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Constellation Conversation

A presentation of facts on the world's most famous airline transport

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The Constellation

Most people have had conversations about the purchase of a family automobile – but buying a million-dollar airliner is not so commonplace. To give you an idea as to how this airline goes about the important business of choosing its equipment, we have listed some of the questions which were asked of the manufacturer by our board of directors before deciding to purchase Constellation aircraft. Air-India International thinks you will be interested in the answers provided by Dr. Hall L. Hibbard, Vice President and Chief Engineer of Lockheed Aircraft Corporation.

1. WHAT WAS THE REASON FOR DEVELOPING THE CONSTELLATION?

Lockheed believed that there was need for a new standard of luxury, speed and dependability in air transportation. A series of conferences with operating airlines indicated that fulfillment of this need meant a reliable four-engined transport that would fly "over the weather" at 20,000 feet or more, at 300 miles per hour, with passenger-comfort features to fit requirements of the discriminating customers of the world's airlines. Lockheed spent more than 30 million dollars in developing those ideas, and the Constellation is the satisfying result.

And is this the same Constellation that is flying today?

No, the airplane has developed a great deal since then. The first design called for the Constellation to lift 72,000 pounds, including its own weight. Today it lifts 107,000 pounds, and in the near future it will lift 130,000 pounds.

How have these improvements come about?

Mainly through more powerful engines, which were not available at the outset. Structurally, the airplane has been capable of handling the larger loads from the beginning. In that respect, it was ahead of its time, and this is one reason for the long, useful life of the design.

How long has Lockheed been manufacturing Constellations?

The first Constellation flew on January 9, 1943. Early production models were requisitioned by the Armed Forces; deliveries to commercial airlines began in 1945. Since then,

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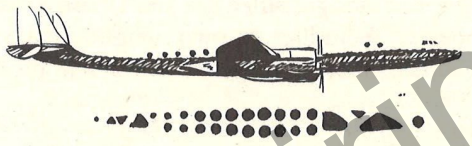
hundreds of these sky giants have been delivered, and additional hundreds are on order at the Lockheed factory.

A long list of commercial airlines, operating throughout the world, plus the U. S. Navy and the U. S. Air Force. At any given moment, day or night, there are from 50 to 60 Constellations in the air somewhere in the world.

Air blast from the four propellers exerts its force over three surfaces, rather than one, giving the pilot easier control. As for the fuselage, you notice that it has the same general shape as the cross-section of a wing. Thus the entire fuselage acts as an "airfoil," so that instead of being purely dead weight, it adds to the lifting power of the entire airplane, in the same way as the wings. These sound aerodynamic features contribute greatly to the superior range, speed, and smoothness of every Constellation flight.



The Constellation is essentially a "new" design. However, the designers naturally drew heavily upon Lockheed's previous experience in building aircraft. Such Constellation features as the Lockheed-Fowler wing flaps, booster controls for pilots, and all-metal control surfaces were all first developed in earlier Lockheed airplanes that flew on 35 airlines throughout the world.

No, indeed! As early as 1930, Lockheed planes were being used on some of the earliest passenger-carrying airline routes.

Nearly eleven million man hours, on the part of all sorts of engineering and design specialists, went into the first version of the Constellation. It took six years. Actually, if one person had set out to do it all alone – assuming that one person could ever acquire all the technical knowledge necessary – he would have had to start work 5500 years ago, around 3550 B.C.!

It never has been finished. Since the first design work started on the airplane, a Constellation Project Engineering group has been at work at the factory, and that group is there now. Every day something new is learned in the aircraft business. The experience of the airlines in operation has been invaluable, and as rapidly as improvements are found practical and desirable, they are incorporated into current Constellation construction. It is probably safe to say there have been as many as 8,000 modifications or improvements since the conception of the Constellation.

All major improvements developed at the factory are incorporated in airplanes in service. Lockheed is very

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jealous of the reputation of its Constellation, as are the airlines who fly it. Constellations are truly dynamic airplanes – that never cease to grow and improve. Lockheed is extremely proud of every one of them.

3. HOW ABOUT CONSTELLATION PRODUCTION—

Is that a complicated task?

It certainly is. For instance – not counting rivets and nuts and bolts, the airplane has 134,000 separate parts.

Does Lockheed make all these parts in its own plant?

