

A330-200
TECHNICAL TRAINING MANUAL
MECHANICS / ELECTRICS & AVIONICS COURSE
45 ON BOARD MAINTENANCE SYSTEMS
GE Metric

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ON BOARD MAINTENANCE FACILITIES

Acquisition
Consolidation
Retrieval
Analysis

ACQUISITION

The acquisition of aircraft system data is performed by 4 major electronic systems :

- the Electronic Centralized Aircraft Monitoring (ECAM) system which monitors the operational data in order to display warnings and system information,
- the Flight Data Recording System (FDRS) which is mandatory and records aircraft operational parameters for incident investigation purposes,
- the Central Maintenance System (CMS) which monitors the BITE data in order to record the system failures,
- the Aircraft Condition Monitoring System (ACMS), if installed, which records significant operational parameters in order to monitor the engines, the aircraft performance and to analyze specific aircraft problems.

CONSOLIDATION

In normal operation, the ECAM permanently displays normal aircraft parameters. The ACMS, if installed, and FDRS permanently record aircraft system parameters.

When an anomaly is detected by an aircraft system, the ECAM displays the abnormal parameter or function and its associated warning and the CMS records the failure information detected by the system BITE.

RETRIEVAL

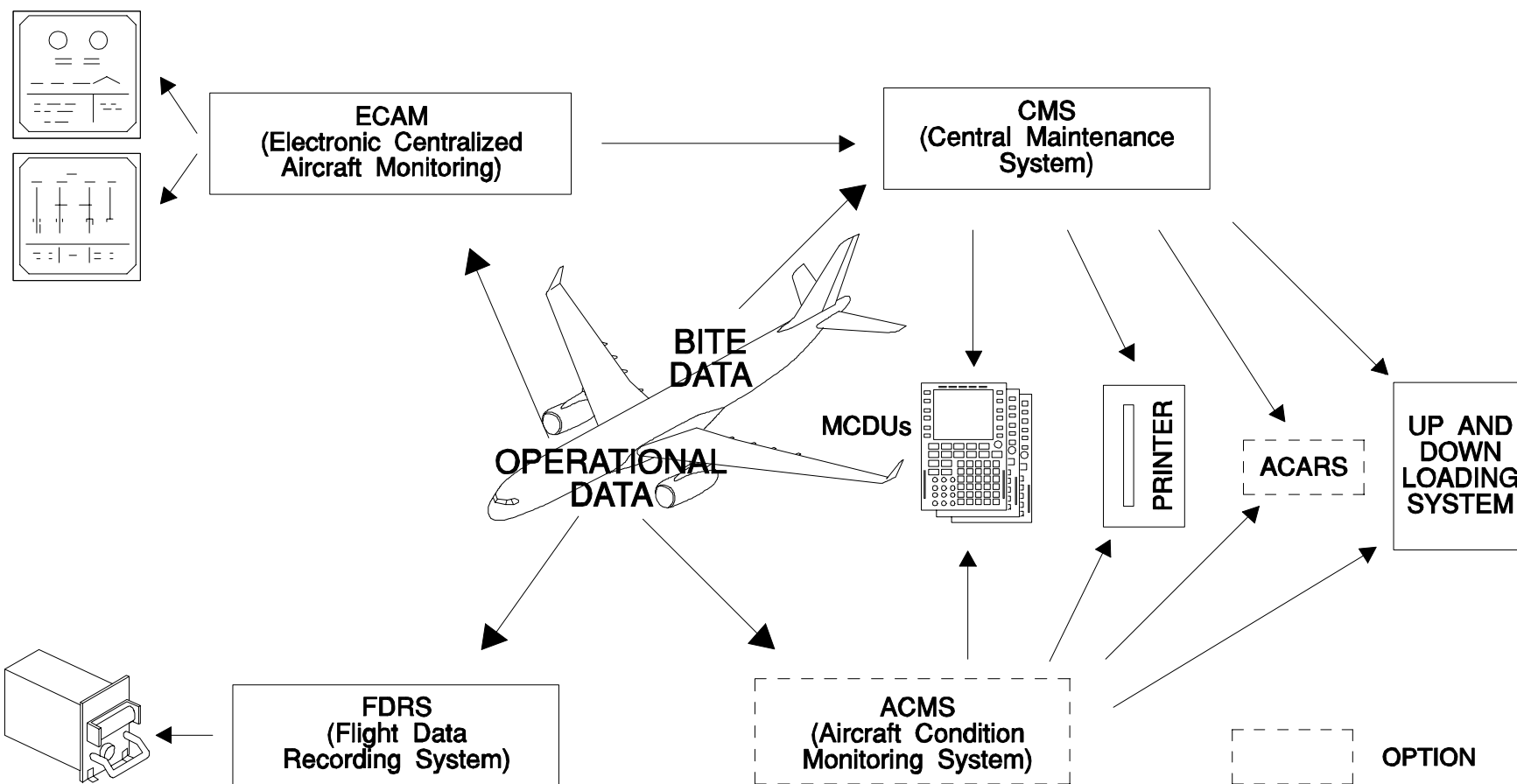
All the information can be retrieved through :

- the cockpit Multipurpose Control Display Unit,
- the ECAM displays,
- the cockpit printer,
- the down loading system,
- a ground station via ACARS, if installed,
- and the recorders.

ANALYSIS

Maintenance operations can be divided into 3 groups :

- minor trouble shooting which is performed with the help of the ECAM and the CMS through the MCDUs and the printed or ACARS down-linked reports, if ACARS installed.
- in-depth trouble shooting which is performed with the help of the CMS and the ACMS, if installed, through the MCDUs and printed reports.
- long term maintenance which is performed with the help of the ACMS, if installed, and the FDRS through printed, ACARS down-linked, if ACARS installed, and down-loaded reports or recorded data.



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STUDENT NOTES

BITE PHILOSOPHY

GENERAL

BITE

- Fault Detection
- Isolation
- Memorization

TEST

- Power Up Test
- Cyclic Tests
- System Test
- Specific Tests

NEW CONCEPT

GENERAL

A system is composed of LRUs which can be : computers, sensors, actuators, probes, etc.

With the new technology, most of these Line Replacable Units (LRUs) are controlled by digital computers.

For safety reasons, these LRUs are permanently monitored, they can be tested and trouble shooting can be performed.

In each system, a part of a computer is dedicated to these functions : it is called Built-In Test Equipement.

Sometimes, in multi-computer systems, one computer is used to concentrate the BITE (Built-In Test Equipment) data of the system.

BITE

During normal operation, the system is permanently monitored : internal monitoring, inputs/outputs monitoring, link monitoring between LRUs within the system.

FAULT DETECTION

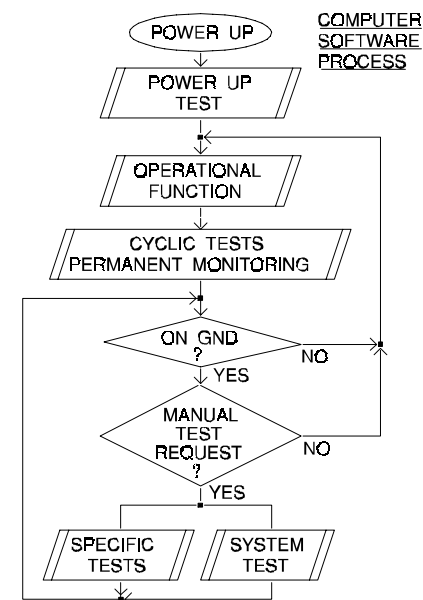
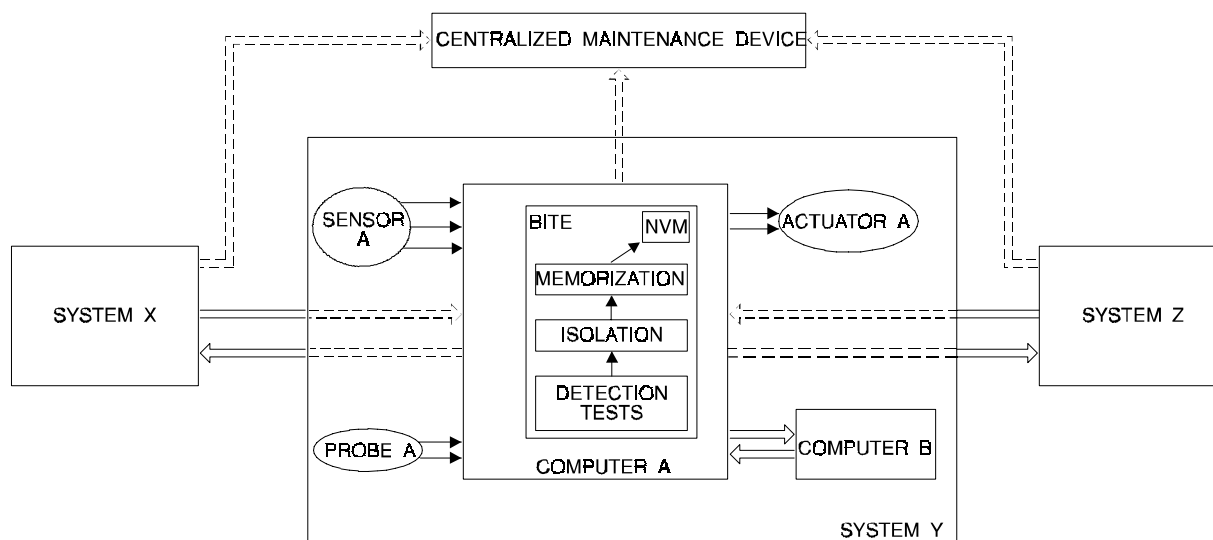
If a failure occurs, it can be permanent (consolidated) or intermittent.

ISOLATION

After failure detection, the BITE is able to identify the possible failed LRUs and can give a snapshot of the system environment when the failure occurred.

MEMORIZATION

All the information necessary for maintenance and trouble shooting is memorized in a Non Volatile Memory.



TEST

The test function can be divided into 4 groups.

POWER UP TEST

The power up test is first a safety test.

The purpose of a safety test is to ensure compliance with the safety objectives.

It is executed only on ground after long power cuts (more than 200ms).

Its duration is function of the system which is not operational during the power up test.

If the aircraft is airborne, the power up test is limited to a few items to enable a quick return to operation of the system.

The typical tasks of a power up test are : test of microprocessor, test of memories, test of ARINC 429 and various I/O circuits, configuration test.

CYCLIC TESTS

These tests are carried out permanently.

They do not disturb system operation.

The typical tasks of a cyclic test (also called IN OPERATION TEST) are : Watchdog test (a watchdog is a device capable of restarting the microprocessor if the software fails), RAM test. Permanent monitoring is performed by the operational program (e. g. ARINC 429 messages validity).

SYSTEM TEST

The purpose of this test is to offer to the maintenance staff the possibility to test the system for trouble shooting purposes.

This test can be performed after the replacement of a LRU in order to check the integrity of the system or sub-system.

It is similar to the POWER UP TEST but it is more complete.

It is performed with all peripherals supplied.

SPECIFIC TESTS

For some systems, specific tests are available.

The purpose of these tests is to generate stimuli to various command devices such as actuators or valves.

They can have a major effect on the aircraft (automatic moving of slats or flaps, engine dry cranking).

NEW CONCEPT

The BITE information stored in the system BITE memories is sent to a centralized maintenance device.

The manual tests (SYSTEM TEST and SPECIFIC TESTS) can be initiated via this centralized maintenance device.

Its main advantages are :

- single interface location (cockpit).
- easy fault identification.
- reduction of the trouble shooting duration.
- simplification of the technical documentation.
- standardization of the equipment.

MCDU DESCRIPTION

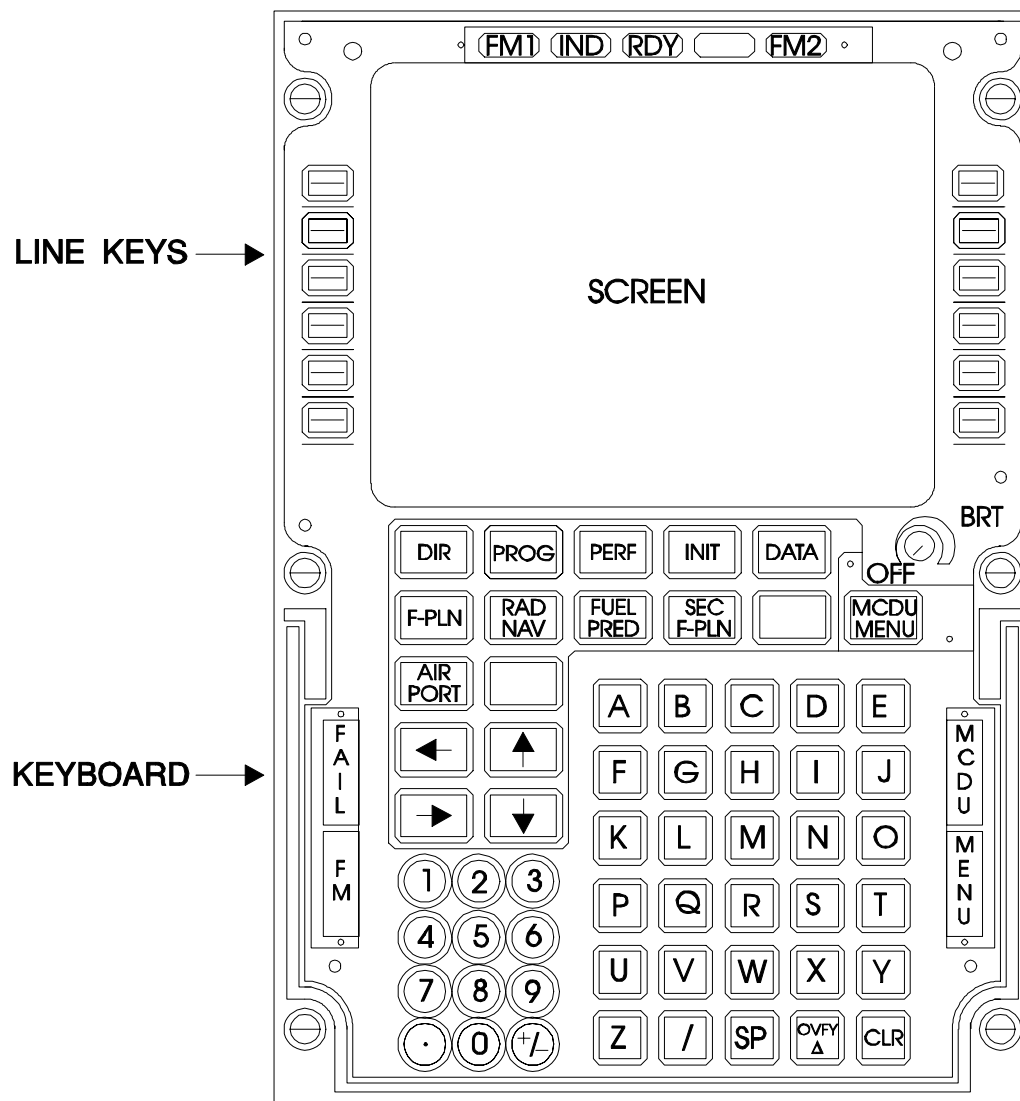
- General
- Display
- Line Select Keys
- Colour Code
- Keyboard
- Annunciators
- Example of Utilization

GENERAL

The MCDU consists of a screen for data display, a keyboard and line keys used to send commands to the connected systems.

The Multipurpose Control and Display Unit (MCDU) provides access to the following systems components :

- FMGEC (Flight Management and Guidance Envelope Computer).
- ACARS (Aircraft Communication Addressing and Reporting System) if installed.
- ACMS (Aircraft Condition Monitoring System) if installed.
- CMS (Central Maintenance System).



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DISPLAY

The brightness knob (BRT) allows brightness adjustment of the screen and power up test and reset.

The status page is the first one presented at power up.
It is sent by the Flight Management.

The MCDU display contains 14 lines, each having 24 characters.

Of these 14 lines, the top line (line 1) is normally used as a title line or to display data to which the user does not have access.
The bottom line (line 14) is the scratchpad line and is used to alter data in the data field.

Lines 2 to 13 are data lines arranged into six pairs.

Each pair of lines has a label line (the upper of the two lines) and a data line.

The data lines are adjacent to the line select keys, and the label line is just above the data line.

The line pairs are referenced by line select keys as follows :

Reference	CRT lines (line pairs)
1L-1R	2-3
2L-2R	4-5
3L-3R	6-7
4L-4R	8-9
5L-5R	10-11
6L-6R	12-13

R : Right, L : Left

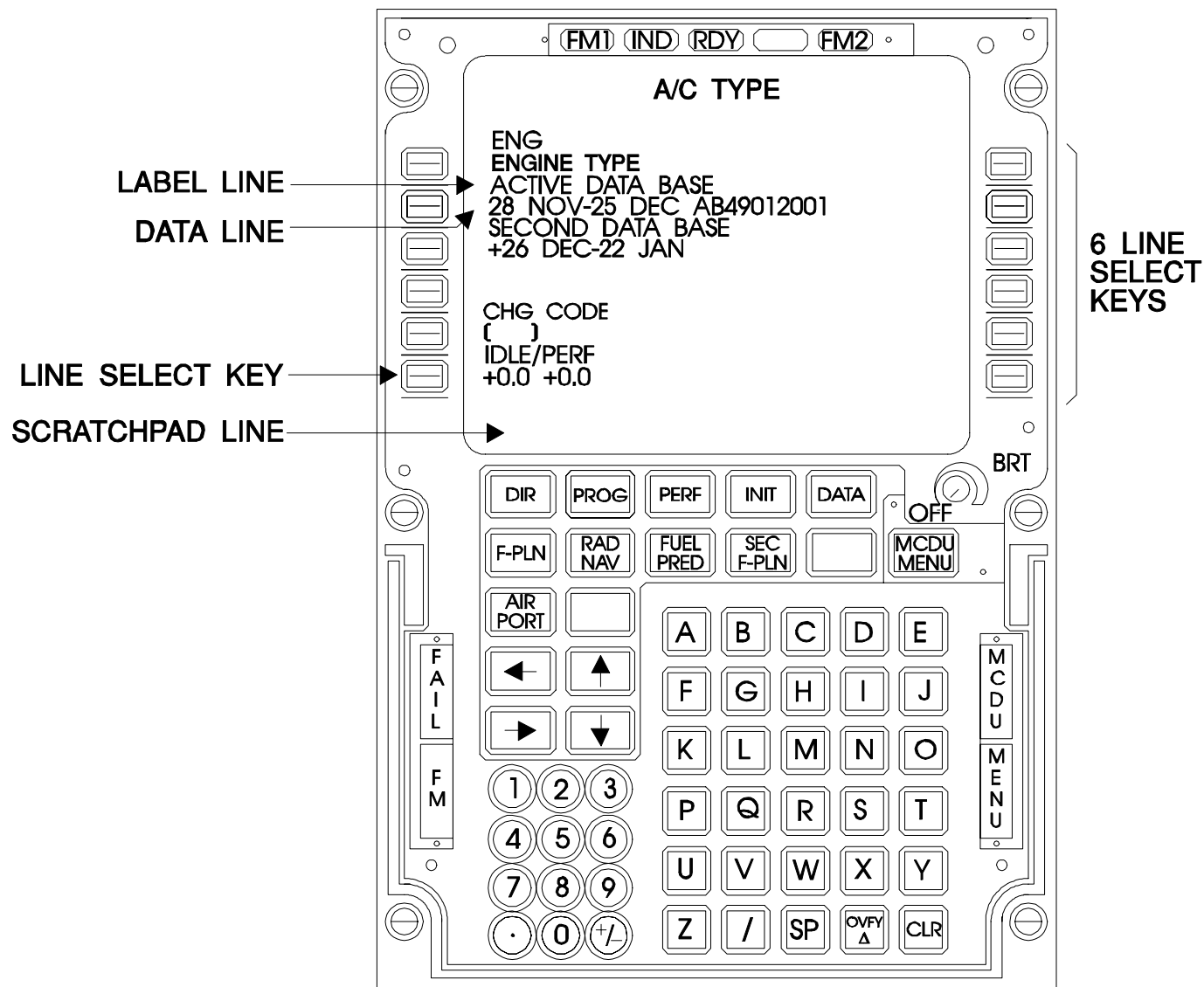
LINE SELECT KEY

Lateral keys called line select keys allow entry of data into a field and access to data or a function identified by this field.

COLOUR CODE

The colour code enables the data and information displayed on the screen to be differentiated. Most of the presented colours are specific to the FM mode.

- . Titles, comments, dashes, symbols and minor messages are displayed in WHITE
- . Non modifiable data or active data is displayed in GREEN.
- . However, in temporary flight plan, the same data is shown in YELLOW until it is validated by an insertion.
- . The modifiable data and selectable data is displayed in CYAN.
- . Mandatory data, boxes, required pilot actions and important messages are displayed in AMBER.
- . Data associated with the flight plan constraints is indicated in MAGENTA. The same applies for the maximum permitted flight level.



KEYBOARD

The keyboard includes :

- mode keys,
- function keys,
- alphanumeric keys.

Mode keys :

Pressing one of the FM (Flight Management) mode keys causes a new FM MCDU page to be displayed and allows access to certain functions.

The MCDU MENU key enables the operator to initialize the dialog with one of the connected systems.

Function keys :

The up arrow↑ and down arrow↓ keys are used to access the next pages or the previous pages of a menu or of the contents of an item.

The left arrow← and right→ arrow keys are used to access a next lateral page or a previous lateral page, or another function (PRINT, SEND, DUMP).

Alphanumeric keys :

They are used to enter into the scratchpad line data characters needed by a system when necessary.

In addition to characters, the scratchpad line displays messages which can either be comment messages used as an operator's guide or warning messages advising the operator of improper operation or incorrect utilization of a system.

. CLEAR key :

It is used to erase data entered in the scratchpad. A short push action (<2s) erases the last character. A long push action (>2s) clears the entire scratchpad. The operator can also clear a data field which has been acquired and validated. For that, he must push the clear key, and then the line key adjacent to the data field he wants to clear.

. OVFY key :

The overfly key is a FM specific key.

ANNUNCIATORS

Various annunciators are located on the top panel and on the front panel.

Top panel annunciators :

The FM (FM1 and FM2) failure annunciators indicate when an FM failure occurs.

RDY comes on when the MCDU passes its long term power up or power off reset test after the BRT knob is turned off.

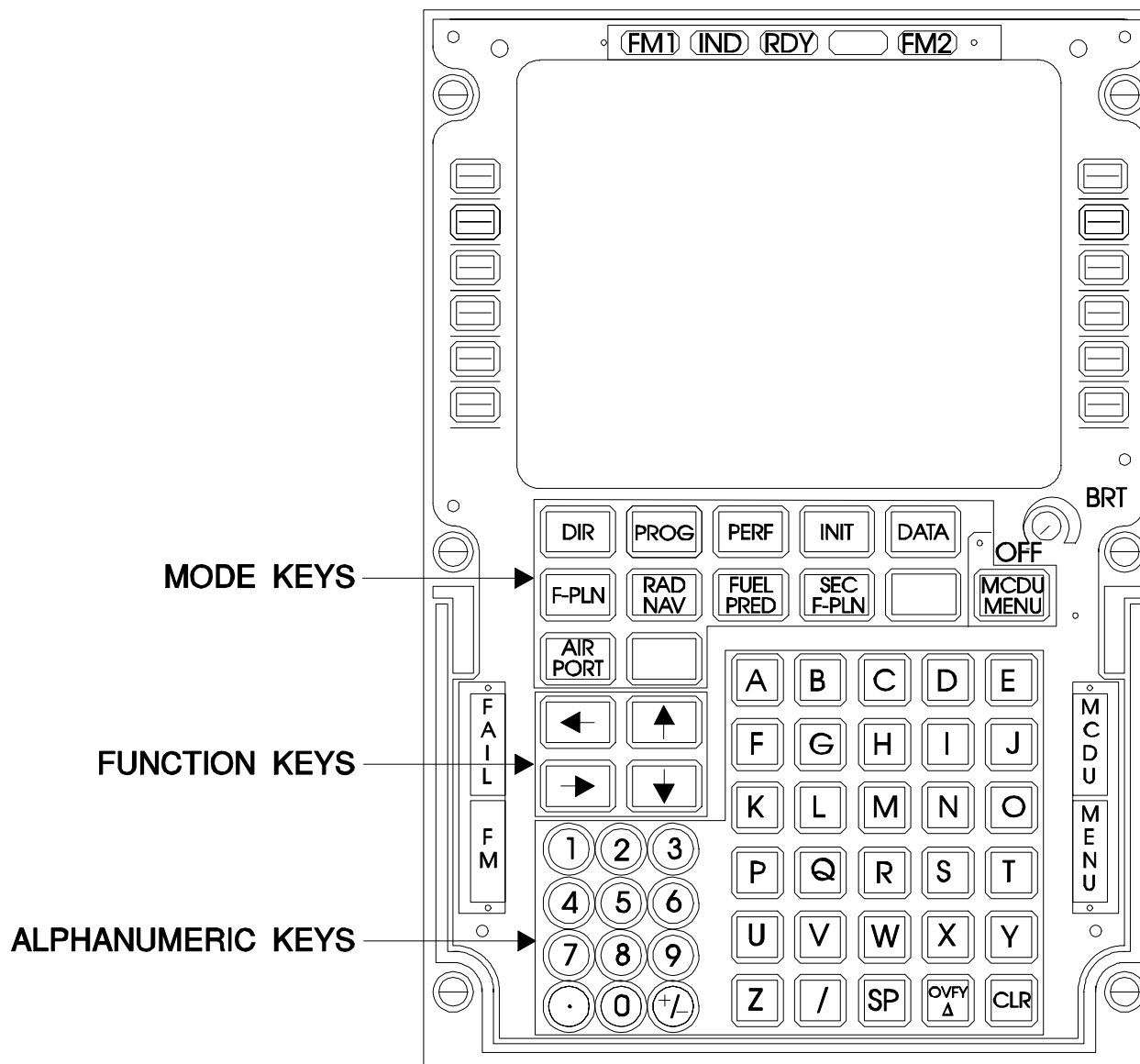
IND comes on when the selected FM detects an independent operation while both FMs are valid.

Front panel annunciators :

FAIL comes on when the MCDU has failed.

MCDU MENU comes on when a system linked to the MCDU other than the FM requests the display.

FM comes on when the FM is not the active system and it has sent an important message.



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This topic will show you a short example of the utilization of the MCDU.

EXAMPLE OF UTILIZATION

The name of the active subsystem is displayed in green (here FM1), and the name of the inactive subsystems is in white.

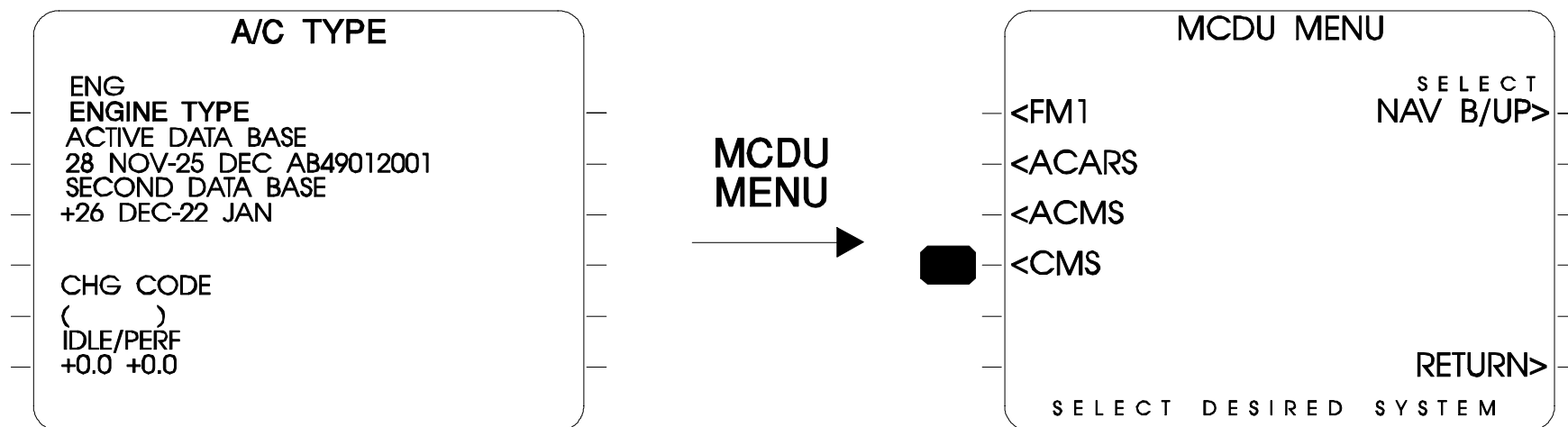
When a system is requesting in service, its name is followed by (REQ).

The symbols < or > indicate that the line keys adjacent to these prompts are active.

Pushing a line key enables access to either another menu or an item providing information about a system.

NOTE:

If communications are not established with a subsystem after it has been selected, a (TIMEOUT) indicator is displayed adjacent to the subsystem menu text.



These lines are displayed
only if the ACARS or the
DMU are installed.

-<ACARS
-<ACMS

The selected subsystem menu text (here CMS) is displayed in cyan. A SEL indicator is displayed indicating the communication which has not been established.

Additionally, during this period, all button pushes are ignored and the scratchpad message "WAIT FOR SYSTEM RESPONSE" is displayed.

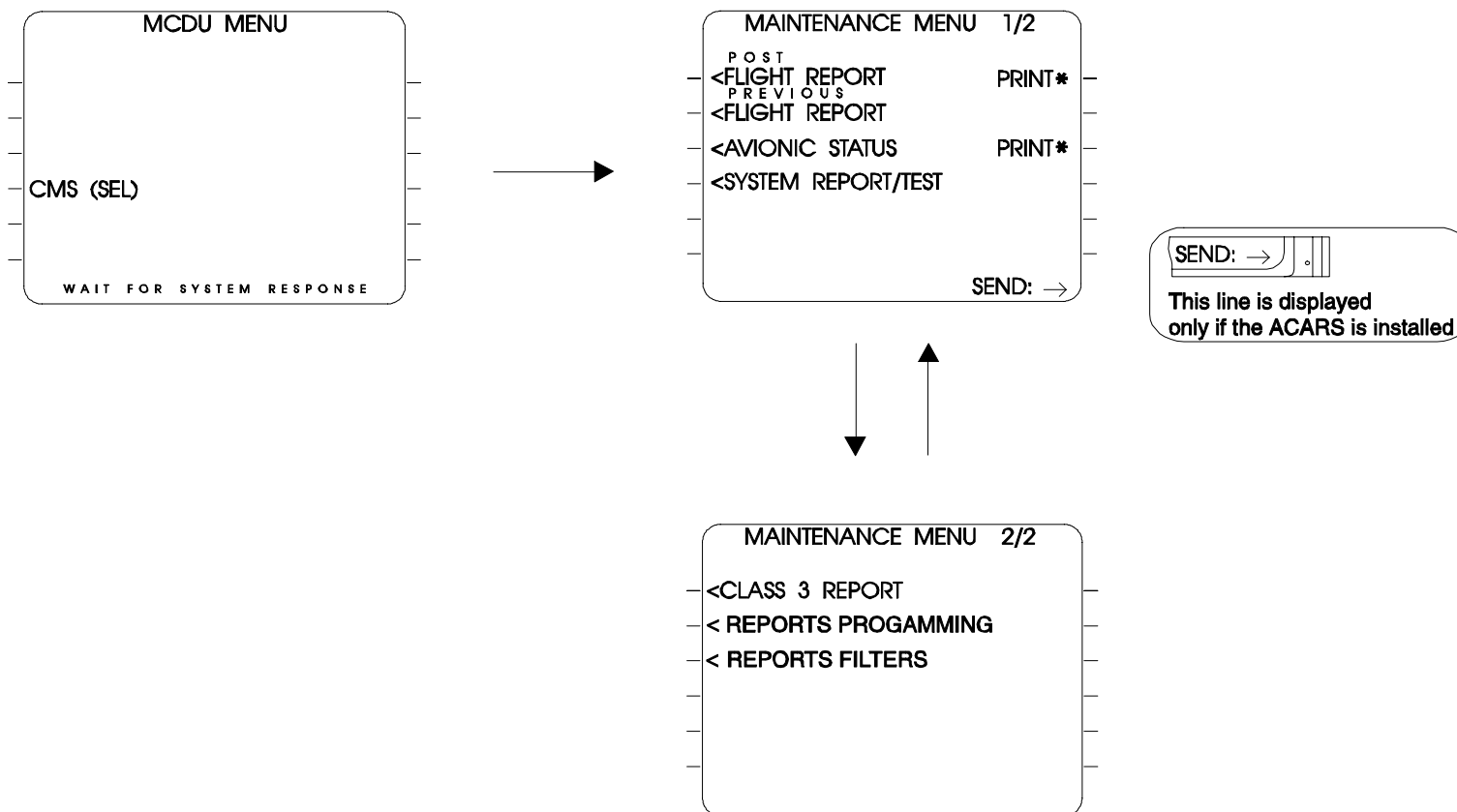
This display begins after communication is initiated and remains displayed until either communications have been successfully established or a communication breakdown has occurred.

The page number is displayed on the first line on the right side.

If the page or item contents can be printed, the PAGE PRINT* or PRINT* indication is displayed on the screen in cyan.

By pressing the down arrow key, you can get access to the second page.

By pushing the up arrow key, you can come back to the first page.

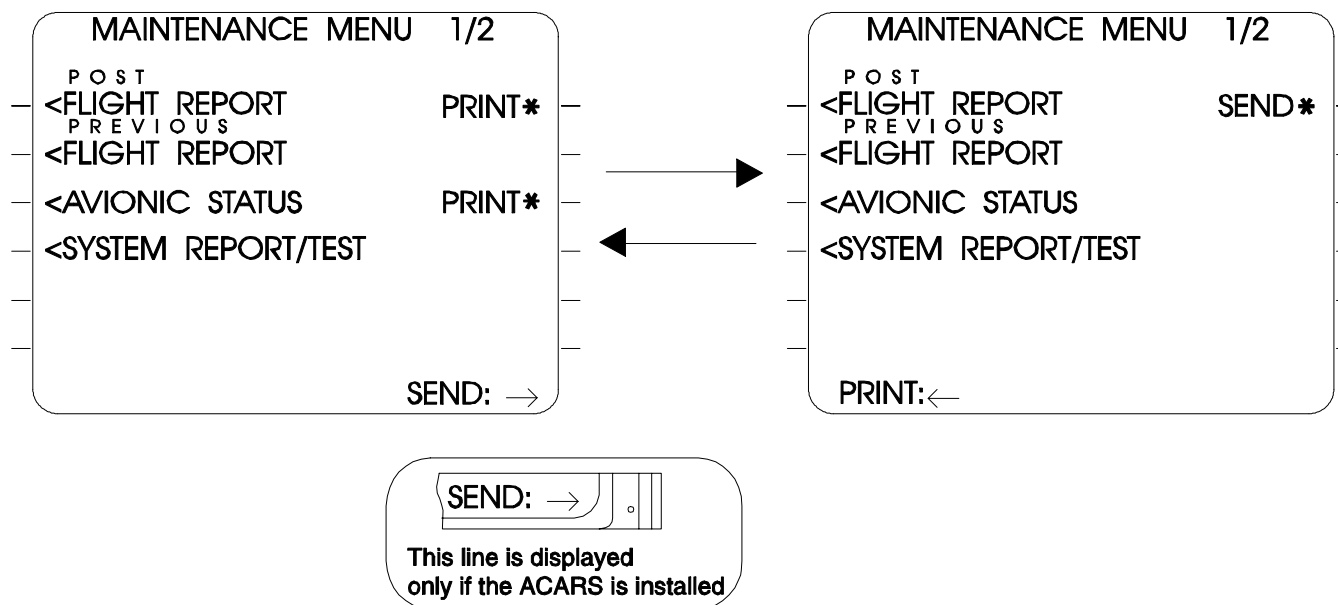


It is possible, via the ACARS if installed, to down link or up link information.

The message "SEND:→" tells the operator that pushing the right horizontal arrow key causes the "SEND*" function to be displayed.

When the operator pushes the right horizontal arrow key, the SEND function is activated.

The message "PRINT:←" tells the operator that pushing the left horizontal arrow key causes the "PRINT*" function to be displayed.



The POST FLIGHT REPORT can be displayed from the maintenance menu.

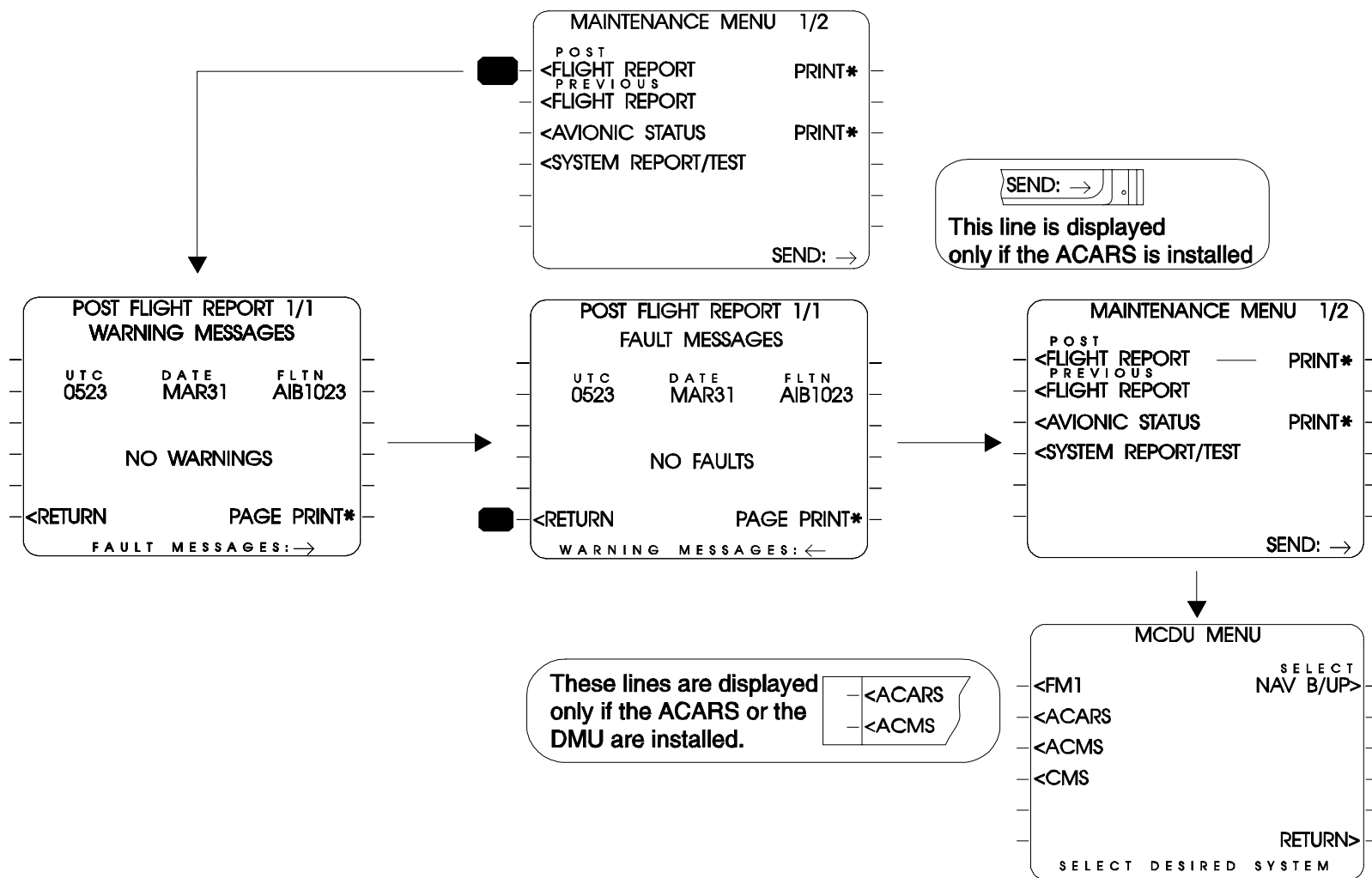
The display of this scratchpad message is valid for all the POST, CURRENT or PREVIOUS FLIGHT REPORT item pages.

