FAA | AVIATION NEWS

SEPTEMBER 1963

FEDERAL AVIATION AGENCY

FAA | AVIATION NEWS

F E D E R A L   A V I A T I O N   A G E N C Y

VOL. 2, NO. 5 SEPTEMBER 1963

COVER

Research in airport lighting is among many projects conducted at FAA's busy National Aviation Facilities Experimental Center (see page 8)

FAA AVIATION NEWS is published monthly by the Office of Information Services, Federal Aviation Agency, Washington, D.C., 20553, in the interest of aviation safety and to acquaint readers with the policies and programs of the Agency. Use of funds for printing this publication approved by the Director of the Bureau of the Budget February 1, 1963.

Subscription rates: U.S. $1.50 a year, foreign $2.00 a year, single copies 15 cents. Send check or money order (no stamps) and change of address notices to Superintendent of Documents, Washington, D.C. 20553.

In requesting a change of address, subscribers should include the mailing label from any issue to facilitate the change.

CONTENTS

GORDON BAIN HEADS SUPERSONIC PROGRAM, DESIGN COMPETITION LAUNCHED

Gordon M. Bain, formerly FAA Assistant Administrator for Appraisal, has been named to head the nation's government-industry supersonic transport development program.

Bain, who took charge of FAA supersonic transport research at the end of March, now is Deputy Administrator for Supersonic Transport Development. In this post, he directs the administrative-technical organization within FAA charged with responsibility for the program of government assistance to the aviation industry for development of a supersonic commercial airliner.

Current scheduling calls for the first test flight of an American SST in 1968 and the inauguration of passenger service in 1970. The plane will travel between two and three times the speed of sound.

Two weeks after Bain's appointment, in line with the planned development schedule, FAA sent a formal request for proposals, or RFP, to the industry to initiate SST design competition among airframe and engine manufacturers. The first phase of competition will end early next year. On the basis of these design submissions, manufacturers will be selected to proceed with development of the aircraft.

The RFP, prepared in consultation within the government and with the aviation community, established the performance requirements for the aircraft and associated systems, plus funding and development plans.

Among major design objectives established in the RFP:

- The aircraft must provide, as its primary characteristics, optimum operating safety and potential commercial profitability.
- Development costs and sales price must be kept at minimum practicable levels.
- Range of the aircraft should be 4000 statute miles—or New York to Paris.
- Capacity should be 125 to 160 passengers, allowing 200 pounds per passenger, plus 5000 pounds of cargo and mail.
- Cruising speed, in line with the desirable safety and economic characteristics, and consistent with over-all program timing, should be set at Mach 2.2 or better. Mach 1 is the speed of sound at sea level. Mach 2.2 is roughly 1500 mph.
- Noise created in the vicinity of airports must not exceed the noise created by current long range jet transports.
- Sonic boom levels must be kept within limits shown in studies to be tolerable to the public. These limits are considered to be two pounds per square foot, measured on the ground, during the brief period when the aircraft accelerates to supersonic speed, and 1.5 pounds per square foot during aircraft cruise.

Gordon M. Bain

Also set forth in the RFP was the program requirement for cost-sharing in development contracts between the government and the manufacturers. Total development cost has been estimated at about $1 billion. Government costs under the development plan will be reimbursed by the airlines through royalties geared to aircraft purchases and operating revenue.

FAA sought, in preparing the request for proposals, to bring together the best thinking of government and industry experts. Accordingly, this procedure was followed. About 150 copies of a first draft RFP were selectively distributed with a request for written comments and constructive appraisal. Responses were painstakingly reviewed and a revised draft printed. This revised draft was then discussed at a series of three meetings presided over by Deputy Administrator Bain at the beginning of August.

In attendance at these sessions, on successive days, were representatives of the aviation manufacturing industry, the airlines, aviation employee groups, other organizations concerned, and government agencies. A second round of written suggestions regarding the revised draft were requested for submission a week after these meetings.

These and earlier written suggestions were reviewed, once again, in producing the formal request for proposals for distribution in mid-August.

Bain comes to the post of Deputy Administrator after service in a succession of high level positions in government and the airline industry. He was Executive Officer of the Civil Aeronautics Administration, forerunner to FAA, from 1946 to 1951. He served as Director, Bureau of Air Operations, Civil Aeronautics Board, from 1951 to 1953. Before joining CAA, he had been a principal budget examiner at the Bureau of the Budget.

Bain left the government temporarily in 1953. He became Executive Vice President of Slick Airways in that year. In 1956, he moved to Northwest Airlines as Vice President for Sales, a position he held until 1960, when he became Executive Vice President of SITA World Travel, Inc., of Rancho Mirage, California.

At the time he returned to government service as Assistant Administrator for Appraisal of FAA in April 1962, Bain headed his own management consultant concern. In this FAA post, he became responsible for evaluating, for the Administrator, the Agency's operations in all of its seven regions as well as Washington. He was concerned with both technical and administrative areas.

Bain, 54, was born in Canada. He holds an M.A. from the Univ. of California.

DR. M. SAMUEL WHITE NEW FEDERAL AIR SURGEON

Dr. M. Samuel White

Dr. M. Samuel White has been named to the position of Federal Air Surgeon of the Federal Aviation Agency by Administrator N. E. Halaby.

Dr. White, command surgeon since 1959 of the Air Training Command, Randolph Air Force Base, San Antonio, Texas, will remain on active military status as a Major General when he moves into his FAA job on or before October 1.

"We are very pleased with General White's assignment, which ends a search for the best professional man qualified and available for this important and difficult challenge," Mr. Halaby said. "He brings particularly outstanding qualifications for handling the critical tasks ahead in learning more about the human element in civil aviation. Dr. White's background and experience make him uniquely suited to lead the way in this important work."

Dr. Homer L. Reighard, who has been Acting Civil Air Surgeon since March, will continue his excellent work in the Aviation Medical Service, Mr. Halaby added.

