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PILOT'S GUIDE

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SECTION I

GENERAL

SCOPE

The purpose of this document is to specify a User Manual for the Electrical Control and Display Unit (ECDU) system.

The ECDU is part of the Solid State Electrical Plant Management System (SSEPMS) and its scope is to manage the power generation and distribution of the helicopter based on the Solid State technology.

The ECDU behaviour depicted in this user manual is applicable to the ECDU APSW Rel. 3.1.

DOCUMENT OVERVIEW

Section I	SCOPE and System Overview/Applicable Documents
Section II	ECDU System Description
Section III	SYSTEM PAGES FUNCTIONAL DESCRIPTION
Section IV	NORMAL AND EMERGENCY PROCEDURES
Appendix A	List of Acronyms

SSEPMS SYSTEM OVERVIEW

The Solid State Electrical Plant Management System (SSEPMS) depicted in Figure 1-1 has in charge to replace circuit breakers, control panels and any mechanical switches used to handle the helicopter power distribution and helicopter basic plants (i.e pumps, valves, fans, lights and so on) performing system integration via a common human machine interface.

The major components of the SSEPMS are the Remote Electrical Power Unit (REPU) and the Electrical Control and Display Unit (ECDU) system.

The REPUs manage the Solid State Power Controllers to allow a remote load control, over-current protection as well as arc-fault protection for wiring and electrical loads, based on default configuration and upon the commands received from the controlling computer.

The ECDU is connected to the REPUs via ARINC 429 lines and is able to manage up to 4 Remote Electrical Power Units.

For AW189 application the system consists of 3 REPUs.

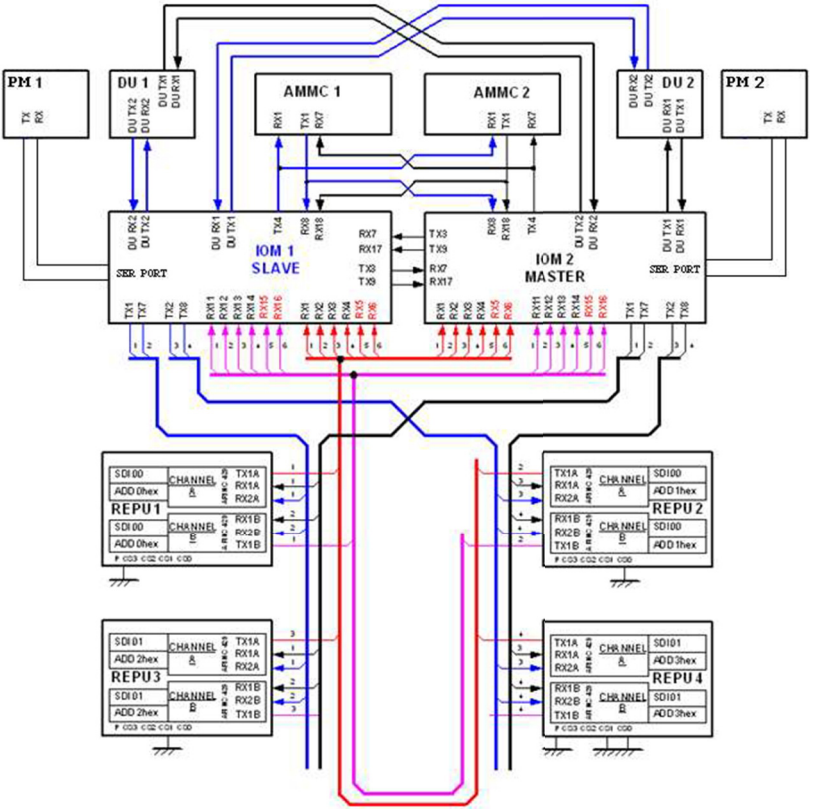

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Figure 1-1 SSEPMS Interconnections (for architectural view only)

The ECDU is composed by (see Figure 1-1):

– two I/O Modules (IOM)
– two Display Units (DU)
– two Personality Modules (PM).

IOM OVERVIEW

In the ECDU system the IOM unit identifies the active part of the system since it has in charge to actually execute the software managing the basic helicopter plants.

Each IOM provides the following resources/capabilities.

– Discrete IO (ground/open, 28V/open, low side relay driver, solid state switch);
– Analogue IO (differential or single ended);
– ARINC429 general purpose and dedicated communication channels;
– CAN general purpose communication channels;
– Non volatile storage capability (logging/configuration functions).

DU OVERVIEW

The Display Unit (DU) constitutes the Human Machine Interface and allows the crew to interact with the system.

Each DU provides 8 Functional Keys (FK), 2 Rocker Switches and 12 LSKs.

The 8 FKs will be used as links to main function pages.

The Rocker Switches will be used one to browse parallel pages (Rocker Switch 1) and one to change DU brightness (Rocker Switch 2).

The LSKs, as they are used to implement all possible actual switches and trimmers installed on helicopter panels and to browse pages, manages a defined set of LSK key types.

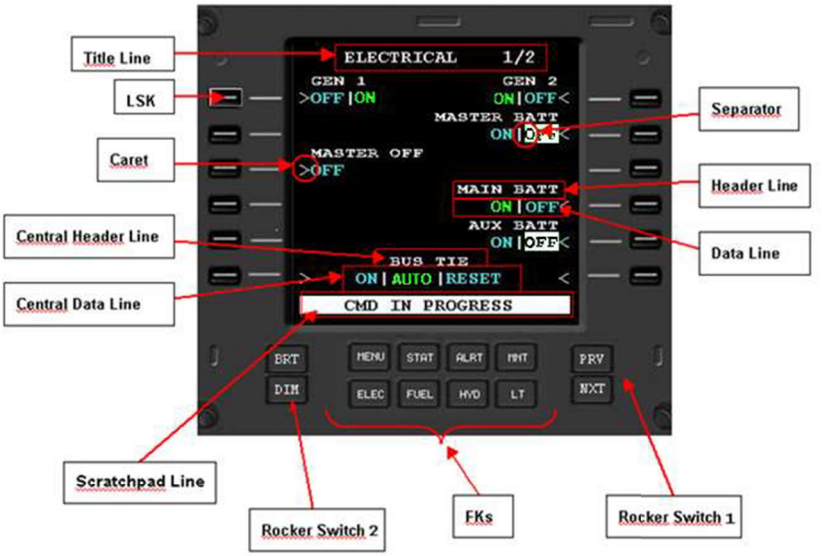

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Figure 1-2 DU Layout (for reference only: it is a dummy page with the purpose to show the graphical items)

The DU layout is logically organized in the following objects:

Title Line: is used as title for a HMI page. Header Lines: are used as title/ description for related Data Lines.

Data Lines: are used to display actual I/O parameters values, or to indicate an executive action. These lines usually contain dynamic data that will be displayed based on key types using a set of "dynamic display rules". Central Header Lines: are used as title/description for related Central Data Lines.

Central Data Lines: are used to display actual I/O parameters values or to indicate a message to the operator. These lines usually contain dynamic data that will be displayed based on key types using a set of "dynamic display rules".

Scratchpad Line: is used to display local error messages or aid messages to the operator. The displayed messages will be divided into two basic types: dynamic messages and static messages.

Dynamic messages will be displayed on Scratchpad Line only for a defined time interval (3 seconds) and then cleared.

Static messages will be displayed on Scratchpad Line for a variable time interval, depending on an external condition. They are used, for instance, to indicate that an alert condition (i.e. breaker TRIP) occurred.

Dynamic Message priority is higher than Static message one, so a dynamic message is able to overwrite a static one.

PM OVERVIEW

The ECDU is independent from the H/C configuration: the information related to the power-controlled peripherals and their connections are configurable in relation to the helicopter where the ECDU has to be installed.

The configuration, from her on called CONFIGURATION FILE, is stored into a dedicated component called Personality Module (PM) connected to each IOM and internally composed by a FLASH memory.

Each PM pair identifies a single helicopter and its electrical plant capabilities.

The PM is an independent component and can be installed/removed separately from the IOM.

The Configuration File contains all information relevant to:

– Human Machine Interface definition (DU pages in terms of layout, key functionalities, colours, fonts)
– Link definition between physical resources and application (i.e. link between keys on DU and I/O physical resources)
– Macro procedure definition (set of basic operations like “input get” or “output set” gathered together in sequence in order to execute full macro functionalities)

The produced Configuration File is also provided by a CRC32. The CRC32 is used to validate the PM content in order to ensure Configuration File integrity. This CRC32 shall be also verifiable on the DUs on dedicated pages where this data is displayed.

APPLICABLE DOCUMENTS

Rif.	Doc. Num.	Title	Issued by
1	MULG4640E004	Sofware Requirements Specification for ECDU APSW	AW
2	S612-01SPM	Software Programmer's Manual	Selex Galileo
3	10793AR	Remote Electrical Power Unit ARINC429 ICD	Ametek
4	189G4620E028	AW189 ECDU Configuration File Software Requirements Specification	AW

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SECTION II

ECDU SYSTEM DESCRIPTION

SYSTEM POWER ON

At power on, while the system is performing the PBIT, the system displays on DU the page depicted in the following figure:

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Figure 2-1 DU Startup Page during PBIT

where the 'PLEASE WAIT' string is blinking.

The PBIT time duration is about 20 seconds in case of system started on ground and about 6 seconds in case of system started in flight.

When the PBIT phase is completed, the following page is displayed:

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Figure 2-2 ECDU Startup Page

In this page the current APSW Release, Part Number and CRC and Equipment Software Part Number are indicated.

Two kinds of start-up are foreseen based on the WOW condition:

– On Ground Start-Up
– In Flight Start-Up.

ON-GROUND START-UP

The main purposes of the start-up on GROUND are:

– Configuration File loading and Validation: the PM content is examined and possible new Configuration File is uploaded (during maintenance operations);

– Dormant Failure Analysis: it signal to the operator any possible failure detected by a full BIT activity;

– Input/Output Initialization: it initializes the system in a default condition.

START-UP SEQUENCE

Hereafter the description of the start-up sequence in the scenario when the helicopter is started using the Auxiliary Power Unit:

STEP	ACTION	EFFECT
1	Select BATT MASTER to ON	APU system is supplied.
2	Select MAIN BATT to ON	The ECDU and all the electrical loads supplied via EMERGENCY Circuit Breaker Panel are turned on.
3	Wait for the ECDU finishing the start up. If the DF RESULTS page(s) is(are) displayed then check the failure(s) and press the functional key STAT. If the LOCKED CB LIST page(s) is(are) displayed then check the locked CB(s) and press the functional key STAT.	If some failures are detected during the power on built in test the DF RESULTS page(s) is (are) displayed: see Page 2-5 If some Circuit Breakers are locked the LOCKED CB LIST page(s) is (are) displayed: Page 2-9 If nor failure neither locked CBs are detected or after the pilot has acknowledged both DF RESULTS and LOCKED CB LIST pages then the system will finish the start up phase and display the LITGHS page.
4	Start the Auxiliary Power Unit	When the APU GEN is on line, all the electrical loads supplied via ESSENTIAL BUS and MAIN BUS bars are turned on: the whole helicopter is electrically supplied.

Table 2-1 Start-up sequence

CONFIGURATION FILE LOADING AND VALIDATION (FOR MAINTAINER)

If a new Configuration File, that is different from the one stored into IOM NOVRAM, is present on the PM, the system starts to read it.

While the read operation is in progress, the "CONFIGURATION LOADING" message blinks on the scratchpad.

Once the Configuration File has been read, its content is validated via a dedicated CRC. If this validation fails, the "PMx INVALID CONTENT" message is displayed on the scratchpad. In this message, 'x' is the PM identifier (1 or 2).

In case of successful validation, the Configuration File is stored into the IOM NOVRAM and is used to configure the SW.

The Configuration File loading activity is performed independently by the two IOMs.

In any case, the system verifies the integrity of the Configuration File stored in NOVRAM and that the same Configuration File is present on both IOMs.

If no valid Configuration File is present on both IOMs the following page is displayed.

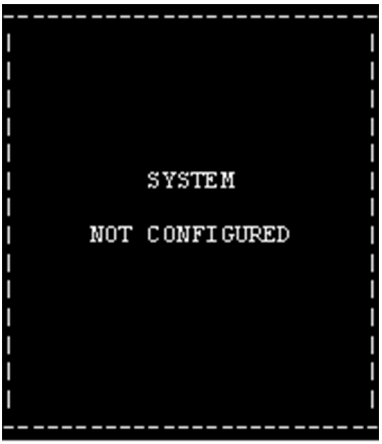

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Figure 2-3 System Not Configured Page

In this case, the system must be shut-down and it should be checked if the PMs are correctly installed or if the content is valid.

If a valid Configuration File is present on only one IOM, the other one is automatically halted by the system. If this condition occurs, it will be detected analyzing in Dormant Failure Results (see Page 2-5) or run-time checking the equipment statuses as explained in Page 2-33 or as explained in Page 2-35.

DORMANT FAILURE ANALYSIS (FOR MAINTAINER)

If at least one failure is detected during the full BIT activity, a page resuming the possible failed equipments is then displayed on PILOT DU. The format of the page is the one indicated in the following figure:

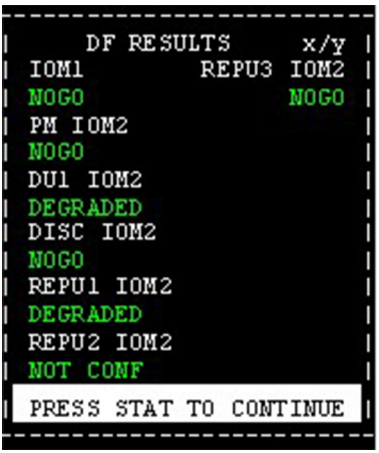

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Figure 2-4 Dormant Failure Results Page

The following page is displayed on COPILOT DU, if powered:

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Figure 2-5 Dormant Failure Results Auxiliary Page

If more than one page is needed to display the equipment list, the set of pages can be browsed using the PRV/NXT Rocker Switch. The list of pages is circular.

