A321 NEO AIRBUS CABIN FLEX (ACF)

NOTE. THIS SECTION IS FOR INFORMATION ONLY AND WILL NOT BE EXAMINED

INTRODUCTION

A321NEO Airbus Cabin Flex (ACF)

Increase the maximum seat count of the A321NEO,

Improve the flexibility for cabin arrangement,

Offer a ‘Long Range’ variant for trans-continental operations.

A321NEO ACF will become standard version for all A321NEO in 2019.

The A321NEO ACF change is introduced as a new standard within the Airbus Single aisle fleet (ST8) and will be based on all A321NEO models.

The reference aircraft for A321NEO ACF models are the A321NEO namely A321-251Nx, A321-252Nx, A321-253Nx, A321-271Nx, and A321-272Nx.

The reference aircraft for the “up to 3 ACTs” option is the A321NEO ACF.

A321NEO ACF vs A321NEO Nx

A321NEO ACF is the concept name.

A321NEO Nx is the model reference:

A321-251Nx	(CFM LEAP)
A321-252Nx	(CFM LEAP)
A321-253Nx	(CFM LEAP)
A321-271Nx	(PW1127G)
A321-272Nx	(PW1127G)

Example:

A321-212	A321ceo CFM 56
A321-251Nx	A321NEO CFM LEAP
A321-251Nx	A321NEO ACF CFM LEAP


82
D-AVZO
unbeatable fuel efficiency now flying long range
A321 AIRBUS

ACF is a combination of 2 Versions

Basic ACF modifications:

Door re-arrangement,

Up to 97t MTOW via dedicated WV (weight variant).

ACT Options:

Option for 1, 2 or 3 ACTs.

DOOR RE-ARRANGEMENT PERMITS FLEXIBLE LAYOUT OF PASSENGER ACCOMODATIONS (LOPA), AND HIGHER DENSITY

ACT'S PERMIT GREATER RANGE THEREFORE ETOPS.

ALL ACF'S WILL BE 97T CAPABLE
A321LR IS THE COMBINATION OF 97T WV AND ACT OPTION

EMERGENCY DOOR CONFIGURATIONS CEO/NEO

A318-A319-A320: overwing emergency exits are called “hatches”.

A318 and A319: 2 overwing emergency exits (1 on each side).

A319: may optionally have 4 overwing emergency exits.

A320: 4 overwing emergency exits (2 on each side).

A321: 4 emergency exit doors (two on each side) FWD and AFT of the wing.

Also called door 2 and 3.

Overwing emergency doors are always armed and will cause deployment of the overwing slide if opened from the inside or outside.

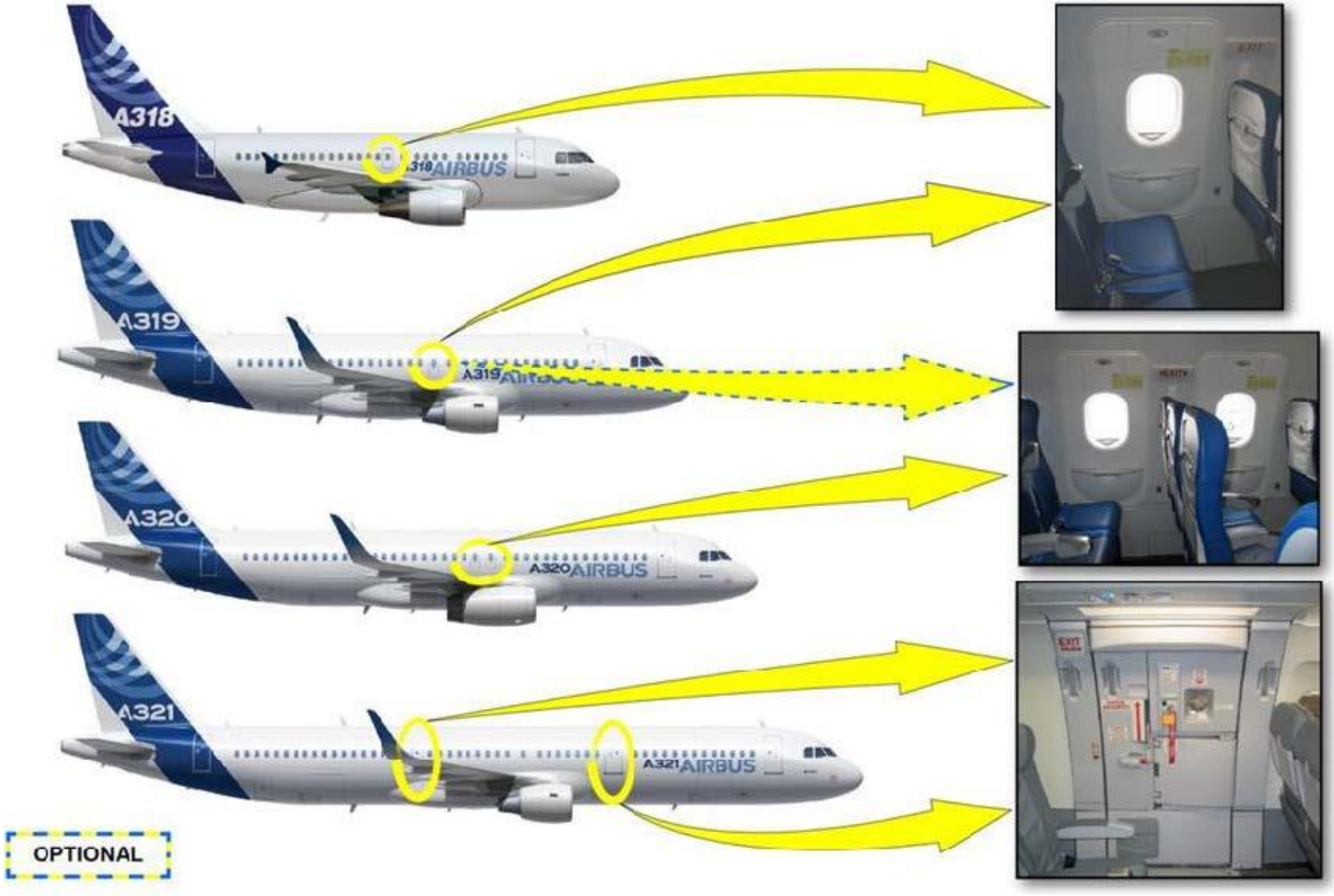
Disarming is done by maintenance personnel only.

Emergency exit doors 2 and 3 are opened from the inside or outside.

Doors are equipped with an emergency assist system and an emergency escape slide.

Door and escape slide are automatically disarmed when doors are opened from outside.

If opening doors from inside, the door assist, and the escape slide system must be disarmed.


A318
A319
A320
A321
OPTIONAL

EMERGENCY DOOR ESCAPE SLIDES

A318-A319-A320

Slide packs are installed in the unpressurized fuselage, aft of the flap.

One slide on each side of the fuselage.

Slides are always armed; they may be disarmed for maintenance purposes.

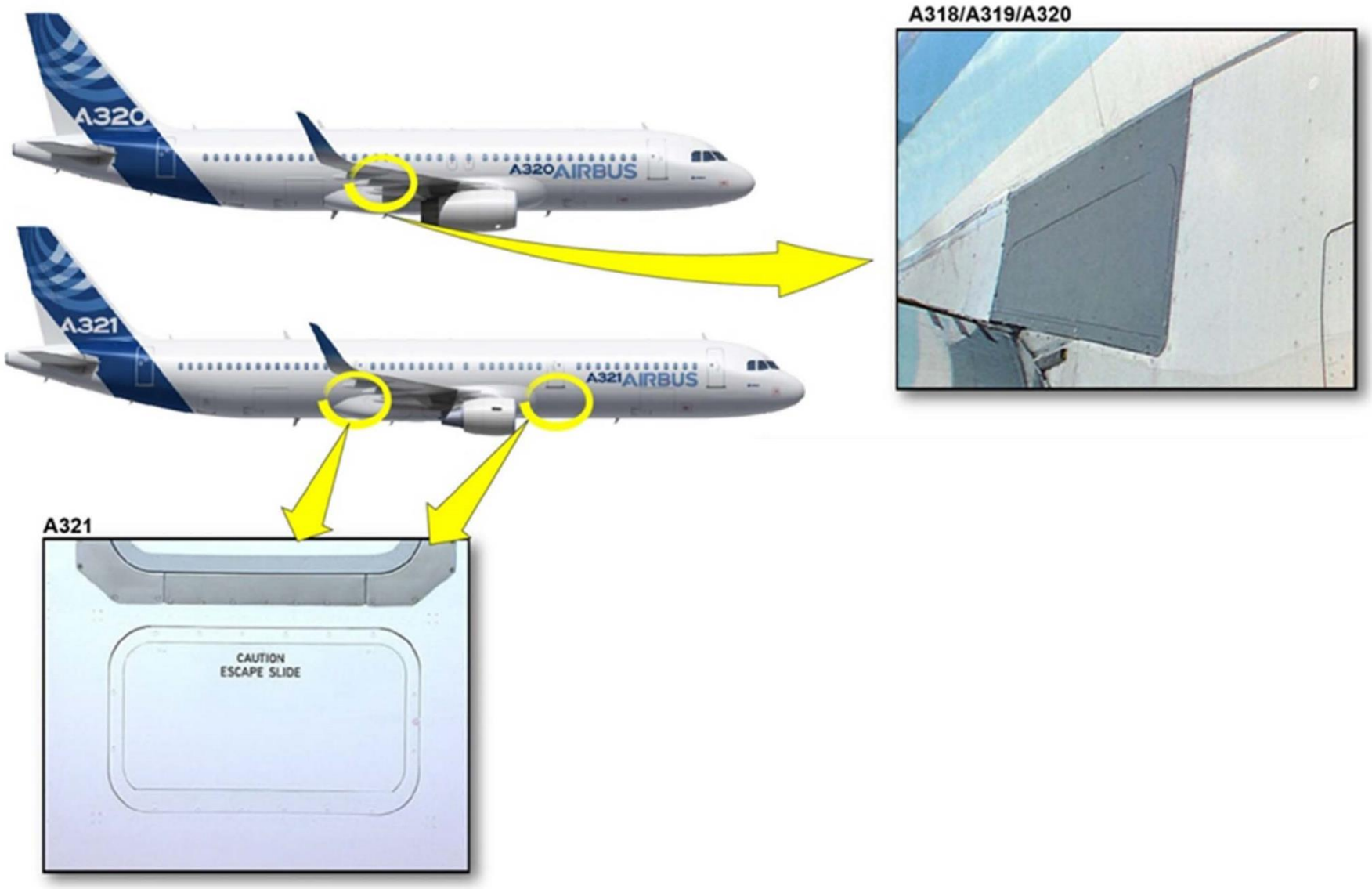
Both hatches on same side must be disarmed to fully disarm the escape slide.

The inflation reservoirs for the slides are in the aft cargo compartment sidewalls or in the aft cabin overhead stowage compartments if fuel ACTs are installed in the aft cargo.

A321

Slide packs are installed below each of the emergency exits.

The inflation reservoirs for the slides are located above each door in a dedicated compartment or in the overhead stowage compartments.


A320
A320 AIRBUS
A321
A321 AIRBUS
A318/A319/A320
A321
CAUTION
ESCAPE SLIDE

ACF Physical Modifications

PAX door 3, moved 4 frames back,

PAX door 2 permanently deleted,

Two oversized overwing exits installed on each side,

Plug solution for door 3 deletion,

Plug solution for overwing door deletion,

Solution for overwing door deactivation,

Limited wing reinforcements due to increased MTOW,

Fuselage reinforcements for ACTs in REAR and FWD cargos.

The changes for the ACF high density envelope configuration are:

Doors 1 and 4 themselves are not modified compared to A321NEO.

However, they are certified for an increased rating of 65 passengers (“C65”) similarly to the Single Aisle MAXPAX project.

For configurations with doors 1 and 4 certified for a passenger rating of 65, the installation of Wide Slides or Slide/rafts is mandatory.

Door 2 (RH and LH) are permanently deleted from the aircraft and replaced by a current structure (with a full-sized window and continuous interior lining) and the removal of the associated emergency exit slide.

The emergency exit slide is replaced by the installation of an aerodynamic but unpressurized cover plate.


unbeatable fuel efficiency
A321
AIRBUS

ACF Physical Modifications

Door 3 itself remains unchanged compared to A321NEO and is moved 4 frames aft (RH and LH). Door 3 emergency evacuation slide is redesigned considering an increased sweep angle. Door 3 is the non-standard oversized Type I qualified to Type C exit with a passenger rating of 55 (“C55”) as certified on A321NEO.

Two pairs of Over Wing Exits (RH and LH) with fast opening automatic doors are introduced in Section 15, including an associated emergency evacuation slide.

These exits will be rated with an increased passenger capacity of 70+ compared to the regulatory type III rating.

As a result of these changes, the theoretical Maximum Passenger Seating Capacity would be 250, and the envelope capacity to be certified in the frame of the ACF high density project is 244 passengers.

As for the Max Pax project, the ACF high density configuration is defining an envelope.

The A321 NEO ACF weight variants to be considered are A321NEO (WV50-WV70), with the addition of WV71 to WV84 up to 97t MTOW.

The center wing box is locally modified to cope with the ACF loads and “feed through” holes for the installation of ACTs.

The A321 NEO ACF Maximum Ramp Weight is 97.4T and Maximum Take-off weight is 97T.

The effect on landing gear loads is very limited.

There is no change on the existing nose landing gear, main wheel design, nose wheel design, main tire design and nose tire design.

For the wings, inner wing ribs and fixed trailing edge are reinforced.

There is a slight increase in the Main Landing Gear (MLG) tire pressure compared to current certified A321.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DOOR CHANGES

How is the maximum seat count increased?

Re-classification of main exit doors to higher capacity (55 X 65),

Installation of 2 Over-Wing-Exits (as per A320),

Door 3 moved rearwards,

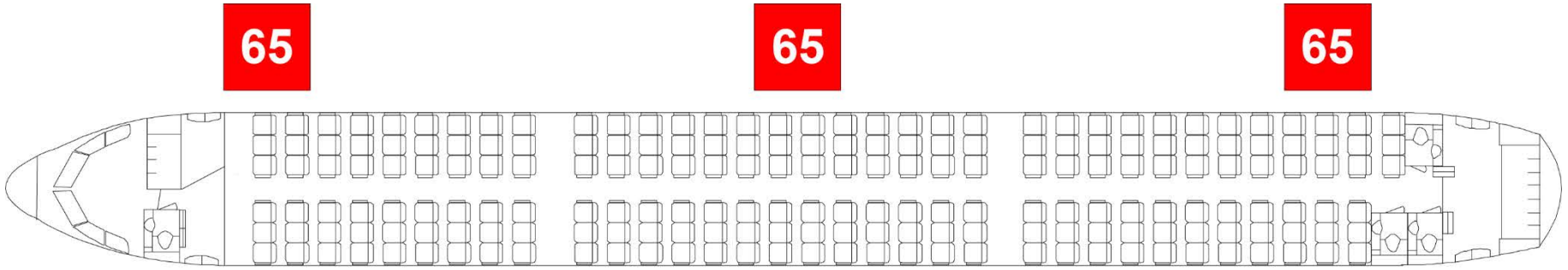
Seat count increases from 220 to 244.

How is the flexibility for cabin arrangement improved?

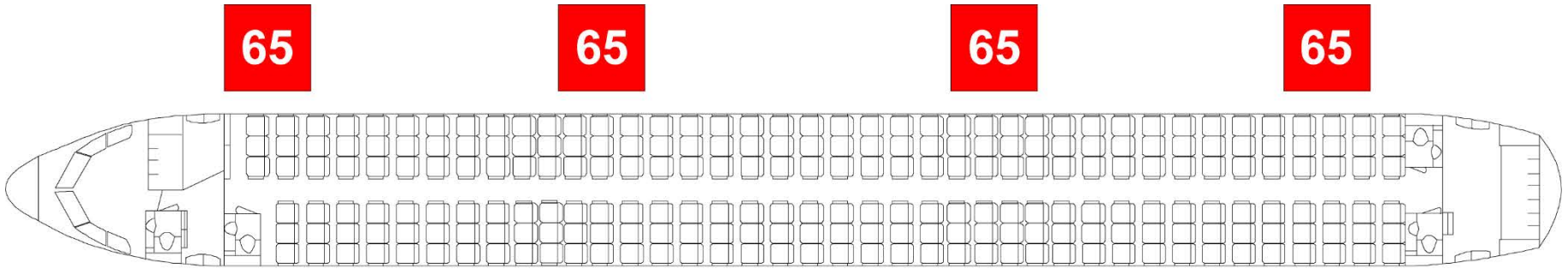
Permanent removal of Door 2,

Forward cabin can be configured without door safety area,

Door 3 can be de-activated for low passenger count.



2-CLASS LAYOUT (HERE LIMITED TO 195 PAX)
NO BREAKS IN REAR CABIN



HIGH DENSITY LAYOUT CURRENTLY LIMITED TO
244 PAX (COULD GO TO 250)

DOOR CHANGES

ACF (Airbus Cabin Flex) introduces a new door configuration for the A321NEO offering an improved flexibility for 2 class layouts and / or an increased passenger capacity.

Two pairs of OWD (Over Wing Doors) are defined as standard installation.

The forward pair of OWD are located between Fr38 and 39.

The rearward pair of OWD are located between Fr40 and 41.

It is possible to deactivate one pair of OWDs by a mechanical lock kit or one pair of OWDs can be replaced by a plug, depending on the customer cabin layout.

One pair of OWD will always be required to be active.

A new door slide at door 3 is installed.

It will only be installed, if door 3 will be active.

Door 3 can be replaced by a plug with a full window and a continuous interior lining.

Cabin door 1 and 4 installed on A321NEO ACF are not changed compared to Single Aisle NEO aircraft.

The A321 NEO ACF is equipped with:

2 Pairs of oversized Type “1” passenger/crew doors at 1 L/R and 4 L/R (also qualified as type “C” doors)

2 Pairs of Type III overwing exits

1 Pair of oversized Type “1” doors at 3 L/R (also qualified as type “C” doors)

2 Cockpit window exits (1 each side) which can be opened from the inside.

4 avionics compartment access doors

DESIGNATION	DIMENSIONS	HT FROM GND
Doors 1 L/R & 4 L/R (Oversized Type 1)	1.85m x 0.81m (73in x 32in)	3.4m (11.5ft)
FWD & AFT Overwing Exits (Type III)	1.04m x 0.51m (41in x 20in)	3.72m (12.2ft)
Door 3 L/R (Oversized Type 1)	1.52m x 0.76m (60in x 30in)	3.40m (11.15ft)

Note: For customised layouts, according to the seating capacity and seats arrangement, door 3 oversized type 1 (also qualified as Type C doors) can be re-qualified as a type III or Type 1 door


DOOR 4
DOOR 3
OVERWING EXITS
DOOR 1
COCKPIT WINDOW EXITS
AVIONIC COMPARTEMT ACCESS DOORS
A321 AIRBUS
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DOOR CONFIGURATIONS

For A321 NEO ACF, the passenger door / emergency exit arrangement is modified:

- Doors No. 2 in section 14A is completely removed on LH and RH side,
- New Over Wing Doors (OWD) are installed (2 on each side),
- Doors No. 3 is moved afterwards by 4 frames on LH and RH side.

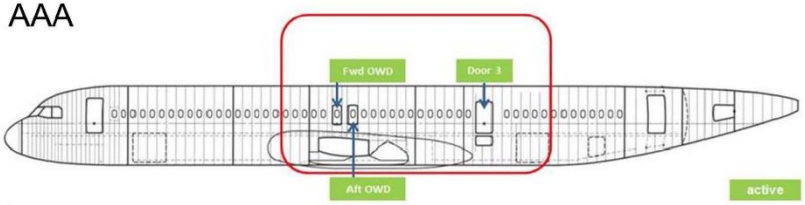
Following these modifications, several possible door configurations are possible (see table)

Configuration	Naming	Fwd OWD	Aft OWD	Door3
1	DAA	deactivated	active	active
2	AAA	active	active	active
3	DAP	deactivated	active	plugged
4	PAA	plugged	active	active
5	PAP	plugged	active	plugged
6	AAP	active	active	plugged
7	ADA	active	deactivated	active
8	ADP	active	deactivated	plugged
9	APA	active	plugged	active
10	APP	active	plugged	plugged

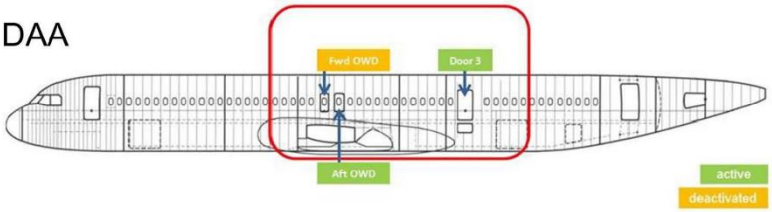
Remarks:
• Door active: door is installed and equipped,
• Door deactivated: door equipped and wired but electrically not connected to A/C,
• Door plugged: door is not equipped and wired, removed and replaced by door stopper.

Examples of possible configurations

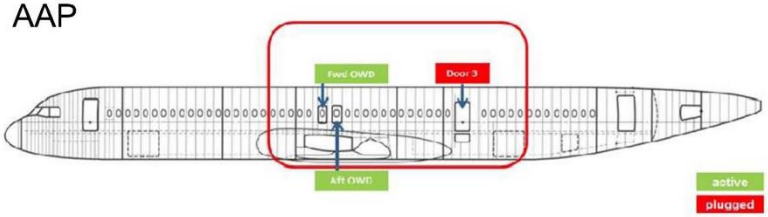
AAA



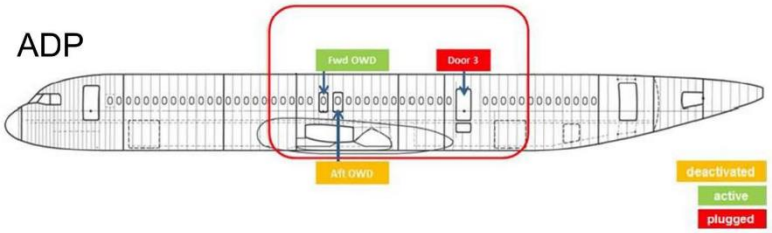
DAA



AAP



ADP



OVERWING DOORS

Two pairs of oversized Type III exits with automatic fast opening doors are installed on A321 NEO ACF in Section 15.

Their position relative to the wing is identical to A320 NEO aircraft.

They offer significant potential for superior performance compared to standard Type III exits based on:

Fast opening automatic over wing exits,

Exit opening dimension exceeding the required minimum of 20” by 36”, actual size of door 41” by 20”,

13” above floor access to forward and aft OWE,

42” evacuation path over the wing.

The off-wing slide is a dual lane slide installed inside a composite enclosure in the belly fairing in the rear portion of the wing.

Following the principle applied on A320ceo/NEO, the escape slide inflation reservoirs are installed in the AFT cargo compartment or cabin.

The doors open outwards.

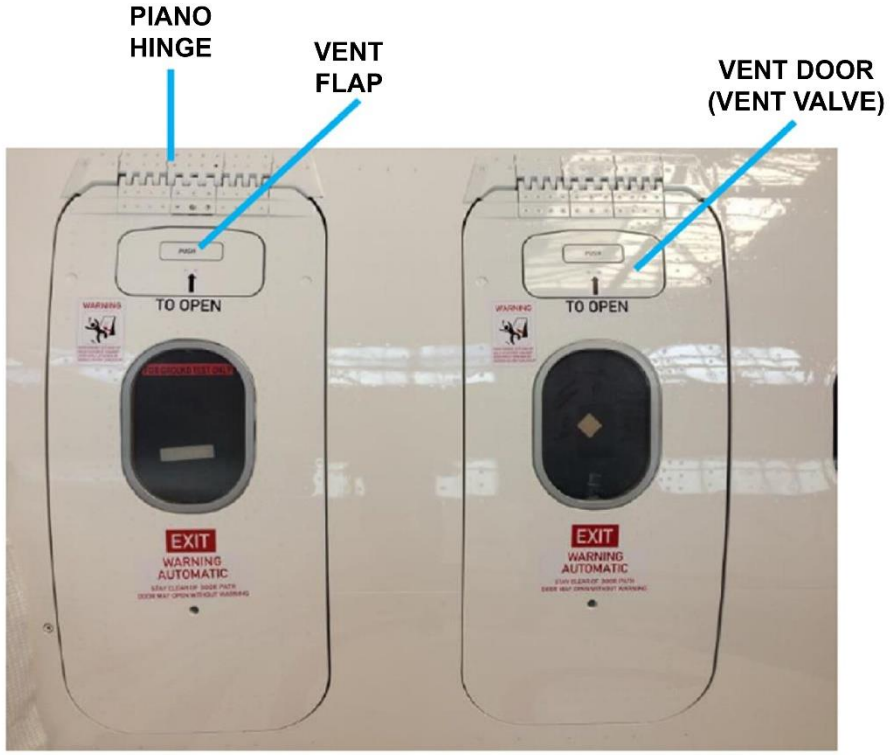
They are connected to the fuselage with piano hinges.

