

1978-1979

Sabbatical Leave Report

by

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October 31, 1979

Acknowledgment

My sincere thanks is extended to the Board of Trustees and the administration for the opportunity presented to me by this leave.

I had presented numerous written reports while associated with the air transportation industry prior to joining the staff at Mt. San Antonio College. This experience, however, has given me an appreciation of the research and organization necessary to complete a project of this nature.

In addition, I wish to thank the Mt. San Antonio College Publications Department and the Mt. Sac Book Rac. The co-operation I received made it possible to provide a moderately priced textbook for my students for this fall semester.

Purpose and Objective

Since my second year at Mt. San Antonio College, I have taught Air Cargo Transportation 16 without a textbook, much to the displeasure of my students. There has been no suitable textbook on the market during that time, and no prospect for one in the near future. The purpose of this sabbatical leave, as stated in my original request, was to research and write a textbook for that course.

The benefits from this effort were derived in many ways. Through my visits to several airlines, support companies and government agencies, I was able to establish or re-establish contacts within the industry which will not only be of value to me in all transportation courses I teach, but also valuable in aiding my students in securing employment in the industry. I was able to acquaint myself with new products, procedures and services common in the industry today through first-hand observation. I was taken

on personal facility and operations tours, and this "review of the old and introduction to the new" was most beneficial to me, and I'm sure these new insights ultimately will benefit my students in the classroom.

My students now have a textbook which will provide regular reading material; the extensive appendices will provide required reference material for use in classroom and homework assignments.

One last benefit has accrued to me - the personal satisfaction I have enjoyed from this effort have been well above what I expected.

Personal Contacts

Air Transport Association, Washington, D.C.

Air Wisconsin, Appleton, Wisconsin

Civil Aeronautics Board, Washington, D.C.

Continental Air Lines, Los Angeles, Calif.

Eastern Airlines, Miami, Florida

Emery Air Freight, Los Angeles Offices, CA

The Flying Tiger Line, Los Angeles, Calif.

Federal Express Corporation, Memphis, Tenn.

Indiana Airways, Lafayette, Indiana

KLM Royal Dutch Airlines, Amsterdam,
The Netherlands

Lufthansa, Frankfurt Au Mainz, Federal Re-
public of Germany

Northwestern University, Evanston, Illinois

Pan American World Airways, New York, N.Y.

Purdue University, Lafayette, Indiana

Mail and Telephone Contacts

Airbus Industrie, New York Office

The Boeing Company, Renton, Washington

Frontier Airlines, Denver, Colorado

Lockheed-California Company, Burbank, Calif.

Lockheed-Georgia Company, Marietta, Georgia

McDonnell-Douglas Company, Long Beach, Calif.

Northwest Orient Airlines, Minneapolis, Minn.

Ozark Airlines, Lambert Field, St. Louis, Mo.

Rocky Mountain Airlines, Denver, Colorado

Seaboard-World Airlines, New York, N.Y.

United Air Lines, Chicago, Illinois

Western Airlines, Los Angeles, California

TABLE OF CONTENTS

	<u>Pages</u>
ACKNOWLEDGMENTS	1
CHAPTER I - BACKGROUND	(1-18)
A. A Brief History of Aviation to 1918	1
B. Development of the Air Transportation System	8
C. The Jet Age	18
CHAPTER II - SIGNIFICANCE	(1-17)
A. Social, Economic and Political Aspects	1
B. Elements of Air Cargo	12
C. Why Ship By Air?	16
CHAPTER III - EQUIPMENT	(1-51)
A. Flight Equipment	1
B. Ground Equipment	5
C. Containers	25
CHAPTER IV - SERVICE	(1-28)
A. The Carriers	1
B. The Forwarders	15
C. The Services	20
CHAPTER V - HANDLING	(1-39)
A. Handling Procedures	1
B. Special Handling	11
C. Restricted Articles	19
D. Handling Claims	28
E. Physical Handling	32
CHAPTER VI - THE TARIFF	(1-31)
A. Air Freight Rates	1
B. Factors Affecting Air Freight Rates	5
C. New Rates and Rate Changes	7
D. The Tariff Structure	8

	<u>Pages</u>
G. Air Freight Case of 1949	(1-76)
H. All-Cargo Carrier Deregulation	(1-16)
a.) Public Law 95-163	2
b.) CAB Order to Implement	15
I. Summary of the Airline Deregulation Act of 1978	(1-34)
J. All-Cargo Air Carrier Certificate of Convenience and Necessity	(1-06)
a.) Before Deregulation (One Route Only)	2
b.) After Deregulation	5
K. Trunk Air Carrier Certificate of Convenience and Necessity	(1-10)
a.) Before Deregulation (One Route Only)	2
b.) After Deregulation	9
L. Air Freight Forwarder Letter of Registration	(1-03)

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Gratitude is extended to the Air Transport Association, Civil Aeronautics Board, Continental Airlines and Pan American World Airways for their outstanding cooperation in this endeavor.

Also contributing were Airbus Industrie, Boeing Aircraft, Eastern Airlines, Emery Air Freight, Federal Express Corporation, KLM Royal Dutch Airlines, Lufthansa, Mc Donnell-Douglas and Purdue University. Many thanks to all of these.

Special thanks to Cindy Porter for the typing and set up, and to the Mount San Antonio College Publications Department for the rest.

-DLK-

CHAPTER I - BACKGROUND

This chapter examines the history of aviation, to give the student an appreciation of the slow and unsophisticated progress made in its early development; then moves to the periods of rapid growth, examining the forces responsible for that growth; and finally to the mature industry.

The discussions contained herein are brief, consistent with the author's goal of a concise but understandable presentation of the subject matter.

A. A Brief History of Aviation to 1918

Aviation's background dates back in history to mythology, then to Oriental history (balloons and kites), and on to Medieval times and the Renaissance, where the records appear of tower jumpers, and those who attempted flight using levitation, and devices such as ornithopters (wing-flapping devices), helicopters, parachutes (fall-breakers), lighter-than-aircraft, and finally, fixed-wing aircraft.

Mythology

Studies of ancient civilizations reveal man's interest in flying and his curiosity about the mystery of flight. There are numerous references to flying animals, men and devices in both Greek and Roman mythology: a flying bull, the flying horse Pegasus, flying chariots drawn by flying horses, flying carpets, flying thrones, Mercury (the winged messenger), and the famous story of Daedalus and Icarus.

Daedalus (the father) and Icarus (the son) were imprisoned in Crete, and escaped by flying from the prison on wings fashioned from wax and feathers. Despite his father's warning, Icarus flew too close to the sun, the wax melted and feathers and Icarus fell into the sea.

Oriental History

In the thirteenth and fourteenth centuries, the Chinese experimented with both kites and balloons, but only for the purpose of celebrating important events, for entertainment, and for use as toys. There was no direct contribution to aviation resulting from these experiments.

The Tower Jumpers

From the eleventh through the fifteenth centuries, men attempted to fly by jumping from medieval towers and city walls. Some attached wing-like devices to their bodies, unsuccessfully imitating the flight of a bird; others built devices they hoped would act as today's parachute, only to fall to their deaths or serious injury. Still others, utilizing large cloaks, tried to emulate the bat, but with the same disastrous results

of the rotating screw as a rotor blade. He invented the "air screw," a predecessor of the propeller and helicopter rotor. He built a model helicopter, using feathers, and it flew. Later, Sir George Cayley, an Englishman, solved the problem of tongue (twist) in a rapidly revolving rotor by utilizing two rotor blades turning in opposite directions. After this development, very little real progress was made for a long time. The helicopter was to become a reality in the dynamic twentieth century.

The Parachute

Leonardo da Vinci again! He designed a pyramid-shaped device from which a weight was suspended by cords; he called them "fall-breakers." The tower jumpers who preceded his time certainly could have used his invention.

The Lighter-Than-Air Era

While da Vinci had also designed an elementary hot-air balloon in his time, he is not considered the pioneer in this area. Roger Bacon (1214-1294), an Englishman, visualized a thin copper globe filled with some gas lighter than air that would float in the air, but had no suggestion as to the gas that could be used to accomplish this.

Sir Henry Cavendish, another Englishman, successfully isolated hydrogen in 1766, but being a chemist and not interested at all in flight, his discovery was not put to use until several years later.

The real beginning of this era occurred in France where Joseph and Jacques Montgolfier discovered that ordinary paper bags rose in the air when filled with hot air. After several experiments to fortify this discovery proved successful, the Montgolfier brothers built the first balloon in 1783.

A balloon is an impermeable bag, inflated with heated air, or a gas lighter than air, and designed to rise and float in the atmosphere. It has no guidance system and no propelling system; it is at the mercy of the elements. Passengers and pilot are carried in a gondola (car or basket) which is suspended under the bag by cord or ropes. The pilot (aeronaut) can bleed off hot air or gas to descend, and can jettison ballast to increase altitude.

The gondola is not suspended, but structurally attached to the frame. Control surfaces are also attached to the frame, and are easier to operate. Zeppelin designed his first rigid airship in the mid 1800's, and continued (as did Santos Dumont) his work into the twentieth century as well.

The Fixed-Wing Era

While not first in the history of flying, the fixed-wing aircraft worked the best and led to the improvement and development of the modern airplane. In the early and mid 1800's attention was largely turned to fixed-wing aircraft. With no form of power plant available, the most promising approach was to concentrate on gliding flight.

Sir George Cayley was a notable contributor. His aerodynamic research established fundamentals of flight; among these were the airfoil, a proposal for wheels attached to the undercarriage, ratio of lift to wing area and flying model gliders. From 1804 to 1853 he designed, built and flew his model gliders, learning from each flight and publishing that knowledge.

Other Englishmen were building successful models during this period. Samuel Henson, John Stringfellow and Thomas Moy built models powered by compressed air or springs, and they flew. Francis Wenham, also English, advanced the idea of a biplane, or double wing, as a way of increasing wing area without increasing span.

Success for the airplane came at last. Otto Lilienthal, a German, was the first man to fly in a heavier-than-air craft, a glider. He, along with his brother, Gustav, had studied birds for many years before building a successful glider in 1891. In all, Lilienthal made over 2,000 flights, some with 180 degree turns made by shifting his body weight. Otto Lilienthal was killed in 1896 when he lost control of his glider, and his brother ceased further experiments.

Other contributors during this period were Percy Pilcher, Octave Chanute, Samuel Langley, and John Montgomery. Pilcher gained recognition by constructing several promising gliders, introduced ground takeoff for gliders (horses, oxen or men towing the glider until it took off), put wheels

The Wright Brothers

Orville and Wilbur Wright, from Dayton, Ohio, had experimented with gliders since 1896. They were bicycle builders by trade, but their interest in aviation was intense. Their final problem, after all this experimenting, was a power plant. With no engine on the market, it was left to their mechanic, Charles Taylor, to build a 170 pound, twelve horsepower engine. On December 17, 1903, Orville and his "Wright Flyer" lifted off, rose into the air for twelve seconds, covering 120 feet, and returned to Earth. This first powered flight, with a pilot, covered less distance than the wingspan of today's wide-bodied jet aircraft; however, it started a "rush" the world over that exceeded any "gold rush" in its total impact.

The Wrights continued to pioneer the aircraft, designed an airplane for the U. S. Army and successfully demonstrated it. It was time, however, for other pioneers to emerge and take their places in the spotlight.

The Other Pioneers

Santos-Dumont, who had earlier cruised the sky in a dirigible, made the first powered flight in France. Louis Bleriot, a Frenchman, was first to fly over the English Channel, and built several successful aircraft. Glenn Curtiss, an American began building airplanes in 1908; he was the most successful of all American pioneers, and the Curtiss name was prominent throughout aviation's history.

Early Air Mail

Between 1910 and 1915, experimental mail and express flights were performed to demonstrate the feasibility of a mail/express system. While these experiments were no more than a novelty to most observers, Congress set discussions to determine if the mail could be carried efficiently, safely and swiftly; little came of these discussions, and it was not until 1916 that the Congress appropriated the first meager sum of about \$50,000. Before the Post Office Department could develop the system, the United States became involved in World War I. There were a few independent operators that carried small amounts of light merchandise, flying short distances between towers, but their impact was nominal.

the Ford-Stout (became the Ford Tri-motor, or "Tin Goose," a 12-passenger and mail aircraft). Incidentally, the Ford Tri-motor was the most durable and dependable aircraft built in that era. Some are flying today on scenic flights in the Grand Canyon and Great Lakes areas.

To supplement the Airmail Act of 1925, the Air Commerce Act of 1926 was passed, providing for the government (through the Department of Commerce) to develop, maintain and operate the airway system, including navigation and weather forecasting.

Before leaving the period of the 1920's, two observations should be made regarding this era: first, that the passage of these two Acts established air transportation in this country; and second, the development of the aircraft already mentioned, along with the Pitcairn "Mailwing" and "Super Mailwing" (single-engine, short-haul mailplanes), and Boeing's Model 95 (single-engine, long-haul mailplane), created the equipment to insure its stability and future growth.

The 1930's: Economic Upheaval and Recovery

Not mentioned previously, but in part a development of the 1920's, was the Railway Express Agency (REA). For air transport, it started on a small scale as early as 1927, providing pick-up and delivery service for airlines from remote areas, thus developing new markets for the somewhat skeletal system that existed at that time. For its service, REA received 25 percent of the revenue, and the airline received 75 percent. In 1934, General Air Express was formed, but its existence was short-lived, and by 1937, virtually all airlines had contracted with REA. The revenue split went to 87½ percent to the airline and 12½ percent to REA.

As the industry grew, so grew legislation to modify and regulate it. The Airmail Act of 1930 (Mc Nary-Watres Act, named for its sponsors) was passed, providing among other things, for computing mail rates based on space available rather than weight. This was done to stimulate the development of larger and longer-range aircraft. The hoped-for result was to be an increase in the number of passengers carried, for until this time, the mail and express were the primary sources of revenue.

the cost of the service jumped over 300 percent. From a cost, service and safety standpoint, this was a fiasco. Roosevelt ordered a halt to the service and the former carriers were given a 90-day contract to resume the service until Congress could decide on new legislation (and regulation). Congress did pass the desired legislation in 1934.

The Airmail Act of 1934 (Black-Mc Kellar Act, for its sponsors) was passed to set up competitive bidding for airmail contracts, excluding any company that had been involved in the "collusion" with former Postmaster Brown. Since the only companies owning equipment and possessing the expertise for cross-country and night flying were the very companies excluded from bidding, there remained a small problem: Who would bid for these contracts? In typical political deceit (and for expediency, no doubt), these carriers were permitted to change their names slightly, and having accomplished this, they bid and were awarded contracts. A few small airlines were awarded routes, but most could not survive the economic situation of the 1930's.

The Act also provided that aircraft manufacturers and airlines would have to separate, insuring that no airline would have an unfair advantage from the flight equipment standpoint. Further, a commission was provided for in the Act: Study the system and make recommendations with regard to policy and/or control of aviation. The recommendations of this commission resulted in additional legislation some four years later.

A few observations are in order here. One, that Postmaster Brown was exonerated of all charges just prior to World War II, although this action did not command the front-page treatment of the alleged wrongdoings while in office. Another observation was made by the airlines. It was that depending on the federal government was at best tenuous, and at its worst disastrous. They formed the Air Transport Association (ATA) in an attempt to do collectively what had been so nearly impossible to accomplish individually: to operate their business, using their expertise, making their decisions to the betterment of their industry. Passenger traffic increased and overtook mail and express as the main source of revenue at the end of 1936. This was due in large part to the airlines' desire to minimize their dependence on mail contracts.

1940-1945: World War II

The war period, as the World War I period, accelerated changes and development that would have taken years or decades to achieve. The airlines were directly affected from the start. Through the war service requirements, the airlines were to fly three-fourths of their previously scheduled mileage, utilizing only one-half of their previously operating aircraft. The other one-half of all operating aircraft were designated for the war effort. The airlines responded as ordered, with nearly every flight operating at full capacity, and utilization rose to a level approaching twenty hours a day in some cases. There were also impressive increases in mail and express carried.

Navigation and navigational aids were improved; aircraft design experienced a quantum jump. The Douglas DC-3 (previously discussed) saw duty as the C-47, a cargo and troop carrier. In all, 10,000 of these aircraft were built in the military version ("Gooney Bird"), and it was successful in any role assigned. The Douglas DC-4 (C-54 military) saw service in both the Pacific and European campaigns. Boeing's B-377 "Stratocruiser" (C-97 military) was instrumental late in the war. Lockheed's 049 Constellation served as a military transport, and later was valuable to the airlines as the first mass-produced pressurized airliner in domestic service. The Curtiss "Commands" (C-46 military) served mostly in the Pacific, notably China and Burma. The Beech 185 (C-45 military) saw action throughout the war as a medium-range transport. All of these aircraft served as part of the post-war civilian commercial fleet.

In addition to the above aircraft, the fighters, bombers and transports utilized by the military incorporated technological advances that were to be designed into the new aircraft to follow. Also, the thousands of pilots, mechanics and operational personnel trained for the war effort were to be available as the nucleus of the new growing industry.

In an almost overlooked action in 1944, the Civil Aeronautics Board (CAB) issued a decree stating that, after hostilities ceased, a new level of air transportation was to be instituted. The decree established that all communities of 25,000 population or more should have air transport service.

built for the navy. This aircraft was capable of lifting 7,000 pounds of cargo at 150 miles per hour over a 500-mile range. The first business was two plane-loads of grapes. The Conestoga was replaced by a fleet of C-47's (DC-3's), slightly superior in speed, range and cargo capacity. By late 1947, Flying Tiger Line had around 300 competitors, mostly small operators. Tigers soon shifted to the C-54 (DC-4), a four-engine, 210 mile per hour aircraft with a 2,000 mile range and capable of carrying 20,000 pounds of cargo. The fleet grew to 42 aircraft at one point.

In 1949, with its newly-awarded U. S. Airfreight Route Number 100 All-Cargo Certificate, Flying Tiger placed 25 Curtiss C-46 "Commandos" into service. Many pilots who flew for this carrier had flown the C-46 during World War II. This aircraft had a range of 900 miles, a capacity of 13,000 pounds of cargo, and a speed of 200 miles per hour. All these aircraft were war-surplus, and provided for the growth of a most viable air cargo specialist. Most of the business generated during this period was in conjunction with the military: U. S. Occupation of Japan, and charters for the Military Air Transport Command (MATC).

Flying Tiger Line continued to grow. Other operators entered the market, but the three principal competitors of the time, Air News, Slick Airways and United States Airlines, fell on hard times and only Slick Airways survived as a major competitor.

In the mid-1950's, Flying Tiger Line modernized their fleets with new aircraft for the first time. In chronological order, they were:

<u>Aircraft Type</u>	<u>Speed</u>	<u>Range</u>	<u>Cargo Capacity</u>
Douglas DC-6A	275 mph	2,000 mi.	32,000 pounds
Lockheed Super H Constellation	300 mph	2,500 mi.	43,000 pounds
Canadair CL-44	375 mph	3,000 mi.	65,000 pounds

The latter was the first true airfreighter, with a swing-tail design, allowing for straight-in loading of freight, and it was the first turbine-powered airfreighter.

At this time, a complex air transportation system was in operation, and a large part of that operation was air cargo. The next technological change provided a quantum jump in the areas of capacity, range and speed.

CHAPTER II - SIGNIFICANCE

Air cargo is a rapidly changing industry. It provides services to the shipper far beyond what was offered in its infancy. The social, economic and political significance is examined here, both the positive and negative aspects.

The basic elements of air cargo--mail, express and freight--have undergone much change and sophistication, to a degree that makes air transportation a viable choice for shippers of an ever-increasing variety of goods.

Finally, we take a look at the shippers, and outline some of the reasons for the decision to use air cargo.

A. Social, Economic and Political

The first cargo liners, the mailplanes, were not well-designed freighters; they were slow aircraft, of limited payload and range, not very dependable, and a little short on safety. The mailplanes were, at first, castoff war-surplus aircraft. Then, during peace-time, and with the stimulation derived from 1930 legislation, larger aircraft, both in terms of passengers and cargo capacity, appeared on the scene. World War II came and went, adding further to the technology in terms of capacity, speed and range. Finally, the jet age was upon us with the improvements we see today. It made our country and the world smaller in terms of elapsed time between any two cities.

The improvements in air cargo have been dramatic; maybe even more so than improvements in passenger service. In the twenties, air cargo was limited to the carriage of mail; in the thirties it was limited to mail and air express only. The late 1940's saw the growth of air freight at a rapid rate. All elements of air cargo have demonstrated high growth rates since then.

With air express and air freight, the range of commodities carried prior to World War II was limited to:

1. Shipments of extreme urgency--medicines and vaccines; certain machine parts; chemicals.
2. Dated material--newspapers, magazines and periodicals; news films.
3. Perishables--cut flowers; some foods.
4. Low bulk, high value shipments--gems, jewelry and precious metals; optical equipment; photographic equipment; motion picture films; currency and valuable documents.
5. Seasonal shipments--fashions and new products; gift and fad items.

In addition to the limited list above, there were other drawbacks to shipping by air prior to 1945. There were weight and size limitations resulting from the aircraft design: cargo doors were small and the floors of most aircraft were not structured for shipments of considerable weight. Poor packaging, packing and stowage resulted in damaged shipments. Commodities

There are social costs to consider, also. The character change in a rural or mountain community can bring negative as well as positive results. Then, too, there are environmental considerations: the congestion that additional activity brings with it, and pollution, in the case of the jet aircraft, noise pollution.

Today, any airport or airport facility expansion can materialize only after an Environmental Impact Report (EIR) has been submitted to the Environmental Protection Agency (EPA), and is approved by that agency of government. Sometimes the delay is in terms of years. Air cargo moves at night (although this nighttime-only characteristic of the industry is becoming less predominant), and several airports in the country now operate under a curfew. Usually, these curfews prohibit takeoffs and landings between, say 11:00 p.m. and 7:00 a.m. If this kind of restriction expands, the impact on air cargo movement could be affected critically.

It should be noted here that, if present-day noise restrictions had been applied in earlier years, most of the piston-powered aircraft would have been under fire of public outcry. Those aircraft landed and took off more slowly (and thus, the noise from each aircraft was present over a longer span of time), their climb was shallow (and thus, they were flying lower for a longer span of time), and the vibrations were more intense than today's jet aircraft. It has become the vogue to criticize and complain with regard to airports and aircraft as well as anything else that can attract publicity, political advantage or a hefty settlement resulting from a lawsuit. It is a fact that most airports were established in remote areas, only to have developers build new residential units ever nearer to the facility. It is an additional fact that zoning boards allowed such development.

The social aspects are many, both positive and negative. We are fortunate that we have the best developed air transportation system in the world, allowing for expedited distribution virtually anywhere in the country. Aircraft manufacturers have reduced noise levels dramatically, and planning and zoning boards in communities all over the country have recognized their responsibilities in this area, and most have responded well. The negative aspects are being neutralized, leaving the air cargo industry in relatively good shape.

Table 1

Air Freight Statistics, 1968-1977

<u>Year</u>	<u>Freight Revenues (\$-000)</u>	<u>Freight Ton-Miles (000)</u>	<u>Freight Yield (¢ per ton-mile)</u>
1977	1,687,167	5,385,130	31.33
1976	1,482,560	5,074,193	29.22
1975	1,295,100	4,766,119	27.17
1974	1,216,332	4,890,026	24.87
1973	1,038,459	4,736,729	21.92
1972	906,494	4,217,452	21.49
1971	795,272	3,712,288	21.42
1970	713,423	3,407,552	20.94
1969	648,030	3,240,965	19.99
1968	547,094	2,804,878	19.51

SOURCE: AIR TRANSPORT ASSOCIATION

Table 3

Air Mail Statistics, 1968-1977

<u>Year</u>	<u>Mail Revenues (\$-000)</u>	<u>Mail Ton-Miles (000)</u>	<u>Mail Yield (¢ per ton-mile)</u>
1977	390,473	1,147,324	34.03
1976	320,121	1,114,239	28.73
1975	303,022	1,097,297	27.62
1974	300,155	1,150,881	26.08
1973	295,047	1,197,974	24.63
1972	263,619	1,190,198	22.15
1971	279,664	1,313,376	21.29
1970	298,559	1,470,131	20.31
1969	288,373	1,339,923	21.52
1968	267,229	1,257,051	21.26

SOURCE: AIR TRANSPORT ASSOCIATION

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Douglas DC-6A	275 mph	2,000 mi.	32,000 pounds
Lockheed Super H Constellation	300 mph	2,500 mi.	43,000 pounds
Canadair CL-44	375 mph	3,000 mi.	65,000 pounds

The latter was the first true airfreighter, with a swing-tail design, allowing for straight-in loading of freight, and it was the first turbine-powered airfreighter.

At this time, a complex air transportation system was in operation, and a large part of that operation was air cargo. The next technological change provided a quantum jump in the areas of capacity, range and speed.

CHAPTER II - SIGNIFICANCE

Air cargo is a rapidly changing industry. It provides services to the shipper far beyond what was offered in its infancy. The social, economic and political significance is examined here, both the positive and negative aspects.

The basic elements of air cargo--mail, express and freight--have undergone much change and sophistication, to a degree that makes air transportation a viable choice for shippers of an ever-increasing variety of goods.

Finally, we take a look at the shippers, and outline some of the reasons for the decision to use air cargo.

A. Social, Economic and Political

The first cargo liners, the mailplanes, were not well-designed freighters; they were slow aircraft, of limited payload and range, not very dependable, and a little short on safety. The mailplanes were, at first, castoff war-surplus aircraft. Then, during peace-time, and with the stimulation derived from 1930 legislation, larger aircraft, both in terms of passengers and cargo capacity, appeared on the scene. World War II came and went, adding further to the technology in terms of capacity, speed and range. Finally, the jet age was upon us with the improvements we see today. It made our country and the world smaller in terms of elapsed time between any two cities.

The improvements in air cargo have been dramatic; maybe even more so than improvements in passenger service. In the twenties, air cargo was limited to the carriage of mail; in the thirties it was limited to mail and air express only. The late 1940's saw the growth of air freight at a rapid rate. All elements of air cargo have demonstrated high growth rates since then.

With air express and air freight, the range of commodities carried prior to World War II was limited to:

1. Shipments of extreme urgency--medicines and vaccines; certain machine parts; chemicals.
2. Dated material--newspapers, magazines and periodicals; news films.
3. Perishables--cut flowers; some foods.
4. Low bulk, high value shipments--gems, jewelry and precious metals; optical equipment; photographic equipment; motion picture films; currency and valuable documents.
5. Seasonal shipments--fashions and new products; gift and fad items.

In addition to the limited list above, there were other drawbacks to shipping by air prior to 1945. There were weight and size limitations resulting from the aircraft design: cargo doors were small and the floors of most aircraft were not structured for shipments of considerable weight. Poor packaging, packing and stowage resulted in damaged shipments. Commodities

There are social costs to consider, also. The character change in a rural or mountain community can bring negative as well as positive results. Then, too, there are environmental considerations: the congestion that additional activity brings with it, and pollution, in the case of the jet aircraft, noise pollution.

Today, any airport or airport facility expansion can materialize only after an Environmental Impact Report (EIR) has been submitted to the Environmental Protection Agency (EPA), and is approved by that agency of government. Sometimes the delay is in terms of years. Air cargo moves at night (although this nighttime-only characteristic of the industry is becoming less predominant), and several airports in the country now operate under a curfew. Usually, these curfews prohibit takeoffs and landings between, say 11:00 p.m. and 7:00 a.m. If this kind of restriction expands, the impact on air cargo movement could be affected critically.

It should be noted here that, if present-day noise restrictions had been applied in earlier years, most of the piston-powered aircraft would have been under fire of public outcry. Those aircraft landed and took off more slowly (and thus, the noise from each aircraft was present over a longer span of time), their climb was shallow (and thus, they were flying lower for a longer span of time), and the vibrations were more intense than today's jet aircraft. It has become the vogue to criticize and complain with regard to airports and aircraft as well as anything else that can attract publicity, political advantage or a hefty settlement resulting from a lawsuit. It is a fact that most airports were established in remote areas, only to have developers build new residential units ever nearer to the facility. It is an additional fact that zoning boards allowed such development.

The social aspects are many, both positive and negative. We are fortunate that we have the best developed air transportation system in the world, allowing for expedited distribution virtually anywhere in the country. Aircraft manufacturers have reduced noise levels dramatically, and planning and zoning boards in communities all over the country have recognized their responsibilities in this area, and most have responded well. The negative aspects are being neutralized, leaving the air cargo industry in relatively good shape.

Table 1

Air Freight Statistics, 1968-1977

<u>Year</u>	<u>Freight Revenues (\$-000)</u>	<u>Freight Ton-Miles (000)</u>	<u>Freight Yield (¢ per ton-mile)</u>
1977	1,687,167	5,385,130	31.33
1976	1,482,560	5,074,193	29.22
1975	1,295,100	4,766,119	27.17
1974	1,216,332	4,890,026	24.87
1973	1,038,459	4,736,729	21.92
1972	906,494	4,217,452	21.49
1971	795,272	3,712,288	21.42
1970	713,423	3,407,552	20.94
1969	648,030	3,240,965	19.99
1968	547,094	2,804,878	19.51

SOURCE: AIR TRANSPORT ASSOCIATION

Table 3

Air Mail Statistics, 1968-1977

<u>Year</u>	<u>Mail Revenues (\$-000)</u>	<u>Mail Ton-Miles (000)</u>	<u>Mail Yield (¢ per ton-mile)</u>
1977	390,473	1,147,324	34.03
1976	320,121	1,114,239	28.73
1975	303,022	1,097,297	27.62
1974	300,155	1,150,881	26.08
1973	295,047	1,197,974	24.63
1972	263,619	1,190,198	22.15
1971	279,664	1,313,376	21.29
1970	298,559	1,470,131	20.31
1969	288,373	1,339,923	21.52
1968	267,229	1,257,051	21.26

SOURCE: AIR TRANSPORT ASSOCIATION

- Trucks, Various
- Tugs, heavy duty and mini-
- Vans, Various
- Winches

Some of the equipment can be visualized from its name; others cannot. Each category will be described; where verbal description is inadequate, a drawing will be found at the end of this section.

Carts and Dollies

Aerocarts, pushed or towed carts and dollies all combine to facilitate movement of cargo around the terminal and ramp areas, but perform somewhat different roles.

Aerocarts are similar to the old freight carts at a railway station, having a flat bed, four wheels, with possibly two of those wheels on a swivel or caster mounting. A rail or handle at chest or shoulder height allowed for manual pushing, pulling and maneuvering.

Pushed or towed carts are designed to be hooked up in train fashion for towing. The front of each is equipped with a tongue much like that on a child's coaster wagon. This tongue can be attached to the rear of a towing vehicle or to the rear of another similar cart. These carts may be pushed individually by hand or by vehicle.

Dollies are also wheeled, the task to be performed determining the number and location of wheels, and whether they are swiveled or not. Upon these wheels is a platform on which is placed a bulky, awkward, cumbersome or heavy item. With the use of the dolly, these unwieldy items can be moved about. (Piano movers use dollies of varying sizes and shapes.) Dollies are not designed to be towed, but rather as an aid in positioning an item, container, pallet, etc.

Scales

This equipment, while self explanatory, is sometimes quite specialized. Most scales around the terminal allow for the weighing of cargo while loaded

Cargo Platforms and Dock Boards

Any flat, raised, level, movable "floor" of any size can be a platform or dock board. It is merely a slightly raised surface upon which cargo can be placed, either to facilitate loading and unloading, or to protect it from moisture, exposure or similar hazard. Made of aluminum or other light metal or alloy, the construction is usually corrugated or offers a non-slip surface.

Trucks and Vans

In a cargo terminal or ramp area (passenger, too) there is a beehive of activity. Trucks and vans of every description move about providing servicing, loading, unloading, fuel, shuttle service and the like. (See Ground Power Units, Lift-trucks, Shuttle, Transporters.)

Chocks

Chocks are angular blocks placed against the tires of aircraft landing gear. The portion of the chock in contact with the surface holds securely. Smaller chocks or "blocks" are used on vehicle tires.

