



## CHALLENGER 350

BD-100-1A10

# COMMUNICATIONS

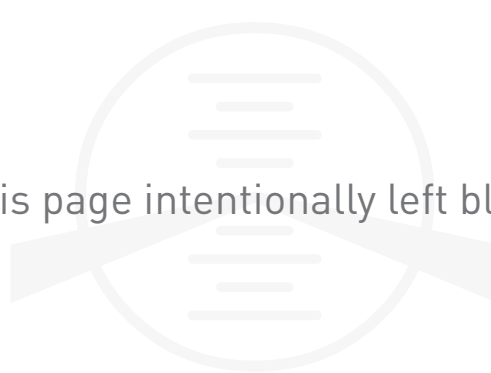
### STUDY GUIDE · CARD SYSTEM

A flashcard-style study guide for the CL350 ATA 23 Communications system. Each card targets one testable topic — VHF/HF/SATCOM architecture, audio control, recorders, ELT, and data link. Work through the cards, lock in the numbers, and you will be ready for the oral.

ATA 23 · COMMUNICATIONS

Section COMM · Revision: Original

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## COMMUNICATIONS CONTENTS

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01

**FIVE THINGS YOU MUST KNOW**

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

|                    |                                       |
|--------------------|---------------------------------------|
| 118–136.991<br>MHz | VHF operating band (8.33 kHz spacing) |
| 2.0–29.9999<br>MHz | HF operating range — 280,000 channels |
| 120 min            | CVR recording capacity (4 channels)   |
| 25 hours           | FDR recording capacity                |
| 75° N/S            | SATCOM coverage limit (lat)           |

**TIP** Master the four colors cold: Red = act immediately, Amber = act promptly, Cyan = awareness only, White = system state. Everything else flows from this rule.



02

## VHF COMMUNICATION SYSTEM · STUDY CARDS

## VHF ARCHITECTURE

**How many VHF transceivers, and what type?**

- Two independent VHF-4000 transceivers
- Remote-mounted for physical separation
- Optional third VHF available

## VHF FREQUENCY BAND

**What is the VHF frequency range?**

- 118.000 to 136.991 MHz
- 25 kHz spacing: 118.000–136.975 MHz
- 8.33 kHz spacing: 118.000–136.991 MHz

## VHF CONTROL — NORM

**What controls the radios in NORM mode?**

- MFD is the master tuning control
- CDU available for convenience
- Both DCP and CDU commands accepted

## VHF PRESET CHANNELS

**How many preset channels on the CDU?**

- 20 preset channels selectable via CDU
- Retained in memory during power interruption
- Direct frequency entry also available

## TUNING REVERSION — CDU ONLY

**What happens in CDU ONLY?**

- CDUs ignore tuning commands from MFDs
- MFD radio menu displays blank
- Full on-side and cross-side radio control

## EMERGENCY FREQ OVERRIDE

**What does COM 1 121.50 position do?**

- Forces COM 1 to emergency frequency 121.50 MHz
- Normal tuning continues for other radios
- Immediate emergency frequency access

## TUNING REVERSION — SWITCH POSITIONS

- MFD ONLY — radio tuned via DCP only; CDU TUNE page blank
- NORM — radio tunable from either DCP or CDU (master = MFD)
- CDU ONLY — radio tuned via CDU only; MFD radio menu blank
- COM 1 121.50 — forces COM 1 to guard frequency 121.500 MHz
- MFD failure in reversionary mode → set RSP TUNE to CDU ONLY

03

## HIGH FREQUENCY (HF) RADIO · STUDY CARDS

## HF SYSTEM OVERVIEW

**What kind of system is HF, and where is the unit?**

- Optional long-range communication system
- Receiver/transmitter in aft equipment bay
- Conformal antenna in vertical stabilizer leading edge

## HF FREQUENCY RANGE

**What are the HF frequency specifications?**

- 2.0 to 29.9999 MHz operating range
- 280,000 communication channels
- 100 Hz (0.1 kHz) channel spacing

## HF TUNING TIME

**What is the maximum HF tuning time?**

- Maximum 6 seconds tuning time
- Typically less than 1 second
- Antenna coupler auto-tunes to selected frequency

## HF MODULATION MODES

**What modulation modes does HF support?**

- UV — upper voice SSB; UD — upper sideband data
- LV — lower voice SSB; LD — lower sideband data
- AME — amplitude modulation equivalent; CW — continuous wave
- MFD-selectable modes: LV, UV, AM

## SELCAL SYSTEM

**How does SELCAL work on HF?**

- Unique four-letter code assigned per aircraft
- Ground station transmits code to call aircraft
- EICAS SELCAL HF 1 / SELCAL HF 2 advisory displayed
- Aural alert: voice message — the words 'SELCAL HF 1 (2)' spoken aloud