The position of Civil Air Surgeon, in which Dr. Reighard has been acting, has been redesignated Federal Air Surgeon, in keeping with other terminology changes from the transition from CAA to FAA.

General White has been a flight surgeon for nearly 28 years. He has been associated with a number of pioneering achievements in aviation medicine since graduating from the USAF School of Aviation Medicine, Randolph AFB, Texas, in 1935.

In 1940 he made the first electrocardiograph recordings and the first complete scientific study of heart action in high altitude flying. His work formed the basis for many present-day techniques for recording biological functions in the investigation of human factors in flight. In 1945 he was a member of the group which pioneered the first scheduled round-the-world military air transport flights in six days.

Born in New York City on November 24, 1907, Dr. White received his medical degree from New York University in 1931 and was commissioned first lieutenant in the Medical Corps. His first assignments as post surgeon were at Fort Huachuca, Ariz. and Barksdale Field, La.

From 1940 to 1942 he headed the Department of Aviation Medicine at the AAF School of Aviation Medicine, Randolph AFB, Texas, and was command surgeon with the Air Transport Command. During this latter period he was responsible for ATC's global air evacuation of U. S. sick and wounded personnel, a revolutionary concept in handling military casualties at that time.

FAA Allocates $75.9 Million in Airport Aid Funds

Allocation of $75,911,216 for the construction and improvement of 452 civil airports under the Federal Aid Airport Program for fiscal year 1964 was announced last month.

These allocations, based on appropriations by Congress of $75 million during fiscal year 1964, represent the last funds authorized under the present Federal Airport Act. The President has proposed a three-year extension to this Act which is now before the Congress for approval. Allocations to long-term projects in this year's program are based upon the concept of a continuing program. Local project sponsors will match the Federal funds generally on a 50-50 basis. Until grant offers are actually tendered, allocations for projects are tentative and subject to reprogramming.

Of the 452 airports in the program, 253 will be developed for the use of general aviation exclusively. A total of $18,714,455 is allocated for construction of 68 new public airports and improvement of 185 others. The remaining 199 airports—involving $57,196,761 in Federal aid money—serve all segments of aviation.

Study Certificate Requirements At Aviation Mechanic Meetings

A series of meetings with aviation mechanics was launched last month by the Federal Aviation Agency to discuss modernization of the certification requirements for these airmen.

Of a total of 31 meetings, 12 already have been held with the remaining 19 scheduled for this month (*see* below) at various locations.

George S. Moore, Director of FAA's Flight Standards Service, pointed out that the aviation mechanic certification program "has remained relatively unchanged for more than 30 years and perhaps should be realigned with the responsibilities of maintaining modern complex aircraft."

Among topics to be covered at the meetings are the experience, knowledge and skill requirements for an aviation mechanic certificate. Discussion will include the following proposals:

■ Should FAA increase the present 18-month experience requirement for aviation mechanic ratings *or* should the Agency retain the present experience requirement and establish specific mechanical functions or projects that an applicant must complete as a helper or trainee?

■ Should knowledge requirements for the aviation mechanic written examinations be raised to include testing in theoretical understanding of specific aircraft systems *or* should more emphasis be placed on physics, mathematics, and basic operating principles of aircraft systems and should the actual familiarization of specific systems come after certification and employment?

■ Should the regulations be revised to require a demonstration of only limited skills *or* should the Agency continue to require engine overhaul, fabric recovering, cable splicing and so forth in order to teach the newly certificated mechanic an appreciation for the art of aircraft maintenance?

Other items include discussion of the general privileges and limitations of the aviation mechanic certificate and the FAA exam and rating system.

Meetings are scheduled as follows:

Alabama: Birmingham Sept. 7; **Arkansas:** Little Rock Sept. 23; **California:** Los Angeles Sept. 10, **Oakland** Sept. 18; **Colorado:** Denver Sept. 16; **Georgia:** East Point Sept. 13; **Hawaii:** Honolulu Sept. 10 and Sept. 18; **Illinois:** Chicago Sept. 10; **Massachusetts:** East Boston Sept. 11; **Missouri:** St. Louis Sept. 12; **New Mexico:** Albuquerque Sept. 25; **New York:** White Plains Sept. 25; **Oklahoma:** Oklahoma City Sept. 16, Tulsa Sept. 17; **Texas:** Fort Worth Sept. 5, Houston Sept. 12, Lubbock Sept. 18, El Paso Sept. 23.

PILOTS, CONTROLLERS EXCHANGE VISITS; SEE HOW THE OTHER GUY WORKS

Left, Patrick Horan, coordinator in the control tower at Washington National Airport, accompanies American Airlines pilots to their operations office for pre-flight briefing. Top right, Horan in Electra cockpit with pilots. Bottom right, Horan, an FAA controller since 1952, explains tower operations to his visitors.

The men and women responsible for the safe and efficient control of the nation's air traffic don't spend all their working hours peering at earth-bound radar scopes or flight strips. Conversely, pilots don't spend all their time in the cockpit. From time to time they exchange visits to see how the other fellow works.

This program is designed to give flight crews and FAA traffic control personnel a better understanding of mutual problems.

Traffic control personnel may make one round trip familiarization flight per year with each air carrier served by their facility. The trips are official travel in line of duty but many controllers and communicators use their days off for the flights. Being on official duty, they are covered by provisions of the Federal Employees' Compensation Act but they do not receive overtime pay.

The familiarization trips are on a regularly scheduled flight of the airline. However, they are strictly business affairs which cannot be used in lieu of paid transportation or a pleasure trip.

FAA traffic control specialists are with the flight crews from preflight to postflight and ride in the jump seat as guests of the airline. During the flight, air crews and traffic controllers have an opportunity to discuss their problems and obtain each other's viewpoints. At the end of each flight the FAA representative must submit a report to his regional air traffic division.

