AVIATION WEEK

AUG. 4, 1952

THIS ISSUE $2.00

A McGRAW-HILL PUBLICATION

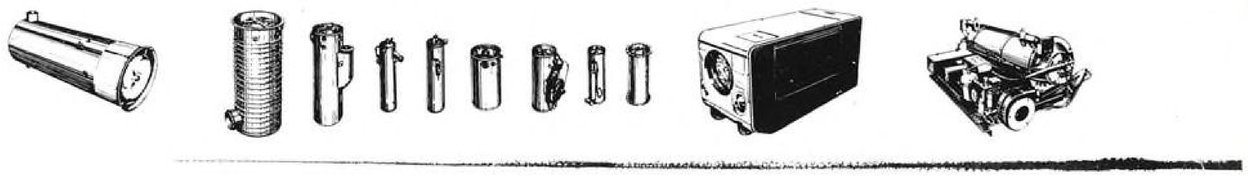
Special Report ...
AIR MATERIEL COMMAND

Of special interest to AMC personnel . . .

Just off the press: colorful, interesting, 40-page brochure that tells the story of combustion engineering progress from early heat treating furnaces to the latest heating developments for military and commercial requirements. Write for your copy.

COMBUSTION EQUIPMENT FOR ALL REQUIREMENTS

Proven Janitrol equipment for military applications includes trailer heaters, a complete line of aircraft combustion heaters and components from 15,000 to 700,000 Btu-per-hour capacity . . . inert gas generators . . . portable self-contained ground heaters . . . and liquid and coolant heaters for ground vehicles and stationary engines.



Janitrol combustion equipment is in use or has been specified on: C-124A & C, YKC-124B, C-119, XC-119H, F-89D, S2F-1, AF-2W, H-19, H05S-1, C-123B, HUP-2, H-21, B-25, F-51, C-47F, R4D-8, C-118A, P2V-4, P2V-5, P2V-6, T-28, C-100, F4U-7, ZPN Dirigible, S-55, C-125, DC-6, DC-6A & B, DC-7, DC-4, SDC-3, CV-240, Martin 4-0-4, 2-0-2A, T-6J, A-2 Tow Tug, 010 & 011A fire fighting vehicles, GCA trailer and others.

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When you call in the Janitrol Aircraft-Automotive Division, for research and development of equipment to meet new far-reaching requirements, you also tap the resources of five other divisions in the Surface Combustion organization. For proven products . . . or pioneering . . . it's never too early to call in your Janitrol representative.

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HEATERS WITH THE WHIRLING FLAME

Janitrol®

Aviation Week

ABP Member ABC

Volume 57 — August 4, 1952 — Number 5

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CONTRACTORS' GUIDE TO

LIVING IN DAYTON

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7 Holden

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CROUSE-HINDS *offers all 3 types*

of high intensity airport runway lights

The Crouse-Hinds Company offers all three types of high intensity fixtures to meet the three CAA Specifications (L-818, L-819 and L-820). All three fixtures (types HRC, HRL and HSL) are approved by CAA.

Type HRC utilizes a double prismatic lens system on a cast aluminum base, with a 500-watt, 115-volt lamp mounted on a movable socket. The main beams may be "toed in" or "toed out" by remote control from the tower to provide the best setting for particular visibility conditions. The candlepower is the highest of the three types. In bad weather the pilot sees more lights and sees them sooner with this system.

Type HRL is constructed with an optical prismatic Pyrex globe mounted on a 3-piece cast aluminum fixture assembly. Each fixture uses a 200-watt lamp and is provided with a series-to-series insulating transformer installed underground in the base housing.

This system has the lowest installation cost. Its use is often justified for non-instrument runways, as well as instrument runways.

Type HSL has a cast aluminum housing with two 95-watt sealed beam high intensity lamps inside and a 30-watt medium intensity light on top. Three insulating transformers are installed underground in the base. Each of the three lamps may be switched separately from the tower.

This system is economical to operate, since only 95 watts is used for the high intensity beam, and a 30-watt light is used in good weather. This fixture provides a main beam in only one direction, without the background haze resulting from the "back beam". After relamping, the sealed beam optical system is back to 100% initial efficiency.

All three fixtures provide the basic high intensity candlepower required and the three types have many construction features in common such as: cast aluminum housing, Pyrex glassware, disconnecting cable connector, same breakable coupling and standard steel base with base plate. All three units provide the necessary top light and side light needed for planes not on the approach path and all use a 5-stage brightness control.

Write for Bulletin 358-F. It contains detailed features and an impartial comparison of the relative advantages of the three systems with estimated installation costs of each.

CROUSE-HINDS COMPANY
Syracuse 1, N. Y.

A Nationwide Distribution Through Electrical Wholesalers

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for the aviation industry

...mechanical drives
...power transmissions
...gears and assemblies

Many of the nation's leading aircraft are equipped with mechanical drives and power transmissions manufactured by Foote Bros. On aircraft engines, both reciprocating and jet, you will find Foote Bros. gears that meet extremely high load requirements coupled with exacting standards of dimensional accuracy, minimum size and weight.

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Foote Bros. is one of the oldest and largest manufacturers of power transmission equipment in the country, with a long history of service to the aircraft industry. Our engineers may be able to help you solve the problem you may be facing on the design or application of aircraft devices.

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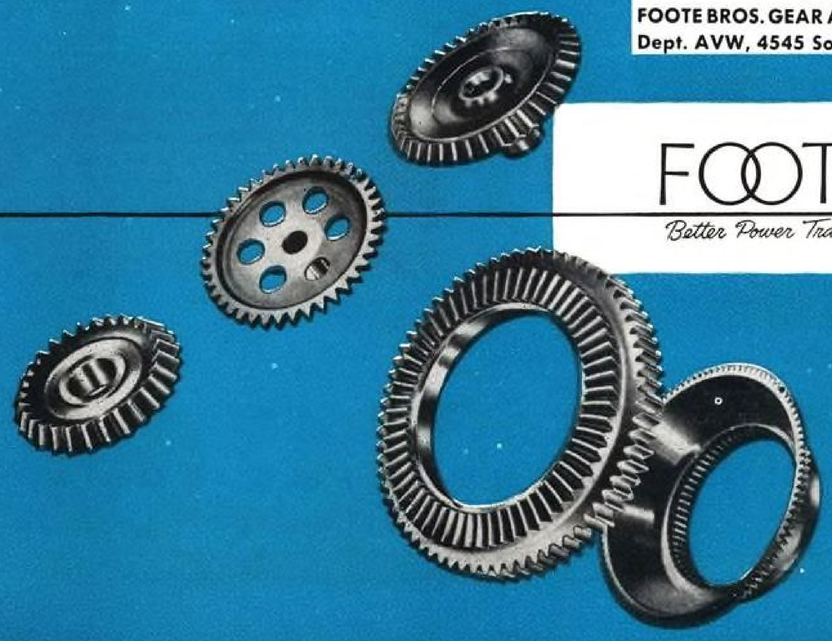

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Better Power Transmission Through Better Gears

LEWIS Complete Temperature Measuring Systems for Aircraft

. . . Sturdy
. . . Accurate

Hermetically Sealed TEMPERATURE INDICATORS
TO "AN" AND AIR FORCE SPECIFICATIONS

THERMOCOUPLE THERMOMETERS
STANDARD RANGES FOR CYLINDER, BEARING OR EXHAUST TEMPERATURES

2" SINGLE INDICATORS WITH MOUNTING BEZEL

2¾" DUAL INDICATORS

2" SINGLE INDICATORS FOR RING CLAMP MOUNTING

RESISTANCE THERMOMETERS
STANDARD RANGES FOR CYLINDER, OIL, FREE-AIR, COOLANT, CARB-AIR OR HEATING DUCT TEMPERATURES.

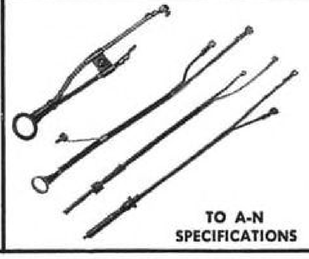
2" SINGLE INDICATORS WITH MOUNTING BEZEL

2¾" DUAL INDICATORS

2" SINGLE INDICATORS FOR RING CLAMP MOUNTING

RESISTANCE BULBS • **THERMOCOUPLES** • **THERMOCOUPLE WIRE**
STURDY . . . FAST-ACTING — ACCURATE . . . RELIABLE — AIRCRAFT QUALITY . . . FROM OUR OWN WIRE MILL

A-N, FREE-AIR, STUFFING-GLAND AND CYLINDER-HEAD BAYONET TYPES



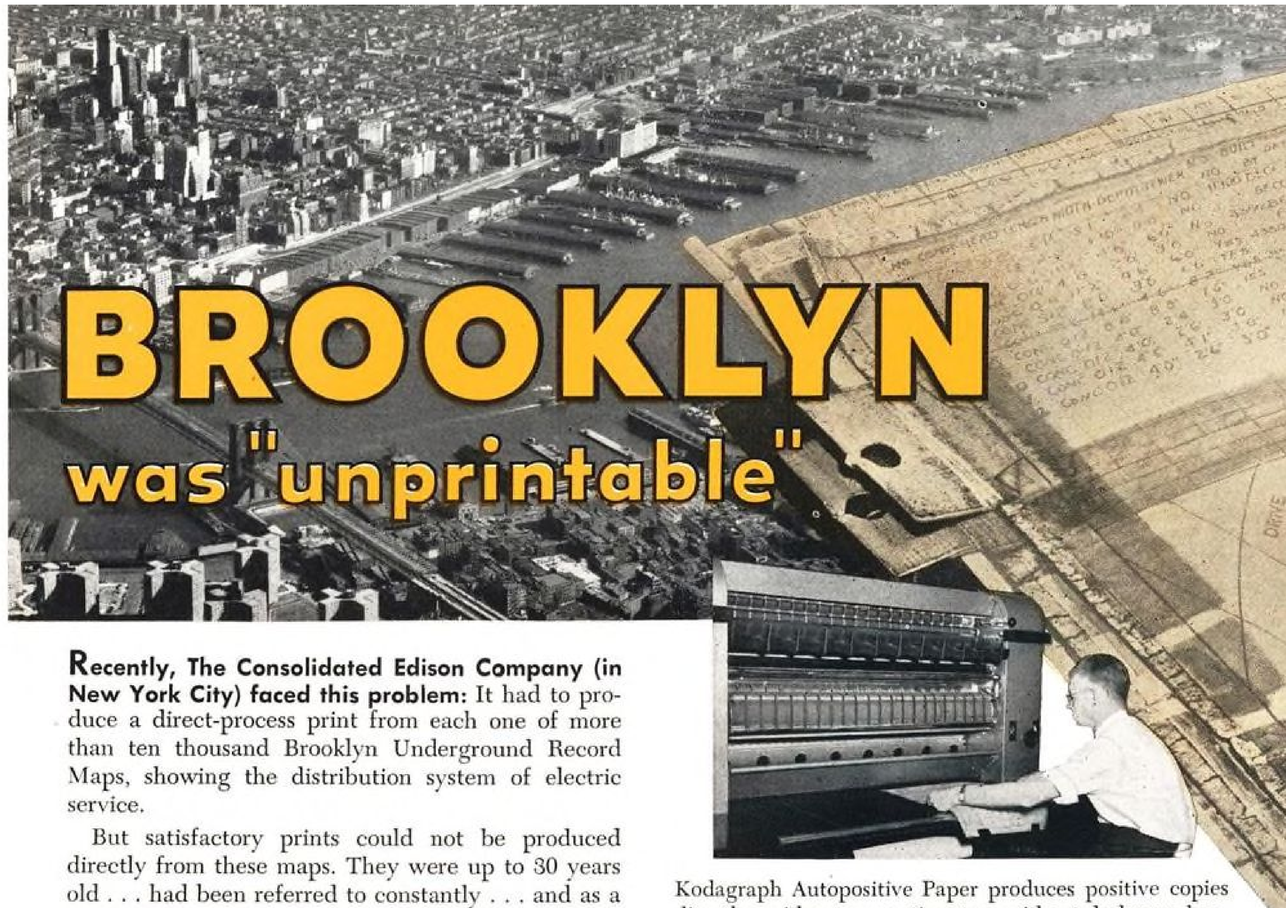
TO A-N SPECIFICATIONS

CHROMEL-ALUMEL — COPPER-CONSTANTAN

IRON-CONSTANTAN — TO A-N AND MILITARY SPECIFICATIONS

TO INSURE ACCURATE, RELIABLE TEMPERATURE INSTRUMENTATION, USE LEWIS BULBS, THERMOCOUPLES, LEAD WIRE, FIREWALL BLOCKS, RESISTORS AND INDICATORS

THE LEWIS ENGINEERING CO.
NAUGATUCK, CONNECTICUT
Manufacturers of Complete Temperature Measuring Systems for Aircraft



Recently, The Consolidated Edison Company (in New York City) faced this problem: It had to produce a direct-process print from each one of more than ten thousand Brooklyn Underground Record Maps, showing the distribution system of electric service.

But satisfactory prints could not be produced directly from these maps. They were up to 30 years old . . . had been referred to constantly . . . and as a result were soiled, stained, creased, and "dog-eared."

What to do? Retracing was out of the question, since it would take a draftsman from two to three days to trace and check just one of these 17″ x 25″ drawings.

Kodagraph Autopositive Paper was the speedy, economical solution

With this revolutionary photographic intermediate paper, approximately 40 sharp and clean "duplicate originals" could be turned out in an hour. *Yes, 40 in an hour* because Kodagraph Autopositive Paper produces positive copies directly—without a negative step, without darkroom handling. At the same time, it drops out stains, creases . . . cleans up backgrounds . . . transforms weak detail into dense photographic black lines. Furthermore, Autopositive Paper can be exposed in standard print-making equipment . . . and processed in standard photographic solutions.

Thus, Consolidated Edison obtained—*in record time and at minimum cost*—a complete set of duplicate originals, which were used to produce the required direct-process prints . . . and were then filed away for future reference work and print-making needs.

Kodagraph Autopositive Paper

"THE BIG NEW PLUS" in engineering drawing reproduction

Learn in detail all the ways you can save with Kodagraph Autopositive Paper—the revolutionary photographic intermediate material which you, or your local blueprinter, can process *quickly . . . economically . . . at low cost.* Mail coupon today for free booklet!

EASTMAN KODAK COMPANY
Industrial Photographic Division, Rochester 4, N. Y.

107

Gentlemen: Please send me a copy of "New Short Cuts and Savings"... describing the many savings Kodagraph Autopositive Paper is bringing to industry.

Name _____ (please print) Position _____

Company _____

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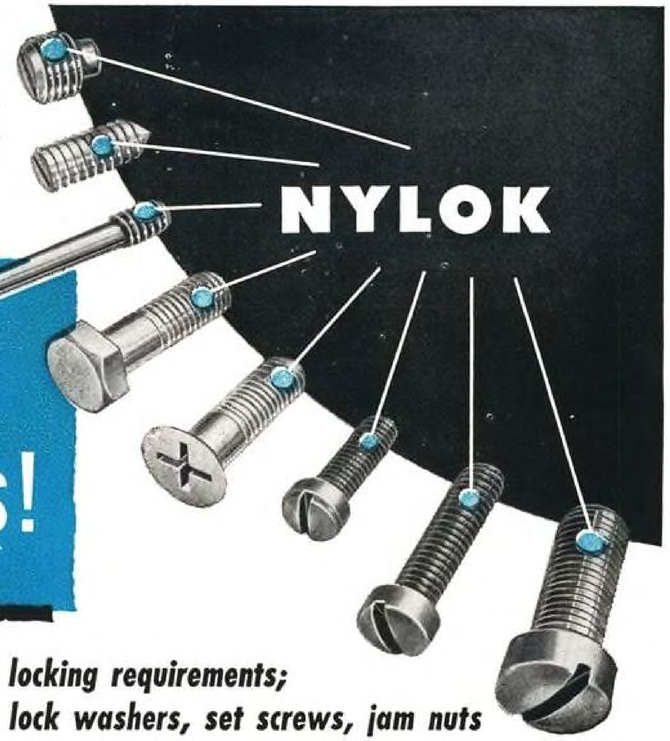
City _____ Zone _____ State _____

Kodak TRADE-MARK

Now- FOR THE FIRST TIME



Self-Locking Screws, Bolts!

Meet AN locking requirements;
Eliminate safety wire, lock washers, set screws, jam nuts

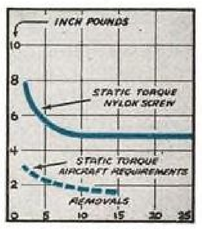
Now the Nylok principle of locking threads with the smooth wedging action of a nylon plug has been applied to screws and bolts.

The new Nylok screws and bolts are self-locking in any position, seated or unseated. They lock where stopped; they eliminate costly, time-consuming safety wiring and lock washers. No thread mutilation, nor backing out. Locking is positive even when seated against gaskets.

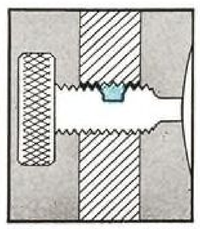
Nylok now enables you to design for simplified fastening, with full safety, for faster assembly time and easier servicing.

Presently available in sizes # 8 to ½ inch, lengths ¼ inch up

How Nylok Locks:
Resilient nylon plug (A) sets up lateral thrust, smoothly wedging mating threads together (B). All of locking action is on the threads; head is not stressed. Locking is positive seated or unseated.



Repeated Uses:
Typical curve shows high removal torque, in inch-pounds, after repeated installations, compared with AN requirements. Curve is for 10-32 size; other sizes are equally superior to requirements.



Adjusting Mechanisms:
Nylok adjusting screws insure quick, accurate adjustment with wrench or screw driver. Setting remains constant against vibration. No spring loading, jam nuts or other old style holding designs.

Vibration Proof:
With old-style screws, best time was 8 hours before military truck carburetors were loosened in desert proving ground grind. Locked with Nylok, carburetor fastenings were still tight after 30-day test.

NYLOK offers these Advantages

- Positive locking
- Eliminates safety wire, lock washers, jam nuts
- Re-usability
- Interchangeability
- Locks without seating
- Standard head sizes, types
- Standard overall lengths

Write or Wire for full specifications

THE NYLOK CORPORATION
ELMIRA HEIGHTS, NEW YORK

Mfrs. of Nylon-locked Fasteners. Covered by U. S. patents and patents pending

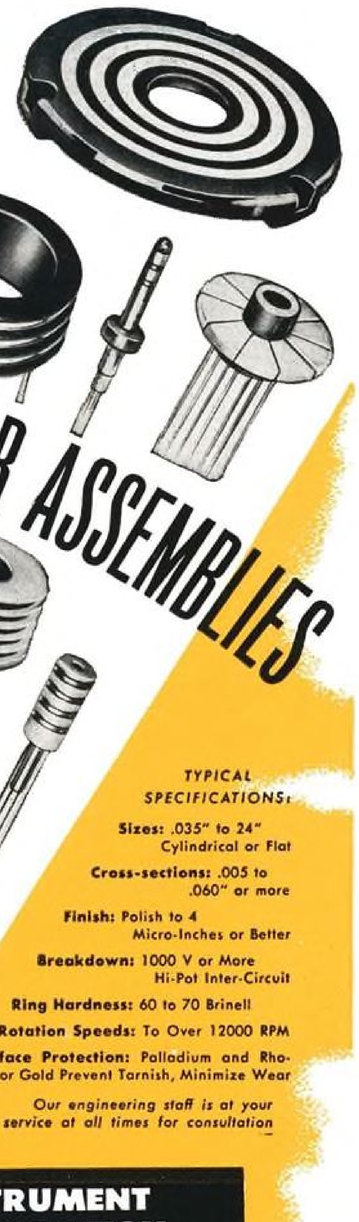
Sales Offices: New York: 475 Fifth Ave.
Detroit: 7-244 General Motors Bldg.
Los Angeles: 6842 Beck Ave., N. Hollywood

SLANT your requirements to

INSTRUMENT CORP. OF AMERICA

for miniature

SLIP RING AND COMMUTATOR ASSEMBLIES



This Instrument Corporation of America plant contains the most modern and complete facilities available anywhere in the world for the exclusive production of Miniature Slip-Ring and Commutator Assemblies to precision standards. It is now in full scale production to meet your requirements in the fastest possible time at the lowest possible cost.

ALL TYPES OF CONSTRUCTION NOW AVAILABLE INCLUDING MOLDED OR FABRICATED TYPES

Assemblies of these types can be supplied at low cost. Quality is the highest in the industry. Dimensional accuracy and other characteristics are excellent and these units are highly recommended for instruments such as synchros.

ONE PIECE ELECTRO-PLATED TYPES FOR EXTREME ACCURACY

Wherever extreme dimensional precision, accurate concentricity and high dielectric qualities are required, the electro-deposition method is recommended . . . the production of which is licensed under an exclusive arrangement with the Electro Tec Corporation.

TYPICAL SPECIFICATIONS:

Sizes: .035" to 24" Cylindrical or Flat

Cross-sections: .005 to .060" or more

Finish: Polish to 4 Micro-Inches or Better

Breakdown: 1000 V or More Hi-Pot Inter-Circuit

Ring Hardness: 60 to 70 Brinell

Rotation Speeds: To Over 12000 RPM

Surface Protection: Palladium and Rhodium or Gold Prevent Tarnish, Minimize Wear

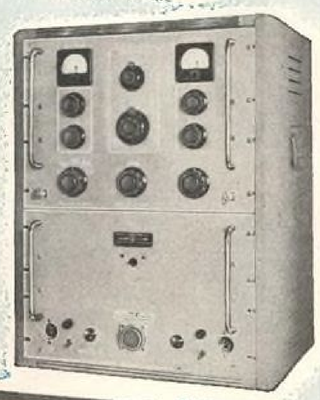
Our engineering staff is at your service at all times for consultation

INSTRUMENT CORPORATION OF AMERICA
BLACKSBURG • VIRGINIA

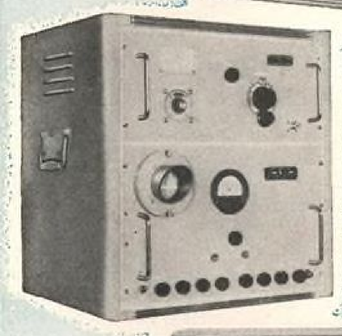
UNDER EXCLUSIVE LICENSE OF ELECTRO TEC CORPORATION

When you *TEST*, use the *BEST*...

Type 275
VOLTAGE STANDING WAVE RATIO AMPLIFIER
300—3000 cps.



Type 801-A
UNIVERSAL KLYSTRON POWER SUPPLY
300-1500 V at 65 ma;
1.5—3.6 KV at 25 ma



Type 854
UNIVERSAL SPECTRUM ANALYZER
8.5—9.6 kmc/s

Type 907
BROADBAND SWEEP FREQUENCY GENERATOR
35—900 mc/s

Type 904
VHF-UHF NOISE GENERATOR
.01—1.0 kmc/s

THE STANDARD OF COMPARISON IN

Augmented by many new components, the PRD line of RF Test Equipment is presently the most complete line available covering the entire frequency range from .01 to 40 kilomegacycles per second. The units listed indicate the wide diversity and applicability of PRD equipment. In addition to the standard line, PRD specializes in the design and manufacture of special equipment to meet special requirements. A skilled staff of engineers is available to analyze your requirements and to assist in the application of standard or special components to your test problem. PRD equipment is engineered and manufactured to the highest attainable standards. No effort has been spared to make this equipment the finest available anywhere with the result that PRD equipment is now used in leading laboratories all over the world.

FREQUENCY MEASURING DEVICES

Frequency Meters	Frequency Range (kmc/sec)	Type No.	Transmission Line Size (Nominal O.D.—inches)	R—Reaction T—Transmission
General Purpose	0.47—0.95	584	⅜	T
	3.95—5.85	574	2 x 1	R
	4.00—10.0	562-A	⅜	Detector included
	5.85—8.20	575	1½ x ¾	R
	7.05—10.0	576	1¼ x ⅝	R
	8.2—10.0	585-A	1 x ½	R
	8.2—10.0	585-B	1 x ½	T
	8.2—10.0	586-A	1¼ x ⅝	R
	8.2—10.0	586-B	1¼ x ⅝	T

In addition to the General Purpose Frequency Meters listed above, PRD manufactures a complete line of Precision Frequency Meters covering the entire frequency range from 0.55 to 39.0 kmc/s. Transmission line sizes include ⅜" coaxial line and all standard wave guide sizes from 0.280" x 0.140" I.D. to 2" x 1" O.D. All types are available in Reaction and Transmission styles.

The Type 500 Frequency Standard Multiplier is available to generate standard frequency signals in the UHF and microwave regions when used with the Type 612-A Tunable Crystal Mount.

SIGNAL SOURCES AND RECEIVERS

ITEM	DESCRIPTION
TUBE MOUNTS	
Type 701	For type 2K28 klystrons, 2.400—3.445 kmc/sec
Type 702	For type 2K25 klystrons, 8.50—9.60 kmc/sec, 1¼ x ⅝ waveguide
Type 703	For type 2K25 klystrons, 8.50—9.60 kmc/sec, 1 x ½ waveguide
OSCILLATORS	
Type 705	Covering the frequency range from 7.0 to 11.0 kmc/sec
Type 706	Covering the frequency range from 3.6 to 7.3 km/sec
POWER SUPPLIES	
Type 801-A	Providing all required electrode voltages to operate a wide variety of klystrons, plus internal modulators
SPECTRUM ANALYZERS	
Type 853	Covering the frequency range from 2.40 to 3.40 kmc/sec
Type 854	Covering the frequency range from 8.50 to 9.60 kmc/sec
Type 855	Combining both of the above ranges in one instrument
GENERATORS	
Type 902	Covering the frequency range from 3.65 to 7.30 kmc/sec
Type 903	Covering the frequency range from 7.00 to 10.5 kmc/sec
Type 907	Covering the frequency range from 35 to 900 mc/sec
NOISE GENERATORS	
Type 904	For the direct measurement of noise factors in the range of 10 to 1000 mc/sec

Type 706
BROADBAND MICROWAVE OSCILLATOR
3.6—7.3 kmc/s

...from *VHF* to *EHF*, it's PRD

QUALITY, ACCURACY, DEPENDABILITY

ITEM	TRANSMISSION LINE SIZE: COAXIAL (Nominal O.D.—inches) ⅞	⅜	WAVEGUIDE (Nominal O.D.—inches) 3x1½	2x1	1½x¾	1¼x⅝	1x½	0.622x 0.311 I.D.	0.420x 0.170 I.D.	0.280x 0.140 I.D.
ATTENUATORS AND TERMINATIONS										
Variable Attenuators Uncalibrated			171	162	161	160	154 159	189	190	191
Dial			174-A	169-A	177-A	184-A	196-A 196-B	187-A		
Precision			175-A	170-A	178-A	185-A	195-A	188-A	153-A	192
Cut-Off		181, 198					180			
Fixed Attenuators Low Power	136 series 142 series	130 series 135 series	s	s	s	s	140 series	s		
High Power	141, 143	144								
Terminations	145	139	129	115	121	114	116	131	132	133
TRANSMISSION LINE COMPONENTS										
Waveguide to Coaxial Adapters			365	357	356	355	354			
Coaxial Transitions	389, 390 391, 392	389, 390 391, 392								
Directional Couplers				400	404	401	402	405		
Waveguide Stands			375-A	376-A	377-A	378-A	379-A	386A	387-A	388-A
Flange Bolt and Nut Assemblies			369-A	369-B	369-B	369-C	369-D	369-E	f	f
Bends and Tees				s	s	s	462 465 481	s	s	s
IMPEDANCE MEASUREMENT AND TRANSFORMATION										
Slotted Sections	200-C 200-D	205-A 215-A	209-A	201-A	204-A	202-A	203-A	210	211	212
Tuners		306	309	300	305	302	303	311 314	313	312
DETECTION AND POWER MEASUREMENT										
Detector Mounts Crystal		612-A 613					601	616	621	615
Bolometer	623, 624 625, 626	612-A,613 627, 628						616	620 621	618
Thermistor							635			

The Type 250-A Broadband Probe is designed for use with the Types 200-C through 209-A and 215-A Slotted Sections; Types 210-212 are supplied with built-in tunable probes. The Type 361 R-F Adapter is available for use with the Type 250-A Probe.

The Type 650 Universal Power Bridge is designed to be used with any of the bolometers or thermistors listed for the measurement of absolute power level.

BOLOMETERS

TYPE No.	FOR USE WITH	TYPE No.	FOR USE WITH	TYPE No.	FOR USE WITH
610-A	250-A,612-A, 613	629-A	623	630-B	626
614	210, 211, 616, 621	629-B	624	631-A	627
617	212, 618, 620	630-A	625	631-B	628

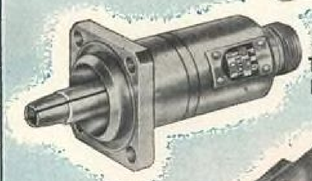
f—Equipment supplied with captive flange screws
s—Available on special order only

Type 650-A
UNIVERSAL POWER BRIDGE
0.1, 1.0, 10, 100 mw full scale

Type 627-A
BROADBAND COAXIAL BOLOMETER MOUNTS
4.0—10.0 kmc/s

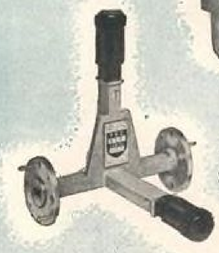
Precision *RF* Test Equipment

Type 196-A
VARIABLE ATTENUATOR
8.20—12.4 kmc/s

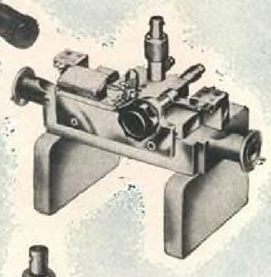


Type 389
COAXIAL TRANSMISSION LINE ADAPTER
0—4.0 kmc/s

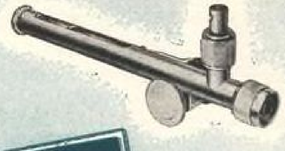
Type 481
E/H TEE
8.20—12.4 kmc/s



Type 312
E/H TUNER
26.5—40.0 kmc/s



Type 211
PRECISION WAVEGUIDE SLOTTED SECTION
18.0—26.5 kmc/s



Type 250-A
BROADBAND PROBE
1.00—12.4 kmc/s

NEW ILLUSTRATED CATALOG AVAILABLE ON REQUEST

Contains complete information on the entire PRD line of precision rf test equipment. Write for your copy today on your company letterhead — no obligation; address Dept. G-1.

Polytechnic RESEARCH & DEVELOPMENT COMPANY • INC

55 JOHNSON STREET, BROOKLYN 1, NEW YORK
WESTERN SALES OFFICE: 737 NO. SEWARD ST., HOLLYWOOD 38, CALIFORNIA

Boeing B-47 Stratojet medium bomber — Boeing Airplane Co. Photo

"NERVE CENTERS" made to order for instruments and controls!

Cost-savings, too, with these bellows assemblies!

IF YOU HAVE a tricky job that a bellows assembly can do, we can build the assembly to do the job. For we help design engineers in practically all industries—produce these "nerve centers" for many instruments and controls.

They're used in thermostatic devices . . . flexible connectors . . . pressure controls . . . hydraulic mechanisms and other units.

A few of the many types of assemblies we build are shown. All are made to order, to your specifications.

And you'll make cost-savings, too. For you benefit from our half-century of experience in this specialized field. Our skilled personnel work with you designing and developing assemblies—produce them for you in a wide range of metals and sizes. You save time and money.

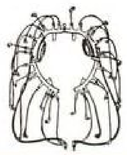
If you have a product requiring one or more bellows assemblies . . . if you have a design problem involving control of temperature or pressure that bellows assemblies can help solve . . . write us for helpful information and advice. Ask for idea-packed Catalog PA-1200.

FULTON SYLPHON DIVISION Knoxville 4, Tenn.

Robertshaw-Fulton CONTROLS COMPANY "EVERYTHING'S UNDER CONTROL"

TEMPERATURE CONTROLS • BELLOWS ASSEMBLIES • BELLOWS DEVICES

BRIDGEPORT THERMOSTAT DIVISION Bridgeport 1, Conn.



IGNITION SHIELDING

Complete harness assemblies with detachable unit leads or rewirable leads. Igniter or ignition lead assemblies for jet and reciprocating aircraft engines and military vehicles.

FLEXIBLE METAL TUBING

For electrical shielding, mechanical protection, fluid lines, conduits and ducts, pressure lines, and high and low temperature applications. Material, shapes and sizes to specification.

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Precision worm drive—for aircraft, automotive, marine, special-purpose and industrial use. Vibration-proof—will not work loose. Corrosion-resistant steel.

ACTUATING SYSTEMS

Electrical, mechanical, and hydraulic actuators for aircraft controls, valve closures, landing gear, or virtually any other type of equipment to manufacturer's specifications.

WELDED DIAPHRAGM BELLOWS

"Job engineered" to meet your requirements and make possible the use of bellows in applications where they could not previously be considered.

SPECIALIZED CONNECTORS

For electronic, aircraft, ordnance and communications equipment. Water-tight or pressure sealed types, panel types, quick disconnects, or other types for your new and special applications.

A Quarter Century of Design Experience backs BREEZE MARK products

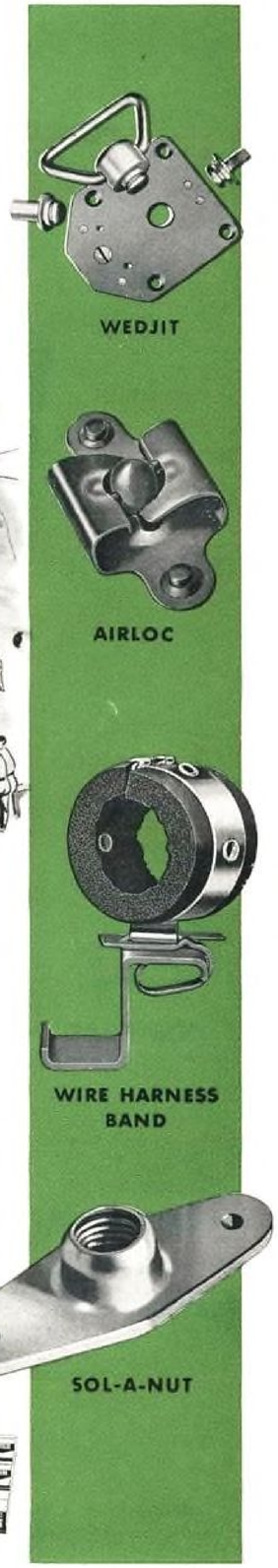
You benefit from 25 years of engineering design and manufacturing experience when you call on Breeze for precision production. Breeze offers an extensive line of quality products for aviation, communications, automotive and general industry. In addition, Breeze offers complete engineering services for the design and development of specialized electrical and mechanical devices.

Breeze products meet the latest government specifications.

BREEZE CORPORATIONS, INC.

41 South Sixth St., Newark 7, N. J.

Speed assembly



cut costs

. . . with fastening devices engineered for the specialized requirements of the aircraft industry. We urge you to check your fastening needs with us *before* your new designs crystallize.

It is at this all-important *development* stage that you can make the most effective use of our specialized services.

Monadnock, with a wealth of fastening experience, also has reliable development and production facilities available to manufacturers of other quality products.

MONADNOCK MILLS San Leandro California

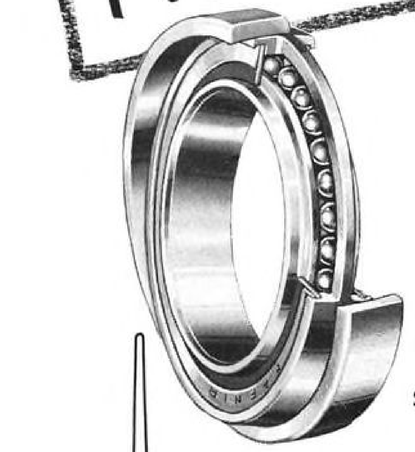
Subsidiary of UNITED-CARR FASTENER CORPORATION

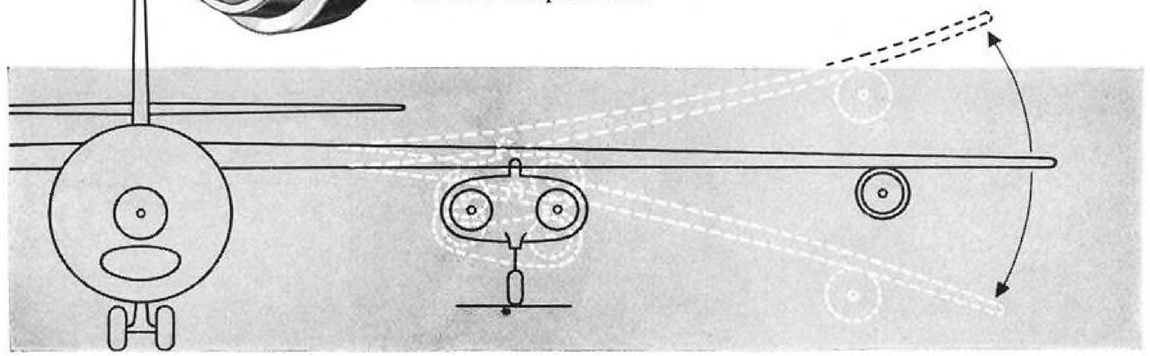
NEW!

Self-Aligning Torque Tube Type Bearing

Solves Control Problem in Wing Deflection

Specifically designed for hinge applications and push-pull controls on modern high speed planes, the new Fafnir torque tube type, *external self-aligning* ball bearing provides friction-free rotation when wing sections and other members are deflected. It is a variation of the AN 202 KP-B series, and is available in the same bore sizes. This space-saving, weight-saving bearing is protected by Plya-Seals and is pre-lubricated at the factory. Send for complete data.





DESIGN ADVANTAGES OF THE NEW SELF-ALIGNING CONTROL BEARING

(1) simplifies application
(2) eliminates parts
(3) reduces costs
(4) insures minimum weight and space
(5) incurs no reduction in bearing capacity

Working with aircraft designers to solve this problem is another example of the Fafnir "attitude and aptitude" . . . a way of looking at bearing problems from the designer's viewpoint, and aptitude for coming up with the right bearing to fit the need.

The Fafnir Bearing Company
New Britain, Connecticut

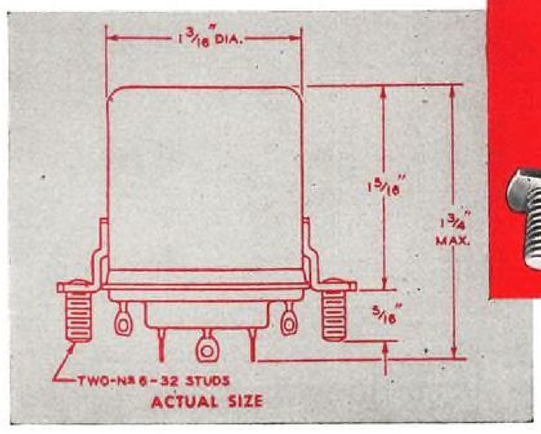
FAFNIR BALL BEARINGS
MOST COMPLETE LINE IN AMERICA

Miniaturized DC Relay

for military aircraft applications

IMPORTANT FEATURES

- Designed to meet U. S. Air Force Relay Specification MIL-R-5757
- Palladium Contacts . . . Six-pole, double-throw design
- Moisture-free-gas-filled . . . Hermetically sealed



RCA-203W1 DC RELAY

. . . Specifically produced for military requirements by the Electronic Components activity of the RCA Tube Department.

Immediately available to prime suppliers and sub-contractors of military aircraft equipment, the new RCA-203W1 DC Relay is designed for general use throughout the electrical systems of military aircraft.

Built to operate under severe service conditions, and in any mounting position, the RCA-203W1 will provide longevity of service under extremes of temperature, humidity, shock, vibration and voltage variations. Because it is hermetically sealed in a steel envelope which is evacuated and filled with moisture-free gas, the coil and contacts are impervious to dust, moisture, and corrosion.

Its 6-pole, double-throw construction features palladium contacts rated to handle 2 amperes with a resistive load at 26.5 volts dc and 1 ampere with an inductive load at the same voltage. Contacts are arranged in a break-before-make sequence.

A technical bulletin covering ratings, dimensions, terminal connections, operating information, and descriptive data on shock, vibration, and life tests, is yours for the asking. Just write RCA, Commercial Engineering, Section HR69, Harrison, N. J. . . . or contact the nearest RCA field office.

FIELD OFFICES: (East) Humboldt 5-3900, 415 S. 5th Street, Harrison, N. J. **(Midwest)** Whitehall 4-2900, 589 E. Illinois St., Chicago, Illinois. **(West)** Madison 9-3671, 420 S. San Pedro St., Los Angeles, California.

RADIO CORPORATION of AMERICA
ELECTRONIC COMPONENTS **HARRISON, N. J.**

One of the many fine achievements of the AIR MATERIEL COMMAND has been to put matchless teamwork into the engineering and production efforts of its many and diversified supporting industries.

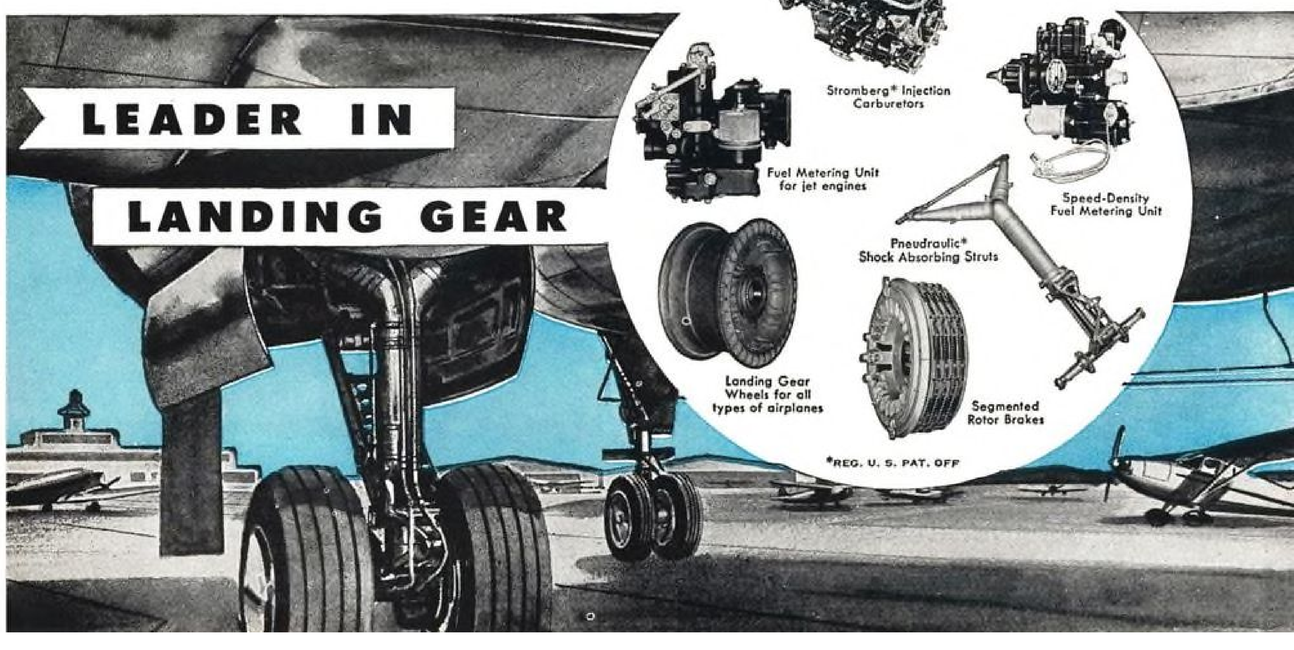
Bendix Products Division is proud to be a part of that great team of defense industries.

Also—in the field of landing gear and fuel metering equipment—Bendix takes special pride in the importance and responsibility of its assignments from the AIR MATERIEL COMMAND.

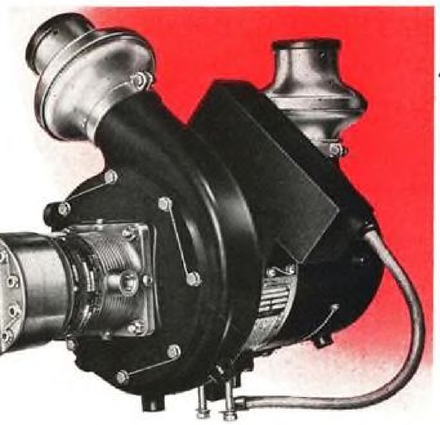
BENDIX · PRODUCTS DIVISION · **SOUTH BEND**

Bendix AVIATION CORPORATION

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N.Y.



STRATOPOWER



They FIT . . . in every respect. That's why STRATOPOWER hydraulic pumps are so widely specified by design engineers and preferred by operational personnel.

Today, a selection of several basic STRATOPOWER pump types, in both constant and variable delivery models, blanket the diversified requirements of modern aircraft hydraulic systems. And, there are two distinct types of integral pressure regulation available . . . with modifications to provide both electrical and oil-piloted means for automatic or selective pressure control.

Both direct engine driven and electric motorized units are furnished in capacities from one-quarter to ten gallons per minute at a nominal speed of 1500 rpm with continuous working pressures to 3000 psi. The maximum continuous duty operating speed is 3750 rpm, with a maximum of 4500 rpm allowable for intermittent operation.

Proven by exhaustive laboratory and extended service experience, STRATOPOWER hydraulic pumps continue to set new standards of performance and dependability for the aviation industry.

Hydraulic Division

THE NEW YORK AIR BRAKE COMPANY

HYDRAULIC PUMPS
FOR THE AVIATION INDUSTRY

VARIABLE DELIVERY—POSITIVE PISTON RETURN TYPE... Pumps in this series incorporate a positive piston return actuator and were designed to meet new specifications calling for higher reservoir pressurization. This design insures adequate pump by-pass under all conditions to provide fluid circulation for cooling and lubrication during the zero flow, full pressure cycle. In systems where two or more pumps are manifolded in a single circuit the positive priming characteristics of these pumps eliminate the necessity of priming valves and independent pump priming.

SERIES 66W

CONSTANT DELIVERY TYPE... Used in conjunction with open center systems having relief valve over-pressure protection, or in any closed center system provided with an accumulator and unloading valve. Consistent with STRATOPOWER design, these units are of the axial reciprocating piston type with rotating cam and fixed cylinders. Mounting position and direction of pump rotation are optional without internal alteration and without interchanging port connections.

SERIES 67

VARIABLE DELIVERY—SUCTION CONTROL TYPE... This series incorporates the most direct known method of integral maximum pressure regulation. A pressure loaded pilot valve reacts against an adjustable calibrated spring to vary the amount of fluid admitted through the suction passage in relation to system pressure demand. Characteristics of all STRATOPOWER pumps, minimum cylinder clearance and positive valve closure at each cylinder end assures prompt priming and permits their successful use at altitudes where other pump types require pressurized reservoirs.

SERIES 67V

VARIABLE DELIVERY—INTERNAL BY-PASS TYPE... Pressure regulation incorporated in this series of pumps is accomplished by internal by-pass with reduced effective pumping stroke. These models automatically assume unloaded condition upon attaining maximum regulated pressure, cooling and lubricating circulation being maintained by centrifugal action and delivery to the pressure circuit limited to the supply of circuit leakage. Because of minimum inertia of regulating parts, the pumps instantly and positively adjust delivery to the demands of the circuit.

SERIES 67W

VARIABLE DELIVERY—DUAL PRESSURE TYPE... This series retains all the variable delivery self regulating features of the 67 W Series with the addition of a selective, low pressure, zero flow cycle. This feature provides two ranges in which the pump operates, chosen selectively by the energizing or de-energizing of the control or pilot line to the pump. An electrical modification of this series provides means for "latching out" the regulating elements during the zero flow or unloading cycle, thus permitting the pump to operate under no load during periods when pressure is not required in the hydraulic system.

SERIES 67MW

ELECTRIC MOTOR DRIVEN UNITS... These units are used in secondary hydraulic circuits or where it is desirable to have the source of power independent or remote from the aircraft engine. Models are furnished complete with AC and DC motors for both continuous and intermittent duty operation. Modifications are available, individually designed, in various combinations of electric motor characteristics and pump types.

SERIES 167

The New York Air Brake Company, through its affiliate companies, is a major supplier of high vacuum and hydraulic equipment extensively used by various divisions of the armed services. . . .

- **DUDCO DIVISION** — Hydraulic Motors and Pumps for Tank Ordnance Vehicles and Naval Vessels.
- **HYDRECO DIVISION** — Hydraulic Motors, Pumps, Valves and Cylinders for Materials Handling, Road and Construction Machinery.
- **KINNEY MANUFACTURING COMPANY** — High Vacuum Pumps and Equipment for High Altitude Test Chambers, Evacuation of Cyclotrons and Atomic Diffusion Vessels. Also Rotary Pumps for handling Main Cargo Liquids, High Pressure Fuel Oils, Ballast Water and other materials on Tankers, Barges and Fighting Ships of the Navy.

420 LEXINGTON AVENUE • NEW YORK 17 • N. Y. • FACTORY: WATERTOWN • NEW YORK

Improving the EYES of the Air Force

How PERKIN-ELMER's specialized optical and engineering skills serve the Air Force

New "EYES" for reconnaissance—photograph 50,000 sq. miles in less than a day

A new type of aerial camera developed by Perkin-Elmer around a unique 90-lb. rotating glass prism, enables aerial cameramen to photograph an area the size of Pennsylvania in less than a day on a single roll of film. The Transverse Panoramic Camera scans terrain from horizon to horizon across a plane's line of flight and records the image on a 400-lb. roll of film 18 in. wide and 5000 ft. long. The extreme accuracy of Perkin-Elmer's optics even captures such fine ground detail as pole shadows and railroad ties from 40,000 ft. on a single 12-ft. frame. A battery of seven conventional aerial cameras was previously needed to do the same job, now done by this single, lighter, Perkin-Elmer unit.

Perkin-Elmer has designed and built an impressive variety of telephoto camera lenses for the Air Force, ranging in focal length from 24" to 144" with apertures up to F3.5.

New "EYES" for pinpointing the target—at jet speeds

The Air Force foresaw the need for a simplified bombsight with navigational attachments incorporating radar, calling for less operator skill, and designed to work at the high speeds and altitudes of jet aircraft. Compactness, reliability, ease of maintenance through unitized construction and design that anticipates improvements of aircraft performance were Air Force mandatories. The BDHSA sight that resulted from the unique combination of optical, electronic and mechanical engineering skills found at Perkin-Elmer, permitted the Air Force to write "Mission Accomplished" on the assignment. (Mechanical, electronic and optical design details of the BDHSA are withheld for security reasons.)

Indeed, at one time or another, Perkin-Elmer has designed nearly every type of sighting device used in the Air Force—including bombing periscopes, fighter sights and many other devices for sighting ground targets and enemy planes. How thoroughly Perkin-Elmer meets the complex optical requirements of the Air Force is revealed in this observation of an Air Force pilot who remarked, wonderingly, that only he "looks out through a windshield; everyone else in the plane looks out through Perkin-Elmer optics."

New "EYES" that see in the dark

Darkness and haze cannot stop infrared radiation. Devices that detect such radiation can spot objects otherwise invisible. Perkin-Elmer, as the outstanding manufacturer of industrial infrared spectrometers and other infrared equipment, is well equipped to undertake the development of specialized devices for the Air Force based on this principle.

The foregoing covers but a few of the examples of the optical, the electro-optical and engineering skills at Perkin-Elmer that serve the Air Force. Those same skills are available to you in meeting your instrumentation and production problems. We welcome the opportunity of talking them over with you.

The Perkin-Elmer Corporation, 895 Main Ave., Norwalk, Conn.

For Optical Design and Electro-Optical Instruments

PERKIN ELMER

CHATHAM ELECTRONIC TUBES

Hydrogen Thyratrons —for Pulse Voltage Generation

ELECTRICAL DATA*

Type	VC-1258	5949/1907	5948/1754	VC-1257
Maximum Peak Forward Anode Potential	1000 volts	25000 volts	25000 volts	38000 volts
Maximum Peak Anode Current	20 amps	500 amps	1000 amps	2000 amps
Maximum Average Anode Current	0.05 amps	0.50 amps	1.0 amps	2.0 amps
Maximum Heating Factor (epy x prr x ib)	1.0×10^8	6.25×10^9	9.0×10^9	—
Nominal Filament Power	12.6 watts	95 watts	190 watts	230 watts
Hydrogen Reservoir	No	Yes	Yes	Yes

*More detailed information on electrical and mechanical data will be supplied on request.

TYPE VC-1257
Hydrogen filled, zero bias thyratron with hydrogen generator for generation of pulse power up to 40 megawatts.

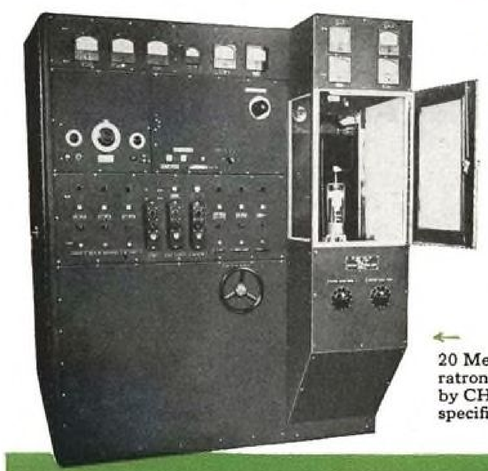
TYPE 5948/1754
Hydrogen filled, zero bias thyratron with hydrogen reservoir for generation of peak pulse power up to 12.5 megawatts.

TYPE 5949/1907
Hydrogen filled, zero bias thyratron with hydrogen reservoir for generation of peak pulse power up to 6.25 megawatts.

TYPE VC-1258
Zero bias miniature hydrogen thyratron for the generation of peak pulse power up to 10 KW.

● A NEW CONCEPT OF HYDROGEN THYRATRON DESIGN! The tubes illustrated represent a departure from conventional hydrogen thyratron designs and are a result of several years of concentrated development work. They are primarily employed in the generation of peak voltages with durations in the order of microseconds.

Custom-built Electronic Equipment



● CHATHAM specializes in the development, design, and construction of custom-built electronic equipment to exactly meet customers' requirements. Our capable staff of engineers will furnish prompt estimates or, if desired, will call to discuss your problem personally. Call or write today.

5 Megawatt radar modulator built by CHATHAM to rigid government standards.

Pulse life test equipment built by CHATHAM checks receiver type tubes under pulse conditions. →

← 20 Megawatt Hydrogen Thyratron Test Equipment built by CHATHAM to customers' specifications.

ELECTRONICS AND EQUIPMENT

Electronic Tubes

Ruggedized Type Tubes

● The following tubes are JAN approved and can be supplied promptly, usually direct from stock:

5R4WGY 2D21W
6AL5W OC3W
6H6WGT OD3W
25Z6WGT 2050W

TYPE 719-A HIGH VACUUM CLIPPER DIODE
This tube is used primarily for clipper diode service in hard tube modulator circuits. Filament 7 volts, 7 amps... Inverse peak anode voltage 25 kv, Max., peak anode current 10 amps, Max., anode dissipation 75 watts.

TYPE 1Z2 RECTIFIER
A small bulb high voltage vacuum rectifier. Low cathode heating power and low dielectric losses make tube suitable for radio frequency supply circuits. Filament 1.5 volts, .290 amps... Inverse peak anode voltage 20,000, average plate current 2 ma.... peak plate current 10 ma.

TYPE 1B46 REGULATOR
A cold cathode glow discharge tube designed for voltage stability. DC operating voltage 82 volts, operating current range 1 ma minimum, 2 ma maximum. Regulation 3 volts.

TYPE 395-A COLD CATHODE GAS TRIODE
Requires no filament supply and is used in many grid controlled rectifier and relay applications.
Maximum D.C. anode current— 10 ma.
Maximum D.C. anode voltage—150 volts

TYPE 4B32 RECTIFIER
A rugged half-wave Xenon filled rectifier. Operates in any position throughout an ambient temperature range of −75°C to +90°C. Filament 2.5 volts, 7.5 amp... Inverse peak anode voltage 10,000 average anode current 1.25 amps.

TYPE 394-A THYRATRON
A Mercury vapor and Argon filled thyratron for grid controlled rectifier service. Operates over wide ambient temperature range. Heater 2.5 volts, 3.2 amps... Inverse peak anode voltage 1250, average anode current 640 ma.

TYPE 3B28 RECTIFIER
This rugged half-wave Xenon filled rectifier will operate in any position and throughout an ambient temperature range of −75°C to +90°C. Filament 2.5 volts, 5.0 amps... Inverse peak plate voltage 10,000, average anode current .25 amp.

Chatham Vacuum Switches

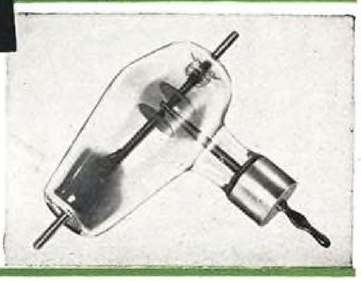
● TYPE 1S22 (illustrated) is a mechanically actuated, single-pole, double-throw, glass vacuum switch. This and other types can be supplied.

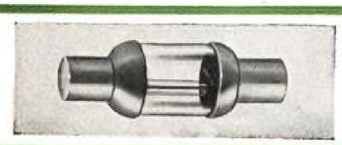
SPECIFICATIONS

HOLD OFF VOLTAGE: Internal—10,000 volts rms; External* (at 27,000 feet altitude)—10,000 volts rms; External* (at 40,000 feet altitude)—7,500 volts rms.

INTERRUPTING RATING, RESISTIVE LOAD: 1,000 operations life at 10,000 v, ac, rms—10 amp, ac, rms; 1,000,000 operations life at 10,000 v, ac, rms — 2 amp, ac, rms; 500,000,000 operations life at 10,000 v, ac, rms—0.1 amp, ac, rms.

NET WEIGHT (approx.)..... 2 ozs.
MAXIMUM LENGTH (overall)..... 3⅜ ins.
MAXIMUM WIDTH (overall)..... 4½ ins.
MAXIMUM THICK. (overall)..... 1⅞ ins.
*at 50% humidity





HIGH VOLTAGE VACUUM FUSES
Can be supplied by Chatham to exact customers' specifications if ordered in adequate quantity. Call or write for full particulars and quotes.

CHATHAM ELECTRONICS CORP.
475 WASHINGTON STREET • NEWARK 2, NEW JERSEY

A NEW INSTRUMENT FOR A NEW USE!

Align-A-Scope

"Optical Tooling," for microscopic accuracy in aircraft production, has made the slow and inaccurate mechanical methods of the past obsolete. Here is the most important precision tooling advancement in years — and Align-A-Scope is the most advanced instrument in the Optical Tooling field today! Its design; the result of concentrated research in cooperation with leading Aircraft Tooling and Optical Engineers, is such that exact readings are quickly and accurately made, thereby reducing the human element to a minimum. Inspectors and tool makers obtain the same readings — resulting in a vast saving of time. By an exclusive construction feature incorporated within its A.I.A. standardized dimensions, Align-A-Scope has greatly increased the usual Field of Vision.

Auto-Collimation attachments may be added to the Align-A-Scope at any time.

Get the facts on this precision instrument, now being produced, to speed your tooling program.

ACCESSORIES:

BALL MOUNT BASES
AUTO REFLECTION TARGET MIRRORS
ALUMINUM TARGETS
TOLERANCE TARGETS
OPTICAL SQUARES

Rugged, rustproof chrome-alloy steel barrel.

Eyepiece can be used parallel to line of sight or at right angles to it, and rotated 360° in the latter position — facilitating its use in restricted locations.

Optical micrometer used for displacing the line of sight vertically or laterally.

Standard 3½" dia. steel spherical mount — integral and concentric with barrel.

Magnification:	*30 X*
Field:	*90 min. or 31.4" at 100'*
Range:	*10" to infinity*
Resolution:	*2 to 4 seconds of arc*
OPTICS:	*Fully coated*

write for information

Align-A-Scope *is made by the* ***Joel Fox Co., Inc.***
1110 North Seward St., Los Angeles 38, Calif.

Selected For the BOEING B-47

THE LEAR MODEL 188AK, a small but powerful rotary actuator, is but one of the Lear electro-mechanical products selected for the giant B-47 jet bomber. Small enough to fit into a hand (1.8 pounds), the Lear Model 188AK Rotary Actuator produces up to 50 pound-inches torque and will hold against 750 pound-inches under severe vibration without creeping. It will withstand stalling and jamming. Used as a Trim Co-ordination Actuator in setting the initial trim of the B-47, its operational characteristics make it ideal for countless other applications.

Lear engineering and production skills are combined to meet rigid customer requirements in the manufacture of vital aircraft accessories. Lear rotary and linear actuators, power units, screw-jacks, servo mechanisms, electronic controls, and gyro instrument products are serving the aviation industry through precision performance.

Lear Model 188AK
Rotary Actuator

LEAR INC., GRAND RAPIDS, MICHIGAN

Lear-Romec Div., Elyria, Ohio
LearCal Div., Los Angeles, California

Electro-mechanical actuators, electronic temperature and positioning controls, servo systems • Pumps and radar pressurization equipment • Autopilots and gyro instruments • Electric motors • Aircraft radio

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GILFILLAN pioneered, developed and now mass-produces GCA Radar

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GILFILLAN GCA Radar is proven and in operation at both U.S. civil and military airports

Only

GILFILLAN GCA Radar is standard equipment among the 24 nations of the free world

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Los Angeles

GCA

Miniature Precision Ball Bearings

are used in aviation instruments, railway and marine indicating and recording devices, cameras, medical appliances, and many other fine mechanisms.

RADIAL SERIES

Deep-groove, full-race, radial-type bearings of heavy duty design, combining large load capacity with a minimum of friction.

Bearing No.		100	2	2½	★ 3	★▼4	★▼5
O. D.	(D)	.100"	.1250"	.15625"	.1875"	.2500"	.3125"
Bore	(B)	.0250"	.0400"	.04687"	.0550"	.07812"	.09375"
Width	(W)	.03125"	.04687"	.0625"	.07812"	.09375"	.10937"
Balls		7-.65 mm	8-1/32"	10-1/32"	8-3/64"	8-1/16"	10-1/16"
Load Rating (lbs.) 5000 rpm		1.5	2.1	3.5	4.6	8.0	9.2

TOLERANCES (D) + .0000" − .0002" (B) + .0000" − .0002" (W) + .000" − .001"
Eccentricity .0002" Max.

SUPER-LIGHT RADIAL SERIES

To accommodate larger shafts than above, while retaining minimum o.d. dimensions for utmost reduction of bearing space requirements.

Bearing No.		★ 418	★▼518	★ 5532	★ 5632	★ 5732	★ 614
O. D.	(D)	.2500"	.3125"	.3125"	.3125"	.3125"	.3750"
Bore	(B)	.1250"	.1250 "	.15625"	.1875"	.21875"	.2500"
Width	(W)	.09375"	.10937"	.10937"	.10937"	.10937"	.1250"
Balls		15-1 mm	11-1/16"	15-3/64"	16-3/64"	26-1/32"	25-1 mm
Load Rating (lbs.) 5000 rpm		4.9	9.5	7.2	7.2	4.2	6.5

TOLERANCES SAME AS STANDARD RADIAL SERIES

CONRAD SERIES

For applications of medium speed, light load, low torque and minimum clearances. Stainless steel snap retainers.

Bearing No.		★ 4C	★ 5C	★ 518C	★ 5632C
O. D.	(D)	.2500"	.3125"	.3125"	.3125"
Bore	(B)	.07812"	.09375"	.1250"	.1875"
Width	(W)	.09375"	.10937"	10937"	10937"
Balls		5-1/16"	5-1/16"	6-1/16"	7-3/64"
Load Rating (lbs.) 1000 rpm		11.5	11.5	13.2	8.2

TOLERANCES SAME AS STANDARD RADIAL SERIES —
ABOVE BEARINGS ALSO AVAILABLE WITH FLANGE OR GROOVE

SEPARABLE MAGNETO SERIES

Designed for certain oscillating movements, combining radial load and single direction thrust. Consult us concerning application of these bearings.

Bearing No.		★ 3M	★ 4M	★ 5M	★ 518M
O. D.	(D)	.1875"	.2500"	.3125"	.3125"
Bore	(B)	.0550"	.07812"	.09375"	.1250"
Width	(W)	.07812"	.09375"	.10937"	.10937"
Balls*		5-3/64"	5-1/16"	7-1/16"	8-1/16"
Load Rating (lbs.) 5000 rpm		3.8	6.6	8.2	9.5

*Subject to variations with non-metallic retainers.
TOLERANCES SAME AS STANDARD RADIAL SERIES

PIVOT SERIES

A heavy duty series to withstand heavy loads and shock in applications where jewel bearings do not have sufficient strength. Self-aligning within 4 degrees.

Bearing No.		1.5P	3P	★ 4P	★▼5P	★▼7½P	★▼10P
O. D.	(D)	.0590"	.1181"	1575"	.1968"	.2953"	.3937"
Width	(W)	.0472"	.0709"	.0945"	.1181"	.1772"	.2362"
Shaft	(S) Min.	.020"	.030"	.040"	050"	.075"	.100"
Balls		4-1/64"	4-1/32"	4-3/64"	4-1/16"	4-3/32"	4-1/8"
Load Rating R & T 1000 rpm		.55	2.7	6.0	10.8	25.0	41.0

TOLERANCES (D) + .0000" − .0002" (W) ± .002"
ECCENTRICITY DEPENDS ON SHAFT, RACEWAY AND O.D. CONCENTRIC WITHIN .0004"

ANGULAR CONTACT SERIES

Has self-retaining feature eliminating need for retainer or cap. For radial and thrust loads. Greater load capacity than pivot series. For cone or straight through shaft.

Bearing No.		★ 2A	★ 3A	★▼4A	★▼6A	6A7B
O. D	(O)	.1250"	.1875"	.2500"	.3750"	.3750"
Width	(W)	.04687"	.0700"	.09375"	.14062'	.1406"
Shaft (SE) Max. (without cone)		.032"	.048"	.063"	.094"	.1250"
P Shaft	(S) Min.	.042"	.062"	.0850"	.124"	.150"
Cone	(C) Max.	60°	60°	60°	60°	60°

TOLERANCES (D) + .0000" − .0002" (W) + .000" − .002" Eccentricity same as for Pivot Series. Consult Engineering Department for other angles and speeds.

Prefixes indicate material: Standard [no prefix] is chrome bearing steel. [SAE 52100]. ★ Indicates also available in 440 stainless. Order with prefix "SS". ▼ Indicates also available in 25 beryllium. Order with prefix "NM".

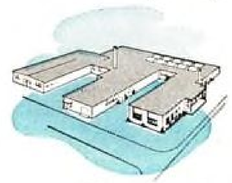
MPB ball bearings

are available in ten series and more than 120 different types and sizes which normally can be supplied from stock. The variety of MPB bearings provides a ready solution to some of the most difficult miniaturization projects.

Manufacturers and users of small precision mechanisms can now enjoy all the well known advantages of anti-friction bearings (accurate alignment, long wear, freedom from attention) universally accepted in larger quality equipment.

For more than 20 years MPB bearings have contributed to the operation of precision mechanisms. A pioneer in designs and dimensions now being internationally standardized, MPB has also originated many precision manufacturing techniques. All MPB bearings are ground, honed, lapped and/or burnished in accordance with highest quality practice for optimum operating characteristics.

Complete specifications are given in our new engineering bulletin #52 B. Your copy will be mailed immediately.



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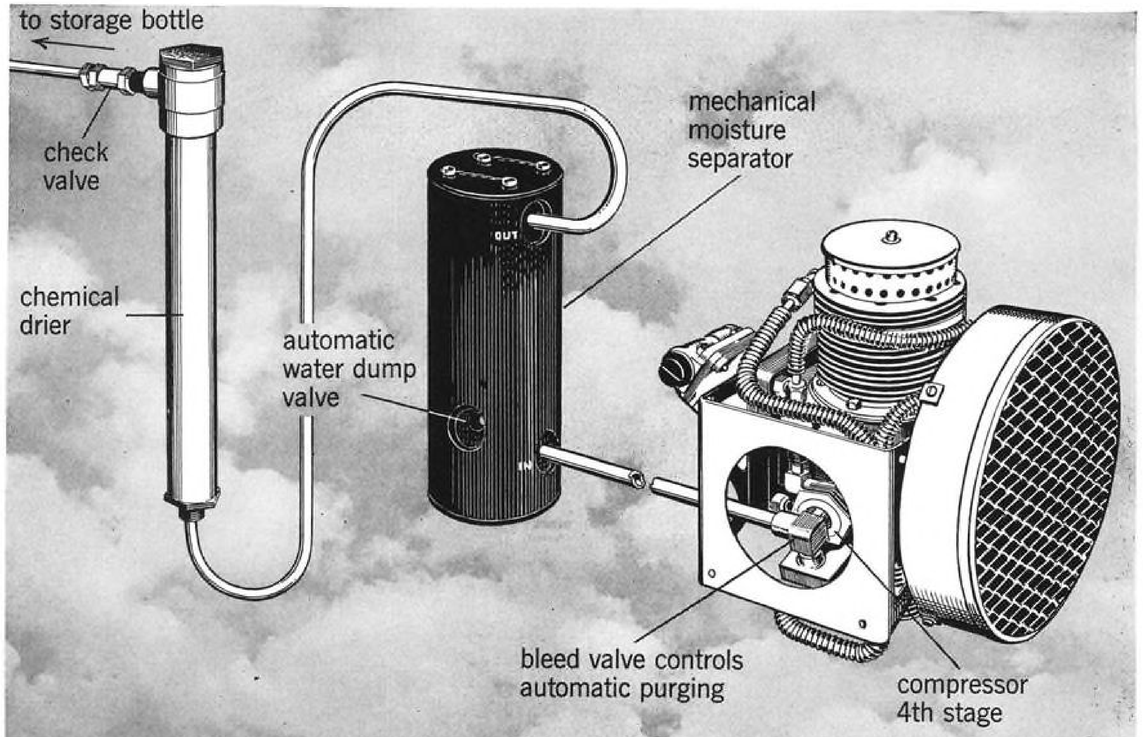
Incorporated Keene, New Hampshire

"Pioneer Precisionists to the World's Foremost Instrument Manufacturers"

save space weight friction



this *KIDDE* dehydration equipment makes pneumatics work at 50,000 feet

Aircraft pneumatics systems don't *have* to freeze—even at 50,000 feet.

Kidde dehydration equipment, through processes of separation and drying, delivers compressed air to the storage bottles with a free air dew point of at least minus 65° F. Saturated air going into the compressor is 99.6% dry when it reaches the storage bottles. The accumulated moisture is released by automatic dump valves. When this happens the entire system from compressor to check valve is purged.

This special *Kidde* dehydration equipment, coupled with the new lightweight *Kidde* four-stage compressor, gives you a "workhorse" pneumatics system even at altitudes of 50,000 feet and through a temperature range of minus 65° F to 160° F.

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Kidde

The word "Kidde" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc. and its associated companies.

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We have prepared an illustrated booklet outlining the Collins Flight System and we will be pleased to send you one on request.

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on the assembly line of the Boeing Airplane Company, Wichita Division, Wichita, Kansas

Capable of carrying a bomb load of more than ten tons, the Boeing B-47 Stratojet Bomber is designed to do the job of the B-29, but with a crew of three instead of thirteen and at one-third the time. The massive swept-wing, six-jet plane is capable of high speed, long range flights. 52,000 parts go into the B-47, exclusive of rivets, bolts and engine components.

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When it comes to selecting an anti-friction bearing, the best buy is the one that best suits your specific application. Many manufacturers have found that for high radial capacity, light weight or compact size, the Torrington Needle Bearing cannot be equalled at any price.

They have found, too, that Needle Bearings provide dollars-and-cents savings in assembly, lubrication and maintenance. All this, plus the initial low cost of Needle Bearings, makes them a really outstanding value.

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Needle • Spherical Roller • Tapered Roller • Straight Roller • Ball • Needle Rollers

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You are invited to write regarding positions in new, long-range projects at Northrop Aircraft, Inc. Exceptional opportunities now exist to join the engineering and scientific staff headed by John K. Northrop. If qualified, you may select important developmental work, or equally vital production engineering.

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Pioneer Builders of Night and All-weather Fighters

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ELECTRO TEC

PRECISION-MINIATURE

slip ring assemblies

AND COMMUTATORS

offer all these advantages:

EXCLUSIVE* *ELECTRO TEC* TECHNIQUES

insure closer tolerances, absolute uniformity, and the ultimate in miniaturization

Electro Tec units are the product of an exclusive manufacturing technique that results in accuracy unattainable by conventional fabricating methods. In this process a plastic is moulded around the wire leads. Accurate machining reduces this blank to the proper shape, complete with grooves. Hard silver is deposited into the grooves by electroplating to produce the required rings. Final machining insures concentricity and dimensional accuracy. The result is one-piece, unitized construction with conducting rings of 60 to 70 Brinell hardness.

Diameters of these assemblies range from .045" to 24" cylindrical or flat. Cross-sections may range from .005" to .060" or more. Rings are polished to a jewel-like finish and can be held to 4 micro-inches or better. Even the smallest sizes withstand a 1000 V.A.C. breakdown test. Most types easily withstand rotational speeds up to 12000 rpm.

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- ONE PIECE, UNITIZED CONSTRUCTION
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- DIAMETERS FROM .045" TO 24.0"
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MIDWESTERN HYDRAULIC SERVOVALVE

Only four watts of input power are required for precise control of ten horsepower. The servovalve will operate at pressures ranging from 200 to 3000 psi, delivering from ¼ to 10 hp to the load at those respective pressures. By utilizing Midwestern's versatile electronic servoamplifier with this servovalve, a complete servosystem can quickly be put into operation. Write for complete specifications.

- HIGH PERFORMANCE . . . Servosystem natural frequencies up to 100 cps are feasible.
- DEPENDABLE . . . The servovalve operates on unfiltered oil.
- NO EXTERNAL LEAKAGE . . . A small, separate drain line returns slight leakage to the sump.
- BALANCED DESIGN . . . The symmetrical twin-piston design assures smooth operation under adverse vibration conditions.
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This Pratt & Whitney Jig Borer used in the manufacture of Wilcox communication equipment has a resettable tolerance of ± 1/10,000 inch.

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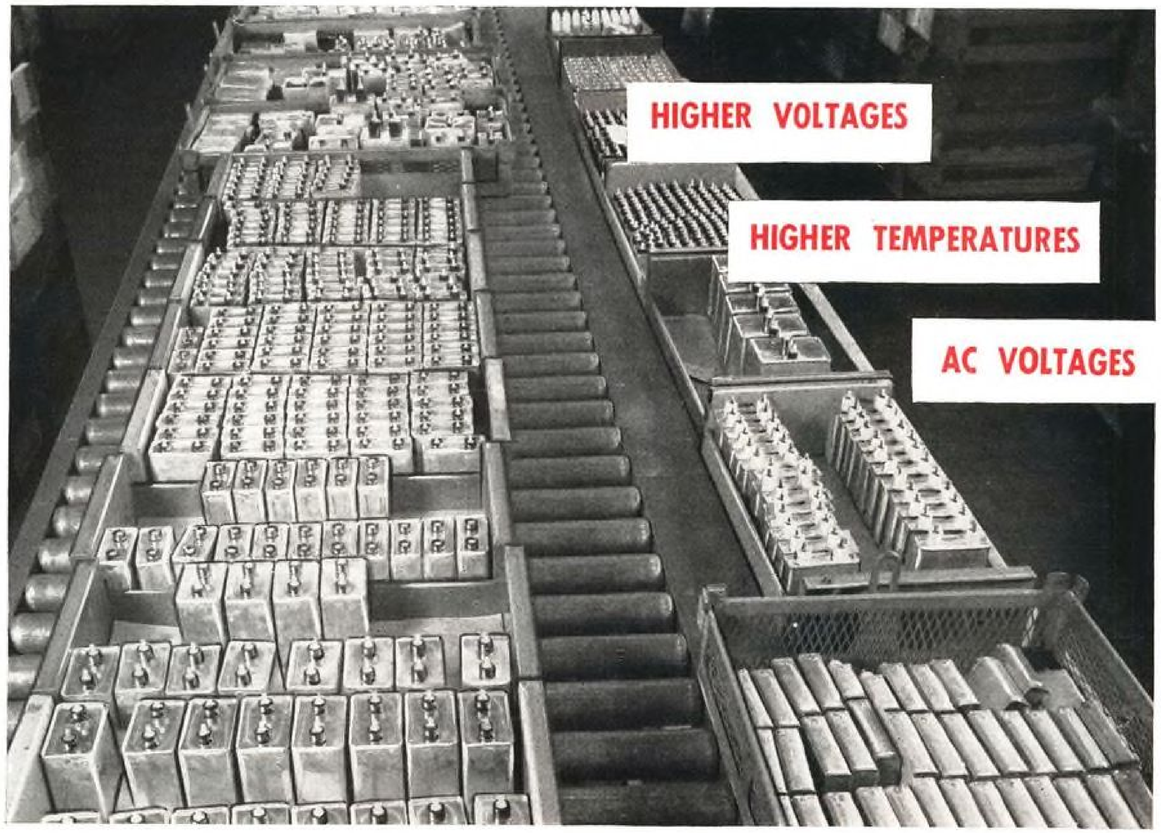
means dependable communications



General Electric can show you how to make wider use of JAN-C-25 capacitors

From years of experience in manufacturing paper-dielectric capacitors, General Electric can show you how to make wider use of your JAN capacitors.

These capacitors are used in thousands of applications—primarily d-c at rated voltages and temperatures. However, most JAN units can be operated at other voltages and under widely varying conditions.

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Higher voltages—1380 v. d-c at 85 C for 500 hours.
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General Electric has similar data for most of its JAN units, showing how each may be operated under a variety of conditions. For information on how these standard G-E capacitors may be applied in your circuits, consult your Apparatus Sales Office, or write to Specialty Capacitor Sales, General Electric Company, Hudson Falls, N.Y.

GENERAL ELECTRIC

407-307

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The Swedlow facilities bring to the production lines of American industry 10 years of specialized experience in precision engineering and production of acrylic and laminated fiberglas parts.

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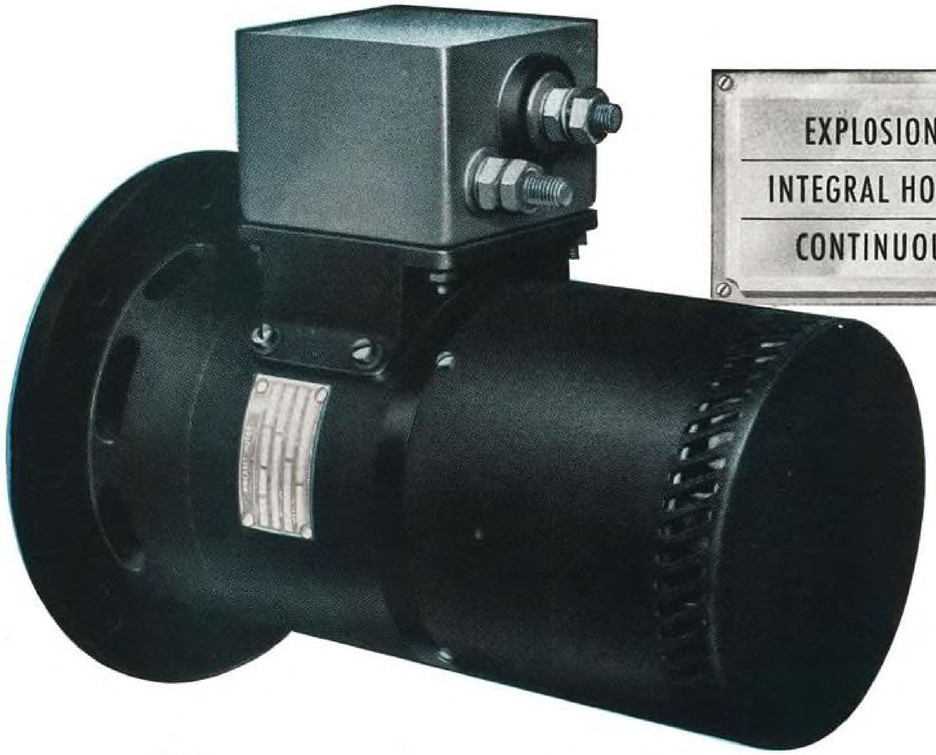

More motor per pound

in this completely new design

Now you can have a lightweight, continuous-duty, explosion-proof motor. This new construction in integral horsepower ratings represents another Westinghouse first in the Aviation Industry.

This revolutionary d-c motor is completely self-contained. No ducts or other external ventilation equipment is required. Special flame arrester design provides complete protection and permits continuous-duty operation . . . with only a slight increase in weight over corresponding open, self-ventilated motors.

These direct drive motors cover a range from 1 to 4 horsepower and weigh from 20 to 28 pounds. They are available with standard AND mounting pads or with special mountings. Radio noise filters are installed. This new design has been explosion-proof tested according to USAF specifications.

Look into this new motor. Call your nearest Westinghouse Office or write Westinghouse Electric Corporation, Aircraft Department, Lima, O.

J-03004

YOU CAN BE SURE.. IF IT'S
Westinghouse
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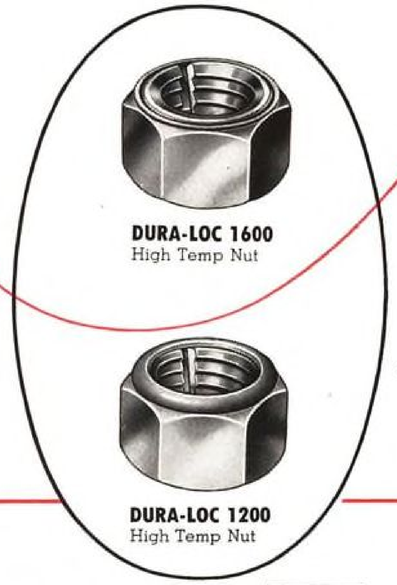
SPECIFY **Dura-Loc**
for
HIGH TEMPERATURE LOCKNUT PROBLEMS

1600°
1200°
1000°
800°

Wherever the need for a specialized fastener existed, Delron pioneering research and ingenuity met the challenge. As a result, Delron products proved to be an outstanding contribution to the aircraft industry where high temperature and severe vibration present a hazard to sustained performance of various assemblies. Special design characteristics of Delron products make for easy installation and removal in difficult locations . . . saving countless productive man-hours. Further savings are provided by the unlimited re-usability of Delron locknuts . . . without impairment of locking action.

DURA-LOC 1200 and 1600 High Temp Nuts were the first self-locking nuts approved by the military and industry for temperatures up to 1200° F. and 1600° F. respectively. From a standpoint of efficiency and engineering design, Dura-Loc High Temp Nuts are the most economical to use wherever critical high temperature fastening problems must be solved.



DURA-LOC 1600
High Temp Nut

DURA-LOC 1200
High Temp Nut

DURA-LOC FEATURES

- *Conforms dimensionally with aircraft standards*
- *Positively locked when tightened*
- *Free spinning (spin on and lock . . . unlock and spin off)*
- *Lock releases upon breaking torque, permitting removal over corroded threads*
- *Resistant to severe vibration, galling and seizure*
- *Speeds maintenance—nuts usable on low and high tolerance bolts interchangeably*
- *Protects bolt or stud threads*
- *Basic pitch fit obtained through collet action of nut*

Engineering data on standard sizes available. Inquiries regarding special high temperature nut or bolt problems invited. Write or wire Engineering Research Dept.

Delron #5 Self-locking Nut. Washer faced; free-spinning installation with prevailing torque removal.

Delron High Temp Bolt. Designed especially to minimize seizure and galling.

Delron Fasco Spacer. An effective support for attachments to sandwich type structures.

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"use MICRO Precision Switches as a principle of good design"

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Aircraft designers have found their lightweight, small size, rugged construction and extreme resistance to vibration, acceleration, temperature and altitude extremes, make them ideal components for the most exacting aircraft requirements.

New special switches for aircraft are always on the drawing boards and in the experimental stages at MICRO SWITCH. Our sales engineers are fully experienced in aircraft switching problems. Call the nearest branch office today for consultation on your switching problems.

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FREEPORT, ILLINOIS

MICRO Snap-Action Switches . . . Honeywell Mercury Switches

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY


MODEL 10421


MODEL 10423
10412


MODEL 10422


MODEL 10409


MODEL 10410

ARO OXYGEN REGULATORS
Meet All Aircraft Requirements!

ARO Two-Stage Automatic Continuous-Flow Oxygen Regulators are *precision-made* to provide better performance . . . simplified servicing.

All models are variants of a basic regulator, Model 10409, and will give specified performance on inlet pressures of 50-2000 p.s.i. These models cover all currently known installation requirements. Models can be furnished with output performance according to Civil Aeronautics or Type A-11 specification.

ARO has modern facilities and years of know-how in producing high-precision aircraft products. Adequate facilities for servicing oxygen equipment are as close as your nearest phone. Write or call . . . The Aro Equipment Corporation, Bryan, Ohio.

ARO

AIRCRAFT PRODUCTS

Vacuum Pumps, Oxygen Regulators, Air and Oxygen System Accessories


MODEL 10416


MODEL 10413


MODEL 10411


MODEL 10418


MODEL 10417


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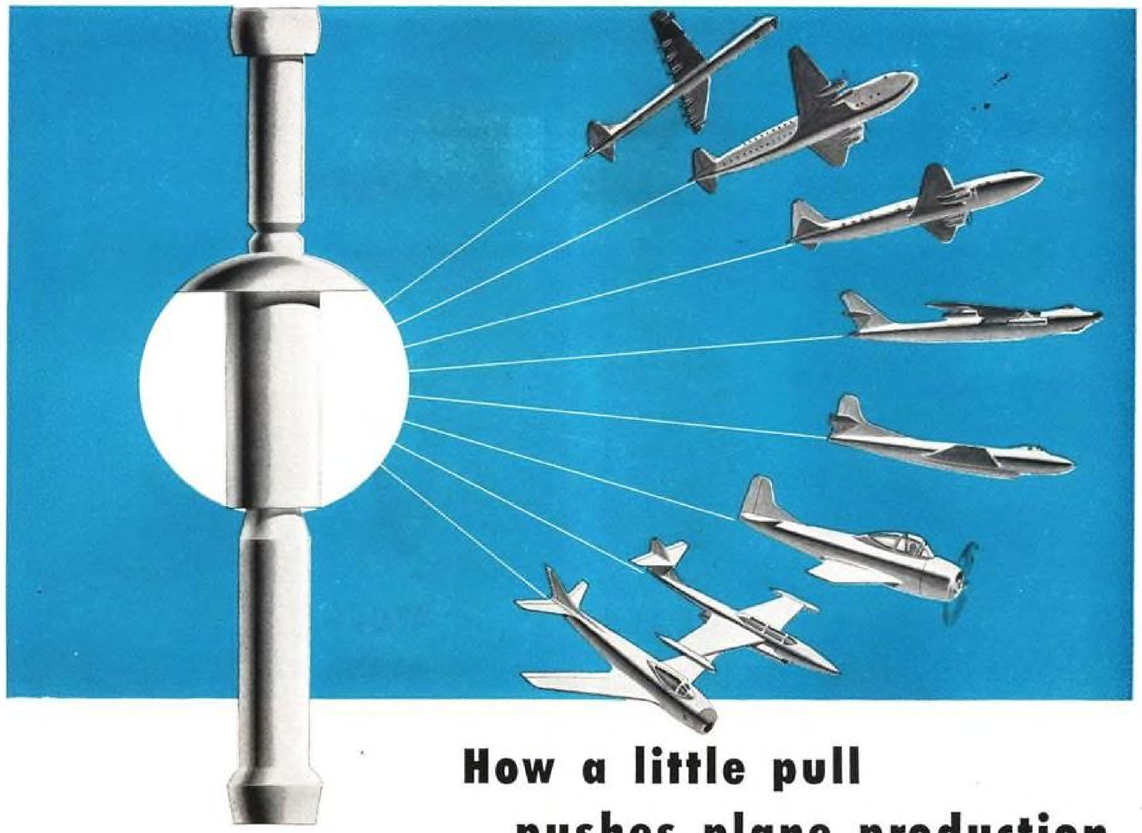
MODEL 10414


MODEL 10424


MODEL 10415



How a little pull pushes plane production

It's a pulling action that sets Cherry Blind Rivets and makes it possible for them to be installed quickly and easily from one side of the work by one man. They require no bucking—no hammering—no exploding. This is why they are standard in the aircraft industry where they help improve aircraft production in several ways. The use of Cherry Rivets reduces man hours—lowers unit costs—makes possible refinements in design, all of which are important in producing more and better military and civilian aircraft.

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Cherry Blind Rivets represent one group in the 10,000 types of fasteners manufactured by Townsend to fabricate wood, glass, plastics, fabrics, and metal products. From this wide selection, Townsend engineers are able to provide you with almost any standard cold-headed fastener or part to help speed assembly—improve your products. They will also help design special fasteners for your particular need. For information on how you can benefit from their broad experience in solving your production problems, write today.

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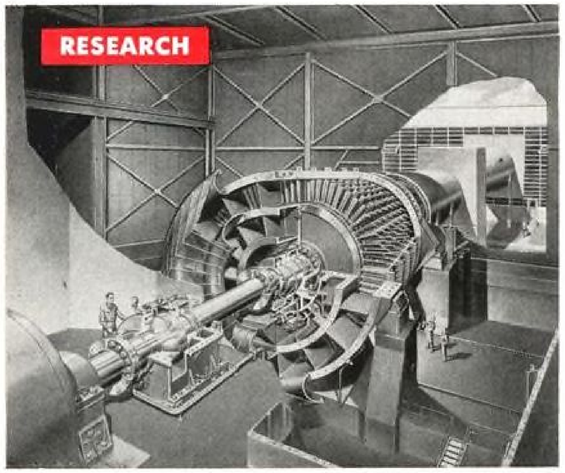
Plants: *New Brighton, Pennsylvania—Chicago, Illinois—Plymouth, Michigan—Santa Ana, California.*

PICK ANY



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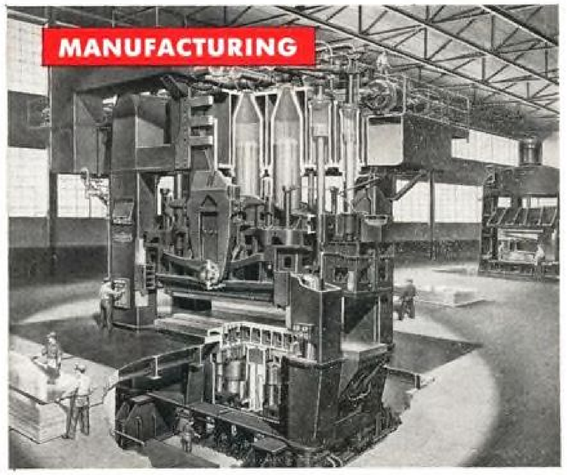

Birdsboro Hydraulic Press—largest of its kind—exerts a force of 8,000 tons to stamp out whole sections of Lockheed Constellations. Correct hydraulic and lubricating oils supplied by Socony-Vacuum.

Convair B-36's—world's largest and longest-ranging bombers—have flown 10,000 miles without refueling. Flying Red Horse products played an important part in flight-testing and developing them for the U. S. Air Force.

Twenty-one years of safe operation! That's the outstanding performance record of Colonial Airlines. Accident-free record backs up their slogan, "Safety Is No Accident." Colonial relies on Flying Red Horse products.

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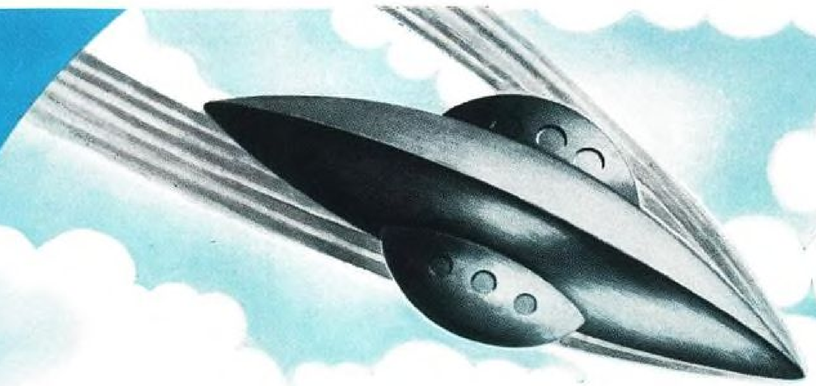

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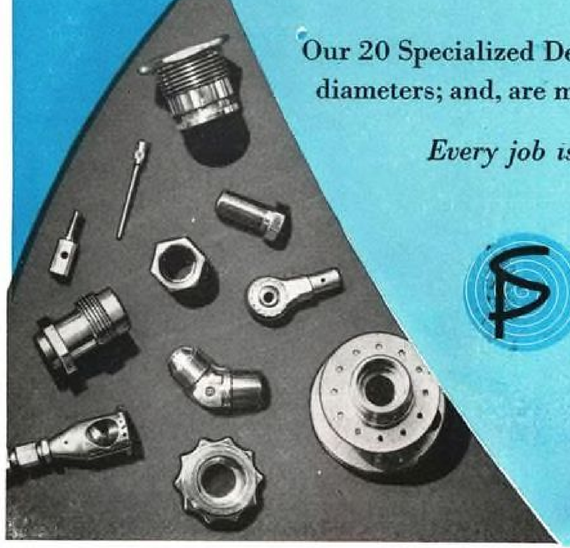

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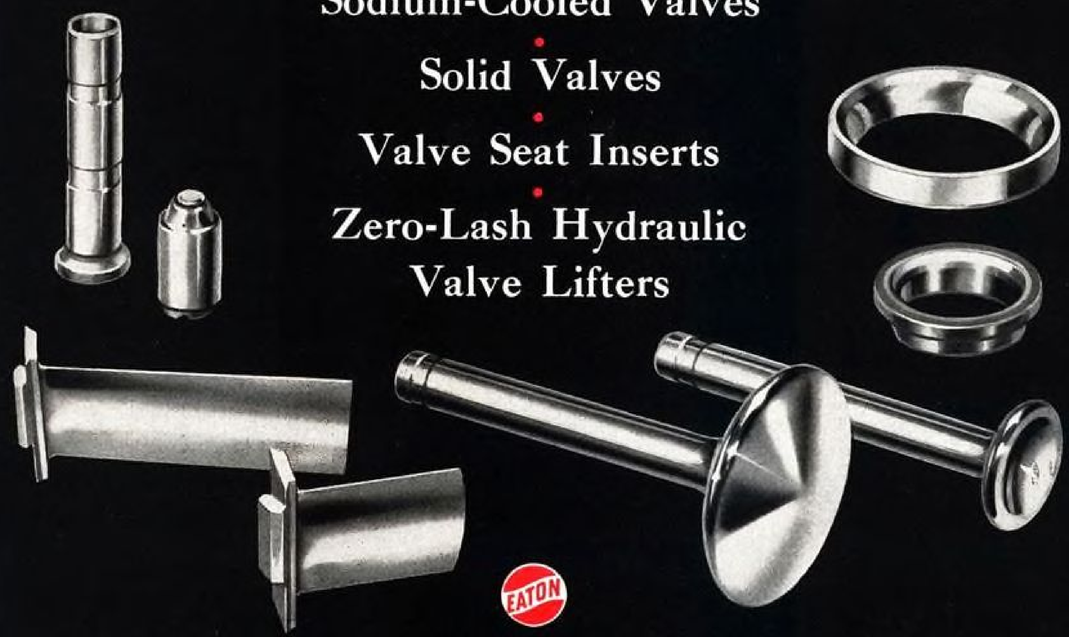

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AVIATION WEEK VOL. 57, NO. 5 AUGUST 4, 1952

Pilots Elect Officers of New Airline Union

- **ATPA seen as a legal countermove to Behncke.**
- **Sayen expected to head new organization.**

Airline pilots dissatisfied with the leadership of David L. Behncke, longtime president of the Airline Pilots Assn., were treading softly last week with plans for a separate union.

Their attitude was one of "wait and see" until they learned the result of their appeal from a Chicago court order reinstating Behncke, and request for a stay of that order (AVIATION WEEK July 28, p. 50). Behncke's answer to the petition was filed last week.

▶ **Officers Named**—Preliminary plans for the new union were going ahead, although cautiously. A new Air Transport Pilots Assn. was started by pilots representing each of the airlines. Offices of president and executive vice president (the latter to be appointed by the president) were not filled pending developments, but some officers were elected and the report was that further developments might occur later in the week.

Officers named: W. T. Babbitt, Eastern Air Lines, first vice president; Robert N. Buck, TWA International division, secretary; E. A. Cuttrell, American Airlines, treasurer, and the following regional vice presidents: S. E. Pangburn, AAL, Boston; second, Grant Leroux, Pan American World Airways, Miami; third, Mel Swanson, Northwest Airlines, Minneapolis; fourth, W. T. Betts, Braniff Airways, Dallas, and fifth, Dean Barnett, Southwest Airways, San Francisco.

