



CHALLENGER 350

BD-100-1A10

FIRE

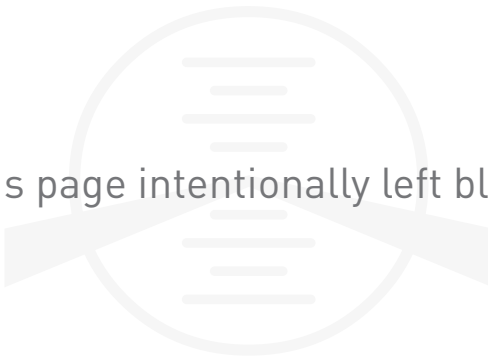
STUDY GUIDE · CARD SYSTEM

A flashcard-style reference for the CL350 ATA 26 Fire Protection system. Each card covers one focused topic — dual-loop detection, Halon 1301 bottles, APU auto-discharge, gear-bay overheat, and EICAS messages. Master the architecture and the key numbers before the oral.

ATA 26 · FIRE PROTECTION

Section FIRE · Revision: Original

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FIRE CONTENTS

01	Five Things You Must Know	14-4
02	Detection System Overview	14-5
03	Fire Bottles	14-6
04	Engine Fire Switch Actions	14-7
05	Apu Fire Protection	14-8
06	Mlg & Cargo Detection	14-9
07	Controls & Test	14-10
08	System Architecture	14-11
09	Dispatch & Limitations	14-12
10	EICAS — Warning Messages	14-13
11	EICAS — Caution + Advisory	14-13
12	EICAS — Status	14-14
13	Quick Recall — Numbers Grid	14-15

01

FIVE THINGS YOU MUST KNOW

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

2 loops	Detection loops per engine (dual-loop redundancy)
Halon 1301	Extinguishing agent — both fire bottles
5 seconds	APU auto-discharge delay (ground mode, unattended)
2 bottles	Bottle #1: 2 heads (engines); Bottle #2: 3 heads (engines + APU)
15 seconds	Aural test duration — 'LEFT ENGINE FIRE' repeats

TIP Two baseline facts: 5 seconds is the APU auto-discharge delay on the ground; Bottle #1 serves the engines only, Bottle #2 serves engines and APU. The cards drill detection, indication, and crew action for each zone.



02

DETECTION SYSTEM OVERVIEW - STUDY CARDS

Thermistor-based dual loops protect engines and APU — resistance drops as temperature rises.

DUAL-LOOP PRINCIPLE

How many loops per engine and what triggers a fire warning?

- Two independent loops per engine
- BOTH loops must sense overheat to trigger warning
- Single loop can still detect fire if the other loop fails

THERMISTOR OPERATION

How do the detection loops work?

- Outer metal sheathing with internal thermistor material
- Electrical resistance decreases as temperature rises
- FIREX-CU monitors resistance vs. preset time/resistance thresholds

FIREX-CU ROLE

What does the FIREX Control Unit do?

- Continuously monitors resistance of all detection loops
- Prevents false warnings via preset time/resistance thresholds
- Provides automatic fault detection and crew alerting

ENGINE LOOP LOCATIONS

Where are the engine detection loops routed?

- Forward engine nacelle
- Core engine area, engine accessory area, forward nacelle, and pylon areas
- Pylon — four zones covered per engine

APU LOOP LOCATIONS

Where are the APU detection loops?

- APU firewall and APU eductor
- Dual loops — same thermistor technology as engine loops
- Connected to FIREX-CU for monitoring

MLG DETECTION

How does MLG bay detection differ from engine detection?

- Single overheat loop per MLG bay (not dual)
- Dual-channel overheat detection unit
- Detection only — no fire suppression capability

FIRE BOTTLES · STUDY CARDS

Two Halon 1301 bottles in the aft equipment bay — know which bottle protects which zone.

BOTTLE #1 CONFIGURATION

How many discharge heads does Bottle #1 have?

- Two discharge heads
- One head per engine (left engine, right engine)
- Cannot discharge into the APU compartment

BOTTLE #2 CONFIGURATION

How many discharge heads does Bottle #2 have?

- Three discharge heads
- Both engines PLUS the APU compartment
- Bottle #2 is the ONLY bottle for APU protection

SQUIB DESIGN

What is the squib design for redundancy?

- Each squib has dual firing bridge wires
- Separate electrical circuits for each squib
- Dual-circuit redundancy prevents single-point failure

EXTINGUISHING AGENT

What agent is used and where are the bottles?