Chutes and Slides

Similar to playground slides, these devices provide for loading and unloading, utilizing gravity for movement. Boxes, cartons, crates, sacks and small containers can be loaded and unloaded using chutes and slides.

Conveyors, Cargo Floor Units and Rails

This class of equipment provides for movement of all elements of cargo. Conveyors are like sidewalks with a moving system of balls, or a belt, or a series of rollers or wheels. Conveyors can be fixed or mobile, vertical, horizontal or sloped. They can be gravity or powered. The balls, rollers and/or wheels spin or the belt moves. Cargo is placed on these moving parts and are transported from place to place.

A loading plate is built with a slope or slant, to accommodate a hand truck, small fork-lift, cart, etc. It is used away from the aircraft, around warehouse and dock or terminal areas.

Loading ramps and various other ramps provide for movement over any open area, between surface and truck bed, between surface and several types of equipment. It has the appearance and the utility of a small bridge. In all cases, mobile docks, plates, ramps, etc. provide for movement from one level to another, whether by hand or other ground handling equipment.

Elevators and Escalators

As with everyday operation, the elevator and escalator provide an efficient method for the movement for both bulk and unitized shipments. They are not used in conjunction with aircraft loading and unloading except in very specialized locations. Elevators and escalators are both utilized and are a part of mezzanine systems.

Fork Lifts--All Sizes

A fork lift is the most versatile of all ground handling equipment. Designed specifically for the movement of pallets, it can perform nearly all tasks requiring lifting an item with a level floor or bottom. It can reverse the operation, taking a pallet or other item from an elevated position to a position lower with the surface being the lower limit.

The fork lift is a powered, steerable, highly-maneuverable vehicle. It has two or more forks (tines) in front, mounted on a hydraulically-operated raising and lowering system. The forks fit into a pallet opening, an igloo opening, or under a container. The fork is quite flat, providing a stable base for any flat-bottomed unit. Once the fork or tines is securely under the unit, the hydraulic frame in which the fork is constructed can provide for the lift to various heights. Then this very maneuverable machine can turn and transport the unit to the desired location. Although there are many manufacturers of this type of equipment, most airlines have selected Hyster fork lifts in 2,000 to 15,000 pound capacities.

Hooks and Tow Bars

Used in conjunction with a crane, hoist, winch, tug or tow tractor, hooks and tow bars are used as connectors between shipments being pulled, lifted or otherwise transported for purposes of loading, unloading, storing or just moving from one location to another. Also, a tow bar is used between a towing vehicle and an aircraft, cart, cart shuttle or any other towed vehicle or device.

Jacks

Jacks are used to raise any aircraft, cart, truck, trailer, tractor, tug or any other vehicle. It is used when maintenance is to be performed, and to stabilize for any purpose. Jacks are versatile, and can be used horizontally as well as vertically if necessary. An example would be to move two stands together so that stanchions could be applied.

Ladders

A ladder is a device for climbing and descending, consisting of two parallel or near-parallel rails connected by a series of rings for use as footholds. In air cargo, ladders are used all around the terminal, in storage areas, and in and around mobile equipment. Also, stands, mezzanine systems and many racks are equipped with ladders.

Lifts, Lift Tables, Lift Trucks

This equipment consists of a movable (lift, lift table) unit, or a mobile (truck) unit, the base or bed of which is capable of being raised through use of a hydraulic piston or rod. Some of these units are lifted directly by the hydraulics; others have a scissors-like apparatus that raises and lowers through application of hydraulic or electric power. Lifts are for main deck operations.

The lifting equipment is necessary for maintenance or other work on the aircraft or any other piece of equipment as needed. It is more valuable,

Wheeled Shuttles

A wheeled shuttle is a series of carts or hampers on wheels or a combination of these. It is pulled by a tow tractor or tug; the carts and hampers are connected by two bars.

Sweepers

These vehicles are similar to the powered street cleaner, but are smaller. All airport areas must be relatively free of foreign matter as the jet engine may ingest it. The loading areas, ramp, aprons and staging areas are serviced by these dry sweepers. Some are capable of sweeping one million square feet per hour at up to twenty-five miles per hour.

Tow Tractors, Tugs

Designed mainly as towing vehicles, these machines pull aircraft around the airport, and push departing aircraft to a place where taxiing can be accomplished. A jet airliner cannot back up (reverse) as a result of its own power. In addition these vehicles are available for any other towing and pushing mission as may be required. They are relatively small in size, but most powerful. A tow vehicle, a tug, is described and illustrated at the end of this part. (Part B)

Tractors, Mini-Tractors

Diesel tractors are those used to pull large trailers in intermodal transportation. They are utilized most often in air-sea operation, although certainly not limited to that operation.

Mini-tractors are those seen at the airport pulling cradle-shaped carts or wagons. It can position the cart under the aircraft perpendicular to the fuselage, and receive the belly-containers directly into the cradle. It is not built for wide-body operations.

F. FORKLIFT TRUCKS

3. Hyster Challenger Lift Truck Model H-60-F

a. Specifications

6,000 lb. Capacity @ 24" Load Center

Tires: Pneumatic - Single drive wheels

Drive: 8.15 x 15, 12 ply - Steering: 6.50 x 10, 10 ply

112½" Lift height - 79" Lowered height

Intermediate freelif type upright with 25½" of freelif

Apron: ITA Hook type 42" wide

Forks: 48" long with 57" extensions

Engine: Continental, Model G-193, H.P. 72 @ 2800 RPM

Transmission: Constant mesh, two speed, full reversing

Clutch: Long life 12" diameter Oil clutch

Power Steering

Electrical System: 12-volt with alternator

Engine hour meter

Hydraulic oil cleaner: Full time; full flow

Air Cleaner: Dry type filter

Brakes: Hydraulic

Overhead guard for operator

Lights: 2 headlights, 1 combination stop & tail light

Special paint Continental specs. Dupont Dulux equipment gray #6858D

ILLUSTRATION ON FOLLOWING PAGE

A. INTRODUCTION - Ground equipment consists of motorized and non-motorized vehicles used for the transporting of cargo either in a bulk condition or in a cargo container. Within this section you will find the specifications for the standardized ground equipment within our system today. Variations from the standard are still found in many stations; however, the variety is diminishing yearly.

B. CONTAINER/PALLET LOADER

1. Description

- a. The Container/Pallet Loader is a self-propelled vehicle which will transfer baggage and cargo containers or pallets to the lower deck compartments of the B-727, DC-10, and L-1011 aircraft. As a concomitant feature, the loader will transfer pallets to the main deck of the DC-8, DC-9, B-707 and B727-DC-9 aircraft. The loader will handle B11 approved containers and standard aircraft pallets up to 96 inches by 125 inches. The unit will transfer containers or pallets to the aircraft at transfer heights to 135 inches and will receive and discharge loads from ground vehicles at any height, 18½ inches on up, from either side or the rear of the unit.
- b. The basic loader design features two scissor lifts; the forward scissors supports the loading bridge platform and the rear scissors carries the load from the base level to the transfer elevation. The bridge platform is supported by the rear scissors lift when the unit is at transfer height.

2. Specifications

- a. Size:

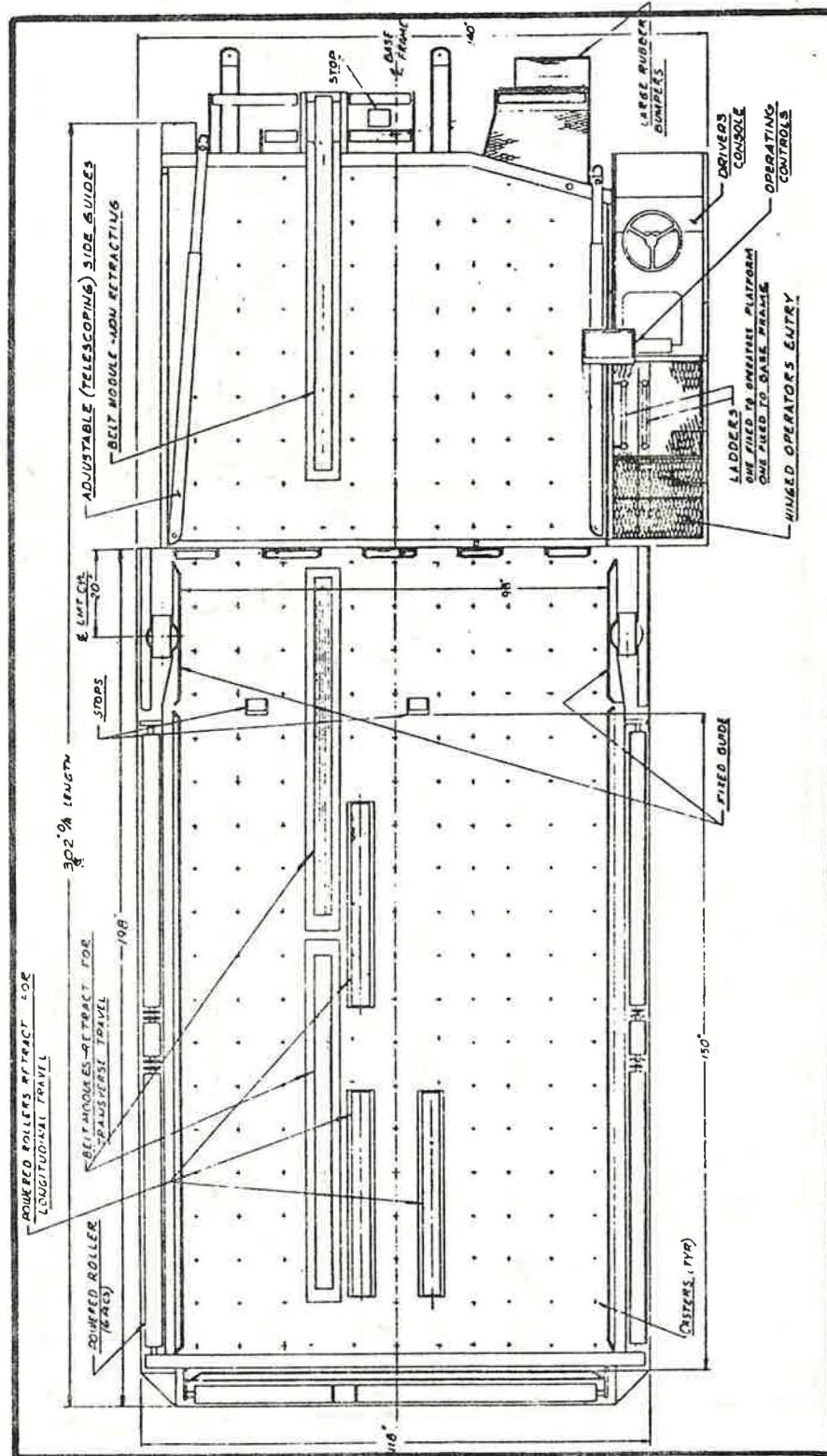
Length	25' 2"	Capacity	13,500 lbs.
Width: Deck	118"	Tires: Front	10.00 x 20
Bridge	140"	Rear	5.00 x 8
Height Min.	110"	Fuel Capacity	20 Gal.
Shipping: Width	118"	Weight	Approx. 18,000 lbs.
Height	84"		
Length	25' 2"		

b. Performance:

Lift Speed	50 FPM
Lift Range: Rear	18½" to 135"
Front	75" to 135"
Lift System:	Vertical Hydraulic Cylinders 2:1 ratio constant speed
Conveying Speed:	60 FPM
Hydraulic System:	Split Open-Center 1,500 psi
Turning Radius:	34 ft. to the outside edge
Travel Speed:	0 to 6 MPH - Standard, 0-10 MPH - Optional

B. CONTAINER/PALLET LOADER

TOP VIEW



H. TOW VEHICLES

1. Description - Kalamazoo Tug Model T30A - A workhorse among towing equipment, the KAL TUG combines strength and maneuverability in a unit capable of working within crowded warehouse areas.

2. SpecificationsGeneral -

Length with coupler	121 1/2"
Width over rear fender	55"
Width over front tires	51"
Height over steering wheel	55"

Turning Radius -

Center line outside front tire	100"
Outside corner of frame	111 3/4"
Minimum intersecting aisle	82 1/2"
Wheelbase	50"
Ground clearance	7 1/2"
Travel speed	15 mph
Drawbar pull (T-50A)	5,000 lbs.

(based on .75 coefficient of friction)

Drawbar center line height	12"
Weight - Front	1,660 lbs.
Rear	4,300 lbs.

Engine Specifications -

Model Ford	240
Cylinders	6
Bore	4.06
Stroke	3.18
Displacement	240 cu. in.
Governed RPM (full load)	2,650
Net brake H.P. @ gov. RPM	94
Torque @ 1600 RPM	181 ft. lbs.
Cooling system capacity	17 qts.
Fuel tank capacity	28 gal.
Oil bath type air filter	

Electrical System - Standard Equipment -

12 volt - negative ground	
42 Amp. alternator	12V - 60 Amp. battery
Keyless Ignition and starter switch	
Engine hour meter	
Two Hi-Lo beam headlights	Two combination tail & stop lights
Instrument Panel Light	

Instruments -

Ammeter, oil pressure gauge, fuel gauge, engine hour meter and water temperature gauge, as Standard Equipment

Steering -

Automotive type gear provides maximum steering ease and performance with 17" diameter handwheel

Wheels and Tires - Front	6.50-10 6-ply
Rear	7.50-16 6-ply

C. CONTAINERS

Air cargo shippers, forwarders and the air carriers are using containters in ever-increasing numbers. The Air Cargo Unit Load Device (ULD) Program was the industry's first container program and was approved by the Civil Aeronautics Board and put into effect by the carriers in November, 1966. The program began on the clear understanding it would be an experiment to be improved on the basis of experience and shipper needs. Improvements have been made several times with the latest modifications, effective in February, 1970, which simplified container tariffs and enabled more shippers to take advantage of rate reductions on containerized shipments.

Containerized air freight reduces packaging costs for the shipper because of the protection afforded by the container. The build-up of container or pallet loads at the shipper's own plant bypasses many of the steps encountered by other freight as it flows through terminals. Specially equipped trucks pick up ULD shipments at the shipper's plant for direct delivery to mechanical loading equipment at airport facilities.

Both palletization and containerization save the airlines time and manpower in ground handling and enable the carriers to achieve a more efficient utilization of the cubic capacity of modern aircraft. Consequently, the airlines pass along part of this savings to shippers participating in the program through two types of incentive--the first, a rate reduction arising from the fact that the shipment has been unitized; the second, a density incentive.

Among developments that have spurred increased growth in unitization are the trends toward inter-carrier and inter-modal ULD's. In air freight a greater degree of inter-carrier containerization has been made possible by recent refinements both in the domestic ULD program and the ULD program developed by the International Air Transport Association (IATA).

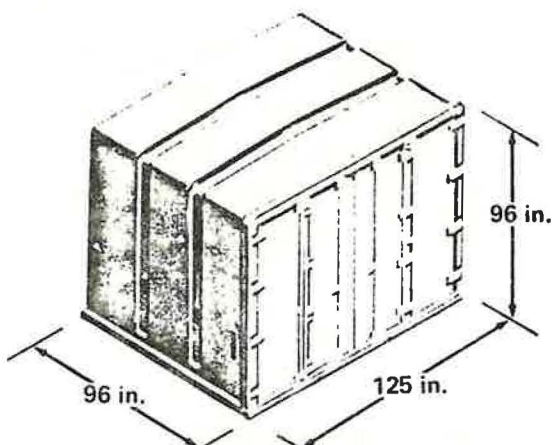
A further stimulus to the movement of unitized cargo is the expected flow created from the fact that many airlines are introducing additional ULD service with wide-body jets.

Shipper-owned ULD's--The shipper-owned ULD's in the domestic program consist of various sizes which should fit most shipper needs. To qualify for the incentives, these units must be loaded and unloaded by shippers or receivers at places other than on the carrier's premises. These ULD's are mostly modular in that, for example, the capacity of the "B-2" is about half that of the "B," and the "D" approximately two-thirds of the "B-2."

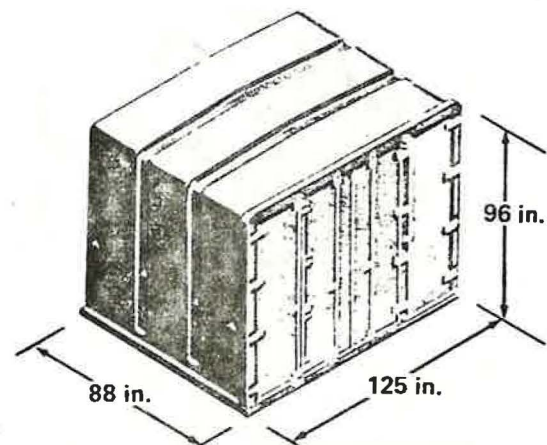
Lower-Deck Wide-Body ULD's

The LD-3 is a corrugated aluminum ULD designed specifically for the new wide-bodied aircraft--the Boeing 747, DC-10 and L-1011. The ULD is a weather-proof enclosure with two doors, one on either side, having door assemblies hinged at the middle and attached to the ULD roof. This arrangement permits storage of the doors on top of the ULD while it is being loaded. A retainer strap is provided on the door as a safety feature to secure the doors on top of the ULD. The LD-3 is equipped to handle two adjustable shelves each weighing approximately 40 pounds and may be removed if necessary. They can be used for restraint of loose cargo or baggage by letting the shelf downward to the top of the item, thus preventing shifting or movement. The base of the "LD-3" is constructed of aluminum sheeting laminated to a balsa core. The ULD base is designed for movement on mechanized conveyor systems within the aircraft. This assembly and the base locking devices have very critical mechanical tolerance. The LD-3 ULD should remain on the dolly or on rollers at all times. It is advisable never to lift ULD with a fork lift as it may cause serious damage to both the ULD and the aircraft.

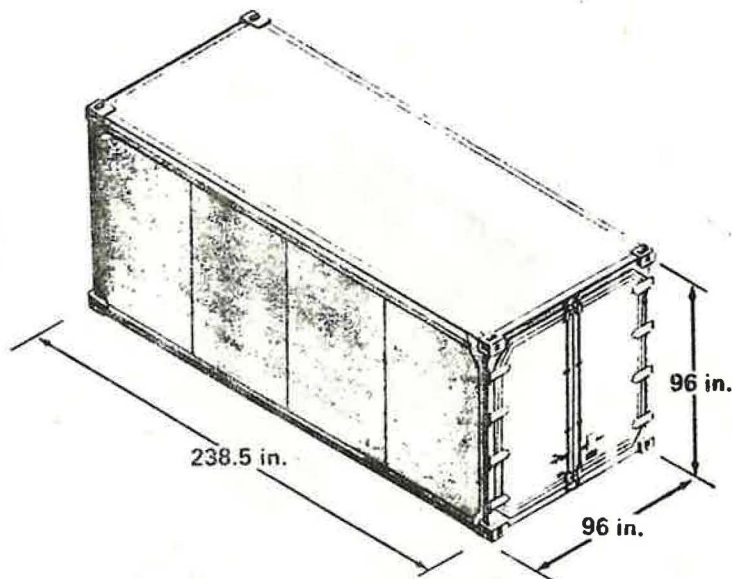
The LD-7 is probably one of the most acceptable and utilized ULD's in the industry today. It is well accepted by shippers due to the relatively low packing loss, easy handling and interchangeability on the Boeing 747 and on Douglas DC-10 aircraft. This unit is a non-structural ULD and is made of a fiberglass laminated shell with a nylon restraint webbing with a plastic impregnated nylon cloth cover. The unit's net is fastened to the pallet by securing "D" rings into the pallet at prescribed intervals.



Type: M1 Container
 Internal volume:
 1. Structural design: 526 to 595 cu ft
 2. Non-structural design: 571 cu ft
 Tare weight:
 1. Structural design: 1,050 to 1,146 lb
 2. Non-structural design: 798 lb
 Weight limitations:
 1. Structural design: 15,000 lb
 2. Non-structural design: 15,000 lb

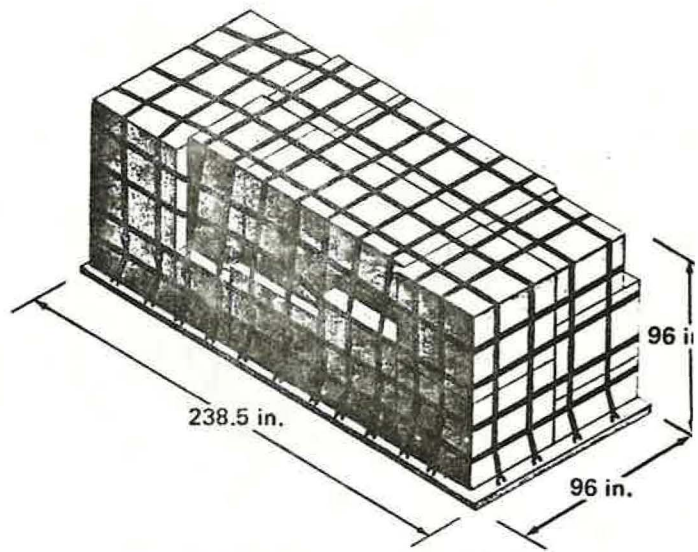


Type: M1 Structural Container
 Internal volume: 560 cu ft
 Tare weight: 925 lb
 Weight limitations: 15,000 lb

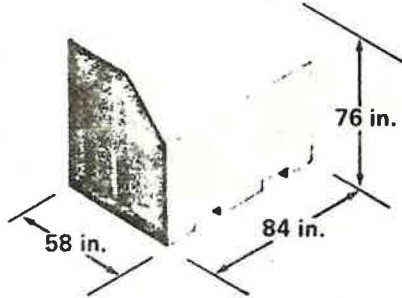


(1) Type: M2 Structural Container
 Internal volume: 1,178 cu ft
 Tare weight: 2,090 lb
 Weight limitations: 25,000 lb

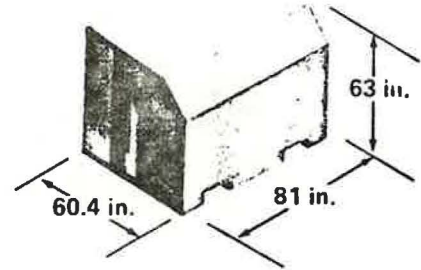
 (2) Type: M2 Structural Container
 Internal volume: 1,165 cu ft
 Tare weight: 2,116 lb
 Weight limitations: 25,000 lb



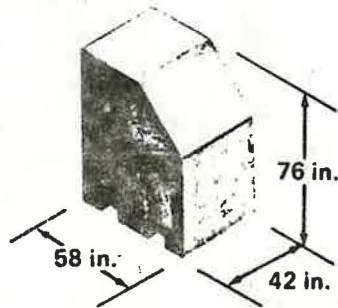
Type: M2 Netted Pallet
 Internal volume: 1,183 cu ft
 Tare weight pallet:
 Aluminum with balsa core: 890 lb
 Tare weight net: 77 lb
 Weight limitations: 25,000 lb



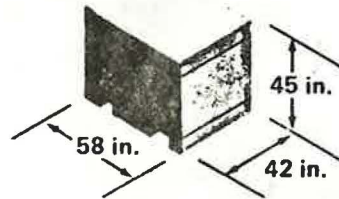
Type: B Container
 Internal volume: 166 cu ft
 Tare weight: 338 lb
 Weight limitations: 3,838 lb



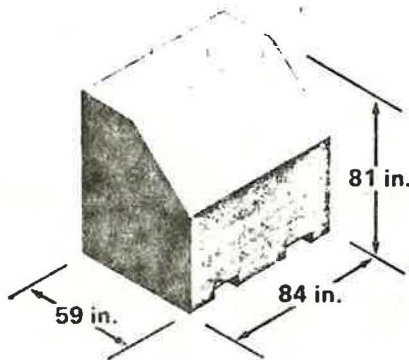
Type: FTC Container
 Internal volume: 151 cu ft
 Tare weight: 309 lb
 Weight limitations: 4,500 lb



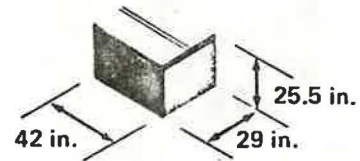
Type: B2 Container
 Internal volume: 83 cu ft
 Tare weight: 169 lb
 Weight limitations: 1,919 lb



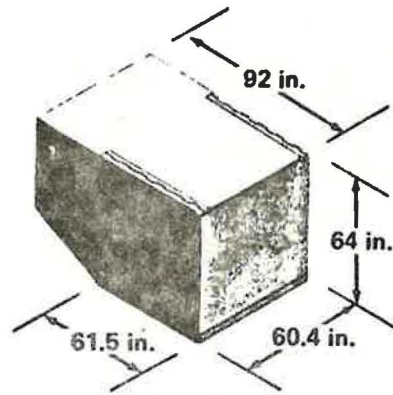
Type: C, D, D2 Container
 Internal volume: 52 cu ft
 Tare weight: 63 lb
 Weight limitations: 2,000 lb to 3,383 lb



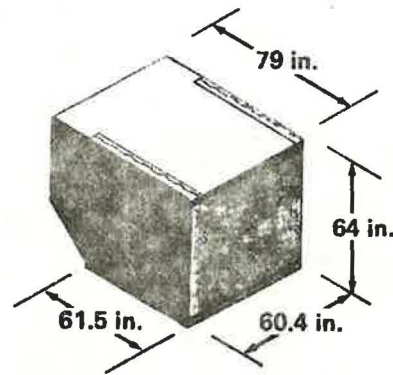
Type: FTB Container
 Internal volume: 175 cu ft
 Tare weight: 350 lb
 Weight limitations: 3,890 lb



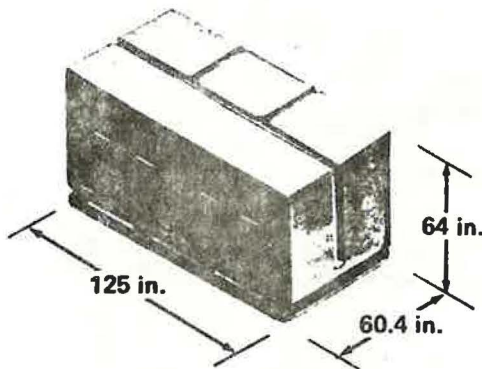
Type: E Container
 Internal volume: 16 cu ft
 Tare weight: 18 lb
 Weight limitations: 500 lb



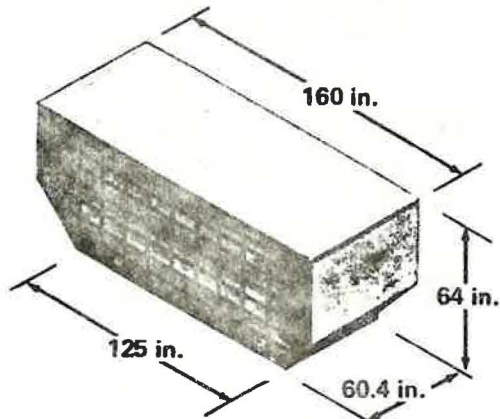
Type: L-1 Container
Internal volume: 159 to 173 cu ft
Tare weight: 209 to 375 lb
Weight limitations: 3,500 lb



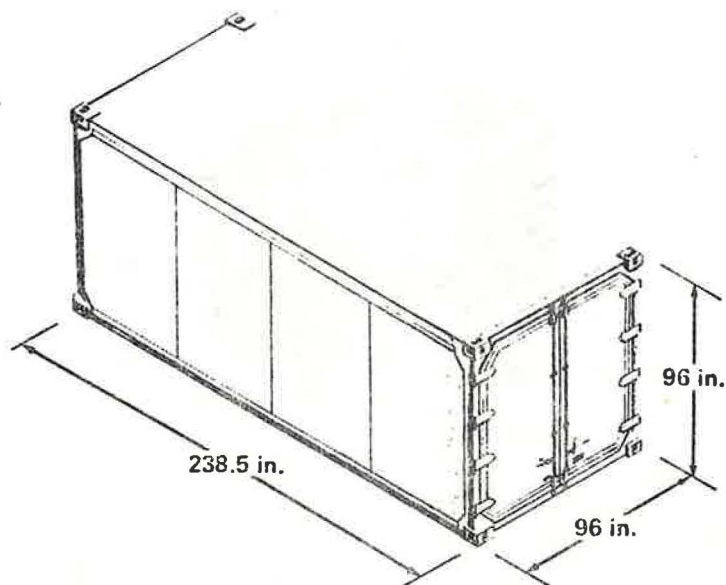
Type: L-3 Container
Internal volume: 149 to 158 cu ft
Tare weight: 246 to 370 lb
Weight limitations: 3,500 lb



Type: L-5 Structural Container
Internal volume: 243 cu ft
Tare weight: 820 lb
Weight limitations: 7,000 lb



Type: L-6 Structural Container
Internal volume: 316 cu ft
Tare weight: 385 lb
Weight limitations: 7,000 lb

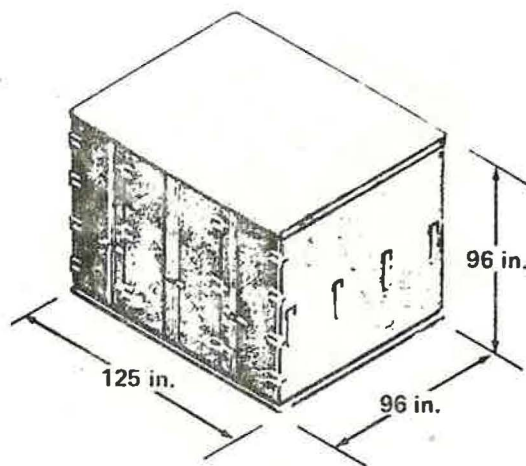


(1) Type: 1 Structural Container

Internal volume: 1,178 cu ft
 Tare weight: 2,090 lb
 Weight limitations: 25,000 lb
 Aircraft type: 747 main deck

(2) Type: 1 Structural Container

Internal volume: 1,077 cu ft
 Tare weight: 2,116 lb
 Weight limitations: 25,000 lb



Type: 2 Container

Internal volume:

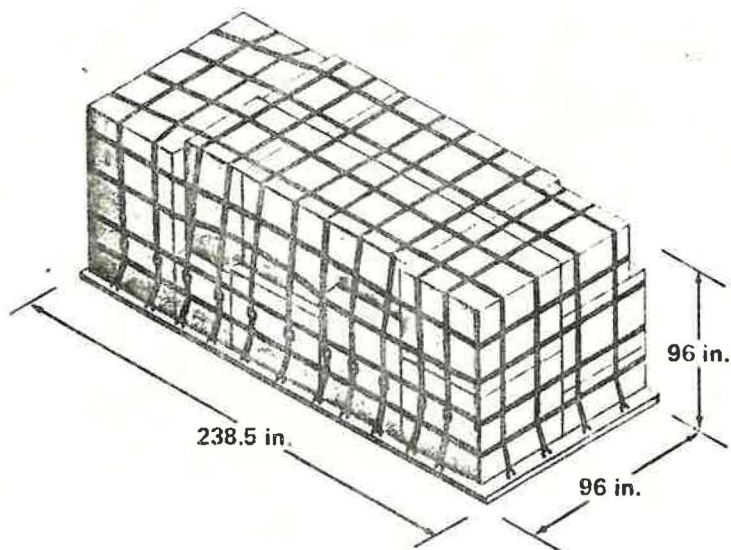
1. Structural design: 526 to 595 cu ft
2. Non-structural design: 571 cu ft

Tare weight:

1. Structural design: 1,050 to 1,146 lb
2. Non-structural design: 798 lb

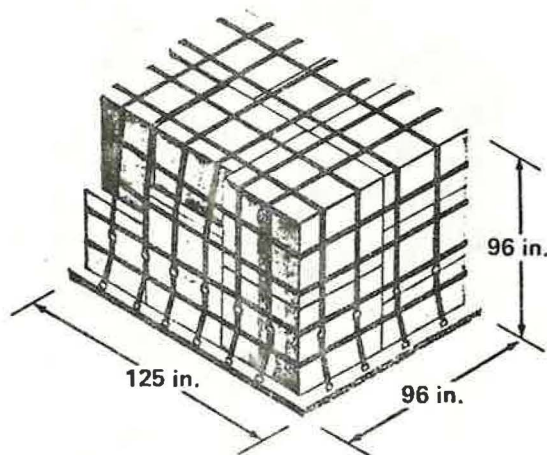
Weight limitations:

1. Structural design: 15,000 lb
2. Non-structural design: 15,000 lb



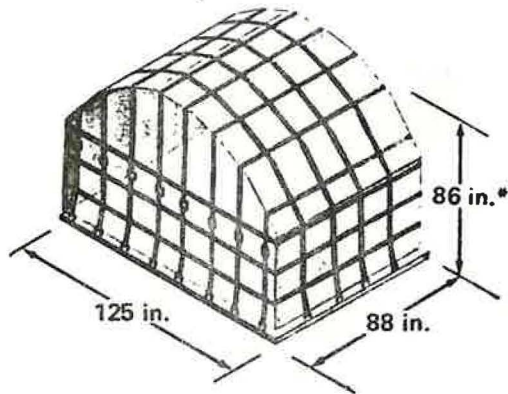
Type: 1 Netted Pallet

Internal volume: 1,183 cu ft
 Tare weight pallet:
 Aluminum with balsa core: 890 lb
 Tare weight net: 77 lb
 Weight limitations: 25,000 lb



Type: 2 Netted Pallet

Internal volume: 630 cu ft
 Tare weight pallet:
 1. Solid aluminum sheet: 255 lb
 2. Aluminum with balsa core: 258 lb
 Tare weight net: 47 lb
 Weight limitations: 15,000 lb



Type: 3 Container

Internal volume:

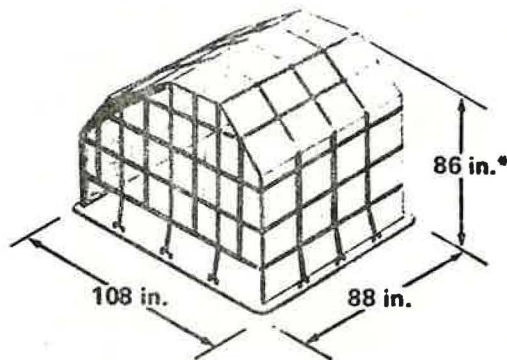
1. Structural design: 390 to 449 cu ft
2. Non-structural design: 371 to 496 cu ft

Tare weight:

1. Structural design: 760 to 950 lb
2. Non-structural design: 452 to 692 lb

Weight limitations:

2. Structural design: 10,000 to 13,300 lb
2. Non-structural design: 8,000 to 13,300 lb

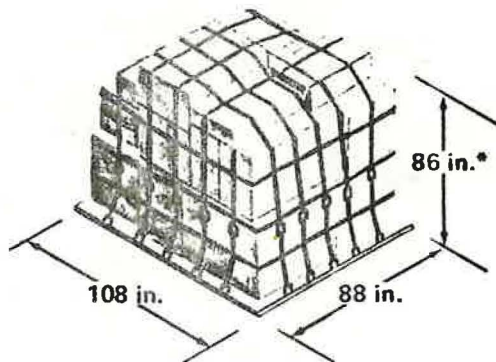


Type: 4 Non-Structural Container

Internal volume: 303 to 361 cu ft

Tare weight: 397 to 570 lb

Weight limitations: 8,000 to 10,000 lb



Type: 4 Netted Pallet

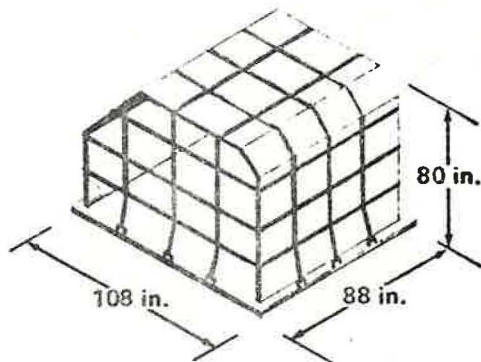
Internal volume: 311 to 375 cu ft

Tare weight pallet:

1. Solid aluminum sheet: 210 lb
2. Aluminum with balsa core: 176 to 216 lb

Tare weight net: 30 to 75 lb

Weight limitations: 8,000 to 10,000 lb

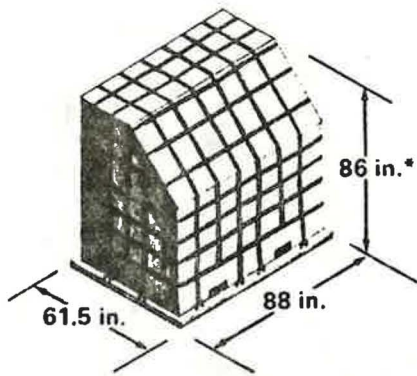


Type: 4A Non-Structural Container

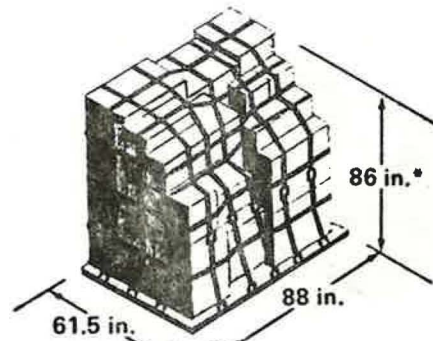
Internal volume: 341 cu ft

Tare weight: 483 lb

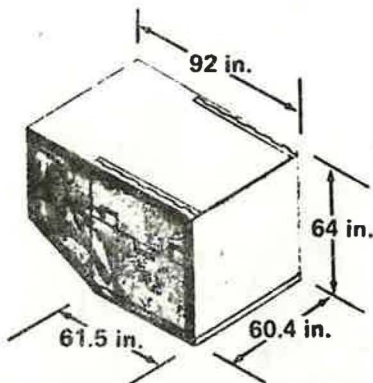
Weight limitations: 8,000 lb



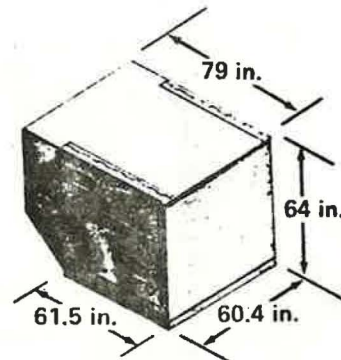
Type: 7 Non-Structural Container
 Internal volume: 215 cu ft
 Tare weight: 295 lb
 Weight limitations: 3,500 lb



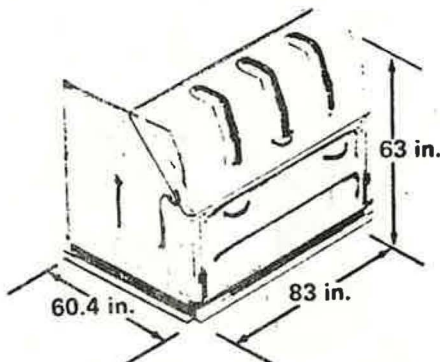
Type: 7 Netted Pallet
 Internal volume: 224 cu ft
 Tare weight pallet:
 1. Solid aluminum sheet: 110 lb
 2. Aluminum with balsa core: 112 lb
 Tare weight net: 30 lb
 Weight limitations: 3,500 lb



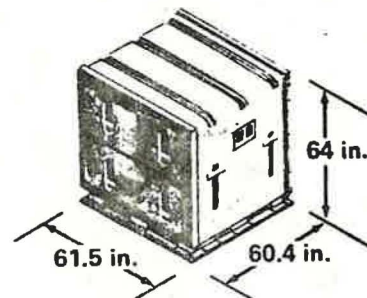
Type: 8 Container
 Internal volume: 159 to 173 cu ft
 Tare weight: 209 to 375 lb
 Weight limitations: 3,500 lb



Type: 8 Container
 Internal volume: 149 to 158 cu ft
 Tare weight: 246 to 370 lb
 Weight limitations: 3,500 lb

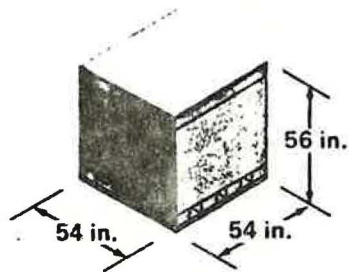


Type: 8B Container
 Internal volume: 151 cu ft
 Tare weight: 309 lb
 Weight limitations: 4,500 lb

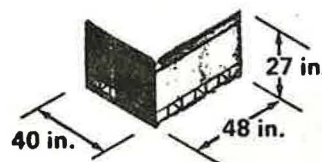


Type: 8C Structural Container
 Internal volume: 103 cu ft
 Tare weight: 337 lb
 Weight limitations: 3,500 lb

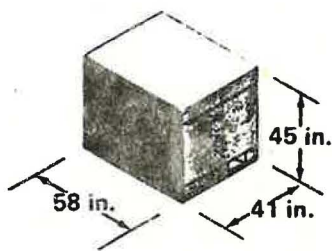
Shipper-Owned Containers—
Weight Limitations and Tare Weight Vary
According to Construction



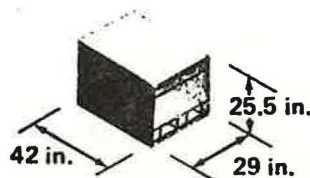
Type: CO7 Container
Internal volume: 81 cu ft
Tare weight: 142 lb
Weight limitations: 2,867 lb



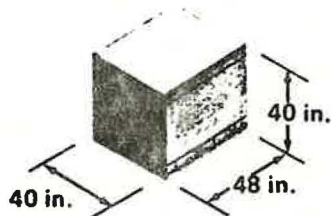
Type: COO Container
Internal volume: 25 cu ft
Tare weight: 30 lb
Weight limitations: 2,010 lb



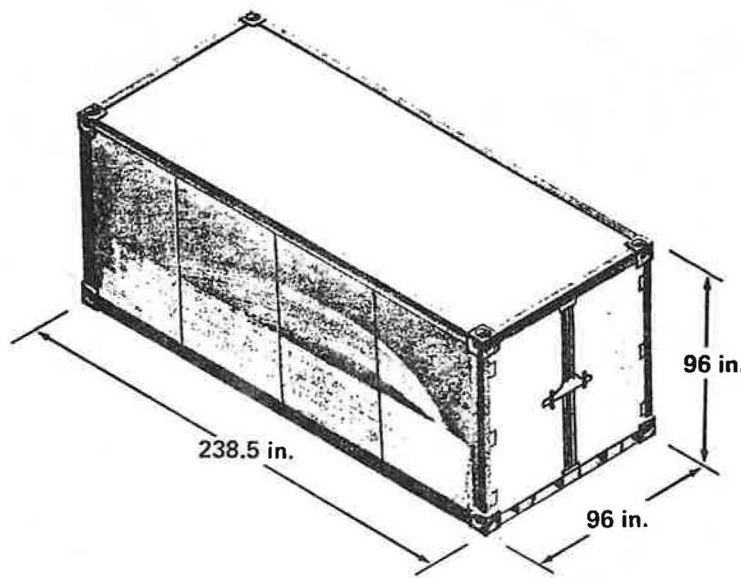
Type: CO8 Container
Internal volume: 52 cu ft
Tare weight: 93 lb
Weight limitations: 3,290 lb



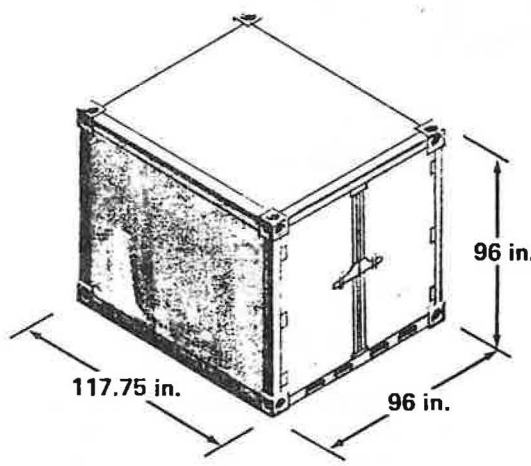
Type: COS Container
Internal volume: 16 cu ft
Tare weight: 18 lb
Weight limitations: 1,400 lb



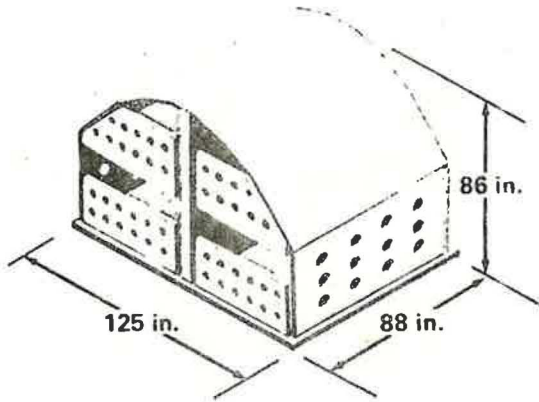
Type: CO9 Container
Internal volume: 36 cu ft
Tare weight: 45 lb
Weight limitations: 2,661 lb



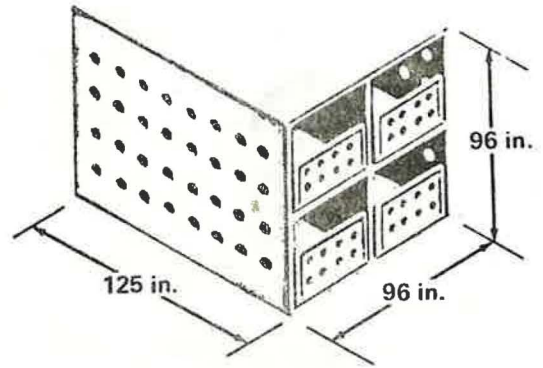
Type: 1C Container
Volume: 1,113 cu ft



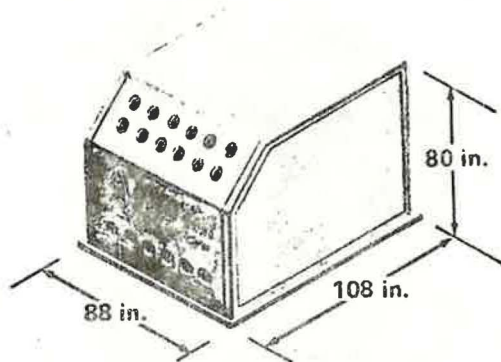
Type: 1D Container
Volume: 531 cu ft



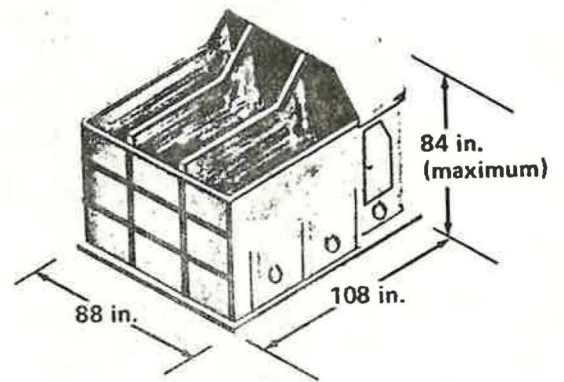
Type: "A" Structural Container
 Tare weight: 950 lb
 Weight limitations: 13,300 lb
 Sheep, cattle, swine, etc.
 Removable deck



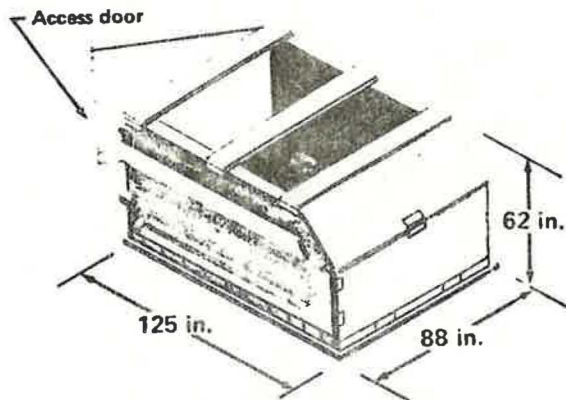
Type: M1 Structural Container
 Tare weight: 1,075 lb
 Weight limitations: 15,000 lb
 Sheep, cattle, swine, etc.
 Removable decks



Type: Not Classified
 Tare weight: Not available
 2 or 3 sheep, cattle, swine, etc.

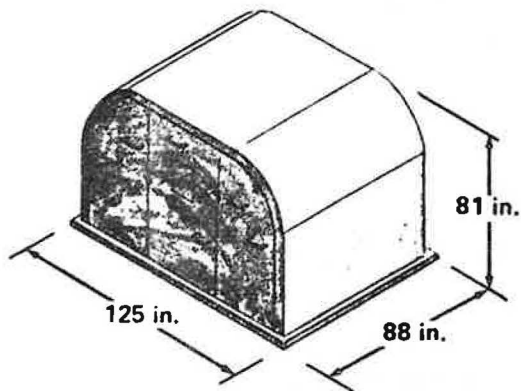


Type: Not Classified
 Tare weight: Not available
 3 cattle or horses

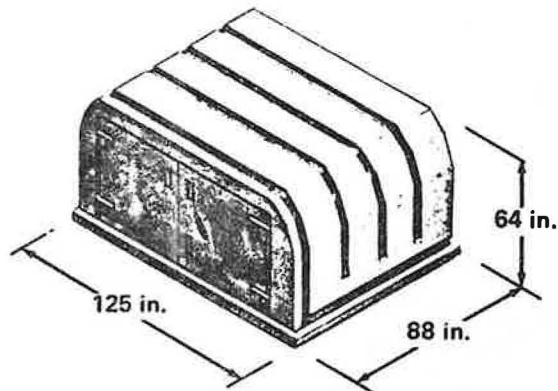


Type: Not Classified
 Tare weight: Not available
 Sheep, cattle, swine, etc.

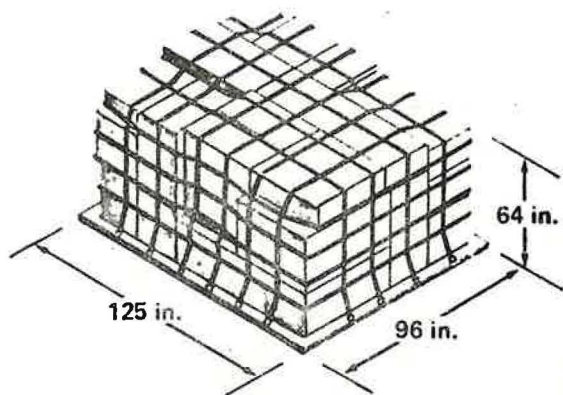
Refrigeration Systems Use Dry Ice, Heat-Battery System
(with Cold Plates), Liquid Nitrogen, Auxiliary Power, or Combination



Type: A3 Container
Internal volume: 390 cu ft
Tare weight: 1,200 lb
Weight limitations: 12,500 lb



Type: L-7 Container
Internal volume: 298 cu ft
Tare weight: 1,150 lb
Weight limitations: 10,200 lb



Type: Not Classified-Netted Pallet

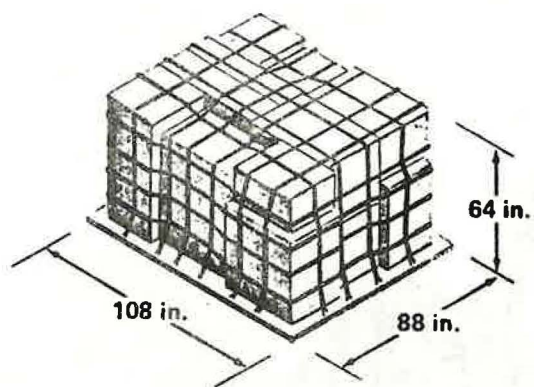
Internal volume: 415 cu ft

Tare weight pallet:

1. Aluminum with balsa core: 258 lb

2. Tare weight net: 40 lb

Weight limitations: 11,100 lb



Type: Not Classified-Netted Pallet

Internal volume: 327 cu ft

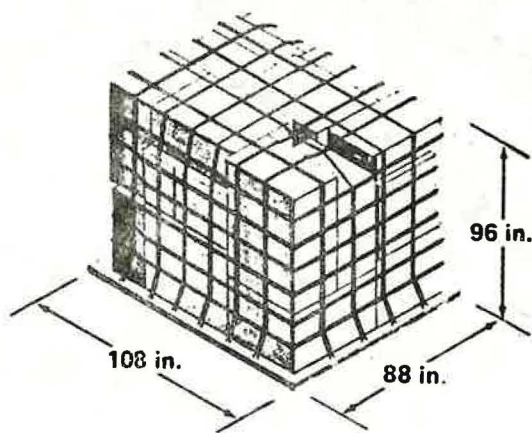
Tare weight pallet:

1. Solid aluminum sheet: 210 lb

2. Aluminum with balsa core: 176 to 216 lb

Tare weight net: 30 lb

Weight limitations: 8,000 to 10,000 lb



Type: Not Classified-Netted Pallet

Internal volume: 498 cu ft

Tare weight pallet:

1. Solid aluminum sheet: 210 lb

2. Aluminum with balsa core: 176 to 216 lb

Tare weight net: 35 lb

Weight limitations: 8,000 to 10,000 lb

The industry is well-equipped indeed. The aircraft, its ground support equipment and the variety of containers, igloos and pallets (collectively called ULD's), all combine to form one of the most finely integrated systems of transportation. The efficiency presented by such a system allows for a high utilization of available aircraft space, and a full manpower utilization.

CHAPTER IV - SERVICE

The air transportation system is a well-developed one, with long-, medium-, and short-haul airlines that blanket the nation with service. Most of these carriers provide cargo capacity on every flight. Recently, through new legislation, additional services have been introduced or expanded to provide an even wider range of choice to the shipper.

Air forwarders, and more recently, forwarder airlines and small package carriers add further to the system.

Intermodal expansion, utilizing bus, truck, rail and water modes, round out an efficient air cargo system to form a door-to-door high frequency service to most communities in the country.

A. The Carriers

The domestic trunk airlines, local service airlines, all-cargo airlines, and the intra-state (including intra-Alaska and intra-Hawaii) airlines comprise the scheduled airline system. This system accounts for nearly all air cargo operations. The supplemental and commuter air carriers contribute to the system also, and on an increasing trend.

Domestic Trunk Airlines

The domestic trunk airlines are those characterized by extensive route systems over the country, most offering transcontinental services and varying levels of international services. All major market areas are served by these carriers, especially the high-density city pairs. There are presently eleven carriers in this category:

- American Airlines
- Braniff Interantional
- Continental Airlines
- Delta Air Lines
- Eastern Air Lines
- National Airlines
- Northwest Airlines
- Pan American World Airways
- Trans World Airlines
- United Airlines
- Western Airlines

Of these airlines, Pan American World Airways is predominantly international, although some domestic routes are in operation. There are two pending merger applications that could reduce the number to nine: Pan American and National, not likely to be approved; Continental and Western, quite likely to be approved. (The latter would be designated Western Continental Airlines.)

Aircraft operated by this group are shown in Table 4; firm orders for additional aircraft are shown in Table 5.

Table 4Aircraft Operated by Domestic Trunk Airlines

<u>Type</u>	<u>Number of Aircraft</u>	<u>Remarks</u>
B-747	111	One Combi, 9 freighters, 8 SP's
B-707	217	15 are freighters
B-727	866	59 are QC models
B-737	81	
L-1011	88	
DC-10	126	
DC-8	109	15 are freighters
DC-9	148	
A-300B	4	

Local Service Airlines

The local service airlines also have extensive route systems, and serve all of the major market areas of the country. In addition, intermediate- and smaller-size communities are connected to the overall system by these carriers. Primarily intermediate- and short-haul routes are operated, utilizing passenger aircraft only, but with adequate belly cargo space to satisfy demand. The local service airlines are paid a subsidy (public service revenue) by the CAB; this is due to the otherwise unprofitable or marginal operation of shorter-haul routes. This is the only category of airline that receives subsidy.

The local service airlines are:

- Air New England
- Frontier Airlines
- Hughes Airwest
- Ozark Airlines
- Piedmont Airlines
- Republic Airlines (until 1979, North
Central Airlines and Southern Airways)
- Texas International Airlines
- USAir (until 1979, Allegheny Airlines)

Aircraft operated and on order by local service airlines are displayed in Table 6.

All-Cargo Airlines

As the name implies, these carriers are certificated to the carriage of cargo only. There are three major carriers in this category, but with the recent deregulation of the all-cargo carrier, more will be operating in the future. The existing carriers can schedule service anywhere in the United States, Puerto Rico and the Virgin Islands, but are excluded from intra-Alaska or intra-Hawaii service (Appendix J). In addition, all have international routes, governed by bilateral agreements.

The three major all-cargo airlines are:

- Airlift International
- Flying Tiger Line
- Seaboard World Airlines

The aircraft operated by these carriers is shown in Table 7. It is reasonable to assume that new aircraft orders are imminent, as Mc Donnell-Douglas DC-8's and Boeing 707's will be phased out of operation by 1983. Each aircraft retired normally requires replacement on a one-for-one basis, regardless of aircraft capacity. Further, with deregulation, these carriers are now permitted expansion limited only by the number of available aircraft.

Intra-State Airlines

Airlines operating within state boundaries fall into this category, however, the trend is away from this limitation. Airlines in this group are usually regulated by air appropriate state agency, except for Alaska and Hawaii. Intra-state carriers within the 48 contiguous states include, but are not limited to, the following:

- Air California
- Gem State Airlines
- Pacific Southwest Airlines (PSA)
- Southwest Airlines

Airlines of Alaska and Hawaii are regulated by the CAB, and operate under authority that allows variances in schedules, equipment types, substitution of equipment, etc. due to seasonal and navigational difficulties. Intra-Alaska airlines include, but are not limited to:

- Alaska Airlines
- Kodiak Western Alaska Airlines
- Munz Northern Airlines
- Reeve Aleutian Airways
- Wien Air Alaska

Intra-Hawaii airlines are two in number:

- Aloha Airlines
- Hawaiian Airlines

Aircraft operated and on order by these airlines are shown in Table 8.

Supplemental Airlines

The primary interest of this category of airline historically has been the carrying of passengers. With the advent of the wide-body aircraft with large cargo capacity in the belly, the supplementals appear to have a bright

Table 8Aircraft Operated and On Orderby Intra-State Airlines

<u>Type</u>	<u>*Number of Aircraft</u>	<u>On Order</u>
B-727	41	5
B-737	37	6
DC-9	9	10
L-188	6	0
FH-227	5	0
YS-11	3	0
Swearingen Metro	4	4

* Also, various Grumman, Cessna, Aero Commander, Dornier, Britten-Norman, Lockheed and Curtiss aircraft are operated by the Intra-Alaska airlines listed.

As jet aircraft increasingly became the backbone of the larger airlines' fleets, some routes became less profitable or even losing operations for those airlines. The commuter airlines have assumed these routes, utilizing the smaller but more realistic aircraft types to fly the systems. These carriers also have aggressively promoted new markets, thus expanding the coverage provided by the industry. Nearly all "commuters" carry passengers and property, and the aircraft employed for this task vary widely as to size, capacity, speed and manufacturer.

A list of manufacturers providing aircraft to this segment of the industry is listed below:

- Beech Aircraft
- Bell Aerospace
- Boeing Aircraft
- Britten-Norman Aircraft, LTD
- Cessna Aircraft
- Convair (General Dynamics)
- de Havilland Aircraft of Canada, LTD
- Dornier GmbH
- Fairchild-Hiller Aircraft
- Grumman Aerospace
- Hawker-Siddeley Aviation, LTD
- Hughes Aircraft
- Lear (Gates Learjet)
- Lockheed Aircraft
- Martin Aircraft
- Mc Donnell-Douglas Aircraft
- Mitsubishi Aircraft
- Mooney Aircraft
- Nord Aircraft
- Piper Aircraft
- Rockwell International
- Short Brothers, LTD
- Sikorsky Aircraft
- Swearingen Aviation
- Westwind Aviation

B. The Forwarders

In an oversimplification, an air freight forwarder consolidates individual shipments to a designated city and, in effect, hires the airlines to carry these shipments. To the airline, the forwarder is a customer; to the shipper, the forwarder is a middleman, an indirect carrier and in many cases, a provider of accessorial services.

Public Law 95-163, the Cargo Reform Act (November 9, 1977--Appendix H), authorized the CAB to give "grandfather" rights to a carrier, if that carrier had provided all-cargo service any time between January 1 and November 9, 1977. If a carrier did not qualify for these rights, any new all-cargo company could apply on and after November 9, 1978, for a certificate to operate all-cargo service. The "fit, willing and able" requirement still applies, and especially to meet stringent insurance requirements. This is a new section added to the Federal Aviation Act (Section 418). Several freight forwarders have applied and secured certificates to operate as an air carrier. These are referred to as forwarder airlines.

The Air Freight Forwarder

From 1927 until 1948, the Railway Express Agency (REA) was the only air freight forwarder authorized to engage in transportation as an indirect air carrier. Since 1948, the CAB has allowed free entry of freight forwarders into the market. This appeared to be an intelligent move on the part of the Board. The freight forwarder had possessed a well-established position in surface transportation for years. But due to the fact that air carriers did not report to the Interstate Commerce Commission, but to the CAB, it was felt that all air freight forwarders, indirect carriers, would have to report to the CAB also. It wasn't until 1948 that this relationship was established.

The air freight forwarder's principal function is to provide for consolidating shipments at the origin market area and distributing those shipments at the destination market area. The consolidating and distributing, then, require ground transportation to provide this door-to-door, pick-up and delivery service.

The service to the shipper, then, involve pick-up and delivery; actual transportation between origin and destination and the airport; consolidation and bulk-breaking; selection of the air carrier; insuring expeditious handling; advising services such as rates, routes, schedules, traffic conditions, packing and marking; insurance; storage and any other accessorial services directly connected with the consolidation, transportation and distribution of air cargo.

As a customer of the air carriers, the forwarder provides significant services. Among these are the soliciting of cargo, collecting shipments, billing, labeling, sorting, packing, arranging in load or consignee order, manifesting, routing, loading and unloading, disassembling, distribution and providing office and warehouse space when needed or requested. There are few "customers" in today's economy that serve businesses to this extent.

With the entire air transportation industry in a dynamic state, changes occur daily that will affect the business as a whole. In early 1979, the CAB issued rules which virtually deregulated air freight forwarders, in that they (the forwarders) no longer must file tariffs or any other rate information with the CAB. In the future, the forwarder may employ the air carrier tariff or his own, relying on the market to determine whether or not the rates are competitive. This market determination will set rate levels of the future, both for the air forwarder and the air carrier.

Air forwarders have increased dramatically in the thirty years of existence. In 1948, there was one; this grew to seven in 1953, 42 in 1958, 94 in 1963, 171 in 1968, 255 in 1973 and 411 in 1978. With further deregulation of both air carriers and the air forwarders, further increases in number of forwarders and services offered are anticipated. The increased competition should result in an improved air cargo industry.

Forwarder Airlines

Little has developed since the passage of the Cargo Reform Act (Section 418) in this area. A few air freight forwarders have applied for entry as air carriers, but a "go-slow" attitude has emerged among the

There is still another factor to consider, and it could become a major factor over time. The CAB has granted a blanket exemption for all commuter airlines and air taxi operators to operate aircraft with capacities to 18,000 pounds of payload and having up to 55 seats. Prior to this ruling by the Board, the limitation had been 7,500 pounds and 19 seats. The Board did this because, in its opinion, the Airline Deregulation Act had intended for air taxis and commuter airlines to be able to compete for passengers and cargo with other segments of the industry. The commuter airlines and air taxi operators clearly have an operational advantage over an air forwarder (and the forwarder has a similar advantage in the handling of cargo).. The future in this area will prove most interesting.

Express Services

The shipper may designate the flight or flights over which their shipments move when using air express. Express services are set up for high priority shipments regardless of size, number of pieces in the shipment or distance to be moved. The shipper can request airport-to-airport or door-to-door service when making the cargo reservation. The shipment must be at the freight terminal 60-90 minutes prior to the designated aircraft's departure (three hours for airworthy restricted material). The only limitations to express service are aircraft size and the timing outlined above.