Flight crews find the welcome mat out at all FAA facilities—Centers, towers, Flight Service Stations—which they can arrange to visit by telephoning.

The program, initiated shortly after the end of World War II, has resulted in a much better mutual understanding of problems faced by the users of the air traffic system and those who operate it.

Montana Credit Card Scheme Promotes Flight Plans

For the Montana pilot who has everything, there's something new in credit cards.

A unique plan, initiated by the Montana Aeronautics Commission, encourages pilots to file and close flight plans by providing them with free long distance phone service to the nearest FAA Flight Service Station.

The service is available to all registered Montana pilots taking off from or landing within the State of Montana. Approximately 300 pilots took advantage of the free service on one or more occasions during the first 75 days of operation.

In addition to a noticeable increase in the number of flight plans filed, there has been enthusiastic reception over the ease with which flight plans can be handled by pilots under this system.

A registered Montana pilot (it costs one dollar to register with the Montana Aeronautics Commission) simply calls the nearest FAA Flight Service Station and tells the operator: "This is a collect call, Montana pilot flight plan." Then he gives the Flight Service Station communicator his Montana registration number. The pilot then files (or closes the flight plan), gets a weather briefing, and takes off. The only request is that pilots avoid calling Flight Service Stations 15 minutes after or 15 minutes before the hour during the scheduled weather broadcasts.

The Montana Aeronautics Commission hopes the program will eliminate the numerous alerts and actual searches developed out of "no flight plan" flights.

Aviation Mechanics Examination Guide Issued to Help Applicants

A new booklet to assist applicants for an aviation mechanic certificate has been issued by FAA.

The 29-page guide provides information on the requirements for an aviation mechanic certificate and the application and examination procedures.

Separate sections in the booklet deal with the aviation mechanic written examination and the oral and practical examinations. Subjects covered in these tests are listed and sample test questions and projects are provided.

Copies of the *Airframe and Powerplant Mechanics Examination Guide* are available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at 30 cents.

FRONTS: STATIONARY OCCLUDED AND UPPER

This is the sixth article in a series on aviation weather prepared by meteorologists of the Weather Bureau.

Every front is a boundary between relatively warm and relatively cold air. The cold front and the warm front, which were discussed in July and August, are the two primary types. But there are variations, known by other names, that affect the safety of flight.

The six symbols used on weather maps to identify fronts are:

- COLD FRONT (SURFACE)
- WARM FRONT (SURFACE)
- OCCLUDED FRONT (SURFACE)
- STATIONARY FRONT (SURFACE)
- UPPER WARM FRONT
- UPPER COLD FRONT

Stationary, occluded, and upper fronts are merely warm or cold fronts in different positions. They cause the same flight problems as the basic fronts. The pilot must give each frontal system individual consideration, because no two are exactly alike and any one may be dangerous.

Two of these—stationary and occluded fronts—can be understood by studying the life cycle of a frontal wave system as it might appear on the surface weather map.

The stationary front (*figure 1*) either does not move or shows no pronounced movement in a definite direction. On one side the air is cold; on the other side the air is warm. Surface winds tend to blow parallel to the front.

Weather conditions along stationary fronts, although similar to those associated with warm fronts, are generally less intense and not so extensive. Nevertheless, they can hamper flight operations for extended periods. Cloudiness, precipitation, and poor visibility may persist in one area for several days. This type of front is especially common along the eastern slopes of the Rockies in winter months.

Often, after a moving front becomes stationary, it will continue to weaken and eventually will dissipate. On the other hand, a front that has remained stationary for several days may suddenly begin to move. It then becomes a warm front or a cold front.

The stationary front shown (*figure 1*) is approximately straight, although surface fronts actually present many irregularities. In *figure 2*, a small irregularity has grown into a small wave on the front. A new low-pressure circulation or wave-cyclone is forming.

A wave-cyclone is a center of low pressure that moves along a front like a sea swell and creates waves in the front resembling waves in the ocean. In the beginning, a wave grows (*figures 3 and 4*) until a "whitecap" is formed (*figure 5*). Later, it diminishes and dissipates (*figure 6*).

At the crest or whitecap stage, the wave-cyclone undergoes a process known as *occlusion*. The cold air portion of the wave, traveling faster than the warm air ahead of it, overtakes and forces the warm air aloft. From this point on, the front at the surface is called an *occluded front*. Although the air at the surface is cold on both sides of the occluded front, *the warm part of the wave still exists some distance above the surface, causing large areas of cloudiness and precipitation.*

In an occlusion, the front between the warm air aloft and the cool air below does not intersect the surface; it is therefore called an *upper front*. Upper fronts present problems to the pilot and the pilot briefer. Their locations are difficult to determine from surface observations. They may be ahead of the surface position of the occluded front or they may be behind it. Moreover, upper fronts are not easy for pilots to identify in flight because their associated cloud layers are hidden by the clouds of the surface system.

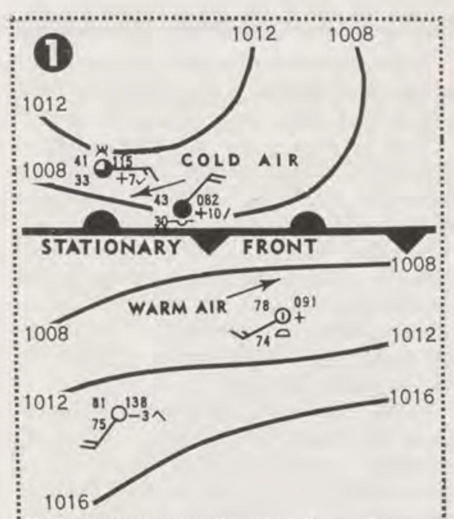
The structure of the occluded front and the location of associated weather depend on the temperature difference between the cold air in advance of the front and the cold air behind it. If the air in advance is colder, the air behind will flow over it. The resulting weather will occur in advance of the occluded front as it does with a surface warm front. If the air behind the front is colder, it will lift the air ahead of it. The weather produced will then be near or behind the occluded front, as in a surface cold front.