▶ **Provisional Committee**—Headquarters of ATPA were to be established in New York instead of Chicago, ALPA's hometown. Clarence N. Sayen, who succeeded Behncke in the reorganization that followed Behncke's ouster a year ago, was in line for ATPA's presidency after the court dispute was resolved and if the new organization actually became active.

The ATPA officers would constitute a provisional executive committee to govern ATPA until the new group could hold its first convention and regular election.

SAYEN is new head of new union if . . .

BEHNCKE is old head of old union.

A spokesman for Behncke called ATPA an "emotional movement," and said "more conservative" pilots were coming back to ALPA. Behncke, ensconced in ALPA's Chicago headquarters, has called an ALPA convention for Dec. 8, but some of the dissenting pilots pointed out that the date is in the midst of election of a new board and they questioned whether the call would stand.

▶ **Fight Costly**—Behncke's first step after his return, the spokesman said, was to reassure the pilots, the carriers and the Mediation Board that present ALPA contracts would continue in effect. Sayen feels that the contracts are legal.

Whatever was to happen, the litigation over ALPA leadership was turning out to be expensive. Lawyers' fees already have amounted to $120,000. There were other high costs, including detectives and a court-appointed observer at $17,000 a year to see that ALPA lived up to terms of interim agreements while the case was pending. And the court decree reinstating Behncke said that in event of an appeal costs and fees would go on as long as the appeal was pending.

Way Clear for Supersonic Bomber

Official Air Force confirmation of production phase-out of the Strategic Air Command's Intercontinental Convair B-36 heavy bomber in 1954 is expected to clear the way for the company to go ahead on its next bomber development, a supersonic entry for which it already has submitted design proposals.

Although planned performance of the supersonic bomber is highly classified, official sources predict it will be more than a match for any interceptor in production during 1955-1960.

This is an interpretation of USAF Undersecretary Roswell L. Gilpatric's statement to Convair officials that "other essential work will be scheduled into the plant. The workload there, I can assure you, is certain to be substantial."

The B-36 phase-out also is expected to apply to its sweptwing eight-jet B-60 modification. Only two B-60s have been built and no more are expected to be produced. Some consideration has been given in official quarters to converting the 30-odd B-36 bombers remaining on order to B-60 configuration. But Air Force sources said that would be too costly in view of the relatively small number to be built.

Although no actual flight evaluation of the B-60 and its rival, the eight-jet Boeing B-52 Stratofortress, has been made, Air Force sources say the B-52's

Special Report on Air Materiel Command begins on page 74.

performance expectations far outweigh those of the B-60. Present performance of the B-60, these sources say, represents its ultimate. But the B-52 is only at the start of its potential. For example, greater speeds at higher altitudes are expected with installation of more powerful engines than the Pratt & Whitney J57s now fitted.

De Havilland Firm Offers Mexico Jets

(*McGraw-Hill World News*)

Mexico City—De Havilland's representative here has offered President Miguel Aleman a wide range of jet planes for the Mexican air force and commercial jets for the nation's airlines, according to reports in the capital.

Observers noted that while Mexico's air force is antiquated and has no jets, construction is being rushed on Santa Lucia field, a big military air base 30 mi. north of Mexico City, with runways suitable for jet operation. Work is expected to be finished this fall.

Aleman visited the field recently and his personal interest is believed to indicate that at least one group of jets will be added to the air force.

The firm that made the DH offer, Compania Mexicana de Aeroplanos S.A., is owned by Hector Mariscal and Aaron Saenz, Jr., both of whom belong to politically influential families. Reports are that the offer proposed either installment payments or straight barter to help Mexico acquire the planes without upsetting its budget.

Atom Engine Test Base

A $33-million facility to test the nuclear powerplant for aircraft now under development at Lockland, Ohio, by the General Electric Co. will be constructed at the National Reactor Testing Station in eastern Ohio, Atomic Energy Commission has announced.

When preliminary work in Ohio is completed, the atomic powerplant, which would open the way for almost limitless aircraft range, will be assembled at the Idaho site.

The new facility will be the fifth reactor-testing project undertaken at Idaho in the past three years.

X-2 Rocket Plane Groomed for Tests

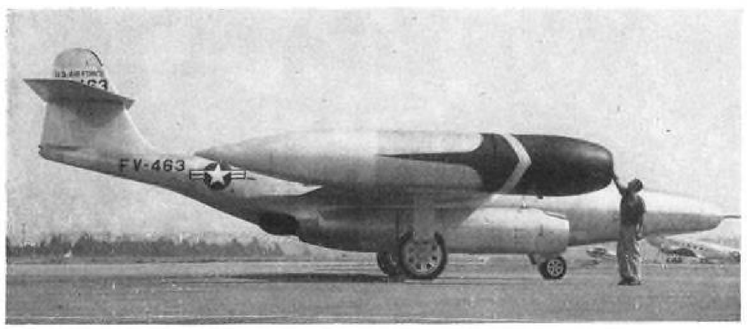
Bell Aircraft Corp.'s X-2 rocket-powered, sweptwing research plane has been delivered to Edwards AFB, Calif., where it is preparing for supersonic flight tests by Air Force and National Advisory Committee for Aeronautics.

The new rocket plane, which has a K-Monel fuselage and stainless steel wings and tail, is powered by a Curtiss Propeller division rocket engine developing 15,000 lb. thrust. Featuring a sharply sweptwing configuration in place of the straight-wing configuration of the original Bell X-1 supersonic research plane, the X-2 is expected to reach speeds above 1,500 mph. and an altitude of more than 100,000 ft.

Air Force officials said the X-2 would undergo considerable ground testing before airborne flight tests would commence. But they also pointed out that flight tests would be restricted to unpowered, free-fall glides to earth in order to prove out the complicated control system before attempting rocket powered flights.

Air Force sources predict the X-2 easily will recapture the world's unofficial speed record currently held by the Douglas-developed Navy D-558-2 Skyrocket which attained 1,238 mph. at an altitude above 78,000 ft.

The Bell X-1, which pioneered supersonic flight, reached an unofficial speed record quoted only as "hundreds of miles per hour faster than sound."



NEW STINGER FOR SCORPION

This Northrop F-89 Scorpion has new type tiptanks which not only serve as auxiliary fuel containers but also house a number of proximity-fused air-to-air rockets. Small panels in the nose of each tank open to allow the rockets to exit. Rocket exhaust leaves via openings situated at approximately one-third the tanks' length.

More Time

- **Answer to proposal for production shift delayed.**
- **Services now have until September to reply.**

Recommendations by a high official of the Aircraft Production Board for a complete shift in the U. S. combat plane production program at the expense of some existing types have been tabled until mid-September.

Military members of APB were given that much extension of the time, originally set for Aug. 6, by which they are to reply to proposals by W. L. Campbell, acting chairman of the board (AVIATION WEEK July 28, p. 12). Campbell granted the extension.

Campbell's proposals to the Air Force and Navy were both condemned and lauded. Some top military and industry officials contended his recommendations would sabotage the production program, while others as highly placed said it was time the industry and military settled down and concentrated on a more realistic procurement schedule than at present.

Campbell's action was clarified by the Defense Production Administration, of which APB is a part. DPA Administrator Henry T. Fowler wrote Admiral Dewitt C. Ramsey, president of the Aircraft Industries Assn., that Campbell's proposals were "questions raised by one member of the board for comment by other members representing the military services."

He described their presentation to APB by its acting chairman as "a discussion of numerous points contained in a staff paper" prepared by Campbell.

Details of what Fowler called the "questions raised" were first disclosed in AVIATION WEEK July 28.

Despite Fowler's letter to Ramsey prior to that date, status of the Campbell recommendations has been a knotty point to the industry and particularly the Air Force and Navy. APB includes top personnel of AF and Navy charged with production and procurement of U. S. air power, but the military services have been careful to point out that the recommendations came only from Campbell and did not have the status of an official APB report, despite Campbell's executive authority.

Both AF and Navy were continuing work, however, on their rebuttal to Campbell's proposals, and observers speculated that time for their reply was extended to permit exhaustive study of the whole production problem. In the meantime, no action on the recommendations was expected.

New Eastern Route Interests Mexicans

(*McGraw-Hill World News*)

Mexico City—Speculation and curiosity here greeted the news that Eastern Air Lines has been granted its long-sought route between New Orleans and Mexico City.

Ostensibly the Mexican government granted Eastern the route, after previous refusals, because of the tourist business it would bring.

But some observers see political maneuvering behind the move. They say previous attempts to grant Eastern's request were frustrated by high officials of competing lines who at one time carried the fight all the way to the Mexican presidency before defeating it.

Eastern has announced it will begin operation of the new route, which had been approved by CAB six years ago, as soon as possible. It built a headquarters building several years ago on Paseo de la Reforma and has kept a staff here ever since, so it is believed the new daily flights can begin shortly. An EAL spokesman says that operations await only naming of a reciprocal Mexican carrier.

► **Big Question**—Eddie Rickenbacker, Eastern president, has said the route will be opened as soon as further details are straightened out on the United States end.

One big question raised here is whether Eastern will offer a one-stop service, no change of plane, from Mexico to New York. This would cut sharply into the business previously split between American Airlines and Pan American.

If Eastern offers such service, and this appears likely, it will have the most direct route between New York and Mexico, since Pan American transfers passengers to Eastern at Houston for New York and American flies via Dallas. Thus it is believed Eastern could cut heavily into business originating east of the Mississippi, but not traffic from the West Coast and the Middle West.

Another argument is that tourist business may increase enough that no line will suffer a loss.

Some Red Tape Cut On Bids for Mail

Legislation removing the requirement for notarization of statements on bids for transporting mail including air mail has been signed by the President. Only signed statements will be necessary.

The Postmaster General requested the legislation, pointing out that the change will eliminate red tape but will not affect liability.

INDUSTRY OBSERVER

► High reliability factor for the Cessna spring steel landing gear is shown by the fact the company has had only nine failures of the gear out of a total of 23,000 individual struts in service. Cessna stamps a serial number on each of the vanadium steel legs and keeps a heat treat record on each for checking in case of trouble.

► **Most likely small jet engine prospect for the TX jet trainer competition, from a standpoint of weight, power and other factors, is the Barbore, which Continental Motors will build under license from the French Turbomeca Company.**

► One problem Boeing has encountered with its B-47 Stratojet bombers is in making various doors fit under varying conditions of temperature etc. encountered in the high altitudes and in the various attitudes the wing takes in loaded and unloaded condition. Solution to this problem involves a warping design for the doors so they are straightened under tension to insure a snug fit.

► **Lear Inc. is sizing up airline interest in transport-type radar and may enter the field. Lear is offering to finance two-thirds of initial radar development costs if airlines will provide balance. Negotiations between another avionics manufacturer and a major airline interested in buying radar are reportedly stymied over whether airline or manufacturer should foot the initial costs.**

► Some West Coast sources say Lockheed's F-94C Starfire interceptor still has its problems as far as the nose arrangement for rocket firing is concerned: The rockets discharge so much noncombustible gas in the immediate vicinity of the engine intakes that the J48 engine has a tendency to flameout; such a dense smoke trail is created by the rockets that the pilot virtually flies blind until he can get out of the wake of the missiles.

► **Howard Hughes has leased the prototype Canadian Avro Jetliner for specialized high speed aircraft electronics development tests. So far the plane is on short term lease with extension options. Hughes Aircraft officials say the test program is not sufficiently advanced to determine whether the Jetliner will be suitable for long-range tests. Rumors that Hughes might seek license for Avro production were scotched by the company. Officials say the XH-17 helicopter is the last of its aircraft ventures, that the company will concentrate hereafter on electronics manufacture.**

► A military transport version of the Bristol Britannia is on the drawing boards, along with sketches of a Vickers Valiant jet transport. And it now appears certain the British Air Ministry will place a small order for Blackburn & General GAL 60 Mark II freighters.

► **Hawker Siddeley Hunter II prototype, with about 7 deg. more sweep in wing than its predecessor, is powered with Sapphires. Hawker Siddeley hopes to make the Sapphire standard in the Hunter series, but the first to go into service probably will be powered by Avons.**

► Future plans of the Piasecki Helicopter Corp. include two new versions of the giant H-16: the XH-16A powered by a gas turbine engine and another proposal which would make a 60-passenger transport out of the big copter. Piasecki also has schemes for multi-engined versions of the HUP and H-21 which could be fitted in at the end of current production runs of both copters.

► **Russian night-flying activity in the East German zone has increased considerably in recent days, according to German sources. Both MiG-15 two-seaters and the twin-jet Il-26 in a new version have been observed on night missions. The Il-26 night-fighter model now mounts the radome in the solid fuselage nose and carries a pair of cannon on either side of the radome.**

NEWS DIGEST

Domestic

"Flying saucer" reports are being received by USAF at the rate of 100 monthly and all are being investigated. Recent flurry of "radar sightings" is attributed to radar's well-known habit of getting responses from rain, birds, weather fronts and other natural phenomena. Only about one-fifth of reports are from "credible" observers, says USAF, and it keeps being concerned about them.

Newly appointed CAA Assistant Administrator Samuel A. Kemp will supervise administration and management operations. He has been with CAA 17 years, serving as Assistant Regional Administrator, Atlanta, Ga., from 1946 to 1949 and as Deputy Regional Administrator, Kansas City, Kans., since then.

Frank F. Rowell, Sr., president of Guardian Electric Mfg. Co., died July 20, at his summer home in Lakewood, Crystal Lake, Ill., at the age of 75.

Colonial and Eastern Air Lines jointly filed an application with Civil Aeronautics Board for approval of merger agreement under which assets of Colonial would be transferred to EAL through exchange of two shares of Eastern stock for three Colonial shares. Colonial stockholders will meet next month to pass on the agreement.

U. S. exports of civil aircraft weighing 6,000 lb. or less totaled 33 units during June. The planes, delivered by five firms, were valued at $178,838. This brings six-month export total to 179 small planes valued at $1,326,128.

New flight patterns have been established at Westchester County Airport following complaints by nearby residents.

Boeing Airplane Co. employment at Seattle and Renton, Wash., plants has reached postwar peak of 30,000 and is scheduled to attain 30,700 mark by end of this month.

Richard W. Darrow, director of public relations and advertising for Glenn L. Martin Co., has joined Hill & Knowlton, Inc., public relations firm, as a vice president. Albert E. Smyser, formerly of AVIATION WEEK and more recently Darrow's assistant, is new Martin public relations manager.

Herbert O. Fisher, previously executive director of Corporation Aircraft Owners Assn., Washington, D. C., and earlier with Curtiss-Wright Corp. in engineering, flight test, public relations and sales, has joined Port of New York Authority as chief of the Aviation Development division of the Aviation department.

Passenger was blown out of PAA Boeing Stratocruiser when cabin door opened while plane was flying at about 12,000 ft. over the ocean off southern Brazil on July 27. Search planes were unable to locate the body. Plane had taken off from Rio de Janeiro and was on its way to Montevideo, Uruguay.

Northrop F-89 Scorpion all-weather interceptors have been assigned to Eastern Air Defense Force, at Griffiss AFB, Rome, N. Y. and Presque Isle AFB, Me.

Interline clearing house handled $30,104,270 in airline transactions during June, a 28.7% increase over the same month in 1951.

Financial

Northwest Airlines reports net profit of $436,000 in June after provision for taxes. Total operating revenues during the month were $5,382,060. Due to fuel curtailment and spring flood, NWA ended first half of this year with net loss of $524,946 after taxes.

United Air Lines shows net earnings of $3,782,565, after taxes for the first six months of 1952, on operating revenues of $72,785,651.

Aeroquip Corp., Jackson, Mich., notes net profits of $708,165 on sales of $15,545,946 for the nine months ended June 30.

International

USAF-Europe placed about $100 million in contracts abroad during the fiscal year ended June 30. Total offshore procurement contracts placed by U.S. armed forces in Europe during the period was approximately $684 million.

Tropic Airways C-47 successfully ditched into the Mediterranean last week when one engine failed. All 29 passengers and four crew members were rescued.

Canadair Ltd., Montreal, has cancelled Ford Motor Co. of Canada's contract to make wings for T-33 jet trainer, reportedly because of labor difficulties in the Ford plant.

Increased Titanium Production Okayed

Stepup in U.S. titanium production facilities was authorized last week in an agreement between Defense Materials Procurement Agency and E. I. du Pont de Nemours and Co., calling for production of an additional 13,500 short tons of titanium sponge by du Pont facilities at Newport and Edgemoor, Del. The production will be three times the company's present production capacity (AVIATION WEEK July 14, p. 13).

DMPA Administrator Jess Larson said the government was advancing to du Pont up to $14.7 million for expansion of its facilities, to be repaid with interest as salable titanium sponge is produced from the additional facilities.

In the event improved production methods may obsolete the production facilities provided for in the agreement, the government has agreed to take possession of the obsolescent facilities, and waive repayment of their original cost, less depreciation and amortization.

Expectations are that more economical methods for processing titanium ore into metal will be developed, but Larson pointed out that the defense need for more titanium was urgent and could not wait for such processes to be perfected.

DMPA has a similar agreement already with Titanium Metals Corp. of America, Henderson, Nevada, for production of 15,000 tons of titanium sponge over a five-year period. Only pilot-plant quantities of titanium were produced in this country before Korea, but utility of the metal for aircraft engines, tanks, ships, armor plate and other military equipment has boosted its requirements high above the small supply now available.

Lycoming Developing Turboprop Engine

Lycoming-Spencer division of Avco Mfg. Corp., has entered the aircraft gas turbine engine field with award of a contract by USAF for a turboprop powerplant. No details of the new engine being developed by the Williamsport, Pa., maker of light and medium aircraft powerplants, were given.

Work on the new project is being directed by Dr. Anselm Franz, head of Junkers' aircraft engine development division during World War II where he had charge of the Jumo 004 turbojet engine that powered the ME-262 twin-jet fighter and other German jet planes. Prior to his present position Dr. Franz was with USAF as a consultant on jet engines at Wright-Patterson AFB, Dayton, O.

Money to Spend: $22.9 Billion—and AMC Will Spend 80% of It

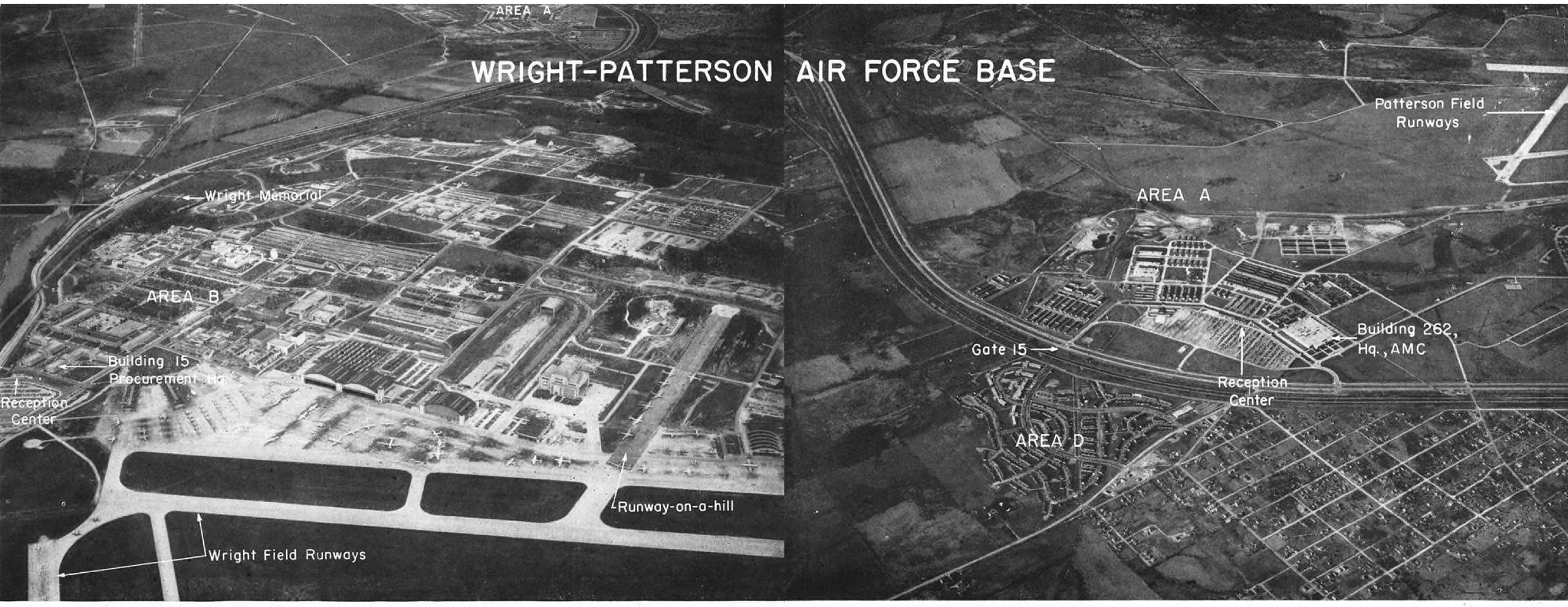
AMC will have the job of spending about 80% of Air Force's record peacetime budget for fiscal 1953. AF's budget for the year, which started July 1, is $22.9 billion. Last year it was $22.7 billion. Budget highlights:

- It provides for orders for 6,410 new aircraft and for completion of financing of 1,163 of 7,431 aircraft which were ordered during the last fiscal year.
- It contemplates buildup in military personnel from 973,350 to 1,061,000.
- It provides for a sharp boost in funds for research, development and guided missiles.
- It continues the upward trend, since Korea, of funds for aircraft procurement.

	Fiscal 1952 Appropriations	Fiscal 1953 Appropriations
Aircraft and Related Procurement	**$11,882,800,000**	**$12,685,044,000**
Including:		
Complete aircraft	4,823,223,804	6,567,218,617
Spares and parts	4,010,584,156	3,290,204,236
Related aircraft procurement	1,914,936,640	648,811,147
Major modification and modernization of aircraft	267,034,400	118,000,000
Guided missiles	130,000,000	300,000,000
Industrial mobilization	9,380,000	3,766,000
Administration	62,424,000	72,000,000
Contract liquidation	625,000,000	1,685,044,000
Major Procurement Other Than Aircraft	**1,775,000,000**	**900,000,000**
Including:		
Electronics and communications equipment	422,901,799	400,000,000*
Training equipment	139,361,139	60,000,000*
Acquisition and Construction of Real Property (to liquidate contracts)	**85,000,000**	**45,334,770**
Maintenance and Operation	**3,208,442,000**	**3,600,000,000**
Military Personnel	**3,016,700,000**	**3,200,000,000**
Research and Development	**425,000,000****	**525,000,000**
As follows:		
Aircraft	74,227,000	74,071,000
Guided missiles	116,052,000	110,381,000
Propulsion	69,503,000	96,677,000
Electronics	54,624,792	68,697,000
Armament	35,536,000	45,507,000
Equipment	41,149,000	42,017,000
Sciences	63,884,000	64,411,000
Special projects	24,477,470	16,545,000
Laboratory operations	5,864,000	6,694,000
Reserve Personnel	**19,043,000**	**26,196,000**
Air National Guard	**87,900,000**	**106,000,000**
Contingencies	**40,600,000**	**30,787,000**
Public Works	**2,200,000,000**	**1,812,857,000**
TOTAL, AIR FORCE	**$22,740,485,000**	**$22,931,218,000**

**May be reduced because of congressional cut to $900,000,000 in over-all allocation for major procurement other than aircraft, from $1,300,000,000 asked by USAF.*

***Items under R&D add up to $485,317,262; the $425,000,000 figure in the table does not include transfers from other accounts and prior year funds available.*



This Is the Air Materiel Command

HEART OF THE U. S. AIR FORCE is the Air Materiel Command Headquarters pictured above sprawling across 7,400 acres near Dayton, Ohio. It furnishes logistics support for USAF, and for foreign forces using U. S. aircraft.

Because of the size of that job, AMC has become the world's biggest business.

AMC spends more money than any other single organization in the nation. To understand AMC, you have to understand that what it does, and how it does it is vital to all industry.

"We have become so big a business," says Lt. Gen. E. W. Rawlings, AMC commander, "that our activities affect the internal economy of the nation."

This is not merely a military man's routine assessment of how important his job is. In the case of AMC it happens to be true. It is true, because of the way AMC fits into the national economy, because of what it is doing and—most important—why it does it.

The Air Force receives the largest appropriation of any of our military services. Its total for procurement—the money it spends in industry—also is the largest: $16.5 billion in the fiscal year just ended; $12 billion in the year ending next June.

AMC spends that money. And the management of that spending makes AMC important in the national economy. It is trying to manage the spending more effectively through a sweeping reorganization.

Its success or failure can stunt or feed inflation; raise taxes or hold them at present levels; give the nation an effective defense or render it helpless.

Costs of aircraft and equipment have been jumping about 20% annually for the past two years. The aircraft program was stretched out because defense was costing so much that it endangered the national economy.

If AMC's long-range reorganization plan works it will give the country an adequate air force and a strong national economy at the same time by keeping costs down to a level the country can afford to pay.

That is the conclusion of a special staff of AVIATION WEEK which for two months talked to hundreds of people and pored over stacks of documents and files to prepare this exhaustive report on the Air Materiel Command.

It is plain now that the key to understanding AMC is to understand the reorganization by which AMC hopes to manage its spending better in the interests of the nation.

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Nature of the Reorganization

HIGH COSTS IN AIRCRAFT PRODUCTION are not inevitable, AMC believes. Planes can be made cheaper with no loss in quality by careful management control on expenditures.

Never before has the Air Force been so cost-conscious.

Two months ago, Gen. Rawlings told the annual gathering at AMC of West Point cadets: "A great many of the taxpayers simply do not believe that what is known as the 'military mind' is capable of cost-consciousness. We are going to have to prove that they are mistaken."

AMC walls are placarded with such signs as "Waste is not a science; you don't have to study it to understand it." AMC is extending the theme—drumming the same thought into Air Force contractors.

AMC's entire reorganization is directed toward "More Air Force Per Dollar." Because that is the goal as well as the guiding force, this reorganization is more than the reshuffling of jobs and people that ceaselessly goes on in government.

Cost savings stem only from better management. So, AMC's reorganization embraces a basic change in techniques and procedures such as the materiel department of the air arm never has known before. Its coat-of-arms would be a slide rule rampant on an electronic calculator.

●

BUSINESS MANAGEMENT techniques is AMC's sword in its new crusade, and education its shield.

Gen. Rawlings takes pride in the fact that among the 604 officers in the Directorate of Procurement and

—the Biggest Business in the World

Area C, Patterson Field, and Area D, Wood City (left center) lie just to the east of Areas A and B (pages 74 & 75).

Production, the average level of formal education is 17 years.

A member of the Harvard Club in Dayton comments that it probably is one of the fastest-growing clubs of its kind in the middle west. Most of the growth has occurred in the past year. Not oddly at all, that corresponds with the tenure of Gen. Rawlings as commander of AMC. He is a graduate of the Harvard School of Business Administration with a master's degree in industrial management.

AMC is frank in proselytizing skilled administrators and graduates of industrial management courses. The siren song is hard work, service to country, a chance to learn a new form of management, and pay not commensurate with industry.

Maj. Gen. William H. Tunner, deputy commander of AMC, not long ago told a meeting of the National Security Industrial Assn., "We are getting a bad reputation for picking the brains of good men . . . the habit will grow steadily worse."

What is actually happening at AMC is the developing of a new science. It is not just the adaptation of industrial management to military science. It is the bare beginnings of the science of military management.

AMC personnel and task groups from major industrial firms have threshed out new doctrines and procedures; professors of industrial management have held seminars for AMC people. Business machines by the hundreds have been installed in the labrythnine buildings of Areas A and B.

AMC officials are still open-mouthed in astonishment at the performance of these mechanical brains, and visitors are practically held in hostage until they have been shown and marveled at the electronic wizardry.

●

AN URGE FOR BETTER MANAGEMENT is at the root of all this. It starts at the top where Gen. Rawlings, dealing in a sphere he knows and understands, is making the AMC Comptroller's Office his management intelligence agency (page 116).

The Comptroller's Office distills the progress reports from AMC's many outlets and from manufacturers. This distillation is routed from AMC to the Pentagon. In this sense, the Comptroller's Office is the management intelligence service for the entire U. S. Air Force.

Management control flows inexorably from management intelligence. These controls, organized and directed by the AMC Comptroller's Office, are gradually pulling the center of all Air Force management into the Air Materiel Command.

When this is understood, it is apparent how AMC, by its influence on the remainder of the Air Force, exerts a strong effect on the national economy.

Yet, business management techniques in materiel activities originated at the Pentagon rather than at AMC. In 1947 Arthur S. Barrows, a former Sears, Roebuck official and then Undersecretary of the Air Force, installed the "buyer concept."

In simplest terms, this is the method of buying which makes one man completely responsible for a contract. This centralizes the work and speeds it up. As an example, in 18 months $17 billion was spent by only 140 buyers or contracting officers and 300 assistant buyers.

The buyer concept means fewer lines of authority. The fewer these are, the easier they are to control. But under certain circumstances, and when not bulwarked by thorough and solid management reforms, a few lines can get dangerously long.

●

Reason for the Reorganization

AMC WAS FOUNDERING in a flood of dollars before the reorganization really got underway more than a year ago. The outbreak of war in Korea touched off the reform.

That was before Gen. Rawlings took command. Even before he moved in, the urgency of reform was known. its broad principles decided. He has been the driveshaft of a revolution.

The impetus to reorganization was simply expansion. Toward the end of June, 1950 AMC was spending the last of Fiscal Year 1950's $2 billion in procurement funds. In the next year it had to spend $11 billion. In the year just closed, the figure soared to $16.5 billion.

In June, 1950, 4,000 people worked in procurement at AMC headquarters and in the field. Early this year the figure stood at 12,000.

Neither AMC nor any other organization could absorb such growth without throes. The difficulty was compounded because the AMC structure was a patchwork that had been put together through the years without a long-range plan. In its 1950 form it was incapable of smooth expansion.

Yet, the logistic heart of the Air Force had to continue pumping support to the Air Force units in the field even while the heart swelled. The initial motivation for the AMC reorganization merely was to accomplish that end.

The realization came slowly that there was a more essential reason to reorganize. Reorganization was vital for management's sake alone—and for economy. AMC had become too big to be operated as it had been in the past.

"The mission of the Air Materiel Command is primarily aerial logistics," says Gen. Tunner. "It is simply not an operation for amateurs."

A more detailed analysis of AMC's mission leads to the belief that neither is it an operation solely for business men.

●

LOGISTICS IS AN UNBUSINESSLIKE operation by its very nature. Time often is more important than dollars. A business creates national wealth. Military logistics expends it. The reason for business is profit. There is no monetary profit in military operations.

A business conforms to its own pattern, or the pattern of its competition. A military organization conforms to a pattern of politics, pressure and protocol.

AMC's difficulties in reorganization stem from attempts to apply business methods to an essentially unbusinesslike operation.

Business methods will work up to a point. And the directing brains of AMC would be the first to admit that complete business methods are impractical. But out of the attempt is emerging the new science of military management.

It will be a long time in attaining its full flowering. As changed as AMC is over a year ago (three new directorates, a complete change in high command, decentralized procurement), the reorganization is just getting underway. Even while this issue was being prepared, changes took place which revised some of the charts.

The reorganization must be a step-by-step process. Too many complicating factors make a speedy transformation impossible. As an observer digs deeper into AMC, he becomes convinced that efforts to reorganize the Air Materiel Command are compromised by geography, history and politics.

●

Geography vs. Reorganization

AMC'S LOCATION is an accident. Perhaps it would be more efficient if it were nearer the airframe complex on the west coast. Still, it is within a few hours driving time of the industrial center of America; within a few hours flying time of the political and financial centers at Washington and New York.

But in other ways its location is not so fortunate.

The Air Materiel Command headquarters occupies 1,000 buildings on 7,400 acres in a shallow valley nine miles east by north of the center of Dayton, Ohio. It is split into four areas: B, Wright Field, nearest to Dayton, and the location of the procurement offices and the laboratories of Wright Air Development Center; A, four miles farther along State Route 4, the site of the Headquarters Building, 262; C, Patterson Field and the headquarters of Wright-Patterson Air Force Base; and D, the military residential area known as Wood City.

Daily 35,000 vehicles move along Route 4 to and from Areas A, B, C and D and along the 100 miles of roads within Wright-Patterson AFB. Route 4 is a four-lane highway, divided only part of the way. The traffic and parking problem is of enormous proportions.

To reach the main entrances of the various areas, cars and busses have to use Route 4. Unimportant in itself, yet basic to an understanding of AMC's troubles with geography, is the fact that a heavy snow once immobilized the logistic heart of the United States Air Force for more than a day.

The line between Greene and Montgomery Counties slices between Areas A and B. Route 4 is classed as a military highway. Each county disclaimed responsibility for snow removal on a military highway; so did the state and the cities involved.

A series of such minor irritants can easily be compounded into a major crisis for AMC.

AMC IS THE LARGEST EMPLOYER in an 11-county area. It employs 35,000, and one-seventh of the annual payroll in the area comes from AMC.

Like all government agencies, it has been a steady employer. Materiel activities in the Dayton area now are more than 30 years old. Many employes at Wright-Patterson AFB have deep roots in Dayton. And this, also, is a factor in the future course of AMC.

Veteran employes are a source of both strength and weakness. Strength because you get loyalty and experience—even in government—from old employes; weakness because such employes are bound to be the core of resistance to a change such as decentralization which transfers employes.

Decentralization, while impelled by strategic considerations (page 285), is a guide point in the reorganization, according to AMC's managers. The reluctance of veteran employes to transfer will not stop decentralization.

But it will hinder it. It means AMC must train new people for the new locations of procurement, and suffer through the breaking-in period of the neophytes.

●

THE GEOGRAPHY OF DAYTON plays its own part in the influences always at work on AMC. An understanding of Dayton's topography leads to an understanding of another of AMC's worries.

Dayton nestles in a trough cut through the rolling hills of southern Ohio by the Miami, Stillwater and Mad rivers. In 1913 they flooded the valley with a loss of 400 lives and $100 million worth of property.

After the flood, the Miami Conservancy District was formed to build a series of dams as protection against future floods. Huffman Dam is one of the integral parts of the Conservancy project. Like a medieval stile it cuts across the fields between Areas A and B.

But AMC headquarters and Patterson Field are downstream of Huffman Dam. In case of flood stage in the rivers, Huffman's sluice gates would be opened and a goodly part of AMC drowned.

And AMC is helpless. The Miami Conservancy District is locally financed and locally controlled. The federal government has no voice, except by invitation, in what is done by the Conservancy District.

So AMC's location is not ideal for such an important component of the Air Force. The area has become congested through the years, and for greater efficiency the reorganization contemplates moving some of the activities elsewhere.

But the deep roots in the area of some key employes argue against the move.

For strategic reasons, much of AMC perhaps should be moved to a site with more suitable topography. But this would be entirely too costly and disruptive. So the reorganization has to be adapted to the present site.

AMC's location imposes limits on what the command does and how far the reorganization can go. To understand why, you have to understand some key factors in AMC history.

●

History vs. Reorganization

THE PAST IS AS POTENT AS THE PRESENT in any assessment of what AMC is today. If AMC had never been unscrambled it would not now have to be scrambled. If, through the years, activities had not been moved into WPAFB, they would not now have to be moved out.

History over-rides USAF and AMC wishes in things both small and great.

USAF wants to change the name of the base to Wright AFB. But under terms of the grant of land to the government, ownership of all of Area C reverts to the Patterson family if that name is ever dropped.

That is a petty thing, perhaps. But it is typical of the iron band history has fastened around AMC. A more important outcropping of history is the location of AMC headquarters, which now is plaguing the reorganizers.

AMC is located at Dayton because of circumstances now archaic, not because those 11½ square miles were the most suitable of all the 3 million square miles in the United States.

Simm's Station, now encompassed by Area A, was the first training ground for Army airmen. Air activities naturally flowed there in later years. McCook Field, a few miles away, was established in 1917 for experimental work for the aviation section of the Signal Corps.

Fairfield Air Depot had been set up by the Signal Corps several months earlier on 10 acres of bought land. So in the same year, procurement and supply activities started in the same area. Those beginnings determined what AMC is today.

●

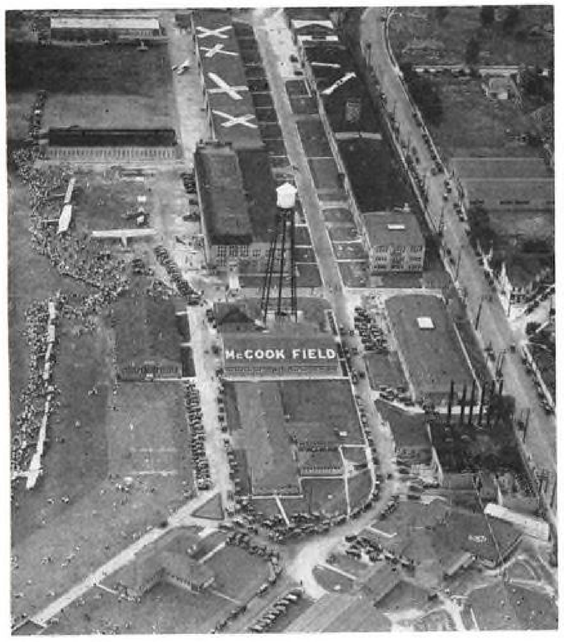
AMC'S TROUBLES WITH HISTORY began when Fairfield and McCook outgrew their quarters.

The air service of the Army was fighting for its life in the early Twenties. It flew obsolete World War I planes because it had merely thousands of dollars, not millions, for procurement—and practically nothing for installations.

The Patterson family gave the huge meadowland near Fairfield to the government for an airfield named in honor of Lt. Stuart Patterson, killed in a wartime crash. The citizens of Dayton bought 4,500 acres of land a few miles south of McCook Field and gave it to the government for a new center of air material activities which was named Wright Field.

The Army Air Corps thus had its new installations —at no cost to the government for land.

The financial undernourishment of the Twenties bent the body that now carries the Air Materiel Command. The hunger of youth left deformities that limit the pace of activities in maturity.



A jumble of buildings bordering the sod airstrip of McCook Field (above) was the center of Army air materiel activities in the Twenties. Today, the functional simplicity of the Patterson Field operations building (below) is symbolic of the change. Only direct flight activities are carried on at Patterson. Materiel functions, that have grown as the Air Force has grown, are—like the Air Force—spread over miles.

Politics vs. Reorganization

THE MILITARY MIND, by inclination, avoids what its possessor terms "political questions." But every action of the military managers of AMC is dictated by the influence of politics. But in trying to arrive at an understanding of AMC, it is necessary to use the dictionary definition of "politics."

Politics is the art or science of government, the forming and administration of public policies. AMC is a weather-vane spinning in the storms of public policy.

Policies of government have forced AMC to institute management reforms. The Comptroller's Office is an easily understood example.

The Air Force needed better production progress reports and planning analyses. Costs were rising too fast and Congress, although convinced of the worth of air power, was becoming more searching than ever before in its questioning of the Air Force budget.

In those circumstances, the Air Force needed the management controls emanating from the Comptroller's Office to protect its own interests. At the same time, it was yielding to the demands of government policy for curtailment of unnecessary expenditures.

This happy blending of Air Force aims and government policy is an outstanding but by no means isolated example of the influence of politics on AMC's reorganization.

●

PROCUREMENT POLICIES are determined by politics. That does not mean rewarding political service or friendship with government contracts.

AMC is clean. "Procurement irregularities," as they are discreetly called at AMC, involved only .01% of total procurements initiated in fiscal 1951.

But politics prevails in many ways. It is government policy to prevent racial or religious discrimination in hiring workers for government contracts; to prevent cut-rate bidding based on slave wages; to prevent excessive profits on work for the government.

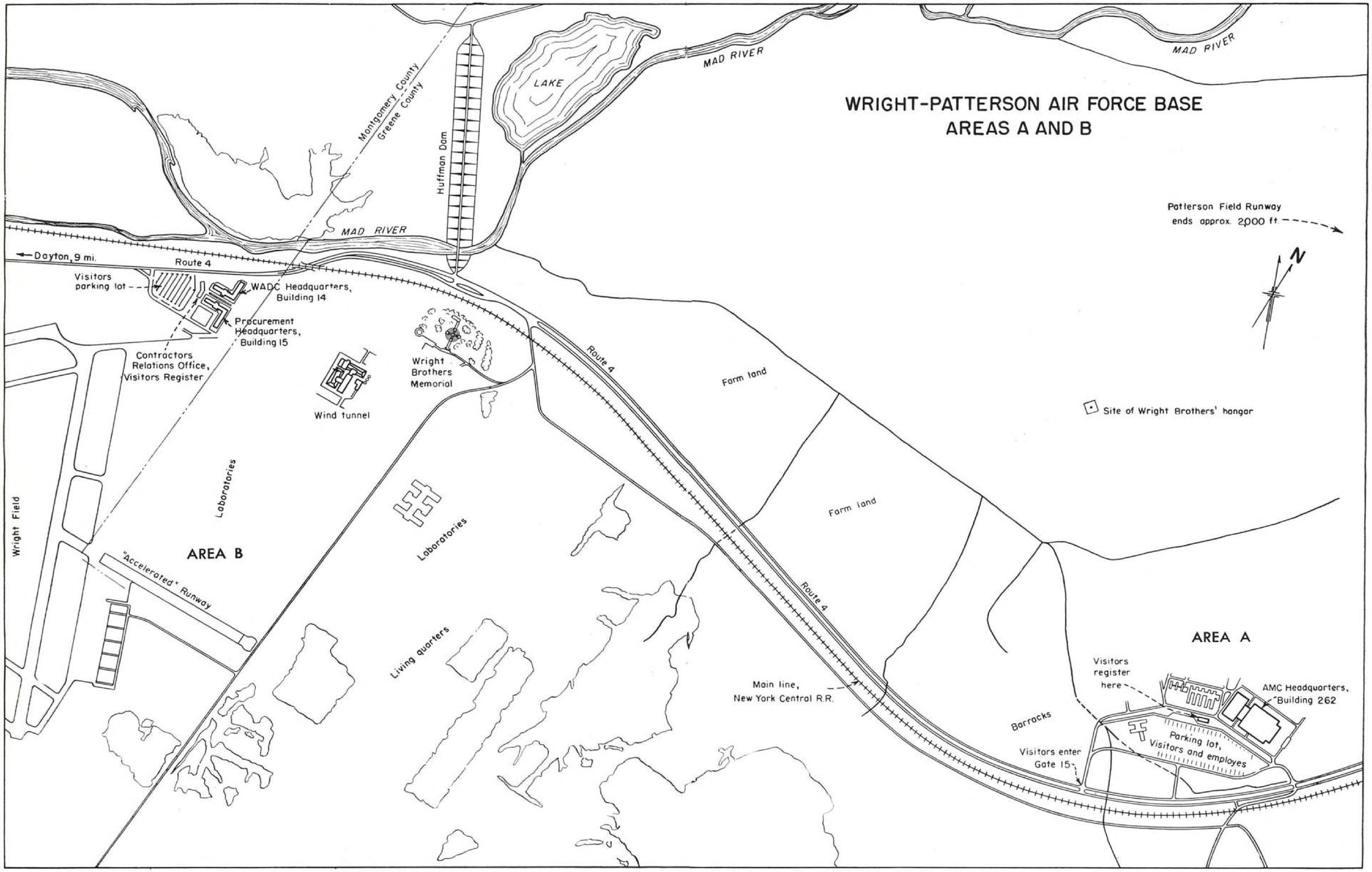
These, and many more expressions of government policy, are written into procurement laws or procurement regulations (page 289).

To understand AMC, it is necessary to understand that the managers of AMC have to proceed within the framework of these laws and regulations—all written to further the ends of public policy.

If AMC cannot persist in its toddling steps toward the new science of military management; if in the end the entire shiny skeleton of the new AMC edifice is squeezed down into a jerry-built shack, politics—the art and science of government—will be as highly suspect as the architects of the new AMC.

The managers of the Air Materiel Command know that well. To understand what goes on at AMC, you have to understand that those managers appreciate their obligation to the taxpayer. The slogan "More Air Force Per Dollar" is not a sophomoric yell; it is a sign of a maturing sense of public responsibility.—**William Kroger**

WRIGHT-PATTERSON AIR FORCE BASE
AREAS A AND B



Procurement Dictionary

• **Acceptance:** The act of an authorized agent of the government by which the government acknowledges and agrees that the supplies or services furnished by a contractor are in conformance with the contract as to quantity and quality.

• **Accessory:** A supplementary device used in conjunction with an end item, contributing to the effectiveness thereof without extending or varying the basic function.

• **Advance Payment Bond:** Bond securing performance and fulfillment of a contractual provision for the making of advance payments.

• **Advance Time:** Represents the sum of the contract negotiation time, flow time, shipping time and lead time.

• **Assembly:** A unit of an end item composed of two or more parts fastened together.

• **Attachment:** A supplementary device fastened to, or mounted on a machine, vehicle, apparatus, or other end item to vary or extend the function thereof.

• **Auxiliary Item:** One without which the parent item of plant equipment could not operate. Examples: motors for driving pumps and machine tools.

• **Bid Bond.** Bond accompanying a bid in which the bidder obligates himself in an amount stated (the penal sum).

• **Commercial Item:** An article designed for and available on the open market.

• **Construction Contract:** Any contract for the construction, alteration or repair of buildings, bridges, roads or other kinds of real property. It does not include any contract for the manufacturing, producing, furnishing, construction, alteration, repair, processing or assembling of vessels, aircraft, or other kinds of personal property, regardless of the terms of any such contract as to payment or title.

• **Contract Administrator:** The individual duly designated by appropriate authority in the military departments to administer a contract.

• **Contract Negotiation Time:** Represents the time between the initiation of a purchase request for a component until a definite contract is awarded. In those cases that require expedited action to place a contract to insure vendor's production on a basis other than a definitive contract, such portion of time after TWX or letter contract is issued; will run concurrently with the vendor's flow time until a definitive contract has been accomplished. But to insure adequate time increments for initial as well as follow-on procurement, the contract negotiation time becomes an integral part of the planning procedures.

• **Contractor-Acquired Property:** Property procured or otherwise provided by a contractor for the performance of a contract, pursuant to the terms of which title is vested in the government.

• **End Item:** A unit which, in itself, accomplishes a specific complete function.

• **Flow Time:** Relates to component vendor's plant only. Represents the time between the date the component vendor receives his contract and the time the component is completely fabricated and ready for shipment.

• **General Purpose Item:** An article adapted to more than one application.

• **Government Property:** All physical property owned by or leased to the government, or acquired by the government under the terms of a contract, except that property to which the government has acquired a lien or title solely as a result of partial, advance or progress payments.

• **Government-Furnished Parts or Property** (GFP): Those items of equipment which, under the terms of an AMC contract, the AMC furnishes to the aircraft or aeronautical equipment manufacturer, without charge, for incorporation into end items being manufactured for the USAF, under that contract.

• **Industrial Property:** Any contractor-acquired or government-furnished property, including materials, special tooling, and industrial facilities employed in the performance of a contract or subcontract for supplies or services.

• **Lead Time:** In general, relates to aircraft manufacturer's plant only. Represents the time between the arrival of the component at the aircraft plant and the acceptance date of the airplane (or equipment) in which it is installed. Most of the AMC planning is based on acceptance schedules. Therefore, whenever lead time data is expressed in terms of shop completion it should be adjusted for the difference between shop completion and acceptance schedules. Lead time, however, is subject to many definitions. It even is used to mean the elapsed time from design conception to delivery of an end item. Lead time varies with the rate of production and during the different production periods, according to the following classifications:

a. Pre-Production Period: Represents the time between the date of the input of the first direct manhours in preparation for production and the date of shop completion of the first article. (This period may relate to either component or aircraft production.) During this time there takes place the establishment and stocking up of all assembly lines.

b. Initial Production Period: Represents the time between the shop completion of the first article and the attainment of the peak rate of production or "leveling off" point (assuming fixed production facilities).

c. Peak Rate Production Period: Represents that period from the time peak rate is reached until production is terminated or decelerated.

• **Licensee:** An individual, company, firm or corporation authorized by a licensor to use his proprietary design rights, manufacturing methods, or patents in the manufacture of articles offered for sale.

• **Licenser:** An individual, company, firm or corporation, holding proprietary design rights, manufacturing methods or patents, who enters into a written agreement whereby these rights, methods or patents may be used by other individuals, companies, firms, corporations or the government.

• **Material:** Such property as may be incorporated into or attached to the end products to be delivered to the government or which may be consumed or expended in the performance of a contract. It includes, but is not limited to, raw and processed material, parts components, assemblies, expendable small tools, and consumable supplies.

• **Modification:** The physical alteration of a special or general purpose item, accomplished to permit a specific adaption of the modified article.

• **Part:** An individual piece of an end item or assembly.

• **Patent Infringement Bond:** Bond securing the performance and fulfillment of undertakings contained in a patent clause.

• **Payment Bond:** A bond executed in connection with a contract, securing payment of all persons supplying labor and material in the prosecution of the work provided for in the contract.

• **Performance Bond:** A bond executed in connection with a contract, securing the performance and fulfillment of all the undertakings, covenants, terms, conditions and agreements contained in the contract.

• **Plant Equipment:** Personal property consisting of machinery, equipment, furniture, vehicles, machine tools, and other production equipment, used or capable of use in the manufacture of supplies or in the performance of services or for any administrative or general plant purpose. The term does not include special tooling.

• **Prime Contractor:** A contractor who has entered into a written agreement with the government to perform work or furnish supplies.

• **Property Account:** The official records of government property furnished to a contractor by a government department.

• **Scrap:** Property in such condition that it has no reasonable prospect of being sold except for its material content.

• **Setback Time:** Represents the sum of the flow time, shipping time, and lead time.

• **Special Purpose Item:** An article restricted by design or physical characteristics to an individual application.

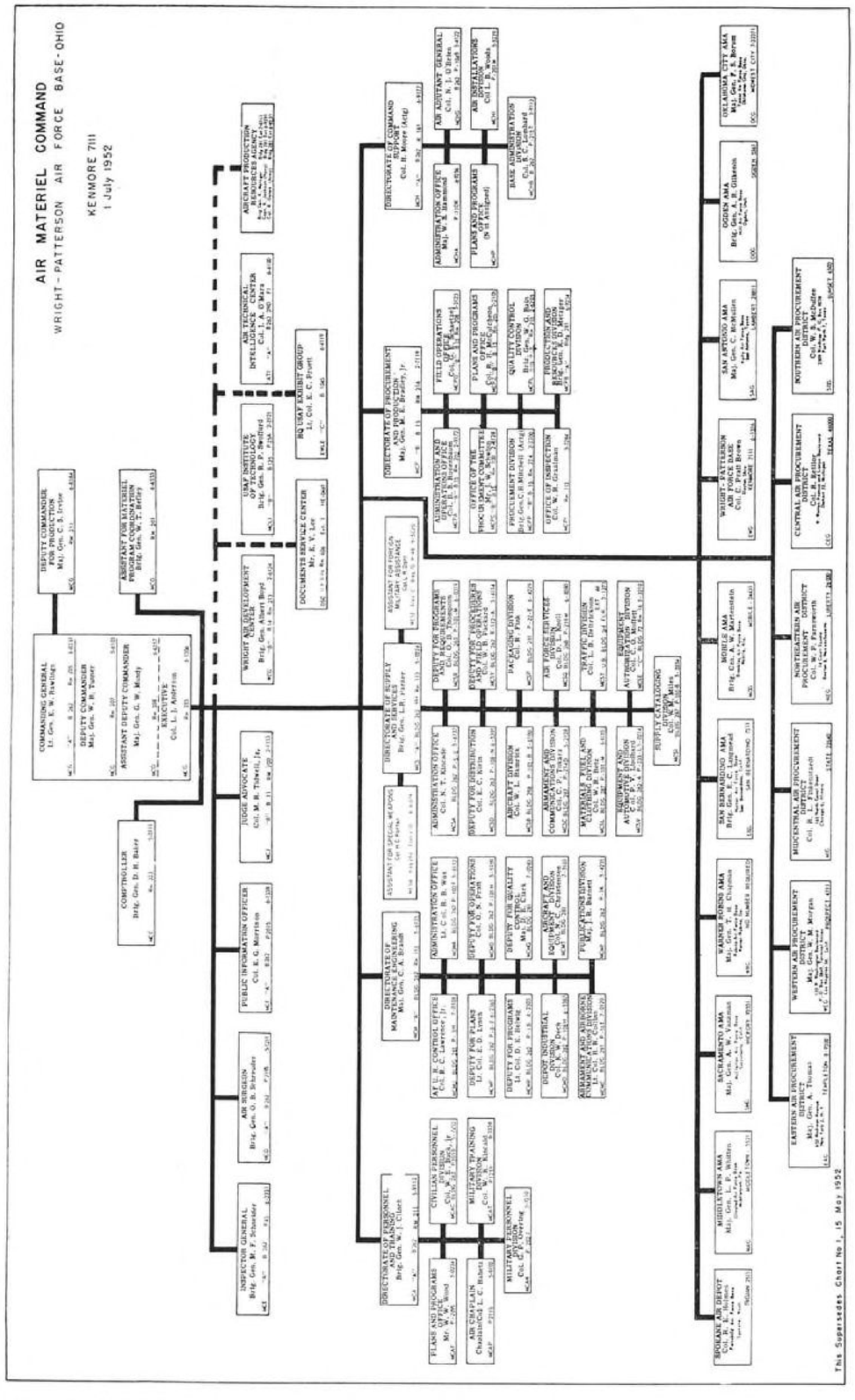
• **Special Tooling:** Property of such specialized nature that its use, without substantial modification or alteration, is limited to the production of the particular articles or performance of the particular services for which acquired or furnished. It includes, but is not limited to, jigs, dies, fixtures, molds, patterns, special taps, special gauges and special test equipment.

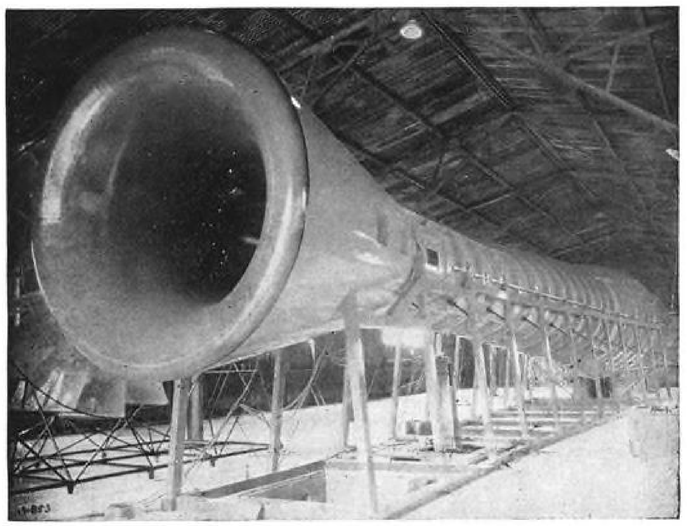
• **Specification:** A description of the technical requirements for a material, an item or a service, including a procedure by which the purchaser can determine whether or not the requirements have been met.

• **Stock Record:** A perpetual inventory form of record which shows quantities received and expended, and the balance on hand with respect to each item of material and special tooling.

• **Subassembly:** A unit of an assembly composed of two or more parts fastened together.

• **Subcontractor:** A contractor who has entered into a written agreement with a prime contractor to perform work or furnish supplies.





"They Sowed the Wind . . ."

". . . and Reaped the Whirlwind"

In the early 1920's, McCook Field—home of the materiel activities of the infant Army Air Corps—built the wind tunnel shown at the top of the page. Its throat was five feet in diameter, its test section able to accommodate a model with a 20-inch span. Highest speed obtainable was about 270 mph. McCook Field has been swept away and so, too, has the Army Air Corps; and the Air Materiel Command no longer operates wind tunnels that occupy its own ground. The winds blow now at 450 mph. and faster in the huge wind tunnel (bottom) on the high ground overlooking Wright Field. But the wind tunnel and all other research and development activities at Wright Field are operated by Wright Air Development Center (see adjoining column), part of the Air Research and Development Command.

How It Starts

- **AMC purchasing based on Weapons Systems Plan.**
- **And the requirements start with the user.**

By Alexander McSurely

A never-ending revolution is going on in the tools of air fighting and training.

While the "old pro" pilots of the Far East Air Force in swept-wing Sabres are winning a deadly game of high speed tag with Russian-built MiG-15s in the thin blue air high above the Yalu river, and—

While Strategic Air Command bomber crews are keeping their superb teamwork razor-sharp in long practice missions ranging over most of the free world, and—

While bright-eyed cadets are cramming on the book knowledge and flight skills they must acquire to become full-fledged Air Force pilots—

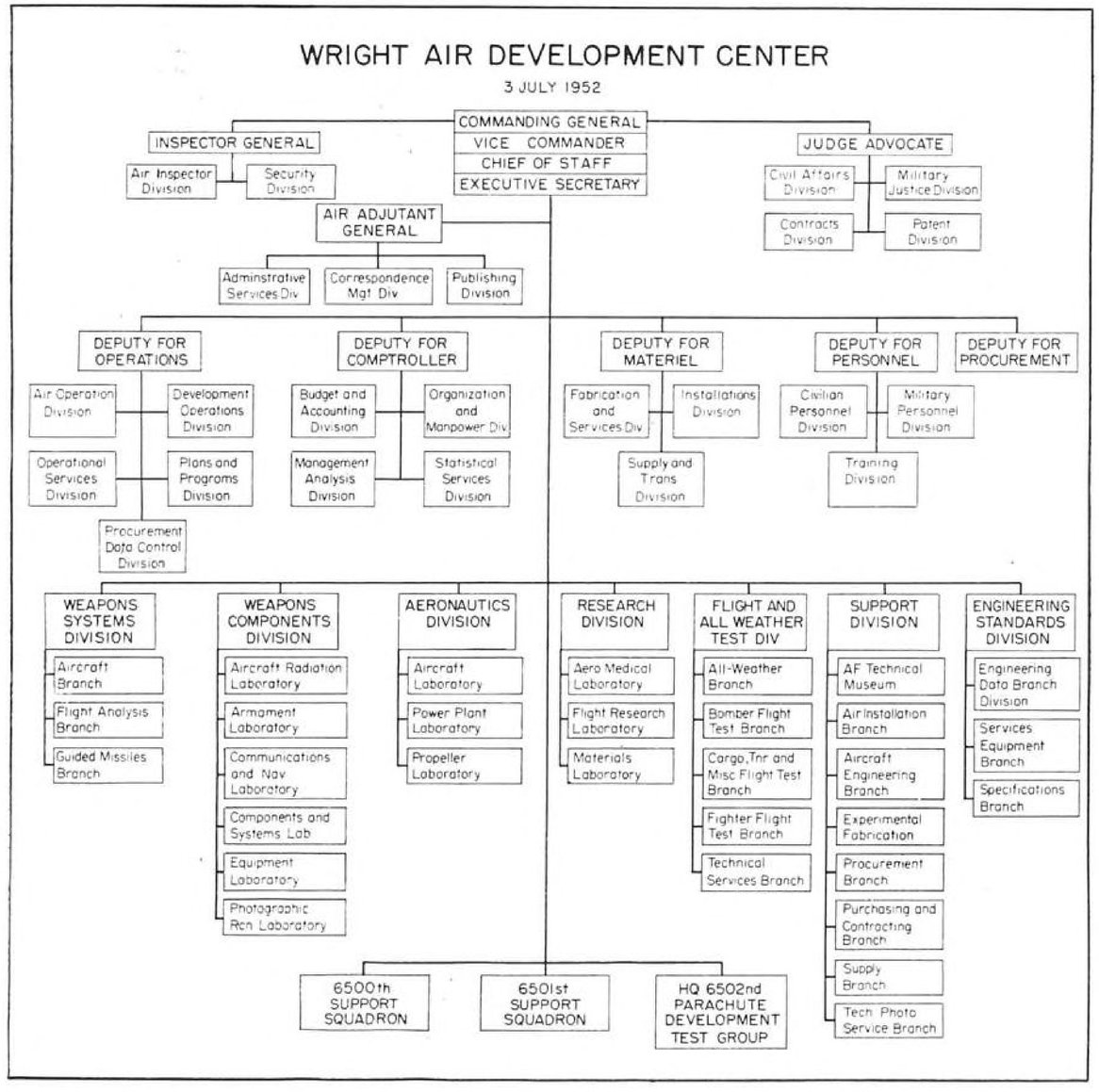
The revolution means continuing replacement of equipment that seems excellent by today's standards, and in many cases far better than the best comparable equipment of World War II. But it is obsolete already in the light of present military planning and present aeronautical knowledge.

►**A Winding Trail**—Few people outside the Air Force have a very clear picture of how the requirements for new aviation equipment are established and the winding trail which they follow from their originators until they get to Air Materiel Command, which does the actual purchasing.

To get this picture and understand its complexities, it helps to have some understanding of the Weapons System Plan which the Air Force now uses. Briefly this is a requirements planning concept which provides for the coordination of all the items which go to make up a complete combat plane, cargo carrier, trainer or guided missile or major piece of ground or airborne equipment.

Into the Weapons System Plan are fitted the requirements for tomorrow's combat and supporting equipment as they stem from the user organizations of the Air Force. The pilots and ground crews, the operational personnel in the field, are the first to see inadequacies of today's equipment and to want improvements. Their observations funnel into USAF headquarters in Washington, to be translated into the next stage in the step-up of capabilities for the new equipment.

Perhaps the field personnel are calling for a more rapid rate of climb, a higher ceiling for a plane, a heavier caliber, harder-hitting, faster-firing armament or a better oxygen system, a new air conditioning system, or one of a thousand other improvements which add up to a better weapons system.



►**Technical Representatives**—Most of the principal U. S. aircraft manufacturers keep a staff of technical representatives in the field with their equipment not only to trouble-shoot for the equipment then in use, but to keep their ears to the ground for new requirement trends, so that the manufacturers can keep up with operational thinking on tomorrow's equipment. And in many cases the industry is in a position to suggest future requirements as a result of its follow-ups in the field.

In broad outline, here is how the requirements cycle will work:

►**Hypothetical Trainer**—Take the case of a hypothetical training airplane—Trainer X as an example.

Suppose the Air Training Command's operations people and flight instructors in the field think it is time to start the developmental wheels rolling for a new training airplane. Perhaps they want to change their flight training curriculum, to tailor it to fit better the needs of higher speed and higher altitude operations in today's and tomorrow's air combat. Maybe they want to "grease" the transition of the new pilots from simple basic trainers into the high-spirited jet combat aircraft by a new intermediate course.

Obviously it should be a docile plane, designed to eliminate vicious flight characteristics, and with an operational speed range and wing loading somewhere between the earlier trainers and those of the combat jets. Its powerplant presumably should be a well-proven engine, now relatively trouble-free.

Once the Air Force people in the field have initiated their ideas about the requirement of such a new plane,

the original concept runs the Pentagon gantlet before it gets to preliminary competitive design stage.

The proposal for Trainer X, for example, would come into USAF staff headquarters to the office of Deputy Chief of Staff Operations. After a preliminary evaluation it would go over to the director of requirements in the office of Deputy Chief of Staff Development. Here more detailed characteristics of the proposed plane would be outlined under the heading of General Operational Requirements.

► **Directive for Development**—After these are stated, the Deputy Chief of Staff Development would prepare a directive for development of the plane to the Air Research and Development Command at Baltimore. In the case of a complete airplane the directive would come out to Wright Air Development Center at Dayton, Ohio, which has the general assignment to conduct the development of aircraft and components and associated handling equipment and airborne electronic equipment.

Besides the Wright center, which is separate from the Air Materiel Command at Wright-Patterson AFD, Dayton, the Air Research and Development Command has seven other centers. Rome Air Development Center at Griffiss AFB, N. Y., has charge of development of ground electronics equipment for Air Force communications and navigation. Air Force Cambridge Research Center, Cambridge, Mass., handles USAF requirements for basic research, and the new Arnold Engineering Development Center, Tullahoma, Tenn., will handle future powerplant and aerodynamic testing in the supersonic speed regions.

The other ARDC centers are for testing as indicated by their names: Air Force Flight Test Center, Edwards AFB, Calif.; AF Missile Test Center, Patrick AFB, Fla.; AF Armament Center, Elgin AFB, Fla., and AF Special Weapons (including atomic weapons) Center, Kirtland AFB, N.M.

At WADC at Dayton the directive would wind up eventually in the trainer unit of the training cargo section of the aircraft branch of the weapons system division.

Actually the Trainer X requirements procedure would move this far without direct connection with Air Materiel Command; but from this point on, the Wright Air Development Center engineers and the AMC's procurement division buyers work in close liaison.

► **Makers Are Surveyed**—Working together in the same office they survey the available aircraft manufacturers who they think from previous experience are likely to be interested in entering a design competition for the trainer.

The trainer buyer sends out invitations to bid for the design competition, and the aircraft manufacturers, some months later, bring in their designs.

Under the new weapons system concept, the design is for a complete aircraft system fully instrumented and equipped so that the accessory and equipment items which make up so much of today's aircraft, are designed integrally into the airframe to a far greater degree than was formerly the case.

► **Laboratory Evaluation**—With the designs in hand, the project engineer assigned to shepherd Trainer X through its development life distributes copies of the design to the various specialized laboratories at WADC for their technical evaluation.

Among the 12 WADC laboratories which may be called upon to check up on the various components of the complete trainer besides the basic aircraft, and powerplant laboratories, are the following specialized organizations: propeller, aircraft radiation, armament, communication and navigation, components and systems, equipment, photo-reconnaissance, aero-medical, flight research and materials laboratories.

The WADC trainer project officer assembles his laboratory evaluation reports and they are returned to USAF headquarters in the Pentagon for consideration of the USAF Evaluation Board. This is a top staff level organization which makes the final decision on the contract award on a basis of the technical recommendations, coupled with other considerations. These include such questions as available facilities and past Air Force good or bad experience with the various bidders.

Decision may call for one or more of the designs to be carried through a Phase I contract after which another decision is to be made before any flight articles are ordered.

The AMC procurement division buyer conducts the negotiations with the winning manufacturers for the contract, with the WADC engineers working alongside him in supervising the technical development requirements.

► **Full-Scale Model**—When the Phase I contract on the trainer is completed, the manufacturer has built a full-scale non-flying reproduction or mockup of the complete aircraft, which has to pass inspection of a mockup board of engineering specialists assigned by WADC.

On the shoulders of this mockup board rests the decision as to whether the trainer project should be continued into production, or terminated. Outside factors such as a change in requirements because of changing concepts of training policy in this case, also are taken into consideration in deciding whether or not to produce the aircraft.

Up to this point the costs have been carried as development costs but once the aircraft is ordered into production for a Phase II contract, AMC assumes the "bill" from here on.

Within the last few years, the procedure was changed on the first flying articles for each contract. Previously the policy had been to hand-build one or two prototype airplanes, which were flight tested, in advance of larger orders to produce. However because of the increasing complexity of postwar military planes, and the long time cycle between initial requirements and the point where the planes enter into squadron service, the separate prototype phase has been largely eliminated. Instead the airplane is ordered into production if it passes the mockup tests, without a first prototype in most cases.

But the production schedule is planned to start at a slow rate to permit static and flight testing of the first production planes by WADC and the various testing centers to shakedown the planes before full production go-ahead is given.

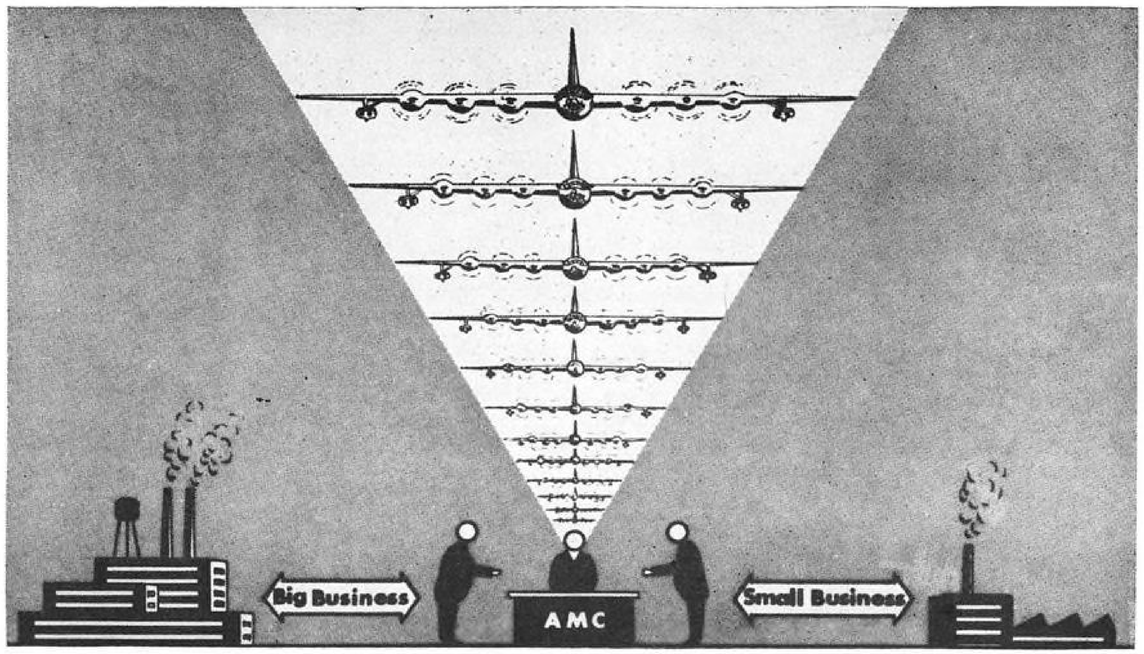
The WADC project officer continues responsible for Trainer X even after it has completed the various flight tests and goes into full production schedules. It is the usual practice to order engineering changes in a new production aircraft at intervals as blocks of the planes come off the line, and if the changes are major, in some cases to modify earlier models to correspond with the later ones.

Such changes and modifications channel through the project officer as long as the plane continues in production. And finally, after the production run is completed, but as long as the plane continues in service, in some cases for five to ten years later, the project officer is still responsible, engineering-wise, for correcting any unsatisfactory mechanical conditions which show up, or making any additional modifications that may be considered advisable.

► **Continuing Monitor**—Thus, throughout the whole cycle of the airplane's life, one Air Force office at WADC keeps a complete set of records on the airplane, its components equipment and accessories, and acts as a continuing monitor on its operational record.

There was a time in World War II when the engineering responsibility for an airplane was broken into two distinct parts. One group of engineers from the Air Materiel Command handled the development of the airplane and components development until it went into service. Then a second group of service engineers from Air Service Command assumed responsibility for the engineering changes and correcting of unsatisfactory conditions throughout its service life. The postwar unification of these two engineering responsibilities into a single responsibility is regarded as an organizational step forward.

A Guide for Selling to the United States Air Force



Teamwork in Defense Production

A Message From Gen. Rawlings . . .

In this new edition of "A Guide for Selling to the United States Air Force" our object once more is to bring up-to-date information on Air Force procurement for all manufacturers who may be able to contribute in greater or lesser degree to the current restoration of United States air power.

Since the last issue of this booklet the tremendously accelerated Air Force buildup has profoundly affected both the size and scope of the Air Materiel Command buying job. Within the course of a comparatively few months after the outbreak of hostilities in Korea the writing of contractual instruments went up 66%. Dollar value in procurement jumped 650%. In fiscal year 1952 the Air Materiel Command will buy about $16 billion worth of modern air power to strengthen the nation's air defenses.

This increase is not merely a stepping up of bulk quantities and value of materiel being procured. It represents a phenomenal increase in the actual number of separate inventory items required. In 1941, at the beginning of World War II, separate items of Air Force supply numbered 90,000. By the beginning of the Korean action the number had risen to 407,000. It is now well over a million, an 1150% increase over the comparatively simple days of 1941. The massive inventory includes everything from B-36s to rivets. To procure it within the time schedules which the national safety demands we urgently need the production capacities, ingenuity, and full cooperation of every segment of American industry, large and small.

The mushrooming size of our operation has become a major problem in itself. Overcrowding of AMC procurement headquarters in Dayton, Ohio, the growing bulk of necessary paperwork involved and transit time consumed in attempting to accomplish the whole job at one Headquarters convinced us that some decentralization would have to be effected for sound management.

We are presently carrying out a decentralization program in which the Headquarters will provide basic planning, management, control and surveillance of AMC world-wide activities, with maximum operating functions delegated to our various field locations scattered throughout the United States. In March of 1951 we replaced the seven existing procurement field offices with six air procurement district offices and a subsidiary network of regional offices, with considerable delegation of authority for contract administration, quality control and production guidance. Disbursing offices in these procurement districts can receive and make prompt payment on many types of invoices, saving the contractor time and the taxpayer discount dollars. We are also working to decentralize a larger volume of business to local purchase.

Other specialized Air Materiel Command functions have been, or will be moved to 15 different Air Materiel Depots throughout the United States.

It is our plan to place in these depots all of the functions, including, in many instances, procurement, associated with the commodities they store and distribute. The point of contact for some manufacturers will, therefore, shift from Wright-Patterson Headquarters AMC to the depots. Manufacturers will be notified before any such change is made.

We hope that those manufacturers doing business with the Air Force will find that the procedures set out in this booklet will be helpful to them in doing business with the Air Force. We believe that by following them the manufacturers will save themselves both time and effort. Any suggestions as to improving our procedures will be welcomed.

E. W. RAWLINGS
Lieutenant General, USAF
Commanding

I

How *You* Can Do Business With the Air Force

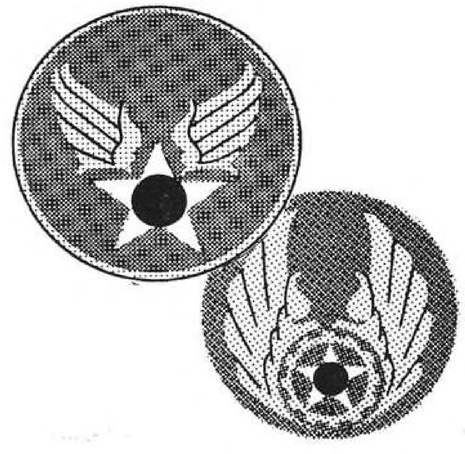
This is what the following pages will tell YOU—the small and big businessmen of this country.

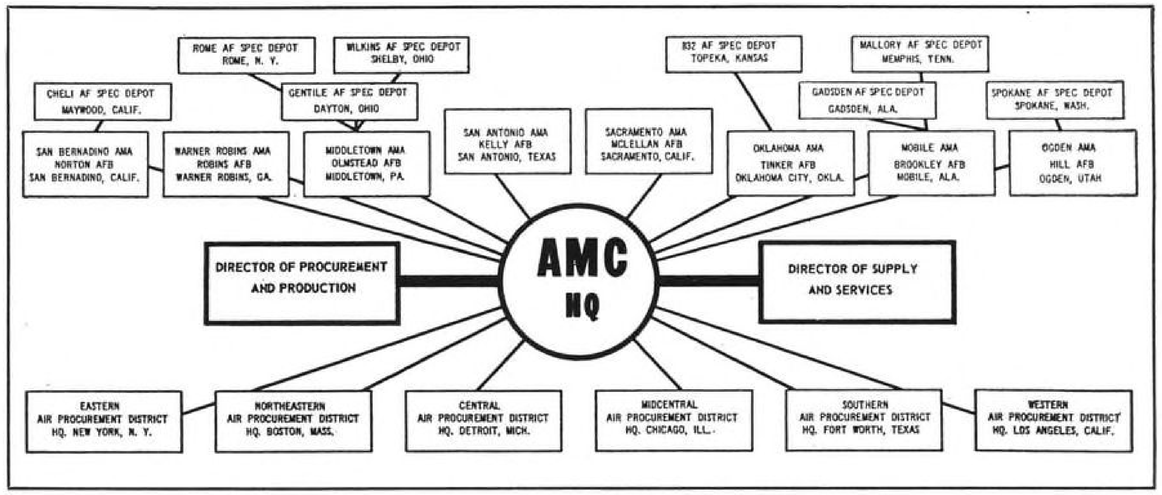
Perhaps you manufacture bolts, or maybe you can turn out complete aircraft, or perhaps you make mechanical toys. It doesn't really matter. The fact that you have a sound business, producing a dependable item, qualifies you to bid on Air Force contracts.

Approximately one million items are stocked by the Air Force. The vast majority of these products can be manufactured by firms not related to the aircraft industry but by companies which normally supply civilian needs.

Air Force buying or contracting is simple in principle although somewhat more complex in everyday practice. The Air Force either formally advertises each of its needs, calling for bids, and awards the contract to the lowest responsible bidder, or it negotiates contracts with qualified producers of the particular item needed.

Actually, FOUR principal procedures are used to purchase materiel for the entire world-wide Air Force, as well as for the Mutual Defense Assistance Program. These are: Central Procurement, accomplished by the Procurement Division at Headquarters, Air Materiel Command; Decentralized Procurement by Air Force Supply Depots; Local Purchase by a number of Air Force Bases and other installations throughout the country, and Research Buying by the Air Research and Development Command. A detailed explanation of these procedures will be given in succeeding pages.





II

The Organization With Which You Deal

The Air Materiel Command is charged with the responsibility for the Air Force's program of procurement, production, supply and maintenance. AMC has been designed along the lines of a large business, in contrast to the usual concept of a normal military organization. The Command procures, distributes, maintains and repairs equipment and supplies for the entire Air Force.

Supervision over all AMC functions is exercised at AMC Headquarters, Wright-Patterson Air Force Base, Ohio. This includes the functions of programming and planning for the future. The actual day-to-day operations of the Command are closely interwoven with all actions of the Air Staff, particularly the Deputy Chief of Staff for Materiel, at Headquarters, USAF, and with all other major Air Force commands. This inter-relationship provides the Air Force with a single integrated logistic system where effective business management and controls can be exercised.

The Directorate of Procurement and Production has the responsibility for selecting manufacturing sources, negotiating contracts with manufacturers, authorizing contract changes, and exercising command surveillance over the procurement activities of AMC field installations.

Three divisions carry out the activities of the Directorate of Procurement and Production—Procurement, Quality Control, and Production and Resources.

► **Procurement**—The Procurement Division does the actual buying. In it you will find a number of subordinate organizations, each responsible for purchasing a certain group or groups of Air Force equipment. Purchasing responsibility is divided among three main Sub-Divisions—Aircraft, Materiel and Modification, Research and Development.

The organizational charts shown indicate the type of equipment purchased by each of the Branches and Sections within the Sub-Divisions.

► **Production & Resources**—The functions of the Production and Resources Division are closely allied to the procurement program. In January of 1951, this division replaced the former Industrial Planning Division, which had been responsible for the perfection of plans calculated to produce aircraft and supporting equipment during emergency periods. The industrial planning function has been retained in the Production & Resources Division, but the division is now concerned primarily with insuring that the Air Force has contractors with the necessary resources to produce equipment on schedule. It is also responsible for the determination of requirements for allocation of materials to Air Force contractors, for the resolution of problems in manufacturing methods, and for the industrial-phase expansion.

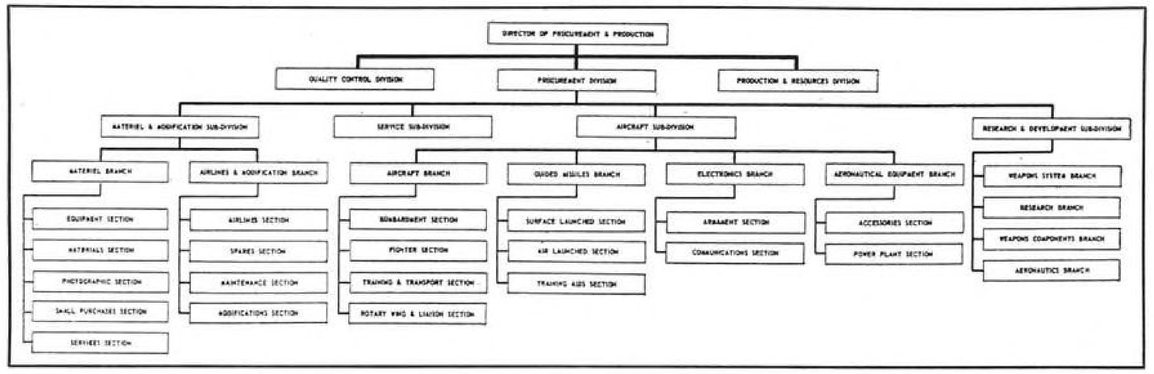
► **Quality Control**—An important element of procurement and production is the quality control of end products. Responsibility for this function lies in the Quality Control Division. This division formulates and maintains a quality control policy to insure that supplies accepted by the Air Force conform to the standards of quality prescribed by the Government. Actual inspection of end products is delegated to Commanders of Air Procurement Districts, who are responsible for assuring that all quality-control operations are performed in conformance with policies established by Headquarters, Air Materiel Command.

► **Field Organizations**—In order that the Air Force may be physically closer to the actual work being performed by industry, contract administration has been delegated to the Commanders of the six Air Procurement Districts, each of which is an organization within the Air Materiel Command, reporting directly to the Commanding General, AMC. These Procurement Districts, in turn, have jurisdiction over 25 regional offices located in industrial centers of the United States, and a number of Air Force Plant Representatives located at the larger airframe and other manufacturing plants. These Air Procurement Districts, in addition to being responsible for the administration of all contracts let by AMC, perform necessary investigations of probable contractor sources.

Another group of AMC field organizations, known as depots, has the prime function of storing and distributing materiel.

Theoretically, the United States is divided into two zones, with the Mississippi River the dividing line between east and west. The two-zone system provides that each zone stores and distributes the same items. In all there are sixteen of these depots. There are eight Air Materiel Areas in the Continental United States, each with a Headquarters Depot, and eight Specialized Depots.

In addition to storing and distributing supplies, these installations now are responsible for establishing supply requirements and letting contracts in accordance with the decentralization program. The latter will be explained in detail under the heading of "Decentralized Procurement".



III

Central Procurement

Central Procurement involves the purchasing of aircraft and engines, propellers, spares and other Government Furnished Property, and items requiring extensive engineering. Contracts under this heading are negotiated and let by the Procurement Division, Directorate of Procurement and Production, Headquarters, Air Materiel Command.

Where You Start

"Let's go to Washington and see about an Air Force contract" has cost businessmen much unnecessary time and travel expense. Washington is **NOT** the place to get an Air Force contract.

Actually, complete information on Air Force procurement activities is as close to your place of business as the nearest Air Procurement Regional Office.

Our country is zoned into six Air Procurement Districts, each with a headquarters office and several regional offices. This "network" of field offices, under the direction of the Commanding General, AMC, administers Air Force contracts after they have been awarded. In addition regional offices are responsible for guiding you in listing yourself as a potential contractor. In each of these offices throughout the country, Air Force representatives will furnish you with the necessary forms and information for making a proposal or submitting a bid; help you solve labor, materiel, and facility problems; furnish information on such matters as quality control, finances, plant security; in fact, make available to you all the services concerning Air Force procurement, short of issuing the actual contract.

Each regional office has a bid board displaying copies of pending procurements, including formally advertised and those negotiated procurements considered suitable for award to small business concerns. Also posted are weekly Synopses of Contract Awards which serve as a lead to firms interested in sub-contracting.

For addresses and maps of Regions and Districts, see Appendix.

How You Start

The Procurement Sources List is the initial step in the ladder of Air Force procurement. It serves a two-fold purpose—(1) it gives manufacturers and regular dealers an opportunity to list themselves as potential contractors, and (2) it makes available to the Air Force a list of potential contractors desirous of supplying the needed items.

In the past few years, the Sources List, as well as the number of items being procured, have increased to such an extent that a mechanized system of listing potential contractors had to be employed. Based on mechanical tabulating machines, the "mechanized bidders list" was established. This system lists for each item bought by the Air Force those manufacturers and dealers who have indicated that they can supply the item.

The Procurement Sources System is based upon the use of the Air Force Commodity List (AFCL). This list, which combines in one volume some 30-odd commodity catalogs previously used, contains a general listing of the thousands of items which the Air Force normally procures. The Air Force Commodity List thus enables you to tell the Air Force which type of items you are able to produce or supply.

For placement in the Sources System, either of the following actions must be taken:

► **By Letter**

• A. Write a letter to the Commanding Officer of the Air Procurement Regional Office exercising jurisdiction over the area in which your firm is located requesting that your company be established in the Procurement Sources System. This letter should include information as to your present activity, number of employes, and products sold or manufactured.

• B. Upon receipt of your letter, the Regional Office will mail to you a Bidder's Mailing List Application, an Air Force Commodity List, and complete instructions.

• C. After you receive the Air Force Commodity List, examine it carefully and then circle the code number preceding the name of the items your firm can supply.

• D. Fill out the Bidder's Mailing List Application, and return it with the completed Air Force Commodity List to the Air Procurement Regional Office.

• E. Your firm will then be established in the Procurement Sources System at Headquarters, Air Materiel Command, for

the items you have selected.

► **By Personal Contact**

• A. Visit the Regional Air Procurement Office in your area.

• B. The same procedure as outlined above will be followed in listing your company as a potential source.

A PERSONAL VISIT TO YOUR REGIONAL OFFICE MAY PROVE ADVANTAGEOUS, SINCE IT GIVES YOU THE OPPORTUNITY TO DISCUSS YOUR PROBLEMS AND ASK PERTINENT QUESTIONS. THE OVERALL WORKLOAD AT AMC HEADQUARTERS IS GREAT. YOU CAN AVOID DELAY AND SAVE UNNECESSARY CORRESPONDENCE BY LISTING YOURSELF THROUGH THE FACILITIES OF THE REGIONAL OFFICE.

The "Bid Sets"

► **IFBs & RFPs**—Invitations for Bid, used for formally advertised procurements, are commonly referred to as IFBs. Requests for Proposal, used for negotiated procurements, are referred to as RFPs. Keep these terms—IFB and RFP—in mind, for you will hear them often.

IFBs are mailed to all manufacturers and regular dealers appearing on the Procurement Sources List for a particular item being procured by means of formal advertising. A limited extra supply is maintained to cover requests from new sources not already established in the Procurement Sources List but who have learned of the proposed procurement through other media.

RFPs are mailed to firms already established within the Sources System who are capable of producing the item in question. This is known as negotiated procurement.

Normally, procurements are advertised whenever and wherever possible. However, Public Law 413, 80th Congress, authorizes the negotiation of procurement during a national emergency such as now exists, or in other special cases.

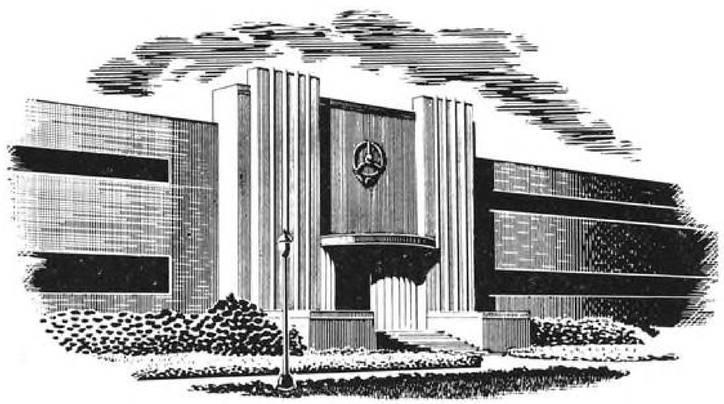
Because of the emphasis on giving small business a larger share of the defense production dollar the Air Force has "modified" its policy on negotiated procurement. Suitable RFPs and IFBs are now posted at Regional Offices immediately following the solicitation of firms listed in the Sources System. Also, synopses of these RFPs are published in suitable news media, and by the Department of Commerce in the same manner as IFBs. This gives potential suppliers an opportunity to let the Air Force know that they are interested in a particular negotiated procurement.

Ordinarily Purchase Requests (Air Force authority to start procurement action) are submitted directly to the respective buyer of the particular procurement. The buyer then refers to the sources system in order to determine which firms to contact. Under the modified procedure every effort is made to consider all available sources whenever an item comes up for procurement. In this manner firms which have never before held an Air Force contract are often invited to submit a proposal.

The only way by which you are assured of receiving IFBs or RFPs in ample time for submission of bids is to make arrangements to be listed in the Sources System for all items in which you are interested and are capable of producing. All Regional Air Procurement offices are fully equipped to supply all required information and advise you in connection with Air Force procurement. It should never be necessary for you to go to Wright-Patterson Air Force Base in Dayton to qualify as a prime contractor or to obtain information.

► **Advance Notices**—In connection with certain procurements, an Advance Notice is sent out to the firms established in the Procurement Sources System for the particular item to be procured. This notice is in the form of a circular letter with a return card and contains a description of the item, the quantity to be procured, and the delivery schedule. If you want to bid on this procurement, you should mark the return card accordingly. Space is also provided on the card to indicate that while you are not interested in this particular procurement, you do desire to remain in the system.

In either case, it is of extreme importance that you return this card, as failure to reply to an Advance Notice or Invitation to Bid is interpreted to mean that you are no longer interested in remaining in the system for the particular item being procured.



IV
Decentralized Procurement

Under the Air Materiel Command's decentralization program certain procurement activities will be transferred to field installations. Since decentralization will have an effect on the way you do business with the Air Force, an up-to-date explanation is in order even though the program is subject to change.

Fifteen Air Materiel Area Headquarters and Air Force Specialized Depots have been selected as procurement points for a portion of AMC's over-all procurement responsibility. All depots may make purchases up to $10,000 regardless of the type of item or intended use, within the limits of their capabilities. However, present decentralization plans call for the distribution of purchasing authority for procurements in excess of $10,000 to only nine of the Depots.

Aircraft, engines, propellers, spares, spare parts and other Government Furnished Property, and items requiring extensive engineering will continue to be bought by the Procurement Division at Headquarters, Air Materiel Command.

It is estimated that this latter group represents the major portion of the Air Force dollar. By moving part of the procurement activities away from Headquarters, AMC it is expected that a considerable amount of the paper work now "clogging up" the procurement pipeline at Headquarters can be eliminated and procurement procedures speeded.

► **What's Involved**—After the procurement responsibility for a certain commodity is transferred to one of the "field" installations, you will be required to submit your bids and proposals to the individual installation responsible. Each procurement office will establish its own bidders list and provide facilities for potential contractors similar to those at Headquarters, AMC. For instance, each agency will have a Small Business Office and Contractors Relations Office for your convenience.

If you are now registered as a potential source at Headquarters, AMC, you will be notified officially when and where to list yourself for those commodities which will be decentralized. Announcements will also be made through the press and other news media.

The following is a list of proposed locations of procurement activities for the items now purchased by the Procurement Division at Headquarters, AMC. The approximate date these changes go into effect and the supply classes involved are included. These changes become effective some time after July 1, 1952. Again it is cautioned that this schedule is subject to change. However, you will be kept informed about any future changes in Air Force procurement as they arise.

832nd AF Specialized Depot
Topeka, Kans.

(Approx. date of change—1 Sept. 1952)

CLASS	NOMENCLATURE
07	Dopes, Paints & Cleaning Compound
12	Fuel & Oil Handling Equipment
18	Specialized Tools
23A	Metals, Ferrous & Nonferrous
23B	Composition Materials
04A & 29	Fittings, Hose, Pipes & Tubes (Commercial Hardware)
24	Chemicals
63	Flags, Bunting & Insignia

Mallory AF Specialized Depot
Memphis, Tenn.

(Approx. date of change—15 Sept. 1952)

CLASS	NOMENCLATURE
04D	Antifriction Bearings & Parts
17B & G	Hand Tools—Non-Powered
17D	Assembled Tool Kits
17H	Measuring Tools, Craftsman's
25A	Office Equipment & Maintenance Parts
25B	Office Supplies
56	Subsistence
59	Building Materials
64	Mess Hall & Baking Equipment
66	Laundry & Dry Cleaning Equipment
70	Agricultural Equipment Implements & Parts

Warner Robins Air Materiel Area
Robins Air Force Base
Warner Robins, Ga.

(Approx. date of change—15 Oct. 1952)

CLASS	NOMENCLATURE
17A & F	Shop Machinery, Equipment, Accessories & Parts
22	Lumber Products
50	Motor Vehicles & Parts (excluding Class 50A)
51	Motor Vehicles & Parts (excluding Class 51A)
52	Motor Vehicles & Parts

Mobile Air Materiel Area
Brookley Air Force Base
Mobile, Ala.

(Approx. date of change—15 Sept. 1952)

CLASS	NOMENCLATURE
19D	Marine Equipment & Parts

Middletown Air Materiel Area
Olmsted Air Force Base
Middletown, Pa.

(Approx. date of change—1 Sept. 1952)

CLASS	NOMENCLATURE
20B	Survival Equipment & Parachutes

Gentile AF Specialized Depot
Dayton, Ohio

(Approx. date of change—15 Aug. 1952)

CLASS	NOMENCLATURE
08C	Electrical Terminals & Terminal Boards
08E	Electrical Connectors & Parts
08G	Lamps & Fuses
16E	Radio & Radar Maint. Parts
16F	Radio Crystals
16O	Capacitors
16P	Coils & Transformers
16Q	Resistors
16R	Switches, Circuit Breakers & Parts
16S	Vacuum Tubes & Parts
16T	Relays, Contactors, Solenoids & Parts
16U	Electrical Insulators, Knobs & Dials
17C	Lab. & Shop Test Equipment

Wilkins AF Specialized Depot
Shelby, Ohio

(Approx. date of change—15 Oct. 1952)

CLASS	NOMENCLATURE
04B	Rubber Materials
04C	Rubber Casings, Tires & Tubes
13A	Special Purpose Clothing
13B	Military Uniforms, "M"
13C	Personal Equipage
13D	Footwear, "M"
13E	Military Uniforms, "F"

Wilkins AF Specialized Depot
Shelby, Ohio

13F	Footwear, "F"
13H	Insignia, Decorations & Badges
20A	Tailored Paulins & Covers
21A	Textiles, Leather, Fur & Cordage
21B	Notions & Findings
30A	Army, Air Force Publications
30B	Technical Orders & Other Technical Publications
30D	Comm. Technical Books, Periodicals & Catalogs
30F	Blank Forms
30G	Posters, Charts & Misc. Publications
0M	Decalcomanias

Rome AF Specialized Depot
Rome, N. Y.

(Approx. date of change—15 Sept. 1952)

CLASS	NOMENCLATURE
08A	Comm. Elect. Equipment & Parts
08B	Elect. Supplies
08D	Flying Field Night Lighting Equipment & Parts
08F	Elect. Wire & Cable
10C	Photographic Supplies
16B	Ground Navig. Equipment & Parts
16C	Ground Radar Equipment & Parts
16H	Meteorological Equipment Supplies & Parts
16I	Installation Parts for Ground Comm. & Elect. Equipment
16L	Telegraph, Teletype—Writer & Facsimile Equipment & Parts
16M	Ground Radio Comm. Equipment
16N	Telephone & Wired Audio Equipment & Parts

Cheli AF Specialized Depot
Maywood, Calif.

(Approx. date of change—1 Oct. 1952)

CLASS	NOMENCLATURE
36	Musical Instruments, Accessories & Parts
37	Athletic & Rec. Equipment & Parts
40A	Furniture & Fixtures
40B	Furnishings
67	Forage & Seed

V
Research and Development Procurement

The Air Research and Development Command (ARDC) with Headquarters in Baltimore, Md., was established in 1951, thus separating the research and development function of the Air Force from its maintenance, supply and procurement functions. The new command is sub-divided into eight Air Development Centers, each of which is concerned with a definite type of research activity.

Basic Research

The job of buying basic research, not involving "end items" has been delegated to ARDC by the Commanding General of AMC, who is the sole procurement authority for the Air Force. The Directorate of Procurement of the Air Research and Development Command is responsible for procurement of theoretical and experimental studies of basic sciences which form the groundwork upon which future aeronautical engineering will be built. The Command also encourages the presentation of new ideas in the field of basic research and will evaluate such ideas for future consideration.

Development

Development projects involve materials which are quite different from production projects. Existing approved items or definite Government drawings and specifications are usually not available. Frequently only a desired performance characteristic is described. Consequently, the procurement procedures affecting the letting of development contracts are somewhat different from regular procedures but are basic to the initiation of a production program. Accordingly, it is essential in the procurement of development work for full consideration to be given to producibility factors which will pave the way for a successful production program.

Development work involving "end items" is generally procured by the Air Materiel Command. The exception is ground electronics development which is under cognizance of the Rome Air Development Center, (RADC), Griffis Air Force Base, Rome, New York, and such development projects as may be initiated at ARDC centers other than Wright Air Development Center, (WADC), Wright-Patterson Air Force Base, Ohio.

R&D Procurement

The Research and Development Sub-Division, Directorate of Procurement and Production, AMC, is the buying agency for development initiated by WADC. This sub-division also exercises surveillance over all research and development procurement activities for the Directorate of Procurement and Production.

