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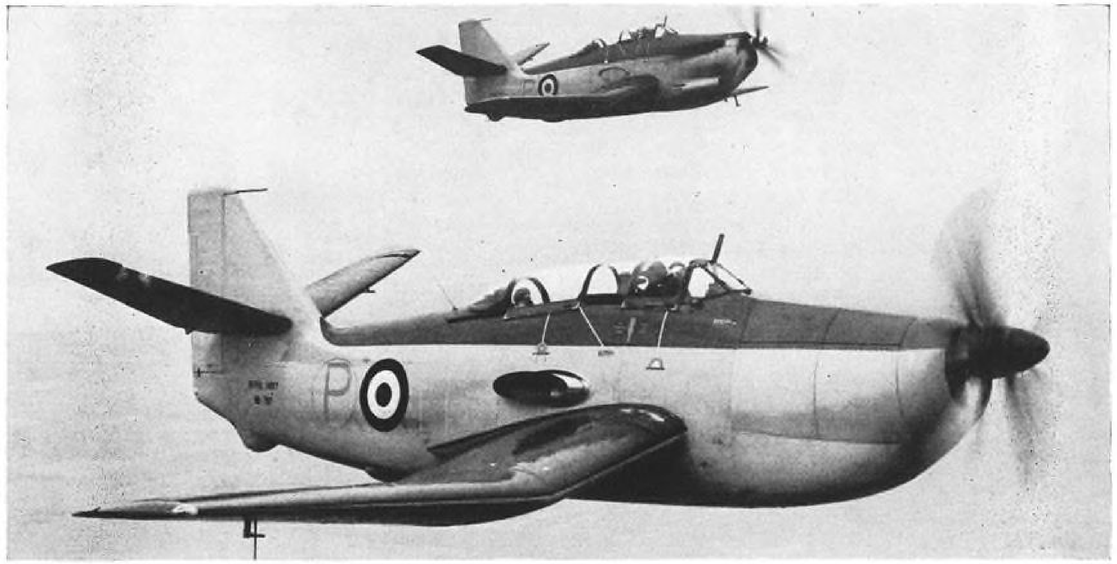
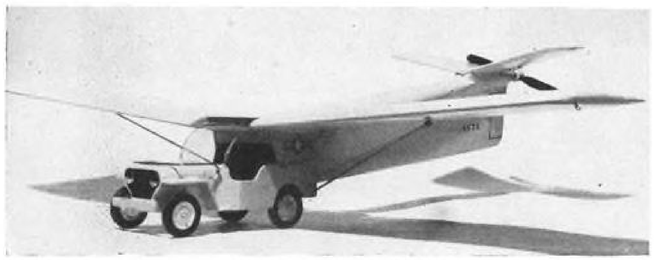
News Picture Highlights . . .



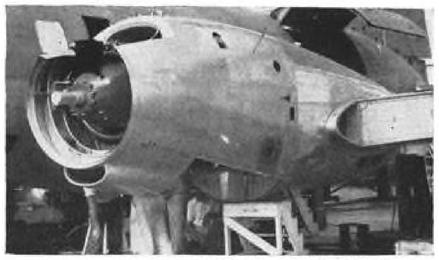
BLACKBURN ANTI-SUB PLANES PASS TESTS

Two similar prototypes built by Blackburn and General Aircraft for anti-submarine warfare fly a formation permitting comparison. The plane in the foreground is designated the Y.B.1 and is powered by an Armstrong Siddeley Double Mamba turboprop and has counter-rotating props. Note exhaust under cockpit for residual thrust. In the background flies a prior model (Y.A.5) powered by a Rolls-Royce Griffon piston engine. Y.A.5 also has jet outlet installation but it has been blocked off.



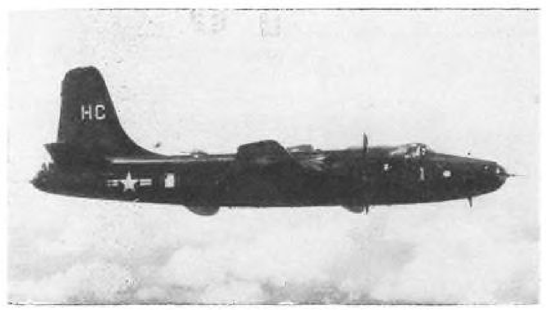
MEET THE FLEEP

Embodying the characteristics of the Taylor Aerocar flying automobile is this proposed military adaptation featuring a military Jeep car. Aerocar, Inc., of Longview, Washington visualizes the combination as providing the military with an air-transportable invasion vehicle.



TURBOLINER ENGINE MOCKUP

Mockup Allison 501 (T-38) turboprop is seen installed in the Convair Turboliner being built for Allison division of General Motors. The nacelle incorporates a built-in monorail as a maintenance aid.



NAVY ACCEPTS MERCATOR

A Martin P4M-1 Mercator patrol bomber, with a Navy crew aboard, is flown on delivery to Squadron VP-21. The P4M is powered by two P&W R-4360s and two Allison J-33s, is heavily armed, and carries extensive radar for search and bombing.

NEW CORSAIR NIGHT FIGHTER

Vought's F4U-5 has added a radome to its starboard wing and a new letter to its designation—N for night fighter. The craft is armed with four 20-mm. cannon. Several Corsair models are seeing action in the Korean theater.

AVIATION CALENDAR

Aug. 7-18—Special two-week program on high temperature ceramics, Massachusetts Institute of Technology, Cambridge, Mass.

Aug. 7-20—First United States International Trade Fair, Chicago.

Aug. 14-16—National West Coast meeting of the Society of Automotive Engineers, Hotel Biltmore, Los Angeles.

Aug. 19—Tennessee air progress conference, Knoxville.

Aug. 20—California Air Freight Clinic, sponsored by Calif. Aeronautics Commission and Oakland Chamber of Commerce Aviation Committee, Oakland.

Aug. 25-27—Fourth Annual Air Force Assn. national convention, Hotel Statler, Boston.

Sept. 5-10—Eleventh flying display and exhibition, Society of British Aircraft Constructors, Farnborough airfield, England.

Sept. 7—Pratt & Whitney distributor operation and maintenance meeting, Pacific Airmotive Corp., Linden, N. J.

Sept. 9-10—Third annual convention of the California Wing of the Air Force Assn., Arrowhead Springs Hotel and Spa near San Bernardino, Calif.

Sept. 10-14—Instrument Society of America instrument conference and national exhibit, the Coliseum, Houston, Tex.

Sept. 12-14—Conference on ground facilities for air transportation, Massachusetts Institute of Technology, Cambridge, Mass.

Sept. 18-22—Fifth national instrument conference and exhibit, Memorial Auditorium, Buffalo, N. Y.

Sept. 19-21—Joint meeting on navigation and electronics, sponsored by the Institute of Navigation, the Radio Technical Commission for Aeronautics and the Radio Technical Commission for Marine Services, Hotel Statler, N. Y. C.

Sept. 25-27—1950 national electronic conference, Edgewater Beach Hotel, Chicago.

Sept. 28-30—Aeronautic meeting and aircraft engineering display, Society of Automotive Engineers, Hotel Biltmore, Los Angeles, Calif.

Sept. 28-30—14th annual convention of International Northwest Aviation Council, Sun Valley, Idaho.

Oct. 12-13—1950 conference on airport management and operations, Max Westheimer Field, North Campus, University of Oakland, Norman, Okla.

Oct. 16-20—1950 annual general meeting of the International Air Transport Assn., Fairmont Hotel, San Francisco.

Oct. 24-25—Third biennial Materials Handling Conference, sponsored by Westinghouse Electric Corp., Hotel Statler, Buffalo, N. Y.

Oct. 25-26—Flight Safety Foundation annual Safety Seminar, Denver, Colo.

Nov. 29-Dec. 1—Eight annual meeting of Aviation Distributors and Manufacturers Assn., Ambassador Hotel, Los Angeles.

PICTURE CREDITS

16—McGraw-Hill World News; 45—McGraw-Hill World News.

NEWS DIGEST

DOMESTIC

Stephen T. Early, Deputy Secretary of Defense, has agreed to stick to his post another three months because of the Korean situation. He was scheduled to leave government service the first of this month. Top Pentagon sources indicated that his replacement would have been Frank Pace, present Army Secretary.

Aircraft shipments for May measured in airframe weight, were 3,583,500 lb., according to the Bureau of the Census and CAA, with 86 percent going to military customers. Engines shipped came to 4,488,000 hp., with 96 percent going to the military. May shipments of civil planes amounted to 377 valued at $7.8 million, compared with April's 329 planes valued at $6.4 million. Airframe employment was up slightly to 165,273, and engine plant employment also showed a slight increase.

Personal and executive plane shipments (1-10 place category) by eleven companies came to 351 during June, with 109 being one- and two-place craft. Net billing price value is calculated at $1,987,000. Previous month's shipments by eleven companies totaled 359 worth $1,702,000. Exports for June of personal and executive planes of 5000 lb. and under came to 29 planes valued at $221,886.

Martin's 2-0-2A, being built for and leased to Trans World Airlines, have been certified by CAA for a gross takeoff weight of 43,000 lb. The original guaranteed gross for the planes had been 41,600 lb.

Eastern Air Lines has signed a $500,000 contract with Texas Engineering & Manufacturing Co. for major overhaul and modification of 10 EAL passenger and cargo DC-4s. Work will be completed by December.

Strike vote of Eastern Air Lines ground maintenance employes approved strike by 93 percent, but International Association of Machinists, to which the workers belong, said Aug. 20 would be the earliest a walkout could occur. Union and airline have been unable to agree on wage terms. Negotiations for the 2400 employes began last October.

A large contract for communication and navigation equipment has been awarded Collins Radio Co., Cedar Rapids, Iowa, by TWA. Contract covers equipment for TWA's Martin 4-0-4s, and for completing omnirange installations in the airline's present Constellation fleet.

FINANCIAL

Curtiss-Wright Corp. reports profit of $1,838,647 for three months ending June 30 on sales of $32,779,747. Included in this profit was a Wright Aeronautical net for the period of $987,830 on sales of $18,965,668. For the first six months of this year, C-W profit amounted to $3,385,267 on sales of $63,486,744, with Wright accounting for $2,037,060 in profit and $37,602,406 in sales.

Western Air Lines reports net profit of $188,110 for the first half-year on total operating revenues of $6,620,720. Compared to a year ago, revenue miles flown increased 34 percent and revenue passenger miles flown rose 58 percent.

Solar Aircraft Co. reports for the fiscal year ended April 30, 1950, profit of $1,104,066 on sales of $21,488,335. For the preceding year, profit was $1,203,287 on sales of $17,376,199.

Consolidated Vultee Aircraft Corp., reports profit for the six months ending May 31 of $4,466,527 on sales of $146,000,000.

Capital Airlines turned in a profit for the six months ending June 30 of $300,260 on total operating revenues of $13,414,248. Operating revenues for June reached an all-time high of $2,606,896, and revenue passenger miles of 41,182,232 for the month also set a new mark.

INTERNATIONAL

BOAC has worked out a special deal with Sperry Gyroscope Co., Ltd., England, to obtain an unspecified number of Sperry Zero Readers for priority installation in the de Havilland Comet and other aircraft.

Avro Ashton four-jet airliner is slated to be one of the 60 different types of planes scheduled for display at the Society of British Aircraft Constructors' Farnborough Show Sept. 6-8. The Ashton is a derivative of the Nene powered Tudor prototypes, and six have been ordered by the Ministry of Supply for "research into the characteristics of high-altitude jet flight."

WHO'S WHERE

In the Front Office

Lyman H. Ford has been named president of Pioneer Parachute Co. and **Henry R. Mallory** has been appointed chairman of the board. Ford dates his parachute experience back to 1922 when he was a chief petty officer at Pensacola and was assigned to the Air Corp's parachute school for a course of instruction. In 1926 he joined the Irving Air Chute Co. and later became connected with Pioneer where he has been vice president since 1938. Mallory had been president and treasurer of Pioneer since 1938 and also is executive vice president and treasurer of Cheney Brothers.

Floyd Durham has been made vice president-production of Caldwell Industries, Inc., Kent, Ohio, makers of electric wiring harness for the aircraft and other industries. He was formerly associated with Packard Electric division of General Motors Corp.

Changes

Dr. Nicholas J. Hoff, noted aeronautical scientist, will become head of the department of aeronautical engineering and applied mechanics at Polytechnic Institute of Brooklyn on Sept. 1.

J. R. Robertson has been appointed superintendent of airways and airports of the Department of Transport, Ottawa, replacing **Maj. Robert Dodds**, recently promoted to controller of civil aviation.

Martha S. Sellers has been named assistant to the executive vice president of the National Air Council.

► **Among the Manufacturers**—**George Anderson** has been put in charge of foreign sales and publicity for Hawker Aircraft Co. . . . **Samuel McConnell** has joined Stratos Corp. as personnel director . . . **Herman Pusin** has been named chief of the structures department, Glenn L. Martin Co. He replaces **Joel M. Jacobson**, resigned . . . **E. S. Stafford**, Beech Aircraft director of sales has resigned to become proprietor of the Spencer Trailer Co. at Augusta, Kans. **Leddy Greever** and **Mike Neuburger** continue as domestic and foreign sales managers respectively. **Harold B. Nelson**, formerly associate editor of Air Force Times, has joined Beech as chief of the news bureau and publication section . . . **E. D. Wilgus**, sales engineer for Cherry Rivet Co. in upper New York State, has moved to Scarsdale, N. Y., to take charge of the company's sales and service organization in that territory.

► **With the Airlines**—**Andrew M. DeVoursney** has been appointed treasurer of United Air Lines, succeeding **N. B. Haley**, resigned

Pan American World Airways' Latin American division has named **Santos Ceyanes** manager of the Miami overhaul base; **Richard S. Mitchell** replaces Ceyanes as manager of ground operations; and **Arthur S. Best** succeeds Mitchell as superintendent of stations.

INDUSTRY OBSERVER

► German sources say Russia is flight testing a new supersonic rocket-propelled fighter credited to design of Alexander Yakovlev. Designated YAK 21, the plane is a modification of the German ME-163B, a rocket-propelled, tailless interceptor made by Junkers at Dessau now in the Russian zone. Basic change incorporated in the YAK 21 is addition of a horizontal tailplane, presumably to improve uncontrollable nose-down pitching at high subsonic Mach numbers.

► Assault transport competition-evaluation, four times delayed, between Northrop C-125, Chase XC-123 and a stripped-down Fairchild C-119, gets under way at Eglin AFB, Fla., this week, with a quantity production contract in the offing for the winner. Chase YC-122C, twin-engine light assault transport originally developed as a tow glider, will be evaluated against its own design performance. Evaluation of planes involved will last through September 18.

► Serious factor retarding development of helicopters powered by jet packs in rotor tips is the safety factor involved in an autorotation descent in event of power failure. NACA studies indicate that rate of descent under such conditions for a "representative ramjet design" would increase to about 3700 fpm. from 1500 fpm. for similar rotor without the additional drag of the tip jet units. Both calculations assume a 600 fps. tip speed. Pulsejet units, however, show up better than ramjet units in a ratio of power-on thrust to power-off drag. Reduction of the power-off drag of tip jet units is recommended, presumably by redesign.

► CF-100, Canadian all-weather long-range jet fighter manufactured by A. V. Roe, Ltd., has been designated "Canuck" by the Royal Canadian Air Force. Second fighter built by Avro was scheduled to begin flight test early this month. First few of ten ordered by RCAF probably will be equipped with two Rolls-Royce 7500-lb.-thrust Avons. Later versions will be powered by the Canadian-designed and -built Avro Orenda now in service test.

► New air bases for USAF strategic bombers are being prepared inland from England's east coast. Under construction near Oxfordshire, strips and facilities are large enough for Convair B-36 bombers. Strength of USAF force in England is 10,000 men—pilots, crews and personnel for three bomber groups and one jet fighter group.

► Negotiations have been completed by de Havilland Aircraft Co., Ltd., for the establishment of a Vampire jet fighter assembly plant at Cairo, Egypt. Egyptian government is also reported to be scheduled for establishment and equipping of an aircraft factory under the program of dividing wartime enemy assets. Plans are to manufacture trainer and fighter-type aircraft for the Royal Egyptian Air Force.

► Piasecki Helicopter Corp., Morton, Pa., delivered its first HRP-2 to Marine Corps HMX-1 Helicopter Squadron, Quantico, Va., following acceptance tests at Naval Air Test Center, Md. The "Flying Banana" will be used by the Marines to develop further helicopter assault tactics.

► Boeing Airplane Co. has abandoned proposed plans to build the Scandia transport of SAAB at Boeing's Seattle plant. Company officials feel that the Scandia is not modern enough in design and that its sales potential as a result, would be too limited to permit Boeing to build enough planes to make the price competitive.

► Eastern Air Lines has almost completed converting its fleet of 18 Model 649 Constellations to 749As. The modification program which will be finished in a month, is being performed at the company's main overhaul base at Miami. EAL is thus killing two birds with one stone. It is not only increasing the payload and range of its Connies, but is also providing work for its Miami staff (and so avoiding lay-offs) during the normally slack summer season. Cost and man/hours of the conversion were not revealed.

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How Industry Gears for Increased Output

Weakest spot: lack of plans by military to use small firms.

By Alexander McSurely

Into the giant jig-saw puzzle of expanded military aircraft procurement, Air Force and Navy planners and the top airframe and engine companies last week were fitting together a few pieces of the complicated supplier and subcontractor background, so necessary for a complete planes and engines picture.

Two main problems complicated their job:

• **Thousands of little companies,** many of whom probably will fit into the picture eventually as sub-sub-subcontractors, were clamoring, in person, or by mail, at the Pentagon and Wright Field, and at prime contractors, to get into the act. You couldn't blame them. They were trying to serve, and eager to get military contracts in case materials shortages curtailed their civilian production. But they interfered with the orderly distribution of major subcontracts and equipment contracts.

• **Lack of detailed** industrial planning in the small business echelons of aviation supply and equipment. This was nobody's fault except the economy advocates in Washington who cut back industrial planning. But now it was beginning to be felt.

► **Starting From Scratch**—At the Contractors' Relations office at Wright Field, more than 800 small business representatives called last week—235 in one day. Many of the companies had never had government contracts before. They had to start from scratch to find out whether they could make something the Air Force wanted.

The situation nationally as far as available makers of components, accessories and equipment was concerned was far different than it was 18 months back, industry sources said. Then aircraft and engine companies really combed the back woods and the hill country looking for small parts people who would take on the miniscule quantities of parts production for which the industry could let contracts.

Some time previous to that, Malcolm P. Ferguson, who is president of Bendix Aviation Corp., told the Finletter Air Policy Commission: "It is of course impossible under present volumes to interest subcontractors in any part of the aviation accessory business. More attention should be given to planning by the small group of individual manufacturers which might make up the flight instrument people, or the fuel handling people or the hydraulic manufacturers."

But a spotcheck of some major equipment people last week showed that most of those reached knew pretty well what they were going to do, and for whom, and were planning their own share in the expansion.

► **The Job Ahead**—With figures of overall quantities planned for plane production still guarded by the Defense Department, indications were gathered in Washington last week as to the size of the job ahead.

Aircraft Industries Assn. estimated that an increase to a plane production rate about one-tenth of the peak attained in World War II would meet the requirements now laid down. Peak monthly rate in World War II was 9113 planes. This indicated an expansion to approximately 900 planes a month, from a June rate of 215, with a yearly maximum rate of about 10,800 planes, on such a basis.

► **The Kick-off**—Throughout the nation, meanwhile, individual companies started the production ball rolling. Here are some of their individual reports:

• **Pratt & Whitney.** To fill Air Force and Navy orders for substantial quantities of piston and turbojet engines, production lines are being accelerated, but schedule at Hartford depends largely on the pace which the engine manufacturer's 4000 suppliers of components and materials are able to set. New orders can be filled with only one additional plant, by putting operations on a three-shift five-day week. Pratt & Whitney is expected to expand into the Southington, Conn., plant which it used in World War II, as soon as the Navy reacquires it from General Services Administration.

Existing orders center around the R-4360 Wasp Major piston engine for the USAF and for the J-42 Turbo-Wasp jet engine for the Navy. No new orders have yet been received for the new J-48 jet engine, but indications are that these will be forthcoming later.