- Halon 1301 extinguishing agent
- Both bottles located in aft equipment bay
- Pressure switches and gauges monitor bottle status

DISCHARGE ORDER

Which bottle should be discharged first and why?

- Always push FIRE EXT 1 first — regardless of which engine has the fire
- Bottle #2 is reserved for APU — must be preserved if APU fire occurs
- Step sequence: ENG FIRE push → wait 10 sec → FIRE EXT 1 (if CAS persists) → wait until 30 sec from ENG FIRE push → FIRE EXT 2 (if CAS persists). The 10-sec interval is from ENG FIRE push to FIRE EXT 1 (first discharge), NOT after the first discharge. The 30-sec interval is from ENG FIRE push to FIRE EXT 2.

CHECK VALVE FUNCTION

What does the check tee do?

- Located at each engine discharge outlet
- Prevents second-discharged bottle agent from backfilling into first bottle
- Ensures full agent delivery to the fire zone

BOTTLE ASSIGNMENT — QUICK SUMMARY

- Bottle #1 → 2 heads → Left engine / Right engine only
- Bottle #2 → 3 heads → Left engine / Right engine / APU
- APU protection: Bottle #2 ONLY — never push FIRE EXT 2 first for an engine fire
- Always FIRE EXT 1 first; if fire persists, FIRE EXT 2 second
- Halon 1301 agent — bottles in aft equipment bay



04

ENGINE FIRE SWITCH ACTIONS · STUDY CARDS

Pushing the ENG FIRE switch isolates the engine and arms the squibs — it does NOT discharge.

FIRE SWITCH — PUSH ACTIONS

What happens when L or R ENG FIRE switch is pushed?

- Fuel shutoff valve closes
- Bleed-air and hydraulic shutoff valves close
- Generator selected offline; FADEC commands engine shutdown

SQUIB ARMING

What else happens to the fire bottles?

- Both fire bottle squibs are armed
- Both FIRE EXT ARMED lights illuminate
- Crew must then push FIRE EXT 1 or 2 to discharge

FIRE EXT SWITCH

What does FIRE EXT 1 / 2 switch do?

- Discharges the selected bottle into the armed engine zone
- Separate from the ENG FIRE switch — two-step action required
- FIRE EXT ARMED light confirms squib is ready to fire

DISCHARGE TIMING

When should you discharge the second bottle?

- Step sequence: ENG FIRE push → wait 10 sec → FIRE EXT 1 (if CAS persists) → wait until 30 sec from ENG FIRE push → FIRE EXT 2 (if CAS persists).
- The 10-sec interval is BETWEEN ENG FIRE push and FIRE EXT 1 (the first discharge), NOT after the first discharge.
- The 30-sec interval is measured from ENG FIRE push to FIRE EXT 2 (the second discharge). Per AFM Emergency Procedures p.80, In-Flight steps 3-5.

POST-DISCHARGE INDICATION

What indication is expected after bottle discharge?

- FIREX BTL 1(2) LOW advisory message — expected, not a new failure
- Confirms bottle has discharged and is now depleted
- Inhibited during takeoff and landing phases

05

APU FIRE PROTECTION · STUDY CARDS

APU fire protection has two modes — fully automatic on the ground, crew-action required in flight.

GROUND MODE

What happens automatically during an APU fire on the ground (unattended operation)?

- Automatic APU shutdown upon fire detection (unattended APU operation)
- Bottle #2 discharges automatically after 5 seconds during unattended operation
- No crew intervention required — protects unattended aircraft; when crew is present, standard QRH action applies

FLIGHT MODE — FIRE SWITCH

What does pushing APU FIRE switch do in flight?

- Bottle No. 2 squib armed / EXT 2 ARMED illuminates
- APU fuel shutoff valve closes
- APU ECU closes APU fuel metering valve
- APU bleed-air shutoff valve closes
- APU generator selected offline

FLIGHT MODE — DISCHARGE

How is the APU fire extinguished in flight?

- Crew must manually push FIRE EXT 2 to discharge
- Bottle #2 discharges through single explosive squib into APU compartment
- Unlike engine fire — only one bottle (Bottle #2) can protect the APU

APU LOOP MONITORING

How is APU fire detection maintained?

- Dual detection loops at APU firewall and eductor
- Both loops must sense overheat for fire indication
- FIREX-CU monitors APU loops continuously

APU FIRE — NO-GO

What is the dispatch status of an APU FIRE indication?