In order to be considered for Air Force development contracts let by AMC, write a letter to

Commanding General
Air Materiel Command
Wright-Patterson Air Force Base, Ohio
Attention: MCPPR

containing the following information:

OCCUPATIONAL

- A. Type, i e., corporation, partnership, proprietorship, education (profit or non-profit institution).
- B. State in which incorporated, if incorporated.
- C. Parent organization and/or subsidiary (if applicable).
- D. Total number of employes, including parent and subsidiary organizations, number of employes in your organization and number of employes in the research and development activity of your organization.
- E. Name of person to contact in connection with this type of Government contract work.

PERSONNEL

Names and following biographical information on each of your leading design and development personnel:

- A. Educational background.
- B. Work history.
- C. Books or papers published.
- D. Patents taken out.
- E. Current field of endeavor.

► **Description** of the more important or unusual laboratory and other facilities pertaining to development.

► **Significant development projects** your organization has accomplished for its own use or for any outside sponsor. Those projects most nearly indicating centers of major fields of interest should be emphasized. The "Jack of all Trades" approach usually precludes selection for a particular project.

► **Descriptive brochure** if available.

Your information will be used to determine which source will be asked to quote on individual specific projects. Therefore, it is essential that the information permit conclusions as to specific fields of interest and ability.

The nature of development work makes it mandatory that all contracts be let on a negotiated basis. However, every effort will be made to consider you for procurement of a particular development item if you are qualified to perform this type of work.

In order to make certain that your company is listed with ARDC as a research and development source, you should, in addition to forwarding the above information to AMC, submit the same information to the proper ARDC procurement authorities.

If interested in ground electronics research and development, write to:

Commanding General
Rome Air Development Center
Griffiss AF Base
Rome, N. Y.

If interested in basic research initiated at WADC, write to:

Commanding General
Wright Air Development Center
Wright-Patterson AF Base, Ohio
Attn: WCUK

If interested in research and development work at ARDC centers other that RADC and WADC, you should communicate with:

Commanding General
Air Research and Development Command
P. O. Box 1395
Baltimore, Md.
Attn: RDMPR

VI
Local Purchase

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

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

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

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

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

Birmingham Mun. Airport
Birmingham, Ala.

Gadsden AF Specialized Depot
Gadsden, Ala.

Mobile AMA
Brookley AFB
Mobile, Ala.

Maxwell AFB
Montgomery, Ala.

Craig AFB
Selma, Ala.

Williams AFB
Chandler, Ariz.

Luke AFB
Phoenix, Ariz.

Davis-Monthan AFB
Tucson, Ariz.

Yuma Municipal Airport
Yuma, Ariz.

Travis AFB
Fairfield, Calif.

Hamilton AFB
Hamilton, Calif.

Western Air Procurement District
155 W. Washington Blvd.
P. O. Box 3849
Terminal Annex
Los Angeles, Calif.

Camp Beale
Marysville, Calif.

Cheli AF Specialized Depot
Maywood, Calif.

Castle AFB
Merced, Calif.

Edwards AFB
Muroc, Calif.

Parks AFB
Pleasanton, Calif.

George AFB
Victorville, Calif.

Long Beach Municipal Airport
Long Beach, Calif.

March AFB
Riverside, Calif.

Mather AFB
Sacramento, Calif.

Sacramento AMA
McClellan AFB
Sacramento, Calif.

San Bernardino AMA
Norton AFB
San Bernardino, Calif.

Ent AFB
Colorado Springs, Col.

Lowry AFB
Denver, Col.

Washington National Airport
Washington, D. C.

Bolling AFB
Washington, D. C.

Andrews AFB
Washington, D. C.

Dover AFB
Dover, Del.

New Castle County Airport
Wilmington, Del.

Patrick AFB
Cocoa, Fla.

Orlando AFB
Orlando, Fla.

Tyndall AFB
Panama City, Fla.

MacDill AFB
Tampa, Fla.

Eglin AFB
Valpariso, Fla.

Morrison AFB
West Palm Beach, Fla.

Miami International Airpo..
Miami, Fla.

Pinecastle AFB
Pinecastle, Fla.

Turner AFB
Albany, Ga.

Lawson AFB
Ft. Benning, Ga.

Dobbins AFB
Marietta, Ga.

Hunter AFB
Savannah, Ga.

Moody AFB
Valdosta, Ga.

Warner Robins AMA
Warner Robins, Ga.

Mountain Home AFB
Mountain Home, Ida.

Scott AFB
Belleville, Ill.

Midcentral Air Procurement District
165 North Canal St.
Chicago, Ill.

Chanute AFB
Rantoul, Ill.

O'Hare AFB
Park Ridge, Ill.

Atterbury AFB
Columbus, Ind.

Sioux City Airport
Seargents Bluff, Ia.

Staniford AFB
Louisville, Ky.

832nd Specialized Depot
Topeka, Kans.

Fairfax Field
Topeka, Kans.

Olathe Naval Air Station
Olathe, Kans.

Smokey Hill AFB
Smokey Hill, Kans.

Forbes AFB
Topeka, Kans.

Wichita AFB
Wichita, Kans.

Alexandria AFB
Alexandria, La.

Lake Charles AFB
Lake Charles, La.

Barksdale AFB
Shreveport, La.

Dow AFB
Bangor, Me.

Limestone AFB
Limestone, Me.

Presque Isle AFB
Presque Isle, Me.

6950th Hqs. Support Group
P. O. Box 1395
Baltimore, Md.

Hqs, ARDC
Baltimore, Md.

Northeastern Air Procurement District
14 Court Square
Boston, Mass.

AF Cambridge Research Laboratories
Cambridge, Mass.

Westover AFB
Chicopee Falls, Mass.

Otis AFB
Falmouth, Mass.

Central APD
W. Warren Ave. & Lonyo Blvd.
Detroit 32, Mich.

Selfridge AFB
Mt. Clemens, Mich.

Oscoda AFB
Oscoda, Mich.

St. Paul International Airport
Minneapolis, Minn.

Williamson-Johnson Airport
Duluth, Minn.

Keesler AFB
Biloxi, Miss.

Aeronautical Chart Plant
St. Louis, Mo.

Sedalia AFB
Sedalia, Mo.

Great Falls AFB
Great Falls, Mont.

Offutt AFB
Omaha, Neb.

Stead AFB
Reno, Nev.

Nellis AFB
Las Vegas, Nev.

Grenier AFB
Manchester, N. H.

Hqs. Newark Transportation Control Depot
400 Delaney St.
Newark, N. J.

McGuire AFB
Ft. Dix, N. J.

Kirtland AFB
Albuquerque, N. M.

Holloman AFB
Alamogordo, N. M.

Clovis AFB
Clovis, N. M.

Walker AFB
Roswell, N. M.

Sampson AFB
Geneva, N. Y.

Mitchell AFB
Hempstead, N. Y.

Stewart AFB
Newburgh, N. Y.

Eastern Air Procurement District
655 Madison Ave.
New York, N. Y.

Niagara Falls AFB
Niagara Falls, N. Y.

Griffiss AFB
Rome, N. Y.

Suffolk AFB
Westhampton, N. Y.

Pope AFB
Ft. Bragg, N. C.

Lockbourne AFB
Columbus, Ohio

Wilkins AF Specialized Depot
Shelby, Ohio

Gentile AF Specialized Depot
Dayton, Ohio

U. S. Institute of Technology
Wright-Patterson AFB, Ohio

Wright-Patterson AFB, Ohio

Wright Air Development Center
Wright-Patterson AFB, Ohio

Vance AFB
Enid, Oklahoma

Oklahoma City, AMA
Tinker AFB
Oklahoma City, Okla.

Portland Municipal Airport
Portland, Ore.

Greater Pittsburgh Airport
Coraopolis, Pa.

Middletown AMA
Olmsted AFB
Middletown, Pa.

Donaldson AFB
Greenville, S. C.

Shaw AFB
Sumter, S. C.

Rapid City AFB
Rapid City, S. D.

Mallory AF Specialized Depot
Memphis, Tenn.

Memphis International Airport
Memphis, Tenn.

Berry Field
Nashville, Tenn.

Sewart AFB
Smyrna, Tenn.

Arnold Engineering Development Center
Tullahoma, Tenn.

Amarillo AFB
Amarillo, Texas

Bergstrom AFB
Austin, Texas

Hensley Field
Dallas, Texas

Biggs AFB
El Paso, Texas

Carswell AFB
Ft. Worth, Texas

Southern Air Procurement District
3309 Winthrop Place
P. O. Box 9038
Ft. Worth 7, Texas

Ellington AFB
Houston, Texas

Reese AFB
Lubbock, Texas

Wolters AFB
Mineral Wells, Texas

Pyote AFB
Monahans, Texas

USAF School of Aviation Medicine
Randolph AFB
Randolph Field, Texas

Goodfellow AFB
San Angelo, Texas

Brooks AFB
San Antonio, Texas

Lackland AFB
San Antonio, Texas

Randolph AFB
San Antonio, Texas

San Antonio AMA
Kelly AFB
San Antonio, Texas

San Marcos AFB
San Marcos, Texas

Perrin AFB
Sherman, Texas

James Connally AFB
Waco, Texas

Sheppard AFB
Wichita Falls, Texas

Bryan AFB
Bryan, Texas

Big Spring AFB
Big Spring, Texas

Foster AFB
Foster, Texas

Laughlin AFB
Laughlin, Texas

Laredo AFB
Laredo, Texas

Ogden AMA
Hill AFB
Ogden, Utah

Ft. Ethan Allen
Burlington, Vt.

Langley AFB
Hampton, Va.

Fairchild AFB
Bong, Wash.

Geiger Field
Spokane, Wash.

Larson AFB
Moses Lake, Wash.

McChord AFB
Tacoma, Wash.

General Wm. Mitchel Field
Milwaukee, Wisc.

Truax Field
Madison, Wisc.

Ft. Francis E. Warren
Cheyenne, Wyo.

VII
Special Procurement Methods

Coordinated Procurement

Certain items and commodities used by the Air Force are procured through coordinated purchasing, that is, one of the departments of our National Military Establishment—the Army, Navy, or Air Force—is responsible for the procurement of such commodities for all three military departments.

The task of selecting the items and commodities in question and assignment of procurement responsibility has been delegated to the Munitions Board by the Secretary of Defense, in order to eliminate unnecessary duplication and overlapping of effort in the field of procurement.

Here are some of the commodities bought under the single service purchase method by the military department indicated:

Army	Navy	Air Force
Lumber and Allied Products	Coal and Coke	Photographic Equipment and Supplies
Railroad Equipment	Paints and Varnishes	Survival Kits
Safety and Sanitation Equipment	Clocks and Parts	Small Life-Saving Craft Airborne
Watches and Parts	Measuring, Controlling, Laboratory, Optical and related instruments	Aircraft Tires and Tubes
Mess and Galley Equipment	Materials Handling Equipment	
Automotive Equipment		

Two commodities, petroleum and medical supplies, are purchased under the Joint Purchase System, by the Armed Services Petroleum Purchasing Agency (ASPPA) and by the Armed Services Medical Procurement Agency (ASMPA), respectively. Inquiries may be addressed to:

Armed Services Petroleum Purchasing Agency
Temporary Bldg. T-3
17th and Constitution Ave., N.W.
Washington 25, D. C.

Armed Services Medical Procurement Agency
84 Sands Street
Brooklyn, New York

Surplus Procurement

Special procedures have been established for those companies dealing in merchandise released as surplus by the War Assets Administration. A special unit has been set up to handle this type of procurement.

If yours is a business dealing in surplus equipment and supplies, here is what you do:

Send an inventory (in triplicate) of the items that you think are suitable for Air Force use to: Commanding General, Air Materiel Command, Wright-Patterson Air Force Base, Ohio, Attn: MCPPMG-56. This inventory should contain the approximate quantity of each item, complete nomenclature, Air Force stock number, main parts number, and any other pertinent information that you may want to include.

After receiving your inventory, the unit will screen the items and enter those items that are required for Air Force use into their permanent files. If and when the time for a procurement arrives, you will be notified in time to make your bid.

It should be emphasized that the Government is interested in buying surplus equipment from owners only, and will not deal with brokers. In order to qualify for a contract dealing in surplus equipment, you must be able to prove that such equipment is actually owned by you and stored in your warehouse when you submit your bid.

Classified Procurement

Before a potential contractor is permitted to look at classified matter (Restricted, Confidential, Secret, or Top Secret), such as drawings and specifications in a bid invitation on a classified Air Force item, he must sign a security agreement with the Government.

If you are interested in becoming eligible to bid on a classified procurement, you must first make it known to an Air Force official that you are capable of manufacturing the product in question. Contract administration officers at the Air Procurement Regional offices, as well as buyers, contracting officers and project engineers, can initiate a security clearance request by submitting the necessary paper work to the Air Provost Marshal at the nearest Air Procurement District. A request for clearance by a subcontractor is processed in the same manner, except that it must first be submitted to the prime contractor, who in turn submits it to the Air Force.

When requesting clearance, you are required to furnish the Air Provost Marshal at the Air Procurement District office serving your locality with pertinent data (on forms supplied by AMC) on all your key employees. He, in turn, forwards the data to the Office of Special Investigation, Washington, D. C. for necessary action.

At the same time an inspection of your facilities is conducted by the Air Provost Marshal from the nearest Air Procurement District Office.

An interim clearance is initiated so that you may have access to certain classified matter without too much delay. The approximate time elements involved in obtaining a security clearance are as follows:

A formal clearance for access to Confidential and Secret material takes about four months. However, an interim clearance for access to Confidential and Restricted matter can be obtained in about two weeks.

Information on Restricted matter may be obtained for bid purposes by executing a security agreement and by submitting an affidavit to the Air Force, stating that owners and key personnel of the company are U. S. citizens. Complete information on this procedure may be obtained from Regional Air Procurement offices.

The security clearance procedure has been streamlined to save valuable production time. The Department of Defense has established a security agreement form to take the place of the three separate agreements (Army, Navy, and Air Force) previously used. Once you sign a Department of Defence Security Agreement, you are cleared for access to classified contract material by all three services, and in the future you will not have to sign separate agreements with each branch of the service.

Qualified Products

The Air Force designates certain items as Qualified Products, that is, products covered by specifications prescribing qualification tests which specify certain standards of performance. Conformance to these standards is a prerequisite to procurement. Manufacturers' products meeting the established standards of performance are listed on the Qualified Products List.

The Air Force requires that a particular item be qualified prior to procurement when any one of the following conditions prevails:

- **The time** required for testing after award will unduly delay delivery of the supplies being purchased.
- **The cost** of repetitive testing is excessive.
- **The tests** require expensive or complicated testing apparatus not commonly available.
- **The interest** of the Government requires assurance, prior to award, that the product is satisfactory for its intended use.
- **The determination** of acceptability requires performance data to supplement technical requirements contained in the specifications.

Only companies whose products have previously been qualified are acceptable in the procurement of qualified products. Each specification for a qualified product gives full details as to where and how the product may be qualified, where to submit samples for specification tests, and all other necessary information concerning such tests. If you apply for qualification testing of your product, you will have to bear the cost of the test and the transportation charges. In addition, the Government will not be liable for any damage to the product that could be caused by shipment or test.

The Air Force will accept the results of qualification tests made by commercial testing laboratories, provided the laboratory is one which has been approved by the Air Force. All of the more important commercial laboratories are known to the Air Force, and approval of their use, if they are qualified to perform the work, is not difficult to obtain.

Each Air Procurement Regional office keeps on file copies of the "Index of Specifications and Publications" which includes a current listing of Air Force qualified products. This list will direct you to the proper engineering laboratory which has specifications responsibility for the item you desire qualified.

Copies of "Provisions Governing Application for Military Qualification Tests" (QPL Summary), dated December 1, 1950, may be obtained from

Commanding General
Wright Air Development Center
Wright-Patterson Air Force Base, Ohio
ATTN: Procurement Requirements Section,
WCXDP-1

VIII
Small Business

A small business is any concern which, including its affiliates, employs in the aggregate fewer than 500 persons.

The Air Force affords every possible assistance to the small business firms interested in obtaining defense work. The Air Force's Small Business Office, operating under simple but effective procedures complies fully with the letter and spirit of:

"The declared policy of the Congress is 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.**

A full-time Small Business Specialist, with an adequate staff, has been appointed in each of the Air Procurement Regional offices. These Specialists are supervised by Small Business Representatives in the six District Small Business offices, which, in turn, are guided by the Office of Small Business located at Headquarters, Air Materiel Command, Dayton, Ohio. Matters pertaining to over-all policy and program determination are handled by the Office of Small Business at Headquarters, USAF in Washington.

The Small Business Specialists in the Regional offices are experienced in the problems confronting small business concerns, and their principal mission is to assist such concerns in getting defense work. In addition, these specialists often are able to offer sound advice on other problems confronting the small businessman, particularly those involving the more technical aspects of Air Force procurement policies and procedures.

If yours is a small business, you can participate in the Air Force procurement program either by becoming a prime contractor to the Air Force, or by obtaining a subcontract from an existing Air Force prime contractor or major subcontractor.

The procedure to be followed in obtaining a prime contract is the same for a small business as for a large business.

However, the Air Force makes certain that small businesses are getting their full "fair proportion of the total purchases and contracts" by a special procedure designed for the purpose.

Every proposed purchase made by the Air Force at AMC is scrutinized by a group of expert analysts who determine the suitability of each item for fabrication by and procurement from small business concerns. Obviously, aircraft or aircraft engines, and similar very large aircraft components, cannot be produced in quantity by small concerns. However, thousands of other items can be, and are, made expertly and economically by such concerns.

Recently the Air Force concluded a procedural agreement with the Small Defense Plant Administration (SDPA) under the policy governing relations between the Department of Defense and SDPA and approved by the Munitions Board.

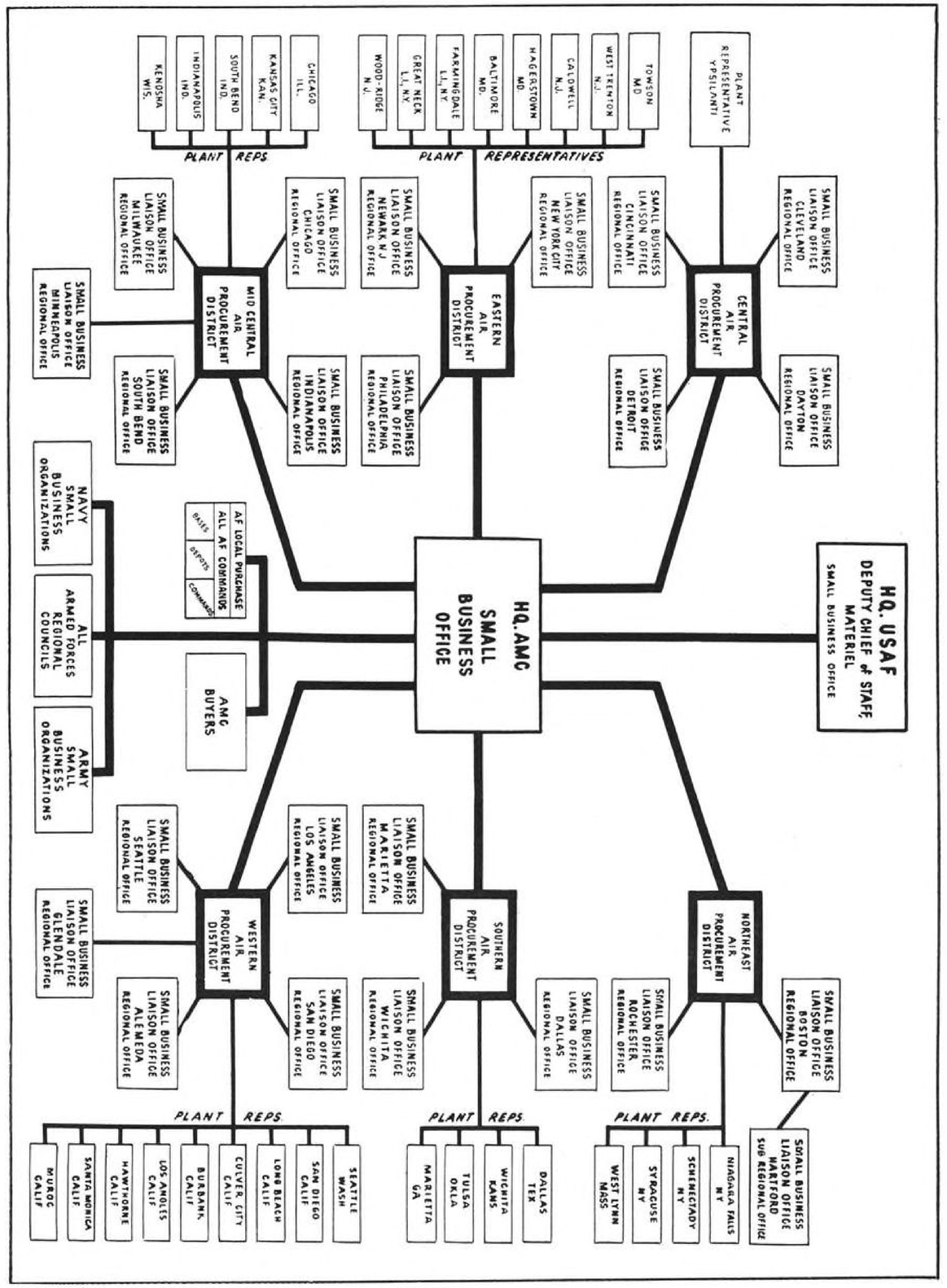
Under this agreement representatives of SDPA will work with small business analysts at AMC in their so-called screening operations.

The group of Small Business Analysts works closely with Air Force buyers on every purchase of items suitable for small business. In appropriate cases the group finds new small business concerns capable of making the required item and, after investigation by Air Procurement Regional and District offices, arranges for them to be added to the Procurement Sources System and thus be asked to submit proposals on negotiated purchases.

Most small concerns, however, will find their greatest opportunities in the subcontracting field. The Air Force provides every possible aid to such concerns in obtaining a subcontract.

In addition, Small Business Specialists in the Regional offices will advise the small businessman of the needs of the prime contractors in his region for subcontracting assistance. Information as to the specific products or processes currently required by the various prime contractors is available to the small businessman, together with advice as to how best to approach the prime contractor.

The Air Force Small Business organization works closely with Chambers of Commerce, Governor's Small Business Commissions, local, regional and national trade associations, and the various organizations in the federal and state governments whose activities directly or indirectly affect the small business program. The ultimate objective, in all cases, is to assist small business enterprises to obtain their fair proportion of defense work.



IX

Subcontracting

One of the most practical means of participating in the Air Force procurement program, especially for firms in the Small Business category, lies in the field of subcontracting.

Air Materiel Command is utilizing every means at its disposal to provide potential subcontractors with information on sources of prime contractors.

In this connection, it must be stressed that subcontractors deal only with prime contractors although the Air Force requires primes to subcontract as much as possible.

The following contract clauses have been approved and made mandatory for use in all cost-type and fixed-price supply and construction contracts in excess of $5,000.

"It is the policy of the Government as declared by Congress to bring about the greatest utilization of small business concerns which is consistent with efficient production.

"The contractor agrees to accomplish the maximum amount of subcontracting to small business concerns that the contractor finds to be consistent with the efficient performance of this contract."

In its constant effort to broaden the industrial base in the total procurement program, the Air Force in March, 1949 instituted the use of Synposis of Contract Awards, which are distributed to Air Procurement Regional and District offices, and to all Department of Commerce field offices. These synopses are used for referring potential subcontractors to holders of unclassified prime contracts. The synopsis includes the name and address of the prime, a thumbnail description of the item purchased, and the dollar value of the contract.

Other Government purchasing agencies compile similar information and forward it weekly to the U. S. Department of Commerce in Chicago. Reports from individual procuring agencies are consolidated into a "Consolidated Synopsis of U. S. Government Procurement Information".

This synopsis is distributed weekly without charge to Chambers of Commerce, Manufacturer's Associations, State and Federal employment offices, and other similar groups throughout the nation. The agencies generally post these synopses on public bulletin boards for reference by interested firms in their areas. In some cases the entire synopsis is reproduced and distributed to members of the organization.

Because the "Consolidated Synopsis" is compiled weekly, the information is up-to-date. Firms which have made extensive use of this service have expressed appreciation for the new business gained through this medium.

If your firm is considered a small business and you are interested in working as a subcontractor, contact your Air Regional Small Business Specialist and ask to be placed on his list of potential subcontractors. He can then refer you to such prime contractors who may have subcontracting requirements for the particular products you are able to supply. It will be helpful to prepare a brochure for use by the Small Business Specialist.

► **What You Can Do**—In addition to taking advantage of the many government-sponsored programs for the assistance of small business in obtaining subcontracts under the defense mobilization program, there are many things the small businessman can do directly with the prime contractors to investigate opportunities for participating in defense production.

A mere declaration of willingness is not enough to obtain a subcontract. The prime contractor will have to make a careful investigation and appraisal of the manufacturing facilities available to a potential subcontractor before any orders can be placed.

Before a potential subcontractor's facility can be evaluated, the prime contractor will need to have complete data as to the capabilities of the subcontractor to perform various types of work. This data should be prepared as briefly as possible and should cover the entire structure of the potential subcontractor's organization. Specifically, the prime manufacturer will need to know the following:

- **Type of work** the company is prepared or equipped to perform, including reference to any previous experience in aircraft work, such as World War II subcontracting, or any other experience with the Air Force, Army, or Navy.
- **Plant** size and location of the plant or plants, including amount of floor space for production, size of bays or other sub-divisions, strength of floors, dimensions of the outlets, etc.
- **Facilities**—a complete list and description, including makes, sizes, model number and capacities, of all the power machinery and equipment available, including equipment on order with expected delivery dates, identified by factory number, and noting its age and condition. Types of processing, treating, plating, or welding facilities. Facilities available for inspection should be listed, as should any facilities available for research.
- **Personnel**—total number of employes, including breakdown of production and other employes, principal officials, proportion of skilled to unskilled workers, special skills, wage scales, and labor resources.
- **Financial**—bank and credit references.
- **Miscellaneous**—facilities for plant security, transportation facilities—rail and highway network, and plant freight handling facilities—technical background, capacity available for additional work, and of course, the names and addresses of both plant and office.

It is recommended that you make the initial contact with the prime contractor by letter, submitting this information. This will save valuable time for both the prime contractor and you and is more likely to obtain early action than personal calls at aircraft plants. It will frequently require several days for the various interested departments of the prime contractor's plant to survey your proposals and to determine whether or not your facilities can be integrated into the prime's current program.

One thing should be remembered: *Prime contractors are just as eager to have qualified subcontractors as they are to secure subcontracts.*

X

You Should Know About—

Production Pools

Production pools were in general use during World War II, and are now authorized by the Defense Production Act of 1950, Section 708. As yet their use has not become widespread. However, it is likely that, as the defense effort accelerates, production pools will again become popular.

Regional Small Business Specialists may be questioned by groups concerning the requirements for the formation of the pool.

To obtain proper approval, the plan of operation of such a pool must be submitted to the Pooling Section, Procurement Assistance Division, Office of Small Business, National Production Authority, United States Department of Commerce. Since such pools may be within the prohibition of the anti-trust laws or the regulations of the Federal Trade Commission, it must be shown that the proposed pool is in the public interest as a contributing factor to the National Defense, in that (1) Defense production will be accelerated by the pool's facilities; or, (2) more effective distribution of the defense contracts among smaller business enterprises and spread of employment will result; or (3) defense production will be further decentralized. Other justifications may be applicable to the particular situation.

Groups planning to form such pools should contact the nearest local office of the National Production Authority for detailed information.

Types of Air Force Contracts

Contracts, which are the legal documents of the business world, are used by the Air Force as by any other large business. Each type of contract is tailored to suit the procurement involved.

► **Fixed Price**

Price established per unit or job without any provision for adjustment. Used for formally advertised purchases, also for negotiated purchases where costs can be forecast with reasonable accuracy.

► **Fixed Price With Redetermination**

Price established by negotiation is subject to adjustment by subsequent further negotiation. Used for negotiated purchases when factors such as uncertainty of cost, long performance time, or other similar reasons prevent reasonably accurate forecast of cost.

► **Cost Contracts** (Including Cost-Plus-Fixed-Fee and Cost Reimbursement without Fee)

These contracts are characterized by the absence of any "price;" the Government's undertaking is to reimburse the contractor for his costs as determined in accordance with a designated standard, and in the case of a cost-plus-fixed-fee contract the contractor is paid a fee for performing the work.

► **Time and Material Contracts**

Provide for payment for materials at cost without profit, and for labor at specified hourly rates which rates include direct labor, overhead, and profit.

► **Letter Contracts**

Temporary contractual instruments, containing descriptions of articles purchased but no prices nor delivery schedule (tentative delivery schedules are now inserted to comply with NPA regulations). Issued when it is essential to give the contractor a binding commitment at once, in order to permit him to proceed without delay pending negotiations and preparation of definitive terms and to incur costs up to a limit stated in the letter contract.

► **Awards**

A written acceptance of a contractor's offer, issued after receiving an acceptable detailed quotation, notifying the contractor of the acceptance of his quotation and thereby constituting an informal contract. It is later superseded by a definitive document.

► **Basic Agreements**

An agreement between the contractor and the Government, setting forth general terms and clauses to be used in specific contracts. Normally a contractor's standard deviations are set forth in addition to many alternate clauses that may be used, depending upon the particular procurement. Individual contracts incorporate the basic agreement and specific alternate clauses by reference, thereby eliminating physical repetition of wordy contract articles.

► **Call Contracts**

An agreement between the Government and a contractor wherein the contractor, for a specific period, agrees to furnish on "Call" of the Government the quantities, specified in the "Call" of those articles described and priced in detail in the contract.

► **Open Contracts**

An agreement between the Government and a contractor wherein the contractor, for a specific period, agrees to furnish on "Call" of the Government, specific articles and quantities thereof, described in the "Call," which are generally described in the contract. The prices for the articles are negotiated after issuance of a "Call."

In both "Open" and "Call" contracts, an exhibit to the contract is prepared by the contractor, setting forth a description of the articles and prices therefor, requested by "Call" which, after approval by the Contracting Officer, is published as an "Exhibit" to the contract.

Bonds

As a prospective Air Force contractor you should understand clearly that you may be required to furnish various types of bonds. The major types of bonds are as follows:

► **Bid Bond**

The purpose of the bid bond is to guarantee acceptance of the contract and compliance with the terms and conditions of the bid if the contract is awarded to the bidder. The terms and conditions include any requirement for performance and payment bonds, prices, deliveries, etc.

A bid bond is required on all Invitations for Bid which require performance or performance and payment bonds. The requirement for and the amount of the bid bond are listed in the Invitation for Bid.

► **Performance Bond**

The performance bond guarantees the contractor's performance and fulfillment of all undertakings, covenants, terms, conditions and agreements of the contract.

Performance bonds are required on all construction contracts exceeding $2,000 in amount, and are normally required on formally advertised procurements for supplies and services when the bid is in excess of $25,000. The requirement for the latter is stated in the Invitation for Bid and the contract. Performance Bonds may also be required at the discretion of the buyer on negotiated contracts for supplies and services.

► **Annual Performance Bond**

The annual performance bond may be used to eliminate the necessity for filing a performance bond with each contract that requires one.

An annual performance bond is submitted to the Air Force for any part of a specific fiscal year (July 1 to June 30, inclusive) and covers all contracts which require performance bonds pertaining to the contractor listed in the conditions clause, up to and including the penal sum set forth in the annual performance bond. It may be written for any amount agreed to by the contractor and the surety of sureties.

► **Payment Bond**

The payment bond guarantees that the contractor will make payments in full to subcontractors, employes, and pay for all supplies and equipment.

Payment bonds are not usually required in connection with contracts other than construction contracts even though performance bonds are required. The requirements for payment bond will be set forth in the Invitation for Bid and contract. However, payment bond will be required in connection with any construction contract exceeding $2,000 in amount. The penal sum of the bond will be set forth in the contract by the contracting officer.

► **Advance Payment Bond**

Advance payment bonds are seldom required due to the security provisions of an advance payment agreement. However, if the bond is required, it must be executed by a corporate or individual surety or sureties. The penal sum of the bond must equal the full amount of the advance payment it supports.

► **Patent Infringement Bond**

Patent infringement bonds will be required only in connection with contracts which contain provision for patent indemnity and then only if a performance bond has not been executed and the financial responsibility of the contractor is unknown or doubtful. Whenever such a bond is required, the penal sum thereof will be in an amount deemed adequate by the contracting officer for the protection of the Government.

► **Miscellaneous Bonds**

At the discretion of the contracting officer other types of bonds may occasionally be required in connection with Air Force contracts. In such cases, the details of the bond are worked out with the contractor.

Facility Capability Report

In order to protect the interests of the Government, as well as the contractor, the Air Force has established a Facility Capability Report which is initiated by the buyer prior to the award of any procurement in excess of $10,000.

This report is requested from the appropriate Air Procurement District by the buyer after he has evaluated all bids or proposals from prospective sources. On the basis of the contract information submitted by the buyer, the district bases its report about the firm tentatively selected for award on the following:

- Are the firm's present facilities satisfactory to perform the contract being considered for award?
- Is the firm's financial stability sufficient to perform the contract being considered for award?
- Does the firm have the necessary production capabilities in consideration of present production load and past performance?
- Are the business ethics of the firm above reproach?
- What percent of subcontracting is comtemplated?

The Facility Capability Report, among other pertinent data, is used as a criterion in determining if the contract award will be made to the firm tentatively selected for award by the buyer.

Financial Aid

It is the policy of the Air Force to require contractors to be able to perform their contracts either with their own funds or with financial assistance from sources other than the government. Government assistance may, however, be granted in appropriate cases, preference as to method of assistance being:

- **Partial Payments**
- **Guaranteed Loans**
- **Advance Payments**

► **Partial Payments**

Partial payments, also called progress payments, provide reimbursement of 75% of the contractor's costs or 90% of labor and materials as incurred before he is able to obtain definitive payment by delivering complete articles. When completed articles are delivered, the amounts previously paid as progress payments are recouped. Progress payments are authorized at the discretion of the buyers. To operate satisfactorily with progress payments, a contractor must have sufficient funds to meet his payrolls as they fall due, since he cannot be reimbursed until after he has paid his laborers. The contractor must also have sufficient credit to be able to obtain shipment of purchased parts and materials, since he cannot seek reimbursement until he has incurred the debt for these items. In no event shall the total of a partial payment exceed 80% of the total contract price.

► **Guaranteed Loans**

Guaranteed loans are bank loans, negotiated between the contractor and a bank of his own selection, repayment of which the government guarantees up to a stipulated percentage of the loan value. The guarantee is executed by the Federal Reserve Bank, as fiscal agent of the Air Force, after certification as to the eligibility of the contractor by Headquarters AMC and after investigation and approval by Headquarters USAF.

► **Advance Payments**

Advance payments are moneys made available to a contractor without his having first laid out his own funds or incurred liabilities in performance of the contract. Advance payment funds are initially deposited in a special account subject to countersignature by the administrating contracting officer and the contractor from which they are transferred to the contractor's unrestricted account as the deed arises. Adequate security is required to be furnished by the contractor. Payments falling due to the contractor for delivered items, or as reimbursements for costs incurred, are made into the special account, which thus becomes a revolving fund subject to alternating withdrawals and replenishments. Advance payments can be authorized only by the Assistant Secretary of the Air Force under provisions of the Armed Services Procurement Act of 1947. Advance payments must be used to offset costs on a specific contract and may not be used for costs incurred in increasing facilities.

Specifications

Because specifications are continually being revised, the Air Force does not normally furnish them until procurement of the item is initiated. At that time copies of appropriate specifications are furnished with the Invitations for Bid and Requests for Proposals. Each Air Procurement Regional office is furnished drawings and specifications at the time IFBs and RFPs are issued, and maintains a file of individual specifications that can be inspected upon request.

Reproduction and distribution of Air Force specifications are extremely expensive operations. Consequently, prompt consideration of requests for copies is given only when made in connection with a proposed bid. Because of the tremendous workload involved in present operations, requests for specifications for other than a proposed procurement must wait. However, they will be serviced. The Air Force asks that requests be kept to a minimum and then made only when absolutely necessary in the best interest of national defense.

If you require a particular Air Force specification, your request should include the specification number and title, and be directed to either the Commanding General, Wright Air Development Center, Wright-Patterson Air Force Base, Ohio, Attn: WCXDP, or the Air Procurement Regional Office in your area. Requests for specifications of branches of the Armed Services other than the Air Force should be addressed to the specific Department concerned.

Gratuities

Air Force procurement activities are subject to the provisions of the various public laws and regulations which apply to the expenditure of public funds. Certain laws apply to those personnel charged with the responsibility of negotiating or administering Government contracts.

In the conduct of private business certain customs have become established. Practices considered ethical include gifts for personal or family use, special discounts, and other valuable favors. In the conduct of Government business these customs must be avoided in order that applicable laws may not be violated. Not only the letter but also the spirit of the law must be observed.

It is our firm desire that all phases of Air Force procurement be accomplished in such a manner that no suspicion or criticism, however slight, can result. Personnel, both military and civilian, are cognizant of the stringent laws and regulations which govern their conduct as representatives of the Government and endeavor to comply therewith.

The cooperation of industrial firms in carrying out these policies as set forth will be appreciated by all personnel of the Air Materiel Command.

Selling Agents

The "Covenant Against Contingent Fees" clause which is included in all Air Force contracts is a warranty by the contractor that he 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, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the contractor for the purpose of securing business."

Although not considered illegal within the meaning of the clause referred to above, "contingent fees" are subject to scrutiny by Air Force procurement officials. If considered out of line with the value of the services rendered, they are subject to negotiation and elimination from the price to the same extent as other cost elements of a negotiation.

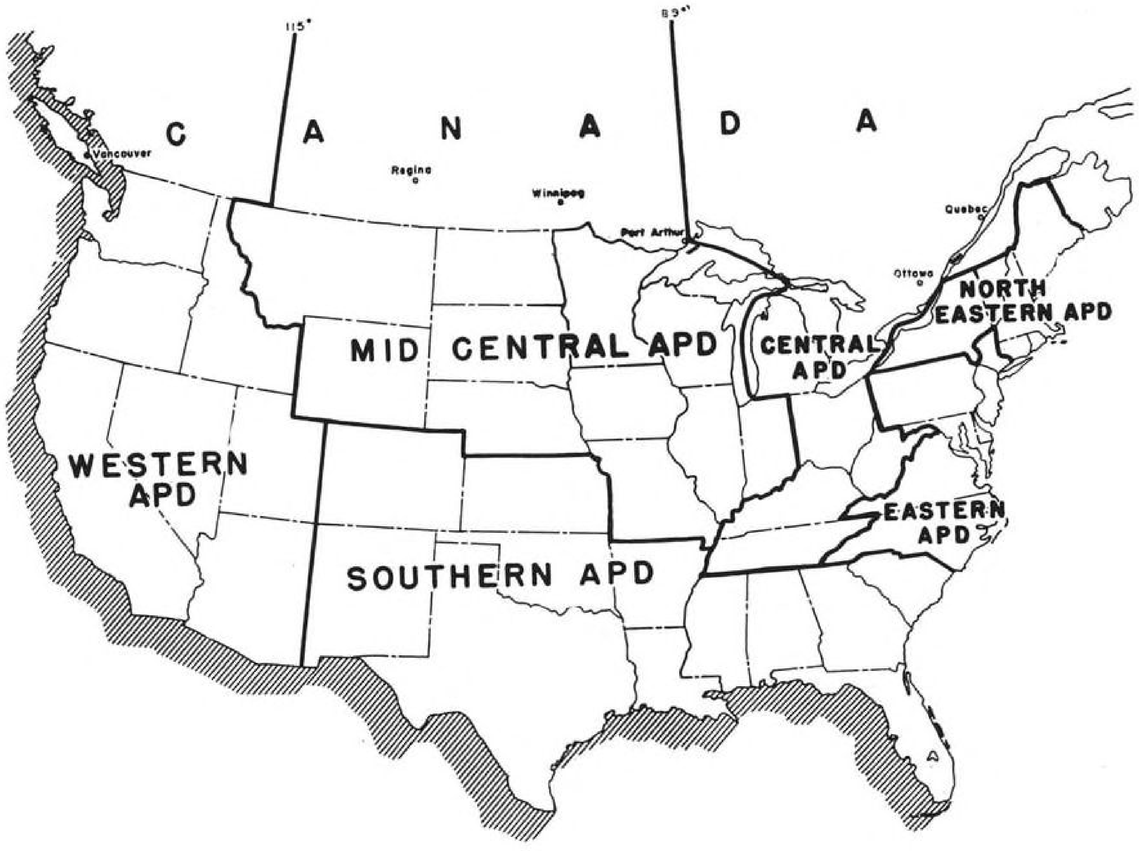
Frequently Used Abbreviations

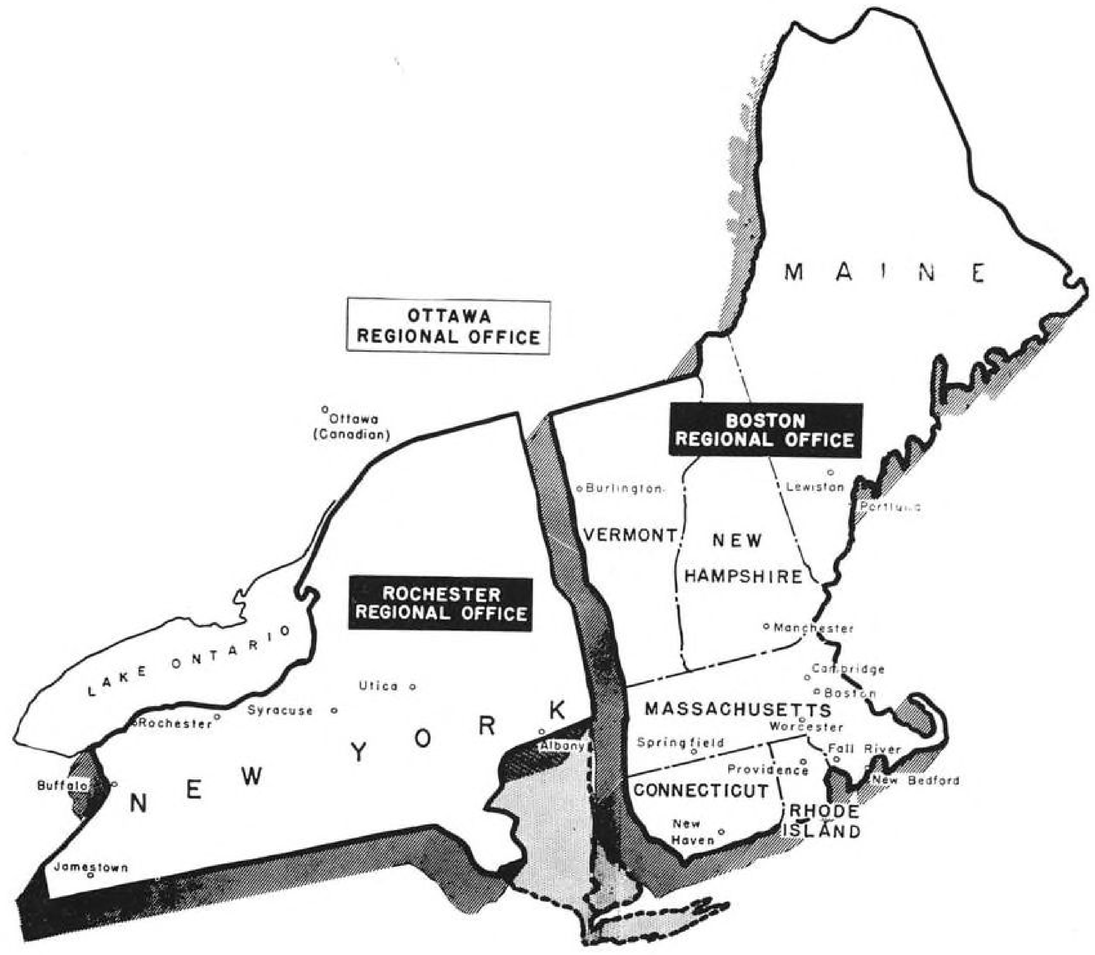
The following is a list of abbreviations that you will, at one time or another, come in contact with. This list is by no means complete, but it does include the more frequently used terms in AFPP (Air Force Procurement Procedures).

AF—Air Force
AFB—Air Force Base
AFM—Air Force Manual
AFPP—Air Force Procurement Procedures
AFPR—Air Force Plant Representative
AGO—Adjutant General Office
AMA—Air Materiel Area
AMC—Air Materiel Command
APD—Air Procurement District
ARDC—Air Research & Development Command
ARR—Air Regional Representative
ASPR—Armed Services Procurement Regulation
CFE—Contractor Furnished Equipment
CG—Commanding General
CO—Contracting Officer & Commanding Officer
CPFF—Cost Plus Fixed Fee
DD—Department of Defense
DN—Director Notice
DOI—Director Office Instruction
FP—Fixed Price
GFAE—Government Furnished Aircraft Equipment
GFP—Government Furnished Property
HOI—Headquarters Office Instruction
IG—Inspector General
IFB—Invitation For Bid
JAG—Judge Advocate General
MDAP—Mutual Defense Assistance Program
MR—Manufacturers Representative
NPA—National Production Authority
PIO—Public Information Officer
PR—Purchase Request
QC—Quality Control
RFP—Request For Proposal
SDPA—Small Defense Plant Administration
TM—Technical Manual
TO—Technical Order
WADC—Wright Air Development Center
WPAFB—Wright-Patterson Air Force Base

Appendix

Geographical Boundaries of Air Procurement Districts





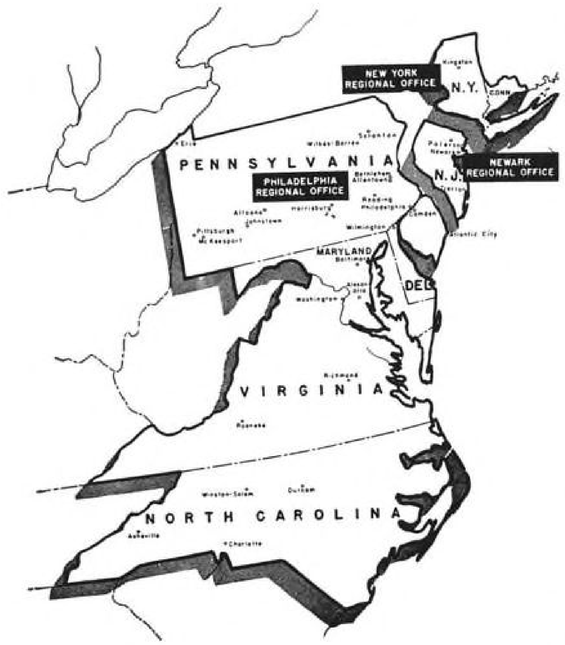
Northeastern Air Procurement District

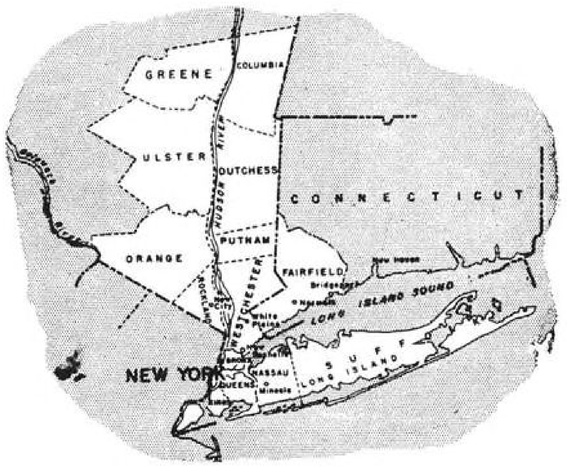
►**NORTHEASTERN AIR PROCUREMENT DISTRICT** serves Maine, Vermont, Massachusetts, Rhode Island, New Hampshire, Connecticut (excluding Fairfield County) and New York State north and west of, but not including Orange, Ulster, Greene and Columbia Counties.
- **Address:** Commanding Officer, Northeastern Air Procurement District, 14 Court Square, Boston 8, Mass.
- **Telephone:** Lafayette 3-7550
- **Commanding Officer:** Col. William P. Farnsworth

►**BOSTON AIR REGIONAL OFFICE** serves Maine, New Hampshire, Vermont, Massachusetts (excluding Air Force Plant Representative at General Electric Co. River Works, W. Lynn), Rhode Island and Connecticut (excluding Fairfield County).
- **Address:** Air Regional Representative, Boston Air Regional Office, 10 West Street, Boston 11, Mass.
- **Telephone:** Liberty 2-3520
- **Air Regional Representative:** Lt. Col. Horace Cannon

►**ROCHESTER AIR REGIONAL OFFICE** serves New York State north and west of, but not including Ulster, Orange, Green and Columbia Counties, and excluding the AFPRs at GE-Schenectady and Syracuse, and Bell Aircraft Corp., Niagara Falls.
- **Address:** Air Regional Representative, Rochester Air Regional Office, 20 Symington Place, Rochester 3, N. Y.
- **Telephone:** Genesee 1815
- **Air Regional Representative:** Lt. Col. Richard F. Ames.

Eastern Air Procurement District





►**EASTERN AIR PROCUREMENT DISTRICT** serves New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, District of Columbia, New York State south and east of, and including Orange, Ulster, Greene, and Columbia Counties, and New York City and Long Island, and Fairfield County in Connecticut.

Address: Commanding General, Eastern Air Procurement District, 655 Madison Avenue, New York 21, N. Y.
- **Telephone:** Templeton 8-9300
- **Commanding General:** Maj. Gen. Arthur Thomas

►**NEW YORK AIR REGIONAL OFFICE** serves Bronx, Columbia, Dutchess, Greene, Kings, Nassau, New York, Orange, Putnam, Queens, Rockland, Suffolk, Ulster and Westchester Counties in New York State, and Fairfield County, Connecticut

- **Address:** Air Regional Representative, New York Air Regional Office, 67 Broad Street, New York 4, N. Y.
- **Telephone:** Digby 4-9600
- **Air Regional Representative:** Col. Albert W. James

►**NEWARK AIR REGIONAL OFFICE** serves Bergen, Essex, Hudson, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex, Union and Warren Counties in New Jersey, and Richmond County in New York.

- **Address:** Air Regional Representative, Newark Air Regional Office, 218 Market Street, Newark, N. J.
- **Telephone:** Mitchell 3-3434
- **Air Regional Representative:** Col. Richard D. White

►**PHILADELPHIA AIR REGIONAL OFFICE** serves Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, and Salem Counties in New Jersey, Delaware, Maryland, North Carolina, Pennsylvania, Virginia and District of Columbia.

- **Address:** Air Regional Representative, Philadelphia Air Regional Office, 1411 Walnut Street, Philadelphia 2, Pa.
- **Telephone:** Locust 7-3886
- **Air Regional Representative:** Col. Douglas L. Rundquist

Central Air Procurement District

►**CENTRAL AIR PROCUREMENT DISTRICT** serves Ohio, West Virginia, Kentucky, Tennessee, lower peninsula of Michigan and all of Canada.
- **Address:** Commanding Officer, Central Air Procurement District, W. Warren Avenue & Lonyo Boulevard, Detroit 32, Mich.
- **Telephone:** Texas 4-6000
- **Commanding Officer:** Col. Russell Keillor

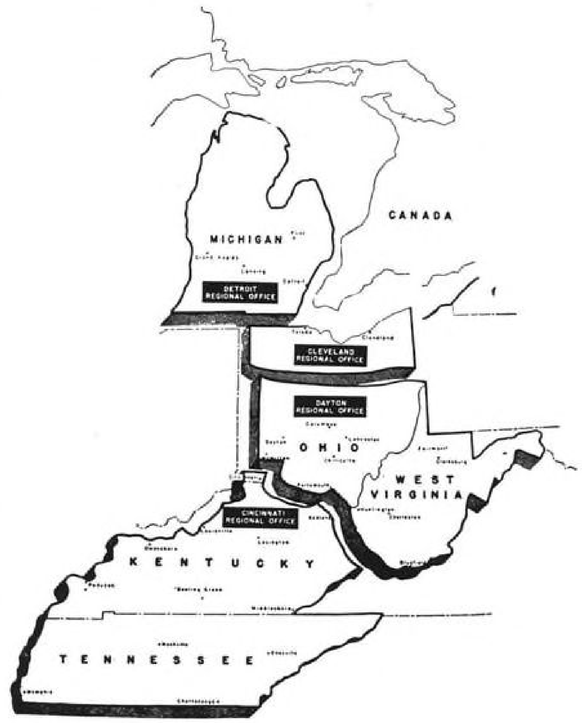
►**DETROIT AIR REGIONAL OFFICE** serves lower peninsula of Michigan.
- **Address:** Air Regional Representative, Detroit Air Regional Office, W. Warren Avenue & Lonyo Boulevard, Detroit 32, Mich.
- **Telephone:** Texas 4-6000
- **Air Regional Representative:** Lt. Col. George A. Miller

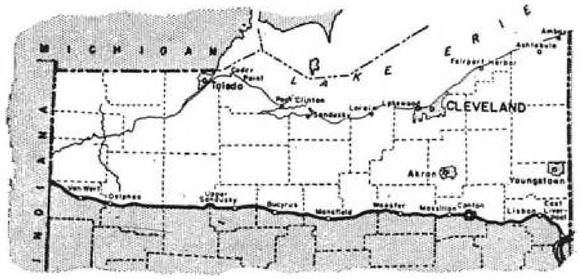
►**CLEVELAND AIR REGIONAL OFFICE** serves portion of Ohio north of Highway 30 and 30N, and cities located on the highway.
- **Address:** Air Regional Representative, Cleveland Air Regional Office, 1279 West Third Street, Cleveland 13, Ohio
- **Telephone:** Cherry 1-7900
- **Air Regional Representative:** Lt. Col. John A. Hampton

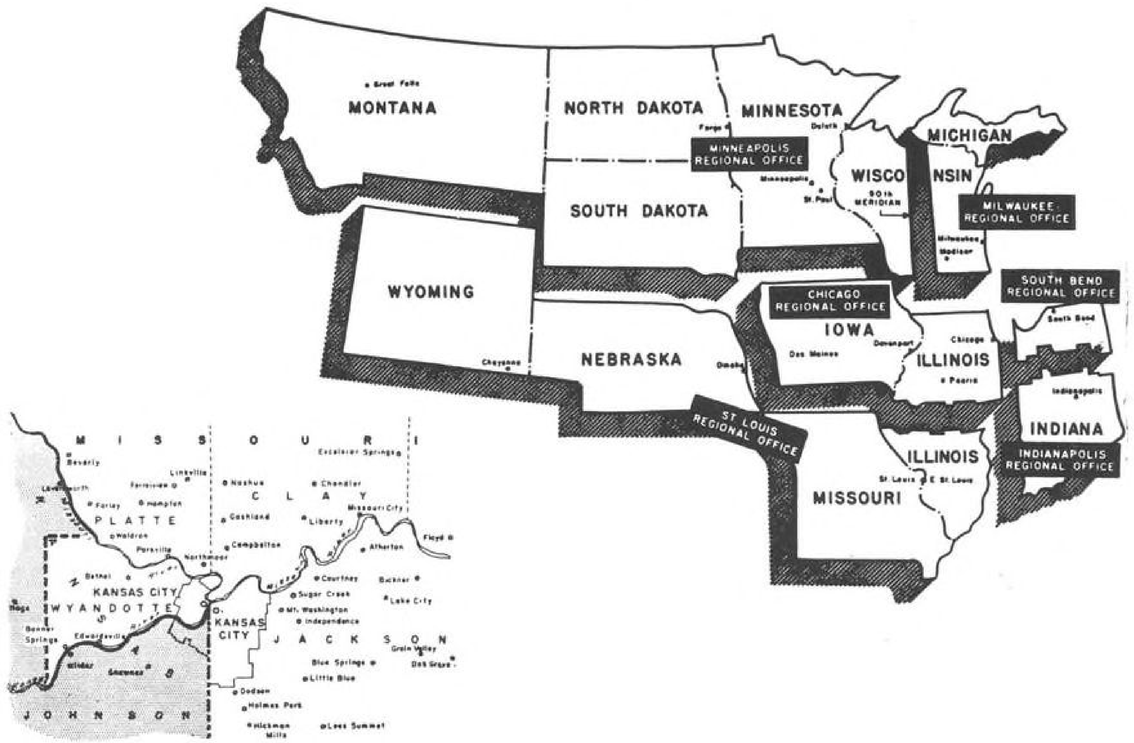
►**DAYTON AIR REGIONAL OFFICE** serves West Virginia and southern part of Ohio excluding Hamilton County.
- **Address:** Air Regional Representative, Dayton Air Regional Office, Fourth Floor, U. B. Building, Fourth & Main Streets, Dayton 2, Ohio
- **Telephone:** Hemlock 0481
- **Air Regional Representative:** Lt. Col. Lawrence H. Prugh

►**CINCINNATI AIR REGIONAL OFFICE** serves Hamilton County, Ohio, Kentucky and Tennessee.
- **Address:** Air Regional Representative, Cincinnati Air Regional Office, Third Floor, Big Four Railroad Building, Cincinnati 2, Ohio
- **Telephone:** Dunbar 2200
- **Air Regional Representative:** Lt. Col. Morris J. Drobeck

►**CANADIAN AIR REGIONAL OFFICE** serves all of Canada.
- **Address:** Air Regional Representative, Canadian Air Regional Office, 220 Temporary Building 4, Ottawa, Ontario, Canada
- **Telephone:** 2-8211
- **Air Regional Representative:** Maj. Wilson O. Henderson







Midcentral Air Procurement District

► **MIDCENTRAL AIR PROCUREMENT DISTRICT** serves Indiana, Illinois, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Montana, Nebraska, Wyoming, upper peninsula of Michigan, and Wyandotte County of Kansas.
- **Address:** Commanding Officer, Midcentral Air Procurement District, 165 North Canal Street, Chicago 6, Ill.
- **Telephone:** State 2-2640
- **Commanding Officer:** Col. Robert L. Finkenstaedt

► **MINNEAPOLIS AIR REGIONAL OFFICE** serves Minnesota, North Dakota, South Dakota, Montana and the portion of Wisconsin west of the ninetieth meridian.
- **Address:** Air Regional Representative, Minneapolis Air Regional Office, 920 Second Avenue, South, Minneapolis, Minn.
- **Telephone:** Atlantic 0115
- **Air Regional Representative:** Lt. Col. James J. O'Donovan

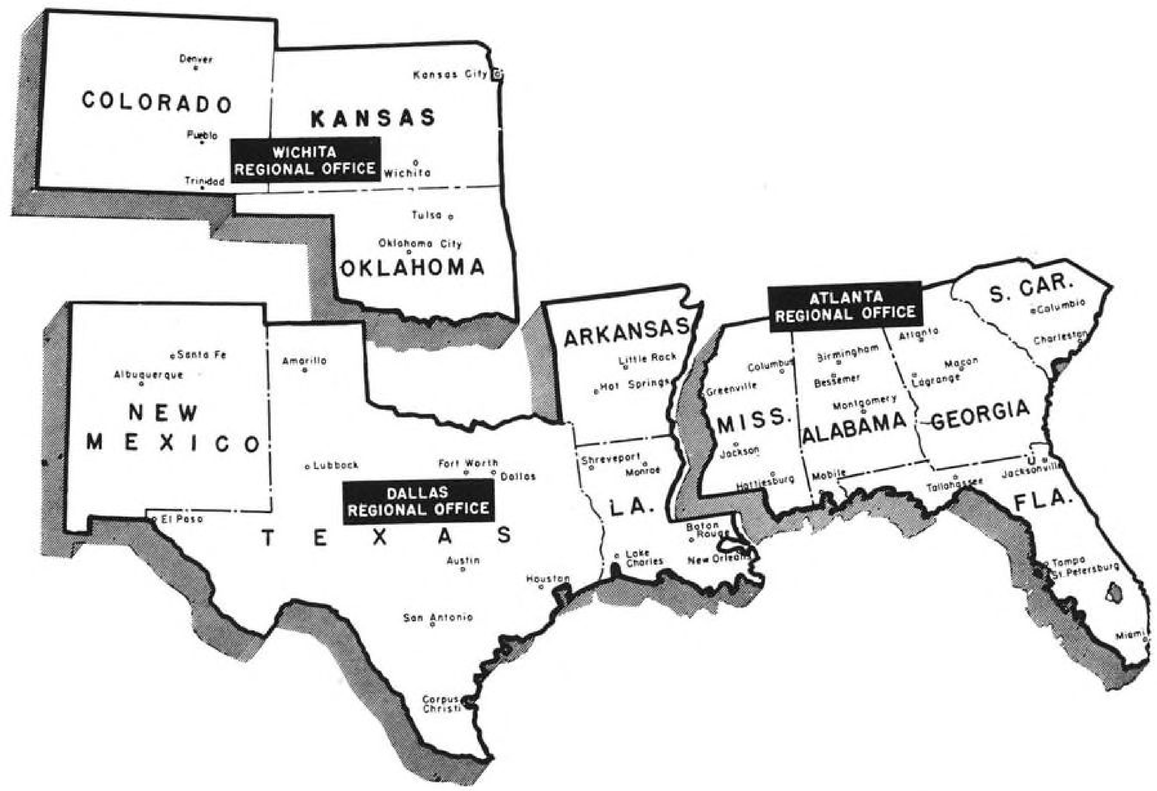
► **CHICAGO AIR REGIONAL OFFICE** serves Iowa and Illinois above the northern boundaries of Adams, Brown, Cass, Douglas, Edgar, Macon, Menard, Moultrie and Sangamon Counties.
- **Address:** Air Regional Representative, Chicago Air Regional Office, 165 North Canal Street, Chicago 6, Ill.
- **Telephone:** State 2-2640
- **Air Regional Representative:** Lt. Col. Edmond E. Brzuska

► **ST. LOUIS AIR REGIONAL OFFICE** serves Missouri, Wyandotte County, Kansas, Nebraska, Wyoming and the portion of Illinois below the northern boundary of Adams, Brown, Cass, Douglas, Edgar, Macon, Menard, Moultrie and Sangamon Counties.
- **Address:** Air Regional Representative, St. Louis Air Regional Office, 8008 Carondelet Avenue, Clayton 5, Mo.
- **Telephone:** Parkview 55250
- **Air Regional Representative:** Lt. Col. Donald E. Sowle

► **MILWAUKEE AIR REGIONAL OFFICE** serves upper peninsula of Michigan and the portion of Wisconsin east of the nineteenth meridian.
- **Address:** Air Regional Representative, Milwaukee Air Regional Office, 770 N. Plankinton Avenue, Milwaukee, Wisc.
- **Telephone:** Broadway 2-4093
- **Air Regional Representative:** Maj. Robert N. Smith

► **SOUTH BEND AIR REGIONAL OFFICE** serves the portion of Indiana north of the southern boundaries of Benton, White, Blackford, Cass, Miami, Huntington, Wabash and Jay Counties.
- **Address:** Air Regional Representative, South Bend Air Regional Office, 521 North Eclipse Place, South Bend 20, Ind.
- **Telephone:** South Bend 3-2101
- **Air Regional Representative:** Lt. Col. Wilbert C. Clinton

► **INDIANAPOLIS AIR REGIONAL OFFICE** serves the portion of Indiana south of the southern boundaries of Benton, White, Blackford, Cass, Miami, Huntington, Wabash and Jay Counties.
- **Address:** Air Regional Representative, Indianapolis Air Regional Office, Seventh Floor, Test Building, 54 Monument Circle, Indianapolis, Ind.
- **Telephone:** Market 1561
- **Air Regional Representative:** Lt. Col. James D. Frye



Southern Air Procurement District

► **SOUTHERN AIR PROCUREMENT DISTRICT** serves South Carolina, Georgia, Florida, Alabama, Louisiana, Mississippi, Arkansas, Oklahoma, Texas, Colorado; New Mexico, Kansas (excluding Wyandotte County).
- **Address:** Commanding Officer, Southern Air Procurement District, 3309 Winthrop Place, P. O. Box 9038, Fort Worth 7, Texas
- **Telephone:** Sunset 6503
- **Commanding Officer:** Col. William S. McDuffee

► **ATLANTA AIR REGIONAL OFFICE** serves Georgia, Mississippi, Alabama, South Carolina and Florida.
- **Address:** Air Regional Representative, Atlanta Air Regional Office, Belle Isle Building, 40 Houston Street, N. E., Atlanta, Ga.
- **Telephone:** Walnut 4121
- **Air Regional Representative:** Lt. Col. Roy Whisenhunt

► **DALLAS AIR REGIONAL OFFICE** serves Texas, Louisiana, New Mexico and Arkansas.
- **Address:** Air Regional Representative, Dallas Air Regional Office, 1407 Ross Avenue, Dallas, Texas
- **Telephone:** Riverside 6951
- **Air Regional Representative:** Lt. Col. John H. Disbro

► **WICHITA AIR REGIONAL OFFICE** serves Kansas (excluding Wyandotte County), Oklahoma and Colorado.
- **Address:** Air Regional Representative, Wichita Air Regional Office, P. O. Box 1941, Wichita 1, Kans.
- **Telephone:** 4-4365
- **Air Regional Representative:** Lt. Col. Carlos C. Pratt

Western Air Procurement District

►**WESTERN AIR PROCUREMENT DISTRICT** serves Idaho, Utah, Arizona, Washington, Oregon, Nevada and California.
- **Address:** Commanding General, Western Air Procurement District, 155 West Washington Boulevard, P. O. Box 3849, Terminal Annex, Los Angeles 54, Calif.
- **Telephone:** Prospect 4711
- **Commanding General:** Maj. Gen. William M. Morgan

►**SEATTLE AIR REGIONAL OFFICE** serves Washington, Oregon and Idaho.
- **Address:** Air Regional Representative, Seattle Air Regional Office, c/o Boeing Airplane Co., Seattle 14, Wash.
- **Telephone:** Mohawk 3333
- **Air Regional Representative:** Col. Waymond A. Davis

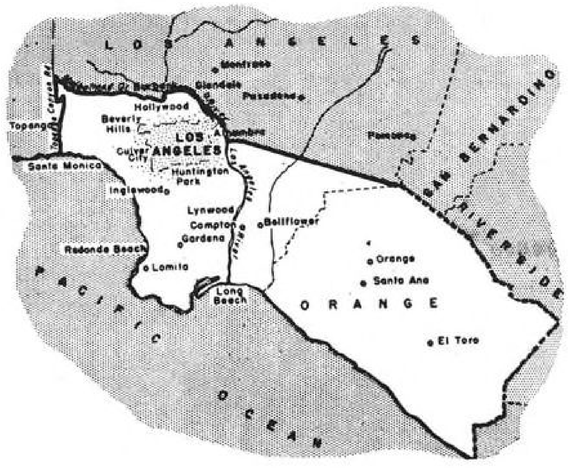
►**SAN FRANCISCO-OAKLAND AIR REGIONAL OFFICE** serves Utah, and California and Nevada north of the northern boundary of the Glendale Region.
- **Address:** Air Regional Representative, San Francisco-Oakland Air Regional Office, Fifth Floor, Jurgens Corder Building, 1515 Clay Street, Oakland 12, Calif.
- **Telephone:** Twin Oaks 3-6330
- **Air Regional Representative:** Maj. Bert R. Eckstein

►**GLENDALE AIR REGIONAL OFFICE** serves Los Angeles County north of northern boundary of Los Angeles Region, Ventura, San Luis Obispo, Santa Barbara, Kern, San Bernardino and Riverside Counties, California, and Clark County, Nevada.
- **Address:** Air Regional Representative, Glendale Air Regional Office, 1401 Airway Drive, Glendale, California
- **Telephone:** Citrus 4-3173
- **Air Regional Representative:** Col. Daniel A. Cooper

►**LOS ANGELES AIR REGIONAL OFFICE** serves Orange County and the portion of Los Angeles County south of a line drawn from the Pacific Ocean north on Topanga Canyon Road, east on Mulholland Drive and Barham Boulevard, east and south on the Los Angeles River, east on Macy Street and U.S. Highway 60, and southeast on Orange Grove Avenue (Pomona) to the Los Angeles-San Bernardino County line.
- **Address:** Air Regional Representative, Los Angeles Air Regional Office, P. O. Box 2642, Terminal Annex, Los Angeles 54, Calif.
- **Telephone:** Prospect 4711
- **Air Regional Representative:** Col. Edmund P. Gaines

►**SAN DIEGO AIR REGIONAL OFFICE** serves Imperial and San Diego Counties, California.
- **Address:** Air Regional Representative, San Diego Air Regional Office, 3165 Pacific Highway, P. O. Box 1950, San Diego 12, Calif.
- **Telephone:** Woodcrest 6611
- **Air Regional Representative:** Lt. Col. Stephen P. Dillon

►**TUCSON AIR REGIONAL OFFICE** serves Arizona.
- **Address:** Air Regional Representative, Tucson Air Regional Office, c/o Grand Central Aircraft Co., Municipal Airport, Tucson, Ariz.
- **Telephone:** Tucson 31791 or 38611
- **Air Regional Representative:** Lt. Col. James L. Pattillo



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INJECTION MOLDED GRADES:

MYCALEX 410

MYCALEX 410 IS APPROVED FULLY AS GRADE L-4B UNDER NATIONAL MILITARY ESTABLISHMENT SPECIFICATION JAN-I-10 "INSULATING MATERIALS, CERAMIC, RADIO, CLASS L." CAN BE INJECTION MOLDED, WITH OR WITHOUT METAL INSERTS, TO EXTREMELY CLOSE TOLERANCES.

CHARACTERISTICS

Power Factor, 1 megacycle	0.0015
Dielectric Constant, 1 megacycle	9.2
Loss factor, 1 megacycle	0.014
Dielectric Strength, volts/mil	400
Volume Resistivity, ohm-cm	$1x10^{15}$
Arc Resistance, seconds	250
Impact Strength, Izod ft.-lb./in. of notch	0.7
Max. Safe Operating Temp. °C	350
°F	660
Water Absorption, % in 24 hours	nil
Coefficient of Linear Expansion, °C	$11x10^{-6}$
Tensile Strength, psi	6000
Compression Strength, psi	25000

★ ★ ★

MYCALEX 410X

MYCALEX 410X CAN BE INJECTION MOLDED, WITH OR WITHOUT METAL INSERTS, TO EXTREMELY CLOSE TOLERANCES.

CHARACTERISTICS

Power Factor, 1 megacycle	0.012
Dielectric Constant, 1 megacycle	6.9
Loss factor, 1 megacycle	0.083
Dielectric Strength, volts/mil	400
Volume Resistivity, ohm-cm	$5x10^{14}$
Arc Resistance, seconds	250
Impact Strength, Izod ft.-lb./in. of notch	0.6
Max. Safe Operating Temp., °C	350
°F	660
Water Absorption, % in 24 hours	nil
Coefficient of Linear Expansion, °C	$12x10^{-6}$
Tensile Strength, psi	6000
Compressive Strength, psi	28000

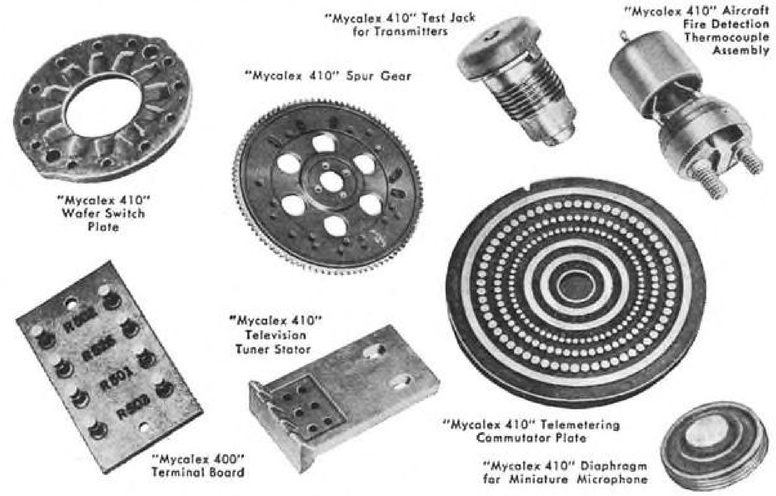
—a superior inorganic glass-bonded mica insulation featuring—

- LOW LOSS — HIGH EFFICIENCY
- HIGH DIELECTRIC STRENGTH
- IMPERVIOUS TO OIL OR WATER
- FREEDOM FROM CARBONIZATION
- PERMANENT DIMENSIONAL STABILITY
- WITHSTANDS HIGH TEMPERATURE
- IMMUNE TO HUMIDITY
- EXCELLENT MECHANICAL CHARACTERISTICS

AVAILABLE IN SHEETS, RODS, AND FABRICATED TO SPECIAL SHAPES

—economical, widely applicable machines and molds to close tolerances

Mycalex is a highly developed glass-bonded mica insulation backed by over a quarter-century of continued research and successful performance. In its present high state of development, MYCALEX combines every important characteristic demanded of a modern, permanent, efficient electrical insulating material. MYCALEX is supplied in sheets or rods, can be injection or compression molded to close tolerance, is readily machineable, and can be fabricated in practically any size or shape. Dielectric losses are very low from 60 cycles to 24 kilomegacycles per second, arc resistance, volume resistivity and other electrical characteristics meet the most rigorous requirements. Physical properties are equally advantageous.



CAN BE TAPPED, DRILLED, THREADED GROUND, OR MOLDED WITH INSERTS

MACHINEABLE GRADES:

MYCALEX 400

MYCALEX 400 IS APPROVED FULLY AS GRADE L-4A UNDER NATIONAL MILITARY ESTABLISHMENT SPECIFICATION JAN-I-10 "INSULATING MATERIALS, CERAMIC, RADIO, CLASS L."

CHARACTERISTICS

Power Factor, 1 megacycle	0.0018
Dielectric Constant, 1 megacycle	7.4
Loss Factor, 1 megacycle	0.013
Dielectric Strength, volts/mil	500
Volume Resistivity, ohm-cm	$2x10^{15}$
Arc Resistance, seconds	300
Impact Strength, Izod, ft.-lb./in. of notch	1.85
Max. Safe Operating Temp., °C	370
°F	700
Water Absorption, % in 24 hours	nil
Coefficient of Linear Expansion, °C	$10.2x10^{-6}$
Tensile Strength, psi	6000
Compressive Strength, psi	35000

★ ★ ★

MYCALEX K-10

CHARACTERISTICS

Dielectric Constant, 1 megacycle	10.6
Q Factor, 1 megacycle	310
Loss factor, 1 megacycle	0.034
Volume Resistivity, ohm-cm	$3.0x10^{14}$
Dielectric Strength, volts/mil (0.10 in. thickness)	270
Fractional Decrease of Capacitance with Temperature Change	0.0056
Fractional Increase of Capacitance with Temperature Change	0.0076
Max. Safe Operation Temperature, °C	400

MYCALEX K EMBRACES AN ENTIRE SERIES OF CAPACITOR DIELECTRICS, EACH WITH SPECIFIC CHARACTERISTICS. THESE CAN BE SUPPLIED ON SPECIAL ORDER IN SHEETS 14" x 18" IN AREA AND FROM 1/8" TO 1" IN THICKNESS, ALSO AVAILABLE IN RODS. MYCALEX K CAN BE MACHINED, AND MYCALEX KM MOLDED TO CLOSE TOLERANCES.

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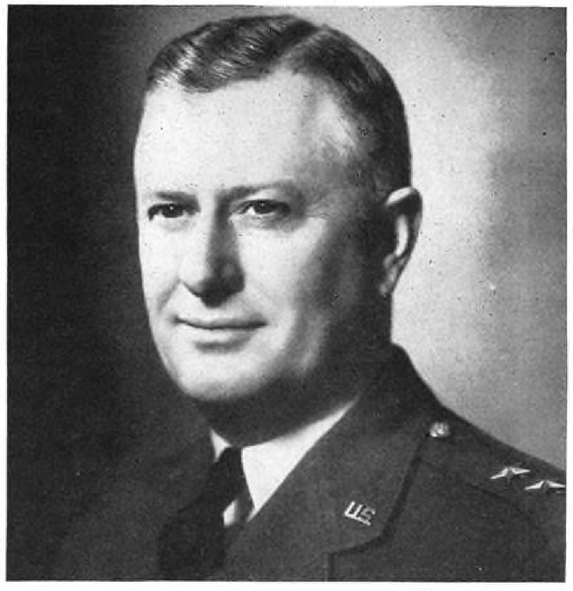
HOW AMC WORKS

LT. GEN. E. W. RAWLINGS, Commanding General,

exercises command over the Air Materiel Command, and is charged with executing all lawful orders and directions of superior authority transmitted to him. Is responsible for the formulation and establishment of policies and plans to accomplish the Air Materiel Command mission and for their execution.



MAJ. GEN. W. H. TUNNER, Deputy Commander,

acts as the officer through whom the Commanding General exercises command over the Air Materiel Command. He performs the duties of the commanding officer in the latter's absence.

MAJ. GEN. G. W. MUNDY, Assistant Deputy Commander,

is assistant to both the Commanding General and the Deputy Commander. Exercises supervision over administration, organization and procedures within headquarters, Air Materiel Command and resolves problems relating to administration and operation of headquarters components or field activities.

COL. L. J. ANDERSON,

Executive, transmits the decisions of the Commanding General to appropriate staff officers; insures that the orders are promptly and thoroughly executed; exercises general supervision over the administrative management, command, liaison, legislative liaison and historical matters within headquarters, AMC keeps CG informed on AMC matters.

MAJ. GEN. C. S. IRVINE,

Deputy Commander for Production, coordinates and supervises all phases of production as they affect headquarters AMC components, other armed services, other governmental agencies and industry, issues orders to AMC directors on matters affecting production and makes commitments in the name of the Commanding General to activities outside of AMC.

BRIG. GEN. W. T. HEFLEY,

Assistant for Materiel Program Coordination, advises the Commanding General on matters pertaining to and monitors the accomplishment of the command plans, programs, and materiel-requirements computations. He maintains cognizance of the status of the accomplishment of the Air Materiel Command mission in its various spheres.

The AMC Mission: Support for USAF

To most of industry, the Air Materiel Command is a gigantic purchasing agency run somewhat along business lines. To the United States Air Force, AMC is considerably more than that. And purchasing is only one of its functions.

Air Force regulations say these are the missions of the Air Materiel Command:

"To provide adequate and efficient system of procurement, production, maintenance, and supply for the United States Air Force.

"To provide general over-all logistical support for all activities and agencies of the United States Air Force.

"To train specialized units for the accomplishment of specified logistical functions in overseas areas and theaters."

In performance of that mission, AMC gets into many things other than plain purchasing. Its job goes away back, to the setting up of production lines to furnish items to be purchased; the job continues long after purchasing, in assuring that the items reach the Air Force consumers in time and in proper condition. In between the two extremes of production methods and packaging and shipment are a host of detail jobs.

On this and the preceding page are shown the top officers, and their functions, who organize and direct what in its essentials is a logistics operation.

► **One of Several**—The key to understanding how AMC works is the realization that it is one of several commands in the Air Force. It is not independent; it does not exist to serve its own ends alone. The commanding general of AMC is responsible directly to the chief of the Air Staff. Nevertheless, he has to coordinate closely with other staff posts, such as the Deputy Chief of Air Staff for Materiel.

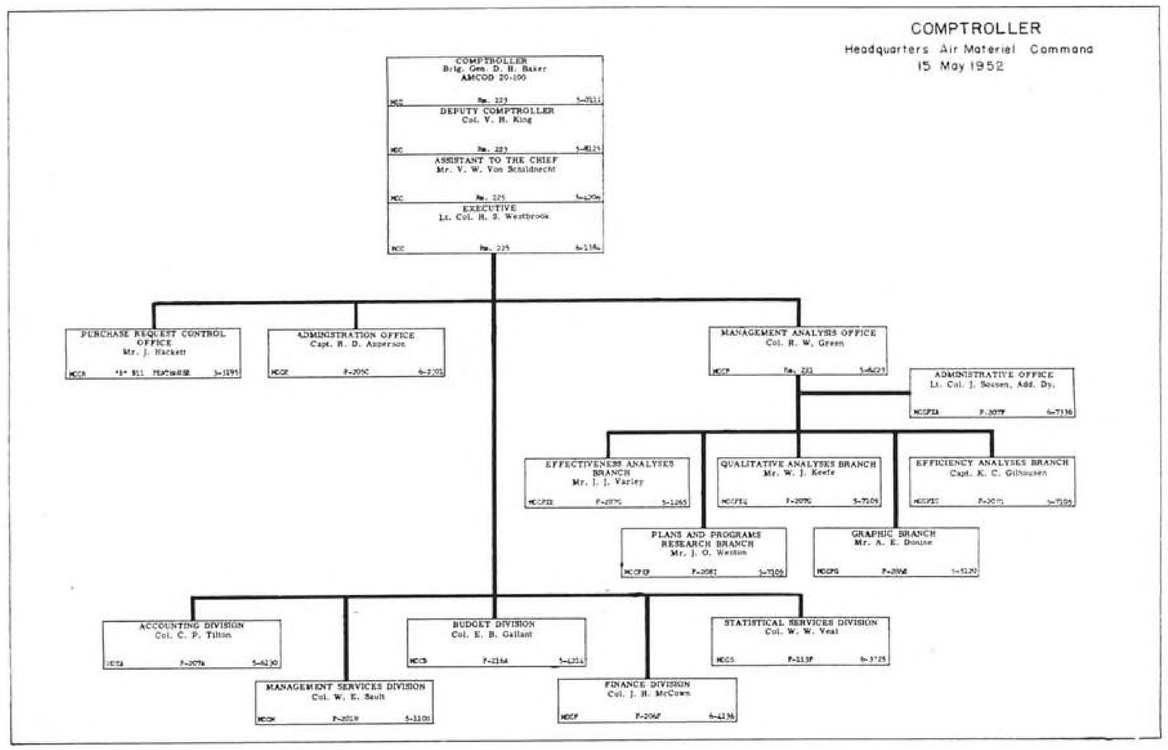
And AMC, in one sense, is the servant of combat commands such as the Strategic Air Force and Tactical Air Force. It exists to serve them, among others. The effectiveness of its operations, to a large extent, can be measured by how ready SAC and TAC are to do their jobs.

But within its own realm, the logistic services of the Air Force, the Air Materiel Command has complete jurisdiction. It picks its own type of organization to do the job in the best way. As it presently stands, AMC is organized into five Directorates and several major staff offices:

- **Directorate of Personnel and Training**
- **Directorate of Command Support**
- **Directorate of Supply and Services**
- **Directorate of Maintenance Engineering**
- **Directorate of Procurement and Production**
- **Comptroller's Office**
- **Inspector General's Office**
- **Judge Advocate General's Office**

While the business man has most of his dealing with the Director of Procurement and Production, the transmutation of logistics from wheels to wings is being carried on in the Directorates of Supply and Maintenance Engineering. As one index of how that change is being pushed, the former Directorate of Supply, Services and Maintenance Engineering recently had to be split into the two present organizations.

AMC organization must of necessity be as fluid as its job. Other changes are being contemplated. The overall chart of the command shown on page 83 gives some idea of the enormous scope of the present operation. The charts and reports on the following pages pinpoint the major efforts of the command.



Management Control Starts at the Top

- **AMC's Comptroller Office is concerned with more than how the Air Force is spending its money.**
- **Its big job is studying better business methods; and it is sparking changes both in and out of AMC.**

In the brand new headquarters building of the Air Service Command on Patterson Field every bulletin board, every desk top, carried the slogan: "Keep 'Em Flying."

Nine years ago, in the critical days of World War II, that motto succinctly defined the vital logistical job of the command.

At that dark time nobody would have slapped a ceiling price on this indispensable service. Everyone would have agreed that a dead taxpayer—whether in his riddled fighter or in his bombed-out home—wouldn't fret about the dollar cost of national defense.

Nobody seemed upset over the fact that the Army Air Corps appropriation had rocketed to more than 300 times its amount five years before, up to a thumping $23 billion. And that would look like more than $50 billion in the Air Force's market area nowadays.

► **A New Sign**—Today there's another sign of the times on the bulletin boards of the Air Materiel Command headquarters in the now nine-year-old building. It reads: "More Air Force Per Dollar."

The new slogan reflects the hammered-in cost consciousness of an inflationary era. It's a public attitude so deep seated that even after two years of the grueling Korean war, Air Force officials still feel obliged to talk more of budgets than bombers.

Some days ago, Lt. Gen. E. W. Rawlings, commanding general of the Air Materiel Command, told West Point graduates:

"A great many of the taxpayers simply do not believe that what is known as the 'military mind' is capable of cost consciousness. We are going to have to prove that they are mistaken."

► **Comptroller's Office**—In General Rawlings' organization, that proof is offered in the office of Brig. Gen. D. H. Baker, AMC Comptroller.

Congress has appropriated about $20 billion for the Air Force for fiscal 1953. Of that sum, AMC will receive between $15 billion and $16 billion. So it will spend approximately $4 out of every $5 appropriated for the Air Force.

General Baker's job is to supply the "controls," the facts, methods and studies AMC top management needs to put this fabulous sum to work in businesslike ways.

AMC's money is received in the budget division of his office. The sum he gets is apportioned there against ascertained needs. In his offices and divisions, methods are devised and submitted to management to get work properly and legally done, and with a saving of time, money and manpower. Facts are compiled. Systems are designed and studied. Money is paid out to Air Force suppliers and to AMC's military and civilian personnel.

To top this, the comptroller prepares a graphic presentation of all these varied, yet interlocking functions, so that General Rawlings and AMC top management can see at a glance the status of any given activity at any given time.

► **World's Largest**—To do all these things General Baker has to have the largest comptroller (more often called

controller in industry) organization in the world. It is largest both in staff and scope.

The work of the comptrollership is performed by three top-level offices and five divisions at the headquarters of AMC, and by counterparts at each AMC field installation. World-wide staff is some 7,500 officers, airmen and civilians.

In the upper echelon are the offices of Administration, Management Analysis and Purchase Request Control. On the division level are Accounting, Budget, Finance, Management Services and Statistical Services divisions.

These organizations work with AMC's five huge directorates of Procurement and Production, Supply and Services, Maintenance Engineering, Command Support, and Personnel and Training. They cover every level from janitor to general. Sometimes it is hard for the observer to tell where the comptroller's function ends and management takes over.

► **Facts and Figures**—The magnitude of the task can be sampled from some AMC facts and figures.

AMC now has a world-wide military and civilian strength totalling almost 200,000.

Supply division runs a mammoth "mail order house" which stocks more than a million items. That's five times as many as in Sears, Roebuck's stock.

In the 12 months ending Nov. 30, 1951, Supply processed nearly 35 million items. These totaled 5,337,662 tons.

In 1951 Maintenance overhauled 1,949 complete aircraft, 27,919 aircraft engines, 217,431 instruments.

Checking such big operations as these is only a piece of the comptroller's field of work. In these and in other Air Force activities he looks for what he calls "problem areas." Broadly, a "problem area" is a situation in which reports show there is a need for improvement.

► **Three Fields**—General Baker sees the comptrollership divided into three wide fields:

"There's first our relation with our customers," he says. "These are the other major commands of the Air Force to which we give support in the form of goods and services.

"Next is our relation with industry. We're concerned with what industry is doing to reduce costs, and how we can assist them in meeting their objectives.

"Then there's our internal area: operations within the framework of the AMC." He adds:

"We're developing a program which will enable us to control and manage our resources more effectively."

The most noticeable result of his efforts is the increasing use of industrial patterns, the building of what might be called industrial structures within the AMC—operations which are organized much as private industry would build them. The main difference is that they're not run for private gain. Rather, they result in dollar savings.

But dollar saving is not the only purpose which prompts them. AMC management has adopted them simply in the expectation of doing a better job.

These industrial structures were designed to get efficiency. They were devised to give better service to AMC's Air Force "customer" and to work smoothly in the crisis of war.

It would take some scratching these days to dig up one of those nine-year-old "Keep 'Em Flying" posters. But the command's aim to furnish swift, dependable logistical support to a fighting Air Force always is uppermost. It has to be that way. And that aim is a continuous thread running through the varied activities of the comptroller's office.

Accounting

In the Accounting Division there's a good view of AMC's evolution from traditional military logistical procedures toward modern business methods.

A little more than a year ago accounting was principally a record-keeping function. This was handled in AMC's old Budget and Fiscal office and other agencies of the command. Now the work of the division, a year old Aug. 1, closely parallels the accounting function in industry.

The division's most significant work is being done in its Working Capital subdivision. This agency is charged with the account operations of all "working capital activities." There are two types: "stock funds" and "industrial funds."

Shorn of this nomenclature, these are businesses set up within the Air Force to deal with AMC's customers as private industry would deal with them.

One of these businesses, the Clothing Stock Fund, has tossed the old-time quartermaster system of issuing uniforms out the window.

► **A Big Clothing Store**—Under the fund the Air Force has established a world-wide clothing store chain within its own framework. There are some 200 stores for airmen. Their inventory comes to hundreds of millions of dollars. Current sales are measured in millions.

And gone is the old QM sergeant who shoved misfit duds across the counter. In the dressed-up store where Air Force clothing is displayed—not stacked, please—a trained salesman gives the airman the Brooks Brothers treatment.

The airman pays for his purchases out of his clothing allowances.

Col. C. P. Tilton, chief of Accounting, says:

"We have saved millions of dollars through this stock fund. Those savings represent the difference in the care an airman takes of clothing he buys and clothing he's given."

The term "stock fund" is applied only to those businesses which have been developed out of a supply function.

Colonel Tilton believes that a good many of AMC's 168 supply operations might be converted from a government-issue to a business basis.

At present his staff is planning ways to handle petroleum and lumber "sales" to AMC customers through the device.

► **Industrial Funds**—As distinguished from a stock fund which "sells" goods, an "industrial fund" is a device for running an industry.

Could a maintenance depot be operated this way? With an established price list for overhauls and repair jobs? Paying its own labor and material costs and overhead, just like private industry?

Warner Robins Air Force base in Georgia may be the proving ground to test this concept. Accounting now is making studies of the engine overhaul set-up there to check possibilities.

If the Warner Robins overhaul is industrialized, the Air Materiel Area then would bill its customers (these would be the Air Force commands which sent their planes there to be serviced) and the customers would pay out of their own budgets.

This seems like taking money out of one Air Force pocket and putting it in another.

However, the real advantage of the system lies in the fact that the proprietor of the shop will have to handle his business as he would in private industry. He will have to work and plan efficiently if his capital structure is not to be impaired.

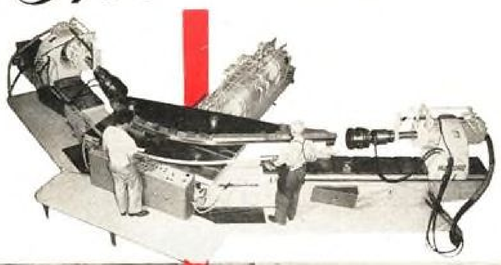
► **Printing Plant**—An example of a going industry-styled concern within the Air Force is the printing plant at Kelly Air Force Base in Texas which does printing work for government agencies in the Department of Defense, bidding for jobs at prices comparable with those of private industry.

Management Analysis

AMC is beginning to resemble private industry in other noticeable ways. Through its Management Analysis Office and Management Services Division, the Comptroller is studying the management procedures of private industries and working out their application across the entire command.

Management Analysis does creative

93% of all Aircraft Manufacturers in the Free World use



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Stretch-Wrap Forming is *another* of the many Hufford contributions which are speeding world-wide output of much-needed military equipment . . . *another* example of Hufford engineering which is developing advanced equipment for today's urgent industrial requirements.

If you want to know more about HUFFORD STRETCH-WRAP FORMING, a basic treatise titled **"PRINCIPLES OF STRETCH-WRAP FORMING"** *explains in simple terms the why and how of this new process. A request on your letterhead will bring it.*

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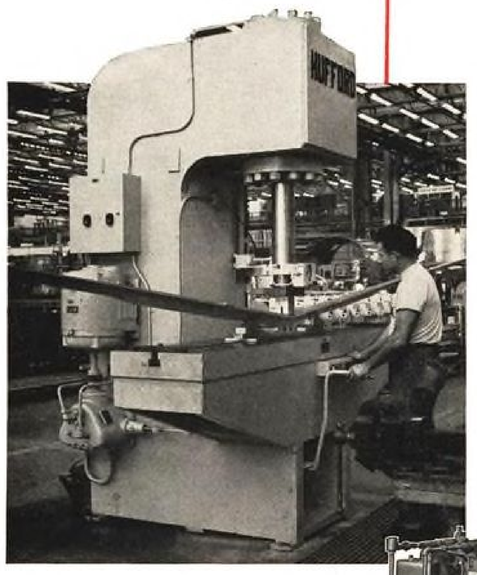
removes the risk of "over-correcting" on ticklish straightening jobs. Equipped with the Automatic Stroke Limiter, the ram is under positive control at all times, automatically comes to a halt at any pre-established setting . . . can't run wild! Ram stroke is varied by means of a graduated handwheel on the face of the press and will repeat with unerring accuracy. Applied force is indicated on a dial gauge and ram travel is read on a counter to .010" from any starting position.



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HUFFORD METAL FORMING BULLDOZER

saves hours of valuable production time and relieves bulldozer operators of unnecessary drudgery. This bulldozer offers two outstanding advantages:

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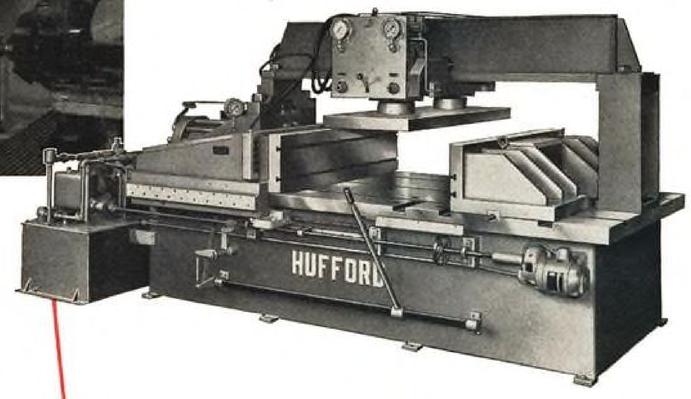

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GEN. BAKER: Proving a state of mind.

analytical work. Its branches study and measure the effectiveness and efficiency of command operations. In other words, they find out how much was done on a given job against what should have been done, and how well.

► **Electronic Measure**—No common yardstick is put to these things by Management Analysis. Its measuring device is electronic. Facts about men and methods are sifted out of thick decks of punch cards spun through electric business machines. On these mechanically-found facts the office bases its analytical and creative work.

The quality and level of thinking behind this work may be gauged by one bit of statistics gleaned from the office: Of 18 civilian analysts, seven have their master's degree in business administration. The remaining 11 have bachelor's degrees with additional graduate work. The educational background of officers is comparable.

The task of reducing the complex mass of information collected by the comptroller's activities to a least common denominator—the standardized charts which post management on the progress of each phase of AMC activity —also falls to Management Analysis.

Management Services

Management Services Division operates the comptroller's manpower, organizational and procedural controls.

It slices the manpower pie. Col. W. E. Sault, division chief, says, "We are always dealing in shortages, and the Management Services' function has become even more important in these days of AMC decentralization on a limited budget."

The growing trend toward industrial methods shows prominently here. The division is the headhouse for the Management Improvement-Cost Reduction program. Now spread command-wide, the program apparently uses every technique known to industry to lift the quality of management.

▶ **Problem Areas**—Management Analysis sifts over the command to point up "problem areas". Management Services goes to work on them in the same way industrial management would tackle them.

Working closely with private industry, Management Services trades ideas through such organizations as the Aircraft Industries Assn. Member of this group submit reports to AMC on their methods of saving administrative and manufacturing costs. To date 35 such reports have been received. In turn, AMC reports its saving discoveries to the association. Through the division, the command also works with outside management consultant services.

▶ **Not Just Talking**—These contacts with industry are not merely a matter of talking things over. Colonel Sault says AMC has initiated action on each applicable recommendation made—which indicates industry invariably has made some helpful, constructive recommendations.

The Management Improvement and incentive programs have produced tangible results on which the division keeps tab. Sometimes the actual dollar saving can be computed.

In one instance the setting up of a new procedure brought an increase in the comptroller's own official family. Until recently, the processing of purchase requests was a high-ranking bugaboo in AMC headquarters. It took five trips across the 11-square-mile air base and a full calendar month to process the paper. It also took 56 employes.

Management Analysis pegged the "problem areas." Management Services followed by establishing a new procedure. Now only one trip across the base is necessary, and the new organization is manned by 14 people. Forty-two employes could be diverted to other work.

Then came the question: where to put the new organization? AMC management decided to lodge it with the comptroller. It's called the Purchase Request Control office.

Finance

A few AMC people have been unhappy with decentralization. But not Col. J. H. McCown, chief of the Finance division.

Finance's own decentralization has brought the Air Force both savings and prestige. And, as Colonel McCown puts it, Finance's program is disabusing sup-

AMC Saves Millions By Short Cuts, Salvage

Dollar savings of $109,246,284, effected through procedural short cuts, reclamation and incentive programs over a year's time have been reported by the Air Materiel Command.