• **Ryan Aeronautical Co.** Orders received in the past 30 days total over $10 million, including the largest single order since World War II, to make aft fuselage sections for Boeing C-97 transports. Current employment level of 1800 is expected to be built up to 4000, with approximately 1000 new workers needed in the next 90 days. Ryan has been building C-97 assemblies for Boeing for the last 18 months, but the new orders call for a peak monthly production rate well beyond previous requirements.

• **Texas Engineering & Manufacturing Co.** Overhaul work on military transports has caused hiring of 700 new workers since the Korean war started, and some of the work has been turned over to the company's subsidiary, Luscombe Airplane Corp., at Garland, Tex., where 150 new workers have been added.

• **McDonnell Aircraft Corp.** Announced $125 million in Navy contracts before any other Navy contractor would admit he had received a letter of intent. McDonnell has received additional orders, presumably swelling the total well beyond the early figure, which actually was principally composed of pre-Korean business.

In addition to the Navy Banshee jet fighter contracts, McDonnell stands a good chance to get Air Force contracts for either a jet or a turboprop version of its F-88 jet fighter. McDonnell is stepping up its hiring of workers but expects its production acceleration to be governed mainly by ability of suppliers to provide equipment items.

• **Lockheed Aircraft Corp.** is hiring at the rate of 50 a day to meet stepped-up production requirements for the F-94 all-weather jet fighter, T-33 and TO-2 jet trainers, P2V anti-submarine patrol

Labor Supply In Aircraft Manufacturing Centers

This listing shows the percentage of the total labor force which is unemployed in important aircraft manufacturing centers. Source is U. S. Department of Labor, Bureau of Employment Security.

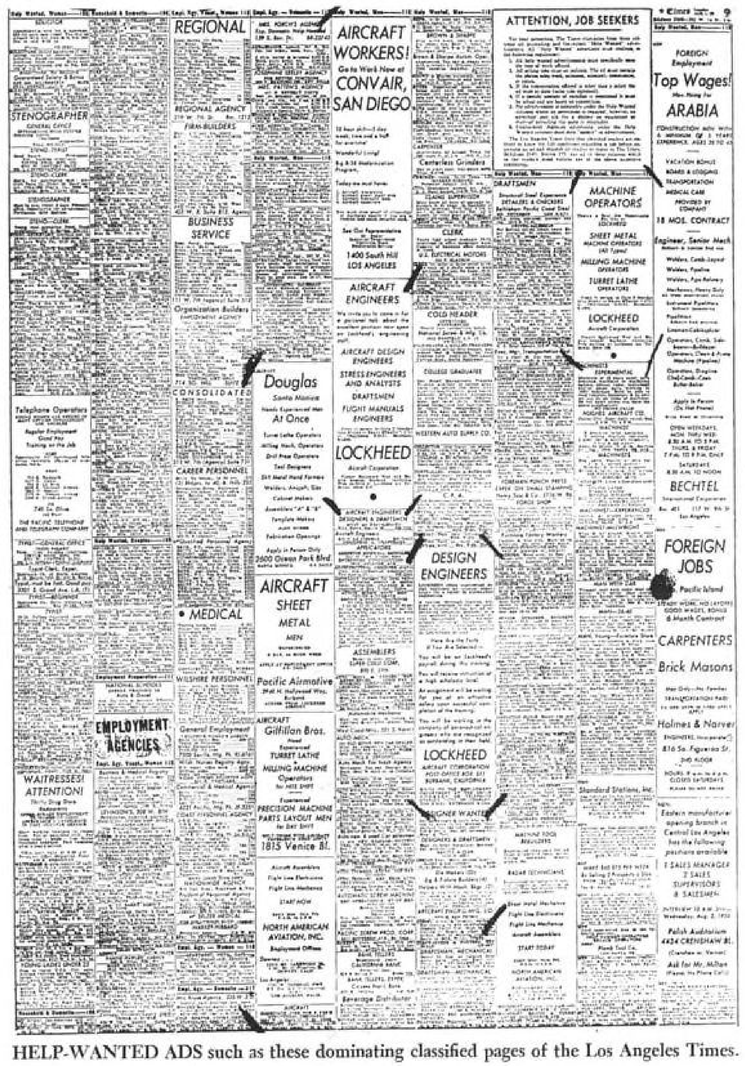
	May 1950 Percent	May 1949 Percent
Hartford, Conn.	3– 4.9	5– 6.9
New Haven	5– 6.9	5– 6.9
Boston	7–11.9	5– 6.9
Buffalo	5– 6.9	7–11.9
New York	7–11.9	7–11.9
Chicago	5– 6.9	5– 6.9
Indianapolis	3– 4.9	5– 6.9
Wichita	3– 4.9	3– 4.9
Kansas City, Mo.	3– 4.9	5– 6.9
St. Louis	5– 6.9	5– 6.9
Cincinnati	5– 6.9	7–11.9
Cleveland	5– 6.9	7–11.9
Columbus, O.	5– 6.9	5– 6.9
Baltimore	7–11.9	7–11.9
Dallas	Under 3	Under 3
Fort Worth	3– 4.9	5– 6.9
Los Angeles	7–11.9	7–11.9
Seattle	7–11.9	5– 6.9

Key to unemployment percentages:

Under 3 percent.....Tight or balanced labor supply
3– 4.9 percent.....Slight labor surplus
5– 6.9 percent.....Moderate labor surplus
7–11.9 percent.....Substantial labor surplus

NOTE: Boston labor market area was redefined in May to include Lynn-Salem.

JOB-SEEKERS mill around employment office of West Coast plants in response to . . .



HELP-WANTED ADS such as these dominating classified pages of the Los Angeles Times.

plane, and PO-1W Constellation early warning plane.

Lockheed sees no need to expand in new plants in other communities at the production rate called for in its new orders, but will subcontract some components. It also expects to keep its commercial transport Constellation production line going well into 1951 on basis of present orders. Lockheed will expand the F-94 production into two assembly lines, taking over the line formerly used for the F-80 now out of production. Expansion probably will call for a three-shift work force.

• **Douglas Aircraft.** Santa Monica plant may need 1000 more workers for its new Navy R4D-8 modification program. In addition 1500 new workers are being added at Long Beach plant for the renovating program on B-26 Invader bombers. Douglas also is handling a rush modification program on C-54 transports for MATS at Santa Monica.

• **Northrop Aircraft.** Expects to handle its increased orders for F-89 Scorpion night fighters with the present work force of around 7600. Northrop has not yet received orders for the C-125 light assault transport.

• **Fairchild Engine & Airplane Corp.** Plans a gradual stepping-up of its production rate on C-119 troop- and cargo-carrying planes on the basis of additional orders, but will not do any major hiring of new employes now.

• **Wright Aeronautical Corp.** Reported a $4-million order for 1475-hp. Wright Cyclone engines to power Douglas Aircraft's modernization of the Navy R4D-8 transports. Payload of the planes is expected to be increased from 6800 to 10,100 lb. by the modification and more powerful engines. The order was negotiated in advance of Korean events.

• **Consolidated Vultee Aircraft Corp.** San Diego plant was hiring workers at the rate of 500 a week, with current employment at about 8500. A five-day week of two daily 10-hr. shifts for employes assigned to the B-36 modification project has been started. At Ft. Worth, a similar work week had already been put in force, with approximately 14,000 employes. Hiring program at Ft. Worth has not yet been announced.

• **Thompson Products Inc.** Has received orders stepping up production on its aircraft parts contracts on which 7500 employes are now working. Principal Thompson parts are jet engines components and valves for piston aircraft engines.

• **Pesco Products division, Borg-Warner Corp.** This producer of pumps, actuators and similar aircraft equipment asked employes to cancel vacations to expedite aviation production.

• **Bell Aircraft Corp.** Has stepped up contracts for jet nacelles for B-47 and B-36 bombers. Company has also been directed to speed up production in other fields "which we cannot discuss at this time." Bell is known to be making guided missiles, supersonic research aircraft and helicopters, in addition to its subcontracting work for Convair and Boeing. The company has also been mentioned in the press as a probable licensee for production of additional North American F-86 jet fighters in event a still larger scale of production is called for.

Top Aviation Producers Listed

Forty-one makers of aviation products were among the 100 leading U. S. war goods producers of World War II and most of them are expected to play major roles in the new emergency defense production program.

It may be assumed that these companies, which among them held 45.3 percent of all prime contracts (June 1940 through Sept. 1944) with a total dollar value of over $79 billion, will be principal sources of subcontracting once again under the new fiscal year 1951 program.

Therefore, AVIATION WEEK is publishing, for the benefit of small business firms seeking subcontracts, the list of the 41 companies, ranked in order of their contract volume in World War II. This listing is taken from Smaller War Plants Corp. report "Economic Concentration and World War II." Figures are from the WPB.

	Millions of dollars	Percent of total
General Motors	$13,812	7.9
Curtiss-Wright	7091	4.1
Ford Motor	5269	3.0
Convair	4875	2.8
Douglas	4431	2.5
United Aircraft	3923	2.2
Chrysler	3394	1.9
GE	3360	1.9
Lockheed	3246	1.9
North American	2768	1.6
Boeing	2700	1.5
Martin	2344	1.3
Bendix Aviation	1869	1.1
Packard	1783	1.0
Sperry	1531	.9
Westinghouse	1375	.8
Grumman	1330	.8
Republic	1231	.7
Bell	1228	.7
Nash-Kelvinator	1162	.7
Goodyear	1091	.6
Standard Oil of N. J.	1053	.6
Aviation Corp.	1045	.6
U. S. Rubber	798	.5
Continental Motors	782	.4
Sun Oil	712	.4
Permanente Metals	635	.4
Firestone	455	.3
Goodrich	359	.2
Beech	351	.2
Higgins Ind.	349	.2
Fairchild	334	.2
Standard Oil of Calif.	327	.2
Jack & Heintz	312	.2
Brewster	281	.2
Socony-Vacuum	276	.2
Jacobs Acft. Engine	269	.2
Texas Co.	260	.1
Galvin Mfg.	243	.1
Stewart-Warner	242	.1
Northrop	232	.1
Totals	**$79,068**	**45.3**

Military CAA?

Plans made to organize workers under USAF in national emergency.

A plan to put Civil Aeronautics Administration airways and control tower personnel on military status in event of national emergency was reported last week to have approval of both CAA and Defense Department.

Reliable sources state that up to 70 percent of the male CAA employes are now on reserve status. These would be included in such a mobilization as members of a CAA "Corps," of the Air Force in a status somewhat comparable to the Coast Guard's transfer to the Navy from the Treasury Department in the last war.

If such a broad transfer were accomplished it would probably also include U.S. Weather Bureau meteorologists and other Commerce Department employes who are associated with aviation functions. It is expected that in event of emergency these employes in reserve status would be reassigned immediately from their regular reserve units to their specialist assignments in the CAA Corps.

The proposal was expected to require authorization by Congress, and it was understood that legislation for the quick transfer of key CAA personnel to Air Force status was now being prepared.

The arrangement is aimed at preventing duplication of airways communications facilities, a defect of the civilian controller arrangement largely used in this country in World War II.

Military control of the federal airways in an emergency was recommended for consideration in the Congressional Aviation Policy Board report of 1948.

Significantly, the principal advisor to the Congressional Board on Radio Communications Planning was Delos W. Rentzel, then president of Aeronautical Radio, Inc., and now CAA Administrator.

It is understood that Rentzel and his deputy administrator, Donald W. Nyrop, have worked out most of the details of the emergency transfer of airways control with the Department of Defense in preparation for the transfer if it becomes necessary.

► **Emergency Expedient**—AVIATION WEEK learned that the program was being considered solely as an emergency expedient at present, not to be put into effect unless national emergency appeared to require it.

However various civil aviation organizations and groups, including some airline representatives, were apprehensive that the rigidity of such a control system might seriously interfere with civil aviation operations, in the event it was arbitrarily put in force.

One recommendation was that the approval of the National Security Resources Board be required as to the state of emergency, before the system could be put into effect.

► **Movement Control**—Another proposal affecting civil aviation appears headed for passage soon. It is a bill, recommended by Commerce Secretary Charles Sawyer, to give CAA sweeping authority to control air movements "whenever the President determines such an action to be required in the interest of national security."

Civil aviation organizations and groups, who have discussed this bill with CAA, have recommended that it, too, be made subject to a notification by the National Security Resources Board that an emergency exists warranting initiating such action. It is understood that this control would deal primarily with restricting or banning traffic over certain areas, such as defense areas, or military zones, or the radar defense network zones.

Sawyer told Sen. Ed Johnson, chairman of the Senate Interstate and Foreign Commerce Committee, in asking prompt action on a bill giving the new authority to CAA, that the civil agency and USAF together had blueprinted a restricted plan providing the details for controlling traffic in the special restricted areas.

Air National Guard Being Strengthened

The 27 groups of the U.S. Air National Guard are recruited to about 80 percent of full strength and have about 75 percent of their full complement of planes, an AVIATION WEEK survey discloses.

The ANG has about 2500 planes and 45,000 officers and men as a supporting organization for the regular USAF and its reserves.

Although its plane strength has been temporarily depleted by withdrawals of planes for use in Korea, the ANG is due to receive more modern planes as replacements. Tempo of deliveries of jet fighters to ANG for the rest of the year has been ordered stepped up.

► **Jet Deliveries**—Republic F-84s, probably "E" models, will go to guard fighter squadrons currently flying F-47 Thunderbolt piston-engine fighters, informed sources indicate. And deliveries of North American F-86 and Lockheed F-94 jet fighters originally scheduled for early in 1951, will begin late this fall instead.

The Guard's 24 fighter groups include 12 jet fighter squadrons. Six fly Lockheed F-80A, B and C fighters, and the other six are equipped with Republic F-84Bs and Cs.

► **Bomber Groups**—The three ANG light-bomb groups are equipped with Douglas Invader B-26 bombers. There are four squadrons of 16 planes each allotted in each bomber group, and three squadrons of 25 planes each authorized for each fighter group.

On the basis of latest available figures, the total jet fighter complement of the Guard was not sufficient to bring its jet squadrons to full authorized strength.

► **Plane Strength**—ANG, according to its last report, has:

• **Light bombers:** 223 Douglas B-26s.

• **Jet fighters:** 122 F-80s and 111 F-84s.

• **Piston fighters:** 926 North American F-51 Mustangs; 543 Republic F-47 Thunderbolts, and 17 RF-51s.

• **Cargo transports:** 157 Douglas C-47s; 2 Curtiss C-46s, and 2 Beech C-45s.

• **Trainers:** 101 TB-26s; 16 TF-47s; 23 TF-51s; 6 TRF-51s; 270 North American T-6s, and 33 Beech T-11s. (The TB-26, TF-47, TF-51 and TRF-51 are trainer versions of bombers and fighters previously listed.)

The ANG groups include only air personnel and ground crews. They do not provide for supporting units, such as supply, medical, administrative, etc. The groups are designed to be drawn into federal service by units if needed, to augment regular Air Force wings which have these supporting units provided under the USAF Base Wing organization plan.

Prototype Hope

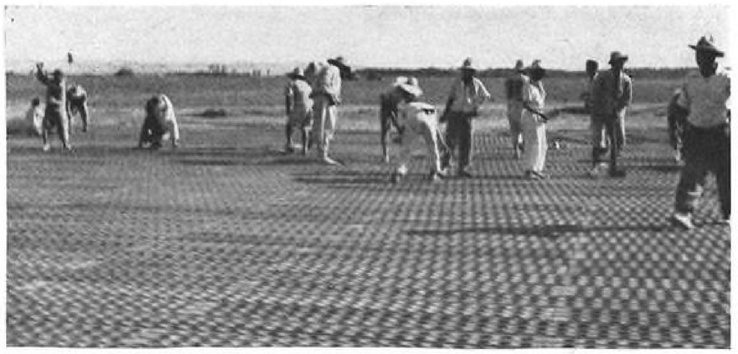
House group hearings rekindle chances of cargo, transport program.

New hope for a "full-scale" government transport prototype procurement program to stimulate development of commercial cargo and transport types emerged from hearings of the House Interstate and Foreign Commerce Committee.

Committee members, led by Rep. Lindley Beckworth, chairman of the

PANTHERS OFF KOREA

With wings still folded, combat-loaded Grumman Panthers (left) are being towed into position for catapulting off the deck of a U.S. carrier operating in Korean waters. The only Navy jet planes known to be operating in the conflict, the F9Fs are reportedly giving a good account of themselves, making devastating rocket attacks on vital enemy installations. Complementing the strikes of the speedy jets are piston-engined Vought Corsairs. Some are parked off to the left, near the carrier's island.



PIERCED STEEL PLANK air strip being laid by Koreans for USAF combat aircraft.

Air Strips Built to Order—Fast

(*McGraw-Hill World News*)

An American Air Force Base in Southern Korea—American aviation engineers of the 20th Air Force have transformed this abandoned Japanese air strip into a combat operational fighter base for F-51s. It's been a patchwork job—nothing compared with the construction of the giant bomber and fighter strips during World War II.

When the Air Force first flew in July 12, there was nothing here but a gravel-covered 4500-ft. concrete strip surrounded by fields of beans and weeds. The next morning, a company of engineers arrived by LST. Working 24 hr. a day, they cleaned off the strip, built a 500-ft. over-run with pierced steel plank (being laid by Korean workers in photo above). And the F-51s were operating against the enemy on July 15.

By July 18, they had completed a 40-ft.-wide taxiway around one side of the strip, with parking ramps for the combat aircraft.

The Air Force would like to put in a new major strip for the use of F-80 jet fighters in Southern Korea. But there isn't enough steel plank or enough engineers to do the job—yet.

At the major F-80 base in Japan, from which the majority of fighter sorties have been flown against the Communist armies, the condition of the runway has seriously limited the combat effectiveness of the aircraft. The strip is macadam which is so soft in the summer heat that F-80s landing at 120 mph. seldom have to be braked to bring them to a halt. Also the JP fuel eats into the surface making it spongy.

On takeoff, the F-80 has been able to carry only two 5-in. rockets instead of the full load of eight. Even then pilots have had to raise their landing gears in order to get airborne. With 7000 ft. of concrete, there would be "no sweat" taking a full load to the enemy. But defense savings prevented the reconstruction of this runway when engineers urged it over a year ago.

Transportation subcommittee, and Rep. Charles Wolverton, ranking minority member, called the proposed $12.5-million five-year program, under which Civil Aeronautics Administration would pay testing costs on new transport types, inadequate. Beckworth suggested a $50-million-a-year program would be nearer the mark.

They were spurred by the testimony of Adm. DeWitt Ramsey, president of Aircraft Industries Assn., that the British government, starting in 1942, "was willing to risk . . . an estimated $300 million or more" on a transport development program and has now outstripped the United States by three years in the commercial jet and turboprop fields.

▶ **Testing Program Backed**—Ramsey, and the other witness at the hearing, J. W. Crowley, acting director of the National Advisory Committee for Aeronautics, endorsed the testing program. It has been approved by the Senate Commerce Committee and is now awaiting floor action as "a first step in the right direction." But, the AIA president said, the $12.5 million "would not go very far" toward solving the problem, and added:

"It is apparent that American manufacturers feel it essential that the government, through an established procurement agency, embark on a comprehensive program of purchasing transport prototypes. Unless such a program is adopted, there is no assurance that this industry or our country can meet the challenge of the de Havilland Comet or the Avro Jetliner."

▶ **U. S. Lags**—In three hours questioning of Ramsey and Crowley, committee members repeatedly expressed exasperation that the U. S. "has done nothing much" to stimulate commercial plane development, while Great Britain, whose economy is substantially supported by the U. S., has moved forward with a full-scale program. Then the committee took these actions:

- **Requested AIA to submit** "a comprehensive program" for government purchasing of transport prototypes. Ramsey agreed, but indicated reluctance to risk defeat of the modest testing program by controversy that might develop over the larger program. Beckworth urged speed in working it out, declaring, "we cannot go slower than the fastest we can on this program which is vital to defense."
- **Requested NACA to ascertain** from the industry the cost of developing types which would put the U. S. in the lead in the transport field. Crowley said that NACA has technical data which would "permit the start at once of a program which will produce superior planes" to those of any other country.
- **Requested appearance** before the committee of the new Secretary for Air, Thomas Finletter.

Jetliner to Carry Cargo This Fall

Trans-Canada Airlines will fly the first North American commercial jet airliner as a cargo carrier this fall. That is when the Avro Jetliner C-102 goes on domestic routes, probably from Toronto to Montreal and Toronto to Winnipeg.

