



CHALLENGER 350

BD-100-1A10

FUEL

STUDY GUIDE · CARD SYSTEM

A flashcard-style reference for the CL350 fuel system — ATA 28. Covers tank architecture, ejector and boost pump operation, crossflow methods, refueling limits, quantity gaging, and all fuel-related EICAS messages. Each card targets one examinable fact; work through them before your oral.

ATA 28 · FUEL

Section FUEL · Revision: Original

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01

FIVE THINGS YOU MUST KNOW

The five highest-value facts for the oral. Memorize numbers cold.

14,150 lb

Maximum usable fuel — pressure refueling

13,000 lb

Maximum usable fuel — gravity (overwing) refueling

55 psig

Maximum pressure refueling pressure limit

−35°C / −31°F

WING FUEL TEMP LOW caution threshold (right wing)

53.6 lb

Fuel capacity of each surge bay (one per wing)

TIP Five baseline numbers for the fuel system: pressure-refuel limit 14,150 lb, gravity-refuel limit 13,000 lb, and the −35°C temperature caution. The cards break the system into storage, distribution, transfer, and indications.



02

SYSTEM ARCHITECTURE · STUDY CARDS

TWO DISTRIBUTION SYSTEMS

How is fuel divided between engines?

- Left system feeds left engine only
- Right system feeds right engine AND APU
- Systems are fully independent — no automatic crossfeed

TANK CONSTRUCTION

What type of tanks does the CL350 use?

- Integral wet wing tanks — wet wing design
- Sealed with fuel-resistant sealant
- Collector tanks in aft/inboard corner of each wing

COLLECTOR TANKS

What are collector tanks and where?

- Aft inboard section of each wing tank
- All engine fuel consumption flows from collector tanks
- Fed by gravity (flapper check valves) and scavenge ejectors

SURGE BAYS

What is the purpose of surge bays?

- Located outboard of each wing tank — one per wing
- Each holds 53.6 lb of fuel as expansion volume
- Prevent fuel spillage; flapper valves block outward flow

APPROVED FUEL TYPES

What fuel grades are approved?

- Kerosene: Jet A, Jet A-1, JP-5, JP-8
- Wide-cut: Jet B, JP-4
- ASTM D1655, MIL-DTL-5624, MIL-DTL-83133 and equivalents

03

EJECTOR PUMPS · STUDY CARDS

MAIN EJECTORS — PRIMARY FEED

Components of the low-pressure spool?

- Installed on bottom of collector tanks
- Motive flow from engine-driven fuel pump (high pressure)
- Venturi effect draws fuel from collector tank to engine

EJECTOR MOTIVE FLOW

Components of the high-pressure spool?

- Engine-driven fuel pump provides high-pressure motive flow
- High-velocity flow through venturi creates suction
- Same engine-driven pressure drives the scavenge ejector

SCAVENGE EJECTORS

Combustion section details?

- Located at lowest inboard point of each wing tank
- Transfer fuel from wing tanks to collector tanks
- Motive flow from engine-driven fuel pumps

EJECTOR PRESSURE SWITCH

Fan blade containment material?

- Pressure switch at ejector outlet
- Signals proper ejector pump operation to EICAS
- Low pressure triggers DC boost pump activation

APU FUEL FEED

What does the VG system control?

- Right collector tank supplies APU
- Right main ejector is primary source
- Right DC boost pump activates if ejector pressure is low

DC BOOST PUMPS - STUDY CARDS

BOOST PUMP FUNCTIONS

What are the three functions of DC boost pumps?

- Fuel pressure during engine start
- Backup for main ejector pump failure
- Fuel transfer between wing tanks (crossflow)

BOOST PUMP AUTO MODE

What activates the pump in AUTO?

- ENGINE RUN switch ON and pump switch in AUTO
- Operates when ejector pressure is insufficient
- 10-second time delay before shutdown after ejector pressure achieved

BOOST PUMP MODES

What are the switch positions?

- OFF — pump disabled
- AUTO — normal flight position; auto logic governs
- ON — manual activation (L (R) FUEL PUMP ON status posts)

10-SECOND DELAY

When does the 10-second delay apply?

- After ejector achieves sufficient pressure
- Pump remains on for 10 seconds before AUTO shutdown
- Ensures stable ejector pressure before boost pump stops

BOOST PUMP LOCATION

Where are DC boost pumps installed?

- Parallel with each feed ejector
- One per side (left and right)
- Installed in collector tank area



CROSSFLOW SYSTEMS · STUDY CARDS

POWERED TRANSFERFEED

How is powered fuel transfer performed?

- Open transfer valve (interconnects pumps)
- Select DC boost pump ON on the pumping side
- Fuel pumped through transfer valve past inactive pump

TRANSFER VALVE NORMAL

What is the normal state of the transfer valve?