Of this savings total, $8,113,397 was contributed through the command's Suggestions and Awards program.

AMC's savings figures, while not complete, cover the command headquarters at the Wright-Patterson Air Force Base, McClellan, Tinker, Brookley, Kelly, Robins and Norton Air Force Bases.

▶ **Biggest Saving**—The biggest single economy was brought about through the command's policy of using commercial-type vehicles rather than specialized military vehicles in the continental U. S. The change is estimated to save the Air Force approximately $79 million during fiscal 1952.

Another $2.6 million will be saved in the conversion of over-age personnel parachutes into cargo parachutes which can carry from 200 to 300 pounds. Reclaimed parachute nylon saved another $77,000.

Reclaimed oil reduced lubricant procurement by $196,800. AMC also sold $122,454 of steel scrap and recovered $33,600 worth of silver from condemned sea water de-salting kits. The money was applied on the purchase of new kits.

Rebuilding welding machinery gave the Air Force a savings of $1,310,896 under the cost of new replacement machines.

Two instances of work simplification at AMC headquarters saved an estimated $85,000 in man-hour costs.

▶ **Suggestion Box**—The Suggestions and Awards program at AMC headquarters alone accounted for savings totaling $3,838,516 for the calendar year 1951. The biggest individual saving, totaling more than $2 million came from an employe suggestion that excess aircraft spare parts be made available to manufacturers instead of being released as surplus.

At McClellan Air Force Base, $3,095,089 worth of vital B-29 parts were salvaged from 22 outdated Superforts. The items were sent to stock or sold to civilian agencies on bid. McClellan's paper salvaging program netted an estimated $24,000 for the year.

The Suggestions and Awards program at Tinker Air Force Base netted the Government an estimated $2,177,109 during 1951.

At Kelly Air Force Base the program for 1951 showed measurable savings of $1,109,000, representing 878 adopted suggestions.

Robins Air Force Base reported $166,163 saved on suggestions, while lumber reclamation accounted for another $20,370.

Norton Air Force Base saved $152,481 under the incentive program.

Through emphasis on management economies, Brookley Air Force Base found $771,000 of unobligated funds of its $41,650,050 budget at the 1951 year end.

pliers of the belief that government agencies are "independent as a hog on ice" in the matter of punctual payment.

Before 1950, all Air Force payments to industry were made at command headquarters. Anticipating the swift growth of procurement, Finance set before industry and the Procurement directorate a plan to place offices closer to Air Force suppliers.

It was hoped with this decentralization that fewer discounts would be lost by the Air Force. For their part, suppliers would not have to program their own money so far in advance and their borrowings might be reduced. In any event, mailing time on payments would be reduced.

▶ **Reluctance in Washington**—Washington didn't care much for the idea at first, but finally consented. Six strategic points—Boston, New York, Chicago, Detroit, Los Angeles and Fort Worth—were picked for Air Procurement Districts. Offices already had been established at the eight Air Materiel Areas.

Recently Finance offices have been opened in Seattle (almost exclusively for Boeing), the Mallory Air Force Specialized depot in Memphis, and Wilkins Air Force Base, Shelby, Ohio. More recently, the Middletown Air Materiel Area has been authorized to make payment on all fuels and lubricants contracts.

▶ **Up-To-Date Figures**—Finance says it got everything it hoped for from the spread of its offices. Here are up-to-date figures on disbursements to suppliers:

Over the first 11 months of the 1952 Fiscal Year, the Air Force has been

realizing 97% of all discounts offered on its bills.

The increase in discount savings, amounting to some $2,780,000 over the period, is more than the cost of the decentralization program.

Over the same period there has been a 43% reduction in the number of invoices on hand more than 60 days. And 18% in invoices over 30 days old.

During the 11 months, AMC Finance offices have disbursed some $7 billion. Of this 86%, or over $6 billion was paid out to Air Force suppliers. (The remaining 14% was salaries.)

Budget

Budget Division's operations make it clear that the AMC Comptrollership is the real manager of the Air Force dollar.

This division has the biggest Budget job in the world. Readily apparent too are the many skull-cracking complexities involved.

From a size standpoint alone, consider that AMC is responsible for efficient management of 82% of all Air Force funds. During Fiscal Year 1953, the amount involved will approximate $30 billion.

"Our job is an operating job," says Col. E. B. Gallant, division chief. "In this respect it differs from the broad planning and directional activities of Washington. We provide the budgetary know-how and financial management to carry out the planned objectives of the Air Force consistent with the intent of Congress."

▶ **Early Estimates**—The budget task of the Air Force in obtaining funds from Congress is complicated by the necessity of preparing estimates several months in advance. The forecasts must clearly show why a given number of dollars will be required for each of many thousands of items. Dollars for new items adopted as a result of continuous research must be accurately determined. When the rapid changes in aircraft design are recognized, the tremendous problem of predicting dollars required to operate a large Air Force is quickly seen.

Beyond its job of obtaining dollars, the budget organization is primarily concerned with proper management of funds. Congress imposes broad limitations: for example, a certain amount of the total appropriated is legally restricted to use for Maintenance and Operations. With this limitation and administrative restriction of the Air Force, AMC carries out the primary intent of the "performance budget" that "available dollars should be related to the individual work programs to insure appropriate financial management and control within the intent of Con-

gress." In other words, the best estimates of engines to be overhauled, aircraft to be serviced, etc., must be "priced-out".

As operations progress, analyses of the financial position are performed to find out where the AMC stands dollar-wise. In addition, future dollar positions must be projected.

These are samples of the many ramifications involved in the Budget job which strongly emphasizes "maximum Air Force per dollar".

Statistical Services

For a further measure of the growing importance of the AMC comptrollership, take a look at an overseas organization which needs some supplies.

It's a high priority order. The requisition goes into a business machine in punch card form, and is flashed to a U.S. overseas shipping point. Punched back into a card, it goes to a Zonal supply depot. The order is made up and shipped. All this is done within 48 hours.

From there on, AMC controls let the consignee know what ship or plane is carrying the goods. If the ship is sunk or the plane downed, a duplicate shipment will be begun within 24 hours. An item-by-item report of the whole transaction is furnished by electrical transmission to everyone concerned.

The same business machines give each decentralized supply installation a world-wide stock balance and consumption report.

The Air Force says it pioneered in electronic logistical computations. The first installation kept stock records at the Fairfield Air Depot in 1942.

▶ **Nerve Center**—Today, a huge room in the AMC headquarters building houses hundreds of business machines which form a nerve center for almost every phase of the command's world-wide activities.

Fed on raw arithmetic, they produce the factual compilations on which the comptroller can base his studies for improvement programs.

Now performing functions far beyond their original property accounting job, they can peg the average cost of an engine overhaul, specifying the level of manpower and material costs.

As the comptroller's function has grown, the uses of the machines have multiplied.

Col. W. W. Veal, Chief of Statistical Services, reports that AMC is spending $5 million a year on the leases of business machines throughout the command. That does not include overseas operations.

The machines' indispensable service probably has helped to effect savings

many times more than their rental cost.

Through "Stat," the comptroller knows the location of every engine, every airplane, by serial number. Incidentally, the compilation of these records gives the Air Force a complete history of every airplane it ever purchased.

Like "Stat," many of the comptroller's activities far antedate the creation of his own office. The concept of industrial comptrollership is quite new to the Air Force. Relatively new, too, even in private industry.

The man who had most to do, it's believed, with the establishment of the Air Force comptrollership is Lt. Gen. E. W. Rawlings, former Air Force comptroller and now Commanding General of AMC.

In November, 1946, he was assigned the task of developing the Air Force comptroller concept.

► **Authorized in 1947**—The comptrollership was authorized in 1947 under Public Law 216 which since has been the comptroller's Bible. The AMC comptrollership was created in October that year. However some comptroller functions had been assigned to T-5 Plans in 1945.

Reporting on the Air Force comptrollership last year, Gen. Rawlings outlined the functions of the office and forecast its activities this way:

"In wartime as in peacetime, the primary mission of the Comptroller will continue to be rendering advisory service in the management of personnel and resources.

"In peacetime, when funds are the limiting factor, this is accomplished by translating personnel, materiel and other resources into dollars.

"In wartime it is accomplished by using the resources themselves. Therefore war will bring about only a change of emphasis within the functions of the comptroller.

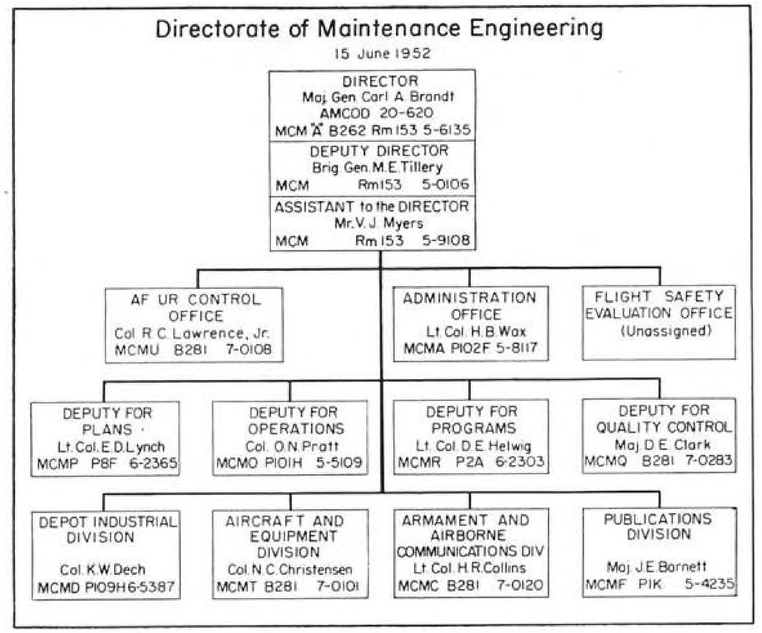
"Overall it is anticipated that the organization (comptrollership) will increase in size consistent with the expansion of the Air Force. Internally, the reporting, disbursing and management analysis functions will increase most, since these functions will bear the impact of increased reporting and servicing requirements. Moreover we may expect enormous increases in the field of operations and inventory control reporting."

The forecast applies in every particular to the AMC comptrollership, which since has assumed an even greater importance in the eyes of the entire Air Force.

For, as commanding general of the Air Materiel Command, Gen. Rawlings naturally is expected to have an extraordinary appreciation and understanding of the vital functions of the AMC comptroller.

Flexibility Is Key to AMC Maintenance

- **It starts at Maintenance Engineering Directorate.**
- **And fans out through the country's major depots.**



The Directorate of Maintenance Engineering is the central Air Force agency in the field of maintenance. It is supposed to furnish technical assistance, publications and data to insure that Air Force equipment is maintained at maximum effectiveness in support of worldwide operations of the Air Force. This includes staff responsibility for maintenance, overhaul, repair of aircraft, manufacture of parts for emergency needs, modification and modernization programs, both within the Air Force establishments and by contractors. Maintenance standards, techniques, and procedures that apply to all Air Force agencies are established by this Directorate.

The eight major Air Materiel Areas (AMA's) or depots which are strategically located throughout the continental United States give AMC flexibility in furnishing urgent types of modifications and repairs, reconditioning of combat equipment, and also in carrying on modernization and modification programs. By returning used equipment to a serviceable status through reconditioning processes, these AMA's save the Government millions of dollars annually, as well as conserving strategic materials necessary in the manufacture of new items.

Responsibility for over-all guidance of the Directorate's activities rests with the Director of Maintenance Engineering. To support the Director in accomplishing the over-all maintenance mission, various deputies and divisions comprising the Directorate are charged with performing specific functions.

▶ **Administration**—The Chief of Administration exercises staff surveillance over all administrative functions performed by the major components of the Directorate. This office also performs administrative duties for the office of the Director of Maintenance Engineering. These functions involve manning all authorized positions, preparing internal instructions and publications, estimating fiscal year travel fund requirements, disseminating items for public information, monitoring the security program, screening and distributing correspondence, and assuring that all administrative programs are properly coordinated.

▶ **Plans**—The Deputy for Plans is responsible for intermediate and long-range plans and requirements relating to the accomplishment of future Air Force maintenance operations. Staff studies are prepared to insure the adequacy of facilities for supporting projected operations, as well as special staff studies, reports, and estimates relating to various problem areas affecting intermediate and long-range plans of the Directorate. He handles the spending required for modification, modernization, depot contract maintenance, and technical consultant services. Personnel budget estimates for both depot and contract maintenance, as well as for construction of maintenance facilities at AMC installations, are developed and substantiated.

▶ **Operations**—The Deputy for Operations is the central coordinator for the Directorate. He is supposed to develop procedures and prescribe policies for maintenance operations, as well as develop the organizational structure and make recommendations for the distribution of functional responsibilities. He analyzes the management of Directorate operations and monitors the preparation of presentations showing the status of Air Force maintenance engineering programs, including civil maintenance of Air Force equipment. Distribution of manpower within the Directorate is determined by the Deputy for Operations.

▶ **Programs**—The Deputy for Programs is in charge of all Directorate programs involving aircraft, missiles, and related equipment, including special weapons and ground equipment. The term "special weapons" includes atomic weapons and equipment, biological and chemical warfare munitions and equipment. He provides Directorate representation on all aircraft, missiles, and equipment coordinating groups and attends mock-ups and engineering inspections.

All command or special projects, major and minor modifications to aircraft, missiles, and equipment operated by the Air Force are monitored and records are maintained showing their progress and current status. He acts for the Directorate in supervising, directing, and controlling functions of the various divisions as they relate to developing capabilities for maintenance support of special weapons, and assures world-wide maintenance support of the USAF in the field of special weapons.

▶ **Quality Control**—The Deputy for Quality Control establishes quality control standards for maintenance engineering and maintains surveillance over those developed by the AMA's. Technical consultant services are made available on standards and techniques relating to maintenance engineering quality control. Statistical quality control techniques and methods are researched, developed, and implemented for Air Force-wide use in overhaul and maintenance operations.

▶ **Trouble Spot**—An important organization in the Directorate of Maintenance Engineering is the AF UR Control Office. The unsatisfactory report (UR)

GEN. BRANDT: Maintenance means many things.

is the medium for reporting failures; malfunctioning of any item of Air Force equipment or materiel; unsatisfactory design; defects resulting from faulty material, workmanship, or inspection; as well as unsatisfactory maintenance or supply forms, methods, or systems.

Since the inception of the UR system in July, 1921, the UR has rapidly grown in importance.

Because of the complexity of modern-day aircraft, and their related equipment, and the inevitable increase in the size of the Air Force, it became impossible to attempt to handle within one organization the problem of solving all the aches and pains. It therefore became necessary to decentralize to the various Air Materiel Areas and bases as much of the processing and determination of fixes as possible, centering control of the entire system at headquarters.

Each AMA and base organization now includes a UR control office where UR's are processed. In determining the fixes for UR's, the AMC and AMA organizations avail themselves of the technical services of the Air Research and Development Command and, through the Air Procurement Districts, of the various manufacturers responsible for the equipment which is the subject of the UR.

The Directorate's UR control office receives copies of all UR's, together with pertinent correspondence, which are numbered, coded, and processed to an AMC numerical file that serves as a statistical and historical record from which development of trends in equipment failures can be detected. With this vertical line of control over the system, they are able to utilize the knowledge, know-how, and facilities of the AMA's and manufacturers to provide more expedient answers and solutions to reported difficulties.

Riding Herd on the AMC Depots

Depot Industrial Division also watches over AMAs to get the most out of maintenance facilities.

The Depot Industrial Division exercises command-level control over the USAF depot-level maintenance program. Basically, the management function performed by this division consists of two principal responsibilities. The one is the development or revision of facilities and equipment at AMA's or depots of Air Materiel Command to meet the rapidly expanding requirements brought about by the increase in Air Force strength. The other deals with the attainment of maximum production by maintenance facilities at activities of Air Materiel Command.

The first of the division's principal responsibilities is met by studying production methods and techniques, plant layout and facilities, building design and utilization in order to improve operation. Industrial engineering consultant services are provided for all AMC as well as USAF maintenance activities. Depot maintenance work specialization programs are developed. Authority to acquire and keep up tool and equipment lists for depot maintenance activities is vested in this portion of the organization, as well as approval of depot maintenance plant and production facilities. Work specifications are prepared as guides in reworking reparable equipment or modifying equipment to a new configuration.

The division's other principal responsibility is met by developing forecasts and establishing and monitoring depot work programs. Requirements are established and action initiated for maintenance contract services. Lists are made of material required for work projects and production schedules, USAF reclamation and specialized storage programs are monitored. Assigned service-test and modification projects are established as well as Air Force programs that use AMA or depot maintenance facilities.

► **Management Job**—The division's job can be summed up: The Depot Industrial Division insures Air Force depot maintenance support in phase with maintenance requirements by exercising command-level management of depot maintenance workloads, including civil auxiliaries, within the Air Materiel Command and furnishing assistance to all USAF maintenance activities in the implementation of operational procedures and manuals.

The end result produced at the Air Materiel Area level is continuous building of new maintenance facilities together with improvement and expansion of existing facilities to meet the requirements of a growing Air Force, and to insure success of the Air Force materiel overhaul mission and the depot maintenance support mission.

In addition to the usual staff offices for handling the normal plans, operations, and administrative functions, the division is organized to support its two principal objectives by the following branches.

For Efficiency

The Production Engineering Branch of the Depot Industrial Division was set up to improve efficiency through constant development and improvement of production engineering methods and procedures. The scope of its mission is to provide direct monitorship and control of assigned functions as applied to guidance of AMA depots within the continental United States and to provide technical assistance, as required, to other major commands and overseas activities.

The basic objective of the four sections comprising the branch is to secure the best utilization of AMC maintenance resources with most economy. To achieve this goal, each of the following specific functions is discharged by a different section.

Zonal work programs are planned and controlled through monitoring the two-zone maintenance specialization program. The complexity and quantity of modern aircraft led to the development of what is known as the two-zone system of maintenance support. The United States is divided into an Eastern zone and a Western zone, thereby providing two separate depot maintenance support zones. Under this plan one depot in each zone is set up to assume maintenance responsibility to all Air Force activities within its zonal boundaries, covering certain specified items.

Industrial engineering and management consultant services are provided for AMC and USAF maintenance activities by continuous review of depot production methods and techniques, plant layouts and facilities and building design. This function consists primarily of staff surveillance over industrial engineering groups established at each AMA Headquarters and requires regular liaison with commercial agencies to insure continuous application of improved industrial techniques. Standard methods and processes are developed and improved and their effectiveness evaluated. Changes are recommended in tool and equipment designs to provide for increased efficiency.

Depot tooling and facility programs are developed by checking allocations for tools and test equipment for the zone of the interior to determine if they are to be approved, and new or modified depot maintenance plants and production facilities are reviewed for approval. Control of tools and test equipment is maintained by constant review of requirements established for maintenance support of new aircraft engines and other Air Force operating equipment. Monitorship of requirements for fixed facilities is accomplished by continuous review of workload programming data, proposed plans for new facilities, and plans for facility modification.

Work specifications are prepared for modifying and overhauling Air Force equipment. These specifications or work guides are utilized by Air Force depots and commercial activities in restoring used equipment to serviceable condition or in modifying existing equipment to conform with a new configuration.

For Monitoring

In line with the established policy which provides for paralleling modern industry to improve effectiveness of operations through development of existing engineering methods and procedures, the Production Control Branch has been established within the Depot Industrial Division. Its primary operational objective is to obtain the maximum possible production through full utilization of AMC maintenance resources.

The scope of the Production Control Branch job is to provide direct monitorship and control of assigned functions relative to guidance of AMA depots within the continental United States and to provide maintenance assistance to other major commands and overseas activities. Various offices are set up to discharge specific functions of the branch as follows.

► **The Workload Coordination Office**—This office keeps in touch with depot and civil agencies and exercises over-all surveillance of the depot workload program. It also keeps track of manhour and production reports, recommending necessary changes to meet production requirements. Over-all procedures and priority of workload assignments are reviewed to insure adherance to policies and to provide a check on relative program importance.

► **Aircraft Section**—Here is exercised control over all maintenance programs including contractual programs, to insure timely accomplishment of such aircraft projects as reclamation, reconditioning, modification, modernization, or

repairs. All aircraft projects and work directives or contracts involving depot level maintenance are initiated in this section and then are monitored and controlled.

Responsibility for administering, monitoring and controlling for the Maintenance Engineering Directorate the aircraft storage program and the review and determination of disposition to be made of damaged aircraft rests in this section.

► **Powerplant Section**—This maintains control over powerplant depot maintenance programs and overhaul production schedules, including contractual auxiliaries, to insure timely accomplishment of sufficient engine overhauls to meet supply requirements for serviceable engines.

This section initiates and controls all depot engine schedules and work programs, and is responsible for review and follow-up of engine work programs to insure adequate production and timely schedule changes.

► **Electronics and Armament Section**—Here is established, based on programming data and supply requirements, the depot schedules and modification programs for AF electronics and armament equipment, and work schedules are checked, including contractual work programs, to insure adequate production of serviceable items. Depot work programs involving special weapons are controlled in this section.

► **Accessories and Associated Equipment Section**—The work program involving accessories and miscellaneous equipment is controlled in this section. Depot schedules and programs, including contractual overhaul programs, are established and controlled. This section is responsible for timely accomplishment of scheduled work programs for equipment under its control.

Govt. Property Must Be Marked

All government property furnished to a contractor, with a few exceptions, must be recorded and identified immediately on receipt. This includes government-owned special tooling.

Exceptions to the marking rule are granted when the contractor, his employes or other contracting agencies own no other materials of the same type at the same location; when adequate physical control is maintained by the contractor over tool crib items, etc., issued for use by individuals in performance of the contract; when property is of the bulk type, or is otherwise unsuited for marking; where property is commingled with the contractor's property, in cases where this is permitted.

New Armament:

As a result of the rapid increase in speed of aircraft and the improvement of enemy defensive measures, development of the armament program has been considerably accelerated to maintain the necessary effectiveness of combat aircraft.

Present and predictable future developments make necessary the adoption of electronics control for computing systems, bomb sights, fire control systems, and launching systems, so that aircraft will be able to attain the desired combat efficiency during operations at high altitudes and high speeds.

Electronics computing systems appear to be the only solution known to date for the problem of coordination between armament systems and radar systems.

In view of the magnitude and importance of their mission, it was decided that functions relating to these highly specialized classes of equipment be consolidated into one organization and completely separated from functions involving regular aircraft and engine equipment and accessories. As a result, a new activity was set up in the Maintenance Engineering Directorate with the title of Armament and Airborne Communications Division.

▶ **For Better Results**—In addition to the advantage of having responsibility for maintenance of armament and communications equipment consolidated in one organization, it was believed that such an organization would be more capable of supporting the anticipated expansion of Air Force programs.

Full utilization of manpower and available skills would be realized, as well as material improvement of logistic support. Furthermore, decisions and action within the Air Materiel Command would be expedited, necessary coordination would be reduced, and budgetary aspects would be simplified.

In doing its job, the Armament and Airborne Communications Division exercises technical supervision over maintenance and installation of USAF armament and airborne communications equipment, including the determination of requirements for complete and continuous support maintenance-wise. It establishes the specification of work to be performed and delegates organizational responsibilities for the successful performance of the assigned mission.

▶ **Weapons Monitor**—Planning support and necessary technical directives are provided, and results of investigations are evaluated. Technical assistance in the field of electronics is furnished all USAF maintenance activities.

In collaboration with the AF special weapons program and the Atomic Energy Commission, the division monitors the Air Force maintenance of special weapons.

A division set up to work on avionics and fire control

In addition to the usual complement of offices for administrative, plans, and operations purposes, the division includes a Bombing and Fire Control Branch, Weapons Branch, Guided Missiles Branch, Radio and Radar Branch, and Installations and Support Equipment Branch. These are all operating branches of the division and, according to the specific equipment peculiar to each branch, they are charged with formulating maintenance policies to insure reliable operation through continuous and adequate maintenance. Acceptance inspections are conducted on new equipment.

▶ **Busy Branch**—Each branch is responsible, not only for analysis, review, and revision of technical orders, handbooks, parts catalogs, and other technical publications affecting operation, maintenance, and repair of assigned equipment, but also for technical provisions of specifications governing preparation of such publications. Standards for quality and quantity of maintenance work are established. Unsatisfactory reports and accident reports are investigated.

These branches also determine corrosion-control standards, basis of issue and replacement factors, and the kinds and amounts of training required for maintenance personnel.

In addition, the branches initiate programs for modernization of equipment, render technical assistance to USAF field units and maintenance activities, and evaluate results of policies in effect. An example of this type of assistance was the recent visit to Korea of a team of USAF officers who monitored the installation of new equipment which was developed as a replacement for more delicate electronics computers that could not withstand the shock of landings on the rough runways common there.

Who Is Responsible For Govt. Property?

A contractor is directly responsible for and accountable for all government property furnished him in accordance with the provisions of a contract.

He must maintain and make available to appropriate government agents such records as required, and must account for all government property he has received until relieved of this responsibility in accordance with established procedures.

Liability for loss, damage or excessive use of government property will depend on the circumstances surrounding the particular case.

LESSONS IN JET ENGINE maintenance is typical job for Aircraft & Equipment.

Technical Team Covers World

Aircraft and Equipment Division's job is around-the-world supervision of maintenance engineering.

The primary mission of the Aircraft and Equipment Division is to exercise worldwide technical supervision of USAF maintenance engineering. The functions, divided among the branches of the division, involve the determination of maintenance engineering requirements for modernization, modification, and retrofit programs; specifications of all work to be performed; placement of organizational responsibility for performance; provisions of necessary technical direction; evaluation of results; and technical assistance in the field.

The services are rendered for the benefit of all elements of the USAF, regardless of command, under the official supervision of the Maintenance Engineering Directorate. Preventive maintenance, and its accompanying projections toward inspection, modification, and modernization of aircraft, engines, and other equipment now operated by the Air Force, is stressed as the main objective of the division.

Preventive maintenance, boiled down to practicality, means efficiency during the utilization and life of aircraft and equipment. Future major action toward preventive maintenance has a definite place on the maintenance engineering agenda, and will be implemented mainly through the new Air Force tailored inspection system which proposes to cover many complex problems not encountered by aircraft industries or commercial airlines.

The objective of industry is production. Commercial utilization of aircraft is conducted for transportation purposes. The needs of the Air Force cover many purposes, including combat superiority, reconnaissance, and expedited supply and transportation. Inspection, tailored to the specific operation ahead, should ease the general workload of maintenance all along the line.

In instances like the Korean operation, where aircraft cannot be removed from combat areas for long periods of overhaul because of the immediate demand or the uncertain problem of supply and replacement, the inspection of equipment will be adjusted to the needs of the moment, or scheduled to accommodate projected combat tactics, as the case may be.

Preventive maintenance is also reaching out to new types of aircraft, operation of which is chronologically far enough away from the production line to provide reliable information and experience on which to figure future inspection requirements before prolonged utilization has taken place. Inspection systems, while not new to the Air Force, are now planned on a new concept which applies the former method of intermediate major inspections to the determined utilization of the aircraft or equipment. It is a medium to relieve unnecessary mass routine inspection of every type of aircraft, periodically, in every corner of the globe, regardless of whether stored, modified, rehabilitated or utilized to a wornout stage this side of dilapidation, and should in time provide extensive savings in both time and money.

▶ **What Streamlining Will Do**—The new streamlined organization will level off responsibility to analyze reports, develop and approve retrofit programs, and write the technical orders and handbook instructions necessary to implement preventive action. Information

will be revised to incorporate the most recent changes as they appear in production and are recommended for operation.

► **Keeping Up-to-Date**—An example of this progress is modification of the flight-simulator concurrently with modification of the type of aircraft it represents, as the aircraft is changed in production. Modification instructions already have been applied to the new trainers for the F-86 and B-47B aircraft.

During World War II, in some instances, pilots fresh out of training school found, when reallocated to operating units, that the types of aircraft assigned for operation were many models ahead of the aircraft in which they had been trained. Lack of up-to-date training instructions and inexperience in handling the new aircraft led to serious accidents, fatalities, and complete destruction of quantities of equipment. The conditions impossible to handle during the rush of war will be alleviated by the new methods of revising concurrently the instructions for training and operating prime aircraft.

The retrofit (modernization) and modification programs already in use have been pointed, since initiation, toward bringing aircraft and equipment up to current practical requirements and to correct operational deficiencies disclosed to the service activities during operation and inspection.

► **Because of Size**—The outlook for a rapidly expanding Air Force influenced the slow and realistic approach made by Maintenance Engineering in establishing its reorganized technical program on a solid base, recently. It was evident that the problems of expansion would bring heavier problems in maintenance which, if approached at too great a speed, could cloud the horizon for some time to come, unless the lag in commercial production and the critical shortages of materials and tools could be overcome.

Increased strikes in industry, inclement weather, and an overwhelming workload all delayed action on entire phases of routine modernization and modification at a time. Aircraft and Equipment Division has a double workload ahead in figuring requirements for a flying defense that will almost double the equipment, while extending its activities and responsibilities into new fields of maintenance. Preliminary decisions must be made by the technicians who recommend new features in design, procedures, and methods of operation; and instructions must be written for these.

Control of technical instructions and the annual initiation of hundreds of interim procedures to be implemented for emergency conditions or unforeseen situations, while formal and often ponderous technical orders are under proc-

ess, require well-ordered thinking. The placement of technical direction and evaluation of results provide the mainstay of technical guidance.

► **Proper Balance**—It requires the proper balance between pilot and airplane for successful completion of a mission. The technical thinking behind the instructions for both the pilot and the mechanic who maintains his aircraft provides this balance.

A general handy-man, capable of fixing anything with odd bits and pieces, has no place in the preparation of aircraft for record service in the air, without proper training, AMC believes. The grease monkey on the runway follows a written authority that guides his daily tasks in whatever technical detail he performs. His Bible is the standardized technical order that directs use of standardized tools for installing standardized parts in standardized aircraft.

This point is especially forceful when one considers that Air Force modification and retrofit programs often cover hundreds of aircraft, hundreds of tool kits, and thousands of component parts. The result is that all mechanical efforts of the Air Force are accomplished in the same fashion, whether at the Air Materiel Command Headquarters at Wright-Patterson Air Force Base, Ohio, where the instructions originate, or at any of the other hundreds of Air Force bases. Variances are permitted only on special authority, through appeal to the decision makers back in the Aircraft and Equipment Division.

► **The Unknown**—The director of this guidance is the maintenance technician, so far back behind the stage of operation that generally he is unknown. However, the pilot on a routine flight in some part of the United States can rest assured that the plane he operates is assembled and maintained in the same fashion as the one of the same type he left behind him after his Korean excursions into MiG alley. The gradually developed methods applied by the Air Force in boosting the factors of standardized efficiency have been reached after long, and sometimes painful, periods of analysis and research toward improvement in maintenance service.

The recent integration of approximately 12,000 Army technical manuals into the Air Force long-range technical order system was intended to avoid duplication of effort in compilation of the same information for common items now utilized by both services. The new responsibilities include maintenance of railway rollingstock, such as flat cars, locomotives, and marine rescue equipment, fuel tanks, forklifts (straddle buggies), heavy construction tractors, draglines, motor patrols (graders) and shovels.

This responsibility, brought about by the division of assets under the unification program, will be taken over by the Air Force through the Aircraft and Equipment Division which will give assistance to the Department of the Army on technical service equipment. Until the division of assets has been completed, the Army Department of Engineers will continue to procure such equipment and perform depot maintenance for engineering equipment utilized by the Air Force.

► **Target Dates**—Tentative dates have been scheduled in 1953 and 1954 for the complete assumption by the Air Force of all engineering type of equipment utilized in air support. As the program advances, the technical manuals, some of which date back to before World War II, will be rewritten to Air Force requirements.

The task of adjustment indicates how the long arm of unification has encircled two other Departments of Defense toward an economic end. Joint publications, common to aircraft and engine equipment of both services, were adopted by the Air Force and the Navy during the last war and are still in effect. The liaison necessary to complete these publications provides a technical meeting ground between the involved services, and often includes further coordination with the Signal Corps, the Anti-Aircraft Service, and with Reserve, National Guard, and Civil Air Patrol groups.

► **Field Visits**—The assistance rendered by more frequent field visits of technicians and component chiefs of the division to depots and Air Materiel Areas all over the world, as well as to contractor facilities in the continental United States, is intended to improve the reliability of instructions and base them on a realistic current demand. Through such personal contacts it is also possible to detect minor deficiencies in equipment that might not be reported through formal channels. It is expected that field visits also will assist in disclosing weaknesses in incipient storage conditions before the stored equipment has reached a stage too critical for utilization.

The Aircraft and Equipment Division also monitors the over-all contractor mission, supervising the worldwide program for technical representatives and devising methods for applying contractor technical instruction in training or operation as it may be needed.

The "tech rep" system has solved many situations in which the Air Force, through shortage of available trained personnel, has found itself unable to implement programs involving highly technical equipment after it had been furnished.

In these instances contractor personnel are assigned wherever they are needed to assist in the original engineering installation of equipment and to simultaneously train military and civilian personnel in the operation of it as they go.

Many technical representatives are assigned to work for indefinite periods, extending from weeks to years, in Air Force installations as official authorities for their respective industries on the handling or modification of their employers' products. Frequently their presence on the spot in such organizations as the Aircraft and Equipment Division has saved the Government a heavy workload of correspondence while major changes are accomplished in the equipment.

► **Voluntary Corrections**—Furthermore, presence of "tech reps" during installation of equipment or on the scene of operation has also led to the manufacturer making voluntary changes or corrections in complex designs not practical for wholesale application.

As the Air Force advances to its goal of groups, more and more assistance from tech reps will be needed to substitute in open competitive technical assignments of the Civil Service until adequately educated or trained personnel can be secured.

The functions of the various operating branches which, in addition to the regular plans, operations and administrative offices, comprise the Aircraft and Equipment Division are described as follows.

Aircraft Branch

The primary mission of the Aircraft Branch of this division is to prepare technical instructions for the service, defining the approved methods and procedures for the maintenance of aircraft and component items consisting of airframes; electrical, hydraulic, and pneumatic systems; heating, ventilating, fuel purging, oxygen, in-flight feeding, anti-icing and de-icing systems; instrumentation, automatic flight controls, photographic equipment, etc.

To do this job requires the formulation of necessary changes to maintenance directives to insure adequacy and accuracy, the providing of technical assistance to service activities, the investigation of reports regarding unsatisfactory performance of assigned equipment, the determination and initiation of corrective action, the evaluation of new aircraft and equipment, and the participation in joint meetings with other elements of the Armed Forces and civilian agencies on maintenance matters concerning the equipment delivered to service activities.

Attendance at provisioning inspections (final and mock-up inspections of aircraft and equipment) conducted by manufacturers is a major assignment in the acceptance of newly designed air-

craft. Attendance at provisioning conferences called later to determine the instruments for replacement parts, spares and maintenance kits, all involving decisions of in-service supply support and the overhaul programs incident thereto, also figure largely in the aircraft maintenance program.

Powerplant Branch

The Powerplant Branch is charged with the mission of providing instructions, advising and assisting other elements of the Air Materiel Command and the Air Force in the maintenance, modification, and reconditioning of power plants and engine components. The job of providing instructions defining the approved methods and procedures for handling reciprocating, jet, and rocket engines and components, for fuel and ignition systems, also involves testing and analysis for efficient maintenance of such systems.

The main function of the branch is to meet service requirements, support of which frequently leads to extensive research and liaison with manufacturers in order to meet the required increases of certain elements of operation as their need becomes apparent after the earlier models are off the production line.

Support requirements, such as boosts in mileage and altitude needed by certain aircraft, are often imposed by service necessities which require expedient ways of testing power plants and providing better power. An example of this is the method adopted to combine rotary and jet engine power to boost the B-36 to the required speed and altitude.

At present the branch is developing a phase of inspection for the power plant evaluation system, adapting it in prolonged in-service tests to determine accurately the amount of power that can be developed for use or takeoff. Now that the earlier problems of maintenance for jet power have resolved themselves into standardized methods, modifications are being made to introduce turbojet proppings into the transport class.

Equipment Branch

The primary job undertaken by the Equipment Branch is to provide technical service and assistance to other elements of the Air Materiel Command and other Air Force commands on the maintenance, modification, and reconditioning of miscellaneous support equipment, and to provide instructions defining the approved methods and procedures for their maintenance.

The functions of this branch vary with the support equipment handled. A major research task has covered analysis and decision regarding the safety factors and technical equipment involved in the atomic decontamination program. Decisions were made regarding special dollies for carting equipment, portable washstands and washracks for personnel exposed to contamination during an atomic installation operation and required to clean the exposed aircraft upon completion of the mission.

The decisions and testing for proper fuels for jet airplanes figured largely in recent accomplishments toward economy. The numerous types of fuel used during World War II were finally brought down to four types more adaptable to the present needs of the Air Force.

Another major responsibility of the branch has been the techniques for handling hundreds of items formerly stored by the Army Quartermaster General. Types of equipment involved in these studies have been parachutes, which deteriorate after prolonged storage without inspection, and woolen and other fabrics vulnerable to the infestation of moths and insects.

Handling of equipment for the B-47B simulator trainer required concentration on the assembly of thousands of yards of electrical wire and other components necessary to the construction accomplished by the Link Trainer organization.

Inspection Systems

The primary mission that is the concern of the Inspection Systems Branch is to devise, establish, and monitor standardized inspection systems for all types of maintenance engineering, Air Force-wide. Included among the major functions are the preparation and distribution of aircraft requirements on a periodic basis, establishment of replacement periods for miscellaneous aircraft accessories, and preparation of periodic lubrication requirements for aircraft and equipment.

Figuring largely in the whole attempt of the new functions of the branch is the proposed tailored inspection system by which it is planned to regulate the frequency and scope of inspection to specific operational demands, not only in aircraft, engines, and component equipment, but also for surface powered vehicles and marine equipment, miscellaneous materials, armament, guided missiles, and ground and airborne communications equipment. Extensive surveys and studies will be necessary to devise the various inspections adjusting standardized maintenance to individual operational requirements.

Surface Equipment

The newly organized Motorized Surface Equipment Branch of the division has now completely absorbed func-

tions recently separated from the Equipment Branch. The separation was induced by the long-range programs ahead for the Air Force in maintaining numerous types of engineering equipment and motorized surface equipment formerly maintained by the army.

This branch is responsible for providing technical advice and assistance to all elements of the Air Force on maintenance, modification, and reconditioning of the numerous items of Air Force equipment now being delivered for future maintenance, such as motorized land, marine, and special-purpose vehicles, aircraft support equipment categorized as crash fire and rescue equipment, general purpose vehicles, aircraft and auxiliary power plants (airborne and ground-support types), motorized equipment such as Diesel generator sets, and railway equipment. Many of these, particularly the railway rolling stock, are to be completely turned over to the Air Force in 1953 and 1954.

With the steadily increasing air arm, marine equipment and railway equipment is destined to play a major part in the over-all support of the Air Force. The program of maintenance for Diesel generators requires special training for large numbers of airmen, and will also play an important role in the country's defense.

Property Mixing Sometimes Okay

Government property, and in particular, material, must generally be segregated and kept physically separate from contractor-owned property.

But commingling of government and private property is permitted in a contractor's plant under these conditions:

- When a production line is engaged solely in government work. Normally no special permission is needed for commingling of government special tooling and plant equipment with the contractor's property in a case like this. But the contract administrator may prohibit it at his discretion, if such commingling is not considered in the best interest of the government.
- Government-furnished special tooling or plant equipment, held in storage by a contractor pending its use under a production contract, may be commingled with contractor property if the contract administrator gives his consent in writing.
- In connection with research and development contracts, when approved by the contract administrator.
- Any commingling may be permitted by the contract administrator upon approval of the cognizant government department, in accordance with departmental procedures.

Now the AF Keeps Them Reading

Publications Division turns out over 3 billion pages a year to provide USAF with technical know-how.

An appetite for reading doesn't make you a "square" in the Air Force.

Our nation's primary air arm is placing great emphasis and reliance on the printed word to provide technical "know-how" for its personnel in a far flung organization.

Complex and rapidly changing equipment, comprising almost innumerable items, has made it necessary to develop a huge but remarkably flexible technical publications system. At present, more than 25,000 active publications, most of them subject to frequent revision, form the unique Air Force technical publications system.

Development and guardianship of this big publication enterprise rests primarily with the Publications Division, Directorate of Maintenance Engineering, Headquarters Air Materiel Command. It is the seat from which more than 15,000 separate publication writing projects are generated annually, involving the services of hundreds of contractor writing agencies as well as the technical writing skill of numerous Air Force technicians at Hq Air Materiel Command, the Wright-Patterson Air Development Center and those in organizations of other military departments.

Operation of this vast and far reaching technical publications system saddles the Publications Division with responsibilities akin to those of some of the nation's largest publishing houses, including control over the printing of more than 3 billion pages annually. This Air Force-reproduced material is equivalent to a 165-mile-high stock of its standard 8½ x 11 inches sheets of paper.

▶ **Printing Plants**—The printing capabilities of the Air Materiel Command rest in printing plants established at its headquarters and most of the Air Materiel Areas. To augment this capacity, commercial facilities are used extensively. In addition, approximately 240 million pages of technical data applicable to the Air Force is obtained from the reproduction sources of other military departments.

Despite the enormous volume of printed material issued each year, it is well controlled through a carefully established filing system placed under the close scrutiny of air inspectors found in the great majority of Air Force bases and installations. Actually, one of the pressing problems of the Publications Division is that of obtaining better coverage of the countless new or modified items of Air Force equipment for Air Force personnel engaged in operating, maintaining, inspecting and supplying this equipment.

In the early days of the Air Force, technical data support, while important, was relatively small due to the limitations and simplicity of equipment. However, with a vastly expanded Air Force utilizing extremely complex equipment, publication support has become Big Business. Some concept of the expanding requirements may be gotten from the fact that more than 1,500 separate publications are required to support a modern B-36 airplane, with its installed equipment and related ground handling and test equipment.

▶ **The Handbooks**—One of the Publications Division's primary responsibilities is the establishment of publication requirements to provide this type of support for Air Force operated equipment. This literature support is in the form of Air Force technical orders consisting of handbooks, each designed for independent usage by personnel engaged either in the operation of equipment, the general maintenance and overhaul of equipment or supply support. Further aids are provided in the form of many types of miscellaneous publications.

A large percentage of this technical literature has its origin with the manufacturers of equipment. Through streamlined procedures, it is prepared in a form to permit immediate reproduction and subsequent distribution to organizations spreading to Europe, Korea, and remote corners of the globe.

The format, illustrative arrangements, and specific contents of the various types of technical publications are set forth in specifications that become part of the contractual requirements for the preparation of publications and serve to establish the necessary uniformity and adequacy of these publications.

A staff of approximately 425 military and civilian personnel discharge the responsibilities of the Publications Division at Hq Air Materiel Command. Organization-wise, the Division is comprised of the office of the Chief of the Division and the Chief Publications Officer, together with the usual complement of personnel who carry on staff functions relating to administration, plans, and operations, plus five operating branches.

Requirements Branch

Primary mission of Publications Requirements Branch is to conduct necessary research and coordinate with maintenance technicians in determining requirements for publications. This action is taken when a procurement document is received for processing. The item of equipment being purchased, whether it be a complete airplane or a small valve assembly, is discussed with supply and maintenance technicians to determine if there will be a service need for technical data. When a requirement exists, a further determination is made as to what handbook specifications would be applicable or whether commercial data as prepared by the contractor will suffice. These data requirements are then included with the equipment purchase request which the procuring agencies finalize into a formal contract.

Requirements established for procurement of data either directly from commercial sources or through other military services are made a matter of record and periodic checks are made against the procuring service to insure that required data will be delivered concurrently with equipment to which it relates.

Contract Branch

Following procurement action for publications, the Contract Publications Branch enters into the next phase of procuring handbooks from Air Force contractors, by guiding the Air Procurement Districts in their work with the equipment contractors.

This branch also monitors contracts with prime equipment manufacturers for maintaining handbooks in current condition where out-of-production equipment is involved. Work of this type has been done by technicians at Headquarters Air Materiel Command for a number of years; however, the large number of books involved and the pressure of other staff work now precludes the maintaining of these books in current condition at the headquarters. At the present time approximately 50 equipment contractors have contracts with the Air Force for this new type of handbook service.

A primary responsibility of the Contract Publications Branch is that of preparing and coordinating the specifications governing format, style and specific technical coverage, to insure uniformity in all of the technical publications.

Editorial Branch

The Publications Editorial Branch of this division performs the necessary editorial and art work incident to preparing a technical publication that originates within the Maintenance-Engineering Directorate. Normally the work involved consists of developing rough draft copy, furnished by technical com-

ponents of the Directorate, into final reproduction copy along with related art work. The resultant publications may be either handbooks, parts catalogs, modification directives or publications of a procedural nature.

The majority of the publications processed deal with the normal maintenance functions on concerned equipment. However, emergency situations are covered by time-compliance and other directive types of technical instructions requiring immediate attention by operating activities covering modification, operation, unusual maintenance practices, and grounding of aircraft. Usually, publications of this type are of an urgent nature and require complete processing with great rapidity.

The Indexers

The Special Publications Branch is primarily concerned with the preparation of very necessary index types of publications. These consist of numerical indexes, alphabetical indexes, requirements tables for use in automatic distribution of technical publications, and lists of publications applicable to specific aircraft or special equipment. The numerical and alphabetical indexes are essential items for identifying desired publications. The need for this type of data can readily be appreciated when the 25,000 publications presently in the system are considered.

A related function of the Special Publications Branch is proper assignment of publication numbers for Air Force handbooks procured from contractors and the applicable publications issued by Departments of the Navy and the Army. This branch also serves as the contact point for the exchange of technical data with other military services.

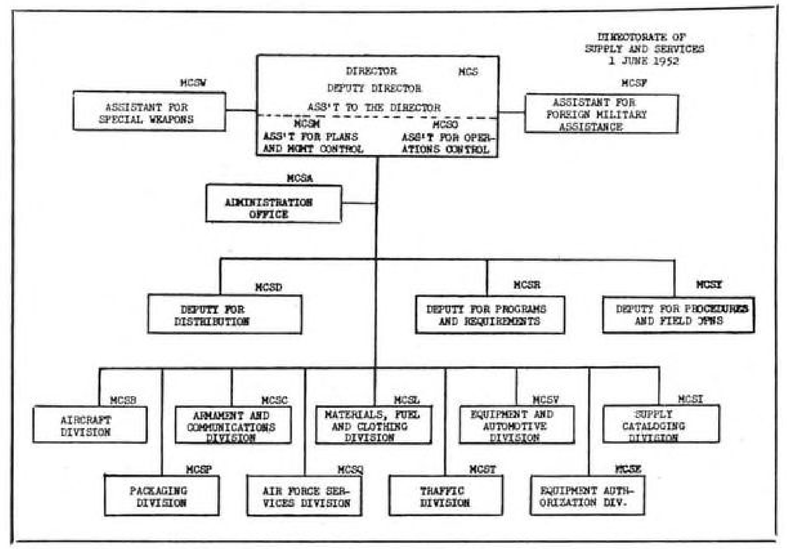
Printing Branch

The Printing and Reproduction Branch has enough equipment to perform practically any type of reproduction work classified as printing. This includes linotype work and other types of composition. The production capacity of this plant is approximately three million 8½ x 11 inch pages per eight-hour day. Reproduction is accomplished on equipment ranging from a simple office duplicating machine to complex two-color offset printing presses. In addition to the printing of technical publications, the plant reproduces all manner of regulations, office instructions, charts, graphs, orders, and all the mass of special publications required by the various components of Headquarters, Air Materiel Command.

It is the practice of the Air Force to reproduce all technical publications by offset printing, so that negatives can be retained for subsequent reprints.

Supply Directorate: Source of Logistics

- **AMC's primary job is to supply the Air Force.**
- **And the pipeline starts in an electronic brain.**



On a certain fateful second, an Air Force jet pilot will get a MiG squarely in his sights. The next few seconds, maybe three, maybe 20, will tick off the outcome of the combat.

At another instant, a bomber will drop its lethal cargo on a pinpointed target with the words, "bombs away."

A few hours later Americans will read or hear brief bulletins that "nine Communists jets were downed in the eastern sector" and "enemy installations south of the Yalu River were bombed early today."

These tactical operations will seem pretty simple to them. They can picture the well-trained pilot hopping into his F-86, taking off, finding the enemy and clobbering him. They can see a bomber squadron high above the Communist ammunition dump.

As news services tell the story nowadays, these moments of combat don't relate closely to the myriad details of the nation's air war effort.

► **It's Big Business**—Actually, it takes the biggest business in the world to place the loaded bomber and the gassed-up F-86 on their landing strips, ready for takeoff. And to equip the pilots and crews for their swift tactical missions.

This is the business of the Air Materiel Command. AMC performs the physical task of providing the pilot with the things he has to have for those relatively few moments of impact on the body of the enemy.

These things include some very personal human needs:

- **Food and clothing** for the pilot. For his work clothes on this job, he'll wear a helmet and pressurized suit. He'll sit on a parachute. It's essential that he has an airplane which performs about as well as the enemy's and has comparable armament. To obtain these might call for some modification.
- **A landing strip** and an airbase somewhere south of the 38th Parallel. That base will have to be able to perform certain small maintenance jobs. So there will be tools at the base.
- **Lots of fuel and lubricants.** To fly upcountry in North Korea the F-86 will have to carry wing tanks.

All these things are not to be found growing on Korea's shell-blasted trees. They have to be brought across the Pacific from America to be stocked against every calculated need.

► **Support Logistics**—Over here, the clothes, the meals, the tools, the airplanes, the ammunition and the fuel had to be bought and tested. They had to be placed where the Air Force could grab them in a hurry. That calls for a workable stock record system and efficient warehousing. Speedy methods of shipment had to be worked out, and safe, convenient packaging. Transportation and routing had to be studied and bought. Fleets of cargo planes and vehicles bought and maintained.

Then men had to be employed to perform the mass of work, often highly technical, involved in these tasks.

In military parlance, all this is the work of logistics in support of tactics. To fall back on the dictionary, tactics is "behavior in the presence of the enemy." Logistics boils down closely to "supply and services to the force in the field."

The people in AMC's newly created Directorate of Supply and Services, believe their functions come closest to fitting the overall definition of logistics. Theirs is the job of delivering goods and personal services to the place where the trigger is pulled.

The people who work on desk jobs at AMC headquarters near Dayton see their tasks reaching even beyond the faraway airbase in South Korea. They see them riding with the jet pilot and the bomber crew. They feel as close to the pulse of combat as the cuff on the flyer's pressurized suit.

The very complexity of the work of Supply and Services makes it hard to conceive how such a vast, farflung operation can keep pace with the supersonic tempo of modern aerial warfare.

How can this whopping big network of area commands, procurement districts and depots move its necessary paperwork fast enough to meet such emergencies?

► **How It's Done**—Maybe it would be easier to tell what can be done than how it's done.

Many times since the outbreak of the Korean war, Supply and Services has been able to deliver its goods almost as fast as the Air Force can deliver bombs.

An assistant to Brig. Gen. Lewis R. Parker, chief of Directorate, discloses:

"We can beat 72 hours on hot items that can be carried by airplane to Korea. That's from the time the original request was made—when the need was discovered—to the moment of delivery to the Korean airbase."

Now, let's time this out:

- Say that at a Korean airbase it is found that a changed tactics requires a new piece of air equipment. The base supply is zero on that item.
- That part, like almost every other part in the Air Force stocks, has a catalog number and nomenclature. The method of getting it is through a requisition form. The form is filled. This requisition is translated to a punch card on a business machine. The card electronically prints its message on a teletype tape.
- This message is flashed across the Pacific by radio teletype. Within the second it is received at the Overseas Control Depot. There it is re-con-

verted electrically to a punch card.

• The requisition goes by teletype to a "prime depot," perhaps in Ogden, where the item should be stocked.

• Suppose that Ogden doesn't have the part. A quick look at AMC's worldwide stock balance on this item tells Ogden the part can be supplied by the Mobile depot. The teletype flashes to Mobile. This is called an extraction.

• There the part is pulled out of stock. Shipping papers are made at Mobile to the proper aerial port. The article is packaged, put on an air carrier and forwarded to the overseas shipping point.

In this case, the bulk of the time consumed in filling the order will be the flying time across the vast stretch of the Pacific.

Actually, there's a lot more to the shipping process than this brief sketch tells. More of that later.

This sketchy account of rush order treatment was given merely to show how Supply and Services, with the aid of modern electronics, can speed its "paperwork" faster than the swiftest jet can fly.

If it has to, that is.

Supply and Services prefers not to do business this way.

► **Anticipate the Needs**—Much of the thinking in the Directorate's headquarters is aimed at avoiding the need for rush—at anticipating requirements so thoroughly that the need of the premium transportation, with its premium costs, can be forestalled.

These AMC Supply and Services people are not "longhairs." But there is some high-level thought behind their down-to-earth functions.

The observer sees the Directorate going about the prosaic business of getting needed goods and services to their "customers," the other Air Force commands. These goods flow through the AMC supply system in various ways.

In some cases property is dealt out to the customers in the traditional procedures of the old time Army quartermaster. In other cases, something like a private retail business is set up. Sometimes supply operations resemble a mail order house. One phase of services is like a super-chain restaurant.

There's nothing static about this huge business. Methods and procedures may change overnight, when somebody discovers a new way to save time and dollars.

The steering of this many-phased operation is in the "headhouse" of the AMC headquarters building. There, in Gen. Parker's office, the planners and top administrators apply an overall philosophy to the complex job.

► **Buy Time & Distance**—Their philosophy sounds at first like something out of Einstein until they reduce it to practical applications.

GEN. PARKER: Paperwork can be faster than a jet.

A civilian assistant to operations control, puts it this way:

"We buy time and distance.

"And we're here to make a business of it, measured as nearly as possible by the same yardstick of economy you'd apply to private industry. We want to deliver as much as we can, per mile and per hour, for a dollar."

The concept of buying time and distance sounds a bit vague until the spokesman cites an example:

Suppose, he says, the Air Force has to buy a six-engine bomber to carry out a certain tactical mission. And suppose each engine in that bomber has to be overhauled every 200 flying hours. Let's say that with normal procedures it takes 180 days for each engine to make the roundtrip from its overseas airbase through overhaul in the U.S. and back to its nacelle.

If in normal operations it has been learned that it takes three spares to replace any single engine over the 180-day period, we will need 24 engines for each bomber. While six are installed, 18 will be moving through the overhaul pipeline.

As there is a tremendous dollar investment in engine inventory, AMC does not follow normal operations. To reduce this investment, AMC has worked out management, production and traffic controls in an effort to trim the pipeline time.

In this way AMC cuts the cost of time and distance. That reduction may be so great that only 12 spares will be needed to support the bomber. And if those engines cost $100,000 each, AMC has saved $600,000 on each bomber in this hypothetical case.

This policy is being followed in every high-cost or critical item, the AMC spokesman says.

"Suppose," he explains, "an Air Force installation needs some desks. AMC could do one of two things:

"For one, it could go to the manufacturer and buy up a lot of desks, say 10,000, and stock them in a warehouse. We could pull the desks from this stock and ship them to the installation.

"The other thing it could do is to give that installation a piece of money and tell it to buy is own desks.

"Now, which is cheaper?

"There's usually a price advantage in bulk buying.

"But warehousing, packing and shipping can tie up a lot of money in manhours, land buildings, packaging and freight.

"Can we save a bit and cut local small business in on a part of its own tax contribution by authorizing the installation to make a local purchase?

"Recently, we have found we can. Local purchase is the policy now in many items, including office furniture where it's feasible.

"The time and distance saving factors are obvious. We've saved ourselves a long-time storage, a lot of work, and shipping the stuff across the country from our depot to the installation. The manufacturer has done all that in his normal dealings with his outlets. We've also helped the local dealer.

"But we can't always say we'll follow this policy. Circumstances may require a change. If a piece of office equipment threatens to become critical, and we have to buy it, we may start stocking it. We try to be as flexible as private industry."

The Directorate of Supplies and Services covers a lot of ground—39 million sq. ft. of covered ground throughout the world.

In a way, it seems odd to compare AMC's colossus of Supply and Services with private industry.

►**S & S Scope**—Recently, the deputy for procedures and field operations prepared a chart series outlining the scope of the new directorate.

It was created when the former Directorate of Supply, Services and Maintenance Engineering was split into two new organizations.

The organization chart, page 161, shows nine divisions under General Parker's directorate.

These are Aircraft; Armaments and Communications; Material Fuel and Clothing; Equipment and Automotive; Supply Cataloging; Packaging; Air Force Services; Traffic; and Equipment Authorization.

At top levels are the offices of Assistant for Special Weapons and the Assistant for Foreign Military Assistance;

the Administration office and Deputies for Distribution, Programs and Requirements, and for Procedures and Field Operations.

These organizations are so closely knit that the activation of a single wing in the U. S. Air Force will involve all of the deputies' offices and eight of the nine divisions.

Command-wide, the directorate employs approximately 37,000 people.

Its covered storage space, worldwide, comes to 39 million square feet.

During fiscal year 1952, its catalogs listed 768,926 different items for the Air Force.

In this last fiscal year, ended July 1, Supply and Services handled some 4,830,000 tons of materials. It processed 37,039,071 items in the same 12 month period.

The directorate had those totals on hand before July 10. The totals came from the AMC world-wide stock balance and consumption report and the AMC supply activity report which are prepared quarterly.

► **U. S. Zones**—In Continental United States, AMC divides its Supply and

Food for airmen cost the Services Division over a quarter of a billion dollars last year. This did not include the cost of preparation or handling.

Services function into two zones. The dividing line, roughly is the Mississippi river.

In each zone there is a group of depots which handle all "classes" of Air Force property. In other words, east of the river a cluster of depots can supply from their stock everything which is warehoused by the Air Force. West of the Mississippi another cluster duplicates that entire stock.

► **Property Classes**—A "property class" embraces all things which have a common purpose or nature. Class 25B, for instance, stocks office supplies, like pens and paper, which commonly are used up in ordinary business. Class 25A stocks furniture and business equipment —more permanent things. Class 10C includes such photographic supplies as film. Class 10D contains motion picture cameras, projectors and processing machines. And so on down the list.

There now are 241 property classes and subclasses of property in the Air Force Supply system.

Their range is enormous. They include all types of airplanes and their spare parts, vehicles, boats, fuel, huge specialized training equipment, raw metal stocks and tools of every kind. Even dogs.

The Air Force is a big operator in the dog market.

But the dogs are not kenneled or fed in local depots. They're kept in the Far North. You see, these dogs are huskies, bought and trained for their indispensable services to the isolated Air Force stations in the Arctic.

► **AF Depots**—In the East Zone the 241 property classes and subclasses of goods are stored in nine depots. These depots vary in size and in the number of property classes.

Nine depots in the West Zone also divide the property classes.

Of these 18 depots, nine are called "prime" depots. The prime depot has worldwide control of the property classes it stocks. There are four primes west of the Mississippi, five to the east. The other nine are called simply "zonal" depots for given classifications.

For instance, in the East Zone the Wilkins Air Force depot at Shelby, O., is the prime depot on clothing. It's supporting depot in the West Zone is Maywood, Calif.

Like other primes. Wilkins computes the worldwide requirements for its property class. It buys all clothes and is in charge of their worldwide distribution. This is the setup under decentralization. Formerly, the buying was done at AMC headquarters.

Now let's say an Air Force organization calls on Wilkins for an extraordinary amount of shirts, and Wilkins doesn't have enough to fill the order. Wilkins checks over the stocks in the East Zone (it has the stock balance report from everywhere) to see if there is a surplus. If so, it draws from this surplus to fill the order.

If it can't muster up enough shirts this way, Wilkins "extracts" the deficit to Maywood, the supporting depot in the West Zone. Maywood may have to scratch over the West Zone to find enough shirts to fill the requisition. Anyhow, the requisition is filled, and with less fuss than might be supposed, considering that all Air Force installations in the U. S. may have to be combed over. The science of electronics has made the job easy and swift.

► **Communications Web**—For, linking every Air Force depot with AMC headquarters and overseas operations is a network of teletype and radio teletype stations which move orders for needed supplies and services. This communications web, linked to business machines, gives Supply and Services not only a swift channel for requisitioning, but provides totals and statistical data.

This network doesn't belong to Supply and Services. It is operated by the Statistical Services division of the Comptroller's office. It works for Supply and Services just as it works for the other directorates of AMC.

It is an essential nerve center in the linkage between AMC's stockpiles in America and the Air Force's overseas missions.

► **Overseas Shipments**—Overseas shipments are handled through three Overseas Control depots at Sacramento, New Orleans and Newark, N. J.

• **Sacramento** deals with shipments to Alaska, the Far East and all Pacific areas.

• **New Orleans** monitors those to North Africa, Puerto Rico and the rest of the Caribbean.

• **Newark** monitors to the northeast, England, Continental Europe, Bermuda, Greenland, Iceland and The Azores.

This monitoring job means the receipt and fanning of overseas requisitions to their proper depots, selecting the method and time of shipment and a "case and item control" over shipments once they leave the American shoreline.

► **Critical Items**—"Hot" shipments go by air. These are shipments which have been assigned a high priority by the overseas requisitioning agency. They come into the depot by radio teletype, and they are forwarded to the supplying depot by teletype wire service.

Other shipments, not quite so hot, may be made by "marinex." This translates to marine express. It's a method of giving a special treatment to certain items in a ship's cargo.

Critically needed items are "top-loaded" on the ship's deck so they can be unloaded in a hurry.

A requisition which is drawn up at an airbase in Korea is forwarded to the Fifth Air Force depot.

From there it passes to Feamcom, the Far East Materiel Command headquarters in Japan, and to Sacramento and the supplying depot.

► **Delivery Insurance**—The shipment by the depot is covered by a new Air Force delivery insurance program. This is called "case and item control."

When the shipping depot prepares an overseas consignment, it fastens a list to each shipping case showing just what items are in that case. While it does this, it sends a "case and item report" to the overseas base where the stuff is expected. An information copy goes to the Overseas Control depot. For the Korean theater, this depot is at Sacramento.

Both overseas and at Sacramento it's known exactly what items are on the way, what cases they are in, how they are being shipped, and when they leave the airport or the water port. Also both places know the route to be followed by the airplane carrier or the ship.

There are 153 issue commissaries and 131 sales commissaries under the Services Division.

Not long ago the Air Force lost a 5,000-ton cargo when a freighter bound for Japan struck a reef.

The San Francisco Port of Embarkation caught the news of the disaster by wireless. San Francisco fired duplicate case-and-item cards (these fit into business machines) to the Overseas Control depot at Sacramento. Within two days a duplicate shipment, in identical cases, was ready to be loaded aboard the next freighter headed for Japan.

► **"Bugs" Get In**—"Hot" overseas shipments, which often get careful scrutiny at Supply and Services top administrative levels, sometimes bring out strange "bugs."

There was the matter of auxiliary fuel tanks for Korea.

The long-range missions of F-84 and F-86 jets and their extraordinary fuel needs brought about a critical situation. The North Korean landscape was cluttered with dropped tanks, but they were a scarce item in South Korean stockpiles.

In a serious business like this Supply and Services headquarters took a hand. Procurement schedules were revised upward. The two manufacturers who were supplying the tanks were alerted to wheel out their product as fast as possible.

The assistant to the director required that every day a report showing the number of carloads of tanks shipped to the Air Force by each manufacturer would be placed on his desk.

"I figured that ought to be enough," he said. "I knew the dimensions of the tanks and of a boxcar. A boxcar is eight feet wide, eight feet high. So each day I could tally the exact number of wing tanks we had coming, and add up the totals—I thought."

One day his figuring blew up in his face. He learned from the port of embarkation the number of tanks it had received from Manufacturer A and Manufacturer B. The total from B was far short of the number he had computed.

"I yelled that we'd lost those tanks," he said. "We'd have to find them. They had to be some place."

In the probe that followed, Jackson found his answer. There were no lost tanks. They never had been made.

Manufacturer B had shipped his tanks in a bulkier box than Manufacturer A built. He could load a boxcar only two tanks high, two tanks wide.

Very soon thereafter, Manufacturer B got a visit from the Packaging division. As a result, AMC worked out a considerable savings in freight costs between the plant and the depot. There was another savings atop that: the reduction in cubage for the overseas shipment.

Air Force officials have tossed over this business of packaging through many a sleepless night. The program they have set up to cut down the weight and size of packaging is described on p. 172.

► **Changing Accent**—Not long ago, the accent in Supply and Services was entirely on Supply. Services, such as the routing of materials to the area of combat, were considered small incidentals. But, like Packaging, Traffic has stepped to the front as an important consideration in the Air Force's overall logistical planning.

Large among the directorate's new divisions is the Air Force Services Division.

This organization looks after the individual needs of the airman, wherever he happens to be.

Whatever he uses is an object of Services' scrutiny. It checks his equipment and weapons to find out how they fit his body. It guards him through a scientific safety program of ammunition storage.

It does his laundry. It handles explosive ordnance demolition. In the U.S. it looks after his funeral arrangements.

Services division has the answer to "How much can an airman eat?"

It feeds him.

The individual airman can't compete with a jet engine in fuel consumption, but he does a workmanlike job. Services division finds the actual cost of food for issue is over $250 million a year.

The division's gastronomical computers report:

It maintains nearly 1,500 dining halls of varying sizes and layouts. There are 55 central meat-cutting plants. There are 75 pastry bakeries and 55 bread bakeries.

There are 153 issue commissaries and 131 sales commissaries, and four overseas subsistence supply points,

► **Re-Catalog Job Ahead**—In the months, maybe years, to come, the Air Force, through Supply and Services will be tackling one of its biggest technical jobs: Re-cataloging its huge stocks to comply with a new law signed last month by President Truman.

This law will be enforced through a standardization act which sets up a requirement for a uniform cataloging system covering all federal agencies. This law will be enforced through a government cataloging agency. It will set the uniform standards for the Air Force, Army, Navy and every other federal agency which buys and distributes materials.

The procedures under the law are novel. All items which are handled by any or all of the agencies are lumped into groups. Under these groups are various classifications.

Re-cataloging of Air Force stocks will probably require the rewriting of every tech order and manual. This will be a Supplies and Services project.

Each item, regardless of classification, will be given an identification number.

The number will replace the present Air Force stock numbers, as well as the Navy's and Army's numbers. They're all different.

The scheme is to avoid duplication.

It is designed to work like this: Every single thing bought or handled by government agencies will be listed under its own identification number in a master card-file catalog.

From this card file book catalogs can be made. The book making would be split up. For instance the Air Force might make books on airplanes, fuels and spares. The Army would do the book on vehicles. The Navy certainly would compile the books on shipping equipment and supplies.

So far, the plan is still in motion. Nothing has been settled. But the new standardization is bound to have an impact on the Air Force reaching as far back as the bin labels in a warehouse. It probably will require the rewriting of almost every technical order and manual. It's still too early to estimate the extent of change.

But Supply and Services officials say they'll roll with the punch.

They're used to extraordinary jobs.

LIGHT AND STRONG framework for C-47 rudder is shown in model form by Col. Rudolph Fink, Packaging Division chief. Box in right hand is for ground shipping, storage.

Packaging Also Part of Logistics

Making containers sturdy, but light enough for air shipment is the job of AMC's Packaging Division.

Once the "biggest unorganized business in the Air Materiel Command," packaging is now a going concern with one head and one objective.

Col. Rudolph Fink is the head. His organization is the newly-formed Packaging Division, Its aim is to give the Air Force the most for its packaging dollar and to work out more efficient methods of handling the vast quantities of Air Force material in depots and in the field.

The same problems that have plagued these functions in the Air Force have long been apparent in industry. For more than 20 years, American industry has recognized packaging as one of its major problems. But only in the last three years has packaging been recognized as a major field of management improvement.

It has been reported that industries as large as General Motors spend as much as 21 cents of each dollar on their packaging. On the whole, packaging is considered to be a multi-billion-dollar business.

AMC's packaging division was established last March at the personal direction of Lt. Gen. E. W. Rawlings, AMC commanding general, who saw the position industry had assigned to packaging and the tremendous gains made in this quarter.

Col. Fink and his staff have approached the problem in this manner:

• **Manpower and material** may be conserved by improving packaging and materials handling for the Air Force.

• **Technical guidance** and assistance must be given to other Air Force and field activities.

• **Ordinary problems** must be put in a secondary category with the view that material and money savings can be made right now through common sense application of new packaging and materials handling principles.

▶ **Four Branches**—Operating organizations of the new packaging division are the packaging, services, cost-data and materials handling branches.

• **Packaging Branch** designs new containers, standardizes containers, lends technical supervision to certain Air Force packaging activities, and is responsible for corrosion control, preservation and packaging of Air Force supply items.

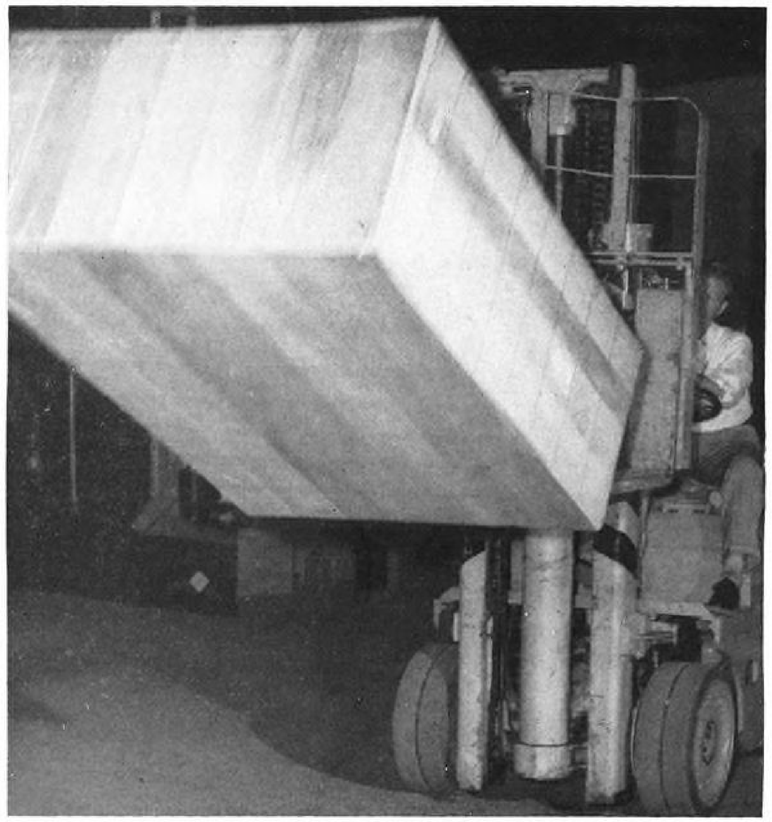
• **Cost-Data Branch** assures proper balance between the cost of packaging and protection requirements.

• **Services Branch** gives the Air Force technical assistance on packaging problems, prepares technical publications and develops standards for storage, marking, corrosion control and preservation.

• **Materials Handling Branch** functions include lending technical information

(Continued on page 175)

AMC Experiments in Better Packaging . . .



THE TREATMENT given this container is about what it might receive in service. A device inside measures the shock.

RESULT of crate's impact is read on instrument.

ALL-AROUND fork lift truck climbs 45 deg.

FULLY PACKED cans of clothing are cheaper to ship than large wooden crates, give better protection, and can be re-used.

CAN CANS protect plane parts? Can machine shows.

on materials handling operations of the Air Force and assisting in the planning and layout of Air Force packaging lines, box shops and corrosion control. The branch also develops unit loading systems and monitors materials handling provisions for lifting lugs, slings, pallets, tie-down and skids.

▶ **No New Functions**—In forming the Packaging Division, Col. Fink pointed out, no new functions or responsibilities were invented and no additional personnel were required. The new division simply brought together tasks which belong together and were not "dyed in the wool" supply or maintenance functions.

"We have given the commanding general a man whom he can put a finger on for the mistakes, and recognition for the good things. We have also established an office that can and must make a decision," said Col. Fink.

"Packaging does not belong to supply, nor to maintenance, nor to procurement. It is an insurance function that prevents the loss of the concerted efforts of supply, maintenance and procurement," the new packaging head continued.

He explained that the Air Force will spend more than $1 billion next year on packaging, preserving and packing, or about 10% of the total Air Force procurement bill.

Col. Fink is particularly interested in designing containers for rapid airlift transportation. His staff, with the help of the Forest Products Laboratory, Department of Agriculture, is developing minimum-weight containers for airlift.

In the not too distant future some of the advances the Packaging Division is making in packaging and materials handling for air cargo might change the entire logistics concept of the military services and help give commercial air cargo its place in the sun.

▶ **Axiom**—An axiom Col. Fink uses in trying to lighten the air cargo load is this:

"The only reason you put boxes around materials to be shipped by air is to assure the individual pieces stay together and to insure against rough handling. In a sense, you should throw away the wooden box and fly the interior cardboard carton."

His thinking behind packaging for air shipment is that items in aerial transit should not get the rough handling or jolts they would receive in ground shipment. Therefore, the air package should be just sturdy enough to "get by," with provisions for "beefing up" the same package for ground transportation.

Col. Fink called upon memory to bring out this striking illustration of the importance of cutting tare weight for air shipment: it costs about $1.90 a pound on the average to fly Air Force

material from San Francisco to Japan, and about $.95 a pound from Westover AFB, Mass., to Europe.

Another major reason for cutting down on air cargo package weight is the fact that the airplane, unlike surface craft, runs out of weight carrying capacity before it exhausts its cubage. Col. Fink said the average Air Force parcel being shipped by sea-going vessel weighs about 17 pounds per cubic foot and occupies four cubic feet or less. The same item being shipped by air must weigh less, although its outside dimensions are not so important.

The average storage or overseas package, according to Col. Fink, weighs about two and one-half times the weight of the product enclosed. With no great difficulty, he believes, the tare weight can be cut down to 50% of the item weight, and ideally, the package should weigh between 10% and 15% of the product it protects.

▶ **Applying the Theory**—This thinking is being pulled rapidly out of the theory stage. Col. Fink produced statistics which show how his staff already has designed packages for air shipment of aircraft parts that weigh a third as much as standard packages in current use.

Standard packages for airplane control surfaces, in particular, seem unduly heavy when compared to the weight of the surfaces themselves. This is due generally to the fact that control surfaces, though light, are long, flat, cumbersome affairs.

Thumbing through charts, Col. Fink pointed to a horizontal stabilizer weighing 94 pounds which, when packaged according to standard procedures, weighs 540 pounds gross. An aircraft rudder measuring 75 x 24 x 6" weighs 26 pounds but adds 142 pounds to its packaged weight. Another surface weighing 960 pounds weighs 11,770 pounds with standard packaging.

Studies by the Packaging Division quickly reduced gross packaged weights from 360 to 87 pounds on one control surface; from 445 to 103 on another, and from 745 pounds to 181 pounds on a third.

A C-54 aileron measuring 307 inches in length and weighing a mere 96 pounds tipped the beam at 982 pounds when packaged by the regular method. Packaging Division people whittled this down to 350 pounds gross on an air shipment pack. A study of the C-119 aileron package brought about a 50% weight and a 40% cubage saving.

▶ **Strong Framework**—Most of these package weight reductions were accomplished by designing a strong, rigid framework to contain the product, where the ordinary method was to enclose the tire control surface in a heavy wooden box. The box can be added for ground shipment if necessary.

Another device that Col. Fink is

applying to a lot of packaging problems is the metal container, or can. Steps are being taken to can certain types of clothing for overseas shipment. Many instruments and smaller aircraft parts are starting to be canned, and one of these days the canned parachute might be standard.

Use of cans in packaging provides the perfect moisture barrier and durability scarcely possible with other types of containers. Cans cut down the instances of pilferage. If there's a flood in Missouri, your stored or moving products in cans won't be damaged.

Another factor about cans which is of particular value to the military services is that when the man in the field receives a canned item, he may unpack it easily, then place a reparable item back in the empty can, seal it in a jiff and return it to the depot for repair.

▶ **Canned Bearings**—As an instance of savings, the Air Force cites current tests being made on "canned" bearings.

Storing bearings is a delicate process. You have to allow for weight, temperature and other things which may throw a bearing off kilter. Storage and inspection procedures have been carefully written up in Air Force Technical Orders. These TOs call for lubrication at intervals and special care to avoid dust and grit.

It was learned that despite all these precautions, the Air Force was losing something like $500,000 a year on bearings which developed defects in storage.

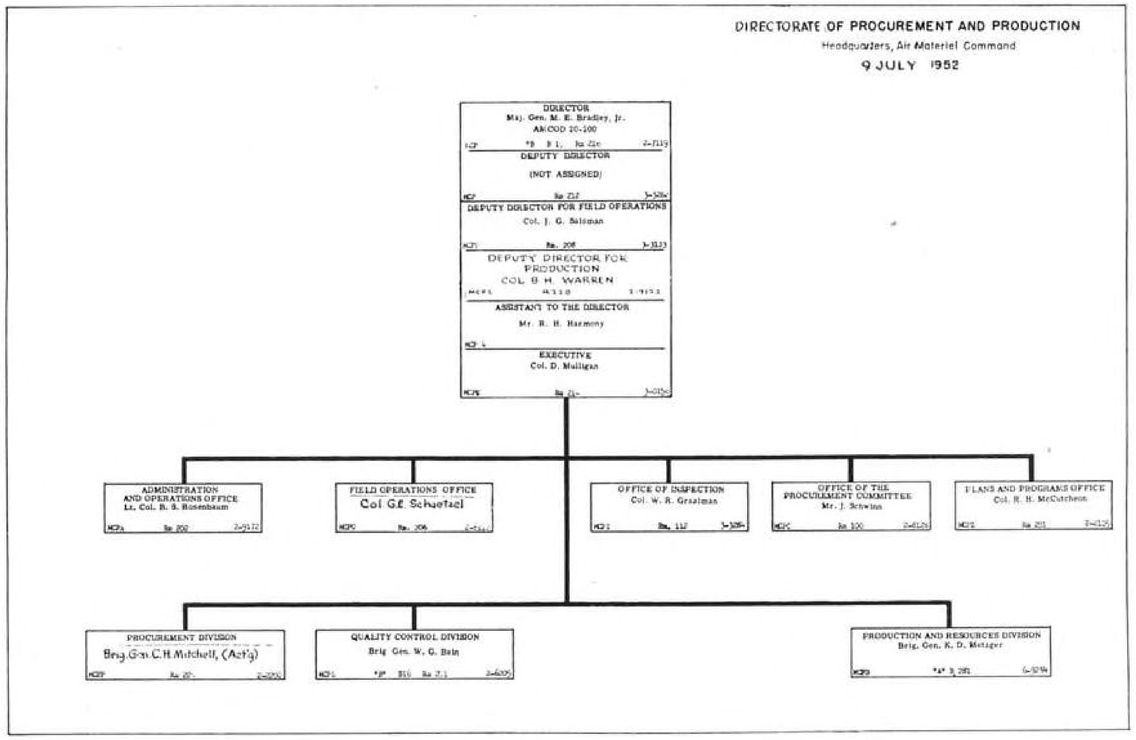
Now Packaging believes there's a partial answer in canning bearings, like you'd can tomatoes, in an airtight can, bathed in boiling lubricant to knock out the least chance of corrosion.

▶ **Tissue Paper**—Another innovation suggested by a Packaging Division employee is saving the Air Force more than $800,000 a year. The suggestion was to use tissue paper as a first wrapping for delicate instruments and other lightweight aircraft accessories to prevent the entrance of dust and other foreign matter.

The tissue paper replaces an expensive, acid-free, non-corrosive, greaseproof barrier material formerly used. Costing one-tenth as much, the tissue paper is specially treated to make it acid-free.

As part of its efforts to improve packaging and materials handling for air cargo, the AMC Packaging Division is cooperating closely with the Air Cargo Task Committee of the National Security Industrial Association. Members of the packaging division are on this committee, and early in June the division held a meeting of the committee at Wright-Patterson Air Force Base.

The Packaging Division also is well represented in the new Air Force Packaging and Materials Handling Board, of which Col. Fink is the chairman.



Organized for Purchasing and Production

- **Procurement directorate in two years triples staff as its spending increases 600%.**
- **And the change in its internal set-up has been just as marked—even the name is different.**

Take Quality and Urgency and then accentuate Economy—there you have the three basic ingredients of Air Force procurement policy.

Subtract either of the first two, and you would find dollar savings much easier to accomplish. **But—**

If Air Materiel Command's Directorate of Procurement and Production only buys the world's second-best aerial weapons—planes and missiles—the people of the Free World won't stay free much longer. And—

If the same Directorate can't get the huge U.S. aviation industrial complex rolling to produce these weapons so that we can have them in time to meet an aggressor's challenge, the whole investment is wasted. Yet—

If the huge dollar costs of modern piloted and pilotless aircraft are not held down to the lowest possible level still consistent with quality and prompt delivery, there will be very little national economy left to come home to, after the aggressor's challenge is beaten.

▶ **Crucial Factors**—These are the crucial factors that complicate the biggest buying job in the world—the assignment of obligating the U.S. Air Force's multi-billion dollar annual procurement budget.

Since the outbreak of hostilities in Korea in 1950, Congress has authorized a 600% increase in Air Force procurement money, from $2 billion to this year's $12 billion.

To meet the step-up in funds, the Air Force rapidly increased its staff of personnel to negotiate and supervise procurement contracts. The number grew from 4,000 at the time the Communists crossed the 38th parallel, to 12,000 at the present time. And since only a few of the new employees had had much experience in Air Force procurement, the major task has been that of on-the-job training.

▶ **Name Change**—Directorate of Procurement and Production used to be called Directorate of Procurement and Industrial Planning. The name change symbolizes the new emphasis on broadening the U.S. aviation production base, the recognized urgency for meeting the growing production schedules on time.

No. 1 program of the directorate is to buy planes, missiles and related equipment for the Air Forces, and some special items common to the other military services, for which the Air Force has a joint procurement assignment.

No. 2 program in time sequence, but equally important is to help Air Force contractors boost their production flow by a wide variety of methods.

These two programs of the directorate are carried on by two operating divisions, Procurement, and Production and Resources, while a third division, Quality Control, checks them. Their responsibilities and functions will be described more fully in the following paragraphs.

Broad outlines of the policies to be followed by the operating divisions are developed by four staff offices and a committee which reports directly to Maj. Gen. Mark E. Bradley, Jr., Director of Procurement and Production, and his staff.

▶ **Administration and Operations Office**—Best known to the representatives of manufacturers who make Air Force materiel is the Contractors' Relations

GEN. BRADLEY: New name for new emphasis.

Branch of the Administration and Operations Office. It is a service organization to provide assistance and information on procurement problems to the industry representatives through its two sections for contractors' liaison and industrial liaison.

A Policies and Procedures Branch, a Reports and Analysis Branch and a Manpower and Budget Branch are key organizations within the Administration and Operations framework. Other branches handle military and civilian personnel and administrative services.

▶ **Office of Inspection**—Means for the director to keep a closer check on procurement actions is provided through the relatively new Office of Inspection. Until recently this had been a section in the Administrative and Operations Office, but it was given separate status reporting to the director, last August.

The change was made to provide a more effective channel for the Directorate to investigate and recommend action on reports of procurement inconsistencies and irregularities and to prevent recurrence of such incidents.

▶ **Plans and Programs Office**—A current status report on programs for production and procurement is maintained for the Directorate by the Plans and Programs Office. The office has the responsibility of interpreting programs and of determining the directorate's capability to support programs assigned from AMC headquarters or higher authority. Besides a Programs Branch in this office, a Budget Branch maintains a continuing analysis of available funds and budget plans, acting as a fiscal control point for aircraft, missiles, equipment and support programs.

▶ **Field Operations Office**—The new decentralization program, which is discussed elsewhere in this issue, has added to the importance of the field operations within the Directorate to such an extent that a reorganization was necessary. The new Field Operations Office, which is charged with a number of new functions, places Col. George E. Schaetzel as office chief, and makes Col. John G. Slasnan deputy director for field operations.

Mission of the reorganized office is to exercise staff surveillance for the director over all Air Force field procurement. A foreign procurement branch is established to keep an eye on foreign procurement activities of the Air Force, including overseas commands, air attaches and Air Force foreign missions.

Other branch reorganizations provide for surveillance over Air Procurement District operations.

▶ **Procurement Committee**—One of the most powerful outfits in the Air Force's buying setup is the Procurement Committee for the directorate. Composed of veteran civilian procurement specialists it acts as advisor to the director, and recommends new procurement policies to the Undersecretary of the Air Force as well.

The committee, headed by John Schwinn, is instructed to review every Air Force contract in the amount of more than $100,000. It also may review any other contract of any size if it choses. Another of its responsibilities is to review supplemental agreements for revision of prices or overhead rates, when permitted by "redetermination" articles in the original contract.

Canadian Unit Agent For U.S.War Buying

U. S. Defense Department purchases from Canadian manufacturers are handled exclusively through the Canadian Commercial Corporation, except for off-the-shelf items.

The agreement, dated February 18, 1952, will extend through December 31, 1955, unless extended by mutual agreement.

The Corporation was established as an agent of the Crown by an act of the Canadian parliament in 1946.

Terms of the agreement between the Canadian deputy minster of defense production and representatives of the armed services in this country provide for renegotiation of contract prices where fluctuating monetary standards create hardships. The agreement also provides Canada with the responsibility of regulating margins of profit on contracts with the armed services.

All provisons contained in the agreement are subject to change at annual discussions or at other mutually acceptable times.

Planning for Production Essentials

Job of Production and Resources Division concerns equipment, manpower, materials and plant facilities.

Four basic elements in the U.S. aviation production program determine whether that program shall succeed or fail: production equipment, manpower, materials, and plant facilities.

Work of the Production and Resources Division of AMC is concerned with all four of these elements, the fundamental industrial resources which finally decide the measure of our national ability to mobilize industry, and of our ability to produce both for military and civilian needs.

The Division's job is to plan for production resources to support Air Force mobilization programs, as well as to provide production resources to support current Air Force production programs.

The Division is more specifically concerned with:

- **Industrial mobilization** planning studies.
- **Material requirements** for aircraft programs.
- **Distribution** of materials and components for aircraft programs.
- **Controlled Materials Plan** administration as it relates to the Air Force.
- **Industrial facilities** expansion for aircraft programs.
- **Providing** manufacturing methods services to aircraft contractors.
- **Purchase and distribution** of industrial equipment.
- **Industrial manpower policy** development for the Air Force.

The basic plan of the military establishment is its projection for mobilization for total war. This mobilization plan sets up the magnitude, character and timing of the military effort for victory.

From this overall plan come the industrial mobilization plans. These plans determine industrial feasibility of the war plan, and estimate national production and resources for Air Force purposes. It is in this area of industrial planning that the Air Materiel Command and specifically the Production and Resources Division has been active since 1947.

It is the Division's responsibility to take the requirements of the mobilization planning and to interpret them into what can be achieved industrially and to specify facilities and resources for their production. The Division works closely with industry in determining what production acceleration can be attained. It is through the medium of this work that the Joint Chiefs of Staff are kept informed of the industrial feasibility of the overall war plan.

▶ **World War II**—The development of industrial resources to support the World War II aircraft production program was slow and groping. Because of the sheer size of the job, trial and error and unprofitable efforts were unavoidable. Workable procedures and organization for handling complex problems of resources control, however, were evolved by the Aircraft Production Board, the Aircraft Resources Control Office, the Aircraft Scheduling Unit, and the Resources Control Section of the Materiel Command.

Commenting on their accomplishments at the time of dissolution in 1945, the Chairman of the War Production Board said the "APB-ARCO-ASU organization, in the central direction of the aircraft production program, has been one of the finest and most successful examples of coordinated federal activity developed in this war." The Aircraft Scheduling Unit was located at Wright Field, and was administered by Col. E. W. Rawlings, now a lieutenant general, and commanding General of the Air Materiel Command. Other members were Capt. J. M. Weldon of the Navy and Col. W. S. Cave, the British representative.

The magnitude of the present defense mobilization program has again created problems similar to those in the recent war. There are problems of fluctuating aircraft production schedules and production bottlenecks. Computing accurate materials and component requirements still is difficult; and the Controlled Materials Plan, production equipment and machine tools, facilities expansion, and manpower present still other problems.

There is one main purpose which threads its way through all this planning, and that is the time factor. Everything the Division does, in a planning or operational way, is aimed at saving time if the whistle should blow.

Mobilization planning and resources support is based upon exhaustive studies and analysis of World War II performance and problems. The Division has tried to develop preparedness measures to reduce these time-spans. It has pushed these concepts through to the highest policy levels. The "know-how" and experience of a mobilization period is usually lost between two to three generations. The World War II experience is being utilized and is being found extremely effective.

The present production expansion or semi-mobilization is being carried out

under plans that were drawn for a "no-warning" full-scale war. While proceeding towards those ultimate objectives, the Division is trying to be resourceful and adaptive to make them work. It is attempting not to lose sight of the necessity for flexibility and adaptability of plans.

Requirements Branch

This branch is responsible for computing materials and components requirements to support aeronautical programs. It's also responsible for providing information necessary in industrial facilities expansion and procurement programming.

Computing Air Force materials and other requirements is a simple problem in concept but very complex in practice. After a production schedule has been developed and "frozen" as nearly as possible, determining what materials, parts and components are required to build it is not easy.

It is not only essential to know what is needed, but also when, where and in what quantity, far enough in advance to assure capacity to satisfy needs. At the same time, it is necessary to know what suppliers must be expanded, at what time, and to what degree.

The computing methods of the three services were studied early in 1951 by a group from the Harvard University Graduate School of Business Administration. The "Mace Report" found that the basic processes were sound, but with frequent program changes, as has been true since the Korean outbreak, and with inadequate time for computation, accurate requirements are difficult to obtain.

Thus, you must have good programming data, time and accurate bills of materials if you are going to come up with accurate requirements for materials and components.

► **Bills of Materials**—Basic information for computing materials and component requirements must be obtained from bills of materials, surveys and special studies. A bill of materials is a quantitative and descriptive listing of all raw and semi-fabricated materials, except processing materials, and all the government furnished property and purchased parts required by the manufacturer and his subcontractors to produce one completed end product, including name or identity of each item, form, size and description, specifications, unit of measure, quantity, and flow time. There was difficulty in 1951 in obtaining bills of materials. The Aircraft Scheduling Unit had similar trouble during the war. By persistent efforts and because of the Controlled Materials Plan, ASU finally collected thousands of bills that were fairly accurate, covering as many as six or seven thousand items.

During the "austerity" period of Air Force operation and prior to the present mobilization push, bills of materials were not as necessary as now because of the limited scope of the various programs and because of the availability of materials. But with the inauguration of the Controlled Materials Plan and the increase in the size of the program, complete and accurate bills have become essential.

► **Special Requirements Studies**—Requirements for certain items can be determined only by specialized research—"special" studies, of which the Aircraft Scheduling Unit, for example, made during the war on 260 components and equipment items, and on 224 materials. It has been necessary to make 50 such studies in the present period of mobilization, covering items from aluminum bronze sleeve couplings to zirconium (A-Z).

It was learned during the war that the policies, procedures, and paper work for the development of requirements must be given top priority in an operation concerning materials, components, equipment and tools. Maximum coordination and cooperation with industry must be accomplished to assure accuracy in requirements.

ALUMINUM - MAGNESIUM
STAINLESS STEEL

MANUFACTURERS
OF
PROPELLER SPINNER EQUIPMENT
TURBOJET AND GAS TURBINE ENGINE
COMPONENTS • GASOLINE AND OIL
TANKS • DEEP DRAWN MAGNESIUM
SHELLS AND DIP BRAZED ALUMINUM
PARTS AND ASSEMBLIES
FOR

ARMY - NAVY AND COMMERCIAL AIRCRAFT
AND
GUIDED MISSILES

BENSON MANUFACTURING COMPANY
KANSAS CITY 1, MISSOURI

FACILITIES

ENGINEERING DEPT. equipped with complete library, reproduction drawing equipment and staffed with mechanical and technical engineers with extensive knowledge and thoroughly experienced with basic procedures in development and perfecting the complete product for its particular purpose.

LABORATORY complete with chemical and physical apparatus for Microscopic and Metallurgical examination, X-Ray equipment for examination of welds up to two inches in aluminum, equipment to determine electrical resistance of metal surfaces, magnaflux equipment, Rockwell hardness testing equipment, P.H. meters for chemical tests. Pyrometers and all necessary equipment for examination of metal materials in process of manufacture and staffed with chemists and Metallurgists with extensive experience.

MACHINE TOOL DIVISION equipped with engine and machine lathes, turret lathes, milling machines, boring mills, shapers, grinders, tapping machines, power saws, hardening furnaces and radial drills.

HYDRAULIC PRESS DEPT. equipped with presses with 200 ton to 1,000 ton capacity to produce formed parts measuring up to 3 feet wide and 12 feet long.

MECHANICAL PRESS DEPT. equipped with 15 punch presses ranging up to 100 ton capacity.

SPINNING DEPT. equipped with electric annealing furnaces and 23 spinning machines with capacity up to 60 inches in diameter.

SHEET METAL DEPT. equipped with 12 foot power rolls, 12 foot power brakes, 12 foot power shears, routing machines, nibbling machines, power saws and drill presses.

WELDING DIVISION equipped with Inert Shielded Argon Welding Equipment, electric spot welders, electric seam welders, electric flash butt welder, heliarch welders, electric arc welders, atomic hydrogen welders and acetylene gas welders.

DIP BRAZING complete with furnace and quenching facilities, can dip braze aluminum assemblies up to 20″ deep x 20″ wide x 30″ long; facility is rapid and eliminates machining of any part after brazing for additional hardness if required furnaces are available for aging; dip-brazing is used for conversion of cast housings, elimination of porosity, by the use of formed or drawn sheet aluminum housings.

HEAT TREATING FURNACE—Lindbergh electric heat treating furnaces each with 600 Cubic Foot Capacity, equipped complete with automatic controls and quenching baths.

AGING FURNACES—Lindbergh electric aging furnaces equipped with modern automatic controls; each furnace has 600 cubic foot capacity.

FOUNDRY—Associate, equipped with oil fired furnaces, tram rail, crane, automatic moulding machines, sandblasting machines, producing castings from one ounce to five hundred pounds.

PLATING DEPT.—complete with equipment for cadmium plating steel and iron castings and machined parts.

FINISHING DIVISION—Anodizing, chromatizing, alumilite, enameling and plating plant equipped with tram rail system—4,000 gallon tanks, heat exchangers for automatic control laboratory maintained by expert electrochemists, testing tanks, water wash enamel department, chemical dip tanks, drying furnace and ample electric power.

SHIPPING—Crate and box making department equipped with complete wood working equipment and large dock facilities for convenient loading and transportation.

BENSON MANUFACTURING COMPANY
18TH ST. & AGNES AVE., KANSAS CITY, MISSOURI

Controlled Materials

The function of the CMP Branch is to allot the controlled materials for the aircraft program, including allotment audit and record keeping functions.

Materials support for aircraft production programs is achieved mainly through operation of the Controlled Materials Plan.

During the war three systems were employed to distribute scarce materials; the Priorities System (early 1940 to mid-1942); the Production Requirements Plan (mid-1942 to mid-1943); and the Controlled Materials Plan (mid-1943 through VJ-Day).

During the period of initial mobilization planning and programming (July to December, 1950) defense plans were devised and initiated and production goals established. To insure an adequate supply of materials to defense producers, a material priority system was introduced. By April, 1951, the impact of defense requirements was beginning to impinge heavily on critical materials and a Controlled Materials Plan was announced to become effective July 1, 1951.

The Controlled Materials Plan is designed to insure the fulfillment of production schedules in defense industries using the three basic metals, steel, copper and aluminum.

The essential principles of CMP are simple. The heart of the plan is the concept of requirements accumulation and allotments distribution, both of which are done by so-called "claimant agencies."

The National Production Authority selects certain government offices concerned with the production of war products and essential civilian goods and designates them as claimant agencies. For the military departments, the Munitions Board performs the function of the claimant agency.

The claimant agencies determine the controlled materials required by their contractors and manufacturers to meet production schedules. This is the demand side of the picture.

