 20g to 2000 cps
Ambient (max.)	120°c
Max. Weight	12 oz.
Overall Dimensions	2⅜" dia. x 2⅞"

A companion DHR-7B with 115V.-400c rectifier operated coil is also available, as are various contact arrangements in SPDT center off and DT latching constructions, all in the same package.

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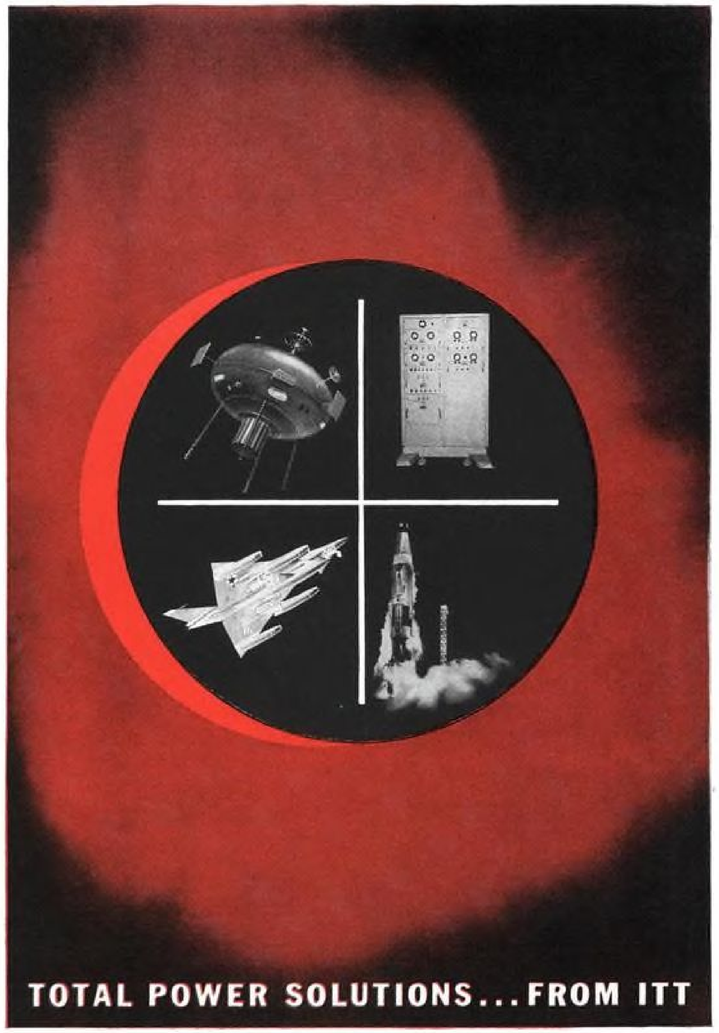

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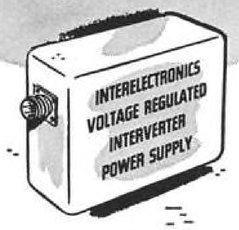

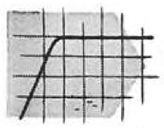

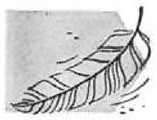

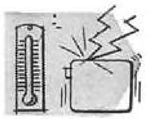

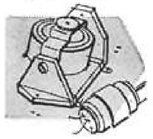

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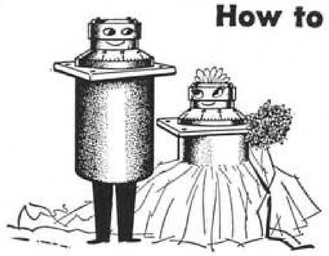

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Total Count Range	2^7 to 2^{19}	2^7 to 2^{19}	2^8 to 2^{16}	10^2 to 10^6	360 to 360,000	36,000
Available Counts per Turn	128, 256, 512, 1,024	128	256, 512, 1,024	100, 1,000	100, 360, 360,000	10
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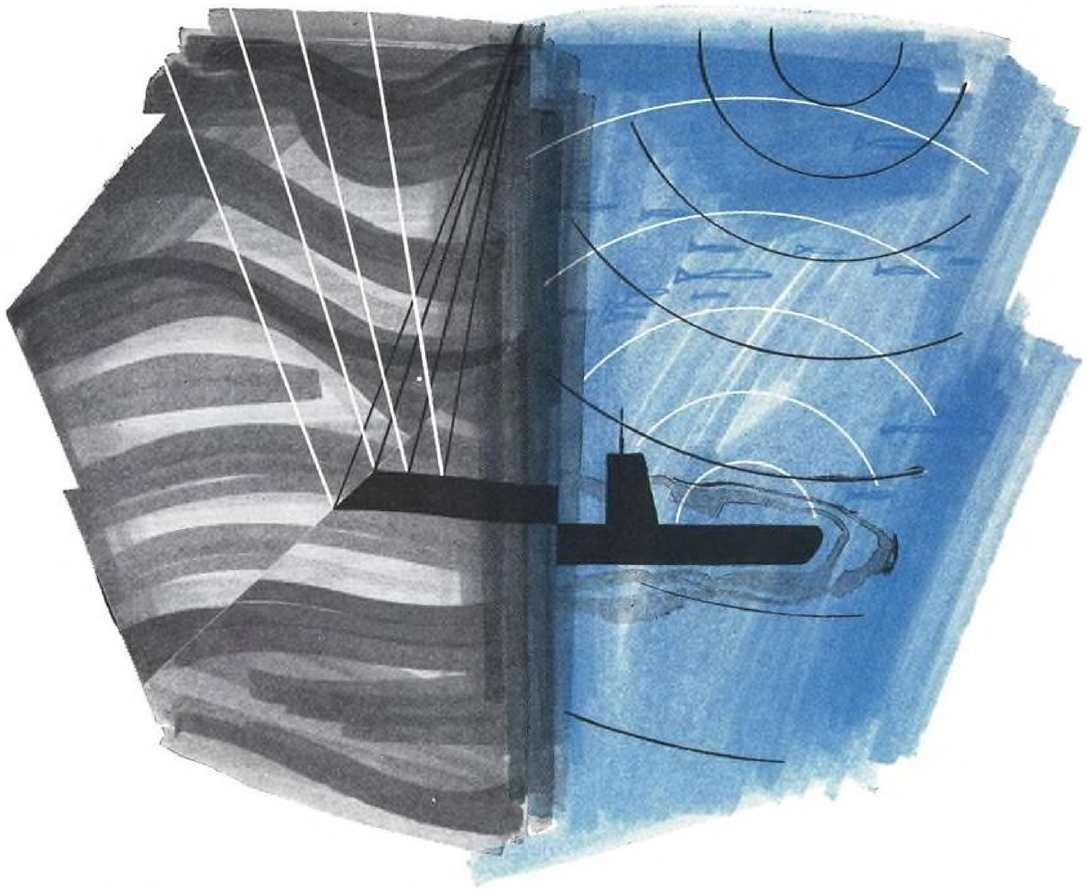

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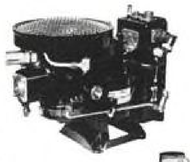

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KELLOGG

Pumps
Extremely high horsepower-to-weight ratio combined with exceptionally high efficiency.

Surge Valves
Designed to prevent sudden pressure surges to eliminate shock.

AIRBORNE HYDRAULICS

pumps . . . fluid motors . . . systems

A complete line of hydraulic pumps and motors ranging from 0.06 to 1.77 cubic inches per revolution (c.i.p.r.) with variable or constant delivery.

These compact and lightweight hydraulic components have been developed through the coordinated effort and abilities of the Kellogg Division Engineering Department and the Airborne Hydraulic Laboratory of the Brake Shoe Research Center, and are built to meet today's demands for high performance. General range: 0.06 to 1.77 c.i.p.r., —65° to 450° F., to 4000 psi, to 12,000 rpm. Individual designs for special requirements. For information on hydraulic components or complete hydraulic systems, contact our engineering representatives, Airsupply—Aero Engineering Company, Division of The Garrett Corporation, with offices in major cities.

Fluid Motors
Reversible, capable of high speeds and temperatures.

A-3528 R-E

AMERICAN Brake Shoe COMPANY

KELLOGG DIVISION, OXNARD, CALIFORNIA, U. S. A.

Manufacturers of hydraulic components and hydraulic systems for the aircraft and missile industries.

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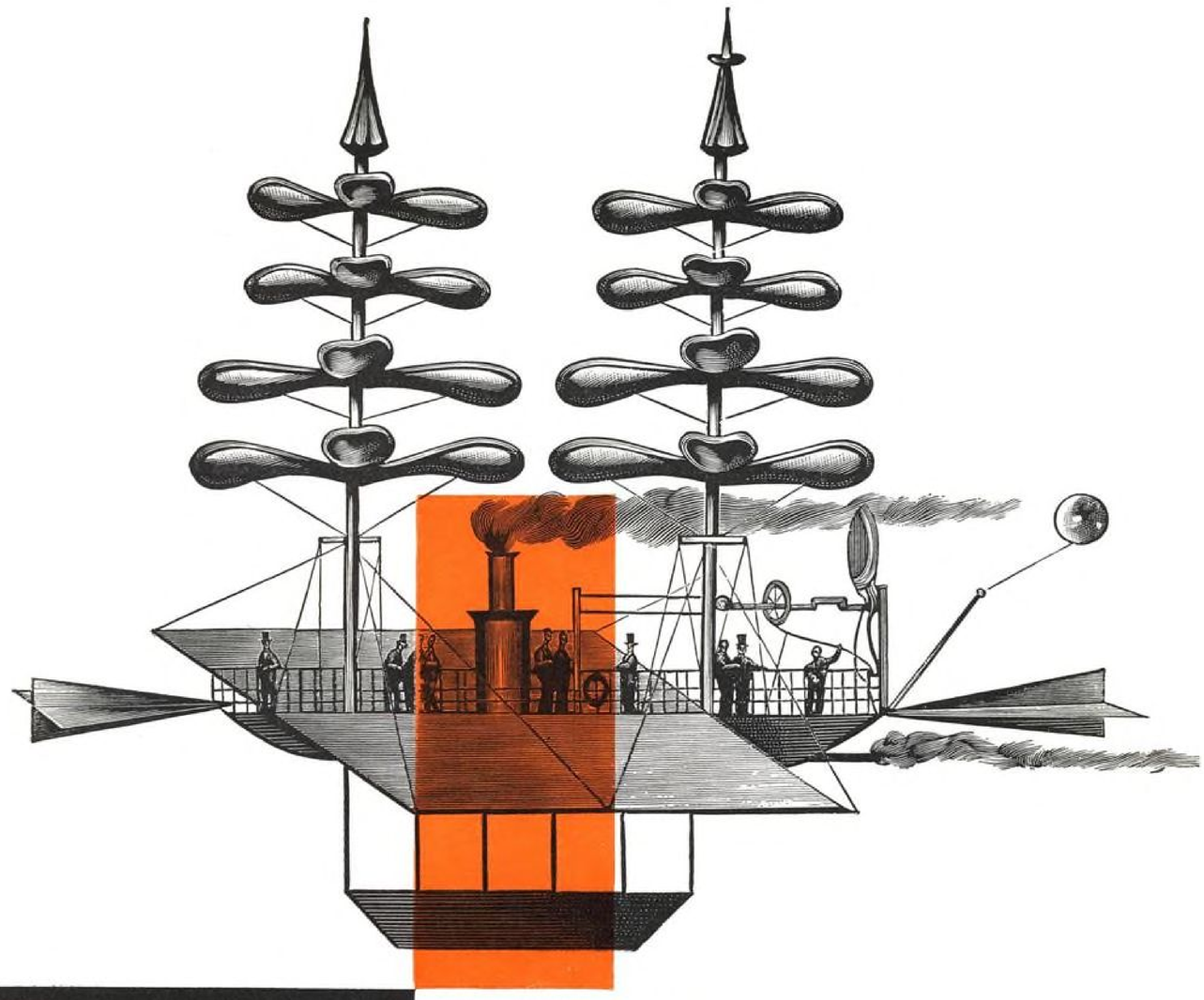

The basic principle of the helicopter was first advanced in 1863 by Gabriel De La Landelle of France. Rising steam was expected to turn the air screws and lift the craft upward. For this illustration, Brussel-Smith has followed earlier renderings of the "Steam Airliner" to create this intricate wood engraving.

IMAGINATION IN SPACE

Since Creation, man has looked out on space. At first, unknowing and incurious; then with the beginnings of understanding; now free and able to explore. Yet to move in space calls for wholly new concepts of energy.

This, then, is the working philosophy of Hercules in chemical propulsion: To design and manufacture highly concentrated packages of energy as propellants and rocket motors; each compatible, controllable, predictable; and each perfected for its specific mission.

HERCULES' BACKGROUND: A half-century of creative imagination in the evolution of propellants, from shotgun powder to the manufacture of the propellants for all the U. S. rockets fired during World War II, and now to space propulsion. Hercules facilities today encompass research, design, engineering, and staff organization for the production of the most advanced propellants. Illustrated brochure available on request.

HERCULES POWDER COMPANY
INCORPORATED
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NEW DEPARTURES IN MINIATURE

ULTRA-CLEAN INCUBATORS FOR M/I* BALL BEARINGS

N/D'S NEW WHITE ROOM PROVIDES ULTRA-CLEAN ENVIRONMENT FOR M/I BALL BEARING ASSEMBLY

N/D announces a new White Room at Sandusky, Ohio incorporating the latest technological advances available today. This new room provides a virtually dust-free atmosphere so necessary for the production of Miniature and Instrument Ball Bearings of high reliability.

Environmental controls within the room hold temperature to plus or minus 1°... with maximum humidity only 40%. Final air filtration into room removes particles smaller than 3/10 micron. A complete air change is made every three minutes. Engineers and technicians entering the room are thoroughly bathed by air showers in two successive deduster chambers.

You can benefit from New Departure's 25 years of experience in M/I ball bearing production by calling your nearby N/D Sales Engineer. Or write Department L.S., New Departure, Division of General Motors Corporation, Bristol, Conn.

*Miniature and Instrument Ball Bearings.

SEND FOR NEW DEPARTURE'S M/I BALL BEARING CATALOG TODAY. WRITE DEPT. L.S.

NEW DEPARTURE

MINIATURE AND INSTRUMENT BALL BEARINGS

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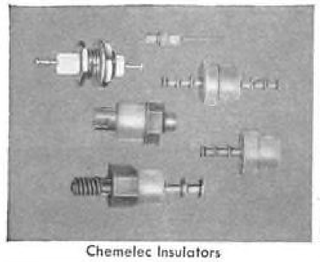
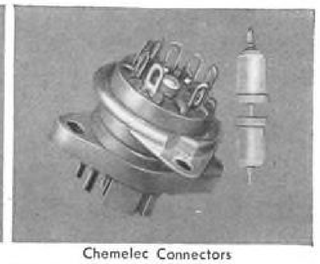
ENGINEERED COMPONENTS for the Electronics Industry

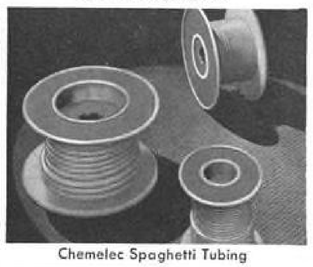


Chemelec Insulators

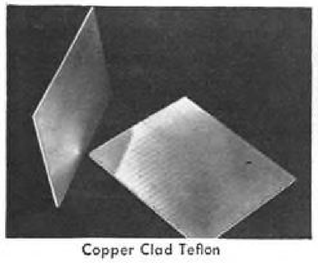


Chemelec Connectors

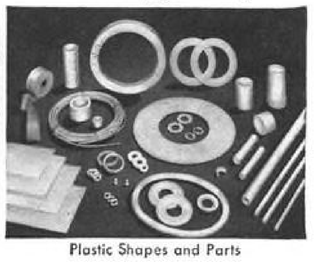
Chemelec Socket



Chemelec Spaghetti Tubing



Copper Clad Teflon



Plastic Shapes and Parts

A COMPLETE, TOP-QUALITY LINE FROM ONE SOURCE

Chemelec* Stand-Off and Feed-Thru Insulators are unaffected by humidity, mechanical shock and vibration, ambient temperatures from −110°F to +500°F. Insulators of Teflon** TFE. Metal base, metal body, compression-mounted, hermetic solder-seal types. Coded in 10 standard RMA colors.

Chemelec Connectors come in single pin compression mounted type with Teflon TFE insulator, miniature 9-pin tube base type with insulator of Teflon FEP and Kel-F†. Individual connectors and test points available, coded with standard RMA colors.

Chemelec Tube Sockets are available in 7- and 9-pin miniatures . . . shield base and top and bottom-mounting saddle types. Insulators of Teflon FEP and Kel-F. Also, crystal sockets and compression-mounted miniature and subminiature tube and transistor sockets of Teflon TFE.

Chemelec Teflon Spaghetti Tubing is extremely flexible. 500 to 1000 volts/mil dielectric strength, lowest dielectric constant (2.0) and dissipation factor (0.0002). Comes in thin, standard, heavy-wall. Available in RMA colors.

Copper Clad Teflon for printed circuit boards and cable strips has a bond strength of 7 lbs./in. cu. to Teflon, is unaffected by 500°F solder. Offers uniform dielectric constant (2.05) and dissipation factor (0.002) . . . resists delamination. Available in sheet and tape form.

Plastic Stock Shapes and Intricate Parts, inserts, thin sections, threaded pieces available with precision tolerances. Excellent facilities and experience in compression and injection molding, extruding, machining of Teflon, Nylon, Delrin**, Kel-F and other industrial plastics.