They secured at the bottom by latches. These doors are not plug type doors.

From outside, the doors can be opened with help of the VENT FLAP and VENT DOOR.

From inside, the doors can be opened with help of a handle.

A removable cover hides the handle.


PIANO HINGE
VENT FLAP
VENT DOOR (VENT VALVE)
TO OPEN
TO OPEN
EXIT
WARNING
AUTOMATIC
EXIT
WARNING
AUTOMATIC


REMOVABLE COVER
EXIT

OVERWING DOORS

New external markings are developed to reflect the opening sequence related to the new design.

New internal emergency exit opening placards are developed to reflect the opening sequence from the inside.

The off-wing slide is a dual lane slide installed inside a composite enclosure in the belly fairing in the rear portion of the wing.

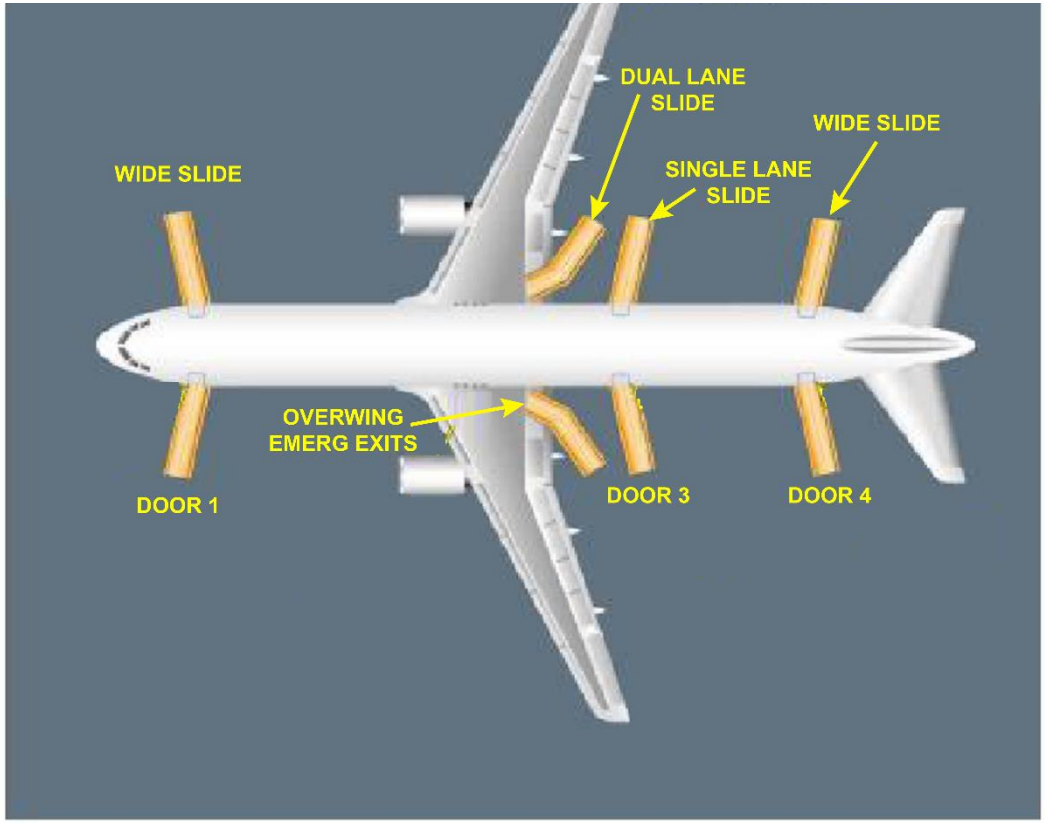
The inflation reservoir is installed in the AFT cargo compartment or the cabin.

Door 3 slide system is a single lane slide installed inside a fuselage- mounted composite enclosure.

The enclosure remains unchanged compared to A321NEO design.

The inflation system including reservoir is installed in an OHSC inside the pressurized cabin following the same philosophy as applied on A321NEO.

OHSC overhead stowage compartment.


DUAL LANE
SLIDE
WIDE SLIDE
WIDE SLIDE
SINGLE LANE
SLIDE
OVERWING
EMERG EXITS
DOOR 1
DOOR 3
DOOR 4

OWD OPENING FROM INSIDE

Ensure the outside conditions are safe (no fire, no obstacle….),

Remove and discard the protective cover,

Pull down the operating handle,

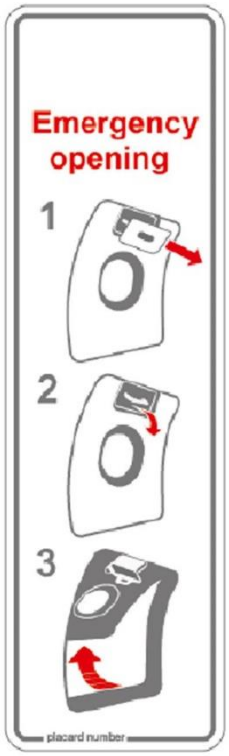
Release the handle,

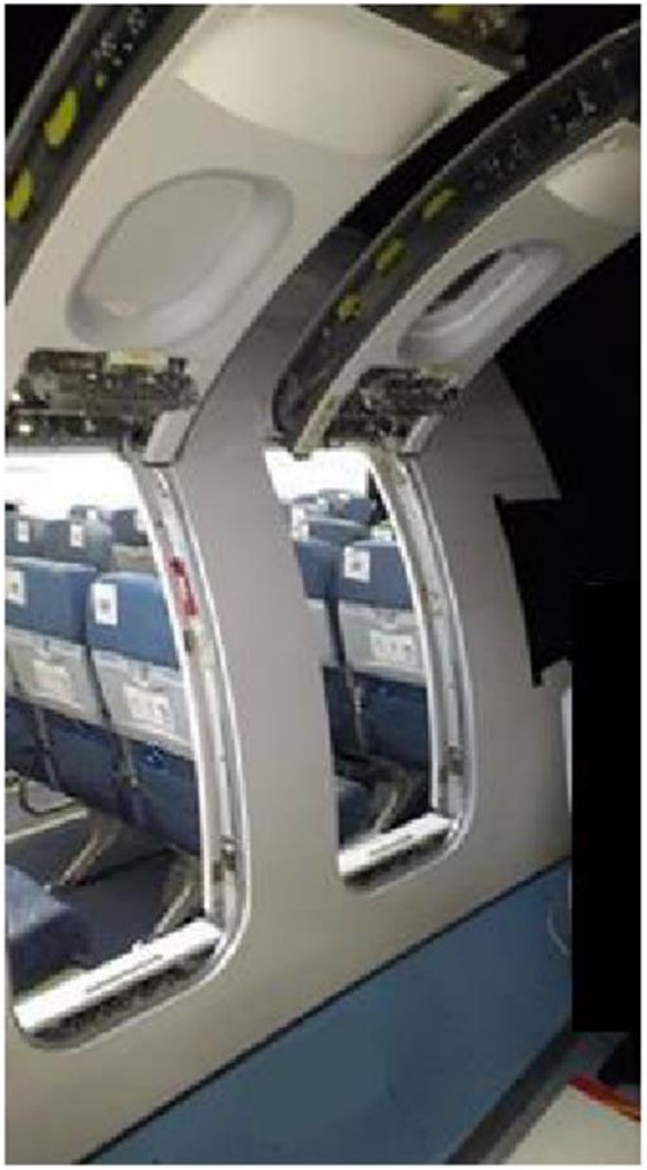
The fail-safe actuation mechanism using compression spring rods will open the exit.

Notes:

A light next to the control handle (Handle light) illuminates the handle.

If slide was not previously disarmed, it will inflate automatically.


Emergency
opening
1
2
3
placard number



OWD OPENING FROM OUTSIDE

Apply body weight against the exit (toavoid injury during the opening),

Push on the PUSH handle to push the vent door inward,

Move away slowly from the exit to avoid injury as the exit (will spring open).

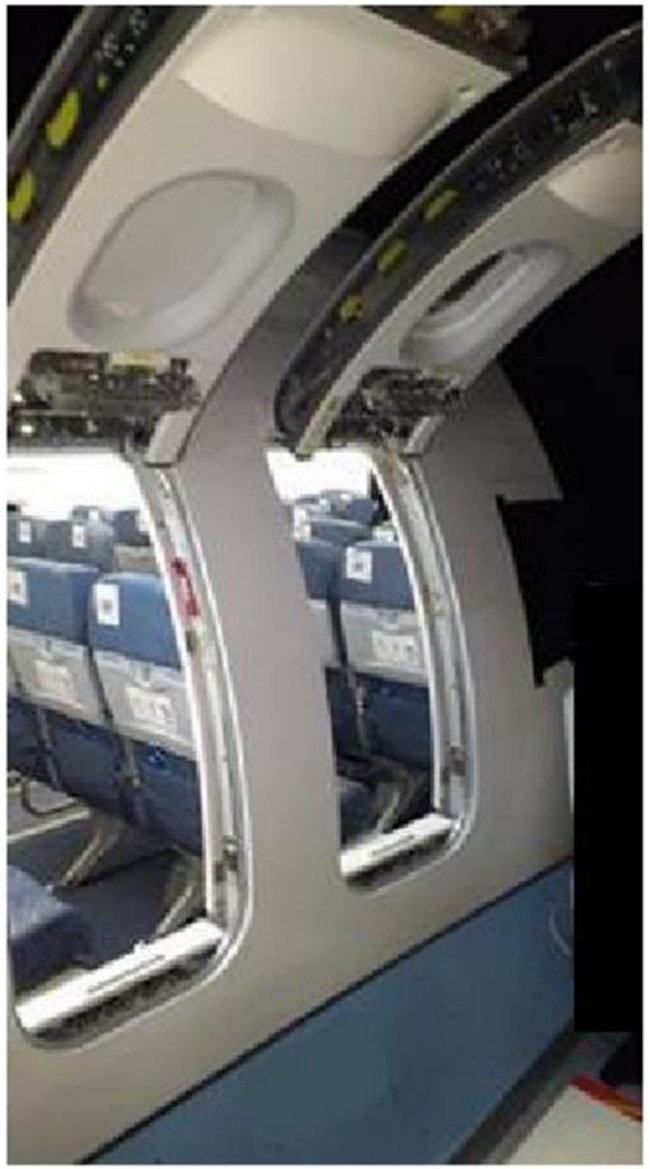
Note:

The slide will automatically inflate if it was not previously disarmed.


WARNING
DOOR SWINGS OUT AND UP
HOLD YOUR BODY AGAINST
DOOR WHILE OPENING OR
SERIOUS INJURY CAN OCCUR


WARNING
TO OPEN


PUSH
TO OPEN
WARNING
EXIT
WARNING
AUTOMATIC



OWD DESCRIPTION

The main seal is an omega section seal.

There are seal retainers attaching the main seal to the door skin.

The seal counterpart at the fuselage is a seal striker which presses perpendicular to the seal and allows for motion in all three directions.

The seal is fitted with drainage holes located inside the pressurized cabin which also allows pressurization to ensure sealing function.

The drainage holes located in the top horizontal part allows drainage during opening for maintenance.

SEAL STRIKER

SEAL

SEAL RETAINER

OWD DESCRIPTION

In order to prevent the door skin to interfere with the door frame due to fuselage deformation, there are X-stops installed on the vertical side of the frames.

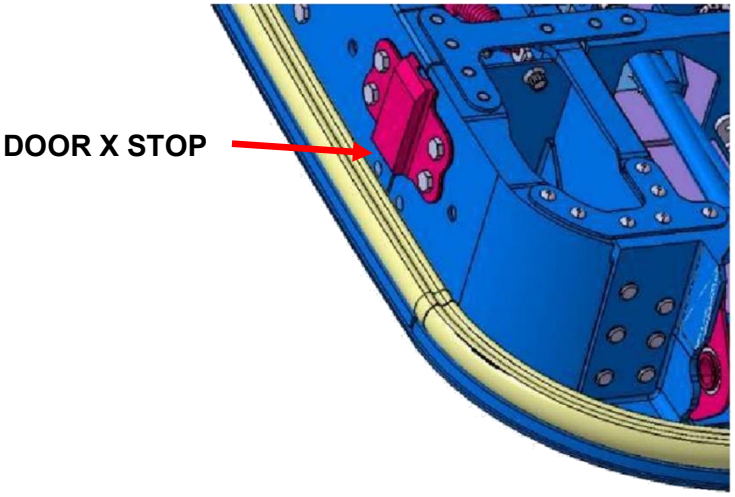
The X-stop brackets are adjustable with shims.

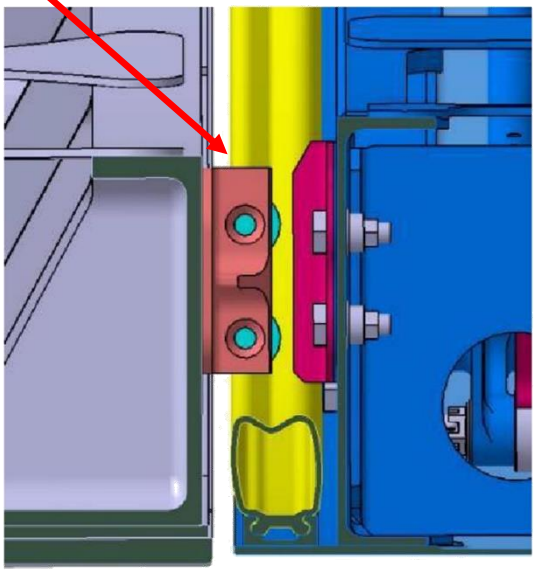
The counter part on the fuselage is a bracket with two rollers and is also installed with shim to secure a correct interface.

Three hoisting points are located on the door. Two on the upper part of the door and one below the window.

The hoisting points are used if the door needs to be replaced.

The hosting points consist of an insert thread in the frames and are covered with a plastic plug.


DOOR X STOP


FRAME X STOP

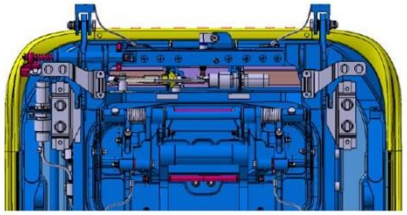
OWD DESCRIPTION

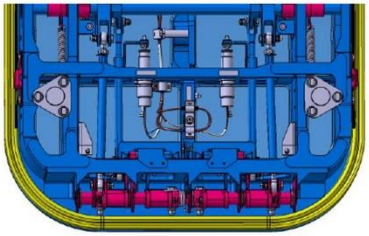
For maintenance purposes, linings can be removed.

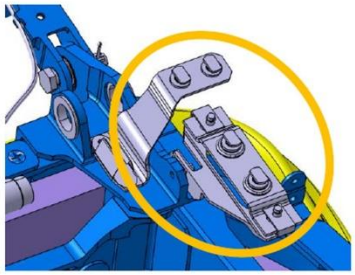
Provisions for attachment of the lining is via holes in the frames and lifting brackets placed according to agreed interfaces.

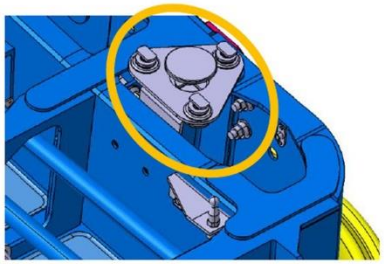
In the lower and upper part there are holes enabling installation of brackets with anchor nuts which are pre-fitted to the lining.


XIT









OWD OPERATING MECHANISM

The opening of the door is performed from inside via one handle or from the outside via vent door.

The entire sequence is done in one single motion.

10° turn of handle, vent door assembly opens with no movement in the latch/lock mechanism,

35°, the clutch between the inboard handle and the latch/lock mechanisms engages,

47.5°, the over center mechanism moves to neutral,

52°, door indication shows open,

55°, mechanical lock indicators show unlocked,

64°, the slide release mechanism operates,

79°, latch hooks are released,

95°, door fully unlocked and unlatched and is lifted by the spring actuators.

The latch and lock operation is performed via rotation of the handle in the opposite direction from the opening sequence.

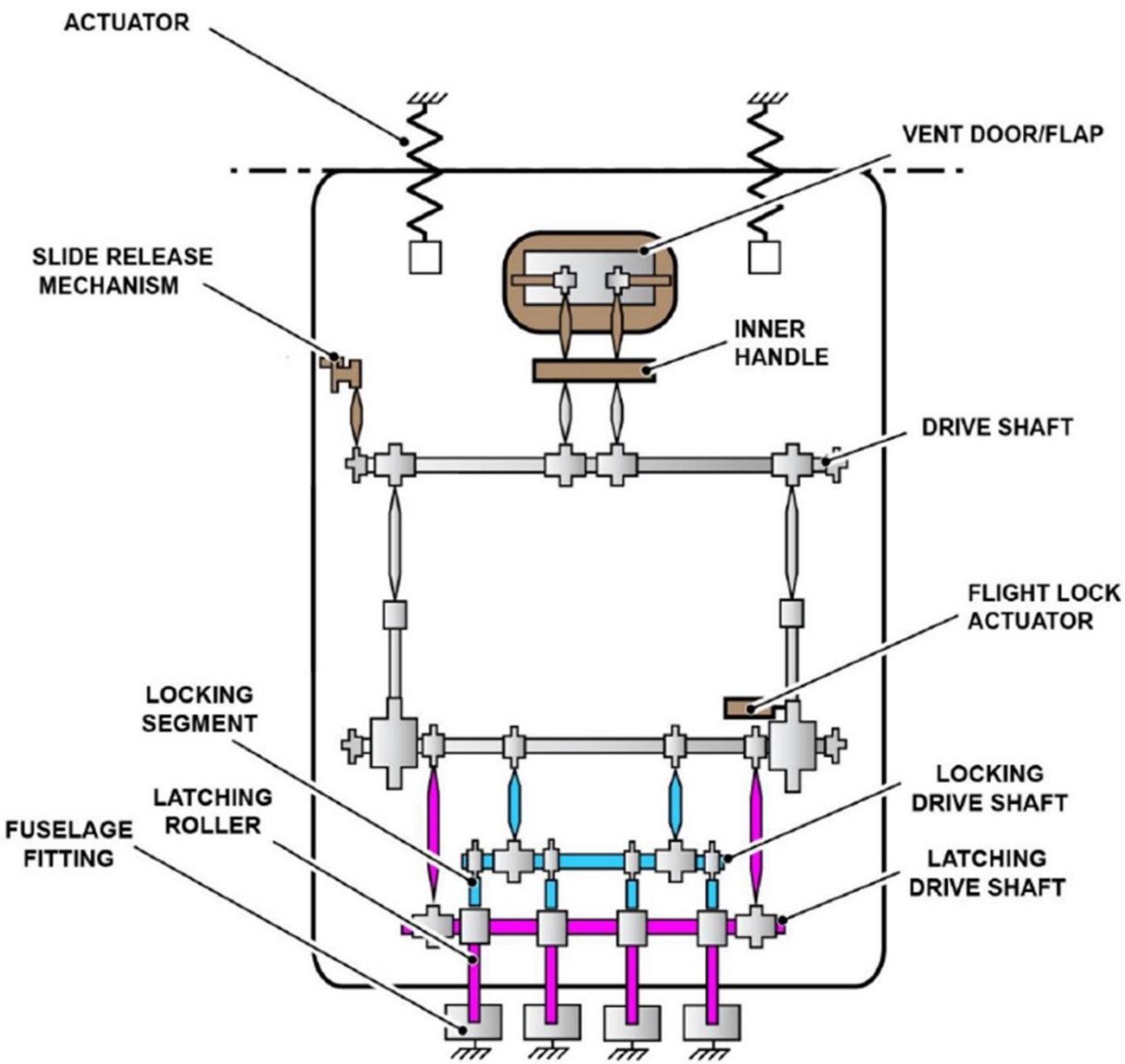
It's not possible to close, latch and lock the door from outside.

Door closing is performed by pulling a strap to close the door and subsequent latch and lock using the inner handle.

Opening from the outside is performed via pushing an outer handle which releases the locking device of the vent door from its over- centered flight position.

The subject over-center feature protects the vent door from opening due to an external pressure.

The vent door is mechanically connected to the inner handle which drives the mechanism to unlock and unlatch.


ACTUATOR
VENT DOOR/FLAP
SLIDE RELEASE MECHANISM
INNER HANDLE
DRIVE SHAFT
FLIGHT LOCK ACTUATOR
LOCKING SEGMENT
LATCHING ROLLER
FUSELAGE FITTING
LOCKING DRIVE SHAFT
LATCHING DRIVE SHAFT

OWD OPERATING MECHANISM

The vent door mechanism is designed to prevent the cabin from being pressurized when the door is not closed, latched and locked.

An over- centred mechanism prevents the vent door to open if an outer pressure should occur.

The vent door is driven by the inner handle and acts as the outer handle if the door is opened from the outside.

The inner handle unlocks the vent door through the over-centered mechanism.

The outer handle in the vent door disengages the over-centered mechanism when the door is opened from the outside.

The outer handle is fitted with a spring to ensure that the handle is kept in correct position in the case of over-pressure outside of the cabin.

When opening from outside, the required load is determined by the spring stiffness as well as the required load to release the over-center feature.

The inner handle is fitted with a self-illuminated sticker which is activated by a lamp.

The vent door acts also as pressure lock; the mechanism geometry and the size of the vent door prevent the door to be inadvertently opened by a passenger when the cabin pressure is above 2.0 psi.

The handle shaft is connected fully redundant by two sets of rods, roller and clutch.

At 35° handle angle opening the rollers engage in their respective clutch and start to drive the unlocking and unlatching sequence.

The latch-lock mechanism has to be in latched and locked position before the vent door can be closed, the geometry of each clutch prevents the vent door to be closed before the door is closed latched and locked.

The clutches are also designed to prevent any back driving.

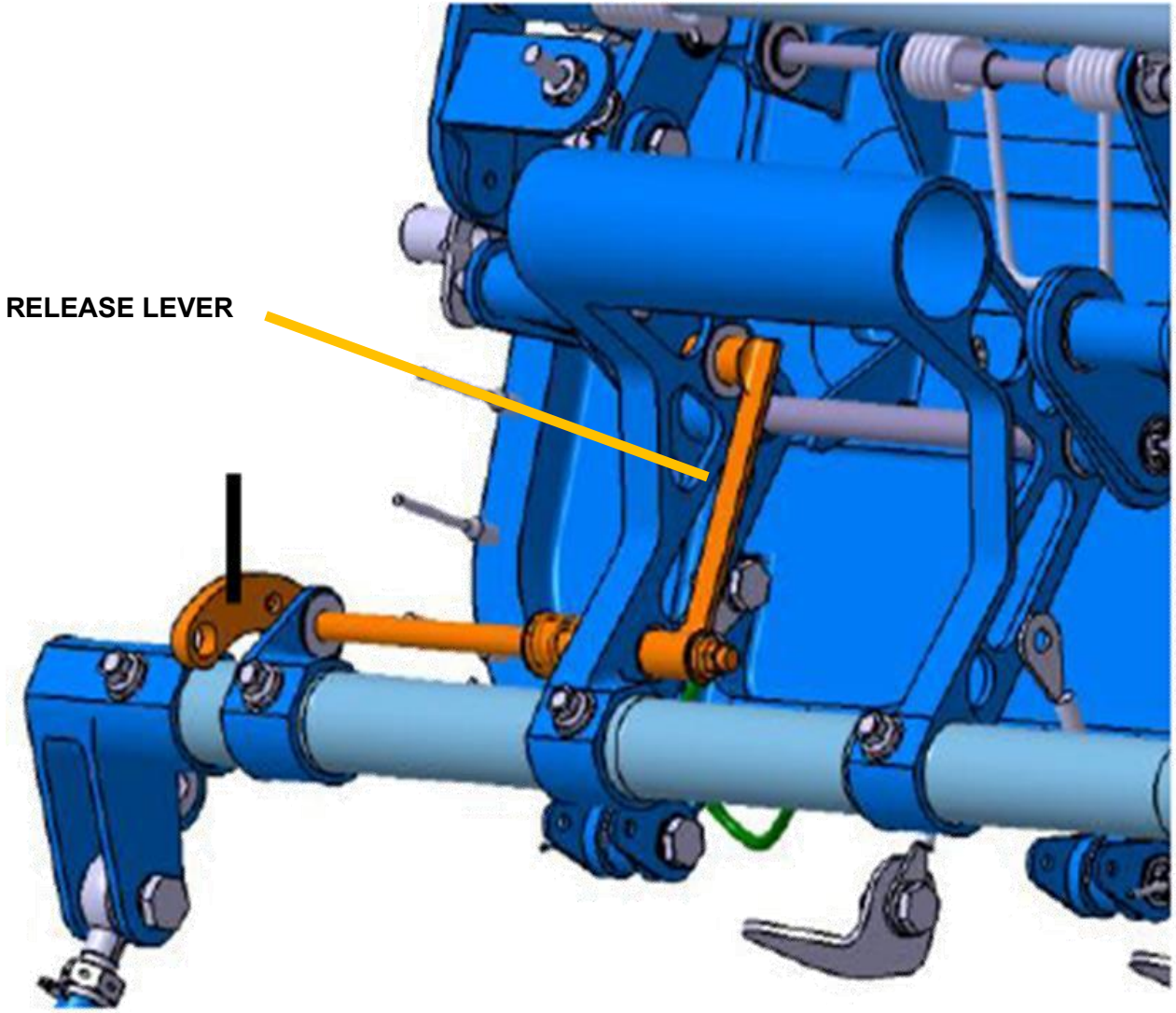
The cam curve lever is blocked by the cam roller lever when the door is closed, latched and locked.

