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EASA Introduction

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Training Manual

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ATA 00–20 EASA INTRODUCTION

ATA 00 INTRODUCTION

00–00 INTRODUCTION GENERAL

DEVELOPMENT OF THE A320 FAMILY

History

After the initial success of the Airbus A300, Airbus began developing a new model aimed at replacing the world's most popular aircraft at the time, the Boeing 727. The new Airbus would be of the same size, but offering better operating economics and available in various passenger capacities.

The digital technology in the A320 would herald a two–generation technological leap over the all–analog Boeing 727 and be a generation ahead of the Boeing 737 series.

The A320 was targeted at the global fleet replacement requirements for the 727 and early variants of the 737.

After the oil price rises of the 1970s, Airbus needed to minimize the trip fuel costs of the A320. To assist this aim, Airbus incorporated advanced features such as fly–by–wire flight controls, composite primary structures, center–of–gravity control using fuel, glass cockpit and a 2–person flight deck. With all these technologies on board, the A320 achieved 50% less fuel consumption than the 727

In Service

The type certificate for the A320 was awarded by the JAA on February 26, 1988. After entering the market in March 1988 with Air France, the A320 family rapidly expanded:

- the 185–seat A321 Program was launched in 1989
- the 124–seat A319 Program was launched in 1993
- the 107–seat A318 Program was launched in 1999

The A320 Family has become one of the world's safest airliners, with thousands safely in service. Compared to other airliners of the same class, the A320 features a wider cabin and larger overhead bins along with fly–by–wire technology.

In addition, the aircraft has a spacious cargo hold equipped with large doors to assist in expedient loading and unloading of goods.

These features have resulted in orders from airlines such as Northwest Airlines as the United States launch customer, United Airlines and British Airways.

Its low maintenance and operating costs have also appealed to low–cost carriers. JetBlue, for example, ordered up to 233 of the A320 family for its fleet.

Variants

The A320 has given rise to a family of aircraft which share common design. Typical range with 150 passengers is about 2900 nautical miles. It's powered by two CFM56–5 or IAE V2500 engines.

- A320–100: First Model, very few produced
- A320–200: The definitive version, features wingtip fences and increased fuel capacity over the A320–100 increased range.

The A321 is the lengthened version. The wing are slightly enlarged and the undercarriage is strengthened. Typical range with 186 passengers is about 2300 nautical miles.

- A321–100:
- A321–200: Extra fuel capacity to enlarge the operational range up to 3000 nautical miles.

The A319 is the shortened version, with nearly the same fuel capacity as the A320–200 and fewer passengers. Typical range with 124 passengers extends to 3900 nautical miles.

- A319CJ: Corporate Jet Version, incorporates 6 additional fuel tanks in the cargo compartment. This leads to an operating range of 6500 nautical miles.
- A319LR: This version contains only a business class layout (48 seats), used for exclusive business class service on intercontinental routes. Typical range is 4500 nautical miles by 4 additional fuel tanks.

The A318 is the smallest member of the family. Typical Range with 109 passengers is up to 3250 nautical miles.

- A318: 6m shorter and 14 tonnes lighter than the A320.
- A318 Elite: Announced by Airbus in November 2005. The Elite is aimed for the medium range market for flights up to 4000 nautical miles. Two cabins are possible to seat up to 14 till 18 passengers.

FAMILY TIES FILM

Introduction

“Before we design an aircraft, there are a lot of people we listen to:

the businessman is interested in saving time, the cabin crew want the aircraft to be user friendly, the ground crew want easy maintenance, the pilot wants the aircraft to be dependable and easy to handle, management are interested in the bottom line and our sales team want an aircraft that can go out and beat the competition with.

So when we have done the listening, we started to design a new generation 150 seat. And what we design has been a great success on original lines all over the world.

With the latest electronics Flight By Wire control and a new approach to the man machine interface, the A320 really is the state of the art in commercial aviation.

But to the Airbus Industry approach to the success is to go further. By getting our ideas clear at the design stage we have made the A320 the start of a real family. For example, to stretch the 150 seat A320 into a 190 seat A321 we have simply to make local re–enforcements to the wing and center section and some minor changes to the flight control software. The rest could stay virtually the same. The A321 is an A320 with two extra fuselage sections and room for 36 more paying customers.

In the same way we have been able to shorten the A320 to create the A319, the most economic member of the family. These three aircraft between them cover the needs of the airlines from 124 to 185 seats. This family design makes it easier for an airline to cope with daily or seasonal variations in traffic and keep maintenance costs down because of the fleet effect.“

Comfort

“The family effect is all the greater because the initial design was right. For passengers, this means an aircraft that is comfortable and convenient in every class. The versatility of the single aisle cabin lets operate as to match the market. First, business or economy class layouts as passenger demand requires.

On regional flights, this means an equal comfort and useful flexibility for the airline.

Flexibility

The cabin intercommunication system makes it easy to vary cabin configuration. With the wide aisle, cabin crew and passengers can move more easily. A standard A321 with 196 passengers has a turn round time of only 34 minutes and this reduces to 29 minutes with the wide aisle option, 11 minutes faster than the competition.“

Efficiency

“When the baggage isn’t left behind, the cargo compartments can be unloaded and reloaded well within the passenger turn round time. 70% of A320 users have opted for the containerization system based on the LD 3 standard. A wise choice when you consider the increasing proportion of an airline income that comes from freight.

Although the A321 is only 18% longer than the A320, its underfloor capacity is 40% greater, room for three more containers.“

Technology

“Advanced composite materials and the best aluminum alloys produce a rugged yet light airframe. High structural efficiency directly reduces operating costs. The A321 and A319 are assembled in Germany at a purpose built Deutsche Airbus plant.

Since potential corrosion problems are addressed at source, structural inspection programs are simplified reducing maintenance costs and enhancing resell value.

More advanced technology can be seen in the wings which are lighter and optimized for computer control flight. Because of better aerodynamics, they made the A320 and the A321 the most fuel efficient commercial jets on the market.“

Range

“The Airbus A321 cost per passenger mile is by far the lowest in its category. The A319 has the lowest fuel consumption. The engines too interface with the flight by wire controls and the autopilot system. The whole family has the same man machine interface. The Primary Flight Display alone replaces six conventional electromagnetic instruments.

Information is displayed on a six cathode ray tubes when it is needed, thus reducing the crew’s workload. A major asset of computer–aided design is ease of access to system operation parameters. This is an advantage for the Centralized Fault Display System (CFDS), the key to maintenance guidance.

Any failure is analyzed, the faulty component identified, the diagnosis made, and if necessary the information is transmitted to the ground in real time for time saving repair.

The A320 family ties really come into their own when it comes to maintenance. Virtually all spares, test devices and procedures are identical. No need for extra stocks or special training or facilities in service staff are available for the whole family.“

Fleet Advantage

“In terms of maintenance operating A320s, A321s and A319s is the same as operating a single type. The savings are enormous, common equipment, common staff.

For cabin crew, the cabin is just a little longer or shorter. For pilots the aircraft are virtually the same. They react in the same way to the same commands. This is true of all Airbus Industry new generation aircraft from the A319 to the four engine A340.

The simulator is common to the whole family. Basic crew conversion costs are therefore much lower for airlines, which base their fleets on Airbus technology. Because the crews can be used on different aircraft, operations are more flexible and efficient.

Designing a 192/200 seater based on the A320 was a natural step. The cost effectiveness of the idea is even clearer in market forecast. The advent of the A319 is perhaps even more inhibitive. Now airlines can adapt a slack operating periods and expand their commercial networks to second relines while keeping the fleet effect.

The A319 opens up development perspectives for smaller airlines too by providing them now with a high quality aircraft that would go on being attractive.

By founding the first real family of aircraft, Airbus Industry has created a novel concept based on standardization and maximum commonality. We have provided the market with three cost effective aircraft, which operate efficiently together. This family works as a team.“

Figure 1 A320 Family

A320 FAMILY HIGHLIGHTS

ECAM

Aircraft system monitoring is now achieved by a ECAM (Electronic Centralized Aircraft Monitoring) system where system page is automatically displayed in case of failure.

EFIS

The cockpit is equipped with EFIS (Electronic Flight Instrument System), consisting of six CRT indicators.

CFDS

A CFDS (Centralized Fault Display System) uses the Multifunction Control and Display Units (MCDU) as access keyboard to perform check and trouble shooting of various computers in most of the systems in the aircraft.

MCDU

Two MCDUs (Multipurpose Control & Display Units) are used as interface for the Flight Management System ATA 22, access to the CFDS, AIDS (Aircraft Integrated Data System) & ACARS (Aircraft Communication Addressing & Reporting System).

Composite

Composite materials of different kind are used in a great extend, specially for flight control surfaces. These materials are:

- CFRP: Carbon Fiber Reinforced Plastic
- GFRP: Glass Fiber Reinforced Plastic
- AFRP: Aramid Fiber Reinforced Plastic
- QFRP: Quartz Fiber Reinforced Plastic

Fly By Wire

The conventional cables for the flight control surfaces are replaced by electrical wires, only the Stabilizer and the Rudder have a backup by cable runs.

Sidestick

The conventional control column is replaced by two sidesticks for control of the aircraft. They send electrical signal to the flight control computers.

EFCS

The aircraft is equipped with a EFCS (Electrical Flight Control System) controlled by computers.

FADEC

Each of the Engines is controlled by a FADEC (Full Authority Digital Engine Control) providing power management, indications and engine limitation among other duties. Pilot control is achieved by means of electrical power levers on the pedestal.

CIDS

The Cabin Intercommunication Data System (CIDS) is a microprocessor based system. It operates, controls and monitors the main cabin systems and can do different system and unit tests.

The connected systems are:

Air conditioning,

Communications,

Fire protection,

Escape facilities,

Ice protection,

Cabin Lights,

Water/Waste.

If the cabin layout is changed, it is not necessary to make a complex and time–consuming hardware change of CIDS components. Only the software database has to be changed to adapt e.g. the new cabin zoning.

Autobrake

The Landing Gear is equipped with Auto brake system and Carbon brakes. The system includes electronic control of Nose gear steering and brakes.

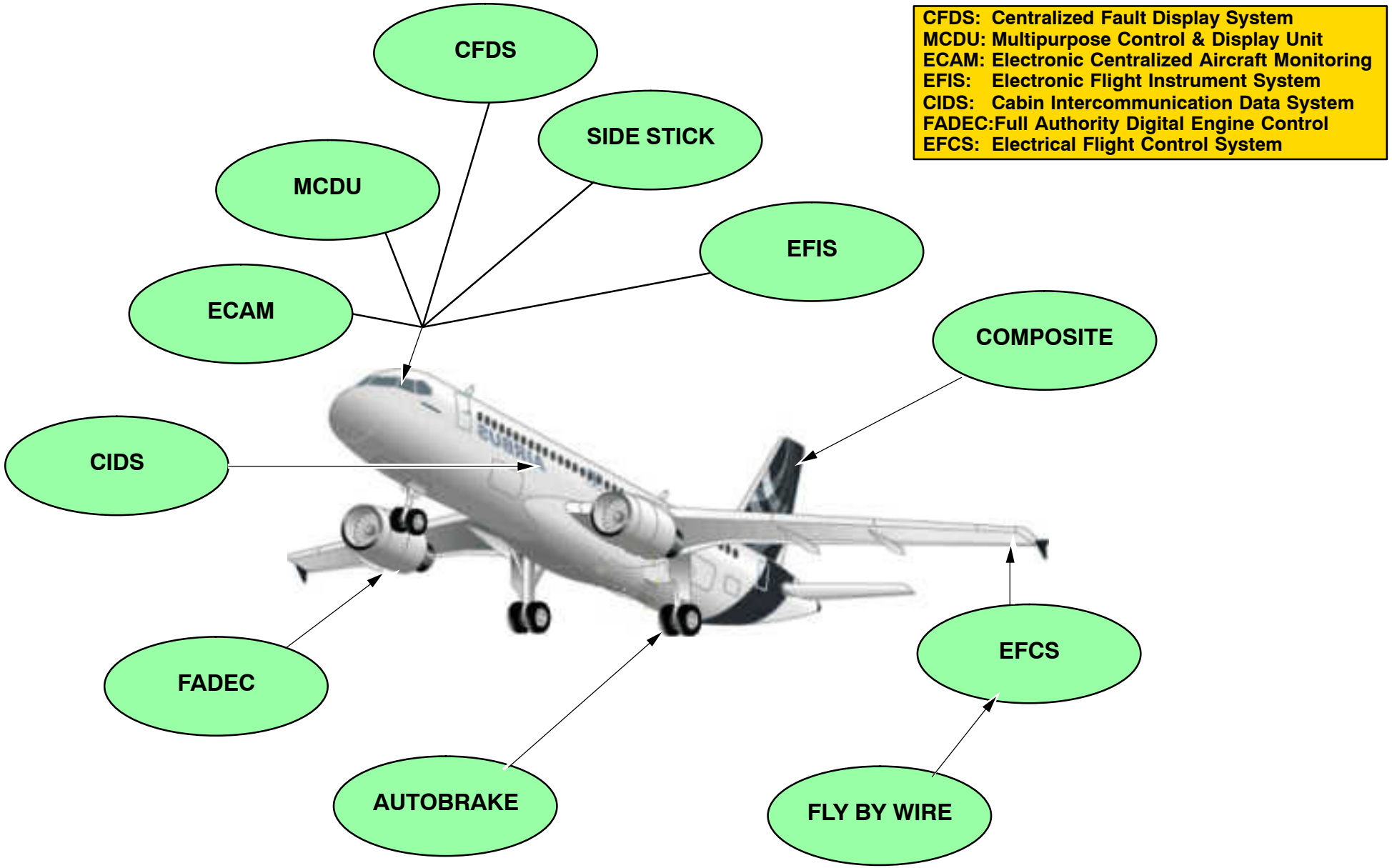


Figure 2 A320 Family Highlights

AIRCRAFT GENERAL

Maintenance Optimization

The A320 Maintenance check intervals have been escalated several times since entry into service. This is proof of the low–level of non–routine findings in A320 maintenance. A more flexible maintenance program (non “letter check“) is available to all operators since Jan 2005.

Usage parameters(days or months/ Flight hours/Flight cycles) are now used in order to optimize the resulting intervals for each operator utilization. The tasks of former A and C checks are split between 3 different sub–groups which have their interval expressed in the corresponding usage parameter (calendar / hourly / cyclic).

Each Operator is therefore able to optimize the Checks intervals depending on their own aircraft utilization.

- Daily check: 36 hours
- Weekly check: 8 calendar days
- A check: 600 FH/750 FC/100 days
- C check: 20 months/4500 FC/6000 FH
- Zonal/Structure check : 6/12 years
- Fatigue threshold: 24000 FC
- Landing Gear overhaul: 10years/20000 FC

Maximum Weights and Operating Limits

The following picture shows maximum weights and operating limits for the Single Aisle family aircraft.

Model	Engine		Maximum Weights (in 1000 kg)			Operating Limits	
	Manufacturer	TYPE	MTOW	MLW	MZW	MMO	VMO
A318–111	CFM	CFM56–5–B	Standard: 59,0 Options: 61,5-68,0	Standard: 56,0 Option: 57,5	Standard: 53,0 Option: 54,5	0,82	350 kt
A318–121	PW	PW6000A					
A319–112	CFM	CFM56–5–B6	Standard: 64,0 Options: 68,0-75,5	Standard: 61,0 Option: 62,5	Standard: 57,0 Option: 58,5		
A319–114	CFM	CFM56–5–A5					
A319–131	IAE	V2500–A5					
A320–111	CFM	CFM56–5–A1	68000	63000	59000		
A320–211	CFM	CFM56–5–A1	Standard: 73,5 Options: 75,5-77,0	Standard: 64,5 Option: 66,0	Standard: 61,0 Option: 62,5		
A320–212	CFM	CFM56–5–A3					
A320–213	CFM	CFM56–5–B5					
A320–231	IAE	V2500–A1					
A320–232	IAE	V2500–A5					
A321–131	IAE	V2530–A5	Standard: 89,0 Options: 93,0-93,5	Standard: 75,5 Options: 77,8	Standard: 71,5 Options: 73,8		
A321–111	CFM	CFM56 B1					
A321–112	CFM	CFM56 B2					
A321–113	CFM	CFM56 B5					

Abbreviations:

CFM: CFM International, **C**ommercial **F**an **M**otor International is a company jointly owned by GE („**G**eneral **E**lectric“) from USA and SNECMA („**S**ociete **N**ationale d’**E**tude et de **C**onstruction de **M**oteurs d’**A**viation“) from France.

IAE: **I**nternational **A**ero **E**ngines is a company owned by PW (**P**ratt & **W**hitney), RR (**R**olls **R**oyce), MTU Aero Engines and the Japanese Aero Engines Corp.

MTOW: **M**aximum **T**ake **O**ff **W**eight

MLW: **M**aximum **L**anding **W**eight

MZW: **M**aximum **Z**ero Fuel **W**eight

MMO: **M**aximum **M**ach **O**perating Speed

VMO: **M**aximum **O**perating Speed

Typical A320 Family Operation Ranges:	
A318	3900 NM (MTOW 66t)
A319	4200 NM (MTOW 68t)
A320	3600 NM (MTOW 77t)
A321	3100 NM (MTOW 83t)

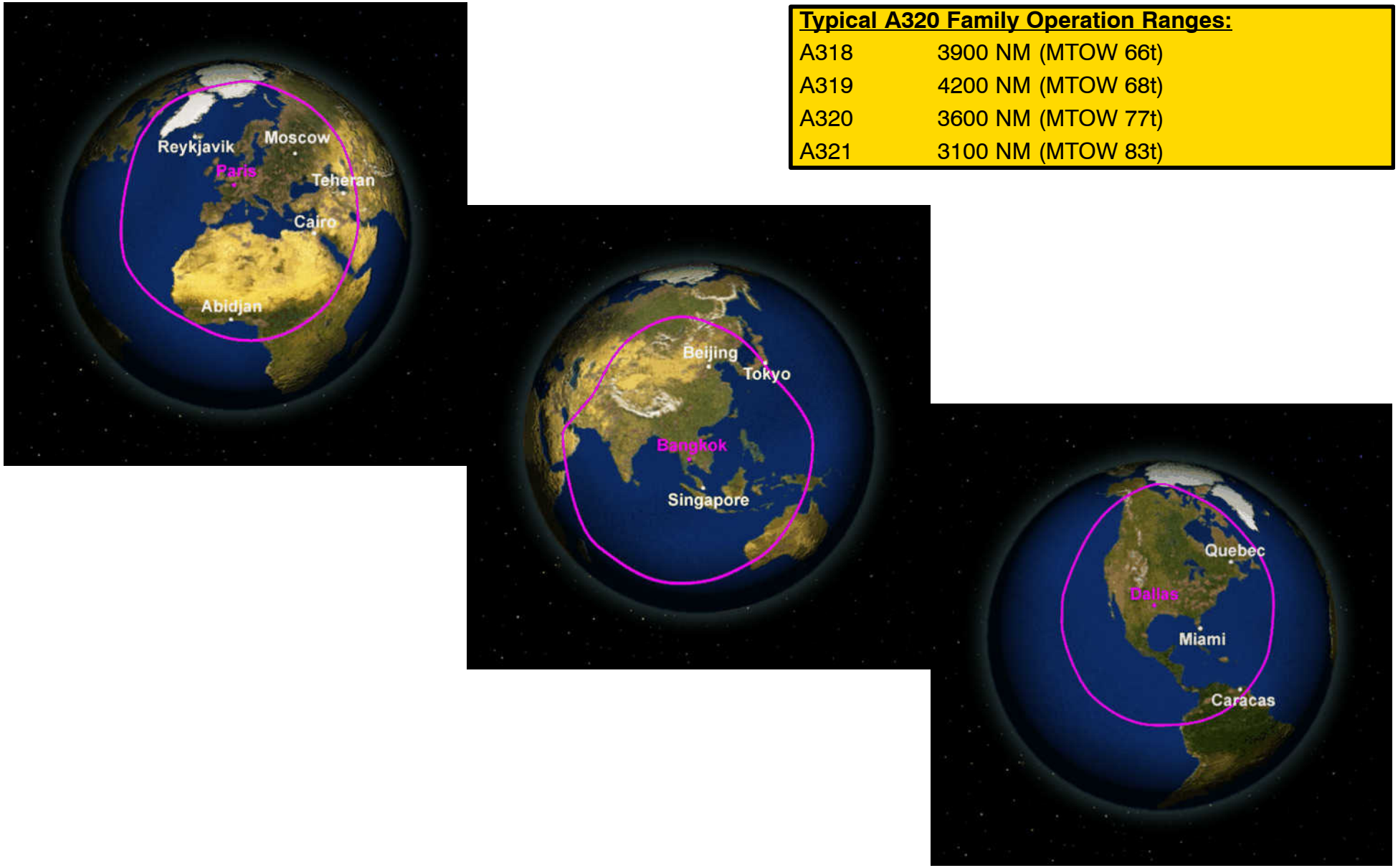


Figure 3 Typical Operating Ranges

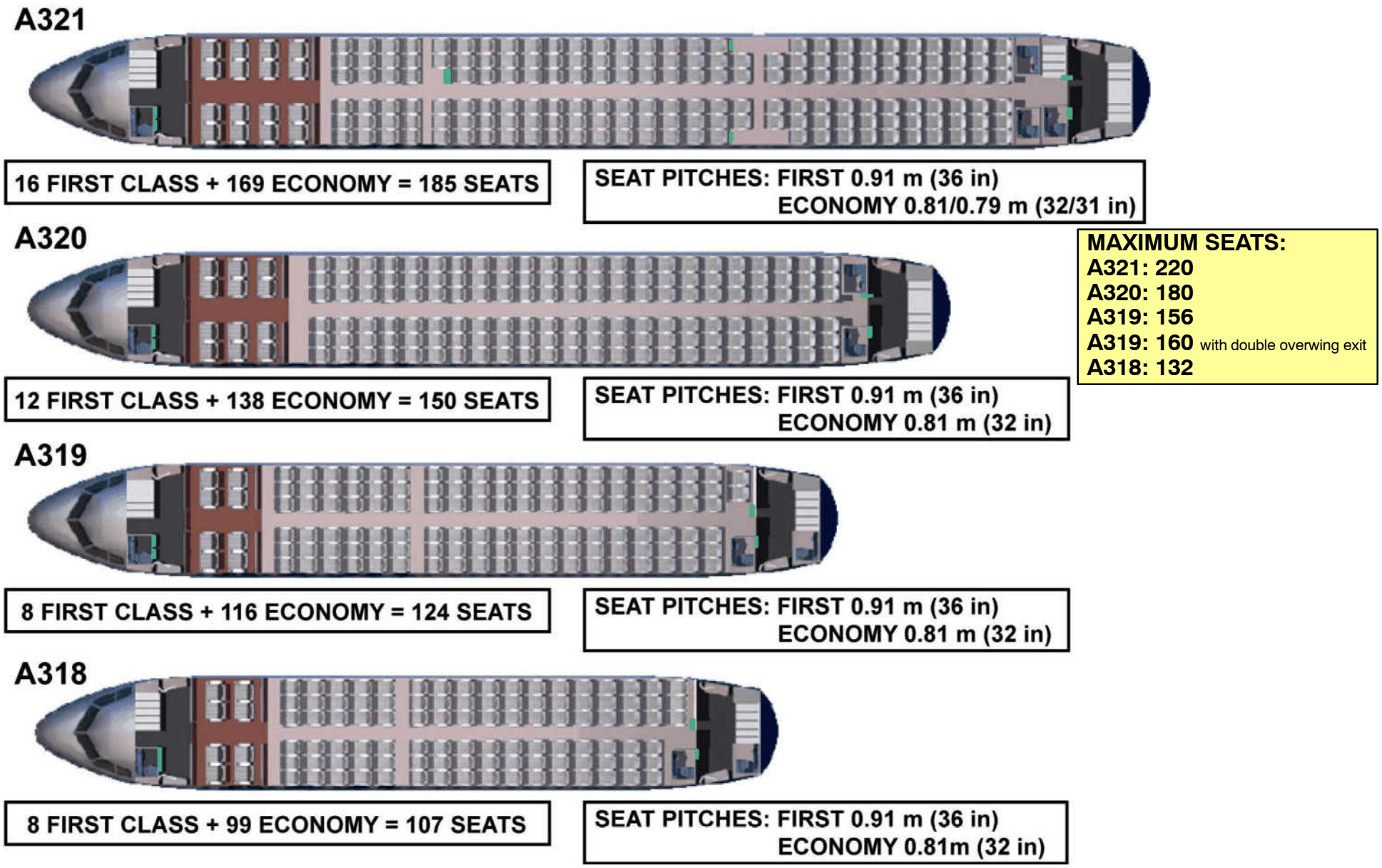


Figure 4 Seat Quantity

AIRCRAFT MATERIALS

Metallic Materials

The basic A/C structure is made of aluminum alloys with stainless steel and titanium alloys in specific areas.

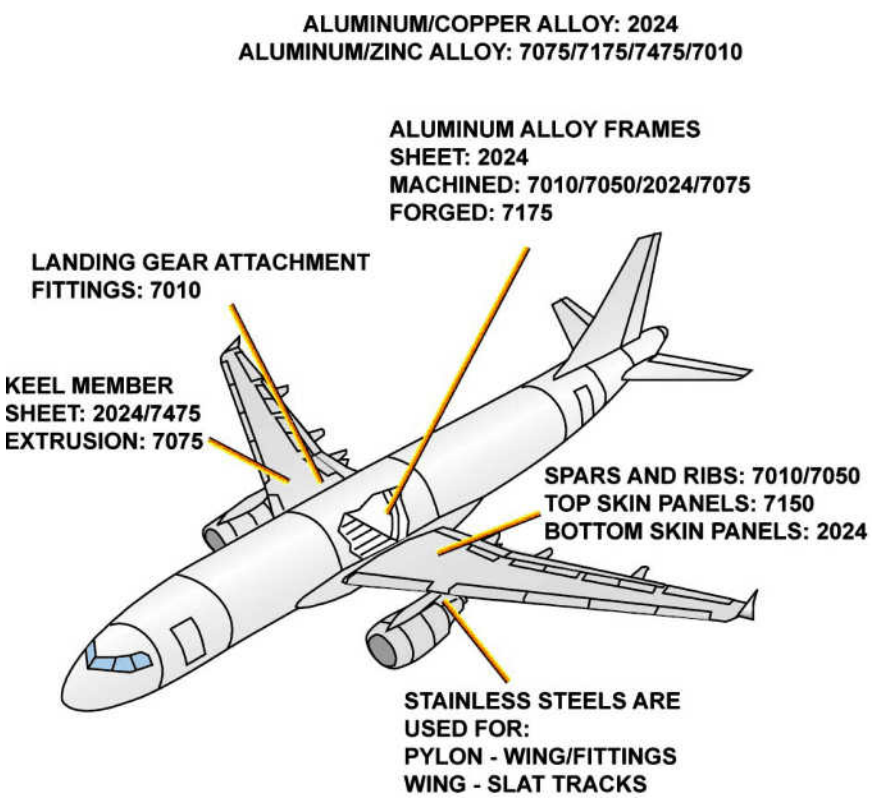
Composite Materials

Composite materials are used for primary and secondary structure.

Composite materials represent about 15% of the A/C structural weight.

Carbon Fiber Reinforced Plastic (CFRP) is mainly used for primary structures, whilst Aramid Fiber Reinforced Plastic (AFRP) and Glass Fiber Reinforced Plastic (GFRP) are only used for secondary structures. Quartz Fiber Reinforced Plastic (QFRP) is used for the radome.

