

Directions to the Club Meeting Location

Where: South St. Paul Municipal Airport, a.k.a. Fleming Field, located on the southern extremity of South St. Paul, south of I-494, west of Concord Street and East of Highway 52.

If coming from the western Twin Cities going east on 494:

- Exit at the 7th and 5th Avenue exit (Exit No.65)
- Turn right (South) on 7th Ave and go approximately .6 miles to a 4-way Stop sign. This is South Street W. To your left there will be a McDonald's; to your right front there will be a Walgreen's.
- Turn left (East) at the 4-way Stop onto
- South Street W and go approximately .6 miles. Along the way you will encounter three more Stop signs—the third Stop sign (Henry Avenue) will be a "T" intersection. At the "T" intersection on your left will be homes and on your right softball fields.
- Turn right (south) onto Henry Ave. and go approximately .2

miles toward the Fleming Field airport terminal building.
if coming from east Twin Cities on westbound 494:

- Exit at the 7th and 5th Avenue exit (Exit No.65)
- Turn left (South) on 7th Ave and go approximately .6 miles to a 4-way Stop sign. This is South Street W. To your left front there will be a small strip mall; to your right there will be an Amoco station.
- Turn left (East) at the 4-way Stop onto
- South Street W and go approximately .4 miles. Along the way you will encounter two more Stop signs—the third Stop sign (Henry Avenue) will be a "T" intersection. At the "T" intersection on your left will be homes and on your right softball fields.
- Turn right (south) onto Henry Ave. and go approximately .2 miles toward the Fleming Field airport terminal building.

The terminal is on the right with parking available.

Twin City Aero Historian
Rick Schmlerer
1852 E. 39 Street
Minneapolis, MN 55407

Return address requested

The Aero Historian is published monthly by the Twin City Aero Historians, Inc., a joint chapter of the American Aviation Historical Society and International Plastic Modelers Society/USA, for members and readers as part of their annual dues or fees.

The group is open to aviation enthusiasts from teenagers on up who are interested in aviation modeling, photography, collecting, art and writing. For more information contact Ken Hornby at 651-552-0888

The Twin Cities Aero Historians (TCAH) meet the second Saturday of every month at 1:30pm.

See above for the new meeting locations and directions.

Mail Newsletter material and address changes to the treasurer.

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DRAW DECALS

The Aero Historian

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December 2008



F-8C
by Frank Cuden

MOHAWK AIRCRAFT CORPORATION

by Noel Allard

Immediately preceding Lindbergh's flight across the ocean in 1927, several fledgling aircraft companies attempted to mass produce airplanes for the air-minded public. Among those was a Minneapolis concern, the Mohawk Aircraft Corporation; the brainchild of Leon Dahlem, whose vision included building an airplane that the average person could own and fly. Borrowing \$400 from his mother, he enlisted the help of engineer, Wallace "Chet" Cummings, who came

with credentials of having helped design several other aircraft for Alexander Aircraft Corporation of Colorado. The company was incorporated in April of 1927 with Rufus Rand, former WWI airman and Minneapolis banker as President and CEO. Engineer Dahlem, after creating the Mohawk Pinto aircraft, left for the US Navy, where he held a reserve commission. The plane then went into production.

In 1928, the first Mohawk Pinto airplane to make it into the sky was a simple low-wing monoplane with a Detroit "Aircat" engine of 60 hp. It was an open cockpit ship with fixed

landing gear and cockpits arranged in tandem, but offset so that the rear seat passenger could look over the shoulder of the pilot and share the flight instruments.

The first airplanes were ungainly on tall fixed landing gear, and were hard to handle. They had a sinister spin characteristic and several crashed with fatalities. U. of M. professor, John Akerman was hired to re-design the airplane and iron out the bugs. His redesign included placing the cockpits a true tandem arrangement, spreading the landing gear for more stability on the

(Continued on page 3)

