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The communication system includes facilities for radio communication and for internal communication. Aural communication facilities are integrated in an audio management system.

AUDIO MANAGEMENT SYSTEM

Captain and first officer (F/O) are provided with individual audio systems (L and R). If an audio system fails, the relevant AUDIO p/b, located at the AVIONICS panel, must be depressed to restore operation.

Audio Panels

Two audio panels, located at the side panels, provide selection of communication and navigation facilities. These facilities are:
- VHF radio communication.
- Monitoring of navigation aids.
- Flight interphone with other pilot, observer, and/or ground crew (IC).
- Cabin interphone with attendant(s) (CAB).
- Passenger Address (PA).

Volume control of the selected audio source is possible. Incoming signals are routed to loudspeaker and headset/headphones. The loudspeaker can be switched off. For an observer, an audio panel is installed at the observer's station in the flight deck entrance; incoming signals are not routed to the loudspeakers.

Microphones

Microphones, which can be used for all voice communication, are:
- A boom-mike (headset), plugged into the relevant jack panel in the flight-deck ceiling.
- A hand-mike, plugged into the jack panel at the side console. The hand-mike operates only when the integral Push To Talk (PTT) button is depressed.
- An oxygen-mask mike, which is permanently connected to the audio system.

When the oxygen-mask mike is operative (automatically through oxygen flow), both hand- and boom-microphones are inoperative. To restore communication with the hand- or boom-microphone, the doors of the oxygen-mask container must be closed and the reset/test lever must be operated.
An oxygen-mask mike is also available for the observer.

Loudspeakers / Headphones

Two loudspeakers are installed in the flight-deck ceiling. When the hand-mike or boom-mike is used, both loudspeakers are muted. The loudspeakers are not muted when the oxygen-mask mike is in use. Headphones must be plugged into the relevant jack panel in the flight-deck ceiling and are not muted.

Jack Panels

Jack panels are installed at the side consoles and at the flight-deck ceiling. In each ceiling jack panel a headset and a headphone can be plugged. In each side console a hand-mike can be plugged. At the observer's station a jack panel is installed in which a headset and a headphone can be plugged.

Cockpit Voice Recorder (CVR)

The CVR records the last 30 minutes of flight deck audio on a continuous magnetic tape. All voice communication is recorded. Flight-deck conversation is recorded via the remote area microphone, installed at the lower side of the overhead panel. Operation is automatic from engine start until five minutes after engine shutdown. Operation prior to engine start is obtained by depressing the FDR/CVR GND CTL p/b at the AVIONICS panel. Pre-engine-start operation is annunciated by a chime and indicated by an ON light in the p/b. The light extinguishes as soon as either engine is started.
A CVR panel is located at the overhead panel. When the aircraft is on the ground with the parking brake set, the information on the tape can be erased by depressing the ERASE button. A CVR test is performed when the TEST button is depressed. To monitor CVR operation, a headphone jack is installed.

RADIO COMMUNICATION

VHF COM Systems

Three independent Very High Frequency (VHF) communication systems are installed.

NOTE: VHF COM 3 is dedicated to ACARS and can only be used for voice communication if the ACARS switch is set to VOICE; see ACARS.

The frequency range is 118.00 to 136.990 MHz. Channel spacing is 8.33 kHz. Each system, which comprises an externally mounted antenna, a transceiver, and a control panel, is integrated in the audio system. Each pilot can select either system for use from his/her audio panel. Incoming signals can always be heard.
Radio Transmission (RT) must be selected either at the audio panel or on the control wheel. When the hand-mike is used for radio transmission no RT selection is needed.
The VHF COM control panels, located at the pedestal, allow preselection of the frequency to be used.

ACARS

The ACARS (Arinc Communication Address and Reporting System) provides for reception and transmission of data via VHF COM 3. VHF COM 3 is normally dedicated to ACARS, but can be used for voice communication by switching the guarded ACARS switch on the pedestal to the VOICE position.
The system comprises an Interactive Display Unit (IDU) in the flight deck, a Cabin Management Terminal (CMT) in the passenger entrance, and a remote Management Unit (MU). For the system description see subsection ACARS.

Navigation Aid Audio Monitoring

Monitoring ADF, VOR, ILS, and marker beacon is possible by depressing and releasing the relevant buttons at the audio panel. A released button will pop out and illuminate. The volume of each audio channel can be adjusted by rotating the relevant button. Navigation aids can be monitored simultaneously.

INTERNAL COMMUNICATION

Flight Interphone

The system enables communication between captain, first officer, and observer when IC is selected on either control wheel or OPEN IC at either audio panel.

NOTE: As long as one microphone switch at either audio panel is in the OPEN IC position, which is a maintained position, both loudspeakers remain muted.

Flight interphone is also possible with the ground crew; a headset connector is installed next to the external electrical power receptacle.

Cabin Interphone

Communication with the attendants is possible when the FWD or AFT CALL light at the left lower overhead panel is on. Either CALL light comes on after a pilot call or after an attendant call; see below. To interrupt cabin interphone or to reset the CALL light, a button is installed at the left lower overhead panel. Either pilot or observer can use any mike when the cabin interphone button (CAB) at the relevant audio panel is depressed.

