



**BOEING®**

2003

# Freighter Reference Guide

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## Introduction

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## Abbreviations and definitions

## Freighter aircraft specifications and capabilities

### Utility—maximum payload less than 25,000 lb (11,340 kg)/12.5 tons

Antonov AN-26	12,125 (5,500)
Antonov AN-32	14,770 (6,700)
Antonov AN-72/-74	22,045 (10,000)
ATR 42-300, 72-200, 72-500	10,698 (4,853)–17,159 (7,783)
Cessna 208 Caravan	3,500 (1,590)
Convair CV-580/-5800	16,000 (7,260)–21,834 (9,903)
Fairchild Dornier Metro III/Expediter I	4,780 (2,168)
Fokker F-27-600	13,600 (6,169)
Hawker Siddeley HS-748	11,320 (5,130)
McDonnell Douglas DC-9-10F	22,424 (10,171)
Saab 340 A	8,500 (3,856)
Shorts 330-200, 360-300	7,280 (3,300)

### Small standard-body—payload from 25,000 lb (11,340 kg) to 65,000 lb (29,485 kg)/12.5 to 33 tons

Antonov AN-12	44,090 (20,000)
BAe146-200, -300QT	26,075 (11,827)–27,535 (12,490)
Boeing 727-100C/QC/F, -200F, -200 ADV F	43,600 (19,777)–65,015 (29,491)
Boeing 737-200C/QC/F and ADV, -300SF, -700C/QC	83,175 (17,315), 43,500 (19,731), 41,420 (18,790)
Lockheed L-100, -20, -30 Hercules	47,990 (21,770)–52,805 (23,950)
Lockheed L-188F Electra	33,000 (14,970)
McDonnell Douglas DC-9-30F	35,837 (16,255)
Tupolev TU204-100C/-120C	59,524 (27,000), 55,116 (25,000)

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## Medium standard-body—payload from 65,000 lb (29,485 kg) to 120,000 lb (54,430 kg)/33 to 60 tons

Boeing 707-320C	92,300 (41,867)
Boeing 757-200F/-200SF	67,460 (30,600), 87,720 (39,789)
Ilyushin IL-76 MD	103,615 (47,000)
McDonnell Douglas DC-8-54/-55F, -62, -63/-73AF	93,000 (42,185), 90,776 (41,117), 111,782 (50,703)–107,642 (48,826)
Shorts SC5 Belfast	75,120 (34,070)

## Medium widebody—payload from 80,000 lb (36,290 kg) to 145,000 lb (65,770 kg)/40 to 72.5 tons

Airbus A300-B4, -600F	96,080 (43,580), 112,130 (50,861)
Airbus A310-200F, -300F	94,580 (42,900), 92,790 (42,089)
Boeing 767-200SF/-300F	84,800 (38,465), 127,130 (57,665)
Lockheed L-1011-200F	118,720 (53,850)–130,720 (59,294)–140,720 (63,830)
McDonnell Douglas DC-10-10F	122,500 (55,570)–143,500 (65,090)

## Large widebody—payload from 145,000 lb (65,770 kg) to 265,000 lb (120,200 kg)/72.5 to 132.5 tons

Antonov AN-124	264,550 (120,000)
Boeing 747-100SF/-200F/SF/-300SF, 747-400F/-400ERF	208,500 (94,574), 245,264 (111,250), 227,900 (103,374) 248,300 (112,630)/248,600 (112,760)
Boeing MD-11CF/F	200,100 (90,770)–210,520 (95,490)/211,730 (96,040)
McDonnell Douglas DC-10-30F	154,000 (69,850)–177,000 (80,290)

## Aircraft pallets and containers

# Introduction

The *Freighter Reference Guide* provides general information on freighter aircraft that are manufactured by Boeing and numerous airframe manufacturers that are currently in service throughout the world. It does not include every freighter or cargo aircraft in operation, including some passenger-to-freighter conversions and a number of older models of which a very limited number are still in service (e.g., DC-3, DC-6A, DC-8-30F). The information in this guide was compiled from many sources and reflects the “typical” freighter aircraft representative of the type illustrated, rather than any airline-specific configuration. Please use your professional judgment when using this information in an airline-specific application. In addition, this information is intended to be used in comparing various aircraft models for general analysis and gaining a better understanding of the capacities, interoperability, and performance capabilities of a wide range of freighters.

The “Freighter Aircraft Specifications and Capabilities” section separates the covered aircraft into five categories based on each type’s maximum payload capability. Within each category, the listed aircraft are arranged alphabetically by manufacturer, and in turn, by ascending model variants. The payload-range information shown is based on Boeing typical international freighter mission rules, nominal performance (i.e., no degradation for age or OEW growth), zero winds, sea-level takeoff, and ISA conditions unless otherwise indicated.

Most currently operated freighters use pallet or container-type unit load devices for cargo carried on the main deck. Provisions for cargo carried in the lower hold vary considerably by both aircraft model and airline operator, thus allowing the flexibility of various combinations of containers and pallets, as well as bulk loading. The unit load devices shown in the “Aircraft Pallets and Containers” section are intended to be consistent to facilitate equitable comparisons among the aircraft illustrated. Please note that design details, construction techniques, materials used, and handling features, such as bases that can be lifted by a fork lift, affect net internal volume and tare weight of individual pallets and containers. Therefore, exact capacities and loading allowances vary among the airline operators and ULD manufacturers.

The ULD values given are typical maximum allowable weights. Specific weight limitations will vary with the airline operator and the loading position on a particular aircraft. The tare weights shown are the best estimates available and exclude the weight of pallet nets and straps. Pallet nets weigh approximately 25 pounds for a 64-inch-high pallet and 35 pounds for a 118-inch-high pallet. Please contact the specific airline if exact weights are needed.

Because the *Freighter Reference Guide* is intended to reflect the majority of aircraft currently in the worldwide fleet, periodic revisions will be made to ensure the guide remains current and accurate for its intended purpose as an industry reference.

# Glossary

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## Commonly used air cargo terms

**ACE system** See “telescopic loading system”

**ACMI** A lease contract between two parties, through which an entity with an air operating certificate (an air carrier) is the lessor. The lessor provides the aircraft, crews, maintenance, and insurance. The second party, in most cases also with an air operating certificate, is the lessee. The lessee is responsible for the schedule, flight charges, cargo handling, crew support, flight operations, ramp handling, aircraft servicing, fuel, and so on. Charges are typically based on an hourly rate, with a minimum number of hours to be operated per specified period. (See “dry lease” and “wet lease.”)

**Agent, cargo** Any person other than an employee of the air carrier performing the direct air transportation, who for compensation or profit

1. Solicits, obtains, receives, or furnishes property or consolidated shipments of property for transport by an air carrier.
2. Procures or arranges for air transportation of property or consolidated shipments of property by an air carrier by charter, lease, or any other arrangement.

**Air cargo** Any property (freight, mail, or express) carried or to be carried in an aircraft, other than the carry-on, checked or excess baggage, or property carried, which is incidental to the carriage of passengers (e.g., in-flight meals) or cargo (e.g., empty containers).  
The IATA definition of cargo excludes mail and company-owned material (COMAT).

**Air Cargo, Inc.** A service organization owned by a large number of scheduled air carriers, which provides local pickup and delivery, road feeder services, and various other cargo handling and processing services for air carriers, air freight forwarders, and shippers.

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## Commonly used air cargo terms

- Air express** Shipments for which an air carrier provides a time-definite or guaranteed level of service (e.g., “flight specific,” “overnight,” at a premium charge). Air express shipments may be restricted as to package size, weight, and contents.
- Air freight** Property other than mail, express, or passenger baggage tendered to an air carrier for transportation.
- Air freight, deferred** Property received for air transportation at a level of service lower than standard (e.g., “space available” or with other specified longer-than-standard transit time provisions), which is typically transported at a lower charge than standard air freight.
- Air freight forwarder** A business operation that in the ordinary and usual course of activities
1. Assembles and consolidates property for shipment by air, or performs or provides for the performance of breakbulk and distribution operations with respect to consolidated shipments.
  2. Is responsible for the transportation of property from the point of receipt to the point of destination.  
An air freight forwarder may use the services of a direct air carrier for the whole or any portion of such transportation, or may provide the entire transportation on its own aircraft or trucks.  
An air freight forwarder is ordinarily categorized as an “indirect air carrier,” but some operate as integrated carriers as well.
- Air freight, priority** Property received for air transportation at a level of service higher than standard air freight. Typically, these shipments have first claim on available air transport capacity on a flight-specific basis and are transported at a premium charge.

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## Commonly used air cargo terms

- Air waybill (airbill)** A shipping document titled “Air Waybill/Consignment Note” made out by or on behalf of the shipper, which evidences the contract between the shipper and air carrier for the carriage of goods by the carrier.
- Airmail** Documents, letters, or parcels bearing the appropriate postage specifically established for carriage of mail by air.
- Aircraft container** An integrated platform and structural or nonstructural upper shell unit with a flat bottom surface, in which goods are assembled before being loaded as a unit onto an aircraft. The flat bottom surface interfaces with ball, roller, or caster surfaces of aircraft and loader handling systems for loading and unloading. Aircraft containers are considered unit load devices.
- Aircraft pallet** A platform of standard dimensions with a flat bottom surface, on which goods are assembled and secured before being loaded as a unit onto an aircraft. The flat bottom surface interfaces with ball, roller, or caster surfaces of aircraft and loader handling systems for loading and unloading. Aircraft pallets are considered unit load devices.
- Aircraft pallet net** A webbing or rope net for restraining an aircraft pallet load. Applications include both direct pallet and over nonstructural container uses.

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## Commonly used air cargo terms

### **Aircraft**

An assembly of components consisting of any of the following:

### **ULD**

1. Aircraft container.
2. Aircraft pallet and pallet net.
3. Aircraft pallet and pallet net over a nonstructural container or igloo.

The purpose of the unit load device (ULD) is to enable individual pieces of cargo to be assembled into a standard-size unit to facilitate efficient loading and unloading of aircraft having compatible handling and restraint systems.

### **Airline Tariff Publishing Company**

A corporate entity wholly owned by certificated air carriers that publishes and distributes passenger fares and cargo tariffs throughout the air transport, travel, and shipping industries (ATPCO).

### **AS 1825 Volume**

The Society of Automotive Engineers, Inc. (SAE) Aerospace Standard. AS 1825, issued July 1983, developed recommended standards for determining usable internal volumes in a variety of areas.

Generally speaking, container volume is calculated as 93.5 percent of the external envelope volume.

For pallets, volume is determined by making the following allowances:

1. Pallet thickness: 0.75 in (19 mm) for commercial and 2.25 in (57 mm) for military.
2. Length and width: assumes a 2-inch setback from the outer edges of the pallet.
3. Height: controlled by a 2-inch clearance dimension allowance to the minimum aircraft envelope through which the pallet must pass. For detailed information, see the referenced Aerospace Standard.

### **Available ton-miles/ tonne- kilometers**

A measure of airline or aircraft cargo capacity and production; calculated as the product of total cargo payload capacity and distance flown.



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## Commonly used air cargo terms

- Baggage** Passenger personal property or other passenger articles transported on an aircraft in connection with a passenger journey. Unless otherwise specified, it includes both checked and unchecked baggage.
- Baggage cart** A towed vehicle used for on-airport ramp transport of baggage, bulk freight, and mail.
- Belt loader** A powered vehicle with a powered belt system used for loading and unloading baggage, bulk freight, and mail between baggage carts, containers, other vehicles, and aircraft.
- Bilateral agreement** An agreement or treaty between two nations, contracting for reciprocal international air service to be operated by designated carriers of each nation. The agreement may include provisions for the types of aircraft to be used, frequency of service, intermediate stops en route, aircraft airworthiness compliance, insurance requirements, fuel taxation, and arbitration procedures. These are normally standardized agreements applied to negotiations between one nation and numerous other nations, which allow for the inclusion of different routes and service points by various carriers.
- Breakbulk** Disassembling or breaking down consolidated shipments for reconsignment or delivery.
- Bulk cargo** Air cargo delivered to an air carrier as separate pieces or packages, and loaded or unloaded onto or from aircraft by the air carrier, and delivered as separate pieces to the consignee. (Also referred to as “loose cargo” or “loose shipments.”)
- Bulk cargo cart** Mobile towed vehicles, which transfer bulk cargo between the cargo handling terminal and aircraft.

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## Commonly used air cargo terms

<b>Bulk loaded</b>	Cargo loaded as loose or individual pieces into aircraft cargo compartments.
<b>Cargo load factor</b>	The percentage of capacity available to carry cargo that is actually used to carry such cargo. Load factor may be calculated on the basis of volume, weight, or unit loading device capabilities. On passenger aircraft, cargo capacity excludes the space necessary to carry passenger baggage. The most common method of computing cargo load factor is the ratio of the actual cargo load by weight to the available cargo weight capacity based on a carrier's cargo density assumption.
<b>Cargo loader</b>	Powered, mobile equipment with elevating platforms and powered rollers for loading and unloading unit load devices on aircraft main decks or lower holds. Common designs include both "scissors" and "post" types. Forklifts equipped with a nonpowered roller platform are also considered cargo loaders.
<b>Cargo revenue ton-miles/ tonne-kilometers</b>	A measure of cargo operations production. Calculated as the product of cargo carried (revenue tons/tonnes) and the distance flown in revenue service. Cargo tonnage includes freight, express, and mail.
<b>Carrier packed</b>	A phrase describing a unit load packed by an air carrier. (See "shipper packed.")
<b>Certification, ULD</b>	Approval by the appropriate governmental airworthiness authorities indicating that the aircraft unit load device (ULD) meets their safety requirements.

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## Commonly used air cargo terms

<b>CIF</b>	A pricing method that includes cost, insurance, and freight.
<b>City pair</b>	The origin and destination cities of an air route. One “city pair” consists of one origin and one destination city.
<b>Clearance</b>	The clear space between the aircraft interior cargo compartment lining and the unit load device.
<b>COMAT</b>	An acronym for “company-owned material.” Generally the air carrier’s own property (e.g., spare parts, station supplies) carried on the carrier’s own aircraft as cargo.
<b>Combi aircraft</b>	An aircraft certified and configured to carry both passengers and cargo on the main deck.
<b>Consignee</b>	The person or entity whose name appears on the air waybill as the party to whom the goods are to be delivered by the carrier.
<b>Consignment</b>	Synonym for shipment. (See “shipment.”)
<b>Consignor</b>	The person or entity whose name appears on the air waybill as the party contracting with the carrier for the carriage of the goods. Also commonly referred to as “the shipper.”
<b>Consolidation</b>	A number of separate shipments that have been assembled or combined into a single shipment for movement on one air waybill from one location to one destination.

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## Commonly used air cargo terms

### **Container, nonstructural**

A bottomless rigid shell constructed of fiberglass, metal, or other suitable material, used with an aircraft pallet and net assembly as a unit load device. (See “aircraft ULD.”)

### **Container, rate**

A rate for the transportation of an entire container or unit load device at a uniform charge, regardless of the weight of its contents (up to the maximum allowable gross weight of the container), unless a pivot weight is specified. When a pivot weight is specified, the per pound weight charge for all applicable weight above the pivot weight is added to the base container rate to calculate the total container charges. (See “pivot weight.”)

### **Container structural**

A rigid structured assembly made of fiberglass, metal, or other suitable material that performs the function of a unit load device without the use of a restraining/pallet net. (See “aircraft ULD.”)

### **Container rate**

Unit load devices (ULD) shaped to fit aircraft main deck or lower hold compartments to enable maximum space utilization while also ensuring adequate clearance between the device and adjacent aircraft structure.

### **Contract rate**

The air cargo rate applicable to a shipment in accordance with a contractual agreement between the shipper and the carrier. Contract rates are generally at a discount and may be weight and volume as well as city pair and/or flight and directional specific, and may be applicable to both bulk and container shipments.

### **Convertible aircraft**

An aircraft which is certified for, and can be converted between, an all-passenger configuration and an all-cargo configuration.

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## Commonly used air cargo terms

<b>Corner fittings</b>	Structural fittings at the corners of intermodal containers to facilitate the handling and securing of such units during surface transportation.
<b>CRAF</b>	An acronym for “Civil Reserve Air Fleet”: A contractual agreement with the U.S. Department of Defense by which commercial aircraft are contracted to be available for military airlift use on an “on-demand” basis.
<b>Cube rule</b>	A cargo tariff basis that states the minimum density on which weight-based charges are calculated. (See “dimensional weight.”)
<b>cwt</b>	Abbreviation for “hundredweight” (i.e., 100 lb). The standard tariff unit used for establishing U.S. domestic cargo rates for shipments over 100 pounds that are rated on a weight basis.
<b>Declared value</b>	The monetary value of a shipment stated by the shipper on the air waybill.
<b>Deferred rate</b>	An air cargo rate that is lower than the corresponding standard rates for a comparable shipment. Shippers using a deferred rate agree in advance to a lower level of service in return for the reduced rate.
<b>Density</b>	Weight per unit volume. Calculated by dividing shipment weight by shipment volume. Typically noted as either pounds/cubic foot or kilograms/cubic meter. For example, a 100 lb shipment with a volume of 10 ft <sup>3</sup> . 100 (weight) divided by 10 (volume) equals 10-pounds-per-cubic-foot density.

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## Commonly used air cargo terms

- Dimensional weight** A computed weight based on a prescribed minimum density, which is used to determine the chargeable weight for a cargo shipment. For example, if the minimum density is 8 lb/ft<sup>3</sup>, a 10-ft<sup>3</sup> shipment weighing 60 lb would be assessed the charge for shipping 80 lb.
- Direct air carrier** An air carrier that operates aircraft on a scheduled, contract, or charter basis and provides transportation for a charge.
- Dolly** A towed vehicle with a roller platform for transporting unit load devices between the cargo terminal and aircraft. This equipment can also be referred to as “trailers.” These units range from 8-ft units for LD-type containers to 40-ft ISO-fitted chassis for intermodal containers. Those with integral roller platforms may be powered or unpowered.
- Door to door** Transportation of a shipment from the shipper’s premises (e.g., factory, warehouse, store) to the consignee’s premises (as opposed to airport-to-airport transportation).
- Dry lease** An aircraft leasing arrangement between two parties. The lessor provides the aircraft only to the lessee, who then provides the crew, fuel, maintenance, insurance, and so on required for operation. (See “ACMI” and “wet lease.”)
- Edge rail** The outer frame structure of an aircraft cargo pallet to which retaining devices (e.g., pallet nets) are attached.

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## Commonly used air cargo terms

<b>Express</b>	Cargo with a guaranteed or time-definite service level. Express cargo services are typically offered at varying service levels by combination (passenger/cargo), all cargo, and integrated carriers. Priority air freight service is designated “express” by many carriers. (See “air express” and “integrated carrier.”)
<b>External dimensions</b>	The extreme outside measurements, including any handles or other protrusions of a unit load device.
<b>External volume</b>	The total amount of volumetric or cubic space a unit load device occupies in an aircraft. This volume is calculated using the three maximum external dimensions of the unit.
<b>Freight, express, and mail</b>	The three components of air cargo. (See “air cargo.”)
<b>Freight forwarder</b>	See Air Freight Forwarder.
<b>Freight rate</b>	The charges per unit of measure (usually per lb, per cwt, per kg, or per container) stated in the applicable tariff for the transportation of property. Air freight rates may be airport to airport or door to door.
<b>General commodity rate</b>	The tariff rates published that are applicable to all articles or commodities not specifically identified elsewhere in the carrier’s governing rules tariff as a “Specific Commodity.” Often abbreviated as “G.C.”

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## Commonly used air cargo terms

<b>Hazardous materials</b>	Also referred to as “dangerous goods.” Items of freight that are inherently or potentially harmful or dangerous. All such goods are transported only under certain specified conditions including limiting quantity, packaging, labeling, documentation requirements, aircraft type (e.g., passenger, all-cargo only), location allowed on an aircraft, and so on, as specified in the IATA Dangerous Goods Regulations and in conformance with all other applicable regulatory and operating rules.
<b>High-capacity aircraft</b>	Equivalent to the term “widebody aircraft.” Specifically refers to B747, B767, B777, A300, A310, A330, A340, DC-10, MD-11, L-1011, AN-124, and other large aircraft types.
<b>Identification code</b>	The IATA code designation on a unit load device, which indicates its type, size, category, serial number, and owner or registrant.
<b>Igloo</b>	A structural or nonstructural container contoured to a variety of dimensions for use on standard-body freighter main decks.
<b>Indirect air carrier</b>	A business activity authorized to engage in the transportation of goods by air, which uses the aircraft and services of direct air carriers to transport the goods. (See “air freight forwarder.”)
<b>Integrated carrier</b>	A carrier that provides door-to-door air cargo transportation services using its own or contracted aircraft and motor vehicles and performs these services under the authority of a single air waybill.
<b>Intermodal</b>	Denotes the transportation of a shipment via two or more modes of transportation in the same unit load device. More specifically, handled as one continuous through-shipment moving under the authority of a waybill to which all participating surface and air carriers are parties.



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## Commonly used air cargo terms

- Intermodal container** A structural container designed for carriage via two or more modes of transportation (e.g., on aircraft as well as trucks and/or rail cars and/or ocean vessels). Depending on the intended application, many are fitted with corner fittings for proper restraint on a truck chassis and/or lifting by crane or other loading mechanisms, as well as the ability to be handled by aircraft cargo loaders.
- Intermodal module** A lightweight nonstructural container designed primarily for carriage on a pallet or inside of an intermodal container. Dimensions are such that the modules can use the maximum internal cubic capacity of the external container.
- Intermodal fittings** Fittings provided inside of a cargo container for securing cargo in place.
- Internal volume, ULD** The maximum total available cubic space within a cargo container or pallet net envelope. The internal volume of containers with the same type or designation varies with manufacturer and materials. The Pallets and Containers section of this guide indicates the AS 1825 Volume, which is generally calculated as 93.5 percent of the external envelope volume. This serves as a practical internal volume figure, which accommodates the majority of manufacturing variations.
- International Air Cargo Association** A worldwide not-for-profit Air Cargo Industry Association with broad-based membership that includes airlines, forwarders, airports, ground handlers, all-cargo carriers, motor carriers, multimodal operators, and customs agencies. The organization's primary objective is to advance the interests of the air cargo industry and strengthen its contribution to world trade. (Refer to [www.tiaca.org](http://www.tiaca.org))

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## Commonly used air cargo terms

### **International Air Transport Association**

A voluntary industry association founded in 1919, which is open to scheduled air carriers whose home countries are members of the International Civil Aviation Organization (ICAO). IATA is actively involved in virtually every aspect of airline operations and management. Primary functions include provision of a wide range of services to airlines, airports, governments, and consumers. Primary products and services include consulting, publications, and training for both passenger- and cargo-related issues. (Refer to, [www.iata.org](http://www.iata.org))

### **Liability, carrier's**

The maximum amount, as provided in applicable tariffs, that a carrier will reimburse a shipper when a shipment is lost or damaged while under the direct control of the carrier. For shipments of value exceeding the carrier's standard liability limits, a shipper may purchase excess value coverage up to specific limits provided for in the carrier's cargo tariff, or directly from independent insurers.

### **Load factor**

The percentage of capacity available to carry cargo that is actually used to carry cargo. This may be calculated on the basis of volume, weight, or unit load device (ULD) capability. In combined passenger/cargo operations, cargo capacity excludes the space necessary to carry checked baggage.

1. **Cargo load factor:** The percentage of cargo load by weight based on a computed cargo weight capacity based on a density assumption. This is the most common method of computing cargo load factor.
2. **Position load factor:** The percentage of loaded ULDs to cargo ULD positions available on an aircraft.
3. **Volume load factor:** The percentage of the volume actually used to carry cargo to the usable internal volume of ULDs and bulk compartments.
4. **Weight load factor:** The percentage of actual cargo weight to the maximum payload weight available on an aircraft when loaded for a specific range.

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## Commonly used air cargo terms

### **Loading gauge**

A rigid framework in the shape of an aircraft interior contour. Used as a template for pallet buildup at the cargo terminal to ensure that the cargo and restraining net will fit into a particular position in a specific aircraft type with required clearance in either main deck or lower hold positions. (See “template.”)

### **Loose cargo**

Air cargo delivered to as carrier a separate packages and loaded into unit load devices and aircraft by the air carrier’s employees, and redelivered as separate pieces to the consignee. (Also referred to as “loose shipments” and “bulk cargo.”)

### **Lower deck ULD**

A unit load device (ULD) (pallet or container) carried in the lower deck/hold/lobe cargo compartment. These units are commonly designated with an “LD” prefix, plus a number. Many come in both full and half sizes, as related to the width of the lower deck (e.g., LD-1 through LD-11).

### **Lower hold**

The compartments below the main deck. (Also referred to as “lower deck,” “lower lobe,” or “belly.”)

### **Main deck**

The primary deck (level or floor) on which the major portion of an aircraft payload is carried.

### **Main deck ULD**

A unit load device (ULD) (pallet or container) carried on the main or primary aircraft payload deck. These units are commonly designated with an “A” or “M” prefix, plus a number (e.g., A, A2, Modified A, M1, M4, M6).

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## Commonly used air cargo terms

- Manufacturer's empty weight** The weight of an aircraft's structure, power plants, systems, furnishings, and other required items of equipment that are an integral part of a particular aircraft configuration. MEW is essentially a "dry" weight, including only those fluids (e.g., hydraulic) in closed systems. (See "typical operating empty weight.")
- Maximum gross weight, ULD** The maximum allowable combined weight of the unit load device (ULD) and its contents/payload.
- Maximum landing weight** The maximum certified total aircraft weight for landing, as limited by aircraft strength and airworthiness requirements.
- Maximum takeoff weight** The maximum certified total aircraft weight at takeoff brake release, as limited by aircraft strength and airworthiness requirements.
- Maximum zero fuel weight** The maximum certified total aircraft weight allowable before usable fuel must be loaded in the aircraft, as limited by aircraft strength and airworthiness requirements.
- Minimum charges** The basic charge required to be paid for air cargo transportation of an individual shipment, regardless of the weight of the shipment. The minimum charge applies even though weight-based charges for a small shipment would be less. (See "cube rule" and "dimensional weight.")
- Minimum weight** The lowest weight at which a freight rate is applicable. (See "weight break.")

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## Commonly used air cargo terms

### **Multilateral agreement**

An agreement or treaty between three or more nations, contracting for reciprocal international air service to be operated by designated carriers of each nation. The agreement may include provisions for the types of aircraft to be used, frequency of service, intermediate stops en route, aircraft airworthiness compliance, insurance requirements, fuel taxation, and arbitration procedures. These are normally standardized agreements applied to negotiations between one nation and numerous other nations, which allow for the inclusion of different routes and service points by various carriers.

### **Negotiated rate**

In the United States, a rate that an air carrier charges a shipper to carry a shipment on terms agreed to and arranged for that specific shipment, which is not included in the carrier's current air freight rate tariff. These rates became legal when the air freight industry was deregulated in the United States in November 1977. (See "contract rate.")

### **Nonairplane unit load**

A unitized load consisting of a single package or comprising a number of smaller individual packages, not intended to interface directly with an aircraft cargo handling system. The most common variations are constructed of corrugated paperboard and may incorporate a wood pallet base (e.g., D, E, F, EH, S containers).

### **Official Airline Guide**

A semimonthly (24 issues per year) publication by OAG Worldwide, Inc. listing the published schedules operated by air carriers between city pairs. The schedules include both nonstop and simple connection services. (Refer to *www.oag.com*)

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## Commonly used air cargo terms

### **Operational items**

Personnel, equipment, and supplies necessary for a particular aircraft operation, but not included in the manufacturer's empty weight (MEW). These items may vary for a particular aircraft and may include, but are not limited to, the following:

1. Crew and baggage.
2. Manuals and navigation equipment.
3. Removable food service equipment for cabin and galley.
4. Food and beverage.
5. Usable fluids other than those in the useful load.
6. Life rafts, life vests, and emergency locator transmitters.
7. Aircraft unit load devices.

### **Outsize cargo**

A term used primarily by the U.S. Air Force Air Mobility Command (AMC) to classify an item of cargo that is too large for the C-141 but that can be carried in a C-5, but not on other AMC aircraft.

### **Oversize cargo**

Unusually large or heavy cargo that will not fit in the cargo areas of standard-body freighters or passenger aircraft. A further definition of the term that is unique to the U.S. Air Force Air Mobility Command (AMC) is an item of cargo that can be carried on a C-141 aircraft, but that exceeds any dimension of a standard military pallet unit (88 x 108 x 96 in).

### **Payload**

The actual or potential revenue-producing portion of an aircraft's takeoff weight. This includes passengers, free baggage, excess baggage, freight, express, and mail.

# Glossary

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## Commonly used air cargo terms

### Pickup and delivery

An optional service provided for air cargo shipments that provides surface carriage between the shipper's and/or consignee's premises and the carrier's air cargo terminals. This service is generally provided by independent truck operators, either separately, or under contract to an air carrier. *Note:* Pickup and delivery charges may be separate or incorporated on the carrier's air waybill. Typically abbreviated as "PU&D."

### Pivot weight

The shipment weight at which applicable rates change, as follows:

1. **Container-rated shipments:** The weight at which an additional charge is levied for each pound in excess of the basic charge for carrying the container.
2. **Bulk-rated shipments:** The weight at which it becomes less costly to pay the lower per pound rate applicable on a higher weight, than the higher rate per pound that would normally apply to the lower actual weight. (e.g., If the tariff rate is \$50/cwt for shipments weighing between 100 and 249 pounds, and \$45/cwt for shipments weighing 250 pounds or more, the pivot weight is  $\$45 \times 2.5/\$50 = 225$  pounds.) Therefore, if a shipment weighs more than 225 pounds, it is less expensive to pay for 250 pounds at \$45/cwt. In the case of a 240-pound shipment, for instance ( $240 \times \$45 = \$108$ ), rather than to pay the higher rate of \$50/cwt ( $240 \times \$50 = \$120$ ).

### Released value rate

A rate that exempts the carrier from liability for loss or damage in excess of a specific amount. This is normally used for high-value shipments for which a shipper has arranged separate loss and damage insurance.

### Restraint system

The attachment system installed in an aircraft floor structure, which allows unit load devices to be secured to prevent movement during flight. Also applicable to a cargo pallet net to restrain the load on the pallet, as well as to a flexible net barrier between the cargo load and the aircraft flight deck to protect the flight crew in the event of cargo shifting forward.

# Glossary

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## Commonly used air cargo terms

**Road feeder service** Also referred to as RFS. A freight service provided by air carriers in motor trucks using public highways. This is generally used with, but may be used in lieu of, air movement.

**Roller ball system** A friction-reducing transfer system installed in mats in aircraft cargo floors, transport dollies, loaders, and cargo terminal handling systems to facilitate the movement of unit load devices.

**Seat track** A standardized structural device tied with fasteners into the aircraft floor structure. It is also designed to accept cargo tie-down fittings such as those on cargo nets and straps.

**Shell** The superstructure (upper contoured portion) of any unit load device container or igloo.

**Shipment** One or more pieces of freight being transported under the contract authority of one air waybill.

**Shipper packed** A phrase describing a unit load device that has been packed by the shipper rather than by the air carrier.

**Shippers cooperative** An association of shippers, a legal entity, which acts in unison to increase the quantity of freight offered to the carriers for transport. A key objective of most shippers cooperatives is to obtain lower cost volume rates. A shippers cooperative may, in some cases, also act as an agent of the direct air carrier.

**Stacking efficiency** A measurement of the volume lost within a pallet or container. This factor, usually expressed as a percentage, is calculated as follows:

$$\text{Stacking efficiency} = \frac{\text{Sum of individual piece volumes}}{\text{ULD volume used when loaded}}$$



# Glossary

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## Commonly used air cargo terms

**Standard-body aircraft** Aircraft which generally have a fuselage diameter of less than 200 inches (5.08 meters). In most configurations and applications, this limits main deck cargo loading to a single row of full-size unit load devices longitudinally. Also commonly referred to as “single-aisle” aircraft of the same model when in a passenger configuration. In this guide, these aircraft are divided into two categories based on structural payload capability:

1. Small standard-body, with payloads from 25,000 lb (11,340 kg) to 65,000 lb (29,495 kg).
  2. Medium standard-body, with payloads from 65,000 lb (29,485 kg) to 120,000 lb (54,430 kg).
- Examples: AN-12, BAe 146-200, B737-300SF, B757-200F, and DC-8-73F (See “widebody aircraft.”)

**Standard items** Equipment and fluids not considered an integral part of a particular aircraft and not a variation for the same type of aircraft. These items include, but are not limited to, the following:

1. Unusable fuel and other unusable fluids.
2. Engine oil.
3. Toilet fluid and chemicals.
4. Fire extinguishers, pyrotechnics, and emergency oxygen equipment.
5. Structure in galleys.
6. Supplemental electronic equipment.

**Straddle crane** A self-propelled vehicle used for top-lifting intermodal containers and handling heavy special shipments. The principal air cargo use is in transferring M-type ISO containers between highway trailers and unit load device trailers for on-airport use.

# Glossary

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## Commonly used air cargo terms

<b>Structural-limit payload</b>	Maximum aircraft payload calculated as a structural limit: maximum zero fuel weight minus operating empty weight.
<b>Tare weight</b>	The weight of an empty unit load device (ULD) (pallet or container), including all liners, doors, fittings, and nets. This varies by manufacturer for a given ULD type.
<b>Tare weight allowance</b>	A “free weight” allowance given to shippers as part of a unitization incentive program to encourage the use of unit load devices.
<b>Telescopic loading system</b>	A mechanized system of telescoping bins or trays, which may be installed in the lower hold of a standard-body aircraft that is not equipped for containers (e.g., ULDs). The system is designed to provide easier and faster loading and unloading of baggage and cargo.
<b>Template</b>	A rigid framework in the shape of an aircraft interior contour. Used as an outline for the purpose of pallet buildup at the cargo terminal to ensure that the cargo and restraining net will fit into a particular position in a specific aircraft type with required clearance in either main deck or lower hold positions. (See “loading gauge.”)
<b>Tensioning buckles</b>	Hardware on an aircraft pallet cargo net or tie-down strap used to adjust the length and tension to ensure that the contained load is secured.

# Glossary

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## Commonly used air cargo terms

<b>Thermal container</b>	An enclosed unit load device with insulated walls, top, and optionally, floor panel, that retard the rate of heat transfer between the inside and exterior of the container. Generally used for shipping perishable goods.
<b>Tie-down fitting</b>	A device attached to a cargo net or strap that locks into the tie-down track in the edge rail to hold a pallet net in place and secure the cargo load.
<b>Ton</b>	A unit of weight measurement. As most commonly used, a “short ton,” or U.S. ton (2,000 pounds), as compared to a “long ton” (2,240 pounds).
<b>Ton-mile</b>	One ton transported a distance of one mile.
<b>Tonne</b>	The French spelling of “ton” used in the air cargo industry to denote a metric ton (1,000 kg or 2,204.6 lb).
<b>Tonne-kilometer</b>	One metric ton transported a distance of one kilometer.
<b>Trailer</b>	A towed vehicle. In air cargo use, used to transport unit load devices between the cargo terminal and aircraft. Trailers in this application range in size from 8- to 40-ft ISO-fitted chassis. Many contain roller platforms, which can be powered. (See “dolly.”)
<b>Transporter</b>	A self-propelled vehicle equipped with a powered roller system for hauling and transferring unit load devices within a cargo handling terminal, and between the cargo terminal and dollies/trailers, and to and from aircraft cargo loaders.

# Glossary

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## Commonly used air cargo terms

**Unit load** A number of individual pieces of freight or cargo in a single box or container, or on a pallet, and held in place with a net, or similar device, to make them suitable for transporting, stacking, or storage as a single unit. It may also be a single large item packaged for transporting, stacking, or storage.

**Unit load device** Normally referred to as a ULD. Any type of certified container with an integral pallet, or an air cargo pallet assembly designed specifically top interface with an aircraft loading and floor restraint system.

**Utility tug** A self-propelled vehicle used for towing cargo carts, dollies, trailers, and miscellaneous equipment between passenger and cargo terminals and aircraft.

**Volume utilization** A measure of the proportion of the unit load device ULD volume used to stow cargo expressed as a percentage.

$$\text{Volume utilization} = \frac{\text{ULD volume used for cargo}}{\text{ULD total internal volume}}$$

**Weight and Balance manual** A regulatory agency–approved document for each specific aircraft that controls the weight of all items, including cargo, and the type and number of unit load devices that can be loaded. The purpose of the weight and balance process is to ensure that the aircraft is properly loaded with respect to both aircraft floor loading distribution and weight and balance criteria for each flight.

**Weight break** A cargo tariff parameter, which describes the weight of a cargo shipment at which a lower per pound (or per kilogram) becomes effective. (See “minimum weight” and “pivot weight.”)  
Example: 0–99 kg, \$.45/kg; 100–250 kg, \$.42/kg; over 250 kg, \$.38/kg

# Glossary

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## Commonly used air cargo terms

### **Weight chargeable**

The weight of a shipment used in determining air freight charges. The chargeable weight may be the weight calculated in accordance with the scale weight, or the shipment dimensional weight if the dimensional weight is greater. The chargeable weight may also be higher than the actual weight if a lower charge results.

### **Wet lease**

A leasing arrangement between two parties. The lessor typically provides the aircraft and crew. Other operational requirements such as fuel, insurance, ground services, and maintenance are as negotiated. In the practical sense, wet leases function between the general provisions of an aircraft-only “dry lease” and an “ACMI agreement.” (See “ACMI” and “dry lease.”)

### **Widebody aircraft**

Aircraft that generally have a fuselage diameter of greater than 200 inches (5.08 meters). In most configurations and applications, this allows main deck cargo loading to two rows of full-size unit load devices longitudinally. Also commonly referred to as “twin-aisle” aircraft of the same model when in a passenger configuration. In this guide, these aircraft are divided into two categories based on structural payload capability: medium widebody, with payloads from 80,000 lb (36,290 kg) to 145,000 lb (65,770 kg) and large widebody, with payloads from 145,000 lb (65,770 kg) to 265,000 lb (120,200 kg). Examples: A300-B4, B767-300F, L1011-200F, AN-124, B747-400ERF (See “standard-body aircraft.”)

# Glossary

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## Commonly used air cargo terms

**Workrate** The number of available ton-miles/available tonne-kilometers that an aircraft is capable of producing in a specified time, such as a year. Workrate is the product of the number of trips an aircraft makes in the period, times the average trip distance, times the cargo capacity. It is primarily used in macro-economic-approach fleet planning.

**Yield** Air transport revenue per unit of weight and distance. For U.S. domestic and international traffic, it is ordinarily stated as dollars per ton-statute mile. For international traffic, it is generally stated as units of currency per tonne-kilometer.

The term “yield” is often confused with “average revenue.” However, yield considers the distance carried, while average revenue does not; it is limited to units of currency per unit weight.

### Example

Shipment weight	4,000 lb (2 tons)
Distance carried	1,000 statute miles
Revenue	\$860.00

$$\text{Yield} = \frac{\$860.00}{2 \times 1,000 \text{ miles}} = \$0.43 \text{ per ton-mile}$$

$$\text{Average revenue} = \frac{\$860.00}{4,000 \text{ lb}} = \$0.215 \text{ per lb}$$

# Abbreviations and Definitions

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<b>A</b>	Airbus, aircraft manufacturer (e.g., A300F)
<b>AAPA</b>	Association of Asia-Pacific Airlines
<b>ACI</b>	Air Cargo, Inc*
<b>ACMI</b>	Aircraft, Crews, Maintenance, and Insurance*
<b>AD</b>	Airworthiness Directive
<b>Adv</b>	Advanced
<b>AEA</b>	Association of European Airlines
<b>AOC</b>	Air Operator's Certificate
<b>APU</b>	Auxiliary Power Unit
<b>ATC</b>	Air Traffic Control
<b>ATK</b>	Available Tonne-Kilometers*
<b>ATM</b>	Available Ton-Miles*
<b>ATPCO</b>	Airline Tariff Publishing Company*
<b>B</b>	Boeing, aircraft manufacturer (e.g., B747F)
<b>BAe</b>	British Aerospace, aircraft manufacturer (e.g., BAe 146QT)
<b>C</b>	Convertible Aircraft*
<b>CAA</b>	Civil Aviation Authority (United Kingdom)
<b>CAAC</b>	Civil Aviation Authority of China
<b>CF</b>	Converted Freighter
<b>CFMI</b>	CFM International, engine manufacturer, a GE/SNECMA consortium
<b>CIS</b>	Commonwealth of Independent States
<b>Combi</b>	Combined Main Deck Passenger/Cargo Aircraft
<b>CRAF</b>	Civil Reserve Air Fleet*
<b>Cu</b>	Cubic

\* A detailed definition is provided in the "glossary of commonly used air cargo terms" section.