"FAULT MESSAGES:→" tells the operator that pushing the horizontal right arrow key causes the fault messages item to be displayed.

The backward return in the menu hierarchy is initiated in all cases from line select key 6L.

You can recover the MCDU MENU by selecting the MCDU MENU key

CMS is displayed in green because it was the last system selected. By selecting RETURN, you can recover the last page of the last selected system.



STUDENT NOTES:

CENTRAL MAINTENANCE SYSTEM (CMS) PHILOSOPHY

- General
- New Technology
- Maintenance Level
- Functions
- Safety Precautions

GENERAL

The Central Maintenance System includes the BITEs of all electronic systems and two fully redundant Central Maintenance Computers (CMCs).

The Central Maintenance Computers (CMCs) centralize and memorize warnings generated by the Flight Warning Computers (FWCs), and failure information produced by the BITE function integrated in computers.

NEW TECHNOLOGY

The Central Maintenance System enables maintenance personnel to perform system operational tests, functional checks and read out of BITE memory information through the Multipurpose Control and Display Unit (MCDU).

The CMS uses standardized presentation in plain English.
Reports can be printed on-board or transmitted to the ground, manually or automatically, through the Aircraft Communication Addressing and Reporting System (ACARS), if installed, and printer.

MAINTENANCE LEVEL

The Central Maintenance System may be used for quick troubleshooting (LRU removal), and in-depth troubleshooting.

FUNCTIONS

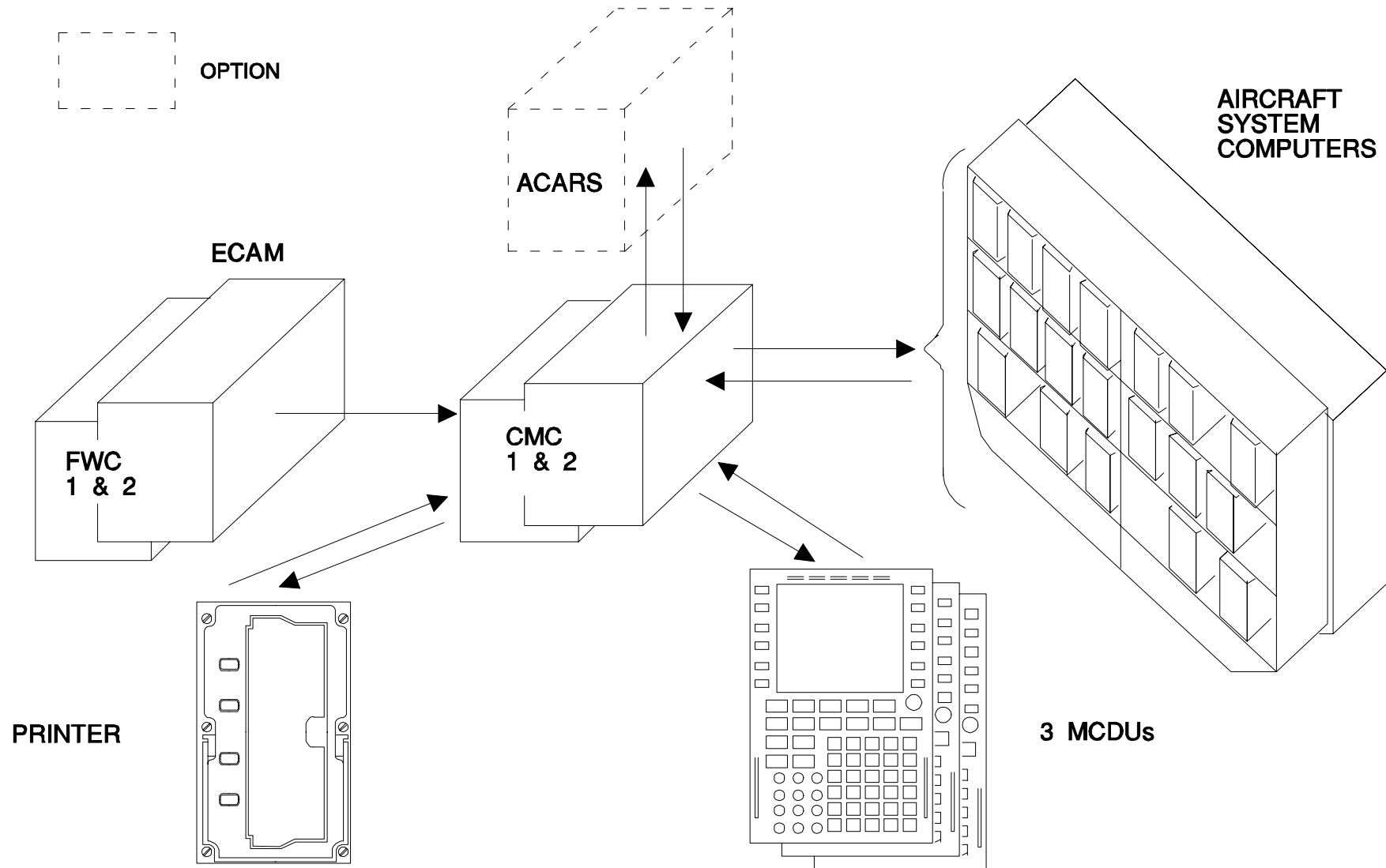
The Central Maintenance System enables memorization and display of fault messages and Electronic Centralized Aircraft Monitoring (ECAM) warnings.

The CMS also enables BITE interrogation and system tests.

SAFETY PRECAUTIONS

As it is possible to perform operational tests from the cockpit, where aircraft systems become active, safety precautions must be observed before doing these tests.

In this case, the safety precautions will be displayed on the MCDU.



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STUDENT NOTES:

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CENTRAL MAINTENANCE SYSTEM (CMS) ARCHITECTURE

- General
- Central Maintenance Computer (CMC)
- BITE
- Multipurpose Control and Display Unit (MCDU)
- Printer
- ACARS (OPTION)
- MDDU (OPTION)

GENERAL

The Central Maintenance System (CMS) is composed of the two Maintenance Computers and the aircraft system BITEs.

The interfaces are :

- any two of the 3 MCDUs,
- a printer,
- the Aircraft Communication Addressing and Reporting System (ACARS), if installed,
- a data loader called Multifunction Disk Drive Unit (MDDU), if installed.

CENTRAL MAINTENANCE COMPUTER (CMC)

Two Central Maintenance Computers are provided :

- number one is active and
- number two is a hot standby.

A pushbutton is provided for manual transfer from one to the other.

The Central Maintenance Computers (CMCs) continuously scan the buses from the A/C systems.

If a failure message, from a system BITE, is present on a bus, the CMCs copy and store it.

They also store the Electronic Centralized Aircraft Monitoring (ECAM) messages generated by the Flight Warning Computers (FWCs).

BITE

In each aircraft system computer, a BITE monitors the system and memorizes the failures.

The A/C systems are divided into three types, depending on their capabilities and their connection to the CMCs.

MULTIPURPOSE CONTROL AND DISPLAY UNIT (MCDU)

The Multipurpose Control and Display Unit is the operator's interface with the Central Maintenance System.

Any two of the three MCDUs may be operated simultaneously.

PRINTER

Most of the Central Maintenance System reports may be printed.

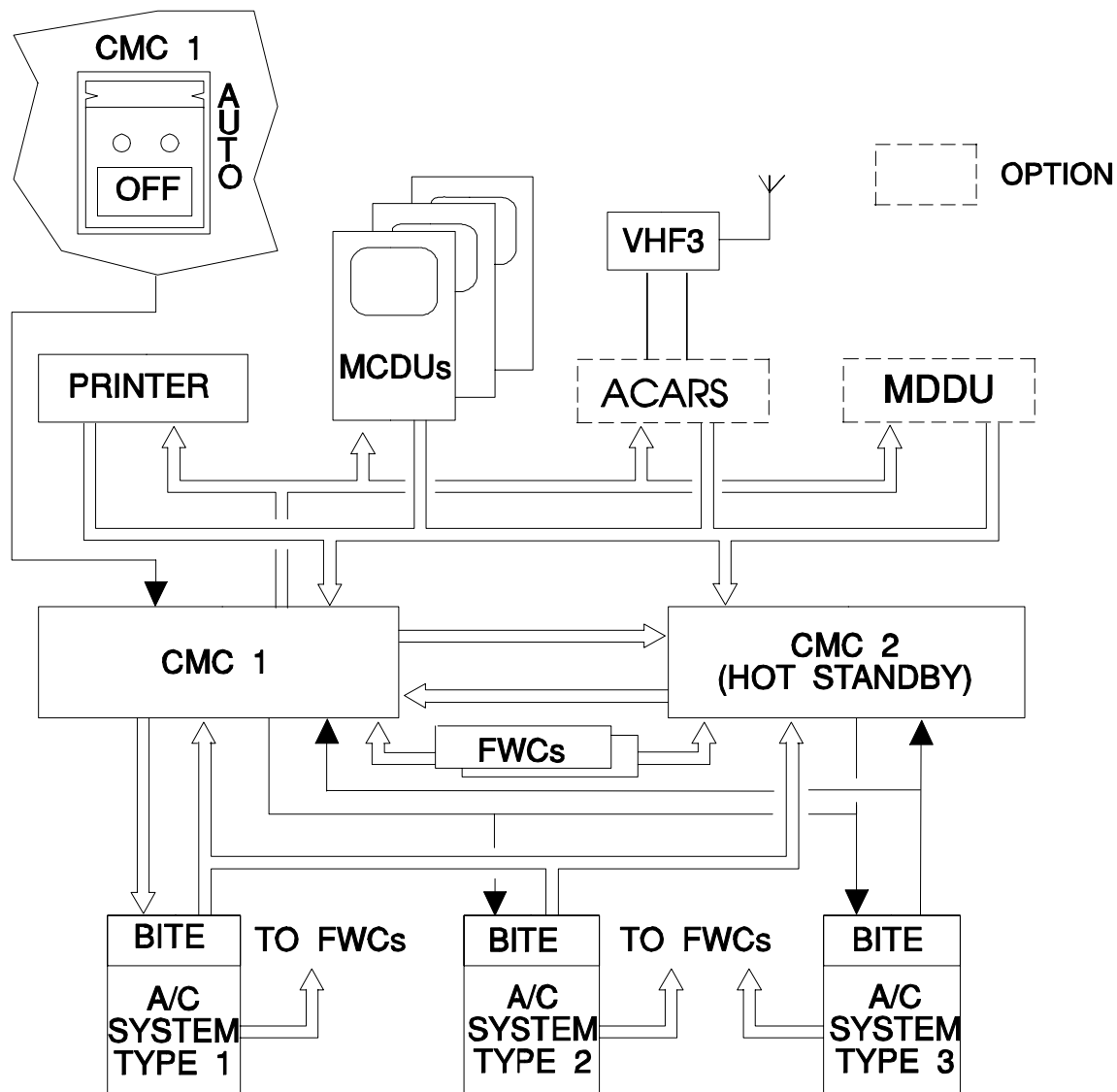
The printer provides the Post Flight Report (PFR) print which is the main maintenance tool.

ACARS (OPTION)

Data may also be transmitted to the ground through the Aircraft Communication Addressing and Reporting System (ACARS).

MDDU (OPTION)

Data may also be loaded into the CMCs through the Multifunction Disk Drive Unit (MDDU).



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STUDENT NOTES:

CENTRAL MAINTENANCE SYSTEM (CMS) FUNCTIONS

- General
- Modes of Operation
- System Types
- Internal/External Failures

GENERAL

The Central Maintenance Computers centralize the fault messages sent by the system BITEs.

The Central Maintenance System (CMS) also allows the operator to test the A/C systems.

MODES OF OPERATION

The Central Maintenance System operates in two modes, a normal mode and an interactive mode.

NORMAL MODE :

- The Central Maintenance System (CMS) records fault messages.

INTERACTIVE MODE :

- The CMS allows the operator to obtain troubleshooting data from the systems and to initiate self tests.

This mode is available on ground only.

SYSTEM TYPES

The systems are of three different types depending on their memory and connection to the Central Maintenance Computers :

TYPE 1 :

These systems can memorize failures occurring in the last 64 flights.

Most of the systems are of type one.

They are connected to the both CMCs by an ARINC 429 output bus and to the CMC 1 by an ARINC 429 input bus.

This enables on ground in-depth troubleshooting and interactive test of the system and its components.

TYPE 2 :

These systems memorize only failures from the last flight.

A discrete input allows initiation of the system test.

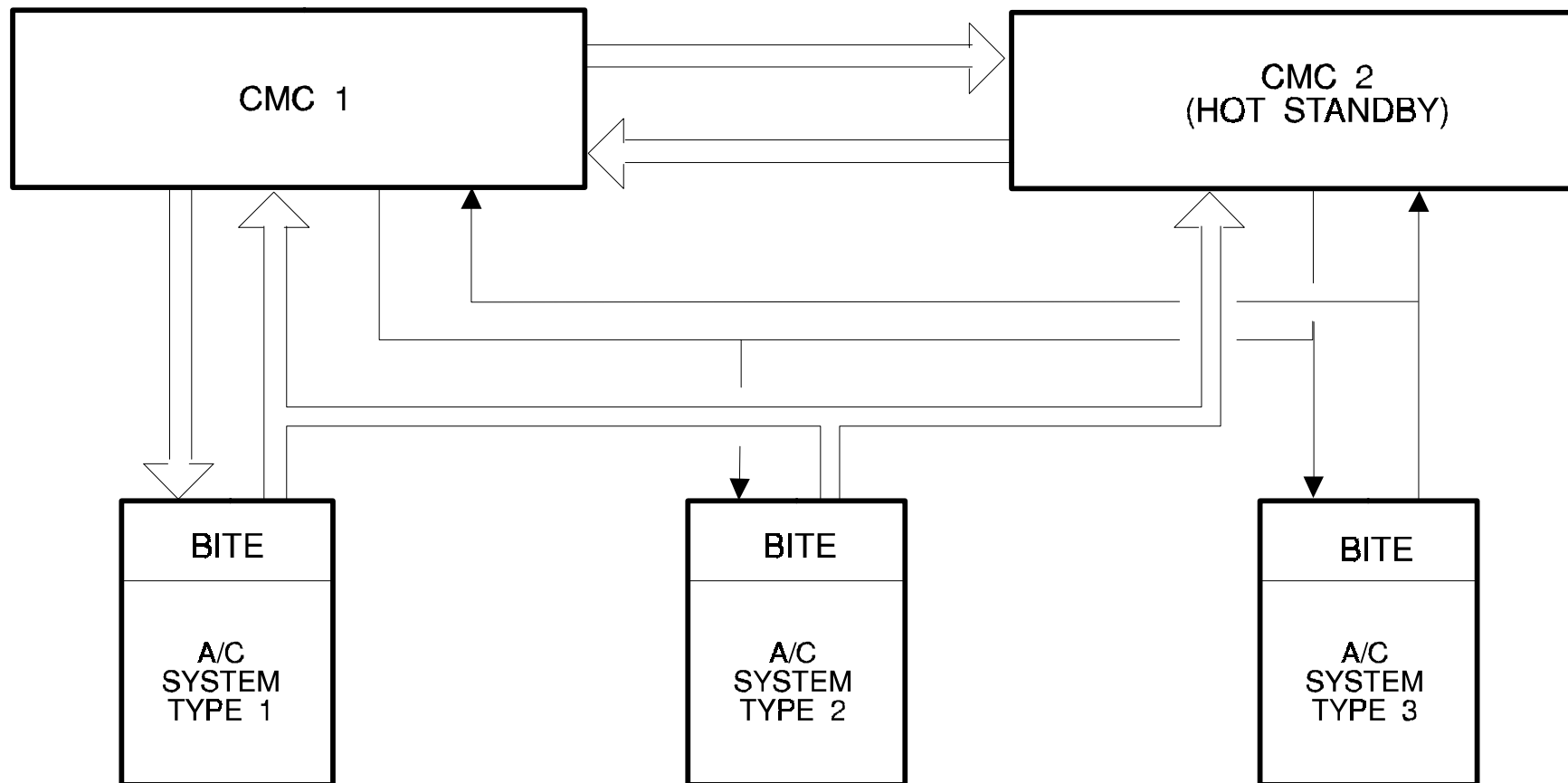
The output connection is an ARINC 429 bus.

TYPE 3 :

These systems cannot memorize the failure messages.

The discrete input permits initiation of the test or reset.

The discrete output indicates if the system is OK or not.



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INTERNAL/EXTERNAL FAILURES

Failures can be external or internal to the system.

INTERNAL FAILURES :

Failures within the affected system.

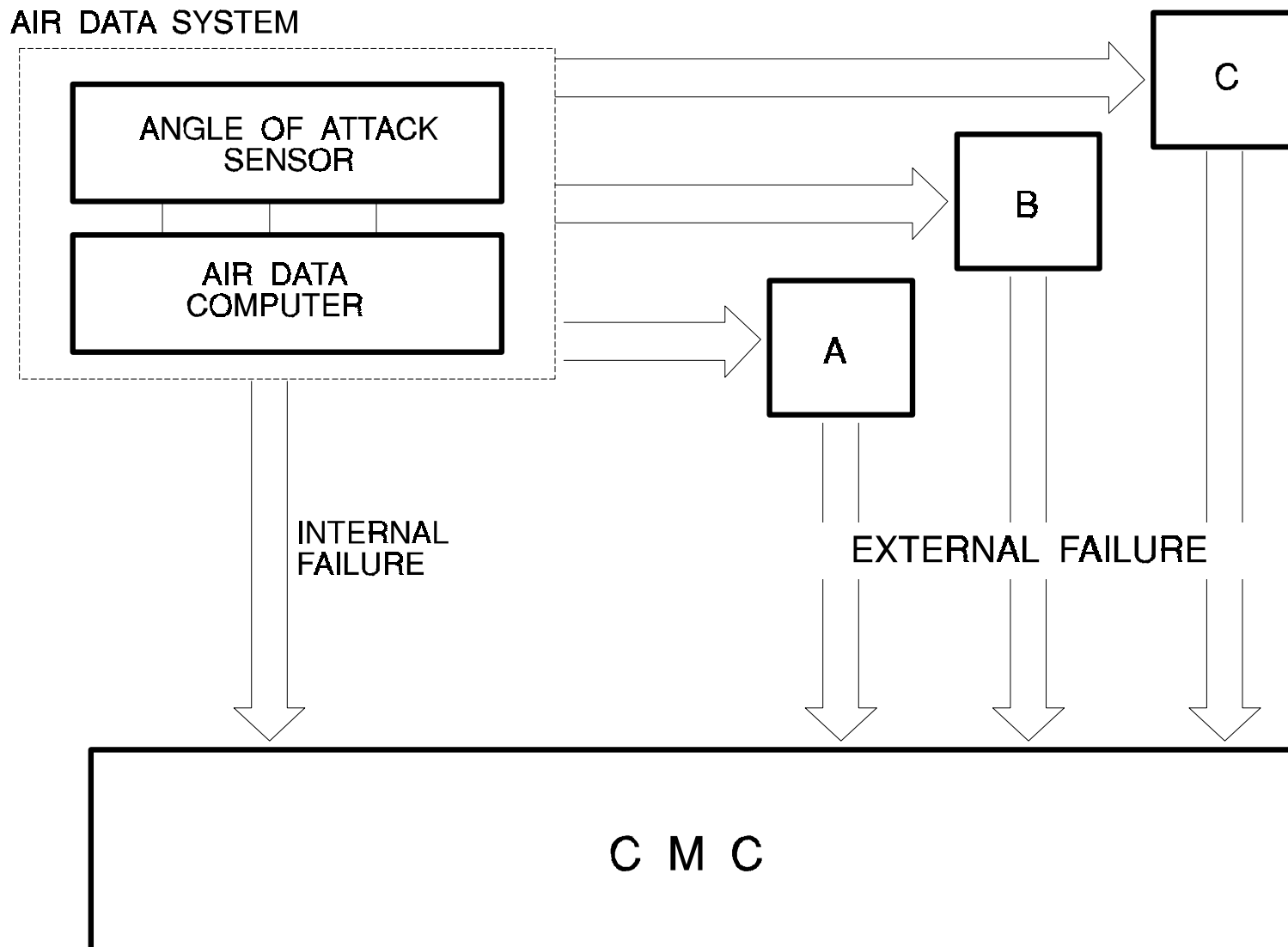
EXTERNAL FAILURES :

Failures in another system which interfaces with the affected system.

Each BITE can make the difference between an internal and an external failure in order to perform a correlation task in the CMS.

Let us suppose that an angle of attack sensor failure has been detected and that systems A, B, and C (e.g. Auto-Flight System) are affected by this failure :

- The Air Data System will transmit an INTERNAL FAILURE.
- Systems A, B and C will transmit an EXTERNAL FAILURE.



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STUDENT NOTES:

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FAILURE CLASSIFICATION

Class 1
Class 2
Class 3

The system failures are classified in three categories, in function of their operational and safety consequences on the aircraft.

CLASS 1

The class 1 failures are the failures which have an operational consequence to the current flight.

They are displayed as a warning in real time on the ECAM and available on the MCDU.

Class 1 failure example :

Failure of one engine hydraulic pump.

CLASS 2

The class 2 failures are the failures which have no operational consequence to the current flight.

The systems affected are identified on the ECAM STATUS page.

Class 2 failure example :

Loss of one wing leak detection loop continuity.

CLASS 3

The class 3 failures have neither operational nor safety consequences on the aircraft.

They are only available on ground through the MCDU.

Class 3 failure example :

No DFDR playback to the FDIU.

FAILURE	CLASS 1	CLASS 2	CLASS 3
INDICATION TO THE FLIGHT CREW	MESSAGE DISPLAYED IN FLIGHT (COCKPIT EFFECT) - WARNING/CAUTION ON EWD - FLAGS ON PFD, ND OR SD - LOCAL WARNINGS	STATUS LIGHT FLASHING AT THE END OF THE FLIGHT	NO INDICATION TO THE FLIGHT CREW
DISPATCH CONSEQUENCES	MEL ENTRY : "GO","GO IF" OR "NO GO"	MEL PREAMBLE : "GO"	MEL NOT APPLICABLE
HANDLING	CORRECTION IN ACCORDANCE WITH MEL CONTENT (TIME DELAY,..)	CORRECTION CAN BE DEFERRED FOR 500 FLIGHT HOURS	NO FIXED TIME FOR CORRECTION : HOWEVER, CORRECTION IS RECOM- MENDED TO IMPROVE THE DISPATCH RELIABILITY
INDICATION TO THE MAINTENANCE TEAM	PRESENTED AUTOMATICALLY AT THE END OF THE FLIGHT: FAILURE MESSAGES ON THE CMC POST FLIGHT REPORT PRINT OUT		PRESENTED ON REQUEST WHEN NEEDED : FAILURE MESSAGES ON CMC CLASS 3 REPORT

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STUDENT NOTES:

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CENTRAL MAINTENANCE SYSTEM (CMS) MULTIPURPOSE CONTROL DISPLAY UNIT (MCDU) MENU PRESENTATION

- General
- Central Maintenance System (CMS) Multipurpose Control
- Display Unit (MCDU) Menus
- Normal Mode
- Interactive Mode
- Complementary Functions

GENERAL

All the CMS functions are managed through the MCDUs.

Some of these functions are only available on ground.

CENTRAL MAINTENANCE SYSTEM (CMS) & MULTIPURPOSE CONTROL DISPLAY UNIT (MCDU) MENUS

The functions are displayed on a ground and a flight menu.
The flight menu comprises only a part of the ground menu.

Note that the Central Maintenance System (CMS) menu switches to flight mode when at least 1 engine is running for 180 seconds with the flight number inserted (or A/C speed is above 80 kts) and back to ground mode during roll-out, when the A/C speed is below 80 kts for more than 30 seconds.

NORMAL MODE

Several functions provide aircraft status reports.

- CURRENT FLIGHT REPORT :

This provides the list of ECAM warnings/cautions and faults recorded during the current flight (class 1 and 2).

- POST FLIGHT REPORT :

This provides the list of ECAM warnings/cautions and faults recorded during the last flight (class 1 and 2).

- PREVIOUS FLIGHT REPORTS :

This is the list of the POST FLIGHT REPORTS, up to the last 63 previous flights.

- AVIONICS STATUS :

This provides a real time list of the systems affected by a fault.

- UTC/DATE INIT :

This enables initialization of the backup clock in case of main clock failure followed by a long power interrupt of the CMCs.

- CLASS 3 REPORT :

This provides the list of class 3 faults.

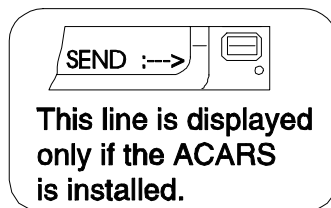
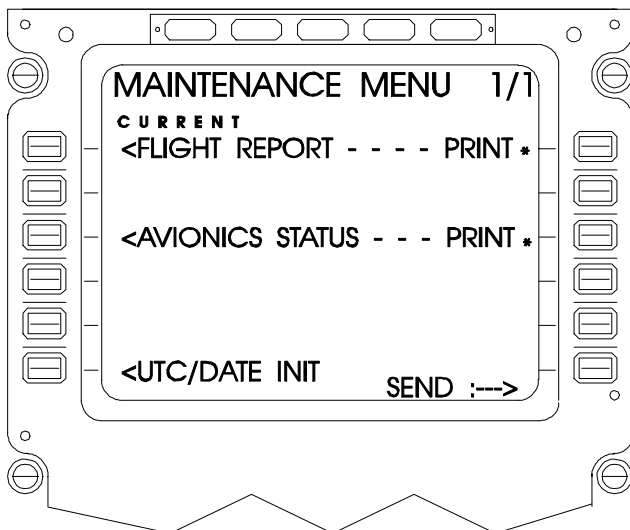
INTERACTIVE MODE

The "SYSTEM REPORT/TEST" function enables access to the interactive mode.

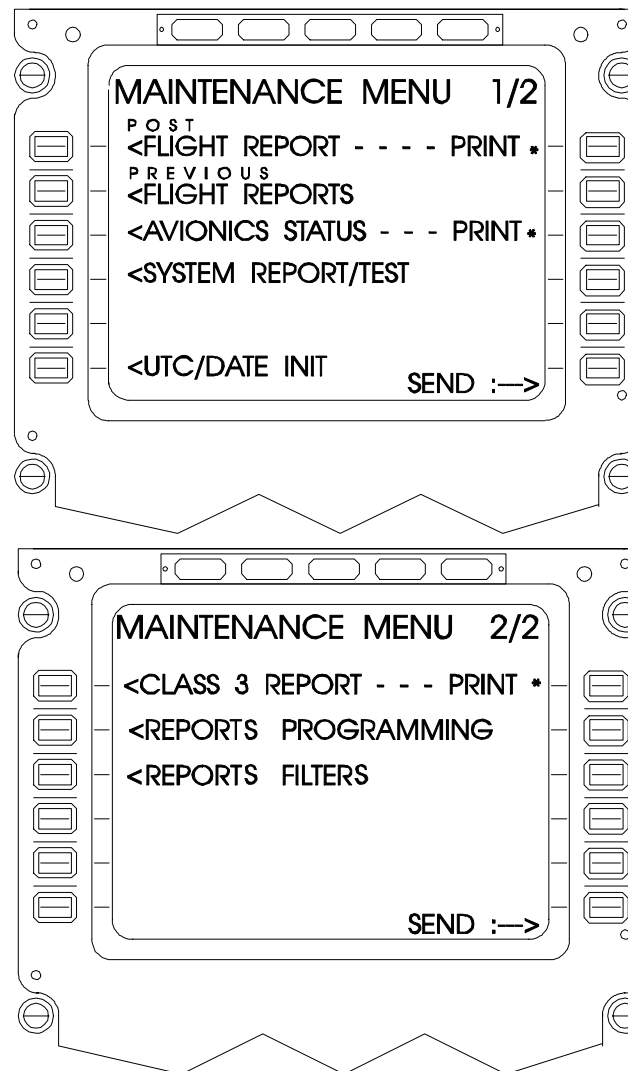
- SYSTEM REPORT/TEST :

It allows interactive dialogue with any system to obtain detailed failure information from the system BITEs.

CMS flight menu



CMS ground menu



COMPLEMENTARY FUNCTIONS

Filtering and report programming functions are available via the second page of the maintenance menu.

- REPORTS FILTERS :

This function allows spurious messages in the flight reports to be filtered.

This filter can be inserted either manually, via the MCDU or by uploading in the CMC.

- REPORTS PROGRAMMING :

This function allows an automatic print or an automatic transmission via ACARS, if installed, of the POST FLIGHT REPORT at engine shut down.

It also allows activation of the report filter.

STUDENT NOTES:

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STUDENT NOTES

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MAINTENANCE MESSAGE PHILOSOPHY

GENERAL

MESSAGE CATEGORIES

- Category 1
- Category 2
- Category 3
- Category 4
- Category 5

MESSAGE CONSTRUCTION

MESSAGE HANDLING

GENERAL

A maintenance message is generated by the system BITE each time a fault is detected and isolated.

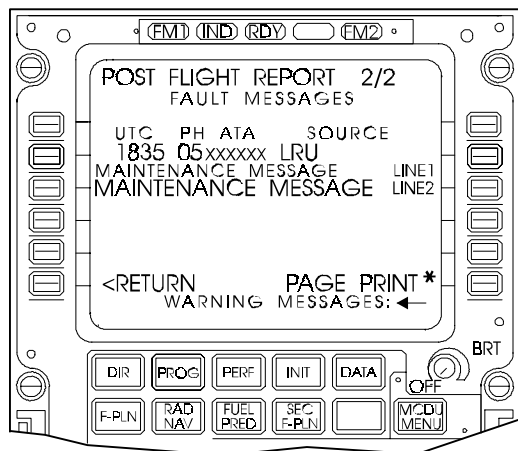
It is memorized in the BITE memory and transmitted to the CMCs.

The maintenance message must indicate, as directly as possible, the faulty LRU.

Each message is limited to a maximum of 48 characters in 2 lines of 24 characters.

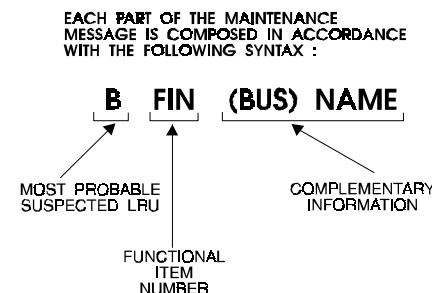
It can be composed of one or several parts depending on the number of suspected LRUs.

In addition, the ATA reference (6 digits) of the suspected LRU is provided. Even if the message is composed by several parts(suspected LRU's) only one suspected element could be faulty.



MESSAGE CATEGORIES

Any part of a maintenance message necessarily belongs to one of the 5 categories.

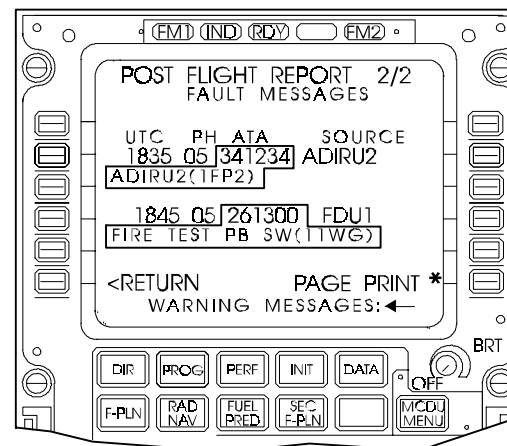


CATEGORY 1

When a computer requires maintenance this may be detected and declared by the computer itself or a system using the computer.

Message : LRU (FIN)

CATEGORY 2



In this category, the primary suspected element is a computer generating several signals. The complementary information makes it possible to identify the suspected signal. This signal may be controlled on the aircraft.

Messages :

LRU(FIN) SIGNAL NAME
LRU(FIN) BUS NAME
LRU(FIN) DISCRETE NAME

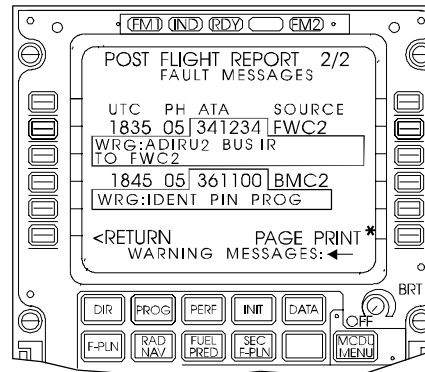
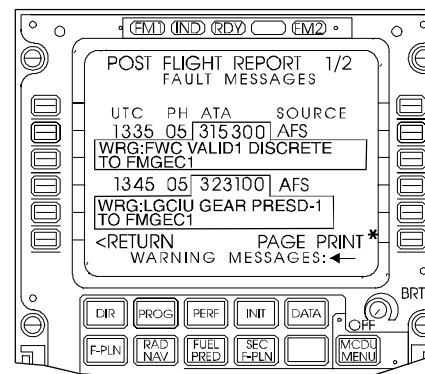
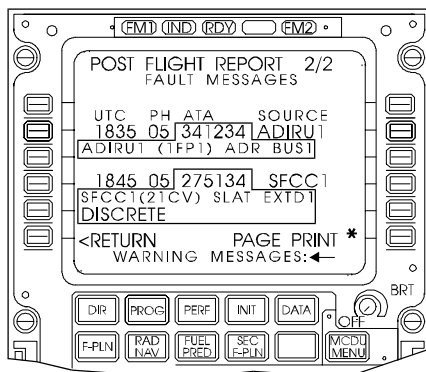
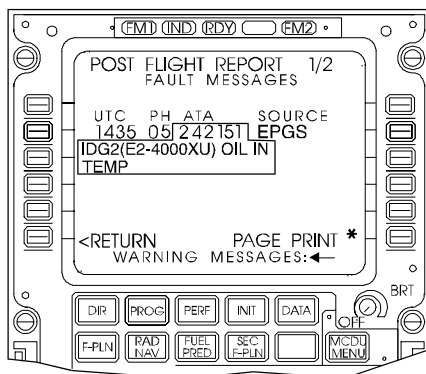
CATEGORY 3

Wiring is only indicated when the conclusion of the BITE analysis is a wiring fault.

Messages :

WRG : LRU1 DISCRETE NAME TO LRU2
WRG : LRU1 SIGNAL NAME TO LRU2
WRG : LRU1 BUS NAME TO LRU2
WRG : PIN PROG NAME

NOTE : The wiring can always be involved even if there is no mention of wiring in the message.

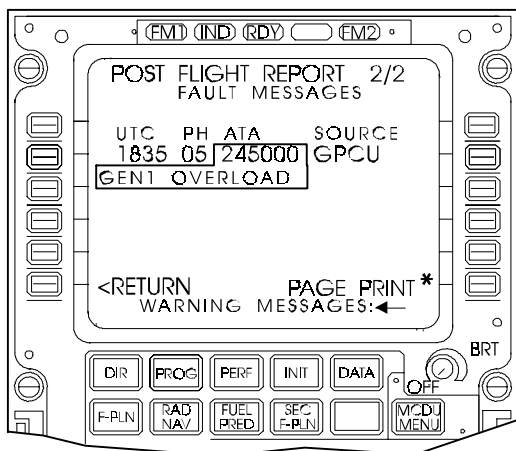


CATEGORY 4

These are cases where precise identification of the faulty LRU would require a too complex BITE.

Message : SPECIFIC

In this type, only an analysis of the problem by the technicians makes it possible to identify the component involved.
The procedure to be followed is described in the TROUBLE SHOOTING MANUAL.

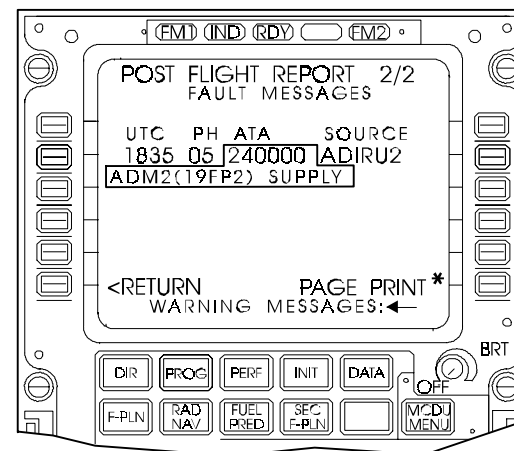


CATEGORY 5

The part of the message belongs to this type when the loss of LRU power supply is unambiguously identified : the LRU power supply must then be precisely controlled before LRU replacement.

Message : LRU (FIN) sply

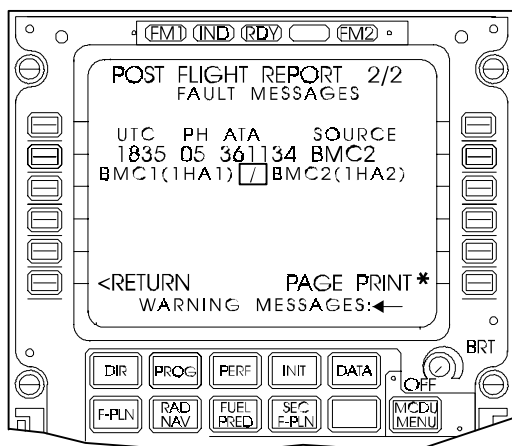
It has to be noted that the LRU itself may be one of the causes for this loss of supply.