- Normally CLOSED — isolates left and right systems
- Opened manually by pilot for powered transfer
- FUEL XFER OPEN status posts when open

GRAVITY CROSSFLOW

How does gravity crossflow work?

- Independent of the powered transfer system
- Direct gravity flow path between wing tanks
- Gravity crossflow SOV opened by pilot

GRAVITY CROSSFLOW — WHEN

When is maneuvering required for gravity crossflow?

- Minimal imbalance: aircraft maneuvering may be required
- Large imbalance: no special maneuvering required
- FUEL GRAV XFLOW OPEN status posts when valve is open

CROSSFLOW MONITORING

How is fuel transfer monitored?

- Visual monitoring via EICAS fuel synoptic page
- Fuel quantity displays update in real time
- FUEL IMBALANCE caution appears if threshold exceeded

CROSSFLOW — TWO METHODS

- POWERED: Transfer valve OPEN + boost pump ON → fuel pumped across
- GRAVITY: Gravity crossflow SOV OPEN → fuel flows by gravity
- Transfer valve is normally CLOSED — isolates L/R systems
- Both methods monitored on EICAS FUEL synoptic page
- FUEL XFER OPEN (status) and FUEL GRAV XFLOW OPEN (status) flag open valves

FUEL QUANTITY & INDICATIONS · STUDY CARDS

FUEL COMPUTER

What does the dual-channel fuel computer do?

- Calculates onboard fuel quantity
- Controls automatic refueling operations
- Automatic switchover if one channel fails

QUANTITY INPUTS

What data does the fuel computer use?

- Fuel density and probe readings
- Aircraft attitude and accelerations from IRS
- Weight-on-wheels (WOW) signal

FUEL DISPLAY UNITS

What units are shown on the FUEL synoptic?

- Flow: PPH (pounds per hour) or KPH (kilograms per hour)
- Quantity: pounds or kilograms
- Magenta dashes indicate invalid sensor input

TOTAL FUEL GREEN

When does total fuel display in green?

- Over 1,000 lb total fuel AND 500 lb per wing
- Below these values: color changes to indicate low state
- Monitored on EICAS summary and FUEL synoptic pages

FUEL USED

How does the FUEL USED counter work?

- Displays fuel used since counter was last reset
- Automatic reset on FADEC power-up
- Magenta dashes indicate invalid data

FUEL TEMP PROBE

Where is the fuel temperature probe?

- Located in the right wing tank only
- Provides temperature to fuel indicating system
- Triggers WING FUEL TEMP LOW caution below -35°C

FUEL IMBALANCE · STUDY CARDS

IMBALANCE THRESHOLDS

When does FUEL IMBALANCE caution post?

- 250 lb imbalance when total fuel > 13,700 lb
- 315 lb imbalance when total fuel 10,000–13,700 lb
- 450 lb imbalance when total fuel 4,700–10,000 lb

IMBALANCE — LOW FUEL

Low-fuel imbalance threshold?

- 600 lb imbalance when total fuel < 4,700 lb
- Higher tolerance allowed at low total fuel loads
- Monitor on EICAS; correct with crossflow

IMBALANCE CORRECTION

When does total fuel display in green?

- Powered transfer: transfer valve + boost pump
- Gravity crossflow: open gravity crossflow SOV
- Monitor EICAS fuel quantities during transfer

IMBALANCE DISPLAY

How does the FUEL USED counter work?

- Fuel quantities shown per wing on synoptic
- **FUEL IMBALANCE** (C) caution when threshold exceeded
- Total fuel shown in green above 1,000 lb / 500 lb per side

FUEL IMBALANCE TRIGGER TABLE

- Total fuel > 13,700 lb → 250 lb triggers FUEL IMBALANCE (C)
- Total fuel 10,000–13,700 lb → 315 lb triggers caution
- Total fuel 4,700–10,000 lb → 450 lb triggers caution
- Total fuel < 4,700 lb → 600 lb triggers caution
- Correct with powered transfer or gravity crossflow — monitor EICAS

FUEL SHUTOFF VALVES · STUDY CARDS

ENGINE FUEL SOV LOCATION

Where are the engine fuel shutoff valves?

- Aft spar of wing box in main landing gear bay
- Located forward of engine rotor burst areas
- One per engine — electrically operated

ENGINE SOV CONTROL

How are engine fuel SOVs operated?

- Controlled by L (R) ENG FIRE switches on ENGINE control panel
- ·Close on ENG FIRE switch activation
- ·Can be reopened by pushing the switch again

APU FUEL SOV

How is the APU fuel SOV controlled?

- Electrically operated shutoff valve
- Controlled by APU FIRE switch on ENGINE control panel
- ·Automatic control during normal APU operations

SOV — FIRE INTEGRATION

How does the FUEL USED counter work?

