AVIATION WEEK

MAY 7, 1951

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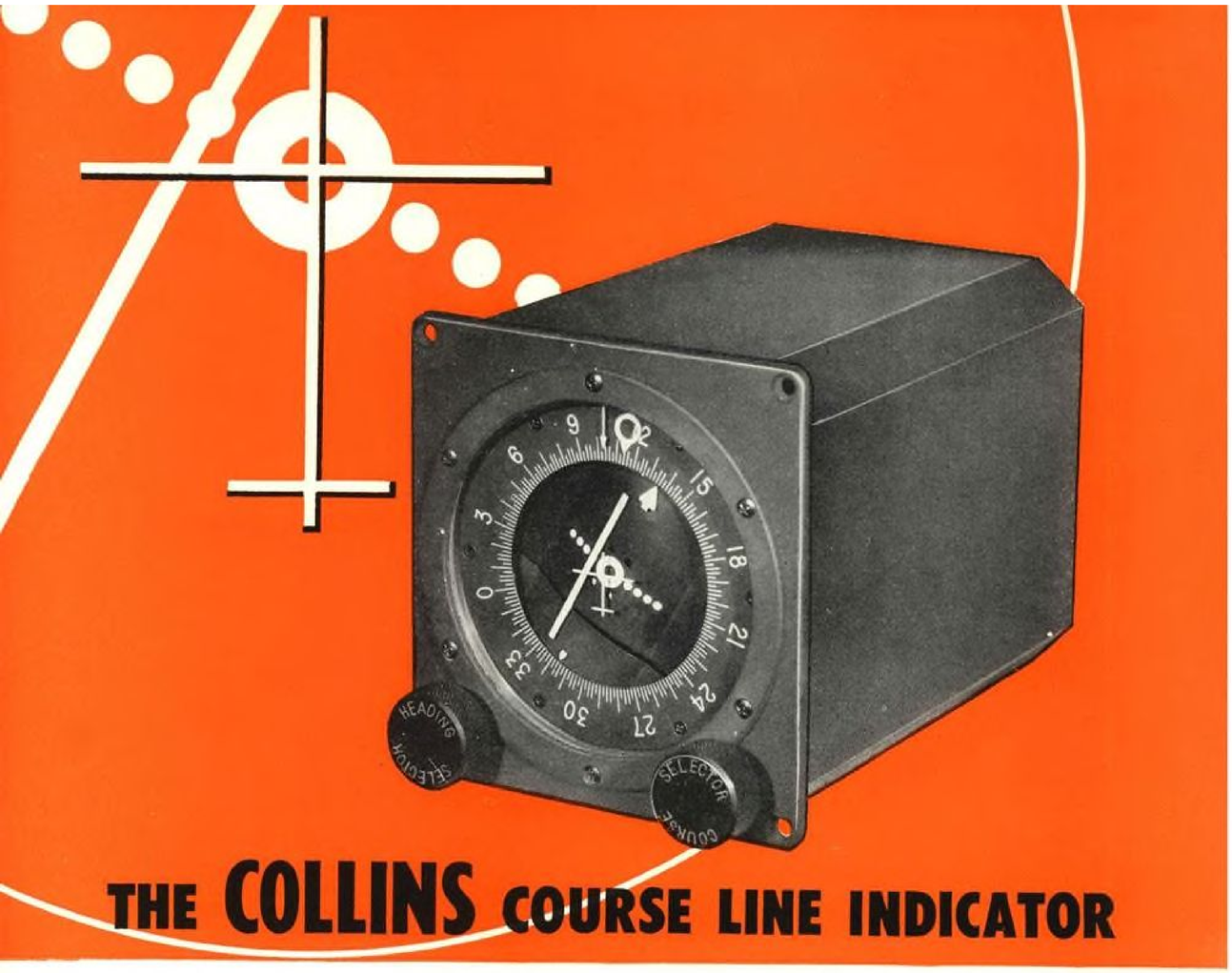

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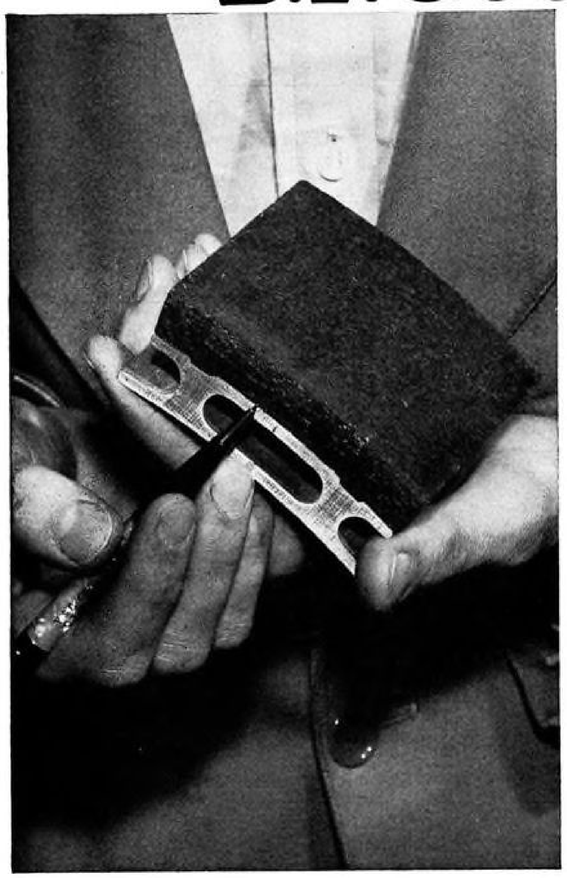

New brake block saves weight, improves braking, lasts longer

A NEW KIND of brake block has been developed by B. F. Goodrich. It is now in use in the BFG Expander Tube brakes on the planes above—the Douglas C-124, North American's B-45, Boeing's B-47 and Convair's B-36.

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This construction is both lighter and stronger than the rivet type.

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Aviation Week

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Domestic News Bureaus: Atlanta 3, Rhodes-Haverty Bldg.; Chicago 11, 520 N. Michigan Ave.; Cleveland 15, Hanna Bldg.; Detroit 26, Penobscot Bldg.; Los Angeles 17, 1111 Wilshire Blvd.; San Francisco 4, 68 Post St.; Houston, 514 South St. *Correspondents* in more than 60 major cities.

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May 7, 1951 AVIATION WEEK Vol. 54—No. 19
Member ABC and ABP

Published weekly by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948), Founder. **Publication Office: 99-129 North Broadway, Albany 1, N. Y.**

Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 18, N. Y. Curtis W. McGraw, President; Willard Chevalier, Executive Vice-President; Joseph A. Gerardi, Vice-President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice-President, Publications Division; Ralph B. Smith, Editorial Director; Nelson Bond, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Vice-President and Director of Circulation.

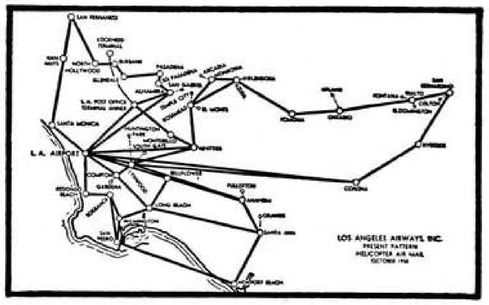
Subscriptions: Address correspondence to AVIATION WEEK—Subscription Service, 99-129 N. Broadway, Albany 1, N. Y., or 330 W. 42nd St., New York 18, N. Y. Allow ten days for change of address.

Please indicate position and company connection on all subscription orders.

Single copies 50¢. Subscription rates—United States and possessions, $6 a year; $9 for two years; $12 for three years. Canada, $8 a year; $12 for two years, $16 for three years, payable in Canadian currency at par. Pan American countries, $10 a year; $16 for two years; $20 for three years. All other countries, $20 a year; $30 for two years; $40 for three years. Entered as second-class matter, July 16, 1947, at the Post Office at Albany, N. Y., under Act of Mar. 3, 1879. Printed in U. S. A.

CLARENCE M. BELINN has been in aviation since the 20's and is the man who put helicopters "on the map" for commercial operation. His Los Angeles Airways was granted the first CAB certificate for scheduled helicopter commercial service and has proved an outstanding success. Mr. Belinn is shown with the world's first helicopter to attain a service life of 4,000 hours and to be type-certificated for instrument operation.

FROM HEADQUARTERS at Los Angeles International Airport, Los Angeles Airways' Helicopter Mail Service covers more than 45 communities three times daily. Its Sikorsky S-51 Helicopters operate day and night in all weather. In more than 3½ years of continuous operation, more than 200,000 flights have been completed, more than 13 million pounds of mail carried.



NEWS DIGEST

DOMESTIC

Personal and executive plane exports (6000-lb. empty weight and less) for March as reported to AIA by nine companies totaled 50 valued at $703,430, compared with 32 planes worth $153,408 shipped by nine companies the previous month.

Roswell L. Gilpatric replaces Harold C. Stuart as Assistant Secretary of the Air Force. Gilpatric is a New York attorney. Stuart, who held the post since October, 1949, will probably return to his law practice.

Donald W. Nyrop, new chairman of CAB, has been appointed a member of NACA by President Truman, succeeding Delos W. Rentzel, Undersecretary of Commerce for Transportation.

Cuban airline DC-4 was hit by a twin-engined Navy Beechcraft just off the shore of Key West, Fla., killing 39 abroad the airliner and four in the Navy trainer, which was on a blind flight mission. The DC-4 was operated by Compania Cubana de Aviacion, a Pan American World Airways affiliate.

Maj. Gen. Donald Putt has been named Assistant Deputy Chief of Staff, Development, USAF. Director is Maj. Gen. Gordon P. Saville. Brig. Gen. Donald N. Yates takes over the post of Director of USAF Research and Development Directorate held by Putt.

United Air Lines' DC-3 crashed near Ft. Wayne airport, Ind., during a heavy electrical storm, killing all eight passengers and the crew of three.

Legislation amending the prototype testing bill to authorize $8 million for development of a local service plane is being pushed by Sen. Edwin Johnson and **Sen. Owen Brewster.**

Big Four mail rate has been temporarily set by a CAB show-cause order at 42 cents a ton mile retroactive to Jan. 1, 1951. Four carriers affected are American, Eastern, TWA and United. Their 1950 average compensation ran 60-65 cents a ton mile.

FINANCIAL

Republic Aviation Corp. reported a net income of $404,754 for the first quarter of 1951 after provision for federal income and excess profits taxes and New York State franchise tax. Sales for the period were $19,437,760. Last year's earnings for the initial quarter came to $363,033 after taxes on sales of $15,195,572.

Northwest Airlines operating revenues during the first quarter of 1951 were $9,193,796—the highest during any first quarter in the carrier's history. The first-quarter loss was $1,614,000, compared with last year's loss for same period of $3,611,000.

Piasecki Helicopter Corp. has declared a 100-percent stock dividend payable May 16 to shareholders of record May 2.

Boeing Airplane Co. reports net earnings of $1,113,165 for the first quarter ended Mar. 31, after provision for federal and state income and excess profits taxes. The figure for the same period last year was $1,381,527. Sales and other income for the 1951 quarter were $73,122,148.

Pan American World Airways reports net earnings for 1950 of $4,064,000 on gross revenues of $153,802,000. Company's reported net earnings are based on temporary mail rates now in effect, rather than on estimates of mail pay due, the former calculation method.

Lockheed Aircraft Corp. announced a two-for-one stock split, subject to approval by the stockholders, confirming an AVIATION WEEK forecast (Mar. 26).

United Aircraft Corp. reports net income of $3,717,436 for the quarter ended Mar. 31 on income of $87,950,621. Backlog as of that date was about $910 million.

Jack & Heintz Precision Industries reports profit of $1,748,500 for the year ended Dec. 31, 1950 on sales of $13,672,646.

Hiller Helicopters, in filing a registration statement for proposed issuance of $2,500,000 5-percent debentures, disclosed that its backlog of military business now is over $18 million.

INTERNATIONAL

Hawker Aircraft Co. appointed Squadron Leader Neville Duke chief test pilot, succeeding Trevor Wade who was killed in the crash of the experimental P. 1081.

South African aviation writer reports that Willy Messerschmitt, German aircraft manufacturer, will establish a large aircraft factory near Johannesburg to produce military and other aircraft.

SIDELIGHTS

Air Force

Replying to rumors, sources close to **Lt. Gen. K. B. Wolfe** say he is eligible for retirement after 33 years' service but that commitments will keep him on active duty at least till October, and perhaps until after January. He is building a home on the West Coast . . . **Maj. Gen. Ben Chidlaw**, Wright-Patterson AFB boss, will not be eligible for retirement for another year . . . **Nils A. Lennartson** deputy director of public relations, has been given the added title of special assistant to Secretary Finletter . . . **Technical Training Air Force** Headquarters Command, with 700 personnel, probably will be located at Keesler AFB . . . **TTAF** will establish one of its bases at Biloxi, Miss. . . . White House announced resignation of **Harold C. Stuart**, Assistant Secretary of the Air Force . . . **Bryan AFB, Tex.**, which has been in stand-by status, will be reactivated as a single engine jet trainer base. Training will start in September with F-80, T-33, and T-28 ships . . . **Eastern Air Procurement District** of AMC has leased four floors in a new building at 655 Madison Ave., at 60th St., in NYC . . . AMC is establishing a 7000-man **supply depot** at Chateauroux, France, 150 miles from Paris, to service USAF units now building up in Europe. It may also supply air forces of NATO countries using U. S.-**built** equipment.

Commerce

Delos Rentzel will be sworn **in** May 7 as Undersecretary of Commerce for Transportation. He takes with him **Charles I. Longacre**, who served as his executive assistant at CAB.

CAA

Aircraft type certification will continue all regions, despite earlier discussions, the agency says . . . New written **examinations for commercial pilot's license** will include questions on radio "because of the increasing importance of radio in aviation, according to the CAA.

Air Transport

The Flying Irishman last of the large independent agencies selling tickets for nonskeds, has gone into involuntary bankruptcy . . . **Eastern Air Lines** has contracted with a nonsked, Continental Charters, to help it move Puerto Rican workers. EAL will fly them to Miami; C. C. will carry them to Milville, N. J.

People

Reginald M. "Rex" Cleveland, one of the pioneer aviation editors and industrial advertising manager of the New York Times, is the new president of the Wings Club . . . Langley Lab director **Dr. H. J. E. Reid** was honored for thirty years of service with NACA.

Washington Roundup

Boom for Air Power

Outlook now is that Congress will prod the Administration into hiking up its 95-group ceiling on the Air Force.

There's general agreement on Capitol Hill that U. S. defense must rest on all-powerful naval and air arms.

Navy seems satisfied that it will command supremacy of the seas with a conservative build-up.

But Air Force is discreetly letting it be known that a 95-group program—and the Administration isn't even giving it enough funds for that—is thoroughly inadequate.

Three Senate committees are going to focus attention on air power—and probably keep it focused for many months to come:

• **The Foreign Relations and Armed Services** Committees, in joint sessions on the ousting of Gen. Douglas MacArthur from his command, will go thoroughly into military strategy for defense of Pacific Atlantic areas.

A resolution introduced by Sen. Kenneth Wherry directs the committee to compare "the relative cost in manpower, financial and other resources of maintaining mastery of the air and seas with that of a defense policy based upon ground forces as the decisive factor. . . ." It's aimed to hit the conclusion that U. S. should put most of its eggs in one basket: strategic air. The committees will tackle the problem, but probably not from Wherry's approach.

• **Appropriations Committee.** This is where the big battle over the $60-billion 1952 fiscal year military budget will be waged. Wherry, high-ranking Republican on the group, now leans in favor of plunging into a 150-group build-up this coming fiscal year with a $35-billion USAF outlay—some $15 billion more than the Truman budget allows.

USAF wants the 150-group build-up, but would go at it more conservatively than does Sen. Wherry. They'd build up to 95 groups this coming year, 120 groups in '53 fiscal year, and the 150 groups in the '54 fiscal year.

Wherry's thought is that USAF could get the $15 billion without much of a boost in the $60 billion overall defense program—simply by diverting funds earmarked for the Army's ground forces.

"I'm fed up with this divide-the-dollar-three-ways policy of the Defense Department," the Senate's minority leader declared. "It isn't calculated to give the country what it needs for defense. It's calculated to keep the three services equally happy—or unhappy. What we need for defense of the country is a big air force and a little army. I'm for that."

Air Power: What Type?

There's a cleavage in the ranks of Senate air power advocates that stems from political convictions.

• **Internationalists** such as Sen. Henry Cabot Lodge, who favor moves toward an all-out effort to hold Europe while strategic air launches its offensive in the event of war with the Soviet Union, want an all-out build-up of tactical air, secondary emphasis on strengthening strategic air.

• **Isolationist-inclined senators**, such as Sens. Robert Taft and Wherry, want to go all-out for strategic air, give secondary emphasis to tactical air for support of ground operations in Europe or elsewhere.

The cleavage cuts the Air Force, too.

USAF's Chief of Staff Gen. Hoyt Vandenberg is on the side of the tactical air internationalists; USAF's Lt. Gen. Curtis LeMay, Commanding General, Strategic Air Command, is on the side of the long-range bombing strategy.

Air Force: The Major Arm?

USAF is approaching that status.

Under the Truman budget, USAF falls only $1 billion short of matching the Army, moneywise. The money would be divided among the services: Army, $20.8 billion; Air Force, $19.8 billion; Navy, $15.1 billion.

For this fiscal year, USAF is over $3 billion below the Army. The services are financed: Army: $19.4 billion; USAF, $15.9 billion; Navy $12.4 billion.

Army Aircraft

Army's aircraft procurement program will take a nosedive in the coming fiscal year.

Under the 1952 fiscal year Truman budget, Army is allowed $44 million for planes. This compares with the $134 million it'll obligate this year.

Government Plants

President's request for authority to build defense plants received a cool reception on Capitol Hill.

The Southern Democratic-Republican bloc, a majority of the membership of both houses, look on it as a step down the road to nationalization.

They feel that with government loans and tax amortization privileges, private industry is ready to make all reasonable expansions of capacity.

Navy Public Relations

Air Force has the reputation among reporters for astuteness, ingenuity, and aggressiveness in promoting its case on Capitol Hill.

But, oddly, it was the Navy—which has shown little service spirit since the B-36 investigation it promoted bommeranged—that was taken over the coals for spending too much taxpayers' money on public relations officers by the House Appropriations Committee.

The committee didn't even bring up the question with USAF or Army, both of whom maintain far bigger PR staffs.

Navy's Chief of Operations, Adm. Forrest Sherman, surprisingly, concurred with Appropriations Committee members that Navy's public relations activities might well be slashed.

"Why do you have to waste all this money on information officers and public relations officers, and people of that type?" Texas Rep. George Mahon queried.

Sherman replied: "I think there is a great field for improvement in our organization and the conduct of what is known as public relations. It has been my experience that public relations are controlled by the people who make the decisions, and no press relations officer can gloss over a bad one."

—Katherine Johnsen

WHO'S WHERE

In the Front Office

Malcolm S. Mackay, a member of Northwest Airlines' board of directors, has been named executive vice president of the carrier, with headquarters in St. Paul, Minn. He has been active in NWA affairs since 1948, flew transport planes in the Marine Corps during World War II, where he achieved the rank of lieutenant colonel. He retains his membership on the board.

Thomas G. Lanphier, Jr., has been appointed assistant to the president of Convair, where he will handle policy planning in the company's guided missile program. Previously, Lanphier had been special assistant to the head of the National Security Resources Board, and prior to that was a special assistant to the Secretary of the USAF, working in the research and development field.

William J. Carry has been made a vice president of the BG Corp., N. Y., and **Arthur Goldsmith** has been named vice president and secretary. Carry joined BG in 1939, coming from Fairchild Engine & Airplane Corp. Goldsmith joined the firm in 1948.

Halzey R. Bazley has become executive vice president in charge of various aviation activities with L. B. Smith enterprises, Miami, Fla. Bazley resigned his position as vice president of All-American Airways, which he has held since 1946, to take the new post. He remains on AAA's board.

C. B. Gracey has been promoted to the newly created position of vice president-operations of Boeing Airplane Co. Gracey, who has been with the company for 25 years, was previously factory service manager at Seattle.

W. G. Townley has been made executive assistant to the president of Canadian Pacific Air Lines, with headquarters in Vancouver, B. C. He was vice president-general manager of Capilano Airways, Ltd., Vancouver, when it was taken over by CPA in Mar. 1947. In 1949, he was made general manager of operations.

Don McLennan has been appointed executive vice president of the Wm. R. Whittaker Co. Ltd., in charge of both the Saval and Hollywood divisions.

J. L. Weller has been named an assistant vice president of TWA. Weller previously was assistant to the chairman of the board and to the president of the carrier.

Changes

Robert R. Miller, previously assistant to the president of Republic Aviation Corp., has joined Northrop Aircraft where he will work with **John W. Myers**, vice president-customer relations. With Republic for two years, Miller at one time was executive vice president and a director of Menasco Mfg. Co.

Henry B. Yarbrough has been made manager of USAF sales for Bendix Radio division of Bendix Aviation, and **Arthur B. Gittelman** has been appointed manager of Navy and Signal Corps sales.

INDUSTRY OBSERVER

(This week's column consists of observations of an AVIATION WEEK *editor at the annual American Helicopter Society forum and flight show at Washington.)*

► **New Sikorsky anti-submarine helicopter for which a contract was awarded recently will have approximately the carrying capacity of a DC-3, and will have two Pratt & Whitney R-2800 engines as powerplants. The machine is reportedly the nearest Sikorsky approach yet to a tandem rotor.**

► Armed services are breeding a small-business battle in the rotary aircraft field by giving the bulk of contracts to the four major companies. Only one of the big four—Piasecki—didn't get a convertaplane contract. It didn't bid. Yet before the competition it was reported that the small companies were going to get a break on this competition, because the big ones were already up to their ears in orders.

