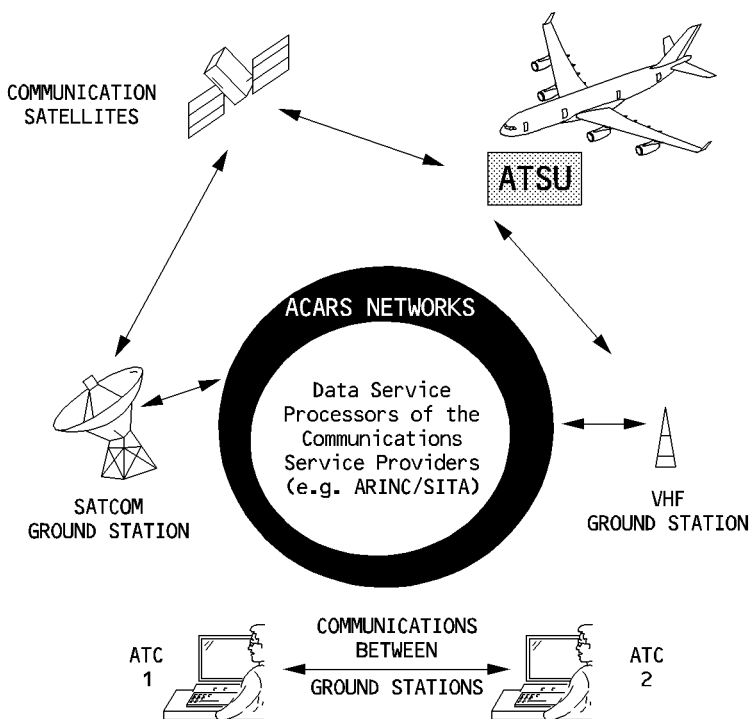


INTRODUCTION

The global CNS/ATM (Communications Navigation Surveillance/Air Traffic Management) system is made up of the C (Communications), N (Navigation) and S (Surveillance) tools, developed to provide efficient Air Traffic Management methods.

Such methods include the introduction of datalink communications between pilots and controllers, considered to be the primary means of communications over oceans and remote areas.

The current CNS/ATM system uses the ACARS networks, mainly ARINC and SITA (See the ACARS Chapter for world coverage). The related data communications are managed by the Air Traffic System Unit (ATSU), and can be supported by SATCOM or VHF.



The CNS/ATM system includes the following functions :

- The ATS Facilities Notification (AFN)
- The Controller Pilot Data Link Communications (CPDLC)
- The Automatic Dependent Surveillance (ADS).

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ATS FACILITIES NOTIFICATION (AFN)

ATS Facilities Notification (AFN) is necessary in order to inform the ATC that the aircraft is capable of datalink communications, and to exchange address information. It is initiated by the pilot (See the NOTIFICATION Procedure in 3.04.46).

CONTROLLER PILOT DATA LINK COMMUNICATIONS (CPLDC)

CPLDC involves the exchange of preformatted or free text messages.

All ATC messages, either coming from the ATC center (uplink) or to be sent to the ATC center (downlink), transit through the DCDU.

UPLINK MESSAGES (FROM THE ATC TO THE CREW)

The following message categories can be uplinked :

1. Clearances (immediate or deferred, speed, heading, altitude, offset, direct to, route clearance or constraint etc...)
2. Report requests (confirm, position reports...)
3. Negotiation requests (ex : Can you accept ... ?)
4. Information messages.

Upon message reception, the ATSU triggers the ATC chime and the flashing blue "ATC MSG" pushbutton light on the glare shield.

For normal messages, the aural signal is repeated every 15 seconds (with the first signal delayed by 15 seconds). For urgent messages, the aural signal is triggered without any delay and is repeated every 5 seconds.

If the screen is empty, the message appears on the DCDU. If not, a flashing "MSG 1/2" cue is displayed. The pilot can display the message by using the MSG + pushbutton.

Note : *Urgent messages are displayed, regardless of the state of the screen.*

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The alert is stopped by pushing one of the two “ATC MSG” pushbuttons, or by any pilot action on the DCDU.

Answering the message always requires the following two steps :

- Manual preparation of the message by selecting the appropriate function key (WILCO, ROGER, AFFIRM, NEGATIVE...) or automatic preparation of the message by the FMGS.
- Sending an answer to the ground by using the SEND key.

The screen may be cleared for additional messages, once the message has been sent, by using the CLOSE key.

The last closed message can be displayed by using the RECALL function key.

Review other messages can be done from the MCDU MSG LOG page.

To allow some delay in answering, the pilot may answer STBY. In this case, the message cannot be removed until the final answer is sent, within an expected short period of time (around 10 minutes).

The FMGS monitors most of the deferred clearances and automatically recalls messages, when applicable. This is indicated by the “MONITORING” signal on the lower part of the DCDU, which comes on in white.

Route clearances and time constraints, received on the ATSU, can be loaded into the FMGS (SEC F-PLN) by using the LOAD key on the DCDU. The result of the loading (e.g. LOAD OK or LOAD PARTIAL) is displayed on the DCDU.