## POLAR OPERATIONS

**When is HF required for polar ops?**

- HF essential outside VHF coverage in polar regions
- VHF unreliable above 70° N and below 70° S (FCOM unverified; 75° N/S verified for SATCOM coverage)
- Flight allowed when HF propagation forecast favorable



## 04

## AUDIO CONTROL SYSTEM · STUDY CARDS

## AUDIO CONTROL PANELS

## What are the ACP functions?

- Two ACPs — one per pilot
- Monitor/transmit VHF and HF; PA; intercom control
- Individual volume adjustment for each source

## SPKR SELECTOR

## What does the SPKR selector do?

- Routes audio to on-side crew speaker
- Warning audio audible in any position
- Push SPKR knob in to deselect

## EMER/NORM SWITCH

## What happens in EMER position?

- EMER bypasses RIU — direct audio to headphones
- NORM is standard audio routing
- Locking toggle mechanism

## O2/MASK SWITCH

## What does O2 position select?

- O2 — oxygen mask microphone active
- NORM — boom microphone active
- Used during emergency oxygen descent

## VOICE/ID/BOTH SWITCH

## What does each position do?

- VOICE — filters out Morse code identifier
- ID — NAV/ADF identifier tone only
- BOTH — station identifier and voice

## AURAL WARNING ROUTING

## Do warning tones go through volume control?

- TAWS, TCAS, and aural warning do NOT
- Bypass all volume control switches
- Always audible regardless of ACP setting

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## INTERPHONE SYSTEM - STUDY CARDS

## CREW INTERPHONE

## How do pilots use interphone?

- INPH selector on ACP enables intercommunication
- Hot microphone capability available
- Control wheel INPH switch for PTT

## CONTROL WHEEL SWITCHES

## What are the TX/INPH functions?

- TX position for radio transmission
- INPH for intercom transmission
- Momentary switch on both control wheels

## FLIGHT DECK SPEAKERS

## How many speakers, and how adjusted?

- Two overhead speakers in flight compartment
- SPKR knob adjusts volume
- Push SPKR knob to deselect

## MAINTENANCE INTERPHONE

## Where are maintenance interphone panels?

- Nose compartment panel (left side)
- Aft equipment compartment panel
- Hot microphone; headphone and mic jacks

## OBSERVER INTERPHONE

## Where is the observer panel located?

- PMAT (aft left avionics rack)
- Dedicated headphone/mic jacks with volume control
- Channel 1 recording capability



## 06

## COCKPIT VOICE RECORDER - STUDY CARDS

## CVR DESCRIPTION

**Physical characteristics of the CVR?**

- Bright orange with reflective stripes
- Mounted in aft equipment bay
- Non-volatile solid-state memory

## CVR RECORDING CAPACITY

**How long and how many channels?**

- 120 minutes recording capacity
- Four-channel audio capture
- Continuous loop — overwrites oldest audio

## CVR CHANNELS

**What does each channel record?**

- Ch 1: Observer station
- Ch 2: Copilot position
- Ch 3: Pilot position; Ch 4: Area mic

## CVR AREA MICROPHONE

**Where is the area microphone located?**

- Above liquid compass — windshield center post
- Records all flight compartment sounds
- Continuous recording during operation

## CVR ERASE REQUIREMENTS

**What conditions are needed to erase?**

- Aircraft on ground
- Hydraulic systems pressurized
- Parking brake set — all three must be met

## CVR UNDERWATER LOCATOR

**ULD specifications?**

- 30-day transmission capability
- 6-year battery life expectancy
- Automatic water activation

## CVR — KEY NUMBERS

- Duration: 120 minutes (continuous loop)
- Channels: 4 — Observer / Copilot / Pilot / Area mic
- Area mic: above liquid compass, windshield center post
- Erase: ground + hydraulics pressurized + parking brake set
- ULD: auto water-activated, 30-day transmission, 6-year battery

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## FLIGHT DATA RECORDER · STUDY CARDS

## FDR OVERVIEW

## Key FDR characteristics?

- Optional — crash-survivable container
- Tail section installation
- 25-hour recording capacity, solid-state memory

## FDR ACTIVATION

## What triggers FDR recording?

- STROBE/BEACON switch in BEACON position
- STROBE/BEACON switch in STROBE position
- Weight-off-wheels signal from PSEU

## FDR ACCELEROMETER

## What does the tri-axial accelerometer measure?

- Vertical, lateral, and longitudinal acceleration
- Located near aircraft center of gravity
- Data formatted through DCU

## FDR ULD

## FDR underwater locator device?

- Battery-operated pulse generator
- Front panel mounting
- 30-day transmission, water-activated

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## EMERGENCY LOCATOR TRANSMITTER · STUDY CARDS

## ELT INSTALLATION

## Where is the ELT, and how does it activate?

- Top left side aft fuselage
- Auto-activation on excessive longitudinal forces
- Manual activation also available