# Abbreviations and Definitions

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<b>DASA</b>	Daimler Chrysler Aerospace (subsidiary of EADS)
<b>DOT</b>	Department of Transportation (United States)
<b>EADS</b>	European Aeronautics Defense and Space Company
<b>EFIS</b>	Electronic Flight Information System
<b>EPNdB</b>	Effective Perceived Noise Level in Decibels
<b>ER</b>	Extended Range
<b>EROPS</b>	Extended-Range Operations
<b>ETOPS</b>	Extended-Range Twin-Engine Operations
<b>EU</b>	European Union
<b>F</b>	Freighter Aircraft
<b>FAA</b>	Federal Aviation Administration (United States)
<b>FAR</b>	Federal Aviation Regulations (United States)
<b>FADEC</b>	Full Authority Digital Engine Controls
<b>ft</b>	Feet
<b>ft<sup>3</sup></b>	Cubic Feet (dry volume measure)
<b>FTK</b>	Freight Tonne-Kilometers*
<b>FTM</b>	Freight Ton-Miles*
<b>GE</b>	General Electric, engine manufacturer
<b>H/K</b>	Hushkit (engine noise—reducing system)
<b>hp</b>	Horsepower
<b>IAE</b>	International Aero Engines, engine manufacturer (R-R, P&W, JAE, MTU, and Fiat)
<b>IATA</b>	International Air Transport Association*
<b>ICAO</b>	International Civil Aviation Organization
<b>in</b>	Inches

\*A detailed definition is provided in the “glossary of commonly used air cargo terms” section.



# Abbreviations and Definitions

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<b>JAA</b>	Joint Aviation Authority
<b>JAR</b>	Joint Aviation Regulations
<b>kg</b>	Kilograms (metric weight measure)
<b>km</b>	Kilometers (metric distance measure)
<b>kN</b>	Kilonewtons (metric thrust measure)
<b>km/h</b>	Kilometers per Hour (speed in kilometers per hour)
<b>kn</b>	Knots (speed in nautical miles per hour)
<b>kW</b>	Kilowatts (electrical power/energy)
<b>lb/lbt</b>	Pounds/Pounds of Thrust
<b>LTL</b>	Less than Truck Load Shipment
<b>L</b>	Litres (metric liquid volume measure)
<b>M</b>	Modified
<b>m<sup>3</sup></b>	Cubic Meters (metric dry volume measure)
<b>MD</b>	McDonnell Douglas, aircraft manufacturer (e.g., DC-8, MD-80)
<b>MEW</b>	Manufacturer's Empty Weight*
<b>MLW</b>	Maximum Landing Weight*
<b>mi/h</b>	Miles per Hour (speed measure)
<b>MTOW</b>	Maximum Takeoff Weight*
<b>MZFW</b>	Maximum Zero Fuel Weight*
<b>NAS</b>	National Aerospace Standards
<b>NATO</b>	North Atlantic Treaty Organization
<b>NCD</b>	Nose Cargo Door
<b>nmi</b>	Nautical Miles (distance measure)
<b>NRN</b>	Noise Reduction Nacelle

\* A detailed definition is provided in the "glossary of commonly used air cargo terms" section.

# Abbreviations and Definitions

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<b>OAG</b>	Official Airline Guide*
<b>OEM</b>	Original Equipment Manufacturer
<b>OEW</b>	Operating Empty Weight*
<b>P&amp;W</b>	Pratt & Whitney, engine manufacturer
<b>PAX</b>	Passenger Aircraft/Passengers
<b>PF</b>	Package Freighter
<b>PIP</b>	Performance Improvement Program
<b>QC</b>	Quick Change Aircraft and/or associated equipment
<b>RAF</b>	Royal Air Force (United Kingdom)
<b>RE</b>	Re-engined
<b>R-R</b>	Rolls-Royce, engine manufacturer
<b>RTK</b>	Revenue Tonne-Kilometers*
<b>SII</b>	Stage 2 Hushkit Designation
<b>SIII</b>	Stage 3 Hushkit Designation
<b>SCD</b>	Side Cargo Door
<b>S/N</b>	Serial Number
<b>SF</b>	Special Freighter, Converted Passenger Aircraft (Boeing)
<b>SHP</b>	Shaft Horsepower
<b>SQ</b>	Square
<b>SR</b>	Short Range
<b>STC</b>	Supplemental Type Certificate
<b>STOL</b>	Short Takeoff and Landing
<b>SUD</b>	Stretched Upper Deck, Applies to Boeing 747

\* A detailed definition is provided in the “glossary of commonly used air cargo terms” section.

# Abbreviations and Definitions

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<b>TCAS</b>	Traffic Collision Avoidance System
<b>TIACA</b>	The International Air Cargo Association*
<b>TSO</b>	Technical Standard Order
<b>ULD</b>	Unit Load Device*
<b>USAF</b>	United States Air Force (United States)
<b>U.S. gal</b>	U.S. Gallons (liquid volume measure)
<b>USN</b>	United States Navy (United States)
<b>USPS</b>	United States Postal Service (United States)

\* A detailed definition is provided in the “glossary of commonly used air cargo terms” section.

# Utility Aircraft

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*Less than 25,000 lb*

## Maximum payload less than 25,000 lb (11,340 kg)/12.5 tons

Antonov AN-26	12,125 (5,500)
Antonov AN-32	14,770 (6,700)
Antonov AN-72/-74	22,045 (10,000)
ATR 42-300, 72-200, 72-500	10,698 (4,853)–17,159 (7,783)
Cessna 208 Caravan	3,500 (1,590)
Convair CV-580/-5800	16,000 (7,260)–21,834 (9,903)
Fairchild Dornier Metro III/Expediter I	4,780 (2,168)
Fokker F-27-600	13,600 (6,169)
Hawker Siddeley HS-748	11,320 (5,130)
McDonnell Douglas DC-9-10F	22,424 (10,171)
Saab 340 A	8,500 (3,856)
Shorts 330-200, 360-300	7,280 (3,300)

*Boeing*

*Airbus*

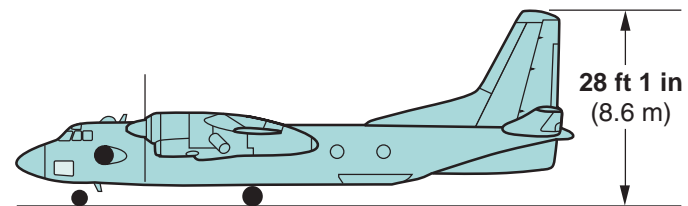
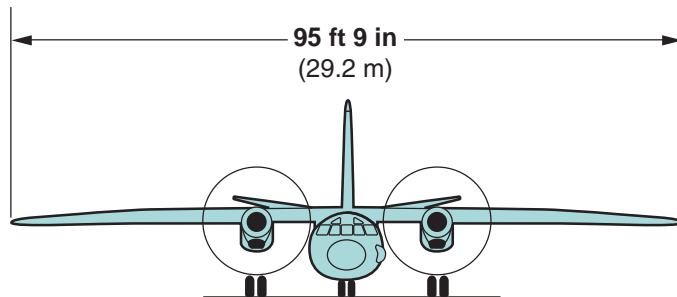
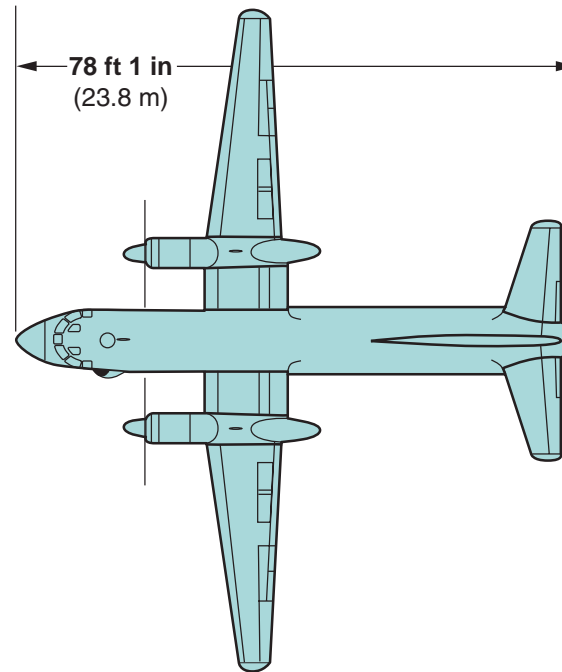
*United States*

*International*

# Antonov AN-26

## General Arrangement

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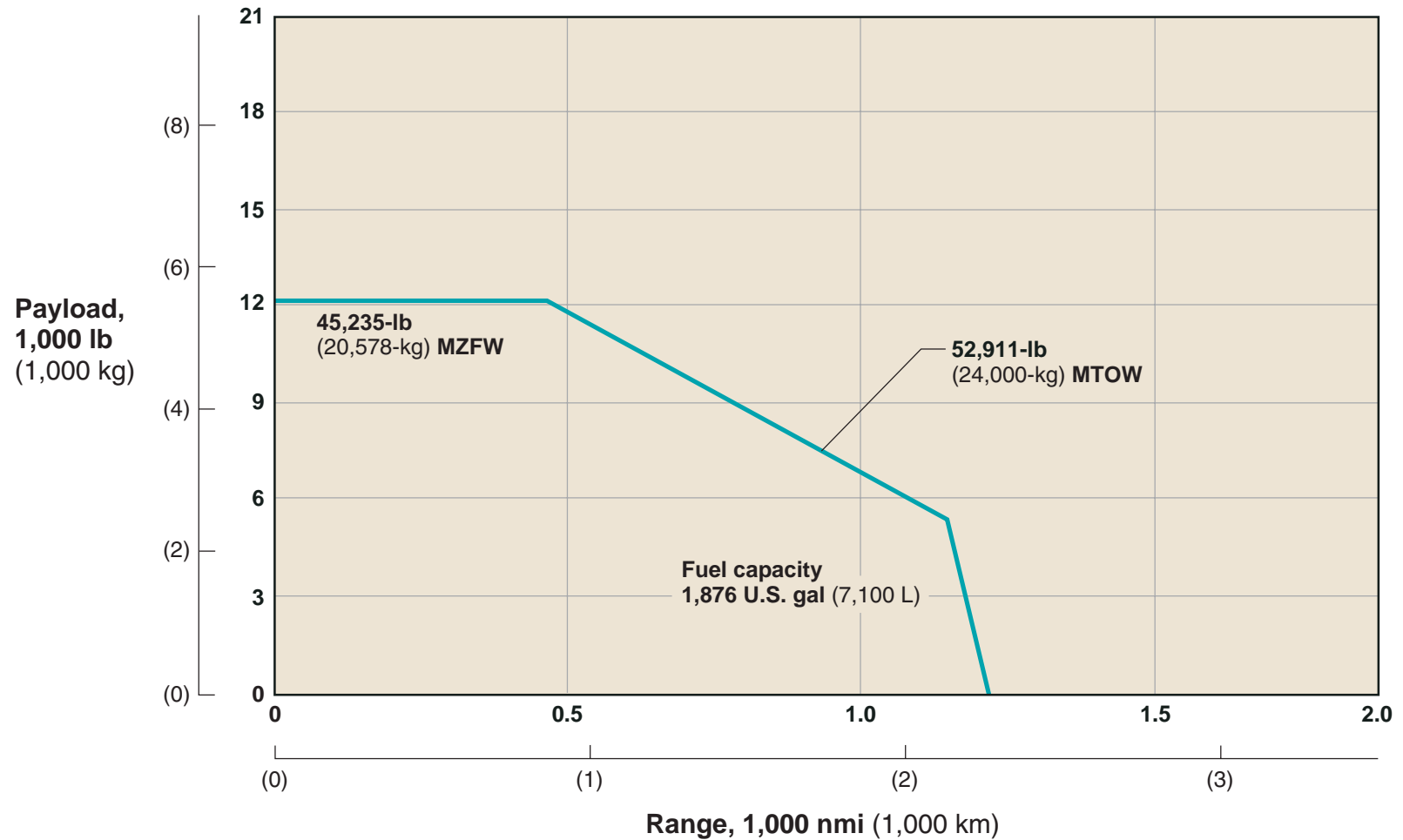


### Ivchenko AI-24VT turboprop engines

	AN-26	
<b>Cargo capacity, ft<sup>3</sup> (m<sup>3</sup>)</b>		
Main deck, excluding ramp	1,027	(29.1)
Total cargo volume	1,027	(29.1)
<b>Maximum gross weight, lb (kg)</b>		
Takeoff	52,911	(24,000)
Landing	52,911	(24,000)
Zero fuel	45,235	(20,518)
Structural limit payload (MZFW – OEW)	12,125	(5,500)
Operating empty weight including tare	33,110	(15,020)
Fuel capacity, U.S. gal (L)	1,876	(7,100)
<b>Design range (MZFW payload), nmi (km)</b>	528	(978)

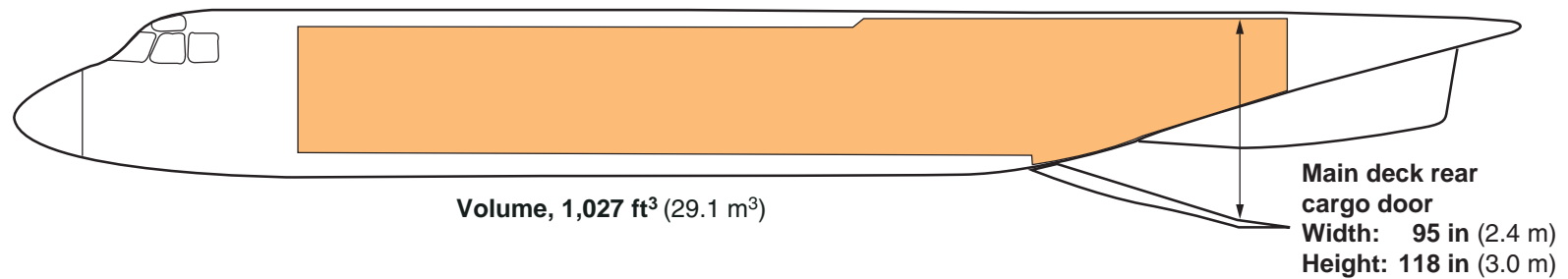


### Ivchenko AI-24VT engines





### Cargo door opening

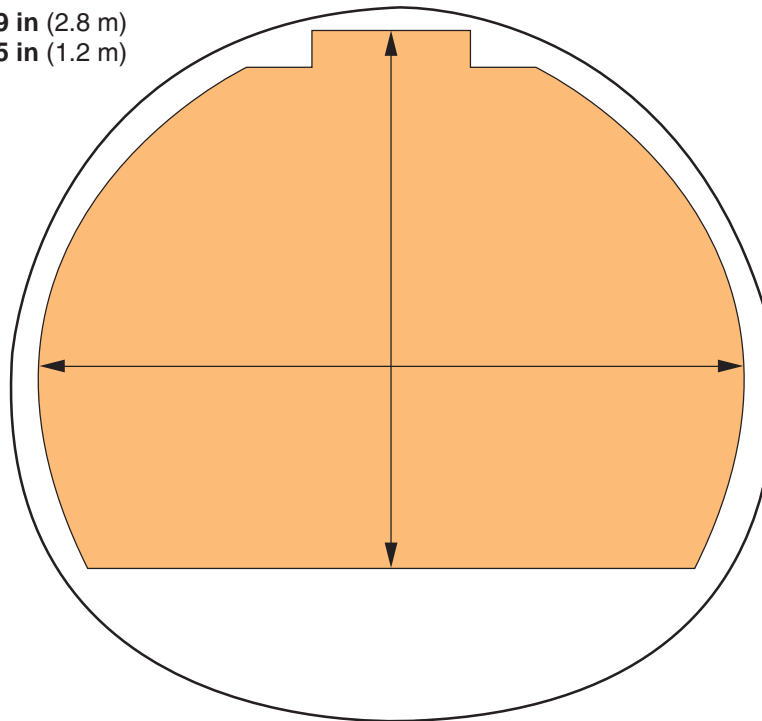






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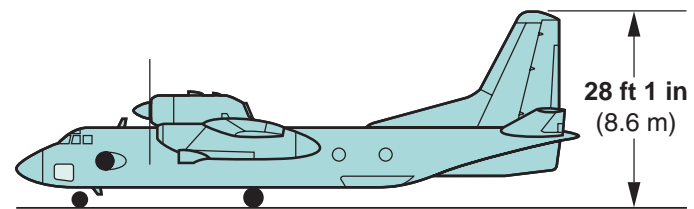
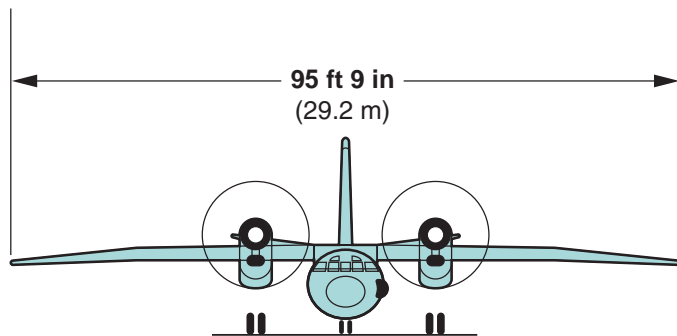
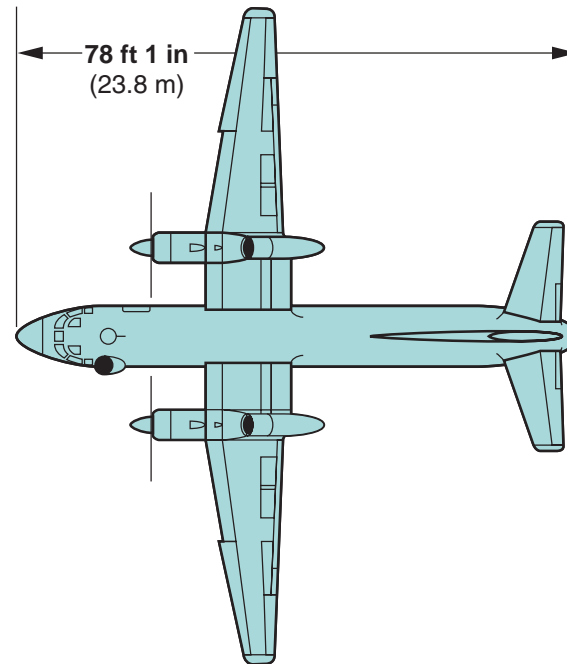
**Width: 109 in (2.8 m)**  
**Height: 75 in (1.2 m)**



# Antonov AN-32

## General Arrangement

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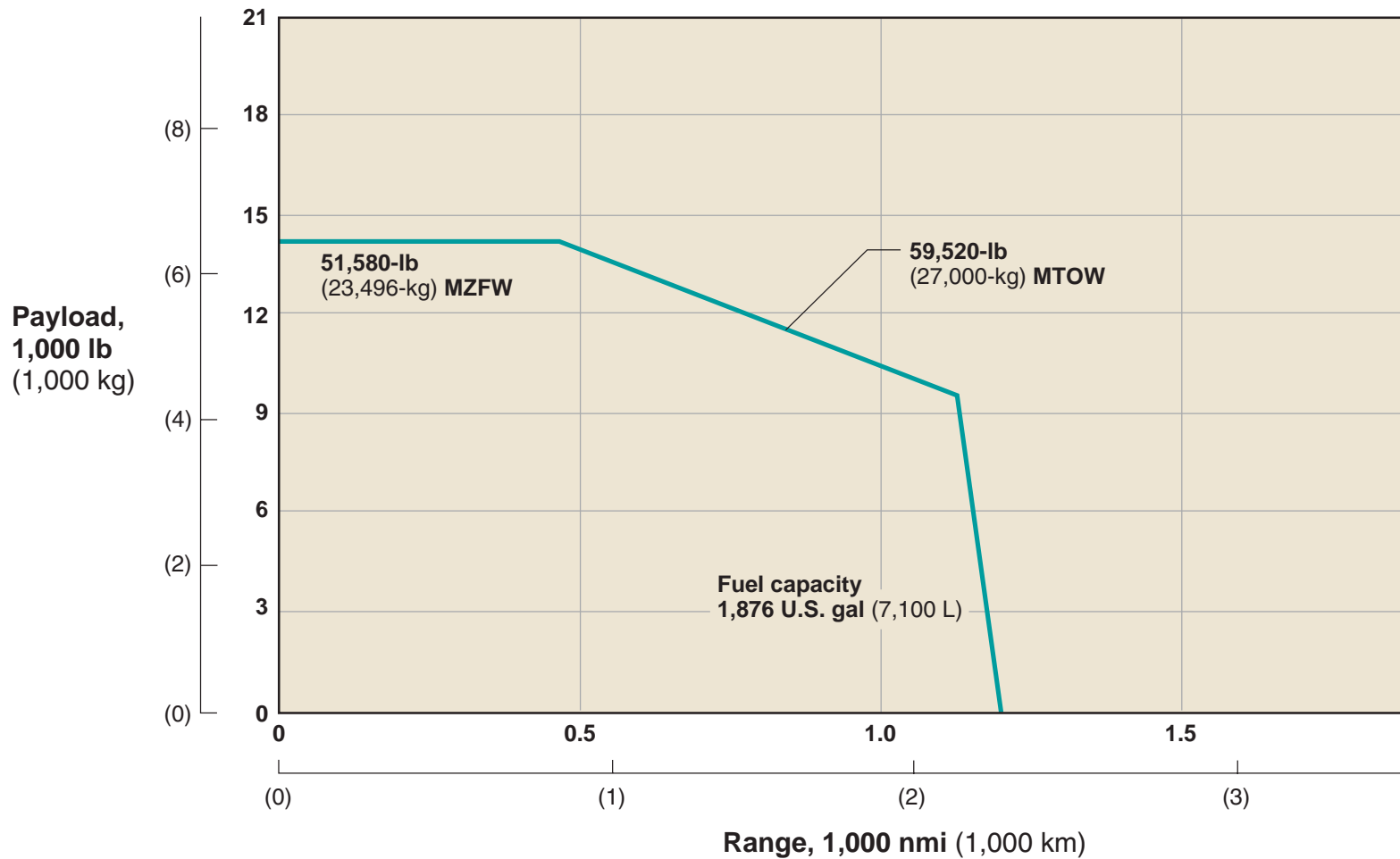


### ZKMB Progress AI-20D turboprop engines

	AN-32	
<b>Cargo capacity, ft<sup>3</sup> (m<sup>3</sup>)</b>		
Main deck, excluding ramp	1,027	(29.1)
Total cargo volume	1,027	(29.1)
<b>Maximum gross weight, lb (kg)</b>		
Takeoff	59,520	(27,000)
Landing	55,115	(25,000)
Zero fuel	51,810	(23,496)
Structural limit payload (MZFW – OEW)	14,770	(6,700)
Operating empty weight including tare	37,040	(16,800)
Fuel capacity, U.S. gal (L)	1,876	(7,100)
<b>Design range (MZFW payload), nmi (km)</b>	485	(898)

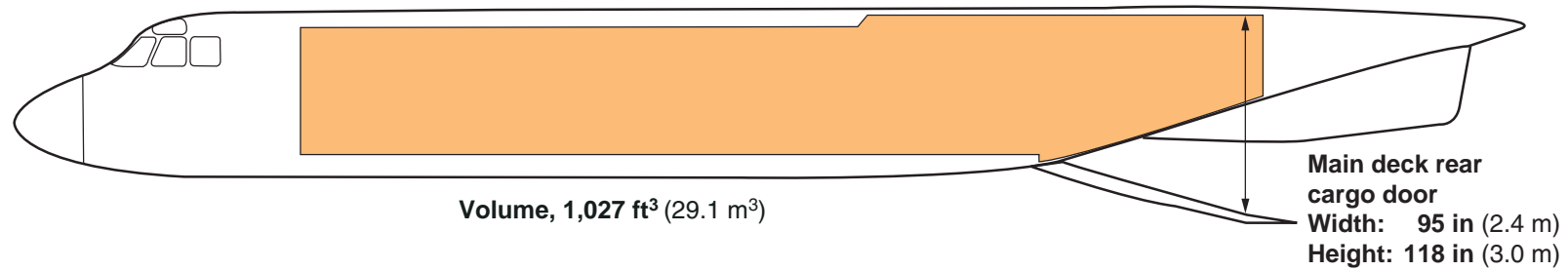


### ZKMB Progress AI-20D engines





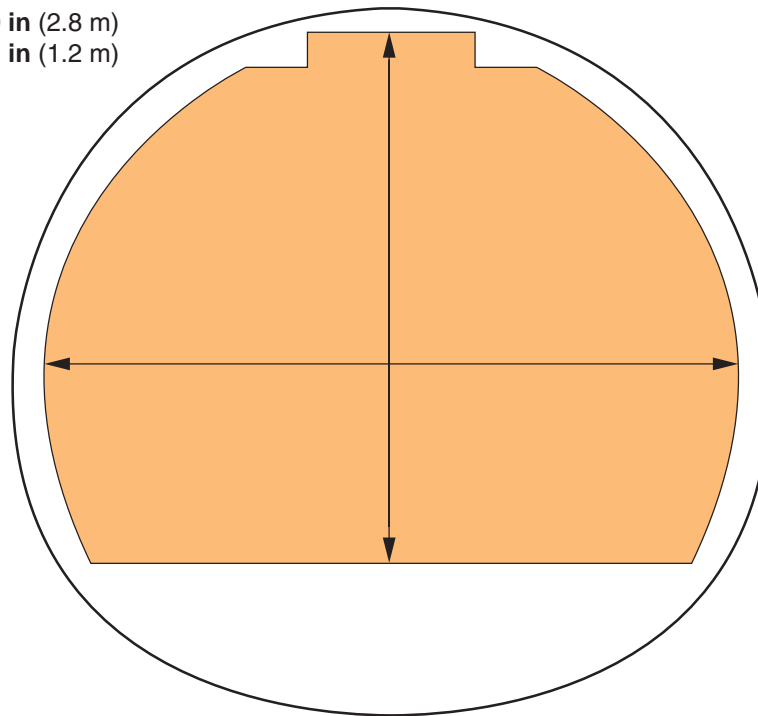
### Cargo door opening





### Cross section

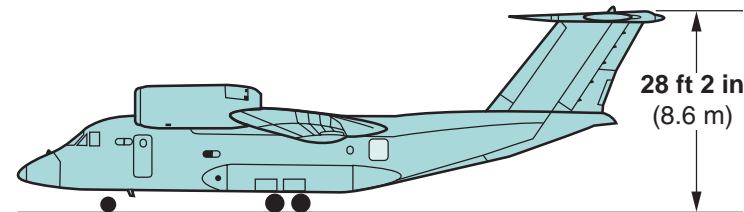
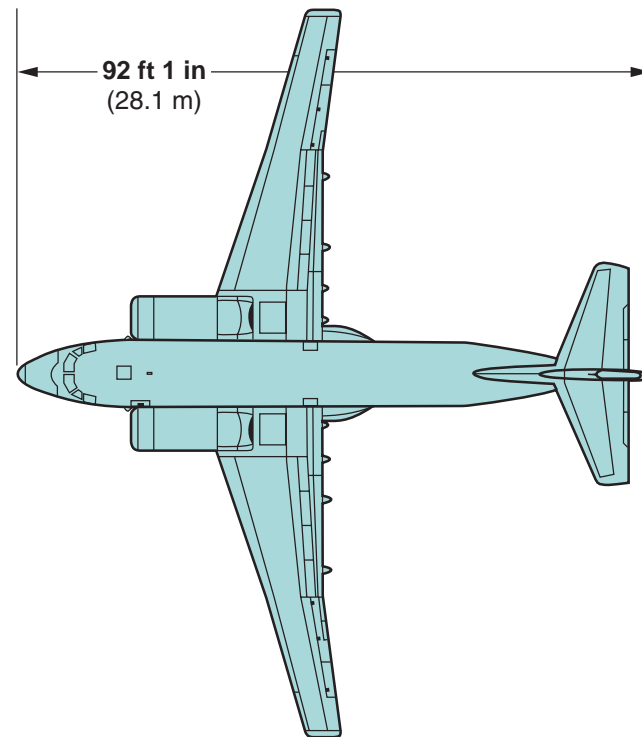
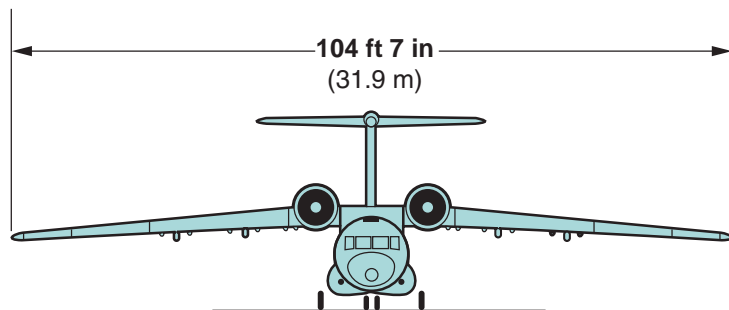
**Width:** 109 in (2.8 m)  
**Height:** 75 in (1.2 m)



# Antonov AN-72/-74

## General Arrangement

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### ZKMD Progress D-36 engines

#### AN-72/-74/-74TK-200\*

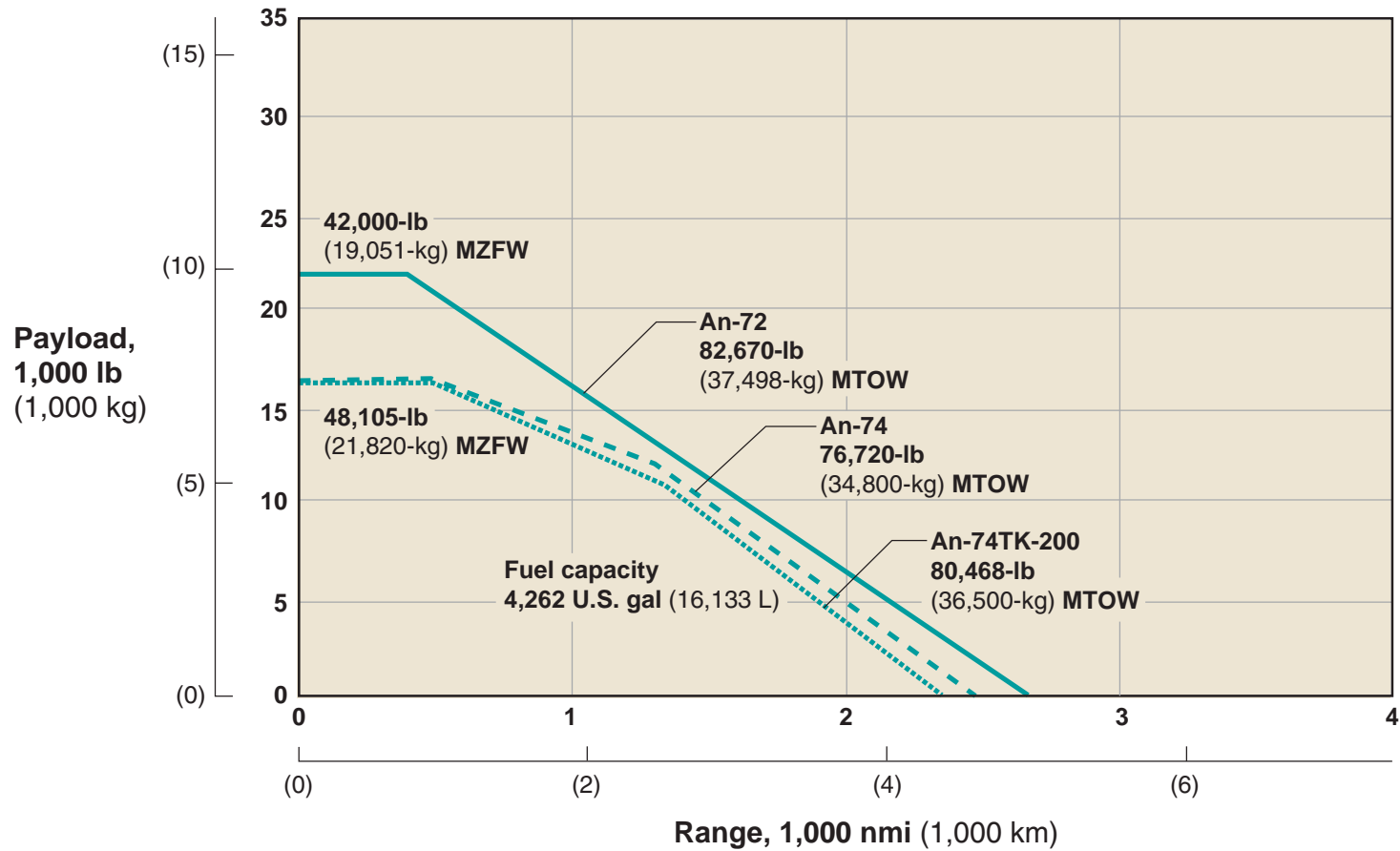
<b>Cargo capacity, ft<sup>3</sup> (m<sup>3</sup>)</b>		
Main deck, excluding ramp	<b>1,690</b>	(47.8)
Total cargo volume	<b>1,690</b>	(47.8)
<b>Maximum gross weight, lb (kg)</b>		
Takeoff	<b>76,060</b>	(34,500)
Landing	<b>72,750</b>	(33,000)
Zero fuel	<b>64,045</b>	(29,050)
Structural limit payload (MZFW – OEW)	<b>22,045</b>	(10,000)
Operating empty weight	<b>42,000</b>	(19,050)
Fuel capacity, U.S. gal (L)	<b>4,262</b>	(16,133)
<b>Design range (MZFW payload), nmi (km)</b>	<b>470</b>	(870)

\* Data shown is for the AN-72-100.



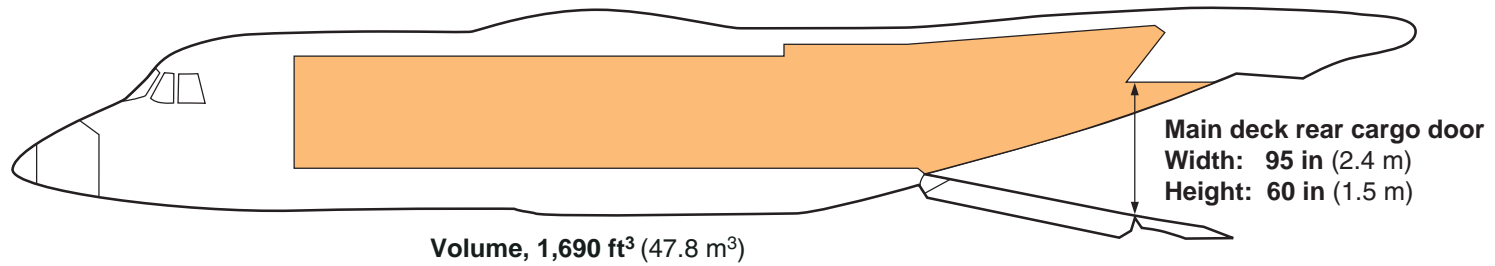


### ZKMD Progress D-36 engines





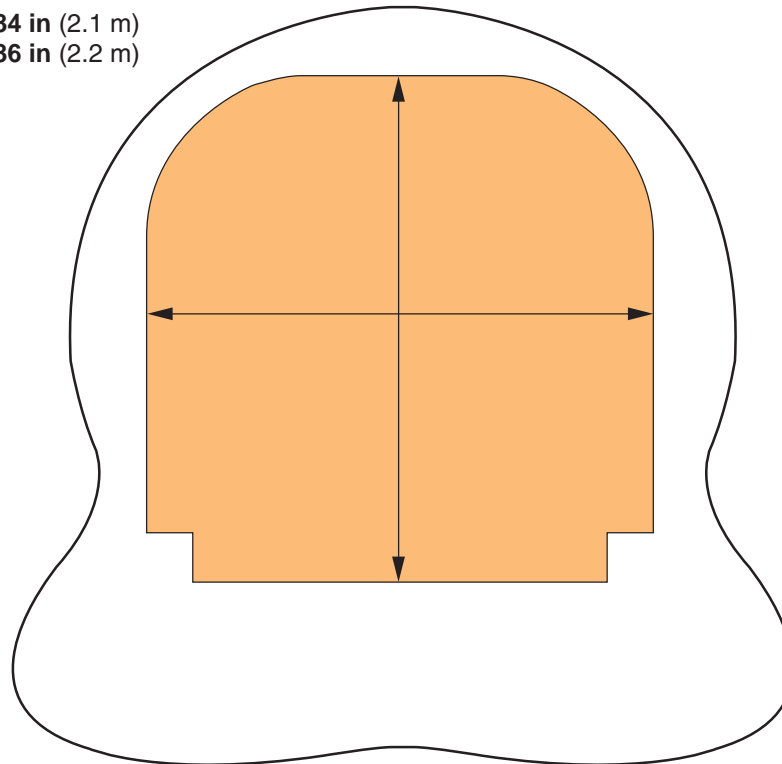
### Cargo door opening





### Cross section

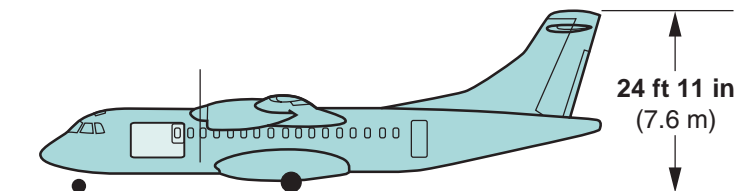
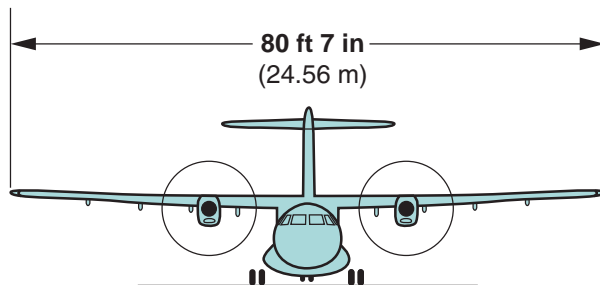
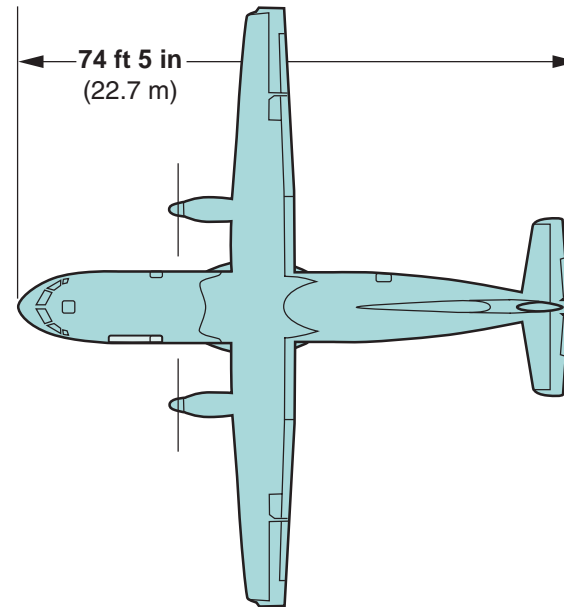
**Width: 84 in (2.1 m)**  
**Height: 86 in (2.2 m)**



# ATR 42-300 Standard

## General Arrangement

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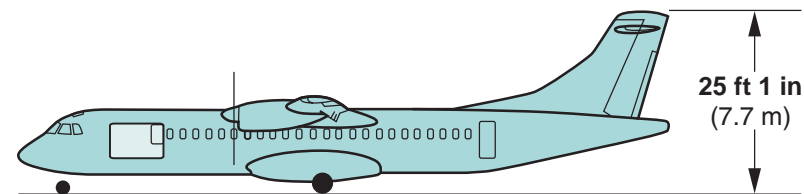
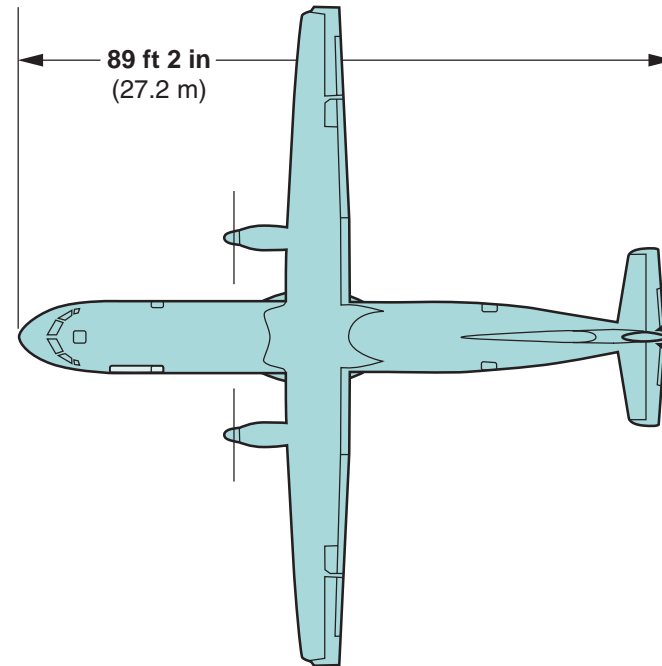
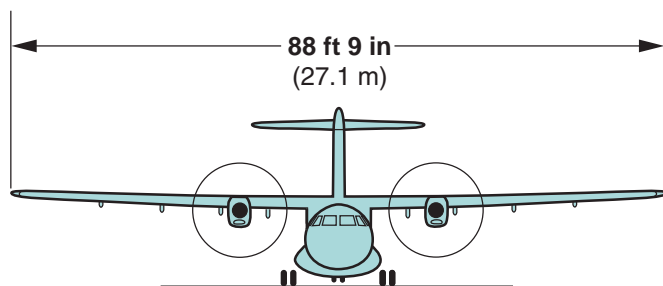