Vent Flap and Handle Mechanism

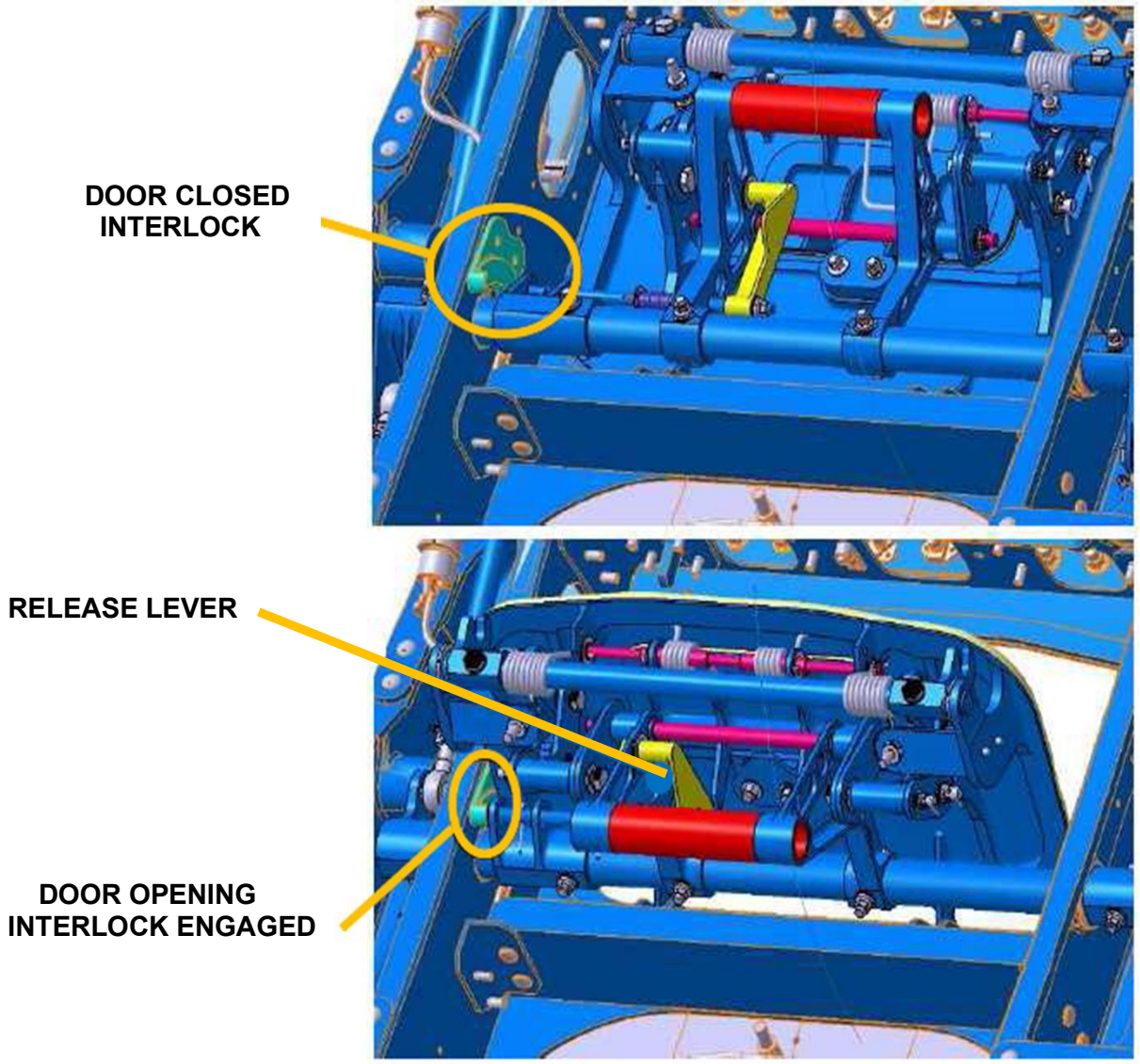
OWD OPERATING MECHANISM

An interlock mechanism prevents the handle from inadvertently being moved to closed position during the opening sequence.

The interlock mechanism engages once the handle reaches its end position (95°) and has to be manually disengaged using the release lever before the handle can be moved back to latch and lock the OWD.


RELEASE LEVER

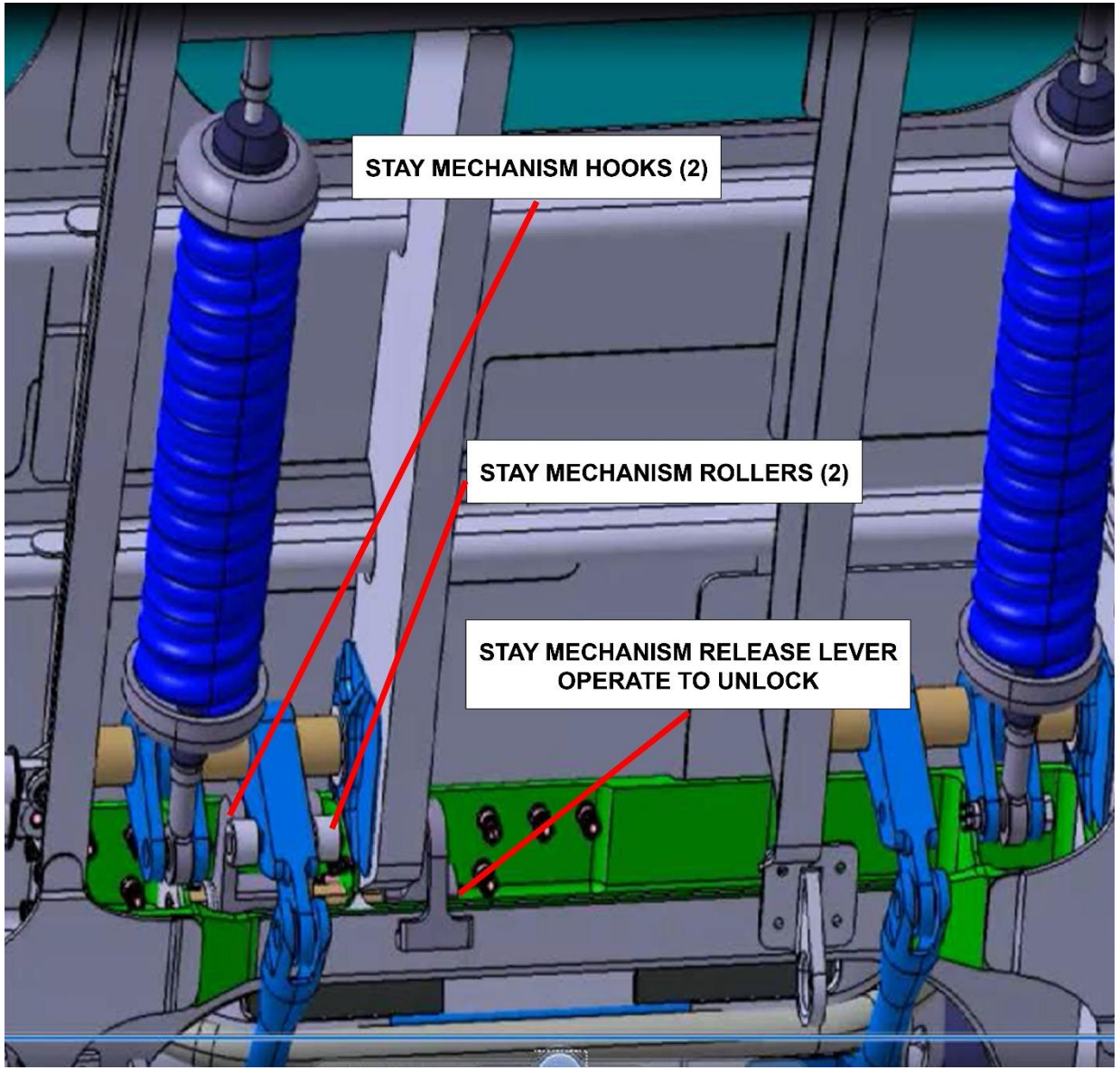
INTENTIONALLY BLANK


DOOR CLOSED
INTERLOCK
RELEASE LEVER
DOOR OPENING
INTERLOCK ENGAGED

OWD OPERATING MECHANISM

Once the springs have operated the door to the fullY open position, two rollers engage into hooks (part of the stay mechanism), and the door can no longer be pushed or pulled in the close direction unless the stay mechanism is released.

To release the stay mechanism, a release lever needs to be operated manually.


STAY MECHANISM HOOKS (2)
STAY MECHANISM ROLLERS (2)
STAY MECHANISM RELEASE LEVER
OPERATE TO UNLOCK

OWD OPERATING MECHANISM

The latches are activated through a linkage system from the handle to the latches through the cam curve and the cam roller (clutch) in the lower part of the door.

The system is fully redundant from the handle shaft all the way to the four latches.

The levers to the latch mechanism are over-centered to prevent back driving of the latch shaft.

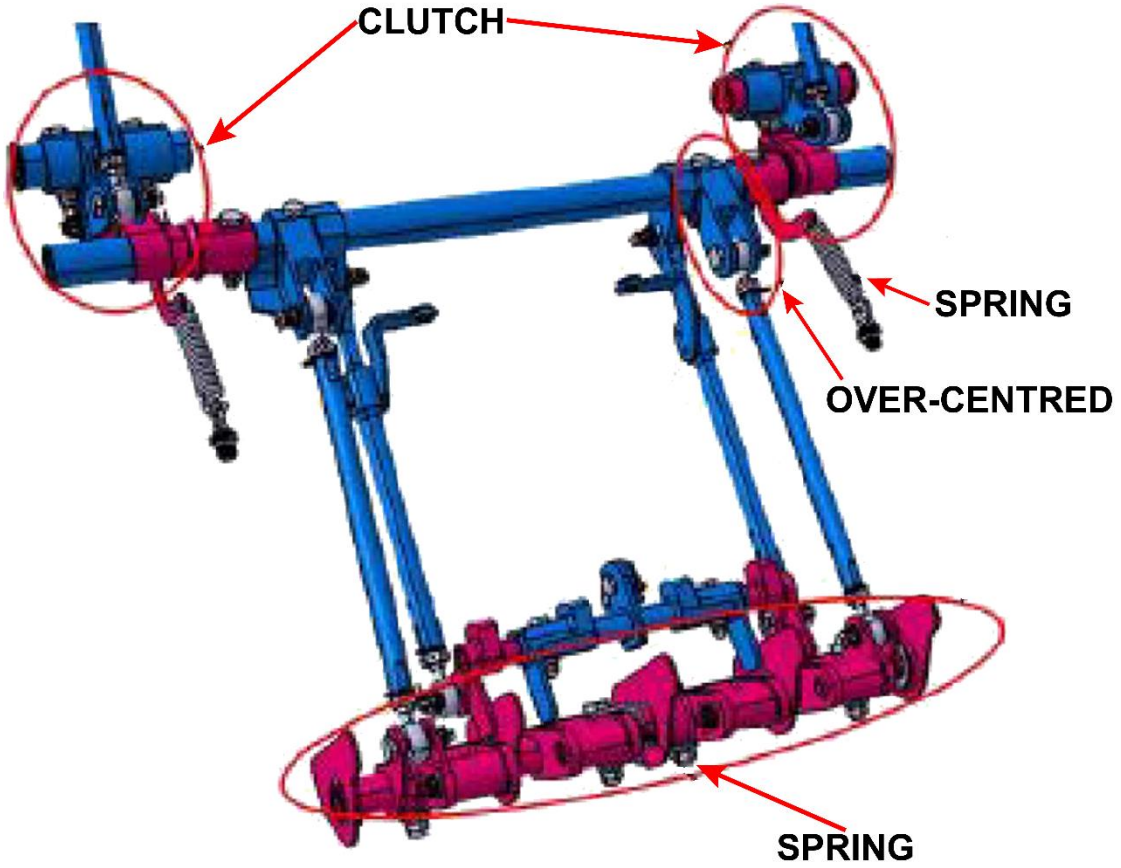
Each over- center has its own stop.

A spring is installed on the latch shaft in order to keep the latches in latched position even if there is no contact or no cabin pressure.

On the over-centred mechanism there are two springs installed and when the door is latched and locked the spring force will keep the mechanism over-centered.

During the opening sequence, the spring will follow the over-centering and shift load direction.

The spring force will now assist to open the mechanism.



LATCH MECHANISM

OWD OPERATING MECHANISM

The latches are orientated so they are tangent to the fuselage latch hook geometry in order to prevent opening torque to be introduced in the latch mechanism due to the cabin pressure.

The latches engage with the latch hooks which are located at the lower beam on the fuselage.

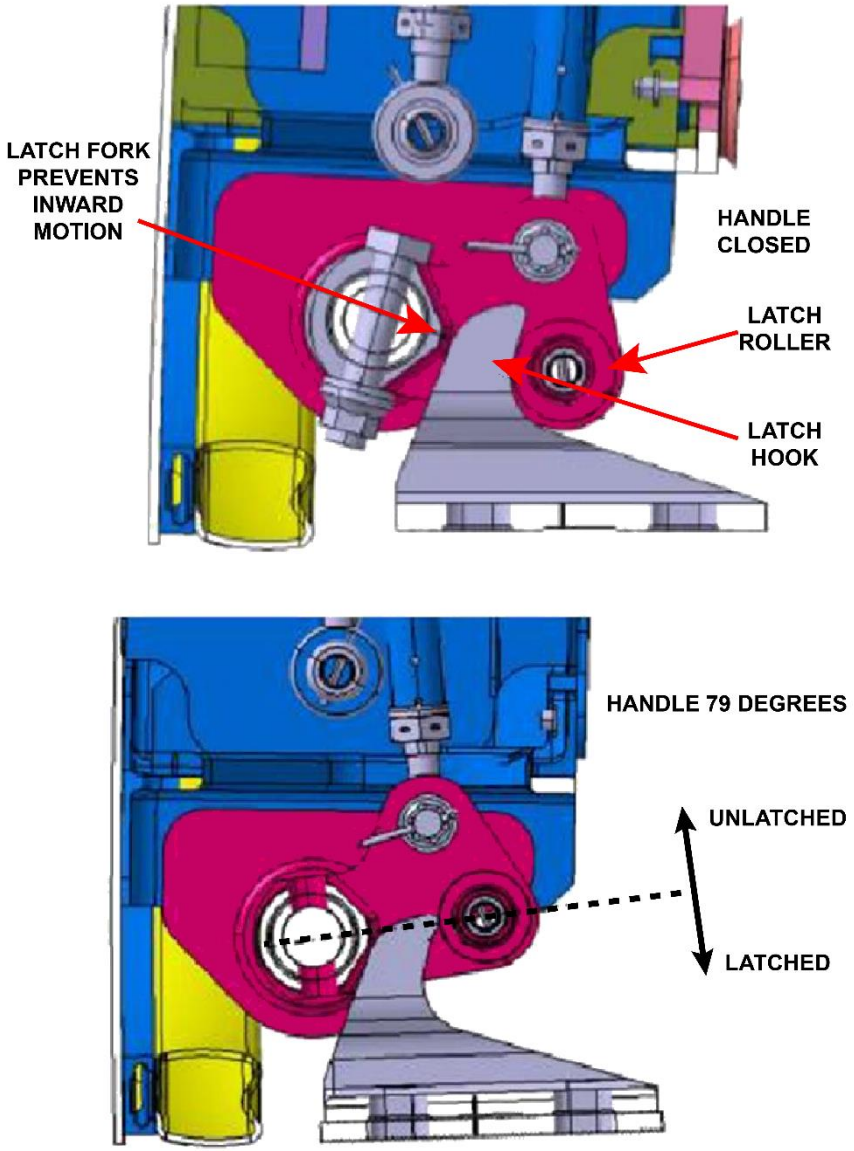
The geometry of the latch hooks is designed to initially rotate the door inward before the latches can be disengaged from the latch hooks.

The latch hooks are rigged with a small inclination toward floor direction to ensure the latches move further to latched position when there is a cabin pressure.

The latch mechanism is also designed to prevent inward motion when the door is closed latched and locked.

If a force should occur which will push the door inwards the latch fork will be blocked by the back of the latch hook without creating loads that could unlatch and the door.

The latch cannot move more than 3 mm inward at the lower edge.


LATCH FORK PREVENTS INWARD MOTION
HANDLE CLOSED
LATCH ROLLER
LATCH HOOK
HANDLE 79 DEGREES
UNLATCHED
LATCHED

OWD OPERATING MECHANISM

The locks are activated through a linkage system from the handle to the locks in the lower part of the door.

The linkage system is fully redundant from the handle shaft all the way to the four lock segments.

Each latch has an individual lock segment.

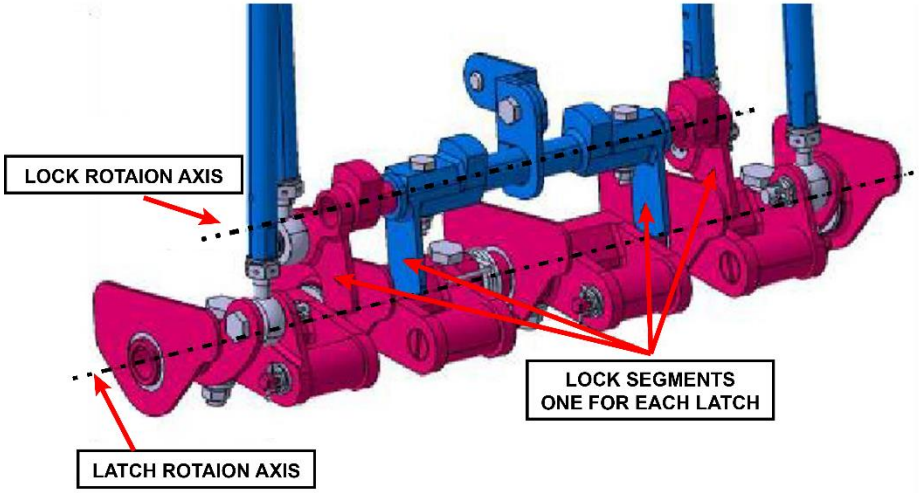
The lock function rationale is to prevent the latches to be un-latched if any malfunction should occur.

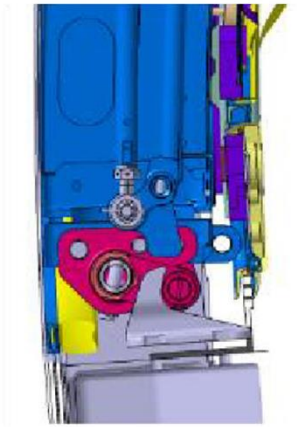
The design of the locks and orientation ensure the lock shaft will rotate even more to the locked direction if the latch trend to inadvertently unlatch.

The contact with structure prevents further rotation of the lock shaft.

Springs at the clutch will help the mechanism to keep the locks in locked position if any malfunction should occur.

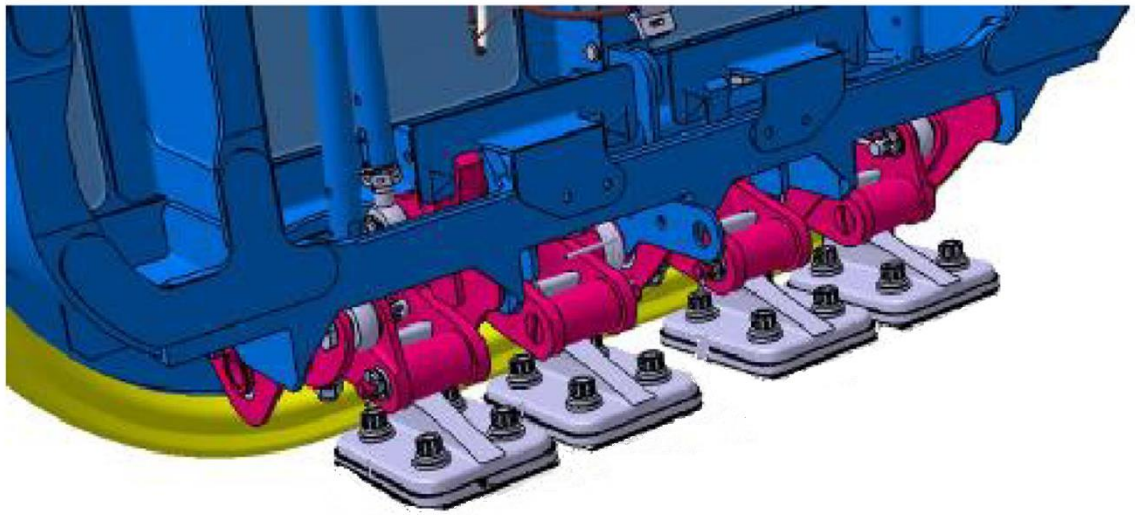
The same springs also retains over-centering of the latch mechanism.





LOCK SEGMENT IN NORMAL OPERATION POSITION

LOCK MECHANISM



OWD OPERATING MECHANISM

Above each OWD are two actuators installed in the fuselage.

Via the mechanism connected to the door, these actuators open the door from closed to fully open position (0-109°) when the handle is pulled, and the latches disengage from the latch hooks.

The actuators are mechanical springs with a damper inside which reduce the speed in order to decrease the loads when the door reaches open position and to minimise risk for personal injury.

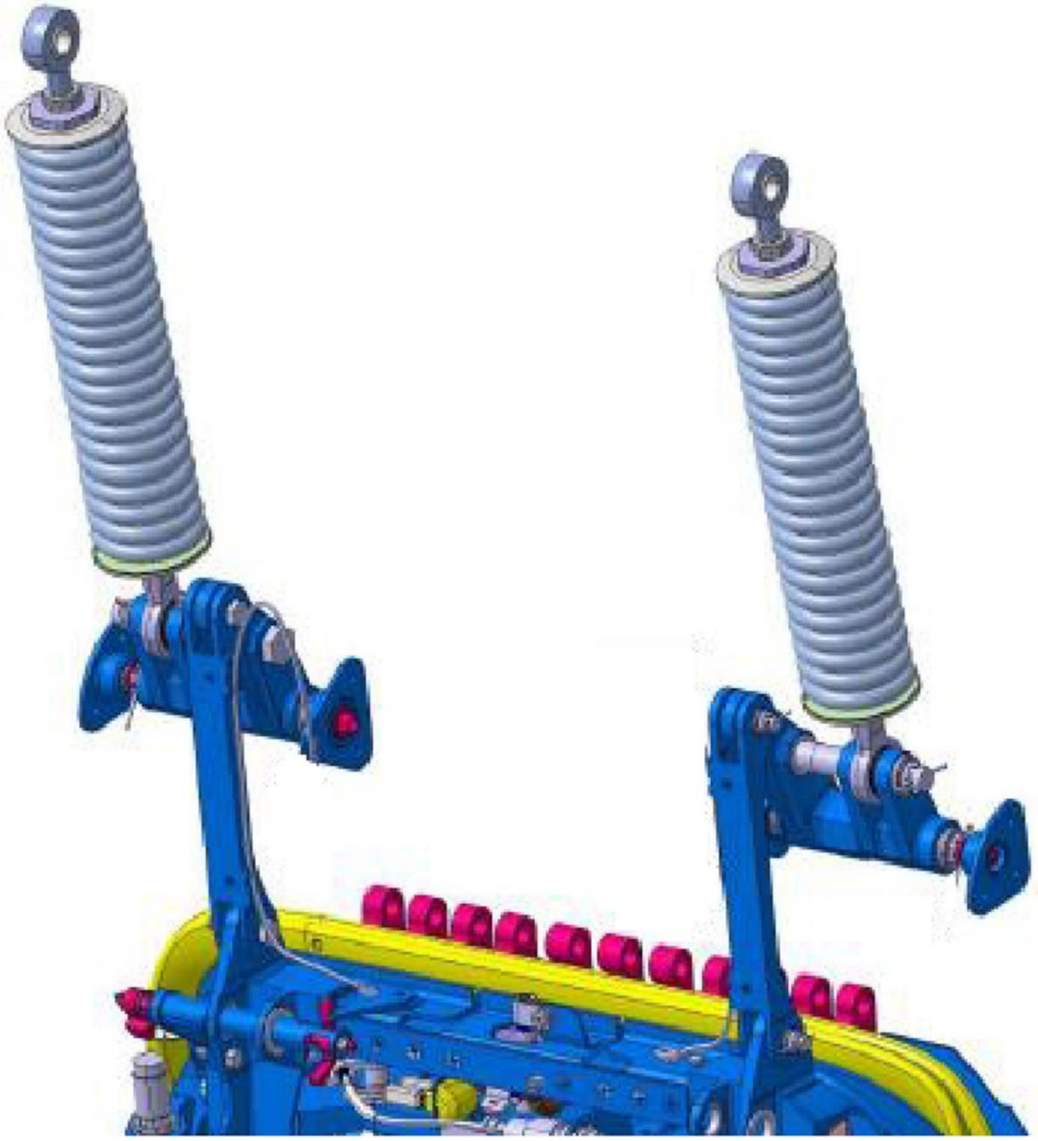
The actuators are designed with an internal stop.

