A330-200
TECHNICAL TRAINING MANUAL

MECHANICS / ELECTRICS & AVIONICS COURSE

52 DOORS

GE Metric

For Training Purposes Only
Issued By SPL/GK March 2006

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Under no circumstances
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DOORS GENERAL PRESENTATION

General
Passenger Doors
Emergency Exits
Cargo Doors
Door And Slide Control System
Miscellaneous Doors

GENERAL

The door system consists of :

- passenger doors,
- emergency exits doors,
- cargo doors,
- door & slide control system (DSCS)
- miscellaneous doors (access doors, servicing doors, etc...)

PASSENGER DOORS

Six type "A" passenger doors allow access to the cabin for passenger boarding or cabin service access.

EMERGENCY EXITS

For crew evacuation, two sliding cockpit windows can be used as emergency exits. Two emergency exits are fitted behind the wings. Cabin emergency exits are type "A" doors, like the passenger doors.

CARGO DOORS

Three cargo doors allow access to the cargo compartments :

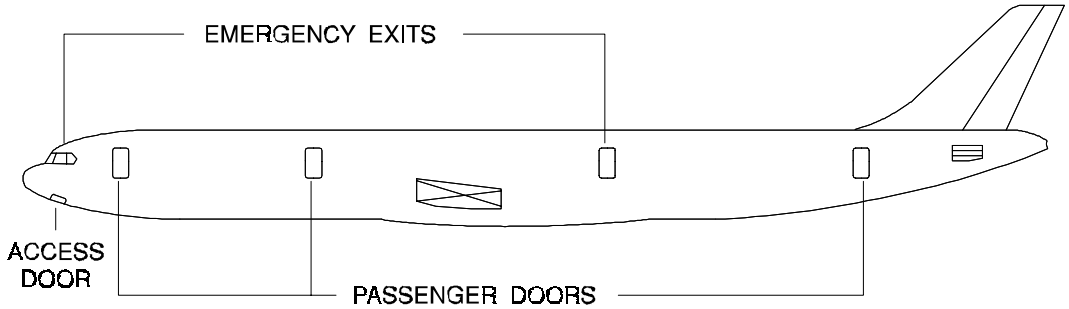
- the FWD & AFT doors are hydraulically operated,
- the bulk cargo door is manually operated.

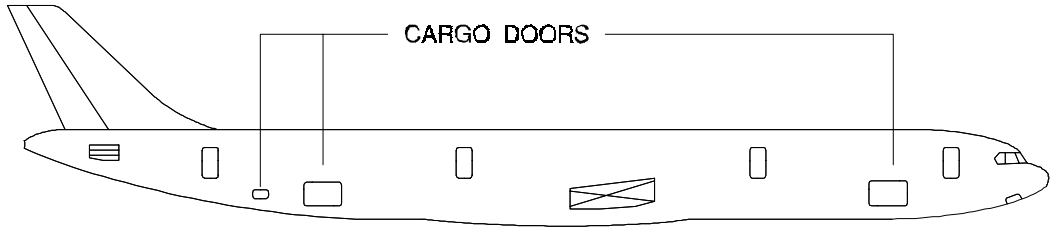
DOOR AND SLIDE CONTROL SYSTEM

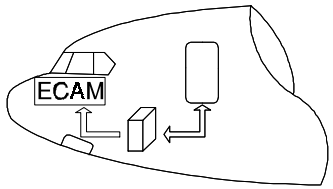
The Door & Slide Control System (DSCS) generates indications and warnings in the cockpit and on the doors themselves.

MISCELLANEOUS DOORS

Cockpit door, avionic compartment access, partition doors, access panels are also covered in this subsystem.







DOOR AND SLIDE CONTROL SYSTEM

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STUDENT NOTES

ECAM PAGE PRESENTATION

Door Symbol
Door Indication
Slide Indication

DOOR SYMBOL

The door symbol can have three states :

-  : door closed, green.
-  : door not closed, amber.
-  : information not available (amber) .

DOOR INDICATION

The door indication can have three states :

-  : door not closed, amber.
-  : open/closed information not available, white.
-  : suppressed when door is closed.

SLIDE INDICATION

The slide indication can have four states :

-  : door slide is armed, white.
-  : door slide is disarmed and door not closed, amber.
-  : nothing is displayed when door slide

is disarmed and door is closed,

-  : door slide information not available (amber) .

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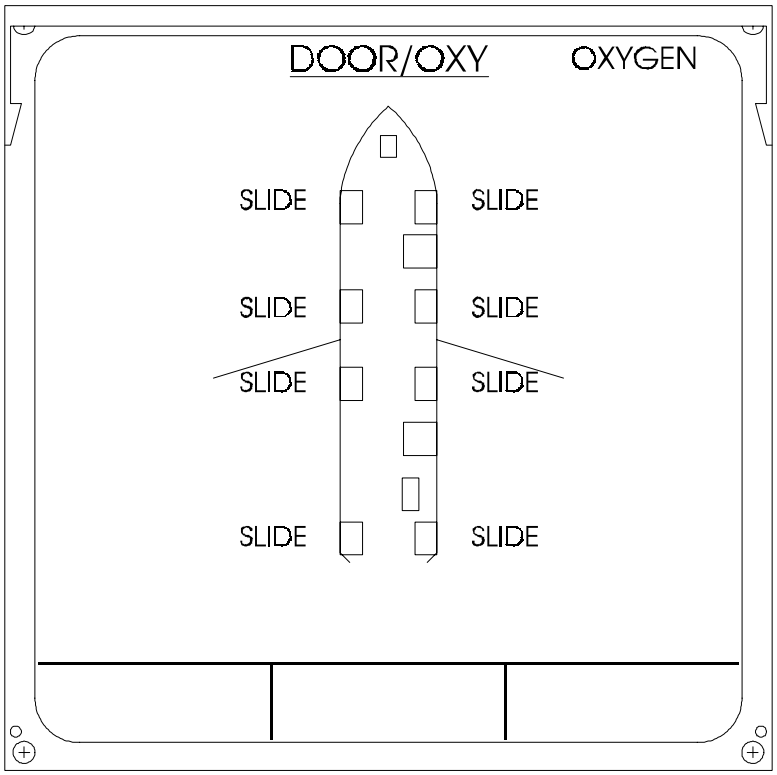

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STUDENT NOTES

PASSENGER DOOR PRESENTATION

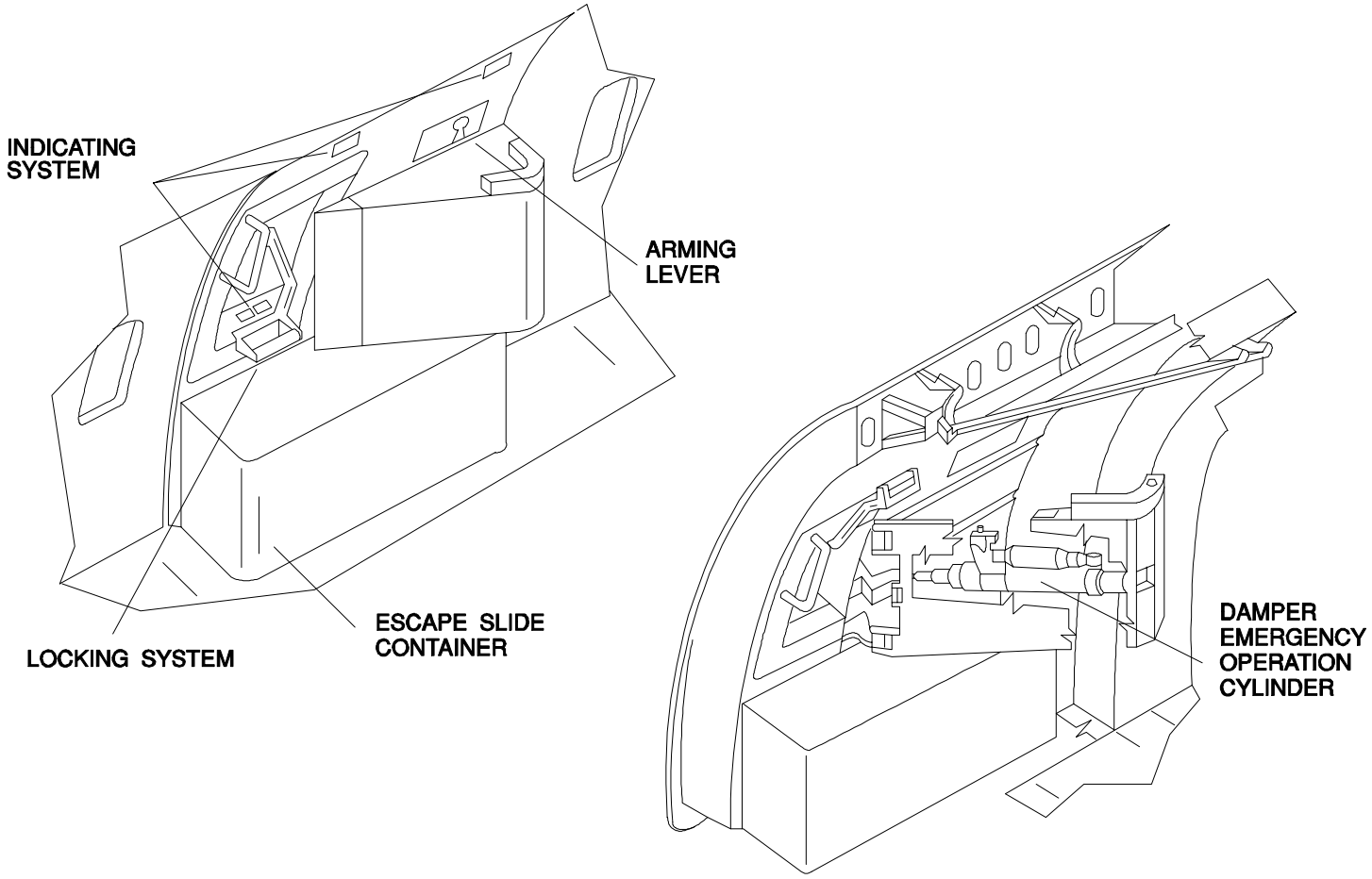
General
Structure
Attachments
Locking System
Emergency
Indicating

GENERAL

The passenger/crew doors are of a failsafe plug type construction. They open outwards and forward, parallel to the fuselage.

The various items covered are :

- structure,
- attachments,
- locking system,
- emergency system,
- indicating.



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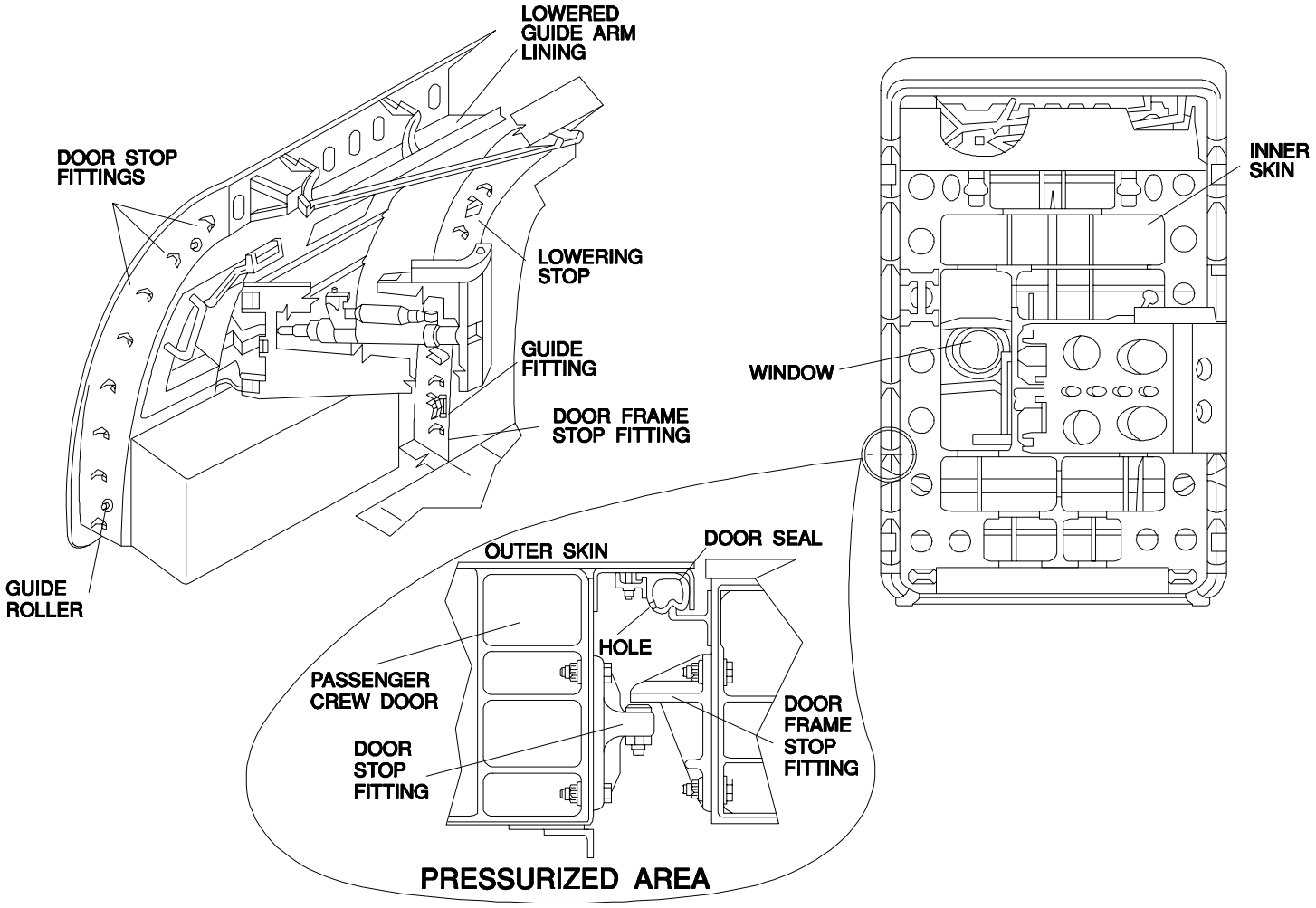
STRUCTURE

Each side edge of the door is fitted with adjustable door stop fittings and guide rollers. A viewing prism window equipped with window shade allows the inside mounted cabin pressure warning light to be seen.
The door seal around the door is inflated through holes when the cabin pressure is available.



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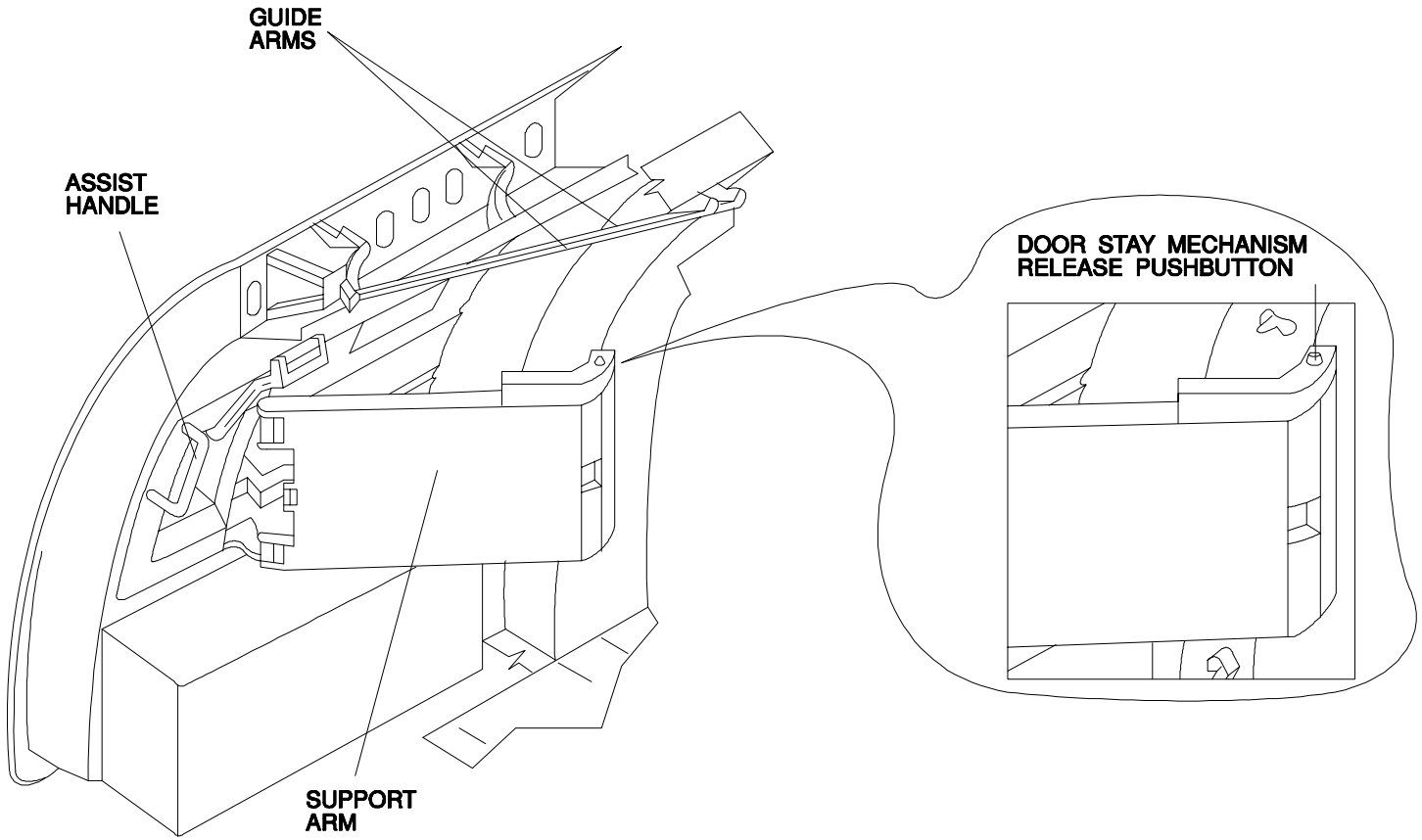
ATTACHMENTS

The door load is supported by the support arm. Two guide arms maintain the door parallel to the fuselage.
To prevent the door from moving when in the fully opened position, the door stay mechanism locks the door.
It is released by a pushbutton fitted on the support arm.



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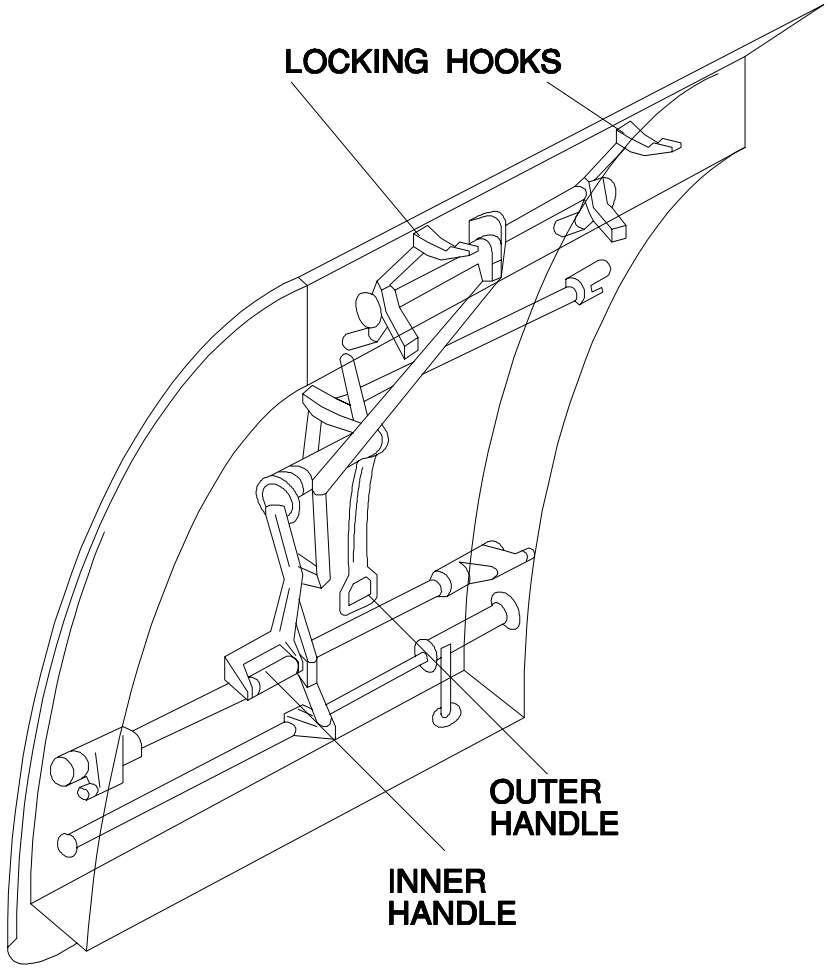
LOCKING SYSTEM

Door locking/unlocking is initiated either from the inner handle or outer handle. Both handles operate a mechanical linkage to assist all the door movements : lowering, lifting and outward opening.
The locking is provided by two locking hooks located on the upper edge.



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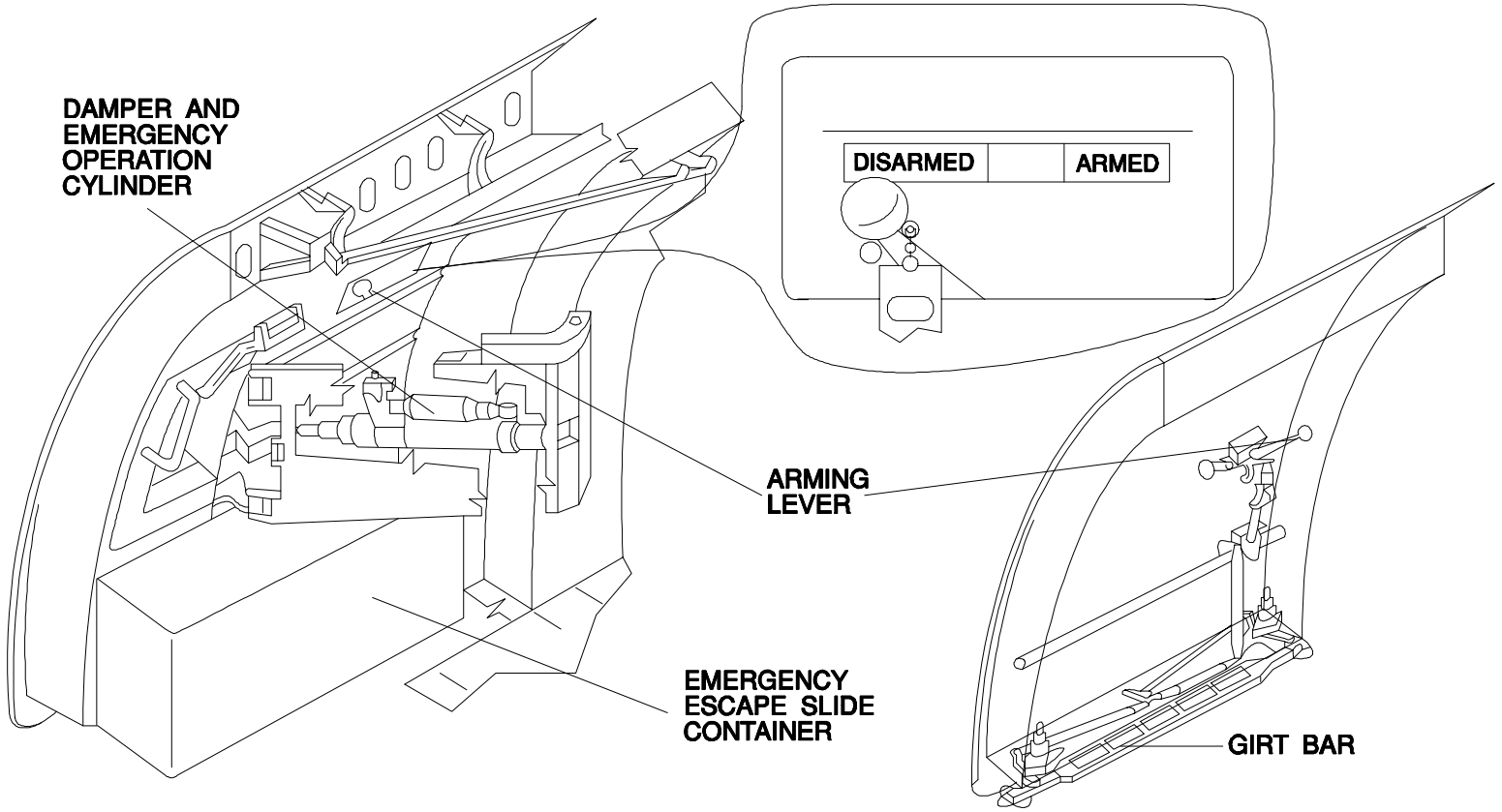
EMERGENCY

The emergency system consists of an arming lever controlling the girt bar, a damper and emergency operation cylinder, and an escape slide/raft. The escape slide/raft is packed in a container fitted at the bottom of the door.
In "DISARMED" mode, the mechanical linkage secures the girt bar to the door.
The damper & emergency operation cylinder dampens the door movement.
In "ARMED" mode, the arming mechanical linkage fixes the girt bar to the structure in order to deploy the escape slide/raft during opening.
When in "ARMED" mode, the damper & emergency operation cylinder is powered by a gas bottle.
This cylinder opens the door automatically when the handle is raised to allow escape slide/raft deployment.



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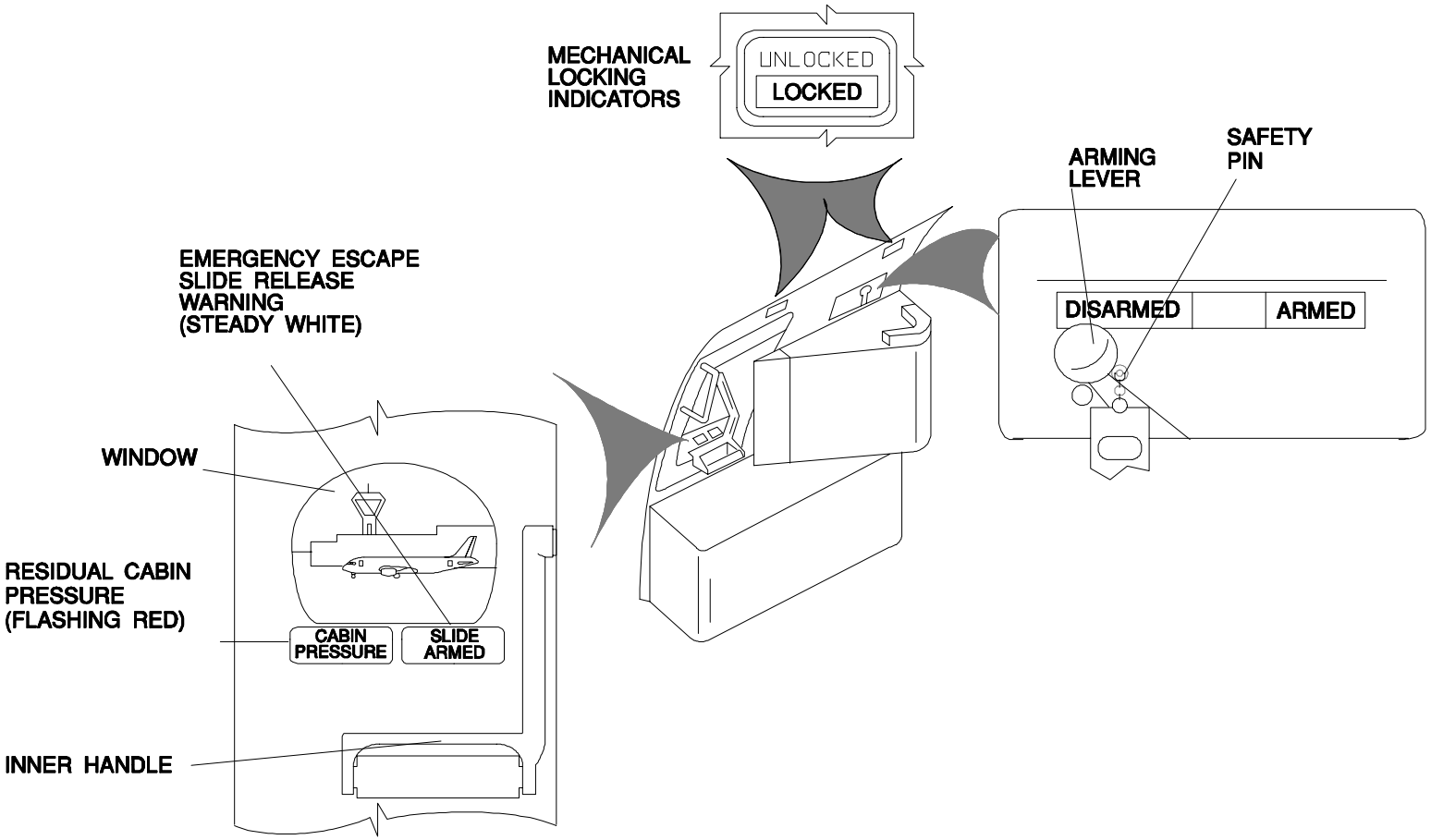
INDICATING

The door is fitted with two mechanical indicators to show its "LOCKED" (green) or "UNLOCKED" (red) condition. The arming lever modes (ARMED or DISARMED) are shown on the background of the lever.
The lever is secured in the "DISARMED" position by a safety pin.
Two interior warning lights are located below the window :
- the white light indicates the ARMED configuration of the evacuation system,
- the red flashing light warns the operator that the cabin is still pressurized.



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STUDENT NOTES:

PASSENGER/CREW DOOR LOCKING MECHANISM DESCRIPTION/OPERATION

General
Handles Operation
Lowering
Lifting
Locking
Stay Mechanism

GENERAL

The main functions of the locking system are :

- handle operation,
- door lowering,
- door lifting,
- door locking,
- door stay mechanism.

HANDLES OPERATION

The inner and outer handles operate the locking mechanism via a gear box. The gear box makes sure that the outer handle does not move when the inner handle is operated.

LOWERING

The lowering shaft acts on a safety cam to block the gear box.

As soon as the door is no longer in contact with the door frame, the lowering shaft rotates the safety cam to lock the gear box and thus prohibit handle operation.

LIFTING

The lifting shaft enables the door to be lifted clear of the stop fittings.
The torque shaft and torsion bar spring compensate the weight of the door.