Attendant/Ground Crew Call

An attendant can be requested to use cabin interphone by depressing the FWD or AFT CALL p/b at the left lower overhead panel. In the cabin, this will result in a high chime, two pink-coloured area-call lights, and a 'pilot' light at either handset hanger; see MISCELLANEOUS. Depressing the ALL ATTND button at the left lower overhead panel will result in a high chime in the cabin.
The ground crew can be requested to use flight interphone, by depressing the GND CALL p/b at the left lower overhead panel. This will activate a horn in the nose-wheel bay.

Pilot Calls

The pilots can be called by an attendant to use cabin interphone. This will result in a FWD or AFT CALL light at the left lower overhead panel and an aural generated by the buzzer at the overhead panel.
The pilots can be called by the ground crew to use flight interphone. This will result in a GND CALL light at the left lower overhead panel and an aural generated by the buzzer at the overhead panel. A pilot call button for the ground crew is located next to the external electrical power receptacle.

PASSENGER ADDRESS

PA can be used by either pilot or by an attendant. PA selection by the pilot will override possible announcements by the attendant. With the flight-deck handset, located aft of the pedestal, the pilot can get access to the PA system via the PA p/b at the left lower overhead panel. Access with boom-, mask-, or hand-mike can be obtained via the audio panels. An attendant has access to the PA system with two microphones and a tape deck; see MISCELLANEOUS. PA volume in the cabin is automatically increased when one or both engines are running and when cabin pressurization is lost. Monitoring PA announcements in the flight deck is possible through the PA volume lever at the audio panel.

Cabin Signs

Annunciators with 'fasten seat belts' and 'no smoking' legends are provided at each passenger service panel. The signs are controlled from the left lower overhead panel. The 'no smoking' signs are switched on automatically when the passenger oxygen system is activated (see EMERGENCY EQUIPMENT). The 'fasten seat belts' sign includes 'return to cabin' signs in the toilet compartments. A chime in the cabin announces any on and off switching of the signs.

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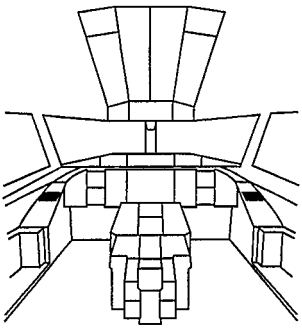


SPEAKER SWITCH

ON
- Loudspeaker active.
- Loudspeaker muted when boom- or hand-microphone is selected for use.

OFF
- Loudspeaker off.

MICROPHONE SWITCH

OPEN IC
- Microphone selected for flight interphone.

RT (springloaded to center)
- Microphone selected for radio transmission.

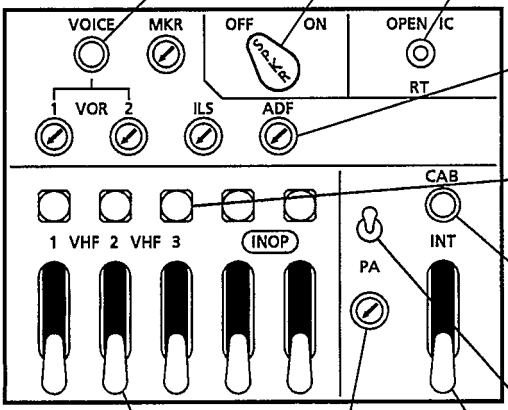
NAVIGATION AUDIO FILTER BUTTON

When depressed:
- Voice audio only; ident signals from VOR 1 and 2 are suppressed.

NAVIGATION AUDIO CONTROL KNOBS VOR 1/2, MKR, ILS, ADF

In (blank)
- Monitoring of respective system off.

Out (lit)
- Monitoring of respective system on.
- Rotate to adjust volume.



AUDIO PANEL

TRANSCEIVER SELECT BUTTONS

VHF 1/2/3
- Depress respective button to select the desired transceiver.

NOTE: Normally, VHF 3 is not available for voice communication.

CABIN INTERPHONE BUTTON (springloaded)

When depressed:
- Microphone selected for cabin interphone.

TRANSCEIVER VOLUME LEVERS

VHF 1/2/3
- Set lever to adjust the audio volume of the respective transceiver above minimum level.

PA SWITCH

PA (springloaded)
- Microphone selected for passenger address.

PA VOLUME KNOB

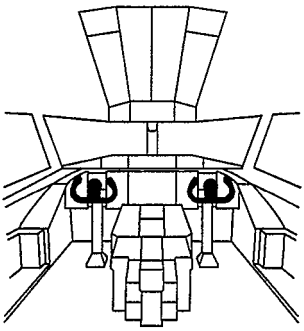
In (blank)
- Monitoring of PA system off.

Out (lit)
- Monitoring of PA system on.
- Rotate to adjust volume.