Therefore, the door will stop rotation before the door over rotates and damages the hinge and structure.

The internal stop inside the actuators stop the door rotation at 114°, then the door rotates back to equilibrium at 109°.

The internal stop eases the installation of the unit as they maintain the actuator at a length needed for installation when the door is in the fully opened position.

Therefore, the need for any special tool is eliminated. Common practice is to replace one actuator while the other actuator keeps the door in the fully open position.



OWD FLIGHT LOCK SYSTEM

For passenger safety, the OWD must be secured in flight to prevent any opening while the cabin is pressuriSed.

Flight Lock Actuators (FLA) lock the OWDs during flight.

The Flight Lock Actuator (FLA) is an electrical actuator to lock the Over Wing Door (OWD) by the command of an external signal.

The FLA includes:

flight lock actuator mechanism,

sealed enclosure,

power electronics

and positioning sensors.

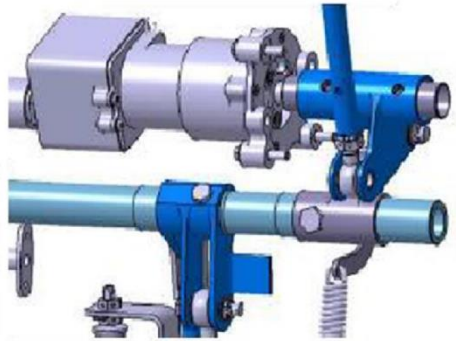
The FLA provides the electric control, actuation, mechanical locking and monitoring.

For these tasks, the FLA receives inputs from other aircraft systems.

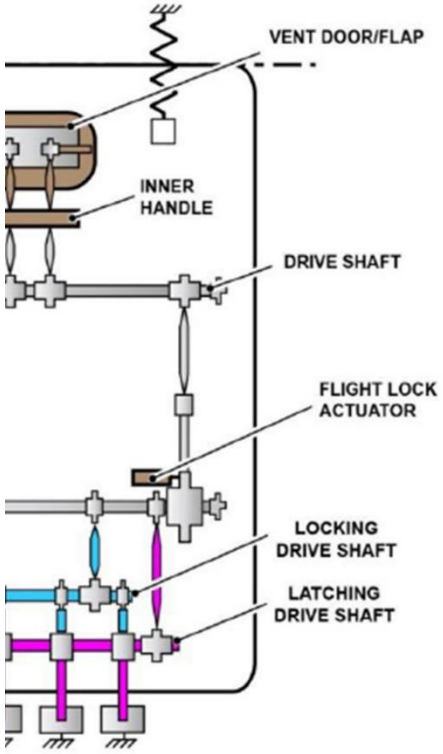
The FLA also provides all the necessary outputs in order to interface with other aircraft systems for indication of engaged or disengaged position.

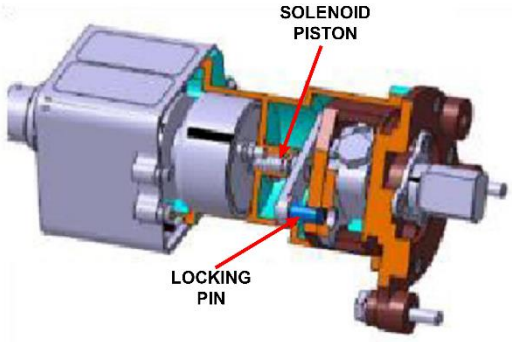
The FLA is attached to the structure below the window and locks one shaft in the redundant clutch mechanism if activated.

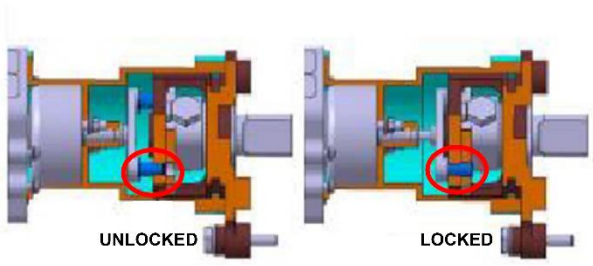
The handle is therefore locked in the flight position and cannot be moved.



FLIGH LOCK ACTUATOR AND LINKAGE







OWD FLIGHT LOCK SYSTEM

On each OWD, an FLA is installed to block any door handle movement in flight phases in which the opening of the OWD is not permitted.

The flight locks are engaged when both engines run above 50% N1. The flight locks are disengaged after first engine shut down and the A/C speed is less than 70 kts.

The activation logic is computed by EIU1 and EIU2. Each EIU activates a relay.

The relays are in series for the control of the 4 FLAs.

The control signal must also pass through test switches.

The FLAs are powered by 28VDC. The FLAs detect internally the engaged / disengaged status.

The states as well as the activation signals are routed through the SDAC and FWC, for fault and alert processing.

Internal FLA position detectors will provide discrete FLA ENGAGED and FLA DISENGAGED signals.

The FLA activation logic requires that both EIUs, both relays 41WN and 42WN and test switches be healthy and in the proper state for FLA activation.

Failure of one relay prevents the control signal from reaching the 4 FLAs.

The EIU outputs to relays 41WN and 42WN) can be activated via MCDU, for test purposes. But only one EIU can be activated at a time.

It is not required to run engines or to simulate Vcas. When the output of EIU1 is activated (via MCDU), the output of EIU2 is automatically deactivated.

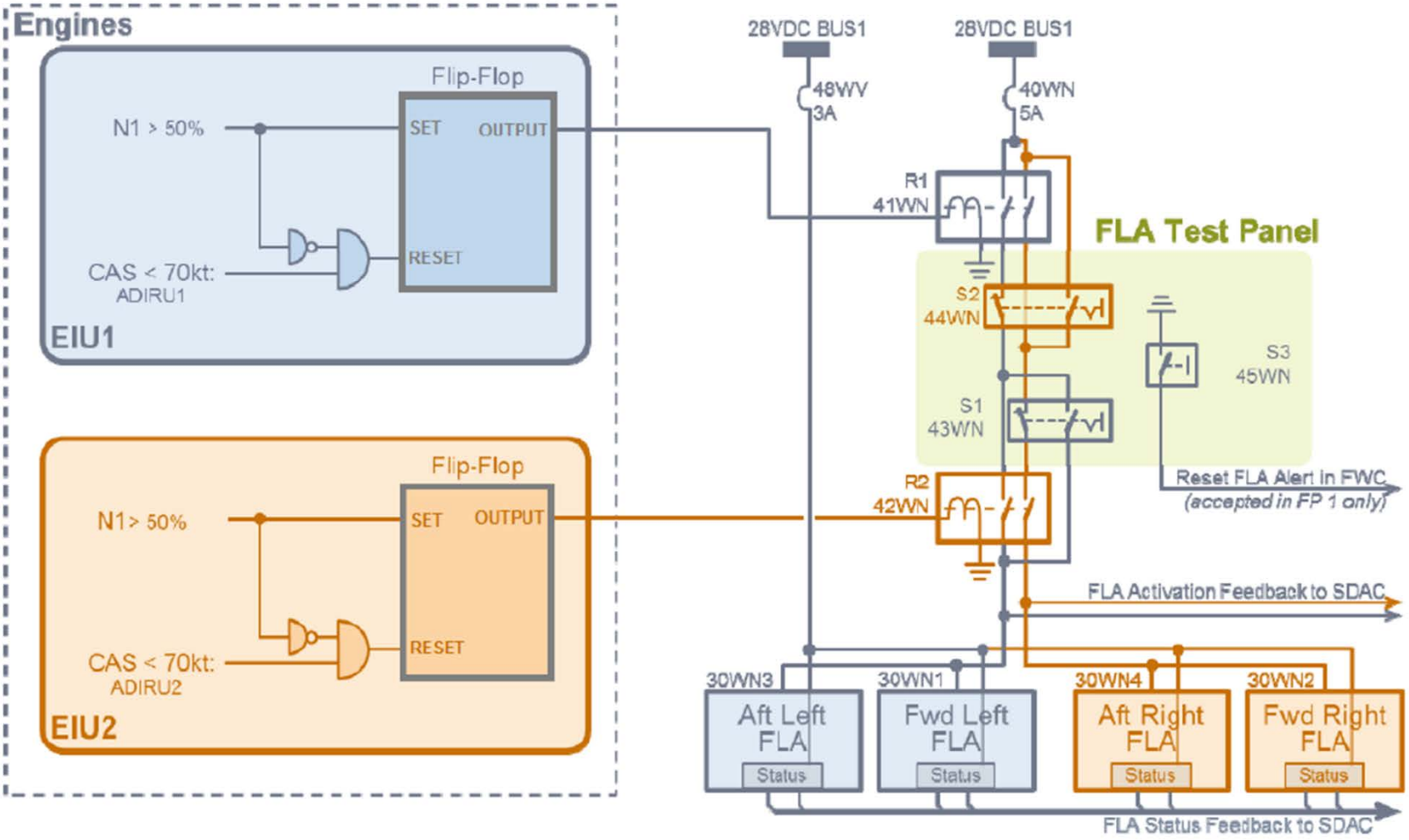
Flight Lock Alerts:

Will be indicated to the flight crew only in flight phases 1 and 10.

Will be recorded at any time, when not indicated. Reset automatically at beginning of FP 2.

Alerts are: DOOR L/(R) FWD/(AFT) OVERWING FAULT FLIGHT LOCK ENGAGED (engaged when commanded to unlock), FLIGHT LOCK NOT AVAIL (not engaged when commanded to lock), FLIGHT LOCK CTL FAULT.

Monitoring both FLA status signals could increase the check intervals for the OWD's.


Engines
Flip-Flop
N1 > 50%
SET
OUTPUT
RESET
CAS < 70kt:
ADIRU1
EIU1
Flip-Flop
N1> 50%
SET
OUTPUT
RESET
CAS < 70kt:
ADIRU2
EIU2
28VDC BUS1
28VDC BUS1
48WV
3A
40WN
5A
R1
41WN
FLA Test Panel
S2
44WN
S3
45WN
S1
43WN
R2
42WN
Reset FLA Alert in FWC
(accepted in FP 1 only)
FLA Activation Feedback to SDAC
30WN3
30WN1
30WN4
30WN2
Aft Left FLA
Fwd Left FLA
Aft Right FLA
Fwd Right FLA
Status
Status
Status
Status
FLA Status Feedback to SDAC

OWD FLIGHT LOCK SYSTEM

The FLAs are activated via relays, controlled by the EIU, and switches on the FLA test panel 72VU in the avionic bay.

Test switches S1 (43WN), S2 (44WN) and the CLEAR FLA ALERTS P/B sw.

The EIU outputs to relays 41WN and 42WN) can be activated via MCDU, for test purposes.

But only one EIU can be activated at a time. It is not required to run engines or to simulate Vcas.

When the output of EIU1 is activated (via MCDU), the output of EIU2 is automatically deactivated.

The test switches S1 and S2 allow the test feature. Activating EIU1 requires S1 to be switched ON. This will activate both left FLAs.

The signal to the right FLA(s) is automatically deactivated. S2 has to be in AUTO (off) position.

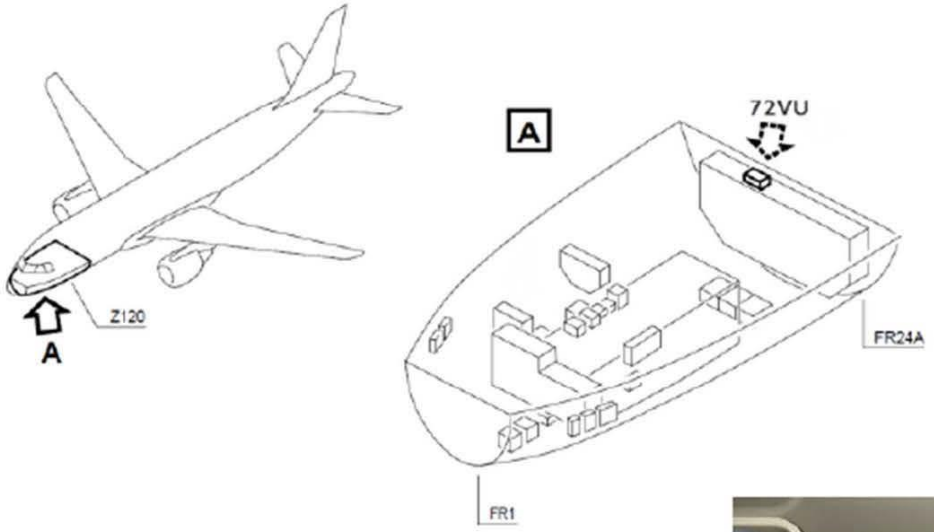
Activating EIU2 requires S2 to be switched ON and S1 in the AUTO position.

This will activate both right FLAs. The signal to the left FLA(s) is automatically deactivated.

S3 is a pushbutton, that is used to clear FLA alerts that are latched in the FWC.

It has to be pushed for 5 sec (10 sec maximum).

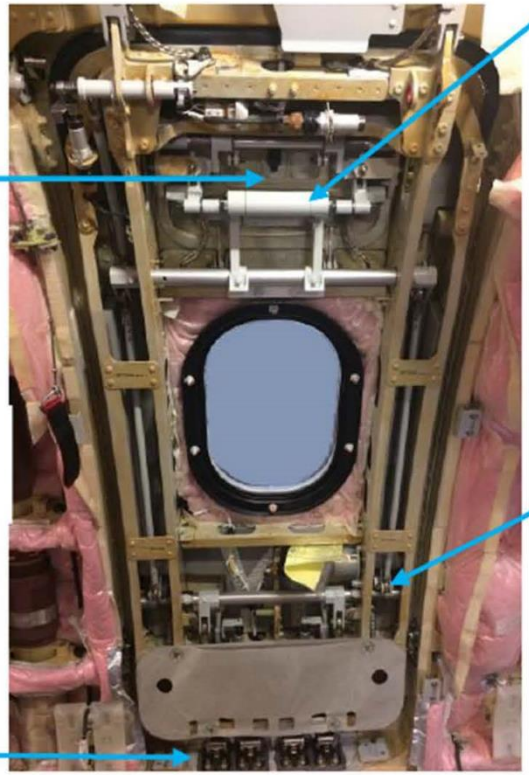
Clearing the alerts is allowed in flight phase 1 only.



FLAs C/B on 122 VU

INTENTIONALLY BLANK

UPWARD MOTION POWER ASSISTED
POWER SUFFICIENT FOR OPERATION IN 4SEC
UNDER ADVERSE CONDITIONS; UPLOCK OR
SUFFICIENT REMAINING ACTUATOR FORCE TO
KEEP THE DOOR FULLY OPENED



INNER HANDLE CONTROLS THE
VENT FLAP, LOCK & LATCH SHAFT
OPERATION TO OPEN.
HANDLE PROTECTED BY HANDLE
COVER (LINING PART, AS ON
LEGACY HATCHES, CHECKED BY
ONE SENSOR).

OUTER HANDLE (INSIDE THE VENT FLAP)
WITH SAME SEQUENCE AS INNER HANDLE.

VENT FLAP (= OUTER HANDLE)
OPERATED BY REDUNDANT LINKAGE
TO INNER HANDLE AND MECHANISM

LATCHING SHAFT: SEPARATE,
INDIVIDUAL LATCHES,
ACTUATED BY DUAL LINKAGE,
OVERCENTERED, 2 SPRINGS.
SMALL INITIAL INWARD
MOVEMENT WHEN OPENED.

LOCKING SHAFT:
EACH LATCH
INDIVIDUALLY LOCKED.
MONITORED BY 2PROXIMITY SENSOR IN SERIES.

NOTE: SMALL INWARD MOVEMENT NECESSARY TO CLEAR THE LOWER LATCHES.

OWD SENSORS

There are 4 proxy sensors which monitor each overwing door.

Two sensors installed at the lock system, monitor that the locks are in locked position (two sensors for redundancy).

One proxy sensor installed behind the handle cover which will indicate if the cover is not in place.

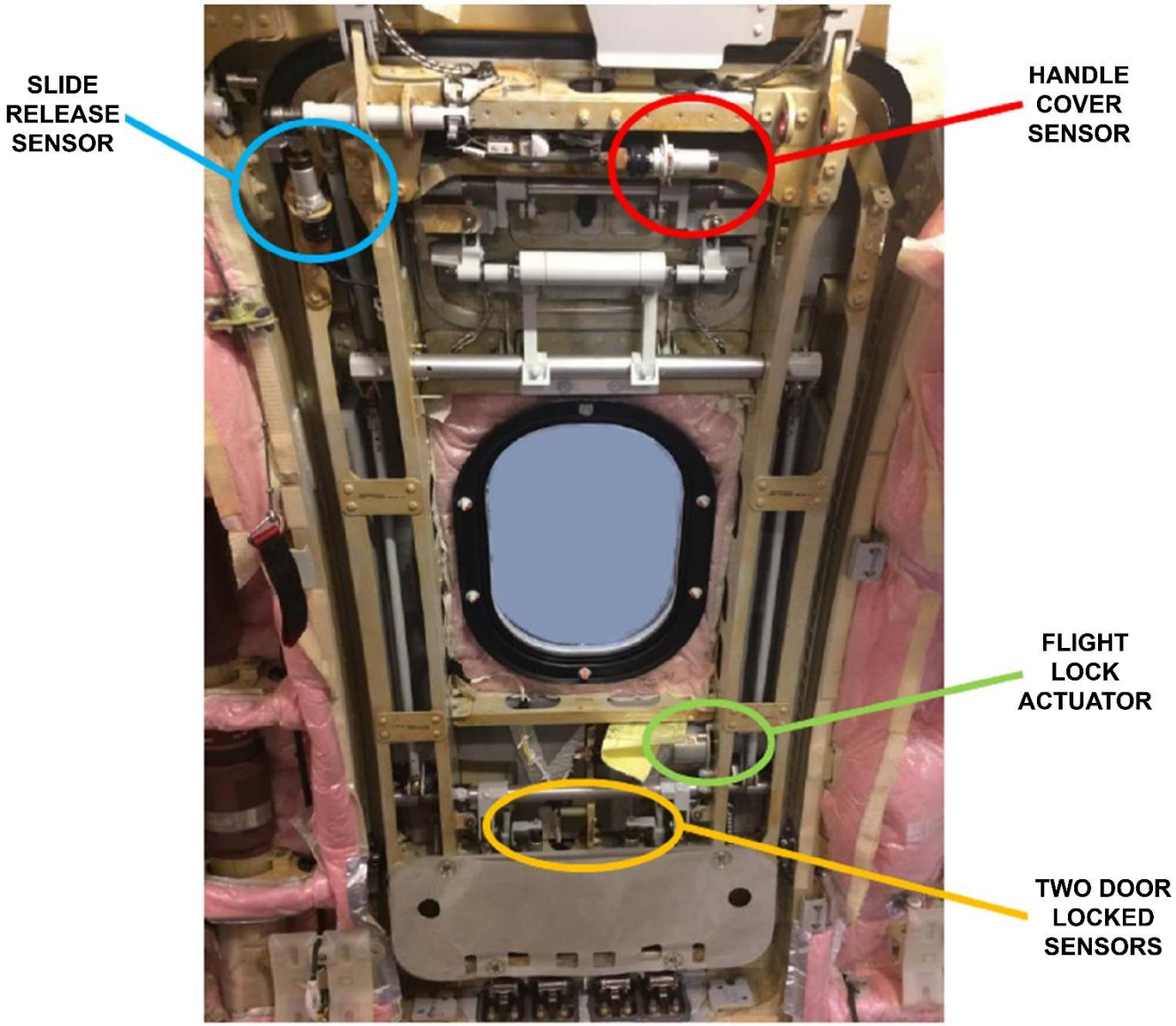
The handle cover is not possible to be in place if the handle is not in latched and in locked position.

One sensor installed to monitor the escape slide arm disarm function.

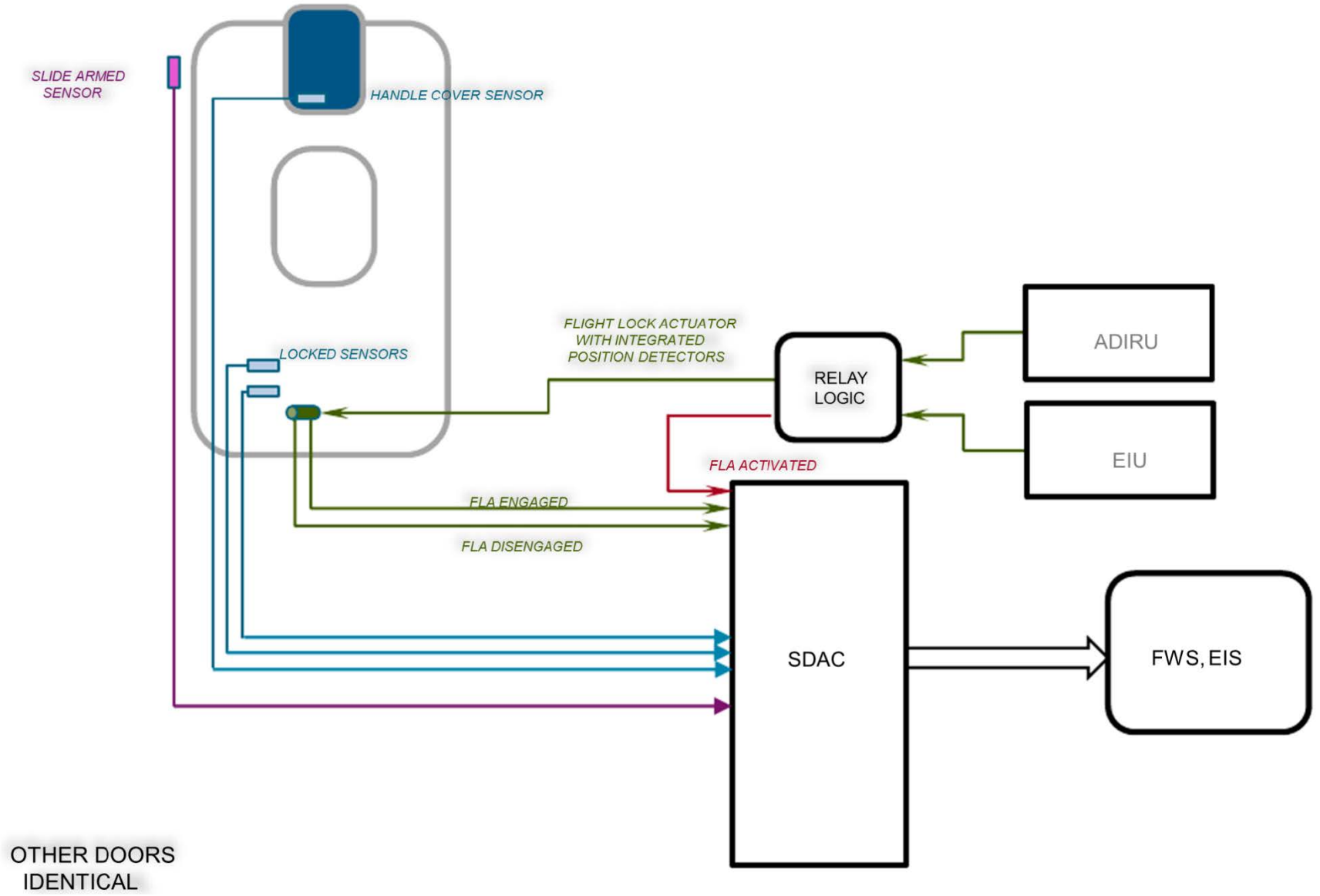
The flight lock actuator engaged-disengaged status is monitored internally within the FLA assembly.

