CPDLC –

Cockpit perspective

Objectives

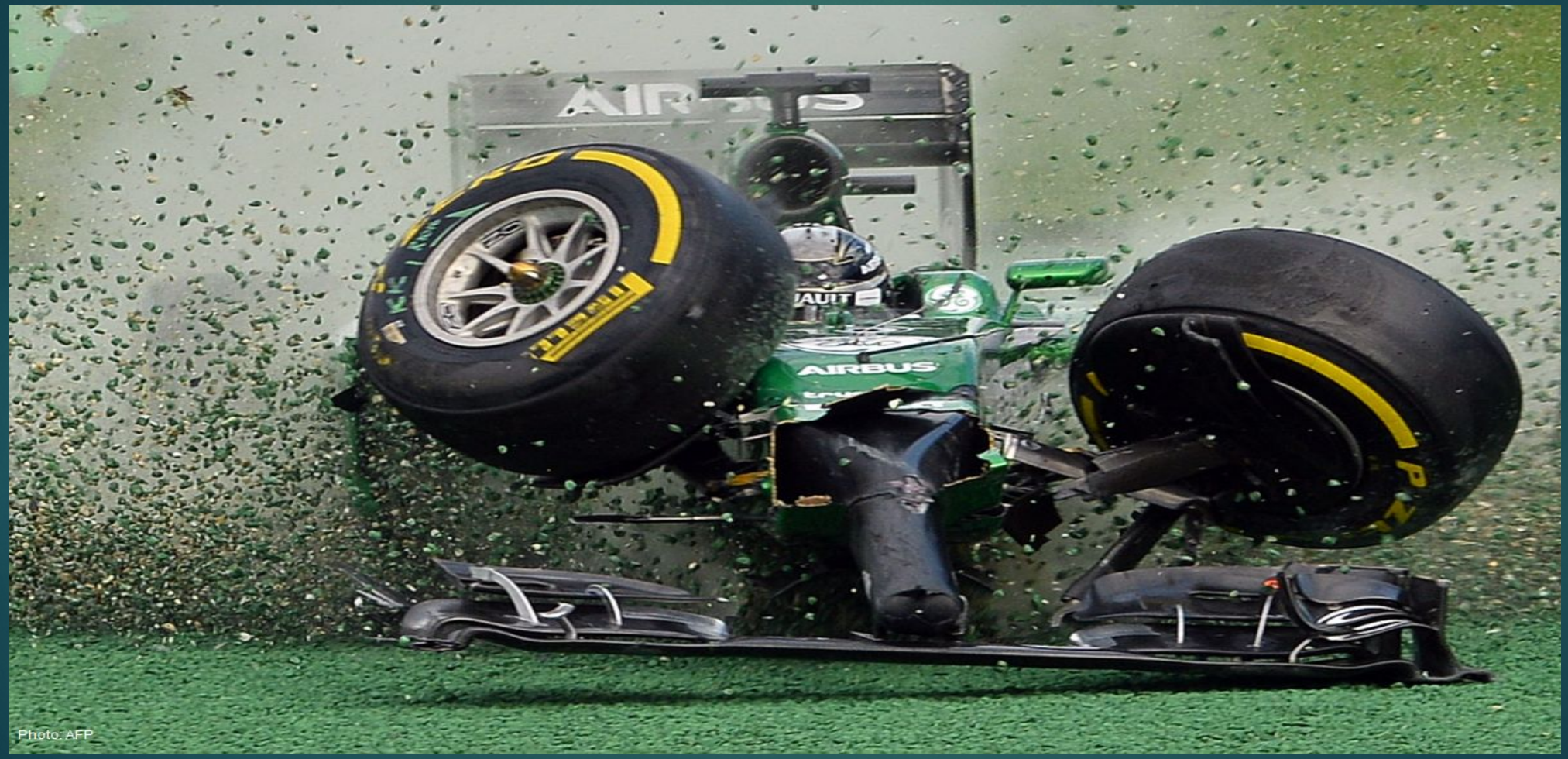
- Describe crew procedures
- Discuss challenges/issues
- Answer questions

Admin

- Delta centric
- Boeing 767 (old) architecture
- Western Africa anecdotes

DENSO

I was just driving along minding my own business...



TOPICS

- Cockpit Hardware
- CPDLC handling protocol
- Common messages/flow
- Crew feedback/issues

The pilot as seen by himself –

- Calm, cool and collected
- Mission completion oriented
- lives and thinks at 600 mph
- thrives in a dynamic, ambiguous environment
- modest, humble

As seen by his wife –

Type-A,
egocentric,
needy,
narcissistic,
childish,
control freak.

As seen by management

PILOT 101

- Process managers
- Automation dependency
- Failure modes
- complacency

SA

FLEXIBILITY

Crew Knowledge of CPDLC/ADS-C

- Limited to operation - not design or differences – Boeing vs Airbus interface
- Theater exposure

CRM

URE WARNING
CO-PILOT CHECKLIST
1. DON'T TOUCH ANYTHING
2. KEEP YOUR MOUTH SHUT

CPDLC PROTOCOL

- PM manages CPDLC dialogue
- PF manages FMS/MCP
- Both pilots verify all uplinks and downlinks
- Respond to messages within one minute

Typical comm flow

- Logon
- CDA confirmation
- Climb request
- Weather deviation

FANS

LOGON CODES

ATSU Call Sign (Country)	FANS Logon	Remarks
AFRICA		
Abidjan (Ivory Coast)	DIII	
Accra (Ghana)	DGAC	
Algiers (Algeria)	DAAA	
Antananarivo (Madagascar)	FMMM	
Brazzaville (Congo)	FCCC	
Canarias (Canary Islands)	GCCC	
Capetown (South Africa)	FACT	
Dakar (Senegal)	GOOO	
Mauritius (Mauritius)	FIMM	
Niamey (Niger)	DRRR	
N'djamena (Chad)	FTTT	
Seychelles (Seychelles)	FSSS	
ASIA		
Bangkok (Thailand)	VTBB	
Beijing (China)	ZBAA	
Chengdu (China)	ZUUU	

MESSAGES

- ATC COMM ESTABLISHED
- CDA - Welcome message/posrep/nothing
- Climb request-UNABLE vs UNABLE DUE TO TRAFFIC
- Weather deviation request
- Conditional clearances-requires manual input, confusing
- Route uplinks
- Freq change

HARDWARE

ATC INDEX
< EMERGENCY
POS REPORT >
< REQUEST
WHEN CAN WE >
< REPORT
FREE TEXT >
< LOG
CLEARANCE >
< LOGON/STATUS
VOICE >
BRT
INIT REF
RTE
DEP ARR
ATC
VNAV
FIX
LEGS
HOLD
FMC COMM
PROG
EXEC
MENU
NAV RAD
PREV PAGE
NEXT PAGE
DSPY FAIL
MSG OFST
A B C D E
F G H I J
K L M N O
P Q R S T
U V W X Y
Z SP DEL / CLR
1 2 3
4 5 6
7 8 9
. 0 +/-

