G650 Pressurization System

Pressurized Baggage Compartment

Pressurized Cabin

Aft Secondary Bulkhead

Aft Primary Bulkhead

10.69 psi

TROY
The pressurization system controls cabin pressure by modulating the thrust recovery outflow valve (TROV) in order to achieve and maintain an optimum cabin pressure.
Cool, conditioned, dehumidified Air

Exhausted overboard via the TROV

10.69 Psi

L Pack R Pack

ECS

12/5/17
Three (3) Operational Modes

Two (2) Pressurization Modes

PSI Limits

FL 510
10.69 psi
4,850' Cabin Altitude

Normal
MAX 4

MAX 0.3 psi during Taxi, Takeoff and Landing so as to allow opening of Emergency Exit Doors (EED) and Main Entrance Door (MED)

5th and 6th windows

EED

EXIT

EED
Cabin Pressure Controller (CPC)

- Brains of the pressurization system
- Microprocessor located in the REER which makes all logical decisions
- Receives input from:

- Two (2) channels in AUTO and SEMI modes
- One (1) channel active at the time while the other channel remains on standby
- CPC 1 2

Channels change by:

- Removing power
- Cycling main or baggage door

- Selecting/deselecting

- Located at the bottom of the REER
Cabin Pressure Acquisition Module (CPAM)

- Self contained unit located beneath the REER.
- Standalone source of cabin pressure information.
- CPC channels compare cabin pressure data with each other.

- If channels 1 and 2 differ by ≥ 310', they then compare each other against the CPAM.
- The CPAM acts as arbitrator.
- Any channel that differs by $\geq 310'$ than the causes that channel to fail.

CPCS automatically selects operative channel.
AUTO MODE

- Normal mode of operation (fully automatic)
- CPC controls pressurization based on pressurization schedule
- CPC receives input from MCDU data
- Requires AC power

IDGs → APU GEN → RAT GEN →

LESS DC 28VDC [STATIC INVERTER] 115VAC

- Pressure profile modes are automatic

Flight Flight
Landing Landing
- Pre-pressurization to 0.25 Psi (approx. LFE-500') initiated if door closed and any of the following occur:
  1) Taxi speed > 9 Knots, or
  2) Throttles advanced > 15° Thrust Lever Angle (TLA), or
  3) Manually selected by the crew

**CAUTION** if returning to the ramp deselect in order to depressurize the cabin prior to opening the main door.

- Cabin rate of climb after takeoff: 500 fpm
- During descent as the aircraft crosses 1,000' below cruise altitude pressure profile changes from:
  - Flight
  - To
  - Landing
CPC uses data from rate to calculate descent.

If the aircraft levels off for 3-6 minutes ≥ FL 250, the pressure profile changes from:

- **Pressurization Profile**

- Taxi out > 9 knots
- LFE - 500' @ 300 fpm
- Δ P 0.25 PSI
- LFE - 250' @ 150-300 fpm
- 1,000' below cruise altitude
- FL 510
- FL 4,850'
- 10.69 PSI
- 50,000'
- +500 fpm
- -150 fpm
Weight-on-wheels

1. Cabin climbs 500 fps to LFE
2. PRV opens sixty (60) seconds after touchdown
SEMI MODE

- Alternate Normal mode of operation (semi automatic)
- Semi mode used when:
  - FMS data not available or is invalid
  - Directed by the checklist
  - Crew discretion < QFE operations
    Crew wants more control
    over the system
- Crew enters data via Standby Multifunction Controller (SMC)
- Same AC power requirements as AUTO mode
- Pressure Profile modes are automatic
If CPC channels are both inoperative the crew can still control the pressurization manually.

CPCs Fail - Select Manual

Crew selects manual and controls TROY.
- Crew manually controls the outflow valve (TROY) in order to climb, maintain, and descend the cabin pressure altitude.

- Crew uses the MAN HOLD knob.

- Requires L ESS DC power.

- Cabin Pressure Acquisition Module (CPAM) provides the following data:
  - Cabin altitude
  - Cabin rate
  - Cabin differential
THRUST RECOVERY OUTFLOW VALVE (TROV)

- Located on the right side of the fuselage
- Controlled by the CPC in AUTO/SEMI
- Controlled by the crew in MANUAL
- Shutter-type door design that minimizes drag
- Three (3) electrical actuators (motors)
  - Two (2) AC and one (1) DC