The equipment identifier and status is detailed in the following table:

Equipment/ Driver	Equipment Id	Displayed Status	Condition	Action
DU1, DU2	DU1 IOMx DU2 IOMx	NOGO	DU not connected or not working	Abort the mission
		DEGRADED	DU BIT Failure	Maintenance asap
Discrete Driver	DISC IOMx	NOGO	More than 1 discrete failure (i.e. short circuit)	Abort the mission
		DEGRADED	Only one discrete failure	Maintenance asap
Analogue Driver	ANLG IOMx	NOGO	All analogue resources in failure (i.e. short circuit)	Maintenance asap
		DEGRADED	At least one analogue resource in failure	Maintenance asap
REPU 1..4	REPUy IOMx	NOGO	Both Arinc Lines IOM to REPU or both Arinc Lines REPU to IOM in FAIL or REPU not working	Abort the mission
		DEGRADED	One Arinc Line Status FAIL or one REPU WOW not matching the IOM one	Maintenance asap
		NOT CONF	REPU PART NUMBER not retrieved or REPU PART NUMBER not matching the Configuration File one	Abort the mission
IOM	IOMx	NOGO	OPSW FAIL, both READY IN CBIT failed	Abort the mission
		DEGRADED	At least one READY OUT CBIT failed or IOM resources CBIT/PBIT failed or one READY IN CBIT failed	Maintenance asap
PM	PM IOMx	NOGO	PM not connected or not working	Maintenance asap

Table 2-2 Equipment Statuses Resume

where x ranges from 1 to 2 to identify the IOM id.

For more details on the equipment status descriptions, refer to [1] of Page 1-7.

If one IOM status is NOGO, no other equipment statuses relevant to this IOM are displayed.

If an equipment is not foreseen in Configuration File, because for instance one REPU will not be installed on a particular AIRCRAFT, no information relevant to it will be displayed in DF result pages.

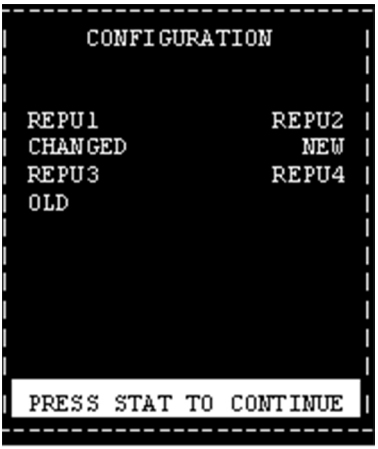
The message displayed on the Scratch Pad line is used to ask for operator confirmation to continue the Start-Up also in case of the failure occurrence. The start-up continues when the operator presses the 'STAT' FK on the DU.

The system then checks for any possible new REPU installations from the last start-up.

In detail, if all SSPCs contained on a REPU are locked, the REPU is considered as a brand new one.

If the REPU is not a brand new one and at least one SSPC locked status is different from the last startup, the system considers it as a changed REPU from installation point of view.

If at least one of the two above conditions occurs, the following page is displayed:



189G4620U001-0008-01

Figure 2-6 REPU Configuration Page

where each dataline is filled as indicated in the next table:

Header Line	Data Line	Meaning
REPUx	OLD	SSPC Lock statuses not changed
	NEW	SSPC Lock statuses all to "LOCK"
	CHANGED	At least on SSPC lock status changed
	Empty	Empty dataline in case of REPU not installed

Table 2-3 REPU Configuration

As already explained, the message displayed on the Scratch Pad line is used to ask for operator confirmation to continue the Start-Up.

LOCKED CB PRE-FLIGHT CHECK

The system shall then retrieve the list of possible SSPC remained locked from last session. If at least one SSPC is locked, the following page is displayed on PILOT DU:

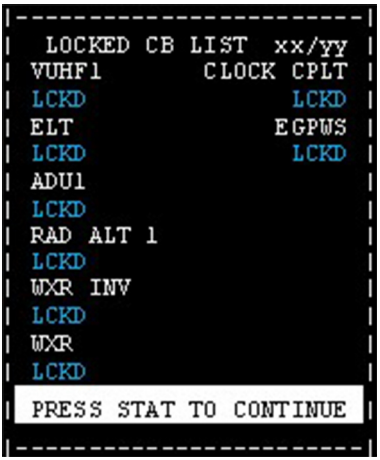


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Figure 2-7 Locked CB List Page

While the following page is displayed on COPILOT DU, if powered:

189G4620U001-0010-01

Figure 2-8 Locked CB List Auxiliary Page

If more than one page is needed to display the list of locked SSPC, the set of pages can be browsed using the PRV/NXT Rocker Switch. The list of pages is circular.

Note that the list contains SSPCs relevant only to REPUs whose status is different from 'NOT INSTALLED' or not 'NOT CONFIGURED'.

The message displayed on the Scratch Pad line is used to ask for operator confirmation to continue the Start-Up.

INPUT/OUTPUT INITIALIZATION (FOR MAINTAINER)

This phase initializes the system in the default condition defined by mean of the Configuration File.

During this phase, the message 'START-UP IN PROGRESS' blinks on the scratchpad.

If any failure is detected during this phase, the error message 'START-UP FAILED' is displayed as a dynamic scratchpad message.

If this error occurs, the operator should check:

– the Solid State Status – Equipment Status page (see Page 2-33) to look for any possible equipment failure;
– the Alert page to look for possible tripped or failed breakers (see Page 2-26);
– the breaker pages in order to find any possible breaker who failed its initialization. In this last case the breaker status will be displayed in AMBER colour, INVERSE video and the operator can try to set it again manually.

IN-FLIGHT START-UP

In this case the system starts immediately without performing any BIT activity.

The system is not initialized to a default condition. The condition present before the re-boot is restored.

If any failure is detected during this phase, the error message 'START-UP FAILED' is displayed as a dynamic scratchpad message and the same actions depicted above apply to detect the possible failure conditions.

ECDU OPERATIVE MODES

Once the start-up phase has been completed, the MENU page is displayed on both DUs and the system is ready to operate. This ECDU mode is called ACTIVE Mode.

A dedicated session is provided in order to let the operator to LOCK/UNLOCK breakers. This session is called from here on MAINTENANCE Mode and is available on ground.

In MAINTENANCE MODE only the DU2 nearby the pilot is active and displays the BREAKER Main Page ordered by system when the mode is entered.

When a breaker page is reached, the page will look like the one displayed in the next figure:

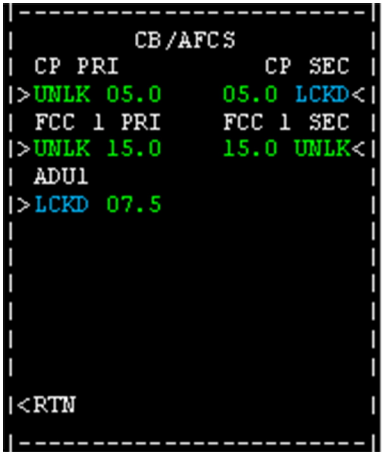

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Figure 2-9 Example of CB Page in Maintenance Mode

From any of these pages, the operator can LOCK or UNLOCK breakers pressing the relevant LSK.

If a breaker is locked, the LCKD string is displayed in CYAN colour while if a breaker is unlocked the UNLK string is displayed in GREEN colour.

Close to breaker lock/unlock status, the relevant Trip Setting Current Value is displayed.

If a Current Value is not available (i.e. the value has not been correctly retrieved from REPU), the value 00.0 is displayed on the DU.

In MAINTENANCE mode only pages reachable from Maintenance Menu (see Page 2-35), Solid State Status Pages (see Page 2-33) and Alert pages are accessible.

The CO PILOT DU presents the following page and all its keys are disabled.

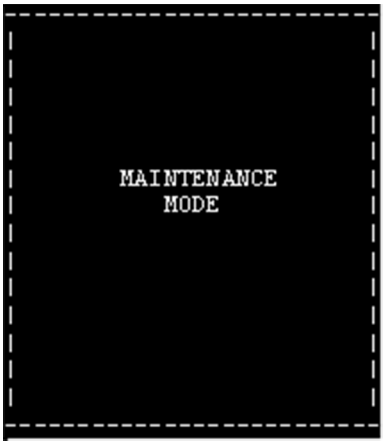

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Figure 2-10 Maintenance Mode CoPilot DU

The MAINTENANCE Mode can be reachable from Maintenance Menu Page by mean of a dedicated menu (see Page 2-35).

HUMAN MACHINE INTERFACE MANAGEMENT

In this paragraph all common display rules and HMI management provided by the system will be detailed.

In next paragraph the currently used character attributes are reported but all display rules in terms of character attributes as colour, font and inverse video can be configured via Configuration File.

TITLE LINE DISPLAY RULE

The title line is displayed in BIG font and WHITE colour.

HEADER LINE DISPLAY RULE

The Header line is displayed in SMALL font and WHITE colour.

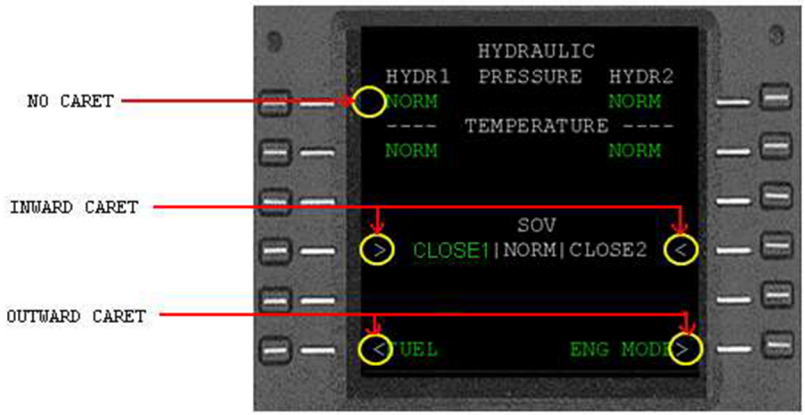
DATALINE CARET DISPLAY RULE

The caret ('<' or '>' symbol) can be present only on data lines.

If the caret is present in the Inward direction, it indicates an active control (i.e. set an output or execute a complex action).

If the caret is present in the outward direction, it indicates a 'goto' page control.

If the caret is not present, it indicates that no action can be performed on the LSK (i.e. a display only information or a LSK temporary disabled).



189G4620U001-0013-01

Figure 2-11 Caret Display Rules

KEY TYPES DEFINITION

The data lines usually contain dynamic data that will be displayed based on key types using a set of "dynamic display rules". Here follows a description of implemented key types for ECDU HMI.

For any keytype a layout example is reported. The example must be intended for reference only in terms of colours and fonts.

CENTRAL VERTICAL TOGGLE

This control allows performing the toggle among multiple mutually exclusive options listed vertically in the page. The applicable range of options must be from three (3) up to five (5). The options are displayed vertically on the central field of the page layout. The options are selectable the left side LSKs. The header line is present above the higher dataline in the central field. This type is provided to design a control that has got central serigraphy on the original panel of the helicopter. See also Page 2-20.

189G4620U001-0014-01

Figure 2-12 Central Vertical Toggle Layout

DISPLAY ONLY (INLINE)

This type is provided to display two (2) mutually exclusive STATUS ONLY options (e.g. ON OFF, YES|NO, etc.). The LSK alongside has got no function. Both the options are displayed and the active one is highlighted. The options are separated by the character "|". See also Page 2-17.

189G4620U001-0015-01

Figure 2-13 Display Only (inline) Layout

EXECUTIVE

This control allows to perform a request or set a condition or to start a procedure.

189G4620U001-0016-01

Figure 2-14 Executive Layout

GOTO

This control allows recalling the DU page linked to the relevant LSK.

189G4620U001-0017-01

Figure 2-15 Goto Layout

IMPOSED DISPLAY ONLY

This type is provided to display one of two (2) mutually exclusive STATUS ONLY options (e.g. ON or OFF, YES or NO, etc.). The LSK alongside has got no function. Only the ACTIVE option is displayed. See also Page 2-16.

189G4620U001-0018-01

Figure 2-16 Imposed Display Only Layout

IMPOSED TOGGLE

This type is provided to perform the request to toggle between two possible mutually exclusive options (e.g. ON or OFF, YES or NO, etc.). Only the ACTIVE option is displayed. See also Page 2-19. This key type is mainly used for breakers.

189G4620U001-0019-01

Figure 2-17 Imposed Toggle Layout

LAMP

This type is provided to display one of up to five (5) mutually exclusive STATUS ONLY options with arelated color attribute based on the option severity. The LSK alongside has got no function.

189G4620U001-0020-01

Figure 2-18 Lamp Layout

MESSAGE

This type allows reporting a message to be displayed on the ECDU page. This can be used to inform the pilot with Special procedure to be followed or Information. Both the central header line and the central dataline in all fields can be used to display messages.

MULTIPLE TOGGLE

This type is provided to perform the request to toggle among multiple mutually exclusive options. The applicable range of options will be from three (3) up to five (5). They are all displayed horizontally in the central field of the page and separated by the character "|". The options are selectable both via left side LSKs (the active selection is moved left not circularly) and via right side LSKs (the active selection is moved right not circularly).

189G4620U001-0021-01

Figure 2-19 Multiple Toggle Layout

TOGGLE (INLINE)

This type is provided to perform the request to toggle between two (2) mutually exclusive options. The options are all displayed horizontally on side fields and separated by the character "|".

189G4620U001-0022-01

Figure 2-20 Toggle (inline) Layout

TRIMMER

This type is provided to manage the display and control the current value of the trimmers. This selector is displayed horizontally and it is controllable on both sides of the DU: the left side LSK is used to the decrease the value and the right side LSK is used to the increase the value. The number of steps is calculated according to the max value, the min and the step weight values associated to the trimmer control. The parameter representation is graphical: a horizontal bar (max 22 characters) is displayed.