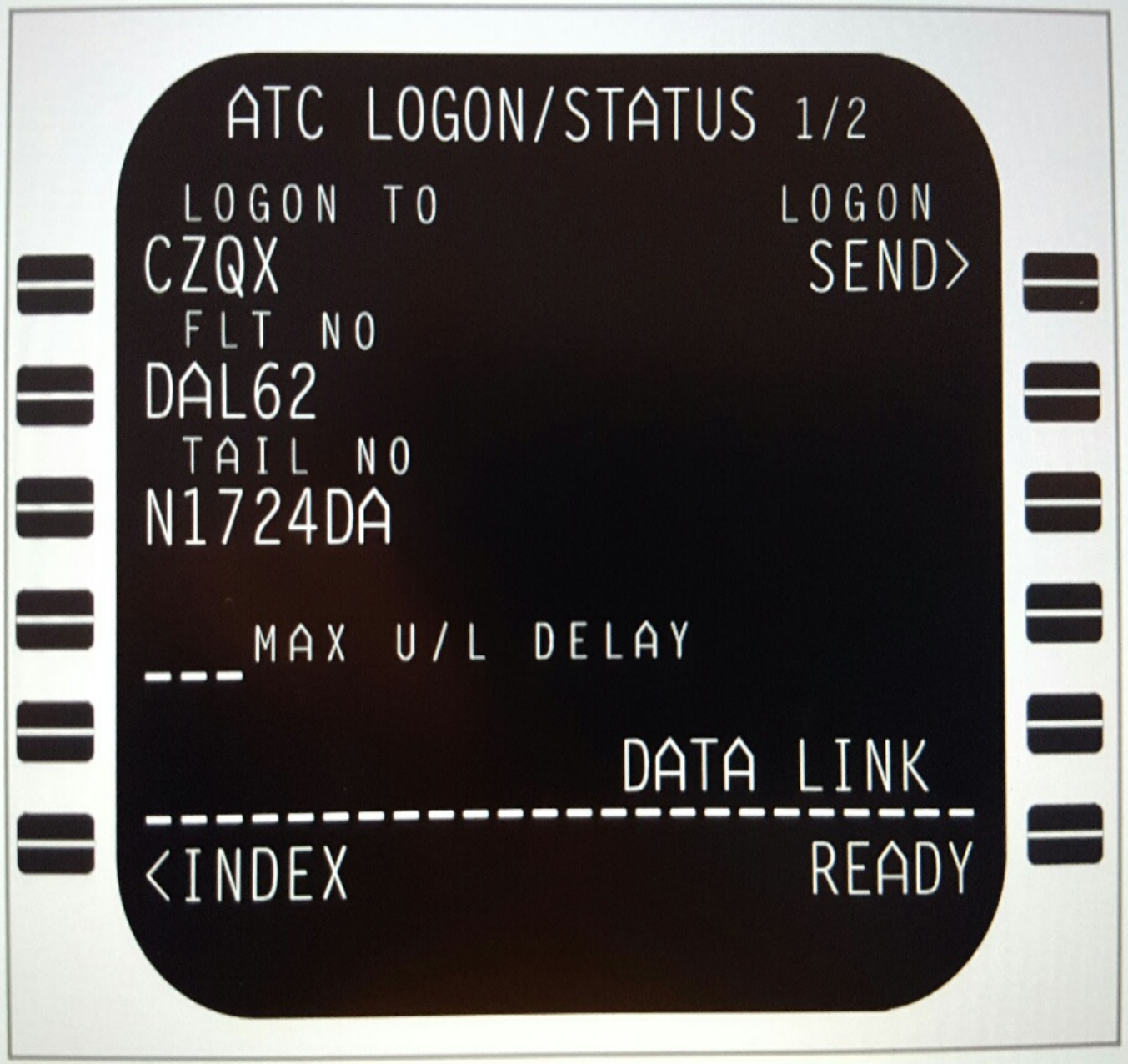
08 43
MSG DISPLAY
01/01
AIRCRAFT IS CPDLC/ADS
CAPABLE-USE CPDLC/ADS
PROCEDURES
< PRINT
< RETURN
BRT
INIT REF
RTE
DEP ARR
ATC
VNAV
FIX
LEGS
HOLD
FMC COMM
PROG
EXEC

MENU
< FMC
<ACT>
< ACARS
< SAT
MEMORY >
INIT REF
RTE
DEP ARR
ATC
VNAV
FIX
LEGS
HOLD
FMC COMM
PROG
EXEC

LOGON

ATC INDEX
< EMERGENCY
POS REPORT >
< REQUEST
WHEN CAN WE >
< REPORT
FREE TEXT >
< LOG
CLEARANCE >
< LOGON/STATUS
VOICE >
BRT
INIT REF
RTE
DEP ARR
ATC
VNAV
FMC
PROG

LOGON


ATC LOGON/STATUS 1/2
LOGON TO
LOGON
CZQX
SEND>
FLT NO
DAL62
TAIL NO
N1724DA
___MAX U/L DELAY
DATA LINK
<INDEX
READY

TAT -23c
158
CRZ
158
20
121
20
121
10
10
15
15
EPR
842
841
N1
•ATC
360
358
EGT
V V V V V V V

ATC COMM ESTABLISHED

ADS-C

ACTIVE

0109z ATC UPLINK 1/1
STATUS
ACCEPTED
THIS IS AN AUTOMATED
MESSAGE TO CONFIRM
CPDLC CONTACT WITH
MONCTON CENTER.
---- RESPONSE 0110Z ----
ROGER.

MENU

PAGE

ATC INDEX
< EMERGENCY
POS REPORT >
< REQUEST
WHEN CAN WE >
< REPORT
FREE TEXT >
< LOG
CLEARANCE >
< LOGON/STATUS
VOICE >
INIT REF
RTE
DEP ARR
ATC
VNAV
FIX
LEGS
HOLD
FMC COMM
PROG
EXEC
BRT

ALTITUDE REQUEST

ATC ALT REQUEST
ALTITUDE
FLT 350
REQUEST
CRZ CLB>
STEP AT

MAINTAIN OWN
SEPARATION/VMC>
DUE TO
PERFORMANCE>
DUE TO
<AT PILOT DISC
WEATHER>
<REQUEST
VERIFY>

0212z ATC UPLINK 1/1
DISPLAY
STATUS
<REQUEST
OPEN
CLIMB TO AND MAINTAIN
FL350.
REPORT LEVEL
FL350.
STANDBY
<SEND
ACCEPT
<REJECT
SEND>
REPORT>

ATC LOG
1/1
0212Z
NEW
↑ CLIMB TO REACH FL33..>
0210Z
OLD
↑ STANDBY.
>
0210Z
RESPONSE RCVD
↓ REQUEST CLIMB TO FL..>
0026Z
OLD
↑ UNABLE. DUE TO TRAF..>
0023Z
RESPONSE RCVD
↓ REQUEST CLIMB TO FL..>
<ATC INDEX
ERASE LOG>