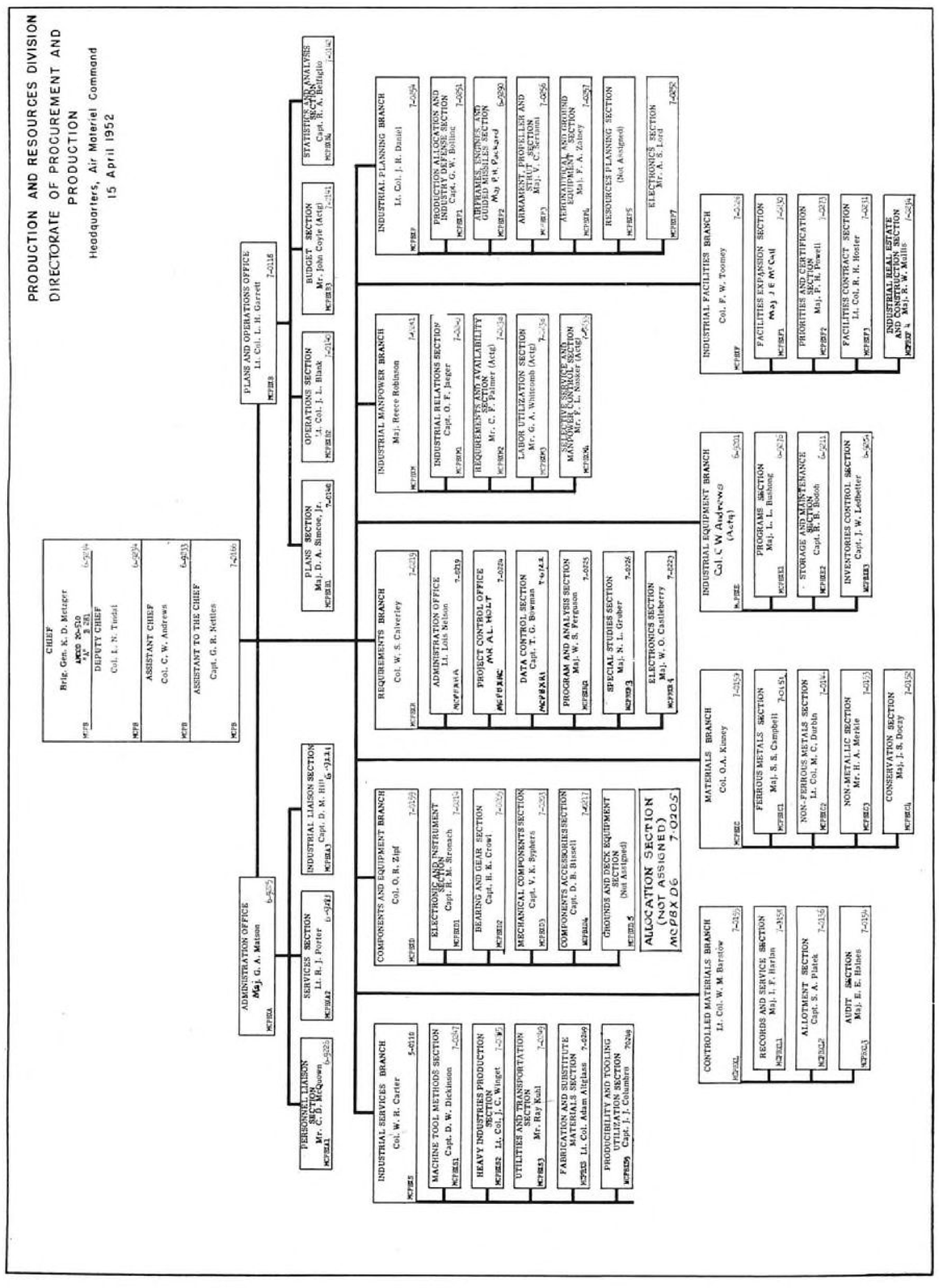
Office of Defense Mobilization determines the total quantity of steel, copper, and aluminum that can be produced and available for delivery in a given quarter of the year. This is the supply side of the picture.

Demand is matched against known supplies and necessary adjustments are made to maintain balance not only between military and civilian production but also between military programs. Each claimant agency is then allotted its materials.

▶ **Vertical Allotment**—The claimant agencies then re-allot the materials to

Story *continued on page* 194.
Chart on page 193.

PRODUCTION AND RESOURCES DIVISION
DIRECTORATE OF PROCUREMENT AND PRODUCTION
Headquarters, Air Materiel Command
15 April 1952



Continued From Page 190

their "prime consumers", the final assembling points of major components or end products. Prime consumers in turn extend their allotments to their "secondary consumers", who in turn re-allot until the controlled materials allotments have been filtered down through the production chain. This plan is known as the "vertical allotment system."

Production schedules based upon capacity factor of tools, manpower and space can be accomplished only if supported by a balanced and time phased flow of materials and components to manufacturers and contractors.

It is assumed steel, copper, and aluminum represent a "common denominator" in production. In bringing all programs within "producibility" with respect to these metals, requirements for other materials will be within available supply. There is controversy on this point, however.

This, then, is the essence of the plan. The administrative machinery, details and orders are much more complicated.

The Production and Resources Division of AMC operates CMP as it applies to specialized military-type items (so-called A class products) assigned for procurement.

To meet schedules, aircraft employment must reach 500,000 by the end of this year. It is now over 300,000.

During the period May 1 through December 31, 1951, AMC received 6,044 requests for materials allotments, of which 1,133 were returned to contractors for correction. Material allotments were completed on the balance.

An audit program has been set up and as it develops, more concrete requirements data will be available, and a greater degree of adequacy and accuracy of audit information will be provided. This information should reflect contractor inventories in requests for allotments then were completed on the balance.

The operation of CMP is becoming more stabilized as a result of contractor and operating personnel becoming more familiar with the procedures, regulations and objectives of the plan. This will result in better scheduling of materials orders, more efficient utilization of allotments and an increased ability of contractors to meet deliveries.

Manpower Branch

This branch develops Air Force industrial manpower policy, evaluates manpower utilization and impact of work stoppages on Air Force programs.

With adequate machine tool capacity, manpower becomes the most limiting factor to aircraft production.

For a general view of the manpower problem, certain conclusions of a recent study on "Manpower and Partial Mobilization" by the Department of Labor are of interest. The study, which was published in Defense Production Record, November 15, 1951, states:

- **Manpower needs** of the limited military production program can be met.
- **Spot problems** involving individual areas, industries and occupations, however are likely to arise before peak employment is achieved.
- **Maximum impact** of manpower demands will be reached late in 1952 or early 1953, under present plans.
- **A general manpower** tightening has occurred in the major labor market areas across the country, and the trend is expected to continue but to vary in intensity among areas.
- **The planned expansion** is expected to require an increase of two million workers in employment and related activities by the end of 1951 and 2.5 million more in 1952.

Realizing the importance of manpower problems to an expansion program, as early as 1948, the Air Materiel Command set up an industrial manpower organization which has responsibility for developing industrial manpower policy for the Air Force. It also assists Air Force contractors in meeting manpower demands, and evaluates industrial manpower utilization and the impact of work stoppages on Air Force programs.

6,398,200 production man hours were lost due to strikes from July, 1950 through September, 1951.

► **Manpower Requirements and Controls**—It has been estimated that airframe employment must reach 500,000 by the end of 1952 if the proposed plan for 143 wings is to be attained. Between June, 1950, and October, 1951, employment in airframe plants increased from 167,000 to 331,000.

With current national employment at a new high, securing additional employees is becoming more and more difficult. Some expansion of unskilled and semi-skilled workers is possible in most areas when the pinch for this type of worker becomes acute. This can be accomplished by relaxing restrictive hiring practices, job breakdowns, and similar devices which permit the hiring of older workers, women and the handicapped.

The big problem now is the professional and skilled categories of workers, particularly engineers, electronic technicians and tool designers. All the major companies in the aircraft industry are conducting extensive and expensive recruiting campaigns on a national scale, with rather negligible results.

The importance of these specialists

is illustrated by the following figures. During the war, for example, the ratio of engineering to factory work was 1 to 25; whereas today it is 1 to 6.

▶ **Manpower Availability**—In the placement of new contracts, and the planning for new production sources, the Air Materiel Command gives serious consideration to manpower availability. This reduces the necessity for migration which is accompanied by problems of housing, schools, health, transportation and other community facilities and services. Air Force contractors have been aided by bringing these matters to the attention of the armed forces regional councils, defense manpower mobilization committees, public housing authorities, and community manpower committees.

Other activities of AMC in this general area consist of presenting the Air Force position before the Wage Stabilization Board on "rare and unusual wage cases", where such action is necessary for contractors to secure and retain essential workers, and before state labor agencies in actions involving cases of relaxation of state labor laws with respect to hours of work and employment of women and minors.

▶ **Work Stoppages**—AMC acts as the source of contact with both labor and management in the case of strikes at Air Force contractors' plants and reports on their status and effects. It does not have authority to settle strikes.

From July, 1950, through September, 1951, 401 work stoppages occurred, resulting in the loss of 6,398,200 man days of production. If you add to this figure production that was lost in plants not on strike because of failure to receive material from strikebound facilities, the effect on production was great.

Production losses would have been greater had not AMC removed finished materials from these plants. Seventy-five tons of critical aluminum castings and forgings, for example, were removed from the Alcoa plant at Cleveland during their recent strike, and distributed to practically every major airframe and engine plant in the country. In some cases, AMC has arranged for the union to work to complete some critical material while the strike was in process.

To the extent possible AMC is expanding its activities in the fields of industrial relations, manpower requirements and availability, and labor utilization as a means of expediting production and increasing the production potential of the aircraft industry. Some activities, however, are beyond the scope of the AMC organization and require action at higher levels.

Services Branch

This branch provides industry with manufacturing methods advice and engages in productivity studies. Manufacturing methods research, productivity research and product design are considered an important phase of AMC planning.

Extensive analyses of the World War II areonautical production program have shown that serious delays were encountered because:

- **Air Force products** were not designed for line-assembly, high-volume production.
- **The most effective** and efficient manufacturing methods were not utilized throughout the aeronautical industry.

To minimize the possibility of such delays in any future mobilization program, extensive work has been undertaken in this field. In addition to the primary time savings, there is saving on product unit costs in the current production.

New or revised production methods are encouraged wherever practicable by coordinated action with industry representatives and organizations. Where government financing is required and where it is desirable, contracts are initiated by the Air Force to explore or implement new techniques of production.

Approximately 125 contracts have been initiated. Examples are the designing of machines specifically for Air

Force type production, application of optical tooling, redesign of items for elimination of critical materials, and redesign of items to utilize high volume production techniques. One such arrangement, the Curtiss-Wright contract and report on machinability of metals, has been widely distributed at industry request.

The USAF heavy press program, which amounts to $300 million or more, is the largest current project of a new production technique being monitored. This project has received world-wide attention. It will result in materially reducing lead time and cost in aircraft production.

Since production techniques are constantly being studied, AMC is in an excellent position to act both as a pooling agency and as a monitor on production problems. Within the bounds of proprietary rights technical assistance is available to industry on call.

Facilities Branch

This branch administers the facilities expansion program and the industrial reserve plant program.

An "industrial facility" is property, other than materials and special tooling, for use in the performance of a contract or subcontract for supplies or services. It includes real property, including buildings, structures and improvements, vehicles, machine tools and other production equipment.

The purpose of expansion of facilities is to increase the productive capacity of Air Force contractors to meet delivery schedule of current and planned production programs.

The present industrial capacity of the country would be utilized to a greater degree and in a different manner in an all-out effort. The present "butter and guns" economy precludes the utilization of a substantial part of national capacity. Even under current semi-mobilization and possible future all-out mobilization additional specialized capacity is required for our aeronautical production.

▶ **Certificates of Necessity**—Industry has been encouraged, through tax amortization provisions of certificates of necessity, to enlarge its capacity with its own or borrowed funds, but there are many instances where it is not good business for industry to carry on an extensive expansion because of the indefinite length of the production program. In those cases it is necessary for the Air Force to provide some facilities necessary to obtain the required productive capacity.

In this enlargement of the productive capacity of industry, additional sources for a given item have been established and expanded in line with the production policy statement of the Director of Defense Mobilization: "The program

to provide these immediate demands must be directed to provide production lines, which will sustain a greater output than contemplated in the immediate program, to be available as a reserve for war. This will require a spread of contracts across industry as widely as possible in order to obtain a sufficiently broad industrial base." This policy is further emphasized by a Department of Defense directive which states in part: "Industrial capacity should be large enough to provide the rate of delivery required not only for the current armament build-up, but also to provide a production and mobilization base capable of the necessary expansion in the event of full mobilization."

► **War-Time Financing**—During the war, government financing of industrial facilities for the aircraft program was handled in five ways: Government-owned facilities, emergency plant facilities, special facilities, facilities furnished as part of a supply contract, and the Defense Plant Corporation. The DPC plan of expansion was used to finance the cost of about 85% of all aircraft expansions. Although many of the facilities furnished by DPC are presently being used, many were sold after the war, and others require extensive modification or rehabilitation.

Here's why there is such a drive on in the aircraft industry for engineers, electronic technicians and tool designers: during World War II there was one engineer for every 25 production workers; today there is one for six.

Two general types of contractual instruments are used today to furnish facilities: "facilities contracts" and "facilities leases." Normally, a facilities lease is used where the government has a title to the facilities. Leases must be approved by the Secretary of the Air Force, and are used in relatively small expansions in which machinery and equipment have been furnished to the contractor out of the industrial reserve. The dollar volume of this type is small.

Facilities contracts are normally issued when the government does not have facilities "in stock" to furnish a contractor and it is necessary to expend money to acquire facilities, install facilities, or to repair or rehabilitate such facilities.

The following hypothetical case will serve to illustrate AMC facility practices and procedures:

• **AMC determines** a given article is to be procured from "X" prime contractor.
• **The contractor prepares** a list of facilities required to attain the prescribed monthly production rate. This list is called an Appendix "A".
• **AMC processes** the contractor's request by ascertaining the scope of the facilities contemplated, the allowability of items, justification on a program basis, completeness and validity of contractor's written justification, and phased dollar amount which will be required to implement and complete the contractor's facilities expansion.
• **A processing** letter to Hq.USAF specifies the need for the expansion, the end item to be produced, the peak monthly capacity to be established, the dollar amount of the expansion, and the type of facilities to be furnished.
• **A procurement directive** then is issued which establishes and allocates the necessary funds.
• **AMC prepares** a purchase request.
• **With approval** of the project and purchase request, a facilities contract is prepared and negotiated.

The issuance of a contract is on a negotiated and not a bid basis. Ordinarily, there is no advertising or solicitation of bids. All facility contracts are of cost reimbursement type, and no profit is allowed the contractor under the contract. He acquires facilities for the Air Force and the Air Force reimburses him.

AMC's expansion projects increased from 42 on January 1, 1951, to the 415 currently in effect. During the past year AMC processed special facilities contracts in the amount of $1.5 billion as compared with only $50 million in 1950.

There are currently 702 facilities leases in effect or in process; whereas in 1950 there were none of these short form leases.

In 1951, 417 applications for certificates of necessity with a total value of $390 million were reviewed by AMC and forwarded to Hq. USAF; 107 Reconstruction Finance Corporation loan applications for $68 million were reviewed.

For this year it is contemplated there will be a gradual decline in the number of new projects received for processing. The work load in this area will be confined to negotiation of definitive contracts, administration of contracts in effect, and termination of some contracts where projects will be reduced or cancelled.

Industrial Planning

This branch is responsible for developing industrial mobilization plans, making industrial capacity studies and administering all the details of the production allocation and industry defense program.

Mobilization planning for resources has consisted principally of determining the total requirements of contractors for manpower, materials, production equipment and facilities to produce the

mobilization levels. These requirements have been kept before the appropriate planning and mobilization agencies. For example, the expansion of basic steel and aluminum capacity was initiated as a result of the magnitude of all-out requirements. The expansion of the machine tool industry was preceded by vigorous efforts on the part of the branch to point out the impact of its requirements for tools.

Throughout the past several years there has existed a pattern of specific production plans for the attainment of mobilization levels of production. Such plans are based upon realistic estimates of production capacities and acceleration rates.

It is within the framework and pattern of these industrial plans that the several expansions of the Air Force have taken place as it moved from a 48 group to a 70 group Air Force and from that level to a 95 wing Air Force and later to the current 143 wing structure; each plant expansion and new production source established was accomplished as planned for in the mobilization program.

Filing for material allocations can be complicated: in an eight month period, 1,113 requests had to be corrected.

In providing for plant expansion and establishment of new production sources for aircraft, the creation of additional or "reserve" capacity has been authorized in each facility. This is known as the production acceleration insurance program.

Under PAIP, contractors are authorized to incorporate quality of tooling and plant layout to create a capacity base for the ultimate mobilization load.

The production programs of the Air Force, whether current or projected, all are tied together and provide a pattern for expanding production to mobilization levels. The production structure through which the goals are achieved must be erected and known to industry in advance of the time it must be put to use.

Along with plans for the aircraft manufactures, the same type of planning has been completed for the principle items of equipment that go into the aircraft. For example, the rate of build-up to peak production has been adjusted for production lags or deficiencies in such things as engines, propellors, landing gears, armament systems, communication systems and radar. For these items the mobilization production structure has been planned which also is being used in the current production program.

Today, the branch is faced with the old problem of "ever-changing" schedules. One contributing factor is the defense budget which has fluctuated

considerably in the last twelve months. Various shortages such as equipment, materials, machine tools and inadequate facilities have delayed the production of aircraft as planned and as a result, the production schedules have had to be rescheduled.

Equipment Branch

This branch administers the purchase and distribution of Air Force owned machine tools, computes machine tool requirements and administers the disposition of idle and surplus special tooling for aircraft production.

The key to aircraft productivity and the one resource which is paramount to effective industrial capacity is machine tools.

By virtue of their complexity and the length of time required to build them, they represent the most critical limiting factor in production programs, current and planned.

Aside from the limited production capabilities of the machine tool industry, one of the major areas of deficiency has been the difficulty in determining the total load to be placed on the industry. During the war the industry expanded production of tools from a total annual volume of about $200 million to a peak of $1.3 billion. At present the annual production rate is about $650 million. About 70% of the output goes to the military services, with the Air Force getting about 30% of the total output.

It is estimated that Air Force contractors have on order an undelivered 30,000 tools, of which two-thirds will be delivered in 1952. Under present conditions and procedures it is believed most Air Force contractors will be in good condition by the third quarter of this year as far as most tools are concerned. There will be troubles, of course, on certain critical types of machine tools.

► **AF Machine Tool Reserve**—After the war the Air Force was aware of the potential shortage of machine tools in case of another emergency. Recognition of the problem resulted in the establishment of the Air Force machine tool reserve of more than 28,000 tools. The reserve was built up from government-owned facilities and storage was maintained at the former Martin-Omaha, Nebraska plant and at Bell-Marietta, Georgia plant.

Ninety percent of this reserve has been returned to production with shipments going to Air Force contractors, the Army, Navy and Air Force installations.

Efforts are being made to place the remaining 10% in production by continuing to make selections from the reserve, by substitution of reserve machine tools for new tools on order.

► **AF Purchase of Machine Tools**—In January, 1951, the Air Force instituted a program for the purchase of metalworking machinery to supplement the reserve and to support production. Types of tools purchased were based on specifications received from Air Force contractors and were directly related to their needs. Total purchases amounting to $44 million and involving 1,820 tools have been made with 62 producers, most of which have been allocated to 132 Air Force contractors.

► **Improving Machine Tool Deliveries**—Present efforts to improve delivery and determine the status of machine tools for Air Force programs are based on the Department of Defense master urgency list. The list is used by DPA, NPA, and the Department of Defense for the purpose of expediting materials, machine tools, metalworking equipment and other related equipment. The military urgency system is a procedure for identifying procurement with urgency category symbols which express the precedence of categories of military procurement among each other. This military urgency system thus provides guidance to the production effort for the entire defense program.

The procedures of this program are fairly simple:

• **Air Force contractors** list the machine tools undelivered and required by them and their subcontractors to meet approved production schedules.

• **Requirements** are screened in accordance with program urgency against the production equipment control inventory group's combined inventories of reserve tools.

• **If equipment** is not found in the reserve, action is taken to divert the deliveries of new tools in accordance with program urgencies established in the master urgency list.

The program has been in operation only a short time, but it has proven to be the most effective measure to date in helping to solve the machine tool problem.

Materials Branch

This branch expedites materials for aircraft programs, relieves critical shortages and operates the material conservation program.

The Materials Branch differs from the Controlled Materials Plan Branch in that the Materials Branch has as its chief function the expediting of material, while the CMP Branch is primarily concerned with the allocation and audit of materials.

Another phase of industrial planning for "materials" is a conservation program. The objective of this program is to promote engineering redesign of engines and other equipment to reduce the need for critical materials such as

columbium, cobalt, chromium and nickel. The national availability of these critical materials used in high temperature steels is severely limited and dependent largely on foreign sources. Accordingly their uses must be reduced wherever possible.

Progress has been made in the field of conservation and substitution through extensive contracts for technical developments with various Air Force contractors, and it is now possible to incorporate in Air Force contracts specific limitations of critical materials in various categories which can be used in aeronautical equipment.

It was recognized during World War II that conservation must be a national program with overall coordinated policy. This has again been recognized in setting up conservation activities at the NPA-DPA and the Munitions Board levels. Conservation orders are approved and issued under this national program.

The Materials Branch in 1951:

• **Received** 4,032 critical shortage reports. Relief was found for 3,663.

• **Encouraged** substitutes for columbium bearing alloys.

• **Instituted** a scrap recovery program for super alloy materials used in jet engines.

• **Organized** a program for return of platinum scrap to spark plug manufacturers.

Equipment Branch

The primary function of this branch is to relieve critical shortages and to distribute aircraft components and equipment which are in short supply.

Activities in 1951 included:

• **Received** 2,180 critical shortage reports. Of this number, shortages in 2,042 cases were relieved.

• **Initiated** 52 special projects. Projects incorporated preliminary studies of requirements for components against existing capacity.

Among items studied were: Aircraft piston rings, pumps, actuators, oxygen regulators, hydraulic motors, commutators, lamps, piezo electric quartz crystals, AN switches, electronic tubes, AN plugs and connectors, sintered metal products for bearings and gears, bearings, high pressure braided hose and aircraft spark plugs.

• In cases where capacity was insufficient this branch located new sources, recommended expansions, investigated foreign procurement, arranged subcontracting, and set up licensee-licensor agreements.

• **Completed study** of gear tolerances which resulted in establishing standard gear classification for joint industry government use.

Property Records Must Be Kept

A contractor who has acquired government property or material for the fulfillment of a contract must keep certain records to satisfy the government. These records include:

• **Property Control System.** This should provide the following information: contract number, nomenclature or description of the item, quantity received, quantity issued, balance on hand, posting reference, date received or issued, unit price, location, and disposition action taken.

• **Consolidated Stock Record.** Where a contractor has more than one contract under which government property is provided, a consolidated record for materials may be authorized.

• **Records of Special Tooling.**

• **Records of Plant Equipment.** Plant equipment must be accounted for by individual items. However, in the case of accessory or auxiliary equipment which is attached to or is otherwise a part of plant equipment, and is required for the proper operation of the plant equipment, its description is attached to that of the plant equipment, and is not kept separately.

• Records of Real Property.

• Scrap. All scrap or salvage generated must be recorded. These records may be in accordance with the contractor's system of scrap or salvage control.

Air Force's Watchdog of Quality

The 'how' of inspection is left up to the contractor; results are what Quality Control is interested in.

General Electric's jet engine production line at its West Lynn, Mass., plant is spotlighted for attention these days.

Both the Air Force and the engine makers who supply it are watching what goes on at West Lynn with more than a passing interest.

Last week, one of every four engines rolling off the line was torn down for inspection.

Next week, maybe one of every 10 will be marked for teardown. On the other hand, one of two may be chosen. Last April, every engine got the painstaking dis-assembly and examination.

To the casual onlooker this might seem like a welter of arbitrary sampling experiments.

▶ **A Pattern**—It is not. It is a piece of carefully-planned pattern for statistical quality control, devised by the Air Force to protect itself against hidden defects which could cause engine failure.

The plan typifies the Air Force's attempt to approach through quality control the protection which it would have with 100% teardown of aircraft engines.

As a consumer of goods, the government is in a unique position. Through the years it has been the tradition that all items bought with the public's dollar have to be inspected. In some instances the inspection process has been a mighty costly business.

In World War II the Army Air Corps was bound with the practice of 100% inspection. It had some 16,000 inspectors stationed in the plants of its suppliers, in addition to the large staffs maintained in its depots. Despite this horde of inspectors, the air procurement people were not happy with results. The whole inspection picture lacked consistency.

▶ **Basic Idea**—Even in the turmoil of that disjointed program, the Procurement Division was experimenting with the concept of "surveillance inspection," then ill-defined and a target for plenty of criticism. Nevertheless, Procurement had grasped a basic idea.

It was this: Since the manufacturer has lived with his product from its inception to its finished state, he ought to know more about the product's quality than anybody else. Couldn't his knowledge be tapped to help in the acceptance decision?

When the Department of the Air Force was established in 1947, Procurement found its big opportunity to study the inspection problem. At that time, procurement activity was at ebb. But the budget also was in the low peacetime bracket.

▶ **Explanation**—As Brig. Gen. Walter G. Bain, chief of Air Materiel Command's Quality Control Division, explains:

"All approaches led to the inevitable conclusion that some form of surveillance was the only means by which the Air Force could do its job within the limited peacetime budgets and at the same time provide a sound base for emergency expansion.

"One of the first steps was the separation of inspection from the procurement function and the establishment of the Inspection Division at Headquarters, AMC in 1948. A short time later the division was re-designated the Quality Control Division, in view of the fact that the functions of this organization transcended the field of mere inspection.

"The new name did not imply that the Air Force intended to control quality in the usual sense. Rather, it recognized that any kind of "surveillance inspection" would be ineffective unless the contractor properly controlled his own quality."

▶ **Broad Review**—As a guide to policy development, the Stanford Research Institute in 1949 made a review of the inspection function of the Air Force during World War II, and offered recommendations for improvements.

Later, the National Industrial Conference summarized the World War II inspection problems of the Armed Services in a study. They were:

Industry had complained of the duplications of inspection among the services and the duplication of the contractors' efforts. They noted that many inspectors, particularly civilians, had been unqualified for their jobs.

They deplored the red tape. Many design specifications, they said, were either too rigid or too ambiguous. Many design requirements were impractical or complicated, deviating from accepted commercial practices. There was "too much 100% inspection," they declared, not enough spot-checking and use of statistical quality control methods.

▶ **Tart Contributions**—The Armed Services had some tart contributions of their own. Some contractors didn't seem to know what their contract meant, they countered. There was a lot of cornercutting, too. Some firms didn't have any inspection system worthy of the name. And few, especially among the little fellows, had modern management

Lockheed

STARFIRE NEARLY AUTOMATIC FIGHTER

On the opposite page you see illustrated in action the nearly automatic Lockheed *Starfire* (F-94C). This all-weather jet fighter is an electronics masterpiece with an interesting development history.

The "C" is the third in the *Starfire* series and is now being delivered to the U. S. Air Force to augment squadrons of F-94A's and F-94B's now on 24-hour duty as protection for such key cities as New York and Washington.

The evolution of the *Starfire* actually dates from the spring of 1945, when Lockheed developed America's first operational jet fighter, the F-80 *Shooting Star*. From the F-80 came the T-33 two-place jet trainer now used to train 9 out of 10 U. S. jet fighter pilots (also pilots from 9 other nations).

In turn the T-33 was redesigned to incorporate the most advanced electronic equipment known as well as some unknown devices that had to be specially invented. This became the U. S. Air Force's F-94 *Starfire*, now developed to the point where it both flies and fights with more than human accuracy. It has an all-rocket armament—no guns!

Electronics innovations include the Westinghouse Autopilot and Sperry Zero Reader. It is one of the few fighter-type planes equipped with ILS (instrument landing system) for low-visibility landings. *Starfires* pack 1200 pounds of electronics, compared to 168 pounds of radio in the Lockheed P-38 of World War II.

The *Starfire* is the first production aircraft to fly with the new Pratt & Whitney J-48-P-5 jet engine. Its afterburner provides extra power for rapid take-off and extra performance in battle.

The F-94C is the largest of the original Lockheed jet series. The statistics: take-off weight, more than 2000 pounds; length, 41 feet, 5 inches; wingspan, 37 feet, 6 inches; height, 13 feet, 7 inches.

A pioneer in the jet field, Lockheed has produced more jet aircraft than any other manufacturer.

techniques or statistical quality control. Many seemed unhappy with any attempt to introduce quality control into their operations. Others were plainly uncooperative and apparently were ready on every occasion to soak the government.

This was the backdrop, then, behind the newly-born Air Force's radical departure from time-honored government thinking.

▶ **Korean Outbreak**—The Air Force's surveillance program began to take its present form at the time of the swift defense buildup for the Korean war, although conceived shortly after World War II. It was apparent the Air Force would have to do its inspection job with relatively few people. Quality Control's personnel had fallen back to 2,500 in the peacetime slump.

These few, and perhaps just a few more, would have to do the same job of protecting government purchases that took so many during the last war.

In the squeeze play of the Korean crisis, Quality Control shaped and launched its present policy:

That the Air Force no longer will inspect each and every item it buys. But it will require the contractor to present enough "objective quality evidence" on which the Air Force can "base an acceptance."

Perhaps this term "objective quality evidence" needs a bit of air. So, suppose a manufacturer proposes to sell his bolts to the Air Force. He says, "My inspection shows that my bolts are 99.43% good."

Quality Control's reaction is: "What is 'good'?"

It wants to know the quality characteristics that have been examined—such as shank diameter or pitch diameter—their percentage of defectiveness and the inspection methods used. Above all, it wants to be certain the information has been gathered and reported in such a manner that a reinspection will come up with the same answers. These are facts, rather than conclusions of fact, on which AF can base its decision: "We'll take it."

▶ **Factual Evidence**—So the Air Force policy resolves to this: That the amount of inspection it has to perform on any given contract depends on the kind and amount of flat factual evidence the contractor submits. The evidence must be measured "by the numbers" rather than words like "pure" and "good." If factual mathematical evidence is abundant, Quality Control has less to do.

The evidence first is evaluated. This means it's examined to see that on its face it gives enough factual data. You might compare this evaluation process with that of the Collector of Internal Revenue when he pores over your income tax return. He looks it over to see that you filled all necessary blanks,

put down the needed figures and added them up correctly. In this stage, theoretically, he believes you.

► **Verification**—The second step is the verification of the evidence. In this stage, the Air Force is asking questions. Again it's much like the Revenue Collector who's about to lower the boom. He wants to find out from his own independent sources whether what you said was true.

Usually, it is necessary for the Air Force to verify only a small part of the quality evidence it receives.

Aside from getting the cooperation of industry, this two-step procedure gives the Air Force another advantage which can be measured easily in dollars.

It can do its inspection job with a comparatively small staff.

It now takes less than 4,000 people on the Quality Control payroll to cover

One tangible benefit to the taxpayer from quality control: it has cut the AF inspection staff by 12,000.

the big inspection assignment that required 16,000 a decade ago.

► **Supplier's Advantage**—On the supplier's side the advantage is that the good contractor is going to have a minimum of surveillance. The fellow who misbehaves will have plenty.

The third party who gains is the taxpayer. In the past he has had to foot the bill for the enormous cost of 100% inspection—a cost which had to be written into the price of every single item.

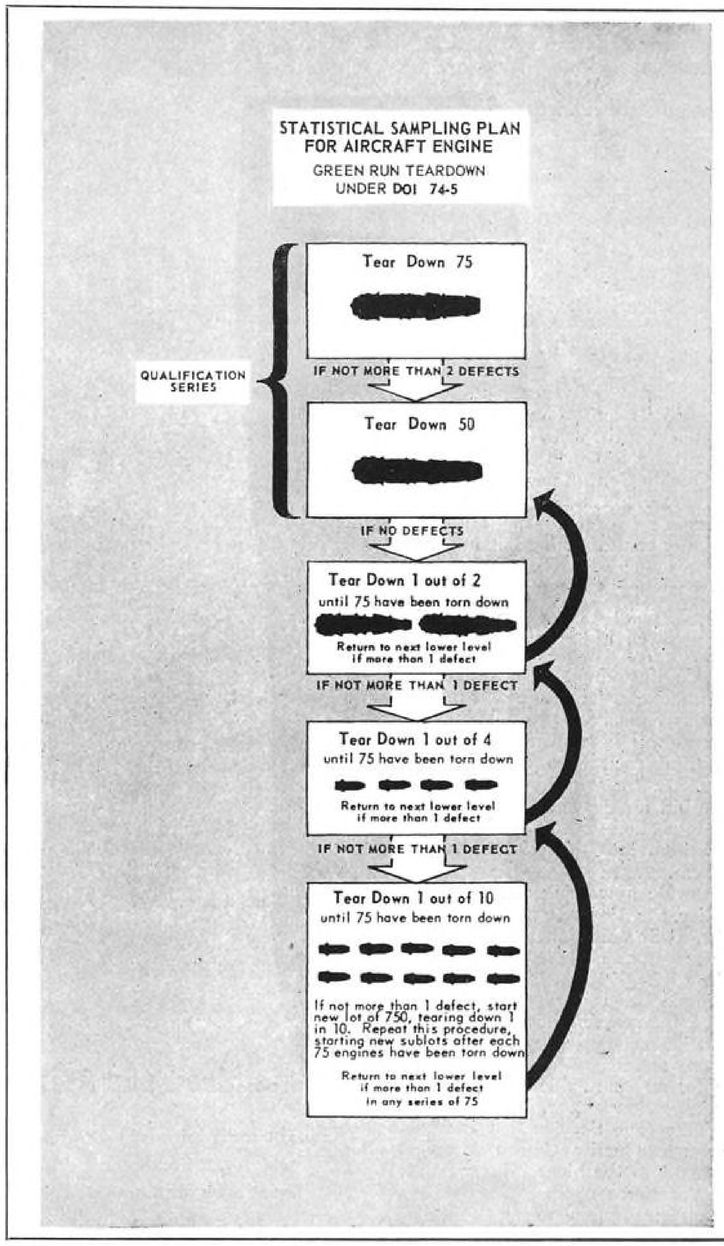
To provide a working basis for its new policy, the Air Force in December, 1950 issued Specification MIL-Q-5923. This was superseded in September, 1951 by MIL-Q-5923A.

In simple language (another radical departure from government ways) the Specification sets up the Air Force's minimum requirement on the contractor for an acceptable quality control or inspection system.

► **Flexibility**—The Specification is flexible enough, Quality Control people say, to apply to the biggest dollar fraction of Air Force purchases.

It does not apply to off-the-shelf purchases from distributors; purchases of brand-name catalog or commercial-type items; facilities contracts; contracts for engineering and research studies; purchases of fuels, lubricants and chemicals from refineries, terminals or warehouses, or to procurement from foreign sources where reciprocal inspection agreements exist.

The specification states that the contractor must show a manual or a written memorandum giving the setup of his quality control or inspection system. The manual should have a chart showing the links between the inspection system, the front office and the rest of



the organization. It should name key inspection personnel and their jobs. A plant diagram should show inspection stations. Inspection forms should be listed and exhibited.

► **Materials Review**—MIL-Q-5923A devotes considerable space to a Materials Review procedure, to provide for engineering consideration of materials which vary from specs. Quality Control officials explain that Materials Review is not a salvage procedure, but rather, was shaped to "create a climate for corrective action."

The review is conducted by a board composed of at least one representative from the manufacturer's quality control office, one from his engineering office and one AF Quality Control representative. The board determines whether the off-specification materials should be accepted by AF, be reworked or scrapped. Only "variations"—i.e., departures from requirements that will not affect weight, safety, performance and interchangeability—may be accepted under this procedure.

► **Source Inspection**—The Specification

also reserves to the government the right of "source inspection," a right much misunderstood in the past. "Source inspection" means Air Force inspection at a subcontractor level of items used by the prime contractor.

For instance, a contractor might have a complicated electrical device in his product. He buys it from a subcontractor. But he has no means of giving the device the inspection he feels it should have. He can ask the Air Force for inspection at the source.

Although the contractor actually may have asked for the inspection, technically the request is considered to have been made by the Air Force.

Frequently the contractor feels he has shed the responsibility for the quality of the item by doing this.

► **Not the Case**—That's not the case, however. For the Air Force considers source inspection as entirely for its own benefit. Quality Control officials emphasize:

It never relieves the contractor of his responsibility to furnish a completely acceptable product. It does not guarantee acceptance of the source-inspected material.

Generally, source inspection is limited to items which could not readily be re-examined by the contractor because they might need either a major dis-assembly or special gauging.

The Air Force doesn t see anything bureaucratic about MIL-Q-5923A. Nor does it view the directive as a concession. General Bain's staffers like to think of it as an expression of the Air Force's desire to find a common ground with the supplier; to place more reliance on his abilities while holding a satisfactory surveillance check on his work.

► **Pioneering**—MIL-Q-5923A is what the Air Force calls an uncoordinated MIL specification. It has not been adopted by the other military services. So far, the Army and Navy are letting the Air Force do a single-handed pioneering job of pooling the manufacturers' information with its own to minimize total inspection costs.

However, one phase of Quality Control's program which is being closely watched by the other armed services is the inspection procedure in General Electric's West Lynn engine plant.

This first took shape last August when Quality Control submitted to AMC Procurement "a statistical sampling plan applicable to aircraft engines, reciprocating and turbojet." It became Directorate Office Instruction 74-5.

In effect, DOI 74-5 tells the manufacturer: If you will agree to this sampling plan the Air Force will give you a flexible inspection schedule. Keep on making good engines and prove it, and you will get reduced sampling. Make bad ones and you'll tie yourself up with tight inspection.

► **"Class I" Defects**—The DOI is built around what it labels "Class I" defects. These are the hidden, serious defects which may cause engine failure, and which can be found only by a complete engine teardown. There are three other classes of defects listed in the DOI, but these can be discovered without engine teardown.

To guard against "Class I" defects the Air Force formerly had to give every engine its teardown after the "green run," its initial test.

Under DOI 74-5 the extent of this search depends on the manufacturer's tested performance.

First he qualifies for the plan.

Say he builds 125 engines. The Air Force checks the first 75 of these with teardowns. If more than two engines show "Class I" defects, the manufacturer must start over with another batch of 75. If there are no more than two defectives, he goes to the second qualifying step.

Here he must build 50 engines which show no "Class I" defects on teardown. If a defective engine shows up, he has to make another perfect 50.

► **First Level**—Now he's ready for the first level of inspection. He tears down and inspects one of every two engines until 75 have been torn down.

If he finds more than one defective

engine in the series, he goes back to the qualifying stage. He has to tear down 50 engines in a row, all acceptable, and then resume teardown of every other one.

But if he has only one or no engine showing a "Class I" defect, he's ready for the second inspection level.

Here he gives one out of each four engines the teardown inspection, until he has inspected 75. If, in those 75, he finds no bad ones, or only one, he proceeds to the third level. If he spots two defectives, he goes right back to the first level—one out of two until 75 inspections have been made, uncovering no more than one defective.

▶ **Longest Interval**—The third inspection level is as far as the Air Force now feels it can stretch the sampling interval. In this stage the manufacturer tears down one of every 10 engines until he has inspected 75.

He holds this level until he has uncovered more than two defectives in any single series of 75. At that point he reverts to the second level, one of four.

Quality Control methods makes unnecessary some jet engine test runs—and saves up to 1,700 gal. of fuel.

Through every level, the Air Force sees to it that the manufacturer takes steps to correct each defect as it shows up. Thus the plan as it proceeds would seem to take the "bugs" out of the manufacturer's engine.

When DOI 74-5 was broached last year, the engine makers looked at it askance. They had suggestions of their own. Their most frequent query, according to Air Force officers, was, "Why can't we start off sampling at a one-to-10 level and then work back to something tougher if we make defectives? We're good boys."

▶ **Equal Treatment**—The Air Force answer is based on a long-standing government policy. No matter how good or bad you are, you get equal treatment before the law. That goes for purchasing. So every supplier must submit to the same yardstick for the benefit of everybody.

The Air Force, which worked out the plan, has had only a single application of it to date. That's in the West Lynn plant, where General Electric now is ready for its third-level sampling procedure. This application is really in the nature of a service test.

But at AMC headquarters at Wright-Patterson Air Force base, it's believed that when General Electric gets rolling with its third-level operation, other Air Force engine suppliers will get on the band wagon.

▶ **Cost of Sampling**—The AMC officials

(*Story continued on p. 228; chart on p. 227*)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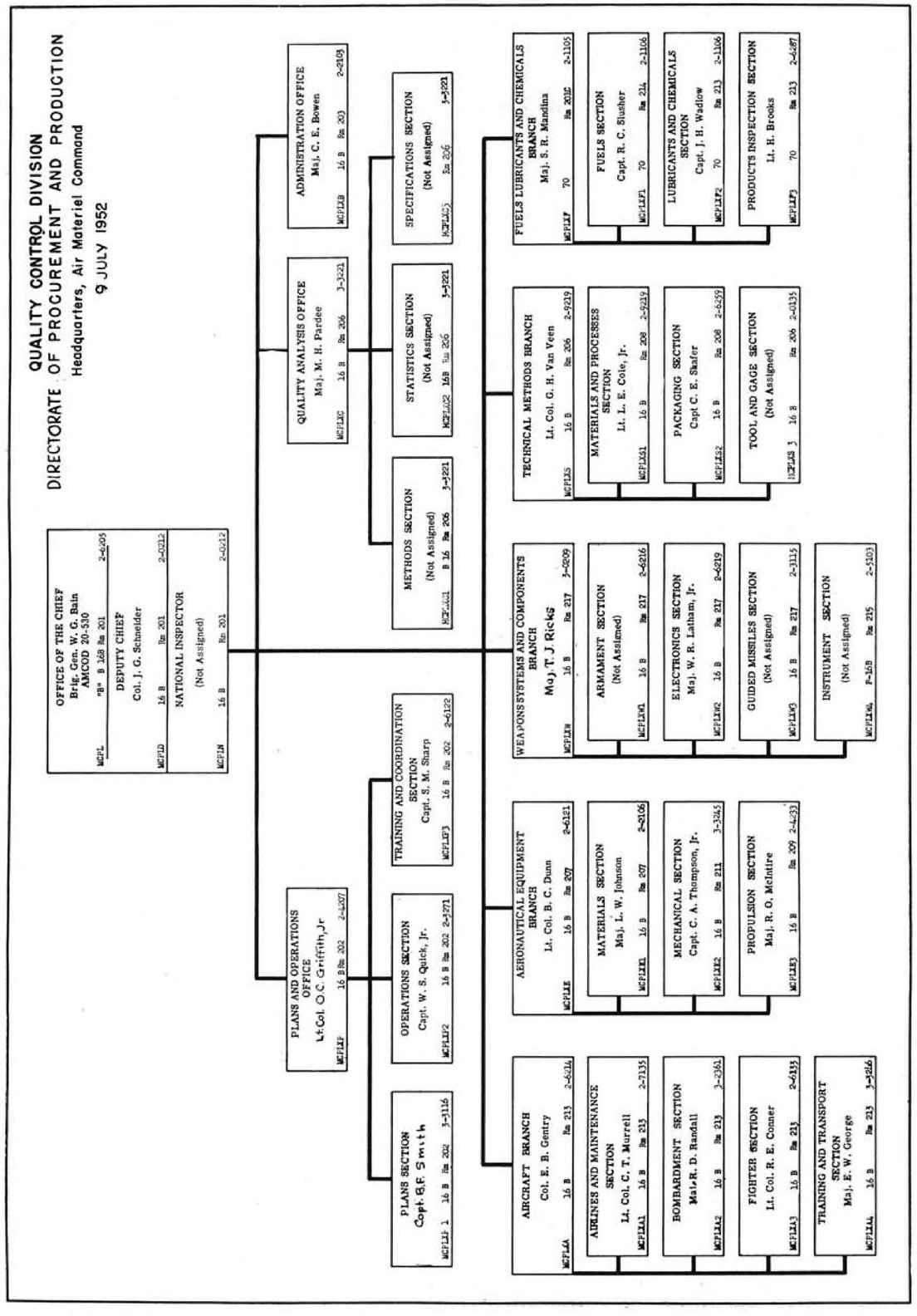

(*Continued from page 222*)

point out that manufacturers object to the cost of the sampling system due to the change in inspection levels. Their answer is: "Would you fellows prefer 100% teardown inspection?"

The difference to the taxpayer between 100% engine teardown and the one-to-10 sampling ratio is something to consider.

On the one-to-10 ratio nine engines won't have to duplicate their green run. That saves quite a bit of fuel.

On reciprocating (piston) engines, this saving **alone comes into** some respectable figures. Quality Control has estimated fuel savings ranging from 15 to 850 gallons per engine shipped, depending on horsepower.

On turbojets—masters at slopping down fuel—the saving comes to between 600 and 1,700 gallons per engine, varying with the model.

► **Manhour Saving**—In the matter of manhours saved per engine shipped, there's an estimated cut of between 10 and 200 hours on piston types, again depending on models. And between 35 and 125 hours on turbojets.

Now add to these savings the elimination of the cost of gaskets, plugs, seals, wires and other things which have to be replaced with every engine teardown.

At this time the Air Force declines to make an estimate of savings, as applied across the board among the engine builders. Quality Control would rather wait until some solid figures can be totted up.

The engine teardown program is only one of many instances where AMC's Quality Control division is looking into the field of Air Force procurement for ways to hurdle the obstacles of hours and men and dollars in the path of AMC's logistical mission.

General Bain and his people believe they have the formula to produce a measure for the acceptance of suppliers' goods which may be more reliable, yet less costly in every sense, than any yet devised by the Armed Services.

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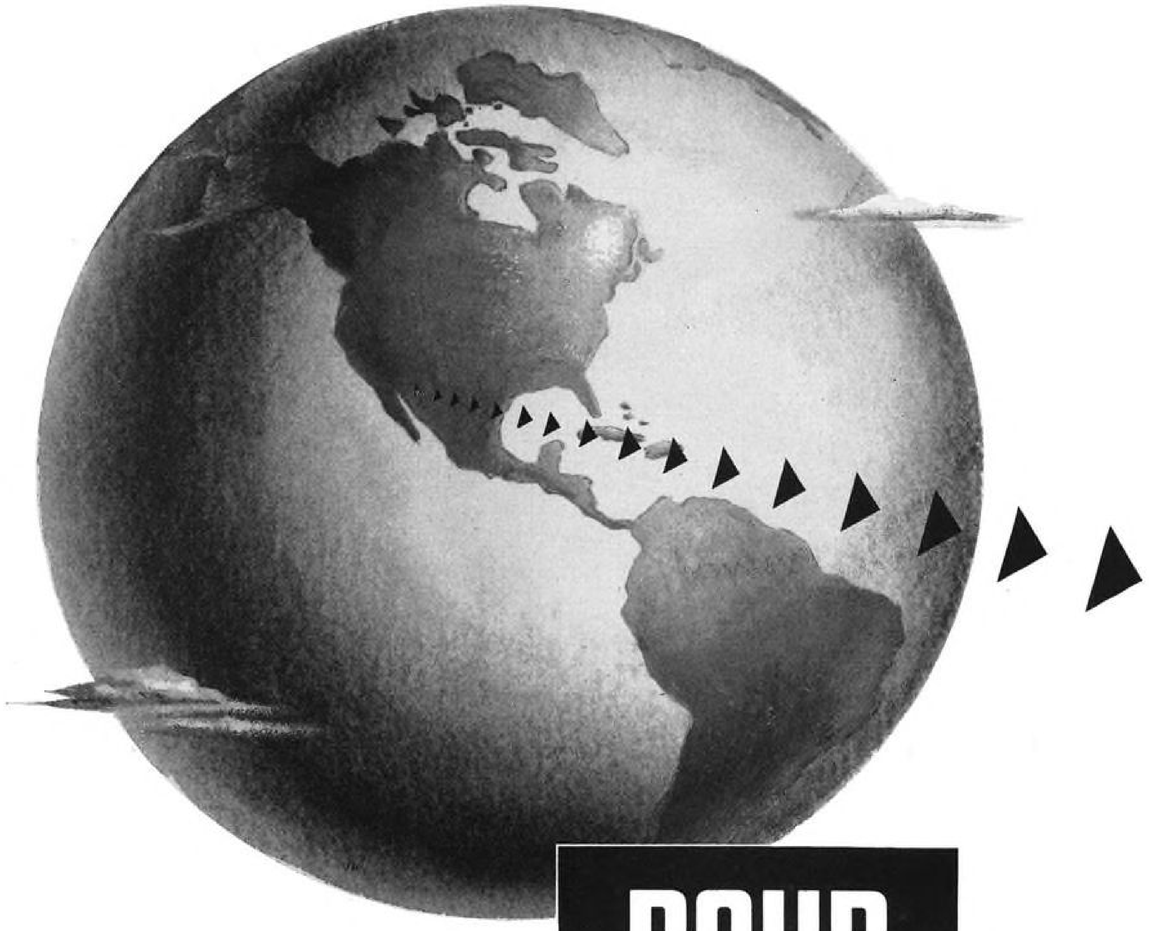

ROHR
AIRCRAFT CORPORATION

CHULA VISTA AND RIVERSIDE
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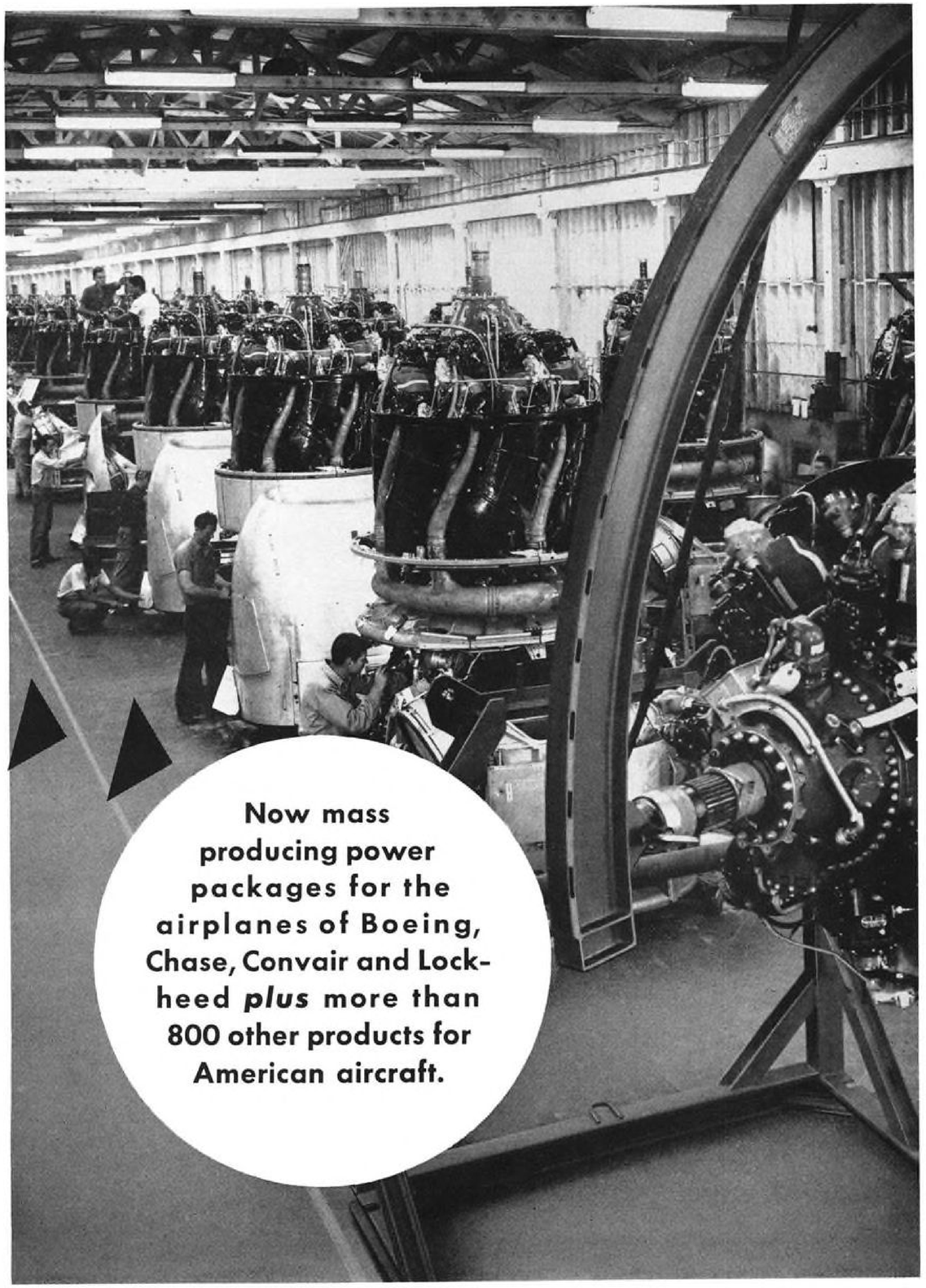


Procurement:

Strictly 'Crystal Ball' planning turns out right.

Defense Secretary Robert Lovett recently said:

"The weapons . . . have grown so complex as to make it almost inaccurate to describe the modern fighter plane as an airplane. The modern fighter is no more like the World War II fighter . . . than a modern automobile is like a buggy."

As airplanes have become more complex, so has the business of their procurement through the Air Materiel Command. Every aircraft manufacturer says he has learned this the hard way.

The complexities don't stem from the point where the AMC Procurement Division's buyer sits down to do business with the manufacturer. They are already there.

They begin many months before the day when the contract is negotiated. They begin on the day when Air Force strategists translate their strategic program into Air Force requirements for airplanes.

At the beginning of the fiscal year, July 1, Hq., USAF, notifies AMC of its program requirements. In effect, Washington says:

"We'll need so many bombers, so many fighters, so many cargo planes. Their performance must be thus and so."

► **Crystal Ball**—This is the takeoff for Procurement's Operation Crystal Ball.

Procurement's first job is to reduce the Air Force's program requirements to schedule requirements: To set up a schedule of bombers, fighters and cargo craft by individual airplane type, model and series.

Then, to work out the requirements for Government-furnished aircraft equipment (GFAE), the spares and supporting equipment each airplane must have. To peg these needs, Procurement must learn the Air Training Command's requirements and how much the Directorate of Supply and Services will need for initial stocks.

From these stages, aircraft schedules are developed.

Meanwhile the aircraft and GFAE budgets for the program are figured and a combined program budget is developed. Then there's the matter of getting the facilities, the plants and machinery, which will be needed to build the needed airplanes and GFAE. This facilities program as rounded out will include an estimate of the manpower, materials, tools and real estate manufacturers will need.

When aircraft schedules finally are prepared they will include schedules not only for the Air Force, but for the Army, Navy and MDAP as well.

► **Knitting is Complex**—The thousands of details of knitting together the aircraft and related equipment requirements for the Air Force alone make a complex planning stage.

But the fact that AF buys certain aircraft for these other defense agencies multiplies planning intricacies by X.

In America there are two channels of aircraft procurement for Department of Defense requirements, the Air Force and the Navy. The Navy pulls some of its planes and some equipment from the Air Force. The Air Force, in turn draws from the Navy. Both supply the Army and MDAP.

In addition to this, some planes supplied to the Army have Signal Corps or Ordnance equipment.

So, between the Armed Services there is a webwork of Military Interdepartmental Purchase Requests (MIPRs) for airplanes and equipment. which would make even a trained observer ask who makes what for whom and on whose budget.

The planning period generally is pegged at 12 months, ending with the end of the fiscal year in which it is launched.

► **The Cycle**—It is the first period in the four-year procurement cycle. It is followed by a procurement period, figured to last six months, and an 18-month period of fabrication, succeeded by a year of deliveries.

On this schedule, the program requirements which were received last month by AMC at the beginning of the fiscal year, will be worked into aircraft and GFAE schedules ready for approval in June, 1953.

Procurement of the items required for the program would occupy the final six months of next year.

Fabrication would begin with the year 1954, involving the tooling up for aircraft and GFAE production.

By midyear of 1955, the first completed airplanes and completed equipment would be rolling off assembly lines.

So airplanes which will be scheduled by Procurement this year may be making news a little over two years hence.

Right now, those airplanes are pretty nebulous things.

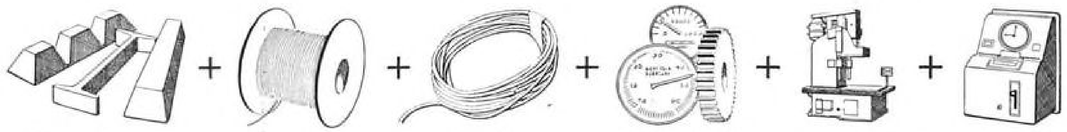
They're little more than a strategist's idea of the kind of weapon he wants, and approximately how many.

► **Half-World**—In a sort of half-world between strategy and logistics, Procurement division's Planning Control office now is working up the aircraft requirements schedule. Said a Planning Control official:

"When Hq., USAF, gives us its program requirements, it's something like

F84, USAF

What it takes to send one jet into action!



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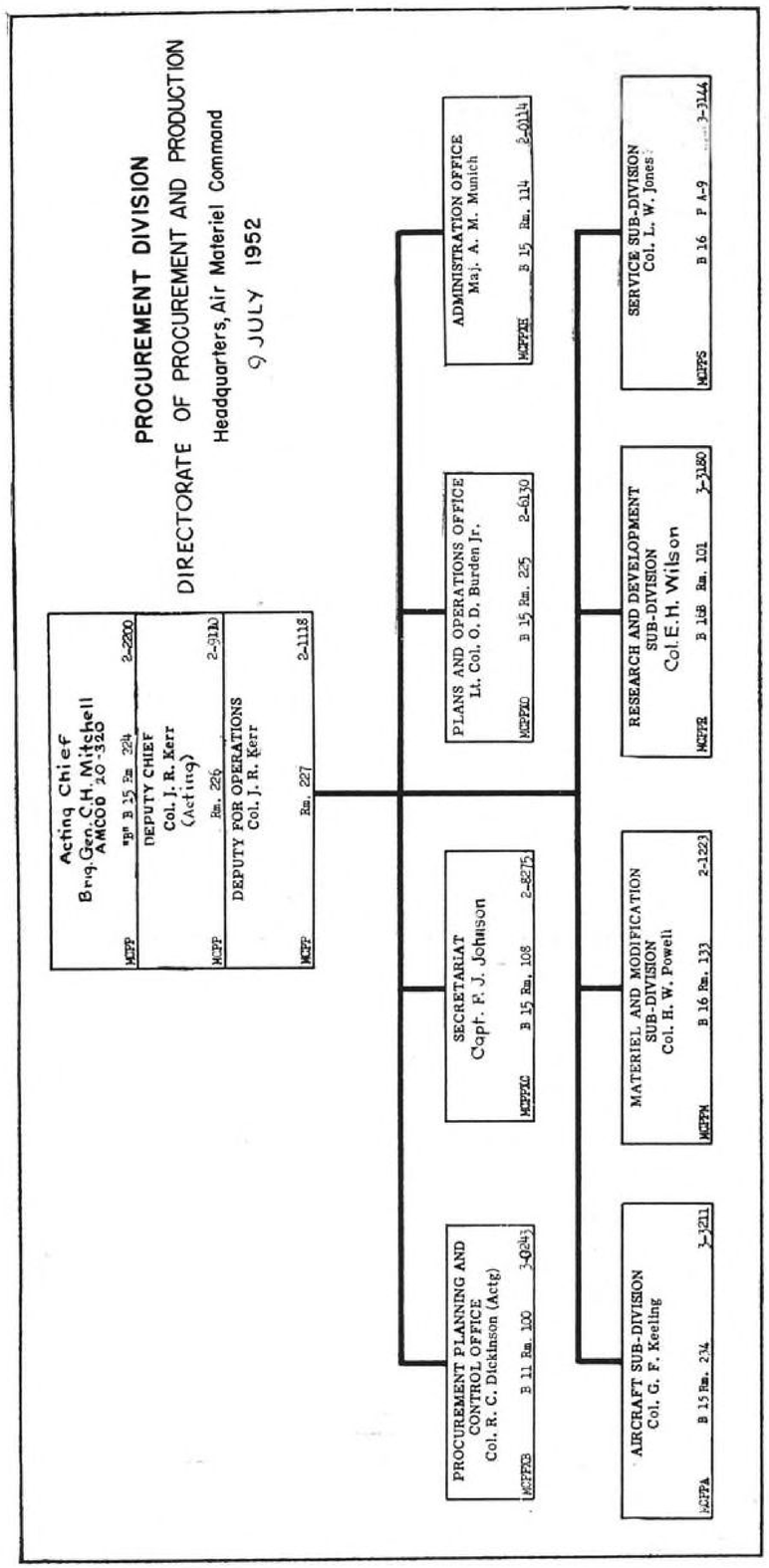
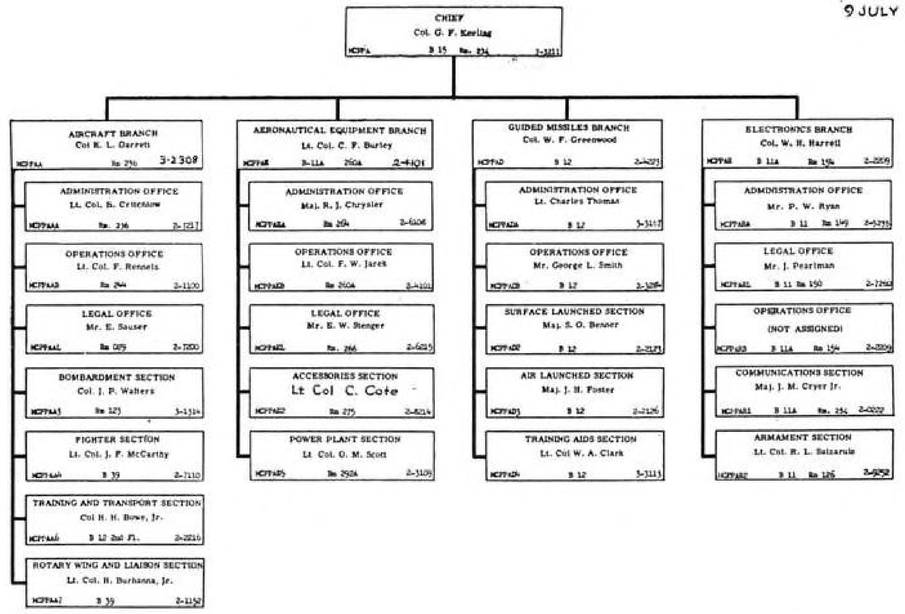
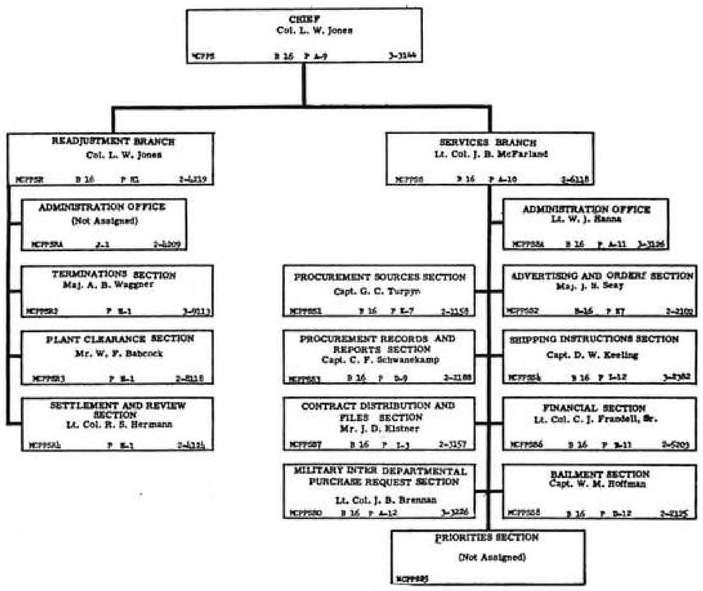


AIRCRAFT SUBDIVISION
PROCUREMENT DIVISION
9 JULY 1952



SERVICE SUBDIVISION
PROCUREMENT DIVISION
9 JULY 1952



a fellow going to a grocery store. He says:

"'I want to buy something to eat and I'd like to have it by mid-afternoon. Steak? No, I'm not sure that's what I want, but certainly there will have to be some meat.'

"Maybe it's not as bad as that, but the Air Force makes us do a lot of crystal gazing to determine exactly what it has to have."

What comes out of planning is not necessarily going to be what USAF Headquarters has specified. Certain compromises and modifications have to be made as the schedules are made up.

►**Modification**—Say for instance, the Air Force has asked for a certain fire-control system on one of its planes. Procurement may find that the specified fire-control system cannot be used on that particular type of aircraft. That brings up a requirement for a modification of the fire-control system.

The biggest hitch in the whole planning picture seems to be this basic fact:

You simply cannot buy spares and supporting equipment for an airplane until you know just what airplane you are going to buy.

So first, Planning has to determine the type, the model and the series of the craft. And approximately how many it's possible to buy under the program.

From that, Planning can set up the

schedules for spares and equipment covering the period of a year.

Now, the worst of it is that the entire package, the airplane, its equipment and its spares must be ready simultaneously.

On the day when the aircraft is delivered to AMC's "customer," one of the Air Force major commands, AMC's Supply and Services division, should be ready with every spare and every item of supporting equipment for that plane.

►**More Crystal Gazing**—So it takes some hustling and some more crystal gazing in the Planning stage to pull the GFAE program forward fast enough to time out with the aircraft schedules.

If there are no planning catastrophes, the combined aircraft and GFAE schedules have been worked out by the year end. A combined budget program has been estimated, allowing a cushion, of course. The facilities, such as plants, machines, manpower and other facilities the manufacturers may need, have been scheduled.

Then the aircraft program is ready for approval and the planning stage is over.

But there's always the chance, at any stage of planning, that strategy will change, or some contingency will arise which calls for drastic revisions of the schedules all across the board. So Planning will have to do some overtime crystal gazing.

When Planning's program has been approved, and purchase requests have been written and co-ordinated with all interested activities, the Procurement buyer is ready to take over.

At that point the Planning people can take some comfort:

They have no monopoly on complexities and grief.

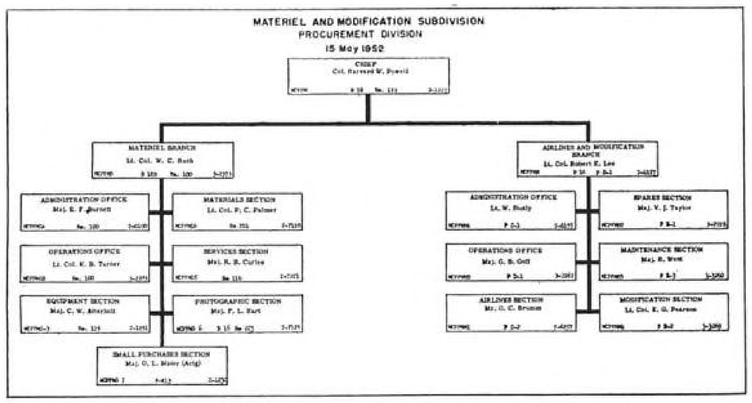
(Additional Procurement Division Charts on P. 240)

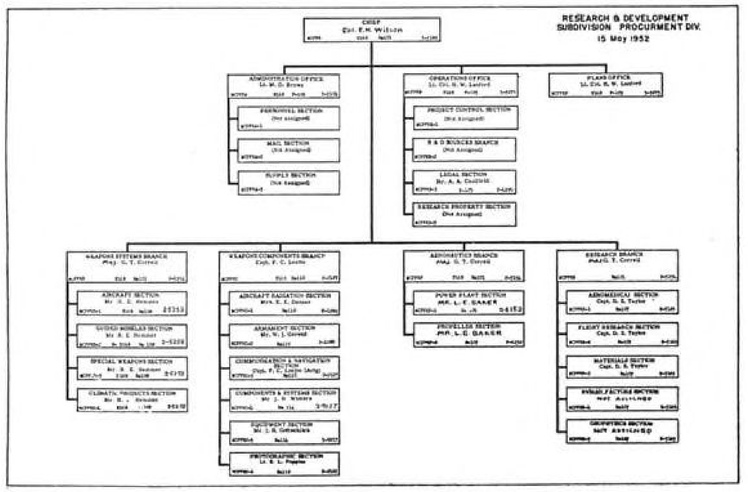
Armed Services Contract Appeals

Contractors may appeal from decisions of contracting officers on disputed contracts. Such questions are studied by the Armed Services Board of Contract Appeals. The board also considers appeals of contractors pursuant to certain provisions under the Contracts Settlement Act of 1944.

The board is a joint board of the Air Force, Army and Navy. It is divided into three panels, one of them the Air Force Contract Appeals Panel. Members of the Air Force Panel are appointed by the Assistant Secretary of the Air Force.

Each service panel generally considers appeals involving its own procure-





ments, but this arrangement may be varied if the workload of any panel becomes particularly heavy.

►**How to Appeal**—Notice of appeal must be in writing, and the original, with two copies, may be filed with the contracting officer from whose decision the appeal is taken. Notice of appeal must be mailed or otherwise filed within the time specified in the contract or allowed by applicable directives.

The hearing will usually be held at the office of the appeals board, although the board will consider a request for a hearing at another location if compelling reasons are presented and request is filed sufficiently early.

It is not necessary for the appellant to appear at the hearing, or be represented there. He may submit a brief stating his case, instead.

Contents which should be included in the notice of appeal and in the trial brief, and the complete procedure to be followed by the contractor in an appeal is described in Armed Services Procurement Regulation, Appendix A (Armed Services Board of Contract Appeals—Charter and Rules), published July 19, 1950.

Insurance Required On Govt. Contracts

The government requires that various types of insurance be carried by the contractors it deals with.

• **Fixed-Price Contracts.** Insurance shall be that required by law. But the Air Force may require additional insurance to protect the government with respect to responsibilities imposed on the contractor in connection with the government property used or furnished for the performance of the contract. In special cases, added insurance may be deemed necessary.

• **Cost-reimbursement Contracts.** The same provisions apply as for fixed-price contracts. In addition, unless the contractor is legally immune from liability or has an acceptable program of self-insurance, he will need: workmen's compensation and employer's liability insurance; general liability insurance; automobile liability insurance on all vehicles used off the contractor's premises in connection with performance of the contract; aircraft liability insurance, where applicable.

District Manages the Contract

Air Procurement District pays the bills and handles inspection; it also gives legal assist to contractor.

The prime mission of an Air Procurement District is to administer the Air Force contracts that are operative within its area.

The district office assists the contractor in the legal phases of his contract and is responsible for the disbursement of contract payments and the accomplishment of materiel inspection and acceptance.

When the occasion demands, the district renders whatever technical assistance may be needed.

The Air Materiel Command has established six district offices in the United States at Boston, New York, Chicago, Detroit, Ft. Worth and Los Angeles.

District offices are staff headquarters with a line of responsibility flowing straight into AMC's Directorate of Procurement and Production.

Like most components of the Air Materiel Command, civilian personnel far outnumber the military.

▶ **Regional Offices**—Responsible to district commanders are the air regional representatives who head up air regional offices located in strategical industrial areas throughout the U.S. Air Force plant representatives stationed at certain industrial plants where establishment of their offices is justified by the size or importance of the Air Force contract are also under the jurisdiction of the district.

The air regional representatives, in turn, have authority over regional suboffices, plant offices with an Air Force officer-in-charge—who may be civilian or military—and those other plants where no officer-in-charge has been assigned and supervision over inspectors is exercised by the Air Force quality control representative.

Staff functions performed by district personnel have, in most instances, their operational counterparts in the regional offices.

Like any well organized military establishment, the district has a variety of functions to give internal support and services to its mission—personnel and administration, judge advocate, inspector general, for example.

▶ **Industry Contact**—It is its three directorates which enter most deeply into those duties that bring the district into closest contact with American industry.

These directorates are: Procurement Administration, Production, and Quality Control.

Actual administration of the district's contracts is performed by contracting officers assigned to regional and air force plant representative offices, who call upon the district's directorate of procurement administration for guidance and advice. This directorate sets, within limits defined by AMC, the policies under which regional and air force plant representative contracting officers work.

Directorate of Procurement Administration also maintains surveillance over settlements of the district's terminated contracts and—again to an extent set forth by AMC—accomplishes price redetermination of contracts.

Districts have government owned industrial property scattered in various facilities throughout their area. The control of this property and its allocation to contractors is another function of procurement administration.

This directorate negotiates, prepares and administers all contracts on local purchase items.

▶ **Production and Planning**—That portion of the district mission relating to production and industrial planning is handled by the Director of Production. Production personnel work daily and closely with Air Force contractors to effect completion of contracts, jogging those contractors whose production is drifting toward a delinquent status, rendering such assistance as may be necessary to keep the contract up to schedule.

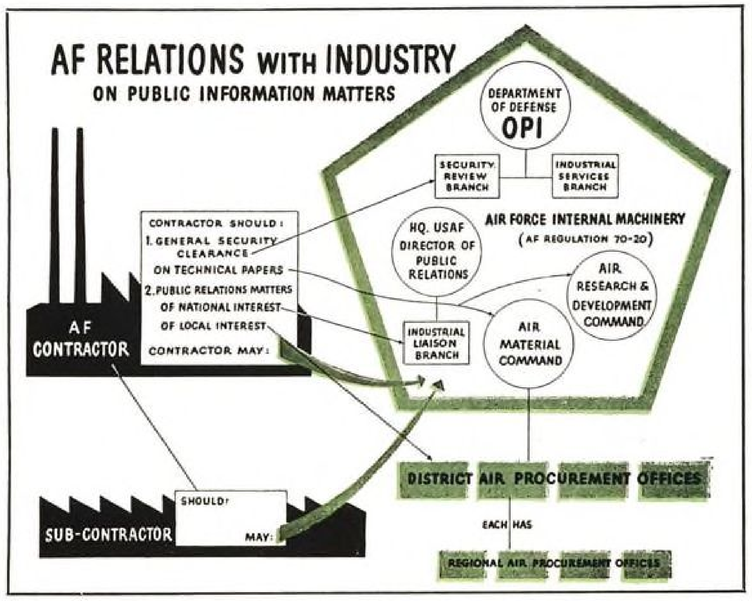
Production's resources section provides aid to contractors in the control and conservation of materiel and keeps an ear keyed to detect any discordant labor-management troubles that might slow delivery of critical items.

Operating out of this directorate is the Office of Small Business which the Air Force has established in all district and regional offices to assist small business men looking for Air Force contracts and contract information.

The development of industrial mobilization plans and the determination of contractor expansion requirements are also handled under authority of this directorate.

Perhaps the widest and most frequent association that contractors have with the Air Force is made through the Air Force quality control personnel.

Acting under policies fashioned by AMC, the district directorate of quality control is responsible for planning and coordinating all training needs for its inspectors. At the same time, it is responsible for establishing the exchange of inspection services with other military components.



They Cope With Intangibles

USAF industrial relations officials try to smooth out the wrinkles in morale and public information.

The Air Materiel Command, chief AF purchasing agency, is spending more than $16 billion a year as the U. S. moves toward its goal of faster-than-sound air power. Its job of building a modern air force while supporting open warfare in the skies over Korea is made more difficult by the complexity of present-day aircraft production.

This complexity is not only material. It is psychological too.

▶ **A Job to Be Done**—USAF planners are borrowing ideas liberally from big industry to get the tremendous production task done, effectively and economically. A prime example of this new approach is the establishment of an "Industrial Relations" program initiated recently by USAF and Air Materiel Command.

The planes, guns, electronic equipment and thousands of other necessary items do not "materialize" simply because somebody writes an order. In addition to finding the facilities, the material and manpower to do the job, there must be understanding, willingness, cooperation and a host of other intangible factors incorporated in the mass-production machine to lubricate its gears.

For example, industry, itself, must be sold on the "urgency" of the aircraft program. Industry's employes must understand the critical nature of their jobs. And, the American taxpayer must be willing to support the program.

▶ **Industrial Relations**—Thus, Air Force Regulation 70-20, entitled "Industrial Relations With Air Force Contractors," was born. Contained in it is a set of rules to guide industry in handling information and public relations aspects of the mass-production job. This new directive standardizes the policies and procedures for:

- **Security review** and release of unclassified information.
- **Unclassified plant visits.**
- **Product identification.**
- **Naming aircraft and engines.**
- **Advertising.**
- **Special events.**
- **Photographs.**
- **Subcontractors and suppliers.**
- **Licensor-licensee relations.**

It was reviewed and favorably received by public relations people of the Aircraft Industries Assn. during a meeting in Los Angeles late last year.

▶ **Liaison Office**—Because of its mission as the chief production and purchasing agency of the USAF, Air Materiel Command was given the job by Washington to put the new program into high gear. A new Industrial Liaison organization with headquarters at Air Materiel Command and offices in six Air Procurement Districts across the nation was established.

Prime purpose of the new AMC Industrial Liaison activity is to provide a closer link between the Air Force and

Security & Public Information

These Air Force regulations explain the whys and wherefores of military security policies as they may affect Air Force contractors. Check with your Air Force plant representative if you want to study them.

- **AF Regulation 205-1,** and the newer supplemental AF regulations 205-1A through -1E, cover USAF security regulations. They explain the need for classification of military information and tell in detail how it must be safeguarded.
- **AF Regulation 70-20** sets forth policy for the Air Force's industrial relations with its contractors. It covers public information activities including news releases, plant visits, advertising and special events.
- **AF Regulation 190-5** covers Air Force participation in ceremonies, celebrations and exhibitions. It defines types of participation by USAF aircraft, covers the rules which apply to this participation.
- **AF Regulation 190-6** establishes the Air Force's public information policy, and outlines the duties of public information officers. Included in the regulation is a section covering cooperation with advertisers which spells out instances in which the Air Force uniform, title, rank, etc., may be used in advertisements.
- **Public Information Security Guidance No. 16** (Dept. of Defense) furnishes public information security guidance on the release of information by manufacturers holding Army, Navy or Air Force contracts. It provides a specific listing of releasable and nonreleasable information.

thousands of its contractors on industrial information and relations matters. In official language the mission reads something like this:

- **Conduct appropriate liaison** with AF contractors and governmental and civilian agencies as required to establish and maintain an effective contractor-AF relationship as outlined in AFR 70-20.
- **Furnish staff counsel to,** and act in behalf of, Air Regional and AF plant representatives in all contractor-AF relationship matters.
- **Review, clarify and disseminate** industrial information to industry.

A more simple version describes the Industrial Liaison activity as coordinating numerous service activities with

news media, small business groups, contractors, both large and small, civic and governmental groups constantly dealing with the AF, and its thousands of contractors.

At Headquarters level at AMC, the Industrial Liaison activity has been set up within the Directorate of Production and Procurement. Public Relations phases of the program are coordinated directly with the AMC Public Information Office, which serves all directorates and departments within the command in a consultant and advisory capacity.

▶ **Liaison Program**—Specifically, the AMC Industrial Liaison Operation, both at Headquarters and in the field, is built around an eight-point program:

- **Handles relations** with contractors, providing data on the latest regulations, security review, and policy guidance on contracts and procurement information.
- **Supervises industrial relations policies.**
- **Is the distribution source** for information affecting the procurement program at Headquarters and in the field.
- **Maintains close liaison** with the Industrial Liaison offices at Air Procurement Districts and Air Procurement Regional Offices, and AF plant representatives, together with higher headquarters such as USAF and Department of Defense.
- **Assists AF contractors,** on request, with special events such as plant rallies and other functions designed to stimulate AF production and incentives.
- **Supervises regional office** Industrial Liaison activities.
- **Serves as staff counsel** to AF plant representatives on matters concerning industry and the community.
- **Is the focal point** for handling community relations where the air procurement districts are concerned.

▶ **Review & Clearance**—One of the most important jobs accomplished by the Industrial Liaison organization, and one received favorably among public relations people in the Aircraft Industries Assn., is the standardization of security review and policy clearance procedures.

Department of Defense policy is to allow contractors all practicable latitude in advertising or publicizing their products. It is desired to encourage and assist contractors in every way possible in this.

Only two restrictive factors enter into this problem:

- It is essential that no classified information prejudicial to the national security be publicly released.
- Neither the Department of Defense nor any of its component services, as government agencies, may endorse or permit implication of endorsement of one manufacturer's product in preference to similar products of other manufacturers.

Clearance procedures and channels

Industrial Liaison Personnel

- **Department of Defense:**
  Lt. Col. Herbert Crisler
  Security Review Branch
  Office of Public Information
  Department of Defense
  Washington 25, D. C.
  Phone:
  Liberty 56700, Ext. 72135
- **USAF:**
  Lt. Col. Donald L. Perry
  Industrial Liaison Officer
  Directorate of Industrial Resources
  Office of Deputy Chief of Staff, Materiel
  Room 4C-287, Pentagon Bldg.
  Washington 25, D. C.
  Phone:
  Liberty 56700, Ext. 76852
- **Air Materiel Command:**
  Maj. Russell D. Webb
  Mr. Lou Herz
  Industrial Liaison Office
  Headquarters, AMC
  Wright-Patterson AFB, Ohio
  Phone:
  Kenmore 7111, Ext. 20156
- **Central Air Procurement District:**
  Mr. Maurice Yenn
  Central APD
  W. Warren Ave. & Lonyo Blvd.
  Detroit 32, Mich.
  Phone: Texas 46000
- **Eastern Air Procurement District:**
  Mr. David Cusick
  Eastern APD
  655 Madison Ave.
  New York 21, N. Y.
  Phone: Templeton 89300
- **Mid-Central Air Procurement District:**
  Mrs. Corliss Fowler Jones
  Mid-Central APD
  Industrial Liaison Office
  165 N. Canal St.
  Chicago 6, Ill.
  Phone: State 22640, Ext. 60
- **Northeastern Air Procurement District:**
  Maj. John Brennan, Jr.
  Northeastern APD
  14 Court Square
  Boston 8, Mass.
  Phone: Liberty 26000
- **Southern Air Procurement District:**
  Mr. Robert Wear
  Southern APD
  3309 Winthrop
  P. O. Box 9038
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  Phone: Sunset 6503
- **Western Air Procurement District:**
  Lt. Col. Richard Hutchison
  Western APD
  155 W. Washington Blvd.
  P. O. Box 3849
  Terminal Annex
  Los Angeles 54, Calif.
  Phone: Prospect 4711

are set forth in AF Regulation 70-20, Industrial Relations with Air Force Contractors, and Public Information Security Guidance No. 16, "Releases by Manufacturers.

In general, manufacturers are required to submit all advertising, publicity material or technical papers dealing with classified military contracts for review by the Security Review Branch, Office of Public Information, Department of Defense, Washington 25, D. C.

Certain purely local news material can be cleared at district or regional level. All national releases, however, particularly initial releases concerning new aircraft or major components, must be cleared by the Department of Defense prior to release.

Moreover, all material involving projects of more than one command or service, or overall strategic considerations applicable to the national security as a whole, must be cleared through the Department of Defense.

► **Objective: Simplicity**—Main objective of clearance procedures and channels is to keep them as simple as possible, to route material direct to the agency qualified to take definitive action, with a minimum of administrative waystops. The contractor himself can use a certain degree of common sense in interpreting clearance directives to save time and red tape. If a paper contains detailed and technical information concerning a project of which Air Materiel Command or Air Research and Development Command has prime cognizance, time can usually be saved by sending the original direct to the Command concerned, with information copy to Department of Defense.

A paper concerning a major new manufacturing method, for instance, if sent to Department of Defense would normally be referred to Air Materiel Command for recommendation and return to Washington.

On the other hand, a national release concerning a new airplane could only be finally approved by the Department of Defense, and the manufacturer would probably save time by sending the action copy direct to Washington, with information copy to the subordinate command concerned and area, field or regional offices or representatives who constitute his local contacts.

Information copies are important to subordinate commands and offices because they help to keep personnel apprised of the state of publicity on their own projects, a vital factor in establishing consistent release policies.

► **Plant Visits**—There is a continuing flow of requests from news media, civic groups and other organizations for visits to the plants of Air Force contractors and subcontractors.

Aside from certain policy aspects, Air Force is primarily concerned with

two principal questions that arise with each request for a plant visit:

- **Is security involved with such a visit?**
- **Will production be adversely affected?**

Visits of national news media must be cleared by Headquarters, USAF, prior to publication. Approval for purely local visits can be given by the Air Procurement District. However, in any case, Air Force plant representatives are consulted prior to such a visit.

The AF contractor can file his request for approval of a visit by national media through the Air Procurement District Industrial Liaison Office; through Industrial Liaison, Headquarters, AMC; or direct to the Industrial Liaison Office, Directorate of Industrial Resources, Office of Deputy Chief of Staff, Materiel.

Regardless of the Command level where the request is filed, the coordination will remain the same and all offices up and down the line, including the interested AF representative at the plant where the visit is to take place, will be notified.

The Industrial Liaison activity from the Pentagon on down through AMC and Air Procurement Districts is set up to handle special queries and requests for information. Again AFR 70-20 serves as a guide. As a rule, all local requests should be forwarded to Air Procurement Districts, while matters of national scope should be channeled to Headquarters, AMC, or to USAF in Washington. By maintaining a close working relationship with Industrial Liaison Officers at Air Procurement Districts, the AF contractor will have the benefit of AF guidance on such matters.

► **Special Events**—Another function of the Industrial Liaison Offices will be one of assisting with special events and functions such as plant rallies to stimulate production. Ordinarily, Air Procurement Districts will be able to supply assistance, if requested by the AF contractor, for purely local functions. However, if an event holds national significance, assistance and guidance may be sought at Headquarters, AMC, or USAF level.

The same holds true of requests filed for Air Force speakers, which may be necessary for plant rallies, plant dedications and other morale events.

The AF contractor ordinarily will file his initial request for an Air Force speaker through the Air Procurement District Office. If it is determined that the event will hold national significance, the Air Procurement District may forward the request on to Headquarters, AMC, where a Speaker's Bureau is maintained. For reasons of economy, speakers, other than general officers, are not normally assigned to engagements beyond a 50-mi. radius from the home station. On special occasions, AF motion picture films (unclassified) and other visual aids can be supplied.

Normally, if exhibits are required for events sponsored by AF contractors, assistance can be requested through Air Procurement District Offices, which in turn, will forward the request to higher headquarters. In such cases AF contractors are cautioned to make such requests far enough in advance to allow time for action by the higher echelons. However, for economy reasons, transportation and manning costs must be borne by the requesting agency.

► **Forward Step**—After all is said and done, the Air Force believes that it has established a system for effectively handling industrial liaison matters which does not preclude the use of everyday common sense. The system is thought flexible enough to meet nearly any situation, yet firmly establishes channels for utilization by the Air Force contractor.

Moreover, every effort is being made by the Air Force to fill industrial liaison job assignments with officer and civilian personnel well acquainted with industry's problems. Most important of all, the Air Force is fully aware there is always room for improvement. And it believes its Industrial Relations Program is a step in the right direction.

CONTRACT PROCEDURE

A Contract Goes Through the Mill

- **Before the postman brought you that contract, the document had to survive a blizzard of paperwork.**
- **Here are the procedures it had to follow, and how it was kept from smothering in required red tape.**

Your postman rang a dozen times—and still no contract on the low bid you submitted on the 10,000 gimmicks the Air Force was buying.

Being the nervous type, you:

Suspect the buyer is goofing off and the file is gathering dust on his desk; or

Somebody—like your arch competitor—is contending that your firm can't produce on the contract; or

The procurement is being canceled because of another facet of the stretch-out program.

Actually, you are dead right in figuring that the buyer is involved in the interval between submitting bids and mailing the formalized contract. He's a busy man, that buyer, and perhaps you would like to see come of the things he's doing to your contract after you submitted the low bid.

▶**Preliminaries**—First off is a request to the appropriate Air Procurement District (APD) for a Facility Capability Report (page 269).

Without waiting for a report from the APD, the buyer prepares a notice of contract obligation and a procurement action report for forwarding to his branch Purchase Request (PR) Control, retaining one copy of the notice for review by the legal assistant in his own section.

PR control then has a check on its work sheet of all the PR's processed prior to assignment to appropriate buying units. When the PR is received originally in the Procurement Division, PR control makes a record of the action to be taken.

The notice of contract obligation is the signal to PR control that the procurement has been processed at least as far as awarding the contract.

We will get back to the buyer later. Meanwhile, PR control in the Services Branch extracts the procurement action report for use as an obligation follow-up and forwards the notice to the Accounting Division of the Comptroller's Office. There, the fund obligation is noted on all copies, one of which is retained for the files. The remaining copies are returned to Services Branch PR control. Hourly messenger service has been instituted between these two "stops" to accelerate the flow of the paperwork.

Services Branch PR control will retain one copy of the notice and forward the original notice to the buying branch's PR control unit for delivery to the buyer.

The notice of contract obligation actually is the second step in processing on the individual procurement by accounting. The initial step was made when the PR was issued. Accounting then made a fund commitment which was sufficiently large to take care of possible unit price increases since the last time the item or items were purchased.

Since the notice contains the exact amount involved in the procurement, accounting can adjust its fund records so that the exact amount is obligated. The residue—difference between commitment and obligation figures—can be returned to the appropriate fund for use in committing on another procurement.

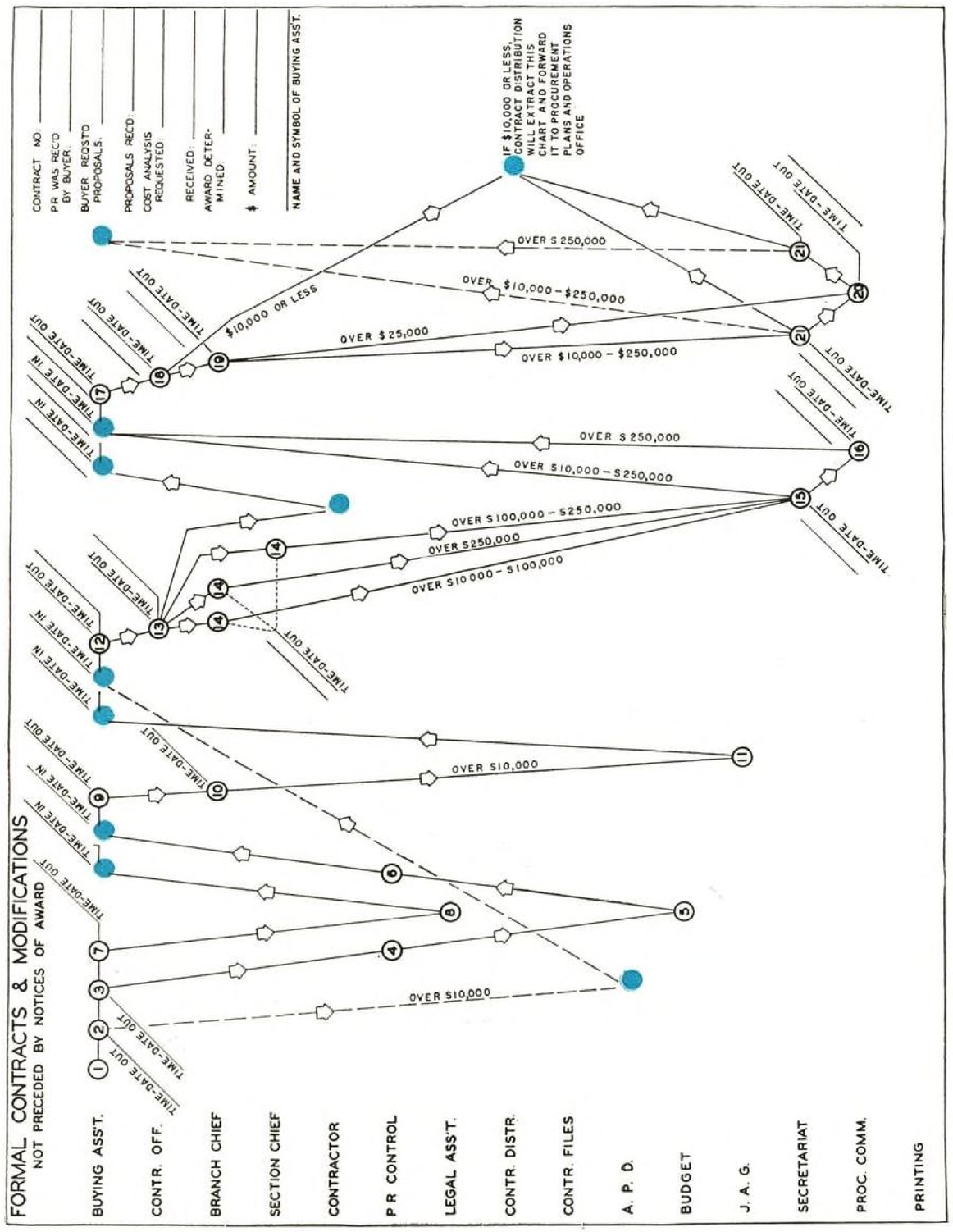
▶**Contract Drawn**—While all this has been going on, the buyer has been preparing a request for preparation of contract. He includes the original PR and the contract preparation request and forwards the file to the legal assistant in his buying branch. The latter prepares the contract and returns the required number of copies, plus the file, to the buyer.

The buyer then reviews the contract to see if it is in order before preparing a Judge Advocate General (JAG) coordination sheet which is signed by the buyer's superior—section chief, assistant section chief or section procurement assistant—and delivered to the JAG's contract branch. The latter organization reviews legal aspects of the contract and, if found sufficient, approves the contract and returns it to the buyer.

An Air Force contract frequently is a bulky affair—and a great many of the articles included in the pact literally are "traffic light" warnings in order to protect the buyer from personal liability.

For the Air Force has learned from past occasions when some contractor has

(*Continued on p. 258*)



The Ups and Downs of a Contract Before It Gets to the Winner

A contract is a job for many hands in many places. This chart shows the flow through these hands of a particular type of contract. For a complete explanation of this flow, see story on page 255. Every contract does not make the same journey; there are fewer stops on the route for some.

In the above illustration, it has already been definitely decided who will get the contract before the action starts at stage 1. In fits and starts it then moves along to the last colored dot on the right where it is mailed. The colored dots in between the first and last stages represent cross currents to the main flow. At each one some extra action is taken.

At stage 2, for instance, the Air Procurement District is asked for a Facility Capability Report, which is prepared while the contract continues through channels and catches up with it at stage 12. At other stages, information copies are made for various offices, or the contract treads water briefly waiting for a legal opinion to catch up with it, or it is sent to the contractor for signature (it doesn't become binding until AMC officials sign).

There are alternate channels for some contracts. This is shown at stage 14, where the Contract Letter of Transmittal, which was prepared at stage 12, has to be signed by different officers depending on its size. At stage 21, the dotted line represents a copy of the contract returning to the buyer while the document itself goes to the final stage.

(This chart was prepared by AMC before nomenclature was changed; what is called a "branch" in the chart is now a "section," and the "section" is now the "branch.")

(Continued from p. 255)

outsmarted a buyer on some legal technicality contained in his contract. Probably the individual buyer in each instance never would be mouse-trapped like that again—but that doesn't protect the other buyers, who might get caught.

Legal sufficiency, in these applications adds up, therefore, to protecting the government on any "fine print" articles that may have been added to the bid by the attorneys for the awardee.

With both the JAG coordination and FCR in hand—and approved—the buyer than prepares a contract memorandum of transmittal and a letter of transmittal to your company. This action is taken on contracts that are in excess of $10,000.

▶ **Contract Nearer**—The memorandum, letter to you and copies of the contract then go to the contracting officer in the buyer's unit for review, approval, signing and mailing the letter of transmittal and copies of the contract to your company for execution. He also signs the memorandum and sends it to the section chief.

If the contract is more than $10,000 and less than $100,000, the section chief approves the award by signing the memorandum. If the award is more than $100,000 but less than $250,000, the memorandum must be signed by the branch chief. Awards over $250,000 require only the signature of the section chief, but get reviewed by the Procurement Committee. In all three cases, the file is forwarded to the Secretariat in order that an objective review of the award may be made.

After review by Secretariat, those awards in excess of $250,000 are forwarded to the Procurement Committee.

The entire contract file is subjected to an exhaustive study by the Procurement Committee to see that all pertinent papers are included and that each form or enclosure is executed in proper form.

The Procurement Committee also reviews the entire contract file from the unit price standpoint, and if necessary makes an inquiry about the factors involved in the determination of the unit price.

When your company's signed copies of the contract are received by the buyer, as well as the file from the Secretariat or Procurement Committee, he will prepare a disposition form (if the award is less than $10,000) and an endorsement to the memorandum (if more than $10,000) before forwarding the file to the contracting officer.

▶ **In the Mail**—The contracting officer will sign the required number of copies of the contract and the disposition form or an endorsement on the memorandum. In case it's the disposition

form, he sends the file to Contract Distribution by way of the PR Branch Control office.

If it has the memorandum, the contracting officer forwards it to the section chief who signs the endorsement before relaying the file to the Secretariat (if under $250,000) or the Procurement Committee (if over $250,000). If it goes to the latter, the contract and supporting papers are reviewed and manual approval by the appropriate approving authority is obtained. The file then is returned to the Secretariat.

Where final review is vested in the Secretariat, the review is accomplished and the file is forwarded to Contract Distribution. Your company's copies of the contract then will be forwarded to the designated home office.

▶**The 'Report Card'**—This, then, is what has been happening to the paperwork on that contract you have been expecting. It is the type of handling required by formal contracts and modifications not preceded by notices of award.

Everywhere that file went during its internal AMC traveling, it had a little gadget working for you. It was the flow chart, sample of which is shown on page 256, which eventually is detached and sent to the Procurement Plans and Operations Office.

Just like Junior's report card, it "grades" the operation at each major point. Personnel in the Plans and Operations office generally are nice people—but they can get embarrassingly personal where a series of a few flow charts indicates one or more operations is cluttering up the premises with a bogged-down operation.