<p>TCAH Officers</p> <p>President, Dave Nelson</p> <p>Vice-President, Larry Donovan</p> <p>Secretary, Merrill Anderson</p> <p>Treasurer, Jeff Fries</p> <p>Historian, Tom Norrbohm</p>	<p>Election Results</p> <p>Elections for club officers were held at the November Meeting, prior to beginning the annual auction. The new slate of officers for 2009 are:</p> <p>President: Dave Nelson Vice-President: Larry Donovan Secretary: Merrill Anderson Treasurer: Jeff Fries</p> <p>Congratulations and thanks to our new leaders. </p>	<p>strike against Boeing was not settled sooner.</p> <p>Jet Airways of India, has 260 foreign pilots. They will begin to phase out as more Indian pilots gain experience. This is a cost cutting initiative since foreign pilots are paid more. Most new airlines is developing countries, use foreign pilots - mainly American and European pilots.</p> <p>Uzbekistan Airways ordered four Boeing 767-300ERs worth \$597 million. The airline currently has 6 Boeing 757-200s and 5 Boeing 767-300ERs.</p> <p>Grupo Marsans, Europe's largest tourism group, ordered 61 Airbus A-380s, 10 Airbus A-350s, 5 Airbus A-330-200s, and 42 Airbus A-320s.</p> <p>LAN, the airline of Chile, ordered 4 Boeing 767-300ERs for \$636 million for delivery in 2012.</p> <p>Delta Airlines is expanding its marketing agreements with Alaska Airlines. Is this another possible take-over or merger? It sure looks like it, in this case.</p> <p>Airline employment continues to fall. Employment fell 4.5% in September of 2008 as compared to September of 2007. September was the third consecutive month of a fall. The number of airline employees fell below the number in 1997. Alaska Airlines is the only exception among the legacy airlines. They grew the number of employees. Also, among the new low cost carriers, there was some growth in the number of employees. Jet Blue was up 6.7%, Spirit Airlines was up 9%, and Southwest Airlines was up 5.2%.</p> <p>Southwest Airlines paid \$7.5 million for bankrupt ATA's landing slots at LaGuardia Airport. Southwest Airlines is becoming more aggressive into larger markets at larger airports, now that some of the</p> <p style="text-align: right;"><i>(Continued on page 3)</i></p>	<p><i>(Continued from page 5)</i></p> <p>import shipments to boom, and so allowed electronics manufacturing to move across oceans.</p> <p>The high profile, modern image, and made-in-America characteristics of air travel made it a terrorist target even before the 1970s. But after airport security was tightened in the early 1970s, a comparative lull in skyjacking and terror in the air in the 1980s and 1990s led to coordinated skyjackings, or suicidal hijackers, even though both had happened, and been threatened. The incidents were very rare. Then came September 11, 2001.</p> <p>Now the novelty and glamour of air travel is a memory. The list of legendary airlines like Pan Am, TWA, Swissair, Sabena, Eastern, Braniff and others now defunct only grows. Airports are no longer thought of as civic monuments or tourist attractions; more as grim necessities like pipelines or power plants. Merely taking photos of jets at a busy airports anywhere in the world could likely lead to the photographer being questioned by the authorities.</p> <p>Fuel cost has made air travel more expensive, but is not likely to end it. Biofuel experiments have already been done, and coal can be distilled into kerosene fairly easily. (This was done on an industrial scale over a century ago.) You could bet on airliners in 2050 being similar to today's, but many, if not most, automobiles could be powered differently by then.</p> <p>Mass air travel was not predicted. Futurists like Jules Verne and H. G. Wells wrote nothing about it. Even aviation enthusiasts in 1945 did not foresee the near extinction of ocean liners and passenger trains by 1970. Also not predicted:</p> <ul style="list-style-type: none"> - Airports with many hundreds of daily flights. - Aircraft types flying for a decade after introduction without a 	<p>fatal accident. (Boeing's 777 has gone over 15 years!)</p> <p>The population of a sizeable city suspended over the Atlantic, the Pacific, Asia, Europe, or North America.</p> <p>None of this was predicted, or even conceivable, before the jet.</p> <p>So the Jet Age did not fail, it succeeded too well. Demand for flights and low fares consistently exceeded supply all over the world. As a nation's economy developed, air traffic grew in tandem. Almost no one in the 1970s would have predicted booming airline industries in China and India, but that's the reality in 2008.</p> <p>50 years ago, the Boeing 707 ushered in a new age so pervasive and influential, most people can no longer notice it. Passengers think of their destination, not the once-intimidating mountain ranges, oceans, and Polar Regions miles below. The typical passenger is no more able to explain how airliners fly or jet engines work than 50 years ago, and passengers do not dwell on how just inches away the temperature averages 40-50 degrees below zero Fahrenheit and the atmosphere would produce unconsciousness in under one minute.</p> <p>As an American revolution, the Jet Age had no patience for elitism. The Jet Age was about scientific research and development, high technology, mass production, high finance, practical regulation and standardization, cost calculation, market research, an understanding of human nature, and a bit of showmanship and promotion. Only post-WWII America had all these qualities. Ever since, airports, airlines and aircraft manufacturers have had to follow American examples.