

AVIATION WEEK

A MCGRAW-HILL PUBLICATION

January 23, 1950



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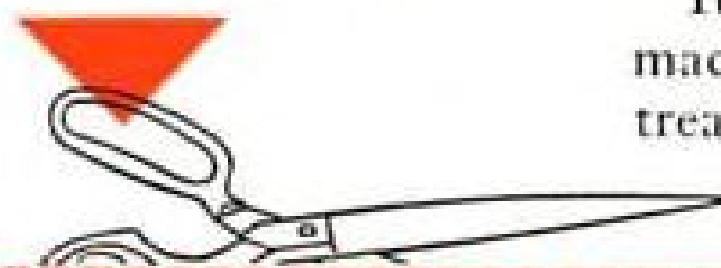
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Tensile Strength Range, psi.	75,000 to 175,000	125,000 to 160,000	140,000 to 170,000	140,000 to 170,000	150,000 to 200,000	140,000 to 190,000	140,000 to 200,000	150,000 to 200,000	140,000 to 170,000	150,000 to 200,000	100,000 to 175,000	140,000 to 170,000	125,000 to 200,000	150,000 to 240,000
Heat Treatment →	Quenched and Tempered, or Cold Finished With or Without Heat Treatment	Oil Quenched and Tempered	Quenched, Tempered and Nitrided	Carburized and Quenched and Tempered	Oil Quenched and Tempered	Oil Quenched and Tempered	Oil Quenched and Tempered	Oil Quenched and Tempered	Oil Quenched and Tempered	Oil Quenched and Tempered	Normalized or Quenched and Tempered	Quenched, Tempered and Nitrided	Carburized Quenched and Tempered or Quenched, Tempered and Nitrided	Carburized Quenched and Tempered or Quenched, Tempered and Nitrided
TYPES Ni				2515 2517 AMS 6242									2512 2517 AMS 6240 AMS 6242	2517 AMS 6242
Ni Cr					3140 AMS 6332		3140 AMS 6332							
				3310 AMS 6250			3310 AMS 6250							3310- 3316 SuperKore A AMS 6250 AMS 6253 AMS 6266
Cr Mo	4130 4135 4137 AMS 6361 AMS 6362 AMS 6363 AMS 6365 AMS 6366 AMS 6367 AMS 6368 AMS 6369 AMS 6352	4140 AMS 6382							4140 AMS 6382	4130 4137 AMS 6370 AMS 6380	4130 AMS 6350			
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	8725 AMS 6357	8740 AMS 6322							8740 AMS 6322 AMS 6324	8740 AMS 6322 AMS 6324				
				9310 AMS 6260				9310 AMS 6260	9840 AMS 6342	9840 AMS 6342				9310 9315 SuperKore A AMS 6260 AMS 6263 AMS 6266
Cr Mo Al			AMS 6470									AMS 6470		AMS 6470
CARNEGIE-ILLINOIS STEEL CORPORATION														

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Carillooy Steels

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UNITED STATES STEEL

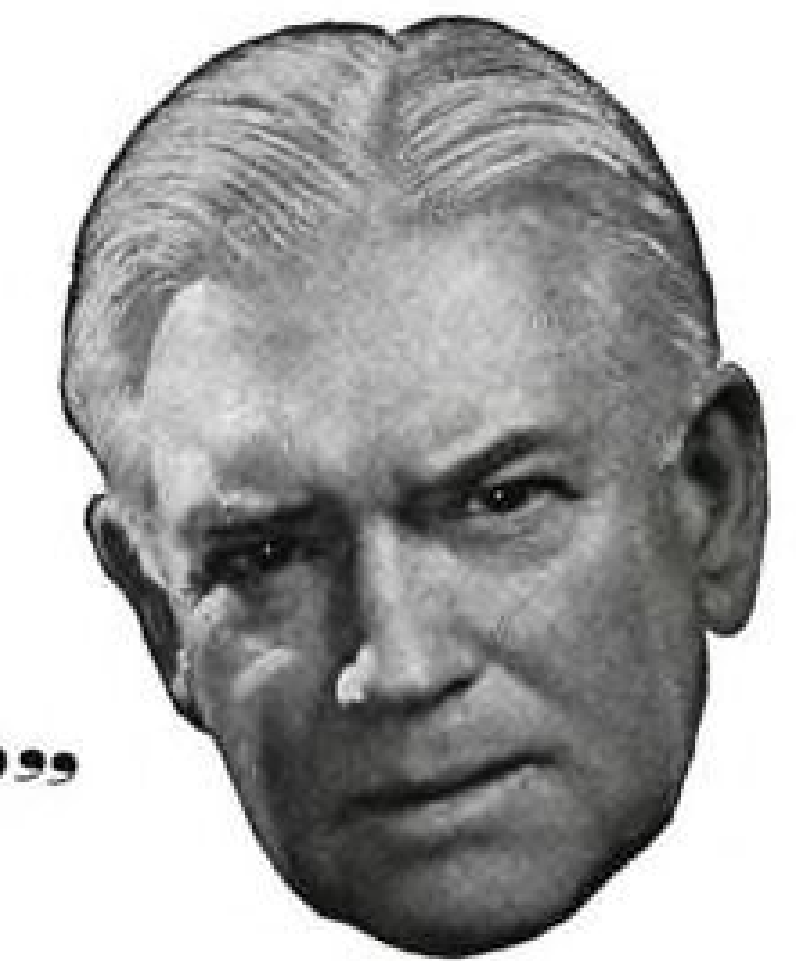
Here for ready reference are listed the various grades of U.S.S. Carillooy constructional alloy steels available for use in airframe and aircraft parts. The grades shown for each application or part are not necessarily the only grades suited for a particular purpose, but are rather those grades most commonly used prior to 1941, together with some of the new alloy steels developed during the war. It is obvious that design, economy, machining facilities, availability of heat treating equipment, and other factors will enter into your final selection of the alloy grade for your particular purpose. To get optimum results from these steels, we suggest that you obtain expert advice both in selecting and applying them. This we are prepared to furnish. Our staff of service metallurgists is always ready to study individual problems and to assist you with practical recommendations that you will find extremely helpful not only in determining what grade of U.S.S. Carillooy will do the best job for you, but also in showing how it can be handled efficiently in your shop.



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"Chloromonobromomethane?"



"Bromochloromethane?"

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Aviation Week

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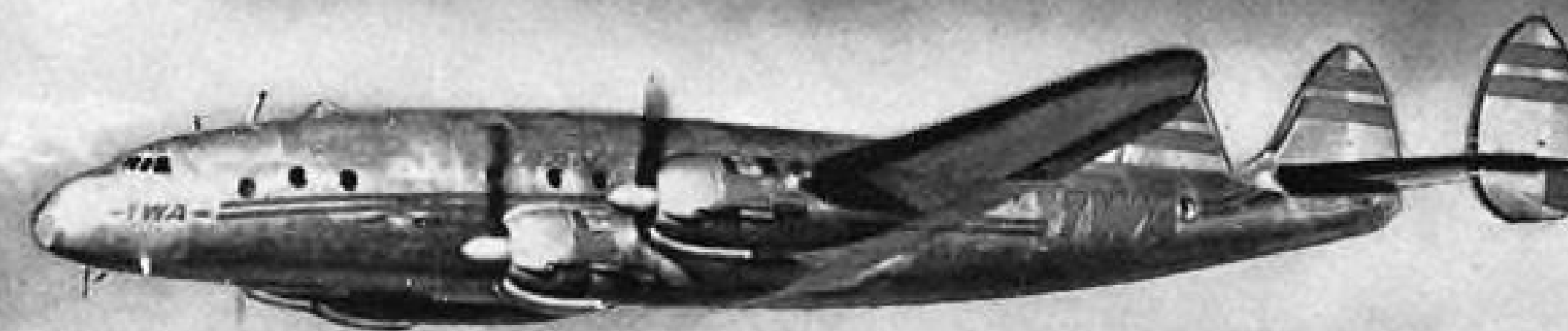
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The Old-Timers Know!

Aviation is a business and a pleasure based on experience . . . and experiences. And the length of that experience often determines the standing of pilots, planes, and parts.

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AVIATION PRODUCTS

NEWS SIDELIGHTS

Crop Dusting Accidents

Of four helicopter accidents in 1948 involving serious injury or death (two fatal), all resulted from persons walking into the tail rotors while the craft were idling on the ground. There were 11 other crop control helicopter accidents.

Survey of crop dusting accidents from 1942 through 1948, made by Ben Ashmead, CAB accident analyst, shows a total of 727 accidents, with 23% fatal or causing serious injury.

Of fatal accidents 52% resulted from stalls, while collisions were the second most numerous type of fatal. Only one 1948 accident was attributed to an airframe failure.

Comparison of the 23% fatal or serious injury accidents in crop control with the general average for non-air carrier accidents (14%) shows that the low-flying crop dusting operation is nearly twice as dangerous as normal flying, with the types of aircraft generally in use.

Studies by CAA and by individual manufacturers on the need for special type aircraft for agricultural crop control point up requirements for air vehicles which can fly slower safely, and for stall-warning devices such as have been made mandatory in some states for crop control flying.

What Slash Means to Navy

Aviation reductions in 1951 Navy budget will result in the following curtailments in operational ships and aircraft, John Floberg, assistant secretary of the navy for air told the National Security Industrial Security Assn. last week:

- Large carriers, reduced from 8 to 6.
- Small carriers, from 11 to 8.
- Carrier air groups, from 14 to 9.
- Patrol squadrons from 30 to 20
- Marine air squadrons from 16 to 12.

The five carriers inactivated will be added to the reserve fleet. Five cruisers which are also being withdrawn from service under the curtailment leave a total of 13 active cruisers and 14 carriers.

McCarran vs. McKellar

Sen. Pat McCarran (D., Nev.) is on the warpath against the Air Force for locating its \$1-billion Air Engineering Development Center in Tennessee instead of a southern Nevada area surveyed as a possible site. He had a conference on the matter with Air Secre-

Favor Randolph Field

Rep. Paul Kilday (D., Tex.) says he has assurance from Air Force Secretary Symington that the Air Force's proposed air academy, when and if it is authorized, will be located at Randolph Field, Tex. However, Air Force states that it has made no definite decision on location and is conscientiously surveying all sites (totaling 195 in 34 states) recommended to them. Congressmen and chambers of commerce feel the Air Force is strategizing to get their support for the legislation authorizing the academy by holding out the possibility that it may go to their locality.

tary Stuart Symington in the Senate Armed Services Committee last week. Sen. Kenneth McKellar (D., Tenn.) was on hand to look after his state's interests. Although construction of the center is already underway, McCarran told AVIATION WEEK after the session that the Tennessee decision "is not final, as far as I am concerned." McCarran sailed for Europe last fall with high optimism that the center would go to Nevada. After he landed on the other side of the Atlantic, USAF announced selection of the Tennessee site. Some irate Nevada constituents are now complaining that if their senior Senator had stayed home, instead of romping in Europe, Nevada would have a fat new Air Force installation ultimately valued at \$1 billion.

Prototype Development

Department of Defense will urge a government-financed program to develop new commercial aircraft as vital to national defense in its coming report to the Senate Interstate and Foreign Commerce Committee, according to word passed on to senators.

This will make unanimous among government aviation agencies, the aircraft and air transport industries the feeling that action should be taken to promote the development of advanced commercial planes. But numerous controversies over how the program should be administered remain to be compromised and solved.

Meanwhile, Assn. of American Railroads is set to launch a campaign against

the program as "government subsidization upon government subsidization" for the airlines. Sen. John Williams (R., Del.), unwavering opponent of indirect government assistance to airlines through equipment financing, will make an all-out attempt to scuttle prototype legislation in Congress. He was named last week to the Senate Commerce Committee.

Rescue Emblem

Igor Sikorsky has long been proud of the lives that his helicopters have saved, and that his development is a machine of mercy and peace rather than one of destruction of life.

Now Sikorsky Aircraft division of United Aircraft Corp. is going to do something tangible about this by issuing "rescue pins" and certificates to pilots who accomplish life-saving missions with Sikorsky helicopters, and to the persons who have been rescued.

The pin will bear the familiar winged S insignia used on Sikorsky fixed-wing and helicopter craft for many years, with the word "Rescue," and the accompanying certificate will state the basis for the award.

Airmail Hike

The President is expected to recommend a hike in the six-cents-an-ounce airmail postage rate in the near future. He served notice in his budget message that he would propose legislation raising mail rates to increase postal revenues by over \$400 million annually and partially write off the Post Office Department's mounting deficit, estimated at over \$543 million for this fiscal year.

NAC Planning Again

National Air Council's seven-point "long-range program of promotional and educational activity" announced recently makes imposing reading, but basic questions of "how" have not yet been settled.

One of the most interesting points of the program states NAC will "act in a liaison capacity between government boards and industry, especially on such problems as mobilization requirements and personnel training." This is a field in which Air Force and Navy have been very active. NAC was vague in elaborating just what it intended to do in this respect and indicated that this plank, as well as others in its program, is still in the discussion stage.

No 12

Mamba

memo

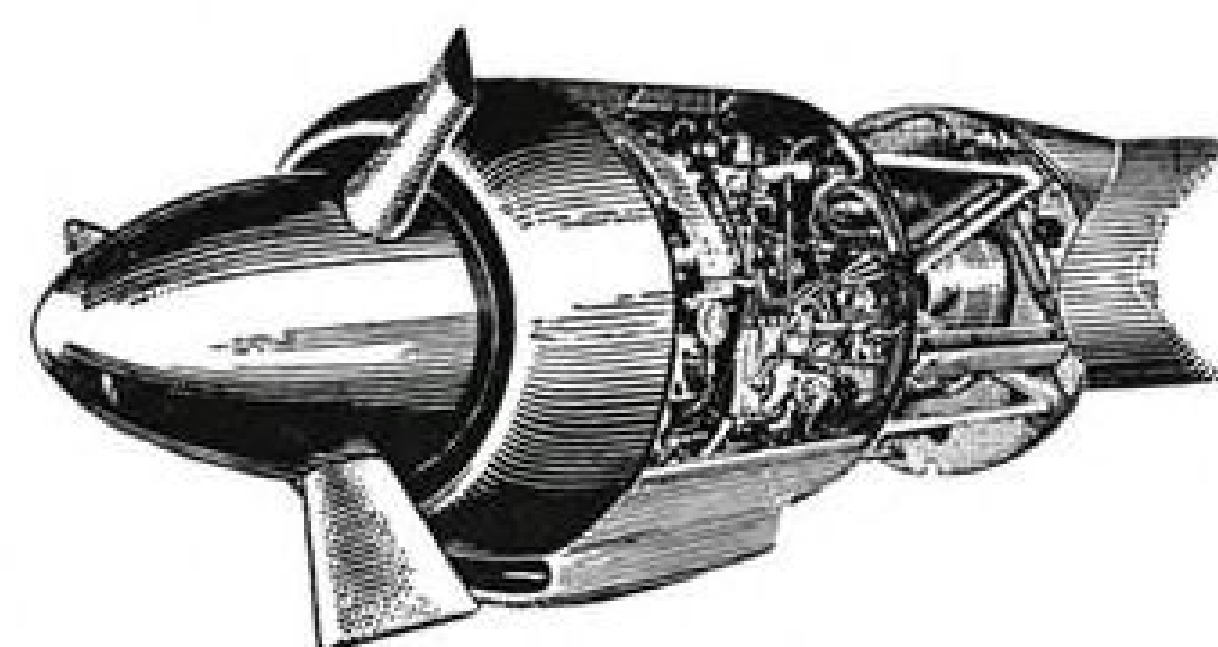
QUIETNESS

The noticeable quietness of the Mamba engine in flight is due to the fact that, unlike a piston engine, the exhaust gas flow is uninterrupted, and, unlike a pure jet engine, the exhaust velocity is low.

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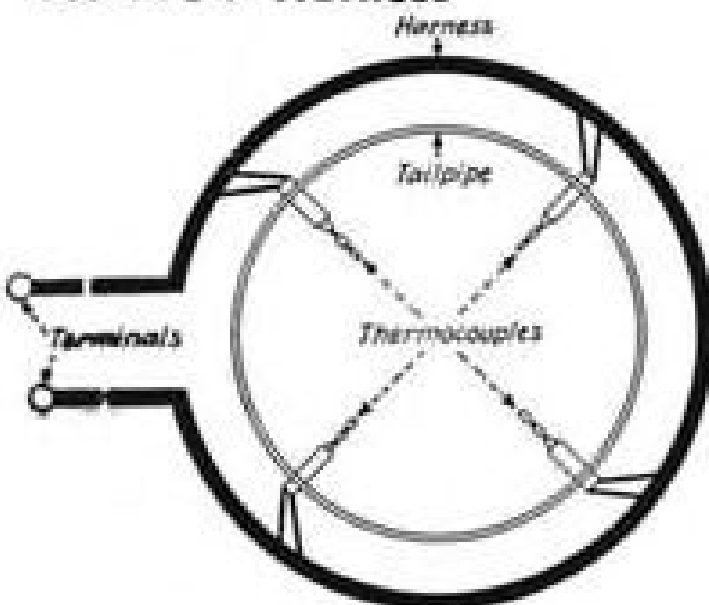


REVERE THERMOCOUPLES AND HARNESS *standard on* JET AIRCRAFT

Chromel-Alumel Thermocouples manufactured to AN-5545-1 Drawing and Specification AN-T-90 (Revere Part No. TK-2706)

This couple was developed for measuring the temperature of jet tailpipes. It is constructed with a Chromel-Alumel sensing element and its leads are protected with a stainless steel armor for increased service life.

TH-1954 Harness



Chromel-Alumel manufactured to AND-10409 Drawing for paralleled arrangement where averaging temperatures are required.

This type of harness is designed to meet specific application where four or more temperatures are to be averaged, as indicated in the diagram.

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AVIATION CALENDAR

- Jan. 23—IAS annual Honors Night dinner, Hotel Astor, New York, N. Y.
Jan. 23-26—IAS 18th annual meeting, technical sessions, Hotel Astor, New York, N. Y.
Jan. 24—Ninth session, ICAO Council, Montreal.
Jan. 30-Feb. 3—Winter general meeting, American Institute of Electrical Engineers, Hotel Statler, New York City.
Feb. 9-10—Symposium, sponsored by the Eastern region of the Institute of Navigation, Department of Commerce auditorium, Washington, D. C.
Feb. 18-26—National Sportsmen's Show, Grand Central Palace, New York, N. Y.
Feb. 27-Mar. 3—Spring meeting, American Society for Testing Materials, Hotel William Penn, Pittsburgh.
Mar. 1-2—Louisiana Aviation Conference, Washington-Youree Hotel, Shreveport, La. Harold J. Bryant, Shreveport Chamber of Commerce, chairman.
Mar. 6-8—Sixth annual Fourth Region non-scheduled operators meeting and second annual Agricultural Aviation Conference, Hotel Texas, Fort Worth.
Mar. 6-9—47th annual meeting, American Road Builders' Assn., Netherlands Plaza Hotel, Cincinnati.
Mar. 6-9—Annual convention, Institute of Radio Engineers, Hotel Commodore, New York City.
Mar. 24—Fifth annual flight propulsion meeting, sponsored by the Institute of the Aeronautical Sciences, Carter Hotel, Cleveland.
Mar. 28-31—National Plastics Exposition, sponsored by Society of the Plastics Industry, Navy Pier, Chicago.
Mar. 30-31—Sixth annual helicopter forum, sponsored by the American Helicopter Society and the Institute of the Aeronautical Sciences, Ben Franklin Hotel, Philadelphia.
Apr. 4-6—Engineering and Maintenance conference, Air Transport Assn., Hotel Continental, Kansas City.
Apr. 4-8—National Production Exposition, sponsored by the Chicago Technical Societies Council, Stevens Hotel, Chicago.
Apr. 16-20—Annual business meeting, American Assn. of Airport Executives, Neil House Hotel, Columbus, Ohio.
Apr. 17-19—1950 aeronautic meeting, Society of Automotive Engineers, Hotel Statler, New York City.
May 5-6—Midwestern conference on fluid dynamics and the national meeting of the American Physical Society, fluid dynamics division, University of Illinois, Urbana.
June 10-13—National Aeronautics Assn., annual convention, Hotel Statler, St. Louis, Mo.
June 26-30—53rd annual meeting, American Society for Testing Materials, ninth exhibit of testing apparatus and related equipment, Chalfonte-Haddon Hall, Atlantic City, N. J.

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NEWS DIGEST

DOMESTIC

TEMCO (Texas Engineering and Mfg. Co.) has offered to put \$500,000 into getting the bankrupt Luscombe Airplane Corp. back into business. Under a reorganization plan, TEMCO would get a mortgage on all Luscombe assets and take over operation of the plant at Garland, Tex. Luscombe's liabilities have been listed at \$667,877.95. It's the second attempt to reorganize the company, but the first with an actual plan. A previous attempt was contingent on receiving an RFC loan, which was refused.

Dr. Albert W. Hull, assistant director of the General Electric Research Laboratory, has resigned. Also resigned at GE: Dr. Gorton R. Fonda, research chemist who, with his associates, developed the American version of the radar screen 14 days after the problem had been assigned to GE's research laboratory.

CAA plans to open a new 10,000-mile "express service" communications circuit which would link 40 major cities now receiving weather forecasts and information service. Circuit is scheduled to begin operation Mar. 1.

Backlog of orders for aircraft, engine and propeller companies as of Sept. 30, 1949, totaled \$2859 million, with \$1852 million for complete aircraft and parts, \$732 million for engines and parts, \$102 million for propellers and parts, \$173 million for other products and services. Total new orders received during third quarter 1949 totaled \$437 million. Net sales during the quarter were \$459 million.

Adm. Forrest Sherman's nomination as chief of naval operations was approved by Senate Armed Services Committee. Confirmation by the full Senate seems assured for Sherman, who replaced Adm. Louis Denfeld in the top Navy post.

TWA has asked Civil Aeronautics Board permission to install Constellations on its daily transcontinental coach service, replacing DC-4s; install DC-4s on its New York-Pittsburgh coach segment, replacing Boeing Stratoliners; and install DC-4s on its night coach run between Kansas City and Los Angeles, replacing DC-3s. Constellations, according to TWA, would be equipped to carry not less than 70 passengers.

John V. Sharp, Bausch & Lomb Optical Co. scientists, received the Sherman Fairchild award for "outstanding achievement" in the field of aerial photography from the American So-

ciety of Photogrammetry in Washington, D. C. Sharp headed the development of the auto-focus rectifier, a device that enlarges prints and automatically reduces aerial photographs to a common scale and level.

Solar Aircraft Co. has sold its subsidiary, Hubbard Casket Co., to W. G. Hubbard for an undisclosed cash sum. Solar continues to manufacture knock-down caskets, and operates its wood mill in the manufacture of shipping boxes and other wood products.

New York City's airports, LaGuardia, New York International and Newark, showed a 19.4 percent increase in domestic passenger travel during 1949, according to the Port of New York Authority. Overseas passenger travel increased 21.3 percent over the previous year, LaGuardia Airport handled 2,891,132 passengers; Newark, 742,836; International, 110,091. LaGuardia also handled 68,253 nonscheduled passengers.

Capital Airlines will buy five Constellations on an installment plan basis. The planes, which will cost \$684,000 each, will be paid for in monthly installments over a three-year period. Craft were owned by KLM, but turned in to Lockheed as the carrier acquired newer-model Connies.

FINANCIAL

Bendix Aviation Corp. reported net income for fiscal year ended Sept. 30, 1949, of \$11,086,781. Sales volume for the period was \$182,674,462, 12.4 percent above the previous year's total of \$162,495,665. Backlog of unfilled orders at fiscal year's end totaled \$165 million, an increase of \$3 million from the previous year. Net working capital was \$73,328,670, compared with \$69,917,091 a year earlier.

INTERNATIONAL

Air service to Argentina resumed after a 12-day suspension, caused by a strike of airline ground personnel. Settlement came after airlines agreed to pay from 90 to 110 pesos a month as an "emergency" increase, until the matter is settled by a 1950 contract, terms of which are still pending negotiation.

Sudair International Airways, Johannesburg, South Africa, has applied for a scheduled operation between South Africa, the East Indies and Australia. Carrier hopes to use Constellations. Sudair currently operates nonscheduled service between Africa and Paris, via Palestine, using Vikings.



QUESTION:

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- R-985 Exchange (for engines with 1,000 hours or less total time; other prices for engines with more time) \$1050
- E-185 Overhaul (engine only, labor and parts, excepting replacement of crankshafts and cylinders) \$ 800

Any many others!

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INDUSTRY OBSERVER

► Final decision is expected soon on proposed joint purchase of Martin 4-O-4 transports (revision of the 2-O-2 transport first disclosed in AVIATION WEEK Dec. 19) by TWA and Eastern Airlines. Engineers from both airlines are at Baltimore going over specifications. It is expected that approximately 65 of the twin-engine planes will be purchased, with Eastern buying about 30 and TWA about 35, if the deal is consummated. The airplane's speed will be about the same as that of the 2-O-2 (around 255 mph. true airspeed) and both airlines have agreed to use Pratt & Whitney R-2800-CB-16 engines rated at 2400 hp. with water injection, eliminating Wright power plants which were considered as an alternate. Plane would be a 40-passenger craft, with an alternate high density version seating 44 passengers.

► Braniff International Airways is operating in and out of LaPaz, Bolivia, using a DC-4 with JATO units, to enable the flight to comply with CAR. Gross weight of the plane is based on its takeoff performance with one engine out plus JATO. Operational data on the LaPaz flights is being watched by other airlines, since use of JATO has not yet been incorporated into airline operations in this country. Use of JATO offers attractive possible increases in gross weight at certain critical airports.

► Series of stall-warning indicator vanes (Greene Safe Flight) on the leading edge of the XB-49 jet Flying Wing bomber are being used for research on stall patterns as well as a preventive measure against inadvertent stalls. With new personal plane production dropping, military and commercial plane markets are providing additional outlets for the stall warning devices, now standard equipment on the North American F-86, Grumman F9F, McDonnell and Chance Vought Navy jets, and expected to be used on other planes soon.

► A three-control Ercoupe soon will be available, first since a few experimentally built before the war. Sanders Aviation expects it will be spinproof, like the two-control plane, since a three-control Ercoupe developed before the war was certificated spinproof as well as the standard Ercoupe. Reason for the addition of the rudder pedals control is for training plane sales. Sanders will offer a kit for conversion of present two-control planes to three-control. Kit probably will sell for \$200 or less.

► First two Navy pilots to fly the Douglas D-558-II Skyrocket at supersonic speeds following first supersonic flights in the plane by Gene May, Douglas test pilot, are Comdr. Turner F. Caldwell and Capt. W. V. Davis, director and assistant director of flight test at Patuxent Naval Air Test Center. Caldwell had set world record of 650 mph., since exceeded, in the D-558-I Skystreak in 1947.

► McDonnell's No. 2 XF-88 Voodoo penetration fighter (afterburner version) is back at St. Louis for repairs after a belly landing at Edwards AFB (Muroc) in which plane lost a wheel and suffered damage to belly, air intakes and wing. McDonnell has officially terminated its Edwards flight test work, and Air Force pilots and ground crew take over on future flight work on the two XF-88s.

► Hughes Aircraft is scheduling flight tests for the XH-17 twin-jet helicopter next September, after recently receiving a \$490,000 USAF contract to convert a static test model to a flying craft. Rotor unit, developed by GE and first tested at Schenectady, is powered by two GE J-35 turbojets at the base of the hub. Remainder of design was developed by Kellett and purchased by Hughes.

► New indication of improved reliability of jet engines is the operational record just set by the 27th Squadron, First Fighter Group, USAF, in North American F-86 Sabres. Squadron has completed 5000 hr. of flight in the past year's operations, including participation in a shooting match at Las Vegas which called for flying 216 sorties in 205 hr., without a single minor or major accident.

► De Havilland of Canada is discussing a plan with the RCAF and the Canadian flying clubs under which approximately 50 de Havilland two-place tandem trainer Chipmunks, at a cost of approximately \$500,000, would be made available for the club's use. Airplane is the same model now used by the RAF as its primary trainer.

► Bellanca Aircraft Corp. has made some studies on large jet transports, and may seek to offer them for consideration in Washington in the discussions of transport prototype sponsorship by federal agencies.

WHO'S WHERE

Changes

► **New Appointments**—Richard L. Johnson has been named assistant to the president of Glenn L. Martin Co. . . Lockheed Aircraft Corp. named Robert E. Reedy manager of its sales engineering dept. . . Leroy A. Critchfield will direct Standard-Thomson Corp.'s chemical and metallurgical laboratory in Dayton.

John H. Stark has been appointed staff superintendent-petroleum products for United Air Lines. He will supervise negotiation and purchase of all petroleum products and facilities used by the airline. . . Delman E. Rowe was named senior test director in the guided missiles research laboratory of the National Bureau of Standards.

Carruthers and Fernandez, Inc. has named these officers for its new division, Airborne Equipment, Ltd.: Frank C. Fernandez, president; William R. Carruthers, vice president; Frank M. Salisbury, vp-engineering; William B. Kitchin, secretary-treasurer. . . William R. Hopkins now heads up engineering and development activities at Airborne Accessories Corp. . . Kennametal Inc., has named John McVeigh special development engineer to augment research into applications of Kentanium, new heat resistant material, to gas turbines.

► **Resigned**—Vernon Crudge, general manager of British Overseas Airways Corp.'s western division, has resigned. BOAC said his services will remain available during 1950 to facilitate carrier's reorganization plans.

Al Sari, administrative assistant to American Airlines engineering vp Bill Littlewood, is resigning effective Jan. 31 to do promotional work for a new project of Gene Goble (Goble Aircraft Specialties)—a fishermen's resort at Montauk, Long Island. Planned to be a fishermen's paradise, it will, naturally enough, be called "Fishangri-La."

► **Sales Shifts**—Norman L. Hess is director of sales for American Airlines' western region. . . J. Russell Watt has been named sales manager of industrial laminates and insulating materials for General Electric Co.'s chemical division. . . Capital Airlines named John B. Andersen sales promotion manager. . . Robert C. Overmyer has been named advertising manager of Stewart-Warner Corp.'s South Wind division.

Elections and Honors

Howard S. Cullman and Joseph M. Byrne, Jr., were reelected chairman and vice-chairman respectively of the Port of New York Authority at the agency's annual meeting.

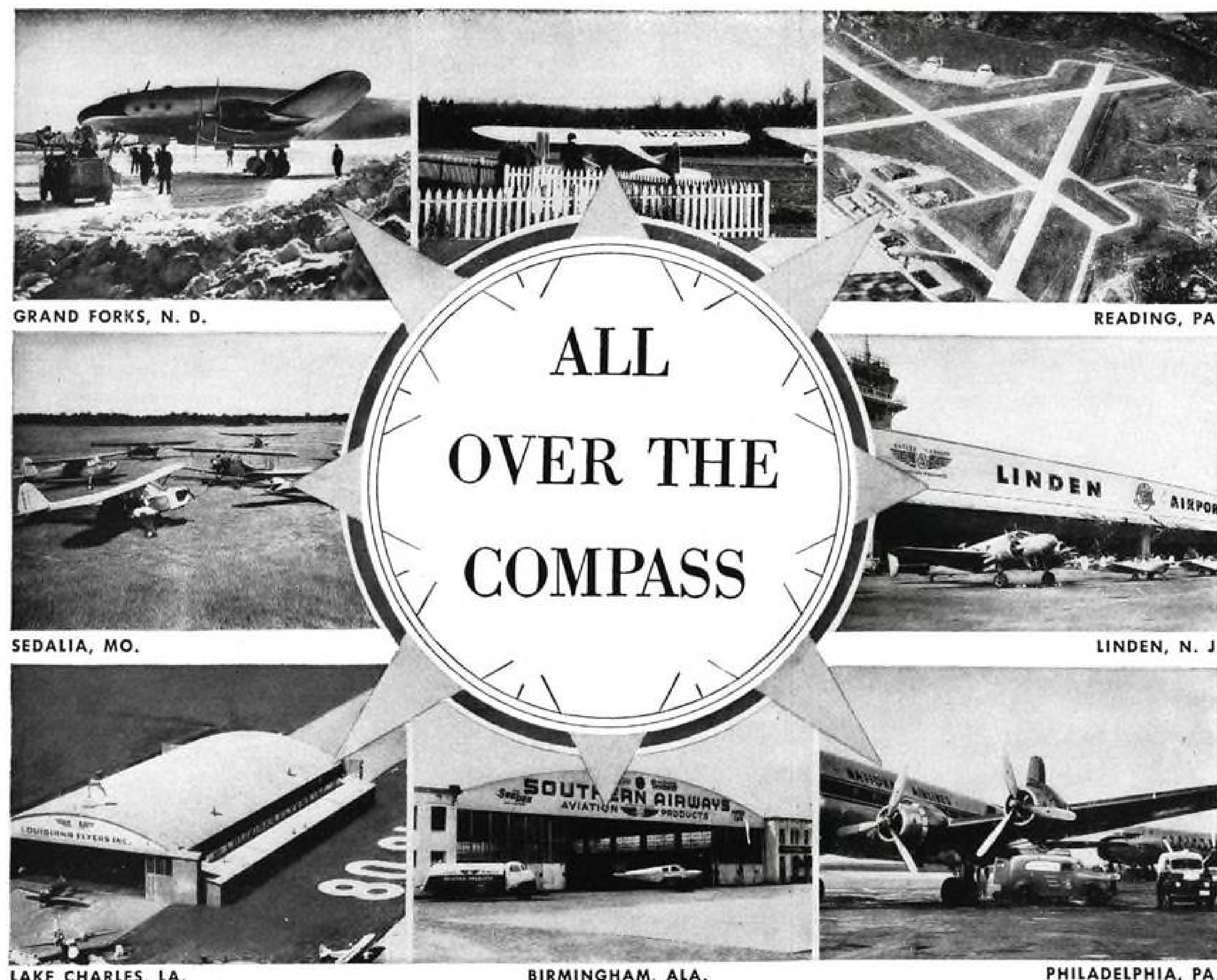
Brig. Gen. Donald N. Yates, chief of the Air Weather Service of Military Air Transport Service, was elected president of the American Meteorological Society for a two-year term at its recent 30th anniversary meeting in St. Louis.

Joseph T. Johnson and Edwin White, directors of Northwest Airlines, were presented with 10-year service pins in recognition of the active parts they played in the development of the carrier.



Air Force's new navigational trainer,
Consolidated Vultee T-29 "Flying Classroom,"
with Hamilton Standard propellers.