LOCKING

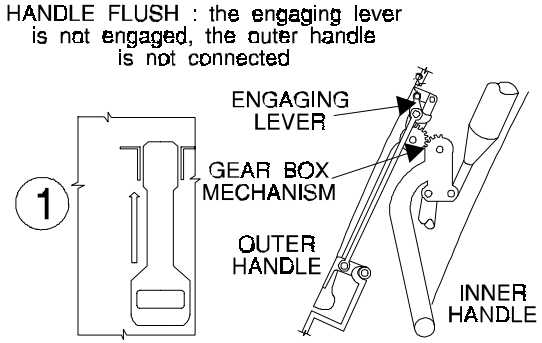
The locking shaft keeps the passenger door in the closed position with two locking hooks.
Each crank lever has a mechanical visual indicator.

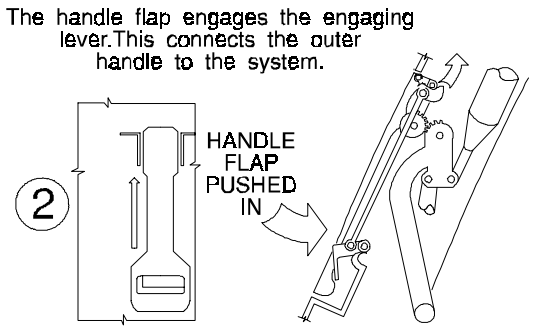
When the passenger door is locked, two springs hold the locking shaft in an overcenter position.

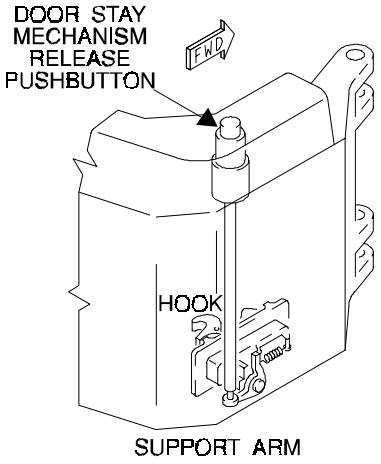
STAY MECHANISM

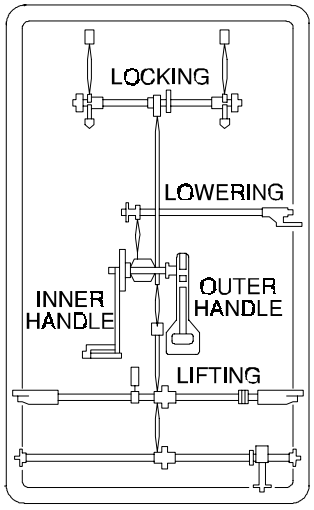
The door stay mechanism is installed in the support arm.
It has a hook which holds the door in position when it is fully opened.

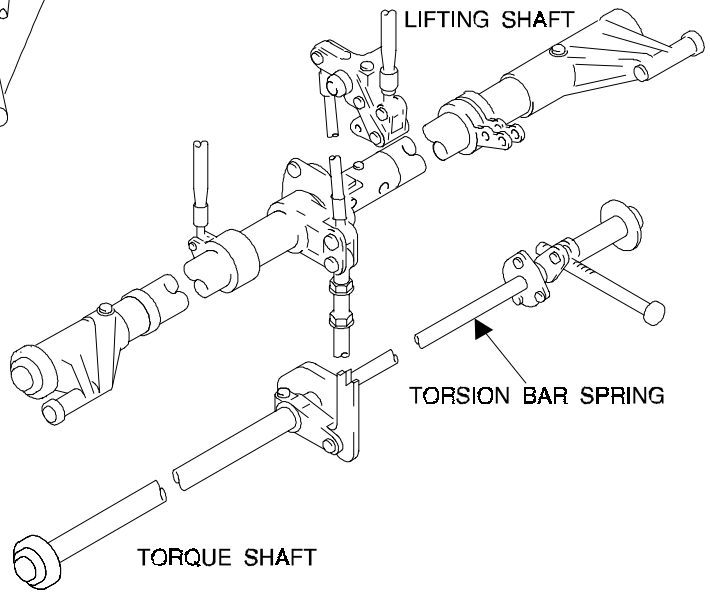
All the support arms are interchangeable.
Depending on the side the support arm is installed (RH or LH), the door stay mechanism position is handed.

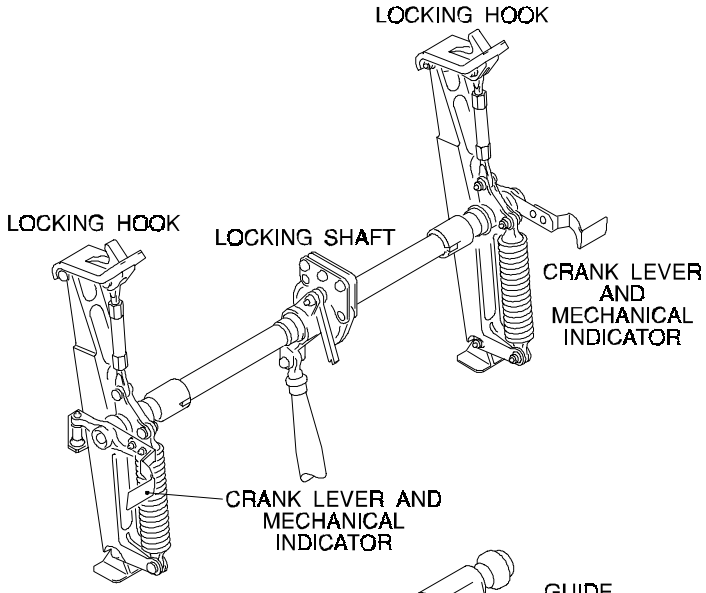


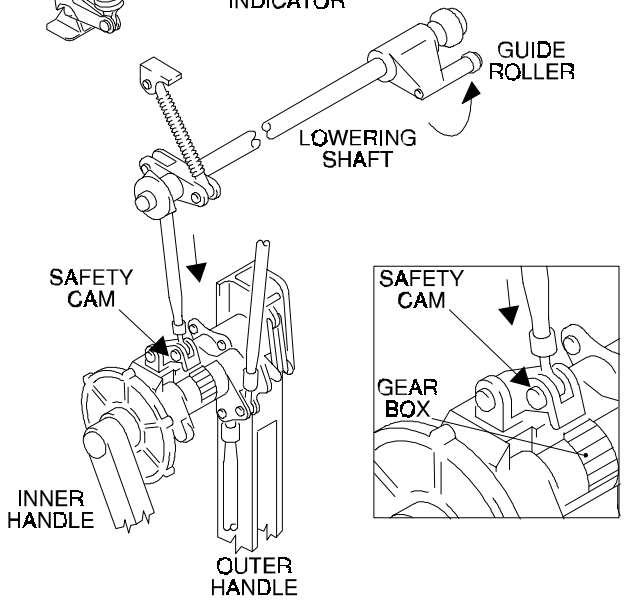












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STUDENT NOTES

ESCAPE FACILITY RELEASE MECHANISM DESCRIPTION OPERATION

General
Safety Pin
Outside Disarming
Cylinder Arming
Girt Bar

GENERAL

The main functions of the escape facility release mechanism are :

- arming lever safety pin,
- outside disarming,
- cylinder arming,
- girt bar operation.

SAFETY PIN

The safety pin keeps the arming lever in the DISARMED position.
The arming lever can be locked by the pin when in DISARMED position only.
In ARMED mode, the lever cannot be locked to allow outside opening.
Thus the safety pin must be stowed on the support arm.

OUTSIDE DISARMING

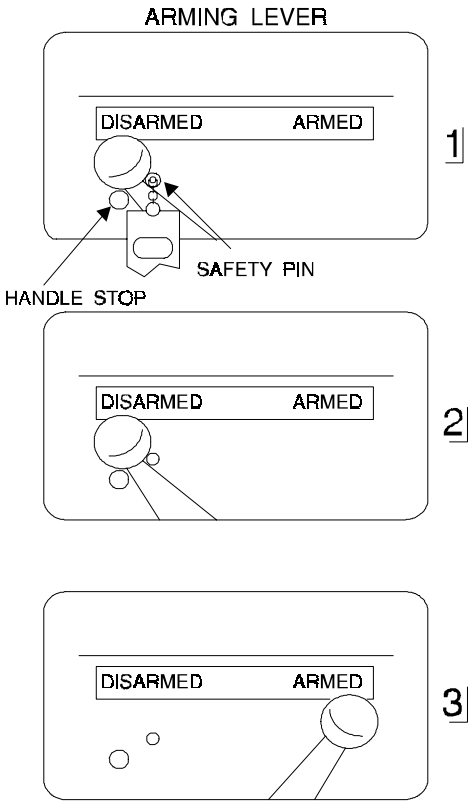
Outside opening disarms the arming lever.
The cam, linked to the outer handle through the jaw, moves the arming lever to the DISARMED position.
The inner handle slides in the cam disk, and doesn't affect the arming lever position.

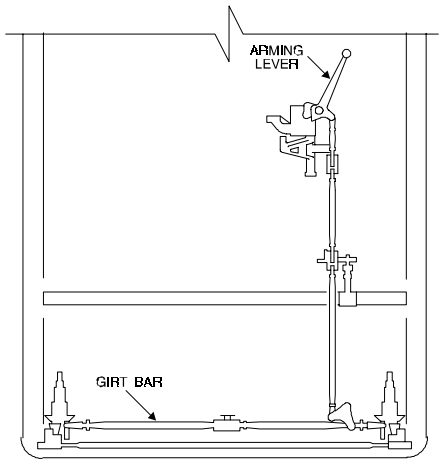
CYLINDER ARMING

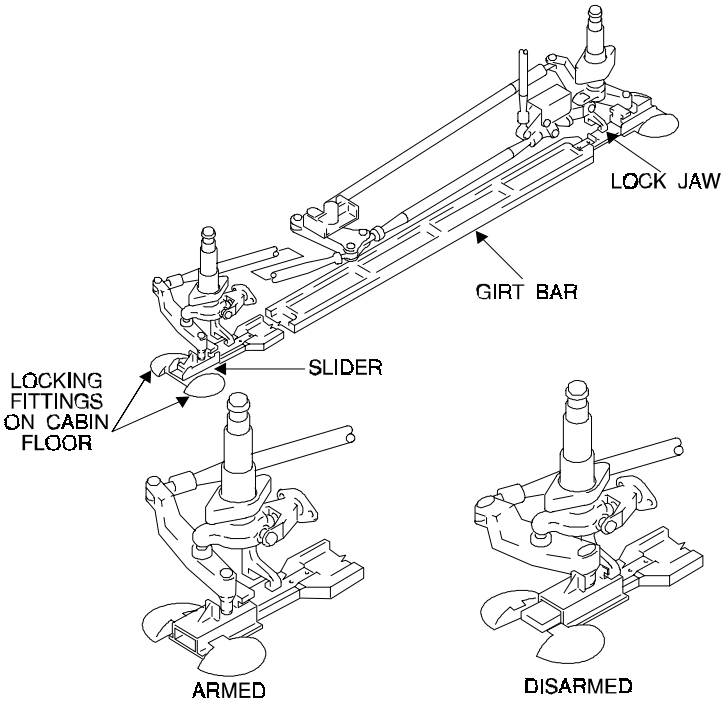
When ARMED, the stop lever is positioned underneath the percussion mechanism of the emergency operation cylinder.

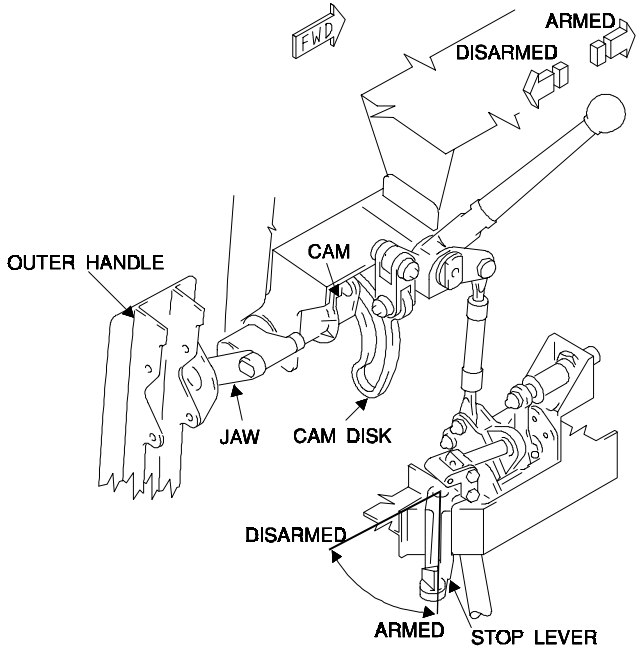
GIRT BAR

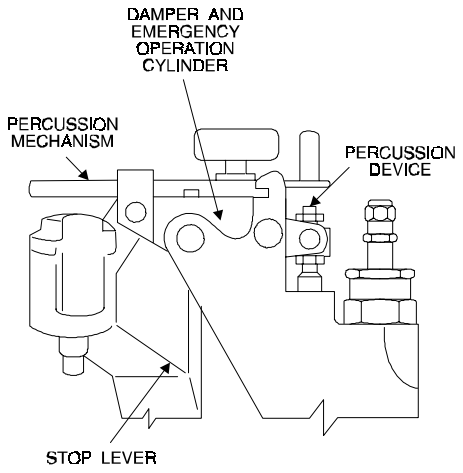
There is a slider on each end of the girt bar.
ARMED : the sliders lock the girt bar to the locking fittings.
DISARMED : the lock jaws hold the sliders to the door.











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STUDENT NOTES:

PASSENGER/CREW DOOR CYLINDER - D/O - DEACTIVATION/ACTIVATION

General
Description
Damping
Emergency Operation
POS. 1
POS. 2
POS. 3
POS. 4

GENERAL

The damper and emergency operation cylinder is attached to the support arm.

NORMAL OPERATION : (DISARMED)
The damper and emergency operation cylinder works as a damper and controls the door moving speed.
EMERGENCY OPERATION : (ARMED)
The cylinder helps to open the door.

DESCRIPTION

The primary components are :
- an operating rod,
- a hydraulic damping system,
- a percussion mechanism,
- a charging valve,
- a gas cylinder,
- a CIDS connector,
- a pressure gage,
- a shear pin.

DAMPING

The damping operation is performed by hydraulic fluid and restrictors inside the actuator.
They limit the door speed in normal opening and closing.

EMERGENGY OPERATION

In "ARMED" mode, the stop lever is underneath the release lever.

As soon as the door lifts during opening, the stop lever activates the percussion mechanism.
It causes the gas cylinder to discharge in the actuator.

POS. 1

The release lever can be manually moved in various positions.
Position 1 is the normal flight position.

The shear pin provides a resistance for the percussion mechanism.
It must be replaced after percussion.
The knurled screw is safety wired to prevent inadvertent unscrewing.

POS. 2

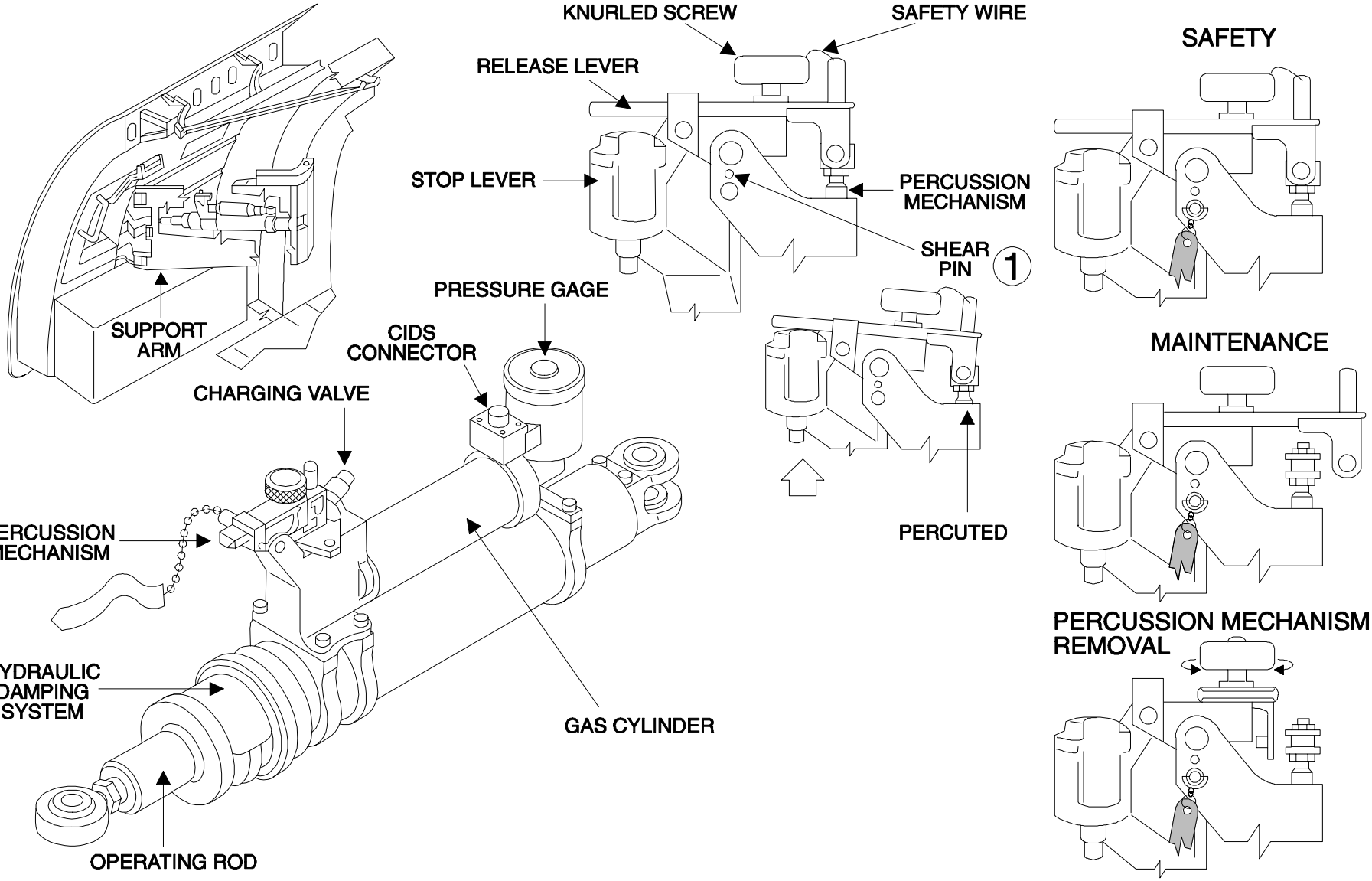
Safety position 2, with the safety pin, inhibits the striking of the percussion mechanism.

POS. 3

Maintenance position 3 allows door opening in armed position without striking the percussion mechanism.

POS. 4

Position 4 is used to give access to the percussion mechanism by turning the release lever through 90 degrees.



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STUDENT NOTES:

EMERGENCY EXIT PRESENTATION

General
Structure
Attachments
Locking System
Emergency
Indicating

GENERAL

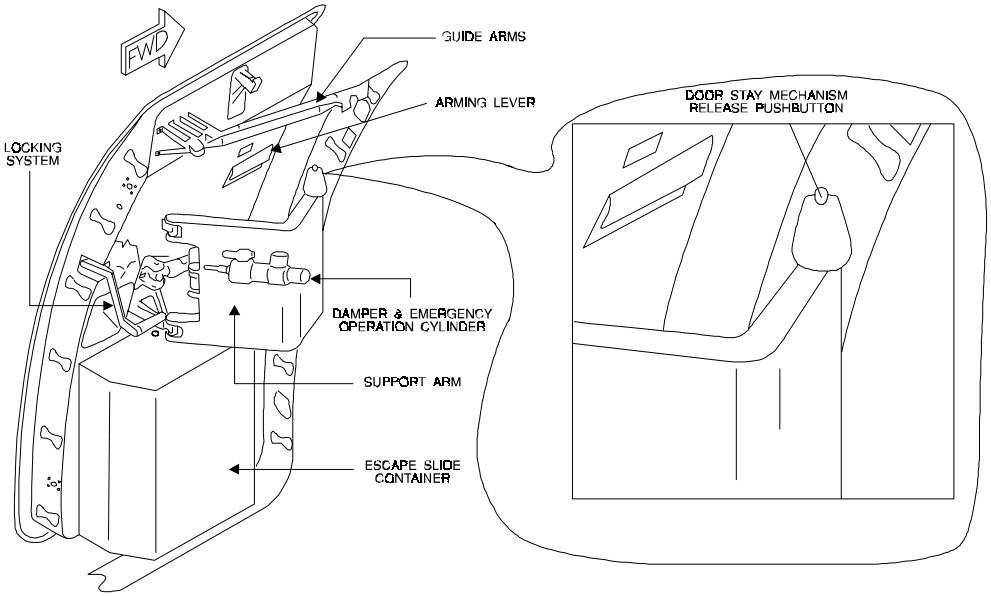
The type 1 doors are similar to the type A doors in function but not in design. They are also smaller, but are still equipped with an escape slide/raft and a damper & emergency operation cylinder.

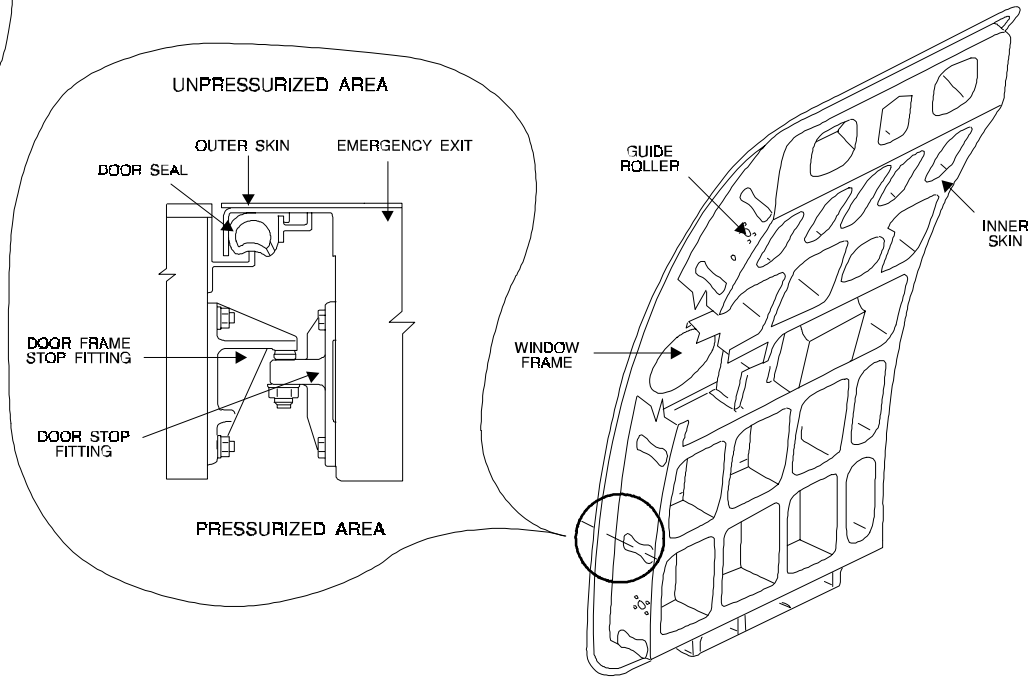
STRUCTURE

Same construction as type A with adjustable stops and guide rollers.

ATTACHMENTS

Identical to type A doors.





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LOCKING SYSTEM

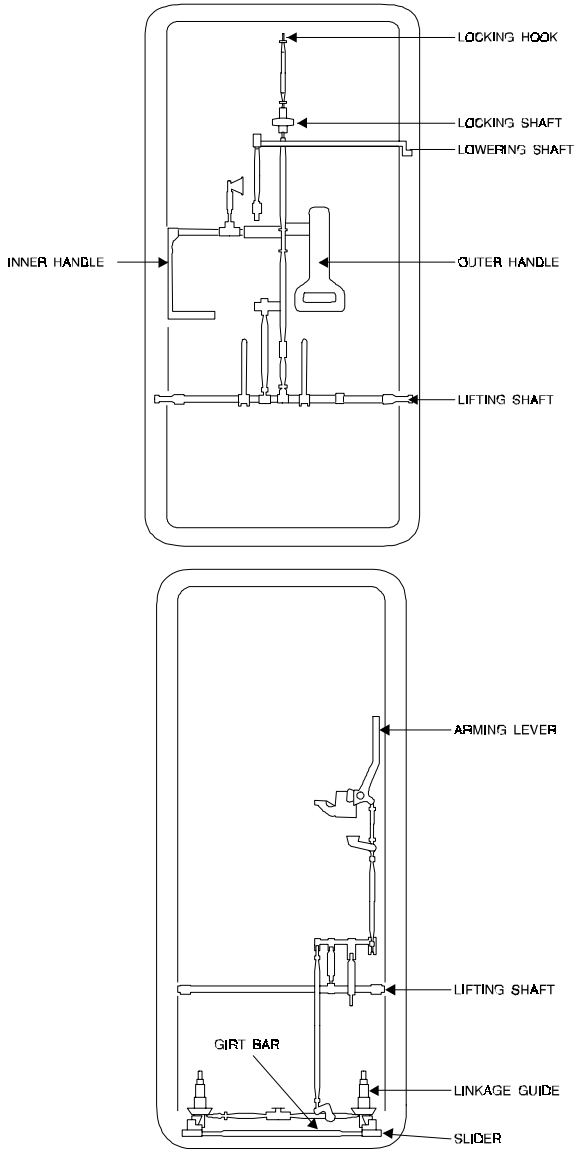
Same type of mechanical linkage but with only one locking hook.

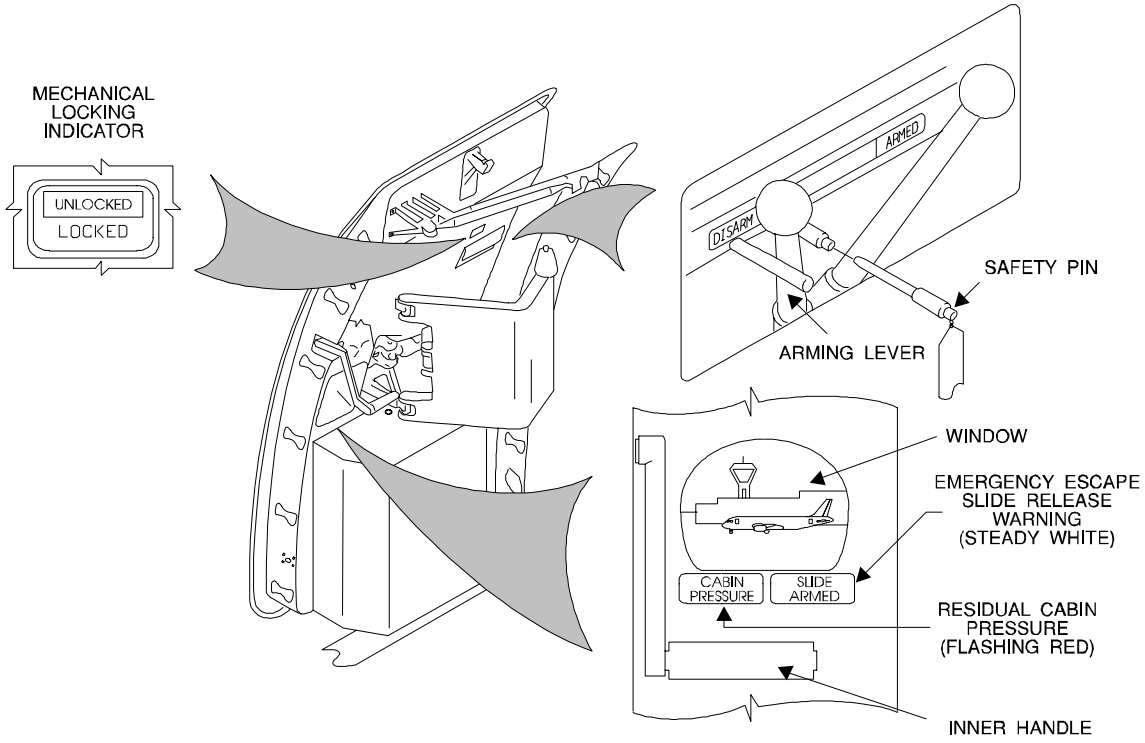
EMERGENCY

An arming lever operates a girt bar via a mechanical linkage.
The damper & emergency operation cylinder works also as a damper in DISARMED mode or as an emergency operation cylinder in ARMED mode.

INDICATING

There is only one mechanical indicator showing the door condition.
All the other indications and warnings are similar.





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STUDENT NOTES

EMERGENCY EXITS D/O

General
Structure
Locking Shaft
Lifting Shaft
Damper
DSCS

GENERAL

As there are a few differences between type "A" and type "I" doors, we will compare a type "I" door to a type "A" door.

STRUCTURE

The structure is of the same type and construction. Only the number of stops is different : six instead of eight.

LOCKING SHAFT

The locking shaft operates one hook instead of two.

LIFTING SHAFT

The lifting shaft is no longer connected to a torque shaft for lifting movement assistance. The type "I" doors are equipped with two safety springs connected to the lifting shaft.

DAMPER

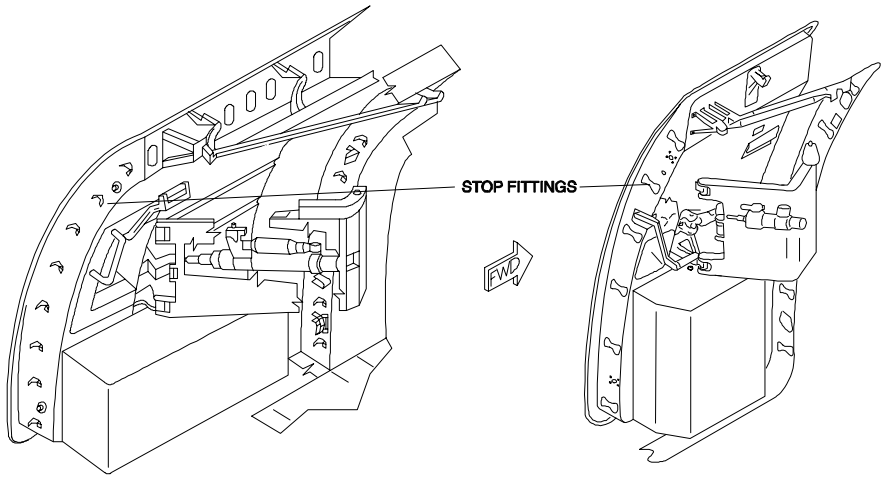
The damper and emergency cylinder is of the same design, but smaller.