MESSAGE CONSTRUCTION

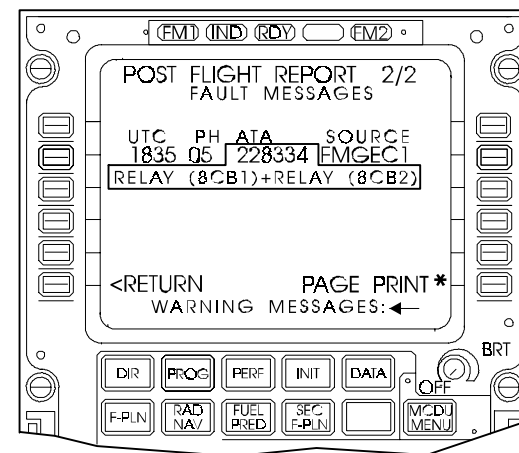
In the case of ambiguous faults, up to 3 possible faulty LRUs may be indicated in the most probable order.

Each possibility being separated by the sign "/", only one component is effectively responsible.



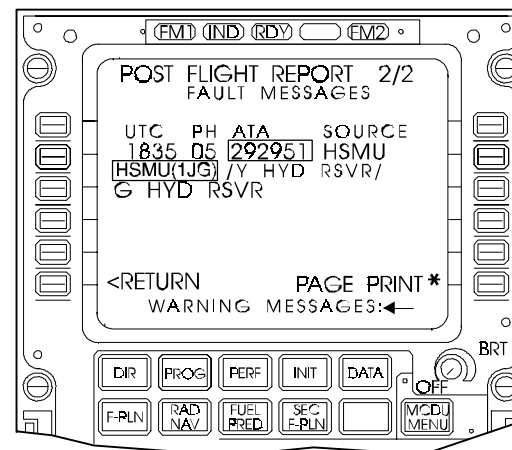
In some cases of multiple faults, it is possible that a BITE generates a single maintenance message which may concern several defective components.

These components are then separated by the sign "+".
LRU1(FIN)+LRU2(FIN)



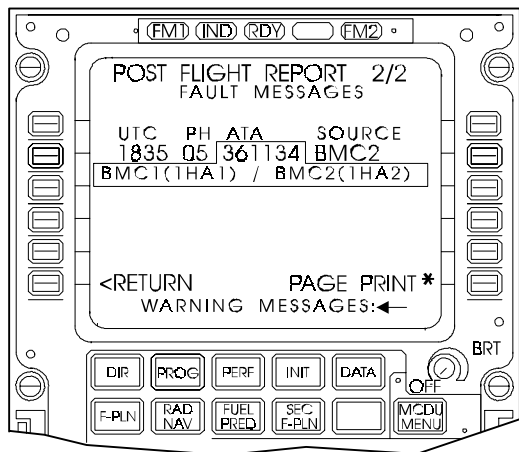
The ATA reference next to the message corresponds to the first suspected component.

When the "FIN" part of the message is absent, this means that no LRU is directly involved in this part.

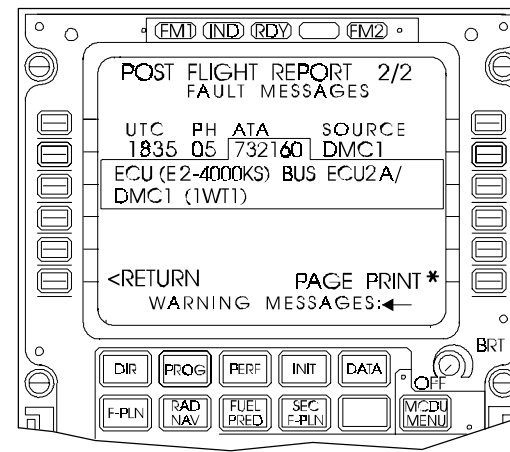


The possible combinations are for example :

LRU1(FIN)/LRU2(FIN)

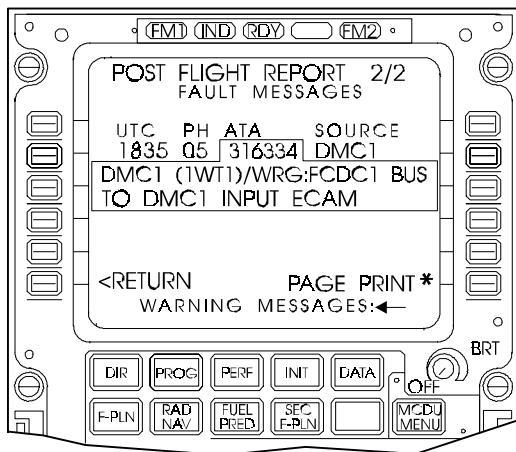


LRU1(FIN) BUS NAME/LRU2(FIN)

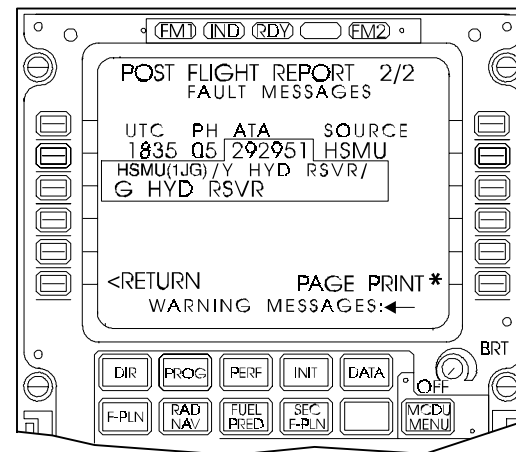


LRU1 (FIN)/WRG :

LRU2 BUS NAME TO LRU1



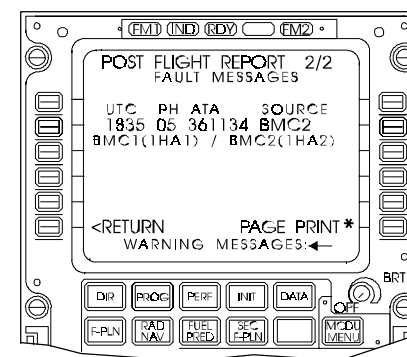
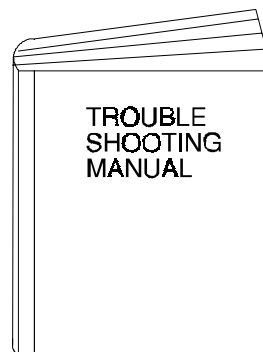
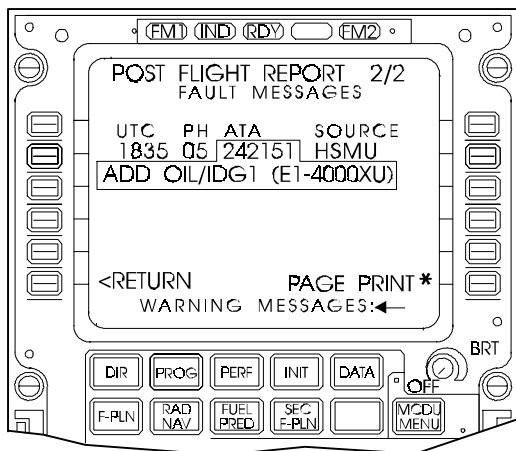
LRU1 (FIN) /SPECIFIC/SPECIFIC



SPECIFIC/LRU1 (FIN).

MESSAGE HANDLING

Each CMS message is covered by the Trouble Shooting Manual and is an entry point to trouble shooting.



STUDENT NOTES:

FQW4200 GE Metric

STUDENT NOTES

CENTRAL MAINTENANCE SYSTEM (CMS) OPERATION IN NORMAL MODE

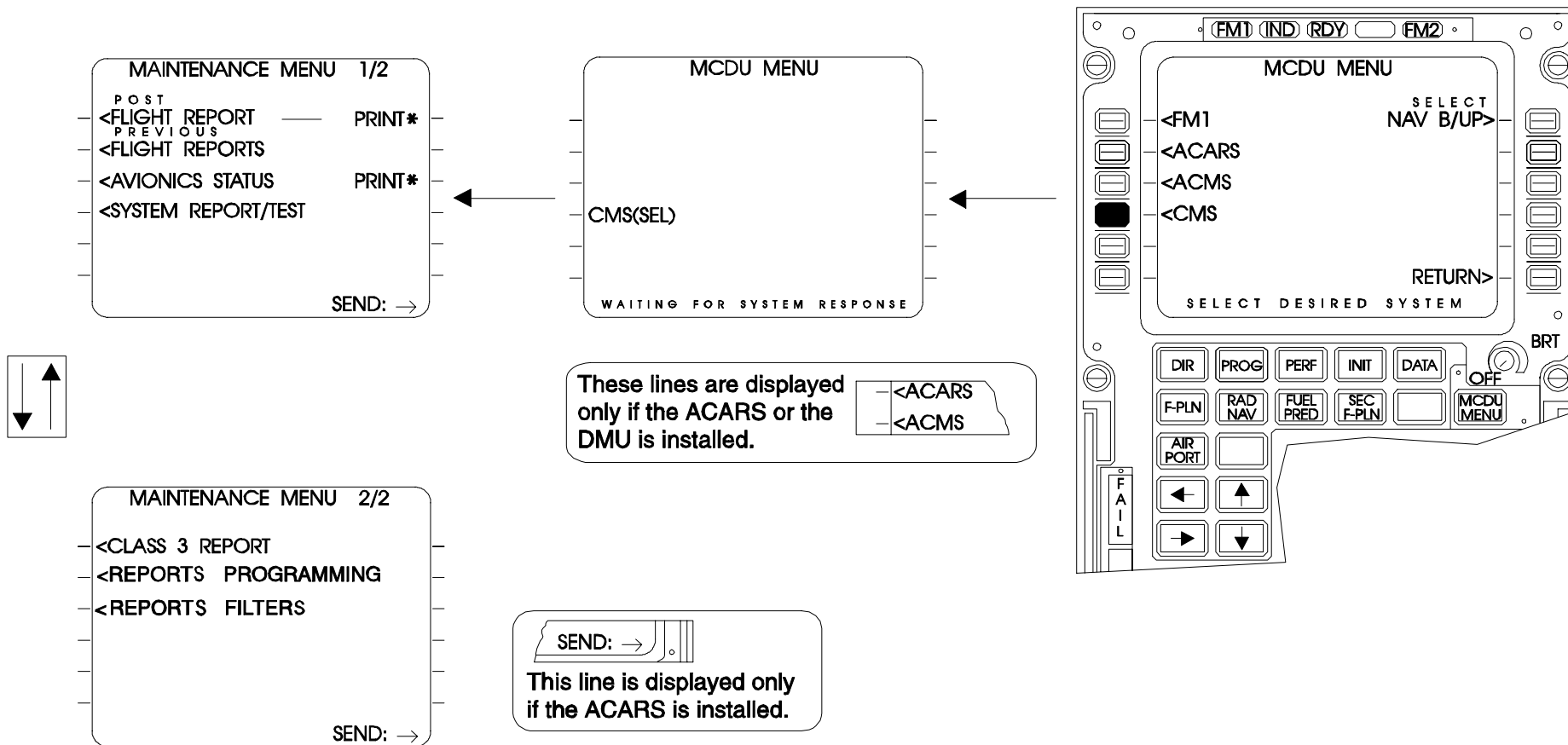
- General
- Post Flight Report
- Post Flight Report Print
- Previous Flight Reports
- Avionics Status
- Class 3 Report
- Complementary Functions

GENERAL

This is the MCDU menu page which presents the systems connected to the MCDU and the NAVIGATION BACK UP function.

Let's suppose we are on ground, engines shut down.

From the MAINTENANCE MENU, you will be able to see all the Normal Mode CMS reports.



POST FLIGHT REPORT

Remember that the POST FLIGHT REPORT displays the ECAM messages such as WARNINGS/CAUTIONS and MAINTENANCE STATUS messages and also CLASS 1 and 2 FAULT messages which occurred during the last flight and have been memorized in the CMC.

It will display a maximum of 64 warnings and 64 faults.

The first item of the POST FLIGHT REPORT are the ECAM messages.
The first page contains only one message.
If there are several messages, they will be displayed 2 at a time only, on the following pages.

The ECAM messages are displayed in order of acquisition by the CMC, minute after minute.
The last message memorized is displayed the first.
If there is no warning, the NO WARNING message will be displayed.
In our example, there are 2 ECAM message pages.

From each "warning messages" item page, we can access to the first "fault messages" item page by pressing the right arrow key.

The first page contains only one message.
If there are several messages, they will be displayed 2 at a time only, on the following pages.
The number of ECAM message item pages and FAULT message item pages is not necessarily the same.

The fault messages are displayed in order of acquisition by the CMC, minute after minute.
The last message memorized is displayed the first.
If there are no failures, the NO FAULT message will be displayed.
In our example, there are 2 fault message pages.

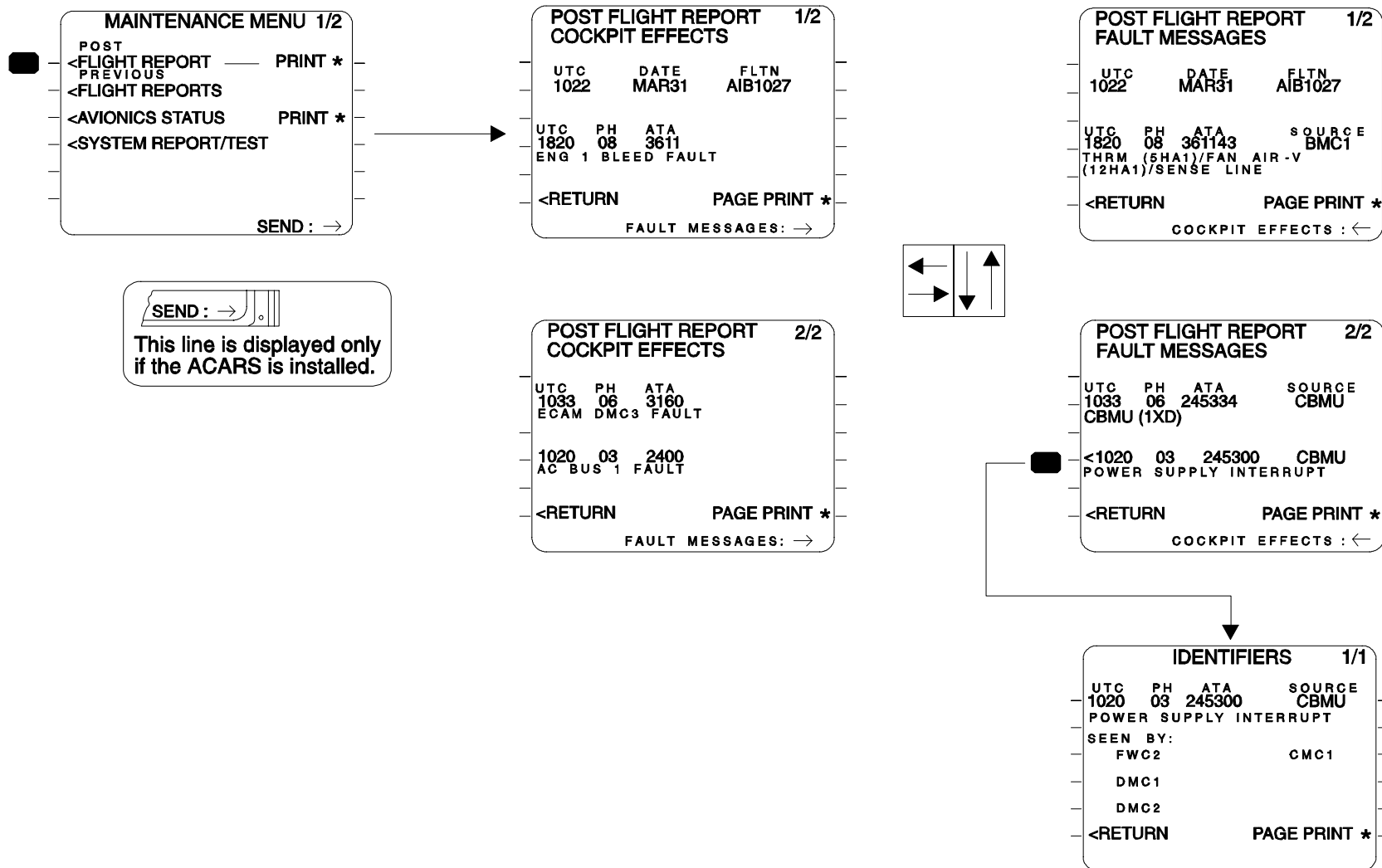
From each fault message item page, we can go back to the first warning message item page by pressing the left arrow key.
In our example, the prompt (<) before the second fault message means this

fault is also detected by other systems (as external failures) :

these systems are called IDENTIFIERS.

The IDENTIFIERS page lists the fault message and the name of the systems (other than the source) which detected the fault.

A maximum of 6 systems can be displayed.



POST FLIGHT REPORT PRINT

All the information presented on the POST FLIGHT REPORT on different MCDU screens, are printed together on one page.

Extra information is added in this POST FLIGHT REPORT print out. This report (called CURRENT FLIGHT REPORT in flight) can be printed at any time.

The ECAM and FAULT messages concerning the same event and recorded in the same minute, are printed side by side.

The header presents general information about the flight and the report print out.

The cockpit effects list presents the ECAM messages.

If during a flight phase inhibit a warning is generated it will not be presented to the crew.

On the Post Flight Report Cockpit Effects the warning will be presented and "NOT DISPLAYED" added to the message.

The time of warning or fault message occurrence and the name of the flight phase are displayed.

The FAULTS list presents intermittent failures and permanent failures called hard failures with their source and their identifiers.

MAINTENANCE MENU 1/2

POST
<FLIGHT REPORT — PRINT *
PREVIOUS
<FLIGHT REPORTS
<AVIONICS STATUS PRINT *
<SYSTEM REPORT/TEST

SEND : →

A/C IDENT F-GGMM DATE MAR 31 FLT NBR AIB1027 FROM/TO LFBO/LFPO START/END 0950/1850	MAINTENANCE POST FLIGHT REPORT LEG 00 DB/N 002		CMC1 PRINTING PAGE 01/01 DATE MAR 31 UTC 1022
08 COCKPIT EFFECTS	UTC FLIGHT PHASE	08 FAULTS	
ATA 2400	1020	ATA 245300 Class 1 Hard POWER SUPPLY INTERRUPT	SOURCE CBMU
AC BUS 1 FAULT	Taxi Out 03		
ATA 3160	1033	ATA 245334 Class 1 Intermittent CBMU (1XD)	SOURCE CBMU Identifiers DMC2 FWS
ECAM DMC3 FAULT	Cruise 06		
ATA 3611	1820	ATA 361143 Class 1 Hard THRM (5HA1) / FAN AIR-V (12HA1) / SENSE LINE	SOURCE BMC1
Not Displayed	Roll Out 08		
ENG 1 BLEED FAULT			
END OF REPORT			

PREVIOUS FLIGHT REPORTS

Remember that the PREVIOUS FLIGHT REPORTS item enables access to the previous POST FLIGHT REPORTS affected by failures with a maximum of 63 previous flights.

It will display a maximum of 256 ECAM messages and 256 faults.

This report presents the list of the previous flights (4 per page) and allows access to the corresponding PREVIOUS FLIGHT REPORT. The flights are presented in reverse order on the MCDU screen.

In case of CMC removal/installation :

- if the new CMC comes from another aircraft, the previous POST FLIGHT REPORTS concerning this aircraft will not be displayed,
- if the new CMC comes from the shop, a pseudo flight (00) is created to indicate the date of the first computer installation on aircraft.

To study the details about this report, please refer to the POST FLIGHT REPORT topic.

AVIONICS STATUS

Remember that the AVIONICS STATUS report displays in flight or on ground, the identity of systems affected by, at least, one CLASS 1 or 2, internal or external failure at the moment of the request.

This is the list of systems affected by a failure.

The entire report can be printed.

If no systems are affected, NO FAULT message is displayed.

On ground, a prompt (<) indicates that a direct access to interactive mode of the selected system is possible.

If the SYSTEM REPORT/TEST mode is selected on one of the other MCDUs, "DUAL SYSTEM ACCESS" message is displayed on the scratchpad line.

PREV FLIGHT REPORT 1/3

UTC	DATE	FLT
1015	DEC06	AIB718

UTC	PH	ATA
1017	03	3611

ENG 2 BLEED FAULT

<RETURN PAGE PRINT*

FAULT MESSAGES:→

PREV FLIGHT REPORTS 1/4

LEG	DATE	FLT	ENG
FROM/TO			ENGON/ENGOFF
<02	DEC16	AIB718	PRINT*
LFBT/LFPO		1015/1120	
<03	DEC10	AIB817	PRINT*
LFPO/LFBT		2005/2129	
<04	DEC06	AIB718	PRINT*
LFBT/LFPO		1015/1125	
<05	DEC03	AIB817	PRINT*
LFPO/LFBT		1601/1728	
<RETURN			

FAULT MESSAGES:→

MAINTENANCE MENU 1/2

POST		
<FLIGHT REPORT	PRINT*	
PREVIOUS		
<FLIGHT REPORTS		
<AVIONICS STATUS	PRINT*	
<SYSTEM REPORT/TEST		

SEND :→

SEND: →

This line is displayed only if the ACARS is installed.

AVIONICS STATUS 1/1

<VHF 1
<ADR 2
<PHC 1
<RMP 1
<RETURN

PAGE PRINT*

CLASS 3 REPORT

Remember that this report displays the list of the systems affected by class 3 faults and the failures by system on request.

This report is created, on ground only, by the CMC upon selection.

A page tells the operator to check that all systems are in normal configuration and enables the CLASS 3 REPORT to be printed.

This is the affected systems list.

To see the list of the class 3 failures sent to the CMC by a computer, you have to select the corresponding adjacent line key.

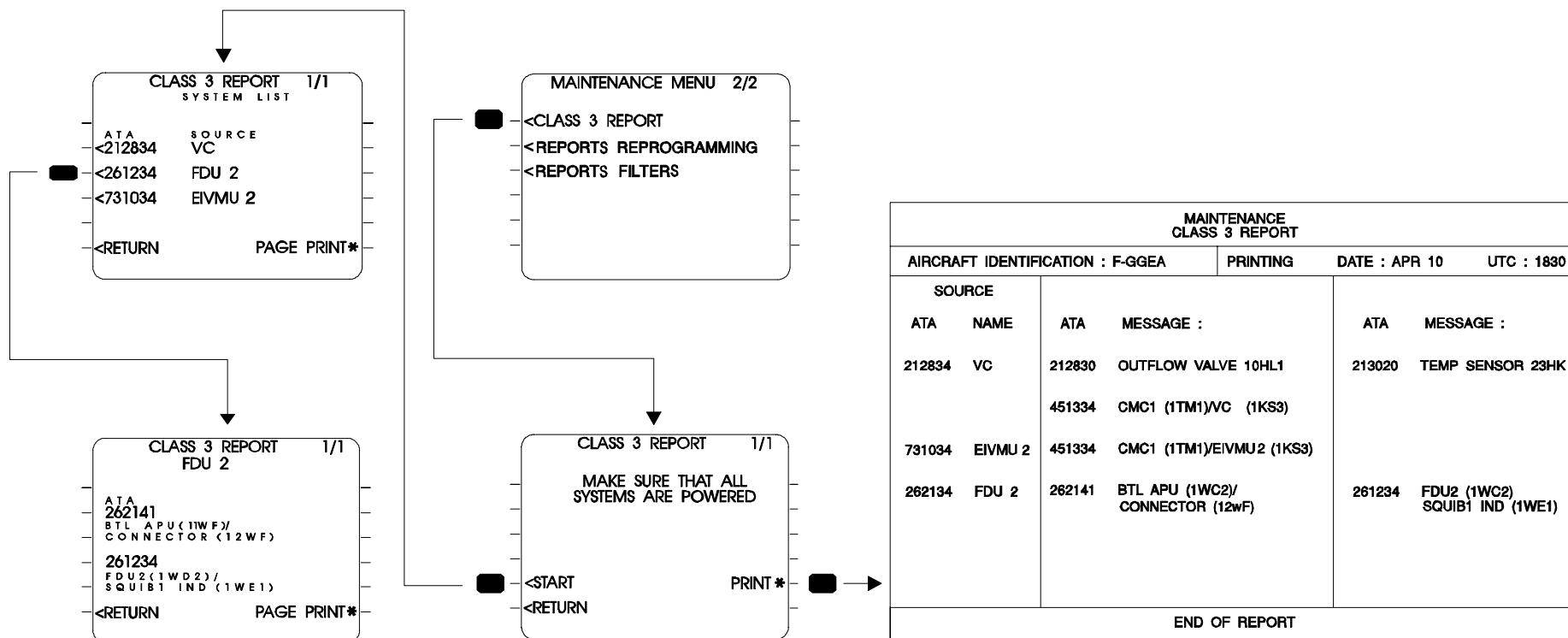
If there are no failures, NO FAULT message will be displayed.

In the complete CLASS 3 REPORT print out, class 3 failures and affected systems are printed side by side.

The header presents general information about the aircraft identification and the report print out.

A list presents the systems affected by at least one CLASS 3 fault.

A list presents the associated CLASS 3 fault messages.



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COMPLEMENTARY FUNCTIONS

Filtering and Report programming functions are available via the second page of the maintenance menu.

REPORTS PROGRAMMING

Remember that this function allows automatic prints and transmissions via ACARS if installed of the PFR at the end of the flight.

It also allows the activation of the report filter.

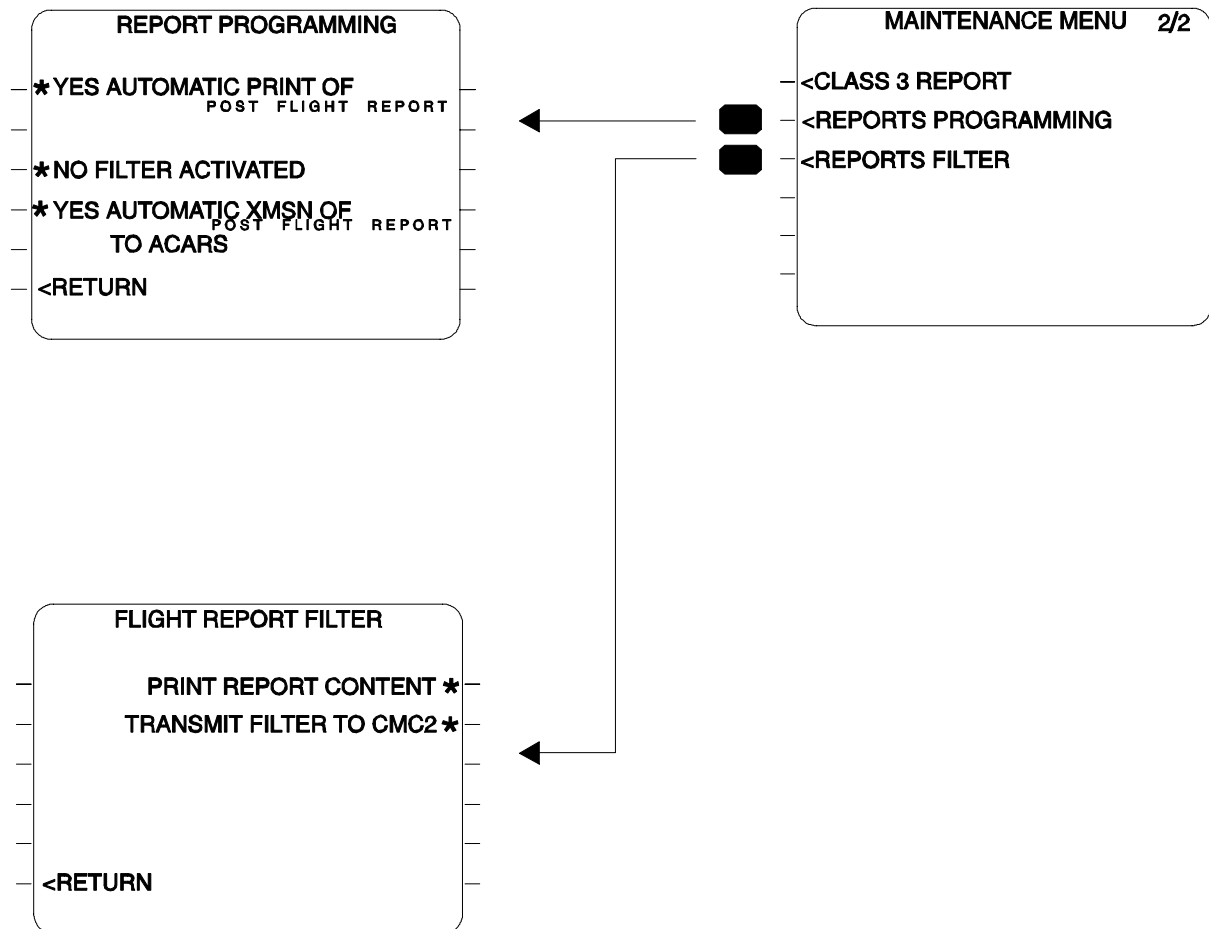
In the displayed configuration, print and transmission are automatic, but the filter is not activated.

REPORTS FILTERS

Remember that this function allows spurious messages in the PFR to be filtered.

The purpose of this item is to print the content of the filter data base and to transmit the filter data base to the opposite CMC.

The programming of the filter can be manually performed via a password at engineering level.



STUDENT NOTES:

CENTRAL MAINTENANCE SYSTEM (CMS) OPERATION IN INTERACTIVE MODE

General

Type 1 System Typical Menu

Type 1 System Example Menu

Type 2 System Typical Menu

Type 2 System Example Menu

Type 3 System Typical Menu

Type 3 System Example Menu

GENERAL

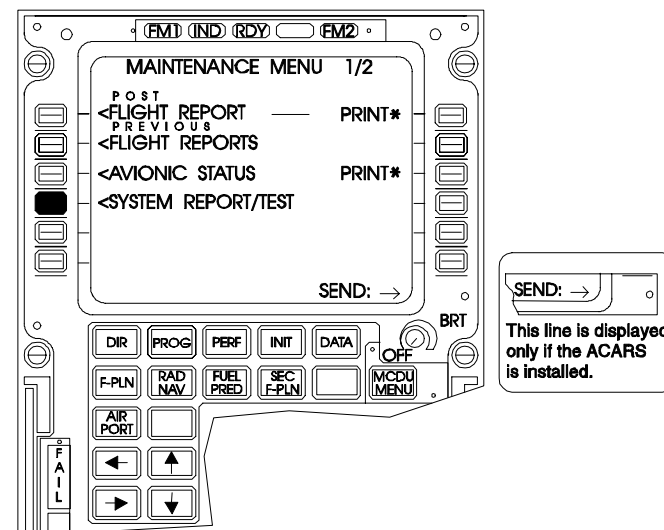
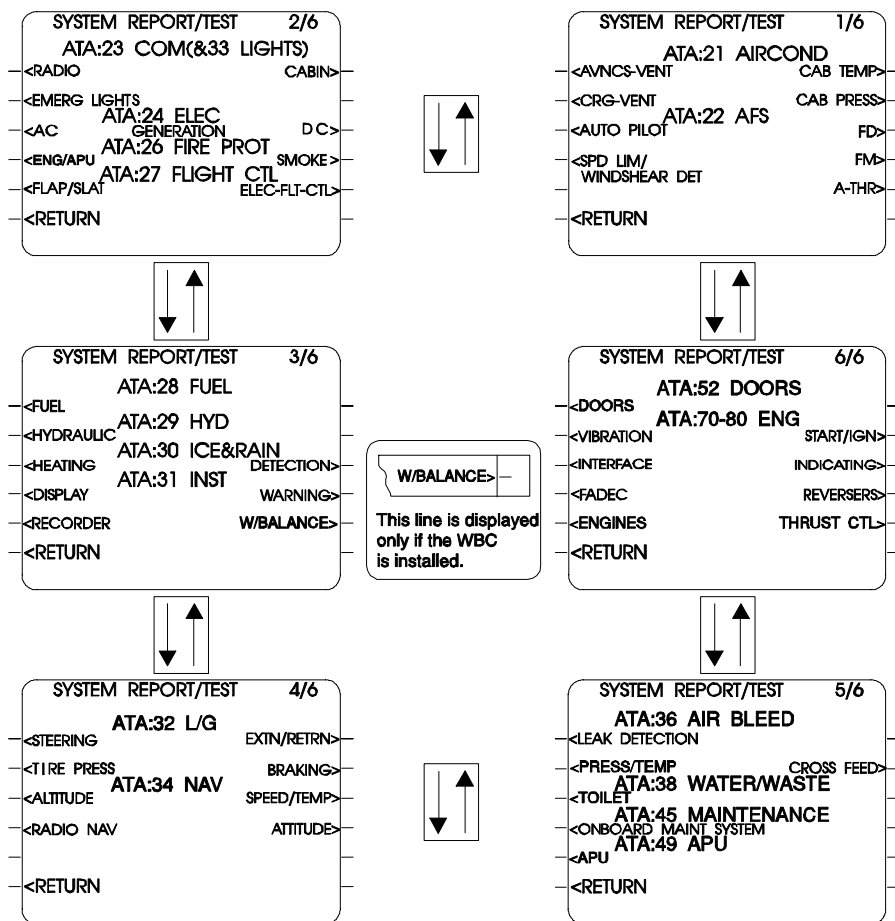
We gain access to the interactive mode through the system report/test function.

Let's suppose we are on ground, engines shut down.

This function ensures the dialog between the MCDUs and each one of the systems (type 1, 2, 3) connected to the CMCs, on ground only.

The page displayed by the CMC gives the list of all the systems sorted by function in the ATA chapter sequence.

This list is displayed on 6 pages. Each function allows access to the related computers or units dealing with that function.



TYPE 1 SYSTEM TYPICAL MENU

This is a typical type 1 system menu.

However, most of the radio-navigation, navigation and communication systems, which are interchangeable with other aircraft, may have a different menu presentation.

The following items are always available :

LAST LEG REPORT

The purpose of this item is to present the internal and external class 1 and 2 fault messages, concerning the system, that appeared during the last flight.

PREVIOUS LEGS REPORT

The purpose of this item is to present the internal and external fault messages, concerning the system that appeared during the previous 63 flights.

This item is the sum of the LAST LEG REPORT items over several flights.

LRU IDENTIFICATION

The purpose of this item is to present the part number of the selected system.

The serial number and the data base number can also be indicated for certain systems.

GROUND SCANNING

The purpose of this item is to reconfigure the computer BITE as being in flight.

Fault messages (class 1, 2, 3, internal and external) detected by the BITE during the activation of this function, are displayed in real time.

TROUBLE SHOOTING DATA

The purpose of this item is to present internal snapshot data concerning any failure of any class for airline engineering use.

In most cases, it is coded data and sometimes can be accessed from other reports (LAST LEG REPORT, PREVIOUS LEGS REPORT,

TEST, CLASS 3 FAULTS, GROUND REPORT, GROUND SCANNING).

CLASS 3 FAULTS

The purpose of this item is to present the class 3 fault messages, concerning the system, that appeared during the last flight.

TEST

The purpose of this item is to initiate tests from the MCDU and display the test results with their failure class. If the test takes more than 1 second, TEST IN PROGRESS and the maximum waiting time are displayed.

If several types of test exist for a system, they must be displayed in line 2R, 3R, 4R or even on a sub-menu page accessed from line key 6R.

Tests are divided into 3 groups :

- Basic or system tests which have no effect on the A/C, accessible via key 2R,
- complementary tests which affect the A/C and require safety precaution accessible via key 3R,
- additional tests which are menu guided tests, accessible via key 4R.

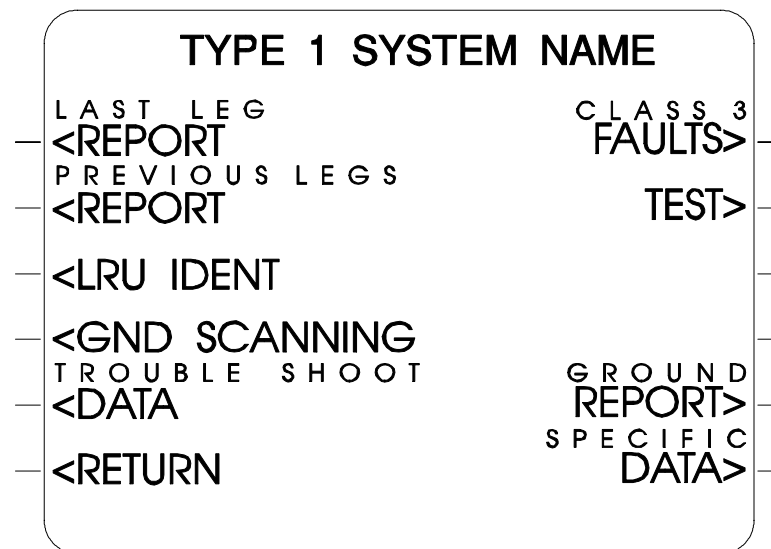
GROUND REPORT

The purpose of this item is to present the internal fault messages which appeared since the last flight at the moment of the request.

SPECIFIC DATA

The purpose of this item is to display specific information in order to help for trouble shooting.

If only one type of specific data exists in the system, the exact name will be displayed in place of SPECIFIC DATA. If more than 2 types of SPECIFIC DATA exist in a system, they must be displayed on a sub-menu page accessed from line key 6R.



TYPE 1 SYSTEM EXAMPLE MENU

To describe the contents of the different items of a type 1 system, we have chosen the Electric Power Generation System (EPGS), part of the AC ELECTRICAL GENERATION function.

The Ground Power Control Unit (GPCU) is the interface unit between the EPGS and the CMCs.

This is the EPGS menu which contains most of the type 1 system items.

LAST LEG REPORT

This report presents only 2 at a time, the fault messages recorded by the system with the UTC at which the fault occurred, the 6 digit ATA reference and the class of the failure.

When no failure has been recorded during the last flight, NO FAULT DETECTED message is displayed on the MCDU.

PREVIOUS LEGS REPORT

This report presents only 2 at a time, the fault messages identically to the LAST LEG REPORT plus the date at which the failure occurred and the leg number.

In addition, the identification of the A/C where the failure occurred, is included in the header.