All sensors and the flight lock are connected to SDAC for monitoring and alerting.

These provide ECAM alerts trough the FWC and DOOR page information from SDAC.


SLIDE
RELEASE
SENSOR
HANDLE
COVER
SENSOR
FLIGHT
LOCK
ACTUATOR
TWO DOOR
LOCKED
SENSORS

INTENTIONALLY BLANK


SLIDE ARMED SENSOR
HANDLE COVER SENSOR
LOCKED SENSORS
FLIGHT LOCK ACTUATOR WITH INTEGRATED POSITION DETECTORS
RELAY LOGIC
ADIRU
EIU
FLA ACTIVATED
FLA ENGAGED
FLA DISENGAGED
SDAC
FWS, EIS
OTHER DOORS IDENTICAL

ESCAPE SLIDES

A321LR slide configuration.

Door 1-4 dual lane slide or dual lane slide raft.

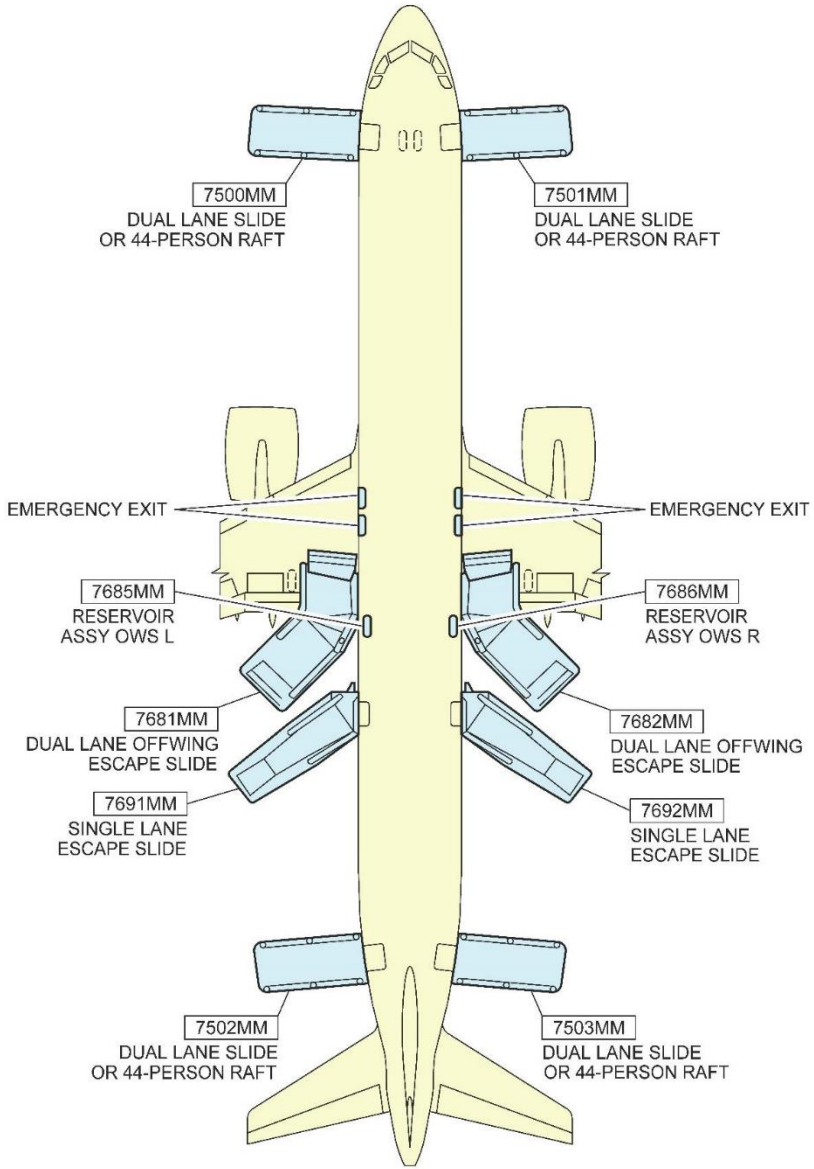
OWD doors, only dual lane slides.

Door 3 only single lane slides.

Additional rafts are added in the cabin to compensate for the lack of rafts at the OWD and door 3 locations if the aircraft is be operated ETOPS.

Escape slide direct reading gages are available at each escape slide reservoir.

As an option, a pressure switch on each slide reservoir provides slide bottle status on the FAP. (Forward Attendant Panel).


7500MM
DUAL LANE SLIDE
OR 44-PERSON RAFT
7501MM
DUAL LANE SLIDE
OR 44-PERSON RAFT
EMERGENCY EXIT
EMERGENCY EXIT
7685MM
RESERVOIR
ASSY OWS L
7686MM
RESERVOIR
ASSY OWS R
7681MM
DUAL LANE OFFWING
ESCAPE SLIDE
7682MM
DUAL LANE OFFWING
ESCAPE SLIDE
7691MM
SINGLE LANE
ESCAPE SLIDE
7692MM
SINGLE LANE
ESCAPE SLIDE
7502MM
DUAL LANE SLIDE
OR 44-PERSON RAFT
7503MM
DUAL LANE SLIDE
OR 44-PERSON RAFT

ESCAPE SLIDES

The OWD slide inflation reservoirs are installed in the AFT cargo compartment between frames 47 and 47.1.

The reservoirs are triggered by a cable moved on each side by a slide release mechanism and a door lever.

When an OWD is opening, the lever moves the slide release cable which in turn, triggers the slide inflation reservoir.

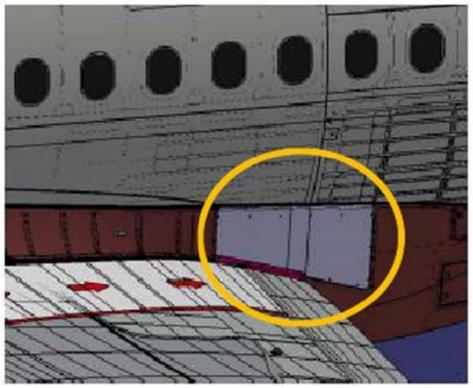
The slides are installed in the belly fairing between frames 45 and 47.1.

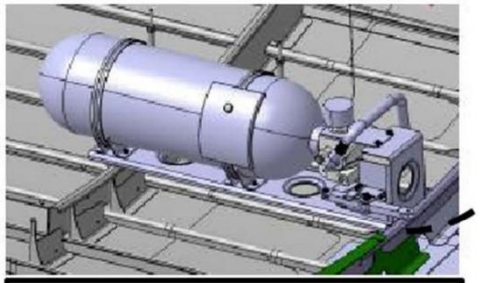
A placard "ACCESS TO ESCAPE SLIDE PRESSURE RESERVOIR" is installed accordingly on cargo compartment lining panels.

The slide can be manually inflated.

The manual inflation handle is located on each exit’s frame.

OWD SLIDE
PACK LOCATION





L/H SIDE ONLY SHOWN

WITHOUT ACT

CABLE PULLED BY SLIDE RELEASE
PERCUSSION MECHANISM CABLE

INFLATED SLIDE

OVERWING SLIDE INFLATION
RESERVOIR IN AFT CARGO COMPARTMENT

ESCAPE SLIDES

The OWD slide inflation reservoirs are installed in the cabin around frame 47.

The reservoirs are triggered by a cable moved on each side by a slide release mechanism and a door lever.

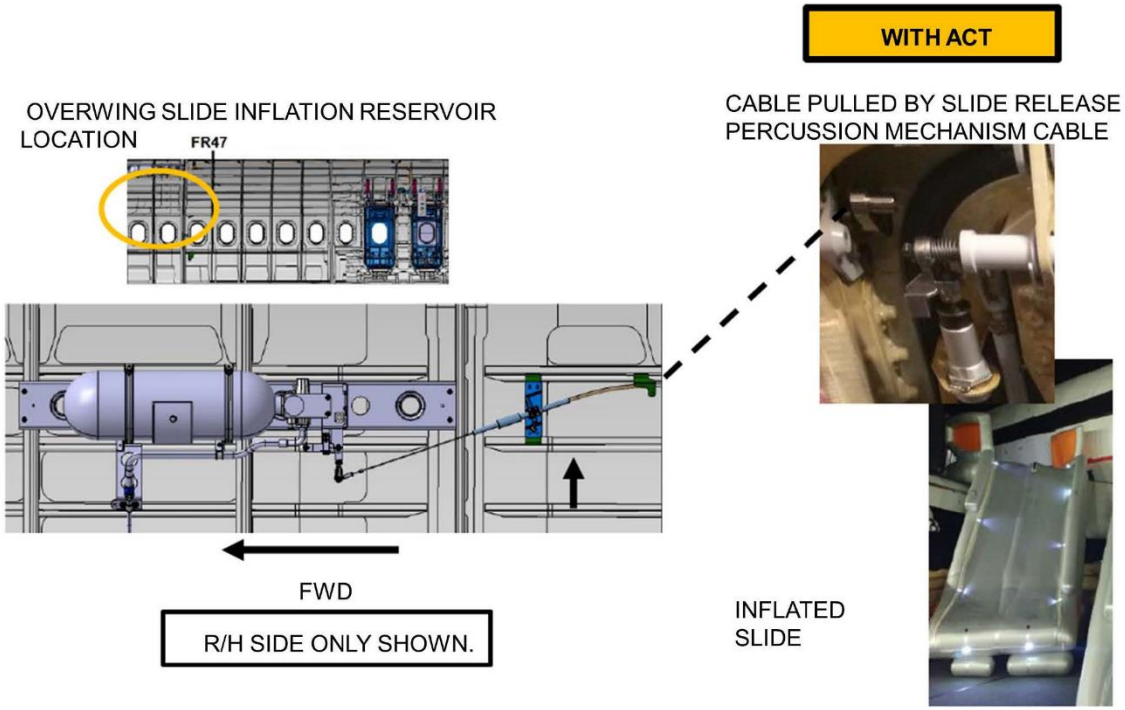
When an OWD is opening, the lever moves the slide release cable which in turn, triggers the slide inflation reservoir.

The slides are installed in the belly fairing between frames 45 and 47.1.

The slide can be manually inflated.

The manual inflation handle is located on each exit's frame.

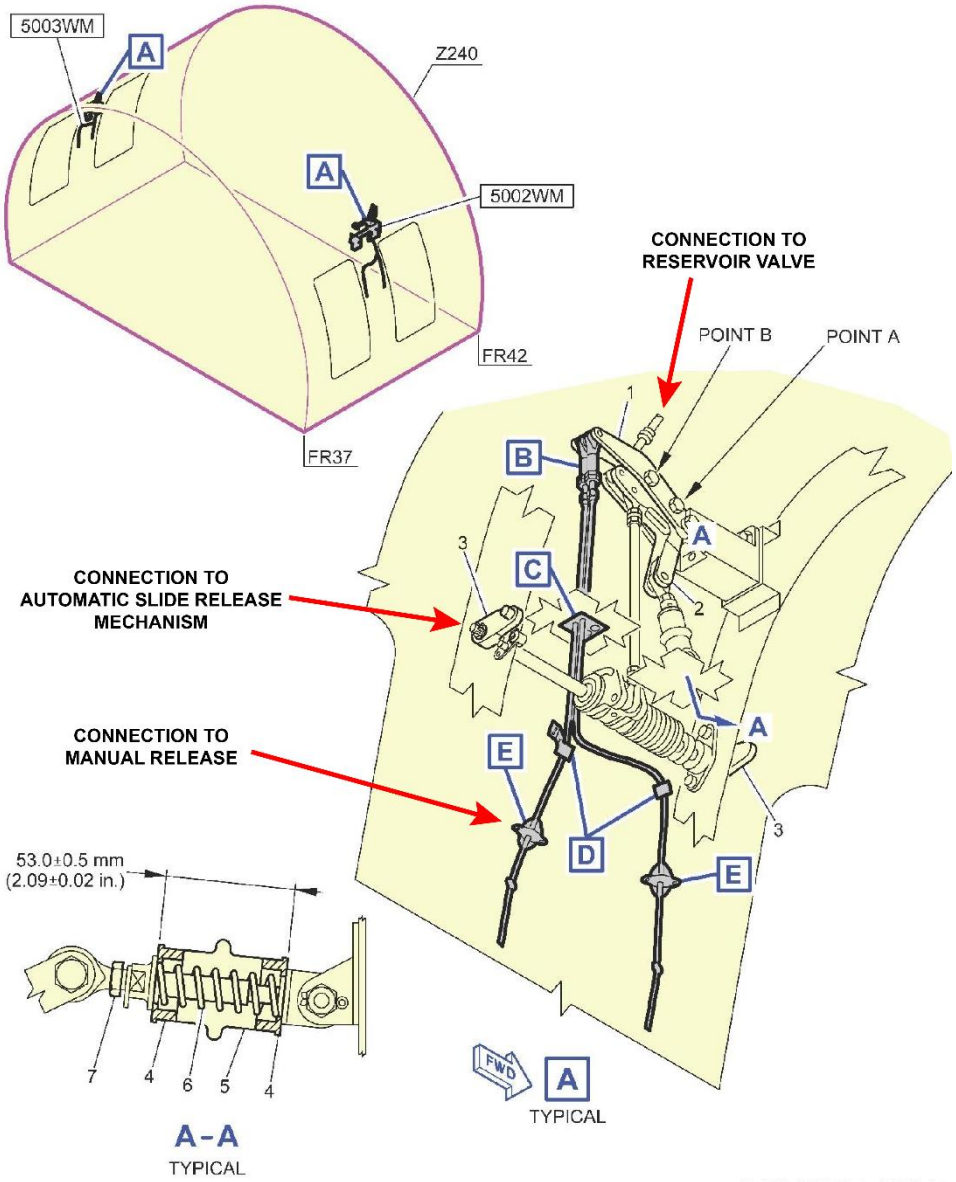

PULL


WITH ACT
OVERWING SLIDE INFLATION RESERVOIR LOCATION
FR47
CABLE PULLED BY SLIDE RELEASE PERCUSSION MECHANISM CABLE
FWD
R/H SIDE ONLY SHOWN.
INFLATED SLIDE

ESCAPE SLIDES

The OWD are connected to the inflation reservoir through cables, rods, and levers.

It is important to deactivate the slide release mechanism on both doors before attempting to open a door.


5003WM
A
Z240
A
5002WM
FR42
FR37
CONNECTION TO
RESERVOIR VALVE
POINT B
POINT A
1
B
A
3
C
2
CONNECTION TO
AUTOMATIC SLIDE RELEASE
MECHANISM
A
CONNECTION TO
MANUAL RELEASE
E
D
E
3
53.0±0.5 mm
(2.09±0.02 in.)
7
4
6
5
4
A-A
TYPICAL
FWD
A
TYPICAL

ESCAPE SLIDES

For maintenance purposes, it is sometimes necessary to de-activate the slide release system.

This is performed from inside the cabin.

The slide release system consists of a turning axle linked to the door handle shaft.

To disarm the slide, the turning axle inner shaft has to be pulled and turned until the slide release lever is far from the percussion mechanism (fuselage side).

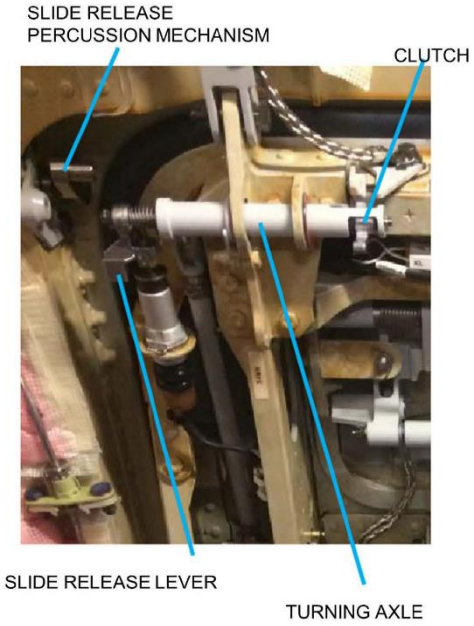
The spring in the mechanism holds the shaft behind the disarm bracket.

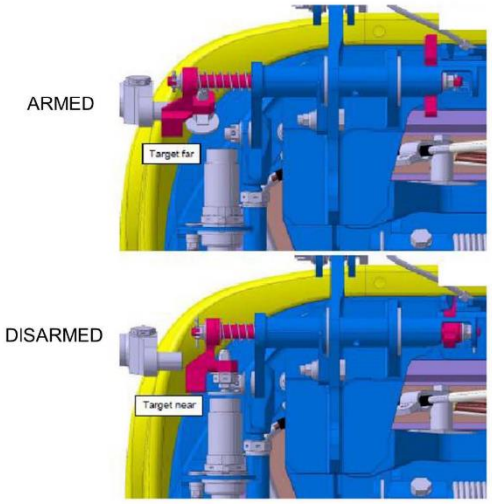
To re-arm the slide, the turning axle inner shaft has to be pulled and turned.

It can be pushed until the clutch is engaged.

The spring in the mechanism holds the shaft in the armed position.

A sensor monitors the system position.


SLIDE RELEASE
PERCUSSION MECHANISM
CLUTCH
SLIDE RELEASE LEVER
TURNING AXLE


ARMED
Target far
DISARMED
Target near

ESCAPE SLIDES

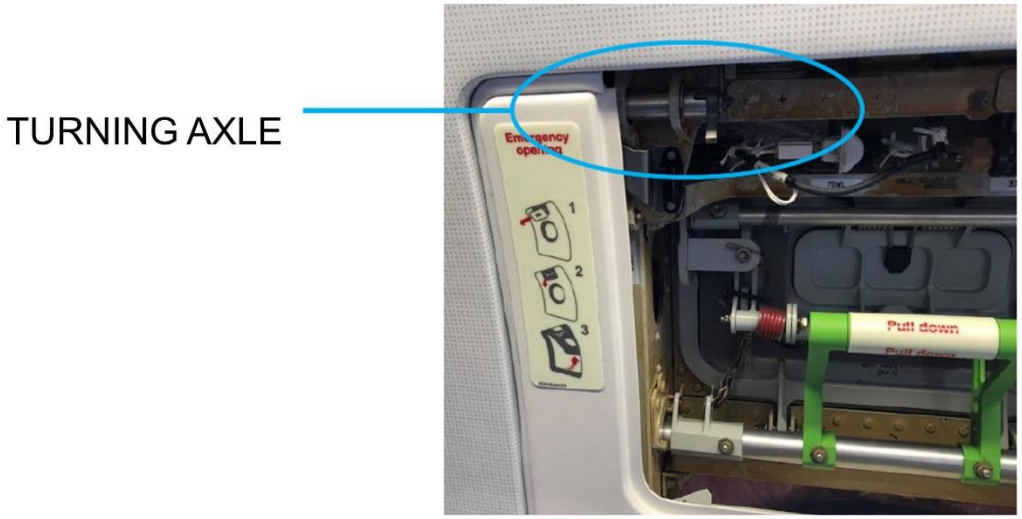
To disarm the slide, the turning axle inner shaft must be pulled and turned until the slide release lever is far from the percussion mechanism (fuselage side).

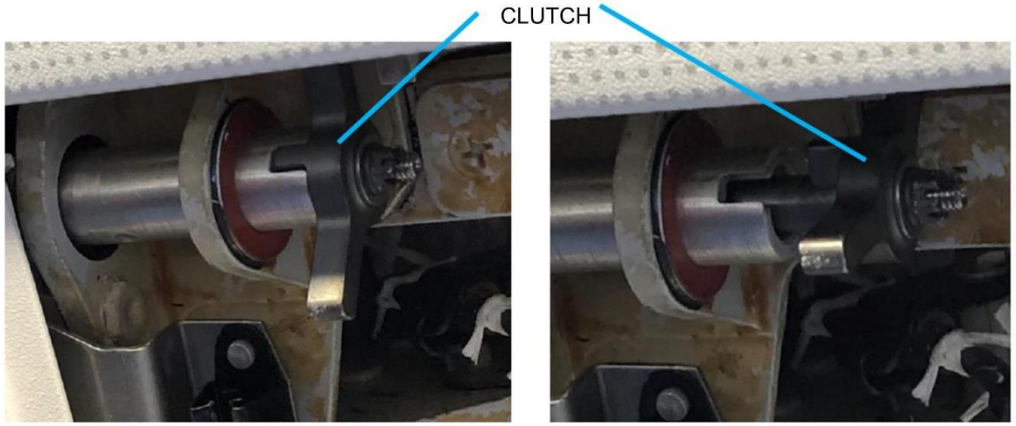
The spring in the mechanism holds the shaft behind the disarm bracket.

To re-arm the slide, the turning axle inner shaft must be pulled and turned.

It can be pushed until the clutch is engaged.

The spring in the mechanism holds the shaft in armed position.





SLIDE RELEASE SYSTEM ARMED

SLIDE RELEASE SYSTEM DISARMED

ESCAPE SLIDES

Before maintenance is accomplished on the emergency doors 2/3 and the OWDs, it is also necessary to safety the inflation reservoirs.

The inflation reservoir safety lock pin is found in a pouch attached to the reservoir.

Install the lock pin into the regulator valve assembly.

If the lock pin cannot be installed, do the adjustment procedure to install the lock pin in the regulator valve assembly.

WARNING: slide deployment may occur during this procedure.

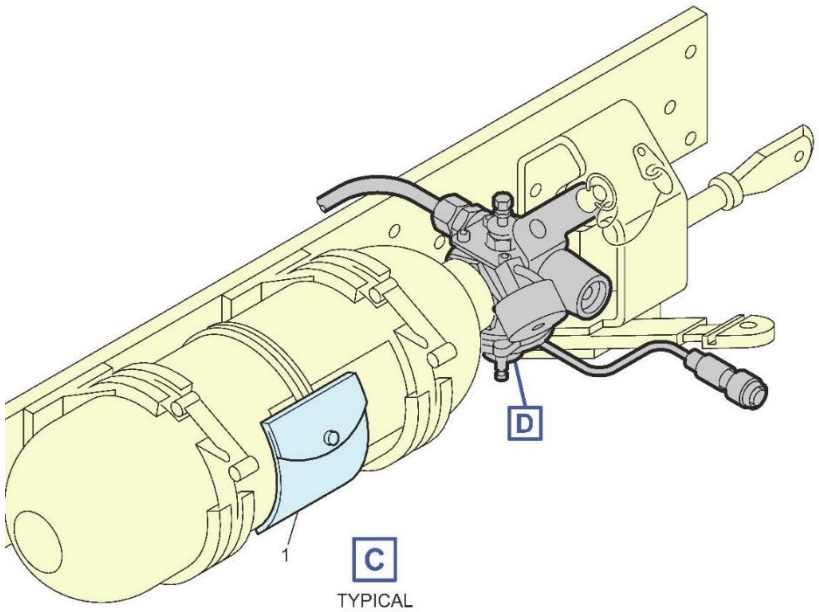
Follow AMM procedures.

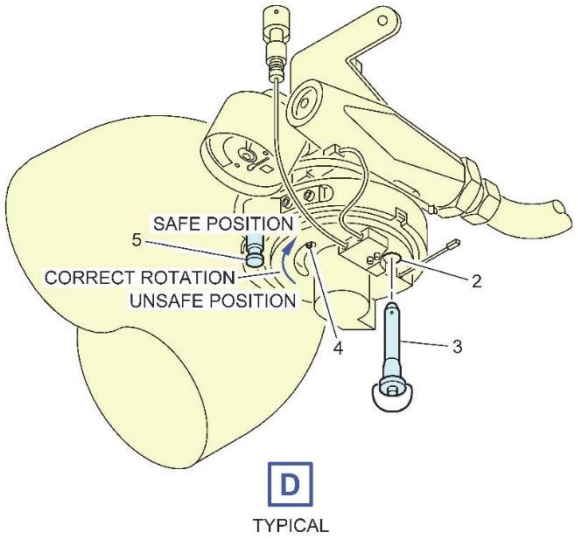
Adjustment:

Push the release stud (5) in the SAFE direction, to move the pulley stop-pin (4) to the closed position.

When the pulley stop-pin (4) is in the fully closed position, the internal hole aligns with the installation hole (3).

Install the regulator valve lock pin.