METALLIC MATERIALS



Titanium alloy 6AL4V is used for:

Pylon: ribs / panels / fittings,
Wing: manhole doors / spar straps,
Flap track racks,
Fuselage: windshield surrounding panels / APU / fire walls

COMPOSITE MATERIALS

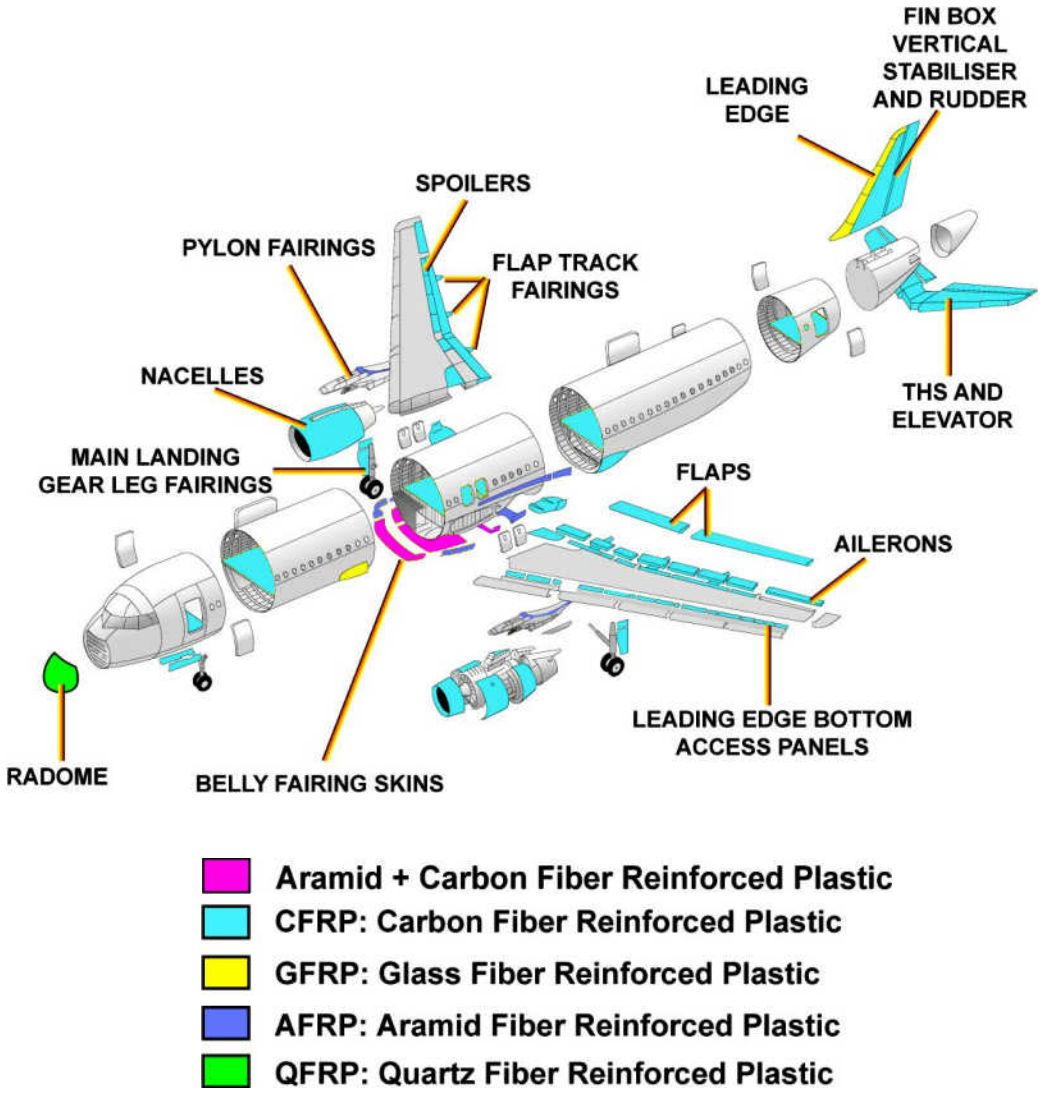


Figure 5 Aircraft Metallic & Composite Materials

COCKPIT PRESENTATION

General

The cockpit comprises the area above the floor structure between frames 1 and 12. Access to the cockpit is gained via the left forward passenger/crew door and the cockpit door. The cockpit is equipped with adjustable seats for two crew members, a third occupant seat and optional a folding seat for a fourth occupant. Various furnishings and equipment are fitted in the cockpit for the comfort, convenience and safety of the occupants.

The cockpit, furnishings consist of:

- Crew Members Seats
- Heat and Sound Insulation Panels
- Lining and Furnishing Panels
- Equipment Racks

Overhead Panel

The controls of most aircraft systems are located on the overhead panel.

The overhead panel is divided into two main sections:

- a FWD Section including the System Panels
- an AFT Section including mainly the Circuit Breaker Panel

Glare Shield

The Flight Control Unit (FCU) includes the EFIS controls, and is used for control and monitoring of the Auto Flight System (AFS). It is located on the glare shield. The ”Master Warning” and the ”Master Caution” lights are also located on the glare shield.

Main Instrument Panel

Six identical and interchangeable Cathode Ray Tubes (CRTs) or Liquid Crystal Displays (LCDs) are located on the main instrument panel of the A318, A319, A320 and A321 aircraft.

The 2 centrally located DUs are dedicated to the Electronic Centralized Aircraft Monitoring (ECAM). The other 4 displays are the Electronic Flight Instrument System (EFIS) DUs.

Standby instruments or the Integrated Standby Instrument System (ISIS) and landing gear control panels are also located on this main instrument panel.

Center Pedestal

The center pedestal ergonomic design of the SA family aircraft gives the flight crew efficient access to multiple system controls without compromising safety. The panels are:

- Switching Panel
- ECAM Control Panel (ECP)
- Multipurpose Control Display Units (MCDUs)
- Radio Management Panels (RMPs)
- Audio Control Panels (ACPs)
- Thrust Levers and Thrust Reverser Levers
- Pitch Trim Wheel
- Engine Start Panel
- Air Traffic Control/Traffic Collision Avoidance System Panel (ATC/TCAS)
- Flap/Slat and Speed Brake Control Panel
- Parking Brake Control Panel
- Cockpit Door Lock Panel
- Landing Gear Gravity Extension Handle
- Printer
- Multifunction Disk Drive Unit
- PA Handset at the rear of the Pedestal

Side Consoles

The Conventional Aircraft control yoke is noticeably missing in the Airbus Single Aisle aircraft. The Side Stick Controller (SSC) replaces the Conventional Aircraft yoke. There is one SSC for each pilot mounted in the side consoles.

The Aircraft nose wheel is steerable. The flight crew operates the Nose Wheel Steering (NWS) by using the NWS handwheel mounted outboard of the SSC on the same side console.

Behind the most forward side console are installed several other compartments along the outboard sides of the cockpit. These side consoles are used as stowage space for documents, oxygen masks, fire extinguisher and microphone and headset connections

Figure 6 Cockpit Overview

AVIONICS COMPARTMENT

General

The avionics compartment is located in the underfloor nose section between Frames 1 and 24.

Its structure is as follows:

- Frames 1 to 9: the avionics compartment forward part, forward of the nose landing gear well, under the cockpit.
- Frames 0 to 20, R side and L side: the avionics compartment lateral left and lateral right parts, on each side of the nose gear well, under the cockpit and the forward passenger compartment.
- Frames 20 to 24: the avionics compartment aft part, aft of the nose gear well, under the forward passenger compartment.

The total capacity of the ventilated racks is 415 MCU (Modular Concept Unit).

Each part is fitted with a door allowing access from the outside. An access panel in the aft part of the avionics compartment allows a connection with the passenger compartment.

Avionics Compartment – Forward Part

This part contains the following items of equipment:

- Weather Radar Shelf 109VU

  Between Frames 2 and 4, L side, there is a 16 MCU capacity rack for Weather Radar installation.
- FWD Electronics Rack 90VU

  Between Frames 7 and 8, there is a 95 MCU capacity transversal rack fitted with five shelves.

Space is provided for installation of non–Arinc miscellaneous items (window heat computers, probe heat computers, contactors, relays, miscellaneous equipment, etc...).

There is also a ground power receptacle forward of the nose gear between Frames 7 and 8.

All the rack shelves are removable. An underfuselage access door is provided at Frame 4.

Avionics Compartment – Lateral Right Part

- This part contains the following items of equipment:
- Ann Lt Test Unit 70VU, between Frames 10 and 12,
- Relay Box 103VU, between Frames 9 and 10,
- Contactor Box 107VU, between Frames 15 and 16,
- It is also fitted with two batteries, 2 transformer rectifiers, 1 static inverter and 2 battery charge limiters.

An underfuselage off–centered door provides external access at Frame 13.

Avionics Compartment – Lateral Left Part

This part contains the following items of equipment:

- AC/DC Emergency Power Center 106VU, between Frames 13 and 15,
- the associated generator control unit, transformer rectifier and transformer.

An underfuselage off–centered door provides external access at Frame 14.

Avionics Compartment – Aft Part

This part contains the following items of equipment:

- A 30 MCU capacity rack with an adjustable shelf for ADIRS installation, located under the air cooling pack for the ventilated equipment, between Frames 21 and 22.
- Aft Electronics Rack 80VU

Between Frames 23A and 24 there is a 274 MCU capacity transversal rack having four levels.

An underfuselage off–centered door provides external access at Frame 22.

An access panel allows connection with the passenger compartment.

NOTE: This access panel is normally closed, locked and sealed because of the galley above.

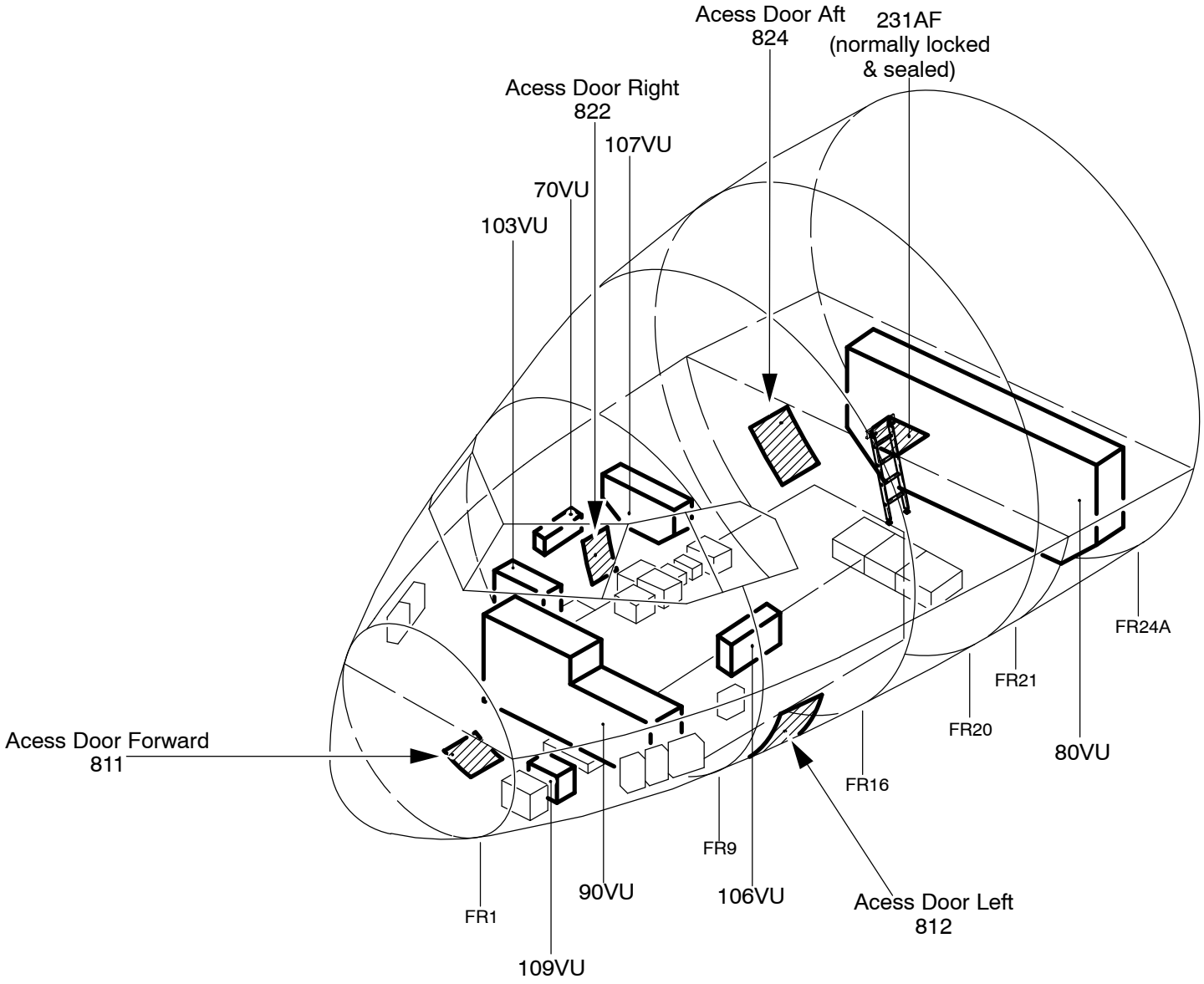


Figure 7 Avionics Compartment Overview

ATA 06 DIMENSIONS AND AREAS

06–10 DIMENSIONS AND AREAS

Aircraft Dimensions

Aircraft Dimensions	A318	A319	A320	A321
Fuselage				
Overall length	31,45 m	33,84 m	37,57 m	44,51 m
Height	12,93 m	11,75 m	11,75 m	11,75 m
Fuselage Diameter	3,95 m			
Max. Cabin Width	3,70 m			
Cabin Length	21,38 m	23,77 m	27,50 m	34,44 m
Wings				
Span	34,1 m (35.80 m with Sharklets)			
Area	122,4 m2			
Stabilizers				
Area of THS	31 m2			
Area of Vertical Stabilizer	23,1 m2	21,5 m2		
Height	12,56 m	11,76 m		
Wheel				
Wheelbase	10,25 m	11,05 m	12,65 m	16,92 m
Wheel track	7,59 m			

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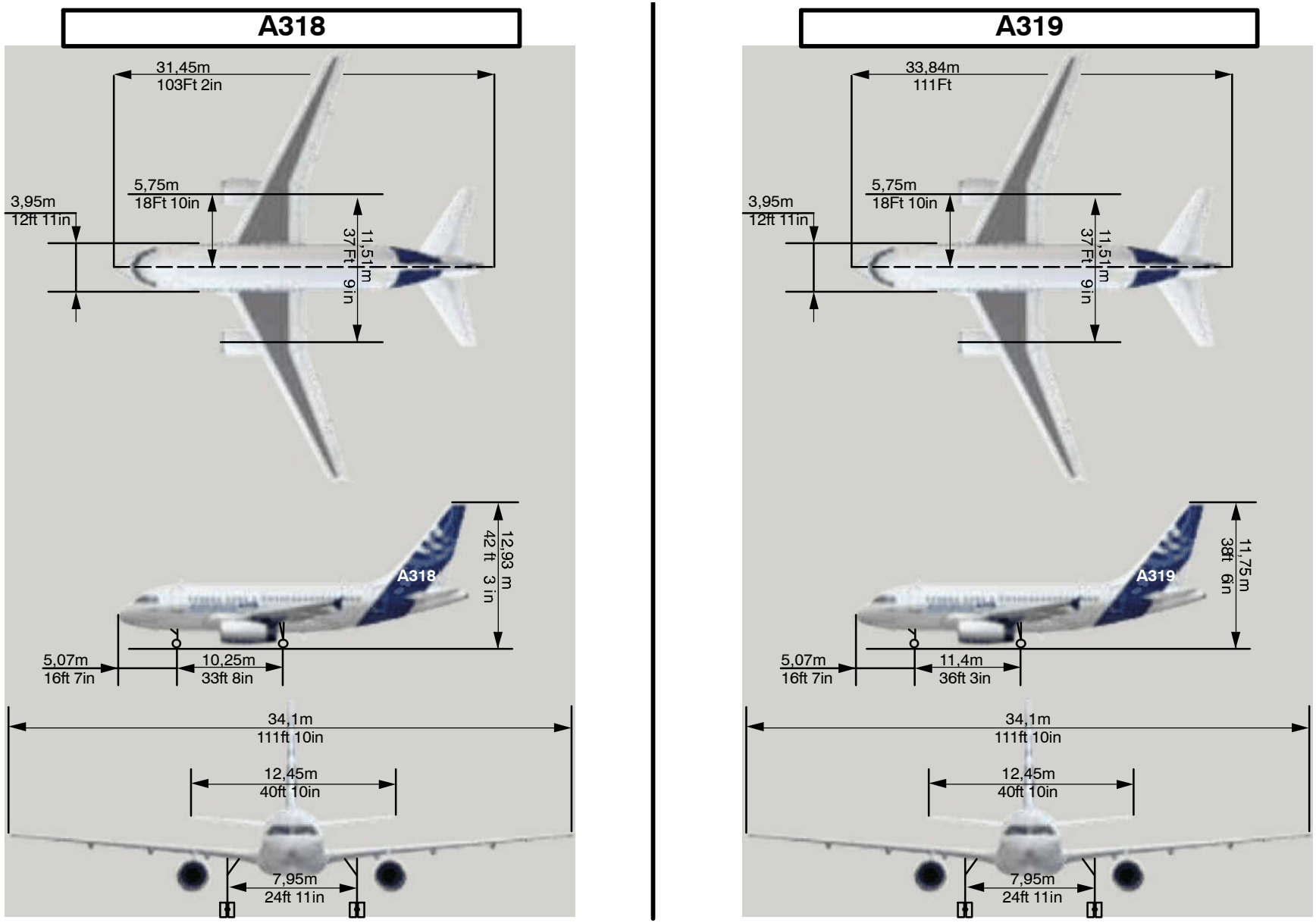

Figure 8 Dimensions A318 and A319

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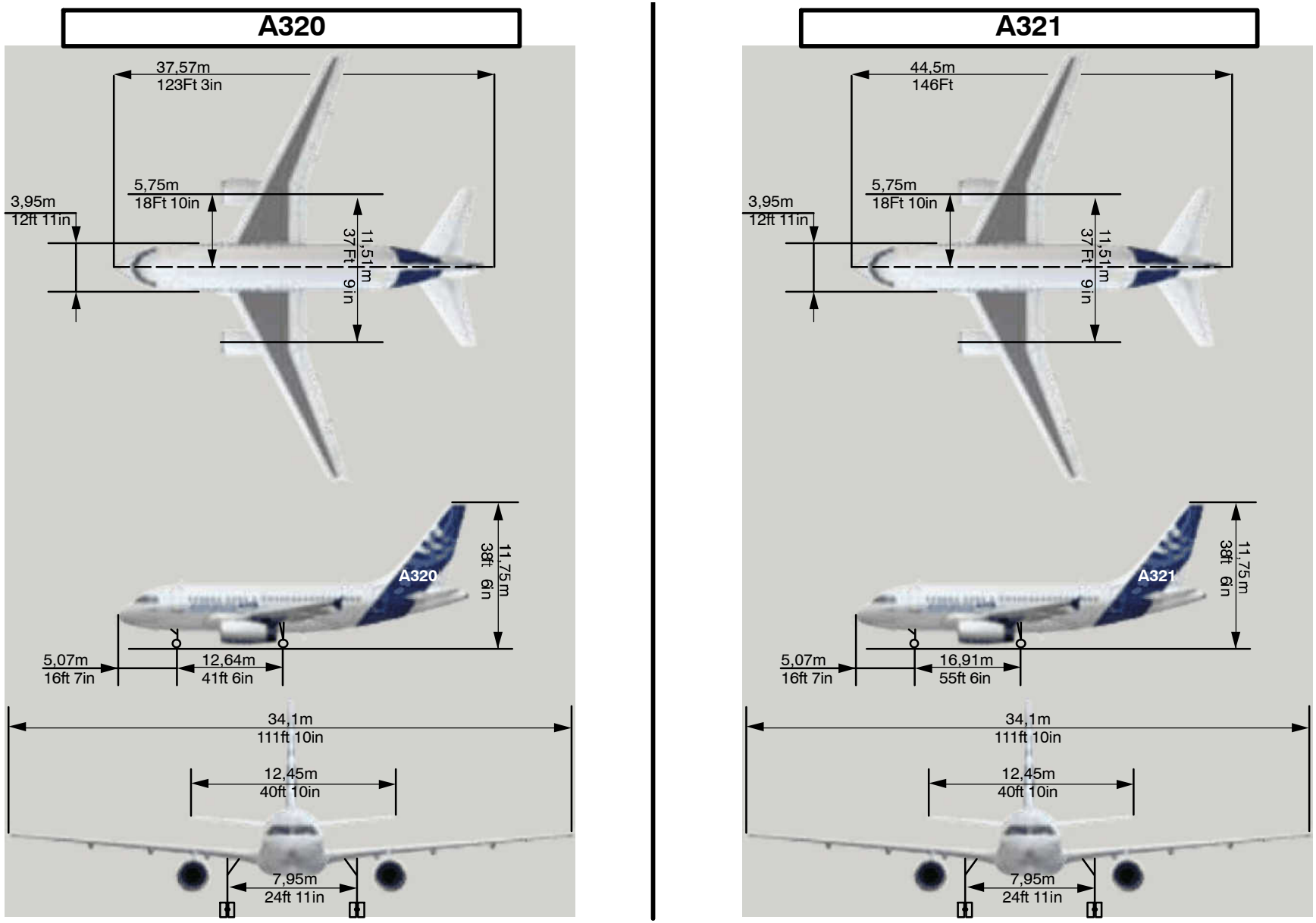


Figure 9 Dimensions A320 and A321

DIMENSIONS AND AREAS

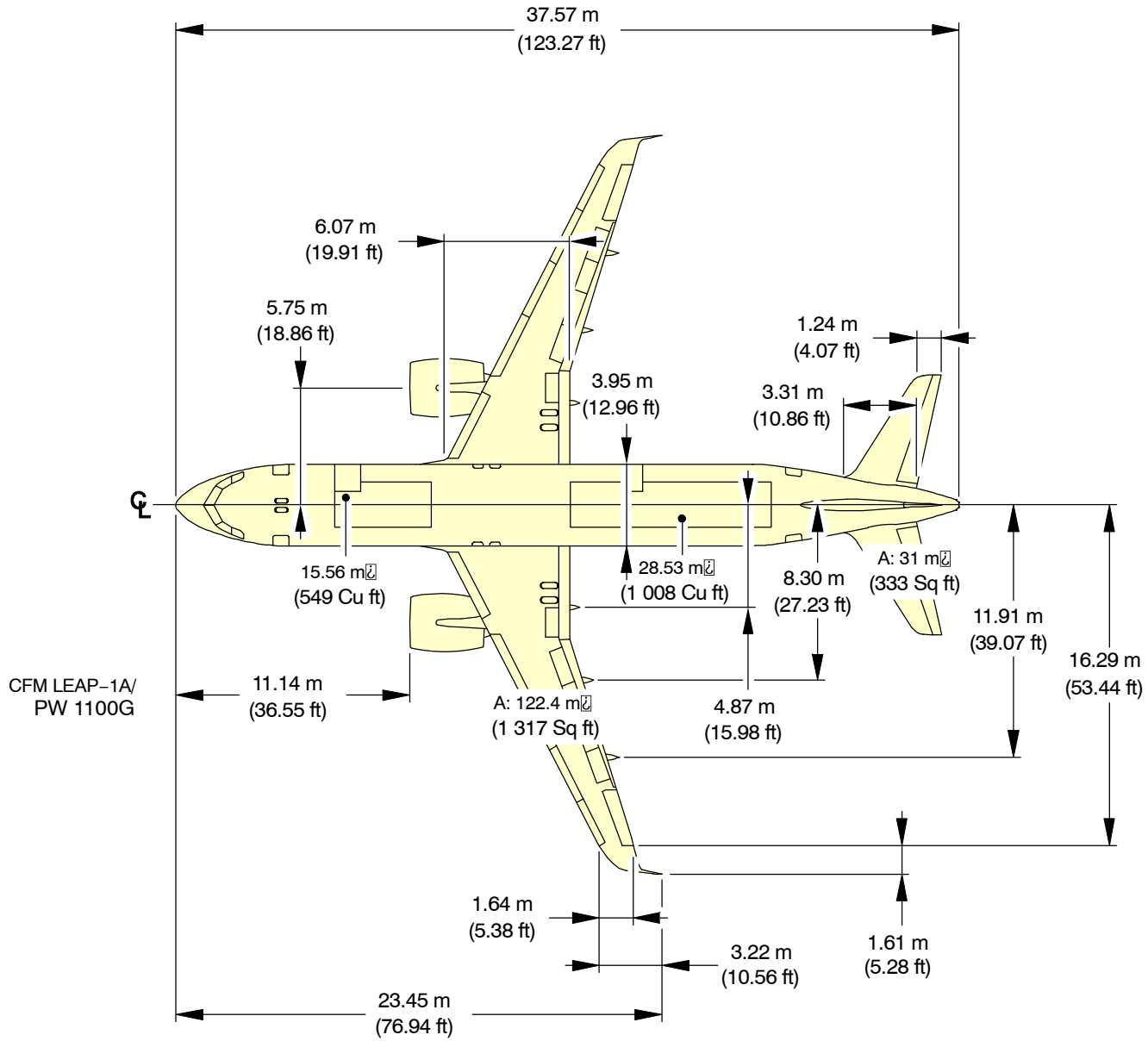
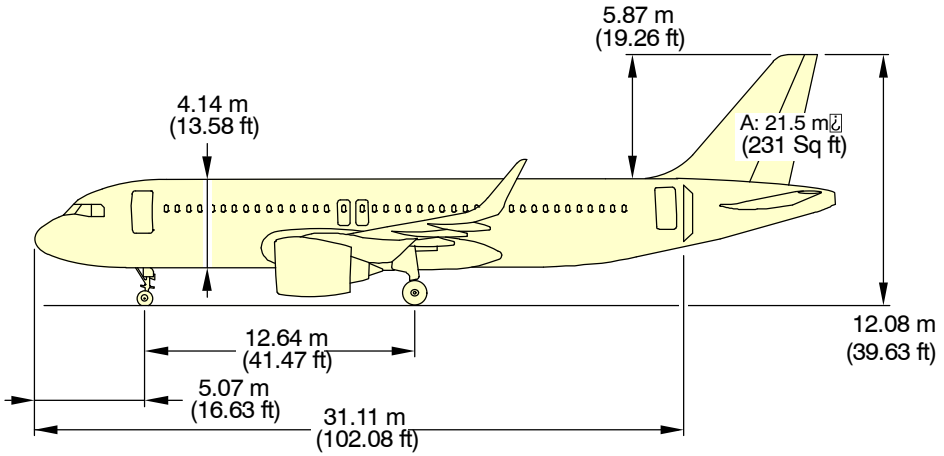


Figure 10 Dimensions A320 Neo



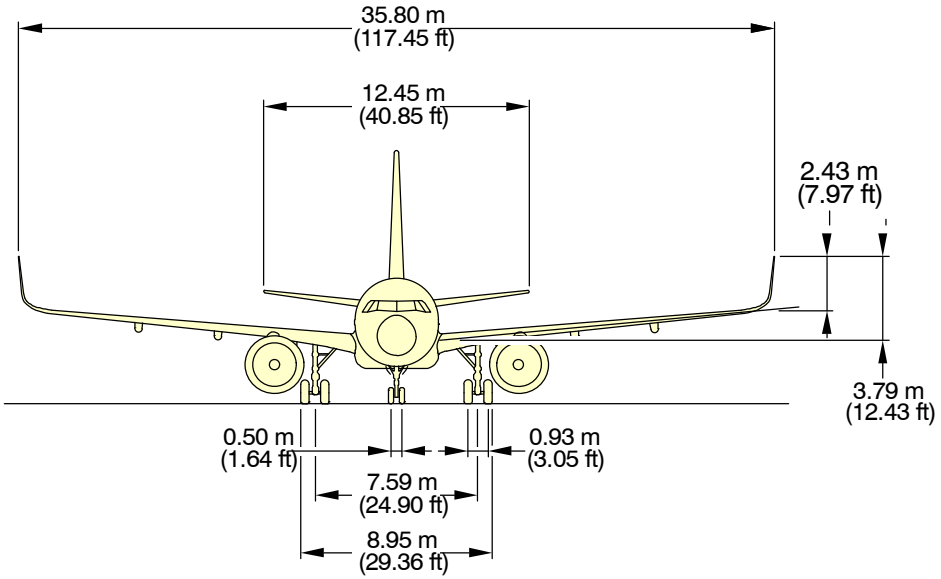
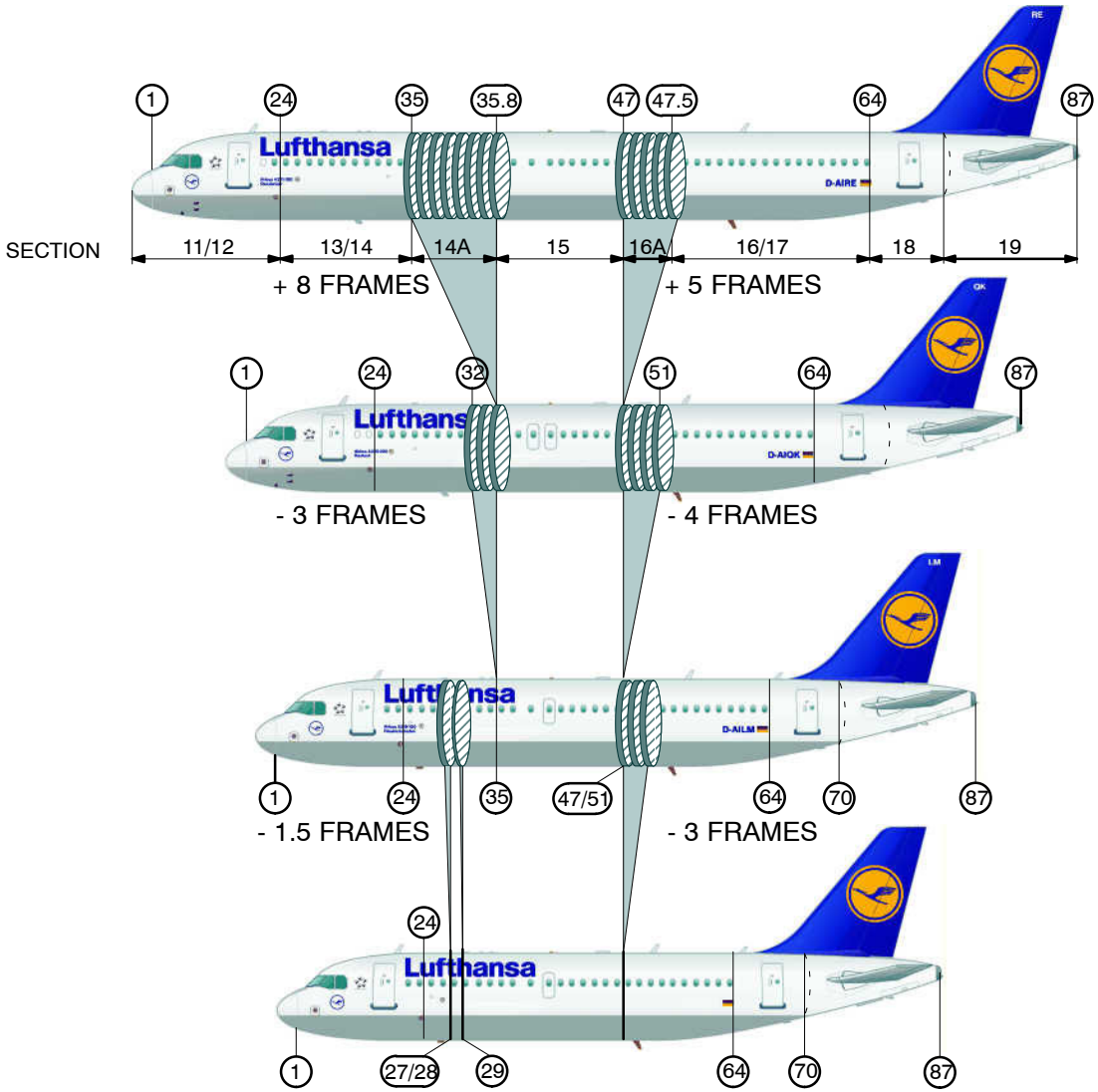


Figure 11 Dimensions A320 Neo



A321
+13 FRAMES
(+ 6.93 m / 273 in)

A320
(BASE MODEL)

A319
- 7 FRAMES
(- 3.73 m / 147 in)

A318
- 4.5 FRAMES
(- 2.38 m / 94 in)

Figure 12 Aircraft Frames Comparison

DIMENSIONS AND AREAS

REFERENCE AXES

General

The structure elements are installed according to the following reference axes.

