AERONAUTICS

Jets Push the Trade Winds

From the jungles of South America to the fashion salons of Paris, giant jet freighters are carrying more goods faster to consumers, a step expected to lower retail costs eventually.

➤ GIANT JET FREIGHTERS are shrinking the world for goods as well as people.

From delicious, exotic fruits to delicate computer brains, high-style fashions to brilliant tropical orchids, eyeglass lenses to entire orchards, the applications of jet freight broaden daily.

Produce can be picked ripe in the fields and jet-rushed overnight to markets 2,000 miles away. Little or no refrigeration is needed because the food is not in transit long enough to spoil.

Stores can restock merchandise from another part of the country on a few hours notice. Fads do not have a chance to become obsolete.

No time is wasted in the movement of cargo from shipping room to truck to rail to steamer to rail to truck to receiving dock. Jet freighters move the merchandise directly from point of manufacture to key retail outlets in a matter of hours. At present there are about a dozen cargo jets in the air, with 40 or more on order from Douglas Aircraft Company and the Boeing Company.

Forty-five Tons of Cargo

Able to lift 45 tons of cargo and speed it anywhere in the world at 600 miles an hour, jet freighters are opening up a whole new dimension in commerce. By developing new markets in previously unexploited areas, they are changing the air lanes into major freight highways.

The advent of the cargo jet is expected to have an even greater impact on the transportation industry as a whole.

Although planes that carry only cargo have existed for 20 years, the percentage of freight in the United States that moves by air is less than one-half of one percent. Breaking down that amount, only about 30% of the air freight moves in cargo planes. The rest rides in the holds of passenger planes.

This is because the air business was raised on and geared to passenger traffic. Air freight has always been secondary. But with the use of multimillion dollar jet freighters and costly terminals and loading systems to handle ground bottlenecks, air freight becomes important in its own right.

Once an airline initially invests about $50 million in a jet freight system, it must generate enough business to fill the huge planes to capacity. One cargo jet holds a little more than two railroad boxcars.

Many manufacturers already use air freight in shipping everything from ladies' wear to automotive parts, phonograph records and electronic instruments. But cargo jets have nearly three times the capacity of the DC-7F, the largest piston freighter, and twice its speed. Jets have squeezed the United States to five hours wide and two hours deep. They have narrowed the Atlantic Ocean to six hours.

Airlines with cargo jets must develop new markets for new products in new places. Luxury items from other parts of the world will soon become everyday realities at the corner store.

Market for Papaya

The advent of jet freight opened a new market in the United States for Guatemalan papaya, a luscious fruit that must be harvested while ripe and transported quickly in order not to lose its delicate flavor.

Taking advantage of the cargo jet's speed and space, thousands of pounds of papaya are cut and put on a California-bound jet at 6 p.m. one day and delivered early the next morning. Other Guatemalan produce, such as melons, avocados and grapefruit, may soon be traveling the same way.

In another instance, Pan American jet freighters transplanted an orchard full of trees from California to France. The shipment of 35,000 trees was on behalf of an American firm building a canning plant in France to produce canned peaches for the Common Market countries.

Through consulting services the airlines must show manufacturers that they can sell their goods at a much lower cost to consumers in the end by changing their pattern of distribution. The necessity of building huge warehouses, maintaining large organizations, tying up large inventories and paying for expensive crating is eliminated.

Shipping Without Crates

For example, a hotel full of furniture was airlifted from Louisville, Ky., to Bermuda by two jet freighters in four hours without protective crating. Upon arrival in Bermuda the furniture shipments were transferred directly to a coastal steamer, ferried to the hotel dock and placed in the individual rooms.

It is actually cheaper to ship freight by jet than by piston freighter as far as direct flying costs are concerned. The aviation industry expresses this savings in terms of ton miles, or the amount it costs to fly one ton one mile.

The direct flying cost of piston engines averages ten cents per ton mile. With jets the figure is about six cents a ton mile because of the large volume and high speed.