DSCS

The Doors and Slides Control System design and operation are the same for both types of doors.

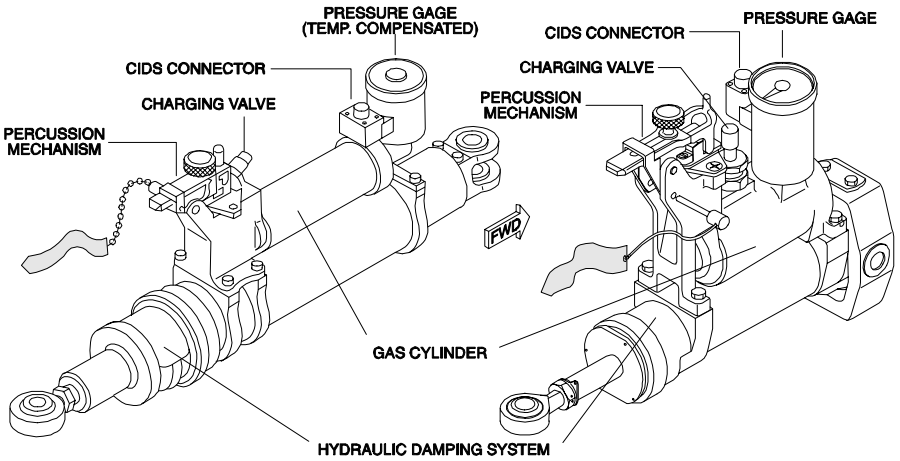
TYPE "A" DOOR

TYPE "I" DOOR



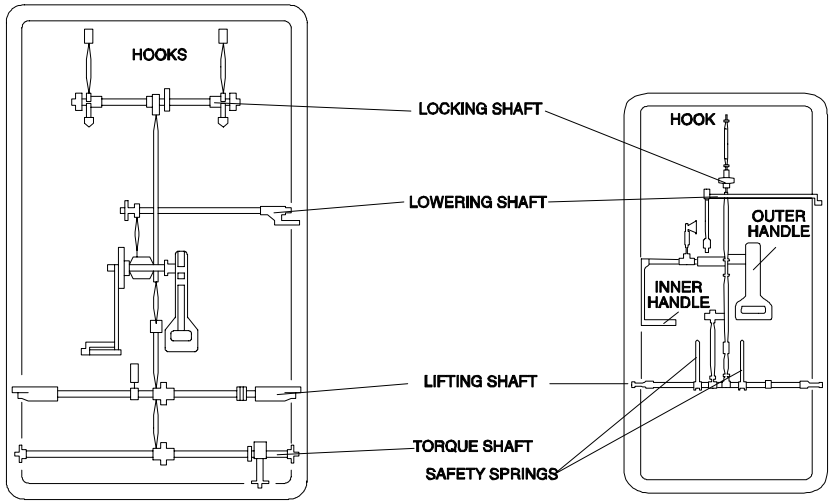
TYPE "A" DOOR

TYPE "I" DOOR



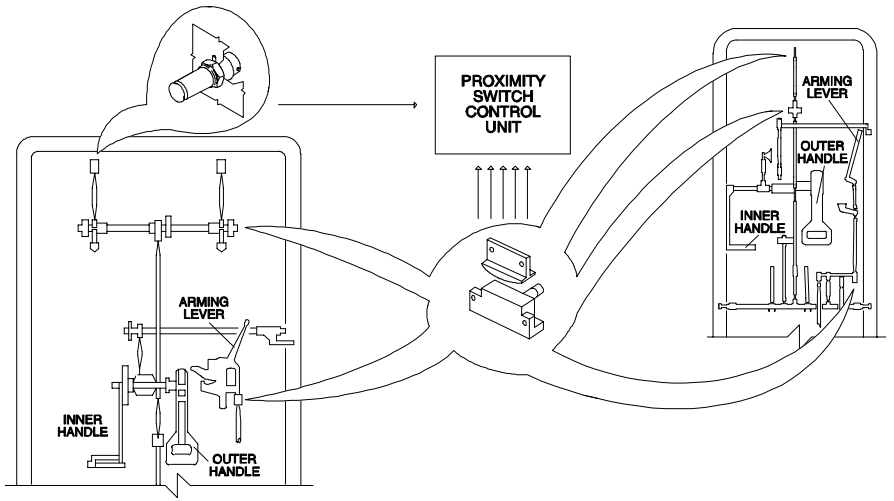
TYPE "A" DOOR

TYPE "I" DOOR



TYPE "A" DOOR

TYPE "I" DOOR



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STUDENT NOTES

FWD & AFT CARGO DOOR PRESENTATION

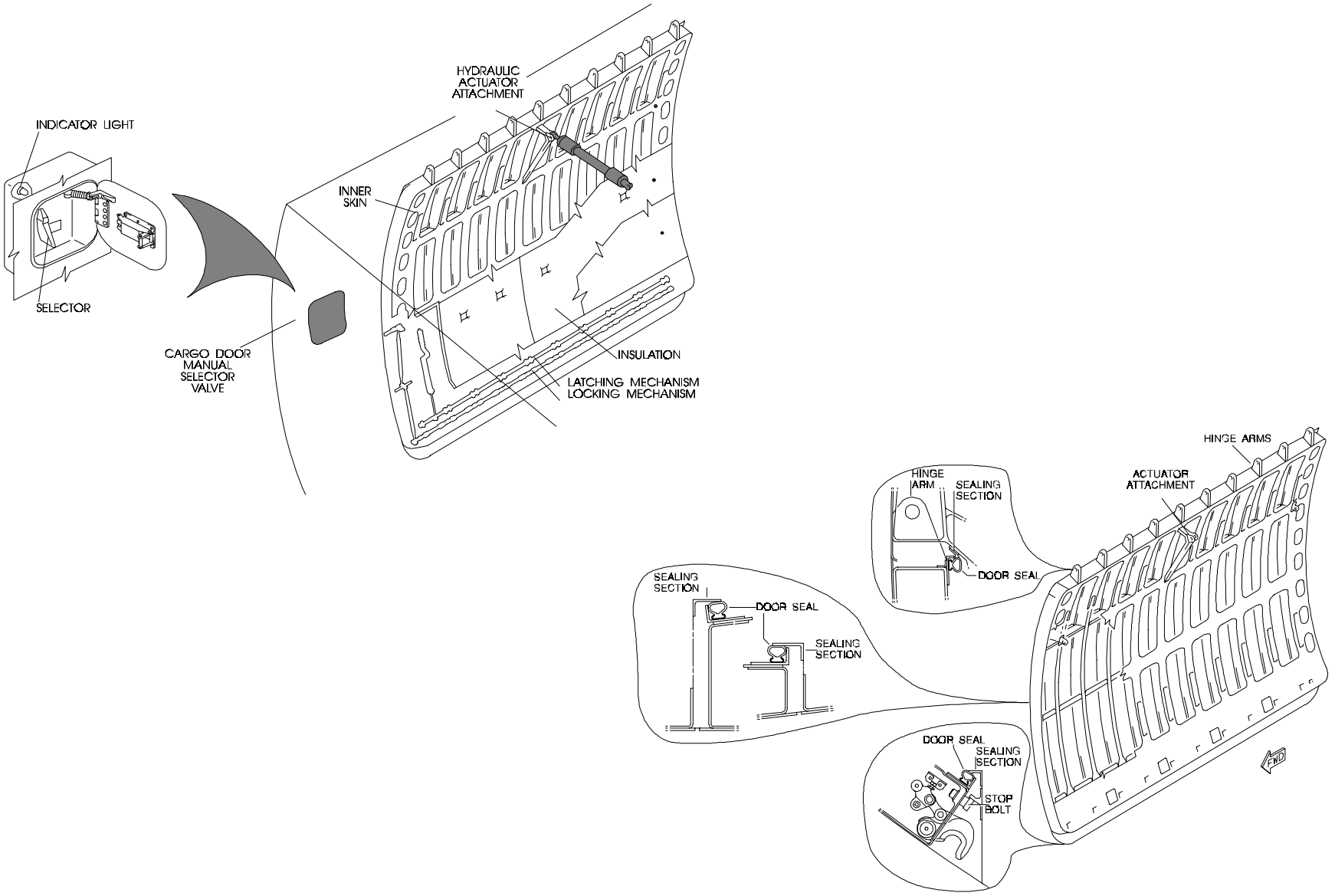
General
Structure
Locking and Latching
Locking
Latching
Hydraulic Operation
Indicating

GENERAL

The forward and AFT cargo doors open outwards and upwards from the fuselage. They are manually locked and unlocked but hydraulically operated.

STRUCTURE

On the top, the door is fixed on the hinge by ten hinge arms. At the bottom, the door is locked on the sill by ten hooks. The door seal around the door is inflated through holes when pressurization is available.



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LOCKING AND LATCHING

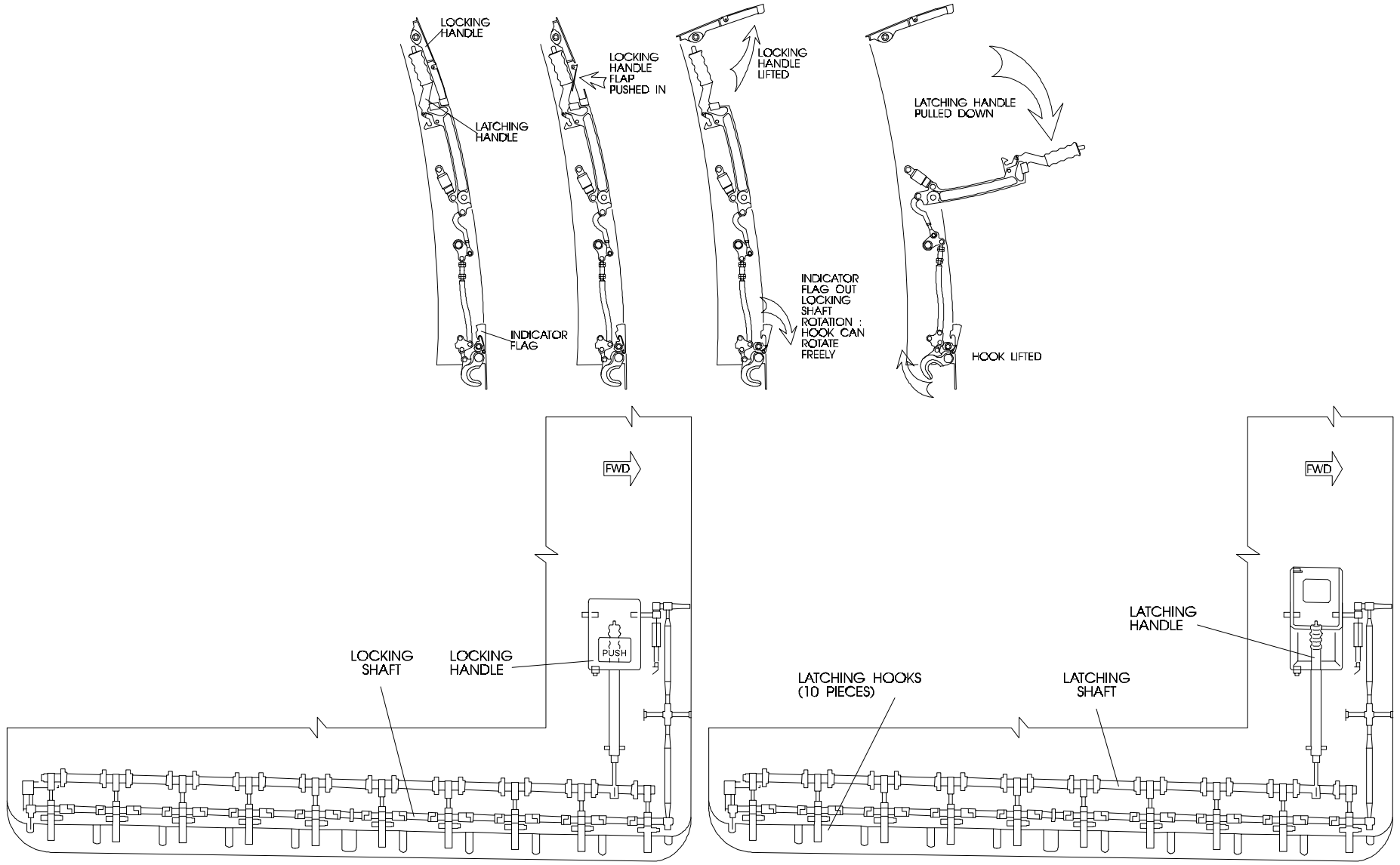
The door is also equipped with a locking handle, a latching handle and individual locking indicators for each hook. The latching handle operates the hooks which secure the door to the door frame. The locking handle provides safety by securing the hooks in the latched position.

LOCKING

The locking handle is a flapper door which gives access to the latching handle. This locking handle operates a locking shaft which secures the latching shaft when the hooks are closed.

LATCHING

The latching handle drives the latching shaft to release or lock the hooks.



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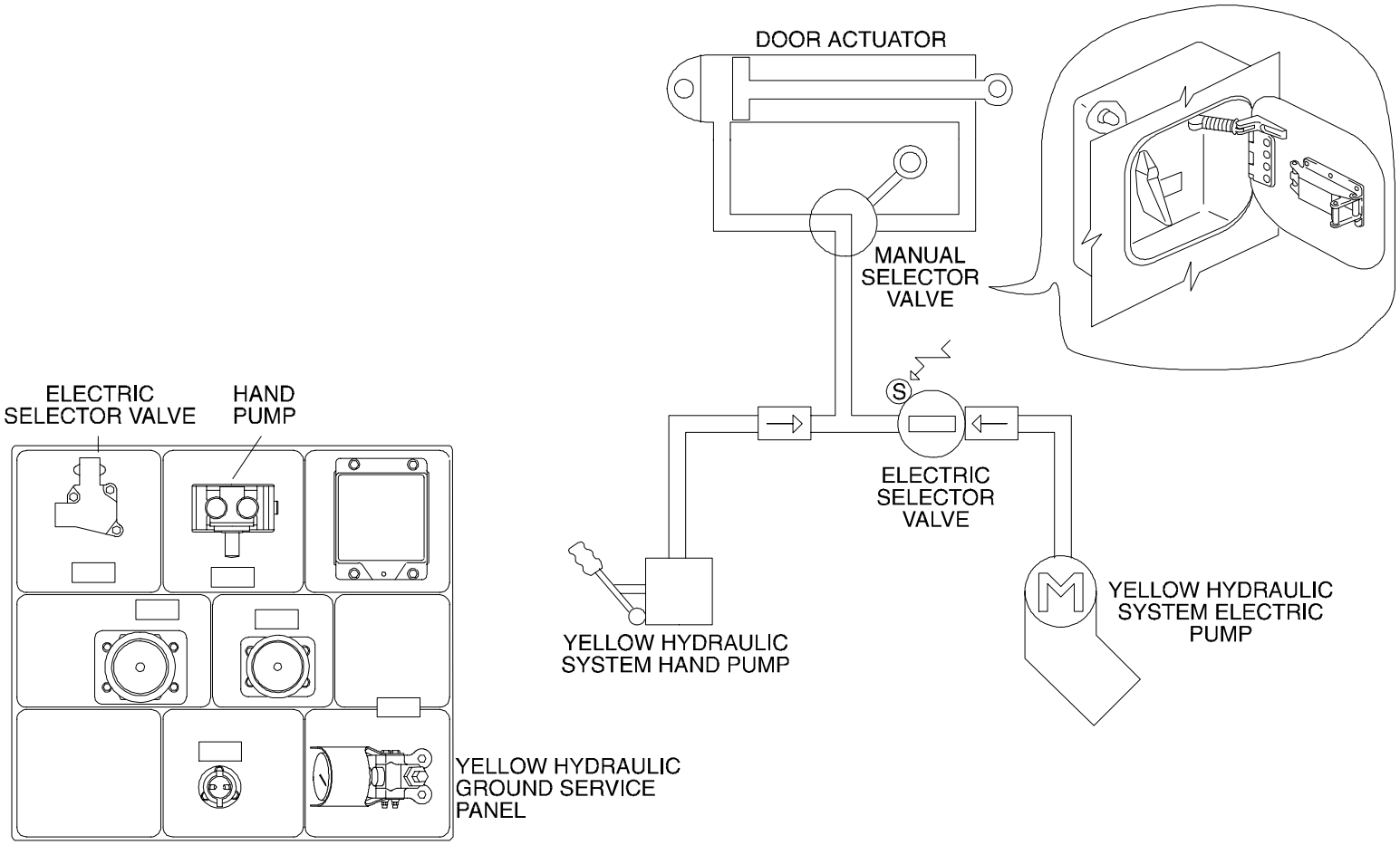
HYDRAULIC OPERATION

The cargo doors are hydraulically operated using the yellow hydraulic system. They can be operated by using either the yellow electrical pump (normal operation) or the hand pump (manual operation).
Normal operation : by turning the manual selector valve, the yellow electric pump starts and the door opens.
Manual operation : it is performed by using the hand pump instead of the yellow electric pump.



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INDICATING

DOOR CONDITION

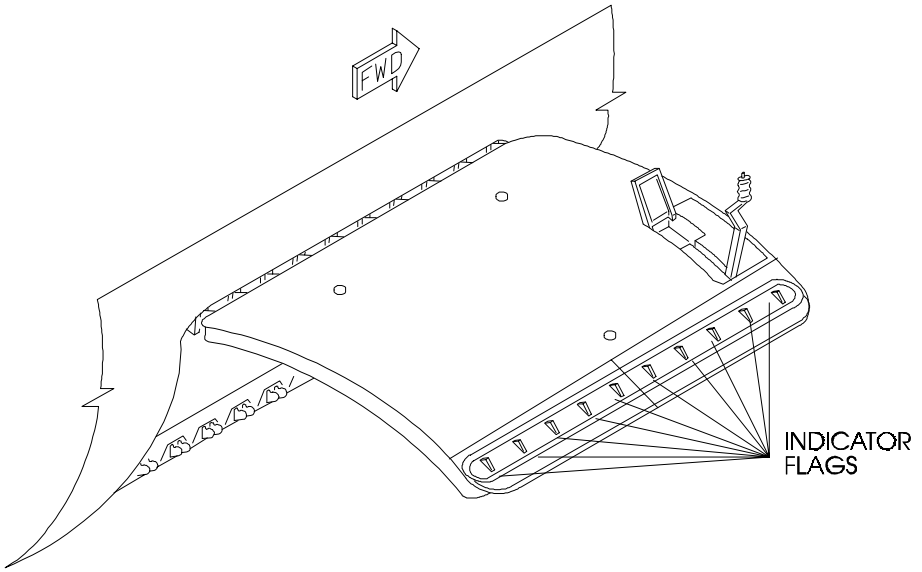
Each door is fitted with ten indicator flags showing hooks not locked.

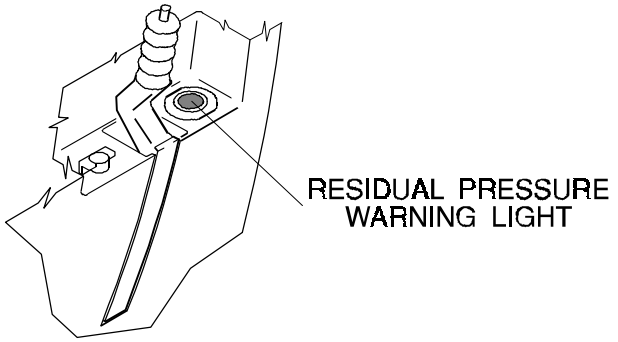
OPENED POSITION INDICATION

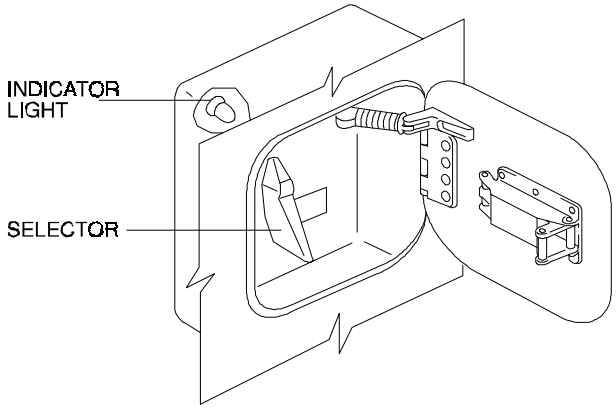
In the door manual selector valve recess, a green light comes on when the door is locked in the fully opened position to show that the cargo compartment is safe for entry and that the cargo loading system may be operated.

RESIDUAL PRESSURE

A red light flashes when there is a residual pressure in the cabin.







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STUDENT NOTES:

FORWARD AND AFT CARGO DOOR OPERATION

Cargo door opening with electric pump
Cargo door closing with electric pump
Cargo door opening with hand pump
Cargo door closing with hand pump

CARGO DOOR OPENING WITH ELECTRIC PUMP

- The forward and the aft cargo doors are identical in design and in operation; only the size is different. The two doors can be opened simultaneously.
- For each door, the sequence of operation is written on the fuselage.
- A platform is required to gain access to the door operation controls.
- Push the locking flapper in and pull the locking handle to the unlocked position.
- Stop the opening procedure if the red warning light flashes.
- Verify that all indicator flags are out.
- Make sure that the door can be opened freely.
- Release and pull the latching handle from the recess to the unlatched position.
- The door moves freely from the frame.
- Set the selector to OPEN.

The yellow electric pump runs and the door starts to open.

- When the door is up and locked, the green light comes on.

As soon as the light is on, the selector must be released.

- The electric pump continues to run for a few seconds after the selector is released.

CARGO DOOR CLOSING WITH ELECTRIC PUMP

- As for the opening, we will show the aft cargo door operation which is similar to the forward one.
- The instructions for closing are written on the fuselage.
- A platform is required because of the height of the aircraft.
- Make sure that the sill latches are up and that the door can close freely.
- Set the selector to CLOSE.

The electric pump runs and the door starts to close.

When you reach the second detent of the lever, the green light goes off.

- Release the selector when the door is in contact with the frame.
- The electric pump continues to run for a few seconds.
- Push the latching handle into the recess.

Push the locking flapper down to the locked position.

- Make sure that all indicator flags are flush with the surface of the door.
- The door closing procedure using the electric pump is completed.

CARGO DOOR OPENING WITH HAND PUMP

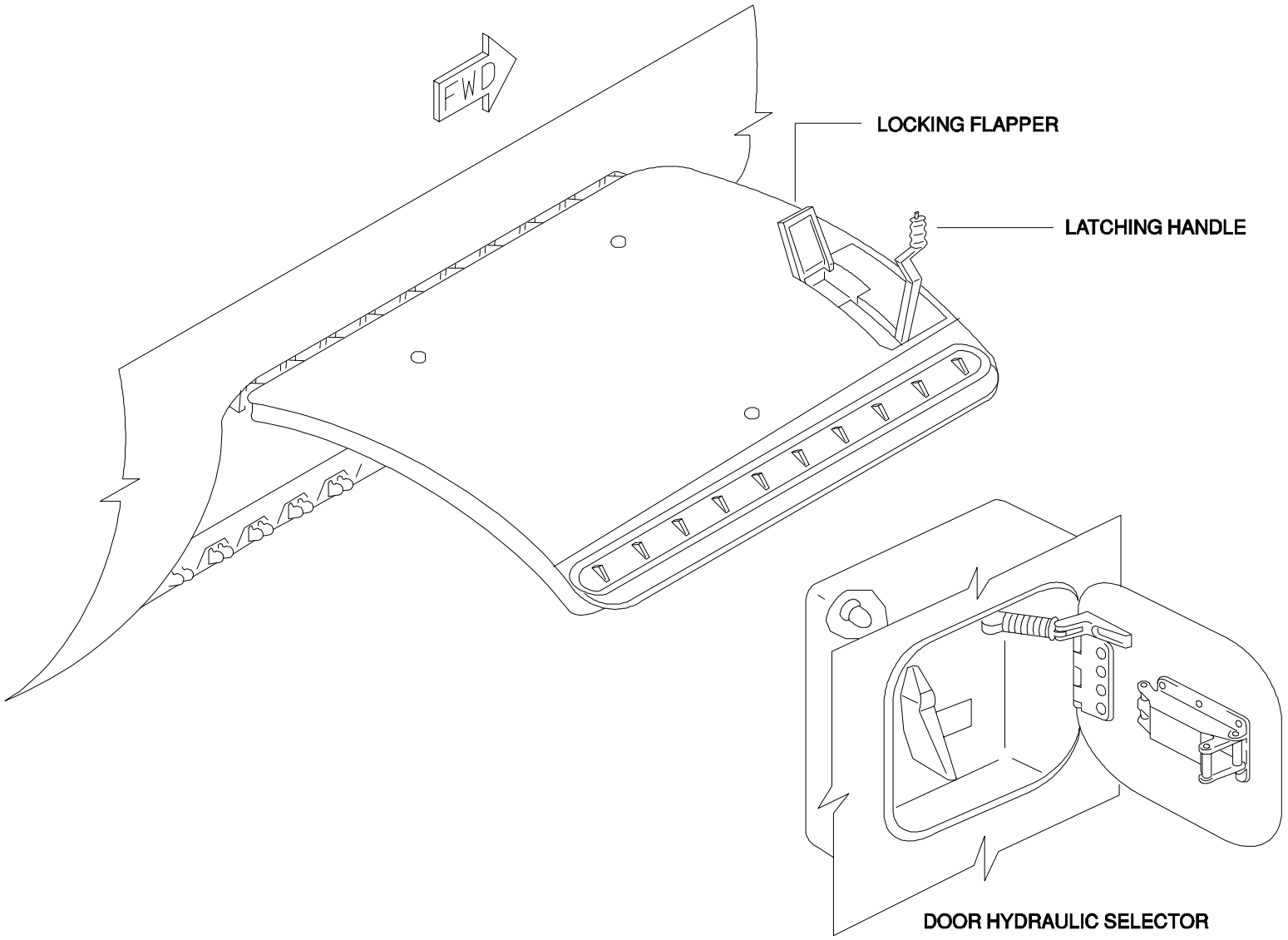
- When normal opration is not possible, the cargo doors can be operated using the hand pump fitted on the yellow hydraulic ground service panel.
- As for normal operation, we will operate the aft cargo door only, but its operation is identical to the forward one.
- Manual operation requires two operators.
- The door is unlatched and unlocked following the same sequence of operation as for normal opening.
- Take the pump handle on the green hydraulic ground service panel.
- Install the handle on the hand pump located on the yellow hydraulic ground service panel.
- On the door, operator 1 sets the selector to OPEN.
- Operator 2 starts to pump.
- The hand pump is of the double flow type.
- When the door is opened and locked, operator 1 releases the manual selector and operator 2 removes the handle and closes the access door.
- Then he restows the handle on the green hydraulic ground service panel.

CARGO DOOR CLOSING WITH HAND PUMP

- To close the cargo door using the hand pump, two operators are required.
- Connect the hand pump on the yellow hydraulic ground service panel
- On the cargo door, make sure that the sill latches are up and that the door can close freely.
- On the manual selector valve, select the CLOSE position .

The selector stops at the first detent.

- As soon as operator 2 starts to pump the selector can be moved to the second detent.
- The door starts to close.
- Release the selector when the door is in contact with the frame.
- Operator 2 can stop pumping.
- Operator 1 can thus push back the latching handle and the locking flapper down to the locked position.
- He also makes sure that all indicator flags are flush with the door.
- Operator 2 can now restow the handle on the green hydraulic ground service panel and close the access.



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STUDENT NOTES

FWD AND AFT CARGO DOORS LOCKING MECHANISM DESCRIPTION AND OPERATION

Locking Handle
Locking Mechanism
Latching Handle
Latching Mechanism
Interlock Mechanism

LOCKING HANDLE

The locking handle is spring loaded in both the open and the closed position via two gas spring units.

LOCKING MECHANISM

The locking shaft is fitted with ten safety cams, one per hook to prohibit inadvertant hook opening.
The indicator flags are also controlled via the safety cams.

LATCHING HANDLE

A catch controlled by a pushbutton safeties the handle in the fully closed position.
A gas spring unit keeps the handle in the fully open or fully closed position.