GARLOCK

ELECTRONIC PRODUCTS

Find out more about what Garlock offers. Contact the Garlock Electronic Products representative near you. Call him, or write for catalog AD-169, Garlock Electronic Products, Garlock Inc., Camden 1, New Jersey.

*Registered Trademark
**DuPont Trademark
†Trademark, Minnesota Mining & Mfg.

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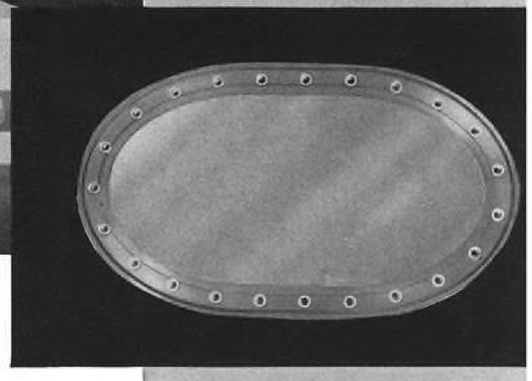
on the wing...



NOW! PROVEN DIE CASTINGS FOR THE JET AGE

40 Ireco wing panel inserts on each Boeing 720 save $4,000 per jetliner

One of the first die castings accepted for stress on any jet airliner was this wing panel insert produced for Boeing by IRECO and now used on all Boeing jets, civil and military. It is unlikely that any die casting has ever before been subjected to such critical use.

The reliability of this jet-age pressure-tested, stressed vacuum-die casting is now established beyond doubt. Equally established is its economy. Each 720 requires 40 such panels. They were previously machined from aluminum plate. IRECO die castings, plus IRECO-engineered floating inserts of a radical new design, produced a better panel at a saving of over 75%. This amounts to more than $4,000 per craft!

Do you have any difficult die casting problems for stressed application to aircraft or missiles? Our engineering department would be pleased to discuss them with you.

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IRECO

INDUSTRIAL DIVISION

of Irrigation Equipment Co., Inc.

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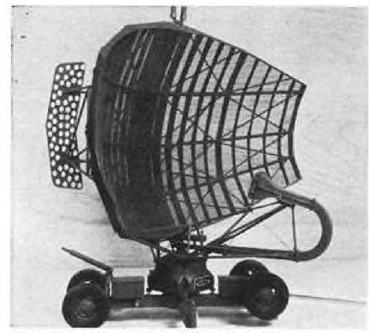
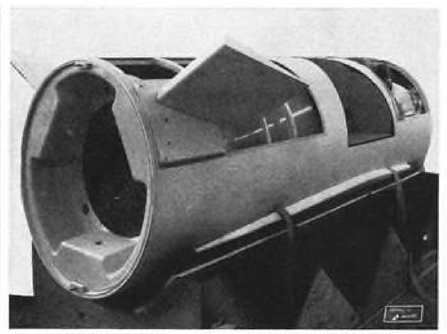
Eugene, Oregon



Mobile radar antenna model to clarify engineering problems, proposals & budget requirements.



Pershing missile mock-up for orientation and training.

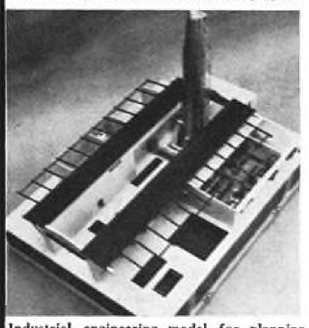
Engineering flow study model speeds "debugging."

Scale satellite model for IBM Space Center, Washington, D. C.

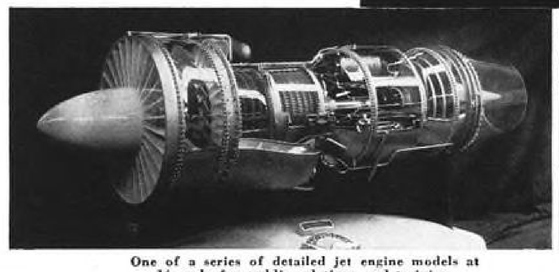
training aids, mock-ups, models and accomplishments in the AEROSPACE field.

Customer Engineering Service helps you save money, speed completion of project.

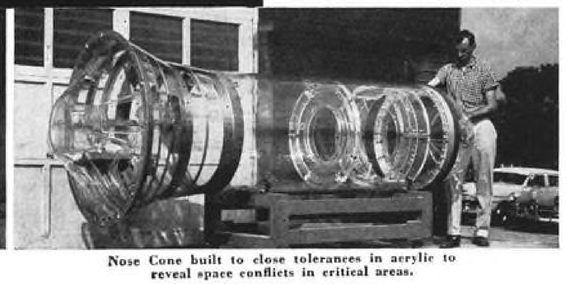
Lacrosse missile trainer, in reinforced plastics.



Industrial engineering model for planning and presentation of project scope.



One of a series of detailed jet engine models at ¾ scale for public relations and training.



Nose Cone built to close tolerances in acrylic to reveal space conflicts in critical areas.

Transparent full scale models to assist in "debugging" prototypes, models for wind tunnel test, launching site planning, human engineering study, and public relations are all part of our regular work. Because of our flexibility, such models can be produced on an urgent deadline basis, merely by referring the project to Atkins & Merrill.

May we help you get your project off the ground?

atkins & merrill, inc. *Home Office, Post Road, Sudbury, Mass., HIlltop 3-8822*

Reinforced Plastics Div., Bartlett St., Marlboro, Mass., HUntley 5-4120

Atkins & Merrill West Inc., 1701 Placentia Ave.. Anaheim, Calif., KEllogg 2-3396

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282

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KEEP AHEAD WITH HAVEG

SIL-TEMP®

the only high purity silica fabric that offers all these features.

Physical and General Data on Types of SIL-TEMP Fabric Available

	Sil-Temp 82	Sil-Temp 84	Test Method
Weight, oz./sq. yd.	10.3 ± 1.0	19.5 ± 1.5	Weight of 6" x 6" piece
Breaking Strength, lb./in.	Warp 22 Fill 20	Warp 35 Fill 30	ASTM D579-49
Silica Content, min.	98%	98%	Haveg Method M-20
Moisture Content, max.	4%	4%	Cenco Moisture Balance
Roll Width, in.	33½ ± ½	33½ ± ½	
Material Thickness (nominal), in.	0.013	0.028	
Areal Shrinkage, max.	5%	5%	6" x 6" piece, ½ hour exposure at 1,800°F
Roll length (nominal), yd.	100	70	
Bagginess, max., in.	4	4	Unrestrained drop between two 4" rolls, 20" apart
Melting Point, approx.	3,000°F	3,000°F	

Other Operating Divisions: American Super-Temperature Wires, Inc.—Burlington, Vermont • Blow Molding Division—Bridgeport, Connecticut • Chemical Materials Division—Wilmington, Delaware • Hav-A-Cup Division—Akron, Ohio Haveg Corporation—Wilmington, Delaware • Hemisphere Products Corporation—Rio Piedras, Puerto Rico Reinhold Engineering & Plastics Co., Inc.—Norwalk, California

The general data chart at left shows the unique properties that have made Sil-Temp an outstanding success as a reinforcement for plastics in missile and rocket compacts.

Sil-Temp has not only replaced bulkier and costlier materials but has shown superiority to asbestos, fiberglass, and other fibrous and non-fibrous organics, inorganics, and metallics.

Sil-Temp's higher quality is also evident in its more uniform dimensions, geometry, moisture content, density, and pH. AND Sil-Temp's quality is carefully guarded from raw material to final shipping destination.

Sil-Temp is shipped in 33¼ inch width rolls that are individually sealed in a moisture resistant envelope which serves as a humidity barrier and keeps out dirt and foreign matter. In addition, each roll is packaged in a special cushioned container to prevent telescoping, crushing or abrasion. These precautions assure you of top quality.

For further information send for our Sil-Temp folder or write, wire, or phone Haveg's Chemical Materials Division. One of our experienced engineers will be happy to work with you on your particular application.

Keep Ahead with HAVEG®

FIRST IN *Engineered* PLASTICS

CHEMICAL MATERIALS DIVISION
HAVEG INDUSTRIES, INC.
Plastics Park • Wilmington 8, Delaware

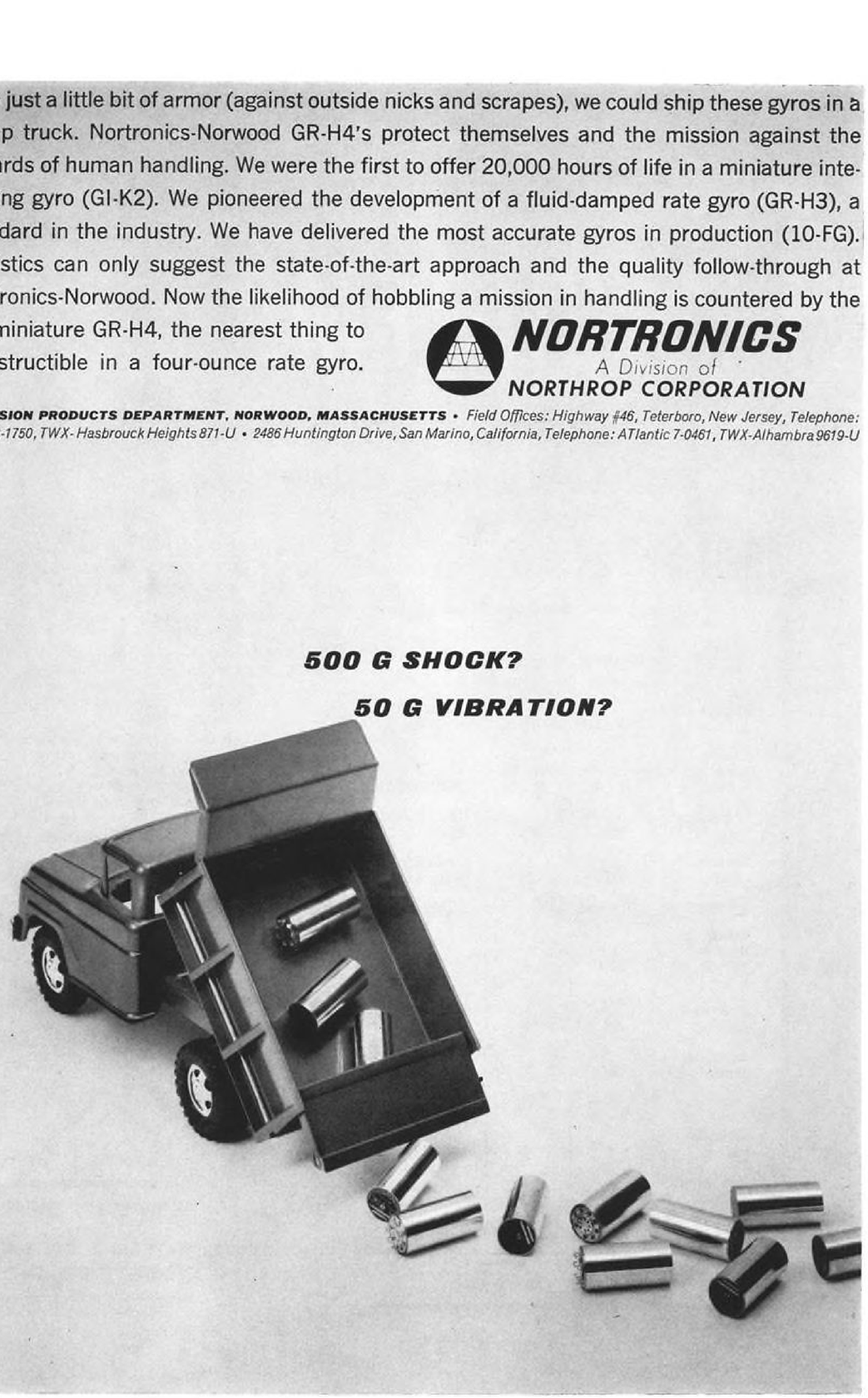
With just a little bit of armor (against outside nicks and scrapes), we could ship these gyros in a dump truck. Nortronics-Norwood GR-H4's protect themselves and the mission against the hazards of human handling. We were the first to offer 20,000 hours of life in a miniature integrating gyro (GI-K2). We pioneered the development of a fluid-damped rate gyro (GR-H3), a standard in the industry. We have delivered the most accurate gyros in production (10-FG). Statistics can only suggest the state-of-the-art approach and the quality follow-through at Nortronics-Norwood. Now the likelihood of hobbling a mission in handling is countered by the subminiature GR-H4, the nearest thing to indestructible in a four-ounce rate gyro.

NORTRONICS
A Division of
NORTHROP CORPORATION

PRECISION PRODUCTS DEPARTMENT, NORWOOD, MASSACHUSETTS • *Field Offices: Highway #46, Teterboro, New Jersey, Telephone: ATlas 8-1750, TWX- Hasbrouck Heights 871-U • 2486 Huntington Drive, San Marino, California, Telephone: ATlantic 7-0461, TWX-Alhambra 9619-U*

500 G SHOCK?

50 G VIBRATION?



Flexonics

...fabricators of precision-formed thin metals!

THIN WALL STAINLESS STEEL TUBING & DUCTING ASSEMBLIES

Flexonics Thin Wall Stainless Steel Tubing is unique—developed by Flexonics engineers especially for the aero/space industries. Made in two types: "Standard" in sizes from 1.00" to 6.00" O.D.; "High Strength" in sizes from 1.50" to 6.00" O.D. Both types available to 12.00" on special order. Also tubing assemblies and complete ducting systems, both with and without flexible sections.

METAL HOSE and FLEXIBLE CONNECTORS

Flexonics manufactures the broadest line of corrugated stainless steel hose for aeronautical and missile applications—to absorb vibration, permit deflection, correct for misalignment, and compensate for thermal growth. Sizes to 6.00" I.D.; larger on special order. Also specially fitted metal hose assemblies and flexible connectors.

FLEXIBLE JOINTS

Both restrained and free-flexing flexible joints, single or multi-ply, lined and unlined. Restrained flexible joints in three basic types—gimbal, pin, and link—are standard in .25" increments from 1.00" to 2.75", in a variety of alloys. Larger sizes on special order. Unrestrained or free-flexing joints also to your specifications.

Flexonics has the manufacturing facilities—with unique capabilities in research, engineering, fabrication, cleaning, and qualification testing—for complete responsibility on aircraft and missile ducting systems.

Flexonics engineers have pioneered the development of many forming and fabricating processes that are still exclusive in this field. This pioneering is in full swing yet today. To make your own design job easier, submit it to Flexonics as early as possible in the development stage.

Only at Flexonics will you find this fully-integrated service. Let our Flexonics sales engineers show you how this service can save you time and money!

Mail the coupon today! Check your field of interest and clip the coupon to your letterhead, for helpful and informative Flexonics literature.

A-435

Flexonics
corporation

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EXPANSION JOINTS · METAL HOSE · SYNTHETIC HOSE · BELLOWS · AERO/SPACE COMPONENTS

SUBSIDIARY OF CALUMET & HECLA, INC.

ATTACH TO YOUR LETTERHEAD—MAIL TODAY!

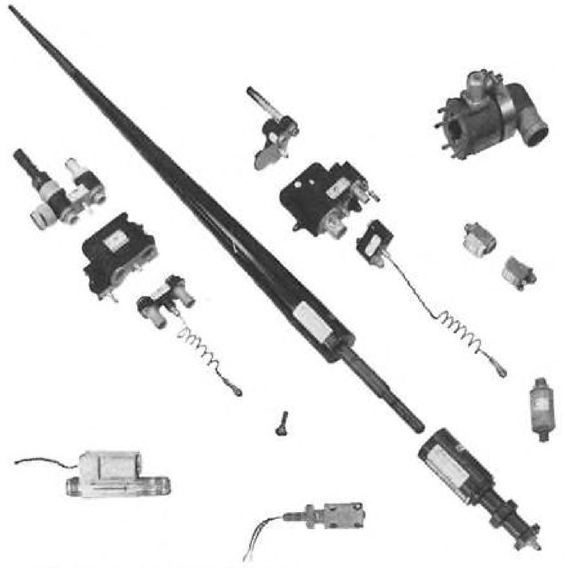
Flexonics Corporation
232 E. Devon Avenue, Bartlett, Illinois

Please send me literature on the subject that I have checked:

- ☐ Stainless steel tubing
- ☐ Aircraft and missile ducting systems
- ☐ Metal hose
- ☐ Flexible joints
- ☐ Product cleaning
- ☐ Qualification testing

Research
Responsibility
Results

Hundreds of thousands of Aerotec disconnects, valves, flow indicators, pressure switches, and float switches have been produced for America's weaponry.



FROM SATELLITES TO SUBMARINES . . .

Aerotec components have proven their reliability under all service demands. This reliability results from a background of 16 years' experience in the design, development, and production of equipment to exacting specifications.

Use Aerotec's capabilities for the answer to *your specific requirements.*

Send details of your problem for our recommendations. Write us now. Our representatives are conveniently located for prompt liaison and service

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Aircraft Equipment Division, Dept. W, Greenwich, Conn.
PRECISION EQUIPMENT FOR AIRCRAFT, MISSILES AND NUCLEAR APPLICATIONS
West Coast Office: Culver City, California
Canadian Affiliate: T. C. CHOWN LIMITED, Montreal & Toronto

Other Aerotec divisions: ***Aerotherm Division,*** a pioneer in energy absorption, manufactures passenger and crew seating, lounges and accessories; ***Industrial Division,*** engineers, produces and installs dust collecting systems, gas scrubbers, fans, stacks and allied equipment.

IN THE LABORATORY
ON THE PRODUCTION LINE

TEST SHOCK WITH CVC HYGE

You can produce and reliably repeat today's widest range of shock waveforms—half-sine, ¼ cosine, sawtooth, square and combinations—with CVC HYGE.