► **Despite some enthusiasm about very-thin-blade high-speed supersonic rotors for helicopters, more conservative engineering analysis at Bell Aircraft puts a damper on it. Blade designs with a thickness ratio of around 12 percent are about as thin as can be used without serious power losses which would be unacceptable in themselves, even assuming that structural and high noise level problems could be licked. This does not ease the problem of tilting rotors for convertaplanes, which Bell is trying to solve.**

► Marine Corps has decided that there are a number of jobs which the fixed-wing liaison plane can do better than the helicopter, as a result of comparable experience with both types of liaison craft in Korea. Main outcome of the decision will be that for the foreseeable future, the fixed-wing planes will continue to have a place in liaison work, reversing the decision made about a year ago to replace all fixed-wing Marine liaison aircraft with helicopters (AVIATION WEEK Apr. 10, 1950).

► **The Piasecki XHJP-1 prototype of the HUP-1 shipboard Navy tandem copter has stripped off its extra fins, as a result of the success of its Sperry autopilot experimental flights which culminated in the cross-country auto-piloted flight from the plant at Morton, Pa., to Anacostia Naval Air Station last week. As long as the autopilot is in working order, the extra stabilizing effect of the fins aren't needed, and even if the pilot goes out, there is enough stability without the fins for ordinary non-precision manual control with hydraulic boost. A fairly heavy stick force is about the only problem in manual flight. Production HUP-1s and -2s will be supplied to the Navy with autopilots and without the fins.**

► Army convertaplane enthusiasts have discussed with some engineers the idea of putting rotors on the Chase YC-122 twin-engine assault transport as a first step toward making a convertaplane of about that size.

► **Army tacticians consider a helicopter of around 5-ton payload—roughly the size of the Piasecki XH-16—as the most practical size for their requirements for supplying troops in forward areas. It is probable that any production versions of the XH-16 will go to higher powered engines to carry heavier loads. Turbine engines, possibly such as the Allison T-38, are a likely future alternate for piston engines in the production H-16s.**

► Sikorsky leads in the number of new big helicopters produced, with approximately 20 of the model S-55 in its various military versions already off the line and others moving fast.

► **Marine Corps experience with helicopter operations at the HMX-1 Experimental Squadron at Quantico has shown a steady uptrend in copter operational time for the last several months, indicating an appreciable gain in operating time with experience. But total is low compared to fixed-wing operations. Average number of flight hours per helicopter, operating an average of seven models of three types, climbed from 12 hr. a month last August to 50 hr. in February.**

AVIATION WEEK VOL. 54, NO. 19
MAY 7, 1951

Revolt on USAF Budget Looms in Senate

Funds too low for 95 groups, yet drive is for 175.

By Katherine Johnsen

A strong Senate drive for speedy build-up of the Air Force to 175 groups gathered momentum last week in the wake of the President's submission of a trim $60-billion military budget for the approaching 1952 fiscal year. The Air Force allotment falls far short of providing even adequate funds for the 95-group program the Administration supports.

The Truman budget allows USAF $19.8 billion. A build-up to an effective 95-group force over the coming year, AVIATION WEEK is authoritatively informed, would require $24.1 billion.

The budget reflects plans for a modest strengthening of the Navy's air arm. Under it, the Navy would have $4474 million available for its air activities, or, approximately $500 million more than the $3971 million that it is obligating this year.

▶**Protest Lodged**—The first congressional stirring against the Administration's budget was touched off by a floor speech which was made by Sen. Henry Cabot Lodge.

Calling for the 175-group build-up, he said:

"The cold, brutal fact is that the U. S. does not have air supremacy, air superiority or anything like it. The staggering fact is that on balance, air superiority as well as land superiority lies with the Soviet Union," Sen. Lodge said.

Lodge summarized the situation like this:

• **Air defense.** The U. S. is unable today to prevent almost a total knock-out of its industrial plants by Siberian-based Russian air power five and a half hours away. Seventy percent of the force could penetrate through to key targets. Russia's air defense network would be substantially more difficult to infiltrate.

• **Strategic air.** The U. S. has a "gradually disappearing advantage." If it's not to disappear, the Air Force must rapidly replace the B-36s that are the backbone of the arm with "all-jet high speed bombers like the Boeing B-52 and the all-jet version of the B-36 and at the present time insufficient funds are being provided to move quickly to this goal."

• **Tactical air.** U. S. suffers "from a very substantial inferiority." There are 9000 Russian planes poised for umbrella operations over some 175 divisions the Kremlin could order into action. To offset a tremendous advantage in ground power, the North Atlantic Treaty command requires a minimum two-to-one air superiority. This means 18,000 planes organized in 240 groups. If the U. S. intends to prevent slaughter of the six Army divisions it is dispatching to the continent, it must supply 48 groups manned with 3600 planes, "about three times what the Administration is now planning to send." In addition, the U. S. must contribute at least 6000 aircraft to man the remaining 192 groups, because of Europe's lack of manufacturing capacity.

▶**Air Force Requirement**—The 175-group program, which means substantial strengthening of air defense and strategic air and a major build-up of tactical air, Lodge disclosed, is what the Air Force considers necessary to fulfill its initial mission in all-out war with the Soviet Union.

Air Force would space the build-up over four years, attaining its objective for all-out war readiness by mid-1954, AVIATION WEEK has been informed. After a $24.1-billion appropriation for the coming 1952 fiscal year to complete the 95-group build-up, this would mean: $29 billion for a build-up to 120 groups in 1953; $34.6 billion for a build-up to 150 groups in 1954; and $36.7 billion for a build-up to 175 groups in 1955 and $25 billion level-off cost.

On the contrary, Truman's 1952 fiscal year budget, which could indicate a softening on a stiff military program that would mean unpopular taxes, civilian scarcities and rigid controls, means this:

The services will have to squeeze a program with an estimated cost of $106 billion under a $66-billion ceiling.

After the President's declaration of a national emergency in mid-December, the Joint Chiefs of Staff approved an "emergency" build-up program costing the $106 billion—$20 billion in a 1951 fiscal year supplemental and $86 billion for 1952 fiscal year. So far, not a penny has been granted toward the emergency program. The supplemental appropriation bill totalling $6 billion now pending in Congress and the $60-billion '52 budget will give the military $66 billion to finance, skimpily and partially, the "emergency" program.

▶**Budget's Affect**—This is how the 1952 budget will affect aviation activities of the services:

• **Plane purchasing** will be conservatively stepped up. USAF will have $10.9 billion available for new commitments; Navy, $3.4 billion. This compares with the $6.7 billion USAF will obligate this year and the $2.7 billion of the Navy.

• **Guided missiles.** Both USAF and Navy programs will be substantially reduced. USAF is earmarked $130 million, compared with $150 million for this year; Bureau of Aeronautics, $33 million, compared with $101 million for this year.

• **Industrial mobilization** funds, understandably, are radically below this year's allocations, since many programs have already been put in operation. The $9.3 million for USAF and the $6.2-million for Naval Air, compare with the $80 million USAF and the $29 million BuAer had available for this year.

• **Research and development** will be stepped up approximately 20 percent—far short of the 100 percent step-up sought by the services. The $425 million USAF is allocated compares with the $368 million it will obligate this year; and the $159 million for Naval Air compares with the $130 million for this year.

What the Military Plans to Spend

(Selected expenditures in millions of dollars)

	Fiscal 1951 Appropriated Basic 1st & 2nd Supp.	Fiscal 1951 3rd Supp. Request	Fiscal 1951 Total	Fiscal 1952 Budget Request
AIR FORCE				
Procurement	$6,615	$700	$7,315	$13,517
Research	355	....	355	425
NAVAL AVIATION				
Procurement	2,542	508	3,050	4,022
Research	130	....	130	160

Third Supplemental: 'Austerity' Budget

A $2.5-billion slice is earmarked for Air Force and Naval aviation in the $6-billion third supplemental appropriation bill for the armed services approved by the House to tide the air programs over to July.

The measure marks the return to comparative austerity in military budgets. House Appropriations Committee member Rep. George Mahon pointedly queried military witnesses: "Do all of you understand that it is the wish of Congress that we be submitted austerity budgets, with all the plush pared off? That is our wish. Is that clearly understood?"

The funds are almost wholly to take care of going expenses: meet payrolls; expand bases for increasing personnel strength; meet costs for continuing expansion of aviation manufacturing facilities; permit USAF, with an allocation of $330 million, to make payments due on planes already in production and make 10-to-20-percent down payments to initiate production on planes and engines already contracted for—the B-47 at the Lockheed Marietta plant, the J-47 jet engine, and the Canberra night intruder at Glenn L. Martin Co.

▶**No Navy Plane Funds**—No funds at all are provided the Navy for plane purchasing, despite the fact that BuAer had obligated all available money for planes and engines by last December.

It adds up to a slow-down in plane production until 1952 fiscal year funds are voted and pumped into the industry to step-up output.

The services between now and then will be on a hand-to-mouth basis to fill their needs.

USAF's Undersecretary John McCone urged: "We are up to the point where we have to put some more money against contracts, or we will create a hiatus in our manufacturing activities."

Between now and the first of July, USAF's Brig. Gen. H. A. Shepard testified, funds will probably have to be shuffled around to meet payments to contractors. And, if additional procurement money is not promptly made available then, "it will be necessary to seek authority for additional interim financing."

BuAer's former chief, Rear Adm. Pride, reported "higher authority" in the Department of Defense had "instructed" the postponement of any more plane buying for a few months.

▶**Where Money Goes**—Of the total, $1925 million is for USAF and $570 million for Naval aviation. It includes:

• **Expansion** of aviation facilities, $736 million. Of this, $370 million is for USAF and $366 million for Naval aviation. Air Force has already obligated most of the $370 million.

• **Plane purchases.** In addition to the $330 million allocated USAF, Naval aviation is allowed $52 million to cover price increases on spares and parts already under order.

In addition, Army is provided $43.7 million to complete financing on L-19 lightplanes and H-23 helicopters already in production.

• **Guided missiles.** Naval aviation is allocated $73 million to push its program. $29 million will go toward expanding production facilities. No money is provided toward USAF's program. Army is given $137 million, plus $30 million for tooling-up for production of the Nike missile at Western Electric Co. and for an undetermined manufacturer for the propellant.

The appropriation measure, now pending before the Senate Appropriations Committee, seems evidence of the slackening concern in Washington over building up the defense and the increasing bent on keeping military spending down. It means that the "emergency" program, approved by the Joint Chiefs of Staff shortly after the President's mid-December declaration of a national emergency, won't get going before the start of the next fiscal year, July 1.

That program called for a $20-billion-plus supplemental to start it off in January. Since it was drawn no money has been granted to implement it. It will probably be mid-May before Congress completes action on the $6-billion supplemental.

▶**Source of Slashes**—Meanwhile, requests for drastic economy in the nation's military budget have been forthcoming from the higher echelons of government. The moves are aimed at not one, but at all branches of service.

Both the White House and Congress are putting insistent pressure on the civilian command of the Defense Department to strip down and postpone military programs and keep costs at a minimum.

From mid-January to mid-March, Defense Department's Comptroller W. J. McNeil and the three service comptrollers "screened" military requests from a $20-billion total down to $9.6 billion. With demands from House Appropriations Committee and the Bureau of the Budget for still more "austerity," the rock-bottom estimate of $6 billion to keep the services in operation was finally cleared by the President and sent to Congress.

R&D Pattern Taking Form

Dayton—Pattern for the reorganized research and development activities of USAF under the Air Research and Development Command is taking form at Wright-Patterson AFB, Dayton, temporary headquarters for the new command, headed by Maj. Gen. David Schlatter.

Selection of a permanent headquarters for the new organization, probably at Friendship Airport, Md., will be the next step in solidifying the organization. But a sizeable portion of the research and development activities will continue at Wright-Patterson, as tenants of Air Materiel Command, to which they were formerly attached.

▶**Components**—Brig. Gen. Frederick L. Dent, formerly head of the engineering division of AMC, will head the continuing research and development organization at Wright-Patterson which has been designated the Air Development Force of ARDC. Its components will be the Engineering Division, Flight Test Division, All-Weather Flying Division, and Office of Air Research.

Other research and testing activities which have already been placed under ARDC include the avionics center at Griffis AFB, Rome, N. Y.; the electronics laboratory at Cambridge, Mass.; the Guided Missiles Center at Holloman AFB, and the flight research activity located at Edwards AFB, Muroc, Calif.

Expected to be assigned to ARDC in the near future are these activities: Long Range Proving Ground, Patrick AFB, Fla.; Arnold Engineering Development Center, Tullahoma, Tenn.; Special Weapons Command, Kirtland AFB, Albuquerque, N. M.; and the Armament Testing Center at Eglin Field, Fla.

It is anticipated that approximately 1600 persons will be stationed at the permanent ARDC headquarters when that is located, and that possibly 300 of these will be drawn from AMC personnel at Dayton.

USAF Activating 19 Guard Units

Air Force announced recently that it would order into active duty 19 non-flying units of the Air National Guard within the next nine months. This will integrate into active service approximately 10,000 officers and men, the Air Force said.

Units presently being ordered into service include 11 aircraft control and warning groups, five signal light construction companies and three communications squadrons.

PRESIDING over six of the ten sessions at the annual ATA engineering and maintenance conference were R. R. Stark (EAL), J. T. Dyment (TCA), J. D. Crane (NAL), left photo; E. Cheyno (AAA), R. K. Horton (TWA) and F. G. Bennett (PAA). Other session chairmen were: David North (AAL), R. L. Anderson (C&S), W. C. Mentzer (UAL) and J. B. Franklin (CAP).

ATA Group Finds Equipment Improving

Report of progress in solution of earlier problems heard at 1951 engineering and maintenance meeting.

By George L. Christian

Chicago—Vast strides are being made in improving the reliability and safety of airborne equipment and components.

The Air Transport Assn. engineering and maintenance conference here revealed that many problems which were considered chronic in 1949 and 1950 have been solved. Examples: Ignition systems and spark plugs are giving unsurpassed reliability; the 6AK5 vacuum tube, long cursed as the worst tube in an airplane, has slid to 27th on the offenders' list. And aluminum wire, whose installation gave many an airframe and airline engineer sleepless nights, can now be used with more confidence in its ability.

Automatic pilot and hydraulic pump performance have improved markedly. Rotating electrical components, recently an airline's trouble child, are now well behaved, as is indicated by United Air Line's failure rate of these units. Drop has been from 4-8 a week to 1-2 a month.

▶**Ten Subjects**—Following the same successful pattern established at the 1949 conference and used since, the delegates discussed these ten topics: Heating, Ventilating & Pressurization; Hydraulic & Vacuum Systems; Ground Servicing & Shop Equipment Maintenance; Propellers; Engines; Electrical Systems; Structures & Controls; Ignition; Instruments; and Fuel & Oil Systems.

Officials at the conference, which ran Apr. 24, 25 and 26, elected as the 1952 chairman R. L. (Doc) Anderson, director, research and development, Chicago & Southern Air Lines.

Highlights of some of the meetings were:

• **Hydraulics**—To cope with steel hydraulic line failures in the DC-6, Douglas has increased the wall thickness of certain lines in the power system resulting in a ratio between static burst and working pressures of 7.5 to 1 instead of its standard 5 to 1.

Much is being done to reduce to a minimum the number of "O" rings in hydraulic systems.

The wrong hardness of stainless steel has been used for high pressure hydraulic lines— ¼ hard went into aircraft instead of ½ hard.

• **Ground Equipment**—The big money saver for ground equipment is an effectively administered preventive maintenance program.

Baggage unloading is still a problem, especially because of the "after thought" type of baggage installations on most aircraft.

The trend is towards pit, rather than truck refueling.

• **Engines**—Considerable discussion revolved around oil change periods, additive and detergent oils.

After exhaustive tests, Pan American concluded that oil need not be changed between engine overhaul periods on the P&W R-2000 and -2800 engines. Similar evaluation of the R-4260 is now in progress.

With one possible exception, no detergent oils are currently acceptable for aircraft engines.

• **Electrical Systems**—Aeronautical Radio, Inc., has established an important program designed to obtain more reliable, longer-lasting vacuum tubes. Ten types of tubes are involved at present.

Success of past ATA meetings is indicated by the many problems (on the Boeing Stratocruiser, for example) which appear to have been solved at them.

• **Ignition**—Accelerated interest in analyzers. TCA, indicative of the trend, will convert its entire fleet of 20 North Stars and 27 DC-3s to a portable, ground ignition analyzer.

Low tension ignition reduces maintenance time considerably.

• **Instruments**—Great unanimity of opinion exists among airlines that red and white cockpit lighting is the best.

Instrument marking trend is towards using white on black, eliminating radium dials.

• **Fuel Systems**—Big question hinges on AC and AN fittings. The military does not want manufacturers to make both types simultaneously. So airlines would have to convert 100 percent to AN fittings. This they consider costly and unnecessary. Plan is to carry their plea to the armed forces through ATA and AIA.

Hydraulic & Vacuum Systems

Failure of steel and dural tubing used in aircraft hydraulic systems is still common.

It was pointed out that at least one make of hydraulic pump gives pulsation pressure peaks of up to 6000 psi., complicating the problem of designing a failure-free system.

Eastern Air Lines, among others, has resorted to the installation of "Everdur" tubing in critical areas such as those subjected to sharp bends or constant removal. Everdur has excellent bend and longevity characteristics, but imposes a severe weight penalty, according to airlines using it.

EAL has also gone to a systematic hydraulic line replacement every 6-8000 hr. to combat line failures.

▶**Tube Troubles**—Engineers agreed that much high pressure hydraulic tube failure, both aluminum and steel, is due to tubing tears or die mark defects. Problem is to establish rigid quality control when tubing is received from the manufacturer.

Douglas stated relative to the DC-6, that about six years ago they discovered that since weld structure can be carried through a number of subsequent draw operations, it has purchased weld-drawn tubing in only the smaller sizes (up to and including ½ in.).

Lockheed is buying 24 ST dural tubing to specification AMS-4086. In addition, very stringent inspection of this material is being maintained. Constellations in service using this tubing have been relatively trouble free.

The Glenn L. Martin Co. replaced 24 ST tubing with 61 ST on the 2-0-2. After about 3000 hr., it experienced trouble with cracking at bends, etc.

▶**High Pressure Flexible Hose**—All American Airlines claimed excellent service life for high pressure flexible hose. Removed "on condition," average life has been 3500 hr.

EAL and CAP get two engine runs and Convair reports no known failures of "super" high pressure hose on the 240. Braniff has 4000 hr. on a test installation on a DC-4 and it is still going strong.

Douglas sees no objection to using flexible hose for emergency repairs, provided installation allows for shrinkage under pressure. Lockheed prefers repairs of 52 SO or steel.

▶**Fire Resistant Hydraulic Fluids**—Lockheed stated that considerable corrosion and deterioration had been experienced on military aircraft using U-4 fluid.

Douglas examined one of its military planes that had been test flown with Hydrolube and noticed evidences of fluid separation, corrosion and minor packing difficulties. In general, the parts seemed to be in "reasonably good condition."

Most DC-6 operators are converting the cabin supercharger drive system to Skydrol. Douglas states that, in general, experience has been satisfactory except for some premature "O" ring packing deterioration resulting in leakage and in the fluid's removing paint on the plane where leakage occurs.

"O" ring chewing has apparently been eliminated through the use of spiral-type Teflon back-up rings instead of the original leather units.

Paint removal is largely stopped by using Nylon paint. Current problem is to find a suitable bonding material for this paint.

Douglas experience shows great reduction in wear of all steel-to-bronze bearing surfaces resulting in increased pump life. Replacement of Vickers pump rotating assemblies using Skydrol have been only 1/6 to 1/10 the number operated on Univis 54, according to Douglas.

▶**Talking in Circles**—There were many reports of "O" ring trouble. PAA is experiencing it and Convair has issued a Service Bulletin calling for a substantial reduction of "O" rings by substituting manifolds.

EAL is insisting on the elimination of all "O" rings possible on the Martin 4-0-4.

An Air Materiel Command representative stated that it has redesigned "O" rings completely and is providing leather back-up rings. Now in service are series AN6289-90-91 which give an almost perfect, leak-proof joint, AMC claims.

▶**A Number of Things**—Opinion on Ermeto fittings was divided, although preponderantly in favor of the units. TWA, NWA and UAL spoke well of Ermeto; PAA against. Problems seem to be possibility of over-tightening the fittings and cutting tubing to correct length.

• **CAP has reworked** two Vickers unloading valves AA-34580 to the-A configuration and reports pounding has been almost completely eliminated. It is proceeding with rework of all of the units.

• **Engineers reported** excellent results were obtained from Pesco gear-type pumps used in high pressure systems. Convair indicated that Western Air Lines had experienced no leakage after 1400 hr. on the large 3000-psi. unit. UAL and EAL are testing the pump and report satisfactory operation to date. EAL will get them on the Martin 4-0-4.

• **New York Air Brake** hydraulic pump unscheduled removal rates were quoted as follows: PAA (PAD)-2.1; PAA (AD)-1.78; NWA-1.04 per 1000 hr. of operation. It was noted that approximately 75 percent of the pumps removed were in good condition.

• **Airline operators** who have "T"ed the two DC-3 hydraulic pumps together reported favorably on the operation. For one thing, they permit much faster gear retraction. Some retained the Douglas pressure regulator and increased the high setting from 800 to 850 psi. to avoid chatter, others installed the Air Associates regulator—both with good results. EAL, CAP, BNF and Delta were among the airlines testing or using this configuration.