- Large cargo door (shown): 116 x 71 in (2.94 x 1.80 m)
- Regular cargo door: 51 x 62 in (1.30 x 1.58 m)

# ATR 72-200/-500

## General Arrangement

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- Large cargo door (shown): 116 x 71 in (2.94 x 1.80 m)
- Regular cargo door: 51 x 62 in (1.30 x 1.58 m)



### Pratt & Whitney PW120/121\* engines Pratt & Whitney PW124B/127F engines

	ATR 42-300		ATR 72-200/-500	
<b>Cargo capacity, ft<sup>3</sup> (m<sup>3</sup>)</b>				
<b>Main deck, (6*/9) 61.5- x 88.0-in     (1.6- x 2.2-m) containers</b>	<b>1,121</b>	<b>(31.8)</b>	<b>1,682</b>	<b>(47.6)</b>
<b>Bulk volume</b>	<b>421</b>	<b>(11.9)</b>	<b>371</b>	<b>(10.5)</b>
<b>Total cargo volume</b>	<b>1,542</b>	<b>(43.7)</b>	<b>2,053</b>	<b>(58.1)</b>
<b>Maximum gross weight, lb (kg)</b>				
<b>Takeoff</b>	<b>37,257</b>	<b>(16,900)</b>	<b>49,603**</b>	<b>(22,500)</b>
<b>Landing</b>	<b>36,155</b>	<b>(16,400)</b>	<b>48,171**</b>	<b>(21,850)</b>
<b>Zero fuel</b>	<b>33,510</b>	<b>(15,200)</b>	<b>44,092**</b>	<b>(20,000)</b>
<b>Structural limit payload (MZFW – OEW)</b>	<b>10,698</b>	<b>(4,853)</b>	<b>17,159**</b>	<b>(7,783)</b>
<b>Operating empty weight including tare</b>	<b>22,812</b>	<b>(10,347)</b>	<b>26,933**</b>	<b>(12,217)</b>
<b>Fuel capacity, U.S. gal (L)</b>	<b>1,515</b>	<b>(5,736)</b>	<b>1,674**</b>	<b>(6,337)</b>
<b>Design range (MZFW payload), nmi (km)</b>	<b>460</b>	<b>(852)</b>	<b>520**</b>	<b>(963)</b>
<b>Chapter 3 cumulative margin, EPNdB</b>	<b>-17.3</b>		<b>-25.9</b>	

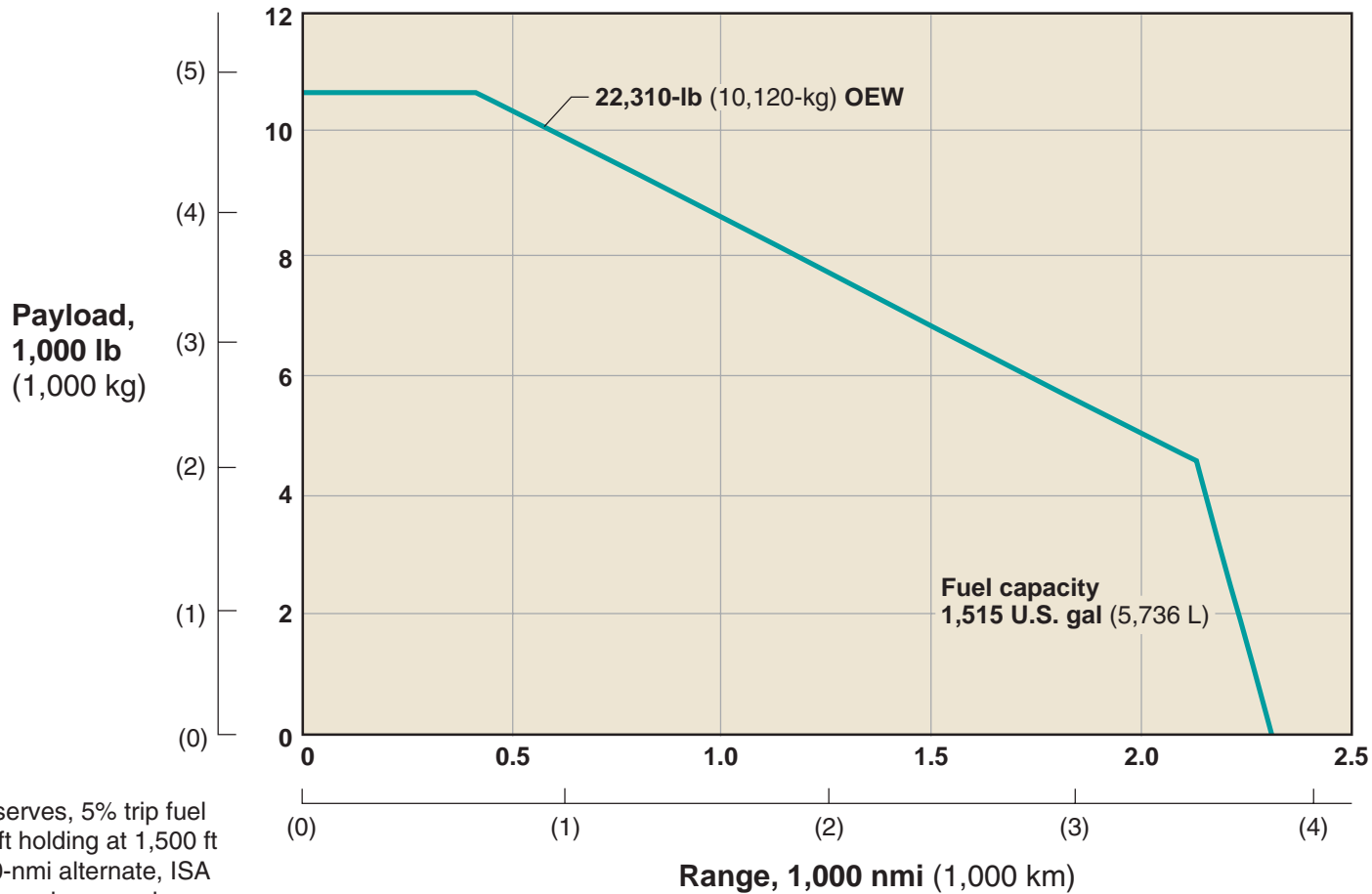
• Tare weights: 1,020 lb (463 kg) for the 42-300, 1,530 lb (694 kg) for the 72-200/-500

\* ATR 42-300 models

\*\* ATR 72-500 model



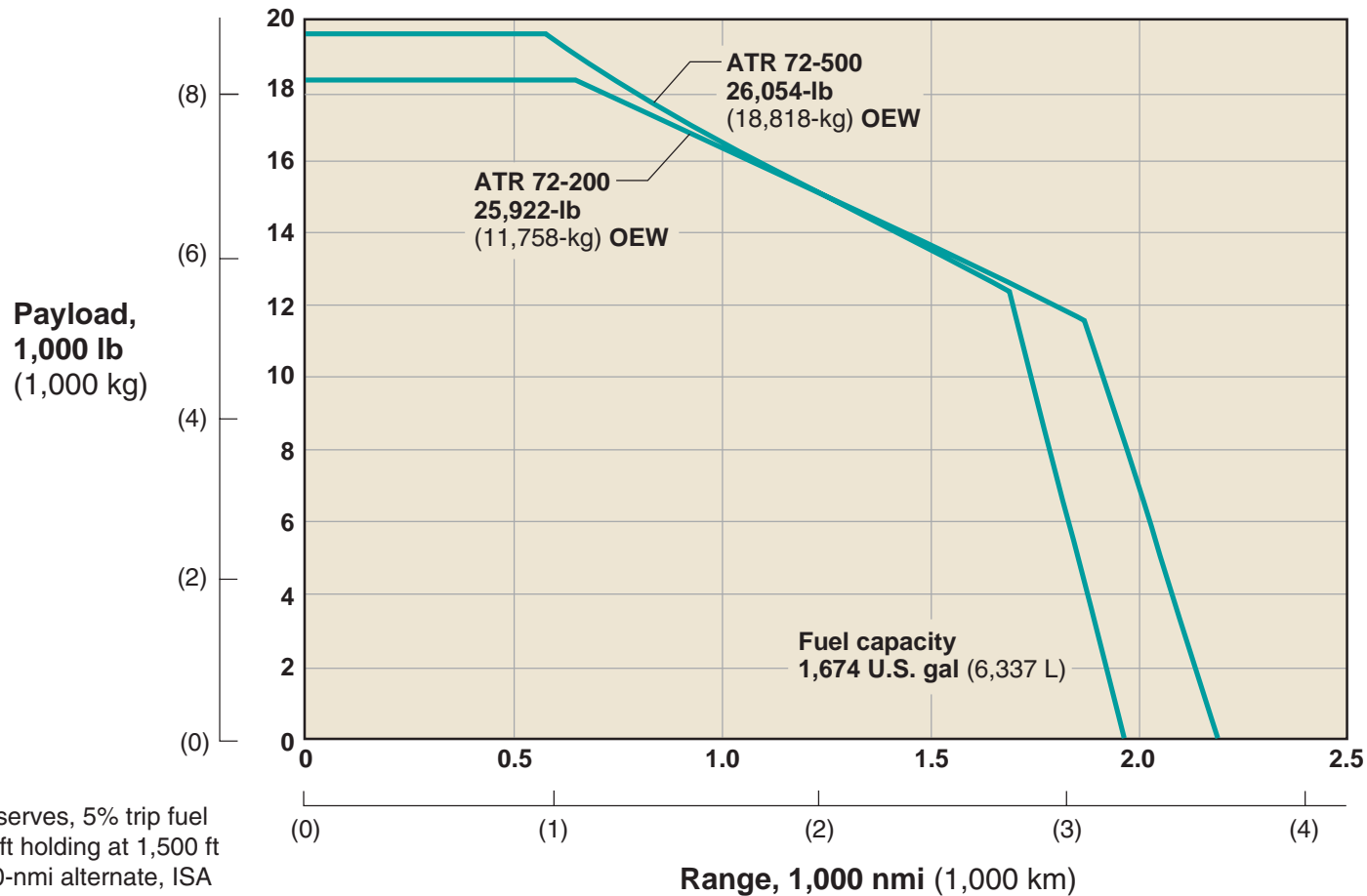
### Pratt & Whitney PW120/121 engines



- Reserves, 5% trip fuel
- 30-ft holding at 1,500 ft
- 100-nmi alternate, ISA
- Max cruise speed



### Pratt & Whitney PW124B/PW127F turboprop engines



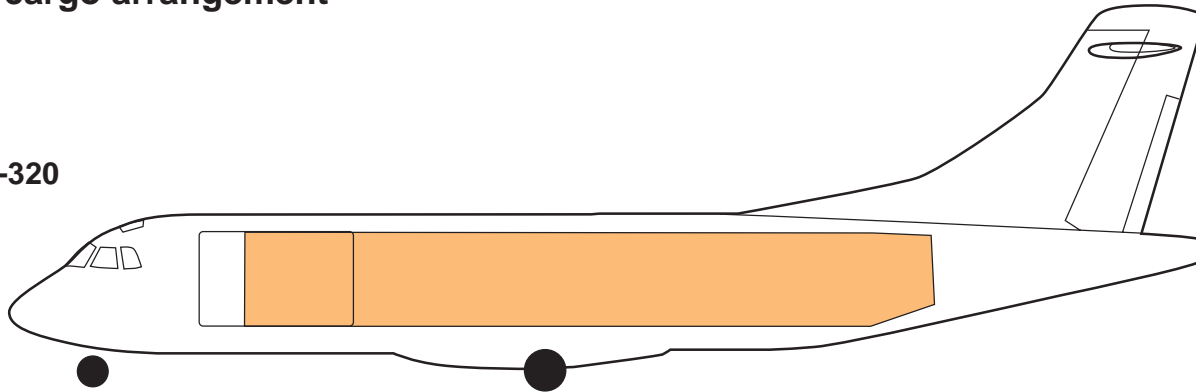
- Reserves, 5% trip fuel
- 30-ft holding at 1,500 ft
- 100-nmi alternate, ISA
- Max cruise speed





### Main deck cargo arrangement

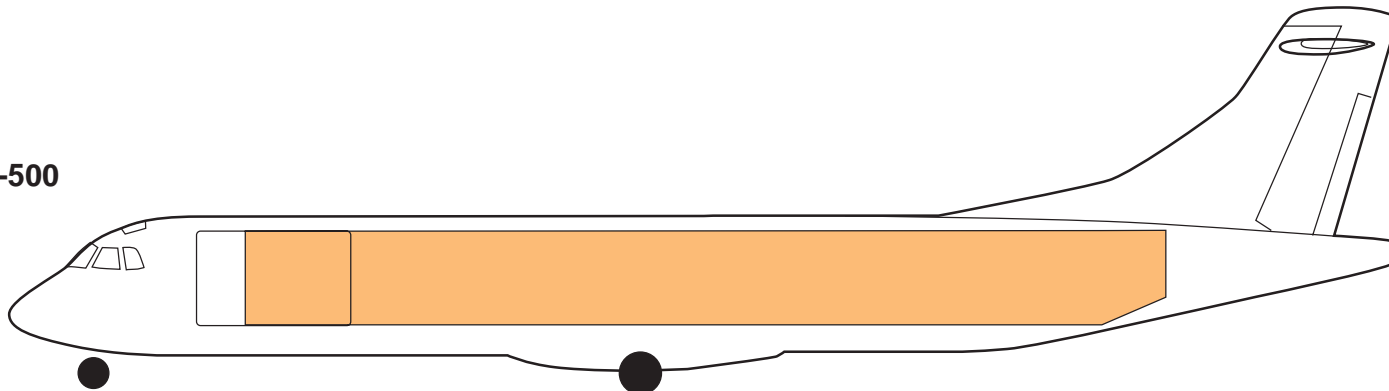
#### ATR 42-300/-320



**6 containers, 88.0 x 61.5 in (2.2 x 1.6 m)**  
**Bulk volume, 421 ft<sup>3</sup> (11.9 m<sup>3</sup>)**

**Container volume, 1,121 ft<sup>3</sup> (31.8 m<sup>3</sup>)**  
**Bulk volume, 421 ft<sup>3</sup> (11.9 m<sup>3</sup>)**  
**Total volume, 1,542 ft<sup>3</sup> (43.7 m<sup>3</sup>)**

#### ATR 72-200/-500



**9 containers, 88.0 x 61.5 in (2.2 x 1.6 m)**  
**Bulk volume, 371 ft<sup>3</sup> (10.5 m<sup>3</sup>)**

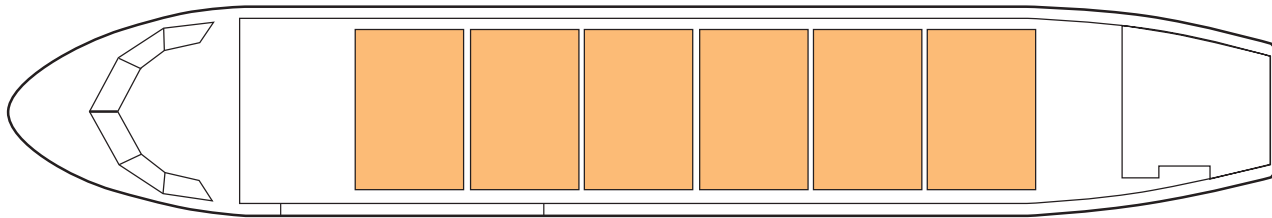
**Container volume, 1,682 ft<sup>3</sup> (47.6 m<sup>3</sup>)**  
**Bulk volume, 371 ft<sup>3</sup> (10.5 m<sup>3</sup>)**  
**Total volume, 2,053 ft<sup>3</sup> (58.1 m<sup>3</sup>)**

- Large cargo door (shown): 116 x 71 in (2.9 x 1.8 m)
- Regular cargo door: 51 x 62 in (1.3 x 1.5 m)



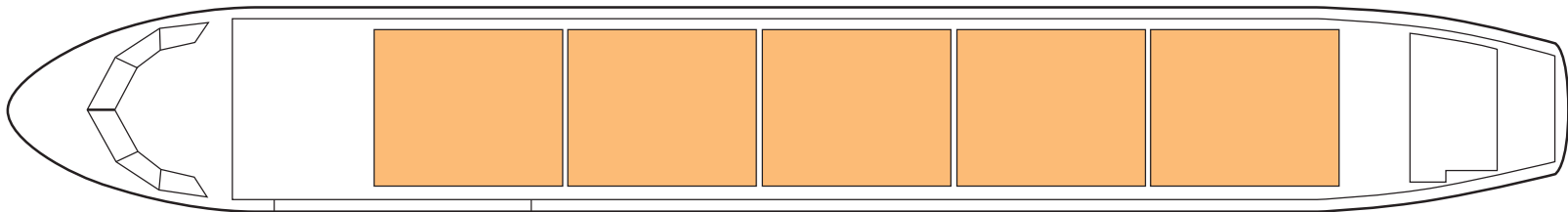
### Main deck cargo arrangement

#### ATR 42



**6 ULDs, 88.0 x 61.5 in (2.2 x 1.6 m)**  
**Volume, 1,121 ft<sup>3</sup> (31.8 m<sup>3</sup>); bulk, 421 ft<sup>3</sup> (11.9 m<sup>3</sup>)**

#### ATR 72

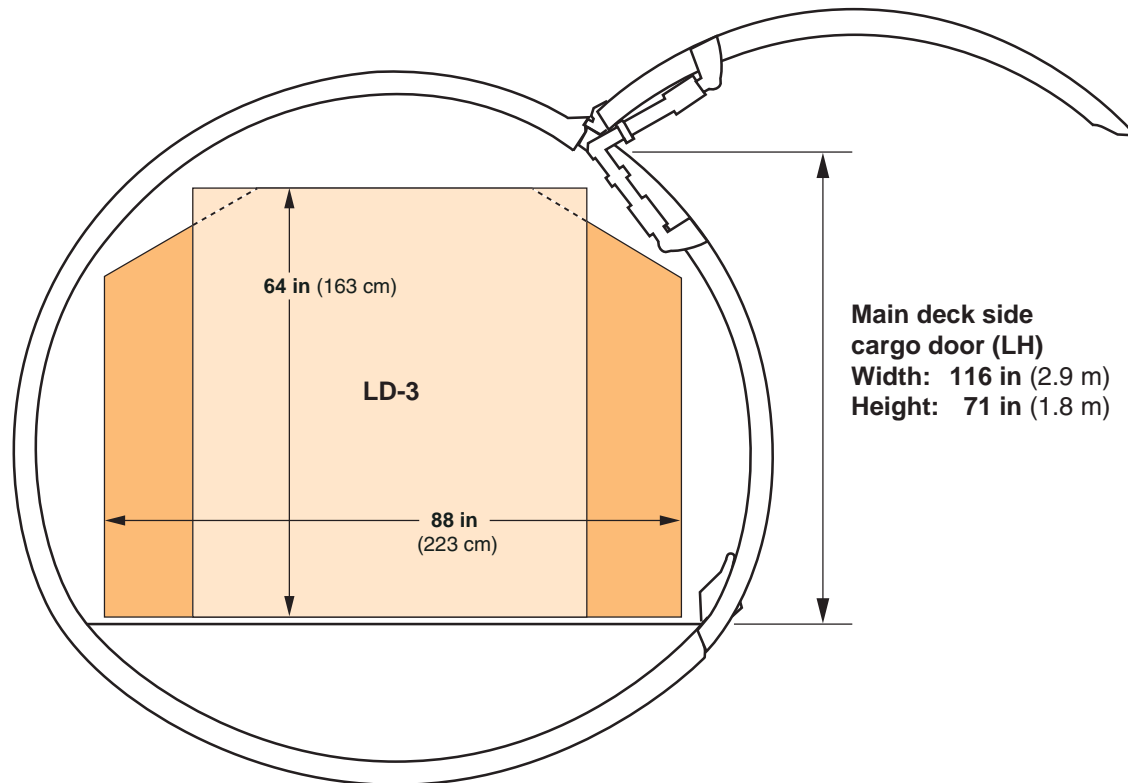


**5 ULDs, 88 x 108 in (2.2 x 2.7 m)**  
**Volume, 1,682 ft<sup>3</sup> (47.6 m<sup>3</sup>); bulk, 470 ft<sup>3</sup> (13.3 m<sup>3</sup>)**

- Large cargo door (shown): 116 x 71 in (2.9 x 1.8 m)
- Regular cargo door: 51 x 62 in (1.3 x 1.5 m)



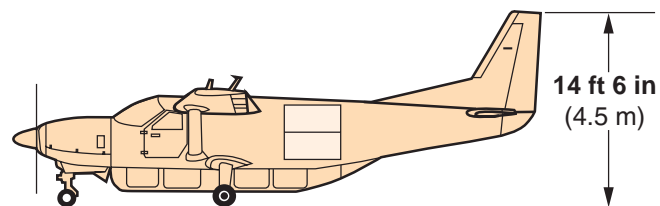
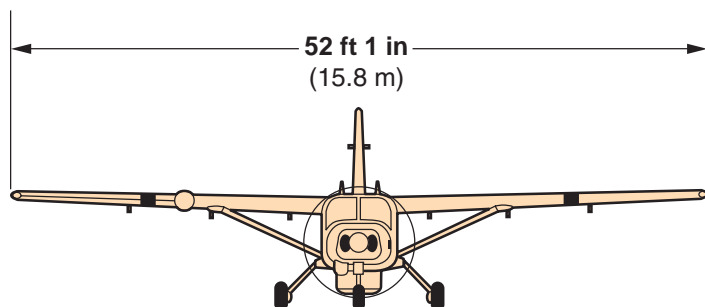
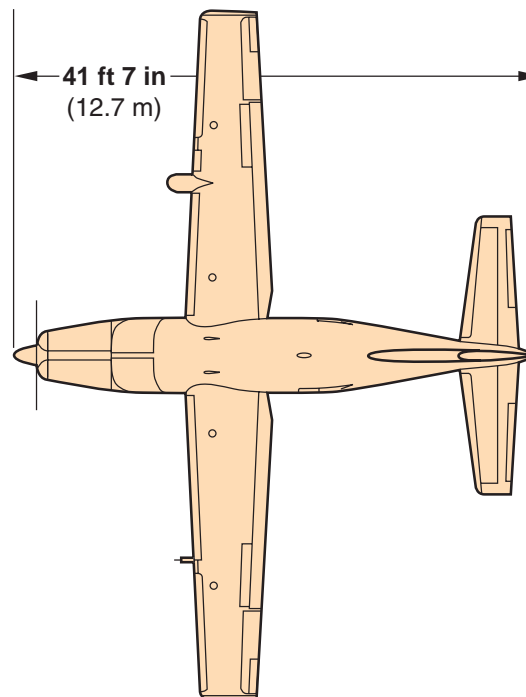
### Cross section



# Cessna 208A\* Cargomaster/208B Super Cargomaster

## General Arrangement

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\* Cessna 208A Cargomaster: Length, 37 ft 7 in (11.5 m); height, 14 ft 0 in (4.3 m)



### Pratt & Whitney PT6A-114 turboprop engine

#### 208B Super Cargomaster

<b>Cargo capacity*, ft<sup>3</sup> (m<sup>3</sup>)</b>		
Main deck	<b>364</b>	(10.3)
Optional belly-mounted container (pannier)	<b>84</b>	(2.4)
Total cargo volume	<b>448</b>	(12.7)
<b>Maximum gross weight, lb (kg)</b>		
Takeoff*	<b>8,750</b>	(3,969)
Landing	<b>8,500</b>	(3,855)
Zero fuel	<b>7,360</b>	(2,747)
Structural limit payload (MZFW – OEW)	<b>3,500</b>	(1,590)
Operating empty weight including tare	<b>3,860</b>	(1,750)
Fuel capacity, U.S. gal (L)	<b>335</b>	(1,268)
<b>Design range (MZFW payload), nmi (km)</b>	<b>992</b>	(1,596)

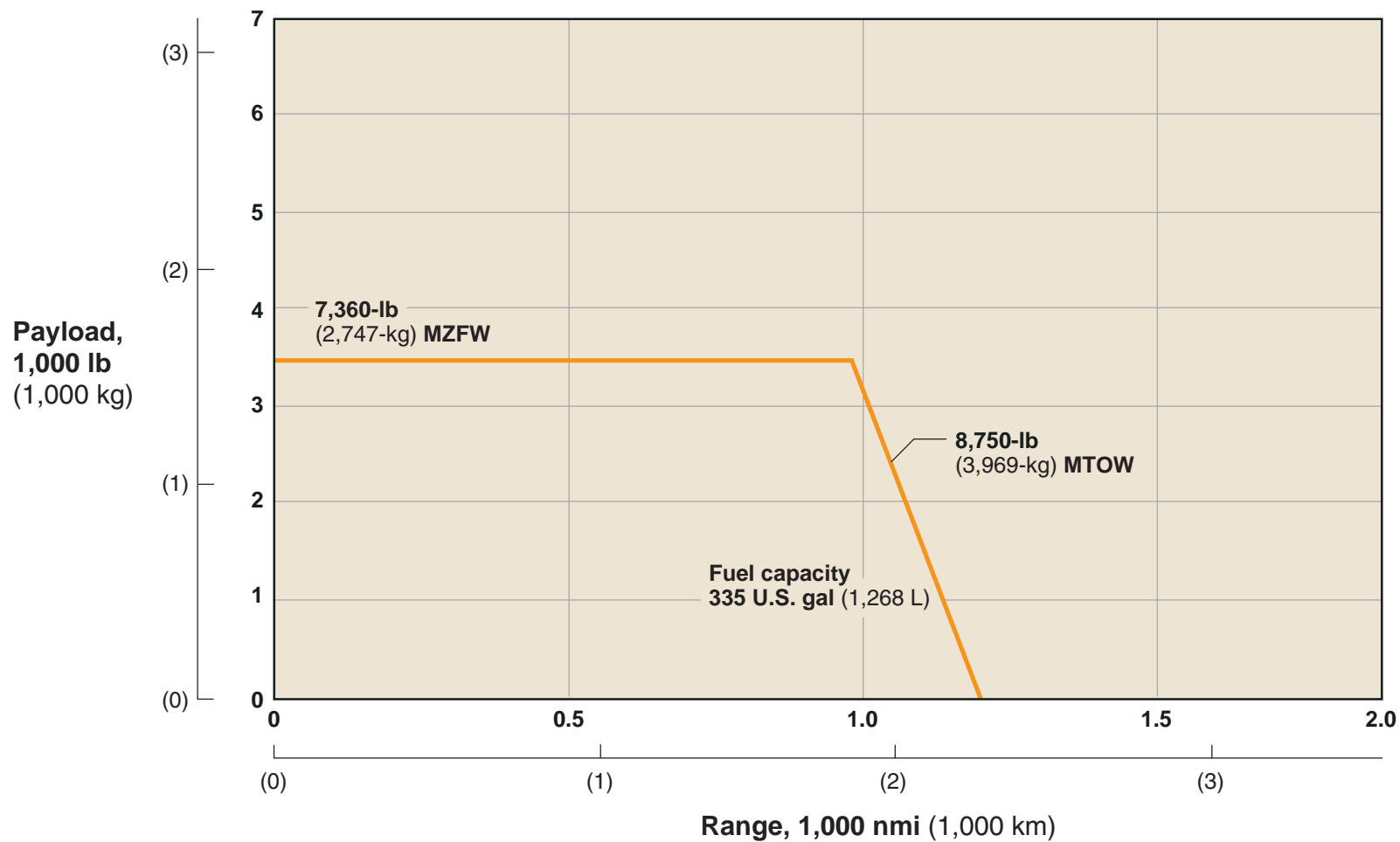
\* 208A Cargomaster (basic version): main deck volume, 293 ft<sup>3</sup> (8.3 m<sup>3</sup>); total volume, 377 ft<sup>3</sup> (10.7 m<sup>3</sup>); 8,000-lb (3,630-kg) MTOW

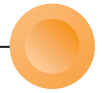
# Cessna 208A Cargomaster/208B Super Cargomaster *Payload-Range Capability*

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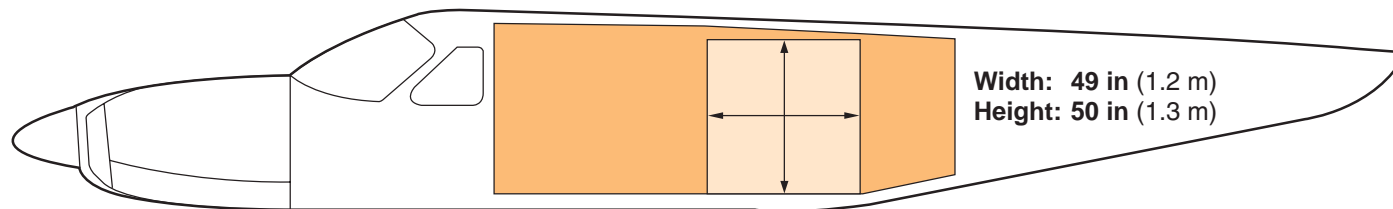


## Pratt & Whitney PT6A-114 turboprop engine





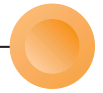
### Cargo door opening



**208A: Volume, 293 ft<sup>3</sup> (8.3 m<sup>3</sup>)**

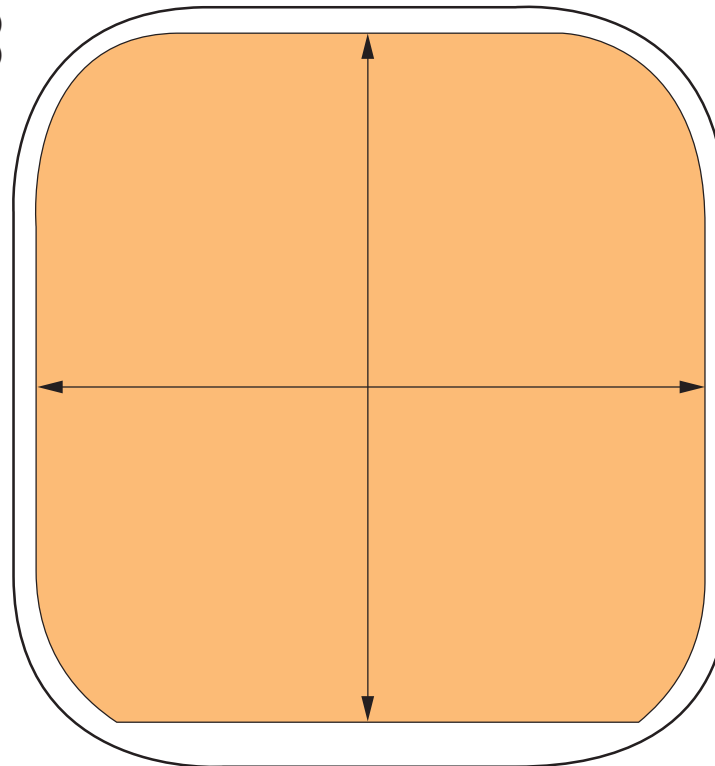
**208B: Volume, 364 ft<sup>3</sup> (10.3 m<sup>3</sup>)**

**Optional belly-mounted pannier, 84 ft<sup>3</sup> (2.4 m<sup>3</sup>)**



### Cross section

**Width: 62 in (1.6 m)**  
**Height: 51 in (1.3 m)**

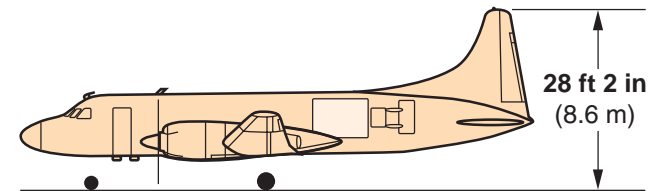
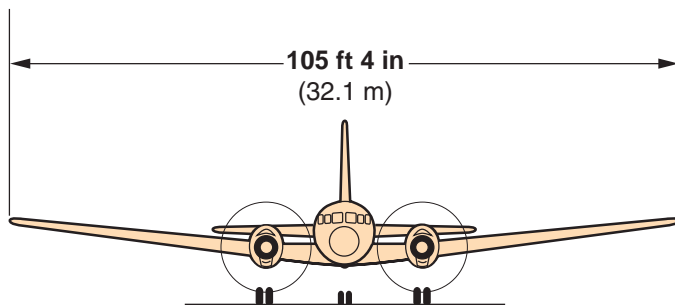
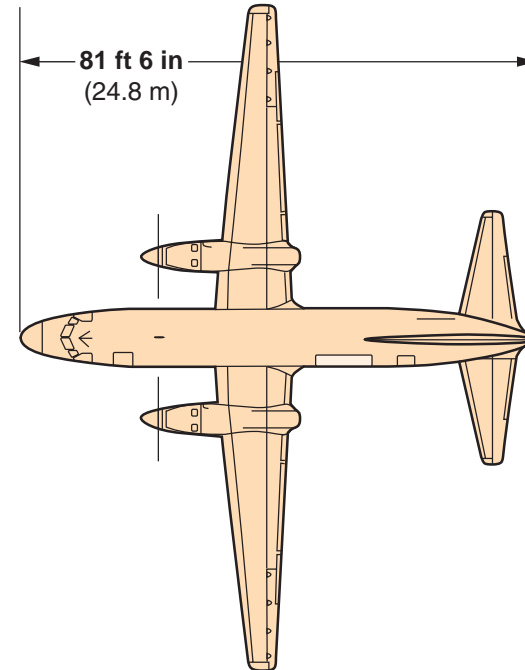
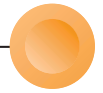




# Convair CV-580/-5800\* Freighters

## General Arrangement

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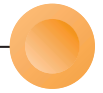
\* Convair-5800 stretched model conversion: length, 95 ft 9 in (29.2 m)



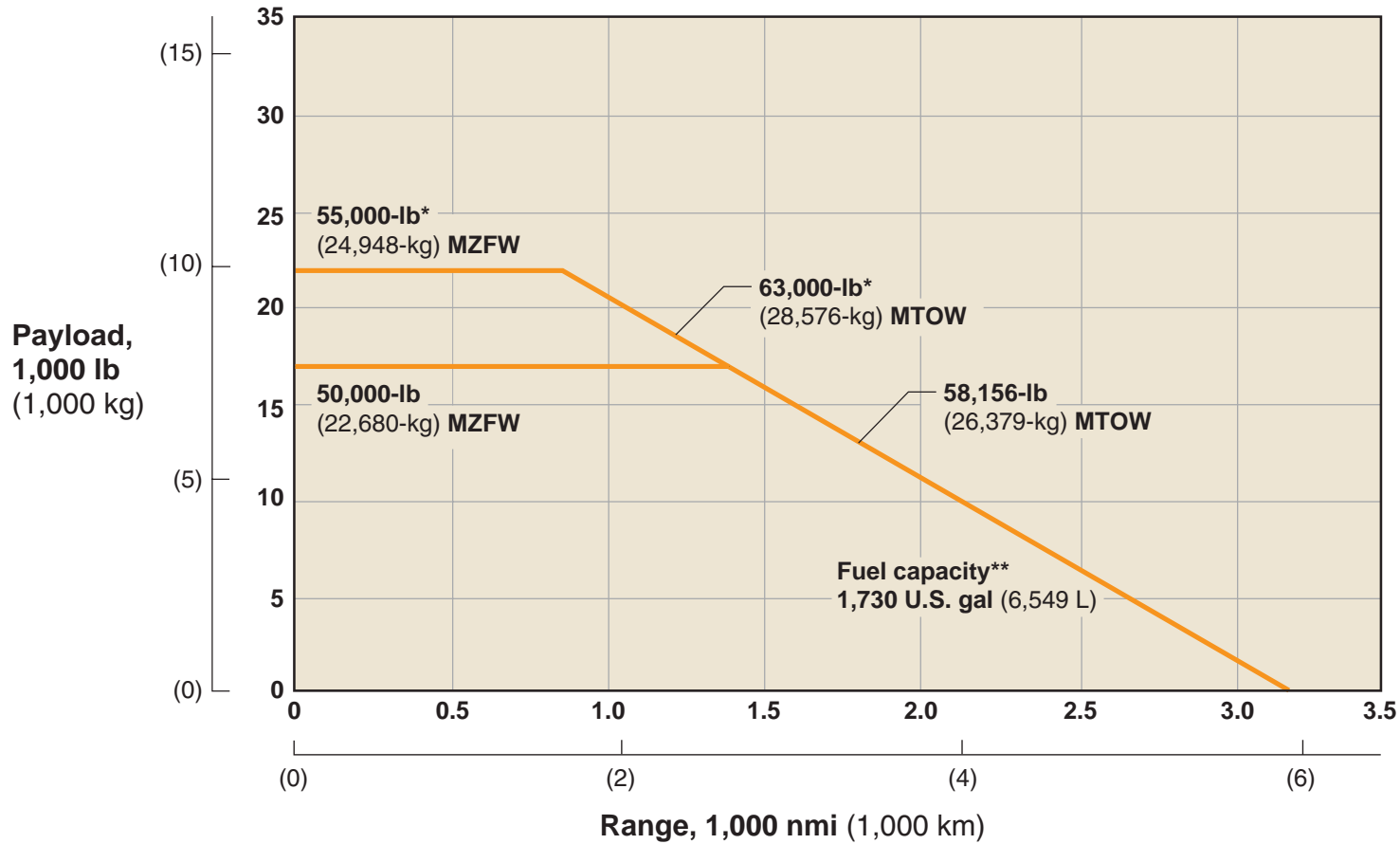
### Allison (R-R) 501-D13/-D22G\* Turboprop engines

	CV-580		CV-5800*	
<b>Cargo capacity, ft<sup>3</sup> (m<sup>3</sup>)</b>				
Main deck	<b>2,673</b>	(75.7)	<b>3,378</b>	(95.7)
Lower hold	<b>N/A</b>		<b>N/A</b>	
Total cargo volume	<b>2,673</b>	(75.7)	<b>3,378</b>	(95.7)
<b>Maximum gross weight, lb (kg)</b>				
Takeoff	<b>58,156</b>	(26,379)	<b>63,000</b>	(28,576)
Landing	<b>53,000</b>	(24,040)	<b>58,000</b>	(26,308)
Zero fuel	<b>50,000</b>	(22,680)	<b>55,000</b>	(24,948)
Structural limit payload (MZFW – OEW)	<b>16,000</b>	(7,257)	<b>21,834</b>	(9,903)
Operating empty weight including tare	<b>34,000</b>	(15,420)	<b>33,166</b>	(15,043)
Fuel capacity, U.S. gal (L)	<b>1,730</b>	(6,549)	<b>2,080</b>	(7,874)
<b>Design range (MZFW payload), nmi (km)</b>	<b>1,052</b>	(1,950)	<b>1,150</b>	(2,130)

\* Convair-5800 stretched model conversion

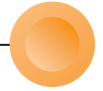


### Allison (R-R) 501-D13/-D22G\* turboprop engines

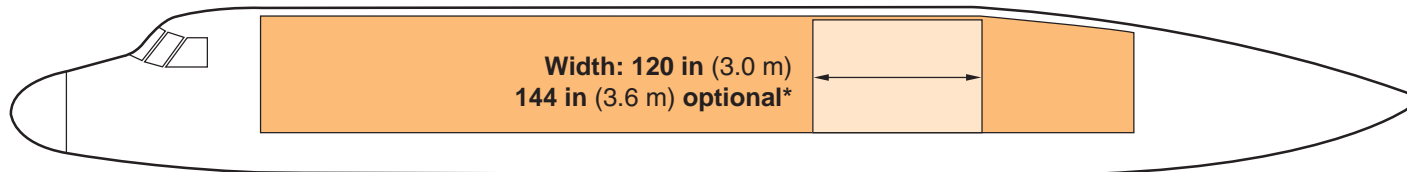


\* CV-5800 stretched model conversion

\*\* Optional fuel capacity for -5800 stretch model: 2,080 U.S. gal (7,874 L) reduces payload to 14,350 lb (6,509 kg). Maximum range: 1,475 nmi, (2,730 km)



### Cargo door opening



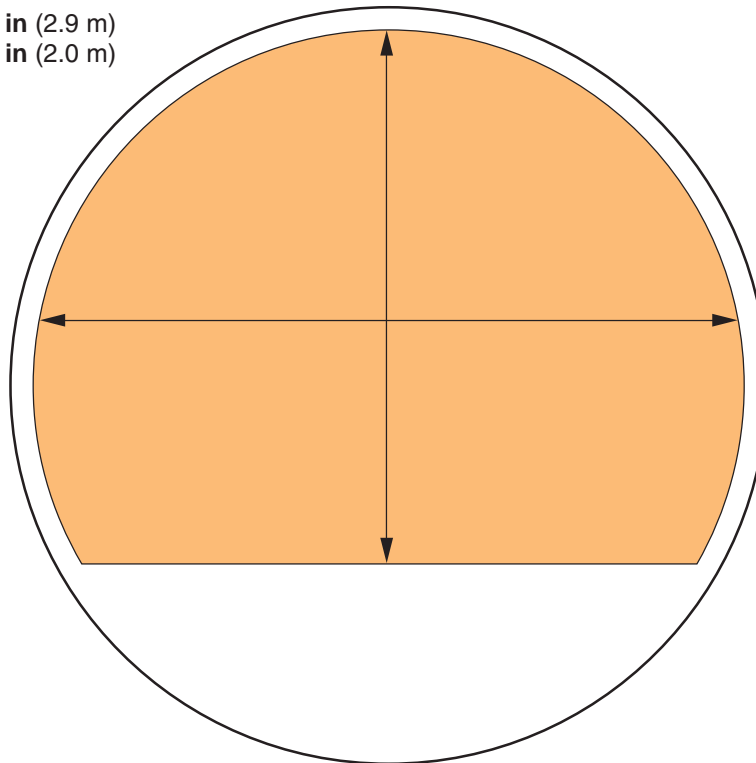
**Volume, 2,673 ft<sup>3</sup> (75.7 m<sup>3</sup>)**  
**Stretched model volume, 3,378 ft<sup>3</sup> (95.7 m<sup>3</sup>)\***