You'll find a HYGE model to meet your requirements for laboratory *or* production line use. With HYGE, you'll have a compact source of stored energy at your fingertips for producing shock waveforms to meet most test specifications—and at a cost of only pennies per test. As new requirements develop, HYGE lets you adapt to them by adding a simple metering pin.

HYGE 6000	Large laboratory model. Thrust capacity to 40,000 lbs.; acceleration, 2000G.
HYGE 3000	Small laboratory model. Thrust capacity to 10,000 lbs.; acceleration, 500G.
NEW PRODUCTION LINE HYGE	Thrust to 15,000 lbs.; acceleration, 100G. Provides most widely specified shock pulses: MIL-E-5272A (11 ±1 ms half-sine) and Ramo-Woolridge (6 ±0.5 ms Sawtooth). 5 tests in 5 minutes at less than 5¢ per test.

WRITE for HYGE Bulletins. Or, outline your requirements and ask for a specific recommendation.

Consolidated Vacuum Corporation
ROCHESTER 3, NEW YORK

SUNDSTRAND... New Concepts and Designs in Systems and Components

Package-Type Constant Speed Drive

Controlled-Speed Motors

Cartridge-Type Constant Speed Drive

Sundyne Water Injection Pump

Sandwich-Type Constant Speed Drive

Cartridge-Pneumatic Starter

New starter drive combines electric starting and 400-cycle generating system . . . mounts on a single engine pad . . . saves weight and cost . . . simplifies ground support . . . provides electric cross starting from idling engine . . . eliminates power interruption when transferring from external power to aircraft system . . . provides 400-cycle power at low engine speeds.

Combination cartridge-pneumatic jet engine starter starts on cartridge, low-pressure ground cart compressed air, or cross bleed engine air. "Cascaded" safety features insure fail-safe operation.

Sundyne water injection pump designed for 1500 hours' operation between overhauls. Negligible temperature rise during continuous dry operation, high reliability, and long life.

High-temperature hydraulic motors capable of operation at 600° F oil inlet, as part of a complete electrical system for 600° F operation.

Controlled-speed motors —variable and fixed displacement types. Variable displacement provides freedom from throttling losses, making them very desirable for many aircraft and missile applications.

Pump-motor combinations—variable displacement units that make smooth stepless transitions from motoring to pumping and from pumping to motoring, including integral speed controls and pressure controls.

Constant speed drives 10 to 120 kva. More than 28,000 drives and systems delivered for 39 major aircraft programs have accumulated over 10,000,000 flight hours with exceptional reliability.

Combination Starter Drive

Combination Pump and Motor

High-Temperature Motors

SUNDSTRAND

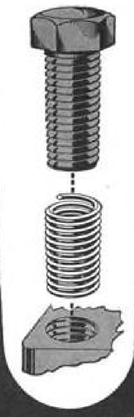
SUNDSTRAND AVIATION

DIVISION OF SUNDSTRAND CORPORATION

ROCKFORD, ILLINOIS

District Offices in: Arlington, Texas; Hawthorne, California; Rockford, Illinois; Dayton, Ohio; Seattle, Washington; Stamford, Connecticut; Washington, D. C.

3 WAYS TO PERMANENT THREADS – IN ANY MATERIAL!



For original design—production salvage and "on-the-job" thread repairs—use *Heli-Coil*® Stainless Steel Wire Screw Thread Inserts.

HELI-COIL Standard Insert

for stronger, smoother, lifetime threads

Permanently protects threads against wear, stripping, corrosion, galling, seizing, vibration, and shock. Made of 18-8 stainless steel wire, this precision-formed *Heli-Coil* Insert has a tensile strength of approximately 200,000 psi. Conforms to military standards and all commercial and industrial thread forms.

HELI-COIL Screw-Lock Insert

eliminates lock wiring and lock nuts

This one-piece wire Screw-Lock Insert provides all the thread protection of the Screw-Thread Insert, PLUS an exclusive resilient *internal* locking feature that eliminates clumsy protruding lock nuts, lock wiring and other supplementary locking devices. It saves cost, space and weight – permits simple streamlined design in standard bosses. Meets military and N.A.S. specifications for locking torque and vibration.

HELI-COIL Shop-pack

for all "on-the-job" thread repairs

Contains everything needed for fast, easy thread repair – *on the spot!* Salvage expensive parts – for pennies! Shop Pack restores threads to original size. Available in U.N.F. and U.N.C. sizes 6-32 to 1½-6. There's a kit for spark plug and pipe thread sizes, too. Each Shop Pack contains a supply of *Heli-Coil* Screw-Thread Inserts with special tap plus inserting tool.

There is a *complete* line of *Heli-Coil* products for every thread need: inserts, taps, tools and gages. Let us help with your design and application problems. Write today for complete information.

HELI-COIL CORPORATION

3512 Shelter Rock Lane, Danbury, Connecticut

3103

S-N HIGH SPEED INCREASER UNITS

Illustrated is S-N Model 4092-1 high power Speed Increaser rated 1,700 HP at 8,000 RPM. Used for dynamometer testing of gas turbine engines.

Vital to the wondrous advancement of our rockets, missiles, and jets are the grueling tests and checkout of their components on high speed test stands that simulate actual operating conditions during flight. Today, major test installations are equipped with S-N High Speed Gear Increaser Units. Most jets have components checked on S-N equipped high speed test stands.

Whatever your requirements for high speed testing, S-N has a standard unit or will design and build, to your specifications, units from 2 to 2,000 HP to operate at speeds from 80 to 80,000 RPM. They are the product of transmission engineers with over a half century of experience and are built to highest standards of quality. For complete information, write The Snow-Nabstedt Gear Corporation, Hamden, Conn.

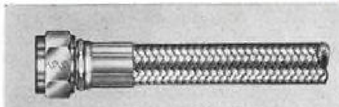
SNOW-NABSTEDT

Industrial Division

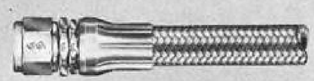
Transmission Engineers

FOR OVER HALF A CENTURY

SPECIFY STRATOFLEX



SUPER-T TEFLON
124001-S-L
MIL-H-25579 Hose Assembly



SUPER "T-HP" TEFLON
129001-S-L
ARP 604 Hose Assembly

113026-S-L
("113" Hose up to 40% lighter than conventional MIL-H-8794)

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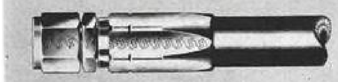
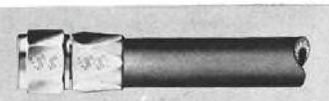


112-313-313-S-L
MS 28759 Hose Assembly
MIL-H-8788 Hose

112-342-342-S-L
MS 28762 Hose Assembly
MIL-H-8788 Hose

111-312-312-S-L
MS 28741 (MIL-H-8795)
Hose Assembly
MIL-H-8794 Hose

FLEXIBLE FLUID LINE REQUIREMENT



193-311-311-S-L
AN-6270 Hose Assembly
MIL-H-5593 Hose

SPECIAL CONFIGURATIONS—shown here are a few of the many different configurations Stratoflex has supplied to industry.

(Above hose assemblies conform in every detail to specifications listed.)

STRATOFLEX offers complete hose assemblies, hose and fittings in a wide range of sizes and types, allowing engineers exceptional freedom in equipment design. Stratoflex flexible hose and fittings are available for most fluid applications and for a wide range of pressures. Medium pressure Super-T Teflon* and high pressure Super "T-HP" Teflon* are designed for extreme temperature applications.

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SF12-0

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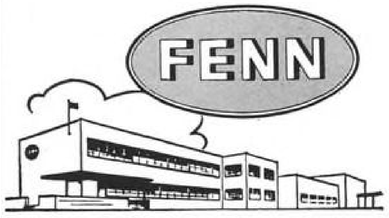

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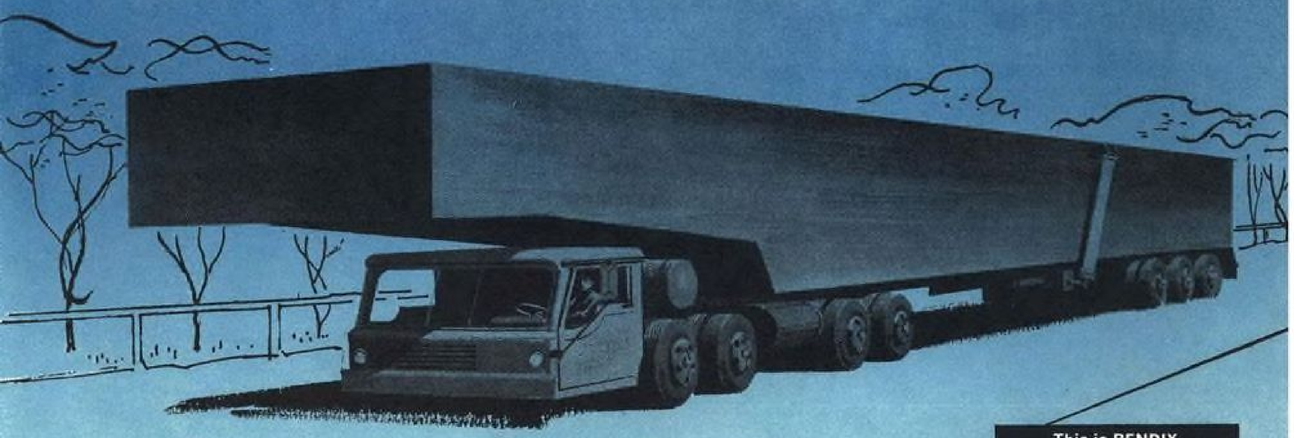

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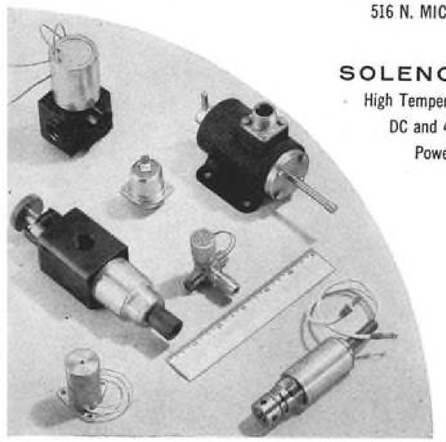

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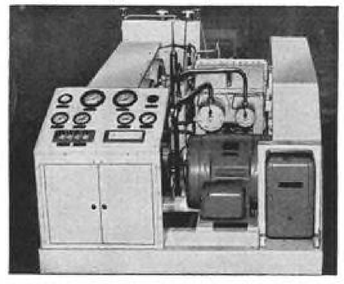

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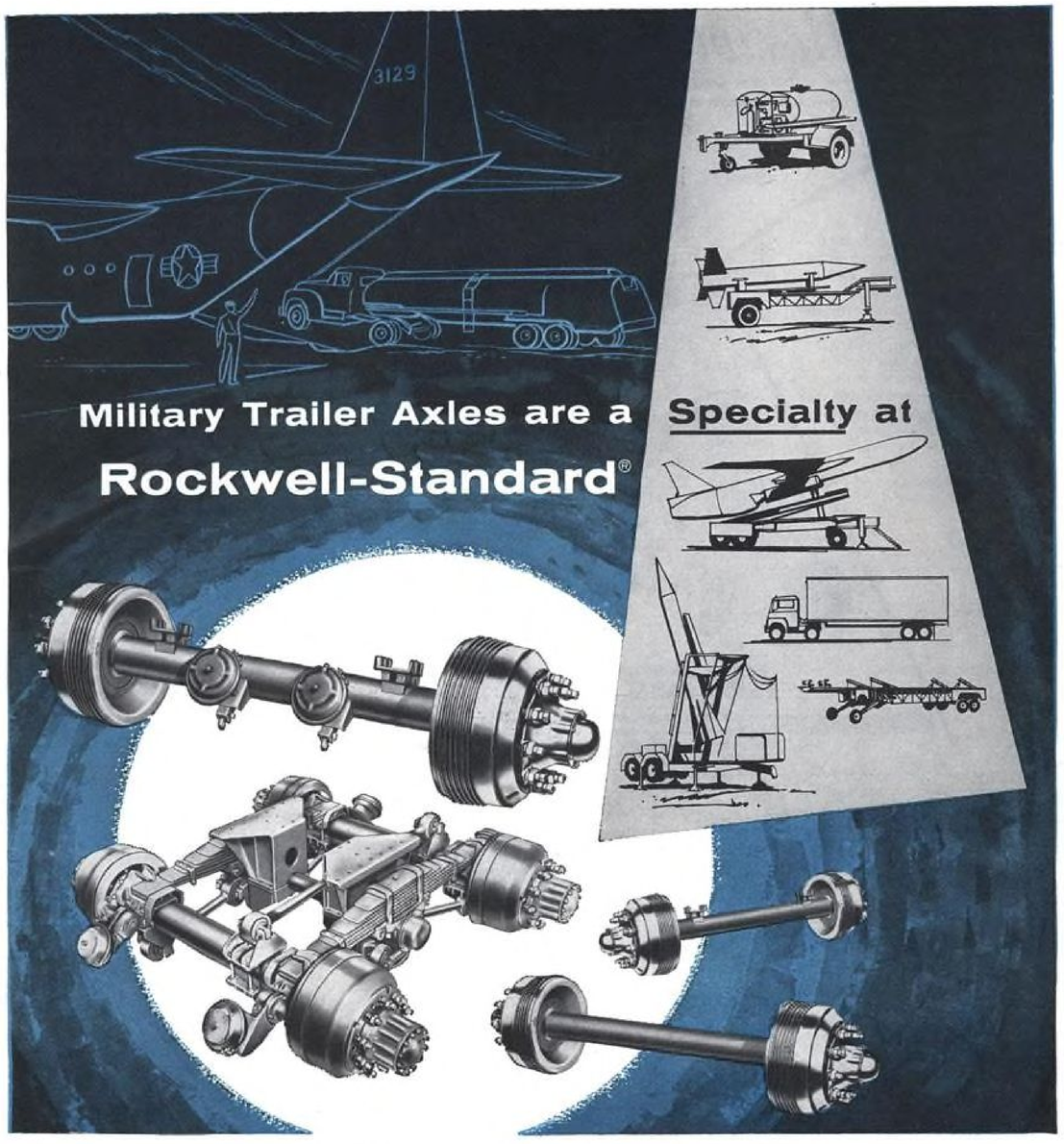

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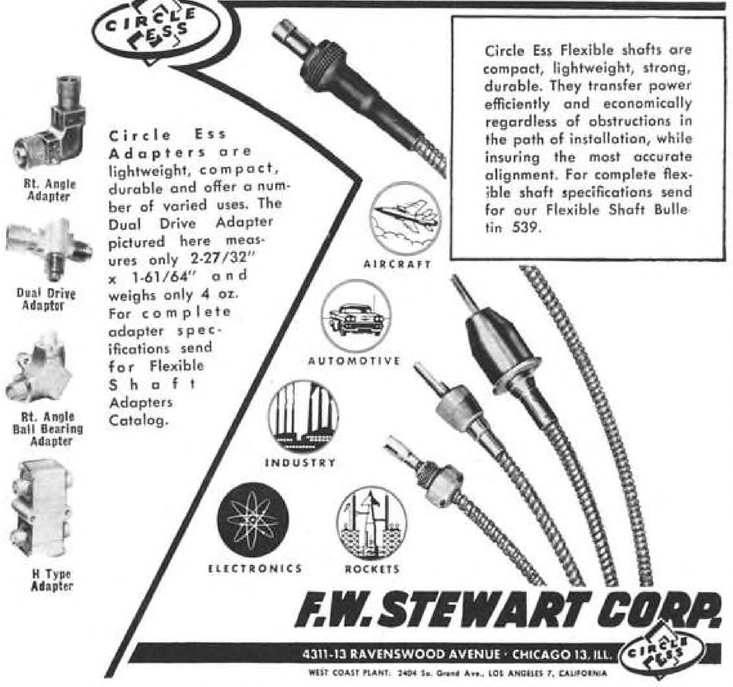

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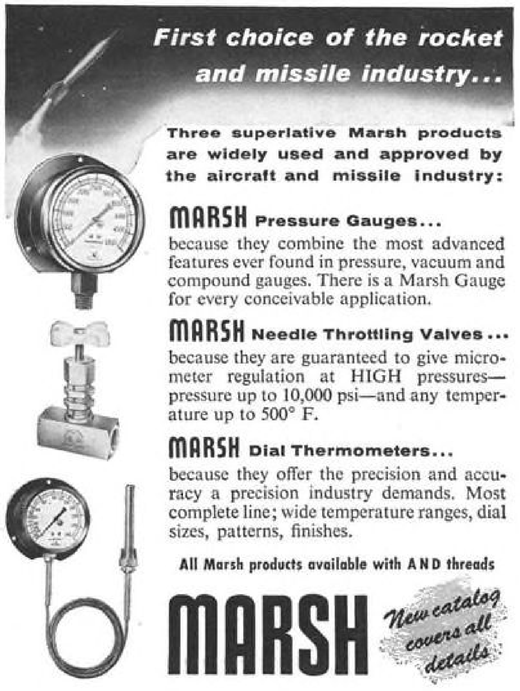