The plane has not yet completed its certification as a passenger carrier but is expected to put in a substantial number of hours on the cargo run, before going on a passenger schedule.

Recent reports show the plane has now flown more than 100 hr. and has exceeded 500 mph. in level flight, with a cruising speed of 450 mph. and a cruising ceiling of up to 39,500 ft.

On several occasions the plane has made three-engine takeoffs, and has been flown with three of its four engines out at 200 mph. Longest flight has been 1100 mi., but the plane has made several triangular flights between Toronto, North Bay and Montreal for a distance of about 800 mi., with a fuel consumption of 1600 gals. of kerosene.

A. V. Roe Canada Ltd., recently decided not to send either the Jetliner, or the other new Avro jet plane, the CF-100 Canuck two-place nightfighter, to England for the September air show at Farnborough. It was decided the time could be spent more profitably in completing tests on the Jetliner and in giving the RCAF a chance for more familiarization with the two Canuck nightfighters which are now flying.

Avro had previously planned to send transport and fighter across the Atlantic, to try for new Atlantic crossing records.

FINANCIAL

Aviation Portfolios Gain in Value

Major trust specializing in air investments shifts its holdings to take advantage of rising market.

With aviation shares attracting considerable investment and speculative favor in recent months, trust portfolios containing aviation commitments have been bolstered in value.

Since National Aviation Corp. is the largest single fund devoted exclusively to aviation investments, its periodic portfolio shifts are of interest, particularly now.

Its net assets were up to $8,048,368, or $18.03 per share, as of June 30, 1950, compared with $7,439,545, or $16.65 per share, at Dec. 31, 1949. It is evident that the rise in aviation securities during the last week in June had a sharp impact on National Aviation's holdings. Moreover, the continuing appreciation of aviation equities during July and August may be expected to have carried the value of the trust's portfolio even higher.

▶ **Heavy Buying**—During the first six months of 1950, National Aviation decreased its holdings of cash and U. S. securities sharply and, on balance, bought heavily of aircraft equities. Aircraft and accessories comprised 59.2 percent of the total portfolio as of June 30, with airlines accounting for 31.5 percent and the 9.3-percent balance represented by cash, U. S. securities and other receivables.

The additions among aircraft holdings during the first six months of this year were represented by the following: 4200 shares Bendix; 100 Douglas; 7500 Garrett Corp.; 1100 Greer Hydraulics preferred; 1000 Grumman; 5000 Sperry; 1360 Thompson Products, and 800 United Aircraft. The only aircraft shares sold were 5500 North American and 600 Bell. The 1950 shares of Airfleets received as a stock dividend from Convair were also liquidated.

Material increases in the airline group also appear among National Aviation's holdings during the first six months of this year. An initial commitment of 5000 shares of United Air Lines was made. Holdings were augmented in other issues as follows: 600 American Airlines preferred; 6500 Braniff; 1500 Delta, and 4000 TWA. The only airline shares sold were 14,500 of Eastern and 2500 Pan American Airways.

▶ **June 30 Portfolio**—Reflecting these adjustments, National Aviation's portfolio as of June 30, 1950 consisted of the following:

- **Aircraft Securities:** 20,400 Bell; 9200 Bendix; 15,000 Convair; 4800 Curtiss-Wright "A"; 7800 Douglas; 7500 Garrett; 2400 Greer Hydraulics preferred; 16,000 Grumman; 25,000 Lockheed; 30,000 North American; 5000 Sperry; 7500 Thompson Products; 16,900 United Aircraft; 1500 United Aircraft preferred.
- **Airlines:** 20,000 American; 12,000 American preferred; 20,000 Braniff; 15,000 Chicago & Southern; 17,500 Delta; 25,500 Eastern; 7500 Pan American; 9000 TWA; 5000 United; 5010 United preferred.
- **Other:** 10,000 Helicopter Air Service; 10,000 Air Express International; 10,000 Resort Airlines.

The total indicated cost of National Aviation's portfolio at June 30, 1950, was $6,636,490. The market values as of the same date was $7,275,939.

▶ **Smaller Trusts**—Specialized aviation trusts, but of smaller aggregate funds, also exist under a broad group of investment companies sponsored by professional managers. In this classification, no serious selective pattern is in evidence.

One such fund—the largest in this category—comprises the aviation shares of Group Securities, Inc. Its shifts during the first half of its fiscal year appear to have been badly timed. For example, it sold 4000 shares of Beech, 500 Boeing, 4500 Cessna, 1000 Curtiss-Wright "A," 1000 Fairchild, 700 Grumman, 500 Lockheed, 3000 North American, 4700 Piper, 4500 Republic and 500 Sperry. In the airline group it disposed of 1000 American, 1500 Eastern, 2000 Northwest and 5700 Pan American World Airways.

Not a single addition to holdings is in evidence beyond 400 shares of Bendix.

▶ **Group Securities**—The Group Securities aviation holdings as of May 31, 1950, were represented by the following portfolio: 16,000 American; 1000 Bendix; 4000 Boeing; 11,500 Braniff; 10,000 Convair; 6000 Curtiss-Wright "A"; 2500 Douglas; 2000 Eastern; 14,000 Fairchild; 5300 Grumman.

Also 7500 Lockheed; 8500 National; 12,000 North American; 8000 Northwest; 10,300 Pan American; 8000 Piper; 6000 Republic; 6000 Solar; 4000 Sperry; 4500 United Aircraft; 10,500 United Air Lines; 2000 Western.

▶ **Institutional Shares, Inc.**—Another separate fund in this general category is represented by the aviation group of Institutional Shares, Inc. Nominal shifts, frequently at cross-purposes, are in evidence for the first half of this group's fiscal year.

Its holdings as of May 31, 1950, consisted of the following: 9400 American; 3200 Boeing; 1300 Capital; 4200 Convair; 1350 Douglas; 1900 Eastern; 3800 Fairchild; 2600 Grumman; 3100 Lockheed.

Also 2600 Martin; 5200 North American; 2700 Northrop; 1700 Northwest; 2600 Pan American; 5000 Republic; 1400 TWA; 1200 Solar; 2400 United Aircraft; 2700 United Air Lines.

▶ **New York Stocks, Inc.**—New York Stocks, Inc., is another diversified group of investment funds presenting a special aviation category. The changes among its portfolio during the first six months of its fiscal period were also of limited proportions but with a little better discrimination in evidence. For example, it sold 3400 shares of Northwest and purchased 600 Douglas, 200 Bendix, 2800 Eastern and 500 Trans World Airlines.

The aviation holdings of New York Stocks, Inc., as of May 31, 1950, were represented in the following: 5400 American; 900 Bendix; 1000 Boeing; 3300 Convair; 600 Douglas; 2800 Eastern; 1400 Electric Boat; 1400 Lockheed; 3000 North American; 500 TWA; 1400 United Aircraft; 1700 United Air Lines; 1000 Square D; 400 Thompson Products.

Among the general type investment trusts, it is significant that hardly any buying in aviation shares took place during the first six months of this year. General investment trusts, for the most part, have shown a poor conception of the position and outlook of the aviation industry in recent years. This is revealed by the limited aviation commitments they have made when it would have been extremely profitable for them to have done so.

Investment trusts may have been leery of aviation securities because they have been hurt by past investments in this group and have failed to understand that the aircraft and airline industries do not always conform to the same measures of evaluation found in other industries.

Yet, a fuller participation in aviation investments could be highly beneficial to both the trusts and the aircraft and airline groups.

For the funds, a well selected aviation portfolio could provide satisfactory income yields and desirable appreciation features. For the industries, it would open up new reservoirs of capital that are frequently necessary for normal expansion and growth.

—Selig Altschul

AIR FORCE CONTRACTS

USAF Procurement Awards Listed

This listing completes AVIATION WEEK's publication of recently released Air Force contracts for the month of May. Awards for this period totaled $189 million, with Curtiss-Wright Corp.'s $12,265,351 contracts leading the parade (AVIATION WEEK July 31, p. 32).

Only contracts of $5000 and over are shown.

Lockheed Aircraft Service, Inc., Long Island, N. Y., services and materials necessary to rehabilitate F-51 type aircraft, Jan., 1951, $500,000.

Loewy Construction Co., New York, repair accumulator stations and extrusion presses, Aug., 1951, $251,699.

Lord Manufacturing Co., Erie, Pa., maintenance and overhaul spare parts for shock mounts used in B-26 aircraft, July, 1950, $6228; plugs, Sept., 1950, $18,438.

Lycoming div., Avco Manufacturing Corp., Willamsport, Pa., spare parts for 0-435-1-11 and 0-290-7 engines used in L-5 and L-15 aircraft, Dec., 1950, $82,026; spare parts for V-1650-3-7-9-9A engines used in F-51 aircraft, Jan., 1951, $101,285.

Magnavox Co., Fort Wayne, Ind., type G-9 solenoid, June, 1951, $47,697.

Magnovox Corp., Chicago, inspection equipment, horizontal, magnetic particle, for ferrous metals, Oct., 1950, $11,515.

Manhattan Lighting Equipment Co., New York, cord extension, June, 1950, $5375; 45 portable grinders and data, Nov., 1950, $7278.

Marinette Glove Co., Marinette, Wis., gloves, Dec., 1950, $20,400.

Marlin-Rockwell Corp., Jamestown, N. Y., ball bearings, Aug., 1950, two contracts, $25,350, $10,034.

Marman Products Co., Inglewood, Calif., clamps, July, 1950, two contracts, $8335, $7072; clamps, Aug., 1950, $13,275.

Marquette Metal Products Co., Cleveland, windshield wipers, Sept., 1950, $39,989.

Martin Fabrics Corp., New York, nylon and cotton webbing, Sept., 1950, $15,365.

Martin, Glenn L., Co., Baltimore, six component strain gage balance system, Aug. 1950, $10,000; instrumentation and adjustment of decelostats, M-1 canopy remover and release mechanism on 2 XB-51 airplanes, Oct., 1951, $11,636.

Mastercraft Metals Co., Dayton, Ky., stainless steel photographic sinks, June, 1950, $8687.

Maxson Engineering div., Maxson, W. L., Corp., New York, reflex dimmer bombsight switch, Sept., 1950, $7426.

Maxson, W. L., Corp., New York, amplifiers, Feb., 1951, $49,544.

McColpin-Christie Corp., Los Angeles, stationary DC power supply rectifier, Nov., 1950, $193,065.

McMillan Laboratory, Marblehead, Mass., radome design studies, Feb., 1951, $30,000.

McPhillips Co., Trenton, N. J., pack assembly, pack tray, Feb., 1951, $125,417; pack assembly—type T-7 parachute pack assembly, Oct., 1950, $29,500.

McQuay-Norris Mfg. Co., St. Louis, switches, Sept., 1950, $11,220.

Menasco Manufacturing Co., Burbank, Calif., industrial preparedness study, Mar., 1951, $78,006; fabrication of tubular aircraft landing gear parts, May, 1951, $58,423.

Metal Hose and Tubing Co., Dover, N. J., gasoline hose, Aug., 1950, $8589.

Michigan Bolt-Nut Co., Detroit, carriage bolts, Sept., 1950, $15,699.

Micro-Balancing, Inc., Oceanside, N. Y., gyroscopic test motor apparatus and maintenance data, July, 1950, $12,180.

Midwest Research Institute, Kansas City, Mo., motor drive system for phasing mechanical vibrators, May, 1951, $10,000.

Miller Products Co., New York, rubber bands, July, 1950, $7345; wire marking and identification machine, Sept., 1950, $13,680.

Miller, William, Corp., Pasadena, Calif., galvonometer and oscillograph elements, Aug., 1950, $5985.

Milwaukee Electric Tool Corp., Milwaukee, portable electric drill, Sept., 1950, $15,339.

Milwaukee Valve Co., Milwaukee, fuel servicing nozzles, Feb., 1951, $40,830.

Minneapolis-Honeywell Regulator Co., Minneapolis, modification of turn controllers, Nov., 1950, $17,241; spare components automatic pilots, May, 1951, $378,790; B-4 turbosupercharger regulator systems, spares, tools and data, July, 1951, $145,985; automatic pilots, Aug., 1951, $162,101; spare parts for C-1 autopilot, Dec., 1950, $31,647.

Minnesota Mining-Mfg. Co., St. Paul, electric splicing Scotch Tape, June, 1950, $12,300.

Moak Machine-Tool Co., Port Huron, Mich., band saw, Nov., 1950, $11,562.

Moore Business Forms, Inc., Dayton, business machines, July, 1950, $17,420.

Morey Machine Co., New York, engine geared turret lathe, Sept., 1950, $65,995.

Morse Instrument Corp., Hudson, Ohio, printers, Nov., 1950, $99,496; processing machine, Jan., 1951, $218,648.

Motch-Merryweather Machine Co., Cleveland, engraving machine, Sept., 1950, $5580.

Mt. Vernon-Woodberry Mills, Baltimore, cotton duck, June, 1950, $20,700.

Munston Mfg. and Service, Inc., New York, audio coder, Oct., 1950, $10,880; dummy load, Dec., 1950, $9904.

Muth, George F., Co., Washington, drawing equipment, Sept., 1950, $61,743.

National Battery Co., Depew, N. Y., aircraft storage battery, type K-1, Feb., 1951, $45,470; dry charged aircraft storage battery, Apr., 1951, $94,525.

National Cash Register Co., Dayton, cash registers, Aug., 1950, $114,642; cash registers, Sept., 1950, $27,202.

Navy Dept., Chief, Bureau of Aeronautics, Washington, receivers and transmitters, Nov., 1950, $5600.

Neptune Meter Co., New York, fuel flowmeter transmitter, Oct., 1950, $10,599.

New Departure div., General Motors Corp., Bristol, Conn., ball bearings, Aug., 1950, two contracts, $18,100, $24,500.

N. Y. Rubber Corp., New York, pneumatic mattress, May, 1951, $589,920.

Norma-Hoffman Bearing Corp., Stamford, Conn., ball bearings, Sept., 1950, $6510.

North American Aviation, Inc., Los Angeles, mobilization program, June, 1951, $10,404; spare parts for the F-95 airplane, Mar., 1952, $788,655; modification kits for F-86A airplanes, Nov., 1950, $50,793; wing walkway and plug assembly, Jan., 1951, $8979; antenna for B-45C, Oct., 1950, $28,209; fuel tanks, Jan., 1951, $376,068; design, install in a B-45C aircraft and test a broad band flush antenna, June, 1951, $67,993; electronic heating application to a band saw, Aug., 1951, $27,455; technical data, Aug., 1950, $6160; B-45A storage and retrofit program, Aug., 1951, $1,184,131; kits for B-45A aircraft, Dec., 1951, $72,088; bomb bay adapter, maintenance, inspection, Dec., 1951, $5470; kits for B-45C aircraft, Feb., 1951, $8282; spare parts for the F-86A aircraft, Nov, 1950, $100,525; spares for all types of aircraft manufactured by North American, June, 1950, $20,000; spare parts for T-6 and F-51 aircraft, July, 1950, $502,460; spare parts for T-6 aircraft, July, 1950, $28,098.

Northrop Aircraft, Inc., Hawthorne, Calif., flight test programs for YF-89A and F-89A airplanes, May, 1951, $898,553.

Ohio State University Res. Fdn., Columbus, Ohio, acceleration of photogrammetics research related to aeronautical mapping and charting, May, 1951, $29,055; research studies to determine the relations between variables in crew compositions and criteria of group effectiveness, June, 1951, $36,616; fatigue studies of X76 ST aluminum alloy and 4330 steel alloy, June 1951, $25,000; services materials and reports on antenna radiation characteristics, Feb. 1952, $75,000.

Ohmite Mfg. Co., Chicago, rheostat voltage adjusting aero, June, 1950, $1087.

Old Dominion Iron-Steel Corp., Richmond, Va., tanks, Aug., 1950, $8260.

Oliver Machine Co., Grand Rapids, Mich., jig sawing machines self-contained direct motor driven, July, 1950, $9200.

Ord. Bureau of Navy Dept., Washington, D. C., spare parts M series bombsight, Jan., 1951, $20,338.

Osborne Sexton Machinery Co., Columbus, Ohio, saw-variety single arbor tilting table blade with mortising motor, Nov., 1950, $19,375.

Ozalid div., General Aniline and Film Corp., Johnson City, N. Y., spare parts kit for streamliner Ozalid machine, Aug., 1950, $34,560; Ozalid paper and containers, July, 1950, $7292.

Pacific Airmotive Corp., Burbank, Calif., reconditioning of 23 T-7 aircraft, July, 1950, $600,000.

Pacific Scientific Co., Los Angeles, tensionmeter engineering data and maintenance data, Aug., 1950, $23,821.

Paragon Oil Co., Brooklyn, lard oil, July, 1950, $8415.

Parker Appliance Co., Cleveland, plugs, Sept., 1950, $14,491.

Pease, C. F., Co., Chicago, blue printing machine, July, 1950, $7050.

Phaostron Co., S. Pasadena, Calif., portable volt, ohm, milliammeter and maintenance data, Oct., 1950, $11,549; tester assembly for a flux gate compass and handbooks, Aug., 1950, $17,238; generator field control relays, Feb., 1951, $35,872.

Philco Corp., Philadelphia, factory familiarization training, Mar., 1951, $43,852.

Photographic Products, Inc., Hollywood, cameras, Sept., 1950, $26,033.

Photostat Corp., Rochester, N. Y., photocopying machines, Sept., 1950, $207,778.

Piqua Engrg., Inc., Piqua, O., tester assembly, fire detector system, field and maintenance data, Jan., 1951, $21,102.

Pittsburgh Screw-Bolt Corp., Pittsburgh, carriage bolts, Sept., 1950, $14,926.

Plainville Metal Works, Plainville, Conn., ripcord assembly, Dec., 1950, $31,388.

Premier Crystal Labs, New York, 1500 crystal holders, Sept., 1950, $7275.

Press Wireless Co., Hicksville, N. Y., recorder unit, Dec., 1950, $28,115.

Press Wireless, Inc., West Newton, Mass., voltage divider, Dec., 1950, $33,061.

Radio Corp. of America, Camden, N. J., receiver-indicator and antenna coupler, Oct., 1950, $445,132.

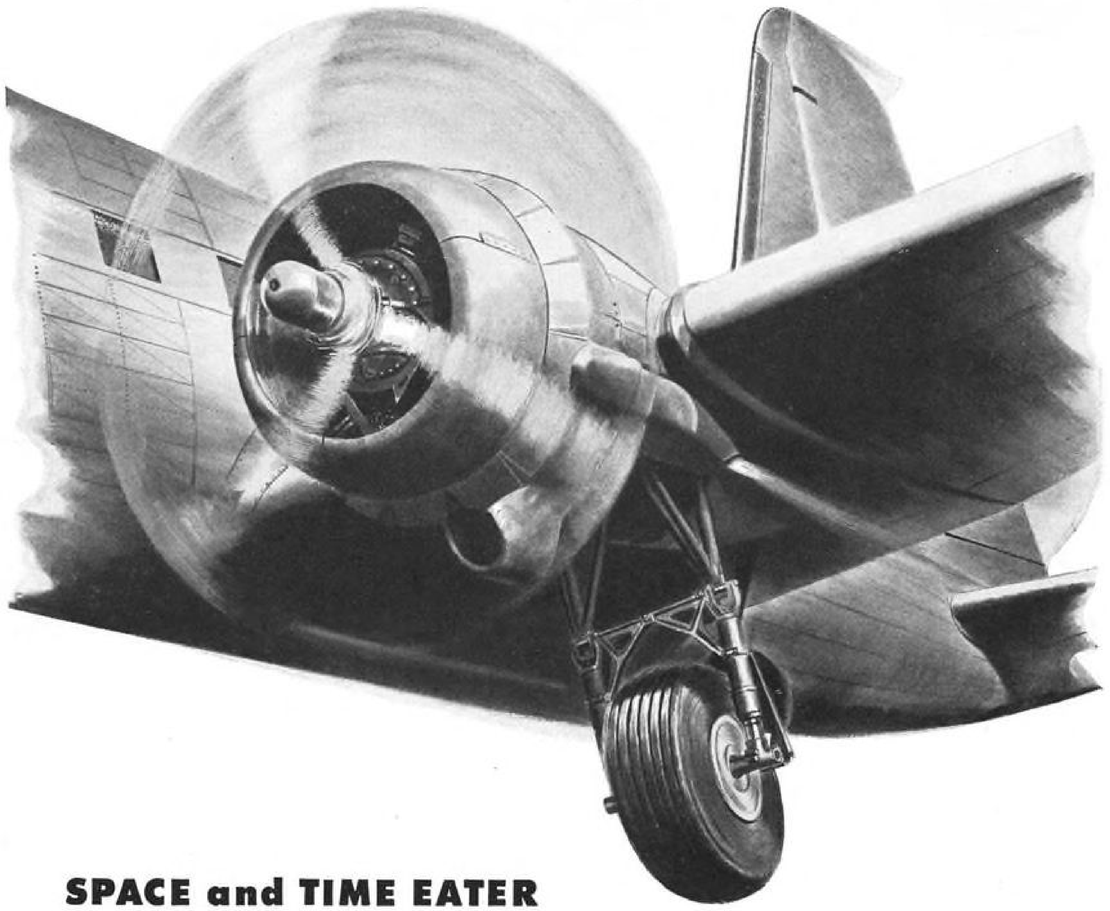
Radioplane Company, Van Nuys, Calif., recharging kits, data, spare parts, June, 1950, $6717; rotary launcher and ground handling equipment, Sept., 1950, $114,294;

PRODUCTION BRIEFING

▶ **Lockheed Aircraft** has reduced prices up to 20 percent on Constellation fabricated spare parts.