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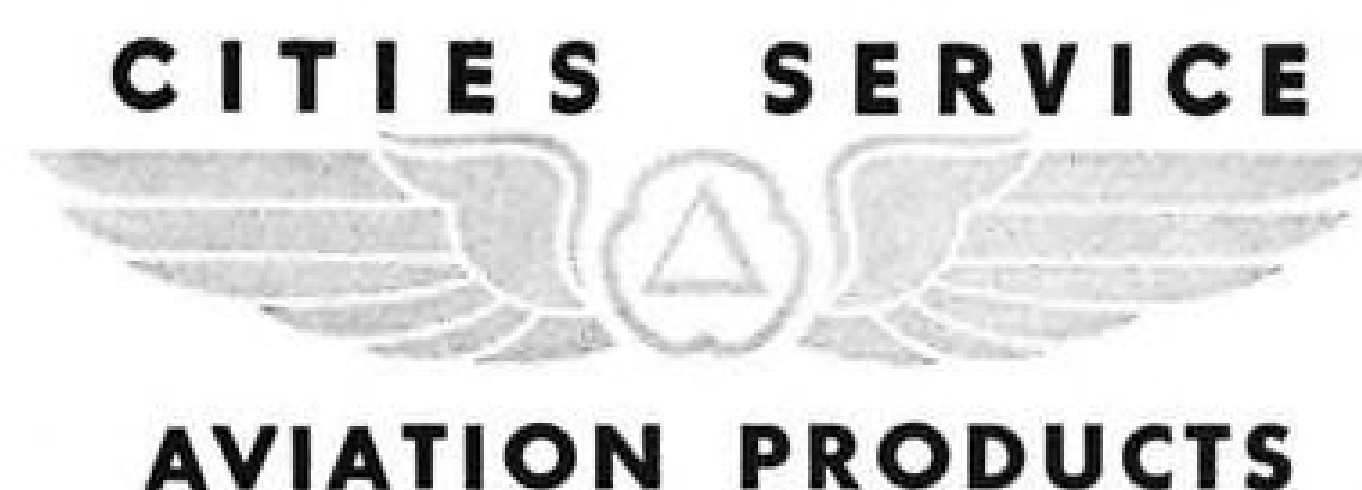


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Vol. 52, No. 4

AVIATION WEEK

Jan. 23, 1950



BOEING PRODUCTION of C-97s now fills assembly line at Seattle, but that area wonders what happens when end of line is reached.

Factions Open Fight Over Plant Dispersal

Midwest and West Coast groups square off in battle for congressional support.

Principal military aircraft manufacturers, the USAF and the Navy Bureau of Aeronautics are caught in the middle of a politics-saturated sectional tug-of-war over present and future locations of aviation installations and plants.

Tugging on the two sides are:

- **Mid-Continent Industrial Council** with a membership of business and civic leaders of Texas, Oklahoma, Kansas, Nebraska, South Dakota, Iowa, Missouri and Arkansas.
- **All-America Defense Assn.** which originated in the Pacific Northwest, but now has active support from the Pacific Coast states, the Rocky Mountain area, the Great Lakes region and New England states.

The Mid-Continent group contends that national interest "dictates" that key industrial plants and military installation be "dispersed" inland with the rest of the nation serving principally as a fortifying land mass. With headquarters in Kansas City, the council has campaigned at long range for its "one-

plank" platform with brochures and pamphlets sent to Washington, but has not, at least openly, had much personal representation in Washington.

► **Administration In?**—Some quarters, however, claim that it is "in" with the Truman Administration and credit it, in part, with causing a relocation in Boeing B-47 bomber production from Seattle to Wichita, moving of the Chance-Vought plant from Bridgeport, Conn., to Texas, and other shifts.

All America Defense Assn. was sparked by Seattle interests as a protest against the Wichita location of B-47 production and USAF's refusal to situate the \$1-billion Air Engineering Development Center in eastern Washington because of "strategic vulnerability."

► **Civilian Consultation**—With considerable fanfare, AADA is calling for "adequate defense" for Alaska, for the west, north and east perimeter areas of the continent, and for greater civilian participation in Department of Defense decisions. It is attacking "unilateral

military decisions" and pushing for increased armed service consultation with civilian business, labor, and civic leaders. These two planks coincide with the self-serving objective of AADA: To hold industries and acquire new military business and installations for the areas it represents.

AADA's public kick-off meeting in Washington last week drew an audience of 1000 to hear as speakers: Sen. Warren Magnuson (D., Wash.); A. L. Hayes, president, International Assn. of Machinists; Rep. Harry Sheppard (D., Calif.); Gov. Ernest Gruening of Alaska; Wallace Bennett, Salt Lake City businessman and chairman of the board of National Assn. of Manufacturers. Numerous other legislators attended, including Sen. Wayne Morse (R., Ore.); Sen. Homer Ferguson (R., Mich.); Sen. Arthur Watkins (R., Utah); Sen. Harry Cain (R., Wash.).

► **Not Contributing**—Aircraft Industries Assn. reports that its members have not, and will not, contribute to the financial support of either organization and that it "wants to keep out of the sectional fighting." But its repercussions are already being felt by the industry.

On the side of the Mid-Continent

Council is the fact that two large modern World War II-built aircraft plants in its area at Tulsa and Omaha, are not being used except for storage of tools and parts.

► **Rumors Flying**—Among typical unconfirmed rumors which were flying in Washington last week about plant relocations were these four:

- That Lockheed would move part of its production to the Tulsa plant, which Douglas had occupied during World War II.

- That the Lockheed move would not be to Tulsa but to the Omaha plant occupied by Glenn L. Martin Co. in World War II.

- That Lockheed would not move to Omaha but would remain on the West Coast. This last rumor is confirmed by a company statement.

- That production of the new eight-jet Boeing intercontinental XB-52 might be moved to Ft. Worth to follow the Convair B-36 down the production line when the B-36 became obsolete and its production was cut off.

It is understood that Boeing would like to build the XB-52 in quantity at Seattle, where the prototypes are now under construction, and where the slackening of B-50 and Stratocruiser production schedules will open up production capacity which was not available at the time the B-47 production was scheduled at Wichita (AVIATION WEEK, Jan. 16).

► **Stated Policy**—Air Force and Navy BuAer officials take refuge in the Administration's stated policy: No area is considered "to be less secure for defense production than other areas" but capacity within each area must be dispersed.

Department of Defense disclaims any plan to shift military business inland, as advocated by the Mid-Continent Industrial Council and sarcastically referred to as "the ostrich approach to defense" by AADA. USAF explains that the shift in heavy-bomber production from Seattle and the switch in the Air Engineering Development Center were influenced by an over-concentration of vital establishments in a small area in Washington state. National Security Resources Board, however, is continuing its study of "measures which must be taken to protect American industry and the general public to the maximum in the event of an emergency."

► **Political Maneuvers**—Air Force and BuAer, nevertheless can count on political maneuvering in opposite directions by AADA and Mid-Continent advocates in Congress this session, and both are apprehensive of the threatened "interference."

There are these developments:

- Magnuson has already mobilized some

200 congressmen to promote AADA objectives through legislation, appropriations, and political pressure. A counter-movement of inland area congressmen is getting underway.

- Morse has successfully promoted a "thorough investigation" of Alaska and Pacific Coast defenses by the Senate Armed Services Committee, of which he is a member. It will get underway in a few weeks, and points to an acceleration in the program for defense from Pacific attack. The threatened Communist move, unopposed, into Formosa has augmented widespread fears on this score in the West.

Sen. William Knowland's (R., Calif.) observation on the Senate floor typified the general sentiment: "If Formosa gets into unfriendly hands, our Japan-Okinawa-Philippine defense is pierced and the Pacific Coast may have to become our first line of defense. . . . Already there are those in Washington who advocate moving some of our large industries out of the states of Washington, Oregon, and California. If we are to make the Pacific Coast our outpost line, this is understandable."

The political election this year figures strongly in the picture. Democratic politicians are concerned over possible development of anti-Administration sentiment on the Pacific Coast, particularly in Washington state where Magnuson is up for re-election. Morse is up for re-election, and Bennett, who was a key-note at the AADA kick-off, is the likely Republican Senate candidate in Utah. Both AADA and Mid-Continent Industrial Council will furnish popular regional campaign issues.

► **After November**—There is speculation that both movements may fizzle out after the November contest—like a program put forward by Sen. Pat McCarran (D., Nev.) during his 1944 campaign. He campaigned to keep all Eastern war plants on ice until all Western plants had been sold in order to achieve a balanced East-West economy. Easterners thundered against it in the campaign and Westerners thundered for it. But afterwards both sides let it die.

PAA Offers \$582 Holy Year Package

Pan American Airways will offer a two-week Holy Year all-expense tour for \$582, using leading travel agencies and other carriers to provide service to Rome, Nice, Paris and London.

The tour plan, which expires on Mar. 16, has nothing to do with PAA's agreement with Felix Roma, according to Willis G. Lipscomb, vice president-traffic and sales.

Pan American will provide service from New York to European gateways

and return. European carriers will transport the tourists to the other cities. PAA is also offering a 15-day trip, including London, Paris, Milan and Florence, for \$628.

Hap Arnold

Air Force's first five-star general dies of heart attack in California.

By Alexander McSurely

An era in military aviation closed last week when General of the Air Force Henry Harley Arnold, 63, died (Jan. 15) at his home at Sonoma, Calif.

"Hap" Arnold retired in 1946 after he had commanded the greatest air force the world has ever known, which reached a peak of nearly 2,500,000 men, and 70,000 planes in World War II. Probably never again, due to development of atomic and hydrogen bombs and long-range rocket missiles, will piloted aircraft play such an important role numerically in war.

► **Early Bird**—Gen. Arnold began his aviation career in 1911 as one of five early Signal Corps officers who learned to fly with the Wright Brothers. Actually his flight instructor was A. L. Welch, a civilian pilot at the Wright Flying School at Dayton. But like most of the early Wright students, Gen. Arnold had a rudimentary ground school training and checkout flights from the brothers themselves. (Of the other officers, only two, Brig. Gen. Thomas Dewitt Milling, Washington, who accompanied Gen. Arnold to Dayton, and Brig. Gen. Frank Lahm, Cleveland, who preceded them, now live.)

Beginning with such early exploits as a new altitude record of 4167 ft. and winning the first Mackay trophy for a 20-mi. cross-country reconnaissance flight from College Park, Md., to Ft. Myer, Va., and return, Gen. Arnold had a long eventful record in aviation. In World War I he was executive officer and then assistant director of the Signal Corps office of military aeronautics.

► **Air Power Apostle**—A campaigner for air power in the middle 1920s, he received a reprimand from his superiors for supporting proposal of an autonomous air force.

For commanding a flight of 10 Martin B-10 bombers to Alaska, an 18,000-mi. flight to prove long-range-bombing theories, he won the Mackay trophy a second time in 1934.

► **Succeeded Westover**—By 1938 he had attained the rank of brigadier general and post of assistant chief of the Army Air Corps, heading the Air Corps after his predecessor, Maj. Gen. Oscar Westover was killed in a plane crash.

Publicity-minded expansionist Arnold sponsored an aggressive public relations campaign about the Air Corps having "the world's finest" planes and pilots, overlooking the puny size of his pre-war 2000-plane Air Corps. A massed plane demonstration at Wright Field in Aug. 1939, brought in a scant 100 planes for the show. But shows like this and Air Corps publicity on a lavish scale brought public awareness of air power's potential.

► **Congress Prepared**—They helped prepare Congress for appropriations necessary to finance the huge World War II Army Air Forces, which Arnold as deputy chief of staff for air helped plan and then returned to build with a driving insistence on urgency.

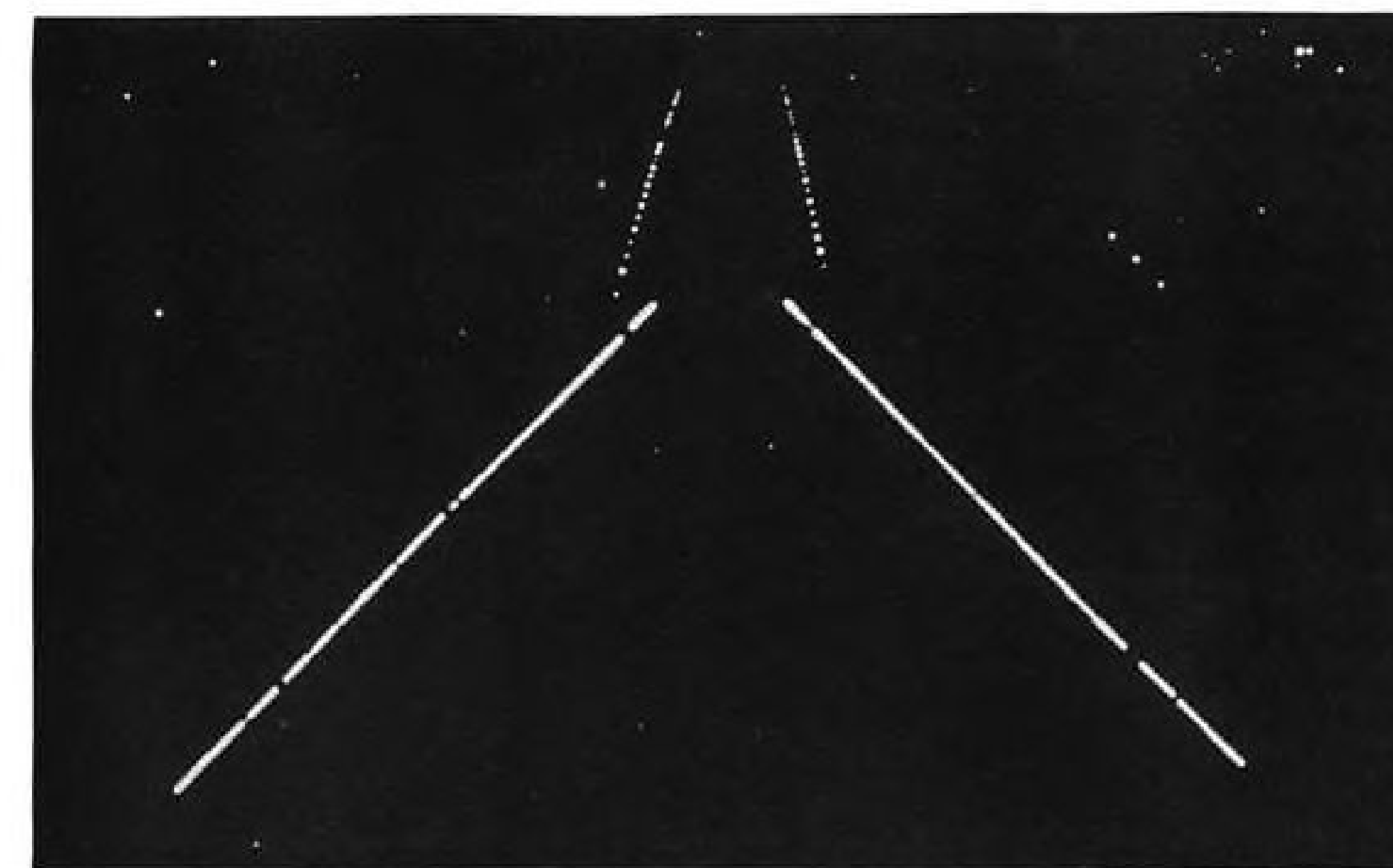
His responsibilities increased with the growth of his organization and he rose in rank from major general to lieu-

tenant general, then to become the first four-star general who wore wings, and finally the first five-star airman general of the army.

► **Adviser to Roosevelt**—An aviation advisor to President Roosevelt, he accompanied him to the important big power conferences at Casablanca, Teheran and Yalta.

As a writer he is best known for two books, his recent autobiography, "Global Mission," and a pre-war volume "This Flying Game," which he and Lt. Gen. Ira Eaker wrote in collaboration.

He suffered his first heart attack in 1944, but remained in active service for two years, before retirement. Recurring heart attacks preceded the one which caused his death. His body was flown to Washington for military funeral at Arlington Cemetery.



HOW SLOPE LINE LOOKS for proper approach—which ALPA says CAA didn't make.

CAA Withdraws Slope Line Support

Study shows terrain problems make it impractical to use approach system at half the airports considered.

Civil Aeronautics Administration has withdrawn its all-out support for the twin-row, funnel-shaped slope line lighting system which was designated last year as the U.S. standard for high-intensity approach lights at both civil and military airports.

The move was made when CAA Administrator Delos W. Rentzel met with the Munitions Board's Army-Navy-civil Subcommittee on Visual Aids to Air Navigation. He said studies had shown that terrain problems made the slope line configuration impractical for at least half of the airports considered for the new high-intensity lighting systems. ► **ALPA Wins**—Rentzel's action represented a victory for the Air Line Pilots Assn., which has strongly opposed the

twin-row slope line configuration. ALPA favors a single row of bar lights (the same as those used in the slope line) but set horizontal to the runway along a line leading to the center of the runway.

The V-shaped slope line configuration—developed by CAA engineers—is now in use at Arcata, Calif., Indianapolis and New York International (Idlewild) Airport. Similar systems are slated to be operating at Los Angeles and Washington National Airport by the middle of February.

► **Plans Changed**—Because of terrain problems, obstructions, water or difficulties in obtaining land easements, CAA has been unable to install the three-dimensional slope line configuration at Boston, Chicago, Newark or

LaGuardia Field. A single line of slope line bar units mounted horizontally on the left side of the runway is slated for installation at the latter three points by early spring, replacing existing neon lights. The left-side, single-line arrangement meets military requirements for a clear approach lane.

Rentzel denied that CAA's request for abandonment of the twin-row slope line configuration standard represents a major switch in his agency's thinking on high-intensity approach lights. He told AVIATION WEEK that his latest recommendations to the Munitions Board's subcommittee were made in the hope of reaching a quicker agreement on international standards and getting all interested parties, including ALPA and the Air Force, together on a domestic program.

When the slope line was adopted as a standard last year, determination of the proper light assembly was of prime importance, and the configuration for installing the lights was secondary, Rentzel continued. He pointed out that when the slope line was adopted by the Munitions Board it was provided that "any exceptions to this standard (configuration) necessitated by conditions of local terrain shall utilize slope line fixtures."

► **Wastage Denied**—"We haven't bought any equipment we can't use," Rentzel emphasized. "Abandonment of the slope line configuration standard won't mean any delay in the high-intensity light installation program."

Turning to charges that slope line installation costs are far exceeding estimates, CAA officials said that \$105,000 was the budget cost for the average project (although CAA engineers originally had cited a much lower figure). The agency now places the cost of the Washington installation at about \$112,000, Los Angeles \$79,000 and Idlewild \$72,000. However, the Port of New York Authority has shouldered the heavy cost of building piers for the slope line system at Idlewild.

► **Union Arguments**—ALPA has kept up a running fire against the slope line during the past year. The union accused CAA of conducting comparative tests at Arcata which favored the slope line arrangement from the start. It added that when pilots of fast four-engine equipment make their approach in poor visibility there is no time to determine whether the break-out is over the left or right-hand row of the slope line.

Besides, ALPA declares, the single-row, center-line system it advocates is considerably less expensive to install and maintain, requiring only 440 lights and 34 fixtures mounting locations, compared with around 688 lights and 58 mounting locations for the slope line. With its fewer mounting loca-

tions, the single-row, center-line system requires a minimum of land acquisition, an important factor because of the increasing difficulty encountered in condemning ground, smoke stacks, trees, water and radio towers, ALPA states.

► **ICAO Action**—During a meeting in Montreal late last year, the Aerodromes, Air Routes and Ground Aids Division of the International Civil Aviation Organization examined three approach light systems and recommended them all as being satisfactory. The U.S. sponsored the slope line. The French backed a single-row system of lights parallel to, but offset 100 ft. to the left of, the extended runway center line and having three crossbars.

Great Britain favored the Calvert crossbar system, consisting of a line of lights on the extended center line of the runway, together with additional lines of lights arranged symmetrically and at right angles to the center line as horizon bars. The bars decrease in width towards the runway threshold to provide glide path guidance to the point of touchdown.

► **Idlewild Setup**—The recently activated slope line at New York International Airport gave many airline pilots their first experience with the three-dimensional slope line system. Sixty individual light assemblies are used in Idlewild's double-row system, each assembly forming a 45-degree angle with the ground.

Linear spacing between the fixtures is 100 ft. Individual lamps in the system are rated at 250 watts and provide 85,000 candlepower at maximum brightness setting. Ten white sealed-beam lamps are placed along the 14-ft. length of each bar fixture.

Five levels of intensity, controllable from the tower, are available. Lowest level is adequate for normal clear-weather night approaches. Higher levels are used for decreased visibilities. Maximum brilliance is reserved for daytime approaches in poor visibility when high background brightness tends to reduce effectiveness of the lights.

► **Continuous Lines**—When the plane is properly aligned on the ILS during an approach, the two rows of lights seem to form continuous lines. The projected point of contact of the slope line system coincides with that of the ILS.

Deviation from the proper approach path either horizontally or vertically is indicated by the manner in which the rows break up in echelons. In case of deviation to the left, each bar will "lean" toward the right—in effect pointing the direction toward the correct path.

Right deviation will produce an opposite effect. When the plane is below the proper path, the bars appear to point upward, and the reverse is true when the aircraft is above the path.



WITTMAN and Continental trophy.

Wittman Repeats, Sets Miami Record

Sylvester (Steve) Wittman, Oshkosh, Wis., former school teacher, fixed-base operator and airplane designer, won the Continental Motors Trophy midget plane races at Miami for the second successive year.

The veteran race pilot pushed his little yellow home-made racer, "Bonzo," to a 185.4 mph. average over the 20-mi. final race for a new high speed at Miami, well ahead of his competition. Keith Sorenson of La Crescenta, Calif., in a green Cosmic Wind racer was second with a 182.044 mph. average; Bob Downey, Whittier, Calif., was third with 181.334.

► **Cut Pylon**—Wittman was disqualified for the prize money for his first preliminary heat in which he cut a pylon, but was permitted to continue in competition, and won a total of \$2250 including the \$1800 finals first prize.

Rodney Jocelyn, Langhorne, Pa., wartime RAF fighter pilot won the international aerobatic championship, in a Great Lakes biplane with 160 hp. Kinmer engine against a competitive field which included Beverley Howard, Charleston, S. C., defending champion, and Betty Skelton, last year's women's champion. This year the competition, sponsored by Gulf Oil, was thrown open to both men and women flyers.

► **Crash Landing**—Spectators watched a National Guard F-80 jet fighter crash land, after it had lost a right elevator when struck by the wing tip of another F-80 flying in tight aerobatic formation with it on a gusty day. Lt. Col. Bill Dehavilland, leader of the four-plane "Rocket" formation and pilot of the damaged plane, continued in a straight-on approach, touched down at about 180 mph. in a field near the airport, plowed through fences and

came to rest near a herd of cows, with the plane washed out, but the pilot not seriously injured.

Highlight of the exhibition flying was the demonstration of the French Fouga Cyclone, first jet lightplane, powered with a 100-lb. jet engine developing approximately 200 hp. The one-place craft, with long tapered sail-plane wings, is capable of soaring with the engine cut off. Plane piloted by Fred Nicole of Paris, is credited with 190 mph. speed in level flight.

IAS to Make Awards At Honors Dinner

Boeing staff engineer George S. Schairer will receive the Sylvanus Albert Reed award, for analytical and experimental work contributing to design and development of large swept-wing high-speed aircraft, at the Institute of the Aeronautical Sciences' 1950 Honors Night dinner, at the Hotel Astor in New York City.

The Institute's 18th annual meeting, from Jan. 23 to Jan. 26, will open with the Honors Night dinner tonight at which Walter Lippman will be the principal speaker. Other awards:

- **Robert M. Losey award**, to William Lewis, U. S. Weather Bureau meteorologist, whose research provided quantitative information on meteorological conditions conducive to the formation of ice on airplanes, enabling design of airplane ice prevention equipment by rational methods.

- **The Lawrence Sperry award**, to A. H. Flax, Cornell Aeronautical Laboratory, for significant additions to methods available for determining dynamic behavior of airplanes, helicopters and missiles.

- **The John Jeffries award**, to Arnold D. Tuttle, United Air Lines medical director, for outstanding contributions to the advancement of aeronautics through medical research.

IAS will award a special certificate to Jerome Lederer, director of the Flight Safety Foundation, for outstanding contributions in engineering for flight safety and for untiring efforts to encourage research in this field.

Daily sessions will cover the following subjects:

- **Jan. 23**—Rotating wing aircraft; instruments; aerodynamics.

- **Jan. 24**—Aerodynamics; aeroelasticity. Luncheon speaker, Rear Adm. C. M. Bolster, chief of research and development, Bureau of Aeronautics.

- **Jan. 25**—Meteorology; structures; aircraft design; air transport. Luncheon speaker, Maj. Gen. Donald L. Putt, director of Research and Development Office, USAF.

- **Jan. 26**—Symposium on jet installation design problems.

70-Group AF Outlook Dim

Prospects for another congressional fight with President Truman on the 70-group Air Force issue last week had dimmed to a near blackout.

After a week's session with defense leaders on the Truman 48-group program as outlined in the 1951 fiscal year military budget (AVIATION WEEK, Jan. 16) Rep. George Mahon (D., Tex.) one of the strongest 70-group advocates on Capitol Hill, and chairman of the House Appropriations Subcommittee on the Armed Services admitted the Truman political tactic of impounding last year's extra USAF funds was a tough one to beat.

He told AVIATION WEEK:

"Within the framework of its \$13.5 billion ceiling, the President's military budget is good. Of course, we regret that he did not go stronger with regard to Air Force funds.

"But, in view of fact that funds appropriated last year to implement a 70-group program have not been expended and Congress does not have the power to control this aspect, I doubt that there will be any serious controversy over the matter this year. We have made clear our position of overwhelming support for the 70-group program. But we have to be practical and face facts."

NACA Report

Practical supersonic military planes now in reach of every nation.

In planning its future air force, the U. S. will have to reckon with the certainty that any nation willing to make the effort can build supersonic military aircraft, Dr. Jerome Hunsaker, chairman of the National Advisory Committee for Aeronautics, stated last week in the agency's annual report to Congress.

Pointing out that both USAF and Navy are making "great efforts in fostering the design of operational transonic and supersonic aircraft," the NACA chairman intimated that the experimental supersonic flights already made have clearly indicated that the fundamental aerodynamic problems of supersonic flight are now solved.

Significance of the Hunsaker state-

ment is in its indication that the classic conflict between airframe and engine designers has again swung in favor of the airframe makers and that the engine designers who were in the lead until recently, now have to hurry to catch up. Whereas the turbojet engine gave designers far greater power than they had had previously, "the challenge is now somewhat reversed and it is necessary that means be found to provide improved propulsive systems for aircraft being designed for transonic and supersonic flight."

► **Aerodynamics**—Unconventional supersonic configurations have placed increased emphasis on low-speed characteristics of high-speed forms. NACA studies show that leading edge slats, droop noses and trailing edge flaps offer practical solutions to the problem of low-speed stability of swept-wing and delta-wing planforms. The use of camber and twist in swept wings also shows promise of improving low-speed stability.

Boundary layer control studies still exhibit conflicting results with no clear line of advantage yet isolated. Investigations of leading edge and mid-chord suction slots designed to improve the low-speed stability of very thin wings fails to show important advantages. However, the use of suction on the aft portion of thick wings, such as are used near the root of long-range bombers, promises substantial reductions in drag and consequent range increases.

► **Stability and Control**—Unconventional form of high-speed aircraft has aggravated the stability and control problem. Extensive research on downwash behind various swept wings to determine the best tail location showed that the downwash centerline is considerably lower for swept wings than for sweptforward wings, indicating the desirability of a low tail position for sweptback wings.

For supersonic speed, design studies indicate that thin sharp-edged wings without sweepback would have better performance than other wing arrangements.

Stability of delta-wing models having various aspect ratios, airfoil sections and vertical fin arrangements have been investigated at the Langley Laboratory. It was found that the wing thickness has an appreciable effect on stability but the arrangement of the vertical fin is still indicated as the most important lateral and directional stability factor.

Investigations of the plug aileron for use with fullspan flaps indicates an increasing field of usefulness for this device in high speed aircraft.

(A more detailed report on NACA technical activities during the year will be carried in the Aeronautical Engineering section of an early issue of AVIATION WEEK.)



Aeroproducts Names Pearce Sales Chief

Appointment of Guilford C. (Gad) Pearce as general sales manager of Aeroproducts division, General Motors Corp. at Dayton, effective Feb. 1, is announced by Max M. Monroe, Aeroproducts general manager.

Pearce has been Washington representative of Allison division, General Motors Corp. for the past four and one-half years, and recently has been conducting the programming and development liaison work with the Navy on the Allison T-40 turboprop engine, and similar work with the USAF on J-33 and J-35 turbojets.

He served as Mediterranean manager and service representative for Allison during World War II, working with the Italian, French, Turkish, and Egyptian Air Forces as well as with the USAF.

A former USAF pilot, Pearce was associated with various airlines in Chicago, after attending Wabash College and Butler University. He has been with Allison for the last 10 years.

At Aeroproducts Pearce's first assignments will be to direct a sales program for the division's single and dual rotation propellers designed for several forthcoming turboprop engines, and new programs on actuators and engine controls.

Munitions Board List

Munitions Board has issued a new revised index of military purchasing offices as a guide to selling to the armed services.

Copies of the index may be obtained from Central Military Procurement Information Office, Munitions Board, Department of Defense, Pentagon Bldg., Washington 25, D. C.

SALES & SERVICE



PIPER'S 1950 SUPER CUB carries 400-lb. in bulky loads. Flaps and balanced elevators are standard on Lycoming-engine version.



PIPER PACER shows detail improvement over Clipper, including better streamlining. The 135-hp. Lycoming model has Aeromatic prop.

Piper Shows 1950 Personal Planes

Two models of the famed Cub and three versions of the Pacer—a development of the popular Clipper—have been readied by Piper Aircraft Corp., Lock Haven, Pa., for the 1950 personal plane market. Three of the new planes were shown at the recent air maneuvers in Miami for the first time.

► **Super Cub**—Larger and roomier tandem seating is featured in the Super Cub 95 and Super Cub 105, powered by 90-hp. Continental and 105-hp. Lycoming engines respectively and priced at \$2795 and \$2995, respectively. Aerial photography will be facilitated by a sliding window on the left and a wide door on the right.

A swinging engine mount is incorporated for easier maintenance. A large baggage compartment and folding rear

seat will permit carrying of bulky loads up to 400 lb. The Super Cub 105 is similar to the Model 95 except for the Lycoming engine, which gives the craft a cruising speed of 105 mph., and flaps and balanced elevators as standard equipment. The company states that the 105 can maintain controlled flight at 28 mph.

Gross weight for both models is 1500 lb. The 95 has a useful load of 710 lb., and service ceiling of 13,500 ft., while the 105 has a useful load of 675 lb., and 15,750-ft. service ceiling.

► **Pacer**—Pacer 115 has new type wheel controls and re-designed instrument panel, with glove compartment on the left side. Fuel capacity has been upped to 36 gal., with two wing tanks replacing the fuselage tank. A re-engineered

Hydrasorb landing gear is standard equipment. The horizontal tail has 20 percent more area and is balanced to provide improved stability and easier control loads. A crossover exhaust system to give better power output is standard equipment. The Pacer 115 has a gross weight of 1650 lb., 750-lb. useful load, 600-fpm. climb, and 11,000-ft. service ceiling. Price is \$3295.

The Pacer 125 has flaps and complete soundproofing as standard equipment. A 125-hp. Lycoming engine is used. Gross weight is 1800 lb., useful load 820 lb., rate of climb 810 fpm., and service ceiling 14,250 ft. Price of the aircraft is \$3795.

The Pacer 135 is similar to the 125 but is fitted with an Aeromatic controllable pitch prop, and has a manifold pressure gage, outside temperature gage, and fairing kit. Useful load is 800 lb., and climb 850 fpm.

NEW AVIATION PRODUCTS

Evaluation Report

Craze-Proof Plastic for Windows

Five airlines buying Sierracin, thermosetting material that cuts weight and saves on maintenance.

After tests running in some cases for nearly a year, six airlines and at least one transport plane manufacturer have placed orders totaling \$72,000 with Sierra Products Co. for Sierracin 212, a transparent plastic for cabin windows that saves weight, is cheaper than glass and may possibly last as long as the plane—cutting maintenance almost to zero.

Those orders may be only a starter. Eastern Air Lines and Pan American Airways will install Sierracin in all their Constellations, in place of existing window materials, when the planes go in for major overhauls. The cost of such a job runs between \$1400 and \$1600 per plane, and EAL has 20 Connies, PAA, 14.

TWA already has specified Sierracin in its 20 new Connies, and Lockheed plans to use either Sierracin, or a plastic of somewhat similar characteristics (made by Aero Plastics Co.) in all 749 Constellations. Other airlines that have bought Sierracin are British Overseas, Qantas and Air France.

Here is what recommends Sierracin to customer airlines:

- **Initial cost** for a Constellation installation of about \$1600 (according to Sierra) vs. about \$2300 for glass. Sierracin is much more expensive than other plastics, however: \$56 per window in TWA's Connies, against \$28 per window for Lucite.

- **Weight saving** of 144 lb. in a Constellation (according to EAL) compared to use of glass.

- **Practically no maintenance.** Sierra Products guarantees it not to craze, and tests so far conducted by manufacturers and airlines bear out the claim. And it is not affected by most cleaning compounds. PAA says the Plexiglas installed in its Connies (now being replaced) has a life of about a year. EAL has been using Sierracin experimentally since last April and it is still good.

- **Experience Records**—Eastern is cautiously pleased with Sierracin on the basis of hard experience. Its Connies originally were equipped with plastic window coverings. They cracked and crazed and Lockheed—under terms of the guarantee—had to replace all the

window material with glass. This was satisfactory, but EAL had to pay a weight penalty. At the moment, Sierracin looks like a better answer to Eastern.

Pan Am had a somewhat similar experience, except its Connie windows were never replaced by glass. It had crazing and cracking troubles and had to use extreme care in cleaning the window panes. Now it plans to use Sierracin except in cockpit windows which will continue to be laminated, "bird-proof" glass.

One foreign airline has bought some Sierracin and investigated it, but is a hold-out. It has specified glass for its new Constellations on the theory that it knows glass will be satisfactory, even though more expensive than Sierracin. It reasons that if it had Sierracin installed and the material was not satisfactory, then it would have to go back to glass—with an overall greater expense than if it had started with glass.

► **Background**—Sierracin 212 is a product of the pressurized era in airline operation. Pressurized cabins require strong window coverings, tightly sealed. Laminated glass is one answer, but is expensive and heavy. Plastics are ideal because they are light in weight, less expensive. But cleaning them is a headache; sealing them is just as bad because sealing compounds may be as damaging as cleaning solutions.

Those were the conditions Sierra Products set out to correct with Sierracin. An indication of its success is that the Compton, Calif., company has sold 2010 Constellation windows and 1390 windows for other aircraft.

► **Characteristics**—Sierracin 212 is a thermosetting plastic that can be machined by all standard methods and formed into a variety of shapes. Its luminous light transmission is 89 percent; refractive index, 1.55; Taber and falling emery abrasion resistance are, respectively, 1 and 2.5; Rockwell hardness is M60-M100; tensile strength, 10,700 psi.; flexural strength, 16-19,000 psi.; it has resistance to continuous heat of from 210 to 225 deg. F.

Here are Sierra Products' reports on some of the tests run on Sierracin:

- **A 13-lb. weight** at a radius of 13 in.

swinging through an arc of 54 deg. was required to shatter a window when internal air pressure was maintained at 10 psi.

- **A one-half-lb. steel ball** was dropped from a height of 32 in. on window panel deeply notched in a cross pattern and supported on a wooden frame. No damage to panel.

- **Isopropyl alcohol bath** for 30 minutes. No crazing or other visible effects.

- **Same window bathed** in lacquer thinner for 30 minutes. No crazing or other adverse effects.

- **At stress level of 5000 psi.** in a testing machine, sample was bathed with lacquer thinner and acetone for 15 minutes. No visible crazing or other adverse effects.

- **Sample was mounted** with overhang of six inches loaded to 4000 psi. Load was reversed every month for 15 months. Tests conducted under continuous weather exposure and sample bathed in various solvents. Sample then loaded to 10,000 psi. while bathed in acetone. No failure or crazing.

Fast-Cut Blade

"Molyflex" steel hacksaw blades, offered by Victor Saw Works, Inc., Middletown, N. Y., are designed for high-speed-cutting and are represented to be shatterproof when used in frames.

Firm states that blades averaged 23.5 percent more metal cut than the average for 6 different brands of flexible-back, high-speed steel blades used in comparison tests.