This service is about 30% higher in cost than regular air freight. If the shipment does not move on the shipper-designated flight, the difference between express and freight is refunded, and the shipment moves on the next available flight out. An additional feature of this service is the close monitoring and special handling at the terminal.

When time is at a premium, such as an emergency or other critical situation, air express offers the ultimate in speed, care of handling and processing, convenience of timing and assurance of expedited delivery. The term priority reserved freight (PRF) and air express are synonymous.

Small Package Counter Services

From express services of the past fifty years has emerged a wider choice of services. One of these is the small package counter service offered by most of the scheduled airlines. More than three million shipments move via this specialized service each year. It involves use of the passenger ticket counter at the airport.

The shipper takes the package to the airline ticket counter at least 30 minutes prior to flight departure. There can be only one package per airbill, and it cannot exceed 50 pounds. Maximum overall measurement cannot exceed 90 inches, length and girth. Maximum insured value is \$500 and inter-line connections are available. At the destination, the package is available for pick-up in the claim area. An important factor here is that the consignor (shipper) has the responsibility of notifying the consignee as to the flight on which the package will arrive, and the time of arrival. Rates

Table 10Small Package Services

<u>Airline</u>	<u>Service</u>
Alaska Airlines	Gold Streak Package Express
Aloha Airlines	VIP
American Airlines	Priority Parcel Service
Bratiff International	Pronto Package
Continental Airlines	PBX-Proud Bird Express
Delta Air Lines	DASH-Delta Air Lines Special Handling
Eastern Air Lines	SPRINT
Frontier Airlines	Kwickee Service
Hawaiian Airlines	AIRPAC
Hughes Airwest	Rapid Package Service
National Airlines	Sun Streak Service
Northwest Airlines	EPS-Expedited Package Service
Ozark Airlines	First Flight
Pan American World Airways	Clipper Package Service
Piedmont Airlines	PEP-Piedmont Expedited Package Service
Republic Airlines	VIP Service-Very Important Package
Texas International Airlines	QUICK-PACK
Trans World Airlines	Next Flight Out
United Airlines	SPD-Small Package Dispatch
USAir	PDQ-Package Delivered Quick
Western Airlines	SPS-Speed Pak Service
Wien Air Alaska	ESP-Expedited Small Package

5. Emery Flyte-Pak is a very specialized service, incorporating one small container 15 inches by 12 inches by three inches, and containing a handle to give it the appearance of a small attache case. The containers are free, and up to five pounds may be shipped. The single rate is \$10, airport-to-airport, anywhere in the United States or Canada. If additional service, such as a pick-up and delivery service, is needed, the rates for such service is added to the \$10 single rate.

6. Since 1972, the Federal Express Corporation has offered a wide choice of small-package services. Using ten Boeing 727's and 32 Dassault Falcons, along with 1,300 radio-dispatched vans, the company provides daily service to 150 major cities and over 10,000 smaller U. S. communities. Small packages sent via Federal Express are picked up, sorted, transported and delivered by company employees, with no interline connecting or transshipment involved. All shipments are routed each night through a facility in Memphis, Tennessee; the system, therefore, resembles the spokes in a wheel rather than a more conventional network. The company offers seven different services, each satisfying a specific segment of the overall market for small package transportation.

- a.) Priority 1: Overnight service, limited to one package per shipment. Maximum weight is 70 pounds and maximum dimensions are 108 inches, length and girth. Any package exceeding 70 inches (length and girth) is assessed a minimum rate for 25 pounds. No package over 54 inches long will be accepted. Up to 300 pounds may be accepted from one shipper to one consignee each day.
- b.) Courier Pak: Utilizing envelopes, small boxes and tubes, this service is expedited overnight also. The envelope has a two-pound maximum, and is used for important reports and correspondence. The Courier Pak Box (16" x 12 $\frac{1}{4}$ " x 3") is designed for computer printouts and tapes replacement parts, etc., with a five-pound maximum. The Courier Pak Tube (38" x 3" x 3") is designed for items requiring protection from folding, creasing or bending, such as maps, blueprints and photographs.

as main deck cargo on freighters, and belly cargo on both freighter and passenger aircraft, make up most of the traffic. However, bulk freight and other smaller shipments are carried also.

The scheduled airlines, supplemental airlines (non-scheduled), cargo charters, forwarders, forwarder airlines, Federal Express, ACI and inter-modal special services combine to form the best air cargo system in the world. Air freight has the broadest reach of all other cargo services due to the interline system in operation at all hours of every day, accomplishing world-wide distribution in the shortest possible elapsed time. The domestic system is even more efficient and dependable.

Domestic System Features

Throughout the 50 states, the freight terminals, flight frequency, time-of-day service, connecting banks of flights at major airports, and interline cooperation, combine to create for the shipper a flexible air distribution system. This system is geared to the needs of industry, the regular shippers of auto parts, computers and parts, clothing and fashions, electronics, machines and machine parts, produce and other foodstuffs. In satisfying the volume users, the occasional shipper reaps the benefits too.

There are freight terminals at all major cities, and freight handling facilities at intermediate and smaller airports, but it is the manner in which they are utilized that creates the distribution system. Routing of aircraft considering elapsed time, flight direction, frequency, and time-of-day, is the manner in which value of service is created.

Several major terminals in the United States serve as the hubs for air freight movement. Atlanta, Chicago, Dallas, Denver, Los Angeles, Memphis, New York, San Francisco and Seattle are the major hubs involved in the domestic system; some or all are involved in the movement of international cargo also. Let us examine here a westbound connecting bank of flights using Chicago as the hub. Our hypothetical case would involve the following routings for ten flights, all arriving and departing at approximately the same hour, e.g., arriving at 0100 and departing at 0200 (1:00 a.m. and 2:00 a.m.):

as main deck cargo on freighters, and belly cargo on both freighter and passenger aircraft, make up most of the traffic. However, bulk freight and other smaller shipments are carried also.

The scheduled airlines, supplemental airlines (non-scheduled), cargo charters, forwarders, forwarder airlines, Federal Express, ACI and inter-modal special services combine to form the best air cargo system in the world. Air freight has the broadest reach of all other cargo services due to the interline system in operation at all hours of every day, accomplishing world-wide distribution in the shortest possible elapsed time. The domestic system is even more efficient and dependable.

Domestic System Features

Throughout the 50 states, the freight terminals, flight frequency, time-of-day service, connecting banks of flights at major airports, and interline cooperation, combine to create for the shipper a flexible air distribution system. This system is geared to the needs of industry, the regular shippers of auto parts, computers and parts, clothing and fashions, electronics, machines and machine parts, produce and other foodstuffs. In satisfying the volume users, the occasional shipper reaps the benefits too.

There are freight terminals at all major cities, and freight handling facilities at intermediate and smaller airports, but it is the manner in which they are utilized that creates the distribution system. Routing of aircraft considering elapsed time, flight direction, frequency, and time-of-day, is the manner in which value of service is created.

Several major terminals in the United States serve as the hubs for air freight movement. Atlanta, Chicago, Dallas, Denver, Los Angeles, Memphis, New York, San Francisco and Seattle are the major hubs involved in the domestic system; some or all are involved in the movement of international cargo also. Let us examine here a westbound connecting bank of flights using Chicago as the hub. Our hypothetical case would involve the following routings for ten flights, all arriving and departing at approximately the same hour, e.g., arriving at 0100 and departing at 0200 (1:00 a.m. and 2:00 a.m.):

CHAPTER V - HANDLING

Whether routine or not, all cargo requires attention and control. Cargo, unlike passengers, requires personnel to handle it at every turn. Handling procedures, special handling, restricted articles, other services, and the physical care of cargo discussed here represent just one of the major trunk airlines. However, most handling is similar to that of other air carriers, and where differences occur, they are minor differences.

Several forms are discussed in this chapter; the more uniform of these will be detailed in Chapter VII.

Some international handling is included in the discussions, as most domestic carriers have a few international routes.

A. Handling Procedures

When an order for air cargo service originates, there are numerous procedures to follow. Not all of the procedures discussed here would apply to all shipments. Origin and destination procedures are about the same in all cases, but circumstances alter the handling in other cases.

Preparatory Procedures

Whenever air freight service is requested, the Freight Agent should answer all questions tendered by the shipper as to rates, routings, available flights and the like. The agent then obtains the name and address of the shipper and the approximate weight, size, and number of pieces in the shipment. The origin and destination is obtained also, as is the nature of the commodity itself, to determine if the shipment is acceptable under the current tariff, or if advance arrangements are necessary.

Shipments exceeding a certain declared value (\$20,000-\$25,000) require approval, sometimes executive approval. Shipments of live poultry, birds, animals or perishables are accepted only if weather conditions and flight movements are determined to be favorable for moving such shipments to the destination without deterioration or damage.

After a shipment is accepted, the consignor must be contacted if the shipment cannot be accommodated on the next scheduled flight (especially with regard to perishables). The shipper advises as to the disposition preferred, and a notation is made on the airbill by the agent. This notation gives the name of the person contacted, the time, date and instructions received from the shipper. The agent must be identified, noting also if the contact was made by the agent in person or by telephone.

When all is in order, the agent determines if the shipment will be cash or credit. If the shipment is to move on a credit basis, the agent will verify shipper's credit by checking an approved credit list or similar check.

On interline shipments, the Air Cargo Transfer Manifest furnished by the connecting carrier must be verified by the Freight Agent, making notations regarding any overage, shortage or damage apparent at the time of transfer (badly damaged shipments may not be accepted from connecting carriers without authorization from the Station Manager). The time and date of the transfer are noted on the Transfer Manifest, and the original and one copy are returned to the transferring air carrier. Since all of the shipments listed on the Transfer Manifest were billed to the final destination by the originating carrier, a new airbill must not be prepared. When the shipment is dispatched by the connecting carrier, appropriate information, such as flight number and departure time, are noted on the connecting carrier's copy of the Transfer Manifest. When shipments are received from surface carriers or non-participating air carriers with whom the connecting air carrier does not have an interline airfreight tariff and agreement, such shipments are handled as if originating at that point, although a copy of the original airbill should be attached for verification purposes.

On all credit shipments, a statement of charges is mailed to the shipper, attached to the invoice copy of the airbill.

Destination Airport Procedures

When shipments are unloaded from the aircraft, they should be inspected for overages, shortages or damage. Then these shipments are divided into:

Local deliveries

Interline shipments to be forwarded

Shipments to be forwarded via a surface
or other non-participating carrier

In case of a reweigh request by the origin city, confirmation of destination weight must be teletyped immediately. Shipper must be notified by telephone regarding any change of shipment weight; the name of the person notified must appear in the body of the airbill.

copies. Transferring carrier retains appropriate copies also. Airbills are not removed on any shipment being transferred unless the receiving air carrier is a non-participating air carrier with the transferring air carrier in a joint airfreight tariff.

With shipments to be forwarded via a surface or non-participating carrier to the final destination, the procedure is also simple. The Freight Agent contacts the carrier regarding transfer of shipment, handling such carrier as the consignee. The forwarding carrier must be informed if airfreight charges are to be collected, and a copy of that carrier's airbill is retained as a receipt.

Enroute Removal and Forwarding

Sometimes it is necessary to remove air freight from a scheduled flight, and forward it on a later flight. The reasons are numerous, ranging from weight limitations on a specific flight segment to delay or cancellation of a flight because of mechanical or operational difficulties. When necessary to remove one or more shipments, perishables and expedited service items should be removed last unless the flight is canceled. Then these items would be removed first and would have priority on the next flight. Outside of this exception shipments with the most recent airbill dates are removed first. This removed freight must move ahead of local originating freight when the airbill date of the removed freight is earlier. Through traffic has priority over removed or local originating freight if the through freight has the same airbill date or earlier. Lot shipments are not to be split unless absolutely necessary. Space reservations must not be accepted at a given station when there is through removed freight or local originating freight on hand. If the backlog is more than 24 hours, all up-line stations must be advised to hold or reroute freight traffic until the backlog is cleared. Once cleared, the up-line stations must be so notified. Whenever the number of pieces removed, reason for removal and destinations are entered on the Station Dispatch Report. Also, an Airfreight Removal Report must be completed by the Freight Agent.

The Freight Agent must expedite removed freight by the fastest means possible, on-line, interline or surface if necessary (and feasible). If the shipment continues on-line, the agent enters flight and date of dispatch.

All unclaimed, refused, unidentified and damaged shipments which are non-perishable are sent to the carriers claims office after holding 30 days, except for damaged shipments. These are forwarded to claims when requested, however, damaged shipments should be accepted by the consignee until the claim is settled. If a claim is paid in full, or if refused shipments are of such a nature that it would be impractical to forward to the claims office, such shipments involved may be salvaged locally when authorized. Three bids, if possible, are obtained and revenue received from the sale is recorded on the Airfreight Collection Report, with an explanation and cross-reference entered on the Notice of Non-Delivery and Disposal Record. Copies of all documents are distributed according to each carrier's operations.

Diversion or Reconsignment

A shipper may wish to divert or reconsign a shipment while enroute before delivery to the consignee. Authority must be in writing, although a telegram may precede the letter. A new airbill must be prepared showing the new routing or consignee (or both) and charges on the original airbill will be shown as advanced charges on the new airbill.

Accepting Cargo

When cargo is accepted for shipment, it must be properly packed, palletized or containerized to prevent damage or deterioration and to insure safe transportation and delivery.

Routing and Transfer

When routing air freight, the agent or other personnel should always strive to maximize his company's share of the revenue, without violating the customer's right to receive the lowest applicable rate for the shipment. Also, transit time must remain competitive with other airlines' service and routings.

The routing shown on the airbill or other shipping document must be observed unless weather conditions, equipment failure, accidents, congestion at the terminal, strikes, embargoes, government requisition for space or equipment or other emergencies require a change.

When rerouting a whole shipment, the new routing must be shown on all original documents, envelopes and labels. A transfer manifest is prepared with the word "Rerouting" in the remarks column opposite the airbill number. If another airline is also the destination airline, it must deliver the shipment to the consignee.

If partial (split lot) rerouting occurs, the rerouted portion is treated as a new shipment, complete with a new airbill (cross-referenced with the original), showing the tendering airline as the consignor and the point of rerouting as the origin. The tendering airline also becomes the consignee because at destination, the parts of the shipment will need to be reassembled for delivery to the original consignee.

Whenever practical, a rerouted shipment should be returned to its original route and airline at the nearest junction in the direction of movement.

Providing the best service for the customer does not always dictate single-carrier service. More frequency of service, greater capacity available, quicker connections and quicker recovery are all instances of better service for the customer. When these conditions exist to a significant degree, it is the duty of the airline representative or agent to advise the shipper accordingly.

Tracing Air Freight

The tracing of a shipment is sometimes necessary and is most important to assure good customer service. In attempting to locate part or all of a shipment, airbill number, shipper, consignee, number of pieces, weight, date shipped and any other pertinent facts should be obtained. Then a message is sent to the station(s) involved. Only if it is established that all or part of a shipment is definitely astray should an all-stations tracer be considered.

Each airline has its own procedure for on-line tracing messages. All should be clear, complete and concise, but including all available and pertinent information.

B. Special Handling

There are numerous special handling requirements in air cargo, most requiring just good personal judgement. Some of the most important will be discussed here.

Perishables

In this category, cut flowers, fresh fruit and vegetables, eggs, frozen foods, seafood and fresh meat are the commodities.

Cut flowers are fragile, and extremely sensitive to heat and cold. Fresh fruit and vegetables are perishable to varying degrees, and the documents and labels on the shipment(s) usually contain adequate instructions to assure careful and expeditious handling. Eggs are sensitive to heat, cold, impact and crushing. Arrangements for quick consignee pick-up at destination is advised.

Frozen foods, seafood and fresh meat must be kept away from sources of heat, and delivered as soon as possible.

Live Animals

Animals, like perishables, provide a profitable commodity in air cargo. Animals are accepted for transportation if advance arrangements are made, if they are securely and adequately caged (crated), if they are inoffensive, and if they require no unreasonable attention in transit or at destination.

In handling animals, when attention is required, a shippers letter of instruction (SL01) must be securely attached to the container and giving full instructions as to watering, feeding, exercising, etc. (wild or vicious animals of any kind are not accepted with these instruction attached). Whenever feeding or watering is required, a suitable non-spillable container and necessary food and dispensing utensils must be furnished by the shipper. The cage, crate or container must protect the animal from weather extremes. If the container is less than 200 pounds, well-ventilated, and untippable, it may be accommodated in the lower compartment of passenger aircraft.

3. Tropical fish must be kept warm.
4. Move in covered carts to cargo area during cold weather.
5. Notify consignee immediately on arrival.

Birds and Poultry (Poults)

Most birds move under normal conditions but must be handled with care. General precautions should be followed, such as keep out of drafts, be sure to load properly to assure circulation and load to prevent overturning, movement of container.

Customers who ship poults (chickens and turkeys) usually make reservations well in advance, preferring non-stop flights. The poults are accepted as close to load time as possible. Covering the poults while transported in a cart or other vehicle is good practice, providing that air circulation is not hampered. The agent should check to see if poults are active (not dormant) and make the notations to the contrary on the airbill (all copies).

When loading, the agent would make sure that cases were not jammed together (assures circulation) and that cases are never stacked more than five or six high. The destination and all intermediate cities must be notified giving the number of cases, weight, and name, address and phone number of the consignee.

At all intermediate cities, the cargo doors should be opened until just before departure to assure air circulation while the aircraft is on the ground and airborne systems are not operating. Further, the cases and nets that support and separate them should be visually checked to assure safe arrival.

Prior to flight arrival at the destination city, the consignee is advised as to arrival to enable early pick-up. If consignee is not available, poults must be kept in a satisfactory environment until pick-up occurs. Check condition of the shipment and make proper notations on the airbill.

carrier will advise both the ultimate consignee and the originating carrier at the point of origin of the shipment, of the details of the delay. Such advice will contain the minimum information set forth in "Form of Advice," will be at the expense of the carrier sending it, and sent by the best available means of communications.

When onward surface transportation is involved, forwarding details of the surface transportation to be furnished will always be given by the destination air carrier. Confirmation of such services must always be transmitted by the destination air carrier to the originating air carrier, at the point of origin. Such details will contain the minimum information set forth in "Form of Advice," at the expense of the carrier sending it, and must be sent by the best available means of communications (which may include the communications facilities of the carrier who is sending the message). When the onward surface transportation is routine, and no delays are involved, details will be furnished only to the ultimate consignee at the point of final destination. In the event of delay, details will also be furnished to the originating carrier at the point of origin for transmittal to the shipper.

The form of advice message should be easily recognized, and should state the name of consignor, consignee, airbill number, date of departure and, if available, the name of the deceased.

In the event of delay, the reason for the delay, an estimate of the duration of the delay, a brief statement of alternate handling arranged, and an estimate of the new time of arrival will all be included in the message.

Military human remains are basically handled the same as other remains, with a Government Bill of Lading (GBL) used as the shipping document. Any escorts use a Government Travel Request (GTR), one for each escort.

Armed Forces Courier Traffic

Armed forces couriers carry a standard identification card, and are permitted to supervise loading and unloading. All airline personnel must give all possible assistance to the courier. The courier must be permitted

Shipment-Dispatch Record must be completed for each such shipment. If there is any change in routing or delivery, or if any irregularity occurs, originating city must be notified.

Acceptance of articles of extraordinary value (an actual value of \$5,000 or more) require advance arrangements. The shipper must turn over the shipment at an area designated by the carrier at that carrier's terminal not more than three hours prior to flight time. The shipper must guarantee in writing that the consignee will accept delivery of the shipment at the destination airport within three hours after the arrival time. If the consignee fails to appear within three hours, the carrier provides an armed guard to protect the shipment until picked up. (The airlines do not care to have armed guards at the freight terminal; this option is not chosen often.) If the consignee doesn't want to or cannot pick-up the shipment, the carrier will hire an armored vehicle to deliver the shipment. In almost all cases, this latter method is used. This condition must be noted on the airbill. All charges for this service is attached to the shipment and is covered in the tariff.

In-Bond Shipments

The term "In-Bond" designates a procedure under which Customs clearance of cargo is postponed until cargo reaches an inland point, a city, or the closest location to the consignee. The procedure is so named because the cargo moves under the carrier's bond from the gateway city and remains "In-Bond" until Customs releases the cargo to an importer at the inland point, rather than clearing at the congested gateway city where it is usually more time consuming. In-Bond shipments must remain inaccessible to all non-employees and, except in the case of repairing or repacking, must not be opened or the contents disturbed. U. S. Customs must be notified promptly of any international shipments arriving via Continental which require customs clearance. The consignee must be notified and furnished an Arrival Notice stating the location and address where the shipment is being held pending Customs clearance.

C. Restricted Articles

Restricted articles are those materials defined in Title 49 Code of Federal Regulations, CAB 82 Tariff 6-D, and the IATA Restricted Articles Regulations which are not acceptable for transportation by air unless properly packaged, marked, labeled, and certified to be in compliance with the above regulations. Due to the potential hazards involved, each shipment of Restricted Articles must be carefully examined to be certain that it is acceptable for air transportation. Restricted Articles Regulations establish criteria for safe transportation of hazardous materials by air.

Federal Regulations require that all personnel involved in the handling and loading of Restricted Articles be adequately trained in safe handling and loading techniques to ensure compliance with applicable regulations. In addition, it is required that personnel be given recurrent training once each 12 calendar months to keep abreast of changing requirements. Individuals who have not been trained or who are past due for recurrent training must not be allowed to handle restricted articles without direct supervision of currently trained personnel.

Certain restrictions of 49 CFR Parts 170-189 governing carriage of Restricted Articles aboard aircraft may be waived for one or more flights when other forms of transportation are impractical, or in an emergency. Applications for such exemption must be made to the Department of Transportation, Office of Hazardous Materials Operations. These applications must be submitted in accordance with 49 CFR Part 107. Each city must ensure that at least one trained Restricted Articles Specialist is on duty at the terminal whenever Restricted Articles are handled.

When a Restricted Articles Specialist is not available, a shipment can be accepted subject to inspection by the Specialist. The shipper's copy of the airbill should be so noted and the shipment segregated from others and posted with appropriate notices that inspection is required. Due to various government and carrier exceptions to the Restricted Articles Regulations, it is essential that employees be informed of the necessity of confirming with the interlining carrier service to offline points.

accepting the shipment and loading the aircraft. Also an authorized statement (if passenger aircraft is used) that it is permissible to load on a passenger aircraft. The loading position is also mandatory; where is the shipment on the aircraft, forward, aft, middle? A ULD number is not enough.

For radioactive shipments, in addition to the above, fissile class, name or symbol, chemical form (solid, liquid or gas), and number of curies.

Messages must be sent to all down-line, interline or off-line stations to be involved, advising them with all of the above information. The captain may accept or refuse the shipment; if a refusal, a statement in writing must be signed and sent to the appropriate office(s).

Enroute Procedures

Essentially the same precautions are in effect during performance of the transportation. At through cities, any transloading or repositioning must be carried out under tight supervisions. If a crew change occurs at any down-line stations, it is imperative that all pertinent information be communicated, such as loading position, nature of the shipment and so forth. The new crew captain also has the option of accepting or refusing the shipment, as did the originating captain. Enroute inspection for damage, leakage, spillage, distortion of the container and any other irregularity is necessary. Transloaded or repositioned restricted articles are treated as if being originally loaded.

Destination Airport Procedures

Offload, inspect, check, examine and comply with regulations, using care regarding both the shipment and the personnel handling any hazardous materials. If there is injury or exposure, the individual should wash the affected area(s) immediately with soap and water and seek medical assistance. If clothing is contaminated, the individual should take a shower with clothing on, and completely soak for a few minutes. Obtain immediate medical assistance if contamination occurs.

Whenever any incident occurs as the direct result of loading, off-loading, carrying or storing of any dangerous articles, the regional FAA office should be notified.

Refer to Tables 11 and 12 for an example of condensed listing of limitations as published by one airline in its Cargo Manual.

Restricted Articles

CARRIAGE OF RESTRICTED ARTICLES

The table below is a condensed listing of loading and quantity limitations for carriage of restricted articles. The classifications are general and the limitations conform with the requirements of 49 CFR Part 175. For regulations governing any particular article within the general classification listed refer to "IATA RESTRICTED ARTICLES REGULATIONS," a copy of which is available at each station.

49 CFR Part 175.33 requires that the pilot in command be notified in writing of shipping name, classification, locations, and quantities of any Restricted Articles on board, as well as the results of inspection of Restricted Articles prior to loading.

Use This Table For PASSENGER Airplanes Only

MAXIMUM ALLOWABLE QUANTITY — SEE NOTE (1) — AND LOADING LIMITATIONS, PASSENGER AIRPLANE (2)				
CLASS—Abbreviation (Class—Description) LABEL	WEIGHT LIMITS BY LOCATION, KILOGRAMS			EXCEPTIONS AND REMARKS
	Forward 1 and 2 Combined All Airplanes	Aft 3 and 4 Combined 707-727	Aft 3-4-5 Combined 747-747SP	
Cor. M. (Corrosive Material) CORROSIVE	Note (1)	Note (1)	Note (1)	Flammable solids, Poison B, oxidizing materials or organic peroxides shall not be placed next to, or in a position to allow contact with a package having a corrosive label.
Etio. Ag. (Etiologic Agent) ETIOLOGIC AGENT	Note (1)	Note (1)	Note (1)	
Expl. (3) (Explosive) EXPLOSIVE B or EXPLOSIVE	Not Acceptable	Not Acceptable	Not Acceptable	
Expl. (Explosive) EXPLOSIVE C or EXPLOSIVE	Note (1)	Note (1)	Note (1)	Small arms ammunition securely packed in fiber, wood, or metal boxes accompanying a passenger must be carried as checked personal baggage and limited to 25 kg. per bag or outside container, and is not subject to labeling, compartment weight limitations for restricted articles, or pilot notification requirement. A commercial shipment of small arms ammunition must be handled as cargo, requires Explosive C handling, and all associated restrictions apply.
Fla. G. (Flammable Compressed Gas) FLAMMABLE GAS	Note (1)	Note (1)	Note (1)	Only aerosols and cigarette lighters are acceptable.
Fla. L. (Flammable Liquid) FLAMMABLE LIQUID	Note (1)	Note (1)	Note (1)	
Fla. S. (Flammable Solid) FLAMMABLE SOLID and DANGEROUS WHEN WET	Note (1)	Note (1)	Note (1)	
Org. Per. (Oxidizing Material) ORGANIC PEROXIDE	Note (1)	Note (1)	Note (1)	Flammable solids, Poison B, oxidizing materials or organic peroxides shall not be placed next to, or in a position to allow contact with a package having a corrosive label.
Oxy. M. (Oxidizing Material) OXIDIZER	Note (1)	Note (1)	Note (1)	
Pois. B. (Poison) POISON	Note (1)	Note (1)	Note (1)	Poison B must not be loaded in same compartment with animals or with food for humans or animals, and must not be placed next to or in a position to allow contact with a package containing corrosive material.
Irr. M. (Irritant) IRRITANT	Not Acceptable	Not Acceptable	Not Acceptable	

(Continued on next page)

NOTES:

(1) Quantity is net quantity by weight: the weight of the packaged article less its packaging.

Total combined weight of all restricted articles on this page must not exceed 25 kg. per compartment. Example: although 25 kg. of Cor. M. may be carried in any compartment, only 10 kg. may be carried in any compartment if 15 kg. of Fla. L. is being carried in that compartment.

(2) Articles bearing the orange "Cargo Aircraft Only" label must not be carried in passenger airplanes.

(3) Explosive A carriage is prohibited.

Use This Table For **CARGO** Airplanes Only

MAXIMUM ALLOWABLE QUANTITY — SEE NOTE (1) — AND LOADING LIMITATIONS, CARGO AIRPLANE (2)						
CLASS—Abbreviation (Class—Description) LABEL	WEIGHT LIMITS BY LOCATION, KILOGRAMS				EXCEPTIONS AND REMARKS	
	Forward 1 and 2 Combined All Airplanes	Aft 3 and 4 Combined 707-727	Aft 3-4-5 Combined 747-747SP	Main Cabin 707/727/747		
Cor. M. (Corrosive Material) CORROSIVE	Note (1)	Note (1)	Note (1)	No limit*	*Must be accessible to crew. Flammable solids, organic peroxides, oxidizing materials or poison must not be placed next to or in a position to allow contact with a package containing a corrosive material.	
Etio. Ag. (Etiologic Agent) ETIOLOGIC AGENT	Note (1)	Note (1)	Note (1)	No limit*	*Must be accessible to crew.	
Expl. (3) (Explosive) EXPLOSIVE B or EXPLOSIVE	Not Acceptable	Not Acceptable	Not Acceptable	No limit		
Expl. (Explosive) EXPLOSIVE C or EXPLOSIVE	Note (1)	Note (1)	Note (1)	No limit*	*Must be accessible to crew.	
Fla. G. (Flammable Compressed Gas) FLAMMABLE GAS	Aerosols & Lighters	Note (1)	Note (1)	Note (1)	No limit*	*Must be accessible to crew.
	All Others	Not Acceptable	Not Acceptable	Not Acceptable	No limit	
Fla. L. (Flammable Liquid) FLAMMABLE LIQUID	Note (1)	Note (1)	Note (1)	No limit*	*Must be accessible to crew.	
Fla. S. (Flammable Solid) FLAMMABLE SOLID and DANGEROUS WHEN WET	Note (1)	Note (1)	Note (1)	No limit*	*Must be accessible to crew.	
Org. Per. (Oxidizing Material) ORGANIC PEROXIDE	Note (1)	Note (1)	Note (1)	No limit*	Flammable solids, organic peroxides, oxidizing materials or poison must not be placed next to or in a position to allow contact with a package containing a corrosive material.	
Oxy. M. (Oxidizing Material) OXIDIZER	Note (1)	Note (1)	Note (1)	No limit*		
Pois. B. (Poison) POISON	Note (1)	Note (1)	Note (1)	No limit*	*Must be accessible to crew. Poison, Class B, not to be loaded in same compartment with animals or with food for humans or animals, and must not be placed next to or in a position to allow contact with a package containing a corrosive material.	
Irr. M. (Irritant) IRRITANT	Not Acceptable	Not Acceptable	Not Acceptable	No limit		

(Continued on next page)

NOTES:

(1) Quantity is net quantity by weight: the weight of the packaged article less its packaging.

Total combined weight of all restricted articles (unless specifically identified as not quantity-limited) on this page must not exceed 25 kg per inaccessible compartment. Example: although 25 kg. of Cor. M. may be carried in any compartment, only 10 kg may be carried in any compartment if 15 kg. of Fla. L. is being carried in that compartment.

(2) In addition to the stated limitations, articles with "Cargo Aircraft Only" labels must be carried in a location accessible to the crew during flight. Such articles must be loaded in the main cabin in accordance with instructions in the Clipper Cargo Manual, the Aircraft Loading Manual and the Aircraft Operating Manual.

(3) Explosive A carriage is prohibited, except by specific exemption.