ATC UPLINK

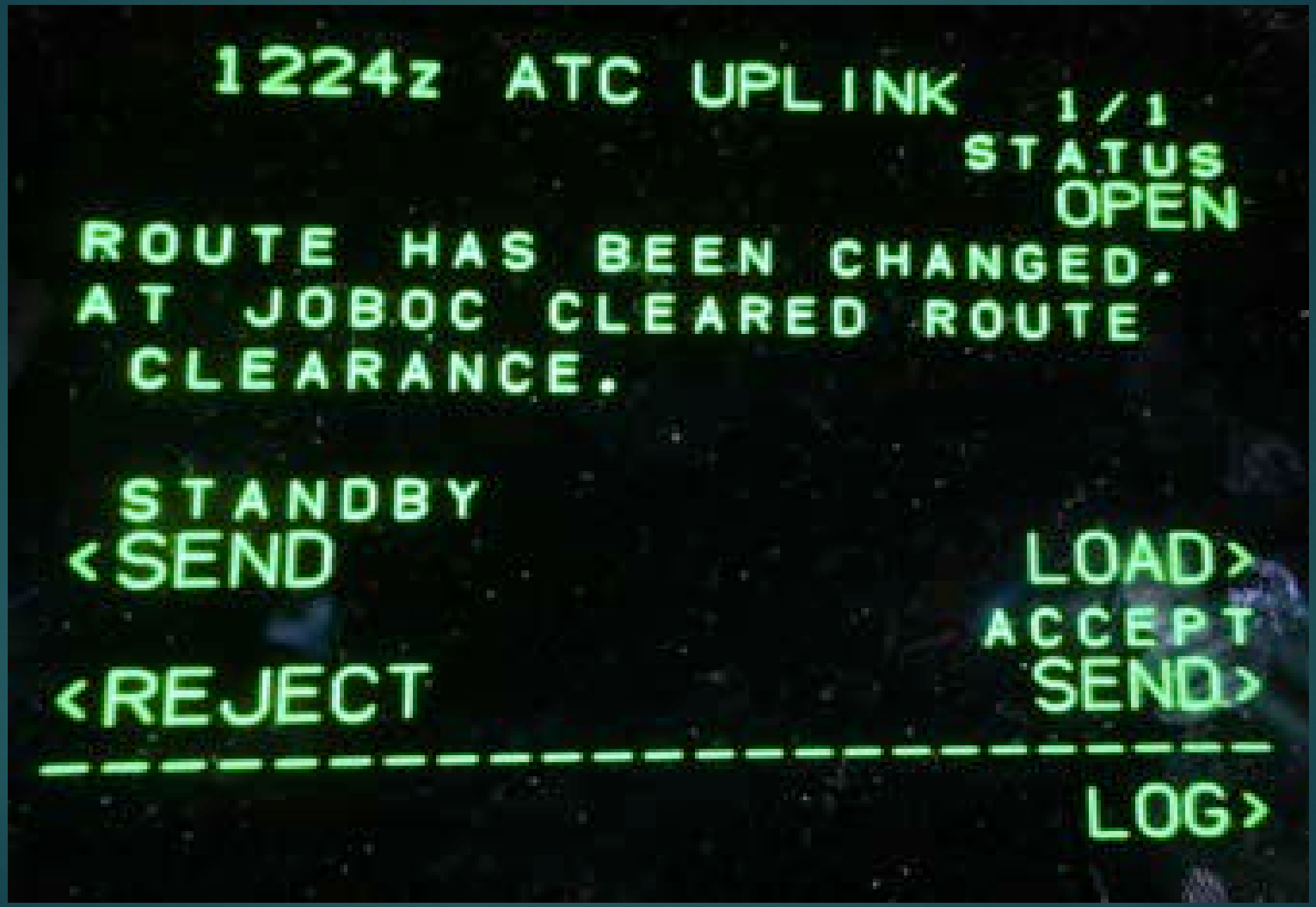
with
Load prompt

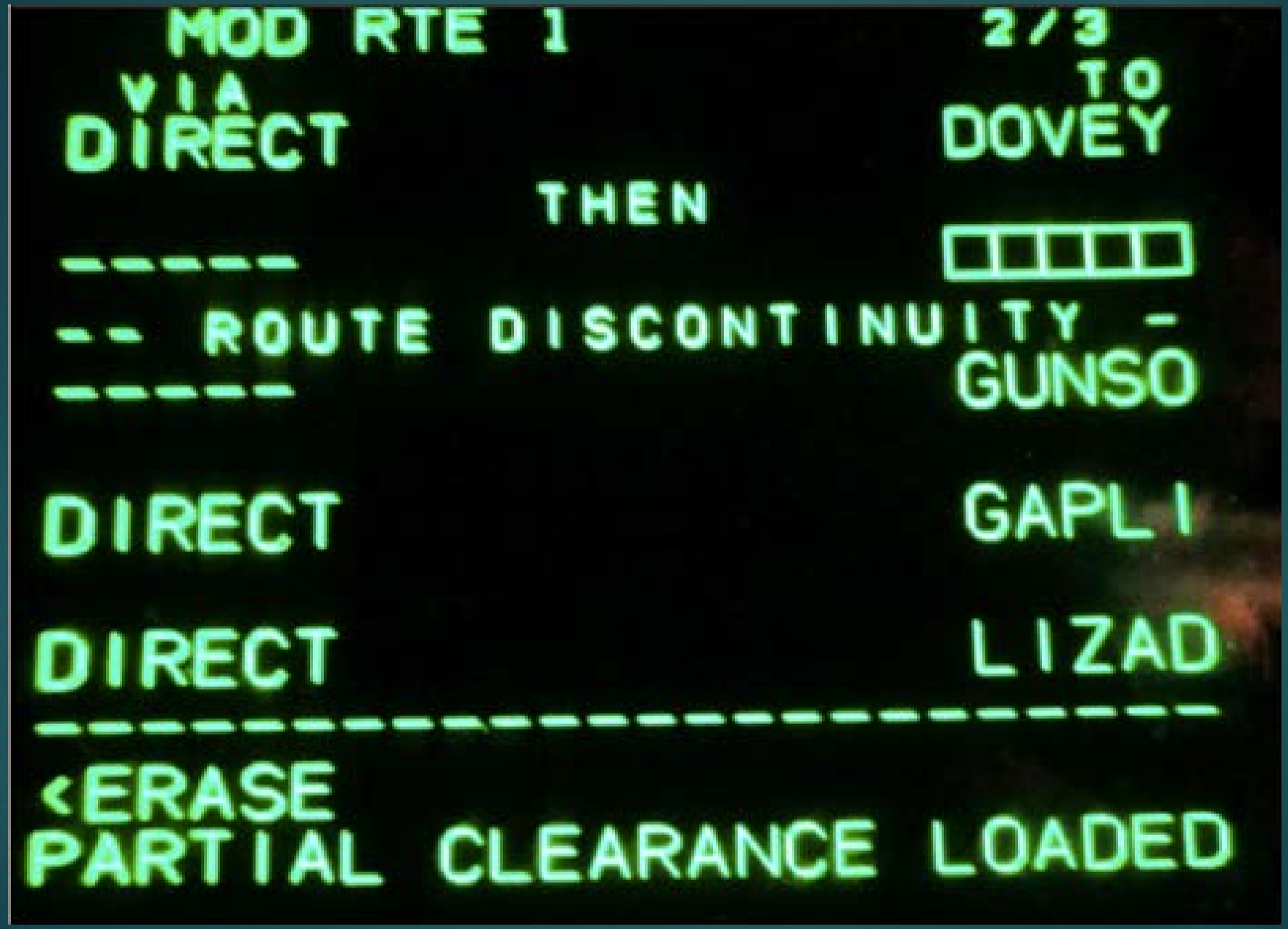
1337z ATC UPLINK 1/1
DISPLAY
STATUS
<REQUEST
OPEN
CLEARED ROUTE CLEARANCE.
STANDBY
<SEND
LOAD>
ACCEPT
<REJECT
SEND>
LOG>