189G4620U001-0023-01

Figure 2-21 Trimmer Layout

VERTICAL TOGGLE

This control allows performing the toggle among multiple mutually exclusive options listed vertically in the page. The applicable range of options must be from three (3) up to five (5). The options are displayed vertically on the side field of the page layout. For all the description refer to CENTRAL VERTICAL TOGGLE type.

189G4620U001-0024-01

Figure 2-22 Vertical Toggle Layout

DATALINE DISPLAY RULE

As a general rule, if a data is not available, for example the status of a breaker relevant to a REPU that has been turned off, the string representing its value is replaced by dashes and the caret is removed as depicted in the next figure for CP PRI and FCC 1 SEC.

189G4620U001-0025-01

Figure 2-23 Not Available Data Display Rules

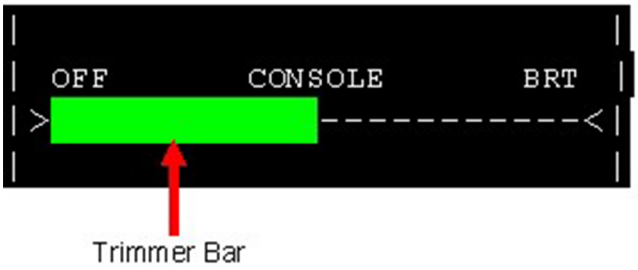
The same rule applies to all data relevant to a REPU that is in NOT CONFIGURED Status.

In case the data is available the active option is displayed in GREEN colour, NO INVERSE and BIG font and the not active option(s) is (are) displayed in CYAN colour, NO INVERSE and SMALL font.

189G4620U001-0026-01

Figure 2-24 DataLine Display Rules Example

The bar used to represent an analogue output (a trimmer) is displayed in GREEN colour.



189G4620U001-0027-01

Figure 2-25 DataLine Display Rules Example

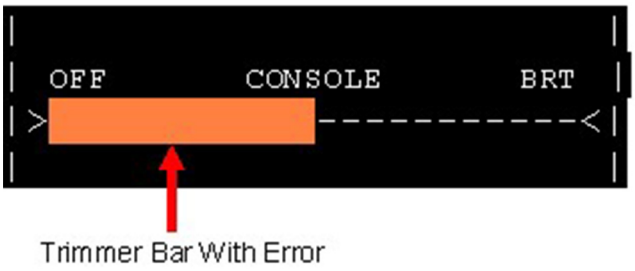
If an error occurred in setting an option, the current active one is displayed in AMBER colour, INVERSE video.

This situation can mainly happen in the following cases:

– The requested option is relevant to a REPU and the REPU does not execute the request within a given timeout.
– The requested option implies to set a TRIPPED, FAILED or LOCKED SSPC or an SSPCrelevant to a turned-off REPU channel.
– The requested option is relevant to an IOM discrete that is in failure condition due for example to a short circuit. The indication is also present in the MAINTENANCE 16/16 Page (see Page 2-35)
– The requested option is relevant to an IOM analogue that is in failure condition due for example to a short circuit. The indication is also present in the MAINTENANCE 16/16 page (see Page 2-35).

189G4620U001-0028-01

Figure 2-26 DataLine Display Rules Example



189G4620U001-0029-01

Figure 2-27 DataLine Display Rules Example

If an option has been indicated 'with confirm' (via Configuration File), when requested, the option is highlighted using CYAN colour and INVERSE at first pressure and accepted/forwarded by the system only if the same button is pushed again within a timeout of 1.5 seconds, otherwise the previous option is re-established.

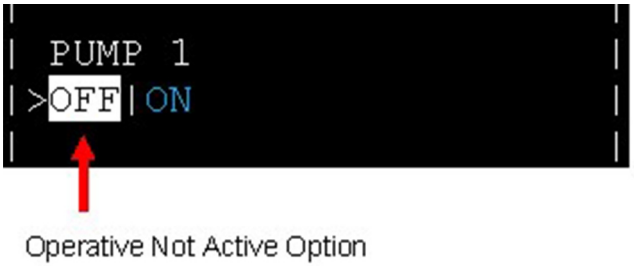
189G4620U001-0030-01

Figure 2-28 DataLine Display Rules Example

189G4620U001-0031-01

Figure 2-29 DataLine Display Rules Example

If an option has been indicated as 'Operative Not Active' (via Configuration File), when it is the current selected one, the option is highlighted using WHITE colour and INVERSE.



189G4620U001-0032-01

Figure 2-30 DataLine Display Rules Example

BREAKER DATALINE DISPLAY RULES

In ACTIVE MODE a further set of dedicated rules are used to display the breaker statuses in breaker list pages:

– if a breaker is LOCKED, the relevant value is replaced by the string 'LCKD' in CYAN colour and the caret is removed.

– if a breaker is TRIPPED, the caret is removed and the relevant dataline is replaced with the 'TRIP' string in WHITE colour and INVERSE video.

– If a breaker recovered from TRIP but has not yet been inserted (see Page 2-26), the caret is removed and the relevant dataline is replaced with the 'OUT' string in WHITE colour and NO INVERSE video

– If a breaker is FAILED, the caret is removed and the relevant dataline is replaced with the 'FAIL' string in WHITE colour and INVERSE video in case the relevant Alert has not been already acknowledged or NO INVERSE video in case the relevant Alert has been already acknowledged.

In MAINTENANCE MODE the previous rule is not applied in order to let the operator change the breaker LOCK status.

ERROR MESSAGES

When the operator presses an LSK while a change is already in progress on it, the error message "CMD IN PROGRESS" is displayed on the scratchpad as a dynamic message.

When the operator presses an LSK and for any reason the requested value cannot be set within a given timeout, the error message "CMD NOT EXECUTED" is displayed on the scratchpad as a dynamic message. The operator should retry the action.

When the operator presses an LSK related to a more complex action (i.e. SOV) and for any reason some of the requested actions cannot be performed within a given timeout the "CMD NOT EXECUTED" local error message on the scratchpad as a dynamic message.

When a REPU channel is turned off or stops responding to IOM requests the error message 'REPUx CHNy LINK FAIL' is displayed on the scratchpad as a dynamic message, where x indicates the REPU id (from 1 to 4) and y indicates the REPU channel (A or B).

BRIGHTNESS VALUE AND MODE MANAGEMENT

The Brightness Rocker Switch is used to increase/decrease DU brightness based on current brightness and Brightness Mode (NVG).

It is possible to increase/decrease DU brightness either pressing once at a time or keeping pressed the rocker switch.

ALERT MANAGEMENT

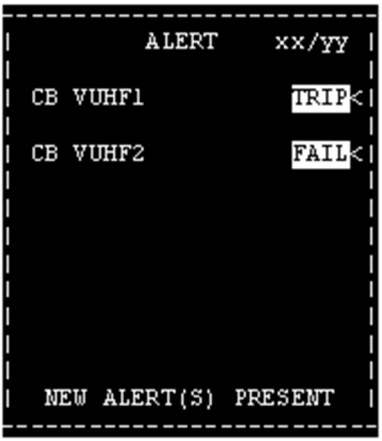
The ECDU implements an Alert Management; Alerts are used to inform the operator in case of SSPC is in Trip or Failure conditions.

The alert priority order is:

– SSPC TRIP
– SSPC FAIL

Each time a new alert occurs in the system, the "NEW ALERT(S) PRESENT" message is displayed on the scratchpad as a Scratchpad Static Message and blinking on both DUs independently from the current displayed page.

When the operator presses the ALRT FK, the system displays a page resuming the current alert situation formatted as follows:



189G4620U001-0033-01

Figure 2-31 Alert Page Example

Each alert page displays a maximum of 6 alerts. In case of more than 6 alerts present in the system, the operator can view other alert pages browsing them using the PRV/NXT Rocker Switch.

The alerts display order follows the Alert priority order and, in case of same priority, follows the occurrence time order that is, the last occurred alert will be displayed as the first one.

If one alert page is already displayed, it is automatically updated in case of new alert occurrences or alert removal.

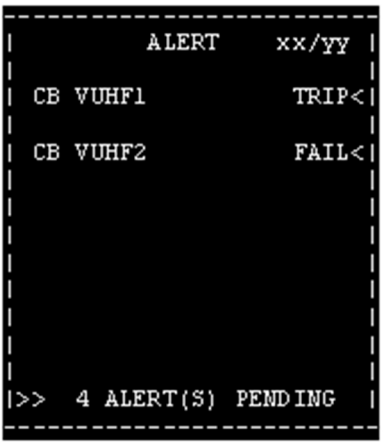
In case of SSPC Trip or Failure condition, the affected SSPC is indicated (i.e. CB VUHF2) followed by the kind of failure occurred (TRIP or FAIL).

The strings TRIP and FAIL are displayed in WHITE colour.

If the strings TRIP or FAIL are displayed in inverse video, it means that the relevant alert has not yet been acknowledged.

An Alert is acknowledged when the relevant right LSK is pressed. In this case the inverse video is removed.

When all alerts present in the system are acknowledged, the scratchpad content is replaced by the ">>xx ALERT(S) PENDING" as Scratchpad Static Message where 'xx' represents the number of present alerts. The message also stops blinking. This message is displayed only if alert pages are displayed.



189G4620U001-0034-01

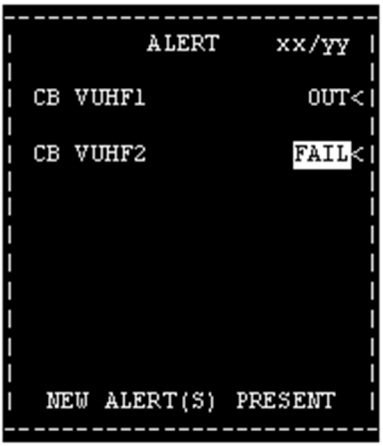
Figure 2-32 Alert Page Example with all Alert acknowledged

If no alert is present in the system, when the operator presses the "ALRT" FK, the following page is displayed:

189G4620U001-0035-01

Figure 2-33 Alert Page Example with No Alert

If the alert is relevant to a tripped SSPC, the tripped breaker is reset and the TRIP string is replaced by the OUT string as displayed in the following figure. This means that the TRIP condition has been reset and the breaker is not yet inserted.



189G4620U001-0036-01

Figure 2-34 Alert Page Example after Breaker RESET

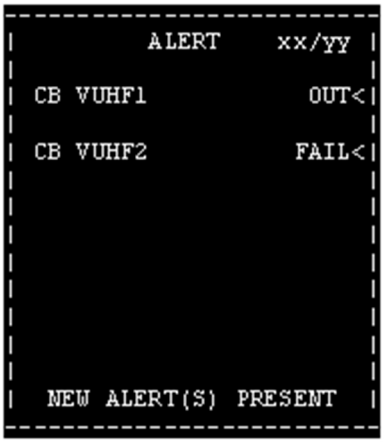
If the right LSK is pressed again, the breaker is inserted and the alert is removed from the page.

In case of unsuccessful reset, the 'CMD NOT EXECUTED' is displayed as Scratchpad Dynamic Message and the TRIP string remains displayed in not inverse video. The operator should retry the action.

In case of unsuccessful breaker insertion, the 'CMD NOT EXECUTED' is displayed as Scratchpad Dynamic Message and the OUT string remains displayed in not inverse video. The operator should retry the action.

If the system is in MAINTENANCE Mode, only the breaker reset operation is performed and in case of successful reset the alert is removed from the list.

If the alert is relevant to a failed SSPC, pressing the right relevant LSK the alert is acknowledged as displayed in the following figure.



189G4620U001-0037-01

Figure 2-35 Alert Page Example FAIL Breaker Acknowledged

If a SSPC is in TRIP, OUT or FAIL condition and the ECDU is in ACTIVE Mode, in the relevant CB page the current SSPC status (ON or OFF) is replaced by the alert condition as displayed in the following figures.

189G4620U001-0038-01

Figure 2-36 CB Page in case of SSPC TRIP

189G4620U001-0039-01

Figure 2-37 CB Page in case of SSPC FAIL

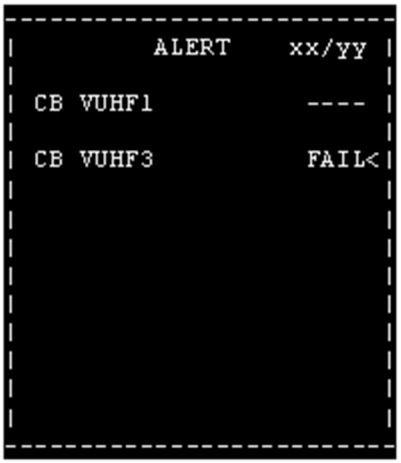
189G4620U001-0040-01

Figure 2-38 CB Page in case of SSPC OUT

The caret beside the SSPC is removed in order to let the crew to operate the alert only from Alert pages.

In case the ECDU is in MAINTENANCE Mode, the system let the crew to operate the SSPC from CB pages also in case of TRIP/FAIL condition in order for example to LOCK a SSPC that is experiencing the problem.

Note that if a REPU channel, that is a single bar, is turned off, or if a REPU enters the NOGO status, each possible SSPC TRIP or FAIL Alerts relevant to this bar are displayed with dashes as detailed in the following figure for CB VUHF1.



189G4620U001-0041-01

Figure 2-39 CB Display Rule in case of REPU link fail

REDUNDANCY MANAGEMENT (FOR MAINTAINER)

The two IOMs are connected together to implement a MASTER/STANDBY criterion in order to perform the redundancy policy.

If MASTER notices that the STANDBY becomes unavailable, it displays the "BACKUP IOM FAILURE " on the scratchpad as a dynamic message.

If STANDBY notices that the MASTER becomes unavailable, it display the MASTER IOM FAILURE" on the scratchpad as a dynamic message and performs a Role Exchange.