LRU IDENTIFICATION

This report presents the name, the part number and, in this example, the serial number of the electronic LRUs which are included in the EPGS.

Only 2 are displayed at a time, and in this example, on 3 pages.

TROUBLE SHOOTING DATA

This report presents snapshot coded information such as aircraft configuration and system configuration.

If no failure has been recorded by the system, NO FAULT DETECTED message is displayed on the MCDU.

CLASS 3 FAULT

This report presents, only 2 at a time, the class 3 faults recorded during the last flight.

Only the time and the ATA reference are presented.

These pages are given as an example.

EPGS
LAST LEG REPORT DEC 01

UTC	ATA	CLASS
1410	242234	1
GCU2(1XU2)		

<RETURN PRINT*

EPGS
PREVIOUS LEGS REPORT
F-GGEA

LEG	DATE	UTC	ATA	CLASS
01	DEC16	2130	242234	1
GCU2(1XU2)				
02	DEC15	1510	244155	1
EPCA(4XG)/ECMU2(1XM2)				

<RETURN PRINT*

EPGS 1/3
LRU IDENTIFICATION

GPCU	P/N: 5908624	S/N: 103
GCU APU	P/N: 5908623	S/N: 109

<RETURN PRINT*

EPGS

LAST LEG	CLASS 3
<REPORT	FAULTS>
PREVIOUS LEGS	GCU/GPCU
<REPORT	TEST>
<LRU IDENT	GCU APU
	TEST>
TROUBLE SHOOT	GROUND
<DATA	REPORT>

<RETURN

EPGS
TROUBLE SHOOTING DATA

DATE	UTC	SOURCE	CODE
DEC14	1410	GCU1	74
FF45	0001	467E	00AB 3957
0000	0000	0000	0000 0000

<RETURN PRINT*

SYSTEM REPORT/TEST 2/6
ATA:23 COM(&33 LIGHTS)

<RADIO	CABIN>
<EMERG LIGHTS	ATA:24 ELEC
<AC	GENERATION DC>
<ENG/APU	ATA:26 FIRE PROT SMOKE>
<FLAP/SLAT	ATA:27 FLIGHT CTL ELEC-FLT-CTL>

<RETURN

SYSTEM REPORT/TEST 1/1
ELEC:AC

<ECMU 1	ECMU 2>
ELEC CNTR MGT UNIT	
<GPCU	
GND PWR CTL UNIT	
<GCU EMER	
GEN CTL UNIT EMER	
<CBMU	
CKT BRKR MONG UNIT	

<RETURN

EPGS
LAST LEG CLASS 3 FAULTS

UTC	ATA
1515	244134
GPCU(1XG)	

<RETURN PRINT*

GCU/GPCU TEST

This item, which is a system test, enables initialization of the power up test, amongst other things.

All faults detected and presented by the system will be analyzed and reported by this test.

NOTE : If the test is OK : TEST OK is displayed on the MCDU.

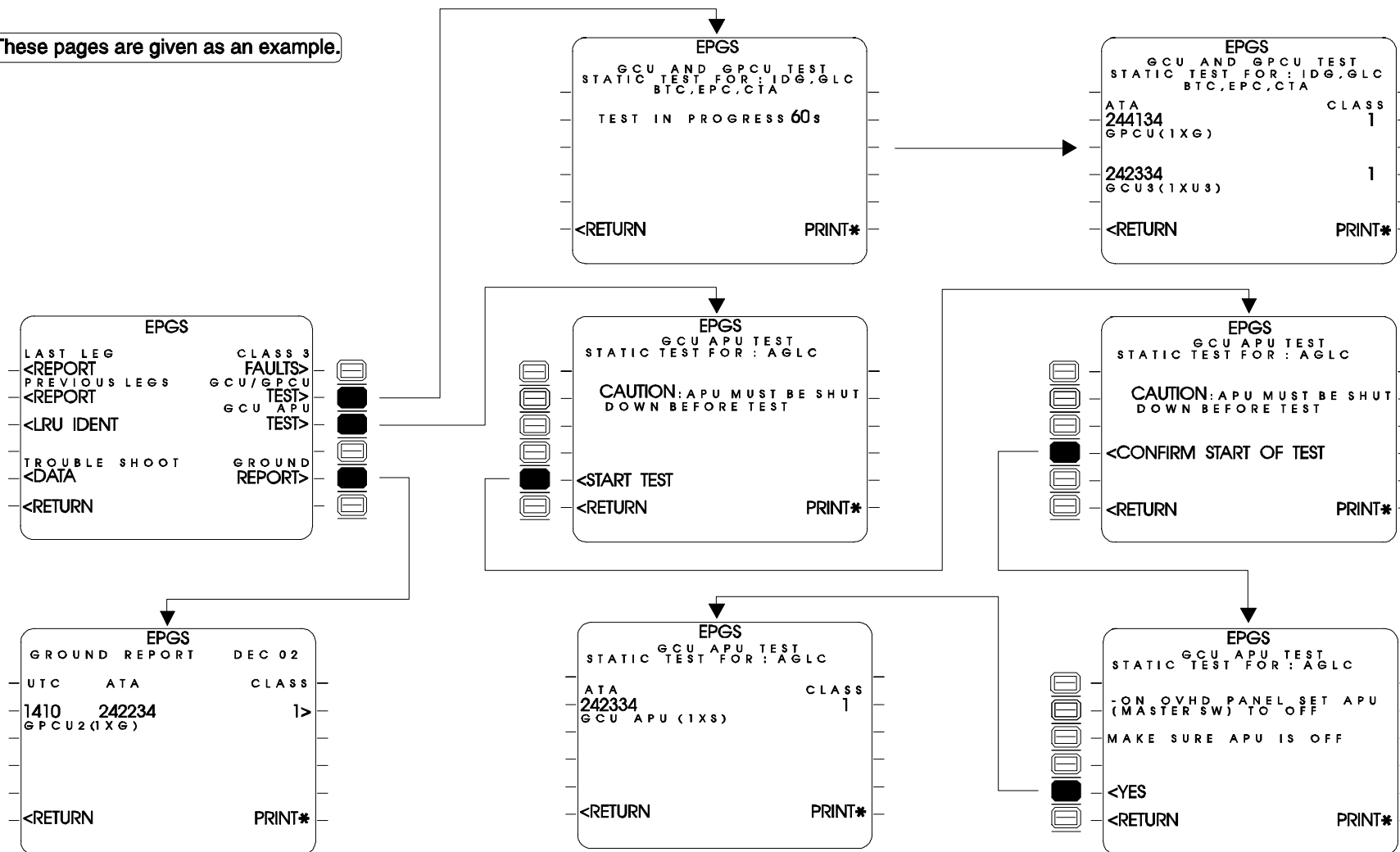
GCU APU TEST

This test is identical to the GCU/GPCU TEST which is a system test. But it is considered as a complementary test because it affects the aircraft and includes a caution message.

GROUND REPORT

The characteristics of this report are the same as those of the LAST LEG REPORT but limited to the internal failures of any class.

These pages are given as an example.



TYPE 2 SYSTEM TYPICAL MENU

This is a typical type 2 system menu. The menu is generated by the active CMC.

The following items are always available :

LAST LEG/GND REPORT

The purpose of this item is to present the class 1 and 2 fault messages, concerning the system, that appeared during the last flight and on ground.

LRU IDENT

The purpose of this item is to present the part number of the selected system.

CLASS 3 FAULTS

The purpose of this item is to present the class 3 fault messages concerning the system.

TEST

The purpose of this item is to initiate the system test from the MCDU and to display the test result with its failure class.

If the test takes more than 1 second, the CMC displays TEST IN PROGRESS xxS with the maximum waiting time.

TYPE 2 SYSTEM NAME	
LAST LEG / GND	CLASS 3
<REPORT	FAULTS>
	TEST>
<LRU IDENT	
<RETURN	

TYPE 2 SYSTEM EXAMPLE MENU

To describe the contents of the different items of a type 2 system, we have chosen the Battery Charge Limiter 1, part of the DC ELECTRICAL GENERATION function.

This is the BCL 1 menu.

LAST LEG/GND REPORT

This report, formatted by the active CMC, presents, only 2 at a time, the fault messages with the 6 digit ATA reference and the class of the failure which are permanently transmitted by the system.

In case of failure detected on ground (after touch down), the fault message will be preceded by "GND".

LRU IDENT

This report, formatted by the active CMC, presents the part number of the BCL 1.

CLASS 3 FAULTS

This report, formatted by the active CMC, presents, only 2 at a time, the class 3 fault messages with the 6 digit ATA reference which are permanently transmitted by the system.

TEST

During the progress of the test, some information is provided on the MCDU.

If the test is OK : the CMC displays "TEST OK" on the MCDU screen.

These pages are given as an example.

SYSTEM REPORT/TEST 2/6

ATA:23 COM CABIN

<RADIO

<EMERG DISPLAY LIGHTS

ATA:24 ELEC

<AC GENERATION DC>

ATA:26 FIRE PROT

<ENG/APU SMOKE/LAV>

ATA:27 F/CTL

<FLAP/SLAT ELEC FLIGHT>

<RETURN

SYSTEM REPORT/TEST 1/1

ELEC:DC

<BCL 1 BCL 2>

BATTERY CHARGE LIMITER

<BCL APU TR>

TRANSFORMER RECTIFIER

<RETURN

BCL 1 1/1

LAST LEG/GND REPORT

ATA CLASS

24 38 55 1

BAT 1 CONTACTOR(6PB1)

24 38 34 1

BCL1

<RETURN

PRINT*

BCL 1 1/1

LAST LEG/GND CLASS 3 FAULTS

<REPORT TEST>

<LRU IDENT

<RETURN

BCL 1 1/1

LAST LEG CLASS 3 FAULTS

ATA

24 38 34

BCL1

<RETURN

PRINT*

BCL 1

LRU IDENTIFICATION

P/N : A001152002

<RETURN

PRINT*

BCL 1

TEST

ATA CLASS

24 24 55 3

EMER GEN CONTACTOR(2XE)

24 38 00 1

BAT 1 SHUNT(3PB1)

<RETURN

PRINT*

BCL 1

TEST

TEST IN PROGRESS 60s

ON OVHD ELEC PANEL235VU

BAT 1 FAULT LT ON

FOR 12S

ON OVHD EMER ELEC PANEL

211VU

EMER GEN FAULT LT ON

FOR 12S

<RETURN

TYPE 3 SYSTEM TYPICAL MENU

This is a typical type 3 system menu. The menu is fully generated by the active CMC.

TEST

The only possible item is TEST or RESET for the Transformer Rectifiers (TRs).

In case of failure, the CMC displays the name of the tested or reset component.

If the test (or reset) is OK : the CMC displays "TEST (or RESET) OK".

TYPE 3 SYSTEM EXAMPLE MENU

To describe the contents of the different items, we have chosen 2 examples:
GCU EMERGENCY then Transformer Rectifier 1 in the AC and DC GENERATION function.

GCU EMER MENU

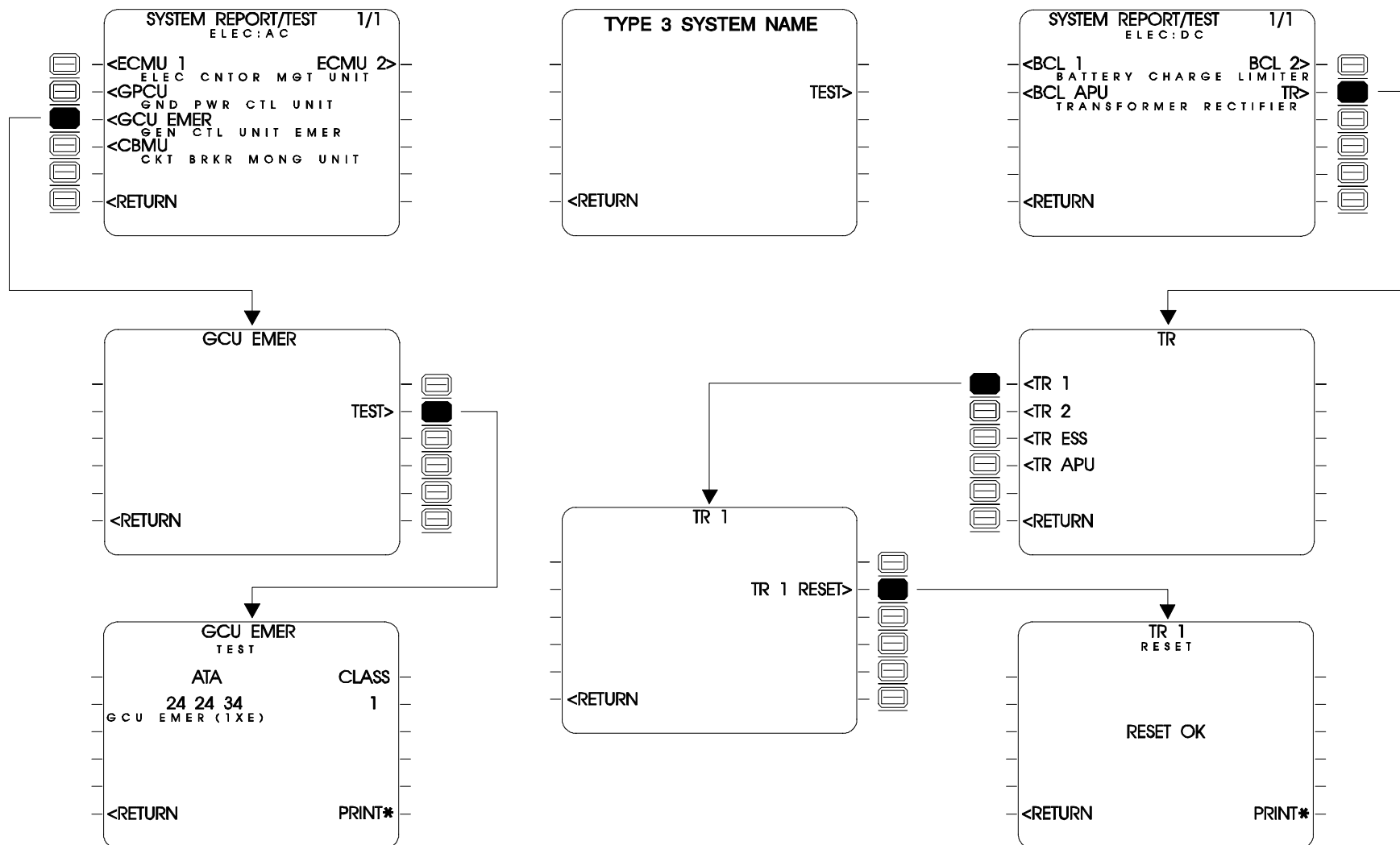
If the test is OK : the CMC displays "TEST OK" on the MCDU screen.

TR 1 MENU

If the reset is not successful, the fault message

[24 32 51] is displayed.
TR1 (1PU1)

These pages are given as an example.



STUDENT NOTES:

CENTRAL MAINTENANCE SYSTEM (CMS) D/O IN NORMAL MODE

GENERAL PARAMETERS

CMC/TYPE 1 SYSTEM

DC 2
DC1
Null

CMC/TYPE 2 SYSTEM

Flight
Ground

CMC/TYPE 3 SYSTEM

DC 1+ DC 2
Null

CORRELATION

GENERAL PARAMETERS

The CMC acquires and dispatches general information to the type 1 systems.

The CMC is the interface between the main clock and the system BITEs which use time and date data.

If the main clock has failed, the CMC back-up clock takes over.

The CMC is the interface between the Flight Management, Guidance and Envelope Computers and the systems which use Flight Number and City Pair (ACARS and Aircraft Condition Monitoring System only).

The CMC is the interface between the Digital Flight Data Recording System and the system BITEs which use the Aircraft Identification.

In addition to its own warnings, the CMC processes the FDRS and ACMS warnings which are sent to the Flight Warning Computers.

The CMC is the interface between the FWCs and the system BITEs concerning the flight phases.

The CMC transmits the aircraft configuration which is processed by pin programming to all type 1 system BITEs.
This aircraft configuration is used to know the installation of optional equipment.

The CMC processes the maintenance phases (DC1, DC2 and NULL) independently from the flight phases and transmits them to all type 1 systems.
These maintenance phases control the memorization of the BITE data and the leg management.

For the constitution of these maintenance phases, the CMC receives :

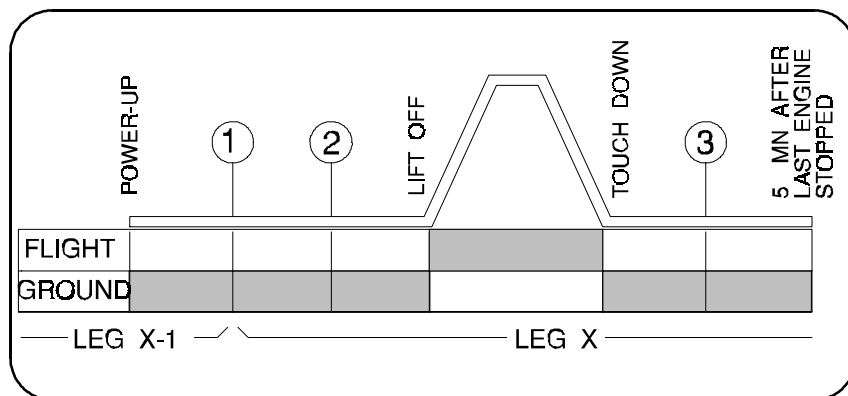
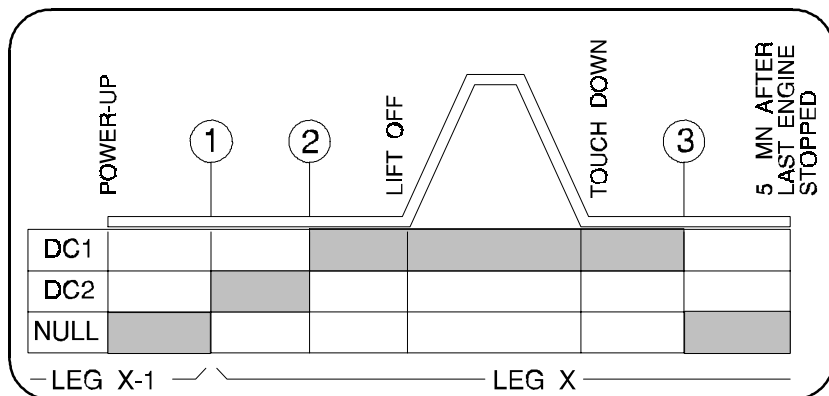
- the "50% N2" from the EIVMUs.
- the "A/C below 5ft" from the RAs.
- the "ground or ground power unit connected" from LGCIU 1.
- "CAS>80kts" from the ADIRUs.
- "Flight Number inserted" from the FMGECs.

The type 2 systems process their own FLIGHT/GROUND condition and consequently their own management whereas the type 1 systems use the CMC maintenance phases.

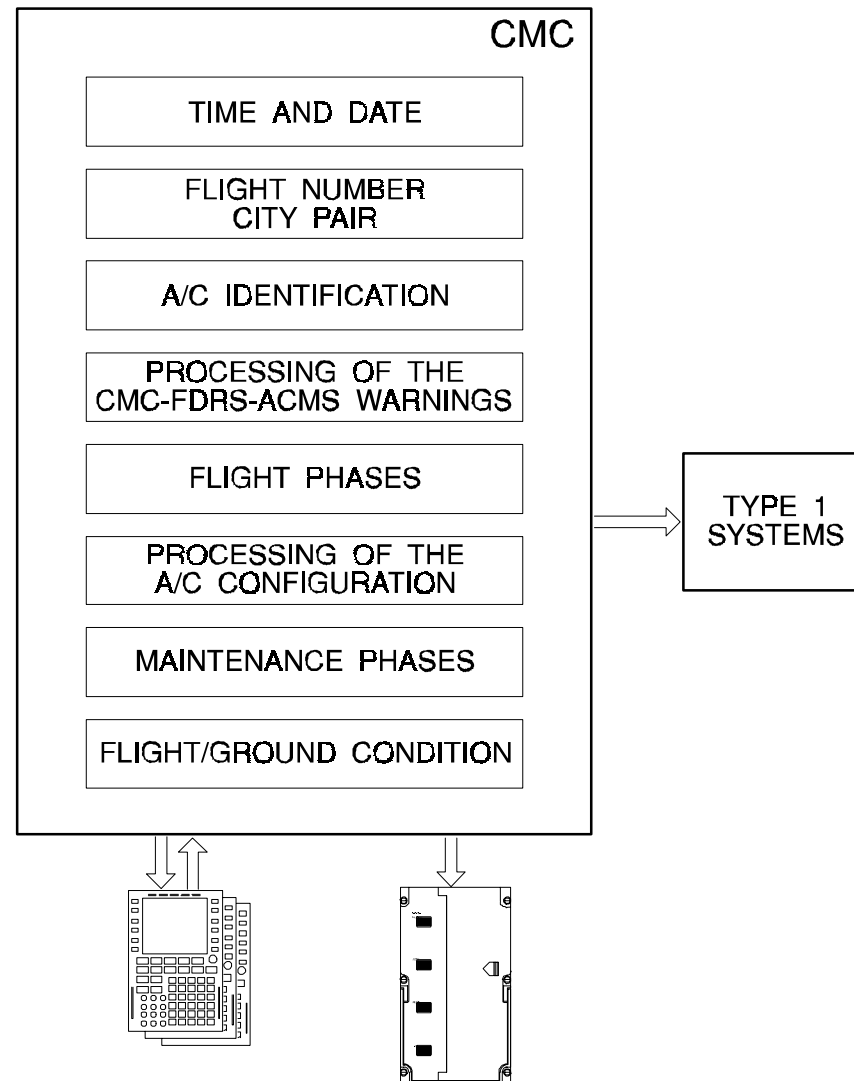
The CMC must process a FLIGHT/GROUND condition to manage the type 2 system BITE data : the CMC considers the type 2 systems in flight after take-off and on ground after "landing gear compressed".

NOTE : For the type 1 systems, the FLIGHT/GROUND condition is given by the maintenance phases sent by the CMC :

- FLIGHT = DC1 + DC2
- GROUND = NULL



- ① DC2 = (NULL memorized for 120s) and (1st eng. start+180s) and [(CAS>80kts+30s) or (Flight Number inserted)]
- ② DC1 = DC2 memorized for 30s.
- ③ NULL = (DC1 or DC2 memorized) and [(CAS<80kts+30s) or (eng. stopped)]



CMC/TYPE 1 SYSTEM

The fault processing, memorization and transmission to the CMC is different in each maintenance phase.

DC 2

When the leg starts, in the type 1 system computer, the contents of the LAST FLIGHT memory are transferred to the PREVIOUS FLIGHTS memory, the GROUND and the CLASS 3 FAULTS memories are erased and in the CMC, the contents of the POST FLIGHT memory zone are transferred to the PREVIOUS FLIGHT memory zone.

When an internal class 1 or class 2 fault occurs, after detection and isolation of the faulty LRU, the BITE processes a fault message which is stored in the system BITE memory and transmitted to the CMC where it is also memorized.

At the same time, if there is a warning message, it is also memorized by the CMC.

The AVIONICS STATUS zone memorizes the name of the system affected as long as an external or internal fault is present.

If an internal class 3 fault occurs, it is memorized in the system BITE memory.

DC1

When an internal or external class 1 or class 2 fault occurs, after detection and isolation of the faulty LRU, the BITE processes a fault message which is stored in the system BITE memory and transmitted to the CMC where it is also memorized.

At the same time, if there is a warning message, it is also memorized by the CMC.

The AVIONICS STATUS zone memorizes the name of the system affected as long as the fault is present.

If a class 3 fault occurs, it is only memorized in the system BITE memory.

At the end of the flight (DC1/NULL transition), the CMC reanalyses the fault message consolidation (HARD OR INTERMITTENT) and processes the POST FLIGHT REPORT, according to the spurious message filter which is applied.

NULL

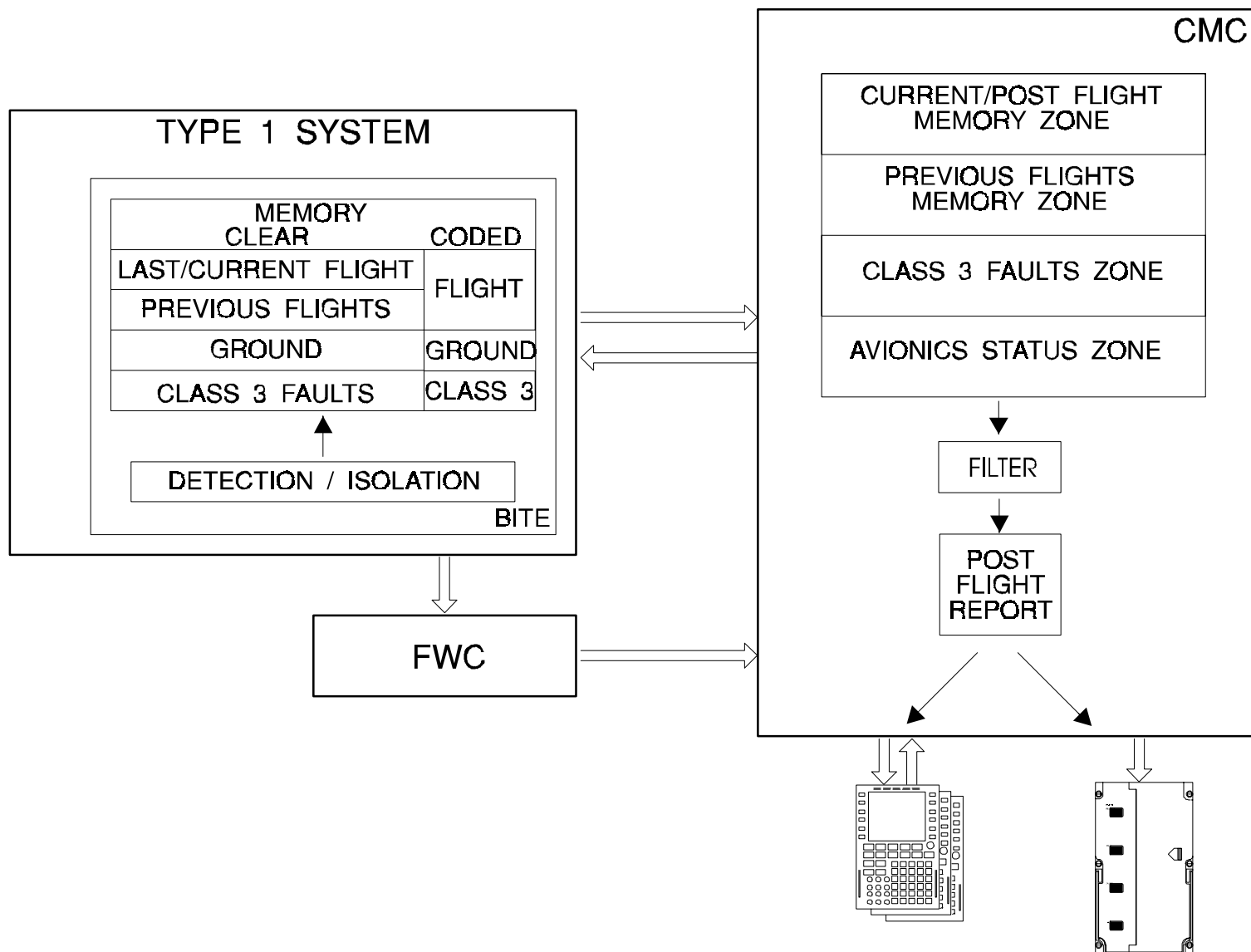
The system BITE transmits, to the CMC, the fault messages of any class which are due to the faults detected in the last flight.

This is used to feed the "class 3 zone" when the CLASS 3 REPORT is requested.

When an internal fault of any class occurs, after detection and isolation of the faulty LRU, the BITE processes a fault message which is stored in the system BITE ground memory only.

The AVIONICS STATUS zone memorizes the name of the system affected as long as an external or internal fault is present.

If an internal class 3 fault occurs, it is memorized in the system BITE memory.



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CMC/TYPE 2 SYSTEM

For the type 2 systems, the leg starts at take-off.

FLIGHT

When the leg starts, the flight and ground system BITE memories are erased.

When an internal or external fault of any class occurs, after detection and isolation of the faulty LRU, the BITE processes a fault message which is stored in the system BITE memory and transmitted to the CMC where it is also memorized, except for the class 3 faults.

At the same time, if there is a warning message, it is also memorized by the CMC.

The AVIONICS STATUS zone memorizes the name of the system as long as the fault is present.

GROUND

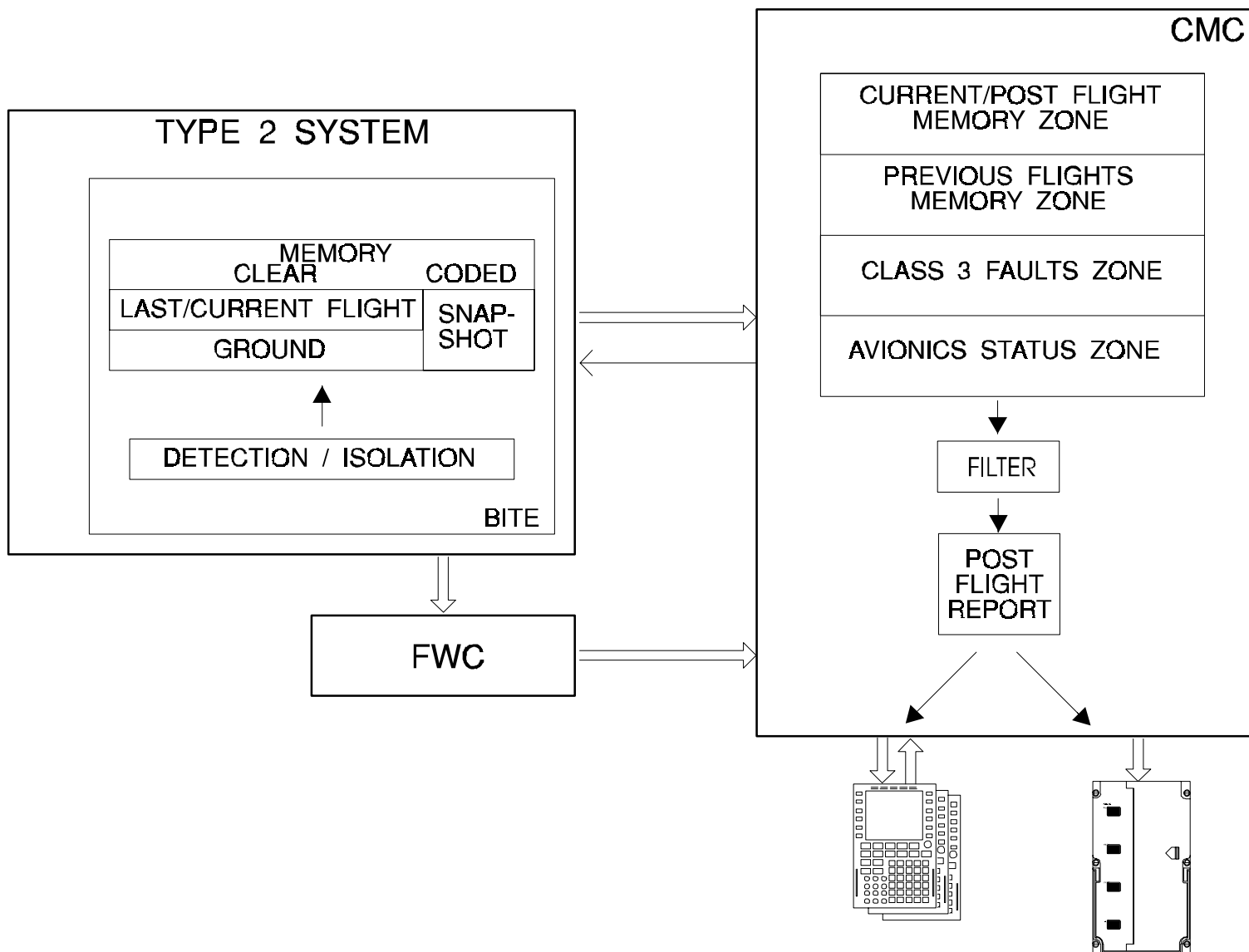
The system BITE transmits, to the CMC, the fault messages of any class which are due to the faults detected in the last flight.

This is used to feed the "class 3 zone" when the CLASS 3 REPORT is requested.

NOTE : The type 2 system fault message consolidation is reanalysed by the CMC at the DC1/NULL transition to process the PFR.

When an internal fault of any class occurs, after detection and isolation of the faulty LRU, the BITE processes a fault message in the system BITE ground memory and transmits it to the CMC to update the AVIONICS STATUS zone.

The AVIONICS STATUS zone memorizes the name of the system as long as the fault is present.



CMC/TYPE 3 SYSTEM

The type 3 system BITE has no memory.

DC 1+ DC 2

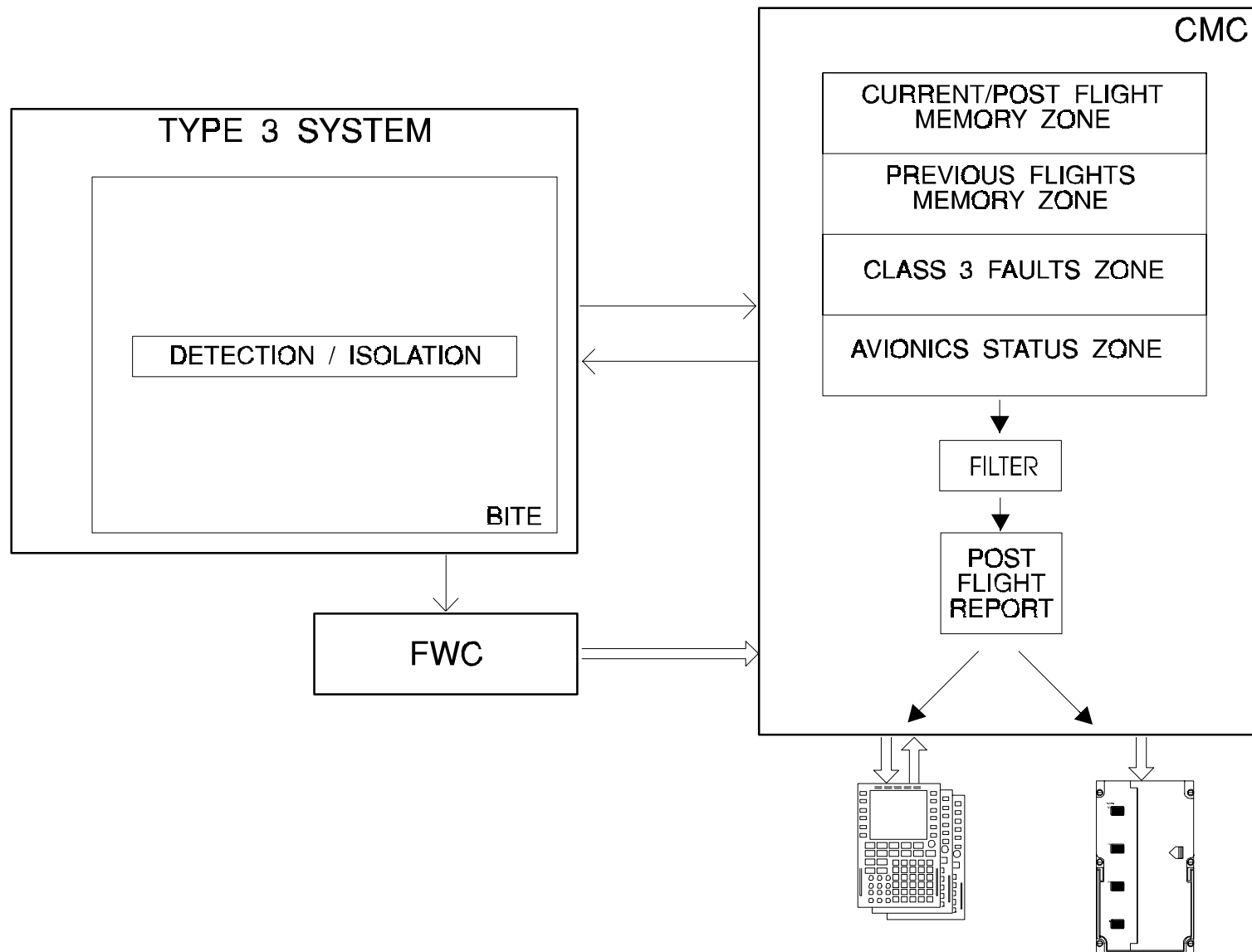
When a type 3 system unit fails, the system status is sent to the CMC.
The CMC processes the class 1 fault message and stores it in its
CURRENT FLIGHT memory zone.
At the same time, if there is a warning message, it is also memorized.

The AVIONICS STATUS zone memorizes the name of the system as
long as the fault is present.
The CMC consolidates the fault status at DC1/NULL transition to
process the POST FLIGHT REPORT.

NULL

The system status is always sent to the CMC, but only the AVIONICS
STATUS zone is updated(No memorization).

The AVIONICS STATUS zone memorizes the name of the system as
long as the fault is present.



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CORRELATION

The purpose of the correlation is to group all the fault messages related to the same event.

NOTE : The association provided on the PFR print-out, between the fault messages and the ECAM messages, is also a correlation: it is based on time and on the ATA references.