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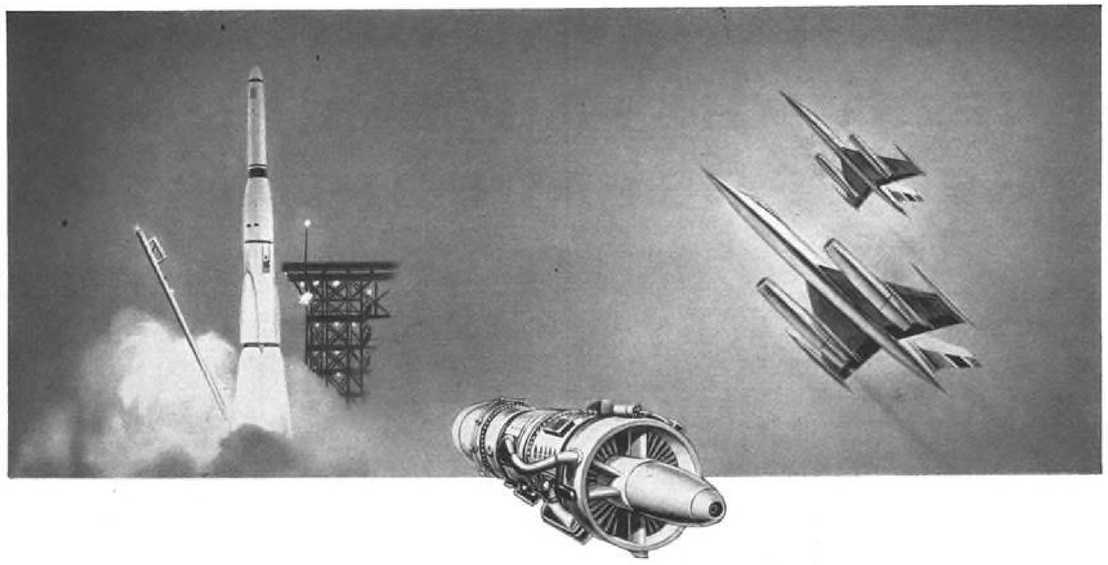

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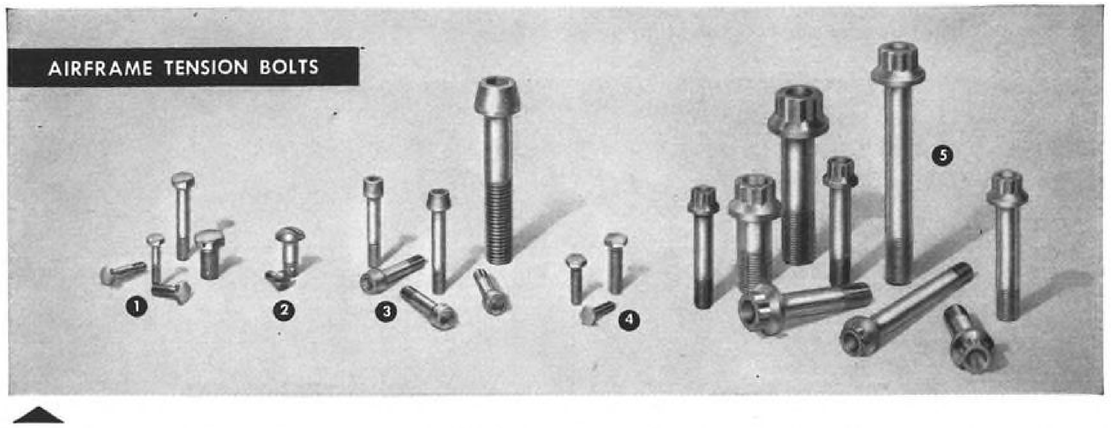


Broad selection of AN, NAS and MS Series, plus SPS high-strength, high-temperature types. Tensile range from 110,000 to 260,000 psi; service temperatures to 1600°F. Materials include aircraft quality alloy and corrosion-resistant steels and many of the new super alloys. Bolts furnished drilled, undrilled or with the Nylok* self-locking feature. Plating per your specifications or to meet specialized service conditions. Heads forged to retain continuous grain flow into shank. Threads fully formed by rolling after heat treatment.

T.M. Reg. U.S. Pat. Off., The Nylok Corporation

1. Hex Head Bolts: Complete line of AN and NAS Series. Tensile strengths from 125,000 to 160,000 psi. Serviceable to 550°F.

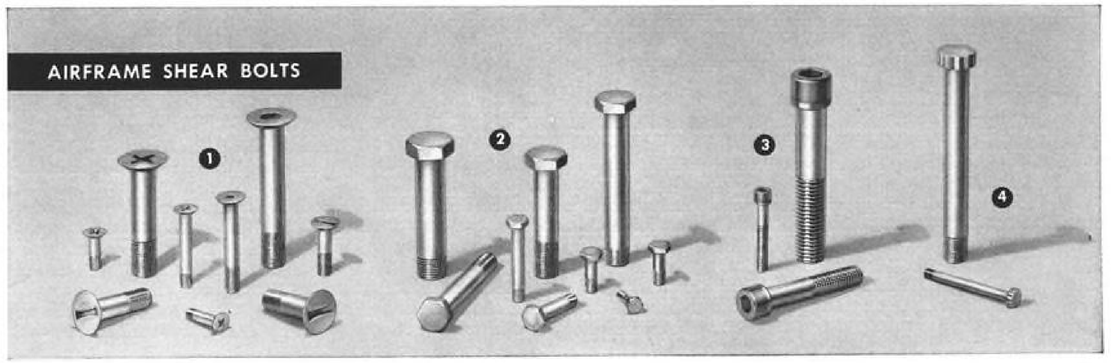
2. Clevis Bolts: AN type. 125,000 psi tensile strength. Serviceable to 550°F.

3. Internal Wrenching Bolts: Complete line of AN, NAS and MS Series. Tensile strengths from 125,000 to 180,000 psi. Serviceable to 550°F.

4. Crown Hex Head Bolts: NAS type. 125,000 psi tensile strength. Serviceable to 550°F.

5. 12-Point External Wrenching Bolts: Extensive line of NAS and MS Series, plus SPS special high-performance types (Hi Psi EWB 22, LWB 22, EWB 26; EWB 1615; EWB Tm 9). Tensile strengths from 180,000 to 260,000 psi. Service temperatures to 1600°F.

SPS HIGH-PERFORMANCE PRECISION FASTENERS FOR THE AEROSPACE INDUSTRY



Shear strengths from 95,000 to 156,000 psi. Temperature range to 900°F. Extensive line of NAS and MS Series, along with SPS high-performance types. Variety of wrenching recesses. Furnished in aircraft quality alloy and corrosion-resistant steels and—where appropriate—in new super alloys. Wide choice of plating and other finishes. Can be supplied drilled or with Nylok locking pellet in thread. Heads forged; threads fully formed after heat treat.

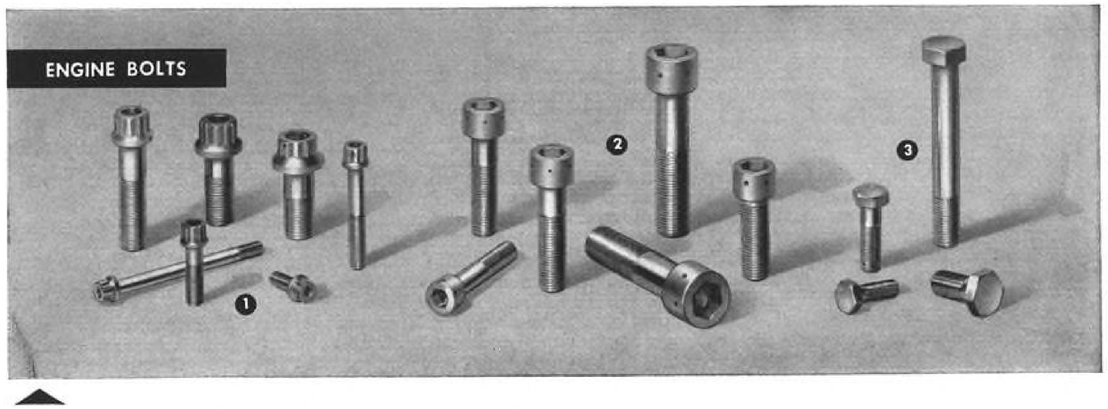
1. 100° Flush Head Bolts: Complete line of NAS Series. Also SPS high-strength, high-temperature types—SFH and SFT 22, 922, 26 and 926. Internal hex, Phillips, Torq-Set* or Hi-Torque†

2. Hex Head Bolts: Selection of NAS Series in shear strengths to 95,000 psi. Serviceable to 550°F.

3. Socket Head Cap Screws: MS and NAS types with internal hex wrenching socket. 95,000 psi shear strength. Serviceable to 550°F.

4. 12-Point External Wrenching Bolts: SPS high-strength, high-temperature types (EWSB 22, 922, 26, 926). Shear strengths from 132,000 to 156,000 psi. Service temperatures to 900°F.

*Pat. No. 2,847,894 †Pat. Nos. 2,677,983; 2,745,120

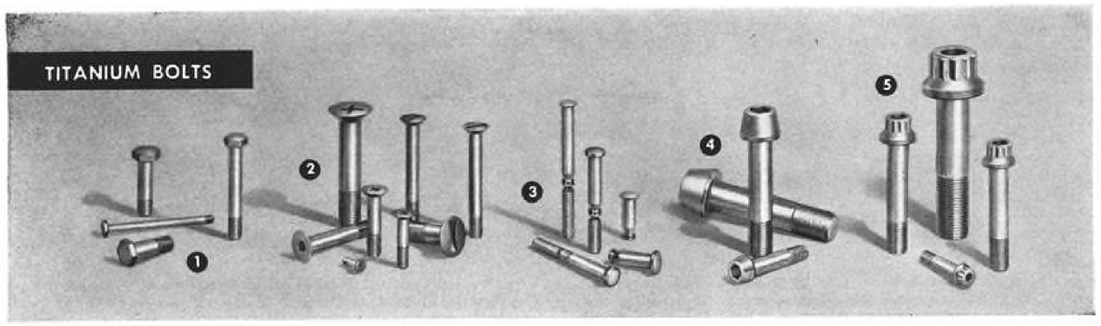


Complete line of AN, MS and SPS types—undrilled, drilled or with Nylok self-locking feature. Tensiles from 110,000 to 260,000 psi. Temperatures to 1600°F. Furnished in aircraft quality alloy and corrosion-resistant steels and in new super alloys, plated or otherwise finished to meet application needs. Heads forged to retain continuous grain flow. Threads fully formed by rolling after heat treatment. High-performance bolts have SPS Hi R thread form with increased root radius for greater fatigue resistance.

1. 12-Point External Wrenching Bolts: Extensive line of MS Series, plus SPS special high-strength, high-temperature types (BE 1615, Hi Tm 9). Tensile strengths from 125,000 to 260,000 psi. Service temperatures to 1600°F.

2. Internal Wrenching Bolts: AN type with internal hex wrenching socket. 140,000 psi tensile strength. Serviceable to 550°F.

3. Hex Head Bolts: Complete line of AN and MS Series. Tensile strengths from 110,000 to 125,000 psi. Service temperatures to 1200°F.



Selection of NAS, AN, MS and SPS types offering shear strengths to 95,000 psi; tensile strengths to 160,000 psi. Available drilled, undrilled or with the Nylok self-locking element. Titanium aircraft bolts, first developed by SPS, weigh 43% less than their alloy steel counterparts. Yet in tensile strength-to-weight, they outperform steel. SPS Hi Ti titanium bolts are forged to retain continuous grain flow at the critical head-shank juncture. Fillets under the head are cold worked for increased fatigue life. Threads—fully formed by rolling after heat treatment—have a wider root radius to minimize stress concentrations.

1. Hex Head Bolts: NAS and AN Series. Shear strengths to 95,000 psi.

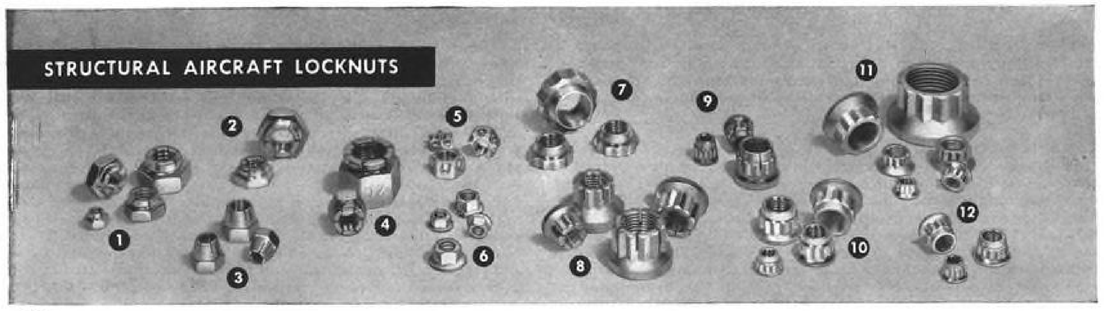
2. 100° Flush Head Bolts: NAS and AN Series. Phillips, Torq-Set or Hi-Torque wrenching recesses. Shear strengths to 95,000 psi.

3. Hi Ti Lockbolts*: Complete line of shear and tension types, pull or stump, protruding or 100° flush head. Shear strengths to 95,000 psi; tensile strengths to 150,000 psi.

4. Internal Wrenching Bolts: MS type. 150,000 psi tensile strength.

5. 12-Point External Wrenching Bolts: NAS 624 type. 160,000 psi tensile strength.

*Manufactured by SPS under Huck Pat. Nos. 2,527,307; 2,531,048; 2,531,049; 2,754,703



SPS locknuts assure high-performance, minimum-weight joints when used with companion SPS bolts. Cadmium-plated carbon and alloy steel; nickel or nickel-cadmium plated AMS 6304; silver-plated austenitic stainless steels; and silver-plated A-286 (SPS-M-118) alloy. Complete range of standard sizes.

1. FLEXLOC Full-Height Locknuts: 22 FSD Series for tension applications to 125,000 psi; temperatures to 550°F. For AN 3-type bolts. (Meet MS 20365, AN 363, AN 365, NAS 1021.)

2. FLEXLOC Thin Nuts: 22 FT Series. Primarily for shear applications on bolts with shear strengths to 95,000 psi. 550°F max. (Meet MS 20364, AN 364, NAS 1022.)

3. High-Beam FLEXLOCS: 990 F12, 990 FR12 Series for temperatures to 1200°F. For MS 9033-type tension bolts to 125,000 psi.

4. High-Temperature FLEXLOC Locknuts: 99 F12, 99 FR12 Series for service to 1200°F. For bolts such as MS 9033 having a minimum tensile of 125,000 psi. (Meet MS 20500.)

5. Lightweight Hex Locknuts: 22 FZ Series for tension bolts to 125,000 psi and shear bolts with 95,000 psi shear strength. 550°F max. For AN 3 and other bolts. (Meet NAS 679.)

6. Featherweight Hex Locknuts: FN 12 Series meet requirements of NAS 1291 and MS 21042; FN 812 Series meet requirements of NAS 1291C. Serviceable to 550°F and 800°F respectively. Used on wide variety of aircraft bolts.

7. 12-Point High-Strength Shear Locknuts: EWSN 22, EWSN 922 Series. Primarily for shear applications on bolts with shear strengths to 132,000 psi. Also EWSN 26, EWSN 926 Series for shear bolts of 156,000 psi shear strength. Serviceable to 550°F and 900°F respectively.

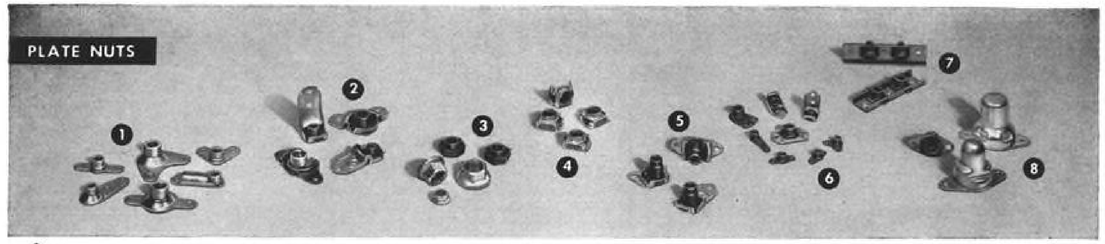
8. 12-Point Locknuts: 42 FW, EWN 22 Series offering tensile strengths of 180,000 and 220,000 psi respectively. 550°F max. Also EWN Tm 9 Series for tension bolts of 220,000 psi. 900°F max.

9. 12-Point Locknuts: 119 FW Series for temperatures to 1200°F. Minimum tensile strength of 125,000 psi. For MS 9033 and other bolt series.

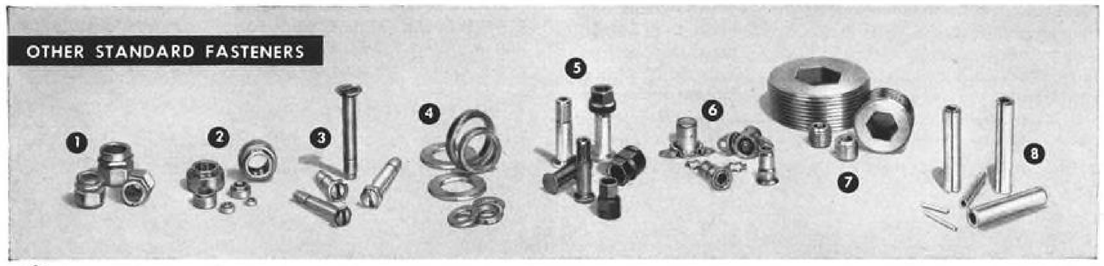
10. Lightweight 12-Point Locknuts: 42 FLW Series for tension bolts (MS 20004, NAS 624) to 180,000 psi. 550°F max.

11. Featherweight 12-Point High-Strength Locknuts: FN 22 Series for tension bolts of 220,000 psi. 550°F max.

12. Featherweight 12-Point High-Temperature Locknuts: FN 920 Series for temperatures to 900°F. Tensile strength of 200,000 psi. Also FN 1216 Series for temperatures to 1200°F. For tension bolts to 160,000 psi.