The chart is dated at the conclusion of each step during its journey through the various departments and those dates amount to "confessions" of lax handling where too great a time is consumed by the individual department.

All of the foregoing applies to processing of formal contracts and modifications not preceded by notices of award. There are parallel handling operations with a great many other types of paper work involved in other types of contracts. The one detailed was selected deliberately because it contains most of the way stations, also found in other types of agreements.

There are several of these, but each is accompanied by the flow chart which indicates undue delay at any stop.

Some of the others include:

Letter Contracts

Assuming your company has been selected to perform certain work, the buyer prepares a request to the APD for an FCR. Without waiting for the FCR, he prepares a disposition form requesting authority to issue the letter contract. The form states that the authorization, if granted by the Procurement Committee, will be based on an affirmative FCR or an exception. The form is forwarded to the contracting officer for coordination and relay to the branch or section chief.

The next stop is the Procurement Committee where, if approved, the form is returned directly to the buyer. If not approved, it is sent back to the branch or section chief.

▶**Through Channels**—Assuming approval, the buyer prepares a notice of contract obligation and a procurement action report which is dispatched to his branch PR control. PR control extracts the procurement action report and sends the notice to the Accounting Division for an allocation of funds. The executed notice then is returned to PR Control where it is noted and sent on to the buyer.

Meanwhile, the buyer will have prepared a request for preparation of letter contract. The request, the original PR and the notice are sent to the legal assistant for drawing up the letter contract in sufficient quantity and returning to the buyer. The latter then prepares a JAG coordination sheet and forwards the file to the JAG contract branch through channels.

After receiving an affirmative FCR

and JAG coordination, the buyer writes a letter of transmittal to your company which he turns over to the contracting officer for signature and mailing. When your signed copies of the letter contract are returned, the buyer prepares a disposition form for the Secretariat which will be forwarded to the contracting officer for coordination.

The buyer, however, retains the original PR for use in framing the definitive contract. After further coordination by the section chief, the file is forwarded, through PR control, to the Secretariat. The latter approves the letter contract and forwards the file to contract distribution after extracting the flow chart for filing with the Plans and Operations office.

Forms 26&98 Contracts

(Not Preceded By Notices Of Award)

Your company has been chosen and complete substantiation has been made. The buyer requests the APD for an FCR on your plant, as in the case of other types of contracts. He then prepares the usual notice of contract obligation and procurement action report which goes to his branch PR control then the Services Branch PR control.

Services Branch PR control removes the procurement action report and forwards the remainder of the file to the Accounting Division where funds obligation is certified on all copies of the notice. The file is returned to Services Branch PR control which extracts a copy of the notice and sends the file to the buyer via his branch PR control unit.

►**Papers in Motion**—The buyer then prepares a Request for Contract which, with the PR, copy of the notice and all other pertinent papers are sent through his branch PR control to the Advertising & Orders Section of Services Branch. The latter branch completes a stencil on Form 26, Award, and mats on Form 98, Purchase Order. The contracts will not be dated. Six copies will be reproduced by the branch and the reproducibles will be sent to Print-

ing for reproduction of facsimile copies.

After reviewing the contract, the buyer prepares a JAG coordination sheet and sends the file through his section chief to the JAG contract branch for review of legal sufficiency, approval and return to the buyer. The latter then prepares a contract memorandum of transmittal and forwards the file to the contracting officer. If the contract is for $10,000 or less, a disposition form will be prepared.

▶ **Who Signs**—The contracting officer will sign the required number of copies of the contract and either sign the disposition sheet or endorse the memorandum, as the case may be. If the award is more than $10,000 but less than $100,000, the contract can be approved by endorsement of the section chief.

If the contract is between $100,000 and $250,000, approval is by the branch chief who signs the memorandum. If the award exceeds $250,000, the section chief signs the memorandum. In all three cases, the file then is forwarded to the Secretariat.

When the award does not exceed $250,000, the Secretariat reviews the file and award before forwarding to Contract Distribution—sending a copy of the memorandum endorsement to the buyer. On contracts over $250,000, the Procurement Committee reviews correctness of the file, obtains manual approval of the appropriate approving authority and returns the file to the Secretariat for processing similar to those contracts under $250,000.

Notices of Award

Terms and conditions of the contract have been agreed upon by your company and the buyer and the latter then makes the customary request for an FCR from the APD. He then prepares a Notice of Award and a JAG coordination sheet. The notice will be undated in all cases over $10,000. If the award is more than $250,00, it will bear a certification which reads: "This award has been approved by ..... on .....as required by DOI No. 70–3"

The section chief, assistant section chief or procurement assistant will sign the JAG coordination sheet and forward the file to the JAG contract branch. The latter organization will review the file and, if approved, will return it to the buyer.

In the meantime, the buyer will have prepared a notice of contract obligation and a procurement action report which are processed exactly as in previously cited cases through Services Branch PR control, the Accounting Division and back through channels to the buyer. The buyer then makes up a contract memorandum of transmittal and it is included in the file to be forwarded,

under listed conditions as to dollar volumes, to the Secretariat and/or Procurement Committee. The Secretariat will execute the certification and return the approved file to the same destinations previously listed.

Formal Contracts

(Superseding Notices of Awards)

The buyer will draw up a request for contract preparation and forward it to the legal assistant who prepares the formal contract and sends the required number of copies to the buyer. The latter then originates the JAG coordination sheet and that is transmitted through channels outlined above for other types of contracts.

The remainder of the action on this type of contract is identical with procedures above on routing to the Secretariat and Procurement Committee.

Forms 26&98 Contracts

(Superseding Notices of Award)

The PR, notice of contract obligation, copy of the completed notice of award, bids or quotations and all pertiment papers in the award file will be sent to the Advertising & Orders section for preparation of stencils on Form 26, Award, and mats on Form 98, Purchase Orders. If the award exceeds $250,000, the cover page will bear the following certification: "Award of this contract was approved by ..... on .....as required by DOI No. 70-3"

Subsequent procedures involving the JAG contract branch Secretariat, and Procurement Committee are the same as on other contracts.

Small Purchases Branch

($10,000 or less)

Assuming that your company has been chosen for the award, the buyer prepares the notice of contract obligation and procurement action report which are processed through channels as outlined above. The departure from procedures involved in other types of contracts begins when the notice is returned.

The buyer prepares a request for contracts and forwards it, with the PR, quotations and all pertinent papers to the Writing and Reproduction unit. The unit writes and reproduces enough copies of the contract to fulfill distribution needs. Copies of the notice are included in the contract file when it is received from the Accounting Division.

The contracts then are delivered to the contracting officer for review and, if proper, signature. He prepares a disposition form and forwards the complete file to Contract Distribution.

Your FCR

- **Facility Capability Report is good insurance.**
- **Your firm must square with it to get contract.**

One of the best two-way "insurance policies"—designed to protect you and the Air Force—on fulfilling terms of an Air Force contract is the Facility Capability Report (FCR) required in awarding contracts over $10,000.

In simple terms, it is a report that your plant is capable of meeting the required delivery schedule at the time the contract is awarded. Like plenty of other Air Force regulations, the FCR was born of much travail.

A buyer at AMC may know very good and well that your plant is equipped to produce—in accordance with delivery schedules—on a procurement on which you have submitted the low bid. What he doesn't know is how much outside work you may have scheduled in the form of prime or sub-contracts with other agencies or private industry. Awards have been made in the past only to find that production facilities were tied up—possibly during the interim between submitting the low bid and receiving the contract.

▶ **The Big Questions**—Therefore, with few exceptions, the buyer is required to obtain from your Air Procurement District some current facts on your status. In no case will figures more than 60 days old be accepted.

• **Is your firm able** to meet contractual obligations? Biggest factor is the basic one of your machine tools and equipment. Are they adequate to make the item to be procured? Then comes your production abilities. Is your present production schedule so heavy that any new demand would force you into an impossible struggle to produce the item? What new commitments do you anticipate during the lifetime of the pending contract? Another factor is your company's proven production record on past contracts. Is the proposed delivery schedule beyond your production means? What about availability of contractor-furnished material or components? Do you have the skilled labor necessary to fabricate precision parts?

• **What is your** current financial status? Are you capable of paying your own way during the lifetime of the proposed contract, or will you need help?

• **Are you a responsible bidder?** Again, past performances and your company's code of ethics will be scrutinized.

• **What percentage** of subcontracting is contemplated?

The internal AMC mechanics of the

FCR are simple. The buyer asks the proper Air Procurement District (APD) for answers to all the foregoing questions. The APD makes its check and sends the answers to the buyer. A five-day maximum time limit is specified, except where exceptional circumstances prevent and in those cases the APD must make an interim reply stating the reasons for the delay.

Where the answer to any of the questions is "No," the APD is compelled to say why.

In preparing the answers to the first question the APD has an option—where a "no" is submitted on ability to meet the delivery schedule—of suggesting a delivery schedule which your company can meet.

To the second question, the APD can answer yes, no or specify that your company can perform if financial assistance under terms of that provision are applied.

Complete explanations will be made by the APD in answering the third and fourth questions.

▶ **Sole Source Items**—If the item involved is classed as a "sole source" item and the APD has knowledge of other firms capable of manufacturing it, that information will be sent to the buyer.

After receiving a negative reply to the first question, the buyer may ask for a reconsideration by the APD or modify the delivery schedule to suit your company's capabilities.

Unqualified negative replies to the second question will be final. If, however, the APD has indicated that performance can be accomplished with financial assistance, the decision to award the contract will be cleared through the Financial Branch prior to execution.

Negative answers to the third question will be submitted to the Procurement Division chief for review and recommendations.

In general, the foregoing applies to formally advertised and negotiated procurements. Exceptions include purchases of continued technical services, purchases from the Federal Supply Schedules, technical data on items already in production, books, periodicals and magazines, off-the-shelf articles, basic mill-run items, foreign purchases, air transport service, purchases by the Small Purchase Branch and others of a minor nature.

Sureties for Bonds

Various types of bonds may be required of a contractor doing business with the Air Force.

In lieu of corporate or individual sureties on bonds, the contractor may furnish United States Bonds or Notes, certified or cashier's checks, bank drafts, money orders or currency.

Property Classes

For procurement and stocking purposes, the Air Force divides its property into various classes and sub-classes. Following is the complete classification list as of April, 1952.

- 01-A—Complete aircraft
- 01-W—Complete aircraft donations
- 01-Z—Complete ground instructional aircraft

Aircraft Parts

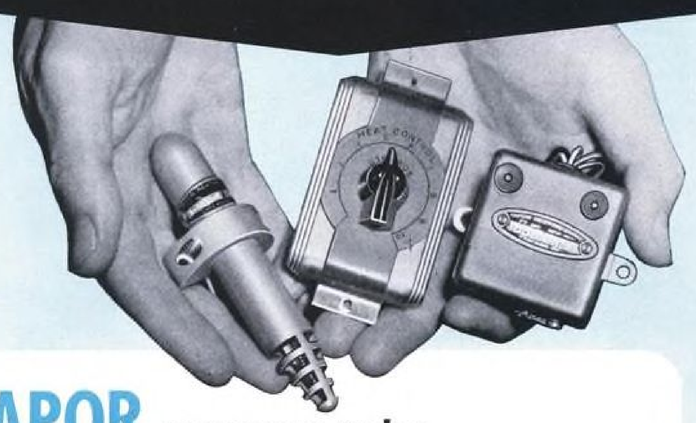
- 01-B—Consolidated-Vultee
- 01-C—Curtiss-Wright
- 01-D—Douglas
- 01-E—Northrop
- 01-F—Boeing
- 01-G—Hiller Helicopters
- 01-G—Piasecki Helicopter
- 01-G—Grumman
- 01-G—Texas Engineering
- 01-G—Superior
- 01-G—Noorduyn
- 01-G—DeHavilland
- 01-G—Chase
- 01-G—Waco (Aircraft)
- 01-H—Beech
- 01-I—Sikorsky
- 01-J—Waco (Glider)
- 01-K—Glenn L. Martin
- 01-L—Lockheed
- 01-M—North American
- 01-N—Republic
- 01-R—Fairchild
- 01-S—Cessna
- 01-T—Bell
- 01-U—Aeronca
- 01-U—Piper
- 01-U—Taylorcraft

Aircraft Engines and Parts

- 02-A—Complete aircraft engines
- 02-B—Auxiliary aircraft engines
- 02-C—Continental
- 02-D—Wright
- 02-E—Lycoming
- 02-G—Jacobs
- 02-H—Pratt & Whitney
- 02-I—Allison
- 02-J—Packard (Rolls-Royce)
- 02-P—Aircooled motors
- 02-Q—General Electric
- 02-R—Westinghouse
- 03-A—Propellers and parts
- 03-B—Wheels, brakes, skis, floats and parts
- 03-C—Aircraft electrical equip.
- 03-D—Aircraft carburetors & parts
- 03-E—Turbosuperchargers & parts
- 03-F—Miscellaneous aircraft accessories & parts
- 03-G—Hydraulic struts, cyls. & parts
- 03-H—Aircraft ignition systems & parts
- 03-I—Aircraft fuel, hyd., vac., oil, deicer sys.
- 03-J—Miscellaneous engine accessories & parts
- 03-K—Aircraft oxygen equip. & parts
- 03-L—Aircraft aux. fuel tanks, parts
- 03-M—Transmission system parts, rotary wing aircraft
- 04-B—Rubber materials
- 04-C—Rubber casings, tires & tubes
- 04-D—Antifriction bearings & parts
- 05-A—Aircraft nav. instr. & parts
- 05-C—Aircraft flight instr. & parts
- 05-D—Aircraft engines instr. & parts
- 05-E—Aircraft & training aids instruments standard parts
- 05-F—Automatic pilot, gyro control & parts
- 05-G—Miscellaneous aircraft instruments & parts
- 05-H—Training aids instruments & parts
- 05-I—Electrical meters & parts
- 06-A—Aircraft engine fuels & oils
- 06-B—Lubricants, compounds, gases & cylinders
- 07—Dopes, paints & cleaning compounds
- 08-A—Commercial electrical equip. & parts
- 08-B—Commercial electrical supplies
- 08-C—Electrical terminals & terminal boards
- 08-D—Flying field night lighting equip. & parts
- 08-E—Electrical connectors & parts
- 08-F—Electrical wire and cable
- 08-G—Lamps and fuses
- 09-A—Man-carrying, power driven aerial targets
- 09-B—Guided missiles & parts
- 09-C—Gliders

Here's all it takes...

to accurately regulate cabin temperature in civilian aircraft with gasoline heaters



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2. Unaffected by altitude changes.
3. Sealed against moisture, dust, and all other foreign matter.
4. Pulses down to every ½-second to assure pin-point control.
5. Never fatigues—maintains high accuracy indefinitely.
6. No periodic adjustments needed.
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8. Easy to install. Simply mount components, and connect the wiring as directed.

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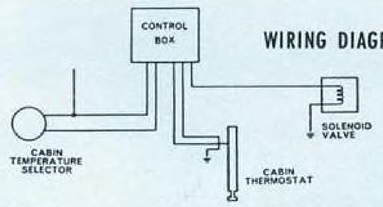
Aircraft Distributors: mail coupon for sales and installation data.

Nothing can match a thermometer for accurate simplicity



WIRING DIAGRAM

VAPOR HEATING CORPORATION

80 EAST JACKSON BOULEVARD • CHICAGO 4, ILLINOIS

New York • St. Paul • Denver • St. Louis • Cleveland • Washington • Philadelphia
San Francisco • Los Angeles • Portland • Jacksonville • Richmond • Houston • Montreal

VAPOR HEATING CORPORATION, 80 EAST JACKSON BLVD., CHICAGO 4, ILLINOIS

Please send me complete information on Vapor Mercury-Tube Thermostatic Control for civilian aircraft.

COMPANY_____

INDIVIDUAL_____ TITLE_____

ADDRESS_____

CITY_____ STATE_____

- 09-D—Atomic special weapons equip. & parts
- 10-A—Photographic aerial equip. & parts
- 10-B—Photographic ground equip. & parts
- 10-C—Photographic supplies
- 10-D—Motion picture equip. & parts
- 11-A—Bombing equip., accessories & parts
- 11-B—Gunnery equip. accessories & parts
- 11-D—Locally controlled aircraft turrets & parts
- 11-E—Remote controlled aircraft gunnery fire systems & parts
- 12—Fuel & oil handling equip.
- 13-A—Special purpose clothing
- 13-B—Military uniforms, male
- 13-C—Personal equipage
- 13-D—Footwear, male
- 13-E—Military uniforms, female
- 13-F—Footwear, female
- 13-H—Insignia, decorations & badges
- 15—One-time modification kits
- 16-A—Airborne radio communications equip. & parts
- 16-B—Ground navigational equip. & parts
- 16-C—Ground radar equip. & parts
- 16-F—Radio crystals
- 16-G—Ground radio & radar equip., complete, ground instruction
- 16-H—Meteorological equip. supplies & parts
- 16-I—Installation parts for ground communications & electrical equipment
- 16-K—Airborne radar equip. & parts
- 16-L—Telegraph, teletype-writer and facsimile equip. & parts
- 16-M—Ground radio communications equip. & parts
- 16-N—Telephone & wired audio equip. & parts
- 16-O—Capacitors
- 16-P—Coils & transformers
- 16-Q—Resistors
- 16-R—Switches, circuit breakers & parts
- 16-S—Vacuum tubes and parts
- 16-T—Relays, contactors, solenoids & parts
- 16-U—Electrical insulators, knobs & dials
- 17-A—Shop machinery, accessories & parts
- 17-B—Hand tools, edge, non-powered
- 17-C—Laboratory & shop test, inspection equip. & parts
- 17-D—Assembled tool kits
- 17-E—Production tooling acquired by USAF
- 17-F—Shop equip. & parts
- 17-G—Hand tools, non-edge, non-powered
- 17-H—Craftman's measuring tools
- 17-I—Abrasives & abrasive materials
- 18-A—Specialized engine tools & equip.
- 18-B—Airframe & propeller specialized tools & equip.

Split-Second Visibility...

Instrument Panels

No Light-to-Dark "Blackout" with

FELSENTHAL

Qualified Producers Under
USAF—Navy Aero. Stds. Grp.
MIL-P-7788 Formerly AN-P-89

Felsenthal engineering and ingenuity, well-known—in war years and peace years—for aircraft equipment and special installations, again mark a rapid advance:—This time, in instrument panels with features that set them far ahead in pilot efficiency and safety.

Our Special Process Guarantees:

1. **White won't discolor — maximum color contrast, day or night.**
2. **Ease of cleaning, due to flat, etch-free surfaces.**
3. **Economical tooling, making unexpected changes comparatively simple — mass production step-up without additional tool cost.**
4. **Prices as low or lower than similar panels currently available.**

Our service includes a complete light testing laboratory with the same equipment as used in the Bureau of Standards in Washington—we *furnish complete light test reports.*

Knob-skirt assemblies can be furnished from stock, or to specification.

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INJECTION MOLDING • FABRICATING • COMPLETE ASSEMBLY

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- 18-C—Armament & communications specialized tools & equip.
- 18-D—Miscellaneous specialized tools & equip.
- 19-A—Flying field & hangar equip.
- 19-D—Marine equip. & parts
- 19-E—Maintenance parts for subclasses 19-A, -F, & -G equip.
- 19-F—Generator sets
- 19-G—Materials handling equip.
- 20-A—Tailored paulins & covers
- 20-B—Survival equip. & parachutes
- 21-A—Textiles, leather, fur & cordage
- 21-B—Notions & findings
- 22—Lumber & lumber products
- 23-A—Metals, ferrous and nonferrous
- 23-B—Composition materials
- 24—Chemicals
- 25-A—Office equip. & parts
- 25-B—Office supplies
- 26—School equip., war devices & trophies
- 28-A—Instrument flying, landing & navigation trainers & parts
- 28-B—Bombing & gunnery training aids & identification material
- 28-C—Misc. training devices & parts
- 28-D—Radar & radio trainers, equip. & parts
- 28-E—Training film slides, strips, recordings, etc.
- 29-A—Fittings, hose, pipe & tube
- 29-B—Bolts, screws, studs, nuts, washers & hdwe.
- 29-C—Nails, keys & pins
- 29-D—Gaskets & oil seals
- 29-E—Valves
- 29-F—Pulleys, gears, drive belts & drive chains
- 29-G—General line hardware
- 29-H—Rivets
- 29-I—Cable & chains
- 30-A—Department of Army and Air Force publications
- 30-B—Technical orders & other technical publications
- 30-C—Drawings & microfilms
- 30-D—Commercial technical books, periodicals & catalogs
- 30-F—Blank forms
- 30-G—Posters, charts & miscellaneous publications
- 30-J—Specifications
- 30-M—Decalcomanias
- 31—Special technical intelligence equip. & material
- 32—Museum & historical equip.
- 33-A—Printing, offset, binding equip. & parts
- 34-A—Air conditioning, refrigerating equip. & parts
- 34-B—Heating, ventilating, plumbing, steam equip. & parts
- 35—Assist take-off units
- 36—Musical instruments, accessories, parts & supplies
- 37—Athletic & recreation equip. & supplies
- 38—Time keeping, navigational computing, optical inst. & parts
- 39-A—Weapon emplacement equip. & parts
- 39-B—Ammunition & parts
- 39-C—Hazard-detecting, decontaminating, impregnating equip.
- 40-A—Furniture & fixtures
- 40-B—Furnishings
- 43—Packaging materials
- 50-A—Spec. designed motor vehicles
- 50-B—Runway & road clearing & cleaning equip.
- 50-C—Fire trucks & fire trailers
- 50-D—Industrial trucks, tractors & trailers
- 50-E—Materials handling cranes, derricks, self propelled equip.
- 50-F—Passenger motor vehicles
- 50-G—Motorcycles, bicycles & scooters
- 50-H—Cargo trucks & truck-tractors
- 50-I—General purpose trailers
- 50-J—Specially designed trailers
- 50-K—Crane, shovel basic & complete units
- 50-L—Crane & shovel attachments
- 50-M—Runway & road construction & repair equip.
- 50-N—Earth moving & excavating equip.
- 50-O—Mining, rock drilling, earth boring equip.
- 50-P—Tractors, tracklaying
- 50-Q—Tractors, wheeled
- 50-R—Truck & tractor attachments
- 51-A—Complete engines (except aircraft) & parts
- 51-H—Engine electrical systems & parts
- 51-I—Engine fuel system access. & parts
- 51-J—Engine air & oil filters, strainers, cleaners & parts
- 51-K—Engine cooling & exhaust sys. & parts
- 52-A—Vehicular cab, body, frame assy. & parts
- 52-B—Vehicular power transmission assy. & parts
- 52-C—Vehicular brake, steering, tread assy. & parts
- 52-D—Vehicular type accessories & parts
- 52-E—Special purpose vehicular fuel servicing equip. & parts
- 52-F—Special purpose vehicular fire equip. & parts
- 52-G—Miscellaneous special purpose vehicular equip. & parts
- 52-H—Special purpose crane, construction, road equip. & parts
- 56—Subsistence
- 58—Railroad equip. & parts
- 59—Building materials
- 62—Chaplain equip. & supplies
- 63—Flags, bunting & insignia
- 64—Mess hall & baking equip. & parts
- 66—Laundry & dry cleaning equip. & parts
- 67—Forage & seed
- 68—Live animals
- 69—Animal equip. & supplies
- 70—Agricultural equip., implements and parts
- 72—Mortuary equip. & supplies

New CRO

- **Changed setup to save lots of steps and time.**
- **No passes now needed to get to bid openings.**

Contractors Relations Office—port of call for thousands of current and prospective Air Force contractors—is scheduled to be moved to an addition to the Reception Center at Area B, Wright-Patterson AFB.

The move, scheduled for Aug. 1, is designed to facilitate the flow of contractors and representatives into the various Air Materiel Command buying sections and Wright Air Development Center laboratories.

Under the previous arrangement, contractors or their agents entered Area B through the reception center, after filling out identification passes, and proceeded to CRO, then located in Bldg. 15 across the street. In some cases, visitors needed only to scan boards on which were posted information on formally advertised and negotiated bids of an unclassified nature. Appointments with AMC buyers and WADC project engineers frequently were not needed as the information could be obtained by telephone from the bid room.

▶ **Traffic Jams**—The necessity for filling out a pass remained, however, and since the Korean outbreak it has caused a large number of "traffic jams" in the Reception Center.

Under the proposed new arrangement, visitors can enter the regular Reception Center entrance—which remains unchanged—and immediately adjacent thereto will be the CRO bid room. All the information previously available on proposed new procurements, contract awards, appointment services and telephones will be available in the new annex.

It won't be necessary to fill out a pass to get to bid openings. These openings are in the Reception Center and identification passes are not necessary to attend them.

The new building was planned in October, 1950 by Maj. Gen. Mark E. Bradley, Jr., director of procurement and production, when the influx of visitors after the Korean outbreak made existing facilities inadequate.

▶ **Before Korea**—For example, an average of 80 appointments a day was made during the six months prior to Korea. After the outbreak, manufacturers swarming into Wright-Patterson AFB from all sections of the country broke all existing appointment records, with the one-day peak of 417 appointments

being recorded in January, 1951.

Figures for the first six months of 1952, released by Capt. Parke H. Tamplin, CRO chief, reveal an average of 142 a day.

The CRO plant at Wright-Patterson AFB is expected to be duplicated at Air Force specialized depots under the decentralization program. All of the facilities currently available to the public at CRO here will be found at the depots, although physical locations may be tailored to fit requirements at the individual depot.

It also has been announced that procurement information, originating in the depots, consisting of copies of IFB's and RFP's will be posted in all the depots and Air Procurement District and Regional offices.

AMC Codes

One of the most baffling features at first glance of the AMC behemoth are the addresses you find in telephone books, organization charts and literature about the command. But actually, there is very simple logic and orderliness to an address such as MCF "A" B262 P2015 that you will find on the master AMC chart on page 83.

From right to left, it means Post 2015, Building 262, Area A, and the code symbol is M for Materiel, C for Command and F for Information. AMC's buildings are so enormous and cut into so many huge bays that it is impossible in most cases to number offices in an orderly sequence. Therefore, AMC numbers the posts or pillars. In the illustration above, it is Post 015 on the second floor. All of the buildings in each of the main areas, A, B and C are numbered to make finding a particular office or post easier.

For mailing purposes, the code symbol is all-important.

Once you get on to it, the code is simple. For AMC offices, it always begins with MC (Wright Air Development Center's code begins with WC). Then follows the symbol for the top office or directorate, such as C for Comptroller's Office, P for Directorate of Procurement and Production, S for Directorate of Supply and Services. The last letter may be followed by a number, such as MC PPRR-5, which means the fifth section or unit in the branch.

Following is a list of symbols for the main organizations within AMC.

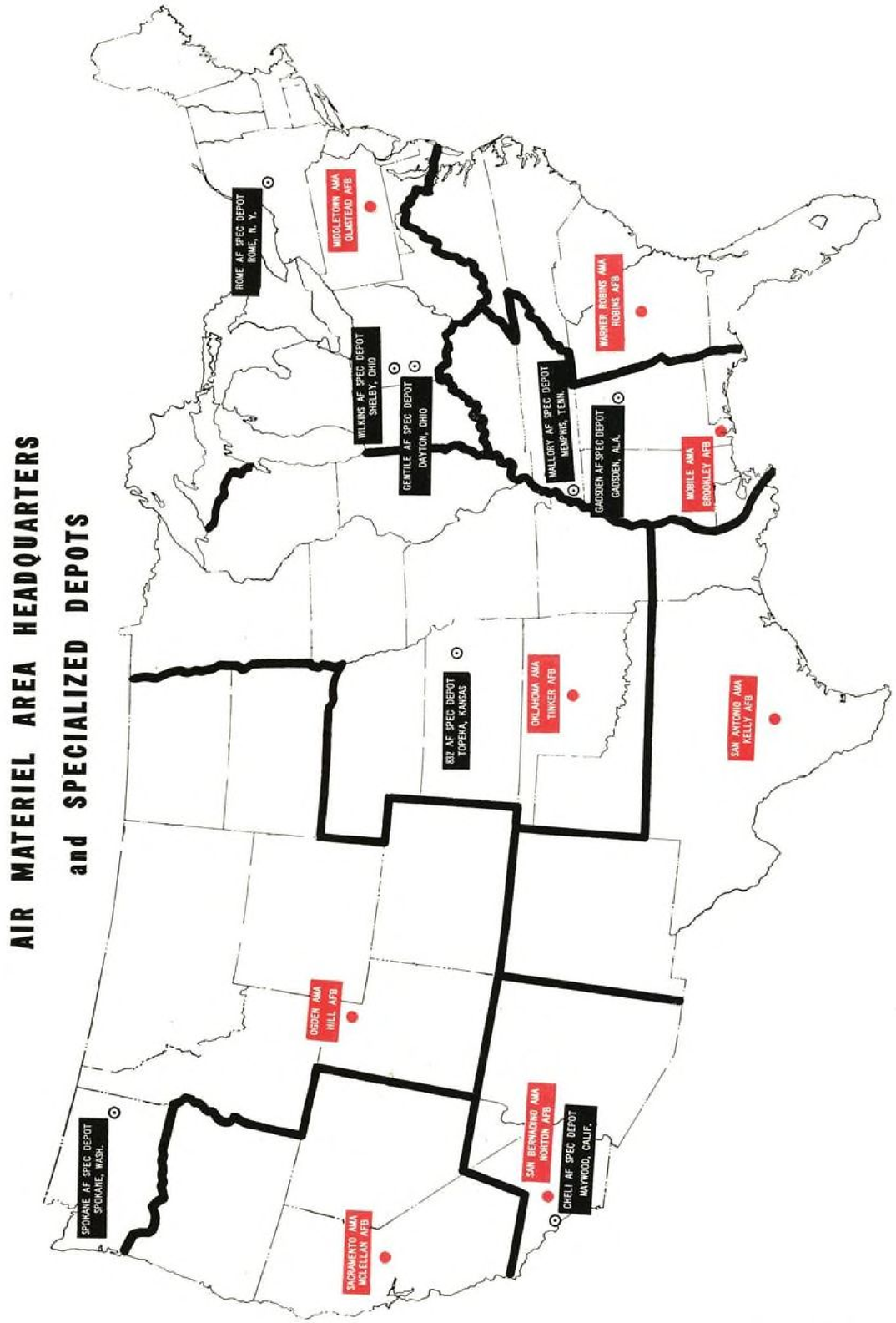
Commanding General	MCG
Deputy Commanding General	MCG
Adm. Management Division	MCGA
Command Support, Director of	MCH
Comptroller	MCC
Inspector Generals Office	MCE
Judge Advocates Office	MCJ
Personnel & Training, Director of	MCA
Procurement & Production Director of	MCP

Deputy Director for Field Operations	MCPF
Administration & Operations Office	MCPA
Adm. Services Branch	MCPAXA
Civ. Pers. Liaison Branch	MCPAXL
Contractors Relations Branch	MCPAXC
Contractors Liaison Sec.	MCPAXC
Industrial Relations Sec.	MCPAXC
Manpower & Budget Branch	MCPAXB
Policies & Procedures Branch	MCPAXP
Procurement Section	MCPAXP
Production Section	MCPAXP
Printing & Forms Control Section	MCPAXP
Reports Control Section	MCPAXP
Executive Office	MCPE
Executive for Coordinated Procurement	MCPE
Small Business Office	MCPE
Field Operations Office	MCPO
Deputy Chief	MCPO
Contract Service Branch	MCPOXC
Industrial Property Accounts Br.	MCPOXI
Office of Inspection	MCPI
Office of Procurement Committee	MCPC
Plans & Programs Office	MCPZ
Deputy Chief	MCPZ
Administration Office	MCPZ
Program Room	MCPZ
Budget Branch	MCPZXB
Budget Preparation Sec.	MCPZXB
Funds Control Section	MCPZXB
GFP Budget Data Section	MCPZXB
Production Analysis Branch	MCPZXP
Reports Section	MCPZXP
Programs Branch	MCPZXR
Programs Control Section	MCPZXR
Programs Plans Section	MCPZXR
Program Status Section	MCPZXR
Industrial Resources Division	MCPB
Information	MCPBXA
Assistant Chief	MCPBA
Asst. to the Chief	MCPBB
Deputy Chief	MCPBD
Administration Office	MCPBXA
Industrial Liaison	MCPBXA
Components & Equipment Branch	MCPBXD
Bearing & Gear Sec.	MCPBXD
Component Accessories Sec.	MCPBXD
Electronic & Instrument Sec.	MCPBXD
Ground & Deck Equipment Sec.	MCPBXD
Mechanical Component Sec.	MCPBXD
Controlled Materials Plan Br.	MCPBXL
Allotment Sec.	MCPBXL
Audit Sec.	MCPBXL
Records & Services Sec.	MCPBXL
Industrial Equipment Branch	MCPBXE
Inventories Control Sec.	MCPBXE
Programs Section	MCPBXE
Storage & Mtce. Section	MCPBXE
Industrial Facilities Branch	MCPBXF
Facilities Contract Section	MCPBXF
Facilities Expansion Section	MCPBXF
Priorities & Certification Sec.	MCPBXF
Real Estate & Construction Sec.	MCPBXF
Industrial Manpower Branch	MCPBXM
Industrial Relations Section	MCPBXM
Labor Utilization Section	MCPBXM
Requirements & Availability Sec.	MCPBXM
Selective Serv. & Manpower Sec.	MCPBXM
Industrial Planning Branch	MCPBXP
Aero & Ground Equip. Section	MCPBXP
Airframes, Engines & Guided Missiles Sec.	MCPBXP

Armament, Propeller & Strut Sec.	MCPBXP
Electronics Section	MCPBXP
Production Allocation & Industry Defense Sec.	MCPBXP
Resources Planning Sec.	MCPBXP
Industrial Services Section	MCPBXS
Fabrication & Substitute Materials Sec.	MCPBXS
Heavy Industries Prod. Section	MCPBXS
Machine Tool Methods Section	MCPBXS
Producibility & Tooling Utilization Sec.	MCPBXS
Utility & Transportation Sec.	MCPBXS
Materials Branch	MCPBXC
Conservation Section	MCPBXC
Control & Procedures Section	MCPBXC
Ferrous Metals Section	MCPBXC
Non-Ferrous Metals Section	MCPBXC
Non-Metallic Section	MCPBXC
Plans & Operations Office	MCPBXB
Budget Section	MCPBXB
Operations Section	MCPBXB
Plans Section	MCPBXB
Statistics & Analysis Section	MCPBXB
Requirements Branch	MCPBXR
Components Computation Section	MCPBXR
Electronics Section	MCPBXR
Materials Computation Section	MCPBXR
Requirements Research Section	MCPBXR
Procurement Division	MCPP
Information	MCPAXC
Deputy Chief	MCPPD
Deputy for Operations	MCPPE
Procurement Consultants	MCPP
Purchase Survey Board	MCPP
SECRETARIAT	MCPPXC
Administration Office	MCPPXH
Administrative Services Branch	MCPPXH
Mail Branch	MCPPXH
Plans & Operations Office	MCPPXO
Analysis & Reports Branch	MCPPXO
Local Purchase Branch	MCPPXO
Pricing Branch	MCPPXO
Forward Pricing Unit	MCPPXO
Initial Pricing Unit	MCPPXO
Insurance Unit	MCPPXO
Policy & Coordination Unit	MCPPXO
Procurement Planning & Control Office	MCPPXB
Administration Office	MCPPXB
Operations Office	MCPPXB
Distribution Section	MCPPXB
Accessories Unit	MCPPXB
Armament Unit	MCPPXB
Coordination Unit	MCPPXB
Electronics Unit	MCPPXB
Power Plant Unit	MCPPXB
Planning Section	MCPPXB
A/C & Missiles Unit	MCPPXB
Computation Unit	MCPPXB
GFP Unit	MCPPXB
Programs Analysis Section	MCPPXB
Configuration Control Unit	MCPPXB
GFAE Planning & Procurement Publications Unit	MCPPXB
Requirements Control Section	MCPPXB
Accessories Unit	MCPPXB
Armament & Photo Unit	MCPPXB
Electronics Unit	MCPPXB
Power Plant & Prop Unit	MCPPXB
Aircraft Subdivision	MCPPA
Aeronautical Equip. Branch	MCPPAE
Information	MCPPAE
Assistant Chief	MCPPAE
Procurement Assistant	MCPPAE
Production Assistant	MCPPAE

Administration Office	MCPPAE
Handbook Data Office	MCPPAE
Legal Office	MCPPAE
Operations Office	MCPPAE
Aero Equipment Control	MCPPAE
Accessories Section	MCPPAE
Auto Pilot & Navigation Instruments Unit	MCPPAE
Electrical Unit	MCPPAE
Engine Instruments Unit	MCPPAE
Flight Instruments Unit	MCPPAE
Mechanical Unit	MCPPAE
Miscellaneous Unit	MCPPAE
Power Plant Section	MCPPAE
Accessories Unit	MCPPAE
Jet Engines Unit	MCPPAE
Piston Engines Unit	MCPPAE
Propeller Unit	MCPPAE
Aircraft Branch	MCPPAA
Information	MCPPAA
Administrative Assistant	MCPPAA
Administration Office	MCPPAA
Bombardment Section	MCPPAA
B-36 Unit	MCPPAA
B-47 Unit	MCPPAA
B-50 Unit	MCPPAA
B-52 Unit	MCPPAA
B-57 Unit	MCPPAA
RS-66 Unit	MCPPAA
Fighter Section	MCPPAA
F-80-94A Unit	MCPPAA
F-84 Unit	MCPPAA
F-86-100 A Unit	MCPPAA
F-89 Unit	MCPPAA
F-101 & 102 Unit	MCPPAA
Rotary Wing & Liaison Sec.	MCPPAA
Liaison Unit	MCPPAA
Rotary Wing Unit	MCPPAA
Training & Transport Sec.	MCPPAA
Assault Transport Unit	MCPPAA
Heavy Transport Unit	MCPPAA
Medium Transport Unit	MCPPAA
Trainer Unit	MCPPAA
Electronics Branch	MCPPAR
Information	MCPPAR
Assistant Chief	MCPPAR
Procurement Ass't	MCPPAR
Production Office	MCPPAR
Armament Section	MCPPAR
Communications Section	MCPPAR
Guided Missile Branch	MCPPAD
Air Launched Section	MCPPAD
Surface Launched Section	MCPPAD
Training Aids Section	MCPPAD
Materiel & Modification Subdiv	MCPPM
Office of the Chief	MCPPM
Deputy Chief	MCPPM
Airlines & Modification Branch	MMCPPM
Information	MCPPMM
Assistant Chief	MCPPMM
Airlines Section	MCPPMM
Aircraft Unit	MCPPMM
Airlines Unit	MCPPMM
Property Unit	MCPPMM
Maintenance Section	MCPPMM
Aircraft Unit	MCPPMM
Engine & Misc. Mtce	MCPPMM
Modification Section	MCPPMM
Bomber Unit	MCPPMM
Cargo Unit	MCPPMM
Fighter Unit	MCPPMM
Spares Section	MCPPMM
Airframes Spares Team	MCPPMM
Misc. Spares Team	MCPPMM
Materiel Branch	MCPPMG
Assistant Chief	MCPPMG
Procurement Assistant	MCPPMG
Special Projects Officer	MCPPMG
Equipment Section	MCPPMG
Electrical Unit	MCPPMG
Ground Equipment Unit	MCPPMG
Publications & Data Unit	MCPPMG
Test Equipment Unit	MCPPMG
Tools Unit	MCPPMG
Vehicle & Marine Unit	MCPPMG
Materials Section	MCPPMG
Chemical Unit	MCPPMG
Fabrics & Clothing Unit	MCPPMG
Hardware Unit	MCPPMG
Metals & Plastics Unit	MCPPMG
Office Equip. & Supplies Unit	MCPPMG
Survival Equipment Unit	MCPPMG
Photographic Section	MCPPMG
Cameras & Equipment Unit	MCPPMG
Film & Paper Unit	MCPPMG
Motion Picture Unit	MCPPMG
Services Section	MCPPMG
Misc. Services Unit	MCPPMG
Test Facilities & Mtce Unit	MCPPMG
Training & Professional Services Unit	MCPPMG
Small Purchases Section	MCPPMG
Equipment Unit	MCPPMG
Materials & Accessories Unit	MCPPMG
Writing & Reproduction Unit	MCPPMG
Research & Development Subdiv.	MCPPR
Information	MCPPR
Assistant to Chief	MCPPR
Procurement Assistant	MCPPR
Aeronautics Branch	MCPPRF
Information	MCPPRF
Assistant Chief	MCPPRF
Power Plant Section	MCPPRF
Propeller Section	MCPPRF
Research Branch	MCPPRR
Information	MCPPRR
Assistant Chief	MCPPRR
Aero Medical Section	MCPPRR
Flight Research Section	MCPPRR
Materials Section	MCPPRR
Weapons Components Branch	MCPPRC
Information	MCPPRC
Assistant Chief	MCPPRC
Procurement Assistant	MCPPRC
Aircraft Radiation Section	MCPPRC
Armament Section	MCPPRC
Communication & Navigation Sec.	MCPPRC
Components & Systems Section	MCPPRC
Equipment Section	MCPPRC
Weapons Systems Branch	MCPPRS
Information	MCPPRS
Assistant Chief	MCPPRS
Aircraft Section	MCPPRS
Climatic Project Section	MCPPRS
Guided Missiles Section	MCPPRS
Special Weapons Section	MCPPRS
Service Subdivision	MCPPS
Foreign Procurement Branch	MCPPSQ
European Section	MCPPSQ
Far East Section	MCPPSQ
Readjustment Branch	MCPPSR
Information	MCPPSR
Legal Assistant	MCPPSR
Plant Clearance Section	MCPPSR
Classification & Supply Requirements Unit	MCPPSR
Field Service Unit	MCPPSR
Industrial Property Screening Unit	MCPPSR
Settlement & Review Sec.	MCPPSR
Claims Unit	MCPPSR
Renegotiation Unit	MCPPSR
Settlement & Field Service Unit	MCPPSR
Terminations Section	MCPPSR
Bonds Unit	MCPPSR

Records & Reports Unit	MCPPSR
Termination Unit	MCPPSR
Services Branch	MCPPSS
Information	MCPPSS
Contract Writing Unit	MCPPSS
Distribution Unit	MCPPSS
Invitation Unit	MCPPSS
Purchase Request Control Unit	MCPPSS
Bailment Section	MCPPSS
Bonds & Insurance Section	MCPPSS
Insurance Unit	MCPPSS
Contract Dist. & Files Sec.	NCPPSS
Assistant Chief	MCPPSS
Classified Files Unit	MCPPSS
Contract Files, Chief	NCPPSS
Contract & Purchase Order information	MCPPSS
Distribution & Processing Unit	MCPPSS
Financial Section	MCPPSS
Contract Financing Unit	MCPPSS
Corporate Analysis Unit	MCPPSS
Financial Clearance Unit	MCPPSS
Financial Info. Unit	MCPPSS
Liaison Unit	MCPPSS
Organization & Methods Examiners Unit	MCPPSS
Procurement Records & Reports Section	MCPPSS
Assistant Chief	MCPPSS
Committment & Obligation Unit	MCPPSS
Contract Reporting Unit	MCPPSS
Contract Status Unit	MCPPSS
GFP Pricing Unit	MCPPSS
PR & Contract Info Unit	MCPPSS
PR & MIPR Control	MCPPSS
Procurement Action Unit	MCPPSS
Procurement Sources Section	MCPPSS
Assistant Chief	MCPPSS
Interview & Correspondence Unit	MCPPSS
Operation & Mtce. of Bidders List	MCPPSS
Production Division	MCPR
Quality Control Division	MCPL
Information	MCPLXB
Deputy Chief	MCPLD
Administration Office	MCPLXB
Plans & Operations Office	MCPLXP
Plans Section	MCPLXP
Operating Section	MCPLXP
Training Coordination Sec.	MCPLXP
Statistical Quality Ctl. Office	MCPLXC
Aeronautical Equipment Branch	MCPLXE
Materials Section	MCPLXE
Mechanical Section	MCPLXE
Propulsion Section	MCPLXE
Aircraft Branch	MCPLXA
Airlines & Mtce. Section	MCPLXA
Bombardment Section	MCPLXA
Fighter Section	MCPLXA
Training & Transport Section	MCPLXA
Fuels, Lubricants & Chemicals Branch	MCPLXF
Fuels Section	MCPLXF
Laboratories Section	MCPLXF
Products Inspection Section	MCPLXF
Technical Methods Branch	MCPLXS
Materials & Processes Section	MCPLXS
Packaging Section	MCPLXS
Tool & Gage Section	MCPLXS
Weapons Systems & Components Branch	MCPLXW
Armament Section	MCPLXW
Electronics Section	MCPLXW
Guided Missiles Section	MCPLXW
Instrument Section	MCPLXW
Maintenance Engineering, Director of	MCM
Supply & Services, Director of	MCS



DECENTRALIZATION

Will Decentralized Buying Work?

- **AMC says it can be done, and must be done, despite problems, for greater operating efficiency, economy.**
- **But contractors are not too happy about the program; they think it will mean more lost time and delays.**

At the half-way point in decentralizing Air Materiel Command functions, the program still is the center of controversy as the most practical method of purchasing Air Force material.

Involved are AMC top management, employes scheduled to be transferred to Air Force specialized depots, and manufacturers doing business with the Air Force.

Details of the program were announced by AMC in April. The announcement indicated that certain units in Supply Requirements, Maintenance, and Procurement would be farmed out to various AF depots and Air Materiel areas (see facing-map). Exempt from being moved were airframe, engine, propeller and Government Furnished Equipment (GFE) including major electronic devices. AMC mapped out the schedule of new locations (page 93) and the functions which would be carried out at the depots.

Internally, employes of units to be moved were given options on being assigned to the decentralized unit, transferring to other positions at Wright-Patterson AFB for which they were qualified, resigning, or being separated from government service.

▶ **The Reasons**—Operational economy and efficiency were cited by AMC as being the basic motive for the program. Lesser factors were lack of adequate space at Wright-Patterson AFB, traffic problems, a housing shortage in Dayton and surrounding communities and an awesome amount of correspondence required under the old program of keeping the AMC operation under one roof.

Unstated officially, but nevertheless real is another major reason for the decentralization: strategic considerations. AMC at Dayton is the heart of the Air Force, pumping logistics blood to the operational commands. This heart is concentrated in an 11½-sq.-mi. area. It is susceptible to both sabotage and direct attack.

That concentration of all Air Force materiel records and operations has been a source of uneasiness among top AF officers for some time. Decentralization, of course, will not be the entire answer because the control over the operations will still be lodged at Wright-Patterson Air Force Base. But decentralization will relieve some of the worry of Air Force planners.

In its initial stages, decentralization will save little if any money. AMC will have to reckon with training costs and, eventually, perhaps just as many people in procurement jobs as it has now. The all-important difference is that those people will not be at AMC headquarters.

▶ **Half-and-Half**—Personnel-wise, the move has been somewhat less than a howling success. AMC figures reveal that a fraction less than 46% of employes holding positions in decentralized operations have accompanied their positions to specialized depots. The exact figures are 475 leaving to take up their duties at new stations, 485 being transferred to other jobs at Wright-Patterson AFB, 44 resignations and 34 separations from government service. The 1,038 positions already moved represents approximately half of the anticipated total of 2,000 scheduled for decentralization by the end of 1952, AMC said.

Family and/or property ties are the biggest reasons for employes declining to leave Dayton and vicinity. A large factor for colored employes is a reluctance to transfer below the Mason-Dixon line. Still another large factor is the feeling among employes that depots, being lower echelon installations, will have generally lower salary scales than are to be found at AMC headquarters.

▶ **Same Work, Same Pay**—In reassurance, Lt. Gen. E. W. Rawlings, AMC commanding general, issued a statement declaring there will be no general down-grading among employes. Furthermore, the general stated, the chances for up-grading at the depots will be exactly the same as at Wright-Patterson AFB.

Gen. Rawlings pointed out that, since the entire function is being transferred, its importance remains the same regardless of location. He declared down-grading—as a direct result of decentralization—is out of the question.

▶ **Training Program**—The nearly 50%

of employes who have refused to move causes AMC's biggest headache in the decentralization program. For they have to be replaced. Ordinarily it would take years to inculcate in the new people the know-how possessed by the old AMC hands who are not moving. But AMC has set up a course for buyers and contracting officers that may be surprisingly effective.

Sixty-day training classes began July 7. A new publication, "Air Force Buyer's Handbook," written by an outside firm, is the textbook for the class. Not only is it all-embracing as far as procurement procedures and practices are concerned; it is written in common sense style with a wealth of down-to-earth advice. In discussing negotiation of contracts, for example, the Handbook says:

"If the contractor is unable to supply both government and commercial customers, as a general rule he will be unwilling to accept government business. . . ."

"If he (the contractor) thinks government work will help his competitors or new concerns he likely will seek government business to forestall competition. . . ."

"The buyer should take advantage of terms strongly desired by the contractor in order to improve his own bargaining position. . . ."

"The quickest way to reach an agreement is to avoid argument with the contractor. . . ."

AMC hopes that such distillation of wisdom acquired the hard way through years of bargaining will enable the new buyers to start off with far more seasoning than normally could be expected.

▶ **Any "Bad Apples?"**—There is one other danger in the decentralization program, but AMC officials insist it is more potential than probable, and they offer good supporting reasons. The danger is "irregularities."

Observers point out to officials directing decentralization that procurement irregularities occurred among veteran AMC personnel, men whose past had been impeccable enough to furnish grounds for trust. Now AMC is hiring perhaps several hundred new buyers whose integrity has not been exposed to the temptations occasionally facing AMC buyers.

Will these new men measure up to AMC standards? If they don't, won't they be harder to detect because they will be so far from headquarters? AMC officials answer "yes" to the first question, "no" to the second.

In effect, they say, people are people. Among the approximately 35,000 AMC headquarters personnel, a very small fraction of 1% proved unworthy of the trust placed in them. There is no reason the percentage of untrustworthy individuals should be any higher farther from AMC headquarters.

And if any of the new buyers do turn out to be "bad apples," it will be easier —not more difficult—to detect them. One reason procurement irregularities at headquarters went undetected for so long, officials says, was because there were too many people to be policed effectively. A bad actor in a small group is far more apparent.

▶ **The Outside View**—Air Force contractors, generally speaking, are not too happy with the decentralization program. They figure it will increase their administrative and liaison expenses. Perhaps the hard core of reasoning behind this is that an estimated 90% of Air Force procurement dollars will continue to be obligated at Wright-Patterson AFB. That's the volume to be expended on airframes, engines, propellers and GFE, no matter what size the current arms budget.

However, an anticipated 90% of AMC contracts will be processed at the depots when procurement is scattered around on a schedule to begin Aug. 15.

Contractors wise in the ways of correspondence with AMC on contracts are apprehensive about the inevitable time delays attendant to shuttling paperwork from depots to Wright-Patterson AFB—and this is only a secondary basis for their dismay.

Primarily, they feel that any separation of procurement and engineering functions is a cinch to result in much lost time on any contract for an item subject to even minor engineering changes. Constant striving to improve equipment renders engineering and design changes practically the rule of the day on most of the Air Force equipment being supplied today.

These same contractors are quick to emphasize that—with procurement and project engineers presently housed in the same area at Wright-Patterson AFB —there is much lost time in shuttling paperwork between buyers and project officers. Many shudder to contemplate the potential time loss when procurement is shifted several hundred miles away, instead of several blocks.

These same producers are not concerned, particularly, with the decentralization of supply and maintenance functions. The big job of supply requirements is to originate purchase requests (PR) which boils down to canvassing all Air Force commands prior to an upcoming PR. This can be accomplished from any base in the continental United States, they say.

The situation currently adds up to a test of counter predictions. First is the AMC contention that it can be done. Second is the contractors' consensus that the whole operation, so far as procurement is concerned, will be returned to Wright-Patterson AFB within a year.

A Legal Jungle Is Home to the Buyer

A purchasing agent in industry conceivably could go mad as a buyer for the Air Force. It would be through no fault of the Air Force, the Air Materiel Command—its buying agency—or AMC procedures. In industry his actions are dictated by economics and sketchy laws; in AMC, his buying is circumscribed by a mass of legislation, sometimes obsolete, sometimes contradictory, and by volumes of interpretations and practices.

And the conglomeration has a near-impossible goal: to give the taxpayer his money's worth, and the Air Force the best money can buy—but without making anyone angry.

Dangling over AMC and its procurement practices is always a mighty drop hammer: Congressional legislation. On the occasions it booms down, it can remold in a twinkling the carefully fashioned form of AMC procurement.

In theory, Congress can legislate that AMC could buy only from red-haired men with brown eyes. It never has and probably never will. But some of the legislation which prescribes the ground rules for AMC buying highlights the Congressional authority just as bluntly.

Most of the present Air Force buying authority is derived from the Armed Services Procurement Act of 1947. But there are still some live provisions of the Air Corps Act of 1926, particularly in the realm of patent rights. And the 1947 act has been supplemented temporarily in part by a 1951 extension of portions of the First War Powers Act. Some provisions of the Defense Production Act of 1950 affect the 1947 procurement act.

There are perhaps a dozen miscellaneous laws containing certain stipulations regarding procurement. There is the Renegotiation Act of 1951. Plucked from the mass of legislation is the Armed Services Procurement Regulation, a thick book of policies and interpretations that is the Bible of procurement men in all three services. From ASPR has been selected a body of provisions, amplified and interpreted into the Air Force Procurement Procedures. From this flows a stream of "Regulations," "Circulars," "Letters," "Directives" and "Instructions."

Into this jungle an AMC buyer steps every time he tackles a new procurement assignment. Just what he has to consider—and what a business man wanting to do business with the Air Force should consider—is summed up in the following sections.

Basic Rules: The Laws

The basic ground rules for Air Force procurement were set in 1947 with passage of two laws: Public Law 253, the National Security Act; and Public Law 413, the Armed Services Procurement Act. The first created an independent Department of the Air Force with permission to do its own purchasing. The second laid down the broad requirements in purchasing that must be followed not only by USAF, but by Army, Navy, Coast Guard and National Advisory Committee for Aeronautics.

► **National Security Act**—The law which created three co-equal armed services in a Department of Defense gave the Secretary of Defense two years in which to split off Air Force functions from the Army. The procurement authority was transferred in January, 1948 by "Transfer Order No. 6." While this order passed USAF procurement authority over to the Secretary of the Air Force, it also provided that the authority could be redelegated.

Consequently, the Secretary of the Air Force redelegated the procurement responsibility to the Air Force Undersecretary who passed it along to the Deputy Chief of Staff, Materiel, who sent it on to the Commanding General of the Air Materiel Command, who turned the authority over to the Director, Procurement and Production. Each redelegation was accomplished by an appropriate regulation, each of which is a link in the chain which now connects AMC with the procurement law.

► **Procurement Act**—The Armed Services Procurement Act of 1947 was enacted two years after a war during which the ground rules for procurement were decades old in some cases and necessitated the use of the special war powers granted the President.

During the war, speed had been the keynote in procurement. All firms that could handle war work were busy; and the government didn't have time to make price paramount. Such procedures are neither economic, fair nor desirable in ordinary peacetime buying. So the 1947 act emphasized competition after formally advertised bids.

The act sets forth specific conditions for advertised competitive bids, and AMC procedures follow those conditions exactly. But the legislators' intention was to give the armed services flexibility in procurement; the act cites a number of circumstances in which negotiated procurements are allowable:

• **When national emergency requires negotiation.** After the President declared a national emergency on Dec. 16, 1950 the Assistant Secretary of the Air Force invoked the provision of the procurement law that permits negotiation in such a period. Accordingly, for a year and one-half most of AMC's procurements have been negotiated, rather than advertised. But the AF policy provides for publicizing certain negotiated procurements to aid small business.

• **When delay** incident to advertising would be harmful to the public good.

• **When it is impracticable** to advertise because of the nature of the item.

• **When development,** research or experimentation is involved in procurement of the item.

• **When national security** would be affected by the public disclosure necessary in advertising.

• **When standardization** and interchangeability of parts in technical equipment is in the public interest and could not be obtained through an advertised procurement.

• **When substantial investment** is involved in the procurement, and advertising would result in duplication of that investment or preparation.

► **Negotiated Contracts**—The act also details some of the contract terms in government procurement. It outlaws flatly cost-plus-a-percentage-of-cost contracts. But it permits cost-plus-fixed-fee contracts under certain conditions (principally for research and development contracts) and limits the fee to 10% of the estimated cost of the contract exclusive of the fee on production contracts, 15% on research and development contracts.

Under cost-plus-fixed-fee contracts, contractors are required to notify the procuring agency of any CPFF subcontracts, or any fixed price subcontracts in excess of $25,000. The law

gives the procuring agency the authority to inspect the plant and audit the books and records of any company working on a CPFF prime or subcontractor.

The law lays down certain specific terms applicable to negotiated contracts. One permits the procuring agency to grant advance payments to the contractor, but "only upon adequate security." In practice this generally means a lien on the manufacturer's inventory covered by the contract. Another requirement in negotiated procurements is that the contract must contain a provision against contingent fees.

► **Other Laws**—The Procurement Act of 1947 was the basic law for less than three years before it had to be supplemented. When the Korean war began some extraordinary measures were necessary in procurement and in the administration of government contracts. So several new laws and executive orders bulwarked the procurement act.

• **Public Law 921,** enacted in January, 1951 amends and extends Title I of the First War Powers Act which was the legal authority for negotiations during World War II. Under P. L. 921 the President may authorize any department or agency to enter into contracts, amendments and modifications of contracts; and to make advance, progress and other payments regardless of provisions in the procurement law. However, Executive Order 10210—issued under the terms of P. L. 921—makes it clear that the 1947 procurement act is still the basic statute governing procurement.

At the present time, P. L. 921 is being used by the Air Force primarily as authority for changing the terms of contracts to correct mistakes.

• **Defense Production Act** of 1950 affects procurement principally because it establishes the authority for controlling materials and expanding production facilities.

• **Public Law 152,** enacted in 1949, established the General Services Administration to supervise and control all general supply activities of the government. Although the law does not exempt the armed services from its provisions giving GSA charge over government supply activities, it does permit the Secretary of Defense, with the approval of the President, to exempt the Defense Department from the provisions of the law.

Accordingly, the Defense Department, GSA and the Budget Bureau are now working out a delineation of responsibilities. Agreements reached so far make the Federal Supply Service, which is part of GSA, the procuring agency for certain strictly commercial articles, such as typewriters, for the armed forces.

And there are other laws supplementing the Armed Services Procurement Act.

Special Laws: To Each His Own

An Air Force buyer or contracting officer has only begun his legal familiarization when he runs through P. L. 413 and emergency laws. Government purchases are affected by laws and orders on hours and wages, use of convict labor and child labor, foreign purchases, "excessive" profits, and racial discrimination—to name only a few.

► **Employment Conditions**—Both statutes and executive orders pertain to employment conditions. In every government contract is a clause under which the contractor agrees not to employ any person in connection with the performance of the contract who is undergoing sentence of imprisonment at hard labor.

There are exceptions. The clause does not apply to purchases from any state or federal prison, or to employment of persons on parole or probation, to those pardoned or to those who have served their terms.

Ever since 1941, government policy

has been that contractors shall not practice discrimination in employment because of race, creed, color or national origin. Further, a prime contractor must include such a provision in his subcontracts. It is against this policy even to require employes to be American citizens.

And the policy is so firm that buyers are instructed to place the business elsewhere if a contractor refuses to accept the non-discrimination clause. The clause must be adhered to even if it means the government must pay a higher price for the supplies.

"Oppressive" child labor is prohibited by the Fair Labor Standards Act of 1938. This act applies to all employes engaged in producing goods in interstate commerce, not just to those employes engaged in producing on a government contract. This is the law which sets minimum wages and maximum hours. It's not as specialized in its application as other laws.

▶ **Wages and Hours**—There is an entire body of laws in the wages and hours field, and the most important for buyer and contractor alike is the Walsh-Healey Public Contracts Act of 1936.

• **Walsh-Healey.** This law applies only to government contracts in excess of $10,000 and requires inclusion in the contract of certain guarantees regarding

Air Force can't make a contractor hire only American citizens, no matter what the nature of his work.

convict labor, child labor, safe working conditions and other employment conditions. But its main impact on government and industry comes from its wage provisions.

Under the terms of the act, the Secretary of Labor makes a "determination" of the prevailing minimum wage for an industry. All contractors in that industry must then pay at least the minimum to all employes working on government contracts.

Proven violators of the clauses required by the Walsh-Healey Act will be declared ineligible to obtain government contracts for three years.

There are some exceptions to the act, notably contracts exclusively for services, and when a contract for more than $10,000 is reduced to less than that amount, it no longer comes under the act. On the other hand, a contract that is increased to more than $10,000 is subject to the law.

"Besides being limited to certain classes of contracts, the act is also limited to certain contractors and employes," the Air Force tells its buyers in a recently published handbook. "The contracting officer is responsible

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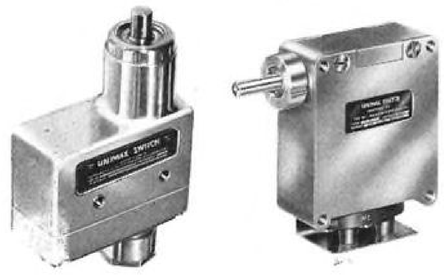

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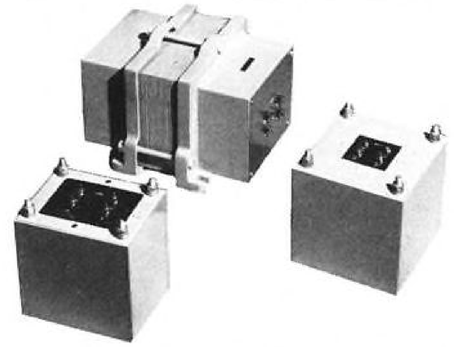

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for determining when the Walsh-Healey Act applies to a contemplated procurement."

So that puts another burden on Air Force buyers and contracting officers. And this one is of a peculiar nature. The Armed Service Procurement Regulation, Air Force Procurement Procedures, AMC directives, etc., all are prepared by the armed services and presumably to meet a need the services themselves have found. But the ground rules set by the Walsh-Healey Act are the doing of the Secretary of Labor and are fluid. The AF handbook says "the act does not apply to subcontractors." However, the Labor Department for some time has been proposing that prime contractors be responsible for the observance of Walsh-Healey by their subcontractors.

• **Eight-Hour Law.** This law is older than the Air Force or its predecessors. It goes back to 1912, although it since has been amended several times. Primarily, it provides that no laborer or mechanic working on a government prime or subcontract shall be permitted to work more than eight hours a day unless paid at least time and one-half when he passes the eight-hour mark. As in Walsh-Healey, there are exceptions and the Department of Labor, not the Air Force, is responsible for the terms of the law. And the eight-hour law applies even when the contract is small.

• **Davis-Bacon Act.** This law applies to laborers and mechanics on public works contracts over $2,000 and contains some of the same provisions as the Walsh-Healey and Eight-Hour laws. It also requires that each contract stipulate that the contractor and his subcontractor must pay not less than once a week the full amount accrued to all laborers and mechanics, computed at not less than the wage rates stated in the specifications for the work. To live up to the terms of this law, a contracting officer must get from the Labor Department a wage determination, and must obtain weekly payroll records from the contractor to see that he is complying with the law.

• **Copeland Act.** While the Davis-Bacon law applies to laborers and mechanics on public works contracts over $2,000, this act covers all employes. Its main purpose is to make illegal "kickbacks" of wages.

▶ **Foreign Purchases**—The Buy American Act is a good example of a law, enacted for a specific purpose, that stays on the books and must be a concern of Air Force buyers even after the conditions that inspired it no longer pertain. It was passed in the depression days when government contracts were more important to business than they ever had been before and Congress was anxious to see that U.S. industry got

preference over foreign firms.

If the supplies are for use outside the U.S., the act does not apply. Thus, air forces overseas can buy from foreign firms. Otherwise, the Air Force cannot buy foreign manufactured goods unless they were manufactured from supplies furnished from the U.S. The service secretaries can make exceptions when application would:

- **Be inconsistent** with the public interest.
- **Increase cost** of the supplies to be bought.
- **Be impracticable** or unreasonably increase the cost of construction and repair work.

Under the first exception cited above, the service secretaries have decided that in the period of national emergency it would be inconsistent with the public interest to apply the Buy American Act to supplies made in Canada. Although this is a blanket exemption (unless other statutes are over-riding), buyers and contracting officers still have to file several special reports on Canadian purchases.

▶ **Limiting Profits.** There are two main laws concerned with "excessive" profits. One is the Vinson-Trammell Act, which has been in effect for many years, and the other is the Renegotiation Act of 1951. As originally passed, the Vinson-Trammell Act required that a certain portion of government aircraft had to be built each year in government factories and the costs of these planes would be a yardstick by which to measure the cost of aircraft charged to government by private builders.

As is stands today, however, the act's main features provides that the contractor must pay to the U.S. Treasury all profits in excess of 12% of the contract price of aircraft. Buyers and contracting officers still have to keep in mind the Vinson Trammell Act, although its application is very limited. For one thing, it applies only to contracts for complete aircraft and major components; for another, the growing use of redetermination provisions eliminates application of the act.

And to make the use of the Vinson-Trammell Act highly unlikely, there is the Renegotiation Law, (see page 320).

Interpretations: The Regulations

The Armed Services Procurement Regulation is the direct implementation of the 1947 procurement law. It applies to all services, and consequently cannot be specific regarding the procurements of individual services.

In general, ASPR lays down broad policies, but does contain some general directives to all services. As ASPR it-

self says in the introduction:

"Rules, regulations and directives of any department not in conflict with this regulation, as from time to time amended, shall remain in full force and effect. This regulation is not intended to cover detailed procurement procedures or instructions of the respective departments and their procuring activities . . ."

ASPR became effective May 19, 1948. Eventually, it will comprise 15 sections and several appendices, but not all of the sections have been completed. In areas not yet covered by ASPR, the Joint Procurement Regulation is the guiding policy.

ASPR is not static. It is continually being revised. Representatives of the three services meet periodically to discuss these revisions, and subcommittees are appointed to handle specific problems. Representatives of industry also are called on to give suggestions.

► **Basic Policies**—An example of the broad principles ASPR lays down are the basic policies set forth in Section I, Part 3. After stating that the two principal methods of procurement are formal advertising and negotiation, the regulation lists sources of supplies as:

• **Government agencies** with surplus stocks. "To the extent possible, supplies shall be obtained from surplus property in the hands of disposal agencies, or from surplus or excess stocks in the hands of any government agency."

• **Sources outside the government.** Regardless of whether the supplies are to be bought by advertising or negotiation, "competitive proposals . . . shall be solicited from all such qualified sources . . . as are deemed necessary by the contracting officer to assure such full and free competition . . . to obtain for the government the most advantageous contract—price, quality and other factors considered."

• **Small business concerns.** "It shall be the policy of each department to place with small business concerns (herein considered to be any concern which, including affiliates, employs in the aggregate fewer than 500 persons) a fair proportion of the total procurement of supplies and services for that department . . . when not clearly to the disadvantage of the department, the procurement of supplies and services shall be divided into such reasonably small lots as will enable and encourage small business concerns to make bids or quotations on such supplies and services . . ."

► **Precise Instructions**—Most of ASPR is concerned with types of contracts and the preliminaries to contracts. And in dealing with the preliminaries to a contract resulting from an advertised bid, ASPR does get into specifics. Section II, Part 2 deals with soliciting bids, and

TYPICAL BUYING SECTION in Procurement Division, where paragons are routine.

Meet the Air Force Buyer . . .

Every government purchase affects the complex balance among defense needs, industry capability and the civilian economy.

The Air Force buyer—agent of each AF purchase transaction—thus holds a primary responsibility for the success of the procurement mission and the national defense policy.

The mission of Air Force procurement—and by delegation, that of the buyer—is to contract at fair and reasonable prices with qualified suppliers for the proper quantity and quality of materials to be delivered at the right time and the right place.

► **Fully Responsible**—The buyer is responsible for all details from the initiation or receipt of the Purchase Request to the execution of the contract. He must:

• **Investigate the sources of supply.**
• **Determine the method of procurement.**
• **Buy at fair and reasonable prices.**
• **Draft contracts** which express the intent of the parties.
• **Gear the timing** of the Purchase Request, when he originates the request, with the need for the supplies.

► **The Authority**—The buyer is vested with the authority necessary to discharge his responsibilities.

• **He is a contracting officer,** duly authorized to execute contracts binding the government.
• **He may allow deviations** from specifications, where warranted.
• **He decides** whether the government will exercise its rights under the latent defects clause of a contract, where defective material is delivered and accepted.
• **He initiates action** for contract termination, both for default and convenience of the government.

► **"Team" Concept**—The buyer is assisted in his job by the concept of "team buying." He receives information and aid from many sources, including the government's attorneys, production and design engineers, and price analysts.

But he is the leader and coordinator of this team of experts.

As a member of the team, the buyer often must furnish information to others, for example, data for the preparation of budgets and future schedules.

► **Intelligent Buying**—The buyer must know his product and his market. Intelligent buying depends on his knowing:

• **How and where a product is made;** manufacturing techniques that are employed.
• **Effect of changes** of design on production methods and costs.
• **Market conditions** and special problems of the industry.
• **The contractors** with whom he deals. Through study of commercial publications, or records and experience of past government contracts, he becomes familiar with a supplier's qualifications.

► **Contracting Officers**—The authority of the buyer to execute and approve contracts is delegated to him by terms of DOI (Director Office Instruction) 70-3, Appendix 1, in his capacity as a procuring contracting officer. But a contracting officer is any officer or civilian employe with power to enter into and administer contracts.

The functions of contracting officer are often divided between two individuals:

• **The contracting officer,** who negotiates and executes the contract.
• **The administrative contracting officer,** who has responsibility for administering the contract. He issues change notifications, determines questions of fact, and makes numerous other determinations.

details exactly what should be contained on the invitation for bid (IFB) form.

Because of ASPR, IFBs for all services are standard, and all the principal parts of an IFB are set forth in ASPR. An AMC buyer accordingly does not have to worry about choice of an IFB form, but ASPR does permit each service to include in an IFB any provisions peculiar to that service.

Methods of soliciting bids (which are used by the Air Force and described elsewhere in this issue) also are prescribed by ASPR, including a provision that synopses for IFBs shall be prepared and sent to Commerce Department regional offices. Among other details ASPR covers is that "A synopsis of invitations for bids shall not include any invitations scheduled to be opened less than 18 days from date of issue."

► **Handling of Bids**—ASPR also requires that the contracting officer follow certain procedures in handling bids after they are submitted. This is all detailed in Section II, Part 4.

Although sealed bids are directed to be kept unopened until the official time of opening, ASPR says an unidentified bid "may be opened solely for the purpose of identification, provided that such bid shall be resealed immediately and that no information obtained therefrom shall be disclosed."

It is up to the bidder, says ASPR, to prepare his bid correctly. But it still is the responsibility of the contracting officer, after the bids are opened and prior to the award, to "examine all bids for minor informalities or irregularities and for obvious or apparent mistakes . . ."

When the contracting officer finds such minor errors, he "shall give the bidder an opportunity to cure any deficiency . . . when it is not to the disadvantage of the government." The contracting officer himself may correct any obvious clerical mistake provided he first obtains from the bidder a statement "as to any mistake therein."

Despite these instructions, ASPR gives the contracting officer wide latitude in rejecting bids. "Any bid which does not conform to the essential requirements of the invitation for bid shall be rejected, provided that any such bid may be considered when in the interest of the government and not prejudicial to other bidders.

"All bids may be rejected by the contracting officer when rejection is in the interest of the government or when he finds in writing that the bids are not reasonable or were not independently arrived at in open competition, or are collusive, or were submitted in bad faith." Any evidence of bids not independently arrived at shall be forwarded to the Justice Department.

► **Deciding Awards**—Whenever ASPR discusses contracts, it invariably makes the point that awards should be advantageous to the government "price and other factors considered." Part 4 lists some of these other factors—a buyer or contracting officer may consider:

- **Judgement**, skill and integrity of a bidder.
- **Reputation** and experience of a bidder, and prior work of a similar nature done by him.
- **Foreseeable costs** or delays to the government resulting from differences in inspection, shipping, location of supplies and such details.
- **Changes made** or requested in any of the provisions of the solicitation, to the extent that any such change does not constitute ground for rejection of the bid.
- **Restrictions** or conditions imposed in the bid.
- **Advantages or disadvantages** to the government resulting from the making of multiple awards.

When two or more bids are equal, the award "shall be made by drawing by lot which shall be witnessed by at least three persons and which may be attended by the bidders or their representatives." But that is not always the only procedure. When he receives equal

A contracting officer may throw out all bids on a contract; but he's got to have good reason for the action.

bids, the buyer or contracting officer has another set of principles to guide him. He has to make the award to:

- **Small business firm** if one of the equal bidders is in that category. If all are small business firms, then the drawing by lot takes place.
- **Firm in a distressed area.** If all state they will perform the work in a distressed employment area, then the drawing by lot shall take place. A firm other than small business may receive the award in case of equal bids if it guarantees to do the work in a distressed area and a small business firm cannot give that guarantee.

► **Use of Negotiation**—Because it is the fastest, most flexible method of procurement, most procurement officials prefer negotiation to advertising. But most small business firms for obvious reasons prefer advertising. Possibly with this fundamental conflict in mind, the authors of ASPR in Section III, Part 2 go into some detail in interpreting the provisions in law that permit negotiation.

First ASPR cites the authority for negotiation in the 1947 procurement act, then outlines application of that authority:

- **National emergency.** ASPR declares this authority shall be used "only to

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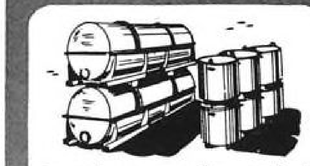

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the extent determined by the secretary concerned to be necessary in the public interest, and then only in accordance with procedures prescribed by each respective department."

• **Public exigency.** This authority can be used, says ASPR, only if the need is "compelling and of unusual urgency, as when the government would be seriously injured, financially or otherwise." An example would be in the procuring of equipment or repairs to an aircraft grounded or about to be grounded when the aircraft is needed immediately for the performance of a mission.

• **Impracticable to advertise.** This provision, ASPR states, covers such circumstances as the following: when the supplies can be obtained from only one source; or when competition is precluded because of patent or copyright rights.

• **Experimental work.** There is little question but that AMC has to negotiate for experimental, developmental or research work, but ASPR says the authority shall not be used for production work. However, contracts for a "reasonable number of experimental or test models, or prototypes, shall not be regarded as contracts for quantity production."

• **Classified purchases.** This authority shall be used, according to ASPR, only for purchases of contracts classified confidential or higher.

• **Standardization and interchangeability.** This authority applies, under ASPR, when an armed service finds it necessary to limit the quantity of spare parts to be carried in stock, or when standardization will make more available the number of parts that may be interchanged among damaged pieces of equipment during combat. But the authority will not be used "for initial procurements of equipment and spare parts which will ultimately be stand ardized."

• **Substantial initial investment.** Under this authority, AMC negotiates for aircraft, engines, guided missiles, radar and such other items. These involve special tooling and engineering and development work that would not be usable by any other supplier, says ASPR.

There are several other specialized situations cited by ASPR which make the use of negotiation permissible.

▶ **Factors in Negotiation**—In Section III, Part I, ASPR tells what the buyer or contracting officer must consider when negotiating a contract:

• **Prices,** with due regard for other prices for same or similar supplies or services, with due regard to cost of transportation, cash discounts and other price factors.
• **Business reputations** and responsibilities of firms or individuals submitting quotations.
• **Quality** of supplies or services offered.
• **Delivery** requirements.
• **Analysis of prices** and costs.
• **Price aspects** of any important subcontracts—and extent of subcontracting.
• **Type of contract,** particularly provisions relating to price re-determination.
• **Size** of the business concern. Another paragraph in this same part reminds the buyer or contracting officer of the Defense Department's small business policies. It says that where practicable procurement should be divided into small lots, lists similar to bidders lists should be used to discover small business sources, advance notices should advise small businesses of proposed negotiations, and multiple awards should be made where suitable.
• **Whether plant facilities** would have to be expanded for the prospective supplier.
• **Labor supply** in the prospective supplier's area.
• **Workload** of the prospective supplier, both existing and potential.

Those are merely some of the things in the Armed Services Procurement Regulation an AMC buyer or contracting officer must keep in mind in doing business. Then he has his own set of Air Force regulations.

▶ **Air Force Procurement Procedures**—

In general, the Air Force Procurement Procedures parallel and elaborate on ASPR. But the purpose of AFPP is to go into procurement procedures that are distinctive to the Air Force and to spell out in greater detail for Air Force personnel some of the procedures specified by ASPR.

For example, ASPR, Section II Part 4, says "all bids . . . shall be publicly opened and read aloud by the government official whose duty it is to open the bids." AFPP, Section 2, Part 4 says "The officer whose duty it is to open the bids shall decide when the specified time has arrived, and then will personally and publicly open all bids received and read them aloud to those present, and a record of each bid shall then and there be made."

The bulk of AFPP is concerned with telling the buyer or contracting officer what forms he must file, with whom, and in what fashion. And many of the key procedures are outlined by repeating in simplified language the pertinent part of ASPR, or merely by citing ASPR.

The Results: The Contracts

The end result of the maze of laws and regulations through which a buyer must pick his way is a contract. But "a contract" is an over-simplification. There are six generally used types of definitive contracts (excluding letters of intent or "letter contracts"):

• **Fixed-Price.** This is the only type of contract used in advertised procurements. It also is used in negotiated contracts, but almost always with special features that could not be incorporated in a contract following an advertised procurement. As the name implies, it provides for a firm price, and nothing more.

• **Fixed-Price With Determination.** This contract starts out with a fixed-price, but has provisions for changing the price during the life of the contract. And because of redetermination, this type of contract may take one of six different forms.

• **Incentive Contract.** This type of contract today is used for the largest part of Air Force procurement, dollar-wise, for it is practically standard in the procurement of airframes. Basically, it may be either a fixed-price, or possibly a cost-plus-a-fixed-fee contract. It provides for a tentative contract price with a maximum price or maximum fee.

After completion of the contract a final price or fee is determined on the basis of the contractor's actual costs plus a sliding scale of profit or fee which varies inversely with the cost. But the final fee or price cannot exceed

the maximum stated in the contract.

As an example, assume the ceiling is 120% of the contract, or target, price, and that the contractor's profit is 8% of the target price. If the contractor's final costs are less than the target, he retains 20% of the savings, and the government gets the other 80%.

• **Cost Contract.** Under this type of contract, the government pays the contractor's allowable costs, as specified in the contract, and total cost is estimated.

• **Cost-Plus-a-Fixed-Fee.** This contract, too, establishes an estimated cost and provides for payment of all allowable costs, but in addition it covers payment of a fixed fee based on the estimated costs. The fee may not vary with the actual costs, although it may be changed if the estimated costs are changed.

Reason for this is that a wartime type of contract, cost-plus-a-percentage-of-cost, has been outlawed by Congress as it puts a premium on inefficiency.

Even the CPFF type of contract has limitations. It cannot be used unless it is likely to be less costly than any other type of contract; or unless it is "impractical to secure supplies or services" by other types of contracts. Because of its nature, most research and development work cannot be bought by any other contract than a CPFF, although almost all research contracts with universities are plain cost types.

And the law and ASPR limits the amount of the fee under this type of contract. While the law permits a fee of 15% of estimated cost on research and development work, and 10% on production work, ASPR specifies that the fee shall be no more than 10% and 7% respectively.

• **Time and Materials.** This type of contract provides for the purchase of supplies or services on the basis of direct labor hours at specified hourly rates (which includes direct labor, overhead and profit), and of materials at cost. This type of contract would most likely be used for overhaul and such work.

► **Price Redetermination**—While many of the Air Force dollars are spent through incentive contracts because they cover the most costly items, the most frequently used type of contract in negotiated procurement calls for redetermination of a fixed price.

The Air Force uses five types of price redetermination:

• **Form I**—Upward or downward price revision negotiated at fixed periods with prospective effect only.

• **Form IIA**—Upward or downward revision negotiated upon demand of either party, with prospective effect only. The demands have to be at least 90 days apart.

• **Form IIB**—Upward or downward revision after a stated time, with the revi-

sion, either party can demand revision, which would affect future price only, but the demands can be no less than 90 days apart.

• **Form III**—Downward revision upon demand of the contracting officer after completion or termination of the contract.

• **Form IV**—Downward or limited upward revision after completion or termination of the contract.

• **Form V**—Upward or downward revision negotiated upon the happening of a specific contingent event and limited to that event and its direct effect.

▶ **Use of Forms**—Since the start of the Korean War, Form IV has been used most extensively. Prior to that time, Form III had been widely used in research and development contracts. Form I and Form IIA are used in contracts of reasonably extended duration which require repetitive operations and on which costs can be estimated fairly accurately because of previous experience with similar contracts.

Form IIB also is used in contracts of reasonably extended duration which require repetitive operations, but on which cost data is lacking until some work has been done. The first period for redetermination is fixed in the contract as being from 20% to 40% of deliveries. After that the first redetermination is made.

Redetermination on $518-million worth of contracts since Jan. 1, 1951, has saved nearly $26 million—4.96%.

Form V is rarely used by the Air Force.

▶ **Results of Redetermination**—In testimony before the Senate preparedness subcommittee, AMC cited these results from redetermination of prices since Jan. 1, 1951:

• Target or contract price	$517,588,772
• Final negotiated price	$491,899,560
• Savings to the government	$25,689,212
• Ratio of savings to target price	4.96%

▶ **Contract Termination**—Neither buyer nor contracting officer is finished with a contract when it is signed and work has begun. They have to administer the contract during its life, and the contracting officer has the knotty job of handling the details when and if the contract is terminated.

A CO's most ticklish problem is to terminate a contract by default. Default provisions in a contract specify that it can be terminated if a contractor fails to deliver or perform in a required time, fails to perform any other provision of the contract, or if he so fails to make progress "as to endanger performance of the contract." A contractor

is liable to default for the last named reasons only if the failure persists for at least 10 days, or for a longer period specified by the contracting officer.

The industry objected to the "endanger performance" provision, but it has been retained to cover the government on long tooling-time contracts. However, it is seldom invoked. Most defaults are because of failure to perform or deliver on time. A contractor is not liable for default due to reasons not under his control, such as fires, floods, and strikes.

Termination for default makes a contractor liable for excessive costs to the government for reprocurement of the supplies covered by the defaulted contract. This, of course, may result in court action. But the government has another recourse. ASPR provides that contracts wrongfully terminated for default shall be terminated for the "convenience of the government."

The termination "for convenience" clause in a contract is a huge tent to cover all possible changes in procurement requirements. As the Air Force buyer's handbook explains, "The power Congress has given to the armed services to make contracts is considered to carry with it the inherent power to terminate such contracts when the supplies or services being procured are no longer needed. . . ."

Only in this way can the armed forces have flexibility in procurement.

Each contract contains a standard termination clause which in the first paragraph says ". . . this contract may be terminated by the government in accordance with this clause in whole, or from time to time in part, whenever the contracting officer shall determine that such termination is in the best interests of the government."

So that puts it squarely up to the CO. But he has a long list of principles and examples from ASPR to guide him after the termination notice has been given. Once the decision has been made to terminate, the basic objective is to make a settlement with the contractor that will compensate him for work done and for preparations he has made to continue with the work that has been terminated.

ASPR gives these examples of costs which can be included in a termination settlement:

- **Advertising costs** that can be "reasonably allocable" to the terminated portion of the contract.
- **Bonds and insurance**, including self-insurance, but not premiums on insurance of the lives of officers and directors.
- **Claims of subcontractors** which are common to the contract and to other work of the contractor.
- **Compensation of officers** that is reasonable, in the light of services ren-

dered, and that is allocable to the terminated portion of the contract.

• **Costs that continue** after termination despite all "reasonable" efforts of the contractor to discontinue costs upon receipt of the termination notice.

• **Depreciation** at "appropriate" rates.

• **Special tooling**, engineering and development costs, provided that the contractor transfer title to the government.

• **Research expense** to the extent it is consistent with an established program of the contractor and to the extent that it is reasonably related to defense purposes.

• **Initial costs** that have not been absorbed on the completed portion of the contract because fewer articles were produced than were originally called for under the contract. Initial costs may include labor costs and high material costs which are abnormal because of the learning period on a new contract.

• **Memberships** in trade, business and professional organizations.

• **Preparatory expenses**, including plant alterations, organization, planning and other arrangements undertaken especially for the contract.

► **No Profit, No Loss**—Object of termination "for convenience" is to save the government money by not completing supplies that will be useless. But the government tries to avoid loss to the contractor. According to the Air Force handbook, termination clauses provide means of interim financing to cover contractors who have big investments, with bills coming due before settlement can be made.

Amounts up to 100% of the contract prices may be paid for undelivered acceptable items completed prior to termination date, or completed afterward with the approval of the contracting officer. Up to 90% of the direct costs on termination inventory may be paid before final settlement is made. But there can be no partial payment of profit or a fixed fee.

In settlement, according to ASPR, the contractor should be allowed profit only on preparations made and work done for the terminated portion of the contract. No profit is allowed on post-termination and settlement expenses.

This review, long as it is, covers only parts of the buyer's catechism that he must learn by heart or keep close at hand.

But he could memorize all the present laws, and still be caught off base. For when all's said and done, Congress makes the laws—and seldom asks the buyer's consent.—W.K.

If you violate the Walsh-Healy Act you will be declared ineligible to receive government contracts for three years.

The Squeeze on Aircraft Profits

Renegotiation is supposed to take back excess profits at year-end—if AMC redetermination leaves any.

By Selig Altschul

The aircraft industry, by its very nature, is subject to close scrutiny as to its profits by the controlling government agencies.

The means through which aircraft profits are kept in line and prevented from becoming "excessive," is commonly believed to be renegotiation. Actually, in the postwar period, renegotiation in itself has thus far been an unknown element. But it is because the renegotiation processes wait at the end of the line, that the squeeze has been applied to profit margins in the aircraft industry.

▶ **Fixed-Price Contracts**—Under the broad policies the Munitions Board has indicated, Air Force, Navy, and Army still have a wide leeway in the type of contract they may let. The Air Force favors, wherever possible, fixed-price contracts with price redetermination and escalation clauses.

• **Redetermination.** Under this form of arrangement the Air Force waits until a "fair sample," usually 25%, of the entire contract is completed. Then actual output costs are examined and the contract price is "redetermined" in view of the experience demonstrated.

• **Escalation** is tied to items such as the rising cost of materials or labor. An escalation clause operates almost automatically with the change in price of the items concerned. Officials, however, tend to keep the list of "contingencies" subject to escalation as limited as possible.

▶ **Redetermination vs. Renegotiation**—It is highly significant that funds recovered under price redetermination are available to the procuring agency for further orders, but funds recaptured under renegotiation go directly to the Treasury and are not available to the military services for additional procurement. Price redetermination techniques therefore receive principal emphasis on the part of the contracting officers in the Air Materiel Command of the Air Force. This "close pricing" on contracts develops a tendency by service officers to recover as much additional funds as possible for further procurement.

More importantly, a contracting official is frequently under the illusion that if any profits should remain for renegotiation he has failed to do his job properly; therefore, profit margins are squeezed at every opportunity in the price redetermination processes.

This is demonstrated by the low profit margins prevailing in published 1951 aircraft company annual reports. The average profit margin on sales for the industry was around 2%.

This approach of, in effect, applying renegotiation in the price redetermination process was never intended. Price redetermination is to apply to individual contracts which may extend for several years. Renegotiation is based upon the over-all profits of a manufacturer on all government work for a given year. The Renegotiation Act of 1948, later revised as the Renegotiation Act of 1951, applies in this respect.

▶ **Why Renegotiation?**—The purposes of renegotiation were defined by Frank L. Roberts, Chairman, Military Renegotiation Policy and Review Board, Office of the Secretary of Defense, before the Committee on Finance of the U. S. Senate as it was considering the Renegotiation Act of 1951. Among other things Mr. Roberts declared:*

> "Renegotiation is a broad, overall operation. It is not a detailed process of audit and examination, contract by contract and dollar by dollar. Nor is it a device to remedy or repair errors or inequities in individual procurement transactions. The renegotiation authorities do not reset the price of each contract after completion of performance and payment. This type of individual price adjustment, which was contemplated in the earliest days of renegotiation and from which the process derived its name, gave way almost immediately, out of obvious necessity, to over-all review of a contractor's operations for his entire fiscal year.
>
> "This basic conception is indispensable to any understanding of what renegotiation is and the way it works. All of a contractor's receipts or accruals during this year from all of his contracts and subcontracts subject to renegotiation, including both his profitable and his non-profitable ones, and all of his costs and expenses applicable thereto are considered at a single time in a single proceeding, together with all pertinent facts and figures, and a single over-all determination is made.

* Hearings before Committee on Finance, U. S. Senate 82nd Congress, First Session, on HR 1724, p. 2.

"It is entirely a judgment operation. There is no fixed formula or yardstick for the determination of excessive profits, nor is there any fixed maximum to the amount of profits which may be realized or retained by any contractor.

"If no excessive profits are found to exist, a clearance is granted to the contractor. If it is determined that excessive profits were realized, a determination of the amount thereof is made and this determination is embodied in an agreement or order.

"As you gentlemen know, this procedure has several advantages.

"The consideration of all contracts and subcontracts as a group reduces cost accounting and allocations of cost to a minimum and saves time for both contractors and the Government.

"The use of the fiscal period for renegotiation facilitates the use of the regular financial and accounting material maintained by contractors for tax purposes and avoids the preparation of such data on an entirely different basis. In addition, this method allows contractors to offset their losses on one or more contracts subject to renegotiation against their profits from other subject contracts during the same period." (Italics supplied.)

This statement presumably was evoked to satisfy the committee's concern with the processes of determining excessive profits. Strong support was accorded the recognition of efficiency. It is also clear that considerable latitude is present in the determination of excessive profits.

The "ground rules" specified for renegotiation are undoubtedly given a "forward look" by the contracting officers in the price redetermination processes. For this reason the philosophies currently underlying the administration of the Renegotiation Act assume added importance.

► **Board Policy**—Enjoying independent status, the Renegotiation Board has the responsibility of administering the Renegotiation Act of 1951. Broad policy declarations have emerged from this agency only recently.

Earlier this year John T. Koehuer, the Chairman of the Renegotiation Board, reiterated the desire to encourage incentives for contractors who perform more efficiently. In his statement the Chairman declared, ". . . in determining excessive profits, favorable recognition must be given to the efficiency of the contractor, including reduction of costs and economy in the use of materials, facilities and manpower. It follows that both the control of production costs and the maintenance of incentives to economical management continue to be as fundamental objectives in renegotiation as they ever were."

► **Risk Factor**—Subsequently, the Renegotiation Board, in publishing final renegotiation regulations in the Federal Register on Mar. 25, 1952, is attempting to give special consideration to the risk factor present in defense contracts.

Among other things the type of risk that will be considered includes risk of saturation in the post-emergency market, risks incident to close pricing policies, delivery guarantees, quality and performance guarantees, temporary sacrifice of civilian markets, the acceptance of contracts without escalation or similar protection, and the guarantee of work performed by subcontractors.

The Board said that in general it will ". . . consider whether the contractor's performance of renegotiable business is free from risk, or subject to it on the basis of actual experience and not more speculative or unlikely possiblities."

The statement went on to assert that, while the Board will operate completely separate from the procurement agencies,

it will function in close contact with military procurement officials and special divisions will help develop performance data on all contractors.

▶ **No Simple Formula**—Subsequently, the Chairman of the Renegotiation Board outlined the difficulties involved in attempting to solve renegotiation problems by reducing them to a formula, or series of formulas. This was particularly true in trying to evolve a series of formulas covering maximum or minimum profit standards.

The Chairman went on to assert that:

> ". . . when a contractor demonstrates unusual efficiency in his operations, thus effecting substantial savings to the government, or when a contractor makes an unusual contribution to the defense effort, thus benefiting the defense program greatly, such a contractor should be fully rewarded in his renegotiation proceeding."

He said such a contractor should be permitted to retain a higher profit, expressed as a percentage of sales, than his competitors.

▶ **A Concrete Example**—As a practical example, the Chairman presented an illustration of how renegotiation would be applied in the case of a hypothetical "X" Corporation producing "widgets." Assuming that the **X Corporation** had $2 million of renegotiable sales in 1951, on which allowed costs applicable to such sales totaled $1.6 million —indicating 20% realized before renegotiation or taxes, the Board would take the following steps:

• In 1947-9, **X Corporation** sold an average of $1 million a year, entirely to civilians, and its profits were 15% on sales—although its prices were relatively low in this period as well as in 1951 compared with other producers. Assuming that **X Corporation** was forced to increase its facilities, even after accelerated amortization, the government should get a substantial part of the benefit.

Therefore, **X**'s profit per unit sales to the government should be lower instead of higher than its profit on sales during the 1947-9 period.

• The statute directs the Board to look at the net worth, with particular reference to the amount and source of private and public capital employed. But the Board's accountant might find it "difficult to attach any particular significance to the contractor's net worth," since the Board's accountant reported that it was difficult to propose any justifiable segregation of assets between those employed and those not employed in performing renegotiable contracts."

• There appeared to be no justification for giving the contractor any particular credit for assuming risks, since the pricing policy provided an adequate margin. Moreover, there was no risk of post-emergency difficulties in this case.

• The Board could not give special consideration to the factor of "contribution to the defense effort, inventive and developmental contribution," since the **X Widget** was a standard item.

• In considering "character and extent of subcontracting," the Board might find that the corporation was entitled to a larger profit because it located subcontractors and imparted know-how to them.

• In considering the most important factor of all—efficiency—the Board, on ascertaining that **X Corporation** was more efficient, and has a lower cost of production in normal times, would have to allow **X** a sufficient advantage over its competitors to give **X** an incentive to continue, and if possible, to enlarge upon its superiority in this respect.

▶ **Cost to Producers**—While renegotiation has yet to have its full impact in reviewing aircraft operations for recent years, it can develop to be a costly affair. This circumstance will prevail despite the heavy bite already imposed

on earnings resulting from price redetermination.

For example, during World War II the peak tax on corporations was 85¼%. Any money refunded through renegotiation thus represented a net reduction in earnings of only 14¼%. Currently, however, the top tax rate is 70%.

This makes the net reduction by renegotiation some 30%, or twice as high as the figure that prevailed during World War II.

Certainly the experiences developed in the renegotiation processes during World War II should be most helpful to government and industry alike. In any event, each company is hopeful that its operations will be given a high evaluation in all of the key factors listed by the Renegotiation Board. In this manner, by being judged on the merits of its individual ease, each company may hope to retain larger profit margins.

Auditor's Role In Procurement

Contractors' accounts and records under cost-type contracts, contracts with price redetermination, and industrial property accounts are subject to review by the Auditor General's office of USAF.

Headquarters of the Auditor General is in the Office of the Deputy Chief of Staff, Comptroller, USAF, to whom the Auditor General is directly responsible.

The audit field organization consists of district and section offices, audit resident offices in important industrial plants, and an audit liaison office. The eight district offices are in New York, Detroit, Chicago, Atlanta, Fort Worth, Los Angeles, Wiesbaden (Germany) and Tokyo (Japan). To facilitate flow of audit information to procurement personnel, the Auditor General's Liaison Office is located at Headquarters, AMC.

The Auditor General may initiate and direct performance of any audit deemed necessary, but procurement personnel are responsible for requesting audits of all transactions where they may serve to increase the efficiency of procurement.

The Auditor's office is often called on to help the Air Force buyers. Besides arranging for and evaluating audits, this office can furnish accounting and financial information from its files, advise on the accounting aspects of special cost provisions contemplated for a contract, and arrange for the presence during contract negotiations of an auditor familiar with the accounting records of the contracts that are being negotiated.

REPRESENTATION DIRECTORY

● Many hundreds, sometimes thousands, of businessmen journey to Dayton, Ohio, week after week to represent their companies at the Air Materiel Command. Hundreds more are full-time company representatives in Dayton, or act on behalf of groups of companies. The following directory is divided into two parts, one showing representatives, the other companies represented, both as of July 1. The lists cover only individuals and firms responding to an AVIATION WEEK survey before deadline. Because so many companies within a few hundred miles of Dayton do not have a resident representative there, but send him frequently from the parent plant, the DR symbol, for "Dayton Representative" is included in the company listing in such cases. Representatives whose names are underlined are members of the National Association of Manufacturers Representatives.

List of Representatives

• **Able, Charles R.**
1215 Hulman Bldg.
Dayton 2, O.
Hemlock 6367
Douglas Aircraft Co., Inc.

• **Aldrich, Edwin M.**
306 Keith Bldg.
Dayton 2, O.
Michigan 9647
Buick-Oldsmobile-Pontiac Assembly division, General Motors Corp.

• **Anderson, David L.**
High at Chestnut
Hartford City, Ind.
Hartford City 349
Blackford Manufacturing Co.

• **Andrews, John J.**
1221 Third National Building
Dayton, Ohio
Michigan 6061
Temco Aircraft Corp.
Pastushin Aviation Corp.