</p> <p>The jet airliner definitely symbolizes the post-1958 era as much as the steamship, railroad, covered wagon, or sailing ship did for earlier times. The jet, for good or bad, has changed the way mankind lives, moves, conducts commerce, and</p>	<p>even thinks.</p> <p>As Great Britain's dominance of the sea defines its time, the post-1958 era has been defined by the Jet Age.</p> <p>The Jet Age is also an example of America and American's love of utility. America has a tradition of taking an object produced out of a useful need, like blue jeans, the Model T Ford, modern architecture and steel frameworks, communication satellites, the Boeing 707, and even hamburgers and buns, to name just a few items, apply mass production, and end up with something of enormous symbolic meaning. Americans do not even try to make this process happen, it just does. And the original invention doesn't even have to be an American one, as jet airliners and super-highways prove.</p> <p>So what will be the next great industry, a game changing application of high technology? Clean, renewable energy is the best guess. Unlike air transportation or computers in their early days, vast worldwide demand is quite obvious. Government involvement will be necessary, again like air transport and computers. And, judging from the Jet Age, applied technology can make the unimaginable possible, then routine, then commonplace, all over the world.</p> <p>So just what are people saying is impossible now? </p>
<p>Newsletter Info</p> <p>Article Submission Deadline: 22nd of each month.</p> <p>Editor</p> <p>Bob Arko 6417 Rice Court Lino Lakes, MN 55014 651-481-8887h 763-496-6742w bob@loumc.com</p> <p>Distribution Editor</p> <p>Rick Schmierer 1852 E. 39 Street Minneapolis, MN 55407 612-721-8787 rschmierer@mn.rr.com.</p> <p>Send articles to:</p> <p>Bob Arko 6417 Rice Court Lino Lakes, MN 55014 bob@loumc.com</p> <p>Send Change of address notice to: Steve Jantscher 20430 Texas Avenue Prior Lake, Minnesota 55372</p>	<p>Airline Chatter by Terry Love</p> <p>U S Air lost \$865 million in the third quarter of 2008.</p> <p>Jet Blue lost \$4 million in the third quarter of 2008.</p> <p>Air Tran lost \$107.1million in the third quarter of 2008.</p> <p>Alaska Airlines lost \$86.5 million in the third quarter of 2008.</p> <p>GOL, the Brazilian airline, lost \$209 million in the third quarter of 2008.</p> <p>Frontier Airlines lost \$30.4 million in the third quarter of 2008.</p> <p>Hawaiian Airlines ordered two more Airbus A-330-200s airliners to join its fleet in 2011. This order is on top of the order for 24 new aircraft.</p> <p>Sterling Airlines has filed for bankruptcy, and grounded all of its aircraft.</p> <p>U S Government approved the Northwest Airlines-Delta Airlines merger on Wednesday, October 29. Deal is worth about \$2.6 Billion.</p> <p>Airbus expects a sharp drop in the number of airliners ordered next year in 2009. SO does Boeing, and this is one of the reasons that the</p>	<p>even thinks.</p> <p>As Great Britain's dominance of the sea defines its time, the post-1958 era has been defined by the Jet Age.</p> <p>The Jet Age is also an example of America and American's love of utility. America has a tradition of taking an object produced out of a useful need, like blue jeans, the Model T Ford, modern architecture and steel frameworks, communication satellites, the Boeing 707, and even hamburgers and buns, to name just a few items, apply mass production, and end up with something of enormous symbolic meaning. Americans do not even try to make this process happen, it just does. And the original invention doesn't even have to be an American one, as jet airliners and super-highways prove.</p> <p>So what will be the next great industry, a game changing application of high technology? Clean, renewable energy is the best guess. Unlike air transportation or computers in their early days, vast worldwide demand is quite obvious. Government involvement will be necessary, again like air transport and computers. And, judging from the Jet Age, applied technology can make the unimaginable possible, then routine, then commonplace, all over the world.</p> <p>So just what are people saying is impossible now? </p>	<p><i>(Continued from page 6)</i></p> <p>cluding Europe, the Mediterranean, China, Burma, India, and the Pacific. Considered the most technically advanced aircraft used during that War, the P-61 was beloved by its pilots as "a beast of an airplane that flew like a fighter." Aside from telling the story of the Black Widow's development and service history, this book also contains comprehensive appendices with detailed data for every single P-61 ever built.</p>		
<p>TCAH This Month</p> <p>The monthly meeting will be held Saturday December 13, at Fleming Field, South St. Paul, beginning at 1:30 pm. Vendor baiting will begin about 12:30, so come early.</p> <p>Picture your model here! Send me a photo of your model, and it'll be used to fill these little white spaces at the ends of the columns.</p>	<p>TCAH This Month</p> <p>The monthly meeting will be held Saturday December 13, at Fleming Field, South St. Paul, beginning at 1:30 pm. Vendor baiting will begin about 12:30, so come early.</p>	<p>TCAH This Month</p> <p>The monthly meeting will be held Saturday December 13, at Fleming Field, South St. Paul, beginning at 1:30 pm. Vendor baiting will begin about 12:30, so come early.</p>	<p>TCAH This Month</p> <p>The monthly meeting will be held Saturday December 13, at Fleming Field, South St. Paul, beginning at 1:30 pm. Vendor baiting will begin about 12:30, so come early.</p>		

