smiths

THALES

New FM REV 1 Pilot's Guide

A318 / A319 / A320 / A321

Aerospace Division

FOREWORD

Contents

PAGE INTENTIONALLY LEFT BLANK

DISCLAIMER

For the purpose of this Disclaimer, the term "User" means any person, individual, company (whether state-owned or private and whether incorporated or not) or government, on their own behalf as well as on behalf of their directors, officers, representatives, employees or agents, which is having or is going to have the direct or indirect usage of the A318/A319/A320/A321 New FM Pilot's Guide (hereinafter referred to as the "Pilot's Guide").

The Pilot's Guide is intended for the User's informal information only, related to the behavior in an operational environment of the system's "REV 1" version.

FOR OFFICIAL INFORMATION AND PROCEDURES, THE USER MUST ALWAYS REFER TO DOCUMENTS APPROVED BY AIRWORTHINESS AUTHORITIES, TRAINING AUTHORITIES, AND INCLUDING BUT NOT LIMITED TO THE AIRBUS FCOM (FLIGHT CREW OPERATING MANUAL), AFM (AIRCRAFT FLIGHT MANUAL), AND YOUR AIRLINE'S SOP (STANDARD OPERATING PROCEDURES).

Interpretation and implementation of the Pilot's Guide (including without limitation the content, illustration, texts, legends, figures, examples or the combination thereof) or any part thereof for any purpose related to the use of any device, display or function described therein shall be at the User's sole risks.

Thales Avionics disclaims any liability whatsoever for any appropriation or use of this Pilot's Guide directly or indirectly in relation with or for the purpose of any criminal, terrorist or whatever malevolent actions on the part of individuals or groups which may have access to this Pilot's Guide or part thereof by any means.

Whilst every effort has been made to ensure the high quality and accuracy of the information enclosed, THALES AVIONICS MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THIS PILOT'S GUIDE AND THE CONTENT THEREOF. THALES AVIONICS EXPRESSLY DISCLAIMS ALL WARRANTIES, INCLUDING BUT NOT LIMITED TO WARRANTIES OF ACCURACY, COMPLETENESS, OR FITNESS FOR A PARTICULAR OR INTENDED PURPOSE.

IN NO EVENT SHALL THALES AVIONICS, ITS AFFILIATES, PARTNERS OR OTHER SUPPLIERS BE LIABLE FOR DIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING DIRECTLY OR INDIRECTLY FROM THE USE OF (OR FAILURE TO USE) OR RELIANCE ON THE PILOT'S GUIDE, EVEN IF THALES AVIONICS HAS BEEN ADVISED OF THE POSSIBILITY THAT SUCH DAMAGES MAY ARISE.

THE USER HEREBY EXPRESSLY WAIVES ALL RIGHTS OF RECOURSE AND SHALL INDEMNIFY AND HOLD HARMLESS THALES AVIONICS, ITS AFFILIATES, PARTNERS OR OTHER SUPPLIERS (INCLUDING THEIR RESPECTIVES INSURERS) AGAINST ANY AND ALL CLAIMS, DEMANDS, LIABILITIES, EXPENSES OR COSTS (INCLUDING BUT NOT LIMITED TO ATTORNEY FEES), TO WHICH THALES AVIONICS ITS AFFILIATES, PARTNERS OR OTHER SUPPLIERS THEIR OFFICERS OR ANY PERSON EMPLOYED BY THEM MIGHT BE DIRECTLY OR INDIRECTLY HELD LIABLE AS A CONSEQUENCE OF (I) ANY LOSS OF OR DAMAGE TO PROPERTY EITHER LEASED OR OWNED BY THE USER (INCLUDING ANY AIRCRAFT) ITS OFFICERS, AGENTS OR EMPLOYEES OR THEIR SUCCESSORS OR THE PROPERTY OF ANY THIRD PARTY OR (II) ANY INJURY OR HARM (INCLUDING DEATH) SUFFERED BY ANY PERSON, INCLUDING THE USER'S OFFICERS, AGENTS OR EMPLOYEES AND THIRD PARTIES, WHICH MAY BE OR ARE PROVEN TO BE DIRECTLY OR INDIRECTLY CAUSED BY OR SUFFERED AS A RESULT THE USE OF THIS PILOT'S GUIDE.

CONTACT

For any discrepancy, omission or error found in this manual, to order additional copies, to be notified of further revisions,

PLEASE CONTACT:

techpubs.frontoffice@fr.thalesgroup.com

Technical Publications Department
18, Avenue du Maréchal Juin - B.P. 49
92362 Meudon-la-Forêt Cedex
France
Tel : + 33-1-39-45-50-00
Fax : + 33-1-39-45-58-71

AUTHORS' NOTE

The THALES NEW FM as installed on A318/319/320/321 aircraft is part of the Flight Management & Guidance System (FMGS), which provides Flight Management (FM) and Flight Guidance (FG) functions.

This guide was written by pilots for pilots. It provides information on utilization of the Flight Management (FM) functions of the FMGS.

It is primarily intended for system familiarization during the initial phases of training on type, and as a reference aid during line operations.

It does not replace the AIRBUS approved procedures specified in the FCOM and OPERATORS' manuals, which take precedence.

PAGE INTENTIONALLY LEFT BLANK

1. STRUCTURE OF GUIDE

1.1. CONTENTS

1.2. GUIDE ORGANIZATION

Guide objectives

The THALES FMS Pilot's Guide is operationally oriented and describes the tasks performed by the pilots during flight (from preparation to shut-down). The guide reflects the principle that only relevant need-to-know information is presented. Nice-to-know information has been restricted to such instances where questions might be raised by the user. All technical details not required for operational use are omitted.

Guide description

This guide consist of a Foreword, 5 Parts and a fold-out showing the full MCDU. Parts are divided into chapters and subjects. Tab dividers showing Part titles and numbers are provided for prompt identification.

Part I - GENERAL DESCRIPTION is an overview of the FMGS and its philosophy, FMGC operation, MCDU functions and operations (for Abbreviations see PART V - Appendices).

Part II – FLIGHT-PHASES is a description of the pilot's tasks during a normal flight from preflight through takeoff, climb, descent and approach to landing and go-around. Examples of data entered, based on a sample flight scenario, are given to assist clarity.

Part III – MULTIPHASE FUNCTIONS is a description of FM operations which can be performed in the same way during different flight phases.

Part IV –DEGRADED OPERATION is a description of FM operation in case of FMGS anomalies or downgraded configuration.

Part V – APPENDICES provide summaries of FM messages (ND, PFD, MCDU), MCDU data format. as well as acronyms and abbreviations.

At the end of Guide an INDEX enabling quick access to specific information and fold-out showing the full MCDU, are provided in order to assist the reader.

Aircraft applicability

This guide is applicable to the complete Airbus Single Aisle (SA) family A318/319/320/321 equipped with THALES FMS2 – REV1 version.

An A320-200 with CFM engines, GPS and DATALINK has been used as reference.

Variants in aircraft configuration and in operators' options are covered where they affect the crew tasks.

1.3. GUIDE UPDATING

Revision

Revisions will be distributed whenever necessary. The revision date is shown only on the page affected by the revision. Revised text and/or illustrations are indicated by a vertical black line along the outside margin of the page, opposite revised, added or deleted material.
On pages where a black line is not appropriate to identify revised, added or deleted material, a black pointing hand will be used. Changes in capitalization, spelling, punctuation or the physical location of material on a page will not be identified by a symbol.
Appropriate revision pages with the related List of Effective Pages will be provided when revising the basic document.

Obtaining Revisions:
The user should check that the approval dates of pages in the manual are the same as shown in the List of Effective Pages for that page. If any page is missing or shows an incorrect approval date, the user has to apply for replacements.

Record of Revisions

The Record of Revisions contains revision date, short description, and additional columns for date inserted and incorporator's initials.
Revisions are issued on the assumption that previous revisions have been incorporated.

List of Effective Pages

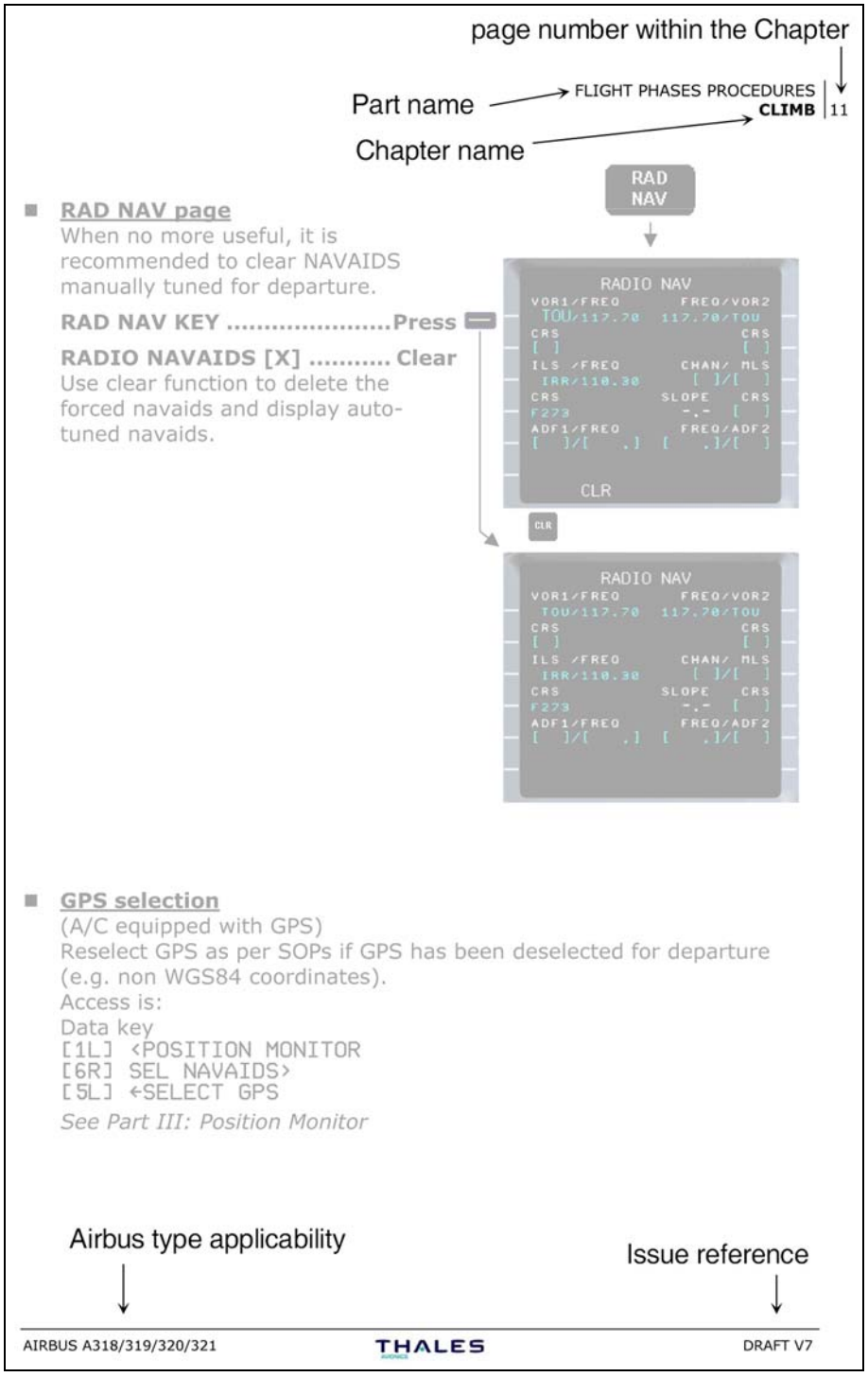
The List of Effective Pages enables the user to determine that the manual is up-to-date, with all revisions incorporated and all deleted pages removed. The contents of this guide must at all times comply with the contents as given on the List of Effective Pages.

1.4. CONVENTIONS USED IN THE GUIDE

As you progress through this guide, you will encounter some standard conventions intended to make the guide easier to read.

Page identification

The head of each page presents Part name and Chapter name. Page identification consists of the standard page numbering within the chapter. The issue reference is placed in the lower right/left corner. Information concerning AIRBUS type applicability appears in the lower left/right corner



A normal blank page within a page block is identified with the phrase:

INTENTIONALLY LEFT BLANK

■ Text format

☐ Figures

Tables, illustration, and drawings are not identified. They always illustrate adjacent text.

☐ Cautions

When it has been considered necessary to include a caution, for example to advise of the consequences of an incorrect action, this is identified by a **Caution** indication and the relevant text is boxed.

Example:

Caution

Data entered in the scratchpad should be carefully checked before pressing the relevant Line Select Key.

☐ Pilot's actions

All of the pilot's actions in this guide are presented as the action sequence consisting of a control or display element and an action verb. These actions are written using bold font.

The possible pilot's actions are:

ACTION	**Description and example**
Enter Ex:	means keying in information in MCDU scratchpad then pressing the specified LSK to insert this entry into the required data field. **COST INDEX [5L] .....Enter** This Action allows to enter the cost index written in the scratchpad by pressing the LSK 5L.
Press Ex:	means pressing specified MCDU key. **INIT key ..... Press**
Check Ex:	means verifying a value displayed on the MCDU, PFD, ND or ECAM. **GPS PRIMARY .....Check**
Scroll Ex:	means using the MCDU slew key to adjust a value. Vertical slew keysScroll
Select Ex:	means choosing the appropriate value or option. **FCU SPEED .....Select / Pull**

ACTION	**Description and example**
Pull	means pulling a rotary knob on FCU to obtain selected guidance.
Ex:	**FCU ALT ..... Pull**
Push	means pushing a rotary knob on FCU to obtain managed guidance
Ex:	**FCU ALT ..... Select / Push**

☐ Supplementary information

Details not essential for operational use are omitted. Additional information which may be of interest is provided in italic text.

☐ Terminology

Technical terms appearing through the guide are listed in the Abbreviations in Appendices.

2. RECORD OF REVISIONS

Revision Reference	Description	Date inserted	Initials
J43126AA 00	First release.	DEC 2004	

PAGE INTENTIONALLY LEFT BLANK

3. LIST OF EFFECTIVE PAGES

Issue 1 - DECEMBER 2004

■ FOREWORD

FOREWORD	PAGE	REVISION
NOTICE	1	J43126AA 00
NOTICE	2	J43126AA 00
STRUCTURE OF GUIDE	1	J43126AA 00
STRUCTURE OF GUIDE	2	J43126AA 00
STRUCTURE OF GUIDE	3	J43126AA 00
STRUCTURE OF GUIDE	4	J43126AA 00
STRUCTURE OF GUIDE	5	J43126AA 00
STRUCTURE OF GUIDE	6	J43126AA 00
STRUCTURE OF GUIDE	7	J43126AA 00
STRUCTURE OF GUIDE	8	J43126AA 00
REVISIONS	1	J43126AA 00
REVISIONS	2	J43126AA 00
LIST OF EFFECTIVE PAGES	1	J43126AA 00
LIST OF EFFECTIVE PAGES	2	J43126AA 00
LIST OF EFFECTIVE PAGES	3	J43126AA 00
LIST OF EFFECTIVE PAGES	4	J43126AA 00
LIST OF EFFECTIVE PAGES	5	J43126AA 00
LIST OF EFFECTIVE PAGES	6	J43126AA 00
LIST OF EFFECTIVE PAGES	7	J43126AA 00
LIST OF EFFECTIVE PAGES	8	J43126AA 00
LIST OF EFFECTIVE PAGES	9	J43126AA 00
LIST OF EFFECTIVE PAGES	10	J43126AA 00
LIST OF EFFECTIVE PAGES	11	J43126AA 00
LIST OF EFFECTIVE PAGES	12	J43126AA 00
LIST OF EFFECTIVE PAGES	13	J43126AA 00
LIST OF EFFECTIVE PAGES	14	J43126AA 00
LIST OF EFFECTIVE PAGES	15	J43126AA 00
LIST OF EFFECTIVE PAGES	16	J43126AA 00
LIST OF EFFECTIVE PAGES	17	J43126AA 00
LIST OF EFFECTIVE PAGES	18	J43126AA 00

■ PART I – GENERAL DESCRIPTION

PART I - GENERAL DESCRIPTION	PAGE	REVISION
CONTENTS	1	J43126AA 00
CONTENTS	2	J43126AA 00
INTRODUCTION	1	J43126AA 00
INTRODUCTION	2	J43126AA 00
SYSTEM OVERVIEW	1	J43126AA 00
SYSTEM OVERVIEW	2	J43126AA 00
SYSTEM OVERVIEW	3	J43126AA 00
SYSTEM OVERVIEW	4	J43126AA 00
SYSTEM OVERVIEW	5	J43126AA 00
SYSTEM OVERVIEW	6	J43126AA 00
SYSTEM OVERVIEW	7	J43126AA 00
SYSTEM OVERVIEW	8	J43126AA 00
SYSTEM OVERVIEW	9	J43126AA 00
SYSTEM OVERVIEW	10	J43126AA 00
FMGS OPERATION	1	J43126AA 00
FMGS OPERATION	2	J43126AA 00
FMGS OPERATION	3	J43126AA 00
FMGS OPERATION	4	J43126AA 00
FMGS OPERATION	5	J43126AA 00
FMGS OPERATION	6	J43126AA 00
FMGS OPERATION	7	J43126AA 00
FMGS OPERATION	8	J43126AA 00
FMGS OPERATION	9	J43126AA 00
FMGS OPERATION	10	J43126AA 00
FMGS OPERATION	11	J43126AA 00
FMGS OPERATION	12	J43126AA 00
FMGS OPERATION	13	J43126AA 00
FMGS OPERATION	14	J43126AA 00
FMGS OPERATION	15	J43126AA 00
FMGS OPERATION	16	J43126AA 00
FMGS OPERATION	17	J43126AA 00
FMGS OPERATION	18	J43126AA 00
MCDU	1	J43126AA 00
MCDU	2	J43126AA 00
MCDU	3	J43126AA 00
MCDU	4	J43126AA 00
MCDU	5	J43126AA 00
MCDU	6	J43126AA 00
MCDU	7	J43126AA 00
MCDU	8	J43126AA 00
MCDU	9	J43126AA 00

PART I - GENERAL DESCRIPTION	PAGE	REVISION
MCDU	10	J43126AA 00
MCDU	11	J43126AA 00
MCDU	12	J43126AA 00
MCDU	13	J43126AA 00
MCDU	14	J43126AA 00
MCDU	15	J43126AA 00
MCDU	16	J43126AA 00
MCDU	17	J43126AA 00
MCDU	18	J43126AA 00

■ PART II - FLIGHT PHASE PROCEDURES

PART II - FLIGHT PHASE PROCEDURES	PAGE	REVISION
CONTENTS	1	J43126AA 00
CONTENTS	2	J43126AA 00
FLIGHT PLAN SCENARIO	1	J43126AA 00
FLIGHT PLAN SCENARIO	2	J43126AA 00
FLIGHT PLAN SCENARIO	3	J43126AA 00
FLIGHT PLAN SCENARIO	4	J43126AA 00
FLIGHT PLAN SCENARIO	5	J43126AA 00
FLIGHT PLAN SCENARIO	6	J43126AA 00
PREFLIGHT	1	J43126AA 00
PREFLIGHT	2	J43126AA 00
PREFLIGHT	3	J43126AA 00
PREFLIGHT	4	J43126AA 00
PREFLIGHT	5	J43126AA 00
PREFLIGHT	6	J43126AA 00
PREFLIGHT	7	J43126AA 00
PREFLIGHT	8	J43126AA 00
PREFLIGHT	9	J43126AA 00
PREFLIGHT	10	J43126AA 00
PREFLIGHT	11	J43126AA 00
PREFLIGHT	12	J43126AA 00
PREFLIGHT	13	J43126AA 00
PREFLIGHT	14	J43126AA 00
PREFLIGHT	15	J43126AA 00
PREFLIGHT	16	J43126AA 00
PREFLIGHT	17	J43126AA 00
PREFLIGHT	18	J43126AA 00
PREFLIGHT	19	J43126AA 00
PREFLIGHT	20	J43126AA 00
PREFLIGHT	21	J43126AA 00

PART II - FLIGHT PHASE PROCEDURES	PAGE	REVISION
PREFLIGHT	22	J43126AA 00
PREFLIGHT	23	J43126AA 00
PREFLIGHT	24	J43126AA 00
PREFLIGHT	25	J43126AA 00
PREFLIGHT	26	J43126AA 00
PREFLIGHT	27	J43126AA 00
PREFLIGHT	28	J43126AA 00
PREFLIGHT	29	J43126AA 00
PREFLIGHT	30	J43126AA 00
PREFLIGHT	31	J43126AA 00
PREFLIGHT	32	J43126AA 00
PREFLIGHT	33	J43126AA 00
PREFLIGHT	34	J43126AA 00
PREFLIGHT	35	J43126AA 00
PREFLIGHT	36	J43126AA 00
PREFLIGHT	37	J43126AA 00
PREFLIGHT	38	J43126AA 00
PREFLIGHT	39	J43126AA 00
PREFLIGHT	40	J43126AA 00
PREFLIGHT	41	J43126AA 00
PREFLIGHT	42	J43126AA 00
PREFLIGHT	43	J43126AA 00
PREFLIGHT	44	J43126AA 00
PREFLIGHT	45	J43126AA 00
PREFLIGHT	46	J43126AA 00
TAKEOFF	1	J43126AA 00
TAKEOFF	2	J43126AA 00
TAKEOFF	3	J43126AA 00
TAKEOFF	4	J43126AA 00
TAKEOFF	5	J43126AA 00
TAKEOFF	6	J43126AA 00
TAKEOFF	7	J43126AA 00
TAKEOFF	8	J43126AA 00
TAKEOFF	9	J43126AA 00
TAKEOFF	10	J43126AA 00
CLIMB	1	J43126AA 00
CLIMB	2	J43126AA 00
CLIMB	3	J43126AA 00
CLIMB	4	J43126AA 00
CLIMB	5	J43126AA 00
CLIMB	6	J43126AA 00
CLIMB	7	J43126AA 00
CLIMB	8	J43126AA 00
CLIMB	9	J43126AA 00
CLIMB	10	J43126AA 00
CLIMB	11	J43126AA 00

PART II - FLIGHT PHASE PROCEDURES	PAGE	REVISION
CLIMB	12	J43126AA 00
CLIMB	13	J43126AA 00
CLIMB	14	J43126AA 00
CLIMB	15	J43126AA 00
CLIMB	16	J43126AA 00
CLIMB	17	J43126AA 00
CLIMB	18	J43126AA 00
CLIMB	19	J43126AA 00
CLIMB	20	J43126AA 00
CLIMB	21	J43126AA 00
CLIMB	22	J43126AA 00
CLIMB	23	J43126AA 00
CLIMB	24	J43126AA 00
CLIMB	25	J43126AA 00
CLIMB	26	J43126AA 00
CLIMB	27	J43126AA 00
CLIMB	28	J43126AA 00
CLIMB	29	J43126AA 00
CLIMB	30	J43126AA 00
CRUISE	1	J43126AA 00
CRUISE	2	J43126AA 00
CRUISE	3	J43126AA 00
CRUISE	4	J43126AA 00
CRUISE	5	J43126AA 00
CRUISE	6	J43126AA 00
CRUISE	7	J43126AA 00
CRUISE	8	J43126AA 00
CRUISE	9	J43126AA 00
CRUISE	10	J43126AA 00
CRUISE	11	J43126AA 00
CRUISE	12	J43126AA 00
CRUISE	13	J43126AA 00
CRUISE	14	J43126AA 00
CRUISE	15	J43126AA 00
CRUISE	16	J43126AA 00
CRUISE	17	J43126AA 00
CRUISE	18	J43126AA 00
CRUISE	19	J43126AA 00
CRUISE	20	J43126AA 00
CRUISE	21	J43126AA 00
CRUISE	22	J43126AA 00
CRUISE	23	J43126AA 00
CRUISE	24	J43126AA 00
CRUISE	25	J43126AA 00
CRUISE	26	J43126AA 00
CRUISE	27	J43126AA 00
CRUISE	28	J43126AA 00

PART II - FLIGHT PHASE PROCEDURES	PAGE	REVISION
CRUISE	29	J43126AA 00
CRUISE	30	J43126AA 00
CRUISE	31	J43126AA 00
CRUISE	32	J43126AA 00
DESCENT	1	J43126AA 00
DESCENT	2	J43126AA 00
DESCENT	3	J43126AA 00
DESCENT	4	J43126AA 00
DESCENT	5	J43126AA 00
DESCENT	6	J43126AA 00
DESCENT	7	J43126AA 00
DESCENT	8	J43126AA 00
DESCENT	9	J43126AA 00
DESCENT	10	J43126AA 00
DESCENT	11	J43126AA 00
DESCENT	12	J43126AA 00
DESCENT	13	J43126AA 00
DESCENT	14	J43126AA 00
DESCENT	15	J43126AA 00
DESCENT	16	J43126AA 00
DESCENT	17	J43126AA 00
DESCENT	18	J43126AA 00
DESCENT	19	J43126AA 00
DESCENT	20	J43126AA 00
DESCENT	21	J43126AA 00
DESCENT	22	J43126AA 00
DESCENT	23	J43126AA 00
DESCENT	24	J43126AA 00
DESCENT	25	J43126AA 00
DESCENT	26	J43126AA 00
DESCENT	27	J43126AA 00
DESCENT	28	J43126AA 00
APPROACH	1	J43126AA 00
APPROACH	2	J43126AA 00
APPROACH	3	J43126AA 00
APPROACH	4	J43126AA 00
APPROACH	5	J43126AA 00
APPROACH	6	J43126AA 00
APPROACH	7	J43126AA 00
APPROACH	8	J43126AA 00
APPROACH	9	J43126AA 00
APPROACH	10	J43126AA 00
APPROACH	11	J43126AA 00
APPROACH	12	J43126AA 00
APPROACH	13	J43126AA 00
APPROACH	14	J43126AA 00

PART II - FLIGHT PHASE PROCEDURES	**PAGE**	**REVISION**
APPROACH	15	J43126AA 00
APPROACH	16	J43126AA 00
APPROACH	17	J43126AA 00
APPROACH	18	J43126AA 00
APPROACH	19	J43126AA 00
APPROACH	20	J43126AA 00
APPROACH	21	J43126AA 00
APPROACH	22	J43126AA 00
APPROACH	23	J43126AA 00
APPROACH	24	J43126AA 00
APPROACH	25	J43126AA 00
APPROACH	26	J43126AA 00
APPROACH	27	J43126AA 00
APPROACH	28	J43126AA 00
APPROACH	29	J43126AA 00
APPROACH	30	J43126AA 00
GO AROUND	1	J43126AA 00
GO AROUND	2	J43126AA 00
GO AROUND	3	J43126AA 00
GO AROUND	4	J43126AA 00
GO AROUND	5	J43126AA 00
GO AROUND	6	J43126AA 00
GO AROUND	7	J43126AA 00
GO AROUND	8	J43126AA 00
GO AROUND	9	J43126AA 00
GO AROUND	10	J43126AA 00
GO AROUND	11	J43126AA 00
GO AROUND	12	J43126AA 00
GO AROUND	13	J43126AA 00
GO AROUND	14	J43126AA 00
DONE PHASE	1	J43126AA 00
DONE PHASE	2	J43126AA 00
DONE PHASE	3	J43126AA 00
DONE PHASE	4	J43126AA 00
DONE PHASE	5	J43126AA 00
DONE PHASE	6	J43126AA 00
DONE PHASE	7	J43126AA 00
DONE PHASE	8	J43126AA 00

■ PART III - MULTI PHASE PROCEDURES

PART III - MULTI PHASE PROCEDURES	PAGE	REVISION
CONTENTS	1	J43126AA 00
CONTENTS	2	J43126AA 00
MCDU MENU PAGE	1	J43126AA 00
MCDU MENU PAGE	2	J43126AA 00
MCDU MENU PAGE	3	J43126AA 00
MCDU MENU PAGE	4	J43126AA 00
MCDU MENU PAGE	5	J43126AA 00
MCDU MENU PAGE	6	J43126AA 00
F-PLN pages	1	J43126AA 00
F-PLN pages	2	J43126AA 00
F-PLN pages	3	J43126AA 00
F-PLN pages	4	J43126AA 00
F-PLN pages	5	J43126AA 00
F-PLN pages	6	J43126AA 00
F-PLN pages	7	J43126AA 00
F-PLN pages	8	J43126AA 00
F-PLN pages	9	J43126AA 00
F-PLN pages	10	J43126AA 00
F-PLN pages	11	J43126AA 00
F-PLN pages	12	J43126AA 00
F-PLN pages	13	J43126AA 00
F-PLN pages	14	J43126AA 00
LATERAL F-PLN management	1	J43126AA 00
LATERAL F-PLN management	2	J43126AA 00
LATERAL F-PLN management	3	J43126AA 00
LATERAL F-PLN management	4	J43126AA 00
LATERAL F-PLN management	5	J43126AA 00
LATERAL F-PLN management	6	J43126AA 00
LATERAL F-PLN management	7	J43126AA 00
LATERAL F-PLN management	8	J43126AA 00
LATERAL F-PLN management	9	J43126AA 00
LATERAL F-PLN management	10	J43126AA 00
LATERAL F-PLN management	11	J43126AA 00
LATERAL F-PLN management	12	J43126AA 00
LATERAL F-PLN management	13	J43126AA 00
LATERAL F-PLN management	14	J43126AA 00
LATERAL F-PLN management	15	J43126AA 00
LATERAL F-PLN management	16	J43126AA 00
LATERAL F-PLN management	17	J43126AA 00
LATERAL F-PLN management	18	J43126AA 00
LATERAL F-PLN management	19	J43126AA 00
LATERAL F-PLN management	20	J43126AA 00

PART III - MULTI PHASE PROCEDURES	PAGE	REVISION
LATERAL F-PLN management	21	J43126AA 00
LATERAL F-PLN management	22	J43126AA 00
LATERAL F-PLN management	23	J43126AA 00
LATERAL F-PLN management	24	J43126AA 00
LATERAL F-PLN management	25	J43126AA 00
LATERAL F-PLN management	26	J43126AA 00
LATERAL F-PLN management	27	J43126AA 00
LATERAL F-PLN management	28	J43126AA 00
LATERAL F-PLN management	29	J43126AA 00
LATERAL F-PLN management	30	J43126AA 00
LATERAL F-PLN management	31	J43126AA 00
LATERAL F-PLN management	32	J43126AA 00
LATERAL F-PLN management	33	J43126AA 00
LATERAL F-PLN management	34	J43126AA 00
LATERAL F-PLN management	35	J43126AA 00
LATERAL F-PLN management	36	J43126AA 00
LATERAL F-PLN management	37	J43126AA 00
LATERAL F-PLN management	38	J43126AA 00
LATERAL F-PLN management	39	J43126AA 00
LATERAL F-PLN management	40	J43126AA 00
LATERAL F-PLN management	41	J43126AA 00
LATERAL F-PLN management	42	J43126AA 00
LATERAL F-PLN management	43	J43126AA 00
LATERAL F-PLN management	44	J43126AA 00
LATERAL F-PLN management	45	J43126AA 00
LATERAL F-PLN management	46	J43126AA 00
LATERAL F-PLN management	47	J43126AA 00
LATERAL F-PLN management	48	J43126AA 00
LATERAL F-PLN management	49	J43126AA 00
LATERAL F-PLN management	50	J43126AA 00
LATERAL F-PLN management	51	J43126AA 00
LATERAL F-PLN management	52	J43126AA 00
LATERAL F-PLN management	53	J43126AA 00
LATERAL F-PLN management	54	J43126AA 00
LATERAL F-PLN management	55	J43126AA 00
LATERAL F-PLN management	56	J43126AA 00
LATERAL F-PLN management	57	J43126AA 00
LATERAL F-PLN management	58	J43126AA 00
LATERAL F-PLN management	59	J43126AA 00
LATERAL F-PLN management	60	J43126AA 00
LATERAL F-PLN management	61	J43126AA 00
LATERAL F-PLN management	62	J43126AA 00
LATERAL F-PLN management	63	J43126AA 00
LATERAL F-PLN management	64	J43126AA 00
LATERAL F-PLN management	65	J43126AA 00
LATERAL F-PLN management	66	J43126AA 00
LATERAL F-PLN management	67	J43126AA 00
LATERAL F-PLN management	68	J43126AA 00

PART III - MULTI PHASE PROCEDURES	PAGE	REVISION
LATERAL F-PLN management	69	J43126AA 00
LATERAL F-PLN management	70	J43126AA 00
LATERAL F-PLN management	71	J43126AA 00
LATERAL F-PLN management	72	J43126AA 00
VERTICAL F-PLN management	1	J43126AA 00
VERTICAL F-PLN management	2	J43126AA 00
VERTICAL F-PLN management	3	J43126AA 00
VERTICAL F-PLN management	4	J43126AA 00
VERTICAL F-PLN management	5	J43126AA 00
VERTICAL F-PLN management	6	J43126AA 00
VERTICAL F-PLN management	7	J43126AA 00
VERTICAL F-PLN management	8	J43126AA 00
VERTICAL F-PLN management	9	J43126AA 00
VERTICAL F-PLN management	10	J43126AA 00
VERTICAL F-PLN management	11	J43126AA 00
VERTICAL F-PLN management	12	J43126AA 00
VERTICAL F-PLN management	13	J43126AA 00
VERTICAL F-PLN management	14	J43126AA 00
VERTICAL F-PLN management	15	J43126AA 00
VERTICAL F-PLN management	16	J43126AA 00
VERTICAL F-PLN management	17	J43126AA 00
VERTICAL F-PLN management	18	J43126AA 00
VERTICAL F-PLN management	19	J43126AA 00
VERTICAL F-PLN management	20	J43126AA 00
VERTICAL F-PLN management	21	J43126AA 00
VERTICAL F-PLN management	22	J43126AA 00
VERTICAL F-PLN management	23	J43126AA 00
VERTICAL F-PLN management	24	J43126AA 00
VERTICAL F-PLN management	25	J43126AA 00
VERTICAL F-PLN management	26	J43126AA 00
VERTICAL F-PLN management	27	J43126AA 00
VERTICAL F-PLN management	28	J43126AA 00
VERTICAL F-PLN management	29	J43126AA 00
VERTICAL F-PLN management	30	J43126AA 00
VERTICAL F-PLN management	31	J43126AA 00
VERTICAL F-PLN management	32	J43126AA 00
VERTICAL F-PLN management	33	J43126AA 00
VERTICAL F-PLN management	34	J43126AA 00
VERTICAL F-PLN management	35	J43126AA 00
VERTICAL F-PLN management	36	J43126AA 00
SEC F-PLN	1	J43126AA 00
SEC F-PLN	2	J43126AA 00
SEC F-PLN	3	J43126AA 00
SEC F-PLN	4	J43126AA 00
SEC F-PLN	5	J43126AA 00
SEC F-PLN	6	J43126AA 00

PART III - MULTI PHASE PROCEDURES	PAGE	REVISION
SEC F-PLN	7	J43126AA 00
SEC F-PLN	8	J43126AA 00
SEC F-PLN	9	J43126AA 00
SEC F-PLN	10	J43126AA 00
SEC F-PLN	11	J43126AA 00
SEC F-PLN	12	J43126AA 00
SEC F-PLN	13	J43126AA 00
SEC F-PLN	14	J43126AA 00
FUEL Monitoring	1	J43126AA 00
FUEL Monitoring	2	J43126AA 00
FUEL Monitoring	3	J43126AA 00
FUEL Monitoring	4	J43126AA 00
FUEL Monitoring	5	J43126AA 00
FUEL Monitoring	6	J43126AA 00
FUEL Monitoring	7	J43126AA 00
FUEL Monitoring	8	J43126AA 00
NAVIGATION management & monitoring	1	J43126AA 00
NAVIGATION management & monitoring	2	J43126AA 00
NAVIGATION management & monitoring	3	J43126AA 00
NAVIGATION management & monitoring	4	J43126AA 00
NAVIGATION management & monitoring	5	J43126AA 00
NAVIGATION management & monitoring	6	J43126AA 00
NAVIGATION management & monitoring	7	J43126AA 00
NAVIGATION management & monitoring	8	J43126AA 00
NAVIGATION management & monitoring	9	J43126AA 00
NAVIGATION management & monitoring	10	J43126AA 00
NAVIGATION management & monitoring	11	J43126AA 00
NAVIGATION management & monitoring	12	J43126AA 00
NAVIGATION management & monitoring	13	J43126AA 00
NAVIGATION management & monitoring	14	J43126AA 00
NAVIGATION management & monitoring	15	J43126AA 00
NAVIGATION management & monitoring	16	J43126AA 00
NAVIGATION management & monitoring	17	J43126AA 00
NAVIGATION management & monitoring	18	J43126AA 00
NAVIGATION management & monitoring	19	J43126AA 00
NAVIGATION management & monitoring	20	J43126AA 00
NAVIGATION management & monitoring	21	J43126AA 00
NAVIGATION management & monitoring	22	J43126AA 00
NAVIGATION management & monitoring	23	J43126AA 00
NAVIGATION management & monitoring	24	J43126AA 00
NAVIGATION management & monitoring	25	J43126AA 00
NAVIGATION management & monitoring	26	J43126AA 00
NAVIGATION management & monitoring	27	J43126AA 00
NAVIGATION management & monitoring	28	J43126AA 00
NAVIGATION management & monitoring	29	J43126AA 00
NAVIGATION management & monitoring	30	J43126AA 00

PART III - MULTI PHASE PROCEDURES	PAGE	REVISION
NAVIGATION management & monitoring	31	J43126AA 00
NAVIGATION management & monitoring	32	J43126AA 00
NAVIGATION management & monitoring	33	J43126AA 00
NAVIGATION management & monitoring	34	J43126AA 00
NAVIGATION management & monitoring	35	J43126AA 00
NAVIGATION management & monitoring	36	J43126AA 00
NAVIGATION management & monitoring	37	J43126AA 00
NAVIGATION management & monitoring	38	J43126AA 00
NAVIGATION management & monitoring	39	J43126AA 00
NAVIGATION management & monitoring	40	J43126AA 00
NAVIGATION management & monitoring	41	J43126AA 00
NAVIGATION management & monitoring	42	J43126AA 00
NAVIGATION management & monitoring	43	J43126AA 00
NAVIGATION management & monitoring	44	J43126AA 00
NAVIGATION management & monitoring	45	J43126AA 00
NAVIGATION management & monitoring	46	J43126AA 00
NAVIGATION management & monitoring	47	J43126AA 00
NAVIGATION management & monitoring	48	J43126AA 00
NAVIGATION management & monitoring	49	J43126AA 00
NAVIGATION management & monitoring	50	J43126AA 00
NAVIGATION management & monitoring	51	J43126AA 00
NAVIGATION management & monitoring	52	J43126AA 00
NAVIGATION management & monitoring	53	J43126AA 00
NAVIGATION management & monitoring	54	J43126AA 00
ENGINE-OUT	1	J43126AA 00
ENGINE-OUT	2	J43126AA 00
ENGINE-OUT	3	J43126AA 00
ENGINE-OUT	4	J43126AA 00
ENGINE-OUT	5	J43126AA 00
ENGINE-OUT	6	J43126AA 00
ENGINE-OUT	7	J43126AA 00
ENGINE-OUT	8	J43126AA 00
ENGINE-OUT	9	J43126AA 00
ENGINE-OUT	10	J43126AA 00
ENGINE-OUT	11	J43126AA 00
ENGINE-OUT	12	J43126AA 00
DATA LINK	1	J43126AA 00
DATA LINK	2	J43126AA 00
DATA LINK	3	J43126AA 00
DATA LINK	4	J43126AA 00
DATA LINK	5	J43126AA 00
DATA LINK	6	J43126AA 00
DATA LINK	7	J43126AA 00
DATA LINK	8	J43126AA 00
DATA LINK	9	J43126AA 00
DATA LINK	10	J43126AA 00

PART III - MULTI PHASE PROCEDURES	PAGE	REVISION
DATA LINK	11	J43126AA 00
DATA LINK	12	J43126AA 00
DATA LINK	13	J43126AA 00
DATA LINK	14	J43126AA 00
DATA LINK	15	J43126AA 00
DATA LINK	16	J43126AA 00
DATA LINK	17	J43126AA 00
DATA LINK	18	J43126AA 00
DATA LINK	19	J43126AA 00
DATA LINK	20	J43126AA 00
DATA LINK	21	J43126AA 00
DATA LINK	22	J43126AA 00
DATA LINK	23	J43126AA 00
DATA LINK	24	J43126AA 00
DATA LINK	25	J43126AA 00
DATA LINK	26	J43126AA 00
DATA LINK	27	J43126AA 00
DATA LINK	28	J43126AA 00
DATA LINK	29	J43126AA 00
DATA LINK	30	J43126AA 00
DATA LINK	31	J43126AA 00
DATA LINK	32	J43126AA 00
DATA LINK	33	J43126AA 00
DATA LINK	34	J43126AA 00
DATA LINK	35	J43126AA 00
DATA LINK	36	J43126AA 00
DATA LINK	37	J43126AA 00
DATA LINK	38	J43126AA 00
DATA LINK	39	J43126AA 00
DATA LINK	40	J43126AA 00
DATA LINK	41	J43126AA 00
DATA LINK	42	J43126AA 00
DATA LINK	43	J43126AA 00
DATA LINK	44	J43126AA 00
DATA LINK	45	J43126AA 00
DATA LINK	46	J43126AA 00
PRINT FUNCTION	1	J43126AA 00
PRINT FUNCTION	2	J43126AA 00
PRINT FUNCTION	3	J43126AA 00
PRINT FUNCTION	4	J43126AA 00
PRINT FUNCTION	5	J43126AA 00
PRINT FUNCTION	6	J43126AA 00
PRINT FUNCTION	7	J43126AA 00
PRINT FUNCTION	8	J43126AA 00
PRINT FUNCTION	9	J43126AA 00
PRINT FUNCTION	10	J43126AA 00
PRINT FUNCTION	11	J43126AA 00

PART III - MULTI PHASE PROCEDURES	PAGE	REVISION
PRINT FUNCTION	12	J43126AA 00
PRINT FUNCTION	13	J43126AA 00
PRINT FUNCTION	14	J43126AA 00
PRINT FUNCTION	15	J43126AA 00
PRINT FUNCTION	16	J43126AA 00
PRINT FUNCTION	17	J43126AA 00
PRINT FUNCTION	18	J43126AA 00
PRINT FUNCTION	19	J43126AA 00
PRINT FUNCTION	20	J43126AA 00