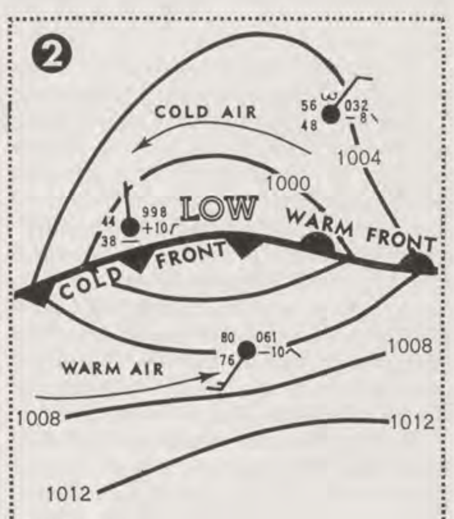
Occlusion is a process of decay, heralding the death of the entire storm system. In its early stages, however, enough energy remains to produce very hazardous weather over an area extending from 50 to 100 miles outward along the occlusion. *A weatherwise pilot will avoid this area which often contains all the worst features of both warm and cold fronts, including turbulence, icing, precipitation and thunderstorms.*

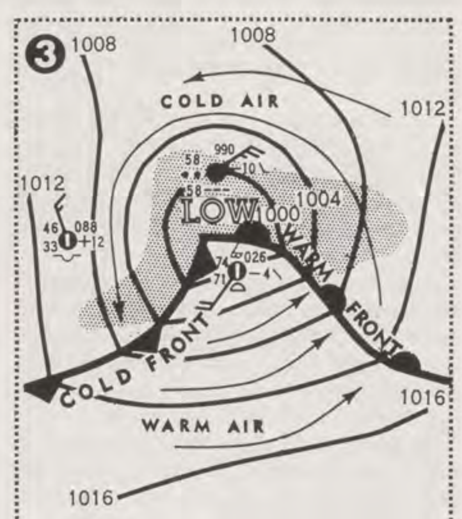
When occlusion reaches its final stages, the temperature contrast within the low pressure center decreases, frontal characteristics disappear, clouds gradually decrease, and the atmosphere returns to normal. The low pressure center which has accompanied the atmospheric wave loses its cyclonic, or counterclockwise, circulation and fades into the larger air mass circulation.

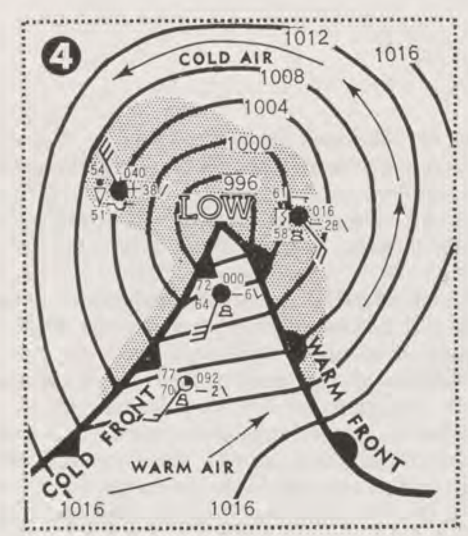
Upper fronts are warm or cold fronts aloft in the atmosphere. They do not intersect the earth's surface. Upper fronts occur in the occlusion process as described above.

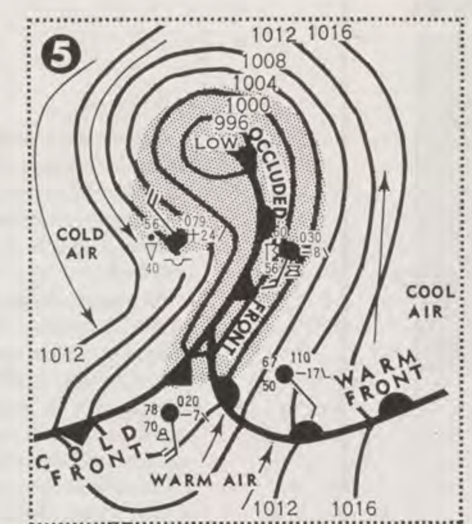
During the winter months, another type of upper front is frequently found to the east of the Rocky Mountains. Cold fronts from the Pacific Ocean move eastward over the mountains and across the Plains states. At upper levels, the Pacific air is colder than the air it replaces. Close to the ground, the snow-covered Plains have created a very dense layer of cold air. The Pacific air rides over the lower, colder air. Such upper fronts often move for long distances and dissipate without ever touching the surface.