• **Constellation rudder oscillation** will be remedied by SB No. 668 which provides for the new "trail center" type rudder booster control valve. TWA commented that it had found cases of tail oscillation due to an individual rudder, oscillation following the rudder from plane to plane as it was installed on successive aircraft. Lockheed commented that rudder balance had no bearing on oscillation and TWA concurred.

• **Convair indicated** that the primary purpose for the micronic filter in the 240 hydraulic system was to intercept debris from a failed pump and also to give a check point for incipient failure.

• **Air Associates hydraulic pressure** regulators have an overhaul period of 3360 hr. on Flying Tiger DC-4s and 80 percent of the units go the full period, according to Douglas. Martin expressed satisfaction with the regulator, saying it was the least noisy; they will be installed on EAL's 4-0-4s.

▶**Vacuum System**—Vacuum pump failures are not considered critical, it was agreed.

Some failures possibly are due to unbalance, so Pesco has set up a balancing inspection.

Engineers generally agreed that oil separators should be capable of disassembly; EAL is developing its own along that line.

EAL suggested that increased vacuum pump drive shaft failures and fusible plug blow-outs during winter operation might be due to a marginal condition aggravated by de-icer boot use. Its plugs melt at 351 deg. F., PAA's, at 360 deg. The latter's utectic is composed of 63 percent tin, 37 percent lead.

▶**Brakes—Eastern is planning** to test the Goodyear single disc brake on its Constellation Model 749As. Lockheed pointed out that no hydraulic revisions

Safety Record

Last year saw an all-time safety record set on scheduled domestic airlines, latest CAB safety statistics show.

The passenger fatality rate on scheduled domestic airlines in 1950 was 1.1 per 100 million passenger miles flown. Prior record was a rate of 1.2 in 1946. The airlines flew 8,362,621,000 passenger miles, had 96 passenger fatalities. That means one fatality per 87,006,460 passenger miles.

International scheduled flights last year met with only one fatal accident—at Cairo, Egypt, killing 48. That one accident brought the all-up average rate to 2.1 fatalities per 100 million passenger miles. In the year before, there were no fatalities at all.

or jacking provisions have yet been designed to accommodate this brake.

Goodyear predicted that problems surrounding the single-disc brake should be pretty well eliminated by making the disc out of Timken steel and leaving out the slots which were responsible for occasional cracked discs.

No solution was offered for Connie brake lag which amounts to 10 to 12 ft. of wing-tip movement when the ship is pivoted around one gear. UAL indicated that DC-6 brake lag is an acceptable 3/10 sec.

Engineers said that loosening of attaching bolts used on the Boeing 377 brakes may be prevented by substituting high temperature nuts.

▶ **Pneumatic Systems**—A. H. Hobelman of Walter Kidde & Co. gave a resume of aircraft pneumatic systems, and said his company is producing a complete line of aircraft pneumatic components.

The past year has seen a large expansion of high pressure pneumatics, mostly in military aircraft to actuate armament systems.

He stated that air is generally as good as and sometimes superior to competitive systems. Among its advantages are:

- **Pressure medium** (air) is nonflammable.
- **Minor leaks** pose no problem; supply of air being limitless.
- **Leaks** are often easy to detect—just find the hiss.
- **As a one way system,** return lines and attendent plumbing are eliminated.
- **Frigid conditions** have little effect on its operation.
- **Extremely fast** operational response.

The Convair B-46 was the first American all-pneumatic airplane (except for brakes). The system was reported to be satisfactory. Convair added that it was entirely feasible to make the 240 and 340 all-pneumatic (except for brakes).

A representative from Wright Field contributed this added information: First problems on the B-46 were excessive leakage and induction of moisture into the system. He averred that brakes were no problem to actuate pneumatically.

A completely pneumatic B-26 (including brakes) equipped with three MC compressors is giving an excellent account of itself. It was the only plane operating out of Ladd Field in Alaska for some time largely because of the pneumatic system, he reported. He concluded that pneumatics are becoming more useful on military aircraft.

Lockheed stated it has found no real requirements for pneumatics on commercial airplanes. Requirements for rapid operation of certain military equipment make this system attractive.

(This report on the annual engineering and maintenance conference of the Air Transport Assn. will be continued next week.)

HANDS ON: Frank N. Piasecki, left, and Lt. Cmdr. Vance W. Adler greet William H. Coffee and Ed Vanderlip, Piasecki company pilots who "flew" the HUP prototype on autopilot to Washington and landed it without touching the controls (see photo, page 17).

AHS Examines Helicopter Future

Lowered operating costs will make commercial competition practical.

A fast-growing helicopter industry and the armed services last week pooled their helicopters and efforts to put on the most elaborate and spectacular rotary-wing flight show believed ever held anywhere, as a climax to the biggest annual forum of the American Helicopter Society, at Washington, D. C. (See Industry Observer, p. 11)

Crowds of more than 10,000 spectators watched the flight shows during two days at Hains Point and the Anacostia Naval Air Station. No. 1 show highlight was the first official autopilot helicopter cross-country flight from Morton, Pa. to Anacostia, made by a Piasecki XHJP-1 prototype of the Navy HUP-1 seven-place utility copter.

▶ **Future Blueprint**—Probably most significant in two days of speeches at the AHS forum was the blueprint for the future of large commercial transport helicopters laid out by Richard K. Waldo, CAA staff analyst who has just completed an industry-wide survey of future transport helicopter prospects.

Commercial versions of military transport helicopters now flying or soon to fly range in capacity from 7 to 70 passengers, plus mail and cargo. Waldo's calculations show their direct operating cost per ton mile will decrease with increasing capacity, from $1 down to 33 cents, with the cost curve tending to flatten out at the 20-30 passenger size vehicle. The study covered nine models ordered from five manufacturers.

Estimates were on the basis of a 15-mile block distance between stops and an annual utilization of 2000 hr (5.5 hrs./day). In comparison, using the ATA formula and performance data for two fixed-wing transports, the Douglas DC-3 and the proposed Boeing 498-3, their operating cost showed as 22 cents a ton mile, making the cheapest helicopter direct cost 50 percent higher. However, Waldo points out, on assumption that ground and indirect costs of the helicopter on feeder and trunk lines will be about equal to that of fixed-wing aircraft, this reduces the overall cost disadvantage to 25 percent for the helicopter. And the helicopter's advantage in being able to operate from downtown heliports, eliminating need for ground transportation to and from outlying airports, is another asset favoring the helicopter transport.

▶ **Time Comparison**—Waldo made a further comparison of airplane vs. helicopter time schedules, from downtown to downtown, using a cruising speed of 115 mph. for his copter transports, and came up with an advantage of between two and three to one favoring the rotary-wing transport over the fixed wing, for trips ranging from 45 to 130 miles. Such short-haul advantages, he expects, will lead helicopter feeder routes into competition with short-haul surface transportation, busses, trains and autos, more directly than with other longer range air travel. He foresees establishment of close-in heliports as a prerequisite to success for helicopters, and warns of the possibility of noise, nuisance, safety or other reasons denying the necessary public acceptance for such close-in landing facilities.

Speeds up to 130 knots (150 mph.) are entirely feasible for pure helicopters, without other assisting devices, a Bell aircraft preliminary design engineer, Joseph Stuart III, told the forum. Stuart analized the prospects for very thin helicopter blades, down to 4-percent thickness ratio to chord, which he considered too thin for practical use. He made the general conclusion that helicopter rotors operating largely at supersonic speeds do not appear to be practical. Decreased lifting capacity of rotors at higher forward speeds eventually makes them impractical as the sole lifting means, after which some form of unloading the rotors by stub wings or other devices is necessary.

Achievement of minimum rotor blade area and weight requires relatively thin airfoils (about 12-percent ratio) combining high maximum lift coefficient and high drag divergence Mach numbers. Highest possible tip speeds not incurring large tip speed losses should be employed. Stuart feels the need for additional research testing full scale rotors at high rotational and forward speeds to delineate accurately the boundaries of excessive tip speeds.

▶ **Rosenbaum Recommends**—Fatigue testing of each component of rotating load carrying members of the helicopter was recommended by Robert Rosenbaum, CAA Chief of Dynamics and Loads Section, as a preventive measure against incipient fatigue failures. He warned that incipient fatigue failures may have rapid progression rates so that they may not be detected by usual inspection procedures. He called for more design attention to reducing maintenance costs on helicopter rotors by increasing service life of the components.

"The helicopter may well be the key to 100-percent integration of the armed services, because none of them can do without it," Lt. Col. K. B. McCutcheon, Marine Corps, declared.

Reporting on experience in Korea, Col. McCutcheon said that the biggest handicap was the insufficiency or total lack of available spares for helicopters, and that often it was necessary to wait days or even weeks before a machine could be returned to operational status.

▶ **The Third Flank**—A military force without helicopters in the future will be obsolete," he said. "They will give the military a new style of calvary with all-important mobility, speed and dispersion of the tactical kind. Troops will be carried over obstacles of flank and rear of the enemy and will be able to be picked up, once they have landed. Weather and time of day will be no bar. With fighter cover and ground support planes to cover front and flanks, and flying low, they will impose on the enemy necessity for a true all-around defense in great depth. The air will truly become a third flank."

Advantages of rotary-wing gliders were described by Igor Bensen, Kaman Aircraft Corp. research chief and former project engineer on experimental rotary gliders at General Electric. Bensen pointed out the ability of the British rotachute and larger designs developed from it to spot land, and to lift larger payloads than fixed-wing gliders or motored aircraft. A rotary-wing glider will lift twice the payload of a fixed-wing glider of the same empty weight, or four times the payload of a helicopter of equal empty weight, he asserted.

The two day flight show included a formation flight of 19 helicopters over the Washington area, probably the largest and most varied formation of rotary aircraft ever assembled.

Copter Officers

Bartram D. Kelley, chief engineer of the Bell Aircraft Corp. Helicopter division, was elected president of the American Helicopter Society succeeding Frank N. Piasecki, chairman of the board of Piasecki Helicopter Corp. Other AHS officers: Monroe Brown, Piasecki, treasurer; Jean Ross Howard, Aircraft Industries Association, secretary; and the following regional vice-presidents; Northeastern, D. D. Viner, Sikorsky; Eastern, T. R. Pierpoint, Piasecki; Great Lakes, R. Allen Price, Parsons Industries; Southern, Tom Wilson, chief of Rotary Wing division, Army Ordnance, Washington; Midwest, Charles R. Wood, McDonnell; West Coast, Clarence Belinn, Los Angeles Airways.

HANDS OFF: Copter lets down on autopilot.

Air ROTC Training Legislation Likely

A big increase in business for flight training schools is a likely prospect.

Outlook for enactment of Air ROTC legislation is good. It would authorize all schools and colleges with ROTC programs to contract with adjacent private schools to give cadets flight training. Army and Navy, as well as Air Force, enlistees would be eligible for flight courses. Department of Defense wants the legislation. Hearings on it were scheduled to open before House and Senate Armed Services Committees shortly after the Easter recess but result of any such discussions have not been announced.

Extension of the GI educational program is expected. It expires July 25. But Congress seems inclined to continue it to permit Korean veterans to receive the same educational opportunities that have been made available to World War II veterans. Veterans Administration approvals of students for flight courses under the program are now down to about 1000 a month. At the postwar peak, they reached 20,000 a month.

Air Force Academy Site Study Continues

After a year's deliberation, the Air Force Academy site selection board, headed by former Chief of Staff General Carl Spaatz, has narrowed to seven the number of sites proposed for establishment of an air academy on par with Army's West Point and Navy's Annapolis.

Sites are: Camp Beale, Calif.; site near Colorado Springs, Colo.; sites near Grapevine in Grayson County and Randolph AFB, Tex.

Next stop before obtaining congressional authorization for actual establishment of the academy is a detailed survey of six of the seven sites by the architectural engineering firm of Holabird and Root and Burgee, Chicago.

Randolph AFB is the one site upon which no survey is necessary.

New Gunsight Sees First Combat Use

First combat use of a new fighter gunsight—likely the A-1 electronic computing gunsight—has been announced jointly by Sperry Gyroscope Co. and Republic Aviation Corp.

A report by the 27th Fighter-Escort Wing to these neighboring manufacturers cited the combined effectiveness of the Sperry sight and the Republic F-84E Thunderjet.

The 27th Wing, which introduced both the Thunderjet and the Sperry sight into the Korean theater on Dec. 7, 1950, has flown over 7500 combat sorties since then, hitting enemy troops, buildings and aircraft.

Some indication of the possibilities of the sight-pilot-aircraft combination are afforded by the amazing score racked up by Group Capt. John Roberts, RAF, now in charge of a British contingent practicing gunnery with Thunderjets at Las Vegas AFB. Firing at a frayed target measuring about 26 ft. x 6 ft., Group Capt. Roberts holed the target with 175 rounds out of a total of 180 fired.

Initial credit for developing the Sperry equipment which is also used for rocket firing and bombing, is given to Dr. Charles S. Draper, Massachusetts Institute of Technology. Dr. Draper's work was done under the sponsorship of the Air Materiel Command.

USAF Set to Choose Air Freight Winner

The Air Force is expected to pick a winner by May 15 from the nine proposals of five manufacturers competing to design and build an aerial freighter capable of moving a 25,000 lb.-payload 2500 miles directly into a forward combat area.

Invitations to submit designs were issued to Lockheed, Boeing, Douglas, Chase, Airlifts Inc., Fairchild, Martin, North American and Northrop, with the latter four not participating in the competition.

All competitors entered designs built around the Allison T-38, three included alternate designs proposing use of the Allison T-40 and Douglas also submitted a design proposing use of the Wright-compounded 3350 engine.

Douglas submitted three separate proposals, Chase Aircraft, three; Lockheed, two; Airlifts, Inc., one; and Boeing Airplane, one. Designs submitted were for aircraft ranging from just under 100,000-lb. gross for the Chase entry to 140,000-lb. gross for the Lockheed entry. Interesting sidelight of the Airlifts Inc., entry is a plan which would give production of their entry, a scaled-up Burnelli flying wing design, to Canadair, Ltd.

Requirements for the new design were agreed upon mutually by Army, Military Air Transport Service and Air Materiel Command for Air Force. They include that the plane must be capable of carrying a 25,000 lb.-payload from San Francisco to Hawaii; take off within 3000 ft. over a 50-ft. obstacle using Rato; land within a 3500 ft.-run using brakes only; have a treadway capable of supporting 13,000-lb. single axle load; and have a 250-knot minimum cruising speed.

The plane is to be designed featuring two loading doors, one at the side and one at the rear. Rear entry floor level is to be not more than 45 in. above ground (truck bed level) rear ramp door must be operable while plane is in flight for para-dropping cargo. Specifications indicated that cargo decks might have conventional load carrying characteristics of 200 lb. psi.

Development contract is scheduled for the winner out of 3rd supplemental 1951 budget.

Most entries, by virtue of requirements demanding truck-bed-height rear loading, probably will feature a high or mid-wing design and broad-bellied fuselage.

National Air Races

National Air Races have been definitely set for Detroit this year, according to general manager Ben T. Franklin. Slated for Aug. 18-19, there will be limited military participation, Department of Defense officials say, if the international situation permits.

There will be six separate jet events.

Our Expanding Industry . . .

Ford Motor Co. announced receipt of an Air Force contract for manufacture of fuel injection systems for the Wright R-3350 engine. Production will be undertaken at a new plant, location not yet determined, which will employ 3000 . . .

Westinghouse Electric Corp. plans to spend $42 million this year for new facilities. Included: expansion of the Kansas City jet engine plant; new plant to make jet engine parts; new plant at Bath, N. Y., for electronic tubes; formation of an "air-arm" division and construction of a 400,000-sq. ft. plant at Baltimore's Friendship Airport for production of airborne armament . . .

Douglas Aircraft Co. plans to set up a testing and "fly-away" base at Palm Springs, Calif., Airport . . .

Allis-Chalmers Mfg. Co. received the largest subcontract yet awarded by Curtiss-Wright in its Sapphire production program. Allis-Chalmers' order for compressors amounting to several million dollars, will require construction of a $5-million 400,000-sq. ft. plant, employment of 3500-4000 persons . . .

Buick Motor division of General Motors Corp. will build a 1-million sq. ft. plant in the township of Lyons, near Chicago, for final assembly of the J-65 Sapphire engines it will build under license from Wright Aeronautical . . .

Rototiller, Inc., Troy, N. Y., is building a new plant to increase its production of aircraft engine parts . . .

Fairchild Stratos division will build a $2-million, 125,000-sq. ft. plant at Bay Shore, N. Y., to step up production of aircraft refrigeration and pressurization units . . .

Republic Aviation Corp. is opening a branch engineering office in downtown New York City to handle the greater work load stemming from larger government orders. It is expected that the engineering staff will be increased by 150 . . .

Frederic Flader, Inc. is expanding its North Tonawanda, N. Y., plant because of greatly increased jet engine component contracts. Capacity will be increased about 50 percent . . .

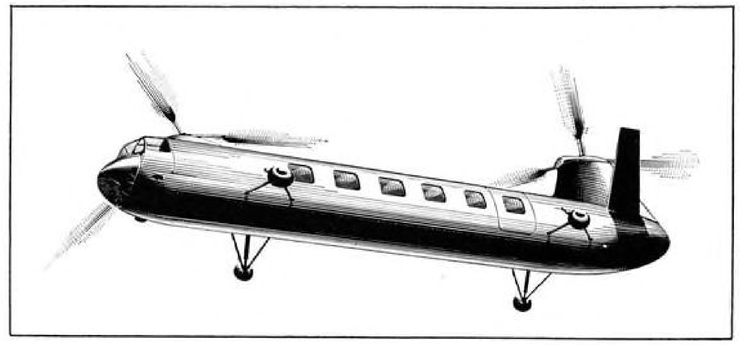
Collins Radio Co. will build a new plant at Garland, Tex., to handle greatly increased military orders. Backlog in March was more than $110 million . . .

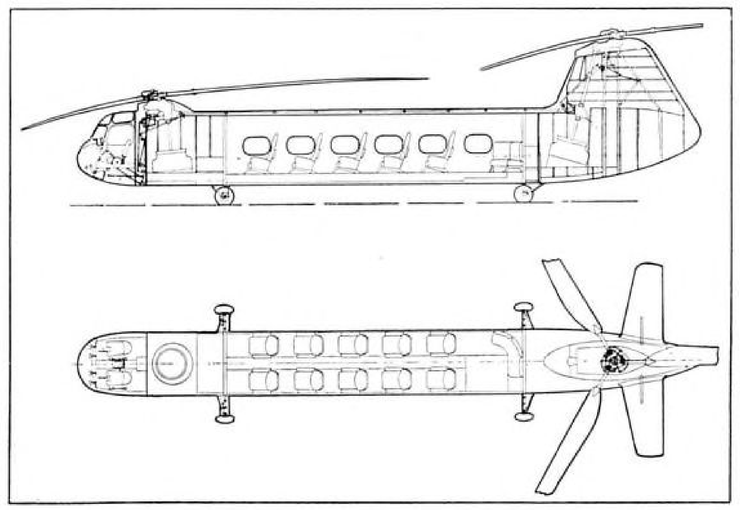
Aluminum Co. of America will build a new aluminum smelting plant at Wenatchee, Wash., which will be capable of supplying 170 mililon lb. of aluminum annually . . .

California General, Inc., formerly Cordrey Mfg. Co., is adding about 14,000 sq. ft. to its Chula Vista factory to handle subcontracts for aircraft companies.

Bristol Finishing Prototype 173 Copter

BEA plans use by 1953 of these 2-rotor craft carrying up to 14.





Implementation of Britain's ten-year helicopter plan (AVIATION WEEK Apr. 9, p. 21) began in earnest with the recent announcement of the Bristol 173, a twin-rotor, 10-14 passenger craft.

And close on the heels of Bristol's disclosure came a statement from Peter Masefield, chief executive of British European Airways, that BEA hopes to be operating these copters on the Birmingham-London route by 1953.

The prototype aircraft is now being completed at the Filton works of The Bristol Aeroplane Co., Ltd., and is due to fly sometime this summer.

▶ **Alvis-Powered**—The Bristol 173 is powered by two Alvis Leonides LE.25 H.M.V. radial engines, rated at 550 hp. each. In the event of a single engine failure, the copter can continue flying on one.

Bristol states that in addition to the primary design purpose of carrying passengers over medium or short ranges, there are a variety of military uses possible. As a freighter, 2500 lb. of cargo can be accommodated; as a flying crane, it can tote still heavier loads over short distances by slinging them under the fuselage on a beam.

Normal gross weight of the aircraft is 10,600 lb. Maximum hovering weight within the ground cushion area may go to around 13,500 lb., depending on the altitude at which the plane is required to hover. And the craft can be overloaded above its normal gross and still hover without the ground cushion.

Cruising speed in lean mixture is estimated at 105 mph., and maximum speed at 142 mph. Maximum rate of climb is 1150 fpm., and service ceiling is approximately 19,600 ft.

Folding rotor blades reduce the overall length to 78 ft. 2 in ; width is 17 ft., and height, 15 ft. with rotors folded. Rotor diameter is 48 ft. 6.7 in., which figures out to a total disc area of 3720 sq. ft. Disc loading at normal gross weight is 2.85 psf.

▶ **Helicopter Heart**—Basic element in any helicopter is the fuselage, which in the 173 is divided into four major sections:

• **Crew compartment.** Pilot and co-pilot sit side-by-side, separated by a console with engine ground-running, trim and bias controls. Primary flight controls include the collective-pitch lever operated by left hand of either pilot, a cyclic-pitch control in the usual central position, and rudder pedals for yaw control. Instrument layout was planned after consultation with many pilots, and includes provision for installation of the Decca navigational aid.