- APU FIRE indication is a No-Go item
- Simultaneous L/R FIRE DET FAIL + APU FIRE DET FAIL also No-Go
- Single detection loop failure has MEL relief available



MLG & CARGO DETECTION - STUDY CARDS

Gear bay and cargo protection are detection-only systems — no integrated suppression.

MLG BAY DESIGN

What is unique about MLG overhear detection?

- Single loop per MLG bay (not dual like engines)
- Loops installed around top of inner wheel bin surface
- Dual-channel overhear detection unit processes signals

MLG BAY ALERTING

How does the crew know about gear bay overhear?

- Master warning lights illuminate
- Triple chime sounds
- **GEAR BAY OVHT** (W) CAS message on EICAS

MLG BAY — NO SUPPRESSION

Is there fire suppression in the MLG bays?

- No fire suppression capability — detection only
- Protects composite-material wheel wells from brake/tire overhear after T/O
- GEAR BAY OVHT inop has MEL/DDG relief

CARGO SMOKE DETECTOR

What type of detector is used in the cargo bay?

- Light-scatter type smoke detector
- Ceiling-mounted in cargo bay
- Activates at specific smoke concentration threshold

CARGO FALSE ALARMS

What can cause false cargo smoke alarms?

- Mobile transceiver operation near detectors
- Ground equipment exhaust fumes
- Cargo smoke detector has MEL relief with door monitoring

CARGO SUPPRESSION

How is cargo/baggage fire suppressed?

- Portable extinguishers — manual operation required
- One behind copilot's seat bulkhead
- Additional unit in right aft enclosure (lavatory)

CONTROLS & TEST · STUDY CARDS

Five guarded switches plus the SYSTEMS TEST pedestal knob — no preflight test required.

FIRE SWITCHES — LAYOUT	TEST SWITCH LOCATION	TEST SEQUENCE
What are the five fire switches? • L ENG FIRE and R ENG FIRE (guarded, push-to-activate) • APU FIRE (guarded, push-to-activate) • FIRE EXT 1 and FIRE EXT 2 (push to discharge)	Where is the fire system test switch? • SYSTEMS TEST switch on pedestal near PARK/EMER brake • Rotate to FIRE DET position, then press to initiate test • No preflight test required — fire system continuously monitored	What happens during FIRE DET test? • Warning CAS messages illuminate: L ENGINE FIRE, R ENGINE FIRE, APU FIRE, GEAR BAY OVHT, CARGO SMOKE. CARGO SMOKE must illuminate — absence indicates CARGO SMOKE DET FAIL fault. • FIRE SYS IN TEST (S) CAS message; master warning lights flash and chime • 15-second aural test — triple
TEST COMPLETION	CONTINUOUS MONITORING	
How does the test end? • FIRE SYS TEST OK message upon successful completion • All fire switches illuminate during test sequence • Control unit verifies detection and extinguishing components	Is preflight testing of the fire system required? • No preflight test required • Fire system is continuously monitored by FIREX-CU • Test functions available whenever FIREX-CU is powered	



08

SYSTEM ARCHITECTURE · STUDY CARDS

FIREX-CU in the aft equipment bay — cross-powered from essential and battery buses.

FIREX-CU LOCATION

Where is the FIREX Control Unit?

- Aft equipment bay
- Co-located with fire extinguisher bottles (2), pressure gauges, and squib wiring
- Central processor for all fire detection and alerting

ELECTRICAL POWER — DETECTION

Which buses power fire detection channels?

- LEFT ESS Bus: FIRE DET CH A
- RIGHT MAIN Bus: FIRE DET CH B
- Dual-channel redundancy maintained

ELECTRICAL POWER — FIREX

Which buses power the extinguishing system?

- LEFT BATT Bus: FIREX A
- RIGHT BATT Bus: FIREX B
- Battery bus power ensures availability during electrical emergencies

PROTECTION ZONES

What zones does the fire system cover?

- Engines (left and right) — dual-loop detection + Halon suppression
- APU compartment — dual-loop detection + Halon suppression (Bottle #2)
- MLG bays — single-loop detection only; cargo bay — smoke detection only

MEL RELIEF SUMMARY

What fire system items have MEL relief?

