AERONAUTICS

Civil Jet Age Is Upon Us

Military experience with jets is about to pay off for the air traveler as jet and turboprop liners are rushed into production.

By EDWARD HOUSMAN

➤ THE WHISTLE of shiny new turboprop airliners cutting across American skies heralds the beginning of the civilian jet age in this country.

Lessons learned in the design of military jets are about to pay off for the traveler in far greater speed and comfort in flight. Imagine taking off from Paris after a light continental breakfast and landing in New York in time for an American ham-and-eggs breakfast.

When you debark, the only meal you will be able to buy is breakfast, for the plane will land at approximately the same time it took off, sun time. The aircraft will travel as fast as the earth spins at the flight latitude, or at about the speed of sound. The sun will seem to remain in the same spot in the sky during the whole transatlantic flight.

This is not all fancy. Speeds close to that will soon be possible with jet airliners now being readied for production.

The Vickers Viscount turboprop airliner, now in service on Capital Airlines, is the stepping stone to the jet age. The turboprop engine is a jet, but not in the ordinary sense. The blast of jet air stays mostly inside the engine and is used to spin a turbine that spins the propeller. Harnessing the jet gases to a propeller allows greater fuel economy at lower altitudes and medium speeds. On the other hand, the turbojet engine used on modern fighters propels the plane by exhausting hot gases to the rear, pushing the plane forward.

Many Major Contenders

No pure turbojet-powered aircraft are in commercial service today, but the race is on among aircraft manufacturers of the world to get a civil turbojet liner into satisfactory production form.

Here are the major contenders:

The new Comets, models 2, 3 and 4, now being tested in England, are variations of the Comet 1, the first and only commercial jet to go into passenger service. Unfortunately, the Comet 1 was grounded a little over a year ago after crashes caused by weakness of the pressurized fuselage. The British are pinning their hopes on the latest model, the Comet 4, which is expected to be ready for airline use in 1958. Designed by The de Havilland Aircraft, Ltd., the plane will carry 58 passengers at a speed of 500 miles an hour.

In the United States, two major jet liners have been proposed. The Douglas Aircraft Company will produce a huge four-engine plane, the DC-8, the over-water version of which is expected to weigh 257,000 pounds gross. The largest presently used airliner, the Boeing Stratocruiser, weighs 145,000 pounds.

First test flights for the DC-8 are scheduled for December, 1957, and deliveries to airlines should begin in 1959, the manufacturer said. Cruising speed of the DC-8 will be greater than 550 miles an hour. The swept-wing jet will be able to make nonstop trips to Europe regardless of headwinds and fly from Los Angeles to New York in four and one-half hours. It will carry 80 to 125 passengers.

The second U. S. jet, Boeing's 707, is in a more advanced stage of development. A prototype has been flown almost 200 hours in tests, and a military version, the KC-135, is in production as an Air Force tanker for aerial refuelings. The Air Force has just given Boeing Airplane Company the go-ahead on producing the 707 for civilian use. Previously, it was feared that military contracts would hold up 707 production. This might have given the lead in the jet liner race to British Comets.

Boeing 707's, which will cruise at 550 miles an hour and carry 80 to 135 passengers, are expected to be delivered early in 1957. If this occurs, the four-jet plane will be ready for service a year before any of its rivals.

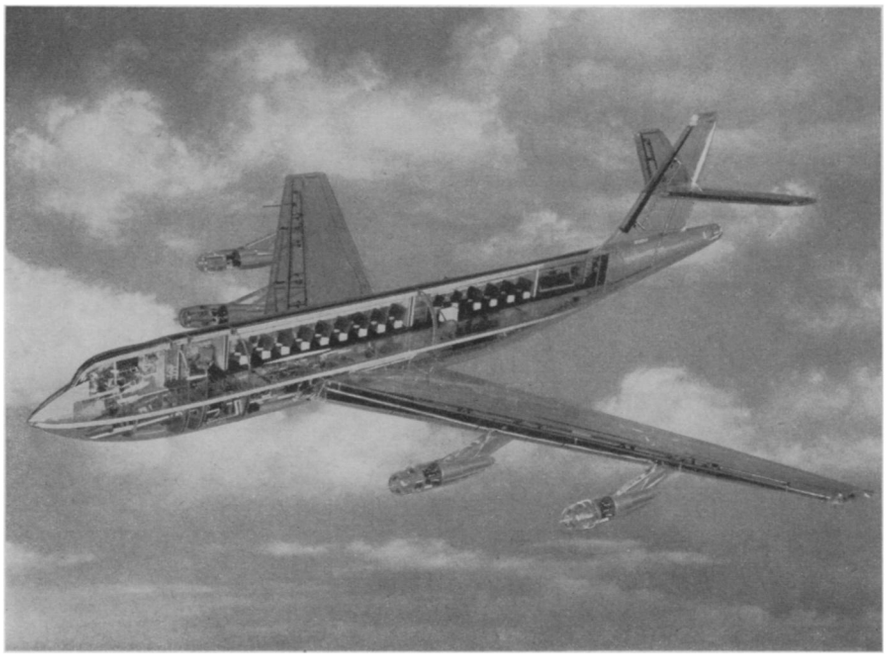
France is entering the jet race with the Caravelle, a 70-passenger airliner expected to cruise at more than 480 miles an hour. Its two jets are near the tail instead of on the wings. Its designers claim tail jets will reduce the noise reaching passengers.