• **Forward engine bay.** The Leonides is mounted with its shaft tilted five degrees forward from the vertical, and is contained within a steel cowling which forms, in effect, a fireproof box. A direct-drive cooling fan is provided. Engine bay is insulated from the pilot's and passenger compartments by soundproof bulkheads. Complete fuel and oil system for the forward engine is also housed in this bay.

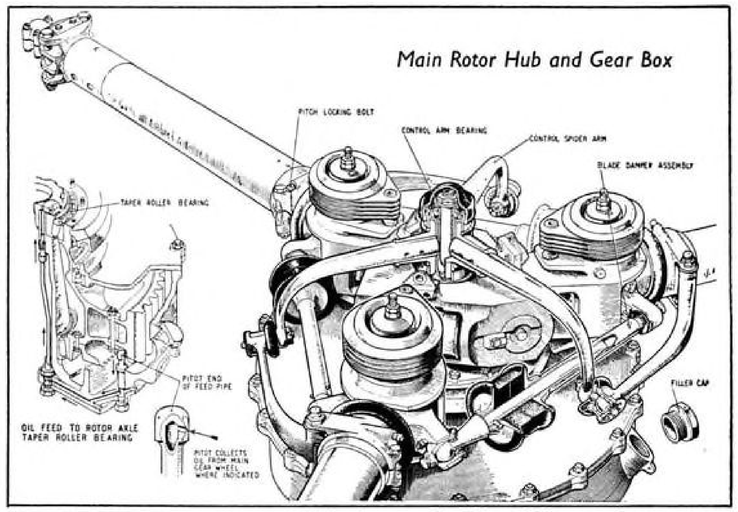
• **Passenger compartment.** This bay is of constant cross-section for its entire length of 26 ft. 2 in. Maximum height is 5 ft. 8½ in. over a depressed central walkway. Raised portions on either side of the walkway serve as floors for two rows of single seats. For freight, a level floor can be bridged across the walkway. Such an arrangement provides 605 cu. ft. of cargo space of constant section.

Cabin entrance door is on the port side at the rear of the fuselage; access is easy because of the low floor level and rear rotor is well above head level.

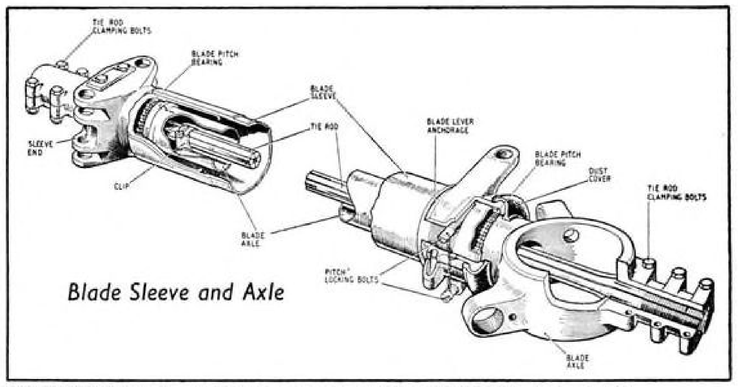
• **Rear engine bay.** This compartment is similar to the forward engine bay except that the engine shaft is tilted aft. The rear engine bay is extended upward into a pylon mounting for the aft rotor.

One other basic feature of the layout of the 173 is worth mentioning. A butterfly tail is incorporated as an aerodynamic damper—in this case, for reduction of phugoid pitch oscillation and pendulum instability in roll.

Both engines are interconnected by



CUTAWAYS of hub, gear box and blade sleeve are for Bristol 171 copter, but . . .



COMPONENTS of rotor blades and hubs are identical for both 171 and 173.

a single shaft which extends over the passenger cabin. A free wheel and clutch in the drive system between each engine and its rotor permits isolating the dead engine, or autorotation with both engines out.

► **Rotor System**—In building the 173, Bristol used the rotor blades and hub from their earlier Type 171 single-rotor helicopter. The rear rotor of the 173 uses the 171 parts as is; front rotor parts are different only in that they are handed because they rotate in the opposite direction from the rear rotor. This has enabled Bristol to use a proven rotor system with known characteristics, and must have saved much developmental time.

Rotor blades are of wood with a compressed wood leading edge spar, spruce ribs and plywood cover. (All-metal blades are being developed.)

Blades are articulated in both flapping and drag planes. Centrifugal forces on the blades are taken by tie-rods, fixed at the inboard end to the hub and at the outboard end to the blade root sleeve. These tie-rods are segmented so that they are torsionally flexible to permit easy pitch change of the blades.

Collective pitch (simultaneous pitch changes on all blades and rotors) changes are made from the single control column which operates both rotors. Fore and aft control is obtained by varying differentially the collective pitch on the rotors in conjunction with simultaneous cyclic pitch changes. (Cyclic pitch involves changing the pitch of the rotor blade in a sinusoidal mode varying with the azimuth angle of the blade.)

Bristol claims that this method gives better compensation for c.g. travel than does simultaneous cyclic pitch change alone.

Both rotors are tilted for lateral control by simultaneous cyclic pitch control. In yaw, differential cyclic pitch changes tilt the two rotors laterally in opposite directions.

These rotors have a comparatively high moment of inertia, and they are capable of running at high rpm.; enough kinetic energy is stored in the

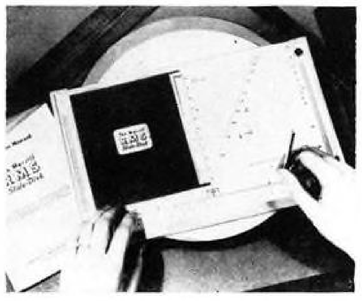
rotors to permit hovering for about four seconds before descent starts.

► **Simple Construction**—Because of the constant cross-section of the copter, it is designed as a pure monocoque cylinder, and the resultant structure is very light. Structurally, the Bristol 173 is probably the simplest 13-place aircraft ever built.

Windows are large (28 x 18 in.) and can be pushed out if needed for emergency exits.

A four-wheel landing gear is fitted to the 173. Load distribution around the center of the copter makes this arrangement preferable to tricycle gear. A very considerable saving in structural weight is obtained by taking the loads on the wheels near the engines, where weight is concentrated. Taxiing propulsion is obtained from the rotors, which are set with a slight forward tilt with respect to the fuselage.

The version of the 173 which has been suggested for service with BEA mounts five seats on each side of the aisle, and has a quarter-circle bench which seats three more people at the aft end of the cabin. Alternative seating arrangements are available which provide more passenger space, more luggage space, or an installed toilet at the expense of luggage space.



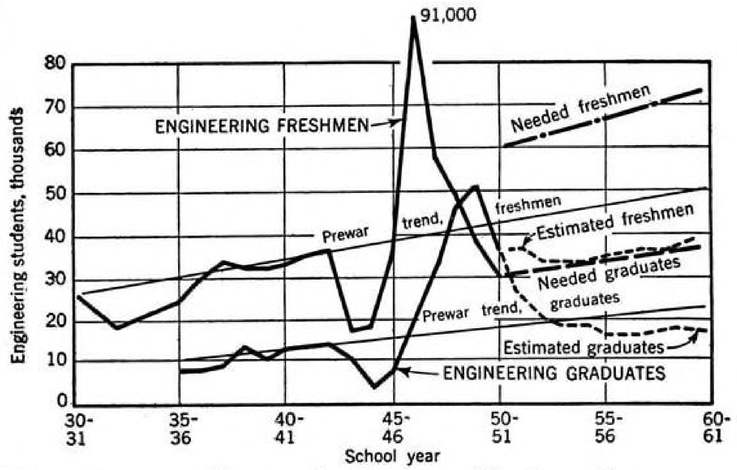
Slide-Disk Calculator

Aerodynamicists and mathematicians who have to make statistical analyses in the course of their work now have a new calculator to aid in lengthy computations.

The calculator, the Merrill RMS Slide-Disk, performs squares, sums of squares and square roots simultaneously. It consists of a 10-in. disk, free to slide and rotate beneath a pair of vertical and horizontal scales. Linear and logarithmic scales come with the calculator.

Accuracy claim is one-half percent or better; time-saving claim is that the computer will perform five separate mathematical operations in about two seconds with one mechanical setting.

The Merrill Slide-Disk is available only from the manufacturer, Graphic Calculator Co., 633 Plymouth Court, Chicago 5. Retail price is $64, postpaid.



Engineer Supply Low, Going Lower

School enrollment drops while industry needs grow; and draft will take many of those who graduate.

The aviation industry, facing the shortest supply of engineering manpower in its history, has even blacker prospects for 1952 and 1953.

That is the conclusion drawn from an AVIATION WEEK study of the current situation.

You won't be able to hire many more aeronautical engineers of the class of '51. Almost every member of this graduating group has had from three to six job offers at starting salaries up to $400 per month. And most students have accepted one of their offers.

Prospects are that next year's class will not be substantially larger, and could even be smaller. And 1953 will find the same situation prevailing.

On a longer-range view, current freshman enrollment in engineering courses is 18 percent under last year's. So 1955 is going to be a bad year, too.

And there isn't much hope for you if you turn to other branches of technology to find your engineers. There is an across-the-board shortage.

The reasons aren't too hard to find.

► **Enrollments Dropped**—It's true that there has been a general decrease in college enrollments this year. But registration in engineering courses dropped almost three times as far as over-all registration.

That means a minimum of four years before there can be any increase in the number of engineering graduates per year.

Irreparable damage has been done to the structure of engineering education. And in talking to educators, AVIATION WEEK heard over and over again the same reasons for the damage.

Foremost among these was the wide publicity given a statement (attributed to the Bureau of Labor Statistics about two years ago) which said in effect that engineers were getting to be a glut on the market. It was expected that within a few years, more engineers would be graduating than industry could absorb. So, prospective engineering enrollees turned to other subjects or went out and got jobs.

Another contributing factor to decreased enrollment was the scale of engineering salaries as compared to that of salesmen, administrators and production executives. Consequently, business administration and plant management courses have been getting additional entries from those who might otherwise have become engineers.

► **Availability Decrease**—Apart from the downward trend in engineering futures, there will be less graduates available from classes already in college. Some of these men will be drafted; half the freshmen class, one-fourth the sophomores, some juniors and even seniors are eligible. These are mostly men with lower academic standings, but they are getting technical training nevertheless, and the man-hungry industry would surely be able to use these men in some capacity.

There has been since the war a great increase in the Reserve Officers Training Program for all branches of the services. And this means that many of the current student body will be commissioned in the reserve upon their graduation. Industry can't (or won't) hire these men because of their standby status with the military. (In a spot check, prospective reserve officers comprised up to one-fourth of the graduating class for this June.)

The increased complexity of current technologies contributes to the continuing shortage of engineers. Up to one-third of the graduates with bachelor's degrees stay on as candidates for master's degrees, simply because they feel that the time will be better spent in study than in obtaining experience. And of the master's group, one-third continues to the doctorate.

► **Future Deficits**—The schools impose a limit on expansion of engineering student registration with quota systems. Colleges argue that to over-expand is dangerous to their educational future and that overtaxed facilites and faculties can only result in a general lowering of standards. And so quotas are set which effectively limit the number of students in any one course, dependent upon the scale of instruction and laboratory space and equipment available.

In querying, it was found that schools were running a little under the quota figures for aeronautical engineers, although other engineering courses were full. So it appears as if filled quotas in all course registrations will not alleviate the situation, either.

There is one other point that seems worth mentioning in connection with things that happen to the prospective engineering market. Every year, a percentage of engineers take non-engineering jobs. The over-all figures for the entire profession are not available, but one indication has been furnished in a recent survey conducted by New York University's College of Engineering. That college found that over 25 percent of its alumni were in responsible non-engineering positions, including such diverse lines as teaching, sales, law, medicine and publishing.

► **What to Do?**—These are some of the factors which either have or will contribute to the continuing shortage of engineers. The problem, of course, is to reverse the trend and somehow assure a continuing supply of engineers in the quantities needed.

It has been estimated that needs of industry and military could be met by an annual graduation of 30,000 available engineers.

Since the drop-out rate on engineering students is about 50 percent, not counting those who fall to the draft, a minimum annual input of 60,000 freshmen would be required. This is double the number entering this year.

And there is an expected drop in high school graduations expected in the period from now until 1958. Clearly, no dependence can be placed on a continuing increase in the number of engineering frosh.

Over the past fifteen years, about 3 percent of the total high school graduating classes have entered engineering schools. But on the basis of current numbers of high school graduates, about 10 percent would have to enter in order

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to guarantee 30,000 engineering college graduates per year. And educators express doubt that so high a percentage have the aptitude or interest to make engineering entrants.

• The basic is that an adequate supply of engineering graduates does not exist and cannot be made to exist.

The aircraft industry—with other industries—is entering the "seven lean years" of the shortest supply and greatest need of engineers that it has ever known. It can only hope at best to relieve its shortage, not to eliminate it.

Industry has been advised (by the Engineers Joint Council, among many others) to make the most efficient use of its existing staffs of engineers; to re-establish training programs of World War II; to give limited technical training to high school graduates, women and supporting personnel. Full utilization of these suggestions will help to strengthen engineering staff's abilities, by passing some of the details on to various aides or assistants.

Long-range, the aircraft industry can enter more into cooperation with educational institutions in a number of ways. It can suggest curricula changes or additions to enable graduates to make the transition from school to work in less time and more smoothly. It can actively support, through gifts of equipment or components, the laboratories of technical colleges. And it could certainly sponsor—through scholarships, loans or direct subsidy—many times more students than it now does.

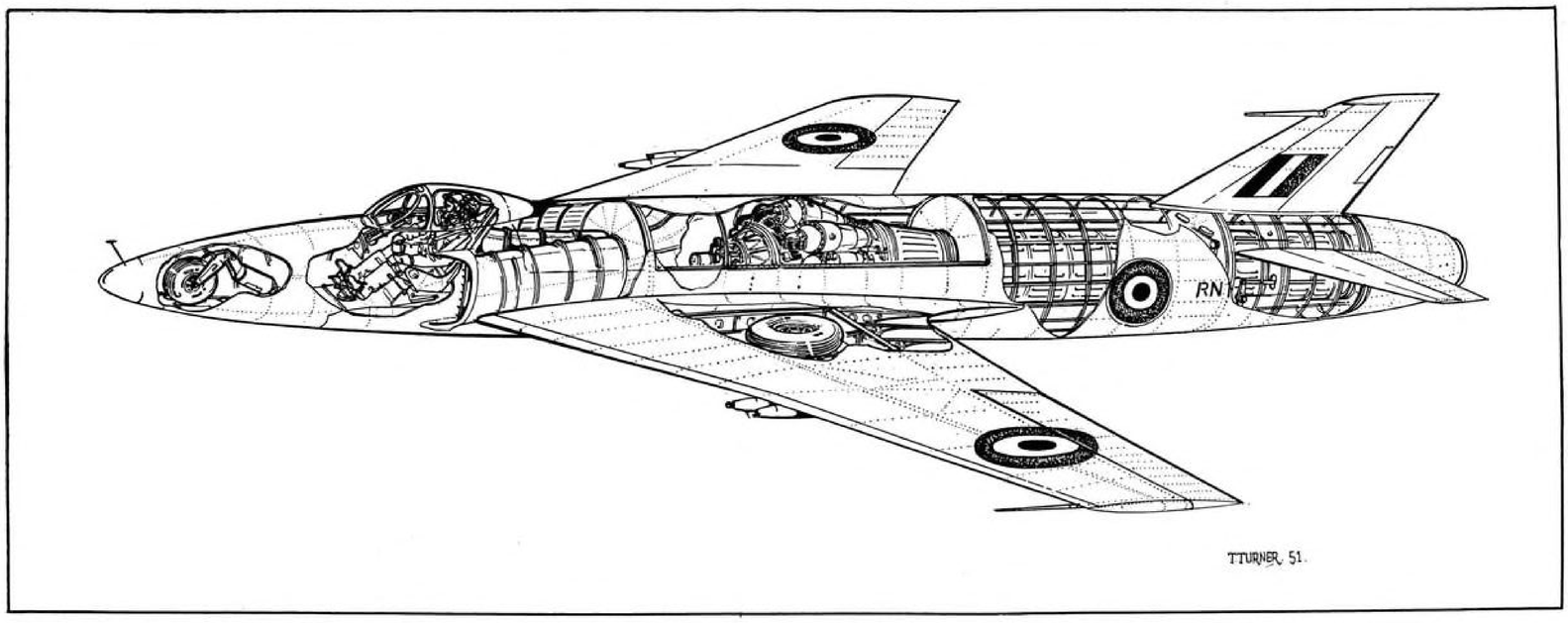
The problem belongs to industry; and only the industry, within itself, can find the solution.

To substantiate material for this article, Aviation Week *spot-checked four eastern colleges whose curricula have the approval of the Engineers' Council for Professional Development. These colleges represent about 9 percent of the entire graduate and undergraduate population of the United States, but about 22 percent of the aeronautical engineering student body. The four:*

- *NYU College of Engineering*
- *Rensselaer Polytechnic Institute*
- *Polytechnic Institute of Brooklyn*
- *Massachusetts Institute of Technology*

As a matter of interest, these schools together will graduate 180 aero engineers this year, about 140 next year and about 140 the year after that.

Other figures used in analyzing the current status of the engineering profession came from Circular 287 of the United States Office of Education; the Engineering Manpower Commission of the Engineers Joint Council; John I. Mattill, of the MIT News Service; John W. Andrews, of Brooklyn Poly; the Registrar's office, RPI; the office of Dean Saville, College of Engineering, NYU.



Aviation Week Design Study: Supermarine 535

The Vickers Supermarine Type 535, one of the two latest advances in British fighter design, is dissected in this AVIATION WEEK drawing. Direct lineal descendant of the Royal Navy's production fighter, the Attacker, this sweptwing beauty may replace the Attacker in carrier service at a future date.

This craft was developed as a third step, the first being the Attacker and the second the Type 510. Common to all three is the fuselage, from cockpit to the fin leading edge. Aft of that point, the 535 fuselage has been swollen to accommodate afterburning equipment for the Rolls-Royce Nene which powers the plane. Forward of the cockpit, the nose section has been both lengthened and strengthened to incorporate a nose wheel.

Leading and trailing edges of the Type 510 swept wing have been modified near the root to make the 535 surface. As a result, the leading and trailing edges of the 535 wing are kinked, and give the plane a distinctive appearance in planform.

The tail wheel of the 510 and Attacker has been retained for the 535, so that the airplane really has a quadricycle landing gear. And it is landed in the taildown attitude, pitching forward onto the nosewheel only when the airplane is well through its landing roll.

At the 1950 SBAC display at Farnborough, England, Vickers Supermarine chief test pilot Mike Lithgow demonstrated the 535 in fly-pasts at speeds in excess of Mach .86 at sea level (approximately 660 mph.). Some measure of flight comparison between it and the Hawker P.1081 was afforded by successive flight performances of the two planes. All other things being equal, the 535 was somewhat faster, but somewhat inferior in climb and maneuverability to the P.1081.

Structurally, the airplane is quite conventional and simple. Probably the one outstanding feature of its design is the extreme size and rugged appearance of the nose wheel strut. Part of the canopy is metal, a change from that of the 510, which was clear plastic. Armament is four 20mm. cannon. An ejection seat is fitted.

Olympus: Wright's Ace-in-the-Hole?

A British-designed jet engine—the Olympus—may be Wright Aeronautical Corp.'s ace-in-the-hole if the company finds it necessary to compete quickly in the fast game of higher thrust values.

If this engine is produced here, it is likely to be the last of English high-thrust jets to be taken over by U. S. manufacturers. Wright Aero undoubtedly will bring out designs of its own in the not-too-distant future and our other high-power engine builders already are firmly established in the jet field.

British jet genius has figured vitally in this country's progress in aircraft propulsion. Lacking in productive capacity, the English have made up for this shortcoming in the excellence of their work in the basic field of design and development.

Their Whittle engine paved the way for General Electric's I-16 (J-31), the Rolls-Royce Nene led to Pratt & Whitney's J-42.

Latest of the British jets headed for the production phase in the U. S. is Armstrong Siddeley's 7220-lb.-thrust Sapphire, the American counterpart of which will be built as the J-65 by Wright Aero and its licensee, the Buick Motor Car Co.

Just what part this engine will play in the U. S. air power picture will depend mainly on these factors:

• **Continued requirement** for a jet in this power class.

• **Advisability of continued** extensive development of the engine in an attempt to boost its power to compete with the new contenders in the jet field.

• **Production of the newer** Olympus or another more powerful jet by Wright Aero.

Wright Aero has the manufacturing rights for this engine from Britain's Bristol Aeroplane and Engine Co. Ltd., and reports are that this powerplant already is on the test block here and will be tagged the J-67.

Because Wright Aero has planted both feet in the jet arena, it is likely it will want to keep abreast of the power trend and shift emphasis, at the appropriate time, from the J-65 to the Olympus, since at best the J-65 probably could have its thrust improved to a point substantially below where the Olympus might start development-wise —perhaps in the 9500-10,000-lb. range.

►**Potential for F-84Fs**—First flock of Republic Aviation Corp.'s F-84F Thunderjets probably will be powered by British-built Sapphires, but these will be succeeded by Wright Aero's J-65s as they come off the production line later this year.

Considering the capabilities demon-

strated in the Korean theatre by Republic's F-84E, it is likely that a substantial number of the Fs have been, or will be, ordered—which would mean a huge number of J-65s as powerplants and spares.

It is also to be expected that subsequent, harder-hitting versions of the Thunderjet will follow, with no change in engine type to slow production flow.