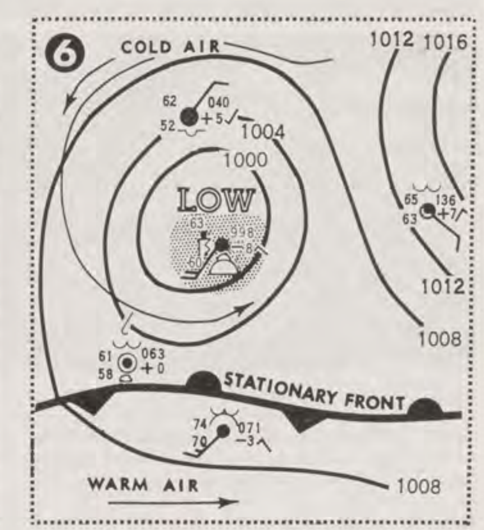


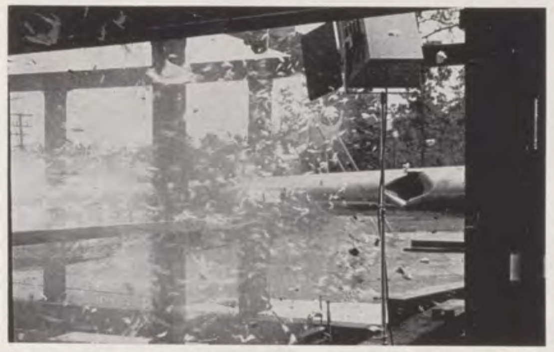






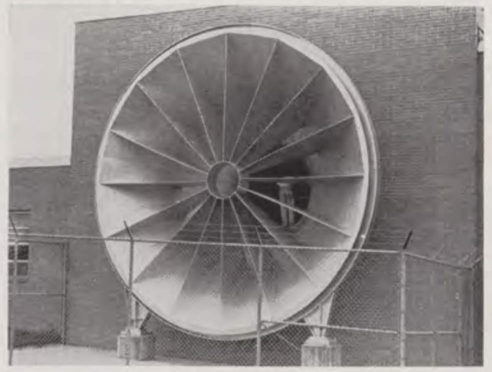






Major program at National Aviation Facilities Experimental Center concerns problem of bird strikes on aircraft, the ingestion of birds into aircraft engines. Two major accidents, several lesser incidents, have been caused by birds in recent years. "Bird gun" facility, in which dead birds, foreign objects including ice pellets are fired at aircraft components, continually examines problem. Here dead chicken is weighed, loaded into "gun," fired at aircraft tail section.

Flight-operation studies including airport approach, departure and pilot reaction in collision avoidance are conducted in F-100A flight simulator at right. Below, evaluating traffic control radar bright display.



Fire Test Cell and Blower Facility is used to study fires in aircraft engines, components. Above, external view. Below, technicians observe from control area.

AERONAUTICAL RESEARCH—FOR TODAY AND TOMORROW . . .

NAFEC.

The letters stand for National Aviation Facilities Experimental Center, FAA's primary research and development complex near Atlantic City, N.J.

They also stand for ceaseless technological probing, in hundreds of R & D projects, to make flight safer and more efficient.

Primary projects at the 6000-acre airfield-aviation laboratory, as shown in the accompanying photographic report, reflect a broad range of aviation challenges:

▪ The air traffic control system, most extensive and efficient in the world, needs continual, evolutionary improvement to meet the requirements of increasingly dense traffic and high performance aircraft. Major aims are (1) more effective use of computers to provide essential information to FAA air traffic controllers, and (2) improved displays of radar and other data to give the controller more, better, and easier-to-use information.

NAFEC scientists, engineers, technicians, and air traffic experts are working to achieve these ends. A representative engineering model of the improved airways system FAA is working toward, which will incorporate considerable progress in both these areas, will be in place at NAFEC early next year.

▪ Another extremely important contribution to air traffic control will be provided when radar beaconry equipment that transmits altitude and positive identification information from aircraft to controller comes into use. Developmental equipment that performs these functions is being tested and checked out at NAFEC.

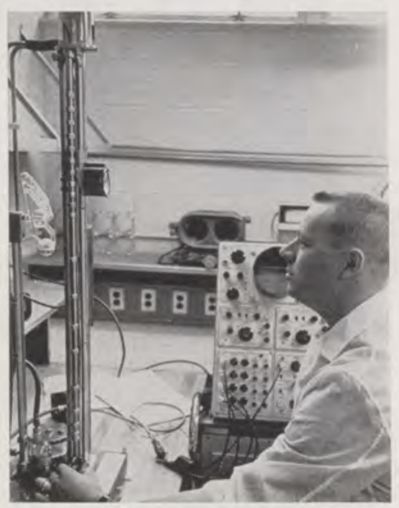
▪ Aviation has, through the years, sought an automatic landing system that is safe and reliable under conditions of low-visibility and no-visibility. In a high priority NAFEC project, more than 1000 landings have been made by an FAA DC-7 equipped with an all-weather landing system built around radio altimeter, airborne computer, and an improved version of the existing Instrument Landing System (ILS) used for approach guidance at major U. S. airports.

▪ Two major accidents in recent years, at Boston and Ellicott City, Md., have pointed up the problem presented by ingestion of birds into jet engines or strikes of birds on aircraft external surfaces. An FAA "bird gun" at NAFEC fires frozen chickens, ice pellets, hamburger meat, and other foreign materials at high speeds into aircraft windshields and structures to gather data on this problem. Scheduled to begin shortly are further tests aimed at developing jet intakes that minimize the danger of birds entering engines. These will complement wind tunnel studies of bird entry into engines that were conducted last year.

▪ "Flying" and controlling make-believe aircraft with a high degree of realism, air traffic simulation personnel in the largest facility of its kind anywhere study traffic problems on

NAFEC has outstanding record in field of airport lighting. Below, engineer adjusts lights on test visual approach indicator. Right, checking "pancake" light for even intensity.

More than 1100 successful "hands-off" landings have been made in FAA DC-7 aircraft fitted with developmental automatic all-weather landing system. Above, automatic approach. Below, checking gear.



Technicians calibrate operating instruments with painstaking precision under controlled atmospheric conditions in calibration lab.

the airways, system improvements, route structures, terminal flight patterns, air traffic techniques. More than 4000 hours of "flight time" were logged in this facility last year. Recently completed was a study of proposed sites for a new jet airport in the New York City area. Under way is an examination of supersonic transport operations in existing and future air traffic environments.

■ In another project keyed to air safety, NAFEC experts are evaluating cockpit voice recorder and improved flight recorder equipment. Flight recorder equipment which makes a permanent record of such data as aircraft courses, speeds, and altitudes is carried by airliners now. Recovered at the scene of an accident, crash-proof voice recorder and flight recorder equipment would in conjunction provide investigators with solid indications of the cause of a crash.