• **Arksey, Carl J.**
1208 West Kalamazoo St.
Lansing, Mich.
Lansing 5-2248
Abrams Instrument Corp.

• **Austin, Charles C.**
1327 Third National Bldg.,
Dayton 2, O.
Michigan 7711
Parker Aircraft Co.
Parker Appliance Co.

• **Austin, John E.**
2311 California Ave.
Dayton 9, Ohio
Walnut 9935
Remington Rand, Inc.

• **Atha, John W.**
1049 Third National Bldg.
Dayton 2, O.
Hemlock 4681
Ryan Aeronautical Co.

B

• **Backus, C. L., Jr.**
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Dayton 2, Ohio
Michigan 8781
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Connecticut Hard Rubber Co.
C & H Supply Co.

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Cleveland 2, O.
LA 1-8468
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Chicago Thrift-Etching Corp.
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Elco Mfg. Co.
Hammarlund Mfg. Co.
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Troy 2-1223
Motor Generator div. Hobart Bros. Co.

• **Balcomb, Robert B.**
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Dayton 9, Ohio
Walnut 9744
Tech Art
Robbins Ethol Corporation

• **Bardsley, P. E.**
Anderson, Ind.
5581
Delco-Remy div., GMC

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• **Barnes, H. F.**
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Hemlock 6383
RBM div., Essex Wire Corp.

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Oregon 3621
A. B. Dick Co.

• **Baum, Fred J.**
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Dayton, O.
Hemlock 4580
Northrop Aircraft, Inc.

• **Bay, R. H.**
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Dayton, Ohio
Joseph T. Ryerson & Son, Inc.

• **Bear, Neal**
West Richfield, Ohio
West Richfield 100
Neal Bear Corp.

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63861
Miller Electric Manufacturing Co.

• **Becker, George L.**
246 East 105th St.
Cleveland 8, Ohio
Main 1-0103
Welded Construction Engineering Co.

• **Beedle Equipment Co.**
C. P. Beedle
D. K. Bailey
Roselawn Center Bldg.
Cincinnati 37, O.
Jefferson 2640
381 West First St.
Dayton 2, O.
Adams 6522
Weston Electrical Instrument Corp.
Struthers-Dunn, Inc.
Radio Frequency Labs, Inc.

• **Belcher, J. R.**
125 East Ninth St.
Cincinnati, Ohio
Cherry 4477-4478
Ahlberg Bearing Co.

• **Belitz, Hans G.**
123 Webster St.
Dayton 2, Ohio
G. H. Leland, Inc.

• **Bellis, M. O.**
Van Cleve Hotel
Dayton, Ohio
Servomechanisms, Inc.

• **Bender, H. C.**
332 So. Mich.
Chicago 4, Ill.
Texas Co.

• **Benedict, R. G.**
8-247 General Motors Building
Detroit 2, Mich.
TR 1-9260
Flexible Metal Hose Mfg. Co.

• **Bennett, Philip E.**
330 East 63rd St.
New York 21, New York
Templeton 8-1715
Paragon Plastic Corp.

• **Bertke, Richard**
38 North Ludlow St.,
Dayton 2, O.
Fulton 3368
TelAutograph Corp.

• **Biersdorfer, B. H.**
15614 Detroit Ave.
Lakewood 7, Ohio
Boulevard 2-7322
Diamond Chain Co., Inc.

• **Bigger, C. M. & Co.**
643 Reading Rd.
Cincinnati 15, Ohio
Poplar 1441
Amplex Mfg. Co., div of Chrysler Corp.

• **Bishop, F. H.**
12677 Burt Road
Detroit 23, Mich.
Kenwood 2-8600
Allied Products Corp.

• **Blomberg, Kenneth**
603 Indiana Ave.
Richmond, Ind.
Milwaukee Electric Tool Corp.

• **Boehme Associates**
Talbott Building
Dayton 2, Ohio
Fulton 8188
Sorenson & Co., Inc.
Star-Kimble Motor, division of Miehle Printing Press & Manufacturing Co.
H.M.R. Electronics, Inc.
Measurements Corp.
Telectro Industries Corp.
Marion Electrical Instrument Co.
Instrument Corp. of America
Selby Shoe Co.
Waterman Engineering Co.
Harold Shevers, Inc.
Electro Tec Corp.
Potter & Brumfield

• **Bosway, J.**
118 Westt First St.,
Dayton 2, Ohio
Adams 1263
General Electric Co.

• **Bowen, Max**
216 North Main St.,
Dayton 2, O.
Hemlock 3832
Piasecki Helicopter Corp.

• **Bowman, Bert**
3471 West 140th St.
Cleveland, Ohio
Aerol Co., Inc.

• **Boyt, Jim**
2702 53rd St.
Des Moines, Ia.
Des Moines 9-6936
Boyt Harness Co.

• **Bredenbeck, Richard**
6800 Madison Ave.
Cleveland, Ohio
Woodbine 1-9191
Advance Die & Tool Co.

• **Breidenbach, K. Richard**
460 West Hudson Ave.
Dayton 6, Ohio
Taylor 1490
C. Palmer Boyles & Associates

• **Brew, G. J.**
6900 Jefferey Ave.
Chicago 49, Ill.;
4433 Corinth Drive
Dayton, Ohio
Olive 2905
Scott Aviation Corp.
Mid-Continental Metal Products

• **Brick, Theodore**
44 So. Ludlow St.
Dayton, Ohio
Hemlock 7071
Greer Hydraulics, Inc.

• **Briggs, Norman E.**
500 Third Natl. Bank Bldg.
Dayton 2, Ohio
Adams 9115
Stratos div., Guided Missiles div., Engine div., Fairchild Engine & Airplane Corp.

• **Bryten, W. E.**
1738 Tennessee Ave.
Cincinnati, Ohio
Elmhurst 1100
Timken Roller Bearing Co.

• **Brown, H. C.**
3682 Saybrook Ave.
Cincinnati 8, Ohio
East 4713
Independent Pneumatic Tool Co.

• **Brown, Robert E.**
1635 Newton Ave.
Dayton 6, Ohio
Randolph 5950
United Aircraft Products, Inc.

• **Brubaker, D. D.**
Box 537 Far Hills
Dayton 9, Ohio
Walnut 5373
Mead Aviation Equipment Co., Thermoid Corp.
Aerial Machine & Tool Corp.
United Truck & Equipment Co.
Electronic Measurements Co.

• **Buehler, John L.**
1458 East 19th St.
Indianapolis 7, Ind.
Atlantic 2331
Indiana Gear Works, Inc.

• **Bunch, C. B.**
410 West First St.,
Dayton, O.
Michigan 3403
AiResearch Mfg. Co.

• **Burridge, John F.**
515 Hulman Bldg.
Dayton 2, O.
Hemlock 4213
United Aircraft Service Corp., Hamilton Standard div. United Aircraft Corp.

C

• **Calverts Co., N. W.**
1743 Chester Ave.
Cleveland 14, Ohio
Tower 1-2675
Marman Products Co.

• **Carragher, Harry A.**
4 South Main St.
Dayton 2, Ohio
Michigan 1051
General Tire & Rubber Co.

• **Carrell, William**
P. O. Box 350
Akron, Ohio
Meadowbrook 3224
Chamberlain Aviation, Inc.

• **Carroll, W. J.**
19380 West Dover Road
Rocky River
Cleveland, Ohio
Edison 1-6817
Eberhard Faber Pencil Co.

• **Charbonneaux, W. A.**
35 South St. Clair St.,
Dayton 2, O.
Fulton 6113
Wac Engineering Co.

• **Chase, Stanley**
602 Harries Bldg.
Dayton 2, Ohio
Michigan 0767
North American Aviation, Inc

• **Christensen, I. G.**
411 Piquette Ave.
Detroit 2, Mich.
Trinity 5-7111
Minnesota Mining & Mfg. Co.

• **Clymer, Roy B.**
2304 Roanoke Ave.
Dayton 9, Ohio
Walnut 7928
Acushnet Process Co.

• **Coburn, Robert H.**
1921 Arlene St.
Dayton 6, Ohio
Randolph 5366
Weltronic Co.

• **Cocagne, Art**
434 Merchants Bank Building
Indianapolis, Ind.
Imperial 6481-2
Wm. R. Whittaker Co., Ltd.

• **Coleman, R. L.**
801 Brandt St.
Dayton, Ohio
Michigan 4777.
Shell Oil Co.

• **Collins, Hull R.**
P. O. Box 811
Dayton, Ohio
Madison 0913
Lyon Metal Products, Inc.

• **Condit Co., R. E.**
P. O. 365
Dayton 1, Ohio
Silent Hoist & Crane Co.

• **Condon, R. J.**
1441 Milburn Ave.,
Dayton 4, O.
Adams 8289
Minneapolis-Honeywell Regulator Co.

• **Conley, Irvin A.**
R. R. 2, Box 145
Tipp City, Ohio
Tipp City 8928
A. O. Smith Corp. (Eastern Motor division)

• **Contract Service Organization**
143 Brown St.
Dayton 2, Ohio
Hemlock 8377
Best Manufacturing Co., Inc.
Connecticut Telephone & Electric Corp.
Geco, Inc.
Gedro, Inc.
Heyer Products Co., Inc.
Kalart Co., Inc.
Lysco Manufacturing Co., Inc.
Metalcraft Engineering Co.
Propeller Service Corp.
Rano Machine & Tool Corp.
Renwar, Inc.
S. M. S. Instrument Sales & Service, Inc.
Van Dusen Aircraft Supplies, Inc.

• **Cook, R. R.**
2076 Elston Ave.
Chicago 14, Ill.
Armitage 6-6900
Small Motors Inc.

• **Cook, Vernon A.**
3520 West Carroll Ave.
Chicago 24, Ill.
Sacramento 23710
Metallizing Corp. of America

• **Cosby, J. T.**
719 Hulman Bldg.
Dayton 2, O.
Hemlock 4671
Consolidated Vultee Aircraft Corp.

• **Copeland, Edward L.**
725 Grand Ave., Apartment 321
Dayton, Ohio
Adams 4022

• **Corcoran, John F.**
14321 Curtis St.
Detroit 35, Mich.
University 3-9688
Zoerman-Clark Mfg. Co.

• **Cowell, W. G.**
Roselawn Center Building
7373 Brookcrest Drive
Cincinnati Building
Pittsburgh 22, Pa.
Crouse-Hinds Co.

• **Cox, Claude E.**
20 Bartlett Ave.
Detroit 3, Mich.
To 8-0778
Commercial Research Laboratories, Inc.

• **Crane, W. B.**
15 Ferry St.
Pittsburgh 22, Pa.
Fairbanks Co.

• **Crawford, David**
110 Dietz Road
Warren, O.
American Welding & Mfg. Co.

• **Crews, Marion P.**
1004 Harries Building
Dayton 2, Ohio
Hemlock 7466
Boeing Airplane Co.

- **Cruise, Henry R.**
  438 McIntire Drive
  Fairborn, Ohio
  MO 8-6206
  Canadian Ltd.

- **Crum, R. M.**
  920 East McMillan St.
  Cincinnati, Ohio
  Capitol 3497
  Fafnir Bearing Co.

- **Cunningham, Harold W.**
  619 North Murray St.
  Springfield, O.
  Springfield 2-8280
  General Communication Co.

- **Cyester, Robert W.**
  440 Maricarr Ave.
  Dayton 9, Ohio
  Walnut 9744
  Tech Art

D

- **Dadisman, Roy L.**
  826 Cincinnati St.,
  Dayton 8, O.
  Adams 6258
  Victor Adding Machine Co.

- **Dahlen, Paul**
  69 So. Walnut St.
  Mansfield, Ohio
  Mansfield 2-3336
  Stevens Mfg. Co.

- **Dalton, W. W.**
  238 Lafayette St.
  Dayton 2, Ohio
  Michigan 8871
  Lord Manufacturing Co.

- **Daugherty, F. A. Co.**
  100 Woodrow Ave.
  Bedford, Ohio
  Bedford 2-2231
  Radio Apparatus Corp.

- **Davies, I. P.**
  1270 McCook Ave.
  Dayton 4, Ohio
  Hemlock 8386
  Allegheny Ludlum Steel Corp.

- **Davis, Hugh F.**
  1023 Scott St.
  Covington, Ky.
  Axtel 4546
  Advertising Displays, Inc.

- **Davis, J. I.**
  116 North Broadway
  Medina, Ohio
  Medina 26182
  Conmar Products Corp.

- **Dayton Aviation Radio & Equipment Co.**
  Dayton Municipal Airport
  Vandalia, Ohio
  Vandalia 4-4627
  Flite-Tronics, Inc.

- **Deak, Frank**
  400 Dublin Ave.
  Columbus 16, Ohio
  Main 6492
  Janitrol Aircraft Automotive div.
  Surface Combustion Corp.

- **Dean, Duane**
  900 Warrington Place
  Dayton 9, Ohio
  Walnut 4844
  Walter Kidde & Co., Inc.

- **Deerwester, Allyn L.**
  1132 Gilbert St.
  Cincinnati, Ohio
  Garfield 9217
  Skil Saw, Inc.

- **Deluhery, Pat J.**
  Room 622, 25 South Main St.
  Dayton 2, Ohio
  Hemlock 7859
  Admiral Corp.

- **Dempsey, Byron C.**
  Hotel Moraine
  Dayton 2, O.
  Adams 7241

- **Denemark, Stuart**
  249 Montrose Way
  Columbus 2, Ohio
  Ludlow 1729
  Andrew Brown Co.

- **Desbro, G.**
  46 Cushing Ave.
  Dayton 9, Ohio
  Oxmoor 1531
  Birtman Electric Co.
  Fitzpatrick Bros., Inc.
  Mystik Adhesive Products
  Permo, Inc.
  Radiation Counter Laboratories, Inc.
  Wheaton Engineering Corp.

- **Dettlinger, F. W.**
  211 Leib St.
  Detroit, Mich.
  Lorain 7-5000
  Berry Brothers, Inc.

- **Dichman, Ernest W.**
  401 Third National Bldg.
  Dayton 2, O.
  Hemlock 8381
  United Aircraft Service Corp.
  Pratt & Whitney Aircraft div.

- **Di Matteo, John I., Jr.**
  509 Montgomery St.
  Miamisburg, Ohio
  Miamisburg 6-3290
  W. F. Hausman Co.

- **Dircksen & Landis**
  1448 Vancouver Drive
  Dayton 6, O.
  Oregon 4763
  Daniel Woodhead Co.
  J. G. McAlister, Inc.
  Pryor Mfg. Co.
  Liberty Electric Co.
  Barnes Mfg. Co.
  Davies Laboratories
  W. A. Apple Textile Mfg. Co.
  American-LaFrance-Foamite Corp.
  Aero Motive Manufacturing Co.
  General Industries
  United States Testing Co., Inc.
  Carter Parts Co.
  Eastern Rotocraft Corp.
  Justrite Mfg. Co.
  Lonergan Mfg. Co.
  Photographic Products, Inc.
  Standard Thomson Corp.
  Valentine, Inc.

- **Disser, Milton E.**
  428 New Center Building
  Detroit 2, Mich.
  TR 1-5410
  Tubing Seal Cap, Inc.

- **Dowling, Robert J.**
  6600 Metta Ave.
  Cleveland 14, Ohio
  Utah 1-7500
  Federal-Mogul Corp.

- **Drake, G. F.**
  5001 North Second St.
  Rockford, Ill.
  7-7441
  Woodward Governor Co.

- **Duncan, George**
  5900 Maurice
  Cleveland, Ohio
  Michigan 1-2880
  Ohio Electric Mfg. Co.

- **Dunn, A. W.**
  263 Talbott Bldg.
  Dayton 2, O.
  Michigan 8301
  Goodyear Tire & Rubber Co., Inc.

- **Durham, Eugene E.**
  3350 Felicity Drive
  Cincinnati 11, O.
  Montana 0183
  Cutler-Hammer, Inc.

E

- **East, Frank D.**
  509 Evans Building & Loan
  Akron, Ohio
  Franklin 9178
  Dill Mfg. Co.

- **Egbert, Harry**
  328 Claranna
  Dayton, Ohio
  Walnut 9767
  Axelson Mfg. Co.

- **Ehlers Co., Arthur L.**
  49 Central Ave
  Cincinnati, Ohio
  Murray Mfg. Corp.

- **Emig, Ralph**
  Room C-19m, Roselawn Center Bldg.,
  Cincinnati 37, O.
  Elmhurst 1410
  Panelyte division, St. Regis Sales Corp.

- **Epps and Fedotin**
  1434 Vancouver Drive
  Dayton 6, Ohio
  Taylor 9345 & Walnut 1281
  Reeves Instrument Corp.
  Hoffman Radio Corp.
  American Fixture & Manufacturing Corp.
  Reeves-Hoffman Corp.
  Brach Manufacturing Corp.
  Electronic Transformer Co.
  Edwin I. Guthman & Co.
  Tobe Deutschmann Corp.
  Roanwell Corp.
  Walter L. Schott Co.
  Bell Sound Systems
  Electronic Specialty Co.

- **Evison, S. J.**
  Hotel Biltmore
  Dayton, Ohio
  Adams 2161
  Electric Auto Lite Co.

- **Eyer, Forrest**
  1708 Englewood Ave.
  Akron, Ohio
  Stadium 5411
  General Tire & Rubber Co.

F

Fallon, Joseph
81 E. State St., Rm. 714
Columbus 15, Ohio
Adams 5683
General Controls Co.

- **Farr, Everett D.**
  311 Oakwood Place
  Springfield, Ohio
  Springfield 34725
  Garan Chemical Co.
  International Rectifier Corp.
  Irvington Varnish & Insulator Co.
  Robert B. Taylor Engineering
  S & M Lamp Co.
  Zenith Plastics Co.

- **Fersch, Kenneth E.**
  Talbott Bldg.
  Dayton 2, O.
  Michigan 0373
  Curtiss-Wright Corp., Propeller division

- **Finley, Thomas D.**
  Van Cleve Hotel
  Dayton 2, Ohio
  Fulton 6131
  Capehart-Farnsworth Corp.

- **Fischer, Walter J.**
  113 East Third St.
  Dayton 2, Ohio
  Fulton 6175
  Roth Office Equipment Co.

- **Fishburn, Howard**
  Williams & Co., Inc.
  3231 Fredonia Ave.
  Cincinnati 31, Ohio
  Capital 3000
  Ansul Chemical Co.

- **Flinn, Donald E.**
  1420 Hulman Bldg.
  Dayton 2, O.
  Adams 8154
  Adel division, General Metals Corp.

- **Foley, E. J.**
  9619 Glencrest Ave.
  Kensington, Md.
  Oliver 3935

- **Fox, Arthur W.**
  22 Spring Valley Road
  Paramus, N. J.
  Hubbard 9-4900
  Camloc Fastener Corp.

- **Fox, Nina**
  206 Shiloh Springs Road
  Dayton 5, Ohio
  Taylor 1521
  Trad Television Corp.

- **Franks, James R.**
  531 Hulman Bldg.
  Dayton 2, O.
  Adams 7215
  Ford Motor Co.

- **Freiburger, Charles F.**
  803 Third National Bldg.
  Dayton 2, Ohio
  Hemlock 6631
  Bohn Aluminum & Brass Corp.

- **Fryman, T. E.**
  217 Talbott Building
  Dayton 2, Ohio
  Fulton 4661
  Land-Air, Inc.
  California Eastern Airways, Inc.

G

- **Gagel, J. Frederick**
  933 E. Shantz Ave.
  Dayton 9, Ohio
  G. M. Giannini & Co., Inc.

- **Garber, Thomas H.**
  430 Munsey Building
  Washington 4, D. C.
  Executive 5412
  General Textile Mills, Inc.

- **Garlati, Emil V.**
  1108 W. Fifth St.
  Marion, Ind.
  4810
  Alloy Products Co.

- **Gaskins, Orvin K.**
  220 South Belmont Ave.
  Indianapolis 6, Ind.
  Market 5411
  Link-Belt Co.

- **George, E. C.**
  815 Harmon Ave.
  Dayton 9, Ohio
  Oxmoor 2901
  Hannifin Corp.

- **Gerhardt, Ruth**
  R. R. 11, Box 573
  Dayton 9, Ohio
  Fulton 2034
  American Optical Co.
  Bill Jack Scientific Instruments Co.
  Portable Electric Tools, Inc.

- **Gerrard, Jerry**
  808 U. B. Building
  Dayton 2, Ohio
  Michigan 9904

- **Getsinger, Floyd L.**
  111 Vermont Ave.,
  Cincinnati, O.
  Poplar 1408
  Buick Motor division, General Motors Corp.

- **Giffin, Earl L., Jr.**
  Box 519, Far Hills Branch
  Dayton 9, Ohio
  Walnut 8813
  Flexfirm Products
  Safe Flight Instrument Corp.
  Chemical Products Co.

- **Goodbar, Robert F.**
  Room 302, 11 West Monument Ave.
  Dayton 2, O.
  Adams 5155
  Gray Mfg. Co.

- **Goodwin, Robert P.**
  306 Harries Bldg.
  Dayton 2, O.
  Hemlock 1112
  Aluminum Company of America

- **Goold, H. F.**
  6611 Euclid Ave.
  Cleveland 3, Ohio
  Cities Service Oil Co.

- **Gordon, Donald**
  710 South Noble St.
  Shelbyville, Ind.
  112
  Nukraft Manufacturing Co.

- **Gosiger, C. H. Machinery Co.**
  Bacon & McDonough St.
  Dayton 2, Ohio
  Fulton 5174
  O'Neil-Irwin Mfg. Co.

- **Gower, John W.**
  142 West Second St.
  Dayton 2, Ohio
  Michigan 1231
  Seaboard and Western Airlines

- **Graham, James A., Jr.**
  6000 Avalon Boulevard
  Los Angeles 3, Calif.
  Adams 4-9131
  Century Metalcraft Corp.

- **Griffin, Jr., Earl E.**
  2726 Ronoake Ave.
  Dayton 9, Ohio
  Walnut 8813
  Plastoid Corp.

- **Griggs, J. W.**
  1145 Galewood Drive
  Cleveland, Ohio
  Glenville 1-4800
  Marquette Metal Products Co.

- **Grimm, A. N.**
  1731 Ruskin Road
  Dayton 6, Ohio
  Oregon 1496
  Vectron, Inc.
  Wilcox Electric Co., Inc.
  Airtron, Inc.
  Heppner Manufacturing Co.

- **Groover, Edward P.**
  300 Buhl Building
  Detroit 31, Mich.
  Woodward 3-2290
  United States Radiator Corp.

H

- **Hackney, W. W.**
  238 Lafayette St.,
  Dayton 2, O.
  Hemlock 6385
  W. W. Hackney Co.

- **Hall, Chas. L.**
  Talbott Bldg.
  Dayton, O.
  Michigan 3886
  Bell Aircraft Corp.

- **Hall, Robert T.**
  2196 Clarkwood
  Cleveland, Ohio
  Henderson 1-6765
  Thompson Products, Inc.

- **Hall, William P.**
  311 Wiltshire Boulevard
  Dayton 9, Ohio
  Oxmoor 2085
  International Powder Metallurgy, Inc.
  Detroit Macoid Corp.
  American Rivet and Manufacturing Co.
  Coast Paint & Chemical Co.
  Aero-Cal Engineers, Inc.

- **Haller, C. T.**
  Carew Tower
  Cincinnati, Ohio
  Parkway 1631
  International Nickel Co.

- **Hallin, J. G.**
  2421 11th St.
  Rockford, Ill.
  2-4477
  Sundstrand Machine Tool Co.

- **Halperin, Joseph**
  58 Oxford Place
  Staten Island, N. Y.
  Gibraltar 8-1852
  Aeroil Products Co., Inc.

- **Harbison, Richard W.**
  1610 Windsor Road
  Dayton 6, Ohio
  Cook Electric Co.
  Cook Research Laboratories, division of Cook Electric Co.
  Inland Testing Laboratories, division of Cook Electric Co.

- **Hardy, Russell F.**
  Hulman Building
  Dayton 2, Ohio
  Hemlock 1265
  Delron Co., Inc.
  Screw Products Corp. of America
  Rosan, Inc.
  Fredric Flader, Inc.
  Young Development Laboratories, Inc.
  Control Products, Inc.

- **Harper, H. R.**
  307 North Michigan Ave.
  Chicago 1, Ill.
  Randolph 6-5353
  Cardox Corp.

- **Harrigan, John F.**
  410 West First St.
  Dayton 2, Ohio
  Fulton 5082
  Lear, Inc., Romec div.

- **Hart, Lee**
  3031 Middlesex Drive
  Toledo 6, Ohio
  Lawndale 1012
  John Hassall, Inc.

- **Hartley, Samuel H.**
  293 Eighth Ave.
  New York 1, N. Y.
  WA 4-5085
  General Electronic Devices

- **Hartmann, A. W.**
  175 N. Diamond St.
  Mansfield, Ohio
  Mansfield 3-2016 & 7-5006
  Hartmann Electrical Mfg. Co.

- **Haskell, Charles P.**
  401 Patterson Road
  Dayton 9, Ohio
  Michigan 4713
  Herman Nelson division, American Air Filter Co., Inc.
  William E. Wright & Sons Co.
  Rheem Manufacturing Co.

- **Hassman, Harold M. & Associates**
  Harold M. Hassman
  L. E. Scott
  1844 South Smithville Road
  Dayton 10, O.
  Olive 2313 & Madison 5695
  Exline Engineering Co.
  Harvey-Wells Electronics, Inc.
  Coleman Instrument Mfg. Co.
  Pacific Electricord Co.
  Variety Aircraft Corp.
  Frampton Electrical Equipment Co.
  A. D. Barnes Co.
  Camfield Mfg. Co.
  Press Wireless Mfg. Co., Inc.

- **Haun, B. O., Jr.**
  523 Hadley Ave.
  Dayton 9, O.
  Walnut 0414
  Spencer Thermostat Division Metals and Controls Corp.

- **Hause, Allan E. & Co.**
  132 North Main St.,
  Dayton 2, O.
  Michigan 8383
  Chicago Blower Corp.
  DeBothezat Fans division
  Northern Blower Corp.
  Western Engineering Co.
  Sutorbilt Corp.
  International Engineering, Inc.

- **Hazlett, W. D.**
  1444 Cory Drive
  Dayton 6, Ohio
  Randolph 1029
  Pacific division, Bendix Aviation Corp.
  American Meter Co., Inc.
  Aircraft Mechanics, Inc.
  Gyrodyne Company of America, Inc.
  W. L. Foster Sportswear Co., Inc.
  Benson Manufacturing Co.

- **Hazerodt, H. B.**
  416 Ford Bldg.
  Detroit, Mich.
  Woodward 1-8430
  Drake Engine Co.

- **Heaton, John L.**
  1904 Grand Ave., Apartment 3
  Dayton 7, Ohio
  Randolph 2484
  Fogarty Manufacturing Co.

- **Heckman, Paul J.**
  53 South Harbine Ave.,
  Dayton 3, O.
  Madison 8490
  Master Electric Co.

- **Heitz, A. S.**
  126 West First St.
  Dayton 2, Ohio
  Hemlock 7846
  IBM Corp.

- **Helmuth, Louis W., Jr.**
  424 West Schantz Ave.,
  Dayton 9, O.
  Oxmoor 1059
  Republic Aviation Corp.

- **Hendricks, Robert**
  59 Central #409
  Dayton, O.
  Fulton 7739
  Hydro-Aire Inc.

- **Henry, G. T.**
  13233 Euclid Ave.
  Cleveland 12, Ohio
  Glenville 1-6068
  Cordox Corp.

- **Herrman, Edgar A.**
  226 South Ludlow St.
  Dayton 2, O.
  Hemlock 4027
  SoundScriber Corp.

- **Hess, A. J.**
  5930 Vancouver Ave.
  Detroit 4, Mich.
  Tyler 4-1500
  Holley Carburetor Co.

- **Hewitt, Paul W.**
  406 Delwood Ave.
  Dayton, Ohio
  Walnut 2522
  Chicago Pneumatic Tool Co.

- **Hickerson, Clark**
  211 South Main St.,
  Dayton 2, O.
  Hemlock 6359
  Solar Aircraft Co.

- **Hirsch, G. B.**
  1501 W. Congress St.
  Chicago, Ill.
  Ch 3-1234
  Eicor Inc.

- **Hjermstad, H. U.**
  946 North Ave.
  Des Plaines, Ill.
  Rodney 3-0047
  Electro-Seal Corp.

- **Hobstetter, James P.**
  1904 Brown St.
  Dayton 9, Ohio
  Adams 3690
  Hycon Mfg. Co.

- **Hobstetter, Paul R.**
  Service Equipment Co.
  4500 Euclid Ave.
  Cleveland, Ohio
  Magnetic Amplifiers Inc.

- **Hoener, Earle K.**
  1602-23rd St.
  Detroit 16, Mich.
  Tashmoo 5-0395
  Langlois Gauge Co.

- **Homan, John**
  829 Federal Reserve Bank Bldg.
  Cincinnati, O.
  Main 5387
  Binks Mfg. Co.

- **Hooker, Robert**
  2480 Bellevue Ave.
  Detroit 7, Mich.
  Walnut 1-6207
  Huck Mfg. Co.

- **Hopkins, Frederick**
  3781 East 77th St.
  Cleveland, Ohio
  Diamond 1-1700
  Cleveland Pneumatic Tool Co.

- **Howard, Hans**
  Hulman Building
  Dayton, Ohio
  Revere Copper & Brass Inc.

- **Howard, Roy M.**
  Hanna Bldg.
  Cleveland 15, Ohio
  Main 1-9392
  Telex Inc.

- **Howard, Thomas E.**
  144 Napoleon Drive
  Dayton 9, O.
  Walnut 9647
  Remington Rand, Inc.

• **Huber, J. G. E.**
P. O. Box 57
Price Hill Station
Cincinnati, Ohio
Arens Controls, Inc.

• **Huff, Dempsey B.**
1904 California Ave.
Dayton 9, Ohio
Oxmoor 1930
Hammond Manufacturing Corp.

• **Huggins, E. C.**
621 Salem Ave.,
Dayton, O.
Taylor 7427
Salem Camera Shop

• **Humble, J. H.**
4201 Wrightwood Ave.
Chicago 39, Ill.
Belmont 5-1601
Kester Solder Co.

• **Huntley, O. J.**
16 East Thruston Blvd.
Dayton 9, O.
Walnut 3861
Ex-Cell-O Corp.

• **Hussey, Paul H.**
1919 Hilton Drive
Dayton 9, Ohio
Oxmoor 1149
Aerovox Corp.
Anken Chemical & Film Corp.
Webber Appliance Corp.
Flightex Fabrics, Inc.
G. Felsenthal & Sons, Inc.
Gates Engineering Co.
J-B-T Instruments Co.

King Electric Equipment Co.
Remler Company, Ltd.
Robinson Aviation Co.
Triplett Electric Instrument Co.
U. S. Lens Corp.

• **Hyland, C. L.**
1007 Commercial Building
Dayton 2, Ohio
Adams 7521
Michigan Steel Tube Products Co.

I

• **Ihrig, G. F.**
12800 Shaker Blvd.
Cleveland, Ohio
Wyoming 1-7000
Wellman Bronze and Aluminum Co.

J

• **Jackson, Frederick P.**
R. R. 2, Station Road
Centerville, Ohio
MO 7-7689 (Dayton exchange)
Bendix Products division, Bendix Aviation Corp.

• **Jay, Joseph**
1517 East Third St.
Dayton 3, Ohio
Michigan 9668
Jay Engineering Co.
Aerotec Corp.
Aerotherm Corp.
Barry Corp.
Burton Electrical Engineering Co.
Joseph Pollak Corp.
Leach Relay Co.
Mechanical Products, Inc.
Miller Dial & Name Plate Co.
Seaboard Electric Co.

• **Jenkins, V. P.**
158 Green Rd.
South Euclid 21, Ohio
Evanhoe 7417
MacWhyte Co.

• **Jensen, Leonard**
3738 Lesley Ave.
Indianapolis, Ind.
Cherry 1649
Albertson & Co.

• **Johns, E. C.**
Box 137, Macedonia, Ohio
Northfie'd 208R1
Jack & Heintz, Inc.

• **Johnson, M. E.**
729 Federal Reserve Bank Bldg.
Cincinnati 2, Ohio
Cherry 5178
Whiting Corp.

• **Johnson, Thomas D.**
462 Forest Ave.,
Dayton 5, O.
Hemlock 4830 & 6026
Sikorsky Aircraft div., United Aircraft Corp.

• **Jones, Wyford, D.**
1160 Dublin Road
Columbus, O.
Kingswood 1191
Denison Engineering Co.

• **Jordan, W. M.**
1205 West Columbia St.
Springfield, Ohio
Springfield 5-1541
Steel Products Engineering Co.

K

• **Kalitta, Karl**
21535 Groesbeck Highway
Detroit, Mich.
Lakeview 6-1020
Warner Div., Clinton Machine Co

• **Katzenberger, G. A.**
2153 Hillside Ave.
Indianapolis, Ind.
Hickory 9284
Klincher Locknut Corp.

• **Keichel, Harold**
5900 Maurice
Cleveland, Ohio
Michigan 1-2880
Ohio Electric Mfg. Co.

• **Kellhofer, Robert W.**
Third National Bank Bldg.
Dayton 2, O.
Adams 9114
Fairchild Engine & Airplane, Corp., Guided Missiles div.; Aircraft div.

• **Kendell, Fred J.**
943 Five Oaks Ave.
Dayton 6, Ohio
Taylor 8788
Hunter Manufacturing Co.
Joyce-Cridland Co.
A. J. Miller Co.
Standard Container, Inc.

• **Kenny, William H.**
768 North Riley St.
Indianapolis, Ind.
Blackstone 8953
D. L. Stone Industrial Equipment, Inc.

• **Kerr, Ken W.**
42 North Main St.
Dayton 2, Ohio
Hemlock 8303
United States Rubber Co.

• **Kershner, George W.**
27 Carson Ave.
Dayton 5, Ohio
Taylor 4953
Belnap & Thompson, Inc.

• **Kilham, C. D.**
605 American Building
Parkway & Walnut St.
Cincinnati, Ohio
Dunbar 0400 & 0401
Norma-Hoffmann Bearing Corp.

• **Kincaid, Thomas J.**
115 Bellaire Ave.,
Dayton 10, O.
Kenmore 1185
Knapp Monarch Co.

• **King, Cameron W.**
Wright-Patterson AFB
Dayton, Ohio
Ex. 20186, 70109
Scintilla Magneto div.

• **Klairn, Walter V.**
Municipal Airport
Vandalia, Ohio
Vandalia 4-4661
Aeroproducts div., General Motors Corp.

• **Klein, William**
1472 Earlham Drive
Dayton 6, Ohio
Randolph 0943
Collins Radio Co.
Shure Bros., Inc.

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United Transformer Co.
Ampercx Electronic Corp.

• **Kleinhans, Lou**
3862 Ridge Ave.
Dayton 4, Ohio
Randolph 2770
Lempco Products, Inc.

• **Kleinmaier, George G.**
954 Sherwood Drive
Dayton 6, Ohio
Taylor 4383
Dejur-Amsco Corp.
Curtis Laboratories, Inc.
Sam Tour & Co., Inc.
South Florida Test Service
Wassell Organization, Inc.

• **Knaul, Charles E.**
115 East Third St.
Dayton 2, Ohio
Fulton 6175
Roth Office Equipment Co.

• **Knight, John P.**
P. O. Box 1166
Pittsburgh 30, Pa.
Express 1-2400
Gulf Oil Corp.

• **Knott, James E.**
53 West Peach Orchard Road
Dayton, Ohio
Walnut 0857
Allison division, General Motors Corp.

• **Koenig, W. C.**
1221 Third National Bank Bldg.
Dayton 2, O.
Michigan 6061

• **Kretschmer, Richard**
1109 West Dorothy Lane
Dayton, O.
Walnut 5784
Diamond Tool & Die Co.

- **Kunkler, L. E.**
  3520 West Carroll Ave
  Chicago 24, Ill.
  Sacramento 2-3710
  Metallizing Corp. of America.

L

- **Lakin, Art**
  Suite 556,
  Pureoil Building
  35 East Wacker
  Chicago 1, Ill.
  Central 6-3034
  Harvey Machine Co., Inc.

- **Lamount, H. W.**
  Van Cleve Hotel
  Dayton, Ohio
  Kollsman Instrument Corp.

- **Lane, John**
  4647 West Van Buren St.
  Chicago, Ill.
  Estebrook 8-1000
  Belden Mfg. Co.

- **Larned, A. T., Jr.**
  129 North Ludlow St.
  Dayton 2, Ohio
  Michigan 9886
  Owens Corning Fiberglas Corp.

- **Laufle, C. W.**
  Encorse, Detroit, Mich.
  Vinewood 3-8000
  Great Lakes Steel Corp.

- **Lavery, Thomas F.**
  103 East Norwich Ave.
  Columbus, Ohio
  Un 4988
  Beckmann Instruments, Inc.

- **Lavery, W. A.**
  3781 East 77th St.
  Cleveland, Ohio
  Diamond 1-1700
  Cleveland Pneumatic Tool Co.

- **Lee, Walter G.**
  410 West First St., Room 205
  Dayton 2, O.
  Adams 8513
  Rohm & Haas Co.

- **Lell, E. J.**
  19345 John R St.
  Detroit 3, Mich.
  Twinbrook 3-3800
  Wall Colmonoy Corp.

- **Leupold, George L.**
  326 East Drive
  Dayton 9, O.
  Walnut 2905
  Robertshaw-Fulton Controls Co.

- **Lingler, Louis H.**
  417 West First St., Apt. 31
  Dayton 2, Ohio
  Adams 6835
  Acme Aluminum Alloys, Inc.

- **Linn, Carl F.**
  Hanna Building
  Cleveland 15, Ohio
  Cherry 1-0492
  Watertown Manufacturing Co.

- **Liska, W. R.**
  4305 West 24th Pl.
  Chicago 23, Ill.
  Lawndale 1-5124
  Wittek Mfg. Co.

- **Lodge, R. A.**
  318 Midland
  Detroit, Mich.
  To 8-3900 Ext. 268
  Robbins Eng. Co.

- **Lombard, John A.**
  P. O. Box 481
  Dayton, O.
  Taylor 6336
  Boots Aircraft Nut Corp.
  Plasteck, Inc.
  Beatrice Steel Tank Mfg. Co.

- **Lott, G. Richard**
  Third National Bldg.
  Room 815
  Dayton, Ohio
  Hemlock 5692
  Michigan 8351
  Marquardt Aircraft Corp.
  Reaction Motors, Inc.

- **Loveland, E. B.**
  850 West Main St.
  Kent, Ohio
  Kent 3431
  Twin Coach Co.

- **Luckey, William F.**
  600 West Jackson Blvd.
  Chicago, Ill.
  T. W. & C. B. Sheridan Co.

- **Lueke, H. F.**
  Remington-Rand
  20 Jefferson St.
  Dayton 2, Ohio
  Michigan 0755
  Prestoseal Mfg. Corp.

- **Lutz, S. K.**
  West 117th & Madison Ave.
  Cleveland, Ohio
  Lakewood 1-4000
  National Carbon Co., div. of Union Carbon & Carbide Corp.

M

- **Mack, J. M.**
  1347 Amherst Pl.
  Dayton, Ohio
  Taylor 5236
  E. I. Du Pont de Nemours & Co., Plastics div.

- **MacMillan, I. H.**
  Hotel Dayton-Biltmore
  Dayton 2, O.
  Adams 2161
  Eclipse-Pioneer division, Bendix Aviation Corp.

- **Magee, E. E.**
  4905 Lindbergh Rd.
  Dayton 9, Ohio
  Westcarrollton 3-4270
  Cannon Electric Co.
  Pacific Moulded Products Co.

- **Magyari, Peter**
  19159 John R St.
  Detroit 3, Mich.
  Forest 6-1400
  Ryan Industries, Inc.

- **Main, W. B.**
  1400 Oakman Blvd.
  Detroit 32, Mich.
  Townsend 8-5100
  Vickers Inc.

- **Mann, Neil W.**
  Box No. 29
  Ravenna, Ohio
  Ravenna 7533
  Allen Aircraft Products, Inc.

- **Mansfield, Bruce A.**
  2244 Rugby Ave.
  Dayton, O.
  Randolph 2602

- **Manufacturer's Introductory Service**
  (Don N. Bridges & Vernon E. Midgey)
  1417 Wilmington Pike
  Dayton 9, Ohio
  Walnut 1113 & 1114
  Beaumont & Crandall, Inc.
  Engineering Research Associates, Inc., subsidiary of Remington Rand, Inc.
  Gray Co., Inc.
  Northern Radio Co.
  North American Philips Co., Inc.
  Pro-phy-lac-tic Brush Co., Pro-lon division
  Stainless & Steel Products Co.
  Talon, Inc.
  Pilot Radio Corp.

- **Marvin, N. L.**
  5700 Roosevelt Rd.
  Chicago 50, Ill.
  Columbus 1-0300
  Pheoll Manufacturing Co.

- **Matlock, Ray**
  655 North Cassady Ave.
  Columbus 3, Ohio
  Nylok Corp.

- **Maus, Burns**
  900 Upton
  Toledo, Ohio
  Jordon 3711
  Champion Spark Plug Co.

- **Mayers, D. A.**
  Anchorage, Ky.
  Anchorage 349
  Reynolds Metals Co.

- **McAuliffe, Ted**
  1442 Philadelphia Drive
  Dayton, Ohio
  Oregon 5515
  Bowser, Inc., and subsidiaries

- **McCardle, John P.**
  302 Ryburn Ave.,
  Dayton, O.
  Randolph 5541
  Minneapolis-Honeywell Regulator Co.

- **McCluskey, Roy E.**
  Peoria, Ill.
  Peoria 3-4521
  R. G. LeTourneau, Inc.

- **McCorkle, E. E.**
  1033 West Van Buren St.
  Chicago 7, Ill.
  Hai 4300
  Automatic Electric Sales Corp.

- **McCutcheon, Lowell**
  300 Taylor St.,
  Dayton 1, O.
  Adams 1161
  Frigidaire division, General Motors Corp.

- **McDaniel, Phillip C.**
  11 West Monument Ave., Room 302
  Dayton 2, Ohio
  Fulton 1502
  Varo Manufacturing Co., Inc.

- **McDonnell, E. G.**
  Route 7, Box 605
  Dayton 9, Ohio
  MO 7-7370
  PSP Engineering Co.

- **McGregor, David**
  1620 East Pleasant St.
  Springfield, Ohio
  Springfield 1-9151
  Western Tool & Mfg. Co.

- **McGuire, J. G.**
  410 West First St.,
  Dayton 2, O.
  Hemlock 6931
  Firestone Tire & Rubber Co.

- **McIlrath, Robert J.**
  416 West First St.
  Dayton 2, Ohio
  Michigan 6883
  Raytheon Manufacturing Co.

- **McIntosh, H. H.**
  263 Talbott Bldg.,
  Dayton 2, O.
  Michigan 8301
  Goodyear Aircraft Corp.

- **McKay, D. N.**
  417 West First St.,
  Dayton 2, O.
  Adams 9475
  Lycoming-Spencer division, Avco Mfg. Corp.
  Bridgeport-Lycoming division, Avco Mfg. Corp.

- **McLusky, John**
  Room C-19, Roselawn Center Bldg.,
  Cincinnati 37, O.
  Elmhurst 1410
  Panelyte division, St. Regis Sales Corp.

- **McNally, William P.**
  22 Seminary Ave.
  Dayton, Ohio
  Michigan 2232
  W. L. Maxson Corp.
  Langevin Mfg. Corp.
  Unimax Switch div.

- **McNary Engineering Service**
  Parkside Industries Bldg.,
  Springfield, O.
  Springfield 2-9432
  Etched Products Corp.
  Krouse Testing Machine Co.

- **McNett, Robert E.**
  504 West Second St.,
  Dayton 2, O.
  Michigan 6573
  Royal Electric, Inc.

- **McQuarrie, Harold R.**
  Peoria, Ill.
  Peoria 3-4521
  R. G. LeTourneau, Inc.

- **Meade, Herbert A.**
  441 Third National Bldg.
  Dayton 2, O.
  Hemlock 7405
  Fairchild Camera & Instrument Corp.

- **Merchant, Dale K.**
  127 South Main St.
  Dayton 2, Ohio
  Michigan 3171
  Dumont Aviation Associates
- **Merrill, P. Edward**
  11 West Monument Bldg.
  Room 413
  Dayton, Ohio
  Adams 1288
  American Latex Products Corp.
- **Merwin, Roy L.**
  601 E. Third St.
  Dayton 2, Ohio
  Fulton 3943
  General Electric Co., Electronics div.
- **Miller, Charles J.**
  118 West First St.
  Dayton 2, O.
  Adams 1263
  General Electric Co.
- **Miller, F. W.**
  332 South Michigan Ave.
  McCormick Bldg.
  Chicago 4, Illinois
  E. I. du Pont de Nemours & Co., Chemicals & Miscellaneous Sales div.
- **Miller, W. M.**
  221 Realty Building
  Dayton 2, Ohio
  Fulton 3991
  Monroe Calculating Machine Co., Inc.
- **Moerbeck, C. P.**
  1639 Keowee St.
  Dayton 4, Ohio
  Hemlock 5518
  Sun Electric Corp.
- **Mohn, Olaf**
  2725 Salem Ave.
  Dayton 6, Ohio
  Randolph 1898
  Optron Laboratory
- **Montgomery, R. J.**
  Warren, Ohio
  Warren 3-2101
  Packard Electric div., General Motors Corp.
- **Moore, Frank M.**
  2011 Orrington Ave.
  Evanston, Ill.
  University 4-2171
  Barco Manufacturing Co.
- **Morehead, J. B.**
  Room 809, Callahan Bldg.,
  Dayton 2, O.
  Michigan 7468
  Studebaker Corp.
- **Morton, Thomas**
  326 Ridgwood Ave.
  Dayton, Ohio
  Walnut 6-6451
  Purolator Products Inc.
- **Mosier, K. C.**
  18 West Monument
  Dayton, Ohio
  Michigan 9805
  Hansen Mfg. Co.
  Keller Tool Co.
- **Muller, J. B.**
  5366 Keyport Dr.
  Pittsburgh 27, Pa.
  Brandywine 1-1490
  Westinghouse Air Brake Co., Industrial Prod.
- **Mullin, A. C.**
  18 West Monument Ave.,
  Dayton 2, O.
  Michigan 9805
  K. C. Mosier Co.
- **Mullin, Stella**
  5 Lookout Drive
  Dayton, Ohio
  Walnut 7962
  Comptometer division—Felt & Tarrant Manufacturing Co.
- **Mulvaney, T. M.**
  1187 Gilbert Ave.
  Cincinnati 2, Ohio
  Cherry 7823
  U. S. Plywood Corp.

- **Munson, A. H.**
  277 South Hague Ave.
  Columbus 4, Ohio
  National Carbon Co., div. of Union Carbon & Carbide Corp.

- **Mustard, William L.**
  1117 Broad Blvd.
  Dayton, Ohio
  Michigan 3371
  Link Aviation, Inc.

N

- **Nafe, M. A.**
  36 East First St.,
  Dayton 2, O.
  Hemlock 3292
  Mars & Staff

- **Nagle, E. M.**
  320 Kenwood Ave.
  Dayton 5, Ohio
  Randolph 1814
  United States Steel Supply div., U. S. Steel Co.

- **National Requirements Service**
  619 Hulman Building
  Dayton 2, Ohio
  Hemlock 4711
  Aircooled Motors, Inc.
  American Helicopter Co., Inc.
  Arrowhead Rubber Co., division of National Motor Bearing Co., Inc.
  Cheney Brothers
  Ford Instrument Co., division of Sperry Corp.
  Pioneer Parachute Co.
  Brown and Mole, Inc.

- **Neal Bear Corp.—Jerry Kilroy**
  4052 Riverside Drive
  Dayton 5, O.
  Taylor 1545
  Cornell-Dubilier Electric Corp.
  Easy-Up Tower Co.
  Jerrold Electronics Corp.
  Leader Products
  McIntosh Engineering Laboratory
  Magnecord, Inc.
  Radiart Corp.
  Herman H. Smith, Inc.
  Switchcraft, Inc.

- **Needles, William F.**
  1402 Carolina Ave.
  Cincinnati, Ohio
  Melrose 1361
  Tech Laboratories

- **Noble, C. E.**
  P. O. Box 39
  LaGrange, Ohio
  LaGrange 190
  Despatch Oven Co.

- **Noonan, E. L.**
  131 N. Ludlow St.,
  Dayton 2, O.
  Michigan 0373
  Curtiss-Wright Corp.

- **Nordquist, R. G.**
  120 North Peoria St.
  Chicago, Ill.
  Se 8-4151
  Luminator, Inc.

- **Nugent, R. B.**
  6470 Montgomery Rd
  Cincinnatti 13, Ohio
  Melrose 1986
  Townsend Co.

O

- **O'Brien, Donald J.**
  24 N. Jefferson St., Room 400
  Dayton 2, O.
  Michigan 8251
  Singer Sewing Machine Co.

- **O'Connell, Patrick J.**
  655 Superior Ave.,
  Dayton 7, O.
  Oregon 3813
  Argus Industries, Inc.

- **O'Donnell, John D.**
  1999 Third National Bldg.
  Dayton, Ohio
  Adams 4575
  E. I. du Pont de Nemours & Co., Finishes div.

- **Ohmer, Frederic L.**
  437 Talbott Drive
  Dayton 9, Ohio
  Walnut 4530
  Lanagan & Hoke, Inc.
  Berkshire Electric Cable Co.
  J. B. Carroll Co.
  CBS-Columbia, Inc.
  Aerolite Electronic Hardware Corp.

- **Oleson, Col. William C. (Ret.)**
  20 East Emerson St.
  Fairborn, Ohio
  Fairborn 8-4924
  Skyway Precision Tools

- **Olsen Co., John O.**
  1402 Carolina Ave.
  Cincinnati 37, Ohio
  Anti-Corrosive Metal Products Co.

- **O'Neil, L. E.**
  446-C Patterson Road
  Dayton, Ohio
  Oxmoor 1061
  L. E. O'Neil & Associates
  Ketchum & McDougall, Inc.
  Bassick Co.

- **Ongemach, John**
  3196 Delphos Ave.
  Dayton, Ohio
  Melrose 3525
  Danly Machine Specialties, Inc.

- **Orndoff, Ted H.**
  Talbott Building
  Dayton 2, Ohio
  Hemlock 9471
  General Mills, Inc., Mechanical div.
  General Mills, Inc., Aeronautical Research div.
  Brooks & Perkins, Inc.
  Schwien Engineering Co.
  Breeze Corp., Inc.
  A. E. Bausenbach, Inc.
  Perkin-Elmer Corp.
  Stromberg-Carlson Co.

P

- **Paquette, A. L.**
  32 North Main St.
  Dayton, O.
  Adams 9153
  Westinghouse Electric Corp.

- **Payne, Howard E., Jr.**
  907 American Building
  Dayton 2, Ohio
  Fulton 0660
  Fletcher Aviation Corp.

- **Pearon, Robert C.**
  627 Salem Ave.,
  Dayton 6, O.
  Randolph 9961
  Thomas A. Edison, Inc., Ediphone Sales division

- **Pedersen, W. W.**
  2215 Terminal Tower
  Cleveland 13, Ohio
  Tower 13282
  Dow Corning Co.

- **Peoples, P. K.**
  293 East 9th Ave.
  Columbus, Ohio
  Industrial Tape Corp.

- **Pereny, Louis**
  420 Dellrose Ave.,
  Dayton 3, O.
  Kenmore 6556
  Protective Treatments, Inc.

- **Peterka, A.E.R.**
  1971 West 85th St.
  Cleveland, Ohio
  Woodbine 1-3800
  Lamson & Sessions Co.

- **Pfund, Pete**
  3635 West Touhy Ave.
  Chicago 45, Ill.
  Hollycourt 5-6000
  National Die Casting Co.

- **Phillips, Frank**
  7045 Machinery Ave.
  Cleveland, Ohio
  Henderson 1-8975
  Cyril Bath Co.

- **Pipe, Harvey**
  P.O. Box 12, Riverdale Station
  Dayton 5, Ohio
  Oregon 6671
  American Electroneering Co.
  Resistoflex Corp.

- **Plummer, William**
  3070 East Outer Dr.
  Detroit, Mich.
  TW 2-2500
  Progressive Welder Sales Co.

- **Plunkett, Harold D.**
  381 West First St.,
  Dayton 2, O.
  Adams 9241
  McGregor & Werner, Inc.
  Corvey Engineering Co.

- **Potgieter, Fred M.**
  Rockford, Ill.
  3-0431
  Mechanics Universal Joint div., Borg-Warner Corp.

- **Power Transmission Sales**
  1276 West 3rd St.
  507 Marion Building
  Cleveland, Ohio
  Cherry 1-2065
  Lovejoy Flexible Coupling Co.

- **Pressler, Robert E.**
  1317 Third National Bank Building
  Dayton 2, Ohio
  Hemlock 8594
  Will Corp.
  Steber Manufacturing Corp.

- **Prior, E. C.**
  Box 46
  Chagrin Falls, Ohio;
  4433 Corinth Drive
  Dayton, Ohio
  Olive 2905
  Scott Aviation Corp.

- **Pryor, Harold E.**
  400 Dublin Ave.
  Columbus 16, Ohio
  Main 6492
  Janitrol Aircraft Automotive div.
  Surface Combustion Corp.

R

- **Reagan, Don B.**
  11 Industrial Road
  Hammond, Ind.
  Sheffield 2280
  Great Lakes Manufacturing Corp.

- **Reagan, William N.**
  Biltmore Hotel
  Dayton 2, O.
  Adams 2161

- **Reutlinger, R. M.**
  1512 Hulman Building
  Dayton 2, Ohio
  Adams 4171
  Reed Products, Inc.
  Vanant Products
  Cargo Packers Inc.

- **Reynolds, H. L.**
  9300 South Kenwood Ave.
  Chicago, Ill.
  Regent 4-8200
  Verson Allsteel Press Co.

- **Rhoades, Walter H.**
  373 Geneva Rd.

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• **Rhoades, Walter H. (Cont.)**
Dayton 7, Ohio
Melrose 6655
Fostoria Pressed Steel Corp.
American Engineering Co.

• **Richard Equipment Co.**
416 Cooper Bldg.
3 East 2nd St.
Dayton 2, Ohio
Fulton 2117
Chiksan Co.

• **Richards, B. T.**
402 Swetland Bldg.
Cleveland 15, Ohio
Cherry 1-0876
Titeflex Inc.

• **Richardson, John H.**
254 Talbott Bldg.
Dayton, O.
Michigan 5606
Hughes Aircraft Co., division of Hughes Tool Co.

• **Ripley, C. S.**
3030 Euclid Ave.
Cleveland, Ohio
Henderson 1-2112
Shafer Bearing Corp.

• **Roche, W. P.**
1012 Engineers Bldg.
Cleveland, Ohio
Cherry 1-6231
Electric Storage Battery Co.

• **Roush, Frank E.**
272 Valley View Drive
Dayton 5, Ohio
Taylor 4764
Beech Aircraft Co.
Guardian Electric Manufacturing Corp.

• **Rowell, J. J.**
1621 West Walnut St.
Chicago, Ill.
Ch 3-1100
Guardian Electric Mfg. Co.

• **Rowley, W. H.**
11 West Monument Ave.,
Dayton 2, O.
Adams 1288
Acroquip Corp.

• **Ruleff, R. L.**
18 West Monument Ave.,
Dayton 2, O.
Michigan 8751
Bart Messing Corp.

• **Rundle, Arthur**
15017 Detroit Ave.,
Cleveland 7, O.
Monowatt, department of General Electric Co.

S

• **Sabins, James F.**
627 Salem Ave.,
Dayton 6, O.
Randolph 8631
Commercial Controls Corp.

• **Sammons, L. W.**
1150 West Second St.,
Dayton 7, O.
Hemlock 4845
Dayton X-Ray Co.

• **Santner, J. R.**
Motch & Merryweather Machinery Co.
Dayton, Ohio
Hemlock 9741
Giddings & Lewis Machine Tool Co.

• **Saperstein, Hank**
2222 South Calumet
Chicago, Ill.
Danube 6-2000
Supreme Products, Inc.

• **Schaefer, Harry G.**
1420 First National Bank Building
Cincinnati 2, Ohio
Parkway 0886 & 6230
Hamilton Manufacturing Co.
Smith & Schaefer
Nellis Industries, Inc.
John E. Sjostrom Co.
Maysteel Products Co.
John N. Smith
Electrosig Corp.
Bavinco Manufacturing Corp.
Jiffy-Join Corp.

• **Schaeffer, W. L.**
Gregg & Spohn
Roselawn Bldg.
Cincinnati, Ohio
Signal Engineering & Mfg. Co.

• **Schenck, H. I., Jr.**
1406 Third National Bldg.
Dayton 2, O.
Fulton 5196
Polymer Corp. of Pennsylvania
Metal Powder Products, Inc.
Imperial Industries, Inc.
Buckeye Molding Co.

• **Schmidt, Kurt W. and Associates**
Van Cleve Hotel
Dayton 2, Ohio
Fulton 6131
Aerovox Corp.
Anken Chemical & Film Corp.
Webber Appliance Corp.
Flightex Fabrics, Inc.
G. Felsenthal & Sons, Inc.
Gates Engineering Co.
J-B-T Instruments Co.
King Electric Equipment Co.
Remler Co., Ltd.
Robinson Aviation Corp.
Triplett Electric Instrument Co.
U. S. Lens Corp.

• **Schmitt, D. L.**
207 Realty Bldg.
Dayton 2, O.
Michigan 0317
Kaiser Aluminum & Chemical Co.

- **Schreiber, E. J.**
  Talbott Bldg.
  Dayton, O.
  Michigan 6578
  Philco Corp., Tech Rep division

- **Schumacker, George P.**
  1120 Chester Ave.
  Cleveland 14, Ohio
  Sier-Bath Gear & Pump Co.

- **Scott, Leslie E.**
  Peoria, Ill.
  Peoria 3-4521
  R. G. LeTourneau, Inc.

- **Scott, R. W.**
  900 Woodward Ave.
  Michigan City, Ind.
  Michigan City 7-7231
  Joy Mfg. Co.

- **Scott Equipment & Engineering Co.**
  1316 Loraine Ave.
  Dayton, Ohio
  Olive 4551
  James-Pond-Clark

- **Sculley, Louis J.**
  924 Harries Building
  Dayton 2, Ohio
  Michigan 8526
  Jack & Heintz, Inc.

- **SeBastian, Ford**
  4222 West Lake St.
  Chicago 24, Ill.
  Van Buren 6-3100
  Electro-Snap Switch & Mfg. Corp.

- **Seifreat, E. J.**
  50 Greenhouse Road
  Dayton, Ohio
  Walnut 6186
  Seifreat-Elstad Machinery Co.

- **Sensenich, Harry**
  Dayton, Ohio
  Sensenich Corp.

- **Sentenac, R. J.**
  627 Salem Ave., Suite 352
  Dayton, O.
  Oregon 2005
  Thomas A. Edison, Inc.

- **Shelburn, C. M.**
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  Indianapolis, Ind.
  Idlewood 0492
  Webber Appliance Co., Inc.

- **Shonn, Don**
  1931 Rugby Road
  Dayton, Ohio
  Oregon 4543
  Gibson Refrigerator Co.

- **Shoup, Russell**
  120 West Second St.,
  Dayton 2, O.
  Michigan 1391
  Insulation Manufacturers Corp.

- **Sickle, E. B.**
  2801 Central Ave.
  Middletown, O.
  Middletown 25583
  Lau Blower Co.

- **Siff, Robert G.**
  11 West Monument St., Room 409
  Dayton 2, Ohio
  Hemlock 1254
  Radio Receptor Co., Inc.
  Control Engineering Corp.
  Industrial Instruments, Inc.
  Diamond Manufacturing Co.
  Trans-Sonics, Inc.
  Winchester Electronics, Inc.
  Marconi Instruments, Ltd.

- **Simmons, M. H. Associates**
  M. H. (Dick) Simmons
  O. M. Stevison
  Alice L. Price
  1327 Third National Bldg.
  Dayton 2, O.
  Hemlock 5866
  Avo Equipment Corp.

(Continued on page 353)

- **Simmons, M. H. Associates. (Cont.)**
  Arnolt Corp.
  Aviators Clothing Co., Inc.
  C. T. M. Co., Inc.
  R. M. Hollingshead Corp.
  Irving Air Chute Co., Inc.
  Nathan Products Corp.
  Phaostron Co.
  M. S. & I. A. Workmen, Inc.

- **Simpson, James L.**
  405 N. River
  Batavia, Ill.
  Batavia 5400
  Dunbar Kapple Co.

- **Sinzinger, Ralph A.**
  315 East Central Parkway
  Cincinnati 2, Ohio
  Garfield 5043
  Micro div., Minneapolis-Honeywell Regulator Co.

- **Skilton, E. K.**
  1474 Ridgewood Ave.
  Lakewood, Ohio
  Academy 1-8852
  Hayden Mfg. Co.

- **Skinner, James H.**
  1500 Trombly
  Detroit 11, Mich.
  Trinity 1-7100
  Skinner Purifiers div., Bendix Aviation Corp.

- **Smith, Beryl**
  55 Beverly Pl.
  Dayton 9, Ohio
  Walnut 2880
  United States Steel Co.

- **Smith, R. S.**
  Swetland Building, Room 402
  1010 Euclid Ave.
  Cleveland, Ohio
  Prospect 1-4005
  Sola Electric Co.

- **Smith, Stuart**
  11 West Monument Ave., Room 305
  Dayton 2, Ohio
  Hemlock 6344
  Reynolds Metals Co.

- **Smysor, W. F.**
  3344 Erie Ave.
  Cincinnati, Ohio
  Trinity 0605
  Fenwal Inc.

- **Snetsinger, Kenneth W.**
  5100 St. Clair
  Cleveland, Ohio
  Endicott 1-1991
  Z & W Machine Inc.

- **Snyder, A. Robert, Co.**
  41 East First St.
  Dayton 2, Ohio
  Adams 4022

- **Soenke, John E.**
  131 N. Ludlow St.,
  Dayton 2, O.
  Michigan 8347
  Glenn L. Martin Co.

- **Spatny, J. C.**
  10507 Lake Ave.
  Cleveland, Ohio
  Permatex Co., Inc.

- **Squires, Don**
  20 North Jefferson St.
  Dayton 2, Ohio
  Michigan 0755
  Remington Rand, Inc.

- **Stansbury, C. B.**
  11 West Monument Ave., Room 305
  Dayton 2, Ohio
  Hemlock 6344
  Reynolds Metals Co., Parts div.

- **Steadman, Fred**
  201 W. Nottingham Road
  Dayton 6, O.
  Randolph 2567
  Fred Steadman Food Service Equipment

- **Stenz, Dale E.**
  7001 Central Ave.
  Indianapolis 20, Ind.
  Broadway 4294
  Blackhawk Mfg., Co.

- **Stevens, J. S.**
  3436 Duncan Ave.
  Cincinnati 8, Ohio
  Trinity 0680
  Scovill Manufacturing Co.

- **Stewart, George C.**
  715 Cafritz Building
  Washington 6, D. C.
  Republic 2139
  Fletcher Aviation Corp.

- **Stineback, G.**
  222 West Adams St.,
  Chicago, Ill.
  Randolph 6-4251
  Polyken Industrial Tapes Dept., Bauer & Black.

- **Stoody, Homer**
  Tavern Arms Apts.
  417 West First St.
  Dayton, Ohio
  South Wind div.—Stewart-Warner Corp.

- **Stoothoff, Byron**
  18071 Wyoming Ave.
  Detroit 21, Mich.
  University 1-0047
  Cleco div.—Reed Roller Bit Co.

- **Stotter, H. J.**
  1441 Broadway
  New York 18, N. Y.
  Longacre 4-4311
  2421 Riverside Drive
  Dayton 5, O.
  Randolph 9467

- **Stratton, E. V., Jr.,**
  212 Burke St.,
  Sharonville, O.
  Monowatt, department of General Electric Co.

- **Strobino, F. L.**
  601 East Third St.
  Dayton 2, O.
  Michigan 0781
  Chemical div., General Electric Corp.

- **Summers, Allen M., Jr.**
  623-33 South Wabash Ave.
  Chicago 5, Ill.
  Wabash 2-4020
  Brunswick-Balke-Collender Co.

- **Susman, Joseph**
  125 B West 168th St.
  Bronx, N. Y.
  American Chronoscope Corp.

- **Swindler, L. W.**
  428 River Road
  Cincinnati 20, Ohio
  McGill Mfg. Co., Inc.

T

- **Taylor, John A.**
  131 N. Ludlow St.,
  Dayton 2, O.
  Hemlock 8659
  American Machine & Foundry Co.

- **Taylor, William H.**
  8700 Brookpark Rd.
  Cleveland, Ohio
  Shadyside 1-9300
  Tinnerman Products, Inc.

- **Thomas, D. E.**
  1800 Troy St.
  Dayton, Ohio
  Sinclair Refining Co.

- **Thomas, Herbert C.**
  808 Third National Bank Building
  Dayton 2, Ohio
  Hemlock 4627
  A. C. Spark Plug div., General Motors Corp.

- **Thomas, Robert M.**
  Hagerstown, Ind.
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- **Thompson, Norman**
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  Dayton, Ohio
  Oxmoor 2870
  Sperry Gyroscope Co. div., Sperry Corp.

- **Thorne, Robert E.**
  2620 Flournoy St.
  Chicago 12, Ill.
  Van Buren 6-1636
  Greer Stop Nut Co.

- **Thresher, William E.**
  1608 Karwin Drive
  Dayton 2, O.
  Oregon 4966
  Philco Corp.

- **Timberman, W. J.**
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  Pittsburgh 19, Pa.
  Atlantic 1 5600
  Pittsburgh Plate Glass Co.

- **Tinker, C. Lawrence**
  Oliver Bldg.
  Pittsburgh 22, Pa.
  Joy Mfg. Co.

- **Tousey, Norris**
  214 Ludlow Bldg.
  Dayton, O.
  Michigan 6584
  Gerity-Michigan Corp.

- **Travco Engineering Co.**
  179 North Michigan Ave.
  Chicago 11, Ill.
  Financial 6-4728
  American Electric Motors, Inc.

U

- **Uchtman, Jerry J.**
  507 St. Paul Bldg.
  111 East Fourth St.
  Cincinnati 2, O.
  Locust 6889, Main 0171 & 4648
  Garden City Plating & Mfg. Co.

V

- **Van Allen, Fred**
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  Dayton 2, O.
  Fulton 9401
  Lavoie Laboratories, Inc.

- **Vandenberg, A.**
  Biltmore Hotel, Dayton, or
  Muskegon, Mich.
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  Continental Motors Corp.

- **Verner, E. B.**
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  Oregon 4871
  Gisholt Machine Co.

- **Voelker, J. E.**
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  Cleveland 15, Ohio
  Main 1-6894
  Pyle National Co.

W

- **Walker, Edwin W.**
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  Dayton 9, O.
  Walnut 2517
  McDonnell Aircraft Corp.

- **Wardrope, T. E.**
  10014 Euclid
  Cleveland, Ohio
  Sweetbriar 1-4789
  Vlier Manufacturing Co.

- **Waterfall, Frank**
  Alfred Crossley & Assoc.
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  Dayton, Ohio
  Computer Research Corp.

- **Webber, Robert C.**
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  Indianapolis, Ind.
  Idlewood 0492
  Webber Appliance Co., Inc.

- **Weihmiller, F. J.**
  2196 Clarkwood
  Cleveland, Ohio
  Henderson 1-6765
  Thompson Products, Inc.

- **Wells, Thomas K.**
  Flexonics Corp.
  Maywood, Ill.
  Fillmore 3-8000
  Flexonics Corp.

- **White, Phil J.**
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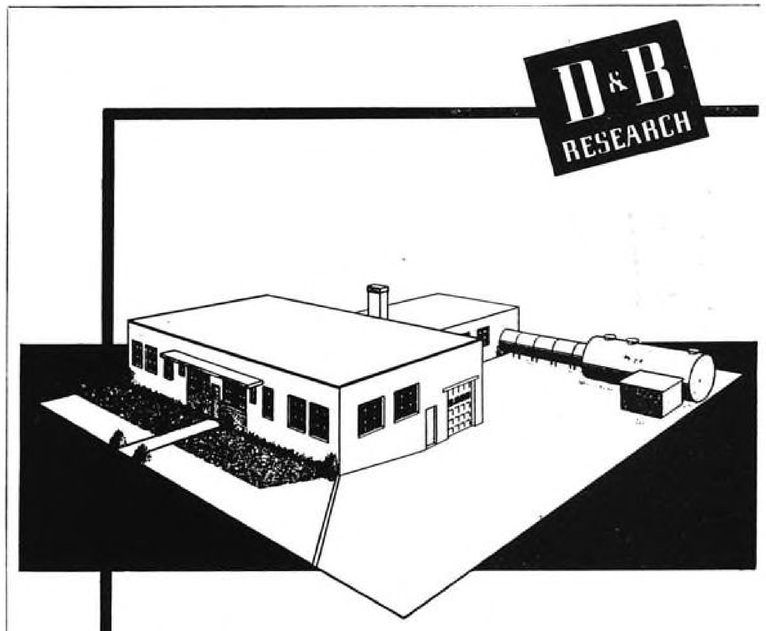
  Cleveland 2, Ohio
  Main 14031
  Amgears, Inc.

- **Whitehead, W. J.**
  5001 North Second St.
  Rockford, Ill.
  7-7441
  Woodward Governor Co.

- **Whittemore, R. G.**
  2000 Grant Bldg.
  Pittsburgh 19, Pa.
  Atlantic 1 5600
  Pittsburgh Plate Glass Co.



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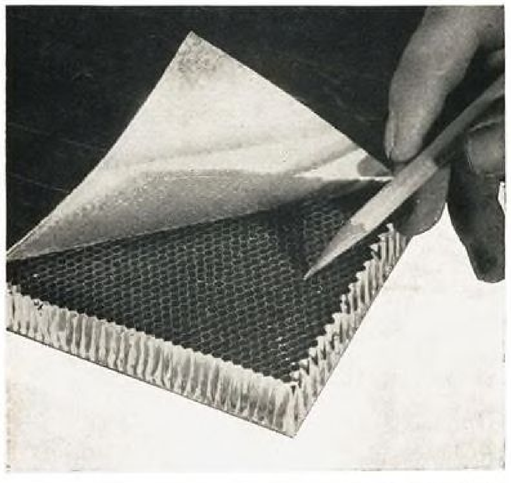

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  Vandalia 4675
  Emery Air Freight Corp.

- **Wilkinson, John E.**
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  Dayton 2, Ohio
  Michigan 3212
  American Phenolic Corp.

- **Willis, H. Hugh**
  Van Cleve Hotel
  Dayton, Ohio
  Wh 30010
  VitroCorp. of America

- **Wilson, Frank C.**
  1417 Hulman Building
  Dayton, Ohio
  Hemlock 5503
  Republic Steel Corp.

- **Woodrow, Jack**
  160 Northfield Rd.
  Bedford, Ohio
  Bedford 2-1500
  Stalwart Rubber Co.

- **Woodward, Theodore**
  219 Oxford Ave.,
  Dayton, O.
  Taylor 7741
  Harry A. Lowther Co., Inc.
  Converto Mfg., Inc.
  Ward La France Truck Corp.

- **Woodward, Wallace W.**
  436 North Terrace Drive
  Wichita 8, Kan.
  Wichita 60510
  O. A. Sutton Corp.

- **Wright, George**
  19400 Frazier Dr.
  Cleveland 16, Ohio
  Boulevard 2-9554
  Eastern Air Devices, Inc.

- **Wyse, Davis S.**
  3629 N. Dixie Drive
  Dayton, O.
  Randolph 2111 & Oregon 4761
  Gadgets, Inc.
  Projects Unlimited
  Harley Buckle division, Sembojda Corp.

Y

- **Young, B. A.**
  Box 501
  Detroit 32, Mich.
  Townsend 8-8600
  Detrex Corp.

- **Young, D. H.**
  35 East Wacker Dr.
  Chicago 1, Ill.
  State 2-2100
  Pure Oil Co.

- **Young, V. C.**
  9771 French Rd.
  Detroit 13, Mich.
  Walnut 1-5820
  Eaton Mfg. Co.

Z

- **Zeppenfeld, Harold B.**
  338 South Broadway
  New Philadelphia, Ohio
  New Phila. 4-2321
  Joy Mfg. Co.

- **Zimmerman, Gifford G.**
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List of Companies

In the following directory, the name and address of the company is followed by home office telephone number, representative in Dayton or nearby area, and description of products or services.

A

- **Abrams Instrument Corp.**
  606 East Shiawassee St.
  Lansing 1, Mich.
  Lansing 4-9441
  DR—Carl J. Arksey
  Fire control devices, recording cameras, intervalometers, developments in electro-mechanical and optical fields.

- **Acme Aluminum Alloys, Inc.**
  232 North Findley St.
  Dayton 3, O.
  Kenmore 5121
  DR—Louis H. Lingler
  Test equipment, special purpose machinery.

- **A. C. Spark Plug Division, General Motors Corp.**
  Flint, Mich.
  Flint 45611
  DR—Herbert C. Thomas
  Bombing navigational computors; gun, bomb, rocket sights, anti-aircraft fire control systems; tank and truck instrument clusters; miscellaneous parts for trucks, tanks and aircraft.

- **Acme Electric Corp.**
  Cuba, N. Y.
  Cuba 4
  DR—Albert M. Baehr
  Transformers, reactors.

- **Acushnet Process Co.**
  New Bedford, Mass.
  New Bedford 31711
  DR—Roy B. Clymer
  Precision-molded rubber parts and products for a widely diversified national industrial market.

- **Adel div., General Metals Corp.**
  10777 Van Owen St.,
  Burbank, Calif.
  Stanley 72611
  1444 Washington St.,
  Huntington 17, W. Va.
  DR—Donald E. Flinn
  Aircraft hydraulic, pneumatic and fuel system components (Burbank) and aircraft line supports, tubing clamps, electrical harness straps (Huntington).

- **Admiral Corp.**
  3800 Cortland St.
  Chicago 47, Ill.
  Spaulding 2-0100
  DR—Pat J. Deluhery
  Aerial targets and gliders; aircraft armament; fuel and oil handling equipment; communications equipment; metals and composition materials.

- **Advance Die & Tool Co.**
  6800 Cleveland, O.
  Woodbine 1-9191
  DR—Richard Bredenbeck
  Dies & tools.

- **Advertising Displays, Inc.**
  419 Pike St.
  Covington, Ky.
  Colonial 0207
  DR—Hugh F. Davis
  Components of photographic equipment and supplies; aerial delivery equipment, paulins and protective covers; office equipment and supplies; training aids.

- **Aerial Machine & Tool Corp.**
  38-27 30th St.
  Long Island City, N. Y.
  RA 9-2425
  DR—D. D. Brubaker
  Parachute hardware, small forged parts, precision machined parts and assemblies.

- **Aero-Cal Engineers, Inc.**
  2627 Hollywood Way
  Burbank, Calif.
  Stanley 7-7245
  DR—William P. Hall
  Aircraft design and engineering.

- **Aeroil Products Co., Inc.**
  Wesley St.
  South Hackensack, N. J.
  Diamond 3-5200
  DR—Joseph Halperin
  Shop and warehouse machinery, tools and equipment.

- **Aerol Co., Inc.**
  2424 San Fernando Rd.
  Los Angeles, Calif.
  Capitol 2-0165
  DR—Bert Bowman
  Heavy duty, rubber-tired casters for portable and mobile factory and field equipment.

- **Aerolite Electronic Hardware Corp.**
  507 26th St.
  Union City, N. J.
  Union 3-2955
  DR—Frederic L. Ohmer
  Electronic and electrical hardware, dial lights, clips, mounts and transmitting components.

- **Aero Motive Mfg. Co.**
  1803 Alcott St.
  Kalamazoo, Mich.
  Kalamazoo 34671
  DR—Dircksen & Landis
  Complete machine shop facilities, ground servicing equipment, extension reels, parts and assemblies for aircraft armament, special electric equipment for clothing and personal use.

- **Aeronca Mfg. Corp.**
  Middletown, O.
  Middletown 23601
  DR—C. Palmer Boyles & Associates
  Power package complete, photographic pods, aircraft components, jet engine parts, light aircraft and helicopters, armament equipment.

- **Aeroquip Corp.**
  Jackson, Mich.
  Jackson 2-0361
  DR—W. H. Rowley
  Flexible hose lines for fuel, oil and hydraulic systems self-sealing couplings, special powerplant fittings.

- **Aeroproducts Div.—General Motors Corp.**
  Municipal Airport
  Vandalia, O.
  Vandalia 4-4661
  DR—Walter V. Klairn
  Subsonic, transonic and supersonic propellers; electrical, hydraulic & pneumatic actuators, turbine engine controls.

- **Aerotec Corp.**
  Greenwich, Conn.
  Byram River, 68400
  DR—Joseph Jay
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- **Aerotherm Corp.**
  Bantam, Conn.
  Bantam 1180
  DR—Joseph Jay
  Aircraft seats.

- **Aerovox Corp.**
  740 Belleville Ave.
  New Bedford, Mass.
  DR—Kurt W. Schmidt
  DR—Paul H. Hussey
  Capacitors, noise filters.

- **Ahlberg Bearing Co.**
  3025 W. 47th St.
  Chicago 32, Ill.
  Virginia 7-2313
  DR—R. J. Belcher
  Ball bearings and ball bearing pillow blocks.

- **Aircooled Motors, Inc.**
  Liverpool Road
  Syracuse 8, N. Y.
  Liverpool 69-2711
  DR—National Requirements Service
  Franklin aircooled motors.

- **Aircraft Mechanics, Inc.**
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  Colorado Springs, Colo.
  Main 547
  DR—W. D. Hazlett
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- **AiResearch Mfg. Co.**
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  Los Angeles 45, Calif.
  Oregon 8-2221 and Orchard 7-9181
  DR—C. B. Bunch
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- **Airtron, Inc.**
  101 East Elizabeth Ave.
  Linden, N. J.
  Linden 2-8101
  DR—A. N. Grimm
  Aircraft accessories, wired assemblies, microwave components, crystal mixers, duplexers, directional couplers, tapers, waveguide switches.

- **Albertson & Co.**
  Sioux City, Iowa
  20525
  DR—Leonard Jensen
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- **Allegheny Ludlum Steel Corp.**
  2020 Oliver Bldg.
  Pittsburgh 22, Pa.
  Grant 1-1085
  DR—I. P. Davies
  Stainless steels, tool steels, electrical steels, special steels, all forms, shapes and sizes.

- **Allen Aircraft Products, Inc.**
  Box No. 29
  Ravenna, Ohio
  Ravenna 7533
  DR—Neil W. Mann
  Fuel system components

- **Allied Products Corp.**
  12677 Burt Road
  Detroit 23, Mich.
  Kenwood 2-8600
  DR—F. H. Bishop
  Supplies, aircraft engine precision ground parts.

- **Allison Division, General Motors Corp.**
  Indianapolis 6, Ind.
  Belmont 1541
  DR—James E. Knott
  Aircraft engines.

- **Alloy Products Co.**
  734 Lincoln Blvd.
  Marion, Ind.
  5333
  DR—Emil V. Garlati
  Precision sheet metal fabrications, aircraft spinnings and machined parts.

- **Aluminum Company of America**
  306 Harries Bldg.
  Dayton 2, O.
  Hemlock 1112
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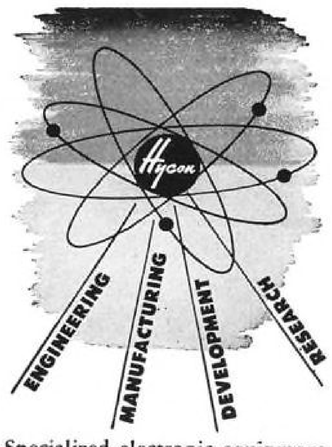

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  Vanderbilt 6-1700
  DR—Paul W. Hewitt
  Air compressors, aircraft actuators, pneumatic and pneudraulic riveters, hydraulic riveters, and electric tools.

- **Chicago Thrift-Etching Corp.**
  1555 North Sheffield Ave.
  Chicago 22, Ill.
  Michigan 2-1630
  DR—Albert M. Baehr
  Instruction plates.

• **Chiksan Co.**
322 Pomona Ave.
Brea, Calif.
Jasper 9-2121
DR—Richard Equipment Co.
Aero-hydraulic swivel joints and assembly.

• **C & H Supply Co.**
Administration Bldg.
Boeing Field
Seattle 8, Wash.
Ranier 8111
DR—C. L. Backus, Jr.
"Metal-Cals," industrial and aircraft supplies.

• **Cities Service Oil Co.**
70 Pine St.
New York, N. Y.
Hanover 2-1600
DR—H. F. Goold
Petroleum products.

• **Cleco div., Reed Roller Bit Co.**
5125 Clinton Drive
Houston, Tex.
Orchard 1761
DR—Byron Stoothoff
Aviation portable pneumatic tools, Cleco countersink, Cleco riveter, Cleco drills.

• **Cleveland Pneumatic Tool Co.**
3781 East 77th St.
Cleveland, Ohio
Diamond 1-1700
DR—Frederick Hopkins
DR—W. A. Lavery
Aircraft landing gear and actuators.

• **Climax Machinery Co.**
301 South LaSalle St.
Indianapolis 6, Ind.
Franklin 3551
DR—M. H. Simmons Associates
Dollies, cradles, ground handling equipment.

• **Coast Paint & Chemical Co.**
1507 Grande Vista
Los Angeles, Calif.
Angeles 1-0338
DR—William P. Hall
Pro-Seal adhesive backed chromate impregnated, rubberized and weatherproof tapes, aircraft tank sealants and adhesives.

• **Coleman Instrument Mfg. Co.**
716 South Troost St.
Tulsa 10, Okla.
Tulsa 41537
DR—Harold M. Hassman & Associates
Aircraft instruments, photographic equipment, special clothing and personal equipment, special tools and equipment, aerial delivery equipment, paulins and protective covers.

• **Collins Radio Co.**
Cedar Rapids, Ia.
Cedar Rapids, 30281
DR—William Klein
Communications equipment.

• **Commercial Controls Corp.**
1 Leighton Ave.,
Rochester, N. Y.
Culver 5800
DR—James F. Sabins
Justowriter, typewriter composing machine; Flexowriter, typewriter, automatic; mailing equipment, mailroom furniture.

• **Commercial Research Laboratories, Inc.**
20 Bartlett Ave.
Detroit 3, Mich.
TO 8-0778
DR—Claude E. Cox
Supply fuel flowmeter, flowmeter calibration stands, fuel nozzle test stands and other fuel flow instruments.

• **Comptrometer Div., Felt & Tarrant Mfg. Co.**
11 West Monument Ave.
Dayton 2, O.
Hemlock 1042
DR—Stella Mullin
Office equipment and supplies.

• **Computer Research Corp.**
3348 El Segundo Blvd.
Hawthorne, Calif.
Osborne 5-1171
DR—Frank Waterfall
Ferrow-resonant flip-flops; ferrow-resonant decade counters, magnetic recording heads, magnetic recording heads, magnetic drums, computing system and components.

• **Conmar Products Corp.**
140 Thomas St.
Newark, N. J.
Bigelow 8-2211
DR—J. I. Davis
Slide fasteners.

• **Connecticut Hard Rubber Co.**
407 East St.
New Haven 9, Conn.
New Haven 7-5761
DR—Charles L. Backus, Jr.
Silicone rubber products, "Cohrlastic," rubber to metal parts for aircraft and other industries.

• **Connecticut Telephone & Electric Corp.**
70 Britannia St.
Meriden, Conn.
Meriden 5-7941
DR—Contract Service Organization
Telephone communication systems, ground radar type GT, switchboards, plugs.

• **Consolidated Vultee Aircraft Corp.**
San Diego 12, Calif.
DR—J. T. Cosby
Airframes.

• **Continental Motors Corp.**
205 Market St.
Muskegon, Mich.
27-631
DR—A. VandenBerg
Aircraft engines, engines for ground equipment, air-cooled, liquid-cooled engines, Diesel engines.

• **Control Engineering Corp.**
863 Washington St.
Canton, Mass.
Canton 6-1126
DR—Robert G. Siff
Engineering development and manufacture of precision instruments and control devices.

• **Control Products, Inc.**
306 Sussex St.
Harrison, N. J.
Humboldt 2-0213
DR—Russell F. Hardy
Thermal switches to 1500 degrees F., waterproof switches, temperature control and indication switches.

• **Converto Mfg., Inc.**
Cambridge City, Ind.
DR—Theodore Woodward
All types of trailers, semi-trailers, dump bodies; hydraulic hoists and jacks.

• **Cook Electric Co.**
2700 Southport Ave.
Chicago 14, Ill.
Diversey 8-6700
DR—Richard W. Harbison
Automatic inverter changeover relays, pressure switches, hermetically sealed aircraft components, pressure activated devices, aircraft and accessory relays, time delay relays.

• **Cook Research Laboratories, div. of Cook Electric Co.**
8100 Monticello Ave.
Skokie, Ill.
Skokie 9202
DR—Richard W. Harbison
Basic and applied research and development in the field of military application.

• **Cornell-Dubilier Electric Corp.**
333 Hamilton Blvd.
South Plainfield, N. J.
Plainfield 6-9000
DR—Neal Bear Corp.—Jerry Kilroy
Commercial electrical equipment, communications equipment shop and warehouse machinery and tools.

• **C. P. Clare & Co.**
4719 West Sunnyside Ave.
Chicago 30, Ill.
Spring 7-1122
DR—Albert M. Baehr
Relays.

• **Crouse-Hinds Co.**
Syracuse 1, N. Y.
Syracuse 2-1111
DR—W. G. Cowell
Airport lighting equipment floodlights, searchlights, conduit fittings for ordinary and hazardous locations, explosion-proof and dust-tight electrical equipment, circuit-breaking power plugs and receptacles.

• **C. T. M. Co., Inc.**
10 Howard St.
Buffalo 6, N. Y.
Cleveland 0596
DR—M. H. Simmons Associates
Bomb shackes, solenoids.

• **Curtis Laboratories, Inc.**
2718 Griffith Park Blvd.
Los Angeles 27, Calif.
Normandy 2-1176
DR—George G. Kleinmaier
One-shot color cameras, separation printers, color analysts, dyes and dye transfer equipment, optical systems, bomb sight lenses, filters.

• **Curtiss-Wright Corp.**
Wood-Ridge, N. J.
Prescott 72900
DR—E. L. Noonan
Aircraft reciprocating and jet powerplants, aircraft propellers, flight simulators, metals fabrication.

• **Curtiss-Wright Corp., Propeller division**
Talbott Bldg.,
Dayton 2, O.
Michigan 0373
DR—Kenneth E. Fersch
Aircraft propellers.

• **Cutler-Hammer, Inc.**
804 Plum St.,
Cincinnati 2, O.
Cherry 5111
DR—Eugene E. Durham
Aircraft and ground equipment electrical components including toggle switches, manual circuit breakers, magnetic contactors, relays, magnetic circuit breakers, motor starters, disconnect switches, limit switches, pushbutton switches, motor control, Unitrol, pressure regulators, brakes.

• **Cyril Bath Co.**
7045 Machinery Ave.
Cleveland, Ohio
Henderson 1-8975
DR—Frank Phillips
Contour formers, radial draw formers, sequence presses, press brakes.

D

• **Dake Engine Co.**
633 Monroe St.
Grand Haven, Mich.
2674
DR—H. B. Hazerodt
Arbor and hydraulic shop presses.

• **Dejur-Amsco Corp.**
Northern Boulevard at 45th St.
Long Island City 1, N. Y.
Astoria 8-1040
DR—George G. Kleinmaier
Cameras, projectors, enlargers, expose meters, indicating instruments, precision potentiometers, rheostats, min. connectors.

• **Dayton X-Ray Co.**
P. O. Box 125, Station B.
1150 West Second St.,
Dayton 7, O.
DR-L. W. Sammons
Industrial X-ray laboratory certified by Air Force, complete line of X-ray apparatus and supplies for industrial and medical use.

• **Delco-Remy div., G.M.C.**
2401 Columbus Ave.
Anderson, Ind.
5581
DR—P. E. Bardsley
Personal plane generators, regulators and cranking motors, gas turbine compressor components.

- **Danly Machine Specialities, Inc.**
  2100 S. Laramie Ave.
  Chicago 50, Ill.
  Bishop 2-1800
  DR—John Ongemach
  Mechanical presses—50 to 3,000 tons, die sets, hydraulic metalworking equipment, Kwik-Klamp toggle clamps, dowel pins, die springs, socket head capscrews, socket setscrews, socket head stripper bolts, flat head capscrews.

- **Davies Laboratories**
  4705 Queensbury Rd.
  Riverdale, Md.
  Appleton 1133 (Washington, D. C.)
  DR—Dircksen & Landis
  Research and development facilities for complex electronic problems, communication equipment, electronic training devices.

- **Dayton Pump Co.**
  Dayton, O.
  Michigan 9871
  DR—John A. Lombard
  Centrifugal and multi-stage water pumps, gasoline pumps, water softeners and related items.

- **Delron Co., Inc.**
  2306 East 38th St.
  Los Angeles 58, Calif.
  Kimball 4181
  DR—Russell F. Hardy
  Self-locking high temperature nuts, special and high temperature bolts, spacers, lock bolts.

- **Denison Engineering Co.**
  1160 Dublin Rd.
  Columbus, O.
  Kingswood 1191
  DR—Wyford D. Jones
  Hydraulic testing equipment, pumps, valves fluid motors and power units; Denison Hydrolic; multipress to 50 tons.

- **Despatch Oven Co.**
  Minneapolis, Minn.
  DR—C. E. Noble
  Aluminum heat treat furnaces, aging ovens, rivet heating furnaces.

- **Detroit Macoid Corp.**
  12340 Cloverdale
  Detroit, Mich.
  Webster 3-9100
  DR—William P. Hall
  Plastics extruded and injection moulded parts.

- **Dexter Corp.**
  Box 501
  Detroit 32, Mich.
  Townsend 8-8600
  DR—B. A. Young
  Degreasing machines, degreasing solvents, alkali & emulsion cleaners, metal parts washers, spray booth compounds, phosphate coating compounds for rust-proofing, paint-bonding & cold extrusion of steel.

- **Diamond Chain Co., Inc.**
  402 Kentucky Ave.
  Indianapolis 7, Ind.
  Franklin 1311
  DR—H. B. Biersdorfer
  Roller chains, sprockets and flexible shaft couplings.

- **Diamond Mfg. Co.**
  North Ave.
  Wakefield, Mass.
  Crystal 9-2200
  DR—Robert G. Siff
  R. F. connectors and radar components.

- **Diamond Tool & Die Co.**
  404 Winston Ave.,
  Dayton, O.
  Kenmore 2113
  DR—Richard Kretschmer
  Manufacturer of molds, tools, special machines.

- **A. B. Dick Co.**
  5700 West Touhy Ave.
  Chicago 31, Ill.
  Niles 7-9200
  DR—Ralph Bassett
  Mimeograph duplicators, stencil duplicating supplies, offset and spirit duplicating supplies, duplicating papers, paper folding machines.

- **Dill Mfg. Co.**
  700 East 82nd St.
  Cleveland, Ohio
  Utah 1-3200
  DR—Frank D. East
  Strut valves and Lok-Skrus.

- **Douglas Aircraft Co., Inc.**
  3000 Ocean Park Blvd.,
  Santa Monica, Calif.
  Santa Monica 43241
  DR—Charles R. Able
  Aircraft, missiles, research and development.

- **Dow Corning**
  Midland, Michigan
  Midland 3100
  DR—W. W. Pedersen
  Ignition sealing compound, silicone insulation, silastic, Dow Corning silicone rubber, silicone resin, silicone varnish.

- **Allen B. Du Mont Laboratories, Inc.**
  750 Loomfield Ave.
  Clifton, N. J.
  Mulberry 4-7400 (Paterson, N. J.)
  DR—B. V. K. French
  Photographic equipment and supplies; communications equipment; training aids.

- **Dumont Aviation Associates**
  1401 Freeman Ave.
  Long Beach, Calif.
  Longbeach 9-4931
  DR—Dale K. Merchant
  Aircraft hardware and fittings.

- **E. I. du Pont de Nemours & Co.**
  Wilmington 98, Del.
  Finishes Div.
  1999 Third National Bldg.
  Dayton, O.
  Adams 4575
  DR—John D. O'Donnell
  Plastics Div.
  1347 Amherst Pl.
  Dayton, O.
  Taylor 5236
  DR—J. M. Mack
  Chemicals & Miscellaneous Sales Div.
  966 Penobscot Bldg.
  Detroit 26, Mich.
  DR—F. W. Miller
  Finishes, coated fabrics, plastics, photographic film, chemicals and chemical products.

- **Dunbar Kapple Co.**
  405 N. River
  Batavia, Ill.
  Batavia 5400
  DR—James L. Simpson
  AN fittings, special fittings, silicone rubber hose assemblies, stainless steel flexible hose assemblies.

E

- **Eastern Air Devices, Inc.**
  585 Deane St.
  Brooklyn 17, N. Y.
  Sterling 3-3406
  DR—George Wright
  Fractional hp. motors and blowers.

- **Eastern Rotorcraft Corp.**
  P. O. Box 171
  Willow Grove, Pa.
  Hatboro 1393
  DR—Dircksen & Landis
  Cargo tiedown equipment for aircraft, test stands, research facilities for mechanical problems.

- **Easy-Up Tower Co.**
  427 Romayne Ave.
  Racine, Wis.
  Racine 3-6389
  DR—Neal Bear Corp.—Jerry Kilroy
  Commercial electrical equipment, communications equipment.

- **Eaton Mfg. Co.**
  9771 French Road
  Detroit 13, Mich.
  Walnut 1-5820
  DR—V. C. Young
  DR—J. R. Stearns
  Supplies, sodium-cooled valves, fuel system parts, valve seat inserts, zero-lash hydraulic lifters, jet engine blades.

- **Eberhard Faber Pencil Co.**
  116 West St.
  Brooklyn 22, N. Y.
  Evergreen 3-3400
  DR—W. J. Carroll
  Pencil-drawing, colored; erasers-pencil, ink; cleaners, leads, draftsman's holders.

- **Eclipse-Pioneer division, Bendix Aviation Corp.**
  Route 6
  Teterboro, N. J.
  Hasbrouck Heights 8-2000
  DR—I. H. MacMillan
  DR—J. H. Thompson
  Auto pilots, servo mechanisms, flight instruments, engine instruments, oxygen regulators, all accessories.

- **Thomas A. Edison, Inc., Ediphone Sales division**
  627 Salem Ave.,
  Dayton 6, O.
  Randolph 9961
  DR—Robert C. Pearon
  Dictating and televoicewriter systems.

- **Thomas A. Edison, Inc., Instrument division**
  West Orange, N. J.
  Orange 3-6800
  DR—R. J. Sentenac
  Aircraft fire detection systems, temperature indicators, pressure gages, resistance bulbs, thermal and sensitive relays.

- **Eicor Inc.**
  1501 W. Congress St.
  Chicago, Ill.
  Ch 3-1234
  DR—G. B. Hirsch
  Inverters, alternators, voltage regulators, dynamotors, generators.

- **Elco Mfg. Co.**
  190 West Glenwood Ave.
  Philadelphia 40, Pa.
  Regent 9-5333
  DR—Albert M. Baehr
  Miniature tube sockets.

- **Electric Auto Lite Co.**
  Toledo, O.
  Adams 3131
  DR—S. J. Evison
  Electrical equipment.

- **Electric Sprayit Co.**
  15th & Illinois Aves.
  Sheboygan, Wis.
  Sheboygan 4891
  DR—C. Palmer Boyles & Associates
  Aircraft and engine accessories, aircraft armament, hydraulic equipment, tester assemblies, fuel and oil handling equipment.

- **Electric Storage Battery Co.**
  42 So. 15th St.
  Philadelphia 2, Pa.
  DR—Mr. W. P. Roche
  Standard type storage batteries, batteries for specialized applications.

- **Electronic Associates, Inc.**
  Long Branch & Naberal Aves.,
  Long Branch, N. J.
  DR—Davis H. Corkran
  Electronic equipment.

- **Electronic Specialty Co.**
  3456 Glendale Blvd.
  Los Angeles 26, Calif.
  Normandy 2-2168
  DR—Epps and Fedotin
  Amplifiers, power supplies, receivers, intervalometers, test equipment.

- **Electronic Measurements Co.**
  Box 850
  Red Bank, N. J.
  Eatontown 3-0300
  DR—D. D. Brubaker
  Electronic test equipment, power supplies, convecters, signal generators, transmitters, receivers.

- **Electronic Transformer Co.**
  207 West 25th St.
  New York 1, N. Y.
  Watkins 4-0880
  DR—Epps and Fedotin
  Audio and power transformers, AF coils, reactors.