► **Other Uses?**—And there are other Air Force near-immediate uses for the J-65. The English Electric Canberra bomber scheduled for production by Glenn L. Martin Co. now is powered with Rolls-Royce Avons with a power rating estimated at about 7500-lb. thrust. This power is fairly close to the Sapphire's and some development refinement incorporated in the J-65 along with its production may give a thrust to match the Avon's.

This consideration, bolstered by the fact that the Avon will not be made here, may swing the scale in Wright Aero's favor to use its J-65 production rate to take care of the Canberra.

Also, there is still a possibility of Air Force orders for Martin's B-51, with the further possibility that the J-65 may be used in it to capitalize on Wright Aero's production potential.

Another reason that may prompt use of the J-65 in a variety of planes is the reported low fuel consumption (of the Sapphire)—believed in some quarters to be less than that of any jet built here.

► **Thrust Factors**—Continued development of the J-65, along with the production of this engine, undoubtedly will be carried out to boost its power. How far this thrust-raising program will continue will depend on the relation of the power potential of this jet to the overall status of the engine requirements picture.

If squeezing additional push out of the J-65 does not seem feasible in the light of other powerful engines which will become available, Wright Aero may focus its development and production efforts on the Olympus.

► **Multiple Compression**—If it is decided to schedule the Olympus for production, more Wright Aero engineering will be incorporated in this engine than in the J-65 because the latter was pretty much a quick deal to get the company's jet lines rolling.

One of the schemes under consideration in this country in jet engine compressor design is towards an arrangement for higher compression ratios and lower fuel consumption, in which two compressors are used—one a low-stage unit, the other a high-stage unit.

The British also are reported to have considered this approach, and because the Olympus is a comparatively late development engine, it is possible that it may emerge with multiple compressors.

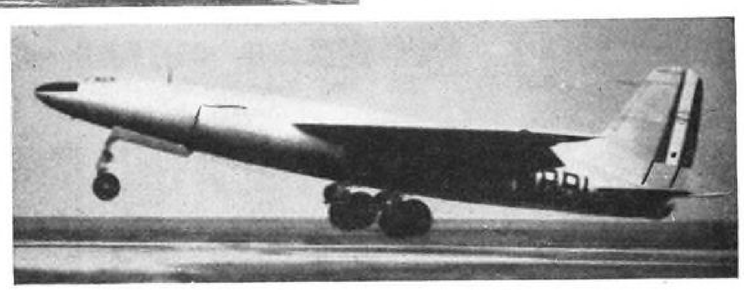
New Stars for Europe's Skies . . .

FRENCH TEST A NEW STYLE—First French jet-propelled transport is this experimental SO30 powered by two Hispano-Nene centrifugal-flow turbojets of about 5000-lb. static thrust each. The SO30 normally carries 36 passengers, but the plane pictured at left is being used to gain practical flight experience for development of future French jet airliners. The Nene SO30 does about 475 mph., approximately 100 mph. more than the Double Wasp-powered production version. The twin-rudder tail of the standard model has been modified to a single vertical tail on the jet-powered model, probably to allow the jet exhausts free passage.

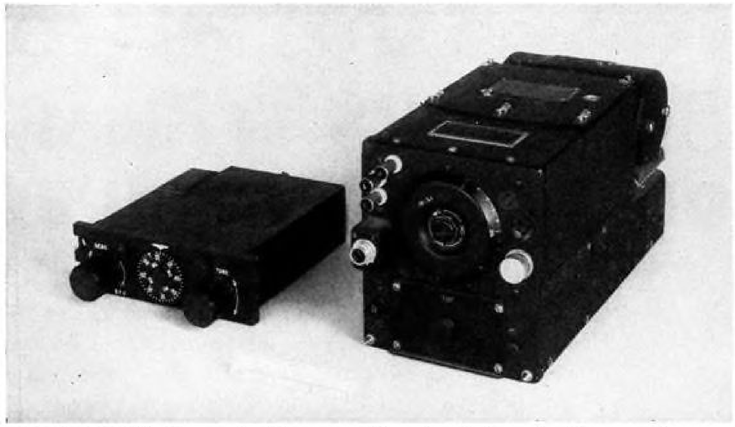
HERE WE GO AGAIN—This slick-looking sweptwing glider (right) was one of the entries in a recent model meet held by West Berlin youths. Stringent ban on any type of aviation activity was relaxed to permit German air model activities to resume for the first time since the end of World War II. This particular model, apparently of stressed skin all-plywood construction, displays a high standard of workmanship and is somewhat reminiscent of the wartime Horten Brothers' projects or the night-fighter designs worked out by Gothaer. The inlets at the apex of the wings near the nose are not explained. The Germans gained much useful data for later high-performance aircraft by intensive glider work during the Allied ban on aircraft in the disarmament period following World War I.

TRIANGULAR FAIREY—Ground view of the rotund Fairey F. D. 1 delta-wing research plane points up the sturdy landing gear having all three wheels retractable into the fuselage. The tiny plane, only 19 ft. 6½ in. long, is powered by a Rolls-Royce Derwent. Actual construction of the F. D. 1 was preceded by numerous tests using pilotless radio-controlled models which helped in working out bugs in the design. The plane was flown for 17 min. on its initial hop. Some of its features, such as the tiny horizontal surface and the leading edge slats are believed to be only temporary fixtures installed for the early flight test period.

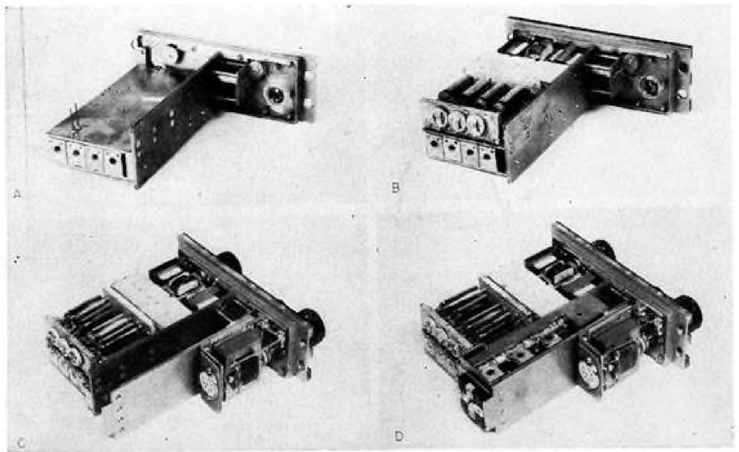
FRENCH BOMBER TESTED—SO4000 light bomber (right) gets off the ground at Orleans for the first time. Powered by two Hispano-Nenes, the two-seater has a top speed of about 650 mph. and is designed to carry a bomb load of five tons. Gross weight is approximately 60,000 lb. and the span is 58.5 ft. Points of interest include the novel truck-type landing gear which folds into the fuselage, and the very long and slender nose. SO studied a flying-scale manned "model" before building this prototype.



AVIONICS



COMPACTNESS of new subminiature vs. old receiver is shown in this comparison.



SIMPLE ASSEMBLY is shown in these sequential views, with (A) mechanical tuners and RF inductors in place; (B) RF amplifiers and power filters added; (C) output transformer, potentiometer and switch in; (D) complete unit ready for sealing and casing.

NBS Develops Tiny Range Receiver

New low-frequency 12-tube unit is one-fifth the size of functionally similar World War II aircraft radio.

As one step in a broad avionics subminiaturization program, the National Bureau of Standards has developed a tiny 12-tube radio range receiver for aircraft. The new receiver is the functional equivalent of a World War II radio range unit of more than five times the volume.

The subminiaturization program was initiated by the Bureau of Aeronautics, Department of the Navy, and has included a previous high-frequency development in addition to this low-frequency receiver.

►**Small Size**—The receiver itself is mounted on a panel only 5¾ in. by 1⅞ in.; the chassis cover is actually smaller than that. Total volume is 55 cu. in., compared to about 300 cu. in. of earlier receivers.

Receiver characteristics include continuous tuning from 190 to 550kc., intermediate frequency of 135kc., power output of 100 milliwatts and a 5-microvolt sensitivity for a 6-db. signal-to-noise ratio.

Seven detachable subassemblies make up the receiver. Printed circuits are extensively used to conserve space and simplify the production of the unit. The circuits are printed on steatite or silicone-impregnated fiber-glass.

The entire unit is hermetically sealed to guard against moisture damage and contamination; it further eliminates protective coatings for the components. This sealing presents a heating problem which has been handled through the use of high-temperature components to withstand the temperature inside the case.

Housing is sealed to the front panel (which incidentally acts as a chassis for the receiver) by a soldered copper band. This band can be removed with a slotted key of the coffee-can type for servicing the set. Nitrogen replaces the air in the sealed unit to protect against oxidation.

►**Design Problem**—Sealing the bushings of the two control shafts which would have to project through the front of the panel presented quite a design problem. To solve it, the Bureau used commercial rotary seals of the wobbling-bellows type. These were too large to be housed within the unit contours, and therefore were placed in the large control knobs themselves.

Tuning the receiver also presented engineering difficulties. It was desired to get a straight-line tuning characteristic (straight-line means that the frequency is proportional to the control angle) and this meant a variable-pitch screw was necessary to drive the slugs in and out of radio-frequency coils. The screws were made on a standard lathe fitted with a linear cam devised by Robert O. Stone, a member of the Bureau's staff.

Tuning slugs are made from newly developed ferrite base materials which are more stable at high temperatures than powdered-iron cores. Anticipating that production control of these materials might be difficult, the tuner was equipped with mechanical means to compensate for nonuniformity of the cores.

►**Components**—The Intermediate-frequency transformers are only ½ x ½ x 1⅜ in. They are double-tuned and have permeability-tuned inductors. Resonating capacitors are washer-shaped and mounted in the ends of the transformers. Radio-frequency coil structures resemble those of the IF transformers, and similar parts can be used for making both.

Large capacitors are of the tantalum electrolytic type for high-temperature application. Others are of glass dielectric type. Insulating materials are steatite and silicone-impregnated fiberglass. Audio-frequency transformers and chokes use high-temperature insulators, ceramic-coated wire and are impregnated with silicone varnish.

The combination of hermetic sealing and panel size kept the number of external controls to two. And since one of these was required for tuning, the other had to be designed to fill the functions of gain control and on-off switch for power and the beat-frequency oscillator. This was done in a special compact switch designed to be produced entirely from stampings.

The gain control employs a high-temperature adhesive-tape resistor which was specially developed by NBS. The tape is wrapped around a tiny glass cylinder (⅜ in. long by ¼ in. diameter) on which 120 axial lines of silver paint have been deposited. These lines form commutator segments. The projecting ends of these silver lines contact a brush which is made out of precious metal.

In addition to its prospective usefulness in aircraft, the receiver has served as a focal point for the development of components and techniques. Many of the basic units developed for this receiver, engineered as they were to withstand rigorous size and temperature requirements, should find application in equipment of more conventional size and design. Aside from the space-saving advantages, the Bureau feels that these tiny components may well afford improved permanence and reliability.

Development of the subminiature radio-range unit was under the direction of Gustave Shapiro, of NBS.

CONSOLIDATED VULTEE PHOTO

1950 Earnings and Dividends

Aircraft Companies

	Per Common Share		
	Reported Earnings	Dividends Paid	Dividend Ratio
Bell	$3.37	$1.75	52%
Beech	0.98	0.80	82
Bendix	8.00	5.00	62
Boeing	10.00	3.00	30
Cessna	0.32	0.20	62
Convair	4.36	1.00	23
Curtiss-Wright	0.77	1.00	129
Douglas	12.02	6.25	52
Fairchild Eng.	0.85(E)	0.60	71
Grumman	3.12	2.00	64
Lockheed	6.45	3.00	47
Martin	2.76	None	..
Northrop	(d)0.10	None	..
No. American	2.35	1.25	53
Republic	2.34	0.50	21
Sperry	4.72	2.00	42
Thompson Products	7.51	1.46	19
United Aircraft	4.48	2.00	45

Airline Companies

	Per Common Share		
	Reported Earnings	Dividends Paid	Dividend Ratio
American	$1.39	$0.25	18%
Braniff	1.23	0.25	20
Capital	2.02	None	..
Chi. & Southern	1.68	0.50	30
Colonial	(d)0.60	None	..
Delta	1.63	0.50	31
Eastern	2.19	0.25	11
Mid-Continent	0.85	0.50	59
National	0.56	None	..
Northeast	0.52	None	..
Northwest	(d)0.70	None	..
Pan American	0.90(E)	0.50	55
TWA	2.68	None	..
United	2.91	0.75	26
Western	1.50	None	..

Notes: (d)—Deficit; (E)—Estimated.

Air Dividend-Earning Ratio High

Disbursement per share, especially for aircraft, is generally above the national industrial average.

Dividend disbursements in the aviation group were in more liberal evidence during 1950. In fact, payments by aircraft companies tended to exceed the general corporate average.

A compilation by a statistical service shows that in 1950 all corporations paid about 42 percent of their earnings in the form of cash dividends. This compared with 45.9 percent in 1949. Ratios around 75 percent were viewed as normal in the past but have become less common in the postwar period.

Most aircraft disbursements last year exceeded the national corporate experience. Dividend payments, where made, range from a low 19 percent to 129 percent of reported earnings.

▶**Postwar Peak**—Aircraft dividends are believed to have hit a new postwar peak in 1950. The relationship of such disbursements to reported earnings is indicated in the accompanying table. Important qualifications are present in that current dividends are not always related to reported earnings for the same period.

The 129-percent distribution of 1950 reported earnings for Curtiss-Wright is merely a reflection of a dividend policy which is hardly influenced by current results but governed largely by the company's financial position and past implied commitments to stockholders.

Beech, which paid 82 percent of its 1950 reported earnings, has one of the most consistent records for liberal disbursements to stockholders in relation to available profits. During 1948, the company established a quarterly dividend equivalent to 25 cents a share on its present stock. This was maintained for two years when a decline in earnings dictated a slight reduction during the 1950 first quarter.

Grumman's 64-percent distribution of 1950 earnings reflects a consistent liberal cash dividend policy in effect for many years. Moreover, Grumman's timing of cash dividends during the year may contain an element of surprise (there is no fixed quarterly or semiannual date or amount), but considerable confidence is present that a generous disbursement will be forthcoming as long as earnings permit.

Bell has consistently maintained a $1.00 annual dividend rate going back as far as 1943. In 1950, disbursements reached a total of $1.75 per share, or 52 percent of reported earnings for that year. In 1942, however, the company paid $2.00 per share.

Also averaging around 50 percent of reported earnings, in distributing dividends last year, were such companies as Douglas, Lockheed, North American and United Aircraft.

The low 19-percent ratio shown by Thompson Products is the result of a statistical fluke created by a stock split and is likely to assume a more normal relationship this year.

Republic with its 21-percent distribution of reported earnings is also low. However, this company has a sporadic earnings record and a dividend policy to match.

Martin and Northrop were the only companies failing to pay any dividends last year. Martin was precluded from doing so by the terms of its bank loans and Northrop, while similarly affected, was also in the red.

In viewing aircraft earnings and dividends, it must be recognized that all current reported results must be regarded with a tentative note until all uncertainties have been resolved years later. These qualifications are present in the renegotiation processes and other factors previously indicated here (AVIATION WEEK Apr. 16).

▶**Airline Group**—The airline group has never been noted for its dividend income-producing qualities. Nevertheless, air carrier stockholders received a far more liberal cash return in 1950 than in any of the postwar years.

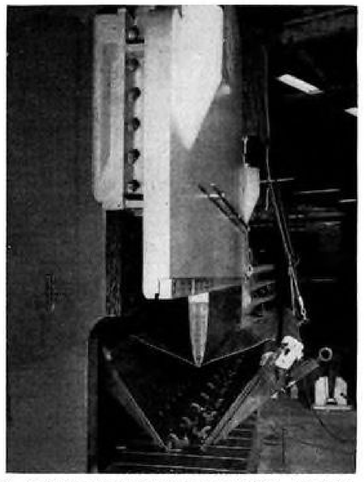
Of the 15 major airlines shown in the accompanying table, only eight paid dividends last year.

A common average experience ranged from 18 percent to 26 percent for the maior lines. Eastern, while only paying 25 cents per share during 1950, is now on a 50 cents annual basis which would have brought its average up to 22 percent.

Mid-Continent, with a 59-percent distribution out of 1950 reported earnings, leads the group. This carrier and other relatively high-dividend payers, such as Delta, Chicago & Southern, and Pan American, are all subsidized airlines.

With airline earnings in a strong upward trend, it is likely that the 1951 record of dividend disbursements will not only show more participants but larger payments. —Selig Altschul

F-89 SCORPION wing and tail leading edge skins are one place where stretch-brake attachment has sped work and saved money.



STRETCH JAWS grip skin before die descends to form skin in hydraulic press brake (left). Holding tool is Northrop 1007. At right, forming operation has begun. Holding tool here is 1006, with radius portion ahead of jaws to lessen tearing tendency.

Stretch Brake Cuts Forming Cost 90%

Northrop finds simple hydraulic press attachment speeds production runs of foil leading edge skins.

Northrop Aircraft, Inc. has developed a simple stretch-forming attachment for a 600-ton hydraulic press brake to ease production runs of wing and tail leading edge skins on the F-89 Scorpion.

Not only does the new procedure eliminate difficulties encountered with a prior method used for the experimental F-89, but estimates show that almost $63,000 can be saved on the parts for 100 planes.

Details of the stretch-forming technique are outlined in a Northrop tooling division report by George Larsen.

► **Difficulties Encountered**—When the XF-89 was built it was found that forming of the leading edge skins for the wings and tail was a very difficult job.

The material is tapered in thickness, and the nose of the airfoil was too sharp to form in the ST condition. Small tolerances aggravated the situation.

With SO material there was too much warpage in heat treating, and attempts with it ended in failure.

With material hot-formed in the ST condition, Northrop eventually got two plane sets of parts, but this required the services of shopmen with years of experience and who had to use extreme care.

► **New Setup**—After all these attempts, stretch-forming seemed the only promising way for fabricating the leading edge skins on a production basis. The production unit is a 600-ton stretch brake—so called because it consists of a standard hydraulic press brake of that tonnage, fitted with a stretch adapter.

For this setup, Northrop's tooling division devised two standard metal-holding tools and leading edge dies which can be made to tolerances of ±.005 without much difficulty.

Northrop designates the two metal-holding tools as 28-DS-1006 and 28-DS-1007. With these tools, the stretch brake will handle sheets 48 in. wide and 144 in. long.

► **What Equipment Will Do**—It can stretch 24S as-quenched or ice-boxed up to .125 in. thick for the full 144 in.; 126 in. of .156-in. material; 90 in. of .187; and 72. of .25.

75S as-quenched or ice-boxed in thicknesses up to .102 can be stretched for the full 144 in.; 136 in. of .125;

SKIN FORMED to leading edge contour is removed from hydraulic press brake.

119 in. of .156; 85 in. of .187; and 58 in. of .25.

The two tool setups are somewhat similar. Tool 1006 requires 6 in. on a side for grip, while the 1007 unit needs only 2 in. for its grip. Minimum gap between the two edges at the grip on 1006 is ½ in.; on the 1007 it is 11 in.

▶ **Tearing Factors**—Of the two arrangements, 1006 is preferred because it does its stretching over a radius ahead of the jaws, lessening the tendency to tear at the serrations.

With the 1007 tool, the stretch is directly against the jaw serrations, hence the tendency to tear is greater. But Northrop reports that this condition is common to all other stretch presses and not considered critical—merely requiring more care in setting up for the operation.

▶ **Placement**—Northrop's report states that when fabricating parts with either tool, the ends of the sheet should be burred to eliminate any scratches or nicks that might start a tear.

The part must be so placed in the jaws that at least one-half of the jaw segment at each corner is holding. When less than half the length of the jaw is holding it gets its grip approximately ¼ in. ahead of the other segments, stretching that portion of the part that much more than the rest, usually tearing it off. If possible, the jaws are arranged so that a full grip is had on all four corners.

On both tool units, the side plates of the jaw supports should be parallel to the side of the die at the point where the part takes off from the die. The jaws must also line up the long way of the setup, parallel where the part takes off from the die into the jaws.

▶ **Warpage Avoidance**—In every case, the parts are stretched in the as-quenched or ice-box condition and should be heat treated to eliminate as much warp as possible.

Warpage in the edge of the part prevents the jaws from closing evenly, causing uneven stretching and perhaps tearing.

Sheet normally is to be stretched from 5 to 6 percent. This means that a part 40 in. from jaw to jaw will get 1 to 1.20 in. stroke on the press after the skin is drawn tight to the punch. Because the stretch goes both ways from the center of the punch, the stroke is figured at 5 to 6 percent of half the width of the part.

▶ **Savings**—Northrop estimates that on the basis of $4 per manhour, the cost for 100 plane sets with the old fabrication procedure would come to $72,000.

With the new fabrication scheme, at $4 per manhour, cost for 100 plane sets is estimated at $1020, showing a manufacturing saving of $70,980. Subtracting from this the cost of the dies—$8000—brings final saving to $62,980.

It is believed that at least two other manufacturers of thin wing military planes are now preparing to install hydraulic press brakes with the stretch-forming attachment.

Northrop recently licensed Pacific Industrial Mfg. Co., Oakland, Calif., to build and market the attachment.

Prop Shipments Up

Shipments of propellers and parts during 1950 went up to $64.2 million an 11-percent gain over the previous year's $57.6 million. By far the greater part of 1950 deliveries, 82 percent, went to U. S. military customers. Civilian orders declined from $11.8 million in 1949 to $11 million last year—with units dropping from 11,343 to 10,413.

Propeller plant employment remained fairly steady last year until the last four months, with a peak of 9489 being reached in December. August was the low month, with 8168 being employed.