- The X (roll) axis in the longitudinal direction of the fuselage.
- The Y (pitch) axis in the direction of the wing span.
- The Z (yaw) axis in the vertical direction

The cross section P presents a typical fuselage section at frame 47.

NOTE: The reference (station 0) for all structural measurements for the X axis is set at 100 inch (254 cm) forward of the A/C nose.

DIMENSIONS AND AREAS

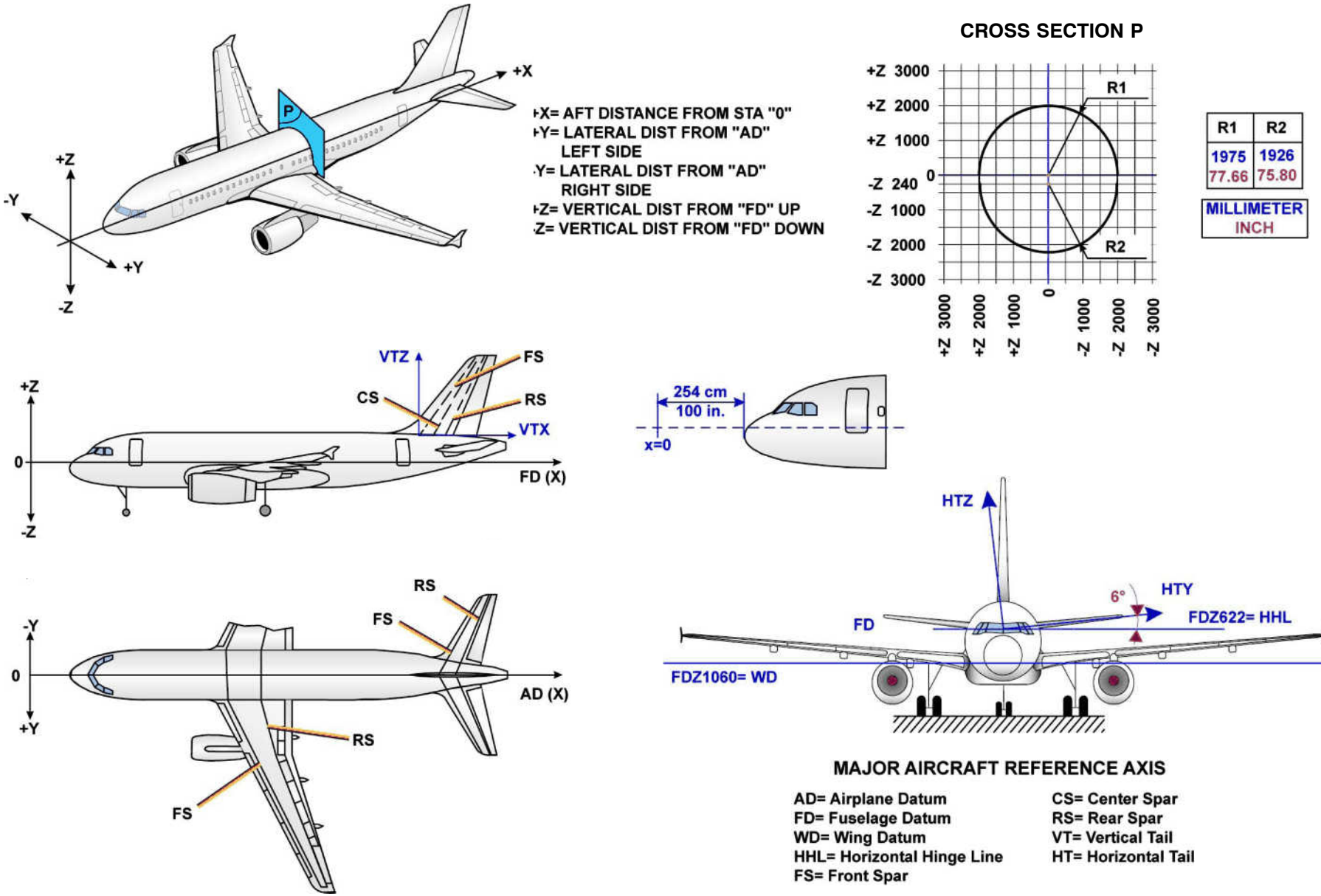


Figure 13 Aircraft Reference Axes

DIMENSIONS AND AREAS

STATION NUMBERS

Fuselage

The Station number is the distance in millimeters of a cross–section from a reference point.

The reference (X=0) for all structural measurements in the X–axis is located 2.54 m (100 in) forward of the aircraft.

The station/frame numbers shown agree with the section boundaries.

DIMENSIONS AND AREAS

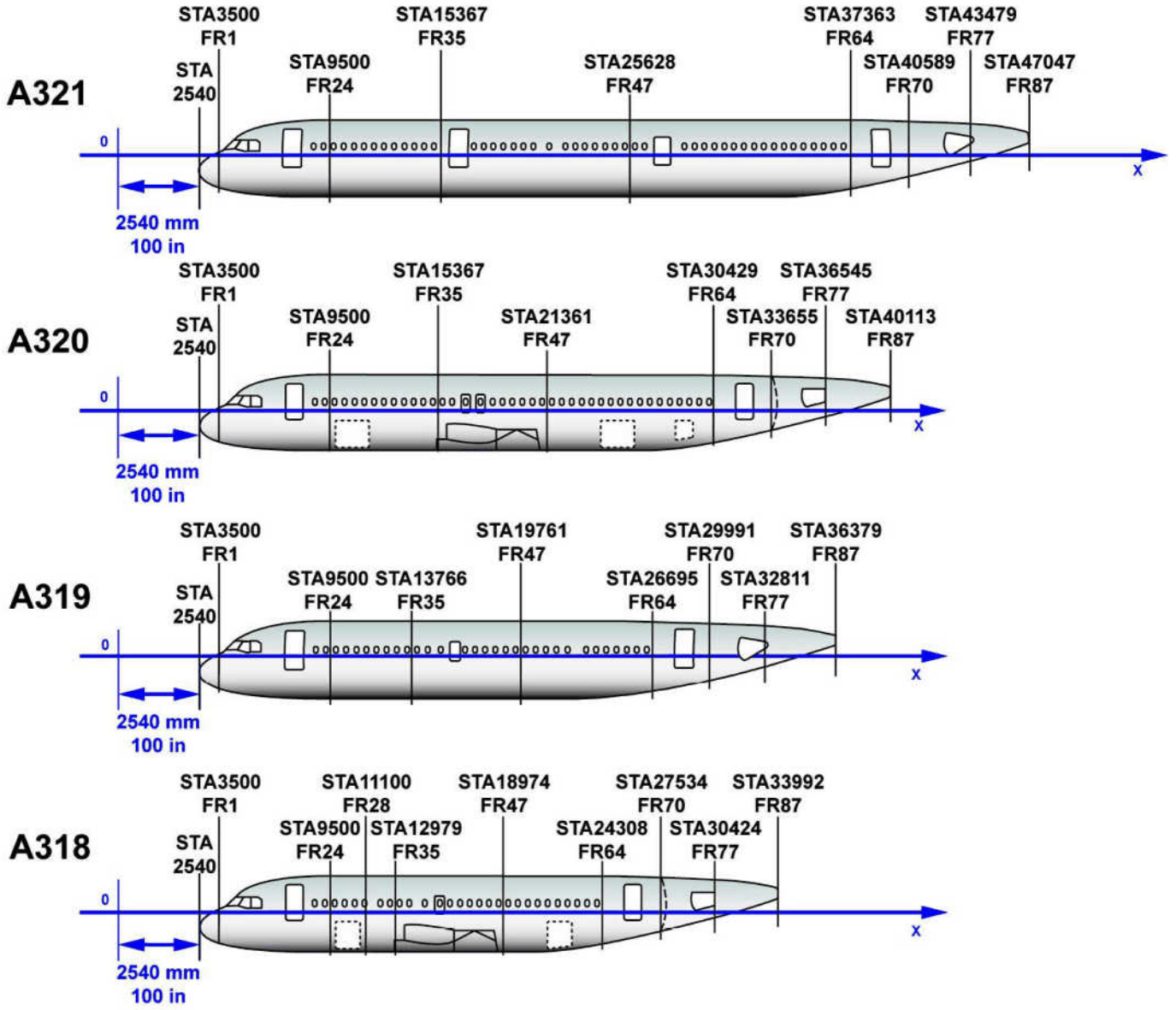


Figure 14 Aircraft Stations

DIMENSIONS AND AREAS

Vertical Stabilizer

For the vertical stabilizer the reference station is Z=0 at the vertical Z–axis. Due to the fin tip extension, the A318 station numbers have changed. The new additional rib 12N is on the STA597.

Horizontal Stabilizer, Engine and Wing

For the horizontal stabilizer the reference station is y=0 at the A/C Y axis.

For the wings, the reference station is the wing reference axis (WY). WY is located at 1868 mm (73.54 in) from the A/C X axis.
For the engines, station numbers are different depending on the version.

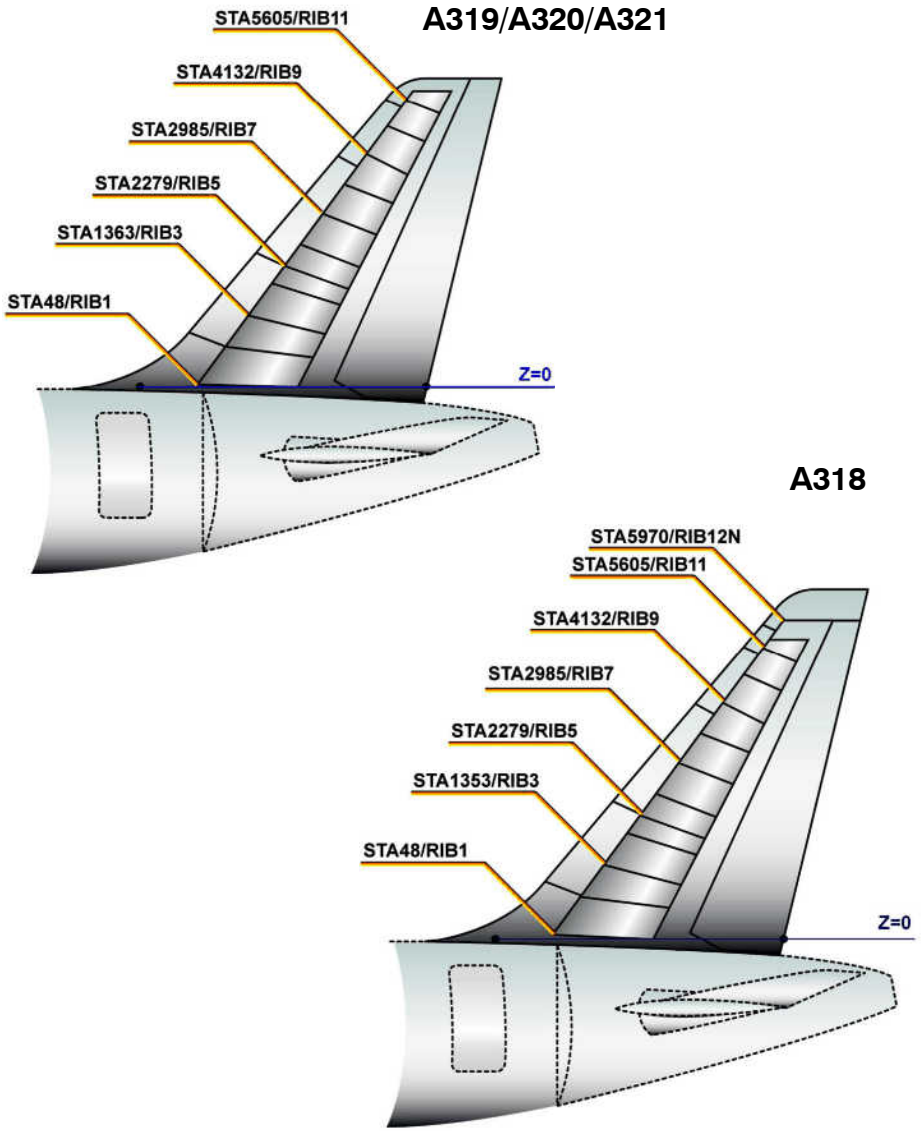


Figure 15 Vertical Stabilizer Stations

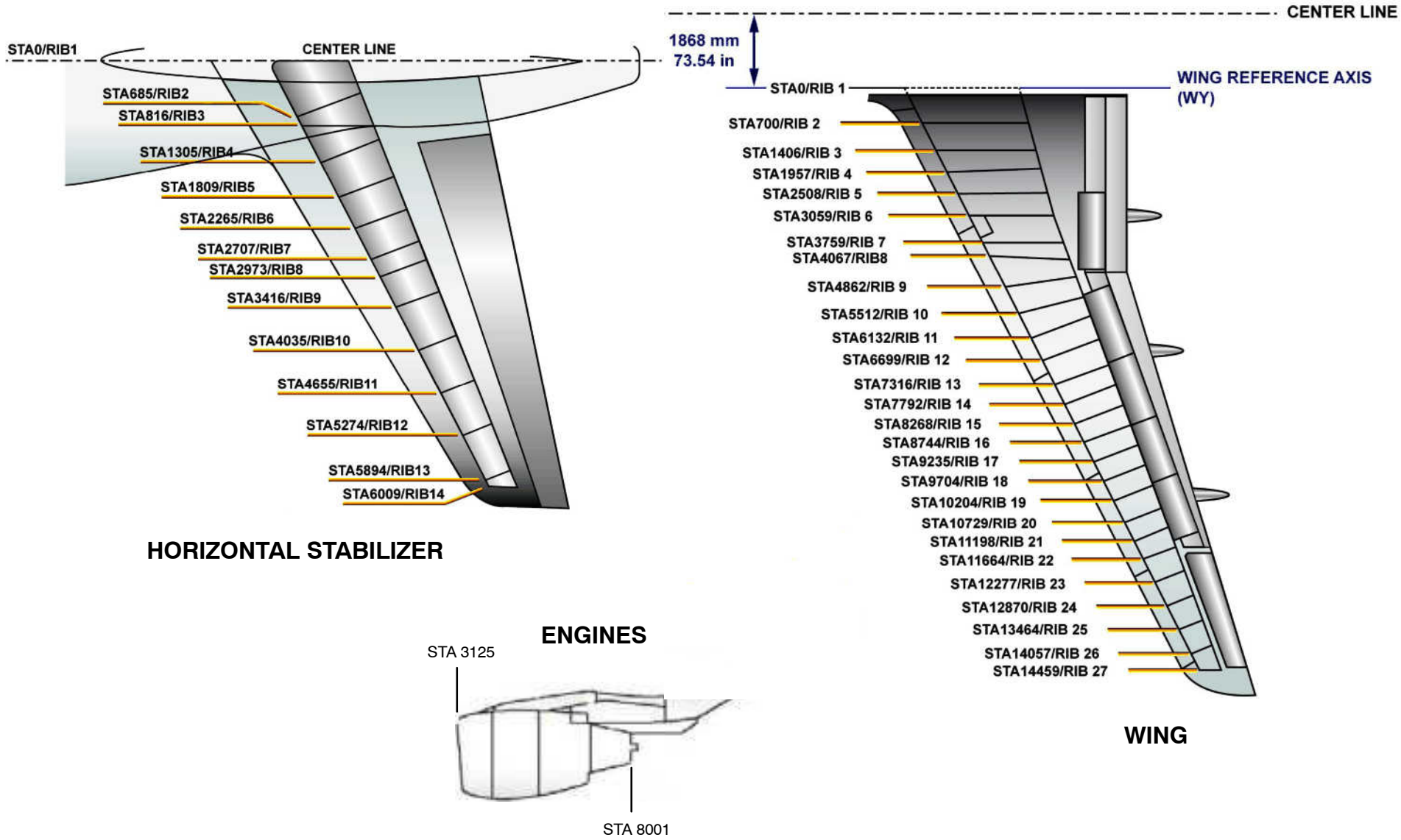


Figure 16 THS Engine & Wing Stations

06–20 ZONING

MAJOR ZONES

General

The aircraft is divided into zones as follows:

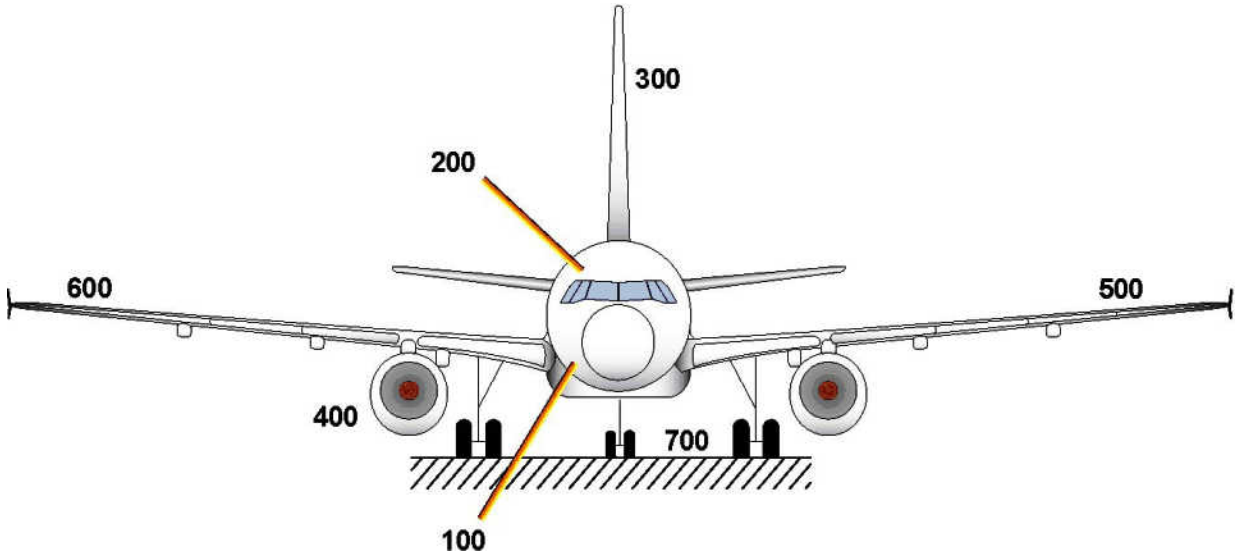
- the major zones
- the major sub–zones
- the zones

A three digit number identifies the zones.

Major Zones

There are 8 major zones for the aircraft, which are identified by the hundreds as follows:

- 100 Lower Half of the Fuselage to Aft Pressure Bulkhead
- 200 Upper Half of the Fuselage to Aft Pressure Bulkhead
- 300 Stabilizers
- 400 Nacelles
- 500 Left Wing
- 600 Right Wing
- 700 Landing Gear
- 800 Doors



100 TO 199: LOWER HALF FUSELAGE
200 TO 299: UPPER HALF FUSELAGE
300 TO 399: STABILIZERS AND FUSELAGE TAIL SECTION
400 TO 499: PYLON AND NACELLE
500 TO 599: LEFT WING
600 TO 699: RIGHT WING
700 TO 799: LANDING GEAR
800 TO 899: DOORS

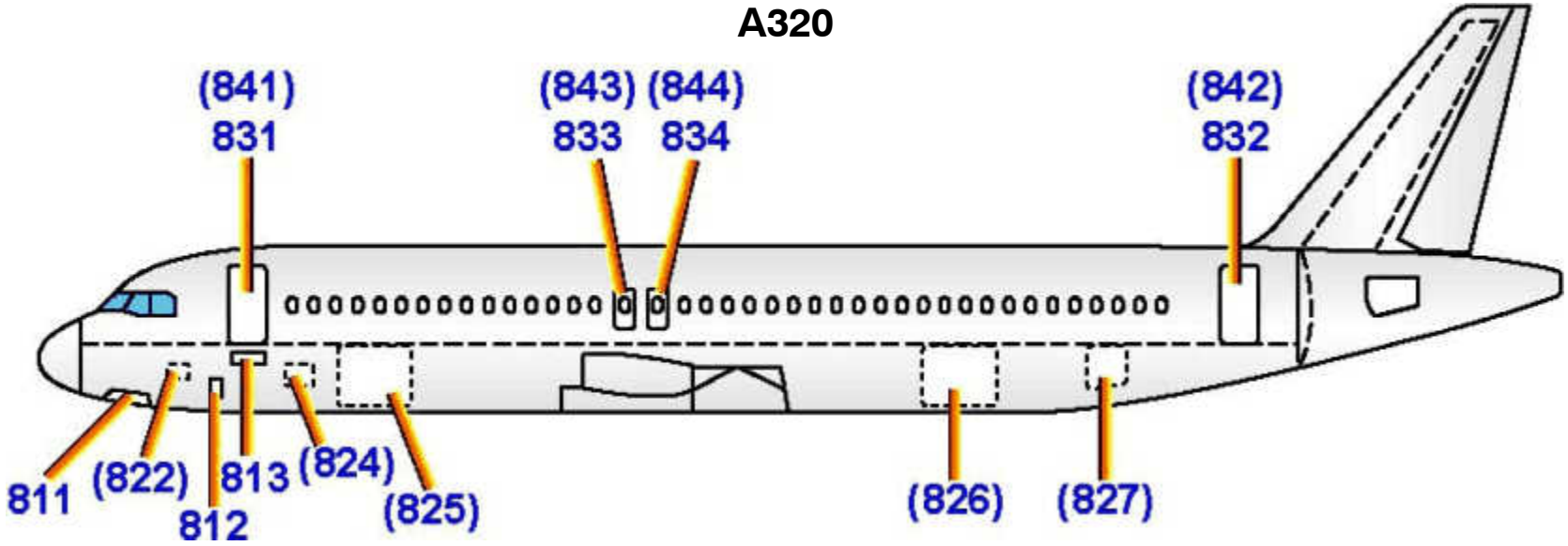


Figure 17 Aircraft Major Zones

MAJOR SUB-ZONES

Major Sub-Zones

Major sub–zones are identified through tenth digit of the three digit zone number.

Numbering takes places within the major zone from:

- Front to Rear and
- Inboard to Outboard
  e.g. 210, 220 etc. (except 190 are wing to body fairings).

A zone defines a certain position within that major sub–zone.

They are identified through single digit numbering, counting from 0 to 9.
Numbering within a major sub–zone happens as follow:

- From Front to Rear
- From Inboard to Outboard
- Uneven Numbers
  (e.g. 131, 211, etc.) identify the left hand side of the center line
- Even Numbers
  (e.g. 142, 162, 264, etc.) identify the right hand side of the center line

Example

For example 162

- Major–Zone 100 identifies the Range below Center Line
- Major Sub–Zone 160 identifies the Bulk Cargo Compartment
- Zone 162 identifies the FWD Right Hand Part of Bulk Cargo Compartment

NOTE: Wings, stabilizers and engine nacelles have similar major sub-zones and units.

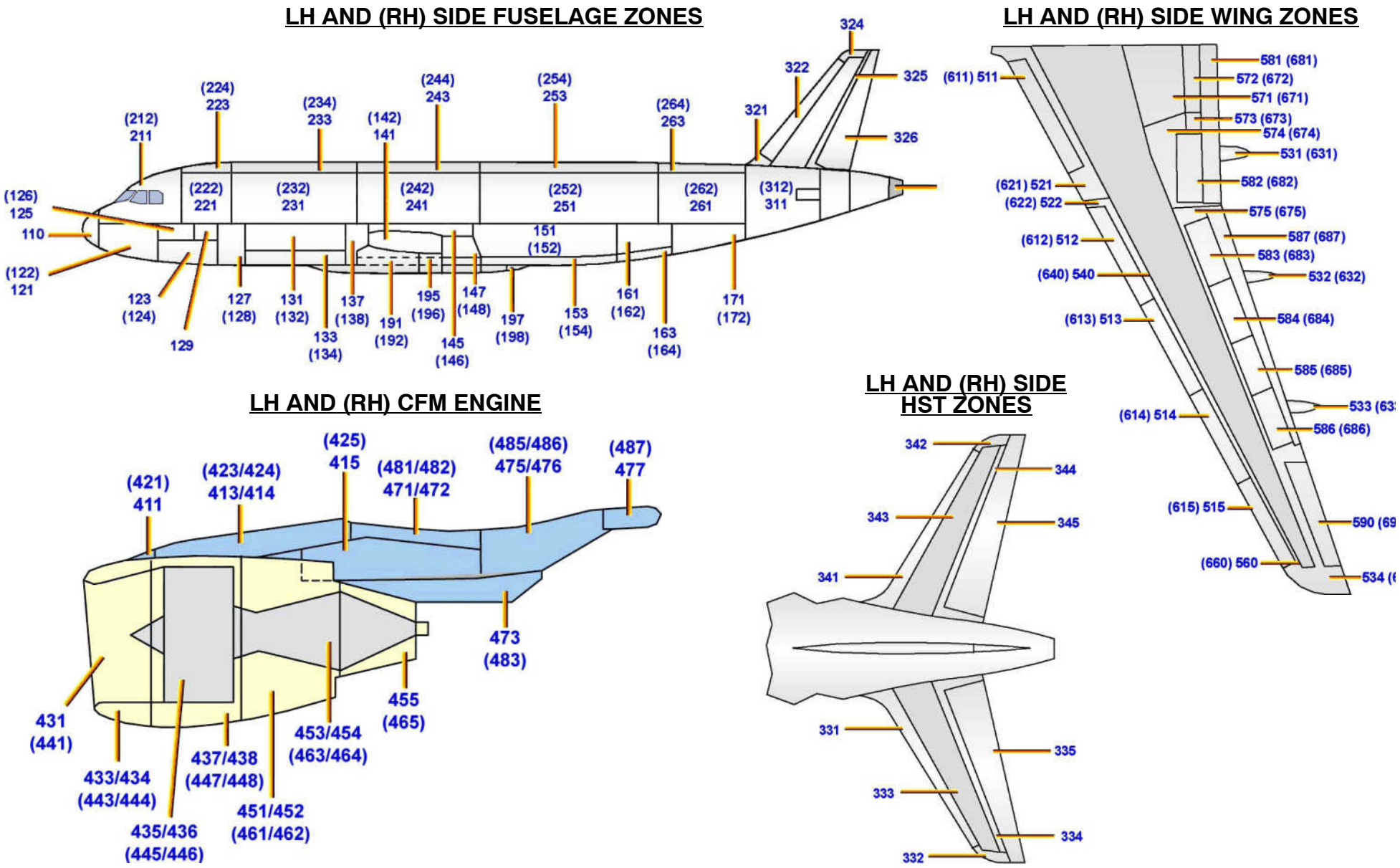


Figure 18 Aircraft Major Sub-Zones

ATA 07 LIFTING AND SHORING

07–10 JACKING

General

Three jacking points, when equipped with jacking pads, are used to lift the aircraft.

The forward point is located forward of the nose landing gear.

The two other jacking points are located outboard of the engine pylons.

A safety stay can be positioned at the rear of the aircraft after jacking to stabilize the aircraft.

You can lift the aircraft at the forward jacking point only, with the wheels of the main landing gear on the ground.

When the aircraft is weighed on landing gear jacks the following jacking points must be used to lift it.

- 2 jacking points located in the main landing gear
- 1 jacking point located in the nose landing gear

Limitations

The open air jacking operation is limited if the wind velocity exceeds permissible values which depend on aircraft gross weight and center of gravity position. In any condition, the aircraft must be pointing upwind.

Precautions

Before lifting the aircraft, you must be sure that the ground safety–locks are in position on the landing gears and the weight of fuel is applied equally on the two sides of the aircraft centerline. The three jacks have to be operated together. As soon as the jacking operation is finished, position the safety stay to stabilize the aircraft. Do not use the safety stay to lift the aircraft.

Jacking Points

Jacking pads have to be used under the jacking points to spread the loads.