INTERCOM VOLUME LEVER

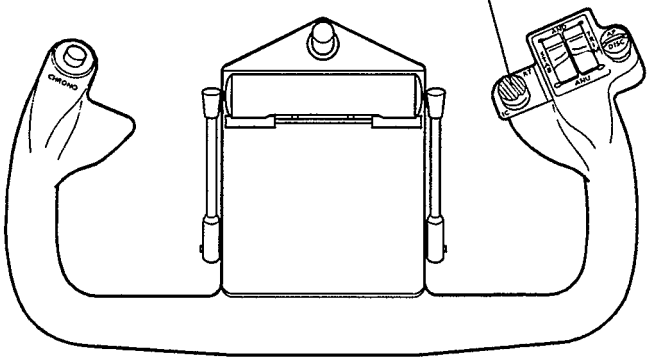
Set to adjust audio volume of interphone above minimum level.

VD/OP-19-134

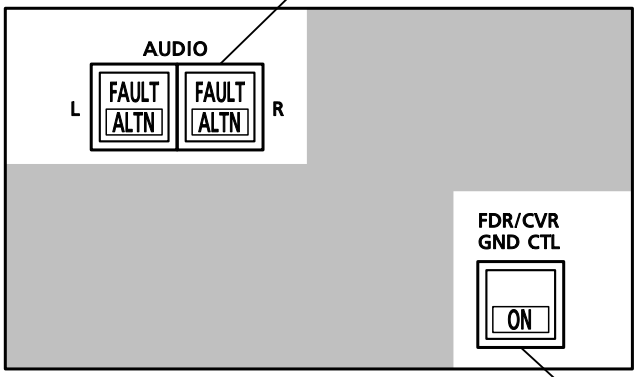


IC/RT SELECTOR (F/O)

IC (springloaded to center)
– Boom mike selected for flight interphone, or
– Mask mike selected for flight- and cabin interphone.
Center position
– No selection.
RT (springload to center)
– Boom or mask mike selected for radio transmission.
NOTE: IC/RT SELECTOR at the captain's control wheel is installed at LH handgrip.



AVIONICS PANEL
LOCATION: OVERHEAD PANEL



AUDIO P/B

Normal (blank)
- **Audio system operating normally.**

FAULT (amber)
- **Audio system failure.**

ALTN (white)
- **Alternate audio system selected for continued normal operation.**

NOTE: ALTN selection by the F/O (R), disables communication facillities for the observer.

FDR/CVR GROUND CONTROL P/B

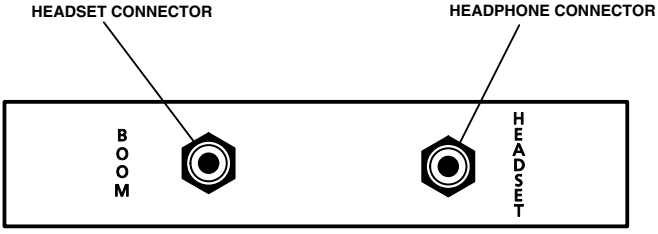
Normal (blank)
- **CVR operation automatically controlled.**

ON (white)
- **CVR operation manually activated before engine start.**

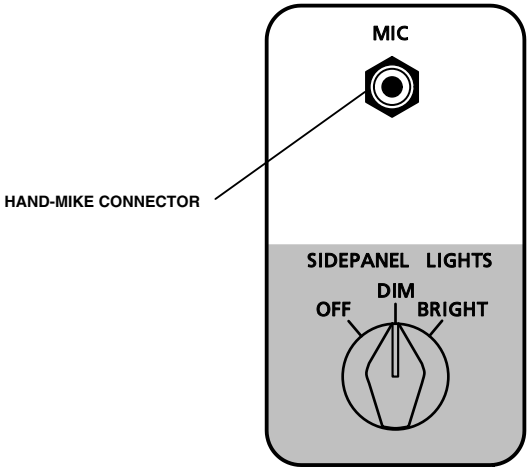
NOTE: For the flight Data Recorder (FDR) see flight/Navigation Data Systems.