LATCHING MECHANISM

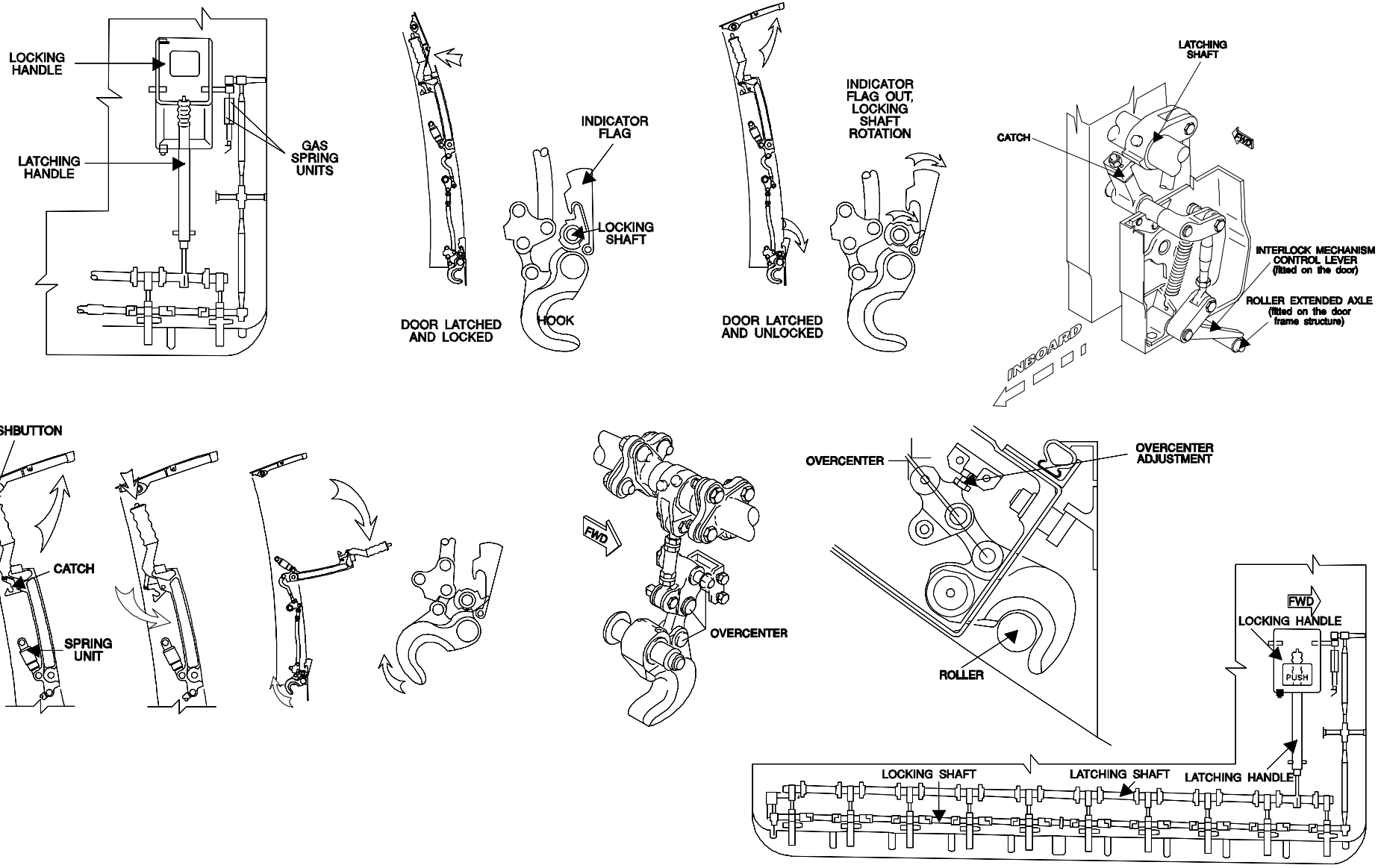
The latching shaft engages or disengages the hooks by moving the overcentering bellcranks.
When the hooks are engaged in side spool fittings on the door frame, they transmit the load from the door to the fuselage.

INTERLOCK MECHANISM

The interlock mechanism blocks the latching shaft as soon as the door is opened.
If the handle is not fully open, the proximity sensor is far and the yellow electric pump can't run.

It is located at the fifth hook ;
it consists of :

- a catch which engages in the latching shaft to prohibit the shaft rotation, thus the handle returning to the closed position.
- when the control lever comes in contact with the axle, it frees the catch, thus the handles.



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STUDENT NOTES:

FWD AND AFT CARGO DOORS HYDRAULIC SYSTEM - DESCRIPTION AND OPERATION

General
Normal Opening
Normal Closing
Manual Operation

GENERAL

The yellow electric pump, the electric selector valve, the hand pump and the double check valve are common to both cargo doors.

NORMAL OPENING

The manual selector valve moves to the open position ; an integrated proximity sensor sends a signal to the PSCU which starts the yellow Electric pump through the Hydraulic System Monitoring Unit.
The electric selector valve is also supplied to allow the hydraulic circuit to be pressurized by the electric pump.

The actuator extends to open the door.

The green light comes on to indicate a fully opened and locked cargo door.

NORMAL CLOSING

The manual selector valve stops in the intermediate position and the pump starts.

The electric selector valve moves as for normal opening.

The door actuator is pressurized on both sides to prevent the door from falling down when the actuator unlocks.

The manual selector valve is released as soon as the blocking piston is pressurized.

The manual selector valve remains in the intermediate position until the pressure reaches 20 bars (290 psi) in the blocking piston.

The manual selector valve can move to supply the door actuator for closing.

NOTE : the door must be latched and locked within a minute to prevent re-opening due to internal leakage.

MANUAL OPERATION

When the yellow electric pump is not available, the manual selector does not energize the electric selector valve. This blocks the return line and allows the use of the hand pump.

As soon as the OPEN or CLOSE position is selected on the door operation lever, the operation is the same as for normal opening or closing, but using the hand pump.

NOTE : the hand pump is located on the yellow hydraulic ground service panel. The handle is located on the green hydraulic ground service panel.

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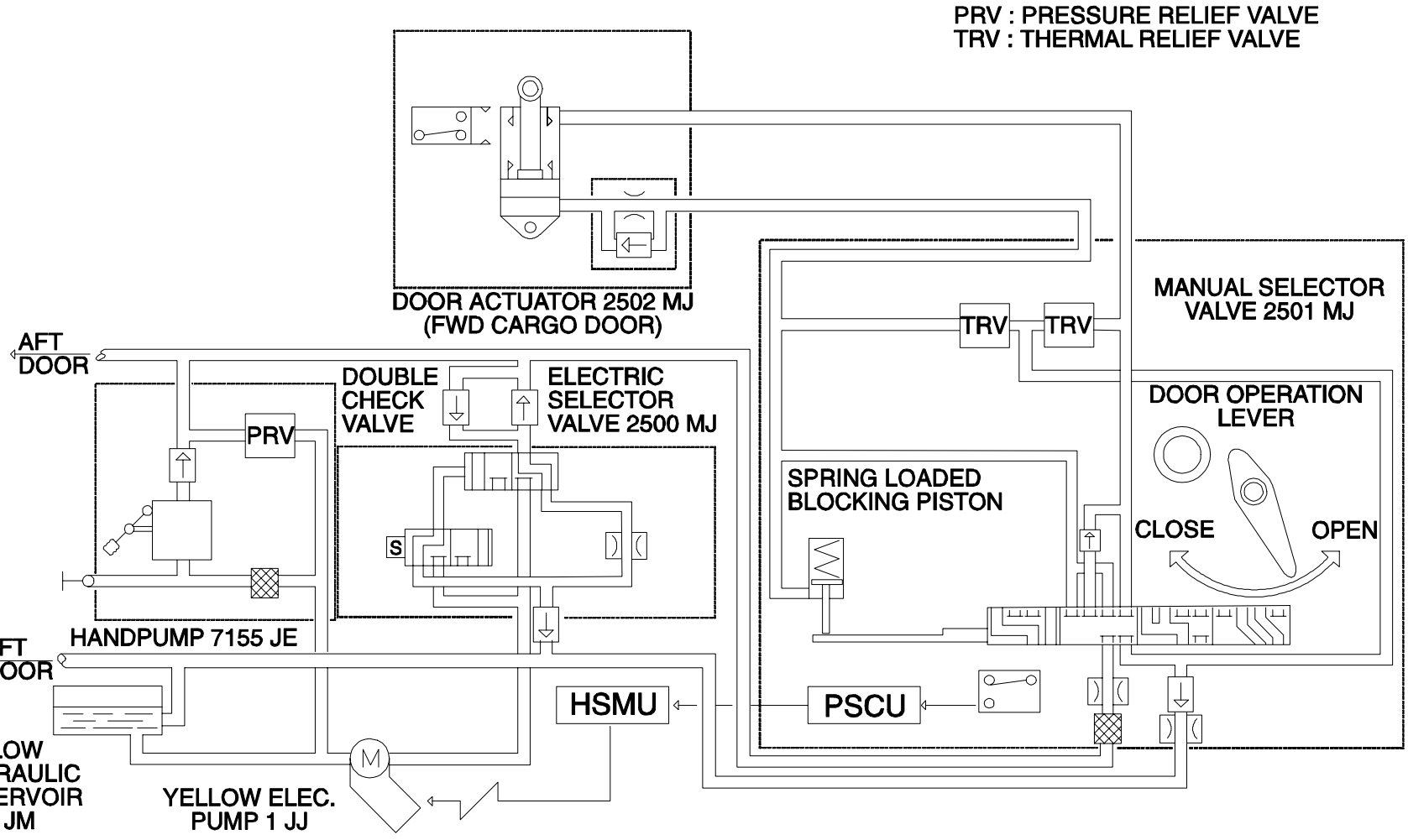

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STUDENT NOTES:

FORWARD AND AFT CARGO DOORS COMPONENTS

Safety Precautions
Manual Selector Valve
Electric Selector Valve
Double Check Valve
Hand Pump
Actuators

SAFETY PRECAUTIONS

Cargo doors must not be opened in case of wind speed greater than : 40 knots.

Aircraft must not be towed with an open door.

Any work on an hydraulic component follows the same safety precautions as defined for the hydraulic system.

STUDENT NOTES

MANUAL SELECTOR VALVE

		FWD	AFT
FIN :			
	GREEN LIGHT	58MJ	59MJ
	SELECTOR VALVE	2501MJ	2503MJ
ZONE :		821	822

COMPONENT DESCRIPTION

The valve housing includes two thermal relief valves, a filter screen, a proximity sensor which controls the electric selector valve and sends a signal to the Hydraulic System Monitoring Unit.

SAFETY PRECAUTIONS

The electrical pump runs 10 seconds after the control lever has been returned to the STOP position.

The control lever must be returned to the STOP position as soon as the door reaches the selected position to prevent hydraulic overheat.

DOUBLE CHECK VALVE

FIN : 6334MJ

ZONE : 195

COMPONENT DESCRIPTION

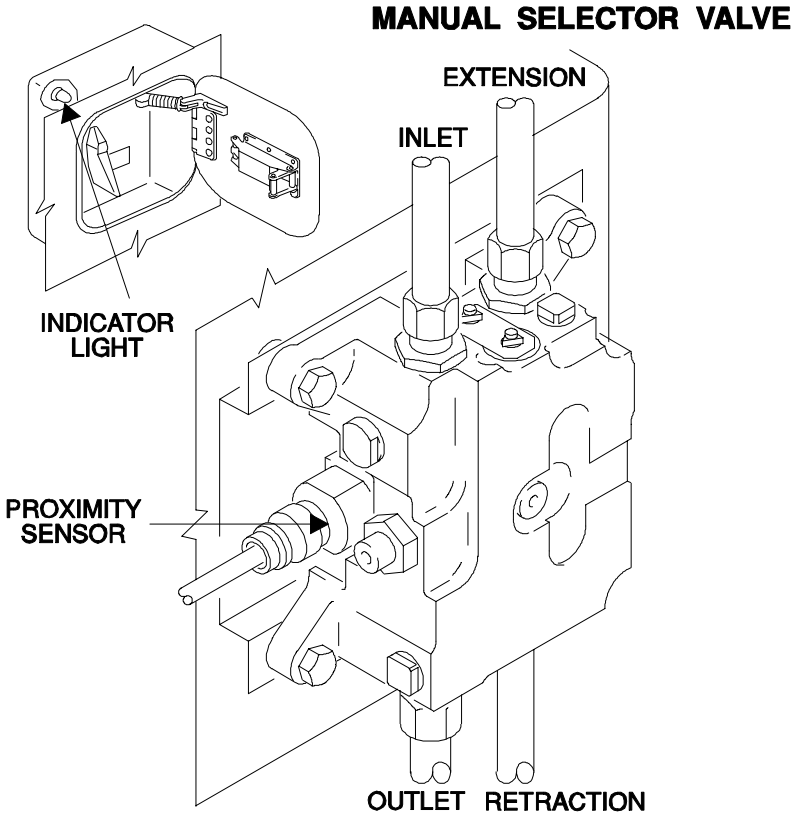
The double check valve is fitted on the supply line.

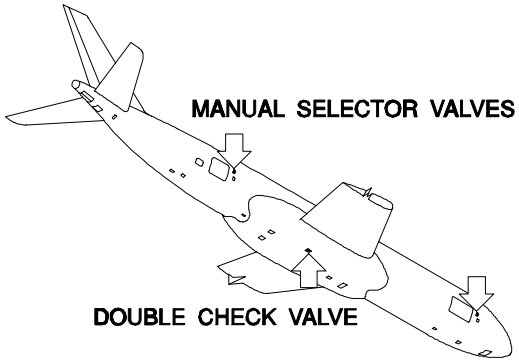
It consists of a normal and a bypass check valves.

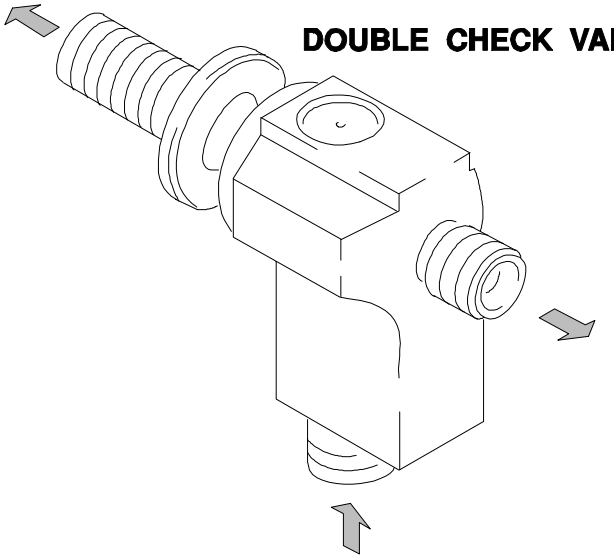
The normal check valve opens when the pressure increases to 5.5 bars (79.77 psi).

It also prevents fluid loss in case of leakage.

The bypass check valve ensures the supply lines are depressurized after each door operation.







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ELECTRIC SELECTOR VALVE

FIN : 2500MJ

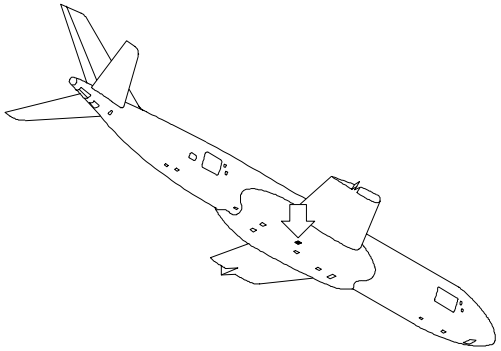
ZONE : 196

COMPONENT DESCRIPTION

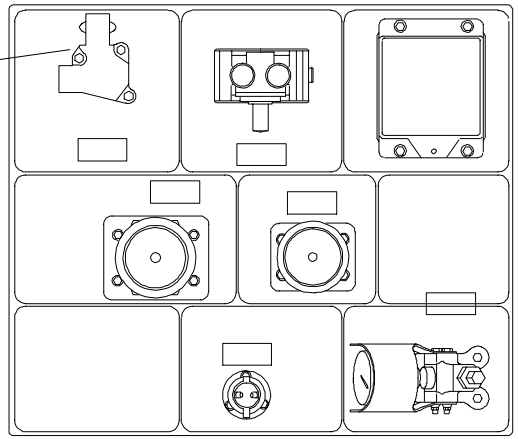
The valve controls the normal or manual mode for hydraulic operation.

The valve includes : a solenoid operated control valve, an hydraulic operated main valve.

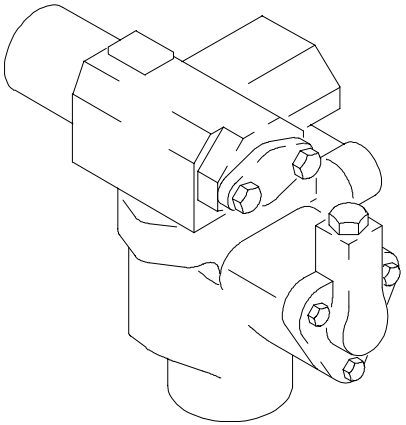
When the solenoid is energized, it moves the control valve which operates the main valve.



ELECTRIC SELECTOR VALVE



Yellow Hydraulic Ground Service Panel 196 BB



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HAND PUMP

FIN : 7155JE

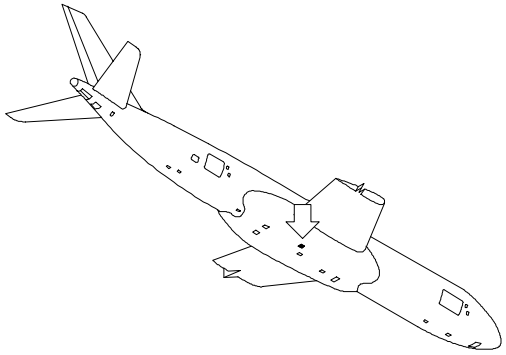
ZONE : 196

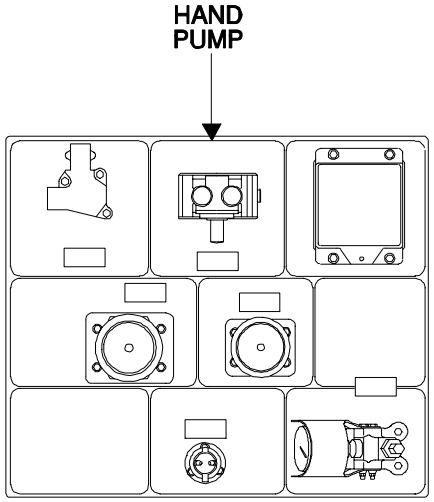
COMPONENT DESCRIPTION

The hand pump is of the double acting type.

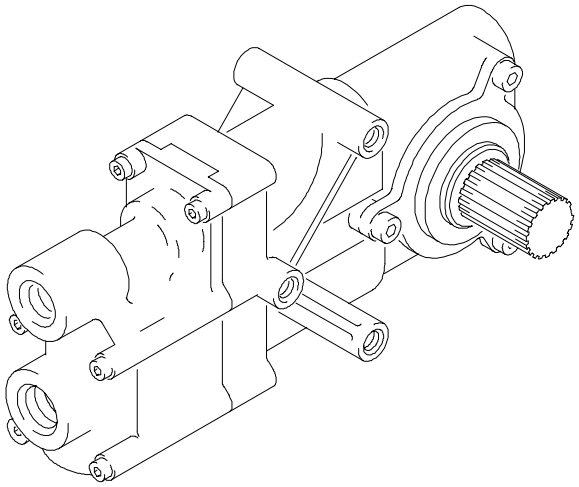
It is equipped with a pressure relief valve to prevent too high pressure during normal operation.

NOTE : the lever is stowed in the green hydraulic ground service panel.





Yellow Hydraulic
Ground Service Panel
196 BB



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ACTUATORS

	FWD	AFT
FIN :		
RESTRICTOR CHECK VALVE	6335MJ	6336MJ
ACTUATOR	2502MJ	2504MJ
ZONE :	821	822

COMPONENT DESCRIPTION

The door actuator has two operation modes : extension and retraction.

At the end of the extension, the actuator is mechanically locked via an internal locking cylinder, a locking piston and a pawl.

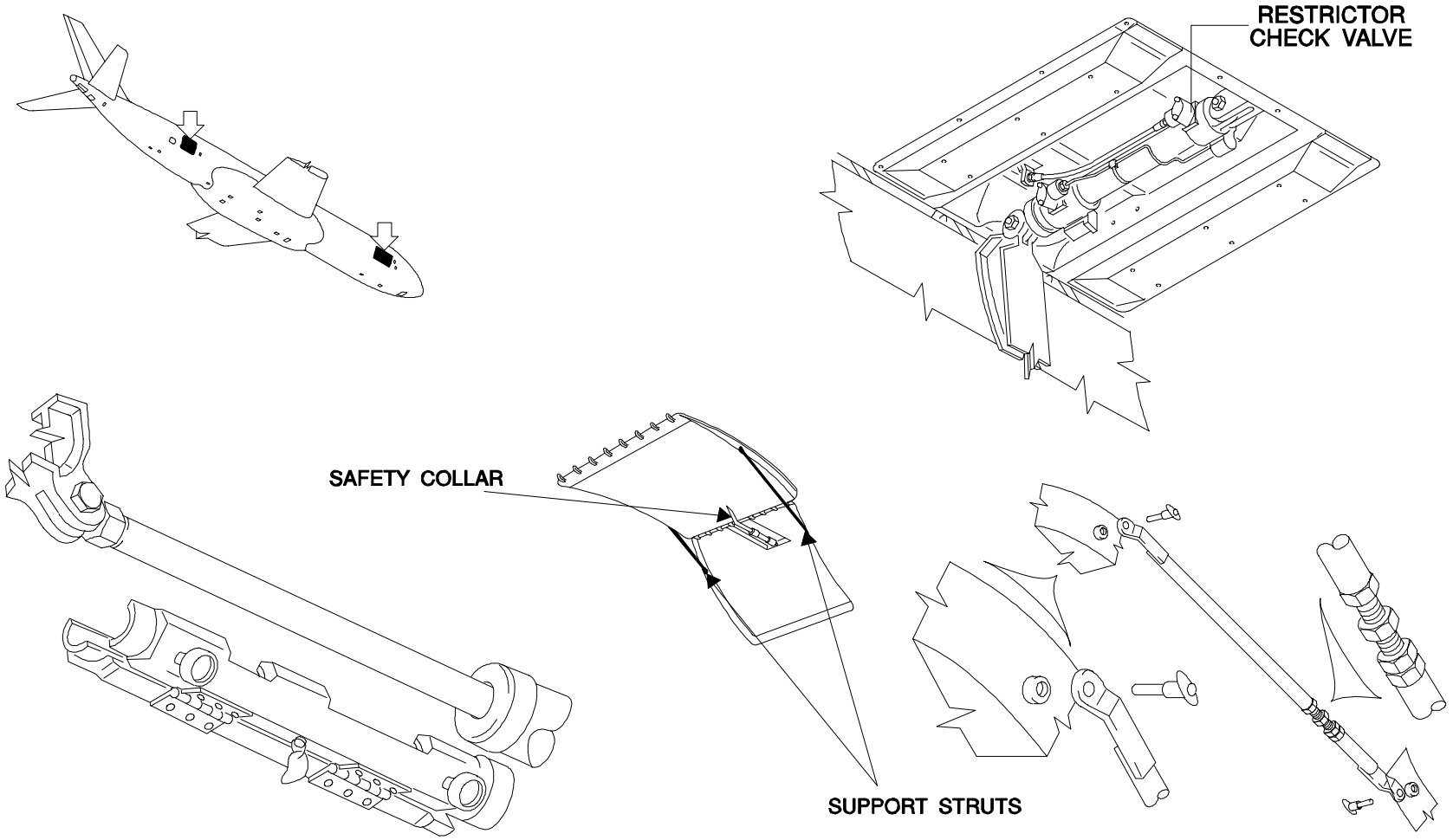
This locking device is released at the beginning of the retraction sequence.

The locking device acts on a lever to operate the limit switch for door open indication (green light in the manual selector valve recess).

For safety reasons, a restrictor check valve is fitted on the extension side to prevent door free fall after unlocking.

Depending on the maintenance operation, the door actuator must be blocked by a safety collar.

Depending on the maintenance operation, the door must be secured by two support struts.



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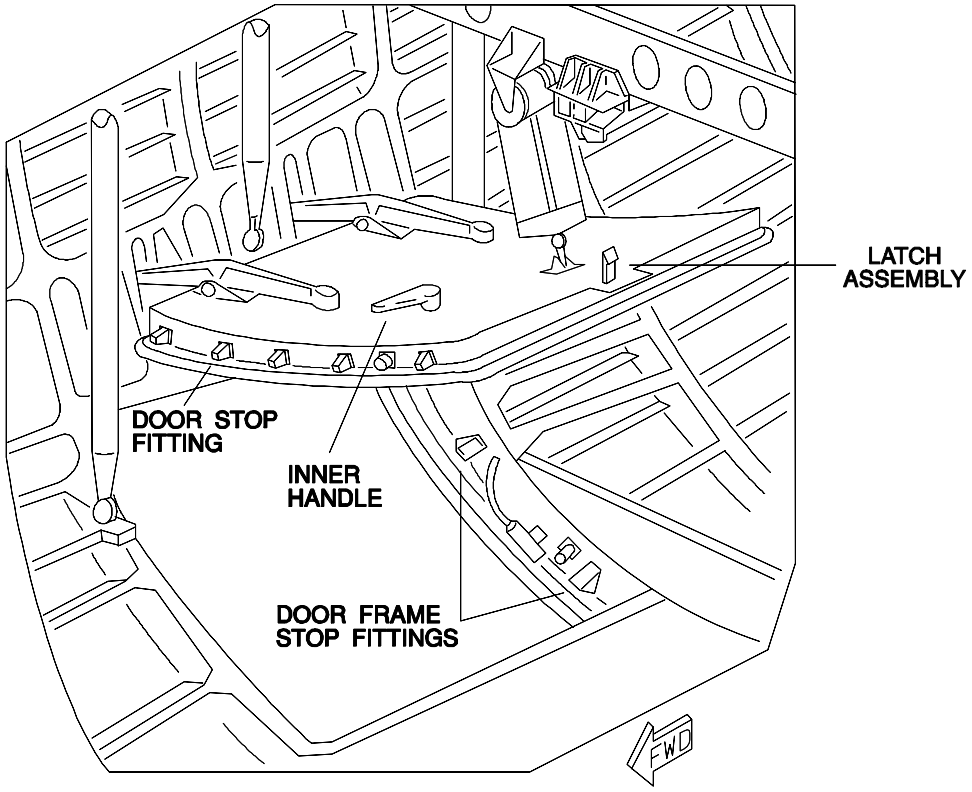
STUDENT NOTES

BULK CARGO DOOR PRESENTATION

General
Structure
Locking
Latching

GENERAL

The bulk cargo door is of the fail safe plug type construction. It is manually operated and opens inwards and upwards.
It is located on the RH side behind the AFT cargo door.



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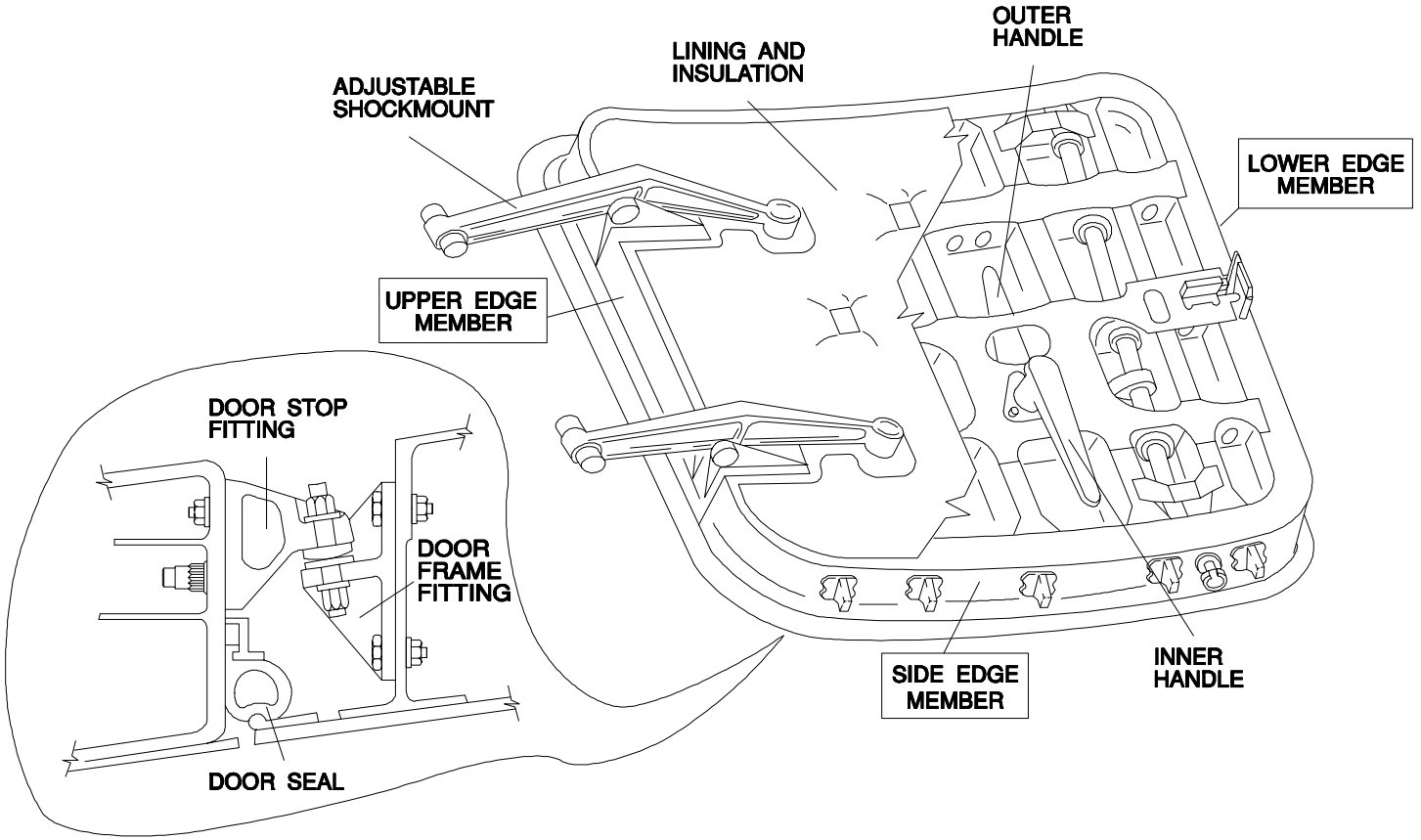
STRUCTURE

The door is equipped with :
- five stops and one barrel lock on each side,
- two shockmount support arms on the upper edge,
- one locking hook on the lower edge,
- and two handles to control the hook.

The door seal around the door is inflated through holes when the cabin pressure is available.