▶ **Switlik Parachute Co.** has military contracts totaling over $5 million for personnel chutes and accessories.

▶ **Cessna** has received a USAF contract for additional LC-126s (Cessna 190s) for the National Guard and Army Field Forces. Order is for about $170,000.



SPACE and TIME EATER

First, the windy emptiness of Kitty Hawk where two brothers changed the outlook of a world. Later the thrilling words at Le Bourget, "I am Charles Lindbergh." And then, Odom's 73-hour shrinkage of the globe. Tomorrow, instead of the propeller, you will hear the roar of jet power breaching the wall of sound.

These and a hundred other milestones are pure drama. But they have led aviation into big business—eating space and time for freight and passengers all over the world.

In every great advance of aviation, SKF was there to help. And SKF will be on hand, behind the scenes, helping to make new advances possible and practical. Higher, safer speeds, longer engine life, lower costs are due to advanced engineering all along the line.

As aviation progresses, SKF keeps pace with Ball and Roller Bearings made by the most modern techniques of design, manufacture and quality control. SKF INDUSTRIES, INC., PHILADELPHIA 32, PA. 7028

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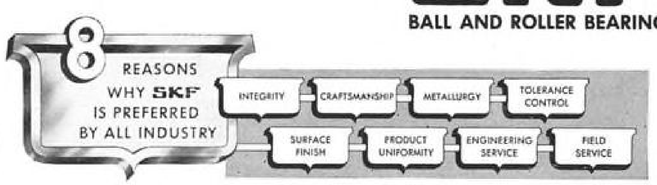


Pioneers of the Deep Groove Ball Bearing—Spherical Roller Bearing —Self-Aligning Ball Bearing.

rotary launchers and cars, Oct., 1950, $15,683.

Rainford Mfg. Co., Closter, N. J., solar stills, Oct., 1950, $87,040.

Rauchbach Trunk-Luggage Co., Newark, N. J., squadron engineering cases and sets, Oct., 1950, $22,632.

Ray, Reid H. Film Industries, Chicago, motion picture training films, Nov., 1950, $32,897.

Raytheon Mfg. Co. div., Raytheon Production Corp., Waltham, Mass., high precision radio landing altimeter, Dec., 1950, $54,903; study of the methods of coordinate conversion, Mar., 1951, $25,000.

Raytronic Laboratories, Cincinnati, modification kits, Dec., 1950, $63,220.

Reading Batteries, Inc., Reading, Pa., dry charged aircraft storage battery, Feb., 1951, $93,570.

Recordak Corp., Washington, photographic film, June, 1950, $78,590; Recordak micro-file machines and 16 mm. enlargers, Feb., 1951, $73,523.

Reiner, John, Co., L. I. City, N. Y., spares for air compressors, fire trucks and powerplants, Nov., 1950, $11,902; generator, starter and regulator assemblies, Sept., 1950, $7065.

Remington Rand, Inc., Dayton, filing cabinets, July, 1950, $18,598.

Republic Aviation Corp., Farmingdale, N. Y., engineering data, June, 1950, $149,179; modification of tailpipe assembly on F-84B airplanes, Sept., 1950, $57,351; spares for F-47 aircraft, June, 1950, two contracts, $17,126, $73,000; wing panels for F-84D-1 aircraft, June, 1950, $97,498; mobile refueling unit for XF-91 airplanes, Sept., 1950, $44,565; study loss of excessive thrust upon installation of J-35 engines in F-84 airplanes, July, 1950, $30,262.

Revere Electric Mfg. Co., Chicago, runway marker lamp assembly and engineering data, Oct., 1950, $7824.

Rhodes Lewis Co., Culver City, Calif., type P-1 dolly, Sept., 1950, $22,377; flexible feed ammunition chute, June, 1951, $14,025; plastic ammunition boxes, June, 1951, $10,862.

Rices, Bernard, Sons, New York, cavity detector, Aug., 1950, $7979.

Robinson Houchin Optical, Columbus, O., parachute folding table assembly, Sept., 1950, $43,558.

Romec Pump Co., Elyria, O., air compressor, Oct., 1950, $8960.

Ryerson, Jos. T., and Son, Cincinnati, steel angle, Aug., 1950, $19,550.

Saval, Inc., Los Angeles, valves, Oct., 1950, $8107.

Schenuit, F. G., Rubber Co., Baltimore, airplane casings, May, 1951, $150,854; airplane casings, Oct., 1950, $86,775.

Schwab, H. W., Textile Corp., New York, cloth for outer garments, June, 1950, $9160.

Schwien, L. N., Engrg. Co., Los Angeles, amplifier-converter, Aug., 1950, $37,948; gyroscope vertical bomb stabilization wiring diagrams and fabrication drawings draft of installation, Sept., 1950, $9882; type F-1 automatic parachute ripcord release, Dec., 1950, $359,050.

Science Associates, Philadelphia, celestail navigation projection trainer, Aug., 1950, $6792.

Seaboard Electric Co., New York, servo controls, Aug., 1951, $36,992.

Seamless Rubber Co., New Haven, Conn., 1400 lbs. absorbent cotton, Sept., 1950, $8673.

Security Steel Equipment Corp., Avenel, N. J., cabinets, Aug., 1950, $16,125; filing cabinets, Aug., 1950, $9017.

Servo Corp. of America, New Hyde Park, N. Y., infra-red double recording monochrometer, Nov., 1951, $79,572.

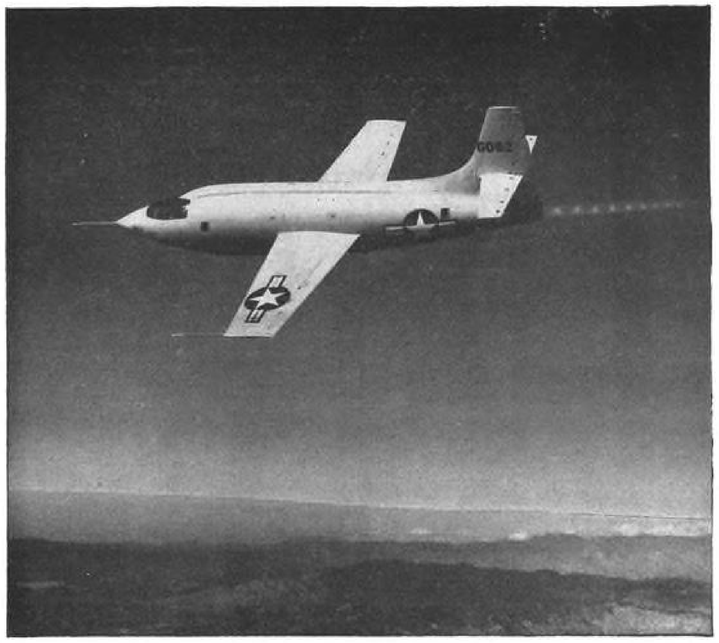
Shaw-Walker Co., Dayton, filing cabinets, July, 1950, $18,598; insulated filing cabinets, June, 1950, $7402.

Sheldon Machine Co., Chicago, bench type lathes, Sept., 1950, $138,601.

Shepard Elevator Co., Cincinnati, design, furnish and install adjustable orifice diaphragm, Jan., 1951, $194,724.

Sidney Machine Tool Co., Sidney, O., engine geared head screw lathe, Feb., 1951, $21,722.

Sikorsky Aircraft div., United Aircraft Corp., Bridgeport, Conn., engineering inspection changes to the YH-19 helicopter contract, July, 1950, $18,895.



Wind Tunnel in the SKY

The sky is a tough proving ground. In its boundless space, the tiny X-1 became the world's first aircraft to exceed the speed of sound. Now, after more than three years of high speed, high altitude research, the X-1 has completed its mission. Designed and built by Bell Aircraft Corporation, in cooperation with the Air Materiel Command of the U. S. Air Force and the National Advisory Committee for Aeronautics, this rugged speedster joins the select company of distinguished aircraft in the Smithsonian Institute...a group which includes Bell's XF-59—this country's first jet-propelled airplane.

In more than 100 flights, the X-1 collected a tremendous volume of invaluable data. Equally gratifying to its designers, the X-1 responded to every requirement—at subsonic, transonic and supersonic speeds...

Exactly as it came from the drawing boards

Work initiated by the X-1 is being perpetuated by other highly specialized research aircraft designed to probe further into supersonic flight at speeds and altitudes which were considered impractical—and impossible—until the X-1 broke through the barriers.

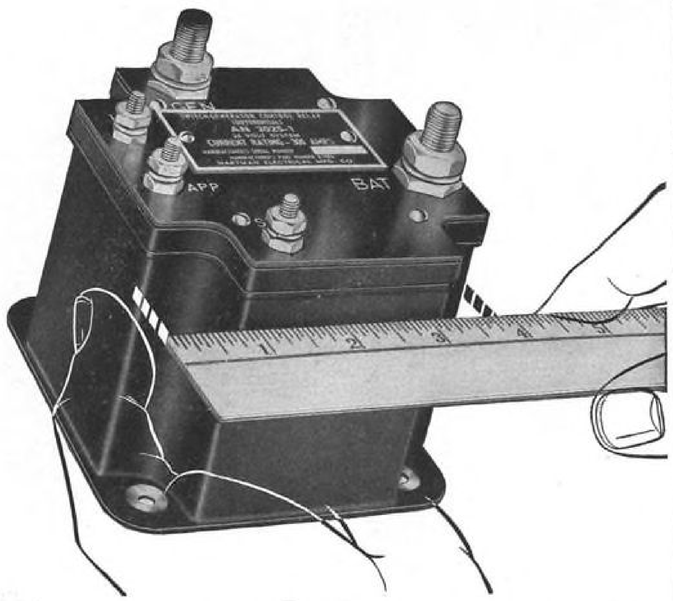
Immediate successor to the X-1 is Bell's X-1A. The X-1A incorporates a turbine-driven fuel pump designed to enable the plane to fly 1700 miles per hour 15 miles above the earth.

Bell's X-2, a rocket-powered, swept-back wing research aircraft is also being prepared. With heat-resisting stainless steel wings and tail, the X-2 is fast approaching the day when it too will use the sky to increase the fund of scientific knowledge upon which future combat aircraft designs will be based.

And somewhere in the background are more Bell projects destined to carry on in the research tradition of their predecessors.

BELL Aircraft CORPORATION

Pioneer of supersonic aircraft — remote controlled flight — jet and rocket propulsion — rotary wing aircraft — fighter design, armament and construction — guided missiles.



Measure of Acceptance

Superior performance within the same size and weight limits—this is just *one* of the reasons why Hartman A-700A* Reverse Current Cutouts have made obsolete the fixed voltage types formerly used . . . *why today they control more military and transport aircraft generators than do all other makes combined.*

Designed to close on differential voltage between generator and bus rather than at a fixed voltage, the A-700A cutout is *free from all contact flutter.* Troublesome rectifiers and current-draining ballast tubes have been eliminated. The A-700A cutout operates with any d-c generator up to 300 amps capacity having a normal regulated voltage of 28.5 volts. 600-amp* units also available.

The A-700A cutout tips the scales at only 2.5 lbs., gives rated operation from sea level to 50,000 ft. altitude in ambients from -67° to 160°F. Constructed from top quality materials only, the A-700A cutout has extra heavy duty contacts capable of interrupting fault currents up to 2500 amps—for longer service life, lower maintenance cost. *Contact replacement is unknown.*

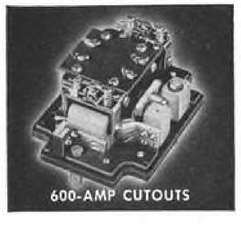
Typical of Hartman design and precision manufacture, the A-700A cutout is just one of many Hartman electrical devices for the aircraft industry. If you have a problem involving d-c electrical controls, turn it over to Hartman where it will be analyzed, engineered and produced with an efficiency that comes from nearly half a century of experience.

A-2644

**Manufactured to AN3025 (Spec. MIL-C-5026). Literature on request.*

the Hartman Electrical Mfg. co.

MANSFIELD, OHIO



600-AMP CUTOUTS

JET STARTER RELAYS

OVERVOLTAGE RELAYS

Simmons Bros., L. I. City, N. Y., lenses and lens assemblies, July, 1950, $9743.

Simplex Time Recorder Co., Cleveland, time recording stamps, Aug., 1950, $16,792.

Singer Sewing Machine Co., New York, sewing machine with stand and table, sewing machine, pedestal type, and machine motor, Dec., 1950, $10,584.

Smoot-Holman Co., Inglewood, Calif., ducting and accessories, Sept., 1950, $11,415.

Solar Aircraft Co., San Diego, Calif., Solar aircraft exhaust stacks for XB-26F aircraft, Oct., 1950, $5417.

Southline Metal Products Co., Houston, metal shipping containers, Sept., 1950, $13,310.

Speedo Electric Co., Los Angeles, spares for air compressors, fire trucks and powerplants, Nov., 1950, $8250.

Spencer Turbine Co., Hartford, Conn., type 1 portable commercial vacuum cleaner, Aug., 1950, $17,751.

Sperry Gyroscope Co., Inc., div., Sperry Corp., Great Neck, N. Y., installation of airborne navigation equipment developed under basic contract into government owned C-54 aircraft, Sept., 1950, $18,033; engine analyzer, May, 1951, $16,395; miscellaneous tools and equipment, Nov., 1950, $8556; automatic pilots, May, 1951, $473,843; spare components automatic pilots, May, 1951, $56,972; furnish test panel for Sperry Zero Reader, Oct., 1950, $8982.

Sprague Engineering Sales, Gardena, Calif., type A-1 gasoline engine driven blowers and spares, Jan., 1951, $29,498.

Springfield Machine Tool Co., Springfield, O., geared engine lathe, Feb., 1951, $57,600.

Standard Electric Products Co., Dayton, light-timing magneto and maintenance data, July, 1952, $28,142; variac-variable transformer, June, 1950, $6400.

Standard Electric Time Co., Springfield, Mass., timer complete in carrying case, Aug., 1950, $8610.

Standard Molding Corp., Dayton, flashlight type A-5A lamp assembly, July, 1950, $9500.

State Electronics Sales, New York, modification of amplifiers, Oct., 1950, $5289.

Steelcraft Mfg. Co., Rossmoyne, O., aerial tower, 75 ft. navigation beacon, July, 1950, $16,140.

Steinthal, M., and Co., New York, jettisonable canopy risers, Dec., 1950, $261,600.

Stevens, L. E., Co., Cincinnati, electroplating system installation, Aug., 1950, $18,976.

Stewart Warner Corp., Chicago, lubricator, Oct., 1950, $9606.

Stott, Charles G., Co., Washington, office furniture, Aug., 1950, $15,920; time recording stamps, Aug., 1950, $5458; drafting chairs, Aug., 1950, $9475.

Summerill Tubing Co., div., Columbia Steel-Shafting Co., Pittsburgh, mild carbon seamless steel tubing, Oct., 1950, $17,148.

Sundstrand Machine Tool Co., Rockford, Ill., type F-1A alternator drive, spare parts data, Dec., 1951, $2,019,344.

Superior Auto, Inc., Dayton, modification of trucks, Sept., 1950, $8021.

Superior Electric Co., Bristol, Conn., variac-variable transformers, June, 1950, two contracts, $15,046, $17,955.

Sverdrup-Parcel, Inc., St. Louis, engineering and other professional services, June, 1954, $5,672,168.

Switlik Parachute Co., Trenton, N. J., jettisonable harness assemblies, Dec., 1950, $1,029,100; panel cover, Dec., 1950, $206,400.

Technicraft Corp., Kansas City, Mo., wing walkways, Oct., 1950, $20,539; multimeter, Dec., 1950, $108,000.

Texas Engineering and Mfg. Co., Dallas, maintenance inspection on 60 C-54 aircraft, July, 1950, $1,655,119; oxygen servicing trailer, Dec., 1950, $306,463.

Thompson, H. I., Co., Los Angeles, quilted fibre glass fabric, Dec., 1950, $60,140.

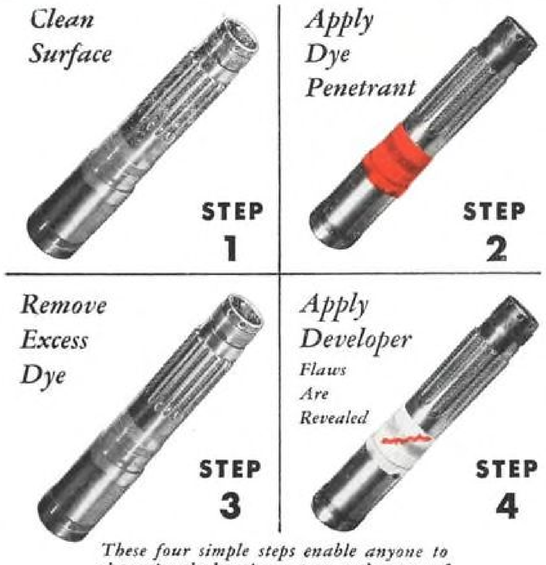
Thompson Products, Inc., Cleveland, fuel booster pumps, Oct., 1950, $11,700; mobilization planning study, June, 1951, $94,710.

Titeflex, Inc., Newark, N. J., wave guide used in Army-Navy radio set, July, 1950, $13,262.

Tracerlab, Inc., Boston, tube, Tracerlab, Inc., No. G874, July, 1950, $7008.

United Aircraft Products, Dayton, oil coolers and spare parts, Nov., 1950, $9662.

NEW INSPECTION METHOD



These four simple steps enable anyone to determine the location, extent, and nature of surface flaws or discontinuities in any metal.

Four Simple Steps for Easy, Economical Quality Control & Preventive Maintenance

The Dy-Chek inspection process involves the use of three special liquid compounds, non-corrosive and easily applied by brush, spray, or dipping. STEP 1—Clean surface with Dy-Chek Cleaner; STEP 2—apply red Dye Penetrant; STEP 3—remove excess Penetrant with Cleaner; STEP 4—apply white Developer ...brilliant red indications appear quickly if flaws are present.

Requires no electricity, lights, or special installations

The *only* requirements for Dy-Chek inspection are the three liquids, and simple equipment — such as brushes, sprays, or dip tanks — for applying the liquids.

Dy✓Chek Inspection Can Be Used Anywhere!

Complete portability takes rigid inspection into the field for use by anyone without special training. Dy-Chek's low cost extends precise inspection to even the smallest companies. Ample supplies for inspecting large areas of metallic surface can easily be carried to any location. On the other hand, the simplicity of the process lends itself equally well to installation in a plant for production-line inspection.

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dy✓chek —*the dye penetrant inspection method*

Revolutionary DY✓CHEK TRADE-MARK Process Quickly Inspects Any Metal For Flaws

DY-CHEK, THE DYE PENETRANT METHOD OF INSPECTION* permits *anyone anywhere* quickly and conveniently to inspect *any* metal for flaws or discontinuities having surface openings. Castings, forgings, machined parts, plate, sheet, tubing, weldments . . . aluminum and its alloys, cobalt, copper and its alloys, iron and its alloys, magnesium, nickel and its alloys, etc. . . magnetic and nonmagnetic . . . all can be surface inspected by the Dy-Chek process. *The surface need not be smooth.* Dy-Chek is a proven economical process developed by Northrop Aircraft Research, and is *already widely used in many industries.*

*Pat. Pend.