JCOM-003

JACK PANEL (FOR HEADSET AND HEADPHONE)
LOCATION: FLIGHT DECK CEILING

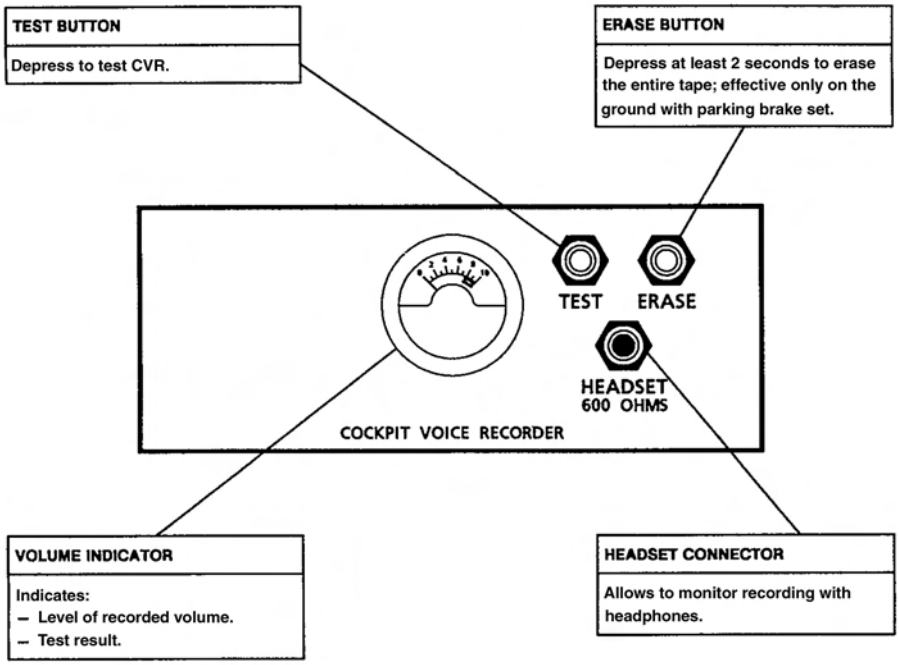


JACK PANEL (FOR HAND-MIKE)
LOCATION: SIDE PANEL



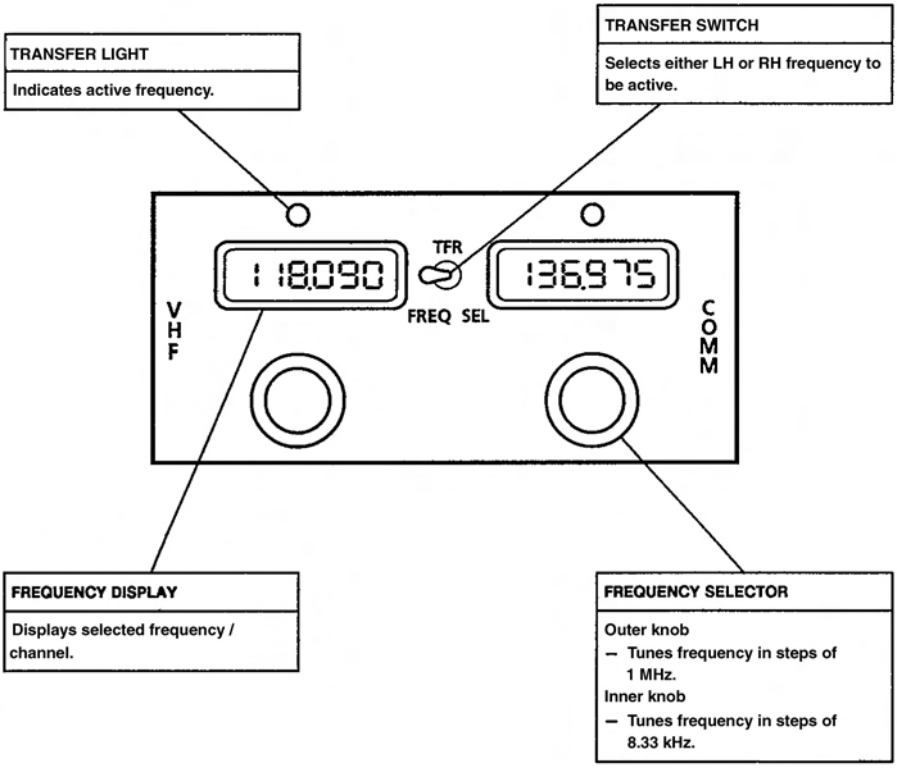
JCOM-053

COCKPIT VOICE RECORDER PANEL
LOCATION: OVERHEAD PANEL



VD/OP-19-196

VHF COMM PANEL
LOCATION: PEDESTAL



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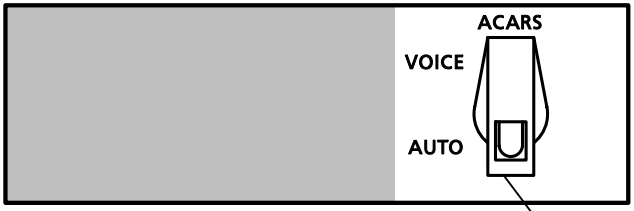
GENERAL SWITCHING PANEL
LOCATION: PEDESTAL



ACARS SWITCH (guarded)
AUTO **- ACARS communication available.** **- VHF COM 3 not available for voice communication.** **VOICE** **- ACARS communication not available.** **- VHF COM 3 available for voice communication.**

JCOM-057

RH LOWER OVERHEAD PANEL
LOCATION: OVERHEAD PANEL

PA P/B

Depressed:
- **PA system open to handset.**

ON (blue)
- **PA system in use by either pilot (handset) or attendant (mike).**

ALL ATTENDANT CALL BUTTON

Depressed:
- **Chime in cabin.**

CALL P/B's

Depressed FWD or AFT:
- **Attendant call.**

Depressed GND:
- **Ground crew call.**

CALL (blue)
- **Pilot call annunciated by buzzer.**

NOTE: The CALL light also comes on when the respective p/b is depressed.