No-Mar Hammers

Redesigned replaceable-face hammers for shop and maintenance use, offered by Greene, Tweed & Co., North Wales, Pa., have freer play between jaws of retaining head to insure positive take-up and firm grip despite variations in face circumferences.

Metal parts are finished in rust-inhibiting aluminum coating, baked on to give a hard wearing surface. Lacquered and enameled handle is shaped to fit the hand.

Hammer faces available include rawhide, Basa molded composition, plastic, copper and babbitt.

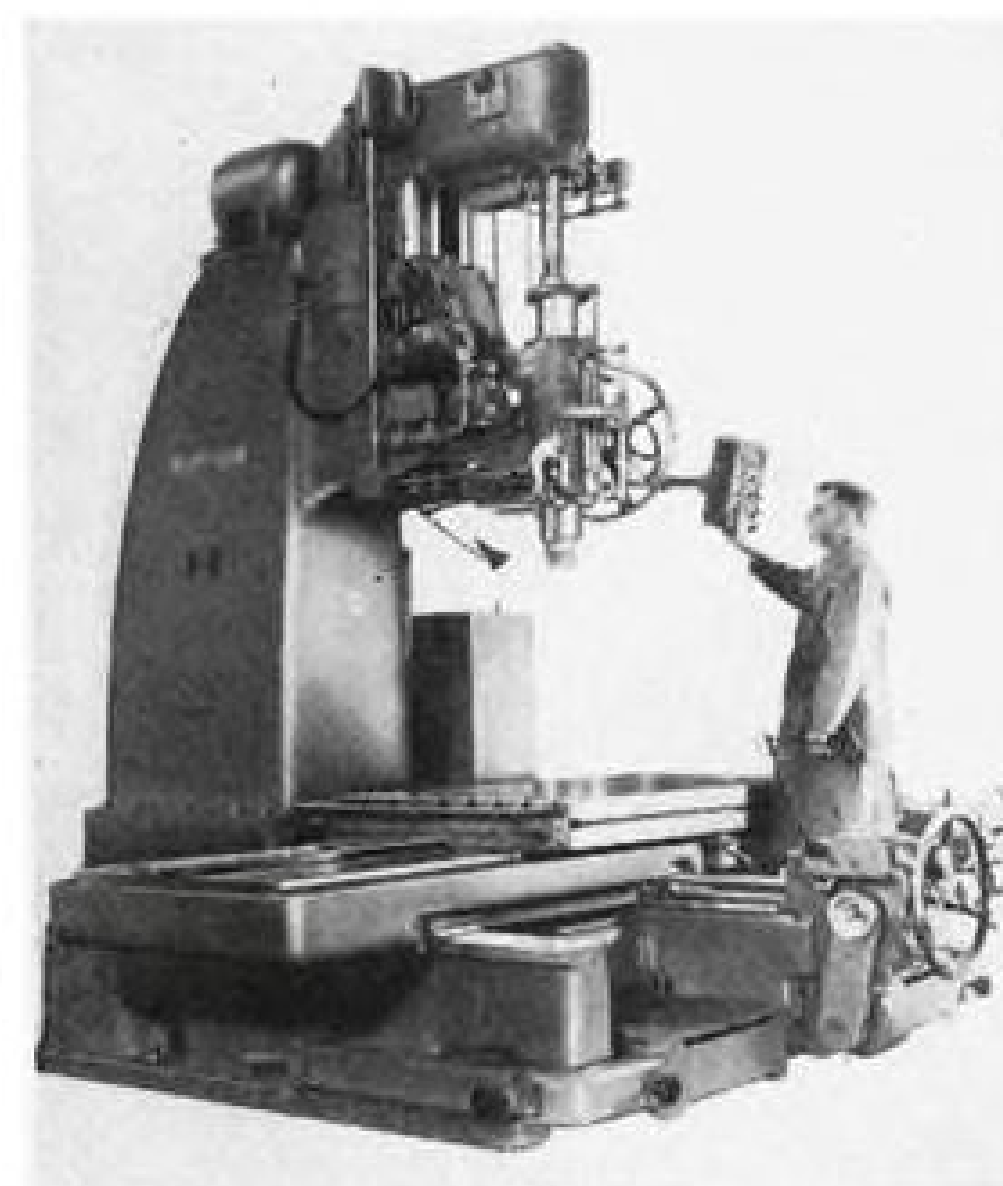


Small Load Truck

Three-wheel Salsbury stake car for plant and airfield transportation, capable of hauling a 600-lb. load in addition to driver, is offered by **Wayne Mfg. Co.**, Pomona, Calif. A 6½-hp. engine is coupled to completely automatic transmission, making for easy ramp climbing as well as providing ease of operating control with manual shifting.

Load is cradled by transverse leaf springs to independently sprung front wheels.

The non-reversible worm-type steering gear is controlled by automotive steering wheel. Coil spring rear suspension insures riding comfort for driver.



Large Jig Borer

No. 4-E Vertical Jig Borer, claimed to be largest ever built, is capable of locating and boring to .0001-in. accuracy with work load of 2½ tons. This 15-ton precision machine, made by **Pratt & Whitney division, Niles-Bement Pond Co.**, West Hartford 1, Conn., is designed with open-side construction to provide maximum convenience in placing and holding wide range of work.

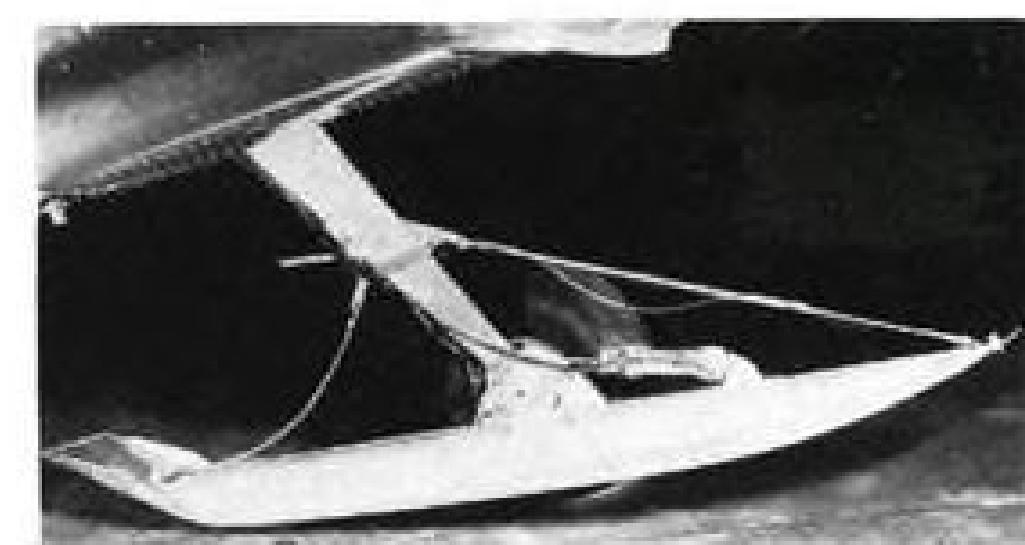
It has 36 x 72 in. rectangular table

with 60-in. longitudinal travel and 36-in. transverse travel. Maximum standard height from table top to spindle nose is 33 in. However, columns 6, 10 and 14 in. higher can be furnished to increase machine's vertical capacity to 47 in.

No. 5 Morse taper can be held in spindle with collets and spindle nose cap. The 5½-in.-dia. quill has 10-in. vertical travel with power feeds (both up and down) ranging from .0005 to .015 in. per revolution of spindle. Adjustable dial indicator depth gage with positive stop is built into spindle head for accurate boring to depth.

Switches controlling primary functions of machine are concentrated on pendant control station, adjustable to suit operating conditions.

Since machine is exceptionally large for its type, it is equipped with new P&W Electrolimit measuring system in place of standard and measure procedure. Floor space required is about 12½ x 11 ft. Approximate overall height (using highest column) is 12 ft.



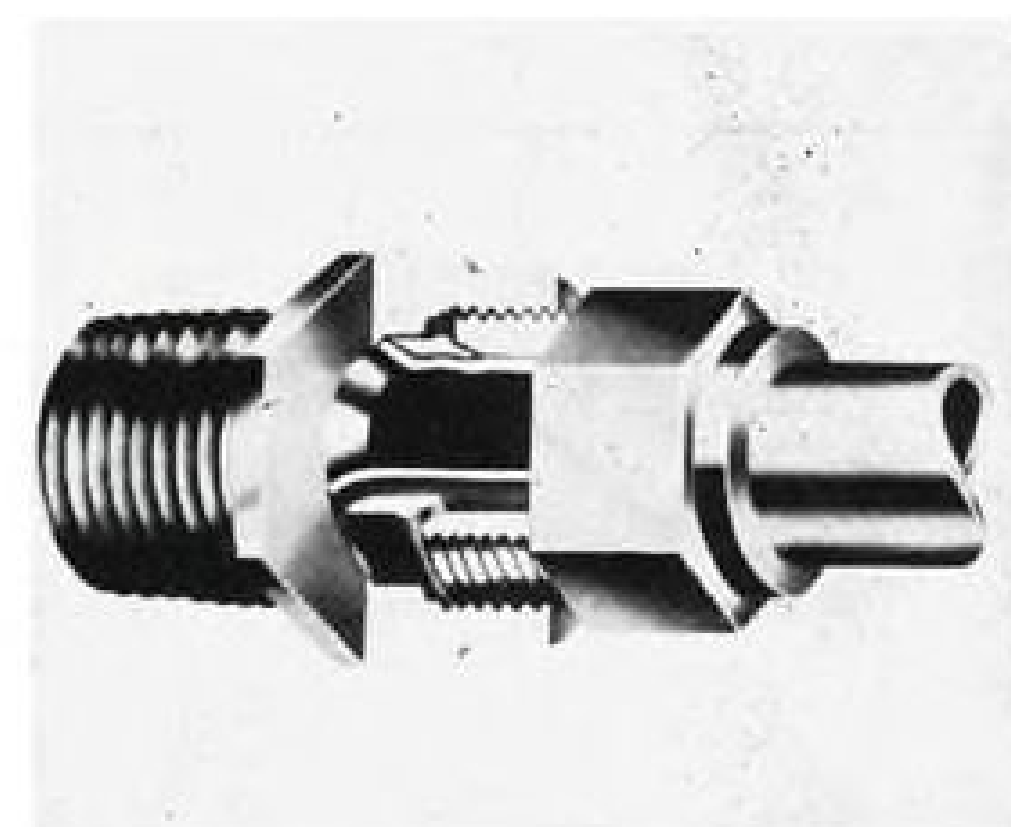
Versatile Wheel-Skis

For all-year operation of small planes in severe climates, combination wheel-skis for light aircraft, permitting landings and takeoffs on either bare runways or deep snow, are offered by **Federal Aircraft Works**, Minneapolis, Minn. Skis are claimed to be developed from proven types used successfully by the AF and RCAF on observation, liaison and transport aircraft.

Wheel-skis attach to landing gear and can be hydraulically or electrically controlled from the cockpit. They are lowered below wheel line for operation in deep snow and raised when it is necessary to make wheel landings on bare surfaces.

Equipment also is available without hydraulic or electrical actuation—ski is placed in fixed position on gear about 1-in. above rolling radius of tire. This arrangement is said to afford reasonably good ski plane performance under normal snow conditions.

Special fixtures can be obtained permitting skis to be manually set either below or above wheel line. Skis also can be positioned underneath tire for shock action, or wheels can be removed to allow for operation of aircraft on skis alone.



Aluminum Fittings

All-aluminum Uniflare fitting with a self-flaring feature and leakproof seal is offered by **Scovill Mfg. Co.**, Waterbury, Conn., for use with annealed aluminum tubing. Body of fitting contains flaring cone and nut contains thrust collar. Turn of nut is sufficient to shear off collar, and further tightening clamps collar to tube, forming seal said to be leakproof.

Manufacturer claims there is no danger of tube cracking during flaring, and claims aluminum fitting offers opportunity to use standard wall tubing rather than heavier tubing usually required to provide extra strength. Fitting may be disassembled and reassembled many times without impairing tightness of seal.

The unit is available in all standard shapes on made-to-order basis for use with tubing ¼ in. through ½ in. o.d.



Production Grinder

Expediter belt grinder, offered by **H. L. Ramsey & Co.**, La Grange, Ill., can be set up quickly for free belt operation, form wheel work, contour grinding, line contact grinding when much stock is removed and for platen precision grinding.

Unit is designed so that with one turn of a clamp, abrasive belt can be set at any angle. Several of these devices can be set above each other with contact wheels or platens directly in front of the operator. With this arrangement, he can rough, semi-finish and finish grind with little movement.

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No. 2050-10"—1 H. P. ball bearing motor—oil packed and sealed—no further lubrication. Extra wide enclosed guards accommodate wire brush. Safety eye-shields, adjustable tool rests. Conveniently located lights with shades. One coarse—one fine grinding wheel. Rated 1725 R. P. M. Pedestal available.



SIOUX 6" BENCH GRINDER

No. 2065—⅓ H. P. Ball bearing—packed and sealed. Adjustable tool rests. Rating 3450 R. P. M. One fine—one coarse grinding wheel.



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No. 2005-6". ⅓ H. P. ball bearing motor. Oil packed and sealed. Enclosed guards. Rated 3450 R. P. M.



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No. 2069—¼ H. P. Ball bearing, permanently lubricated. Adjustable tool rests. Rating 3450 R. P. M.

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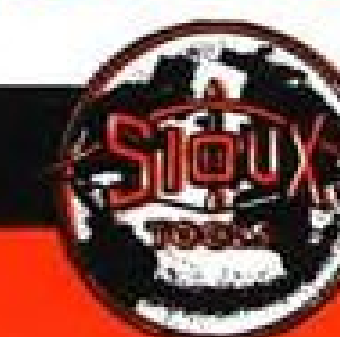
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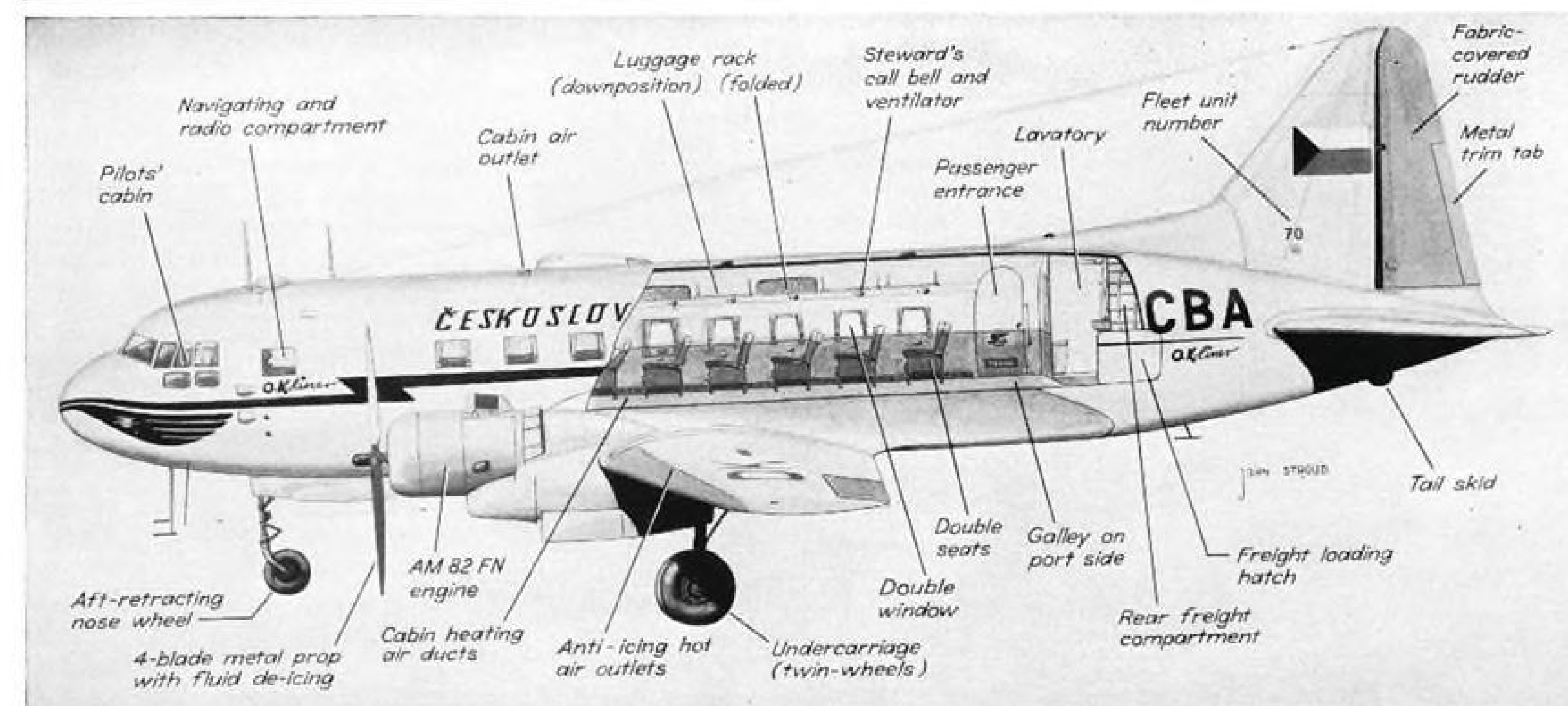


Vickers Model MF-3918 Series
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Vickers Model MF-3909 Series
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AERONAUTICAL ENGINEERING



First Details on Russian-Built Transport

Czech-operated plane on service to London shows performance and design comparable to western craft.

(McGraw-Hill World News)

London—The almost complete covering of secrecy surrounding all Soviet civil and military aviation has obscured largely the fact that the U.S.S.R. has in service a transport, which in numbers, make it come within the small list of the world's most widely used airliners. This is the twin-engine, 27-32 passenger IL 12.

It appears that there are in service about 200 of these craft—about 50 percent more than the number of Convair-Liners in service or about 20 percent of the Douglas DC-3s now employed on scheduled airlines outside the U.S.S.R.

►Basis of Estimate—This figure of 200 IL 12s has been determined after a careful survey of Soviet airline timetables, from which it seems that from 120 to 150 of these aircraft are in daily service.

Many Soviet air services depart early in the morning and, since these early departures reduce night hours available for maintenance, it seems reasonable to suppose that to keep 120 to 150 planes flying, approximately 200 of this type are on the roster of Aeroflot, the Soviet airline.

Additional support for this figure is less reliable but may well be fairly near the truth. This is the actual civil

registration of the IL 12s. Each Soviet civil plane bears as its international lettering the letters SSSR which in Russian characters look to us like CCCP. Airliners in the DC-3 and IL 12 class have also the letter L followed by a number.

Earliest number allocated to an IL 12, for which there is photographic evidence, is 1302. Numerous other numbers in the 1300 series have been seen, while the highest number observed near this batch is 1403. This suggests, although it cannot be proved, that an initial production batch of something over 100 craft was constructed.

In 1948, about two years after the IL 12 first appeared, one of these planes was exhibited in various European capitals, including Helsinki and Prague, and this was number 1701. No registrations between 1403 and 1701 have been reported, but a number 1721 has been seen and, more recently, number 1834.

This suggests that a second batch of aircraft has been produced starting at 1701, and it may be that the first batch began at 1301. Assuming that both groups were of the same or similar size, this confirms the figure of something over 200 gathered from timetable study.

►Line Use—In addition to the IL 12s operated by Aeroflot, 2 IL 12s are in service with the Czechoslovakian Airline

CSA and 8 more are on order for that company. Polskie Linie Lotnicze, the Polish airline has just placed an unspecified number of this type in service. It is reported that TARS, Rumanian-Soviet airline, has 3 IL 12s on order, and it is known that the Red Air Force has adopted this type as its standard parachute troop and military glider-towing aircraft.

In the last two years, Aeroflot has steadily replaced the LI 2s (Soviet name for the DC-3) with IL 12s on Soviet domestic routes. It is reported that on the Moscow-Leningrad-Helsinki twice weekly run, the IL 12 had only been used about four or five times recently.

Probable reason for this scarcity of the IL 12 on this international route came to light when one of the two Czech operated aircraft came to London's Northolt Airport. At one time this craft had carried a Soviet civil registration where it later had its Czech lettering, and it also had a major modification to its vertical stabilizing fin, which had been increased in area by addition of a spine fin similar to, but larger than, that on the DC-3.

Shortly after this, IL 12s were put into regular service on the Moscow-Helsinki and other Soviet international routes, but they, too, had the extra fin area.

It seems likely that one or a series of unpleasant experiences or even accidents caused by an engine failure at takeoff had forced the Russians to with-

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IL 12 uses four-bladed props, has excellent visibility downward from cockpit.

draw the IL 12 for modifications, with the result either that the internationally operated aircraft were needed for the domestic routes, for the Soviet international services have very light loads anyway, or that the Russians did not want to risk an accident on an international route, where it could not be hushed up. This presumably accounted for the absence of the IL 12s on the Helsinki route.

► **Makeup Details**—Designed by a staff under Sergei Ilyushin, the IL 12 first flew in 1946 and went into service late in '47 or early '48. It is an orthodox all-metal, low-wing cantilever monoplane with fully retractable nose wheel and single fin and rudder.

Passenger cabin is spacious and is entered by a door at the rear end on the starboard side—standard Soviet practice. The prototype had accommodation for 27 passengers, with seats arranged in pairs on the port side and singly on the starboard side. In this craft, rigid luggage racks ran the full length of the cabin on either side above the seats.

It is not known how the interior of the production Aeroflot aircraft has been arranged but it is believed to be similar to the layout of the Czech-operated craft, which normally accommodate 28 in seats arranged in pairs on either side of a central aisle.

In this layout the front wall of the cabin, which forms the bulkhead between the passenger cabin and the front freight compartment, can be moved forward, allowing an eighth row of seats to be fitted. Permanent chair fittings are installed for these extra seats, bringing the accommodation up to total of 32 seats.

Seats are comfortable, adjustable type chairs with armrests on the aisle and cabin wall sides and with center armrests on all except the rear eight seats, where they were omitted to retain the same seat and aisle width despite narrowing of the fuselage.

► **Racks**—There is a large rectangular

double-glazed window beside each pair of seats including the extra forward seats. Light yellow curtains of a silky material are fitted to each window. Above each window is an individual ventilator and steward's call bell. Below each window is an ash tray.

Fitted to the cabin walls above each pair of seats is an upward folding luggage rack. There is no tendency for even light articles to vibrate or roll off these racks even during takeoff. The racks are light enough to rise up should a passenger accidentally stand up beneath one, thus reducing or eliminating possibility of injury.

Emergency exists, similar to those in the DC-3, are provided on each side of the cabin.

Cabin heating is by hot air fed through ducts at the base of the walls. Air is withdrawn through three ventilators in the cabin roof. Lights are spaced out along the centerline of the roof. The seat-belt and no-smoking notice is in English, French, Czech and Russian.

► **Lavatory, Freight**—Aft of the cabin on the starboard side is a well equipped lavatory compartment, with wash basin and mirror. In addition to electric lighting, there is a ceiling window.

Situated beside and behind the lavatory is a freight compartment. This has a small loading hatch in the port side of the fuselage and a door connecting it with the passenger cabin.

On the rear port side of the cabin opposite the entrance door is a small, but adequate, galley.

► **Pilots Cabin**—Forward of the main cabin is a fairly large freight compartment loaded through the underbelly. In the Czech aircraft, the starboard side of this compartment had been fitted to take hats and coats.

In front of this section is the crew compartment, very roomy and well laid out. Behind each pilot is a semi-bulkhead which makes a separated radio compartment (starboard) and navigating compartment (port). Behind and be-

tween pilots is a jump seat for a flight engineer. Radio equipment is comprehensive and includes two-way VHF.

► **Vision**—Each pilot has a full set of flying controls and basic flying instruments, while first pilot has a blind flying panel. Engine and prop controls are mounted between pilots and engine instruments are centrally placed on the instrument panel.

Most of the instruments are of Russian manufacture and, like the rest of the plane, are of good quality. Cockpit of the IL 12 probably offers its crew better visibility than almost any other transport now in service, excepting the Strato-cruiser. Rear vision is good and extra windows at the side of the cockpit provide unusually good downward scanning.

In size, weight and performance, the IL 12 is comparable with the British Vickers-Armstrongs Viking, while it is smaller and inferior in performance to the Convair-Liner.

► **Wing**—The cantilever wing is of thick section and has a change of profile about half way between nacelles and tips. The wing, like the tail unit, has an anti-icing hot air system. Slit-type air outlets are cut in the upper surface of the wing at about the point of maximum thickness.

Wings, as well as engine cowlings and fuselage nose, are flush riveted. Remainder of the fuselage and the engine nacelles are assembled with mushroom-head rivets.

Ailerons, flaps, elevators and rudder are all fabric-covered. Metal trim tabs are fitted to all control surfaces except the port aileron.

Landing gear has twin wheels on the main units, which retract forward into the nacelles. Nose wheel retracts aft into fuselage.

► **Flight**—A hop in the IL 12 demonstrated its good ground handling qualities, and takeoff time was under 20 sec. with 20 aboard. Fuel load was small, but there was no wind. Climb was steep. Pilot, Captain Koucky, demonstrated the extreme maneuverability of the craft, which is reasonably quiet. Vibration level is also reasonable. Approach with full flap is made at about 100 mph.—about 40 mph. less than the approach speed of the Viking.

Although this flight was of short duration the impression was that the Soviet Union has produced a good handling and useful transport.

► **Specifications**—Engines are two 14-cylinder twin-row ASH-82FN aircooled radials of 1650 rated hp. Large diameter, four-blade props have fluid de-icing.

Span is 104 ft.; length 69 ft., 11 in.; height 26½ ft. Weight empty is 24,470 lb.; weight loaded, 38,030 lb.

Economical cruising speed is 205-210

mph. at 9800 ft. at 1850 rpm. Maximum speed at 8200 ft. is approximately 252 mph.

Figures reported from Poland are of interest—takeoff run of 450-500 yards; landing run of 450 yards; single-engine ceiling 9800 ft.; range with full load 780 mi.; range with 50 percent load, 1865 mi.

► **Routes**—The IL 12 is known to be operating on these Aeroflot routes:—Moscow - Lwow - Budapest - Belgrade - Triana; Moscow - Kazan - Sverdlovsk - Omsk - Novo Sibirsk - Krasnoyarsk - Irkutsk - Ulan Ude - Ulan Bator; Moscow - Odessa - Bucharest - Sofia; Moscow - Minsk - Prague; and Moscow - Leningrad - Helsinki.

The craft is sharing the work on a large number of other routes with the LI 2 (Dakota). And the IL 12 is fast replacing the LI 2 on all the other main Soviet routes, except on the routes where the large four-engine IL 18 is used.

Polish Air Lines uses the IL 12 on its Warsaw-Brussels-Paris route, and the Czechoslovak Airlines uses it between Prague and Amsterdam, Prague and Bucharest, Prague and Paris.

New Instrument Aids Lubricant Research

An electron diffraction instrument, which has aided in the development of improved lubricants and catalysts by its ability to "see" film surfaces as thin as two millionths of an inch, has been developed by General Electric Co., Schenectady, N. Y.

The new device reportedly is the most sensitive instrument yet developed for observing chemical and physical changes in extremely thin films. It currently is being used by the California Research Corp., Richmond, Calif., to reveal quickly the crystalline surface condition of specimen materials under actual operating conditions.

Before development of this equipment, only means of studying very thin films was by X-ray diffraction or chemical analysis.

These analytical methods may show only one chemical composition, while electron diffraction photographs will reveal a very thin layer of another material.

According to California Research engineers, the new instrument permits a truer evaluation of surface-active materials, and may lead to discovery of new lubricants and additives. Another important advantage gained through use of the device is the speed with which analysis of surfaces and thin films can be made.




WHITTAKER EQUIPPED...

The U. S. Air Force welcomes the latest addition to the rapidly growing family of McDonnell aircraft. The XF-88 twin-jet fighter is a powerful thin wing craft of "swept back" design in the 700 miles-per-hour class. 100 tons of air are scooped through gently-curving wing ducts to each Westinghouse J-34 engine every hour. These powerful engines compress the air to white-hot temperatures and blister it out at a thunderous 1200 miles an hour. This requires dependable aircraft valves. The XF-88 is equipped with Whittaker sliding gate shut-off and hot air control valves. Their outstanding performance has made them the acknowledged standard in the aircraft industry. For complete engineering specifications and counsel, contact Wm. R. Whittaker Co., Ltd., 915 N. Citrus Ave., Los Angeles 38, Calif.




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Plastics Research Accelerated

Increasing aircraft performance brings new demands on characteristics for transparent enclosures.

The Air Force recognizes that improved vision is essential in aircraft design. So long as we have pilots in aircraft, the development of transparent materials for windows and canopies will be necessary to meet new requirements for vision and protection.

Progress in aircraft design has always resulted in the need for improved plastic materials. The cellulose esters (cellulose nitrate and cellulose acetate) were dominant until 1936, when acrylic plastics of high clarity and good weathering durability became available. In the years that followed, the development of this material has profoundly affected aircraft design. Evolution of the plastic nose of the B-50 from the early projecting wind deflector represents the transition from a minor attachment to a structural part. Today, therefore, transparent plastics are vital materials.

► **Characteristics Needed**—Principal requirements for transparent materials in air craft, in the order of their importance, are clarity, durability and formability. It is desirable, also, that the material have a low density.

To this list of stringent requirements there have been added recently additional ones created by the increasing altitude of military aircraft operation. For pressurized cockpits and cabins, shatter-resistance of the material becomes significant. Laminated plastics provide one answer to this problem.

► **Absorbing Plastics**—Spectral energy distribution of solar radiation is significantly changed by the absorption of the atmosphere. Ozone reduces the ultraviolet and certain visible radiation, while oxygen, water vapor and carbon dioxide change the spectral distribution in the infrared. At high altitude the effect of solar radiation on personnel must be considered.

Protection from ultraviolet radiation is vital on long missions and reduction in infrared energy would be welcomed as a substitute for refrigeration. Ultraviolet absorbing plastics have been available and the recent introduction of a new absorber indicates progress in the solution of this problem.

► **Heating**—Supersonic aircraft, on which the surfaces attain increased temperatures, must be glazed with transparent

materials of increased heat resistance. This problem of heat stability is considered to be most urgent.

Another requirement which becomes significant is the electrical conductivity of exterior surfaces. The accumulation of static electricity on surfaces which have no leakage path causes disruption of radio and radar contact.

Little significant progress has yet been made on this problem for transparent plastics, although related work is being sponsored by Navy Bureau of Ordnance.

Most plastics research and development is undertaken by industrial laboratories on their own. Other plastics work is done by academic groups and research institutes, with or without government sponsorship. It has, therefore, been deemed necessary for the Air Force to sponsor some work in the direction of a transparent material suitable for glazing supersonic aircraft.

► **Material Selection**—First decision with regard to such a project is whether the goal will be a thermoplastic or a thermosetting material.

If the heat resistant material is thermoplastic, fabrication may be accomplished by forming at temperatures above the expected service temperature.

If thermosetting materials are utilized, it will be necessary to fabricate double curvature parts, such as canopies, by casting in the final shape. Since the required molds are processes are not available, such a program would have to include their development. The Navy Bureau of Aeronautics is working on this approach to the problem.

Present Air Force effort is towards development of a suitable thermoplastic material. Certain models of the fastest experimental military aircraft have used glass, while others have used plastics. Actually, there has not been any plastic failure due to speed or to heat produced by speed.

Research has indicated that considering future aircraft speed, the aim should be temperatures of 350-400 F. in order to achieve them within several years. However, it has been decided to develop a material suitable for use at 250 F as an interim step in the program.

► **Contract Progress**—First contract has been awarded to the General Aniline & Film Corp., primarily for work on methyl alpha-chloroacrylate.

This material appears to offer definite advantages, over currently available materials, with respect to heat resistance. Compared to methyl methacrylate, the

index of refraction is 1.52 as against 1.49; density is 1.45 compared to 1.19; and heat distortion temperature is 250 F. compared to 200-210 F.

Contract work has progressed along two major phases—preparation of monomer and casting of sheet plastic. Six methods of preparation have been studied. Of these, it has been found that dehydrochlorination by means of methanol, by sodium acetate and by sodium lactate show most promise. Evaluation has been based on ultraviolet spectral absorption, visual color and heat distortion temperature.

The details of monomer preparation are considered very significant in the attainment of a stable, colorless product. Although high quality castings have been frequently obtained, complete control of some factors not yet isolated will be necessary to achieve a material of reproducible stability.

A more complete understanding of the chemistry of the plastic may result from studies in thermal decomposition now in progress. Results of these tests will also be significant in relation to high temperature fabrication.

Second phase of the project has been concerned with casting of the sheet plastic, without compromising its properties.

► **Evaluation Factors**—Relation of flexural deflection to temperature for certain transparent plastics indicates that above the 185-200 F. range for commercial acrylics there are perhaps three different experimental materials in the range 230-260 F. One of these is the project material, while the others are the result of independent industrial research.

When typical sheets of the project material are available for comprehensive tests, more will be known about the actual progress toward the goal of a heat-resistant and transparent thermoplastic.