■ PART IV - DEGRADED OPERATIONS

PART IV - DEGRADED OPERATIONS	PAGE	REVISION
CONTENTS	1	J43126AA 00
CONTENTS	2	J43126AA 00
OVERVIEW	1	J43126AA 00
OVERVIEW	2	J43126AA 00
FMGC RESETS AND FAILURES	1	J43126AA 00
FMGC RESETS AND FAILURES	2	J43126AA 00
FMGC RESETS AND FAILURES	3	J43126AA 00
FMGC RESETS AND FAILURES	4	J43126AA 00
FMGC RESETS AND FAILURES	5	J43126AA 00
FMGC RESETS AND FAILURES	6	J43126AA 00
FMGC RESETS AND FAILURES	7	J43126AA 00
FMGC RESETS AND FAILURES	8	J43126AA 00
FMGC RESETS AND FAILURES	9	J43126AA 00
FMGC RESETS AND FAILURES	10	J43126AA 00
FMGC RESETS AND FAILURES	11	J43126AA 00
FMGC RESETS AND FAILURES	12	J43126AA 00
FMGC RESETS AND FAILURES	13	J43126AA 00
FMGC RESETS AND FAILURES	14	J43126AA 00
FMGC RESETS AND FAILURES	15	J43126AA 00
FMGC RESETS AND FAILURES	16	J43126AA 00
FMGC RESETS AND FAILURES	17	J43126AA 00
FMGC RESETS AND FAILURES	18	J43126AA 00
FMGC RESETS AND FAILURES	19	J43126AA 00
FMGC RESETS AND FAILURES	20	J43126AA 00
FMGC RESETS AND FAILURES	21	J43126AA 00
FMGC RESETS AND FAILURES	22	J43126AA 00
FMGC RESETS AND FAILURES	23	J43126AA 00
FMGC RESETS AND FAILURES	24	J43126AA 00
FMGC RESETS AND FAILURES	25	J43126AA 00
FMGC RESETS AND FAILURES	26	J43126AA 00

PART IV - DEGRADED OPERATIONS	PAGE	REVISION
MCDU ANOMALIES	1	J43126AA 00
MCDU ANOMALIES	2	J43126AA 00
OTHER DEGRADED OPERATIONS	1	J43126AA 00
OTHER DEGRADED OPERATIONS	2	J43126AA 00
OTHER DEGRADED OPERATIONS	3	J43126AA 00
OTHER DEGRADED OPERATIONS	4	J43126AA 00
OTHER DEGRADED OPERATIONS	5	J43126AA 00
OTHER DEGRADED OPERATIONS	6	J43126AA 00
OTHER DEGRADED OPERATIONS	7	J43126AA 00
OTHER DEGRADED OPERATIONS	8	J43126AA 00

■ PART V - APPENDICES

PART V - APPENDICES	PAGE	REVISION
CONTENTS	1	J43126AA 00
CONTENTS	2	J43126AA 00
MESSAGES	1	J43126AA 00
MESSAGES	2	J43126AA 00
MESSAGES	3	J43126AA 00
MESSAGES	4	J43126AA 00
MESSAGES	5	J43126AA 00
MESSAGES	6	J43126AA 00
MESSAGES	7	J43126AA 00
MESSAGES	8	J43126AA 00
MESSAGES	9	J43126AA 00
MESSAGES	10	J43126AA 00
MESSAGES	11	J43126AA 00
MESSAGES	12	J43126AA 00
MESSAGES	13	J43126AA 00
MESSAGES	14	J43126AA 00
MESSAGES	15	J43126AA 00
MESSAGES	16	J43126AA 00
MESSAGES	17	J43126AA 00
MESSAGES	18	J43126AA 00
MESSAGES	19	J43126AA 00
MESSAGES	20	J43126AA 00
MCDU NAMING and DATA FORMAT	1	J43126AA 00
MCDU NAMING and DATA FORMAT	2	J43126AA 00
MCDU NAMING and DATA FORMAT	3	J43126AA 00
MCDU NAMING and DATA FORMAT	4	J43126AA 00
MCDU NAMING and DATA FORMAT	5	J43126AA 00

PART V - APPENDICES	PAGE	REVISION
MCDU NAMING and DATA FORMAT	6	J43126AA 00
MCDU NAMING and DATA FORMAT	7	J43126AA 00
MCDU NAMING and DATA FORMAT	8	J43126AA 00
MCDU NAMING and DATA FORMAT	9	J43126AA 00
MCDU NAMING and DATA FORMAT	10	J43126AA 00
MCDU NAMING and DATA FORMAT	11	J43126AA 00
MCDU NAMING and DATA FORMAT	12	J43126AA 00
MCDU NAMING and DATA FORMAT	13	J43126AA 00
MCDU NAMING and DATA FORMAT	14	J43126AA 00
MCDU NAMING and DATA FORMAT	15	J43126AA 00
MCDU NAMING and DATA FORMAT	16	J43126AA 00
MCDU NAMING and DATA FORMAT	17	J43126AA 00
MCDU NAMING and DATA FORMAT	18	J43126AA 00
MCDU NAMING and DATA FORMAT	19	J43126AA 00
MCDU NAMING and DATA FORMAT	20	J43126AA 00
MCDU NAMING and DATA FORMAT	21	J43126AA 00
MCDU NAMING and DATA FORMAT	22	J43126AA 00
MCDU NAMING and DATA FORMAT	23	J43126AA 00
MCDU NAMING and DATA FORMAT	24	J43126AA 00
MCDU NAMING and DATA FORMAT	25	J43126AA 00
MCDU NAMING and DATA FORMAT	26	J43126AA 00
MCDU NAMING and DATA FORMAT	27	J43126AA 00
MCDU NAMING and DATA FORMAT	28	J43126AA 00
FMS RESETS SUMMARY	1	J43126AA 00
FMS RESETS SUMMARY	2	J43126AA 00
FMS RESETS SUMMARY	3	J43126AA 00
FMS RESETS SUMMARY	4	J43126AA 00
OPC and AMI FILES	1	J43126AA 00
OPC and AMI FILES	2	J43126AA 00
OPC and AMI FILES	3	J43126AA 00
OPC and AMI FILES	4	J43126AA 00
OPC and AMI FILES	5	J43126AA 00
OPC and AMI FILES	6	J43126AA 00
ND SYMBOLS	1	J43126AA 00
ND SYMBOLS	2	J43126AA 00
ND SYMBOLS	3	J43126AA 00
ND SYMBOLS	4	J43126AA 00
ND SYMBOLS	5	J43126AA 00
ND SYMBOLS	6	J43126AA 00
ABBREVIATIONS	1	J43126AA 00
ABBREVIATIONS	2	J43126AA 00
ABBREVIATIONS	3	J43126AA 00
ABBREVIATIONS	4	J43126AA 00
ABBREVIATIONS	5	J43126AA 00

PART V - APPENDICES	PAGE	REVISION
ABBREVIATIONS	6	J43126AA 00
ABBREVIATIONS	7	J43126AA 00
ABBREVIATIONS	8	J43126AA 00
ABBREVIATIONS	9	J43126AA 00
ABBREVIATIONS	10	J43126AA 00
ABBREVIATIONS	11	J43126AA 00
ABBREVIATIONS	12	J43126AA 00

	PAGE	REVISION
MCDU FOLDOUT	1	J43126AA 00
MCDU FOLDOUT	2	J43126AA 00

PAGE INTENTIONALLY LEFT BLANK

Part I
FMS GENERAL DESCRIPTION

PAGE INTENTIONALLY LEFT BLANK

Part I: FMS GENERAL DESCRIPTION

Contents

PAGE INTENTIONALLY LEFT BLANK

Part I: Chapter 1 – INTRODUCTION

The THALES Flight Management & Guidance System (FMGS), as installed on Airbus Single-Aisle Family (A318/319/320/321), provides Flight Management (FM) and Flight Guidance (FG) functions.

The main FM functions are:
- Navigation,
- Flight planning,
- Performance prediction and optimization,
- Provision of information to cockpit displays (MCDU, ND, PFD)
- Auto-tuning of navaids.

The main FG functions are:
- Flight Director (FD),
- Auto Pilot (A/P),
- Auto thrust (A/THR) commands.

In addition, the total system provides fault isolation and detection.

The FMGS consists of the following components:
- 2 Flight Management & Guidance Computers (FMGC), in avionics compartment,
- 2 Multipurpose Control & Display Units (MCDU), at sides of forward pedestal,
- 1 Flight Control Unit (FCU), on glare-shield,
- 2 Flight Augmentation Computers (FAC), in avionics compartment.

Comprehensive navigation and performance databases are stored within each FMGC. The navigation database is updated every 28 days by the operator. A separate database allows additional navigation data to be entered and stored by the pilot.

PAGE INTENTIONALLY LEFT BLANK

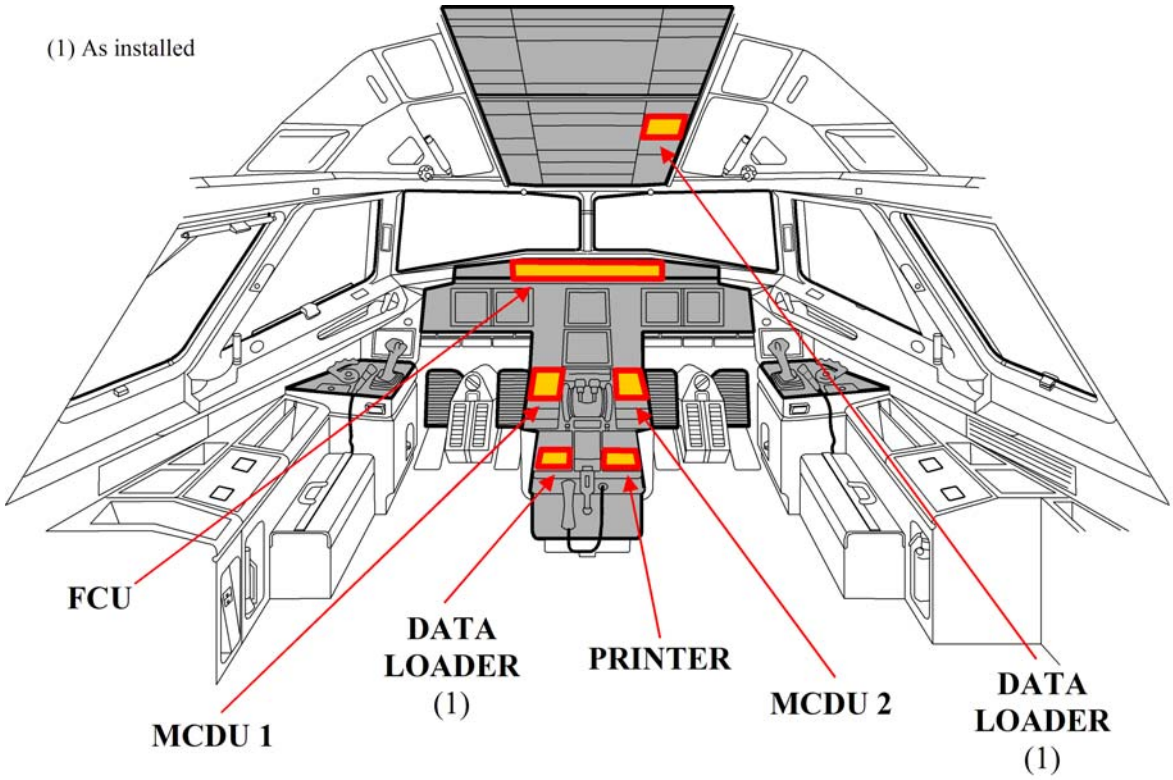
Part I: Chapter 2 – SYSTEM OVERVIEW

Contents

PAGE INTENTIONALLY LEFT BLANK

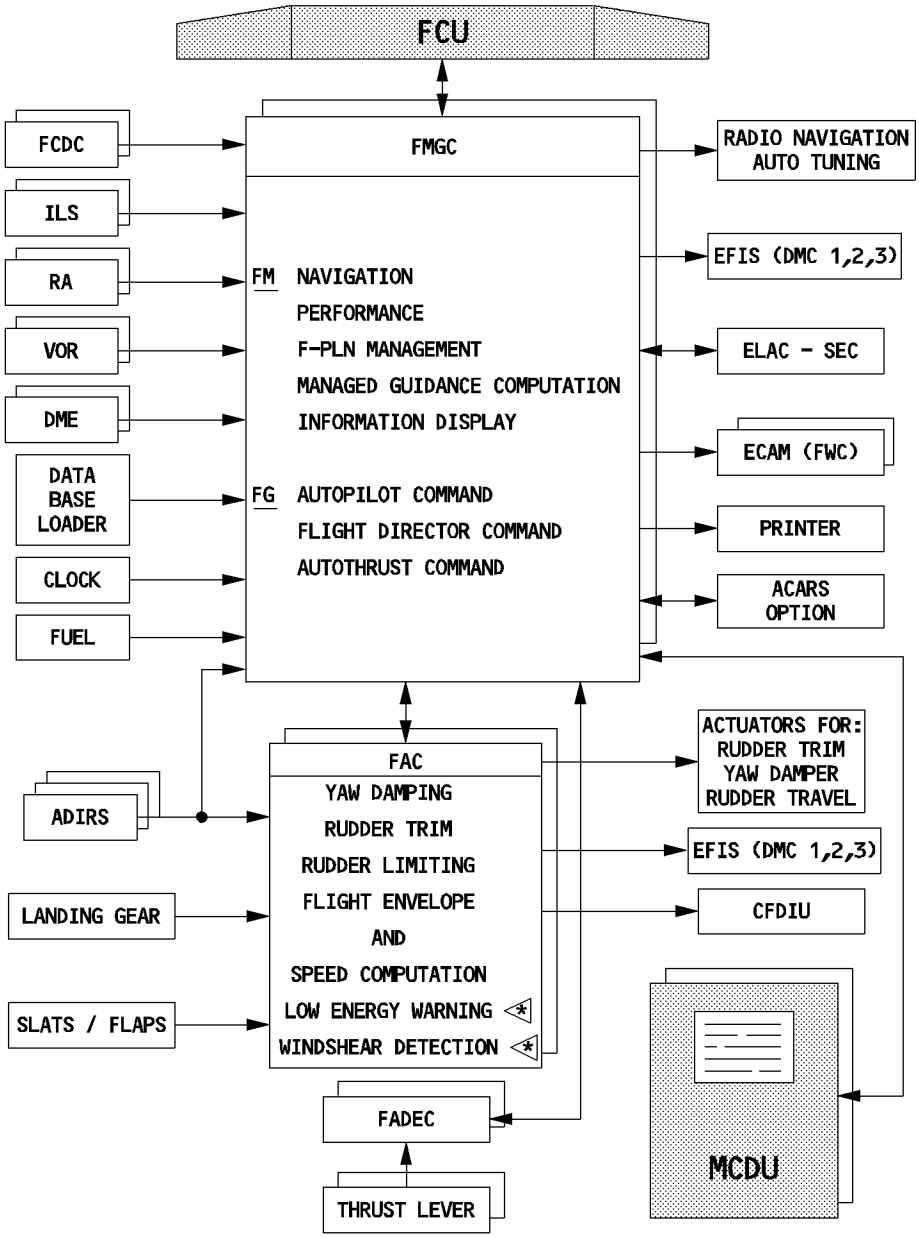
2.1. FLIGHT DECK CONFIGURATION

The location of the cockpit components of the FMGS is shown below.



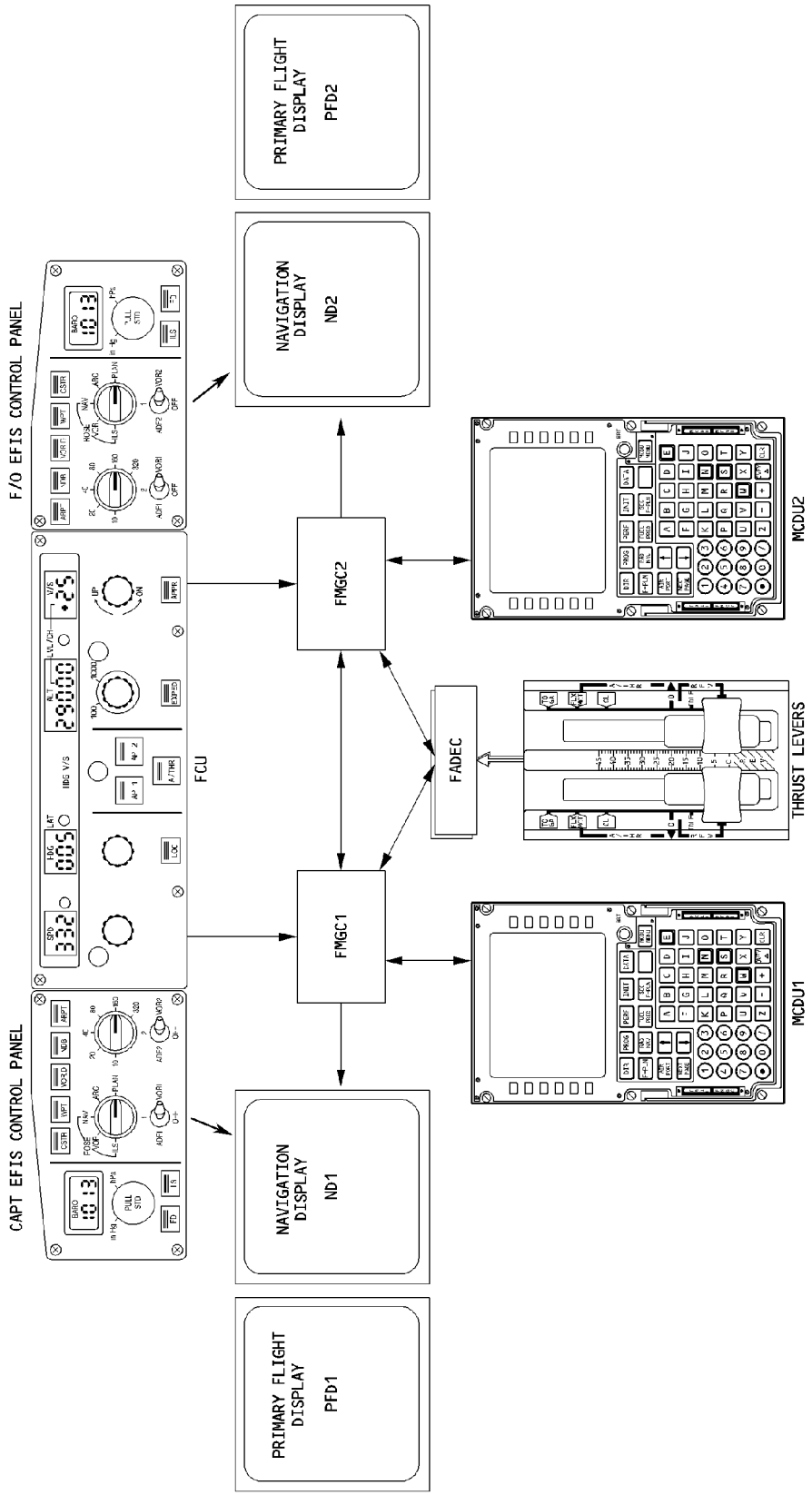
2.2. SYSTEM INTERFACES

The FMGCs receive and transmit signals from and to other aircraft systems. Figure here under shows the interconnections between these systems and the FMGCs.



2.3. PILOT INTERFACES

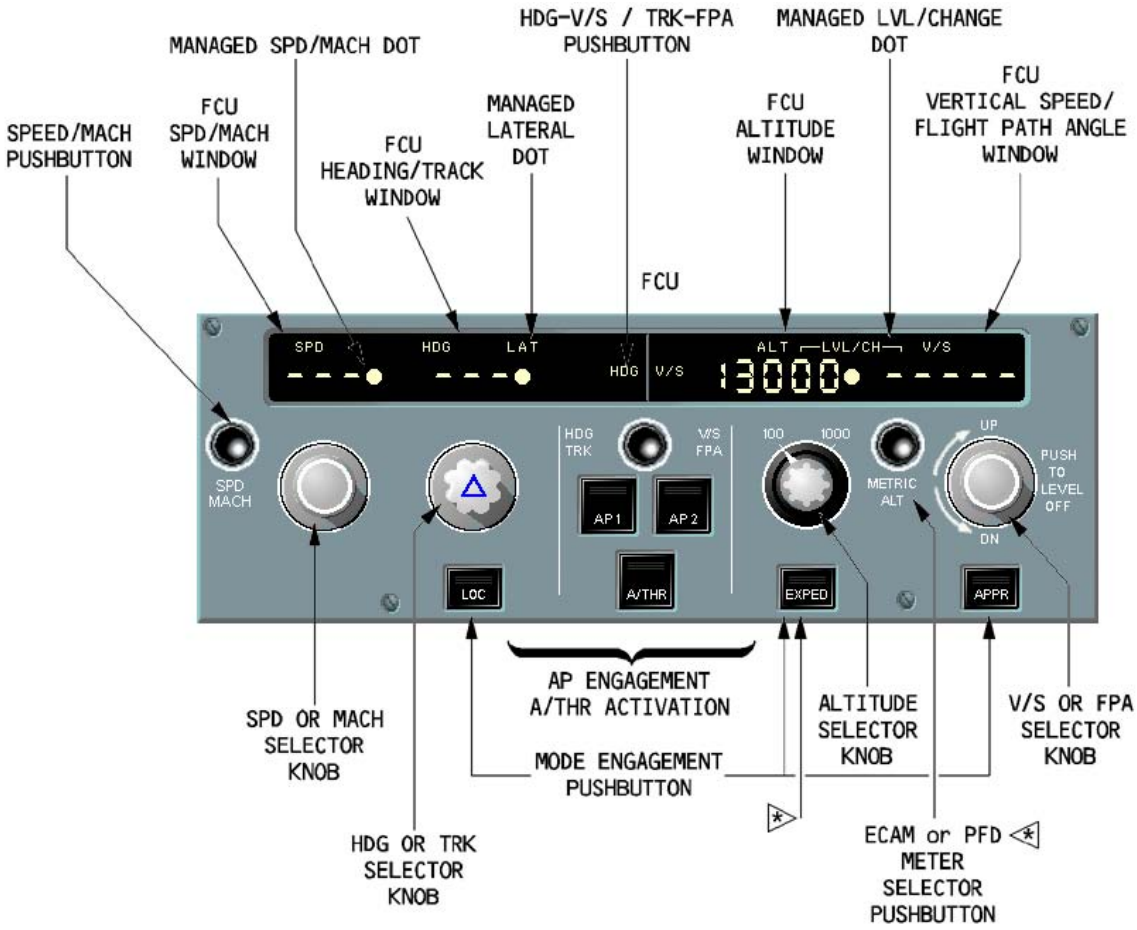
The figure shows the pilot interfaces and their interconnection.



The main interfaces for crew inputs to FMGS are FCU, MCDUs and Thrust Levers (T/L). Outputs of FMGS are monitored on the EFIS (PFD and ND).

The **FCU** is the **short-term** (tactical) interface, and has the following functions:
- Engagement of AP, FD, A/THR,
- Selection of guidance modes,
- Manual selection of flight parameters.

Layout of the FCU is shown below.



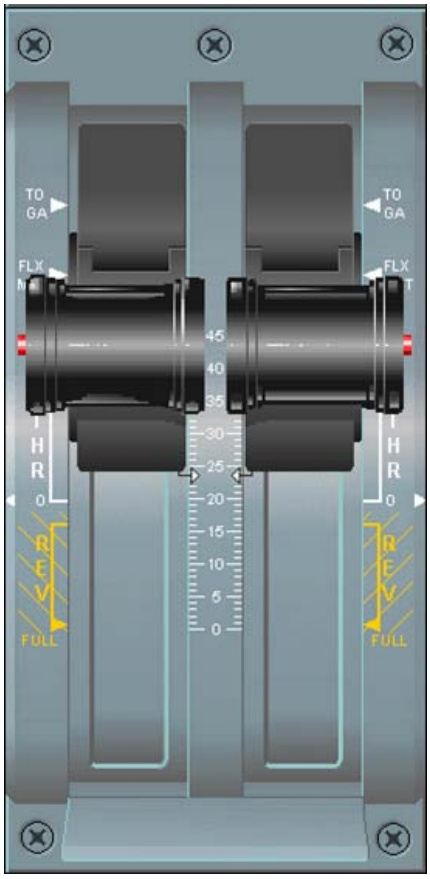
The **MCDU**s (see Fold-out at the end of the Guide) are the **long-term** (strategic) interface between crew and FMGC.

Main functions of the MCDUs include:
- Insertion of initial position to align IRUs before flight,
- Creation and display of Primary, Secondary and Alternate flight plan,
- Insertion of weight, CG, fuel quantity for time and fuel predictions, and performance optimisation,
- Insertion of take-off and approach parameters,

- Lateral and vertical revisions to the flight plan,
- Display of auto-tuned or manually tuned navaids,
- Status of position updating by DMEs or GPS, and navigation accuracy,
- Entry and storage of pilot-defined navigation references not already in data base,
- Initiation of approach phase.

See Part 1 Ch 4 for detailed description of MCDU.

The **Thrust Levers** (T/L) are also an interface for pilot inputs to the FMGCs, and to the FADEC. The Thrust Levers are shown below.



T/L functions are:

- Engagement of A/THR and FD in take off mode (thrust levers at FLX or DRT or TOGA position), and engagement of A/THR, FD and/or AP in go-around mode (T/L at TOGA),
- Selection of other thrust rating limits (T/L to MCT or CL),
- Setting the limit for A/THR authority, by T/L position,
- Controlling manual thrust when A/THR is not active, and reverse thrust.

The **EFIS Displays**: The PFDs and NDs are the visual interface which enables each pilot to continuously monitor status and operation of the FMGS. EFIS Control Panel allows the pilot to select the ND mode, range and navigation features.

The **Flight Mode Annunciator (FMA)** on the PFD indicates:
- Armed or active status of the FMGS modes,
- Engagement status of FD, A/P and A/THR.

The FMA is the primary visual feedback of the FMGS operating modes to the crew. Every mode change, whether pilot-selected or automatic, should be verified by reference to the FMA. Typical FMA indications are shown here under.

The **PFD** also displays FD or FPD commands and target values, thus providing a indication of control and thrust inputs commanded by the FMGC. Typical PFD indications are shown below.

The **ND** displays flight plan track, instantaneous position relative to this track, top of climb and descent points, with other selected navigation features (waypoints, navaids, airports, or altitude/speed constraints), and computed TAS, GS and wind. Typical ND indications are shown here under.

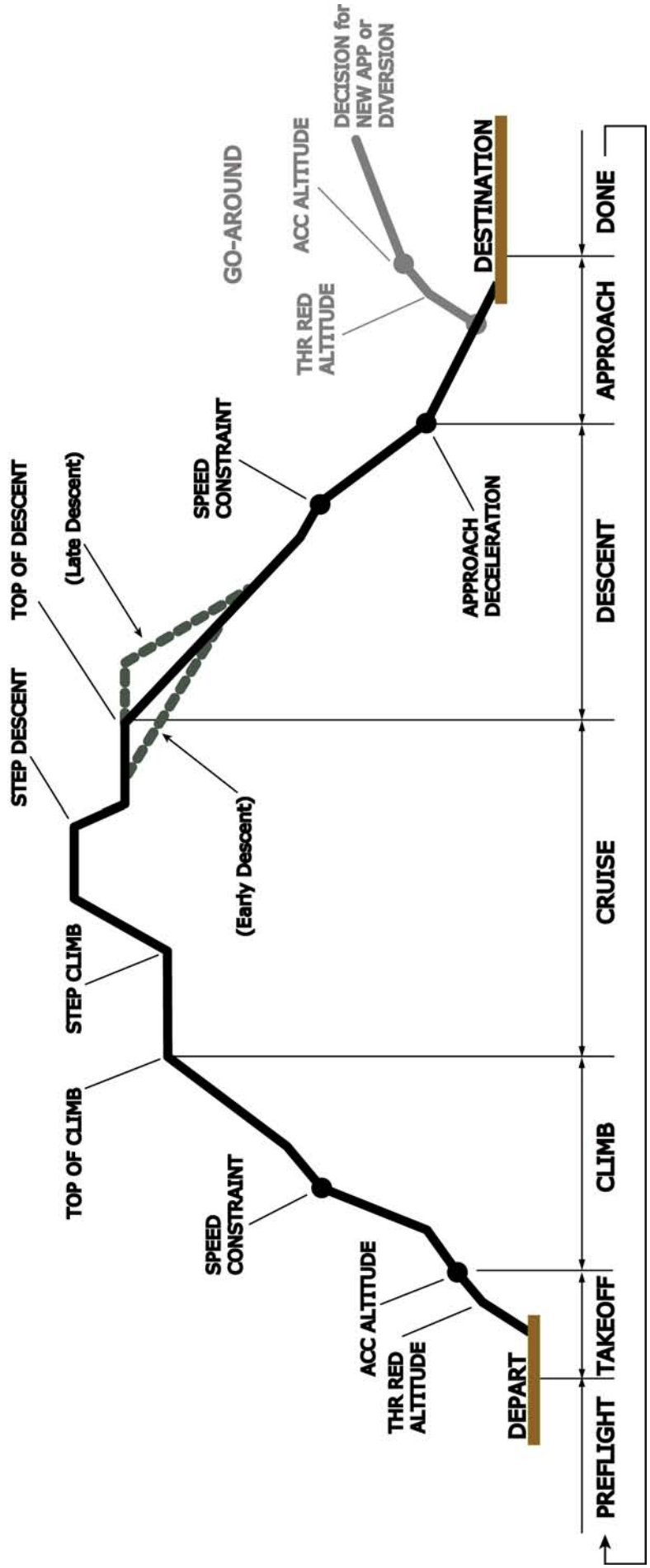
2.4. FLIGHT PHASES

The flight phases of a typical FMS flight profile are shown in the Figure on the next page. They are:

- PREFLIGHT
- TAKEOFF
- CLIMB
- CRUISE
- DESCENT
- APPROACH
- GO-AROUND
- DONE

The switching conditions and procedures related to each phase are detailed in Parts II and III of this Guide.

The active phase is shown in the title field of the PROG and PERF pages of the MCDU.



Part I: Chapter 3 – FMGS OPERATION

Contents

PAGE INTENTIONALLY LEFT BLANK

The Flight Management and Guidance System (FMGS) provides guidance from takeoff, through climb, cruise and descent to approach and landing.

It provides the following capabilities:
- Pre-flight: definition of the required route and prediction of the optimum profile and speeds.
- In flight: comparison of position with the desired profile and provision of commands to FD, AP, A/THR to fly track and profile at the required altitude and speed.

The computing systems to perform these functions are contained in cards located in the FMGC (Flight Management and Guidance Computer).
There are 2 identical and interchangeable FMGC units on the aircraft that become FMGC1 or FMGC2 according to their installed position in the avionics compartment. Normaly FMGC1 is associated with MCDU1 (left pilot seat) and FMGC2 with MCDU2 (right pilot seat).

Throughout this manual the components may be referred to separately or collectively, e.g.:
- AP (Autopilot)
- A/THR (Auto thrust)
- FD (Flight Director)
- FG (Flight Guidance)
- FM (Flight Management)
- FMS (Flight Management System)
- FMGC (Flight Management and Guidance Computer)
- FMGS (Flight Management and Guidance System)

3.1. FMS MODES OF OPERATION Dual/Single/Independent

■ General

The operating program of the FMS uses stored and inserted data to calculate the flight profile and to output information for navigation and display to the aircraft systems, e.g. the Electronic Flight Control System and Electronic Flight Instrument System.

FMS are loaded with FMS Software and data which include: Aircraft and Engine type & model, Navigation data base, Performance data base, Magnetic Variation data base, Airline Modifiable Information (AMI), and Operational Program Configuration (OPC).

Performance factors can be modified prior to flight, based on actual aircraft performance to refine profile and fuel predictions.

See Part II FLIGHT PHASE PROCEDURES for further information.

Data for the flight, inserted manually or by datalink (when installed), include e.g. route to be flown, cost index, expected cruise altitude, forecast winds and temperatures, weight, CG and fuel.

Using these data the FMS can then:
- Construct an optimum vertical profile to be used for vertical guidance, and for time, fuel, altitude predictions at waypoints.
- Compute flight parameters used for lateral and vertical guidance, and for display on the EFIS.

The flight plans which can be entered into the FMGC are:
- The **ACTIVE** flight plan (PRIMARY /ALTERNATE flight plans), which is used for guidance,
- The **TEMPORARY** flight plan, when revisions of the ACTIVE flight plan are made,
- The **SECONDARY** flight plan, which allows preparation (and review) of alternative flight plan. The secondary flight plan can be copied into the ACTIVE flight plan and vice versa.

The FMGCs are supplied by the aircraft electrical power.
The FMSs contain batteries which can maintain power supply and allow to keep entered data in the memory for at least 10 mn, in the event of lost of normal electrical power supply.

The two FMGCs, and their associated MCDUs, operate together to cross-check navigation accuracy and provide redundancy. The normal mode of operation is Dual, with two degraded modes - Single and Independent – after certain failures or data anomalies.

■ DUAL Mode

In DUAL mode (the normal mode of operation) each FMGC makes its own calculations and exchanges the processed data with the other FMGC by "**cross-talk**" for comparison and validation.

Data entered via either MCDU is fed to both FMGCs. However, since each FMGC receives data from the systems (e.g. ADIRS, navaids) on its own side, the predictions of each FMGC may differ slightly.

During operation in DUAL mode, one FMGC is selected as the "master" and the other as the "slave". This ensures that prime navigation functions are synchronized and that guidance commands to A/P, FD, A/THR, are provided by the same source.

FMGC1 is the Master except when:
- AP2 is engaged singly (normal situation when the RHS pilot is PF).

  *When both APs are engaged for ILS approach, FMGC1 becomes the "**master**".*
- FD2 is ON, FD1 is OFF and both APs disengaged.

For DUAL mode operation both FMGCs should remain precisely synchronized. If this is not possible the FMSs may attempt a **resynchronization**.

If resynchronization is successful, the input data previously received and used by FMS before the resynchronization remains stored in memory.

See Part IV: FMS Degraded Operation.

■ SINGLE Mode

The degraded **Single** mode operation occurs automatically when one FMGC has failed; the scratchpad amber message OPP FMGC IN PROCESS is displayed on the MCDU of the failed FMGC. Entries on both MCDUs go to the operational FMGC.

See Part IV: FMS Degraded Operation.

■ INDEPENDENT Mode

The degraded **Independent** mode occurs automatically at power-up if communication between the FMGCs is not possible, or a mismatch between FMGCs is detected.

The scratchpad amber message INDEPENDENT OPERATION is displayed on both MCDUs and the amber IND annunciator on top of the MCDU screen is illuminated.

The two FMGCs and their associated MCDUs operate independently; data entered and displayed is only related to the FMGC on that side of the aircraft. There is no cross-talk.

See Part IV: FMS Degraded Operation.

3.2. TEMPORARY FLIGHT PLAN

When any revision is made to the Active Flight Plan, including a DIR TO, a Temporary Flight Plan is displayed on both ND and MCDU.
The new Flight Plan is shown by a dashed yellow line on the ND and in yellow text characters on the MCDU, while the Active flight plan continues to provide guidance and to be displayed in green on the ND.

Multiple revisions can be made in the Temporary Flight Plan, with the capability to erase the last or all entries before inserting.
The FMS computes track, profile and predictions of the Temporary Flight Plan, according to the entered revisions.

This specific Thales feature enables the pilot to visualize revisions on the ND, and thus avoid incorrect entries.

Because of this feature, it is not necessary to insert the Temporary Flight Plan after each revision in turn, which would waste time. It is therefore recommended to complete the series of revisions before insertion.

See Part III:MULTIPHASE for more details.

3.3. NAVIGATION/FLIGHT MANAGEMENT

■ Navigation

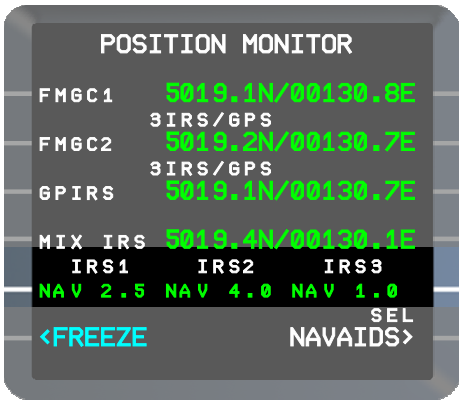
☐ FMGC position

The prime function of the FMGC is to compute an accurate position and ground speed based on the navigation data available.
FMGC1 uses IRS1/IRS2/IRS3, GPS1, VOR1/DME1/LOC1/MLS1,
FMGC2 uses IRS1/IRS2/IRS3, GPS2, VOR2/DME2/LOC2/MLS2,
GPS is an airline option and may be installed with the 2 following architectures :

a) Hybrid - the GPS output data are acquired and processed by the ADIRS, then transmitted to the FMGCs.

b) Autonomous architecture - the GPS output data are directly acquired and processed by the FMGC.

Each IRS is subject to its own variable drift error.
Using GPS reference (or Navaids reference when GPS is not available), both FMGCs continuously monitor each IRS to determine and update an IRS error model. This computation is done by a Kalman filter and provides a BEST position/speed for each IRS.
The estimated IRS drift error is shown in the MCDU POSITION MONITOR page.



GPS provides an accurate position but may be affected by lack of satellite coverage or temporary interruption.

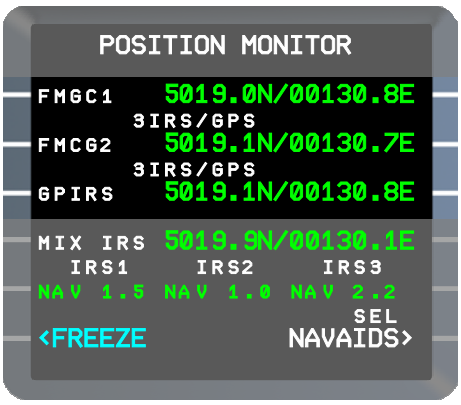
Radionavaids used by the FMGCs to compute the position are DME, VOR/DME, VOR, LOC or MLS. Accuracy is variable depending on type of navaid and its position relative to the aircraft.

When GPS is available:
Hybrid system - the three IRSs use GPS to calculate a hybrid GPIRS position which is sent to FMGC 1 and 2.
The IRS positions are corrected by the FMGCs through the filter, using GPS position, to determine the mixed best FMGC position.

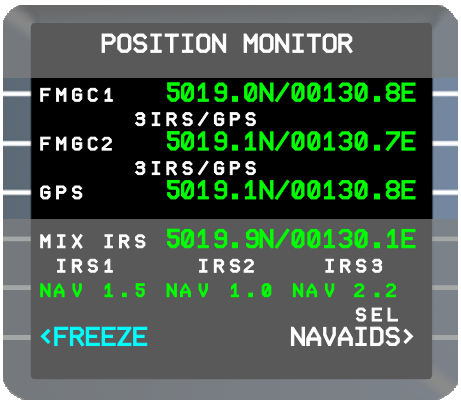
Autonomous system - IRS and GPS positions are sent to FMGCs. IRS positions are corrected by the filter to determine the mixed best FMGC position.

Each FMGC uses its associated GPS and calculates independently. There may thus be a slight difference between the two FMGC positions.

Note:
FMGC1, FMGC2, GPIRS or GPS positions are shown to the pilot on the MCDU POSITION MONITOR page.



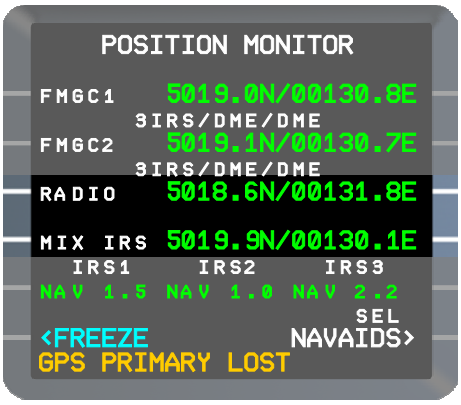
GPS HYBRID



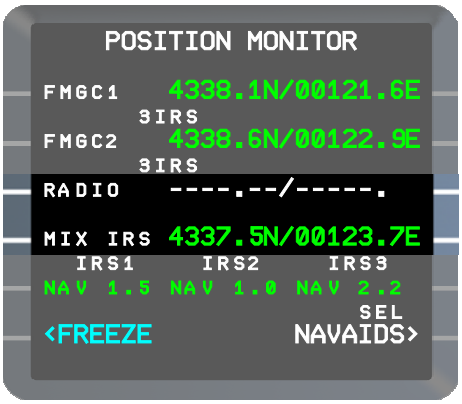
GPS AUTONOMOUS

When GPS is not available, (lack of coverage, deselected or not installed), the FMGCs use the IRS and radio position.
The IRS positions are corrected through the filter to determine the mixed best FMGC position.

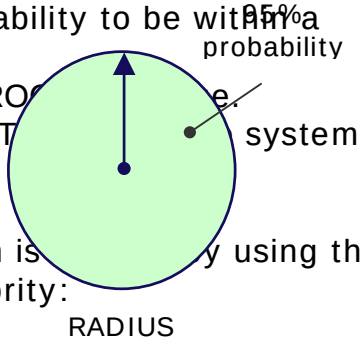
Radio navaids are auto-tuned by the FMS in order to determine the RADIO position. Criteria, such distance, figure of merit, intersection angle, are taken into account to select VOR, DME, VOR/DME, VORTAC, TACAN, ILS, ILS/DME, LOC/DME, or LOC, MLS.



When GPS and radio positions are not available the FMGCs use the triple mix IRS best position to determine, through the filter, the mixed best FMGC position.



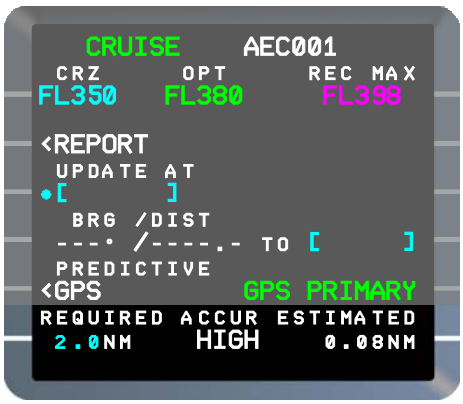
EPE (Estimated Position Error)
The FMGC position is estimated with 95% probability to be within a circle of uncertainty.
The ESTIMATED circle radius is shown on the PROG page.
By comparison of REQUIRED value with ESTIMATED value, the system determines a HIGH/LOW accuracy level .



To provide the best accuracy, the FMGC position is computed using the navigation systems in the following order of priority:

All phases, except approach:
1. 3IRS/GPS
2. 3IRS/DME/DME
3. 3IRS/VOR/DME
4. IRS only

On approach:
1. 3IRS/GPS/LOC or MLS
2. 3IRS/GPS
3. 3IRS/DME/LOC or MLS
4. 3IRS/VOR/LOC or MLS
5. 3IRS/LOC or MLS



More details are given in Part III: POSITION MONITOR page and Part IV: FMS Degraded Operation.

☐ Radio navaids

The FMS auto-tunes the radio navaids contained in the Navigation Data Base:
– to determine the best RADIO position, as stated above,
– for reference when part of the flight plan, or approach aid.

The auto-tuned navaids can be manually changed through the MCDU - RAD NAV page or the RMP.

Navaids selected may be displayed on EFIS with ident and/or frequency.

See Part III – MCDU – NAVAIDS / RAD NAV pages for more information.

☐ Navigation information

In addition to FMS position, the following information is calculated and displayed:

– Magnetic ground track.

The magnetic track is derived from true track and the magnetic variation data base stored in the FMGC.

This information becomes invalid beyond the 73° north / 60° south latitudes due to aircraft limitation and unreliable magnetic variation in these areas.

– Ground speed
– True Wind

■ In Flight Performance

The minimum entries required to compute a flight profile are: cruise flight level, cost index, aircraft weight and CG, fuel at departure. These data are normally inserted during the preflight initialization.
Additional entries may be inserted to improve the flight profile and predictions e.g.: Wind, Temperature and Tropopause, aircraft parameters (Idle/Perf) factors, Step Altitude if applicable.