Northrop's NIGHT HUNTER P-61 BLACK WIDOW

Foreword by
Alvin E. "Bud" Anderson



Jeff Kollin

Book Review
P-61 Black Widow
by Jeff Kollin
Published by Specialty Press

The story of Northrop's P-61 began on 30 January 1941, when the U.S. Government awarded a contract for the development of a brand new airplane designed specifically as a night fighter. Although this was before the U.S. officially entered World War II, the need for such an airplane resulted from lessons learned from the RAF during the Battle of Britain. This

contract effort produced a massive twin-engine, twin-tailboom design bristling with an array of machine guns and cannons, capable of 400-mph speeds, and with a 1,200-mile range.

Powered by two turbo-supercharged 2,800-hp Pratt & Whitney engines, the new airplane not only looked menacing, but even had a name that evoked fear in the hearts of its adversaries, for it was called the Black Widow, one of the deadliest beings on earth. The P-61 also featured a potent combi-

nation of advanced onboard radar systems and lethal firepower that gave it a knock-out punch for aerial encounters. The aircraft's 2,000-foot-per minute rate-of-climb was almost unheard of for a machine that was 48 feet long, had a wingspan of 66 feet, and weighed nearly 30,000 pounds at takeoff.

The Black Widow's operational history, which began in summer 1944, also bears mention, as the air-plane served in nearly every combat theater of World War II in-

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other airlines are weaker, financially.

Alitalia, the bankrupt airline of Italy, has been sold to a group of private investors for \$1 million Euros - less than \$2 million US dollars. The flight equipment owned by Alitalia is worth Billions, but a lot of headaches come with them. The airline was owned by the Italian Government. The government has neglected the airline for years causing economic strife, labor revolts, and no cash on hand. Alitalia will post an operating loss of \$1 Billion Euros (\$1.25 Billion US Dollars) in the third quarter of 2008.



(Continued from page 1)

ground, and lengthening the fuselage to alleviate the spin problems.

The plane was handsome and colorful in cream with red or black accents and scallops along the leading edges and stripes on the fuselage. A Native American head logo was prominent on the sides of the fuselage. Following the redesign, the plane was available with either Kinner or Warner engines of 90 hp or 110 hp respectively. Apparently it was interesting enough that over thirty aircraft were produced in a warehouse in the Midway District of Minneapolis/St. Paul. The planes found their way around the country thanks to a network of dealers and expositions, and a version was tested by the US Army Air Corps in 1930, but did not fit the Army's requirements for a pursuit plane. A twin-engined version with a covered cockpit made it to the prototype stage, but never entered production due to the stock market crash and following financial disaster that swept the country in 1929.

The Mohawk series achieved three federal ATC numbers and Mohawk aircraft were on the Minnesota Civil Aircraft register until 1934 with at least a pair becoming classroom training units during that time.

Sadly, not a single piece of a Mohawk aircraft is known to remain. It is a somber ending for the legacy of Minnesota's only certificated production aircraft prior to the Cirrus designed nearly seven decades later.