About 100,000 of them – the rest are purchased from specialized manufacturers who lead in their various fields. To accomplish Lockheed's end of the fabrication and construction, 80,000 special tools and jigs were built for this one model. Accuracy is, of course, extremely important in aircraft construction. These airplanes are made with the same craftsmanship as fine precision machinery.

Does that mean that Constellation construction is on sort of a "custom" basis?

It does insofar as the quality of the craftsmanship is concerned. However, Constellations are manufactured on a production line, the same as automobiles. But just the propeller assembly alone on a Constellation contains more parts than the average automobile! The Constellation production line has never stopped since 1944, and is operating today at the greatest rate in its history.

Has there been any change in production methods in that length of time?

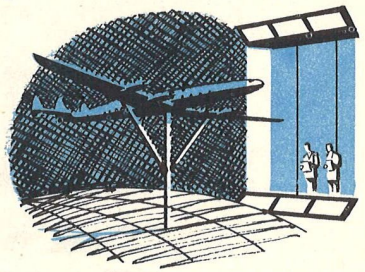
There certainly has. Lockheed has been an aircraft industry leader in developing advanced manufacturing techniques, and has an entire building, called the "Hall of Giants," where the largest fabricating machines in the industry are reducing weight and costs on aircraft parts. The entire lower wing panel for a Constellation is now being milled out of a solid slab of high-test aluminum! And there are dozens and dozens of other improvements resulting from Lockheed's experience on Constellations, and on fighters and bombers for our Armed Forces.

4. WHAT ABOUT THE TESTING PROGRAM *for these improvements – and for the entire Constellation?*

Every conceivable kind of research and test was used in Constellation development – about two million dollars' worth, in fact.

What type of testing was done?

Complete wind tunnel tests were run, of course, to perfect aerodynamic qualities of the plane. Then, in Lockheed's Mechanical Research Laboratory, every part was "life tested" to find the limits of its endurance beyond what would normally be required of it. To test the hydraulic system, an actual full-scale version was erected on platforms and racks. The same thing was done on fuel and electrical systems. One wing section, complete with its tanks loaded with fuel,



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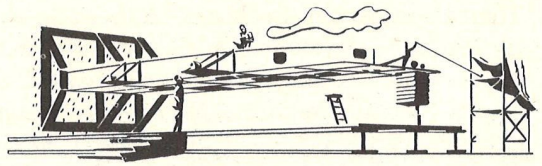
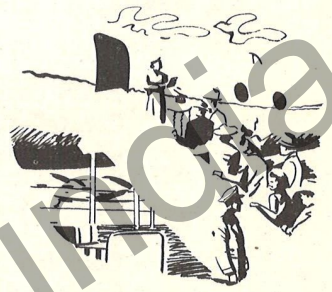
was mechanically vibrated for several months to test effects of engine vibration and air loads in flight.

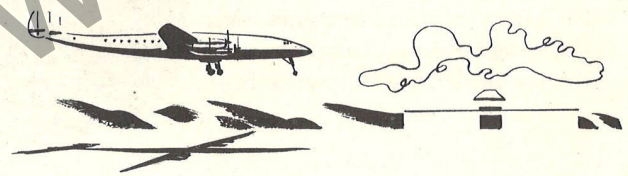


In hundreds of flights made on the "prototype" airplane, a total of 4670 hours in flight were logged before a paying passenger ever set foot in a Constellation! The Constellation passed its Government-required "indoctrination to service" tests in less time than any other transport in aviation history.



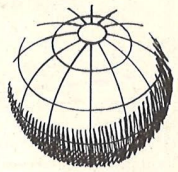
Passenger safety is the concern of everybody who has ever had anything to do with design or construction of a Constellation. That's why every Constellation has so much horsepower to spare. It will fly – and even climb – on any two engines. And on takeoff, the pilot has at his command as much horsepower as does the engineer of the largest diesel locomotive. That is why the Constellation will get off the ground more quickly than any other airplane of comparable size.

Landing with ample room to spare is also a Constellation specialty. Lockheed-Fowler flaps allow the Constellation



to be slowed in the air to a comfortable landing speed, so that the plane floats into contact with the ground on its rugged tricycle landing gear.

To the contrary – Constellation performance is superlative on short, medium, or long flights. The takeoff and landing characteristics make these airplanes ideal for use on even relatively small fields anywhere in the world. Their long range makes them just as ideal for long flights – be it over oceans, jungles of the tropics, or Arctic wastes.