Once a IOM is declared fail it never re-enters as active part of the system until the next entire system start-up.

Furthermore, the ECDU implements an automatic role exchange if any SLAVE condition in terms of connected equipment is better than the MASTER one.

In details, the automatic role exchange is performed if any of the following conditions occurs:

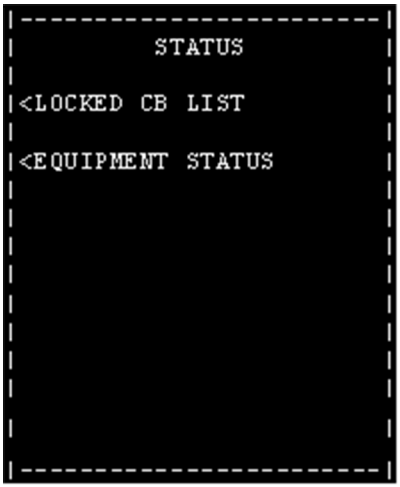
– At least one REPU status equal to NOGO or NOT CONFIGURED on MASTER and relevant STANDBY REPU status different from NOGO and NOT CONFIGURED
– Discrete Driver Status equal to NOGO on MASTER and relevant STANDBY Discrete Driver status different from NOGO
– one DU status equal to NOGO on MASTER and both DU statuses different from NOGO on STANDBY
– DU2 status different from NOGO and DU1 status equal to NOGO on STANDBY, DU2 status equal to NOGO and DU1 status different from NOGO on MASTER
– both DUs status equal to NOGO on MASTER and at least one different from NOGO on SLAVE

A particular management is implemented in case of Dormant Failure Analysis. If the previously detailed role exchange condition is encountered during Dormant Failure, the role is not exchanged immediately but the Dormant Failure result pages are displayed. The role exchange is performed if the operator decides to go on with the Start-up pressing the relevant STAT FK.

SOLID STATE STATUS MANAGEMENT

The system provides pages to display to the operator the Solid State Status (STAT) that is the list of Locked CB and the state of SSEPMS equipments.

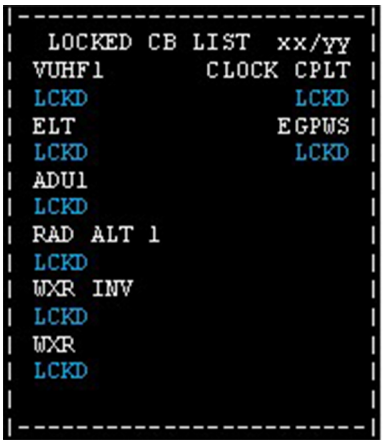
When the operator presses the 'STAT' FK when in ACTIVE or MAINTENANCE mode, the following page is displayed:



189G4620U001-0042-01

Figure 2-40 Solid State Status Page

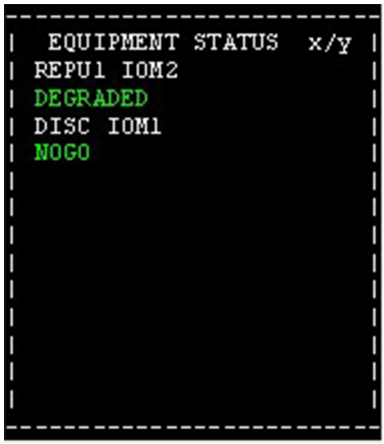
When the operator presses the 'LOCKED CB LIST' LSK, the list of locked breakers relevant to REPUs whose status is different from 'NOT INSTALLED' and 'NOT CONFIGURED' is collected and displayed in a set of circular pages. A single page in the set has the following format:



189G4620U001-0043-01

Figure 2-41 Locked CB List Page

When the operator presses the 'EQUIPMENT STATUS' LSK, the system collects the statuses of the possible equipments whose value is different from GO and displays them in a set of circular pages.



189G4620U001-0044-01

Figure 2-42 Equipment Status Resume Page

For a detailed description of the page content and relevant display rules refer to Page 2-5.

MAINTENANCE MENU PAGES MANAGEMENT (FOR MAINTAINER)

The purpose of MNT FK on the DU is to provide the operator the access to a Maintenance Menu where a set of information relevant to the system status in terms for example of CBIT/PBIT/ETI/ temperature and the breaker list can be viewed.

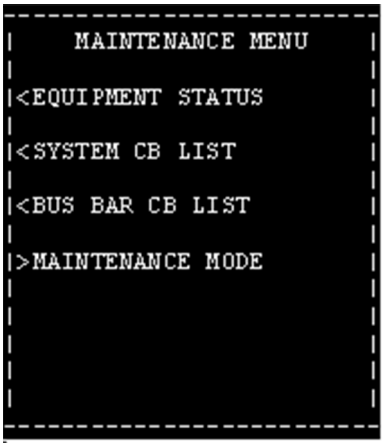
In this Maintenance Menu, it is also possible to change mode from ACTIVE to MAINTENANCE and vice-versa.

During ACTIVE MODE, if the operator presses the MNT FK and the Maintenance Menu have not already entered, the following page is displayed.

189G4620U001-0045-01

Figure 2-43 Maintenance Menu Entry Page

If the operator then contemporary presses LSK 6 and LSK 12, the following page is displayed:



189G4620U001-0046-01

Figure 2-44 Maintenance Menu in ACTIVE Mode

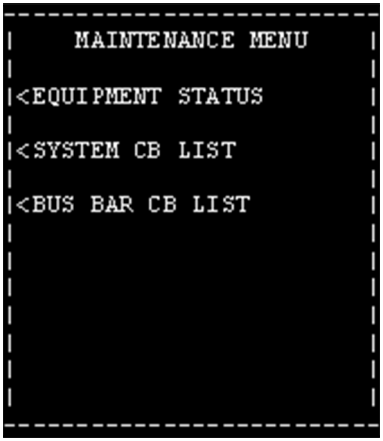
Pressing the EQUIPMENT STATUS LSK, the operator is allowed to reach and browse a set of pages containing the status of both MASTER and STAND-BY APSWs, if available, and connected I/O.

Pressing the SYSTEM CB LIST LSK, the CB List pages ordered by relevant SYSTEM are displayed.

Pressing the BAR CB LIST LSK, the CB List pages ordered by relevant Power BAR are displayed.

Pressing the MAINTENANCE MODE LSK, MAINTENANCE MODE is entered. While the mode change is in progress, the message 'MODE CHANGE IN PROGR' blinks on the scratchpad and any pressed DU key is refused.

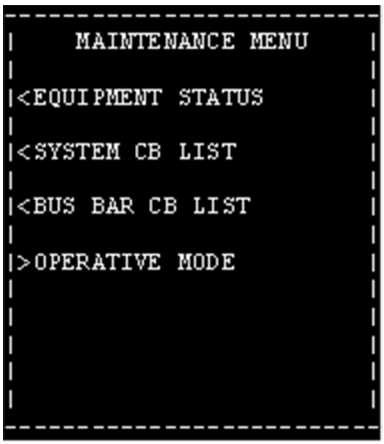
If the H/C is in FLIGHT, the MAINTENANCE MODE LSK is not displayed as depicted in the following figure.



189G4620U001-0047-01

Figure 2-45 Maintenance Menu in FLIGHT

During MAINTENACE MODE, if the operator presses the MNT FK, the following page is displayed:



189G4620U001-0048-01

Figure 2-46 Maintenance Menu in MAINTENANCE Mode

Pressing the EQUIPMENT STATUS LSK, the operator will be allowed to reach and browse a set of pages containing the status of both MASTER and STAND-BY APSWs, if available, and connected I/O.

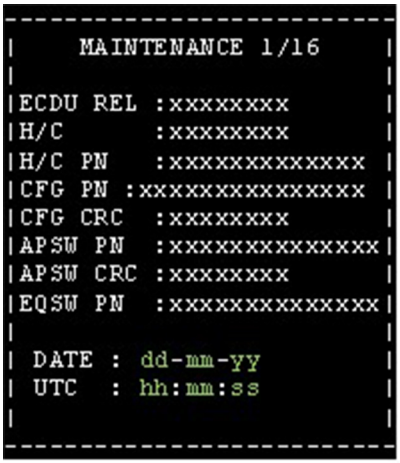
Pressing the OPERATIVE MODE LSK the ACTIVE MODE is entered. While the mode change is in progress, the message 'MODE CHANGE IN PROGR' blinks on the scratchpad and any pressed DU key is refused.

Pressing the SYSTEM CB LIST LSK, the CB List pages ordered by relevant SYSTEM are displayed.

Pressing the BUS BAR CB LIST LSK, the CB List pages ordered by relevant Power BAR are displayed.

If the operator presses the EQUIPMENT STATUS LSK on MAINTENACE MENU page, the MAINTENANCE 1/16 page that is the first page in the set of Maintenance Pages is reached.

The page set can be browsed by mean of PRV/NXT rocker switch.



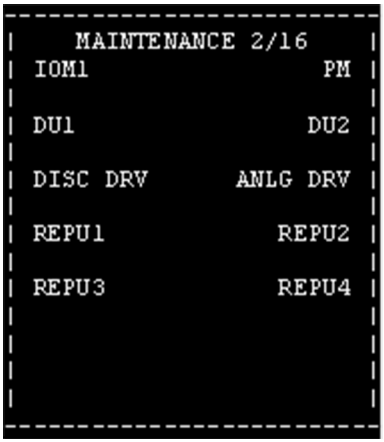
189G4620U001-0049-01

Figure 2-47 Maintenance Page 1/16

where:

– ECDU REL is the APSW release
– H/C is the helicopter model retrieved from Configuration File
– H/C PN is the helicopter version retrieved from Configuration File
– CFG P/N is the Configuration File Part Number retrieved from Configuration File itself
– CFG CRC is the Configuration File CRC retrieved from Configuration File itself
– APSW P/N is the APSW AW Part Number of the Executable APSW
– APSW CRC is the APSW CRC
– EQSW P/N: is the EQSW AW Part Number
– DATE and UTC are the DATA and TIME information retrieved from AMMC or internal timing if AMMC DATA and TIME label is not retrieved.

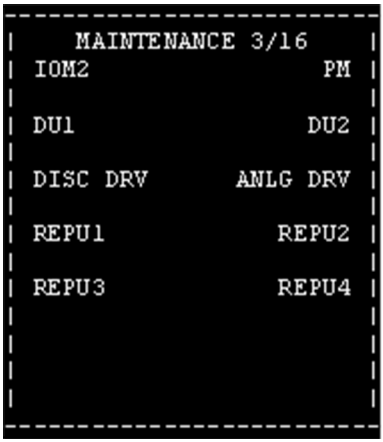
The second page of the set contains data relevant to IOM1 and shall have the following layout:



189G4620U001-0050-01

Figure 2-48 Maintenance Page 2/16

The third page of the set contains data relevant to IOM2 and shall have the following layout:



189G4620U001-0051-01

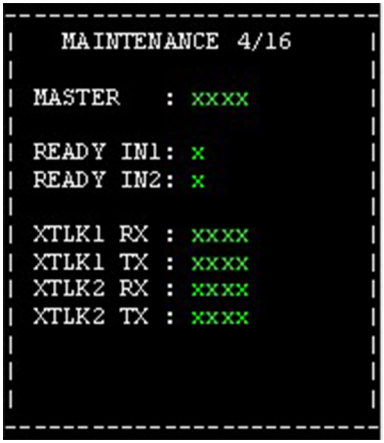
Figure 2-49 Maintenance Page 3/16

On the relevant data lines, the label 'GO', 'NOGO', 'DEGRADED' or 'NOT CONF' is displayed as detailed in Table 2-2.

If one IOM status is NOGO, all other data lines relevant to the same IOM are left blank.

If one equipment is not configured, for instance if REPU4 is not connected, the relevant data line is left blank.

The fourth page of the set contains the following information:



189G4620U001-0052-01

Figure 2-50 Maintenance Page 4/16

where

- MASTER is the actual MASTER IOM (IOM1 or IOM2).
- READY IN1 is the value of the READY IN1 (0 or 1 where 0 means NOT TOGGLING and 1 means TOGGLING); the value will be displayed in AMBER colour and INVERSE if the relevant discrete CBIT is FAIL, GREEN and NO INVERSE otherwise.
- READY IN2 is the value of the READY IN2 (0 or 1 where 0 means NOT TOGGLING and 1 means TOGGLING); the value will be displayed in AMBER colour and INVERSE if the relevant discrete CBIT is FAIL, GREEN and NO INVERSE otherwise.
- XTLK1 RX is the status of the RX1 redundancy channel (GO, NOGO).
- XTLK1 TX is the status of the TX1 redundancy channel (GO, NOGO).
- XTLK2 RX is the status of the RX2 redundancy channel (GO, NOGO).
- XTLK2 TX is the status of the TX2 redundancy channel (GO, NOGO).

The fifth page of the set contains the following information about the MASTER IOM and PM:

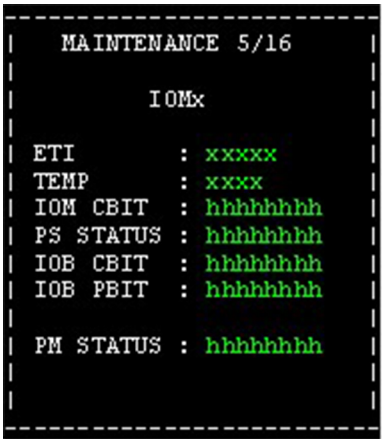


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Figure 2-51 Maintenance Page 5/16

where:

- ETI is the actual MASTER IOM ETI.
- TEMP is the actual MASTER IOM Temperature.
- IOM CBIT is the actual MASTER IOM CBIT result.
- PS STATUS is the actual MASTER CBIT status of Non Critical Power Supply sources internal to the ECDU.
- IOB PBIT: PBIT status of the selected IO Board.
- IOB CBIT: CBIT status of the selected IO Board.
- PM_STATUS is the CBIT status retrieved from PM.