Positive Dy✓Chek Indications Clearly Reveal Flaws

Dy-Chek inspection reveals both the nature and extent of surface discontinuities. A Red Line indicates a crack, cold shut, or similar opening; Red Dots indicate pits or porosity; a Series of Red Dots in a Line indicates a tight crack or cold shut, or a partially welded lap. The extent of the flaw *on and beneath the surface* is easily estimated by the width of the Dy-Chek indication.

SEND TODAY for COMPLETE INFORMATION

The simple, economical Dy-Chek process is available immediately for manufacturing inspection, receiving inspection, and preventive maintenance. Write today for complete details on how to simplify *your* inspection problems.

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1513 East Broadway, Hawthorne, California

Send by return mail complete details on the Dy-Chek Dye Penetrant Method of inspection for any metal.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

United Manufacturing Co. div., United Advertising Corp., New Haven, Conn., aircraft generator test stand, maintenance and engineering data, Aug., 1950, $318,239; generator test stand, Oct., 1950, $19,550; portable electric repair bench, July, 1950, $20,049.

U. S. Electrical Tool Co., Cincinnati, bench type valve refacing grinder and commercial data, June, 1950, $5828.

U. S. Gage Corp div., American Machine and Metals, Inc., Sellersville, Pa., oil pressure transmitter, Dec., 1951, $8925; hydraulic pressure gages, May, 1951, $6714.

U. S. Rubber Co., Detroit, airplane casings, July, 1951, $151,135; airplane casings and tubes, July, 1950, $83,927; casings, Oct., 1950, $7731.

U. S. Steel Supply Co., Cleveland, structural steel, Sept., 1950, $13,488.

Universal Ball Co., Willow Grove, Pa., metal balls, July, 1950, $10,964.

University of Chicago, Chicago, research program on surface and interface reactions on metals, July, 1951, $35,000; research studies and investigations on measurement by electronic methods of nuclear interaction in cosmic rays, June, 1951, $49,150.

University of Illinois, Urbana, investigation of the physical properties of semi-conductors, Aug., 1951, $33,000 human resources research planning, July, 1951, $55,000.

University of Michigan, Regents of the, Ann Arbor, study of special and unusual conditions affecting high speed aircraft and missiles, May, 1951, $22,479.

University of Notre Dame, Notre Dame, develop coding techniques for analogue computing machines, June, 1951, $11,522.

Utility Electronics Corp., Newark, N. J., parts for multimeter, Nov., 1950, $24,500.

Variety Aircraft Corp., Dayton, coupling, Aug., 1950, $9879.

Vectron, Inc., Waltham, Mass., design, furnish and install servo test stand assembly, Mar., 1951, $86,031; indicator straight line, Oct., 1950, $28,870.

Victor Gloves, Inc., New York, gloves, Dec., 1950, $8572.

Victorlite Industries, Los Angeles, visual projectors, June, 1950, $5550.

Vugraph Sales, Newark, N. J., overhead projectors, July, 1950, $8947.

WSW Mfg. Co., Burbank, Calif., photographic washer assembly, June, 1950, $27,374.

Waltz Furnace Co., Cincinnati, electric heat treating furnace, Oct., 1950, $58,450.

Weatherhead Co., Cleveland, aircraft hardware, Sept., 1950, $6680.

Weidenhoff, Joseph, Inc., Chicago, universal automotive generator and starter test bench, less cabinet, magneto test fixture, July, 1950, $6290.

Wells-Gardner and Co., Chicago, radio modulator and transmitter, Dec., 1950, $32,169.

Western Automatic Machine Screw Co., Elyria, O., nuts, Sept., 1950, $5700.

Western Electric Co., New York, miscellaneous parts and components, June, 1951, $100,000; resistor assemblies, May, 1951, $42,727; 100 TR boxes, Feb., 1951, $19,330; altitude computer used with CP-16-APQ-23, May, 1950, $19,209; 16 mm. and 8mm. Fastex cameras, (Research Navy), July, 1950, $5274; bill of materials for radar set, Oct., 1950, $5974.

Western Gear Works, Lynwood, Calif., actuator assembly, Dec., 1950, $22,001.

Westinghouse Electric Corp., Dayton, lamp assembly and engineering data, July, 1950, $61,960; type B-3 generator control system, Mar., 1951, $15,000; relays, Apr. 1951, $154,516; portable arc welder and handbook data of instructions, Mar. 1951, $38,000; B-1 alternators, Oct., 1950, $25,320.

Westinghouse Electric Supply Co., Dayton, oil fuse cutout, Aug., 1950, $10,518; switchboard voltmeter, June, 1950, $5156.

Weston Electric Instrument Corp., Newark, N. J., maintenance parts for aircraft instruments, Nov., 1950, $34,507; indicators, Jan., 1951, $16,526.

White Tuning Corp., New York, AN-ARQ-8 equipment, Nov., 1950, $7560; recorder unit, Dec., 1950, $30,500; type P-1 phase adapters, Dec., 1950, $6647.

Wiggins, E. B., Oil Tool Co., Los Angeles, quick disconnect coupling, Nov., 1950, $11,880.

Wild, Henry, Survey Instrument Supply, Brooklyn, automatic aerial camera and recording stato-scope equipment, (Aviation Navy), Aug., 1950, $17,300.

Wisconsin Motor Corp., Milwaukee, spare parts for F-1 truck tractor, F-1 fuel servicing trailer and A-1 lifeboat, Sept., 1950, $16,276.

Wolverine Diesel Power Co., Detroit, type B-6B powerplants, Dec., 1950, $284,253.

Wright Aeronautical Corp. div., Curtiss-Wright Corp., Wood-Ridge, N. J., spare parts for all Wright engines, Apr., 1952, $5,626,438; conversion and modernization of R-3350-23A engines to R-3350-57AM engines, June, 1950, $1,000,000.

Yawman-Erbe Mfg. Co., Washington, tables, Sept., 1950, $16,235; desk trays, Aug., 1950, $7256.

Yoh, H. L., Co., Philadelphia, development of air compressor, Dec., 1952, $105,788; sheet metal bench brake and data, Nov., 1950, $8784; survey services of initial planning and development of housing construction components, Dec., 1950, $14,306.

Watson Labs

Corps of Engineers U. S. Army, New York, soil analysis and foundation design, May, 1950, $5700.

Goodyear Aircraft Corp. div., Goodyear Tire & Rubber Co., Akron, plotting board and combination screen, May, 1950, $13,987.

Johns Hopkins University, Baltimore, research and investigation into the micrometereology of surface layer of atmosphere, June, 1952, $98,750.

Squier Signal Lab div., U. S. Army Signal Corps, Ft. Monmouth, N. J. battery power supply and battery electro-ore, June, 1950, $7200.

Syracuse University, Syracuse, N. Y., high frequency transponder for use with 100 kc. pulsed transmission circuit, Sept., 1950, $20,000.

Cambridge Labs

Aerojet Engr., Corp., Azusa, Calif., consultant and engineering services in connection with use of RTV-A-1 Aerobee D missiles for upper atmosphere experiments, May, 1950, $10,000.

Collins Radio Co., Cedar Rapids, Iowa, microdensitometer, Nov., 1950, $20,930.

Columbia University, New York, research and investigation of techniques required for the determination of natural C14 content of water ice and air, June, 1951, $9855.

Duke University, Durham, N. C., research and investigation of the absorption characteristics of various gases for microwave frequencies adjacent to the infra-red bands, June, 1950, $75,000.

Kollsman Instrument div., Square D Co., Elmhurst, N. Y., chart paper ribbon assembly cams holder motor, Jan., 1951, $10,707.

McGill University, Montreal, Canada, investigations of cloud and precipitation physics and dynamics, July, 1951, $31,020.

Polytechnic Institute of Brooklyn, Brooklyn, research for theoretical and experimental investigation of the electromagnetic properties of obstacles and slots in wave guides, Nov., 1950, $15,000.

Sperry Gyroscope Co. div., Sperry Corp., Great Neck, N. Y., klystron, Feb., 1951, $13,386.

Tufts College, Trustees of, Medford, Mass., investigation of physical properties of upper atmosphere, June, 1951, $50,000.

University of Alaska, College, study of stratosphere temperatures and winds in high latitudes, Apr., 1951, $11,220; studies leading to an anlysis of temperatures and winds at altitudes 20 to 60 km. throughout a complete year in the northern latitudes, May, 1951, $5000.

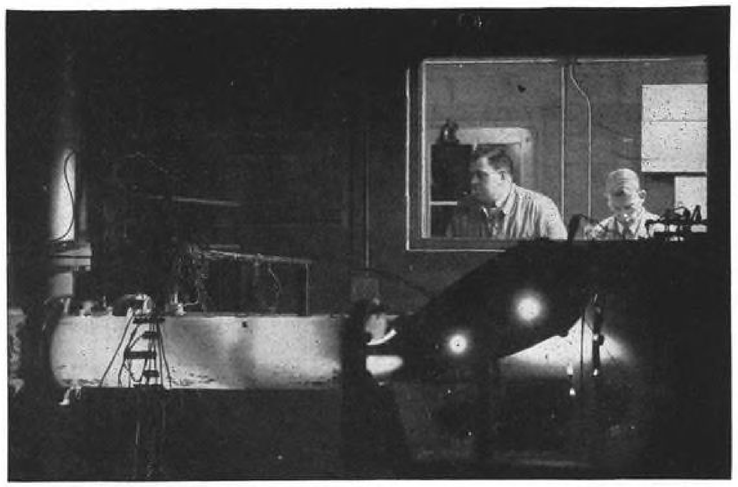
University of Chicago, Chicago, research investigation and reports on nature of patterns of motion induced by thermal and mechanical actions in stationary and rotating fluid layers of various shapes, Sept., 1951, $58,800; research in field of thunderstorm electricity, Feb., 1951, $29,075.

Wentwood Institute, Boston, services in connection with adaptation of upper air vehicles for upper air experiments, Mar., 1952, $98,000.

Lab Pushes Work on Better Lubes, Fuels

Texas Co. aim is to keep product quality ahead of new equipment demands.

By Irving Stone



COMBUSTION TEST of burner can at Texas Company's jet lab. Two bright spots below test cell window are quartz observation ports for visual examination of flame pattern within burner.

Research in aviation fuels and lubricants is being pushed at the Beacon, N. Y., laboratory of The Texas Co., to keep ahead of the increasing quality demands of engines and equipment.

The lab facility, which covers almost 200,000 sq. ft., recently was opened for inspection for the first time to a group of the aviation press. Approximately 25 percent of the facility's area is devoted to research in aviation products.

Because quality of Texaco's fuels and lubes finally are established at Beacon, the lab's testing procedures are necessarily extensive and thorough, and frequently keyed to specific problems of equipment manufacturers and operators.

► **Turbojet Combustion Studies**—A highlight of the lab is the gas turbine combustion facility.

Compressors powered by 500-hp. motors supply air for single-burner runs over a wide range of simulated conditions. A preheater brings the incoming air up to proper temperature.

Combustion studies primarily are concerned with effects of altering fuel properties and the interrelation of fuels and equipment design.

Currently, studies are being conducted on a Pratt & Whitney J-42 Turbo-Wasp combustion chamber to evaluate fuel performance up to 60,000 ft. Test runs covering 20 hours are conducted on an interrmittent basis.

► **Ramjet Setup**—Studies of combustion in steady flow systems are being conducted with a ramjet rig, under contract with the Office of Naval Research.

A movable flame holder is used and a cooling water spray downstream can be advanced or retracted to control exhaust temperatures. View ports reveal flame action.

► **CFR Studies**—A Cooperative Fuel Research engine, almost completely automatic, checks anti-knock qualities of aviation gasoline.

Automatic controllers are used for intake-air temperature, fuel-air ratio, and dynamometer speed. An automatic reference fuel blender also has been used with the unit.

Special, high-output power sections have been developed for the engine to simulate more closely conditions of actual aircraft operation. These sections aid in rocker box lubrication studies, with separate control of oil flow and temperature.

In all, nine CFR engines are available for checks of aviation, automotive and Diesel fuels.

► **CUE Data**—A Cooperative Universal Engine checks both fuel and lubricants.

The special crankcase carries a full-scale aircraft engine cylinder. Speed, head temperature, fuel-air ratio and manifold pressure can be varied independently over the full usable range of engine flight conditions to study anti-knock characteristics.

And lubricants can be checked on the basis of piston varnish, combustion chamber deposits, ring wear, valve and guide performance, and bearing corrosion.

Work with this unit is not limited to fuel and lube studies. Frequently, mechanical defects of the power section components are traced as trouble sources.

► **Engine Oils**—In addition to bench tests, a Continental four-cylinder engine is used for aircraft engine oil studies.

Each cylinder can be held at a different temperature through a servo-motor controlling cooling air shutters. This in effect allows four temperature-runs to be conducted simultaneously.

Tests are also conducted for the company by Pratt & Whitney on Texas-owned engines. These checks are run in cycles simulating typical airline flight schedules.

Operation of jet engine bearings with low viscosity oils is another research phase. Because low temperatures encountered in winter operation and high altitudes require use of light oils, study is now progressing on how these lubricants also will stand up at high temperatures with high speeds and heavy bearing loads.

► **Gear Oils, Greases**—Current emphasis is on lube problems of turboprop gearing. Gear oils and greases are being performance-checked under such conditions as low and high temperatures, high speeds and vibration.

A 16,000-rpm. aircraft-gear tester with tooth loads up to 1500 lb. determines effects on gear operation of oils and greases, tooth form and face, material finish, speed and temperature.

A 36,000-rpm. tester driven by a special Westinghouse motor is being used to investigate suitability of grease instead of oil for ultra-high-speed bearing applications. Aim: to eliminate necessity for oil sumps, pumps, filters, gages, and return lines.

To explore the suitability of greases

for jet plane and rocket controls, another tester is used to oscillate bearings while subjected to temperatures of 400-600 F.

Another temperature check for greases is in ball bearings at about 300 F. The test is run in 25-hour cycles until failure is indicated by noticeable noise, or by roughness in hand-turning.

▶ **Technical Service**—A very important phase of Texaco's Beacon Lab are the service conferences it holds with airline operating and maintenance engineers.

These "trouble-shooting" sessions aim to iron out service difficulties and frequently indicate the direction new research must take.

In many instances, the failure complaint laid at lubrication's door is resolved (after extensive checking frequently involving metallurgical studies and physical property testing) as a mechanical difficulty stemming from component design.

Model Tests Predict Spin Characteristics

Aircraft spin recovery characteristics can be predicted satisfactorily nine times out of ten from spin tunnel tests of a scale model, says the National Advisory Committee for Aeronautics in a new report.

And the tenth time, the model results are still useful in estimating some of the full-scale performance.

Basis for this claim is a correlation of full-scale and model tests of 60 different airplane designs, reported in NACA Tech. Note 2134.

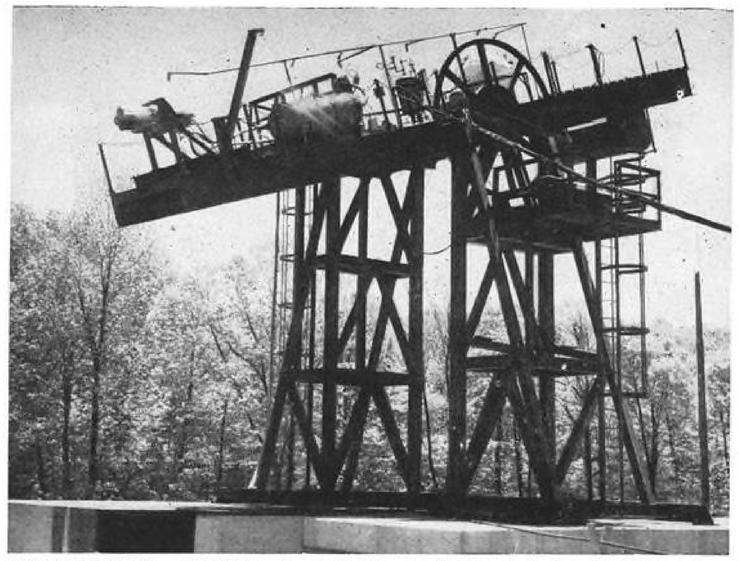
▶ **Second Report**—The study is a follow-up to an earlier memorandum which compared test results for 21 airplanes. But the meagerness of then-available information prompted the later, more comprehensive report.

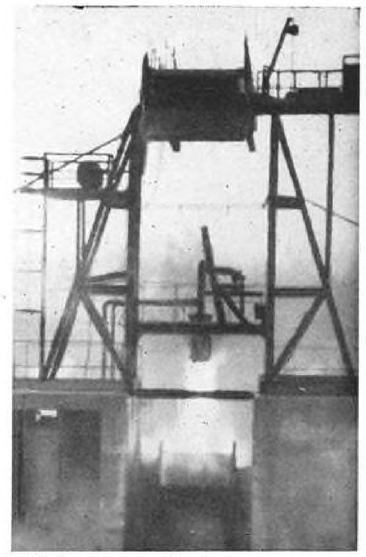
Purpose of the investigation was to get a bench mark for assessing the accuracy of spin tunnel tests as a method of predicting the performance of actual planes. NACA analyzed the results of such tests, and compared them to full-scale aircraft spin data for 60 different airplane configurations.

Types studied varied from biplanes of the 1926 era to the sweptwing designs of 1948.

In a limited number of cases, tests were made of parachute deployment for spin recovery. These studies predicted somewhat larger parachutes than were found necessary in previous flight trials.

There were some variations between full-size and model performance. Most of these were small, and did not affect the overall conclusions arrived at in the study.





POWERPLANT for D-558-II during static firing in climbing attitude and (right) single rocket cylinder in conventional vertical test.

RMI Rocket Test Stand Simulates Flight Attitudes

A rotating-beam test stand, designed and operated by Reaction Motors, Inc., Rockaway, N. J., is representative of the many special-purpose devices needed by rocket engine developers.

Major purpose of the stand is to simulate changing flight attitudes during test runs on complete rocket powerplants. Single rocket cylinders can also be fired from an A-frame on the stand, without using the rotating beam. This flexibility is one of the outstanding design features.

Test and acceptance runs have been made on the engine installations of the Douglas D-558-II Skyrocket and the Martin Viking.

▶ **Skyrocket Tests**—Firings of the Skyrocket motor were made with the beam in a nearly-horizontal position. Engine components are strapped to the beam in locations simulating their place in the aircraft. Then, by rotating the beam either before or during the firing, airplane flight attitude effects can be checked.

▶ **Viking Vertical**—Powerplant checks for Martin's Viking are performed with the rotating beam positioned in a vertical attitude.

The complete tankage, lines, pump, steam system and other accessories are mounted above the rocket motor just as in the missile.

Jet discharge from the rocket motor blasts downward through a water-spraying ring to impinge on an inverted-vee waterbox. Cooling water is circulated at the rate of about 1000 gpm. through this box.

▶ **Rugged Structure**—The rotating beam is mounted on a rugged I-beam structure which is anchored in concrete.

Permissible thrust loading on the concrete is 75,000 lb., but to handle so large a rocket motor, some rework of the steel superstructure would be necessary.

Fuel tankage and pump room are located in the concrete base of the stand. Instrumentation is in a separate protected enclosure. Operators are about 200 ft. away in a semi-buried control room.

Most of the current time is being used in acceptance testing of the 20,000-lb. thrust Viking motor.

Magnesium Alloy Corrosion Studied

An extensive study of the corrosion of magnesium alloys, always a deterrent to aircraft structural applications, has been summarized by the National Bureau of Standards in its recent Technical Report 1464.

The investigation, carried out at the request of the Bureau of Aeronautics, tested samples of sheet and extruded alloys under stress in both inland and marine atmospheres.

Of all specimens, M1-clad AZ31X-h alloy was most resistant to stress corrosion.

Loaded to 30,000 psi. (90 percent of yield) and exposed to a marine atmosphere, the specimen lasted 500 days without failure.

▶ **Samples Tested**—Sheet stock samples tried by the Bureau were M1, AZ31X, AZ51X, AZ61X alloys and a clad alloy (core of AZ31X sheet with veneer of two layers of M1 alloy). Extrusions ZK-60, AZ61X, AZ80X and AZ80X-HTA also were studied.