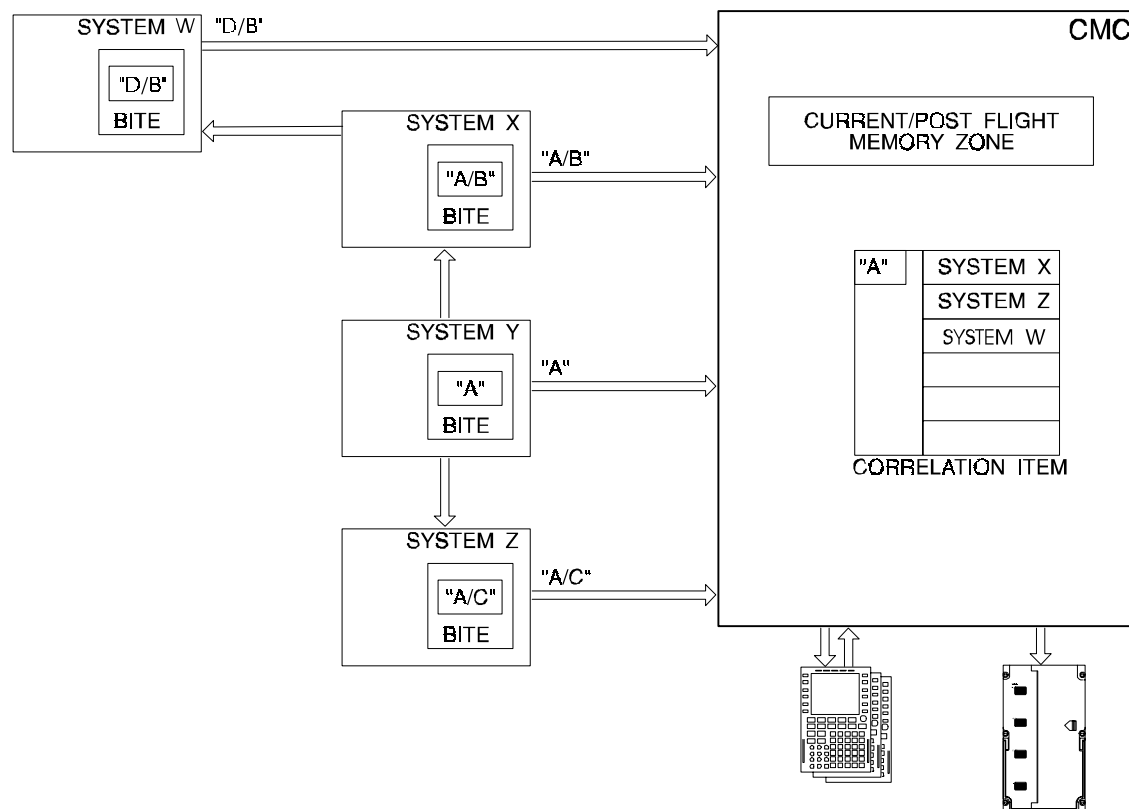
When a fault message "A" appears, the CMC opens a correlation item. During 1 mn, it associates all the fault messages having the same ATA chapter identification (on first 3 or 4 digits) and memorizes, in the correlation item, only the name of the first 6 systems called IDENTIFIERS which have sent the fault messages.

The CMC also associates the fault messages generated by the other systems which are operationally affected by this failure (external failure for them). Remember that the fault messages are always memorized in their own system BITE memories.

After 1 mn, the IDENTIFIERS item is closed. 9 correlation items can be opened at the same time.

If the message "A" is an internal fault message, it is displayed with its associated source.

If it is an external fault message, it is displayed only if there is no internal message concerning the same event, otherwise, the internal fault will be displayed instead.



STUDENT NOTES:

CENTRAL MAINTENANCE COMPUTER (CMC) RECONFIGURATION

General
Automatic Switching
Manual Switching

GENERAL

Aircraft systems (type 1, 2 and 3) send their BITE information in parallel to the 2 Central Maintenance Computers (CMCs) which both acquire and process information in the same manner.

In normal operation, CMC1 is active : in other words, in communication with the type 1, 2 and 3 aircraft systems for BITE check, test request or transmission of general parameters.

The switching can either be the result of an internal switching or of an action on the relevant pushbutton switch in the cockpit.

AUTOMATIC SWITCHING

Automatic switching occurs when the CMC1 internal monitoring detects a hardware or software failure.

In this case, CMC2 communicates with the type 1 systems via CMC1 internal switching stages and with the type 2 and 3 systems via discrete links.

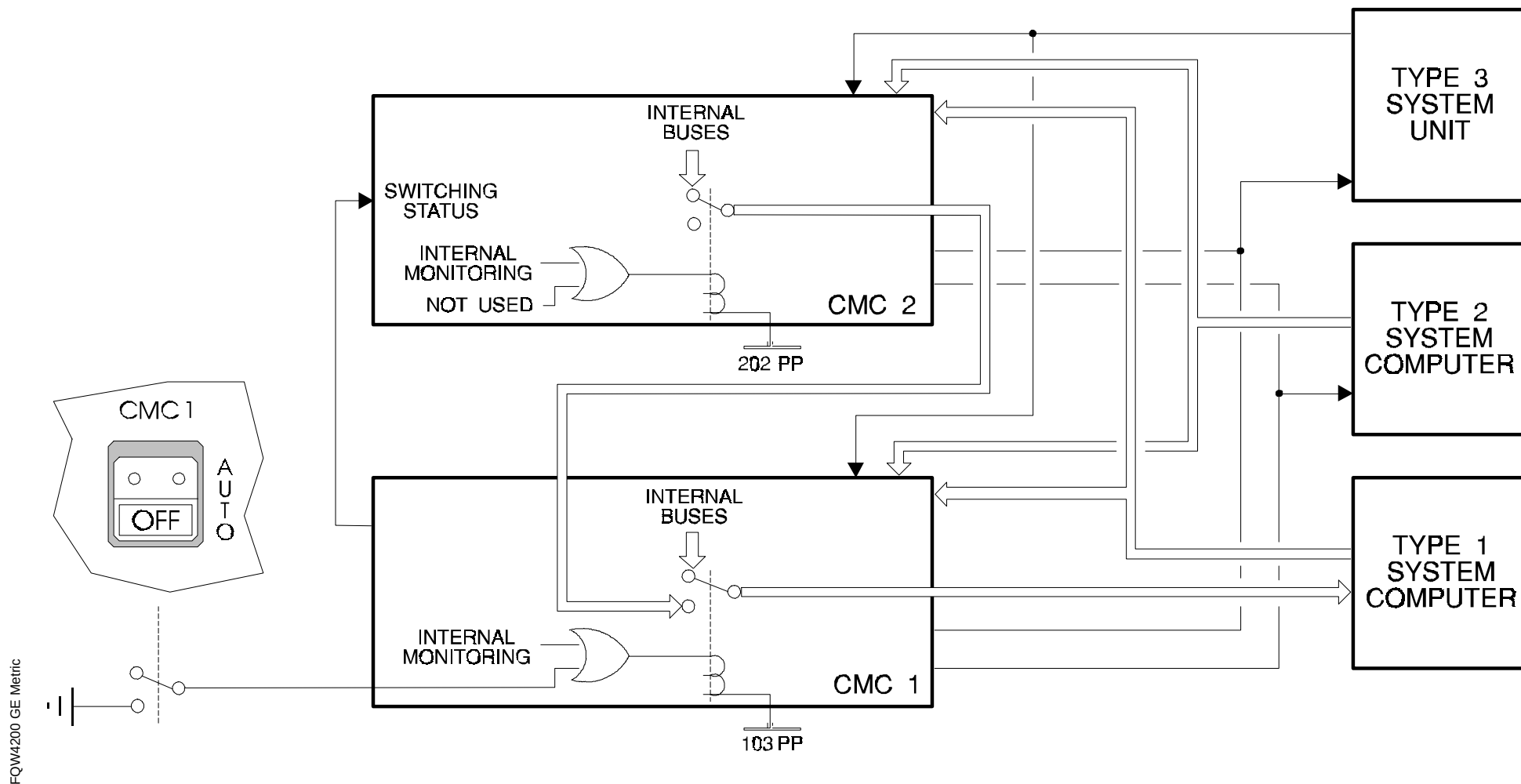
No information is provided to identify the active CMC, except "MAINTENANCE / CMC 1 " displayed on the STATUS page of the ECAM.

MANUAL SWITCHING

CMC Manual Switching is possible via a CMC1 AUTO-OFF pushbutton.

When this pushbutton switch is set to OFF, CMC manual switching occurs.

This can be used in case of a CMC1 problem which does not lead to an automatic switching (e.g. communication problem with a given system).



STUDENT NOTES:

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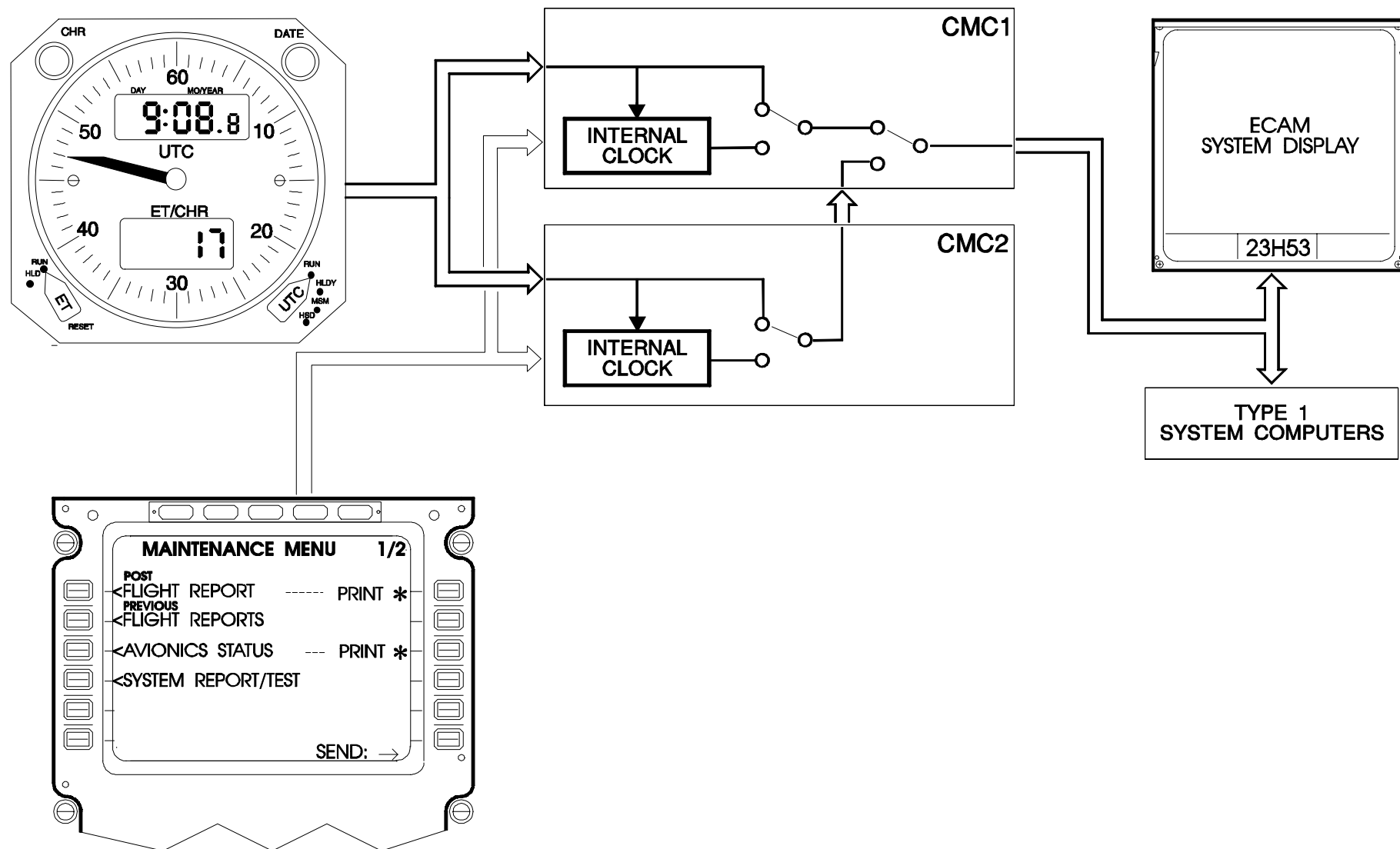
BACK-UP CLOCK FUNCTION

Normal Operation
Abnormal Operation

NORMAL OPERATION

In normal operation, the main clock provides date and time data to the Electronic Centralized Aircraft Monitoring (ECAM) and the type 1 system computers through Central Maintenance Computer (CMC) 1 or CMC 2.

The CMCs cyclically check and validate the time and the date from the clock every second.



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ABNORMAL OPERATION

In case of main clock failure, the active CMC internal clock takes over.

The CMC internal clock supplies time and date to the ECAM and the type 1 system computers.

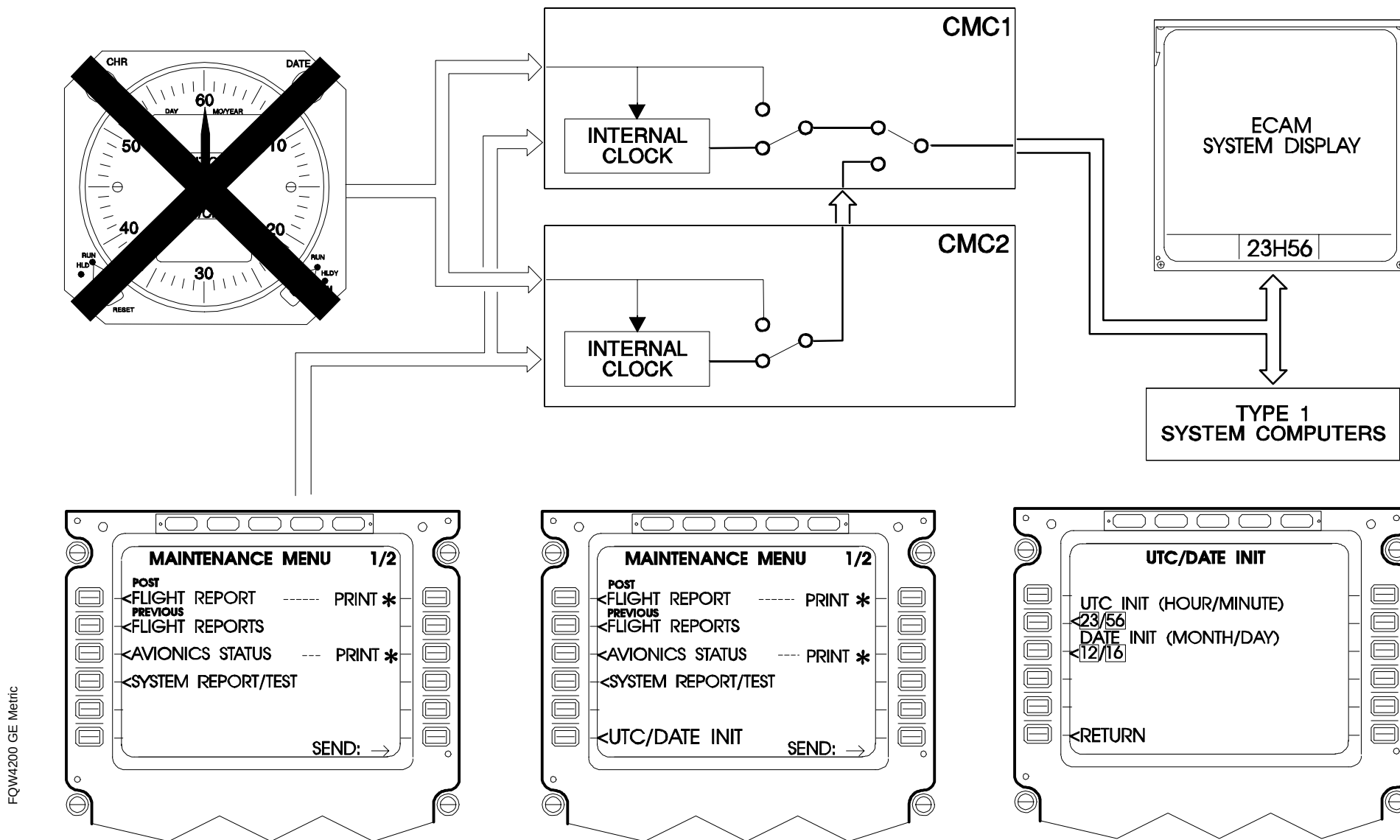
In addition, if a long power interrupt affects boths CMCs (more than 300 ms), the Universal Time Coordinate (UTC)-DATE INIT item is added in the CMS menu.

Time and date are no longer provided to the ECAM and the type 1 system computers.

These funtions enable the crew to initialize time and date.

In this menu, UTC and date can be initialized by entering data in the scratchpad and by pressing the corresponding init key.

Supposing that you have already initialized the date and entered the UTC in the scratchpad, you have to validate it by pressing the correct key.



STUDENT NOTES:

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CENTRAL MAINTENANCE COMPUTERS (CMC) INTERFACES

- General
- User Interfaces
- Type 1 Systems
- Type 2 Systems
- Type 3 Systems
- CMC/CMC Interface
- Pin Programming

GENERAL

Most of the aircraft systems communicate with the Central Maintenance Computers (CMCs) by Low Speed and High Speed ARINC 429 buses and by discretes.

The CMCs are linked together by crosstalk buses and both dialog with the user interfaces through ARINC 429 buses.

USERS INTERFACES

Each CMC communicates through 3 Low Speed Aeronautical Radio Incorporated (ARINC) 429 buses with the 3 Multipurpose Control & Display Units (MCDUs), the printer and the ARINC Communication Addressing & Reporting System (ACARS) management unit, if installed.

These communication buses (C1, C2, C3) enable dialog with the active CMC and transmission of general parameters.

The table below shows the equipment distribution on the bus :

C1	C2	C3
MCDU1	MCDU2	MCDU3
ACARS MU	PRINTER	

In case of CMC 1 inactive, CMC 2 communicates with user interfaces through CMC 1.

Each CMC is fed by these user interfaces through Low Speed ARINC 429 buses for protocol transmission and Built-In Test Equipment (BITE) information.

Each MCDU is also linked to the CMCs by a discrete (ON/OFF).

TYPE 1 SYSTEMS

Each CMC communicates with type 1 system computers through a network of 6 Low Speed ARINC 429 buses.

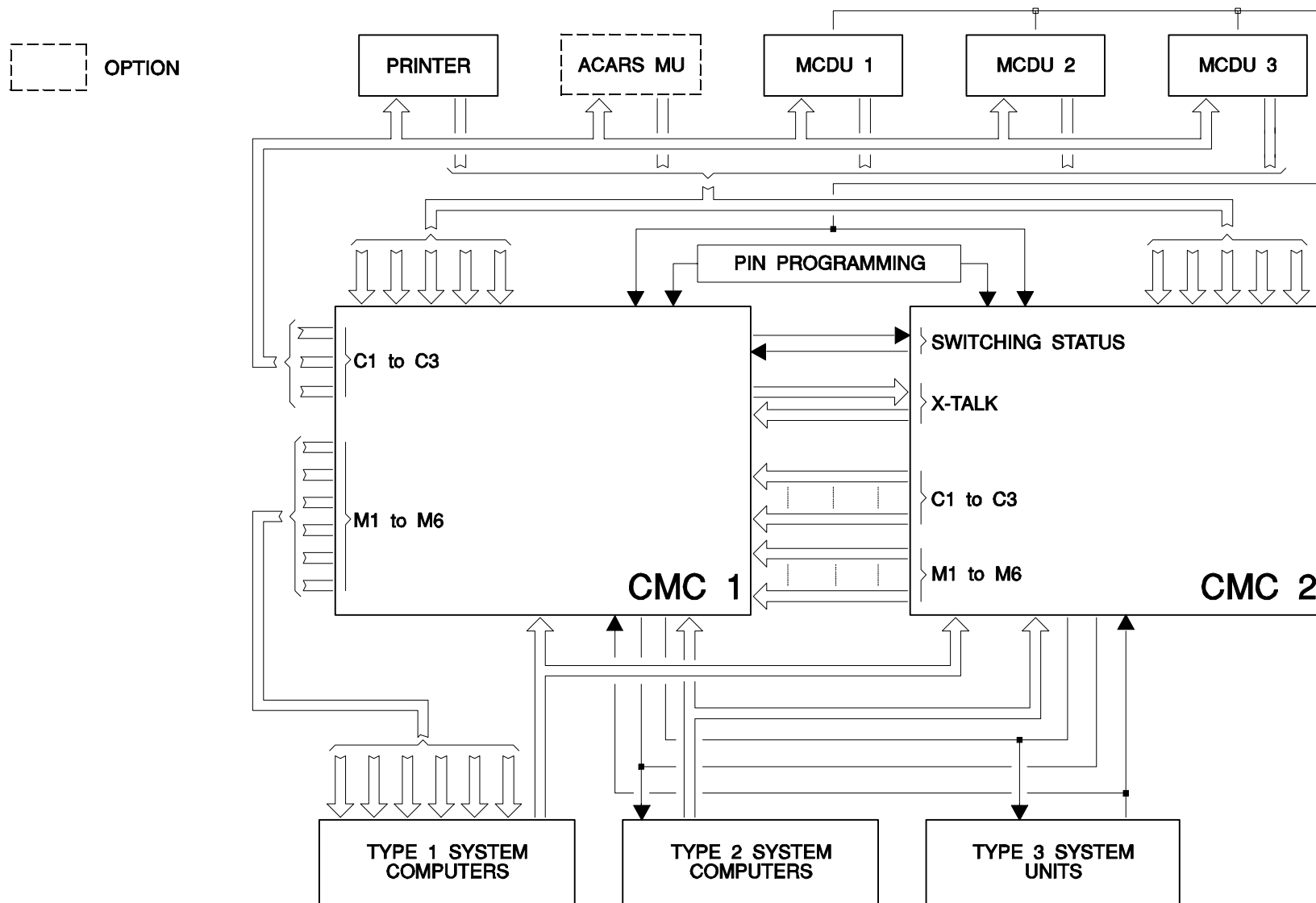
In interactive mode, these maintenance buses (M1 to M6) enable dialog between the active CMC and the system BITEs.

In normal mode, they allow the dispatch of already acquired general parameters (e.g. Time from the CLOCK) to the system BITEs.

In case of CMC 1 inactive, CMC 2 communicates with type 1 system computers through CMC 1.

In normal mode, each type 1 system computer permanently transmits BITE information to the CMCs through a Low Speed or High Speed ARINC 429 bus.

Some type 1 systems also transmit general parameters (e.g. time and date from the CLOCK, software pin programming from Air Data Inertial Reference Unit (ADIRU), warning messages and flight phases from FWC). In interactive mode, the type 1 system computers transmit displayable information on these buses (texts, characters...) processed by their BITE.



TYPE 2 SYSTEMS

The active CMC controls each type 2 system computer with a discrete. This discrete is used to test the system in a pseudo-interactive mode.

Each type 2 system computer permanently transmits BITE information through an ARINC 429 LS bus and the result of the test, if requested.

TYPE 3 SYSTEMS

The active CMC controls each type 3 system unit with a discrete. This discrete is used to test or reset the system in a pseudo-interactive mode.

Each type 3 system unit indicates its status with a discrete.

CMC/CMC INTERFACE

The CMCs communicate with each other through 2 High Speed ARINC 429 buses.

This X-talk enables both CMCs to exchange the general parameters.

For each CMC, the opposite CMC is considered as a full system BITE and transmits its maintenance message through its X-talk bus.

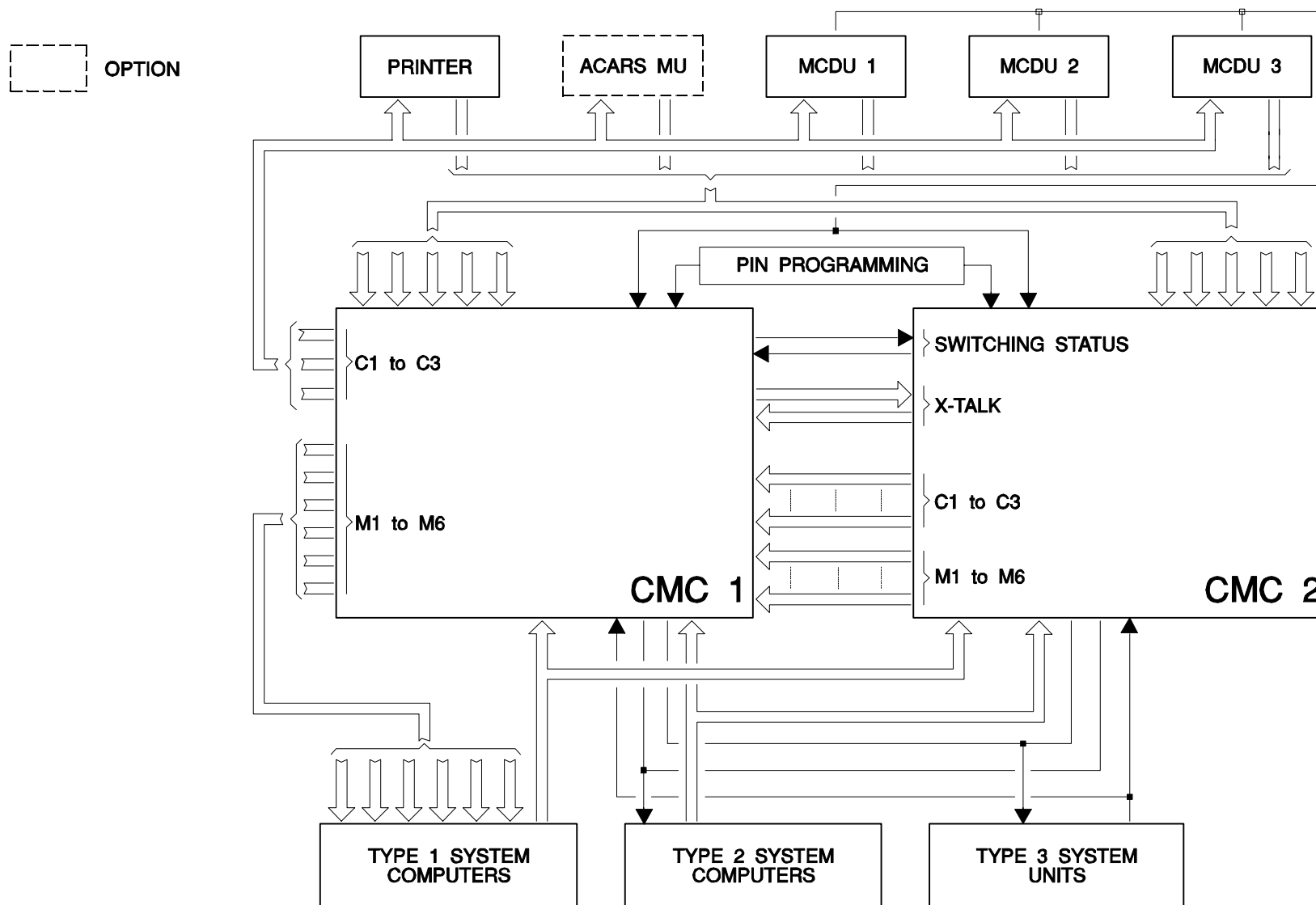
2 discretes link both CMCs : one in each direction, in order to give the status of one computer with respect to the other one (MASTER/SLAVE).

The 3 communication and the 6 maintenance buses link CMC 2 to CMC 1 enabling dialog of systems with CMC 2 if CMC 2 becomes active.

PIN PROGRAMMING

Upon energization, the CMCs process their own configuration according to software Pin Programming received by ARINC messages and hardware Pin Programming directly connected to the CMCs.

The active CMC uses the hardware Pin Programming to determine the aircraft configuration (e.g. CMC side, A/C type: A330 or A340) and the optional equipment (e.g. ACARS MU installed or not).



STUDENT NOTES:

FQW4200 GE Metric

TROUBLE SHOOTING PROCEDURE WITH CMS

Cockpit Effect
PFR
TSM Entry
Fault Isolation Procedure

COCKPIT EFFECT

After a malfunction, the crew reports the cockpit effect in the log book. The fault symptoms, relative to the cockpit effect, can be as follows :

- a WARNING/MALFUNCTION + CMS FAULT message (with possible associated warnings and system IDENTIFIERS).
- a WARNING/MALFUNCTION alone.
- a CMS FAULT message alone.

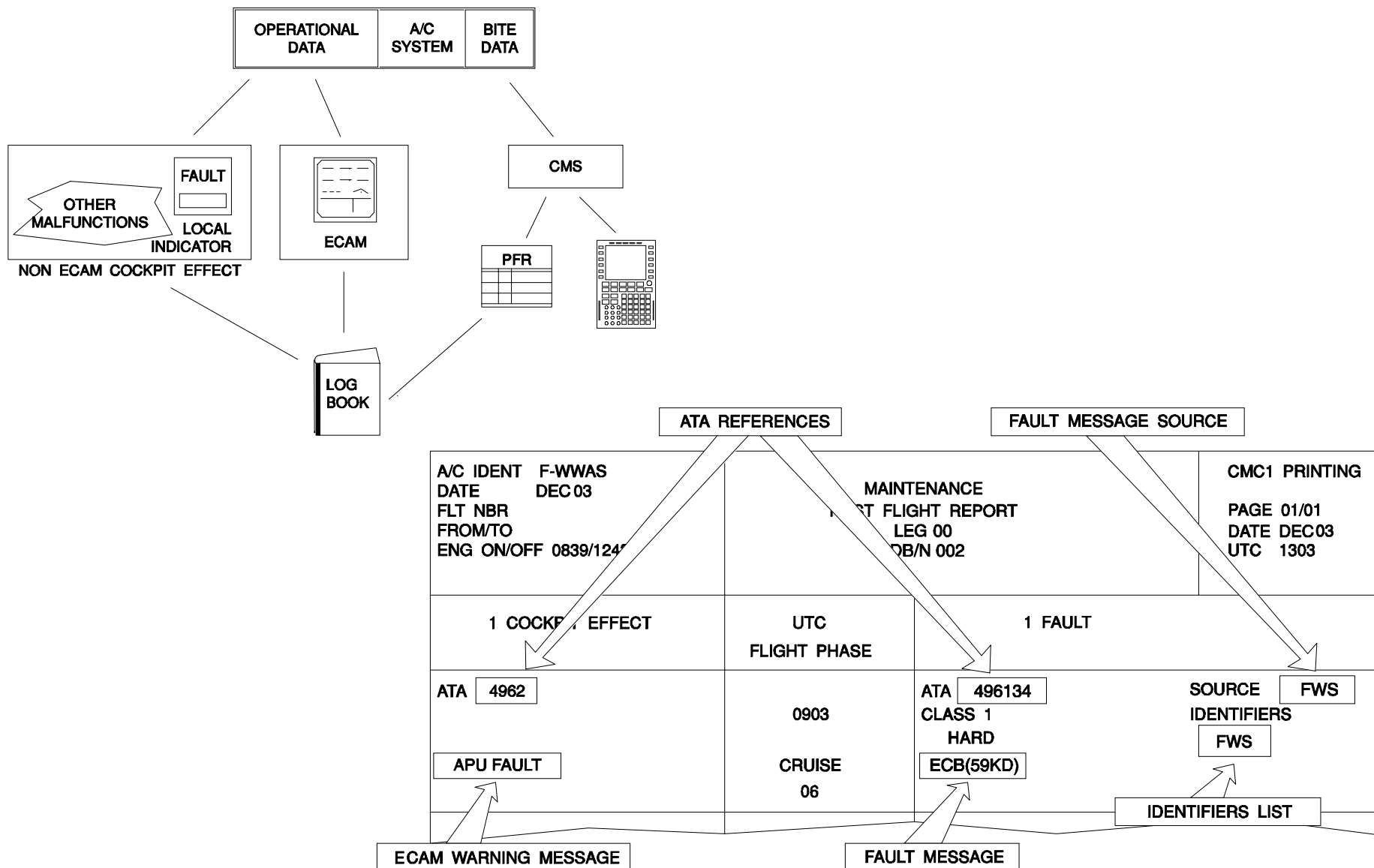
PFR

For the class 1 and 2 failures of CMS monitored systems, the POST FLIGHT REPORT permits an access to the concerned list of faults in the Trouble Shooting Manual.

For this purpose, it provides the following information : ECAM WARNING message (if it exists), FAULT message with its source, ATA references and IDENTIFIERS list.

When the PFR print is not available, this information can be retrieved through the MCDU (in Normal mode or Interactive mode).

A specific document (SIL 00-038) and the maintenance knowledge will be used to eliminate the spurious messages.



TSM ENTRY

The CMS report information permits a direct access to the fault isolation procedure task numbers in page block 101 of the TSM.

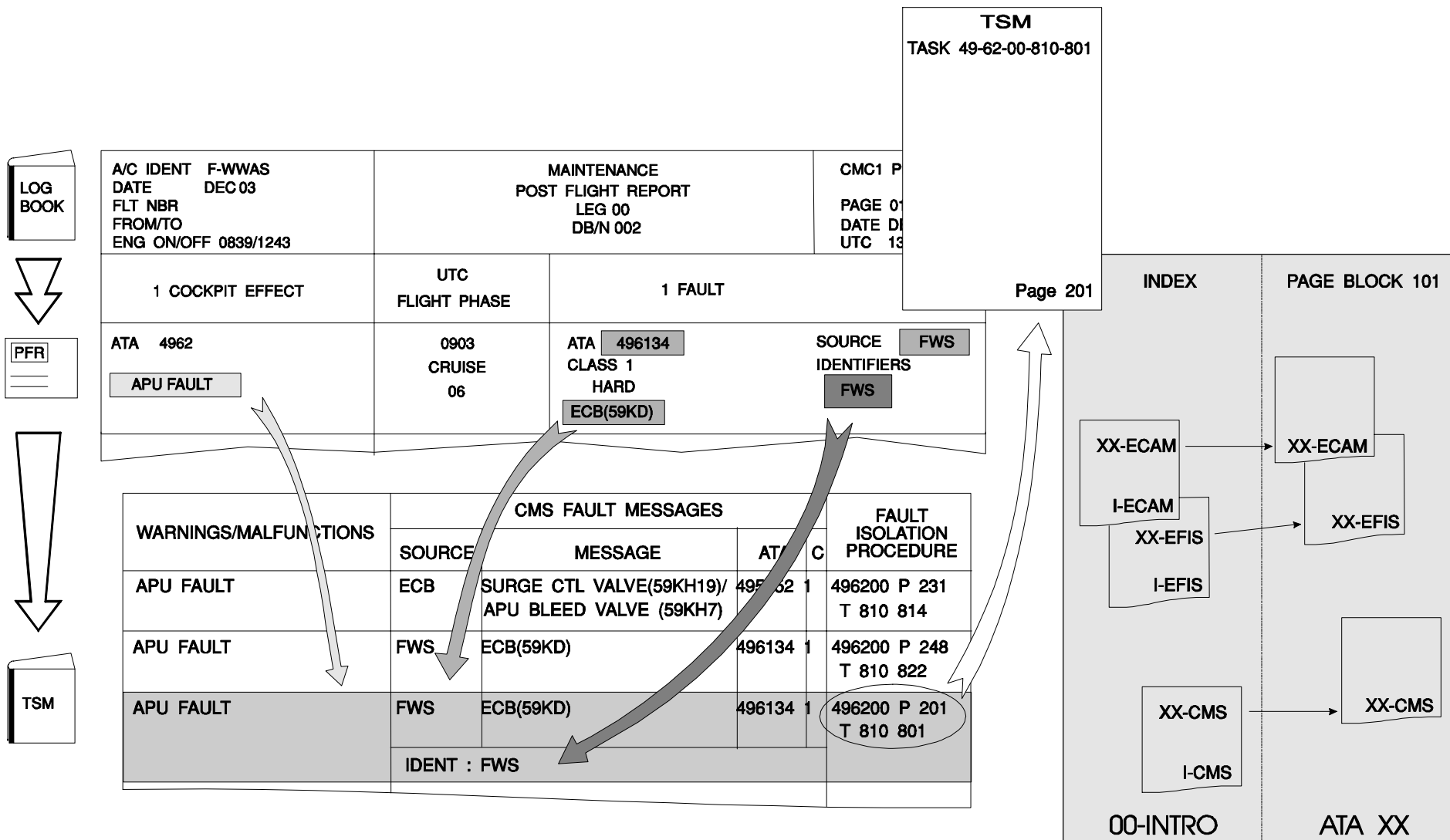
You have to refer to the "WARNING/MALFUNCTION" column to find the reported problem. If the fault symptoms (ECAM, EFIS, local warning, crew observation or CMS) do not allow you to directly find the right page block 101, you can refer to the appropriate section of the index part.

Then you associate the CMS message.

A WARNING/MALFUNCTION with its correlated CMS fault message could have several associated fault isolation procedure tasks according to the systems which have detected the fault.

The PFR provides an IDENTIFIERS list which must be compared with the IDENTIFIERS item of the CMS FAULT MESSAGE part in page block 101 of the TSM.

This task number gives the right access for page block 201 of the TSM.

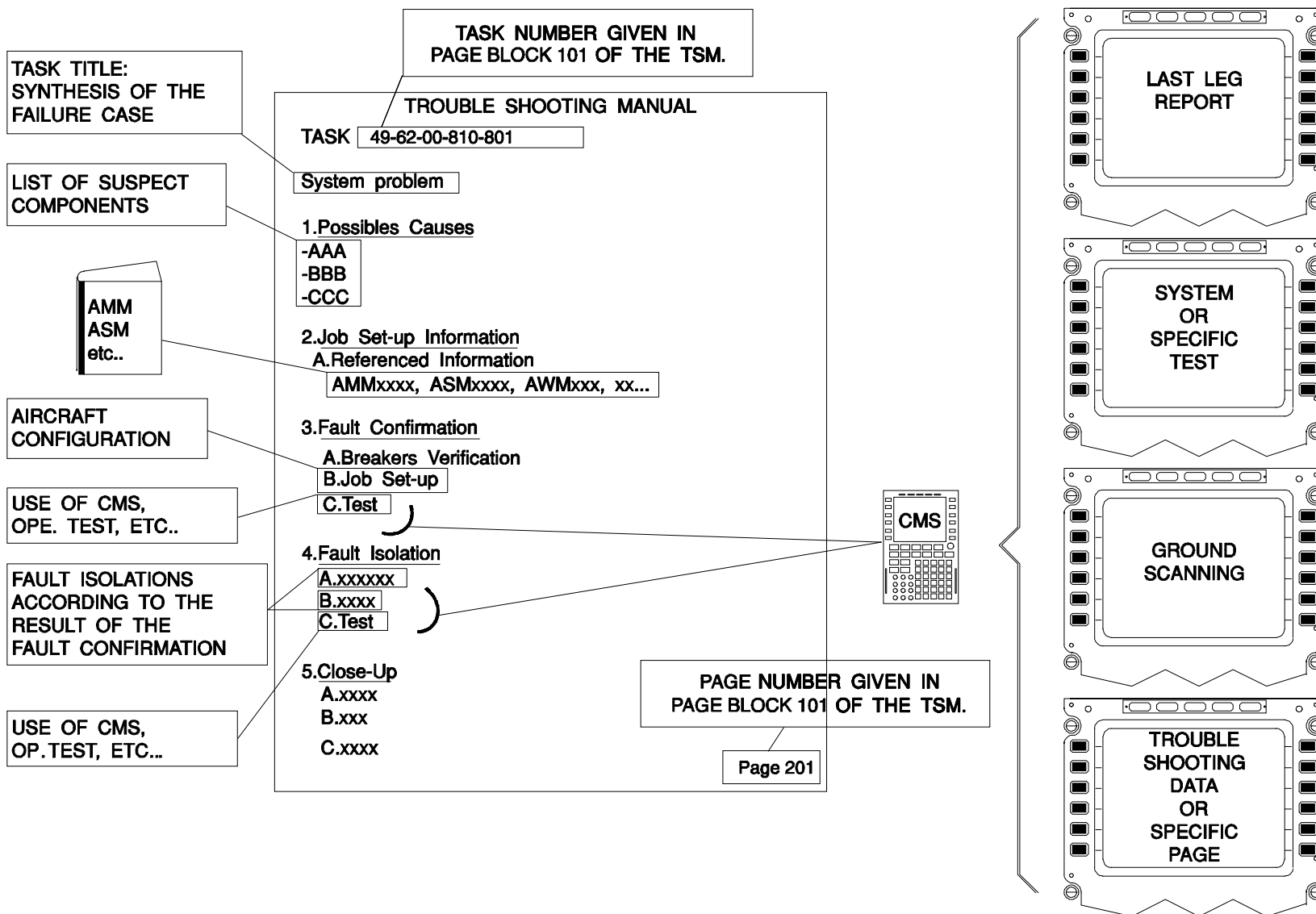


FAULT ISOLATION PROCEDURE

The corresponding fault isolation procedure task in page block 201 of TSM consists of a presentation of possible causes and the fault confirmation (for example by an operational test, power-up test or GROUND SCANNING).