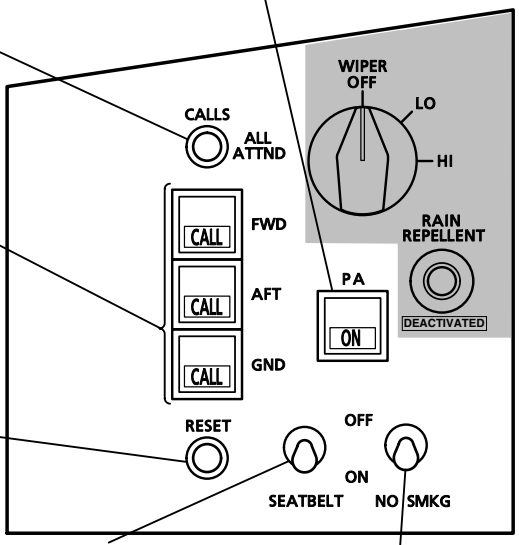
CALL RESET BUTTON

Depress to reset any CALL light and to interrupt interphone.

SEAT BELT SWITCH

ON
- **Cabin signs 'fasten seat belts' on.**
- **Memo message SEAT BELT ON is displayed on MFDU primary page.**

OFF
- **Cabin signs 'fasten seat belts' off.**



LEFT LOWER OVERHEAD PANEL

NO SMOKING SELECTOR

OFF
- **Cabin signs 'no smoking' off.**

ON
- **Cabin signs 'no smoking' on.**

NOTE: When cabin signs are on, memo message NO SMKG ON is displayed on MFDU primary page.

JCOM-069

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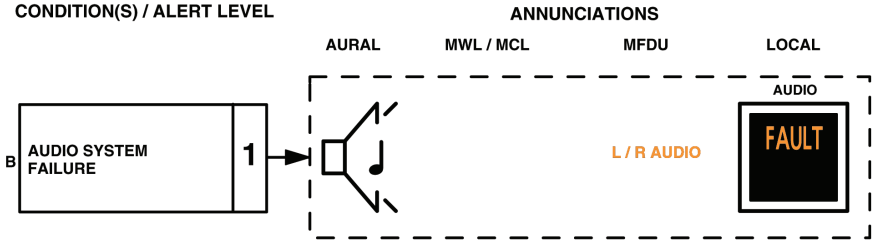
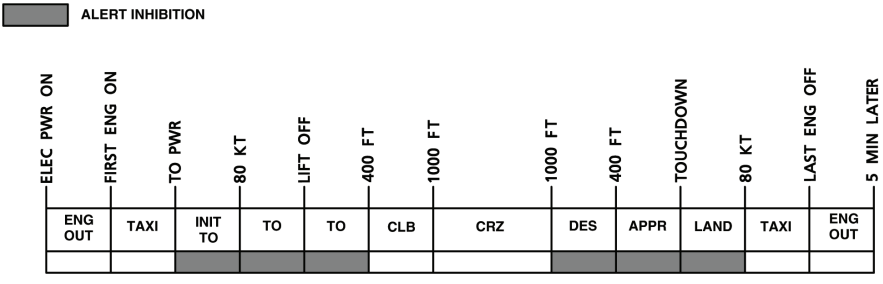
FWS CONTROLLED SYSTEM ALERTS





JCOM-062

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GENERAL

The Arinc Communication Address and Reporting System (ACARS) provides for reception and transmission of data between the aircraft and ground stations. The system comprises an Interactive Display Unit (IDU), a Cabin Management Terminal (CMT), and a remote Management Unit (MU).

The IDU, located at the pedestal, functions as a touch-sensitive keyboard and enables the pilots to receive and transmit data. The CMT, primarily for attendant use, is located opposite the forward attendant seats. It is a touch-sensitive keyboard and functions similar to the IDU at the flight deck, but utilises different menus. See MISCELLANEOUS.

The system is interfaced with VHF COM 3 and the Digital Flight Data Acquisition Unit (DFDAU). VHF COM 3 is normally dedicated to ACARS through a guarded ACARS switch at the pedestal; see COMMUNICATION FACILITIES. The DFDAU provides flight data inputs to the MU and receives documentary data and messages from the MU. The MU provides the interfacing for data flow to and from the IDU, CMT, DFDAU, VHF COM 3, and the flight crews.

INTERACTIVE DISPLAY UNIT

At power-up the IDU will display the main system menu and initially TMO. If, after four seconds TMO is still displayed, a system fault is indicated. The main system menu gives access to either the ACARS or DFDAU menu via which related menus can be called up as shown in the sample illustrations. Each menu consists of touch-sensitive lines which can be used as keys to call up other menu pages or functional pages. Functional pages are used to display and/or enter data.