\* Convair-5800 stretched model conversion



### Cross section

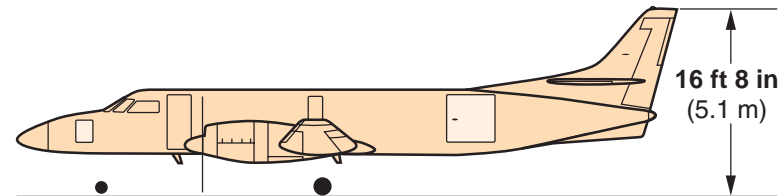
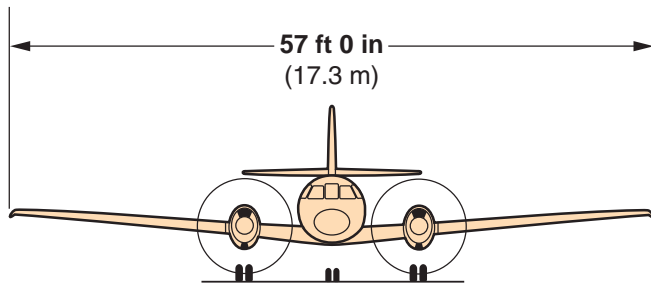
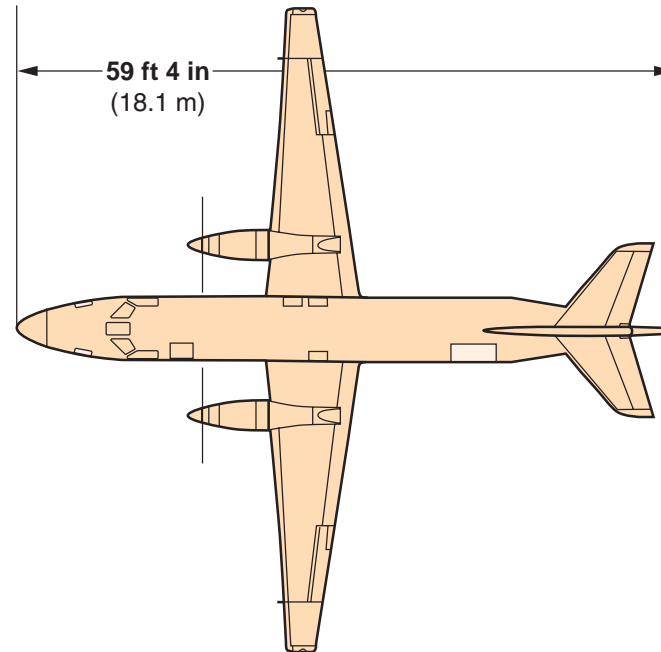
**Width: 117 in (2.9 m)**  
**Height: 79 in (2.0 m)**



\* Convair-5800 stretched model conversion

# Fairchild Dornier SA227-AC Metro III/Expediter I General Arrangement

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### Garrett TPE 331-11U-612G turboprop engines

#### SA227-AC Metro III/Expediter I

<b>Cargo capacity, ft<sup>3</sup> (m<sup>3</sup>)</b>		
Main deck	<b>634</b>	(18.0)
Nose compartment	<b>30</b>	(0.8)
Total cargo volume	<b>664</b>	(18.8)
<b>Maximum gross weight, lb (kg)</b>		
Takeoff	<b>16,000</b>	(7,257)
Landing	<b>15,500</b>	(7,031)
Zero fuel	<b>13,900</b>	(6,305)
Structural limit payload (MZFW – OEW)	<b>4,780</b>	(2,168)
Operating empty weight including tare	<b>9,120</b>	(4,137)
Fuel capacity, U.S. gal (L)	<b>648</b>	(2,452)
<b>Design range (MZFW payload), nmi (km)</b>	<b>1,063</b>	(1,970)

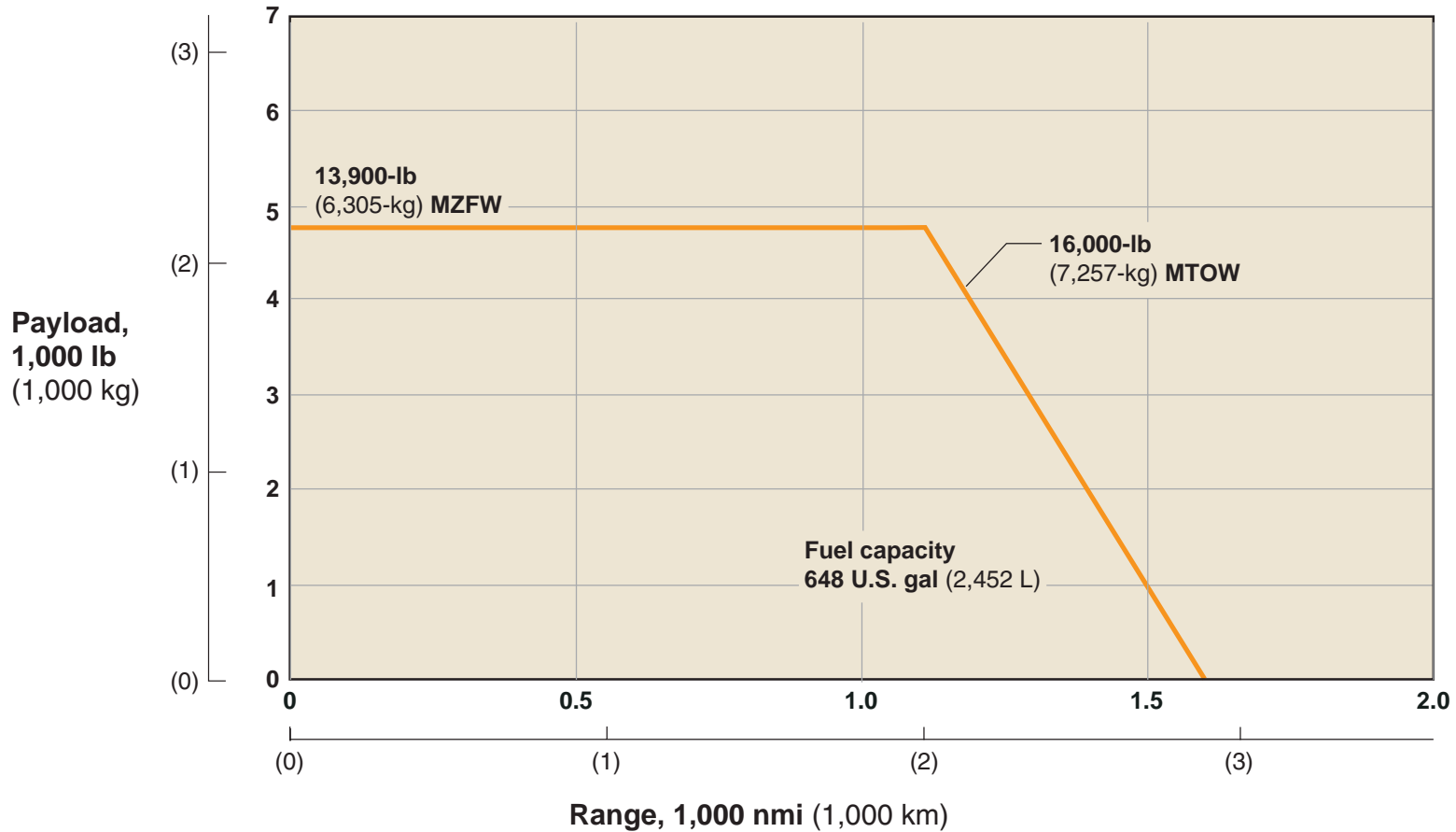
# Fairchild Dornier SA227-AC Metro III/Expediter I

## Payload-Range Capability

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### Garrett TPE 331-11U-612G turboprop engines

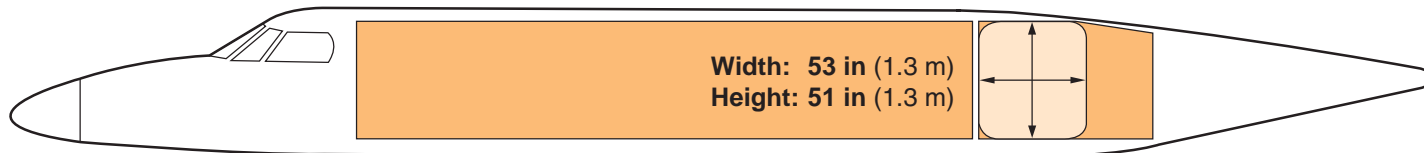




# Fairchild Dornier SA227-AC Metro III/Expediter I Cargo Configuration

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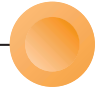
## Cargo door opening



Volume including 30 ft<sup>3</sup> (9 m<sup>3</sup>) nose compartment, 664 ft<sup>3</sup> (18.8 m<sup>3</sup>)

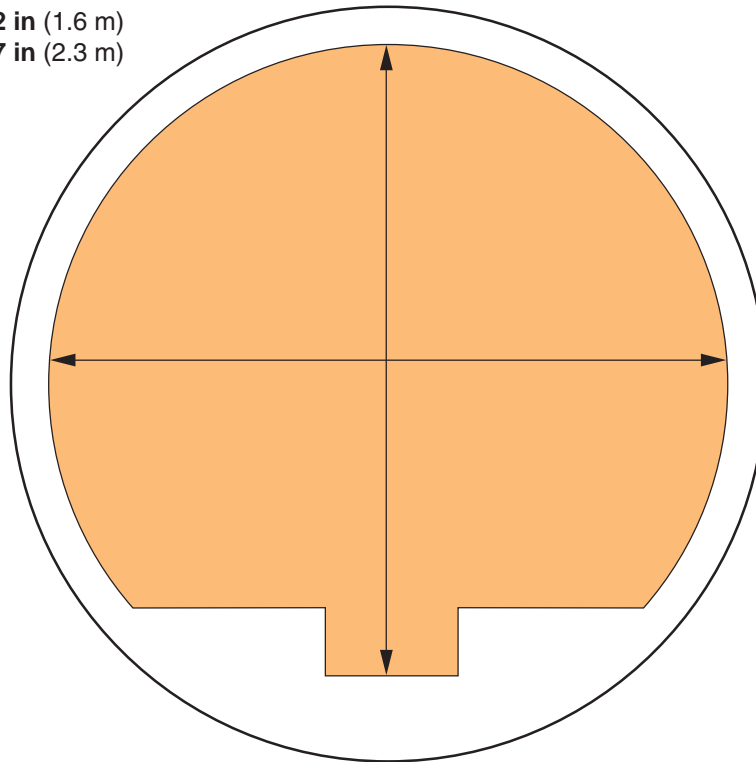
# Fairchild Dornier SA227-AC Metro III/Expediter I Cargo Configuration

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## Cross section

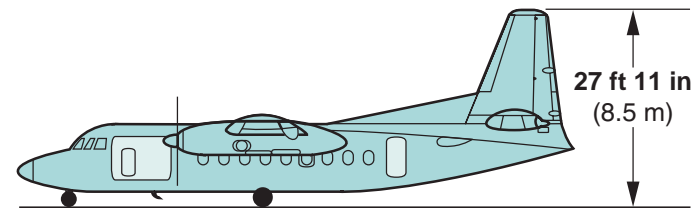
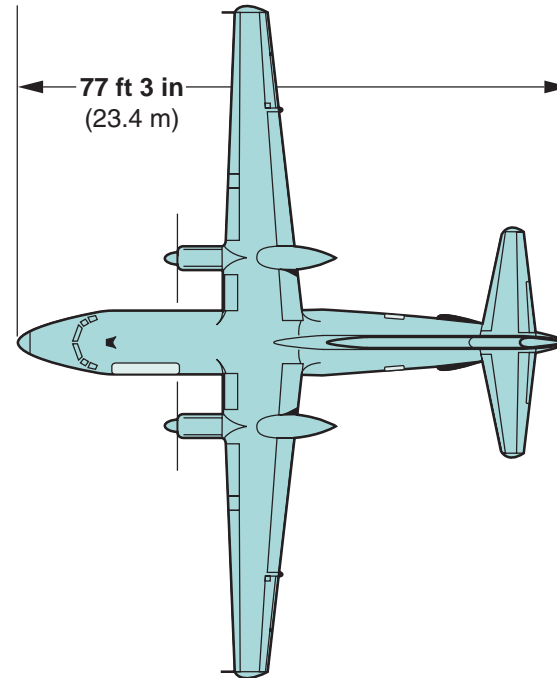
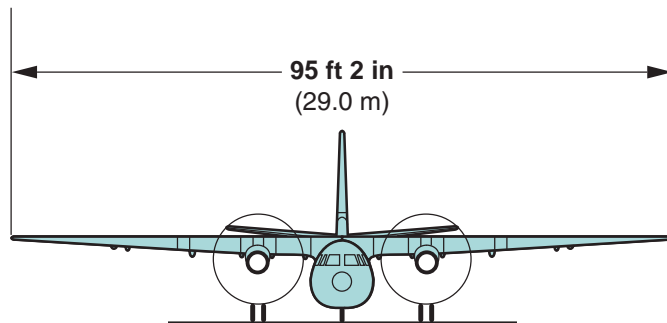
Width: 62 in (1.6 m)  
Height: 57 in (2.3 m)



# Fokker F-27-500\*/-600 Freighters

## General Arrangement

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\* Fokker F-27-500 model only: length, 82 ft 2 in (25.1 m); height, 28 ft 7 in (8.7 m)



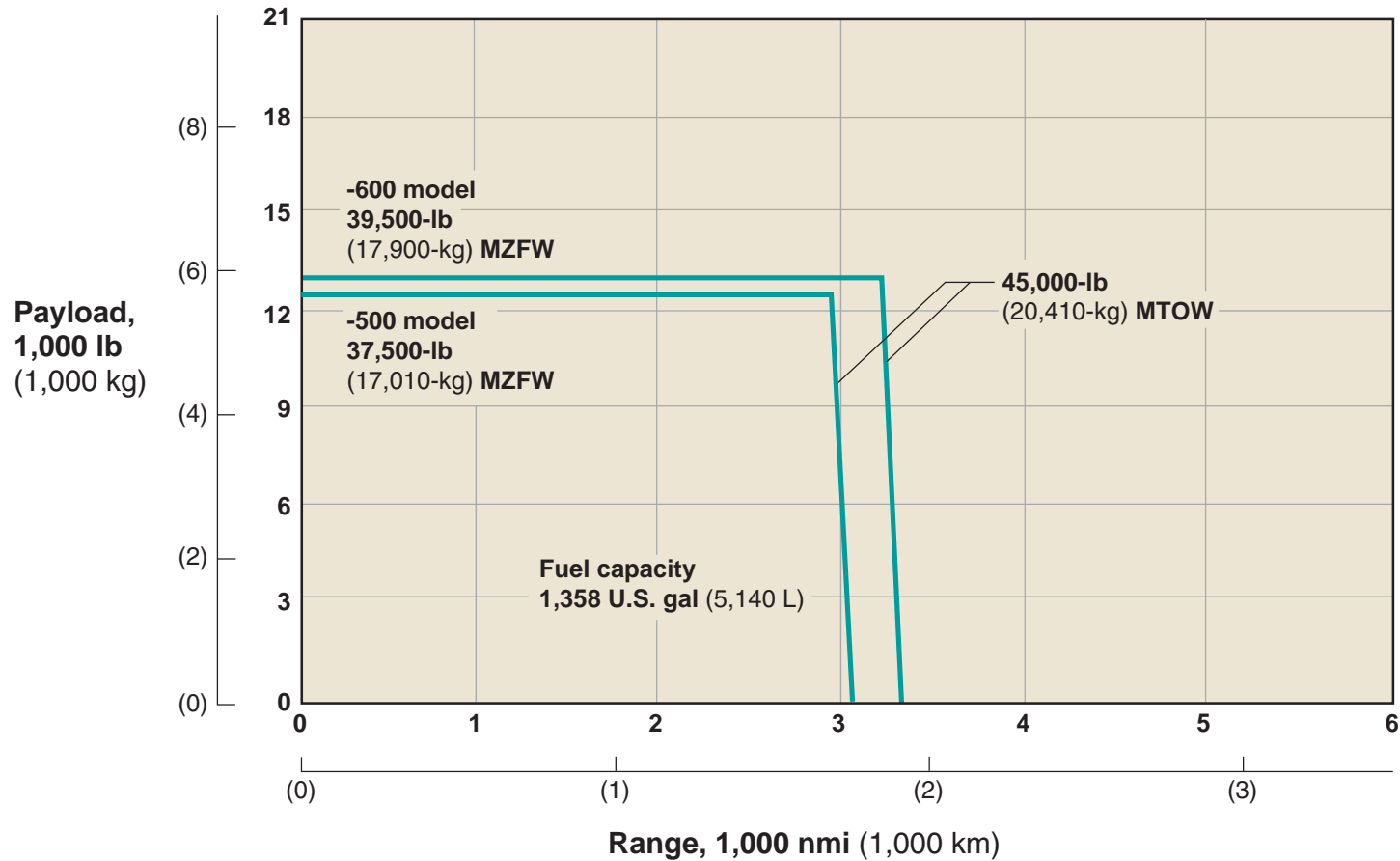
### Rolls-Royce Dart Mk 532-7R turboprop engines

	F-27-500		F-27-600	
<b>Cargo capacity, ft<sup>3</sup> (m<sup>3</sup>)</b>				
Main deck	<b>2,557</b>	(72.4)	<b>2,433</b>	(68.9)
Lower hold	<b>N/A</b>		<b>N/A</b>	
Total cargo volume	<b>2,557</b>	(72.4)	<b>2,433</b>	(68.9)
<b>Maximum gross weight, lb (kg)</b>				
Takeoff	<b>45,000</b>	(20,410)	<b>45,000</b>	(20,410)
Landing	<b>42,000</b>	(19,050)	<b>41,000</b>	(18,600)
Zero fuel	<b>39,500</b>	(17,900)	<b>37,500</b>	(17,010)
Structural limit payload (MZFW – OEW)	<b>13,600</b>	(6,169)	<b>12,800</b>	(5,806)
Operating empty weight	<b>25,900</b>	(11,748)	<b>24,700</b>	(11,204)
Fuel capacity, U.S. gal (L)	<b>1,358</b>	(5,140)	<b>1,358</b>	(5,140)
<b>Design range (MZFW payload), nmi (km)</b>	<b>835</b>	(1,550)	<b>930</b>	(1,725)

\* Fokker F-27-500 model only



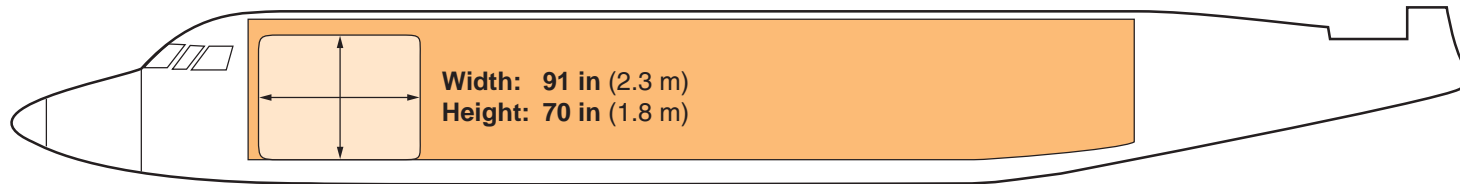
### Rolls-Royce Dart Mk 532-7R turboprop engines



\* Fokker F-27-500 model only



### Cargo door opening



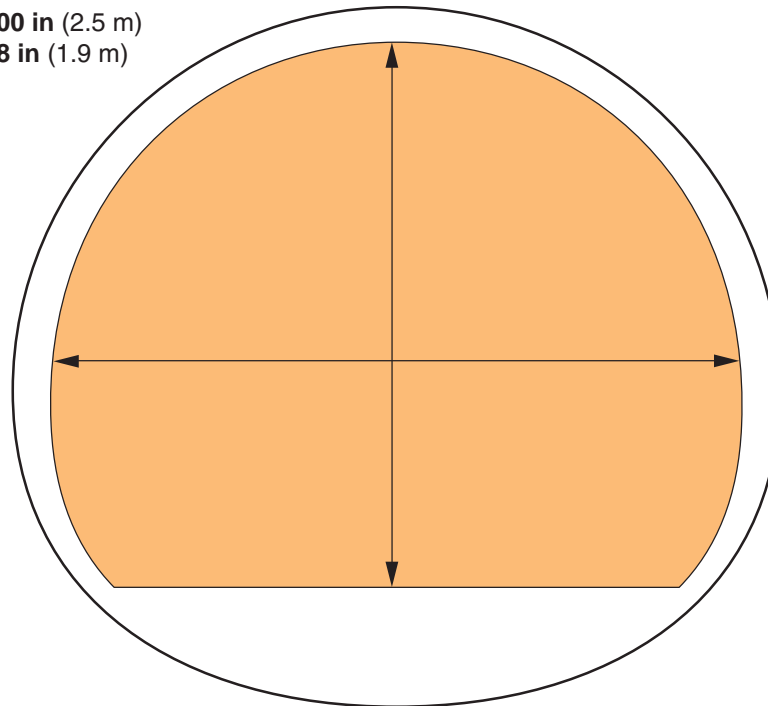
Volume, -500: 2,557 ft<sup>3</sup> (72.4 m<sup>3</sup>)  
-600: 2,433 ft<sup>3</sup> (68.9 m<sup>3</sup>)

\* Fokker F-27-500 model only



### Cross section

**Width:** 100 in (2.5 m)  
**Height:** 78 in (1.9 m)

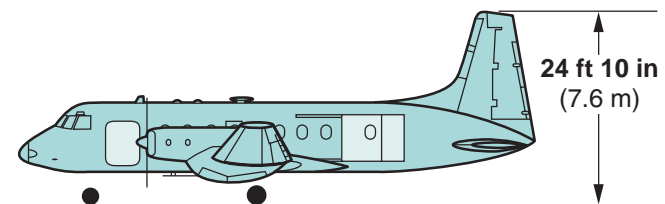
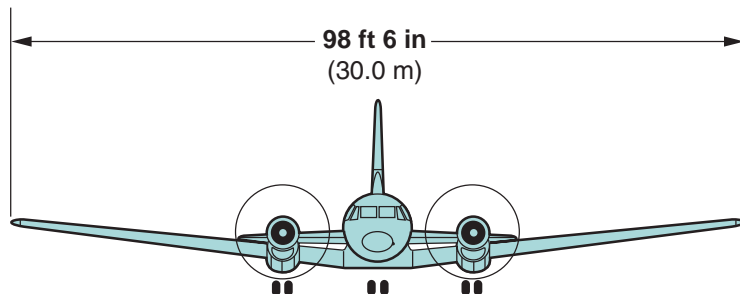
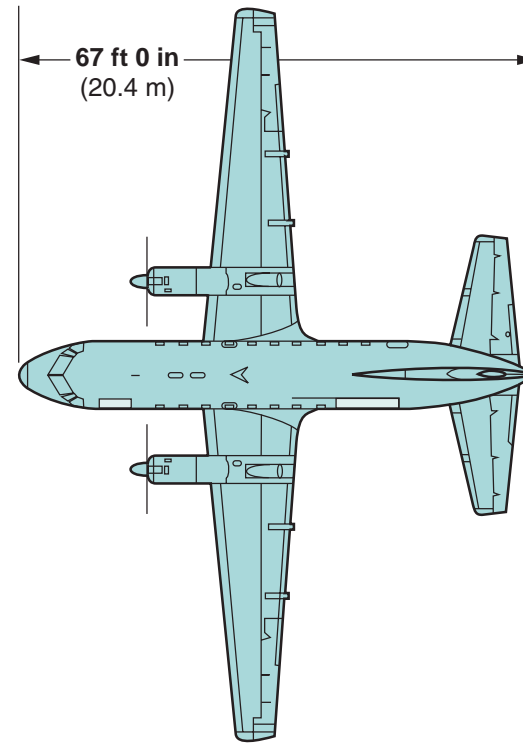


\* Fokker F-27-500 model only

# Hawker Siddeley 748 Freighter

## General Arrangement

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# Hawker Siddeley 748 Freighter

## Performance Summary

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### Rolls-Royce Dart Mk 535-2 turboprop engines

	Hawker Siddeley 748	
<b>Cargo capacity, ft<sup>3</sup> (m<sup>3</sup>)</b>		
Main deck	2,273	(64.4)
Lower hold	N/A	
Total cargo volume	2,273	(64.4)
<b>Maximum gross weight, lb (kg)</b>		
Takeoff	46,500	(21,092)
Landing	43,000	(19,500)
Zero fuel	38,500	(17,460)
Structural limit payload (MZFW – OEW)	11,500	(5,216)
Operating empty weight including tare	27,000	(12,247)
Fuel capacity, U.S. gal (L)	1,730	(6,550)
<b>Design range (MZFW payload), nmi (km)</b>	792	(1,351)

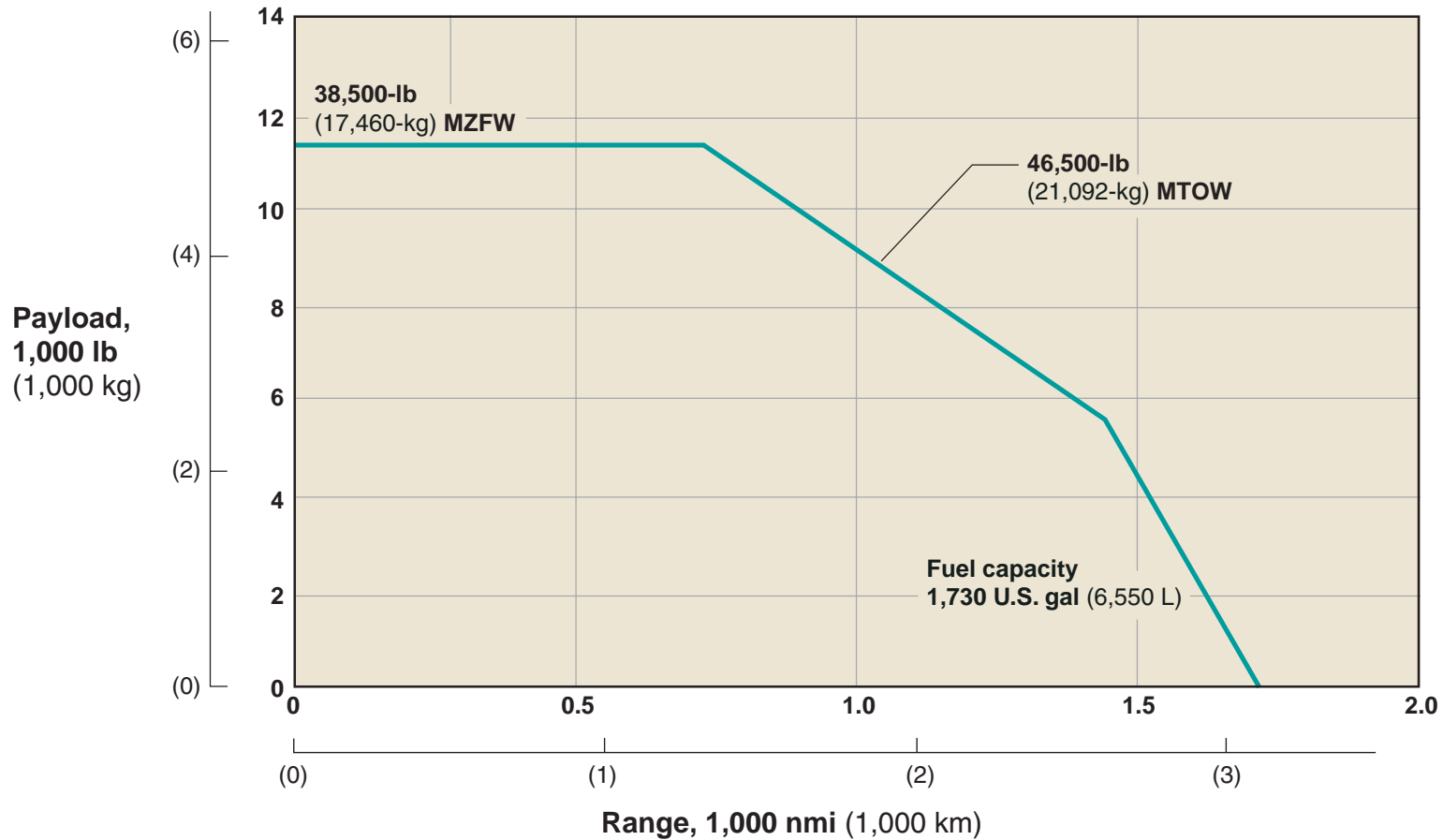
# Hawker Siddeley 748 Freighter

## Payload-Range Capability

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### Rolls-Royce Dart Mk 535-2 turboprop engines



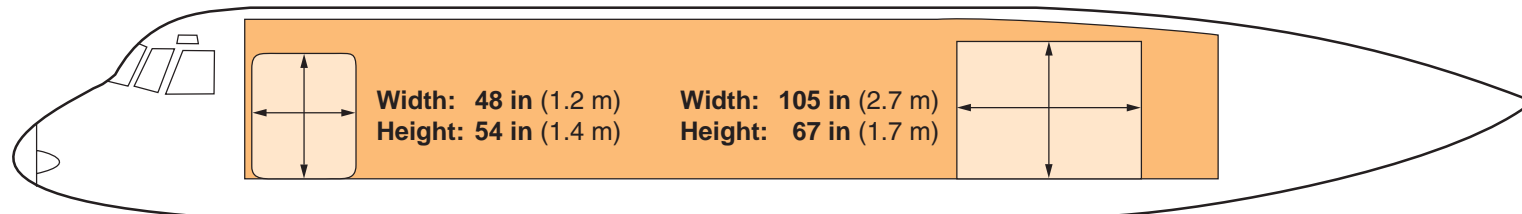
# Hawker Siddeley 748 Freighter

## Cargo Configuration

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### Cargo door opening

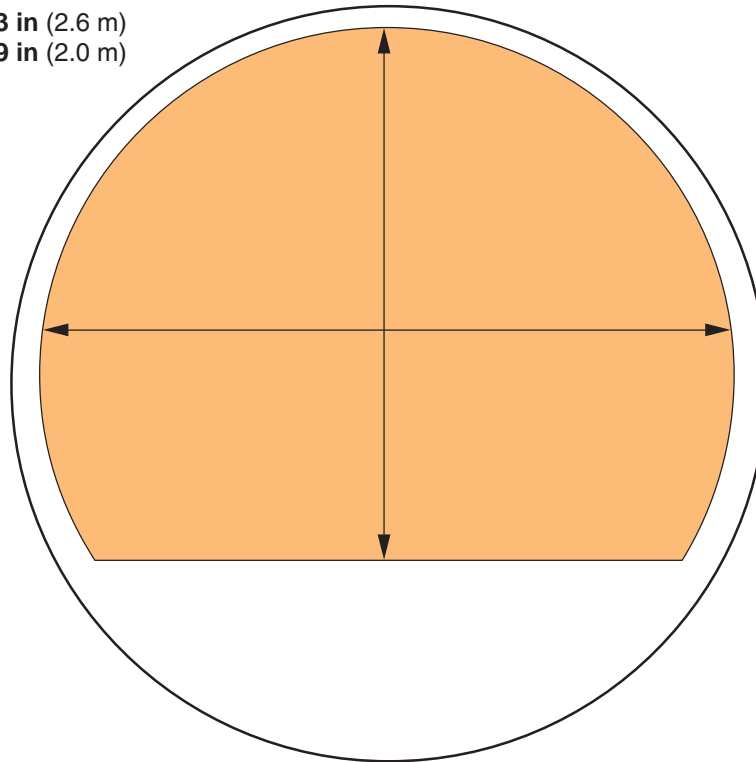


Volume, 2,273 ft<sup>3</sup> (64.4 m<sup>3</sup>)



### Cross section

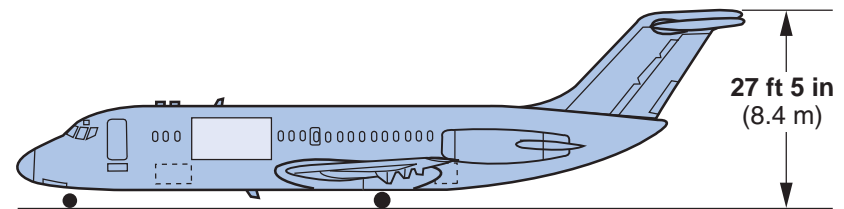
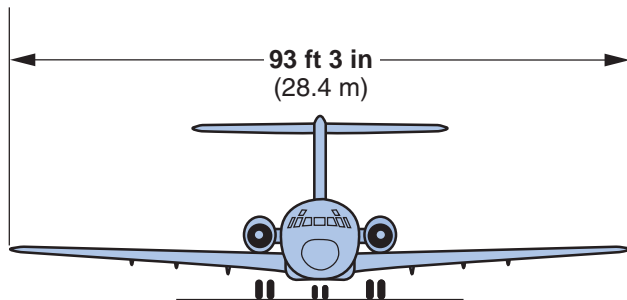
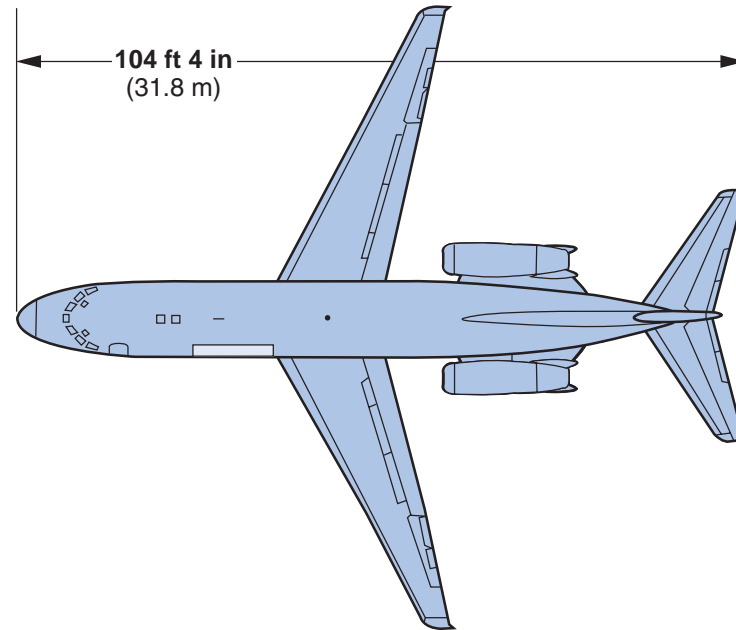
**Width:** 103 in (2.6 m)  
**Height:** 79 in (2.0 m)



# McDonnell Douglas *DC-9-10 Freighter*

## General Arrangement

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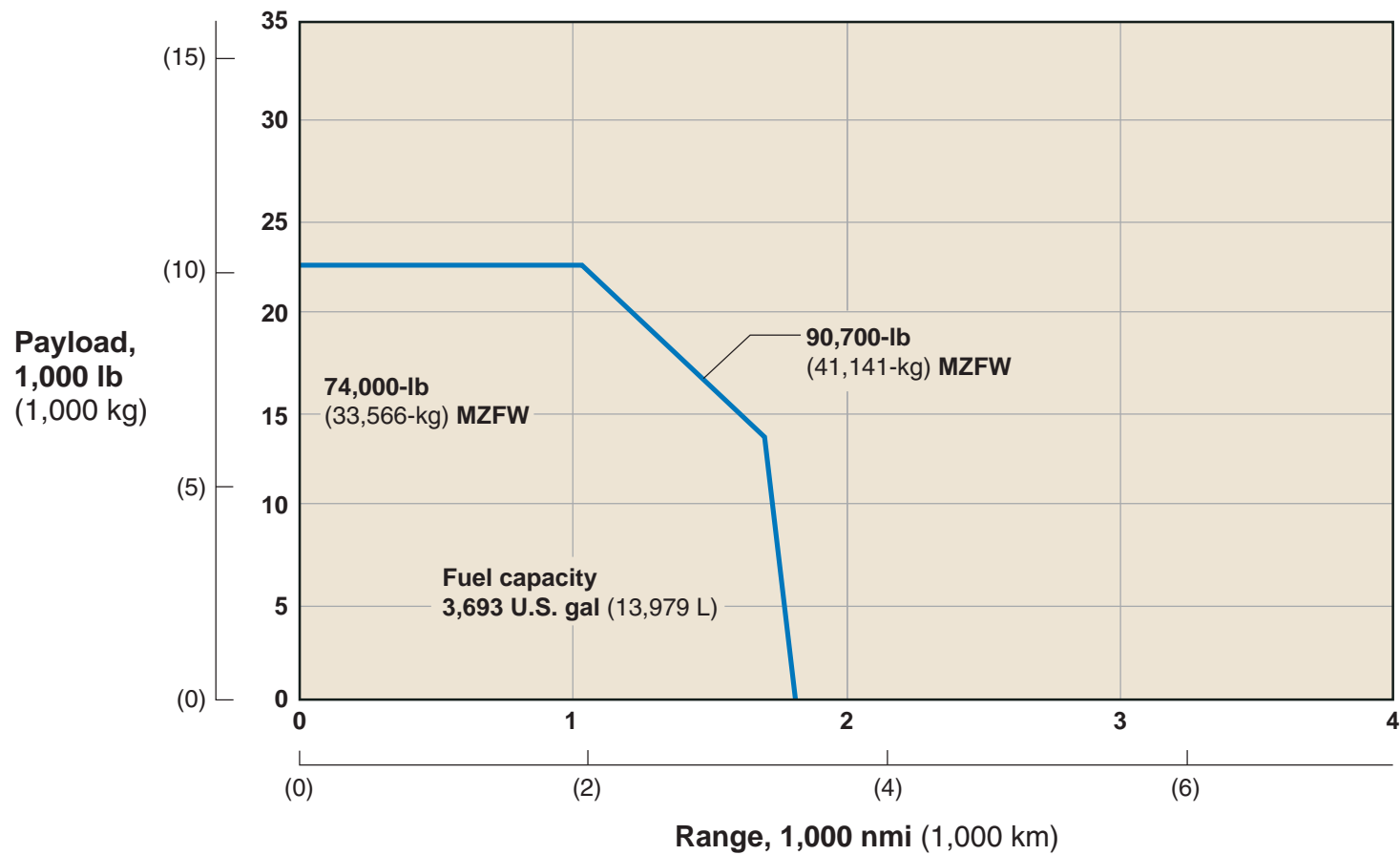
### Pratt & Whitney JT8D-7 engines

	DC-9-10F	
<b>Cargo capacity, ft<sup>3</sup> (m<sup>3</sup>)</b>		
<b>Main deck, (6) 88- x 108-in (2.2- x 2.7-m),</b>	<b>2,448</b>	<b>(69.3)</b>
<b>(2) 54- x 88-in (1.4- x 2.2-m) pallets or containers</b>		
<b>Lower hold bulk</b>	<b>600</b>	<b>(17.0)</b>
<b>Total cargo volume</b>	<b>3,048</b>	<b>(86.3)</b>
<b>Maximum gross weight, lb (kg)</b>		
<b>Takeoff</b>	<b>90,700</b>	<b>(41,141)</b>
<b>Landing</b>	<b>81,700</b>	<b>(37,059)</b>
<b>Zero fuel</b>	<b>74,000</b>	<b>(33,566)</b>
<b>Structural limit payload (MZFW – OEW)</b>	<b>22,424</b>	<b>(10,171)</b>
<b>Operating empty weight including tare*</b>	<b>51,576</b>	<b>(23,476)</b>
<b>Fuel capacity, U.S. gal (L)</b>	<b>3,693</b>	<b>(13,979)</b>
<b>Design range (MZFW payload), nmi (km)</b>	<b>1,038</b>	<b>(1,922)</b>

\* Tare weight: 1,576 lb (715 kg)