■ Now being installed in a flight simulator at NAFEC is an experimental instrumental panel that has been produced in FAA's Project Little Guy, a program to develop an improved, simplified cockpit and controls for the nation's light aircraft. The panel is scheduled for study under conditions of dynamic simulation, after which it will enter flight testing. Theme of this program is that the traditional cockpit and control system of light aircraft may lend themselves to evolutionary modification as the pilot and aircraft population increase in conditions of busy airspace. Project Little Guy aims to highlight potential problems and point the way to possible solutions.

A full roll call of major programs at NAFEC could, and does, fill volumes:

■ Runway "arresting gear" equipment to halt airliners under emergency take-off or landing conditions has undergone extensive development and evaluation.

■ Airport runway tests in conditions of heavy artificially-produced slush have provided definitive information for airport operations.

■ Experimental lighting work resulted last year in adoption of new national standards for runway touchdown zone and centerline lighting. In 1960, NAFEC studies led to adoption of the British-developed Visual Approach Slope Indicator System (VASI) for runway approach lighting both in daylight and under conditions of poor visibility.

■ Crashworthiness and crash fire tests, again vital in developing and enforcing safety standards, are slated to begin before the end of this year.

In all, there are more than 300 active R & D projects at the experimental center, with more than 100 others undergoing preliminary investigation. Conduct and support of this diverse program is the responsibility of the approximately 2100 persons who serve at NAFEC under Center Manager William F. Harrison. The Center is operated by FAA's System Research and Development Service under Director Joseph D. Blatt.

The R & D programs fall within the technical responsibility of this Service and the Aircraft Development Service under Director Melvin G. Gough.

NAFEC comprises some 6000 acres and 200-odd buildings along the stretches of sand and scrub pine common along the East Coast. There are three operational runways, the longest one 10,000 feet. Radar and electronic test facilities dot the terrain. Four phototheodolites roughly resembling lighthouses provide precise space measurement data in many of the flight test programs.

Across the center from the FAA facilities stands the Atlantic City municipal airport, with a shining new terminal building. NAFEC serves, with skill and dedication, the travelers who each day use that terminal, and every other air terminal throughout the world.

Doppler VOR advanced navigation equipment tested at NAFEC provides improved signals for aircraft guidance.

Designs for simplified cockpit for light aircraft—Project Little Guy—will be studied in this simulator.

Major research and development effort is being devoted to air traffic system improvement and modernization. Above, technicians at work in air traffic laboratory. Below, equipment is maintained by NAFEC's own skilled workers.

TRAINING FOR SAFETY

According to a study made by the International Civil Aviation Organization, the 1962 worldwide fatality rate for carriers averaged 0.94 per 100 million passenger miles. The U. S. fatality rate was less than a third of that.

This safety record is no accident. It is the result of the combined skills of able pilots, air traffic controllers and those with whom safety begins—the aviation mechanic. In many ways the forward-looking maintenance program of Delta Air Lines epitomizes the high standards that are the hallmark of the Nation's scheduled air carriers.

Nearly 900 of Delta's 1688 aviation mechanics have A&P ratings. About half of these A&P-rated aviation mechanics earned this coveted rating as an outgrowth of a comprehensive in-service training program that evokes considerable pride among company officials.

In the first six months of 1963 some 21,000 man-hours were devoted to training in the maintenance, inspection and engineering fields. It's all done on company time if a man can get his regular work done; otherwise it's after-hours at straight pay. A 14-man squadron of experts under J. M. Boxley, Superintendent of Training, devotes full-time to teaching, visiting nearly three score bases to take their maintenance message directly to the aviation mechanic. A seven-point program begins with every aviation mechanic from his first day on the job:

- Newly hired aviation mechanics get a three-day orientation program.
- Junior mechanics all get on-the-job training plus as much as 120 hours of specialized classroom instruction.
- A full-fledged aviation mechanic (he either holds an A&P or none is required for his particular specialty) will receive anywhere from 4-40 hours of training in specific problem areas.

These problem areas are spotted by log analysts who follow each flight via "squawk sheets"—daily maintenance sheet that give clues to mechanical problems. After analyzing these squawk sheets, conferences are held with mechanical specialists to solve the problem.

- Preventive maintenance frequently calls for short—as little as one-hour—down-to-the-meat training sessions on specific problems.

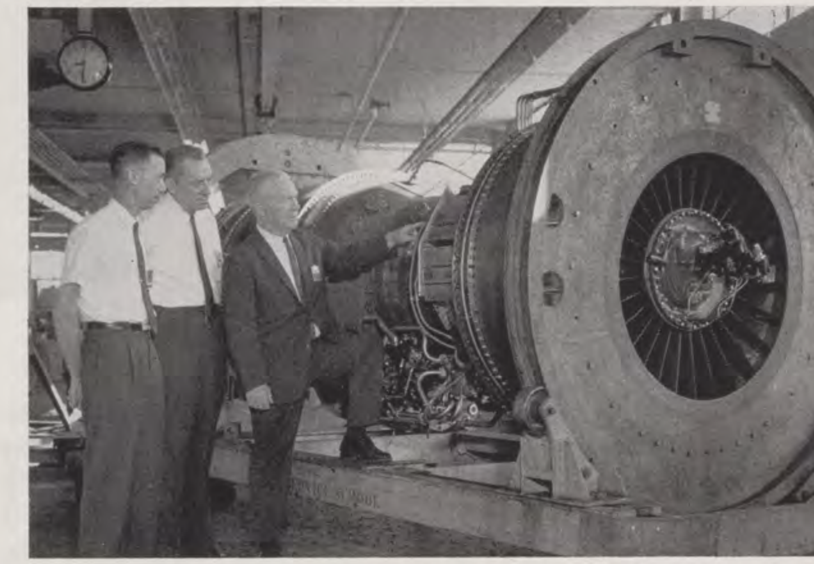
In one typical situation, aircraft were plagued by hydraulic leaks in the landing gear "0" ring. Analysis showed that color coding of certain parts was at fault. Immediately, instructors were sent to all maintenance bases to correct the maintenance practice.