Report requests are sent to the FMGS, which monitors the related parameters (e.g. report passing...). In this case, and when applicable, the FMGS automatically proposes an answer (i.e. : when passing the waypoint at which the report is requested).

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DOWNLINK MESSAGES (FROM THE CREW TO THE ATC)

All downlink messages must be displayed on the DCDU prior to being sent. This allows the crew to visualize the exact message (concatenated) that will be displayed on the controller screen.

The following message categories can be downlinked :

1. Answers to ATC messages by using the DCDU function keys (WILCO, UNABLE, AFFIRM...).
2. Clearance requests (vertical, lateral, speed).
3. Reports (reports when a specific condition is met, position reports upon ATC request or at waypoint sequencing, immediate confirm).
4. Negotiation requests (When can we expect ...?)
5. Emergency messages (PAN PAN PAN, MAYDAY MAYDAY MAYDAY)
6. Additional messages.

All messages, not in direct response to an ATC uplink message, are prepared on the MCDU prior to appearing on the DCDU for review before sending.

Clearance requests are prepared on the MCDU ATC MENU page (prompts VERT REQ. LAT REQ and OTHER REQ). Then, they are displayed on the DCDU using the MCDU's REQ DISPL prompt.

Most report messages are automatically proposed by the FMGS on the DCDU.

They can be modified, if required, using the MODIFY key which calls for the MCDU's MESSAGE MODIFY or POSITION REPORT page. The MODIFY key also enables the updating of FMGS parameters on the DCDU.

The crew may prepare emergency messages on the MCDU by using the EMERGENCY page.

These messages are then sent to the DCDU by using the EMERG DISPL prompt on the MCDU.

The crew must then send the DCDU-displayed messages by using the SEND key.

The message may be removed from the screen by using the CLOSE key.

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AUTOMATIC DEPENDENT SURVEILLANCE (ADS)

The Automatic Dependent Surveillance (ADS) function is normally armed.

However, the crew can select it off on the CONNECTION STATUS page.

As long as the ADS is armed, up to 4 ATC centers can connect themselves.

Connection is at the ATC's discretion and some ATC centers do not use this function.

The ATSU sends surveillance data to the connected ATC centers.

The content and the periodicity of the reports sent by the ATSU are defined by the ATC, in order to satisfy their operational needs, depending on the circumstances.

The ADS is totally automatic and transparent for the crew.

CONTROLS AND INDICATIONS

GLARESHIELD

FFCS-01-4640-006-A200AA



ATC MSG pb

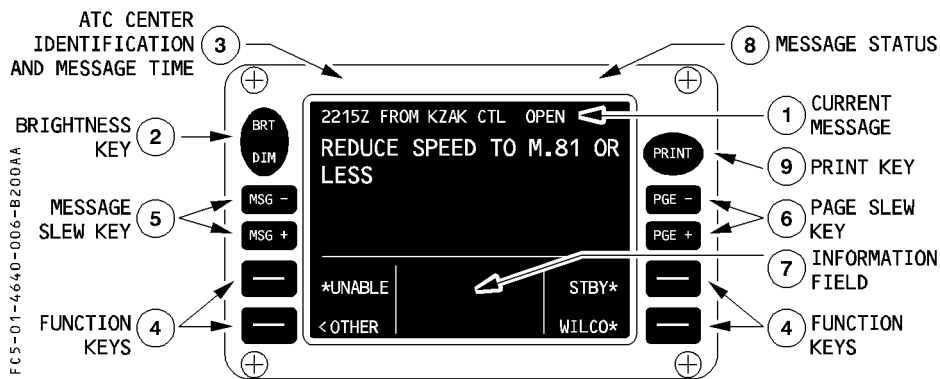
When a message, associated to an aural alert, is received :

- The pushbutton flashes blue.

When the pushbutton is pressed :

- The light stops flashing.
- The aural alert stops.

DATA COMMUNICATION DISPLAY UNITS (DCDU)



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① Current Message

Uplink messages :

- Are displayed on a black background.
- When received, they are in white font and the main parameters are in blue.
- When answered, the font changes to green.
- During monitoring, the parameters monitored by the FMGS are in magenta.
- When the value is attained, the parameters change to green.
- If the monitoring fails, the parameters become amber.

Downlink messages :

- Are displayed in black font on a colored background.
- Before sending, the background is blue.
- When sent, the background changes to green.

② Brightness Key

Used to adjust the brightness on the DCDU.

③ ATC Center Identification and Message Time

Identifies the ATC Center and indicates the time at which the message was received by the DCDU, either from the ATC or from the FMGS.

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④ Function Keys

The function keys are only operative if a star or a prompt is visible.

Depending on the nature of the message, the system automatically proposes an appropriate function (Example : WILCO or AFFIRM or ROGER).