- ENG FIRE switch simultaneously closes fuel SOV
- ·APU FIRE switch closes APU fuel feed SOV
- ·SOVs are forward of rotor burst zones for safety



REFUELING & DEFUELING · STUDY CARDS

PRESSURE REFUELING

How is powered fuel transfer performed?

- Maximum: 14,150 lb usable fuel
- Single-point refueling port preferred method
- Maximum refueling pressure: 55 psig

GRAVITY REFUELING

What is the normal state of the transfer valve?

- When single-point pressure refueling is unavailable
- Maximum: 13,000 lb usable fuel
- Overwing filler caps — one per wing

REFUEL/DEFUEL PANEL

How does gravity crossflow work?

- Right wing root leading-edge fairing
- Allows preselected total fuel load input
- Dual-channel fuel computer controls automatic refueling

DEFUELING

When is maneuvering required for gravity crossflow?

- Suction defueling — limited to -8 psig
- Single-point refuel/defuel adapter used
- Maintenance personnel function only

REFUELING AUTOMATION

How is fuel transfer monitored?

- Fuel computer controls valve closure at target quantity
- High-level sensor cuts off refuel valve when tank full
- Simulated high-level sensor test capability on panel

FUEL HEATER / OIL COOLER

How is fuel transfer monitored?

- Fuel Heater/Oil Cooler in the engine accessory gearbox
- Heats fuel to prevent ice formation in engine fuel system
- Simultaneously maintains engine oil temperature within limits

REFUELING — KEY LIMITS

- Pressure refueling (single-point): 14,150 lb max — preferred method
- Gravity refueling (overwing): 13,000 lb max — use when single-point unavailable
- Maximum refueling pressure: 55 psig
- Suction defueling: -8 psig limit — maintenance only
- Fuel computer automates shutoff; high-level sensor is the final overfill guard

CAUTION MESSAGES

Timely crew awareness/action needed

Message	Meaning	Inhibits
L (R) FUEL COLLECTOR LOW	Fuel collector tank quantity is low	—
L (R) FUEL EJECTOR FAIL	The affected ejector pump has failed to provide sufficient pressure	TO/LAND
L (R) ENG FUEL SOV FAIL	The respective engine fuel shutoff valve has failed to close when commanded	TO/LAND
FUEL IMBALANCE	Fuel imbalance between wing tanks exceeds threshold based on total fuel quantity	TO/LAND
L (R) FUEL PRESSURE LOW	Low fuel pressure detected at engine fuel manifold	TO/LAND
L (R) FUEL PUMP FAIL	The respective electric fuel pump has failed	TO/LAND
FUEL QUANTITY FAIL	Fuel quantity indication has failed	TO/LAND
FUEL QUANTITY LOW	Total fuel quantity is below threshold	TO
WING FUEL TEMP LOW	Bulk fuel temperature in right wing tank is below -35°C (-31°F)	TO/LAND

ADVISORY MESSAGES

Crew awareness - no immediate action required

Message	Meaning	Inhibits
FUEL GRAV XFLOW FAIL	Gravity crossflow valve failed in unexpected position	TO/LAND
L (R) FUEL PUMP ON	Fuel pump auto-activated due to low engine feed pressure	TO/LAND
FUEL QUANTITY FAULT	Fuel quantity processor fault	TO/LAND
FUEL XFER FAIL	Fuel transfer valve failed in unexpected position	TO/LAND



STATUS MESSAGES

Information only - no crew action required

Message	Meaning
L (R) ENG FUEL SOV CLSD	Respective engine fuel shutoff valve is closed
FUEL BALANCED	Fuel is balanced within 100 lb with the FUEL XFER valve open
FUEL GRAV XFLOW OPEN	Gravity crossflow valve is open between wing tanks
L (R) FUEL PUMP OFF	The respective fuel pump is OFF
L (R) FUEL PUMP ON	DC boost pump manually selected ON
FUEL XFER OPEN	Transfer valve is open for powered fuel transfer between wing tanks

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QUICK RECALL · NUMBERS GRID

Cover the labels and recite the number; reverse and recite the label.
Repeat until automatic.

14,150 lb Pressure refueling max	13,000 lb Gravity refueling max	55 psig Max refueling pressure	-8 psig Max suction defueling
-35°C / -31°F WING FUEL TEMP LOW (C)	53.6 lb Each surge bay capacity	10 sec Boost pump delay (post ejector)	250 lb Imbalance caution > 13,700 lb total
315 lb Imbalance caution 10,000–13,700 lb	450 lb Imbalance caution 4,700–10,000 lb	600 lb Imbalance caution < 4,700 lb total	1,000 lb / 500 lb Green total / per-wing threshold
2 channels Fuel computer redundancy	3 drain valves Per wing (collector, wing, surge)	Right tank APU fuel source / temp probe	AGB Fuel Heater/Oil Cooler location



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