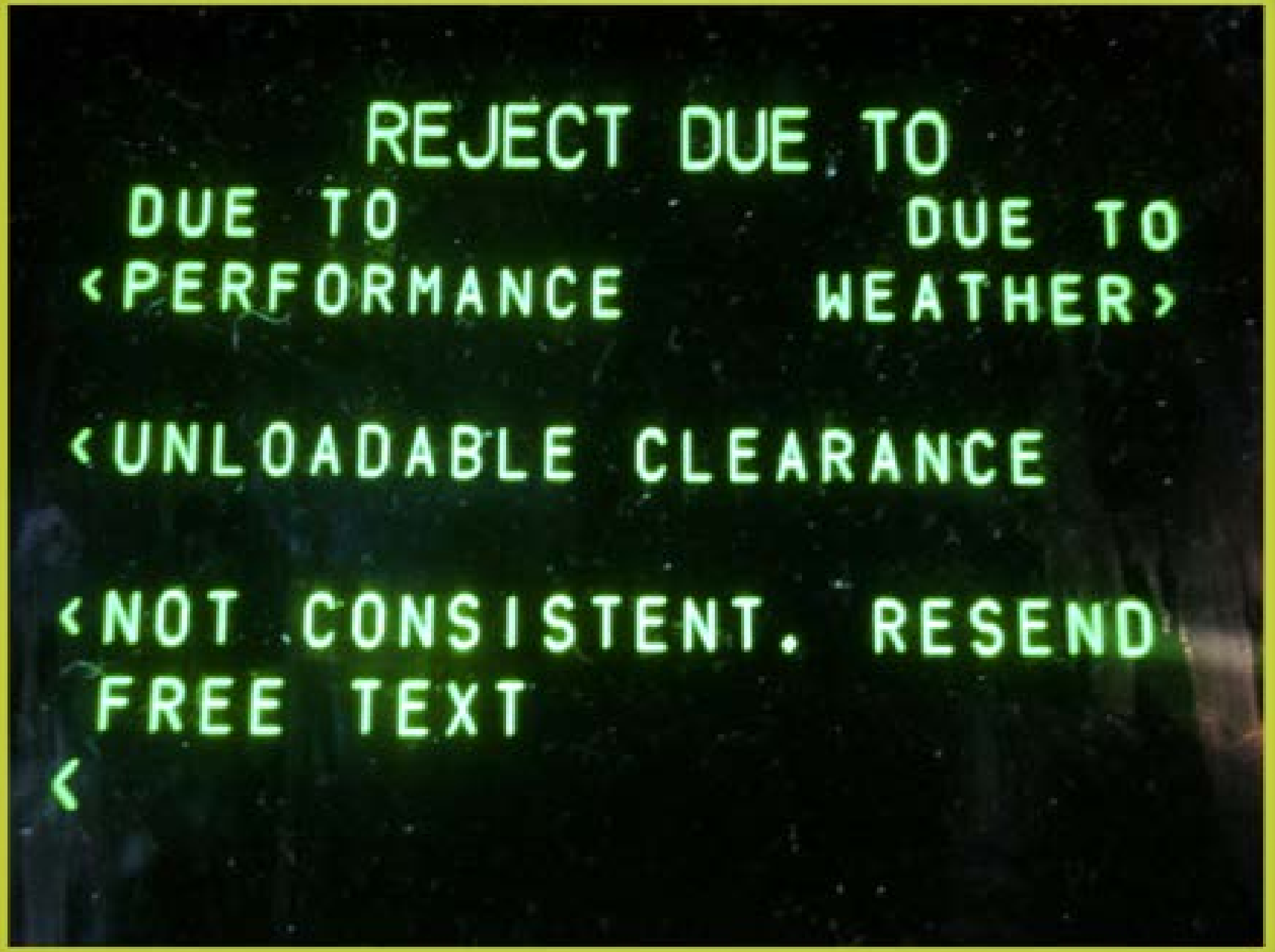
1321z ATC UPLINK 1/1
STATUS
OPEN
CLEARED ROUTE CLEARANCE.
MAINTAIN FL340.
MAINTAIN .79.
STANDBY
<SEND
LOAD>
ACCEPT
SEND>
<REJECT
LOG>