The jet plane is able to do this because of the four huge gas turbine engines which provide power. Each of these powerful fan engines generates 18,000 pounds of thrust for takeoff. In comparison, the DC-7F piston freighter has four engines of 3,250 horsepower each.

Douglas Aircraft Co.

BIG LIFT—Cargo on the pallet is transferred from a dolly train to a high lift device that raises it to the level of the jet trader's cargo door. A full load of 13 pallets can be moved on or off the DC-8F in minutes, with these specialized vehicles at terminals and the Douglas cargo loading system installed in the aircraft.

Both the Douglas DC-8F and Boeing 707-320C have a larger cargo loading door, a heavier floor and heavier landing gear than their passenger counterpart, the DC-8 and 707. The floor area of the cargo jet is greater than the floor area of any known military transport.

The technological developments which helped create the jet freight system are not restricted to the aircraft itself. New terminals and revolutionary ground handling facilities have been developed to prevent bottlenecks on the ground.

American Airlines, largest domestic carrier of freight, has a mechanized Astro-Loader system that unloads 90,000 pounds of cargo in 20 minutes and replaces it in another 20 minutes.

Cargo jets are changing the pace of international trade, but they are not expected to replace the piston freighters entirely. While the jets are feasible for cross-country, intercontinental and trans-oceanic flights, the pistons will always be needed on secondary short-haul routes and to feed into cities from outlying jetports.

Other forms of freight transportation have reached their limits. It is not feasible for boats, trains and trucks to double their size and speed overnight. But the air has no such earth limitations.

After the aviation industry created the biggest planes possible with piston engines, it developed the gas turbine engine and jet aircraft. Five years after the first passenger jet, jet freighters are winging their way around the world. But the story does not end here.

Engineers are already planning for supersonic transports that will withstand the breaking of the sound barrier and hypersonic transports that will fly many times the speed of sound.

"History has placed in our hands one of the most radical new tools of international trade in centuries," said Charles C. Tillinghast Jr., president of Trans World Airlines.

"There can be no doubt," he also said, "that the jet streams of today will be the trade winds of tomorrow."

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GENERAL SCIENCE

Rescue-Aid Satellites?

➤ SURVIVORS of airplane crashes, shipwrecks and other disasters could someday be located by rescuers using space satellites.

A disadvantage of emergency radio beacons, now being used on lifeboats and life rafts, is that their range is limited by the curvature of the earth and interference from the atmosphere at angles close to the horizon. One or more simple satellites, traveling in polar orbits about 600 miles above the earth, could eliminate this problem, said Heinz S. Wolff of the Medical Research Council Laboratories, London.

In Mr. Wolff's system, called SAFE, from SAtellites For Emergencies, a satellite would carry a high-powered radio transmitter, sending out pulses at about one second intervals. When the satellite passes over the emergency beacon with the survivor, the beacon would receive the satellite's signal and send back an "answering" signal, but at a slightly different frequency.

A ground station, also in sight of the satellite at the time, would normally receive only the satellite's regular pulse. When the satellite triggers the beacon, however, the ground station would receive both the satellite's pulse and, after a slight delay, the pulse of the beacon, re-transmitted from the satellite.

The time between the pulse from the satellite and that from the beacon would indicate the distance between the two transmitters. This would fix the location of the emergency beacon as being somewhere on a circle drawn on the surface of the earth, with the satellite directly above the center of the circle.

A second circle would be produced in the same way, either from a slightly later point in the satellite's orbit, or from a second satellite. The two circles would intersect at two points, one of which would mark the location of the emergency beacon. A third circle would intersect the first two at only one point, the site of the beacon. Transmitters of ample power could be contained in spherical satellites only one foot in diameter, with solar cells providing electrical power.

SAFE would require 30 to 50 ground stations to keep the satellites always in sight, or one station near one of the poles, which could receive stored data from the satellites once each orbit. The stations could, in addition, be set to send information automatically to search-and-rescue organizations.

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