Speed and/or altitude constraints can be inserted in the flight plan. The FMS will manage the profile (speed and/or rate of climb/descent) to comply with the constraints.

In preflight phase the FMS uses the entered data to:
– Compute optimum speed in each flight phase,
– Provide predictions of time, altitude passing, top of climb, top of descent, fuel,
– Determine Optimum and Maximum flight levels.

In flight, the predictions at each waypoint of the profile are updated using groundspeed based on actual wind velocity blended with flight planned data. When using selected mode (SPD/MACH, OP CLB, OP DES, V/S or FPA), the FMGC recomputes the predictions based on the selected parameters until the end of current FMS flight phase.

Caution

Performance computation is based on the performance model stored in the FMS, including the one-engine out performance.

Guidance modes

Guidance modes of the FMGC are of two types:

- **Managed** modes provide guidance computed by the FMGC to follow the flight plan track, profile and/or speed schedule, as programmed in the MCDU. To engage a Managed mode, pilot action is to push the appropriate selector knob on the FCU.

- **Selected** modes provide guidance to capture and maintain a target value of a flight parameter selected directly by the pilot on the FCU. Pilot action is to pull the appropriate mode selection knob, then turn it to set the desired value of the parameter.

The aircraft can be operated with mixed selected and managed modes, i.e. Lateral Guidance SELECTED and Speed MANAGED or Lateral Guidance MANAGED with Vertical Guidance SELECTED.
Vertical Guidance MANAGED mode is only available if Lateral Guidance is MANAGED (NAV).

The following paragraphs describe the aircraft logic used to advise the pilot of the actual operating mode: MANAGED or SELECTED.

☐ Speed

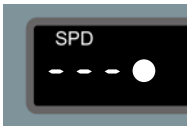
Managed Speed
Managed Speed mode is engaged by **pushing** the FCU SPD/MACH Selector knob.
The speed is controlled by the FMGC.
- On PFD the Target Airspeed is displayed in magenta,
- On FCU the Speed/Mach Window is dashed and the Managed SPD/MACH Dot is displayed,
- On MCDU (PERF page), MANAGED mode is confirmed with the target value.

Selected speed
Selected Speed mode is engaged by **pulling** the FCU SPD/MACH Selector knob,
The speed is controlled by pilot action on the FCU.
- On PFD the Target Airspeed is displayed in blue,
- On FCU the Speed/Mach window displays the Target Airspeed,
- On MCDU (PERF page), SELECTED mode is confirmed with the target value (which is the reference for FMS computation in the current flight phase).

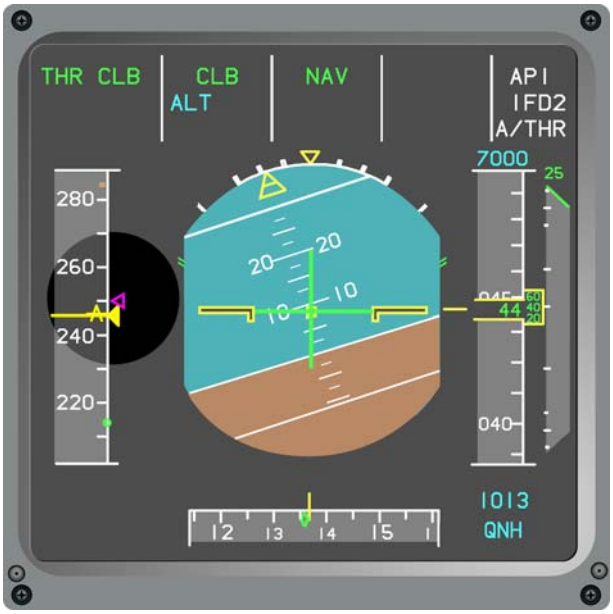
The auto-thrust mode indicated on the FMA does not distinguish between managed and selected Speed/Mach.

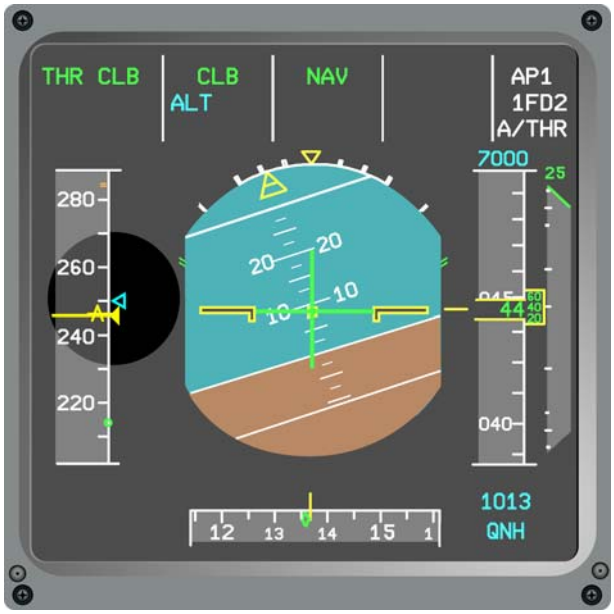
Speed (Cont'd)

MANAGED **SELECTED**



FCU





PFD

MCDU

☐ Lateral guidance

Managed mode: NAV

NAV mode is engaged by **pushing** the HDG/TRK Selector knob.
Lateral guidance is controlled by the FMGC to follow the trajectory defined in FMS.

- On PFD the FMA displays NAV,
- On FCU the Heading/Track Window is dashed and the Managed Lateral Dot is displayed,
- On PFD/ND actual heading and actual track are displayed, but selected Heading or Track Index (blue) is not displayed,
- On ND the flight plan track is displayed by a continuous green line,
- MCDU is used to change the flight path.

Selected mode: HDG (or TRK)

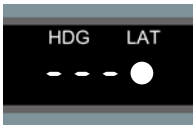
HDG (or TRK) mode is engaged by **pulling** the HDG/TRK Selector knob.
Lateral guidance is controlled by pilot selection on the FCU.

- On PFD the FMA displays HDG (or TRK),
- On PFD/ND the selected Heading or Track Index (blue) is displayed,
- On ND flight plan track is displayed by a dashed green line, and actual track by a continuous green line,
- On FCU the Heading/Track Window displays the Target Heading (Track).

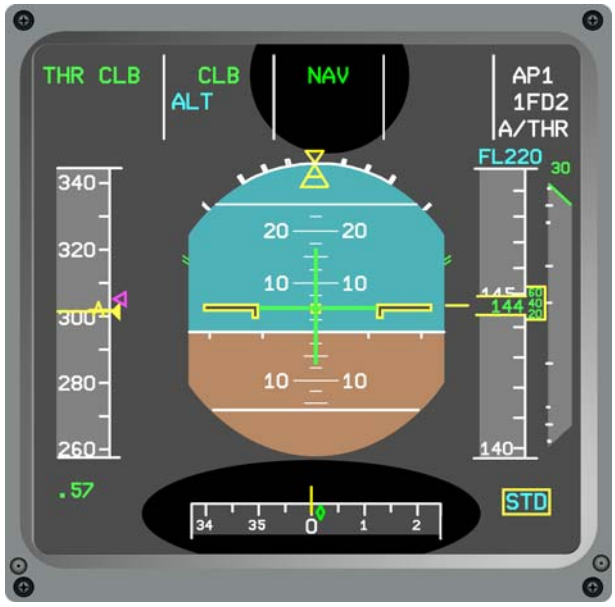
Lateral guidance (Cont'd)

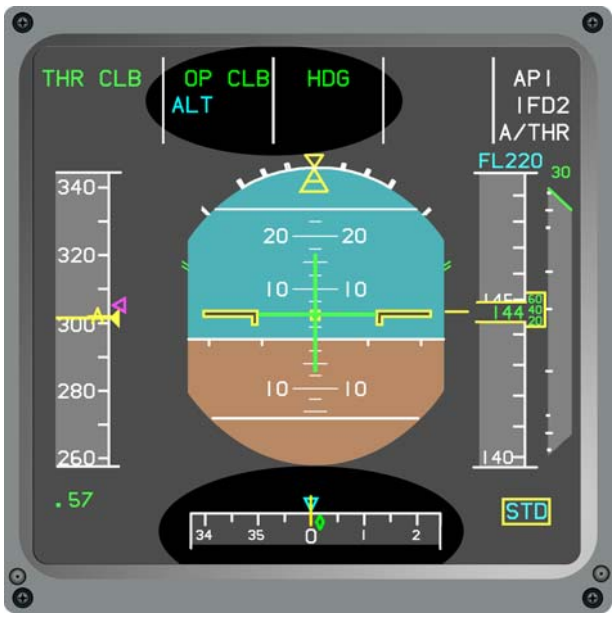
MANAGED **SELECTED**

FCU



PFD





ND

MCDU

☐ Vertical guidance

Managed modes: CLIMB, DESCENT
CLB/DES modes are engaged by **pushing** the Altitude Selector knob provided Lateral Guidance is MANAGED (NAV).
Vertical guidance is controlled by the FMGC to follow the FMS profile and comply with altitude constraints inserted in flight plan.
- On PFD, FMA displays CLB/DES,
- On FCU, Altitude Window displays the target altitude and the Managed Level Change white dot,
- Altitude/FL Constraints Management:
- When in CLB/DES modes, the FMGC will stabilize the aircraft at the FCU altitude or FMS altitude constraint, whichever is first.
- If altitude is limited by the FMS, FMA displays ALT CSTR, and the blue Target Altitude/Selected Flight Level symbol becomes magenta.

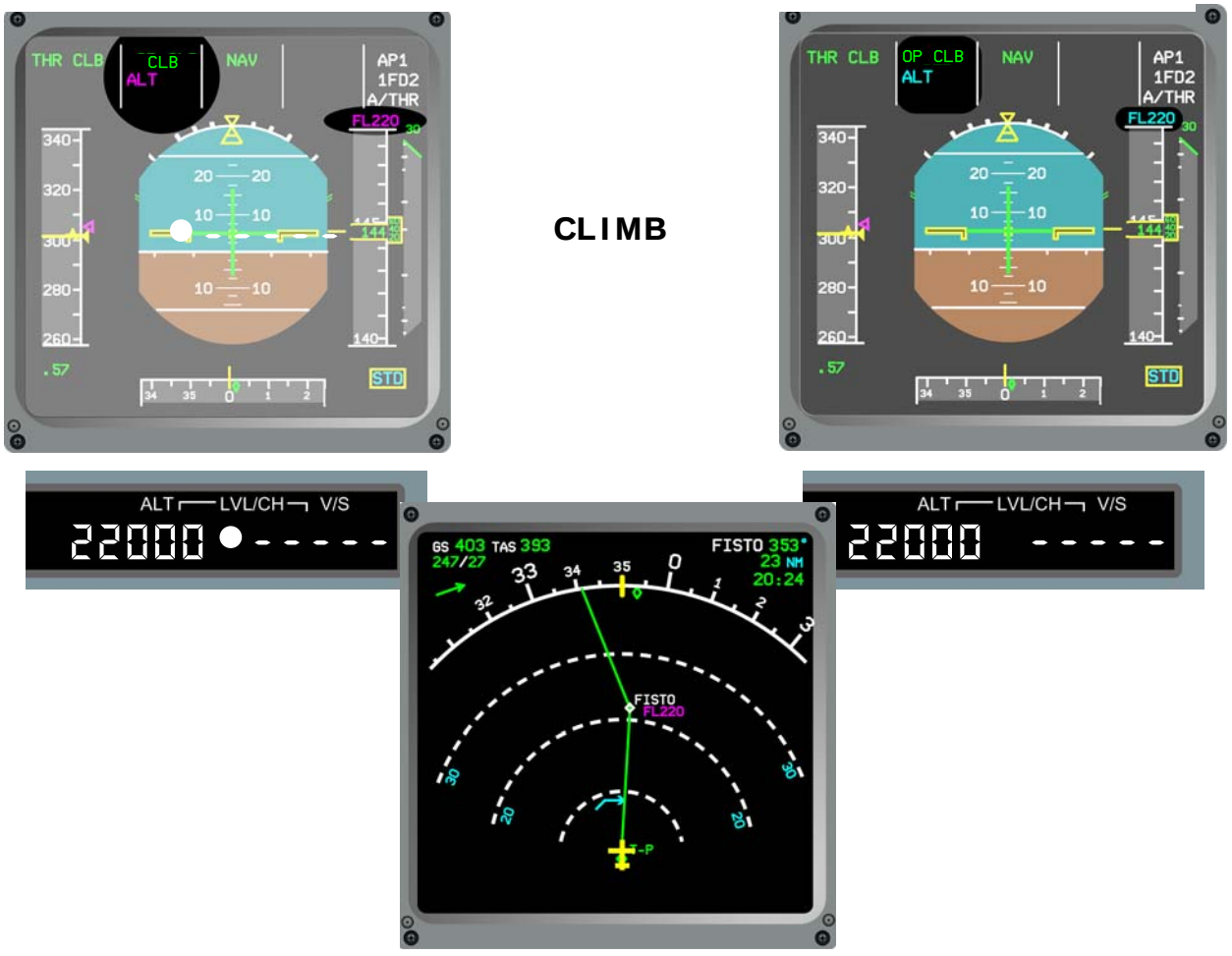
Selected modes: OPEN CLIMB, OPEN DESCENT, V/S or FPA
OP CLB/OP DES & V/S modes are engaged by **pulling** the Altitude Selector knob.
Vertical guidance is controlled by the pilot.
- On PFD, FMA displays OP CLB/OP DES, (EXP CLB / EXP DES, as installed),
- On FCU, Altitude Window displays the target altitude, the Managed Level Change white Dot is blank,

PFD: Vertical deviation symbol (Managed or Selected mode)
On PFD, this symbol appears on the altitude scale corresponding to the theoretical vertical profile computed by the FMGC. It is displayed from the top of descent down to the MAP altitude. The pilot can read the VDEV directly from the altitude scale. The range is ± 500 feet.
When the VDEV value exceeds ± 500 feet, the symbol stays at the range limit and the PROG page displays the exact value.

FMA indications in 2nd column from left:
- ALT is displayed for an intermediate level-off during climb or descent.
- ALT CRZ indicates that altitude matches with the FMS cruise level.

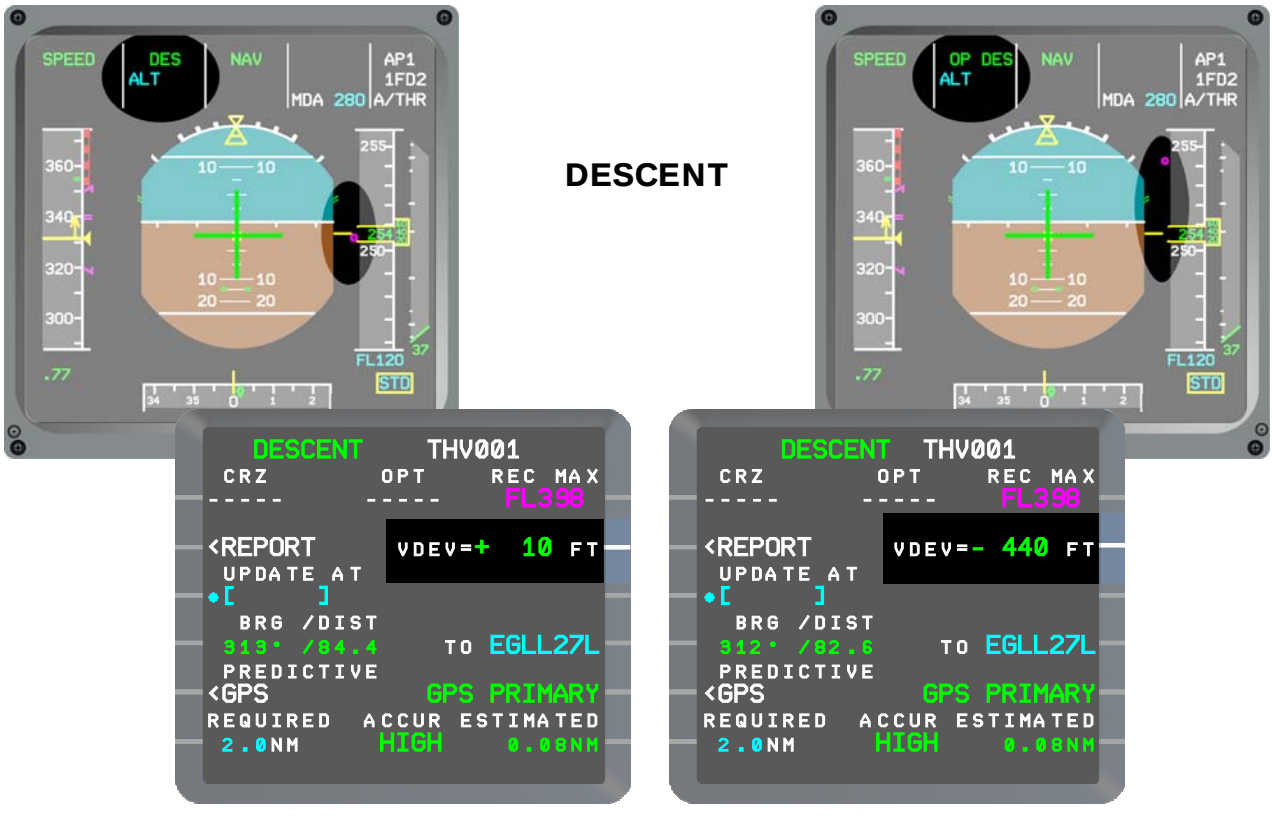
Vertical guidance (Cont'd)

MANAGED **SELECTED**



CLIMB

DESCENT



3.4. SOFTWARE AND DATABASE

The different programs and data bases loaded in the FMS are:

- FMS Software.
  This program contains the data for the relevant FMS version.

- NAV Database
  This database contains navigation database information: Waypoints, Navaids, Airports, Runways, Airways, Holding Patterns, Company Routes, Terminal Area Procedures (SID, optional EOSID, STAR, APPROACH). The data are stored for two successive 28-day cycles.

  A part of the NAV data base is customized for the operator. This concerns area of operation, company routes, alternate routes, and preferred alternate airports.

- Airline Modifiable Information (AMI)
  The AMI file contains software options selected by the operator e.g.: fuel policy values, printer options, customized AOC options, CO RTE retention, Default speed below 10000 ft, DIR TO default selection, THR reduction and ACC heights (All Eng & Eng out), Idle/Perf factors.

- Operational Program Configuration (OPC)
  The OPC file is a set of software programs pins. Some options are chosen by the operator, e.g.: Weight Unit, Length Unit, 2nd ADF option, GPS option, AOC option, Derated Take Off option, Default RNP.

- PERF database
  The Performance Data Base is a set of Engine /Aerodynamic /Performance models.

- Magnetic Variation Database (MAG VAR)
  This database contains the magnetic variation tables.

These data bases are loaded by maintenance using an external loader or the offside FM via the cross-load function available on the A/C STATUS- Software STATUS / XLOAD page.

Each database is identified with a reference number that can be checked on the MCDU pages - SOFTWARE/STATUS menu.

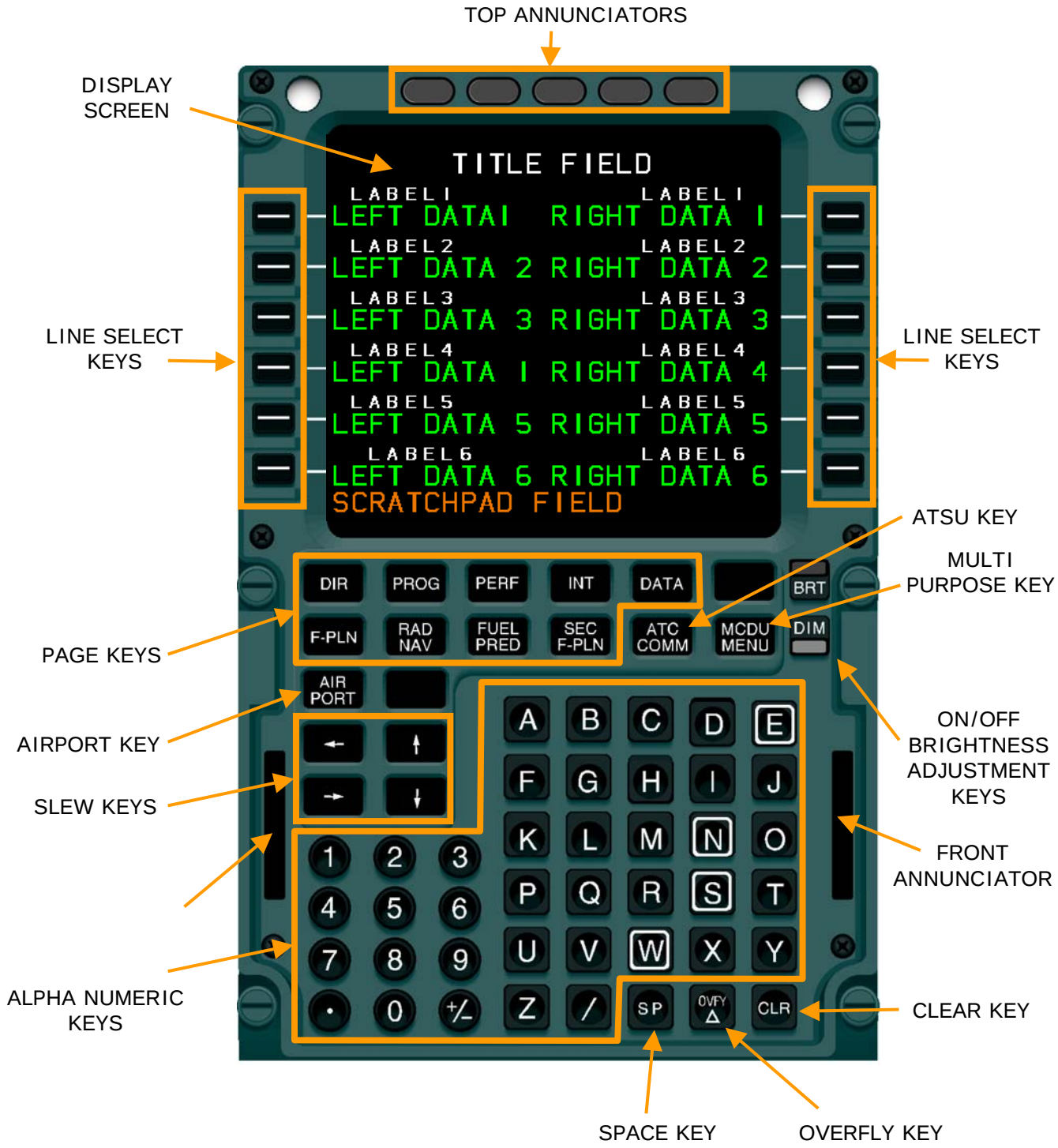
Part I: Chapter 4 – MCDU

Contents

PAGE INTENTIONALLY LEFT BLANK

4.1. DESCRIPTION

Refer to fold-out at back of Guide.
This chapter presents a general description of the MCDU. More details are given in later chapters.



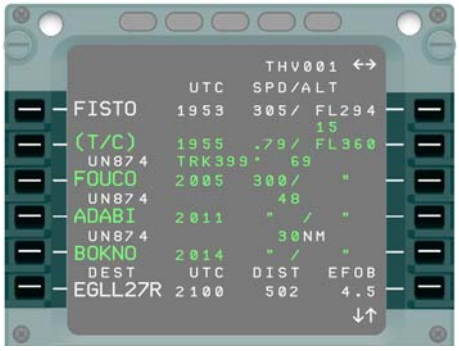
GENERAL

Information processed by the FMGS is presented on the various pages, which can be displayed on the MCDU screen.

The pages are accessed either:

– Directly by pressing the PAGE keys,

– By pressing the LINE SELECT keys,

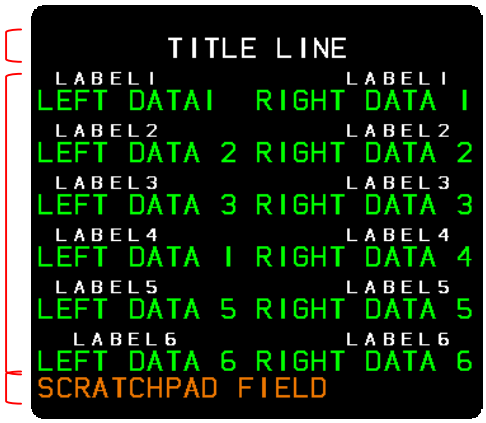


– By pressing the LINE SELECT key adjacent to a page PROMPT, identified by the symbols < or >.
– In some cases by pressing the LINE SELECT key adjacent to a activation PROMPT, identified by the symbols *, ← or →.

– By pressing the HORIZONTAL SLEW keys if more than one page for the specific function exist. In this case, horizontal arrows are displayed in the upper right corner of the screen.

– By pressing the VERTICAL SLEW keys for pages which occupy more than the 6 lines visible on the screen. In this case vertical arrows are displayed in the lower right corner of the screen.

■ DISPLAY SCREEN



The MCDU display screen contains 14 lines, each having 24 characters and is divided into three functional areas:

- On top, line 1 is normally used as a **title line**, or to display data to which the pilot does not have access.
- There are six **data fields** on each side of the display, from lines 2 through 13. They are in six pairs (lines 2-3, 4-5, 6-7, 8-9, 10-11, 12-13). Each pair of lines has a **label line** (the top 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 bottom line (line 14) is the **scratchpad** line and is used by the pilot to insert or modify data in the data fields, or to display FMS messages.

■ LINE SELECT KEYS

There are six line select keys (LSK) on each side of the display screen, adjacent to the data lines.
The left keys are identified as [1L] through [6L] and the right keys are identified as [1R] through [6R].
The line select keys are used:

- To enter data written in the scratchpad,
- To access sub-menu, shown by symbol < or >,
- To activate a specific function identified by a prompt *, ← or →.

■ PAGE KEYS

These keys provide a direct access to the main pages of the FMS.

☐ DIR key

Pressing the DIR key displays the DIR TO pag
flight plan already exists in the FMS.

*On this page, the pilot can initiate a direct flig
waypoint.*

DIR

☐ PROG key

Pressing the PROG key displays the PROG page (progress).

The PROG page displays dynamic flight information and data related to the primary flight plan.

PROG

☐ PERF key

Pressing the PERF key displays the PERF page (performance).

The PERF page provides performance data, speeds and various vertical predictions associated with each flight phase.

PERF

☐ INIT key

There are two INIT pages.
Pressing the INIT key displays the INIT A page.

The INIT A page is used for flight plan initialization by entering the basic parameters of the planned flight, and initializing the FM position at the departure point position.

INIT

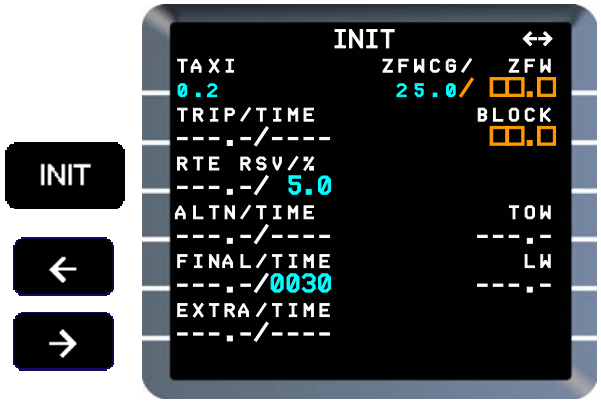
The horizontal slew keys access INIT B page.

The INIT B page is also used for flight plan initialization by entering the zero fuel CG, the zero fuel weight and the block fuel.

NOTE:

Access to the INIT A page is only available in PREFLIGHT and DONE phases.

The INIT B page is only available until engine start.

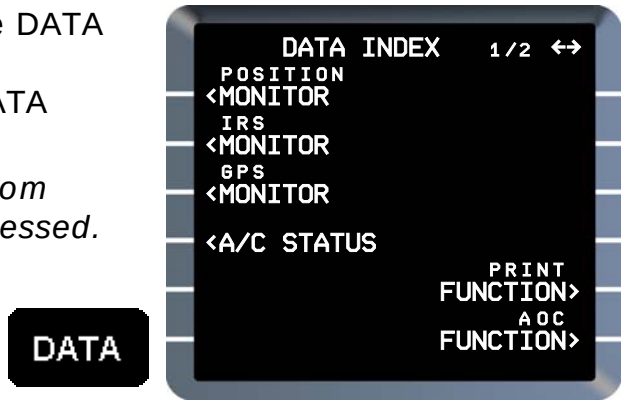


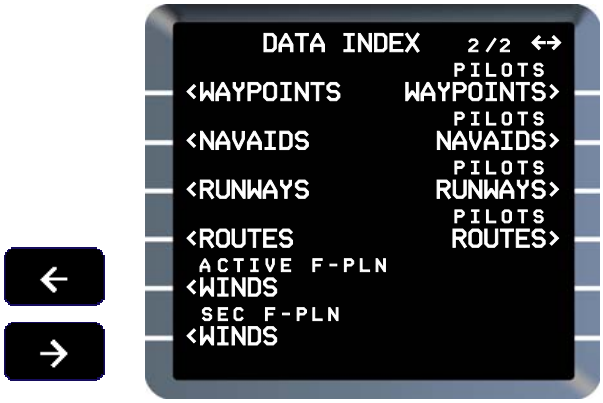
☐ DATA key

Pressing the DATA key displays the DATA INDEX page 1/2.

The horizontal slew keys access DATA INDEX page 2/2.

These pages display sub-menus, from which other Data pages can be accessed.





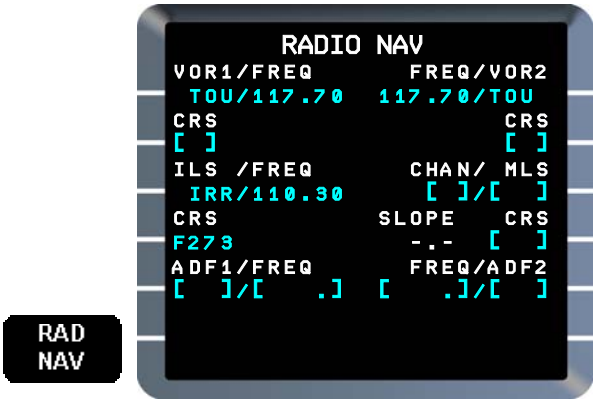
☐ F-PLN key

Pressing the F-PLN key displays the F-PLN A page.
The horizontal slew keys access F-PLN B page.
The Left Line Select keys access Lateral F-PLN revisions.
The right Line Select keys access Vertical F-PLN revisions.

☐ RAD NAV key

Pressing the RAD NAV key displays the RADIO NAV page.

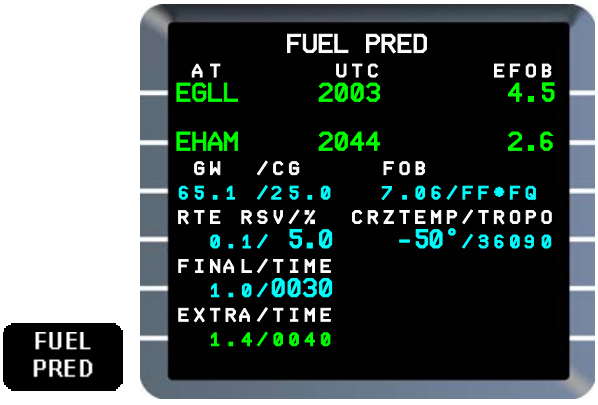
The RAD NAV page displays the navaids tuned by the FMS or selected by the pilot.



☐ FUEL PRED key

Pressing the FUEL PRED key displays the FUEL PRED page.

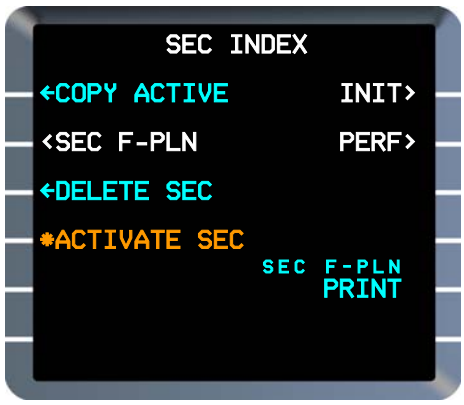
The FUEL PRED page displays fuel and time predictions based on the active flight plan and the current gross weight (GW) and fuel on board (FOB).



☐ SEC F-PLN key

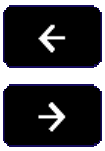
Pressing the SEC F-PLN key displays the SEC INDEX page.

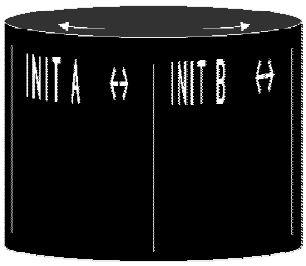
From this page the pilot can access the secondary flight plan data, including initialization (INIT), performance (PERF), also COPY ACTIVE and ACTIVATE SEC functions.



■ SLEW KEYS

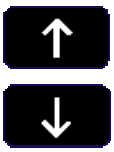
If a function consists of more than one page, horizontal arrows are displayed in the upper right corner of the display screen of the MCDU.
Pressing the → key displays the next page.
Pressing the ← key displays the previous page.

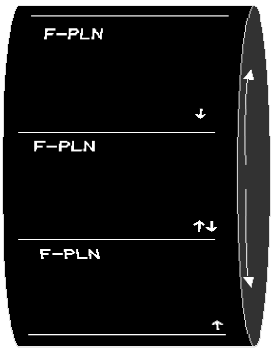




The function is a closed loop, that is, the associated pages wrap around from the last page to the first page and vice versa.

If a page contains more data than can fit on the display, vertical arrows are displayed in the lower right corner of the display screen of the MCDU.
If both arrows (↑ and ↓) are displayed, the displayed data can be scrolled either up or down.
Pushing the ↑ or ↓ key scrolls the display up or down, that is, to display the line below the current bottom line, the pilot must press the ↑ key.





The display is generally a closed loop also, that is, the lines wrap around from the last line to the first line and vise-versa.

The vertical slew keys are also used to increase or decrease latitude and longitude. Vertical arrows next to these data fields indicate that this data can be modified by using the ↑ and ↓ keys.

■ ATC COMM key

Pressing the ATC COMM key allows access to the ATSU (Air Traffic Service Unit), if it is available.
Otherwise, the MCDU MENU page is displayed.

Note:

Screen format may depend on installation.

ATC COMM

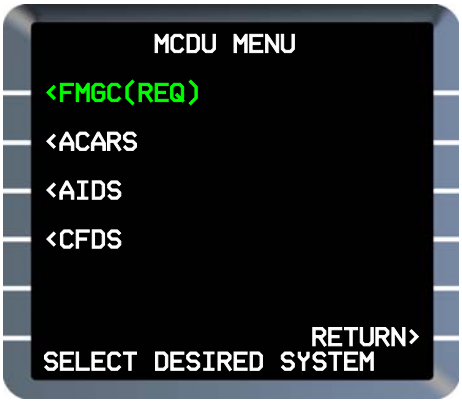
■ MULTIPURPOSE key (MCDU MENU key)

Pressing the MCDU MENU key displays the MCDU MENU page.

This page lists the different systems, which are accessible via the MCDU. Pressing the adjacent line select key provides access to that system.

The system automatically displays this page at power up.

MCDU MENU



■ AIRPORT key

The purpose of the AIRPORT key is to display the F-PLN page, which includes the next airport along the current flight plan. All the functions and displays of the F-PLN page are available on this page.

AIR PORT

The first push of the Airport key, following any other mode key, displays the primary destination airport.
Successive pushes of the key show alternate destination (if defined), origin airport (only before take-off) and back to destination.
After take-off, origin is omitted.

As on F-PLN A or B page, line 6 displays destination airport with estimated time of arrival, distance to go and EFOB.

When the airport key is pressed and a destination airport is to be displayed, the F-PLN page containing the destination is displayed with the destination in field 4L, except when the destination is the TO waypoint (respectively NEXT waypoint), then the press of the airport key changes the location of the destination to field 2L (respectively 3L).

This page can then be slewed such that all the waypoints move up or down including the destination. This logic also applies to the alternate destination and the origin, except that the origin is always displayed in field 1L. Access to the lateral and vertical revision pages and use of the horizontal slew keys remain available.

Note that the AIRPORT key can be considered as a slew key. For instance, if the AIRPORT key has been pressed once such that the destination is in 4L-4R, this is the waypoint orientation that is memorized should a LAT REV or VERT REV occurs. Any subsequent reversion from the LAT REV or VERT REV should return to this orientation, when appropriate.

If a TMPY F-PLN does not exist and a secondary page (e.g. SEC INDEX, SEC F-PLN) is not displayed, pressing the AIRPORT key works on the active flight plan, as described.

If a TMPY F-PLN exists and a secondary page is not displayed, pressing the AIRPORT key works on the temporary flight plan, as described.

If a secondary page is displayed, pressing the AIRPORT key works on the secondary flight plan.

For the active, secondary and temporary flight plan, the alternate origin is not included in the orientation sequence of successive AIRPORT key pushes.

■ ALPHANUMERIC keys

The **alphanumeric keys** enable the pilot to type letters and numbers on the scratchpad successively from left to right.

The **+ / - key** enables the pilot to enter negative figures (for example, outside air temperature).

– is selected when pressing once, + is selected when pressing twice.

The **slash key (/)** is used to separate data when multiple entries are written onto the scratchpad.

For example, airspeed and Mach (280/.78), wind direction / velocity / altitude (150/50/200).

Rules:
The trailing entry must be preceded by the slash if it is entered alone.
The leading entry can be followed by a slash, but is not required if it is entered alone.

■ SPACE key

The **space key (SP)** generates a “space” character.

It is mainly used for “free text” type of messages in ACARS or ATSU applications.

Note: A space character can be entered onto the scratchpad even if it is empty.

■ OVFLY key

The OVFLY (fly over) key enables the pilot to change the transition from a fly-by to a fly-over, and vice versa.

To create a FLY OVER: press the fly over key, then select the LSK adjacent to the waypoint to be over-flown.

To cancel a FLY OVER: press the fly over key, then select the LSK adjacent to the waypoint to be flown-by.

■ CLR key

The clear key (CLR) is used to clear messages or data from the scratchpad or a data field,

Rules:
- If pressed while the scratchpad is empty, the **CLR** message is displayed.
- To erase characters in the scratchpad:
  A single short press of the clear key will erase the last character entered onto the scratchpad.
  Pressing the clear key more than 2 seconds will erase the entire scratchpad.
- To erase data from a data field:
  Press while the scratchpad is empty. CLR appears in the scratchpad.
  Press the LSK adjacent to erase the data field.

  If the cleared data field has a default or FMS-calculated value, the data field reverts to that value.

  In some cases the field cannot be cleared but the value can be modified by a new entry.

  If the cleared data field is a leg in the flight plan, the leg is deleted from the flight plan and, in most cases, a discontinuity is created.
- Pressing the CLR key will erase CLR from the scratchpad.

■ ON / OFF AND BRIGHTNESS ADJUSTMENT keys

Two keys allow the pilot to control the light intensity of the entire MCDU.

MCDU power up is performed with a short press on the BRT key. A long press on the DIM key starts the MCDU power-off test.

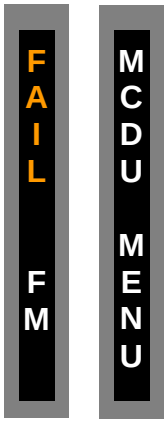
■ ANNUNCIATORS

Top annunciators

- FM1 (amber) indicates FM1 failure.
- IND (amber) indicates INDEPENDENT FM MODE.
- RDY (green) indicates that the MCDU has passed its long term power up or power off reset test after its BRIGHTNESS switch has been turned to OFF.
- FM2 (amber) indicates FM2 failure.

Front annunciators :

- FAIL (amber) is illuminated when the MCDU has failed.
- FM (white) is illuminated when FM is not the active system and it has sent an important message.
- Important messages are those displayed in amber.
- MCDU MENU (white) is illuminated when a system linked to the MCDU other than the FM requests the display (such as ACARS or CFDS).



4.2. GENERAL DISPLAY RULES

■ Non-valid and Missing Data

For all display fields, only valid data is displayed. If the data is not valid for display or not available for display, the display field contains dashes (---).
For example, if performance is calculating optimum altitude, the OPT FL field should be dashes until the calculation is complete.
When a new page is accessed, it may require that the FM performs calculations or predictions before all the data to be displayed are available. In this case, the portion of the display that is available and can be displayed is presented immediately. However, the data fields that are not available are left as dashes and filled in as the data becomes available.

■ Font size

On the MCDU two sizes of font are used according to the following rules:
– **Large font** to display all data on the **data line** (line adjacent to LS key).
– **Small font** to display data on the **label line.**

Data with **default** values or FM predicted values, which could be changed by the pilot, are displayed:
– In **small font** when the FM supplied data are being used,
– In **large font** when the data are pilot entered.

If two data entries are dependent upon each other (such as time and distance for holding pattern leg) the independent data (those defaulted to or input by the pilot) are shown in large font and the dependent data in small font.

If there are active or selected data displayed with non-active or non-selected data, the active or selected data are displayed in large font while the other are in small font.

■ Color code

There are six colors used for data display: white, green, blue (cyan), yellow, amber and magenta.

DATA	MCDU COLOR
Title, comments, < , > , ↑ ↓ ←→ dashes, minor messages, TO waypoint Destination	White
Modifiable data, Selectable data, Brackets, Tuned navaid	Cyan
Non modifiable data, active data	Green
Mandatory data (boxes), Pilot action required, Important messages, Missed constraints	Amber
Constraints, Max altitude	Magenta
ACTIVE F-PLN, Offset (OFST in the title of F-PLN), Active HDG SEL or active TRK SEL	Green waypoints, white legs
TMPY F-PLN	Yellow waypoints, white legs
SEC F-PLN	White waypoints, white legs
Missed approach, Alternate	Cyan waypoints, white legs

*, → and ←, associated with a prompt have the color of this prompt. Slash (/), when used to separate data fields, are the same color and font as of the data to the right of the /, whether the field contains alphanumeric characters, dashes, boxes.

Data Labels

Page prompts – indicate that named page may be accessed from the page currently displayed by pressing the adjacent Line Select Key.

Data entry prompts – Different prompts are displayed in a data line depending on the type or status of data of that line.
Blue brackets ([]) indicate that the data entry in that line is optional.
Amber boxes (□□□□) indicate that data entry is mandatory.

Pseudo-waypoints – A pseudo-waypoint is a waypoint generated by the FMS and inserted in the flight plan to indicate a vertical navigation event. Pseudo-waypoints are speed limit (SPD LIM), top of climb (T/C), top of descent (T/D), top of step climb (S/C), top of step descent (S/D), deceleration point (DECEL).

Flight plan markers – Markers are displayed on the F-PLN, TMPY F-PLN and SEC F-PLN pages to mark either:
- F-PLN DISCONTINUITY (flight plan discontinuity),
- A TOO STEEP PATH,
- END OF F-PLN (End of the flight plan),
- NO ALTN F-PLN (No alternate flight plan).