Russia's Progress Unknown

Next to nothing is known, officially at least, about Russia's progress in the commercial jet field. Recent air shows, however, have demonstrated that the Soviets have advanced jet engines on military craft that could well power commercial planes.

The proposed jets will be used only for long-distance, high-altitude flights where the time saved in flight becomes significant and where jet engines can work at top efficiency most of the time. This is the view of Gordon R. McGregor, president of Trans-Canada Air Lines, and most observices in this country agree.

Mr. McGregor sees the following airline pattern for the future: turboprops for short- and medium-range flights; a new engine,



JET OF FUTURE—This transparent view of a model of a commercial jet shows the kind of plane we may be using soon. No turbojets are in commercial service today, but the production race has started.

the by-pass, for medium long-range hops, and the conventional jet for long-range duty. The piston engine used almost exclusively in today's commercial airplane engines is presumably on its way out as the dominant power plant.

The by-pass engine, predicted for medium long-range flights, is now in the experimental stage, but experts believe that the revolutionary power plant shows great promise.

The only commercial by-pass engine in advanced development stage today is the Rolls Royce Conway of Great Britain, but almost nothing has been released about its performance. It is proposed as the power plant for the VC-7, a British airplane now being developed.

For improved economy at medium-high altitudes and high speeds, the by-pass engine draws more air into the intake than is ordinarily used for burning jet fuel. The excess air is routed around the combustion chamber into the exhaust. The by-passing air slows down the exhaust gases, making the engine more efficient for airplane speeds greater than can be obtained economically in a turboprop, but slower than top jet efficiency.

Efficiencies Compared

The ideal by-pass range is from 500 to 600 miles an hour, precisely the speeds at which airlines are now aiming.

Efficiency of propellor driven planes, such as the turboprop, is best at low speeds, then drops to nearly zero near the speed of sound. Jet efficiency increases directly with speed and shows best performance beyond the sound barrier. The by-pass engine's peak efficiency lies somewhere between the two types. It offers fuel economies of from five percent to ten percent over the jet and is quieter.

For shorter hops, the turboprop engine seems most promising. It offers greater speed than comparable planes driven by piston engines, and has less rumble and engine noise.

In the turboprop field, the 44-passenger 320-mile-an-hour Vickers Viscount has a considerable lead, and its successful use by European and Canadian airlines has spurred development of other turboprop models.

Turboprops Planned

There is also the Bristol Britannia, now being tested in Britain, which should be available next year. The Dutch have developed the Fokker F-27 which is smaller than the Viscount.

In the United States, the Lockheed Electra turboprop liner has been ordered by American Airlines, apparently in answer to Capital's new Viscount fleet. The Electra will probably be powered by four Allison 501 engines. Latest data set the Electra's speed at 414 miles an hour at 25,000 feet with 80,000 pounds. It will carry 64 to 80 passengers and should be coming off the production line in 1958.

Noise is a major setback in the jet's use, the jet engine being one of the loudest machines yet devised by man. In the air, the engines would probably not bother passengers because at high-flight altitudes the air is thin and cabins will be well insulated.

At supersonic speeds, which are predicted in from 20 to 30 years, jet noise for passengers will be no problem, since the plane would travel faster than the sound it makes, leaving the noise behind it.

If you have ever heard a jet fly low over you, you can imagine what an annoyance such engines might be to persons at or near an airport. Jets idling on the runway would also kick up a mighty roar.

Noise Reduction Schemes

Several recent schemes have been developed to reduce the noise problem. One is a portable screen that, when placed at the proper distance from the jet's exhaust cone, considerably reduces noise toward the roar.

Another proposal employs a collapsible sieve attachment for the engine exhaust. It changes the jet noise from a low roar to a squeal, much of which is of too high a pitch for human ears to catch. When the plane reaches cruising altitude, the sieve folds like a collapsible drinking cup, permitting full use of jet power. (See SNL, July 16, p. 39.)

Jets, as a rule, need longer runways than piston-engined planes, but most of the planes being designed could operate from many of today's modern fields safely.

Artificial control of airflow over the wings, called boundary layer control, is seen as the most promising way to shorten landing and take-off runs of future jets. One method employs blowers and suction.

Fuel Consumption High

Fuel is also a problem, especially with the jet. The Super-Constellation, equipped with today's efficient piston engines, needs about 22,000 pounds or almost 4,000 gallons of gasoline to make a non-stop transatlantic flight.

Turboprops drink even more fuel, but of lower grade. By-passes burn even more, and the turbojet tops the list in fuel consumption rate. For this reason, transatlantic jets will have to be giants like the Douglas DC-8.

Airlines in the United States are now "getting scared" as one official in the Civil Aeronautics Administration put it. They fear that competition from abroad and importing of Viscounts by one airline will upset the present passenger balance. Airlines and aircraft manufactureres are now maneuvering for position as they enter the stretch in the jet race. Experts are betting heavily that the outcome will be widespread jet service on major airlines in the next ten years.

Beyond that time, only the most reckless will venture a guess. Perhaps rocket service—perhaps even atomic aircraft lie above the future's horizon.

Science News Letter, September 3, 1955

METEOROLOGY

Antarctic Blizzard Hits Weather Stations

➤ WEATHER OBSERVATION STATIONS in Antarctica have been destroyed by a blizzard, the director of the Australian Antarctic Division, P. G. Law, reported in Sydney, Australia.

The weather stations were automatic and required no attention, he said. They were valuable because they were placed more than ten miles from Mawson in MacRobertsonland, helping to give a broad picture of the Antarctic weather that could not be gained from one station alone.

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