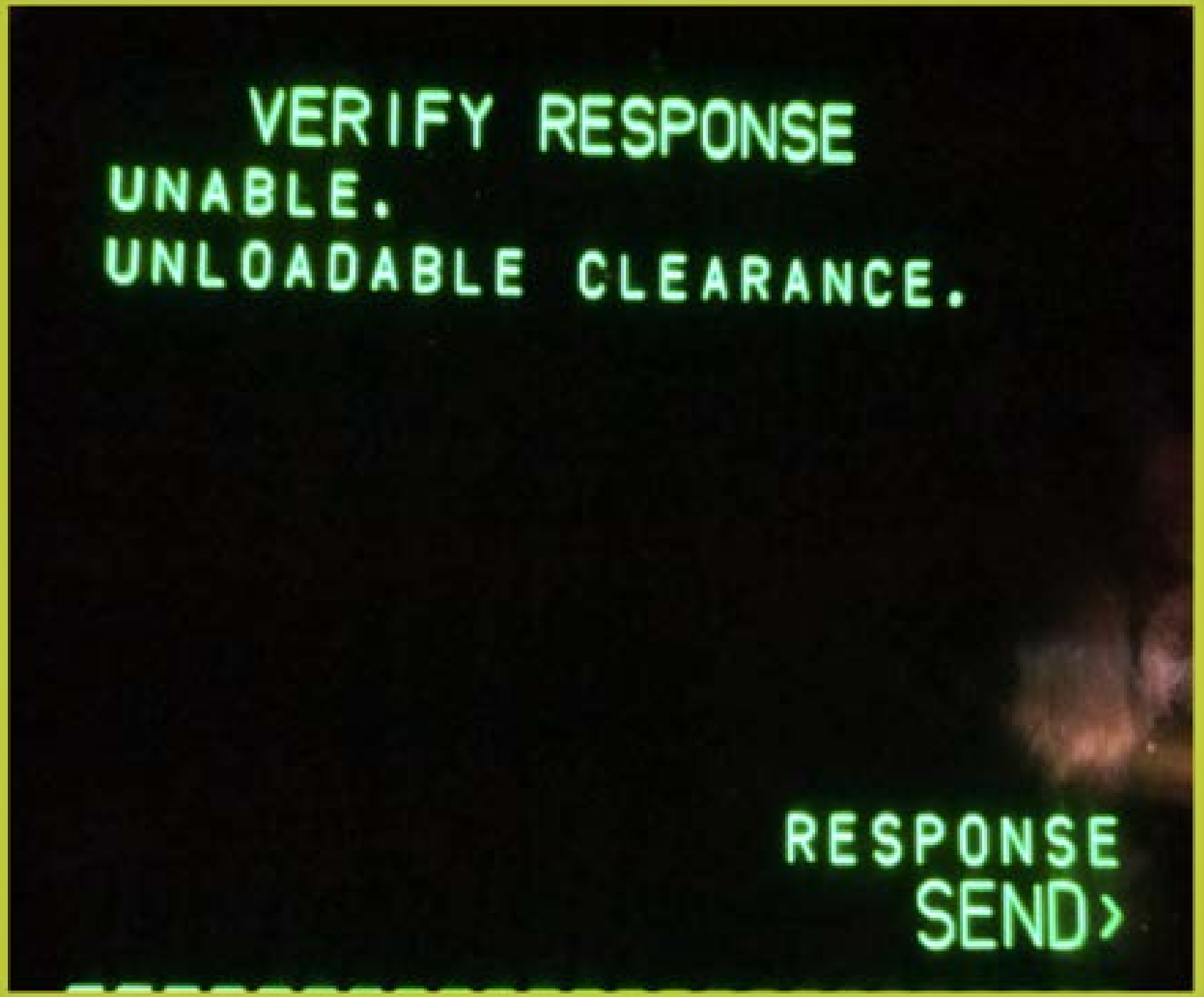
UM79

0917z ATC UPLINK 1/1
STATUS
OPEN
CLEARED TO EBOTO VIA
ROUTE CLEARANCE.
REST OF ROUTE UNCHANGED.
STANDBY
<SEND
LOAD>
ACCEPT
SEND>
<REJECT
LOG>


1224z ATC UPLINK
1/1
STATUS
OPEN
ROUTE HAS BEEN CHANGED.
AT JOBOC CLEARED ROUTE
CLEARANCE.
STANDBY
<SEND
LOAD>
ACCEPT
<REJECT
SEND>
LOG>


MOD RTE 1
2/3
VIA
TO
DIRECT
DOVEY
THEN
-- ROUTE DISCONTINUITY -
GUNSO
DIRECT
GAPLI
DIRECT
LIZAD
<ERASE
PARTIAL CLEARANCE LOADED