■ Special symbols or displays

Symbol	Description
□□□□	Box Prompts (amber) Data input is required in order that the FMS performs the specific function.
----	Dashes Data is calculated and displayed by the FMS when it has enough information to do so. The flight crew does not normally enter this information.
[ ]	Bracket Prompts (blue) Optional data entry. Occasionally, this data may be computed and entered by the FMS as a result of another pilot action.
↑↓	Vertical arrows Vertical slewing (up and or down) is available by using vertical slew keys.
↑, ↓, ↑↓	At the bottom right corner of the screen, MCDU pages may be scroll up or down with vertical slew keys.
←→	Horizontal arrows beside a LSK indicates that the pilot can press the key to activate the prompt or select some data. At the upper right corner of the screen, next/previous page may be displayed with horizontal slew keys.
←WPT WPT→	Horizontal arrows with WPT beside a fixed waypoint on the flight plan page indicates that the A/C must turn at fixed waypoint in the indicated direction.
WPT△	Triangle beside a fixed waypoint on the flight plan page indicates that the A/C must fly over the fixed waypoint.
*	Asterisk beside a LS key indicates that pressing the key causes a change to parameters, which affect the active situation of the aircraft. The page displayed may also change as a result.
< xxxx xxxx >	Page prompt allows access to a FMS submenu.
(xxx)	Pseudo WPT FMS generated WPT.
+, -	Associated with ALT constraint. A plus (+) is displayed for an AT or ABOVE ALTITUDE constraint and a minus (-) for an AT or BELOW ALTITUDE constraint.

■ Data Entry

Data is entered in the scratchpad from left to right using the alphanumeric keys. The pilot transfers the data to a data field by pressing the associated line select key [LSK].

Caution

Data entered in the scratchpad should be carefully checked before pressing the relevant Line Select Key.

Altitude is displayed or entered as an altitude or as a flight level depending on aircraft is above or below the transition altitude.
As a general rule, entry of an altitude requires at least four digits, two-digit or three-digit entries are taken as flight levels.
When entering altitudes below 1000, the pilot must type a zero before typing the altitude itself (e.g. 0500 for 500). A flight level can be entered with or without the leading "FL".

When a data field contains two or more elements [ ]/[ ], it can be entered one by one or as a single entry but separated by a slash.
If the first element is entered alone, it does not need to be followed by a slash.
If the second element is entered alone, it must be preceded by one or two slashes in order to be correctly identified by the FMS.

If the scratchpad contains an FMS-generated message, typing characters overwrites the whole message.

When the pilot intends to make an action on the MCDU, which is not allowed (e.g. enter data into a field where no data may be entered), the white message "NOT ALLOWED" is displayed in the scratchpad.

Simultaneous data entry in the two MCDUs is not a limitation but should be avoided.

Data formats are described in the next chapters and listed in the appendices at the end of the Pilot's Guide.

Part II

FLIGHT PHASES PROCEDURES

PAGE INTENTIONALLY LEFT BLANK

Part II: FLIGHT PHASES

Contents

Chapter 6 – DESCENT

Chapter 7 – APPROACH

Chapter 8 – GO-AROUND

Chapter 9 – DONE

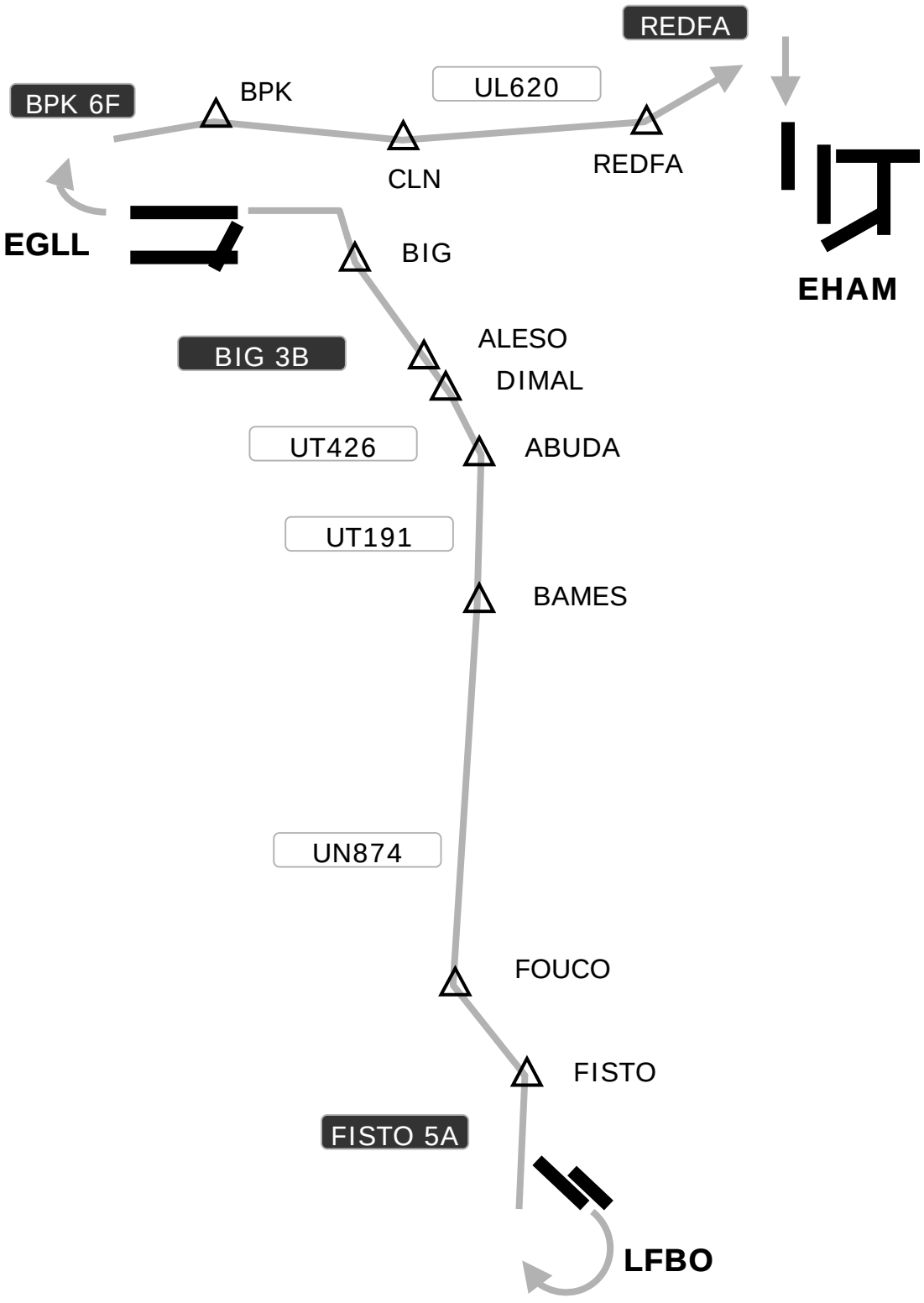
Part II: Chapter 1 – FLIGHT PLAN SCENARIO

Contents

PAGE INTENTIONALLY LEFT BLANK

1.1.ROUTE

A Flight Plan, TOULOUSE (LFBO/TLS) to LONDON Heathrow (EGLL/LHR), with alternate airport AMSTERDAM (EHAM/AMS) is used in this guide as a support to describe the different flight phases.



1.2.FLIGHT PLAN DATA

AIRCRAFT

A320 200 ENGINES CFM 56-5-B4
IDLE/PERF FACTORS:+0.0/+0.0

CALL SIGN :THV001
COST INDEX :CI 30
COMPANY ROUTE :TLSLHR01
ALTN RTE :LHRAMS01
DEPARTURE TIME 1500

ATC FLIGHT PLAN:

LFBO 14R FISTO5A FISTO UN874 BAMES UT191 ABUDA UT426 DIMAL
ALESO BIG3B EGLL 27R
CRZ FL 360

ALTN RTE

EGLL 27R BPK6F BPK DCT CLN UL620 REDFA EHAM ILS 18R
ALTN CRZ FL 250

FUEL/TIME:		E.FUEL KG	E.FUEL LBS	E.TME	NM	NAM	FL
DEST	EGLL	003800	007937	01:21	0544	0570	360
RESV	0.05	000200	000441	00:06			
ALT	EHAM	001700	004630	00:40	0232	0215	250
HOLD		001100	002205	00:30			
XTR		000800	001543	00:24			
TOF		007600	016756	03:13			
TAXI		000200	000441				
BLOCK		007800	017197	03:13			

WEIGHT:	KG	LBS	LIMIT STRUC.	KG	LBS
BASIC WT	042500	093695			
EST PAYLOAD	015500	034171			
EST ZFW	058000	127866	ZFW	61000	134500
TO FUEL	007600	006755			
EST TOW	065600	144621	TOW	75500	166500
EST BURN OFF	003800	007937			
EST LAW	062000	136684	LAW	64500	142200

BALANCE:

ZFW CG: 28%
TOW CG: 26% / TRIM 0.6UP

TAKE OFF PERFORMANCE

CONF 2
V1 141 VR 141 V2 143
FLEX TEMP :F55
THR RED ALT :1990 FT
ACC ALT :3490 FT
ENG OUT ACC ALT :1990 FT

ROUTE LFBO/EGLL: TLSLHR1

WPT	CSTR
LFBO14R	
900	
D144H	+4000'
TOU	
SPD LIM	250/FL100
FISTO	
FOUCO	
ADABI	
BOKNO	
DEVRO	
VANAD	
VADOM	
BAMES	
PODEM	
ABUDA	
DIMAL	
ALESO	
TIGER	15000'
D139L	250
BIG	220/7000'
BIG07	2500'
CI27R	2500'
FI27R	
EGLL27R	

ROUTE EGLL/EHAM: LHRAMS1

WPT	CSTR
EGLL27R	
580	
D273D	+3500'
D282F	
D318H	+4000'
CHT	
BPK	6000'
CLN	
DIDGO	
REDFA	300/-23000'
SULUT	
DO78P	+7000'
SUGOL	+7000'
NIRSI	220/4000'
EH608	210/+3400'
EH621	+2000'
EH622	
EHAM18R	

WEATHER:

TROPOPAUSE 35000

CLIMB WIND

180/20	FL100
270/30	FL200
290/40	FL300

CRZ WIND/TEMP

FOUCO	300/40/M50	FL360
DEVRO	310/50/M48	FL360
BAMES	320/60/M47	FL360

DESC WIND

320/40	FL300
300/30	FL200
290/20	FL100

ALTN WIND/TEMP
300/35/M35 FL250

ATIS

LFBO:
RWY 14R DEPARTURE FISTO5A
RWY 14L CLOSE DUE TO WIP
TEMP 18/12 QNH 1018

EGLL:
27R ARRIVAL BIGGIN3B
250/15 ILS 27R
TEMP 15/10 QNH 1015

EHAM:
18R ARRIVAL REDFA
200/15 ILS 18R
TEMP 16/12 QNH 1014

PAGE INTENTIONALLY LEFT BLANK

Part II: Chapter 2 – PREFLIGHT

Contents

2.1. FMGS INITIALIZATION

For layout of MCDU keyboard (see fold-out at end of the Guide).

This chapter describes the normal crew procedures to initialize the FMGS in the preflight phase.
In this phase flight data are entered or confirmed via MCDU pages in the following sequence:

- A/C STATUS,
- INIT page A,
- F-PLN,
- SEC F-PLN,
- RAD NAV,
- INIT page B,
- PROG,
- PERF,
- F-PLN check.

For supplementary procedures refer to Chapter 2.2 and Operator's SOPs.

■ FMGC power up / Access

- If necessary, perform the power up and adjust the brightness,

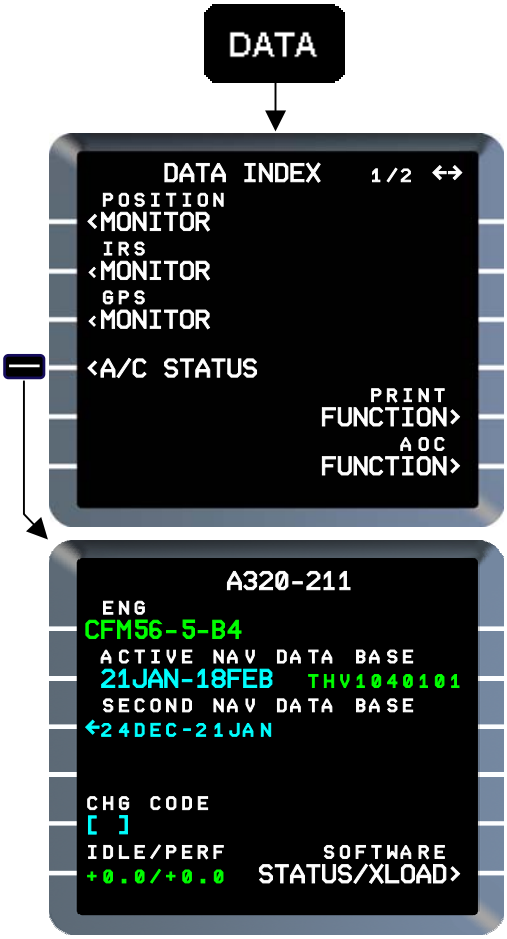
  BRT key.....Press
  Short press will switch on MCDU.
  At power up, the system shows the last page displayed.

  BRT / DIM..... Adjust

  To access A/C STATUS page:

  DATA key .....Press

  A/C STATUS [4L].....Press
  The A/C STATUS page is displayed.



■ Check A/C Status page

A/C type.....Check

Engine type .....Check

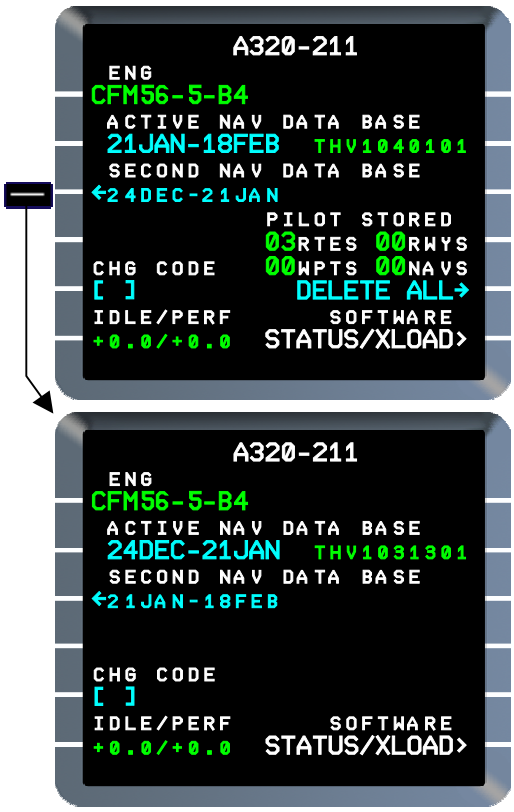
ACTIVE NAV DATA BASE.....
.....Check

Check period of validity and operator reference.

If the validity is not correct:

SECOND NAV DATA BASE [3L]
..... Press

The second NAVdb becomes the active NAVdb.

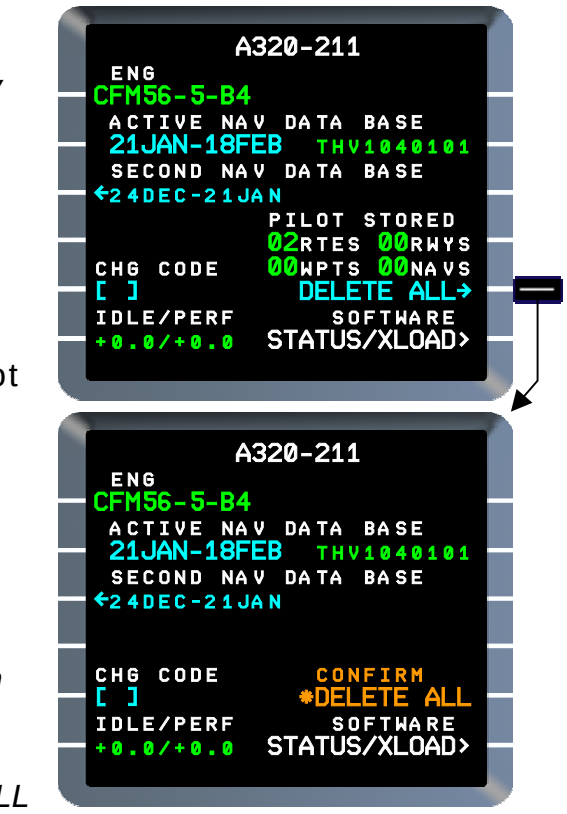


Caution

Changing NAVdb after flight plan data entry causes deletion of all entered data. If done in flight, active and secondary flight plans are lost and ND screen goes blank

If required, change IDLE/PERF factors.

See Part II: Ch 2.2 - Supplementary Procedures.



If some PILOT STORED data exist, either:

DELETE ALL ..... Press

This will cause the deletion of all Pilot Stored Data,
or

Elements .....Check

See Ch 2.2. Supplementary Procedures.

If some pilot stored data are used in the ACTIVE or SEC F-PLN, "PILOT ELEMENT RETAINED" s-pad msg (white) is displayed when DELETE ALL is pressed.

■ Complete INIT A page

INIT key.....Press

☐ Enter Route

● **If NAVdb contains CO RTE(s):**
RTE may be entered either with CO RTE designation or with FROM/TO [1R].

CO RTE [1L] .....Enter
Ex: TLSLHR01,
Or

FROM/TO [1R] .....Enter
Ex: LFBO/EGLL.

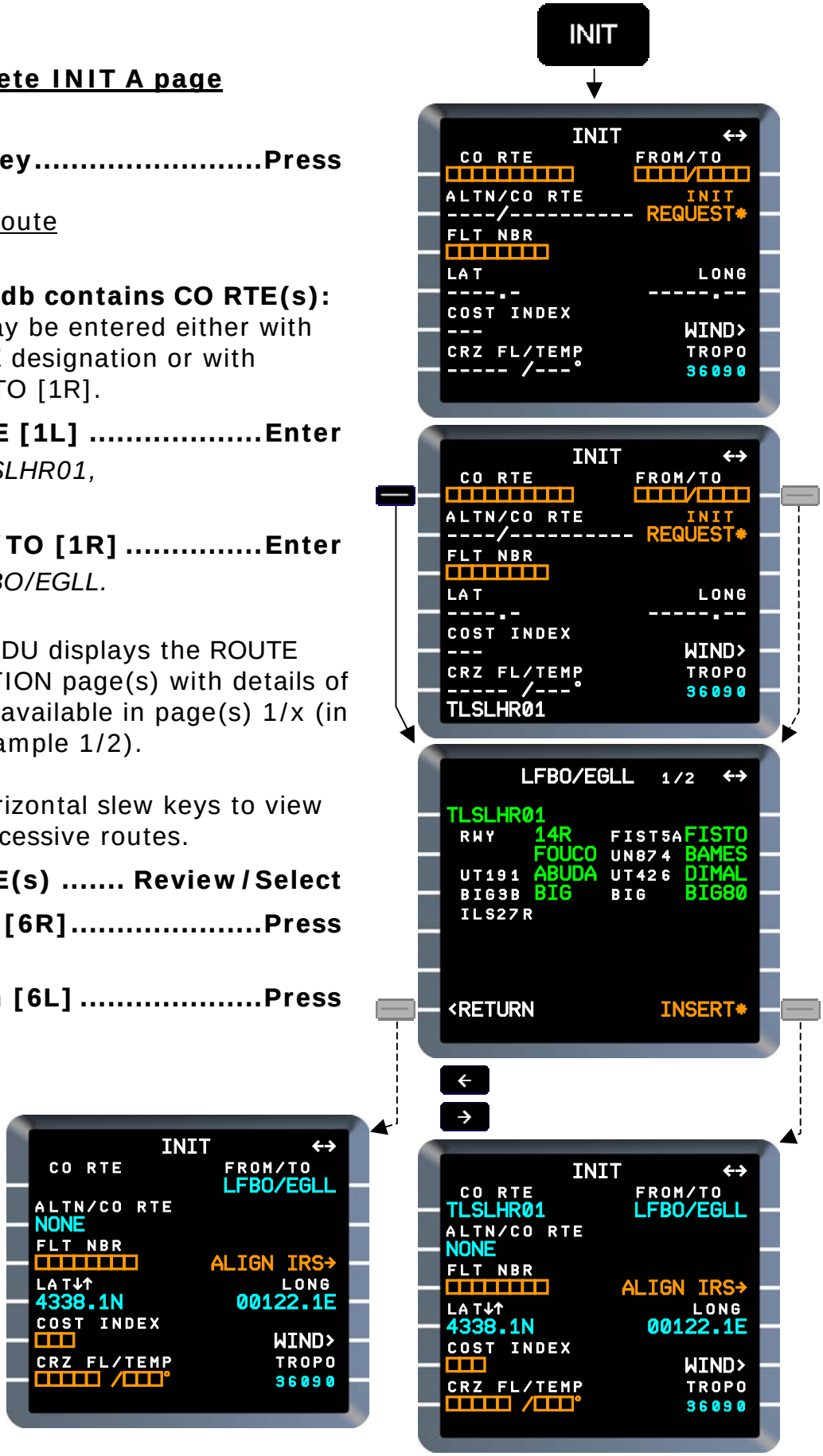
The MCDU displays the ROUTE SELECTION page(s) with details of RTE(s) available in page(s) 1/x (in this example 1/2).

Use horizontal slew keys to view the successive routes.

CO RTE(s) ..... Review/Select

Insert [6R].....Press
or

Return [6L] .....Press



Caution

Check CI (Cost Index) if loaded with CO RTE. It could be wrong due to a software anomaly considering in any case weights in lbs.

- **If NAVdb does not contain CO RTE(s):**

  FROM / TO [1R] .....Enter

  Ex: LFBO/EGLL.

  In this case flight plan route must be defined manually on F-PLN page.

  See paragraph F-PLN in this chapter.

The optional INIT REQUEST field and amber prompt are described in Part III: Multiphase Data Link.

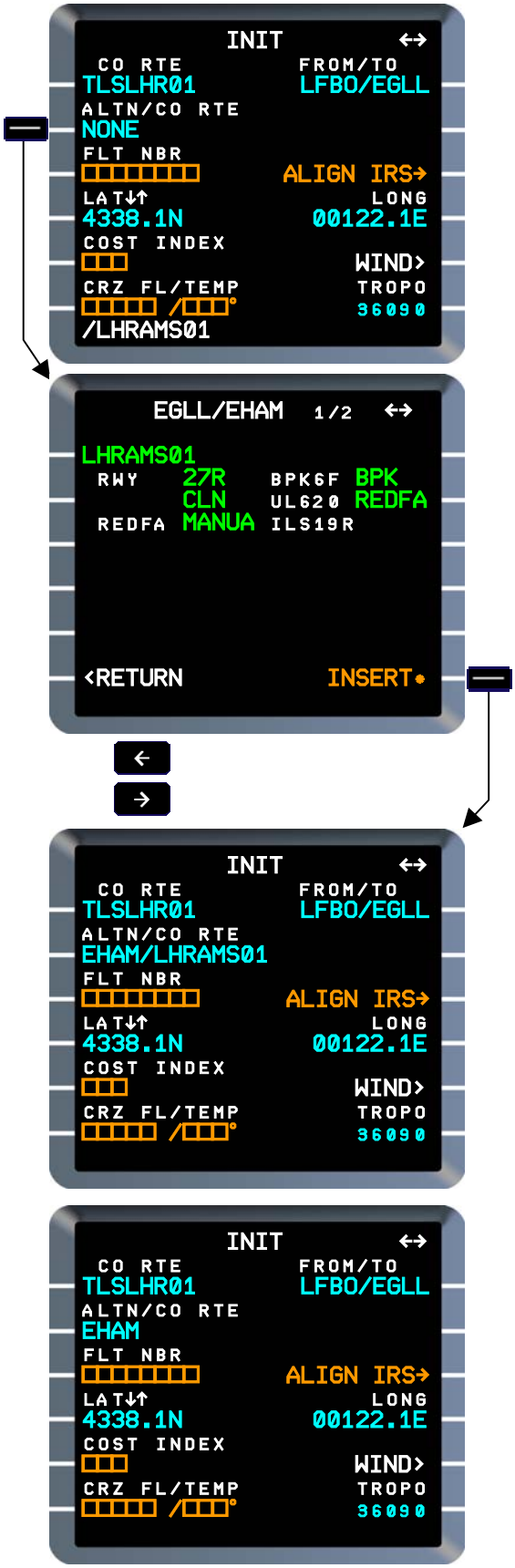
☐ Enter Alternate / Alternate Route

The alternate or alternate route may be automatically selected and displayed on INIT page if associated with primary destination in NAVdb.
(See Part III: 3.6 – ALTN function)

If alternate CO RTE is provided in NAVdb, but not automatically selected, and its code is known:

/CO RTE [2L].....Enter
In the example: /LHRAMS01,
or

ALTN [2L].....Enter
Ex: EHAM.
In this case the MCDU displays the ALTN CO RTE(s) available, on RTE Selection pages.
Use slew keys as desired to review and select the ALTN CO RTE or RETURN.



If alternate company route is not in data base:

ALTN [2L].....Enter
Ex: EHAM
In this case ALTN route may be defined manually on the F-PLN page.

To change an automatically or manually entered alternate, overwrite ALTN/CO RTE field in the same manner as described above.

☐ Enter Flight Number

FLT NBR.....Enter
Ex: THV001.

This information is sent to various applications (as available), e.g. ACARS, Flight Recorder, so it must be entered exactly as written in ATC flight plan.

☐ Align IRS

IRS must be set at NAV on the IRU overhead panel.
Use fast or complete alignment as required by SOPs.

The position should then be checked, adjusted if necessary and re-entered as below:

LAT & LONG.....Check
When a CO RTE or city pair is entered, LAT & LONG fields show by default the departure airport reference coordinates.
If GPS is available, it is recommended to use these coordinates. If GPS is not available, coordinates may be adjusted to gate position by vertical slew keys.

- **To adjust the position:**

LAT↑↓ [4L].....Check arrows
If vertical arrows are not shown after LAT field, press LSK 4L.

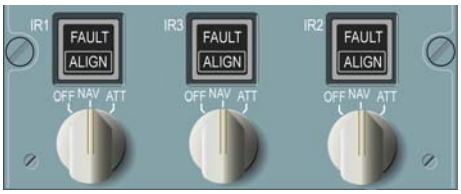
Vertical slew keys ..... Scroll
Scroll up/down to adjust latitude coordinates.

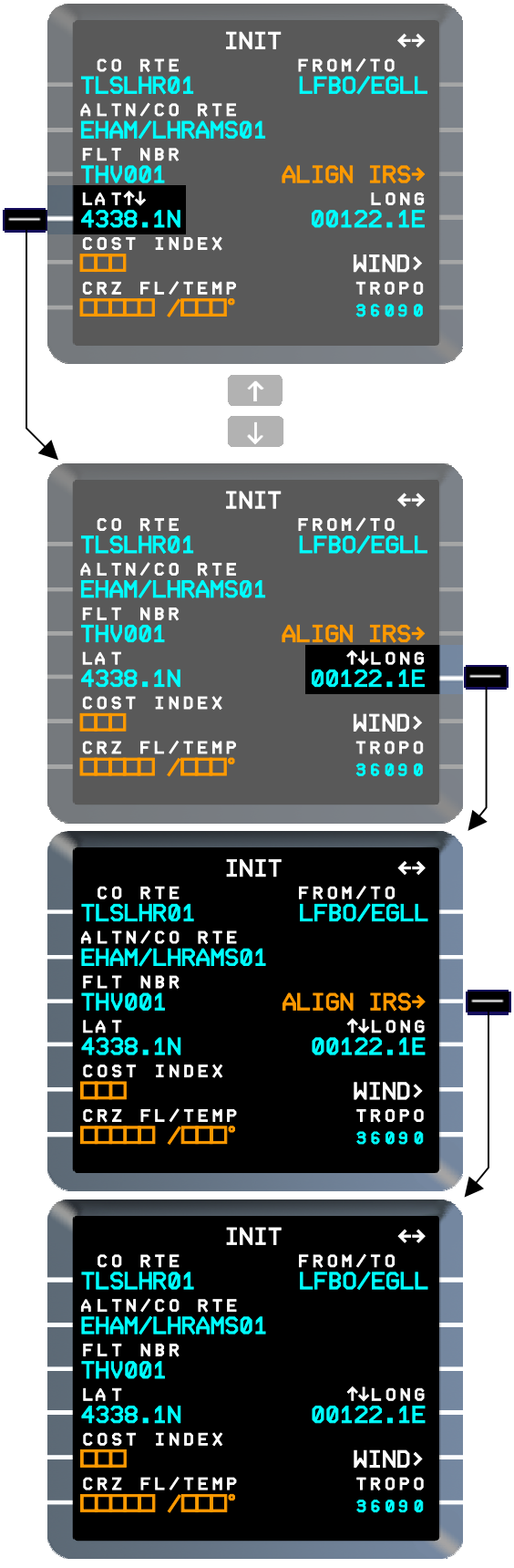
LONG field [4R].....Press
Arrows are selected to right of LONG field (LONG↑↓).

Vertical slew keys ..... Scroll
To adjust longitude coordinates.

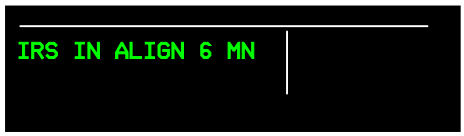
When position is correct:

ALIGN IRS [3R].....Press





The alignment can be checked through:
The ECAM MEMO message IRS IN ALIGN X MN or IRS IN ALIGN. (IRS IN ALIGN appears if one of the 3 IRS is still in alignment, this message becomes amber if one engine is running).
The IRU on the overhead panel,
The MCDU POSITION MONITOR page.



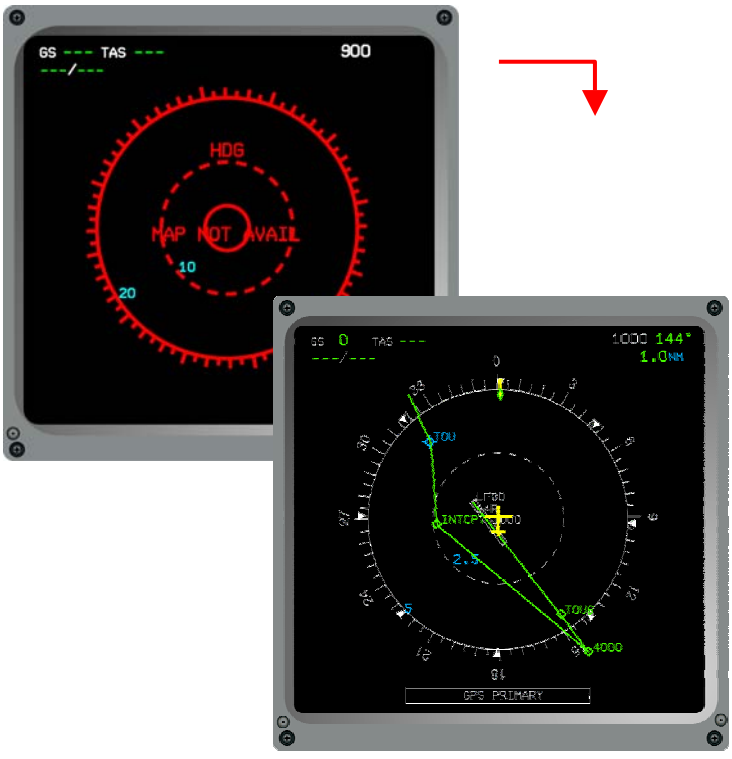
On aircraft with GPS, when alignment is completed, the white message "GPS PRIMARY" is triggered on ND and MCDU scratchpad.

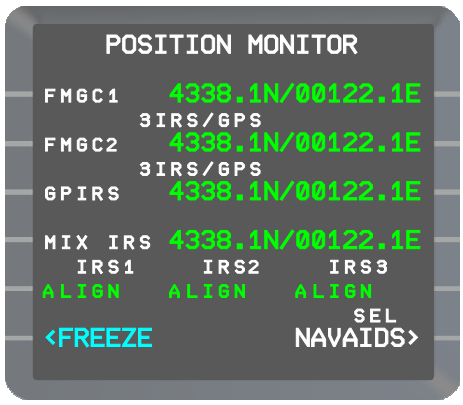
If the IRSs are already in NAV mode, "RESET IRS TO NAV " s-pad msg (amber) appears as soon as the content of CO RTE or FROM/TO fields is changed.

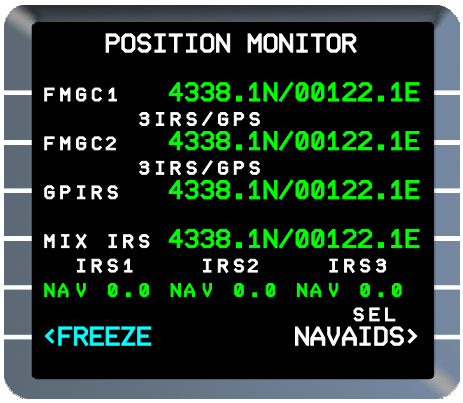
Caution

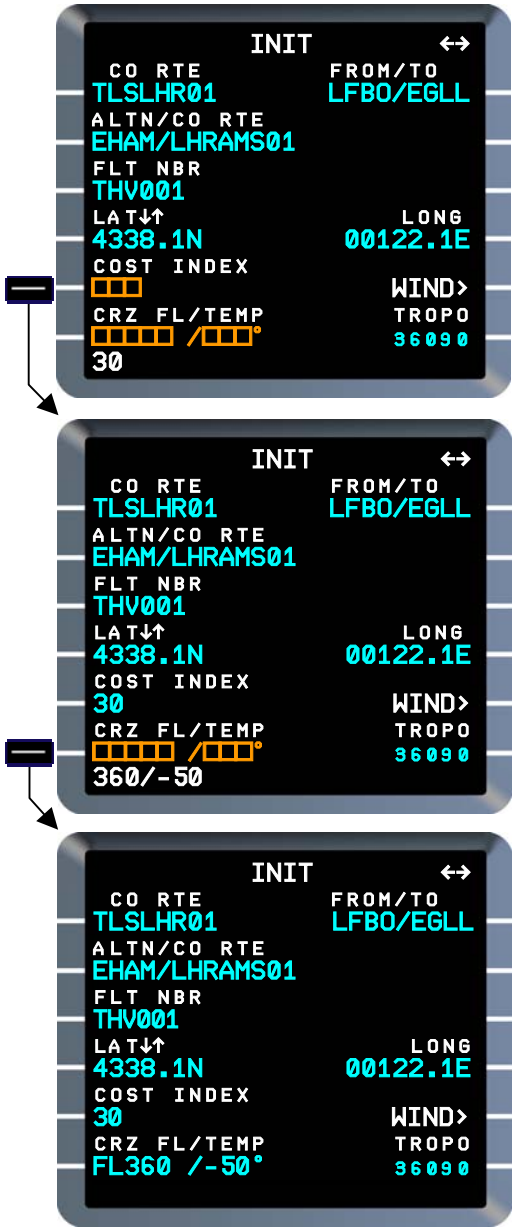
Do not move a/c until IRS alignment is complete.

Few seconds after starting the IRS alignment, map becomes available on ND in PLAN mode.









☐ Enter Cost Index

If data stored with the CO RTE includes a COST INDEX, this will be shown automatically when the CO RTE is entered.
It may be modified by overwriting in COST INDEX field.

COST INDEX [5L] .....Enter

Enter or modify the value as per airline policy.
The range of the cost index is from 0 to 999.
CI=0 provides maximum range,
CI=999 provides minimum time.

☐ Enter Cruise FL and Temperature

CRZ FL/TEMP [6L].....Enter

Ex: 360/-50

If only CRZ FL is entered, the CRZ TEMP defaults to ISA value.
Temperature entry is optional but improves precision of the predicted data.

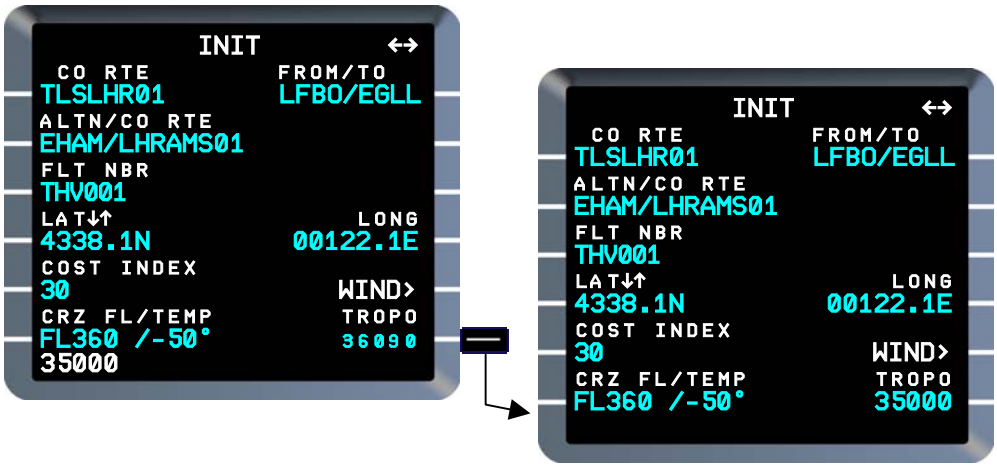
If data stored with the CO RTE includes CRZ FL, this will be shown automatically when the CO RTE is entered.
It may be changed by overwriting another CRZ FL.

☐ Enter Tropopause

Entry of tropopause altitude is optional but improves precision of the predicted data. By default tropopause is set at 36090 feet.

TROPO [6R].....Enter

Ex: 35000.



☐ Enter Climb Wind

Either enter forecast wind and associated altitude/FL and proceed as below; or proceed to Enter History Wind on next page.

WIND [5R] ..... Press
This provides access to the CLIMB WIND page.

TRU WIND/ALT[1L].....Enter
Enter forecast winds & associated altitudes or FLs on climb.
Up to five different winds can be inserted in the CLIMB WIND page.
Ex: 180/20/100 (as predicted in the flight plan: 180°/20 kt at FL100).

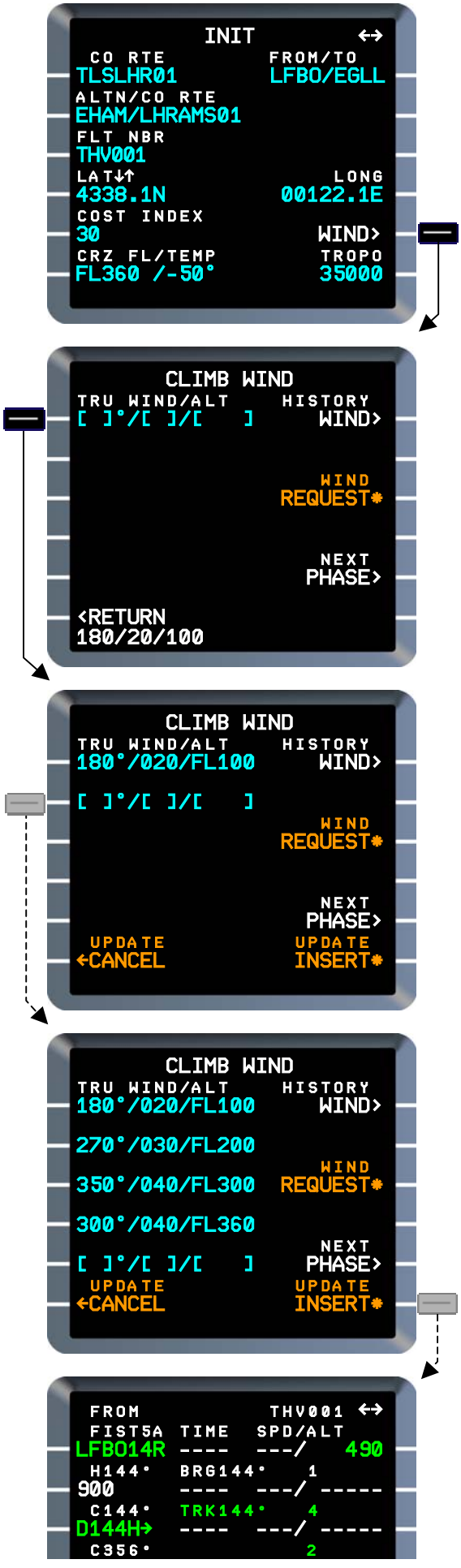
Repeat the operation to insert the other predicted wind.
Ex: 270°/30/FL200, 350°/40/FL300, 300°/40/FL360.
The wind entered for top of climb will be used for predictions during cruise unless specific cruise winds are entered (see below).

All wind directions are True.

If needed to correct after insertion, re-enter with the following data format:
XXX/XX (xxx°/xx KT), or /XXX (FL)

By pressing the UPDATE INSERT amber prompt, the MCDU display switches to the F-PLN page.

The optional WIND REQUEST field and amber prompt are described in Part III: Multiphase – Data Link.

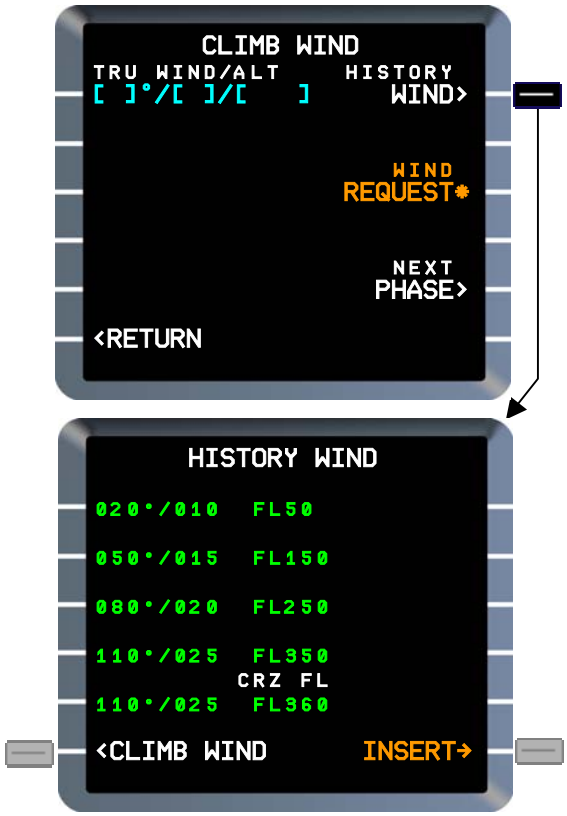


☐ Enter History Wind (when applicable)

The FMGS memorizes the last winds of the previous flight.
The HISTORY WIND prompt allows these winds to be inserted for the next flight.

In this case:

HISTORY WIND [1R].....Press
Verify the data.



- If confirmed:
  INSERT [6R].....Press

- Or return to the CLIMB WIND page
  CLIMB WIND [6L] .....Press

☐ Enter Cruise Wind

- **If a CO RTE has been entered,** forecast cruise winds can be entered at various WPTs along the route.