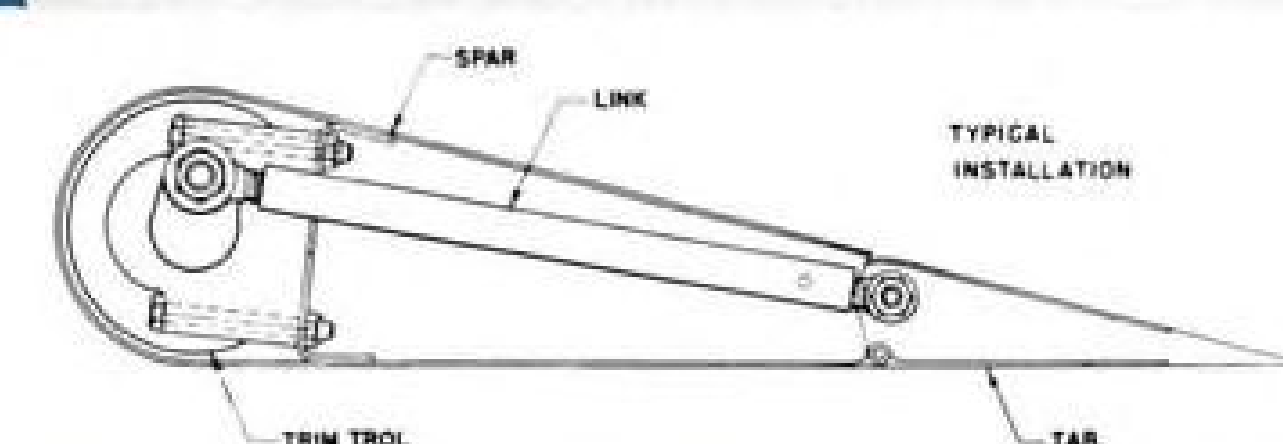
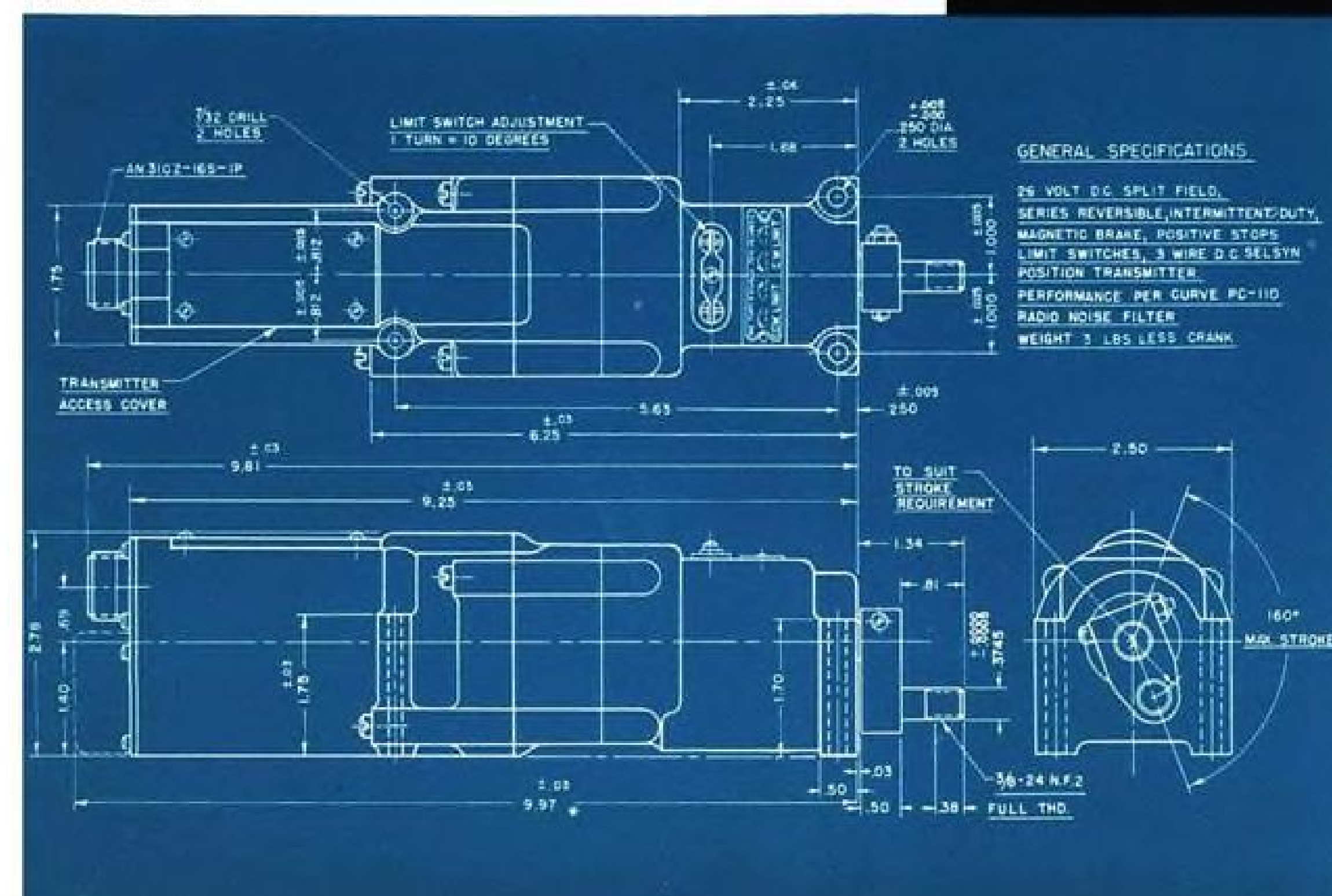
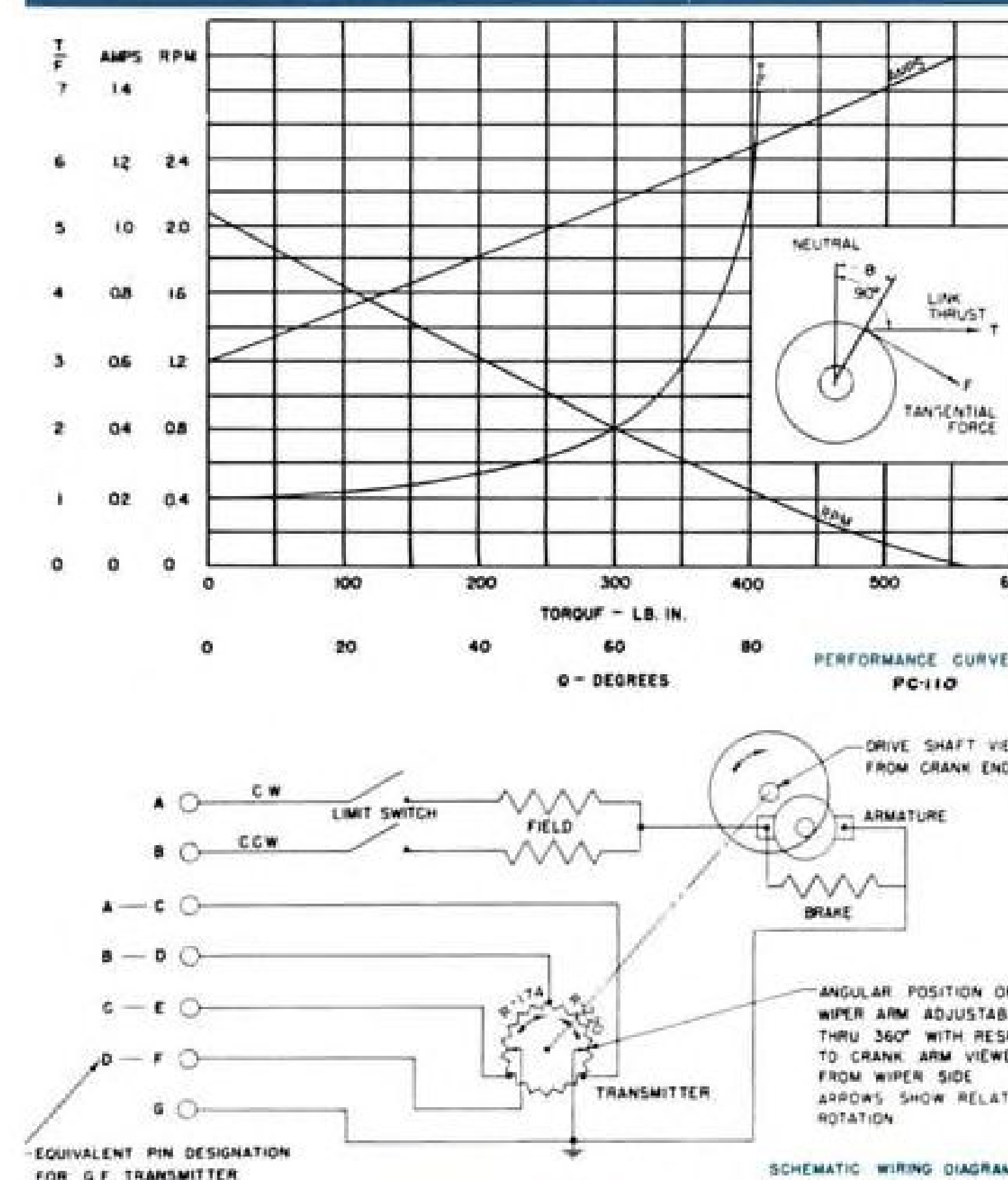
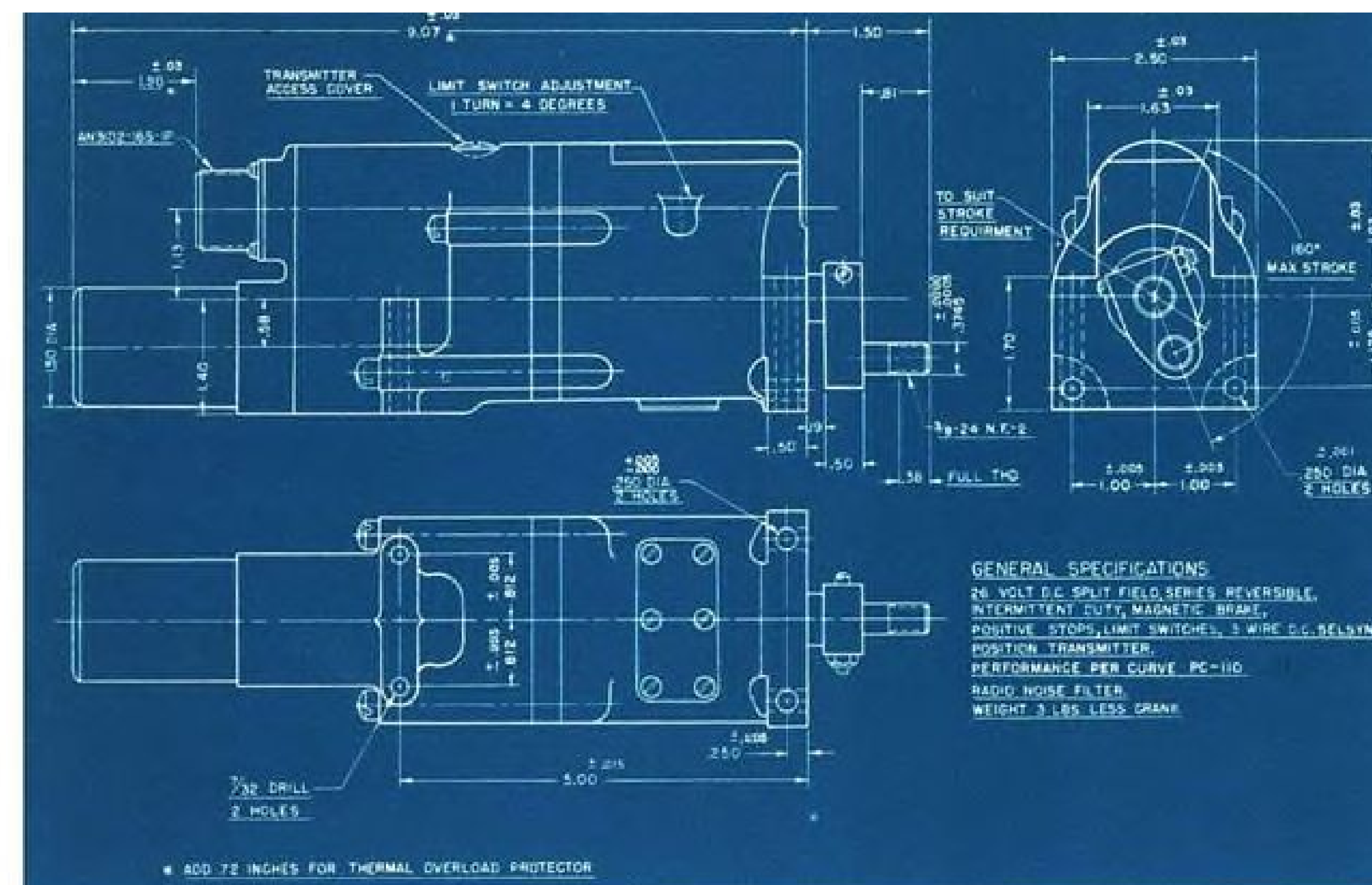
The development of a suitable specification method for evaluation of heat-resistance is a problem closely related to development of the material itself. The traditional heat distortion point, which reduces flexural deformation under certain time and temperature conditions to a single number on a temperature scale, is inadequate but is still widely used.

It has been proposed to supplement this point with short-time creep data for a given load at a fixed temperature specified in relation to the heat distortion point.

In the field of metals, stress-rupture tests have been used for the evaluation of materials which may deform but which must not rupture in relatively short-time service. For each temperature of interest a series of tests is made over a range of stresses selected to cause rup-

(Continued on page 31)

AVIATION WEEK, January 23, 1950



Trim Trol

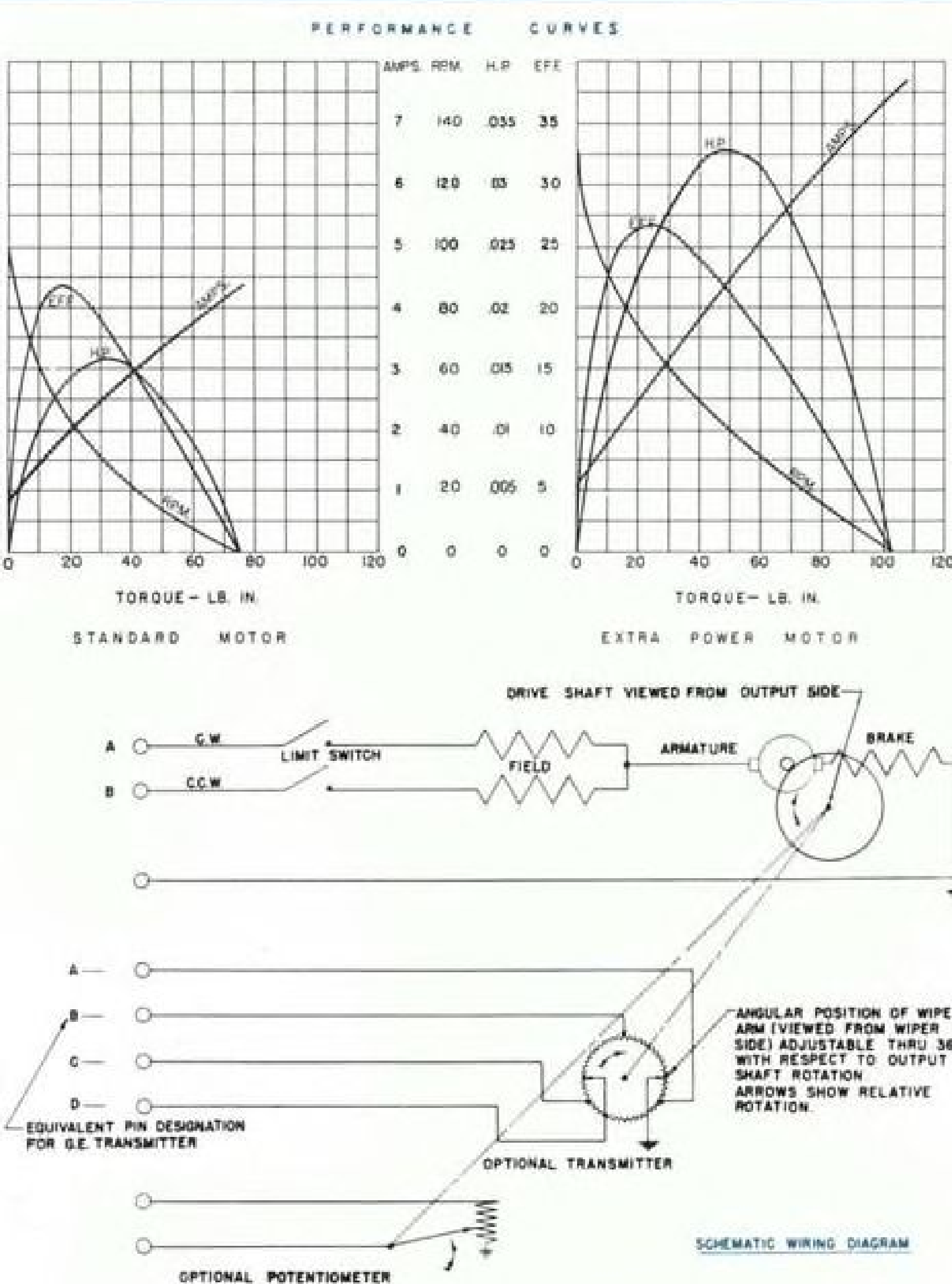
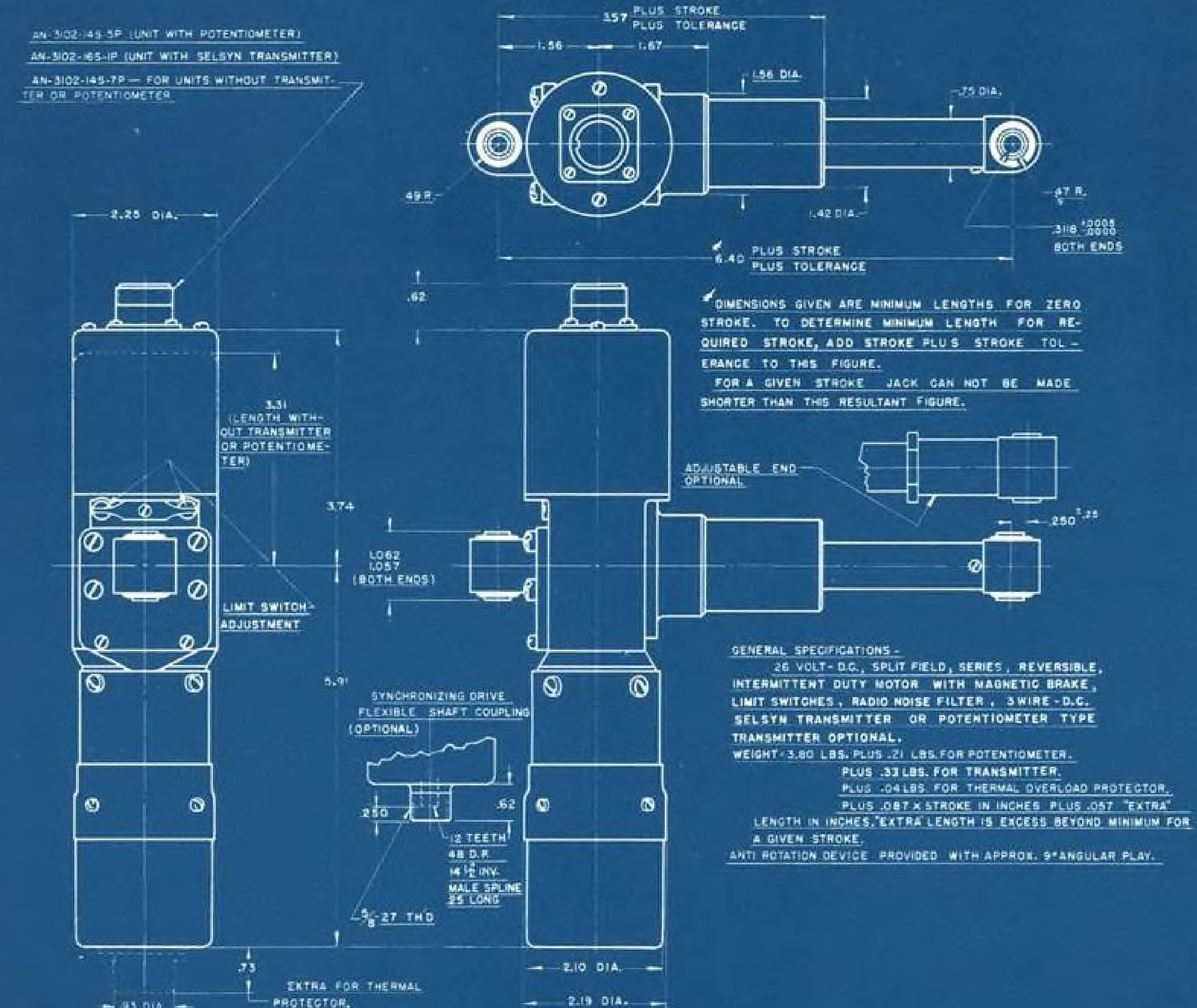
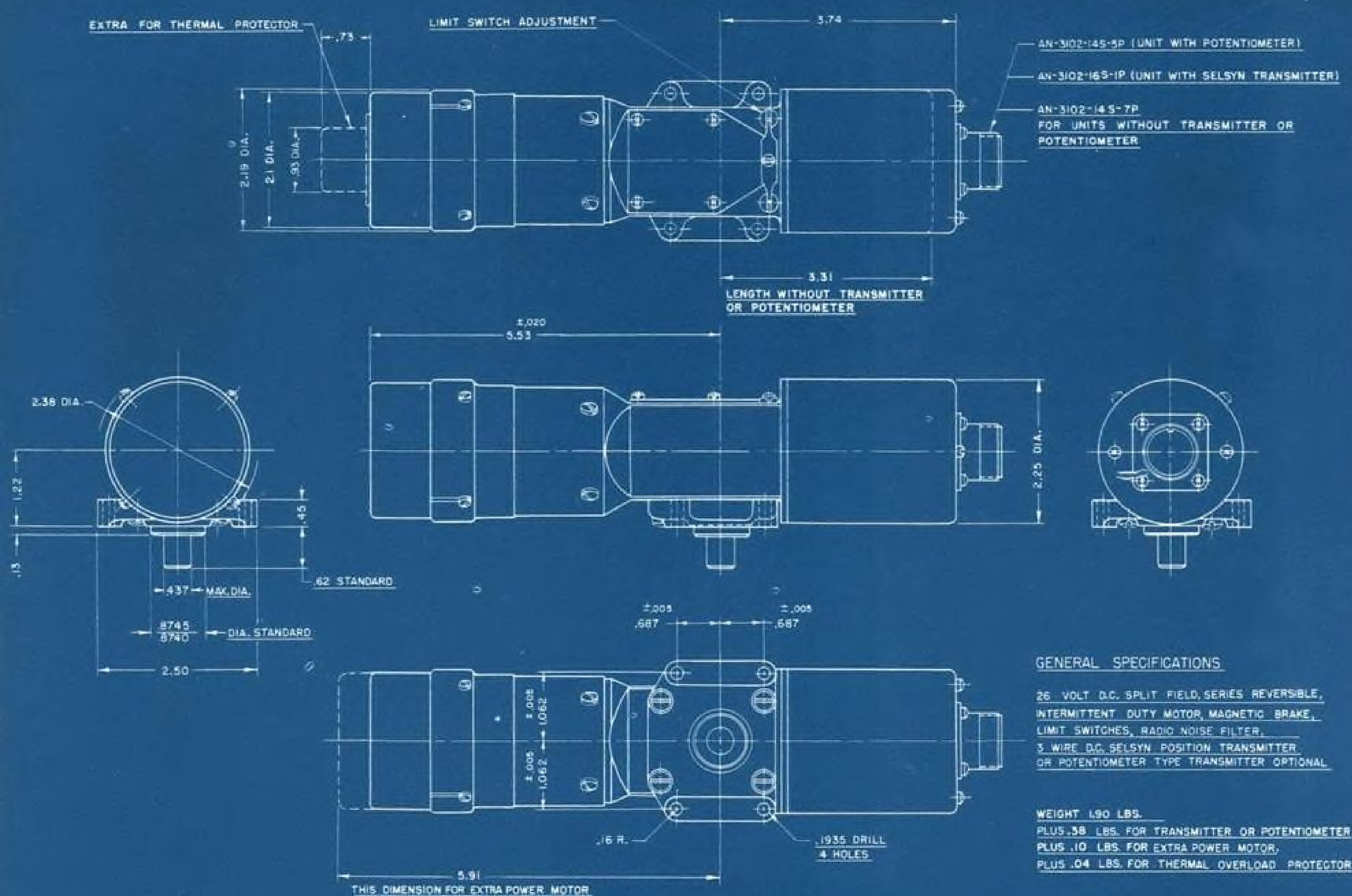
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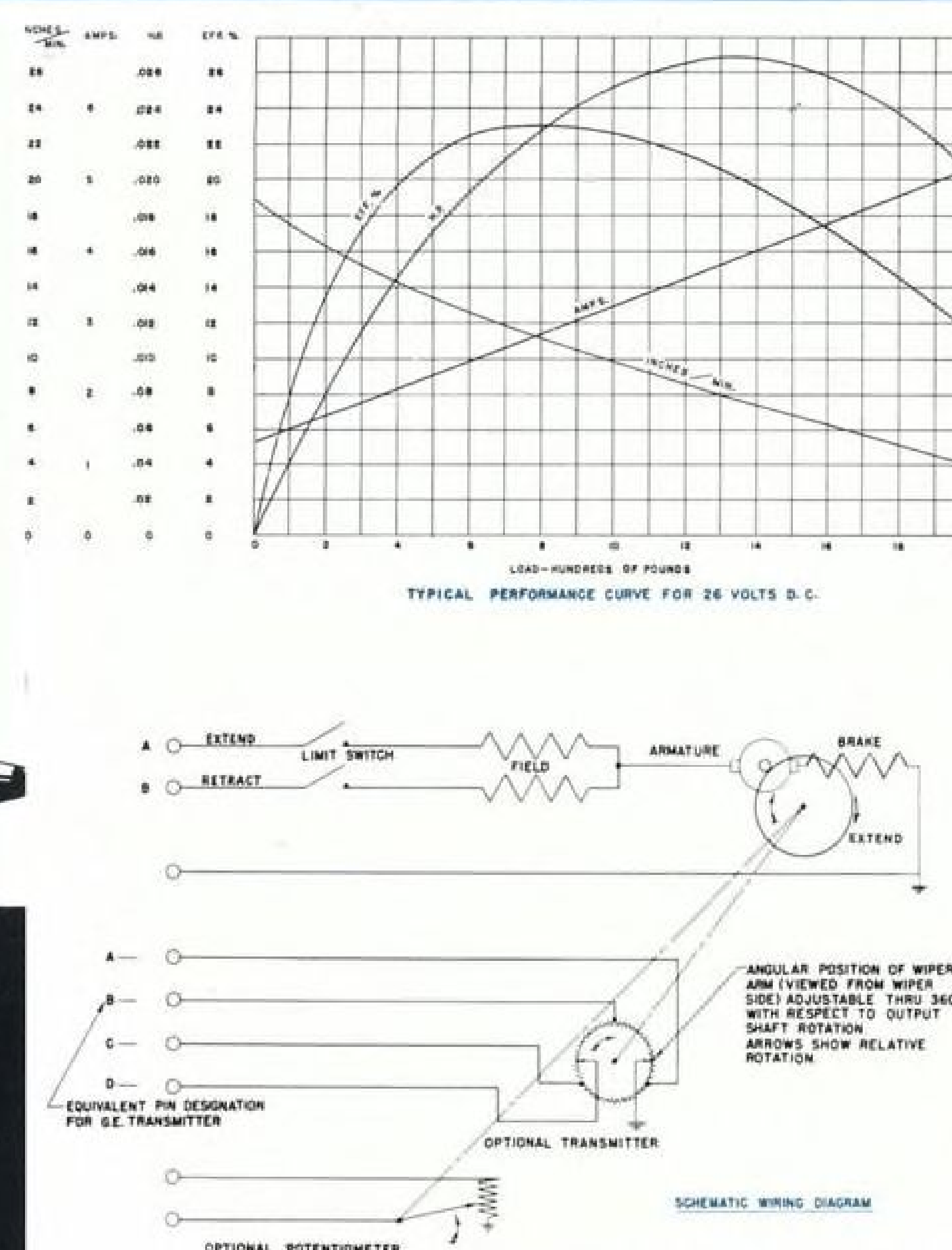
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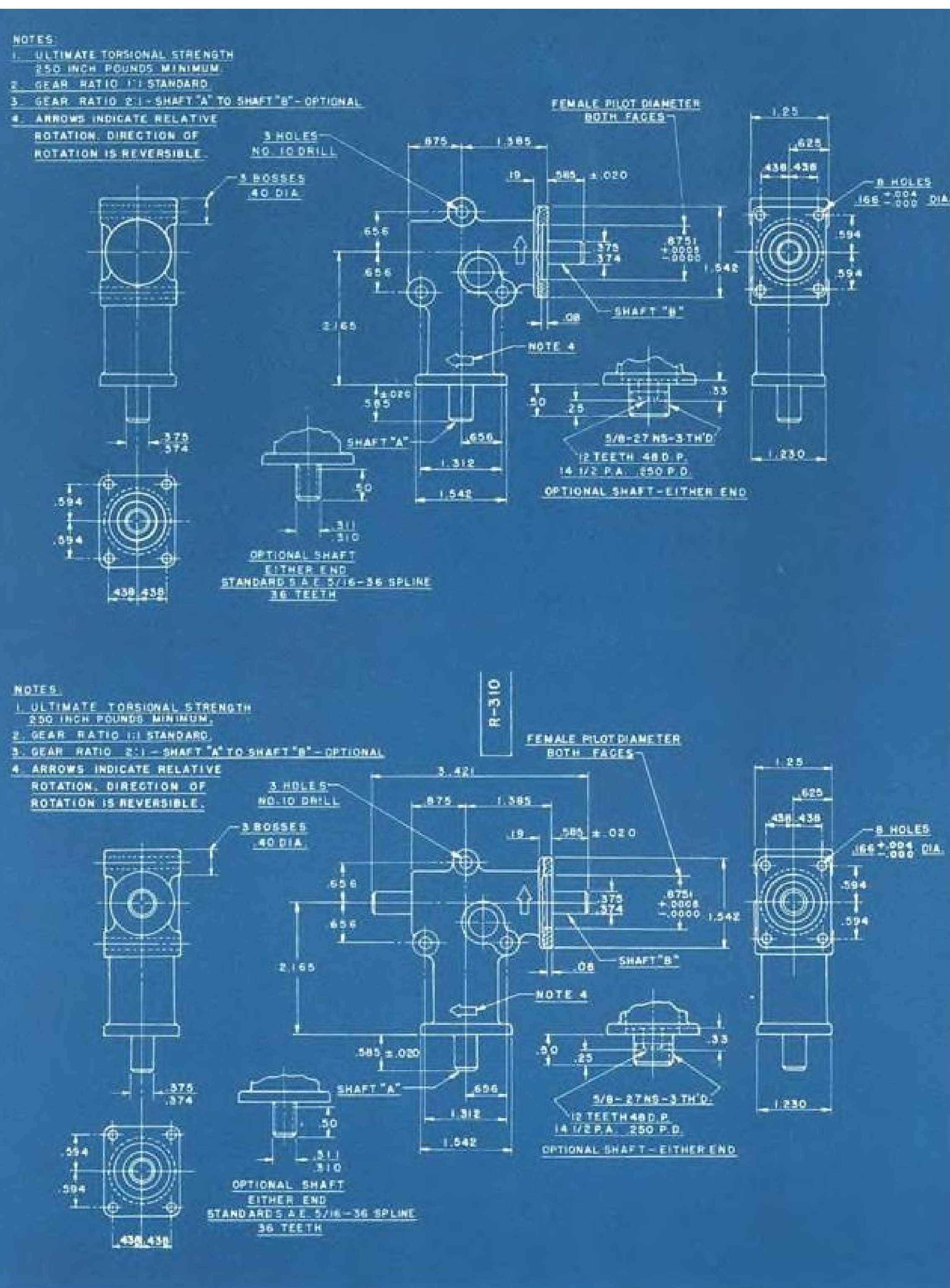
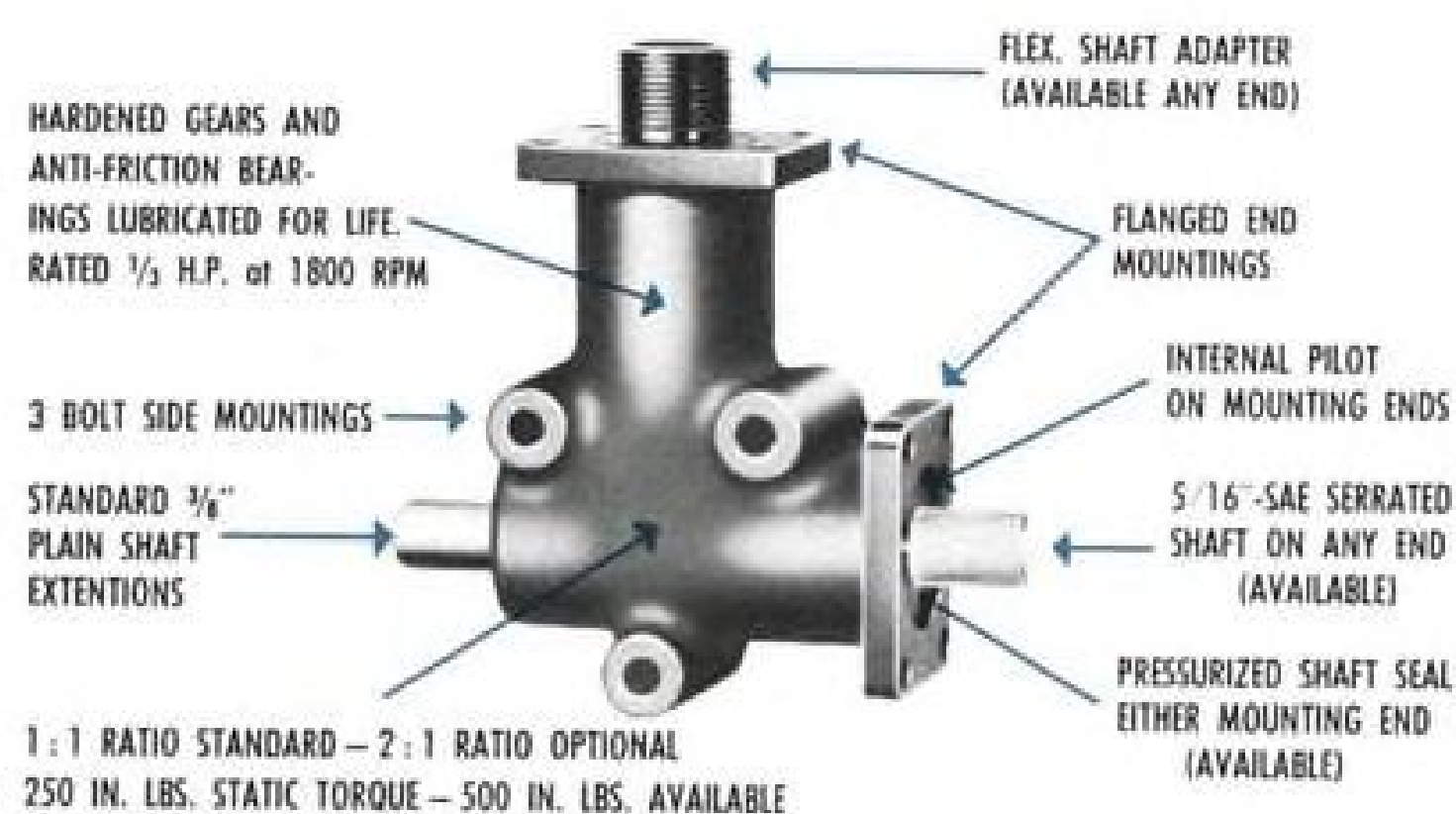
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Considering the Air Force as a customer, it is anticipated that the amount of heat-resistant plastic required will probably be small for some time. It is the existence of this commercial situation that has forced the Air Force to sponsor its own research and development program. Progress in these activities, however, will probably lead to further development in the entire field of transparent plastics.