Nutt-Shel lightweight self-locking type conforming to NAS 679 through NAS 1068 where applicable. Threaded elements furnished in alloy steel, cadmium plated, or corrosion-resistant steel, silver plated (also in other finishes). Designed to meet AN-N-10 and/or MIL-N-25027 (ASG). Alloy steel nuts serviceable to 550°F; corrosion-resistant nuts to 900°F. In floating-type nuts ("Timesavers"), threaded element is readily removable, reusable.
1. Fixed Anchor Nuts: One-lug, 2-lug and corner types in flush and 100° counter sunk styles. **2. Floating Anchor Nuts:** One-lug, 2-lug, corner and right-angle types. **3. Hex Nuts:** Internal-external wrenching and forged featherweight types. **4. Floating Clinch Nuts:** Alloy steel only. **5. Floating Spacer Anchor Nuts:** One-lug, 2-lug and corner types. **6. Miniature Fixed and Floating Anchor Nuts:** One-lug, 2-lug, corner and right-angle types. **7. Gang Channel Nuts:** Plain, self-aligning and dome types. **8. Self-Sealing Floating Dome Nuts:** Two-lug and corner types; also 2-lug miniatures. BUNA-N-base synthetic rubber or silicone rubber seal.



Besides producing complete lines of airframe bolts, engine bolts, structural nuts and plate nuts, SPS is continually developing new types of fasteners to meet the many specialized demands of present-day aircraft/missile design. Representative of these special-purpose fasteners are:

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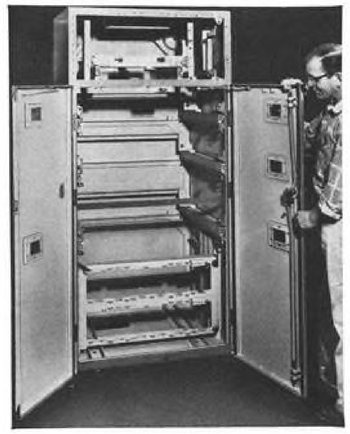

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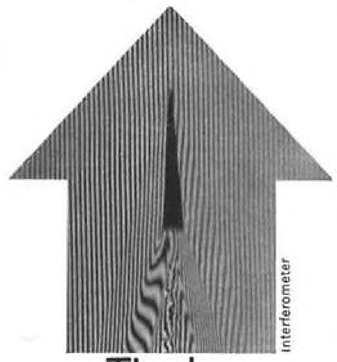

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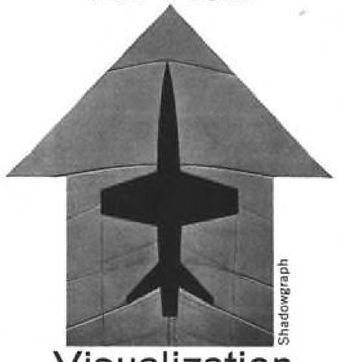

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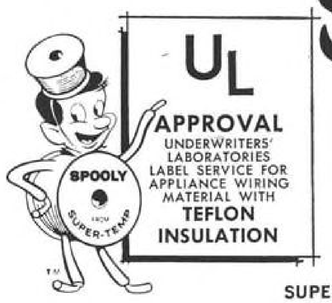

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	FEP Teflon Extruded	√		−90°+200°		√	√	√	√	√	√	√	*Per Mil-C-17B
	Polyethylene Solid or Foam	√		−55°+90°			√	√*	√	√	√	√*	Special constructions and jackets available.
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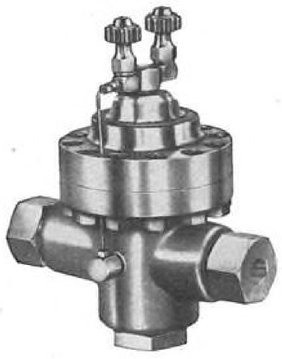

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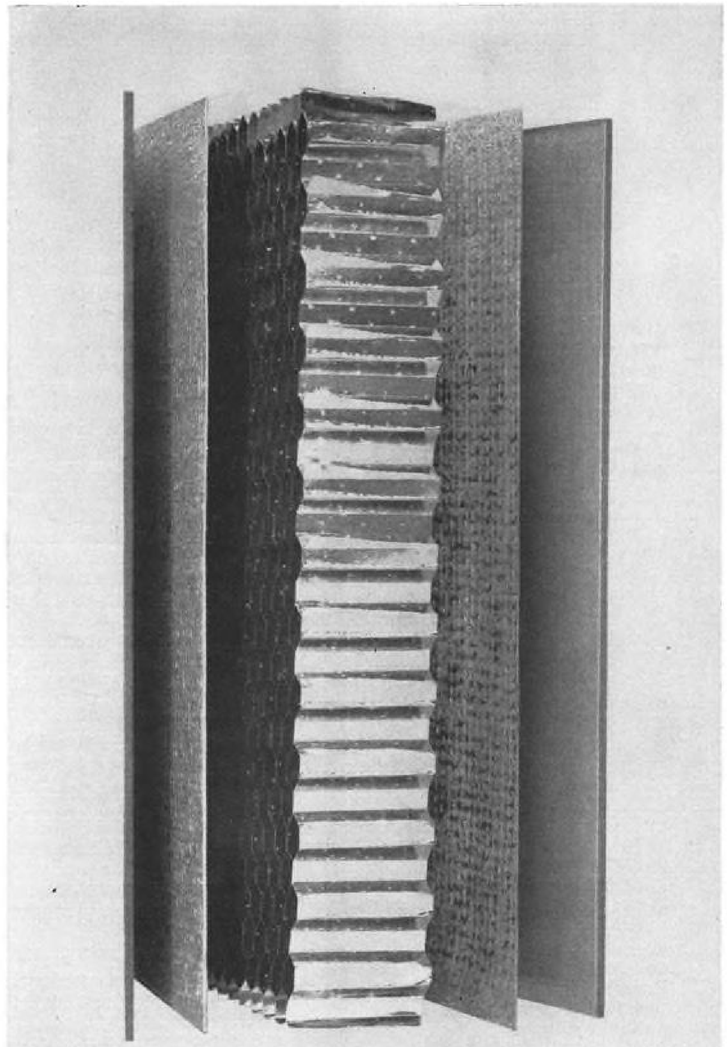

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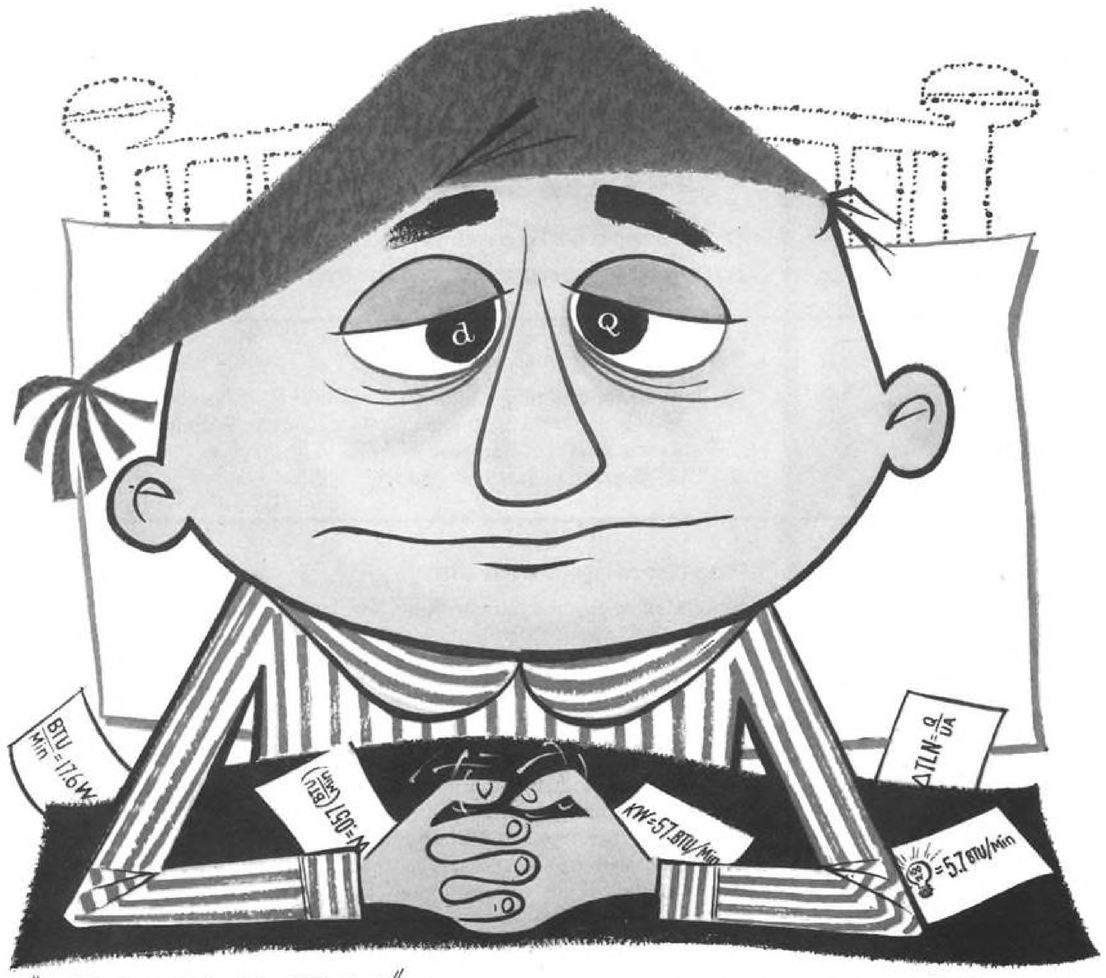

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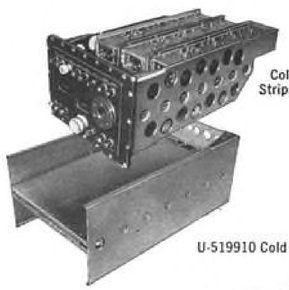
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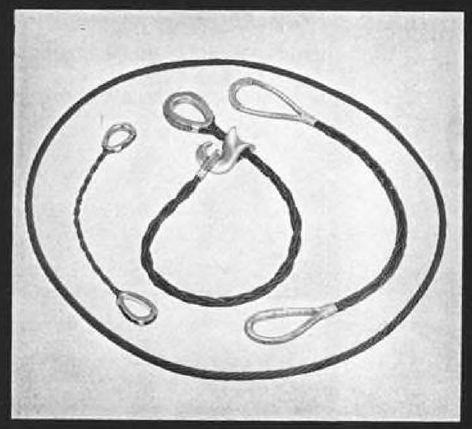
You can choose from a thousand-and-one types, sizes, and grades of Macwhyte Wire Rope to get exactly the right rope for your equipment. Properly lubricated and fabricated to give long, low-cost service. Write for Catalog G-16.



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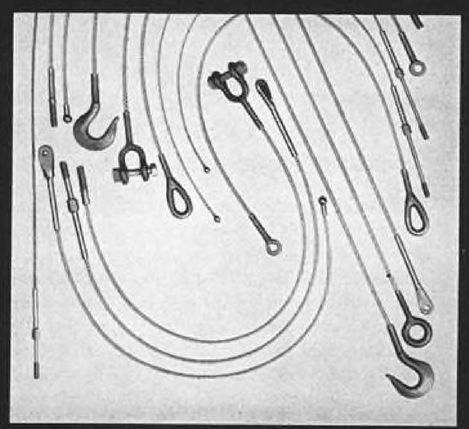
Safe, easy-to-handle Macwhyte slings are available in Round-braided, Flat-braided, or single-part body styles as standard designs or custom-made to your requirements. Write for Catalog S-8.



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133-8A

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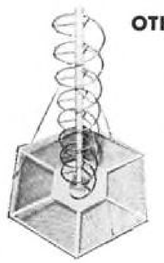

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TRI-HELIX ANTENNA

880-990 MC 17.5 DB GAIN TYPE 81068

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215-265 mc	10.5 db	H 50140 A
215-265 mc	13 db	H 19110 A-2
260-320 mc	13 db	H 19110 A-3
320-400 mc	13 db	H 19110 A-4
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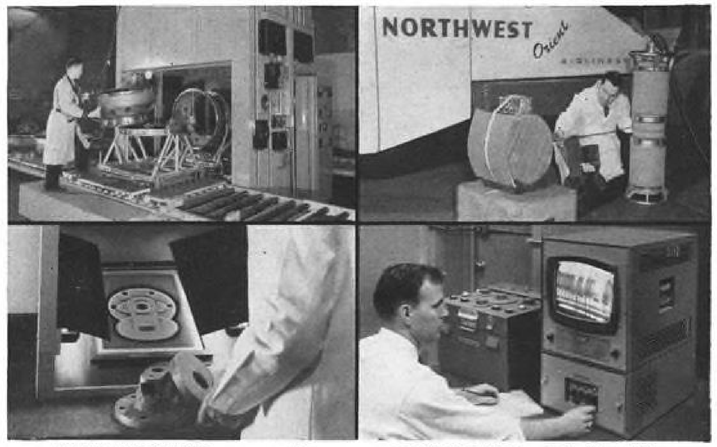

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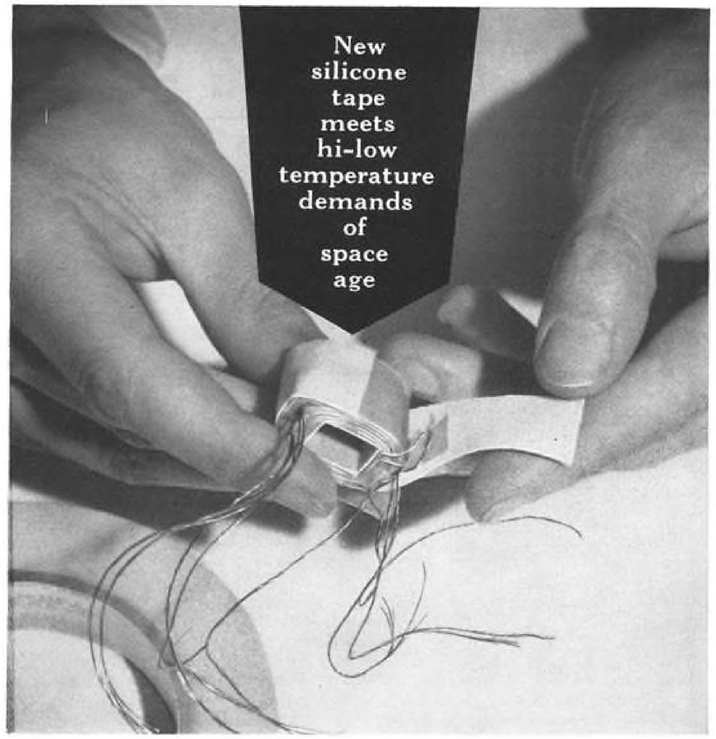
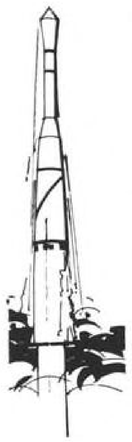


MYSTIK BRAND 7000-G GLASS CLOTH TAPE



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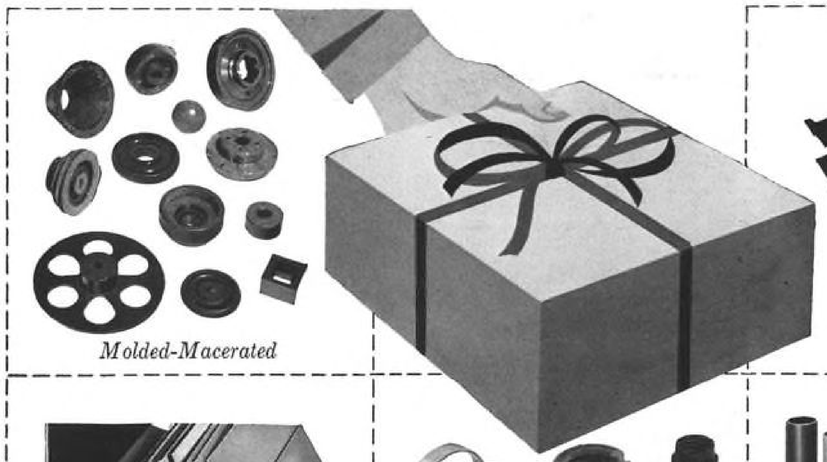
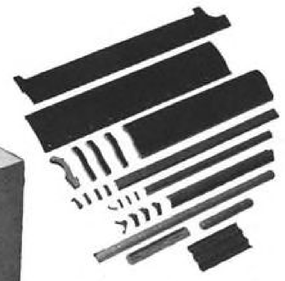
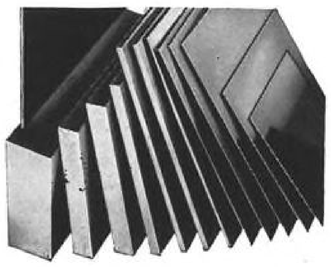


Molded-Macerated



Molded-Laminated



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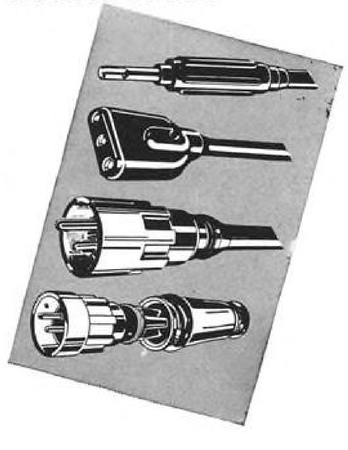