It also provides the fault isolation procedure including LRU removal/installation, wiring check, etc...

In addition, a list of the useful aircraft documentation references is provided in the TSM.



STUDENT NOTES:

FQW4200 GE Metric

A/C DISPATCH ACCORDING TO MEL

ECAM message
ECAM/WARNINGS MMEL entry
MMEL ATA system
Operational procedures
ADPM index
ADPM procedures

In this module we will use the Master Minimum Equipment List (MMEL) as if it was an MEL. This module does not cover the complete use of the MMEL. It is limited to its use with an ECAM message as an entry point. Note: the Airbus MMEL is the regular basis allowing operators to create their own MEL. In reality, the MMEL cannot in any case be used as an MEL, due to the fact that it is not related to operational requirements, specific operations or airlines particular definition.

ECAM MESSAGE

The ECAM message is the entry point for the MMEL.

ECAM/WARNINGS MMEL ENTRY

The ECAM/WARNINGS MMEL ENTRY gives the correspondance between the ECAM messages and the MMEL item number.

The ECAM WARNINGS / MMEL ENTRY can also directly indicate a no dispatch condition.

MMEL ATA SYSTEM

The ATA referenced item number gives information about dispatch conditions:

- * requires the inoperative component or function to be placarded in the cockpit for information.
- (o) implies a crew operational procedure described in the MMEL.
- (m) implies a maintenance procedure described in the A/C Deactivation Procedures Manual (ADPM).

A NO DISPATCH condition can also appear here .

OPERATIONAL PROCEDURES

Note: the order of * and (or) (o) and (or) (m) , if present is always the same. But the tasks must be performed according to the logical order of the operations. In the example, we begin by the operational part.

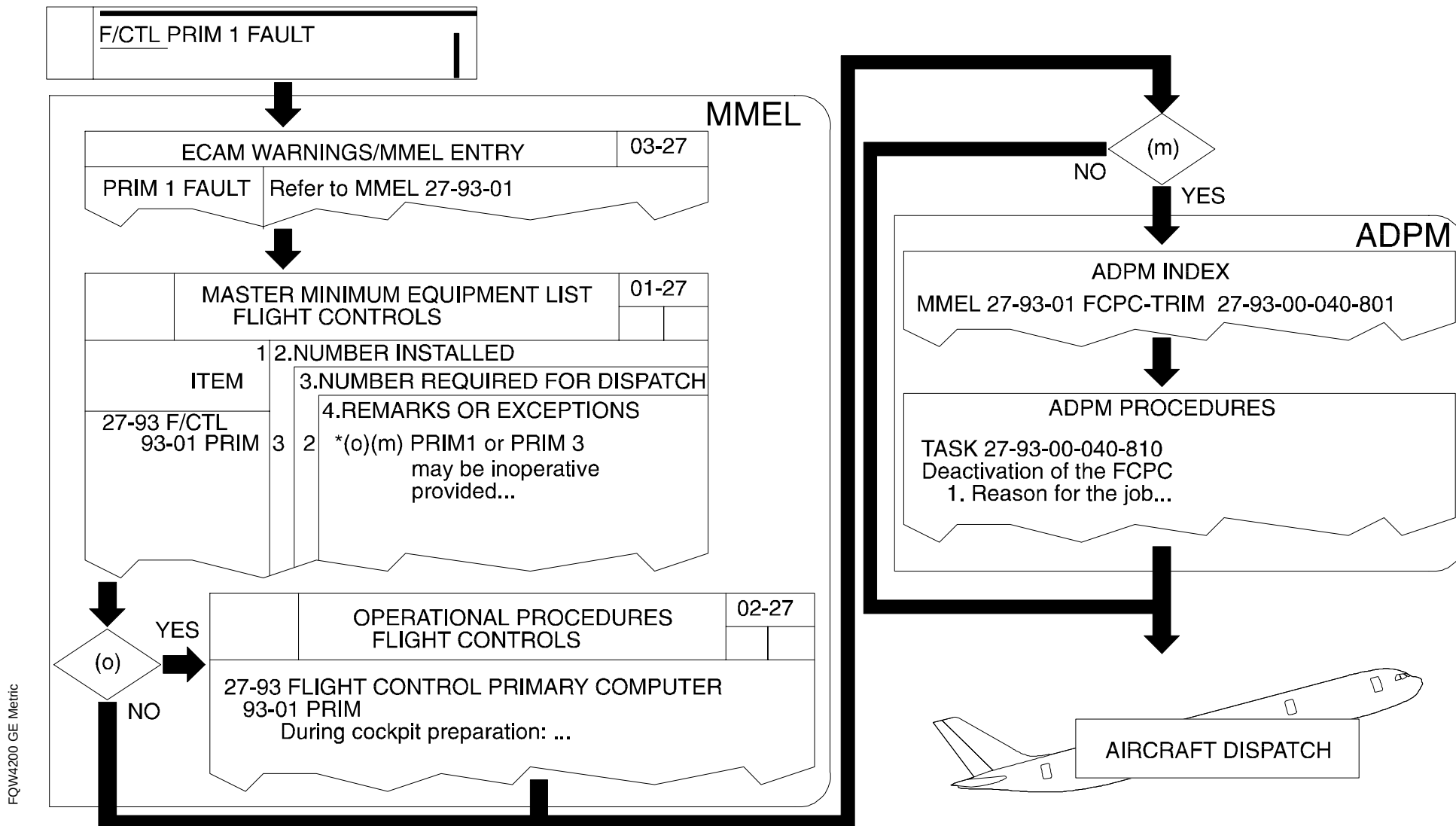
ADPM INDEX

The ADPM contains the deactivation procedures which can be required by the MMEL. The ADPM index gives the correspondance between the MMEL item number and the ADPM task number.

Note: the ADPM procedures may refer to some AMM tasks (such as BITE TEST) which may not be included in the ADPM.

ADPM PROCEDURES

The ADPM procedures are extracted from the AMM procedures.



FQW4200 GE Metric

STUDENT NOTES:

FQW4200 GE Metric

COMPONENTS

CMC
Printer
MDDU

SAFETY PRECAUTIONS

The avionic computers are Electrostatic Sensitive Devices (ESDs).

These components are susceptible to be damaged by electrical sources that would not damage conventional components.

The low energy source, that most commonly destroys ESDs, is the human body which generates static electricity in conjunction with the ground.

The precautions to follow are :

- de-energize all power and signal sources,
- place the unit on a grounded conductive work surface,
- ground any tools that will contact the unit...

When it is specified on the maintenance manual.

STUDENT NOTES

CMC

	CMC1	CMC2
FIN :	1TM1	1TM2
ZONE :	121 861VU	122 862VU

COMPONENT DESCRIPTION

Each CMC comprises :

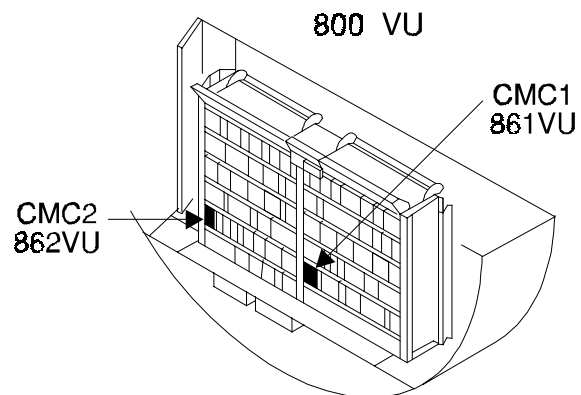
- 1 Central Processing Unit (CPU) board,
- 2 ARINC boards,
- 1 On Board Replaceable Module (OBRM),
- 1 Input/Output board,
- 1 power supply unit.

SPECIAL DESIGN

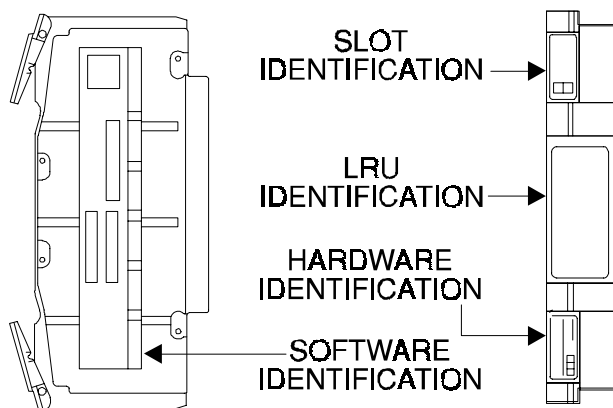
The CMC has one OBRM which incorporates the entire operational software.

It enables the software to be modified without opening the computer.

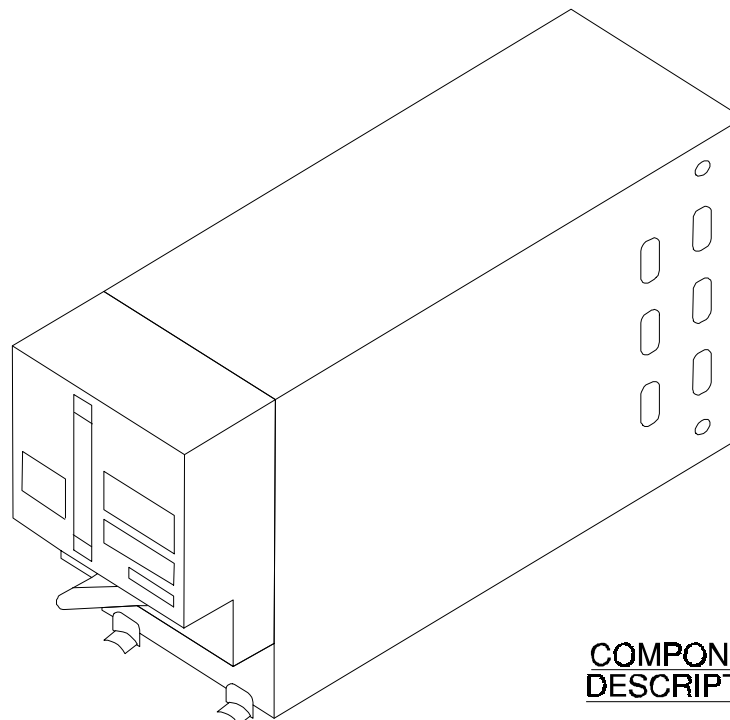
COMPONENT LOCATION



SPECIAL DESIGN

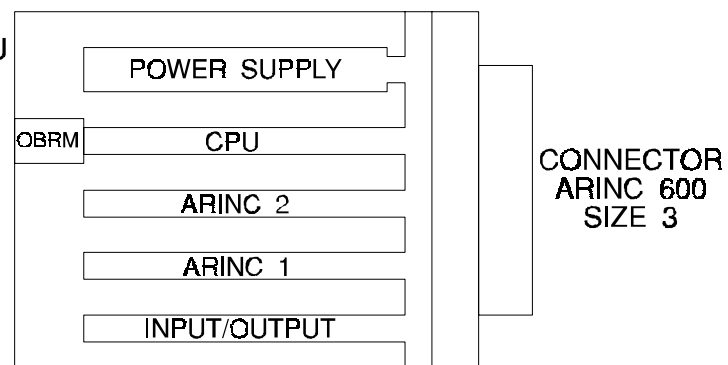


FQW4200 GE Metric



COMPONENT DESCRIPTION

SIZE:
5 MCU



PRINTER

FIN : 2TP

ZONE : 210
100VU

COMPONENT DESCRIPTION

The printer comprises the following functional sub-assemblies :

- a front panel with pushbuttons and indicators,
- an electronic part consisting of a Central Processing Unit, printer controller and power supply boards,
- a mechanical block.

MDDU

FIN : 1TD

ZONE : 212

COMPONENT DESCRIPTION

The MDDU contains :

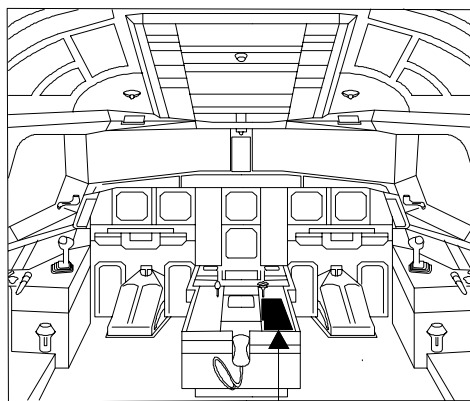
- an electronic unit composed of a power supply, Input/output and CPU / Floppy Disk Drive Control boards,
- a Disk Drive installed on shock mounts,
- a window with 16-character alphanumerical LCD display,
- a door protecting access to the Disk Drive.

SPECIAL DESIGN

The data support is a 3.5 inch double face, high density disk (1.44 megabytes).

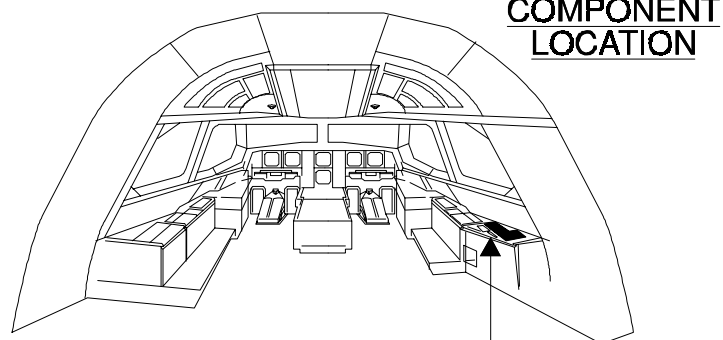
This disk is in MS-DOS format.

It can be read or written on ground by IBM-PC Ground Support Equipment (GSE).



PRINTER

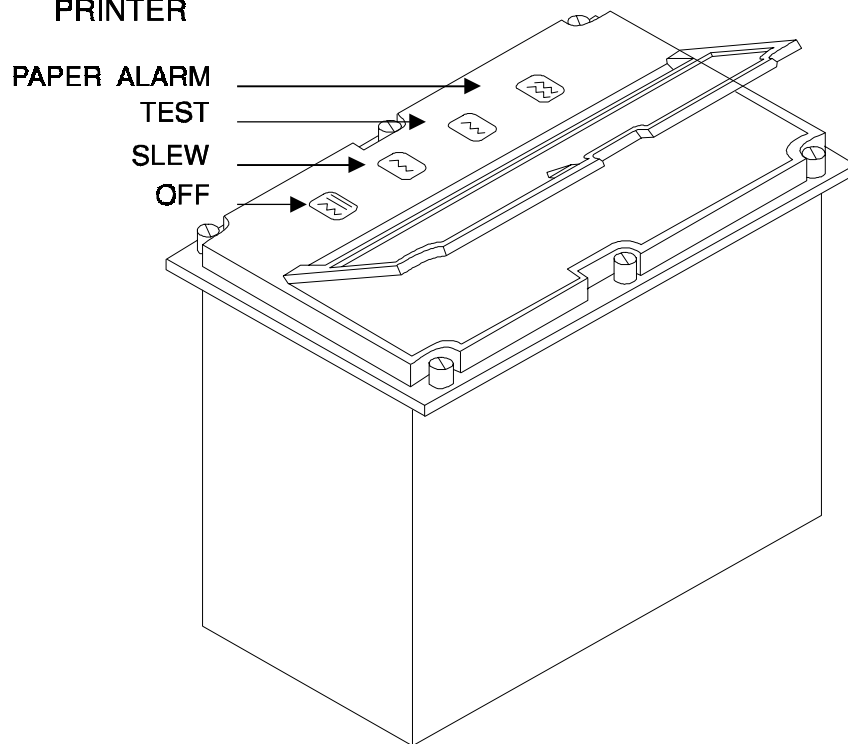
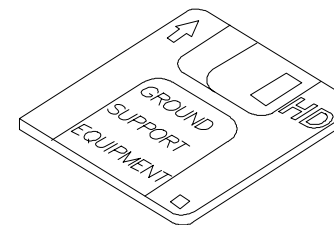
COMPONENT
LOCATION



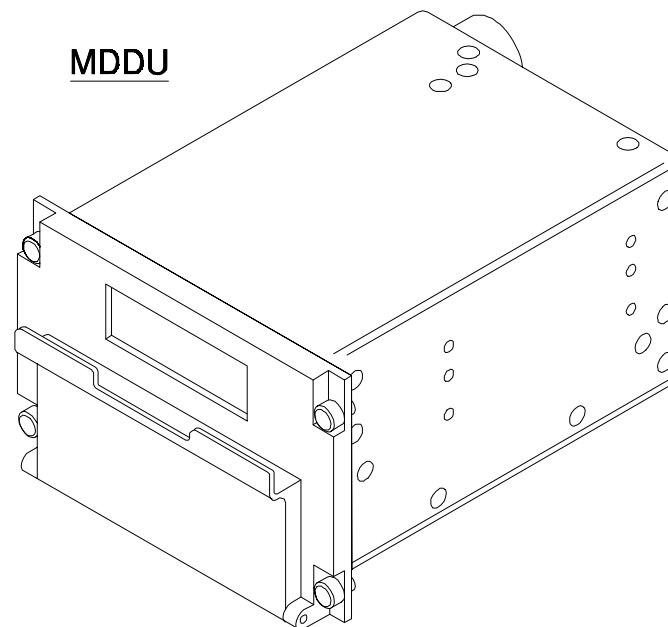
COMPONENT
LOCATION

MDDU

SPECIAL
DESIGN



MDDU



STUDENT NOTES

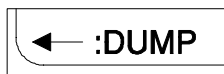
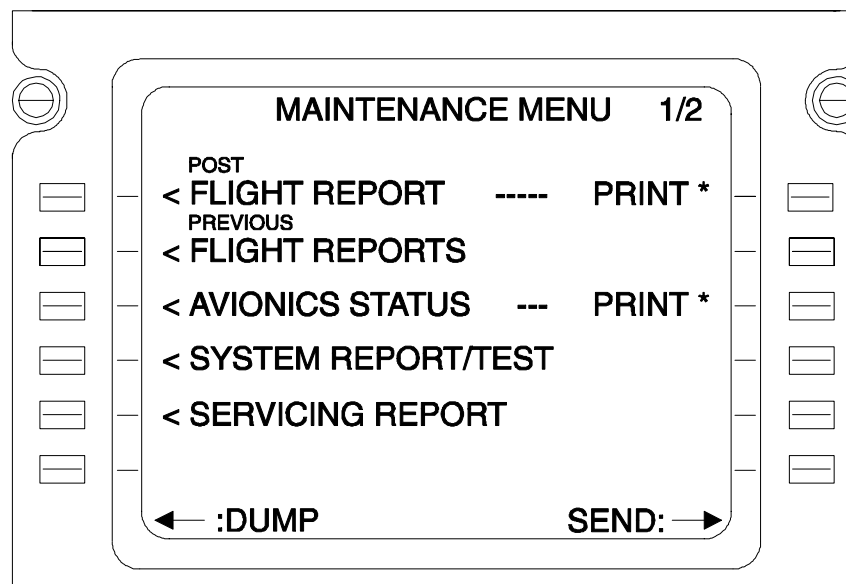
SERVICING REPORTS

General
Report
Programming
Threshold and Text Insertions

GENERAL

This function provides reports with different parameters which have to be periodically checked and which may induce servicing actions. The servicing report is accessible through the MCDU.

It can also be printed, dumped (if data loader installed) or transmitted to ACARS (if installed).



This line is displayed only
if the data loader is installed.



This line is displayed only
if the ACARS is installed.

REPORT

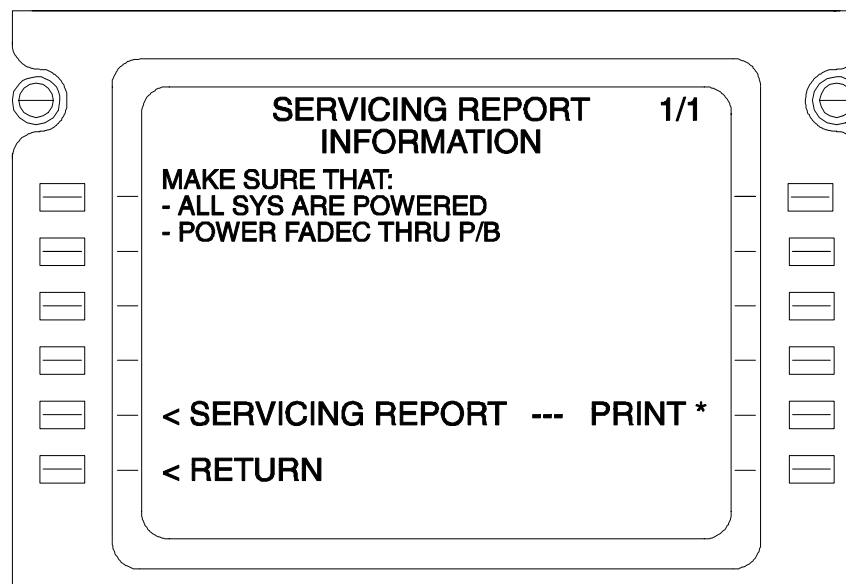
The report is available either in flight or on ground.

The servicing report is composed of the different items listed below:

- engines,
- IDG,
- APU,
- hydraulic,
- fuel,
- landing gear,
- oxygen,
- door and slide bottles,
- water/waste,
- air conditioning.

The servicing report can be presented in 3 ways:

- complete format,
- coupons mode prints,
- MCDU presentation.



The diagram shows a rectangular screen with a central display area and two vertical columns of six rectangular buttons each on the left and right sides. The central display area contains the following text:

SERVICING REPORT 1/1
INFORMATION

MAKE SURE THAT:
- ALL SYS ARE POWERED
- POWER FADEC THRU P/B

< SERVICING REPORT --- PRINT *
< RETURN

REPORT (CONT'D)

COMPLETE FORMAT

In this case the report is composed of all servicing items and presented on two pages.

This report is presented as an example.

A/C IDENT DATE FLT NBR FROM /TO START /END GATE OUT /GATE IN TAKE OFF /LAND ON		F-WWAI AUG02 491 LFBO/LFBO 0920/1104 0911/1113 0932/1103		MAINTENANCE SERVICING REPORT		CMC1 PRINTING PAGE 01/02 DATE AUG02 UTC 1343	
ENGINES ATA 121379 ATA 121379 ATA 792110 ATA 731110 ATA 783000 ATA 792150		OIL LEVEL OIL CONSUMPTION OIL FILTER STATUS FUEL FILTER STATUS REVERSES INHIBITION OIL CHIPS DETECTORS		ENGINE 1 18.2 QT 0.43 QT/HR OK CLOGGED OK CHIPS DET		ENGINE 2 18.0 QT 0.46 QT/HR OK OK INHIBITED OK	
IDG ATA 121324 ATA 121324 ATA 242100		OIL LEVEL STATUS OIL FILTER STATUS DISCONNECTION STATUS		IDG 1 LOW LEVEL OK OK		IDG 2 LOW LEVEL OK OK	
APU ATA 490000 ATA 121349 ATA 499111		OPERATING HOURS APU OIL LEVEL STATUS CHIPS DETECTION		160 HOURS LOW LEVEL CHECK		NUMBER OF START CYCLES 224	
HYDRAULIC POWER ATA 121229 ATA 291400		LEVEL INDICATION RESERVOIR PRESS STS		GREEN SYSTEM REMOVE OK		BLUE SYSTEM OK LOW PRESSURE	
						YELLOW SYSTEM ADD OK	
CONTINUED							

SERVICING REPORT		CMC1 PRINTING		DATE AUG02	UTC 1344	PAGE 02/02
FUEL ATA 121000		TOTAL FUEL ON BOARD 4860 KG 1940 KG LH INNER TANKS RH 2000 KG 400 KG OUTER TANKS 500 KG CENTER TANK 0 KG TRIM TANK 20 KG				
LANDING GEAR ATA 121432		TYRE PRESSURE (PSI) BRAKE TEMP (DEGREE C) /TYRE PRESSURE (PSI)				
		NOSE GEAR 210 - 210 1: 70/210 - 2: 85/210 3: 110/210 - 4: 90/210 5: 120/210 - 6: 120/210 7: 95/210 - 8: 105/210				
OXYGEN ATA 121435		CREW OXYGEN BOTTLE PRESSURE SUPPLEMENTARY CREW OXYGEN BOTTLE PRESSURE PAX OXYGEN BOTTLE PRESSURE				
		1069 PSI 1064 PSI 1279 PSI				
DOORS ATA 521000 AND SLIDES ATA 256241		BTL PRESS STS FWD MIDDLE EMERGENCY AFT		DOOR 1L OK 2L OK 3L LOW PRESSURE 4L LOW PRESSURE		
				SLIDE OK LOW PRESSURE OK LOW PRESSURE		
				DOOR 1R LOW PRESSURE 2R OK 3R LOW PRESSURE 4R LOW PRESSURE		
				SLIDE OK LOW PRESSURE OK LOW PRESSURE		
WATER/WASTE ATA 121529 WATER ATA 122438 WASTE		POTABLE WATER FORWARD TANK WATER LEVEL 48 % AFT TANK WATER LEVEL 18 %			WASTE WATER TANK NOT EMPTY LEFT TANK LEVEL 10 % RIGHT TANK LEVEL 12 %	
AIR CONDITIONING ATA 215225/215226 EXCHANGER		HEAT EXCHANGER 1 CONTAMINATED HEAT EXCHANGER 2				
END OF REPORT						

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REPORT (CONT'D)

COUPONS MODE

The purpose of this is to present to the user only items needing an action. First, a SUMMARY COUPON is printed, followed by the items where a parameter is under the minimum or above the maximum value of a threshold. If a servicing item status is CHECK in the summary coupon, the summary coupon will be followed by the servicing item coupon, otherwise the status is OK.

A/C IDENT DATE FLT NBR FROM /TO START /END GATE OUT /GATE IN TAKE OFF /LAND ON	F-ESSAI AUG22 UVWXYZ5678 LFMN/LFPO 0920/1104 0911/1113 0932/1103	MAINTENANCE DB/N --		CMC1 PRINTING PAGE 01/01 DATE AUG22 UTC 1206
ENGINES-OIL LVL FLTR CHIPS FUEL FLTR REV IDG-OIL LVL STS FLTR DISC APU-OIL LVL STS CHIPS HYDRAULIC SYSTEMS-LVL RSVR AIR PRESS FUEL TANKS-QTY	OK OK OK CHECK OK	LANDING GEAR-TEMP PRESS OXYGEN BOTTLES-BTL PRESSURE DOORS AND SLIDES BTL-PRESS STS WATER/WASTE TANK-LVL AIR CONDITIONING-EXCHANGER FLTR	OK OK OK OK OK	
END OF SERVICING REPORT SUMMARY COUPON				
A/C IDENT DATE FLT NBR FROM /TO START /END	F-ESSAI AUG22 UVWXYZ5678 LFMN/LFPO 1135/1137	MAINTENANCE SERVICING HYDRAULIC SYSTEMS COUPON DB/N ---		CMC1 PRINTING PAGE 01/01 DATE AUG22 UTC 1207
HYDRAULIC POWER ATA 121229 ATA 291400	LEVEL INDICATION RESERVOIR PRESS STS	GREEN SYSTEM REMOVE OK	BLUE SYSTEM OK LOW PRESSURE	YELLOW SYSTEM ADD OK
END OF COUPON				

REPORT (CONT'D)

MCDU PRESENTATION

The servicing report which is displayed on MCDU is complete and therefore includes all parameters. It consists of 11 MCDU pages. These MCDU screens are presented as an example.

SERVICING REPORT 1/11

AIRCRAFT IDENT	: F-GGEA
FLIGHT NUMBER	: AIB
DATE	: JAN 11
GATE OUT/IN:	: 1030/1840
TO/LDG ON	: 1036/1836

ATA : 121379 ENG OIL

OIL	LEVEL	CONSUMPTION
ENG 1:	18.2 QT	0.43 QT/HR
ENG 2:	18.0 QT	0.46 QT/HR

< RETURN
PAGE PRINT *



SERVICING REPORT 2/11

ATA : 792110 OIL SYST

OIL	FILTER	CHIPS DET
ENG 1:	OK	OK
ENG 2:	OK	OK

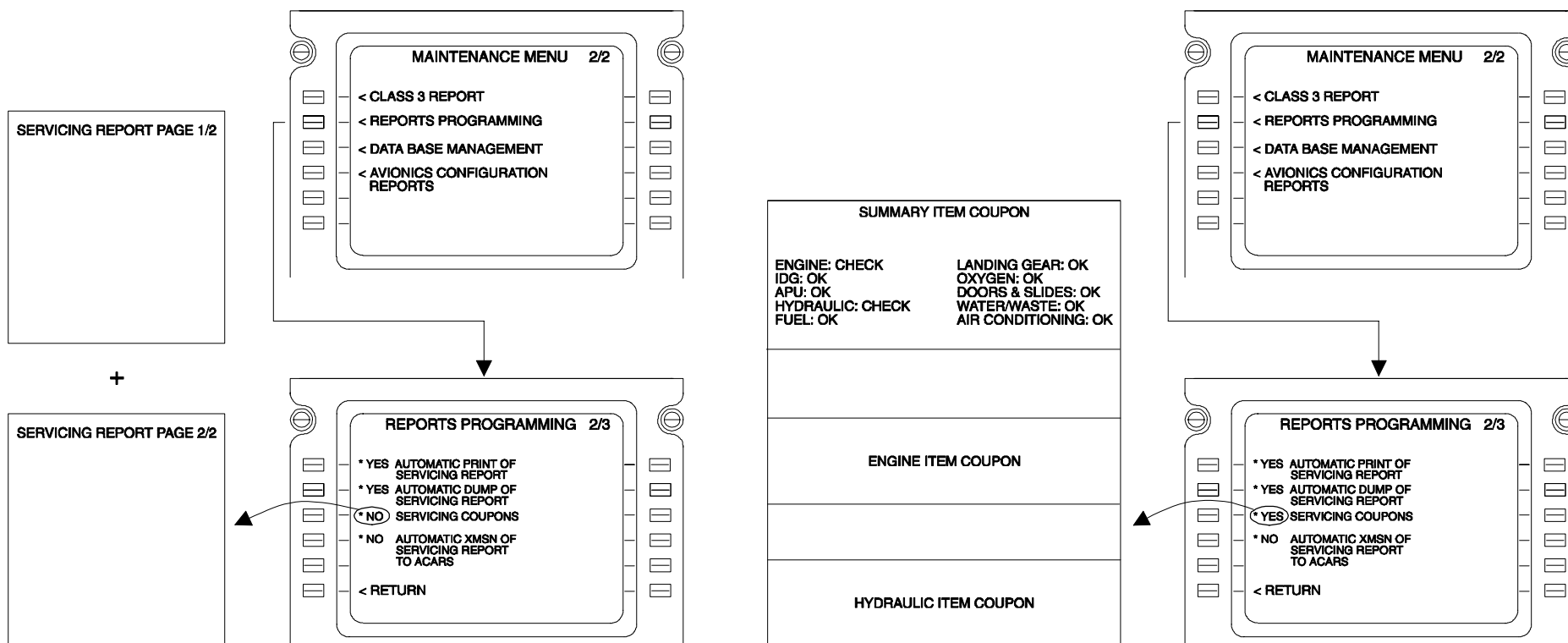
ATA : 731110 FUEL FILTER

ENG 1:	OK
ENG 2:	OK

< RETURN
PAGE PRINT *

PROGRAMMING

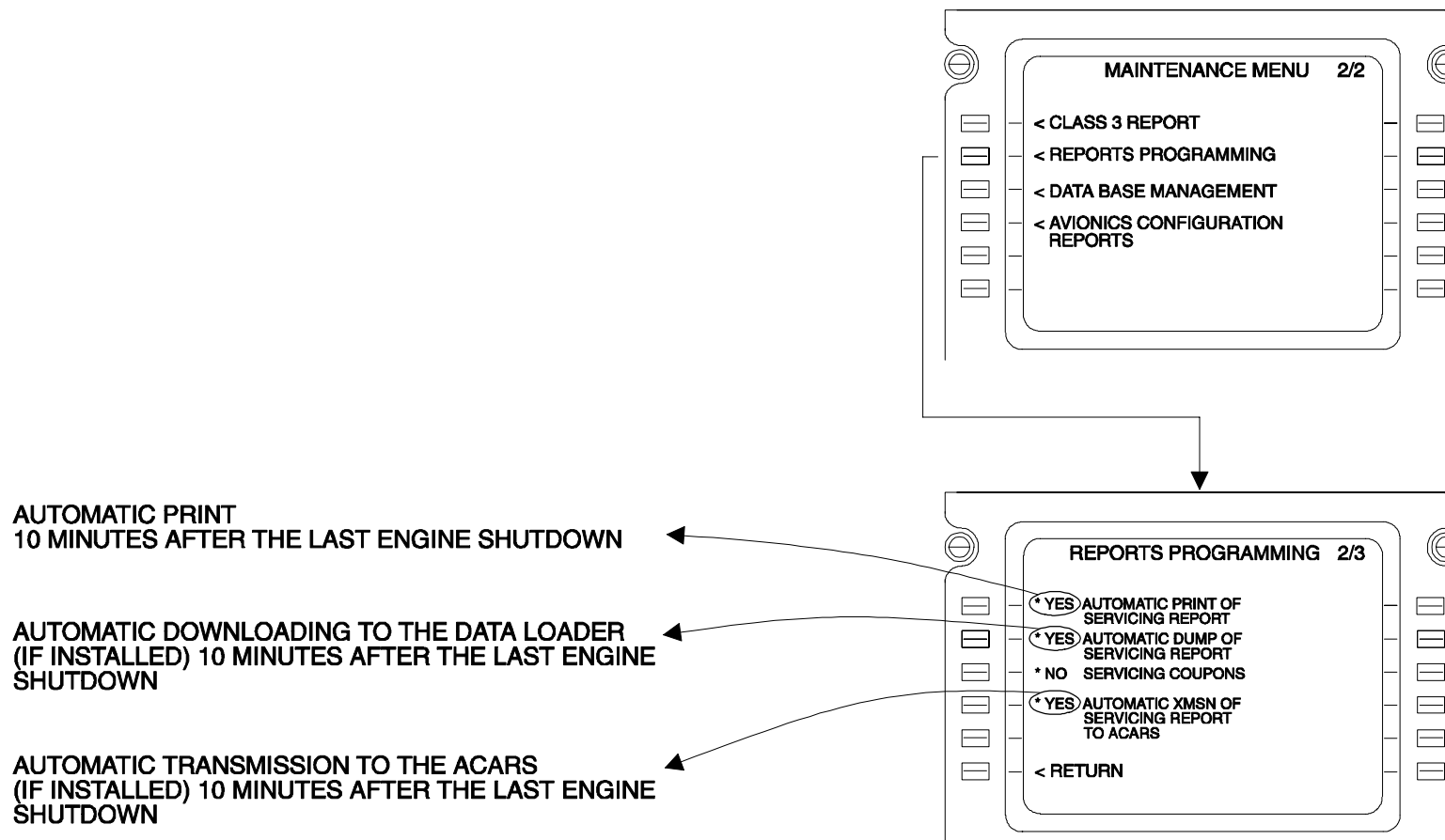
It is possible to program, through the MCDU, certain functions related to the servicing report. You can program a complete report or a coupon mode report.



PROGRAMMING (CONT'D)

You can also program the automatic transmission to the printer, the ACARS (if installed) or the data loader (if installed).

Non programmed prints, dumps or transmissions to the ground have to be made manually.