If a menu remains on display for 60 seconds without being touched, the IDU will go to sleep mode, blanking the display. Touching the screen anywhere wakes up the IDU, returning the current menu to display. If data requiring operator action becomes active while in sleep mode, the IDU will wake up. Free text and pre-defined messages can be transmitted to ground stations via the IDU. Messages received from ground stations are announced by an 'ACARS MESSAGE' alert on the MFDU and a single chime. Messages are queued in order of age and numbered; the newest, annotated 'NEW', having the highest number. After call up the annotation is changed to 'OLD'. If the DFDAU has control of the IDU, and the ACARS MU requires control the MENU key will be presented.

KEYS

Special Keys

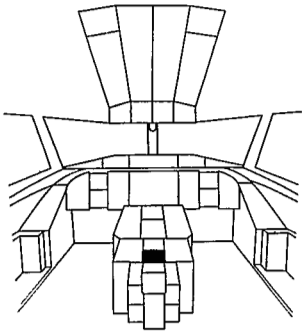
Several special keys can be displayed by IDU and CMT. Touching the key:

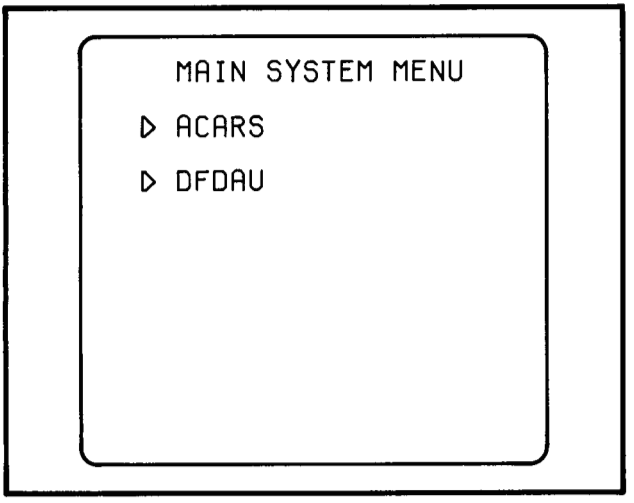
- BKSP moves the cursor back one space.
- CLR blanks the underlined characters at the cursor position and to its right
- ENT stores the displayed underlined contents and moves to the next field, or displays SUMMARY/SEND if it is the last entry of a message.
- EUC displays the parameter engineering unit values in filtered and unfiltered forms.
- HEX displays raw unfiltered parameter values
- MAIN returns the display to the MAIN SYSTEM MENU.
- MENU returns the display to the respective MENU.
- PAGE calls up the next page.
- RE-DO returns the display to the first data entry page to allow changes.
- RTN returns the display to previous page.
- SEND queues the message for transmission and returns to the menu from which the page was called.

Advisory keys

The second key from the left at the bottom of the display is the advisory key, shown as asterisks (****) in the sample illustrations. The highest priority advisory will be displayed in normal, reverse, or flashing video. Activating the key will display the respective page and/or cancel the advisory.

- ACK, A message was received which requires a manual acknowledgement. Activation queues a acknowledge message for transmission.
- ADVIS; A discrepancy exists between data entered and data aquired from external sources.
- BUSY; A voice busy message was received.
- CHK; Checklist not completed and not on display
- DELAY; OFF event delayed.
- ENG 1/2 PPPP EXCEEDENCE, 'EXCEEDENCE SUMMARY REPORT FOLLOWS - STAND BY' message presented. The report will include the parameter concerned
- FAIL, A new failure has been detected or reported to the MU, and not displayed on the respective page or a failure previously displayed still exists.
- FUEL; The fuel-on-board entry is required
- GATES; Connecting Gates message received but not on display.
- INIT; FLIGHT INITIALIZATION DATA not entered.
- MSG; A message has been received but not called to the display. Activation displays the oldest message not yet displayed.
- NOCOM; A message has been sent and no acknowledgement received. Activation causes re-transmission.
- SAVED, DFDAU message not transferred to the ACARS MU is being saved.
- SECAL; A message has been received, but not called up to the display, or SELCAL reset discrete was activated when the flashing SECAL advisory page was enabled.
- SEND; Queues a message ready for transmission.
- SEND, A message has been sent and is awaiting acknowledgement. No response when activated.
- VOICE, The system is in VOICE mode.
- WAIT; A requested report is being generated.
- W/B; A Weight and Balance message was received.
- XFER; A message is being transferred from the DFDAU to the ACARS MU.
- XMIT; PTT is activated while in the VOICE mode. No response when activated.





INTERACTIVE DISPLAY UNIT
(DISPLAY UPON POWER UP)