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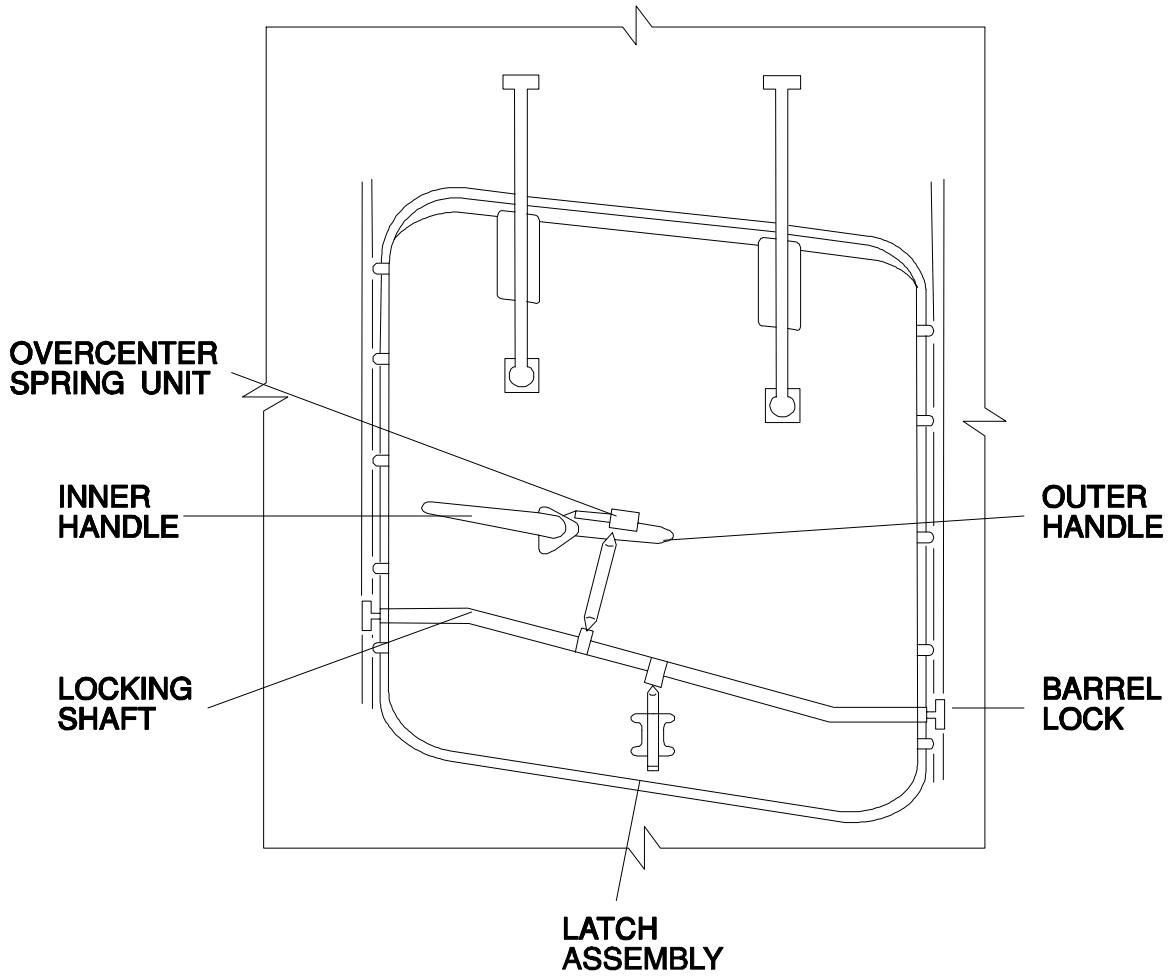
LOCKING

The locking linkage controls a latch assembly on the lower edge and two barrel locks, one on each side.



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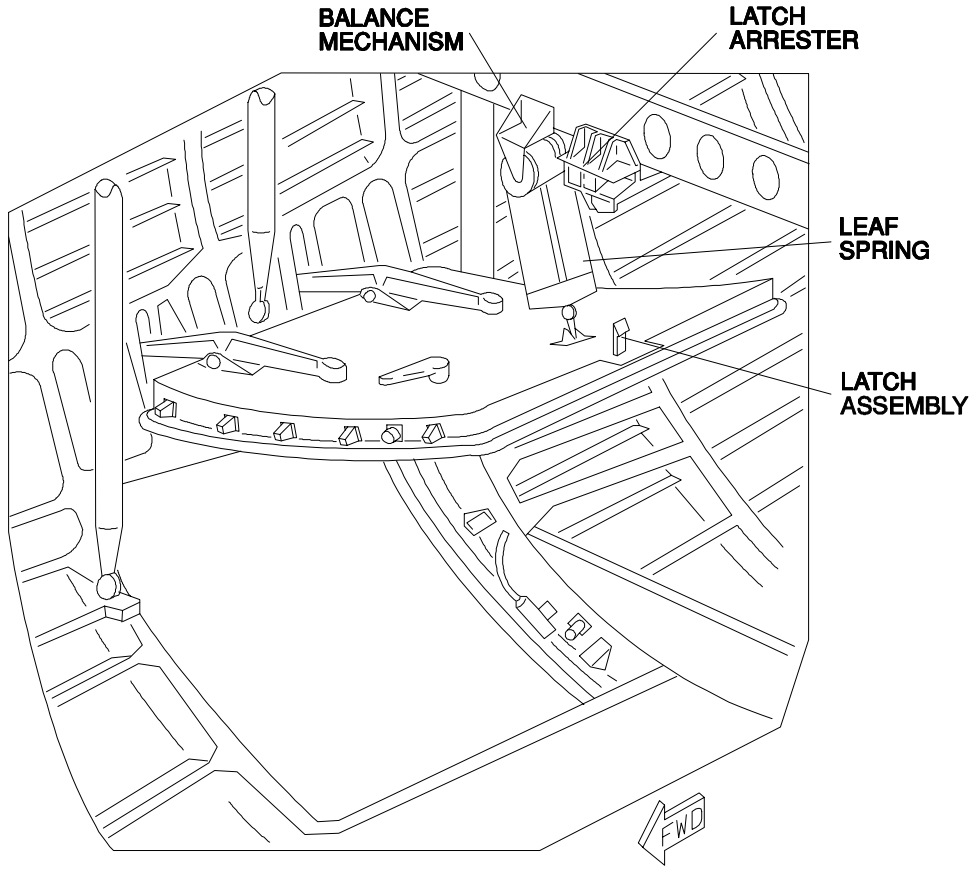
LATCHING

The latch assembly secures the door in the latch arrester, when the door is opened.



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STUDENT NOTES

BULK CARGO DOOR OPERATION

Opening the bulk cargo door
Closing the bulk cargo door

BULK CARGO DOOR OPERATION

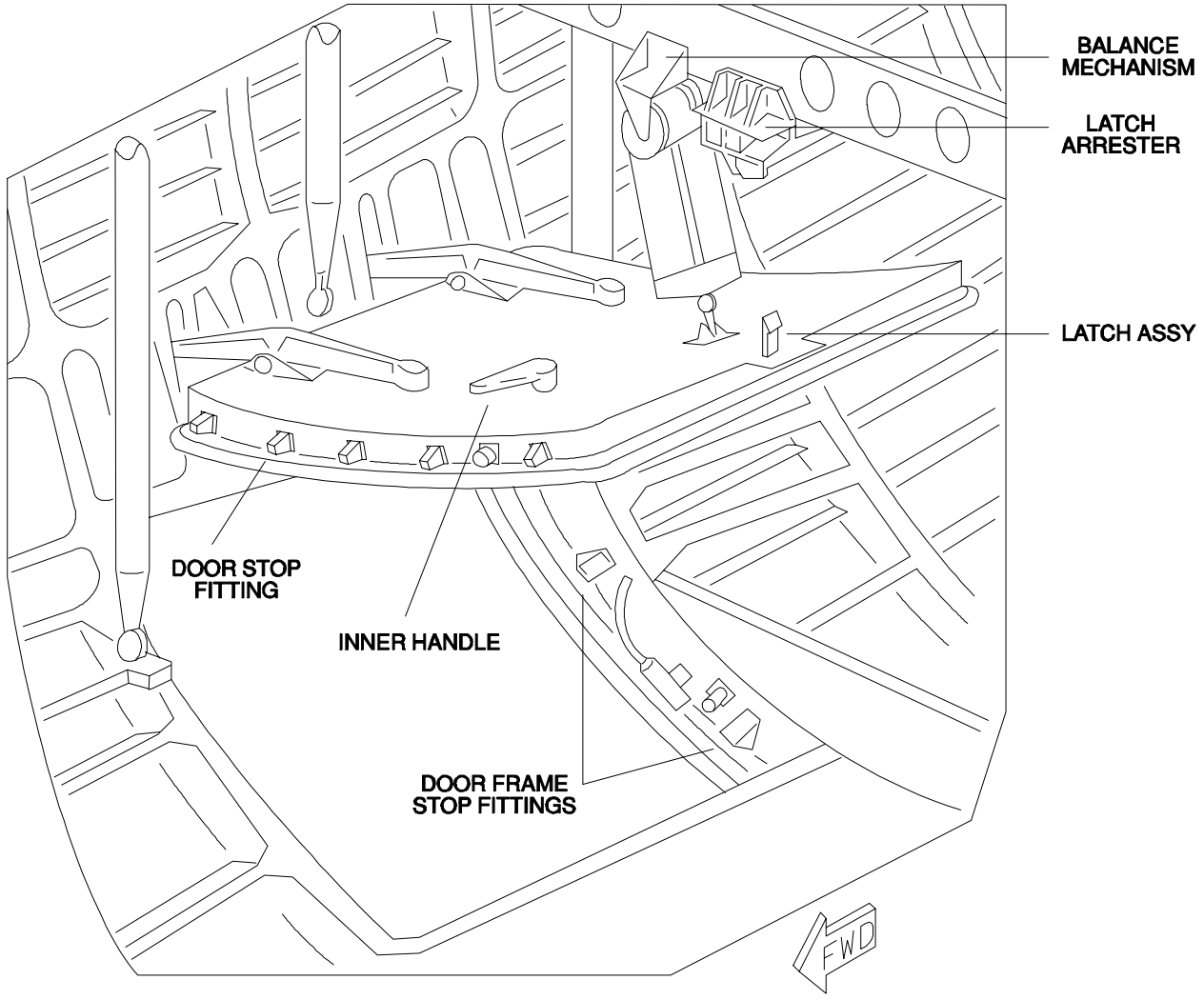
The purpose here, is to describe the opening and closing sequence of the bulk cargo door.

OPENING

- A platform is necessary to gain access to the bulk cargo door.
The operating procedure is written on the fuselage
- Push the button of the outer handle to release it from its recess.
- Move the outer or the inner handle to the open position.
- Push the bulk cargo door partly inwards, then put the door handle in the locked position.
Move the door inward until the hook engages with the hook arrester.

CLOSING

- To close the door use the outer handle.
- Move the outer handle to the open position to unlock the door from the hook arrester.
- Hold the door to prevent it from falling down.
- Move the bulk cargo door down into the opening and put the door handle in the locked position.
- Put the handle back into its recess.
- Remove the access platform.



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STUDENT NOTES

DSCS PRESENTATION

General
Door Indicating and Warning System
Escape Slide Indicating and Warning System
Residual Cabin Pressure
Cargo Door Electrical Control System
Proximity Switch Control Unit
Autonomous Standby Power Supply Unit

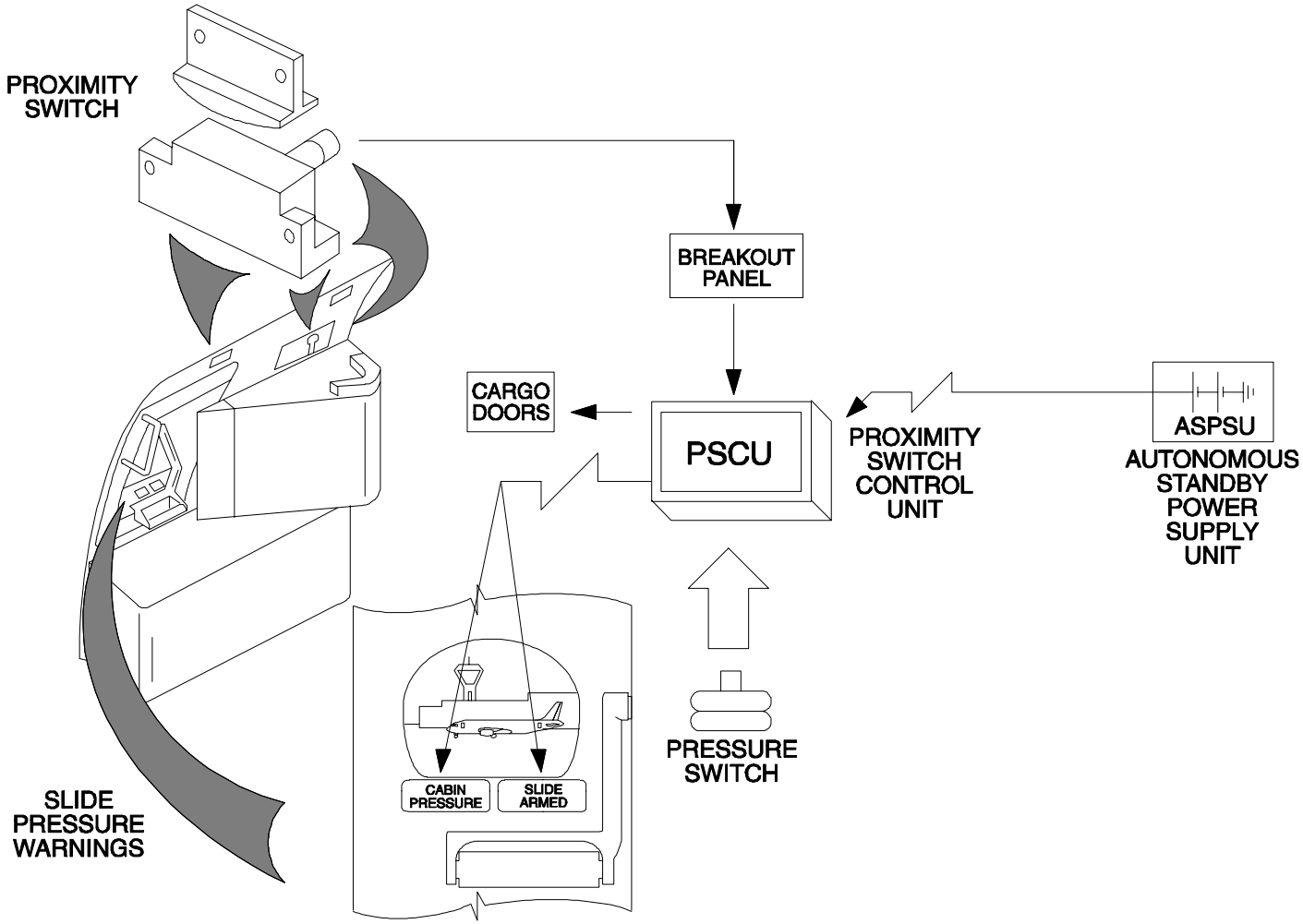
GENERAL

The Door & Slide Control System consists of :

- proximity switches,
- a breakout panel,
- a proximity Switch Control Unit,
- a pressure switch,
- and an Autonomous Standby Power Supply Unit.

The functions of the DSCS are :

- Door Indicating and Warning,
- Escape Slide Indicating and Warning,
- Residual Cabin Pressure Detection and Indicating,
- Cargo Doors Electrical Control and Indicating.



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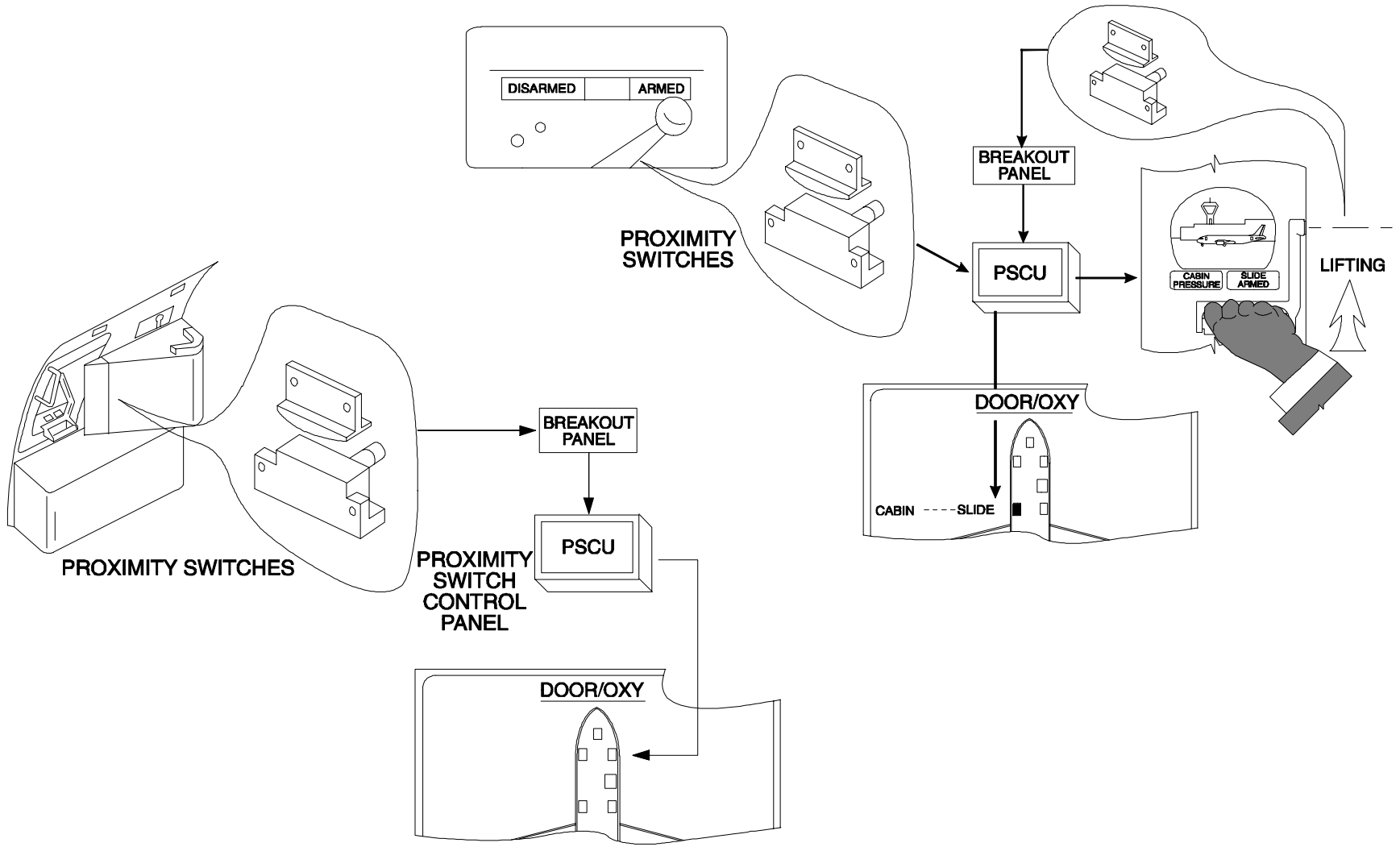
DOOR INDICATING AND WARNING SYSTEM

The door indicating & warning system sends signals to the ECAM which indicates the state of :

- passenger/crew doors and emergency exits,
- forward and aft cargo doors,
- bulk cargo door,
- avionics access door.

ESCAPE SLIDE INDICATING AND WARNING SYSTEM

The escape slide indicating & warning system indicates the state of the slide (ARMED or DISARMED) on the ECAM door page. It also illuminates the white light on the door if the inner handle is lifted with the arming lever in ARMED position.



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RESIDUAL CABIN PRESSURE

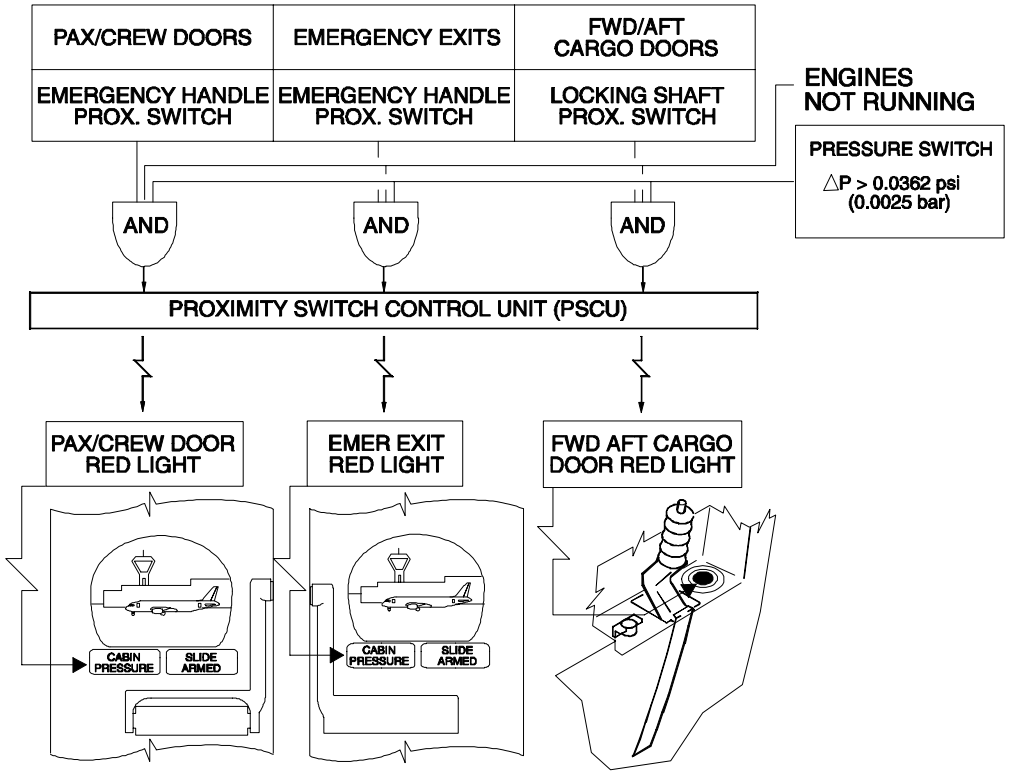
The residual cabin pressure system indicates an excessive residual differential cabin pressure on the cabin and main cargo doors. In case of excessive residual differential cabin pressure, a red flashing light located on the door comes on if :

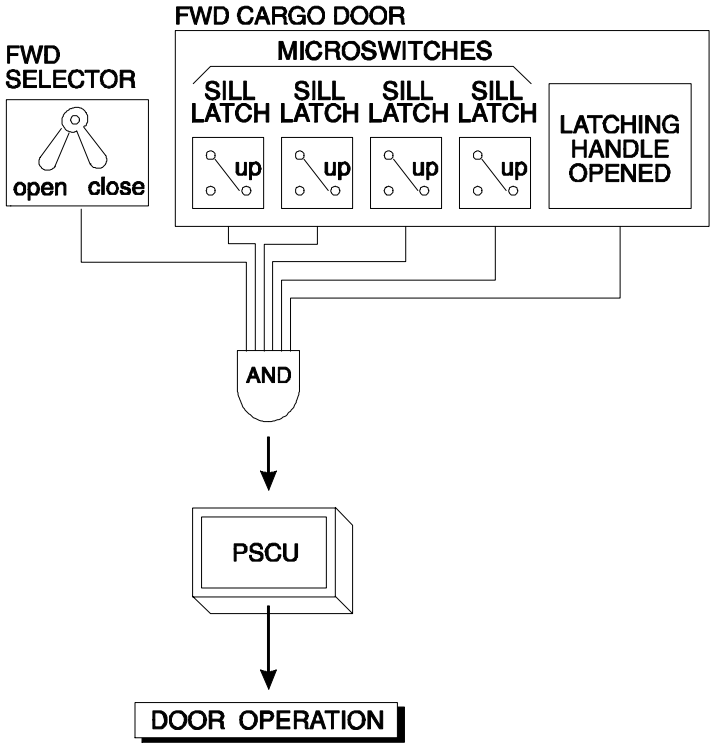
- the engines are not running,
- the escape slide is disarmed (for cabin doors) or the locking handle is fully open (for cargo doors).

CARGO DOOR ELECTRICAL CONTROL SYSTEM

Both cargo doors can be operated at the same time. The door operation starts as soon as :

- the door is unlatched,
- the cargo loading sill latches are raised,
- and the selector is set to the open or close position.





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PROXIMITY SWITCH CONTROL UNIT

The Proximity Switch Control Unit has two independent channels supplied by two independent 28 VDC bus bars:

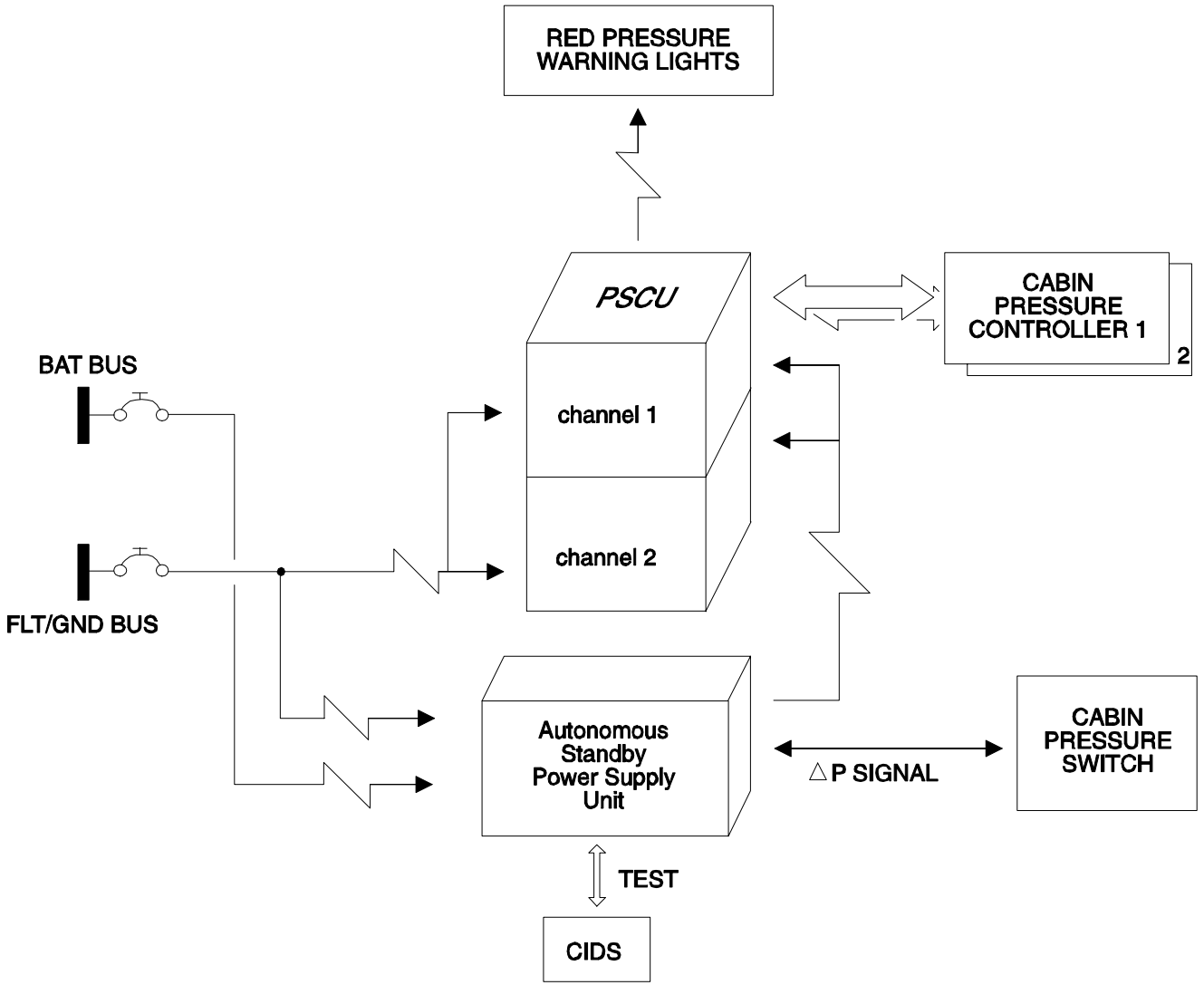
- the FLT/GND busbar,
- the BAT busbar via the ASPSU.

If both buses are inoperative, the ASPSU will supply the PSCU with 28VDC power.

When all doors are closed and locked, the PSCU sends signals to the Cabin Pressure Controller so that the cabin can be pressurized.

AUTONOMOUS STANDBY POWER SUPPLY UNIT

The Autonomous Standby Power Supply Unit provides power to the PSCU in case of loss of aircraft electrical power. In that case, the cabin pressure warning system is supplied. The ASPSU consists of two identical and easily removable battery packs and their electronic control unit. The ASPSU is automatically rechargeable through the aircraft DC power supply. The switching from aircraft power supply to ASPSU power supply and vice versa, is fully automatic. ASPSU test is possible through the CIDS.



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STUDENT NOTES:

PASSENGER AND CREW DOOR DSCS DESCRIPTION AND OPERATION

General
Door Indicating and Warning
Escape Slide Indicating and Warning
Residual Cabin Pressure

GENERAL

Each passenger/crew door has three proximity sensors which are part of :

- the door indicating and warning system,
- the escape slide indicating and warning system,
- the residual cabin pressure detection and indicating system.

DOOR INDICATING AND WARNING

PRINCIPLE

The locking shaft and door frame proximity sensors provide door condition indication on the DOOR ECAM page via the breakout panel and the PSCU.

LOCKED

When the door is locked, the proximity sensors are NEAR, and the door symbol is green on the DOOR ECAM page.

NOT LOCKED

As soon as one proximity sensor is FAR, the door indication is amber on the ECAM page.

ESCAPE SLIDE INDICATING AND WARNING

PRINCIPLE

The locking shaft and the arming lever proximity sensors provide an escape slide condition indication on the DOOR ECAM page and on the door itself via the PSCU.

ARMED LOCKED

The white word "SLIDE" appears on the ECAM page.
The door symbol is green.

ARMED NOT LOCKED

The word "SLIDE" appears on the ECAM page.
The door symbol is amber.
The "SLIDE ARMED" light comes on steady on the door.

DISARMED LOCKED

The word "SLIDE" disappears.
The door symbol is green.

DISARMED NOT LOCKED

The door symbol is amber.
The slide indication is replaced by an amber dashed line.

RESIDUAL CABIN PRESSURE

The red flashing light indicates an excessive residual cabin pressure.

The red light flashes if : engines not running, escape slide disarmed and residual cabin pressure greater than 2.5 mbars (0.0362 psi).