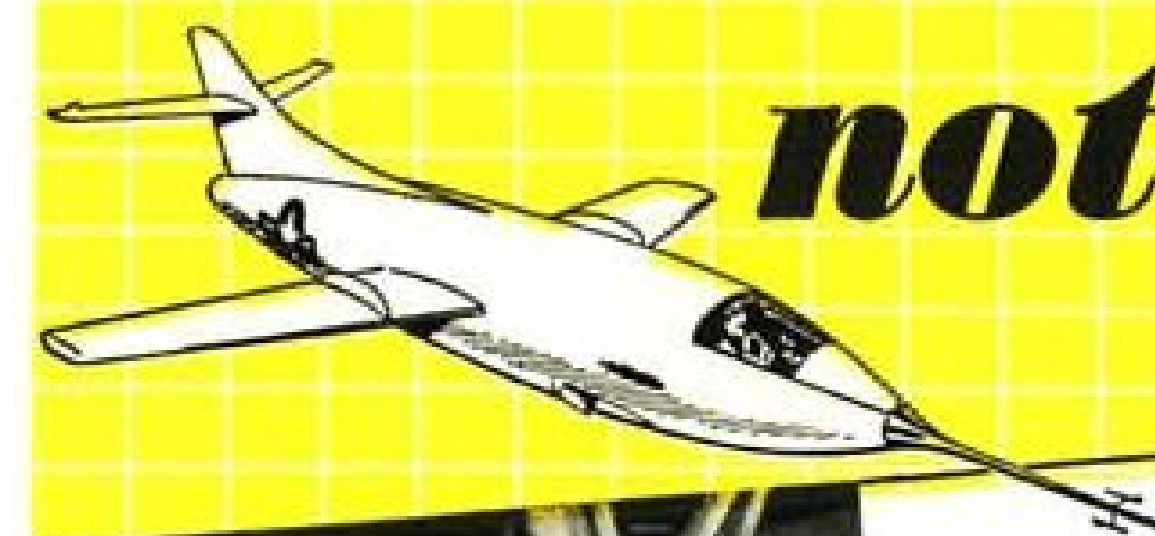
ENGINEERING FORUM

Divergence Data

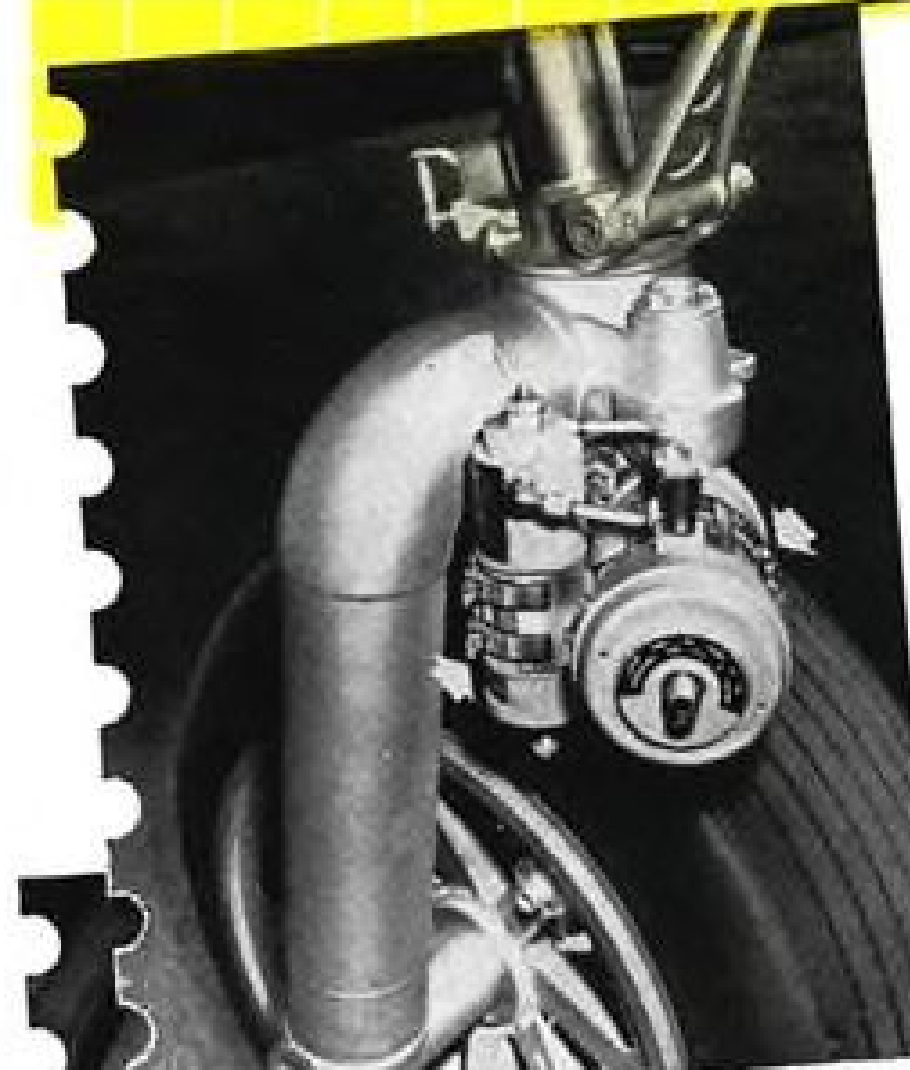
BEN SMILG,
Chief, Dynamics Branch,
Aircraft Laboratory,
Air Materiel Command,
Dayton, Ohio.

AVIATION WEEK, January 23, 1950

engineer's notebook



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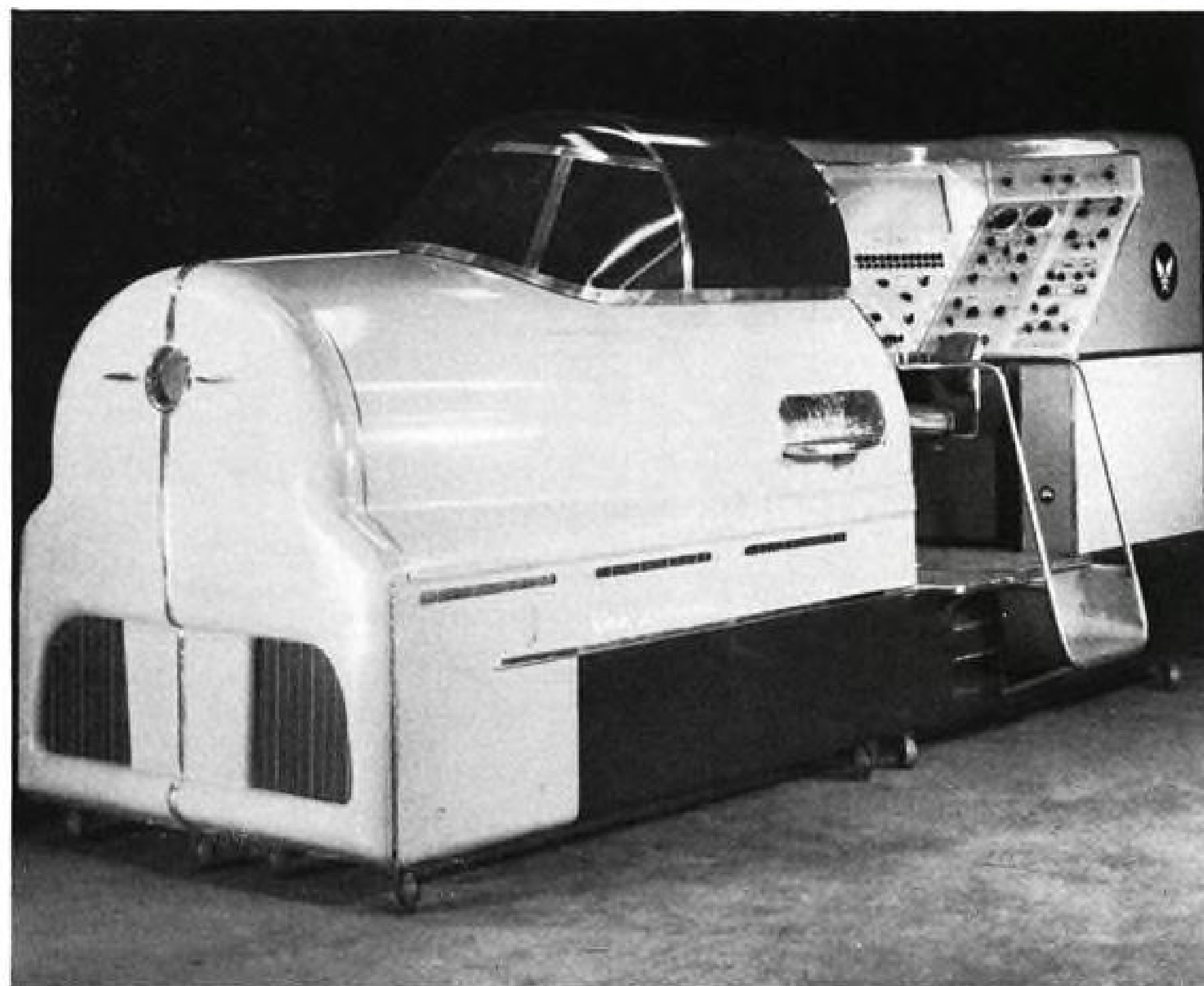


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AVIONICS



REALISTIC GROUND TRAINING offered by Linktronic includes instruction in jet plane instrument flying, aerobatics, engine operation and navigation. Trainer can be split into four sections for easy handling. Instructor's station is at rear.

Cheaper Way to Train Jet Pilots

First device for simulated jet flight cuts risks and costs through more practice on ground—less in air.

Development by Link Aviation, Inc., of the first electronic ground trainer for jet aircraft promises the Air Force faster, safer, cheaper jet pilot training.

The new "Linktronic," prototype of which has been accepted by USAF, also potentially is able to cut in half the number of flying hours required for annual flight checks of thousands of jet pilots.

Since the annual check-out for each pilot may require up to 12 flying hours—with jet fuel being burned fast—the possibility of saving as much as six hours on each of thousands of flights has interested AF training officers. And further, the new Link could be extremely effective in adding training time at low cost to Air Force Reserve units.

► **Cost**—In quantity production, it is estimated the Model C-11 jet trainer will cost somewhere between \$40-\$50,000—about one-fourth the price of a single T-33 jet training plane. The Air Force paid around \$100,000 for the prototype C-11.

Operating cost of the Linktronic, in-

cluding instructor pay, maintenance and overhead, is \$15 hourly. This compares to about \$500 required for an hour's flight instruction in a T-33 jet. "Fuel consumption" in the C-11 runs to the total of 5¢ an hour for 6-7 kva. of 220v. electric current.

The potential value of the C-11, perhaps, is best appreciated when it is measured by the past history of other synthetic training devices. In one year during the war, bomber trainers produced at a cost of \$2,500,000 are estimated to have saved the Air Force 119 lives and \$25,855,684. In a report issued by the AAF in 1946, it states that, "At least 524 lives, \$129,613,105 and 30,692,263 manhours were saved in one year through Army Air Forces' use of 11 synthetic training devices."

► **What It Does**—The C-11 not only is designed for thorough training in jet instrument flying, but is set up to teach students correct engine operation, cruise control, radio navigation with latest equipment, and how to deal accurately and swiftly with emergencies. Controls

and instruments in the device are identical to those in an actual fighter. The cockpit arrangement is said to be similar to that of the F-80.

According to Link, the C-11 is the first ground training device equipped to give complete pilot instruction in the use of VHF, omni-range and off-set computers, now coming into use under the Air Navigation Development Board Interim Facilities Program.

► **How It Works**—Like the Dehmel and other such types of simulators, the heart of the C-11 is an electronic computing system designed around a series of aerodynamic equations which express all essentials of jet flight. Computers instantly react to all student manipulations of the trainer, solve equations covering these actions and, through servo units, cause instruments and controls to register results of these actions exactly as they would in flight.

These are presented to the student as changing instrument indications—even including engine temperature—radio signals and control pressures. Rates of roll, climb and acceleration are faithfully duplicated and controls are loaded so that pressures vary with airspeed.

Added realism is achieved by providing effects of wind, rough air, thunderstorms and lightning. Also, through the use of light intensity controls, flight conditions may be varied from a thin overcast to night instrument conditions.

► **Instructor's Post**—An important and integral part of the Linktronic is a check pilot station behind the cockpit. Here, the instructor can watch the student's progress and advise by intercom on mistakes in all phases of operation. This is made possible by tell-tale lights and duplicate instruments.

By means of trouble switches, the instructor can simulate emergencies in flight to test the trainee's reactions and build up his ability to cope with the unexpected during flight.

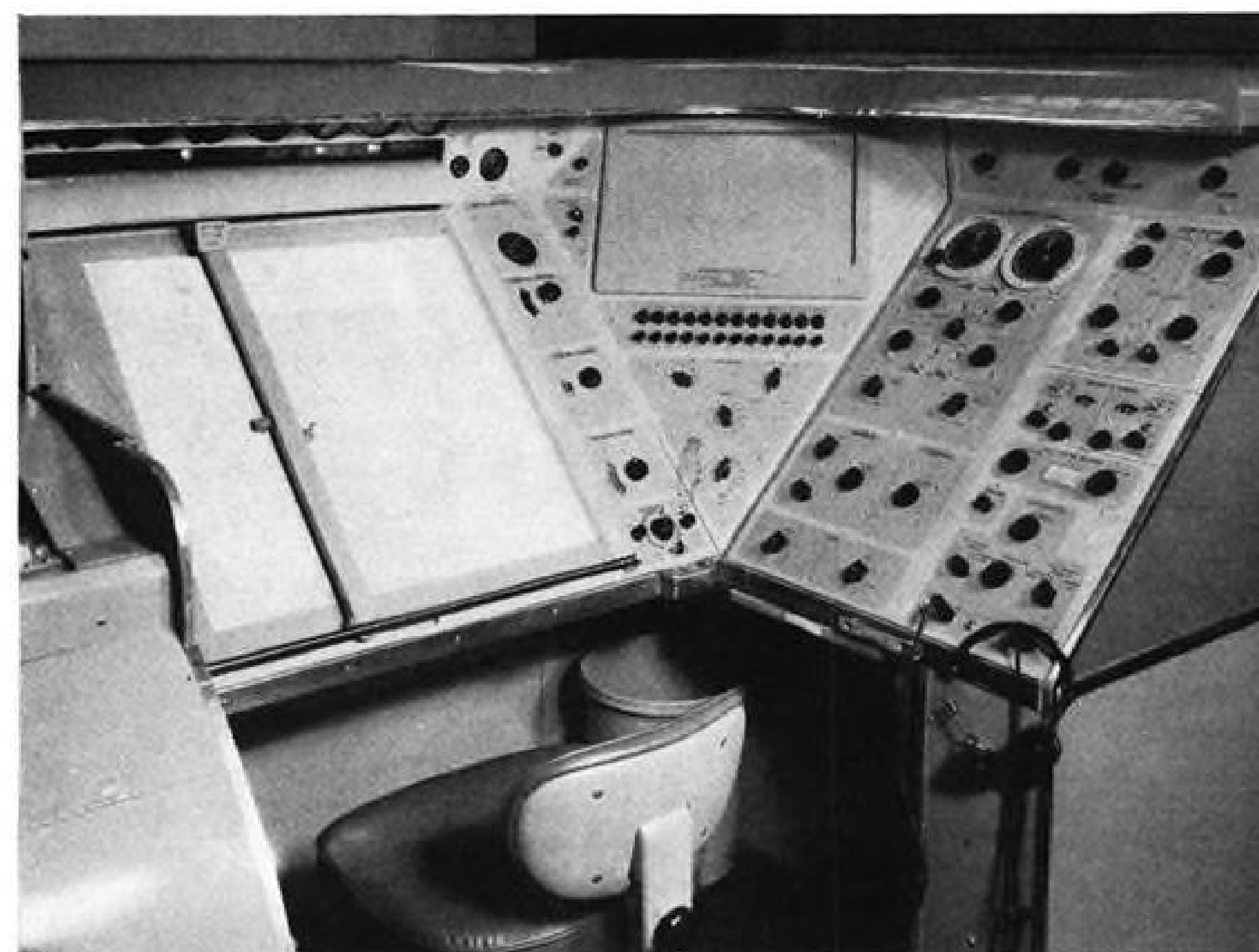
Besides teaching transition pilots how to handle jets, the C-11 offers a superior means of maintaining and even increasing proficiency of experienced jet pilots—at lower cost. While this machine can only supplement actual flight training, it does permit more thorough instruction in some phases of jet operation than can be attained in flight.

► **Just Like Flight**—To operate the new Link successfully, the pilot must adhere as rigidly—from takeoff to landing—to correct flight procedures and performance limits as he would when flying the real thing. Every movement of the controls is monitored by an electronic watchdog which transmits errors to the instructor's light panel. Red lights indicate mistakes in technique, amber the result of an error, and blue lights show the operating condition of the aircraft.

For example, the student starts the



STUDENT "flies" with this full array of jet fighter instruments and controls. Connected to electronic-servo system they react precisely as in real flight, while . . .



INSTRUCTOR, at this rear station, follows student's progress with duplicate set of instruments and lights showing errors. He adds troubles with emergency switches.

engine, but releases the starter button before the engine reaches 17 percent rpm. Immediately, the red "starter off" light flashes, the "engine off" light flashes in blue, and unless he makes a quick correction, the amber "engine disabled" signal also will appear.

There are 23 lights mounted on the instructor's console. They indicate such conditions as: hot tailpipe, amount of fuel, incorrect throttle setting, 20,000 ft. above 300 mph., rapid throttle flame-out, tanks jettisoned, dive flaps extended, pitot heat-on, aircraft disabled,

exceeding Mach number, exceeding $\pm G$, elevator tab neutral, incorrect engine stopping, and idle speed flameout. ► **Overrides**—If the student exceeds G forces or Mach number, he goes into an uncontrollable spin which ends loudly with the blast of a warning horn as he crashes into the ground. To get the de-ranked and shaken electronic system back into shape, the instructor simply flips an "engine-aircraft reset" switch on the emergency control panel.

When the student becomes hopelessly tangled in a flight problem, the instruc-

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CONSOLIDATED B-36, XB-46

LOCKHEED F-80

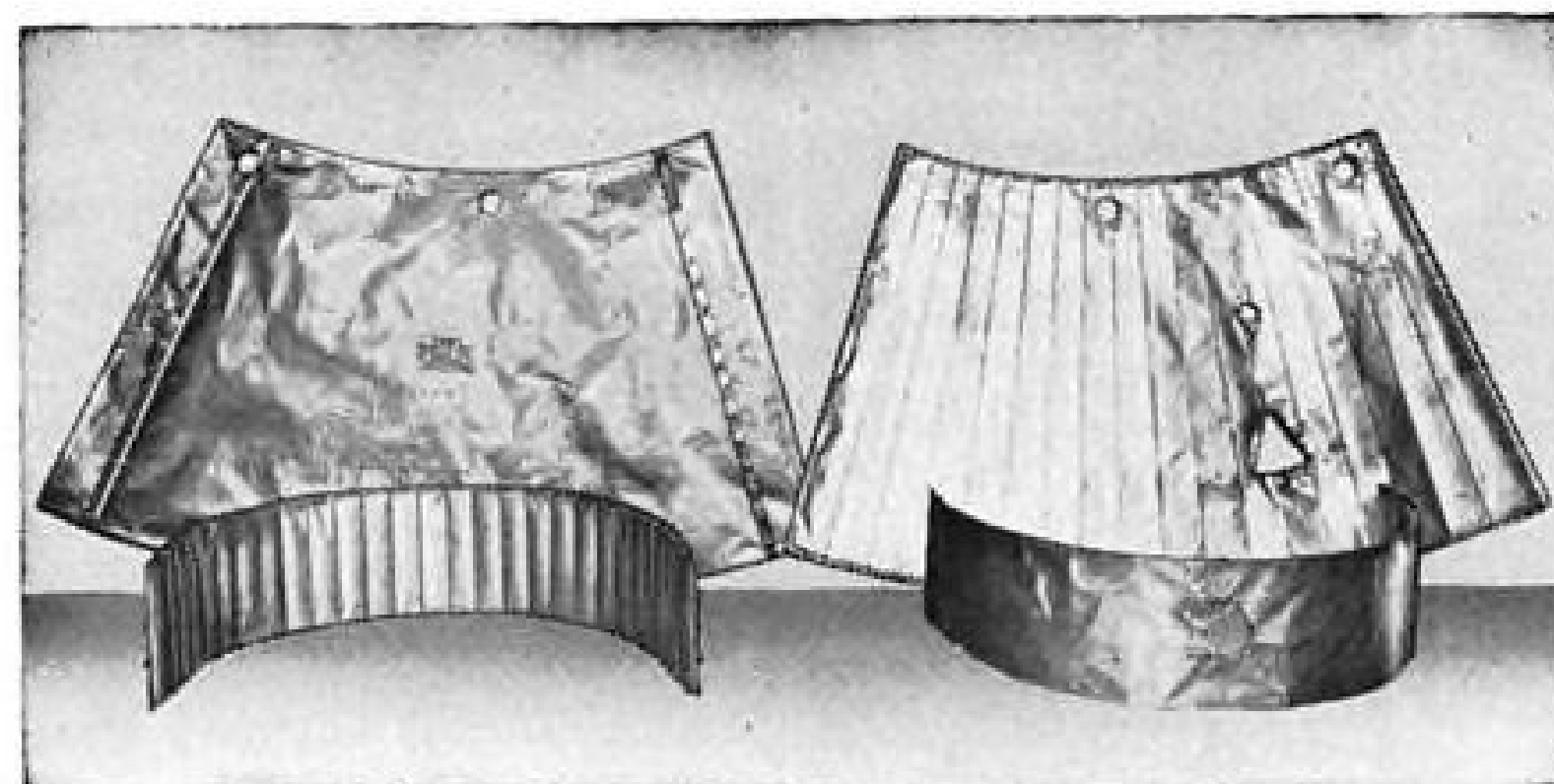
MARTIN XB-48

McDONNELL XF-85

NORTH AMERICAN F-86, B-45

NORTHROP YB-49

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tor can give him a fresh start by using the "pilot failure override" switch. This switch also permits the pilot to skip starting procedures. He has only to push the throttle to obtain thrust.

The trainer is designed for speeds up to Mach .8 and can simulate 360 deg. aerobatics about three axes. Wind velocities up to 120 mph.—double the maximum available in previous Links—can be introduced into flight problems.

► **Making Trouble**—An important feature of the Linktronic is the 12 emergency (bug) switches controlled by the instructor. These permit the instructor to feed to the trainer such simulated troubles as: engine failure, engine fire, engine overspeed, fuel pump failure, low fuel pressure, hydraulic system failure, hot tailpipe, fuselage tank puncture, pitot and wing ice, and lightning.

► **Navigation**—Navigational facilities in the cockpit include a radio magnetic indicator, distance measuring equipment, an ID-249 cross-pointer indicator and an arbitrary course computer. These enable the pilot to determine his position and course through visual reference to instruments rather than through aural signals as is the case with older, low frequency equipment. Low frequency controls are provided, however, for radio compass and aural null procedures.

The instructor's console has two station locators with all controls necessary for setting in type of station, frequency, call letters, maximum range and approach bearing. By resetting Station No. 1 as Station No. 3 as soon as the pilot has turned to Station No. 2, the instructor can simulate an infinite number of radio stations and make possible simulated cross country flights of more than 1000 mi.

A constant record of the pilot's flight path is maintained by a new type of automatic recorder, also located at the check pilot's station. This traces a true ground path on a real 22 sq. in. radio direction finding chart. The instructor can give ILS or GCA letdown practice

► **The "Brain"**—The electronic system, which translates every act, or failure to act, on the part of the pilot into instrument and control responses, consists primarily of 24 computers housed in very accessible cabinets and draw-out type panels at the back-end and base of the trainer. Each chassis unit can be completely removed for maintenance by hand-release fasteners and quick-disconnect plugs. In all, this system has 242 tubes and over 8 miles of wire.

One advantage of the C11 is that it can be split rapidly into four sections small enough to pass through a 3 ft. 6 in. door. Sections are mounted on casters wheels. As a unit, the C-11 is 14 ft. long, weighs 3750 lb. and occupies less than 100 sq. ft. of floor space.

FINANCIAL

Market Action

(Listed Airline Common Stocks)

Carrier	1945-46 High	Dec. 31, 1948 Close	Dec. 31, 1949 Close	% Gain 1949-1948
Alaska	—	4 $\frac{1}{2}$	4 $\frac{1}{2}$	-11
American	19	7	9 $\frac{5}{8}$	41
Braniff	37	6 $\frac{1}{2}$	8	17
Capital	49	5 $\frac{5}{8}$	8 $\frac{1}{2}$	45
Chic. & Southern*....	36	5 $\frac{1}{2}$	7	33
Colonial	45	5 $\frac{5}{8}$	4 $\frac{1}{2}$	-27
Eastern	33	16 $\frac{1}{2}$	14 $\frac{3}{4}$	-11
National	41	5	7 $\frac{3}{8}$	47
Northeast	25	2 $\frac{1}{2}$	2 $\frac{3}{4}$	34
Northwest	63	9 $\frac{1}{2}$	11 $\frac{1}{2}$	24
Pan American	29	8 $\frac{3}{8}$	9 $\frac{1}{8}$	9
TWA	79	11 $\frac{1}{2}$	17	62
United	62	10 $\frac{5}{8}$	13 $\frac{5}{8}$	25
Western	40	6	8	33

* Voting trust certificates.

Airline Shares Stage Comeback

Increased traffic and more mail pay strengthen most carrier's equities. Small minority shows declines.

Airline equities, reflecting improved earnings and a more favorable outlook, finished 1949 at virtually new highs for the year. This market enthusiasm for airline shares also spilled over into the earlier weeks of 1950.

The completion of a calendar year is generally seized upon as a benchmark in evaluating progress of the past period. It would be far more proper to measure results of any given cycle in terms of time paced off between significant events without regard to the usual inventory-taking at year-ends. In this instance, an unusual coincidence is present in that airline shares, as a whole, started the year at virtually their lows and completed the year at their peaks.

► **Mixed Feelings**—Airline stocks retain strong growth characteristics in the minds of speculators and investors alike and for that reason continue to possess glamor in market considerations. Further, the group has been so severely deflated from its 1945-46 price peaks, that there are always hopefuls who expect a recovery back to the old highs. On the other hand, there have been so many false starts or lack of follow-through in the past on airline shares, that a great deal of skepticism has also been developed.

In the final analysis it is earning power or the hope of earnings which influence the course and level of market quotations. The market place is an arena where informed opinion backs its conclusions with cash. In effect, this makes the trend of stock prices nothing more than a barometer of coming events.

Actual earnings reports sparked the course of market prices for individual issues throughout the year. Improving profits generated by increasing traffic gains together with more mail pay converted many previous red-ink results to black. As a splendid safety record was marred by unfortunate crashes and some confusion resulted from the possible overcompetitive possibilities of air coach services, airline equities backed up slightly as the industry entered the final stretch of 1949.

The expectation that business was going to improve further, aided by repeal of the transportation taxes, helped boom airline shares into 1950.

► **Ups and Downs**—Despite the vigorous recovery by the industry last year, lack of uniformity and the presence of strong individualistic traits are very pronounced in the group's market movements. Of the 14 issues shown in the accompanying table, 11 show gains reaching as

high as 62 percent in one instance while among the 3 equities showing declines, a decrease of 27 percent is indicated in one case.

TWA, with the maximum price appreciation for 1949, merely reflects its startling recovery in earnings together with its advantageous position in benefiting from the anticipated peak travel to Rome this year as a result of Holy Year.

National, showing a market appreciation of some 47 percent during 1949, reflects relief from unduly depressed conditions as well as from improving operations. Late in 1948 National was still being plagued by its pilots' strike and CAB dismemberment proceedings. Settlement of the labor controversy and the proposed interchange deal with Pan American Airways have revived the company's outlook.

Capital's sharp recovery of some 45 percent in the market price of its common stock equity bears testimony to the transformation of this property into a profitable airline. A genuine recovery in operations, largely as a result of its own pioneering together with a retroactive mail pay award, rehabilitated the company's finances so that a complete recapitalization of its debt structure was greatly facilitated.

Colonial Airlines shows a price deflation of about 27 percent at the year-end. The carrier's difficulties in having Canadian competition parallel its route from Montreal to New York is believed largely responsible for this market action.

► **EAL Decline**—A surprise of the year is found in Eastern's common stock declining 11 percent during the year. Much of this decline can be attributed to the apprehension among investors as to the possible intensification of competition stemming from the proposed interchange deals between National and Pan American.

Lack of uniformity among the price movements of airline equities affords outstanding opportunities for selective shifts. In retrospect, an investor would have profited handsomely by switching from Colonial into Capital at the same price level.

Rarely has the same selective pattern of the past been repeated in the future. Separate events influence individual price movements along with the broad industry trend. Nor is it wise to anticipate that the olympian price levels established during 1945 and 1946 will soon be recovered.

For the ultimate course of air carrier stock price movements, continuing appraisals of airline earnings must be maintained. It is in such tangible performance that substance can be built to support market quotations with any degree of confidence.

—Selig Altschul

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SOUTHWEST AIRWAYS USES DEPENDABLE CHAMPIONS IN WINNING TWO CONSECUTIVE NATIONAL SAFETY COUNCIL AWARDS

From its first take-off in December, 1946 to the present, with about 60 million passenger miles behind it, Southwest Airways hasn't had an accident. Under normal circumstances that would be record enough; being a feeder line stopping at 33 cities and towns averaging 45 miles apart from Medford, Oregon to Los Angeles, it is a truly outstanding achievement! The National Safety Council gave Southwest its last two Aviation Awards.

Southwest is famous for the short time

it spends on the ground between landings and take-offs . . . they average about six minutes, sometimes stop-start in one minute flat! The extraordinary strain on spark plugs from frequent use of full-throttle and unusual taxiing and engine idling is readily apparent. Southwest, however, like most airlines, uses Champion Spark Plugs and reports them completely dependable. Their fine record bears out this statement.

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AIR FORCE CONTRACTS

Awards of Less Than \$100,000

Following contracts for less than \$100,000 were awarded by the Air Force in November. List of contracts in excess of \$100,000 appeared in AVIATION WEEK, Jan. 16. Estimated completion dates are indicated.

AC Spark Plug division, General Motors Corp., Flint, Mich., cover for gunsight head to be used on K-14A, K-14B, and K-18 gunsight assemblies, Feb., 1950, \$1555.

A and Z Mfg. Co., Covington, Ky., reflector, Jan., 1950, \$3796.

Abrams Instrument Corp., Lansing, Mich., photographic heater, Aviation, Navy, 1950, Feb., 1950, \$9318.

Aemie Visible Records, Inc., Cincinnati, Ohio, visible files, Dec., 1949, \$7493; visible file tabs, Dec., 1949, \$9185.

Adamson United Co., Akron, Ohio, repair and modification of 120-in. brake-testing machine, July, 1950, \$5175.

Adel Precision Products Corp., Burbank, Calif., pumps and valves, Apr., 1950, \$4337.

Advance Equipment Co., Cincinnati, Ohio, hoist handbook, Dec., 1949, \$1204.

Aero Bolt and Screw Co., New York, N. Y., bolts, Feb., 1950, \$1020.

Aero-Motive Mfg. Co., Kalamazoo, Mich., disconnecter and plug assembly, Feb., 1950, \$3880.

Aero Supply Mfg. Co., Inc., Corry, Pa., aircraft hardware, Apr., 1950, \$3041; bolts, Feb., 1950, \$12396.

Aeromatic Products Co., Los Angeles, Calif., bolts, Feb., 1950, \$7568.

Aeronautical Comm. Equipment, Inc., Miami, Fla., miscellaneous spare parts, shaft color terminal board, etc., Jan., 1950, \$1761.

Aeroproducts division, General Motors Corp., Dayton, Ohio, spare parts in support of A542FD-1 propellers, Apr., 1950, \$10,813; spare parts in support of A542FD-1 propeller assemblies, April, 1950, \$11,450.

Aerotec Corp., Greenwich, Conn., to develop and standardize a personal leads connector assembly for all crewmen in bomber airplanes, Mar., 1950, \$1998.

Aeroquip Corp., Jackson, Mich., aircraft hose, Feb., 1950, \$54,762; aircraft hardware, Mar., 1950, \$11,940.

Aerovox Corp., New Bedford, Mass., fixed paper capacitors, Feb., 1950, \$1562.

Air America Sup. Agency, Inc., Washington, D. C., perform minimum inspection to identify and provide information on condition as determined by visual inspection, Nov., 1949, \$3722.

Air Associates, Inc., Teterboro, N. J., clips, Mar., 1950, \$1476.

Aircooled Motors, Inc., Syracuse, N. Y., modification of 85 each Marvel-Schebler carburetor for 0-335 engine used in H-13 acft., Jan., 1950, \$2536.

Aircraft Hardware Mfg. Co., New York, N. Y., aircraft hardware, Mar., 1950, \$1427.

Aircraft Radio Corp., Boonton, N. J., vibration mounts, Apr., 1950, \$12,000.

AIRResearch Mfg. Co., Garrett Corp., Los Angeles, Calif., altitude and pressure selectors, May, 1950, \$29,549; evaluation of cast parts in lieu of machined parts for turbo compressor unit component of USAF type A-1 heater unit, no estimated completion date given, \$50,000.

Airquipment Co., Burbank, Calif., passenger loading ramps, Jan., 1950, \$9570.

Akeley Camera, Inc., New York, N. Y., electrically-heated airspeed tube, Jan., 1950, \$4410.

Alfred University, Alfred, N. Y., research in connection with the use of ceramic ma-

terials in the construction of uncooled liquid propellant rocket thrust cylinder liners and nozzles, Feb., 1951, \$35,135.

Allison division, General Motors Corp., Indianapolis, Ind., wrenches, grinders, fixtures, etc., Jan., 1950, \$1983.

American Aircraft Mfg., Dayton, Ohio, transformer, Mar., 1950, \$1018.

American Blower Corp., Detroit, Mich., blowers, 20 each, Mar., 1950, \$8557.

American Chain division, American Chain and Cable Co., Inc., York, Pa., hoist and basic handbook, Jan., 1950, \$22,050.

American Finishing Co., Memphis, Tenn., waterproof fabric, Jan., 1950, \$8479.

American Gas Accumulator Co., Elizabeth, N. J., relays, Dec., 1949, \$1830; baffle assembly bracket burner, detector lens etc., Dec., 1949, \$3857.

American Helicopter Co., Inc., Manhattan Beach, Calif., type Q-160 trainer, Jan., 1950, \$17,820.

American Mineral Spirits Co., New York, fuel oil FS No. 2-7-0-164 kerosene 7-K-550, Apr., 1950, Watson Lab., \$1943.

Anchor Rubber Co., Dayton, Ohio, synthetic rubber sheet, Feb., 1950, \$23,524.

Anso division, General Aniline Film Corp., photographic film, Aviation, Navy, June, 1950, \$1397.

Apple, W. A., Textile Mfg. Co., Dayton, Ohio, tow targets and flag weights, Feb., 1950, \$41,197.

Arel, Inc., St. Louis, Mo., misc. photographic equipment, Aviation, Navy, May, 1950, \$14,795.

Armour Research Foundation, Chicago, Ill., services, research and development, no description or estimated completion date given, \$40,275; services - investigations toward the development of corrosion preventive additives and reports, Dec., 1950, \$21,822.

Armstrong Cork Co., Cincinnati, Ohio, cement, Jan., 1950, \$3582.

Aro Equipment Corp., Bryan, Ohio, booster pump, May, 1950, \$3200; valve assemblies, Feb., 1950, \$15,600.

Arrowhead Rubber Co., Vernon, Calif., aircraft hose, Jan., 1950, \$7325.

Athol Mfg. Co., Athol, Mass., artificial leather, Mar., 1950, \$19,812.

Auto-Lite Battery Corp., Toledo, Ohio, aircraft storage battery 24v. 34 amp. dry charged, Jan., 1950, \$31,857.

Ballantine Laboratories, Inc., Boonton, N. J., electronic voltmeter, Nov. 1949, \$5000.

Ballastran Corp., Ft. Wayne, Ind., recognition lights, Dec., 1949, \$1892.

Barry Corp., Cambridge, Mass., vibration isolator, Nov. 1950, \$10,000; investigation and development of center-of-gravity type isolators, extend load ranges and operational range and characteristics, no estimated completion date given, \$18,402.

Bausch and Lomb Optical Co., Rochester, N. Y., photographic filters, July, 1950, \$4395.

Beech Aircraft Corp., Wichita, Kan., spare parts for T-7 and T-11 aircraft, June, 1950, \$8791.

Bell Aircraft Corp., Buffalo, N. Y., no description or estimated completion date given, \$2112.

Bell Aircraft Corp., Niagara Falls, N. Y., spare parts for HTL aircraft, Aviation, Navy, Jan., 1950, \$3987.

Bellanca Aircraft Corp., New Castle, Del., transportation of 30 T-6D aircraft to Bandar Shahpour, Iran, Jan., 1950, \$63,485.