- **Electro-Seal Corp.**
  946 North Ave.
  Des Plaines, Ill.
  RO-3-0047
  DR—H. U. Hjermstad
  Hermetically sealed avionic equipment.

- **Electrosig Corp.**
  71 Campus St.
  Buffalo 21, N. Y.
  Amherst 9604
  DR—Harry G. Schaefer
  Manufacturers of electric science panels and accessories.

- **Electro-Snap Switch & Mfg. Corp.**
  4218-30 W. Lake St.
  Chicago, Ill.
  Van Buren 6-3100
  DR—Ford Sebastian
  Switches—miniature, basic, die-cast enclosed, hermetically sealed limit.

- **Electro Tec Corp.**
  South Hackensack, N. J.
  Hubbard 7-4940
  DR—Boehme Associates
  Precision, slip ring and commutator assemblies, precision metal electro-plating.

- **Emery Air Freight Corp.**
  801 2nd Ave.
  New York, N. Y.
  Orgeon 9-1020
  DR—F. A. Wildman.
  Air freight service.

- **Engineering Research Associates, Inc., subsidiary of Remington Rand, Inc.**
  1902 West Minnehaha Ave.
  St. Paul 4, Minn.
  DR—Manufacturer's Introductory Service.
  Aircraft instrument and armament, training aids, photographic equipment, digital computors, magnetic storage systems.

- **Etched Products Corp.**
  39th & Queens Blvd.,
  Long Island City, N. Y.
  DR—McNary Engineering Service
  Printed circuits.

- **Ex-Cell-O Corp.**
  1200 Oakman Blvd.,
  Detroit 32, Mich.
  Townsend 8-3900
  DR—O. J. Huntley
  Precision machine tools, cutting tools, RR pins and bushings, aircraft and misc. production, parts.

- **Exline Engineering Co.**
  716 South Troost St.
  Tulsa 10, Okla.
  Tulsa 41537
  DR—Harold M. Hassman & Associates
  Aircraft instruments, photographic equipment and supplies, special clothing and personal equipment, special tools and equipment, aerial delivery equipment, paulins.

F

- **Fafnir Bearing Co.**
  19 Booth St.
  New Britain, Conn.
  New Britain 9-0381
  DR—R. M. Crum
  Ball bearings.

- **Fairbanks Co.**
  393 Lafayette St.
  New York 3, N. Y.
  Spring 7-8800
  DR—Mr. W. B. Crane
  Valves, dart unions, hand trucks, casters, platform trucks, rubber-tired wheels.

- **Fairchild Camera & Instrument Corp.**
  Jericho, Long Island, N. Y.
  Hicksville 3-4500
  DR—Herbert A. Meade
  Precision, mapping and reconnaissance aerial cameras, photographic laboratory equipment, precision test and control equipment.

- **Fairchild Engine & Airplane Corp., Aircraft division**
  Hagerstown, Md.
  Hagerstown 3600
  DR—Robert W. Kellhofer
  C-119, C-120 transports.

- **Fairchild Engine & Airplane Corp., Engine division**
  Farmingdale, Long Island, N. Y.
  Farmingdale 2-1400
  DR—Norman E. Briggs
  Specialized and conventional gas turbines and internal combustion engines; major components of J-47 turbine jet engine.

- **Fairchild Engine & Airplane Corp., Guided Missiles div.**
  Wyandanch, Long Island, N. Y.
  Midland 3-7171
  DR—Robert W. Kellhofer
  Designers and manufacturers of guided missiles, electronic simulators, molded fibreglas products, missile systems and related electronic equipment.

- **Fairchild Engine & Airplane Corp., Stratos division**
  Bay Shore, **Long Island, N. Y.**
  Bay Shore 7-6500
  DR—Norman E. Briggs.
  Manufacturers of refrigeration, air flow and temperature control systems, cabin superchargers, gas turbines, turbine accessories drives, air moisture separators, ground air conditioners.

- **Federal-Mogul Corp.**
  11031 Shoemaker Ave.
  Detroit 13, Mich.
  Walnut 1-0750
  DR—Robert J. Dowling
  Sleeve-type engine bearings, bronze bushings, bronze precision parts.

- **G. Felsenthal & Sons, Inc.**
  4100 West Grand Ave.
  Chicago 51, Ill.
  Albany 2-1155
  DR—Kurt W. Schmidt
  DR—Paul H. Hussey
  Precision plastic fabricated and moulded navigation instruments and training aids.

- **Fenwal Inc.**
  Pleasant St.
  Ashland, Mass.
  DR—W. F. Smysor
  Aircraft fire and overheat detectors, thermo-switch temperature controls for compartment and de-icing equipment. Used on most of the newer military and commercial aircraft.

- **Firestone Tire & Rubber Co., Defense Products division**
  410 West First St.,
  Dayton 2, O.
  Hemlock 6931
  DR—J. G. McGuire
  Aircraft, truck, bus and special industrial equipment casings and tubes; fuel and oil cells, Velon (Vinyl sheeting); Foamex (foam rubber); coated fabrics and items, polyethylene filament, stainless steel stampings, jet engine parts.

- **Fitzpatrick Bros., Inc.**
  1300 West 32nd Place
  Chicago 8, Ill.
  Lafayette 3-3607
  DR—G. Desbro
  Fiber and cardboard packing containers, soap products.

- **Fredric Flader, Inc.**
  583 Division St.
  North Tonawanda, N. Y.
  Ludlow 5000
  DR—Russell F. Hardy
  Jet engines, industrial compressors, aircraft antenna hardware, aircraft research and development.

- **Fletcher Aviation Corp.**
  190 West Colorado St.
  Pasadena, Calif.
  Ryan 1-6761
  DR—George C. Stewart
  DR—Howard E. Payne, Jr.
  External wing fuel tanks, napalm bombs, aircraft.

- **Flexfirm Products**
  2300 North Chico Ave.
  El Monte, Calif.
  Forest 87627 & Cumberland 31173
  DR—Earl L. Griffin, Jr.
  Special coating materials; coated fabrics, duck, nylon, glass; pre-impregnated glass cloth, mat and chopped fibers for use in low pressure laminating and high pressure molding.

- **Flexible Metal Hose Mfg. Co.**
  2082 Lincoln
  Altacena, Calif.
  Sycamore 8-1185
  DR—R. G. Benedict
  Flexible metal hose.

- **Flexonics Corp.**
  1315 South Third Ave.
  Maywood, Ill.
  Fillmore 3-8000
  DR—Thomas K. Wells
  Flexible metal hose, expansion joints, bellows, stainless steel ducting conduit tube bends, rip-cord housing.

- **Flightex Fabrics, Inc.**
  93 Worth St.
  New York 13, N. Y.
  Worth 4-6658
  DR—Kurt W. Schmidt
  DR—Paul H. Hussey
  Cotton, dynel, vinyon, orlon fabrics and tapes.

- **Flite-Tronics, Inc.**
  3303 Burton Ave.
  Burbank, Calif.
  Charleston 0-2887
  DR—Dayton Aviation Radio & Equipment Co.
  MB-3 Marker Receiver.

- **Fogarty Mfg. Co.**
  1090 East Monument Ave.
  Dayton 2, O.
  Adams 5153
  DR—John L. Heaton
  Sheet steel fabrication, aluminum wire, store fixtures, advertising display stands.

- **Foote Bros. Gear and Machine Corp.**
  4545 South Western Blvd.
  Chicago 9, Ill.
  Virginia 7-4200
  DR—C. L. Backus
  Aircraft quality gears, actuators and power units.

- **Ford Instrument Co., Div. of Sperry Corp.**
  31-10 Thomson Ave.
  Long Island City 1, N. Y.
  Stillwell 4-9000
  DR—National Requirements Service
  Gunfire control and bombing system.

- **L. W. Foster Sportswear Co., Inc.**
  Hancock and Westmoreland Sts.
  Philadelphia 40, Pa.
  Garfield 3-1300
  DR—W. D. Hazlett
  One time modification kits.

- **Fostoria Pressed Steel Corp.**
  Fostoria, Ohio
  Fostoria 7721
  DR—Walder H. Rhoades
  Infrared ovens.

- **Frampton Electrical Equipment Co.**
  999 East First St.
  Dayton 1, O.
  Fulton 8104
  DR—Harold H. Hassman & Associates
  Commercial electrical equipment, aircraft armament, communication, shop and warehouse machinery and tools.

- **Frigidaire division, General Motors Corp.**
  300 Taylor St.,
  Dayton 1, O.
  Adams 1161
  DR—Lowell McCuthcheon
  Refrigeration equipment of all types, fabrication of sheet metal and screw machine parts, porcelain enameling and plating.

G

- **Gadgets, Inc.**
  3629 North Dixie Drive
  Dayton, O.
  Randolph 2111
  DR—Davis S. Wyse
  AN6231-A scraper rings, aircraft electronic, hydraulic and mechanical test equipment and accessories.

- **Garan Chemical Co.**
  1148 North Wilson Place
  Los Angeles, Calif.
  Hudson 2-8811
  DR—Everett D. Farr
  Sizing and finishing materials for glass to be used for reinforcing plastic laminates.

- **Garden City Plating & Mfg. Co.**
  1750 North Askland Ave.
  Chicago 22, Ill.
  Armitage 6-3065
  DR—Jerry J. Uchtman
  Components in virtually all Air Force classes.

- **Gates Engineering Co.**
  P. O. Box 1711
  New Castle, Del.
  New Castle 536
  DR—Kurt W. Schmidt
  DR—Paul H. Hussey
  Neophrene coatings.

- **Geco, Inc.**
  30 Grove St.
  New Canaan, Conn.
  New Canaan 9-0017
  DR—Contract Service Organization
  Light weight precision mechanical assemblies and parts.

- **Gedro, Inc.**
  30 Main St.
  Stamford, Conn.
  Stamford 3-2596
  DR—Contract Service Organization
  Ground radar antenna reflectors, heavy mechanical assemblies and parts.

- **General Communication Co.**
  681 Beacon St.
  Boston 15, Mass.
  Copley 7-6030
  DR—Harold W. Cunningham
  Communications equipment.

- **General Controls Co.**
  801 Allen Ave.
  Glendale, Calif.
  Citrus 2-1169
  DR—Joseph Fallon
  Manufacturers of automatic pressure temperature level and flow controls.

- **General Electric Co.**
  118 West First St.,
  Dayton 2, O.
  Adams 1263
  DR—Charles J. Miller
  Jet engines, turbo superchargers, armament systems, aircraft and engine accessories.

- **General Electric Co.**
  Schenectady, N. Y.
  DR—J. Bosway
  Jet engines, armament systems, aircraft accessories.

- **General Electric Corp. Chemical Div.**
  One Plastics Ave.
  Pittsfield, Mass.
  Pittsfield 8223
  DR—F. L. Strobino
  Phenolic resins, varnishes & compounds.

- **General Electric Co., Electronics Div.**
  Electronics Park
  Syracuse, N. Y.
  Syracuse 76-4411
  DR—Roy L. Merwin
  Electronics equipment including ground and airborne communication and navigation radar.

• **General Electronic Devices**
293 Eighth Ave.
New York 1, N. Y.
WA 4-5085
DR—Samuel H. Hartley
Electronic control, equipment, relays.

• **General Industries**
Elyria, O.
DR—Dircksen & Landis
Parts and assemblies for communication equipment, commercial electric motors, components for electronic equipment.

• **General Mills, Inc., Aeronautical Research Division**
2010 East Henepin Ave.
Minneapolis, Minn.
Geneva 0371
DR—Ted H. Orndoff
Bombing systems, high altitude balloons, precision instrumentation.

• **General Mills, Inc., Mechanical Division**
1620 Central Ave.
Minneapolis, Minn.
Granville 8811
DR—Ted H. Orndoff
Bombing systems, bomb sights, ultra precision armament systems.

• **General Tire & Rubber Co.**
1708 Englewood Ave.
Akron 9, O.
Stadium 5411
DR—Harry A. Carragher
DR—Forrest Eyer
Precision machine parts, runway marker assemblies, aircraft, industrial passenger and commercial tires and tubes; liferafts, floats and boats; aircraft and industrial wheels; aircraft jacks and lifting bags; wing covers, bomb shackles, oxygen masks, actuators, gear box transmissions, bombs, vinyl films, gear pumps and coated fabrics.

• **General Tire & Rubber Co. (Mechanical Goods Division)**
Garfield St.
Wabash, Ind.
Wabash 1440
DR—Harry A. Carragher
DR—William Wright
Molded and extruded rubber goods, extruded plastics, polyester laminates, sponge products, vibration dampers, automotive channel.

• **General Textile Mills, Inc.**
450 Seventh Ave.
New York 1, N. Y.
Rector 2-3983
DR—Thomas H. Garber
Parachutes, helmets, portable shelters, webbing, braid, fabrics, reinforced plastic laminates.

• **Gerity-Michigan Corp.**
1365 East Beecher St.
Adrian, Mich.
DR—Norris Tousey
Magnesium castings, electroplating.

• **G. M. Giannini & Co., Inc.**
254 W. Colorado St.
Pasadena, Calif.
Ryan 1-7153
DR—J. Frederick Gagel
Accelerometers, aerohead, gyros, pressure instrument, potentiometer (linear functional), components of automatic control and telemetering.

• **Gibson Refrigerator Co.**
Greenville, Mich.
Greenville 710
DR—Don Shonn
Aircraft, aircraft engines, aerial targets and gliders.

• **Giddings & Lewis Machine Tool Co.**
Fond Du Lac, Wis.
Tel. 7000
DR—J. R. Santner
Table, floor and planer-type horizontal boring, drilling and milling machines, vertical boring & turning mills, double housing & open side planers, planer-type milling machines.

• **Gisholt Machine Co.**
1245 East Washington Ave.,
Madison 10, Wis.
Madison 69081
DR—E. B. Verner
Turret and automatic lathes, balancing machines, superfinishers, special machines.

• **B. F. Goodrich Co.**
500 South Main St.,
Akron 18, O.
Blackstone 1171
DR—Gifford G. Zimmerman
Tires, wheels and brakes, heated rubber, de-icers, Avtrim, inflatable seals, pressure sealing zippers, fuel cells, Plastilock adhesives, Rivnuts, accessories.

• **Goodyear Aircraft Corp.**
1210 Massilon Road
Akron 15, O.
Franklin 1471
DR—H. H. McIntosh
Jettisonable fuel tanks, canopies, radomes, electronic computors, missile guidance, missile research and development, electronic research and development, tow target research and development, aircraft components, airframes, tow targets, radar structures, simulation equipment.

• **Goodyear Tire & Rubber Co., Inc.**
1144 East Market St.,
Akron 16, O.
Franklin 1411
DR—A. W. Dunn
Aircraft wheels and brakes, tires and tubes, bullet sealing and bladder type fuel tanks, wing and propeller de-icers, rubberized fabrics, airfoam, shelters hose, cements and adhesives, research and development, crosswind landing wheels, rubber products, vinyl, packaging films.

- **Grand Central Aircraft Co.**
  Glendale 1, Calif. & Tucson, Ariz.
  Chapman 51222 (Glendale)
  Tucson 38611 (Tucson)
  DR—C. Palmer Boyles & Associates
  Aircraft and engine overhaul, aircraft and engine accessories, aircraft armament, training aids, personnel training.

- **Gray Co., Inc.**
  Graco Square
  Minneapolis, Minn.
  DR—Manufacturer's Introductory Service
  Lubricating equipment, paint and heavy coating pump spray equipment.

- **Gray Mfg. Co.**
  Arbor St. and Capitol Ave.
  Hartford, Conn.
  DR—Robert F. Goodbar
  Audograph electric sound recording equipment, electrical and mechanical assemblies.

- **Great Lakes Mfg. Corp.**
  11 Industrial Road
  Hammond, Ind.
  Sheffield 2280
  DR—Don B. Reagan
  Aircraft and engine accessories; metals and composition materials; office equipment and supplies.

- **Great Lakes Steel Corp.**
  Ecorse, Detroit, Mich.
  Vi 3-8000
  DR—C. W. Laufle
  DR—F. A. Bourke
  Bars, sheet, light plate AC-9115; low alloy steel for gas turbine structures.

- **Greer Hydraulics, Inc.**
  454 18th St.
  Brooklyn, N. Y.
  South 8-5510
  DR—Theodore Brick
  Test equipment.

- **Greer Stop Nut Co.**
  2620 Flournoy St.
  Chicago 12, Ill.
  Van Buren 6-1636
  DR—Robert E. Thorne
  Self-locking nuts made to conform to AN specifications, AN-N-5b drawings AN 364 and AN 365.

- **Guardian Electric Mfg. Corp.**
  1621 West Walnut St.
  Chicago 12, Ill.
  Chesapeake 3-1100
  DR—Frank E. Roush
  DR—J. J. Rowell
  Relays, switches, contractors, solenoids, electronic sub-assemblies, special flight and armament controls.

- **Gulf Oil Corp.**
  P. O. Box 1166
  Pittsburgh 30, Pa.
  Express 1-2400
  DR—John P. Knight
  Aviation gasoline, lubricating oil and other petroleum products.

- **Edwin I. Guthman & Co.**
  15 South Throop St.
  Chicago 7, Ill.
  Chesapeake 3-1600
  DR—Epps and Fedotin
  IF transformers, RF coils, yokes, shield cans, oscillator coils, RF tuners, trimmer condensers.

- **Gyrodyne Co. of America, Inc.**
  P. O. Box 631
  St. James, Long Island, N. Y.
  St. James 6366
  DR—W. D. Hazlett
  Aircraft; aircraft and engine accessories.

H

- **W. W. Hackney Co.**
  238 Lafayette St.,
  Dayton 2, O.
  Hemlock 6385
  DR—W. W. Hackney
  Designs and specifications for water supply, industrial equipment and mechanical developments.

- **Hamilton Mfg. Co.**
  Two Rivers, Wis.
  Two Rivers 351
  DR—Harry G. Schaefer
  Fume hoods laboratory; bench alberine stone; tops, tables laboratory sinks and accessories.

- **Hamilton Standard Div., United Aircraft Corp.**
  Windsor Locks, Conn.
  DR—John F. Burridge
  Propellers, engine starters, cockpit, air-conditioners and other accessories.

- **Hammarlund Mfg. Co.**
  460 West 34th St.
  New York 1, N. Y.
  Longacre 501300
  DR—Albert M. Baehr
  Variable capacitors, communications equipment.

- **Hammond Mfg. Corp.**
  3600 East Foothill Blvd.
  Pasadena, Calif.
  Ryan 1-8105
  DR—Dempsey B. Huff
  Fuel and oil handling equipment; ground servicing vehicles, marine and motorized equipment; aerial delivery equipment; jet engine containers; guided missile containers.

- **Hansen Mfg. Co.**
  4031 West 150th St.
  Cleveland, Ohio
  Clearwater 1-5115
  DR—K. C. Mosier Co.
  Quick-connective fluid line couplings.

- **Hannifin Corp.**
  1101 South Kilbourn Ave.
  Chicago 24, Ill.
  Nevada 8-0406
  DR—E. C. George
  Hydraulic riveters, hydraulic presses, pneumatic presses, air & hydraulic cylinders, air cylinder control valves.

- **Harley Buckle division, Sembojda Corp.**
  3629 North Dixie Drive
  Dayton, O.
  Oregon 4761
  DR—David S. Wyse
  Harley buckles, quick-release ejection fittings, cargo tie-down equipment.

- **Hartmann Electrical Mfg. Co.**
  175 N. Diamond St.
  Mansfield, O.
  Mansfield 3-2016 & 7-5066
  DR—A. W. Hartmann
  Reverse current cutouts, DC and AC aircraft protective relays.

- **Harvey Machine Co., Inc.**
  19200 S. Western Ave.
  Torrance, Calif.
  Nevada 6-2111
  DR—Art Lakin
  Aluminum extrusions and screw machine products and fittings.

- **Harvey-Wells Electronics, Inc.**
  Southbridge, Mass.
  Southbridge 1940
  DR—Harold M. Hassman & Associates
  Aircraft armament, communications equipment, shop and warehouse machinery and tools.

- **John Hassall, Inc.**
  142 Clay St.
  Brooklyn 22, N. Y.
  Evergreen 9-4700
  DR—Lee Hart
  Special rivets to order.

- **W. F. Hausman Co.**
  2nd & Race Sts.
  Cincinnati, O.
  Cherry 4664, 4665, 4666
  DR—John I. Di Matteo, Jr.
  Photographic equipment and supplies, office equipment and supplies; school equipment.

- **Hayden Mfg. Co., Inc.**
  Torrington, Conn.
  3158
  DR—D. K. Skilton
  Timing motors, timers, and elapsed time indicators.

- **Heppner Mfg. Co.**
  P. O. Box 612
  Round Lake, Ill.
  Round Lake 6-2161
  DR—A. N. Grimm
  Television components, mountings, gun heaters, tow target hardware, armament hardware.

- **Herman Nelson Division, American Air Filter Co., Inc.**
  Moline, Ill.
  Moline 46761
  DR—Charles P. Haskell
  Portable ground heaters, portable blowers, ventilators.

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- **Heyer Products Co., Inc.**
  471 Cortlandt St.
  Belleville 9, N. J.
  Belleville 2-4880
  DR—Contract Service Organization
  Automotive tune-up equipment; battery chargers; meters; testers; electronic systems.

- **H. M. R. Electronics, Inc.**
  36 Grove St.
  New Canaan, Conn.
  New Cannan 99609
  DR—Boehme Associates
  Navigational radar beacons, electronic test equipment, ADF, attenuators, counter measures equipment, gravity meters, heat controls.

- **Motor Generator div., Hobart Bros. Co.**
  33-01 37th Ave.
  Long Island City, N. Y.
  Stillwell 4-6136
  DR—D. W. Baker
  Ground power equipment.

- **Hoffman Radio Corp.**
  3761 South Hill St.
  Los Angeles 7, Calif.
  Richmond 7-9661
  DR—Epps and Fedotin
  Electronic-rescue radar, frequency shift, fire control direction findings, radio transmitting, receiving equipment.

- **Holley Carburetor Co.**
  5930 Vancouver Ave.
  Detroit 4, Mich.
  Tyler 4-1500
  DR—A. J. Hess
  Aircraft carburetors and service parts, turbojet engine fuel controls, afterburner fuel controls and fuel control test equipment.

- **R. M. Hollingshead Corp.**
  840 Cooper St.
  Camden, N. J.
  Woodlawn 4-7000
  DR—M. H. Simmons Associates
  Cleaning compounds, paint remover, protective stripping compound, fingerprint remover, various Air Force compounds.

- **Huck Mfg. Co.**
  2480 Bellevue Ave.
  Detroit, Mich.
  Walnut 1-6207
  DR—Robert Hooker
  Huckbolts, blind huckbolts, stumps, huckbolt studs, conical keystone, blind rivets, O. S. & self-plugging blind rivets.

- **Hughes Aircraft Co., division Hughes Tool Co.**
  Florence Ave. & Teale St.
  Culver City, Calif.
  Texas 0-7111 & Exbrook 8-2711
  DR—John H. Richardson
  Airborne radar & fire control systems, ground & airborne armament equipment, electronic research & development, ground & shipboard radar antennas, miniature glass germanium diodes, helicopters, aircraft modification & all weather intercepter aircraft nose assemblies.

- **Hunter Mfg. Co.**
  1550 East 17th St.
  Cleveland 14, O.
  Tower 1-0035
  DR—Fred J. Kendell
  Manufacturers of gasoline burning heaters.

- **Hycon Mfg. Co.**
  2961 E. Colorado Blvd.
  Pasadena 8, Calif.
  Ryan 1-7611
  DR—James P. Hobstetter
  Specialized electronic equipment, aerial reconnaisance camera equipment, guided missile instrumentation, ordnance.

- **Hydro-Aire Inc.**
  3000 Winona Ave.,
  Burbank, Calif.
  Stanley 7-5481
  DR—Robert Hendricks
  Aircraft accessories and Hytrol anti-skid braking systems; equipment on every type fighter, bomber, transport aircraft.

I

- **IBM Corp.**
  590 Madison Ave.
  New York, N. Y.
  Plaza 3-1900
  DR—A. S. Heitz
  Electronic and electric accounting machines, electronic and electric clock, time-recording and time-signal systems; electric typewriters.

- **Imperial Industries, Inc.**
  4436 Walker Ave.,
  Wayne, Mich.
  Wayne 2350
  DR—Harry I. Schenck, Jr.
  Fabrication and post-forming of plastic shapes and combinations of plastics and wood or metal, plastic displays.

- **Independent Pneumatic Tool Co.**
  175 N. State St.
  Aurora, Ill.
  Aurora 2-7601
  Cincinnati Branch—3726-28 Floral Ave.
  Cincinnati 12, Ohio
  Redwood 2086
  DR—H. C. Brown
  Universal electric, pneumatic & high-frequency drills, screwdrivers, nutsetters, sanders, polishers & grinders, pneumatic rivet squeezers & riveting hammers.

- **Indiana Gear Works, Inc.**
  1458 E. 19th St.
  Indianapolis, Ind.
  Atlantix 2331
  DR—John L. Buehler
  Aircraft gear boxes and actuators, aircraft gears, helicopter transmissions.

- **Industrial Instruments, Inc.**
  17 Pollock Ave.
  Jersey City 5, N. J.
  Bergen 4-5300
  DR—Robert G. Siff
  Electric and electronic test equipment.

- **Industrial Tape Corp.**
  Lincoln Highway
  New Brunswick, N. J.
  Charter 7-7900
  DR—P. K. Peoples
  Permacel and Texcel pressure-sensitive tapes.

- **Infra Electronic Corp.**
  Beaufort and Eagle Rock Ave.
  Roseland, N. J.
  Caldwell 6-4300
  DR—Jerry Gerrard
  Radio equipment, test equipment; communications; special amplifiers.

- **Inland Testing Laboratories, division of Cook Electric Co.**
  2700 Southport Ave.
  Chicago 14, Ill.
  Diversey 8-6700
  DR—Richard W. Harbison
  Product environmental, climatic and qualification testing.

- **Instrument Corp. of America**
  Blacksburg, Va.
  Blacksburg 8208
  DR—Boehme Associates
  Slip ring assemblies, precision; collecter ring assemblies, precision; commutators, precision.

- **Insulation Mfgs. Corp.**
  120 West Second St.,
  Dayton 2, O.
  Michigan 1391
  DR—Russell Shoup
  Electrical insulating materials.

J

- **Jack & Heintz, Inc.**
  Cleveland 1, O.
  Montrose 2-1000
  DR—Louis J. Sculley
  DR—E. C. Johns
  Aircraft starters, motors, actuators, inverters, systems, generators, regulators, relays, control panels.

- **James-Pond-Clark**
  2181 East Foothill Blvd.
  Pasadena, Calif.
  Ryan 1-7136
  DR—Scott Equipment & Engr. Co.
  Check valves.

- **Janitrol Aircraft Automotive div., Surface Combustion Corp.**
  400 Dublin Ave.
  Columbus 16, Ohio
  Main 6492
  DR—Frank Deak
  DR—Harold E. Pryor
  Aircraft heaters and components, ground and portable heaters, GCA trailer heaters, liquid coolant heaters.

- **Jay Engineering Co.**
  5413 Pearl Road
  Cleveland 29, O.
  Shadyside 1-3300
  DR—Joseph Jay
  Shockmounts, relays.

- **J-B-T Instruments Co.**
  441 Chapel St.
  New Haven 8, Conn.
  New Haven 75825
  DR—Kurt W. Schmidt
  DR—Paul H. Hussey
  Electrical measurement meters.

- **Jerrold Electronics Corp.**
  26th & Dickinson Sts.
  Philadelphia 46, Pa.
  Howard 5-9200
  DR—Neal Bear Corp.—Jerry Kilroy
  Aircraft instruments, communications equipment, shop and warehouse machinery and tools.

- **Jiffy-Join Corp.**
  153 West 23rd St.
  New York 11, N. Y.
  Chelsea 2-0638
  DR—Harry G. Schaefer
  Aluminum curtain track for cubicles; Jiffy-Join slider tape, nylon mesh and cubicle curtains.

- **Joyce-Cridland Co.**
  2027 East First St.
  Dayton, O.
  Kenmore 5113
  DR—Fred J. Kendell
  Automatic hydraulic lifts, hydraulic material lifts and elevators, all types of jacks.

- **Joy Mfg. Co.**
  Pittsburgh Div.
  Oliver Bldg.
  Pittsburgh 22, Pa.
  Grant 1-2145
  DR—C. Lawrence Tinker, Jr.
  Axivane fans for electronic cooling, defrosting, de-icing, ventilating and heating.
  Ohio Div.
  338 S. Broadway
  New Philadelphia, O.
  New Phila. 4-2321
  DR—Harold B. Zeppenfeld
  Aviation type electrical connectors.
  St. Louis Div.
  4235 Clayton
  St. Louis 10, Mo.
  Newstead 4842
  DR—R. W. Scott
  Air Compressors.

- **Justrite Mfg. Co.**
  2061 North Southport Ave.
  Chicago 14, Ill.
  Diversey 82114
  DR—Direksen & Landis
  Flashlites, disposal cans, machine shop facilities.

K

• **Kaiser Aluminum & Chemical Co.**
207 Realty Bldg.
Dayton 2, O.
Michigan 0317
DR—D. L. Schmitt
Aluminum—sheet, pig, bar, ingot, rod, wire, foil, extrusions, billets, roofing sheet, shade screen, siding.

• **Kalart Co., Inc.**
Hultenius St.
Plainville, Conn.
Plainville 1811
DR—Contract Service Organization
Photographic and photogrammetric equipment; cameras; range finders; flash equipment.

• **Keller Tool Co.**
Grand Haven, Mich.
Tel. 551
DR—K. C. Mosier Co.
Manufacturers of pneumatic tools, air hoists, air motors.

• **Kester Solder Co.**
4201 Wrightwood Ave.
Chicago 39, Ill.
Belmont 5-1601
DR—J. H. Humble
Manufacturers of Flux-Core solder, other types of solders and soldering fluxes.

• **Ketcham & McDougall, Inc.**
Eagle Rock Ave.
Roseland, N. J.
Caldwell 6-6060
DR—L. E. O'Neil
Small automatic reels, stampings, screw machine parts, assemblies, marine speedometers.

• **Walter Kidde & Co., Inc.**
Belleville, N. J.
Belleville 25000
DR—Duane Dean
Aircraft and engine accessories; aircraft armament; special tools, equipment and related parts; ground servicing vehicles, marine and motorized equipment; aerial delivery equipment.

• **Klincher Locknut Corp.**
2153 Hillside Ave.
Indianapolis, Ind.
Hickory 9284
DR—G. A. Katzenberger
Manufacturer of Locknuts.

• **King Electric Co.**
9123 Inman Ave.
Cleveland 5, O.
Diamond 1-1066
DR—Kurt W. Schmidt
DR—Paul H. Hussey
Automotive and aeronautical testing equipment.

• **Kollsman Instrument Corp.**
80-08 45th Ave.
Elmhurst, N. Y.
Newtown 9-2900
DR—H. W. Lamont
Aircraft instruments and controls; radio communications and navigation equipment.

• **Knapp Monarch Co.**
3500 Bent Ave.,
St. Louis 16, Mo.
Grand 8112
DR—Thomas J. Kincaid
Electro mechanical products, gas cylinders, special valves.

• **Koiled Kords, Inc.**
Box K
Hamden, Conn.
New Haven 2-5515
DR—Albert M. Baehr
Retractile cords.

• **Krouse Testing Machine Co.**
573 East 11th Ave.,
Columbus, O.
DR—McNary Engineering Service
Krouse magnifying micrometer.

L

- **Lamson & Sessions Co.**
  1971 W. 85th St.
  Cleveland, Ohio
  Woodbine 1-3800
  DR—A. E. R. Peterka
  Bolts, nuts, cotter pins, machine screws, tapping screws, special purpose fasteners.

- **Lanagan & Hoke, Inc.**
  Easton Road
  Warrington, Pa.
  Hatboro 3030
  DR—Frederic L. Ohmer
  Automatic and electronic test equipment, multimeters, aluminum fabricators.

- **Land-Air, Inc.**
  440 West Superior St.
  Chicago 10, Ill.
  Mohawk 4-5778
  DR—T. E. Fryman
  Instrumentation of missile ranges, manufacture and installation of electronic gear; research and development; field service.

- **Langevin Mfg. Corp., subsidiary of W. L. Maxson Corp.**
  37 West 65th St.
  New York, N. Y.
  Endicott 2-7200
  DR—William P. McNally
  Audio frequency amplifiers, transformers, power supplies, intercom equipment.

- **Langlois Gauge Co.**
  1602-23rd St.
  Detroit 16, Mich.
  Tashmoo 5-0395
  DR—Earle K. Heener
  Manufacturers of precision gauges & tools, specializing in airfoil work, guillotine gauges.

- **Lau Blower Co.**
  2007 Home Ave.
  Dayton 7, O.
  Melrose 3591
  DR—E. B. Sickle
  Blowers, blower wheels, air moving devices.

- **Lavoie Laboratories, Inc.**
  Matawan-Freehold Road
  Morganville, N. J.
  DR—Fred Van Allen
  Electronic equipment.

- **Leach Relay Co.**
  5915 Avalon Blvd.
  Los Angeles 3, Calif.
  Adams 8221
  DR—Joseph Jay
  AF and AN approved relays and contractors; commercial type relays.

- **Leader Products**
  2120 East 19th St.
  Cleveland 14, O.
  Tower 1-0155
  DR—Neal Bear Corp.—Jerry Kilroy
  Aircraft instruments, commercial electrical equipment, aerial targets and gliders, aircraft armament, communications equipment, shop and warehouse machinery and tools.

- **Lear, Inc.**
  110 Iona Ave., N. W.
  Grand Rapids 2, Mich.
  Glendale 1-1555
  DR—John F. Harrigan
  Flying instruments, auto-pilots, aircraft radio, electrical and mechanical equipment; liquid, vacuum and air pumps.

- **G. H. Leland, Inc.**
  123 Webster St.
  Dayton 2, Ohio
  Hemlock 5896
  DR—Hans G. Belitz
  Ledex rotary solenoids, Ledex circuit selectors Ledex stepping relays.

- **Lempco Products, Inc.**
  5490 Dunham Road
  Bedford, O.
  Broadway 13400
  DR—Lou Kleinhans
  Shop and warehouse machinery, tools and equipment; special tool equipment and related parts; ground servicing vehicles, marine and motorized equipment.

- **R. G. LeTourneau, Inc.**
  Peoria, Ill.
  Peoria 3-4521
  DR—Roy E. McCluskey
  DR—Harold R. McQuarrie
  DR—Leslie E. Scott
  Manufacture of earthmoving and construction equipment.

- **Liberty Electric Co.**
  1915-25 Madison Ave.
  Indianapolis, Ind.
  Capitol 3900
  DR—Direksen & Landis
  Complete stamping facilities, electric hot cups and ovens, special personal equipment kits.

- **Link Aviation, Inc.**
  Hillcrest
  Binghamton, N. Y.
  DR—William L. Mustard
  Manufacturers of electronic training equipment, jet radar and reciprocating engine simulators, gunnery trainers, navigation trainers.

- **Link Belt Co.**
  307 North Michigan
  Chicago, Ill.
  Randolph 6-7790
  DR—Orvin K. Gaskins
  Aircraft silent & roller chains, P. I. V. variable-speed drives, conveying & power transmission machinery.

- **Lonergan Mfg. Co.**
  Albion, Mich.
  Albion 2101
  DR—Direksen & Landis
  Airconditioning equipment, metal stampings, aluminum welding, ammunition boxes, commercial refrigeration equipment.

- **Lord Manufacturing Co.**
  1635 West 12th St.
  Erie 6, Pa.
  Erie 2-2296
  DR—W. W. Dalton
  Dynafocal aircraft engine suspensions, bonded-rubber shock and vibration systems, bonded-rubber mechanical parts.

- **Lovejoy Flexible Coupling Co.**
  4949 W. Lake St.
  Chicago 44, Ill.
  Estabrook 9-3010
  DR—Power Transmission Sales
  Aircraft-type universal joints, variable-speed drives & flexible couplings.

- **Harry A. Lowther Co., Inc.**
  Butler, Ind.
  DR—Theodore Woodward
  Towing tractors for towing aircraft, jet engine starting equipment.

- **Luminator, Inc.**
  120 N. Peoria St.
  Chicago, Ill.
  Se 8-4151
  DR—R. G. Nordquist
  Lighting fixtures for transportation equipment.

- **Lycoming-Spencer division, Avco Mfg. Corp.**
  Oliver St.,
  Williamsport, Pa.
  Williamsport 6181
  DR—D. N. McKay
  Research, development and production of precision machinery, aircraft engines and components, generator units, special machine tools.

- **Lyon Metal Products, Inc.**
  Aurora, Ill.
  Aurora 8421
  DR—Hull R. Collins
  Steel shelving, folding chairs, lockers, stools, kitchen cabincts, shop boxes, benches, cabinets, tool stands, tool toters.

- **Lysco Mfg. Co., Inc.**
  82 Herman St.
  East Rutherford, N. J.
  Hoboken 3-3520
  DR—Contract Service Organization
  Rectifiers; testers; electronic receivers.

M

- **Magnecord, Inc.**
  360 North Michigan Ave.
  Chicago, Ill.
  Andover 3-3737
  DR—Neal Bear Corp.—Jerry Kilroy
  Aircraft instruments, communications equipment, shop and warehouse machinery and tools, training aids.

- **Magnetic Amplifiers Inc.**
  632 Tinton Ave.
  New York. N. Y.
  Cyress 2-6610
  DR—Paul R. Hobstetter
  Magnetic amplifiers for servomechanisms and computer applications, voltage current and frequency regulators.

- **P. R. Mallory & Co., Inc.**
  3029 East Washington St.
  Indianapolis, Ind.
  Imperial 5353
  DR—Edwin D. Wilder
  Aircraft and engine accessories; commercial electrical equipment and supplies; aircraft armament, communications equipment; shop and warehouse machinery, tools and equipment; metals and composition materials.

- **Johns-Manville Corp.**
  22 East 40th St.
  New York, N. Y.
  Lexington 2-7600
  DR—W. E. Patterson
  Thermal insulation blankets, asbestos gaskets, molded packings, asbestos textiles, metallic gaskets, Inconel packings, firewall seals.

- **MacWhyte Co.**
  2905-14th Ave.
  Kenosha, Wis.
  Tel. 7121
  DR—V. P. Jenkins
  Manufacturers of Hi-Fatigue aircraft cable, Safe-Lock cable terminals, cable assemblies, tie rods, braided wire rope slings; bright, galvanized, stainless steel, Monel metal wire rope.

- **Marconi Instruments, Ltd.**
  23 Beaver St.
  New York 4, N. Y.
  Hanover 2-0198
  DR—Robert G. Siff
  Electronic and electrical test equipment.

- **Marion Electrical Instrument Co.**
  Stark Street Gate
  Manchester, N. H.
  Manchester 56971
  DR—Boehme Associates
  Ruggedized and hermetically sealed meters, electrical indicating instruments and meters, aircraft instruments.

- **Marman Products Co.**
  11214 Exposition Blvd.
  Los Angeles 64, Calif.
  Arizona 3-0932
  DR—N. W. Calverts Co.
  Engineered clamps.

- **Marquardt Aircraft Co.**
  7801 Hayvenhurst Ave.
  Van Nuys, Calif.
  DR—G. R. Lott
  Engineers, designers, and manufacturers of ramjet engines, turbine driven auxiliary power units, and fuel pumps, fuel systems, afterburners.

- **Marquette Metal Products Co.**
  1145 Galewood Drive
  Cleveland, Ohio
  Glenville 1-4800
  DR—J. W. Griggs
  Aircraft windshield wipers.

- **Mars & Staff**
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  3520 West Carroll Ave.
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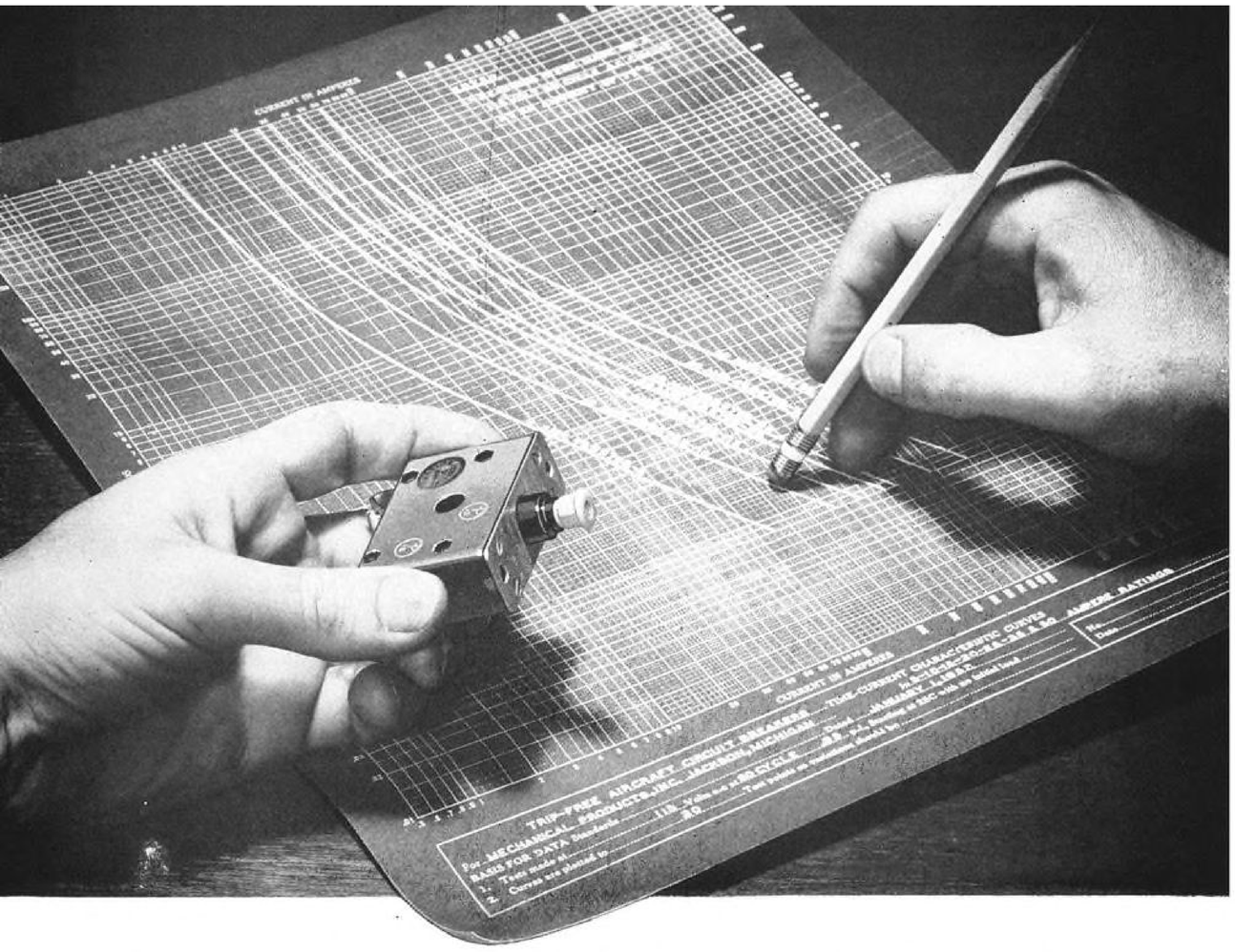

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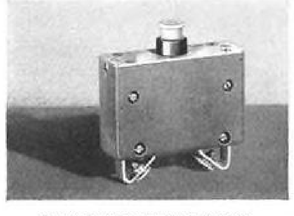

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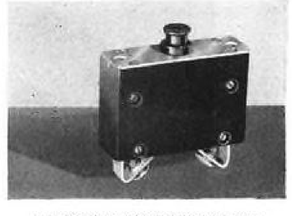

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  DR—Fred J. Kendell
  Aircraft components, aluminum, stainless steel, sheet steel metal forming and assembly.

- **Miller Dial & Name Plate Co.**
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  DR—Joseph Jay
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- **Miller Electric Manufacturing Co.**
  718 S. Bounds St.
  Appleton, Wisc.
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  DR—F. H. Beck
  A. c. and d. c. welders, a. c. welders for Heliarc welding process, gasoline engine-driven combination a. c. welders and powerplants, spot welders.

- **Milwaukee Electric Tool Corp.**
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  Portable electric tools—including drills, saws, nut runners, screw shooters, disc sanders & polishers, grinders, drill stands.

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  Dayton, O.
  Hemlock 7877
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  Trinity 5-7111
  DR—I. G. Christensen
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- **Monowatt, department of General Electric Co.**
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  DR-Arthur Rundle
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  Spaulding 2-1600
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- **Nathan Products Corp.**
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  Cypress 5-1300
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  Murray Hill 7-8000
  DR—S. K. Lutz
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- **National Die Casting Co.**
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  Hollycourt 5-6000
  DR—Pete Pfund
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- **Neal Bear Corp.**
  West Richfield, O.
  West Richfield 100
  DR—Neal Bear
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- **Nellis Industries, Inc.**
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  New York 17, N. Y.
  Murray Hill 9-5960
  DR—Harry G. Schaefer
  Steel cabinets and cases; storage case assemblies; stainless steel tops and sinks; metal specialties.

- **New Castle Products, Inc.**
  New Castle, Ind.
  New Castle 3300
  DR—Everett D. Farr
  Modern fold doors, sewing facility for government requirements.

- **Norma-Hoffmann Bearing Corp.**
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  Stamford, Conn.
  Stamford 48-3731
  DR—C. D. Kilham
  Suppliers of small frame ball bearings as well as precision roller bearings for use in both jet engines and turbo supercharger roller bearings; also for jet engine accessory units.

- **North American Aviation, Inc.**
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  Los Angeles 45, Calif.
  Orchard 7-6121
  4300 East Fifth Ave.,
  Columbus 16, O.
  Douglas 1851
  DR—Stanley Chase
  Manufacture of F-86 Sabre-jet fighters, B-45 bombers, T-28 trainers, missiles, fire control systems.

- **North American Philips Co., Inc.**
  100 East 42nd St.
  New York 17, N. Y.
  DR—Manufacturer's Introductory Service
  Communications equipment—electron, microscope, projection, television, small motors.

- **Northern Radio Co.**
  143 West 22nd St.
  New York, N. Y.
  DR—Manufacturer's Introductory Service
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- **Northrop Aircraft, Inc.**
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  New York office—475 Fifth Ave.
  Oregon 9-4760
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O

- **Ohio Electric Manufacturing Co.**
  5900 Maurice
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  Michigan 1-2880
  DR—George Duncan
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- **L. E. O'Neil & Associates**
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  Dayton, O.
  DR—L. E. O'Neil
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- **O'Neil-Irwin Mfg. Co.**
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  Tel. 6311
  DR—C. H. Gosiger Machinery Co.
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- **Optron Laboratory**
  2725 Salem Ave.
  Dayton 6, O.
  Randolph 1898
  DR—Olaf Mohn
  Interferometers, schlieren windows, precision camera windows.

- **Owatonna Tool Co.**
  Owatonna, Minn.
  Owatonna 2339
  DR—James R. McBeth
  Pulling equipment.

- **Owens Corning Fiberglas Corp.**
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  Toledo 1, O.
  Garfield 7461
  DR—A. T. Larned, Jr.
  Firons glass rolls, textiles, mats and packs for thermal, acoustical and electrical insulation, reinforcement and filtration.

P

- **Pacific Airmotive Corp.**
  2940 Hollywood Way.
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  Rockwell 9-3481
  DR—J. W. Baird
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- **Pacific Division, Bendix Aviation Corp.**
  11600 Sherman Way
  North Hollywood, Calif.
  Sunset 15131
  DR—W. D. Hazlett
  Aircraft and engine accessories, communications equipment, ground servicing vehicles, marine and motorized equipment.

- **Pacific Electricord Co.**
  3217 Exposition Place
  Los Angeles 18, Calif.
  Axminster 3-7205
  DR—Harold H. Hassman & Associates
  Commercial electrical equipment, aircraft armament, communications equipment, shop and warehouse machinery and tools.

- **Pacific Moulded Products Co.**
  905 East 59th St.
  Los Angeles 1, Calif.
  Adams 1-1151
  DR—Edward E. Magee
  Precision moulded parts.

- **Packard Electric Div.—General Motors Corp.**
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  Warren 3-2101
  DR—R. J. Montgomery
  Aircraft electric cable.

- **Panelyte division, St. Regis Sales Corp.**
  230 Park Ave.,
  New York 17, N. Y.
  Murray Hill 6-5800
  DR-Ralph Emig
  DR-John McLusky
  Laminated plastics.

- **Paragon Plastic Corp.**
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  New York, N. Y.
  Longacre 4-7950
  DR—Philip E. Bennett
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- **Parker Aircraft Co.**
  5827 West Century Blvd.,
  Los Angeles 43, Calif.
  Orchard 1-6161
  DR—Charles C. Austin
  Manufacturers of valves, fittings, jet engine accessories, O rings.

- **Parker Appliance Co.**
  17325 Euclid Ave.
  Cleveland 12, O.
  Kenmore 1-3000
  DR—Charles C. Austin
  Manufacturers of valves, fittings, jet engine accessories, O rings.

- **Pastushin Aviation Corp.**
  5651 West Century Blvd.
  Los Angeles 45, Calif.
  DR—John Andrews
  Aircraft fuel tanks, seats, landing flaps, ailerons, tail surfaces, bomb bay doors.

- **Perfect Circle Corp.**
  Hagerstown, Ind.
  2301
  DR—Robert M. Thomas
  Piston rings.

- **Perkin-Elmer Corp.**
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  Norwalk 8-6501
  DR—Ted H. Orndoff
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- **Permatex Co. Inc.**
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  Sheepshead 3-1000
  DR—J. C. Spatny
  DR—J. Del Greco
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  DR—G. Desbro
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  Cleveland 6-2171
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- **Philco Corp.**
  "C" & Tioga St.,
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  Nebraska 4-5100
  DR—William E. Thresher
  Electro-mechanical and electronics.

- **Philco Corp., Tech Rep division**
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  Philadelphia 32, Pa.
  Baldwin 3-1800
  DR—E. J. Schreiber
  Electronic field engineers.

- **Piasecki Helicopter Corp.**
  Morton, Pa.
  Swarthmore 6-4000
  DR—Max Bowen
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- **Pilot Radio Corp.**
  37-06 36th St.
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  DR—Manufacturer's Introductory Service
  Communications equipment—commercial television, pilotuners, control panels.

- **Pioneer Parachute Co., Inc.**
  168 Forest St.
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  DR—National Requirements Service
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- **Pittsburgh Plate Glass Co.**
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  DR—W. J. Timberman, Jr.
  DR—R. G. Whittemore
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- **Plasteck, Inc.**
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  DR—John A. Lombard
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- **Joseph Pollak Corp.**
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  Dorchester District
  Boston 22, Mass.
  Geneva 65080
  DR—Joseph Jay
  Ignition switches, automotive type controls.

- **Plastoid Corp.**
  42-61 24th St.
  Long Island City 1, N. Y.
  Stillwell 6-6200
  DR—Earl E. Griffin, Jr.
  Synkote insulated wire.

- **Polyken Industrial Tapes, Dept. of Bauer & Black**
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  Chicago, Ill.
  Randolph 6-4251
  DR—G. Stineback
  DR—H. D. Segool
  Manufacturers of moisture-resistant sensitive industrial adhesive tapes meeting JAN-P-127.

- **Polymer Corp. of Pennsylvania**
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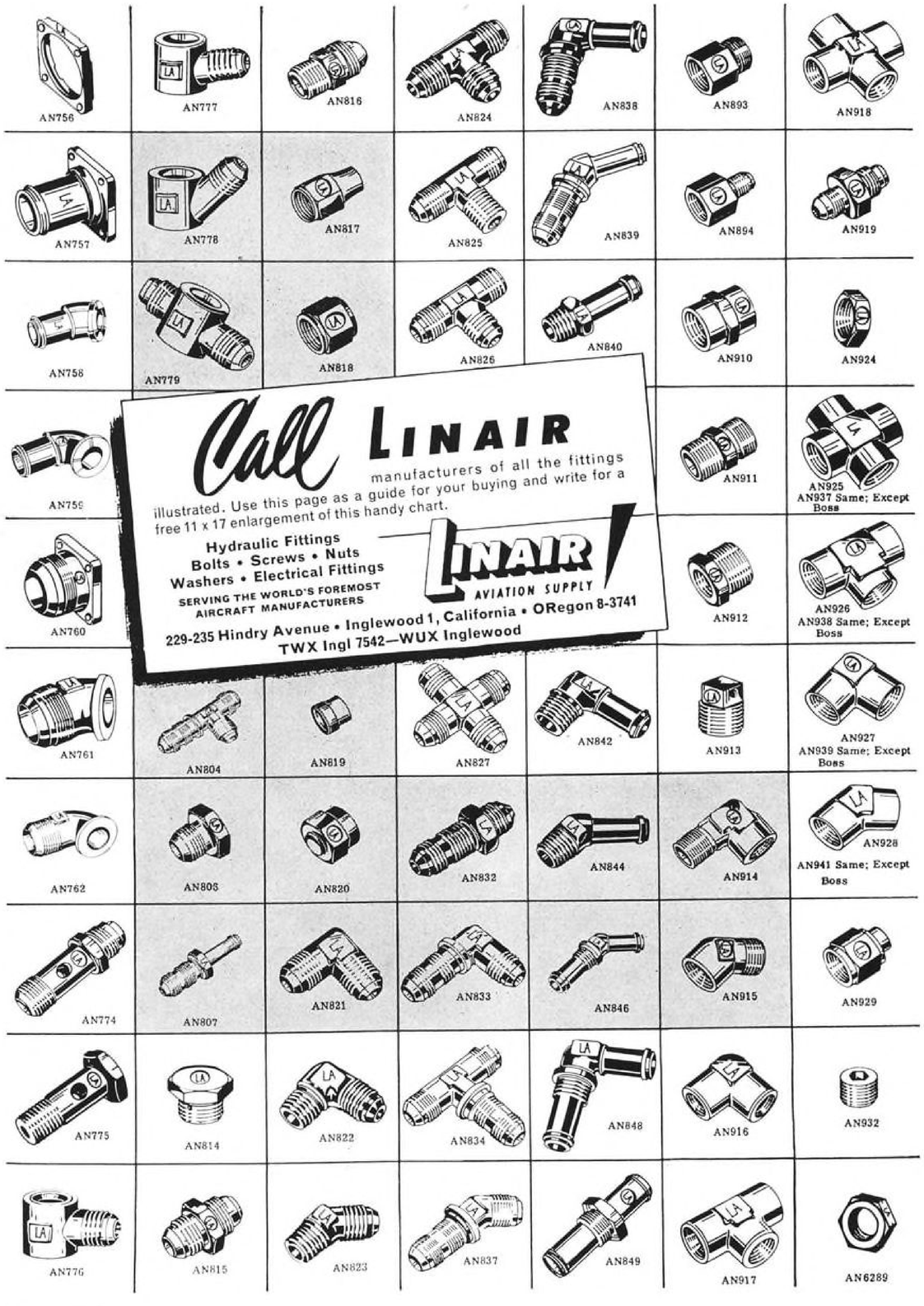

- **Portable Electric Tools, Inc.**
  320 West 83rd St.
  Chicago 20, Ill.
  Hudson 36700
  DR—Ruth Gerhardt
  Portable electric tools, fractional horsepower motors, electric rotary equipment

- **Potter & Brumfield**
  Princeton, Ind.
  Princeton 1208
  DR—Boehme Associates
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- **Pratt & Whitney Aircraft Div.—United Aircraft Corp.**
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  DR—E. Dichman
  Jet and piston engines.

- **Precision Rubber Products Corp.**
  3110 Oakwood Drive
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  DR—Walter R. Brown
  Aircraft hardware, rubber materials, "O" rings.

- **Press Wireless Mfg. Co., Inc.**
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  DR—Harold M. Hassman & Associates
  Aircraft armament, communications equipment, shop and warehouse machinery and tools, training aids.

- **Prestoseal Mfg. Corp.**
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  Stillwell 4-6832
  DR—H. F. Lueke
  Presto butt-weld film splicer.

- **Progressive Welder Sales Co.**
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  DR—William Plummer
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- **Projects Unlimited**
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- **Propeller Service Corp.**
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  Windsor Locks, Conn.
  DR—Contract Service Organization
  Propeller and governor overhaul, commercial and military.

- **Pro-phy-lac-tic Brush Co., Pro-lon Division**
  Florence, Mass.
  DR—Manufacturer's Introductory Service
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- **Protective Treatments, Inc.**
  420 Dellrose Ave.,
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  DR—Louis Pereny
  Paint remover, de-icing and de-frosting fluid, strippable coatings.

- **Pryor Mfg. Co.**
  651 North Main St.
  Mansfield, O.
  Mansfield 42616, 12706
  DR—Dircksen & Landis
  Aircraft and engine accessories, aircraft hardware, rubber materials and bearings, fuel and oil handling equipment, ground servicing vehicles, marine and motorized equipment, builders hardware.

- **PSP Engineering Co.**
  8420 Otis St.
  South Gate, Calif.
  Logan 5-8195
  DR—E. G. McDonnell
  Aircraft quality solenoids.

- **Pure Oil Co.**
  35 East Wacker Drive
  Chicago 1, Ill.
  State 2-2100
  DR—D. H. Young
  Aviation engine oils, aviation gasolines, aviation jet fuels.

- **Purolator Products Inc.**
  970 New Brunswick Ave.
  Rahway, N. J.
  Rahway 7-4000
  DR—Thomas Morton
  Filters and strainers for hydraulic fuel and air coil systems.

- **Pyle National Co.**
  1334 N. Kostner
  Chicago, Ill.
  Di 2-6300
  DR—J. E. Voelker
  Supplies airport lighting, plugs, receptacles, connectors.

Q

- **Quam-Nichols Co.**
  33rd Place & Cottage Grove
  Chicago 16, Ill.
  Calumet 5-7313
  DR—Albert M. Baehr
  Speakers.

R

- **Radiart Corp.**
  3455 Vega Ave.
  Cleveland 13, O.
  Melrose 106660
  DR—Neal Bear Corp.—Jerry Kilroy
  Aircraft instruments, commercial electrical equipment, aerial targets and gliders, aircraft armament, communications equipment, shop and warehouse machinery and tools.

- **Radiation Counter Laboratories, Inc.**
  5122 West Grove St.
  Skokie, Ill.
  Skokie 7805
  DR—G. Desbro
  Nuclear detection instruments, Geiger Muller tubes, reactor controls, scientific glassware.

- **Radio Apparatus Corp.**
  55 North New Jersey St.
  Indianapolis, Ind.
  DR—F. A. Daugherty Co.
  AR-2, AR-3 Monitoradios, receivers for monitoring aircraft calls.

- **Radio Frequency Labs, Inc.**
  Boonton, N. J.
  Boonton 8-3100
  DR—Beedle Equipment Co.
  Test equipment.

- **Radio Receptor Co., Inc.**
  84 North 9th St.
  Brooklyn 11, N. Y.
  Evergreen 8-6000
  DR—Robert G. Siff
  UHF communications, IFF, electronics research and development.

- **Rano Machine & Tool Corp.**
  3799 Harlem Road
  Buffalo 21, N. Y.
  University 9387
  DR—Contract Service Organization
  Medium and heavy mechanical assemblies and parts.

- **Raytheon Mfg. Co.**
  138 River St.
  Waltham 54, Mass.
  Waltham 5-5860
  DR—R. J. McIlrath
  Communications equipment.

- **RBM div., Essex Wire Corp.**
  Logansport, Ind.
  DR—H. F. Barnes
  Manual and magnetic electric controls for automotive, industrial, communication and electronic use.

- **Reaction Motors Inc.**
  Rockaway, N. J.
  Rockaway 9-2323
  DR—G. Richard Lott
  Designers, developers, and manufacturers of rocket engines and allied equipment.

- **Reed Products, Inc.**
  Milwaukee, Wis.
  Broadway 24533
  DR—R. M. Reutlinger
  Special clothing and personal equipment.

- **Reeves Instrument Corp.**
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  DR—Hans Howard
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  White Plains 6-9500
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  DR—E. C. Prior
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  DR—John W. Gower
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  DR—Joseph Jay
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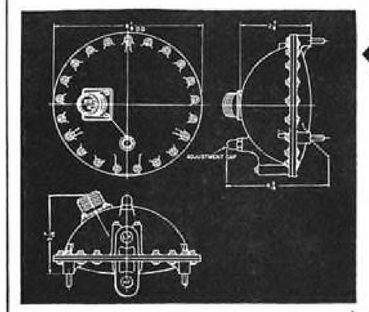

SENSITIVE LOW PRESSURE SWITCH SERIES P904

Differential Type for Ram Air
Sensitivity: 1/10" H_2O
Actuating Pressure Range: 1.50" H_2O to 3 psi with differential of 20% of applied pressure
Electrical Rating: 28 VDC 5 Amp. inductive
Complies with A.F. environmental specification 41065-B
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Electrical Rating: 28 VDC 3 Amp. inductive to 45,000 ft.
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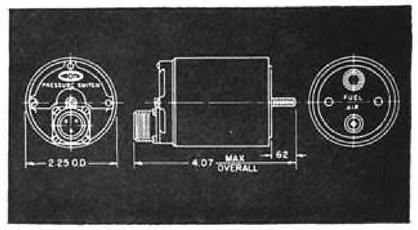

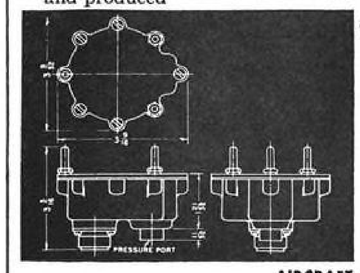

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Temperature Range: −65° F. to +170° F.
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- **Struthers-Dunn, Inc.**
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  DR—Beedle Equipment Co.
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- **Sun Electric Corp.**
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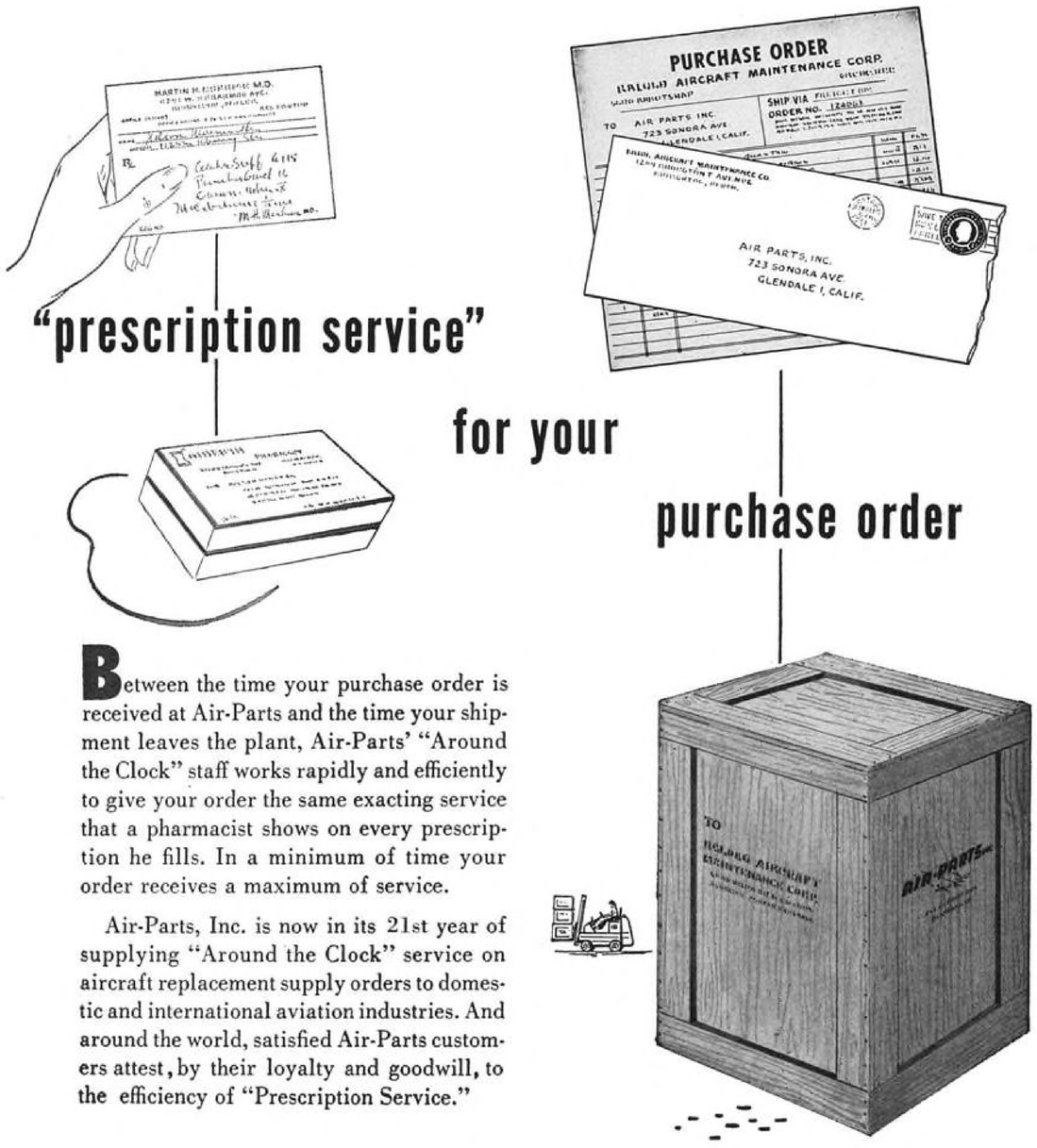

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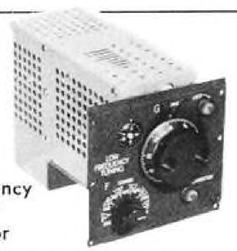

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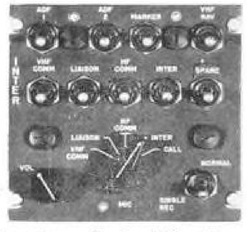

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new Government Surplus complete with 18 inch straight edge—extra bands and carrying case—price $34.50 each, FOB Miami, Florida. Literature upon request: Aeronautical Representatives, Miami International Airport. Mailing address: 256 La Villa Drive, Miami Springs, Florida.

To Employers Who Advertise for Men:

The letters you receive in answer to your advertisements are submitted by each of the applicants with the hope of securing the position offered.

When there are many applicants it frequently happens that the only letters acknowledged are those of promising candidates. Others do not receive the slightest indication that their letters have even been received, much less given any consideration. These men often become discouraged, will not respond to future advertisements and sometimes even question if they are bona fide.

We can guarantee that *Every Advertisement Printed in the Searchlight Section Is Duly Authorized.* Now won't you help keep our readers interested in this advertising by acknowledging every application received, even if you only return the letters of unsuccessful applicants to them marked, say, "Position filled, thank you." If you don't care to reveal your identity, mail them in plain envelopes.

We suggest this in a spirit of helpful co-operation between employers and the men replying to Positions Vacant advertisements.

Classified Advertising Division
McGRAW-HILL PUBLISHING COMPANY, INC.

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AC SPARK PLUG DIVISION
of
GENERAL MOTORS CORPORATION

PRECISION INSTRUMENT PLANT

Positions now available for highest caliber personnel in the field of airborne automatic, electro-mechanical control equipment.

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ELECTRONIC ENGINEERS
SERVO ENGINEERS
ELECTRONIC DESIGNERS
MECHANICAL DESIGNERS

New and expanding division of an established firm with 20 years of successful experience in the instrument field. Work involved deals with the manufacture and development of highly complex equipment of the most advanced type.

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GENERAL MOTORS CORPORATION
1925 E. Kenilworth Place
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ENGINEER

Centrifugal Pump Experience
Preferably Aircraft
LEAR, INCORPORATED
Romec Division
Abbe Road Elyria, Ohio

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ENGINEERING PERSONNEL

For the development of gas turbines and gas turbine components specializing in the fields of—

THERMODYNAMICS
AERODYNAMICS
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Give complete data on education, experience, minimum salary requirements, etc., in first letter to:

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LYCOMING-SPENCER DIVISION
Avco Manufacturing Corporation
652 Oliver St. Williamsport, Penna.
All inquiries held *STRICTLY CONFIDENTIAL*

WANTED—HAM. STD. PROPS
12D40-211 Propeller Hubs
12D40-211-6101A12 Complete Propeller Assys.
Also
AN5773-1A Engine Gauge Units
New or Overhauled & Certified Material OK
Phone, Wire or Write Immediately!!!
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"Aviations' Leading Supply House"

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Expanding C-119 and C-123 Aircraft Program at Willow Run offers fine opportunities and steady employment for qualified men

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- **Tool and Die Engineers**
- **Industrial Engineers**
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- **Tool and Die Designers**

KAISER-FRAZER CORPORATION
Willow Run (near Detroit), Michigan

ENGINEERS

- **Project Engineers**
- **Junior Engineers**

Recent Engineering Graduates (ME or EE preferred)

YOUR FUTURE DESERVES THE BEST!
Kearfott is large enough that it is a leader in its field, yet small enough that your ability and initiative will soon be recognized.

KEARFOTT designs and develops Aircraft Instruments, Controls and Navigation Systems
which include:
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YOUR ADVANTAGES ARE MANY AT KEARFOTT
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- Pleasant suburban surroundings
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KEARFOTT COMPANY, INC.
1150 McBride Avenue Little Falls, N. J.

PRATT & WHITNEY ENGINE OVERHAUL TOOLS

Unused condition excellent. Extensive inventory including tools for the R-985, R-1340, R-1830, R-2800 & R-4360.

Foreign inquiries invited

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Aircraft Radio Corporation
17R (R-15) VHF Receiver
F-11 Isolation Amplifier
15D Omni
Smallest Lightest Finest
NAVCO, Inc., Lambert Field, St. Louis, Mo.

PRATT & WHITNEY ENGINES

R2000-7

Ready for Immediate Delivery

Engine time 00:00 since overhaul by Pacific Airmotive Corp., Burbank.

Modified to latest airline specifications, complete with carburetors, magnetos and harnesses. Preserved for long time storage.

Also 83696 and 78105 cylinders, plus selected R2000 parts.

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OUR GROWTH and PROGRESS

Authorized factory sales and service for Eclipse Pioneer, U. S. Gauge, Kollsman. C.A.A. approved repair station #3564. Contractors to U. S. Air Force.

Has kept pace with the rapid strides of the electronic and aviation industries. Our new plant in Great Neck, New York with new facilities and expert technical help now serves our armed forces, aircraft companies and airline transports, with precision instrument overhaul. Our stock of instruments is one of the largest in the east. A complete line of flight and navigation instruments and engine instruments on our shelves will keep your aircraft flying. We invite inquiries from air frame builders, maintenance shops, and private aircraft owners on our efficient overhaul service or emergency exchange.

INSTRUMENT ASSOCIATES

351 GREAT NECK ROAD, GREAT NECK, N. Y.
Telephone GReat Neck 4-1147

Write for Catalog NE100

U. S. Export License-2140

Western Union address: WUX Great Neck, N. Y.

IMMEDIATE DELIVERY - - - FULLY GUARANTEED

A. C. SYNCHRONOUS MOTORS

110 Vt. 60 Cycle

HAYDON TYPE 1600, 1/240 RPM
HAYDON TYPE 1600, 1/60 RPM
HAYDON TYPE 1600, 4/5 RPM
HAYDON TYPE 1600, 1 RPM
HAYDON TYPE 1600, 1 1/5 RPM
TELECHRON TYPE B3, 2 RPM
TELECHRON TYPE BC, 60 RPM
HOLTZER CABOT, TYPE RBC 2505, 2 RPM, 60 oz. 1 in. torque.

SERVO MOTORS

CK1, PIONEER 2 ϕ, 400 CYCLE
10047-2-A, PIONEER 2 ϕ, 400 CYCLE, with 40:1 reduction gear.

D. C. MOTORS

BODINE NFHG-12, 27 VTS., governor controlled, constant speed 3600 RPM, 1/30 H.P.
DELCO TYPE 5068750, 27 VTS., 160 RPM, built in brake.
DUMORE, TYPE EIY2PB, 24 VTS., 5 AMP., .05 H.P., 200 RPM.
GENERAL ELECTRIC, TYPE 5BA10AJ18D 27 VTS., 110 RPM, 1 oz. 1 ft. torque.
GENERAL ELECTRIC, TYPE 5BA10AJ37C 27 VTS., 250 RPM, 8 oz., 1 in. torque.
BARBER COLMAN ACTUATOR TYPE AYLC 5091, 27 VTS. .7amp., 1 RPM, 500 in. lbs. torque.
WHITE ROGER ACTUATOR TYPE 6905, 12 VT., 1.3 amp. 1½ RPM, 75 in. lbs. torque.

ENGINE HOUR METER

JOHN W. HOBBS, MODEL MI-277 records time up to 1000 hours, and repeats, operates from 20 to 30 volts.

AMPLIDYNE AND MOTOR

AMPLIDYNE, GEN. ELEC. 5AM31NJ18A input 27 vts., at 44 amp. output 60 vts. at 8.8 amp., 530 watts.
MOTOR, GEN. ELEC. 5BA50LJ22, armature 60 vts. at 8.3 amp., field 27 vts. at 2.9 amp. ½ H.P., 4000 RPM.

INVERTERS

WINCHARGER CORP. PU 16/AP, MG750, input 24 vts. 60 amps. output 115 vts., 400 cycle, 6.5 amp., 1 phase.
HOLTZER CABOT, TYPE 149F, input 24 vts. at 36 amps., output 26 vts. at 250 V.A. and 115 vts. at 500 V.A., both 400 cycle, 1 phase.
PIONEER TYPE 12117, input 12 vts., output 26 vts. at 6 V.A., 400 cycle.
PIONEER TYPE 12117, input 24 vts., output 26 vts. at 6 V.A., 400 cycle.
WINCHARGER CORP., PU/7, MG2500 input 24 vts. at 160 amp., output 115 vts. at 21.6 amp., 400 cycle, 1 phase.
GENERAL ELECTRIC, TYPE 5D21NJ3A, input 24 vts. at 35 amps., output 115 vts. at 485 V.A., 400 cycle, 1 phase.
LELAND, PE 218, input 24 vts. at 90 amps. output 115 vts. at 1.5 K.V.A., 400 cycle, 1 phase.
LELAND, TYPE D.A. input 28 vts., at 12 amp. output 115 vts. at 115 V.A., 400 cycle, 3 phase.

PIONEER AUTOSYNS 400 CYCLE

TYPE AY1, AY5, AY14G, AY14D, AY20, AY27D, AY38D, AY54D.
PIONEER AUTOSYN POSITION.
INDICATORS & TRANSMITTERS.
TYPE 5907-17, single, Ind. dial graduated 0 to 360°, 26 vts., 400 cycle.
TYPE 6007-39, dual Ind., dial graduated 0 to 360°, 26 vts., 400 cycle.
TYPE 4550-2-A, Transmitter, 2:1 gear ratio 26 vts., 400 cycle.

VOLTAGE REGULATOR

LELAND ELEC. CO. TYPE B, CARBON PILE. Input 21 to 30 volts D.C. regulated output 18.25 vts. at 5 amp.
WESTERN ELEC. TYPE BC937B, input 110 to 120 volts 400 cycle. Output variation 0 to 7.2 ohms at 5 to 2.75 amps.
WESTERN ELEC. TRANSTAT, input 115 vts., 400 cycle output adjustable from 92 to 115 vts., rating .5 K.V.A.
AMERICAN TRANS. CO., Transtat input 115 vts., 400 cycle output 75 to 120 vts. or 0 to 45 volts, rating .72 K.V.A.

TACHOMETER GENERATOR & INDICATOR

GENERAL ELECTRIC, GEN. TYPE AN5531-1, Pad mounting 3 phase variable frequency output.
GENERAL ELECTRIC, GEN. TYPE AN5531-2, Screw mounting 3 phase variable frequency output.
GENERAL ELECTRIC, IND. 8DJ13AAA, works in conjunction with above generators, range 0 to 3500 RPM.

SYNCHROS

1 F SPECIAL REPEATER 115 vt. 400 cycle.
2J1F1 GENERATOR, 115 vt. 400 cycle.
2J1F3 GENERATOR, 115 vt. 400 cycle.
2J1G1 CONTROL TRANSFORMER 57.5 vt. 400 cycle.
2J1H1 DIFFERENTIAL GEN. 57.5/57.5 vt. 400 cycle.
5G GENERATOR, 115 vt. 60 cycle.
5DG DIFFERENTIAL GEN. 90/90 vts. 60 cycle.
5HCT CONTROL TRAN. 90/55 vts. 60 cycle.
5CT CONTROL TRAN. 90/55 vts. 60 cycle.
5SDG DIFFERENTIAL GEN. 90/90 vts. 400 cycle.

D. C. ALNICO FIELD MOTOR

DIEHL TYPE FD6-23, 27 vts. 10,000 RPM.
DELCO TYPE 5072400, 27 vts. 10,000 RPM.

GENERAL ELECTRIC D. C. SELSYNS

8TJ9-PAB TRANSMITTER 24 VTS.
8TJ11- INDICATOR, dial 0 to 360°, 24 vts.

RECTIFIER POWER SUPPLY

HAMMETT ELECTRIC MFG. CO. MODEL SPS-130 Input voltage 208 or 230 volts, 60 cycle, 3 phase, 21 amps. Output 28 volts at 130 amps. continuous duty, 8 joint tap switch, voltmeter ammeter, thermo reset all on front panel.

MISCELLANEOUS

PIONEER MAGNETIC AMPLIFIER ASSEMBLY Saturable reactor type, designed to supply variable voltage to a servo motor such as CK1, CK2, CK5 or 10047.
SPERRY A5 CONTROL UNIT, part No. 644836.
SPERRY A5 AZIMUTH FOLLOW-UP AMPLIFIER part No. 656030.
SPERRY A5 DIRECTIONAL GYRO, part No. 656029, 115 vt. 400 cycle, 3 phase.
SPERRY A5 PILOT DIRECTION INDICATOR, part No. 645262 contains AY 20.
ALLEN CALCULATOR, TYPE C1, TURN & BANK IND., part No. 21500, 28 vts. D. C.
TYPE C1, AUTO-PILOT FORMATION STICK, part No. G1080A3.
PIONEER GYRO FLUX GATE AMPLIFIER, type 12076-1-A, 115 vt. 400 cycle.

INSTRUMENT ASSOCIATES

351 GREAT NECK ROAD, GREAT NECK, N. Y.
Telephone GReat Neck 4-1147

Write for Catalog NE100

U. S. Export License-2140

Western Union address: WUX Great Neck, N. Y.

EXECUTIVE AIRCRAFT

Now On Display—All Types—On Our Ramp.
Ready for Inspection and Quick Delivery.

Save 30% of your executive time and forget crowded, inconvenient rail and airline schedules. Travel at 200 mph or faster at *your* convenience, while you relax or work in the comfort and privacy of your own flying office.

PBY
Berths for 7—Cabin radio
Deluxe luxury interior
Complete paint—white and green
Galley—electric stove and refrigerator
Shower—lavatory
Two 14' motorboats—wing slung—
Electric hoist
New tires, batteries, etc.
PWR 1830-92 engines—direct drive starters
Auxiliary power unit
2 way VHF—2 ART-13
RA-10 ADF 274N
Glidepath—Localizer
Janitrol—Bar—Radio altimeter

Your Choice
4 Model 35 BONANZAS
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All have curtains, gyros, plastic props, E-185
2 have flares
3 have E-80 starters
3 have VHF transmitters
1 has VHF receiver
1 has ADF
2 have sunshades
1 has new interior
2 have seat covers

DOUGLAS DC-3's
New PW R-1830-75 Engines
Collins omni
Dual ADF, Glide Path, 3 light marker
Skylac Surfaces, Airstair, Aeroquip
Electric shutoffs, boosters,
Fire detectors
New below-proof oil coolers
Dual edge lighted instrumentation
Janitrol heat
Luxurious interior appointments
Paint and other modifications
to your specifications.

BEECHCRAFT D-18S

Camera Door	Cabin instruments
Chair parachutes	Hydromatics, O.H.
Nose tank	Platinum plugs
Taxi light	Windshield wipers
Deicers	ARC 15 Omni
Anti-icers	ARC 17 2 way VHF
Recovered 1951	17E2, RA-10
Dual Instrument Panel	R89B (6), ADF Marker, Speakers
Custom radio panel	Isolation Amplifier
Table, new rug	Thermos rack

Many extras
Strictly corporation used
$55,000

ALSO

PBY WITH GYROSYN COMPASS $24,000 — LODESTAR — PV1 — DC-3

We know our

Aircraft Radio Corporation
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Factory Appointed
SALES, SERVICE, OVERHAUL, INSTALLATION
We stock, sell, and install more executive aircraft radio than anyone else in the country.

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AIRCRAFT & ELECTRONICS PARTS & EQUIPMENT
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RADAR SETS & COMPONENTS
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RADAR TEST SETS
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SPECIAL EQUIPMENT BUILT TO ORDER
Prompt replies to all inquiries.
Write:

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AIRPLANE ENGINE HOISTS
MODEL A-2A CAPACITY 3000 LBS.
Portable. Suitable for Other Uses.
Send for Booklet.
THE VIMALERT COMPANY, LTD.
807 Garfield Avenue, Jersey City 5, N. J.

LODESTAR PARTS
CHARLES BENJAMIN
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WORTH WAITING FOR:
***LOCKHEED* PV-1**
Speed 260 mph (T.A.S.) - Range 1500 Mi.
We have several PV-1 Venturas that are ready for immediate fly-away. They are now unconverted. One aircraft has only 440 hrs. since new—other has 1100 hrs. These are in unusually fine condition. Will stand rigid inspection. *AVAILABLE IMMEDIATELY.*
These Ships may be inspected at Fort Wayne, Baer Field.
Call or Write
LEEWARD AERONAUTICAL
Fort Wayne, Ind. — Ph. H-2145

P & W LODESTAR
Sperry A-12 Auto Pilot with Automatic Approach Control
N60100—very plush executive interior including deluxe lavatory, 6 chairs, divan, desk, hot cups, folding table, deicer boots, anti-icing, Collins Glide Slope Receiver, beautiful paint job—white and gray, 1600 total hours on airframe, new engines.
PAGE AIRWAYS, INC.
Rochester Airport — Rochester, N. Y.

WORLD'S LARGEST CURTISS PROPELLER INVENTORY
THE FURLONG COMPANY
P. O. Box 884 — Coral Gables, Florida

SPECIAL
4—CA15 ENGINES
Write — Wire — Phone
Airline Equipment Corporation
Newark Airport, Newark, N. J.
Market 2-0963-4

IMPORTANT! ***Many items in this group have not been listed in previous ads!***

One of America's largest stocks of UNUSED

AIRCRAFT PARTS

We own and offer all parts listed — plus many thousands more — stocked in our Baltimore warehouse!

43 PIECES
ENGINE QUICK CHANGE UNITS APPLICABLE TO GRUMMAN FM-1 AIRCRAFT. COMPLETE WITH ACCESSORIES

TURRET PARTS
Manufactured by or for General Electric
Control units—grips—motors
Amplidynes, etc.

500 LBS
Nichrome Alloy Wire .0031 enameled Manufactured by Driver—Harris Co.

2000 OIL COOLER ASSEMBLIES W/VALVES
From 5" to 16" diameter
Manufactured by Harrison Radiator Co. and United Aircraft Products

750 OXYGEN and CO_2 CYLINDERS
Various Sizes—Shatter Proof
High pressure—with valves

HUGE STOCKS OF ALL TYPES *AN* HARDWARE NEW — UNUSED. WRITE FOR DETAILED LISTINGS.

46 WHEELS
12.50 x 16
Manufactured by Goodrich

1 CARLOAD
Miscellaneous Engine Parts for RANGER V-770

CARBURETORS!
MAGNETOS!
SPARK PLUGS!

Quantity	Part No.	Description
247	PD12K10	Stromberg injection Carburetor
19	1375F	Holley carburetor
407	SF9LN-2 (manufacturer' part No. 10-12453-6 Spec. AN9511)	Bendix Scintilla Magneto
42	SF5RN-12 (manufacturer's part No. 10-26170-1)	Bendix Scintilla Magneto
185,000	LS4AD1	Spark Plug (Aero)

SPECIAL GROUP!
Ideal for tear-down for parts

Quantity	Part No.	Description
328	PD12K10	Stromberg injection carburetor
236	PR48-A1	Stromberg carburetor

AIRCRAFT ENGINES

WRIGHT

Quantity		Quantity	
1	R1820-52 Low total time since new	4	R-1820-60 Low total time since new
16	R1820-54 Low total time since new	4	R1820-62 NT5N

PRATT & WHITNEY
1 R1830-43 NTSN

PRATT AND WHITNEY AIRCRAFT ENGINE PARTS

Quantity	Part No.	Description
166	1045A	Bearing
500	3506	Flange
130	8288	Follower Ass'y
814	35814	Blower Ass'y
53	48362	Shaft
75	48363	Shaft
56	48392	Sump
390	48461	Gear
78	76236	Gear
1178	84289	Bearing
113	84487	Housing
77	84591C	Nose Housing
200	48350-D	Crankcase Ass'y
200	84083	Cylinder
100	84084	Cylinder
200	84085	Cylinder

MISCELLANEOUS COMPONENTS

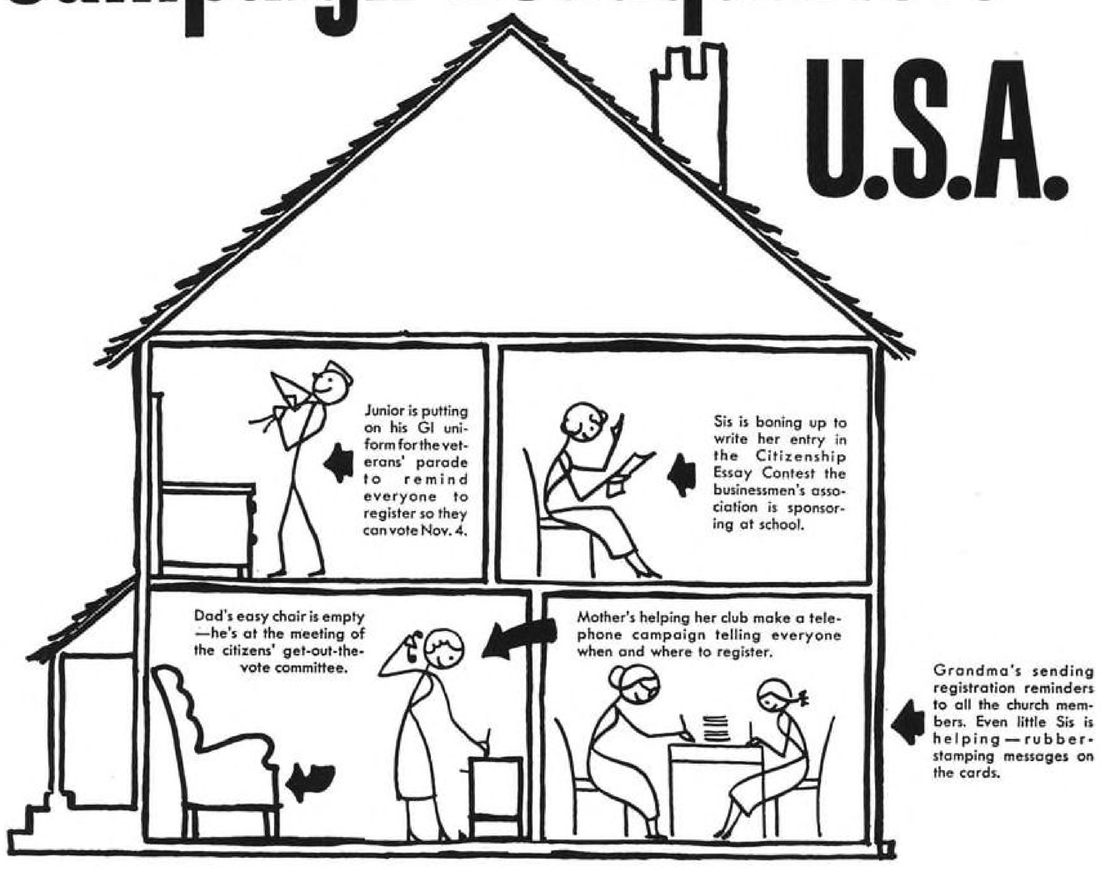
Quantity	Part No.	Mfg.	Description
45	AN4103-2	Clifford	Brass (Valve #U4785) Oil Cooler
38	18597-2	Airsearch	Aluminum Oil Cooler
120	MF9-713-15A	Vickers	Hydraulic Pump
550	TFD 8600	Thompson	Fuel Booster Pump
125	D7818	Adel	Anti-icer Pump
250	AN4014	Erie Meter	Wobble (D-3) Pump
300	1H260-K & KA	Pesco	Hydraulic Pump
1000	AN5780-2	G. E.	Wheel & Flap Position Indicator
400	AN5780-2	Weston	Wheel & Flap Position Indicator
44	5BA25DJ4B	G. E.	DC Motor (½ HP)
50	RDB8220	Holtzer Cabot	DC Motor
115	P4CA3A	Parker	Primer
70	AN3213-1	Scintilla	Ignition Switch
450	A-9 (94-32226)	Nasco	Ignition Switch
687	RS-2	Mallory	Selector Box
90	JH950-R	Jack & Heinz	Starter Motor
492	S-841 (94-32253)	Electronic Labs	Box
53	AN6203-3	Bendix	Accumulator 10"-1500 P.S.I.
1000	13018-A	Bendix	Interphone Box
140	K14949E	Marquette	Windshield Wiper Kit
188	EYLC-2334	Barber-Colman	Control
11	12086-1C	Eclipse	Amplifier
174	450-0	Sklnner	Gasoline Filter
250	558-1A	Eclipse	Oil Separator
100	716-3A	Eclipse	Generator (NEA-3A)
37	117-47	Edison	Detector
89	318	Edwards	Horn
20	794-F	Stewart-Warner	Heater
230	921-B	Stewart-Warner	Heater (200000 BTU)
85	12924-2	Adel	Lock Valve
80	DW28	Eclipse	Transformer
97	6041H-146A	Cutler Hammer	Relay (B-12)
22	0655-D	Aro	Oxygen Regulator
148	PG208AS1	Minn. Honeywell	Air Ram Switch
33	DW47	Eclipse	Transformer
11	DW33	Eclipse	Transformer
65	ASDC2	CO_2 Mfg. Co.	Fire Detector
600	ND21	American Gas Accumulator Co.	Time Delay Relay

★ ***Send us your material lists for screening!*** ***WRITE—WIRE—PHONE***

COMMERCIAL SURPLUS SALES CO.

4101 CURTIS AVENUE, BALTIMORE 26, MARYLAND — **TELEPHONE: CURTIS 3300**

Campaign Headquarters U.S.A.



The Family Vote will elect the Next President

NOT THE FARM VOTE...
THE BIG-CITY VOTE...
THE LABOR VOTE...
OR ANY PARTY VOTE...

Politicians talk a lot about this and that "bloc" of voters being decisive factors in this election. So do all the pollsters. You can't blame them for trying to dope it out that way in advance . . . but . . .

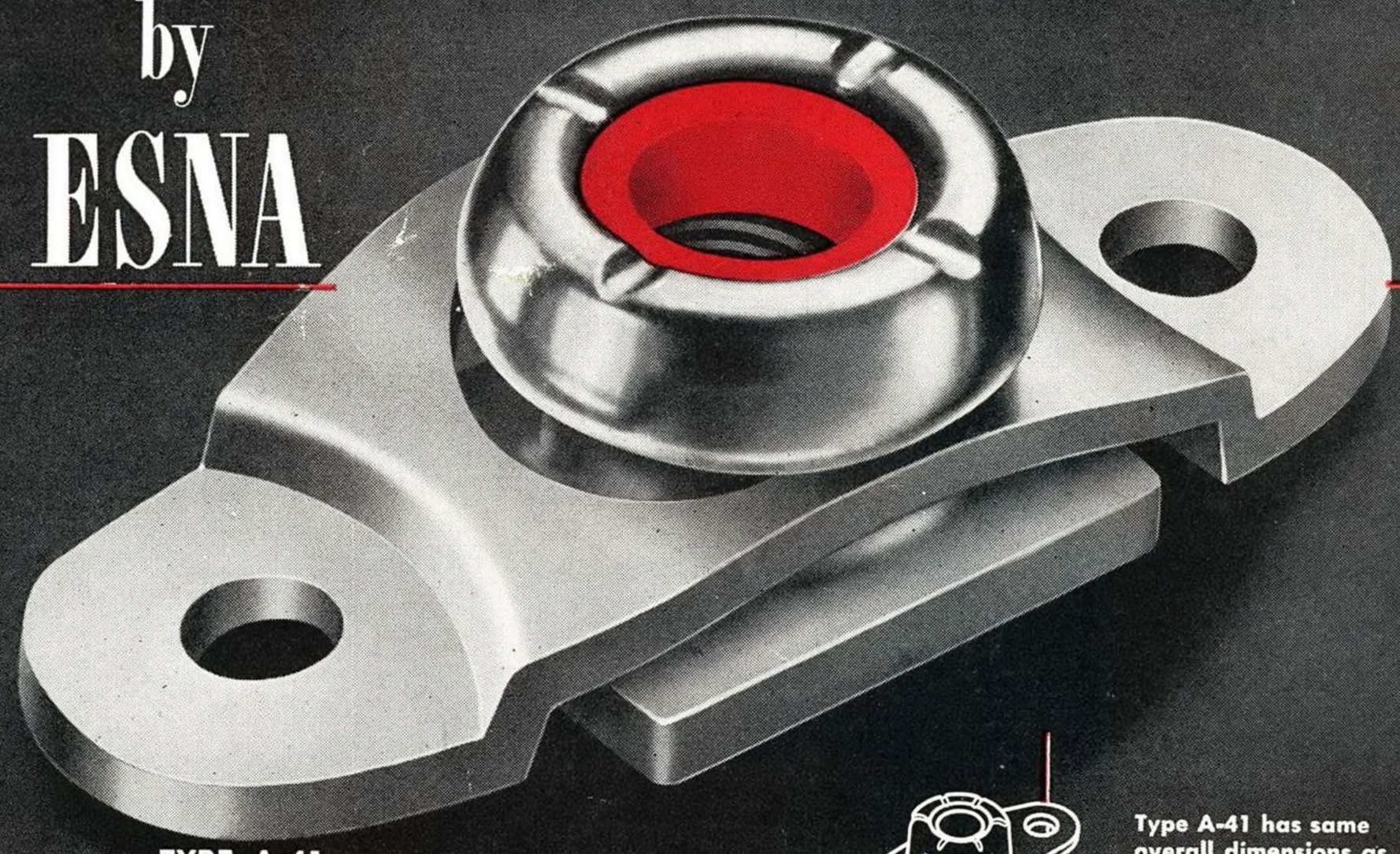
YOU know you're going to vote your own sweet way when you get behind that voting booth curtain—that where you live or work hasn't got a blankety-bloc thing to do with how you'll vote. You'll vote for what you believe to be in the best interests of your family—your kids—and your kids' kids.

So YOU know that this year—as always—it will be the FAMILY vote that really decides things. And families are working as never before to make sure every American votes. Right now in millions of American families, everyone from Little Sis to Grandma is pitching in to remind every eligible American to register to make sure of the opportunity to vote. And then they'll tackle the job of getting out the vote of every member of America's 44,000,000 families. They're the biggest "bloc" in America—they ARE America!

If your family is already working at the job—congratulations! If you aren't, talk it over at supper tonight, and pitch in tomorrow.

EDITORIAL INDEX

New floating anchor nut by ESNA



TYPE A-41

Type A-41 has same overall dimensions as standard ESNA anchor nut type A-1.

Offset basket design prevents rivet head interference with floating action of nut.

Here is the finest floating anchor nut ever developed —ESNA's type A-41.

Consider these design advantages:

1. Envelope dimensions held within limits of AN366.

2. Simplified anchor nut installation methods make cost savings possible. Nut "float" eliminates costly lining-up operations often necessary to accurately install one piece anchor nuts.

3. Offset basket design prevents nut float restriction due to rivet head interference.

4. Approximately thirty percent lighter than previous basket type nuts.

5. The red elastic collar. The self-locking nut principle proved by over twenty years of aircraft usage and billions of installations.

Floating basket nuts are also available in other configurations.

LOOK TO ESNA for self-locking fasteners that cut assembly costs and save weight. Mail coupon for design information.

ELASTIC STOP NUT CORPORATION OF AMERICA IS ALSO MAKER OF THE ROLLPIN

ROLLPIN TRADEMARK

Dept. N25-825, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, N. J.

Please send me the following free information:

- ☐ Drawing of type A-41
- ☐ Elastic Stop Nut Bulletin
- ☐ Rollpin Bulletin
- ☐ Here is a drawing of our product. What self-locking fastener do you suggest?

Name_____ Title_____

Firm_____

Street_____

City_____ Zone____ State_____