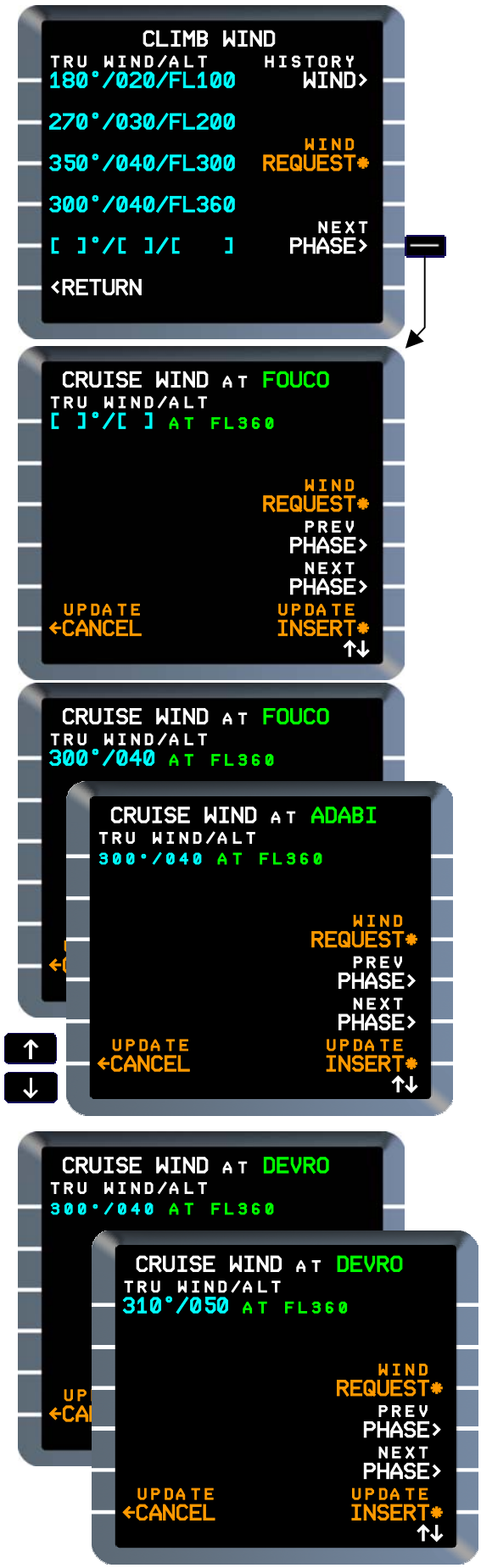
CRUISE WIND page is accessed from the CLIMB WIND page:

NEXT PHASE [5R] ..... Press
The CRUISE WIND page for this WPT appears.

In the absence of predictions (until INIT page B has been completed), the FMGC selects the first WPT after the SID as the start of cruise.

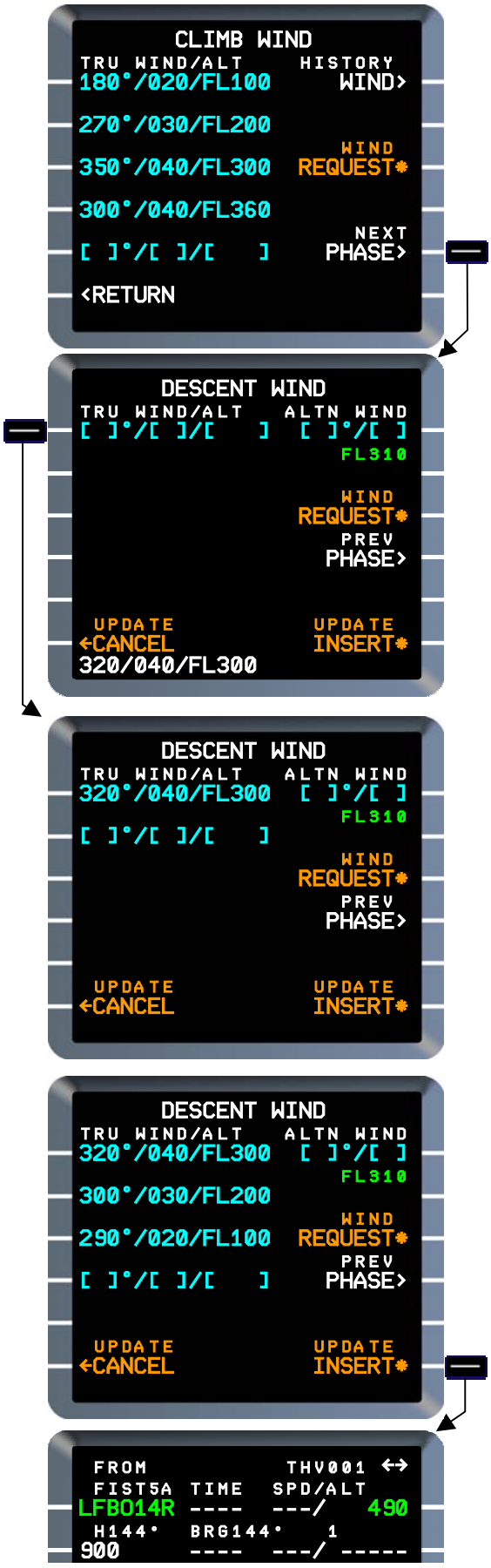
TRU / WIND .....Enter
Ex: At FOUCO 300/40
The entered value is propagated automatically downpath until a new value is manually inserted.

Vertical slew keys ..... Press
Use vertical slew keys to display CRUISE WIND at subsequent WPTs. TRU WIND value is displayed in small blue font, it can be changed by overwriting.
Ex: At DEVRO 310/50
TRU WIND value is displayed in large blue font.
If cleared, the value will return to the propagated value.



- **If no CO RTE,** cruise winds may be entered after the en-route WPTs have been inserted manually on F-PLN page.

  In this case by pressing the NEXT PHASE prompt, the CLIMB WIND page switches to the DESCENT WIND page.



☐ Enter Descent wind
In the same manner descent wind can be inserted during preflight.

☐ Enter Alternate wind
An average wind can be inserted on the alternate route.
The optimum FL for alternate is displayed in green.

After insertion:

UPDATE INSERT [6R] .....Press
The MCDU displays the F-PLN page.

Insertion of CRZ/DES/ALTN winds during preflight improves the accuracy of the computed FMGS F-PLN. Otherwise these insertions may be done in flight.

Access to WIND DATA is also available through DATA page 2 - ACTIVE F-PLN WINDS.

(See Part III: 4.2 Wind)

■ Complete F-PLN page

F-PLN key ..... Press

Convention:
LAT REV (lateral revision) indicates an action on a Left Select Key. **VERT REV** (vertical revision) indicates an action on a Right Select Key.

☐ Enter Departure
This procedure is applicable to enter a departure (RWY & SID), or to change the defaulted RWY & SID if included in CO RTE:

LAT REV at origin [1L]... Press

DEPARTURE [1L] ..... Press
The MCDU displays the runway available in the NAVdb with the following information: length, and if available ILS (course, ident, frequency).

☐ DEPARTURE pages
DEPARTURE pages have two displays:
RWY(s)
If vertical arrows are showed at the right bottom of the screen, use vertical slew keys to display all RWYs available in the NAVdb.
SID(s)
Access to this data is by using the horizontal slew keys.
The same logic as above is applicable if vertical arrows are displayed.

RWY ..... Select / Press
Select runway and press corresponding LSK.
Ex: 14R.
Use vertical slew keys when necessary.

The MCDU display switches to SIDs pages and changes TITLE FIELD in yellow with **TMPY F-PLN** at the bottom left.

SID.....Select
Select SID and press corresponding LSK.

Ex: FIST5A.

If needed to change the RWY and SID already entered:
Go to DEPARTURE RWYs page, then, Change RWY.

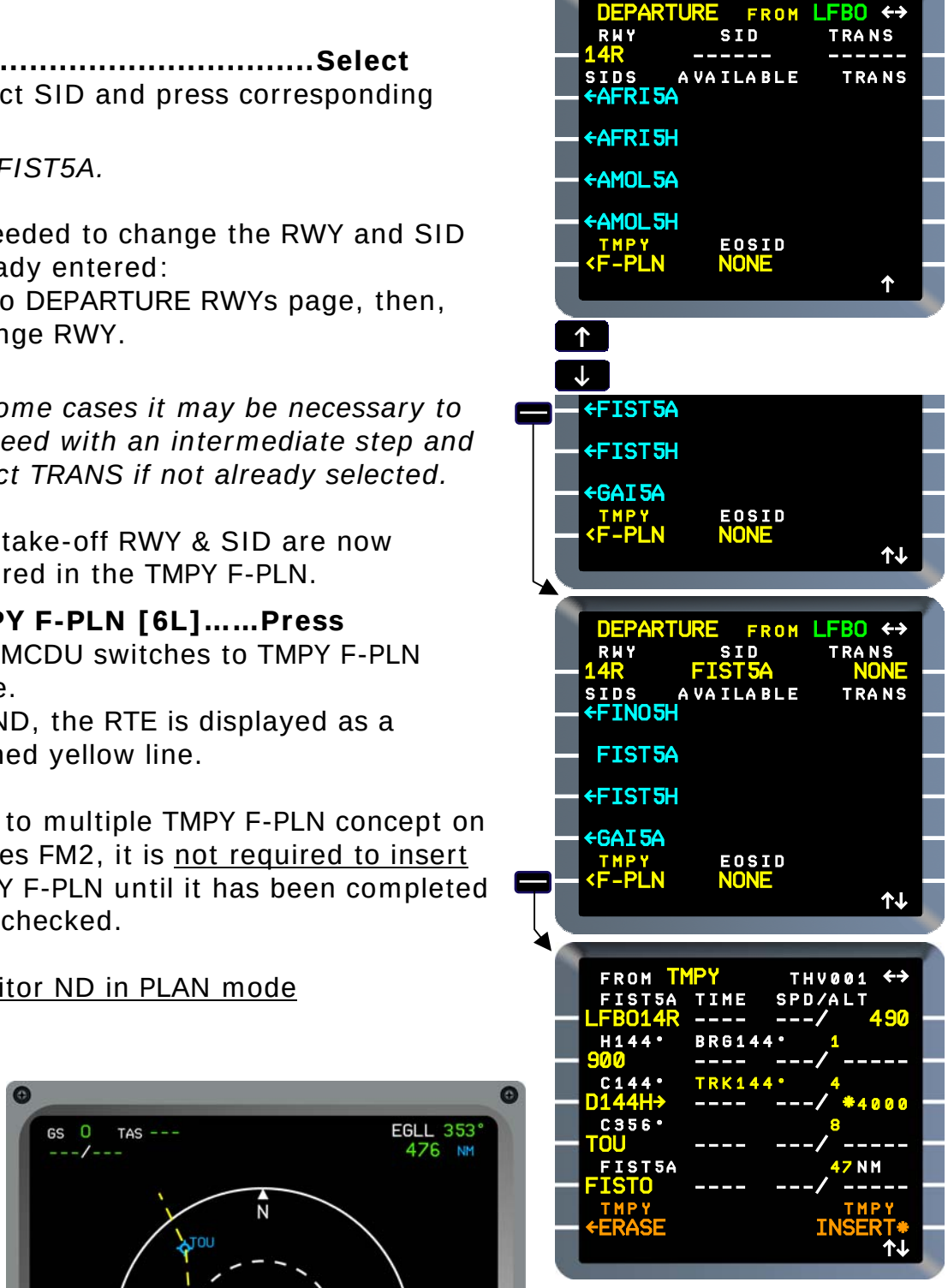
In some cases it may be necessary to proceed with an intermediate step and select TRANS if not already selected.

The take-off RWY & SID are now entered in the TMPY F-PLN.

TMPY F-PLN [6L].....Press
The MCDU switches to TMPY F-PLN page.
On ND, the RTE is displayed as a dashed yellow line.

Due to multiple TMPY F-PLN concept on Thales FM2, it is not required to insert TMPY F-PLN until it has been completed and checked.

☐ Monitor ND in PLAN mode



Each entry should be monitored on the ND, in PLAN mode, with the appropriate range and CSTR selected on EFIS panel.
This enables to check any anomaly, or discontinuity or incorrect insertion.

☐ Enter en-route AIRWAYS

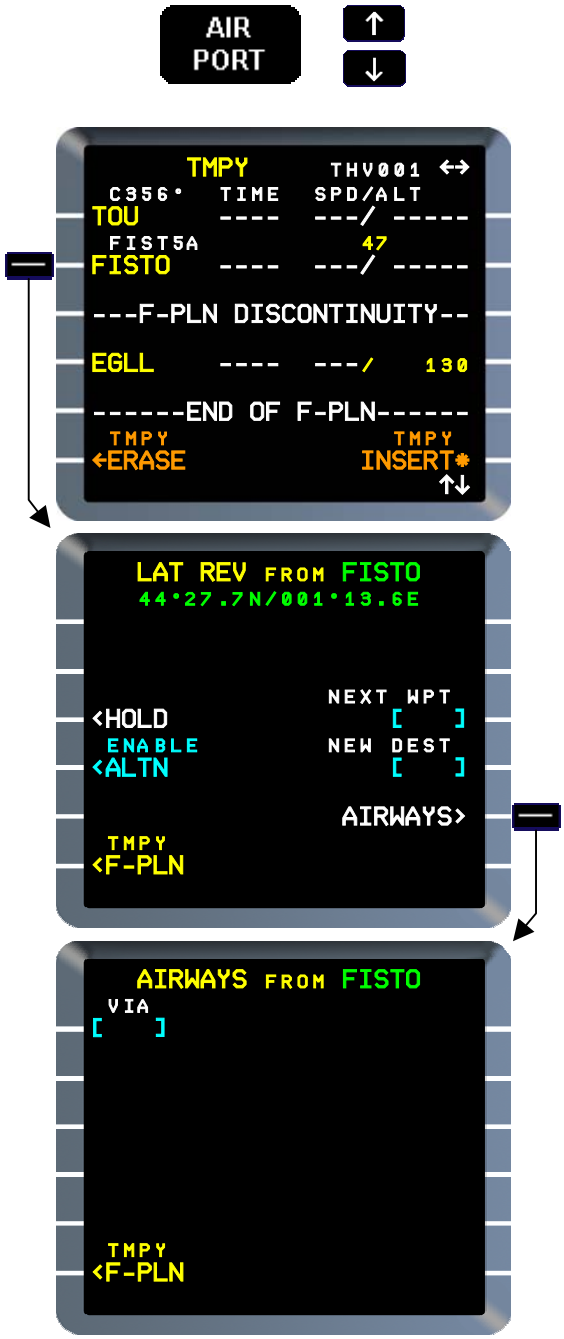
If a CO RTE was entered on INIT page *(Ch.1.3)*, the F-PLN is now complete as far as the final en-route WPT.
Proceed to “Checking F-PLN”.

If not entered:
On F-PLN page, scroll if necessary to display final WPT of SID, or, use AIRPORT key to jump directly to the last leg.

In the example, enter AWY UN874 from FISTO to BAMES:

LAT REV at WPT [2L]..... Press

AIRWAYS [5R] ..... Press
AIRWAYS page from FISTO is displayed.



VIA [1L] .....Enter

Ex: UN874

If the AWY is not stored in NAVdb, "NOT IN DATABASE" s-pad msg (white) is shown.

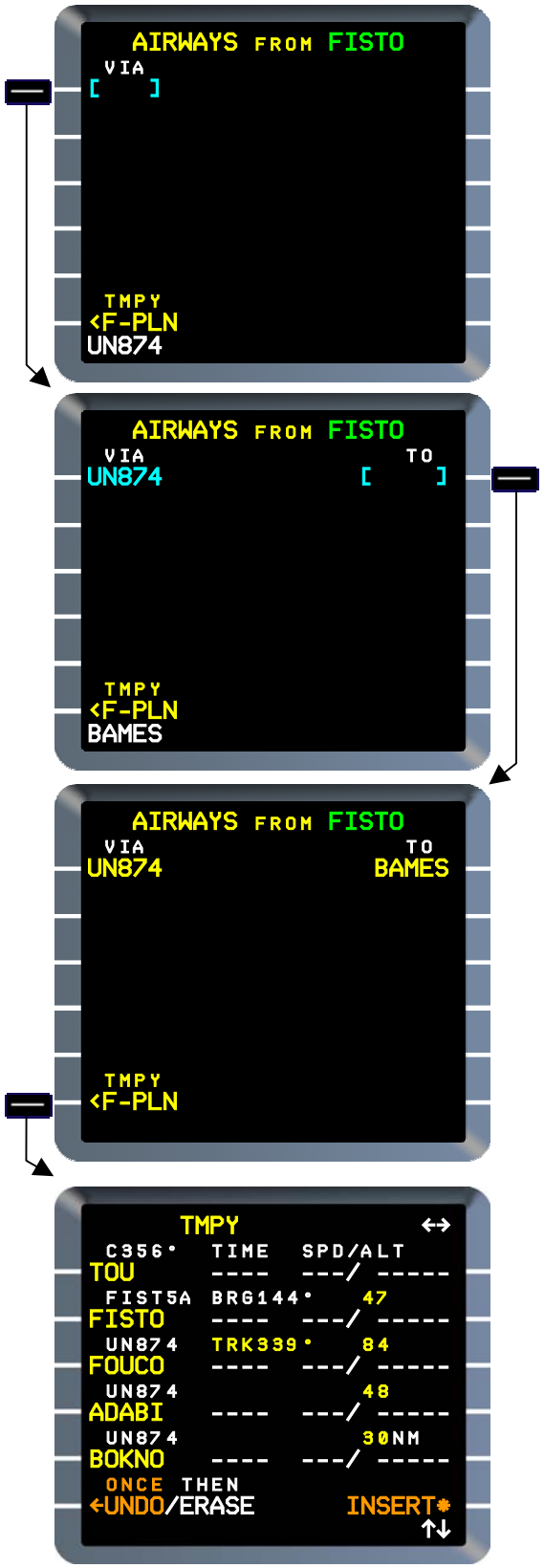
TO [1R] .....Enter

Ex: BAMES.

TMPY F-PLN [6L] .....Press

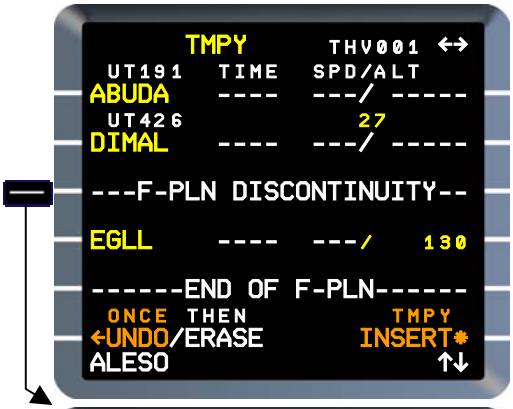
Complete TMPY F-PLN by entering AIRWAYS and WPTs as above, to the final en-route WPT.

Ex: via UT191 to ABUDA, UT426 to DIMAL.



☐ Enter a WPT

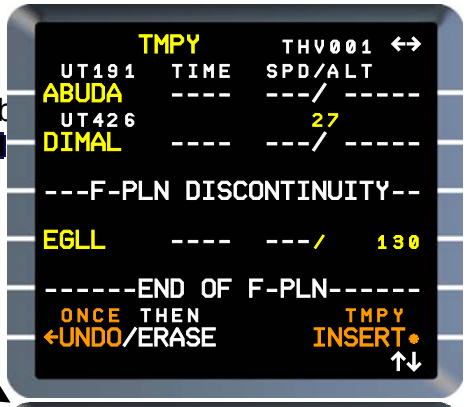
- If proceeding direct to a WPT not connected by an AIRWAY:
  write/enter WPT in next line of F-PLN.
  In the example after DIMAL direct to ALESO.



- Alternatively,
  NEXT WPT function on LAT REV page may b

  LAT REV at WPT.....Press
  Ex:LAT REV at DIMAL [2L].

  NEXT WPT [3R] .....Enter
  Ex: ALESO.



☐ Use AIRPORT key

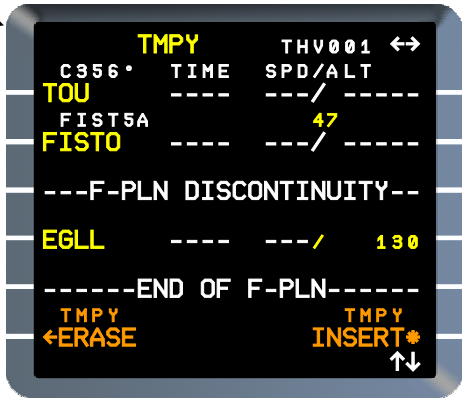
As explained in Part I: Ch 4 - MCDU, pressing the AIRPORT key once, allows to shift the display of the F-PLN page to the DEST airport at the bottom of the screen.
In the previous example, after entering departure RWY 14R at LFBO with SID FISTO 5A, the display becomes as shown on the right side.

AIR PORT

Pressing the AIRPORT key allows to shift to the end of the actual entered F-PLN.
This save time during manual flight plan insertions.

Note that the AIRPORT key is also a shortcut from DEPARTURE/AIRWAYS/ARRIVAL pages to return in TMPY F-PLN at the end of the actual entered F-PLN.

AIR PORT



☐ Enter arrival

Entry of STAR and landing RWY may be completed either during Pre-flight phase, or during Cruise phase before descent, at crew's discretion (see Ch.5 for procedure).

When arrival is not entered, a F-PLN discontinuity exists between the last en route WPT and the DEST. In this case the time & fuel predictions assume the track from final WPT to DEST to be a straight line.

In the example the expected arrival at EGLL is RWY 27R with STAR BIG3B.

LAT REV at DEST [4L]…. Press

ARRIVAL [1R] …… Press

The MCDU displays the runways available in the NAVdb with the following information: length, and if available ILS (course, ident, frequency)

RWY ……. Select / Press

Ex: 27R.

Use vertical slew keys when necessary.

The MCDU display shifts to the ARRIVAL page with the arrivals available in the NAVdb.

ARRIVAL…… Select / Press

Select ARRIVAL and press appropriate LSK.

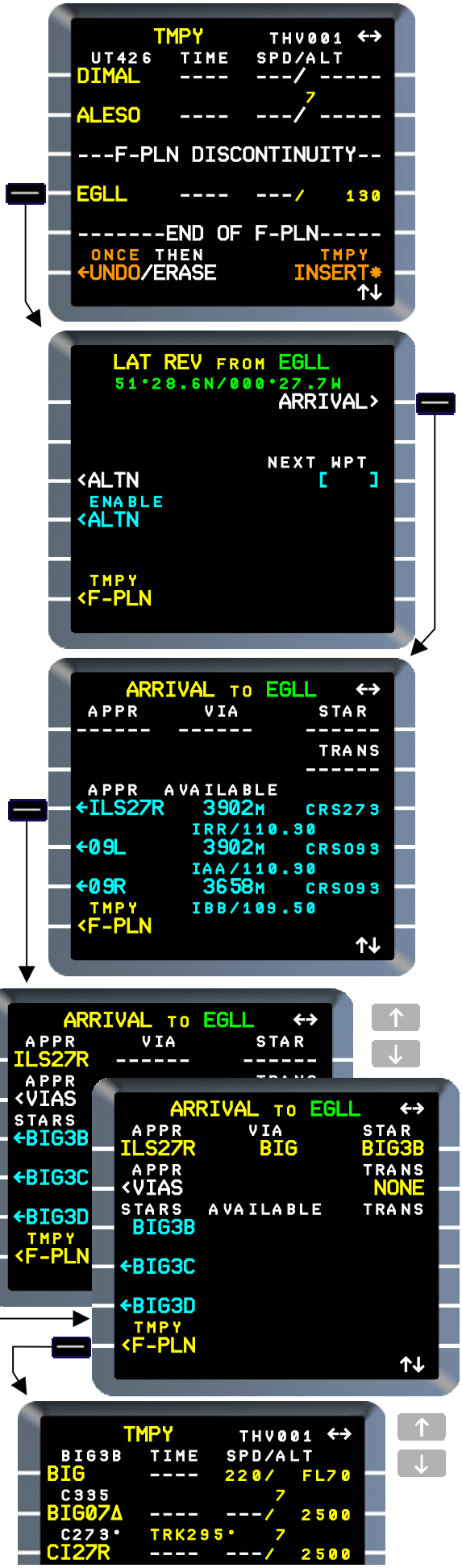
Ex: BIG3B.

Use vertical slew keys when necessary.

Note:

In some cases it may be necessary to proceed with an intermediate step and select VIA if not already selected.

TMPY F-PLN [6L] …..Press



☐ Enter / Revise alternate route

Entry of alternate route may be completed either during Pre-flight phase, or during Cruise phase before descent, at crew's discretion (see Ch.5 for procedure). The benefit to insert during preflight is to give more accuracy to the FMGS fuel prediction.

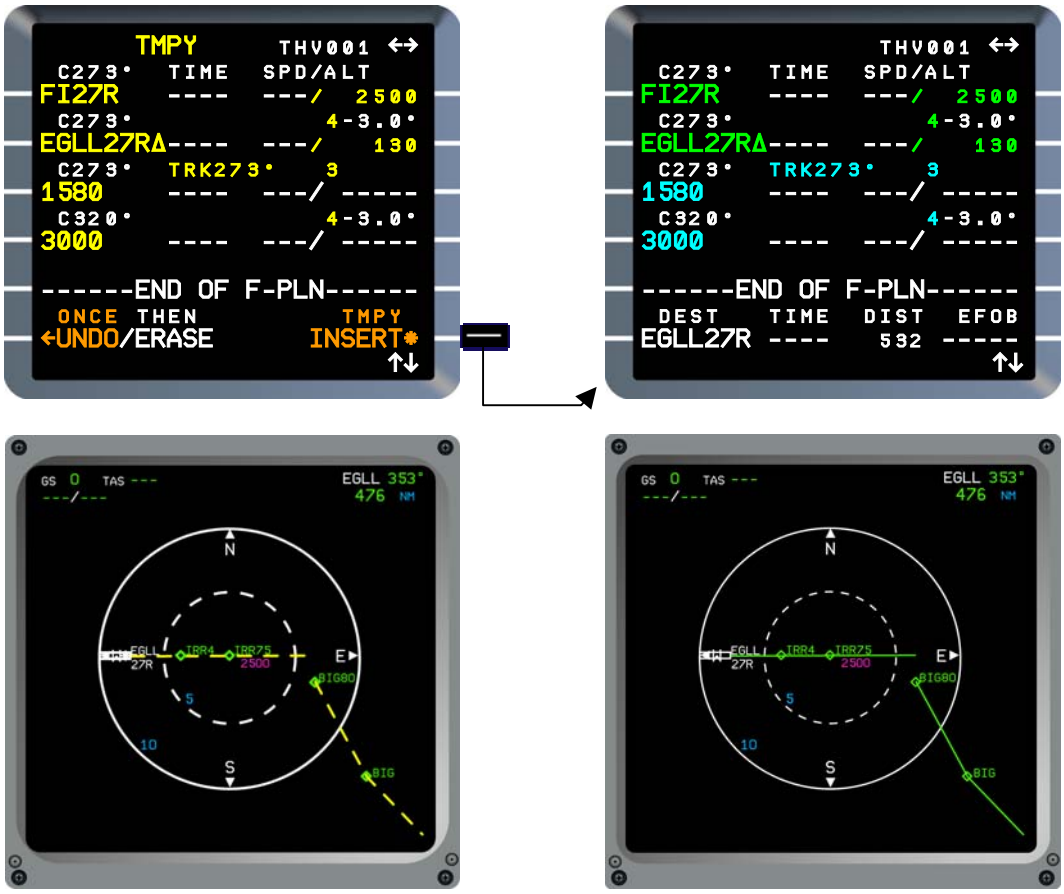
☐ TMPY F-PLN insert

When the entire route is inserted,

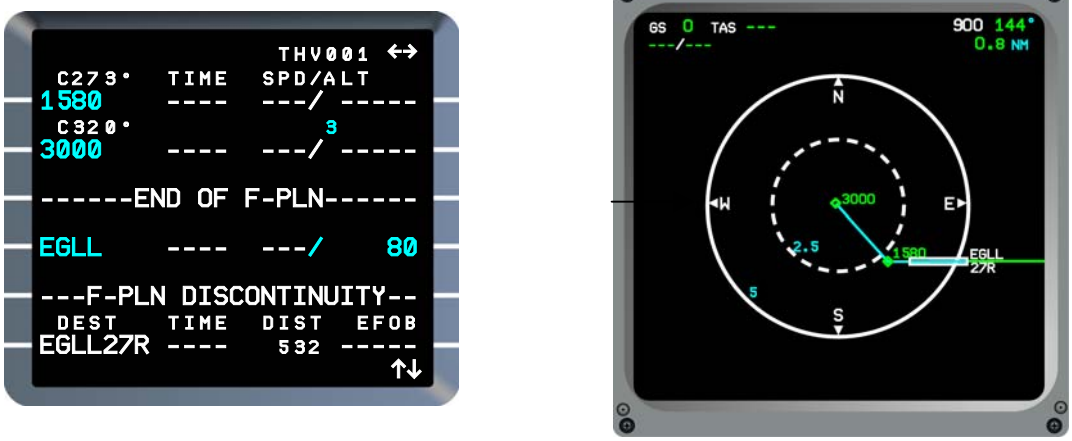
TMPY F-PLN.....Insert

On MCDU F-PLN page is displayed in green.

On ND the route is displayed with a continuous green line.



The missed approach route is displayed in blue.



■ Complete SEC F-PLN page

SEC F-PLN key ..... Press

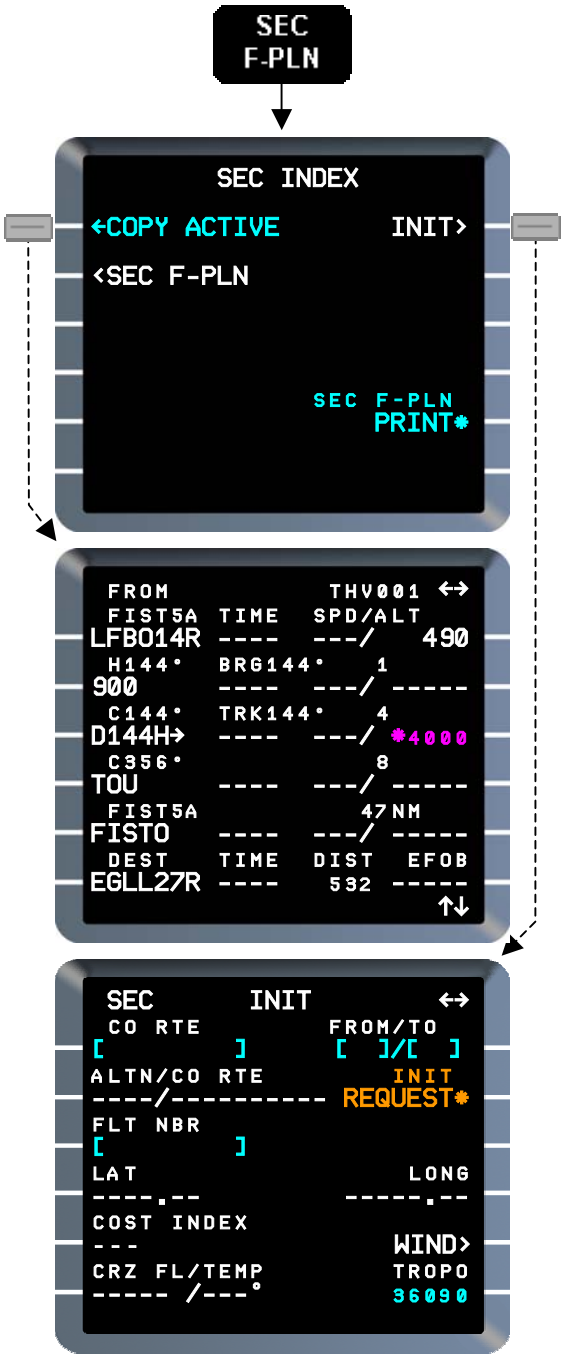
Use SEC F-PLN as appropriate for situation or as per Operator's policy.

Examples of use:

COPY ACTIVE [1L] ..... Press
This would be used to:
- Make a COPY ACTIVE to keep a back up of ACTIVE F-PLN,
- Make a COPY ACTIVE and then modify DEP RWY and/or SID, **SEC PERF page must be completed accordingly,**
- Prepare a diversion at departure.

Or
Keep empty in order to make an INIT via the INIT prompt [1R]:
- To prepare a second route,
- To use Data Link INIT function (if available).

See Part III: Multiphase – SEC F-PLN.



■ RAD NAV page

RAD NAV key.....Press
RAD NAV page is displayed.
Check auto-tuned navaids (in small font).

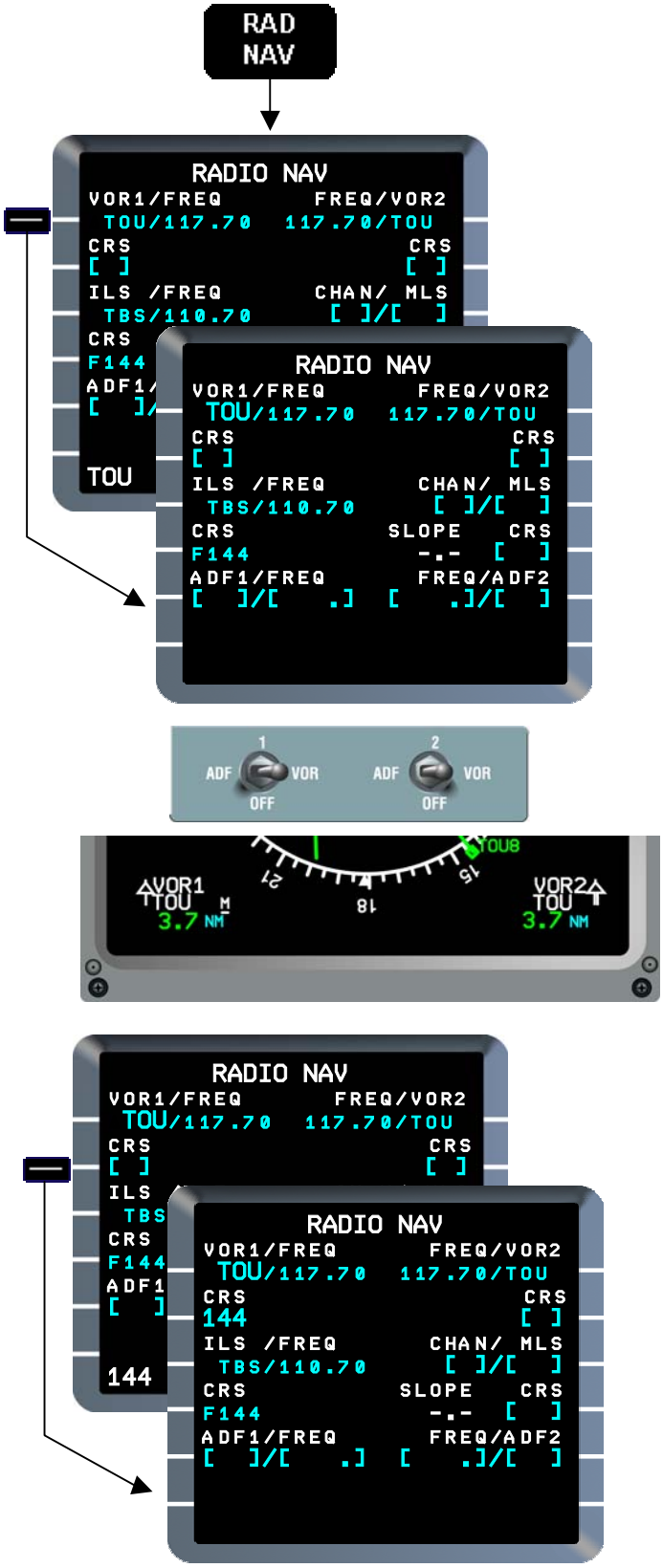
According to SOPs, tune manually VOR/DMEs required for initial departure.
Auto-tuned navaids may be overwritten.

VOR1/FREQ [1L].....Enter
Ex: TOU
Ident is then shown in large font.
On ND the M symbol appears when a VOR is forced manually *(VOR 1 on picture)*.

CRS [2L]..... Complete
Ex: 144.
If localizer of opposite (or another) RWY is to be used for departure, enter and complete the ILS and CRS fields [3L]/[4L] as appropriate.
The amber message "RWY/LS MISMATCH" will appear in the scratchpad. Clear.

If ADF(s) is required, enter and complete fields [5L]/[5R] as appropriate.

(See Part III: Ch 7.2 - RAD NAV page).



■ Complete INIT page B

INIT key..... Press
INIT page A is displayed.
Use horizontal slew keys to display the INIT B page.

Taxi fuel [1L], RTE RSV % [3L], FINAL/TIME [5L] are default values specified by operator in the AMI data base.

FINAL/TIME is holding at 1500' (or as specified by operator) at LW in CONF1.

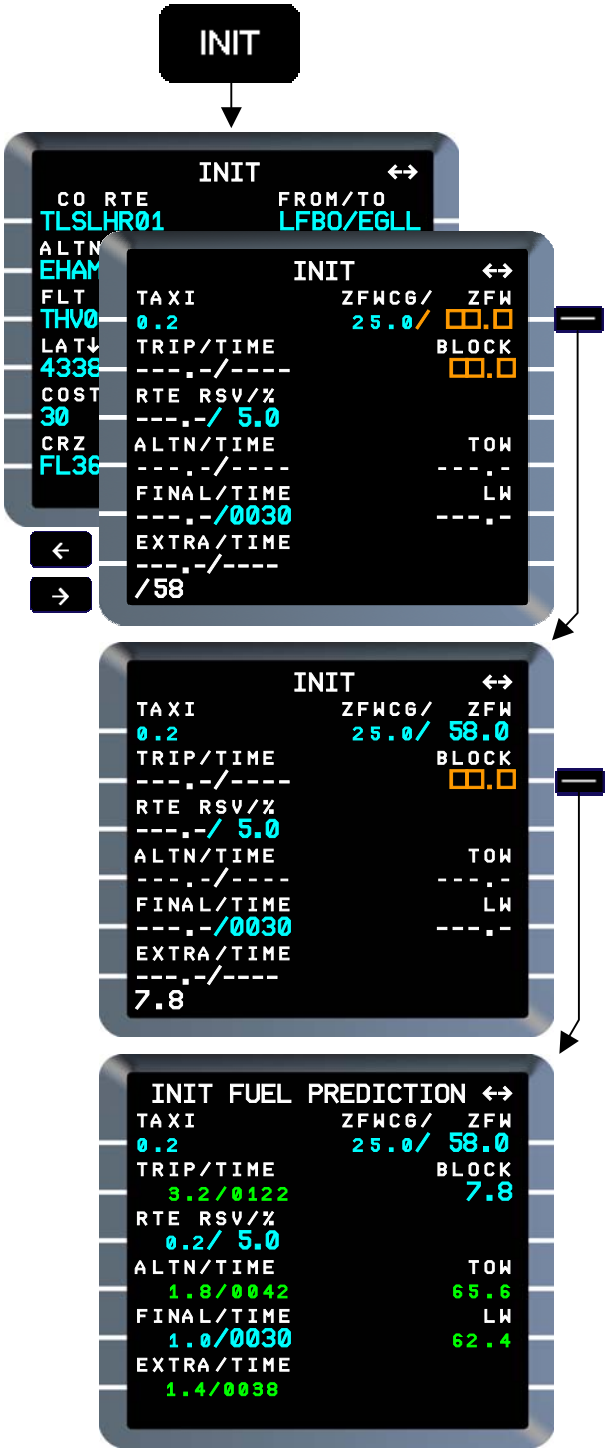
ZFWCG [1R] defaults to 25.0%.

All these values may be modified by overwriting.

ZFW [1R].....Enter
Ex: /58.
When entered these fields cannot be cleared.
ZFW may also be modified by overwriting.

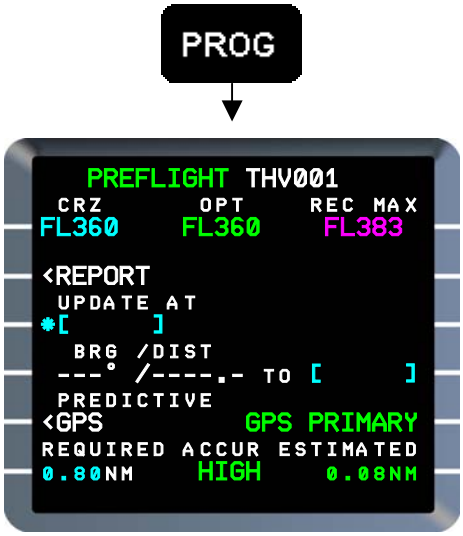
BLOCK [2R] .....Enter
Ex: 7.8.
Title changes to "INIT FUEL PREDICTION".
BLOCK fuel may be cleared or modified by overwriting.

If a F-PLN & CRZ FL have been entered, the FMGS will now compute time & fuel predictions, including turn radius, lateral and vertical profile.
Trajectory is displayed on ND, time and fuel predictions are displayed on F-PLN pages.
Crosscheck fuel & time predictions against data on printed CFP.



■ Check & complete PROG page

PROG key .....Press



CRZ, OPT, REC MAX .....Check
If CRZ is above OPT, overwrite a suitable lower FL.

OPT:
Optimum altitude is the altitude for minimum cost.
Computation takes into account: CI (cost index) corrected by Perf Factor, Ground Speed (KT), total fuel flow.
REC MAX:
Recommended Maximum Altitude computed according to following criteria:
Stabilized in level flight with less than MAX CRUISE thrust,
Speed maintained between GREEN DOT and VMO/MMO,
Minimum rate of climb 300 ft/mn at MAX CLIMB thrust,
Altitude can be reached a margin of 0.3 G,
Altitude is less than MAXIMUM CERTIFIED ALTITUDE.

BRG/DIST TO may be entered with DEST (see Check F-PLN section), or ident of take-off RWY in case of immediate return.

If GPS installed:

GPS PRIMARY .....Check

In any case:

ACCUR.....Check

See Part III: Ch 7.3 – Position monitoring.

■ Complete PERF page

PERF key ..... Press
TAKE OFF page showing departure RWY as entered on F-PLN.
The optional UPLINK TO DATA prompt [6L] is described in Part III – DATA LINK.