Use This Table For CARGO Airplanes Only

MAXIMUM ALLOWABLE QUANTITY — SEE NOTE (1) — AND LOADING LIMITATIONS, CARGO AIRPLANE (2)					
CLASS—Abbreviation (Class—Description) LABEL	WEIGHT LIMITS BY LOCATION, KILOGRAMS				EXCEPTIONS AND REMARKS
	Forward 1 and 2 Combined All Airplanes	Aft 3 and 4 Combined 707-727	Aft 3-4-5 Combined 747-747SP	Main Cabin 707/727/747	
Nonfl. G. (Nonflammable Compressed Gas) NONFLAMMABLE COMPRESSED GAS or NONFLAMMABLE GAS	70	70	70	No limit*	*Must be accessible to crew.
R.A.M. (Radioactive Material — Category I) RADIOACTIVE — Category I White	No limit	No limit	No limit	No limit	
R.A.M. (3) (Radioactive Material — Category II) RADIOACTIVE — Category II Yellow	Not Acceptable	50* transport index units	50* transport index units	50* transport index units**	*Maximum of 50 transport index units for entire airplane. **707 or 727: load only aft of pallet position 1. ** 747: load only aft of pallet positions 103/104
R.A.M. (3) (Radioactive Material — Category III) RADIOACTIVE—Category III Yellow	Not Acceptable	50* transport index units	50* transport index units	50* transport index units**	*Maximum of 50 transport index units for entire airplane. **707 or 727: load only aft of pallet position 1. ** 747: load only aft of pallet positions 103/104
ORM-A, -B, -C, or -D (7) (ORAA, B, or C) (except as specified immediately below) NONE-INDIVIDUALLY MARKED	No limit	No limit	No limit	No limit	See exceptions for ORM A and C below.
ORM-A (7) (ORA A) (Dry Ice) NONE-INDIVIDUALLY MARKED	300 (707) 200 (727) 300 (747)	900 (707) 450 (727)	1800	Following restrictions in Main Cabin: 200 kg Pallets 1-4; 707/727 2250 kg Aft of Pallet No. 4 in 727 4500 kg Aft of Pallet No. 4 in 707 4700 kg Main Deck for 747	See Note (6) for additional main cabin restrictions. Animals shall not be loaded in any lower compartment containing dry ice. 747only: for this purpose, compts 3, 4 and 5 are considered one compt.
ORM-C (7) (Mag. M.) (Magnetized Material) (4) MAGNETIZED MATERIAL	Not Acceptable	No limit	No limit	No limit*	*707 or 727: load only aft of pallet position 3. * 747: load only aft of pallet positions 103/104.
ORM-C (7) (ORA C) (Low Temperature Cryogenic Liquefied Gas) NONE-INDIVIDUALLY MARKED	Not Acceptable	Note (5)	Note (5)	No limit	Containers must be braced upright. Animals shall not be loaded: 1. in any lower compt. containing cryogenic liquids, 2. on any pallet containing cryogenic liquids, and 3. on any pallet loaded between pallets containing cryogenic liquids.
Comb. L. (Combustible Liquid) NONE-NOT MARKED	No Limit	No limit	No limit	No limit	

NOTES:

- (1) Quantity is net quantity by weight: the weight of the packaged article less its packaging.
- (2) In addition to the stated limitations, articles with "Cargo Aircraft Only" labels must be carried in a location accessible to the crew during flight. Such articles must be loaded in the main cabin in accordance with instructions in the Clipper Cargo Manual, the Aircraft Loading Manual and the Aircraft Operating Manual.
- (3) Radioactive Materials, Category II and III; minimum distances measured from the outer surface of package:
On cargo airplanes, main cabin and lower compartments:
 - 7 feet (2.2 meters) from persons or animals.
 - 36 feet (11.0 meters) from undeveloped film shipments.
- (4) The flight crew is to make a functional check of magnetic compass before takeoff.
- (5) Only nonpressurized liquid argon, nitrogen, and low-pressure helium may be carried in containers of 60 liters or less:
 - 727 maximum of 4 containers per airplane.
 - 707/747 maximum of 8 containers per airplane.
- (6) When carrying both dry ice and animals in the main cabin of cargo airplanes:
 - Dry ice and animals should not be loaded on the same pallet.
 - Pallets containing animals shall not be loaded between two adjacent pallets when each contains dry ice. (Example: if pallet 6 contains animals, either pallet 5 or 7 may contain dry ice, but both pallets 5 and 7 must not contain dry ice).
 - If the amount of dry ice on any pallet exceeds 200 kg, animals should be separated from it by at least one intervening pallet.
 - Quantities indicated are for conditions of normal inflight ventilation. When the airplane is to be on the ground for an extended period, the animals must be removed or the cabin must be adequately ventilated.
- (7) U.S. Regulations require classification as ORM instead of ORA.
- (8) 70 kgs. of non-flammable compressed gas may be carried in addition to 25 kgs. of any other hazardous material permitted to be carried aboard passenger-carrying aircraft.

D. Handling Claims

Due to distances involved, the agent may be the only personal contact between the claim situation and the Company; therefore, he may be obligated to act in the dual role of agent and as an assistant in the adjustment of such claims in order to arrive at a settlement equitable to both the Company and the customer. It is important that the agents acquaint themselves with rules regarding time limits for filing claims and carrier limits of liability as well as filing procedures, in order to better serve and inform the customer.

Filing Claims - Domestic

All claims, except for concealed loss and overcharges, must be made in writing to the originating or delivering carrier within 270 days after the date of acceptance of a shipment by the originating carrier. Claims for concealed loss must be reported in writing to the delivering carrier at destination within 15 days after delivery of the shipment, with the carrier being privileged to make inspection of the shipment and container(s) within 15 days after such notice. (Concealed loss shall mean damage or loss discovered by the consignee after a clear receipt is given to the delivering carrier.) Notification to the airline by the claimant within 15 days after date of delivery and proper completion of the joint Air Freight Inspection and Claim Form by the agent and claimant will satisfy the requirement for written notice of concealed loss. It is necessary for the claimant to present a written claim sufficiently describing the goods concerned, giving details of the damage and providing supporting documents requested on the Form.

Claims for overcharges must be made in writing to the originating or delivering carrier within two years after date of acceptance of the shipment by the originating carrier. No carrier is liable in any action brought to enforce a claim unless the applicable foregoing requirements are complied with by the claimant and unless such action is brought within two years after the date written notice is given to the claimant that the carrier has disallowed his claim wholly or in part. No claim for loss, damage or delay to a shipment will be entertained until all transportation charges have been paid. The amount of a claim may not be deducted from the airbill charges to satisfy the claim.

In the case of damage or partial loss to a shipment, claims are barred unless written notice sufficiently describing the goods concerned and details of the damage are presented to the carrier within seven days after receipt of the shipment. In the case of delay, claims are barred unless written notice is presented within 14 days from the date shipment is placed at the disposal of the person entitled to delivery of the shipment. In the case of loss or non-delivery, there is an exception to Warsaw involving transportation on the IATA airbill where it is not considered "International Carriage." The claim must be presented within 120 days from date the airbill is issued. Any right to damages in connection with a claim is barred unless an action is brought within two years after the occurrence of events giving rise to the claim. Inspection of damage and a written notice can be accomplished by completion of the joint Air Freight Inspection and Claim Form by the agent and claimant. The claimant is still expected to file his written claim with supporting documentation.

Limits of Liability - International

In international carriage covered by the rules of Warsaw, the limits of liability are distinctly different from those described for domestic shipments. In no case does the carrier's liability exceed the shipper's declared value for carriage stated on the airbill. In the absence of a special declaration by the shipper, the liability cannot exceed U. S. \$7.48 per pound or U. S. \$16.50 per kilogram of goods lost, damaged or delayed, except that the special declaration may be exceeded if the release value is greater than the declaration. The international carriers further limit liability by considering only the weight of the goods actually lost, damaged or delayed in case of partial loss or damage as compared to the total weight, regardless of the value of any part of the shipment.

General

Airbill documentation is usually the key in establishing carrier liability for on-line or interline shipments, so they should reflect an accurate record of the shipment's movement and its condition when it is delivered or transferred. Shipments with detected damage should be opened

E. Physical Handling

Probably one of the most important functions of an agent or supervisor is proper customer handling. This is accomplished only by maintaining good cargo handling practices.

Pre-Shipping

Shipments should be accepted only when packed to assure safe transportation and when in compliance with applicable rules. Visual inspections should be made to assure that packing will withstand the necessary handling in transit, packages are securely tied or boxed, markings are legible, shipment is properly labeled, shipments are packed to prevent damage to equipment or to other cargo. All paperwork must be checked and cross-referenced as outlined earlier.

Care of Cargo

Each package or piece must be legibly and durably marked so as to identify the name and address of the shipper and consignee. Each piece must have a lot label attached for identification purposes. When each piece is clearly marked and properly labeled, tracing needs are greatly reduced.

All classifications of cargo should be handled with great care. Heavy items should not be placed on fragile or lightly packed shipments. Floor loading and volume limitations should never be exceeded. The cargo should be loaded so as to prevent shifting in flight. Animals should be loaded to receive enough air; they should be in a proper bin. Extreme care should be used to avoid personal injury.

Cargo should be protected at all times, and should never be left exposed on the ramp. Printed instructions such as "This End Up," "Do Not Stand on End," "Fragile" and "Handle With Care" should be heeded. Cargo must be protected from heat, cold, exposure and theft.

General cargo, such as newspapers and wearing apparel, must be given proper handling also. It cannot get wet or be torn. These commodities shipped by air to assure their value at the destination.

of equipment serving the city, and then referring to the charts in the Air Cargo Guide (ACG). With the information thus obtained, you provide the customer a service from origin to destination. Whenever a doubt exists regarding size and weight, the correct information should be obtained.

There is a maximum bearing weight which can be supported by a unit load device on an aircraft. Pieces which exceed this maximum floor bearing weight must be supported by "shoring." The objective of shoring is to increase the "footprint" of the piece so the weight is distributed over the minimum required area. Shoring may be of a material which will effectively distribute the load. Cardboard, for example, is not an acceptable material.

Loading and Handling ULD's

The maximum gross weight (which includes tare weight) is based on how much weight a unit may safely hold and the structural limitations of the aircraft. Pre-planning must be used when loading any ULD. Floor bearing weight must also be a consideration when loading units.

For proper load distribution, heavy or dense items should be loaded on the floor of the unit, with the soft and light pieces on top. To obtain maximum cubic utilization and to prevent loads from tumbling during loading, units should be loaded along the back and side walls first, building toward the center. Excessively heavy pieces should not all be loaded on one side of a unit but evenly distributed throughout. This makes handling ULD's much easier and prevents damage to the ULD walls and/or pallet. Care must also be given to placing items which are subject to shifting. (Example: A 55-gallon drum should be secured with tie-down straps or by placing other traffic around it to eliminate shifting.)

Although the Restricted Articles Tariff indicates some items are acceptable in limited amounts on freighters and shipments usually accessible to the crew in flight, shipments in ULD's are not normally accessible to the flight crew; therefore, it is advisable to thoroughly check the tariff before loading any questionable shipment into a unit. Extreme care and attention must always be given to the problem of interlining ULD's because of the different types of aircraft used.

Shells receive crushed sides, holes in the fiberglass shell, cracks or breaks in the upright edges of the shell contour. This is caused by:

1. Dropping unit to ground or off truck because of being in a hurry.
2. Failure to use "tie down straps" allows cargo to shift and distort the shell contour. This practice not only damages the ULD, but frequently causes damage to aircraft interior walls.
3. Forcing heavy pieces of cargo with sharp exposed edges against the side walls tearing the fiberglass skin.
4. Running forklift tines through sides.

This damage is kept to a minimum by following these rules:

1. Keep containers on dollies, staging racks or approved handling system. Never attempt to forcibly move a container with a forklift.
2. "Tie down" straps are to be attached whenever needed to retain a cargo load within a unit so as not to damage the ULD walls.
3. Shipments with sharp, exposed edges should be crated or protected with heavy burlap. Care must be taken during loading not to strike the walls with heavy cargo.
4. When picking units up on "low profile" dollies with a forklift, be very careful because of the possible imbalance.

Follow these rules to alleviate this difficulty:

1. Do not allow the cargo to come into forcible contact with the shell's side walls when loading heavy cargo with a forklift.
2. Avoid sudden stops when towing or positioning ULD's. Make certain the roller-locking devices are operative and in lock position when moving the ULD. Loaded ULD's should never be off-loaded onto the ground. Use pallet dollies, staging racks, or approved handling systems.

Proper handling of ULD's is of the utmost importance. Whenever possible, place all cargo for a given city in the same area. At origin city, load in reverse order of stops. After removing cargo for your city, move (and secure) cargo for the next city near the door. The handling outlined here assists in both damage prevention and favorable customer relations.

Care of Aircraft and Ground Equipment

The aircraft skin and related parts are easily damaged. Support equipment is sturdier, but still susceptible to damage through careless use, exceeding the limits of the equipment, or utilizing the equipment in ways for which it was not designed.

Use of loading charts for size limitations, and proper shoring or dunnage to comply with floor bearing weight limitations will serve to protect and preserve aircraft interior. The exterior can be protected by observing the rules for operation of ground support equipment.

Most stations have an array of ground equipment, and personnel must be made aware of the necessity for safe operation, not just to protect the aircraft, but to protect the very personnel operating the equipment.

The speed limit for all vehicles operating in the ramp area is 10 miles per hour when an aircraft is parked, and 15 miles per hour when no aircraft is parked. Towing equipment should never operate closer than 15 feet from

CHAPTER VI - THE TARIFF

Air cargo, and each of its elements, plus accessorial services offered, comprise the overall service offered by the airlines and the forwarders in this industry.

It is necessary to determine the charge for each of these services, commodity by commodity, and the conditions under which the services will be performed, outlining each so that confusion is held to a minimum.

All of these factors are combined into a manual, if you will, that gathers all of the information in one place. This is the tariff.

A. Air Freight Rates

Public Law 95-163 passed by Congress on November 9, 1977 deregulated domestic air freight. The law removed the powers from the Civil Aeronautics Board to suspend and investigate domestic air freight rates, rules and regulations. The Civil Aeronautics Board (CAB) retains the power to prevent discriminatory or predatory practices; therefore domestic carriers must still file tariffs with the CAB.

The majority of airline domestic air freight tariffs are published, filed and distributed on behalf of the carriers by a consolidated tariff publishing organization (Airline Tariff Publishing Company). Tariff filings are posted at the carriers' offices and widely circulated to other carriers and shippers on a subscription basis. There are no rate bureaus in domestic air transportation as are found in the trucking and railroad industries.

Domestic Rate Structure

Within the United States, the rate structures of trunkline air carriers and all-cargo carriers are fairly similar although there is no legal requirement that the rates of carriers be the same for the same services. Unlike the rail and truck class rate structure, the air freight rate structure typically consists of the following:

1. General Commodity airport-to-airport rates between all points on their lines which apply to all articles and commodities that are acceptable for carriage, except those for which specific commodity rates are published. The general commodity rate structure begins with a basic minimum charge per shipment, includes rates for shipments under 100 pounds, 100 pounds, and has lower rates at 1,000, 2,000 and 3,000 pounds. Because of heavier traffic flow east-to-west and north-to-south, "backhaul" general commodity rates are generally lower than those for the predominant direction of traffic.

All of the above are airport-to-airport rates. Pick-up and delivery service and rates are available separately on an optional basis and are published in a separate Pick-up and Delivery Tariff.

International Rate Structure

Most international rates are determined by unanimous agreement among the carrier members of the International Air Transport Association (IATA). Such rate agreements are then filed with the various governments for their approval, including the United States Civil Aeronautics Board. Under applicable laws and CAB policy, rate agreements affecting air transportation to and from the United States must be approved by the CAB before becoming effective. IATA is a voluntary association of the major airlines of the world, and the CAB has approved the IATA machinery as a means of establishing a worldwide network of rates.

In the event of CAB disapproval of an IATA rate agreement, carriers are free to file individual tariffs, subject to governmental approvals. However, in the event of governmental disapproval, the pre-existing tariffs generally have remained in effect.

Basic rate (and fare) structures are negotiated at IATA conferences. IATA worldwide conferences on cargo matters are held in the Spring of odd-numbered years and the agreements adopted are normally implemented the following Fall. Between conferences, if the need arises, adjustments in general cargo rates may be initiated by mail vote action. This also requires unanimous agreement among the carriers of the conference concerned and governmental approval. Similarly, to afford needed flexibility in the cargo rate area, procedures are available for revision of the specific commodity rate structure. Under established procedures, specific commodity rate committees are required to meet at least twice a year and more frequently if the need arises.

B. Factors Affecting Air Freight Rates

Rates are affected by the cost of providing the service, the volume of traffic, characteristics of that traffic, the value of the service performed, and lastly, the competition from other modes of transportation.

Cost of Service

A basic consideration in rate-making is that the rates cover the costs of service and allow a reasonable profit. In air freight, cargo is carried in both all-cargo aircraft and in the bellies of passenger aircraft. The wide body aircraft, such as the B-747, DC-10, L-1011 and (A-300B) have greatly increased the capability of passenger aircraft for cargo transportation. More ton-miles of cargo are moved in passenger aircraft bellies than in all-cargo aircraft.

On passenger aircraft, the main cost consideration in the transportation of cargo is the expense incurred in putting the freight on and off the aircraft. Revenue derived in excess of this cost contributes to the overall profitability of the company, since the aircraft is flying to transport passengers regardless of the cargo load. The payload factor (percentage of cargo capacity used) is only about 25%, so the industry certainly has room to grow. Some airlines fully allocate these costs, reducing the profit potential for cargo. Most realistic and progressive managements do not follow this philosophy.

Volume of Traffic

There are numerous pricing considerations which affect rates to the end that revenues will be maximized within the limits of the requirements of reasonable and nondiscriminatory rates. One consideration is the volume of new traffic which a carrier may achieve at any particular rate. Volume is significant, since traffic potential is a key factor in determining the maximum net revenue derived from any commodity.

C. New Rates and Rate Changes

When a shipper feels that a given air freight rate is restricting his ability to ship by air, he should enter into negotiations with the carriers involved.

Domestic air carriers have no uniform requirements regarding the methods for presenting requests. All normal means of communication are acceptable, however, basic requirements are that a shipper present information sufficient to allow proper evaluation of the request. Information falls into four general categories:

1. Transportation Characteristics of the Cargo.
2. Rate and Routing Data relevant to the current movement and delivered cost of the cargo.
3. Estimated volume of the revenue at the present and at the proposed rate.
4. Reasons for the proposed rate.

It is necessary to submit a proposal for rate change. This proposal would include a description of the commodity, its packed density (pounds per cubic foot), normal shipment origin and destination, and any special packaging or handling required.

The airline also needs to know the present shipping status, such as, present mode used, present rate via that mode, peak shipping period of the year, average weight per shipment, average number of pieces per shipment and the overall dimensions of the largest piece shipped.

The proposal should also give the requested new rate(s) or rate change(s) and weight break levels. The estimated annual volume to be shipped, along with shipping volume and frequency must also be submitted. The party requesting the rate then enters a desired effective date. Signs the proposal, and submits it to the appropriate office, such as cargo sales and/or planning. It is an effective approach to assure good customer service through a businesslike customer-carrier communication.

9. Classifications Ratings - Governing rules on classification or exception ratings and items covered by each.
10. Statement of Rates - Itemizes charges between points for air transportation.
11. Routings - Carriers involved in the transportation of goods and their route or movement.

Airline Tariff Publishing Company

The Airline Tariff Publishing Company (ATP) is an agent owned by the domestic air carriers, and publishes, files and distributes the air carriers' consolidated domestic passenger and freight tariffs. Contents are arranged as in 1 through 11 above.

Domestic air carriers participate in the Air Freight Rules Tariff, and the purpose of this section is to define and provide the general information with regard to the Rules Tariff and to discuss the more important rules which are frequently in use.

Air Freight Rules Tariff

The Rules Tariff is a document filed with the CAB setting forth applicable rules governing the movement of goods in air freight carriage. The tariff has the effect of a statute and sets forth the contract of carriage legally binding the shipper, the consignee, and the carrier alike. All rates tariffs are "governed" by the provisions contained in this tariff. The Rules Tariff covers all aspects of air freight carriage, and it is unlikely that a question will arise that cannot be answered by this tariff. The following rules are of particular importance and should be understood by all employees:

Rule No. 2 - DEFINITIONS -

- (a) A number of terms used throughout the tariff, such as "Articles of Extraordinary Value," "Consignor/Consignee," "Advance Arrangements," etc., are used to determine the correct application of rates and

Rule No. 18 - SHIPMENTS SUBJECT TO ADVANCE ARRANGEMENTS - The tariff provides that the carrier must be given advance notice for the following types of shipments:

- (a) Shipments liable to impregnate or otherwise damage equipment or other shipments.
- (b) Shipments requiring special attention, protection or care enroute.
- (c) Shipments of articles of extraordinary value.
- (d) Shipments having a declared value of \$25,000 or more.
- (e) Shipments of live animals.
- (f) Shipments of human remains.
- (g) Shipments of certain large or heavy pieces.
- (h) Shipments with accompanying personnel.

Rule No. 20 - SHIPMENTS NOT ACCEPTABLE - All shipments tendered to a common carrier must be accepted for carriage unless otherwise provided by the tariff. The tariff specifically provides that certain shipments are not acceptable.

Example: Shipments that require the carrier to obtain a Federal, State, or local license for their transportation when the carrier has elected not to comply with such license requirements.

Shipments requiring special devices for safe handling unless such special devices are provided and operated by and at the risk of the shipper or consignee.

In the case of an interline shipment, it is particularly important to determine that the shipment is acceptable by all carriers involved.

prepare a non-negotiable airbill for transportation. The rule also provides that the airbill (a contract of carriage) and the applicable tariffs apply not only to the carrier but to the shipper and the consignee. It also specifies that any shipment being transported for the U. S. Government must be accompanied, in addition to the airbill, by a Government Bill of Lading with the correct number of copies properly executed.

- (b) Of particular interest to carrier employees is the last section of Rule 26 which states, "No agent, servant or representative of carrier has authority to alter, modify or waive any provisions of the contract of carriage or of this tariff."

Rule No. 28 - COMPLIANCE WITH GOVERNMENT REQUIREMENTS -

- (a) This rule provides that the shipper must comply with all applicable laws, customs and other Government regulations of any country to, from or through which the shipment may be carried. The carrier shall not be liable to the shipper or any other person for loss or expense due to shipper's failure to comply with this provision.
- (b) An example of the application of this rule would be in determining the acceptance of a Restricted Article; it is the shipper's responsibility to make sure that the restricted items conform with the appropriate restricted article tariff packaging requirements.

Rule No. 30 - EXCLUSIONS FROM LIABILITY - The carrier shall be liable for loss on any shipment incurred during transportation except:

- (a) Shortage of articles in sealed containers.
- (b) The carrier proves it has taken all necessary measures to avoid the loss, Acts of God, etc.
- (c) Act or default of the consignor or consignee.

- (c) Charges will be assessed at the rates in effect on the day of acceptance of the shipment by the carrier. When two or more rates subject to different minimum quantities are provided on the same commodity in the same shipping form, from and to the same points over the same route, the lower of the two charges specified below shall be applied:
1. The charge computed on the quantity shipped at the rate applicable to such quantity; or
 2. The charge computed on the next greater quantity for which a lower rate is provided at the rate applicable to such greater quantity.
- (d) This rule means you have a 100 pound rate of \$10.00 cwt and a 1,000 pound rate of \$9.00 cwt. If a shipment weighs 900 pounds up to 999 pounds, the 1,000 pound rate at \$9.00 cwt or \$90.00 shall be the charge for the shipment. For example, \$90 is lower than 905 lb. at \$10.00 cwt or \$90.50. The 900 lb. weight break point was determined by dividing the charge for 1,000 lb. by the 100 lb. rate
- $$\left(\frac{\$90}{\$10} = 900 \text{ lb.}\right)$$
- (e) An exception rating to the general commodity rate, stated as a percentage of the general commodity rate, removes the application of the general commodity rate on the same quantity of the same article or commodity (in the same package or shipping form) from and to the same points over the same route.
- (f) A specific commodity rate removes application of the general commodity rate and the exception rating to the general commodity rate for the same quantity of the same article from/to the same points over the same route.
- (g) Except as otherwise provided, when a local or joint rate is established for application over a particular route from points of origin to point of destination for a specified service, such rate is

- (b) If a higher value is so declared, an additional transportation charge of 10¢ shall be required for each \$100.00 (or fraction thereof) by which such higher value exceeds \$9.07 per pound or \$50.00, whichever is greater.
- (c) Except as noted below, the weight used to determine the declared value of a shipment shall be the same as that which is used to determine the transportation charge for such shipment.

Exceptions:

- (1) C.O.D. Shipments - The declared value of a C.O.D. shipment shall be the C.O.D. amount to be collected unless:
- (a) A higher or lower value is declared on the Airbill at the time of receipt of the shipment from the shipper, or
- (b) The C.O.D. amount is less than \$9.07 lb. or \$50.00.
- (2) This rule means an airline will assume a liability of \$9.07 per pound in case of loss unless the shipper declares a higher value. For this higher declared value an airline will charge 10¢ per \$100.00 for the excess value over the assumed value. Example, a 1,000 lb. shipment will have an assumed value of \$9070.00. If the shipper declares a value of \$10,000.00 on the shipment, an airline will assume the liability of \$10,000.00 in case of loss or damage. For this extra liability assumed by an airline, there will be an additional transportation charge of:

\$10,000.00	declared value
<u>9,070.00</u>	assumed value
\$ 930.00	excess value

Excess value charge is 10¢ per \$100 or fraction thereof, or \$930 is \$1000 x 10¢ per \$100 or \$1.00 excess value charge.

shipper must declare the value of each commodity taking a different additional transportation charge.

- (e) Part of a shipment, for the purpose of this rule, shall consist of one package, piece, or bundle, or two or more packages, pieces, or bundles having the same applicable airport-to-airport rate.

Rule No. 56 - CHARGES PREPAID OR COLLECT - Except as otherwise provided in this rule, shipments will be accepted either with charges to be prepaid by the shipper, or to be collected from the consignee.

- (a) The following shipments must be prepaid by the shipper:

- 1) Shipments moving under Distribution Service, as provided in Rule 73, if there is more than one consignee.
- 2) Shipments to be stopped-in-transit for partial unloading pursuant to Rule 73.
- 3) Shipments of newspapers moving without an airbill.
- 4) Personal effects.

- (b) The following shipments must be prepaid unless the shipper guarantees, in writing, the payment of collect charges:

- 1) Shipments of human remains.
- 2) Shipments addressed to persons restrained of their liberty.
- 3) Shipments not equal in commercial value to the charges thereon.
- 4) Shipments addressed to Canadian or United States Government Agencies unless shipped by Government agents presenting proper bills of lading.
- 5) Shipments of used household goods.

- (c) Damage and/or discovered by the consignee after delivery and after a clear receipt has been given to the carrier must be reported in writing to the delivering carrier at destination within 15 days after delivery of the shipment, with privilege to the carrier to make inspection of the shipment and container(s) within 15 days after receipt of such notice.
- (d) No claim for loss or damage to a shipment will be entertained until all transportation charges thereon have been paid. The amount of claims may not be deducted from transportation charges.

Rule No. 66 - C.O.D. (COLLECT ON DELIVERY) SHIPMENTS -

- (a) It shall be the sole responsibility of the shipper to enter the amount of the C.O.D. on the Airbill and the carrier shall not be liable for failure to collect the C.O.D. amount when it is not so entered by the shipper. The shipper must also have the letters, "C.O.D.," and the total amount to be collected on delivery, legibly and durably marked on each piece of C.O.D. shipments. The following shipments will not be accepted C.O.D.:
 - 1) Shipments requiring prepayment or the guarantee in writing of transportation charges pursuant to Rule 56.
 - 2) Shipments to be stopped in transit to complete loading, or for partial unloading, pursuant to Rule 73.
 - 3) Shipments on which the total amount to be collected on delivery exceeds \$50,000.00.
 - 4) C.O.D. pieces will not be accepted on the same airbill with pieces not moving C.O.D.: only pieces covered by one C.O.D. amount will be accepted on one airbill.
 - 5) Shipments moving in Assembly or Distribution Service, pursuant to Rule 73.

Rule No. 69 - R.F.C. (REMITTANCE FOLLOWING COLLECTION) SERVICE

- (a) At the shipper's request, the delivering carrier will release a shipment to the consignee and subsequently collect from the consignee an amount designated as an R.F.C. amount, subject to carrier's billing, collection and credit extension procedures. Shipper must enter the letters "R.F.C." and the amount of the R.F.C. on the airbill. Delivering carrier will not collect any amount for remittance to the shipper when it is not so entered.
- (b) R.F.C. must not include any amounts designated under C.O.D. service or advancement of Charges. Charges for R.F.C. service will be at the same rates as those charged for C.O.D. amounts in Rule 66.

Rule No. 70 - ADVANCEMENT OF CHARGES -

- (a) No charges of any description will be advanced to shippers, consignees or their agents. Rule 69 R.F.C. shall apply to such requests.
- (b) Upon request, the carrier will advance charges for prior or subsequent transportation, cartage, storage, loading or unloading not performed by carrier, Government duties and customs fees.
- (c) Charges will not be advanced on any shipment which, under Rule 56, requires prepayment or guarantee of charges in writing.

Rule No. 73 - ASSEMBLY OR DISTRIBUTION SERVICE -

- (a) Assembly Service will be performed by the carrier, subject to the following:
 - 1) The carrier will accept two or more parts of a shipment from one or more shippers at point of origin and will assemble such parts at one airport of origin into one shipment for transportation to one consignee at one destination address if, no

- 2) A shipper may include as part of a Distribution Service shipment any packages, pieces or bundles consigned to the U. S. or Canadian Post Office Department or to any air or surface carrier at the destination of such Distribution Service shipment for the purpose of carriage beyond such destination, provided however, that the shipper shall designate to the carrier the foreign destination of each part, if any, of such shipment.
 - 3) The carrier will not perform Distribution Service in connection with any shipment which is afforded Assembly Service.
-
- (c) The service charge for either assembling or distributing parts of a shipment will be 50¢ per part, subject to a minimum charge of \$2.00 per shipment.
 - (d) When either pick-up or delivery service is requested for parts of a shipment, such service will be provided subject to applicable rates and charges applied individually to each part. A part of a shipment for the purposes of this rule, shall consist of one package, piece or bundle or two or more packages, pieces or bundles accepted by the carrier as a group or unit at origin, or delivered by the carrier as a group or unit at distribution point.
 - (e) Notwithstanding paragraph 1) a) above, one or more parts of a shipment which receives assembly service may be released by the carrier to the consignee upon the demand of the consignee; provided that there is a charge assessed of 50¢ per part, subject to a minimum charge of \$2.00 for one or more parts released at one time; provided that transportation charges are paid on such part or parts at the rate which would have applied had such part or parts been a separate shipment; and provided that the charges for the remaining part or parts of the assembly shipment are recomputed to reflect the exclusion of the part or parts released. Nothing in this paragraph shall effect the duty of the carrier to collect its full tariff charges for providing Assembly Service on the entire shipment, including those assembly charges applicable to the part or parts released.

- (e) Release of Parts of Multi-Piece Shipments--\$2.00 per part.
- (f) Delivery of Document--\$5.00 for each delivery of documents, other than when delivered with the shipment.
- (g) Proof of Delivery Request--When proof of delivery is requested, carrier will furnish a photo copy of the airbill or manifest signed by the consignee or his agent--\$2.50 for each copy.

Exception: No charge will be assessed when proof of delivery is provided in defense of a written claim.

- (h) Storage--Inbound shipments will be held by the carrier without charge for one calendar day (except Saturday, Sunday and Holidays) after the day of notification of arrival. After expiration of free time, shipments are subject to a charge of 50¢ per day per 100 pounds subject to a minimum charge of \$5.00.

Pick-up and Delivery Tariff

The Pick-up and Delivery Tariff is divided into four sections and defines the air carriers terminal area in each city for which pick-up and delivery service is provided. The tariff contains rates for regular pick-up and delivery service, special pick-up and delivery service and container pick-up and delivery service. In addition, the tariff contains rules of application explaining how the rates apply along with explanation of city terminal service, re-delivery service and application of legal holidays.

Restricted Articles Circular

Within this circular are outlined commodities that have characteristics considered "hazardous" to the health of persons or safety of the aircraft. These characteristics are defined as any combustible liquid, corrosive material, etiologic agent, explosive, flammable compressed gas, flammable liquid, flammable solid, irritant, magnetized material or radioactive material. The Department of Transportation is the Federal Agency responsible for maintenance of this circular. Although the Tariff states that the shipper is liable for tendering a shipment of restricted articles that is

- (4) Human remains
- (5) Meat and meat food products
- (6) Live poultry and hatching eggs
- (7) Agricultural, horticultural and miscellaneous products
- (8) Fish and game
- (9) Gambling devices
- (10) Cigarettes
- (11) Goods to Canada

Unfortunately, the industry seems unable to maintain this circular on a current basis. Much of the data is several years old, and caution should be exercised when using this circular.