Power Sources

Channel 1
- 28VDC
- L ESS DC
- R MAIN AC
- Manual

Channel 2
- L ESS DC

CPC
- Static Inverter
- 115VAC
TROV Motors
Sources of power

L GEN  R GEN
ON    ON

L GEN  R GEN
ON    OFF
OR
OFF    ON

APU GEN
ON

RAT GEN

MAIN BATTERIES
ON
ON

Left    Right

(>180 KTs)
RAT GEN

L-R AC Power Fail
L-R AC Power Fault
APU Power Fail
RAT Generator On

LESS DC 28VDC

STATIC INVERTER 115VAC

TROV MOTOR 1
CPC 1

RAT

(> 180 KTS)
ROTAR BURST/PRESSURIZATION

AFT SECONDARY BULKHEAD

AFT PRIMARY BULKHEAD

PRESSURIZED BAGGAGE COMPARTMENT

PRESSURIZED CABIN

10.69 PSI

TROV

AFT SECONDARY BULKHEAD

AFT PRIMARY BULKHEAD

10.69 PSI

TROV
The physical location of the TROV as well as the availability of the secondary pressure bulkhead ensures that the cabin pressurization is not affected.
Pressure Relief Valve (PRV)

- The PRV is located just above the TROV
- The purpose of the PRV is to protect the aircraft from damage due to excessive positive or negative pressure

1. **Positive Differential Pressure Relief:**
   - Two (2) metering sections

1. **First Chamber Opens at:**
2. **Second Chamber Opens at:**

   **Cabin Differential - 10.80**

   **Cabin Differential - 11.00**
③ Negative Differential Pressure Relief:

No CAS Message

③ Ground Pressurization Limiting:

PRV opens sixty (60) seconds after touchdown

- Independently senses cabin pressure using aircraft static ports located on the right side of the fuselage

Feeds PRV 10.8 PSID Relief

Feeds PRV 11.0 PSID Relief
Emergency Descent Mode (EDM)

Autopilot ON
Aircraft Altitude > FL400
Cabin Pressure Low CAS Message

1. Autothrottles engage if desigaged
   - Trottles Retard to idle
   - FMA Power display on PFD → FLCH

2. GP Lateral Mode - deselected
   - FMA Lateral display on PFD → EDM
   - Command 90° Left Turn

3. GP Vertical Mode - FLCH
   - FMA Vertical display on PFD → IAS with ASEL

4. GP Speed Mode - MAN
   - VMO (340 knots) displays on Speed window

5. Altitude - 15,000' in Preselect window
- **Flight Mode Annunciator (FMA)**

  - EDM | FLCH | IAS
  - 340 | AP 1 | AT 1
  - 15,000

- **Guidance Panel (GP)**

  - SPEED | HEADING | ALTITUDE
  - IAS 340 | HDG 270 | FT 15,000
  - MAN * HDG: 90° LEFT TURN FLCH

- **Level off**

  - FMA VERTICAL display on PFD → ASEL → ALT
  - FMA Speed display on PFD → 340 → 250

- **Canceling EDM:**
  - AP disconnect button, or
  - Deselect on GP
# Cabin Pressure Low Trip Points

<table>
<thead>
<tr>
<th>Mode</th>
<th>Landing Field Elevation</th>
<th>Cabin Altitude</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fault</strong></td>
<td>N/A</td>
<td>8,000’</td>
</tr>
<tr>
<td><strong>Manual</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Manual</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Auto</strong></td>
<td>&gt; 14,000’</td>
<td>≥ 15,500’</td>
</tr>
<tr>
<td><strong>Auto</strong></td>
<td>9,500’ - 14,000’</td>
<td>≥ 14,500’</td>
</tr>
<tr>
<td><strong>Semi</strong></td>
<td>7,500’ - 9,500’</td>
<td>≥ 10,000’</td>
</tr>
<tr>
<td><strong>Semi</strong></td>
<td>Sea Level - 7,500’</td>
<td>≥ 8,000’</td>
</tr>
</tbody>
</table>
Oxygen Requirements/Operations

Above 41,000’ ONE PILOT MUST BE ON OXYGEN - FAR 91

Crew and passenger masks NOT APPROVED for use above 40,000’ cabin altitude.

Above 35,000’ ONE PILOT MUST BE ON OXYGEN if the other pilot leaves the cockpit - FAR 91

Passenger masks will NOT provide sufficient oxygen above 34,000’.

Above FL250 crew masks must be in the quick donning position which allows donning within five (5) seconds.

Automatic deployment of passenger oxygen masks at 14,750’ ± 250’ (15,750’ ± 250’ with high alt).

See AFM 01-35-10 to determine required oxygen quantity for departure.
STATIC PORTS

- Located on the right side of the fuselage

- Two of these static ports are used by the PRV to sense exterior pressure

- The third static port is used by the CPAM

![Diagram of an airplane with static ports and pressure relief values]
Questions, comments or errors...please send me an email: ivan@code7700.com

Thank you!