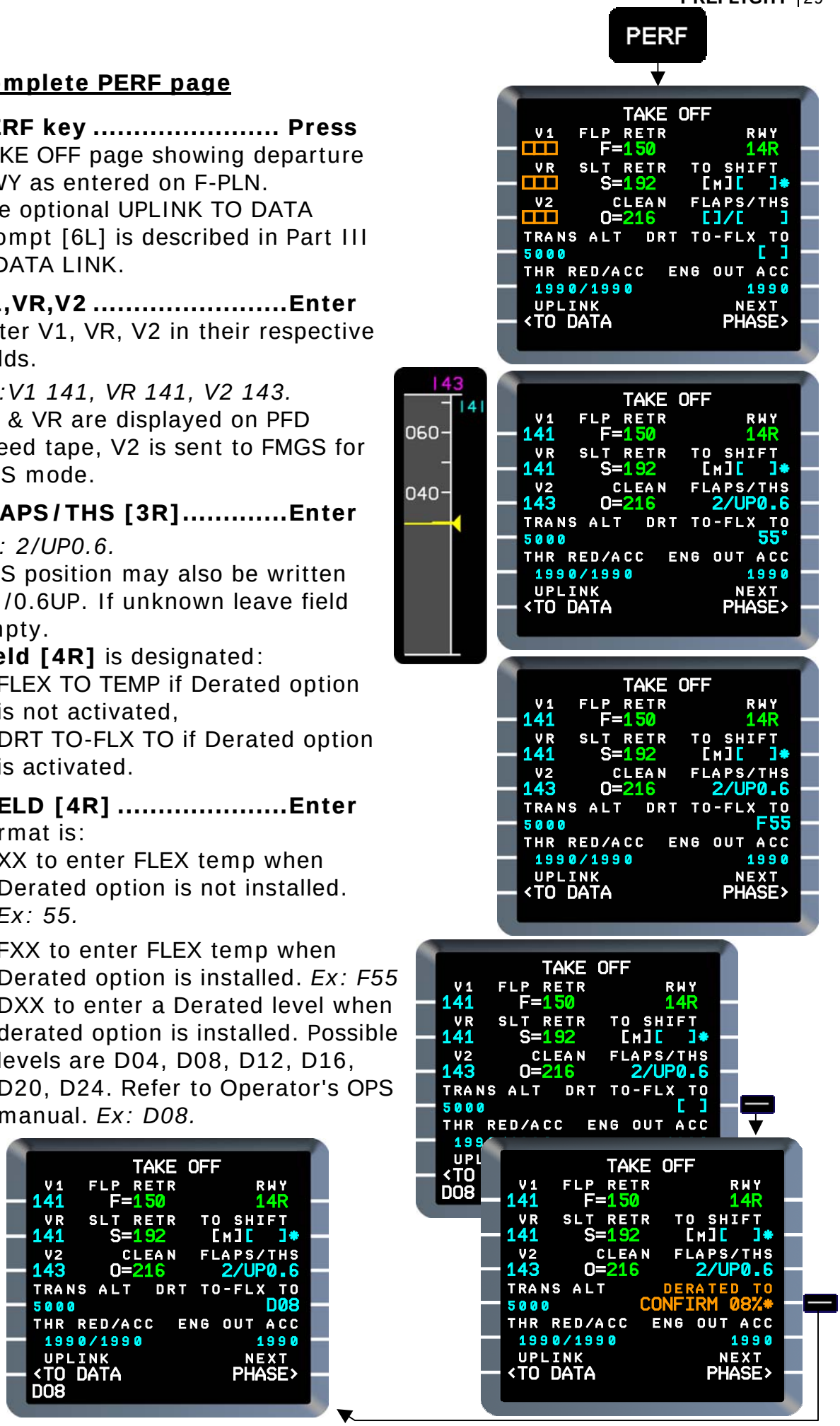
V1,VR,V2 .....Enter
Enter V1, VR, V2 in their respective fields.

Ex:V1 141, VR 141, V2 143.
V1 & VR are displayed on PFD speed tape, V2 is sent to FMGS for SRS mode.

FLAPS/THS [3R].....Enter

Ex: 2/UP0.6.
THS position may also be written as /0.6UP. If unknown leave field empty.
Field [4R] is designated:
- FLEX TO TEMP if Derated option is not activated,
- DRT TO-FLX TO if Derated option is activated.

FIELD [4R] .....Enter
Format is:
- XX to enter FLEX temp when Derated option is not installed. *Ex: 55.*
- FXX to enter FLEX temp when Derated option is installed. *Ex: F55*
- DXX to enter a Derated level when derated option is installed. Possible levels are D04, D08, D12, D16, D20, D24. Refer to Operator's OPS manual. *Ex: D08.*



TRANS ALT [4L] .....
.....Check / Adjust
This field displays the NAVdb value stored for each airport.

THR RED / ACC [5L] .....
.....Check / Adjust

ENG OUT ACC [5R] .....
.....Check / Adjust
Ex: ACC ALT 3490 ft.
Default values specified by operator are stored in the NAVdb.
All these values may be modified by overwriting.
If cleared, reverts to defaulted value.

☐ Reference speeds
F, S, O (green dot) are displayed as soon as weights entered on INIT page B. If no weights entered, dashes are displayed.

Caution

The characteristic speeds displayed on the MCDU (green dot, F, S, VLS) are computed from the ZFW and ZFCG entered by the crew on the MCDU. Therefore, this data must be carefully checked (Captain's responsibility).

☐ Take-off Shift
If published full runway length will not be used for take-off, enter distance between threshold and start of take-off in units specified, [M] or [FT].
The Take-off Shift is used for climb profile computation.
If GPS is not available, this take-off shift is taken into account for position update at take-off (See Part I: Ch 3 – Take-off).

☐ Climb speed

NEXT PHASE [6R] ..... Press
CLB page is displayed, showing MANAGED speed computed by the FMGC according to CI.
If a specific selected speed is required during the initial CLIMB phase (e.g. for ATC or for max gradient):

PRESEL [4L] ..... Complete

Ex: 250.

Only speed entry is allowed. Otherwise "ONLY SPD ENTRY ALLOWED" s-pad msg (white) message is triggered.

To return to managed speed and cancel PRESEL speed, press the green prompt [3L].

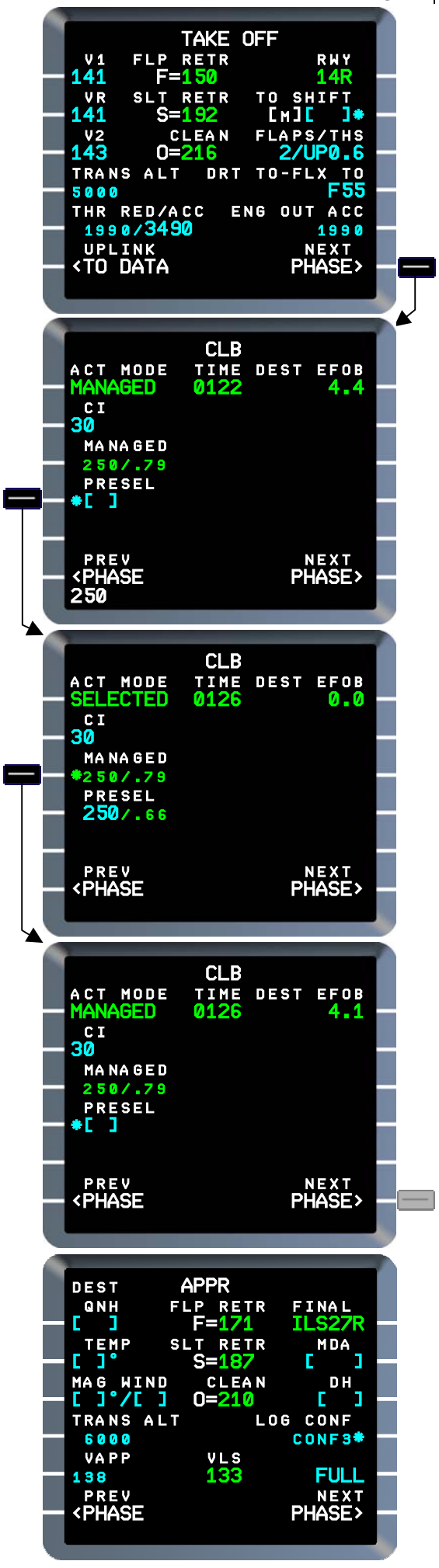
☐ Cruise speed
Access via NEXT PHASE prompt to CRZ page and proceed with the same logic to pre-select a cruise speed.

Either speed or mach are accepted.

Enter speed in xxx format, Mach with .xx format.

☐ APPROACH page

It may be useful to prepare landing parameters at DEP airport in case of immediate return.
Access via NEXT PHASE prompt to APPR page and complete landing data.



■ Check F-PLN

The F-PLN must be checked in accordance with SOPs.
The following procedure is recommended:

EFIS control panel:

ND PLAN mode .....Select

RANGE..... Adjust

CSTR .....Select
In order to display and verify F-PLN constraints.

MCDU:

F-PLN key.....Press

Vertical slew keys .... Scroll up

Departure airport is displayed at the top of the MCDU, and at the center of the ND.
Scroll up the F-PLN and:

- Cross-check SID routing, altitude & speed constraints displayed as published on chart,
- En-route WPTs,
- Cross-check tracks & distances shown between each WPT, comparing with printed CFP, scrolling up as necessary.

The magnetic TRK is shown between 2nd & 3rd WPTs, and great circle distance in NM is shown between each WPT.

By scrolling the F-PLN, with ND set to PLAN mode, the route displayed shifts and the WPT on first line of F-PLN page is shown at centre of ND.

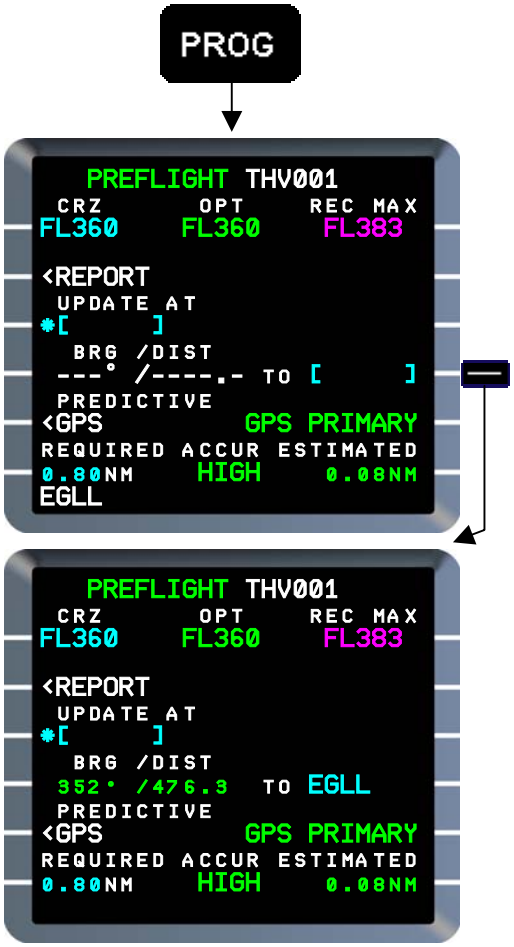
To change an incorrect AIRWAY or WPT, delete by CLR key.
Check and clear any F-PLN DISCONTINUITY as appropriate.

To identify possible gross errors in the F-PLN, it is recommended to check direct distance to destination, and compare with total distance shown on CFP:

BRG/DIST TO [4R] .....
.....Enter DEST
Write & enter ICAO ident of destination.

Ex: EGLL.

Check DIST displayed.



This field may be then completed by the Departure RWY, to display BRG/DIST in case of immediate return.

2.2. SUPPLEMENTARY PROCEDURES

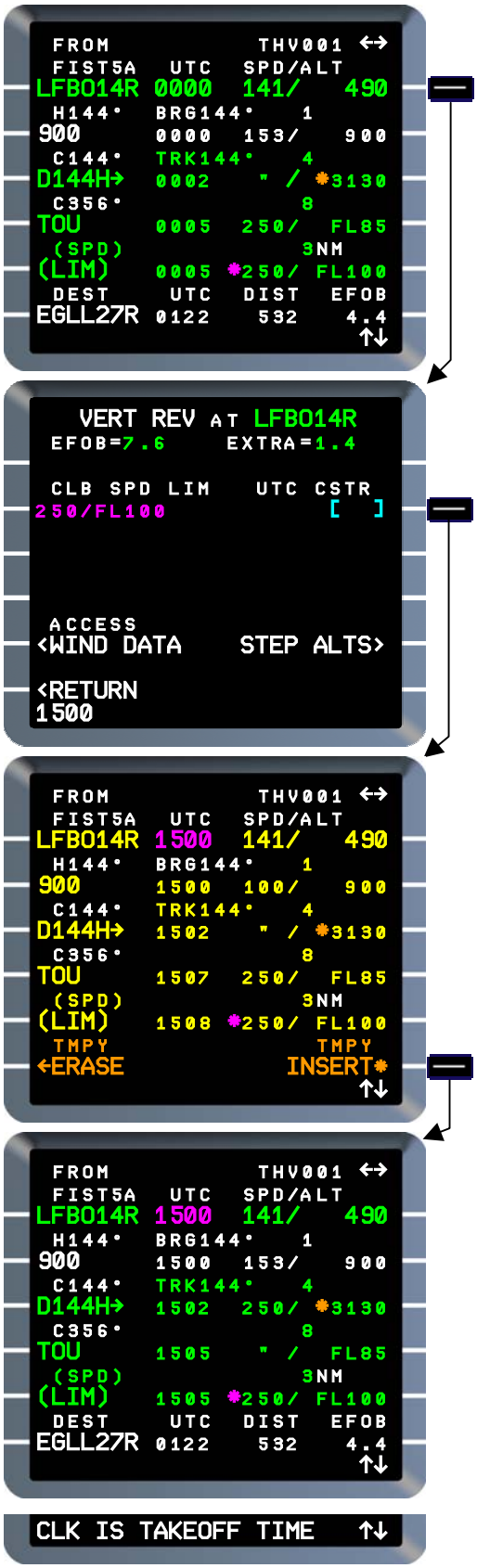
■ Estimated Time for Take-Off(ETT)

By default on F-PLN A departure time is 0000.
An ETT may be entered to enable the FMGS to provide time predictions at the destination and at each WPT in the F-PLN.
On F-PLN A or B page:

VERT REV at Origin [1R].....
.....Press

UTC CSTR [2R] ..... Enter ETT

Ex: 1500.
TMPY F-PLN displays time predictions.



TMPY INSERT [6R] .....Press
TMPY F-PLN is activated. Destination ETA is shown in white.

If a/c has not taken off by ETT, this time is replaced by actual time on clock.
"CLK IS TAKEOFF TIME" s-pad msg (white) is displayed.

■ Change IDLE/PERF factors

This task is performed by Engineering or Maintenance personnel or as per SOPs.

The IDLE/PERF factors may be part of the AMI parameters (Default values are +0.0/+0.0).

On A/C STATUS page:

CHG CODE [5L].....Enter

Ex: ARM.

Access to IDLE/PERF field is armed.

The default code is ARM. It may be changed through the AMI data base.

This field is only displayed in Preflight and Done phases.

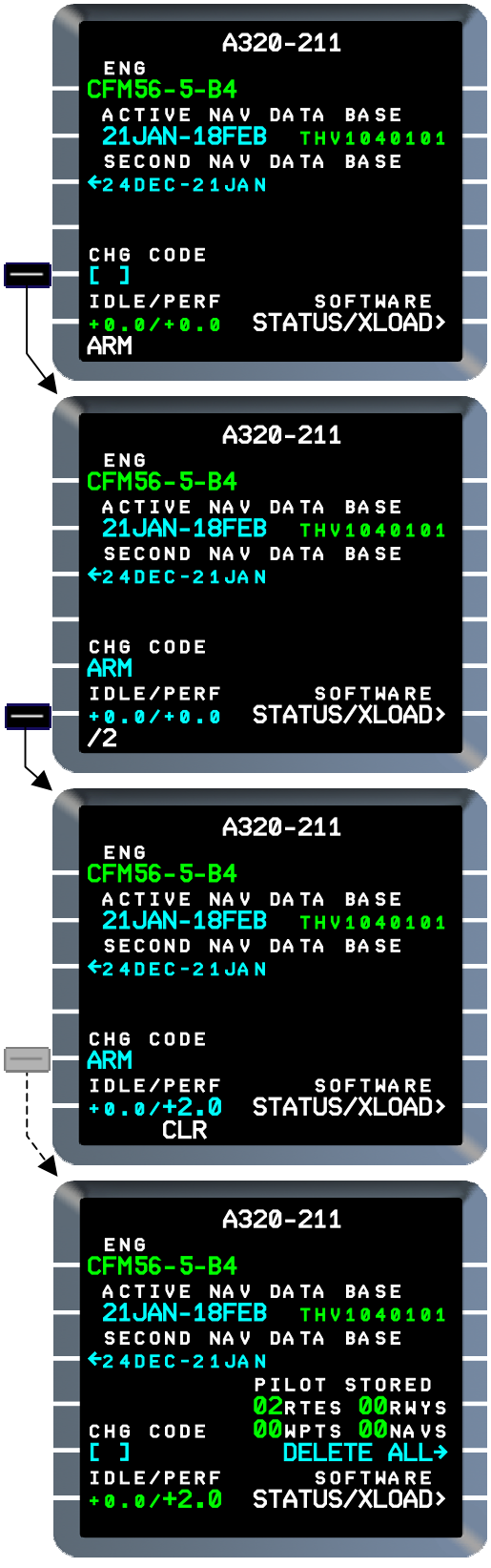
IDLE/PERF [6L].....Enter

Ex: /2.

The IDLE factor modifies Ground and Flight Idle values in the Performance data base.

The PERF factor modifies the Fuel Flow value to allow for airframe and engine deterioration.

CHG CODE field is cleared, automatically when selecting another MCDU page or, by using the CLR key. When cleared, IDLE/PERF field becomes green.



■ DATA not stored in NAV DATABASE

If a WPT, NAVAID or RWY, which is not in the NAV database, is entered, the NEW WAYPOINT, NEW NAVAID or NEW RUNWAY page will appear. The item may then be defined and stored in the FMS memory.

Access to Pilot's stored data is from DATA INDEX 2/2.

Insertion of these data is described in Part III: Ch 7.1 Navigation Data.

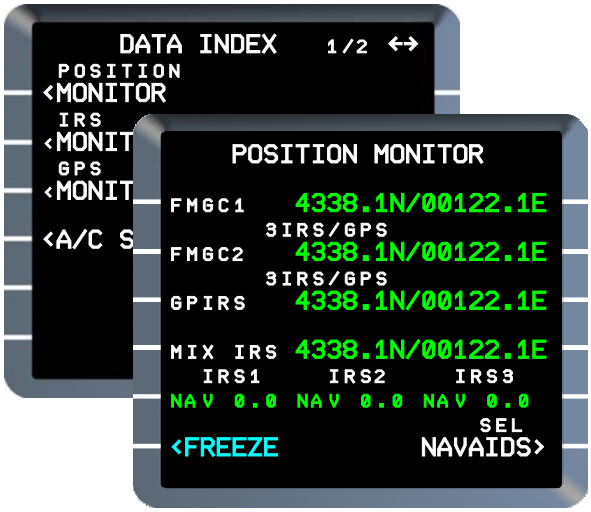
■ NAVAIDS deselection

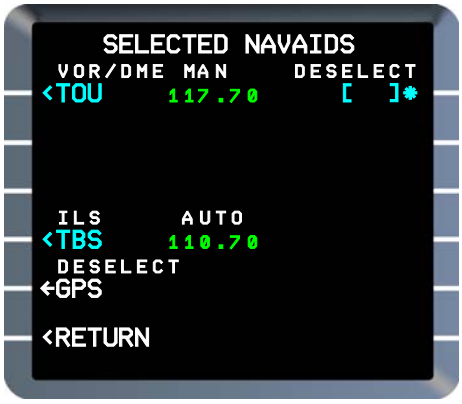
If NOTAMs indicate any navaids on or close to the route are inoperative or unreliable, they should be deselected.

See Part III: Multiphase – Position monitoring.

Access to navaids de-selection is via:

- DATA key,
- POSITION MONITOR [1L],
- SEL NAVAIDS [6R].

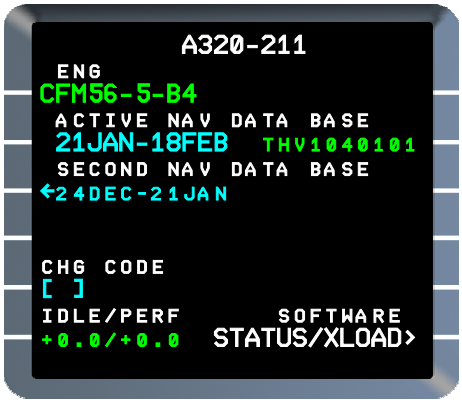




■ Dispatch with an outdated NAV data base

If the NAVdb is out of date, all data used by the FMS (WPT, AWY, Navaids) should be verified.

Refer to SOPs for applicable procedure.



2.3. BEFORE DEPARTURE

Departure **BRIEFING** should be performed in accordance with SOPs, referring to MCDU pages and EFIS displays.

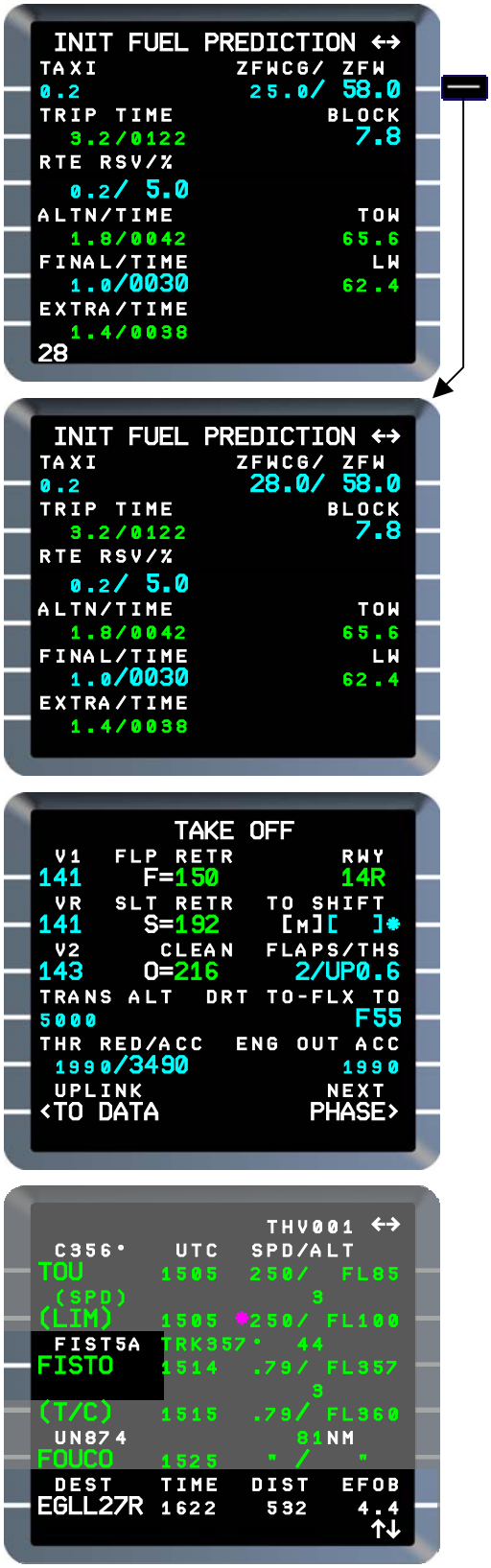
When **LOADSHEET** is obtained, confirm / revise:

- ZFWCG and ZFW on **INIT B** page,
  Ex: adjust ZFWCG 28%.
- **PERF** page entered data.
  Ex: enter THS if not previously known.

When **ATC CLEARANCE** is received, confirm / revise:

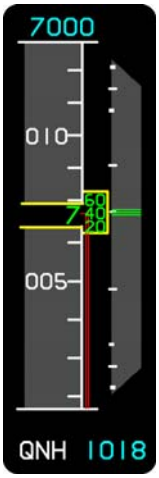
- **F-PLN** page according to the ATC clearance,
- **FCU** settings.

In the flight plan scenario the clearance is SID FISTO 5A:
Intercept TOU R-144 climbing to assigned altitude, at or above 4000 ft, but not before D8 TOU, turn RIGHT, intercept TOU R-170 inbound to TOU, TOU R-356 to FISTO.
Climb to FL70.



■ FCU selection for take-off

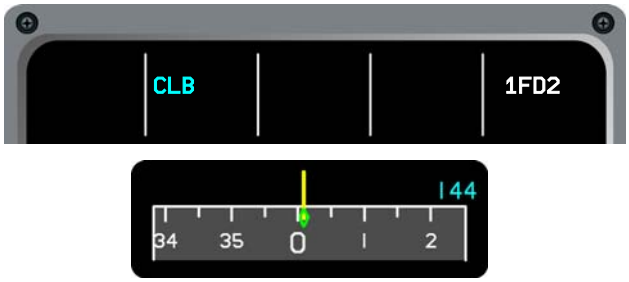
The normal FCU selection with associated FMA and PFD display is:
Ex: DEP LFBO for FISTO5A altitude clearance 7000ft.



If ACC ALT is above the FCU selected ALT, CLB is replaced by ALT blue or, ALT magenta if a more restrictive constraint exists.

☐ Take-off with preset HDG:

FCU..... Set HDG
Rotate FCU knob to preset the HDG value on the FCU.
Dot disappears.
Do not pull HDG knob.



PFD / FMA
- NAV mode is disarmed,
- Preselected HDG is shown (blue) on heading scale.

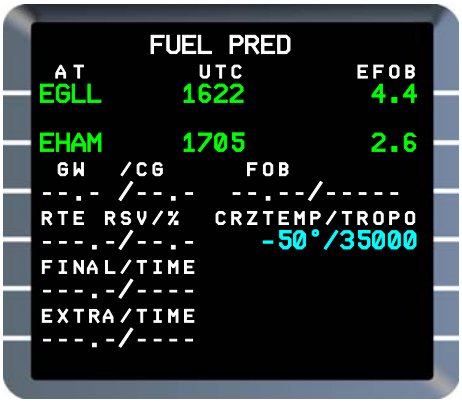
ND
The F-PLN route becomes dashed green, and blue HDG index is displayed.
See Part II: Ch 3 - Take-off.

To cancel preset HDG and re-arm NAV, push HDG knob.

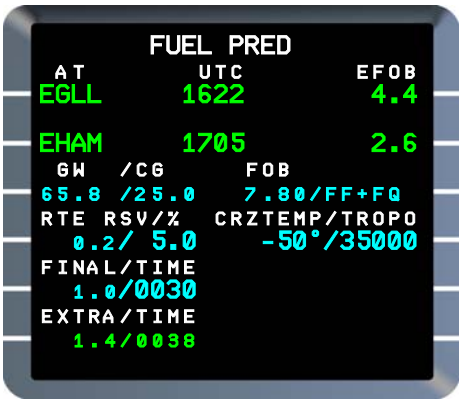
■ MCDU Page selection

Selection of MCDU pages for departure should normally be TAKE OFF page (PF) F-PLN A (PNF).

After starting the first engine, INIT B page can no longer be accessed.
GW and CG can be modified on FUEL PRED page only.



BEFORE ENGINE START



AFTER ENGINE START

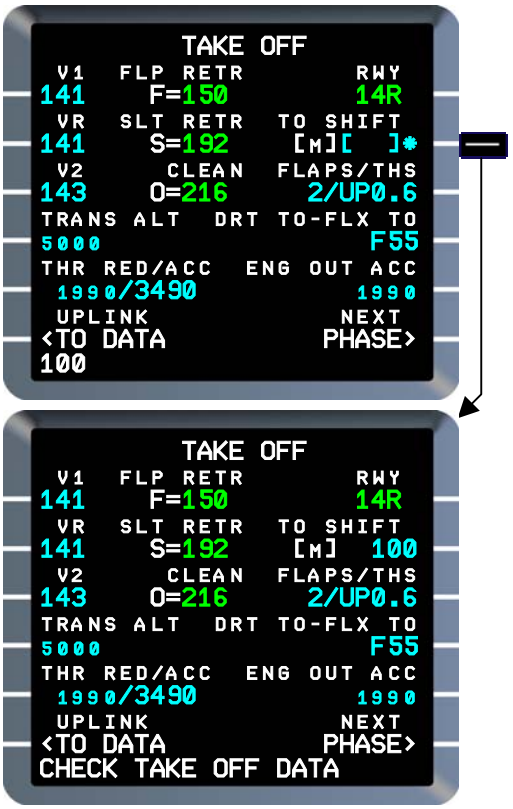
2.4. PROCEDURES DURING TAXI

■ Take-off from intersection or displaced threshold

On TAKE OFF page:

TO SHIFT.....Enter
Enter distance (M:meters, FT:feet, according OPC option) between original threshold and start of take-off.
Ex: 100m.
"CHECK TAKE OFF DATA" s-pad msg (white) is triggered.

TAKE OFF page.....
.....Check/Revise
Check and revise if required:
– FLAP setting,
– V1, VR, V2,
– DRT TO or FLX TO.
If no change, clear message.



■ Change of RWY

On F-PLN A or B page:

LAT REV at Origin RWY [1L]...
.....Press

DEPARTURE [1L].....Press

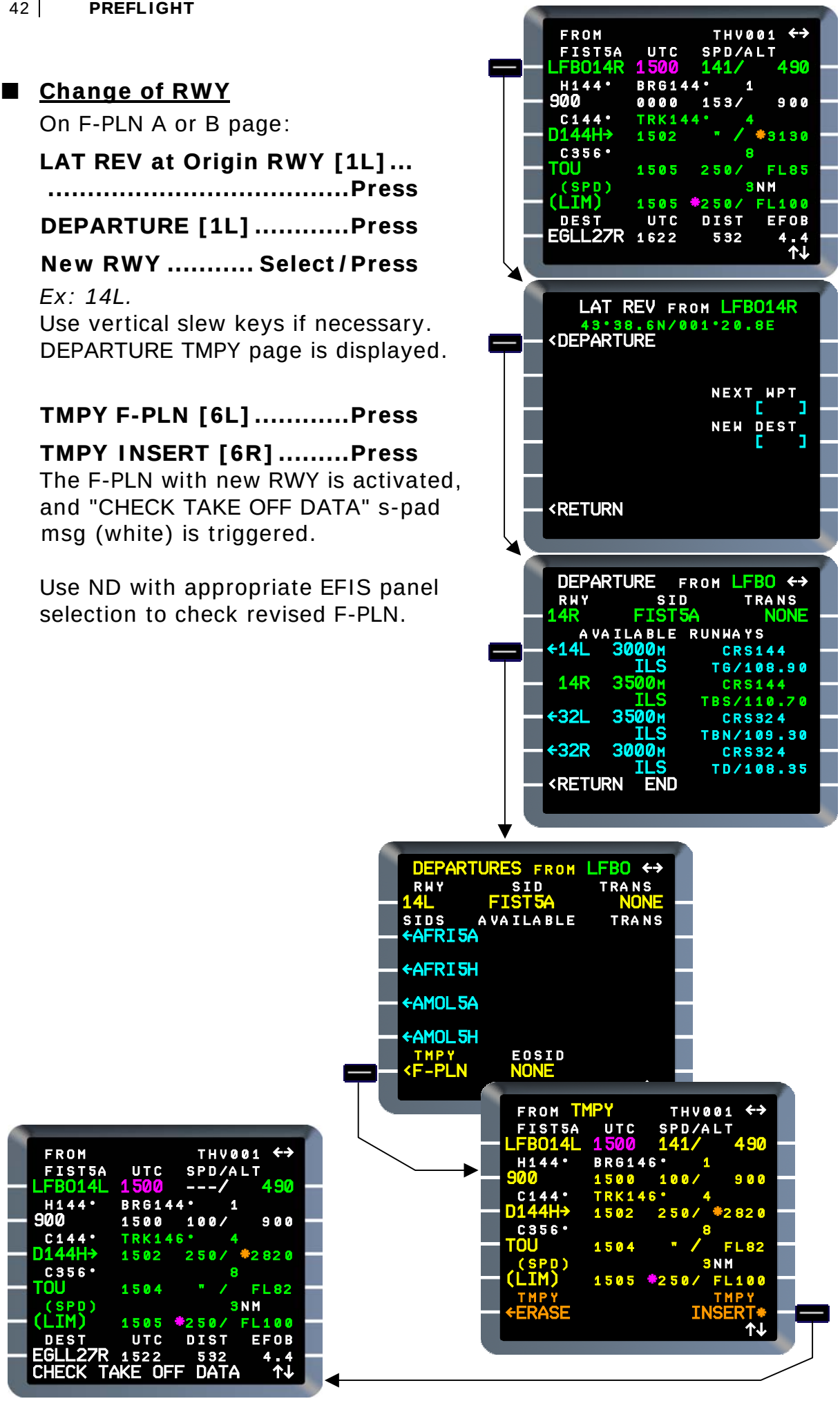
New RWY ..... Select/Press

Ex: 14L.
Use vertical slew keys if necessary.
DEPARTURE TMPY page is displayed.

TMPY F-PLN [6L].....Press

TMPY INSERT [6R].....Press
The F-PLN with new RWY is activated, and "CHECK TAKE OFF DATA" s-pad msg (white) is triggered.

Use ND with appropriate EFIS panel selection to check revised F-PLN.



On TAKE OFF page,

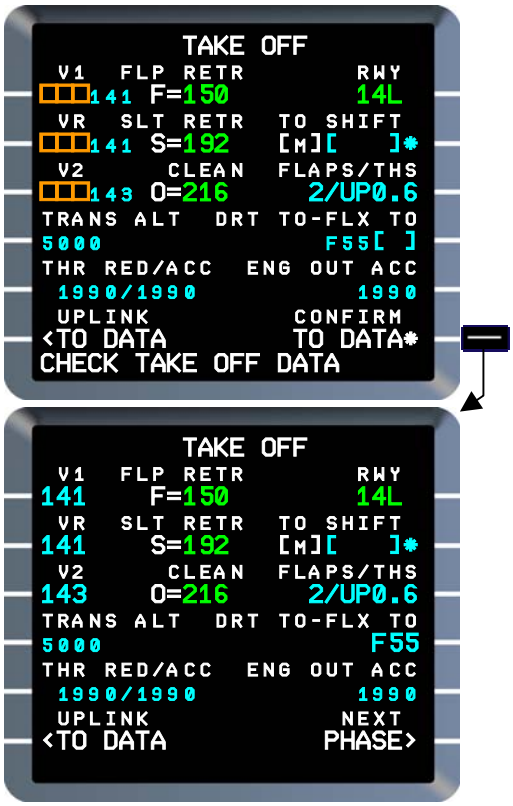
- The previous take-off data V1, VR, V2, DRT TO-FLX TO appear in blue beside the corresponding fields,
- THR RED/ACC & ENG OUT ACC are defaulted to values selected in AMI file.

The take-off speeds are removed from PFD speed scale.

Check data for new RWY.

Revised data.....Enter
Or, if no change:

CONFIRM TO DATA [6R] .... Press



■ CHANGE OF SID

On F-PLN A or B page:

LAT REV at DEP RWY [1L] .....
.....Press

DEPARTURE [1L] .....Press
Dep RWYs page is displayed.

DEPARTURE page 2 .....Select
Use horizontal slew key to access page 2 for SIDs.
Scroll up by vertical slew key if required.

New SID..... Select / Press
Ex: LACO5A.

TMPY DEPARTURE page is displayed.

TMPY F-PLN [6L] ..... Press
Use ND with appropriate EFIS panel selection to check revised F-PLN.

TMPY INSERT [6R] ..... Press
The F-PLN with new RWY is activated.

■ Change RWY/SID with SEC F-PLN.

If SEC F-PLN has been prepared for this alternative RWY and/or SID:

SEC F-PLN key.....Press
Sec INDEX page is displayed.

ACTIVATE SEC [4L] .....Press
SEC F-PLN becomes ACTIVE F-PLN.

"CHECK TAKE OFF DATA" s-pad msg (white) is triggered. PERF page displays take-off data previously entered in SEC PERF page.
Revise as necessary.

Use ND with appropriate EFIS panel selection to check revised F-PLN.

Part II: Chapter 3 – TAKE-OFF

Contents

PAGE INTENTIONALLY BLANK

3.1. SWITCHING CONDITIONS

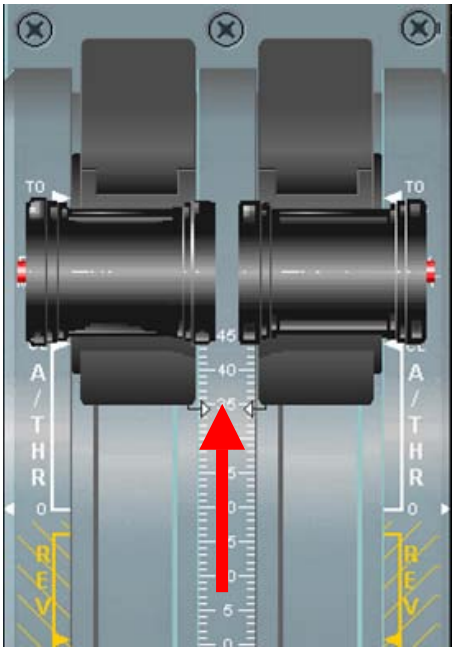
The FMGS transitions automatically from the PREFLIGHT phase to the TAKE-OFF phase when the following conditions are met:

- Thrust levers set to the FLEX or TOGA detent, and,
- Left and right N1 > 85% for CFM engines, or,
- Left and right EPR > 1.25 for IAE engines, or,
- Ground speed > 90 kt.

FMA displays MAN TOGA or MAN FLEX XX or MAN DTO.

PERF & **PROG** pages: title field becomes TAKE OFF green and non modifiable values switch from blue to green.

3.2. STANDARD TAKE-OFF



■ T/O with NAV mode ARM

NAV mode armed for take-off is the default mode as per A/C design.
This chapter describes the normal operations and displays during take-off. It is assumed for the following description:

- PERF page is completed,
- FMS Route is available after take-off and NAV mode will be used after take-off.

TAKE-OFF THRUST..... Set
Set take-off thrust as appropriate

FMA.....Check
Check appropriate mode selection

RWY mode appears on FMA if an ILS is tuned for the selected departure runway. Otherwise no lateral mode comes up until the aircraft is airborne. If altitude selected on the FCU is at or below the ACC ALT, ALT (blue) will be displayed instead of CLB.

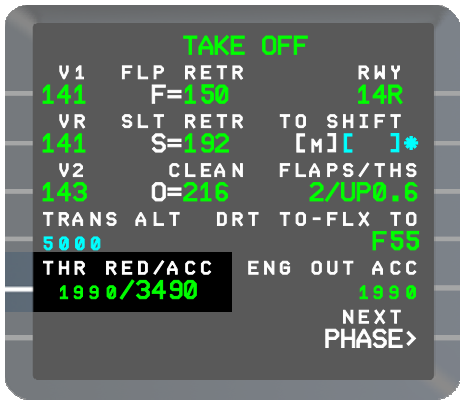
ND.....Check
The aircraft symbol must be centered on the runway threshold on the ND.

■ After take-off

At 30 feet, NAV engages automatically.
At 100 feet, the pilot may engage AP1 or AP2.

■ At THR RED ALT

(Thrust Reduction Altitude) [5L]



LVR CLB flashes in the first column of the FMA.

THRUST LEVERS ..... CL Set
The A/THR activates automatically and THR CLB mode becomes active.

■ At ACC ALT

(Acceleration Altitude) [5L]

FMA Pitch mode switches to CLB, or ALT, and A/C accelerates to CLB speed.

FMGC has now switched to the CLIMB phase.
See part II: Climb

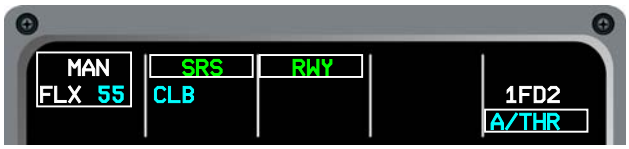
ALT in magenta is displayed if the level-off altitude is managed by the FMS due to an inserted ALT constraint while the FCU is set at a higher altitude.

■ T/O with HDG preselected

If a specified heading is required after take-off, HDG can be pre-selected before take-off. In this case NAV mode is disarmed.

See Part II: Ch2 - Preflight

At TO thrust application:



After take-off:
RWY TRK is displayed on the FMA.

When appropriate:

FCU ..... HDG Pull

HDG green is displayed on the FMA.

At ACC ALT SRS mode is replaced by OP CLB mode.

3.3. VARIATIONS FROM STANDARD

■ T/O with a climb speed preselected

If a speed is pre-selected for CLIMB, when thrust is set for take-off SPEED SEL:XXX is displayed on FMA (line 3, columns 1 & 2).

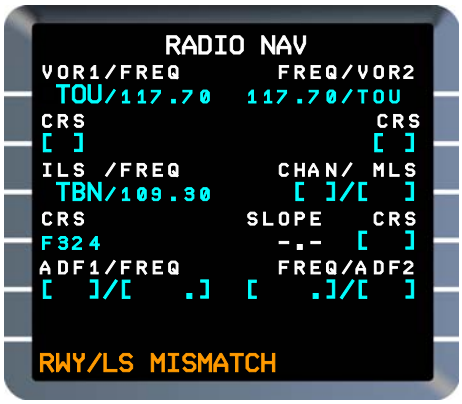
■ TAKE-OFF using localizer of OPPOSITE RWY

If the localizer of the ILS associated with the opposite runway has to be used for take-off:

RAD NAV Page .....Select

ILS[3L] .....Enter

Ex: TBN, for localizer 32L.
Check frequency and course.
This will trigger "RWY/LS MISMATCH" s-pad msg (amber).



Select appropriate PFD/ND display.

At take-off no RWY mode is available.

If LS p/b is selected, and back course TO option is not available, LOC information is reversal.

ND selected in LS ROSE mode may be preferred.

After take-off, NAV mode is automatically engaged.
Select HDG mode and adjust to fly the LOC course.

■ TAKE-OFF with no V2 entry

If V2 is not inserted in the PERF TAKE-OFF page of the MCDU, the SRS mode will not be available after take-off, V/S mode engages and the current speed becomes the speed target.

Refer to Operator's Manual for associated procedure.

3.4. OTHER INFORMATION

■ Position update

Aircraft with no GPS

An automatic position update at runway threshold is performed when the thrust levers are set in the take-off position.
If a take-off shift is entered in the PERF TAKE-OFF page, the FMGC position is updated to the coordinates of the take-off shift.

Aircraft with GPS

No position update occurs when the thrust levers are set to the FLEX or TOGA detent.

■ MAP SHIFT

See Part III: Ch 7.3 - Position monitoring

PAGE INTENTIONALLY LEFT BLANK

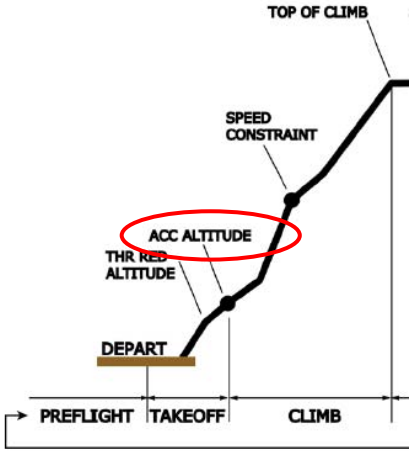
Part II: Chapter 4 – CLIMB

Contents

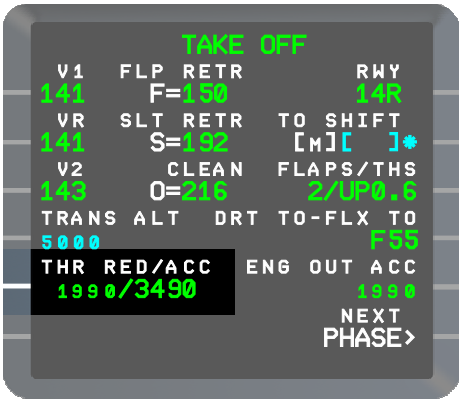
PAGE INTENTIONALLY BLANK

4.1.SWITCHING CONDITIONS

The FMGS switches automatically from TAKE-OFF to CLIMB phase:
When A/C reaches acceleration altitude (ACC), or,
By engagement of another vertical mode.