Boeing Names B-52 Project Engineers

Boeing Airplane Co. has just announced the appointment of Arthur G. Carlsen as chief project engineer for the B-52 heavy bomber program, although he has been working on the project more than four years.

Flight of the first plane under the new program is scheduled late this year but Boeing wouldn't talk until Secretary for Air Thomas K. Finletter announced Mar. 1 that the B-52 was being ordered into production. Carlsen had been chief project engineer for three other Boeing bombers, the B-17, B-29 and B-50, until he was delegated in 1946 to take charge of the preliminary engineering studies which led to the original design of the experimental XB-52.

Assisting Carlsen as project engineer for the first B-52 production bombers is A. I. Ostlund, while Frank Terdina is project engineer for the two experimental XB-52s. Ostlund has been at Boeing since 1931, serving as group engineer on the XB-15 and B-17B before becoming assistant project engineer and subsequently project engineer on the B-29 and later the B-50. Acting as group engineers on the B-52 staff are Martin Leionen, Howard Neff, Charles Loughney, Frank Korsberg, Perry Dodson, Donald Downey, Bruce Allyn, Robert Linforth, Harold Brown, Graham Phillips, Robert Lacalli, Al Bliler and Archie Fawver.

Terdina has most recently been on guided missile work at Boeing. Serving as group engineers under Terdina on the experimental XB-52 staff are Glen Reidasch, Earl Jensen, Dudley Nicholls, Walt Lund, Harold Brown, Richard Stith, John Mayer, W. H. Schlender, Robert Schuehle, Elliot Nichols, Charles Bosserman, Graham Phillips and Doug Graves.

PRODUCTION BRIEFING

▶ **American Extruded Products Co.,** Los Angeles, is gearing its facilities for increased production of vinyl resin compounding and extruding to meet heavy defense orders. The firm recently completed a 4.5-million-ft. tubing order for the USAF.

▶ **Lockheed Aircraft Service, Inc.,** has signed a contract with Aramco for maintenance of the latter's two DC-4s.

▶ **Cherry Rivet Co.,** Los Angeles, employes have voted for the fourth time in eight years against being unionized—this last vote being 157-74 against the United Auto Workers (CIO).

CARGO CONTAINER is towed under Constellation, hoisted by self-contained winch.

BIG ADVANTAGE of Speedpak: it can be loaded and unloaded without tying up the plane.

New Lift Given Connie Speedpaks

Higher allowable gross weight of plane permits carrying more cargo than can be contained in the fuselage.

Higher allowable gross weights on the Constellation and increased traffic factors have combined to bring about a renewed interest in Lockheed's Speedpak. The company's sales department says it hasn't a backlog as yet but admits a deluge of inquiries have been received.

►**Ends Cargo Backlogs**—Latest carrier to announce use of the Speedpak is TWA, which will employ the lifeboat-shaped auxiliary cargo carrier on its overseas routes between Shannon, Ireland and Bombay on a demand basis. The Speedpak will enable TWA to avoid backlogs of cargo during heavy-volume periods by packing up to four tons cargo. The Speedpak can be loaded well before flight time and locked into place on the plane in a minute. KLM also is understood to be using its Speedpaks because passenger loads are heavy and people are carrying more baggage.

The Speedpak didn't create much of a splash when it was developed in 1945, for Connies could lift no more payload than could be carried in the fuselage. Now the Connies' higher grosses let them carry more payload that can be accommodated in the fuselage, hence the renewed interest in Speedpak.

The Speedpak fits snugly against the underside of the fuselage, has self-contained winches to raise or lower it in about one minute. Cargo is fully protected from moisture by a rubber seal and from freezing by a special heating unit. Wheels make the Speedpak easy to move around.

General dimensions are: usable volume, 400 cu. ft.; length, 33′ 4″; width, 7′ 4″; usable depth 3′ 2″; approx. empty wt., 1800 lb. Because of its design, a fully loaded Speedpak has little effect upon the cruising speed of the Constellation. Cruising range is reduced about four percent. Speedpak will carry 100 suitcases or equivalent volume of cargo.

Lockheed estimates Speedpak increases direct flying costs about 5 percent because of added maintenance, insurance, fuel, plus slight cut in range and possibly speed. This increase can offset by an extra cargo of from 200 to 400 lb., says Lockheed, whereas all costs plus the original cost can be recovered by carrying a payload of 400 to 800 or more lb.

Airlines which have Speedpaks are Eastern Air Lines, Chicago and Southern, KLM, TWA, Quantas, and Air France.

Report on Airline Turbosuperchargers

Turbosuperchargers, long used by the military as a tool to enable engines to operate at high altitudes, have passed their first commercial million-hour birthday with flying colors, according to General Electric engineers.

After two years of supercharging the air for P&W R-4360 engines in Boeing Stratocruisers on more than 7000 flights, the commercial units reached the million-hour mark. Overhaul period, initially pegged at 279 hr. two years ago, has reached 800 hr. on at least one airline and is currently being service-tested for 900 hr., A. W. White of GE recently told a meeting of the Society of Automotive Engineers.

Early installation difficulties have been largely overcome with flexibility features to compensate for extreme temperatures which are encountered in the unit.

The BH4, 220-lb. commercial turbosupercharger is about one half the size and weight of its military counterpart which has to maintain full military power to much higher altitudes.

New Abrasive Wheel Faster, Lasts Longer

The Carborundum Co. has developed a new type of contact wheel for abrasive belts which promises to speed up and at the same time reduce cost of thousands of belt grinding operations carried out in airframe, engine and propeller factories.

Production tests, says the company, have shown use of wheel in some applications brings about fivefold increases in the work life of standard abrasive belts and enables them to grind off four times as much metal before they are discarded as is possible with wheels now commonly used.

Carborundum engineers explain the main factor responsible for this improved performance is the relief angle design of the lands or ridges cut out of the serrated rubber contact surface around the outer circumference of the wheel. This is the first contact wheel for abrasive belts, they say, based

largely on the design of milling cutters. The wide-spaced, narrow lands, in effect, provide chip clearance and impart a flexing action to belt as it moves over the wheel, preventing metal particles from "loading up" and glazing the belt so it no longer grinds effectively. This same action also tends to shake off worn abrasive, permitting sharp, new abrasive particles underneath to be exposed to the metal.

The wheel also purposely accelerates belt "creep." This insures the entire surface of the belt will be utilized. The company's engineers point out that without creep, certain sections of the moving belt will always lie on the lands or ridges, the areas of greatest work, when they reach the contact wheel, while following sections will more or less "escape" work by always resting over the valleys between the ridges.

Besides giving belts a longer life and permitting them to grind off more metal before replacement, the new wheel, according to the company, offers these additional advantages:

- **Reduces production down time** in grinding operations. It cuts inventory costs since less replacement belts are needed.
- **Belts cut cooler,** permitting dry grinding in many operations ordinarily requiring wet grinding.
- **More uniform finish** of parts is obtained, with fewer parts rejects. Wheels take heavy part of work load, reducing operator fatigue.

New Safety Harness For Airborne Troops

A web of safety has been woven for airborne troops by the Air Materiel Command.

It is a "side saddle" safety harness (shown above) designed to give much improved crash protection to paratroopers and combat infantrymen. The harness is scheduled to become standard equipment on Air Force cargo planes, transports and assault gliders.

The new harness replaces lap belts, known to give poor crash protection to occupants seated side-by-side along the fuselage.

Stressed for an impact force of 32Gs, the harness is secured by four snap-on fittings to D-rings in the floor and wall. The harness consists of tough, nylon mesh webbing and straps. It will fit over a paratrooper carrying a 150-lb. combat pack. It secures him around the middle, legs and shoulders against forward movement.

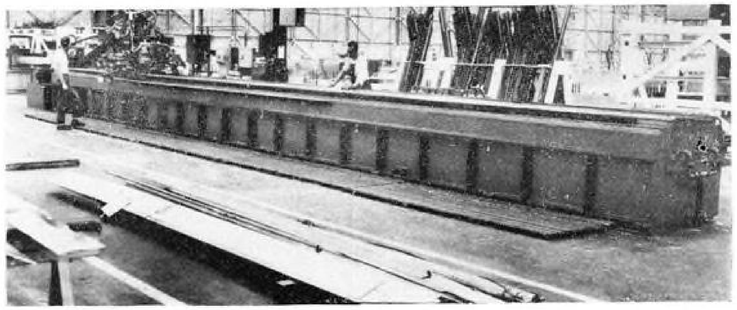
Proved out in tests on the human decelerator at Edwards AFB, Muroc, Calif., the harness weighs only one lb. Development was carried out by AMC's Aero Medical Laboratory.

Quick-Reverse Motor

A quick-reversing aircraft motor embodying an ac. 400-cycle magnetic brake connected in series with the motor field has been placed on the aviation equipment counter by Pachmayr Gun Works.

At power cutoff, the brake is capable of stopping the motor in 25 turns from a full load speed of 11,500 rpm., says the maker. Built to meet Air Force Specification 32590, the 115v., ac., 400c., single-phase motor is an induction type with a start and run capacitor. It is designed for operation in an ambient temperature of 250F. and has a rated output at full load of 1/7 hp Address: 1220 S. Grand Ave., Los Angeles 15.

NEW AVIATION PRODUCTS



Big Miller Gives Close Tolerances

The Farnham Utility Mill, as long as some of the bombers it could help build, is designed to go a long way toward meeting certain production needs in the aircraft industry.

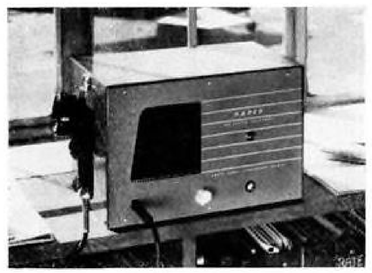
This machine's job is to provide in a highly efficient manner close-tolerance machining of extrusions, sections and billets of aluminum or other non-ferrous metals. According to the maker, Farnham Mfg. division of the Wiesner-Rapp Co., Inc., the precision miller can be tooled simply and at low cost and is adaptable to many types of cuts. The company says it's particularly suitable for:

- **Production of stringers,** longerons, empennage and control surface members.
- **Machining complete wing** spar caps for experimental purposes or prototype airplanes.
- **Profile cuts** on any long parts.
- **Machining of any rail,** angle, frame or other long member of non-ferrous metal.
- **Economical production** of many parts normally machined on standard tools.

Maximum speed in removing metal is provided with two heavy-duty, 15-hp. spindles and carriage feed speeds of 24 to 190 in./min. The spindles are arranged for horizontal hydraulic template control and also are furnished with "time-tested, production-proved" Farnham template control for vertical motion. Both heads may be template actuated vertically and horizontally from four templates at the same time. Each spindle also has manual adjustment for horizontal and vertical movement and a 15-deg. swivel adjustment each side of vertical center.

Specifications: Bed length—60 ft. (longer or shorter if desired); max. work length—55 ft.; work space—max. width, 24 in., max. height, 17 in., width of machine, 80 in.; spindle rpm.—10,800; spindle nose—Browne & Sharpe taper; with coolant tank and chip conveyor.

Farnham emphasizes the machine is the "result of years of experience . . . in . . . production of aircraft machinery by the originators and largest manufacturers of spar cap milling machines." Address: 1600 Seneca St., Buffalo 10, N. Y.



Ground VHF Set

A crystal-controlled, ground VHF communication set priced to put minimum strain on pocketbooks of small fixed-base operators has been developed by the National Aeronautical Corp.

All that is needed to set up the compact two-way radio telephone for airport, feeder airline and similar operations, says NARCO, is to plug it into the nearest electrical outlet supplying standard house current, 115v. ac., 50-60c.

Unit is operated by turning on the on-off power switch and then adjusting the audio volume control. A modulation and pilot lamp indicates set is operating. Both transmitter and receiver are crystal-controlled, usually 122.8mc., to insure exact frequency alignment. Frequencies are limited to a two-megacycle spreads. Two channels for receiver and transmitter can be supplied in the 100-150 mc. band.

The set, contains 11 tubes and rectifier, has a standard microphone jack and loudspeaker, output is three watts and sensitivity is better than one microvolt, according to Narco. A sensitivity adjustment is provided for areas having high noise levels. Antenna is a combination type providing omni-directional horizontal transmission and omni-directional vertical reception for communication with aircraft equipped with standard antennas. The unit consumes 90 watts and measures 12 x 7½ x 8 in. Address: Wings Field, Ambler, Pa.

Tough Nuts

A sheet metal lock nut, reportedly 70 percent lighter in weight than conventional lock nuts, has been developed by Prestole Corp.

This one-piece part is "the only sheet metal unt with a double lock," according to the company. Recent tests at Wright Field, asserts the firm, showed the part has the "highest installation torque, highest prevailing torque and highest backoff torque." It is supposed to have a tensile strength twice that of ordinary spring nuts and, according to Prestole, more than meets requirements of Specification MIL-N-3337.

The nut is made of SAE-1060 steel in thicknesses of .016 and .020 in. It is available for machine screws in these sizes: 6-32, 8-32, 10-32, 10-24 and ¼-20. Address: 1345 Miami St., Toledo.

ALSO ON THE MARKET

Drills can be sharpened by inexperienced operator with device which attaches to standard tool grinders. It helps him correctly grind ⅛- to ⅝-in.-dia. drills (two to four lips) to desired lip and clearance angle. Made by Power Tool division, Rockwell Mfg. Co., Milwaukee 1.

"Scotch" brand carton sealing tape, meeting government specifications for both V3 and W cartons, can be used over labels (it's transparent) to keep them clear and readable despite scuffing and smudging. Designed to withstand shocks, water, rough handling and all types of weather, it can also be used to seal carton seams and interliners. Made by Minnesota Mining and Mfg. Co., 900 Fauquier St., St. Paul 6.

"Mighty Mouse" all-purpose, pint-sized bulldozer is 900-lb. machine that can be used for many chores around the airport such as earth moving, weed control, snow removal, materials handling. It will carry 500-lb. load, has drawbar pull of 1000 lb. and can be truck-hauled to work site in special "Tote Wagon." Made by Mead Specialties Co., 4114 N. Knox Ave., Chicago 41.

SALES & SERVICE

Air Taxi Faces Numerous Hurdles

Expansion of the existing network and education of public are the primary problems facing the operators.

By Erwin J. Bulban

Full blown air taxi service in conjunction with the scheduled airlines is still "down the road apiece" rather than "just around the corner". This appears to be the situation in light of the numerous problems brought up during the recent Washington meeting of the Air Taxi Conference of America, governing body of the nation's organized air taxi operators.

Two major factors needed to spur air taxi development:

- **Increased membership** of scheduled airlines and air taxi operators to provide a more comprehensive and cohesive air network than is now available. At present approximately 20 scheduled airlines are parties to the interline agreement promulgated by the regular carriers and the taxi operators, and about 35 member taxi services. Some 20 operators have applications pending to become members of ATCA.
- **Much more promotion** to educate the flying public and the airlines ticket agents of the availability of air taxi service. Although the airline agreement, signed Feb. 10, approved issuance of "exchange orders," which in effect ticket the client through to his destination utilizing air taxis, very few of these exchange orders have been dispensed.

▶ **Rate Problem**—The air taxi operators also have other matters under scrutiny.

The possibility of more or less standardizing their equipment is being studied—favored are the four-place Beech Bonanza and Ryan Navion. But the airlines have balked at such a proposal on the grounds that it precludes picking up or landing passengers at very small airfields or in the vicinity of resorts having limited space for aircraft operation. So the operators may settle this question by setting up three classes of aircraft:

- Class 1—Such planes as the Bonanza or Navion.
- Class 2—Piper Clipper, Cessna 190, etc.
- Class 3—Cessna 140, Piper Super Cub, etc.

Such a solution would also broaden the service offered because passengers could, within reason, choose the class of plane suited to their pocketbooks.

This classification setup is part and parcel of another factor under consideration—development of standard mileage rates throughout the country. At present these rates are set differently by each operator, even using the same basic equipment. Rates for the Bonanza, for instance, range anywhere from 10 cents to 26 cents per aircraft mile.

Proposed is a standard zone rate. New second vice president of ATCA, W. R. Laudenslager, plans to introduce for consideration a plastic map overlay (scaled to a standard airways map) marked off in 25-mi. zones. This overlay could be mass-produced and distributed to each operator and airline ticket counter, and using it, the passenger could be quickly quoted rates to any destination on a standard rate basis. For example Zone 1, 25 mi., would cost $10; Zone 2, 50 mi., would be $15; and so forth up to Zone 6, 150 mi., which would be $45.

The air taxi operators would also like to have the airline trip insurance plan extended to cover their portion of the flight, and would also welcome getting on the airlines' travel credit card system.

▶ **CAB Regulation**—Official government recognition of this new phase in the U.S. air transport network is already underway. CAB is working out a new Part 298 which would amend Parts 242-291 of the Economic Regulations and would permit scheduled air taxi service supplementing the airlines. The new regulation would limit air taxi equipment to planes of less than 12,500-lb. maximum certificated takeoff weight. Seating will probably be kept down to eight passengers.

Air Taxi Conference of America is a division of National Aviation Trades Assn., and was activated Feb. 6, 1950, when it held its first formal meeting in Washington, D. C., and elected Joseph Garside as its first president.

The body is set up on lines somewhat similar to the Air Transport Assn., and requires members to conform to specific financial responsibility, insured liability, and ethical standards.

▶ **New Officers**—At the last meeting, Mar. 30 of this year, new officers were elected: President, Robert S. Northington (formerly first vice president), vice president of Piedmont Aviation, Inc., Winston-Salem, N. C.; first vice president Samuel Freeman, president of Somerset Aircraft Service, Inc., N. J.; and W. R. Laudenslager, of Red Bank Airport, Inc., N. J., second vice president.

Oregon Awards Spray Contracts

Contracts have been awarded by the Oregon State Forestry Department for the aerial spraying of 636,000 acres of forest land infested with spruce budworm. Seven separate areas are covered in the project.

Five flying concerns will do the spraying at prices ranging from 23.7 cents to 41 cents per acre: Ace Flying Service, Salem, Ore.; A-Z Dust and Spray Corp., Pendleton, Ore.; Roberts Aircraft Co., Reno, Nev.; Pacific Aerial Contractors, Yakima, Wash.; and Oregon Agricultural Aero Sprayers.

Because of the large number of crashes in last year's spraying, safety is being emphasized in this year's project. A representative of the CAA has visited all fields and inspected all craft to be used. During the actual operations a CAA official will be on each field to check planes at all times. Chief pilots are provided, and pilots inexperienced in spraying operations are required to go through training.

BRIEFING FOR DEALERS AND DISTRIBUTORS

► **Free Bonanza Checkup**—For the third consecutive year, Beech Aircraft service-inspection teams will conduct nation-wide program of free inspections on Bonanzas. The tour, to run until November, will cover 35 Beech distributors. Plane owners are invited to bring their Bonanzas to the distributor for a courtesy checkup while the team is visiting the locality. The tour includes a service clinic for the distributors.

► **School Starts Night Shift**—Dallas Aviation School will inaugurate full-scale aviation training night classes soon running seven-hours, five nights weekly, to help take care of the need for skilled workers in the Dallas-Ft. Worth area. The school's day classes are at present handling over 300 students. By May 14 there are expected to be more than 500 students enrolled.

► **Heavy Coverage**—Almost 3 million acres of the Pacific Northwest were chemically treated by planes last year. The job took 481 aircraft, 19 million lb. of dust, 1.5 million lb. of grasshopper bait and 1.6 million gal. of liquid, according to R. D. Bedinger, regional CAA chief. Oregon had 1,384,577 acres treated during a spruce-budworm program, Washington 757,049 acres, Montana 681,257 and Idaho 132,045 acres. Aircraft also put in 30,422 hr. flying on other industrial and agricultural jobs.

Mail Pay: An Air Freight View

Slick Airways head, favoring separation, tells how subsidy issue poses problem to non-mail carriers.

Separation of air mail pay from subsidy, which began as a hotly contested issue between the "haves"—the scheduled passenger carriers—and the scheduled and nonscheduled freight and passenger airline "have nots," is still being studied in Congress, with no solution of the problem in sight.

At least one strong proponent of mail-subsidy pay separation, Earl Slick, chairman of Slick Airways, can't understand why.

"Some day," he told AVIATION WEEK in an interview, "I hope to find out what is wrong with basing mail rates on property costs, and in the process I also hope to find out how carriers, such as American Airlines, can continue to compete with Slick Airways for freight at 16, 15, and 14 cents a ton-mile when 'property costs' for them run in the neighborhood of 38 cents.

"Mail pay has posed one of the perennial problems in aviation," he said. "Recently efforts by some congressmen and senators to enact legislation requiring the separation of subsidy from mail pay have attracted considerable interest, not only in the industry, but on the part of the public as a whole.

"As a non-mail carrier, exclusively in the air freight business, Slick Airways has never received any direct subsidy; nevertheless our interest in the subsidy problem has been great because we have always been competing with subsidized carriers whose freight rates have been considerably below their cost of handling the goods.

"Therefore," he went on, "it is only natural that we have some views on the subsidy problem." He added that since at times these views have been mis-stated or misinterpreted, he welcomed the opportunity to "set our record straight."

▶**A Premium on Efficiency**—"First of all," Slick noted, "while survival has been a near thing with us on several occasions, I cannot help but feel that our ability to withstand what we have been through in the early days of air freight has been considerably strengthened, and that our prospects are considerably brighter because we have never received any of this subsidy. Our airline, aided by the tremendous volume that everyone has experienced in the last half of 1950, is actually operating at a ton-mile cost of less than 13 cents. I think we are able to do this primarily because we had to get our costs below existing freight rates if we were going to stay in business.

SLICK: I'm glad we haven't been subsidized.