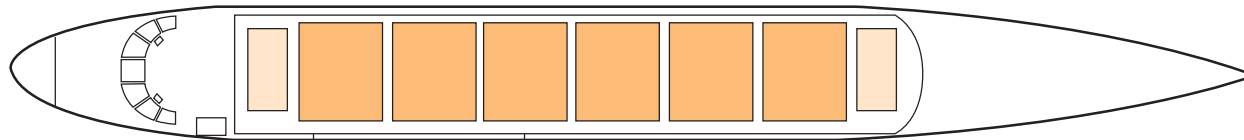


### Pratt & Whitney JT8D-7 engines





### Main deck cargo arrangement



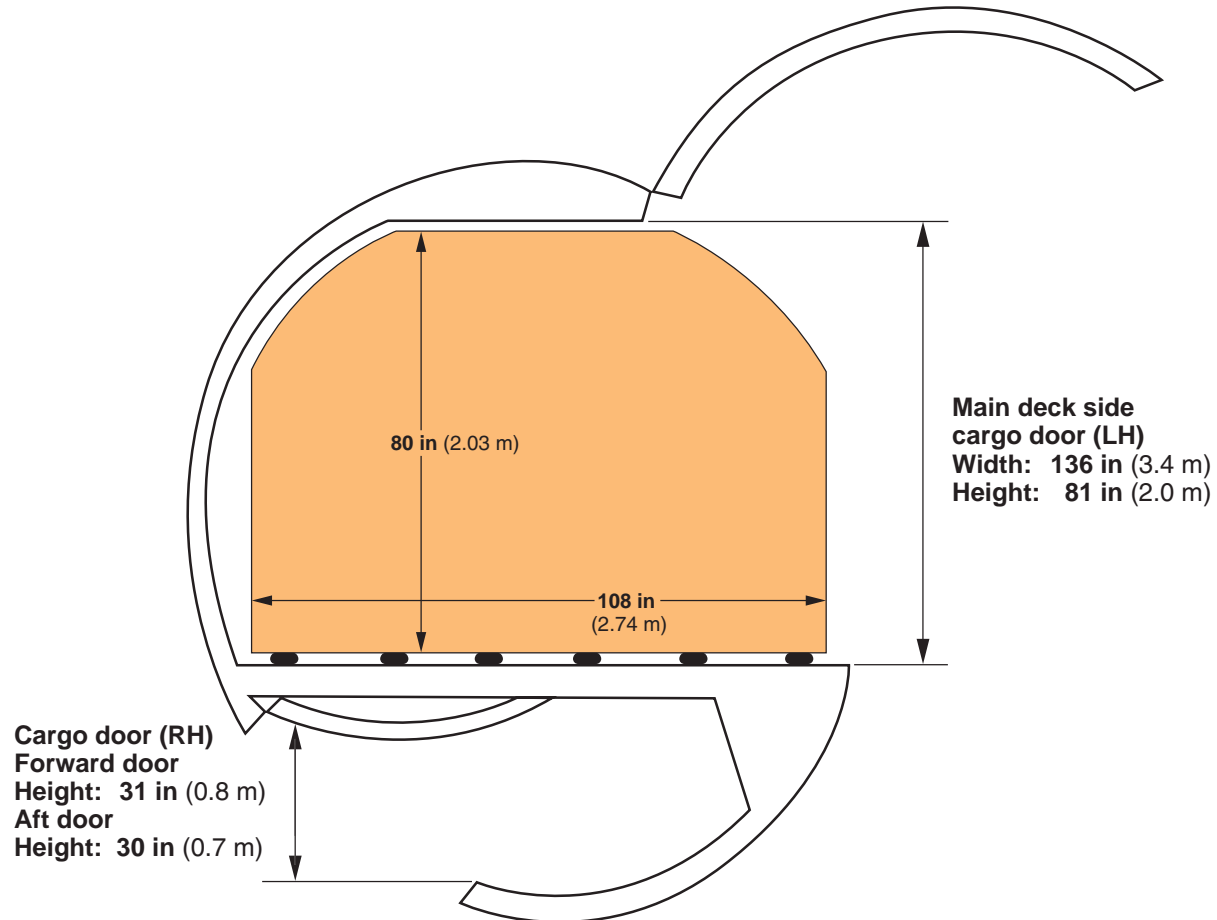
**6 containers, 88 x 108 in (2.2 x 2.7 m)**

**2 containers, 54 x 88 in (1.4 x 2.2 m)**

**Volume, 2,448 ft<sup>3</sup> (69.3 m<sup>3</sup>); bulk volume, 600 ft<sup>3</sup> (17.0 m<sup>3</sup>)**



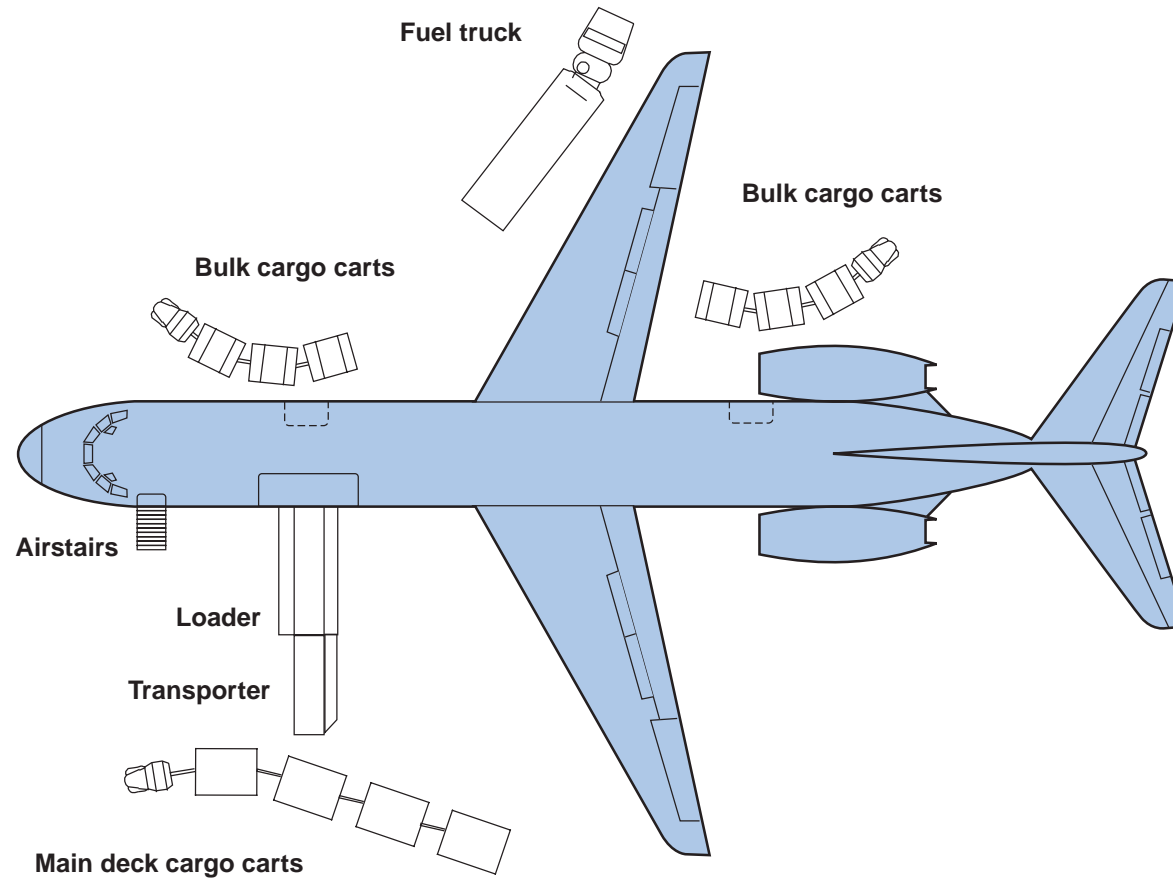
### Cross section



# McDonnell Douglas *DC-9-10F/-30CF*

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## *Turnaround Servicing Arrangement*

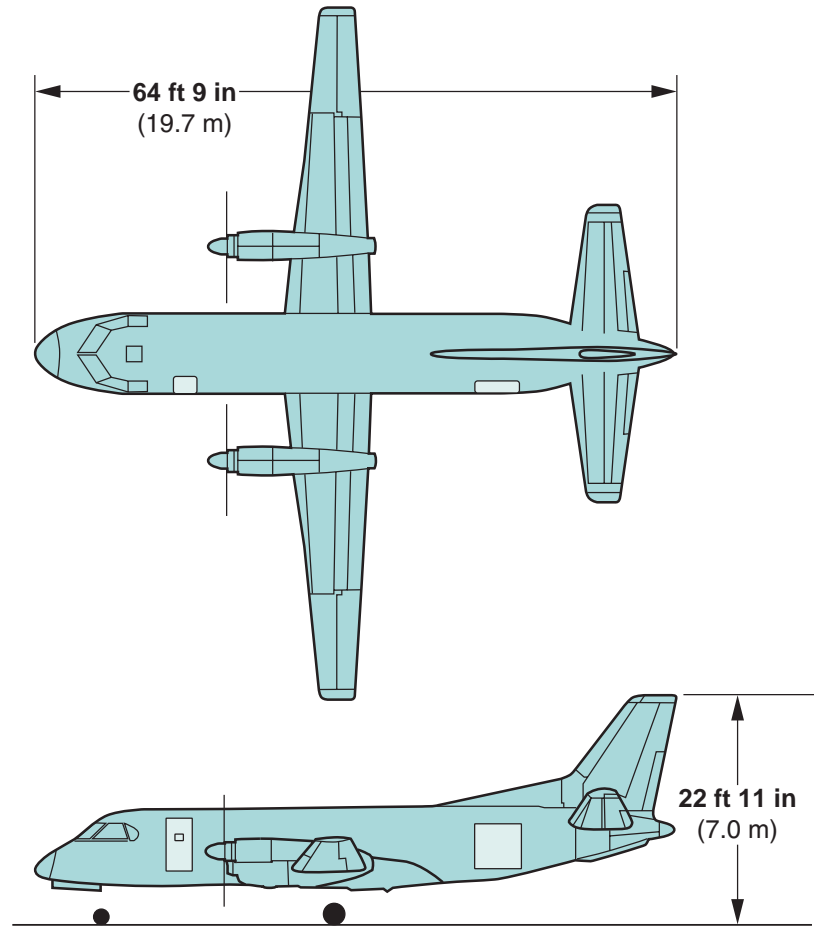
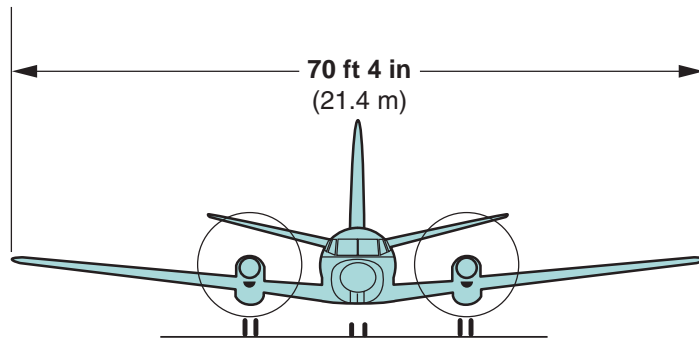


• DC-9-30CF shown

# SAAB 340 A Freighters

## General Arrangement

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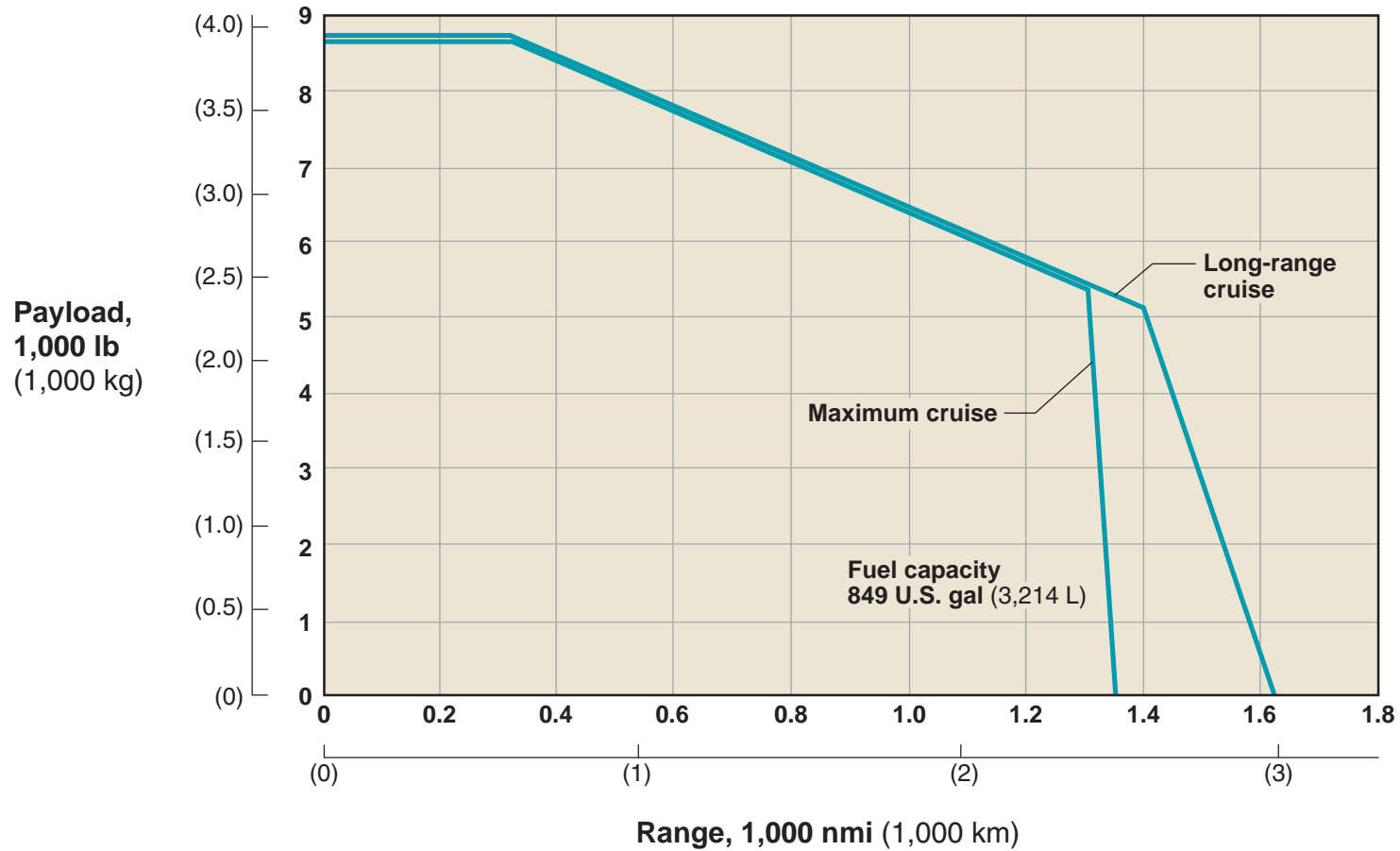


### General Electric CT7 turboprop engines

	SAAB 340 A	
<b>Cargo capacity, ft<sup>3</sup> (m<sup>3</sup>)</b>		
Main deck	1,270	(36.0)
Lower hold	N/A	
Total cargo volume	1,270	(36.0)
<b>Maximum gross weight, lb (kg)</b>		
Takeoff	28,000	(12,700)
Landing	27,200	(12,338)
Zero fuel	25,700	(11,657)
Structural limit payload (MZFW – OEW)	8,500	(3,856)
Operating empty weight	17,200	(7,802)
Fuel capacity, U.S. gal (L)	849	(3,214)
<b>Design range (MZFW payload), nmi (km)</b>	335	(620)
<b>Chapter 3 cumulative margin, EPNdB</b>	-32.5	



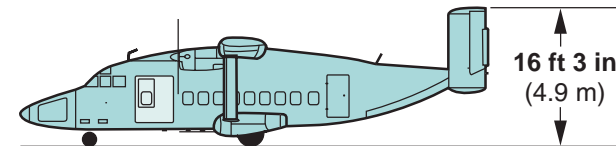
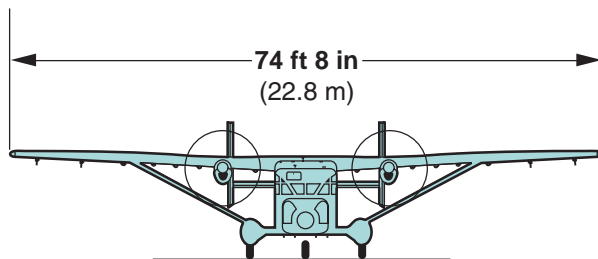
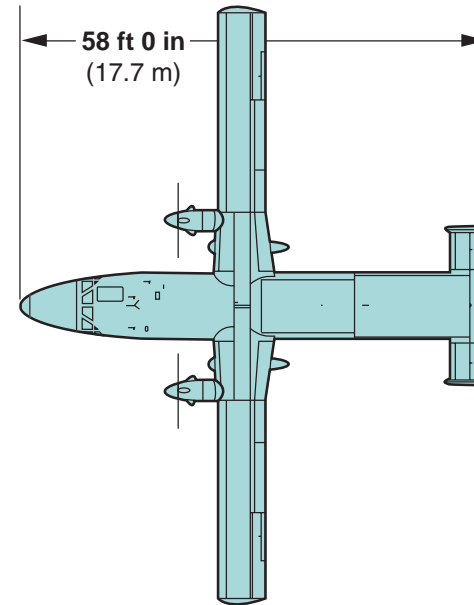
### General Electric CT7 turboprop engines



# Shorts 330-200 Sherpa Freighter

## General Arrangement

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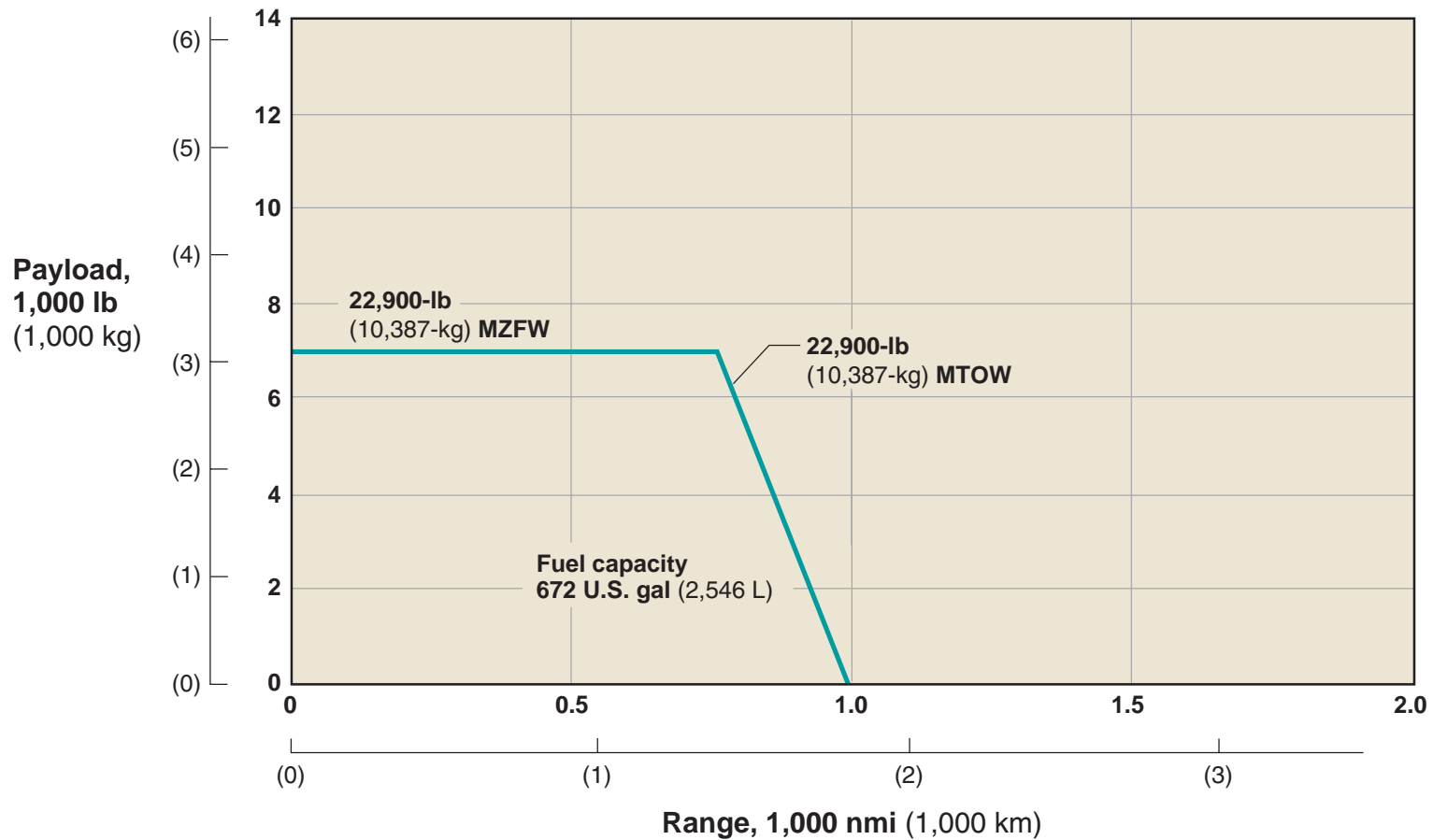


### Pratt & Whitney PTGA-45R turboprop engines

	Shorts 330-200	
<b>Cargo capacity, ft<sup>3</sup> (m<sup>3</sup>)</b>		
Main deck	1,260	(35.7)
Nose compartment	45	(1.2)
Total cargo volume	1,305	(36.9)
<b>Maximum gross weight, lb (kg)</b>		
Takeoff	22,900	(10,387)
Landing	22,600	(10,251)
Zero fuel	22,900	(10,387)
Structural limit payload (MZFW – OEW)	7,000	(3,175)
Operating empty weight	15,900	(7,212)
Fuel capacity, U.S. gal (L)	672	(2,546)
<b>Design range (MZFW payload), nmi (km)</b>	473	(876)



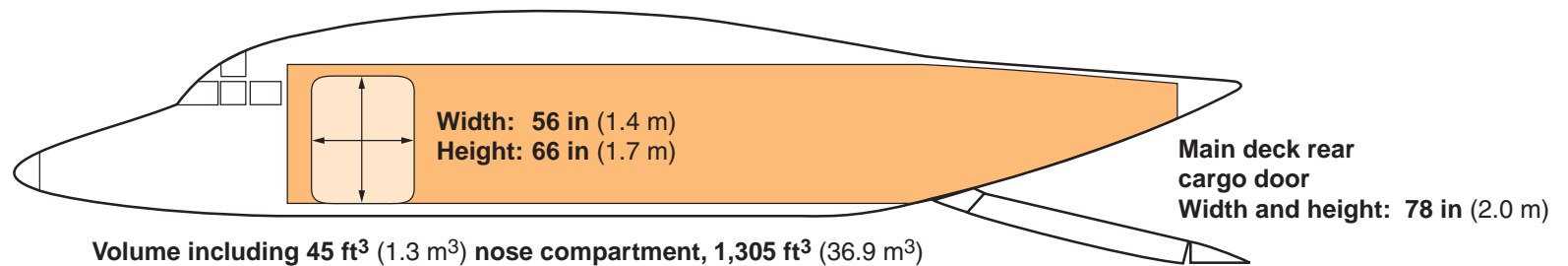
### Pratt & Whitney PT6A-45R turboprop engines







### Cargo door openings

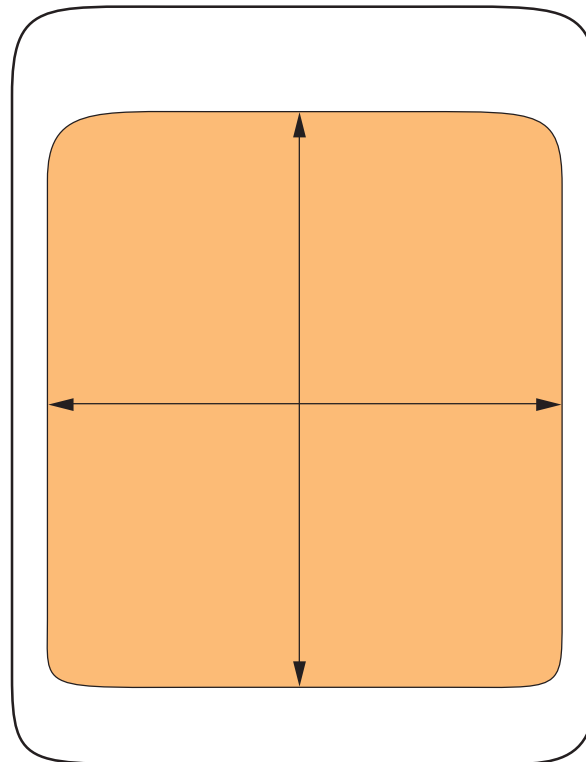


Note: Rear cargo door not available on all aircraft



### Cross section

Width and height: 78 in (2.0 m)



# Small Standard-body Aircraft

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**25,000–65,000 lb**

**Payload from 25,000 lb (11,340 kg) to 65,000 lb (29,485 kg)/12.5 to 33 tons**

Antonov AN-12	44,090 (20,000)
BAe 146-200, -300QT	26,075 (11,827)–27,535 (12,490)
Boeing 727-100C/QC/F, -200F, -200 Adv F	43,600 (19,777)–65,015 (29,491)
Boeing 737-200C/QC/F and ADV, -300SF, -700C/QC	38,175 (17,315), 43,500 (19,731), 41,420 (18,790)
Lockheed L-100, -20, -30 Hercules	47,990 (21,770)–52,805 (23,950)
Lockheed L-188F Electra	33,000 (14,970)
McDonnell Douglas DC-9-30F	35,837 (16,255)
Tupolev TU204-100C/-120C	59,524 (27,000), 55,116 (25,000)

*Boeing*

*Airbus*

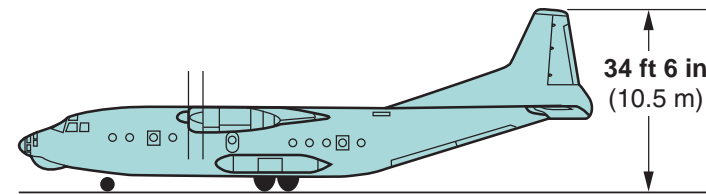
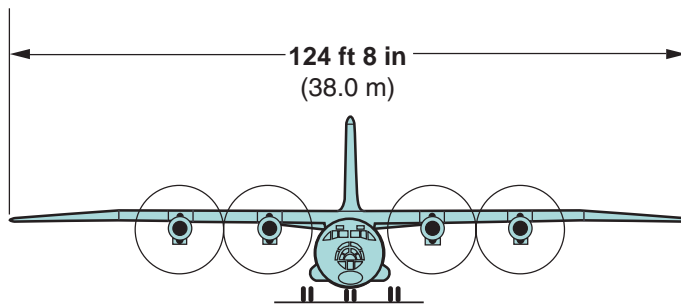
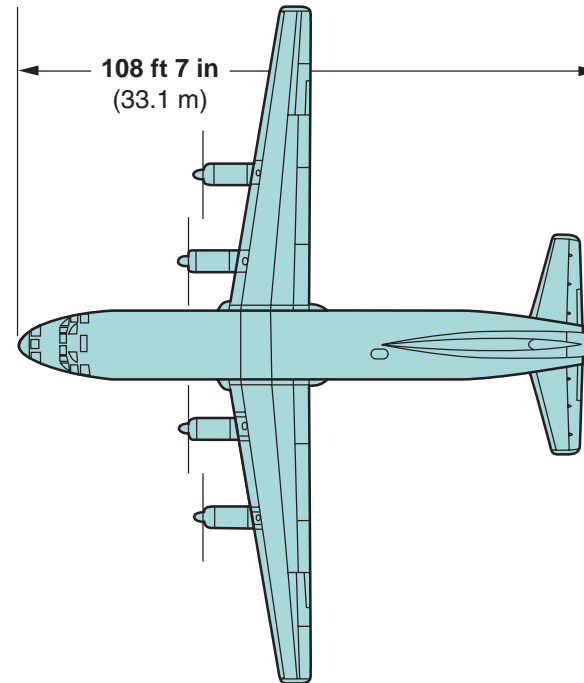
*United States*

*International*

# Antonov AN-12

## General Arrangement

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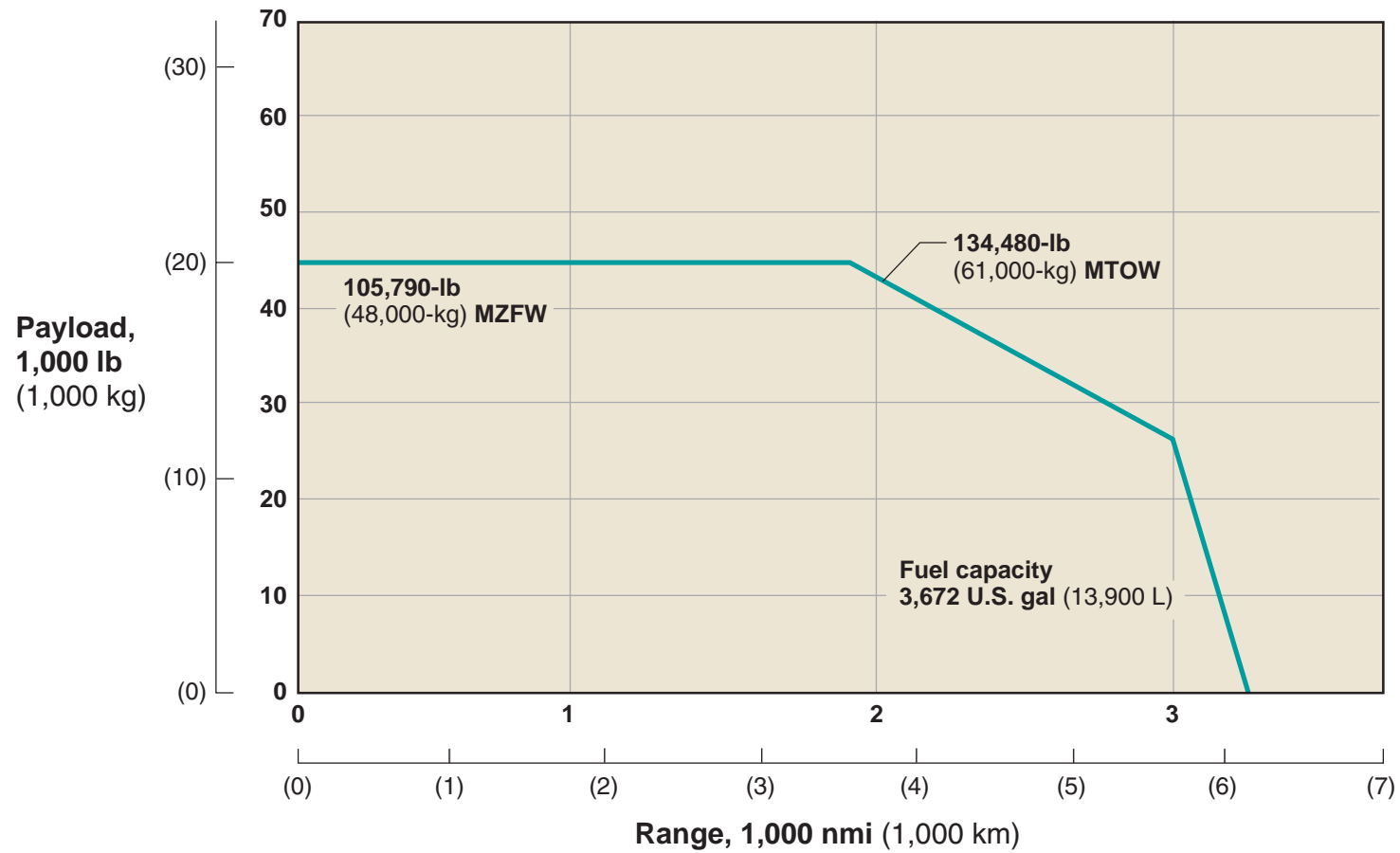


### Ivchenko AI-20K engines

	AN-12	
<b>Cargo capacity, ft<sup>3</sup> (m<sup>3</sup>)</b>		
Main deck, excluding ramp	3,432	(97.2)
Total cargo volume	3,432	(97.2)
<b>Maximum gross weight, lb (kg)</b>		
Takeoff	134,480	(61,000)
Landing	124,500	(56,472)
Zero fuel	105,790	(48,000)
Structural limit payload (MZFW – OEW)	44,090	(20,000)
Operating empty weight	61,700	(27,987)
Fuel capacity, U.S. gal (L)	3,672	(13,900)
<b>Design range (MZFW payload), nmi (km)</b>	1,942	(3,600)

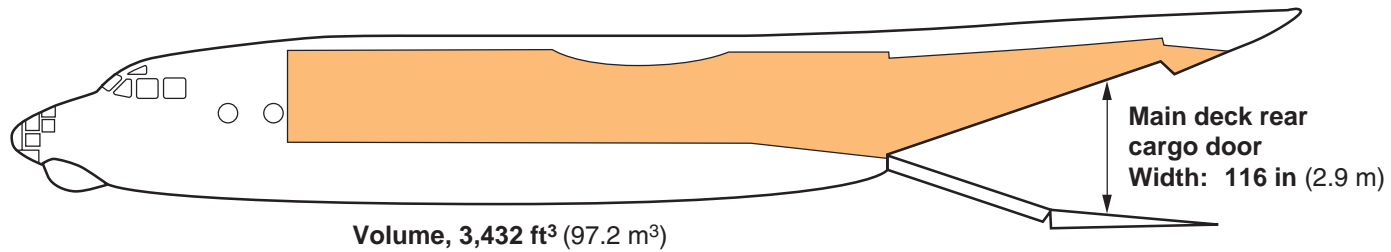


### Ivchenko AI-20K engines





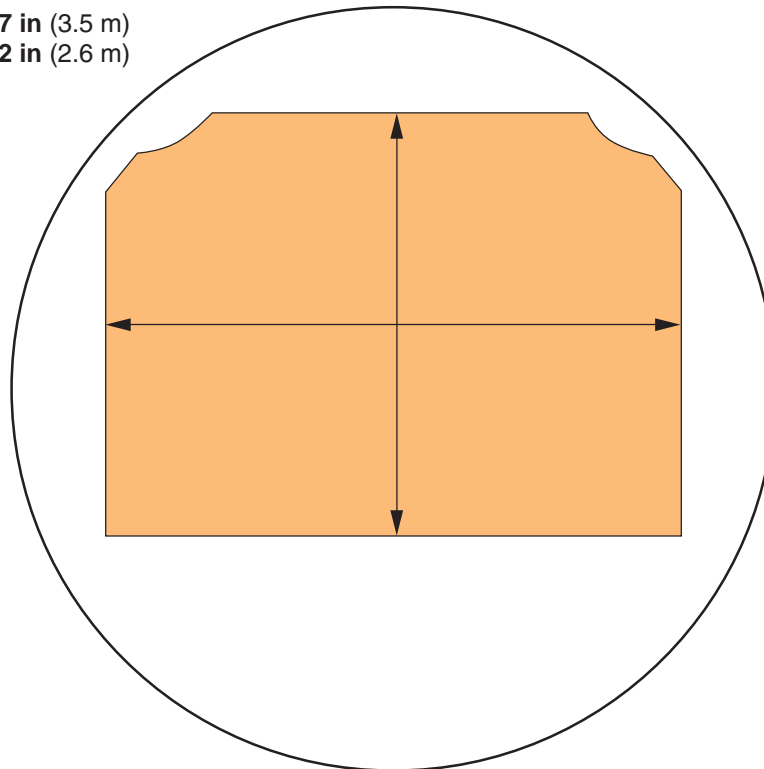
### Cargo door opening





### Cross section

**Width: 137 in (3.5 m)**  
**Height: 102 in (2.6 m)**

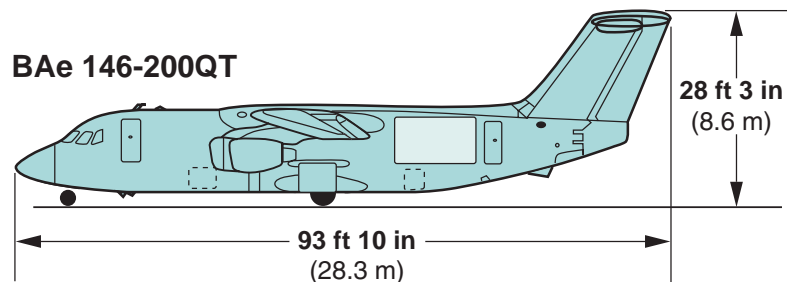
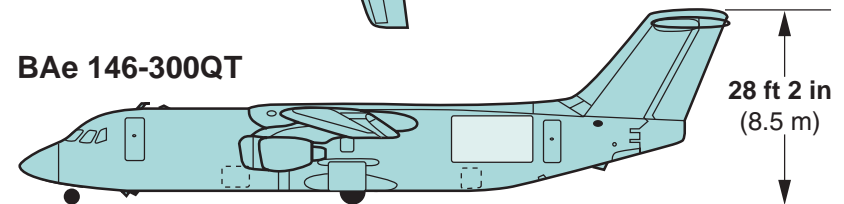
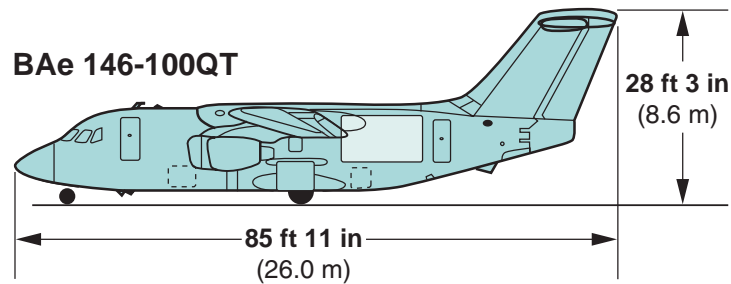
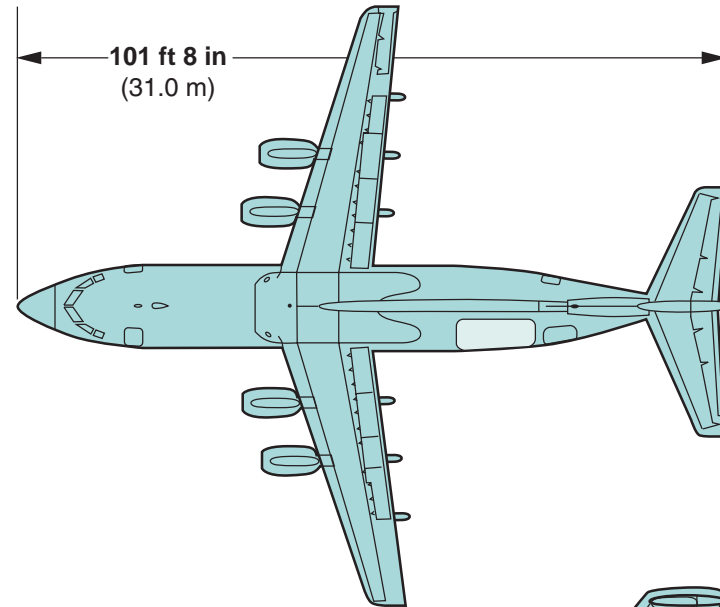
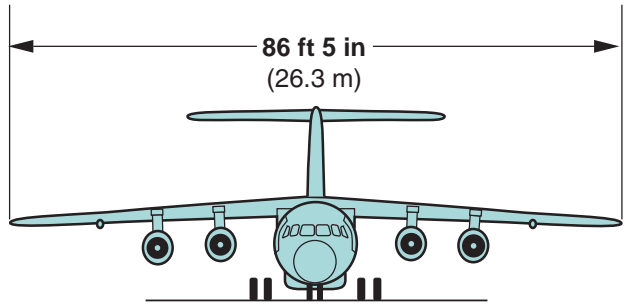




# BAe 146 Quiet Trader Freighters

## General Arrangement

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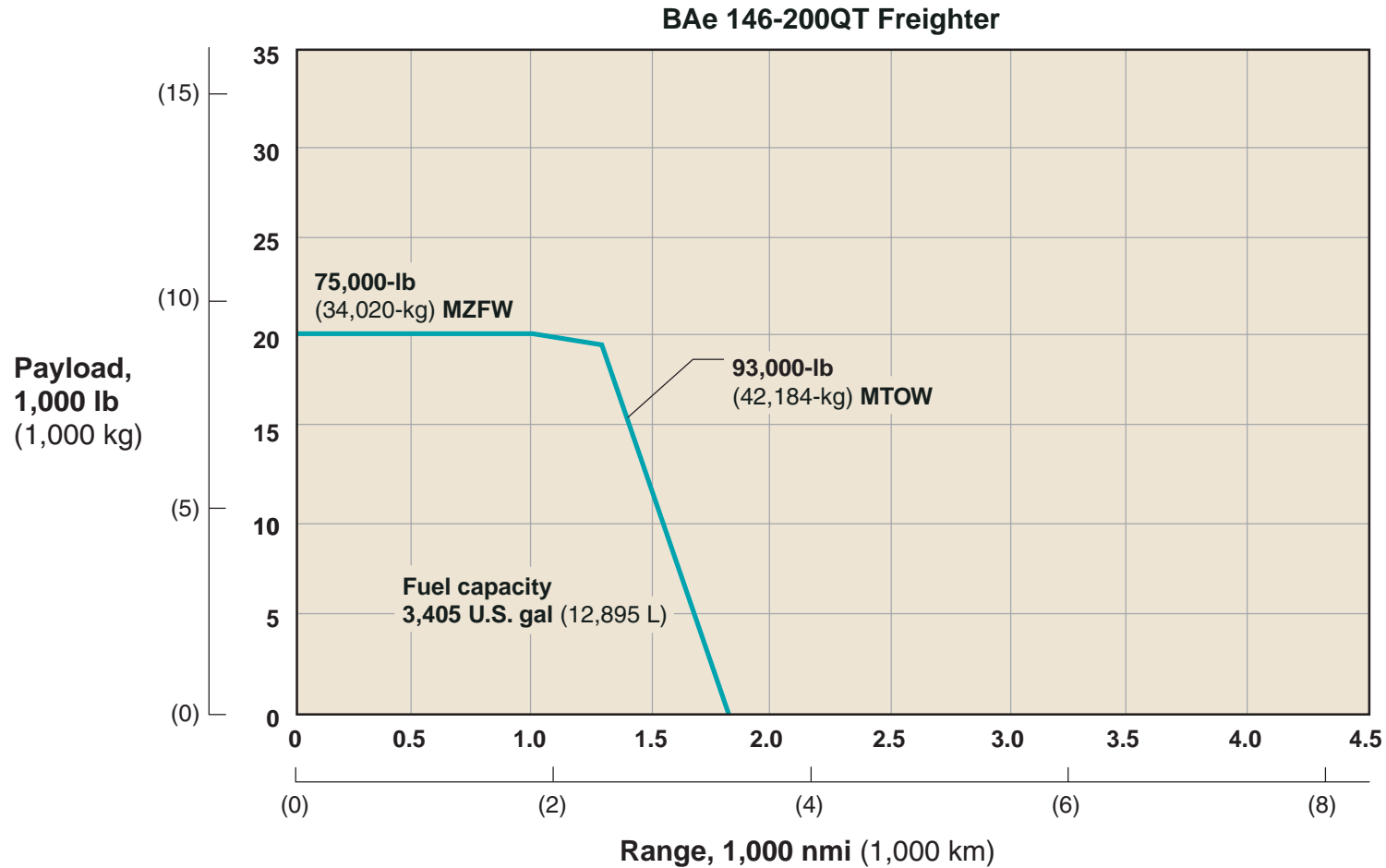
### AlliedSignal ALF502R-5 engines