D
1
C
TYPICAL


SAFE POSITION
5
CORRECT ROTATION
UNSAFE POSITION
2
4
3
D
TYPICAL

ESCAPE SLIDES

Before maintenance is accomplished on the emergency doors 2/3 and the OWDs, it is also necessary to safety the inflation reservoirs.

The inflation reservoir safety lock pin is found in a pouch attached to the reservoir.

Install the lock pin into the regulator valve assembly.

If the lock pin cannot be installed, do the adjustment procedure to install the lock pin in the regulator valve assembly.

WARNING: slide deployment may occur during this procedure. Follow AMM procedures.

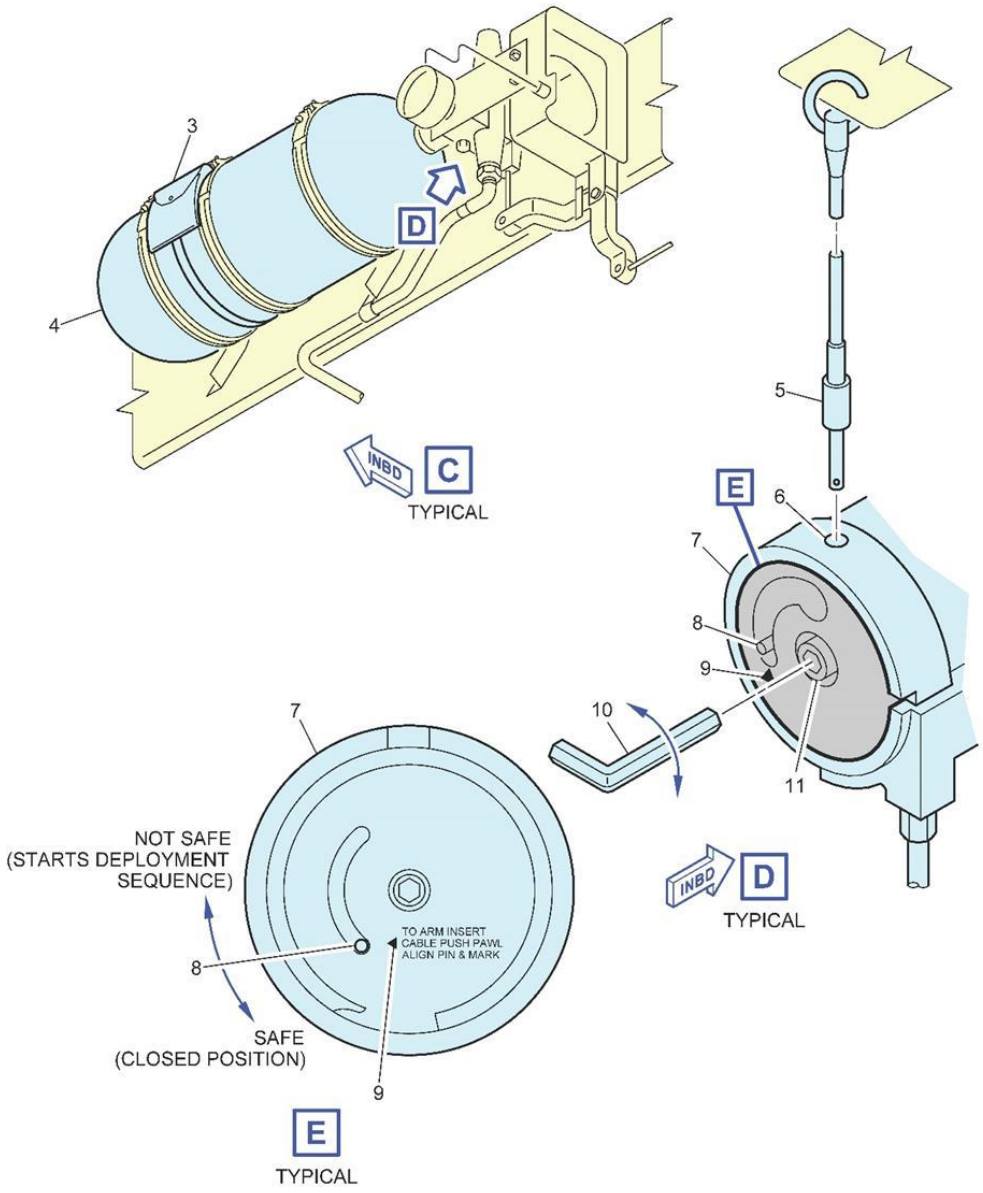
Adjustment:

Put an ALLEN KEY 3/16 IN (10) into the hexagonal socket (11).

Turn the ALLEN KEY 3/16 IN (10) in the SAFE direction, to move the pulley stop-pin (8) in the direction of the black mark (9) (closed position).

Continue until the pulley stop-pin (8) is in the fully closed position to align the internal hole with the installation hole (6).

Install the regulator valve lock pin.


3
4
D
INBD
C
TYPICAL
5
E
6
7
8
9
10
11
INBD
D
TYPICAL
7
NOT SAFE
(STARTS DEPLOYMENT
SEQUENCE)
8
TO ARM INSERT
CABLE PUSH PAWL
ALIGN PIN & MARK
SAFE
(CLOSED POSITION)
9
E
TYPICAL

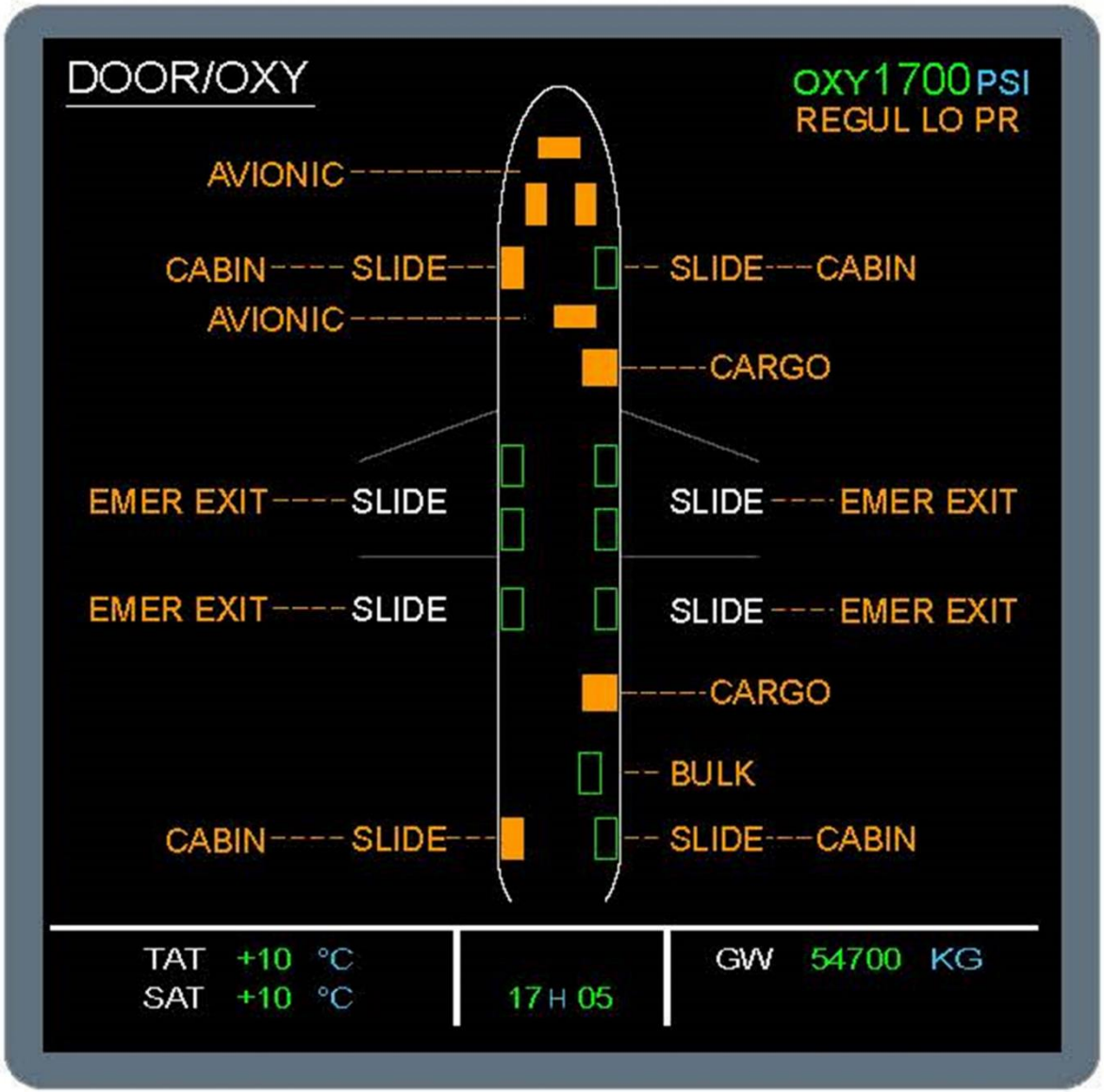
OWD DOOR/SLIDE INDICATIONS

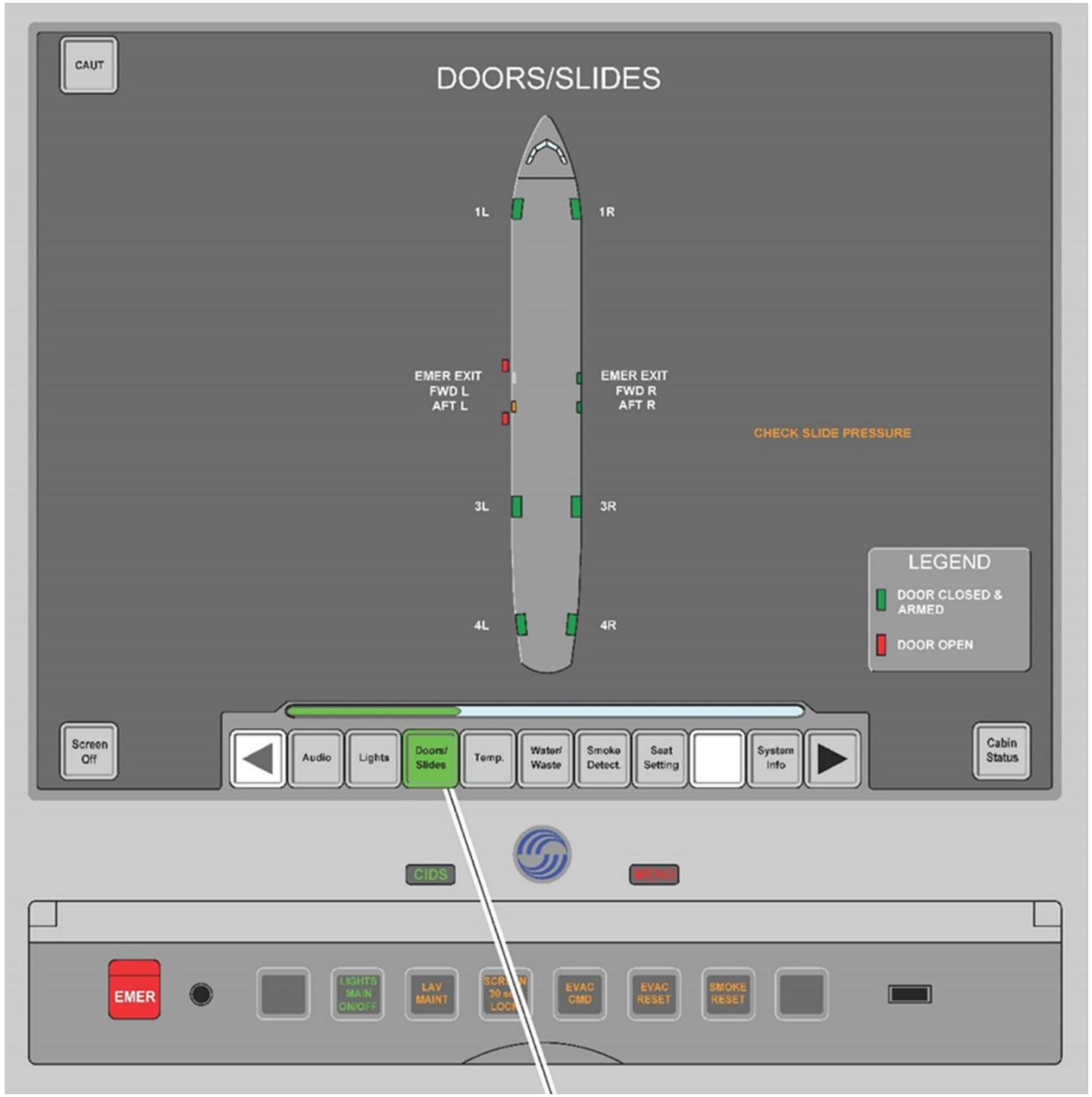
Overwing door and slide indication is available;

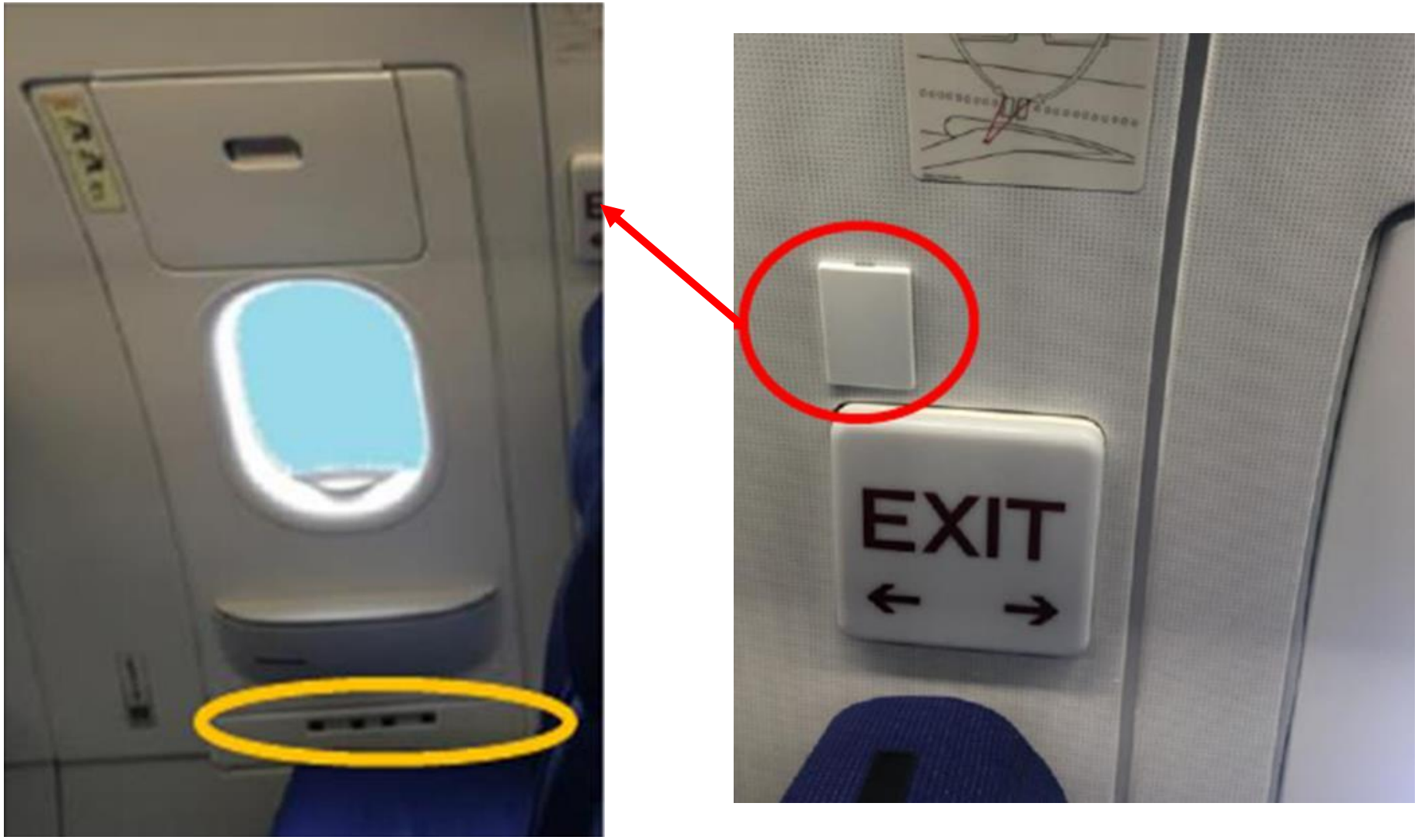
On ECAM DOOR/OXY page,

On the FAP,

At the door.


DOOR/OXY
OXY 1700 PSI
REGUL LO PR
AVIONIC
CABIN
SLIDE
SLIDE
CABIN
AVIONIC
CARGO
EMER EXIT
SLIDE
SLIDE
EMER EXIT
EMER EXIT
SLIDE
SLIDE
EMER EXIT
CARGO
BULK
CABIN
SLIDE
SLIDE
CABIN
TAT +10 °C
SAT +10 °C
17 H 05
GW 54700 KG


CAUT
DOORS/SLIDES
1L
1R
EMER EXIT
FWD L
AFT L
EMER EXIT
FWD R
AFT R
CHECK SLIDE PRESSURE
3L
3R
4L
4R
LEGEND
DOOR CLOSED & ARMED
DOOR OPEN
Screen Off
Audio
Lights
Doors/ Slides
Temp.
Water/ Waste
Smoke Detect.
Seat Setting
System Info
Cabin Status
CIDS
EMER
LIGHTS MAIN ON/OFF
LAV MAINT
EVAC CMD
EVAC RESET
SMOKE RESET


EXIT

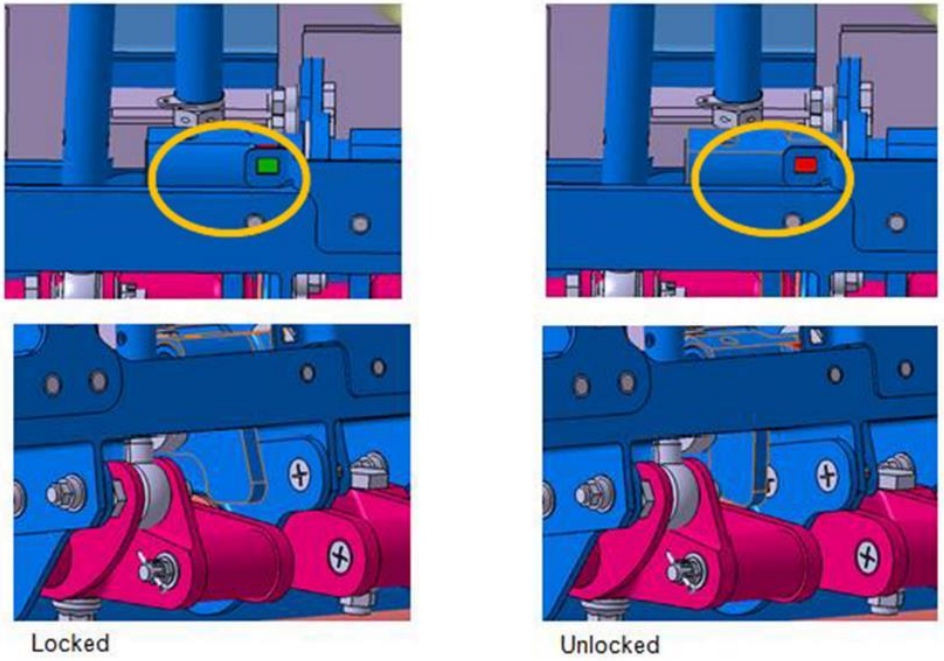
OWD DOOR/SLIDE INDICATIONS

There are visual lock indicators located at the lower part of the door that are visible through the lining to establish if the door is mechanically latched and locked.

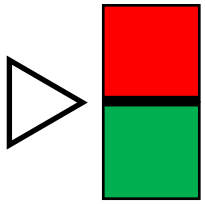
Each lock segment has its own visual indicator and is visible through four windows in the lower part of door lining.

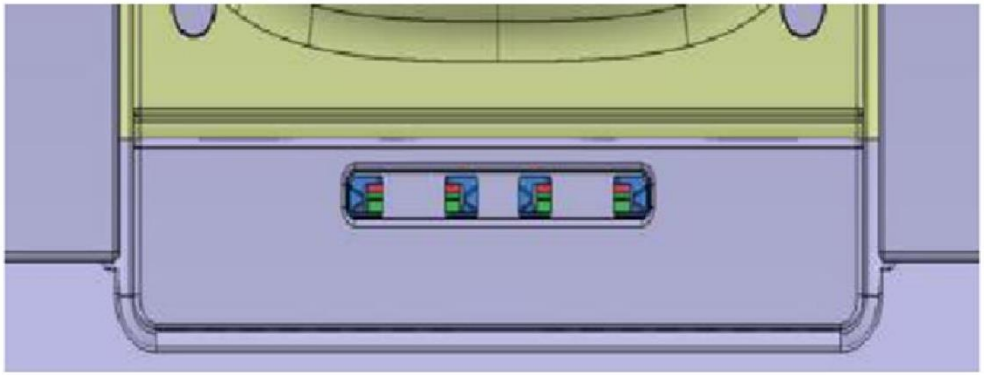
A red or green colour on the (moving) mechanism lock segment indicates locked or un-locked door.

The latched and locked position (green color) also has a black line, which needs to be aligned with the “arrow” on the structure lining to indicate latched and locked.

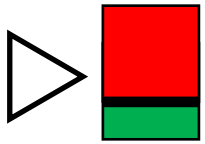

Locked
Unlocked

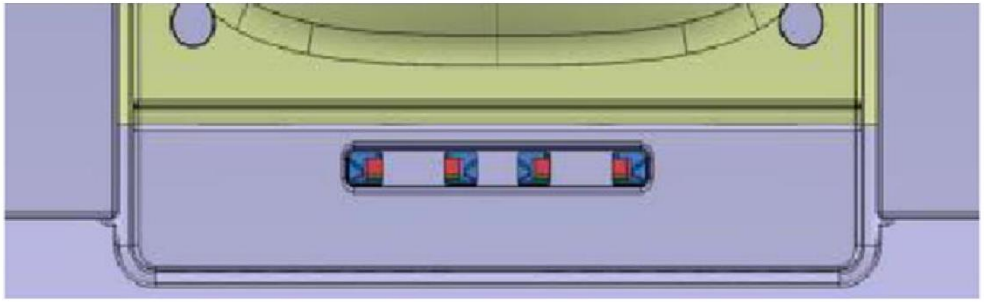
INTENTIONALLY BLANK



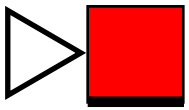


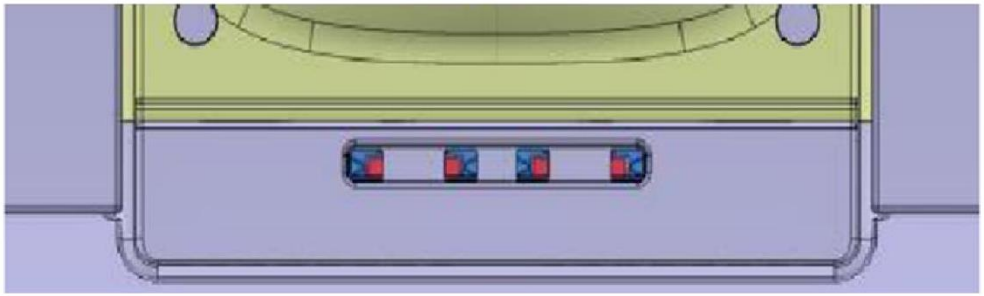
LATCHED AND LOCKED. (INNER HANDLE AT 0 DEGREES)





UNLOCKED BUT STILL LATCHED. (INNER HANDLE AT 47.5 DEGREES)





UNLOCKED AND UNLATCHED. (INNER HANDLE AT 95 DEGREES)

OWD DOOR/SLIDE INDICATIONS

At initial opening operation of the OWD handle cover removal, a white indicator light informs the door operator, that an escape slide would be deployed if the operation is continued.

Assuming 2 OWD are active on each side, disarming the door that has its door handle cover removed will cause the slide white light to extinguish.