December TCAH contest

This month's meeting, we will try something new. We will have a "members only" contest. Any model can be entered as long as it was finished in this last calendar year. Depending what is brought in we will divide the models into categories, and give 1st, 2nd, and 3rd place awards. Judging will be done by club members, each will get a ballot to judge in each category. We ask for all club members who build to please bring in their models and try to make this a success.



Decal Setting Solution-Warning!

by Don Stauffer

I had a very nice pair of needle-nose tweezers that I bought from someone in TCAH. I used them a lot for applying decals. The other day I was doing some decal work, so had the tweezers and a bottle of decal setting solution near each other on the workbench, with the setting solution open.

Now, I know that this solution is an acid (acetic acid- essentially vinegar), but I figured it was too dilute to be dangerous. Anyway, I bumped the bottle of solution and spilled about half a bottle on my bench top. I cleaned up most of it, but did not notice a puddle near the tweezers and X-acto knife. About an hour later I went back to work and found the tweezers covered with rust. When cleaning those off as best I could (they are still brown) I found the needle points were dissolved away! The X-acto blade was also trashed, but the aluminum handle was fine.

Even though that decal setting solution is quite dilute, it apparently

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Mohawk MLV 7294 Pinto at Minnesota State Fairgrounds, 1928.
MN State Fair photo #8025.

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 can do a real job on stainless steel, so beware of this stuff if you have stainless tools in the area. Now, some of you may say, "hey, I thought stainless steel was acid proof." There are a number of kinds of stainless steel. Some of them ARE acid proof, but obviously not all. Don't take chances. I now will also clean tools off when I have been working with decal setting solution. Ordinarily I guess it is not in the solution long enough for harm, but I am not taking any more chances. If you spill the stuff near any SS tools, clean everything up, pronto!



Book Review
B-26 Marauder Units of the MTO
 by Mark Styling
 Published by Osprey



The revolutionary design of the B-26 and its associated flight characteristics initially gained it a reputation as a "widow maker," receiving nicknames such as "The Baltimore Whore" and "The Flying Prostitute" - both a reference to its short wingspan (meaning no visible means of support). Gradual improvements to the design and the development of effective combat tactics enabled these units to make the B-26 a very

effective and safe combat aircraft. The bombing accuracy of the B-26s was unrivalled and they were therefore selected to bomb targets such as the Florentine rail network. Lt. General Eaker, MAAF CO, said: "When we teach the B-17s to bomb like the B-26s, we will have accomplished our job."

Hastily trained on an airplane with a bad reputation and rushed into combat in North Africa, the MTO B-26 groups went on to gain an enviable reputation for bombing accuracy and low combat loss rate. Performing the dangerous close support and interdiction roles, the units played a major role in the defeat of Axis forces in North Africa, Italy and Germany. They proved the B-26 to be a highly reliable, effective medium bomber - indeed, an MTO-based B-26 was the first ever USAAF bomber to reach the 100-mission mark. It was the three MTO Bombardment Groups that established the Marauder as one of the USAAF's truly great aircraft of World War 2.

This book has vivid firsthand accounts and previously unpub-

lished, high-quality photos bring to life the story of the design and development of one of the greatest aircraft of WWII. There are three nose art galleries detail the markings of some of the most colorfully decorated aircraft of the war, and coverage of units rarely featured in histories of the air-craft.

Mark Styling has previously written *Aircraft of the Aces 8 - Corsair Aces of World War 2*. He has been researching the B-26 Marauder for more than 15 years, and in that time has unearthed a wealth of new information and photographs. Styling has illustrated many titles for Osprey including the *Aircraft of the Aces*, *Combat Aircraft* and the *Elite Units* series since 1994. Now based in Bridport, Dorset, he creates accurate illustrations of any chosen air-craft type. He produces some of the best art-work available to Osprey.

(Editor's Note: This book has 13 pages of color profiles, plus 3 pages of nose art [example below]. Lots of reference material here.)



50th Anniversary of the Jet Age
 by Bob Friskney

A golden anniversary is passing unnoticed. Fifty years ago, on October 26th, 1958, a Pan American World Airways Boeing 707 jet flew from New York to Paris, ushering in the Jet Age. This flight took 8 hours and 55 minutes, with one soon to be unnecessary fuel stop at Gander, Newfoundland. Even this schedule cut travel time nearly by half. In 2008, its hard to even imagine a time without worldwide jet travel, but the Post-9-11 airline and aircraft industry doesn't seem to feel up to any sort of observance.