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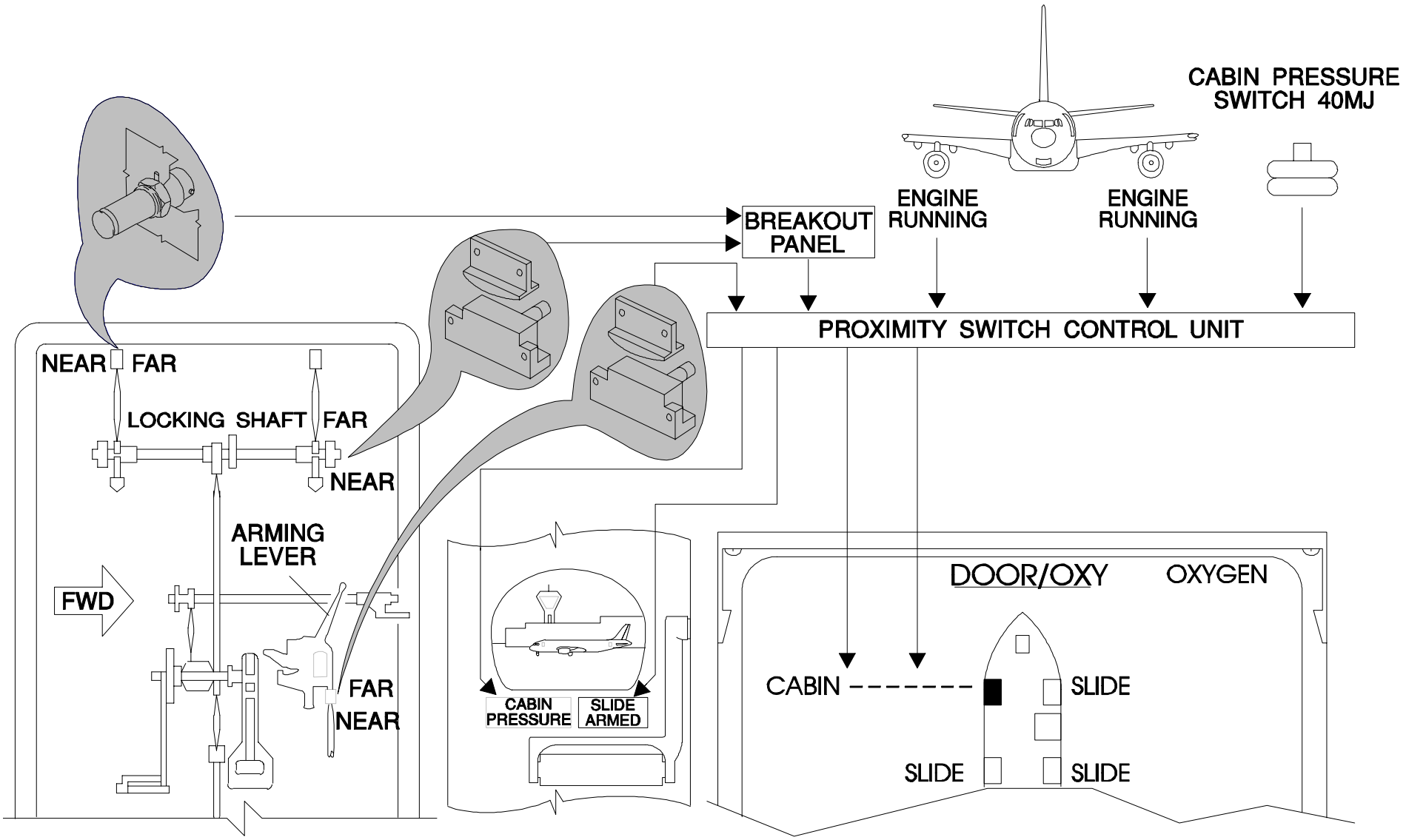


FQW4200 GE Metric

STUDENT NOTES:

FWD AND AFT CARGO DOORS DSCS DESCRIPTION AND OPERATION

General
Door Indicating and Warning System
Residual Pressure
Electrical Control System

GENERAL

The forward and the aft cargo doors have three similar proximity sensors which are part of :

- the door indicating and warning system,
- the residual cabin pressure detection and indicating system,
- the cargo door electrical control system.

DOOR INDICATING AND WARNING SYSTEM

PRINCIPLE

The locking handle and the locking shaft proximity sensors provide the door condition indication on the ECAM via the PSCU.

LOCKED

When the door is latched and locked, both proximity sensors are NEAR.

NOT LOCKED

As soon as one of the two proximity sensors is FAR, the door is indicated unlocked on the ECAM page.

FULLY OPENED

When the door reaches the fully opened position, the door actuator switch illuminates the indicator light fitted in the manual selector recess.

RESIDUAL PRESSURE

The red flashing light indicates an excessive residual cabin pressure.
It is visible only if the locking handle is opened.

The red light flashes if: engines are not running, residual cabin pressure greater than 0.0362 psi (0.0025 bar), and the locking shaft prox. sensor is FAR.

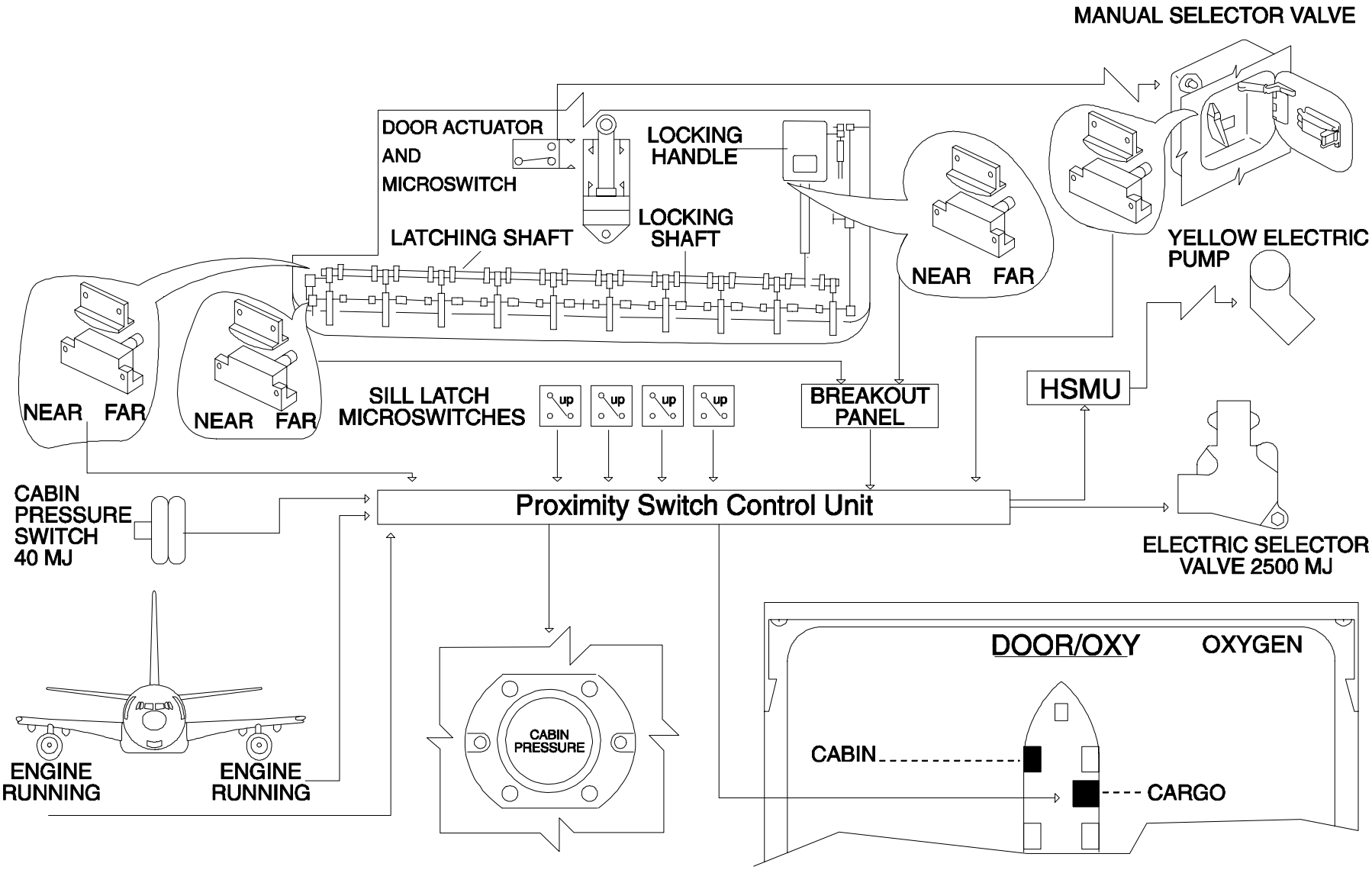
ELECTRICAL CONTROL SYSTEM

The electrical selector valve is supplied when :

- the latching shaft proximity sensor is NEAR,
- the sill latches are up,
- and when the manual selector valve is operated, the integrated proximity sensor sends a signal to the PSCU.

The PSCU also sends a signal to the Hydraulic System Monitoring Unit to:

- close the yellow leak measurement valve,
- inhibit flap operation,
- start the yellow electric pump.



FQW4200 GE Metric

STUDENT NOTES:

BULK CARGO AND AVIONICS FLOOR DOORS DSCS DESCRIPTION/OPERATION

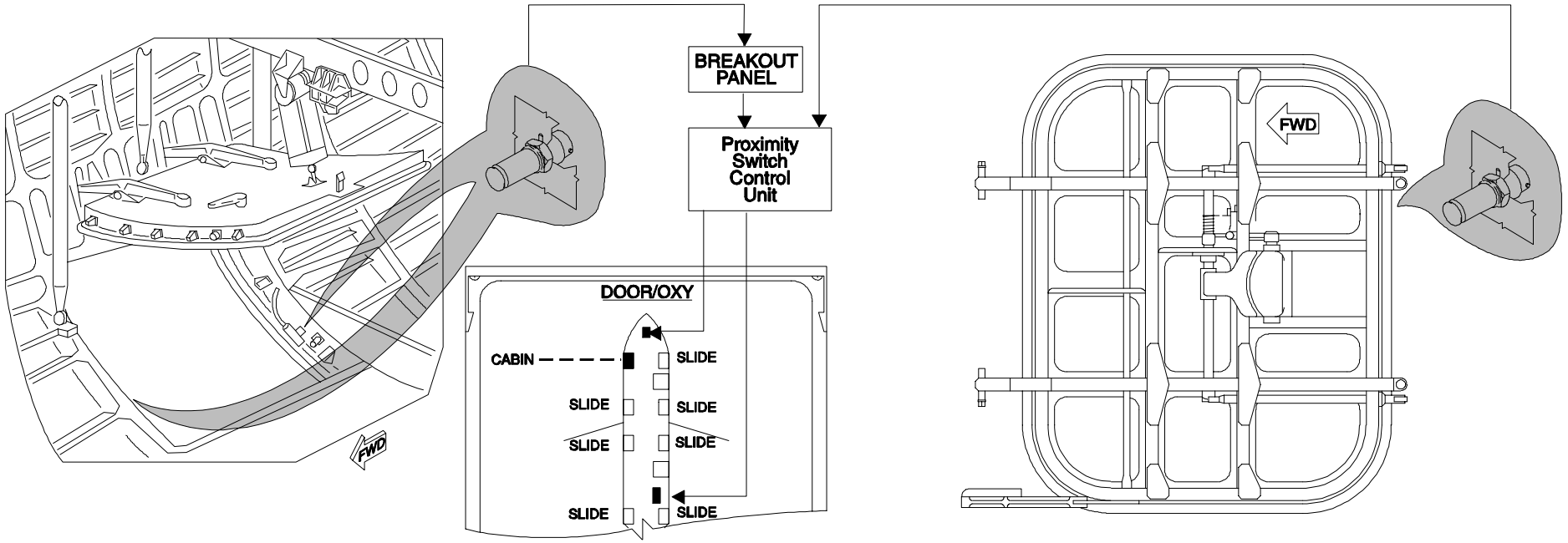
Bulk Cargo Door
Avionics Floor Door

BULK CARGO DOOR

Two proximity sensors control the door warning function of the bulk cargo door.
The sensors are installed on either side of the door frame on the fuselage.
The sensors are also used to prevent pressurization if the door is not fully closed or one sensor is defective.

AVIONICS FLOOR DOOR

The avionics floor door uses a single sensor for the door warning function.
It is installed in the door frame on the fuselage.



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STUDENT NOTES

PSCU INTERFACES

Prox. Sensors
Sill Latches
LGCIU
Engines
Press. Switch
HSMU
Selector Valves
Vent Controller
FMGEC
CPC
Ground
Girt bar heating
Warn Lights
SDAC
CMC
Shop Maintenance

PROX. SENSORS

The PSCU receives a signal from all the proximity sensors to manage indications and warnings.

SILL LATCHES

The PSCU prevents the cargo door operation if one or more sill latches are not up.

LGCIU

The two LGCIUs send signals to the PSCU for ground or flight mode.
In flight, the cargo doors electrical control system is inhibited.

ENGINES

The engines send an "ENGINE RUNNING" signal to the PSCU.
This signal is an initial condition for the residual cabin pressure logic.

PRESS. SWITCH

The PSCU receives a signal from the cabin pressure switch for the residual cabin pressure warning.

HSMU

The HSMU, which controls the yellow electric pump for cargo door operation on ground, receives a signal from the PSCU.

SELECTOR VALVES

The PSCU supplies the manual selector valve when the aircraft is on ground in normal opening mode.
It also sends a signal to the electric selector valve when open or close is selected.

VENT CONTROLLER

The PSCU sends a signal to the ventilation controller to stop the cargo heating when the forward or the bulk cargo door is opened.

FMGEC

The PSCU sends a "door closed" signal to the Flight Management Guidance and Envelope Computer for flight phase information.

CPC

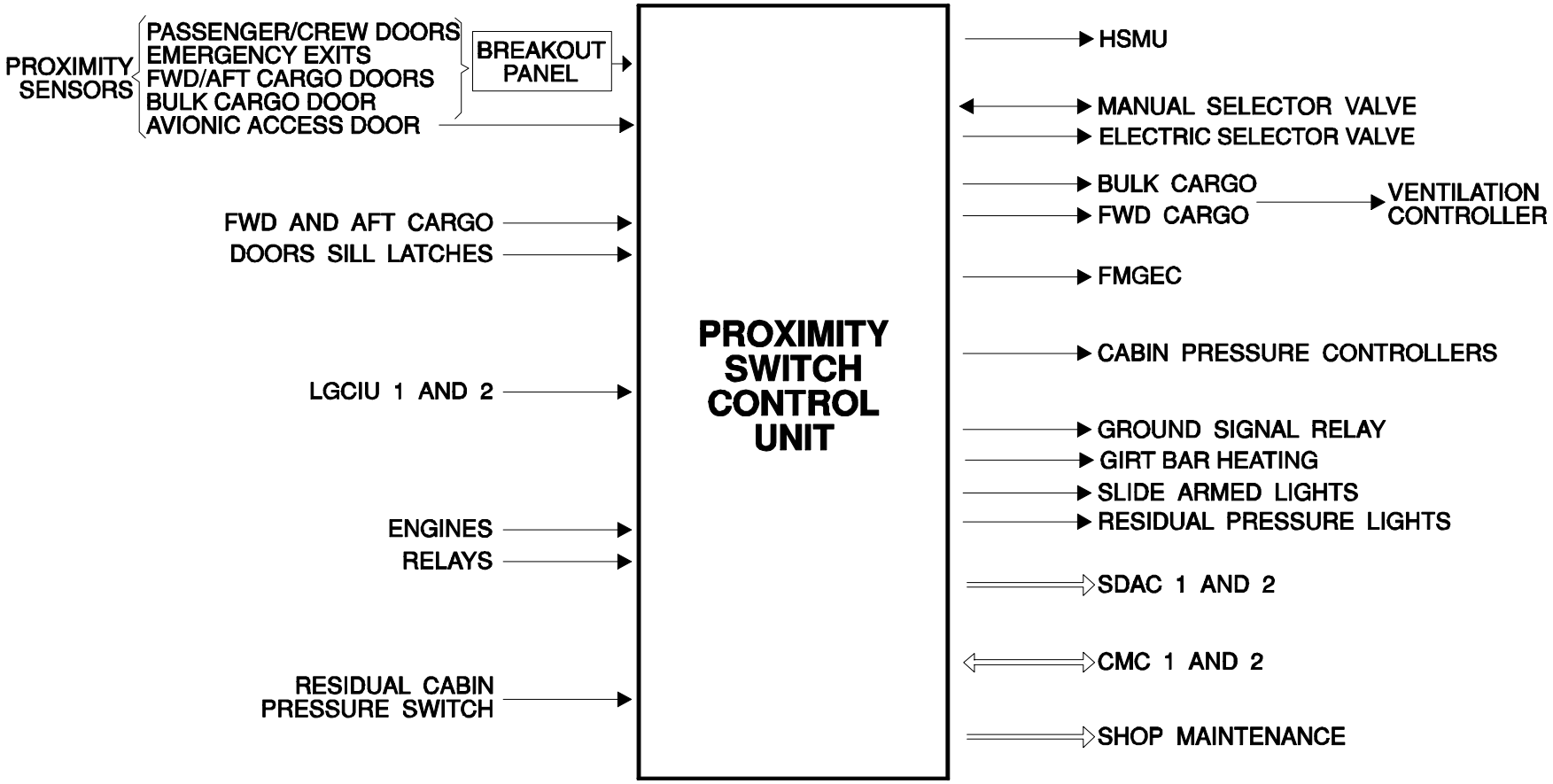
Pressure controllers one and two receive a signal from the PSCU to start pressurization as soon as all doors are closed.

GROUND

The PSCU closes a relay when the aircraft is on ground to supply the cargo door electrical control system.

GIRT BAR HEATING

The PSCU sends a "disable/enable" signal to the Girt bar heating Control Unit, according to the slide arming lever position.



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WARN LIGHTS

The PSCU supplies the indication lights when the logics are satisfied.

SDAC

Each of the two PSCU channels indicates the door status to System Data Acquisition Concentrators one and two through ARINC 429 buses for ECAM display.

CMC

Central Maintenance Computers one and two receive and send signals to the PSCU channel 1 for maintenance operations.

SHOP MAINTENANCE

Each PSCU chanel is equipped with an RS 232 interface for shop maintenance.

DSCS COMPONENTS

Safety Precautions
Proximity Sensors
Breakout Panel
Warning Lights
Proximity Switch Control Unit
Pressure Switch
Autonomous Standby Power Supply Unit

SAFETY PRECAUTIONS

Before working on the Doors and Slides Control System, open and tag the appropriate circuit breakers.

STUDENT NOTES

PROXIMITY SENSORS

FIN:

11MJ, 13MJ, 31MJ, 15MJ, 17MJ, 33MJ, 19MJ, 21MJ, 35MJ, 23MJ, 25MJ, 37MJ, 27MJ, 29MJ, 22MJ, 24MJ, 36MJ, 39MJ, 28MJ, 26MJ, 34MJ, 20MJ, 18MJ, 32MJ, 16MJ, 14MJ, 38MJ, 8MJ, 6MJ, 30MJ, 12MJ, 10MJ, 7MJ

ZONE:

831, 221, 831, 832, 231, 832, 834, 251, 834, 833, 261, 833, 162, 162, 843, 262, 843, 822, 822, 152, 844, 252, 844, 842, 232, 842, 821, 821, 132, 841, 222, 841, 120

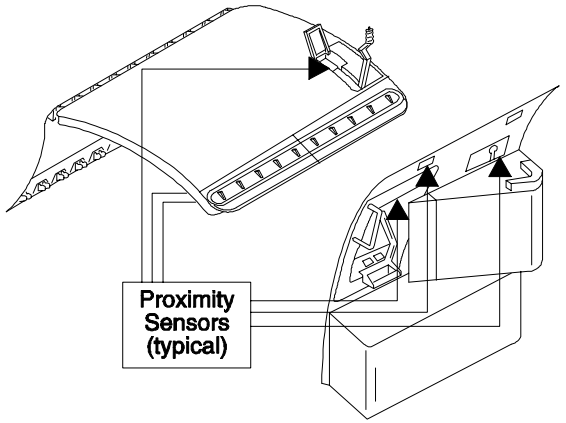
There are two types of proximity sensors :

- rectangular,
- circular.

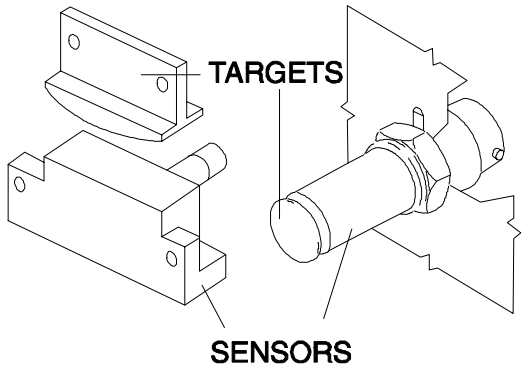
Both of them are of the "two pieces" type.

That means that the electronic sensitive element is no longer part of the sensor itself, but of the control unit.

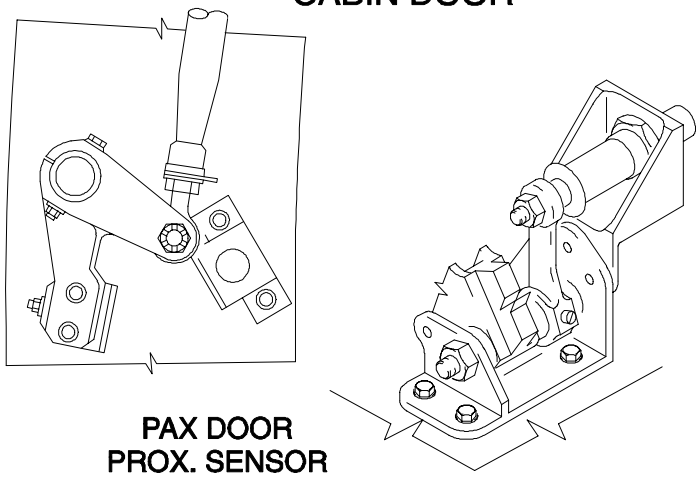
This increases the reliability of the complete system (sensors and control unit).



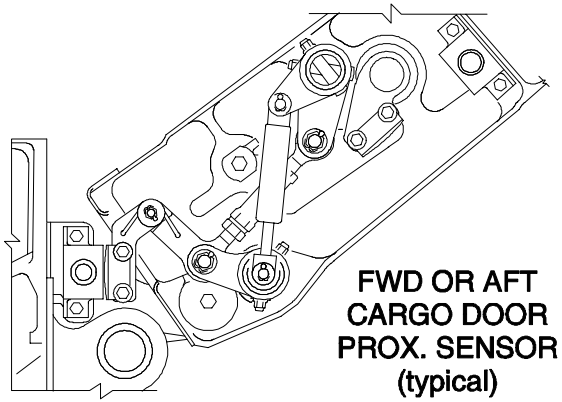
PROXIMITY SENSORS



CABIN DOOR



CARGO DOOR



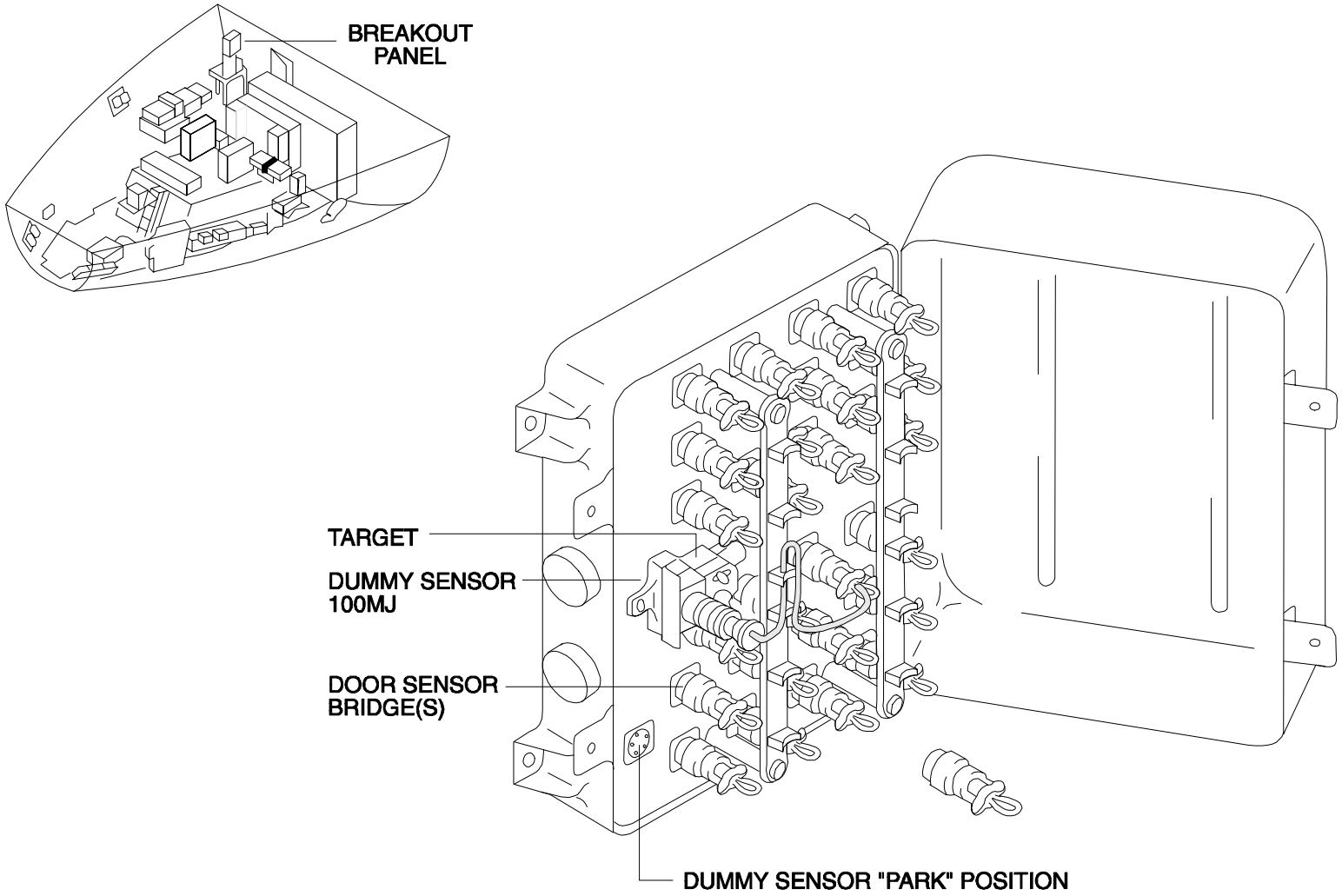
FQW4200 GE Metric

BREAKOUT PANEL

FIN: 5062VE

ZONE: 152

COMPONENT DESCRIPTION
The breakout panel is equipped with one dummy sensor (110MJ) with a fixed target, which can be used to provide a manual override function, for a failed door closed proximity sensor to allow the dispatch of the aircraft using the M.E.L. procedure.



OVERRIDE EXAMPLE

FQW4200 GE Metric

WARNING LIGHTS

FIN:

41MJ, 43MJ, 45MJ, 47MJ, 49MJ, 51MJ, 53MJ, 55MJ, 54MJ, 56MJ, 104MJ, 52MJ, 50MJ, 48MJ, 46MJ, 103MJ, 44MJ, 42MJ

ZONE:

831, 831, 832, 832, 834, 834, 833, 833, 843, 843, 822, 844, 844, 842, 842, 821, 841, 841

COMPONENT DESCRIPTION

There are two types of warning lights.

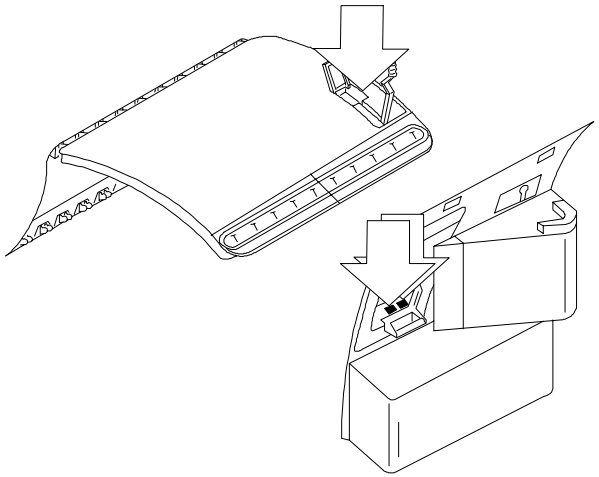
The red warning lights have a flash function with a separate electronic circuit.

They indicate an excessive residual cabin pressure.

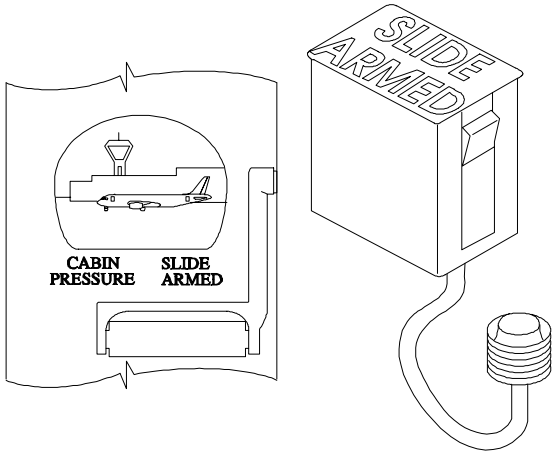
Those lights are fitted on all cabin doors and on FWD and AFT cargo doors.

The white lights are fitted on cabin doors only.

They indicate an ARMED escape slide.



WARNING LIGHT (typical)



FQW4200 GE Metric

PROXIMITY SWITCH CONTROL UNIT

FIN : 5MJ

ZONE : 120, 862 VU

COMPONENT DESCRIPTION

The Proximity Switch Control Unit is the primary component of the DSCS.

It is supplied either by two 28 VDC bus bars or by the Autonomous Standby Power Supply Unit when the aircraft electrical power is not available.

The PSCU consists of :

- two identical proximity interface cards,
- two identical control cards,
- one power supply card,
- one output driver card.