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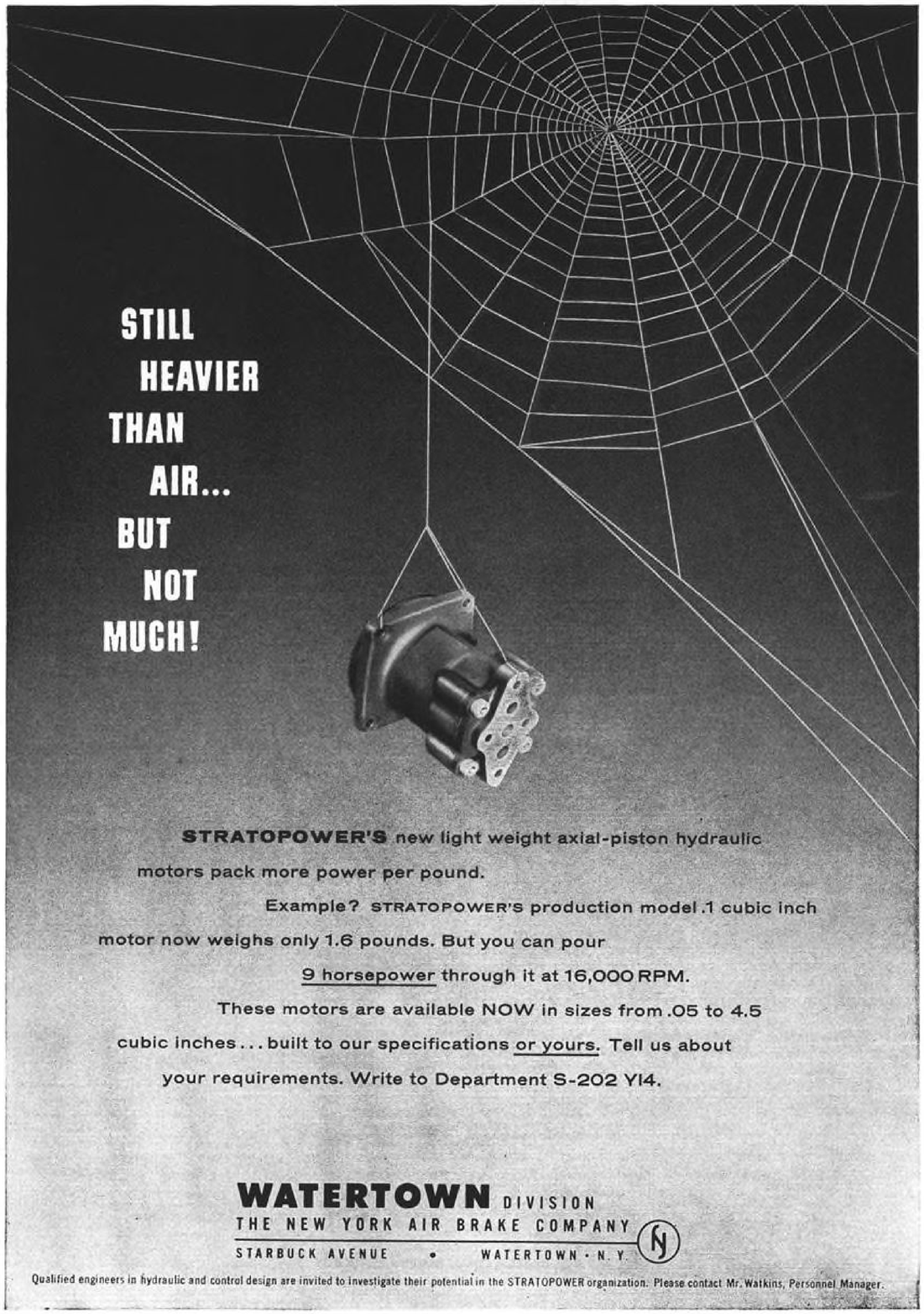

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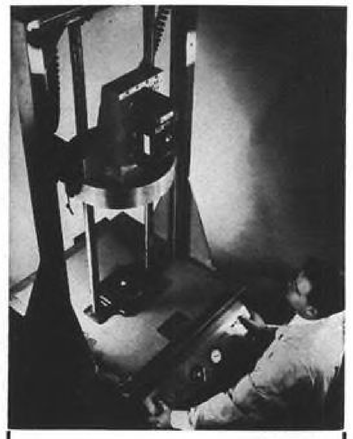

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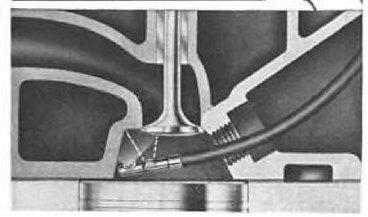

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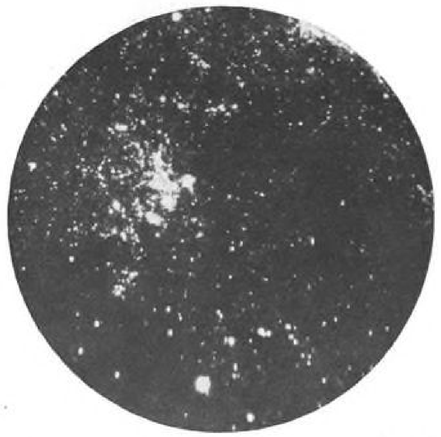

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323

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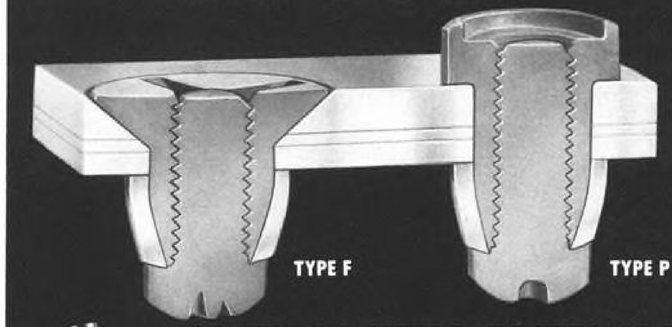

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* Patented

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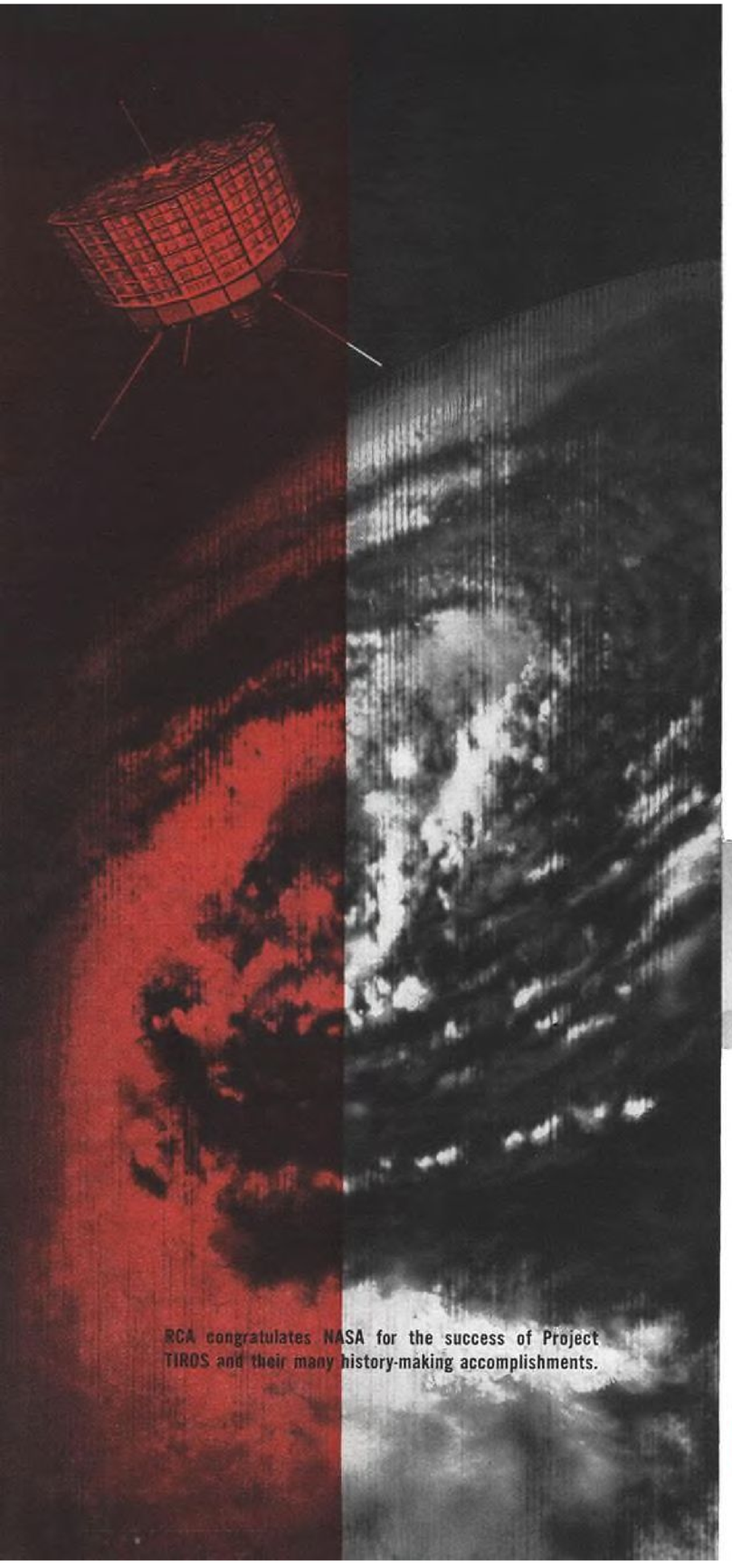

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Republic Aviation Corporation, Farmingdale, L. I., N. Y.
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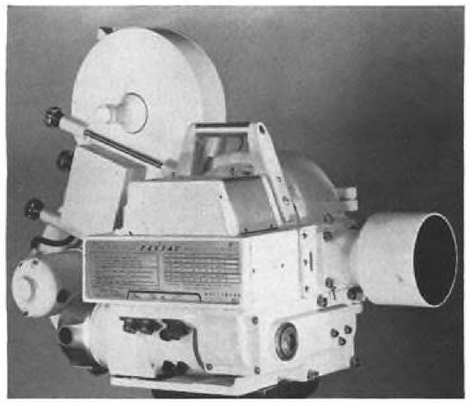

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WF-3T—100' Motion Picture
WF-4—400' Motion Picture
WF-4T—400' Motion Picture
WF-4S—400' Motion Picture Stop-start
WF-4ST—400' Motion Picture Stop-start
WF-6—100' Oscillo-Streak
WF-14—400' Combined Motion Picture-Oscillo-Streak
WF-14T—400' Combined Motion Picture-Oscillo-Streak
WF-14S—400' Combined Motion Picture-Oscillo-Streak Stop-start
WF-14ST—400' Combined Motion Picture-Oscillo-Streak Stop-start
WF-17—100' Combined Motion Picture-Oscillo-Streak
WF-17T—100' Combined Motion Picture-Oscillo-Streak
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WF-23—400' Oscillo-Streak

35mm CAMERAS
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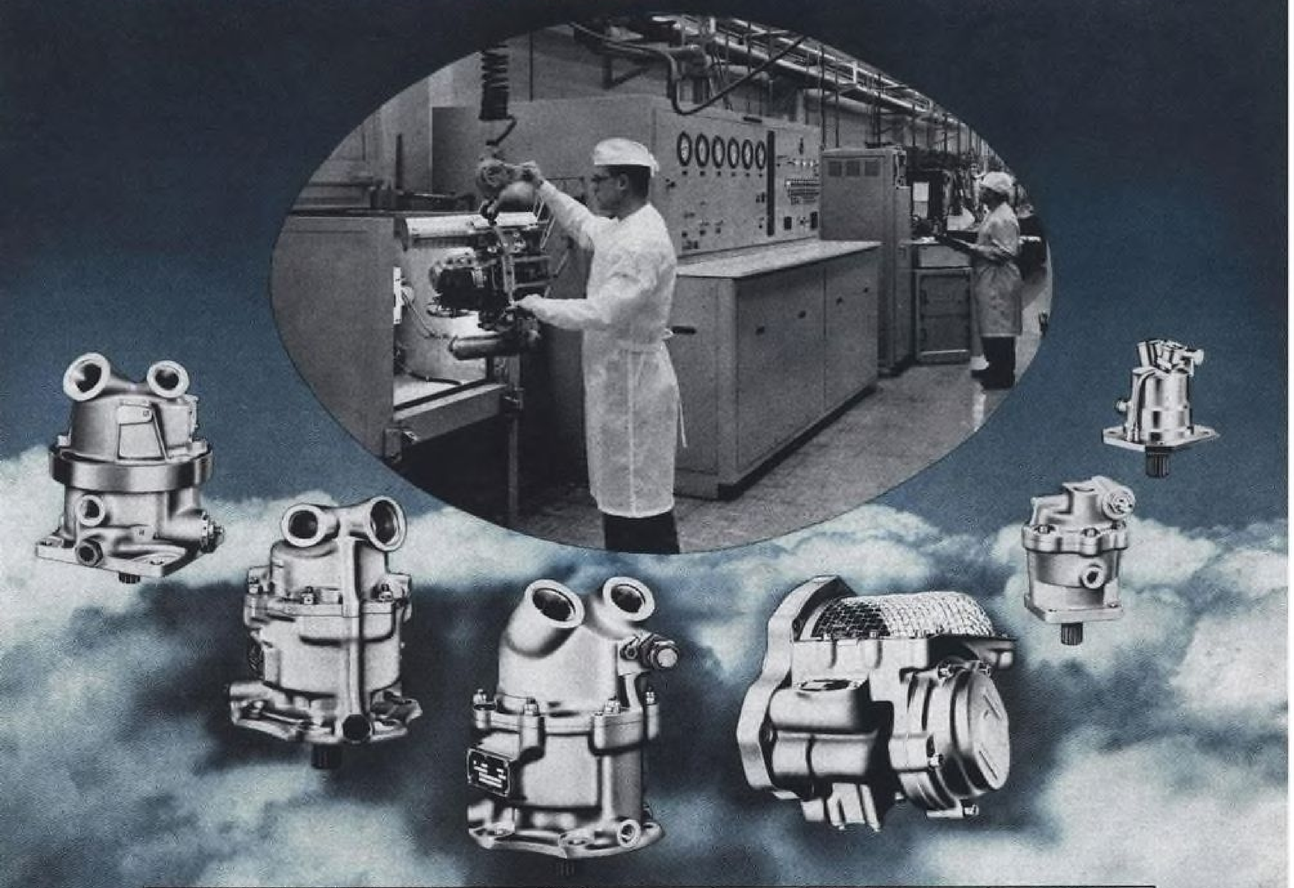

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P65	.65	8.1	6000	16.2	.286	9000	24.6	.188	4.66	6.00
P56	.568	8.1	7000	16.5	.281	10000	23.9	.194	4.66	6.00
P16	.163	3.5	12000	8.0	.250	16000	10.8	.185	3.50	4.75
P11	.115	2.6	12000	5.7	.261	16000	7.7	.193	3.25	4.47
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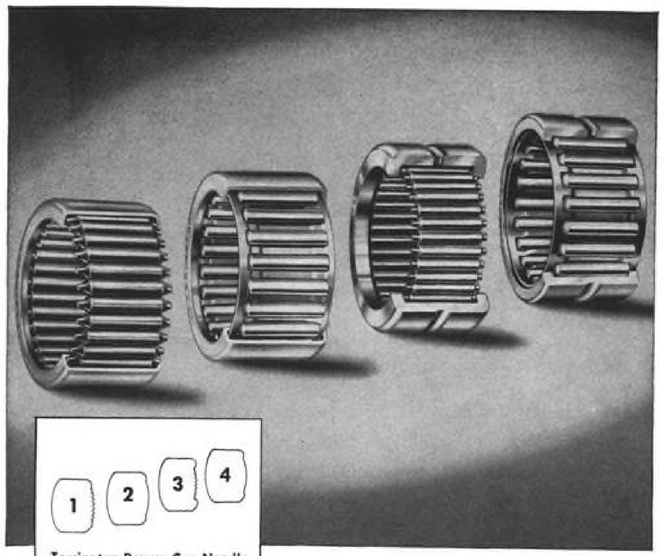

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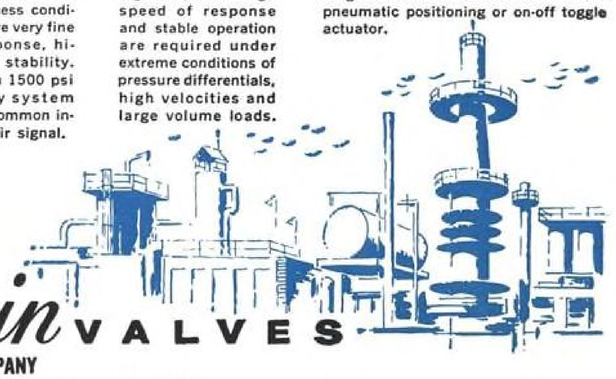
For process requirements where the unbalanced forces are extremely high, or where large through-puts are required. Three types are offered: pneumatic positioning, pneumatic on-off, and manual control, all embodying the toggle actuator; or a manual control arrangement can be combined with the pneumatic positioning or on-off toggle actuator.



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Write for Bulletin 1236-ST

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Circle Number 330 on Reader-Service Card

Airline & Airport Equipment

Section **E**

Night View of Pan American 707 Front of New York International Arrivals Building.