For more details and coding of these parameters, refer to [2] of Page 1-7.

The sixth and seventh pages of the set display information about the DUs:

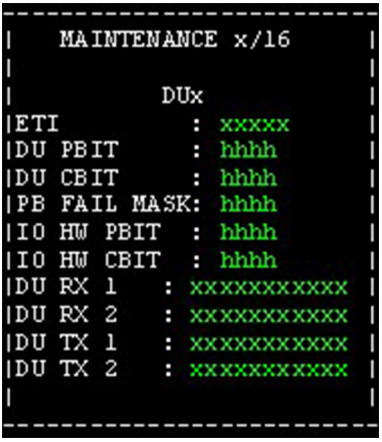

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Figure 2-52 Maintenance Pages 6/16 and 7/16

where:

- ETI is the DUx ETI
- DU PBIT is the PBIT result retrieved from remote DUx
- DU CBIT is the CBIT result retrieved from remote DUx
- PB FAIL MASK is the PUSH BUTTON FAIL MASK retrieved from remote DUx
- IO HW PBIT is the PBIT result of DU ARINC interface located on board of the IOM
- IO HW CBIT is the CBIT result of DU ARINC interface located on board of the IOM
- DU RX(TX) 1(2) is the relevant channel status represented in xxxxxxxxxx as
  - 'GOOD' if Link Status = 00
  - 'L DISTURBED' if Link Status id 01
  - 'H DISTURBED' if Link Status is 10
  - 'FAIL' if Link Status is 11

For more details and coding of these parameters, refer to [2] of Page 1-7.

The pages (from 8 to 15) present information about each REPU channel:

189G4620U001-0055-01

Figure 2-53 Maintenance Pages 8/16 and 15/16

where:

– P/N is REPU CHx PART NUMBER
– S/N is REPU CHx SERIAL NUMBER
– ETI is REPU CHx ETI
– TEMP is REPU CHx Temperature
– CBIT is the six REPU STATUS words retrieved from REPU
– STATUS is the status (GO, NOGO, DEGRADED) of the relevant channel.
– RX (from REPU point of view) is the status WORK or FAIL for the IOM TX internal CBIT result (retrieved by EQSW)
– TX (from the REPU point of view) is the status of the IOM RX channel and is WORK / FAIL where WORK indicates the IOM is receiving data from REPU and FAIL that IOM is not receiving data from REPU.
– WOW is the REPU CHx WOW status (FLIGHT or GROUND)
– V is the REPU CHx Input Voltage
– I is the REPU CHx Total Current

For more details and coding on REPU CBIT refer to [3] of Page 1-7.

For more details and coding on REPU Channel Status refer to [1] of Page 1-7.

A further page displaying the every discrete and analog inputs and outputs status is provided.

In order to compress the representation, hexadecimal format have been used to represent analog value or a set of four discrete inputs or outputs.

For discrete inputs and outputs:

– Green digits shall be used to display a set of discrete all working.
– Amber digits shall be used to display a set of discrete among which at least one is detected as failed.

The page format is:

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Figure 2-54 Maintenance Page 16/16

ANA IN dataline represents the value of the possible 4 analogue inputs and shall be coded as follows:

– dddd represents the value of the first analogue input, cccc represents the value of the second analogue input and so on.
– The analogue input value ranges from 0 to 0xFFF to represent a actual range of 0-36 Volts.
– if an analogue input is not linked to any inner variable, the value 0000 is displayed.

ANA OUT dataline represents the value of the possible 6 analogue outputs and shall be coded as follows:

– dddd represents the value of the first analogue output, cccc represents the value of the second analogue output and so on.
– The analogue output value ranges from 0 to 0xFFFF to represent a actual range of 0-12 Volts.

The 4 digits representing an analogue input or output are displayed using the following colour rule:

– AMBER if the relevant analogue input or output is detected as failed due to a CBIT or PBIT error
– GREEN if the relevant analogue input or output is NOT detected as failed due to a CBIT or PBIT error

DIS IN G dataline represents the values of the 64 Ground/Open discrete inputs where:

– ccccdddd represents the values of discretes from 64 to 33
– bbbbaaaa represents the values of discretes from 32 to 1

DIS IN V dataline represents the values of the 16 28V/Open discrete inputs where eeee are the values of discretes from 16 to 1.

DIS OUT G dataline represents the values of the 20 Ground/Open discrete outputs where baaaa are the values of discretes from 20 to 1.

DIS OUT R dataline represents the values of the 20 Low Side Relay Driver discrete outputs where baaaa are the values of discretes from 20 to 1.

DIS OUT V dataline represents the values of the 20 28V/Open discrete outputs where baaaa are the values of discretes from 20 to 1.

DIS OUT S dataline represents the values of the 16 Two Wire Solid State Switch discrete outputs where aaaa are the values of discretes from 16 to 1.

WOW represents the WOW status in the following way:

– 'GROUND': both IOM WOW1 and WOW2 set to ground
– 'FLIGHT': all other cases

DU DEFAULT PAGES

In this paragraph the DU pages embedded on DU are detailed.

If both IOMs are turned off and the DU remains powered, the following page is displayed:

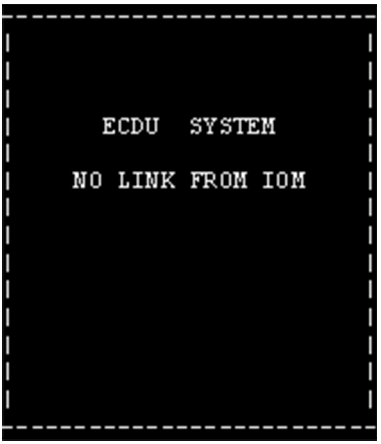

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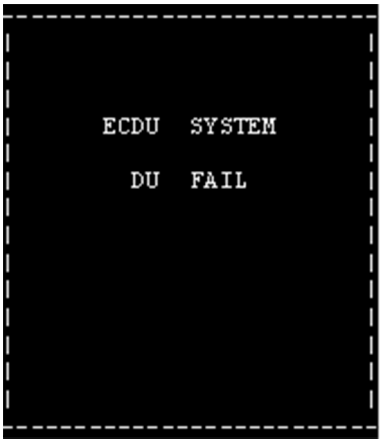
Figure 2-55 DU Page after IOMs turn-off

If a DU fails and it is no more able to display pages requested by IOM, the following page is displayed:



189G4620U001-0058-01

Figure 2-56 DU Page in case of DU Failure

As already detailed, at power on, while the system is performing the PBIT, the DU displays the following figure:

189G4620U001-0059-01

Figure 2-57 DU Startup Page during PBIT

SECTION III

SYSTEM PAGES FUNCTIONAL DESCRIPTION

MENU PAGE

189G4620U001-0060-01

Figure 3-1 MENU page

The aircafrt systems managed by the ECDU can be reached via MENU page. The MENU can be reached using the MENU functional key (the functional key 1). More over the most important or used aircraft systems can be reached via the second row functional keys that are shortcut for these systems.

AFCS SYSTEM PAGE

189G4620U001-0061-01

Figure 3-2 AFCS page

Figure 3-2 shows the AFCS page.
On the AFCS page the pilots can permanently release or engage the trim clutch for pitch and roll and/or for collective and yaw.

		Description
Page	AFCS	Pitch/Roll Permanent Trim Release (P/R PTR) command. The data line displays the actual status of trim clutch.
LSK	1	
LSK Type	Imposed toggle	
Header Line	P/R PTR	
Data Line	CLUTCHED (DECLUTCHED)	
Pwr Up Default	CLUTCHED	
Confirm Req'd on	None	
Inverse White on	DECLUTCHED	

		Description
Page	AFCS	Collective/Yaw Permanent Trim Release (C/Y PTR) command. The data line displays the actual status of trim clutch.
LSK	7	
LSK Type	Imposed toggle	
Header Line	C/Y PTR	
Data Line	CLUTCHED (DECLUTCHED)	
Pwr Up Default	CLUTCHED	
Confirm Req'd on	None	
Inverse White on	DECLUTCHED	

ELECTRICAL SYSTEM PAGE

189G4620U001-0062-01

Figure 3-3 ELEC page

Figure 3-3 shows the ELEC page. On the ELEC page the pilots can command the generator on line or off line as well as the TRUs and override the NON ESS busses shed restoring the power supply to the non-essential loads; the NON ESS loads shedding is automatically performed. Moreover, the pilots can close the Bus Tie Contactor in order to power the whole helicopter in APU or AC EXT PWR mode.

		Description
Page	ELEC	Insert on line or disconnect the generator #1.
LSK	1	
LSK Type	Toggle	
Header Line	GEN 1	
Data Line	OFF|ON	
Pwr Up Default	ON	
Confirm Req'd on	OFF	
Inverse White on	OFF	

		Description
Page	ELEC	Insert on line or disconnect the transformer rectifier unit (TRU) #1.
LSK	2	
LSK Type	Toggle	
Header Line	TRU 1	
Data Line	OFF|ON	
Pwr Up Default	ON	
Confirm Req'd on	OFF	
Inverse White on	OFF	

		Description
Page	ELEC	Bus Tie Contactor 1 control, when the DC ESS 1 bus is supplied then the BTC 1 changes to CLSD automatically; therefore, on ground in APU or AC EXT PWR mode, since EMER 1 and ESS 1 busses are supplied, BTC 1 is closed. When BTC 1 is CLSD and ESS 1 bus is supplied also MAIN 1 and MAIN 3 are supplied otherwise the ECDU prevents the pilots from closing the BTC and shows the message DC ESS 1 OFF. When BTC 1 is AUTO the EDCU system lets to EPGDS the authority to drive the BTC 1.
LSK	4	
LSK Type	Toggle	
Header Line	BTC 1	
Data Line	AUTO|CLSD	
Pwr Up Default	AUTO	
Confirm Req'd on	CLSD	
Inverse White on	None	

		Description
Page	ELEC	Non-essential load shedding override, in AUTO the system will shed the non-essential loads when necessary; the pilot can override the load shedding commanding the OVRD; the OVRD command is not allowed if the electrical power generation system is not in shedding condition.
LSK	5	
LSK Type	Toggle	
Header Line	NON ESS 1	
Data Line	AUTO|OVRD	
Pwr Up Default	AUTO	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	ELEC	Insert on line or disconnect the generator #2.
LSK	7	
LSK Type	Toggle	
Header Line	GEN 2	
Data Line	OFF|ON	
Pwr Up Default	ON	
Confirm Req'd on	OFF	
Inverse White on	OFF	

		Description
Page	ELEC	Insert on line or disconnect the transformer rectifier unit (TRU) #2.
LSK	8	
LSK Type	Toggle	
Header Line	TRU 2	
Data Line	OFF|ON	
Pwr Up Default	ON	
Confirm Req'd on	OFF	
Inverse White on	OFF	

		Description
Page	ELEC	The Bus Tie is automatically operated by the EPDGS, this commands provides the possibility to force a reset if needed.
LSK	9	
LSK Type	Momentary	
Header Line	BUS TIE	
Data Line	RESET	
Pwr Up Default	N/A	
Confirm Req'd on	None	
Inverse White on	N/A	

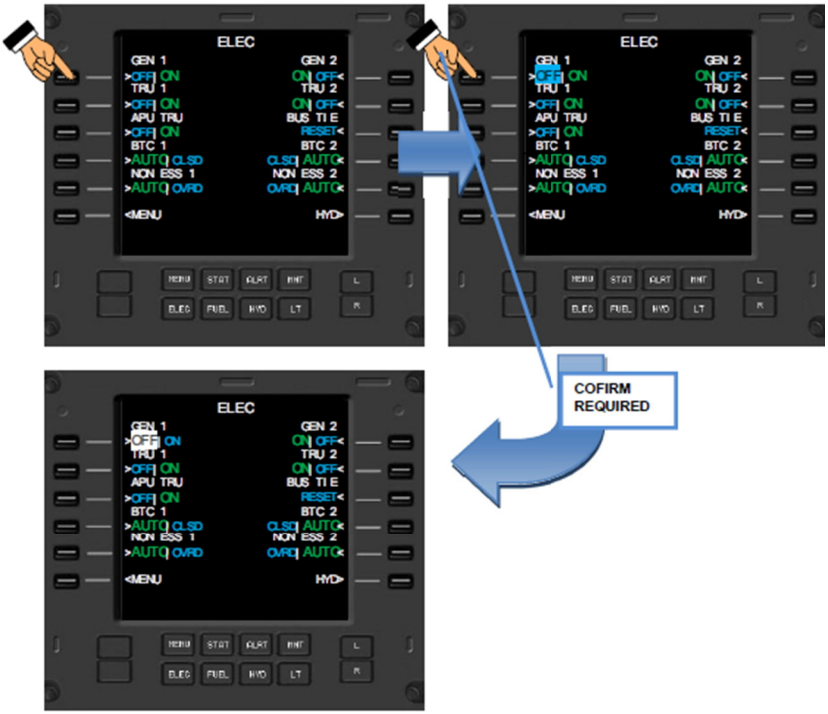
		Description
Page	ELEC	Bus Tie Contactor 2 control, when the DC ESS 2 bus is supplied then the BTC 2 changes to CLSD automatically; therefore, on ground in APU or AC EXT PWR mode, since EMER 2 and ESS 2 busses are supplied, BTC 2 is closed. When BTC 2 is CLSD and ESS 2 bus is supplied also MAIN 2 and MAIN 4 are supplied otherwise the ECDU prevents the pilots from closing the BTC and shows the message DC ESS 2 OFF. When BTC 2 is AUTO the EDCU system lets to EPGDS the authority to drive the BTC 2.
LSK	10	
LSK Type	Toggle	
Header Line	BTC 2	
Data Line	AUTO|CLSD	
Pwr Up Default	AUTO	
Confirm Req'd on	CLSD	
Inverse White on	None	

		Description
Page	ELEC	Non-essential load shedding override, in AUTO the system will shed the non-essential loads when necessary; the pilot can override the load shedding commanding the OVRD; the OVRD command is not allowed if the electrical power generation system is not in shedding condition.
LSK	11	
LSK Type	Toggle	
Header Line	NON ESS 2	
Data Line	AUTO|OVRD	
Pwr Up Default	AUTO	
Confirm Req'd on	None	
Inverse White on	None	

COLOUR CODING EXAMPLE

The following is an example of colour coding related to ELEC page for the:

- Active Option: **BIG GREEN**
- Not Active Option: SMALL CYAN
- Not Operative Active Option: **BIG INVERS VIDEO WHITE**
- Confirm request: **BIG INVERS VIDEO CYAN**



189G4620U001-0063-01

Figure 3-4 Colour coding example

FUEL SYSTEM PAGE

189G4620U001-0064-01

Figure 3-5 FUEL system page

Figure 3-4 shows the FUEL system page. On the FUEL page the pilots can:

– Close and open the engines SOVs
– Force the fuel cross feed valve to open or closed or put it to AUTO giving the system the authority to open or close the valve according to the fuel pressure in the fuel ducts: if the fuel pressure drops in one fuel duct at least then the fuel cross feed valves opens.
– Turn on or off the fuel pumps.