- Single detection loop failure (engine or APU)
- Cargo smoke detector (with door monitoring)
- MLG overheat detection inop (MEL/DDG)

SYSTEM ARCHITECTURE — ONE-MINUTE RECAP

- FIREX-CU (aft equip bay) monitors ALL loops — engines, APU, MLG
- Detection power: LEFT ESS (Ch A) / RIGHT MAIN (Ch B)
- Extinguishing power: LEFT BATT (FIREX A) / RIGHT BATT (FIREX B)
- Bottle #1 → 2 heads (engines only) | Bottle #2 → 3 heads (engines + APU)
- Ground APU fire: auto-discharge after 5 sec | Flight: crew pushes FIRE EXT 2
- MLG and cargo: detection only — no integrated suppression

09

DISPATCH & LIMITATIONS - STUDY CARDS

Five No-Go indications — know them cold before dispatch.

NO-GO ITEMS

What fire system indications are No-Go for dispatch?

- APU FIRE indication
- L (R) ENGINE FIRE indication
- CARGO SMOKE indication

NO-GO ITEMS (CONT.)

Additional No-Go dispatch conditions?

- GEAR BAY OVHT indication may be a dispatch concern — verify per MMEL/DDG
- Simultaneous L (R) FIRE DET FAIL AND APU FIRE DET FAIL
- Engine/APU FIRE and CARGO SMOKE indications = No-Go

MEL ITEMS

What fire items have MEL relief?

- Single detection loop failure — engine or APU (not simultaneous)
- Cargo smoke detector with door monitoring as substitute
- MLG overheat detection inop per MEL/DDG

GROUND MODE REQUIREMENT

What must be powered for APU autodischarge?

- APU ECU must be powered for ground-mode automatic features
- FIREX-CU must be powered for test functions
- Continuous monitoring available whenever electrical power is on

FALSE ALARM SOURCES

What can cause false fire/smoke indications?

- Mobile transceiver operation near cargo smoke detectors
- Ground equipment exhaust fumes near cargo bay
- False alarms do not change dispatch status — investigate cause



10

EICAS - WARNING MESSAGES

WARNING MESSAGES

Immediate crew action required

Message	Meaning	Inhibits	Aural Warning
APU FIRE	APU fire detected — dual detection loops in APU enclosure sense overheat	—	Triple Chime "APU Fire"
R ENGINE FIRE	Right engine fire detected — dual detection loops sense overheat condition		
L ENGINE FIRE	Left engine fire detected — dual detection loops sense overheat condition	—	Triple Chime "Left (Right) Engine Fire"
CARGO SMOKE	Smoke detected in baggage/cargo compartment by lightscatter detector	—	Triple Chime
GEAR BAY OVHT	Main landing gear bay overheat detected — single loop per MLG bay	TO/LAND	Triple Chime

11

EICAS - CAUTION & ADVISORY

CAUTION MESSAGES

Timely crew awareness/action needed

Message	Meaning	Inhibits
L FIRE DET FAIL	Left engine fire detection system fault — single loop may still be operative	TO/LAND
R FIRE DET FAIL	Right engine fire detection system fault — single loop may still be operative	TO/LAND
APU FIRE DET FAIL	APU fire detection system fault — simultaneous with L/R FIRE DET FAIL is a No-Go	TO/LAND
FIREX APU SQUIB FAIL	APU fire extinguisher squib on bottle No. 2 has failed (NO low pressure indication)	TO/LAND

ADVISORY MESSAGES

Crew awareness - no immediate action required

Message	Meaning	Inhibits
FIREX BTL 1 (2) LOW	Fire bottle #1 (or #2) pressure low — expected after discharge; inhibited during TO/LAND (FCOM SFM03-03)	TO/LAND

12

EICAS · STATUS

STATUS MESSAGES

Information only - no crew action required

Message	Meaning
FIRE SYS IN TEST	Fire detection and extinguishing system test in progress
FIRE SYS TEST OK	Fire system test completed successfully — all components passed



13

QUICK RECALL · NUMBERS GRID

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

2 loops Detection loops per engine	Halon 1301 Extinguishing agent	2 bottles Fire extinguisher bottles	2 heads Bottle #1 discharge heads
3 heads Bottle #2 discharge heads	5 sec APU auto-discharge (ground)	~10 sec ENG FIRE push → FIRE EXT 1 (1st discharge)	~30 sec ENG FIRE push → FIRE EXT 2 (2nd discharge)
15 sec Aural test duration	Aft equip bay FIREX-CU location	LEFT ESS FIRE DET CH A bus	RIGHT MAIN FIRE DET CH B bus
LEFT BATT FIREX A power bus	RIGHT BATT FIREX B power bus	1 loop MLG overheat (single loop)	Light-scatter Cargo smoke detector type

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