PRESSURE SWITCH

FIN : 40MJ

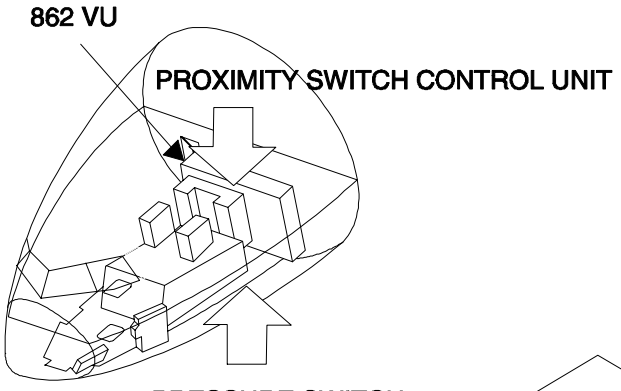
ZONE : 120

COMPONENT DESCRIPTION

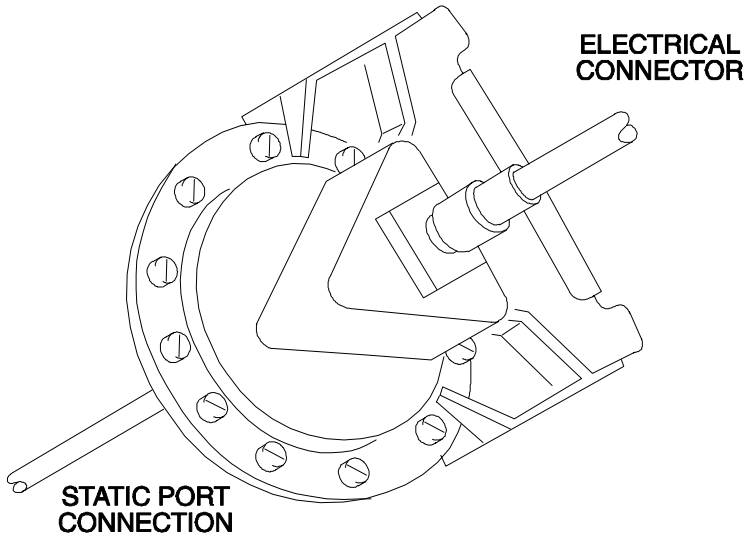
The pressure switch measures the differential pressure between the cabin and the outside.

A membrane causes the activation of the switch when the ΔP is greater than : 0.0025 bar (0.0362 psi).

The external pressure is picked up on the standby static line.



PROXIMITY SWITCH CONTROL UNIT



PRESSURE SWITCH

FQW4200 GE Metric

AUTONOMOUS STANDBY POWER SUPPLY UNIT

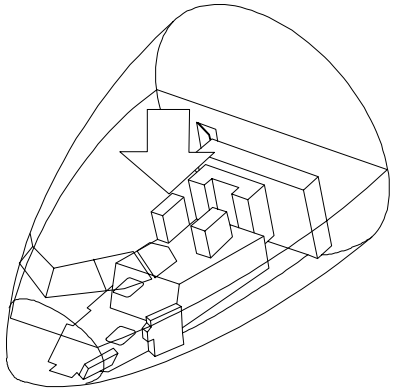
FIN : 101MJ

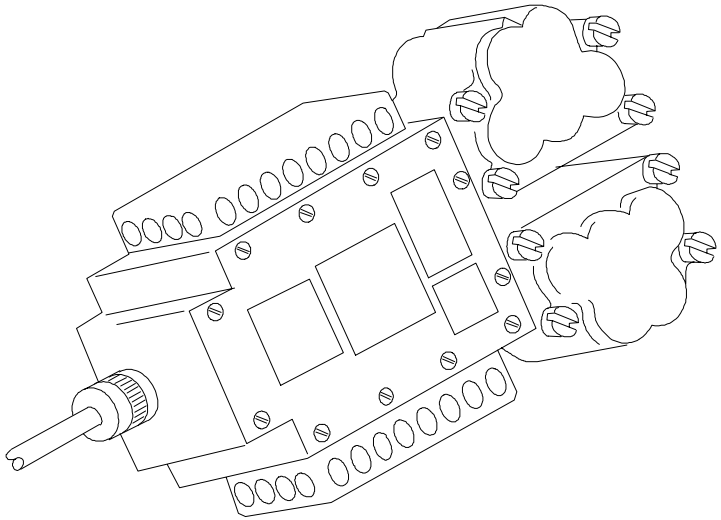
ZONE : 120

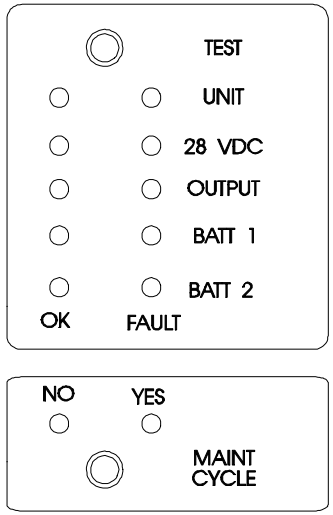
COMPONENT DESCRIPTION

The Autonomous Standby Power Supply Unit comprises :

- two battery packs of five cells each,
- a battery charging device supplied from the aircraft 28 VDC power source through a DC/DC converter,
- a heating device for low temperature operation,
- an internal system test performed through the CIDS,
- a battery capacity test initiated on the ASPSU itself.







CAUTION : the battery capacity test includes a complete discharge of the batteries.
The test duration is approximately 2 hours.
NOTE : when illuminated, "OK" lights are green, "FAULTS" are red.

FQW4200 GE Metric

STUDENT NOTES

DOOR WARNINGS

Door Not Locked
PSCU Failure

DOOR NOT LOCKED

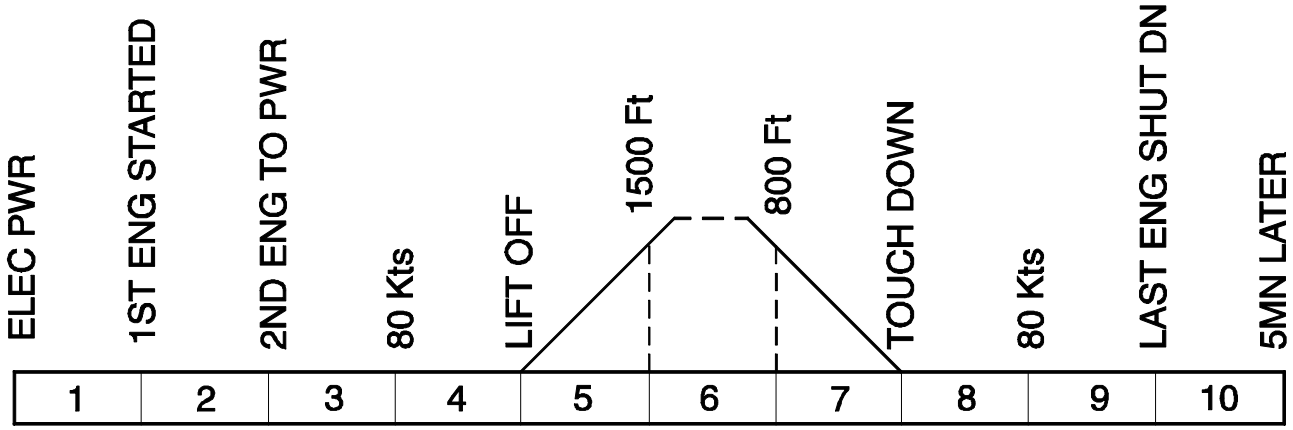
When an engine is running, the following warnings are triggered :

- Master Caution light,
- Single Chime,
- corresponding procedure appears on upper ECAM display.

PSCU FAILURE

The following warnings are triggered :

- Master Caution light,
- Single Chime,
- corresponding message appears on upper ECAM display.



E/WD : FAILURE TITLE conditions	AURAL WANING	MASTER LIGHT	SD PAGE CALLED	LOCAL WARNINGS	FLT PHASE INHIB
L (R) FWD CABIN L (R) MID CABIN L (R) AFT CABIN L (R) EMER EXIT FWD (AFT) (BULK) CARGO AVIONIC Affected door not locked	SINGLE CHIMIE	MASTER CAUT	DOOR	NIL	1, 4, 5, 7, 8, 10
POS DET 1 (2) (1+2) PSCU failure					3, 4, 5, 7, 8

FQW4200 GE Metric

STUDENT NOTES :

MISCELLANEOUS DOORS PRESENTATION

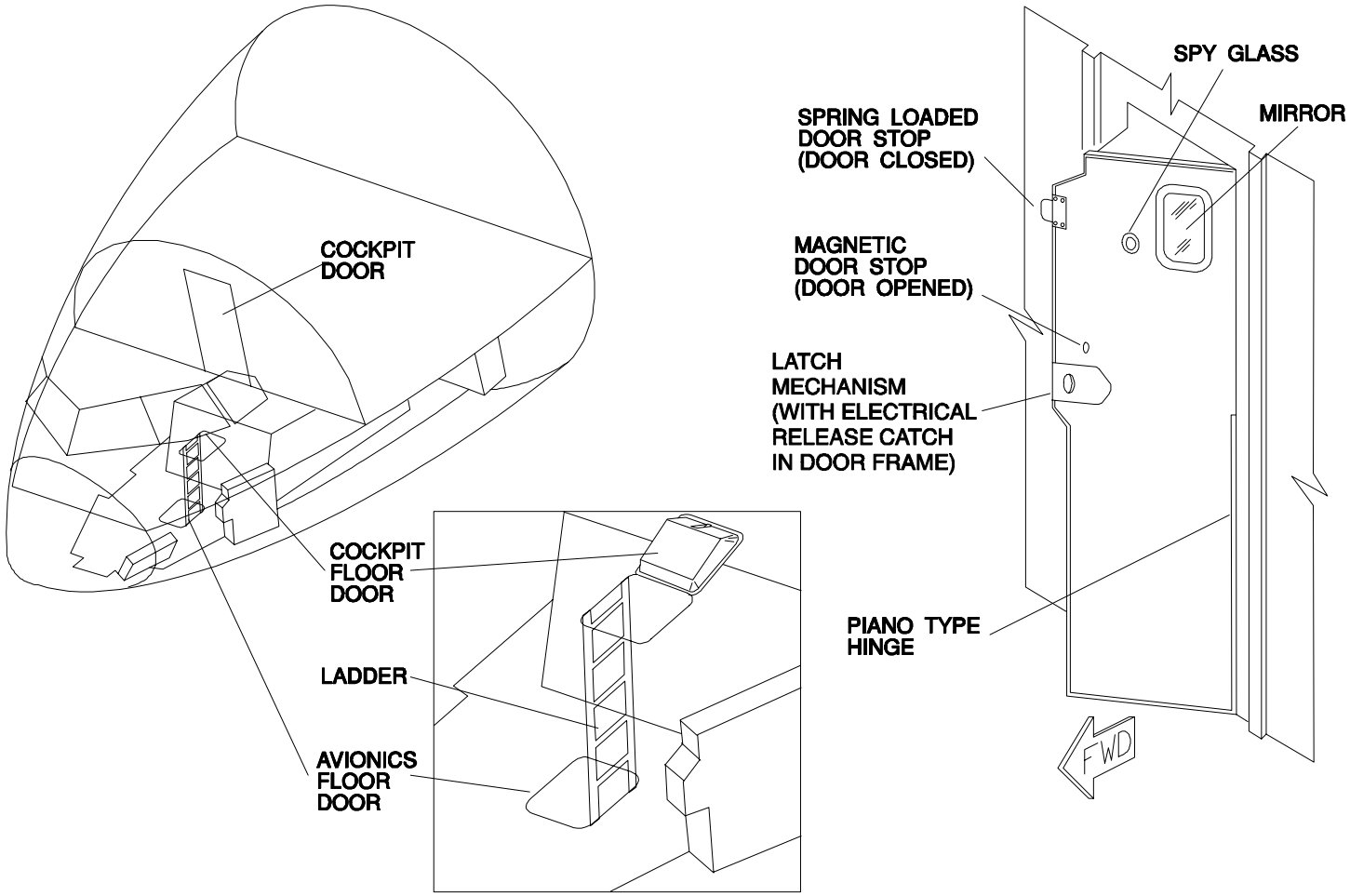
Cockpit
Fixed Partitions Doors
Avionics Floor Door
Access Doors

COCKPIT

The cockpit door is fitted with a handle on each side of the door. A lock fitted on the cockpit side prevents people from entering in the cockpit from the cabin.

An electrical release catch is installed in the cockpit door frame opposite the latch mechanism. It enables the door to be opened from either side without moving the latch. It is controlled by a switch located on the center pedestal, in the cockpit.

A colored mechanical indicator shows the lock lever position. The door normally opens forward. Emergency opening is possible by operating the latch (as for normal operation) and by pushing the door aftward, in the cabin direction.



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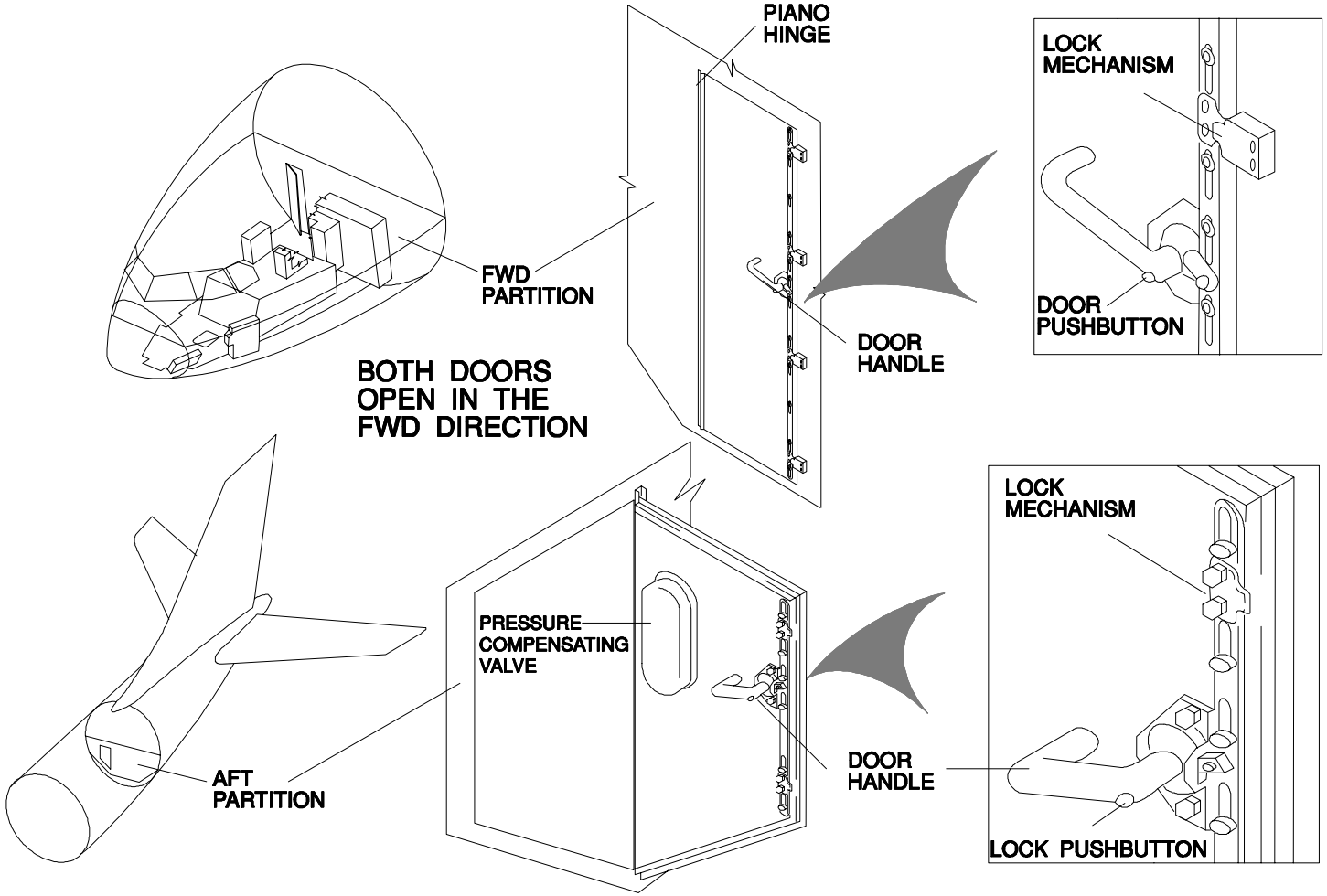
FIXED PARTITIONS DOORS

A handle is fitted on one side only, the opposite side of the cargo compartment. A special key (in the on board tool kit) allows the door to be opened from inside the cargo compartment.

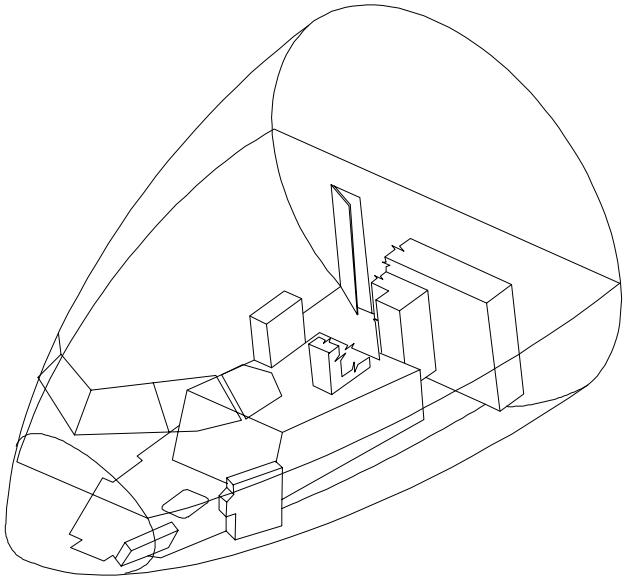
NOTE : THESE DOORS MUST BE OPENED ONLY IF NECESSARY AND BY AUTHORIZED PERSONNEL ONLY.

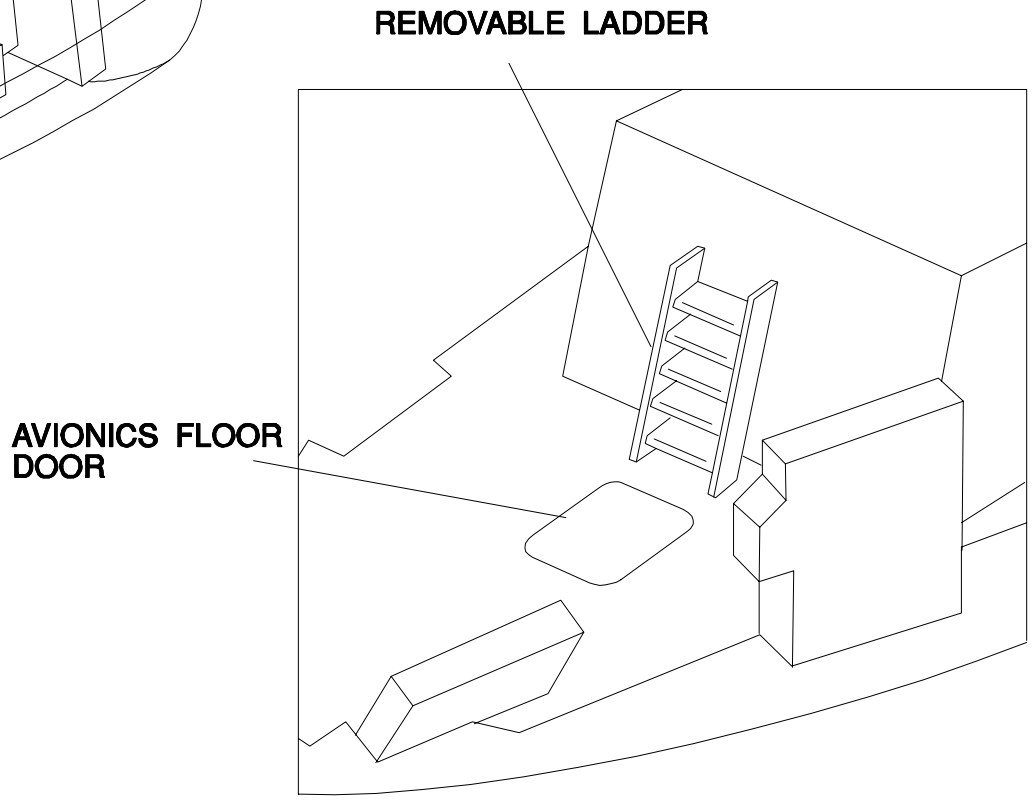


FQW4200 GE Metric

AVIONICS FLOOR DOOR

The avionics floor door allows access to the aircraft from the ground using an extendable ladder. This is the only miscellaneous access door shown on the ECAM door page.

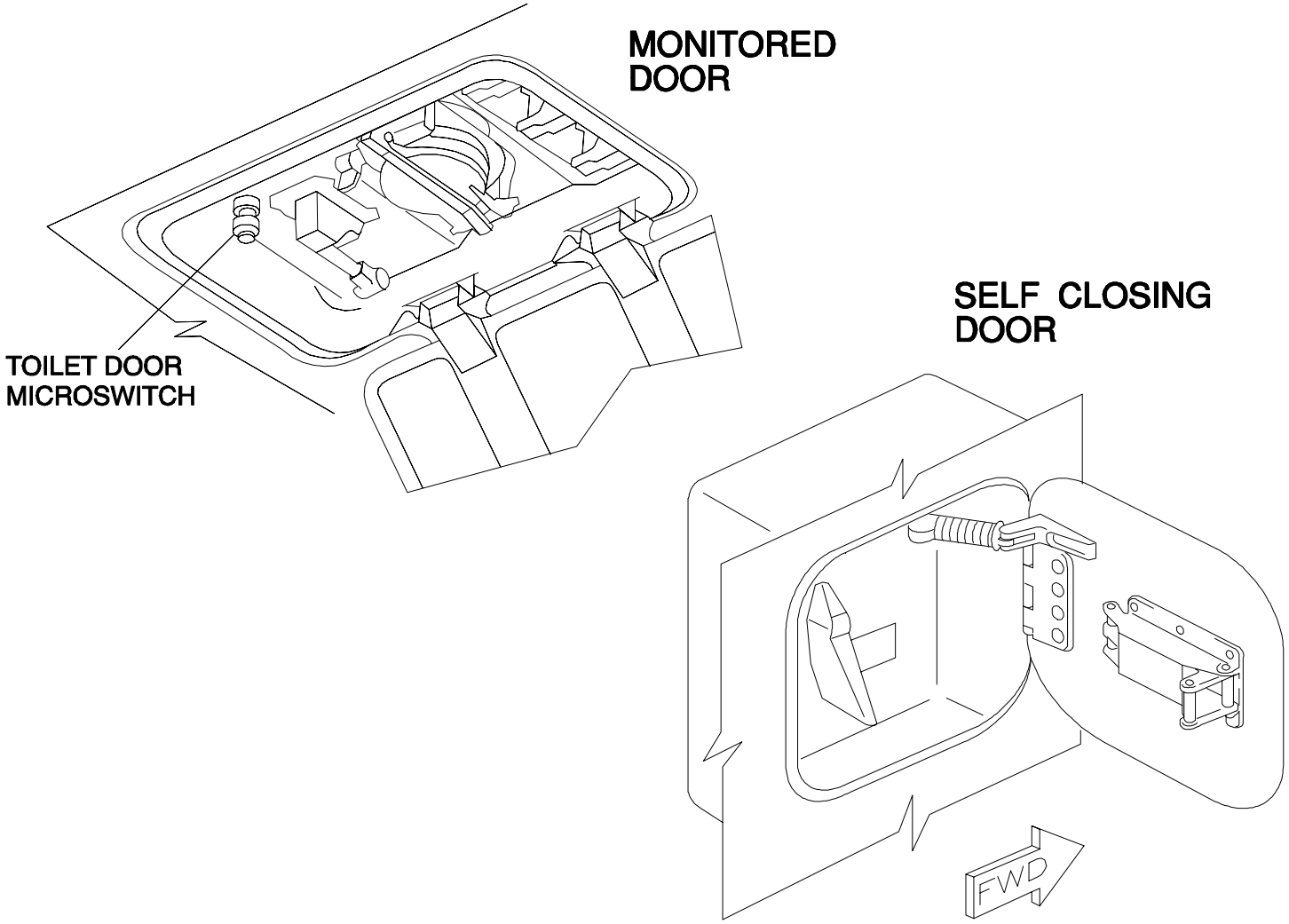




FQW4200 GE Metric

ACCESS DOORS

Access doors are located on the aircraft to allow servicing and miscellaneous access. Any door not monitored electronically will close with the airflow if inadvertently left open.



FQW4200 GE Metric

STUDENT NOTES

MISCELLANEOUS DOOR OPERATION

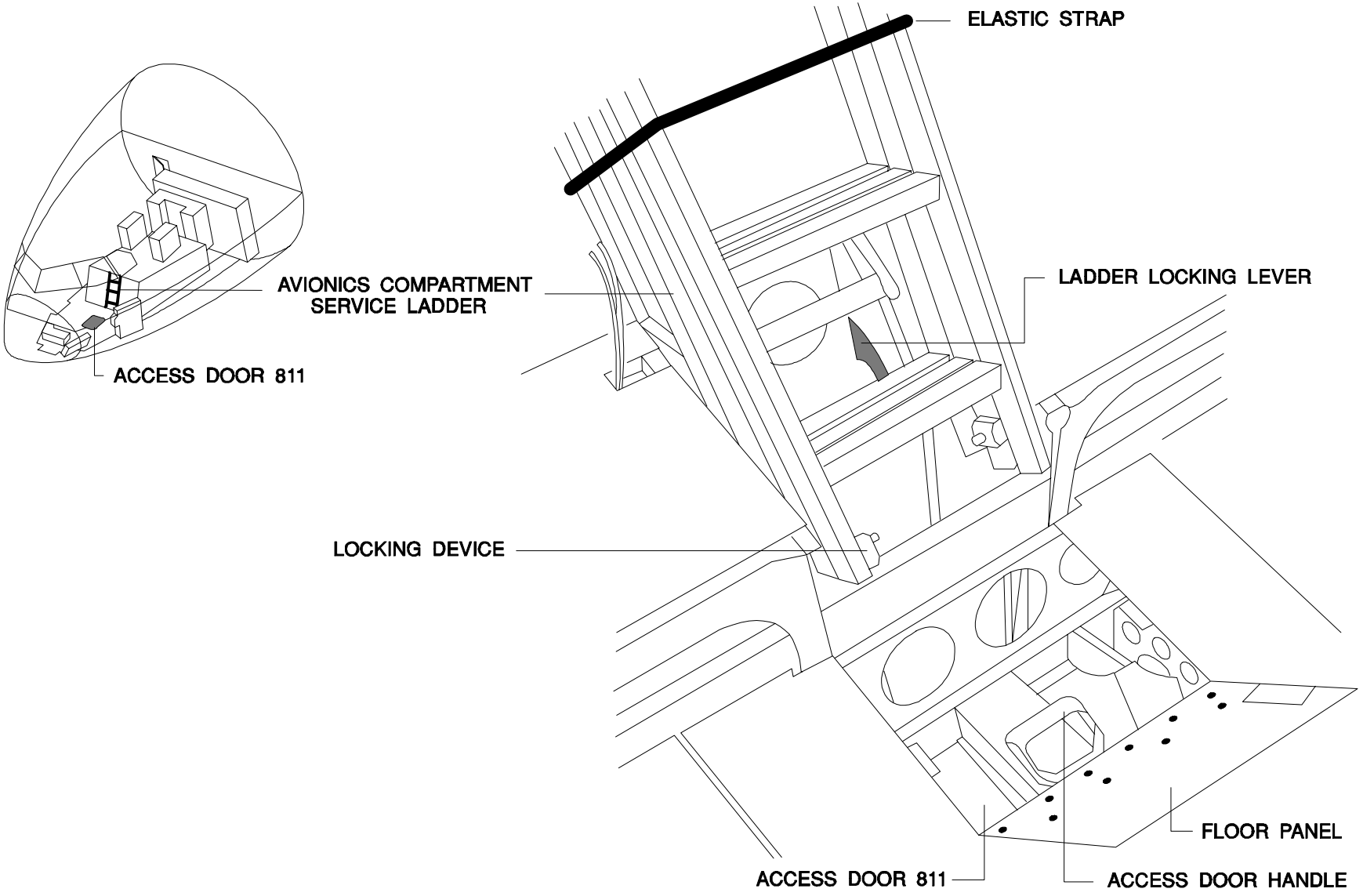
A340 Ground access ladder operation

A340 GROUND ACCESS LADDER OPERATION

The purpose of this part is to describe the operation of the ground access ladder.
The ground access ladder is located in the avionics compartment in the underfloor nose section.

- An access panel in the cockpit gives access to the avionics compartment forward zone.
- Open the access panel, then secure it.
- Open the floor panel which covers the avionics compartment access door handle.
- Lift the handle and pull the door into the compartment until it is latched.
- Remove the strap which attaches the ladder assembly.
- Lift the lever to unlock the ladder and swing it towards the opening.
- Release the locking device by pulling the orange handle forward.
- Move the section down until it latches.

Do the same with the intermediate section of the ladder locking device.
- If the ladder still does not touch the ground, pull forward the orange handle of the lower section.
- To retract the ground access ladder, do the operation in the reverse order.