		Description
Page	FUEL	The ENG 1 SOV is bistable valve with two limit switches that provide a full open and full closed feedback signals: • If the two feedback signal are mutually exclusive then the data line (CLSD|OPEN) shows the actual SOV status; if the actual status is not in accordance with commands issued from the pilot an ENG 1 SOV FAIL message appears for 3 second on the scratchpad and the actual SOV status is showed in inverse video amber and latched in that condition until a new command is issued; • If the two feedback signal are not mutually exclusive then the data line (CLSD|OPEN) shows the command status because the SOV status is undetermined; ENG 1 SOV FAIL message appears for 3 second on the scratchpad and the command status is showed in inverse video amber and latched in that condition until a new command is issued.
LSK	1	
LSK Type	Toggle	
Header Line	ENG 1 SOV	
Data Line	CLSD|OPEN	
Pwr Up Default	CLSD	
Confirm Req'd on	CLSD	
Inverse White on	CLSD	

		Description
Page	FUEL	The fuel cross feed valve is the same as fuel engine SOV and the command shows the same behaviour when commanded to OPEN or CLSD both in normal and failure conditions. When the AUTO option is selected the system opens or closes the valve according to the fuel pressure in the fuel ducts: if the fuel pressure drops in one fuel duct at least then the fuel cross feed valves opens. The valve status is displayed on MFD synoptic page and XFEED advisory message appears on the CAS are when the valve is open.
LSK	2, 3, 4	
LSK Type	Vertical Toggle	
Header Line	XFEED	
Data Line	OPEN| AUTO| CLSD	
Pwr Up Default	AUTO	
Confirm Req'd on	OPEN| AUTO| CLSD	
Inverse White on	CLSD	

		Description
Page	FUEL	The FUEL PUMP 1 indication is ON whether the pilots turns ON the pump via ECDU or via APU control panel. The FUEL PUMP 1 can be turned OFF via ECDU if the APU is not running or via APU control panel if the ENG 1 is not running. Figure 3-6 shows the detailed logic.
LSK	5	
LSK Type	Toggle	
Header Line	PUMP 1	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	OFF	
Inverse White on	OFF	

		Description
Page	FUEL	The ENG 2 SOV is bistable valve with two limit switches that provide a full open and full closed feedback signals: • If the two feedback signal are mutually exclusive then the data line (CLSD|OPEN) shows the actual SOV status; if the actual status is not in accordance with commands issued from the pilot an ENG 2 SOV FAIL message appears for 3 second on the scratchpad and the actual SOV status is showed in inverse video amber and latched in that condition until a new command is issued; • If the two feedback signal are not mutually exclusive then the data line (CLSD|OPEN) shows the command status because the SOV status is undetermined; ENG 2 SOV FAIL message appears for 3 second on the scratchpad and the command status is showed in inverse video amber and latched in that condition until a new command is issued.
LSK	7	
LSK Type	Toggle	
Header Line	ENG 2 SOV	
Data Line	CLSD|OPEN	
Pwr Up Default	CLSD	
Confirm Req'd on	CLSD	
Inverse White on	CLSD	

		Description
Page	FUEL	Fuel pump #2 control.
LSK	11	
LSK Type	Toggle	
Header Line	PUMP 2	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	OFF	
Inverse White on	OFF	

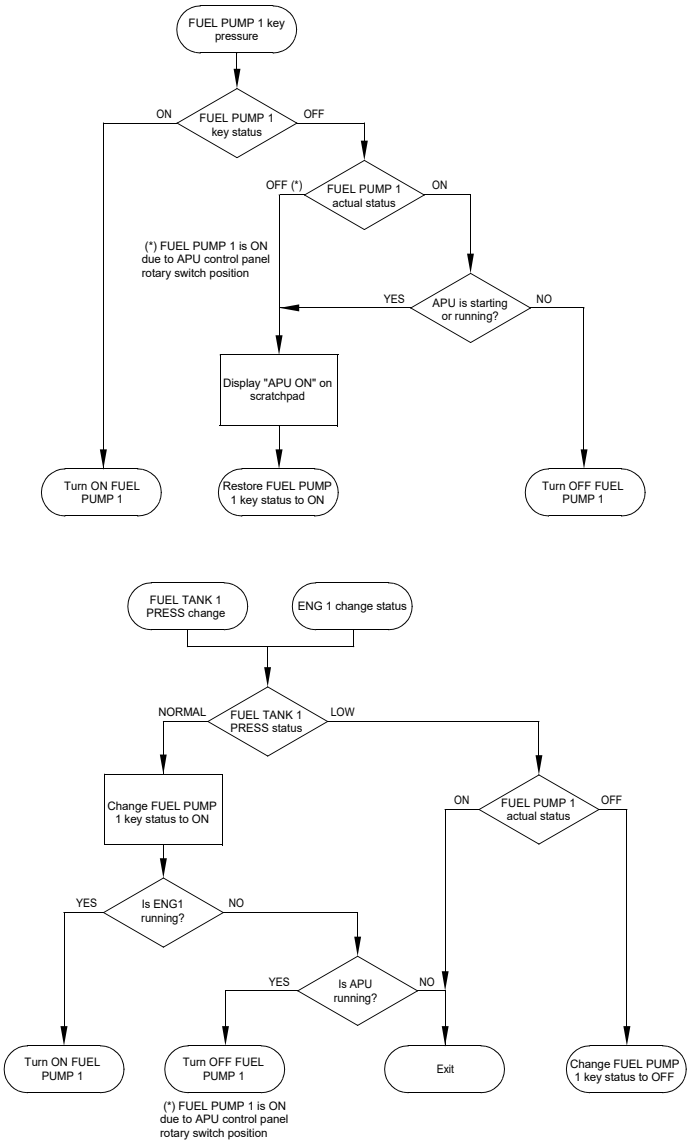


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Figure 3-6 FUEL PUMP 1 key logic

HYDRAULIC PAGE

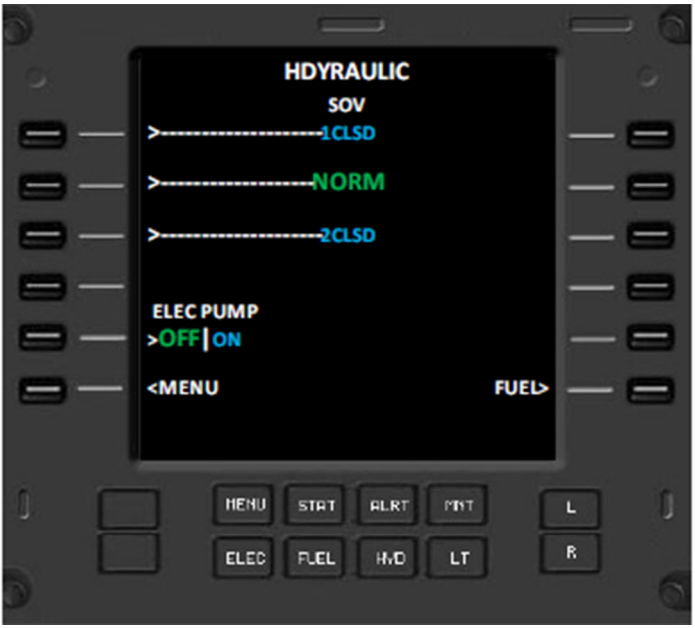

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Figure 3-7 HYDRAULIC system page

Figure 3-7 show the HYDRAULIC system page. On the HYDRAULIC page the pilots can:

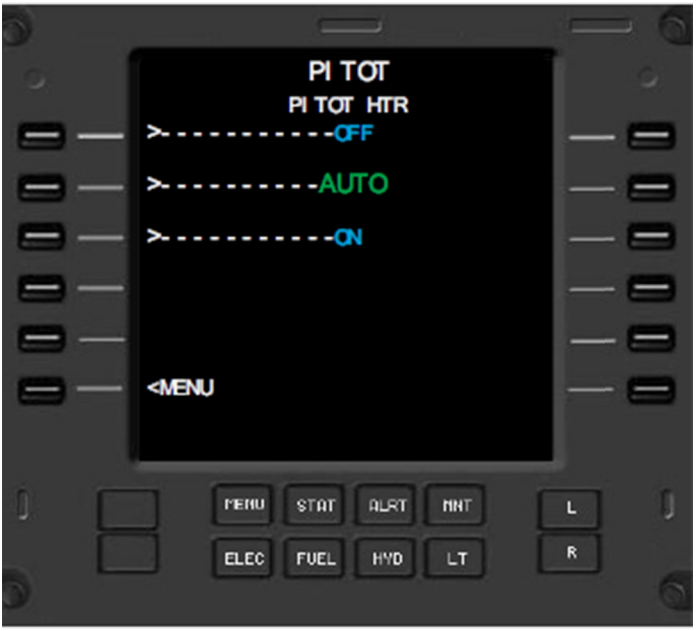
– Close the SOV on the hydraulic circuit 1 or 2 in case of necessity according to the Rotorcraft Flight Manual or Form 59.

– Turn on (and off) the hydraulic ELEC PUMP to perform pre-flight check of the flight controls.

		Description
Page	HYDRAULIC	Hydraulic SOV's control. Hydraulic 1 SOV can be closed only if the oil press in the hydraulic circuit 2 oil pressure is not low and Tail Rotor SOV is not closed. If the Hydraulic 1 SOV is closed and hydraulic circuit 2 oil pressure becomes low or Tail Rotor SOV closes then the Hydraulic 1 SOV automatically re-opens. Hydraulic 2 SOV can be closed only if the oil press in the hydraulic circuit 1 oil pressure is not low. If the Hydraulic 2 SOV is closed and hydraulic circuit 1 oil pressure becomes low then the Hydraulic 2 SOV automatically re-opens.
LSK	1, 2, 3	
LSK Type	Vertical toggle	
Header Line	SOV	
Data Line	1CLSD| NORM| 2CLSD	
Pwr Up Default	NORM	
Confirm Req'd on	1CLSD| 2CLSD	
Inverse White on	1CLSD| 2CLSD	

		Description
Page	HYDRAULIC	Hydraulic electrical pump control. The HYDRAULIC ELEC PUMP can be activated only on ground and is automatically turned off after 2 minutes; if the ELEC PUMP is cycled on and off then it turns off after 2 minutes from the first turn on to protect the pump from overheating. The actual power supply status is displayed.
LSK	5	
LSK Type	Toggle	
Header Line	ELEC PUMP	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	OFF	
Inverse White on	OFF	

PITOTS HEATING PAGE



189G4620U001-0067-01

Figure 3-8 PITOTS HEATING system page

Figure 3-8 shows the PITOTS heating system page. On PITOT page the pilots can:

– Turn on and off the pitots heating system
– Select the auto mode leaving the avionic system turns on the pitots heating system when the OAT is less than 4°C and the helicopter is in flight and turns off the pitots heating system when the OAT is greater than 4°C or the helicopter is on ground.

		Description
Page	PITOT	PITOT's HEATER control, when the PITOT HTR option is: • .OFF: the pitots heating system is forced off; • AUTO: the pitots heating system is turned ON when OAT is less than 4°C and the helicopter is in flight and turned OFF when the OAT is greater than 4°C or the helicopter is on ground • ON: the pitots heating system is forced on.
LSK	1, 2, 3	
LSK Type	Vertical toggle	
Header Line	PITOT HTR	
Data Line	OFF| AUTO| OM	
Pwr Up Default	AUTO	
Confirm Req'd on	None	
Inverse White on	OFF	

ICE PROTECTION PAGE

189G4620U001-0068-01

Figure 3-9 ICE PROTECTION system page

Figure 3-9 shows the ICE PROTECTION page. On the page the pilots can:

– Turn ON/OFF the windshield heating system
– Turn ON/OFF or issue the initiated built-in test for the ice detector
– Turn ON/OFF the generator dedicated to the Ice Protection System
– Turn ON/OFF or issue the initiated built-in test for the Ice Protection System
– Change the IPS MODE from AUTO to MANUAL (and viceversa).