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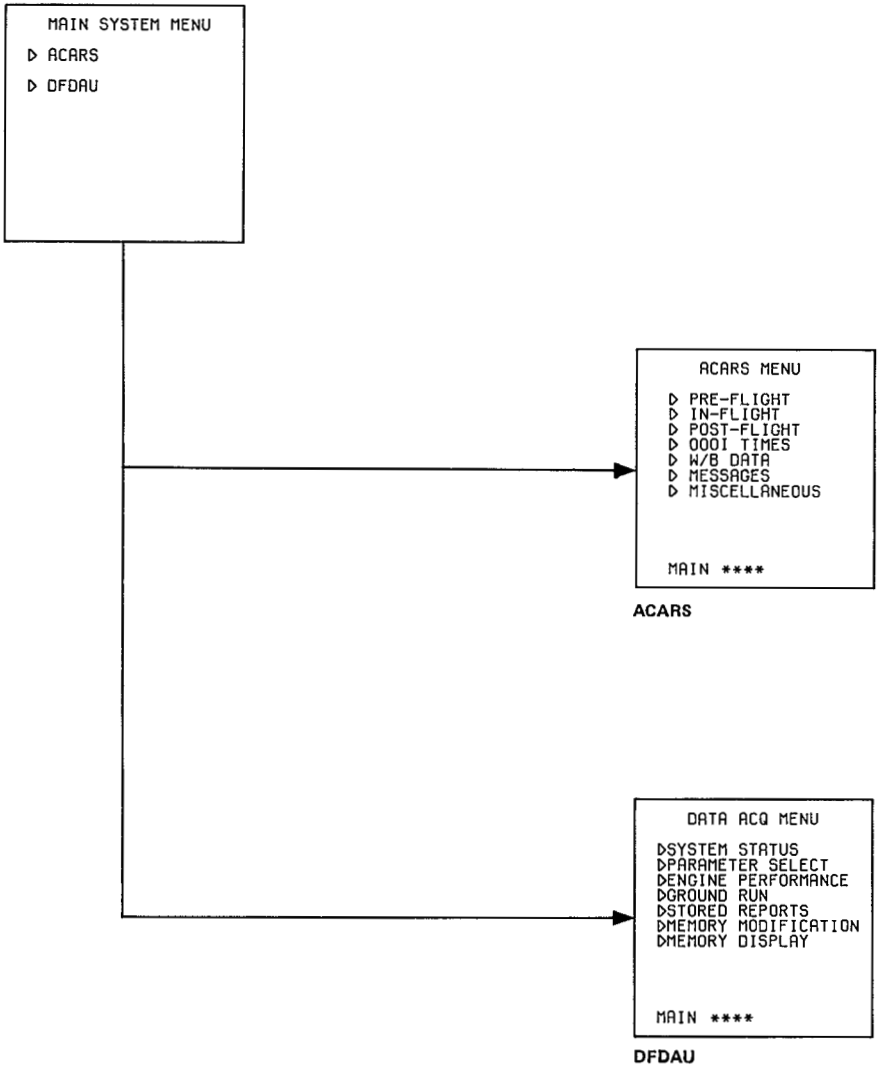
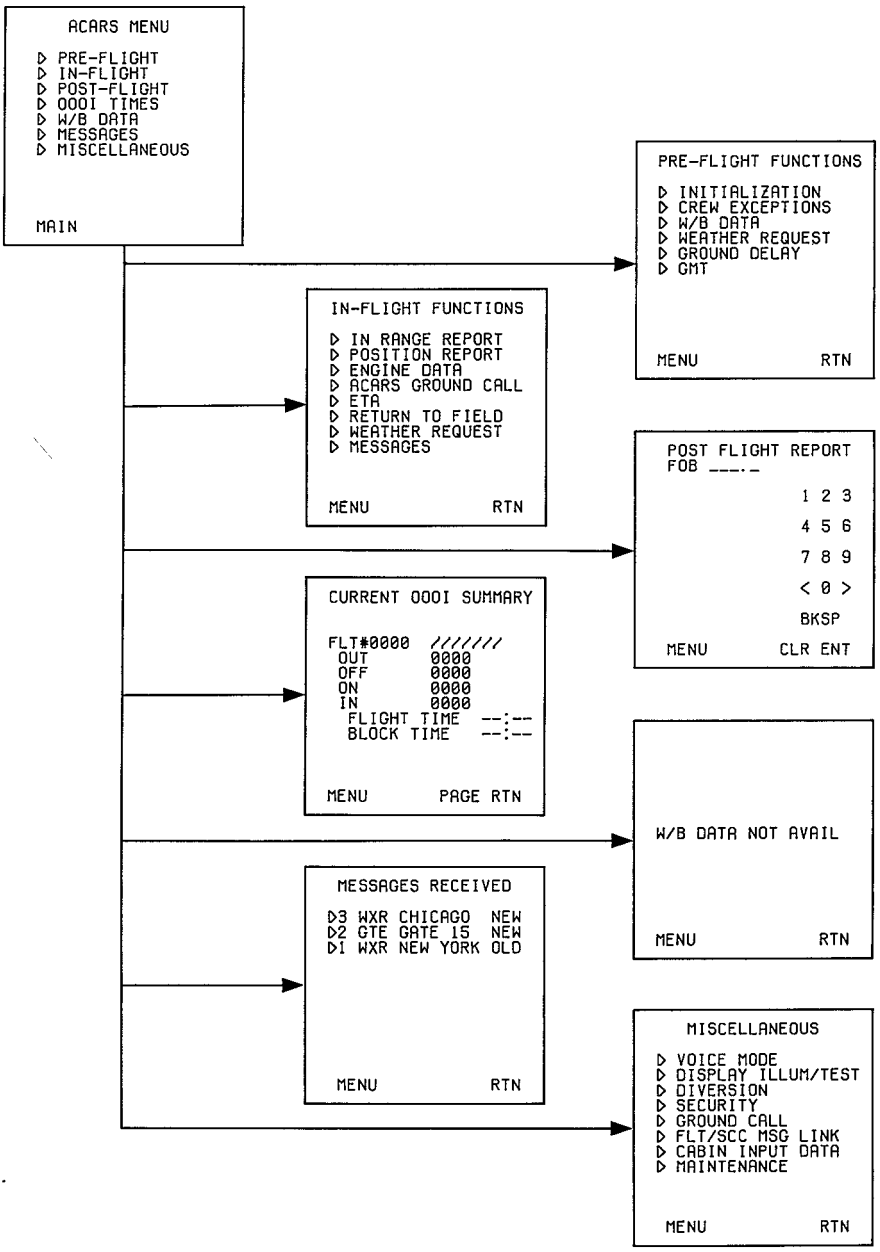
INTERACTIVE DISPLAY UNIT (CONT)