"Thus, I am glad we have not been subsidized," Slick continued, "and that we are not subsidized now. We plan to continue to look for our livelihood to the profits that can be made by keeping air freight costs below rates. We have been criticized for supporting a separation bill in Congress which included a provision authorizing CAB to pay a subsidy to non-mail carriers. This provision certainly has logical appeal, since there seems to be little reason to limit subsidy to mail carriers once subsidy and mail pay are separated. Nevertheless, for reasons stated above, we have not sought and do not now seek Congress to authorize a subsidy for Slick Airways."

▶**Aid That is "Necessary"**—Regarding criticism that had been leveled at Slick because it applied for an RFC loan, Earl Slick replied that, "recently, former CAB Member Harold Jones, in the Puerto Rico service case, predicated his dissent, in part at least, against the award of operating rights to Riddle Aviation Co., Miami, on the ground that Riddle would undoubtedly 'seek subsidy and/or an RFC loan' and proved this assertion by referring to our application.

"We never obtained an RFC loan because CAB never got around to ruling on whether they thought we could repay it." (Slick explained that in the interim, the all-freight carrier's earning made a loan unnecessary.) "In any event," he continued, "there is a major difference between an outright gift of funds, i.e., subsidy, and a loan which you repay in full, plus four percent interest. The first we do not want. The second we may need just as any other business may."

Furthermore, Slick said that he did not mean to imply that he was against subsidy as such, or that he would advocate cutting off subsidy from the feeder lines and some regional carriers facing problems in route development.

"If the government wants an air transport system to grow under forced draft, then certainly subsidy is one way to accomplish this. This method can immediately provide service in excess of that which the traveling public is prepared to pay for at the time, and the rendering of the service sooner or later will attract the customers if there is a market."

▶**"Hidden Subsidy" Hit**—"I do object to payment of a hidden subsidy and to this payment to carriers who are, by all standards, self-sufficient as a result of the manner in which their passenger business has developed."

Slick said he could not believe that anyone in Congress or in CAB would "willingly authorize payment of a subsidy to American Airlines in a year when AA made operating profits of over $20 million (before taxes, interest and depreciation), according to CAB. If government funds are being spent unnecessarily and solely because of the method of mail payment, it should be clear to all that then something should be done about it in a hurry." Speaking as a taxpayer, Slick said, "I firmly believe that subsidy should be separated from mail pay and that the subsidy paid to airlines should be so named, so paid and so justified. From my own experience with Slick Airways, I am sure that such a move would benefit the airlines.

"The separation problem in Congress is designed to achieve this end," explained Slick. "The interesting thing about the separation fight is that no one who opposes it has yet discovered an argument against it based on principle. No one can seriously contend that the present system of lumping subsidy and mail pay is justifiable or desirable on the basis of any public interest consideration. Many of the interested parties have avowedly gone along with the separation idea in principle, but the real fight against it has been waged by means of delay, confusion and obstruction."

Slick said that if the subsidy is to be

separated from mail pay, the first step is to select a mail pay rate, for the carriers involved, that does not include subsidy. The question to be decided, he said, is, "What should these carriers be paid for rendering this service, not how much government money they need in order to enjoy satisfactory profits after taxes."

The rate selected in an ordinary case involving a service or commodity sold to the Government is based on the market rate. But Slick says "there is no market rate in this case because the only customer is Uncle Sam." Lacking a market rate, Slick stated, the obvious and fair way to set a charge would be to "ascertain the cost of rendering the service and add a fair profit to the cost.

"Here, of course, is where the passenger airlines see to it that the trouble begins. For reasons not readily apparent to people engaged in other businesses or to accountants, economists or statisticians, airline costs are vague, filmy, metaphysical and indeterminate things. Of course the fact that mail pay was to be the vehicle of subsidy has had a lot to do with airline managements' point of view with respect to costs, because for years the amount of subsidy actually paid has been kept in doubt by the creation, fostering and preservation of the dogma that cost allocations for airlines are impossible."

▶**A Basis for Payment**—Slick looks upon the problem as quite a simple one in reality.

"A large transcontinental passenger airline, such as American Airlines," he says, "is really engaged in two types of businesses: carriage of passengers and somewhat incidentally, of property. A simple analysis of American's operating figures for the third quarter of 1950, involving the ascertainment of the purely passenger costs, and allocation of remaining costs on a revenue ton-mile basis between passengers and property shows that it costs AA about 52 cents a ton-mile to carry passengers and about 38 cents a ton-mile to haul property." He described property in three classes: freight, express and mail.

"Of course, freight", he went on, "is burdened with sales costs, billing costs, bad account expense, and loss on pickup and delivery." In connection with mail or express (which Railway Express tenders for shipment), Slick noted also that AA incurs no sales, pickup or delivery expense, no billing or bad account cost, and little if any handling expense. He said that these items cost his carrier approximately 15 percent of its total freight handling expense.

"Does it not seem apparent," Slick asks, "that if American were told that its mail pay is to be based on the 38-cents cost of carrying property, plus a profit for rending the service, that American would be getting a pretty fair break from the Government? And further, is it not clear that the 60 cents that AA gets for carrying the mail includes a fair amount of subsidy no matter how you slice it?

"The argument is always made that there is a certain priority cost in carrying the mail," the all-freight carrier's president said, "but none of the transcontinental airlines have ever yet come forward with a single instance of a station served or a schedule put on or maintained under orders from the Post Office Department.

"Possibly I have oversimplified the problem, but this is a field where some simplification is badly needed."

(Note: Because of Mr. Slick's statements regarding American Airlines, AVIATION WEEK *sent a copy of this interview to AA in advance of publication, offering AA an opportunity to reply.)*

Out of the Red, But in Trouble

Top brass of prospering Philippine Air Lines resigns alleging board directors' interference in operations.

A bitter controversy over alleged "interference in the functions of management" by several of the government's representatives on Philippines Air Lines' board of directors has resulted in the resignation of Col. Andres Soriano PAL's president and one of its founders. Resigning with him were four top executives: A. M. McCleod, first vice president; E. T. (Ed) Bolton, vice president-director and vice president in charge of operations; Col. Charles B. L. Anderson, vice president-traffic-and-sales, and Rafael Ygoa, treasurer-comptroller.

In sympathy with private management, the carrier's ground and flight personnel threatened "irrevocable mass resignation" unless Soriano is retained and present management upheld, and also demand that the three government representatives they hold responsible for the split be ousted from their posts.

Col. Soriano announced that he and the other principal officers who handed in their resignations, would continue to assist Philippine Air Lines in an unofficial capacity until May 31 so as not to disrupt operations while new management took over. President of the Philippine Republic Elpidio Quirino has refused to accept Col. Soriano's resignation.

▶**Inspection Trip Opposed**—The climax came when a government director presented a motion that Sergio Osmena, Jr., another government representative on the board, be authorized to inspect the airline's offices abroad. Soriano vigorously opposed the motion because he felt Osmena was "unqualified to undertake such a mission." Soriano also attacked Osmena's trip on the ground that it would hurt employe morale, considering that Osmena on Mar. 20 had demanded the immediate dismissal of a Philippine Air Lines' executive without a hearing, while the man was abroad. Soriano was backed up on his stand by Bolton.

Since the dispute began, Osmena left on his "inspection trip," but according to an airline official, has not visited any of the carrier's offices.

If the government should offer to step out of the airline, it is strongly believed that Soriano would head up a syndicate to take over control. He has a 28-percent interest now.

The upheaval came at a time when Philippine Air Lines was enjoying unprecedented success, showing a net profit for the first quarter of this year of $153,934.50 compared with a loss for the same period the previous year. The 1950 net was $354,739 on a gross of $13,865,969 compared with a loss in 1949 of $1,422,385. The carrier ranks ninth in the world in unduplicated route miles with 24,045.

Last year a bright 70.2-percent load factor was registered for PAL's overall international routes, and 65.4-percent for its inter-island operations.

The 70.2 was on four DC-6s and one C-54, flying San Francisco-Manila, Manila-London, Manila-Hong Kong and Manila-Tokyo. Inter-island, C-47s served 41 towns while flying 3,486,822 scheduled mi.

PAL's start actually came in 1932 when Soriano and other Philippine businessmen formed the Philippine Aerial Taxi Co., chiefly to transport its owners on inter-island business trips.

During 1940 the venture fizzled and a shuffle started that resulted in 1941 in a new firm bearing the present name. After a successful one-route beginning, operations began to fan out through the islands. They were halted when the Japanese attacked Pearl Harbor in 1941.

▶**Inter-Island Phase**—In March 1945 the inter-island phase was vigorously re-activated with C-47s purchased from the U. S. Army Liquidation Commission.

Then, in the summer of 1946, the Pacific Coast shipping was tied tight with a strike, and the stage set for PAL's international move. Two C-54s were chartered from Transocean Air Lines and the San Francisco-Manila segment was started. Following the chartering of more C-54s and the purchase of some, Hong Kong and Shanghai flights were added. In May 1947 the big step was made—Manila to London.

In April 1947 the first of PAL's DC-6s left San Francisco. Soriano is happy with his experience with the DC-6. At the start he brought three Douglas men to Manila and for this reason he thinks PAL has had less trouble than other DC-6 owners.

The latest extension of PAL service is twice-a-week to Tokyo from Manila, but the hottest gleam in Soriano's eyes had been for a San Francisco-Honolulu-Tokyo route. State Dept. turned down a Philippine Air Mission request for this last year. But PAL is trying again. Besides hoping to share the present lucrative trade with PAA and Northwest, PAL thinks the post-peace treaty tourist trade with Japan will provide passengers for all.

Soriano isn't one to miss spinning a phrase. When taking a stand on PAL's request, he said PAL should be granted the route "in recognition of the principle of reciprocity in relation to rights granted to U. S. competitive carriers, and equality of opportunity under the Fifth Freedom."

▶**Government Backing**—The P. I. government owns 52 percent of PAL, and Soriano a majority of the balance. TWA originally held 12 percent, but subsequent watering has dropped its interest to 4.5 percent.

Out of more than 2000 employes, only 149 are Americans. International flight crews are Americans, with Philippine personnel gradually taking over the flying jobs in the inter-island service.

B-rain Storm

PAL's inter-island operation is probably the only one in the world whose schedules were determined by chance. During Bolton's early PAL days he was looking dourly at a chart showing a losing inter-island passenger proposition. The ups and downs of the chart lines caused considerable head scratching.

Suddenly, on the wall, Bolton's eye caught a rainfall chart for the various population areas. Placing the two side by side he saw that the fluctuations were exactly the same. Now the year's scheduling is done largely by seasonal rain calculations.

An affiliate of ALPA represents the fleet captains.

► **Maintenance Plans**—Right now all two-engine craft maintenance is done in the company shops in Manila, with DC-6s getting what PAL calls "three point progressive maintenance." The points are KLM shops in Amsterdam, United's San Francisco base, and Manila. Work is assigned to the end points by work sheets sent in advance to take advantage of turnaround layovers. When completed, the work sheets are signed and returned to the master files on the aircraft to Manila. In the last six months the utilization figure on the DC-6s was 8 hr. 3 min. Complete progressive maintenance checks are made during 100 hours of flying time without upsetting schedules. R-2800 engine overhauls are now done by United, but Manila shops are being equipped to handle these and other major operations.

Aircraft Rule Changes Set on Small Planes

The CAA Office of Aviation Safety proposals to rewrite Part 3 of the CAB Aircraft Airworthiness Regulations for Small Planes are mainly as follows:

- **Make it easier** to shift your plane from one use category to another. Main purpose is to simplify switching a purely personal plane into one suitable for aerobatic training.
- **Cut the number** of design flight conditions. The present Part 3 regulation has 12 conditions that a company must investigate mathematically and exhaustively before building a plane. The list may now be cut to six.
- **Limit the scope** of Part 3 to the design of personal type planes. Part 3 now covers territory from a Piper Cub to a Curtiss Commando.
- **Cut out obsolete** requirements from the regulation. One of these would be instructions in existence on wire-braced biplanes.
- **Cut out non-safety** requirements. Example: upholstery installation.
- **Simplify ground-loading** criteria; this also involves mathematical computations ad infinitum.

Sharp Traffic Gain Over North Atlantic

Passenger travel across the North Atlantic gained 17 percent in 1950 over 1949. Scheduled airlines hauled 312,000 passengers, compared with 266,000 the year before.

Reasons for the traffic gain, according to International Air Transport Assn. Director General W. P. Hildred are:

- Low off-season fares. IATA traffic conferences agreed on these in 1949, put them into effect 1950.
- **Holy Year in Rome.**
- **Promotion**, both abroad and in the U. S.
- **Increased utilization** of aircraft.
- **Better planes.**
- **Frequent schedules.**

IATA member airlines serving the North Atlantic route are: Air France, British Overseas Airways, Italian Airlines (LAI), KLM Royal Dutch Airlines, Pan American World Airways, Sabena Belgian Airlines, Scandinavian Airlines System, Swissair, Trans-Canada Air Lines, and Trans World Airlines.

Findings Issued in Regina C-46F Crash

Overloading, improper loading and dispatch, and inadequate maintenance caused the crash of a Regina Cargo Airlines C-46F May 27, 1950. A half-mile after takeoff at Teterboro, N. J., says the CAB accident investigation report.

The only persons in the cargo plane were captain and co-pilot. The captain was killed; plane was demolished.

Findings of the Board:

The C-46 was overloaded by 5000 lb. gross to 50,000 lb. The plane had been flown in excess of its 80-hour inspection period. Both engines were inadequately maintained. Ignition systems of both engines were defective.

The left engine malfunctioned and its propeller was feathered shortly after takeoff at 130-135 mph. airspeed. The plane settled into the ground in a near-stalled condition after starting a left turn, in which speed dropped to 85-90 mph.

BEA Starts Copter Service on June 1

British European Airways takes the first step June 1 in a plan to link British cities with helicopter service. On that date BEA starts shuttle service from London's two chief airports to Birmingham.

The 1951 schedule calls for three roundtrips a day from Northolt and Heathrow to Birmingham, June-August; two daily in September, and one a day in winter. Copter flying time, terminal to terminal, is one hour ten minutes. Rail time, London-Birmingham, is 2¼ hours.

The experimental service will start with single-engined, 3-passenger Sikorsky S-51s. Within two years BEA plans to operate 12-14-passenger twin-engined Bristol 173s (see p. 21).

BEA plans commercial helicopter service between Britain's ten largest cities. Average distance between cities

is 85 miles. The longest practical link, Manchester-Glasgow, is 183 miles. Average distance between the strongest routes planned is 67 miles.

Nonsked Groups Set For Military Traffic

The two CAB-authorized nonsked airline associations have agreed to share military traffic as follows:

• **Air Force and Marine bases.** Independent Military Air Transport Assn. (IMATA) will be on hand at Air Force and Marine bases. It will represent members seeking military business including common carriage and contract.

• **Army and Navy bases.** Air Coach Transport Assn. (ACTA) will represent its members at the Army and Navy bases.

The two nonsked associations are setting up a joint central office at Washington to handle Military Traffic Service and CAB matters.

Nonskeds who have so far authorized the associations to seek business for them at the military bases are:

• **IMATA:** Overseas National, Trans-Ocean, Flying Tigers, Aaxico, Trans-Caribbean, U.S. Overseas Airlines. Seaboard & Western is negotiating. California Eastern is represented, but it no longer has CAB exemption as a common carrier. So IMATA cannot represent Seaboard for common carriage, but CAB may ultimately permit the associations to represent contract carriers seeking contract business.

• **ACTA:** Aero Finance, Air Finance, Air Transport Associates, American Air Transport, Argonaut, Arrow Airways, Aviation Corp. of Seattle, Blatz Airlines, Continental Charters, Freight Air, Great Lakes, Los Angeles Air Service, Miami Airlines, Modern Air Transport, Monarch Air Service, U.S. Overseas Tradeways, Twentieth Century, Peninsular Air Transport, Standard Air Cargo, Trans-American, Viking, World Airways, Connor Airlines, Central Air Coach, Southern Air Transport, Continental American Airways, Arctic Pacific.

ACTA is a nine-month-old operating association of nonskeds; it has already received a Military Traffic Service tender to bid on military carriage contracts. Its members did about $40-million gross business last year.

IMATA represents a group of independents and is a new association designed only to seek military business.

Intrastate Coach Raise Approved

The California State Public Utilities Commission reluctantly granted air coach fare increases to three operators on the lucrative Los Angeles-San Francisco run, effective May 9, but it scolded the airlines severely for hiking their fares without PUC approval.

The airlines involved—California Central, United, and Western—raised their rates from $9.95 to $11.70 on Mar. 1, asserting their intrastate fares were no concern of the PUC but only of the federal Civil Aeronautics Board. California PUC decided otherwise, and emphasized in its decision that it has jurisdiction over air travel wholly within the state. To further punctuate the point, it ordered the airlines to reimburse passengers "wherever possible" for money already paid for air coach transportation on the L.A.–S.F. run in excess of the $9.95 fare on file with the commission.

2-0-2 Crash Traced To Prop Reversal

Probable cause of the Northwest Airlines check-flight crash of a Martin 2-0-2 Oct. 13, 1950 at Almolund, Minn., was "unwanted reversal of the right propeller during flight," says the CAB accident investigation report.

Following propeller reversal, it is believed the crew was unable to maintain control. The crash was fatal to all six persons aboard.

Findings of the CAB are:

The fuel feed valve of the right engine malfunctioned when tested after the crash. The right prop was in 7-10-degree reverse thrust. A review of the evidence of a similar occurrence indicated the plane would assume dangerous flight characteristics with one prop reversed in flight. The fact that the wing flaps were retracted may have contributed to the uncontrollability of the plane under 140 mph.

What caused the unwanted prop reversal is unknown. There are several possibilities: Combinations of malfunctions in the electrical circuit or pilot confusion, one pilot pushing the feather control to unfeather while another actuated the circuit breaker override switch. The cause of the one previous unwanted propeller reversal on a 2-0-2 was diagnosed as an intermittent electrical short in the junction box at station 225 in the nose-wheel well.

Rentzel Cites Policy of CAB on Nonskeds

Speaking before the Senate select Small Business Committee, former CAB Chairman Delos Rentzel has re-emphasized the policy of CAB on nonsked airlines—in rebuttal to nonsked charges of CAB unfairness.

Main point of CAB Economic Regulation 291 limiting the large irregular carriers to irregular service is that the certificated airlines would require more subsidy if nonskeds skimmed the cream off their best routes, Rentzel asserts.

Rebutting specific nonsked arguments, Rentzel says:

• **Operating cost.** Nonskeds can charge lower fares only because they have war surplus equipment leased as low as $300 a month, and they have no responsibilities such as serving money-losing towns along the routes. Given free rein, the certificated carriers could undoubtedly meet the nonsked fares, but free competition is not what the Civil Aeronautics Act calls for. CAB's mission is to foster orderly growth of the air transport system for the overall national welfare. The "large irregular" carriers are supposed only to provide irregular or spasmodic type service. "Some 13 large irregulars have been given clean bills of health by the Board to operate those services."

▶ **ACTA Proposal**—Air Coach Transport Assn. proposed a substitute for CAB's "death edict" limiting irregulars to three trips monthly between any two points. ACTA asks for twelve roundtrip flights originating from, terminating at, or passing through a carrier's main base of operations.

LETTERS

Air France's Side

I was very shocked to read Mr. Selig Altschul's article in your issue of Mar. 12, and I feel sure that, in view of the high quality of reporting which you have made a standard of your magazine, you will want to print the corrections and extra information contained below:

1. According to our preliminary accounts of 1950, the subsidy received by Air France represents 7.6 percent of the total expenses.

2. The agreement under which Air France is subsidized by the French Government has been published in the Journal Officiel of France. The annual accounts are similarly published and I am enclosing a copy of our Annual Report for 1949. The same document for 1950 is not yet out. These documents give the details of the subsidy allocated to Air France which are not, therefore, "among the best kept international secrets."

The sole support received by Air France consists in the subsidy mentioned above. There are no agreements assuring a definite volume of business on routes in the French Union.

3. The Languedocs, which are, incidentally, four-engined aircraft, were sold to Air France at the price of 50 million francs each (equivalent to $275,000 at the rate of exchange in force at the time).

4. The Latecoere seaplanes, of which only three were operated by us until August, 1948, were never purchased by us since the operation was the subject of a special contract undertaken to connect France with the French West Indies at a time when little shipping was available and the islands had no air fields.

5. Out of the 19 Constellations owned by Air France, only seven were obtained with E.C.A. dollars for which Air France was obliged to pay the equivalent in francs to the French Government. The undersigned had the privilege to negotiate the purchase of all the others, which were paid for with French, and not ECA dollars.

6. In regard to the replacement reserves, Air France has allowed for these at normal depreciation rates in accordance with the practice allowed in the same identical way by the French fiscal authorities and the U. S. Internal Revenue. In 1950 aircraft depreciation represents 8.5 percent of total revenues, a figure similar to those of TWA and PAA.

7. New French aircraft, such as the Breguet, will be purchased by Air France, at a price based on the price of similar aircraft available on the international market.

8. The exchange of revenues in "soft currencies" through Embassy channels is a customary practice among all air lines and, apart from often unfavorable rates of exchange, represents only a very small amount.

9. The long-term debt of Air France is the result of a loan by a French Government fund, very similar to the RFC which has provided credits to various U. S. carriers. None of this came from francs advanced by the ECA Counterpart Fund.

10. Out of more than $10 billion granted to European countries, France has received slightly over $2 billion. Of this amount, only $31 million was allocated to Air France, i.e., 1.5 percent of the French total. Apart from this amount, Air France purchases in the United States, since 1945, have amounted to more than $34 million, coming either from direct revenue or obtained from the French Exchange Control in exchange for francs.