Local Rate Tariff

Specific Commodity Rates take precedence over General Commodity Rates and are coded SCR in the tariff. The rates are named on a from/to basis and in connection with each rate is an item number. The Numerical Index preceding the rate section describes the articles within each item number. Example, Item No. 0511--Eggs, Hatching. If the article described in the shipment matches an item number description and that item number is listed from origin to destination of the shipment, the rates shown in connection with the item number are applicable to the shipment.

General Commodity rates are coded GEN. The Exception Ratings take precedence and they are stated in terms of a percentage of the general commodity rate. Example, Live Dogs - 110% of the general commodity rate. (Observe all symbols shown in connection with a rate on rule.)

Other Tariffs

Individual carriers participate in other tariffs not common to all. The Small Package Tariffs, various Intra-State and Accessorial Tariffs, and tariffs applying to special services or limited geographical areas are examples.

The rates, applicable routes, rules and regulations are the result of many years of operational experience in the field. Tariffs make up the price lists for services offered in air cargo.

CHAPTER VII - PROCESSING

The processing involved in air cargo varies with shipper needs, the nature of the shipment and the service offered. From the time the shipper determines a need to transport his goods, to the time the consignee receives the goods, a complex and detailed journey is completed.

Some of the hundreds of documents that can be used are outlined here. All documentation is necessary to assure the element of control necessary for successful completion of the transportation. In addition to the actual shipping documents, insurance and claim forms are used in large numbers.

Basic calculations and computations are necessary to complete documents and to generate information as to the success or failure of air cargo operations.

These areas of consideration form the basis for Chapter VII.

A. The Chronology of a Shipment

To understand the complexity involved in air cargo, it is necessary at least to be acquainted with the parts that make up the whole. The amount of information required by consignee, carrier and consignor is immense. The order of events here is divided in three parts: prior to the flight, the flight itself, and those final tasks after the flight has been completed.

Prior to the Flight

The shipper determines the need for transportation of goods. This decision initiates the air cargo movement. Depending on the frequency of service, rates, date of proposed shipment, the origin departure and the destination arrival times, the shipper (with or without the aid of airline personnel) calls in to make a reservation. If a forwarder is indeed the shipper, the necessary gathering of smaller consignments for consolidation or assembly will already have taken place.

A truck may be dispatched to pick-up the shipment, and deliver it to the airline cargo terminal. (In many cases, the trucks and vans are dispatched from, and return to satellite terminals, for later delivery to the airline cargo terminal.) When the shipments are brought to the carrier, all documentation is screened and accepted (or rejected). Additional entries to the airbill and other documents, and any calculations/computations necessary are made at this time. When all paperwork is checked and approved, the shipment is accepted by the airline. In the case of international shipments, most will be sent to the export area or warehouse. All shipments not already unitized (containerized, palletized, sacked, etc.) will be assembled for flight; others will arrive in either shipper-owned or carrier owned containers. (The latter arrive from forwarders and frequent, high-volume shippers. Whatever ULD documentation that is necessary will be completed and checked. The cargo and related documents are then dispatched to the aircraft for loading.

While the aircraft is being loaded, the procedure is closely supervised to assure that all handling and positioning is properly done.

B. Documentation

The numerous documents, envelopes and labels discussed thus far must be completed for each shipment handled. All airlines' forms are similar. The minor differences between airline documentation should pose no problem to the student.

The Uniform Airbill

The airbill is the basic document in air cargo transportation, and literally nothing can be moved without it. Unlike a bill of lading, it is non-negotiable and cannot be used as evidence of title or ownership.

The airbill is the contract under which shipments move and its basic purpose is to insure that there can be no mistake by the airlines or their customers, as to the terms agreed upon. All charges collected are based on information shown on the airbill, and the airlines rely upon it for handling instructions. In case of loss, damage, or delay to the shipment, it determines the right of the parties. The need for accuracy and completeness in preparing every Airbill cannot be too strongly emphasized. This seven-part airbill is designed to function as a receiving and source document.

In the event that a shipment is tendered on a uniform airbill which has been accepted by other than a duly authorized agent of the originating airline, or which has missing copies, a new uniform airbill will be prepared by the shipper, or the originating airline acting as the shipper's agent, for subsequent transportation.

The Shippers Uniform Airbill is made out by the shipper, his agent, or the originating airline (acting as the shipper's agent) in accordance with information supplied by the shipper. The airbill may be distributed to shippers prior to the actual date of shipment by mail or personally by cargo representatives. All PU&D contractors will have a supply of airbills. The airbill should be prepared with a typewriter or a ball point type pen.

UNIFORM AIRBILL NON-NEGOTIABLE
 "Subject to Conditions of Contract on Back of Shipper Copy of the Airbill"

CARRIER		ORIGIN		SERIAL NUMBER		<input type="checkbox"/> CARRIER'S LIABILITY IS LIMITED PER ITEM 3 ON REVERSE SIDE. SHIPPER BY INITIAL IN BOX AT LEFT ACCEPTS RELEASED VALUE OR, SHIPPER REQUESTS DECLARED VALUE SHOWN (subject to additional charge)		DECLARED VALUE	
(1)								(30)	
(10) PREPAID <input type="checkbox"/> COLLECT <input type="checkbox"/>									
TO		VIA		TO		VIA		TO	
(11)									
CONSIGNEE'S ACCOUNT NUMBERS (1)				↓ CONSIGNEE ↓				AIRLINE NAME AIRLINE ADDRESS	
NAME				CHARGE CODES A - ASSEMBLY B - CLEARANCE C - HANDLING D - COM/TAKEUP E - FUEL F - INSURANCE G - STORAGE H - STATE SALES TAX I - UNASSIGNED JFC - RECEITANCE FOLLOWING COLLECTION				CARRIER USE ONLY RATE (20) CHARGES (21)	
STREET ADDRESS								WEIGHT CHARGES	
CITY				STATE				PIECE UP (22)	
				ZIP CODE				DELIVERY (23)	
SPECIAL INSTRUCTIONS, INCLUDING CUSTOMER REFERENCE NUMBER AND BILLING INSTRUCTIONS								EXCESS VALUE (24)	
(8)								(26)	
SHIPPER'S ACCOUNT NUMBERS		↓ SHIPPER ↓		PCS/PKGS		LENGTH		WIDTH	
(9)								DEPTH	
NAME				CUBIC FEET		X (31)		X (32)	
STREET ADDRESS				PROVISIONAL WGT - LBS				= (33)	
CITY		STATE		ZIP CODE		C.O.D. Shipment		ADVANCES (25) OTHER (26)	
						if amount entered here by Shipper		(27) (28)	
NO. OF ITEMS		TONE ADVANCE CHGS		DESCRIPTION OF ORIGIN ADVANCE CHARGES		DEST ADVANCE CHGS		DESCRIPTION OF DESTINATION ADVANCE CHARGES	
(3)				(29)		(30)		(34)	
OTHER CHARGES (34)		DESCRIPTION OF OTHER CHARGES (35)		G.S.L./G.T.R. NUMBER (36)				TOTAL CHARGES (38)	
NO. PCS		WEIGHT		DESCRIPTION OF PIECES AND CONTENTS PACKING MARKS NUMBER					
(15)		(17)		(16)					
CHARGE - FOR CARRIERS USE ONLY									
A WEIGHT CHARGES (21)		B PIECE UP (22)		C DELIVERY (23)		D EXCESS VALUE (24)		E ADVANCES (25)	
F OTHER (34)		G SHIPPER'S C.O.D. (27)		H C.O.D. FEE (28)		I TAX (34)		T TOTAL CHARGES (29)	
J EXECUTED AT/BY (36)		K DATE (31)		L 1ST RATE (45)		M 2ND RATE (47)		N 3RD RATE (48)	
O ITEMS PREPAID (48)		P SHIPPER PAYS (50)		Q ITEMS COLLECT (51)		R CONSIGNEE PAYS (52)		S CARRIER ORIGIN SERIAL NUMBER (1)	

THIS IS NOT AN INVOICE

1. SHIPPERS RECEIPT

AC-17

8. Special Instructions - self-explanatory.
9. Pick-Up Zone - Insert the (ACI) pick-up area zone code. The first letter will be the (ACI) pick-up area code, the second letter will indicate type of service:
 - a. Regular pick-up service, repeat the pick-up area letter.
 - b. Special pick-up service, show the letter "S."
 - c. Saturday pick-up service, show the letter "J."
 - d. Sunday and Holiday pick-up service, show the letter "H."
 - e. City Terminal pick-up service, show the letter "T."
 - f. Shipment received by carrier at airport, show the letters "XX."
10. Routing - If the shipper completes this space, verify to insure that the route inserted complies with routings provided for the applicable tariffs. If this space is not completed by the shipper, it will be left blank.
11. From (Shipper) - Insert the full name of the person of the firm making the shipment.
12. Shipper's Street Address - Insert the established address of the shipper to whom the air carrier will write if correspondence is necessary. For example, a salesman returning an itinerant display is not permitted to show the name of the hotel or any other temporary address in this space even though the shipment is actually picked up from his temporary residence.
13. Shipper's City - Insert city or town, state and zip code. (See No. 12)
14. GBL/GTR NO. - Insert GBL/GTR Number.

19. Routing - When routing is not specified by the shipper, the airline should insert here the routing which provides it with the longest haul consistent with good service. Also insert here the route which is the basis for the rates charged. In the absence of a through rate, specifically identify combination rates to show the combination of local and joint rates used, including any specific commodity and/or premium rates.
20. Rate - The airline agent may insert here the applicable tariff rate. All Interline shipments will be rated by the origin carrier. Rates entered apply to the gross weight of the shipment unless dimensional weights apply to the shipment. When specific commodity rates are applicable, the specific commodity description as shown in the tariff, must be indicated, either by the shipper or the airline, under "Description of Pieces and Contents." In the absence of such information, general commodity rates apply. Container shipments - enter the tariff number reference used.
21. Weight Charges - Insert the total of the airport-to-airport charges.
22. Pick-Up - When pick-up service is performed, the applicable pick-up charges prescribed in the tariff for this service will be inserted at the point where such charges are assessed.
23. Delivery - Where delivery service will be performed, charges prescribed in the tariff for this service will be inserted at the point where such charges are assessed.
24. Excess Value Transportation Charge - Insert the applicable excess value transportation charges prescribed in the tariff based on the amount of declared value shown by the shipper.
25. Origin Advanced Charges - Insert transportation charges advanced to another agency for transportation. Use agency code or name in description section followed by the amount.

32. Dimensional Weight - Enter dimensional weight only when shipments are to be rated upon such a basis, and in such cases, use this figure for assessing charges only; do not confuse it with the actual gross weight of the shipment.
33. Cubic Inches - Insert total cubic inches of the shipment when dimensional weight applies.
34. Date - Insert the date the shipment is received at the point of origin.
35. Time - Insert the time the shipment is accepted from the shipper.
36. Agent - The originating airline agent, or PU&D contractor who accepts the shipment for transportation signs here.
37. AT - Insert the name of the origin airport city from which the shipment moves.
38. Date - Two digit day of month, three letters for the month of the year and one digit for the year.
39. TC - Used to identify the nature of corrections.
40. Charges - Used to identify the nature of charges. Use one of the following two-letter codes as applicable.

CC - Collect

CG - Collect GBL

CP - Collect Cash

CX - Collect Credit

MP - Partial Prepaid, Partial Collect-Cash

MX - Partial Prepaid, Partial Collect-Credit

PG - Prepaid GBL and/or GTR

PP - Prepaid Cash

PX - Prepaid Credit

Other Charges Codes

M - Miscellaneous Service Charge

P - Packaging

S - Storage

T - State Sales Tax

X - Unassigned

RFC - Remittance following collection

46. First Carrier Rate - Indicate applicable rate or indicate minimum charge.
47. Second Carrier Rate - Indicate applicable rate or indicate minimum charge.
48. Third Carrier Rate - Indicate applicable rate or indicate minimum charge.
49. Items Prepaid - Item paid by the shipper when partial prepaid and partial collect.
50. Shipper Pays - Amount paid by the shipper when partial prepaid and partial collect.
51. Items Collect - Items to be paid by consignee when partial prepaid and partial collect.
52. Consignee Pay - Amount to be paid by the consignee when partial prepaid and partial collect.
53. Key Line Identifiers - Use to relate lines on AC-17 with AC-16 Transmittable Uniform Airbill.
54. Tax - Insert federal tax applicable to the shipment.

The International Air Waybill

The International Air Waybill/Consignment Note is the Contract under which international shipments move and is consistent with the provisions of the Warsaw Convention. Its basic purpose is to insure that there can be no mistake, by the airlines or their customers, as to the terms agreed upon. All charges collected are based on information shown on the International Air Waybill. The airlines depend on it for all handling instructions and in case anything happens to the shipment it determines the rights of the parties. The need for accuracy and completeness in preparing every Air Waybill cannot be too strongly emphasized, especially in view of the fact that undue Customs delays are created by improperly prepared copies.

In the event that a shipment is tendered on an Air Waybill which has been accepted by other than a duly authorized agent of the originating airline, or which has missing copies, a new Air Waybill will be prepared by the shipper, or the originating airline acting as the shipper's agent, for subsequent transportation.

The International Air Waybill is made out by the shipper or his agent (broker) or the originating airline acting as the shipper's agent in accordance with information supplied by the shipper. The Air Waybill may be distributed to shippers prior to the actual date of shipment by mail or personally by cargo representatives. That the issuing carrier or its agent shall see that upon execution of the Air Waybill all necessary entries are made. There are at least nine copies of this document. Copies are disposed as follows:

Original, No. 3 (blue) - For the Shipper/Consignor - Given to the shipper at the time shipment is picked up or accepted for transportation at the airport and serves as:

- (1) Proof of shipment and documentary evidence of the airline's and shipper's signature on the contract of carriage.
- (2) Cash receipt for paid charges (for customers paying cash).
- (3) Shipper's permanent file copy.

circumstances, secures the signature of the consignee in the space provided on copy #4 only which includes the following:

"Received in good order and condition at _____ on _____."

.....
(Signature of Consignee or his Agent)"

This copy then serves as:

- (1) A signed delivery receipt.
- (2) Evidence of airline's completion of the contract of carriage.
- (3) Airline's record of condition and shipment at the time of delivery in event of claim.

Copy No. 5 (white) - Customs Declaration - Sent from origin airport with the shipment (enclosed in the airbill envelope). Delivered to and retained by Customs at the point of Customs clearance. (Destination of shipment.)

Copy No. 6 (white) - Third Carrier's Copy - Sent from origin airport with the shipment (enclosed in the airbill envelope) and retained at the third airline's (if one involved) point of origin.

Copy No. 7 (white) - Second Carrier's Copy - Sent from origin airport with the shipment (enclosed in the airbill envelope) and retained at the second airline's (if one involved) point of origin.

Copy No. 8 (white) - First Carrier's Receipt (Invoice Copy) -

- (1) If shipment is prepaid, this copy will be retained at the origin airport of the originating airline. May be used as an invoice for collection of charges, or a separate air freight bill may be prepared from information contained in this form depending upon each airline's particular procedure.

The Air Cargo Transfer Manifest

The purpose of the Air Cargo Transfer Manifest is to provide a uniform instrument for the transfer of interline air cargo, both domestic and international, between transferring and receiving airlines. To provide adequate records for tracing, by airbill number, both intra and interline.

This document is made out by the airline presenting the shipment(s) for transfer, in four copies, with the first two distributed to the transferring carrier, and the other two to the receiving carrier.

The information on this document consists of station, date, to whom transferred, airbill number and destination airport, number of pieces and the weight of each and the totals, name of airline transferring and receiving, applicable signatures, and the time and date the receiving airline accepts the shipment. This document is used often.

Register of Airfreight Shipments

This register is a station document and is used to provide a uniform document for reporting the transfer of air freight between the airlines and the PU&D contractor together with accompanying instructions and remittances; and to substantiate the PU&D contractor's bills for services performed. It can be used as an airline agent report, prepared by the airline agent as inbound shipments into the station are sorted and prepared for local delivery; or as a driver's report, prepared by the PU&D contractor's driver as local pick-up instructions are issued in the case of outbound shipments.

This document is also prepared in four copies, two to the airline and two to the pick-up and delivery contractor. The information required is similar to that found on the transfer manifest, except that the driver, consignor and consignee names appear and all dollar amounts involved must be entered for later reconciliation.

C. Basic Calculations and General Instructions

There are many facets of the air cargo industry that require elementary mathematical ability. One must be able to add, subtract, multiply, divide, follow simple procedures, read charts, make conversions and know what percentage is and how to use it. Also, the clock and time zones are an additional consideration.

The Aircraft

The capacity of an aircraft is an elusive value, depending on distance to be flown, its configuration, the altitudes of airports served, the temperature, the manner in which it was loaded and the nature of the shipment.

- Temperature and Altitude -

An aircraft performs less efficiently as the airport altitude increases. Also, efficiency is reduced as the temperature rises. An aircraft with the capability of carrying 30 tons of cargo could be limited to half of that total if operating from a high-altitude airport on a very warm day. While this is a concern of the flight crew and the local dispatcher, the calculations involved will not be covered here. The student should be aware of the effects, however, as good common sense is forever in short supply.

- Payload and Range -

The maximum payload an aircraft is capable of carrying is a result of design, but beyond a given range (distance flown) that payload decreases. There is also a maximum range beyond which the aircraft cannot fly, even though carrying no payload at all. The fuel capacity is obviously the limiting factor here.

The chart on the following page is called a payload-range chart, a very common one. To avoid confusion, all references should be explained:

- Standard Day = Sea Level, Temperature 59 degrees F.,
Barometer 29.92 inches.
- M.82 = 82% of speed of sound (Mach 1.0)
- OEW = Operating Empty Weight
- MLW = Maximum Landing Weight
- MZFW = Maximum Zero Fuel Weight

- TOGW = Take-Off Gross Weight
- Fuel Capacity = Maximum

The range is plotted on the horizontal axis in thousands of nautical miles (a nautical mile is 1.15 times a statute mile). The payload is plotted on the vertical axis in thousands of pounds. To find the maximum payload for a given trip, find the mileage on the horizontal axis and read up to find the payload. For instance, on a trip of 5,000 miles, this aircraft can carry 120,000 pounds of cargo.

To find the maximum range for a given payload, find the payload to be carried on the vertical axis and read across to find the maximum trip that could be accomplished. For instance, a 77,000 pound load can be transported 6,000 miles.

The payload-range chart is used often, and the frequent use by the student is encouraged.

- Weight and Balance -

Payload and range are both limiting factors in aircraft operation, but if an aircraft is loaded improperly, flight is just as easily affected. The center of gravity limitations are affected by improper loading, too heavy, aft or forward. All pilots must be able to compute weight and balance. The captain and the load planning personnel are handed this responsibility.

- Utilization -

This is the measurement of how many hours per day an aircraft or a fleet of aircraft flies in the average 24-hour day. For a single aircraft, it is quite simple: The number of hours flown divided by the number of days for which the utilization is required, equals utilization. An aircraft that flies 7 hours and 54 minutes in a day has a utilization of 7.9 hours. An aircraft flying 232 hours in 22 days has a utilization of

Follow:

$$77,740 \text{ miles} \div 13 \text{ aircraft} = 5,980 \text{ miles per aircraft}$$

$$5,980 \text{ miles} \div 10.4 \text{ hours} = 575 \text{ miles per hour}$$

In order, we need total miles, total aircraft, and time elapsed. From this we can derive miles per aircraft and average utilization. With these two inputs, average speed is a simple calculation.

Before leaving this subject, a word about speed. In the industry, there is a flown speed (T_F) and a block speed (T_B). The flown speed represents the elapsed time between lift-off (on the runway) and touchdown (on the runway) at the destination; another terminology for "flown-time" is "off-to-on" time. The block speed is the most commonly used, representing the elapsed time between push-away at the gate or terminal of origin until stopped at the destination gate or terminal. "Block time" is also referred to as "block-to-block" time. The differences between the two consist of push-away, taxi out and takeoff roll at the origin; landing roll, taxi in, position and park at the destination. The average time elapsed system-wide between block and flight time is about 30 minutes.

- Nautical and Statute Miles -

To this point, the term "miles" has not been adequately clarified. In transportation, the nautical mile was first used only in maritime movement, but is widely used today in air transportation. A nautical mile is 15.15% further than a statute mile:

$$\text{Statute Mile} = 5,280 \text{ feet}$$

$$\text{Nautical Mile} = 6,080 \text{ feet}$$

$$6,080 \div 5,280 = 1.1515 \text{ or } 115.15\%$$

For the purposes of this book, the factor is 1.15. Therefore, to convert statute miles to nautical miles, we would divide the number of statute miles by 1.15. Example: 230 statute miles is equivalent to 200 nautical miles.

$$230 \text{ statute} \div 1.15 = 200 \text{ nautical}$$

in the 24-hour clock, so 1:00 A.M. would become 0100, 5:35 A.M. would become 0535, and so forth. To convert back to the 12-hour clock, insert the colon, delete the first zero if prior to 1000 hours, and add "A.M."

1:45 A.M. = 0145 hours = 1:45 A.M.
 8:30 A.M. = 0830 hours = 8:30 A.M.
 11:50 A.M. = 1150 hours = 11:50 A.M.

Most domestic and all international airlines use the 24-hour clock. Remember, show all 24-hour clock times in 4 digits. To convert after noon, add 1200; to convert back to the 12-hour clock, subtract 1200. The colon, or two dots, never apply to 24-hour clock time. Use the term "hours" when quoting 24-hour clock time.

- Elapsed Time -

If the 24-hour clock is used, elapsed time is much easier to calculate than if using the 12-hour clock.

The zero or prime meridian of the earth passes through Greenwich, England. This village is the base from which time zones are established, and this base is Greenwich Mean Time (GMT), also called "Z" or "Zulu" time. Whenever the sun is precisely above a meridian, all locations on that meridian are at noon. It would be impossible to have to compute a time for every location on the face of the earth, so time zones of about 15 degrees have been established, each varying one hour. (24 hours x 15 degrees = 360 degrees)

As we move west from Greenwich, one hour is deducted for each time zone, giving the 50 states:

AST - Atlantic Standard Time - Minus 4 hours
 EST - Eastern Standard Time - Minus 5 hours
 CST - Central Standard Time - Minus 6 hours
 MST - Mountain Standard Time - Minus 7 hours
 PST - Pacific Standard Time - Minus 8 hours
 HST - Hawaii Standard Time - Minus 10 hours

When a schedule is consulted, all times are local times for that time of year. (There are only two dates in the year when local time can be changed: Last Sunday in April for any change from Standard to Daylight; Last Sunday in October for any change from Daylight to Standard.) April is in the spring; October is in the fall. The rule: "Spring-forward; Fall-back." In the spring (April), the "springing forward" is forward, or toward, Greenwich. Therefore, when PST becomes PDT, it is equivalent to MST. The reverse is true in the fall, when the "falling back" is away from Greenwich.

A westbound flight, say, Chicago to Los Angeles is shown with departures and arrivals in local time. For example, a departure from Chicago at 1305 (CST) arrives in Los Angeles (PST) at 1520. Keep in mind that when the flight left Chicago at 1305 CST (-6 GMT), it was 1105 PST in Los Angeles because Los Angeles is PST (-8 GMT). The elapsed time, therefore is:

	1520 Arrival Los Angeles
	- 1105 Time in Los Angeles
	_____ when flight departed Chicago
Elapsed time	4:15 or 4 hours, 15 minutes

In the opposite direction, a flight departing Los Angeles at 1305 PST arrives at 1855 CST in Chicago. At 1305 PST (-8 GMT) it was 1505 CST (-6 GMT) in Chicago, thus:

	1855 Arrival Chicago
	- 1505 Time in Chicago
	_____ when flight departed Los Angeles
Elapsed time	3:50 or 3 hours, 50 minutes

The reason for the difference in scheduled elapsed time is that the prevailing wind is normally from the west, and all eastbound scheduled times are less than those westbound.

All clock time problems require practice and usage before becoming "second nature." The practice and usage is absolutely necessary.

When the slightest doubt exists as to floor bearing weight, the chart should be checked.

- Size Limitation -

Dimensions of a shipment are always shown Length x Width x Height, in that order and no other. This is necessary, as the loading chart has the package or container width at the left and right margins, and the height at the top and bottom margins. For each combination of width and height, a maximum length is shown in a matrix. The charts are constructed in inches or centimeters, whichever is applicable. On most charts, a flexibility is built-in to allow for a package to be tilted, laid sideways, or some other combination so that width, height or length can be switched to accommodate the package. This flexibility would not apply to packages marked for specific positioning; it would also not apply to ULD's.

Capacity and Payload Measurements

In a service industry, there is no warehouse stocked with an inventory. There is no merchandise on the shelf, no wholesale purchasing and no retail selling. Yet, every business needs a measurement of activity to demonstrate the success or the failure of the venture.

- Units of Production -

In all of air transportation, when an aircraft departs, the empty space it is carrying (seats or cargo capacity) is lost forever, and the revenue that would have been derived from filling that space is likewise lost forever.

The productivity in air cargo is measured in Available Ton Miles (ATM). This represents one ton of capacity transported one mile. Therefore, if an aircraft with a 20-ton capacity would fly 1,000 miles, it would generate 20,000 ATM (20 tons multiplied by 1,000 miles). If, for any reason, the capacity of the aircraft is altered on a given segment, the revised capacity must be used to compute ATM. For instance, if this aircraft made seven flights in a given day, and one of those flights was limited to

On a segment-by-segment basis, the payload factor is quite simple to compute. If the aircraft has a capacity of 30 tons, and actually carries 14 tons, the payload factor is 70%, regardless of the distance flown. (On segment-by-segment load factors only, ATM and RTM do not have to be generated.)

On all other bases, the computation requires a more involved arrangement. Whether flight, aircraft or fleet payload factor is required, the computation is essentially the same, with minor variations.

For example, if an aircraft flies from New York to Cleveland to Chicago to Denver to Los Angeles (NYC-CLE-CHI-DEN-LAX), each of those segments has a different city-pair mileage, and the loads carried will differ on each segment of the flight. To compute the payload factor for the flight, ATM and RTM for each segment must be figured for the four segments, and the total ATM and RTM for the four segments must each be totaled before computing the payload factor. The flight segments, city-pair mileage and on-board revenue loads for this example are as follows:

New York to Cleveland,	450 miles,	20-ton load
Cleveland to Chicago,	300 miles,	15-ton load
Chicago to Denver,	900 miles,	30-ton load
Denver to Los Angeles,	850 miles,	6-ton load

The capacity of the aircraft making this flight is 35 tons. Refer now to Table 11. The information given has been arranged in the first four columns. To generate ATM (col. 5), the RAM (col. 2) is multiplied by the capacity (col. 3). To generate RTM, RAM is multiplied by the revenue load (col. 4). This is done until all segments have been calculated. Then, the total RTM (45,600) is divided by the total ATM (87,500) to generate the payload factor for the flight. (Payload factors were computed for each segment to demonstrate that this factor can be obtained by dividing column six by column five, or by dividing column four by column three. The latter method is applicable only on a segment-by-segment basis.)

Be advised that the example displayed here is most simple. More often than not, the aircraft capacity and/or one or more segments will be given in pounds, and will present a conversion problem: To convert tons to pounds, divide by 2,000; to convert pounds to tons, multiply by 2,000. Whether pounds or tons, if all amounts are converted to the same basis, payload factor will not be affected.

The example given is for one flight of four segments. To compute the payload for one aircraft, all flights, and all segments of those flights, would be taken together to generate ATM, RTM and aircraft payload factor. This is the case, whether it is daily, weekly, monthly, quarterly or annual data.

To get a fleet payload factor, the ATM and RTM total for all aircraft of the same type are assembled to figure the payload factor. The last step is to take the ATM and RTM total (system aggregate) for all fleets of aircraft, again dividing RTM by ATM, resulting in system payload factor.

- Performance Factor -

This is a measure of the airline's system success, and is computed daily, weekly, monthly, quarterly, semi-annually and annually. It is computed by totaling the number of scheduled departures and actual departures, and dividing the latter by the former. For example, an airline may have 38 scheduled departures, but only 35 are actually flown. (The difference of three could be cancellation for reasons of weather, maintenance, etc.) To compute the performance factor, divide 35 by 38, or .921, or 92.1%.

The payload and performance factors provide valuable information to the airline management, the media and regulatory agencies.

Percentage

The factors just discussed are percentages, and many more percentages are involved in air cargo. Percentage increases and decreases, percent revenue and expense, percent profit, market share, market diversion, market stimulation, the percent of the total for damages, pilferage and any number of comparisons requested, all demand a basic knowledge of percentages.

number you have is 631. The percent you have is 69%, or, expressed as a decimal, .69. Just divide 631 by .69 and the resulting figure is the original amount.

$$631 \div .69 = 914\frac{1}{2}$$

With just these three amounts, the following statements are true:

631 is 69% of $914\frac{1}{2}$

69% of $914\frac{1}{2}$ is 631

$\frac{631}{914.5}$ is .69 or 69%

Being familiar with percentages in all forms is necessary, not only in air cargo and air transportation, but in everyday life as well.

Averages

To compute an average, add all of the amounts for which an average is desired. Then divide by the number of amounts previously added. If, for example, the monthly average is required, the 12 monthly totals are added, and then divided by 12.

- Yields -

The yield is the average amount of revenue received per ton mile carried. This figure is obtained by dividing the revenue received by the number of RTM carried. Since these numbers are quite large, rounding off both numbers to the nearest thousand when dealing with hundreds of millions (of RTM) does not usually alter the yield to any great degree. For instance, if an air cargo carrier transported 452,347,412 RTM and received \$321,787,604 for that service, the yield would be:

$$\$321,787,604 \div 452,347,412 = \$.7114$$

$$$.757 \times 97 \text{ pounds} = \$ 73.43$$

$$.633 \times 173 \text{ pounds} = \$109.51$$

The ability to add is obvious, not only from examples already given, but from the necessity to add all the various charges to arrive at a total for the total service offered.

To make the cubic inch computation, merely multiply length times width times height. If a shipment is 10 inches by 23 inches by 40 inches, the cubic measurement is $10 \times 23 \times 40$, or 9200 cubic inches.

Additional airbill computations are conversions from pounds to kilos or kilos to pounds, and the computation of shipment density (pounds per cubic foot).

There are 2.2 pounds to one kilogram. Many shipments are international for all or part of a journey, and conversion between pounds and kilograms are needed on a daily basis. To convert pounds to kilograms (kilos), divide by 2.2. To convert kilos to pounds, multiply by 2.2. Conversion charts are found in the Air Cargo Guide, and are more accurate (there are actually 2.2046 pounds in a kilo).

To compute shipment density, the weight is divided by the number of cubic feet in the shipment. For example, a 150-pound shipment occupying five cubic feet has a shipment density of 30 pounds per cubic foot.

There are other airbill computations explained in Chapter VI. Refer to Rules 48, 50 and 52 in that chapter for instructions.

General

The calculations and instructions covered in this basic text represent the level of skill necessary to function today in many areas of air cargo. For those who prefer mathematical formulas, such formulas may be constructed for each computation contained here.

CHAPTER VIII - ECONOMICS

Air cargo exists because of a public need for the service. All air transportation is heavily regulated, some of this regulation being voluntary. With regulation, there are both benefits and drawbacks to consider.

Contributions to air cargo revenue come from all sectors of the civilian and government economy. The list of revenue sources grows each year.

The decade of the 1970's has seen costs of operation rising steadily. Fuel costs have soared, and recent developments have not halted the rise. Other costs have risen at about the national inflation rate.

A. Regulatory Considerations

To operate in air cargo transportation, a carrier must submit to all kinds of regulation. Most of the regulation comes from the Civil Aeronautics Board (CAB), the Environmental Protection Agency (EPA), the Federal Aviation Administration (FAA), the Federal Communications Commission (FCC), the National Transportation Safety Board (NTSB) and, indirectly, several others. The Department of Transportation (DOT) governs transportation in general (FAA and NTSB are organized under DOT). Voluntary organizations, such as the Air Transport Association (ATA), the International Air Transport Association (IATA) regulate through the vote of member airlines that created them. The International Civil Aviation Organization (ICAO) rounds out the list of voluntary and involuntary regulators. The ATA, CAB, DOT, EPA, FAA, FCC, IATA, ICAO and NTSB, as regulators, affect the economics of all air cargo carriers. Each of these is discussed generally in the pages that follow, with brief evaluations of each organization's activity.