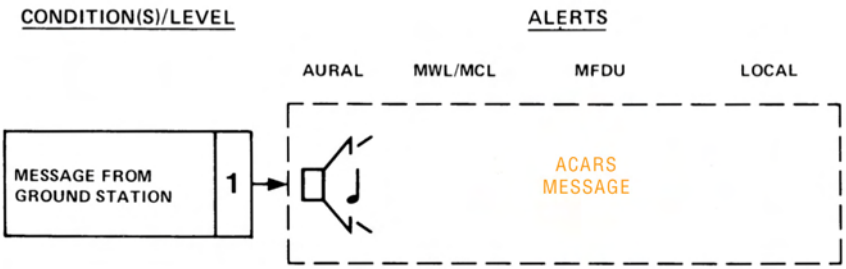


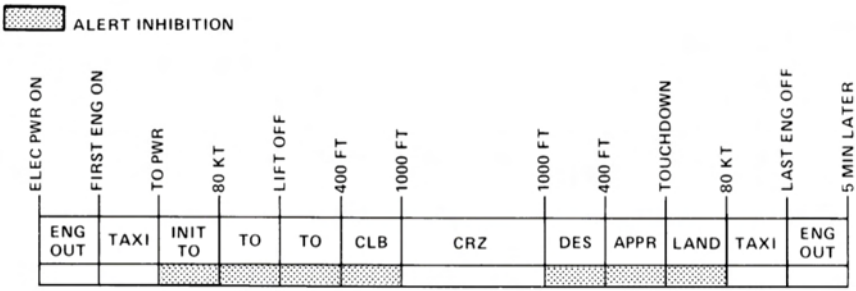
VD/OP–19–137/A

ACARS



VD/OP–19–138





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GENERAL

The aircraft is equipped with a Video Surveilance System (VSS). The VSS provide live video images of the flight deck door entrance area to the flight deck. This allows the flight crew to visually identify persons requesting access to the flight deck.
The system comprises:
- a display computer,
- two cameras,
- system controls.

DISPLAY UNIT

The display unit, located on the back wall behind the captain's seat, diplays video images received from the selected camera. A light is provided to indicte the status of the system. Brightness and contrast controls are provided; two knobs for manual adjustments and a light sensor for automatic adjustment of the video signals. The display unit switches automatically to a standby mode after approx. 5 min of inactivity. Depressing the camera select button within 120 seconds activates the display unit again and displays images from the last selected camera. After 120 seconds image of camera 1 will be displayed.

NOTE: Power to the cameras is not interrupted during standby mode.

CAMERAS

The two cameras are installed in the entrance area, one camera above galley 1 and one in the entrance ceiling. Both camera's have a swiveling capabilty to achieve the desired camera angle.

SYSTEM CONTROLS

System controls are installed at the pedestal adjecent to the F-DK DOOR LOCK p/b, to switch the system ON or OFF, and select one of the two cameras

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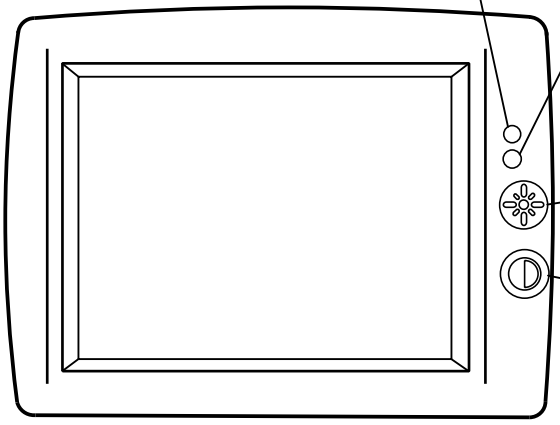
DISPLAY UNIT

LOCATION: FLIGHT DECK BACK WALL BEHIND CAPTAIN'S SEAT



JCOM-063

SYSTEM CONTROLS
LOCATION: PEDESTAL