Standard ASTM reduced-section tension specimens were modified where possible to use grip ends of 1-in or 1¼-in. width, rather than the usual ¾-in. width. Purpose of increased width was to minimize failure caused by stress corrosion around bolt holes.

▶ **Weather Conditions**—Stressed and unstressed specimens were exposed to weather at the National Bureau of Standards in Washington and at Hampton Roads, Va. At the latter site, the specimens were on a platform built out over the tidewater.

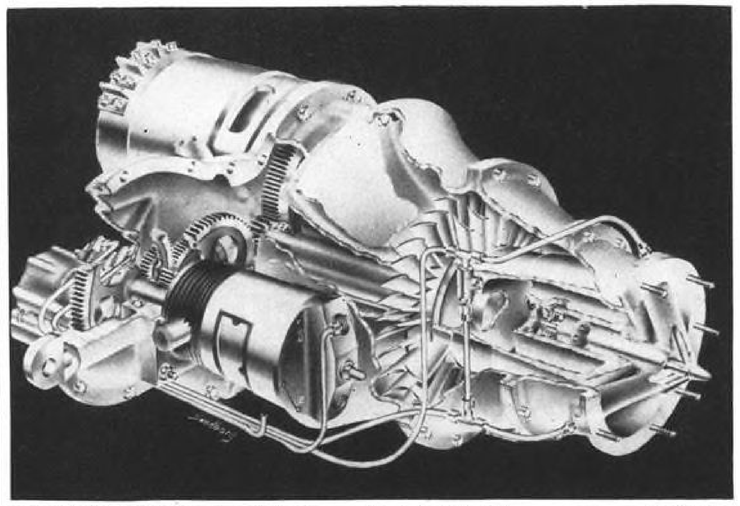
Laboratory tests also were made with stressed specimens in a solution of sodium chloride and potassium chromate and by intermittent immersion in a sodium chloride solution.

▶ **Conclusions**—The corrosion culprit seemed generally to be aluminum. As the content of that metal increased, so did the susceptibility to stress corrosion in weather.

M1-clad AZ31X-h alloy proved to be the most resistant to stress corrosion.

Among the uncoated alloys, M1-h sheet and ZK-60 extrusion were particularly resistant to stress corrosion.

Specimens stressed at the Washington site failed in shorter periods of time than those exposed to the same loading conditions in the marine atmosphere.



COMPACT DESIGN of typical Marquardt air turbine-driven accessory powerplant is shown in cutaway.

Ram Air, Steam Drive Turbines

Announcement of the production and development of four accessory powerplants for guided missiles and piloted aircraft has been made by the Marquardt Aircraft Co., of Van Nuys, Calif.

These accessory drives can be powered either by ram air or by steam from the decomposition of hydrogen peroxide. Marquardt claims their horsepower-weight ratio is more than four times greater than that of conventional reciprocating engine auxiliary units.

► **Drives Described**—Four different powerplants were described:

- **A high-speed ram** air turbine which drives two hydraulic pumps and a constant speed alternator through a reduction gear. It uses a hydraulic speed control (also developed by Marquardt) which governs within 3 percent. This unit is for a Navy missile.
- **A unit** (whether air or steam-driven is not stated) which drives a high-speed alternator direct. An electronic governor and throttle maintain rotational speed within 1½ percent. Powerplant is slated for an Air Force missile.
- **A high-speed ram air** turbine which drives direct a large capacity fuel pump. This one is for missile application.
- **A complete accessory drive** which has been designed to operate on either ram air or hydrogen peroxide.

► **Logical Choice**—The use of ram air or steam as a driving medium for the turbine is a logical design choice. High-speed aircraft can either bleed air from the jet compressor section or use an air scoop to take it on board. Missiles can use either ram air or steam from the now quite-conventional steam plant (hydrogen peroxide with a catalyst).

Missile units use throttling on the intake side to govern the amount of air swallowed by the turbine. One model does this by a bullet-shaped throttle at the air intake.

Installations of these powerplants can be made at remote points, with air supplied through a system of ducts. In this case, the advantage of a distant location would be weighed against the disadvantage of ducting losses.

Aro to Operate AF Development Center

The growing trend toward operation of government research and development facilities by private management corporations under contract is spotlighted by the recent designation of Aro, Inc., a Tennessee corporation, to run Air Force's Arnold Engineering Development Center, near Tullahoma, Tenn.

Major reason for this type of contract seems to be the ability of private corporations with overall management contracts to offer more attractive salaries to researchers than could be paid if the facility were government-operated and subject to Civil Service pay limitations.

Maj. Gen. Franklin O. Carroll, commanding general of the AEDC, will have charge of programming the tests to be performed at the center. But the actual testing will be done by the contractor's personnel under direction of David Roy Shoults, Aro director of Engineering, formerly associated with General Electric and Bell Aircraft. Aro is affiliated with the St. Louis engineering firm of Sverdrup and Parcel, Inc.

The AEDC setup is expected to parallel closely contracts which the Atomic Energy Commission has with private corporations to operate its facilities.

Turbine Transport Airworthiness

Suggested certification requirements offered as stimulus to industry by CAA's George Haldeman.

The Civil Aeronautics Administration is lifting the hazy curtain from the turbine transport scene.

It doesn't profess to know all the answers to the numerous airworthiness problems the high-speed, high-altitude era will bring, but it is tackling those which seem capable of being resolved now. Other solutions will have to be left to development during the certification procedure and operational testing programs.

George W. Haldeman, chief of CAA's aircraft division, aired some of the most pertinent considerations at the recent annual summer meeting of the Institute of the Aeronautical Sciences in Los Angeles (AVIATION WEEK, July 24).

The solutions advanced were not offered as a rigid line of thinking, but rather as a gesture to stimulate discussion with industry and operators so that airworthiness requirements for commercial turbine-planes may be evaluated efficiently and in sufficient time. Here are some of the problems Haldeman uncovered:

▶ **Speed Factors**—Higher operating speeds of turbine-powered craft will require re-evaluation of structural design criteria in present Civil Air Regulations.

Design speed for flaps used as high lift devices should be selected by the designer but probably should not be less than 1.8 the stalling speed of the plane in the configuration specified for the particular condition.

This spread should be sufficient where flaps are used for high lift devices alone.

Spread between design speed for maximum gust (40 fps.) and design cruising speed should account for the time required to slow the airplane to the rough air speed, and account for the rate of increase to design cruising speed in the event of upset at speed for maximum gust.

In selecting the design cruising speed, the value should be large enough to cover the spread between it and design speed for maximum gust and be consistent with actual plane performance.

Suggestion was that this value be at least equal to the speed corresponding to continuous cruise power, plus an increment of Mach .05.

For aircraft with designed dive speed Mach numbers under .65, probably no change will be necessary for present design cruise and design dive speed relationships.

For values over M .65, an adequate margin between these two factors will probably be needed to insure that design dive speed will not be exceeded. The amount of spread should take into consideration design provisions to limit speed.

▶ **Maneuver, Gust Envelopes**—The high speed of the jet craft will involve a larger turning radius, hence decreased maneuverability. With carefully controlled operations, no increase in maneuvering load factor may be required; otherwise, an increase in the present 2.5G maximum value for design will be necessary.

Deterioration of maximum lift coefficient and variation of other aerodynamic parameters probably will make it impossible to realize a load factor of 2.5 at, say, 40,000 ft. Hence it may be desirable to check for only those load factors that can be achieved in conjunction with buffeting loads.

Reports of severe gusts encountered at 40,000 ft., some in clear air, make questionable the advisability of using statistical methods as a basis for reduction of gust strength criteria.

In the absence of further information it may be advisable to consider that the magnitudes of gusts are equivalent to those specified for sea level, with no change for effect of altitude.

▶ **Aerodynamic Proving**—For the high Mach number transport, difficulties of predicting compressibility effects, and greater influence of small and local changes in configuration, indicate that specific wind tunnel test data may be required as a minimum to determine design air loads.

▶ **Structural Flight Tests**—In accelerated flight, a high speed plane may show unfavorable handling characteristics or experience critical loading or vibration conditions. Because it is difficult to analyze theoretically these adverse conditions, the limit lines of the V-G diagram may have to be established in structural flight tests.

Buffeting and other critical conditions may require consideration of an *operating* V-G envelope.

▶ **Speed Control Flaps**—Unless provision is made to automatically limit inadvertent speed pickup, the high-speed craft probably will frequently approach or exceed design never-exceed speed.

Dive brake type speed control flaps are one answer, but any device utilized should have full effect in 5 sec.

▶ **Braking**—Because of higher climb-out speeds, more efficient braking will be needed for discontinued takeoffs. Absence of reverse prop thrust will also be a braking factor.

A brake anti-skid device may be re-

quired, also two braking systems if a supplementary slowdown means is not used.

► **Emergency Exits**—Speedy emergency evacuation of passengers and crew will be a prime consideration—1 sec. per person, and 1 min. total for all, appearing feasible. A few larger doors seem more suitable than many smaller openings.

Inward opening doors may be required for added safety because of pressure differences in flight. But since inward opening may affect quick egress, exit approaches would have to be unobstructed.

► **Oxygen**—To cope with explosive decompression above 25,000 ft., immediate supply of oxygen will be a "must" for passengers and crew.

Possible solutions: passengers be given masks and use-instructions before going above 25,000 ft. (method would have poor psychological effect); flooding of cabin with oxygen (may be impractical at extreme altitudes because of large supply necessarily involved). Or structure could be made sufficiently strong to eliminate possibility of explosive decompression, eliminating need for additional breathing equipment over that now required.

► **Augmentation**—Quick acceleration of the engine, particularly in discontinued landing procedures, will be an important consideration.

This problem could be resolved with special devices, specific operating procedure, and/or tests.

Poor takeoff performance of the turbine plant will warrant some means of thrust augmentation. Methods available now for this purpose are tailpipe burning, water injection of JATO-type means.

► **Blowout**—Combustion failure at higher altitudes will be another problem. Solutions point to improved chamber design, variable-area fuel nozzles, and fuels for better efficiency at altitude.

► **Reliability**—This will be a prime consideration for turbine plants.

It must be shown that they will give reliable service between overhaul periods, with remote chance of breakdown.

Initial overhaul periods will have to be conservative, with overhaul time extension justified only by service experience.

► **Fuel Factors**—Storage of fuel in turbine transports will pose difficulties. If fuselage tanks are installed, these provisions will have to be considered: tank protection for crash landing by placing adequate structure between tank and exterior; tanks to be sufficiently strong to withstand forces in a crash in which passengers could survive (feasibility of 20G valve should be checked); sufficient isolation and ventilation of tanks; restriction to use of low-volatility fuel to

minimize crash fire hazard in view of suitability of this type of fuel for turbine engines.

► **Icing**—Control of icing on turbine plants apparently will pose greater difficulty than with piston engines.

Advantages and performance loss with alternate intakes are being checked by research groups, together with these ice-fighting schemes: boosting inlet air temperature (bleed), heating hollow inlet vanes, inertia separators, electric heating, resistant coatings, alcohol injection for compressor inlet, eddy current heat (magnetization), and retractable inlet screen.

► **Fire Systems**—Satisfactory detection and extinguishing installations will be key considerations for commercial turbine transports. Military operations have turned up fire difficulties with the turbine plant.

Vapor- and liquid-tight firewalls will be required, and additional design and weight sacrifices will be necessary to minimize fire hazard.

► **Windmilling**—Means will be needed for turbine windmilling control because a failed engine will introduce drag, danger of damage to engine and structure, and likelihood of fire.

Possible solutions: use of a front cover, rear cover, or braking.

► **Temperature, Humidity**—Temperature and humidity effects should be considered for temperatures above freezing. And until experience warrants, no credit should be allowed for temperatures below freezing because of the icing danger.

► **Takeoff Path**—Normal operating climb-out speed probably is considerably higher with the turbojet plane than with the piston-powered craft; hence, the all engine takeoff flight path may be more critical in areas close to the field where obstacles usually are avoided by a climb instead of turn.

Suggestion is that the manufacturer's airplane flight manual schedule an all engine takeoff flight path from the field's end, with acceleration provided along the path to a satisfactory climb-out speed and including the gradient of climb with maximum continuous power.

This will permit scheduling of adequate obstacle clearance and acquaint pilots with correct normal operation.

► **Engine Failure Speed**—Engine failure early in the takeoff run, particularly with the turbojet, might not be recognized quickly because of the slow acceleration and the close inboard engine grouping, which reduces effect of asymmetric thrust. These conditions will vary with the particular plane.

One solution seen is selection of an engine-failure speed at a low value, where accelerate-stop distance would not be critical; only the distance to climb to 50 ft. would limit field size.

Best approach for the present may be to judge each case separately.

► **Takeoff Climb Speeds**—CAA leans to the recommendation that for turbojets, the minimum takeoff climb speed should be 1.2 V_{s1} (stalling speed of the plane in the configuration for the particular condition), regardless of number of engines; further, that it be not less than the best angle of climb speed whether the craft is a turbojet or turboprop.

► **Climb**—Present climb requirements seem satisfactory for takeoff climb speed considerations. This is because the takeoff climb requirements and takeoff path requirement are conducted at the same speed.

This does not hold for approach and landing climb requirements since regulations now permit these to be demonstrated at best rate of climb speed, which may exceed considerably the approach speed in landing distance demonstration.

To cover speeds for demonstrating approach and landing climb, CAA suggests that maximums be limited to 1.4 V_{s1} and 1.3 V_{s1}, respectively, unless a higher speed is used in landing distance demonstration, when this higher speed could be used.

► **Landing**—Until complete data is obtained on landing field length requirements, CAA suggests minimum speed in landing distance demonstration should be comparable with speed that would be used in ILS landings at the minimum glide angle of approximately 3 deg.

Also, this speed should not be less than that used in demonstrating balked landing or approach climb-out—unless ability can be shown to attain the desired climb condition at the approach speed with altitude loss of not more than 25 ft. or distance of not more than 2000 ft. from instant of power application on available engines.

Reverse thrust and minimum braking capacity will require careful study.

► **Stall**—This combines two problems: inherent stall characteristics of the swept wing and effect of pre-stall and stall buffeting on the structure.

Because of wing instability plus sequence of loss of lift, violent and possibly uncontrollable pitch may be anticipated at stall, with a serious loss of altitude. Solutions advanced include development of auxiliary lift devices, such as extensible leading edge slats and flaps, suction boundary layer control, droop nose flaps, and fences.

A buffet that gives adequate stall warning on present day transport wings may introduce dangerous structural loads on high-speed aircraft wings because of built-in flexibility, particularly if aspect ratio is high.

► **Stability, Control**—Aileron effectiveness is reduced materially at low speeds requiring large deflection angles for sufficient lateral control. And tip stalling may be expected in basic swept wings with about 25-deg. sweep.

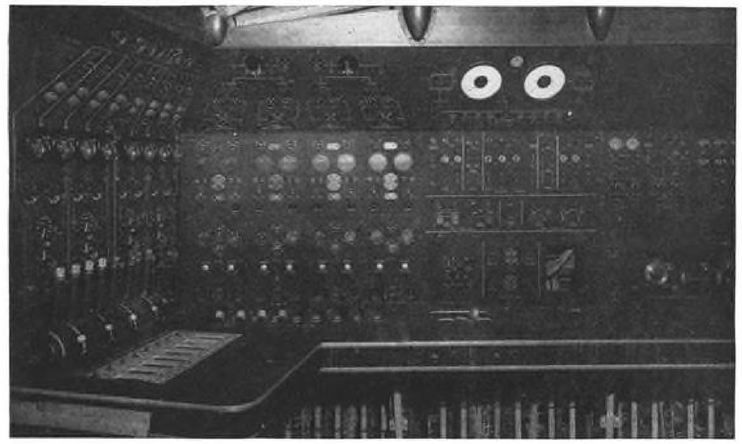
Here again, auxiliary lift devices will play an important part in satisfactory stability and control.

CAA feels that a positive stability requirement should be considered from 1.2 V_{so} (stalling speed in landing configuration) to V_{ne} (never-exceed speed).

► **Operating, Design Speed Range**—A most urgent problem arises because a jet transport's most economical and efficient speed is about 80-95 percent of maximum speed, depending upon individual design. Present V_{no} (maximum structural cruising speed) concept probably will not be rational for a majority of the craft because V_{no} would approximately coincide with V_{ne} (never-exceed speed) for piston-powered planes. And V_D (design dive speed) probably would be limited, to some degree, by handling qualities instead of structural considerations alone.

If flight safety equivalent to that of present piston-powered craft could be shown, it would seem reasonable to reduce the V_{ne}-V_D spread to an absolute minimum and eliminate the specific V_{no} by consolidating the intents of V_{no} and V_{ne}.

Study may show that this would permit the most efficient speeds with no flight safety compromise.



Control Complexity on Brabazon

Flight engineer's position on the Brabazon I is a clean—but hardly compact—layout of a complex mass of instrumentation and controls.

General plan of installation is L-shaped, with a row of eight engine throttles placed at left. Engine instrumentation is above throttles.

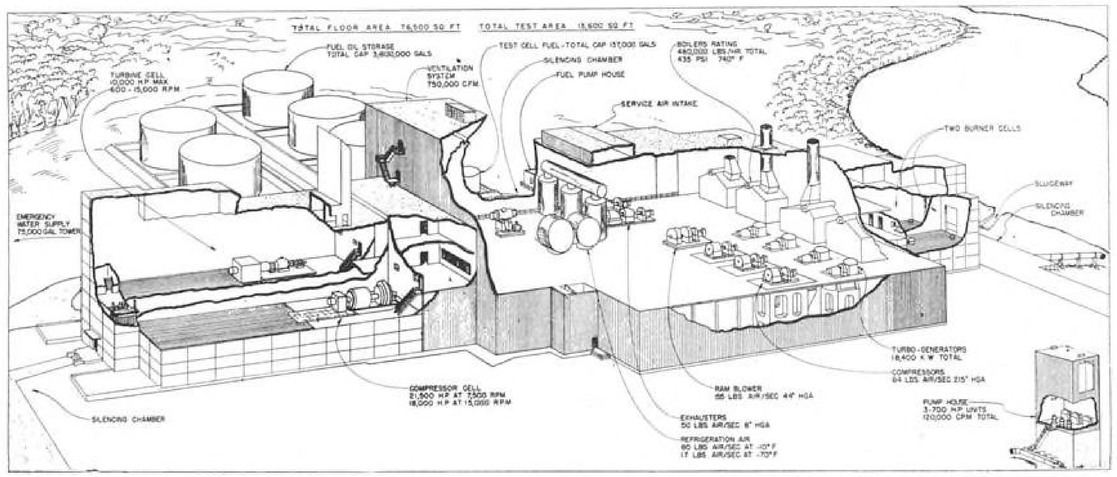
Inclined panel at upper left mounts fire extinguisher controls below standard flight panel.

Next section, reading clockwise around the L, has eight propeller controls mounted on desk and panel immediately above.

Engine oil and coolant systems and instrumentation are on upper half of panel and inclined section.

Third area mounts fuel system dials above, with panel below sectioned for de-icers, control boost, brakes and radio.

Cabin comfortization control center is at extreme right.



EXTENSIVE equipment necessary for adequate ground testing of engines and components is emphasized by this cutaway sketch.

Willgoos Lab: Proving Ground for Engines

New turbine laboratory simulates flight tests on engines, components.

This pictorial layout shows the Andrew Willgoos Turbine Laboratory—East Hartford, Conn., proving ground for Pratt & Whitney's complete engines and components.

The huge windowless structure, reported to be the largest privately owned facility of its kind, is 400 ft. long, 6 stories high.

The battery of war-surplus Navy cruiser boilers seen at rear of the service equipment section in the center of the building supplies power for the entire lab.

Compressors in this section pack in air for component tests, exhausters create air densities to simulate altitudes up to 65,000 ft., a ram blower pushes air at speeds up to 550 mph. for jet testing at simulated high speeds, and a refrigeration unit brings air temperatures down to —70 F.

Below floor level, a jungle of piping carries air, water, fuel and oil to the test chambers.

Front section, housing the turbine and compressor cells, is 135 ft. long, with protective portions of walls and ceilings constructed of 2 ft.-thick reinforced concrete. A large installation (not shown) straightens out air sucked into the test chamber to assure a smooth flow.

