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."

• Science News Letter, 86:218 Oct. 3, 1964

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.

• Science News Letter, 86:219 Oct. 3, 1964