1. WILCO : To accept an ATC clearance
2. ROGER : To confirm the reception and correct understanding of an ATC information or report request.
3. UNABLE : To reject an ATC clearance.
4. AFFIRM : To answer "yes" to an ATC question.
5. NEGAV : To answer "no" to an ATC question.
6. STBY : To inform the ATC that you need to delay the answer.
7. MODIFY : To access the MESSAGE MODIFY or POSITION REPORT page on the MCDU, in order to modify a message proposed by the FMGS. Also enables to update the parameters provided by the FMGS to the DCDU.
8. CANCEL : To remove a prepared downlink message from the DCDU, or to cancel a selected reply to an uplink message.
9. SEND : To send a message or an answer, prepared using other function keys (Example: WILCO, ROGER, AFFIRMATIVE, STBY...).
10. CLOSE : To delete a message (from the screen), which has been sent to the ATC, or a message from the ATC which has been answered, and send it to the MSG LOG. This is not applicable when the answer is in STBY.
11. RECALL : To recall the last message that was removed from the screen using the CLOSE function.
12. LOAD : To load a flight plan from the ATC or a parameter time constraint into the secondary flight plan.
13. CAN : Positive answer to an OPEN negotiation message from the ATC (Ex : When can you.... ?)
14. CANNOT : Negative answer to an OPEN negotiation message from the ATC.
15. ANSWER : To split a message, including several questions, into different messages.
16. OTHER : To display the other functions that could be applicable to the current message and that are not currently displayed.

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⑤ Message Slew Key

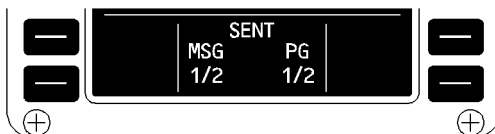
Used to scroll from one message to another.

⑥ Page Slew Key

Used to scroll through the different pages of a message.

⑦ Information Field

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MSG 1/2

- Displayed when several messages are available on the MCDU.
- Flashes when a new message is received

PG 1/2

- Displayed when the current message contains several pages.

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⑦ Information Field (cont'd)

Miscellaneous information

SENDING (white) : The current message is being sent.

SENT (white) : The current message was sent.

MONITORING (white) : The FMGS is monitoring the parameter of the current message.

MONIT FAILED (amber) : FMGS monitoring was requested as failed.

MONIT LOST (amber) : FMGS monitoring is lost.

MONIT UNAVAIL (amber) : FMGS monitoring is not possible.

MONIT CNCLD (white) : FMGS monitoring is cancelled.

LOADING (white) : The flight plan or time constraint contained in the current message is being loaded in the secondary flight plan of the FMGS.

LOAD OK (white) : The loading of the flight plan, contained in the current message was successfully done.

LOAD PARTIAL (amber) : The loading of the flight plan, contained in the current message, was only partially done.

LOAD FAILED (amber) : The loading of the flight plan, contained in the current message, has failed.

LOAD UNAVAIL (amber) : Loading is not possible.

REMINDER (white) : The current message was automatically recalled by the FMGS.

LINK LOST (amber) : Communication with the ATC is unavailable (displayed on any message pending when the loss occurred).

DOWNLINK LOST (amber) : Transmission of a request is not possible.

RESPONSE LOST (amber) : Transmission of a reply to an uplink message is not possible.

NO ATC REPLY (amber) : No answer received within 5 minutes.

WAIT FM DATA (white) : The FMGS is preparing an answer to the ATC's request for navigation parameters.

NO FM DATA (white) : The FMGS is unable to provide the parameters requested by ATC.

PRINTING (white) : Printing was requested from the DCDUs and printing is in progress.

PRINT FAILED (amber) : Printing was requested from the DCDUs and printing failed.

PRINTING UNAVAIL (white) : Printing was requested from the DCDUs, but the printer is unavailable.

NO MORE MSG (white) : Follows pressing of the "MSG + " or "MSG -" key, when no more messages are accessible.

NO MORE PGE (white) : Follows pressing of the "PGE+" or "PGE-" key, when no more pages are accessible.

RECALL MODE (white) : Recalls the last stored message.

ANSWER MSG (amber) : Maximum number of pending uplink messages is reached.

FILE FULL (amber) : Maximum number of downlink messages, accessible on the DCDUs is reached.

OVERFLW STORED (white) : Maximum number of non-pending messages is reached, and a new non-pending message is registered in the file.

MCDU FOR TEXT (white) : Initiation of a negative answer for a pending uplink message.

MCDU FOR EDIT (white) : Follows pressing of the "MODIFY" key.

⑧ Message status

OPEN

BLUE FONTS ON A BLACK BACKGROUND: THE CURRENT UPLINKED MESSAGE HAS NOT BEEN ANSWERED, OR THE CURRENT DOWNLINK MESSAGE HAS NOT BEEN SENT.

WILCO

ROGER

UNABLE

STBY

BLACK FONTS ON A BLUE BACKGROUND: THE CREW HAS ANSWERED THE UPLINKED MESSAGE, BUT THE ANSWER HAS NOT BEEN SENT.
BLACK FONTS ON A GREEN BACKGROUND: THE ANSWER HAS BEEN SENT.

NEGATV

AFFIRM

CAN

CANNOT

OPEN

AMBER FONTS ON A BLACK BACKGROUND: TRANSMISSION FAILURE.

ABORT

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⑨ Print key

Used to print the current message.