WARNING: MAKE SURE THAT THE GROUND SAFETY LOCKS ARE IN POSITION ON THE LANDING GEAR

CAUTION: YOU MUST NOT LIFT THE AIRCRAFT WITH THE SAFETY STAY.

CAUTION: REMOVE THE SAFETY STAY BEFORE YOU DO THE LANDING GEAR EXTENSION AND RETRACTION TESTS. DAMAGE TO THE FUSELAGE CAN OCCUR IF THE AIRCRAFT MOVES DURING THE TESTS.

CAUTION: THE JACKING OPERATION IN OPEN AIR CONDITION IS LIMITED IF THE WIND VELOCITY EXCEEDS PERMISSIBLE VALUES WHICH DEPEND ON THE AIRCRAFT GROSS WEIGHT AND CENTER OF GRAVITY. IN ANY CONDITION THE AIRCRAFT MUST BE POINTING UPWIND.

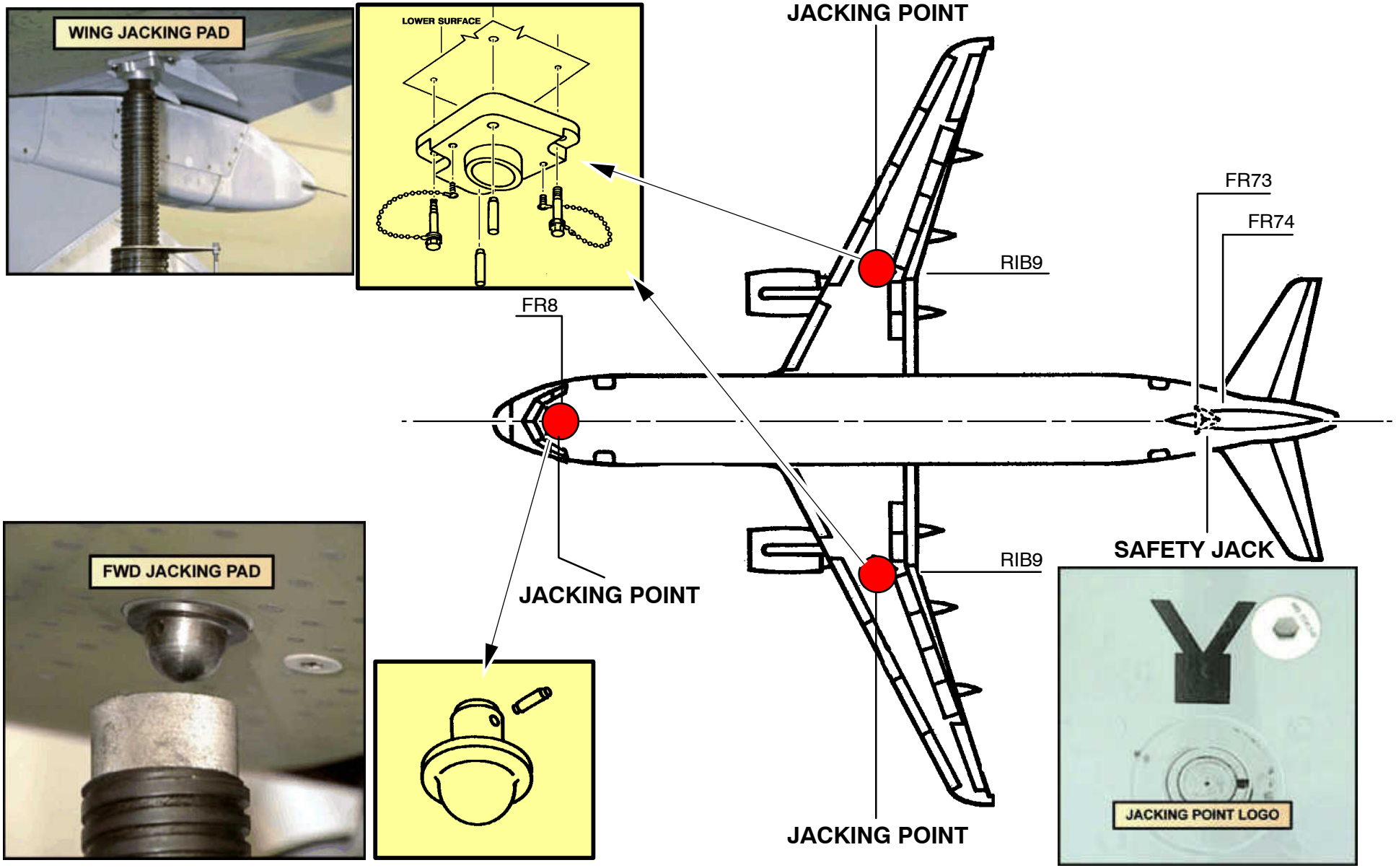


Figure 19 Aircraft Jacking Points

ATA 08 LEVELING AND WEIGHING

WEIGHING

General

You can weigh the aircraft with:

- the aircraft on its wheels
- the aircraft on jacks
- the aircraft on landing gear jacks

Load cells on each jack or platform scales are used for weighing

QUICK LEVELING

Quick Leveling using Attitude Monitor

To ensure that excessive side loads are not placed on the jacks and on the aircraft structure, a quick leveling check must be carried out during the jacking operation.

The procedure consists in operating the jacks of the aircraft to move the bubble to the D4 position in the attitude monitor, which is located in the Refuel/Defuel control panel recess.

The D4 position corresponds to a longitudinal angle of 0 degree and a lateral angle of 0 degree.

Quick Leveling using ADIRU (Air Data Inertial Reference Unit)

First, follow the Inertial Reference (IR) alignment procedure. Then on the MCDU scratchpad the AIDS alpha call–up code has to be entered:

PTCH for the pitch angle to do a check of the longitudinal alignment,

ROLL for the roll angle to do a check of the transverse alignment.

To start this procedure, first of all the aircraft must be lifted. After that, read the pitch and roll angles in the MCDU scratchpad.

Then operate the hydraulic jack below the wing to get the transverse alignment. Then operate the forward hydraulic jack to get the longitudinal alignment.

When you have done the longitudinal alignment, do a check of the transverse alignment.

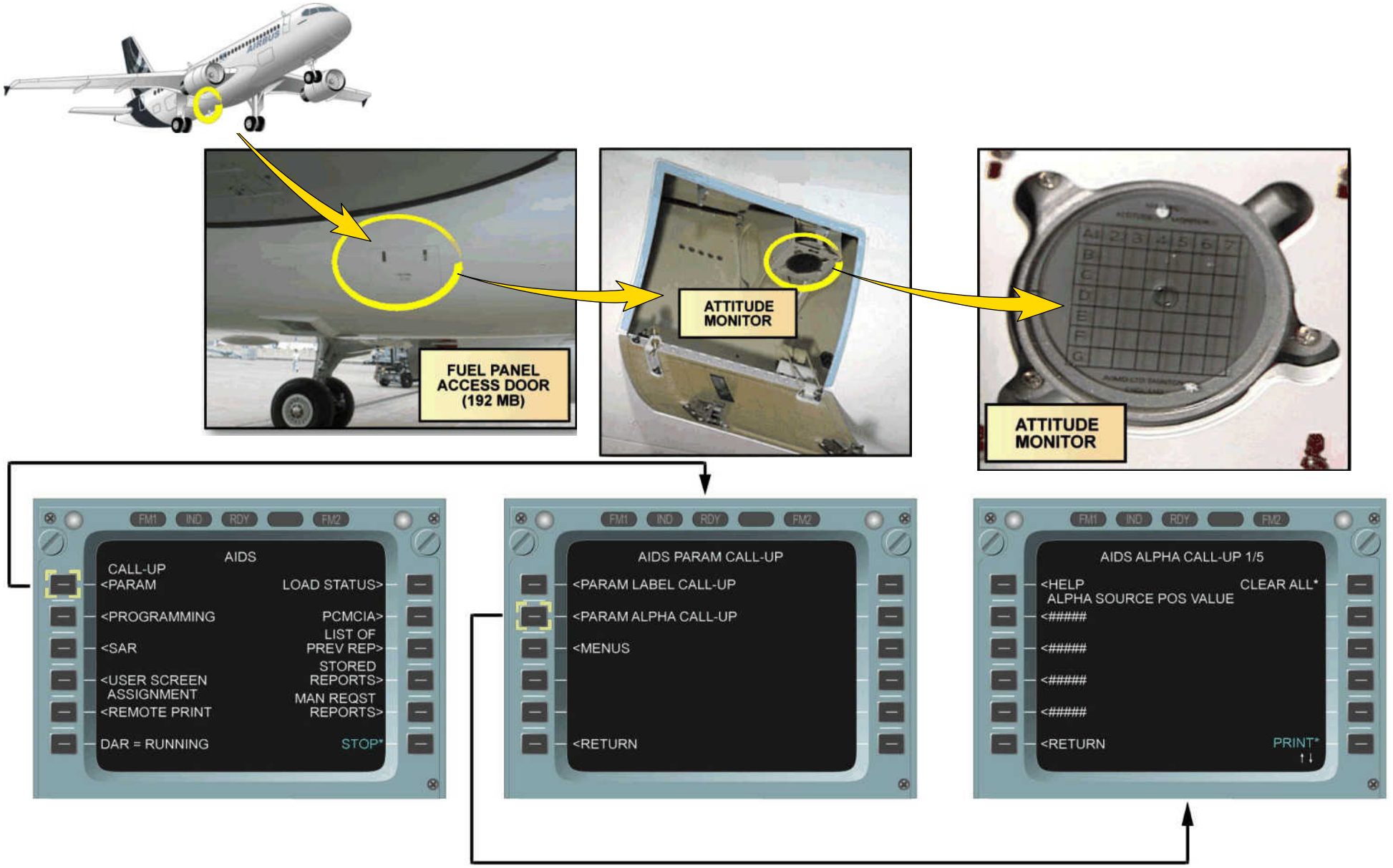


Figure 20 Quick Leveling with Attitude Monitor or AIDS

ATA 09 TOWING & TAXIING

09–10 TOWING

SAFETY PRECAUTIONS

General

Obey the warning and cautions before, during and after to tow or pushback the Aircraft.

You can tow the aircraft by the nose landing gear or the main landing gear.

You can tow the aircraft with deflated tires.

Speed Limits

Door closed and locked or removed:

- for a tractor with a tow bar, a maximum speed of 25 km/h (15.5 mph) is permitted,
- for a tractor without tow bar, a maximum speed of 32 km/h (19.8 mph) is permitted.

Passenger/crew doors fully open and locked and/or cargo doors open in vertical position:

- the maximum speed limit is 10 km/h (6.21 mph).

In wind conditions, calculate the permitted towing speed before towing:

- Measure the wind speed
- Do a check of aircraft stability (Ref. AMM 05–57–00 PB201)
- Subtract measured wind speed from wind speed limit shown on the stability curve. This gives the maximum permitted towing speed.

Approximate Towing Loads

When you push the aircraft rearward with the engines at idle, you must add the engine thrust resistance to the towing loads.

NOTE: The engine thrust resistance at ground idle is 525 daN (for each engine in operation).

Use these coefficients for the friction between the tires of the tow tractor and the ground to calculate the minimum tractor weight:

- Dry Concrete or Asphalt: 0.80
- Wet Asphalt: 0.75
- Wet Concrete: 0.57
- Hard Snow: 0.20
- Ice: 0.05

Minimum tractor weight = 6% Max TO Weight / friction coefficient

WARNING:

MAKE SURE THAT WHEN THE AIRCRAFT MOVES WITH ITS POWER ON THE GROUND

- NO PERSONS GO WHERE THE AIRCRAFT CAN CAUSE THEM INJURY OR CAN KILL THEM
- NO OBJECTS STAY WHERE THE ENGINES CAN BLOW THEM AWAY OR CAN PULL THEM INTO THE ENGINES BY SUCTION.

OBEY THESE SAFETY PRECAUTIONS DURING TOWING PUSHBACK OR MOVEMENT OF THE AIRCRAFT.
MAKE SURE THAT THE PATH OF THE AIRCRAFT IS CLEAR.
MAKE SURE THAT NO PERSONS SIT OR STAND ON THE TOW BAR OR USE THE TRACTOR AS TRANSPORT THIS IS TO PREVENT THE RISK OF INJURY.

DURING TOWING/TAXIING OPERATIONS (LOW–SPEED OPERATIONS INCLUDED), EACH PERSON IN THE AIRCRAFT MUST BE IN A SEAT AND THE SEAT BELT MUST BE FASTENED.
IF THE SEAT BELT IS NOT FASTENED, THERE IS A RISK OF INJURY IF THE AIRCRAFT STOPS SUDDENLY.

Caution

DO NOT TOW OR MOVE THE AIRCRAFT ON THE GROUND IF THE ENGINE COWLS ARE OPEN.
MOVEMENT OF THE AIRCRAFT WITH THE COWLS OPEN CAN CAUSE DAMAGE TO THE COWLS AND THE NACELLE STRUCTURE.

IF YOU MUST CLOSE THE ENGINE COWLS WHEN THE ENGINE IS NOT INSTALLED, BE CAREFUL WITH THE THRUST REVERSER COWLS. IF THE COWLS CLOSE TOO FAR, THERE IS A RISK OF DAMAGE TO HINGE N 4.

Figure 21 Safety Precautions

NOSE GEAR FRONT TOWING

The A/C may be towed or pushed back:

- at maximum ramp weight
- with the engines shut down or running at idle

To begin the procedure, make sure:

- that the safety devices are installed on the L/G (Landing Gears)
- the wheel chocks are in place
- and check if the parking brake is ON.

Do not tow the A/C if the dimension H is more than 300 mm (11.8 in). If you do, you can cause damage to the internal centering cams of the nose landing gear.

Referring to your A/C maintenance manual, make sure that the A/C is stable. Let us suppose that this procedure has been correctly done.

During this procedure, depending on the configuration you are in, the A/C needs to be energized either by using the APU, a specific ground cart, an engine running, or by using the tractor itself.

Let us suppose that the A/C is already energized and the EIS start procedure done.

Outside, on the nose wheel steering deactivation electrical–box, set the ground–towing control lever to the towing position and install the pin.

In the cockpit,

- on the upper ECAM page, the ”NOSE WHEEL STEERING DISCONNECTED” message comes into view on the memo page.
- check on the Yellow brake pressure triple–indicator that the accumulator pressure pointer is in the green range.

Airbus recommend pressurizing the yellow hydraulic system using the yellow electrical pump, thus, the braking system will be more efficient and safer.

Now, you have to install the tow bar.

CAUTION: MAKE SURE THAT THE TOW BAR HAS:

- a Damping System
- a calibrated Shear Pin
- two calibrated Turn Shear Pins

THIS IS TO PREVENT HIGH LOADS CAUSING DAMAGE TO THE LANDING GEAR. REFER TO YOUR A/C MAINTENANCE MANUAL FOR THE CALIBRATION OF THESE PINS.

On the NLG, install the tow bar on the tow fitting and connect the tow bar to the tractor.

CAUTION: PUT THE PARKING BRAKE CONTROL SWITCH IN THE OFF POSITION BEFORE YOU TOW OR PUSH BACK THE AIRCRAFT. THIS IS TO PREVENT HIGH LOADS CAUSING DAMAGE TO THE NOSE LANDING GEAR.

On the Yellow brake pressure triple–indicator, the brakes pressure pointers go down.

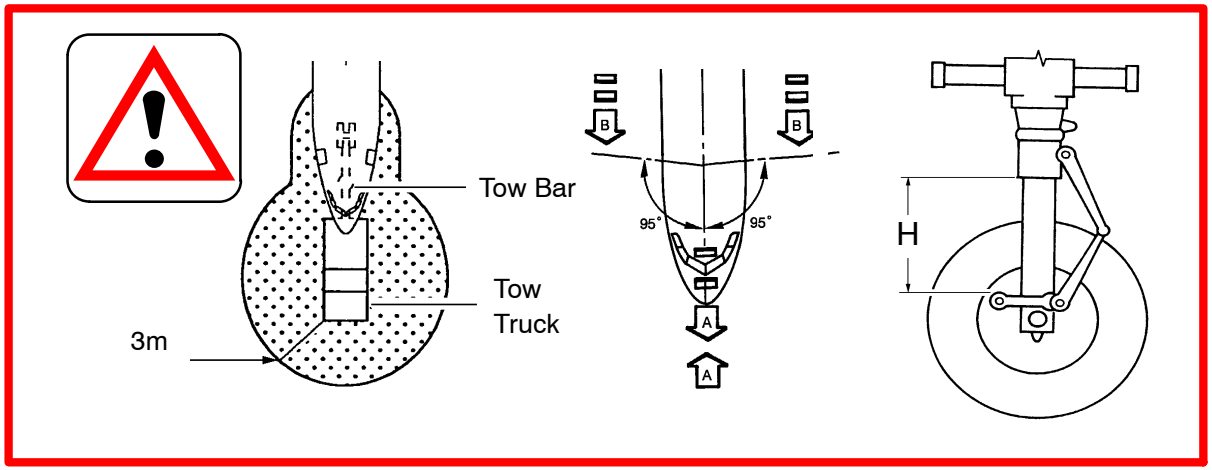
In the cockpit, set the lighting system:

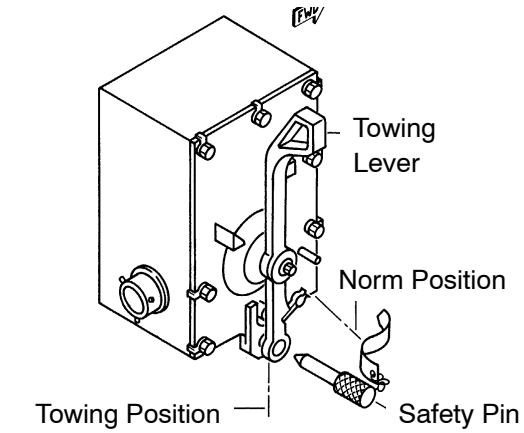
- set the exterior light navigation and logo switch to ON.
- at night, set the interior light dome switch to bright and if the anti–collision lighting is necessary for the local airport regulations or the airline procedures, set the exterior light beacon switch to ON.

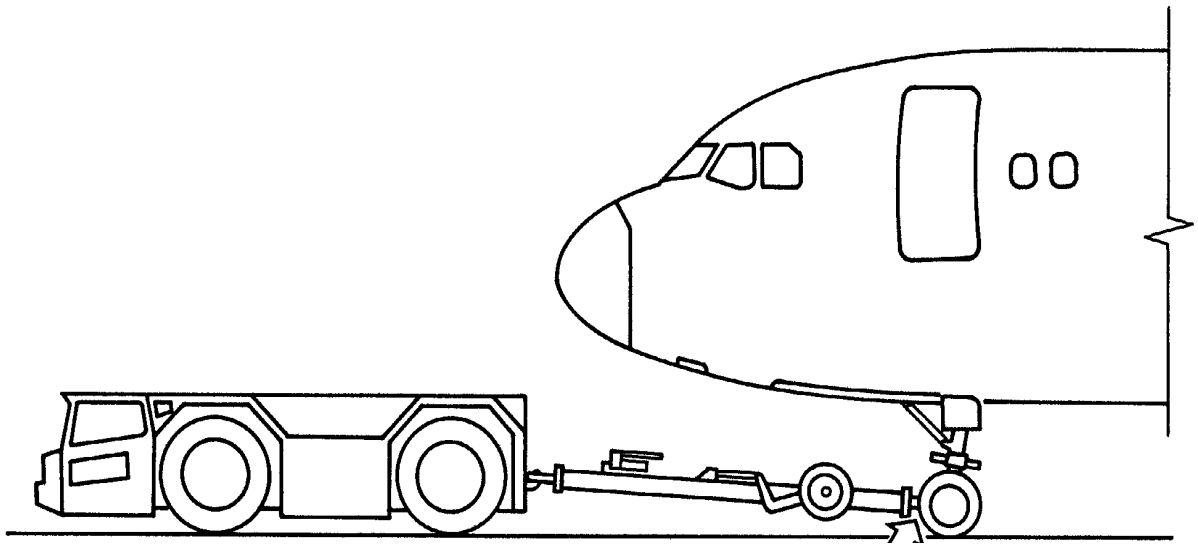
On the VHF system:

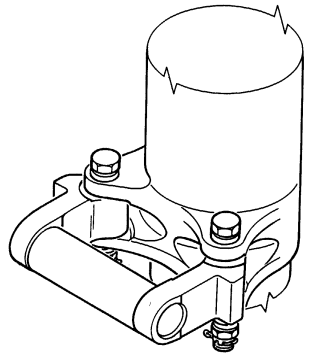
- in order to communicate with the control tower during towing operations, release out the VHF pushbutton switch and select the control tower frequency on the radio management panel.
- in order to communicate with the ground mechanics, on the audio control panel, set the interphone radio switch to the interphone position and release out the interphone reception pushbutton.

WARNING: FOR SAFETY REASONS, A DISTANCE OF 3 METERS MUST BE KEPT CLEAR AROUND THE NOSE WHEELS, TOW BAR AND TRACTOR WHEN THE AIRCRAFT MOVES. TOWING SPEED LIMITATION DEPENDS ON THE POSITION OF THE PASSENGER/CREW AND CARGO DOORS. FOR THESE SPEED LIMITATIONS REFER TO YOUR AIRCRAFT MAINTENANCE MANUAL.









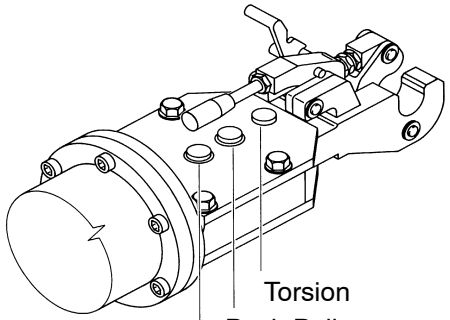


Figure 22 NLG Towing

09–20 TAXIING

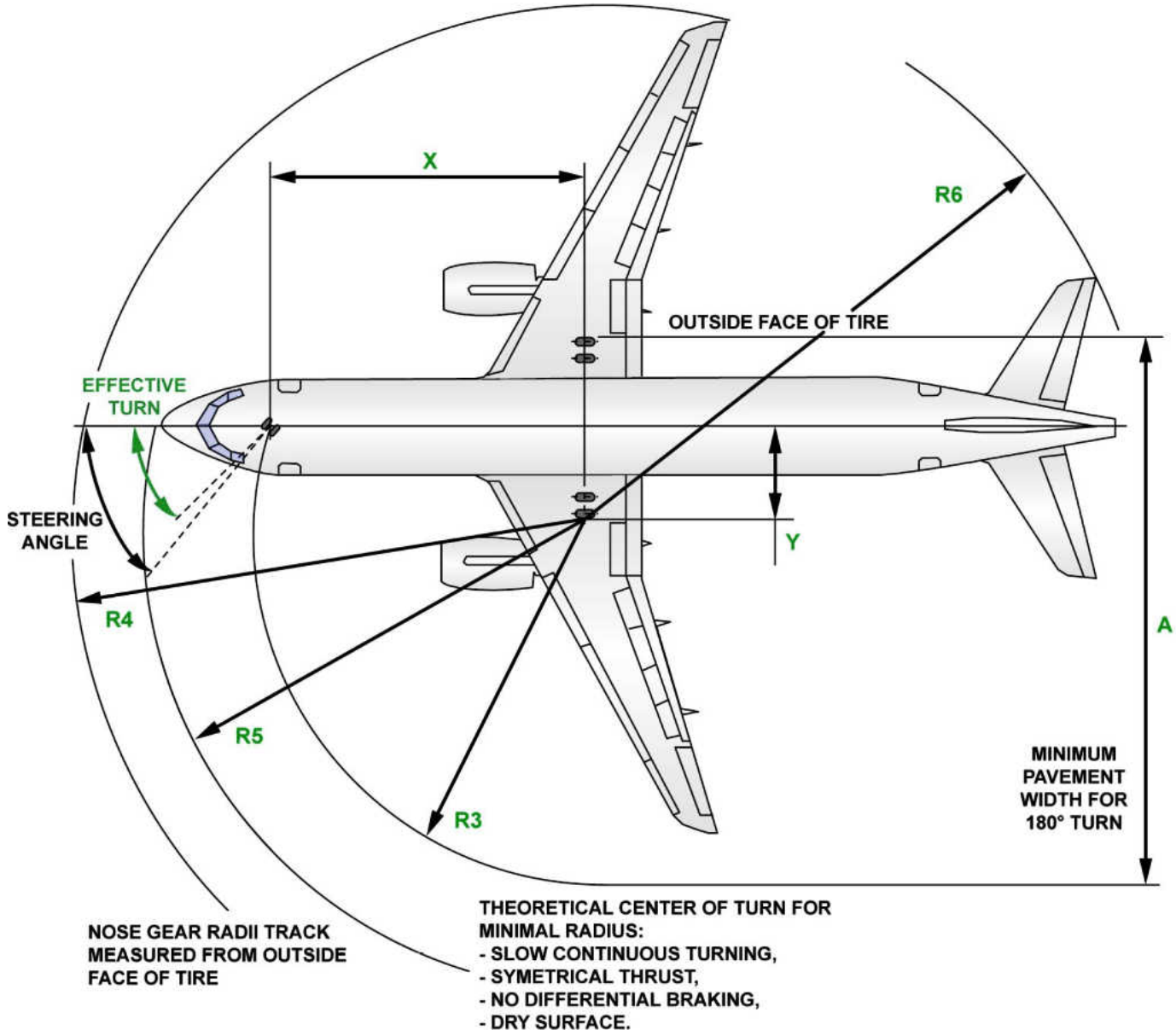
SAFETY PRECAUTIONS

WARNING: MAKE SURE THAT WHEN THE AIRCRAFT MOVES WITH ITS POWER ON THE GROUND NO PERSONS GO WHERE THE AIRCRAFT CAN CAUSE THEM INJURY OR CAN KILL THEM. NO OBJECTS STAY WHERE THE ENGINES CAN BLOW THEM AWAY OR CAN PULL THEM INTO THE ENGINES BY SUCTION.

WARNING: DURING TOWING/TAXIING OPERATIONS (LOW–SPEED OPERATIONS INCLUDED), EACH PERSON IN THE AIRCRAFT MUST BE IN A SEAT AND THE SEAT BELT MUST BE FASTENED. IF THE SEAT BELT IS NOT FASTENED, THERE IS A RISK OF INJURY IF THE AIRCRAFT STOPS SUDDENLY.

Turning Radii

The movement of the aircraft with its power on the ground is called taxi of the aircraft. During taxi of the aircraft, the minimum turning radii must be respected.



AT 75° STEERING ANGLE:

	A318	A319	A320	A321
EFFEC TURN	73.20°	70.03°	70°	73°
X	33'8" 10.25	36'3" 11.04	41'6" 12.64	55'5" 16.91
Y	10'1" 3.1	13'2" 4.01	15'1" 4.6	16'7" 5.1
A	61'2" 18.7	67'8" 20.64	75'1" 22.9	90'6" 27.6
R3	36'4" 11.1	39'8" 12.11	45'4" 13.81	59'1" 18
R4	67'7" 20.6	70'10" 21.58	72'2" 21.99	74'4" 22.7
R5	51'4" 15.6	54'6" 16.6	60' 18.3	74' 22.6
R6	58'10" 17.9	64'11" 19.77	71'11" 21.91	80'4" 24.5

FEET / INCHES
METERS

Figure 23 Turning Radius

Dangerous Areas

Safety precautions must be taken to avoid danger from engine suction and exhaust areas.

Access to the engine is only allowed through the entry corridor.

CAUTION: NOTE THAT THE ENTRY CORRIDOR MUST BE CLOSED FOR WIND DIRECTIONS GREATER THAN 90º.

WARNING: THERE IS NO SAFE ACCESS CORRIDOR WHEN THE ENGINE IS RUNNING ABOVE MINIMUM IDLE.

Depending on the distance from the running engine and on its power setting, it is necessary to wear ear protection and to respect the maximum time exposure.