FQW4200 GE Metric

STUDENT NOTES

MISCELLANEOUS COMPONENTS

Cockpit door
Fixed partition doors
Access doors
Service doors

COCKPIT DOOR

FIN/ZONE

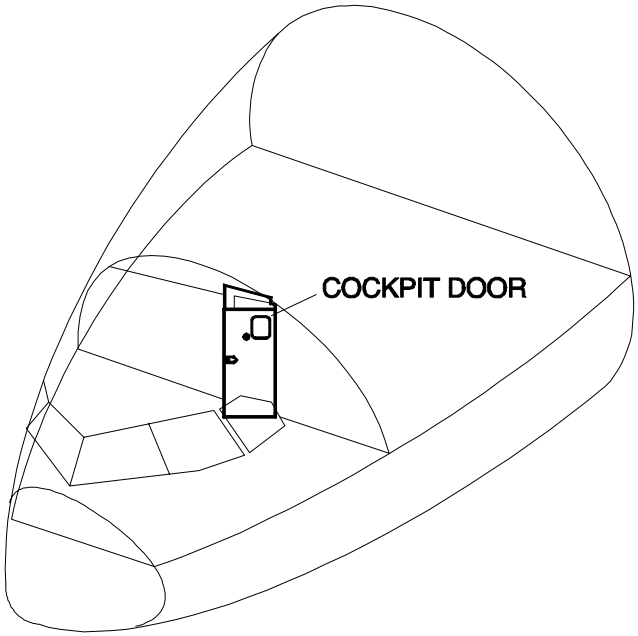
FIN :
ZONE : 220

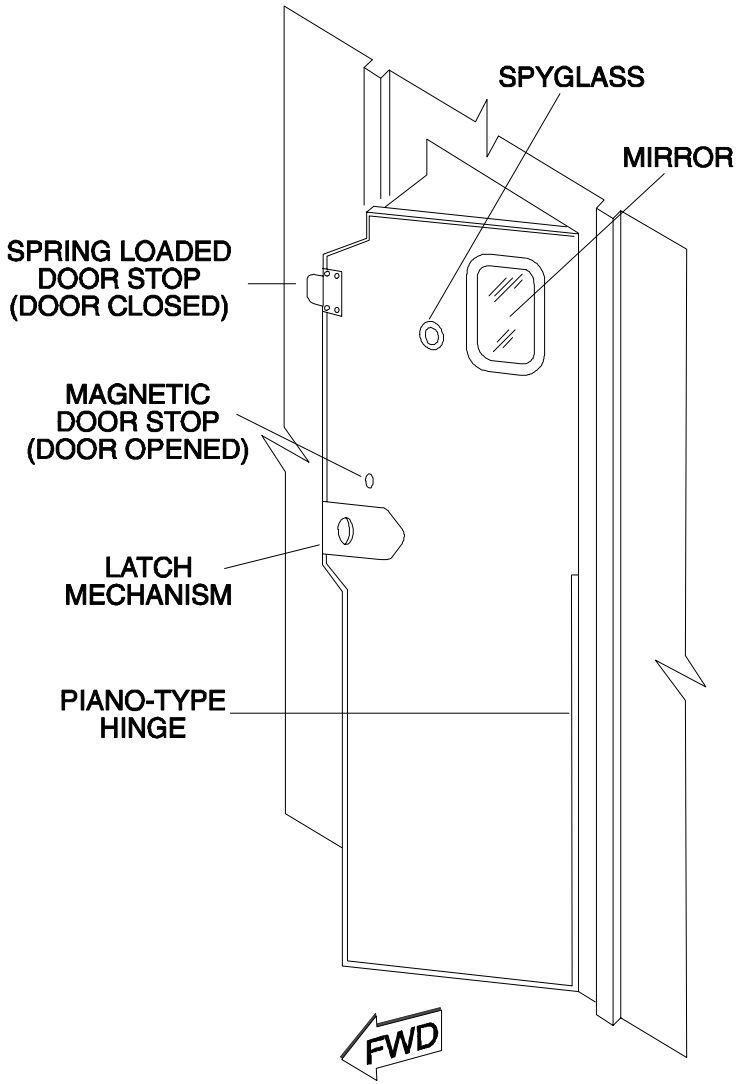
COMPONENT DESCRIPTION

The cockpit door is made of honeycomb core bonded between sheets of GlassFiber Reinforced Plastic (GFRP) which are protected from damage by a lining.
The door is attached to the door frame with a piano-type hinge.

SPECIAL DESIGN

A spyglass is installed in the cockpit door adjacent to a mirror.
You can only look through the spyglass from the cockpit side of the door.





FQW4200 GE Metric

COCKPIT DOOR

FIXED PARTITION DOORS

FIN/ZONE

FIN : 132AZ/162ZW
ZONE : 132/162

COMPONENT DESCRIPTION

The underfloor compartment is divided by fixed partitions.
Some of them have interior doors :

- Door 132AZ (FWD cargo-compartment fixed partition)
- Door 162ZW (bulk cargo-compartment fixed partition)

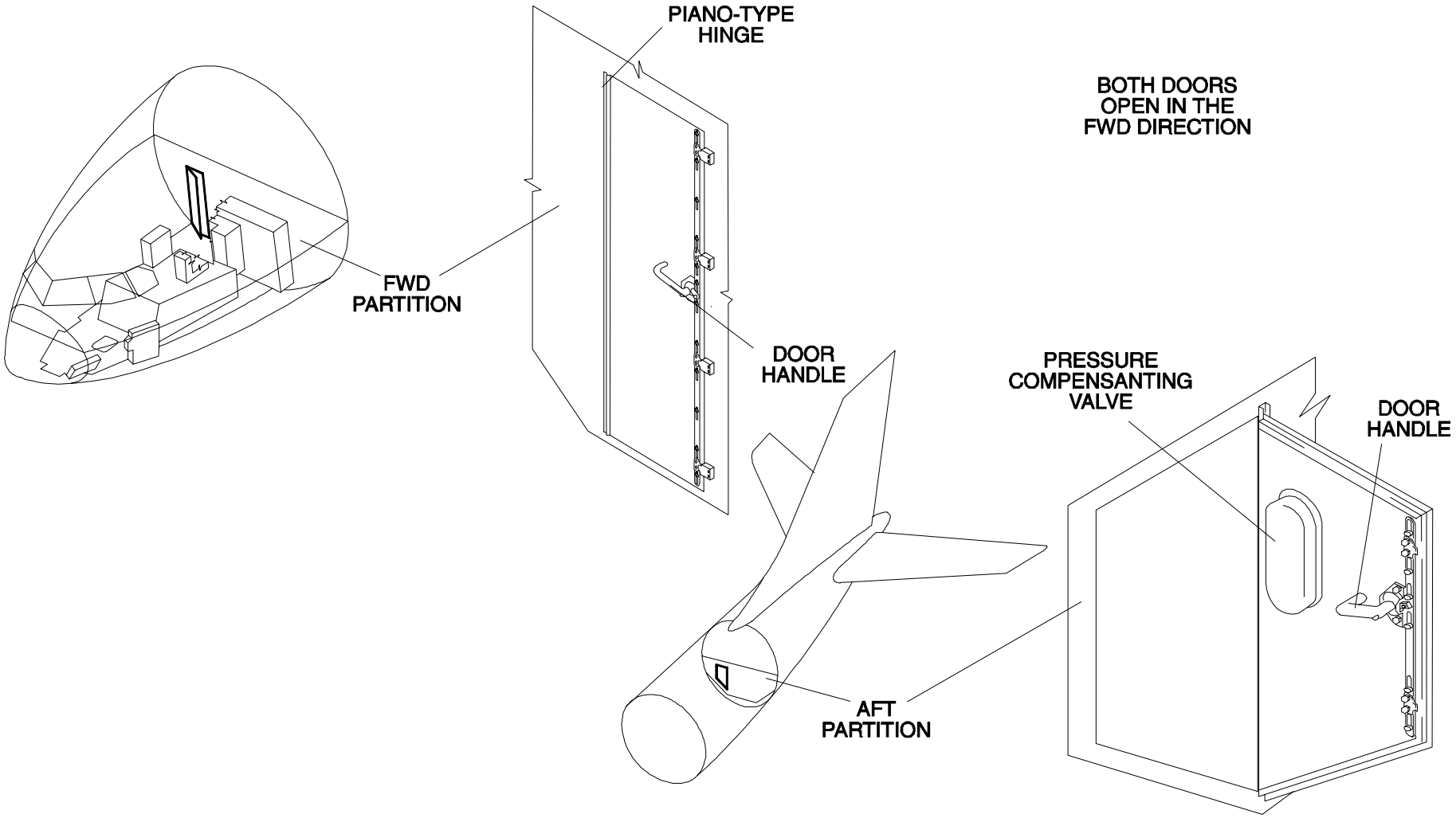
They give access to the installation position of systems and equipment for maintenance.
The doors are made of honeycomb core bonded between sheets of GlassFiber Reinforced Plastic (GFRP).

SPECIAL DESIGN

A pressure compensating valve is installed in the upper part of door 162ZW.
It compensates the pressure between the two compartments.

SAFETY PRECAUTIONS

These doors must be opened by authorized personnel and only if necessary.



FQW4200 GE Metric

FIXED PARTITION DOORS

ACCESS DOORS

FIN/ZONE

FIN : 122DR, 152MR, 311AL, 312AR, 313AL, 315AL, 316AR, 317AL

ZONE : 122, 152, 310, 312, 313, 315, 316, 317

COMPONENT DESCRIPTION

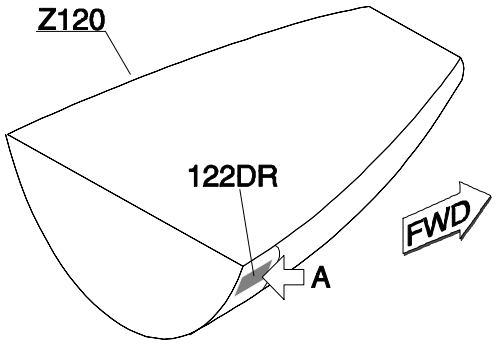
Access doors are installed at different locations in the outer skin of the fuselage.

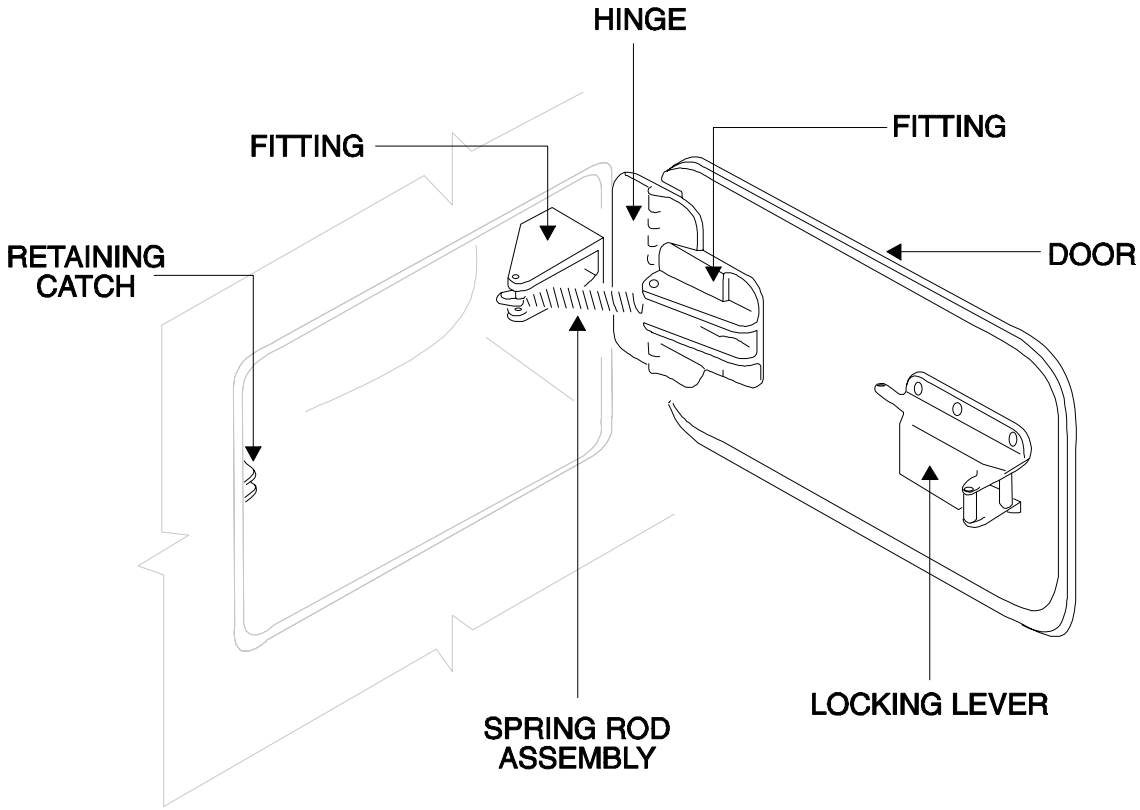
Ex : The Cargo Loading System control panel door :122 DR
The door gives access to the Cargo Loading System control panel of the FWD cargo compartment.

SPECIAL DESIGN

Most of the doors are installed in the non pressurized area of the aircraft.

All access doors are opened and closed manually.





FQW4200 GE Metric

ACCESS DOOR - CLS CONTROL PANEL DOOR 122DR

SERVICE DOORS

FIN/ZONE

FIN :121EL, 122CR, 133BL, 152NR, 154AR, 164AR, 171AL, 191EB, 195BB, 196BB, 197CB, 198DB
ZONE : 121, 122, 133, 152, 154, 164, 171, 191, 195, 196, 197, 198

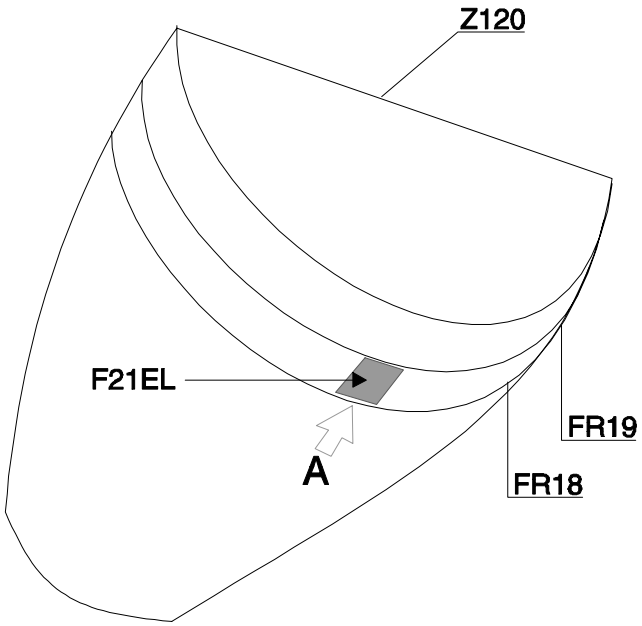
COMPONENT DESCRIPTION

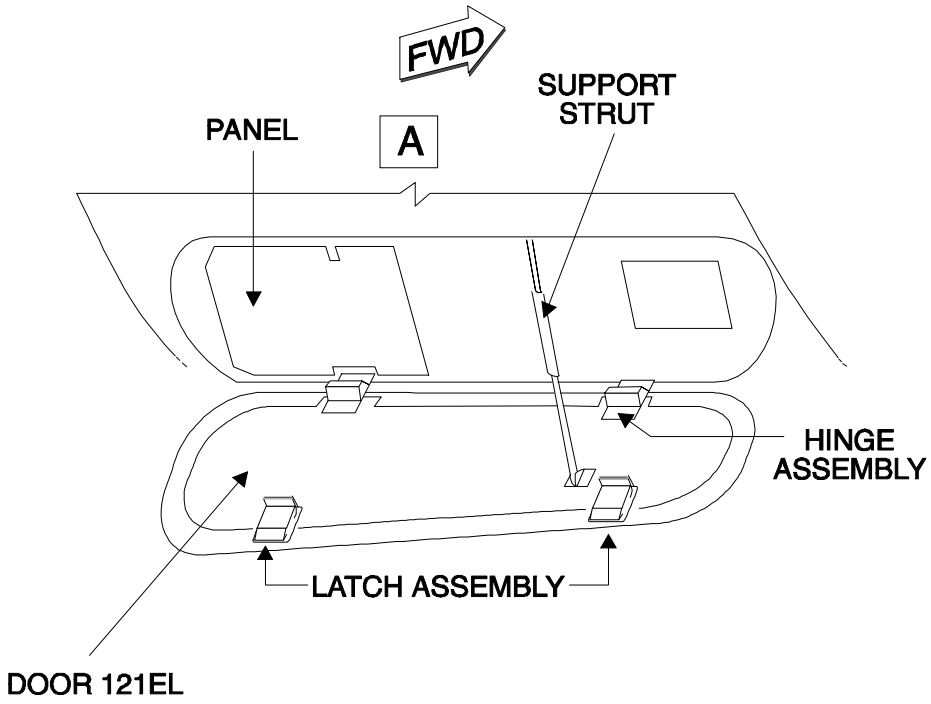
Service doors give access to systems and equipment for servicing.
They are installed at different locations in the fuselage structure.
The designation and zones give the use and the position of the doors.

Example : Door 121EL - External Power Receptacle.
This door, installed to the rear of the nose landing gear, gives access to the external power receptacle.

SPECIAL DESIGN

All service doors are opened and closed manually.





FQW4200 GE Metric

SERVICE DOORS - DOOR 121EL EXTERNAL POWER RECEPTACLE

STUDENT NOTES

PAX / CREW DOOR CYLINDER REACTIVATION

General
Reactivation

GENERAL

During emergency operation, the damper cylinder behaves as an actuator which operates the release lever.
Operation of the release lever triggers the percussion mechanism.
When the door has been opened in an emergency, the percussion mechanism must be reactivated and the gas cylinder recharged.

REACTIVATION

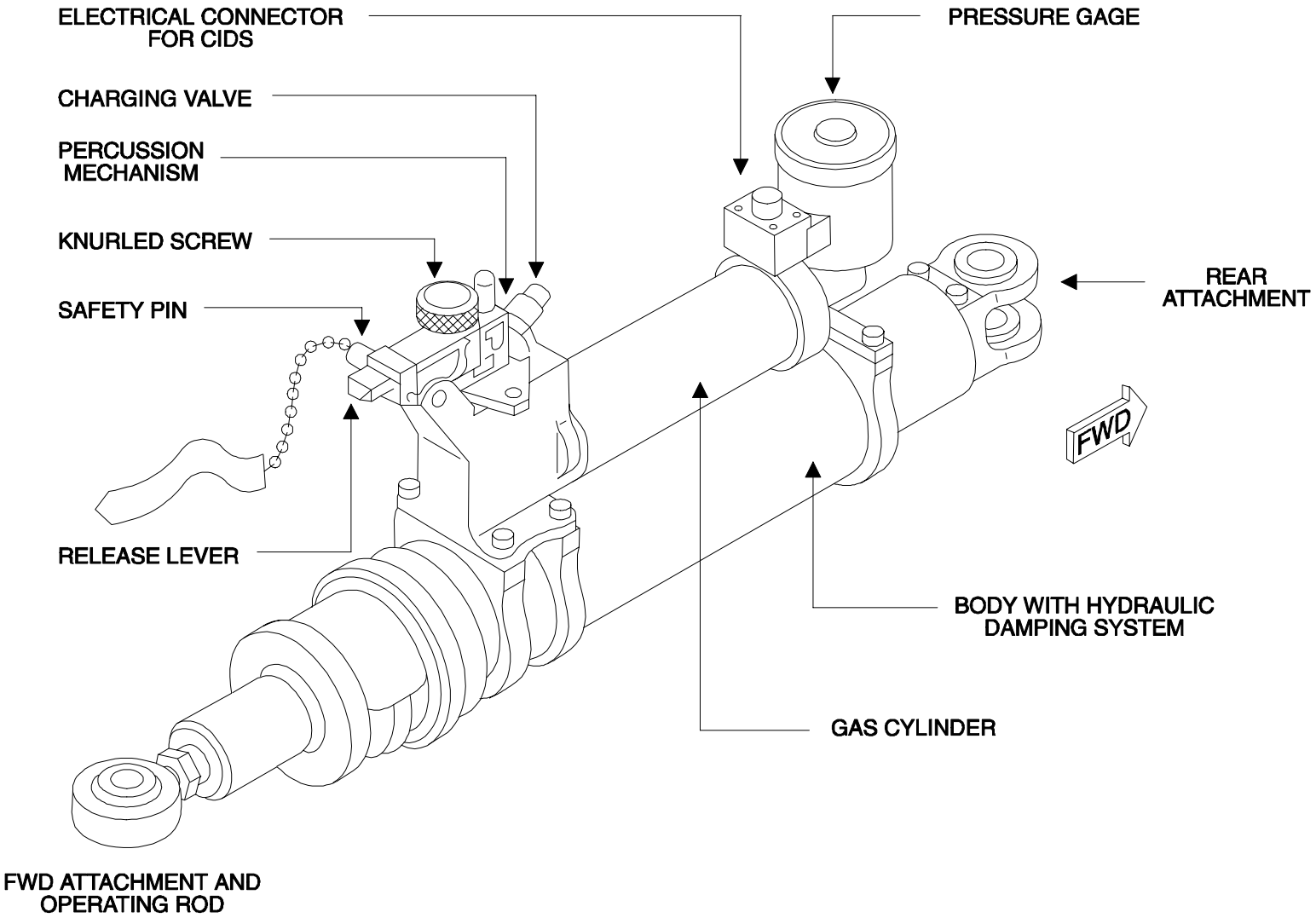
The damper cylinder reactivation first consists in the replacement of a percussion diaphragm located in the percussion mechanism.

- Before you start working on the door, make sure that the emergency control handle is in the disarmed position and the safety pin installed.
The door must be opened to get access to the damper and emergency operation cylinder.

- On the door cylinder, install the rigging pin from inside to outside.
- Make sure that the pressure gage indicates " zero ".
- Remove and discard the lockwire.
- Loosen the knurled screw. Remove the release lever from the guide and turn it through 90 degres.
- Remove and discard the shear pin.
- Remove the screws from the valve guide and remove the valve guide from the housing assembly.
- Remove the diaphgram, the spring and the spacer.
- Discard the diaphgram and inspect the spacer.
- Remove and discard the seal and the packings.

Before you install the new diaphragm, visually inspect the component interface and adjacent area.

- Install the spacer, the spring and the new diaphragm.
- Install the new seal on the valve guide.
- Put the valve guide in position on the housing assembly and install the screws.
- Refer to your maintenance manual for the clearance between the valve guide and the housing asssembly when the screws are fully tightened.
- Install the new shear pin.
- Turn the release lever back through 90 degres, push it fully forward and tighten the knurled screw.
- Safety the screw with corrosion-resistant steel lockwire.
- Refer to the label to fill the gas bottle to the correct pressure.
- Remove the pin.
- Make sure that the work area is clean and clear of tools and other items before close up.



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STUDENT NOTES

CMS SPECIFIC PAGE PRESENTATION

Proximity Switch Control Unit (PSCU) test
Autonomous Standby Power Supply Unit (ASPSU) test

PSCU TEST

The PSCU receives an ARINC 429 input from the Central Maintenance Computer (CMC) for ground maintenance. This enables the CMCs have access to the PSCU main menu, through the Multipurpose Control Display Unit (MCDU), when the aircraft is on the ground.

Two functions are available from the PSCU menu :

< GND SCANNING
If this function is selected, the MCDU displays in real time and indicates :

- the time the fault occurred,
- the ATA number of the component,
- the functional designation of the component,
- the FIN of the component,
- the class of the fault.

Only two faults can be displayed on an MCDU page.
If no faults are detected the corresponding message is shown.

TEST >
This function causes a complete system test of the Doors and escape Slides Control System (DSCS). After the test, the MCDU displays :

- TEST OK (if there is no fault)
- The ATA number, the functional designation and the FIN of the component, the class of the fault (if there is a fault).

Note :
TEST IN PROGRESS (40s) is displayed if the test lasts more than one second.

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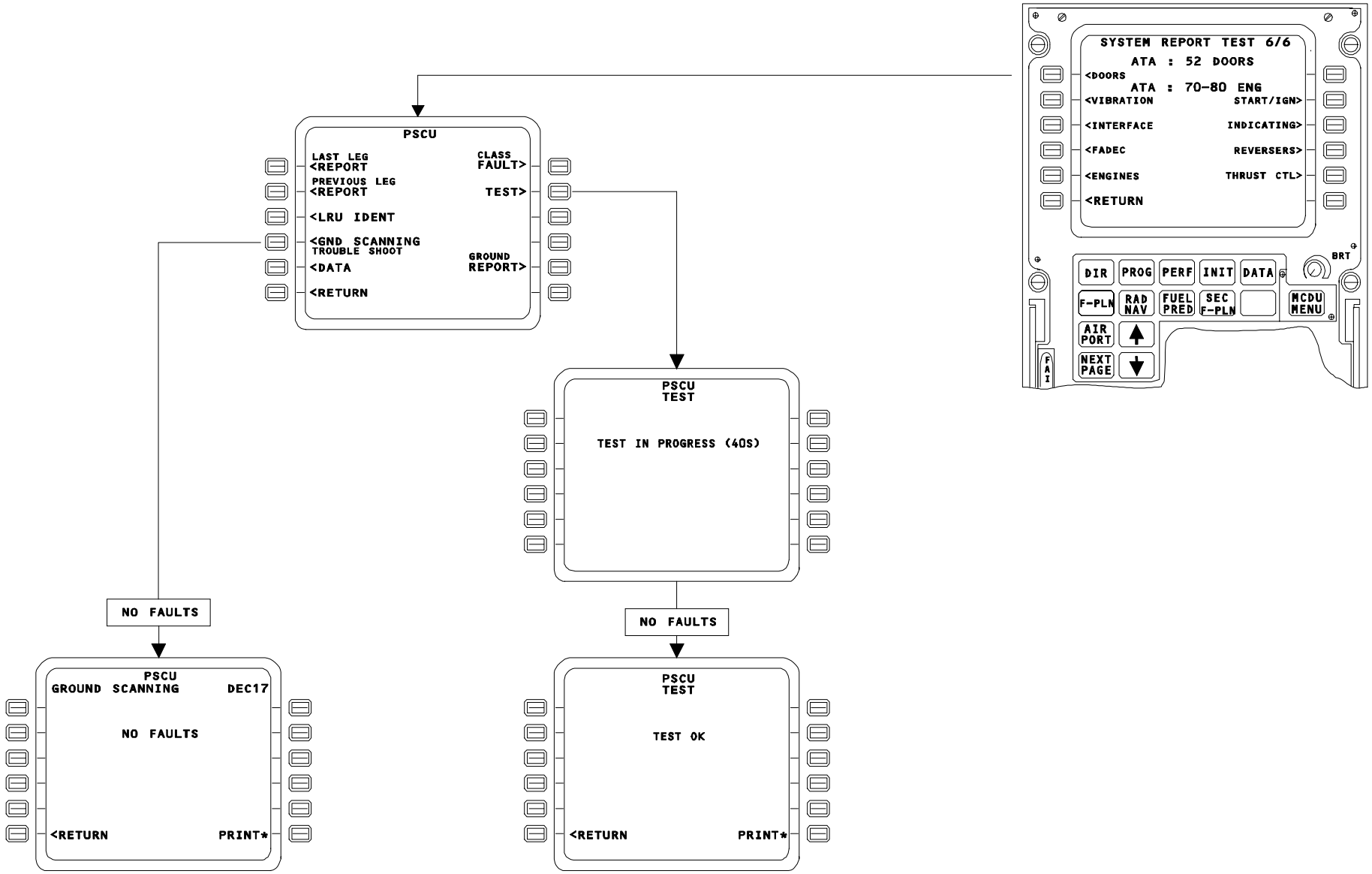

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ASPSU TEST

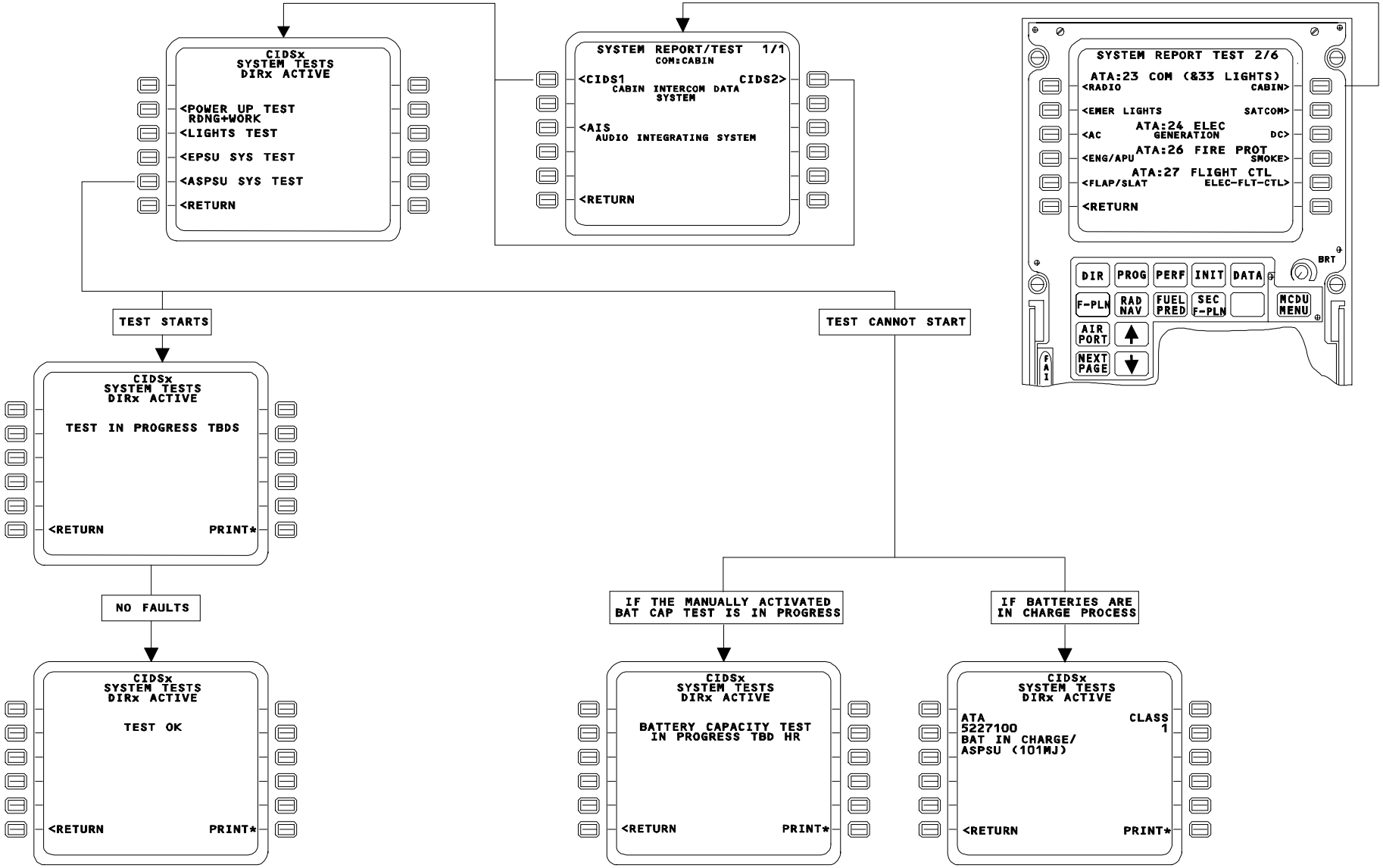
The ASPSU has a Built-In Test Equipment which enables a system test. This test can be performed from the MCDU (CABIN> line key in the SYSTEM REPORT/TEST page 2/6).

The Cabin Intercommunication Data System (CIDS) transmits the "start system test" data to the ASPSU. The MCDU displays the result of the test :

- TEST OK (if there is no fault)
- The ATA number related to the fault, the functional designation and the FIN of the component, the class of the fault (if there is a fault)

Note :

If the manually BAT CAP test is in progress or the batteries are in charge mode, the ASPSU cannot start the system test.



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STUDENT NOTES