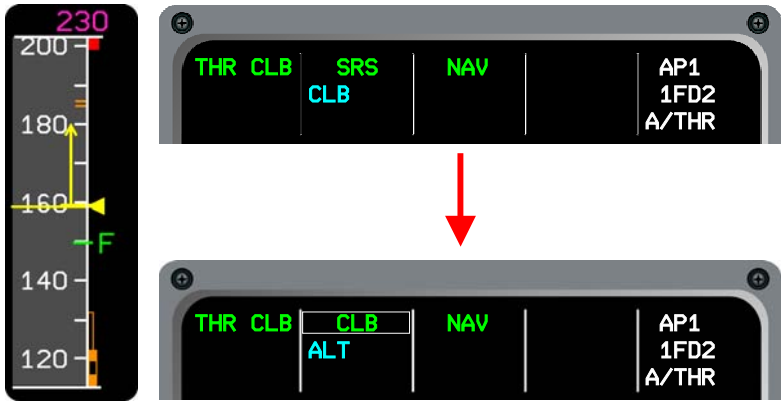


Acceleration altitude (ACC) is shown on TAKE OFF PERF page [5L]



PFD:

- FMA pitch mode switches from SRS to CLB, ALT or OP CLB according the situation,
- Speed is accelerating to the target speed displayed in magenta,



MCDU:
PERF page switches TO to CLB page,
PROG page switches TAKEOFF to CLIMB page.

PERG TAKE OFF page

PERG CLB page

PROG TAKE OFF page

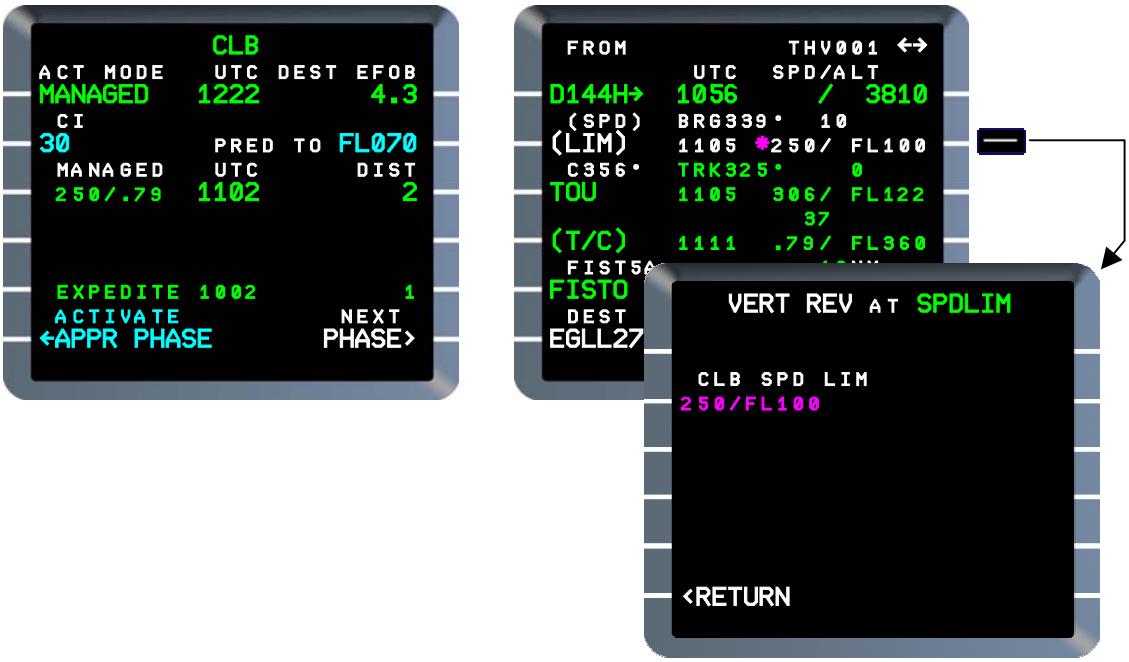
PROG CLB page

4.2. NORMAL CLIMB

If lateral and vertical managed modes are engaged the FMGS provides guidance to maintain track and profile of ACTIVE F-PLN.

On PFD at transition altitude (TRANS ALT), BARO REF flashes, reminding pilot to set STD.
TRANS ALT is displayed on PERF TAKE OFF page (field [4L]), but is not displayed in CLIMB phase.

During climb, the normal MCDU page selection is:
- PERF page for PF, to monitor climb parameters,
- F-PLNpage for PNF to monitor: time, speed, altitude predictions and constraints as matched or missed.



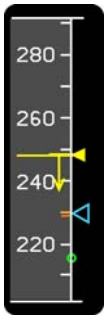
■ Speed control

In CLIMB speed control may be either MANAGED or SELECTED.
If MANAGED speed is engaged, climb speed is optimized, constraints and entered speed data in ACTIVE F-PLN are taken into account by the FMGS. It is the recommended climb speed mode.
If SELECTED speed is engaged, FMGS will maintain speed as selected by pilot on FCU.

☐ If a specific speed is required

FCU SPD .....Select / Pull

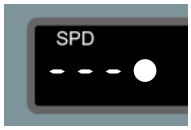
PFD:
Target speed becomes blue.
No change on FMA.



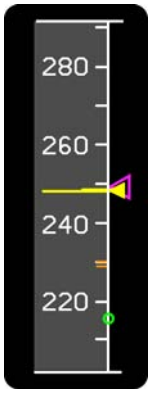
MCDU:

- PERF page, ACT MODE (active) becomes SELECTED [1L]; selected value is displayed in [4L].
- F-PLN page predictions assume that speed remains selected until the next SPD LIM or SPD CSTR, or the next phase, whichever comes first.

☐ To resume managed speed



FCU SPD ..... Push
FCU SPD window is dashed + dot.
Managed Speed is restored at the value shown on PERF page, target speed becomes magenta.



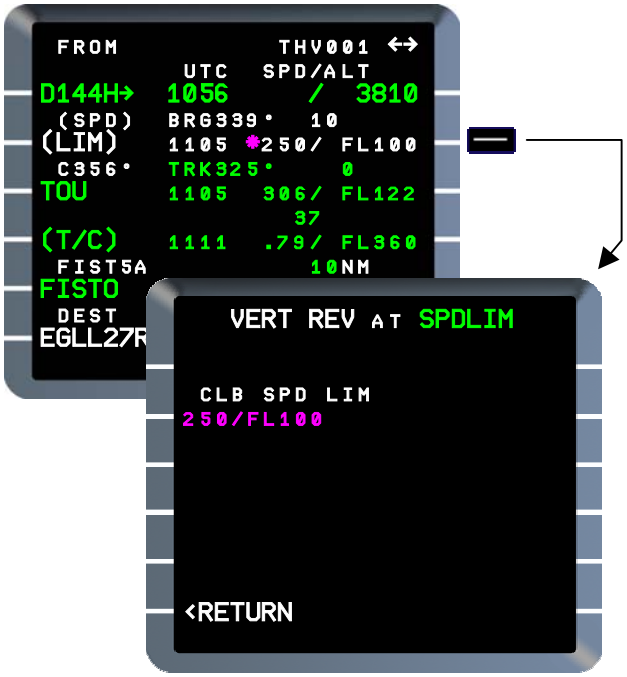
☐ Speed limit

A speed limit may be defaulted in the NAV data base:

e.g. 250 KT until FL100.

It is displayed and may be modified or cleared on VERT REV page at any WPT: CLB SPD LIM [2R].

Speed and altitude data are associated to an airport and stored in the NAV data base (Normally defaulted to 250 KT up to FL100).



■ Lateral guidance

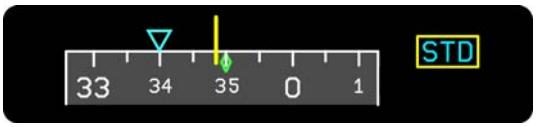
In CLIMB lateral guidance may be either MANAGED or SELECTED.
If lateral MANAGED mode (NAV) is engaged, guidance is provided to maintain track defined in ACTIVE F-PLN.

Associated lateral functions (e.g. DIR TO, HOLD, OFFSET) are described in Part III: Multiphase – Lateral functions.

☐ If a specific heading or track is required

FCU HDG-TRK .....Select / Pull

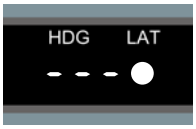
FMA:
HDG is displayed,
Vertical mode **reverts to OP CLB,** if CLB engaged. F-PLN **Constraints are ignored**.
HDG cursor (blue) is displayed on HDG scales.



☐ To resume NAV mode

- **If XTRK is less than 1 Nm**
  (Value depends of A/C orientation to F-PLN track)

  FCU HDG-TRK .....Push
  - HDG-TRK window is dashed + dot,
  - FMA displays NAV green,
  - A/C returns to track.



To resume NAV mode (Cont'd)

- **If XTRK is more than 1 Nm**

FCU HDG-TRK ..... Push
FMA:
– HDG remains displayed,
– NAV (blue) is armed.
FCU: HDG-TRK remains displayed, dot appears.
"NO NAV INTERCEPT" s-pad msg (white) is displayed on MCDUs if HDG is not convergent with F-PLN track.

HDG-TRK ..... Adjust
Check ND to adjust HDG-TRK to enable an INTCPT (intercept point).
FMA will display NAV green when A/C back on track.
NAV mode re-engages when F-PLN track captured.

- **If the HDG-TRK selected flies A/C beyond the active WPT,** and XTRK is more than 5 Nm, no INTCPT is computed.
To resume NAV mode:
– Manually sequence the ACTIVE F-PLN,
or
– Use DIR TO / DIR TO RADIAL IN functions.

See Part III: Ch 3 – Lateral F-PLN management

■ Vertical guidance

In CLIMB vertical guidance may be either MANAGED or SELECTED.
If MANAGED (CLB mode) guidance is provided to maintain computed profile including compliance with any vertical constraints defined in ACTIVE F-PLN.
Refer to Operator's SOPs for use of CLB mode.

Caution

CLB mode is not available if lateral mode is selected (HDG/TRK).

☐ Intermediate level-off

Ex: FL110

FMA displays ALT (green).
Active phase remains CLIMB.
If managed, speed remains CLIMB speed as displayed on PERF CLB page.

FMGS transitions to CRZ phase only when reaching the CRZ ALT as entered on PROG page. FMA then displays ALT CRZ.

☐ Resuming climb after intermediate level-off

Managed vertical mode
(not available in HDG mode)

FCU ALT.....Select/Push
On FCU, select cleraed altitude, dot is displayed.
Ensure that next constraint will not be missed (if applicable).
FMA displays CLB (green);

or as per SOPs,

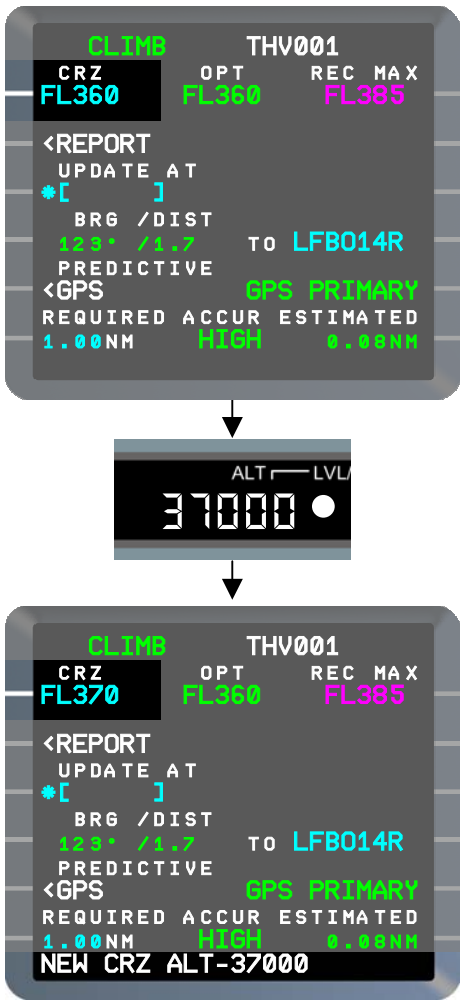
Selected vertical modes

FCU ALT.....Select/Pull
FMA displays OP CLB (green).

Vertical F-PLN constraints are ignored in OP CLB mode, and must be manually set on FCU.

☐ New CRZ ALT

If FCU ALT set is higher than entered CRZ ALT on PROG page, this is automatically updated to FCU setting and,
"NEW CRZ ALT-XXXXX" s-pad msg (white) is displayed.



☐ STEP ALTS

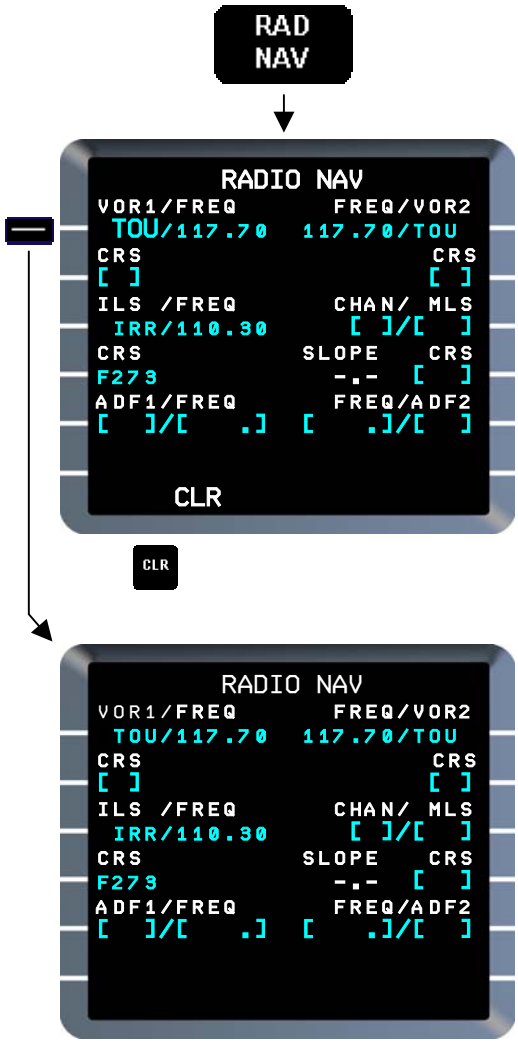
STEP ALTS function is described in Part III: Multiphase – Vertical functions

■ RAD NAV page

NAVAIDS manually tuned for departure should be cleared when appropriate.

RAD NAV KEY .....Press

RADIO NAVAIDS [X] ..... Clear
Use clear function to delete the forced navaids and display auto-tuned navaids.



■ GPS selection

(A/C equipped with GPS)
Reselect GPS as per SOPs if GPS has been deselected for departure (e.g. in case of non WGS84 coordinates).

See Part III: Ch 7.3 - Position monitoring

■ SEC F-PLN

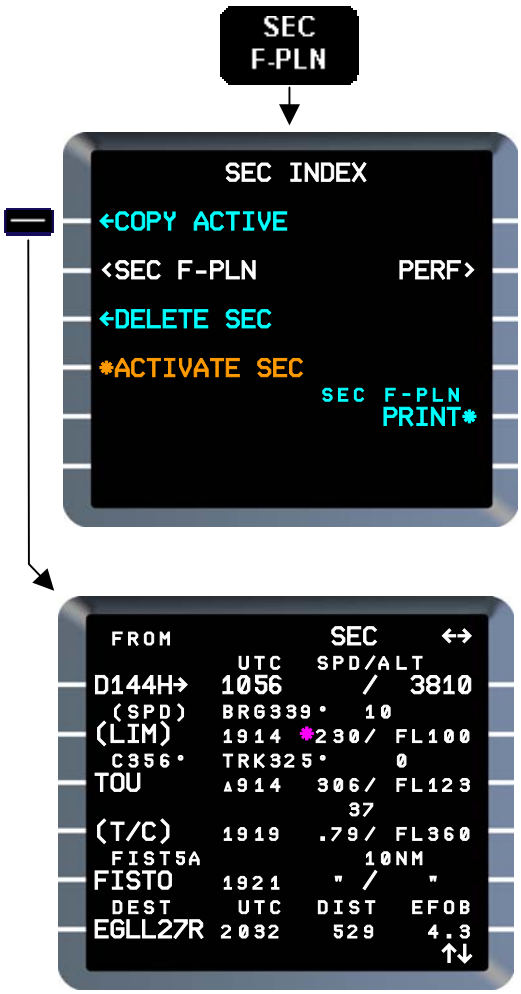
If SEC F-PLN is not used, make a COPY ACTIVE in order to keep SEC F-PLN as a back-up of ACTIVE F-PLN.

SEC F-PLN KEY ..... Press

COPY ACTIVE [1L]..... Press
The SEC F-PLN page is displayed.
Select MCDU page as convenient.

Revisions made to ACTIVE F-PLN (e.g. DIR TO) are not automatically transferred to SEC F-PLN. Thus SEC does not remain in sequence with ACTIVE F-PLN beyond the revise point, unless COPY ACTIVE is performed after each revision.

Keep SEC F-PLN empty, if expected to be used for DATA LINK.
(See Part III – Data Link).



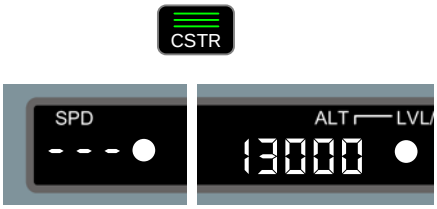
■ WIND data

WINDS may be inserted or updated at any time manually or by Data Link (if available).

The WIND DATA function is described in Part III: Multiphase – Vertical functions.

4.3.CONSTRAINTS MANAGEMENT

To comply with constraints:
Managed SPD mode provides speed management,
Managed CLB mode provides vertical management.



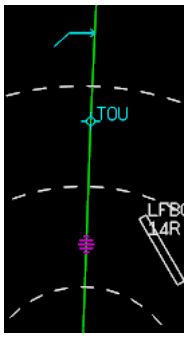
Compliance with constraints should be monitored on PFD, ND, and MCDU F-PLN page as described in the examples below.
Constraints are shown on ND if CSTR p/b is selected on EFIS control panel.

Example 1

In this example, managed SPD and CLB modes are engaged; FL130 has been selected on FCU; a speed limit 250 KT until FL100 is defaulted.

PFD
ALT armed and target altitude are displayed in blue.

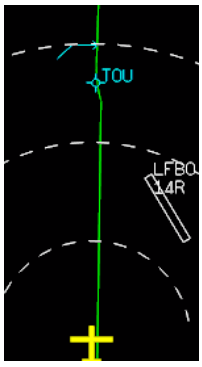
ND
A solid magenta circle shows the pseudo WPT where the speed limit will end.
A blue arrow (↗) shows the position where the FCU selected altitude will be reached.



MCDU: Line 2
Magenta star indicates compliance with Speed Limit.

- **If SPD is selected:**

On ND, speed limit constraint symbol disappears,
On MCDU, magenta star is replaced by an amber star if the selected speed is above the entered constraint.

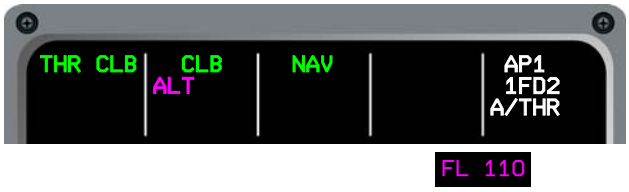


Example 2

In this example, managed SPD and CLB modes are engaged; FL130 is selected on FCU; a speed limit 250 KT until FL100 is defaulted and an ALT constraint of FL110 at TOU is entered.

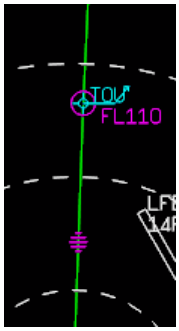
PFD

ALT armed and target altitude are displayed in **magenta** because the constraint is below the FCU selected ALT.



ND

- A solid magenta circle shows the pseudo WPT where the speed limit will end,
- ALT constraint FL110 at TOU is displayed in magenta (provided CSTR is selected on EFIS control panel).
  Magenta circle around TOU indicates that the constraint is predicted as satisfied.
- Climb to FL130 will be resumed after TOU and is displayed by the blue arrow (↗)



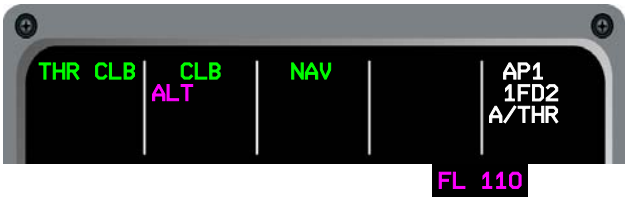
MCDU

Magenta stars indicate compliance with Speed Limit [2R] and ALT constraint at TOU [3R].

Example 2 (Cont'd):

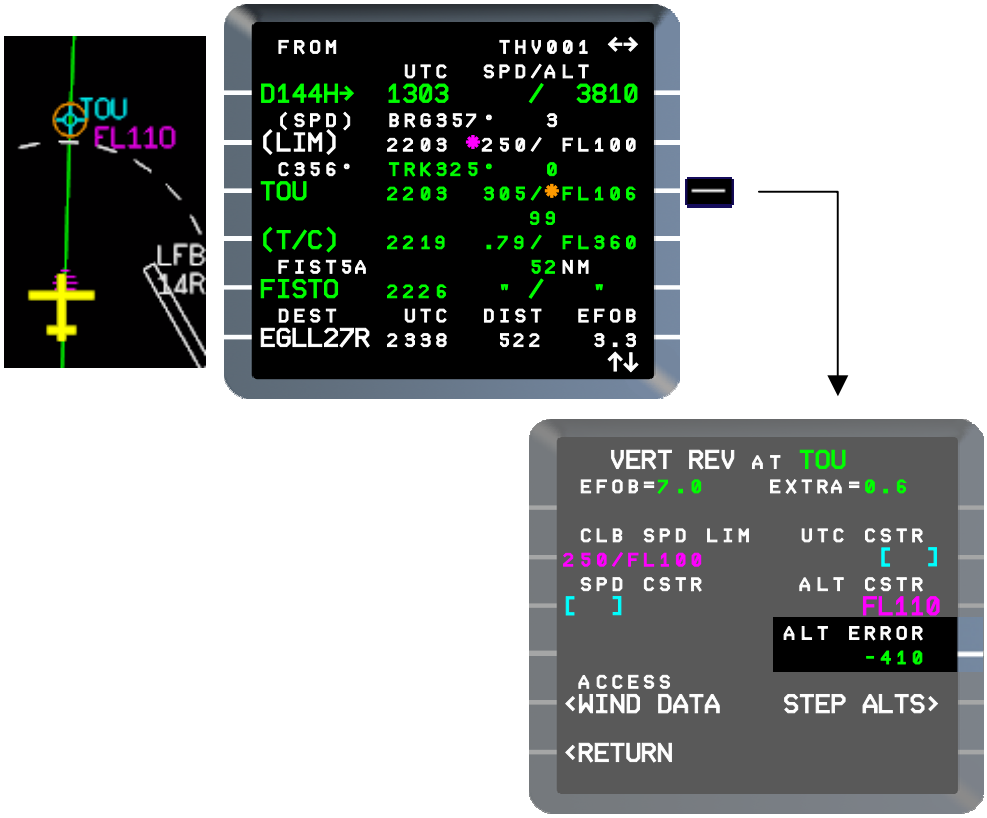
- **If the ALT constraint is predicted as missed:**

On ND an **amber** circle is displayed around the WPT.
On MCDU an amber star is displayed with the predicted altitude.
Vertical error can be visualized on VERT REV page at the WPT field [4R].



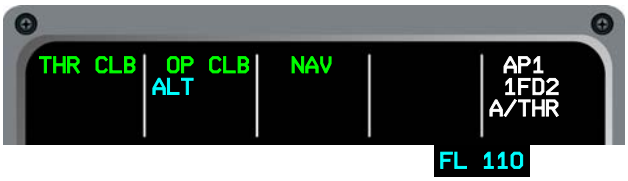
In the example constraint FL110 at TOU is missed, altitude prediction is FL106.

Tolerance for ALT CSTR is 250 ft in CLB and DES 150 ft in APP.



- **If the ALT constraint is ignored (OP CLB):**

  On ND a **white** circle is displayed around the WPT.
  On MCDU magenta star is still displayed.



Caution

Use CLB mode for constraints management as per SOPs.

4.4.SUPPLEMENTARY PROCEDURES

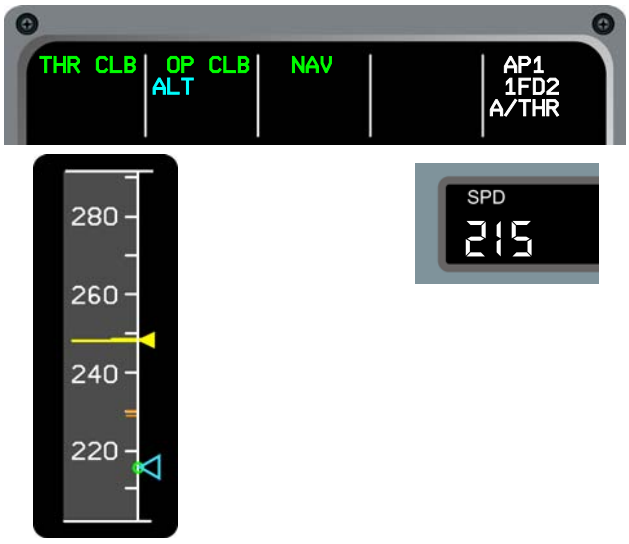
■ EXPEDITE climb

- **If A/C is equipped with FCU EXPED button**

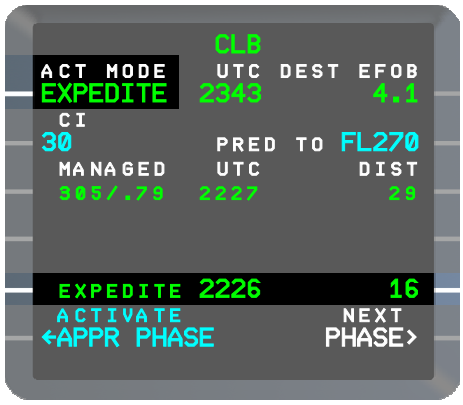
  EXPED p/b ..... Press
  - On PFD, FMA displays EXP CLB, target speed becomes Green Dot (magenta).
  - ALT CSTRs are ignored.

- **If A/C is not equipped with FCU EXPED button**

  FCU SPEED .....Select/Pull
  - Select speed down to Green Dot.
  - On PFD, FMA displays OP CLB, target speed is blue.
  - ALT CSTRs are ignored.



PERF page:
ine 5 provides time and distance to reach ALT displayed in [2R] when using Expedite climb mode.



To resume normal climb proceed as described in 4.2.

■ Preselect a CRZ Speed / Mach

On PERF page:

NEXT PHASE [6R] ..... Press
CRZ PERF page is displayed.
Title page is white.

PRESEL value [4L] .....Enter
CRZ ACT MODE becomes SELECTED
Ex: M.80

To return to MANAGED mode:

MANAGED [3L] ..... Press
CRZ ACT MODE becomes MANAGED

When FCU ALT is selected at the CRZ ALT entered on PROG page, FMA displays MACH SEL:.XX (or SPD SEL:XXX if a speed is selected)

■ Immediate return to DEP airport

☐ Without SEC F-PLN prepared

1 F-PLN page:

LAT REV at TO WPT .....Press

NEW DEST [4R] .....Enter

Ex: LFBO

TMPY F-PLN is displayed.

AIRPORT key .....Press

The new destination is displayed in [4L].

– Enter Arrival.

Refer Part II – Preflight & Cruise (descent preparation).

Depending on A/C position and ATC clearance it may be easier to select NO STAR or NO VIA.

Use systematically ND with appropriate range & scale to visualize revisions.

– Proceed as ATC cleared using HDG mode, assure F-PLN sequencing, or use DIR TO function.

2 Complete approach preparation as described in Part II – Cruise (descent preparation).

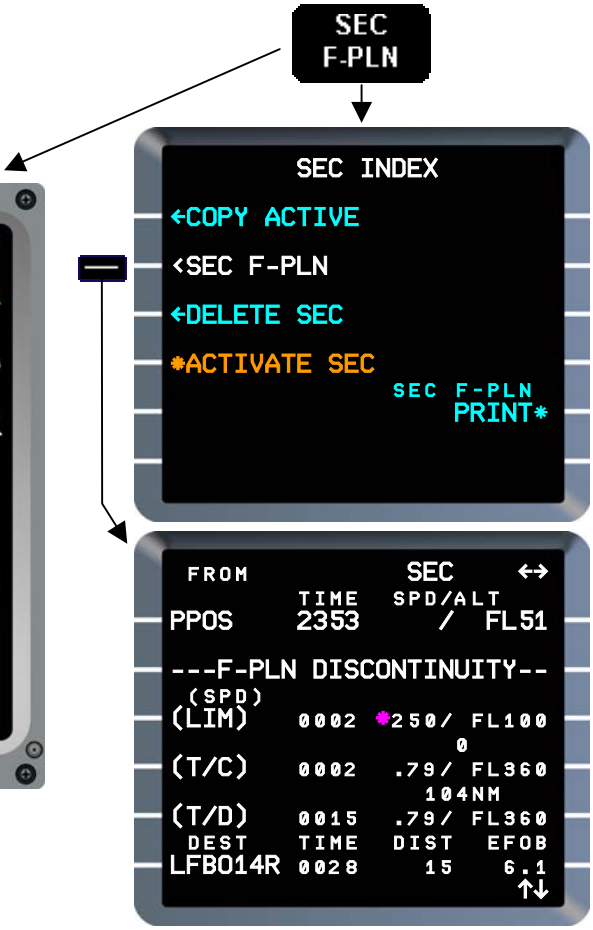
– RAD NAV page

– PROGRESS page

– PERF page

☐ With SEC F-PLN prepared

SEC F-PLN key ..... Press
SEC F-PLN is displayed on ND as a continuous white line.



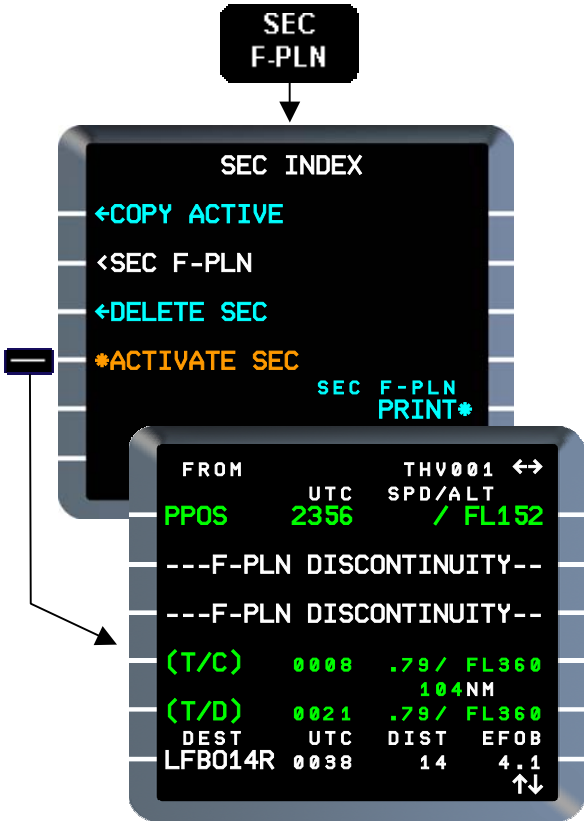
SEC F-PLN [2L]..... Press
SEC F-PLN page is displayed.

Review, modify as desired.
Then:
If NAV mode is engaged and active legs in ACTIVE and SEC F-PLN are not in sequence, select HDG mode. Otherwise "SELECT HDG/TRK FIRST" s-pad msg (white) will be displayed.

ACTIVATE SEC [4L] ..... Press
F-PLN page is displayed and new track on ND.

Proceed as ATC cleared using HDG mode, assure F-PLN sequencing, or use DIR TO function.

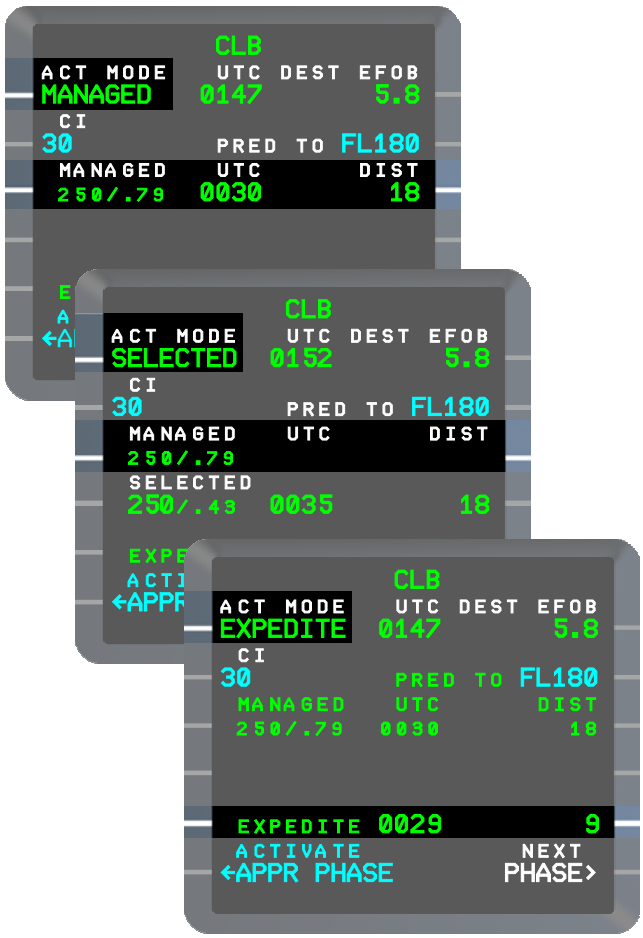
See Part III: Multiphase



4.5.USE OF PERF CLB PAGE

ACT MODE [1L]

Indicates the active speed mode.



MANAGED: managed speed mode is engaged. Speed is computed by the FMGC, value is displayed in [3L]; it cannot be changed.
FCU SPD is dashed + dot.

SELECTED: selected speed mode is engaged. Speed is FCU SPD/MACH, displayed in [4L].

EXPEDITE (if installed): expedite mode has been selected on FCU.

CI [2L]

Displays the actual CI.

- It may be overwritten.
  Changing CI will change the MANAGED climb speed.
- If a time constraint has been entered in ACTIVE F-PLN, and active speed mode is MANAGED, TIME CSTR is displayed.

See Part III – Multiphase

If field [2L] is cleared by using CLR key:

- CI is defaulted to CI of the previous flight and "USING COST INDEX-XXX" s-pad msg (white) is displayed, or,
- If TIME CSTR prevails, clear is not allowed and "TIME CSTR EXISTS" s-pad msg (white) is triggered.

Predictions at DEST [1R]

UTC (Time at destination) and EFOB (estimated Fuel on Board)
These predictions are computed according to ACT MODE speed.
If ACT MODE is SELECTED, it is assumed that speed remains selected until the next SPD LIM or SPD CSTR, or the next phase, whichever comes first.

Predictions to ALT [2R to 5R]

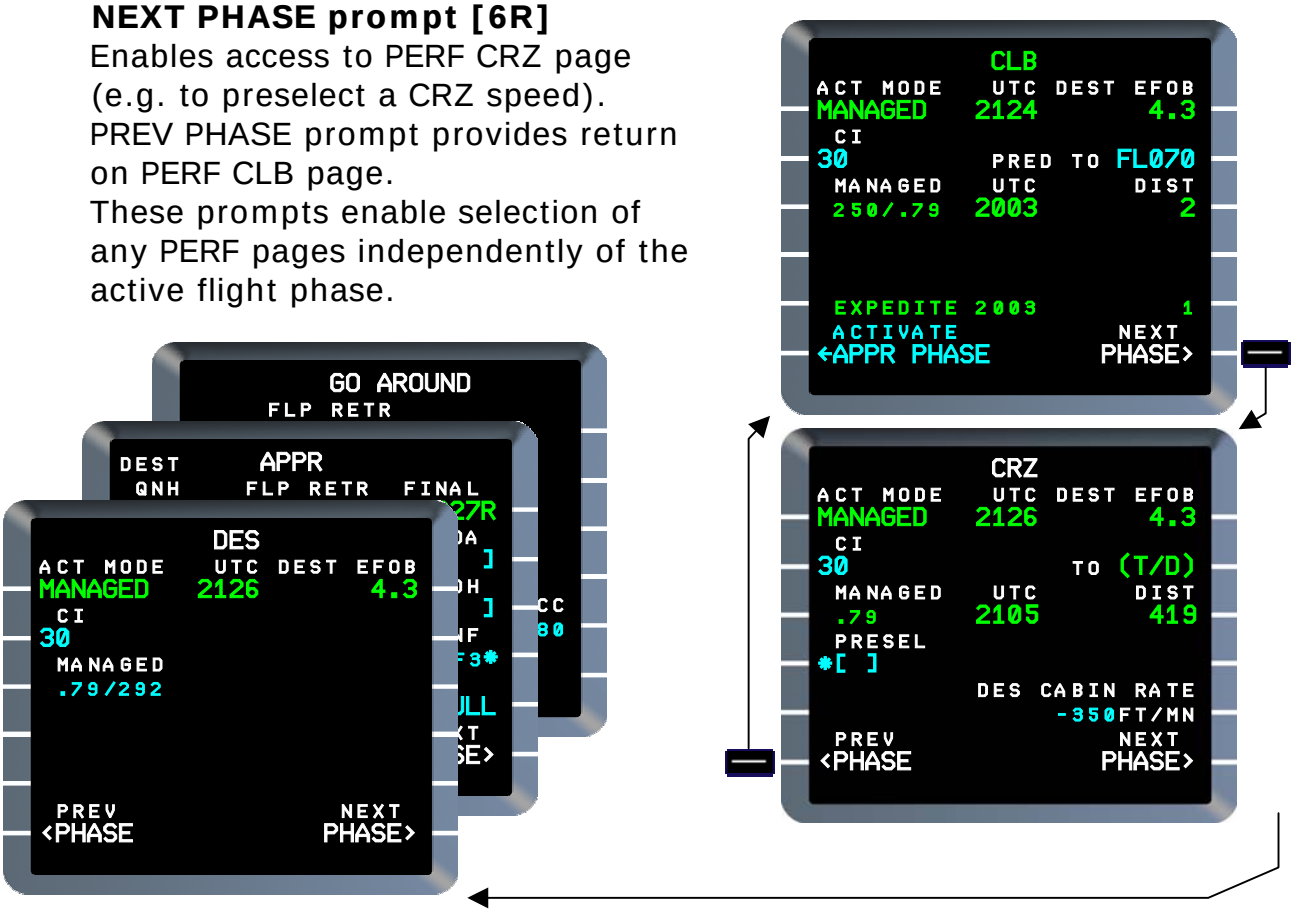
ALT displayed in [2R] is defaulted to FCU ALT.
UTC (Estimated Time) and DIST (Distance) to reach this altitude are displayed in:

- [3R] if speed is managed, or,
- [4R] if speed is selected, or,
- [5R] if EXPEDITE mode is used.

ALT may be overwritten enabling predictions computation at any desired ALT.
When cleared, [2R] field defaults to FCU selected ALT.

NEXT PHASE prompt [6R]

Enables access to PERF CRZ page (e.g. to preselect a CRZ speed).
PREV PHASE prompt provides return on PERF CLB page.
These prompts enable selection of any PERF pages independently of the active flight phase.



ACTIVATE APPR PHASE prompt [6L]
This function may be useful in case of immediate return.

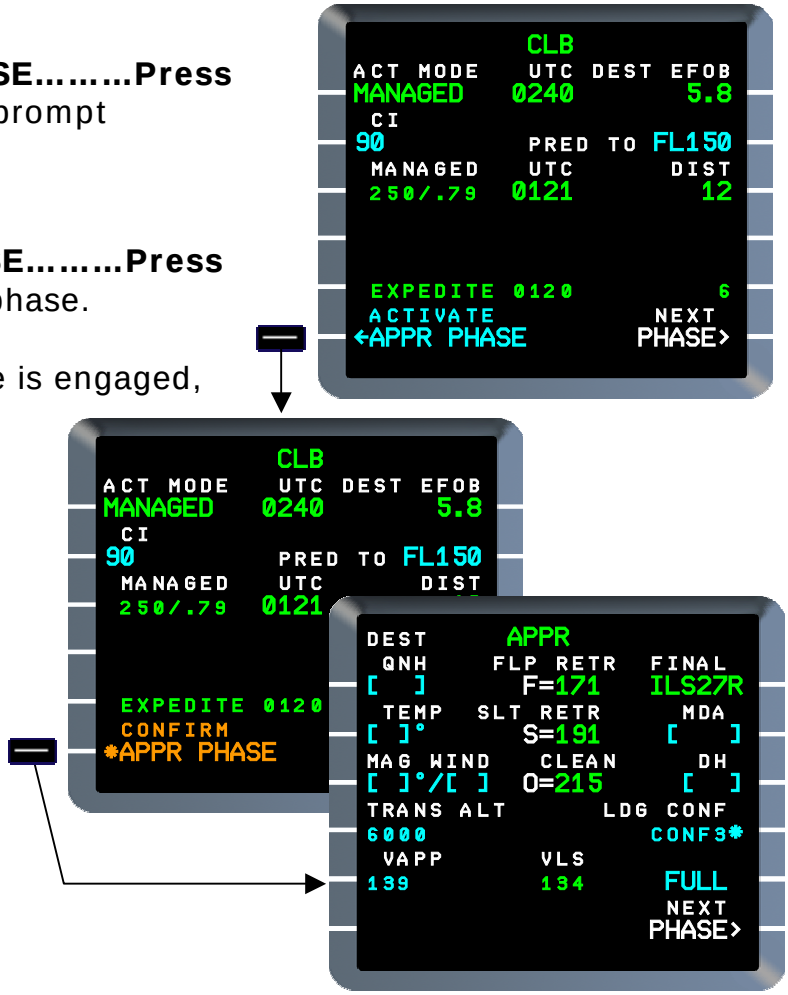
ACTIVATE APPR PHASE……Press
CONFIRM APPR PHASE prompt (amber) is displayed.

- **If confirmed:**

CONFIRM APPR PHASE……Press
FMGCs switch to APPR phase.

If managed speed mode is engaged,

target speed reduces to green dot.



- **If not confirmed:**

Press any LSK, except 6L, or any MCDU page key; amber prompt reverts to blue ACTIVATE APPR PHASE prompt.

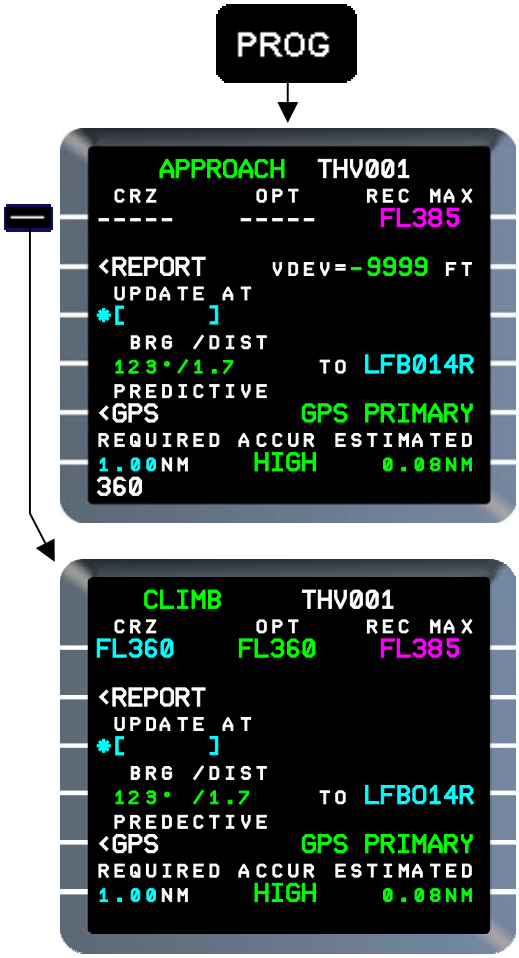
Reversion to ACTIVATE APPR PHASE prompt also occurs:

If actual CLIMB phase transitions to another phase, or in case of FMGC reset, or after a long-term power loss.