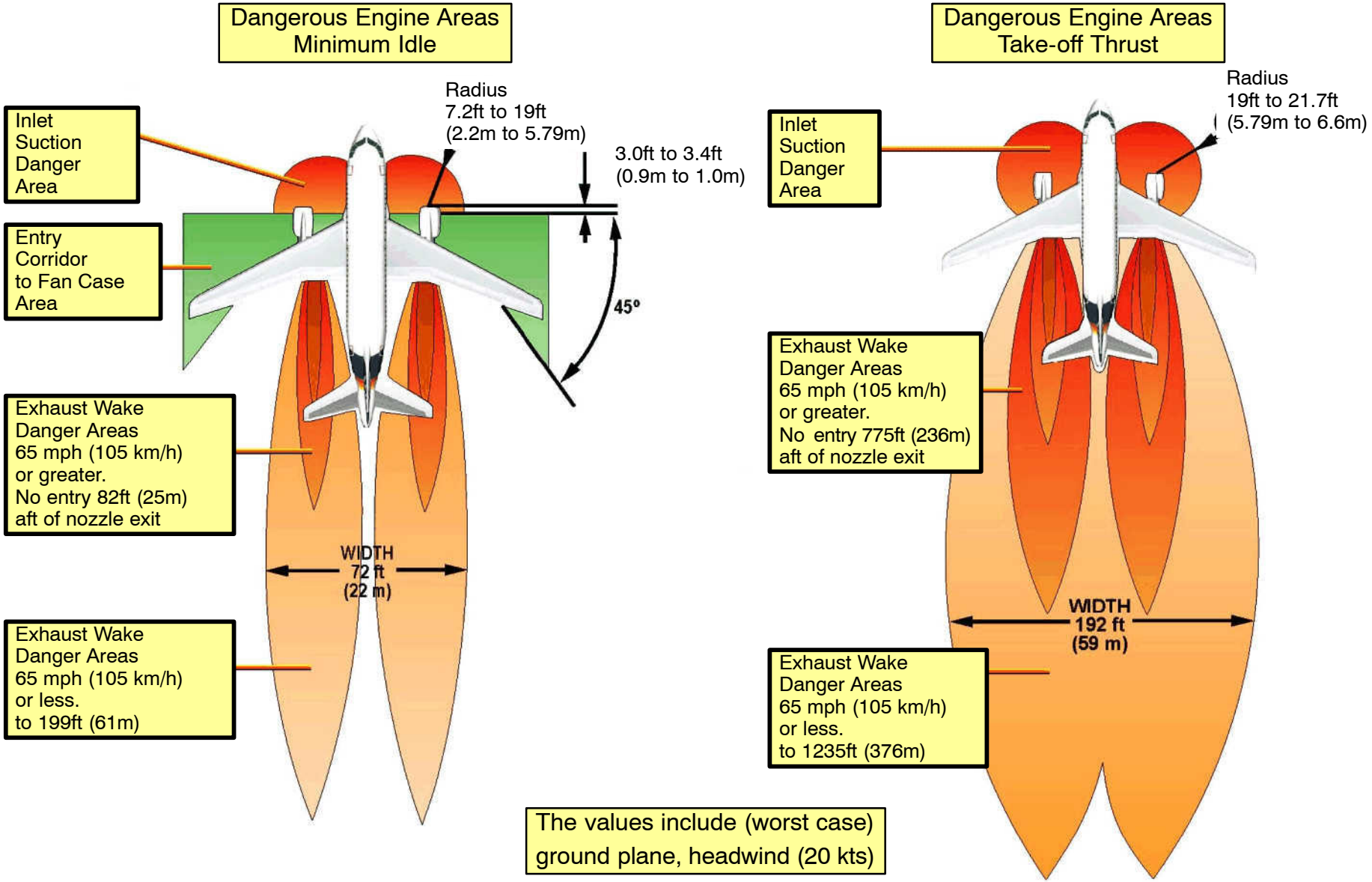


Figure 24 Dangerous Areas

ATA 10 PARKING, MOORING, STORAGE & RETURN TO SERVICE

10–11 PARKING

General

The aircraft maintenance manual listed two different procedures for parking of the aircraft.

The tasks are :

- Parking the aircraft in flight–ready condition for not more than 15 Days.
- Parking the aircraft in flight–ready condition for not more than 12 Weeks.

Both procedures taking the different weather conditions into account. This means you have to perform different procedures depending on the wind and cold weather conditions.

CAUTION: MAKE SURE THAT YOU OBEY THE MAINTENANCE PROGRAM FOR STORED/ PARKED AIRCRAFT. DO NOT CHANGE OR STOP THE MAINTENANCE PROGRAM WITHOUT APPROVAL FROM YOUR LOCAL AUTHORITIES.

This introduction gives the procedure to park the aircraft in standard weather condition for not more than 5 days.

Aircraft Parking for not more than 5 Calendar Days

CAUTION: DURING THIS PROCEDURE:
- MAKE SURE THAT THE LANDING GEAR GROUND SAFETIES, LOCKING DEVICES AND WHEEL CHOCKS ARE IN POSITION.
- KEEP THE ACCESS PLATFORM AT A SUFFICIENT DISTANCE FROM THE AIRCRAFT
(IN WIND, SHOCK ABSORBER REBOUND CAN CAUSE MOVEMENT OF THE AIRCRAFT).

This example demonstrates the procedure to park the aircraft in standard weather conditions. Note that:

- if the aircraft is parked in high wind conditions, a check of the aircraft stability is needed, and moor the aircraft if necessary,
- if the aircraft is parked in cold weather conditions, do the cold weather maintenance procedures

Parking Procedure

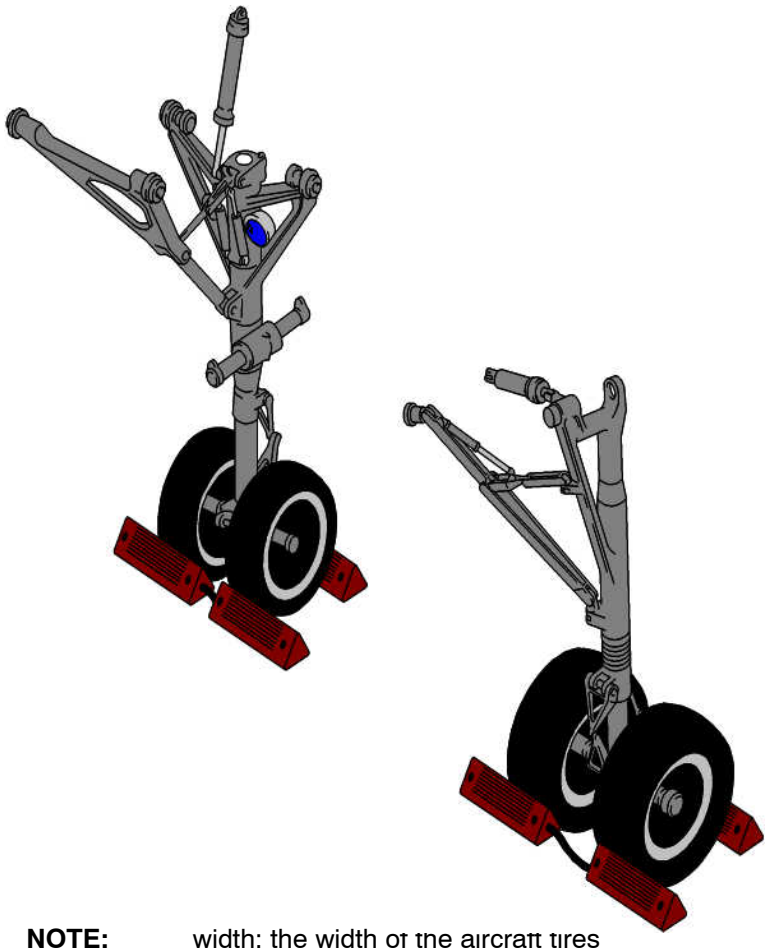
To park the aircraft follow these tasks:

- If necessary, clean the aircraft internally and externally
- Park the aircraft on a flat surface. Make sure that the wheels of the nose landing gear are on the aircraft axis and the aircraft points into the wind.
- Install the safety devices on the landing gears.
- Make sure that the flaps, the slats, the spoilers and the thrust reversers are retracted.
- Make sure that the THS is set to two degrees up.
- Put the wheel chocks in position:
  - For the Nose Landing Gear in front of and behind the wheels.
  - For the Main Landing Gear in front of and behind the wheels.

  NOTE: The wheel chocks on the nose landing gear and the parking brake give more safety in bad weather.
- Ground the aircraft.
- If necessary refuel the fuel tanks to 30% minimum of their total capacity.
- Drain water from all the fuel tank.

  NOTE: Do the water drain procedure one hour after refueling is completed.
- Open the cockpit and cabin window shades. Make sure that the sliding windows are closed.
- Installation of the Protection Equipment: Protect all the probes, the engines and the APU with adapted protection equipment.
- On the overhead panel 25VU, on the CABIN PRESS section, push the DITCHING pushbutton switch to close the ventilation skin valves and the outflow valves.
- Potable water system: Drain, flush and dry the system if necessary.
- Toilet syst: Drain, flush and clean the system with disinfectant if necessary.

NOTE: Airbus recommends that you disconnect the both main batteries.



NOTE: width: the width of the aircraft tires where you must put the chocks will give the width of the chocks (one or more wheel on one axle)

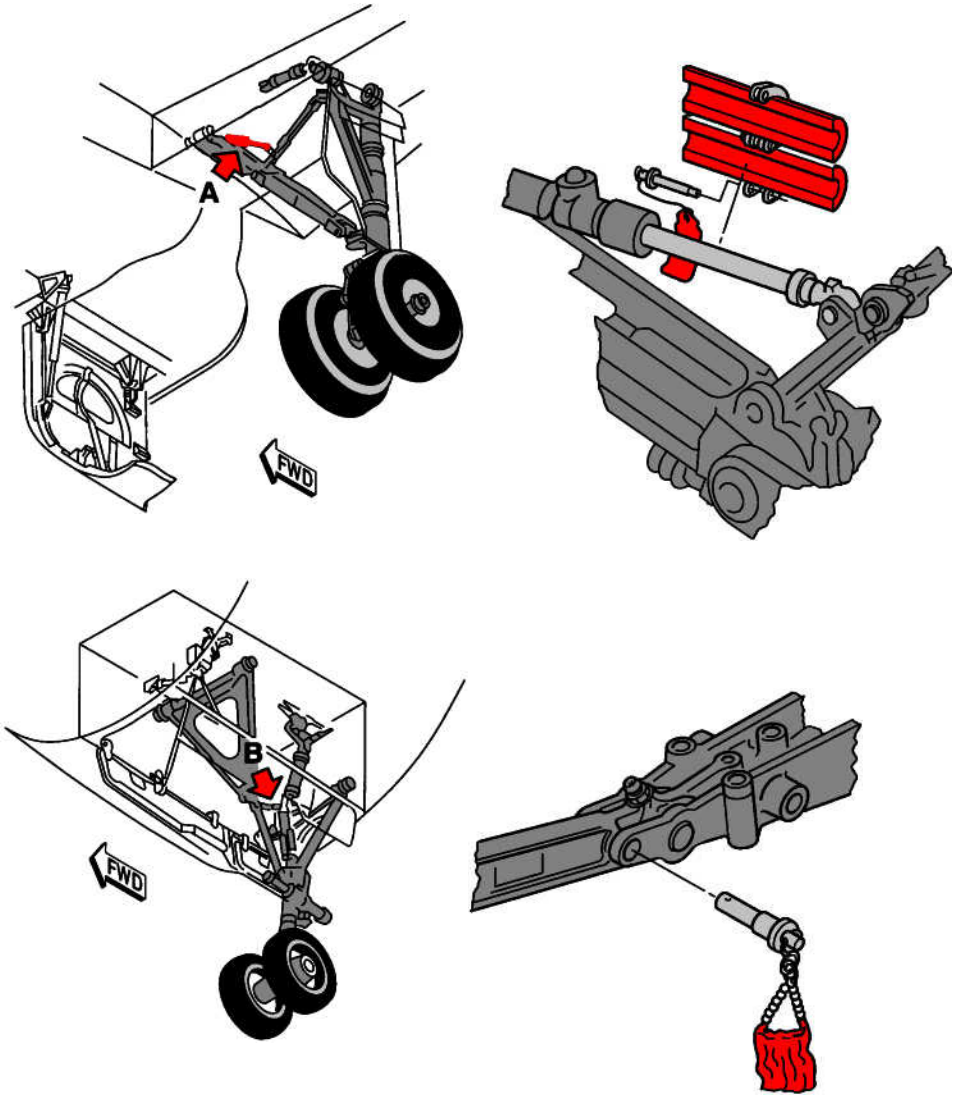


Figure 25 Aircraft Parking

10–20 MOORING

Aircraft Mooring

WARNING: MAKE SURE THAT THE GROUND SAFETY-LOCKS ARE IN POSITION ON THE LANDING GEAR.

WARNING: MAKE SURE THAT THE WHEEL CHOCKS ARE IN POSITION.

CAUTION: THE LAST FEET OF ALL TAXIING AND TOWING OPERATIONS MUST BE IN A STRAIGHT LINE. THIS IS TO PREVENT FORCE ON THE TIRES AND THE MAIN LANDING GEAR.

The function of mooring is to prevent damage to the aircraft on the ground in high wind conditions.

For wind speeds less than 50 Kts:

- mooring is not necessary if the aircraft configuration is in the limits given in chapter 05–57–00.

If the aircraft points into the wind and wind speed is:

- between 50 and 70 Kts, moor the aircraft at the NLG,
- more than 70 Kts, moor the aircraft at the NLG and MLG.

If the aircraft does not point into the wind or the direction of the wind is not stable:

- for wind speeds or gusts more than 50 Kts, moor the aircraft at the NLG and the MLG

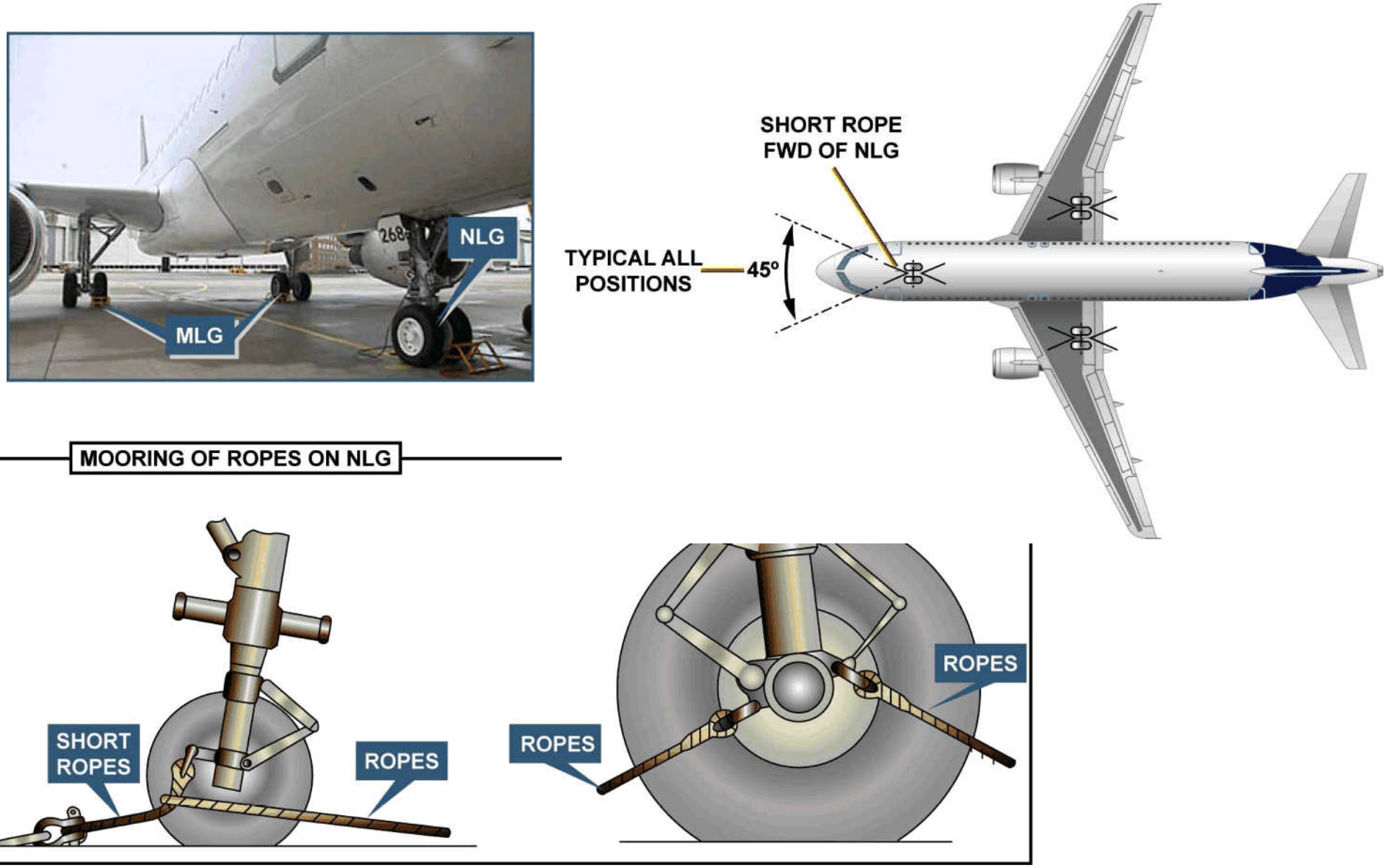


Figure 26 Aircraft Mooring

10–12 STORAGE

Storage Procedure

Certain maintenance tasks must be performed to prepare the aircraft for storage.

For detailed information refer to AMM Chapter 10–12 Storage.

There are different tasks listed for:

- Aircraft Storage for a Period of not more than 6 Months
- Aircraft Storage for a Period of not more than 2 Years
- Ground Checks during Storage
- Return to Operation after Storage
- Renewal of Storage Procedure

Figure 27 Aircraft Storage

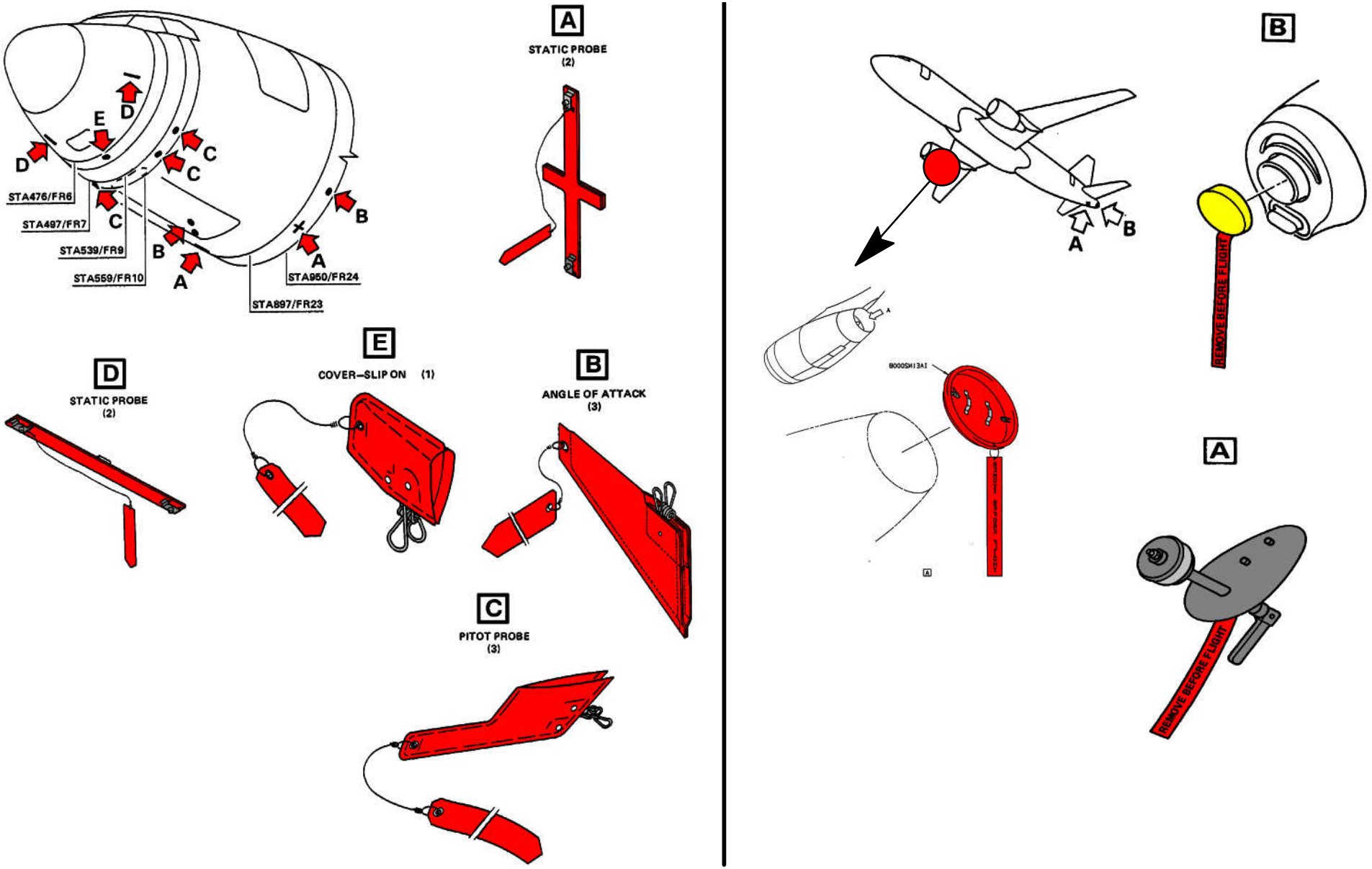


Figure 28 Storage Details

ATA 11 PLACARDS AND MARKINGS

11–00 PLACARDS AND MARKINGS GENERAL

INTRODUCTION

General

This chapter shows the placards, stencils and markings and gives their location on the aircraft.

There are three types of placards and markings ATA 100 specification.

- A. Safety Data

  These placards and markings are used for the flight crew, and passenger cabins, and for equipment safety.

  They include WARNINGS and CAUTIONS.

- B. Maintenance Data

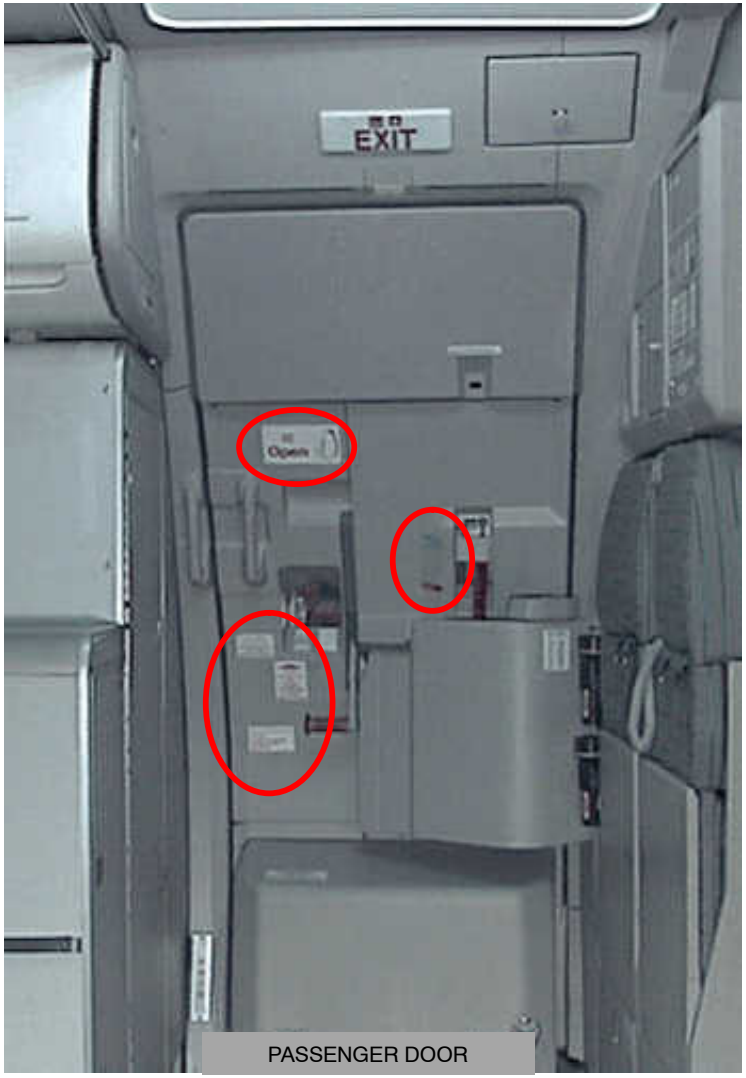
  These are servicing and maintenance instructions or identification placards.

  Identification placards show component names and Functional Item Numbers (FIN).

- C. By Local Regulation

  The aircraft must have these placards and markings. When these types of placards are shown in Chapter 11, they are identified by (1).

SAFETY PLACARDS
AND INSTRUCTIONS



PASSENGER DOOR

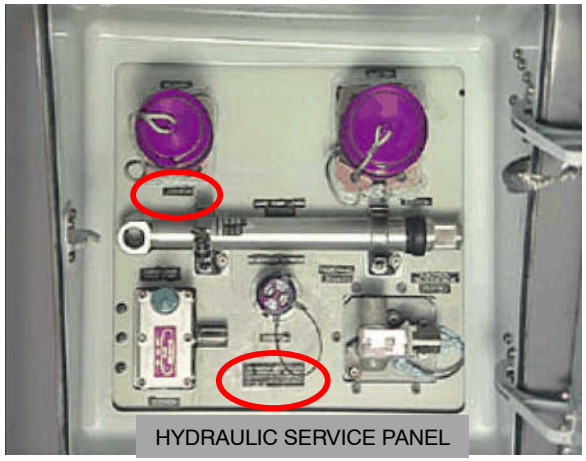
IDENTIFICATION PLACARD
ON NEARBY STRUCTURE

HYDRAULIC FILTER

MAINTENANCE AND
SAFETY PLACARDS

FUEL TANK WITH INERT GAS SYSTEM

IDENTIFICATION PLACARDS
AND INSTRUCTIONS



HYDRAULIC SERVICE PANEL

Figure 29 Placard Arrangements

ATA 12 SERVICING

12–00 SERVICING GENERAL

INTRODUCTION

Aircraft Servicing Arrangement

For A318 and A319 the ground service connections layout is the same.

The main difference between A320 and A321 servicing point is a second potable water draining panel in the center of the A/C on the A320.

The difference between the A318/A319 and the A320/A321 is that the A320 and A321 can have a bulk loader on the bulk cargo door.

The A318 fuselage is shorter than the rest of the single aisle aircraft. Due to the removal of 2.39 meters or 1.5 frames of the forward fuselage, the aft edge of the forward cargo compartment door now is in close proximity to the engine air intake nose cowl. When using a self propelled conveyor belt, there is a possibility of structural damage to the nose cowl because of the clearance.

NOTE: The use of a self–propelled conveyor belt is not recommended by Airbus.