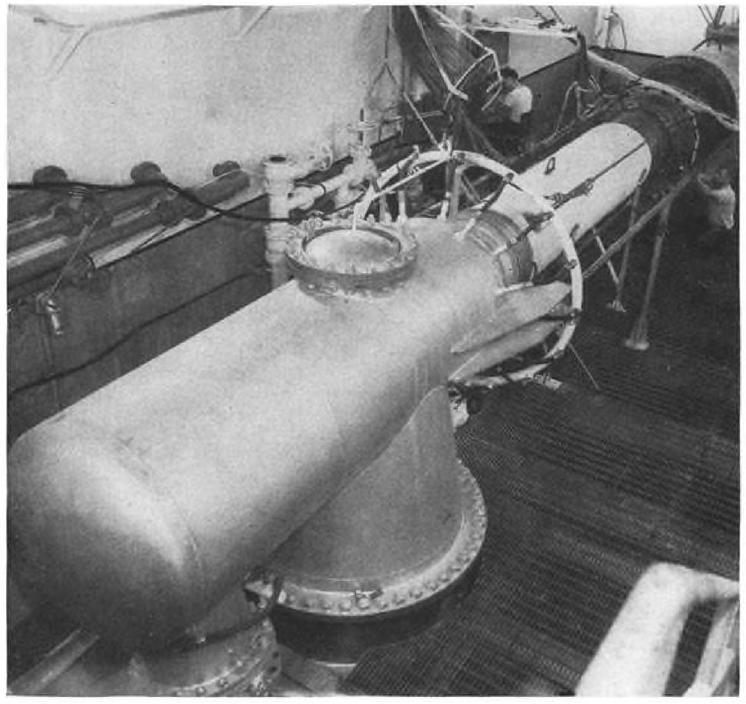
Turbine engine burner components are checked in the two cells at the extreme right. A large tank (not visible) holds water which is pumped to the test stand to cool the hot exhaust gases.

Cooling water from the Connecticut River, servicing the lab's exhaust gases and eleven steam turbine condensers, is handled by a system with a capacity of 120,000 gpm.

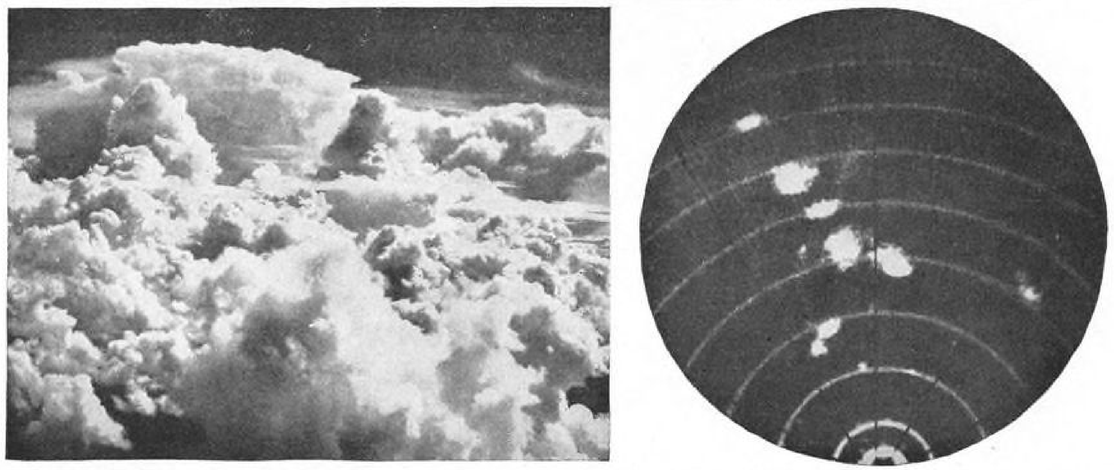
Water is returned to the river and raises the immediate stream temperature only about 1 deg.

Noise and speed of exhaust gases are "tempered" by water sprays in test chamber discharges and in "scrubber" tanks.

The cool gases then pass through silencing chambers, an underground labyrinth silencer, and finally exit to the athosphere through slots in concrete expansion chambers with only a "mild hiss."



BURNER TEST apparatus uses cooling water, stored in tank in foreground, for reducing exhaust gas temperature. Water sprays through ring into hot gas stream.



CUMULO-NIMBUS clouds as seen from aircraft (left). Plane altitude 10,000 ft., cloud top 28,000 ft., base 1500 ft. Photographed from range of 20 mi. Display on radar scope (right) shows response at 15 mi. from cumulus clouds at middle left of photograph.

BOAC Comet to Get Search Radar

Operational tests prove EKCO unit's value as storm cloud, obstacle detector; 'map-painting' use seen.

Airborne search radar, an instrument with which the airline industry has long flirted, has at last been purchased for operational use by one of the larger airlines, British Overseas Airways Corp., for installation in the de Havilland Comet and other aircraft.

The device, equally effective by day or night, is especially significant when used on high speed, high altitude planes, the airline says, since the aircraft safety factor will be improved, passenger comfort increased, and greater schedule regularity ensured.

▶**Vital Statistics**—EKCO Cloud and Collision Warning Radar Equipment Model No. E38, is manufactured by E. K. Cole, Ltd., Malmesbury, Wilts, Eng. It is a 3 cm. radar system based on a British government's Telecommunications Research Establishment design and is intended primarily for the detection of cumulo-nimbus clouds and hence areas of severe turbulence associated with such clouds. Engineers concerned with jet transport development long have been aware that a way must be found to avoid highly turbulent conditions due to extreme stresses imposed on the airframe. The set may also be used for detection of high ground, obstacles, and other aircraft and provides "map-painting" facilities for navigation.

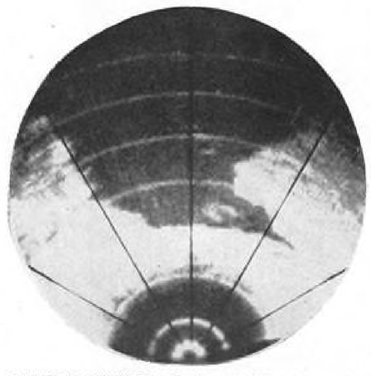
• **Weight** of the complete installation, less aircraft connecting cables, is approximately 155 lb. This weight is reduced 10 lb. if only one indicator is used.

• **Power supplies** required are:
115 v. ac. (1600 c.) 300 volt/amperes
115 v. ac. (400 c.) 400 volt/amperes
24 v. dc., 6 watts.

• **Sealed and pressurized components** include: Transmitter-receiver, servo and synchonizer units, permitting operation to at least 40,000 ft. Unsealed, the units operate satisfactorily to 25,000 ft. Since indicator and control units would normally be mounted in pressurized parts of the aircraft, the containers are left unsealed.

• **Transformers** and similar components are hermetically sealed and temperature rises have been taken into account.

• **Temperatures** from +55 to −40 degrees C. do not impair performance of the unit.



MAP-PAINTING display of French north coast. Seine river inlet shows at right.

Field test gear provided with the set consists of a monitoring unit which is essentially a multi-range voltmeter. It can be connected to the transmitter-receiver unit through a 12-way plug. Measurements of the more important supplies can be made without removing the T.R. from the scanner or disturbing the pressurizing.

Facilities are also provided for *in situ* crystal testing.

▶**Performance**—As a result of extensive tests in cooperation with BOAC, EKCO announces the following performance for the equipment:

• **Coast lines,** such as cliffs were detected up to 40 miles.

• **Low, sandy beaches** appeared at between 30-40 miles, depending on presence of vegetation, etc.

• **Surface ships** and planes were detected at varying ranges—25 miles being typical for an average-size ship, 11 miles for a large aircraft and five miles for a small plane.

• **Clouds** which could not be picked up at a range greater than ten miles were not considered dangerous and were said to be unlikely to cause more than slight discomfort.

Usefulness of the radar for "map-painting" is enhanced by incorporation of gyro stabilization for the scanner within the limits of ±10 degrees in pitch and ±45 degrees in roll.

▶**Components**—The aerial system proper consists of an 18-in. paraboloid, illuminated by a back-fed dipole and reflector. This assembly scans over an

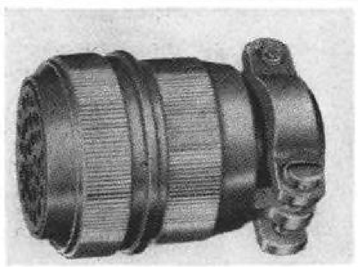
EKCO control unit. Tilt switch and position indicator are in the center of the panel.

arc of 150 degrees in azimuth once per second, providing a cone of R.F. energy subtending an angle of approximately 6 degrees, scanning 75 degrees on either side of the line of flight of the aircraft.

Provision is made for tilting the paraboloid relative to the dipole system so that the plane of scan can be brought above or below the horizontal. The degree of tilt is indicated by a tilt meter on the control unit.

BOAC has conducted thorough operational trials of the equipment aboard Hythe flying boats in the Far East where severe thunder storms are encountered, in Viking aircraft, operated by the firm's Operational Development Unit at Hurn, Eng. It is now fitting three sets to its new Hermes transports for intensive flying with company aircrews.

GYRO-STABILIZED transmitter-receiver unit installed in nose of Hythe flying boat.



Air Force Buying Scintilla Connectors

Electrical aircraft connectors embodying "Scinflex" rubber type dielectric and cable gripping parts are now being procured by the USAF to meet certain critical electric applications.

Scintilla Magneto division of the Bendix Aviation Corp., Sidney, N. Y., manufactures the connectors and claims they provide excellent resistance to moisture and vibration.

Cadmium-plated aluminum alloy shells enclose the "Scinflex" (polychloroprene) inserts. Self-aligning contacts feature:

• Springs designed to provide minimum voltage drop without high spring pressures.

• Easily accessible soldering wells.

• Ease of maintenance, being removable without connector disassembly.

The units are designed to meet "M" connector specifications in accordance with Amendment No. 1 of the latest military specification for electrical connectors, MIL-C-5015.

Nozzle Tester

A nozzle for spraying liquid into a fan-shaped array of tubes is the heart of a new method devised by engineers at the Beacon, N. Y., laboratories of the Texas Co. to determine uniformity of fuel distribution.

Open ends of the tubes, placed across the diameter of the spray, collect liquid from the nozzle in graduated glass vials. The amount in each vial indicates clearly the spray pattern of the nozzle being tested. A slight vacuum in each vial facilitates the flow of fuel through the lines.

The unit is used for both intermittent and steady-flow nozzles.

Knowledge of fuel spray patterns of nozzles used in jet and reciprocating engines is important because of its bearing on efficiency with which fuel is burned and hence the heat or power output and economy.

NEW AVIATION PRODUCTS

Swallows Noise

An exhaust muffler which reduces aircraft engine noise about 60 percent reportedly will soon undergo evaluation by the CAA on a DC-3 transport.

The muffler is a development of the Aero Sonic Corp., 99 Murray St., N. Y. It already is approved by the CAA for use with Pratt & Whitney 450-hp. Wasp Junior engines.

Aero Sonic says it is designing other mufflers which can be used with smaller engines and on large transports. For the 450-hp. engine, the device is 53 in. long, 5 in. in diameter and weighs 16 lb.

The company explains that no baffles are used to cut down noise. Sound absorption is accomplished through use of stainless steel blanketing. While it is highly effective in cutting noise, the new silencer does not reduce engine power, the firm says.

The unit is the invention of Eddy D. Latulippe, Aero Sonic's general manager. Basic design consists of a tube mounted within a tube with a Venturi-shaped tailpipe to induce a jet action in scavenging gases from the muffling chamber.

The outer stainless steel pipe is insulated with ¾ in. steel wool and has an inner wall which is perforated. The inner pipe is, in effect, a second tube of steel wool with a perforated outer casing and inner wall giving a total of three surfaces of 1200 sq. in. and nearly 50,000 perforations to absorb the noise as it passes through the muffler.

Aero Sonic says tests showing the device reduced engine noise by as much as 60 percent were conducted by the College of Engineering of New York University. After a recent demonstration of the muffler to officials of the CAA and Aircraft Owners and Pilots Assn. in Washington, D. C., J. B. Hartranft, Jr., executive director of AOPA, is quoted by an Aero executive as saying: "We are extremely impressed with the . . . Aero Sonic device and are anxious to encourage the use of this or similar devices among private and commercial aircraft users."

Loads From Bottom

A system of loading fuel trucks from the bottom, similar to underwing refueling in aircraft, has been adopted by Shell Oil Co. at Washington (D.C.) Airport.

Shell says the new technique is safer, easier and more economical than the present method of filling tanks from the top. The driver doesn't have to climb up on his truck to complete filling operations. Conventional overhead loading racks have been removed.

As an added bonus, the appearance of the tank storage area at the field has been improved. Storage tanks, half-submerged in the ground, fuel lines and night-lighting units are neatly arranged in compact groups.

An important feature of the new system is a novel coupling and valve arrangement linking the bottom of the truck with the storage tank delivery hose. This device prevents leakage and "permits excellent control of the flow of gasoline." A safety valve at the top of the truck prevents overflow.

Shell feels the change-over to the bottom-loading technique at Washington Airport "may lead to revamping of aviation truck refueling methods at other airports."

Rubber Drive Wheels

"Good traction under all types of service conditions" is the strong point of a new driving wheel developed originally for Douglas Aircraft Co. by the B. F. Goodrich Co., Akron, Ohio.

These units are 6-in. rubber tires (pallet rollers) which serve as driving wheels for two electrically operated elevator hoists in the C-124 Globemaster. The tires were designed to meet rigid traction specifications; so rigid, in fact, that design and rubber compound problems presented in their development "nearly baffled rubber men," according to Goodrich.

The rollers are made of a new rubber compound which permits them to maintain constant traction. They withstand low and high temperatures ranging from −60 to 140 F. without shrinking from the traction surface. They also must withstand high preloads without permanent set so that traction will be adequate while operating on inclines that may often be as great as 6 percent.

ALSO ON THE MARKET

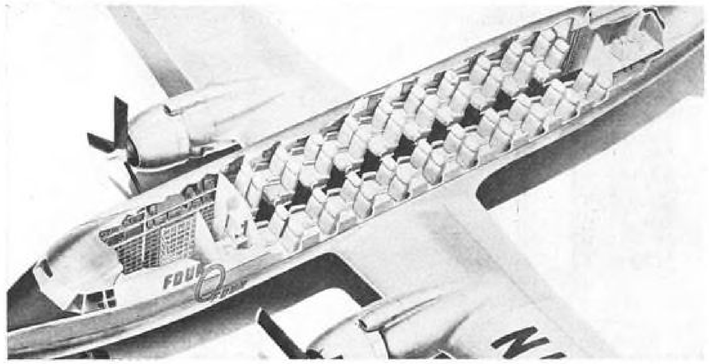
Flame-retardant plastic insulation for electric cable has been developed by du Pont. Called Rulan, product will not drip when molten, can be extruded at high speed or injection molded. Electric properties are comparable, but not equivalent, to those of polythene. Address: E. I. du Pont de Nemours & Co., Wilmington 98, Del.

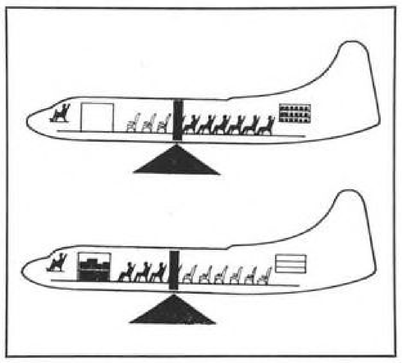
Corrosion-proof instrument tubing, under tradename Dekoron, is made of metal protected by ⅛-in. coating of thermoplastic. Maker says tubing can be bent easily without chipping plastic coating. Address: Samuel Moore & Co., Mantua, Ohio.

Magnetic-particle clutches, used by the Navy for control of radar and other equipment, now are offered to industry for machine control applications. Device uses mixture of iron particles and flake graphite in magnetic field to link driving and driven parts. Advantages: fast response, no wear on torque transmitting surfaces, torque at zero slip. Address: Vickers Electric division, Vickers, Inc., 1815 Locust St., St. Louis, Mo.

Impregnated glass fiber material comes in ready-to-use rolls. Product contains a polyester compound, including catalyst, in a dry state. To form into parts, such as antenna housings, material is trimmed, laid on die to proper thickness and heat cured by conventional means. Use of "Dryply" reportedly removes need of making "messy wet lay-ups" by hand. Address: Flexfirm Products, El Monte, Calif.

New keyless drill chuck can be used with drill presses, lathes and milling machines. Drills, reamers, and other types of shank tools simply are inserted and hand tightened—letting machining action center tool and further tighten chuck grip. Address: Ettco Tool Co., Inc., 594 Johnson Ave., Brooklyn 6, N. Y.





INTERIOR ARRANGEMENT of the 4-0-4 is shown in cutaway drawing (left). Baggage, cargo space and galley are forward between cockpit and main cabin; carry-on luggage, lavatory and built-in loading ramp are aft. Unusually wide C. G. range (13.5 to 38.5 percent MAC) is illustrated by sketches (right). Automatically variable angle of incidence of stabilizer allows wide variations in loading conditions.

Details of New Martin 4-0-4 Disclosed

When the Glenn L. Martin Co. delivers the first 4-0-4s to Eastern Air Lines and Trans World Airlines next spring (AVIATION WEEK May 8, p. 14), those carriers will be getting a modernized and improved version of the tried and proven Martin 2-0-2.

The main difference in configuration is a 39-in. lengthening of the 4-0-4's fuselage, giving the plane a seating capacity of 40 instead of 36.

Major operational improvement is cabin pressurization, permitting cruising altitudes of 16,000 ft. with cabin altitude of 8000 ft. The AiResearch cabin supercharging and air conditioning equipment will, in addition to providing pressurization, supply ground cooling and dehumidification (with right engine operating), an important consideration for passenger comfort.

► **Features**—The Martin Co. points to the following interesting features:

• **Ease of maintenance.** Individual access doors, carefully placed, permit simultaneous servicing of all primary systems. Mareng fuel cells are easily removable.

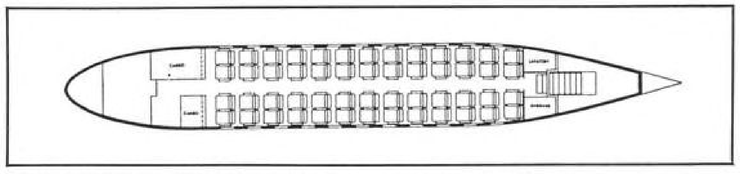
• **Fast loading.** Built-in tail loading ramp eliminates need for unit at stations and makes en route stops of five minutes or less practical.

• **Public address system.** Pilot or attendant may make announcements to passengers and call their attention to points of interest.

• **Martin aileron.** Unusually short span of aileron permits use of extra-long flaps which are double-slotted, giving plane a stalling speed of 79 mph. at sea level, with aft C.G. and 41,000-lb. gross weight.

► **Statistics**—Takeoff weight will probably be 43,000 lb.; landing weight 41,000 lb.; high speed 312 mph.; cruising speed 280 mph. (at 1200 bhp.); operational range 805 mi. with payload

COCKPIT INSTALLATION. Small windows above windshield have been eliminated and forward and side window panels enlarged to provide greater visibility. Lights and handles along instrument panel shade are fire warning indicators and extinguisher pulls.



HIGH DENSITY VERSION of the plane can accommodate 52 passengers as illustrated.

of 8800 lb., 1080 bhp./eng., reserve fuel for one hour, cruise altitude 10,000 ft., 10 mph. head wind.

The aircraft has been stressed for eventual turboprop installation and engineering studies are going forward on this project.

CAB Mail Pay Power Threatened

Civil Aeronautics Board's authority to grant mail pay increases is virtually at stake in the joint House-Senate conference on the omnibus 1951 fiscal year government appropriation bill.

A so-called anti-deficiency provision, approved by the House, would require the Post Office Dept. to apportion its annual budget on a monthly or quarterly basis to prevent the need for additional funds before the year runs out. Under this stipulation the Post Office could not make mail payments in excess of the apportioned amount for the period, even though pay increases had been granted by the Board.

CAB's acting chairman, Oswald Ryan, protested that it would have "a drastic, and it is believed unintended, effect on the Board's powers to fix rates of compensation for the transportation of mail by air carriers under the Civil Aeronautics Act."

An amendment by Sen. Edwin Johnson exempting the Post Office's $400-million budget for transportation of mail from the anti-deficiency provision was approved by the Senate last week, and the issue is now being threshed out in the joint conference.

Tower Interlocks Will Aid Control

A new electronic "mechanical interlock," now being installed by CAA at 33 airport control towers and 23 air route traffic control centers, is another step toward eliminating the human element in control work at traffic-burdened airports.