The powerful engines and aerodynamic quality of the design allow the Constellation to cover lots of distance in a relatively short time with maximum payloads. And even in a most extreme emergency, with the worst known weather and head winds, adequate reserves of fuel can always be carried. The flight engineer adjusts engine performance to conform to the requirements of each flight.

He regulates the engines at the direction of the pilot. He also attends to other mechanical adjustments in flight. As a matter of fact, he supervises approximately 60% of all the dials and instruments, freeing the pilots to concentrate on smooth, comfortable flight.

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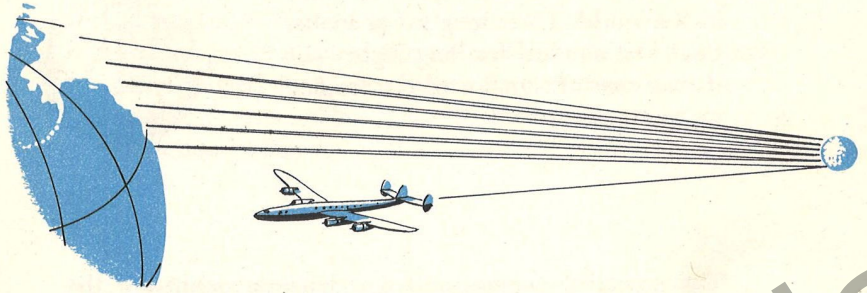
6. MANY MILLIONS OF MILES OF SERVICE *must have been recorded on Constellations by this time. Exactly how many?*

Probably the most accurate way to calculate Constellation service is in passenger miles – a passenger mile is one passenger flown one mile by an airline. A recent estimate is that over ten *billion* passenger miles have now been flown in Constellations. That's equivalent to 630 round trips to the moon with an average passenger load.



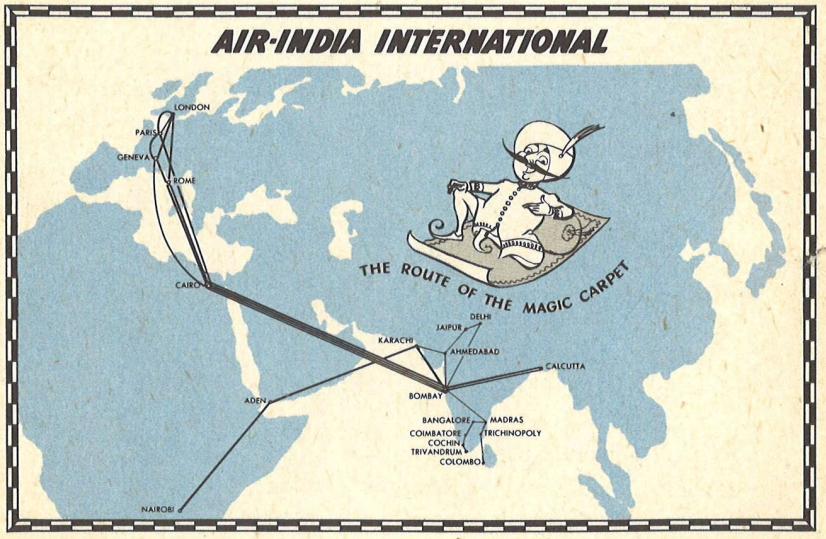
And this total grows all the time, no doubt.

The airlines now operating Constellations are accumulating passenger miles at the rate of two hundred million per month.

Are those flights both over-ocean and over-land?

Oh, yes – there have been more than 30,000 Constellation crossings of the Atlantic Ocean alone. You can travel via Constellation to just about any national capital or major city in the world – on schedules that were unheard of even a few short years ago! And I might add that wherever a Constellation flies, the integrity of the Lockheed organization flies with it. The Lockheed men and women who participate in creation of this magnificent airplane find it impossible not to retain a personal interest in its exploits, wherever it may be in service.

It has taken you approximately seven minutes to read about this Constellation Conversation, and during this time each majestic Constellation flying on important world air routes has progressed 35 miles farther in its journey. Each of these swift, safe and comfortable flights represents the work of many hundreds of people and its completion adds another page in the continuing record of dependable Constellation operation. We hope that whenever you travel, it will be by air – and when you travel by air, you will fly Constellation.



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