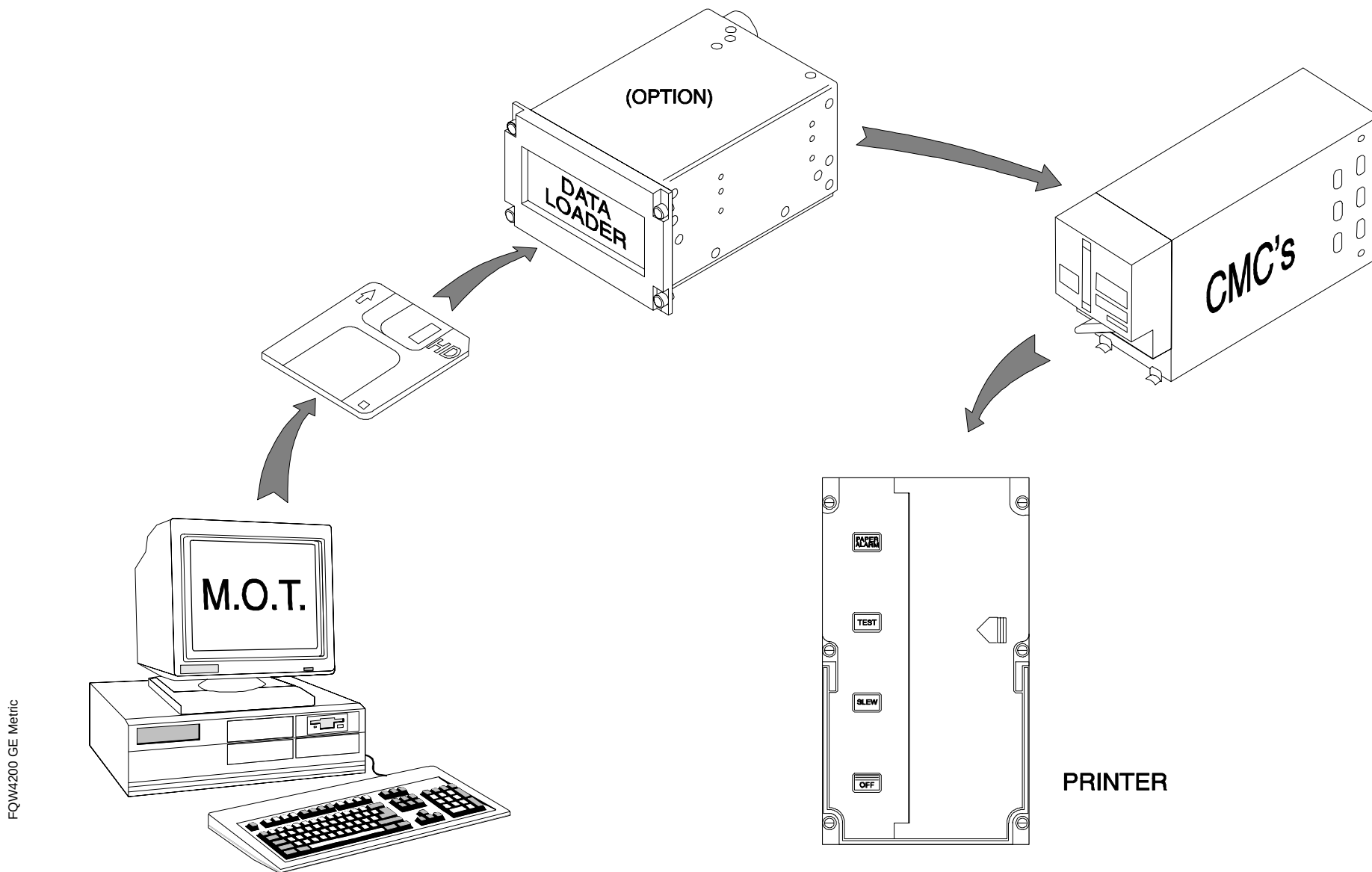


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THRESHOLD AND TEXT INSERTIONS

It is necessary for the airline engineering to first define the various thresholds which will be used for the servicing report. The purpose of these thresholds is to automatically trigger a coupon if they are exceeded. The airline can also add comments and information texts between the coupons.

Report threshold and text insertions are made on a personal computer using a software called Maintenance Option Tool (MOT). Then, when this programming is made, it is loaded in the CMCs using the data loader (if installed). The servicing report thresholds and information texts data base is printed automatically after uploading.



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THRESHOLD AND TEXT INSERTIONS (CONT'D)

A manual printing of the servicing report thresholds and information texts data base could be done through an MCDU menu.
This report is presented as an example.

MAINTENANCE MENU 2/2

- < CLASS 3 REPORT
- < REPORTS PROGRAMMING
- < DATA BASE MANAGEMENT
- < AVIONICS CONFIGURATION REPORTS

DATA BASE MANAGEMENT

FLIGHT REPORT

- PRINT FILTER CONTENT*
- TRANSMIT FILTER TO CMC2*
- TRANSMIT CONFIG TO CMC2*
- SERVICING REPORT COUPONS PRINT THRESHOLDS*
- AVIONICS CONFIG REPORTS PRINT DATA BASE*
- AVIONICS CONFIG NO 003
- < RETURN

A/C IDENT	F-ESSAI	MAINTENANCE SERVICING REPORT COUPONS THRESHOLDS DATA BASE DB/N CPA NOTE: MAXIMUM THRESHOLD IS PRINTED ABOVE MINIMUM THRESHOLD IS PRINTED BELOW		CMC1 PRINTING PAGE 01/02 DATE AUG22 UTC 1159																														
ENGINES	<table border="1"> <tr> <td>OIL LEVEL</td> <td>ENGINE 1 99.9 QT 20.9 QT 0.56 QT/HR 0 QT/HR</td> <td>ENGINE 2 99.9 QT 20.9 QT 0.56 QT/HR 0 QT/HR</td> </tr> <tr> <td>OIL CONSUMPTION</td> <td></td> <td></td> </tr> </table>				OIL LEVEL	ENGINE 1 99.9 QT 20.9 QT 0.56 QT/HR 0 QT/HR	ENGINE 2 99.9 QT 20.9 QT 0.56 QT/HR 0 QT/HR	OIL CONSUMPTION																										
OIL LEVEL	ENGINE 1 99.9 QT 20.9 QT 0.56 QT/HR 0 QT/HR	ENGINE 2 99.9 QT 20.9 QT 0.56 QT/HR 0 QT/HR																																
OIL CONSUMPTION																																		
IDG																																		
APU	<table border="1"> <tr> <td>OPERATING HOURS</td> <td>99999 HOURS 0 HOURS</td> <td>NUMBER OF START CYCLES</td> <td>99999 0</td> </tr> </table>				OPERATING HOURS	99999 HOURS 0 HOURS	NUMBER OF START CYCLES	99999 0																										
OPERATING HOURS	99999 HOURS 0 HOURS	NUMBER OF START CYCLES	99999 0																															
HYDRAULIC POWER																																		
FUEL	<table border="1"> <tr> <td>TOTAL FUEL ON BOARD</td> <td>999999 KG 0 KG</td> <td>LH</td> <td>5000 KG 0 KG</td> <td>RH</td> <td>999999 KG 0 KG</td> </tr> <tr> <td></td> <td></td> <td>INNER TANKS</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>OUTER TANKS</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>CENTER TANK</td> <td>999999 KG 0 KG</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>TRIM TANK</td> <td>999999 KG 0 KG</td> <td></td> <td></td> </tr> </table>				TOTAL FUEL ON BOARD	999999 KG 0 KG	LH	5000 KG 0 KG	RH	999999 KG 0 KG			INNER TANKS						OUTER TANKS						CENTER TANK	999999 KG 0 KG					TRIM TANK	999999 KG 0 KG		
TOTAL FUEL ON BOARD	999999 KG 0 KG	LH	5000 KG 0 KG	RH	999999 KG 0 KG																													
		INNER TANKS																																
		OUTER TANKS																																
		CENTER TANK	999999 KG 0 KG																															
		TRIM TANK	999999 KG 0 KG																															

A/C IDENT	F-ESSAI	MAINTENANCE SERVICING REPORT COUPONS THRESHOLDS DATA BASE DB/N CPA NOTE: MAXIMUM THRESHOLD IS PRINTED ABOVE MINIMUM THRESHOLD IS PRINTED BELOW		CMC1 PRINTING PAGE 02/02 DATE AUG22 UTC 1200															
LANDING GEAR	<table border="1"> <tr> <td>TYRE PRESSURE (PSI)</td> <td>NOSE GEAR</td> <td>999 - 999 140 - 140</td> </tr> <tr> <td>BRAKE TEMP (DEGREE C)</td> <td>1: 100/999 - 2: 100/999</td> <td>3: 100/999 - 4: 100/999</td> </tr> <tr> <td></td> <td>0 /160 0 /160</td> <td>0 /160 0 /160</td> </tr> <tr> <td>/TYRE PRESSURE (PSI)</td> <td>5: 100/999 - 6: 100/999</td> <td>7: 100/999 - 8: 100/999</td> </tr> <tr> <td></td> <td>0 /160 0 /160</td> <td>0 /160 0 /160</td> </tr> </table>				TYRE PRESSURE (PSI)	NOSE GEAR	999 - 999 140 - 140	BRAKE TEMP (DEGREE C)	1: 100/999 - 2: 100/999	3: 100/999 - 4: 100/999		0 /160 0 /160	0 /160 0 /160	/TYRE PRESSURE (PSI)	5: 100/999 - 6: 100/999	7: 100/999 - 8: 100/999		0 /160 0 /160	0 /160 0 /160
TYRE PRESSURE (PSI)	NOSE GEAR	999 - 999 140 - 140																	
BRAKE TEMP (DEGREE C)	1: 100/999 - 2: 100/999	3: 100/999 - 4: 100/999																	
	0 /160 0 /160	0 /160 0 /160																	
/TYRE PRESSURE (PSI)	5: 100/999 - 6: 100/999	7: 100/999 - 8: 100/999																	
	0 /160 0 /160	0 /160 0 /160																	
ATA 121432																			
OXYGEN																			
<table border="1"> <tr> <td>CREW OXYGEN BOTTLE PRESSURE</td> <td>9999 PSI 1500 PSI</td> </tr> <tr> <td>SUPPLEMENTARY CREW OXYGEN BOTTLE PRESSURE</td> <td>9999 PSI 1500 PSI</td> </tr> <tr> <td>PAX OXYGEN BOTTLE PRESSURE</td> <td>9999 PSI 1600 PSI</td> </tr> </table>					CREW OXYGEN BOTTLE PRESSURE	9999 PSI 1500 PSI	SUPPLEMENTARY CREW OXYGEN BOTTLE PRESSURE	9999 PSI 1500 PSI	PAX OXYGEN BOTTLE PRESSURE	9999 PSI 1600 PSI									
CREW OXYGEN BOTTLE PRESSURE	9999 PSI 1500 PSI																		
SUPPLEMENTARY CREW OXYGEN BOTTLE PRESSURE	9999 PSI 1500 PSI																		
PAX OXYGEN BOTTLE PRESSURE	9999 PSI 1600 PSI																		
DOORS																			
WATER/WASTE																			
<table border="1"> <tr> <td>POTABLE WATER</td> <td>FORWARD TANK WATER LEVEL</td> <td>100 % 60 %</td> <td>WASTE WATER</td> <td>LEFT TANK LEVEL</td> <td>30 % 0 %</td> </tr> <tr> <td></td> <td>AFT TANK WATER LEVEL</td> <td>100 % 60 %</td> <td></td> <td>RIGHT TANK LEVEL</td> <td>30 % 0 %</td> </tr> </table>					POTABLE WATER	FORWARD TANK WATER LEVEL	100 % 60 %	WASTE WATER	LEFT TANK LEVEL	30 % 0 %		AFT TANK WATER LEVEL	100 % 60 %		RIGHT TANK LEVEL	30 % 0 %			
POTABLE WATER	FORWARD TANK WATER LEVEL	100 % 60 %	WASTE WATER	LEFT TANK LEVEL	30 % 0 %														
	AFT TANK WATER LEVEL	100 % 60 %		RIGHT TANK LEVEL	30 % 0 %														
AIR CONDITIONING																			
END OF REPORT																			

STUDENT NOTES

FQW4200 GE Metric

AVIONICS CONFIGURATION REPORTS

General
Equipment configuration report
Diskettes configuration report
Configuration change
Programming

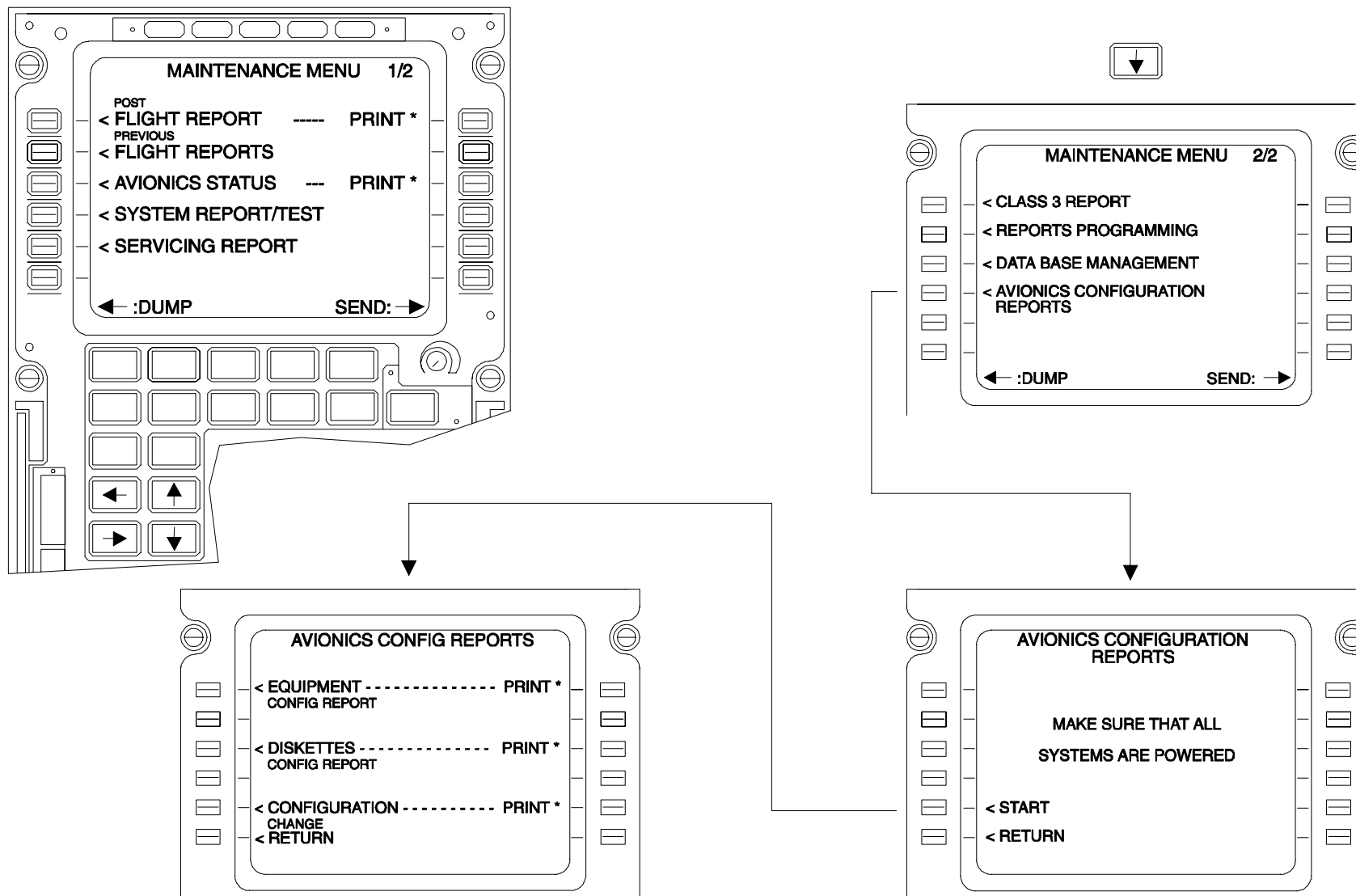
GENERAL

This function is made in order to manage the inventory of the aircraft computer part numbers and software diskettes.

From the CMS MCDU MENU, the function AVIONICS CONFIGURATION REPORTS enables access to:

- EQUIPMENT CONFIGURATION REPORT,
- DISKETTES CONFIGURATION REPORT,
- CONFIGURATION CHANGE.

This function is only available on CMC1 and on ground.



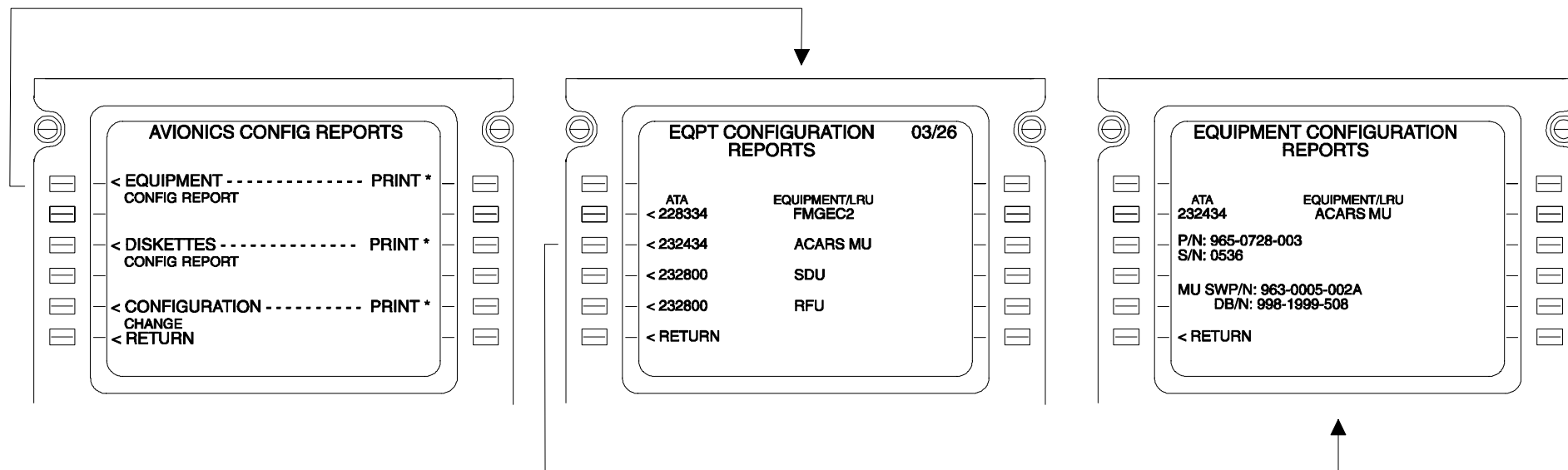
EQUIPMENT CONFIGURATION REPORT

This item displays the list of computer part numbers and, for some, the serial number and/or the data base number.

The part number and serial number are directly read from the computers memory or OBRMs thus no updating is necessary.

There are displayed on the MCDU or they can be printed.

The MCDU screens and the report are presented as an example.



MAINTENANCE EQUIPMENT CONFIGURATION REPORT						
AIRCRAFT IDENTIFICATION	F-WWAI	PRINTING	DATE	AUG02	UTC	1347
ATA 212634	NAME AEVC SYSTEM AEVC	P/N: 785-611-X5 S/N: 0007				
ATA 213134	NAME CPC1 SYSTEM CPC1	P/N: 7125-18086-4				
ATA 213134	NAME CPC2 SYSTEM CPC2	P/N: 7125-18086-4				
ATA 228334	NAME FMGEC1 SYSTEM AFS	P/N: B490AAX0N95 S/N: 00033	DB/N1:	0817		
ATA 228334	NAME FCU SYSTEM AFS	P/N: K274AAM0506 S/N: 00020				
ATA 228334	NAME MCDU1 SYSTEM AFS	P/N: K275AAP0202 S/N: 91030131				
ATA 228334	NAME MCDU2 SYSTEM AFS	P/N: K275AAP0202 S/N: 91030129				
ATA 228334	NAME MCDU3 SYSTEM AFS	P/N: K275AAP0202 S/N: 91030141				
ATA 228334	NAME FMGEC2 SYSTEM AFS	P/N: B490AAM0207 S/N: 00023	DB/N1:	0817		
ATA 232434	NAME ACARS MU SYSTEM ACARS	P/N: 965-0728-003 S/N: 0536	DB/N1:	963-0005-002.A	DB/N2:	998-1999-502
ATA 232800	NAME SDU SYSTEM SATCOM	P/N: 7516100-18036 S/N: 95050695	DB/N1:	S/WM N		
ATA 232800	NAME RFU SYSTEM SATCOM	P/N: 7516240-18036 S/N: 95050520	DB/N1:	S/WM E		
ATA 232800	NAME HPH SYSTEM SATCOM	P/N: 7516250-18036 S/N: 95050695	DB/N1:	S/WM C		
ATA 232800	NAME ORT SYSTEM SATCOM	P/N: GAF-A340-180 S/N: 6N-050595	DB/N1:	S/WM C		
ATA 235134	NAME ACP1 SYSTEM AIS	P/N: 2788AC01				
ATA 235134	NAME ACP2 SYSTEM AIS	P/N: 2788AC01				
ATA 235134	NAME ACP3 SYSTEM AIS	P/N: 2788AC01				
ATA 235134	NAME ACP4 SYSTEM AIS	P/N: 2788AC01				
CONTINUED						

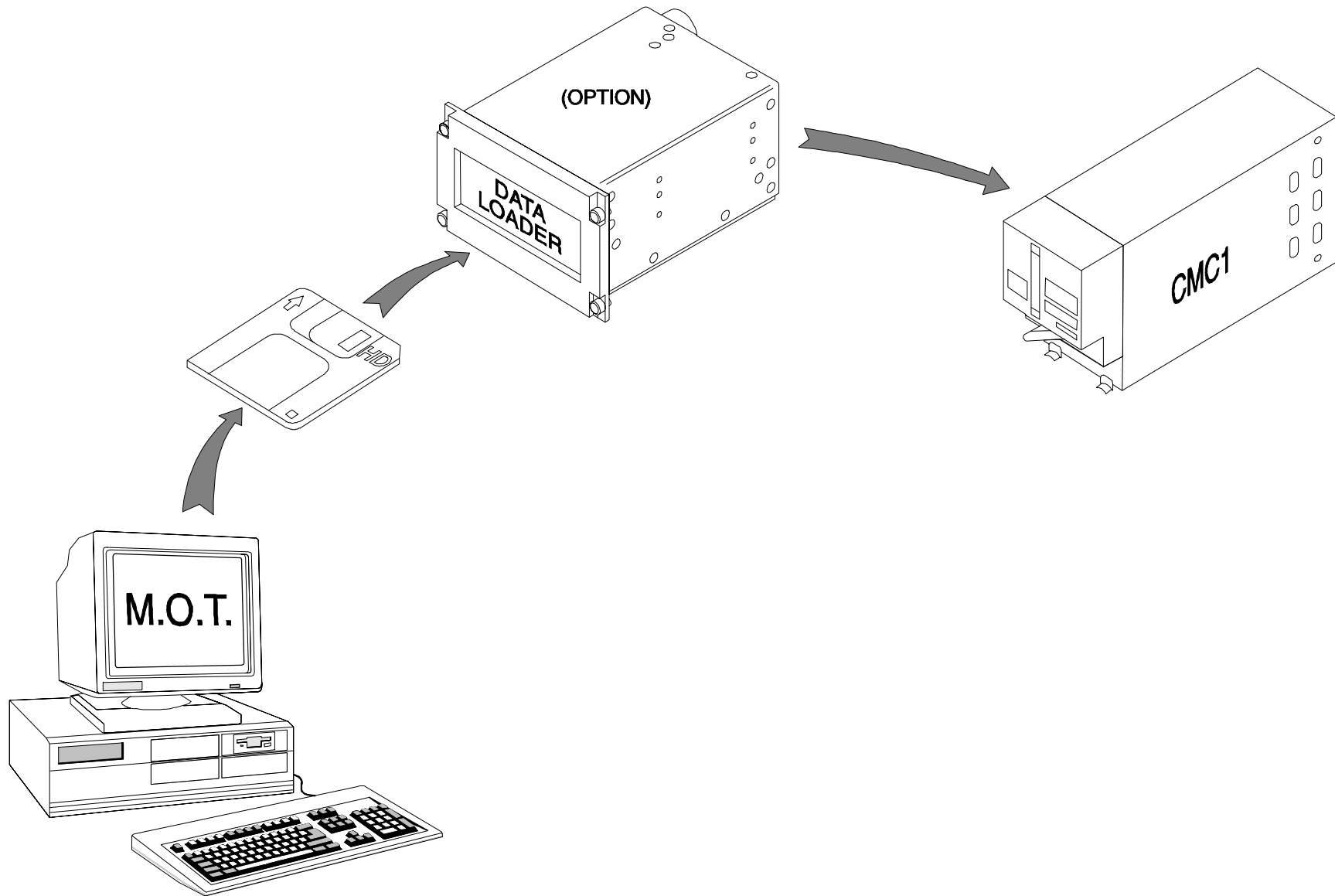
DISKETTES CONFIGURATION REPORT

On each aircraft, a set of floppy disks are available in the cockpit. They contain data bases necessary for the operation of some computers.

The purpose of this item is to record and check the version of these floppy disks.

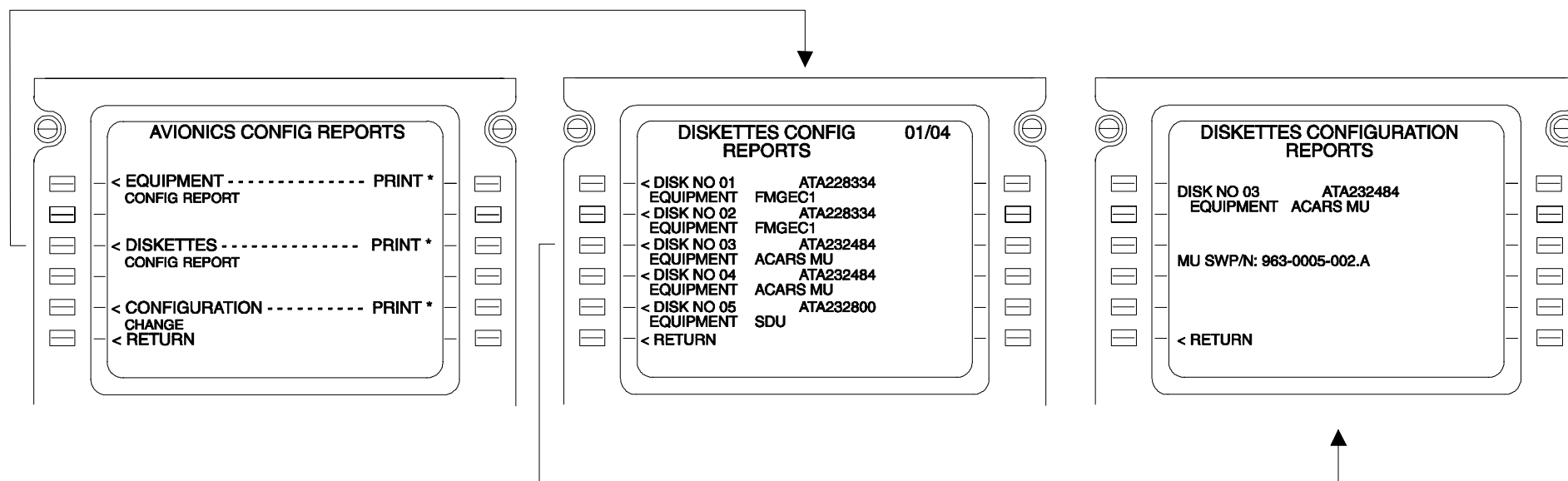
The diskette configuration report is first defined by the airline engineering using an MOT (Maintenance Option Tool), then loaded in CMC1.

The CMC will keep this report updated because it can read the data base numbers directly from the computers.



FQW4200 GE Metric

This report is displayed on the MCDU or can be printed.
The MCDU screens and the report are presented as an example.



MAINTENANCE DISKETTES CONFIGURATION REPORT						
AIRCRAFT	IDENTIFICATION	F-WWAI	PRINTING	DATE	AUG10	UTC 1535
DISK No	ATA	SYSTEM	EQUIPMENT	DATA BASE REFERENCE		
01	228334	AFS	FMGEC1	0817		
02	228334	AFS	FMGEC2	0817		
03	232434	ACARS	ACARS MU	963-0005-002A		
04	232434	ACARS	ACARS MU	998-1999-502		
05	232800	SATCOM	SDU	S/WM N		
06	232800	SATCOM	RFU	S/WM E		
07	232800	SATCOM	HPH	S/WM C		
CONTINUED						

CONFIGURATION CHANGE

This function is designed to validate the part number or data base number changes through the CMS.

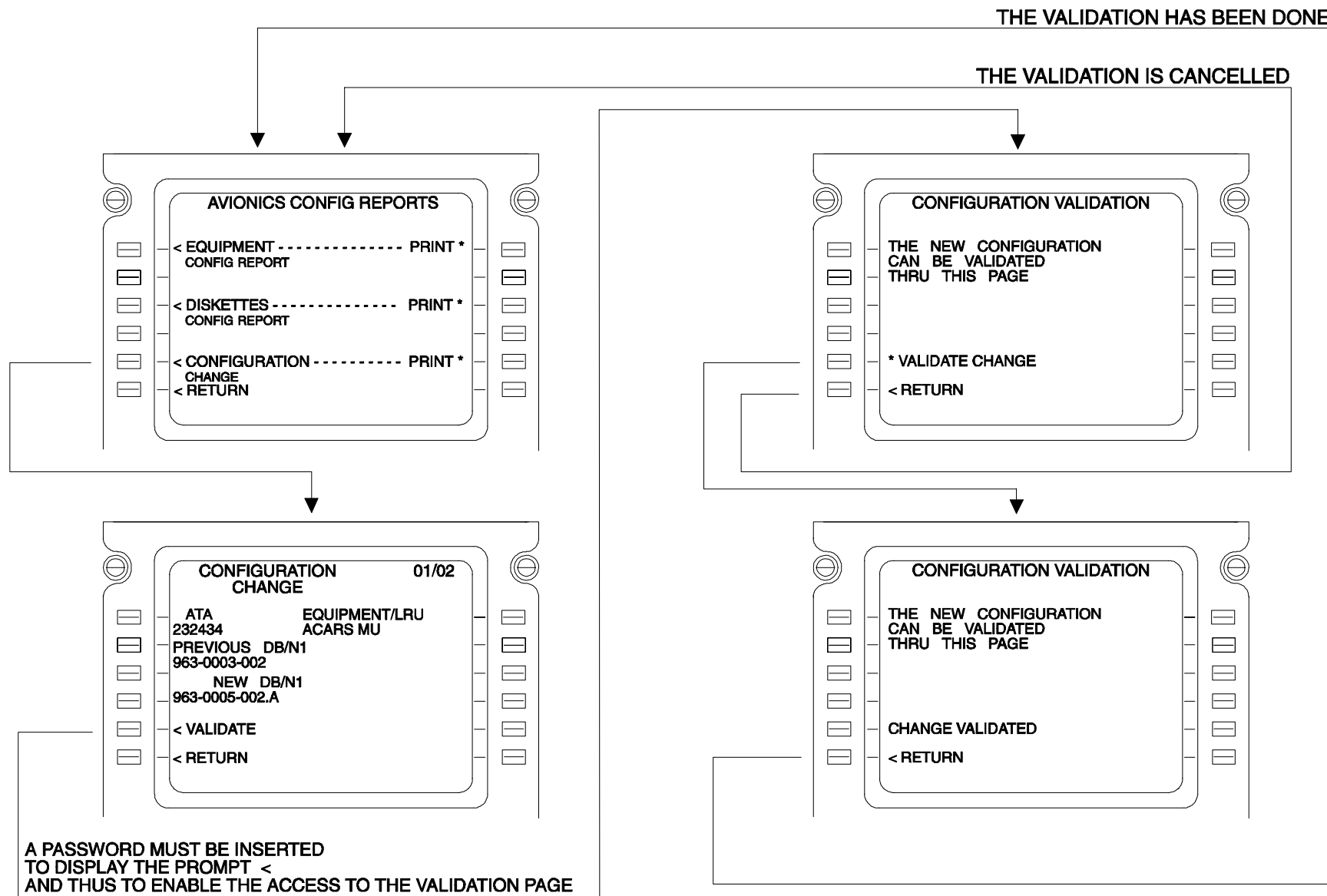
The philosophy is that if a person changes a computer (new part number), then the change is checked and validated on the MCDU by another person (controller).

This function is presented on the MCDU only if new part numbers are detected by the CMS.

The items of equipment that are listed are those for which the change has not yet been validated. A password will be entered to validate the new part number.

After the validation the equipment disappears from the list. It is still available in the Equipment Configuration Report.

The MCDU screens are presented as an example.



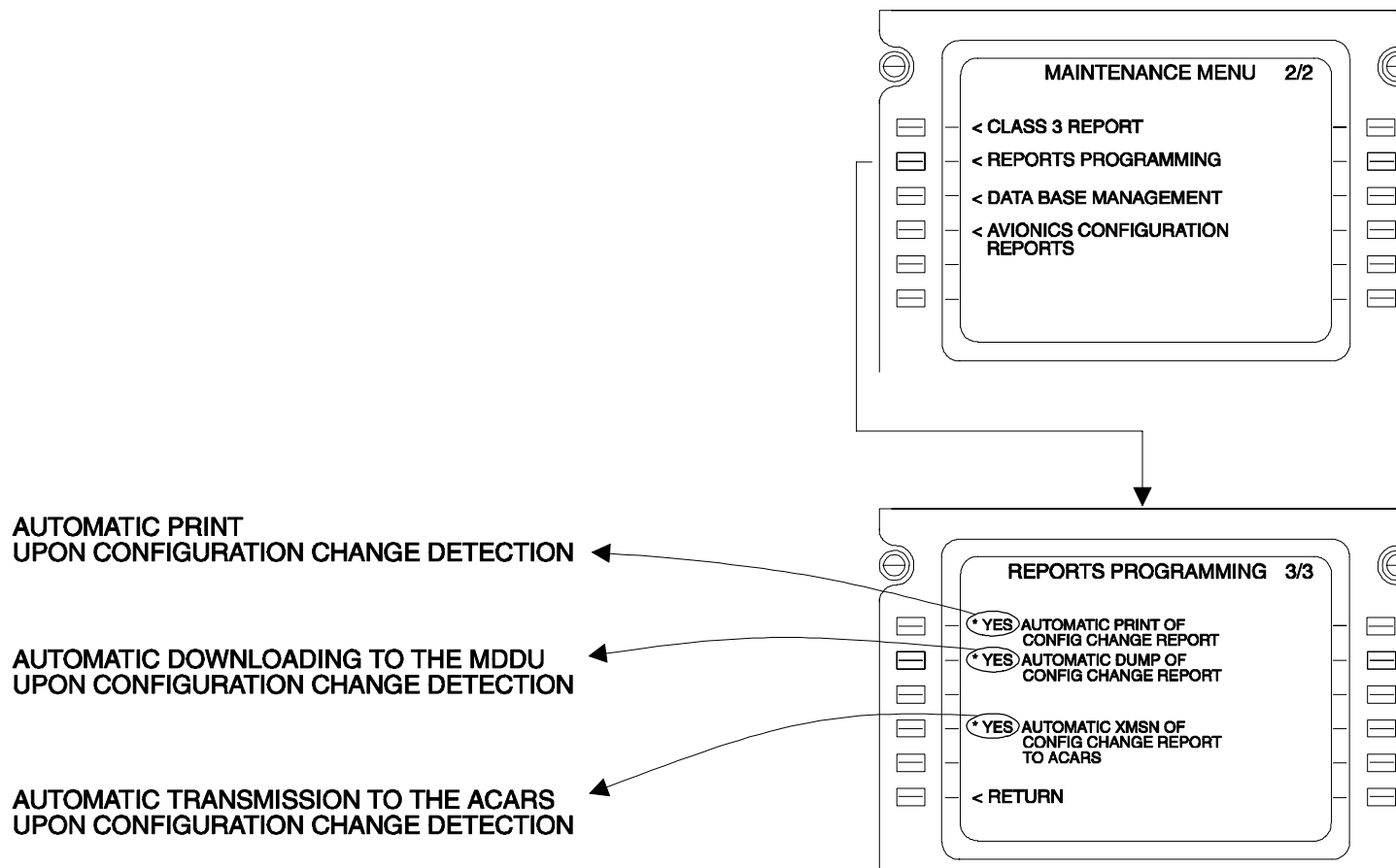
The configuration change report can be printed through the MCDU.
The report is presented as an example.

MAINTENANCE CONFIGURATION CHANGE REPORT					
AIRCRAFT	IDENTIFICATION	F-WWAI	PRINTING	DATE	AUG10 UTC 1535
ATA	EQUIPMENT	PREVIOUS CONFIGURATION		NEW CONFIGURATION	
232434	ACARS MU	DB/N1	963-0003-002	DB/N1	963-0005-002.A
316234	DMC1	P/N	961545661060	P/N	961545661070
END OF REPORT					

PROGRAMMING

It is possible to program the automatic transmission of the configuration change report, to the printer, the ACARS (if installed), or the data loader (if installed).

Non programmed prints, dumps or transmissions to the ground have to be made manually.



STUDENT NOTES

FQW4200 GE Metric

PRINTER PRESENTATION

General
Paper
Controls

GENERAL

The printer allows print-out of the Central Maintenance System reports and additional reports.

The additional reports come from :

- the Aircraft Condition Monitoring System (ACMS) if DMU installed,
- the Aircraft Communication Addressing and Reporting System (ACARS) if installed,
- the Flight Management, Guidance and Envelope System (FMGES) and
- the Engine Interface Vibration Monitoring Unit (EIVMU).

PAPER

The paper can be inserted via an access door incorporated in the front panel.

The printer is loaded with a 8.5 inch wide (216 mm) paper roll.

CONTROLS

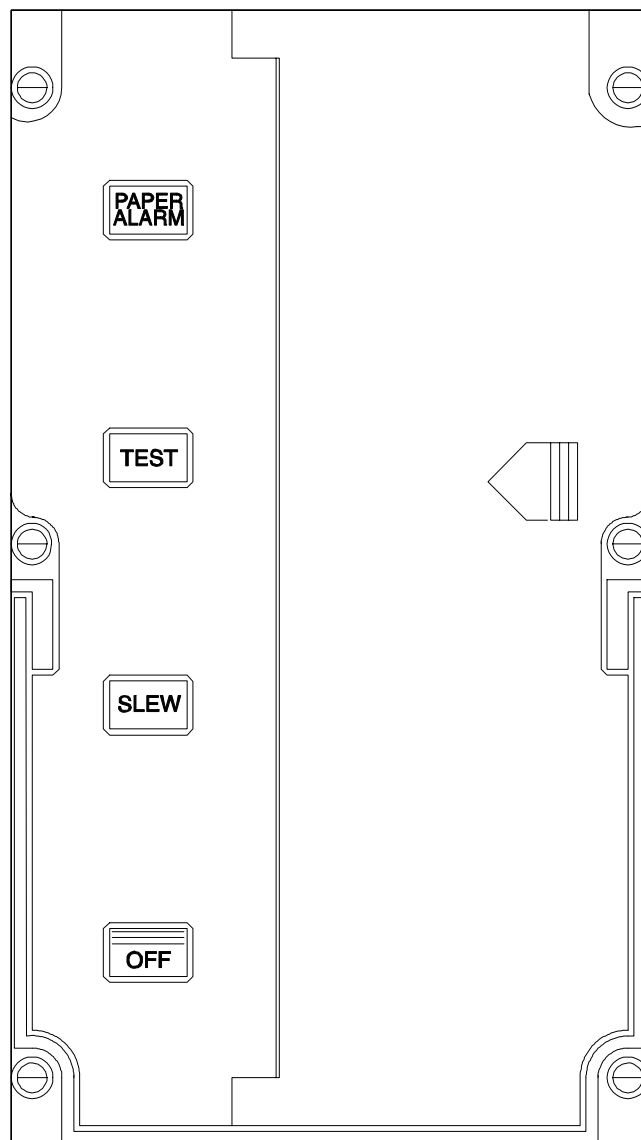
The printer face features two pushbutton switches and two annunciator pushbutton switches.

The TEST switch is used to perform a functional test.

The SLEW switch is used to exit paper.