REJECT DUE TO
DUE TO
DUE TO
‹PERFORMANCE
WEATHER›
‹UNLOADABLE CLEARANCE
‹NOT CONSISTENT. RESEND
FREE TEXT
‹


VERIFY RESPONSE
UNABLE.
UNLOADABLE CLEARANCE.
RESPONSE
SEND›

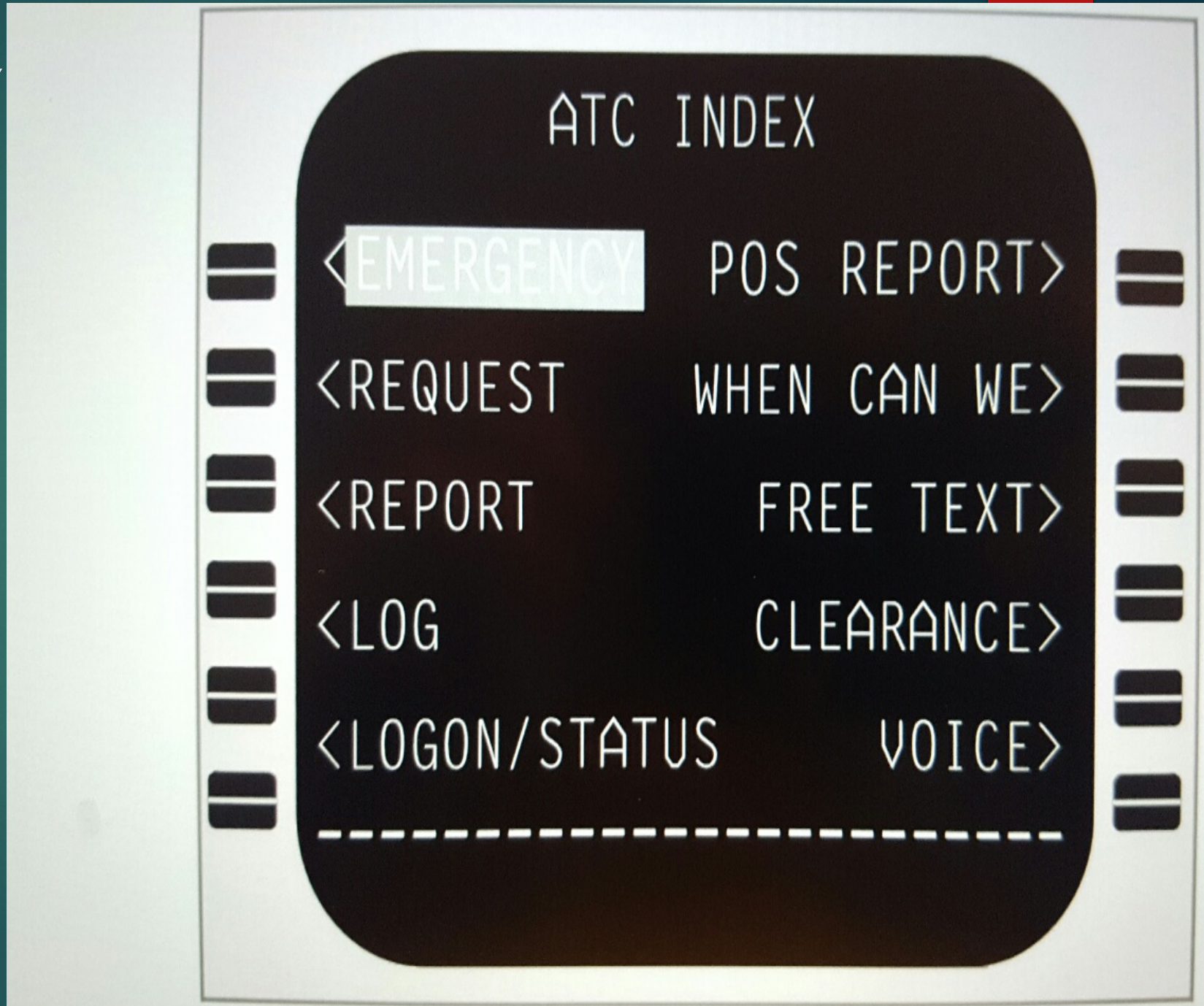
CONDITIONAL CLEARANCE

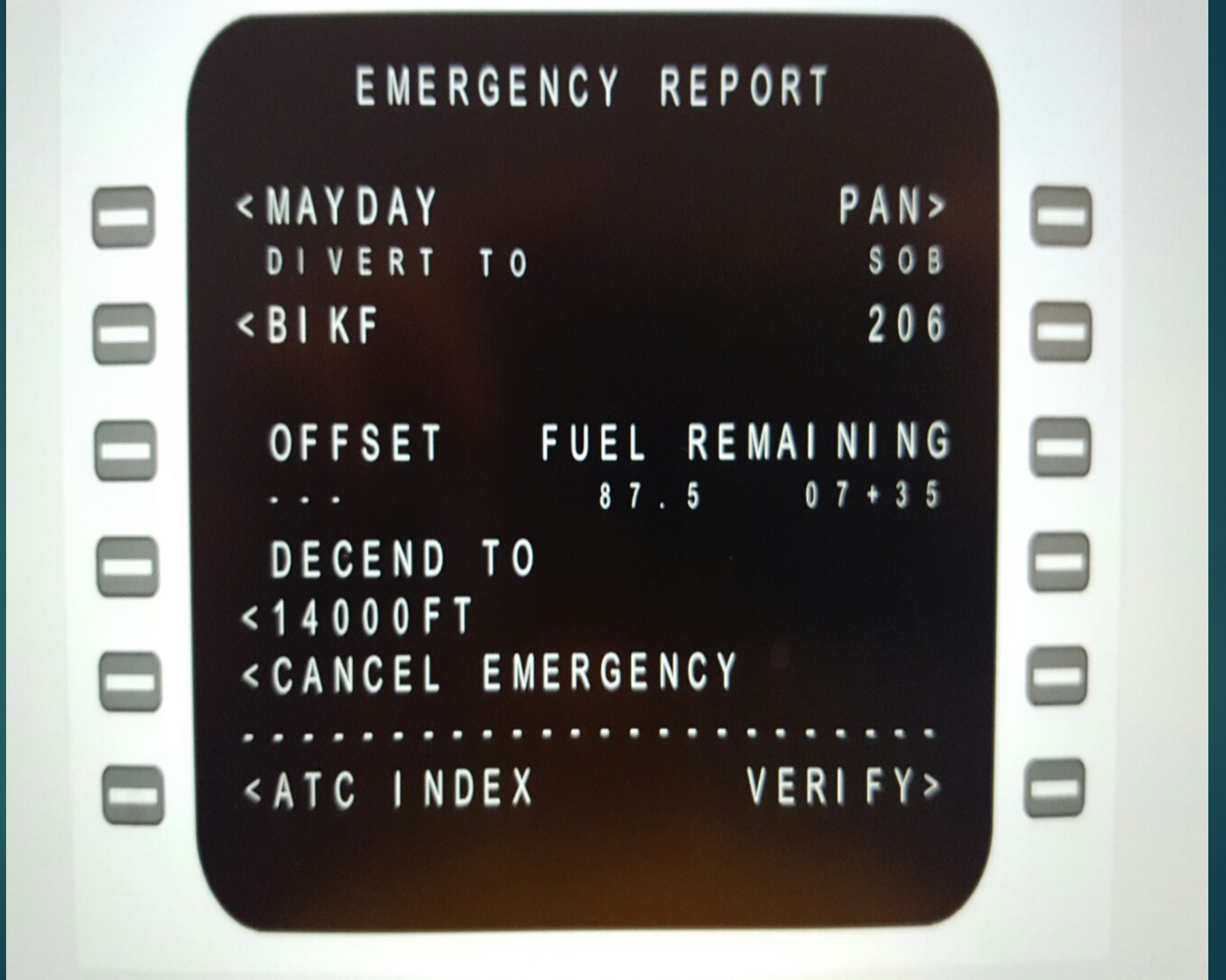
CONDITIONAL CLEARANCE

1343z ATC UPLINK 1/1
DISPLAY
STATUS
<REQUEST
OPEN
CLIMB TO REACH FL330 BY
N58°30.0W036°00.0.
REPORT LEVEL
FL330.
STANDBY
<SEND
ACCEPT
<REJECT
SEND>
LOG>

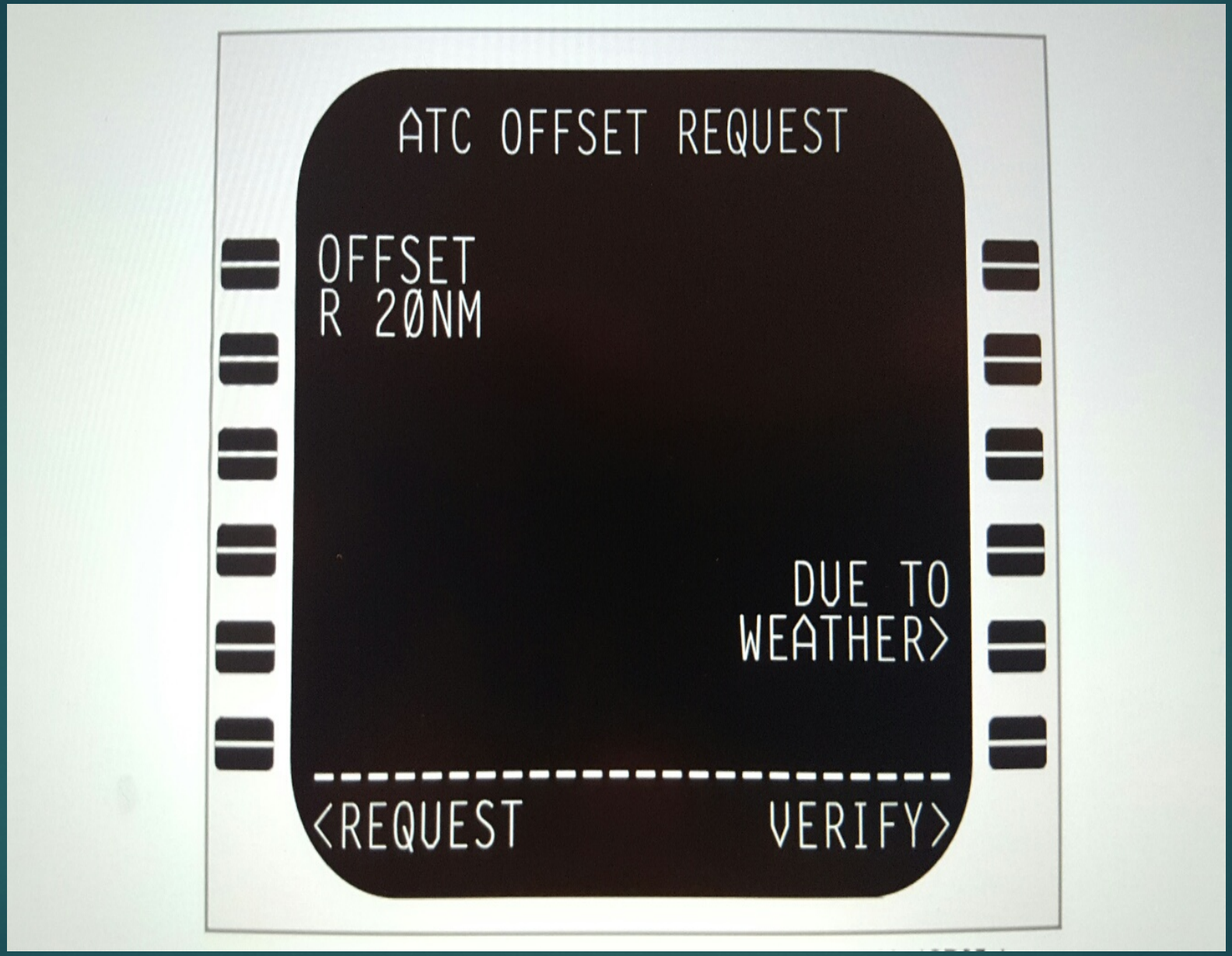
ATC MESSAGE
MAINTAIN FL350
AT 47N40W CLIMB TO AND
MAINTAIN FL360
REPORT LEVEL 360
< PRINT
ACCEPT >
< ATC INDEX
REJECT >
INIT REF
RTE
DEP ARR
ATC
VNAV
FMC