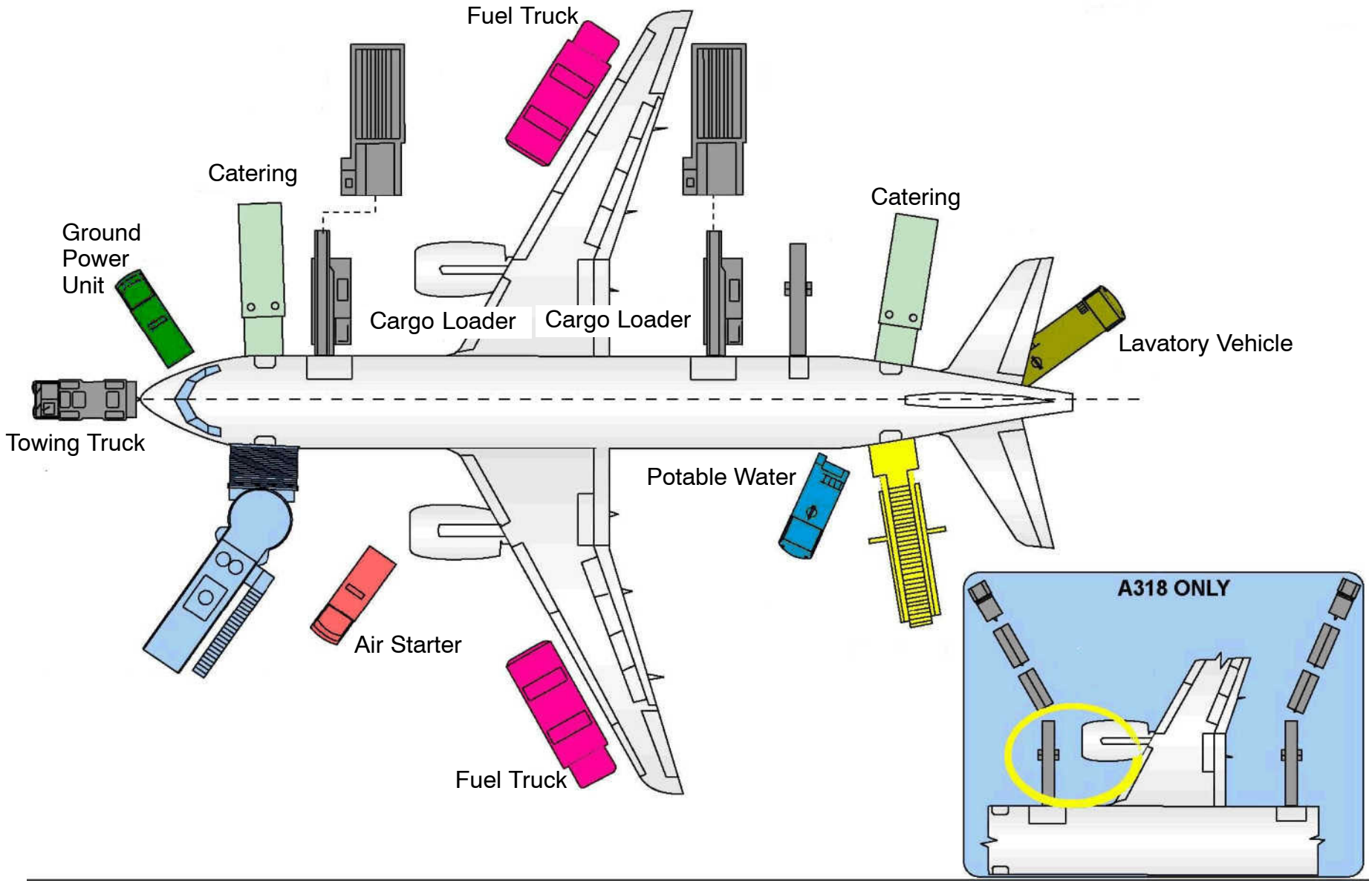


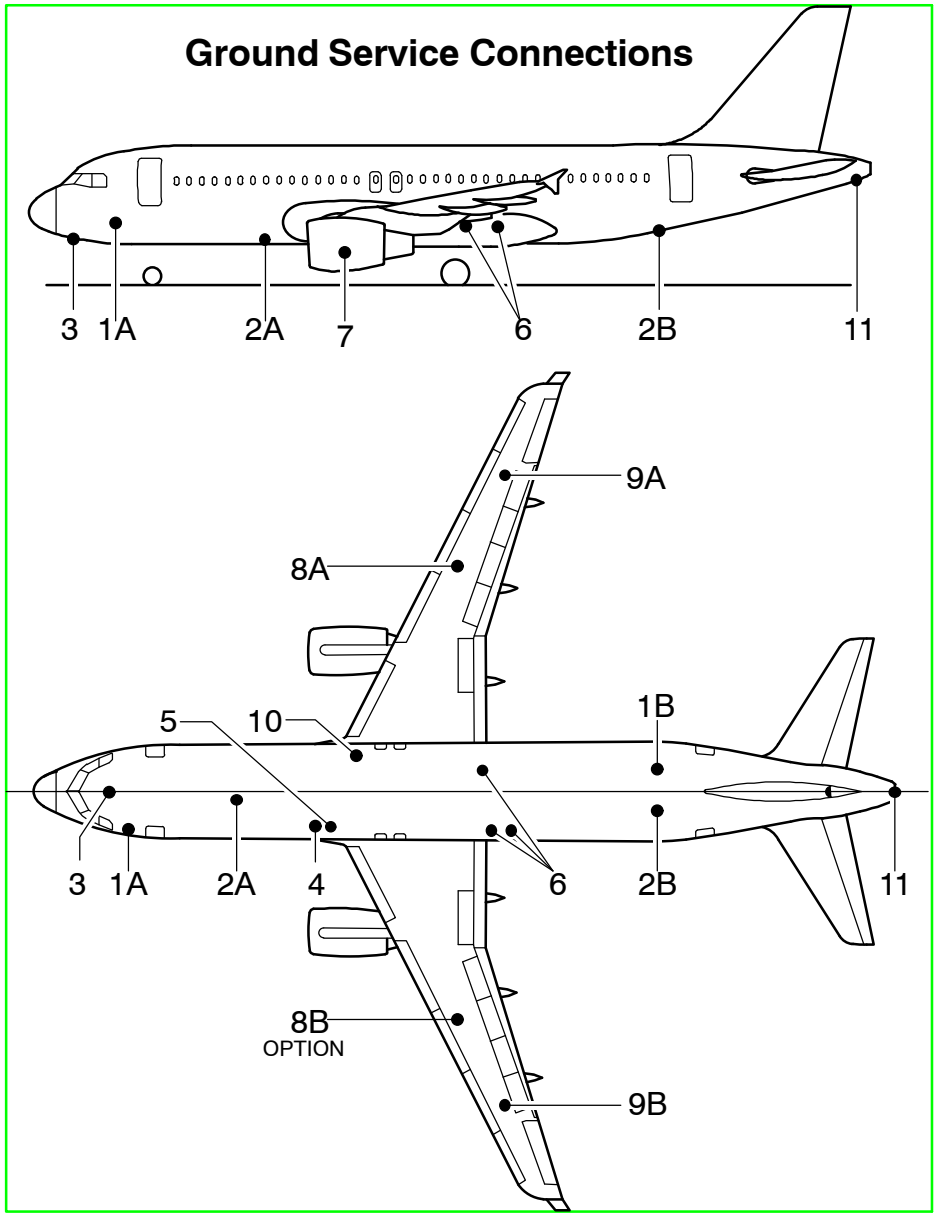
Figure 30 Service Arrangements

Ground Service Connections (A320/CFM)

Item	Designation	Mean Height from Ground (m)
1A	Forward Lavatory Service Door	2.35
1B	Aft Lavatory Service Door	2.79
2A	Potable Water Service Door	1.75
2B	Potable Water Service Doo	2.59
3	External Power Receptacle	2.00
4	Ground Service Conditioned Air Connection	2.60
5	HP Air Ground Connector	1.76
6	Hydraulic System Ground Service Panels	1.76
7	Engine Oil Filling Connector: Gravity Filling Cap Pressure Filling Connection	 1.46 1.42
8A	Refuel/Defuel Coupling	3.40
8B	Refuel/Defuel Coupling Option	3.40
9A	Gravity Filling Panels (R. side)	3.60
9B	Gravity Filling Panels (L. side)	3.60
10	Refuel/Defuel Control Panel	1.80
11	APU Oil Filling Connector	4.20

Drainage Points (A320/CFM)

Item	Designation	Mean Height from Ground (m)
1A	Drain Mast Water	1,73
1B	Drain Mast Fuel	1,57
1C	Drain Mast Water	1,73
2	Fuel Water Drain	3,40
2A	Fuel Water Drain	1,57
4	Potable Water Drain	1,75
5	Potable Water Drain	1,57
6	Potable Water Drain Waste Drain	2,59



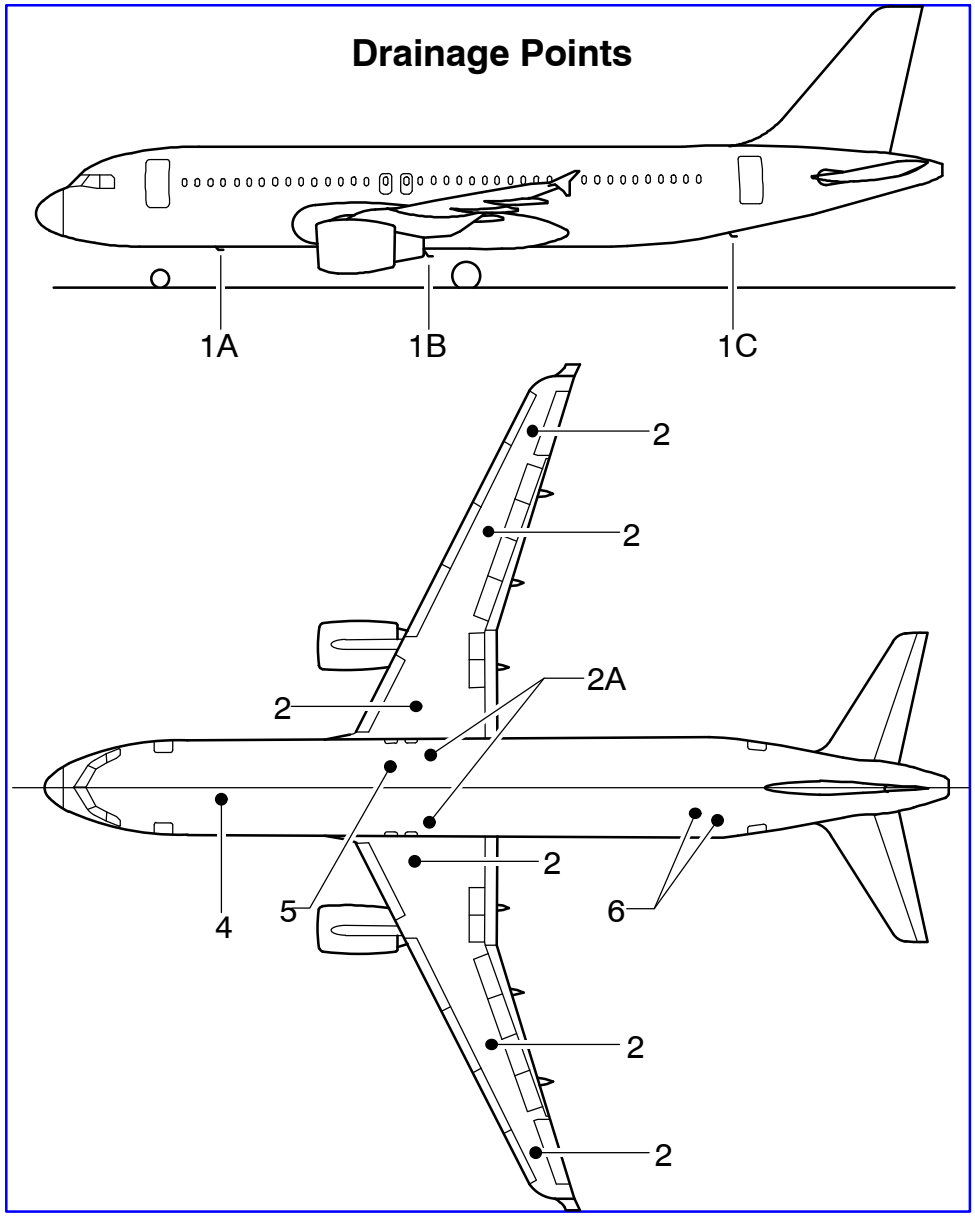


Figure 31 GND Service Connections & Drainage Points

ATA 00 INTRODUCTION

00–00 INTRODUCTION GENERAL

ELECTRICAL SAFETY ITEMS

Electrical System Safety Practices

Before work on an electrical system, it is necessary:

- to know and obey the standard safety practices,
- to have a good knowledge of the electrical standard practices,
- to have a good knowledge of requirements (processes, WARNINGS, CAUTIONS etc..) before you start the work.

This is necessary to prevent injury to persons and/or damage to equipment.

You will find detailed information concerning the electrical standard procedures in the ESPM (**E**lectric **S**tandard **P**rocedure **M**anual).

This document gives general safety practices for work on the aircraft electrical systems and parts of these systems such as: wires, wire routing, conduits, connections, splices, etc...

NOTE: These safety practices do not replace local regulations specified by local authorities.

CAUTION: ALWAYS OBEY THE PRECAUTIONS THAT FOLLOW TO KEEP ELECTRICAL WIRING IN SATISFACTORY CONDITION (ELECTRICALLY AND MECHANICALLY SERVICEABLE). WHEN YOU DO MAINTENANCE WORK, REPAIRS OR MODIFICATIONS, ALWAYS KEEP ELECTRICAL WIRING COMPONENTS AND THE WORK AREA AS CLEAN AS POSSIBLE.

PUT PROTECTION, SUCH AS PLASTIC SHEETING, CLOTHS, ETC. AS NECESSARY ON WIRING AND COMPONENTS. REGULARLY REMOVE ALL SHAVINGS, UNWANTED MATERIAL AND OTHER CONTAMINATION. THESE PRECAUTIONS WILL DECREASE THE RISK OF CONTAMINATION AND DAMAGE TO THE ELECTRICAL WIRING INSTALLATION. IF THERE IS CONTAMINATION, REFER TO ESPM CHAPTER 20–55–00.

WARNING: MAKE SURE THAT NO AC OR DC POWER SOURCE IS CONNECTED TO THE AIRCRAFT ELECTRICAL CIRCUITS. THERE IS A RISK OF ELECTROCUTION IF THE AC OR DC POWER STAYS CONNECTED.

Before you start work: open, safety and tag the circuit breaker(s) related to the system/equipment to prevent the supply of electrical power to the system/equipment during the maintenance work.

This prevents the risk of:

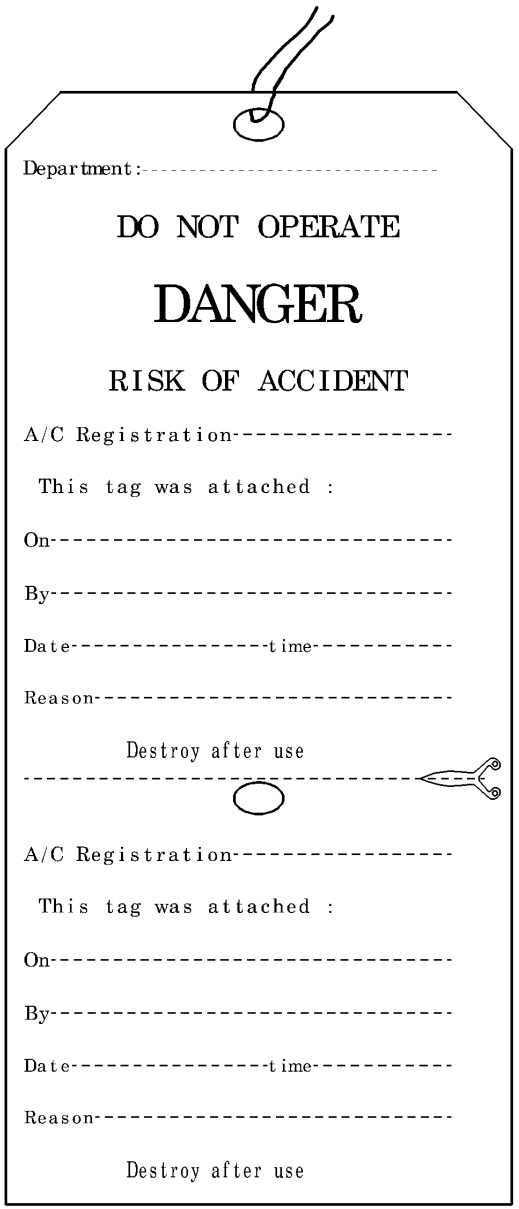
- Electric shocks that can occur if you touch energized wiring connections, terminals, etc...
- Short circuits that can occur if metal tools or parts accidentally touch energized wiring, terminals, contacts, etc...

NOTE: Some circuit breakers have a red threaded bush. This bush prevents reset of the circuit breaker in flight (the crew can not pull it).
If, for maintenance reasons, it is necessary to open such a circuit breaker, you can remove the red threaded bush with a standard wrench.

Materials

WARNING: BEFORE YOU USE A MATERIAL REFERRED TO IN THE ESPM PUBLICATION, YOU MUST KNOW ALL OF THE APPLICABLE PRECAUTIONS.
THESE PRECAUTIONS TELL YOU HOW TO:
- USE THE MATERIAL SAFELY,
- KEEP THE MATERIAL SAFELY,

WARNING: READ THE SAFETY DATA SHEETS FROM THE MANUFACTURER OR THE SUPPLIER OF THE MATERIAL TO LEARN THE RECOMMENDED PRECAUTIONS. OBEY YOUR LOCAL REGULATIONS.



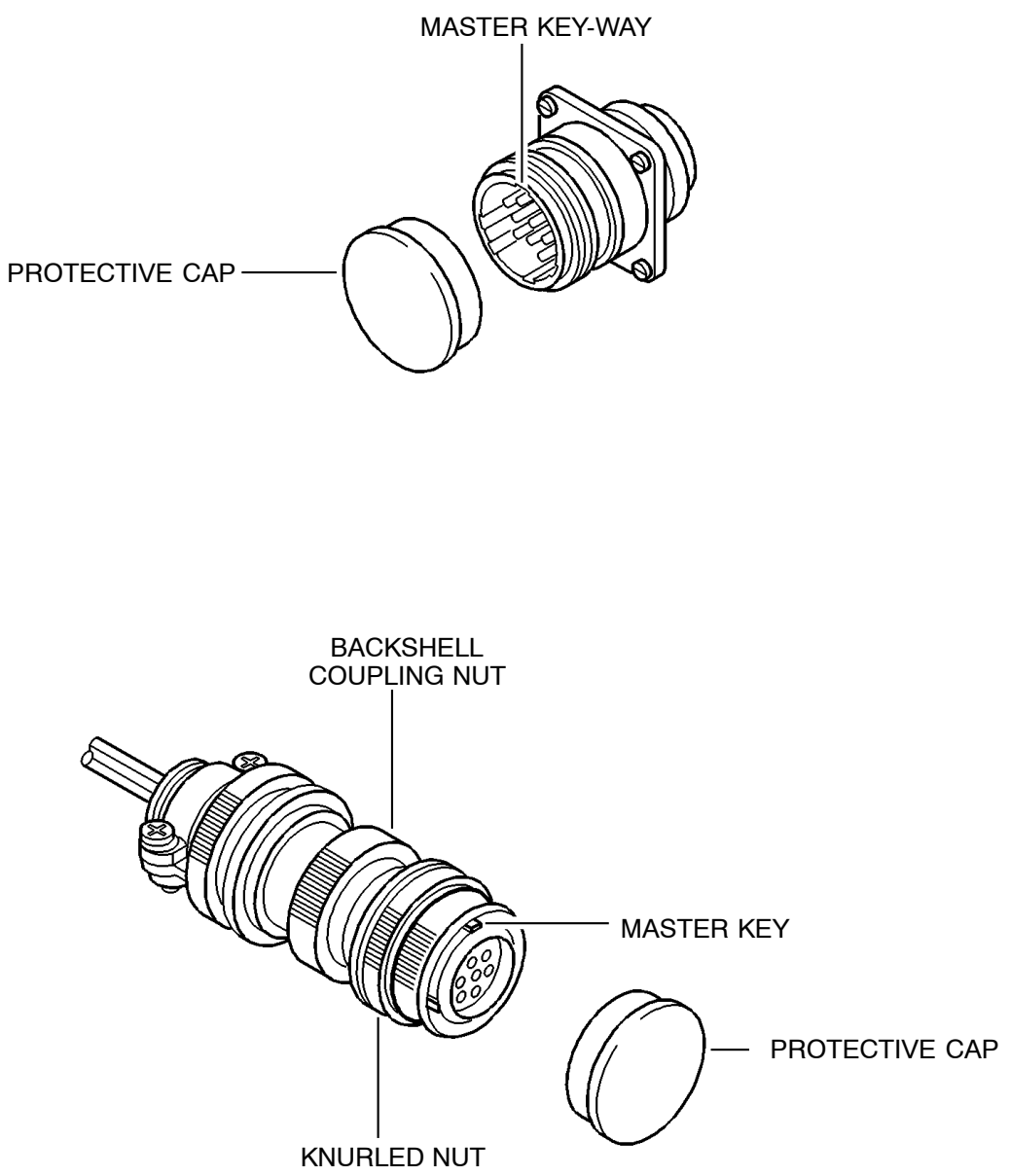


Figure 32 Electrical System Safety Items

WARNING: USE SOLVENTS/CLEANING AGENTS, SEALANTS AND OTHER SPECIAL MATERIALS ONLY WITH A GOOD FLOW OF AIR THROUGH THE WORK AREA.
THESE MATERIALS ARE POISONOUS AND FLAMMABLE AND SKIN IRRITANTS.
OBEY THE MANUFACTURERS INSTRUCTIONS.
PUT ON PROTECTIVE CLOTHING.
DO NOT GET THEM IN YOUR MOUTH.
DO NOT SMOKE.
DO NOT BREATHE THE GAS.
GET MEDICAL HELP IF YOUR SKIN OR EYES BECOME IRRITATED.

Tools

WARNING: BE CAREFUL WHEN YOU USE ELECTRIC TOOLS ON THE AIRCRAFT BECAUSE THERE ARE RISKS OF ELECTROCUTION OR EXPLOSION. IF THERE ARE LOCAL REGULATIONS RELATED TO ELECTRIC TOOLS, MAKE SURE THAT YOU OBEY THEM.

WARNING: BE CAREFUL WHEN YOU USE ELECTRIC TOOLS IN AREAS WHERE THERE ARE RISKS OF EXPLOSION (FUEL TANKS, FUEL VAPOUR AREAS, ETC.). REFER TO YOUR LOCAL REGULATIONS AND MAKE SURE THAT YOU OBEY THEM. SOME ELECTRIC TOOLS SUCH AS HEAT GUNS, SOLDERING IRONS AND TOOLS WITHOUT INTRINSIC PROTECTION ARE NOT PERMITTED IN THESE AREAS.

Never use electric tools which deliver an energy of more than 0.02 millijoule in fuel tanks or in areas where there are flammable vapors.

Never use heat–generating tools in the fuel tanks or in areas where there are flammable vapors.

Use only crimp–type contacts, terminals, splices, sleeves (non–heat shrinkable sleeves) in these areas.

Cables

For cables in harnesses that are identified by a P/N (engine, landing gear, fuel tanks, etc...), also refer to the applicable manufacturer documentation (Component Maintenance Manual).

ELECTROSTATIC DISCHARGE

Electrostatic Problems

ESD stands for ELECTROSTATIC DISCHARGE which is generated by rubbing materials with each other.

By moving over plastic materials (synthetic fibers), wearing synthetic fiber clothing, electrical charges build up on the body.

Thus voltages of 12000 to 35000 volts can develop on a person.

Touching connector pins of computer units, a discharge path is formed through wiring and components.

IC (**I**ntegrated **C**ircuit) chips can be partly damaged or totally destroyed.

You can see the so–called ”TRIBO–ELECTRIC” series of materials. Rubbing materials from this series against each other and then separating them from each other causes a build–up of electrostatic charges.

If the materials are far apart in the series, there will be a higher electric charge.

ESD Protection

Here are some precautions to avoid damage of electronic equipment by Electrostatic Discharge.

There are no specific procedures or instructions related to this subject because:

The LRUs have sufficient built–in protection to prevent electrostatic discharge damage.

No protective electrostatic discharge handling procedures are necessary unless the LRU housing is open.

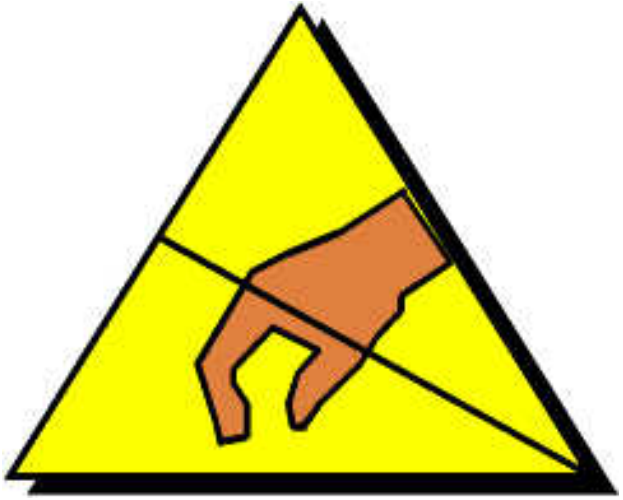
For example, antistatic or conductive protective caps are not necessary for connectors on the LRU housing (standard caps are sufficient).

No electrostatic discharge sensitive devices printed circuit boards are LRUs. Thus it is not necessary to use wrist straps.

NOTE: OBRMs (**O**n **B**oard **R**eplaceable **M**odules) are not LRUs. It is necessary to wear wrist straps for the Installation/replacement of OBRMs.

The necessary standard precautions for each LRU are specified in the AMM in the applicable removal/Installation section.

For example, ”Put the blanking caps on the fixed connector and on the LRU connector(s).“



CAUTION:

- Do not touch connector pins, avoid using flying leads on pins for testing.
- Establish good grounds (e.g. as for fuelling) if a unit has to be serviced.
- Put yourself on ground:
  Either discharge yourself on metallic structure or connect yourself to ground or use a wrist band with lead connector.
- Wrap the unit in conductive plastic foil or use a conductive bag.
- Protect the unit by placing protective caps on the connectors.
- Place the unserviceable unit in its re-usable shipping container.

Figure 33 ESD Sensitive Devices Symbol

HYDRAULIC SYSTEM SAFETY PROCEDURES

WARNING: PUT THE SAFETY DEVICES AND THE WARNING NOTICES IN POSITION BEFORE YOU START A TASK ON OR NEAR:
- THE FLIGHT CONTROLS
- THE FLIGHT CONTROL SURFACES
- THE LANDING GEAR AND THE RELATED DOORS
- COMPONENTS THAT MOVE.

WARNING: MAKE SURE THAT THE HYDRAULIC SYSTEMS(S) IN MAINTENANCE IS (ARE) ISOLATED BEFORE YOU PRESSURIZE THE OTHER HYDRAULIC SYSTEMS.

WARNING: DO NOT GET THE FLUID ON YOUR SKIN OR IN YOUR EYES. IF YOU DO:
- FLUSH IT AWAY WITH CLEAN WATER
- GET MEDICAL AID

Before Hydraulic System Pressurization

Make sure that all persons and equipment are clear of the flight controls and the landing gear doors.

Use only the ground interphone system to get approval to pressurize the hydraulic system.

Hydraulic Fluid Safety Precautions

Do not mix hydraulic fluid of the phosphate ester type with hydraulic fluid of the mineral–base type. This mixture causes a jelly in the hydraulic systems which can damage the system. This could cause a reduction in aircraft safety. These types of fluid are used in the hydraulic systems and landing gear respectively.

Thus there must be precautions to prevent any mixture of the fluids.

Read and make sure you fully understand these precautions before you start work with hydraulic fluid.

Before you start work, clean your hands, wrists and forearms and apply barrier cream.

Apply barrier cream under your fingernails and into creases of your skin.

Put on goggles when you do pressure test components or systems, or when there is a possibility that fluid splashes into your eyes.

If hydraulic fluid gets into your eyes, immediately irrigate your eyes with clear cold water and report the incident.

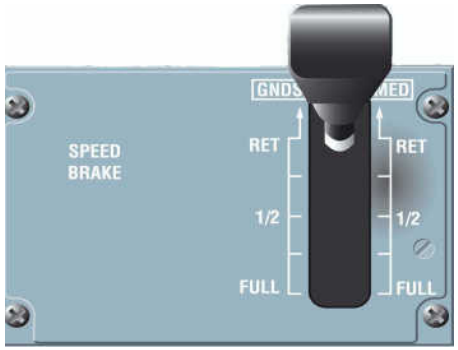
Always clean your hands, wrists and forearms with soap and warm water when it was necessary to touch hydraulic fluid.

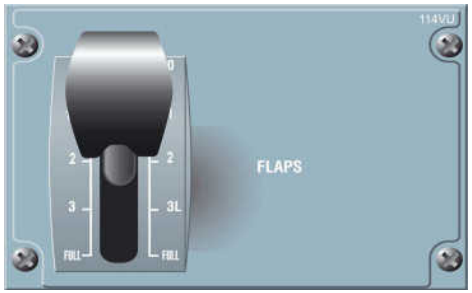
Remove clothing which is soaked with hydraulic fluid as soon as possible.

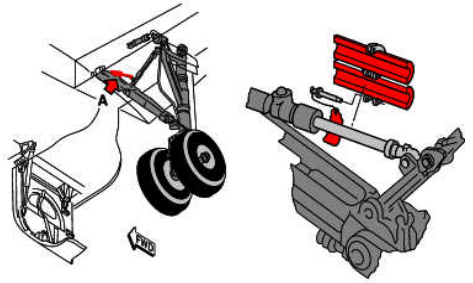
Obey all the AMM Safety Procedures

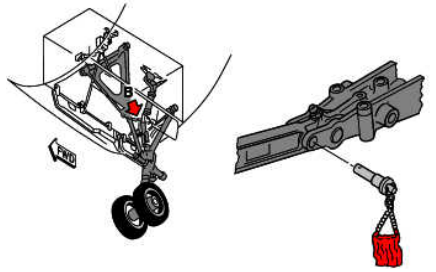
Isolate the Hydraulic System in maintenance before pressurization of other hydraulic systems

Make sure that controls agree with the position of the items they operate before you pressurize a hydraulic system









make sure the travel ranges of the flight controls are clear

Install safety devices and warning before working on or near landing gear and related doors

take care about the risks of hydraulic fluid injections materials in ventilated areas

Figure 34 HYD System Safety Procedures

Technical Precautions

WARNING: USE SOLVENTS/CLEANING AGENT, SEALANTS AND OTHER SPECIAL MATERIALS ONLY WITH A GOOD SUPPLY OF AIR. OBEY THE MANUFACTURERS INSTRUCTIONS. TAKE ON PROTECTIVE CLOTHING. DO NOT GET THEM IN YOUR MOUTH. DO NOT SMOKE. DO NOT BREATHE THE GAS. THESE MATERIALS ARE POISONOUS, FLAMMABLE AND SKIN IRRITANT. GET MEDICAL HELP IF YOUR SKIN OR EYES BECOME IRRITATED.

NOTE: Obey these technical precautions when you work on the hydraulic system. Hydraulic fluid causes damage to many materials, included are:

- Rubber
- Copper
- Titanium
- Plastics
- Paints

Make sure that the hydraulic fluid does not touch the aircraft other than components in the hydraulic system.

Keep to a minimum the hydraulic fluid which falls accidentally during maintenance.

Clean up such hydraulic fluid so that it can not go into adjacent areas. This is also to prevent future incorrect reports of hydraulic fluid leaks.

When you clean up hydraulic fluid, use dry cloth and clean the area with CLEANING AGENTS (Material No. 11–003) .

When you clean metal parts, before you assemble them, use only CLEANING AGENTS (Material No. 11–003) . Make sure that all of the solvent is removed before you assemble the parts.

Use only approved hydraulic fluid when you fill the reservoirs, filter bowls, pumps or other hydraulic components before installation.

Make sure that you prevent the contamination of hydraulic fluids with unapproved hydraulic fluids, fuels, oil, water or unwanted material.

If a system becomes contaminated, keep the hydraulic fluid so that you can make an analysis of it.

Before you connect the ground power supply to the aircraft, make sure that the fluid specifications (of the cart and the aircraft) are the same.

Figure 35 Consequential Damages

MAINTENANCE WALK AROUND

General

This section presents the A321 outside safety inspection and cockpit Check–List (CL) to be performed before powering the A/C for maintenance purposes. Various main stations have been defined.

NOTE: The following describes exemplarily a walk around procedure how it is recommended by Airbus Industries. Company regulations may vary from this procedure.

1 Nose Landing Gear

First verify that the NLG chocks are in place. Then, observe that the NLG doors are closed. Make sure that the NLG safety pin is installed. The NLG steering pin must be as required.