	BAe 146-200QTF		BAe 146-300QTF	
<b>Cargo capacity, ft<sup>3</sup> (m<sup>3</sup>)</b>				
Main deck	<b>2,145</b>	(60.3)	<b>2,475</b>	(70.1)
Bulk volume	<b>645</b>	(18.3)	<b>645</b>	(18.3)
Total cargo volume	<b>2,790</b>	(78.6)	<b>3,120</b>	(88.4)
<b>Maximum gross weight, lb (kg)</b>				
Takeoff	<b>93,000</b>	(42,184)	<b>97,500</b>	(44,225)
Landing	<b>85,000</b>	(38,555)	<b>88,500</b>	(40,143)
Zero fuel	<b>75,000</b>	(34,020)	<b>79,000</b>	(35,830)
Structural limit payload (MZFW – OEW)	<b>26,075</b>	(11,827)	<b>27,535</b>	(12,490)
Operating empty weight including tare*	<b>50,845</b>	(23,063)	<b>52,430</b>	(23,782)
Fuel capacity, U.S. gal (L)	<b>3,405</b>	(12,895)	<b>3,405</b>	(12,895)
<b>Design range (MZFW payload), nmi (km)</b>	<b>1,150</b>	(2,131)	<b>1,040</b>	(1,927)

\* Tare weights: 1,140 lb (517 kg) for the BAe 146-200QTF and 1,315 lb (596 kg) for the BAe 146-300QTF



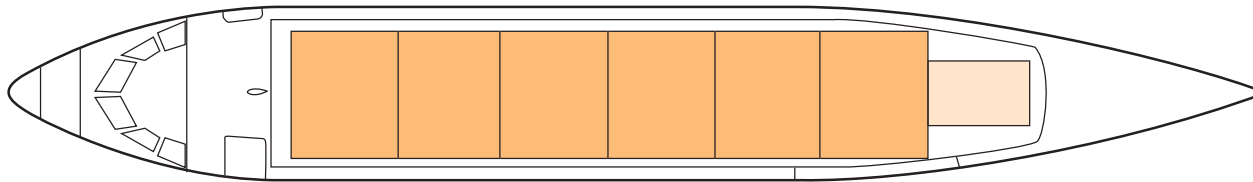
### AlliedSignal ALF502R-5 engines





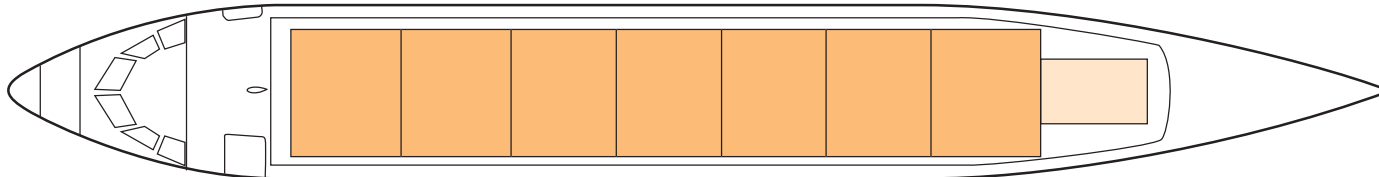
### Main deck cargo arrangements

#### BAe 146-200QT



**6 containers, 88 x 108 in (2.2 x 2.7 m)**  
**1 container, 88 x 53 in (2.2 x 1.4 m)**  
**Volume, 2,145 ft<sup>3</sup> (60.3 m<sup>3</sup>); bulk volume, 645 ft<sup>3</sup> (18.3 m<sup>3</sup>)**

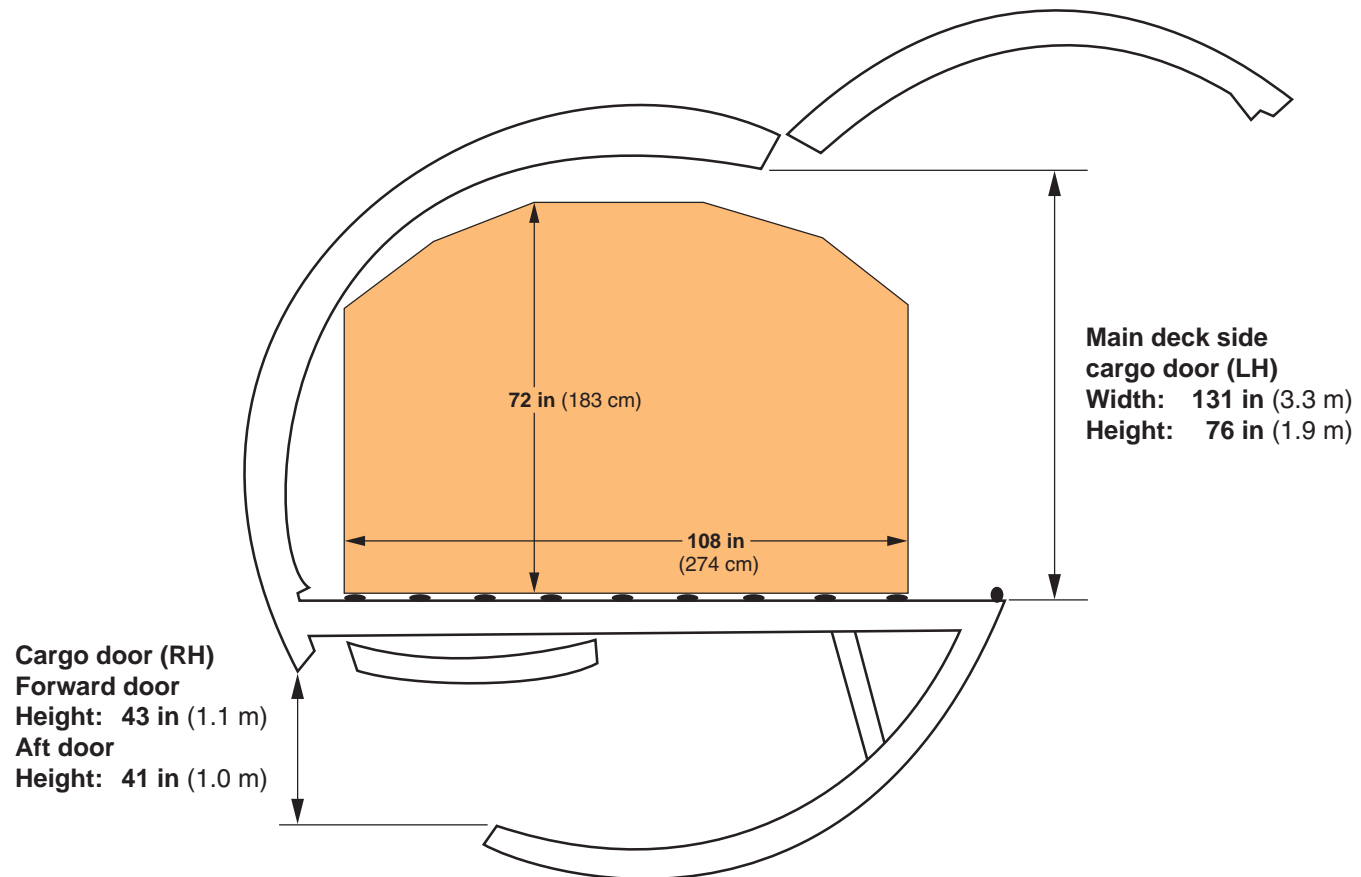
#### BAe 146-300QT



**7 containers, 88 x 108 in (2.2 x 2.7 m)**  
**1 container, 88 x 53 in (2.2 x 1.4 m)**  
**Volume, 2,475 ft<sup>3</sup> (70.1 m<sup>3</sup>); bulk volume, 645 ft<sup>3</sup> (18.3 m<sup>3</sup>)**



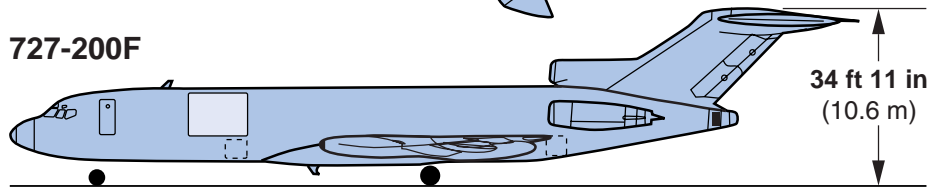
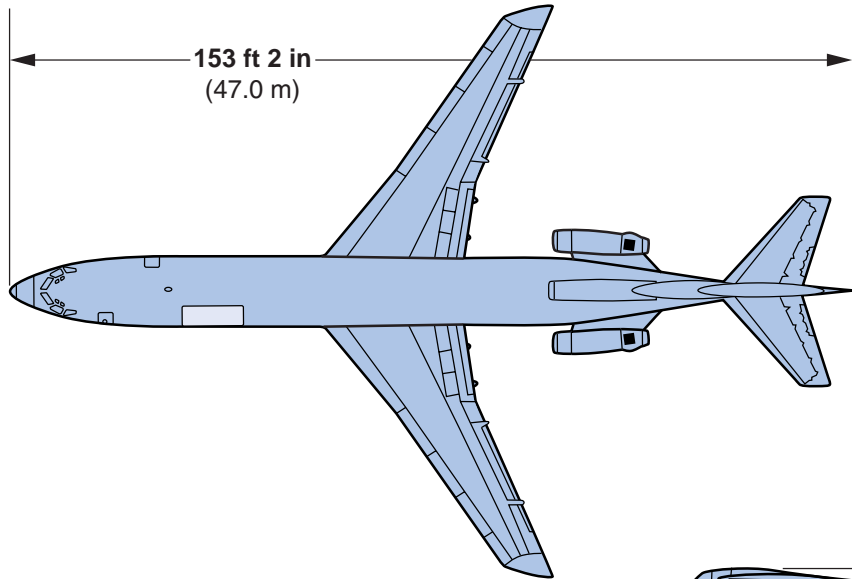
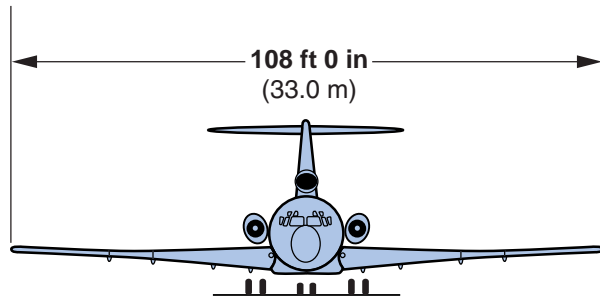
### Cross section



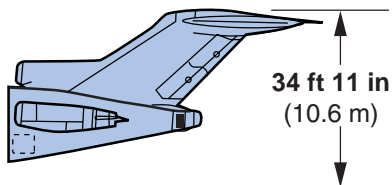
# Boeing 727-100/-200

## General Arrangement

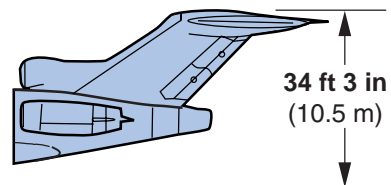
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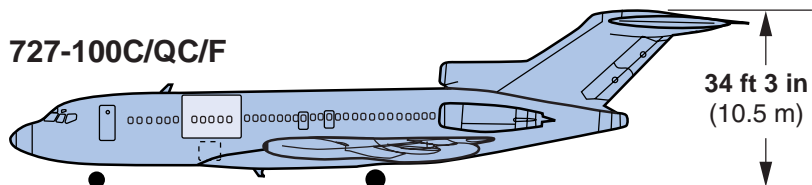
727-200F Valson



727-100QF Tay



727-100C/QC/F



TBC-CO-0073F  
1-16-2-PH/KW



**Pratt & Whitney JT8D-7 engines\***  
**Pratt & Whitney JT8D-17A engines**

	727-100C/QC/F		727-200F	
<b>Cargo capacity, ft<sup>3</sup> (m<sup>3</sup>)</b>				
<b>Main deck (9*/12) 88- x 125-in (2.2- x 3.2-m) pallets</b>	<b>3,960</b>	(112.1)	<b>5,280</b>	(149.5)
<b>Lower hold bulk volume</b>	<b>890</b>	(25.2)	<b>1,525</b>	(43.2)
<b>Total cargo volume</b>	<b>4,850</b>	(137.3)	<b>6,805</b>	(192.7)
<b>Maximum gross weight, lb (kg)</b>				
<b>Takeoff</b>	<b>169,400</b>	(76,839)	<b>203,100</b>	(92,126)
<b>Landing</b>	<b>142,500</b>	(64,638)	<b>166,000</b>	(75,297)
<b>Zero fuel</b>	<b>132,000</b>	(59,875)	<b>155,000</b>	(70,308)
<b>Structural limit payload (MZFW – OEW)</b>	<b>43,600</b>	(19,777)	<b>65,015</b>	(29,491)
<b>Operating empty weight including tare**</b>	<b>90,479</b>	(145,612)	<b>92,757</b>	(149,278)
<b>Fuel capacity, U.S. gal (L)</b>	<b>7,680</b>	(29,269)	<b>8,105</b>	(30,677)
<b>Design range (MZFW payload), nmi (km)</b>	<b>1,385</b>	(2,229)	<b>1,597</b>	(2,570)
<b>Chapter 3 cumulative margin, EPNdB</b>	<b>+10.3</b>		<b>-0.2</b>	
<b>With hushkit</b>	<b>-0.5</b>			

• 727-200F (production freighter version)

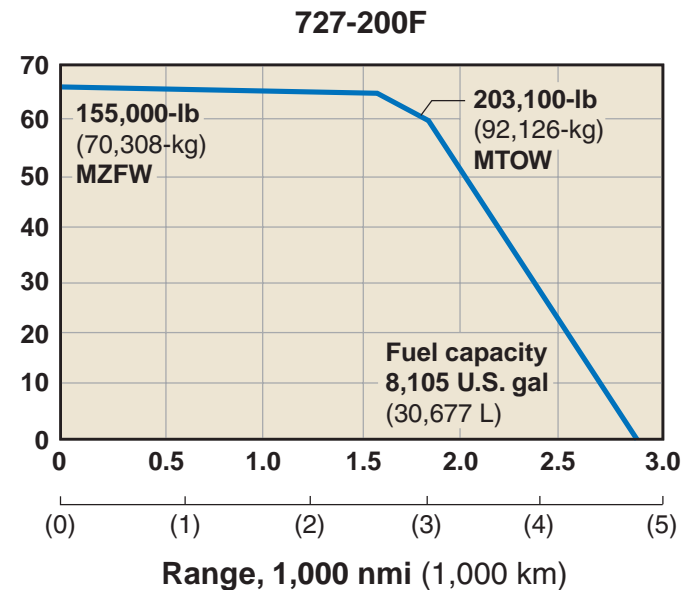
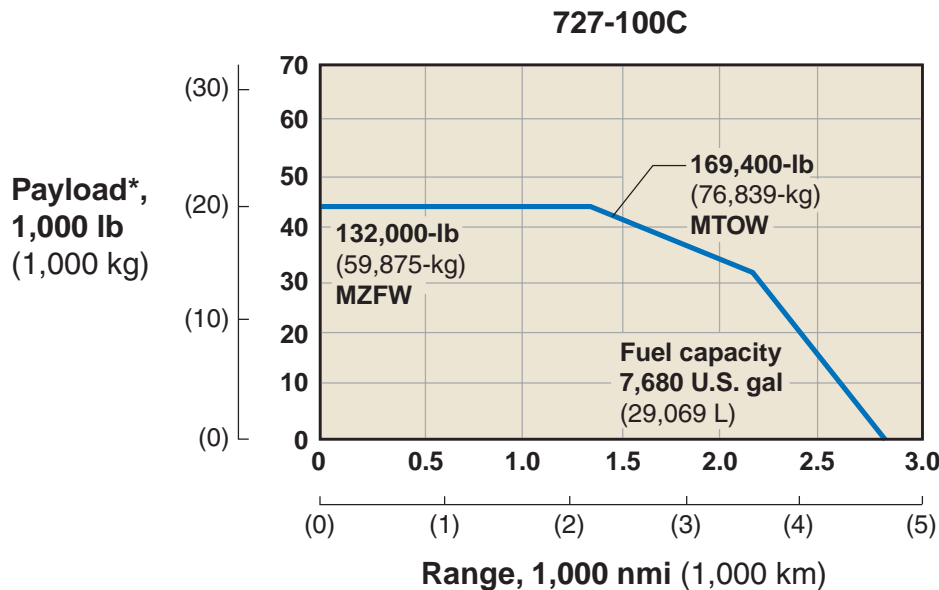
\* 727-100 models

\*\* Tare weights: 2,079 lb (3,346 kg) for the 727-100, 2,772 lb (4,461 kg) for the 727-200



### Pratt & Whitney JT8D-7 engines

### Pratt & Whitney JT8D-17A engines



• Converted passenger aircraft will have lower payload-range capability depending on MTOW and engine combination.

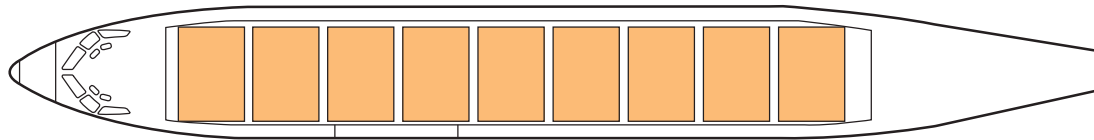
\* No tare in OEW





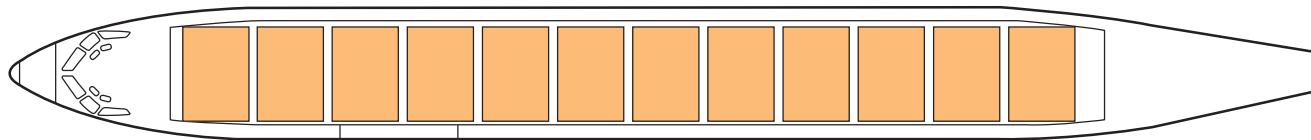
### Main deck cargo arrangement

#### 727-100C/QC/F



**9 containers, 88 x 125 in (2.2 x 3.2 m)**  
**Volume, 3,960 ft<sup>3</sup> (112.1 m<sup>3</sup>); bulk volume, 890 ft<sup>3</sup> (25.2 m<sup>3</sup>)**

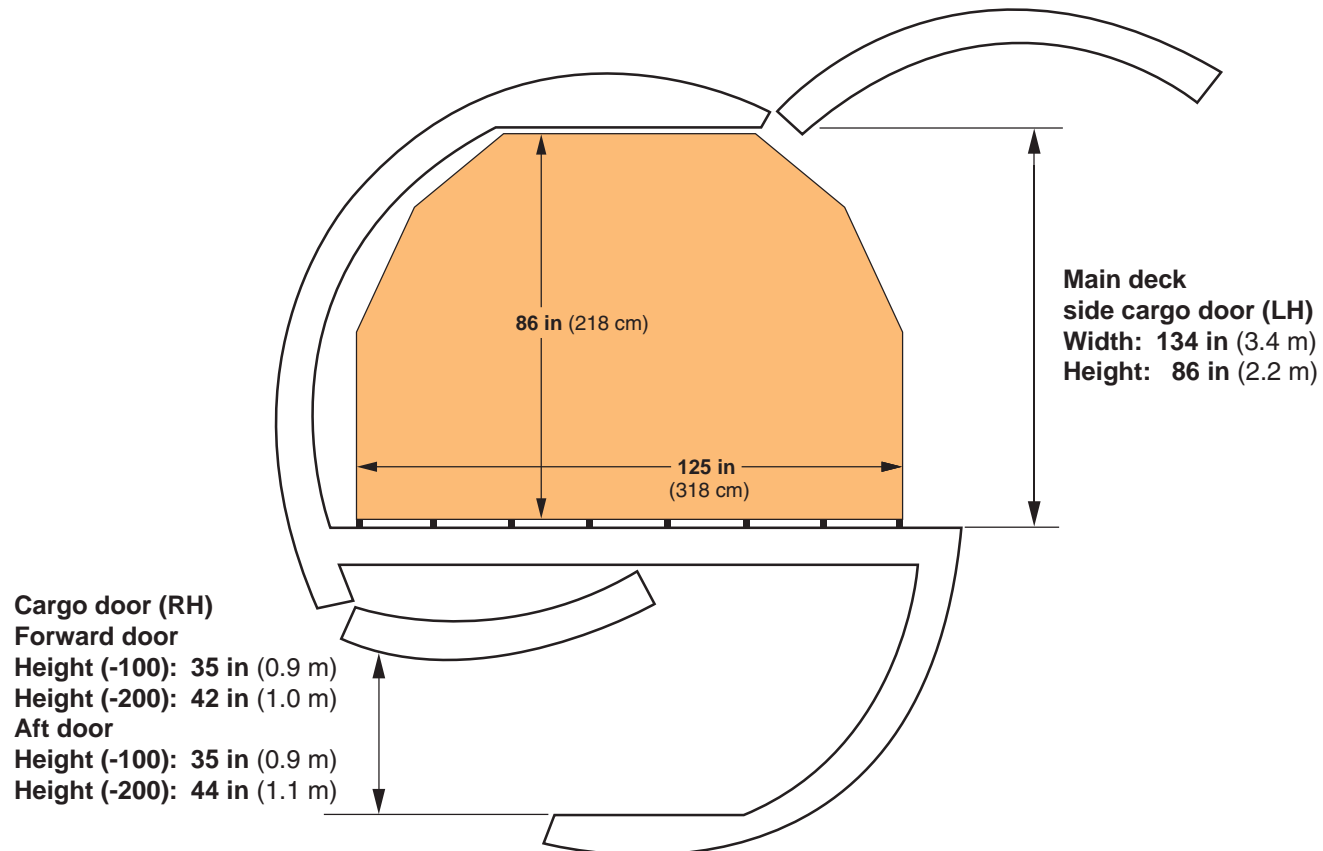
#### 727-200F



**12 containers, 88 x 125 in (2.2 x 3.2 m)**  
**Volume, 5,280 ft<sup>3</sup> (149.5 m<sup>3</sup>); bulk volume, 1,525 ft<sup>3</sup> (43.2 m<sup>3</sup>)**



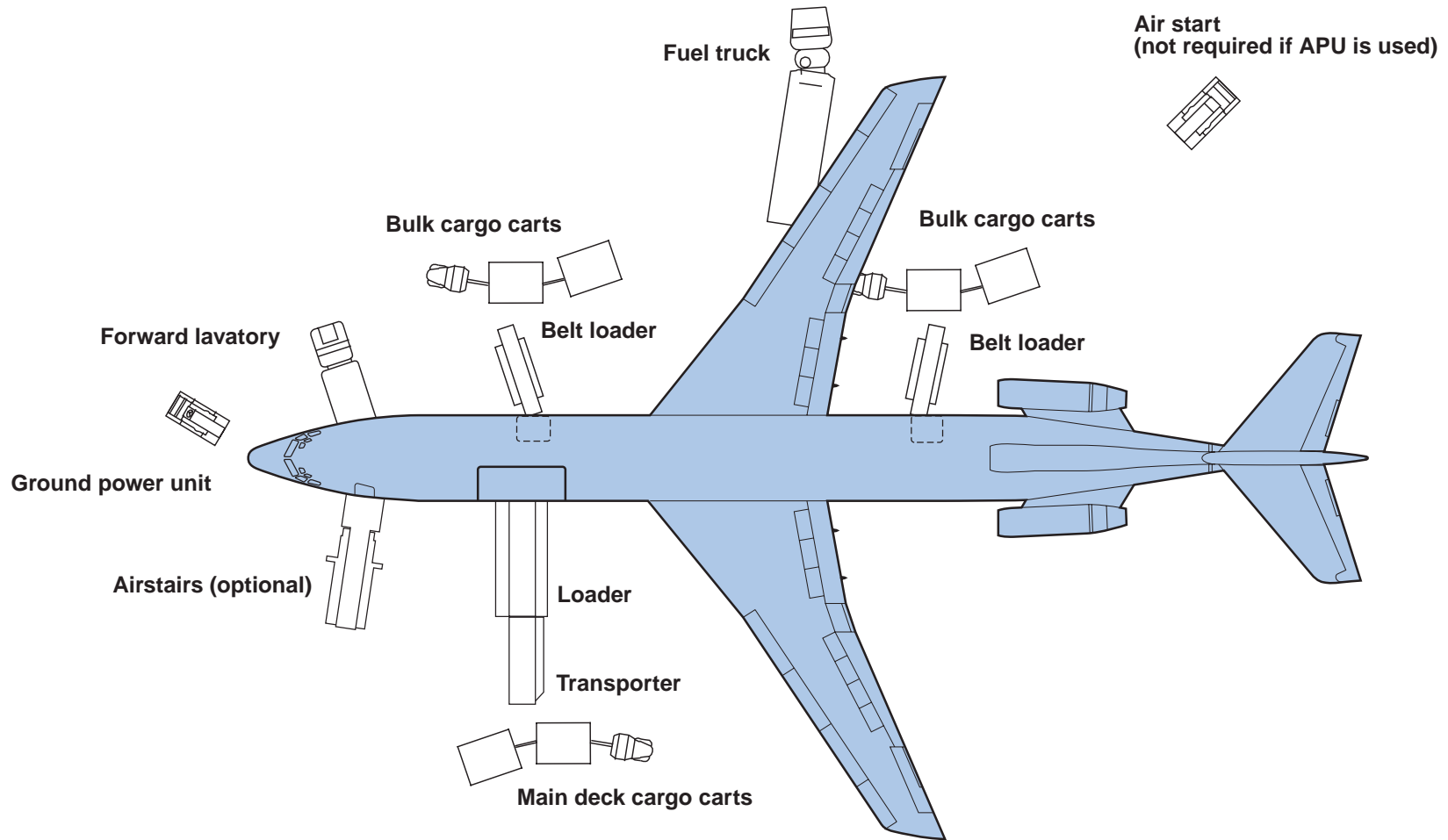
### Cross section



# Boeing 727-200 Freighter

## Turnaround Servicing Arrangement

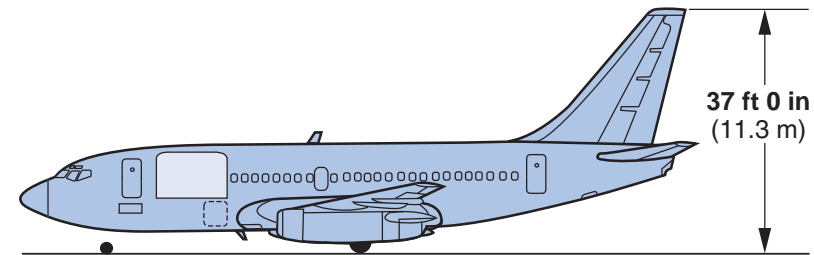
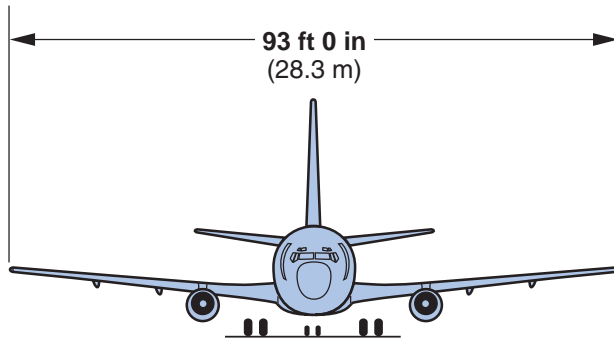
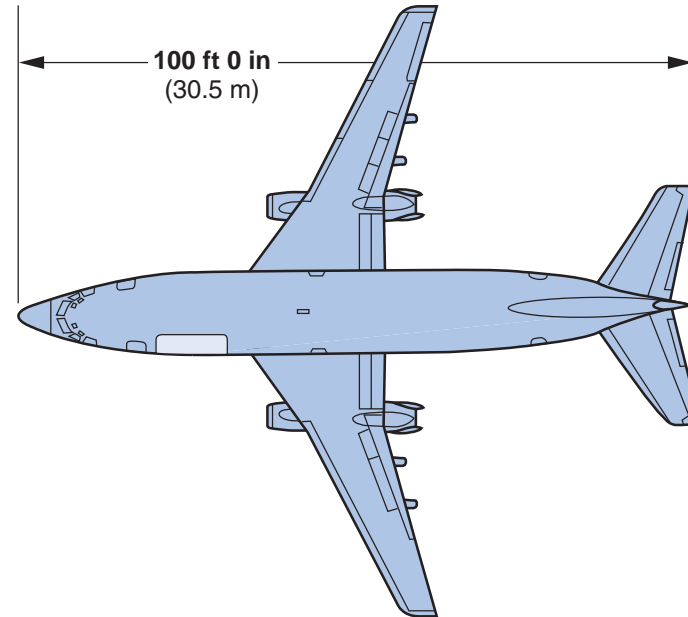
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# Boeing 737-200C/QC/F

## General Arrangement

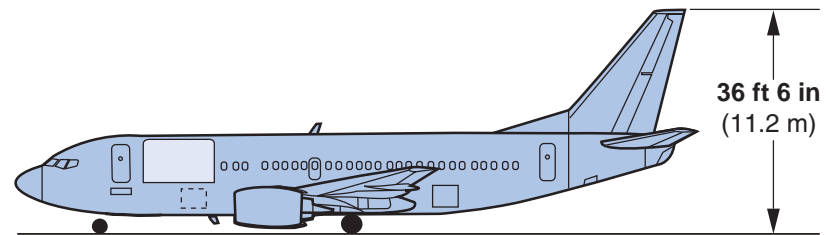
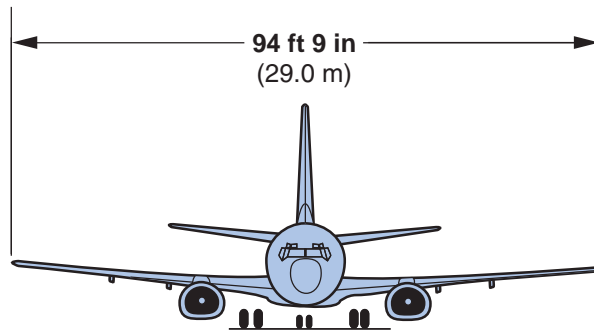
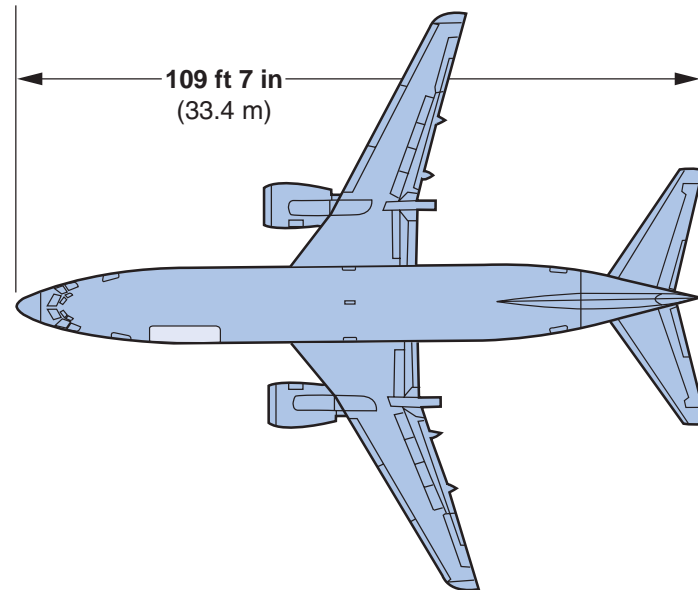
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# Boeing 737-300QC/F

## General Arrangement

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# Boeing 737-200/-300 Freighters

## Performance Summary

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### Pratt & Whitney JT8D-17A engines\* CFM56-3B engines

	737-200C (Advanced)		737-300SF	
<b>Cargo capacity, ft<sup>3</sup> (m<sup>3</sup>)</b>				
<b>Main deck, (7*/8) 88- x 125-in (2.2- x 3.2-m)</b> <b>pallets or containers</b>	<b>3,080</b>	(87.2)	<b>3,520</b>	(99.7)
<b>Lower hold bulk volume</b>	<b>875</b>	(24.8)	<b>1,068</b>	(30.2)
<b>Total cargo volume</b>	<b>3,955</b>	(112.0)	<b>4,588</b>	(130.0)
<b>Maximum gross weight, lb (kg)</b>				
<b>Takeoff</b>	<b>124,500</b>	(56,470)	<b>139,500</b>	(63,276)
<b>Landing</b>	<b>107,000</b>	(48,530)	<b>116,600</b>	(52,889)
<b>Zero fuel</b>	<b>99,000</b>	(44,900)	<b>109,600</b>	(49,714)
<b>Structural limit payload (MZFW – OEW)</b>	<b>38,175</b>	(17,315)	<b>43,500</b>	(19,731)
<b>Operating empty weight including tare**</b>	<b>62,442</b>	(28,323)	<b>67,948</b>	(30,821)
<b>Fuel capacity, U.S. gal (L)</b>	<b>5,160</b>	(19,533)	<b>5,310</b>	(20,100)
<b>Design range (MZFW payload), nmi (km)</b>	<b>1,210</b>	(2,240)	<b>1,635</b>	(3,028)
<b>Chapter 3 cumulative margin, EPNdB</b>	<b>+18.6</b>		<b>-14.4</b>	

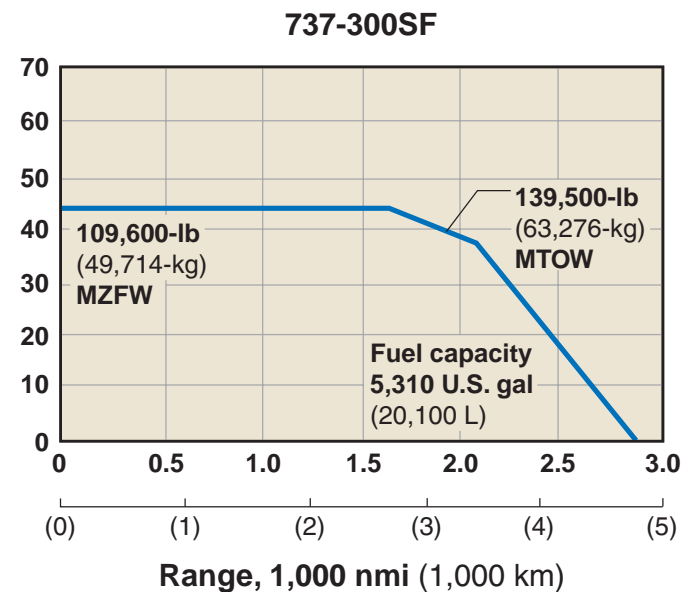
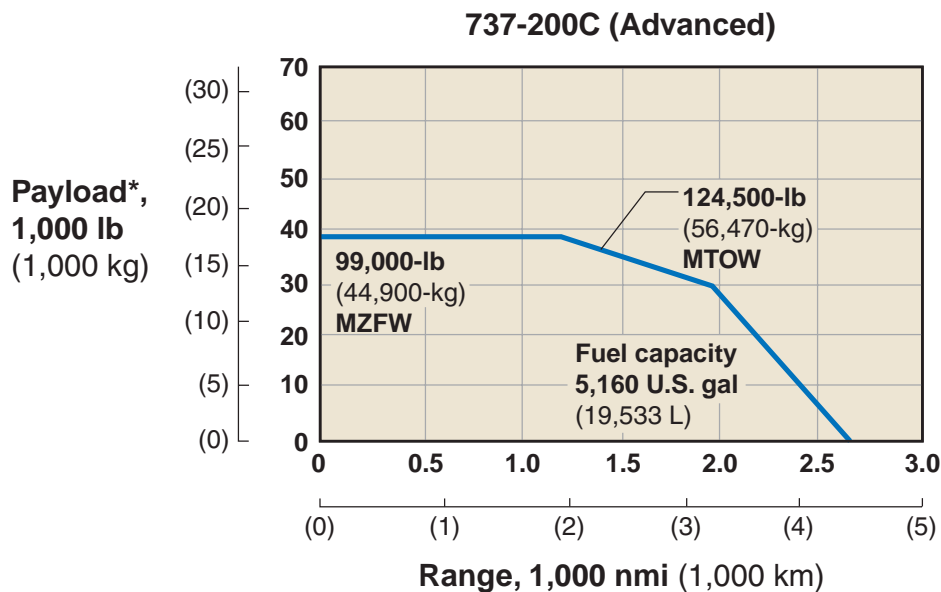
\* 737-200 models

\*\* Tare weights: 1,617 lb (733.5 kg) for the 737-200C (Advanced), 1,848 lb (838.2 kg) for the 737-300SF



### Pratt & Whitney JT8D-17A engines

### CFM56-3B engines

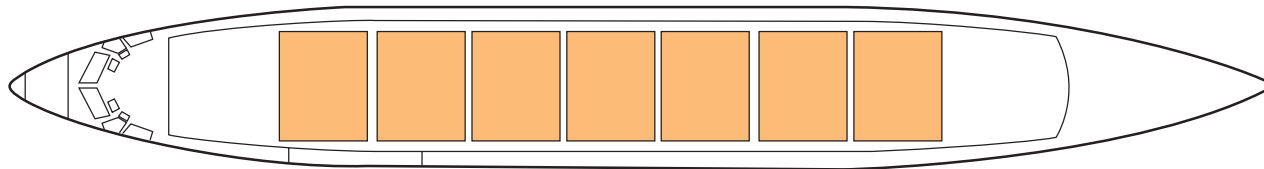


\* No tare in OEW



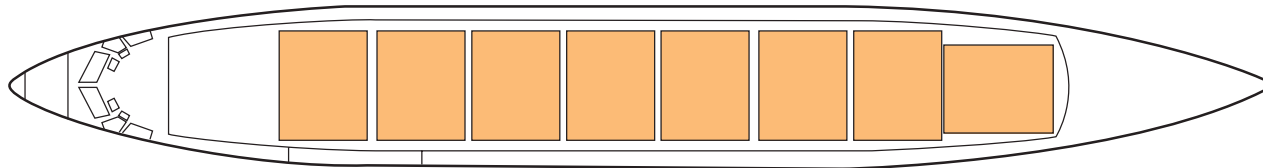
### Main deck cargo arrangement

#### 737-200C/QC/F



**7 containers, 88 x 125 in (2.2 x 3.2 m)**  
**Volume, 3,080 ft<sup>3</sup> (87.2 m<sup>3</sup>); bulk volume, 875 ft<sup>3</sup> (24.8 m<sup>3</sup>)**

#### 737-300F



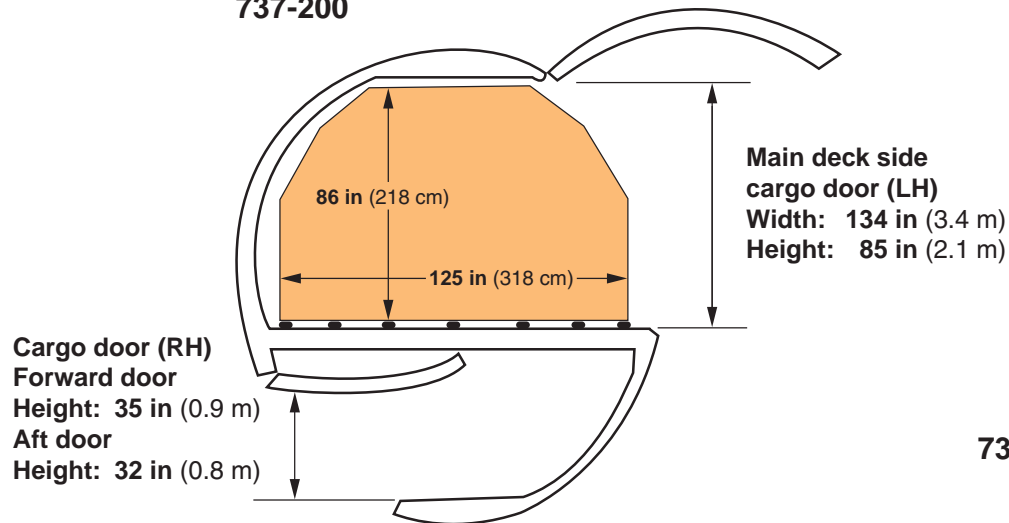
**8 containers, 88 x 125 in (2.2 x 3.2 m)**  
**Volume, 3,520 ft<sup>3</sup> (99.7 m<sup>3</sup>); bulk volume, 1,068 ft<sup>3</sup> (30.2 m<sup>3</sup>)**