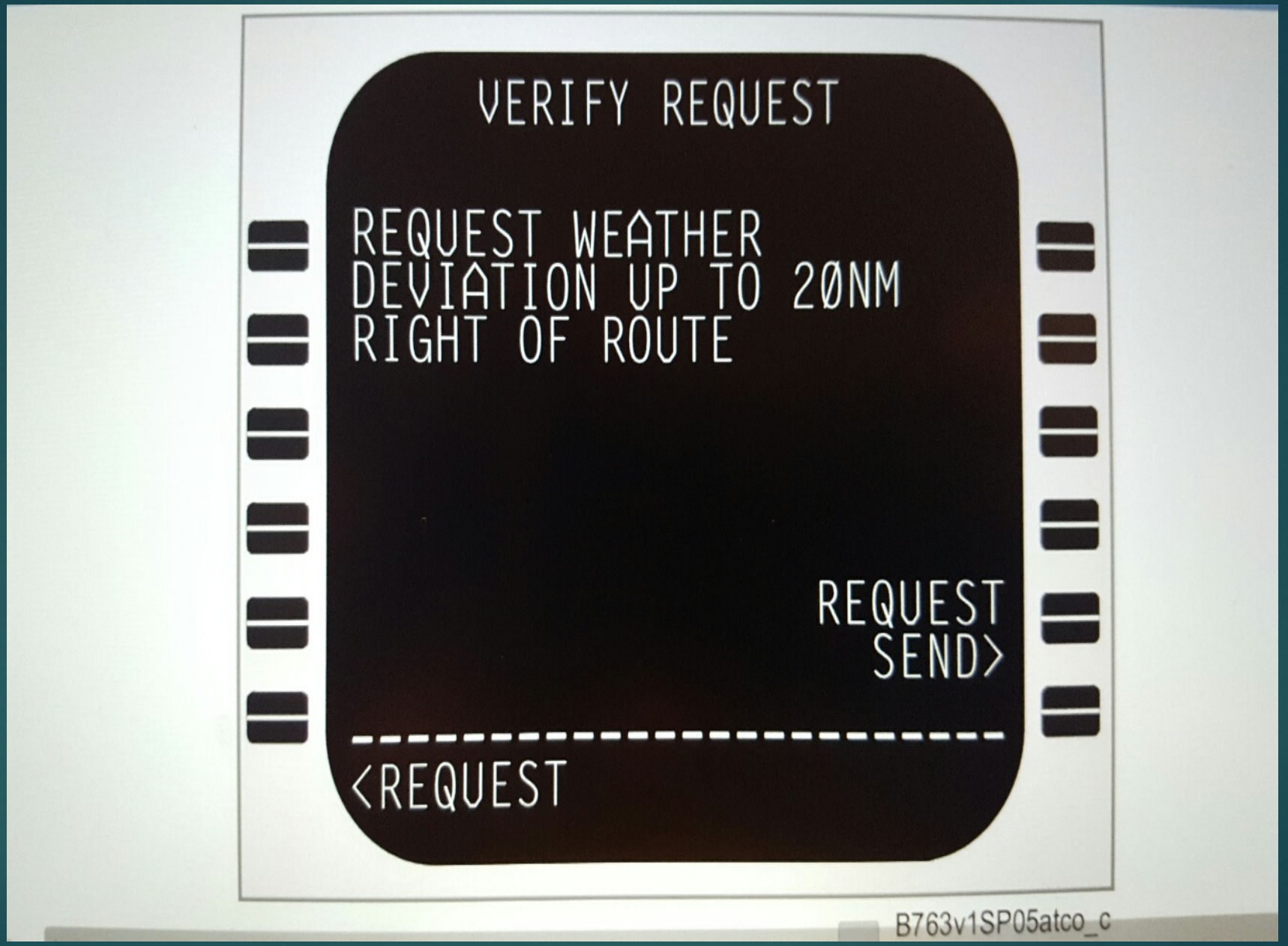
EMERGENCY


ATC INDEX
<EMERGENCY
POS REPORT>
<REQUEST
WHEN CAN WE>
<REPORT
FREE TEXT>
<LOG
CLEARANCE>
<LOGON/STATUS
VOICE>


EMERGENCY REPORT
<MAYDAY
PAN>
DIVERT TO
SOB
<BIKF
206
OFFSET
FUEL REMAINING

87.5
07+35
DECEND TO
<14000FT
<CANCEL EMERGENCY
<ATC INDEX
VERIFY>


ATC OFFSET REQUEST
OFFSET
R 20NM
DUE TO
WEATHER>
<REQUEST
VERIFY>


VERIFY REQUEST
REQUEST WEATHER
DEVIATION UP TO 20NM
RIGHT OF ROUTE
REQUEST
SEND>
<REQUEST
B763v1SP05atco_c

Africa specific

- Most common uplink – freq changes
- Most common downlink – altitude request, weather deviation
- Suggest – UM74 – “Proceed direct xxxx”