- A volunteer program of home-study courses consisting of lessons and quizzes helps aviation mechanics earn their Powerplant rating.
- Suppliers visit maintenance installations to demonstrate new procedures.
- Even before a new airplane is delivered to the airline a training program is conducted at the aircraft factory as well as at sub-contractors' (e.g. air conditioning, autopilot, etc.) factories.

An average of 16 mechanics and inspectors spend full-time at the factory during construction of the new airplane. The average time for mechanics is two months; for inspectors it ranges from six months to a year.

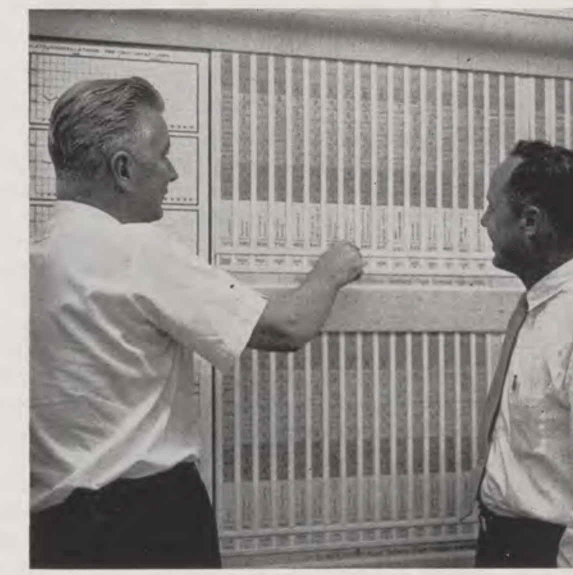
This constant emphasis on training pays off: In the past decade Delta has flown its 82-aircraft fleet more than 16.5 billion passenger miles without an accident.

Delta's principal overhaul base in Atlanta covers more than 30 acres, with 9 acres under roof. Hanger will accommodate three jets at one time.

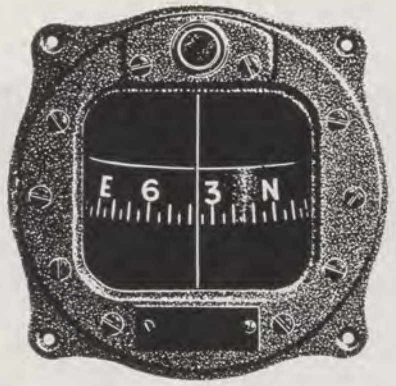


Training on new aircraft begins at factory. Here, two Delta maintenance inspectors *(left)* examine jet engine at Pratt & Whitney service school.

Airline conducts a variety of formal training sessions for its aviation mechanics on company time. This lecture covers fuel control system of DC-7.



Above, accurate charts help log analysts spot maintenance trouble areas that may require training to overcome the difficulty. Below, aviation mechanics such as Richard Palen are encouraged by airline to broaden their technical skills by taking home-study courses.



SAFETY FIRST

Know Your Magnetic Compass

The magnetic compass is one of the most familiar and least understood instruments in the general aviation cockpit. At best it is an erratic instrument. The line of least resistance is to ignore it and to take some comfort in the fact that it belongs on the instrument panel, looks nice there, and in some general way it indicates direction like moss on the side of a tree.

On the other hand, the compass is a reliable directional instrument if a pilot understands it and its inherent errors and, using a little rhyme and reason, compensates for the errors.

First there is the error in geography. True north (where Santa Claus has his hideaway) is not the same as magnetic north. The difference between the two is known as magnetic *variation*.

This is the angular difference between Santa's place, or true north, and magnetic north which is plotted on aeronautical charts in degrees east or west. This brings the whole problem down to simple addition or subtraction to convert a true heading to a magnetic one.

The problem is: "When to add; when to subtract?" For instance, a pilot going on a trip checks his chart for true course and notes the variation, east or west. If the variation is east, he subtracts the indicated number of degrees from his true course. If the variation is west, he adds. Or, in rhyme, "East is least, and west is best." Vice versa for converting magnetic to true.

Another compass error is caused by the airplane itself or even the wife's bobby-pins in the glove compartment. This is known as compass *deviation*, which is a deflection of the compass card so that its indication is not correct with reference to magnetic north as a result of local magnetic disturbances in the aircraft.

Two things can and must be done to compensate for deviation. First, avoid placing metallic objects near the magnetic compass. They may induce large amounts of deviation and seriously affect the instrument's accuracy.

Second, "Compass Rose" is the pilot's best friend and of inestimable value in checking and compensating the compass for deviation. The compass should be checked and compensated periodically. The errors remaining, after "swinging" with "Compass Rose," should be recorded on a compass correction card installed in the cockpit in full view of the pilot.

In going from compass to true heading, or true to compass, *variation* and *deviation* must both be considered.

Pilots with a bent for "poetry" might find these sayings helpful:

"True Virgins Make Dull Company" (**T**rue heading, corrected for **V**ariation equals **M**agnetic heading; corrected for **D**eviation equals **C**ompass heading.)

"Can Dead Men Vote Twice?" (**C**ompass heading, corrected for **D**eviation equals **M**agnetic heading; corrected for **V**ariation equals **T**rue heading.)

Variation and deviation are the primary compass errors. Once mastered, the airborne pilot finds himself faced with the more sophisticated compass errors—*oscillation, northerly turn and acceleration errors.*

The *oscillation error* is the erratic swinging of the compass card which may be due to turbulence or rough piloting technique. The *northerly turn* error is the most pronounced of the in-flight errors. It is most apparent turning to or from headings of north and south. The *acceleration error* can occur during airspeed changes and is most apparent in headings of east and west.