		Description
Page	ICE PROTECTION	Windshield heater control
LSK	1	
LSK Type	Toggle	
Header Line	WSHLD HTR	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	ICE PROTECTION	Ice detector control: OFF, ON.
LSK	3	
LSK Type	Toggle	
Header Line	ICEDET	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	ICE PROTECTION	Ice detector TEST. When TEST is selected the system: • Turn on the ice detector system if it is OFF (the ICEDET key remains OFF but the ICE-DET TST becomes big green indicating the test in progress); if it is already ON then it remains ON. • Issue the initiated built-in test • Leave the ice detector in ON status moving the ICEDET key to ON.
LSK	4	
LSK Type	Executive	
Header Line	ICEDET TST	
Data Line	TEST	
Pwr Up Default	N/A	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	ICE PROTECTION	Dedicated Ice Protection System generator control.
LSK	7	
LSK Type	Toggle	
Header Line	GEN	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	ICE PROTECTION	Ice Protection System control: OFF, ON. The system can be turned OFF if the IPS test is not in progress. When the system is turned ON it is set to AUTO.
LSK	9	
LSK Type	Toggle	
Header Line	SYSTEM	
Data Line	ON|OFF	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	ICE PROTECTION	Ice Protection System TEST. When TEST is selected the system: • Turn on the ice protection system if it is OFF (the ICEDET key remains OFF but the ICE-DET TST becomes big green indicating the test in progress); if it is already ON then it remains ON. • Issue the initiated built-in test • Leave the ice protection system in ON status moving the SYSTEM key to ON and the MODE to AUTO.
LSK	10	
LSK Type	Executive	
Header Line	SYSTEM TST	
Data Line	TEST	
Pwr Up Default	N/A	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	ICE PROTECTION	Ice Protection System control mode control. The system can be turned to OVRD only if it is ON; if the pilot tries to turn the system to OVRD in OFF(TEST) condition the key return to AUTO and the message "ICE PROT SYSTEM OFF"("ICE PROT SYSTEM TEST") appears on the scratchpad.
LSK	12	
LSK Type	Toggle	
Header Line	IPS MODE	
Data Line	OVRD|AUTO	
Pwr Up Default	AUTO	
Confirm Req'd on	None	
Inverse White on	None	

WIPER PAGE

189G4620U001-0069-01

Figure 3-10 WIPER system page

Figure 3-10 shows the WIPER system page. On the wiper page the pilots can:

– Enable the wiper and change the wipers speed
– Change the mode of operation: SINGLE or DUAL.
– Wash the windscreen: light or heavy wash cycle

The wipers are turned on by push button on the control sticks.

		Description
Page	WIPER	Windshield wiper operational mode: • Single: pilot and co-pilot control his own wiper; if both wipers are turned on, they are synchronized. • Dual: pilot and co-pilot control both wipers; the wiper are synchronized.
LSK	1	
LSK Type	Toggle	
Header Line	MODE	
Data Line	SINGLE|DUAL	
Pwr Up Default	DUAL	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	WIPER	Windshield washing cycle control: light or heavy.
LSK	2, 3, 4	
LSK Type	Vertical toggle	
Header Line	WASH	
Data Line	OFF| LIGHT| HEAVY	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	WIPER	Windshield wiper speed control: SLOW and FAST. When OFF is selected the wiper cannot turned on by the push buttons on the control sticks.
LSK	7, 8, 9	
LSK Type	Vertical toggle	
Header Line	SPEED	
Data Line	OFF| SLOW| FAST	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

LIGHTS PAGE

189G4620U001-0070-01

Figure 3-11 LIGHTS system page

Figure 3-11 shows the LIGHTS system page. On the LIGHTS page the pilots can:

- Turn on and off the position/navigation lights.
- Turn on and off the strobe lights.
- Turn on and off the anti-collision lights.
- Turn on and off the lower anti-collision light.
- Convert the lower anti-collision to high intensity strobe light
- Activate the IR mode.

		Description
Page	LIGHTS	Position lights control. The position lights cannot be turned ON in BATTERY MODE and are available in APU MODE only if BTC 1 & 2 are CLSD.
LSK	1	
LSK Type	Toggle	
Header Line	POS	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	OFF	

		Description
Page	LIGHTS	Strobe lights control. The strobe lights cannot be turned on in NVG mode; if the strobe lights are ON and the the NVG mode is activated then they are turned OFF. The strobe lights cannot be turned ON in BATTERY MODE and are available in APU MODE only if BTC 1 & 2 are CLSD.
LSK	2	
LSK Type	Toggle	
Header Line	STROBE	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	LIGHTS	This commands is to revert to following lights to IR mode: steerable search/landing lights, flood lights and hoist light.
LSK	3	
LSK Type	Toggle	
Header Line	IR MODE	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	LIGHTS	Anti-collision light control. The A/COLL light cannot be turned ON in BATTERY MODE and is available in APU MODE only if BTC 1 & 2 are ON.
LSK	7	
LSK Type	Toggle	
Header Line	A/COLL	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	OFF	

		Description
Page	LIGHTS	Lower anti-collision lights control. If the A/COLL is selected ON the this command can be used to select to turn on only the upper anti-collision light or both (upper and lower).
LSK	8	
LSK Type	Toggle	
Header Line	A/COLL SEL	
Data Line	UPPER|BOTH	
Pwr Up Default	UPPER	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	LIGHTS	High Intensity Strobe Light control. If the A/COLL is selected ON and A/COLL SEL is selected to BOTH, the lower anti-collision light is on. In this condition, if in DAY mode, the High Intensity Strobe Light can be turned on.
LSK	9	
LSK Type	Toggle	
Header Line	HISL	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

KIT LIGHTS PAGE

189G4620U001-0071-01

Figure 3-12 KIT LIGHTS page

Figure 3-12 shows the KIT LIGHTS system page. On the KIT LIGHTS page the pilots can:

- Turn on and off the flood lights.
- Turn on and off the main rotor tip lights.
- Turn on and off the tail rotor tip lights.
- Turn on and off the VIP identification lights.
- Turn on and off the logo lights.
- Turn on and off the over door area lights.

		Description
Page	KIT LIGHTS	Flood light control. The flood light is a dual mode, white and IR; the mode is selected by the IR MODE key on the LIGHTS page.
LSK	1	
LSK Type	Toggle	
Header Line	FLOOD	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	KIT LIGHTS	Main rotor tip lights control. The main rotor tip light cannot be turned on in NVG mode.
LSK	2	
LSK Type	Toggle	
Header Line	MAIN TIP	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	KIT LIGHTS	Tail rotor tip lights control. The tail rotor tip light cannot be turned on in NVG mode.
LSK	3	
LSK Type	Toggle	
Header Line	TAIL TIP	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	KIT LIGHTS	VIP identification light control. The VIP identification light cannot be turned on in NVG mode.
LSK	7	
LSK Type	Toggle	
Header Line	VIP IDENT	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	KIT LIGHTS	Logo light control. The logo light cannot be turned on in NVG mode.
LSK	8	
LSK Type	Toggle	
Header Line	LOGO	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	KIT LIGHTS	Over door area light control. The over door area light cannot be turned on in NVG mode. The over door area light turns on automatically in night mode when the footstep is extended.
LSK	9	
LSK Type	Toggle	
Header Line	OVERDOOR	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

COCKPIT LIGHTS PAGE

189G4620U001-0072-01

Figure 3-13 Cockpit lights system page

Figure 3-13 shows the cockpit lights system page. On cockpit lights page the pilots can:

- Dim the instrument panels backlights
- Dim the console panels backlights
- Dim the overhead panels backlights
- Turn on, off and dim the dome light
- Turn on and off the storm lights.

		Description
Page	CKPT LTS	Instrument panels backlight dimming control.
LSK	1, 7	
LSK Type	Trimmer	
Header Line	INSTR	
Data Line	N/A	
Pwr Up Default	0 - OFF	
Confirm Req'd on	N/A	
Inverse White on	N/A	

		Description
Page	CKPT LTS	Interseat console panels backlight dimming control.
LSK	2, 8	
LSK Type	Trimmer	
Header Line	CONSOLE	
Data Line	N/A	
Pwr Up Default	0 - OFF	
Confirm Req'd on	N/A	
Inverse White on	N/A	

		Description
Page	CKPT LTS	Overhead panels backlight dimming control.
LSK	3, 9	
LSK Type	Trimmer	
Header Line	OVERHEAD	
Data Line	N/A	
Pwr Up Default	0 - OFF	
Confirm Req'd on	N/A	
Inverse White on	N/A	

		Description
Page	CKPT LTS	Dome light dimming control.
LSK	4, 10	
LSK Type	Trimmer	
Header Line	DOME	
Data Line	N/A	
Pwr Up Default	0 - OFF	
Confirm Req'd on	N/A	
Inverse White on	N/A	

		Description
Page	CKPT LTS	Storm lights control. The storm lights cannot be turned on in NVG mode.
LSK	8	
LSK Type	Toggle	
Header Line	STORM	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

CABIN LIGHTS PAGE

189G4620U001-0073-01

Figure 3-14 Cabin Lights system page

Figure 3-14 shows the cabin lights system page. On cabin lights page the pilots can:

– Turn on, off and dim the cabin lights and forward the control to the cabin crew

– Turn on and off the cabin signs (fasten seat belt indications) and related sound

– Turn on and off the NO SMOKE indication in the cabin.

		Description
Page	CAB LTS	Fasten seat belt indication control. The fasten seat belt light cannot be turned on in NVG mode.
LSK	1	
LSK Type	Toggle	
Header Line	CABIN SIGN	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	CAB LTS	Cabin lights dimming control. The cabin lights cannot be turned ON in BATTERY MODE and is available in APU MODE only if BTC 1 & 2 are CLSD.
LSK	2, 8	
LSK Type	Trimmer	
Header Line	CAB DIM	
Data Line	N/A	
Pwr Up Default	0 - OFF	
Confirm Req'd on	N/A	
Inverse White on	N/A	

		Description
Page	CAB LTS	No smoke indication control. The no smoke indication light cannot be turned on in NVG mode.
LSK	3	
LSK Type	Toggle	
Header Line	NO SMOKE	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	CAB LTS	If the PLT option is selected only the pilot can dim the cabin lights while if the CAB option is selected then both cabin crew/passengers and pilot can dim the cabin lights.
LSK	10	
LSK Type	Toggle	
Header Line	CTRL SEL	
Data Line	PLT|CAB	
Pwr Up Default	PLT	
Confirm Req'd on	None	
Inverse White on	None	

TRANSMISSION PAGE

189G4620U001-0074-01

Figure 3-15 TRANSMISSION system page

Figure 3-15 shows the TRANSMISSION page. On the TRANSMISSION page the pilots can:

– Activate the transmission chip burn system when requested by the Rotorcraft Flight Manual.

		Description
Page	XMSN	Transmission chip burn activation command.
LSK	1	
LSK Type	Executive	
Header Line	CHIP BURN	
Data Line	BURN	
Pwr Up Default	N/A	
Confirm Req'd on	None	
Inverse White on	N/A	

MISCELLANEOUS PAGE

GENERAL ELECTRICAL ENGINE VERSION

189G4620U001-0075-01

Figure 3-16 Miscellaneous page GE version

Figure 3-16 shows the miscellaneous page. On the miscellaneous page the pilot can:

– Select the regrade mode for audio warning generator to inhibit the LANDING GEAR aural warning.
– Select the engine matching by torque or ITT.

		Description
Page	MISC	Audio warning generator mode: selecting the REGR mode the LANDING GEAR aural warning is inhibited.
LSK	1	
LSK Type	Toggle	
Header Line	AWG	
Data Line	NORM|REGR	
Pwr Up Default	NORM	
Confirm Req'd on	None	
Inverse White on	REGR	

		Description
Page	MISC	Engine matching selection by torque or ITT.
LSK	7	
LSK Type	Toggle	
Header Line	LD SHARE	
Data Line	TEMP|TQ	
Pwr Up Default	TQ	
Confirm Req'd on	None	
Inverse White on	None	

TURBOMECA ENGINE VERSION

189G4620U001-0076-01

Figure 3-17 Miscellaneous page TM version

Figure 3-17 shows the miscellaneous page. On the miscellaneous page the pilot can:

– Select the regrade mode for audio warning generator to inhibit the LANDING GEAR aural warning.
– Select the engine matching by torque or NG.

		Description
Page	MISC	Audio warning generator mode: selecting the REGR mode the LANDING GEAR aural warning is inhibited.
LSK	1	
LSK Type	Toggle	
Header Line	AWG	
Data Line	NORM|REGR	
Pwr Up Default	NORM	
Confirm Req'd on	None	
Inverse White on	REGR	

		Description
Page	MISC	Engine matching selection by torque or NG.
LSK	7	
LSK Type	Toggle	
Header Line	LD SHARE	
Data Line	NG|TQ	
Pwr Up Default	TQ	
Confirm Req'd on	None	
Inverse White on	None	

SOCKETS PAGE

189G4620U001-0077-01

Figure 3-18 SOCKETS page

Figure 3-18 shows the sockets page. On the sockets page the pilot can:

- Turn ON/OFF the 28VDC utility socket
- Turn ON/OFF the 230VAC utility socket
- Turn ON/OFF the auxiliary chargers: USB, electronic flight bag, sitcom cradle charger.