BUYERS' GUIDE FOR 1961

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332

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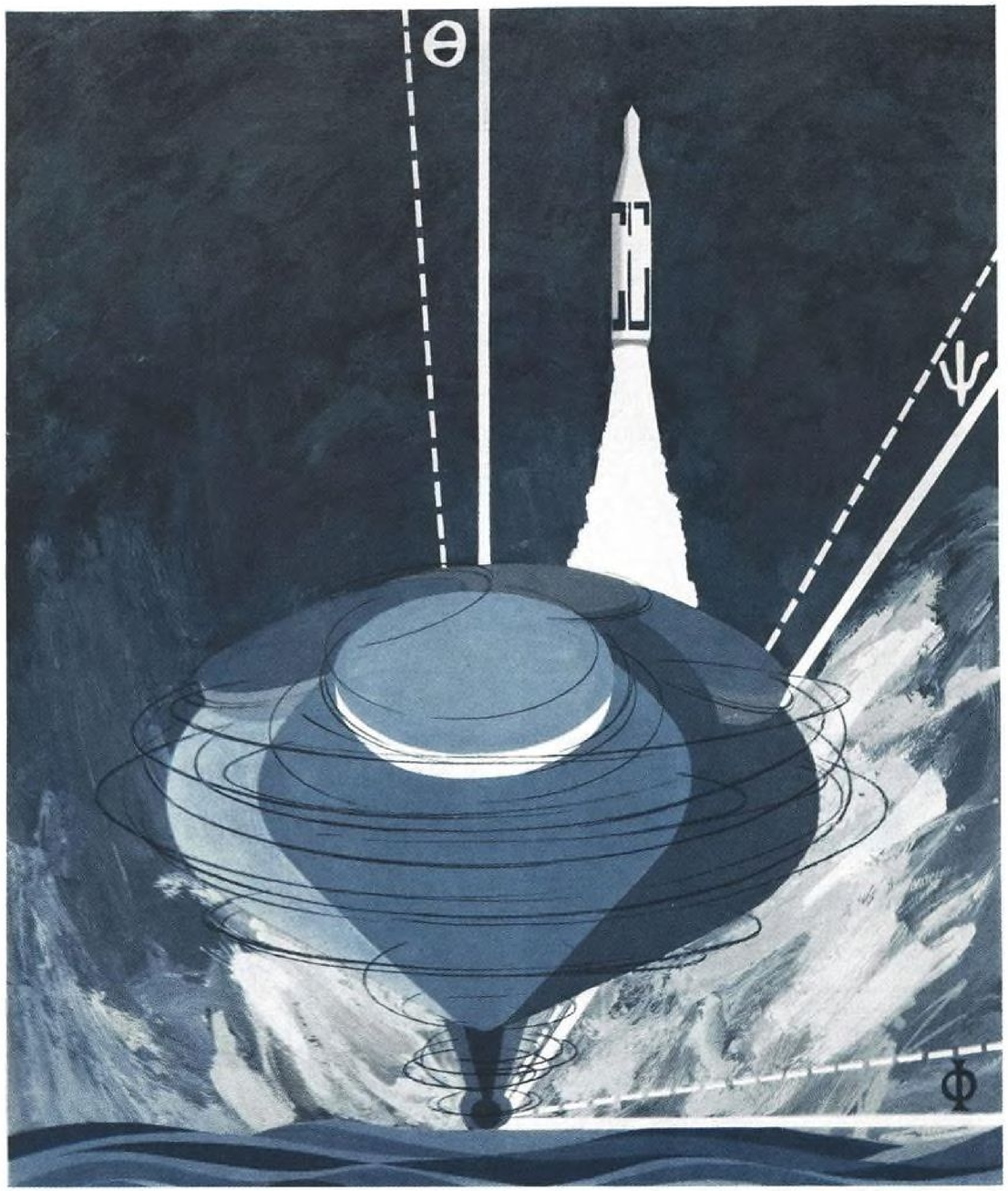

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Kahn & Co., Inc., 885 Wells Rd., Wethersfield, Conn., a, b
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Lockheed Aircraft Corp., California Div., P. O. Box 551, Burbank, Calif., a, b
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North American Aviation, Inc., International Airport, Los Angeles 45, Calif., a, b
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Henry Spen & Company, Inc., 1995 Pitkin Avenue, Brooklyn, N. Y., a, b
B. K. Sweeney Mfg. Co., 6300 East 44 Ave., Denver 16, Colo., a
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Thompson Ramo Wooldridge Inc., 23555 Euclid Ave., Cleveland 17, Ohio, b
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Universal Metal Products, 331 Vineland Ave., La Puente, Calif., a, b
Wallace & Tiernan, Inc., 25 Main St., Belleville 9, N. J., a, b
Weber Aircraft Corporation, 2820 Ontario Street, Burbank, Calif., b
Whiting Corp., Harvey, Ill., a, b
Wollard Aircraft Service Equip., Inc., 2963 N. W. 79th St., Miami 47, Fla., a, b

Starters, Portable Emergency

AiResearch Mfg. Div., The Garrett Corp., 402 S. 36 St., Phoenix, Ariz.
AiResearch Mfg. Div., Garrett Corp., The, 9851 Sepulveda Blvd., Los Angeles 45, Calif.
Amalgamated Electric Corp. Ltd., 160 Laurier Ave., W., Ottawa, Ontario, Canada
AVCO CORPORATION, 750 Third Ave., New York 17, N. Y. SEE ADV. P. 86
Aviation & Special Developments, Dunlop Canada Ltd., 870 Queen St., E., Toronto 8, Ontario, Canada
Bendix Corporation, Utica Division, Utica 1, N. Y.
Boeing Airplane Co., Box 3707, Seattle 24, Wash.
Breeze Corp., Inc., 700 Liberty Ave., Union, N. J.
Dresser Electric Co., 2705 Wight St., Detroit 7, Mich.
Garrett Manufacturing Ltd., 4 Racine Rd., Rexdale, Ontario, Canada
General Electric Co., Direct Current Motor & Generator Dept., 3001 East Lake Road, Erie, Pa.
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Walter Kidde & Co., Inc., 256 Main St., Belleville 9, N. J.
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Vickers, Inc. Div., Sperry Rand Corp., Administrative & Engrg. Center, Detroit 32, Mich.

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Wis.
Aluminum Co. of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa.
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Aviation & Special Developments, Dunlop Canada Ltd., 870 Queen St., E., Toronto 8, Ontario, Canada
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Bethlehem Steel Co., Bethlehem, Pa.
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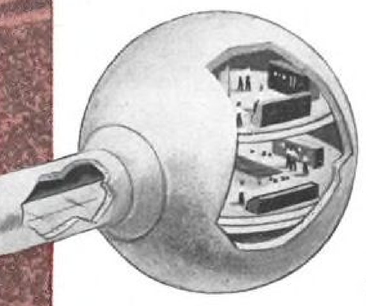

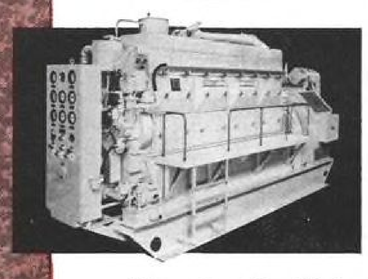

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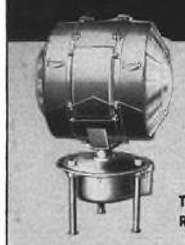

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High Intensity Runway Lights

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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)

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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

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

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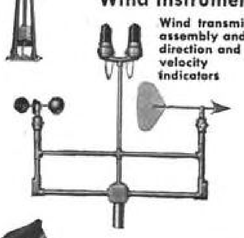
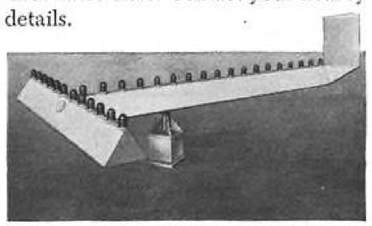
Wind transmitter assembly and direction and velocity indicators



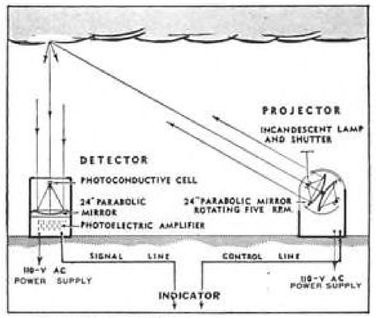
Type PTS **Portable Traffic Signals** (Spec. MIL-L-6617)

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.



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Sancor Products-Hufford Div., The Siegler Corp., 1700 E. Grand Ave., El Segundo, Calif.

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Associated Company, Inc., 1441 McLean Blvd., S., Wichita 13, Kansas
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Engineering & Manufacturing Co., 611 North 40 St., Philadelphia 4, Pa.
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Fairchild Engine & Airplane Corp., Hagerstown 10, Md.
Highland Engineering Co., 1732 Berkeley, Santa Monica, Calif.
Lockheed Aircraft Corp., California Div., P. O. Box 551, Burbank, Calif.
Piasecki Aircraft Corp., Island Rd., International Airport, Philadelphia 42, Pa.
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Schaffer Air Industries, Inc., 290 North Henry St., Brooklyn 22, N. Y.
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Twix Manufacturing Co., Inc., 40-09 21 St., Long Island City 1, N. Y.
Universal Metal Products, 331 Vineland Ave., La Puente, Calif.
Wollard Aircraft Service Equip., Inc., 2963 N. W. 79th St., Miami 47, Fla.

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Continental-Emsco Company, A Division of The Youngstown Sheet & Tube Co., P. O. Box 359, Dallas, Texas
Dresser-Ideco Co., 875 Michigan Ave., Columbus 8, Ohio
Kaiser Steel Corp., Kaiser Center, 300 Lakeside Drive, Oakland 12, Calif.
Wind Turbine Co., E. Market St., West Chester, Pa.

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Brown-Line Corp., 111 Main St., El Segundo, Calif.
Aeroquip (Canada) Ltd., 287 Bridgeland Ave., Toronto 19, Canada

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Aqualite Corp., 1640 21st St., Santa Monica, Calif.
Consolidated Diesel Electric Co., Ludlow & Canal St., Stamford, Conn.
Development Division, Clark Equipment Co., Battle Creek, Mich.
Fairbanks Co., The, 393 Lafayette St., New York 3, N. Y.
Kellett Aircraft Corp., Box 35, Willow Grove, Pa.
LeTourneau-Westinghouse Co., 2301 North Adams St., Peoria, Ill.
Lewis-Shepard Products, Inc., 125 Walnut St., Watertown 72, Mass., **c**
Military Equipment Div., Fruehauf Trailer Co., 10940 Harper Ave., Detroit 32, Mich., **g**
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b. Fire
c. Fork-Lift
d. Fueling
e. Industrial
f. Tank
g. Tow

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Barrett-Cravens Co., 630 Dundee Rd., Northbrook, Ill., c, e, g
John Bean Div., Food Machinery & Chemical Co., Lansing 4, Mich., b
Beech Aircraft Corp., Aerospace Division, Wichita 1, Kan., f, g
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Consolidated Diesel Electric Co., Ludlow & Canal St., Stamford, Conn., d, g
Development Division, Clark Equipment Co., Battle Creek, Mich., c, e
Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio, c
FWD Corporation, 12 & Auto Sts., Clintonville, Wisc., a, b, c, d, f, g
Fairbanks Co., The, 393 Lafayette St., New York 3, N. Y., e
Firestone Tire & Rubber Co., 1200 Firestone Pkwy., Akron 17, Ohio, e
Food Machinery & Chemical Corp., P. O. Box 760, San Jose 6, Calif., b
Garsite Products, 4045 Merrick Rd., Seaford, N. Y., d, f
Hilliard Corp., The, Purifier Div., 100 West Fourth St., Elmira, N. Y., d
Frank G. Hough Co., The, 976 Sunnyside Ave., Libertyville, Ill., e, g
Hyster Co., 2902 N. E. Clackamas St., Portland 8, Ore., c
Walter Kidde & Co., Inc., 256 Main St., Belleville 9, N. J., a
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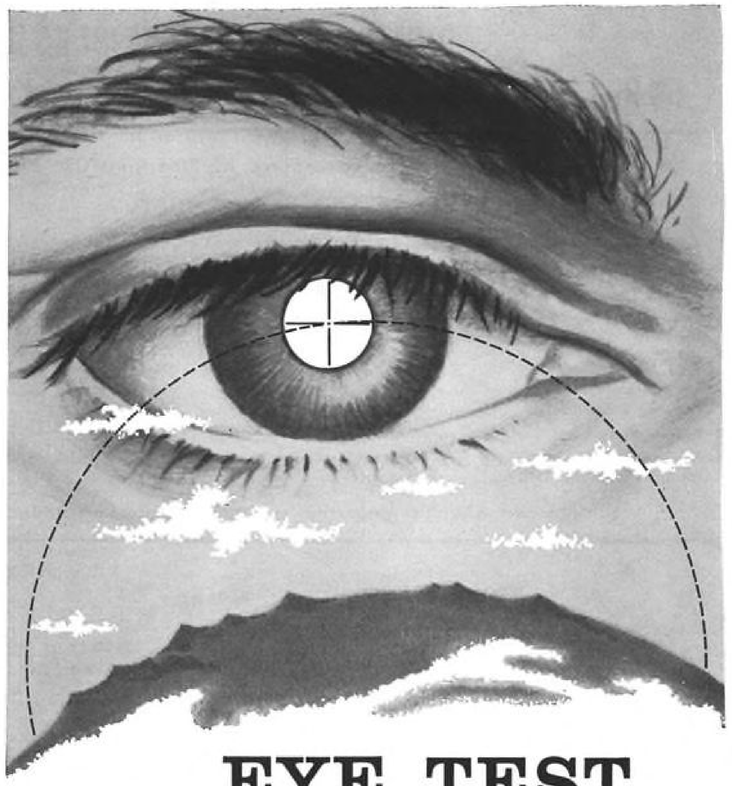

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2—Bolts, Alloy (Grade 8), others
3—Brushes, Carbon
4—Cables, Assemblies, Swaging, Terminals
5—Capacitors
6—Condensers, Mica, etc.
7—Connectors, AN, Coaxial
8—Engines, Parts
9—Equipment, Aircraft, Ground, Electrical, Electronic, Test
10—Fasteners, AN, MS, NAS
11—Fiberglas, Cloth, Tape, Mat, Woven Roving, Milled Glass, Chopped Strands
12—Fittings
13—Generators
14—Gyros, Altitude, Direction, Horizon
15—Hand Tachometers
16—Hardware Supplies
17—Inspection Equipment, Optical, Mechanical
18—Instruments, Engine, Flight, Pressure, Test, Measuring and Precision
19—Inverters, Inverter Parts
20—Meters, Test and Panel
21—Motors, Servo, Synchro, etc.
22—Nuts, Alloy (Grade 8), others
23—Plastic, Sheets, Rods, Tubes, Films
24—Potentiometers
25—Rectifiers, Silicon, etc.
26—Relays, Timers
27—Resin, Plastic, Polyester, Epoxy
28—Resistors
29—Rings, Moulded Rubber "Q", Backup
30—Rivets, Tubular
31—Screws, Miniature
32—Speed Indicators
33—Switches
34—Terminals, Boards, Hardware
35—Transistors
36—Tubes, Electronic
37—Tubing, Steel
38—Valves, Check
39—Washers, Special
40—Wire

The numbers after the advertiser's name, indicate the products offered by the advertiser

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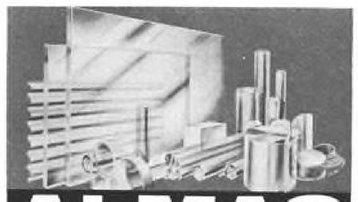
AVNET ELECTRONICS CORP.	350	4, 5, 6, 7, 18, 20, 24, 25, 26, 28, 33, 34, 35, 36, 40



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PARKER SEAL CO.—"O" Rings
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AERO BOLT & SCREW CO., INC.
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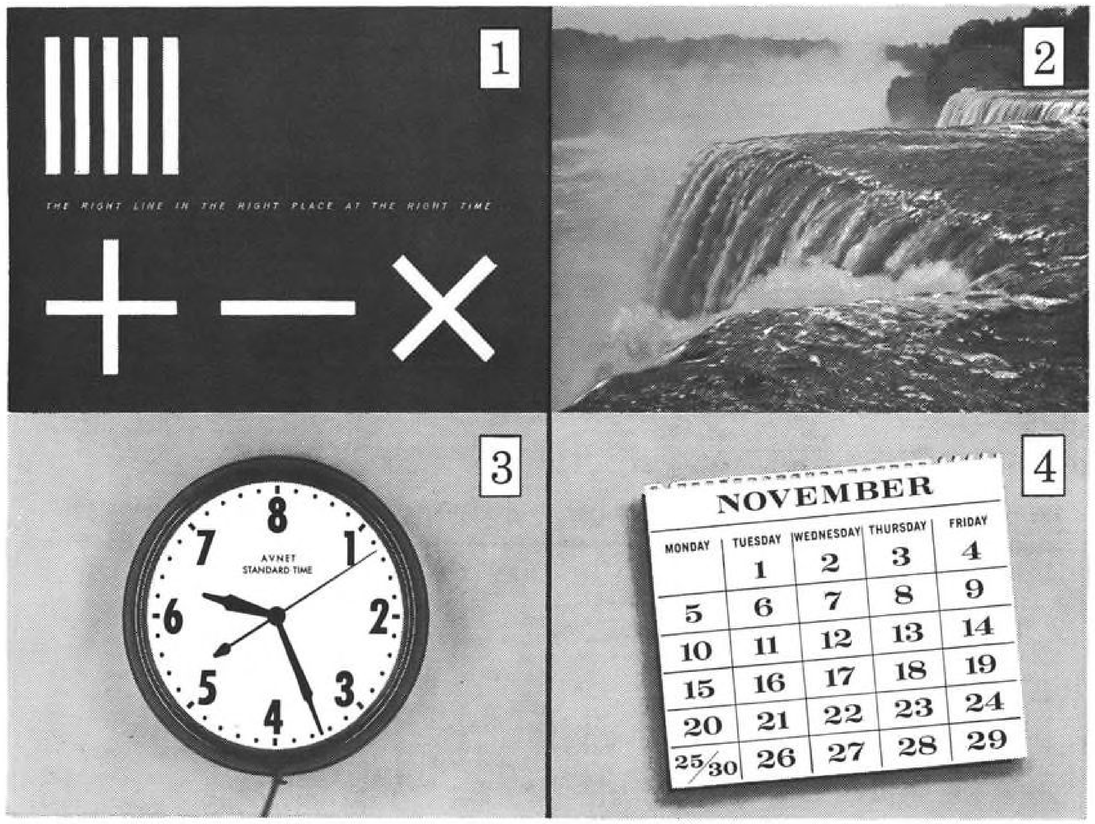
Which of These 4 Major Improvements Is Most Important To Your Business?