The Air Transport Association

A voluntary trade and service organization, the ATA was created by the domestic air carriers for their own benefit as lobbyist, policing force, public relations firm and public information office. Also, matters of safety and national defense are within its realm of activity. ATA publishes statistical data on airline operations as a matter of public record. Further, the organization takes whatever steps necessary to encourage the government to change, add or cancel regulations which affect the airline industry (including air cargo) adversely. ATA is the industry "house organ."

The Civil Aeronautics Board

The operating authority for every air carrier, direct or indirect, scheduled or non-scheduled, comes from the CAB. Since 1938, the CAB has regulated virtually every phase of the entire industry with an iron hand. With recent deregulation legislation, this authority will decrease, coming to a final end in the mid-1980's.

interest in conservation to the contemporary interest of preservation and outright obstructionism has been dramatic, with the special interest environmental groups influencing the EPA to a great extent (sometimes to an alarming extent). It is difficult for the author to express optimism regarding this regulatory body in assessing air transportation's future.

The Federal Aviation Administration

The FAA, as safety regulator for all aviation, has operated under its present organization since 1966. (Prior to that time, it was the Federal Aviation Agency.) Charged with the duties and responsibilities for all commercial and general aviation, the FAA certifies manufacturers, pilots, mechanics, airlines, aircraft, navigational facilities and nearly any other category imaginable, if safety standards, procedures or evaluations is involved. The FAA assists the NTSB as needed, and investigates many incidents and all accidents in general aviation, handing the results to the NTSB. The Administration conducts safety seminars, holding continuing education in the field as a most important safety tool. The FAA's regulations are the Federal Aviation Regulations (FAR), and cover every possible aspect of safety. For air cargo, rules for restricted articles and stress standards for cargo tie-down come from the FAA. The Administration operates under DOT.

The Federal Communications Commission

The FCC regulates the use of the air waves as well as other communication. Assigning frequency and monitoring communications fall within its jurisdiction. The FCC is not a major regulator in air cargo transportation, but all communications, whether air-to-ground, air-to-air, ground-to-air, or ground-to-ground, are regulated in some way. In this sense, the FCC is involved with operations that are vital to the success of the air cargo industry.

B. Sources of Revenue

Mail, express and freight are the elements of air cargo supplying revenue to the air carriers. The recent proliferation of special services will change the makeup in the years ahead, but the total effect is not possible to measure at this time. Certainly, deregulation legislation will also have an effect.

Mail

About 16.5% of cargo revenue and cargo RTM is generated by mail revenues from the U. S. Postal Service. This mail revenue is paid as Mail Service Revenue to any airline participating in its transportation. In addition to this revenue, the Domestic Local Service Air Carriers are paid what is known as Public Service Revenue, or a subsidy. It is paid to those air carriers serving small communities at what would be a loss without the subsidy. Intra-Alaska airlines also receive the subsidy in order to keep that air transportation system in operation. Public Service Revenue, subsidy or "need" pay are all synonymous.

The unsatisfactory service that has been experienced in the last ten years in the surface transportation of mail is likely to result in a larger use of the air carrier soon. This, too, could affect the revenue contribution received by the airlines from this element of air cargo.

Express

Less than one percent of total RTM comes from express transportation, but air express accounts for a little over two percent of total cargo revenues. Here, too, the future is a little uncertain, except that express will surely increase its share of air cargo revenue and traffic. Most of the recent innovation has occurred in this area, and the trend will continue. Small package services offered by all carriers have been well received by the consuming public, and there is no reason to believe this interest will diminish or level off. Deregulation could encourage mass entry into this market.

C. Cost and Expense

While sources of revenue are relatively easy to assess, the cost and expense side present an entirely different picture. Revenue is received specifically for the mail, express or freight service rendered. But most cargo (nearly 88% of the total RTM) is carried by airlines on combination aircraft (passenger aircraft with cargo belly space). Some of these predominantly passenger carrying airlines have all-cargo aircraft in operation also, but the thrust of their business is transportation of passengers. How then, are costs of the service segregated?

Direct Cost

The direct operating costs are the outlays for crew salaries, fuel, maintenance and aircraft depreciation. The salaries and fuel vary with the number of hours it takes to complete a flight, or RAM. The depreciation is calculated on a fixed number of years, which reduces to a cost per hour. The required maintenance on an aircraft can be scheduled with the cost allocated to the number of hours planned in an advance schedule. The line maintenance resulting from everyday wear and tear can't be scheduled, but is easily reduced to an hourly cost. So it can then be said that direct operating costs are handled as hourly costs.

To control and reduce direct operating cost, utilization of the aircraft, the highest possible payload factor, and longer flight (hop) lengths are advisable.

If the aircraft is utilized to the optimum, it is true that crew salaries, fuel and probably maintenance will be higher per day of operation. Since depreciation is yearly, and step-by-step reduced to hourly, the more hours flown, the less depreciation per hour will be. Further, the more hours flown, the more ATM are produced. If that extra daily capacity can be put to use, more revenue will be generated. Lowering cost while increasing revenue is a most desirable combination in any business.

The payload factor is a result of imaginative scheduling which in turn results from good market research. It stands to reason that if the aircraft is going to depart, filling all available space is preferable to flying empty. If the payload factor is high, and the direct cost is virtually the same, the profit margin is certain to be higher.

General

The costs discussed thus far are operating costs. There is relatively little problem in figuring costs for an all-cargo operation. It is with the passenger-cargo operation that difficulties exist. For instance, the Boeing 747 (and the proposed 757 and 767), the Mc Donnell-Douglas DC-10, the Lockheed L-1011 Tristar and the Airbus Industrie A-300B were designed as wide body passenger aircraft. The maximum cabin width is utilized for passenger seats, aisles and passenger service accessories. Since the fuselage is basically round or oval, the space below the passenger cabin floor is immense. Some of this space had to be designed for passenger baggage. The remainder of this space is the space available for cargo.

It is this space upon which the focus should be placed. The aircraft would fly with or without this space occupied by cargo. Therefore, it is logical to say that the additional cost of developing this space--the additional structure, doors, rollers, wheels, conveyors, air conditioning, plumbing, wiring, etc.--should be the basis of allocating costs for depreciation, debt service, overhaul and the like. Other costs, such as fuel, landing fees, crew salaries, line maintenance, tires, etc. could be allocated, rationally on a RTM basis, using an equivalent of, say, 210 pounds for an average passenger and baggage. The cost of cargo operations such as ramp, terminal, in-the-field and driver personnel would be charged directly to the operation. There are few carriers that allocate air cargo cost in this matter, preferring instead to generate much higher costs for the operation. This has two beneficial results for the carrier: It reveals a better profit picture for the passenger operation by reducing the cost through allocation. It helps justify a higher rate for cargo (CAB requires rates that cover costs and allow for a reasonable profit). This in no way indicates that an airline is engaging in any allocation process that might be illegal or irregular. The allocations presently in use are sound accounting practices. These practices, however, fail to give air cargo an advantage it logically warrants.

Another cost, overhead or burden, is allocated over an entire system using various bases for that allocation. Overhead would include, but is not necessarily limited to, home office or headquarters cost, regional office operation expense, and the like.

D. Economic Research

This field is a somewhat recent development with the airlines. It is far from exact in its application, but provides measurements or ranges of measurements that are valuable in making decisions. It often involves reducing some or all operations to the smallest parts, reassembling the parts into alternatives to consider.

The gathering of source data is not an overwhelming problem. The regulatory bodies have amassed a wealth of information, and this is available as a matter of public record. Any pending changes in the scope of regulation are usually available in one form or another. Revenue and cost empirical data are also available from these sources, with additional data available from internal records.

Armed with historical information and information gleaned from manufacturers, the business community, government sources such as the Statistical Abstract of the United States and the City and County Data Book, and a clear statement of the problem to be tackled, the researcher is equipped with the tools that are necessary to perform a task.

These "tasks" may be abandoning a present service or city, adding a new route, phasing out obsolete aircraft or equipment, purchasing new aircraft or equipment, financing alternatives, diversification alternatives, five-year plans, ten-year plans and all types of long-range planning. Studies of fuel costs, with alternatives on how to handle the uncertainty, will be made often in the future. Studies on the possible effects of a curfew or other restrictive actions are also made.

All areas affecting the financial condition of the operation fall within the scope of Economic Research. This type of activity is also handled by several research firms specializing in air transportation and air cargo.

Economic Research and Market Research are often combined in comprehensive studies made both within and outside the air cargo industry.

CHAPTER IX - MARKETING

As there is Economic Research, there is also Market Research. All aspects of marketing are included in this research, often combining with other firms to arrive at solutions.

It is the purpose of marketing to promote and sell the air cargo service. Cooperation between carriers, and intermodal and intramodel carriage is considered.

Competition is intense in this industry and market diversion, market stimulation, market penetration and market share are all constant concerns. Market forecasts are made often, using all available tools.

A. Promotion and Sales

In marketing the air cargo service it is necessary to "beat the bushes" for business. The general belief that air transportation of cargo represents "premium transportation" must be overcome if the industry is to experience continued growth. It is the object of marketing to educate the shipping public by communicating the benefits through promotional programs and sales efforts in the field.

Promotion

Since it is relatively easy to determine what commodities would be practical to ship by air, it remains to communicate this practicality to the present and potential customer. One can examine the total market and consider all commodities, and miss the mark completely. The idea is to identify what part of that total market, and what commodities are "air-eligible." The use of radio and television, newspapers and magazines is acceptable, except that readers of just any newspapers or magazines, listeners to the radio and television watchers, taken in general, do not represent a very high potential as shippers utilizing air cargo. Instead, it would be more productive to "zero-in" on the high-potential customer, using what is known as the "rifle approach" rather than the "shotgun approach" to promoting the service. Some general advertising is viable; the promotional thrust, however, should be in the direction of the prime market.

Advertising in trade journals aims at traffic more specifically. Electronics, pharmaceuticals, fashions, the recording industry and seasonal industries all represent high potential. Traffic managers and other decision-making officers are more likely to see the promotion.

Papers and magazines published for one or more traffic management functions, such as purchasing, containers, warehousing, shipping and handling, packaging and traffic management in general, provide a most likely media selection for promoting air cargo. Trade association papers and journals are also excellent.

The sales representative in the field must be highly qualified with professional knowledge of business procedures, selling techniques, and most of all, the services offered by the company he represents.

The sales representative should be skilled in the servicing of existing customers, while trying to increase the total shipped by each, possibly by adding to the list of commodities already being shipped. This aids in maintaining a carrier's market share. The representative should also make a consistent effort to win additional business from customers of other airlines. This competitive selling increases his company's market share. This is known as market diversion.

Another approach used is that of creative selling, that is, to increase the total market for air cargo (and thus his company's volume also) by convincing shippers now using other modes to ship some or all of their goods by air. This allows air cargo to take a larger share of all cargo transportation and is known as market penetration.

Creative selling can develop a market where none existed before. If a small manufacturer distributes his product over a relatively small geographical area, he might be influenced to expand this distribution into ever larger areas. This is an example of market stimulation, and it also occurs when new services in the form of additional flight frequency is added.

Positive results can be accomplished from all of these approaches to selling in the field. However, selling, especially selling a new concept in distribution, can be achieved when a proposal is made showing economic justification.

A final observation concerns not the field, but the sales agent who takes the reservation. The best promotional program and the best cargo sales representatives in the field will be ineffective if the personnel in daily contact with the shipper-customer is not equal to the task. Whether telephone sales agents or personal contact agents, all should be well-trained and possess a professional behavior.

Mentioned previously, but repeated for emphasis, is that of competitive selling. The sales force of each airline is trying consistently to recruit customers of competing airlines. Those other airlines have sales personnel in the field doing the identical thing. In the competitive environment, the satisfactory or superior servicing of established accounts is the most important of all sales activities. It does little good to win an account on one hand, and lose an equally active account (or even a more active account), on the other.

Cooperation

In such a competitive industry, there is room for cooperation. In air transportation, and therefore air cargo, cooperation is carried out to a very large degree.

No airline can serve every market, yet a customer in one city deserves as much consideration as a customer in any other. Through a system of through fares and joint fares, customer service can be made available between thousands of city pairs throughout the country. With two or more airlines handling a shipment, any community with airline service can take advantage of the air cargo service (at least on an airport-to-airport basis).

In addition to the cooperative services an airline can offer the public, these air cargo operators cooperate among themselves in other ways. Aircraft interchange, interchange routes, joint use of terminals and equipment and the design and utilization of common containers are but a few of the ways in which airlines work together to provide the best possible service to the public.

If two airlines with differing seasonal peak periods agree to "share" one or more aircraft, the reduction in cost brought about by this interchange of aircraft serves to reduce or hold cost. A modern jet aircraft costs between \$12 million and \$50 million. Eliminating the need to purchase one or more aircraft has a beneficial effect on overall cost of providing service.

C. The Market

Market research is a necessary ingredient in air cargo, as it is in passenger service. This research furnishes the information necessary to forecast the market. After a total cargo market forecast is completed, the factors of diversion, penetration, share and stimulation are considered to establish the basis for scheduling and operating the air cargo system.

Market Research

In all market research, it is necessary to investigate the historical data, current developments and future changes expected to arrive at a market forecast.

The study of historical data involves looking at the RTM carried, ATM offered, types of equipment operated, commodities carried, competitive services, the national economy, the airline business atmosphere, the political scene, and any other significant factors that may be apparent.

Empirical data on RTM carried and ATM offered can be obtained from statistics published by the CAB and ATA (and IATA if international information is required) for previous years. Airline reports to the CAB also contain equipment information. As for the commodities carried, individual airlines keep internal records, and do cooperate in exchanging limited data among themselves. The national economic information is published quarterly by the Department of Commerce, and much additional data can be found in the Statistical Abstract of the United States, published annually by the Government Printing Office (GPO) in Washington. Political conditions are a matter of public record, and printed media can be examined to obtain information. There are endless industry magazines and "house organs" that can be read to determine the airline business atmosphere for any given time in the past.

When the historical data has been gathered, a trend of past air cargo industry activity can be plotted on a graph, with reasons (if any) for the peaks and valleys noted for reference.

where a discrepancy might exist. When airline share of the total market has a general agreement among those compiling it, a further look at diversion, stimulation and/or penetration is in order.

Market Diversion

If it can be determined that unfavorable competitive elements have occurred in some city-pair markets, the selected market shares for those individual markets can be adjusted. In any market where the subject carrier has been at a competitive disadvantage (or didn't participate at all), the market share can also be adjusted. Since the total market doesn't change for forecast purposes, this increased share must come from somewhere. It is diverted from other carriers' shares of the total market or market diversion.

Care should be taken when dealing with diversion, limiting it to only those markets where the subject carrier is making a real improvement in its service, promotion and sales efforts, and/or frequency coverage. Also, it is not reasonable to assume that a competitor will not react to a change in the market situation. Often, market diversion is relatively short-lived. Diversion occurs always when a new air carrier enters the market.

Market Stimulation

When a new carrier enters the market, stimulation of the market also occurs. This takes a period of time, and this span of time is seldom identical or even similar to a previous case. Market stimulation is difficult to forecast, but relatively easy to measure after the fact.

There are many forces at work when the service level is greatly expanded. Airlines already established in the market often add to their schedules when a new competitor enters the market. Whether this occurs or not, the market is expanded by the addition of a new carrier. Some diversion from other modes is accomplished, especially where previous transportation offered by the surface carrier was via circuitous routings. Shippers who were previously undecided as to the wisdom or cost saving of

General

Marketing efforts are made to educate the public, to build the total market through penetration and stimulation, to increase individual airline share through diversion, and to study the effects of various actions taken in the market, both beneficial and detrimental. As each finding is evaluated the promotional approach and sales effort are altered to fit the particular situation. Through interview, survey and study of experienced results, the short-term (and possibly long term) problems are solved.

CHAPTER X - PLANNING

Equipment, Service, Handling, the Tariff, Processing, Regulation, Revenues, Expenses, the Market, Abandonment and Entry--an extensive list of complex areas, all of which require planning.

The variables in planning are endless. A basic, almost elementary, examination of planning is considered here. In industry, this activity is termed Airline, Corporate, Cost, Economic, Market, Profit, Schedule or Traffic Planning by the Airlines, Forwarders and Manufacturers of containers and flight and ground support equipment. Whatever the terminology, planning is imperative in this highly-competitive industry.

A. The Planning Process

In the attempt to formulate future actions to be taken by a company wholly or in part engaged in air cargo, it is necessary to plan ahead. It is not possible to buy an aircraft "off the showroom floor" so to speak. A lead time of one to three years is required for new aircraft. Lead times for ground equipment can be that long also. Every facet of the air cargo operation is considered in planning.

Equipment

Planning looks at the aircraft on hand, those already on order, those that will be phased-out soon (whether a management decision or government mandate), those used aircraft that may be available for lease or sale, and any ground equipment that will be necessary to support the increase in the fleet size. At this point, no decision is made, but the raw information on prices, cost, performance and associated factors are gathered. A decision is made later in the planning to select equipment, and to simulate that equipment over the present or proposed system through schedule planning.

Service

In this process, it is necessary to examine the service presently offered, the service desired by customers (information assembled through market research interviews and surveys), changes under consideration, additional services contemplated and the services offered by competitors in markets common to all. Again, this information is assembled only at this stage.

Handling

Here too, present and proposed procedures are compared, both in an effort to reduce and to improve service. Also, it is important to determine if there has been an improvement in handling containers and equipment servicing the shipments and the aircraft. Satisfactory areas and the "need to improve" areas are noted. Any plan must allow for steady upgrading in air cargo handling.

FAA regulations regarding safety are costly but necessary, and will be with the industry until replaced by something superior, if that is possible. These regulations must be taken into the planning process, as they dictate maintenance and inspection times, which in turn, affect fleet scheduling to a great degree.

Bilateral agreements determine virtually all international flying, and these agreements are always in a state of flux. The amount of space and number of seats offered, the weekly flight frequency (or daily in a few cases), the type of aircraft being operated and the city pairs served are but a few of the factors to be considered when planning for a period five or ten years away.

Revenue and Expense

From economic research, the revenue received and expense incurred can be determined for any past period, and on any basis required. Taking into consideration the trend of the economy, some reasonable assumptions can be made regarding revenues and expenses for some future date. Nearly all plans completed in industry in general contain numerous assumptions, and numerous alternatives for action to be taken under each of the plans formulated. The revenue and expense area is extremely important in any plan, as no company wishes to plan for a deficit.

The Market

All aspects of market research are used in the planning process. These data are required information for the plan. If there is no traffic volume for which to plan, there is no need for the plan. The total market for air cargo (usually a low and high forecast) is established for a future year, with the appropriate assumptions. Then, looking at individual city pairs, any diversion that may be applicable is added. Any market stimulation that should occur is also considered. The market share is then generated for the airline air cargo system.

B. Equipment Selection

Early in the planning, it is determined if new aircraft will be required. Further, it is determined if existing aircraft are to be retired before the effective date of the plan, and if so, what model aircraft should be selected to replace or add to the existing fleet.

Once the need for aircraft is determined, one or more alternatives may be tested to see which aircraft fits the bill. It is possible that 12 new aircraft "A" would be preferable to 16 new aircraft "B," even if the total cost for 12 "A" and 16 "B" aircraft was identical. Everything must be considered, not merely the number of aircraft and total acquisition cost.

Assumptions

As previously stated, a plan (regardless of the number of alternatives considered) must be for a future period and must be based on certain assumptions. The market is volatile, and the conditions under which the study is made should be stable. Assumptions are mostly economic. For example, no recessions or wars during the study period, no major technological advances to occur, no fuel shortages, no change in the Gross National Product, no change in the competitive picture.

These same assumptions may be considered showing a percentage increase or decrease. The important thing to consider is that the study must be tempered with a set of assumptions. What those assumptions are is a decision for the personnel making the evaluation.

Acquisitions

There is more to acquiring new aircraft than putting up the money and flying it away. The decision to purchase new or used aircraft, to purchase or lease the aircraft, how much ground equipment to acquire, how many aircraft are needed to cover the market, cost of financing and cost of introduction (if a new type of aircraft) are studied and compared.

C. Scheduling Considerations

The scheduling model usually encompasses the entire airline system, that is, all aircraft included in the alternative under study are scheduled to determine what the system will look like in the future planned year.

Flight Frequency

The number of daily or weekly flights for each city pair is determined by the volume of passenger and/or cargo traffic flowing over that particular segment. An acceptable passenger load factor and/or cargo payload factor will be used in making this determination. These load factors will be pegged above the break-even load factors to assure a profit for the operation. The available seats and/or available cargo capacity for each city pair can then be calculated, and various combinations of aircraft types can be scheduled over the segment. When every city pair is scheduled utilizing all the aircraft available in the alternative under consideration, the number of aircraft required is generated, plus-or-minus one or two units.

It should be noted, however, that a few city pairs in each airline's system will be set as highly competitive. In order to maintain market identity, additional flight frequency may be required, regardless of the planned load factors in the alternative.

Timing

Flight frequency is important to coverage in a market, but proper timing is mandatory. Passenger desires dictate departure (or arrival) times in most cases. Many times are not conducive to the movement of cargo, and this poses a scheduling problem of immense proportions.

This problem can be handled in several ways. An evening, late night, or early morning flight may be loaded to capacity with cargo, but few passengers are willing to fly at that time. The airlines have countered

If the westbound flight were a continuation flight, it could depart Los Angeles at 0530 and arrive in Seattle, Portland or San Francisco before the start of the business day. To serve Seattle, Portland or San Francisco, the eastbound flight would have had to leave at between 1945 and 2045. This does not allow enough time for cargo to be brought to the airport, packed and loaded. The eastbound flight provides excellent service for the Los Angeles to Chicago market only.

Other Considerations

All air carriers prefer high utilization for each aircraft operated. Therefore, an airplane on the apron waiting for the ideal departure time is not very productive, and utilization will suffer because of it. Further, it is costly to have the aircraft taking up gate or terminal space, and it is costly to move it around and to move other aircraft and equipment around it. Trade-offs considering both prime timing and utilization must always be considered.

Another problem area is maintenance. All aircraft must receive scheduled maintenance, from federal safety requirements to company-mandated requirements. During these "down" times, the aircraft cannot produce. It is up to the scheduling personnel to route the aircraft to a maintenance station, setting the "down" time at a non-productive or low-productive time of day.

There is a concentrated effort to reduce the through-time and turn-around time of all aircraft in the system. The less time spent at the gate or the cargo terminal, the more time spent flying. The only way an aircraft can produce revenue is its time scheduled for flying. A reduction in ground time amounting to just fifteen minutes per average day can free each aircraft over 90 hours per year. At an average speed of, say 500 knots (575 miles per hour), 51,750 additional RAM can be flown. If the average aircraft can carry 20 tons, an additional million ATM can be generated. At a 25% payload factor, 250,000 RTM would result; at 50%, half a million. Average cargo yield in 1978 was about 34¢ overall.

D. General

In practice, each air carrier plans in ways similar to that outlined here. The actual scheduling follows the procedure discussed, with flight frequency, timing, utilization, through and turnaround times, time zones and maintenance all considered while constructing the schedule. Small amounts and differences regarding one aircraft become significant amounts and differences when examined on an annual basis for an entire airline system.

CHAPTER XI - FUTURE

The future of the air cargo portion of the air transportation industry is assured. Weighing the positive and negative aspects, the positive side is favored. Domestic as well as international air cargo is expected to grow at a steady rate.

So, too, are future opportunities favorable in the industry. As the number of carriers, services offered, and specialization increases, a corresponding increase will occur for able, creative personnel at all levels of operation for airlines, forwarders, forwarder airlines and manufacturers of aircraft, support equipment and containers.

A. The Future of the Industry

Airlines and manufacturers agree that air cargo will grow at a rate greater than that of passenger traffic. Aircraft to transport that cargo are already available. Some adversity is expected, but the effects are not expected to alter the growth trend.

Positive Future Aspects

Various forecasts predict air cargo growth at 11% - 19% annually to 1990. This assumes no dramatic penetration of surface modes. Using 1978 RTM of 7.5 billion, and a growth rate of 11% (the low side of the forecast) results in a 26.2 billion RTM figure for 1990. The high growth rate (19%) results in a 60.5 billion RTM total. Compared to 7.5 billion RTM in 1978, a range of 26.2 - 60.5 billion RTM represents a quantum jump in traffic for this industry.

The total number of all-cargo aircraft will remain the same or decrease slightly in the immediate future. At first glance, this does not appear to be a favorable aspect. However, DC-8 and B-707 aircraft will be phased out by the mid-1980's, mandated by the government. The all-cargo aircraft that replace them will be the wide body variety, sometimes tripling the capacity. There will be the same number or slightly fewer all-cargo aircraft, but with increased capacity.

With the accompanying phase-out of DC-8 and B-707 passenger aircraft most will be replaced with B-747, B-757, B-767, DC-10, L-1011 and A-300B aircraft, all with belly space that equals the freighter version of those types being phased-out. To be sure, B-727 200 aircraft (the workhorse of today's jet fleet, comprising 40% of the total jet aircraft flying domestically) will replace some of the phased-out aircraft; there are over 100 on order at mid-1979. However, there are nearly 350 DC-8 and B-707 aircraft flown by U. S. air carriers at mid-1979, and all must be replaced soon. The increase in capacity will stimulate the overall market for air cargo, if past observations apply to the future.

would be permitted during the curfew period. A Los Angeles to New York flight would have to leave the west coast before 1500 in order to land before 2300 in New York. If the flight had an enroute stop, it would have to depart from Los Angeles by 1300. The curfew would prove disastrous, not only to the air carriers, but also to the economy. Not only would the local airport economies suffer by layoffs and the absence of efficient air transportation service, but rates would also have to rise, possibly double.

There is also the mounting fuel problem, both quantity of fuel and its price. The effects here would be measured by the extent to which fuel was available and its price rise. However, the imposition of a curfew country-wide would not help in this problem. There would be more aircraft flying during the allowable hours. There would be additional delay, requiring more fuel. And safety would be compromised by a forced increase in flight frequency compressed into fewer hours of each day.

Inflation is a factor which looms ominously over this and all other economic activity. It is another unknown factor that will affect the industry to the same extent as it affects the rest of the economy.

General

These are major positive and negative aspects that the industry faces. In specific regions, there are probably additional benefits or problems not discussed here.

Dramatic developments, such as alternative sources of power for aircraft, or the return to the use of airships for carrying cargo and passengers are possible but not probable before 2000.

It is also possible that zealous environmentalists, attorneys and law makers could retard the growth of air transportation (and air cargo) to the level of impotency.

At the headquarters (regional headquarters in some large companies) an array of accountants, clerks, typists, stenographers, analysts, programmers, computer operators and claims personnel are required. Salaries are commensurate with ability in a \$7,500 - \$25,000 annual compensation.

Fringe benefits throughout the industry include paid vacations and holidays, sick leave, various insurance plans partially or fully paid by the company and free and reduced rate air travel.

Other Careers

The forwarder companies, over 400 strong, provide an excellent entry into air cargo. The training received is beneficial for promotion within the organization, and/or later employment with an air carrier. Since many employees choose to use the training and experience gained with a forwarder to qualify for jobs with an airline, those who remain in forwarding find a more rapid advancement as a general rule, given a reasonable level of ability. Compensation starts at about \$6.50 per hour with provisions for overtime and shift differentials. The top of the range would depend on the position, level of responsibility and so forth.

Manufacturers of aircraft, ground equipment and containers are also possible employers for those interested in this field. Companies providing accessorial services are potential employers. Salaries and/or wages would vary widely, as would the educational and experience requirements for each position. These employers, however, offer competitive compensation and fringe benefits.

APPENDIX A
GLOSSARY OF
AIR CARGO TERMS

Abandonment - Refusal to receive freight, so damaged in transit as to be worthless and render carrier liable for its value.

Absorption - Acceptance by the carrier of a portion of a joint rate or charge which is less in amount than that which it would receive for the service in the absence of such joint rate or charge.

Acceptance - Receipt by the consignee of a shipment. This terminates the common carrier contract for transportation.

Accessorial Service - A service rendered by a carrier in addition to a transportation service, such as stopping in transit to complete loading or to partially unload, heating, storage, etc.

Act of God - An irresistible superhuman cause, such as no reasonable human foresight, prudence, diligence and care can anticipate and/or prevent.

Act to Regulate Commerce - An Act of Congress regulating the practices, rates and rules of transportation lines engaged in handling interstate traffic (known as Interstate Commerce Act).

Advance Arrangement - Prior notice and/or agreement for shipment of certain types of freight, such as animals, human remains, restricted articles, valuables, etc.

Advance Charge - Charge given in advance of service; the carrier pays to an air freight forwarder (the shipper) and the charge is collected from the consignee.

Agreed Valuation - Value of a shipment agreed upon in order to secure a specific rating and/or liability.

Agent - Person or organization authorized to act in behalf of another person or organization.

Agency Tariff - A tariff issued by a publishing agent on behalf of any number of carriers.

Air Express - A service provided by the scheduled airlines for the expeditious transport of shipments. It is used most often for packages weighing less than 100 pounds. Air Express is a nationwide priority service providing door-to-door delivery under an Air Express Tariff.

Air Freight - A service performed by airlines for the transport of goods by air.

Air Freight Forwarder - Serving a dual role, the air freight forwarder is, to the shipper, an indirect carrier, so classified because he receives freight from shippers under his own tariff, usually assembling it into larger units which he tenders to the airlines. To the airlines, the air freight forwarder is a shipper.

Air Mail - The fastest form of mail service, having priority over all other air cargo traffic. Air mail is the first basic step in the revolution in distribution methods. The saving in transit time resulting from air mail's priority service means faster processing of orders, requisitions, contracts, business correspondence and invoicing.

Air Parcel Post - Air mail weighing more than seven ounces and not exceeding 70 pounds and 100 inches in combined length and girth. Recently air parcel post was broadened to include first-class mail weighing more than 13 ounces. In common practice, air parcel post is most widely used for packages of fifteen pounds or less. Air parcel post receives the same priority service as air mail.

Airline Tariff Publishers, Inc. (ATP) - Publisher of airline industry domestic tariffs setting forth rates and rules applicable to air freight, as well as fares for passengers. Tariffs are available on a subscription basis.

Air Transport Association of America (ATA) - The trade and service organization for the U. S. scheduled airlines. ATA acts on behalf of the airlines to serve the government and the public in activities ranging from improvement in air safety to planning for the airlines' role in national defense. ATA plays a leading role in encouraging government

Arbitrary - (a) A fixed amount which a transportation line agrees to accept in dividing joint rates.

(b) A fixed amount added to or deducted from a rate from one station to make a rate from another station.

(c) A fixed amount added to or deducted from a rate to one station to make a rate to another station.

Armed Guard Service - An airline service through which shippers can arrange to have their shipments under the surveillance of armed guards, in accordance with tariff provisions.

Arrival Notice - A notice, furnished to consignee, of the arrival of freight.

Astray Freight - Freight bearing marks indicating origin and destination, but separated from the waybill.

Assembly Service - A service under which an airline assembles shipments from many shippers and transports them as one shipment to one receiver.

Attendants Accompanying Shipments - Sometimes attendants accompany cargo shipments, as when grooms or veterinarians accompany race horses or other live animals. Carriers provide for such contingencies, sometimes enabling the attendant accompanying the shipment to travel for a cost lower than the otherwise applicable passenger fare. This service requires advance arrangements with an airline.

Audit of Freight Bills - The process of verifying the correctness of the transportation charges shown on the carrier's freight bill.

Available Ton-Miles - The total of the products of the aircraft miles flown on each inter-airport hop multiplied by the available aircraft capacity (tons) for that hop, representing the traffic-carrying capacity offered.