		Description
Page	SOCKETS	Cabin 28VDC sockets control.
LSK	1	
LSK Type	Toggle	
Header Line	CAB VDC	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	SOCKETS	Cabin 230VAC sockets control.
LSK	3	
LSK Type	Toggle	
Header Line	CAB VAC	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	SOCKETS	The auxiliary chargers control: USB, electronic flight bag, sitcom cradle charger.
LSK	7	
LSK Type	Toggle	
Header Line	AUX CHRGRS	
Data Line	OFF|ON	
Pwr Up Default	ON	
Confirm Req'd on	None	
Inverse White on	None	

CABIN SYSTEM PAGE

189G4620U001-0078-01

Figure 3-19 CABIN systems page

Figure 3-19 shows the cabin system page. On the cabin system page the pilot can:

- Select the regrade mode for audio warning generator to inhibit the LANDING GEAR aural warning.
- Turn ON/OFF the external camera.
- Turn ON/OFF the rotor track and balance camera.
- Isolate the passengers form the pliot's and cabin crew ICS circuit.
- Turn ON/OFF the HOIST ICS.
- Turn ON/OFF the In-flight Entertainment System (IES)
- Turn ON/OFF the 28VDC utility socket
- Turn ON/OFF the 230VAC utility socket

		Description
Page	CABIN	Cabin management system cut-off.
LSK	1	
LSK Type	Toggle	
Header Line	CMS PWR	
Data Line	OFF|ON	
Pwr Up Default	ON	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	CABIN	Electro-medical systems cut-off.
LSK	2	
LSK Type	Toggle	
Header Line	EMS PWR	
Data Line	OFF|ON	
Pwr Up Default	ON	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	CABIN	Visual/audio passenger address system cut-off.
LSK	3	
LSK Type	Toggle	
Header Line	AIR SHOW	
Data Line	OFF|ON	
Pwr Up Default	ON	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	CABIN	ICS passenger isolation. The PAX ISO function can activated/deactivated both via ECDU or push buttons in the cabin; if the function is activated/ deactivated by the push button in the cabin then the toggle switch on the ECDU will change status, vice versa if the function is activated/deactivated by the ECDU toggle switch then a light on the push button will lit up to return the PAX ISO function status. The indication on the ECDU is the actual status.
LSK	7	
LSK Type	Toggle	
Header Line	PAX ISO	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	CABIN	Hoist intercommunication handset device control.
LSK	8	
LSK Type	Toggle	
Header Line	ICS HOIST	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	CABIN	Cabin handset call.
LSK	9	
LSK Type	Executive	
Header Line	HANDSET	
Data Line	CALL	
Pwr Up Default	N/A	
Confirm Req'd on	None	
Inverse White on	N/A	

		Description
Page	CABIN	Cabin V/UHF control panel control, this command allows the pilot to give the V/UHF control to mission console cabin operator.
LSK	10	
LSK Type	Toggle	
Header Line	V/UHF	
Data Line	CKPT|CAB	
Pwr Up Default	CKPT	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	CABIN	Footstep forced retraction. In the AUTO option is selected the footstep will extend or retracted according to flight or ground condition, if the RETR option is selected then the footstep is forced retracted.
LSK	11	
LSK Type	Toggle	
Header Line	FOOTSTEP	
Data Line	AUTO|RETR	
Pwr Up Default	AUTO	
Confirm Req'd on	None	
Inverse White on	None	

CAMERAS PAGE

189G4620U001-0079-01

Figure 3-20 CAMERAS page

Figure 3-20 shows the cameras page. On the cameras page the pilot can:

- Turn on or off the tail fin camera
- Turn off or on the rotor track and balance camera
- Turn on or off the enhanced video system and inhibit the its colour calibration.

		Description
Page	CAMERAS	Tail fin camera control.
LSK	1	
LSK Type	Toggle	
Header Line	TAIL	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	CAMERAS	Rotor track and balance camera control.
LSK	3	
LSK Type	Toggle	
Header Line	TRK N BAL	
Data Line	OFF|ON	
Pwr Up Default	ON	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	CAMERAS	Enhanced video system camera control.
LSK	7	
LSK Type	Toggle	
Header Line	EVS	
Data Line	OFF|ON	
Pwr Up Default	OFF	
Confirm Req'd on	None	
Inverse White on	None	

		Description
Page	CAMERAS	Enhanced video system camera colour calibration inhibit control: selecting the OFF option the colour calibration is inhibited.
LSK	8	
LSK Type	Toggle	
Header Line	EVS CAL	
Data Line	AUTO|OFF	
Pwr Up Default	AUTO	
Confirm Req'd on	None	
Inverse White on	None	

TEST PAGE

189G4620U001-0080-01

Figure 3-21 TEST page

Figure 3-21 shows the pre-flight check test page. On the test page the pilot can:

- Issue the ENG 1, ENG 2, APU and BAG FIRE test.
- Issue the Audio Warning Generator short and long test.
- Issue the LAMP test.
- Issue the XMS OIL LEVEL test.
- Issue the ENGINE AIR INTAKE test.

		Description
Page	TEST	Fire detection system test. Issuing the command, the ENG 1 FIRE test, ENG 2 FIRE test, APU FIRE test and BAG FIRE test are performed; the tests last about 16 seconds. BAG FIRE test is not available in BATTERY MODE.
LSK	1	
LSK Type	Executive	
Header Line	FIRE	
Data Line	TEST	
Pwr Up Default	N/A	
Confirm Req'd on	None	
Inverse White on	N/A	

		Description
Page	TEST	Lamps test. Issuing the command, the LAMP test is performed; the test lasts 10 seconds. To perform a complete LAMP test, issue the command in DC EXT PWR or APU MODE or with both GEN's ON.
LSK	3	
LSK Type	Executive	
Header Line	LAMP	
Data Line	TEST	
Pwr Up Default	N/A	
Confirm Req'd on	None	
Inverse White on	N/A	

		Description
Page	TEST	Engine air intake heating system test. Issuing the command, the ENG INTK test is performed; the test lasts 21 seconds; the results of the test appear on the PFD. Not available in BATTERY but in APU MODE.
LSK	5	
LSK Type	Executive	
Header Line	ENG INTK	
Data Line	TEST	
Pwr Up Default	N/A	
Confirm Req'd on	None	
Inverse White on	N/A	

		Description
Page	TEST	Aural warning generator short test: only "AWG system test" is generated. Issuing the command, the AURAL SHORT test is performed. Not available in BATTERY and is available in APU MODE only if BTC 1 & 2 are CLSD.
LSK	7	
LSK Type	Executive	
Header Line	AURAL SHORT	
Data Line	TEST	
Pwr Up Default	N/A	
Confirm Req'd on	None	
Inverse White on	N/A	

		Description
Page	TEST	Aural warning generator long test: all warnings are generated. Issuing the command, the AURAL SHORT test is performed. Not available in BATTERY and is available in APU MODE only if BTC 1 & 2 are CLSD.
LSK	9	
LSK Type	Executive	
Header Line	AURAL LONG	
Data Line	TEST	
Pwr Up Default	N/A	
Confirm Req'd on	None	
Inverse White on	N/A	

		Description
Page	TEST	Transmission oil level test. Issuing the command, the XMS OIL LVL test is performed; the test lasts 7 seconds but the caution appears on PFD during the last 2 seconds. Not available in BATTERY and is available in APU MODE only if BTC 1 & 2 are CLSD.
LSK	11	
LSK Type	Executive	
Header Line	XMS OIL LEVEL	
Data Line	TEST	
Pwr Up Default	N/A	
Confirm Req'd on	None	
Inverse White on	N/A	

ECDU SCRATCHPAD MESSAGE DEFINITIONS

MESSAGE	DEFINITION
A/COLL OFF	The pilot is trying to turn on the HISL or the lower anti-collision light with the upper anti-collision light off.
A/COLL UPPER SELECTED	The pilot is trying to turn on the HISL or the lower anti-collision light with anti-collision selector in UPPER position.
APU ON	The pilot is trying to turn off the fuel pump #1 while the APU is running. The APU running condition is detected when the APU fuel shut off valve is open.
X ALRT PENDING	One or more CB(s) have tripped (TRIP)or failed (FAIL).
CMD NOT EXECUTED	The issued command was not executed due to either: • The command was issued more than once and the first command is still in progress • The associated REPU is not available due to not being powered • System failure.
CMD NOT ALLOWED	The command issued is not permitted due to a system interlock.
ENG 1(2) SOV FAIL	The system cannot open/close the fuel SOV. Check MFD ENG Synoptic page for fuel SOV position.
XFEED VLV FAIL	The system cannot open/close the fuel XFEED valve. Check PFD for FUEL XFEED advisory.
ENG 1(2) FIRE ARMED	The ENG 1(2) SOV cannot be operated due to the ENG 1(2) FIRE ARMED push-button pressed on the FIRE control panel.
ICE PROT SYSTEM OFF	The pilot is trying to select the IPS OVRD mode while the IPS is OFF.
ICE PROT STSTEM TEST	The pilot is trying to select the IPS OVRD mode while the IPS is performing the I-BIT. The test option is momentary and lasts during the whole test time; at the end of the test the IPS selector goes to the ON position.
NEW ALRT(S) PENDING	One CB has tripped (TRIP) or failed(FAIL).
NIGHT MODE	The pilot is trying to turn on a light that cannot be turned on in NIGHT MODE. Up to now it is applicable only to HISL.
NVG MODE	The selected light may not operate as the light are selected to NVG mode.
DC ESS 1(2) OFF	The BTC 1(2) cannot be closed as the DC ESS 1(2) is not powered.

Table 3-1 ECDU scratchpad message definitions

SECTION IV
EMERGENCY PROCEDURE

AW149/189 SSEPMS EMERGENCY PROCEDURES

ECDU CIRCUIT BREAKER RESET PROCEDURE

The tripping (TRIP) of an ECDU managed Circuit Breaker (CB) or a failure to recognise the CB status (FAIL) will be indicated by a 'NEW ALERT PENDING' for a single failure or '# ALRT PENDING' for multiple failure message on the ECDU Scratch pad.

A reset of a TRIPped CB can be attempted 2 times, if necessary, which if unsuccessful to re engage the CB will result in a FAIL status.

A failed (FAIL) CB status, whether illuminated after a failed reset procedure or if causing the original ALERT message, cannot be reset.

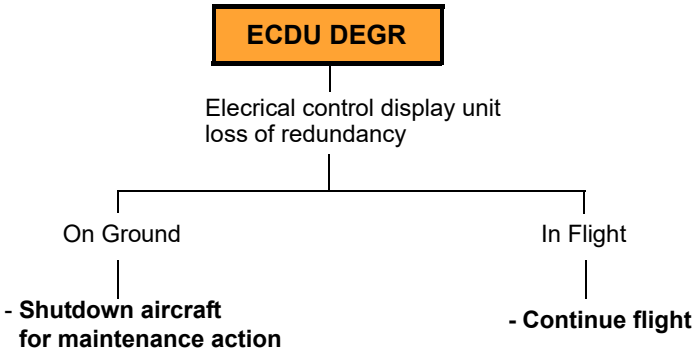
To reset TRIPped CB carry out the following procedure:

1. Press the ALRT button on the ECDU keypad to display the ALERT page.
2. Press button on the RH side of the relevant tripped CB.
3. Confirm the CB goes to OUT status.
4. Press, the button on the RH side relevant to tripped CB again.
5. Confirm the CB that had TRIPped is removed from the page.
6. If the CB is not removed from the ALERT page then repeat step 3 to 5 again, if required.
7. If CB is not removed from the ALERT page then confirm that the CB goes to FAIL status. Further action for this CB is not possible.

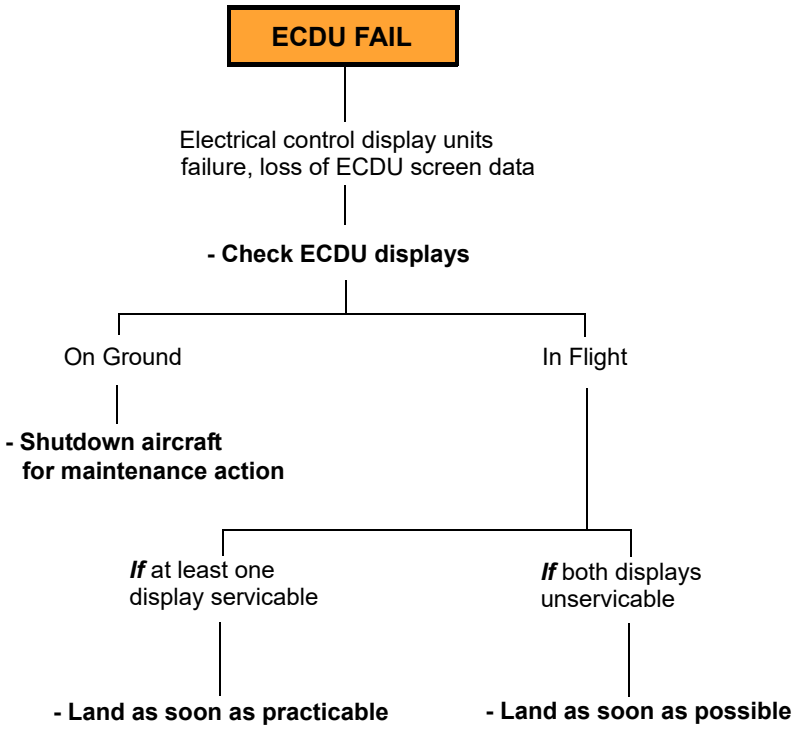
Note

On ground only the reset may be repeated more than twice, however, unless the reason for the TRIP is resolved it is not recommended to perform a reset more than twice.

ELECTRICAL CONTROL DISPLAY UNIT DEGRADED



ELECTRICAL CONTROL DISPLAY UNIT FAILURE



Note

In case of ECDU failure disregard MAIN 1 & 2 ESS 1 & 2 and NON ESS 1 & 2 BUS status on MFD ELEC Synoptic page.

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APPENDIX A

LIST OF ACRONYMS

ALS	Ambient Light Sensor
APSW	Application Software
BCD	Binary Coded Decimal
BIT	Built In Test
CRC	Cyclic Redundant Code
DU	Display Unit
ECDU	Electrical Control and Display Unit
EQSW	Equipment Software
ES-CFG	Electrical System Configuration File Generator
ES-HCM	Electrical System HMI Configuration Manager
ES-IOCM	Electrical System I/O Configuration Manager
ES-BFAM	Electrical System Basic Functionalities Assembly Manager
IBIT	Power-On Built In Test
HMI	Human Machine Interface
IOM	I/O Module
LRU	Locatable Replaceable Unit
NVRAM	Non Volatile Random Access Memory
PDL	Procedure Description Language
REPU	Remote Electrical Power Unit
SSEPMS	Solid State Electrical Power Management System
SSPC	Solid State Power Controller
BSP	Board Support Package
IBSP	Integrate Board Support Package

Table AppA-1 List of acronyms

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