The "PAPER ALARM" pushbutton switch includes an AMBER caution light.

The "OFF" pushbutton switch includes a status indicator light.



FQW4200 GE Metric

STUDENT NOTES

PRINTER UTILIZATION

Operation
Servicing

OPERATION

Upon aircraft energization, OFF, SLEW and TEST illuminated pushbuttons come on white and the OFF light bars flashes for 10 seconds (power-up test):

the printer is supplied and can operate.

When the TEST pushbutton is pressed, the printer provides a test pattern print-out.

To get the entire print-out, you have to press the SLEW pushbutton to advance the paper before tearing.

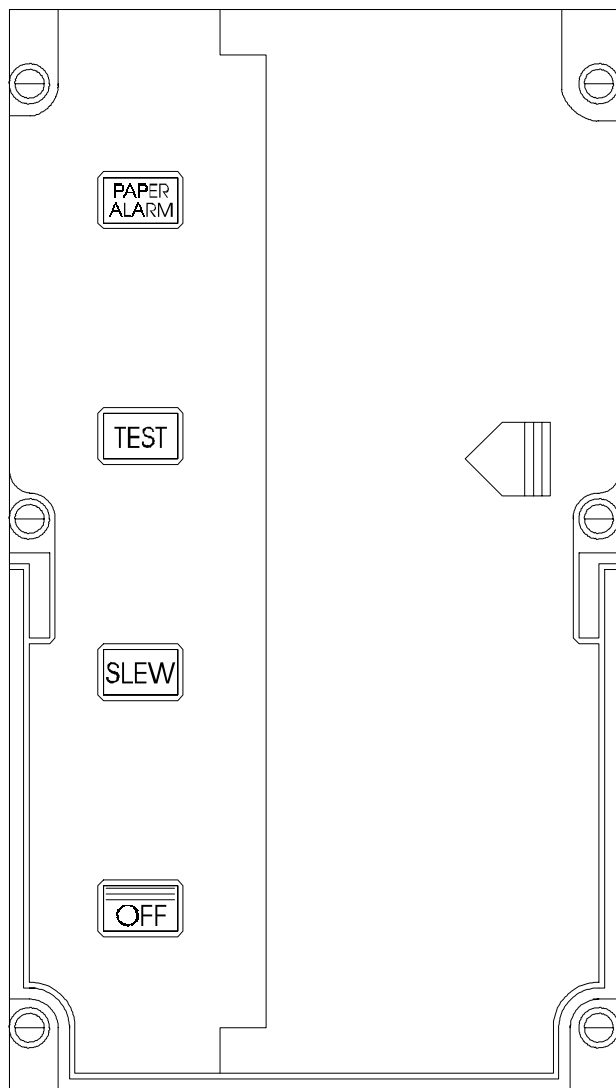
The report printing can be either automatic or manual from the MCDUs.

All the print-outs have the B4 format width.
Some print-outs have the A4 format length on one or several pages (e.g. the POST FLIGHT REPORT print-out).

The MCDU screen print-outs do not have the standard format length.

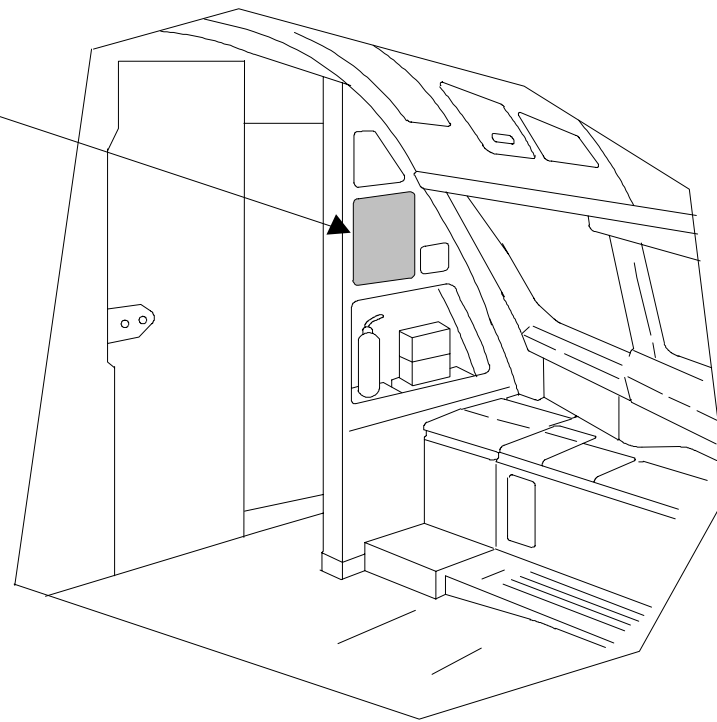
When the OFF pushbutton is pressed, print-outs are interrupted and the white bars come on.

When the OFF pushbutton is released, the printer is reset, the white bars go off and normal operation is restored.



FQW4200 GE Metric

PAPER
ROLL
STOWAGE



SERVICING

When the PAPER ALARM illuminated pushbutton comes on, a reserve of paper of approximately 10 sheets is left.

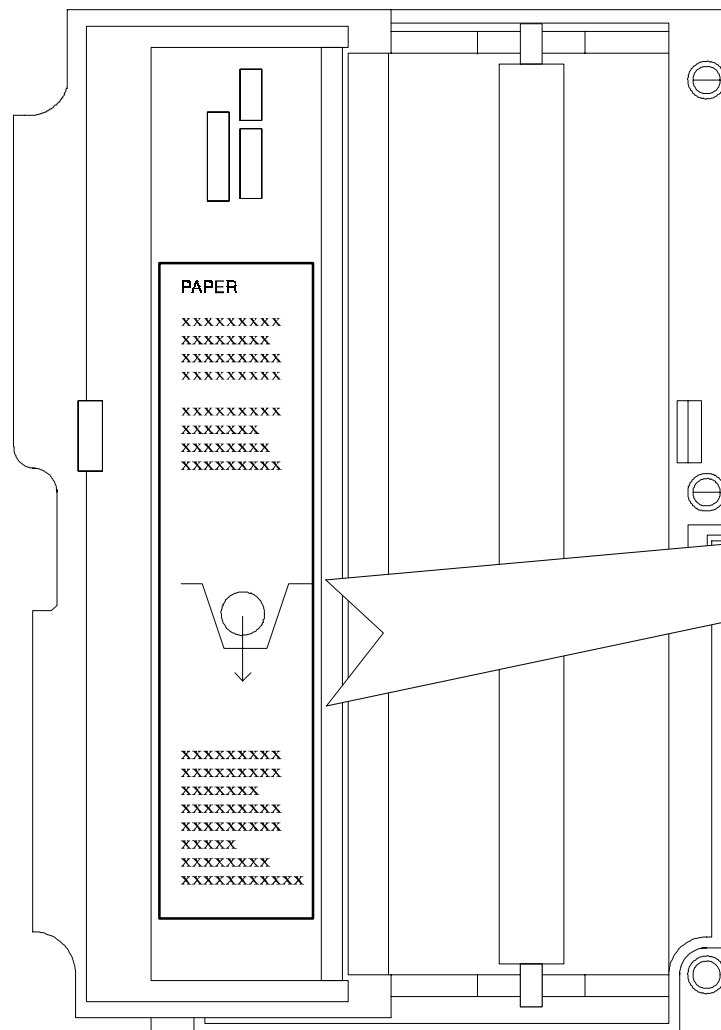
This illuminated push button can be tested by pressing it :

the PAPER ALARM light remains on for 5 seconds.

To replace the paper roll, you have to follow the procedure written on the back of the door.

On the back of the door, there is also a non-jamming procedure which informs you to press SLEW and PAPER ALARM together to reverse paper rotation.

FQW4200 GE Metric



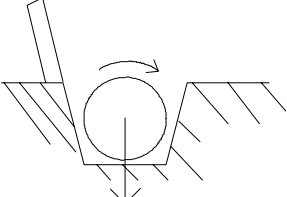
PAPER

UNLOADING

REMOVE
PAPER ROLL
TEAR
PAPER SHEET
SLEW

LOADING

INSERT
PAPER ROLL
TURN ROLL
CLOCK WISE
CLOSE THE
DOOR AFTER
PAPER LEADING
EDGE EXIT



NON JAMMING

REMOVE
PAPER ROLL
PRESS SLEW
AND PAPER ALARM
SIMULTANEOUSLY
TO REVERSE
PAPER ROTATION

STUDENT NOTES:

FQW4200 GE Metric

PRINTER DESCRIPTION OPERATION

General
FMGEC
CMS
EIVMU
ACARS (OPTION)
ACMS (OPTION)

GENERAL

Up to 15 systems can be connected to the printer which uses a multiplexed input receiver, so that the printer is in communication with only one of the possible source systems at a time.

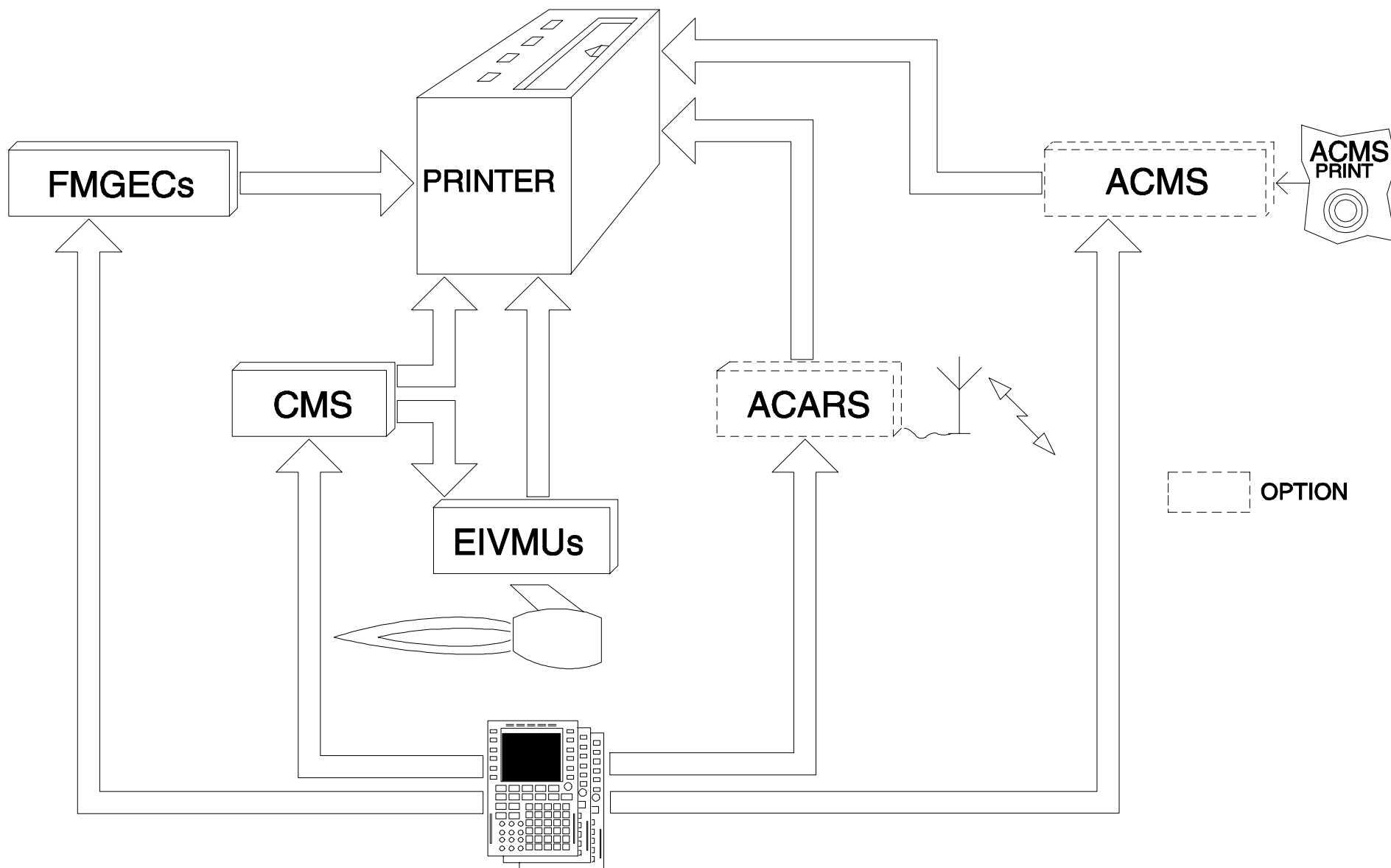
The input data is transmitted on ARINC 429 buses and is ready to be printed.

The output data is transmitted on a single low speed ARINC 429 bus to indicate the printer status (Ready, Busy, etc...).

The printer is usually connected to these systems:

- the FMGECs
- the CMS
- the EIVMUs
- the ACARS (if installed)
- the ACMS (if DMU installed).

Some examples of prints are given hereafter.



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FMGEC

The Flight Management Guidance and Envelope Computers (FMGECs) are connected to the printer so that various types of report can be printed:

- flight plans
- take-off data
- wind data
- flight reports.

The print function allows various FM reports to be printed, either automatically or manually.

The FM pre-flight report becomes available when the current flight phase is PREFLIGHT, whether or not any data has actually been entered.

CMS

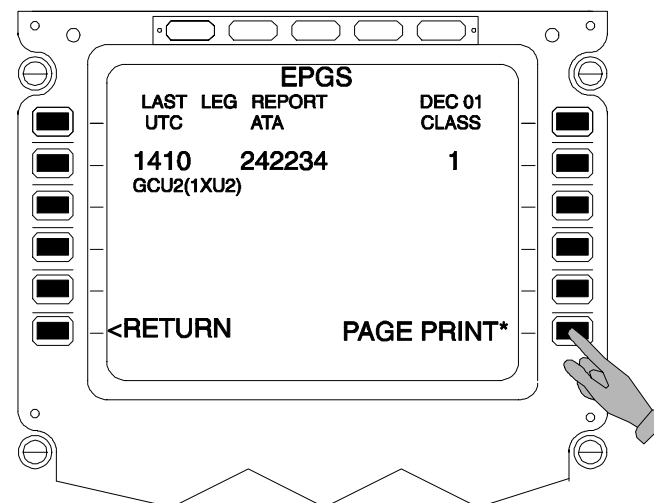
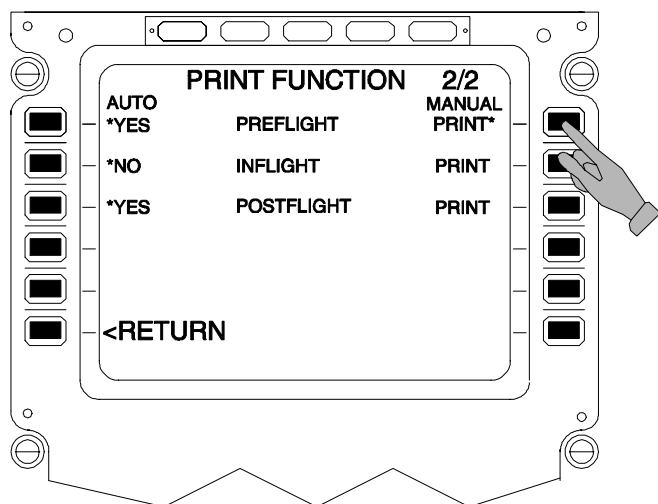
The Centralized Maintenance System (CMS) is connected to the printer in order to print fault reports for maintenance in flight or on ground.

When the last engine is shut down, a Post Flight Report (PFR) may be automatically printed.

It is possible to print data displayed on the MCDU by pressing the Print line select key.

FM PREFLIGHT REPORT		DATE: 20 APR 97
A/C TYPE : A330	DATABASE : AB49411001	
ENG TYPE : XXXXX	CYCLE : 15 MAR-13 APR	
FLT NUMBER : AA6037	FROM/TO : LFPG/KJFK	
CO RTE : CDGJFK	ALTN : KORD	
ALTN CO RTE: JFKORDT		
PERF FACTOR: +1.0	COST INDEX : 60	
IDLE FACTOR: +1.0		
CRUISE FL/STEP START WPT		
CRZ FL 1 : FL270		
CRZ FL 2 : FL310/CPT		
CRZ FL 3 : FL350/ACKIL		
FLIGHT PLAN DATA		

A/C IDENT XXXXX DATE APR 30 FLT NBR 168 FROM/TO LFPG/LFBO START/END 1719/1838	MAINTENANCE POST FLIGHT REPORT LEG 00		CMC1 PRINTING PAGE 01/04 DATE APR 30 UTC 1838
15 COCKPIT EFFECTS	UTC FLIGHT PHASE	26 FAULTS	
ATA 2324	1719	ATA 232434 Class 1 Hard ACARS MU1 (1RB1)	Source AFS Identifiers FWS
COM ACARS 1 FAULT	ENGINE START 02		
ATA 2921	1719		
HYD G ELEC PUMP FAULT	ENGINE START 02		
	1750 Cruise 06	ATA 291134 Class 1 Hard HSMU (1JG)	Source HSMU



EIVMU

Each Engine Interface Vibration Monitoring Unit (EIVMU) automatically constitutes a report in case of an excessive vibration level or upon a manual request, before the flight, via the CMS in interactive mode.

Note: The report is stored in the EIVMU in a volatile memory. Therefore it may be lost before printing in case of a power supply interruption.

The report is printed on ground at engine shutdown.

The MCDU page is accessed from the MCDU EIVMU main menu page and allows frequency analysis acquisition requests. When all the values are correctly entered the request is validated by pressing in the RETURN key.

ACARS (OPTION)

The Aircraft Communication And Reporting System (ACARS) is connected to the printer so that various types of data reports can be printed.

It is possible to print data entered by the crew via the MCDUs.

It is possible to print data elaborated by the ACARS from the data received from the ground and peripheral computers.

```
ENGINE VIBRATION VELOCITY SPECTRUM
DATE       : 12.25.96
TIME       : 00:01
AIRCRAFT ID : XXXXX
ENGINE S/N  : XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXX
SPEED N1    : XXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXX
SPEED N2    : XXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXX
ACCELEROMETER : X

[Hz]  [Val]                                VEL [lps PEAK]
O .....17.....33

 4 / 00.00 >
 8 / 00.01 >
12 / 01.17 ->
16 / 03.45 ----->
20 / 05.95 ----->
24 / 09.34 ----->
28 / 17.43 ----->
32 / 29.57 ----->
36 / 32.21 ----->
40 / 25.30 ----->
44 / 14.97 ----->
48 / 08.41 ----->
52 / 05.41 ----->
56 / 03.36 ----->
60 / 01.32 ->
64 / 00.02 >
```

DX-HAM ---- 16NOV96 520ST

ACARS SCREEN PRINT
ACARS TELEX 1/2>
OPS CONTROL
EDDF SEND*

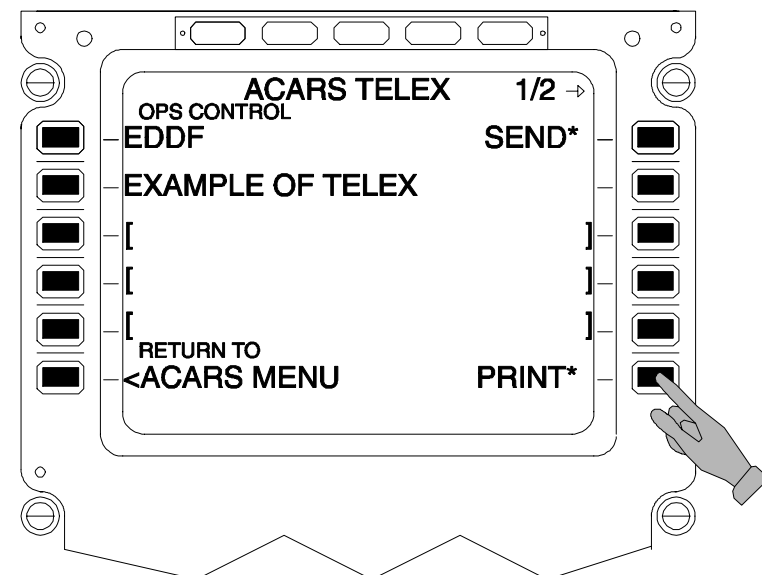
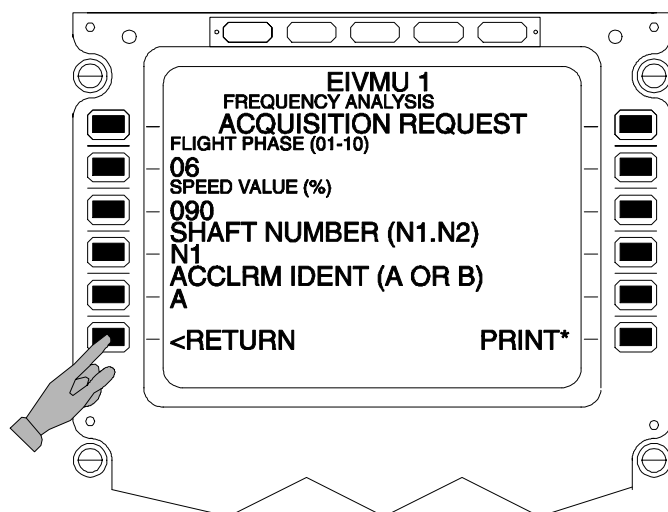
EXAMPLE OF TELEX

[]

[]

[]

RETURN TO
<ACARS MENU PRINT*



ACMS (OPTION)

The ACMS collects data from aircraft systems and formats it to suit various standard reports which can be printed.

The ACMS report prints can be done manually or automatically.

The reports can be manually printed via the MCDU.

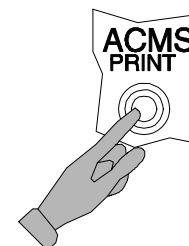
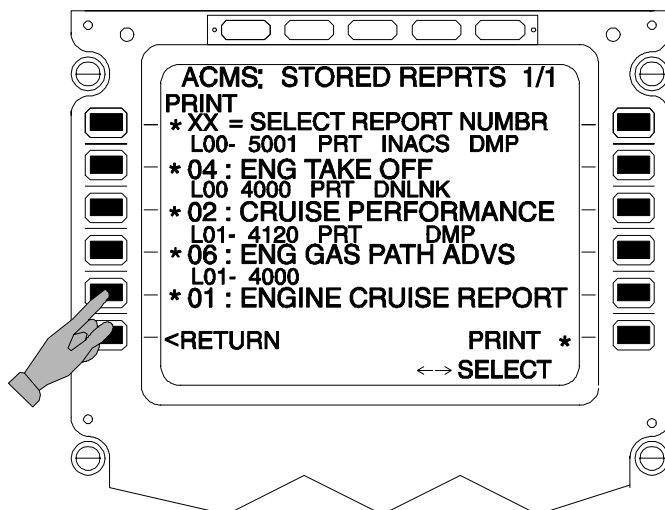
Depending on programming, some reports can be triggered and then printed by the remote ACMS print push button.

A330 ENGINE CRUISE REPORT <01> PAGE 01 OF 01

ACID	DATE	UTC	FROM	TO	FLT	CODE	CNT
C1.D-AERS	97APR02	15.16.09	LFBO	LFBO	LTU171V001	6001	041 BC
PRV PH TIEBCK DMU IDENTIFICATION MOD AP1 AP2							
C2	014	06.0	000000	SE6N03	VN6003	VALVE5	000 056 056 93
TAT ALT MN SYS (... BLEED STATUS ...) APU							
C3	N26.8	34302	0.827	111	0.86	111 10 0 01 111	0.84 - 9B
C4	N26.8	34302	0.827	111	C1		
ESN EHRS ERT ECYC ECW1 EVM QE							
C5	733372	00002	00002	00001	23648	06064	116 25
C6	733371	00002	00002	00001	23648	06064	6D
EPR EPRC N1 N2 EGT P5 FF P2 P25							
N1	1.198	1.198	078.55	083.1	0351	06.837	02701 05.619 16.199 56
N2	1.199	1.199	079.24	083.9	0340	06.878	02724 05.619 16.195 62
LPTC SVA B25							

A330 ENGINE CRUISE REPORT O/R <05> PAGE 01 OF 02

ACID	DATE	UTC	FROM	TO	FLT	CODE	CNT
C1.D-AERS	97APR01	14.37.58	LFBO	LFBO	P2XXXXXXXX	2000	032 89
PRV PH TIEBCK DMU IDENTIFICATION MOD AP1 AP2							
C2	007	04.0	000000	SE6N03	VN6003	VALVE5	000 010 010 7F
TAT ALT MN SYS (... BLEED STATUS ...) APU							
C3	020.3	00389	0.153	111	1.03	111 10 0 01 111	1.03 0 63
C4	020.0	00396	0.111	111	1.03	111 10 0 01 111	1.00 0 56
ESN EHRS ERT ECYC ECW1 EVM							
C5	733372	00000	00001	00000	07688	06064	6F
C6	733371	00000	00001	00000	07688	06064	6F
PRE EVENT, 01 SEC INTERVALS							
EPR N1 N2 EGT FF VF VC VH VL PHF PHT							
S1	1.535	092.92	094.9	0506	11321	02.0	0.03 0.10 00.2 055 213 2B
02.3 0.00 0.21 00.7 227 013 31							



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STUDENT NOTES

UP AND DOWN LOADING SYSTEM PRESENTATION

General
Up Loading
Down Loading

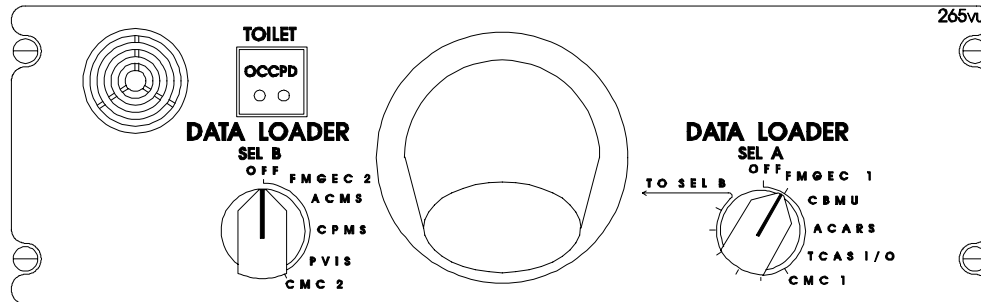
GENERAL

The data loading system is an interface between the aircraft computers and ground data processing equipment used to update software and data bases or to retrieve aircraft system data.

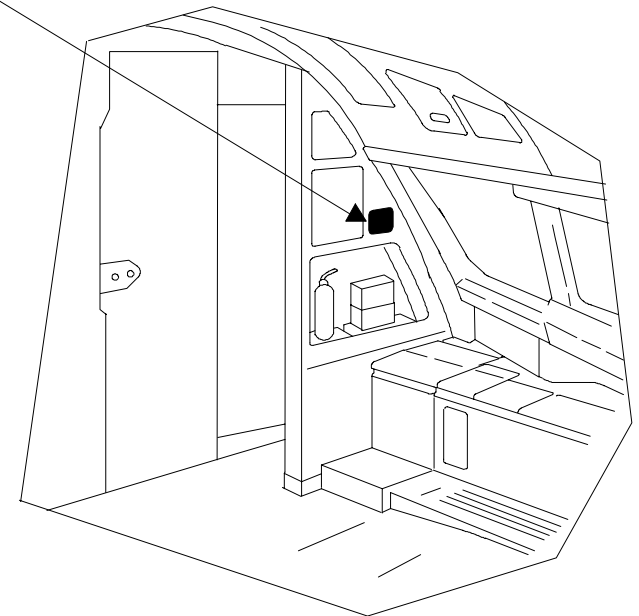
The data loading system includes two rotary selectors for system selection.

It also includes a Multi-purpose Disk Drive Unit (MDDU).

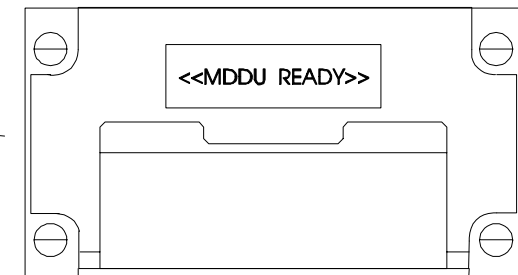
If the Multi-purpose Disk Drive Unit is not installed, Up and Down Loading functions can be performed through a connector by using a portable data loader.



**DISK
STOWAGE**



MDDU



MULTI-PURPOSE DISK DRIVE UNIT (MDDU)

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UP LOADING

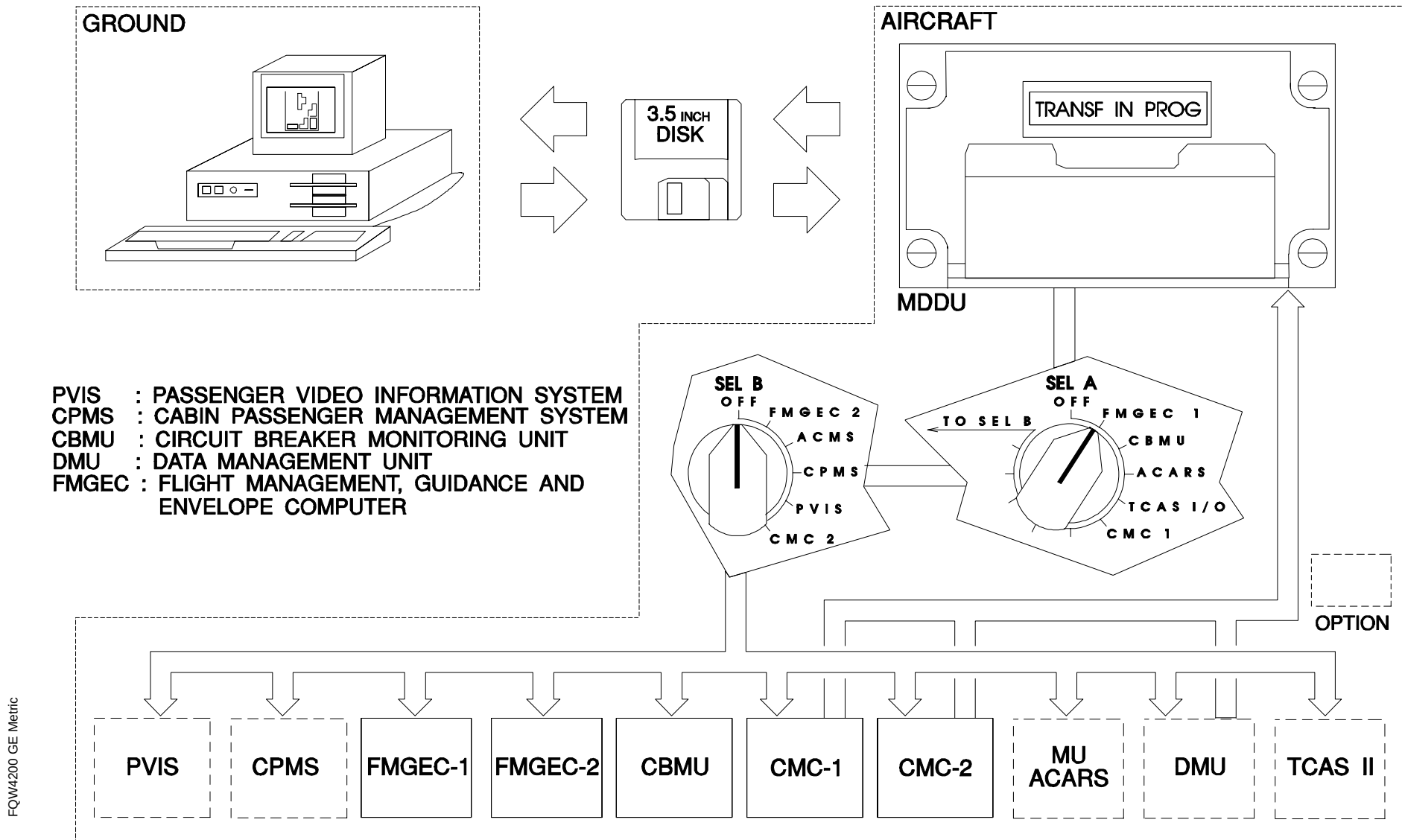
The aircraft system computers use the loading system to update their data base (for example the FMGEC) or to modify parts of their operational software (for example the ACARS Management Unit if installed).

Up loading is automatically performed from a 3.5 inch disk, via an internal logic specific to each computer.

DOWN LOADING

The down loading system is used to down load, to a 3.5 inch disk, the data recorded by certain computers during aircraft operation (for example the Aircraft Condition Monitoring System if DMU installed).

Down loading can be done either manually through one of the MCDUs or automatically through an internal logic specific to each computer.



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STUDENT NOTES

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UP AND DOWN LOADING SYSTEM UTILIZATION

- General
- Automatic Up Loading
- Manual Down Loading
- Automatic Down Loading
- Abnormal Operation

GENERAL

The MDDU can operate in two modes : automatic mode and manual mode. The manual mode is only used to down load data while the automatic mode is used to up and down load data.

According to the operation to be performed, the disk which is used has to contain specific information (e.g. configuration file). Before performing an up data loading operation, refer to the relevant procedure for the corresponding system in the Aircraft Maintenance Manual.

AUTOMATIC UP LOADING

When you have selected the disk corresponding to the computer to be loaded from the disks in the storage box, you have to select the computer by means of the data loader selector switches.

The "MDDU READY" message is displayed on the MDDU window : the system is in the standby state.

You have to open the MDDU door, insert the disk in the data loader disk drive and close the MDDU door.

When the disk is inserted in the disk drive, the "READY" message is displayed : this message acknowledges disk insertion.

The MDDU processes the specific information contained in the disk, contacts the computer to be loaded and displays the "WAIT RESPONSE" message until the computer is ready to receive the data.

This message stays permanently displayed when :

- the data selector switches are set to the wrong computer,
- the configuration file is not correct,
- the Landing Gear Computer Interface Unit 1 is not powered.

As soon as a dialog is established between the computer to be loaded and the data loader, the "TRANSF IN PROG" message is displayed and the data is

transferred to the computer.

Note : The disk should not be extracted while "TRANSF IN PROG" message is displayed as damage to the disk could result.

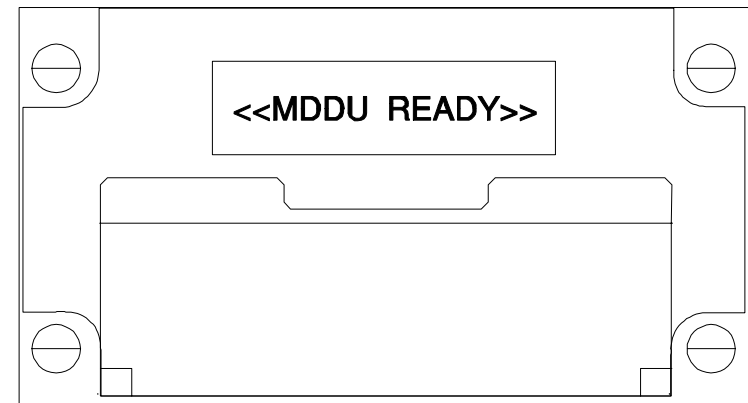
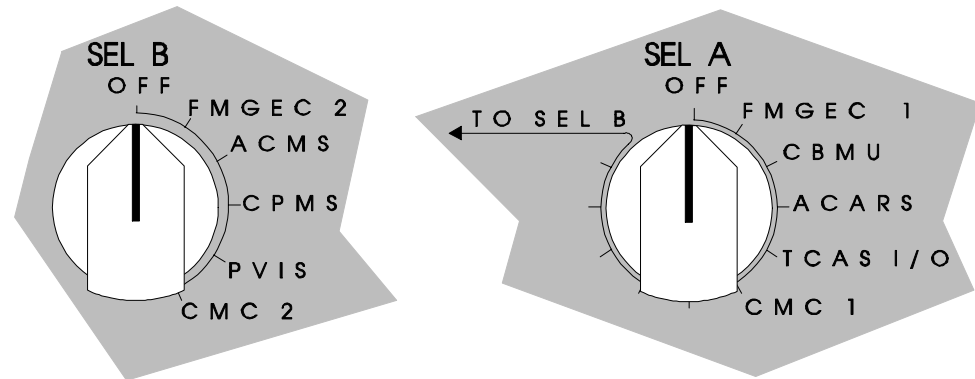
When the data transfer is terminated and no anomalies are detected, the "TRANSF COMPLETE" message is displayed to inform the operator that the transfer is successfully completed.

Note : If up loading requires more than one disk, the "DISK CHANGE" message is displayed on the MDDU when the next disk needs to be inserted. This disk must contain a configuration file identical to the previous one and its order in the sequence to be up loaded on the same computer.

When you have ejected the disk from the disk drive, you have to set the data loader selector switches to the OFF position.

Check on one of the MCDUs that the software reference shown on the LRU IDENTIFICATION page of the concerned computer corresponds to the software reference of the disk used for up loading.

COMPUTER X



MANUAL DOWN LOADING

This function is performed through the MCDU.

At the moment, this is only used by the Aircraft Condition Monitoring System (if DMU installed) via the "DUMP" function.

The "MDDU READY" message is displayed on the MDDU window : the system is in standby state.

The MDDU is activated by inserting the disk containing a configuration file defining the label of the computer concerned by a down loading operation : the "READY" message is displayed on the MDDU window.

Links between the MDDU and the down loadable systems are direct and therefore no action is required on the data loader selector switches. Supposing that the disk inserted is configured to dialog with the DMU, the operator can down load the reports by pushing the line key adjacent to the "DUMP*" indication.

After the computer has acknowledged the request from the MCDU, it sorts the data to be transferred into files and interrupts the wait phase established with the MDDU : the "WAIT RESPONSE" message is displayed on the MDDU window.

Then, the computer down loads its information : the "TRANSF IN PROG" message is displayed throughout the transfer.

When the data transfer is terminated and no anomalies are detected, the "TRANSF COMPLETE" message is displayed to inform the operator that the transfer is successfully completed.

AUTOMATIC DOWN LOADING

This function is only used for on line recording of the DMU (if installed) during flight.

The operator has just to insert in the drive a formatted empty disk at the beginning of the flight.

ABNORMAL OPERATION

Other messages displayed on the MDDU window inform the operator of the transfer status:

TRANSFER FAILURE : If the MDDU has to stop data transfer (up or down loading) for any reason, this message is displayed.

UNIT FAIL : The MDDU displays this message if a hardware failure is detected during the self-test.
In this case, the MDDU stops all operations.

DISK ERROR : If the MDDU cannot read or write data on the disk (incorrect formatting, write-protected, disk damaged, etc), it will interrupt operations and display this message.

STUDENT NOTES:

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STUDENT NOTES