Back Haul - To haul a shipment back over a part of a route which it has traveled.

Baggage, Unaccompanied - Passenger baggage that is sent as cargo.

Block-to-Block - Distance and time between loading ramps of origin and destination airports. Measured from point where taxiing begins at origin to final stop at destination.

Bonded Terminal - An airline terminal approved by the Treasury Department for storage of goods until Customs duties are paid or the goods are otherwise released.

Bond of Indemnity - An agreement made with a transportation line relieving it from liability for which it would otherwise be liable.

Break Bulk - To separate a composite load into individual shipments and route to different destinations.

Bulk Freight - Freight not in packages or containers.

Capacity - The available space for freight.

Cargo - The five elements; air express, air freight, air mail, excess baggage, and other consisting of non-priority mail, for example.

Cargo Revenue Ton-Miles - The ton-mile of revenue freight, express, and excess baggage.

Carriage - The transportation of cargo.

Carrier - An individual, partnership or corporation engaged in the business of transporting goods or persons.

Cartage (local) - hauling between locations in the same town or city or contiguous municipalities.

Center of Gravity ("C.G.") - Point at which all weight forces are concentrated, and at which a body can be balanced. Baughman's Aerothesaurus - "Point of application of the resultant of all weight forces on an aircraft for any position of the aircraft."

City Terminal Service - In some cases, airlines will accept shipments at the terminals of their cartage agents or other designated in-town terminals or deliver shipments to these terminals at lower rates than those charged for the door-to-door airport pickup and delivery service.

Civil Aeronautics Board (CAB) - A Federal agency created by Congress in 1938 to promote the development of the air transport system of the United States. The CAB promotes the development of the air cargo network, along with other elements of the air transport system. The CAB regulates air cargo rates and awards the air routes over which both cargo and passengers move.

CAB Address: 1825 Connecticut Avenue, N.W.
Washington, D.C. 20428

Claim - The demand on a carrier by the owner of a shipment for reimbursement to cover pecuniary loss for which the carrier is responsible.

Claim Agent - An employee who adjusts or settles claims made against his company.

Claimant - A person or company filing a claim.

Claim Tracer - A request for information concerning the status of a claim.

Classification - The grouping of articles into a limited number of classes for the application of rates.

Class Rate - A rate applicable to the rating of an article provided in a published classification. Class Tariffs contain class rates.

Clean Bill of Lading - A bill of lading signed by the carrier for receipt of merchandise in good condition (no damage, loss, etc. apparent), and which does not bear such notation as "shipper's load and count."
(Also "Clean Receipt")

Clear Record - A record which shows that a shipment was handled without loss or damage.

Commodity Rate - A special rate on a specific type of good. A commodity rate replaces a class rate for the goods, except when the tariff specifies the alternative use of class and commodity rates.

Common Carrier - A transportation business that offers service to the general public.

Common Carrier, Irregular Route - A common carrier whose routes and schedules are not regulated by government agencies.

Competitive Point - A place where two or more transportation companies compete for business.

Competitive Rate - A charge established to meet the competition of another transportation line.

Competitive Tariff - A tariff in business for which two or more transportation companies compete.

Concealed Damage - A damage to the contents of a package which is apparently in good condition externally.

Concealed Loss - Loss or damage that cannot be determined until the package is opened.

Concentration Point - A place where small shipments are consolidated into larger shipments.

Conditions of Carriage - Terms that the carrier establishes.

Conditions of Contract - Terms printed on the waybill where the carrier accepts responsibilities.

Confirmed Air Freight (CAF) - Actual confirmed space on a specific flight. Different terms are used by different airlines.

often on the part of shippers with regard to production and distribution schedules. The various aspects of such pre-planning among two or more carriers and shippers is often referred to as coordinated movement.

Contract Carrier - A company that engages in for-hire transportation of property under individual contract or agreement with one or a limited number of shippers.

Cost Per Ton-Mile - Carrier costs computed on basis of a ton-mile of traffic. Most frequently used in statements of operating cost.

Customs Broker - Specializes in clearing shipments through customs, agent for the airlines, expedites shipments, the better his reputation the faster things go through customs.

Dead Head - A trip with an empty vehicle.

Declared Value For Carriage - The value of goods declared to the carrier by the consignor for the purpose of fixing the limit of the carrier's liability for loss, damage, or delay to cargo. It is also the basis for eventually applicable valuation charges.

Deferred Air Freight Service - Reduced rate service in which freight was accepted on a "space available" with a mandatory delay in delivery at destination intended to be two days later than if the freight had been moved in regular service.

Delivering Carrier - The carrier performing delivery in accordance with the Air Waybill.

Delivery - The act of transferring possession of a shipment. This could be from consignor to carrier, one carrier to another or carrier to consignee.

Delivery Charges - Charges for delivery service (transportation of inbound shipments from carrier's airport terminal to consignee's address).

Distribution Service - A service under which an airline accepts one shipment from one shipper and, after transporting it as a single shipment separates it into a number of parts at destination and distributes them to many receivers.

Diversion - A change made in the route of a shipment.

Divert - To change the route of a shipment in transit.

Dock - A platform where trucks load and unload.

Dock Receipt - A receipt given for a shipment received or delivered at a pier or dock. When delivery of a foreign shipment is completed, the dock receipt is surrendered to the transportation line and a bill of lading is issued.

Documents - Air Cargo forms and other paperwork.

Door-To-Door Delivery Service - Transport of shipment by or for air carrier from consignor's address to consignee's address.

Drayage - The charge made for hauling freight on carts, drays or trucks.

Due-Bill - Bill rendered by carrier for undercharges.

Dunnage - The material used to protect or support freight in trucks. The weight of dunnage is shown separately on the bill of lading since it is material used around a cargo to prevent damage.

Duty - A tax levied by a government on imports and exports.

Embargo - To resist or prohibit the acceptance and handling of freight. A formal notice that certain freight will not be accepted.

Empty Weight - The weight of an aircraft less the disposable load and the weight of all removable equipment that need not be carried by regulations.

Express - Property transported by air under published air express tariffs filed with the CAB.

Express Revenues - Revenues from the transportation by air of express as defined in tariffs filed with the CAB.

Facilitation - A program to expedite the flow of international commerce through modernizing and simplifying Customs procedures, duty collection agricultural inspection and other procedures to which international cargo is subject. An airline industry Facilitation Committee pursues this work with government agencies in the United States and other countries. Examples of steps forwarded in facilitation include the elimination of certain export declaration requirements, more expeditious release of cargo from Customs and clearance of cargo at point of origin.

Federal Aviation Administration (FAA) - Created under the Federal Aviation Act of 1958 as the Federal Aviation Agency and charged with the responsibility of promulgating operational standards and procedures for all classes of aviation in the United States. With the creation of the cabinet level Department of Transportation in 1966, FAA became a unit within the new department and received the new designation, Federal Aviation Administration. The FAA Administrator, however, continues to be a presidential appointee and the FAA remains a separate entity with most of its former functions. In the field of air cargo, FAA promulgates certain stress standards which must be met in the tie-down of cargo in flight.

FAA Address: 800 Independence Avenue, S.W.
Washington, D.C. 20553

Flight Number - Numerical designation of the flight.

Floor Resistance - Amount of cargo the aircraft flooring will take per cubic foot. Each aircraft has different floor resistance. (i.e., a Boeing 707 has a floor resistance of 150 pounds per square inch.) If item is heavier than requirements, the floor space must be expanded.

Freight Depot - Place provided by a carrier for the receiving and delivery of freight.

Freight Revenues - Revenues from the transportation by air of property other than express or baggage. These revenues are predominately from individually waybilled shipments carried in scheduled service.

Gateway - A point where freight moving from one territory to another is interchanged between transportation lines.

General Agent - A person or organization authorized to act for, or on behalf of, another person or organization in a clearly specified territory in a general capacity.

General Commodity Rate - An air freight rate applicable on all commodities except those for which specific rates have been filed. Such rates are based on weight and distance and are published for each pair of cities an airline serves.

Goods - See Cargo.

Government Bill of Lading (GBL) - This government form is used in moving U. S. Forces' baggage and household goods as a lower rate is published for this commodity.

Gross Weight - Entire weight of a shipment, including containers and packaging material.

Hamper - Preloaded container; made of canvas, wire mesh or boxes.

Hi-Lift Truck - Truck with vertically movable bed. For carriage and loading of cargo. Bed can be raised 10 or 12 feet above ground level.

Hot Load - Emergency shipment of cargo needed in a hurry.

Interline Freight - Freight moving from point of origin to destination over the lines of two or more transportation companies.

Interline Traffic - Traffic that is handled by more than one carrier between origin and destination.

Intermodal Compatibility - The capability which enables a shipment to be transferred from one form of transport to another, as from airplane to highway truck, to railway freight car, to ocean vessel. Some aircraft in service today have the capability for intermodal exchange of the largest types of standard containers currently used in surface transport.

International Air Transport Association (IATA) - The trade and service organization for airlines of more than 100 countries serving international routes. IATA activities on behalf of shippers in international air freight include development of containerization programs, freight handling techniques and uniform rates and rules.

IATA Address: 1155 Mansfield
Montreal 2, P.Q., Canada

International Civil Aviation Organization (ICAO) - The international aviation organization of governments, ICAO is an agency of the United Nations. It was organized to insure orderly worldwide technical development of civil aviation.

ICAO Address: International Aviation Building
1080 University Street
Montreal 101, P.Q., Canada

International Gateway Airport - Terminal airports through which entry into and exit from a country is permitted.

Intrastate - Within a state.

Intrastate Commerce - The movement of persons or property wholly within the borders of one state. The points of origin and destination as well as the entire route over which the shipment moves must be within the same state.

Local Rate - A rate applicable between points located on the lines or routes of a single carrier. Distance is of no significance, rather, the entire movement from origin to destination must be handled by only one carrier.

Lot Label - A special label attached to each package of a lot shipment for identification purposes.

Lot Shipments - Two or more packages forwarded by one shipper to one consignee under one Air Waybill or Airbill.

Manifest - A document describing a shipment or the contents of a vehicle or ship.

Marks - Letters, numbers and characters put on a package for identification.

Maximum Landing Weight - The maximum weight at which an aircraft is permitted to land, except in an emergency.

Maximum Take-off Weight - The maximum weight at which an aircraft is permitted to take-off.

Maximum Weight - The maximum flying weight of an aircraft permissible under existing regulations.

Memorandum Bill of Lading - A duplicate copy of a bill of lading.

Memorandum Tariff - Non-official publications which contain rule and rate information extracted from official tariffs. Memorandum tariffs are published by many carriers and are available from these carriers upon request.

Mileage Rate - Rates applied according to distance.

Mileage Tariff - A tariff containing rates applied according to distance.

Minimum Charge - The lowest rate applicable on each type of air cargo service, no matter how small the shipment.

On-Line Point - A point (city) served by carrier's route system.

Operating Ratio - The relationship of total expenses to total operating revenue.

Overage - An excess over the quantity believed to have been shipped or more than the quantity shown on a shipping document.

Over-All - (Ton miles, Load factor, Available capacity, etc.) This term applies to the sum total of passenger plus non-passenger traffic, i.e., to the sum of passenger, free baggage, excess baggage, freight, express, U. S. mail, and foreign mail.

Over-All Capacity Per Aircraft - The average over-all carrying capacity (tons) offered for sale per aircraft in revenue services, derived by dividing the over-all available ton miles by the over-all aircraft miles flown in revenue services.

Over-All Flight Stage Length - The average distance covered per aircraft hop in revenue service, from take-off to landing, including both passenger/cargo and all-cargo aircraft. Derived by dividing the over-all aircraft miles flown in revenue services by the number of over-all aircraft revenue departures performed.

Over-All Revenue Load Factor - The percent that total revenue ton-miles (passenger plus non-passengers) are of available ton-miles in revenue services, representing the proportion of the over-all capacity that is actually sold and utilized.

Over-All Revenue Load Per Aircraft - The average over-all tonnage carried per aircraft in revenue services derived by dividing the over-all revenue ton-miles by the over-all aircraft miles flown in revenue services.

Over Freight - Freight separated from its waybill and bearing no identifying marks.

Over on Bill - Freight in excess of that specified by the freight bill or the bill of lading.

Perishable Freight - Freight subject to decay or deterioration.

Pick-up and Delivery Service (PU&D) - An optional service for the surface transport of shipments from shipper's door to originating air terminal and from the air terminal of destination to receiver's door. Pick-up service, at an additional charge, is provided upon shipper's request. Delivery service is provided automatically by the air carrier at an additional charge unless the shipper requests otherwise. PU&D is normally performed within a 25-mile radius of the airport. The latter is commonly referred to as the terminal area. (For service beyond the terminal area see Truck/Air/Truck Service.)

Point of Origin - The terminal at which a shipment is received by a transportation line from the shipper.

Port-Of-Origin Air Cargo Clearance - For the convenience of exporters moving goods by air from inland U. S. cities, certain Customs formalities can now be handled at the originating airport city. This avoids delaying such procedures until the export reaches a gateway point sometimes hundreds of miles from the exporter's business.

Premium Commodity Rate - Rate charged on certain specified commodities, the transportation of which requires a premium or charge greater than that on listed general commodities.

Prepaid Charges - The transportation trade practice under which the shipper pays transportation charges.

Prepaid Freight Bill - Bill rendered by the carrier to the shipper, giving description of the freight, name of the consignee and destination, weight and amount of charges.

Priority Mail - Mail bearing postage for air transportation that goes by air on a priority basis at airmail service rates.

Private Carrier - A company not primarily engaged in the transportation business that hauls its own property in its own vehicles.

Commodity Rate, Joint Rate, Memorandum Tariffs, Minimum Charge, Promotional Rates, Special Rates, Specific Commodity Rates and Tariff.

Remittance Following Collection (RFC) - In instances when the shipper has performed services incident to the transportation of the goods an airline will collect payment for these services from the receiver and remit such payment to the shipper. Carriers charge nominal fees for this service.

Reparation - Compensation for damage.

Reserved Freight Space - A service by some airlines enabling shippers to reserve freight space on designated flights.

Restricted Articles - Certain articles (explosives, for example) which are either excluded from air cargo entirely or subject to stringent requirements on volume and packaging. A restricted articles tariff, giving full details on such articles, is published by Airline Tariff Publishers, Inc.

Revenue Ton-Mile - One ton of revenue traffic transported one mile.

Revenue Yields For Scheduled Freight and Express Services - The yields devised by relating ton-mile volumes to revenues reported for freight services and for freight services and for express service, in some instances, indicate inconsistency in reporting traffic and data for these services.

Route - The course or direction over which a shipment moves.

Sacking - The term used when placing small packages inside different colored sacks (depending on the commodity) to facilitate handling and to prevent loss.

Shipment - Goods consigned for transportation.

Special Rates - These rates apply on traffic under special conditions, and usually at a limited number of cities. Examples of such rates are container rates, exception ratings, surface-air rates and import rates.

Specific Commodity Rate - Rate applicable to certain classes of commodities, usually commodities moving in volume shipments. Hence, specific commodity rates are usually lower than the general commodity rate between the same pair of cities.

Standard International Trade Classification (SITC) - One of a number of numerical commodity codes, this one was developed by the United Nations.

Standard Route - The carrier having a direct route between two points.

Statute of Limitation - A law limiting the time in which claims or suits may be instituted.

Storage - Safekeeping of goods in a warehouse.

Storage in Transit - Temporary safekeeping of a shipment at a point between origin and destination.

Store Door Delivery - Movement of goods to a consignee's place of business.

Surcharge - A charge above the usual or customary charge.

Surtax - An additional or extra tax.

Tare Weight - The weight of the container and material used for packaging.

Tariff - As applied to air cargo, a document filed with the Civil Aeronautics Board setting forth applicable rules, rates and charges for the movement of goods. A tariff sets forth the contract of carriage legally binding the shipper, the consignee and the carrier. In addition to the official domestic tariffs published by Airline Tariff Publishers, Inc., some airlines also publish their own tariffs covering special

Total Cost of Distribution - The sum total of all the costs incurred in the distribution of goods. The total cost of distribution includes such items as:

- Transportation charges
- Cost of capital tied up in inventory
- Warehousing expenses
- Packaging
- Insurance
- Product obsolescence
- Pilferage
- Inventory taxes

Trace - To follow the movement of a shipment from point of departure. When a shipment does not arrive on schedule, a "trace" is put on the shipment.

Track - To find where a shipment is at any given moment.

Trade-off - Trade-offs are defined as the interaction between related activities, such as the offsetting of higher costs in one area with reduced costs or other benefits in another. In air freight the classic trade-off is one of time versus money, but there are many others in the total cost of distribution.

Transit Air Cargo Manifest (TACM) Procedures - Procedures under which air cargo imports move through the gateway city to the city of final U. S. Customs destination for the collection of duty and other import processing, thereby expediting shipment movements, reducing gateway congestion, and saving expense for importers, the Customs Bureau and the airlines.

Traffic - Persons and property carried by transportation lines.

Transportation - The movement of traffic from one place to another.

Trans Shipment - The handling of cargo enroute.

Warehousing - The storing of goods.

Waybill - Description of goods sent with a common freight shipment.

Weight Break - Levels of which the air freight rate per 100 pounds decreases because of substantial increases in the weight of the shipment. Examples of levels at which weight breaks occur are 100 pounds, 500 pounds, 1,000 pounds, 3,000 pounds, 5,000 pounds and 10,000 pounds.

Weight Charge - Charge for something carried by weight and volume such as dry flowers.

Weight Rate Charge - Charges for transportation based on weight. Weight times rate.

Zone - Any one of a number of sections or districts of the U. S. used for the purpose of establishing proper rates for mail and express.

APPENDIX B

AIR CARGO ABBREVIATIONS

AND ACRONYMS

Air Cargo
Abbreviations and Acronyms

A

A/C - Aircraft
ACG - Air Cargo Guide
ACI - Air Cargo, Inc.
A/F - Air Freight
Agt. - Agent
A/L - Airline
AOG - Aircraft on Ground
APO - Army Post Office
AQ - Any Quantity
ATA - Air Transport Association
ATC - Air Traffic Control
ATM - Available Ton Mile(s)
ATP - Airline Tariff Publishers, Inc.
AWB - Air Waybill

B

BELF - Break-even Load Factor

C

CAB - Civil Aeronautics Board
CAF - Confirmed Air Freight
Cap. - Capacity
CC - Common Carrier
Chg. - Charge
c/o - Care of
COCAR - Company Cargo
COD - Collect on Delivery
COMAIL - Company Mail
COMAT - Company Material
CWT. - Hundredweight (100 lbs.)
cu. ft. - Cubic foot (feet)

D

DASH - Delta Airlines Special Handling
d/b/a - Doing business as

Air Cargo
Abbreviations and Acronyms

L

Lb. - Pound (16 oz.)

M

Max. - Maximum

Min. - Minimum

MOM - Military Official Mail

N

NES - Not Elsewhere Specified

NFO - Next Flight Out (TWA)

No. - Number(s)

NPO - Navy Post Office

O

Oz. - Ounce(s)

P

PBX - Proud Bird Express (Continental Airlines)

Pc. - Piece(s)

Pd. - Paid

PDQ - Package Delivered Quick (Allegheny Airlines)

PEP - Piedmont Expedited Package (Piedmont Airlines)

Pkg. - Packages

PO - Post Office

PP - Prepay or Prepaid

PU&D - Pickup and Delivery

Q

Qty. - Quantity

R

RAF - Reserved Air Freight

RAM - Revenue Airplane (A/C) Mile(s)

Rec'd. - Received

RTM - Revenue Ton Mile(s)

APPENDIX C

AIRLINE

ALPHA AND NUMERIC

CODES

<u>Airline</u>	<u>Code</u>	<u>Number</u>
Aeroflot (USSR)	SU	555
Air California	OC	593
Air Canada	AC	014
Air Djibouti	DJ	611
Airlift International	RD	323
Air New England	NE	429
Air Wisconsin	ZW	303
Alaska Airlines	AS	027
Allegheny Airlines	AL	037
American Airlines	AA	001
Aspen Airways	AP	312
Braniff International	BN	002
Bush Pilots Airways (Australia)	QN	262
Catalina Airlines	KG	806
Cochise Airlines	DP	513
Continental Airlines	CO	005
CP Air	CP	018
Delta Airlines	DL	006
Eastern Airlines	EA	007
Flying Tiger Line	FT	023
Frontier Airlines	FL	028
Golden West Airlines	GW	336
Grand Canyon Airlines	ZS	374
Hawaiian Airlines	HA	173
Hughes Airwest	RW	003
Iberia (Spain)	IB	075
JAL (Japan Airlines)	JL	131

<u>Airline</u>	<u>Code</u>	<u>Number</u>
Western Airlines	WA	017
Wien Air Alaska	WC	212
Winnepesauke Aviation (NH)	ZM	519
Yosemite Airlines	JE	008
ZIA Airlines	ZU	360

Source: Air Cargo Guide

APPENDIX D

AIR CARRIER

CITY AND AIRPORT CODES

CODE CITY/AIRPORT

F

FAI FAIRBANKS, ALASKA
 FAR FARGO, N. D.
 FAT FRESNO, CALIF.
 FAY FAYETTESVILLE, N. C.
 FCA KALISPELL, MONT.
 FDY FINDLAY, OHIO
 FKL FRANKLIN-OIL CITY, PA.
 FLG FLAGSTAFF, ARIZ.
 FLL FORT LAUDERDALE, FLA.
 FLO FLORENCE, S. C.
 FMN FARMINGTON, N. M.
 FMY FORT MYERS, FLA.
 FNT FLINT, MICH.
 FOD FORT DODGE, IOWA
 FON FONTANA, CALIF.
 FRM FAIRMONT, MINN.
 FSD SIOUX FALLS, S. D.
 FSM FORT SMITH, ARK.
 FWA FORT WAYNE, IND.
 FYV FAYETTEVILLE, ARK.

G

GAD GADSDEN, ALA.
 GBD GREAT BEND, KANS.
 GBG GALESBURG, ILL.
 GCK GARDEN CITY, KANS.
 GDV GLENDIVE, MONT.
 GEG SPOKANE, WASH.
 GFK GRAND FORKS, N. D.
 GFL GLENS FALLS, N. Y.
 GGG LONGVIEW-KILGORE, TEXAS
 GCW GLASGOW, MONT.
 GJT GRAND JUNCTION, COLO.
 GLD GOODLAND, KANS.
 GLH GREENVILLE, MISS.
 GLS GALVESTON, TEXAS
 GNV GAINESVILLE, FLA.
 GON NEW LONDON, CONN.
 GPT GULFPORT-BILOXI, MISS.
 GRB GREEN BAY, WIS.
 GRD GREENWOOD, S. C.
 GRI GRAND ISLAND, NEB.
 GRR GRAND RAPIDS, MICH.
 GRW GREEN WOOD, MISS.

CODE CITY/AIRPORT

GSB GOLDSBORO, N. C.
 GSO GREENSBORO-HIGH POINT, N. C.
 GSP GREENVILLE-SPARTANBURG, S. C.
 GSW FORT WORTH, TEXAS
 GTF GREAT FALLS, MONT.
 GUC GUNNISON, COLO.
 GUP GALLUP, N. M.
 GUY GUYMON, OKLA.
 GYY GARY, IND.

H

HAR HARRISBURG-YORK, PA.
 HBG HATTIESBURG, MISS.
 HCA BIG SPRING, TEXAS
 HEZ NATCHEZ, MISS.
 HGR HAGERSTOWN, MD.
 HIB HIBBING-CHISHOLM, MINN.
 HKY HICKORY, N. C.
 HLG WHEELING, W. VA.
 HLN HELENA, MONT.
 HNL HONOLULU, HAWAII
 HOB HOBBS, N. M.
 HOM HOMER, ALASKA
 HON HURON, S. D.
 HOT HOT SPRINGS, ARK.
 HPN WHITE PLAINS, N. Y.
 HQM ABERDEEN-HOQUIAM, WASH.
 HRL HARLINSEN-SAN BENITO, TEXAS
 HRO HARRISON, ARK.
 HSI HASTINGS, NEB.
 HSP HOT SPRINGS, VA.
 HSV HUNTSVILLE, ALA.
 HTS HUNTINGTON, W. VA.-ASHLAND, KY.
 HUF TERRE HAUTE, IND.
 HUT HUTCHINSON, KANS.
 HVN NEW HAVEN, CONN.
 HVR HAVRE, MONT.
 HYA HYANNIS, MASS.
 HYS HAYS, KANS.
 HZL HAZLETON, PA.

<u>CODE</u>	<u>CITY/AIRPORT</u>	<u>CODE</u>	<u>CITY/AIRPORT</u>
<u>M</u>			
MAF	MIDLAND-ODESSA, TEXAS	MSL	SHEFFIELD-FLORENCE-TUSCUMBIA, ALA.
MBC	MYRTLE BEACH, S. C.	MSN	MADISON, WIS.
MBL	MANISTEE, MICH.	MSO	MISSOULA, MONT.
MBS	SAGINAW-BAY CITY, MICH.	MSP	MINNEAPOLIS-ST. PAUL, MINN.
MBY	MOBERLY, MO.	MSS	MASSENA, N. Y.
MCE	MERCED, CALIF.	MSY	NEW ORLEANS, LA.
MCG	MC GRATH, ALASKA	MTJ	MONTROSE-DELTA, COLO.
MCK	MC COOK, NEB.	MTO	MATTOON-CHARLESTON, ILL.
MCN	MACON, GA.	MTW	MANITOWOC, WIS.
MCO	ORLANDO, FLA. (MC COY AFB)	MVN	MT. VERNON, ILL.
MCW	MASON CITY, IOWA	MVY	OAK BLUFFS, MASS.
MDW	MIDWAY AIRPORT (CHICAGO)	MWA	MARION-HERRIN, ILL.
MEI	MERIDIAN, MISS.	MYV	MARYSVILLE, CALIF.
MEM	MEMPHIS, TENN.	MZZ	MARION, IND.
MFD	MANSFIELD, OHIO		
MFE	MC ALLEN-MISSION-EDINBURG, TEXAS	<u>N</u>	
MFI	MARSHFIELD, WIS.	NHB	KODIAK, ALASKA
MFR	MEDFORD, ORE.	NYC	NEW YORK, N. Y. (CITY)
MGM	MONTGOMERY, ALA.		
MGR	MOULTRIE, GA.	<u>O</u>	
MGW	MORGANTOWN, W. VA.	OAK	OAKLAND, CALIF.
MHE	MITCHELL, S. D.	OCF	OCALA, FLA.
MHK	MANHATTAN-JUNCTION CITY- FORT RILEY, KANS.	OFK	NORFOLK, NEB.
MHT	MANCHESTER-CONCORD, N. H.	OGD	OGDEN, UTAH
MIA	MIAMI, FLA.	OGS	OGDENSBURG, N. Y.
MIE	MUNCIE, IND.	OKC	OKLAHOMA CITY, OKLA.
MKC	KANSAS CITY, MO.	OKK	KOKOMO, IND.
MKE	MILWAUKEE, WIS.	OLE	OLEAN, N. Y.
MKG	MUSKEGON, MICH.	OLF	WOLF POINT, MONT.
MKL	JACKSON, TENN.	OIM	OLYMPIA, WASH.
MKO	MUSKOGEE, OKLA.	OMA	OMAHA, NEB.
MKT	MANKATO, MINN.	OME	NOME, ALASKA
MLB	MELBOURNE, FLA.	ONA	WINONA, MINN.
MLC	MC ALESTER, OKLA.	ONO	ONTARIO, ORE.
MLI	ROCK ISLAND-MOLINE, ILL. DAVENPORT, IOWA	ONT	ONTARIO, CALIF.
MLS	MILES CITY, MONT.	ORD	O'HARE AIRPORT (CHICAGO)
MLU	MONROE, LA.	ORF	NORFOLK-PORTSMOUTH, VA.
MNG	NEW GLASGOW, N. S.	ORH	WORCESTER, MASS.
MNM	MENOMINEE, MICH.-MARINETTE, WIS.	ORL	ORLANDO, FLA. (HERNDON AIRPORT)
MOB	MOBILE, ALA.	OSH	OSHKOSH, WIS.
MOD	MODESTO, CALIF.	OTG	WORTHINGTON, MINN.
MOT	MINOT, N. D.		
MPV	MONTPELIER-BARRE, VT.		
MQT	MARQUETTE, MICH.		
MRB	MARTINSBURG, W. VA.		
MRH	MOREHEAD CITY-BEAUFORT, N. C.		
MRY	MONTEREY-SALINAS, CALIF.		

<u>CODE</u>	<u>CITY/AIRPORT</u>
SIC	SALT LAKE CITY, UTAH
SLE	SALEM, ORE.
SLK	LAKE PLACID-SARANAC LAKE, N. Y.
SLN	SALINA, KANS.
SMO	SANTA MONICA, CALIF.
SMX	SANTA MARIA, CALIF.
SNA	SANTA ANA-LAGUNA BEACH, ORANGE, CALIF.
SNY	SIDNEY, NEB.
SOP	SOUTHERN PINES-ABERDEEN- PINEHURST, N. C.
SPI	SPRINGFIELD, ILL.
SPS	WICHITA FALLS, TEXAS
SQI	STERLING-ROCK FALLS, ILL.
SRQ	BRADENTON-SARASOTA, FLA.
SSI	BRUNSWICK, GA.
STE	STEVENS POINT-WISCONSIN RAPIDS, WIS.
STJ	ST. JOSEPH, MO.
STL	ST. LOUIS, MO.-E. ST. LOUIS, ILL.
STS	SANTA ROSA, CALIF.
SUN	SUN VALLEY-HAILEY-KETCHUM, IDAHO
SUX	SIOUX CITY, IOWA
SVC	SILVER CITY-HURLEY, N. M.
SWO	STILLWATER, OKLA.
SYI	SHELBYVILLE-TULLAHOMA, TENN.
SYR	SYRACUSE, N. Y.

I

TBN	FT. LEONARD WOOD, MO.
TCL	TUSCALOOSA, ALA.
TLH	TALLAHASSEE, FLA.
TOL	TOLEDO, OHIO
TOP	TOPEKA, KANS.
TPA	TAMPA, FLA.
TPL	TEMPLE, TEXAS
TRI	BRISTOL, VA.-JOHNSON CITY- KINGSPORT, TENN.
TTN	TRENTON, N. J.
TUL	TULSA, OKLA.
TUP	TUPELO, MISS.
TUS	TUCSON, ARIZ.
TVC	TRAVERSE CITY, MICH.
TVF	THIEF RIVER FALLS, MINN.
TVL	LAKE TAHOE, CALIF.

<u>CODE</u>	<u>CITY/AIRPORT</u>
TWF	TWIN FALLS, IDAHO
TXK	TEXARKANA, ARK.-TEXAS
TYR	TYLER, TEXAS
TYS	KNOXVILLE, TENN.
<u>U</u>	
UBS	COLUMBUS, MISS.
UCA	UTICA-ROME, N.Y.
UIN	QUINCY, ILL.-HANNIBAL, MO.
UNK	UNALAKLEET, ALASKA
UOX	OXFORD, MISS.

V

VBG	VANDENBERG AFB, CALIF.
VCT	VICTORIA, TEXAS
VEL	VERNAL, UTAH
VIS	VISALIA, CALIF.
VKS	VICKSBURG, MISS.
VLD	VALDOSTA, GA.
VLE	GRAND CANYON, ARIZ.
VPS	ELGIN AFB, FLA.
VRB	VERO BEACH, FLA.

W

WAS	WASHINGTON, D. C.
WDG	ENID, OKLA.
WJF	LANCASTER-PALMDALE, CALIF.
WRL	WORLAND, WYO.
WWD	WILDWOOD-CAPE MAY, N.J.

Y

YAK	YAKUTAT, ALASKA
YAM	SAULT STE, MARIE, ONT.
YBG	SAGUENAY (AIRPORT), QUE.
YEG	EDMONTON, ALTA.
YFC	FREDERICTON, N. B.
YHZ	HALIFAX, N. S.
YIP	WILLOW RUN AP, DETROIT, MICH.
YJT	STEPHENVILLE, NFLD.