Finally, verify that the A/C is electrically grounded.

2 Right Main Landing Gear

Start by checking that the MLG door is closed. Then, verify that the MLG safety sleeve is installed. Lastly, observe that the MLG chocks are in place.

3 Right Engine

The first thing to do is to make sure that the engine right side access doors are secured. The same must be done for the left side.

Check that the engine fan cowls and thrust reverser cowls are secured.

4 Right Wing

Observe the position of the slats and then, the flaps. The spoilers must be retracted.

5 Left Wing

Here again observe the position of the flaps and then, the slats. Although make sure that the spoilers are retracted.

6 Left Engine

Check that the engine right side access doors are secured. Then pass around the engine to verify that the left side access doors are secured. Make sure that the engine fan cowls and thrust reverser cowls are secured.

7 Left Main Landing Gear

The Ram Air Turbine (RAT) safety device must be in the stowed position. Continue by checking that the MLG door is closed and that the MLG safety sleeve is installed. Before moving on, observe that the MLG chocks are in place.

8 Aircraft Area

In the A/C area station you have to make sure that the A/C area is clean and clear of tools and any other items.

9 Nose Station - External Power Receptacle

Verify that the external power is connected and available.

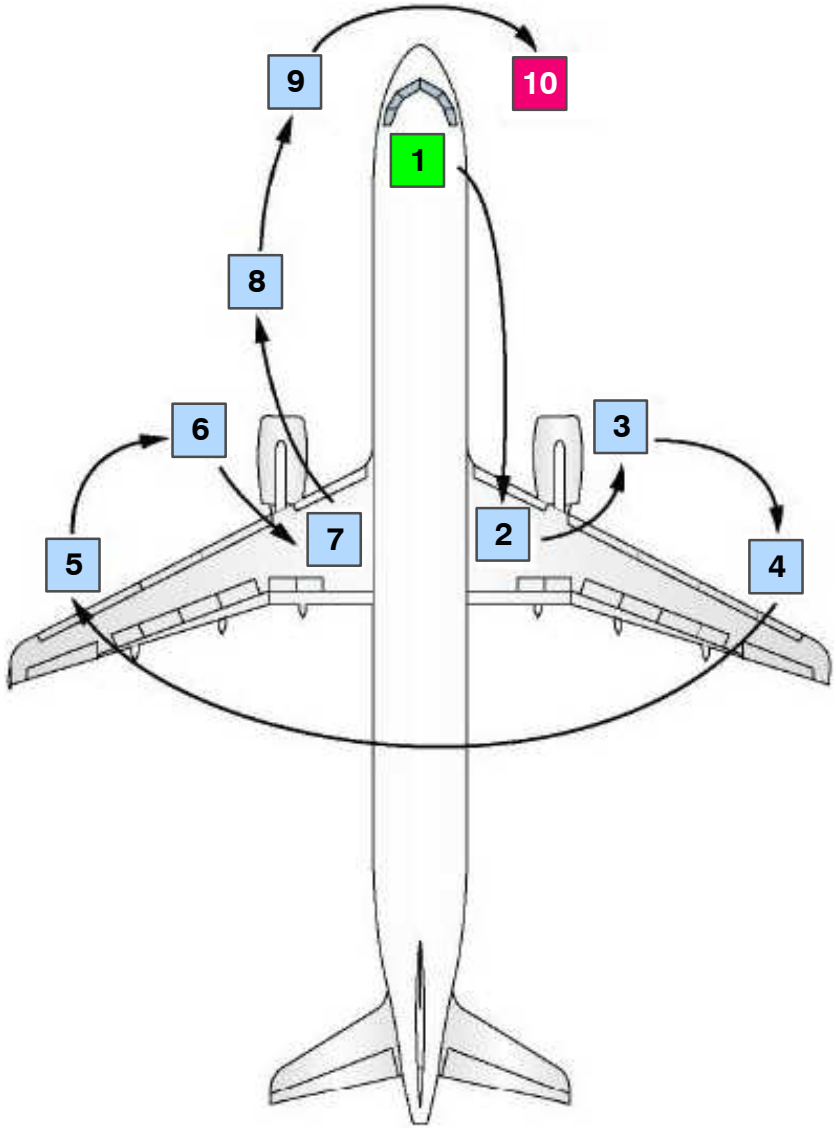


Figure 36 Walk Around

10 Cockpit Station

- Start by checking the rear and the overhead circuit breaker, then have a look to the emergency equipment. This consists in:
  - verifying that the escape ropes are present
  - observing that the fire extinguisher is in position
  - making sure that the cockpit is equipped with smoke hoods
  - checking that the fire protective gloves are present
  - ensuring the crash axe is in position
  - checking that the cockpit is equipped with life vest
  - verifying that the oxygen masks are present
  - observing that the flash lights are in position.
- You must then make sure that the wipers are switched OFF. Battery 1 and 2 P/BSW must be off and their voltage should be about 25 V.
- Proceed by setting the BAT1 P/BSW to AUTO. Then, set the BAT2 P/BSW to AUTO, check that the right hand dome light is on.
- Verify that the speed brake handle is in the retract disarm position. If the speed brake handle disagrees with the surface position maintenance action is due.
- On the center pedestal make sure that the thrust levers are in the idle position. Engine master switches 1 and 2 must be in the OFF position and the engine ignition mode selector in the NORMal position.
- Observe that the flap handle is set according to surface position. If engine reverse cowls have to be opened for maintenance action, the slats must to be retracted.
- Still on the center pedestal, check that the radar is off, also verify that the ATC transponder is off. Make sure that the gravity gear extension crank handle is in the reset stowed position.
- On the instrument panel observe that the three green triangles on the LDG GEAR panel are on.

The control safety check list should now have been accomplished. On the overhead panel set the EXTernal PoWeR P/BSW to ON.

Scan and check that no amber lights are on except GEN1 and 2 FAULT light on panel 44VU. The GALY & CAB P/BSW should be as required.

Finally verify that there is no light on the VENTilation panel. The A/C is now ready for maintenance.

NOSE STATION AND EXTERNAL POWER RECEPTACLE

1 Nose Landing Gear Station

On station 1 verify that the NLG chocks are in place.

Then observe that the NLG doors are closed. Make sure that the NLG safety pin is installed. The steering pin must be as required. Finally, verify that the A/C is electrically grounded.

NOTE: The aircraft may also be grounded from the main landing gear.

9 Nose Station - External Power Receptacle

Verify that the external power is connected and available. (The Avail Light on the External Power Receptacle is illuminated).

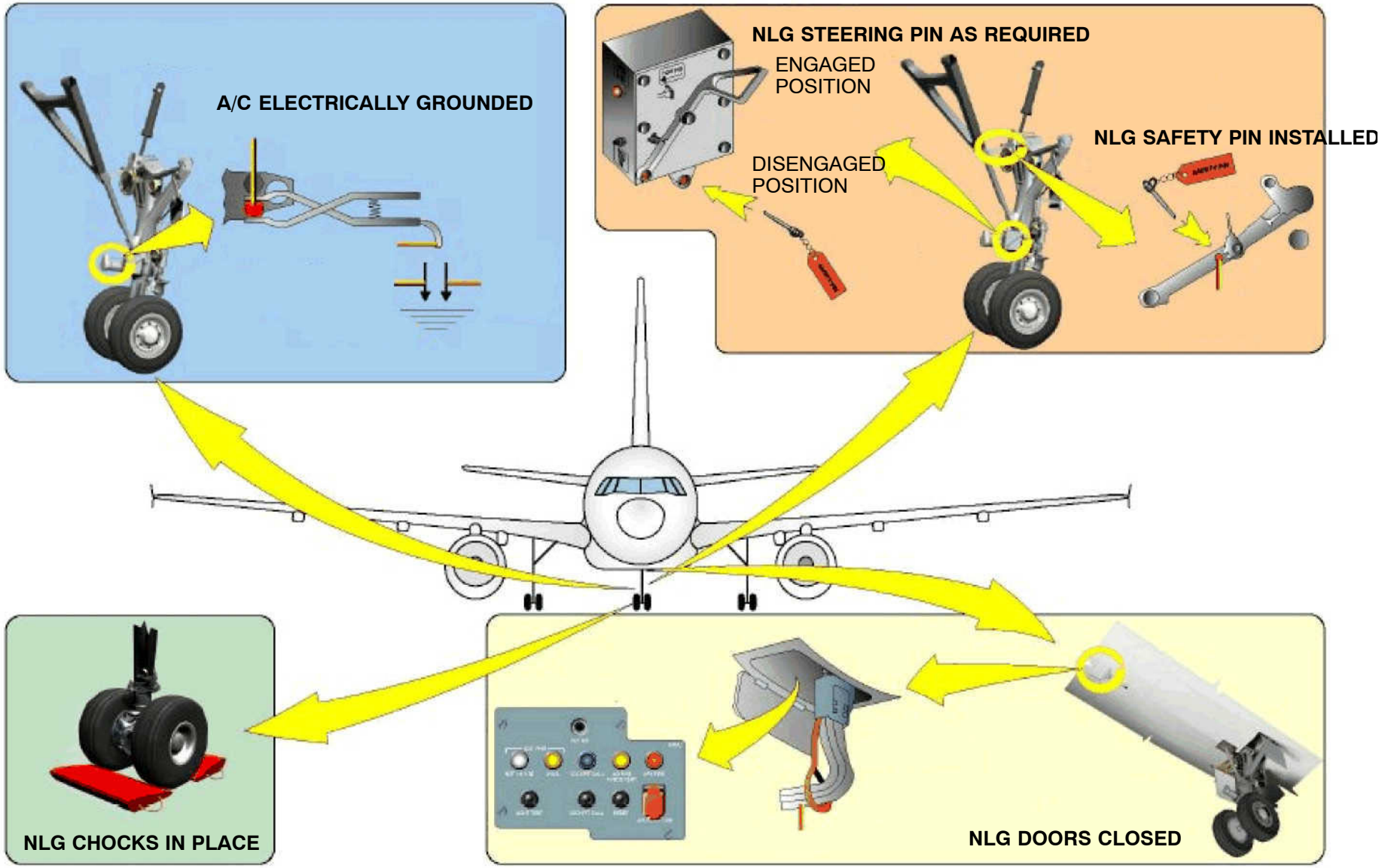


Figure 37 Nose Station and External Power Receptacle

RIGHT AND LEFT MAIN LANDING GEAR STATION

2 Right Main Landing Gear station

Check that the MLG (Main Landing Gear) door is closed. Then, verify that the MLG safety sleeve is installed. Finally, observe that the MLG chocks are in position.

7 Left Main Landing Gear station

Check that the MLG door is closed. Then, verify that the MLG safety sleeve is installed and observe that the MLG chocks are in position.

Finally verify that the RAT (Ram Air Turbine) is in stowed position.

NOTE: for some maintenance activities the RAT safety devices must be installed. in that case check that the devices is installed.

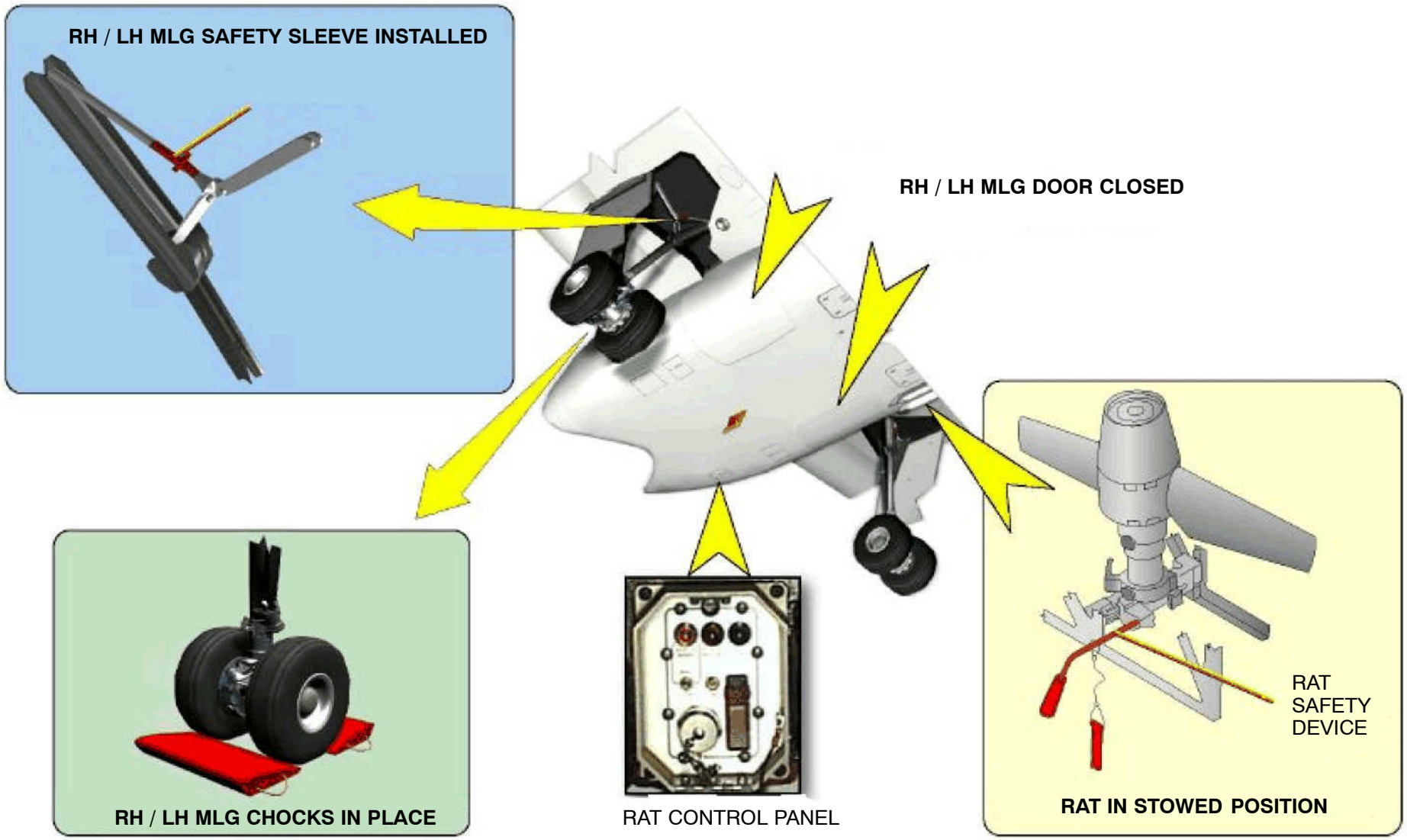


Figure 38 Left and Right Main Landing Gear

RIGHT AND LEFT ENGINE STATION

3 **Right Engine**

and

6 **Left Engine**

Make sure that the engine right and left side access doors are secured.

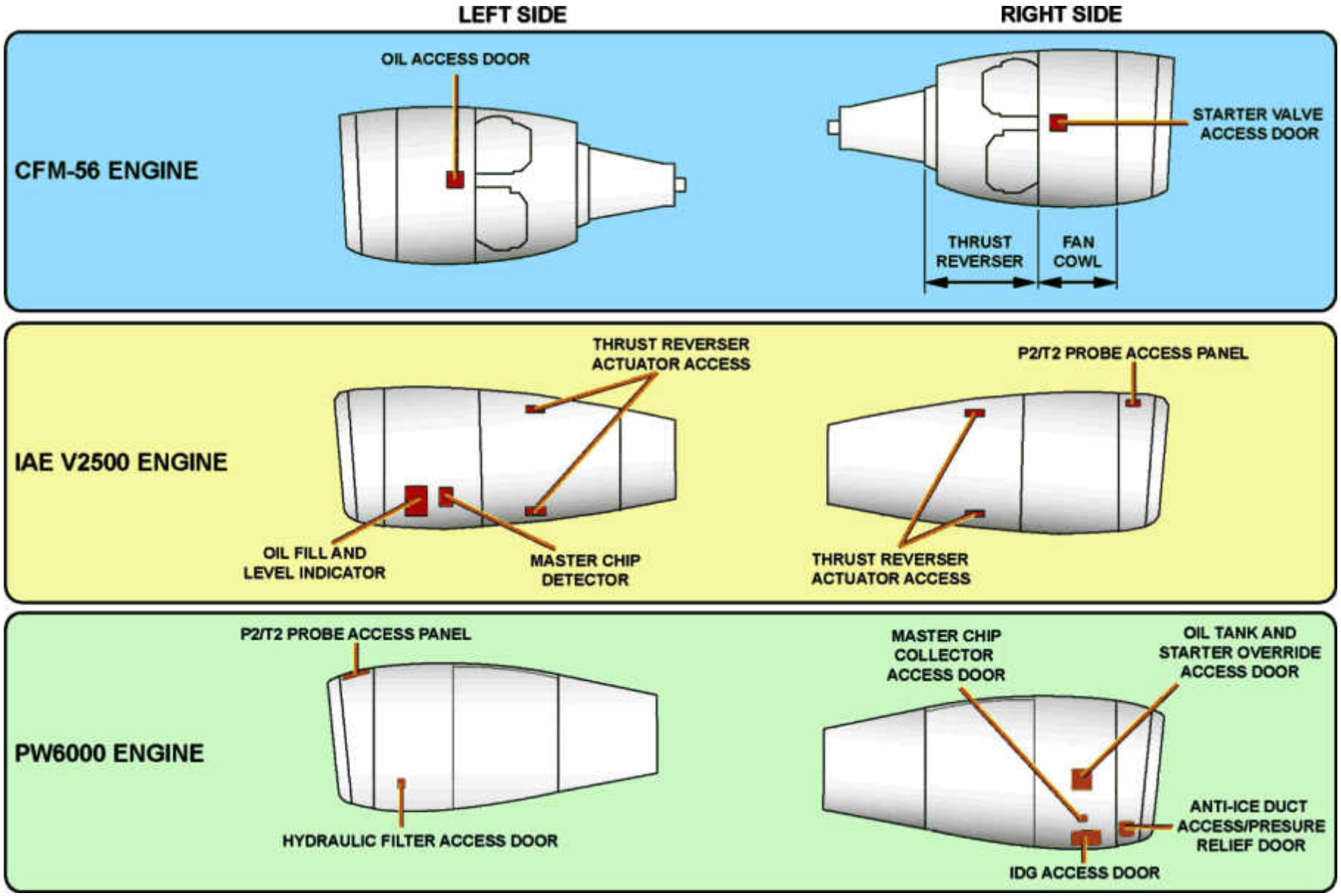


Figure 39 Right and left Engine Doors

RIGHT AND LEFT ENGINE STATION (CONTINUED)

3 **Right Engine station**

and

6 **Left Engine station**

Check that the engine fan cowls and thrust reverser cowls are secured.

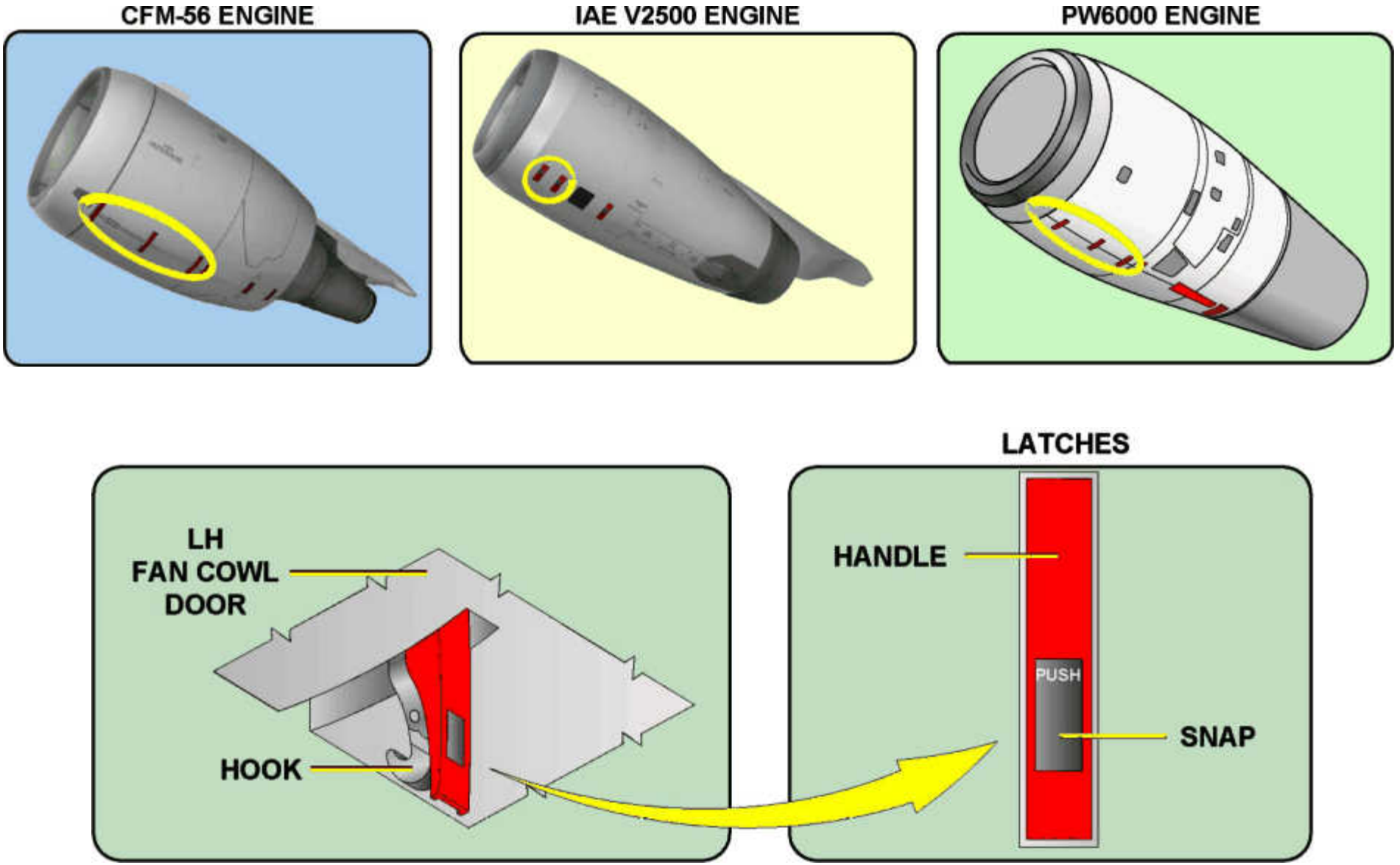


Figure 40 Right and left Engine Fan Cowls

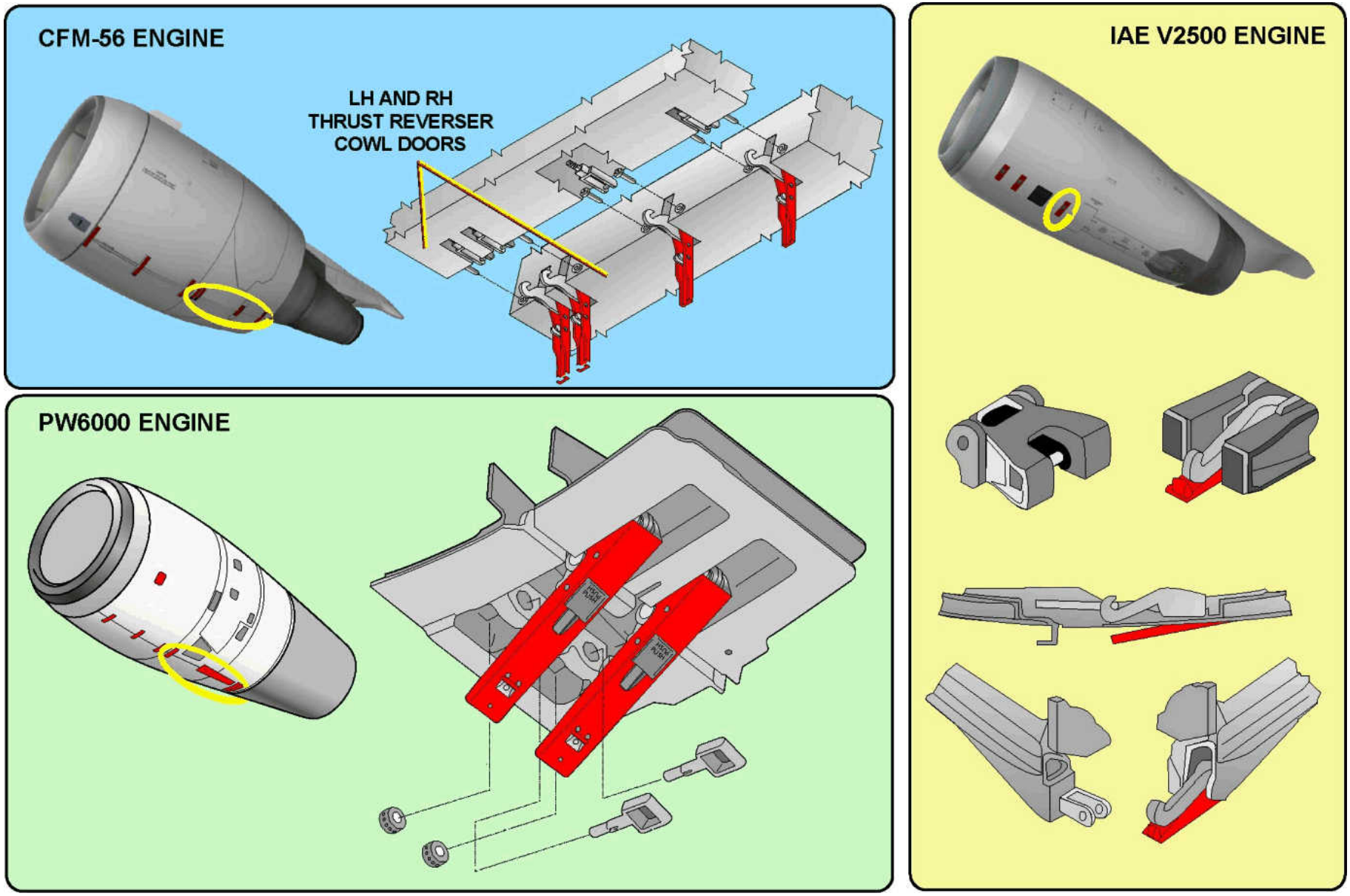


Figure 41 Right and left Engine Thrust Reverser Cowls

RIGHT AND LEFT WING STATION

4 **Right Wing Station and**

5 **Left Wing Station**

Confirm the position of the slats and then, the flaps. The spoilers must be retracted.