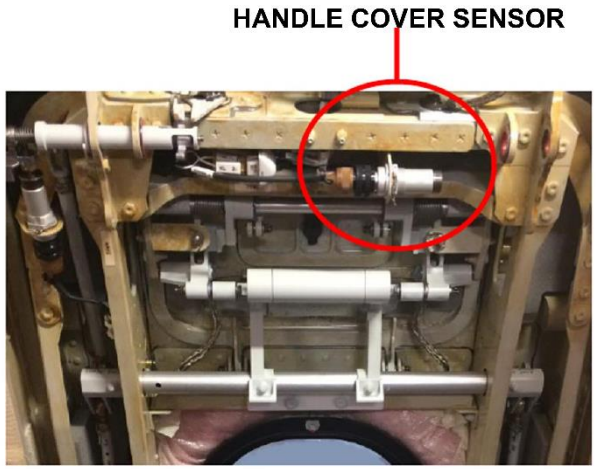
When the door handle cover of the other door on same side is removed, the white slide light illuminates to warn the operator that the slide is still armed.

Critical inspection before closure of door handle cover, ensure that slides are in the armed state ready for flight.

Flight attendants or pilots are not trained for arming these doors.

When covers are re-installed the local slide, white light is extinguished.

However; pilots will have an indication that doors are not armed on ECAM, FAP will indicate that a slide is disarmed.


HANDLE COVER SENSOR


SLIDE ARMED
LIGHT ILLUMINATED
IF ONE OF THE OWD
COVERS IS
REMOVED
EXIT

OWD DOOR/SLIDE INDICATION

The flight deck is informed of any open/closed door status through the DOOR/OXY system page on ECAM.

In case of any door open the system informs the flight deck by announcing warnings, which are displayed on the ECAM.

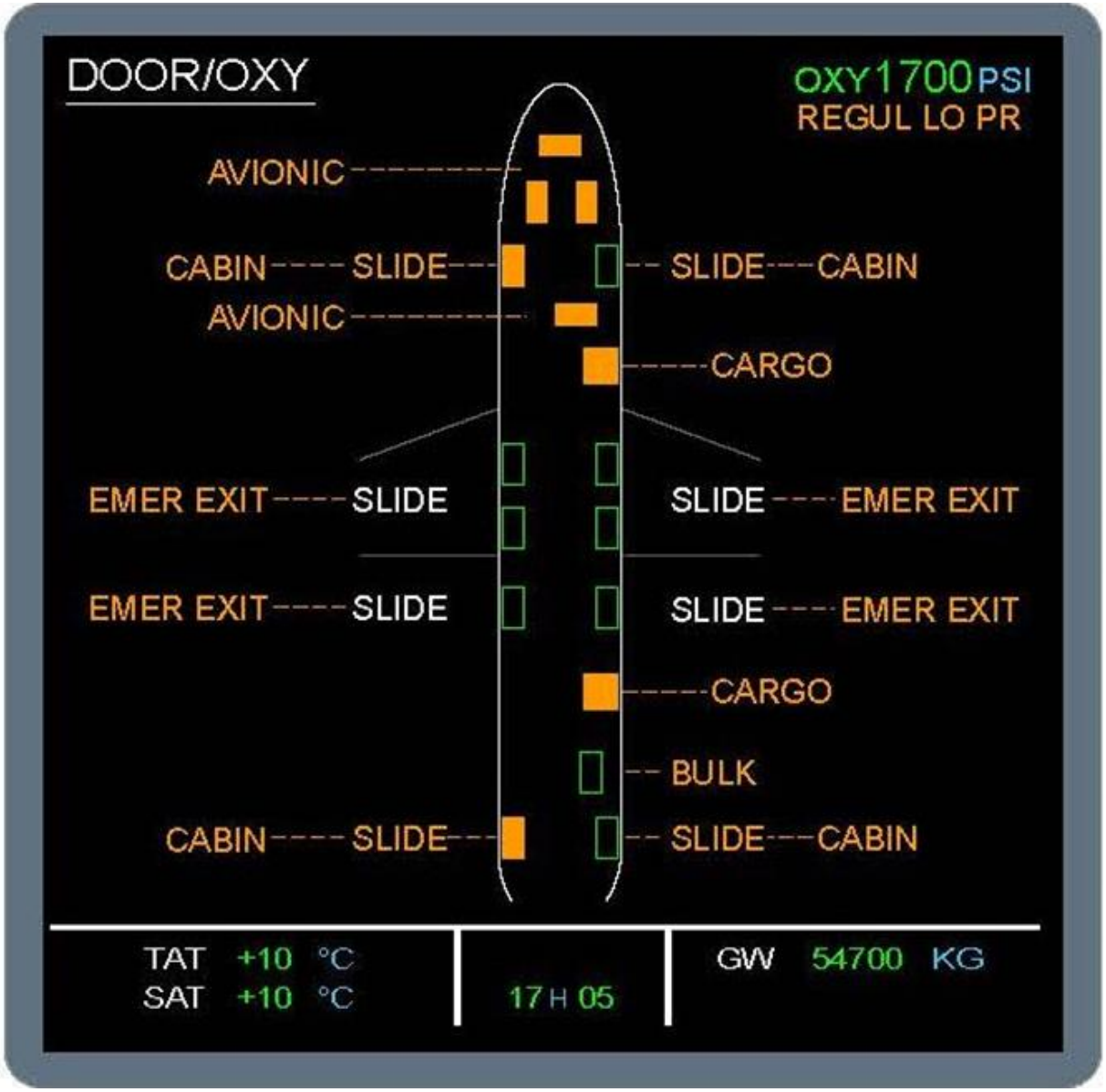
DOOR/OXY page appears automatically in flight phase 1 and 10 without MC alert or SC when a door is detected open.

DOOR/OXY page and related MC alert and SC are inhibited during flight phase 4, 5, 7, and 8 if a door is detected open.

DOOR/OXY page and MC alert and SC appear if a door is detected open during flight phase 2, 3, 6 and 9.

On A321NEO ACF “EMER EXIT” “OWD Symbol” indications are managed according to the 4 different door configurations.

This is dependent of the active, deactivated or plugged doors configurations.


DOOR/OXY
OXY 1700 PSI
REGUL LO PR
AVIONIC
CABIN
SLIDE
SLIDE
CABIN
AVIONIC
CARGO
EMER EXIT
SLIDE
SLIDE
EMER EXIT
EMER EXIT
SLIDE
SLIDE
EMER EXIT
CARGO
BULK
CABIN
SLIDE
SLIDE
CABIN
TAT +10 °C
SAT +10 °C
17 H 05
GW 54700 KG

OWD DOOR/SLIDE INDICATIONS

“EMER EXIT” indication on the same side:

Amber when at least one of the active OWD is open and the indication is valid,

Suppressed when all active OWD are closed on same side,

White when the open/close door indication of at least one of the active OWD is not valid.

“OWD Symbol Box”:

Amber “XX” when the open/closed door indication is not valid,

Amber “filled box” when an OWD is open,

Green “empty box” when an OWD is closed.

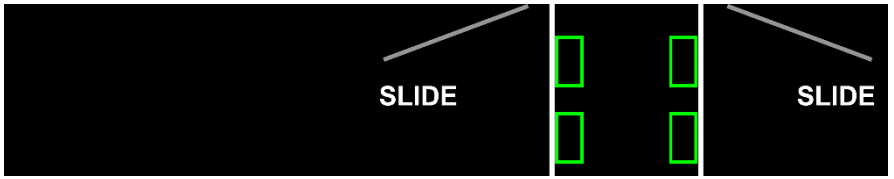
An open door is detected and indicated in one of the following conditions;

One of the 2 door lock sensors detects an open door state,

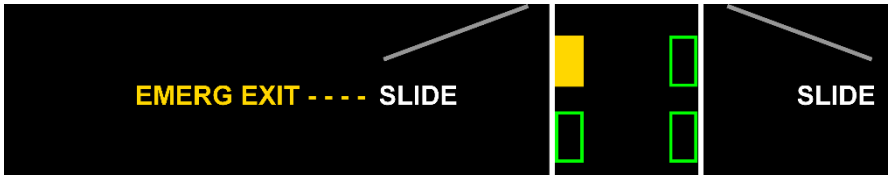
Or the door handle cover is removed.

“SLIDE” white indication is available when both slides on same side are armed.

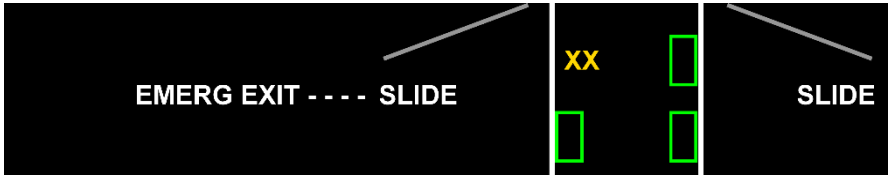
BOTH DOORS CLOSED, BOTH SLIDES ARMED



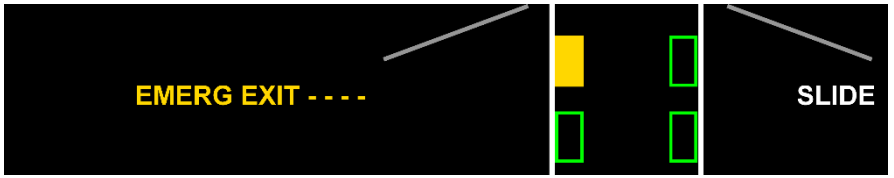
1 DOOR OPENED, BOTH SLIDES ARMED



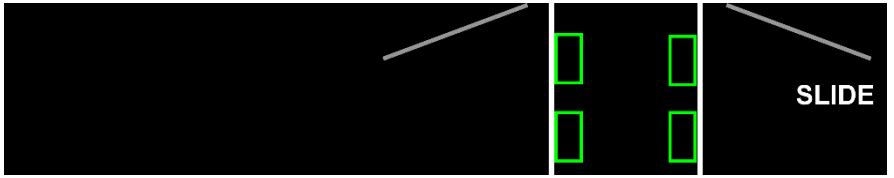
DOOR INVALID DATA, BOTH SLIDES ARMED



1 DOOR OPENED, AT LEAST 1 SLIDE DISARMED



BOTH DOORS CLOSED, AT LEAST 1 SLIDE DISARMED



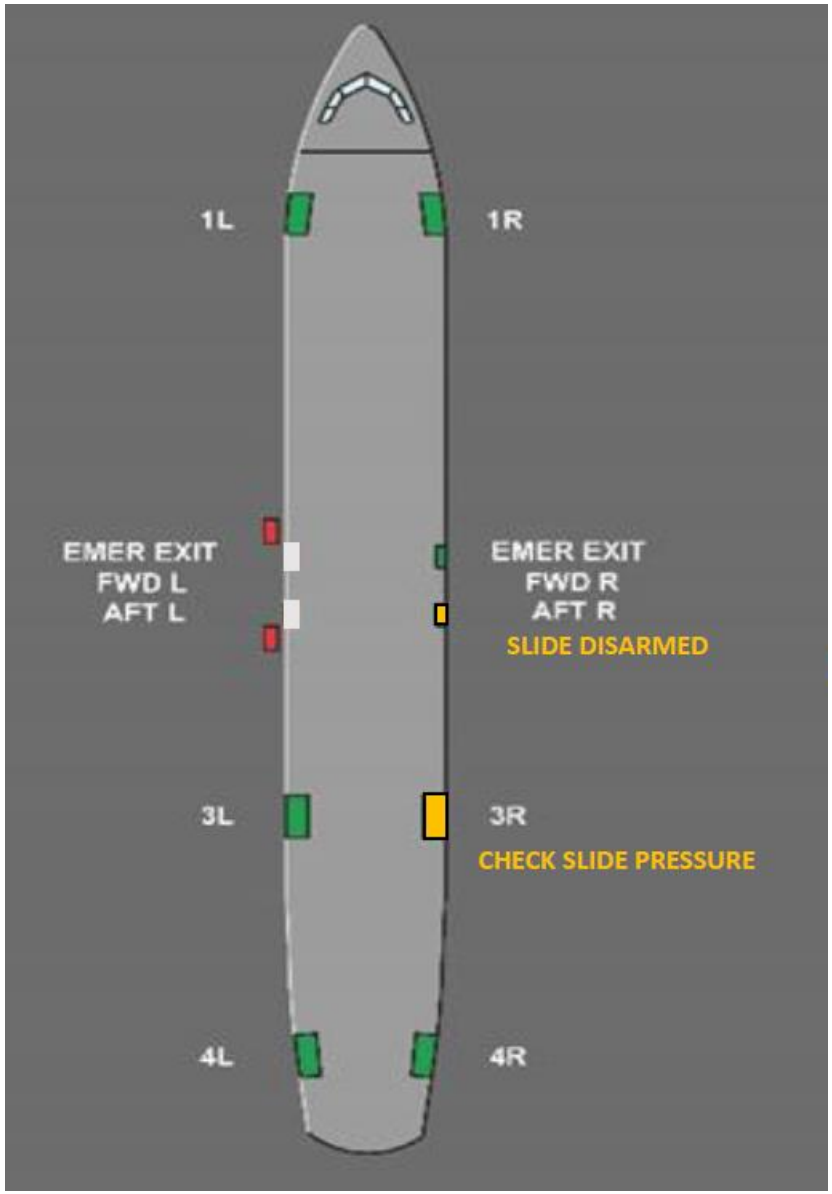
OWD DOOR/SLIDE INDICATIONS

As an option, a pressure switch on slide reservoirs provides slide bottle status on the FAP. (Forward Attendant Panel), similar to the other doors.

Slide disarm condition is indicated when at least one OWD slide is disarmed on same side.

LEGEND

- Door closed & armed
- Door open
- Door or slide issue



OWD CLOSING

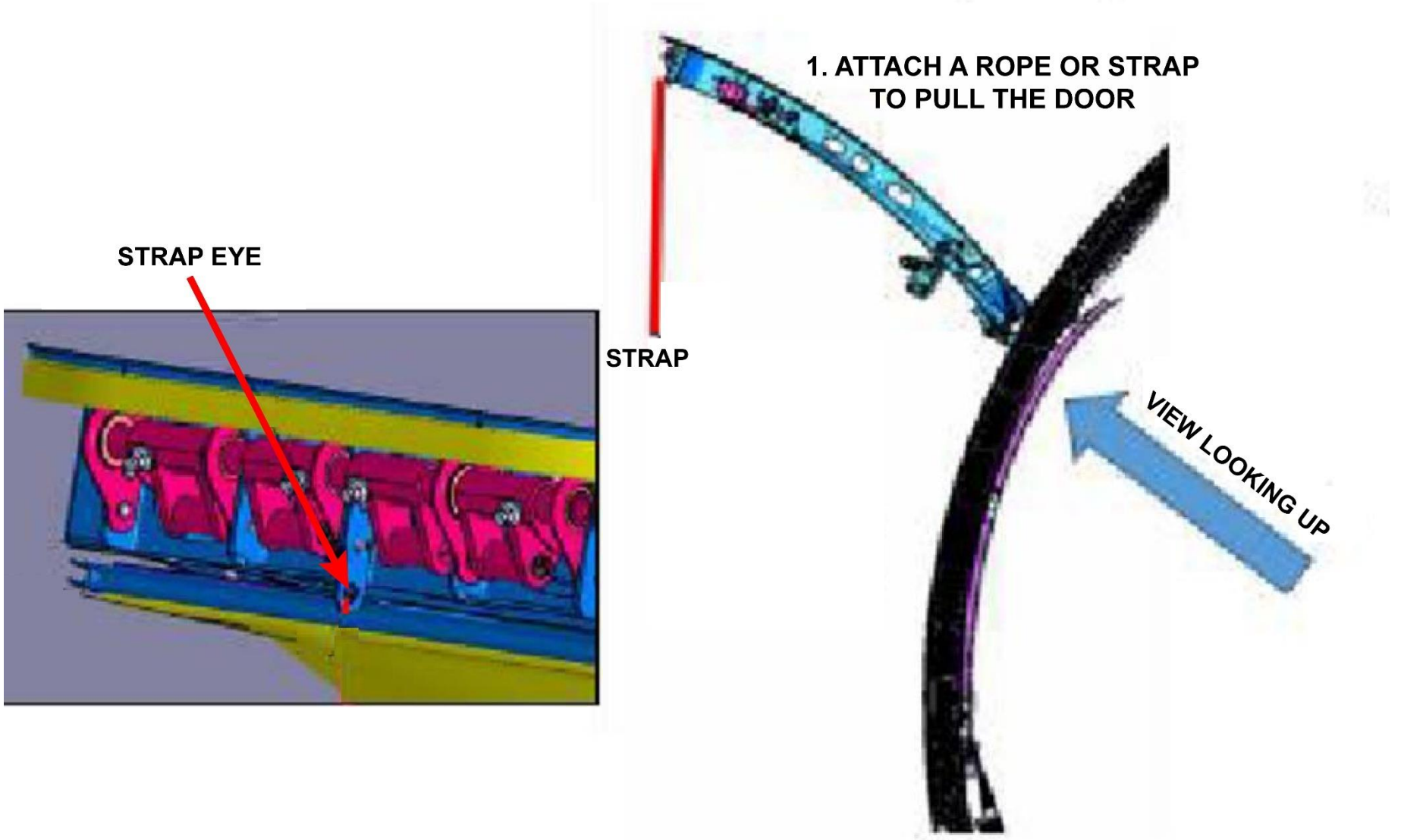
The door is closed by pulling in the strap (part of interior).

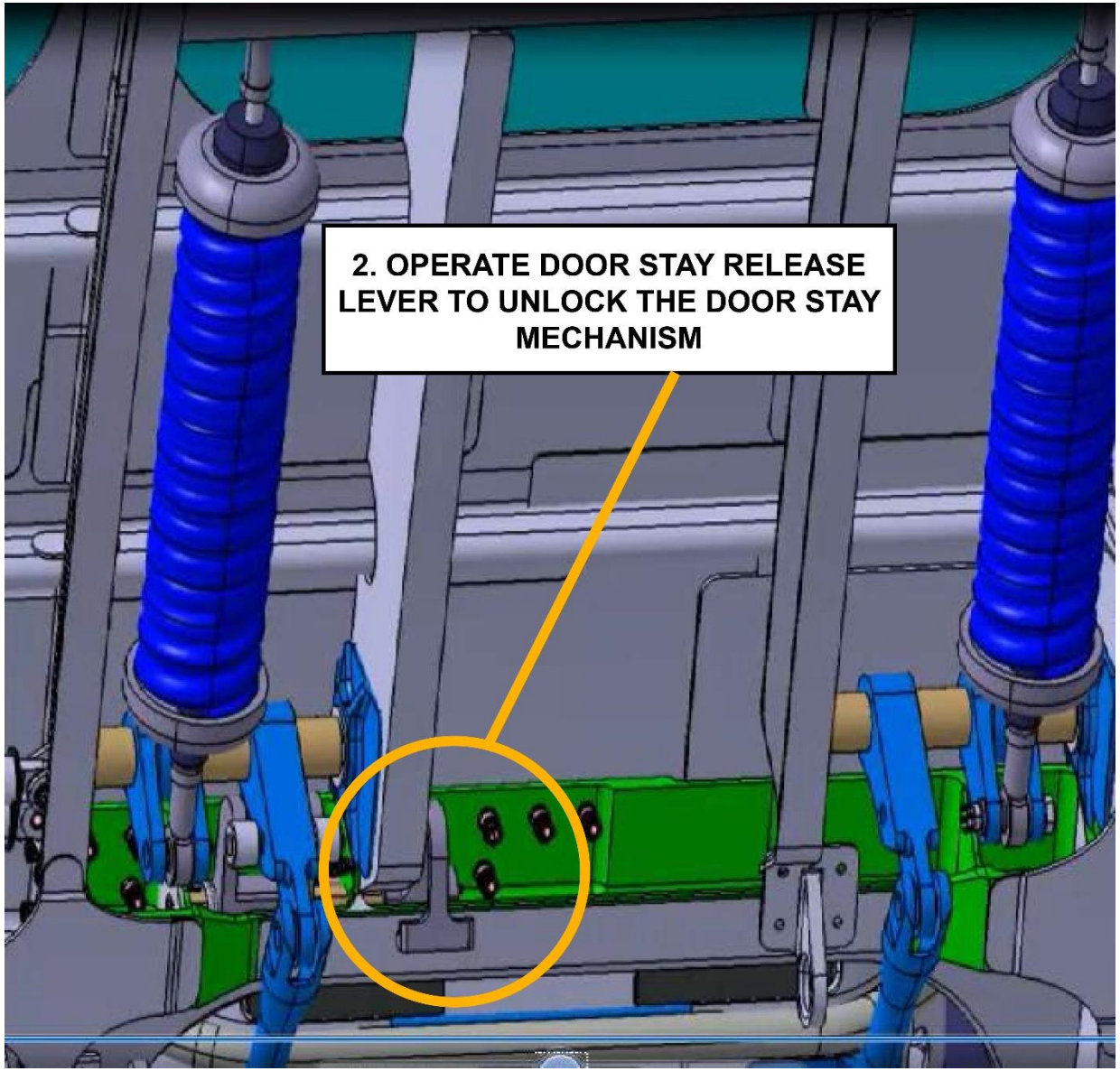
The closing sequence is only possible to perform from the inside of the cabin.

The sequence involves releasing the door stay lock, pulling on the door.

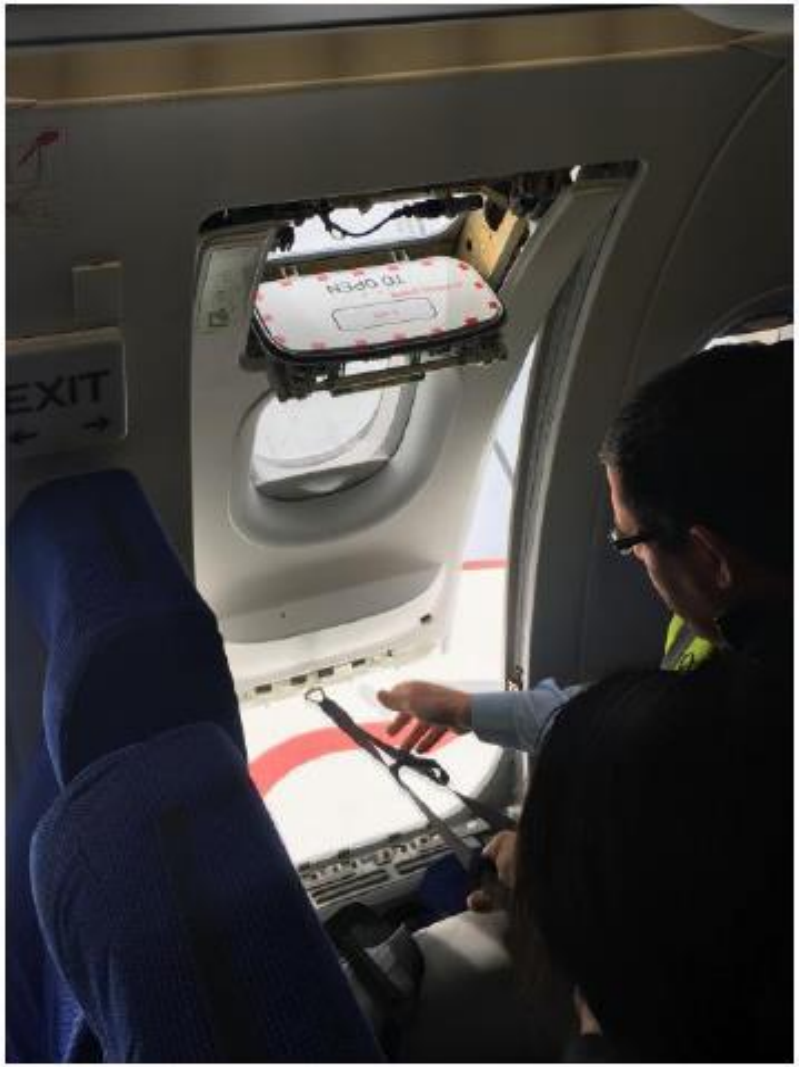
At the door sill, the visual indicator cover must be pulled in prior to fully closing the OWD.

Then manually releasing the interlock mechanism and operating the door handle to the close position.