Present-day instrument weather controlling procedure calls for virtually continuous interphone coordination between the air traffic control center and the airport traffic control tower. This is needed to clear flight assignments and handle movements of planes.

But push buttons and electronic circuits of the mechanical interlock are planned to eliminate most of the voice work. If the control center assigns an altitude to an aircraft, the tower sees a light on its instrument panel, flashed by the center. And if the tower assigns an altitude to a plane, the center gets a similar signal on its board.

When the aircraft is turned over to the tower for "laddering" down to landing position another button is pushed. It lights an indicator lamp telling the tower to take over. Once an altitude has been assigned, and the appropriate button pushed, no other plane can be assigned mechanically to that altitude, until the center or tower, whichever made the initial assignment releases that altitude.

The mechanical interlock is already in operation at Boston, and tentatively scheduled for installation at New York and Washington soon, and at Chicago, Cleveland, Detroit, Los Angeles, Seattle, Oakland, Atlanta, Memphis, Pittsburgh, Kansas City, St. Louis, Ft. Worth, New Orleans, San Antonio, Albuquerque, Cincinnati, Minneapolis, Jacksonville and Salt Lake City.

▶**Connected Towers**—Four airport towers will have mechanical interlocks connected with the New York center—LaGuardia, Idlewild, Newark and Philadelphia; four are tentatively slated to be connected with the Washington center—Washington National, Friendship (Baltimore), Patuxent Naval Air Station and Andrews Air Force Base.

In Chicago, both the Midway and O'Hare airports will be connected with the Chicago center; at Cleveland, Municipal and Buffalo airports will be connected; San Francisco and Oakland with the Oakland center; Atlanta and Birmingham with the Atlanta center.

Memphis Municipal and Nashville will operate with Memphis center; and Ft. Worth's Meacham Field and Dallas Airport with Ft. Worth center.

The other centers named will work in direct mechanical interlock connection with the single commercial airports in their respective areas.

SAFETY AWARD

First four-billion-mile award presented to an airline by the National Safety Council is shown being handed to American Airlines President C. R. Smith (right) by James Tanham, chairman of the Council's board of directors. AA set a new all-time safety record by flying 4,476,739,000 passenger miles without a fatality between Dec. 28, 1946, and Nov. 29, 1949.

Parks Routes

Appeals Court petition freezes CAB's divided decision on feeder.

A petition for judicial review of the Civil Aeronautics Board decision which took away potentially the richest feeder airline network in the U.S. from Parks Airlines Inc., of St. Louis, last week froze the case, pending a U.S. Court of Appeals decision at Washington.

The Board, in a divided decision, had split a 3000-mi. route system in the Mississippi Valley, Great Lakes and North Central regions between Ozark Airways and Mid-Continent Airlines.

▶**"Ready to Go"**—Parks petitioned that it now had planes and was serving part of the route, and was "ready to go" before the other companies could establish service. It further contended that the Board's decision was not supported by evidence in the case. Parks further stated that the reason it did not establish service earlier was because in the period of March, 1948, to June, 1949, it had been unable to get financing, and that airline financing in this period was virtually impossible. The carrier claimed it was now adequately financed.

Under the Board's decision, Ozark would get a lush new eight-state feeder route which combined two of the Parks routes in the Mississippi Valley and the Great Lakes into a single system, operating with St. Louis as a central terminal. It would extend as far northeast as Indianapolis, as far north as Rockford, Ill., as far southwest as Tulsa, and as far southeast as Memphis.

Mid-Continent would get the North Central segment of the Parks system, including stops in Illinois, Wisconsin, Minnesota and Iowa.

Both Ozark and Mid-Continent certificates were to be three-year temporary grants effective Sept. 26. Parks had received a temporary stay freezing the decision, pending a hearing on the case in the Court of Appeals last week.

The Board noted that it had originally awarded certificates to Parks in 1946 and 1947, and that the original certificate holder had "repeatedly delayed using its authorization."

The decision denied application by Mid-Continent to acquire control of Parks, and denied all other applications for portions of the 3000 miles of routes originally given to Parks.

▶**Objection**—Dissents were voiced by Board members Russell B. Adams and Josh Lee to parts of the decision. Acting Chairman Oswald Ryan upheld it in its entirety. Member Harold Jones did not vote.

Adams objected to giving the Great Lakes portion to Ozark, agreeing with an examiner's recommendation that Turner Airlines of Indianapolis should receive the Great Lakes route.

Lee objected to the award of the North Central route to Mid-Continent, contending that it was contrary to established Board policy to permit trunk airlines to operate local air service.

The Board decision pointed out that Parks had been given a July 1, 1949 deadline, for beginning operations, and had failed to comply after previous delays. Efforts of Parks to reopen the record in May, 1950, to show new evidence that it could activate its routes with twin-engine planes, financed by new capital, were denied because it would "unduly delay the decision" and would not be in the public interest.

▶**Ozark Plans**—Ozark presented plans for single-engine Cessna 190 and twin-engine DC-3 equipment on the routes, with scheduled speed about the same for both types. It was selected, the Board said as the only remaining non-trunkline applicant proposing to serve the Mississippi Valley route.

The record showed that Ozark had stock subscriptions totaling $260,000 and that Ozark "will probably be able to secure a bank loan" in the amount of $400,000 upon issuance of the certificate. Further, Ozark's vice president stated that the stock subscribers were willing and able to provide additional capital of $500,000 if needed.

Ozark was selected over Turner for the Great Lakes route, the Board stated, because of the desirability of awarding both routes to the same carrier.

The Board stated that Wisconsin Central Airlines, an applicant for the North Central route, "had not shown to our satisfaction that it would be able to assemble financial resources to provide service over its present route and also establish service over the North Central route within the time required by the public interest." The Turner application for the North Central route was denied on the theory that, if granted, it would involve, in effect, operating two feeder systems with practically no traffic inter-relationship.

Adams' dissent on the Ozark Great Lakes route award was based on his conclusion that Ozark had made insufficient showing of additional capital to operate this route. "The Board has too often accepted and been disappointed by similar tenuous contentions of financial strength," he said.

Slick Airways Has Record Month

July total of 4,053,296 airfreight ton-miles reported by Earl Slick, president of Slick Airways, was the largest month's business in Slick's history and is believed to be a new record for the indus-

try. Slick said the record was due in great measure to movements of military material.

The airline reported such varied July cargoes as heavy machinery, aircraft engines and other war material, in addition to such regular loads as wearing apparel, automotive equipment, cotton, TV parts, produce, livestock and drugs.

The July record represents an increase of more than 100 percent over a similar period last year. Average load factor was in excess of 79 percent. The airline flew more than 850,000 miles last month.

CAB Bars NAL N.Y.-Miami Coach

An "off-again, on-again" Civil Aeronautics Board decision last week left National Airlines without the New York-Miami daylight air coach service that it announced and later was forced to cancel.

The Board reversed itself, denying National the air coach service, 48 hours after it had originally approved the service, a National spokesman said. The reversal came on the heels of a protest by National's principal competitor, Eastern Air Lines, against the daylight coach service.

National lost two legal maneuvers, in the U. S. Court of Appeals for the District of Columbia and in the U. S. District Court, when both courts refused to issue restraining orders barring the reversed decision. G. T. Baker, National president, said the airlines would have to stand on the Board's decision until further legal action could be taken.

The decision granting National the right to the service was handed down Aug. 2 by a two-to-one Board decision, with Acting Chairman Oswald Ryan away on vacation. National immediately spent $4300 to advertise the service and sell tickets for the first flights scheduled to begin last weekend. On Friday, one member changed his vote, reversing the decision, National said, and the airline's proposed service was suspended for 90 days pending an investigation.

►**Air Coach Review**—The Board's announced reason for changing the decision was because it planned to review air coach routes generally before Sept. 30, a date on which many temporary certificates expire. Therefore it was suspending the National service pending the general review.

Baker said National had spent $4 million buying 68-passenger Douglas DC-6 air coach planes for the service and that the airline had originally proposed a $53 fare for the nonstop daylight coach service, but that the Board had forced the rate up $5. "We agreed reluctantly, but with every intention of refiling for the lower figure," he said.

He cited comparative cost figures for Eastern's and National's operation which he said showed that Eastern would need a 75-percent load factor to break even at a $58 fare, while National would need only a 49-percent load factor.

SHORTLINES

►**Air France**—And Trans-Canada Air Lines will fly the first air routes connecting France and Canada, under a bilateral agreement signed last week by representatives of the two nations. Agreement grants rights for Air France to fly into Montreal and Trans-Canada into Paris.

►**All-American Airways**—Has been authorized by Civil Aeronautics Board to suspend service temporarily at Bellefonte-State College, Pa., for a year or until an adequate airport is available for regularly scheduled operations.

►**American Overseas Airlines**—Will begin first through air service between New York and the West German cities of Dusseldorf and Cologne Sept. 2. Service will be twice weekly with 44-passenger Constellations. It augments present New York-Frankfurt daily schedules of AOA.

►**British European Airways**—Passenger miles flown in first three months of 1950 totaled 40,166,325, a gain of 45.7 percent over same 1949 period.

►**British Overseas Airways**—Carried nearly 40,000 passengers and flew 102 million passenger miles in the first three months of 1950, showing a 16 percent gain over passenger miles flown in the same 1949 period.

►**Delta Air Lines**—Civil Aeronautics Board has denied its application to serve Monroe, La., as an alternate intermediate point between Shreveport and New Orleans.

►**Mid-Continent Airlines**—Will start service over a new Sioux City-Chicago route, and over Rockford-Milwaukee portion of its North Central routes Oct. 1 using 21-passenger DC-3s, available since the recent purchase of four 40-passenger Convair-Liners released five of the DC-3s for the new service.

►**Northwest Airlines**—Is establishing eastern regional and local sales, reservations and publicity offices on the 14th floor of the 535 Fifth Ave. Bldg., New York City. Company will consolidate all its New York functions, except ticket offices and airport installations, in the new office. Newly created eastern re-

gional sales offices will have charge of sales in eastern U. S., British Isles and Europe. . . . Company has announced a new ship-air freight service in cooperation with American Mail line. Plan calls for freight shipments from the far Pacific to be brought to Portland and Seattle by the steamship company. From these points they will be flown by Northwest to Chicago and to New York-Newark terminal. Combination ship-air rate will be used. Service is expected to speed deliveries and simplify paperwork for shippers.

► **Sabena**—Has been offering the consultation services of its German representative, Raymond Hody, in New York, for travel agencies and domestic airlines. He had made a transcontinental tour of U. S. cities, drumming up American tourist travel to Germany.

► **Southern Airways**—Has received amendment of its certificate from Civil Aeronautics Board, authorizing additional air service in several southern states including: service between Memphis and New Orleans via Clarksdale, Greenville, Vicksburg, Jackson, Natchez and Baton Rouge; and between Columbus, Miss., and Mobile, via Jackson, Laurel, and Hattiesburg.

► **Transocean Air Lines**—Has been granted temporary exemption from Civil Aeronautics Board limitations on the number of flights it is authorized to operate carrying refugees from Munich, Germany, to the U. S. The carrier will be permitted to operate four flights a month, for the next six months, under contract with the International Refugee Organization.

► **Trans World Airlines**—Its 12 new Martin 2-O-2As will visit principal cities to be served by the planes, between Aug. 15 and Sept. 1, when the planes are due to begin scheduled passenger service. Purpose is employe familiarization, and pilot and maintenance training. . . . Company is establishing a district sales office in Seattle, at 527 Skinner Bldg., with Claude E. League in charge. The new Northwest district is being established as a service to the area, and in recognition of its great travel potential, although the city is not directly on TWA routes.

CAB SCHEDULE

Aug. 14—Resumption of hearing on renewal of Southwest Airways' feeder certificate and service suspension at certain United Air Lines points in the area. (Docket 3718 et al)

Aug. 16—Resumption of hearing on renewal of West Coast Airlines' feeder certificate and service suspension at certain United Air Lines points in the area. (Docket 3966 et al)

Aug. 17—Prehearing conference on Panagra mail rate case. (Docket 2755)

Aug. 18—Hearing in reopened case on additional California-Nevada service. (Docket 2019 et al)

Aug. 28—Hearing on CAB's enforcement action against Air Transport Associates. (Docket 4265)

Sept. 11—Hearing on Lehman Brothers' interlocking relationships case involving partners of firm holding airline directorships. (Docket 3605 et al)

Sept. 11—Hearing on enforcement proceeding involving interlocking relationships between Arrow Airways, Inc., and California Arrow. (Docket 4207)

Sept. 11—Hearing on applications of Aerovias "Q" and Compania Cubana de Aviacion for Havana-Washington-New York foreign air carrier permits. (Dockets 3213 and 4187)

Sept. 18—Hearing on TWA and American Overseas Airlines requests to suspend service at Philadelphia on trans-Atlantic routes. Postponed from Aug. 7. (Docket 4228 et al)

Sept. 21—Prehearing conference on American Overseas Airlines' mail rate. (Docket 1666)

Sept. 26—Hearings on Mid-Continent Airlines' application to have its Route 80 certificate (Tulsa-Houston) made permanent. (Docket 3693)

Oct. 2—Hearing on renewal of Frontier Airlines' feeder certificate and service suspension at two United Air Lines stops in the area. (Docket 4340)

Oct. 9—Hearing in Latin American Airfreight case. (Docket 2888 et al)

Oct. 16—Hearing on Los Angeles Airways' application for renewal of its helicopter mail-cargo certificate and for additional authority to carry passengers. (Docket 3800)

Jan. 8, 1951—Hearing in Big Four mail rate case and CAB investigation of the carriers' economy and efficiency. (Docket 2849 et al)

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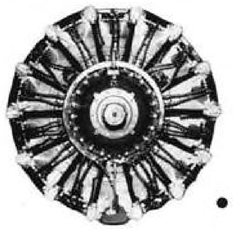

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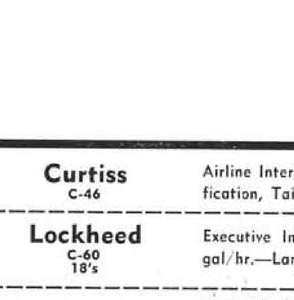

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WHAT'S NEW

Stretch-Wrap Data

The know-how of stretch-wrap forming as wrapped up for aircraft engineering, tooling, production and planning personnel in a concise, but detailed, 87-page compilation issued by Hufford Machine Works, Inc., 207 North Redondo Beach, Calif.

This first edition of **The Principles of Stretch-Wrap Forming** offers data culled from experience of Hufford's staff and outside fabricating personnel.

This complete and profusely illustrated treatment covers:

- **Theory of stretch-wrap forming.**
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- **Laboratory reports.**
- **Nomenclature.**

Sketches for the various phases are clearly executed and annotated.

Price of the volume is $5. New, supplementary, stretch-wrap information will be furnished as it is published.

SBAC Movie

A 16 mm. sound movie of last year's Society of British Aircraft Constructor's show at Farnborough is now available from the British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. The film has a running length of ten minutes and may be rented for $1.50 or purchased for $27.50.

For the Writers

An aviation literary contest in all languages is being sponsored by the Women's International Assn. of Aeronautics, Inc. Cash and trophy prizes are scheduled. Articles, short and long stories and poems are eligible. Contest closing date is Dec. 31, 1950 and all unpublished manuscripts should be forwarded to Mrs. Walter H. Beech, Beech Aircraft Corp., Wichita, Kans.

A biography of Glenn L. Martin is being prepared for publication by writer Ernest K. Gann, author of Island in the Sky, Blaze of Noon, and numerous other aviation books. Gann is a former American Airlines captain and ATC pilot, and is now on leave from Transocean Air Lines. The Martin biography will be published by William Sloane & Associates, N. Y. C., probably early next year.

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—AUGUST 14, 1950

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SEARCHLIGHT SECTION
(Classified Advertising)

What's Ahead in Military Equipment Buying

How to Spend $3.5 Billion

With a pocket-bulging bankroll of $7.7 billion, the Air Force and Navy have started shopping for aircraft and equipment. Experience and established routine tell them where to go for the planes.

But a revolution may be brewing in the purchase of equipment for those planes. Once most of it was bought by the government and furnished to the airframe builders. Now the trend is the other way: Toward the contractor's dealing directly with the supplier.

Based on past performance, Government Furnished Equipment (GFE) should eat up nearly half of that $7.7 billion. And Washington and industry planners are still debating the best way to spend about $3.5 billion on equipment.

It is a vital debate for both industry and government. On the one hand, it raises new merchandising problems for the aircraft suppliers. On the other, government must face the fact that when a prime contractor negotiates for what once was GFE, the armed services' procurement regulations (protection for the government) may or may not apply.

And there's the matter of the "overall picture." No one in industry has access to all the facts necessary to see it. The government will still have to decide, for example, how many of a certain type of radar sets will be needed by both Air Force and Navy, and decide which has priority. So some military men—and you will find industry people agreeing—think the government should continue the GFE procedure, even in the new and specialized avionics field.

Industry's View

What the industry thinks about this problem was rounded up by AVIATION WEEK in a series of interviews with both airframe manufacturers and suppliers of avionic equipment. Roughly speaking, the same split in opinion that is found in Washington was noticed in the comments around the industry.

Here's the view of a large airframe company:

"The Government-Furnished Equipment problem has been discussed for many years. But we think the airframe companies would just as soon it stayed the way it is. In only one case have we asked for equipment not available under existing government procurement.

"We think the trend will be confined to avionics, will not be broadened to cover things like engines."

Two other airframe companies—both also deep in guided missiles, where avionics is perhaps the most important item—look at it this way:

First company: "There is a trend to swing away from GFE to company procurement in certain specialized items in the avionics field. But the services still specify what they expect the equipment to do.

"One advantage of the direct program is that it will enable the plane builder to control the design of an item better so that it is better designed to fit the airplane.

"Another is that the prime contractor can frequently make a better deal—pricewise and deliverywise—than the government. This is probably one reason the AF is swinging away from GFE."

Second company: "Trend seems to be confined to avionic equipment and parts.

"We think it's a sagacious move on the part of the AF—though the plan might not work too well for equipment in the development stage. But when an item is standardized, GFE can become burdensome. This is especially true on parts. For example, the airframe contractor might be furnished with the proper number of parts. But if one is lost or damaged he has to go through considerable paper work to get a replacement. If the company did the procuring it would allow for a few extras."

What Suppliers Think

The companies that make the avionic equipment might be more directly affected by any shift in procurement procedures than would the airframe people. The suppliers, too, are far from unanimous in their views.

One avionics manufacturer says:

"To date, probably about 10 percent of avionics procurement has been handled directly by airframe builders rather than the government.

"If a contractor took responsibility for coordinating all parts of the airplane he of course would bear responsibility for the weapon's success or failure. It might speed time from drawing board conception of a plane to its use.

"Whether the airframe industry is ready to take on such a responsibility is not certain. In the first place, it would have to duplicate all the procurement activities now wrapped up in AF and BuAer. And it would have to duplicate the technical experience of those people."

The principal manufacturer of ground radar equipment thinks the trend should be encouraged:

"One bottleneck in plane production schedules has been GFE which has been manufactured by companies doing other commercial work.

"People depending on these manufacturers would have a better economic club if they could deal with them direct instead of going through the government. Manufacturers have a habit of putting the government off on small items while they push some other commercial development. They have their ideas about deadlines, feel there's no hurry. But they don't realize their little thingatron is holding up production of an airplane."

The Middle View

Sitting in the center of the heavy West Coast airframe production, where he can sense opinions of both prime contractors and suppliers, Capt. L. D. Webb, of the Aircraft Industries Assn.'s Los Angeles office, takes a middle view:

"Electronics is the main item being contracted by the aircraft builder. . . . There's a closer liaison if the government is out of the negotiations. . . .

"There doesn't appear to be any value in changing the procurement plan for major items, such as engines, tires, etc.

"On the other hand, there's a definite advantage to GFE when the equipment is standardized. The government can buy in quantity at reduced rates to supply several contractors."

Ideas For Sale

Joe Thompson, Charlie Byrum, and Charlie Young produce one of G-E's greatest "stocks-in-trade"—ideas. One of many problem-solving squads whose successes read like an aviation roll call of progress—electrically-driven autopilots; a high-frequency ignition system; airborne radar; all-electric remote fire control systems—they have new ideas and approaches that may be what you're looking for in your business.

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