Bendix Aviation Corp., Pacific division, N. Hollywood, Calif., valves, Dec., 1949, \$5192; regulator valve, June, 1950, \$4150; spare parts for valves, Mar., 1950, \$4590.

Bendix Products division, Bendix Aviation Corp., South Bend, Ind., spare parts for brake assemblies, wheels and brakes, July, 1950, \$66,726.

Bendix Radio, Baltimore, Md., transformer, Feb., 1950, \$4284.

Bendix-Westinghouse Auto Brake division, Bendix Aviation Corp., Elyria, Ohio, spare parts for C-2 and F-1 tractors F-1, F-2 trailers and P-1 cranes, May, 1950, \$19,476.

Bergsma Bros. Co., Grand Rapids, Mich., drawing board, Dec., 1949, \$1742.

Binks Mfg. Co., Chicago, Ill., booth and maintenance data, Dec., 1949, \$12,157.

Bjorksten Research Labs., Inc., Madison, Wis., sizing for glass fibers and resins, Dec., 1950, \$14,712.

Boehme, H. O., Inc., New York, N. Y., relay, Mar., 1950, \$3100.

Boeing Airplane Co., Seattle, Wash., maintenance of B-50D airplane 48-080 for 30 days by contractor while AMC flight crews conduct 150-hr. accelerated service test program, Dec., 1949, \$59,786; parts kits, Mar., 1950, \$17,032; special tools and special spare parts for track-type landing gear, Mar., 1950, \$21,374; repair of USAF YC-97A S-N, Nov., 1949, \$4694.

Boston Woven Hose-Rubber Co., Cambridge, Mass., hose, Feb., 1950, \$2490.

Breeze Corp., Newark, N. J., stainless steel hose clamp, Feb., 1950, \$4720.

Brody and Watson Co., Cambridge, Mass., soldering, print X48E51529 realignment of dipoles, Nov., 1949 (Cambridge Lab.), \$2297.

Browne, Stewart, R., Mfg. Co., New York, N. Y., lamp assembly, Feb., 1950, \$45,788.

Browning Bros., Inc., New York, N. Y., level assembly-calibration, master precision, Jan., 1950, \$1688.

Burke and James, Inc., Chicago, Ill., mounts, Jan., 1950, \$13,350; miscellaneous photographic equipment, Aviation, Navy, May, 1950, \$1551.

Caldwell Lace Leather Co., Auburn, Ky., leather, rawhide, 1/8-in. thick—Grade A, Mar., 1950, \$2950.

Cardox Corp., Chicago, Ill., install extension to fire extinguishing system, Jan., 1950, \$6170.

Carter, S. C., Jr., New York, N. Y., antenna mast assembly, Dec., 1949, \$28,550.

Century Aircraft Co., Inglewood, Calif., spare parts for valves, Feb., 1950, \$17,373.

Chase Aircraft Co., Inc., W. Trenton, N. J., spare parts for YG-18A and YC-122 acft., June, 1950, \$1000.

Cincinnati Mill Grinding Co., Cincinnati, Ohio, storage block assemblies, Feb., 1950, \$3807.

Cincinnati Test Research Labs., Cincinnati, Ohio, development of high temperature resistant laminating resins, May, 1950, \$10,550.

Cla-Val Co., Alhambra, Calif., ring, Sept., 1950, \$2820.

Cole Instrument Co., Los Angeles, Calif., voltmeter, Jan., 1950, \$1080.

Cole Laboratories, Inc., Long Island City, N. Y., potassium sodium ferrieyanide, Jan., 1950, \$1086.

Columbian Rope Co., Auburn, N. Y., develop and test nylon tow rope, Jan., 1950, \$2190.

Consolidated Vultee Aircraft Corp., Fort Worth, Tex., spare parts for XC-99 acft., June, 1950, \$5000.

Consolidated Vultee Aircraft Corp., San Diego, Calif., standard aircraft characteristics charts for T-29 (acft., Dec., 1950, \$1417.

Coogan Co., N. Hollywood, Calif., miscellaneous photographic equipment, Dec., 1949, \$1293.

Cooper Precision Products, Los Angeles, Calif., bolts, Feb., 1950, \$5188.

Cornelius Co., Minneapolis, Minn., compressor spare parts for B-29 and B-50 aircraft, Mar., 1950, \$12,931.

Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y., research studies and experimental investigation in the field of aircraft systems, Nov., 1950, \$4770; study and experimental evaluation of corrosion prevention processes to determine the most effective processes compatible to manufacture and use in service of screw jacks, July, 1950, \$5862; design manual for spherical air-supported radomes, Mar., 1950 (Watson Lab.), \$9874.

Cramer, R. W., Co., Inc., Centerbrook, Conn., relays, Mar., 1950, \$1603; relays, Feb., 1950, \$1790.

Crouse-Hinds Co., Syracuse, N. Y., reflector and screen clamps, gaskets, lens and

reflectors, Jan., 1950, \$13,222; panel and maintenance data, Mar., 1950, \$13,598.

Crucible Steel Co. of America, New York, N. Y., annealed spring steel strip, Oct., 1949, \$1031.

Crystal Research Labs., Inc., Hartford, Conn., development of method of adjacent sweep video integration, Mar., 1950 (Cambridge Lab.), \$22,648.

Curtiss-Wright Propeller division, Curtiss-Wright Corp., Caldwell, N. J., whirl test fixture assembly stand, May, 1950, \$25,505; miscellaneous propeller control parts and spares for maintenance of B-36 acft.), Aug., 1950, \$8236.

Cutler-Hammer, Inc., Cincinnati, Ohio, relays, Dec., 1949, \$3810.

Daver Co., Dayton, Ohio, services required for the maintenance of sound source equipment used in the determination of hazards to personnel from intense sound, June, 1950, \$1200.

Dayton Aircraft Products, Inc., Dayton, Ohio, pump and refueling unit type A6A, Jan., 1950, \$13,771.

Dayton Rubber Co., Dayton, Ohio, tube assemblies, demand, mask to regulator, Jan., 1950, \$48,287.

Dayton Wheel Co., Dayton, Ohio, indicator assembly-wind cone, Jan., 1950, \$2458; indicator assembly, Feb., 1950, \$5367.

Denison Engineering Co., Columbus, Ohio, hydraulic pump, Jan., 1951, \$23,602.

Design Center, Inc., Flushing, N. Y., map projection trainer, Jan., 1950, \$1628.

Deutsch Co., Los Angeles, Calif., aircraft hardware, Jan., 1950, \$1372.

Diebold, Inc., Canton, Ohio, film processor, Nov., 1949, \$1994.

Diebold, Inc., New York, N. Y., microfilm camera flow-film processor and Diebold paper processor, Nov., 1949, \$4968.

Dixie Printing Ink Co., East Point, Ga., stencil ink, Jan., 1950, \$1156.

Dole Valve Co., Chicago, Ill., pump assembly, Sept., 1950, \$1160.

Douglas Aircraft Co. Inc., Santa Monica, Calif., maintenance spare parts for C-54 acft., Nov., 1949, \$12,098; maintenance spare parts for B-26 acft. on Turkish Aid Program, Nov., 1949, \$42,575; spare parts for maintenance of B-26 Turkish Aid Program, Dec., 1949, \$35,570; spare parts for maintenance of C-74 acft., Dec., 1949, \$2310; maintenance spare parts for C-47 on Turkish Aid Program, Nov., 1949, \$4437.

Douglas Mfg. division, Kingston Products Corp., Bronson, Mich., spare parts for C-2 and F-1 truck tractors, Feb., 1950, \$1420.

Dow Corning Corp., Midland, Mich., 240 lb. grease, Jan., 1950, \$1644.

Du Betta Metals Corp., Long Island City, N. Y., rolled aluminum alloy shapes, Feb., 1950, \$2743.

Duffy Construction Co., Cleveland, Ohio, protection and maintenance gap No. 7, Cleveland, Ohio, June, 1950, \$2560.

Dumont, Allen B., Labs., Inc., Clifton, N. J., oscilloscope cathode-ray dual beam Dumont type, Nov., 1949 (Cambridge Lab.), \$1150.

Dzus Fastener Co., Babylon, N. Y., grommets, Jan., 1950, \$4765.

Eastman Kodak Co., Rochester, N. Y., photographic supplies, Aviation, Navy, general export Marine Corp., maintenance BuShips, Jan., 1950, \$6825; x-ray film, Apr., 1950, \$22,327; miscellaneous photographic equipment, Aviation, Navy, May, 1950, \$4064; photographic film and paper, Aviation, Navy, research, Navy, 1950, Dec., 1949, \$2881; photographic paper, general expenses, Jan., 1950, \$2555.

Eberhard Mfg. Co., Cleveland, Ohio, spare parts items 1 and 2 for A-1, A-3, F-1, F-1A, F-2, and F-2A fuel servicing trailers and F-3 fuel and oil servicing trucks, May, 1950, \$1028.

Eclipse-Pioneer division, Bendix Aviation Corp., Teterboro, N. J., stand assembly boost control, June, 1950, \$87,975; regulator generator voltage 26-30V. d.c. type 1 engineering and maintenance data spare parts, June, 1950, \$27,537; amplifiers and controllers, Feb., 1950, \$5430.

Electric Auto-Lite Co., Port Huron, Mich., cable, Apr., 1950, \$26,207.

Electronic Brazing Co., Montclair, N. J., additional ignition harness tester assemblies, Apr., 1950, \$2615.

Electronic Instrument Co., Brooklyn,

N. Y., electronic volt-ohmmeter and engineering data, Dec., 1950, \$2384.

Electronic Transformer Co., New York, N. Y., transformer, Feb., 1950, \$1668; transformers, Feb., 1950, \$2453;

Electronic Tube Corp., General Electric Co., Phila., Pa., oscillograph record camera, research, Navy, 1950, Feb., 1950, \$14,415; dual channel oscilloscope, Dec., 1949 (Watson Lab.), \$3480.

Elox Corp., Clawson, Mich., machine arc boring and 1 set in A-W, Jan., 1950, \$3900.

Eltron Inc., Jackson, Mich., radio set AN-ARN-12, Aug., 1950, \$17,077.

Esterline-Angus Co., Inc., Indianapolis, Ind., clock-driven, hand-wound recorder, Dec., 1949 (Watson Lab.), \$2344.

Etes Mfg. Co., Rockford, Ill., bolts, Feb., 1950, \$2019.

Fafnir Bearing Co., New Britain, Conn., bearings, thrust, Feb., 1950, \$4170.

Fairchild Aircraft division, Fairchild Engine and Airplane Corp., Hagerstown, Md., rework, repair, modification or overhaul of GFP components furnished to contractor, June, 1950, \$10,000; miscellaneous MCR changes, Nov., 1951, \$11,045; miscellaneous MCR changes, Nov., 1951, \$11,066; miscellaneous MCR changes affecting C-119B acft., Nov., 1951, \$63,598.

Fairchild Camera & Instrument Corp., Jamaica, N. Y., develop fabrication techniques for producing non-linear functions, June, 1951, \$29,215; signal generator, Apr., 1950, \$9361.

Fansteel Metallurgical Corp., Chicago, Ill., rectifiers, Nov., 1949, \$1674.

Federal Telephone and Radio Corp., Clifton, N. J., RF coils, Feb., 1950, \$1541.

Firestone Tire & Rubber Co., Los Angeles, Calif., rubber material, Jan., 1950, \$5498.

Fischer Porter Co., Cincinnati, Ohio, flow-rator, indicating, Jan., 1950, \$3612.

Flight Research Engineering Corp., Richmond, Va., synchronous cameras, \$13,860.

Frampton Electrical Equipment Co., Dayton, Ohio, power transformer, Jan., 1950, \$4996.

Frank and Warren, Brooklyn, N. Y., gasket, Jan., 1950, \$2161.

Fuel City Metal Works, Clarksburg, W. Va., cross bushings, etc., Mar., 1950, \$1435.

Gannon, Russell R., Co., Cincinnati, Ohio, can warmer, May, 1950, \$8400.

Garrett, George K., Inc., Phila., Pa., washers, Feb., 1950, \$2240.

Geo Inc., New Canaan, Conn., tester-battery engineering data and maintenance data, Feb., 1950, \$1020.

General Communication Co., Boston, Mass., switch RF, Apr., 1950, \$2795.

General Electric Co., Dayton, Ohio, bulb rectifier, Feb., 1950, \$5916; lamps, Jan., 1950, \$82,529; photographic lamps, general export Marine Corps, Jan., 1950, \$13,177; lamp, Dec., 1949, \$3156; repair of 1 aircraft generator, Dec., 1949, \$1182.

General Electric Co., Schenectady, N. Y., services to remove end plate assemblies from gyros and replace these with rear support assemblies, Feb., 1950, \$1741; welder arc and handbook data, July, 1950, \$23,000; vacuum voltmeter and maintenance data, Feb., 1950, \$2041; services surplus units or parts and or bits and pieces for repair servicing and inspection gyros, Feb., 1950, \$15,000; spare parts for maintenance of B-29 and B-50 acft., Jan., 1951, \$68,937; remote fire control system spare parts, Oct., 1950, \$13,635; model C11-B turbo regulators, July, 1950, \$97,600; technical data, Apr., 1950, \$3580; transformers and rheostats, Dec., 1949, \$3690.

General Electric Co., Syracuse, N. Y., coils and circuit breakers, June, 1950, \$11,940; classified, Nov., 1950, \$96,562; switches, Jan., 1950, \$1603; reactor filter choke, Feb., 1950, \$1214; dial assembly, May, 1950, \$1214; motors, Apr., 1950, \$1475; motor, Mar., 1950, \$4982.

General Electric Supply Corp., Dayton, Ohio, cable, Apr., 1950, \$24,511.

General Fire Proofing Co., Youngstown, Ohio, comptometer desks, Jan., 1950, \$2336.

General Radio Co., Cambridge, Mass., variable transformer variac, Feb., 1950, \$1260; continuous film recording camera, Feb., 1950, \$3146.

General Tire and Rubber Co., Akron, Ohio, cone-runway marker lamp, Mar., 1950, \$6808.

General Tire and Rubber Co., Wabash, Ind., isolator shipping mount, Jan., 1950, \$4750.

Gillilan Bros., Inc., Los Angeles, Calif., technician services, June, 1950, \$6000; deflection coil tube, Feb., 1950, \$2550; plumbing radio frequency, Mar., 1950, \$3660; plumbing for transmission line, Mar., 1950, \$1321.

Good Engineering Co., New Canaan, Conn., roller assembly, Feb., 1950, \$3921.

Gisholt Machine Co., Madison, Wis., balancing adaptations, Jan., 1950, \$3962.

Globe-Wernicke Co., Washington, D. C., bookcases, Feb., 1950, \$13,302.

Goldsmith Bros. Smelting and Refining Co., Chicago, Ill., silver cyanide, Jan., 1950, \$48,156.

Goodrich, B. F., Co., Akron, Ohio, wheels and brakes, Nov., 1950, \$11,497; 36-in. nose wheels, Apr., 1950, \$34,797; aircraft hose, Jan., 1950, \$2021; rubber material, Mar., 1950, \$11,278; rubber matting, Feb., 1950, \$9307; synthetic rubber sheet, Jan., 1950, \$25,777.

Goodyear Tire and Rubber Co., Inc., Akron, Ohio, reports covering tests to determine actual diffusion rates of fuel into aircraft structures, July, 1950, \$14,963; research directed toward development of self-sealing oil tank, Nov., 1950, \$15,206; experimental life preservers, Apr., 1950, \$5615; hose, Jan., 1950, \$4342; rubber latex foam, Feb., 1950, \$2249.

Gothard Mfg. Co., Springfield, Ill., dynamotor unit, Jan., 1950, \$1088.

Graf, V. L., Co., N. Baltimore, Mich., bushings, Mar., 1950, \$2940.

Graflex, Inc., Rochester, N. Y., miscellaneous photographic equipment, Aviation, Navy, Feb., 1950, \$18,749; folding camera and tester, Aviation, Navy, May, 1950, \$17,917; miscellaneous photographic equipment, Aviation, Navy, Mar., 1950, \$23,385.

Grand Central Airport Co., Glendale, Calif., trainer-demonstrator type, Jan., 1950, \$3826.

Graybar Electric Co., Inc., Dayton, Ohio, support, Jan., 1950, \$6270; relay, Jan., 1950, \$1400.

Greer Hydraulics, Inc., Brooklyn, N. Y., hydraulic relief valve, Feb., 1950, \$1750.

Grimes Mfg. Co., Urbana, Ohio, light assembly, Nov., 1949, \$8286.

Hale Fire Pump Co., Conshohocken, Pa., spare parts for 155 crash fire trucks, May, 1950, \$2412.

Haloid Co., Rochester, N. Y., photographic paper, Dec., 1949, \$5325; photographic paper, Mar., 1950, \$94,330.

Harnischfeger Corp., Milwaukee, Wis., hoists and basic handbooks, Jan., 1950, \$54,435.

Hartman Electrical Mfg. Co., Mansfield, Ohio, switch generator control relay differential, June, 1950, \$24,952.

Hawthorne Mfg. Co., Kansas City, Mo., hood assembly, Jan., 1950, \$2744.

Hewitt Rubber of Buffalo division, Hewitt-Robins, Inc., Buffalo, N. Y., aircraft hose, Jan., 1950, \$3728.

Hillyer Instrument Co., New York, N. Y., oblique charting photoalidade, Jan., 1950, \$3865.

Hobart Bros. Co., Troy, Ohio, power plant type B-6B, Mar., 1950, \$31,673.

Hoover Electric Co., Los Angeles, Calif., maintenance data, Feb., 1950, \$8200.

Houston Corp., Los Angeles, Calif., photographic developing outfit, Aviation, Navy, Nov., 1949, \$36,788.

Hubbell and Miller Co., N. Rochelle, N. Y., miscellaneous photographic equipment, Aviation, Navy, Feb., 1950, \$27,400.

Hughes-Simonson Engineering Co., Dayton, Ohio, extension of period of performance, Oct., 1949, \$1800.

Hydraulic Press Mfg. Co., Mt. Gilead, Ohio, design develop and fabrication of a valve 4-way selector, Mar., 1950, \$5127.

Hydropress, Inc., New York, N. Y., maintenance inspection of heavy press equipment at Adrian, Michigan, Dec., 1949, \$11,288.

Independent Mfg. Co., Phila., Pa., oil, lard, Feb., 1950, \$12,104.

Industrial Condenser Corp., Chicago, Ill., capacitors, Feb., 1950, \$2327.

Industrial Filter & Pump Mfg. Co., Chicago, Ill., SR-1 type RR photo filters, Dec., 1949, \$2886.

Industrial Precision Products Co., Chicago, Ill., coupling, Mar., 1950, \$2400.

Interstate Engineering Corp., El Segundo, Calif., nose wheels, Feb., 1950, \$7800.

Jack Heintz Precision Industries, Cleveland, Ohio, starter assembly, Dec., 1949, \$99,760; technical data covering motor P-N, Apr., 1950, \$2275.

Jackson, Keene S., S. Pasadena, Calif., components for K-14B gunsights, Dec., 1949, \$8046.

Jam Handy Organization, Inc., Dayton, Ohio, reprints for training, June, 1950, \$5000.

Jam Handy Organization, Inc., Detroit, Mich., training film, Jan., 1950, \$1450.

Jeffries Transformer Co., Los Angeles, Calif., transformers, Jan., 1950, \$3519.

Jumbo Steel Products Co., Azusa, Calif., stand assembly engine repair and storage, Jan., 1950, \$99,400.

Justrite Mfg. Co., Chicago, Ill., collars, nuts, etc., Mar., 1950, \$1729.

K. W. Rubber Co., Delaware, Ohio, mattresses pneumatic, BuShips, 1950, Jan., 1950, \$3750.

Kus-Kel Electrical Co., Inc., New York, N. Y., cord, Feb., 1950, \$90,223.

Kenyon Transformer Co., Inc., New York, N. Y., transformer, May 1950, \$2464.

Kidde, Walter and Co., Inc., Belleville, N. J., cylinder and valve, Mar., 1950, \$2202.

King Co., Batavia, Ill., clamp assembly-cable runway marker lamp, Mar., 1950, \$1425.

Kings Electronics Co., Brooklyn, N. Y., plug, Mar., 1950, \$2340.

Koppers Co., Inc., New York, N. Y., naphthalene flakes, Dec., 1949, \$2563.

L. B. Electric Supply Co., Brooklyn, N. Y., elbow assembly, Mar., 1950, \$7366.

Lamson and Sessions Co., Cleveland, Ohio, aircraft hardware, Feb., 1950, \$1364; bolts, Feb. 1950, \$13,435.

Lawrence, A. C., Leather Co., Peabody, Mass., strap russet grade C, Mar., 1950, \$4496.

Lehigh University, Bethlehem, Pa., study on motor movements associated with radar scopes, Sept., 1950, \$6964; services and reports in connection with ionospheric research, June 1951 (Cambridge Lab.), \$13,800.

Line Material Co., E. Stroudsburg, Pa., tubes, Jan., 1950, \$9000; globe marker lamp, Jan., 1950, \$2888; lens, Jan., 1950, \$2436; switch-oil remote control triple pole single throw, Jan., 1950, \$2305.

Linear, Inc., Phila., Pa., hydraulic packing rings, May, 1950, \$23,846.

Linen Thread Co., Inc., Paterson, N. J., braided cotton cord linen cord, Mar., 1950, \$34,260.

Liquidometer Corp., Long Island City, N. Y., tester, Feb., 1950, \$1335.

Lockheed Aircraft Corp., Burbank, Calif., rework repair modification or overhaul of GFP components furnished to the contractor, June, 1950, \$15,000; investigation of need for aircraft contour milling machine, Apr., 1950, \$18,970; maintenance kits for F-80A and B acft., June, 1950, \$75,600.

Lord Mfg. Co., Erie, Pa., rubber insulation mounts, Jan., 1950, \$5504.

Lorenzo Del Riccio Laboratories, Los Angeles, Calif., projector stand, photographic, Feb., 1950, \$5400.

Los Angeles Standard Rubber Co., Los Angeles, Calif., rubber cushion, Jan., 1950, \$6286.

Lowell Observatory, Flagstaff, Ariz., research in the study of planetary atmosphere, Sept., 1950 (Cambridge Lab.), \$30,332.

Lundy Mfg. Corp., New York, N. Y., screw jack assembly and shaft assembly, Feb., 1950, \$31,250.

Lycoming division, AVCO Mfg. Corp., Williamsport, Pa., endurance testing of type C-22 power plants, and reports, Dec., 1949, \$5855.

Masters, Irvin W., Inc., Burbank, Calif., elbow plug and tee fittings, Mar., 1950, \$1784.

Mallinckrodt Chemical Works, St. Louis, Mo., acid, hydrochloric, Jan., 1950, \$1457.

Mallory, P. R. and Co., Indianapolis, Ind., capacitor, Jan., 1950, \$1049.

Marlin-Rockwell Corp., Jamestown, N. Y., bearings, Mar., 1950, \$4715.

Marquardt Acft. Co., Van Nuys, Calif., analyzer, Jan., 1950, \$17,266.

Martin, Glenn L., Co., Baltimore, Md., classified, June, 1950, \$47,327; classified, Oct., 1951, \$11,937; modification of telemetering system, Dec., 1950, \$30,418.

Massachusetts Institute of Technology, Cambridge, Mass., services and data, Mar., 1950 (Watson Lab.), \$10,000; services research and development of phase diagrams for the titanium-chromium and titanium-copper systems, Oct., \$48,000.

Master Electric Co., Dayton, Ohio, motor, Jan., 1950, \$5454.

Mathewson Machine Works, Inc., N. Quincy, Mass., target simulator, Jan., 1950 (Cambridge Lab.), \$1385.

Maurer, J. A., Inc., Long Island City, N. Y., type 0-22 radar recording cameras, Dec., 1950, \$72,995.

Maxson, W. L. Corp., New York, N. Y., amplifiers, June, 1950, \$26,250.

McQuay-Norris Mfg. Co., St. Louis, Mo., pressure switches, Nov. 1949, \$2665.

Measurements Corp., Boonton, N. J., research model of field strength meter, Dec., 1950, \$48,750.

Mechanisms Co., Uhrichville, Ohio, hydraulic relief valve, Feb., 1950, \$2800.

Melpar, Inc., Alexandria, Va., preamplifier for BG-1364 receiver, Jan., 1950 (Cambridge Lab.), \$1860.

Michigan, University of, Ann Arbor, Mich., studies and experimental investigations in connection with the development of data for design of combustion chambers for acft. engines, Dec., 1950, \$30,000; studies and experimental investigations of the effects of fuel spray quality on combustion in a moving air stream, Dec., 1950, \$24,165.

Middlesex Welding Co., Somerville, Mass., aluminum sandwich parabola, Nov., 1949 (Cambridge Lab.), \$1590.

Milo Radio-Electronics Corp., New York, N. Y., connector cable 5 contact male amphenol, Dec., 1949 (Watson Lab.), \$1086.

Milwaukee Valve Co., Milwaukee, Wis., spare parts for A-1, A-3, F-1, F-2 and F-2A fuel servicing trailers, Feb., 1950, \$1192.

U. S. Bureau of Mines, Pittsburgh, Pa., investigation to determine inflammability characteristics of acft. fuels, July, 1951, \$20,000.

Mines, Bureau of, Washington, D. C., flame and combustion research, Dec., 1950, \$60,000.

Mines Equipment Co., St. Louis, Mo., cable assembly, Feb., 1950, \$62,054.

Minneapolis-Honeywell Regulator Co., Minneapolis, Minn., automatic pilot, Feb., 1950, \$82,639; spare components for B-4 turbo regulator systems, Dec., 1950, \$77,800.

Minnesota Mining & Mfg. Co., St. Paul, Minn., waterproof adhesive tape, Aviation, Navy, May, 1950, \$3522; reflector, Feb., 1950, \$36,180.

Mitchell Camera Corp., Glendale, Calif., spare parts for photographic equipment, Feb., 1950, \$2968.

Monadnock Mills, S. Leandro, Calif., grommets, Jan., 1950, \$1048.

Morse Instrument Corp., Hudson, Ohio, photographic printers, Aviation, Navy, May, 1950, \$14,989; type C-1A photographic timer, Aviation, Navy, Apr., 1950, \$11,923.

Motion Picture Print Equipment Co., Chicago, Ill., photographic spare parts, Aviation, Navy, Feb., 1950, \$2995.

Moynahan Bronze Co., Inc., Detroit, Mich., acft. hardware, Mar., 1950, \$15,050.

Murray Envelope Corp., Chicago, Ill., envelopes, Nov., 1949, \$1157.

Nash Engineering Co., S. Norwalk, Conn., fuel booster pumps, Dec., 1950, \$8950.

New Departure division, General Motors Corp., Bristol, Conn., bearings, Feb., 1950, \$1840.

New England Tape Co., Hudson, Mass., plastic tubing, Feb., 1950, \$5109.

New Haven Clock & Watch Co., New Haven, Conn., washer, plain corrosive-resistant, steel, Feb., 1950, \$4840.

New York University, New York, N. Y., research in determination of neutron maximum at high altitude, Jan., 1950 (Watson Lab.), \$7000.

Nilsson Electric Laboratory, Inc., New York, N. Y., various spare parts for test set, Apr., 1950, \$2320.

North American Aviation, Inc., Los Angeles, Calif., engineering drawings for B-45C mobile training units, Oct., 1950, \$8132.

Northrop Aircraft, Inc., Hawthorne, Calif., technical data covering cylinders and valve installed on YC



VHF Transmitters • H. F. Transmitters • Radio Control Panels • Antennas • Indicators
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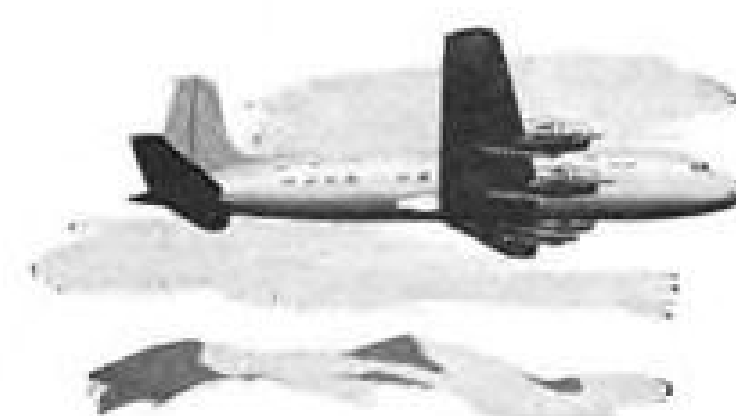
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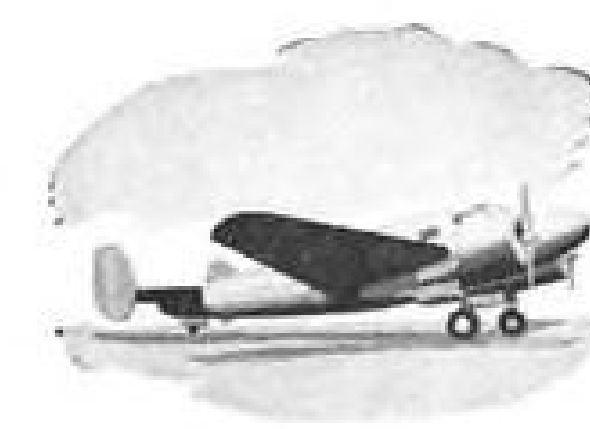


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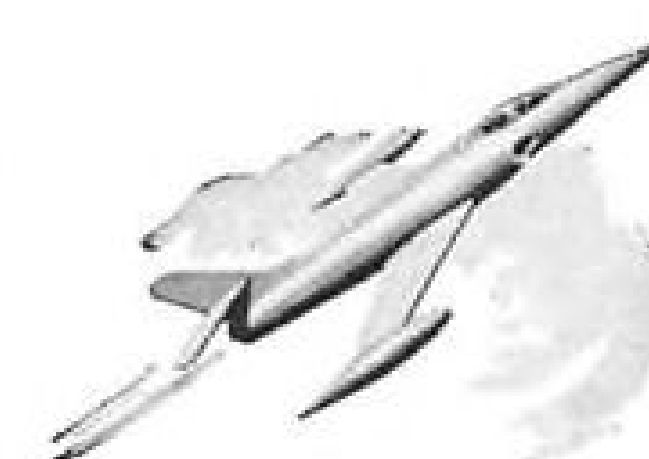
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nished instrumentation cables in lieu of contemplated government loaned, Nov., 1949, \$2854.

RCA-Victor division, Radio Corp. of America, Camden, N. J., spare parts for photographic equipment, maintenance Bu-Ships, Mar., 1950, \$9098; spare parts for photographic equipment, Jan., 1950, \$24,825.

Reading Batteries, Inc., Reading, Pa., battery, acft., storage, 12 v. 88 amp., dry, charged, Jan., 1950, \$17,565.

Recordak Corp., Washington, D. C., microfilm, Dec., 1949, \$4235; photographic film, Dec., 1949, \$1658; photographic film, Sept., 1950, \$36,960.

Remington Rand, Inc., Dayton, Ohio, service charges, Nov., 1949, \$1570; installation and labor charges, Dec., 1949, \$5516.

Republic Aviation Corp., Farmingdale, N. Y., classified, Dec., 1949, \$4832; design and fabricate nozzle for in-flight refueling tests, Jan., 1950, \$10,008.

Revere Electric Mfg. Co., Chicago, Ill., filters, gaskets, and lens, Feb., 1950, \$8662; lamp assembly, Feb., 1950, \$17,140.

Ripley Co., Inc., Middletown, Conn., RE-78-A1C relay, Mar., 1950, \$9999.

Robinson Aviation, Inc., Teterboro, N. J., photographic mounts, Aviation, Navy, Apr., 1950, \$7815.

Rockford Screw Products Co., Rockford, Ill., bolts, Feb., 1950, \$3313.

Romee Pump Co., Elyria, Ohio, valves and pumps, May, 1950, \$29,444; spare parts for pump assembly, June, 1950, \$17,382.

Rosenberg, H. Z. Co., Buffalo, N. Y., spares for B-26, B-29 and B-50, Dec., 1949, \$4538; motor-drive, tail turret-B-26, B-29, B-50 spares, Dec., 1949, \$3000; counters-ammunition, Dec., 1949, \$1200.

Rowe Industries, Toledo, Ohio, antenna, etc., Mar., 1950, \$9397; antenna, Mar., 1950, \$1224.

Roland Mfg. Co., Corry, Pa., acft. hardware, Mar., 1950, \$1450.

Russell Mfg. Co., Middletown, Conn., elastic exerciser card, Feb., 1950, \$7128.

Ryan Aeronautical Co., San Diego, Calif., navigation lights flasher kits, dimming rheostat kits, radio illumination kits, Feb., 1950, \$14,127; contractor furnished parachute release device, Mar., 1950, \$4914.

Savage Elect. Motors, Los Angeles, Calif., spare parts for motor assembly, Dec., 1949, \$11,270.

Saval, Inc., Los Angeles, Calif., valves, May, 1950, \$10,283.

Schmieg Industries, Inc., Detroit, Mich., booth spirits, spray, floor type, and maintenance data, Dec., 1949, \$11,570.

Schwab, H. W., Textile Corp., New York, N. Y., cloth suiting and overcoating, Dec., 1949, \$7700.

Schwen, L. N., Engineering Co., Los Angeles, Calif., bank-and-turn indicators type C-5, Jan., 1950, \$20,823; modification of gyros, Feb., 1950, \$2194.

Scott Aviation Corp., Lancaster, N. Y., spare parts for A-15 regulators, Apr., 1950, \$81,580.

Seal, Inc., Shelton, Conn., mounting tissues, Aviation, Navy, May, 1950, \$4137.

Seifert-Elstad Machinery Co., Dayton, grinder crankshaft, Mar., 1950, \$19,314.

Servo Corp. of America, New Hyde Park, N. Y., servomotor, servoservo and servo precision velocity, Dec., 1949, \$1765; services and materials for evaluation of the principal of a doppler effect navigation system, May, 1950 (Watson Lab.), \$5272.

Sewall Paint Co., Kansas City, Mo., agent brightener, Jan., 1950, \$8250.

Shea Matson Trucking Co., Milwaukee, Wis., amendment to cover the cost of necessary labor tools equipment and preparation for shipment of 73 tools, Jan., 1950, \$4905.

Ships, Bureau of, Navy Dept., Washington, D. C., testing of infrared sensitive elements, Jan., 1952, \$5000.

Sigma Instruments, Inc., Boston, Mass., relays, Dec., 1949, \$1250.

Simmon Bros., Inc., Long Island City, N. Y., spare parts for photographic equipment, May, 1950, \$33,577.

Smith Bearing Co., Inc., Orange, N. J., needle bearings, Apr., 1950, \$3538.

Smoot and Holman Co., Inglewood, Calif., ammunition chuting, Dec., 1949, \$2073.

Sola Electric Co., Chicago, Ill., transformer, Mar., 1950, \$9930.

Southeastern Cordage Co., Cleveland,

Ohio, mildew-proofed buoyant cotton cord, Jan. 1950, \$1400.

Specialty Assembly and Packaging Co., Brooklyn, N. Y., tube-base adapter runway marker lamp, Feb., 1950, \$5304.

Sperry Gyroscope Co., Inc., division, Sperry Corp., Great Neck, N. Y., spare parts for microwave landing system, Jan., 1950, \$31,300; simplifier klystron vacuum tube 9310 mc., June, 1950 (Watson Lab.), \$7656.

Sprague Electric Co., North Adams, Mass., resistors, Jan., 1950, \$3114.