0934z ATC UPLINK 1/1
DISPLAY
STATUS
<REQUEST
OPEN
PROCEED DIRECT TO RODOL.
STANDBY
<SEND
LOAD>
ACCEPT
SEND>
<REJECT
LOG>

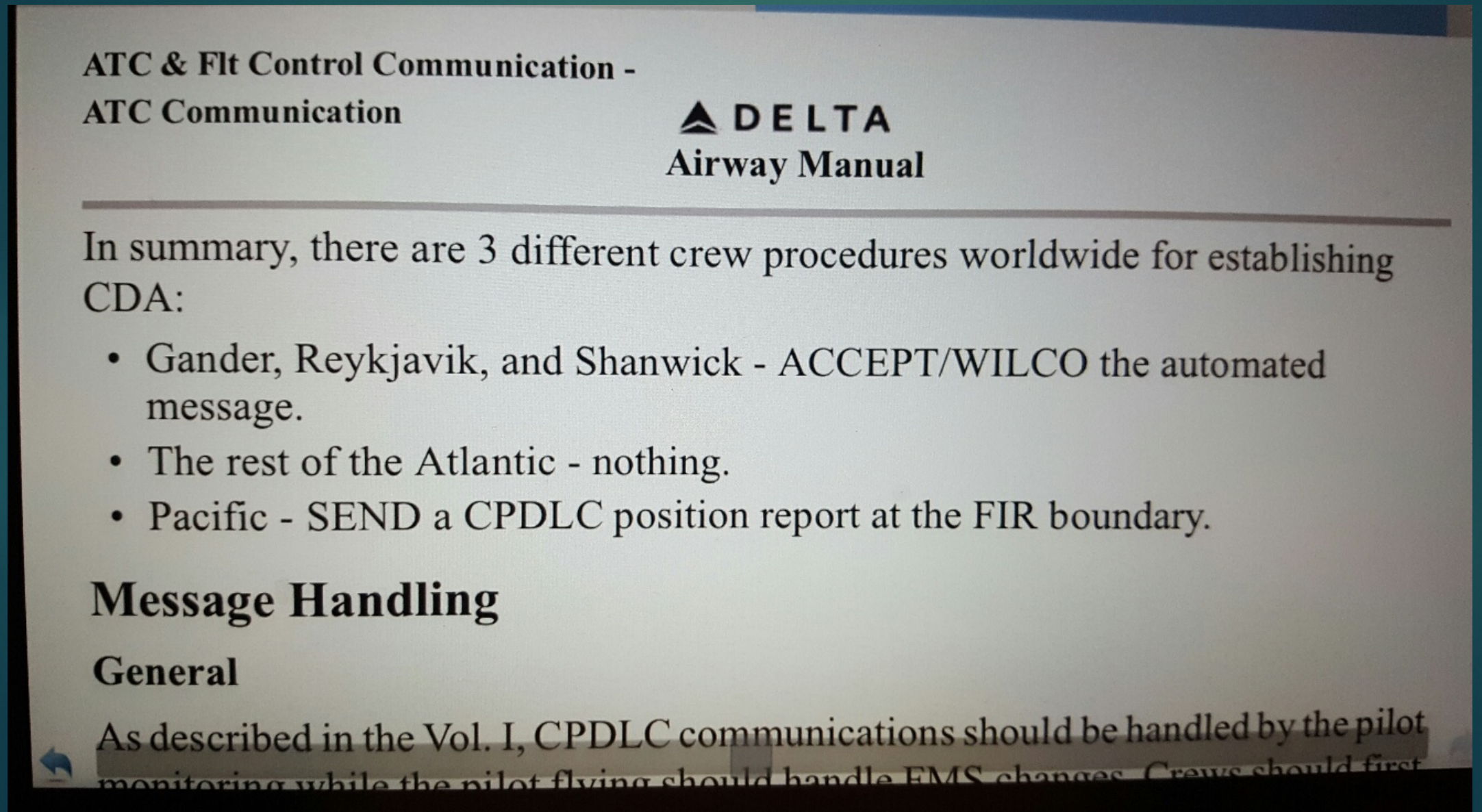
GENERAL ISSUES/ ANOMALIES

- Crew proficiency
- Logging on regardless of functionality-SatCom media limfac
- Free text instead of preformatted message sets
- Conditional clearances – crew change over
- Multi-element messages
- Lack of standardization
- Waypoint sequencing anomaly

General Issues con’t.

- Logon fail
- Transfer fail
- Multiple pages

Standardization



CREW Challenges

- Keeping up with changes to GOLD
- Crew training- CBT/bulletins/manuals/OJT
- Standardization-crews are global
- Utilize full capabilities

I continue to get reports from Oakland and New York on B756 flight crews logging on CPDLC in VHF airspace in a/c that are not SATCOM equipped. As they journey furthe the ocean on the way to HNL, STT, SJU or any other island, ATC is faced with resolvi minimum separation standards (based on FANS functionality) that are now compromi

Possible Solutions:

- Add a Flight Plan to remark to ALL B757s like
  - A/C IS NOT SATCOM EQUIPPED. DO NOT LOG ON CPDLC/ADS-C IF FLIGHT ENTER CLASS II AIRSPACE. USE HF FOR PSN RPTS / COMPANY COMMS W OUT OF VHF COVERAGE. PILOT DEVIATIONS MAY BE FILED
- More Newsletter articles
- Fleet Bulletin
- EFOB

An even better solution is for Oakland and New York Oceanic to program their FDPS accept a FANS logon from an a/c that has not filed J5 or J7. More to follow on that.

Theater issues

- Abidjan and Luanda - voice comm challenges
- Auto transfer failure at FIR boundaries
- LPPO-GVSC-GOOO – transfer failure/voice request to connect
- Cayenne – CDA confirmation
- Uncertainty between procedural/surveillance airspace-xpdr vs posrep
- Variations in functionality between ATSUs
- Logon fail – Kano, Accra

RECOMMENDATIONS

- Facilitate GOLD Standardization

-CDA - welcome message vs position report vs Cayenne

-Revised estimates

-“CPDLC” suffix

- Increase utilization/functionality

ATL-JNB 01

PART 1 OF 2 FLTS ENTERING SOOO FIR SHD SEND CPDLC LOGON NLT 30 MINS PRIOR TO FIR AND THEN SEND CPDLC PSN RPT CROSSING THE BOUNDARY TO CONFIRM CDA.

ATL-JNB 02

PART 2 OF 2 REPLY WILL BE A - MONITOR - MESSAGE AND A EXPECT SELCAL CHECK ON /FREQ/.//

PBT

What information does ADS-C provide to ATC?

Click on the correct answer.

A. Aircraft origin and destination

B. Precise radar return

C. Aircraft position and subsequent waypoints

D. Projected fuel burn

How does CPDLC benefit the crew and ATC?

Click on the correct answer.

A. It allows for fewer voice communication frequency changes.

B. It eliminates the need for company position reports.

C. It negates the requirement to monitor communications.

D. It reduces the need for VHF/HF voice communication.

SUMMARY

- Great tool – Procedural airspace

-Surveillance airspace enhancement

- Enhances SA, workload reduction
- Built in resilience – conformance monitoring, team of teams
- Future capabilities – DARP, in-trail procedures, RLatSM, RLongSM
- Evolving - Strengthen system, exercise

CLOSING REMARKS