Other points of Mr. Altschul's article are, of course, highly a matter of opinion but it might be pointed out that in its Annual Report for 1949, the CAB stated: "Revaluation of future mail pay requirements of the trans-Atlantic operations of AOA, PAA and TWA . . . revealed that these operations had become increasingly dependent upon governmental support. . . ."

The words "artificial barriers from American inroads" seem rather odd at a time when the U. S. carriers are enjoying the greatest extent of Fifth Freedom traffic privileges in Paris and beyond, whereas no one European carrier has, at the present time, any such source of revenue beyond U. S. gateways.

I cannot help feel that the aeronautical relations between our two countries, which have been strengthened by the recent negotiations, should not be hampered by inaccurate information. Let us remember that as in all other international relations, international aviation can only prosper if it runs on a two-way street.

HENRI J. LESIEUR, General Manager
North American and Caribbean div.
Air France
Air France Bldg.
683 Fifth Ave.
New York 22.

The basis of the material appearing in the article in question was obtained from published reports and interviews with responsible officials in Paris. One such well-placed official advised me that the Languedocs along with the Latecoeres were turned over to Air France at the price of one franc each. Substantial confirmation of this fact through the exhaustion of depreciation run-off is available in the interview of Air France's financial director, M. Montarnal, appearing in the Oct. 21, 1950, issue of La Vie Des Transports. The exchange of "soft" currency revenues through Embassy channels is not a customary practice among airlines. This certainly is not the case as far as Pan American and TWA are concerned.

In stating the ECA grants the article referred simply to the aviation award and not the Air France grant in relation to the total ECA contribution of all types to all countries. Also, while Air France has received government loans, no such financial support through RFC loans has been given Pan American, TWA or AOA at any time. In the case of at least one American international air carrier, such government financial assistance was sorely needed.

—Selig Altschul

AVIATION CALENDAR

May 7-11—National Fire Protection Assn.'s annual meeting of committee on aviation and airport fire protection, Hotel Statler, Detroit, Mich.

May 10-11—Meeting on traffic estimation and forecasting for scheduled airlines research personnel, called by ATA, at Palmer House, Chicago.

May 12-13—Airlines Medical Directors Assn., eighth annual meeting, Hotel Shirley Savoy, Denver, Colo.

May 14-16—Aero Medical Assn. 22d annual meeting, Shirley-Savoy Hotel, Denver.

May 16-18—1951 spring meeting of Society for Experimental Stress Analysis at National Bureau of Standards and Wardman Park Hotel, Washington, D. C. Send inquiries to Dr. Edward Wenk, Jr., David Taylor Model Basin, Washington 7, D. C.

May 17-19—Annual convention of the Women's Aeronautical Assn., of the U. S., Little Rock, Ark.

May 18-20—Dedication of new Oneida County Airport, N. Y.

May 21-24—Tenth annual conference of the Society of Aeronautical Wright Engineers, Hotel Jefferson, St. Louis, Mo.

May 22—Aircraft Technical Committee national meeting, Aircraft Industries Assn., Statler Hotel, Washington, D. C.

May 26—Second annual maintenance and operation clinic, Reading Municipal Airport, Pa. Weather date, May 27.

May 27-30—Third annual Wright memorial glider meet, South Dayton Airport, Dayton, Ohio.

June 13—Semi-annual meeting of the aviation division of the American Society of Mechanical Engineers, Royal York Hotel, Toronto, Canada.

June 13-16—Aviation Writers Assn., convention, Hotel Commodore, N. Y.

June 15-July 1—International aviation display, Grand Palais and Le Bourget Airport, Paris.

June 18-July 6—Three-week Air Age Institute course, Parks College of Aeronautical Technology of St. Louis University, East St. Louis, Ill.

June 23—1951 British National Air Races, Hatfield Aerodrome, Hertfordshire, for light, heavy craft, and jets. Entry blanks available from National Aeronautic Assn., 1025 Connecticut Ave., N.W., Washington 6. Closing date for receipt of entries is May 1.

June 27-28—1951 annual summer meeting, Institute of Aeronautical Sciences, IAS Western Headquarters Bldg., 7660 Beverly Blvd., Los Angeles.

July 4-12—National soaring contest, Elmira, N. Y.

July 17-18—European ignition conference, sponsored by Lodge Plugs, Ltd., Savoy Hotel, London, England.

Aug. 22-24—Western convention of Institute of Radio Engineers and Seventh annual Pacific electronic exhibit.

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36—(SO-30, Fairey F. D. 1, SO-4000) Keystone; (sweptwing glider) INP; 38—National Bureau of Standards; 42—Northrop Aircraft.

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1600	11210	Cover
100	11762	Guide
7	26456-2	Bearing
1157	35787-5	Bushing
2174	35787-10	Bushing
39	35807-8	Stud
814	35814	Blower Assy
3967	35817	Spring
280	35855	Cap
2446	35924	Washers
4200	35932	Gasket
6	37751	Cover
15	37993	Housing Stud
28	38314	Rod Assy. Comp
20	45213	Cover
182	46400E	Liner
30	48346	Cylinder
1	48347	Cylinder
1475	48360	Bearing
53	48362	Shaft
175	48363	Shaft
3	48388	Sump
100	48389	Fitting
209	48390	Retainer
56	48392	Sump
533	48447	Bushing
107	48457	Adapter
76	48458	Bushing
390	48461	Gear
149	48468	Bearing
90	48468B	Bearing
389	48469	Bearing
470	48470	Bearing
75000	51506	Plug
395	54847	Clamp
71	56721	Cover
71	57006	Cover
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170	2P-771-A AN4102-1	Pesco fuel pump
250	AN4014	Erie Meter Systems D-3 hand wobble pump
300	1H260k and KA	Pesco Hydraulic hand pump
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STRICTLY PERSONAL

(This column solidifies its renown for public service today. We believe we are the first periodical to tell you how to conduct yourself on Air India. We're not yet sure but we may run this educational course in two installments. These extracts are from a little book titled "Better Acquainted" that Air India gives its passengers. Thanks to Waldo Bowman, editor of Engineering News-Record, who just returned from the mystic East with a copy—R.H.W.)

WELCOME TO INDIA—To those from foreign lands, welcome to India. . . . But don't take the fortune teller seriously. If it's a little excitement you want, let him hold your hand, but when he tells you that the robust lady on your left has not very long to live, he is only doing your wishful thinking, for he knows as well as you do that she is the mother of your wife. . . . Never draw a bead on temple pigeons.

* * * * *

NO FANCY DRESS—When you fly with us, it is not necessary to dress like Trader Horn or Theodore Roosevelt on the eve of a visit to the Dark Continent.

* * * * *

GIVE & TAKE—The passenger is always right but don't overdo it and bully our staff to give you a seat, reduce your excess baggage charges or wink at the bullion in your baggage. Be kind to our boys and they will respond like a Hamadryad to music.

* * * * *

YOUNG HERCULES—We too have children, so hesitate before you tell us that your husky offspring with the 40-inch chest and more hair on it than we have on our heads has not seen 11 and is therefore entitled to a half fare. We can't disagree with you, not with Tarzan knocking around, so it makes it all very embarrassing.

* * * * *

DUMB CREATURES—Livestock, whether accompanied or carried as freight, will be charged double the ordinary freight rates. We are confirmed animal lovers, but on no account can we permit carriage of anything on four legs which may require attention during flight. Frank Buck is one of our heroes but we refuse to play a part in any "Bring 'Em Back Alive" campaign. We have made this abundantly clear to the remaining lion of Gir Forest, who tries to bum a ride to Africa when we fly Bombay-Karachi nonstop.

* * * * *

NO MERCY—We have no time for the man who beats his wife, plays a weak no-trump and overtakes on the left, but he is our buddy compared with the fellow who cancels his passage at the last minute. Where this ghoul is concerned we know no laughter and strong men weep when they see the look in our eyes.

* * * * *

LOOKS BAD—To our male passengers who left school at 6 and are not too hot at reading, we make a request. Please don't force your way into the Ladies' Cloak Room at the various airports on our routes. If you are in doubt, the thing to do is to hang around, for sooner or later someone will want to see a man about a dog and that will be your clue. If it's a man, follow him; if it's a woman you take the other door. We regret we are not permitted to paint a lady on one door and a gentleman on the other, as this is a railway monopoly in India.

* * * * *

STRATEGY—We have read with much interest a recent book on the conquest of man-eating tigers. According to the author, the old theory of staring the animal in the face is out of date. The thing to do is to wait for the mating season and then call the animal, i.e., if the man-eater is a she, then you imitate a he-tiger out on the razzle and, if the man-eater is a he, you take on a falsetto and pretend you are a tigress in the mood for a little slap and a tickle. When the animal answers your call and comes running to you, you side-step into the undergrowth, all the time keeping him against the wind, and when the moment is ripe, slip him a couple in the belly just as he's admiring the sunset.

What has this to do with flying? We're coming to that. It is a question of strategy. When you're at the airport, never approach the plane from the front; the prop is no respecter of persons. You will look a little silly entering the kite with a football in your arms, which once upon a time was your head. To avoid risk therefore you must not approach a plane from immediately in front of the propellers.

* * * * *

YOU & THE GUM TREES—Now try to remember, dearies, when you last climbed Everest, didn't you feel a little deaf and get a buzzing sound in your ears? All you have to do then is to hold your nose, close your mouth and blow out your ears. If this does not help, swallow hard and keep yawning, even if you are not the least bored. If 40 minutes out of Karachi you are still where you were, do drop us a line and we'll think of something else.

* * * * *

FINDERS KEEPERS—Before you leave the plane, please look around and see if you've forgotten anything. Better still, look around in case the other passengers have left something behind, which you can then transfer deftly into your trouser pocket. Our directors all wear watches which our passengers originally purchased. But let there be no misunderstanding for, as in maritime law, it was decided at Chicago that articles forgotten in a plane by passengers are classed as derelicts, 80 percent of which is the property of the finder, whilst the remaining 20 percent goes to the guy who saw the other fellow find it. This, incidentally, is the sixth freedom, which for obvious reasons hasn't been given much publicity in the press. And so when our station superintendent at Bombay finds a Patek Philippe, he keeps the watch and gives the strap to Abdul, our Head Loader.

WHAT'S NEW

New Books

Airplane Design Manual (Third Edition), by Frederick K. Teichmann. Published by Pitman Publishing Corp., New York, 1950. $7.50.

Prof. Teichmann's evergreen design manual, a standard reference text in aeronautical schools throughout the country, appears now in a third edition. It has been modernized with much new material; a brief perusal of the pages shows that the author has included design data on standardized cockpits, prone pilot positions, pressurization and soundproofing, control boosters and jet engines. The appendices, which contain design data, have also been brought up to date.

Prof. Teichmann is Chairman of Dept. of Aero. Engineering at New York University's Daniel Guggenheim School of Aeronautics. —DAA

Telling the Market

Technical report, comprehensively detailing newest developments in fluid flow rate testing for the aviation industry in particular, can be had by writing Fischer & Porter Co., 3780 County Line Rd., Hatboro, Pa. Ask for **Technical Report A-9C-4** . . . **Bulletin A-5200** summarizes technical data on Vickers aircraft hydraulic equipment. Write Vickers, Inc., 1400 Oakman Blvd., Detroit 32. . . . **Current Aircraft Engine and Ignition Systems** contains material taken from a paper prepared by Robert Boyer, Jr., senior sales engineer of Scintilla Magneto division of Bendix Aviation Corp., for the Champion Spark Plug and Ignition Conference at Toledo last Sept. 5-7. Included are criteria for judging the efficiency of current ignition systems, the author's recommendations for efficient operations, and a description of associated equipment. Write Scintilla Magneto division, Bendix Aviation Corp., Sidney, N. Y., attention of the Sales department.

Catalog Section 20 provides technical information regarding selection, application and fabrication and welding of stainless steel tubing. Obtainable from Superior Tube Co., 2508 Germantown Ave., Norristown, Pa. . . . A catalog showing barrier materials for use in government packaging to meet joint Army-Navy B-121 and P-117 specifications contains actual samples of each grade with characteristics described. Material is contained in a loose-leaf binder to permit further inserts. Write H. P. Smith Paper Co., 5003 W. 66th St., Chicago 38.

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EDITORIAL

Set the Record Straight

An indignant reader of ours has sent us an invitation he received from Coronet magazine to subscribe. As you will note, the blurb capitalizes on a sensationalized article in the May issue, titled "Death Rides the Bargain Airlines."

We reproduce the blurb, capitalizing on death to sell subscriptions. Our reader feels this is bad taste in the first place, and is extremely misleading, as well. We agree.

The article, which follows closely on another unjustified attack against the nonscheduled carriers that appeared in Hearst's Cosmopolitan recently, ignores safety statistics after the year 1949. The number of deaths in 1950 operations has been known rather accurately since the end of the year. Estimates of revenue passenger traffic, on which safety-rating statistics are based, were available months ago. Last week the official figures were made available by the Civil Aeronautics Board.

We are glad to tell Coronet that if they are interested in facts, the large irregular carriers in 1950 flew 766,507,000 revenue passenger miles. One passenger fell from a door. There was one fatal crash with 28 passenger deaths but it occurred to a contract carrier on a flight not accessible to the public, to whom Coronet issued its warning.

We also remind Coronet that at the time this editorial was written last week, the last previous crash experienced by any large domestic irregular carrier was on July 19, 1949. The last recorded fatal accident to any U. S. flag international irregular was at Galway Bay, Ireland, on Aug. 15, 1949. These facts could have been obtained by the Coronet writer before his article went to press.

CAB has computed from these latest statistics that the large irregular fatality rate for 1950 was 3.8 per 100 million passenger miles, instead of the previous recognized estimate of 4.1.

The statisticians will also point out to Coronet that Northwest Airlines alone, a transcontinental scheduled carrier, flew about 618 million revenue passenger miles in 1950—less than the nonscheduled carriers, and experienced three accidents that were fatal to passengers, with death to 83, and 10 crew members. These are incontrovertible facts.

Coronet's article is a year too late and thus is inaccurate and misleading, and the promotion accompanying it is in questionable taste. It does all commercial aviation immeasurable harm.

Who's Stupid?

Yes, sir, the railroad people are pretty stupid.

Just look at them. Pullman has gone over to the Interstate Commerce Commission to ask for higher fares. Railway Express Agency just hiked its rates. Railroads in the New York area jumped their commuter tickets. Railroad coach rates in New York State went up. The rails have petitioned for higher mail rates. Ditto with regard to higher freight rates.

It is mighty enlightening to see things as we air people do—from an elevation. How can the railroad people expect to build up patronage with high rates?

Why, it's obvious to anybody in aviation that we have a right to be pretty smug about those railroads. We know that higher Pullman fares will cut Pullman business and increase airline ticket sales. Fewer people will ship by Railway Express. There'll be fewer commuters on the trains. More people will realize that higher rail coach charges will make it look even sillier to sit three days on a train when they can fly in a fraction of the time. And the government probably will grant the rails some kind of mail rate increase but it will just rush its own truck transport program all the faster. Higher freight rates won't increase the number of rail shippers, either.

What's the matter with the rails, anyhow? Don't they know the way to build business is to cut rates and offer more service?

Er that is, except where the air coach idea is concerned.

Sentiment in the big scheduled airlines still is not enthusiastic over the coach idea. Too many vice presidents still picture every air coach rider—either their own or on the nonskeds—as a customer who otherwise would have paid full fare. This despite the fact that the scheduled airlines have never had it so good profit-wise. And load factors this summer look phenomenal from here. This, despite big increases in planes per airline and seats per plane. Passengers are flocking to the airlines; cargo business, especially on the all-freighters, is booming.

We wonder if the railroaders are thinking, with envy, how stupid we are in fighting the coach idea. In fighting the nonskeds that last year, despite all of the obstacles that Civil Aeronautics Board and the old-line industry could throw, still carried a neat 450,000 paid passengers in fighting the freight lines that barely landed certificates after a very unenlightened CAB held them down for such a long time.

The railroads by constantly raising rates and getting fewer customers are learning the hard way. Why must we? Give the public all the passenger and freight service it will use. Aviation will never grow to its ultimate size any other way. And give it economically.

Beware of Prosperity

Scattered complaints are coming to us about a let-down in airline courtesy and service.

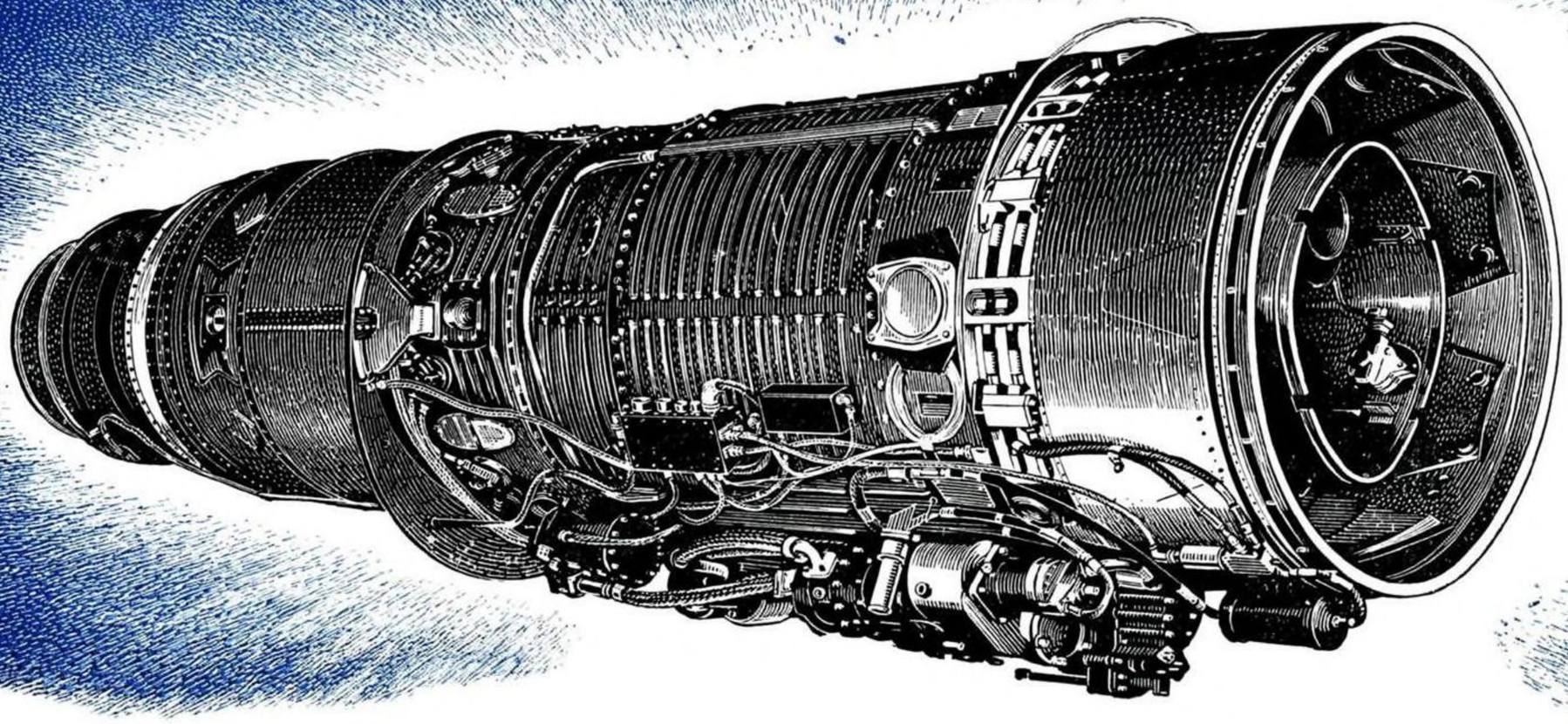
One passenger the other day had a confirmed reservation for a flight. His baggage was put aboard and he was cleared at the desk but denied admittance at the plane door because someone mis-counted or over-sold. He was compelled to take another plane, while his bags went ahead on schedule.

Baggage handling squawks are being heard in some sections of the country in a wail that reminds you of the war. One set of Constellation passengers waited 33 minutes at Cleveland the other day for their bags, on a cold, raw day.

So it goes. Prosperity is here for the airlines. But it may bring compounded trouble for the future if airline management and employes let up in their efforts to serve the public efficiently.

—Robert H. Wood

Allison Wins Record U.S. Air Force Contract for Super-Jet Engines



New Turbo-Jet Leads with Greatly Increased Power and Fuel Economy

ONCE more Allison makes a major contribution to America's air power—a new Super-Jet aircraft engine that excels in power and fuel economy any other jet engine ever released for production.

It's the new J35-A-23 developed in cooperation with the Air Materiel Command—a completely new design—yet retaining the same basic diameter of the famed J35 series. This new engine develops more power per square foot of frontal area than any other jet yet produced. Four of these new engines will be installed in the YB-47C Boeing Strato-Jet. They will produce more power than the six jet engines now used in previous models of the B-47 series.

This J35-A-23 now has been selected by the Air Force—in open competition—for a record-size production contract. Behind this latest award is Allison's unequaled experience in the design and production of more than 10,000 jet engines with total time in the air of over 700,000 hours.

This accents the length and breadth of Allison jet engine experience where it counts most—in the air. Many of these flight hours have been accumulated in Korea powering U. S. fighters for support of ground troops and keeping the skies clear of enemy opposition.

Production will continue at Allison on those combat-proved types of jet engines in addition to the new J35-A-23 Super-Jet and the new T40 Turbo-Prop engines.

The record production order for the new Allison engineered Super-Jet will be met through the combined facilities of Allison and the Chevrolet Motor Division which will build a substantial quantity of these Super-Jets.

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Builders of J35 Axial, J33 Centrifugal Flow Turbine Engines and T40 Turbo-Prop Engines

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