Springfield Tent and Awning Co., Springfield, Ohio, type A5 maintenance shelters, Mar., 1950, \$2191; type A1A maintenance shelters, Mar., 1950, \$9028.

Sreeco, Inc., Dayton, Ohio, transformers, Dec., 1949, \$1641.

Standard Electric Products Co., Dayton, Ohio, relay AC-DPD T miniature hermetically sealed general purpose, Oct., 1950, \$7887; variable transformer variac, Feb., 1950, \$10,185; antenna dipoles, Jan., 1950, \$3824.

Standard Pressed Steel Co., Jenkintown, Pa., bolts, Feb., 1950, \$10,116.

Standard Steel Works, N. Kansas City, Mo., spare parts for maintenance A-1, A-3, F-1, F-1A, F-2 and F-2A fuel servicing trailers, Sept., 1950, \$6225.

Stanford University, Palo Alto, Calif., services and data, June, 1950 (Cambridge Lab.), \$10,400.

Stanley Aviation Corp., Buffalo, N. Y., recorder, three channel, Jan., 1950 (Cambridge Lab.), \$3378.

Steinthal, M. and Co., Inc., New York, N. Y., ribbon parachute assembly, Nov., 1949 (Cambridge Lab.), \$9949.

Stephenson Film Corp., New York, N. Y., miscellaneous photographic equipment, Aviation, Navy, Mar., 1950, \$4860.

Stewart Truck Bodies, Brooklyn, N. Y., utility trailer type F-2, Apr., 1950, \$2800.

Struthers-Dunn, Inc., Phila., Pa., relay sensitive DP DTDT miniature hermetically sealed hard vacuum, Nov., 1950, \$21,948.

Super Electric Products Corp., Jersey City, N. J., oscillator 0-17-ART-13A and spare parts, Feb., 1950, \$14,263.

Sweebrock Aviation Co., Inc., Fort Wayne, Ind., parachute dummies, Jan., 1950, \$3318.

Sylvania Electric Products Co., Inc., New York, N. Y., magnetron tubes, Feb., 1950, \$3760.

Talon, Inc., Meadville, Pa., development and test of an all-nylon slide fastener, Nov., 1950, \$36,000.

Technical Service, Inc., Plymouth, Mich., magazines, film, Feb., 1950, \$3994.

Telectro Industries Corp., Long Island City, N. Y., tester, portable, vibratest, insulation, June, 1950, \$1160.

Telerad Mfg. Corp., New York, N. Y., 16 ea. line RF transmission, Jan., 1950, \$2678.

Thompson Products, Inc., Bell, Calif., acft. hardware, Feb., 1950, \$6327.

Thompson Products, Inc., Cleveland, Ohio, pumps, May, 1950, \$8061.

Thordarson Electric Mfg. Co., McGuire Industries, Inc., Chicago, Ill., transformers, Apr., 1950, \$2185.

Tillotson Mfg. Co., Toledo, Ohio, spare parts for C-2 truck tractors F-2 and F-2A, June, 1950, \$3740.

Tubing Seal-Cap, Inc., Los Angeles, Calif., threaded steel seal cap, Mar., 1950, \$1341.

United Aircraft Products, Dayton, Ohio, spare parts for fuel pumps, Mar., 1950, \$3223.

United Motors Service, General Motors Corp., Detroit, Mich., spare parts for ground vehicles, Sept., 1950, \$19,559.

U. S. Coast-Geodetic Survey, Washington, D. C., development and fabrication of meteorology equipment, Nov., 1950, \$20,000.

U. S. Pipe Mfg. Co., San Francisco, Calif., positioner and data, Jan., 1950, \$19,601.

U. S. Rubber Co., Bristol, R. I., cable, April, 1950, \$5471.

U. S. Rubber Co., Mishawaka, Ind., rubber material, Jan., 1950, \$63,056.

U. S. Rubber Co., New York, N. Y., rubber insulation mounts, Jan., 1950, \$3711.

University of Calif., Berkeley, Calif., investigation of flow visualization methods for hypersonic wind tunnel, Dec., 1950, \$67,800; resnatron development, Mar., 1951, \$50,459.

University of Calif., Regents of the, Los Angeles, Calif., services and reports in-

vestigation of a method of predicting upper level winds, Nov., 1950 (Watson Lab.), \$15,090.

University of Chicago, Chicago, Ill., services and data in connection with research and investigation in hydrodynamic models, Sept., 1950 (Cambridge Lab.), \$65,194.

University of Colorado, Boulder, Colo., research program for the development of data concerning spray formation, Oct., 1950, \$29,566.

University of Dayton, Dayton, Ohio, services for the calibration tabulation and analysis and flight load records, Sept., 1950, \$25,000.

University of Denver, Denver, Colo., study on the capacity of combustion units, Mar., 1951, \$34,839.

University of Illinois, Urbana, Ill., ceramic development for power plants, Feb., 1950, \$60,000; services and data in connection with methods to generate and study the effects of radio frequency energy in the millimeter wave length region, July, 1950 (Cambridge Lab.), \$50,000; search receiver antennas, Nov., 1950, \$51,914.

University of Rochester, Rochester, N. Y., physiological investigations associated with high-altitude oxygen equipment, Nov., 1950, \$22,170.

University of Virginia, Charlottesville, Va., additional studies and experimental investigations on psychological aspects of visual message presentation, Jan., 1952, \$62,250.

V. and S. Engineering Co., Solana Beach, Calif., scanner-synchronizer, Feb., 1950, \$9518.

Vickers, Inc., Detroit, Mich., gear box, Dec., 1949, \$6729.

Visual Education Society, Chicago, Ill., photo projection on spare parts, Dec., 1949, \$1753.

Visual Instruction Bureau of Iowa City, Iowa, training film, Jan., 1950, \$1013.

Warner Electric Brake Mfg. Co., Beloit, Wis., spare parts items 1 to 4 inclusive for the A-1, A-3, F-1, F-1A, F-2 and F-2A fuel servicing trailers and F-3 fuel and oil servicing trucks, Feb., 1950, \$2055; spares for A-1, A-3 fuel service trailers and C-A1 propeller dolly, Jan., 1950, \$2621.

Wayne Tool Co., Waynesboro, Pa., reamers, Dec., 1949, \$2195.

Wells-Gardner and Co., Chicago, Ill., radio transmitter BC-925A, Apr., 1950, \$78,322.

Western Electric Co., New York, N. Y., repair plug-in assemblies for AN-APA-44 ground position indicators, no estimated completion date given, \$25,000; attenuator, Apr., 1950, \$2730; cavity tuned, June, 1950, \$3960.

Westinghouse Electric Corp., Dayton, Ohio, modification, autopilot, May, 1950, \$17,071; cover, gasket, lens receptacle, and screen for runway marker, Jan., 1950, \$7240; socket, Jan., 1950, \$2176; regulator assembly, Mar., 1950, \$44,795; lamps, Nov., 1949, \$9579; lamp, Aug., 1950, \$21,039.

Westinghouse Electric Corp., Pittsburgh, Pa., bulbs rectifier, Feb., 1950, \$1148.

Weston Electric Instrument Corp., Newark, N. J., transformers, Mar., 1950, \$3633; 60 each meter, Mar., 1950, \$1677; wattmeter—portable a.c. and d.c. transformer-multi range, Jan., 1950, \$1584.

Wheaton Brass Works, Newark, N. J., spare parts for A-1, A-3, F-1, F-1A, F-2, and F-2A fuel servicing trailers and F-3 fuel and oil servicing trucks, Jan., 1950, \$1155.

Wichita Park Commissioner, Board of, Wichita, Kans., services in connection with use of the municipal airport at Wichita, Kansas by military acft., June, 1950, \$6000.

Willard Storage Battery Co., Cleveland, Ohio, battery 30v. 1 shot with No. 8 wires and connectors for 30 75-amp. discharge, Nov., 1949 (Cambridge Lab.), \$1118.

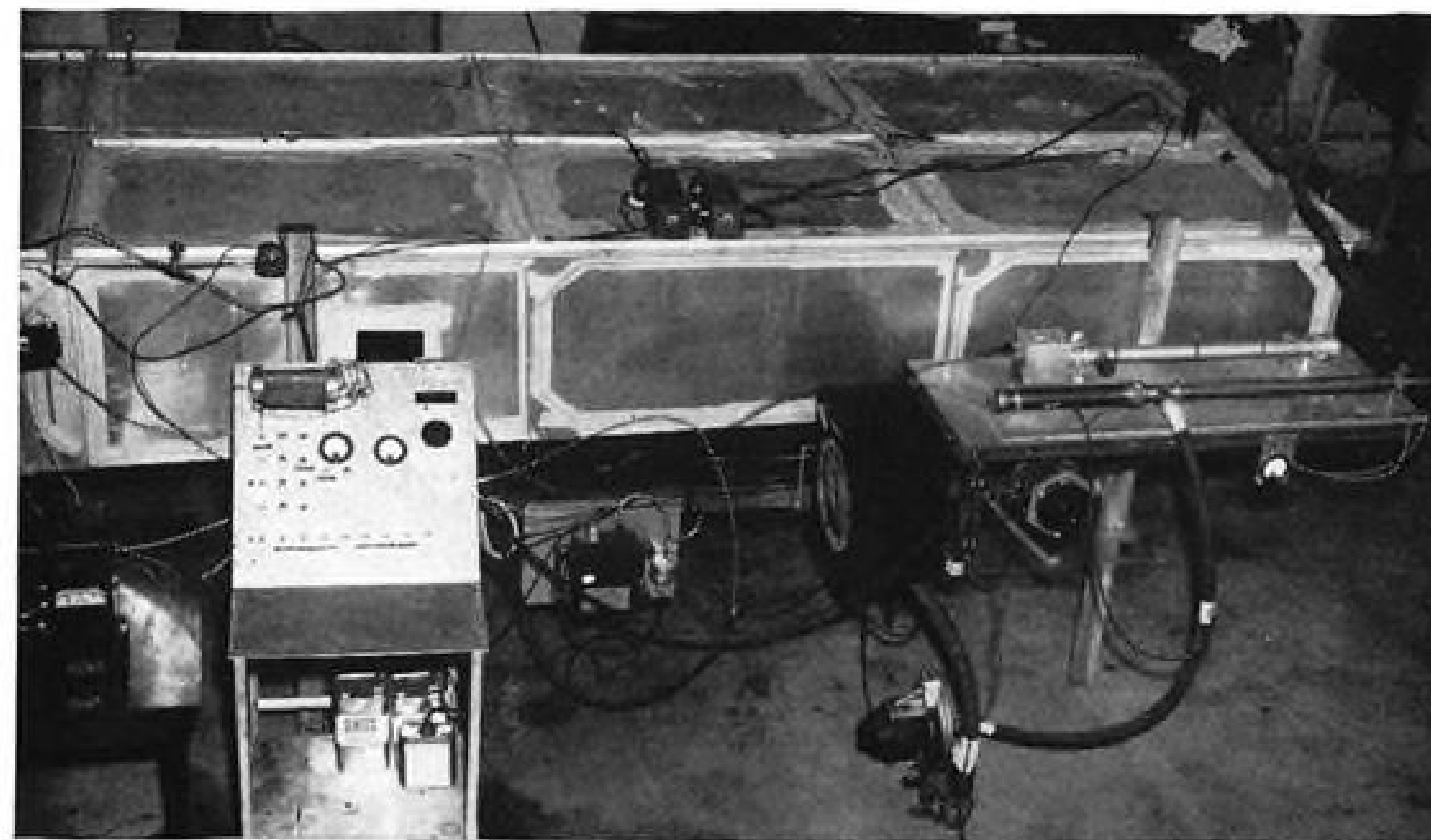
Williams Brown-Earle, Inc., Phila., Pa., camera and photographic equipment, Aviation, Navy, May, 1950, \$6104; miscellaneous photographic equipment, Mar., 1950, \$4121.

Wright Co., Inc., Worcester, Mass., business machine racks, Jan., 1950, \$3460.

Wyandotte Chemical Co., Wyandotte, Mich., agent brightener, Jan., 1950, \$7350.

Wyman, Gordon, Co., Worcester, Mass., furnish labor and material for unloading one 7000 ton press, Aug., 1950, \$1378.

AIR TRANSPORT



SIMULATED CONSTELLATION BAGGAGE COMPARTMENT used in CAA's fire test program at Indianapolis is shown hooked up to various types of visual smoke

detectors on panel at left center; to measuring instruments and blower at center; and to photoelectric type smoke detector and smoke density meter at right.

Smoke Detector Value Weighed

New type visual device, and snifter type being studied as possible replacement for former models.

By Charles Adams

Whether the airlines should again be required to install smoke detectors in all their planes as a protection against cargo and baggage compartment fires, or whether the remedy for such hazards is worse than the hazard itself will soon be weighed by the Civil Aeronautics Board.

Early in 1948, after the smoke detectors turned in hundreds of false alarms, CAA permitted the carriers to disconnect the units. Since then, about 10 percent of the airlines' planes have carried detectors under a test program conducted in cooperation with CAA, the National Bureau of Standards and manufacturers of the devices.

►**Tests Final Phases**—CAA, which has been carrying out an extensive cargo and baggage fire test program at Indianapolis, is now in the final phases of its work. A report is expected within 60 days. After that, CAB may consider new regulations. Late phases of the research work will include additional tests to determine the feasibility of fire control by inert gases; to determine compartment ambient and wall temperature maximums; and to evaluate the use of water as an extinguishing agent.

Investigation will be made of using a simple "snifter" tube as a cargo com-

partment fire detector. United Air Lines will help investigate better compartment sealing as a means of controlling fires, and CAA will expedite modification and development of existing visual type smoke detectors.

Units of the photoelectric cell type were responsible for the series of false warnings that led to suspension of regulations requiring use of smoke detectors on all airline transports. Under the test program in effect since early 1948, reliability of the photoelectric cell units has improved considerably, but there have still been some false alarms.

Tests with both photoelectric type smoke detectors and carbon monoxide type units are now virtually complete. But the visual and snifter type detectors—simpler and reportedly almost fool-proof—are getting increased attention. ►**AIA Recommendations**—Plane builders, through the Aircraft Industries Assn., have recommended that Civil Air Regulations requiring detectors and fire extinguishing systems for baggage and cargo compartments be abandoned entirely.

AIA believes investigations to date establish the improbability of fires in baggage compartments and the ineffectiveness of detectors and extinguishing agents in dealing with whatever problem exists. It says that faulty de-

tectors are merely a source of additional hazard.

CAA investigations have failed to turn up a single instance in which a fatal accident was traced definitely to a fire in flight originating in baggage, although there have been cases where suspicions pointed strongly in that direction. On the other hand, there is the case of the United Air Lines DC-6 crash near Mt. Carmel, Pa., in June, 1948, when a false fire alarm apparently caused the death of 43 persons.

Crew of the DC-6 was incapacitated as a result of a concentration of carbon dioxide gas which seeped into the cockpit after extinguishers were discharged in the forward cargo pit to smother a non-existent fire.

Plane builders believe fire protection can best be obtained in the future by sealing baggage compartments and lining them with fire resistant materials. It is conceded, however, that adequate sealing of compartments on older-type transports would be difficult and expensive.

►**Visual Detectors**—For the past few months, CAA tests have included experimental work on new-type visual smoke detectors, which have been provided in prototype form by Walter Kidde & Co., Belleville, N. J.; and C-O-Two Fire Equipment Co., Newark, N. J.

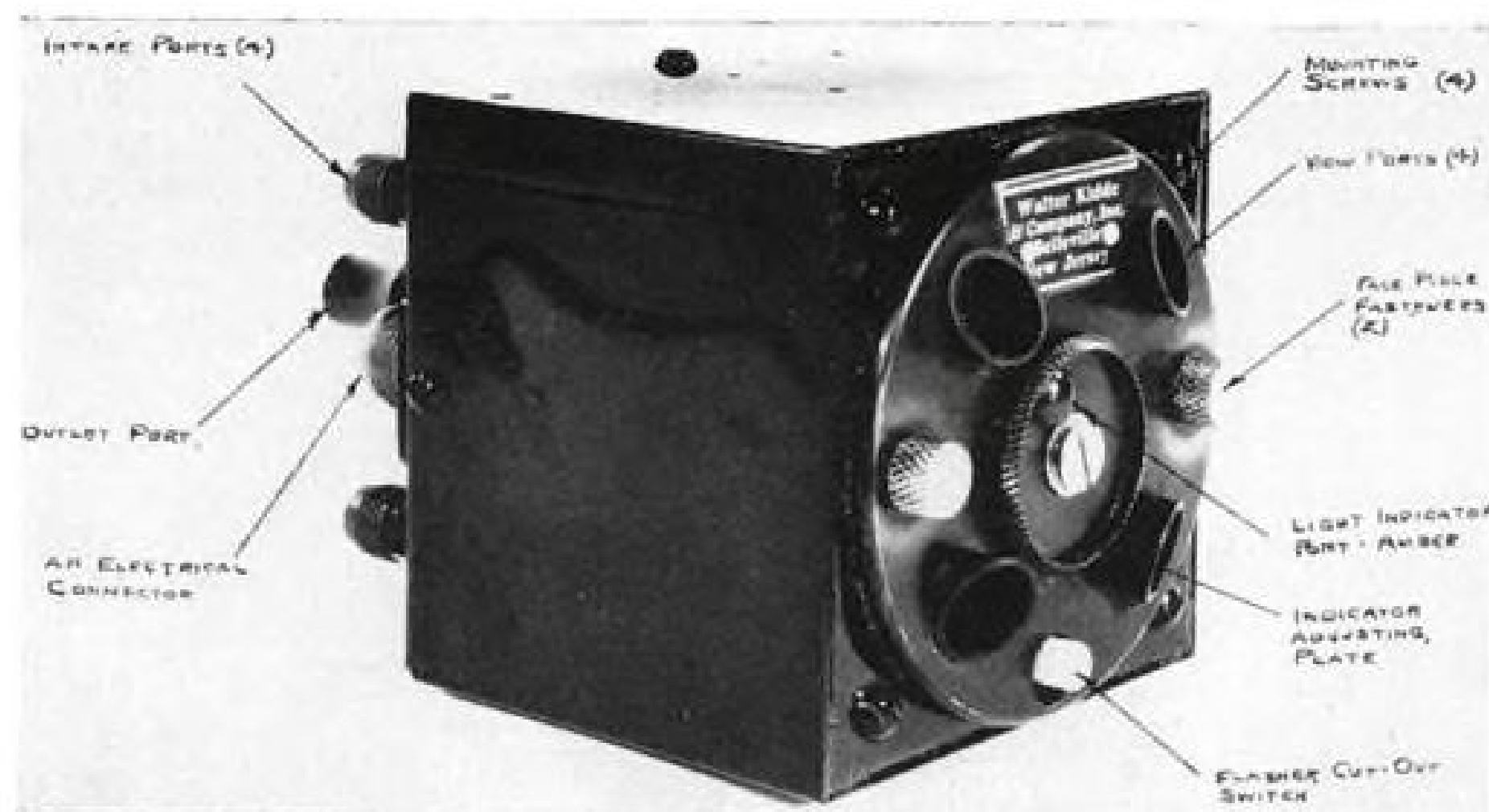
During a recent meeting at Indianapolis, in which CAA reported on the progress of its baggage compartment fire test program to representatives of the Air Transport Assn., Air Line Pilots Assn. and CAB, it was generally agreed that the visual type smoke detector (already in use on ocean vessels and elsewhere) holds the most promise.

The visual type detector consists of tubes running from one or more baggage or cargo compartments to the instrument panel. On the panel, at the end of each tube, is a glass window, behind which is a light that is invisible until foreign matter such as smoke or dust particles enter the tube.

One difficulty with this type detector is the possibility that the light reflected by the smoke particles would be of insufficient intensity to attract the pilot's attention. As a result, in cooperation with the manufacturers, CAA has undertaken responsibility not only for increasing light intensity but for improving the field of view, decreasing viewing lens reflection and providing some means of flow indication.

After the improvements are made, at least three of each type detector will be procured for operational testing by an airline and the National Bureau of Standards.

►**Snifter Type**—CAA has also agreed to investigate the possibilities of the snifter device, which could eliminate need for



Kidde Visual Smoke Detector

This new visual type smoke detector, built by Walter Kidde & Co. and now undergoing flight tests, is designed to permit inspection in the cockpit of air from any one of four compartments in an aircraft.

Construction of the interior is such that no light is visible through any of the four ports even at night unless there is smoke within the housing to reflect the light. If smoke is present, a white light is seen within the chamber through the view port.

► **Sensitivity Increased**—A flasher has been built into the detector so that the light flashes on and off. This feature increases the unit's sensitivity and gives a better warning. The flasher action can be shut off by pressing the flasher cut-out switch at the bottom of the face piece, thus allowing a more detailed inspection as to actual smoke concentration.

► **Makeup**—The adjustable light indicator consists of a stationary view port covered with an adjustable amber port. When the ports are in line, the detector light is visible. By turning the indicator adjusting plate counter clockwise, the intensity of the indicator light reach-

ing the cockpit can be cut down to zero. This is for the convenience of pilots who desire varying degrees of indicator light intensity.

The unit has four separate inlet ports, one for each view port or each test chamber, and one exhaust port. These are located in the rear of the unit. The arrangement permits simultaneous sampling from four compartments, one test chamber being used for each compartment. In the case of a two-compartment aircraft, two test chambers can be used for each compartment. An AN electrical connector is located at the rear of the unit.

► **Bulb Replacement**—Front face piece containing the four view ports can be removed by loosening the fasteners. This permits the face piece to be pulled out but not completely disengaged. After the face piece has been fully extended, it can be hinged down to a position where the bulb may be removed from the socket and replaced in flight if necessary.

The detector has been designed for universal mounting and can fit in a standard instrument panel. Normal mounting in the instrument panel would be with the four mounting screws shown.

the visual type detector. The sniffer type would consist of a simple duct system between the compartment to be protected and the cockpit. It would be designed to permit detection of fire by odor alone. With respect to extinguishment tests in cargo compartments, CAA has indicated that carbon dioxide is not effective unless the air change rates are kept below one-half change per hour, which would require excellent sealing. When sealing is accomplished to such an extent that the air change rates are near zero, it appears that a fire can be self-controlled by lack of oxygen.

Recommend TCA Foreign Permit

Recommendation that Trans-Canada Air Lines be granted a foreign air carrier permit to operate from Montreal and/or Toronto to Port of Spain, Trinidad, via Tampa/St. Petersburg, Fla., Nassau, Bahamas; Kingston, Jamaica, and a point in Barbados has been made by Civil Aeronautics Board Examiner R. Vernon Radcliffe. TCA was designated for the route by the Canadian government in accordance with last June's air transport agreement with the U. S.

Super-Feeder

Monarch - Challenger may acquire Arizona Airways routes.

The Rocky Mountain area's super-feederline is rapidly rounding into shape.

Management assignments for the consolidated operations of Monarch Air Lines and Challenger Airlines were recently announced by H. S. Darr, president of the merged corporation. Coincidentally, Civil Aeronautics Board Examiner James S. Keith recommended approval of Monarch's proposed acquisition of a second feeder, Arizona Airways.

► **Serves Seven States**—CAB approval of the Monarch-Challenger merger last Dec. 16 gave the combined system more than 3000 route miles extending from Denver to Salt Lake City, Billings, Mont., and Albuquerque, N. Mex. Addition of Arizona Airways' system would bring total route mileage to over 4100, with service provided to seven states and around 50 communities.

In endorsing the Monarch-Arizona merger, Examiner Keith said the transaction probably represents the most expedient means of activating Arizona Airways' long-dormant routes. Arizona was designated for a certificate in February, 1948, but was unable to raise enough money to inaugurate service along its routes.

Combination of the Monarch and Arizona routes would result in a reasonably integrated and coordinated system, Keith declared. He added that the price to be paid by Monarch for Arizona is fair; no monopoly would be created; and no other air carrier would be injured substantially.

► **Extension Request Endorsed**—The merger agreement provides for acquisition by Monarch of all Arizona's outstanding stock in exchange for 6000 shares of Monarch's stock and assumption by Monarch of \$150,000 of Arizona's liabilities. Since the two feeder systems at present do not connect, Keith endorsed a request that Monarch be granted a 120-mile route extension from Gallup, N. Mex., to Arizona Airways' northern terminal at Winslow, Ariz.

The examiner agreed that the merger would probably result in higher traffic loads than if the companies operated separately. He said that expenses under the consolidation should be less than with two independent systems, and mail pay requirements should be decreased by the action.

In setting forth conditions for approving the merger, Keith urged that CAB withhold issuance of the new cer-



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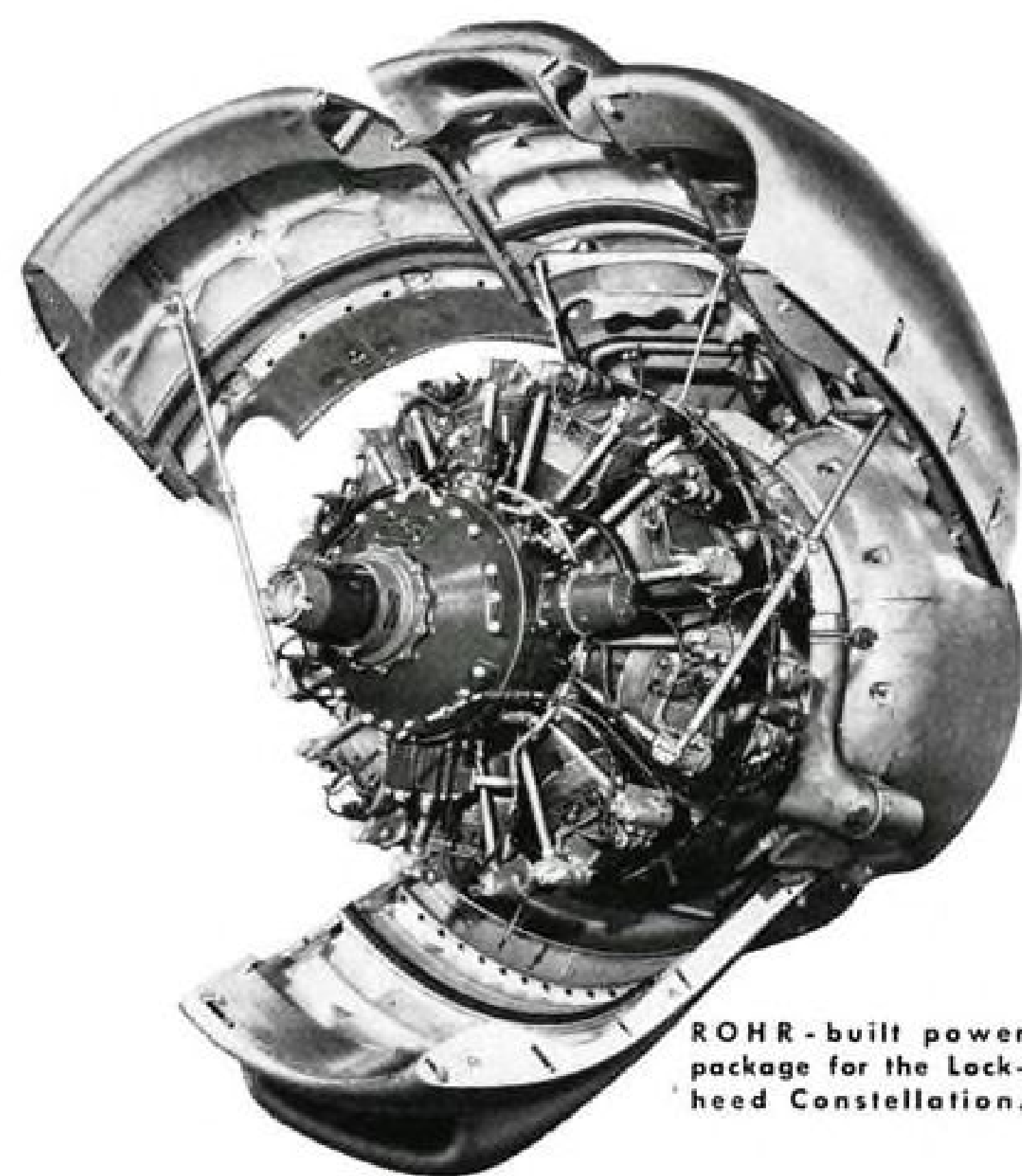
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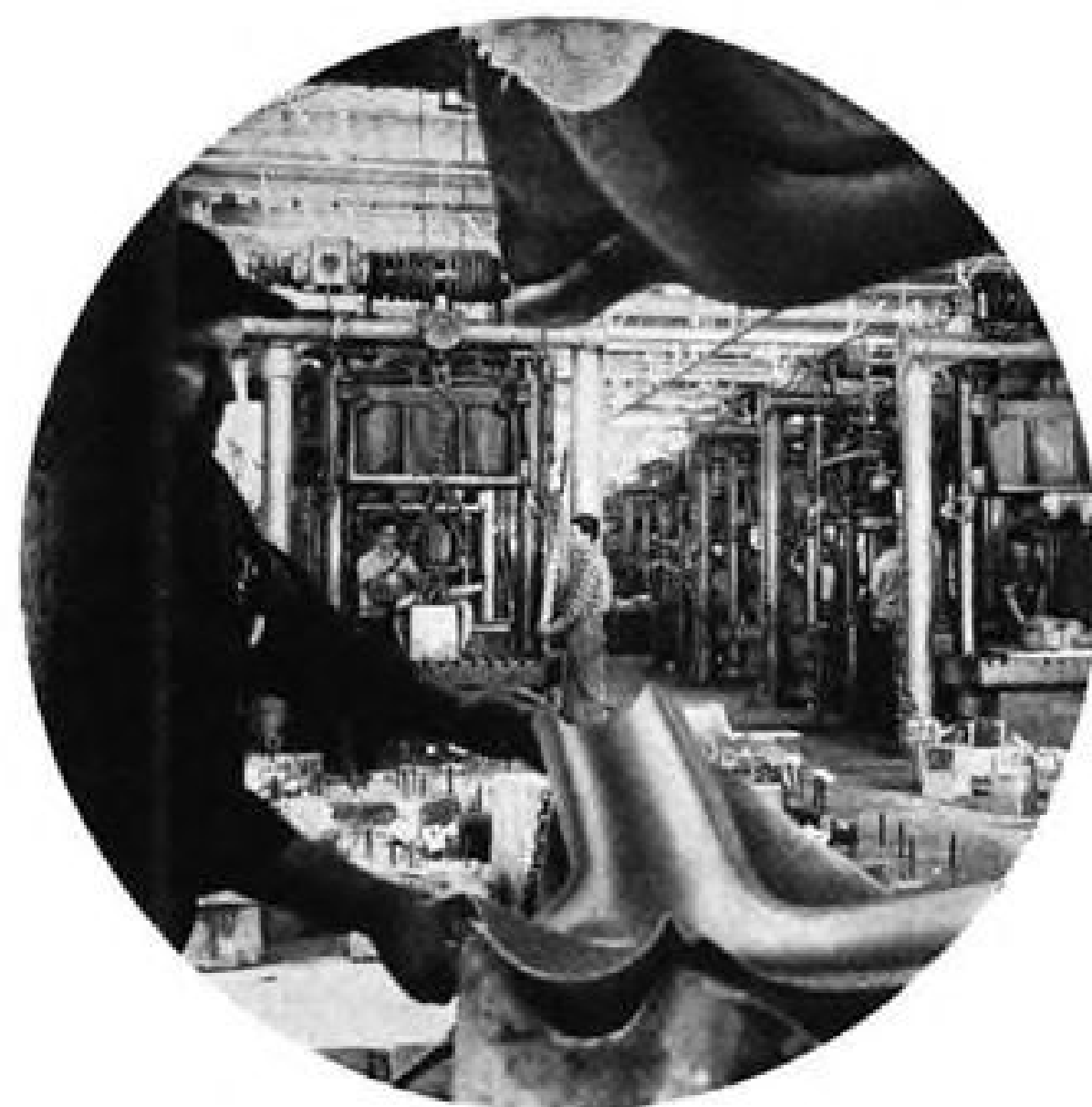
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tificate until Monarch shows it has adequate financial resources to operate the consolidated routes.

Monarch President Darr believes CAB will uphold the examiner's findings and approve the Arizona Airways acquisition shortly. CAB has wanted to experiment with a super-feederline for some time, selecting Parks Air Lines for that purpose in 1947 and 1948. But Parks was unable to activate its more than 4000 miles of midwestern short-haul routes, and allocation of its links to other carriers is now under consideration.

► **New Staff Assignment**—Meanwhile, as president and active head of both Monarch and Challenger, Darr has announced new company assignments.

R. M. Wilson, formerly executive vice president of Monarch, will be vice president-operations for the combined system; and Donald A. Duff, formerly president and board chairman of Challenger, will be vice president-traffic, sales and public relations.

Maj. F. W. Bonfils, board chairman of Monarch, will retain his position and financial interest. C. A. Myhre will be treasurer and administrative assistant to President Darr.

Flashing Lights For Night Flights

New rules requiring flashing lights on all night-flying aircraft are being considered by the Civil Aeronautics Board's Bureau of Safety Regulation.

Under current operating requirements, only scheduled airline transports are required to have flashing position lights. Other planes must have steady position lights.

Both CAB and the airlines feel that danger of collisions under night VFR conditions will be reduced by the proposed new amendments to Parts 41, 42, 43, 60 and 61 of the Civil Air Regulations. Specifically, the new rules require installation of a flasher device on all aircraft, and use of a two-circuit flashing position light system approved by the Civil Aeronautics Administration on all civil aircraft of 12,500 lb. or more maximum certificated takeoff weight, regardless of how they are used.

► **Small Plane System**—The single circuit system required on small aircraft consists of three lights: red on the left wing, green on the right wing and white on the tail. The two-circuit system is a six-light setup having, in addition to the three lights above, a white light on the top and bottom of the fuselage and a red light on the tail. These last three lights will flash alternately with the wing lights and white tail light on all planes of 12,500 lb. or more maximum certificated takeoff weight.

CAB said it had considered the cost of the required new equipment and decided it is negligible in view of the increased safety to be achieved. Inquiries by the Board disclosed that at least one mechanically simple flashing device for small aircraft costs between \$3 and \$4. Cost of the installation for large aircraft is considerably higher.