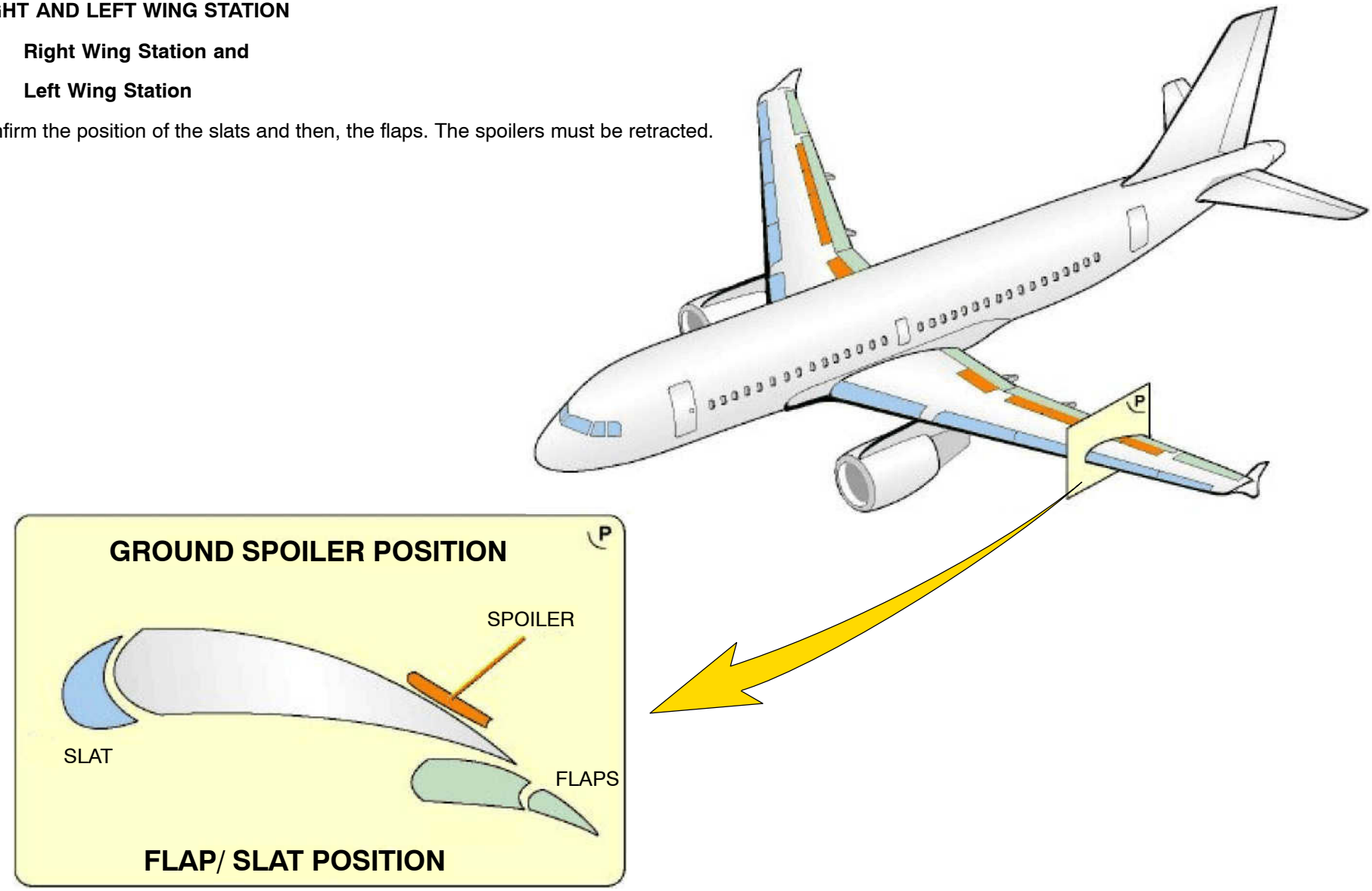


Figure 42 Right and Left Wing

AIRCRAFT AREA

8 In the aircraft area, you have to make sure that the aircraft area is clean and clear of tools.

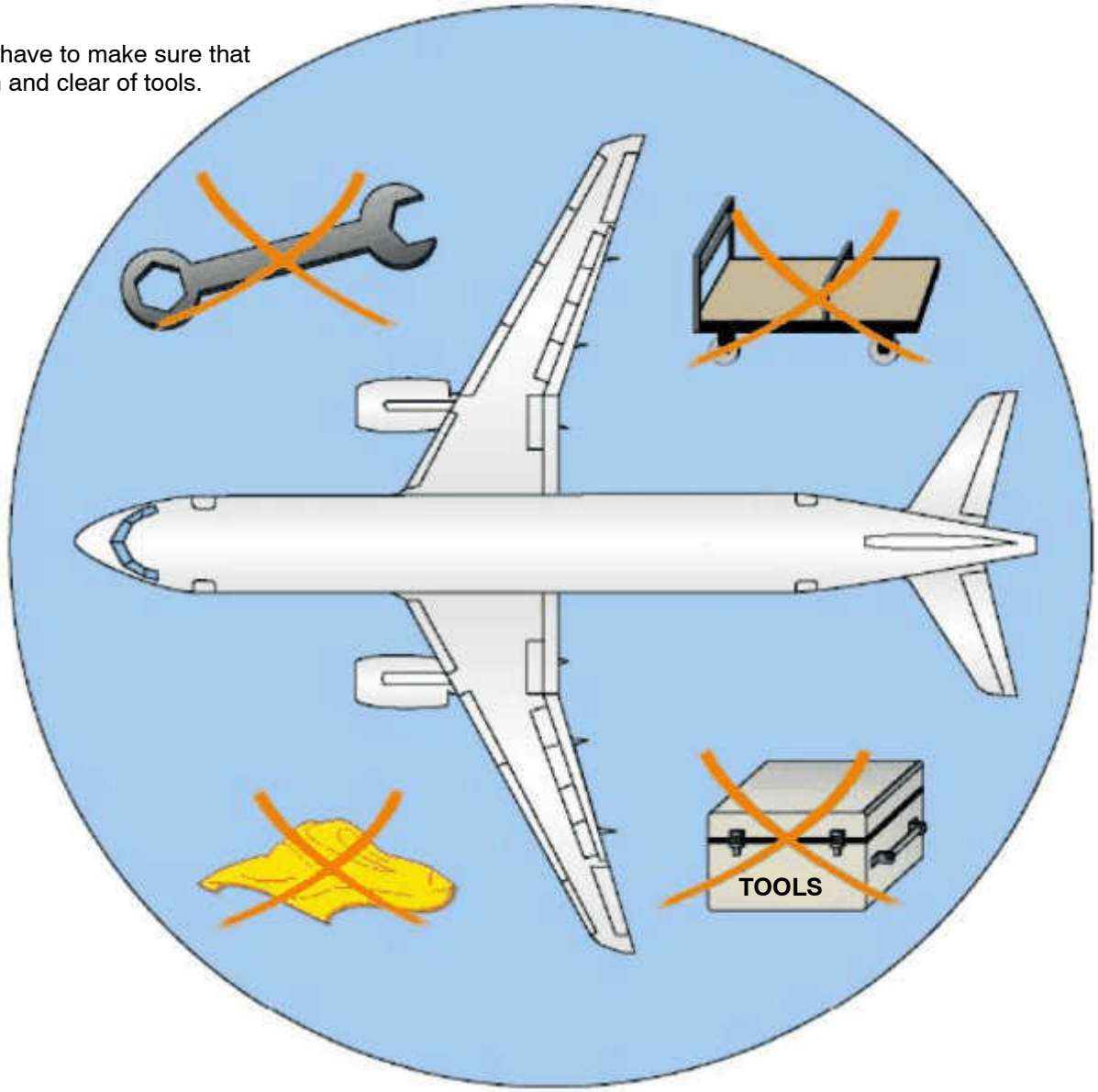
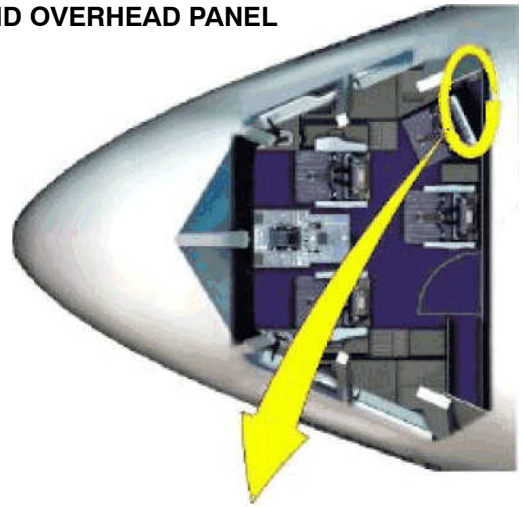
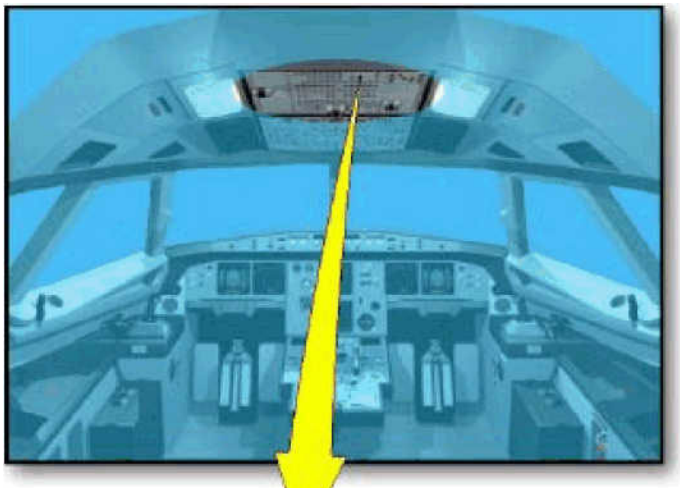


Figure 43 Aircraft Area

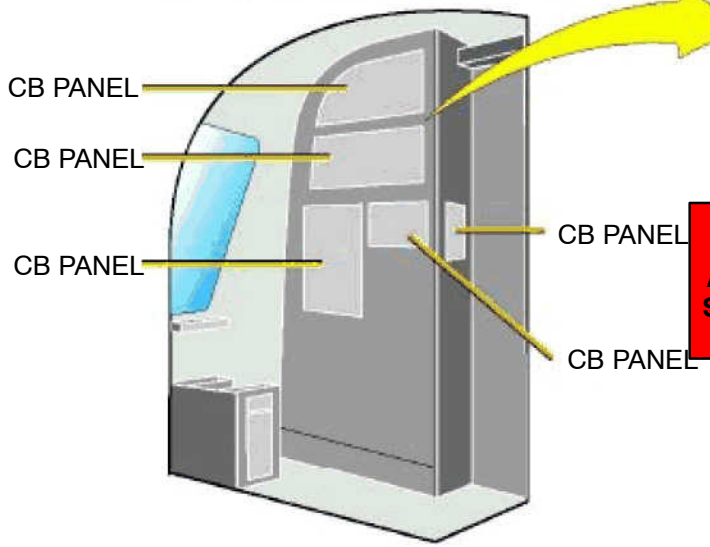
10 COCKPIT STATION

REAR AND OVERHEAD PANEL





REAR CIRCUIT BREAKER PANEL



Start by checking that the rear and overhead circuit breakers are in closed position.

MAKE SURE THAT ALL THE CIRCUITS IN MAINTENANCE ARE ISOLATED BEFORE YOU SUPPLY ELECTRICAL POWER TO THE AIRCRAFT.

OVERHEAD CIRCUIT BREAKER PANEL

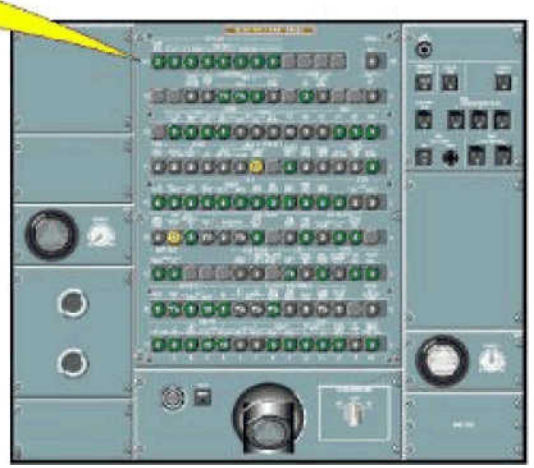


Figure 44 Rear and Overhead Circuit Breaker Panels

COCKPIT MISC. EMERGENCY EQUIPMENT

Emergency Equipment

Have a look at the cockpit emergency equipment. This consists in:

- Verifying Escape Ropes for Presence
- Observing that the Fire Extinguisher is in Position
- Making sure that the Cockpit is equipped with Smoke Hoods
- Checking Fire Protective Gloves for Presence
- Ensuring that the Crash Axe is in Position
- Checking that the Cockpit is equipped with Life Vests
- Observing that the Flash Lights are in Position
- Verifying Oxygen Masks for Presence

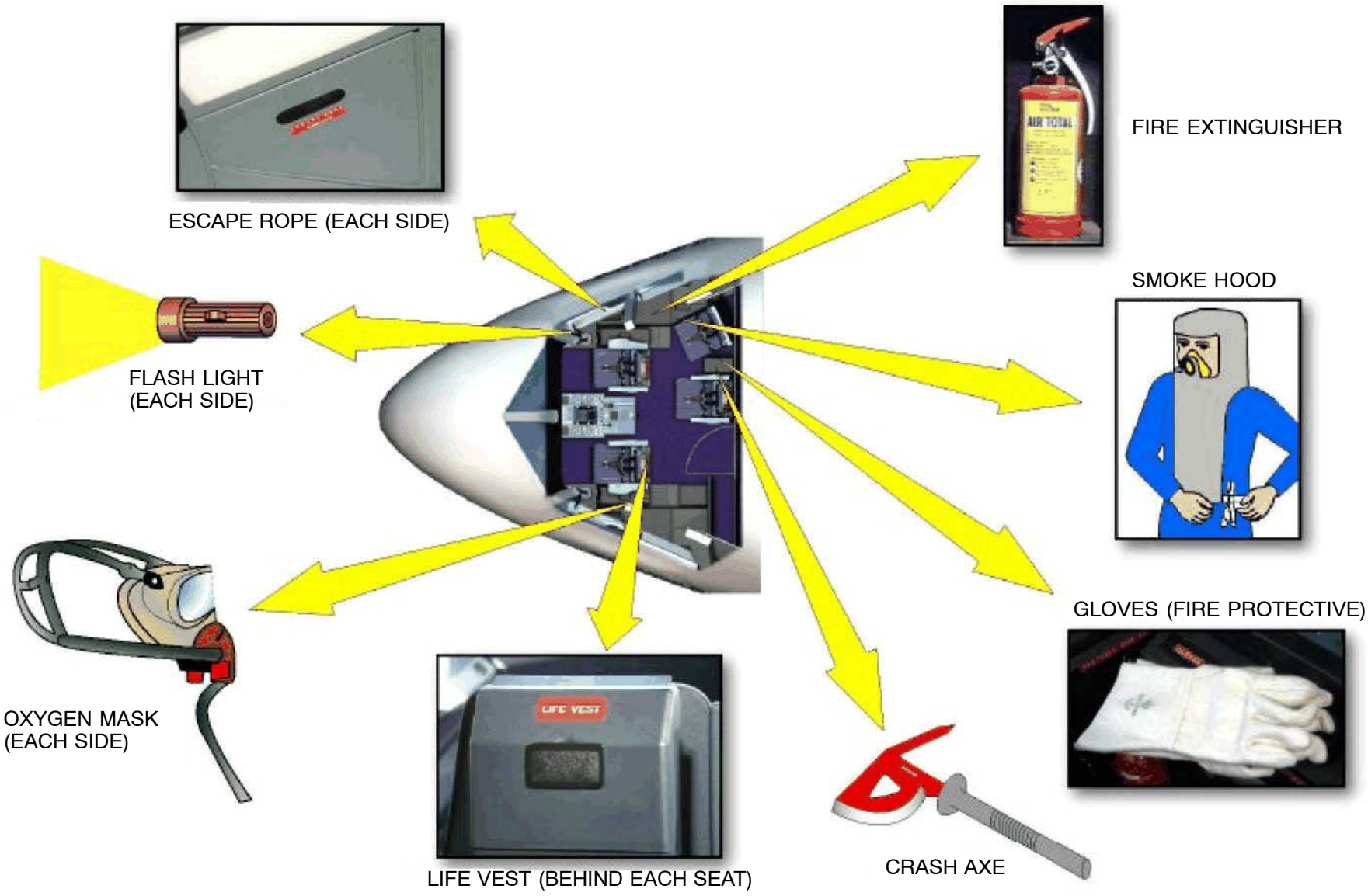


Figure 45 Emergency Equipment

CENTER PEDESTAL PANEL

Pedestal Panel - Check List

On the center pedestal, verify that the speed brake handle is in the retract/disarm position.

If the speed brake handle disagrees with the surface position, maintenance action is due.

Observe that the flap handle is set according to surface position.

Make sure that the gravity gear extension handle is in the reset and stowed position.

Make sure that the thrust levers are in the IDLE position.

ENG MASTER SWs 1 and 2 must be in the OFF position and the engine ignition mode selector in the NORM position.

If engine reverser cowls have to be opened for maintenance action, the slats must be retracted.

Check that the radar is off. Also, verify that the ATC (**A**ir **T**raffic **C**ontrol) transponder is off.

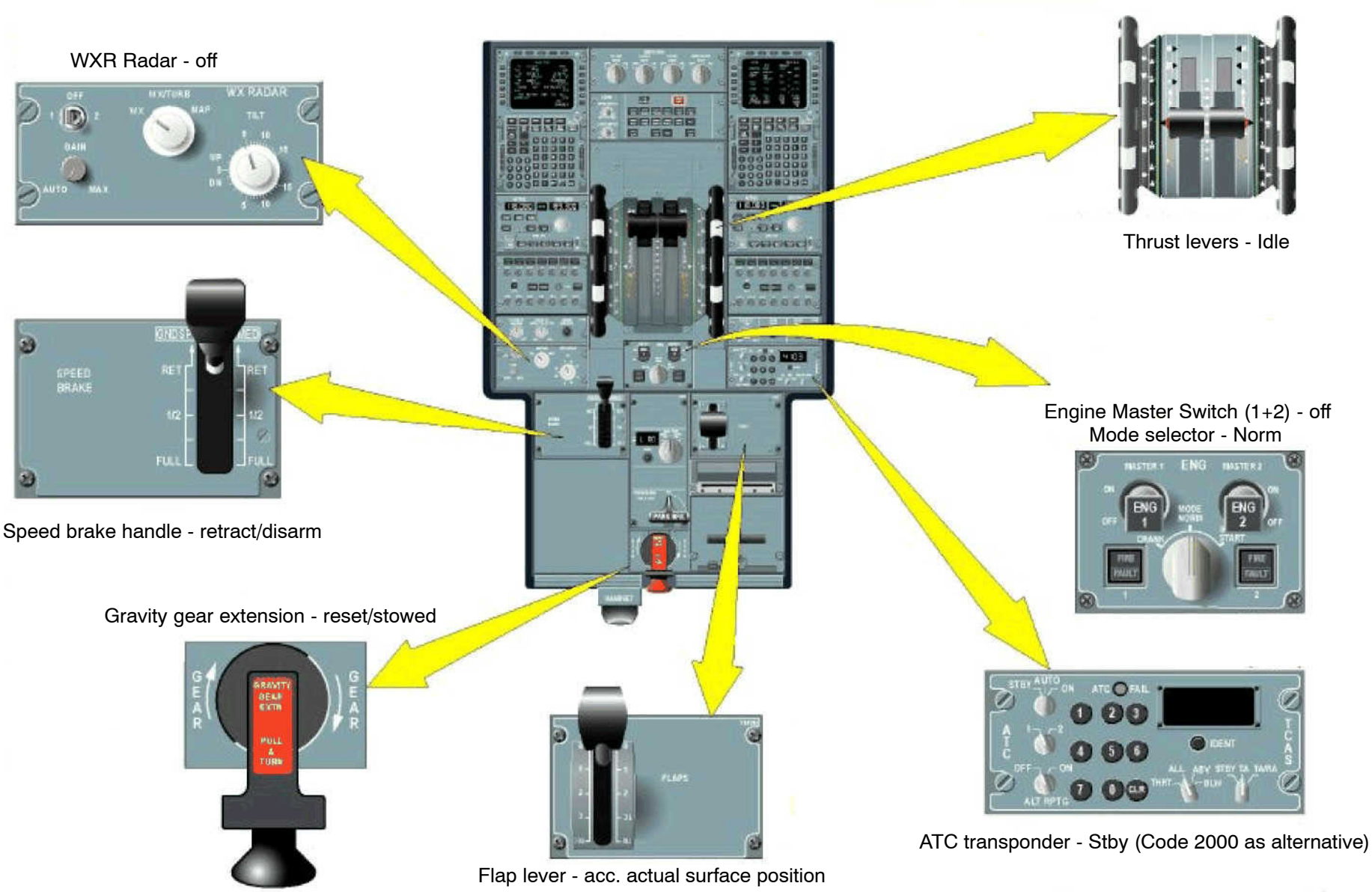


Figure 46 Pedestal Panel

OVERHEAD PANEL

Overhead Panel Check List

Make sure that:

- Wipers are OFF
- Batteries 1&2 P/BSWs must be OFF and the voltage should be about 25V
  - Proceed by setting the BAT1 P/BSW to AUTO position.
  - Set the BAT2 P/BSW to AUTO position.

    NOTE: If BAT voltage is below 25V, a charging cycle of 20 minutes is required.
- Check that the right hand dome light is on.

A/C Power Supply

On the overhead panel:

- Set the External Power P/BSW to ON
- Set the GEN1 P/BSW to ON and the GEN2 P/BSW to ON.
- Scan and check that no amber lights are on except GEN1 and GEN2 FAULT lights on panel 35VU.
- The GALY & CAB P/BSW should be switched off (or as required)
- Finally, verify there is no light on the ventilation panel.

The A/C is now ready to maintenance.

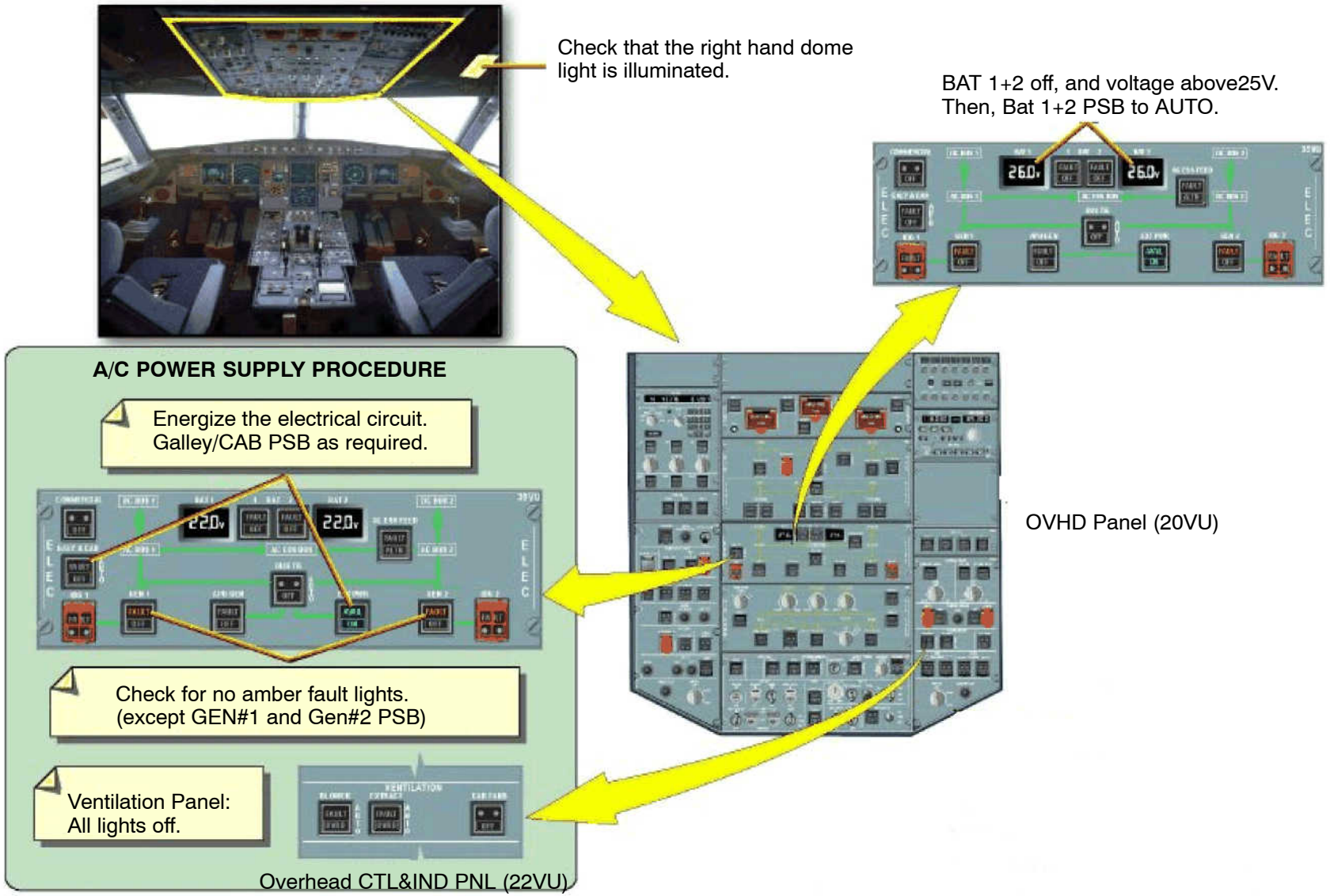


Figure 47 Overhead Panel

MAIN INSTRUMENT PANEL

On the instrument panel, make sure that the L/G lever is in the down position and confirm that the three green arrows on the L/G panel are on.

The control safety Cockpit Checklist should now have been accomplished.

MAIN INSTRUMENT PANEL (10VU)

L/G Lever Indication:
3 Green Triangles

LANDING GEAR
CTL&IND PNL
(402VU)

R CENTER
INSTRUMENT
PNL (400VU)

L/G Lever DOWN

CONTROL SAFETY CHECKLIST

Aircraft System Powering

BAT PSB	OFF/ VOLTAGE ABOVE 25.5V
BAT PSB	AUTO/ON
EXT POWER	ON
VENT PNL	CHECK NO LIGHTS
ECAM	ON
EFIS	AS REQUIRED
ADIRS	AS REQUIRED

Leaving the Aircraft

ADIRS	OFF
PTU	AUTO
FUEL PUMPS	OFF
ECAM	OFF
EFIS	OFF
EXT POWER	OFF
BATTERIES	OFF

Control Safety Checklist COMPLETED

Figure 48 Main Instrument Panel

ATA 05 TIME LIMITS/ MAINTENANCE CHECKS

GENERAL INFORMATION

Maintenance Checks

There are two types of maintenance checks:

- Scheduled maintenance checks

  This includes all the zonal inspections that you must do on the aircraft.

- Unscheduled Maintenance Checks

  This includes maintenance checks to be performed whenever a flight in abnormal conditions is reported by the Flight Crew or on ground by maintenance.

ATA 20 STANDARD PRATICES

GENERAL INFORMATION

Introduction

The airframe standard practices chapter contains information on the use and application of aircraft maintenance and repair processes which are not specifically covered in other chapters of the Aircraft Maintenance Manual.

It also gives the list of materials required for servicing and maintenance operations.

Standards Manual

Information related to the various standards effective for all AIRBUS models are given in a separate manual called: STANDARDS MANUAL.

The STANDARDS MANUAL contains information about all product/semi –finished product standards approved by the AIRBUS partners for the AIRBUS programs, as well as about the proprietary parts and the suppliers qualified for those parts.

Moreover, the STANDARDS MANUAL contains a selection of the basic standards used on the AIRBUS programs. Standard parts which are not found in the STANDARDS MANUAL shall not be used without prior approval by AIRBUS INDUSTRY.

The STANDARDS MANUAL assists the customer with respect to information about the identification of standard parts and their procurement in co–operation with the AIRBUS INDUSTRY spare parts center.

Process and Material Specification Manual

The PROCESS AND MATERIAL SPECIFICATION MANUAL provides basic information on manufacturing processes and materials which are called up in engineering drawings and AIRBUS INDUSTRY documentation.

It is designed to assist operators in producing their own workshop documents necessary to perform work on in–service AIRBUS aircraft. The quality of such work is the responsibility of the Operator.

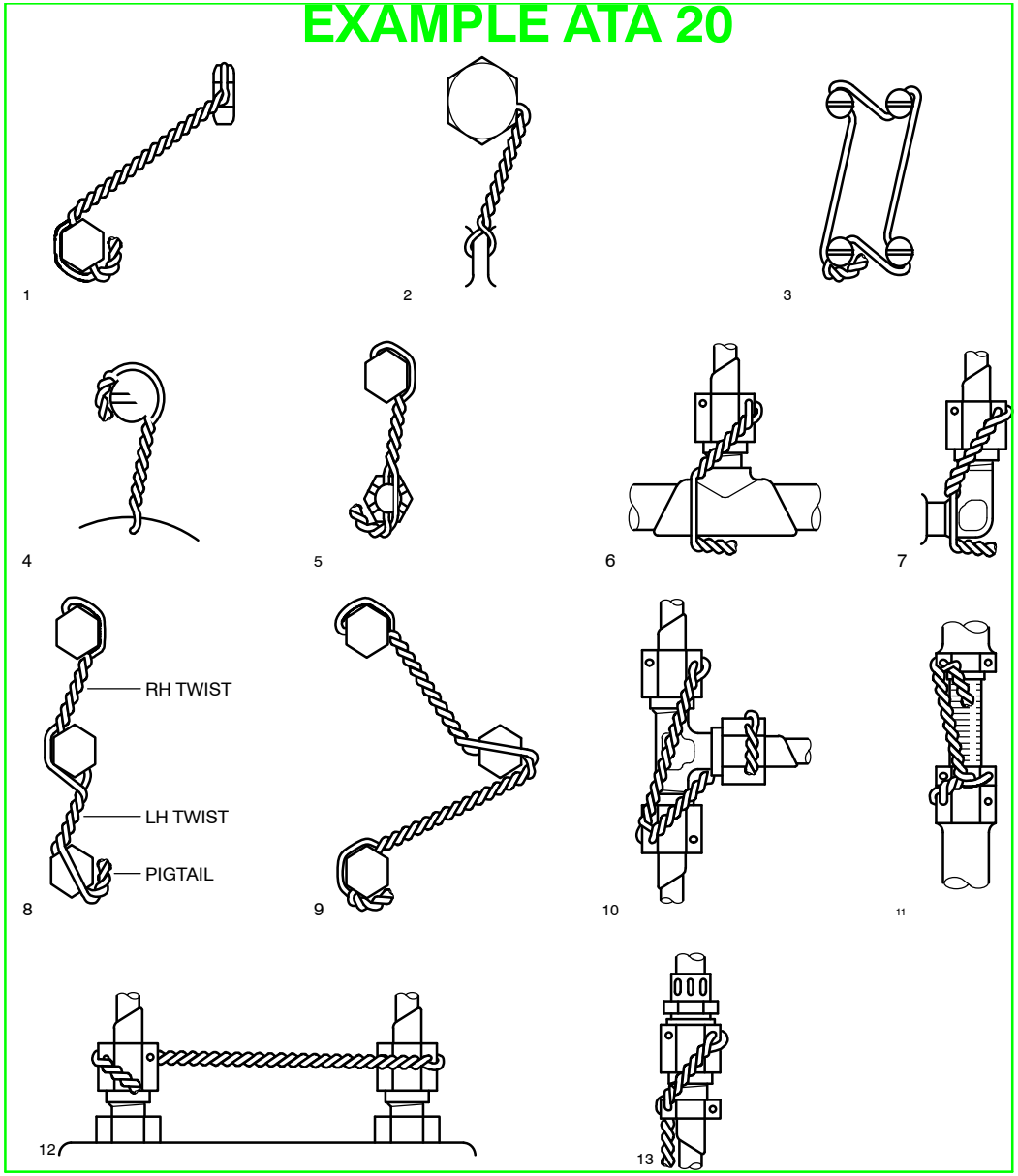


Figure 49 Wire Locking Examples

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