## ELT FREQUENCIES

## What are the three ELT transmission frequencies?

- 121.5 MHz — VHF guard
- 243.0 MHz — UHF guard
- 406.025 MHz — satellite uplink

## ELT SWITCH POSITIONS

## Three switch positions?

- ARM — normal standby (normal position)
- ON — manual activation / test
- RESET — system reset function

## ELT CAS MESSAGE

## What EICAS message appears when ELT is transmitting?

- ELT ON status (white) message on EICAS
- Indicates active ELT transmission
- Investigate and RESET if inadvertent activation

## ELT GROUND BUZZER

## What is the ELT buzzer for?

- Rear fuselage, near venting cutout
- Audible during ground operations
- Not distracting to flight crew in cockpit



## 09

## SATCOM &amp; DATA LINK · STUDY CARDS

## SATCOM COVERAGE

**What are the SATCOM operational limits?**

- Coverage to 75° N and 75° S latitude
- Geosynchronous orbit at 22,300 mi (36,000 km)
- Polar regions excluded

## SATCOM COMPONENTS

**Key hardware in the SATCOM system?**

- Satellite Data Unit (SDU) and Radio Interface Unit (RIU)
- High-gain antenna on vertical stabilizer
- High-power amplifier, RF unit, and ACU

## SATCOM CHANNELS

**Minimum channel requirement?**

- Minimum three channels required
- Two voice + one data (standard configuration)
- Six-channel system available as factory option
- OITS telephone + AFIS/fax/modem data available

## FANS-1/A+ DATA LINK

**What are the three FANS-1/A+ functions?**

- AFN — ATS Facilities Notification
- ADS-C — Automatic Dependent Surveillance-Contract
- CPDLC — Controller-Pilot Data Link Communications

## CPDLC

**How many data authorities in CPDLC?**

- Two data authorities maximum
- Current Data Authority (CDA) has control
- Text-based message exchange with ATC

## LINK 2000+ ATN

**What services does Link 2000+ provide?**

- European Commission mandated enhancement
- DLIC, ACM, ACL, and AMC services
- Automatic frequency switching for continuity

## DATA LINK SUMMARY

- FANS-1/A+ supports: AFN · ADS-C · CPDLC (max 2 data authorities)
- Data link routes via VHF, HF, or SATCOM
- Link 2000+ ATN: EC-mandated; DLIC / ACM / ACL / AMC services
- VDL Mode 2 capability via RIU No. 1 (CMU); powered by CB3 E2 COM 3
- ACARS, weather uplinks, SIGMET/AIRMET, free text, flight plan exchange

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## EICAS - ADVISORY

## ADVISORY MESSAGES

Crew awareness required - May have associated tone

| Message                     | Meaning                                                                                                                     | Inhibits |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------|----------|
| <b>CABIN CALL</b>           | Cabin-to-cockpit call received                                                                                              | TO/LAND  |
| <b>LAV CALL</b>             | Lavatory-to-cockpit call received                                                                                           | TO/LAND  |
| <b>SELCAL DATALINK</b>      | SELCAL call received on Datalink — TO/LAND inhibit; voice message: 'SELCAL DATALINK' spoken aloud                           | TO/LAND  |
| <b>SELCAL HF 1 (2)</b>      | SELCAL call received on HF 1 (or 2) — TO/LAND inhibit; voice message 'SELCAL HF 1 (2)' spoken aloud (FCOM SFM03-03)         | TO/LAND  |
| <b>SELCAL VHF 1 (2) (3)</b> | SELCAL call received on VHF 1, 2, or 3 — TO/LAND inhibit; voice message 'SELCAL VHF 1 (2) (3)' spoken aloud (FCOM SFM03-03) | TO/LAND  |

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## EICAS - STATUS

## STATUS MESSAGES

Information only - no crew action required

| Message       | Meaning                                              |
|---------------|------------------------------------------------------|
| <b>ELT ON</b> | Emergency Locator Transmitter activated/transmitting |



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**QUICK RECALL · NUMBERS GRID**

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

|                                    |                                               |                                             |                                           |
|------------------------------------|-----------------------------------------------|---------------------------------------------|-------------------------------------------|
| <b>118–136.991 MHz</b><br>VHF band | <b>20 ch</b><br>VHF CDU presets               | <b>121.500 MHz</b><br>COM 1 121.50 override | <b>2.0–29.9999 MHz</b><br>HF range        |
| <b>280,000</b><br>HF channels      | <b>6 sec</b><br>Max HF tuning time            | <b>16 ch</b><br>HF programmable presets     | <b>70° N/S</b><br>VHF unreliable (polar)  |
| <b>120 min</b><br>CVR capacity     | <b>4</b><br>CVR channels                      | <b>25 hr</b><br>FDR capacity                | <b>30 days</b><br>ULD/CVR transmission    |
| <b>6 yr</b><br>CVR ULD battery     | <b>121.5/243.0/406.025</b><br>ELT frequencies | <b>75° N/S</b><br>SATCOM coverage limit     | <b>22,300 mi</b><br>SATCOM orbit altitude |

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