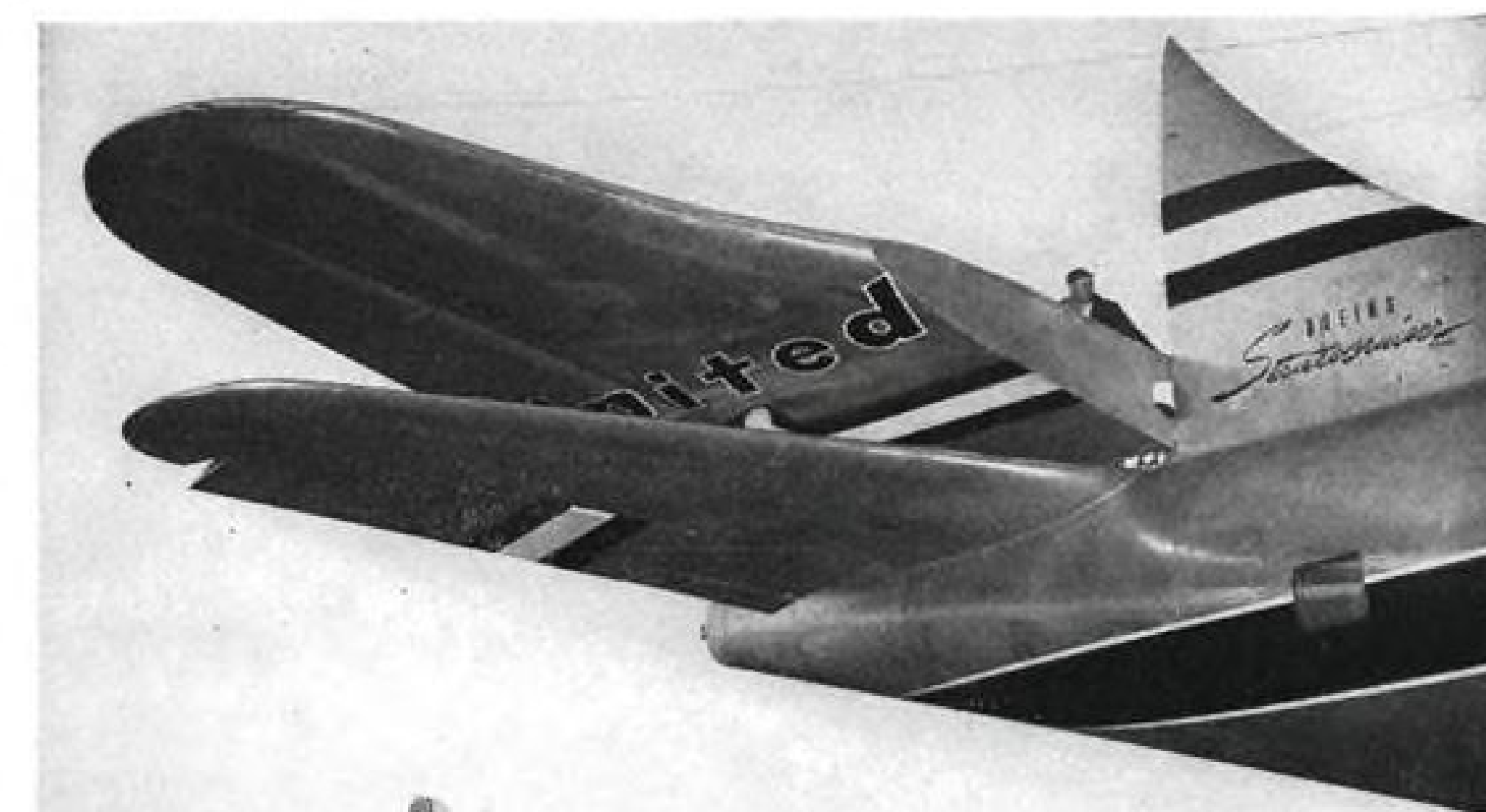
► **Military Converting**—Inclusion of the flashing light requirement in Part 60 of the Civil Air Regulations would require all military and foreign aircraft, in addition to U. S. civil aircraft, to display flashing lights. The armed forces have been converting their planes to a flashing light system, and all military aircraft will be so equipped in the near future.

Comments on CAB's flashing light proposal must be submitted by interested parties to the Board's Bureau of Safety Regulation by Feb. 1.

CAB Reports On Alaskan Crash

Pilot's action in going off the designated airway at an altitude insufficient to clear the terrain probably caused the Alaska Airlines accident near Homer, Alaska, Jan. 20, 1949, in which five occupants of a DC-3 were killed.

In issuing its official report on the mishap, the Civil Aeronautics Board said that the plane, flying in clear weather, crashed into a hill nine miles east of the center line of the airway to Kenai. Contributing cause of the mishap, the Board continued, was the failure of the Alaska Airlines' dispatcher to act when the pilot of the carrier's plane announced his intention to proceed VFR from Homer to Kenai.



STRATOCRUISER'S FOLDING TAIL

United Air Lines, which recently placed its Stratocruisers in service between the West Coast and Hawaii, finds the tail-folding feature on the new Boeings very handy. At its full height of 38 ft., 3 in., the tail would fit into nothing less than a dirigible hangar, UAL says. But in as little as 20 minutes the

vertical stabilizer and rudder can be folded over to reduce the height by 11 ft., 8 in., allowing the tail to slip through most hangar doorways. Top, left, mechanics rig jack to fold tail down; right, lowering operation starts; below, with tail folded, Stratocruiser can enter hangar.

Alaska Airlines' operating certificate requires an instrument flight plan for all night flights. CAB said the dispatcher knew of the flight's intention to proceed VFR 40 minutes before the accident. "If he had advised the pilot to change the flight plan, it is possible that the flight would have altered its course and altitude," the Board's report said.

CAB Moves Against 3 Large Nonskeds

Three more large irregular carriers have been ordered by the Civil Aeronautics Board to show cause why their letters of registration should not be revoked for knowing and wilful violations of the Civil Aeronautics Act.

Nonskeds involved are Air Transport Associates, Inc., Seattle; Economy Airways, Inc., New York, N. Y.; and Arctic-Pacific, Inc., Seattle. All were accused of operating flights with excessive frequency and regularity despite repeated warnings from CAB.

Air Transport Associates was cited for alleged violations on the Seattle-Anchorage, Alaska, run; Economy Airways on the New York-New Orleans, Houston route; and Arctic-Pacific on the Seattle-Fairbanks, Alaska, link. Economy was also charged with failing to report 14 flights allegedly made between July 26 and Sept. 25, 1949.

Maintenance Lease At Idlewild

Aircraft Maintenance International, Inc., has been granted a temporary permit for space for the repair and maintenance of aircraft at New York International Airport.

Company, negotiating with the Port of New York Authority for a lease and erection of a permanent hangar, has been using temporary quarters at Idlewild to service airline aircraft.

Extend Contract

Alaska Airlines' contract with the U. S. Navy for furnishing air transport to the Navy petroleum reserve at Point Barrow, Alaska, has been extended from Dec. 31, 1949, to June 30, 1950. Company has assigned three transport planes and nine bush aircraft exclusively to this contract.

Census Gets Wings

Airline personnel in stations outside the continental United States will be included in the 17th decennial population census, according to Philip M.

WAL Starts Nevada Coach

Western Air Lines is making it easier for Californians to wed quickly or try their luck at Nevada's gaming tables.

The carrier recently inaugurated daily roundtrip coach excursions between Los Angeles and Las Vegas, Nev., with fares 38 percent below the regular first-class rate. Coach tickets on WAL's 74-passenger DC-4s will be good for 15 days and cost \$19.90 roundtrip (slightly over 4 cents-a-mile) compared with \$33.70 roundtrip for first-class accommodations.

For a little extra, WAL will provide couples with a "packaged" marriage plan, including license, justice of the peace fees and use of the plane for the ceremony, with pilot and stewardess as witnesses. Couples leaving Los Angeles International Airport at 6 pm. via the new coach service can be back-married—5 hrs. and 10 min. later.

Hauser, acting director of the Census Bureau.

Pilots will carry with them individual census forms to be distributed among ground men at such remote points as Midway, Wake and Alaska. Count is scheduled to start Apr. 1.



FOR LAST MINUTE INFO

Example of on-the-spot improvisation in the airline industry is illustrated in the picture above. Western Air Lines stewardess Julie Miller sends up last-minute information to First Officer Bob Knowles with a gadget consisting of a long pole with a cylinder on the end.

New Canada Routes Delayed by Battle

Colonial Airlines' court battle against last June's U. S.-Canadian air transport agreement may delay activation of two new American routes into the Dominion which are provided for in the pact.

U. S. State Dept. has announced that an American carrier will not be designated to operate the direct New York-Toronto route, and the Canadian Air Transport Board will not be expected to license an American carrier for the Great Falls, Mont.-Edmonton link until the U. S. can grant authority for a Canadian carrier to fly between Montreal and New York. Colonial's court action, which contests the validity of last June's bilateral agreement, has prevented U. S. issuance of a foreign air carrier permit to Trans-Canada Air Lines for the Montreal-New York service.

► **Montreal Flights Discussed**—State Dept. representatives who discussed the problem with Canadian officials in Ottawa agreed that it is inequitable for Colonial to continue operating its New York-Montreal route while that company blocks TCA's proposed competitive flights. The U. S. decision not to press now for direct New York-Toronto or Great Falls-Edmonton operating rights coincided with assurances that the Canadian Air Transport Board will take no immediate action on its order requiring Colonial Airlines to show cause why its New York-Montreal license shouldn't be revoked (AVIATION WEEK, Dec. 12).

Colonial, which lost a lower court decision, has taken its battle against the U. S.-Canadian air transport pact to the Supreme Court. The case will be argued on Feb. 17.

Should the Supreme Court also rule against Colonial, the Civil Aeronautics Board will quickly submit to President Truman its recommendations concerning TCA's bid to operate between Montreal and New York. Colonial claims it would lose \$1 million annually in revenues if TCA starts competitive service over the link.

SHORTLINES

► **American**—Last year took a solid grip on airfreight leadership by flying 32,600,000 ton-miles, up 40 percent over the 23,204,000 ton-miles in 1948.

► **American Overseas**—Has moved its entire passenger and cargo service to New York International (Idlewild) Airport. Carrier has been operating its Stratocruisers from Idlewild since Aug. 17, but Constellation services remained

at LaGuardia pending completion of additional facilities at Idlewild. . . . Company's North Atlantic Stratocruiser service was extended this month to include Glasgow and Amsterdam.

► **BOAC**—Flew nearly 150,000 passengers in 1949, compared with 119,000 in 1948. Cargo increased from 3166 to 3969 tons.

► **Capital**—Expects a net profit of around \$1,400,000 in 1949 against a \$123,000 profit in 1948. Company showed net income of \$28,387 in November compared with a net loss of \$74,973 in the same 1948 month, and December operations were close to the break-even point. . . . Charter revenue last year reached a record total of \$586,940, up 87 percent over 1948. Carrier flew more than 50 college and professional football teams last year and has already signed up 20 grid teams for 1950.

► **Central Airlines**—Has contracted with Southwest Airmotive Co., Dallas, for overhauls on the Continental E-185 engines used in its Beech Bonanza feeder fleet.

► **Civil Aeronautics Board**—Has dismissed a complaint by Chicago and Eastern Illinois Railroad Co. against the four-cents-a-mile coach tariffs which Delta Air Lines and Eastern Air Lines made effective between Chicago and Miami on Dec. 15. The railroad said the air coach fares were unreasonably low.

► **KLM**—Next month will inaugurate new direct Constellation service from New York to Rome to tap Holy Year traffic.

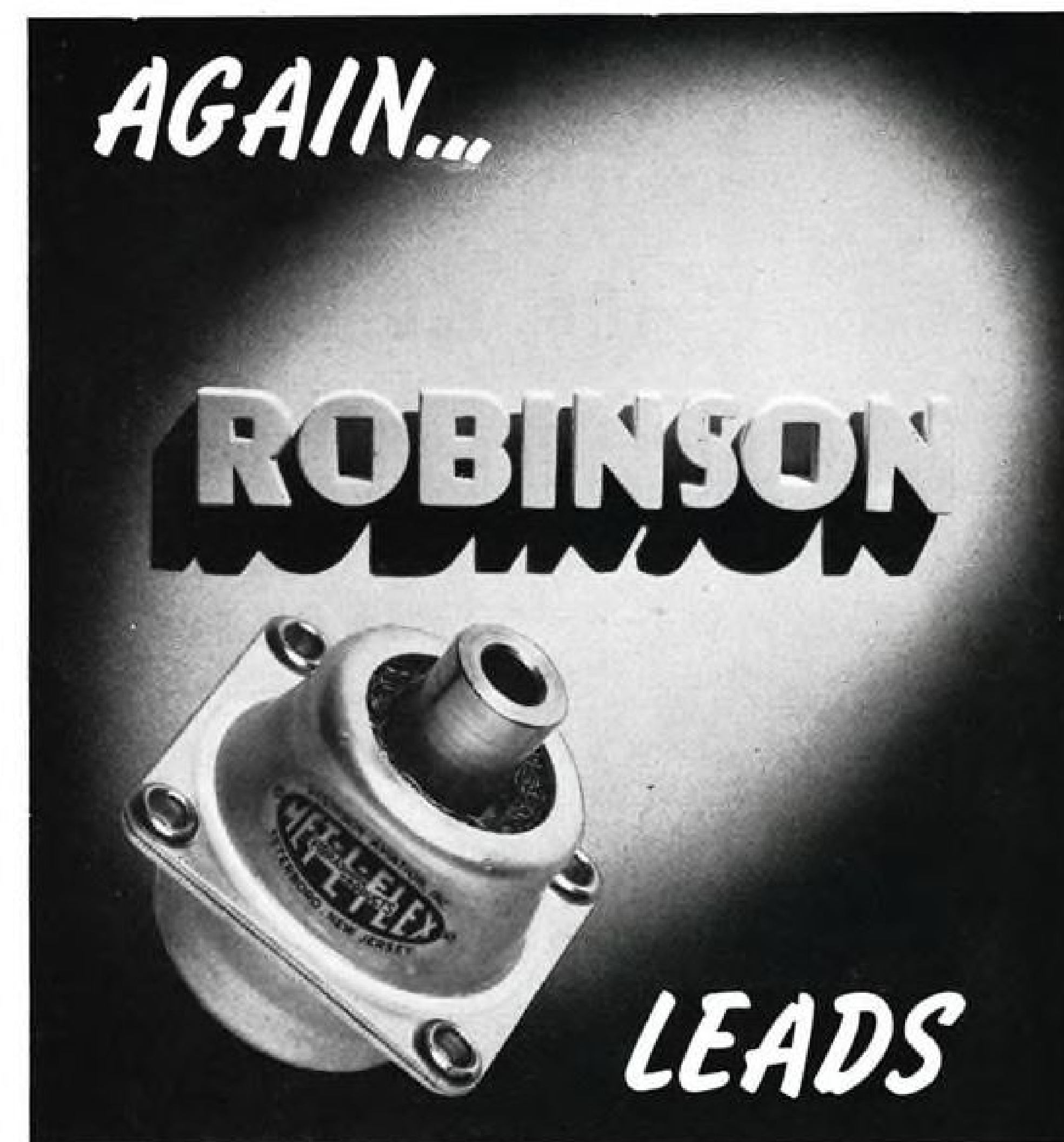
► **Midet Aviation Corp.**—The West Palm Beach, Fla., company has asked CAB for a certificate to operate scheduled service to West End, Grand Bahama Island, British West Indies.

► **National**—In the 12 days between Dec. 23 and Jan. 4 flew 37 percent more passenger-miles than in the same holiday period a year before. On three successive days—Jan. 2, 3 and 4—all previous records for a single day's traffic were topped. Passengers on the New York-Miami link alone more than doubled last year's total, and four extra coach sections were operated northbound on Jan. 2 and 3.

► **Northwest**—Claimed a new commercial speed record between the Twin Cities and New York when an NWA Stratocruiser made the flight in 2 hr., 38 min., an average of 400 mph.

► **Pacific Alaska Air Express**—CAB has been unable to find sufficient evidence to determine the probable cause of the PAAE DC-3 accident on Nov. 4, 1948, in which the plane with 15 passengers and two crewmen disappeared on a flight between Yakutat, Alaska, and Seattle.

► **Pan American**—This month planned to inaugurate a twice-weekly, tourist-



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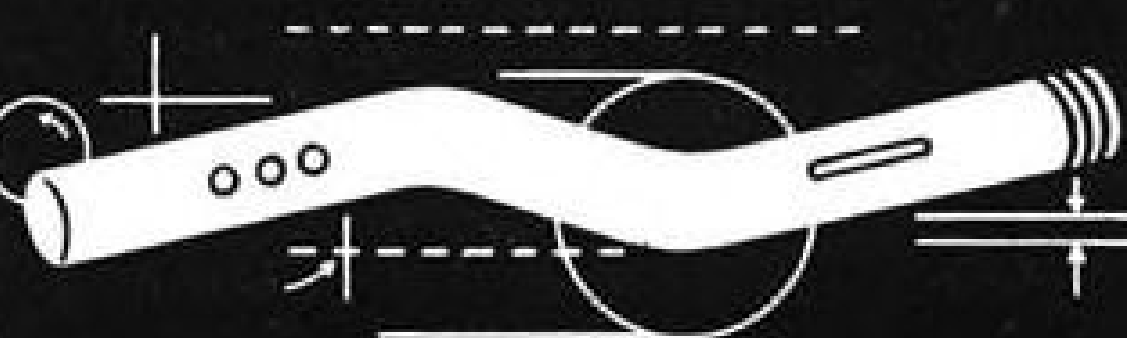
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class service from Houston and New Orleans to Panama with fares 25 percent below regular rates. DC-4s used on the run will have removable seats for greater passenger-cargo flexibility.

► **Trans-Texas**—Following protests by Braniff and Eastern Air Lines, CAB has suspended TTA tariffs proposing extension of cut-rate family fares to every day of the week but Friday (AVIATION WEEK, Jan. 9).

► **TWA**—Domestic passenger traffic during the Christmas holidays was 14 percent below the previous year, and New Year's traffic slipped 23 percent.

► **United**—CAB has suspended for 90 days, pending investigation, a UAL tariff providing five-cents-a-mile fares for certain Chicago-Seattle and Los Angeles-Seattle DC-4 flights in which cargo was to be cabin-loaded.

► **U. S. Airlines**—The certificated all-cargo carrier has placed advertisements in New York papers asking Miami-bound passengers why they should pay premium rates on their baggage when U. S. will fly it with next morning delivery at a rate of \$10.40 per 100 lb.

► **Western**—Set a new record for one-day passenger volume carried out of Los Angeles on Jan. 3, when it enplaned 789 persons.

CAB SCHEDULE

Jan. 23—Oral argument on enforcement action against Viking Airlines. (Docket 3447)

Jan. 23—Hearing on air freight accumulation, assembly and distribution tariffs. (Docket 1705 et al)

Jan. 23—Hearing on Cuba-Florida foreign air carrier permit case. (Docket 3717 et al)

Jan. 23—Prehearing conference on TWA and American Overseas Airlines requests to suspend service at Philadelphia on trans-Atlantic routes. (Dockets 4228 and 4229)

Jan. 23—Hearing on enforcement action against New England Air Express. (Docket 4115)

Jan. 25—Hearing in National Airlines route transfer case. Postponed from Jan. 17. (Docket 3500 et al)

Jan. 30—Hearing in Trans-Texas Airways certificate renewal case. (Docket 3720 et al)

Feb. 1—Hearing on application of Transportes Aereos Nacionales for Honduras-Miami foreign air carrier permit. (Docket 4022)

Feb. 6—Hearing in Colonial Airlines mail rate case. (Docket 2724)

Feb. 6—Hearing in New York area helicopter case. Docket 946 et al)

Feb. 13—Hearing on Eastern Air Lines and National Airlines summer excursion fares. (Docket 4166)

Feb. 20—Hearing in West Coast Airlines certificate renewal case. Postponed from Feb. 13. (Docket 3966 et al)

Feb. 24—Hearing on CAB's enforcement action against Meteor Air Transport. (Docket 4100)

Feb. 27—Hearing in Panagra mail rate case. (Docket 2755)

Mar. 6—Hearing on Twin Cities-Washington and Detroit-Washington through service investigation. (Docket 3661)

Mar. 14—Hearing on enforcement action against Peninsular Air Transport, Associated Airlines Agency and National Air Coach Systems. (Docket 4084)

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DESIGN AND Development Engineer. Old established midwest manufacturer desires experienced engineer to design fuel, hydraulic, and pneumatic valves for aircraft. Please give detailed information of practical experience, education, salary desired and pertinent data. P-1887, Aviation Week.

DIRECTOR OF Aeronautics, Wisconsin State Aeronautics Commission. Non civil service. Salary set by statute not to exceed \$7,000 per annum. Director reimbursed for traveling and other expenses incurred by him in discharge of official duties. Must have executive ability and experience in aeronautics. Prohibited by statute from having pecuniary interest in or any stock or any bonds of any civil aeronautical enterprise. Complete details of training and experience required. Applications accepted until February 15, 1950.

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SALES-PROMOTION. Regional sales manager, assistant to general sales manager of leading personal aircraft manufacturer. Airline background 7 years. Operation, sales and trans-oceanic navigator. Proven sales ability. Pilot. Age 33. A-1 references. PW-1971, Aviation Week.

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12	R-1820-87	Wright Aircraft Engines (boxed)
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6	R-1820-71	Wright Aircraft Engines (boxed)
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BIDS WILL BE OPENED 2:00 P.M., JANUARY 27, 1950—LODWICK AIRPORT, LAKELAND, FLA. (Inspection will be between 10:00 a.m. and 4:00 p.m., January 9 through January 26, 1950, except Saturdays and Sundays).

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OFFICIAL PROPOSAL

Bids: March 1, 1950 (100)

Operation of Airport NOTICE TO BIDDERS

Sealed bids will be received by the Cumberland Municipal Airport Commission for the operation of the whole or any part, or anyone connected therewith, of the Cumberland Airport up until February 3, 1950, at 7:30 P.M. Period of operation would start March 1, 1950, and extend for a year or more.

The airport is located slightly more than a mile from the center of Cumberland, Maryland, a city of over 40,000 population and a wide trading area. The airport area contains three (3) paved runways (one over a mile long), twenty-one (21) individual hangars, two (2) larger buildings, as well as an office and an apartment. Evidence of sufficient financial backing must be exhibited.

Proposals will be received in any form. Additional information may be secured from Mayor Thomas S. Post, City Hall, Cumberland, Md.

Bids should be addressed to T. Donald Shires, Secretary, Municipal Airport Commission, City Hall, Cumberland, Md.

The Municipal Airport Commission hereby reserves the right to reject any and all bids.

MUNICIPAL AIRPORT COMMISSION
T. Donald Shires, Secretary

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A NEW HIGH IN EMPLOYE RELATIONS—We could make references to crude, gushing or oily conditions at Continental Air Lines' general offices in Denver but no, just read a special press release to this colyum from the airline's news bureau:

"Employee relations are peachy around Continental's general offices. It seems Robert F. Six, president, and independent oil producer with wells in Wyoming and Utah, turned over ownership of a potential-producer well in Skull Creek, Wyo., to a group of CAL pilots, clerks and department heads.

"Costs of drilling were underwritten by the employees, with half of one percent ownership parceled out for each \$250 invested. Receipts from the first producer were to be reinvested in the drilling of four additional wells on the property owned by Six, and leased by him from the Morton Oil Co.

"Within 48 hours after arranging for the employee purchase, entire costs of drilling on the first well were raised. One week later, the well 'came in' with about 50 barrels a day of highest grade crude.

"Now, the 'Oil Men' at Continental are looking forward to drilling four remaining wells, and the welcome addition to the income of 'white collar' workers in an industry that has never been noted for its high salaries."

* * *

ALL ABOUT BUCK'S SARDINES—TWA's bustling Pilot Bob Buck writes us a saga about his wandering can of sardines:

"Airline pilots find Cairo food particularly bad, so we often take canned stuff along to tide us over on the two-day layover there. I got a can of sardines in the local Westfield, N. J., market, took them along in my navigation kit when I left New York scheduled for Cairo.

"Got to Paris and instead of going on was turned back to New York, so the fish too came back.

"Next trip to Cairo the sardines came along again.

"Got to Cairo, but so late I had a quickie turnaround and didn't get a chance to eat the sardines.

"Left Cairo and went to Lisbon. Looked at the can in Lisbon and discovered the sardines had come from Portugal in the first place.

"We finally ate them en route between Gander and New York for an early morning snack."

* * *

"SP" CRASHES READERS DIGEST—Readers everywhere are asking if we know about page 19 of the January Readers Digest. That little periodical reprints an item sent this colyum by United Air Lines' Dick Rummel several months ago about the hurried and harassed San Francisco air traveler who boarded a sightseeing bus instead of an airport coach and got himself a two-hour tour of Chinatown.

* * *

SQUARING THE CIRCLE—In case you hadn't heard it before, Charlie Adams, our transport editor, reminds us that Capital Airlines has become the only carrier to operate a DC-4½. They painted a square of gray around the circular windows of two DC-4s and edged the gray with a white stripe. Result, to casual witnesses—a DC-6.

* * *

INSIDE STORY OF A HUMOR CLASSIC—Not content with its public service in locating lost people, this colyum is identifying creators of what previously were anonymous humor classics in aviation literature. Following our publication here Dec. 12 of the scientific burlesque, "Through the Sonic Wall," R. H. Johnson of General Electric Company's research laboratory crashed through with the name of the author. He is C. Darby Fulton, Jr., formerly of GE's research lab and now doing graduate work at M.I.T. "The article several years ago was sent to A. J. Nerad in a letter from Mr. Fulton. Mr. Nerad, developer of our turbojet combustion systems, is the Tony mentioned in the article."

In fairness, we should add that David H. Jaffe, assistant in aeronautical engineering on the faculty of the University of Illinois, deserved credit for sending us the first version of the piece that we saw, but we misplaced it and used another, later contribution. Jim Bowser, flight test engineer at Lockheed, also sent us a copy.

—R. H. W.

WHAT'S NEW

New Book

"Slipstream—The Autobiography of an Air Craftsman" by Eugene E. Wilson belongs with the late Gen. H. H. Arnold's "Global Mission" on the book shelf of the student of aviation history. For in the first half of this book the beginnings and development of Naval aviation are well and interestingly told by one who played an important role in shaping that development.

Mr. Wilson displays ability as an anecdotal historian in telling of his assignment to "assist" Charles A. Lindbergh on the latter's return from Europe in 1927 and of some of the ways used to keep United Aircraft alive in the lean prewar days, and in many other instances.

Recounting his Navy days and his industry missionary work after the war, the author makes a brilliant case for Navy air vs. long-range strategic bombing. And his comments on this likely will renew the controversy that seemed officially ended with the House Armed Services Committee's report on the B-36 squabble.

Mr. Wilson decided to write his autobiography, he says, because he became "convinced that (the) situation called for a new book on aviation, a sort of bible of air power, or at least its gospel." However, nowhere in the book is a thesis set forth clearly, simply and concisely. It would seem that Mr. Wilson's view is that air power should follow the historic pattern of British sea power: Air commerce protected by air force. The impression left by the book is that he feels the common American opinion to be that air power should be military supported by commercial aviation.

It could be debated whether that is the widespread American opinion, in the light of the many speeches, pamphlets and books issued in recent years, and the platform furnished civil air power by the international conference in Chicago in 1944. Unexpectedly, for anyone professedly writing a bible or gospel of air power, Mr. Wilson devotes less than a paragraph to the Chicago conference.

The book can be read profitably and enjoyably without too much attention to the air power doctrine intended to be advanced—and most of it is enjoyable reading.

"Slipstream" is to be published Feb. 7 by Whittlesey House, 330 West 42 Street, New York City, price \$4.50.

—W. K.

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AVIATION WEEK—JANUARY 23, 1950

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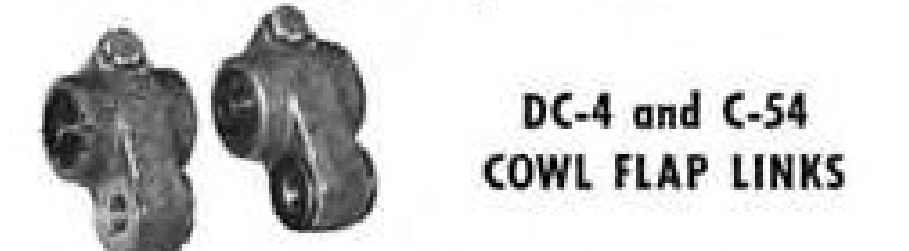
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A lot of passenger remarks floating around these days about rides in "vibrating old ships pressed into rush service," may be causing grey hairs in the industry, but the situation does show that the all-important passenger has developed a "deep-seated" sixth sense where flight comfort is concerned! A quick way to get to the bottom of this problem is to check a prime source of vibration at engine and accessory mountings this easy, economical way . . . specify Moulton Vibration Mount Kits, or order individual parts as required . . . a correct step towards increased passenger and crew comfort! Only top quality, new parts for DC-3, C-47, available for immediate shipment! Order Today!



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LETTERS

Copter Financing

Your comments on the editorial page of the January 9 issue of AVIATION WEEK, under the by-line of "How to Promote the Helicopter," discuss a topic close to our hearts. On reading your editorial I recall 1945 and 1946, and again in 1947, when our young company trudged into office after office looking for (at least) some helpful advice. As you know, our quest for working capital to carry our developments through production, carried us from coast to coast. Whether in New York, Chicago, Los Angeles or San Francisco, the answer was still the same.

In certain respects, I guess we had no one to blame except ourselves; after all, we were young, the product was young, and there was no guarantee. All we had to show was a few motion pictures and other tangible information on our past helicopter developments. There was another factor which we learned from the mouths of those who should know. As legend might have it, it is different now than 25 years ago. The coffers of venture capital have dwindled and disappeared.

Confronted with this indifference, and faced with the problem of not being able to raise adequate working capital through usual and accepted channels we carried our financial problem to the small investors of northern California. Through personal appeals and personal contact, we were able to raise over \$3 million. As far as we know, the money invested in United Helicopters today is the only public equity financing of its kind in the aircraft field since the war. United Helicopters, Inc., a California corporation, has over 4800 stockholders, the greater majority of whom are located in the immediate San Francisco Bay area. . . .

Yes, some of the skeptics were right—it was a risk and we have lost money, but, have we really lost? In fact, we gained to the extent of not losing as much as might have been expected. We have established a going production line and a world-wide system of sales and service, with a product proven in practically all fields of industrial and agricultural application.

How to promote a helicopter? That is an excellent question which only time can tell. . . .

STANLEY HILLER, JR.,
President
United Helicopters, Inc.
1350 Willow Road
Palo Alto, Calif.

Unhappy Stockholder

I would like to comment on your article, "How Fair Is the PAA-AOA Deal" in your Dec. 12 issue. First, let me say I am the owner of 25 shares of American Airlines common stock bought in October 1948.

According to the 1948 AOA annual report, the stockholders of AOA were notified by letter dated Jan. 10, 1949, that on Dec. 13, 1948 the company had entered an

agreement with Pan American to sell American Overseas Airlines to PAA. Unless they had read about it in the daily papers, this was the first notice the stockholders had that their company was to be sold.

The only notice I received, as an AA stockholder, was in the 1948 annual report received in 1949. As American Airlines is the majority stockholder in AOA and as it has been said that AOA is the only subsidiary of AA that operates at a profit, it would seem to me that the AA stockholders should have an opportunity to vote on this before it was negotiated. The stockholders of AA have had no chance to vote on it. I am enclosing the AA annual stockholders notice of meeting for May 17, 1949, and you will note that it does not say anything as to the proposed sale.

I attended that meeting but thanks to my plane being a half-hour late I did not arrive until 11.30 a.m. I was told the voting was over and all the business had been transacted. I was not given a resume of what had taken place.

The report of the meeting sent to the stockholders was an outrage in that it did not tell a single thing that had occurred at the meeting. All it stated was that the board of directors had been re-elected. So it amounts to this—a stockholder of American Airlines knows absolutely nothing about how the company is being run except what he reads in the papers or gets out of the annual report.

Mr. R. S. Damon has said the deal was made in secrecy; in view of the above, I agree with him.

I wrote to the CAB objecting to the deal and in reply I received a letter from Mr. O'Connell, the CAB chairman, advising me to have an attorney present my objections. I am led to wonder if the ordinary citizen has no right to present his views without engaging a lawyer. If this is true, one can easily understand why CAA and CAB decisions take so long. If they would eliminate the long-winded lawyers maybe aviation would advance a lot faster than it has in the last decade.

Let me comment further on the AA stockholders meeting I attended. The board of directors were conspicuous by their absence. I believe there were only a couple of them there.

I asked C. R. Smith when he was going to start coach service and his reply was that there wasn't enough data out that would convince him that it was a paying proposition. This from the man who wrote an article for the "Saturday Evening Post" entitled, "What America Needs Is a 3-Cent Airline." Also this was after Mr. (J. H.) Carmichael had stated that coach service had taken his company, Capital Airlines, out of the red in the previous year. Now I see Mr. Smith is starting a limited coach service to the west coast. . . .

I own stock in a number of other companies but none of them practices the secrecy that American Airlines does. Even one that has not paid a dividend in years sends

its stockholders a very complete report of what happened at the meetings. Some of them even send statements with the dividends telling of news of the companies' affairs. If what I saw at American's meeting is typical of the industry, then it is high time to cut out that nonsense and get down to earth. It is no wonder airline stocks are considered speculative.

WILLIAM H. MOESEL
258 Franklin Avenue
Brooklyn, 5, N. Y.

Asks Suppliers' News

I have read with interest AVIATION WEEK since its first issue. . . . I was on the staff of "Aviation" during 1927 and 1928 and contributed to "Aviation" for some years afterward. I want to take this opportunity to congratulate you on the excellent job you have done in shaping up a publication of this type. For some years I have felt the need for such a publication and at one time contemplated trying to organize one. . . .

I wonder if you would mind if I made a suggestion. . . . I feel that the emphasis on the airplane as a military vehicle has been over-stressed to the point where the present conception of the weapon is distorted by the background of the original need of having a flying machine.

Today the fact that it flies is automatically accepted but its ability to perform the tactics for which it was intended is the major problem. The ability to perform these tactics is dependent upon the equipment installed in the vehicle.

This equipment no longer is a group of "on-off" devices but is a complicated, inter-related device and system involving many complete servo systems, electronic detection devices, etc. . . .

This puts an increased emphasis on the accessories and the equipment carried in the airplane and for that reason I feel that there should be an increase in the amount of space in the trade publications given to the accessories making up this equipment.

Our firm is one of many supplying equipment for practically every airplane, but the industry and most airplane designers know comparatively little about the problems of creating and supplying such equipment.

These accessory manufacturers are justified by their ability to specialize efficiently in certain pieces of equipment and certain phases of the total system and put more time and money into them than could any individual airplane manufacturer, and I feel sure that with a better understanding on the part of the airplane manufacturer of the available equipment and the possibilities and limitations of the equipment, there will be better airplanes and a better industry, which I believe is our objective and yours. . . .

RICHARD M. MOCK, President
Lear, Inc.
Grand Rapids, Mich.



flight instrument with a mind

The Sperry ZERO READER* is a new type of gyroscopic flight instrument. It combines attitude, altitude, heading and radio path information on a simple two element indicator which tells the pilot exactly how to move the flight controls of his airplane.

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of All-Weather Flying Division, USAF and the Air Transport Association, the ZERO READER takes its place among other Sperry "firsts"—the Gyro-Horizon, Directional Gyro, Gyrosyn Compass and Gyropilot. Like these precision instruments it reflects in its performance the laboratory research and careful flight testing which have contributed to

marked advancements in instrument flying.

• The ZERO READER is another example of Sperry's pioneering in equipment to help make air travel increasingly independent of weather for it is the only manual system which approaches the performance of stabilized automatic flight control.

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1903

Alcoa Aluminum took wing with the Wrights at Kittyhawk

People said it wouldn't fly, because it was heavier than air. But when the Wright brothers' famous "flying machine" skimmed over the dunes at Kittyhawk, N. C., nearly 47 years ago, aluminum helped it start the Age of Aviation. Aluminum from the Pittsburgh Reduction Company—which later became Alcoa—was used for the crankcase and waterjackets on the Wright plane. The precious pounds it saved helped make the first flight possible.

1950

Alcoa pioneers again with Extruded Aluminum 'Copter Blades

Today another type of "flying machine"—the helicopter—is finding wide usefulness in air transportation. Besides numerous applications in engine and airframe, Alcoa Aluminum now is being used for rotor blades. Special high-strength extrusions, produced by Alcoa, give the new blades improved performance.

Whatever your requirements, look to Alcoa as your "Flight Metal Headquarters". ALUMINUM COMPANY OF AMERICA, 1800A Gulf Building, Pittsburgh 19, Pennsylvania.



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