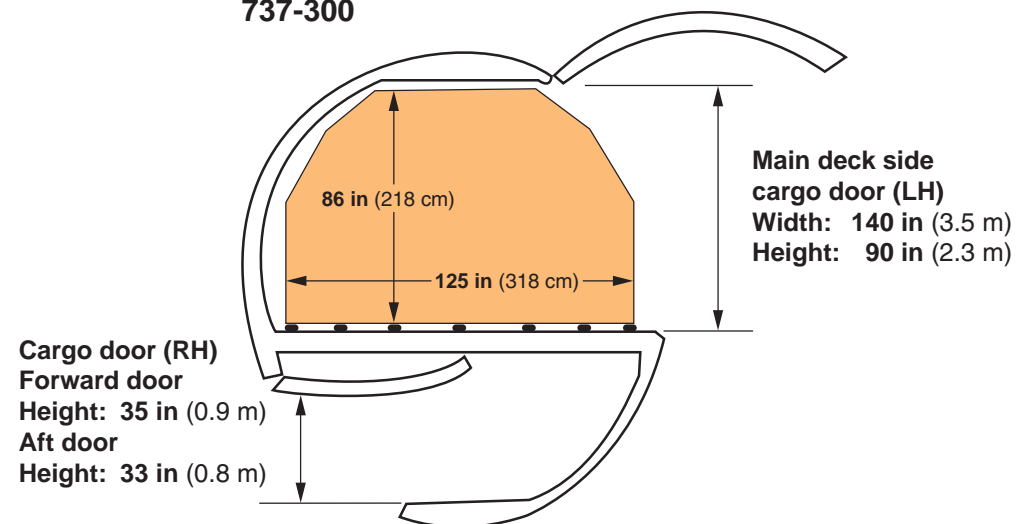


### Cross section

**737-200**



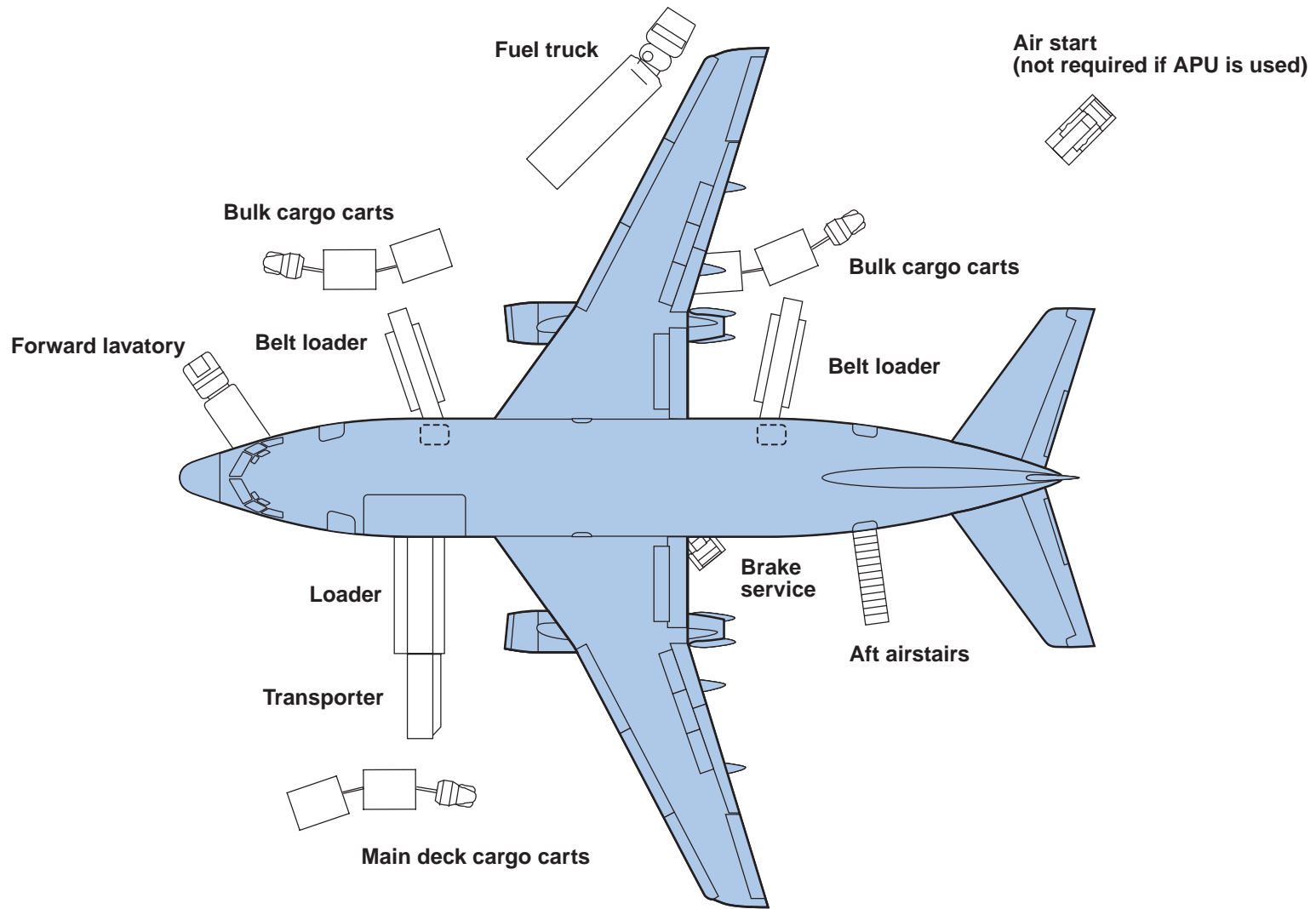
**737-300**



# Boeing 737-200C Advanced

## Turnaround Servicing Arrangement

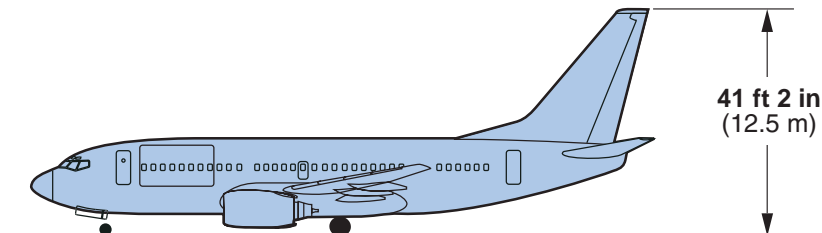
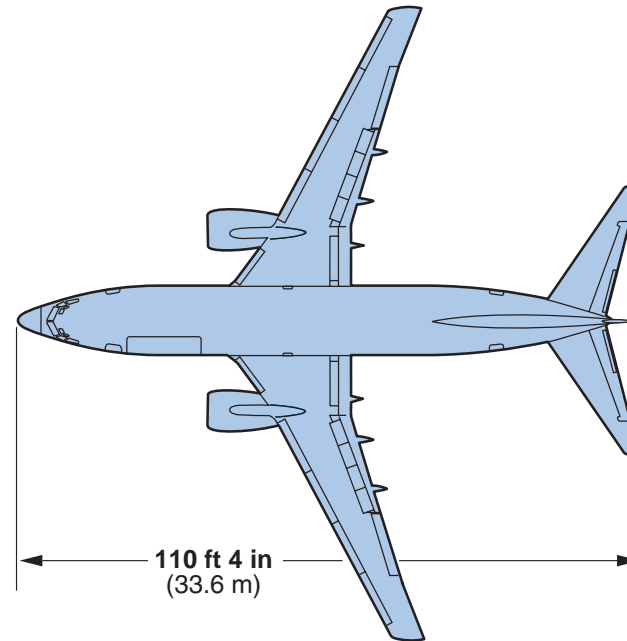
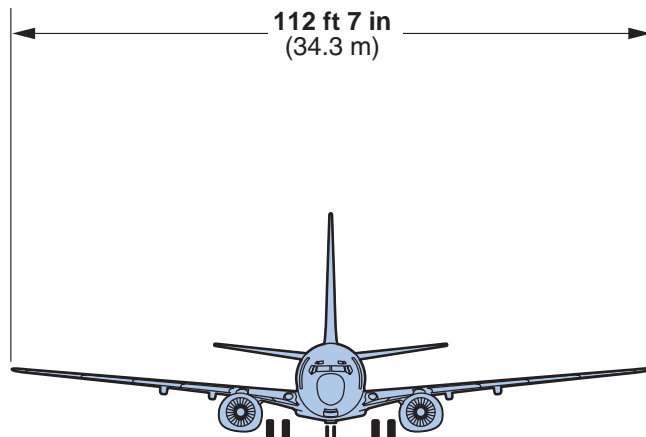
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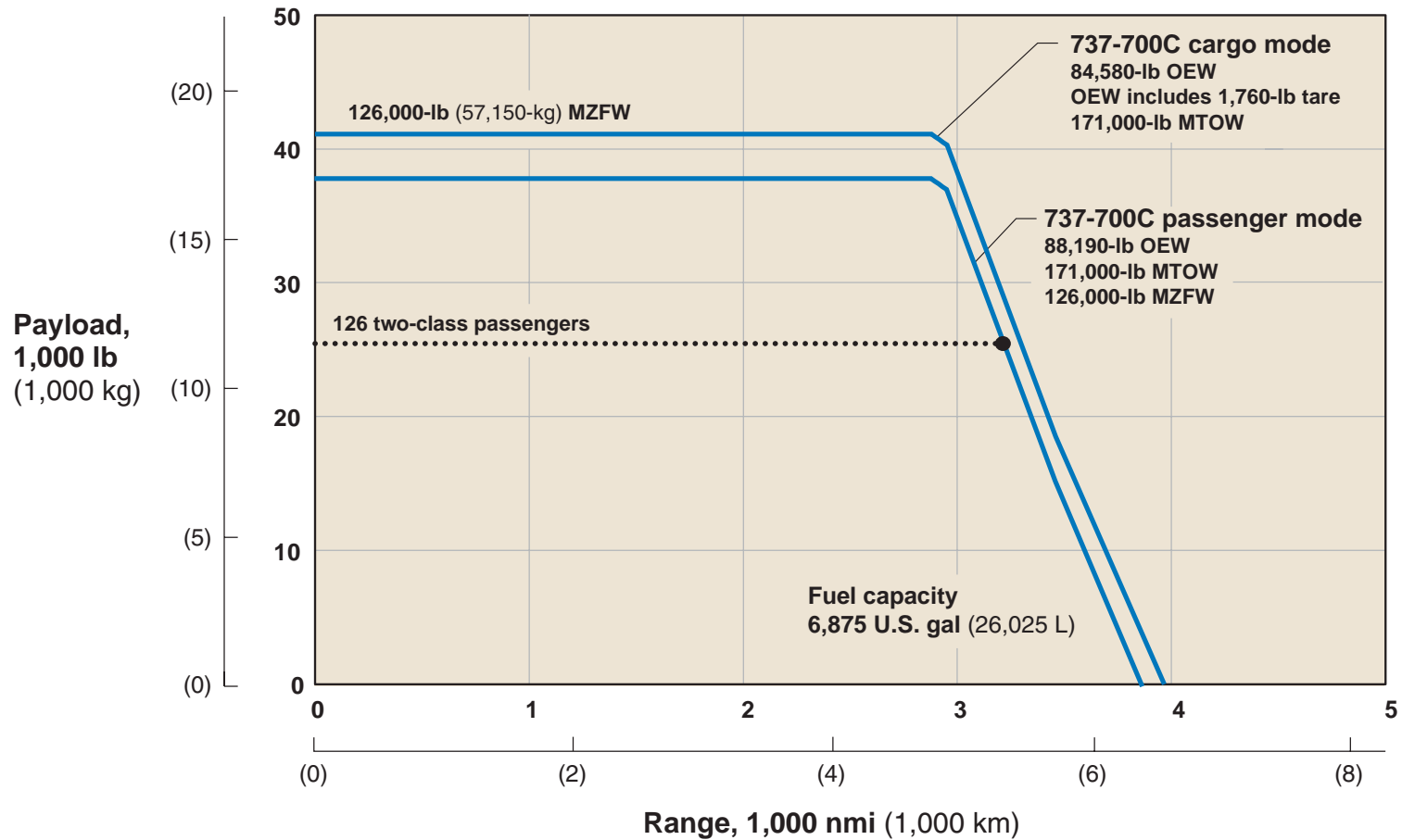
# Boeing 737-700 Convertible Freighter

## General Arrangement

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### CFM56-7B24 engines

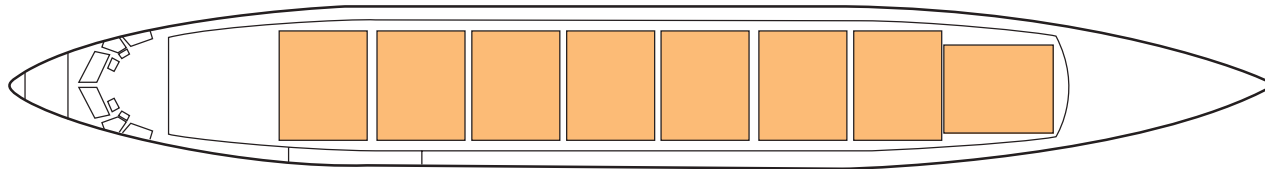


- Typical mission rules
- 200-nmi alternate

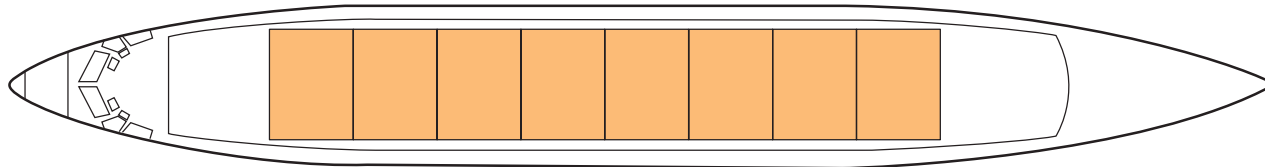


### Main deck cargo arrangements

#### 737-700C

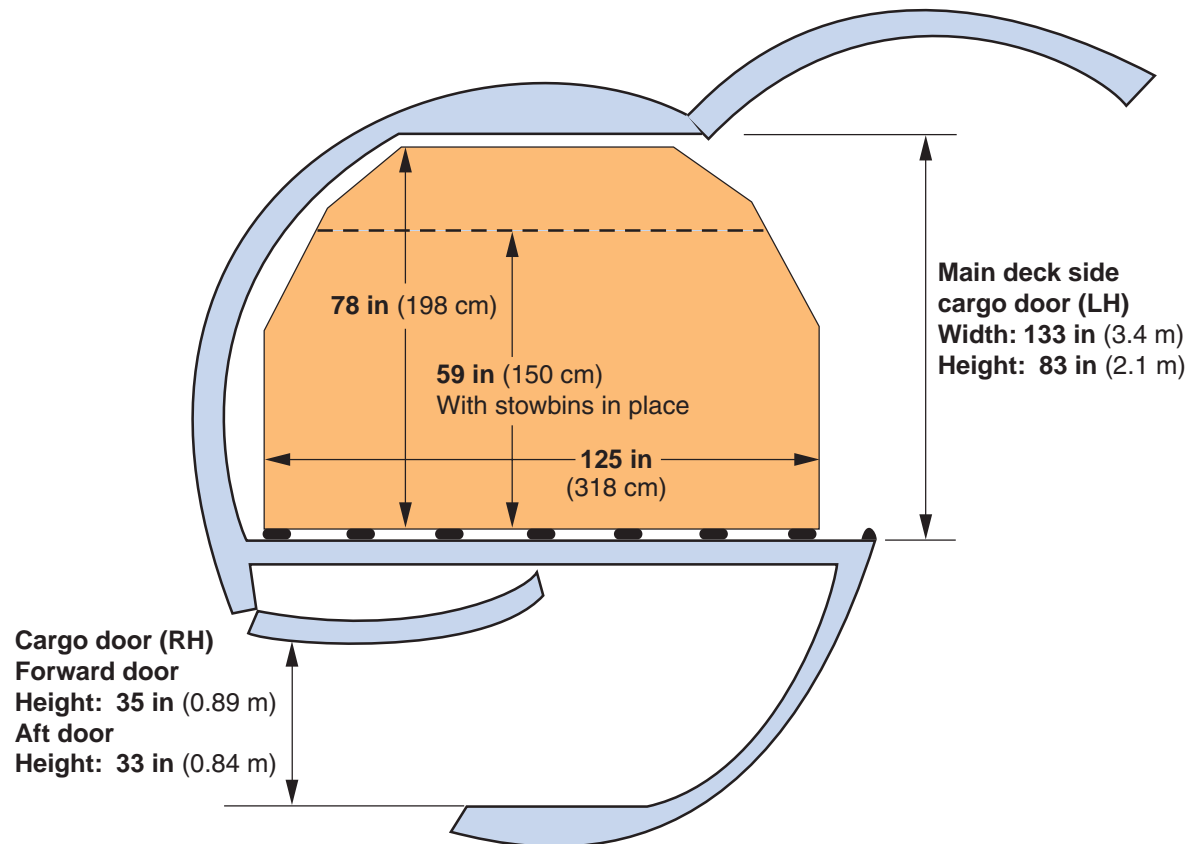


**8 containers, 88 x 125 in (2.2 x 3.2 m)**  
**Volume, 3,520 ft<sup>3</sup> (99.7 m<sup>3</sup>), bulk volume, 966 ft<sup>3</sup> (27.3 m<sup>3</sup>)**



**8 containers, 88 x 125 in (2.2 x 3.2 m); under-bin-height, 59 in (1.5 m)**  
**Volume, 3,005 ft<sup>3</sup> (85.1 m<sup>3</sup>); bulk volume, 966 ft<sup>3</sup> (27.3 m<sup>3</sup>)**

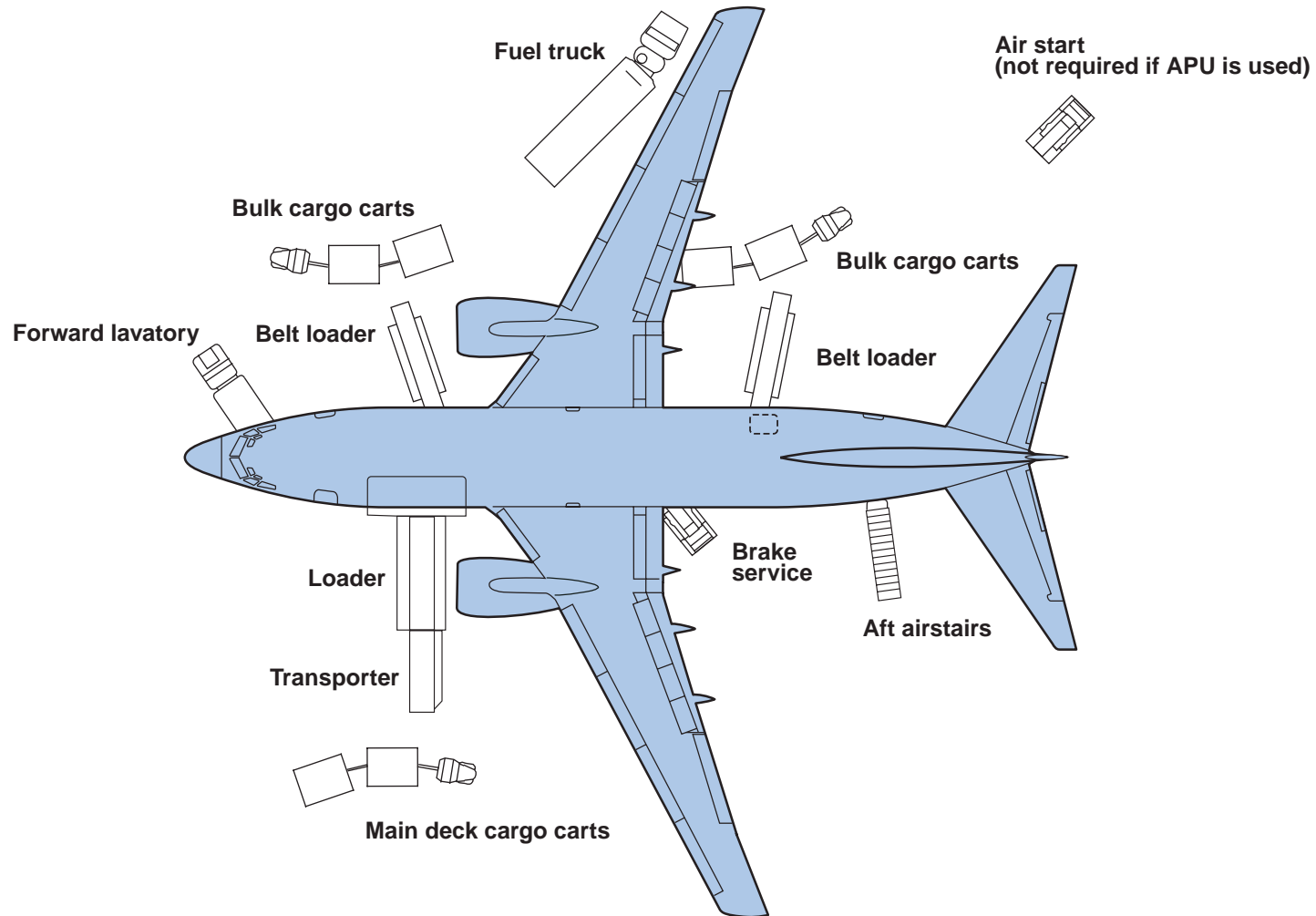
### Cross section



# Boeing 737-700 Convertible Freighter

## Turnaround Servicing Arrangement

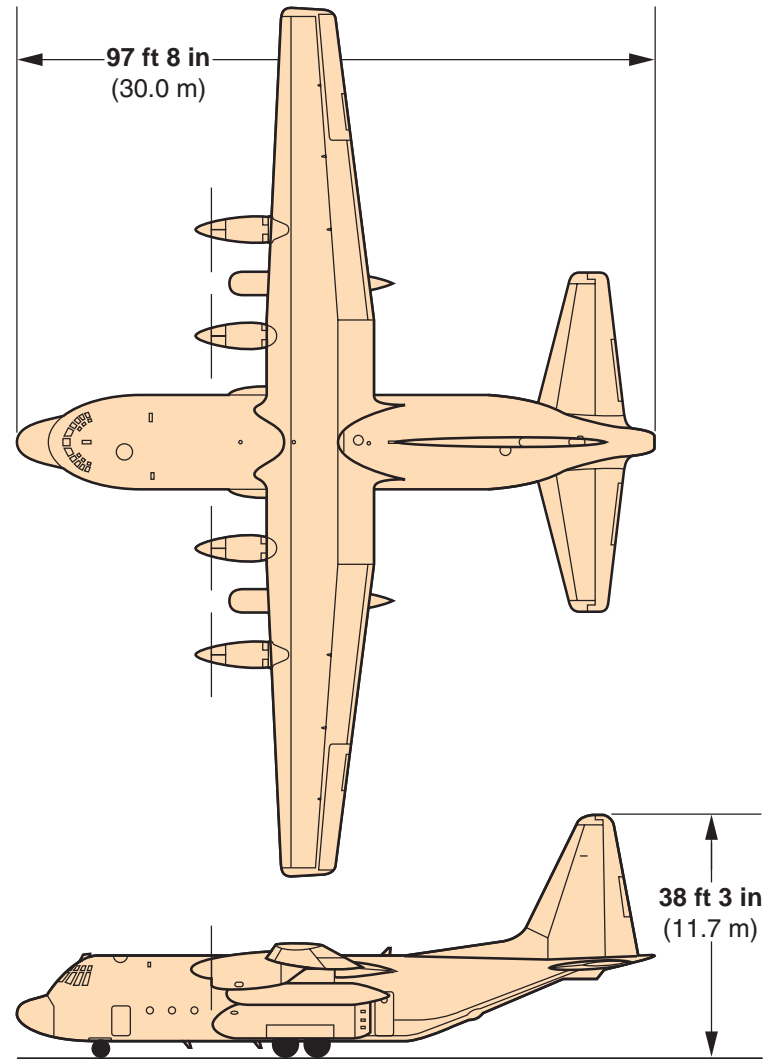
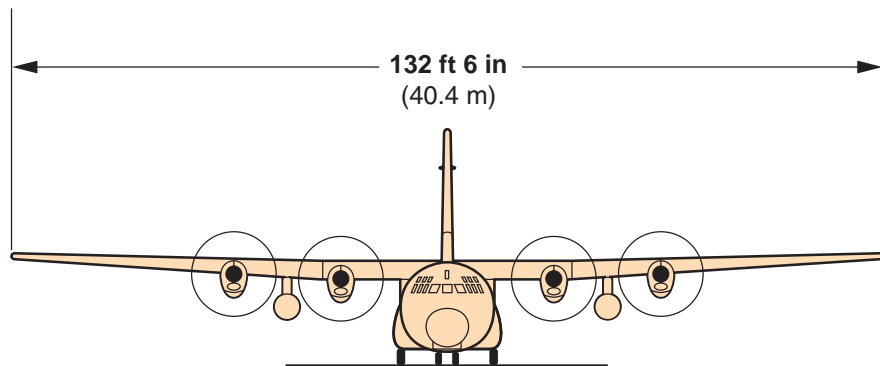
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# Lockheed L-100 Hercules Freighter

## General Arrangement

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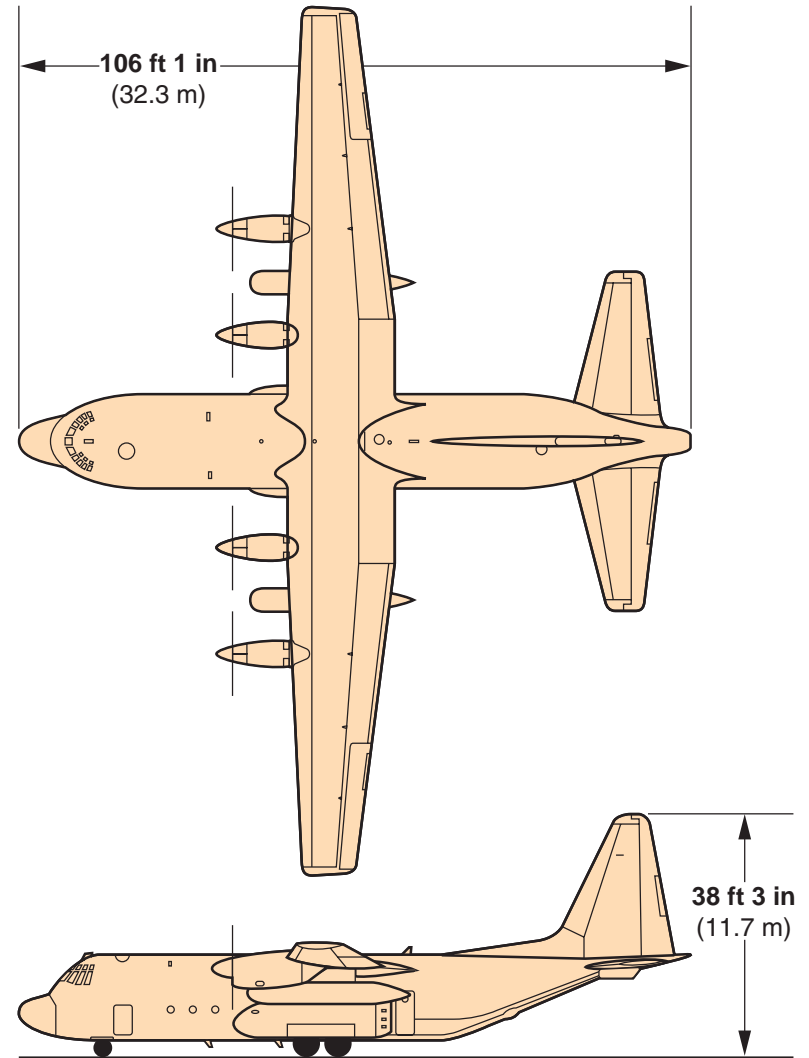
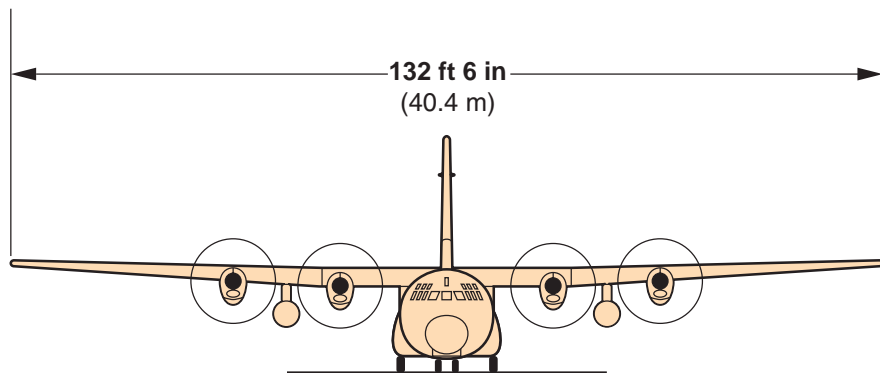
TBC-CO-0052F  
12-12-2-PH/CJ



# Lockheed *L-100-20 Hercules* Freighters

## General Arrangement

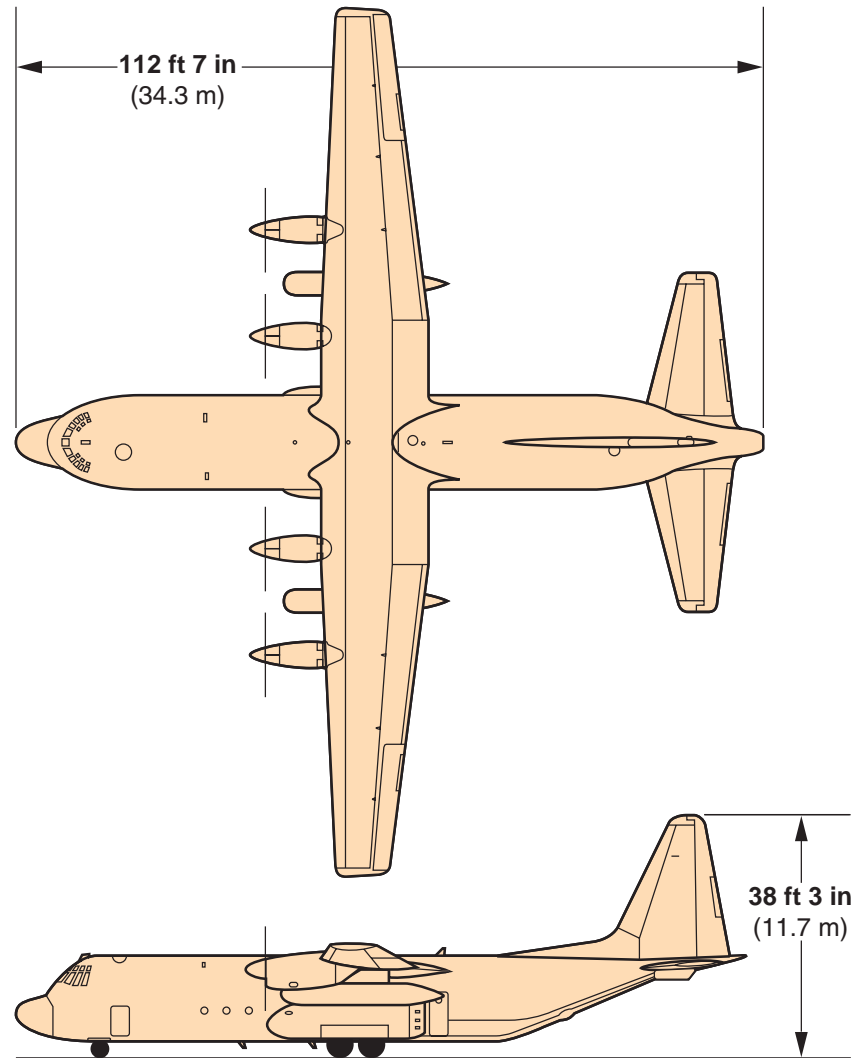
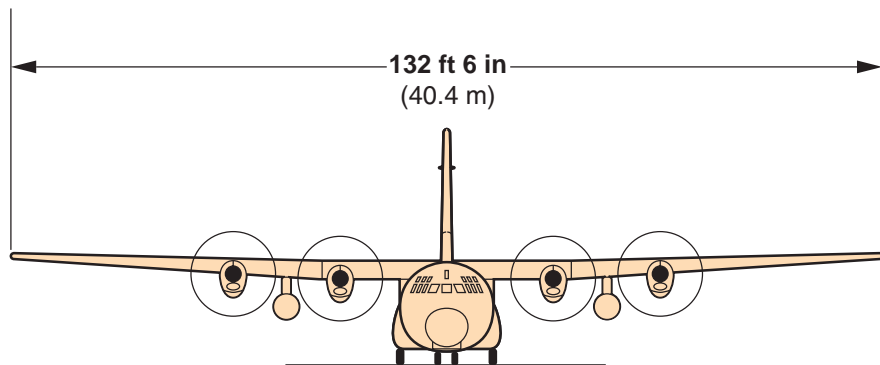
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# Lockheed *L-100-30 Hercules Freighters*

## General Arrangement

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### Allison 501-D22/-D22A\* engines

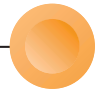
	L-100		L-100-20/-30	
<b>Cargo capacity, ft<sup>3</sup> (m<sup>3</sup>)</b>				
<b>Main deck, (8) 88- x 118-in (2.2- x 3.0-m) pallets or containers</b>	<b>4,000</b>	(113.3)	<b>4,460</b>	(126.3)
<b>Lower hold</b>	<b>N/A</b>		<b>N/A</b>	
<b>Total cargo volume</b>	<b>4,000</b>	(113.3)	<b>4,460</b>	(126.3)
<b>Maximum gross weight, lb (kg)</b>				
<b>Takeoff</b>	<b>155,000</b>	(70,310)	<b>155,000</b>	(70,310)
<b>Landing</b>	<b>130,000</b>	(58,970)	<b>135,000</b>	(61,240)
<b>Zero fuel</b>	<b>125,000</b>	(56,700)	<b>125,000</b>	(56,700)
<b>Structural limit payload (MZFW – OEW)</b>	<b>47,990</b>	(21,770)	<b>52,805</b>	(23,950)
<b>Operating empty weight including tare**</b>	<b>69,050</b>	(31,321)	<b>72,195</b>	(32,747)
<b>Fuel capacity, U.S. gal (L)<sup>a</sup></b>	<b>9,680</b>	(36,640)	<b>9,680</b>	(36,640)
<b>Design range (MZFW payload), nmi (km)</b>	<b>2,050</b>	(3,797)	<b>1,780</b>	(3,297)

\* Lockheed L-100/-20/-30 models

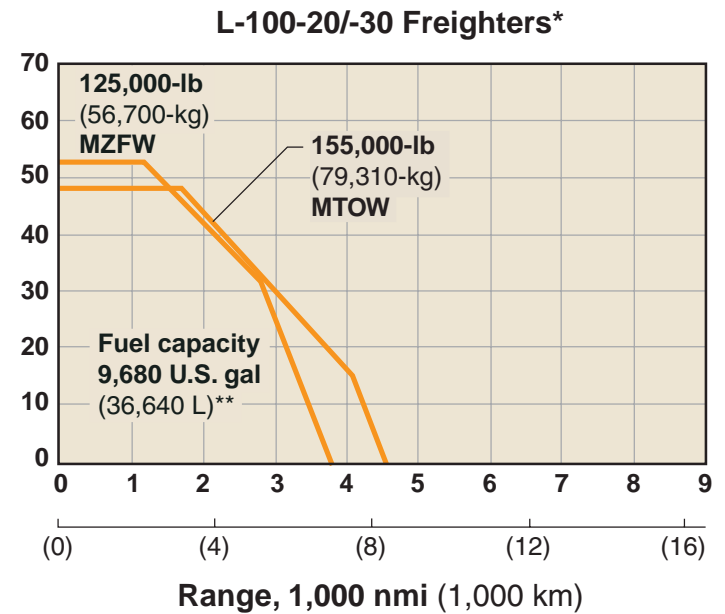
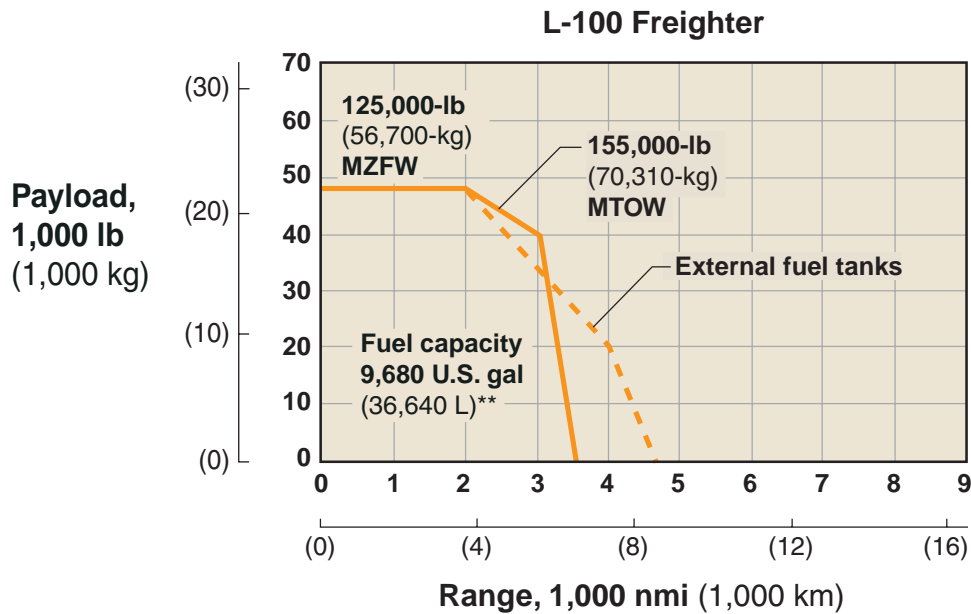
\*\* Tare weight: 1,760 lb (798 kg)

<sup>a</sup> Fuel capacity on late-model -30s: 9,625 U.S. gal (36,435 L)

Fuel capacity without external wing tanks: 6,955 U.S. gal (26,330 L)

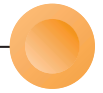


### Allison 501-D22/-D22A\* engines

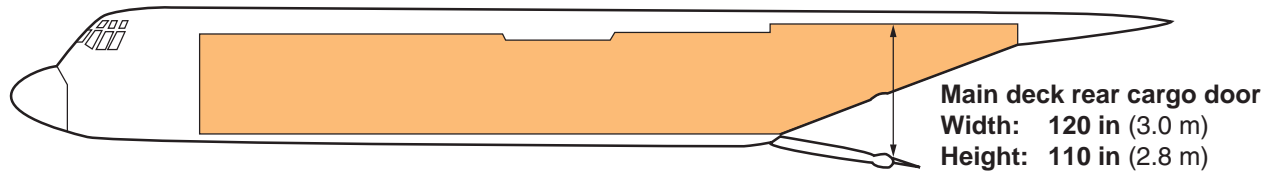


\* L-100-20/-30 Freighters only

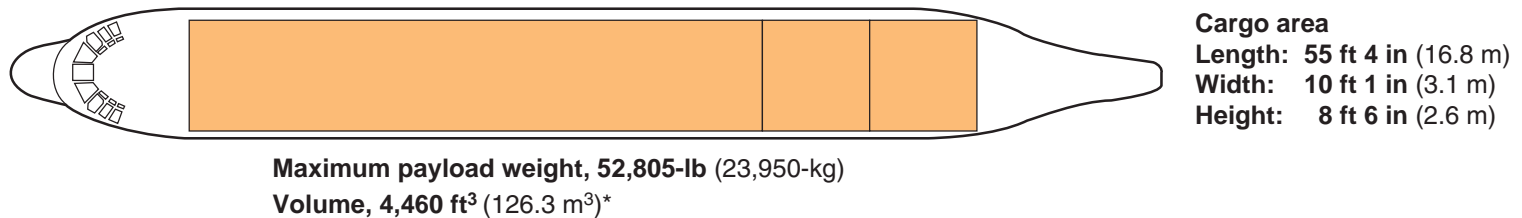
\*\* Fuel capacity without external wing tanks: 6,955 U.S. gal (26,330 L)