There are methods for "beating" these errors. These are detailed and demonstrated in the FAA's *EXAM-O-GRAM No. 12—The Magnetic Compass* published by the Federal Aviation Agency, Operations Airman Examination Staff, 621 North Robinson, Oklahoma City, Oklahoma.

Letters

FAA

FAA Aviation News welcomes comments from the aviation community. We will reserve this page for an exchange of views. Please keep them brief. No anonymous letters will be used, but names will be withheld on request.

• Chutes for Planes

Why can't three parachutes be installed in the top sections of all planes to serve in event the aircraft is in danger of crashing? The pilot could release the chutes and bring the plane down more slowly, thereby saving many lives.

We have parachutes that can land a heavy truck so three of them should land an airliner.

I believe it would reassure passengers and I know the cost would not be too great, and it might entice many additional persons to become air travelers.

Henry A. Marino
Long Beach, Calif.

The method you have suggested has been given much consideration in the past. Many technical problems would be involved in attempting to accomplish it.

For example, it would take parachutes of tremendous size and strength to absorb the loads to which they would be subjected if opened when a modern transport aircraft was traveling at a speed of several hundred miles an hour.

Such an airplane in many cases weighs more than three times as much as the heaviest military equipment which is dropped by parachute.

The airplane from which the military equipment is dropped travels at a much slower speed during the dropping operation than a commercial transport does.

• Helpful Inspector

I have been flying for about 25 years and have had my ATR for many of these years.

Recently, I purchased a PBY amphibian for my personal business travels. I had the airframe and powerplants completely overhauled and all the latest T.S.O.'ed instrumentation for safety and facility installed.

I had not flown the PBY since World War II. After a thorough review of the aircraft systems, I was able to find a current pilot for a very brief check out. After his re-check, I flew the airplane on test flights, etc., after overhaul, until I felt safe in the airplane.

Then I called Mr. A. E. Weninger of your Long Beach Office and asked if he would ride with me for a type certification in the aircraft.

After Mr. Weninger examined the exterior and interior of the aircraft, he thoroughly went through all of the paper work and in fact resolved several discrepancies. He advised me about what he expected of me during our flight and made a point of stressing that if I did not perform with the technique best suited in his opinion for each circumstance he would attempt to show me what he felt to be more acceptable.

After we arrived back at the flight line later in the afternoon, I knew I had been through the mill but I felt as if that was the best time I had invested in years. I well know Mr. Weninger taught me a few maneuvers in the PBY that could well save my life and the lives of many others.

I believe more pilots such as myself should become increasingly aware of the availability of men like Mr. Weninger for helpful proficiency checks and not feel as though the only reason for a check ride is one of legality.

Thank you for the many things you are doing through your fine organization to better serve all of us who use air transportation as a major business tool as well as a source of tremendous enjoyment.

Forrest M. Bird
Long Beach, Calif.

• Lost Pilot "Pathway"

I suggest an analysis be made of the areas within a 10-15 mile radius of all omni stations to determine if a heading is available that would provide reasonable "minimum ground obstruction."

At stations where this kind of heading is practical, a pathway could be indicated in the omni compass rose on aeronautical charts.

This would enable a "lost" pilot (weather, darkness, low fuel, etc.) to locate himself directly over an omni station as a last resort and then use the pathway on the compass rose for letdown in the area of that particular station.

The suggested approach altitude over a particular station also could be indicated on the compass rose for a defined procedure letdown on the indicated pathway.

I am a non-professional general aviation pilot who would prefer to letdown under semi-blind or blind conditions over an indicated path, rather than picking a dark hole or just letting down at random with a prayer and hope.

Gene W. Metzger
Chicago

We appreciate your suggestion but procedures already are available to assist a pilot who finds himself in difficulties such as those you describe. He need only announce to Air Traffic Control through any of its Flight Service Stations or other facilities that he is in trouble, and a vast network of electronic aids and specialists are immediately placed at his command.

Personnel at all FAA Flight Service Stations and control towers are prepared to render navigational advice which, in effect, can lead the pilot down a pathway to the most suitable terrain available under existing conditions.

This navigation can be accomplished using information supplied by the pilot from his airborne receivers. It may be obtained from FAA or military radar, or it may come from FAA direction finding equipment. The radar and DF methods require only an operable receiver and transmitter aboard the aircraft capable of providing two-way communication with FAA ground facilities.

The pilot who becomes trapped by weather, darkness, minimum fuel, or other situations should make his predicament known.

The safest way to get out of the emergency situation is to utilize the services of the trained FAA personnel who are available to help him.

• Flight Test Equipment

Please give me specific requirements for the equipment needed on an airplane used for a private pilot certificate flight test.

C.C.C.
Yazoo City, Miss.

The airplane must be equipped for the procedures and maneuvers required on the private pilot flight test. Among the procedures to be demonstrated are the use of radio for voice communications and as an aid to VFR navigation, and the control of an airplane in flight solely by reference to instruments.

A radio capable of receiving voice and navigation signals is necessary for the radio demonstration, although it may be of a portable type not permanently installed in the airplane. For the demonstration of control by reference to instruments, you would need at a minimum the following: a sensitive altimeter, a gyroscopic turn indicator, and a means for simulating instrument flight conditions (hood or visored cap). The use of full panel of instruments is desirable but not required.

• Instrument Flight Instruction

Will you please explain FAR 61.35, Par. C in regard to the 10 hrs. instrument flight instruction? Is the holder of a commercial with an instrument rating and a flight instructor certificate qualified to give this instruction if he does not hold an instrument instructor rating? Also explain this rule as applied to FAR 61.115 Par. A4.

John H. Morgan Jr.
Albany, Ga.

The instructor who conducts the instrument flight instruction required by FAR 61.35(c) must hold an Instrument Instructor Rating endorsed on his Flight Instructor Certificate.

This is also true of the "5 hours of instrument flight instruction from a rated flight instructor" required by FAR 61.115(a) (4).

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