The Avnet System
is based on New Concepts, Major Improvements in Service

The Avnet System *IS* a system of improvement, newness, change for the better. That's how progress is made. That's how—and why—Avnet is America's major source of supply in electronic components. Of the many new practical concepts Avnet has introduced, four are symbolized above. Which of them are important in your business?

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2 A NEW CONCEPT OF SUPPLY—an available supply that is overwhelming in its size. Avnet's supply of electronic components is vast—in breadth and in depth. It is also carefully anticipated to meet your demands of tomorrow, next month, next season.

3 A NEW CONCEPT OF TIME. Avnet ships your orders about ⅓ faster than any other major source of supply, hence ⅓ of the hours can be cut from your waiting time. Although the 8 hour clock is symbolic, it is symbolic of a fact.

4 A NEW CONCEPT OF SCHEDULING. Once your order is given to Avnet, it knows no "weak-ends." Within a given period, Avnet ships more orders than any other source for electronic components, giving your specific order quicker delivery, faster use.

5 THE CONCEPT OF NEW CHALLENGE. Avnet doesn't know what the next decade will bring. But Avnet is very ready, willing and able to meet the challenge with *more* improvement in service, *more* newness, *more* changes for the better. For this is the very basis of The Avnet System.

AVNET
THE AVNET SYSTEM
Men / Methods / Materials / Management
AVNET ELECTRONICS CORP.

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Circle Number S-6 on Reader-Service Card

SEARCHLIGHT ADVERTISERS INDEX
1961 AVIATION WEEK and Space Technology BUYERS' GUIDE

Classification of products and services offered by "SEARCHLIGHT" advertisers in this issue

PRODUCTS

1—Accessories, Aircraft
2—Aids, Training
3—Air Compressors, Lifts, Jacks
4—Aircraft, Executives, Personal
5—Antennas & Radiating Equipment
6—Bearings
7—Brushes, Carbon
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24—Hardware Supplies
25—Hydraulic Lifts, Jacks, Devices
26—Ignition, Parts
27—Instruments, Engine, Flight, Pressure, Test
28—Inverters, Inverter Parts
29—Lamps
30—Lights, Assemblies, Cockpit
31—Machine, Spec and Print
32—Machine Tools, Used and Rebuilt
33—Materials
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35—Motors, Servo, Synchro, etc.
36—Parts, Magneto
37—Plastic, Sheets, Rods, Tubes, Films
38—Potentiometers
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40—Radio, Aircraft
41—Receivers
42—Rectifiers, Silicon, etc.
43—Relays, Timers
44—Resin, Plastic, Polyester, Epoxy
45—Resistors
46—Rings, Moulded Rubber "O" Backup
47—Seat Assemblies
48—Solenoids
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51—Tapes, Adhesives, Asbestos
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55—Transmitters
56—Tubes, Electronic
57—Valves, Check
58—Wire

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60—Aircraft Brokers
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The numbers after the advertiser's name, indicate the products or services offered by the advertiser.

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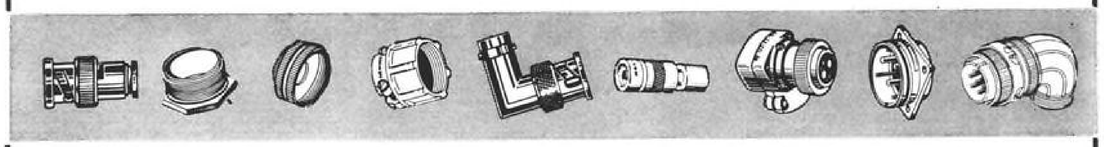

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- Stromberg Carburetors
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Environmental Test Equipment; Humidity Chambers; Vibration Units; Hyd. Test Stands; Hi-Pressure Dennison & Vickers Radial Piston Pumps; Ovens; Flowmeters; Dynamometers; Balancers; Motor Generators; Rectifiers; Tensile & Compression Testers.
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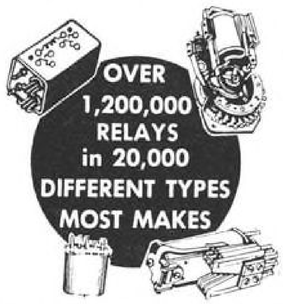

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Bendix MN-53B Marker Beacon Receiver
Bendix MN-62A AFD Receiver & Spare Parts
Bendix MN-85F Navigation Receiver
Bendix ARN14D/R541 VOR Receiver Military MN-85F
Bendix MN-85DB VOR Receiver
Bendix MN-85B VOR Receiver

Eclipse 36106 R.M.I.
Eclipse 34109 R.M.I.
Eclipse 36105 R.M.I.
Sperry C-2 Gyrosyn Compass System
Sperry C-2A Gyrosyn Compass System
Sperry H6A Electric Horizon
Sperry H6B Electric Horizon
AAR DM-32 Power Supply
AAR DY-20 Power Supply
AN 104/BU Antenna
AT/4 Antenna
AAR R-89B 10 Channel Glidepath Receiver
AAR TS-170 Glide Slope Ramp Checker
AAR TS-488/UP X Band Radar Test Set
RCA Senior Volt-O-Myst
AAR TS-148/UP Spectrum Analyzer
TS-147C Signal Generator
T17-D Microphone
H533-Headsets
H46/UR Boom Microphone & Headset

Collins 18S-4A HF Transceiver & Spare Parts
Collins 51X1 VHF Receiver & Spare Parts
Collins 180L-2 Auto Antenna Tuning Unit
Collins 180K-3 Antenna Tuning Unit
Collins 618S-1 HF Transceiver
Collins 337A-2 Omni Bearing Indicator
Collins 336A-2 OBS Indicator
Collins 416N-1 Power Supply
Collins 416N-2 Power Supply AC for VOR
Collins DM-53 A DC Dynamotor Power Supply
Collins 416X-1 Power Supply
Collins 37J-2 VOR Antenna
Collins 37P-3 Glide Path Antenna
Collins ARN-14C/R540 VOR Receiver (Military 51R-3) & Spare Parts
Collins 51R2 VOR Receiver & Spare Parts
Collins 51R3 VOR Receiver
Collins 51V1 Glide Path Receiver
Collins 51V2 Glide Path Receiver
Collins 51V3 Glide Path Receiver
Collins ID-351A Omni Mags
Collins ID-249 Omni Mags
Collins 332C-1 Dual Radio Magnetic Indicator
Collins ID-48 Indicator
Collins ID-251 Indicator

Replacement and spare parts are available for most of the above equipment.

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WHAT HAPPENS WHEN A NATION SPENDS MORE ON GAMBLING THAN IT SPENDS FOR HIGHER EDUCATION?

If you can find any Romans around, ask them. They lived pretty high on the hog in their day. That is, until some serious-minded neighbors from up North moved in. The rest is ancient history.

You'd think their fate would have taught us a lesson.

Yet today we Americans spend twenty billion dollars a year for legalized gambling, while we spend a niggardly four-and-a-half billion for higher education. Think of it! Over four times as much! We also spend six-and-a-half billion dollars a year for tobacco, nine billion dollars for alcoholic beverages, and billions more on other non-essentials.

Can't we read the handwriting on the wall?

Our very survival depends on the ability of our colleges and universities to continue to turn out thinking men and women. Yet today many of these fine institutions are hard put to make ends meet. Faculty salaries, generally, are so low that qualified teachers are leaving the campus in alarming numbers for better-paying jobs elsewhere.

In the face of this frightening trend, experts estimate that by 1970 college applications will have doubled.

If we are to keep our place among the leading nations of the world, we must do something about this grim situation before it is too late. The tuition usually paid by a college student covers less than half the actual cost of his education. The balance must somehow be made up by the institution. To meet this deficit even the most heavily endowed colleges and universities have to depend upon the generosity of alumni and public spirited citizens. In other words, they depend upon *you*.

For the sake of our country and our children, won't you do your part? Support the college of your choice *today*. Help it to prepare to meet the challenge of tomorrow. The rewards will be greater than you think.

IT'S important for you to know what the impending college crisis means to you. Write for a free booklet to HIGHER EDUCATION, Box 36, Times Square Station, New York 36, New York.

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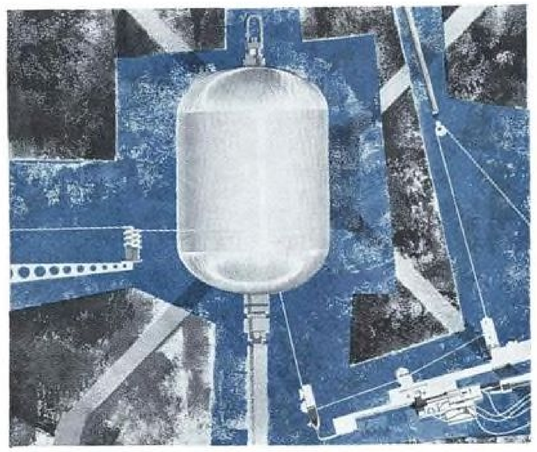
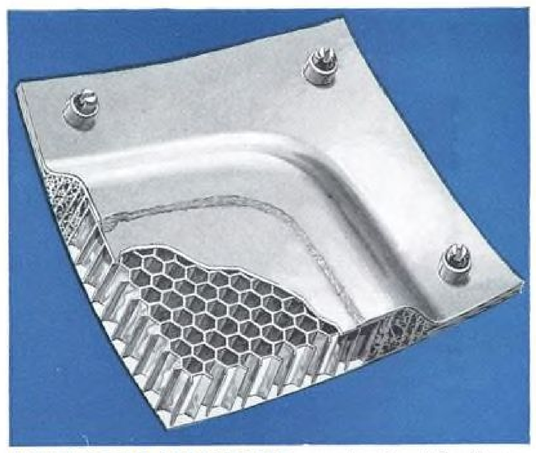


ROCKET MOTOR CASE. Brunswick's exclusive bi-axial Strickland "B" Process of fiber glass filament winding gives S-D ratio to 2,000,000, provides up to 7,500,000 psi modulus. By laying down filaments under tension, SBP excels in making cylindrical shapes, unusual contours, large range of sizes. Pre-stressing gives exactly controlled uniformity.

RADOMES. Brunswick's non-metallic materials boost heat tolerance of radomes and nose cones to 1000-1200°F for limited exposures. SBP filament winding gives highest-ever strength-to-weight ratios with significant weight savings over usual structures. With unmatched electrical uniformity, Brunswick builds to tightest tolerance for dialectric constants and compound configurations.



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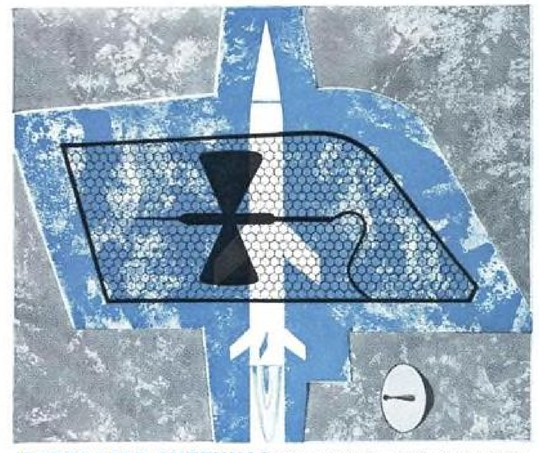

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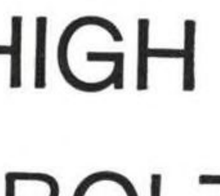

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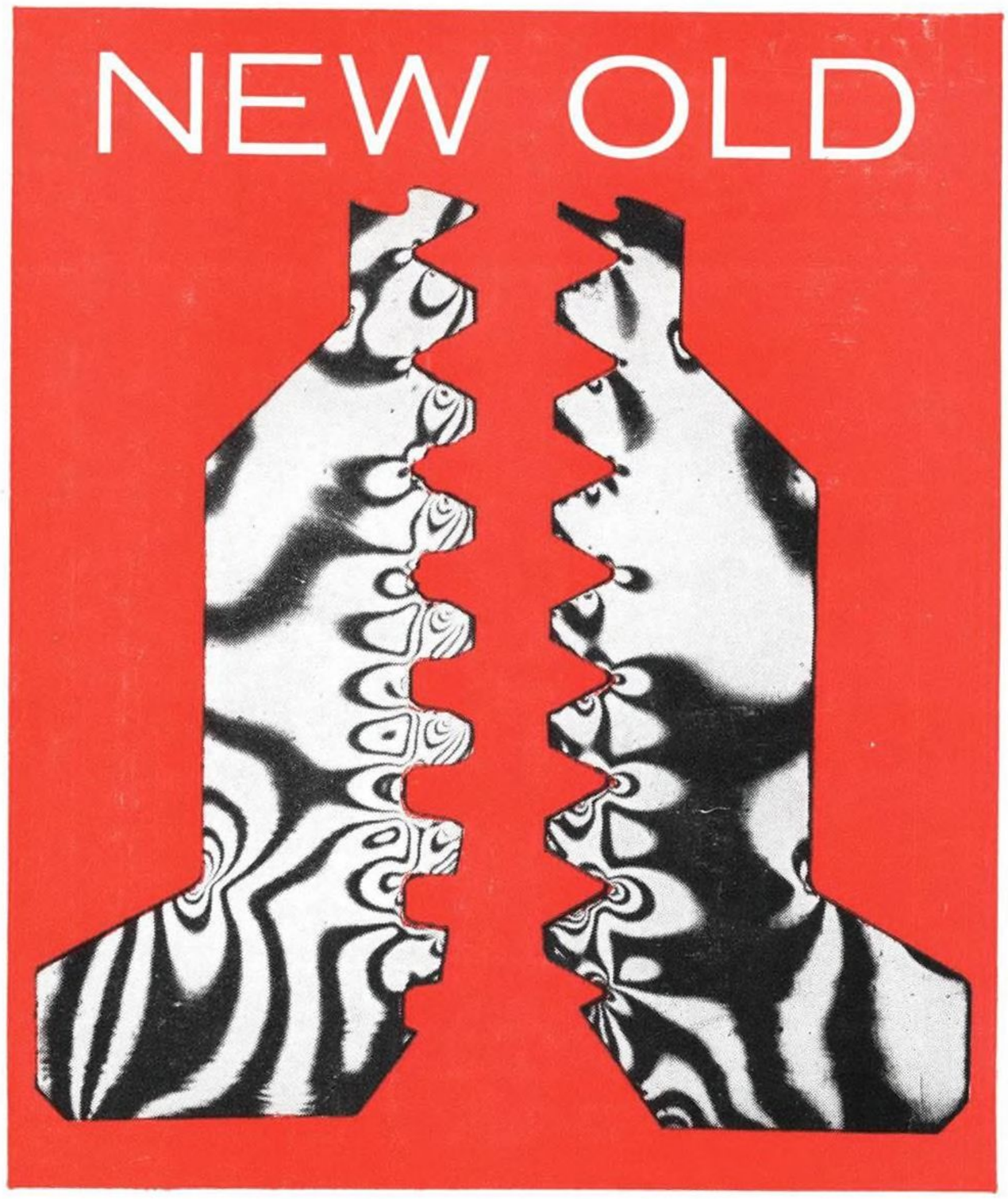

Photoelastic comparison of stress distribution patterns between standard self-locking nut and modified Elastic Stop nut using the Equa-stress thread form applied to a standard UNF-3 thread. Visual analysis reveals that the load is heavily concentrated on the lower three threads of the standard nut; in the Double Durability nut the load is re-distributed over all of the six threads below the locking device. Send for DESIGN MANUAL 5930 for additional photoelastic studies and illustrative drawings of stress distribution in fasteners.

*ESNA's new Double Durability nut is a major breakthrough in the fatigue life control of threaded fasteners. It can multiply the fatigue endurance of the average bolt from 2 to *30 times* depending on the level of stress.

The Equa-stress thread design is the secret. In a standard nut the major portion of the load is carried by the first two or three bolt and nut threads next to the bearing face. The unique new design re-distributes the load more evenly over all the threads . . . without essentially altering the dimensions of the standard UNF-3 thread form or its capability for inspection by standard gages and conventional techniques.

The new Double Durability nut offers the design engineer these advantages:

IN EXISTING DESIGNS—

1. New, higher standards of reliability under fatigue conditions . . without effecting interchangeability.
2. Freedom from restrictive maintenance procedures—reduced maintenance costs.
3. Weight saving opportunities (where present fatigue performance is satisfactory) by use of low height Double Durability nuts and shorter thread length bolts.

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1. A completely fresh approach to fatigue control of fasteners. Use fewer bolts and nuts to carry a determined load; or use the same number of a **smaller** nut and bolt.
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Please send me Design Manual No. 5930 analyzing the effects of fatigue on threaded fasteners and including complete data on the new Double Durability types of Elastic Stop nuts.

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