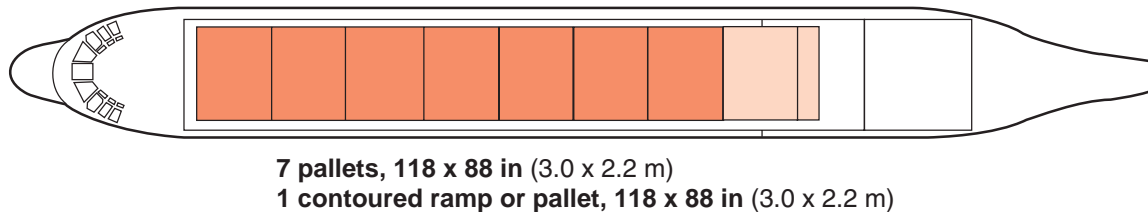
### Cargo door opening



### Main deck layout



### Main deck cargo arrangement

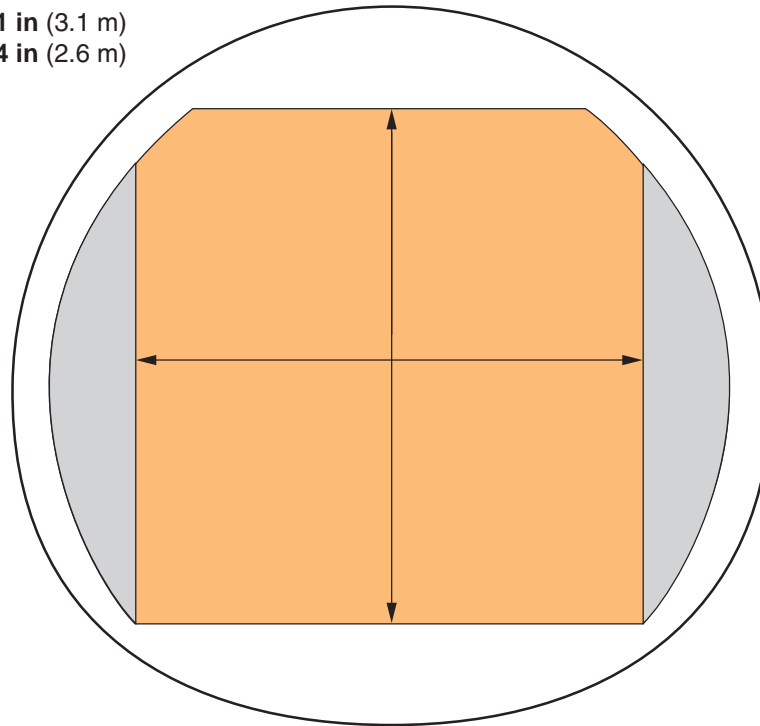


\* L-100 base model cargo volume: 3,200 ft<sup>3</sup> (90.6 m<sup>3</sup>)  
Main deck usable cargo area length: 40 ft 3 in (12.3 m)



### Cross section

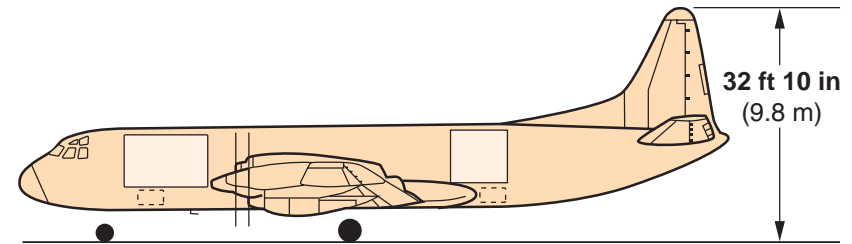
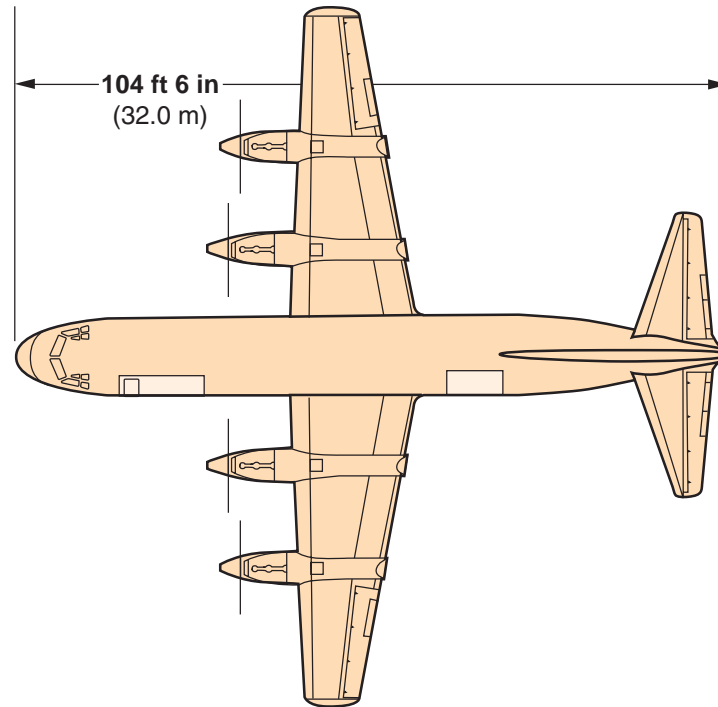
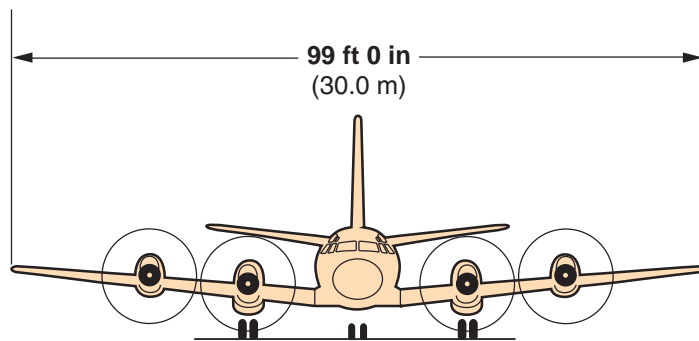
**Width:** 121 in (3.1 m)  
**Height:** 104 in (2.6 m)



# Lockheed L-188F 'Electra' Freighter

## General Arrangement

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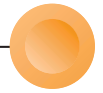


### Allison 501-D13A turboprop engines

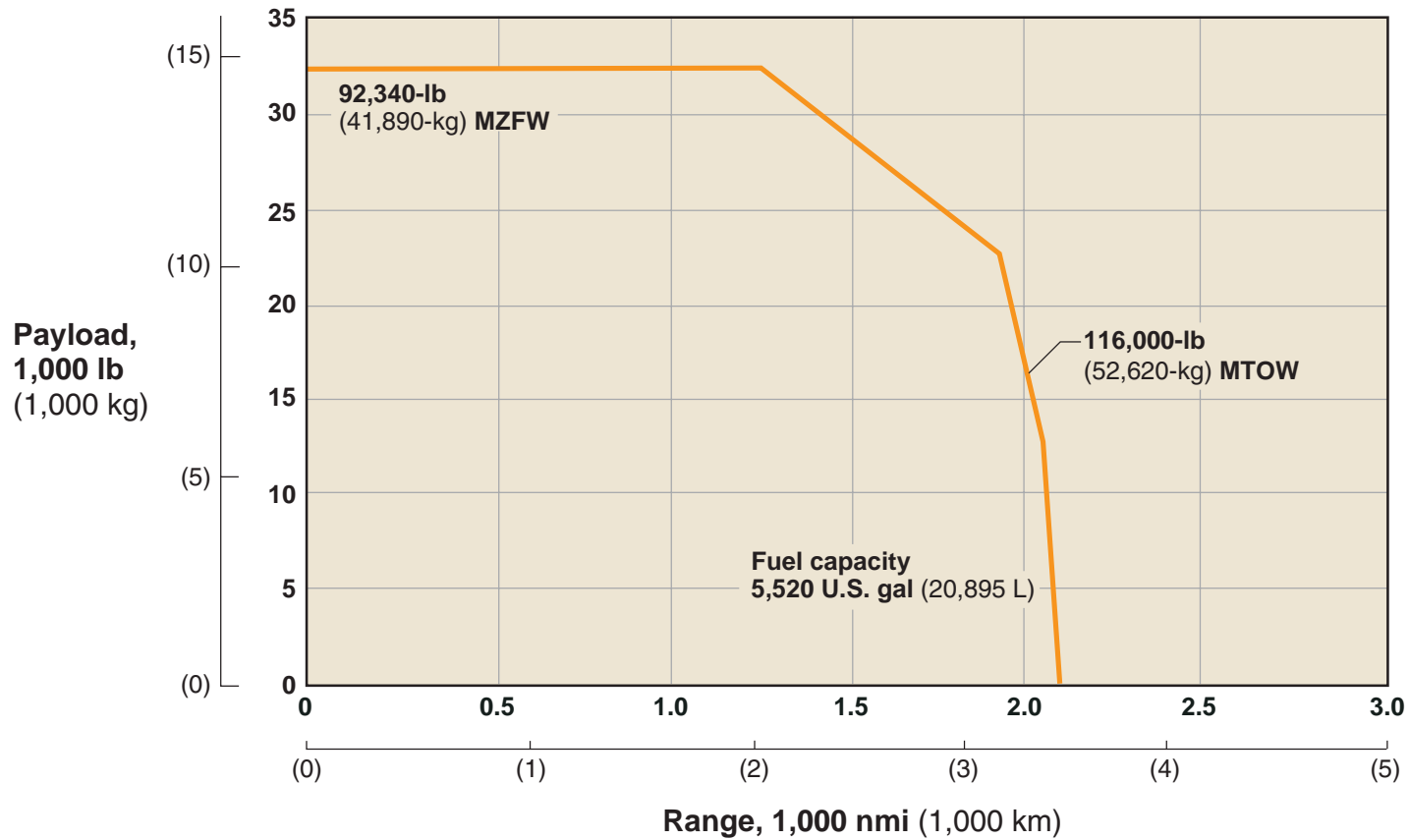
	L-188F	
<b>Cargo capacity, ft<sup>3</sup> (m<sup>3</sup>)</b>		
<b>Main deck, (8) 88- x 108-in (2.2- x 2.7-m),</b>	<b>3,200</b>	(90.6)
<b>(1) 54- x 88-in (1.4- x 2.2-m) pallets or containers</b>		
<b>Lower hold</b>	<b>524</b>	(14.8)
<b>Total cargo volume</b>	<b>4,224</b>	(105.4)
<b>Maximum gross weight, lb (kg)</b>		
<b>Takeoff</b>	<b>116,000</b>	(52,620)
<b>Landing</b>	<b>98,100</b>	(44,500)
<b>Zero fuel</b>	<b>92,340</b>	(41,890)
<b>Structural limit payload (MZFW – OEW)</b>	<b>33,000</b>	(14,970)
<b>Operating empty weight including tare*</b>	<b>59,340</b>	(26,916)
<b>Fuel capacity, U.S. gal (L)</b>	<b>5,520</b>	(20,895)
<b>Design range (MZFW payload), nmi (km)</b>	<b>1,300</b>	(2,408)

\* Tare weight: 1,920 lb (871 kg)



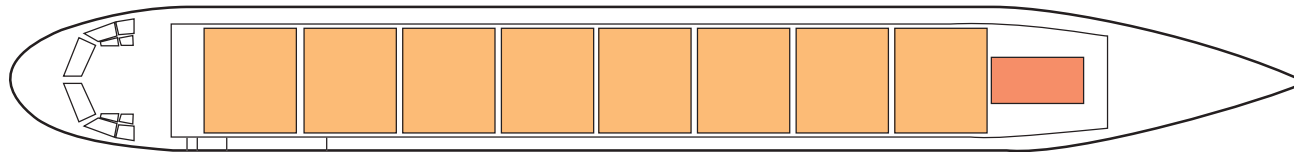


### Allison 501-D13A engines





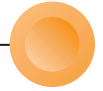
### Main deck cargo arrangement



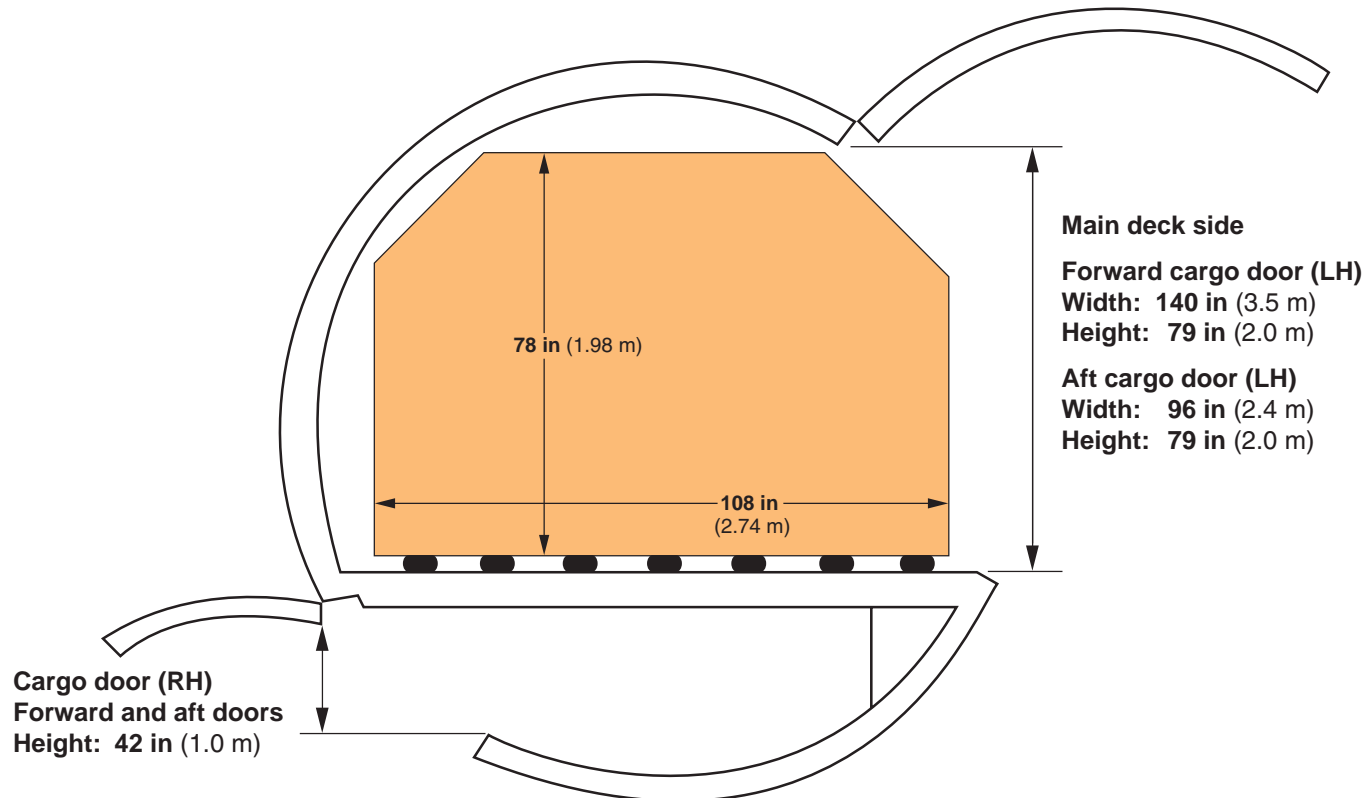
**8 containers, 88 x 108 in (2.2 x 2.7 m)**

**1 pallet, 54 x 88 in (1.4 x 2.2 m)**

**Volume, 3,200 ft<sup>3</sup> (90.6 m<sup>3</sup>); bulk volume, 524 ft<sup>3</sup> (14.8 m<sup>3</sup>)**



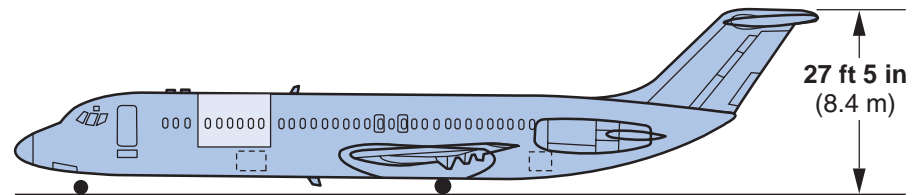
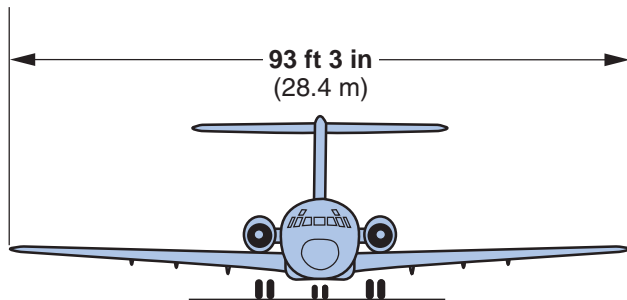
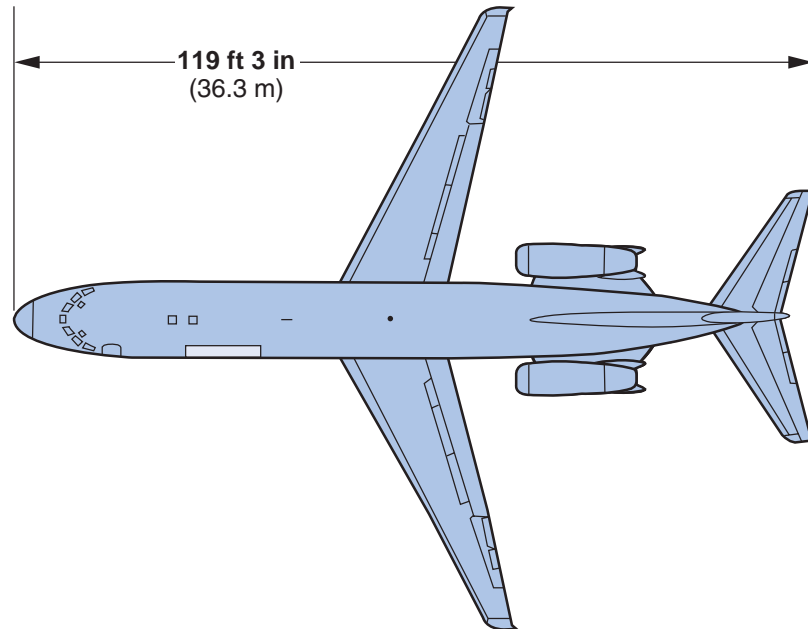
### Cross section



# McDonnell Douglas *DC-9-30 Freighter*

## General Arrangement

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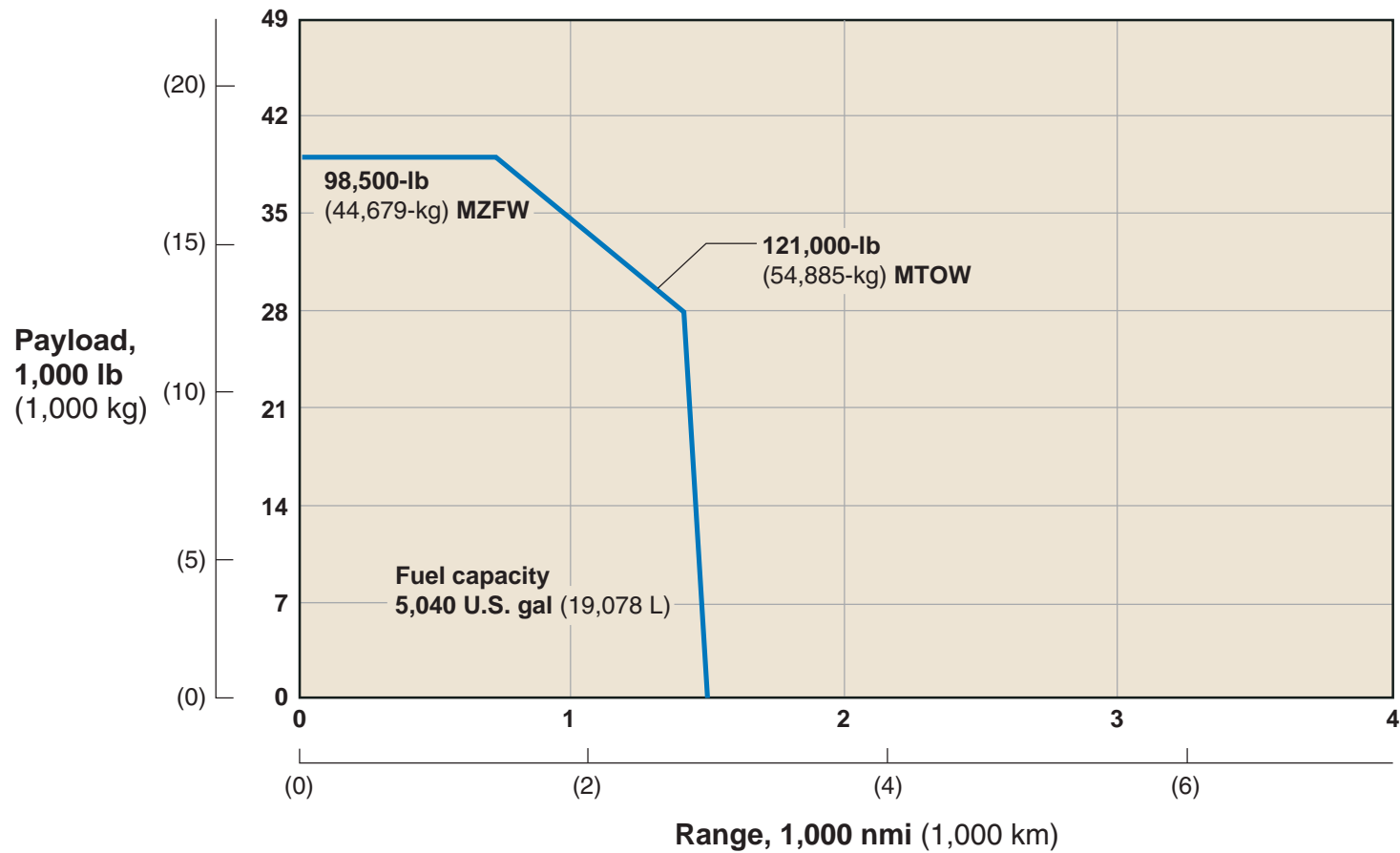
### Pratt & Whitney JT8D-17 engines

	DC-9-30F	
<b>Cargo capacity, ft<sup>3</sup> (m<sup>3</sup>)</b>		
<b>Main deck, (8) 88- x 108-in (2.2- x 2.7-m),</b>	<b>3,148</b>	<b>(89.1)</b>
<b>(2) 54- x 88-in (1.4- x 2.2-m) pallets or containers</b>		
<b>Lower hold bulk</b>	<b>895</b>	<b>(25.3)</b>
<b>Total cargo volume</b>	<b>4,043</b>	<b>(114.4)</b>
<b>Maximum gross weight, lb (kg)</b>		
<b>Takeoff</b>	<b>121,000</b>	<b>(54,885)</b>
<b>Landing</b>	<b>110,000</b>	<b>(49,896)</b>
<b>Zero fuel</b>	<b>98,500</b>	<b>(44,679)</b>
<b>Structural limit payload (MZFW – OEW),</b>	<b>35,837</b>	<b>(16,255)</b>
<b>Operating empty weight including tare*</b>	<b>62,663</b>	<b>(28,423)</b>
<b>Fuel capacity, U.S. gal (L)</b>	<b>5,040</b>	<b>(19,078)</b>
<b>Design range (MZFW payload), nmi (km)</b>	<b>715</b>	<b>(1,324)</b>

\* Tare weight: 2,026 lb (919 kg)

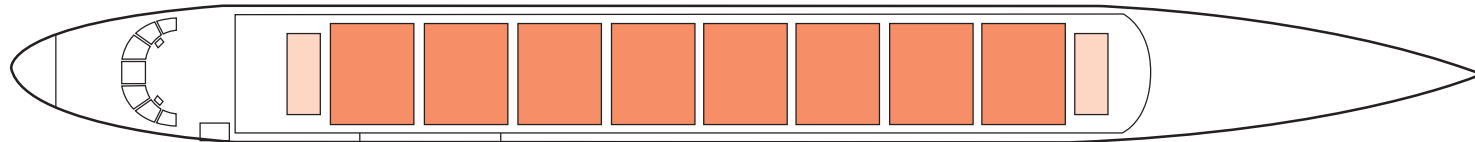


### Pratt & Whitney JT8D-17 engines





### Main deck cargo arrangement

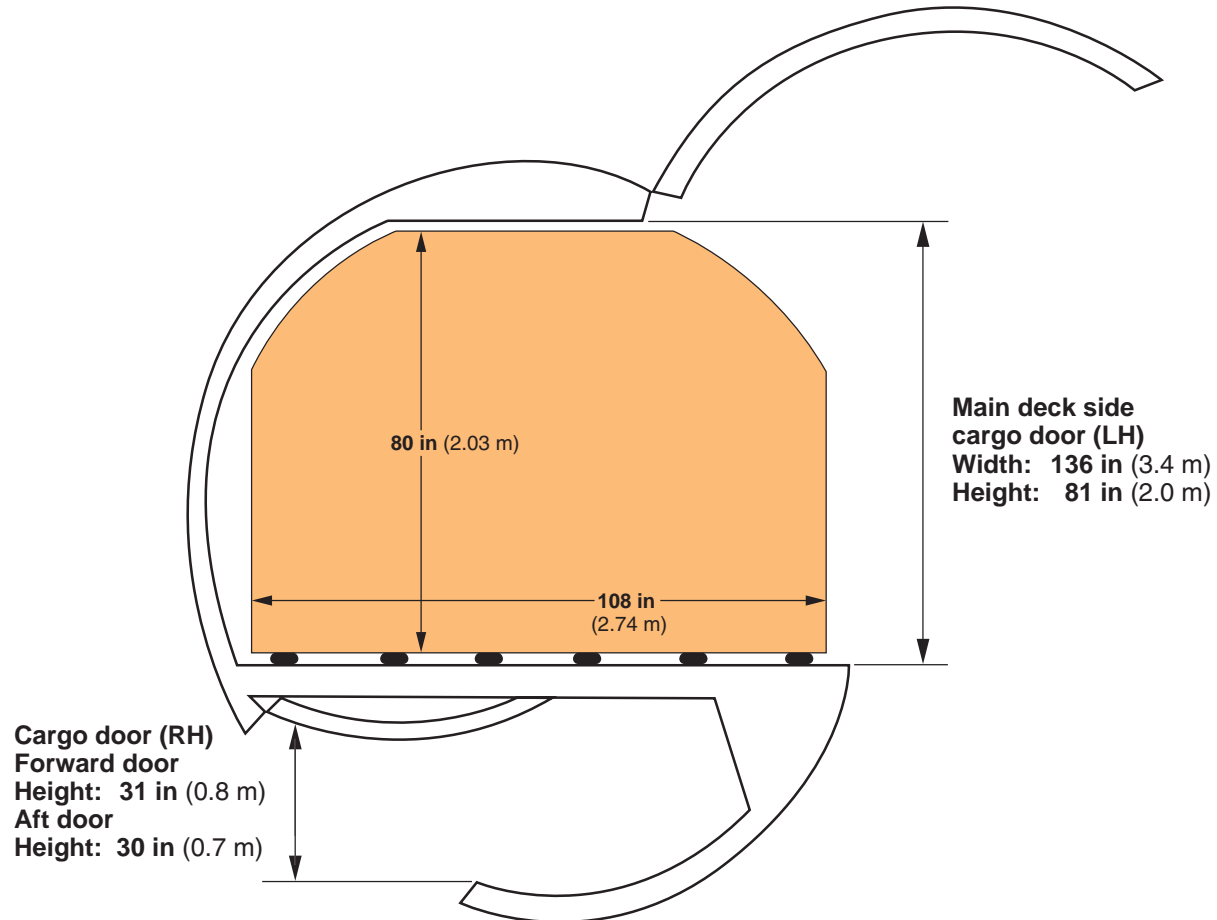


**8 pallets, 88 x 108 in (2.2 x 2.7 m)**

**2 pallets, 54 x 88 in (1.37 x 2.24 m)**

**Volume, 3,148 ft<sup>3</sup> (89.1 m<sup>3</sup>); bulk volume, 895 ft<sup>3</sup> (25.3 m<sup>3</sup>)**

### Cross section

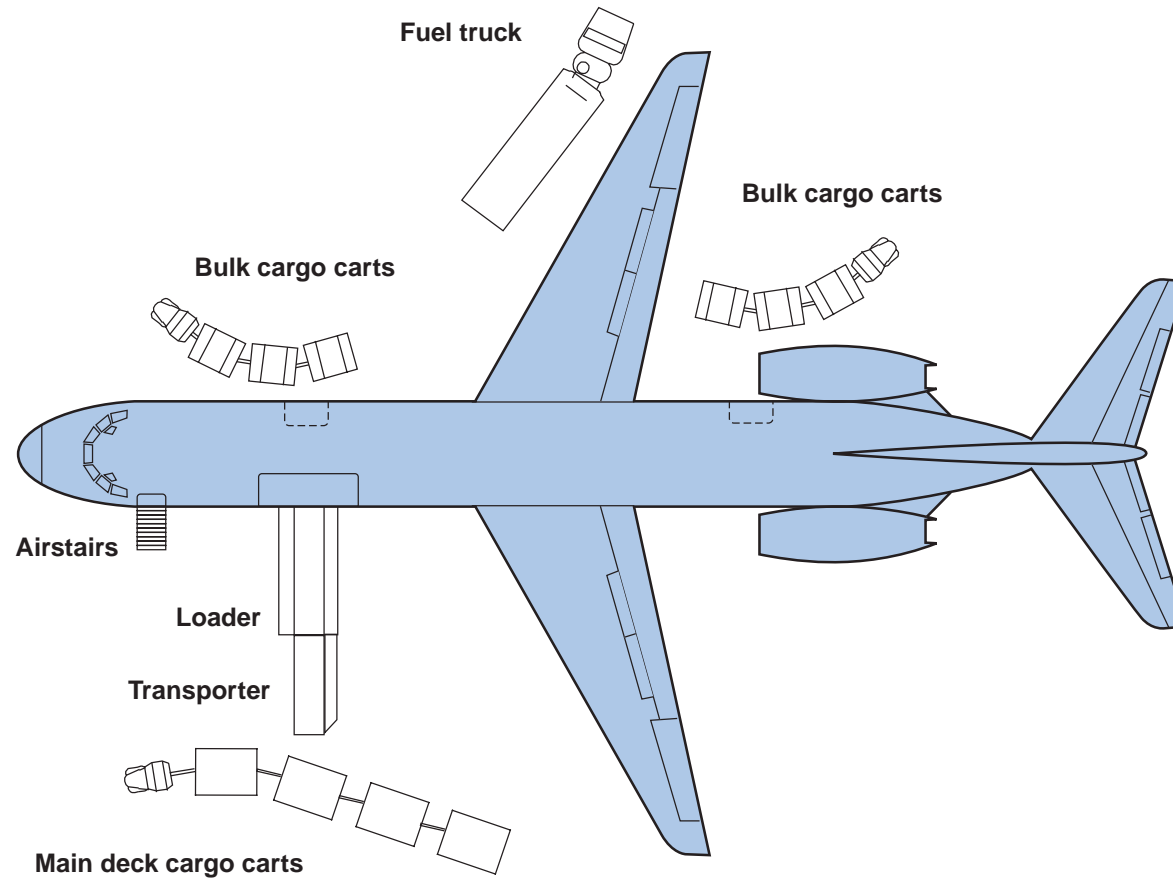




# McDonnell Douglas *DC-9-10F/-30CF*

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## *Turnaround Servicing Arrangement*

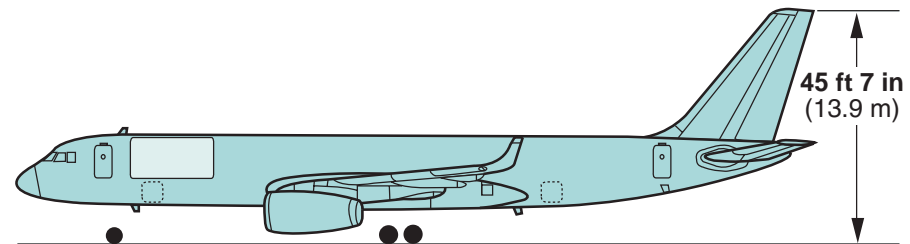
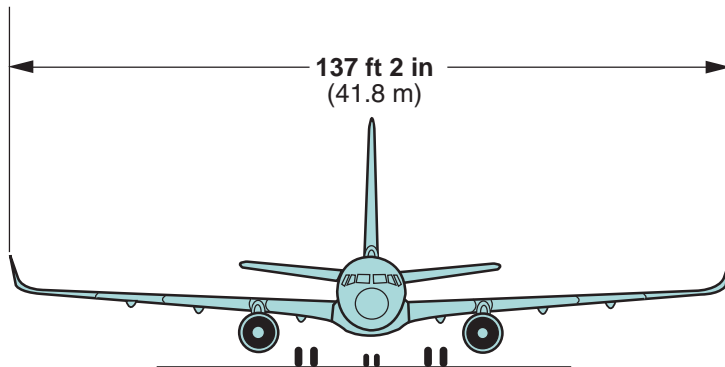
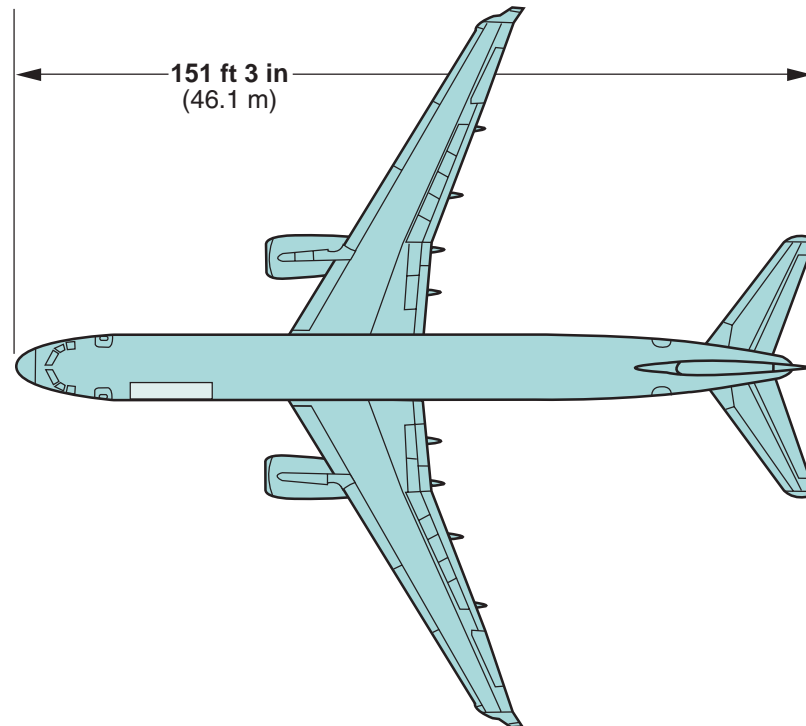


• The DC-9-30CF shown

# Tupolev *Tu-204-100/120C* Freighter

## General Arrangement

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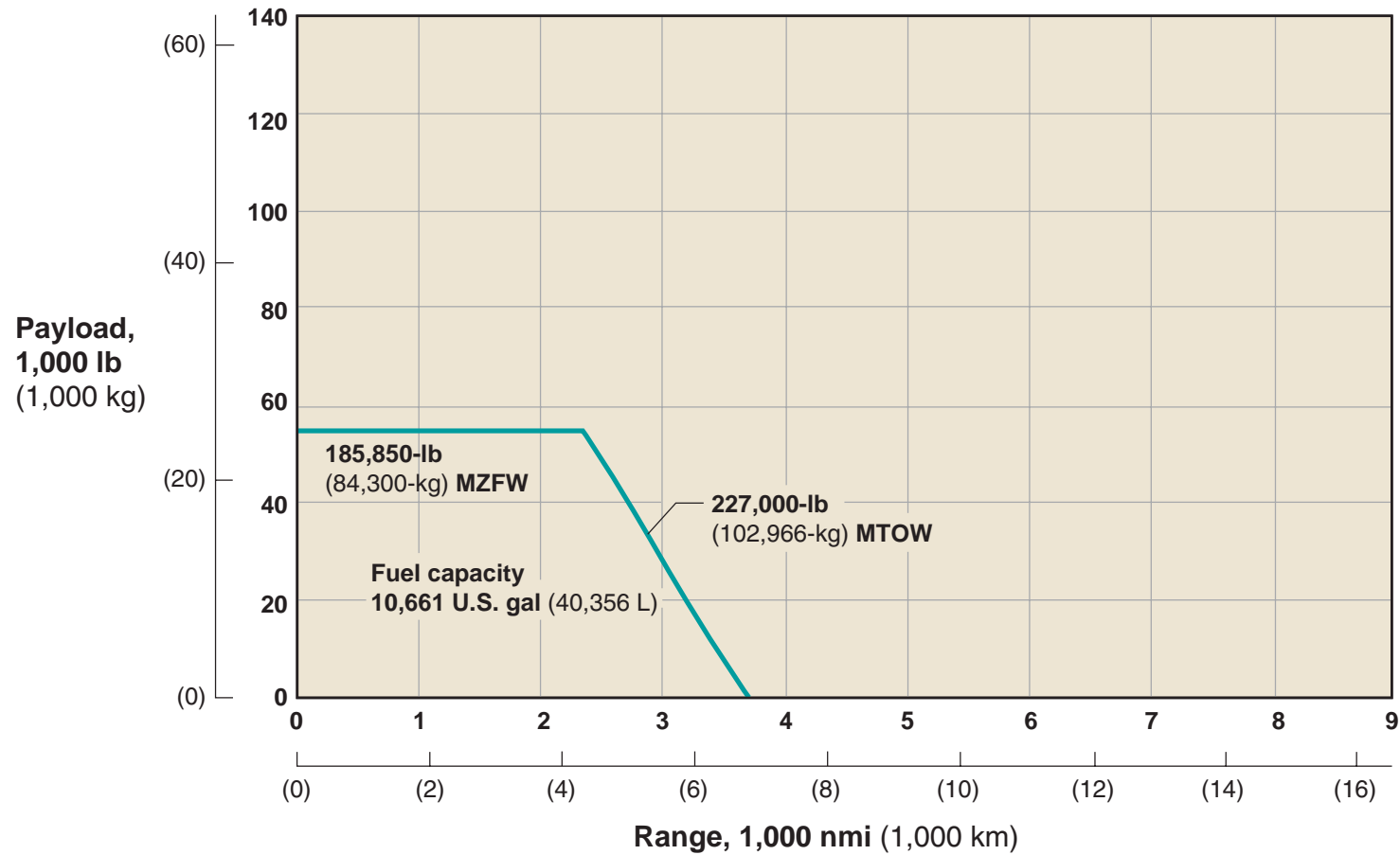
### Perm PS-90A/Rolls-Royce RB211-535-E4\* engines

	Tu-204-100C		Tu-204-120C	
<b>Cargo capacity, ft<sup>3</sup> (m<sup>3</sup>)</b>				
Main deck	<b>5,720</b>	(162.0)	<b>5,720</b>	(162.0)
Lower hold	<b>932</b>	(26.4)	<b>932</b>	(26.4)
<b>Total cargo volume</b>	<b>6,652</b>	(188.4)	<b>6,652</b>	(188.4)
<b>Maximum gross weight, lb (kg)</b>				
Takeoff	<b>227,075</b>	(103,000)	<b>227,075</b>	(103,000)
Landing	<b>197,310</b>	(89,500)	<b>197,310</b>	(89,500)
Zero fuel	<b>185,625</b>	(84,200)	<b>185,625</b>	(84,200)
Structural limit payload (MZFW – OEW)	<b>59,524</b>	(27,000)	<b>55,116</b>	(25,000)
Operating empty weight including tare	<b>129,630</b>	(58,800)	<b>130,735</b>	(59,300)
Fuel capacity, U.S. gal (L)	<b>10,760</b>	(40,730)	<b>10,760</b>	(40,730)
<b>Design range (MZFW payload), nmi (km)</b>	<b>2,321</b>	(4,300)	<b>1,808</b>	(3,350)
<b>Chapter 3 cumulative margin, EPNdB</b>			<b>-14.7</b>	

\* Tu-204-120C



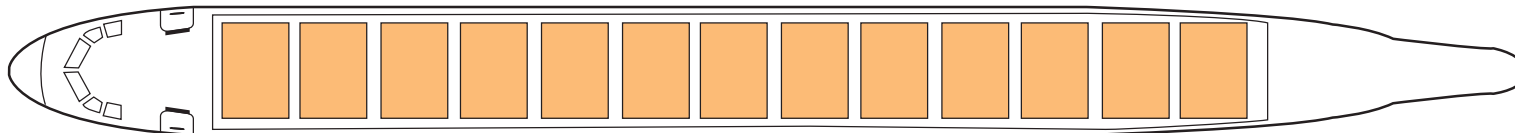
### Perm PS-90A/Rolls-Royce RB211-535-E4\* engines



\* Tu-204-120C



### Main deck cargo arrangement



**13 containers, 88 x 125 in (2.2 x 3.2 m)**  
**Volume, 5,720 ft<sup>3</sup> (162.0 m<sup>3</sup>); bulk volume, 932 ft<sup>3</sup> (26.4 m<sup>3</sup>)**



### Cross section