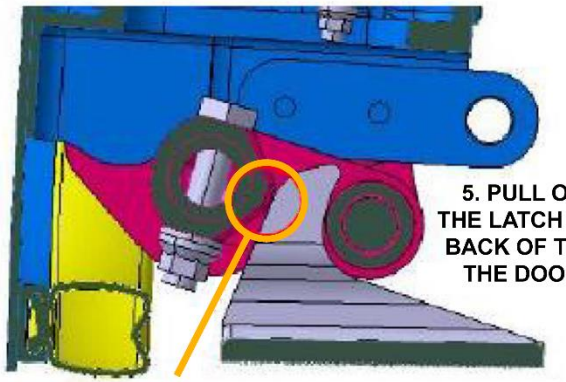

1. ATTACH A ROPE OR STRAP
TO PULL THE DOOR
STRAP EYE
STRAP
VIEW LOOKING UP


2. OPERATE DOOR STAY RELEASE LEVER TO UNLOCK THE DOOR STAY MECHANISM

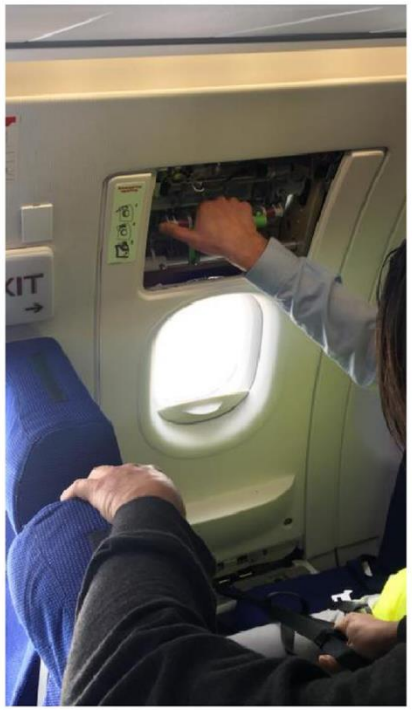
3. PULL THE DOOR INWARDS



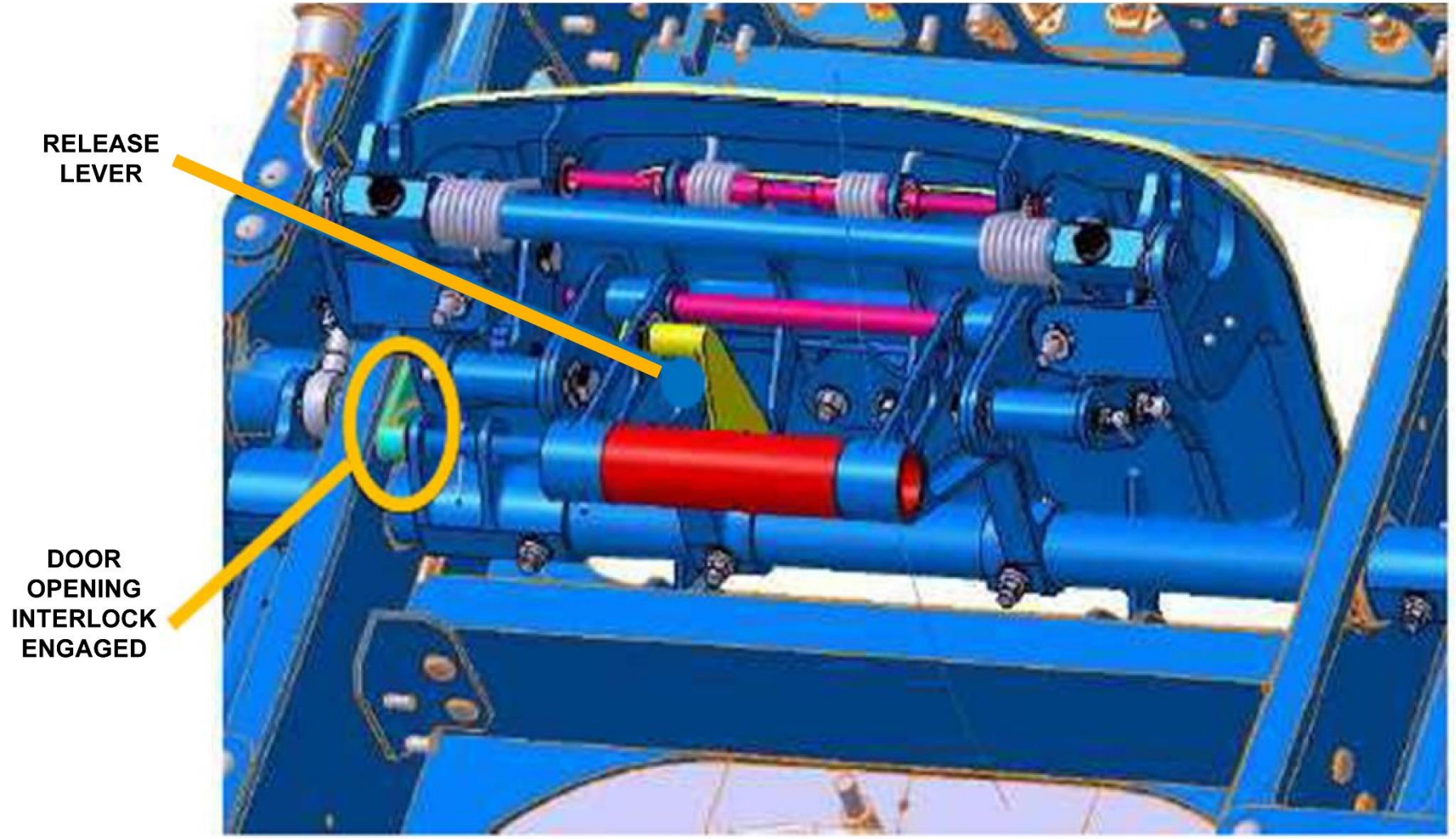
4. LIFT UP DOOR BOTTOM COVER


5. PULL ON THE STRAP UNTIL THE LATCH STOP IS AGAINST THE BACK OF THE LATCH HOOK AND THE DOOR IS IN THE CLOSED POSITION
CONTACT AREA BETWEEN LATCH AND LATCH HOOK

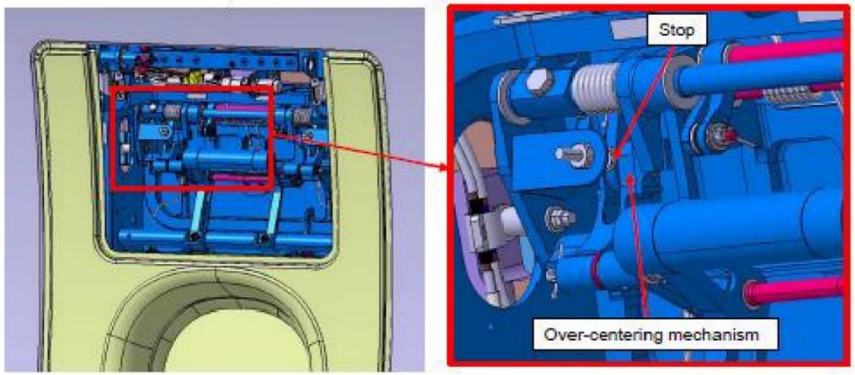
CLOSED DOOR

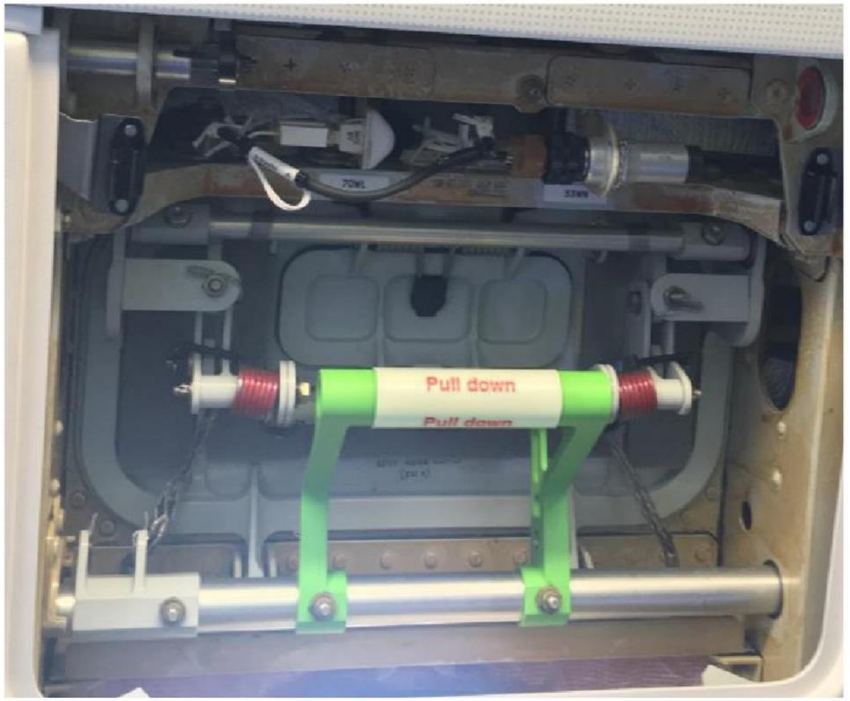


6. PULL ON THE RELEASE LEVER TO DISENGAGE THE INTERLOCK MECHANISM. THIS WILL THEN ALLOW THE DOOR HANDLE MOVEMENT



7. PUSH THE HANDLE UNTIL THE VENT FLAP IS CLOSED AND THE OVER-CENTRED MECHANISM HAS CONTACT WITH THE STOP.



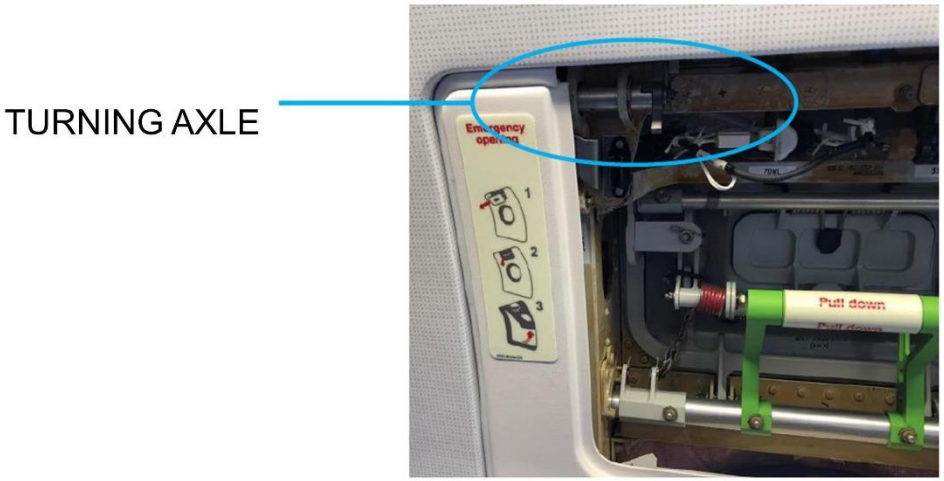


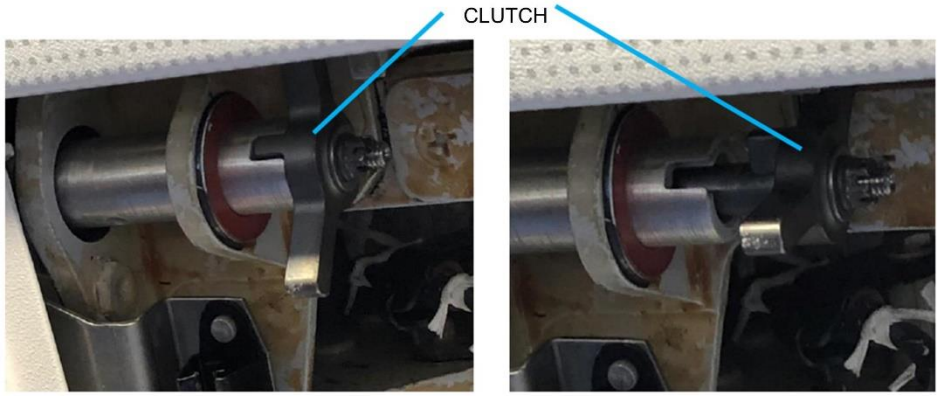
8. RE ARM THE DOOR, CLOSE THE DOOR HANDLE COVER.

CHECK DOOR MECHANICAL INDICATORS.

CHECK WALL SLIDE DOOR LIGHT, ECAM AND FAP FOR CORRECT INDICATIONS.

REMOVE SLIDE RESERVOIR SAFETY PIN AND RETURN AIRCRAFT TO OPERATIONAL CONDITION.





SLIDE RELEASE SYSTEM ARMED

SLIDE RELEASE SYSTEM DISARMED

DOOR DEACTIVATION

There are two design solutions to de-activate the door and make it a structural element if the customer needs only one OWD on each side of the cabin.

The door can only be installed or removed with use of tools and is neither visible for the passenger from the inside of the aircraft nor operable from outside nor inside.

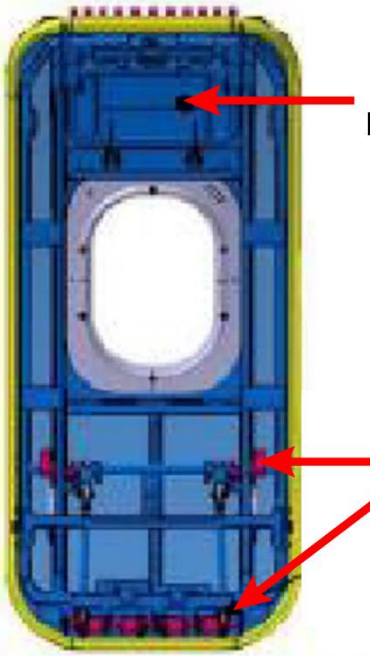
Long Term Deactivation:

The long term deactivated doors have the same structure as a basic door but no mechanism inside apart from the latch elements taking the pressure loads and a structural element identical to the vent flap element without any mechanism.

The latches are installed as on the activated door, but the entire latch mechanism is locked after that the door is installed.

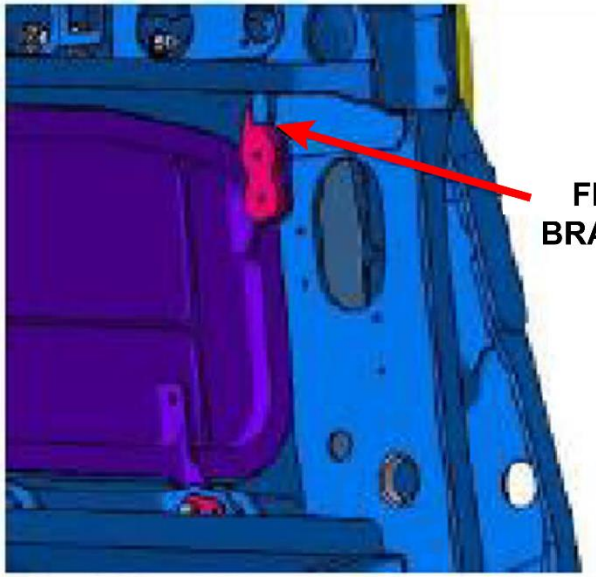
The latch mechanism is locked with two stop pins and can only be unlocked during maintenance.

The ordinary vent door is replaced with a fixed panel attached to the hinge line and locked on the upper edge with two machined brackets.

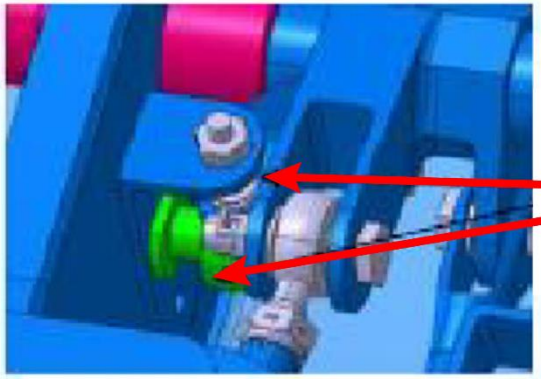


STRUCTURAL ELEMENT
REPLACNG THE VENT FLAP

LATCH MECHANISM
WITH LOCK



FIXED
BRACKET



SHAFT BLOCKED
BETWEEN THE
TWO STOPS

DOOR DEACTIVATION

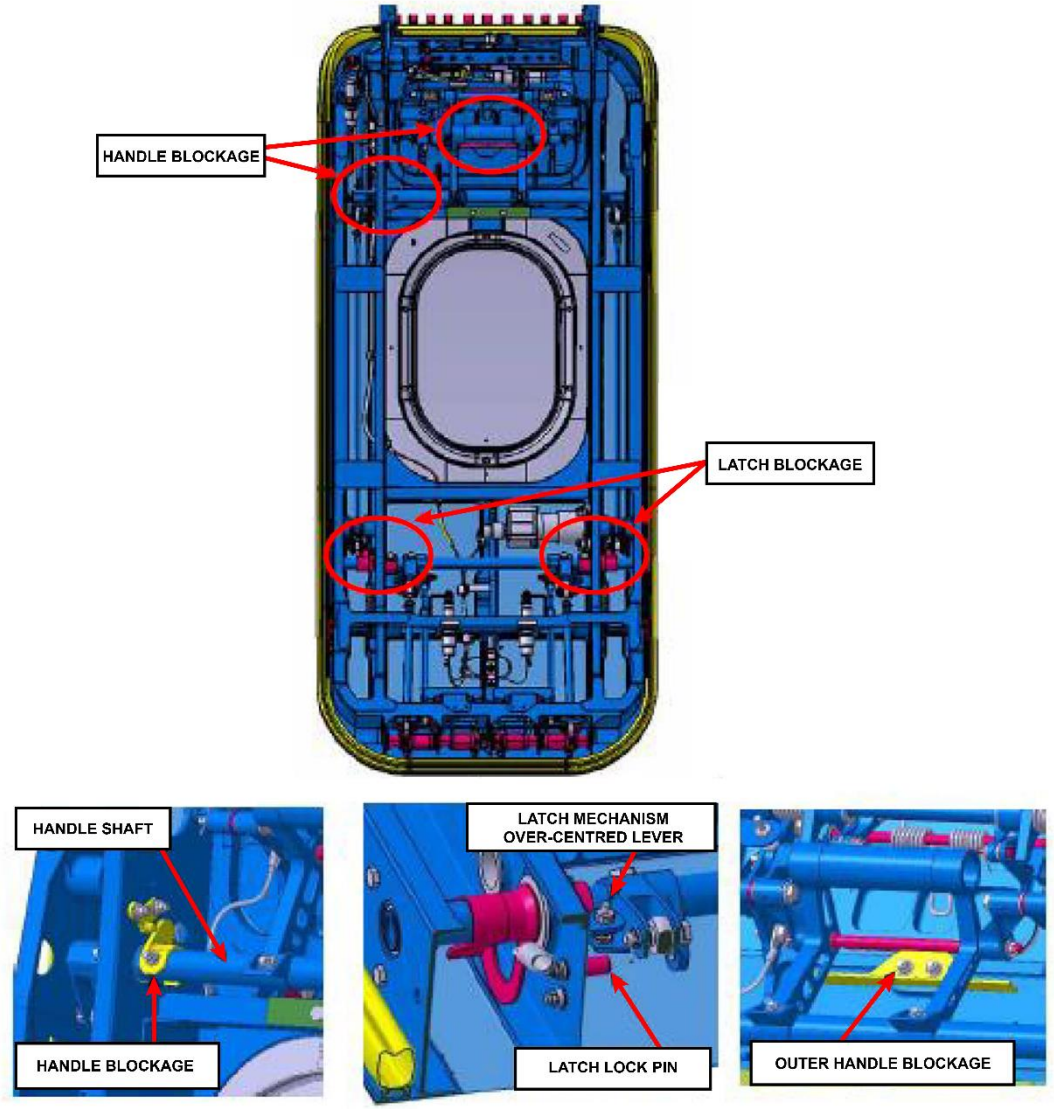
Short Term Deactivation:

The quick term solution is a basic door with a bracket installed which blocks the handle.

There are also brackets in the lower part of the door which block the latch/lock mechanism.

The connectors to the handle light, circular sensors and FLA are electrically disconnected.

When the brackets are installed the handle and the vent door cannot be operated.

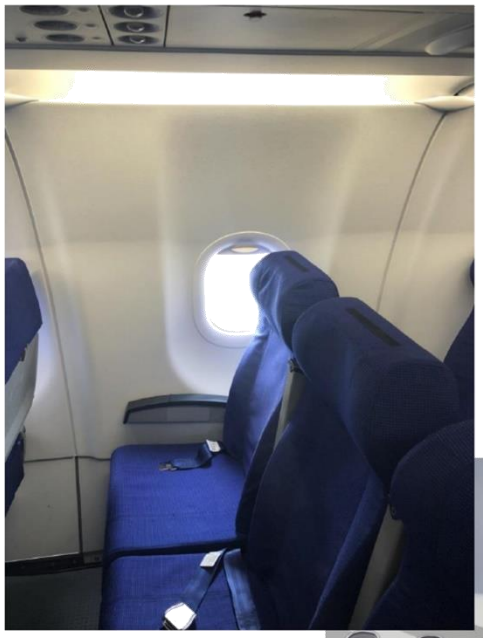


QUICK DIACTIVATED DOOR, PRINCIPLE (DOOR PLUG)

DOOR DEACTIVATION

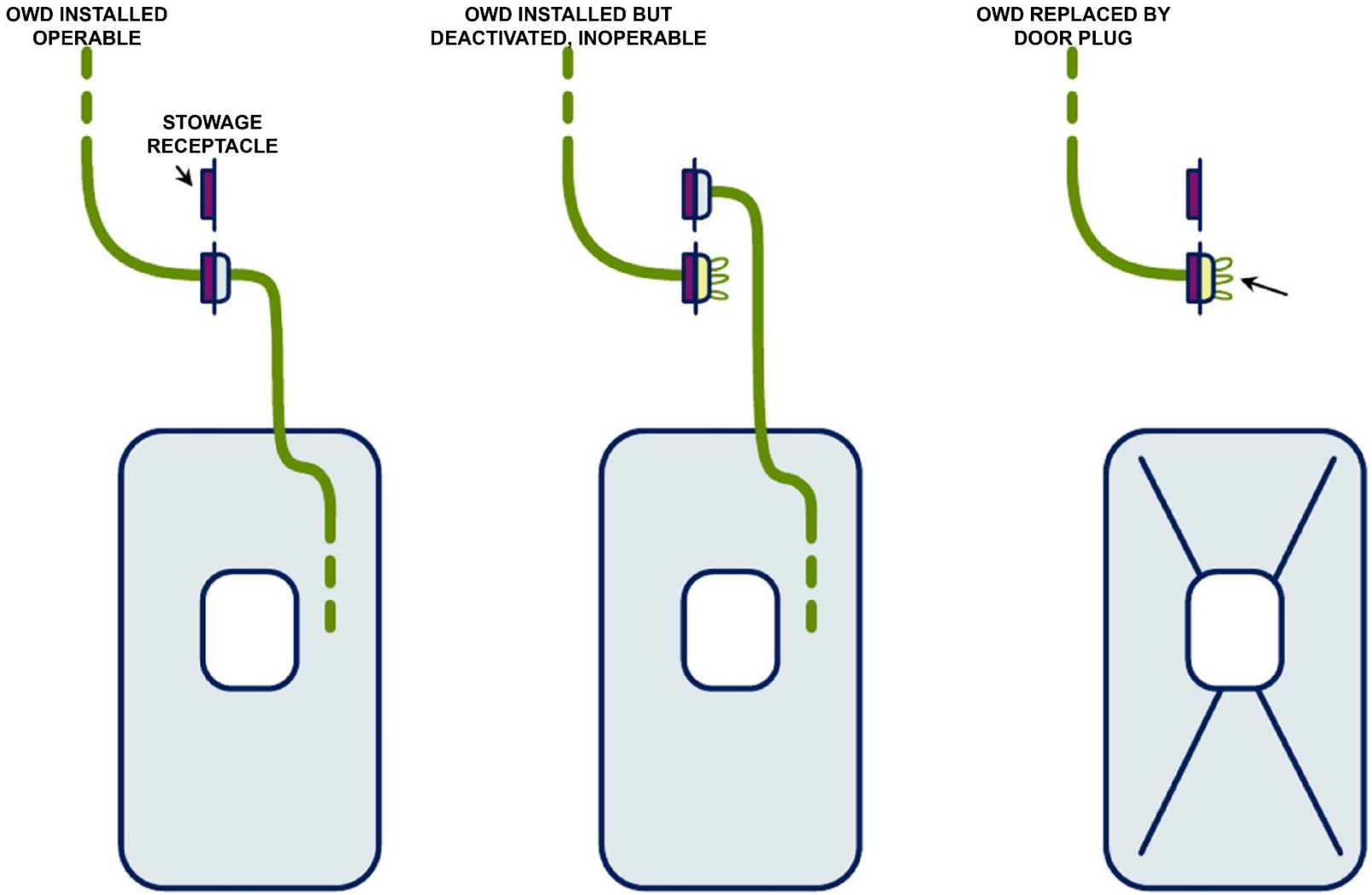
Electrical monitoring system principle for door activation, de-activation or plugged.

OWD PLUG



DOOR 3 PLUG

INTENTIONALLY BLANK


OWD INSTALLED
OPERABLE
STOWAGE
RECEPTACLE
OWD INSTALLED BUT
DEACTIVATED, INOPERABLE
OWD REPLACED BY
DOOR PLUG

INTENTIONALLY BLANK