This was a made-in-the-U.S.A. revolution. Boeing had leveraged its experience with the large B-47 and B-52 jet bombers to venture into a new design for a jet tanker and transport. The resulting Boeing 707 jetliner led to Douglas competing DC-8, to protect their civil transport markets. (The DC-8 would be less successful than the 707, selling about half the 707's total, and setting into motion a chain of events leading to McDonnell Douglas being acquired by archrival Boeing in 1997.) The Boeing 707 and Douglas DC-8 would set the standard on all long routes worldwide throughout the 1960s, with almost no competition. The British Comet 4 went into service on October 4, 1958, but the Comet was smaller and slower than either American jetliner, and so was little competition. (This was one milepost in the decline of the British aircraft industry, a story too long and sad to tell here.) The French produced a smaller jetliner, the Caravelle, for short hauls, entering service in 1959. The Caravelle's success would excite French ambitions, leading directly to the supersonic Concorde and the Airbus consortium.

The jet quickly became the primary means to travel across oceans. From 1947 to 1957, both air and sea traffic across the North Atlantic steadily increased, but airline passenger/miles showed large increases every year, while sea

miles increased much more slowly. Few knew that 2nd class, Tourist, and Steerage fares produced the thousands of budget-minded passengers that covered the overhead and made the profits that kept the steamships running. First Class got all the publicity, but was lucky to break even. In 1952, the airlines made the first serious play for the mass market across the Atlantic with Tourist fares, about one third below previous rates. Steamship traffic below First Class began to divert to the airlines. In 1957-58, air passenger/miles across the Atlantic exceeded steamship volume for the first time. 1958 saw the introduction of even cheaper Economy fares, and the new jets would have Economy seating from the start. By 1970, the biggest liners would be either permanently docked or converted to-cruise ships.

The Jet Age was part of a much larger effort. Pursuit of trade, re-nized as the basic cause of two world wars, so after WWII, in tandem with military deterrence to preserve peace, the United States and its allies would promote a worldwide network of commerce, open markets, and free trade. Social and cultural exchange was expected to follow, and the Jet Age was a part of this. Now we all call it globalization, and most people on Earth deal with the effects daily.

The Jet Age had spin-off effects. Even before jets, the written hardcopy reservations systems used by all airlines were becoming hopelessly inadequate. The only solution was electronic computers for records storage, with real-time data entry and retrieval at dozens, later hundreds, then thousands of places worldwide. These networks, development of computers, data processing, and communications were everywhere in the world served by international airlines. By the 1960s, this meant every large city outside of the Communist bloc.

The 707 and DC-8, at 110 to

150 seats, were almost twice as large as the propeller aircraft they replaced. For several years, passenger traffic failed to keep pace. European airlines flying the North Atlantic pushed for higher fares through the International Air Transport Association (IATA) But the U.S. government and U.S. airlines Pan Am and TWA refused to agree. Instead, fares were cut for 1964, air traffic immediately boomed, and the ocean liners were decimated. Airports became jammed, and would require constant expansion right up to the present. Consumer pressures for lower airfares led directly to airline deregulation in the U.S., and pressure to deregulate other industries.

World air traffic would quadruple in the 1960s. In just a few months in 1964 and 1965, the 707 and DC-8 went from too big to not big enough. Soon they were joined by hundreds of short haul 727s, DC-9s, and 737s. Douglas quickly designed and built a larger, stretched DC-8. Boeing's 707 was not as easily stretched, and pressure from Pan Am led to the launch of the 747 in early 1966, an aircraft more than twice the size of the 707. The McDonnell Douglas DC-10 and Lockheed L-1011 followed soon afterward. Europe combined its efforts into the Airbus Consortium to build a family of passenger jets as the only realistic way to compete with the Americans after the supersonic Concorde was a sales flop.

The giant wide-body jets again outpaced traffic growth in the 1970s, leading to more pressure to deregulate, and hub-and-spoke route networks to feed the beasts. Oil price shocks led to unceasing pressure on airlines to cut costs and save fuel. (The Concorde, and other supersonic transports, were ruined by high fuel costs more than any other factor.)

Lower operating costs and bigger bellies led to cheaper wide body air freight. This allowed high value

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