- **If APP PHASE is activated inadvertently:**

FCU SPD / MACH ..... Pull
To retain existing speed.

PROG key ..... Press

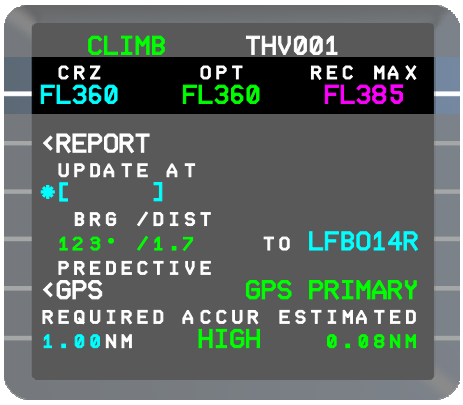


CRZ ALT .....Enter
Re-enter the CRZ ALT.

FMGCs switch back to current phase.

Resume normal climb.

4.6.USE OF PROG CLIMB PAGE



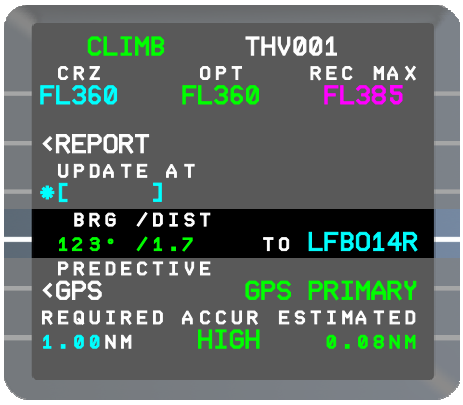
CRZ OPT REC MAX (Line 1)
CRZ: Cruise altitude or FL as entered in the ACTIVE F-PLN.
OPT: Optimum altitude is the altitude for minimum cost.
Computation takes into account: CI (cost index) corrected by Perf Factor, Ground Speed (KT), total fuel flow.
REC MAX: Recommended Maximum Altitude computed according to following criteria:

- Stabilized in level flight with less than MAX CRUISE thrust,
- Speed maintained between GREEN DOT and VMO/MMO,
- Minimum rate of climb 300 ft/mn at MAX CLIMB thrust,
- Altitude can be reached a margin of 0.3 G,
- Altitude is less than MAXIMUM CERTIFIED ALTITUDE.

<REPORT prompt [2L]
This function may be used for position message to ATC or Data Link (if available).
Refer to Part III: PROG page & Data Link

UPDATE AT [3L]
Enables FMGC update position at a navaid.
See Part III: Multiphase – Position Monitor

BRG DIST (Line 4)
This function may be used to enter DEP RWY, or crosscheck FMGCs accuracy by comparing computed BRG/DIST with VOR/DME indications.
Refer to Part III: Multiphase



GPS (Line 5)

A/C with GPS

Field [5R] enables to monitor GPS PRIMARY.

This field is empty when GPS PRIMARY is LOST, which is displayed on ND (not clearable) and on MCDU scratchpad (clearable).

[5L] prompt allows access to PREDICTIVE GPS function.

See Part III: Position Monitor

A/C without GPS

In climb, this field is empty.

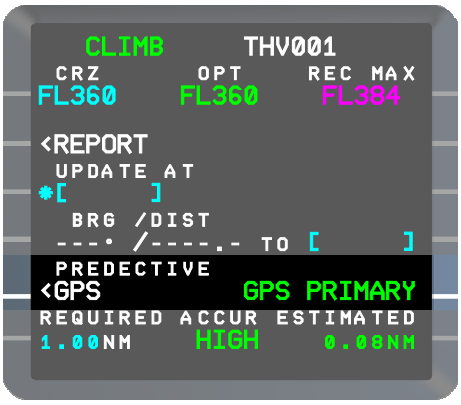
ACCURACY (Line 6)

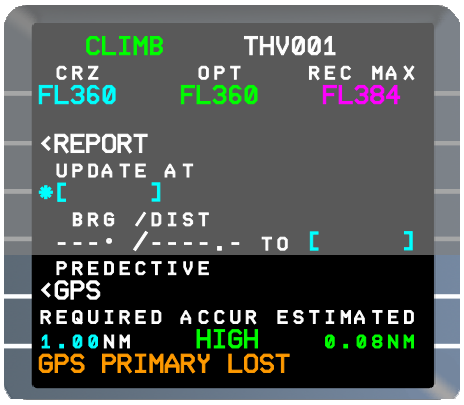
This line provides information to monitor the EPE (FMGC Estimated Position Error) compared to REQUIRED RNP value.

Field [6L] is modifiable.

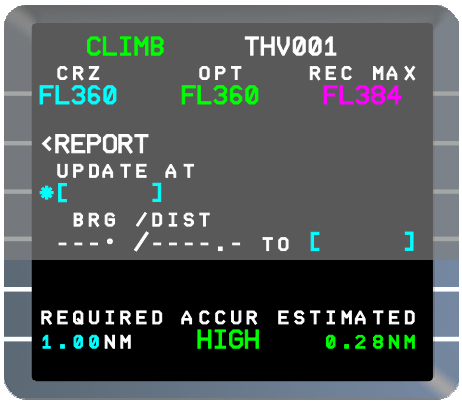
See Part III: Multiphase - Position Monitor

A/C WITH GPS





A/C WITHOUT GPS

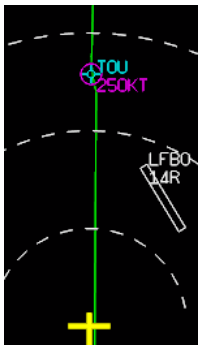


4.7.SCRATCHPAD MESSAGES

■ SPEED ERROR AT XXX

"SPD ERROR AT XXX" s-pad msg (white) is displayed when NAV mode and SPD managed are engaged and the system predicts that a speed constraint will be missed by more than 10 knots.
The message is cleared when the predicted discrepancy is reduced to less than 5 knots.

In this example SPD is selected 270 KT although a SPD CSTR 250 KT exists at TOU.



■ SPEED LIMIT EXCEEDED

"SPD LIMIT EXCEEDED" s-pad msg (white) is displayed in CLIMB, CRUISE and DESCENT flight phases when:

- Speed exceeds SPEED LIMIT by 10 KT, and
- ALT is within 150 ft of SPEED LIMIT ALTITUDE.

Message is cleared when speed no longer exceeds the SPEED LIMIT + 5 KT.

In this example SPD has been selected at 270 KT although a SPD LIM 250 KT exists below FL100.

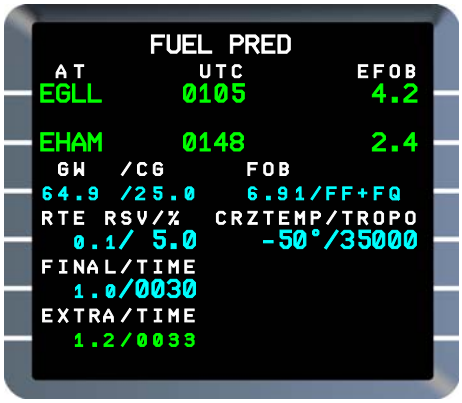
■ CHECK GW

The "CHECK GW" s-pad msg (amber) is displayed when GW computed by FM differs from that computed by FAC by more than 7 tons.
If manually cleared, message re-appears if conditions still exist.

This may be due to a ZFW entry error.
During initial climb (around FL150) GW information is progressively transferred from FMGCs to FACs, which receive AOA (Angle of Attack) information.
Compare the actual GW on FUEL PRED page, with actual GW computed on Load Sheet corrected for Fuel Used.

If an error is detected on GW, the correct value must be inserted on FUEL PRED page.

If actual GW appears to be correct, refer to OPS procedures.



PAGE INTENTIONALLY LEFT BLANK

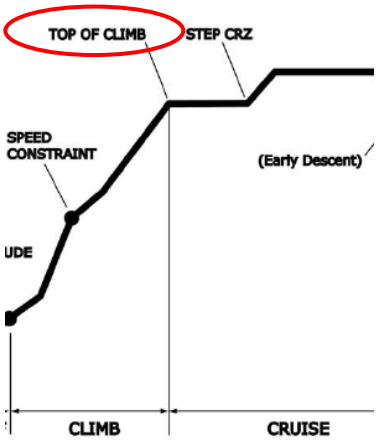
Part II: Chapter 5 – CRUISE

Contents

PAGE INTENTIONALLY LEFT BLANK

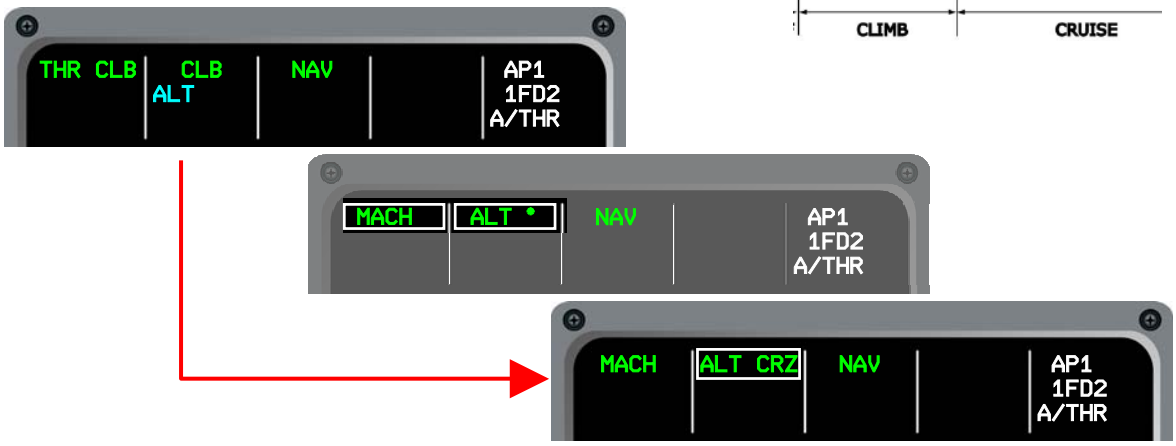
5.1. SWITCHING CONDITIONS

The FMGS switches automatically from CLIMB to CRUISE phase when A/C reaches the cruise altitude entered on PROG page.



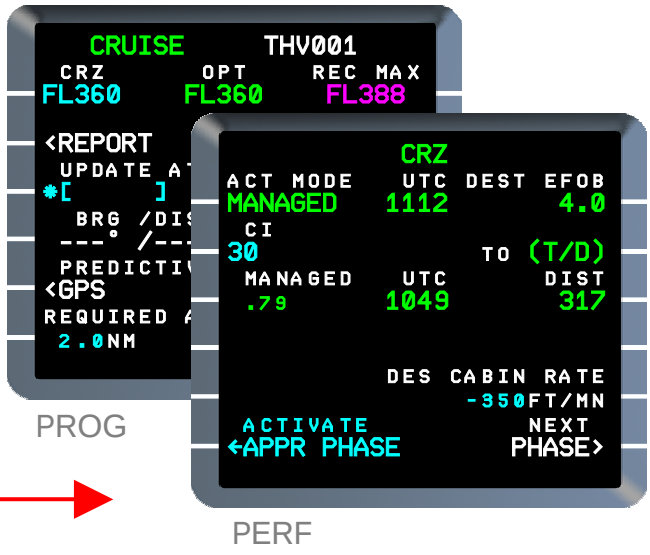
FMA ALT CRZ is displayed,

MCDU:
- PERF page title becomes CRZ green,
- PROG page title becomes CRUISE green.



PROG

PERF



PROG

PERF

5.2. REACHING CRUISE FLIGHT LEVEL

FMA.....Check
ALT CRZ is displayed. If ALT is displayed FMGS is still in CLIMB phase.

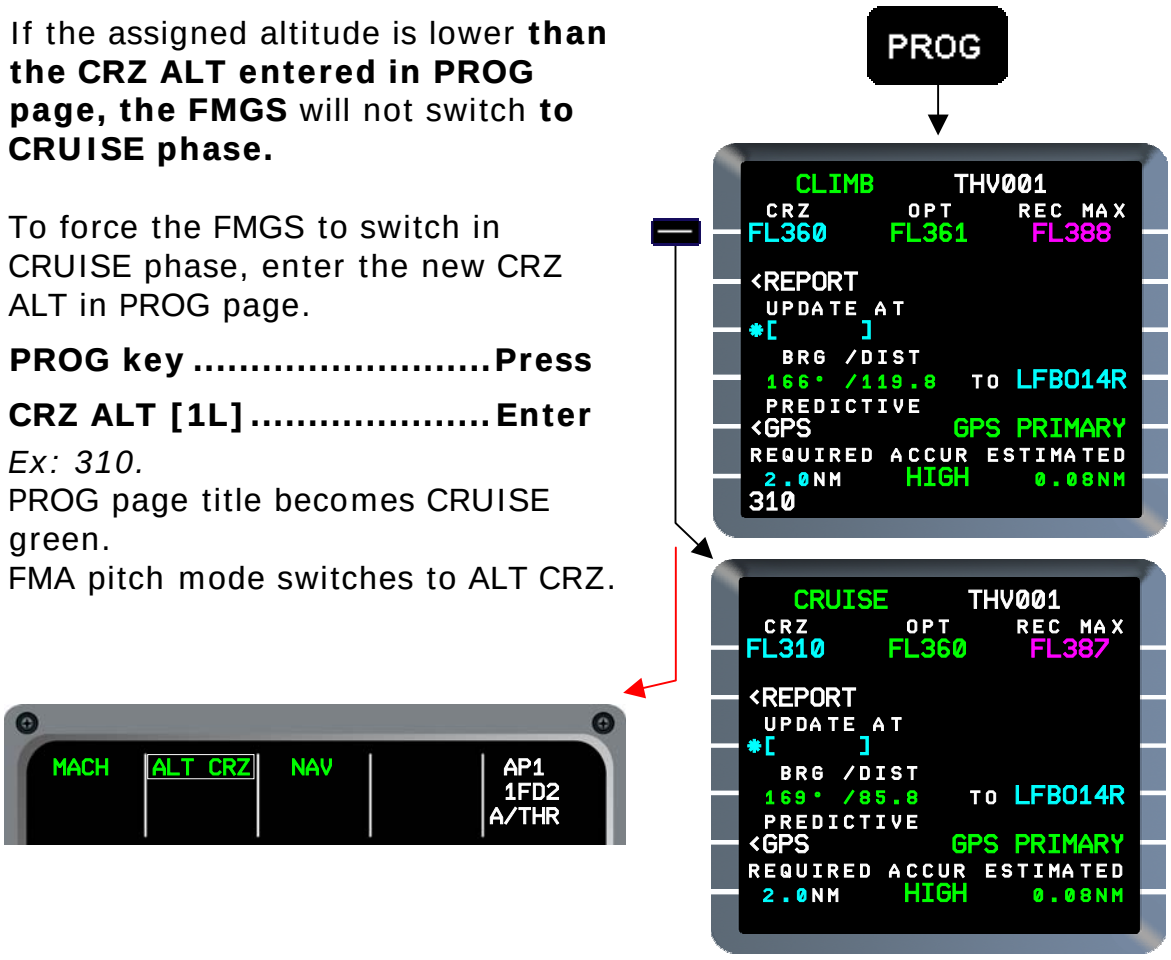
- If the assigned altitude is lower **than the CRZ ALT entered in PROG page, the FMGS** will not switch **to CRUISE phase.**

  To force the FMGS to switch in CRUISE phase, enter the new CRZ ALT in PROG page.

  PROG key .....Press

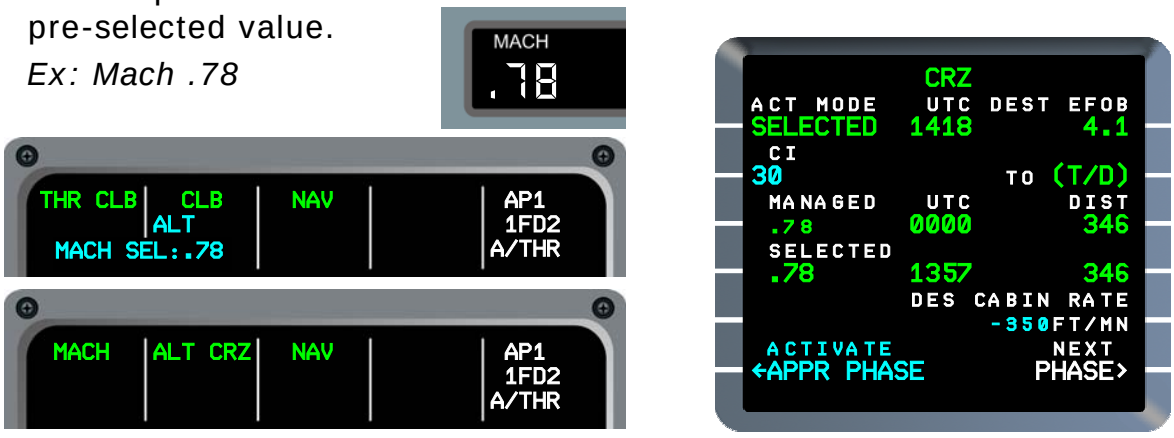
  CRZ ALT [1L].....Enter

  Ex: 310.
  PROG page title becomes CRUISE green.
  FMA pitch mode switches to ALT CRZ.



- **If a PRESEL speed has been entered in the CRZ PERF page,** the blue FMA message "SEL SPD: XXX or MACH SEL: .XX" disappears. Active speed mode becomes SELECTED and FCU SPD window shows pre-selected value.

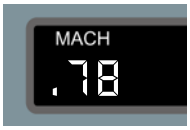
  Ex: Mach .78



- **If ACTIVE speed mode is SELECTED when reaching cruise,**

ACT MODE remains SELECTED.

– "SET MANAGED SPEED" message (white) is displayed on FMA,
– "SET MANAGED SPEED" s-pad msg (white) is triggered,
– FCU SPD/MACH window shows selected speed.



To select managed speed:

FCU SPD / MACH knob.....Push

5.3. NORMAL CRUISE

The normal page display is: PROG or PERF for the PF, F-PLN A/B for the PNF.
Consult or revise MCDU pages as per SOPs, for flight planning, flight management and accuracy check.

PF: PROG or PERF PNF: F-PLN A/B

Main pilot actions and MCDU information during the cruise are described below.

F-PLN page convention:

- *LAT REV is a lateral F-PLN revision made by using MCDU left LSKs.*
- *VERT REV is a vertical F-PLN revision made by using MCDU right LSKs.*

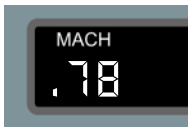
Refer to Part III: Multiphase for pilot actions not specific to the cruise phase.

■ Speed Control

In CRUISE speed may be either MANAGED or SELECTED.
If MANAGED speed is engaged, cruise speed is optimized, constraints and entered speed data in ACTIVE F-PLN are taken into account by the FMGS.
If SELECTED speed is engaged, FMGS will maintain speed as selected by pilot on FCU.

☐ To change speed

FCU SPD / MACH .....Select / Pull



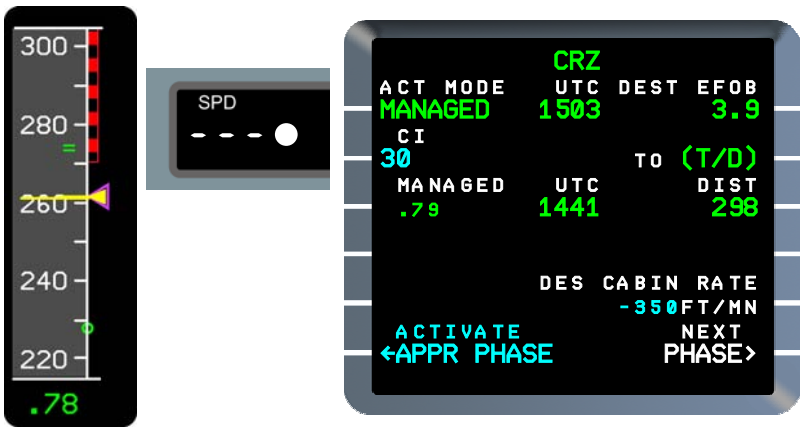
PFD:
Target speed becomes blue.
No change on FMA thrust mode.

MCDU:
PERF page ACT MODE is SELECTED.
F-PLN page predictions assume that speed remains selected until the next SPD CSTR, or the next phase, whichever comes first.

The speed for the current phase cannot be changed on MCDU.

☐ To resume managed speed

FCU SPD .....Push
FCU SPD window is dashed + dot.
Managed Speed is restored to the value shown on PERF page, target speed becomes magenta.



Lateral functions

Normal lateral mode is NAV providing lateral guidance to maintain ACTIVE F-PLN track.
Lateral functions DIR TO, HOLD, OFFSET, are described in Part III: Multiphase – Lateral functions.

Vertical functions

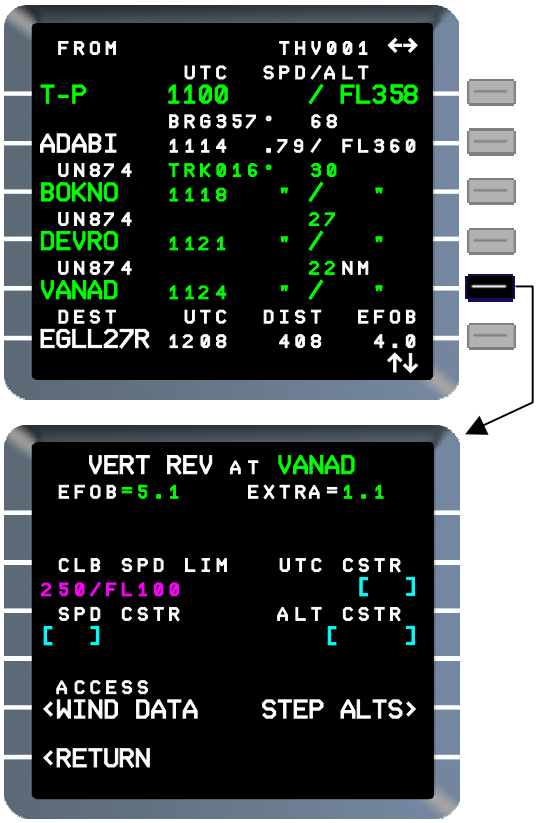
Vertical functions are accessed through VERT REV on F-PLN page.

UTC CSTR [2R], SPD CSTR [3L], ALT CSTR [3R] enable insertion of Time/Speed/Altitude constraints at a WPT in ACTIVE F-PLN.

STEP ALTS prompt [5R] may be used if a level change is expected at a specific WPT of the route.

ACCESS WIND DATA prompt [5L] may be used to insert or update winds manually or by Data Link (if available).

These functions are described in Part III: Ch 4 – Vertical F-PLN management.



☐ Change cruise level

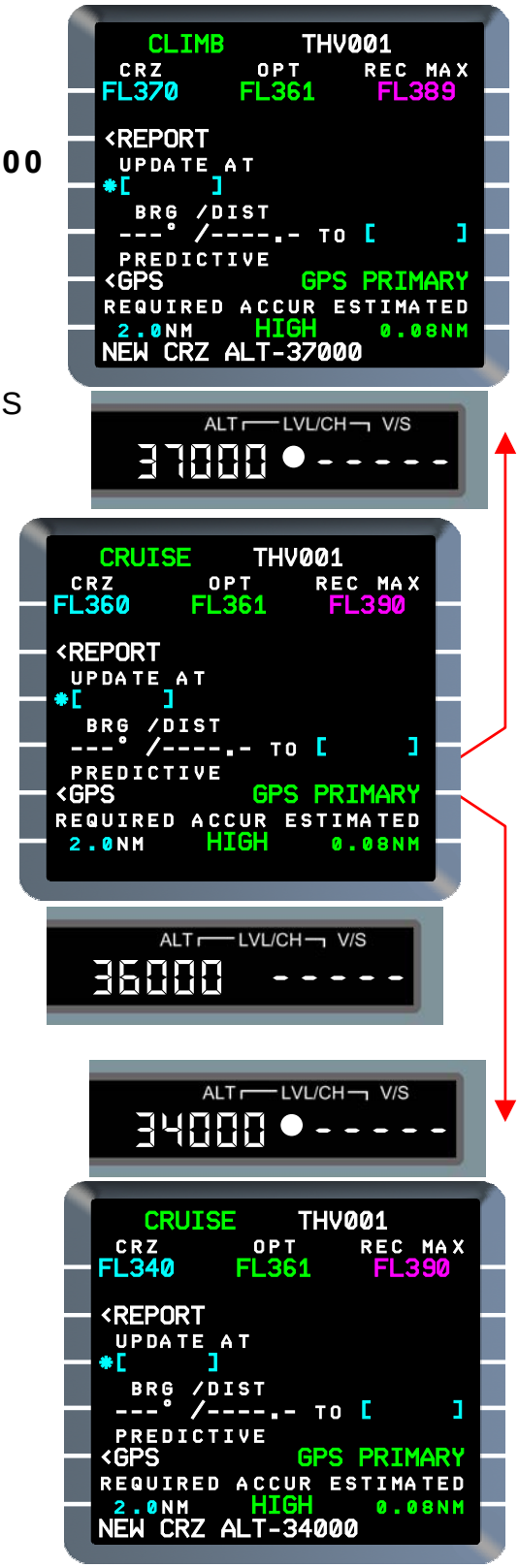
- **If distance to DEST is more than 200 NM:**

  FCU ALT.....Select/Push or Pull
  Push to engage managed CLB/DES modes.
  Pull to engage selected OP CLB/OP DES modes.
  A managed vertical mode cannot be engaged unless the lateral mode is NAV.

  If a **higher ALT** is selected, FMGS switches for CRUISE to CLIMB phase for the time of level change; then switches again to CRUISE.

  If a **lower ALT** is selected, FMGS stays in CRUISE phase.
  If managed DES mode is engaged, A/C descends at 1000 ft/mn.

  CRZ ALT [1L] on PROG page is updated automatically and "NEW CRZ ALT-XXXXX" s-pad msg (white) is triggered.



- **If distance to DEST is 200 NM or less, or** if selected altitude is at or below FL 200 or DES ALT CSTR whichever is higher:

  FCU ALT.....Select/Push-Pull
  FMGS switches to DESCENT phase.

■ Flight monitoring

ND:

– Enables to monitor progress of navigation,
– Additional information is provided: actual GS, TAS and Wind,

Digital wind direction is true, green arrow is magnetic.

– **TO WPT** is displayed top right with BRG/DIST and ETA based on actual GS.

MCDU: main information is on

PERF page:
– ETA & EFOB at DEST,
– ETA & DIST to T/D or STEP ALT.

PF:
ND / PERF page

F-PLN A page :
– En-route WPTs with ETAs.

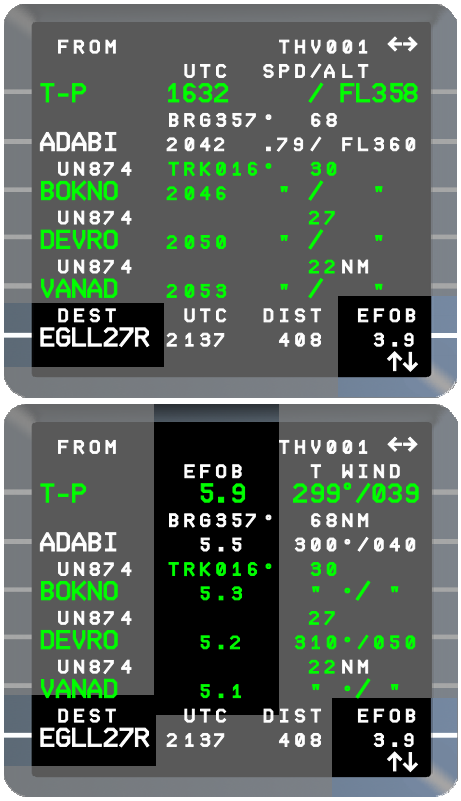
PNF:
F-PLN page A

Fuel

For fuel monitoring see Part III.

PERF page

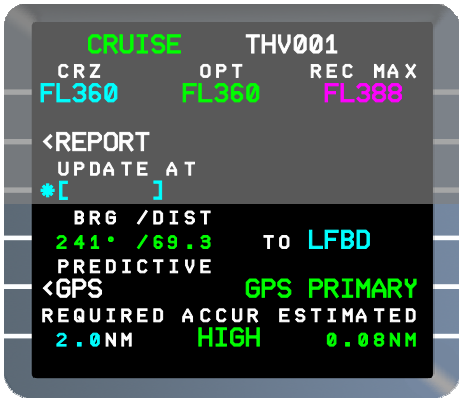
FUEL PRED page



F-PLN page A/B

Position / Accuracy

For monitoring of position and accuracy see Part III: Ch 7.3



■ WIND data

WINDS may be inserted or updated at any time manually or by Data Link (if available).

The WIND DATA function is described in Part III: Ch 4.2.

5.4. Use of PERF CRZ page

ACT MODE [1L]

Indicates the active speed mode: MANAGED or SELECTED.
MANAGED speed cannot be changed.
Associated values are displayed in fields [3L] & [4L].

- *If ALT is above FL250, Mach only is displayed,*
- *If a Step Climb or Step Descent is active, CAS/Mach are displayed,*
- *Within a HOLD or deceleration segment to HOLD, CAS only is displayed.*

Predictions at DEST [1R]

UTC: Estimated time at destination.
EFOB: Estimated Fuel On Board at destination based on ACTIVE F-PLN.

CI [2L]

As for CLB page.

Step, Top of Descent [2R]

This field displays data relative to:
Next step, Step Point (AT) and the Step Altitude (STEP TO),
If no step exists, Top of Descent (T/D) computed by the FMGC based on ACTIVE F-PLN route and profile.

If no T/D exists this field is blank.

Predictions to T/D or STEP [3R]

This field displays Estimated Time (UTC) and Distance (DIST) to STEP point or T/D as shown in [2R] ([3R] if speed MANAGED, [4R] if SELECTED).

DESC CABIN RATE [5R]

See Descent Preparation paragraph in this chapter.

ACTIVATE APPR PHASE prompt [6L]

As for CLB page.
Enables to switch FMGS directly to APPROACH phase: e.g. for diversion.
If activated by error, re-enter CRZ ALT in PROG page.

NEXT PHASE prompt [6R]

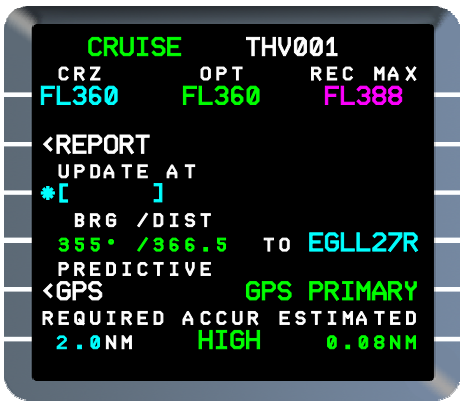
As for CLB page.
This function enables to prepare a PRESEL descent speed.

5.5. Use of PROG CRUISE page

CRZ OPT RECMAX (Line 1)

CRZ [1L]

This field is updated when a new altitude is selected on the FCU.
It cannot be cleared, but may be modified by a new entry.
Entering a higher ALT switches FMGS to CLIMB phase.
To enter a lower ALT distance to DEST must be less than 200 NM; in this case FMGS phase switches to DESCENT phase.



OPT [center]

Shows optimum flight level, based on the actual gross weight, cost index, temperature and winds.

Is displayed if a minimum of 15 minutes cruise-time exists.

REC MAX [1R]

As for CLIMB page.

<REPORT prompt [2L]

This function may be used for position message to ATC or Data Link (if available).

Refer to Part III: PROG page & Data Link

UPDATE AT [3L]

Enables FMGC update position at a navaid.

See Part III: Ch 7.3 – Position Monitoring.

BRG DIST (Line 4)

This function may be used to enter an en-route alternate airport or crosscheck FMGCs accuracy with usable navaids.

Line 5:

A/C with GPS:

PREDICTIVE GPS prompt [5L] and, GPS confidence level [5R].

See Part III: Ch 7.3 – Position Monitoring.

A/C without GPS:

Display Required Distance to Land and Direct Distance to Destination when in HDG/TRK mode and within 180 NM to DEST and in Cruise, Descent or Approach phase.

Required Distance to Land is also displayed on ND by the energy circle.

See Part II – Descent

Line 6: ACCURACY

This field enables to monitor navigation accuracy.

See Part III: Ch 7.3 – Position Monitoring.

5.6. PREPARATION FOR DESCENT AND APPROACH

■ Descent / Alternate WINDS

Insertion or updating of Descent/Alternate winds is recommended.
If no wind is inserted for descent, FMGC will assume linear variation from the existing cruise wind to the entered wind on approach page.
In this case, the computed profile is not optimum if assumed wind component is significantly different. For example:

- If tailwind component is greater than assumed, steep descent requiring extra drag can be anticipated,
- If headwind component, additional thrust needed and fuel penalty will occur.

Alternate wind affects fuel predictions and reserve calculation.

The WIND DATA function is described in Part III: Ch 4.2.

■ MCDU preparation

The MCDU preparation for descent and approach is described here in the following sequence:

- F-PLN page A
- FUEL PRED page
- RAD NAV page
- PROG page
- PERF page
- SEC F-PLN

■ F-PLN page

F-PLN key.....Press

☐ Arrival

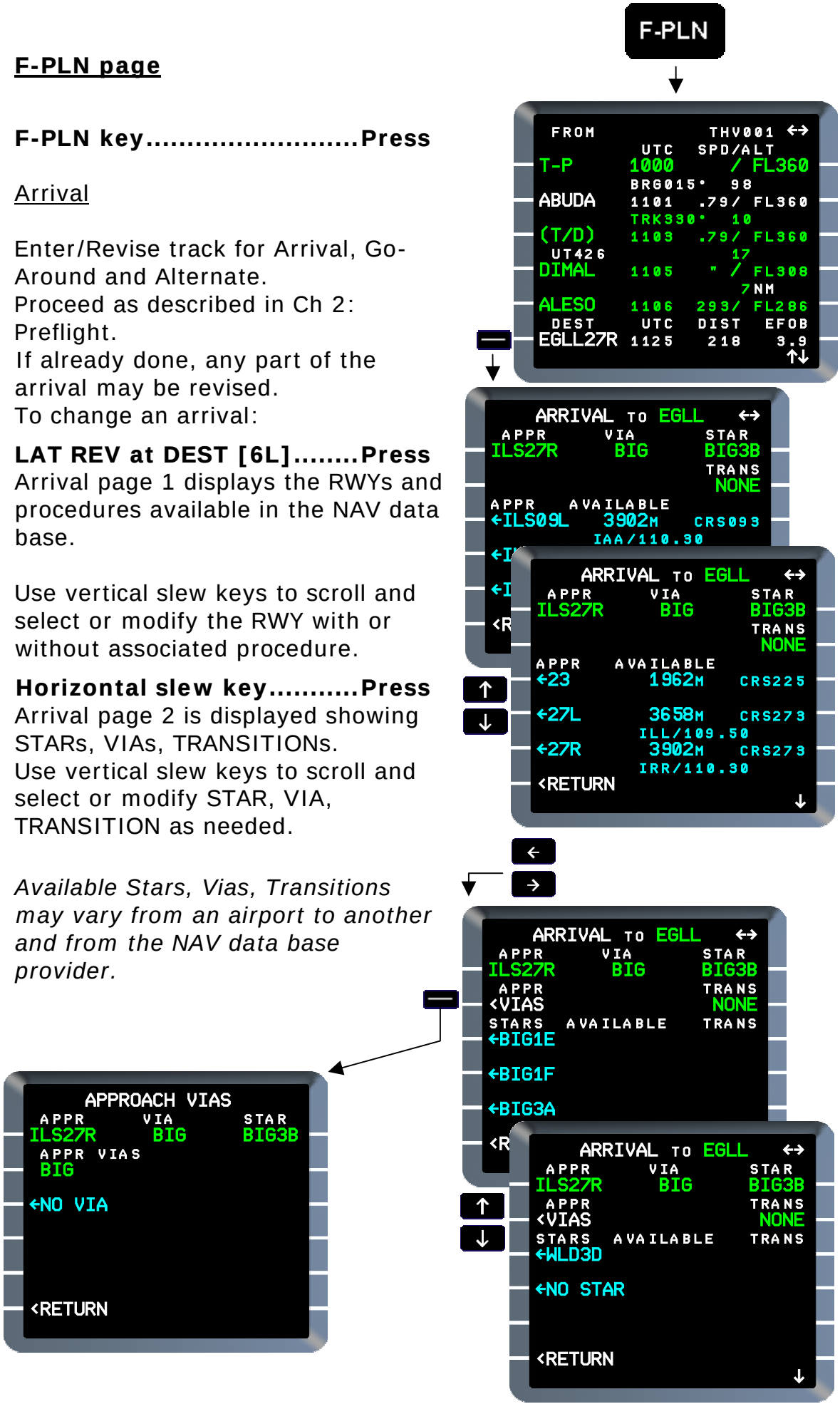
Enter/Revise track for Arrival, Go-Around and Alternate.
Proceed as described in Ch 2: Preflight.
If already done, any part of the arrival may be revised.
To change an arrival:

LAT REV at DEST [6L].....Press
Arrival page 1 displays the RWYs and procedures available in the NAV data base.

Use vertical slew keys to scroll and select or modify the RWY with or without associated procedure.

Horizontal slew key.....Press
Arrival page 2 is displayed showing STARs, VIAs, TRANSITIONs.
Use vertical slew keys to scroll and select or modify STAR, VIA, TRANSITION as needed.

Available Stars, Vias, Transitions may vary from an airport to another and from the NAV data base provider.



☐ Enter/Revise alternate route
If needed.

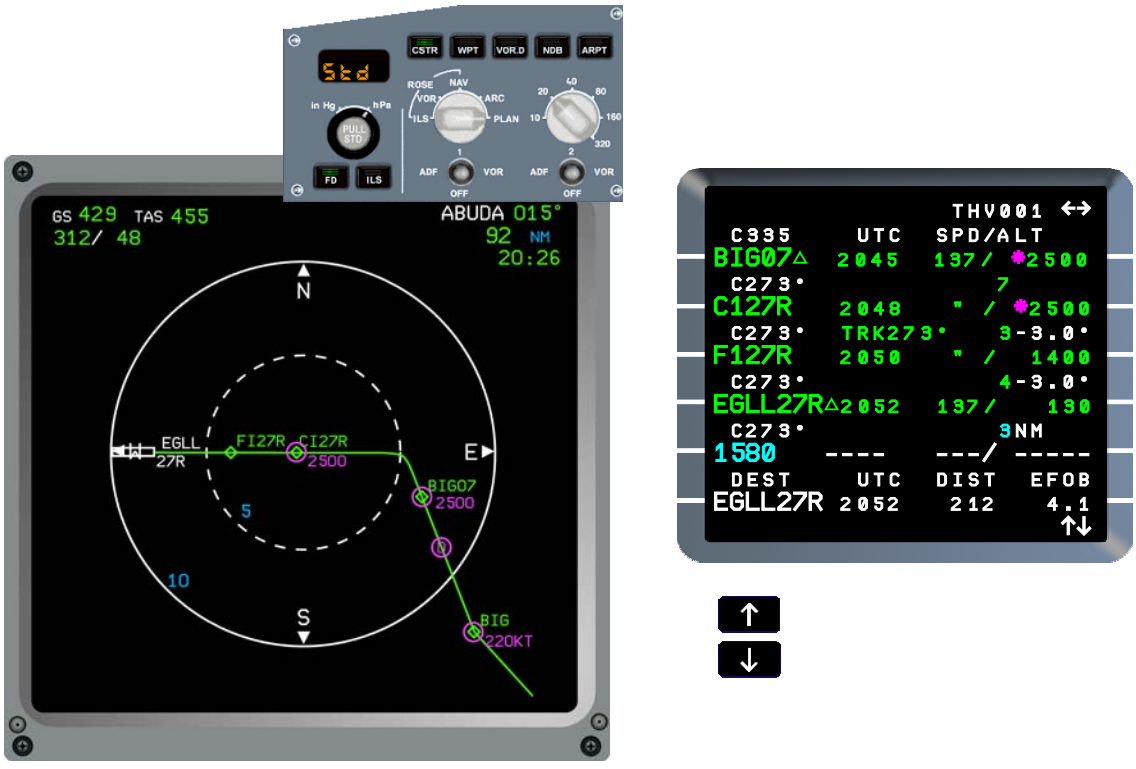
☐ Check F-PLN
Arrival should be checked for adherence to approach charts.
Compare arrival routing and profile as shown on F-PLN page and ND (PLAN mode), scrolling as necessary.
Clear any discontinuities (except in case of MANUAL LEG)
Check or enter needed constraints.

Refer also to:

- *Part II: Preflight – 2.1 Check F-PLN,*
- *Part III: Ch 3 & 4 – LAT & VERT functions.*

Caution

After insertion from NAV data base arrival and approach procedure should not be modified.
Refer to SOPs for acceptable modification.
Consider raw data if divergence from official procedures.



■ FUEL PRED page

FUEL PRED key.....Press

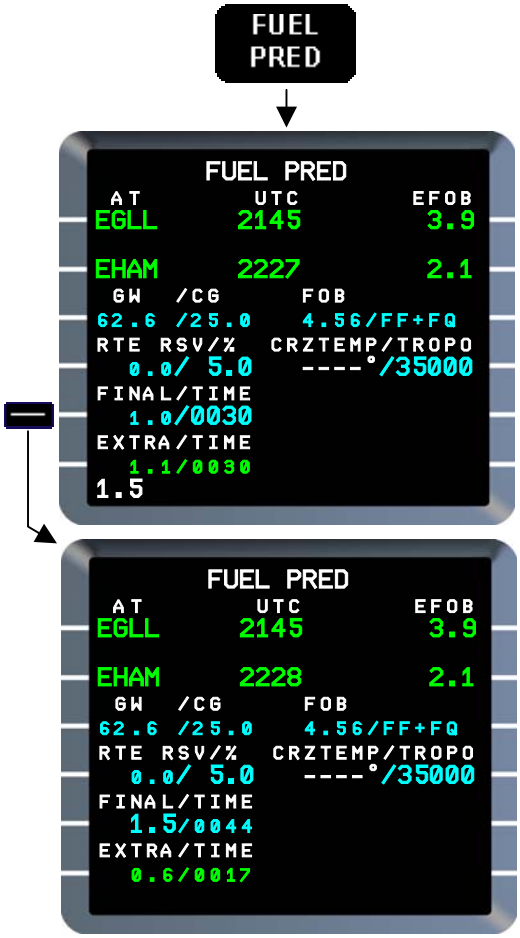
Check:

– EFOB at DEST [1R] and ALTN [2R],
– EXTRA/TIME [6L].

RTE RSV [4L] and FINAL TIME [5L] are modifiable. If modified EXTRA/TIME and HOLD time available are consequently changed.

Ex: Requested Final fuel 1.5 T

Refer also to Part III: Ch3.4 – Hold & Ch 6 - Fuel monitoring.



■ RAD NAV page

RAD NAV key.....Press

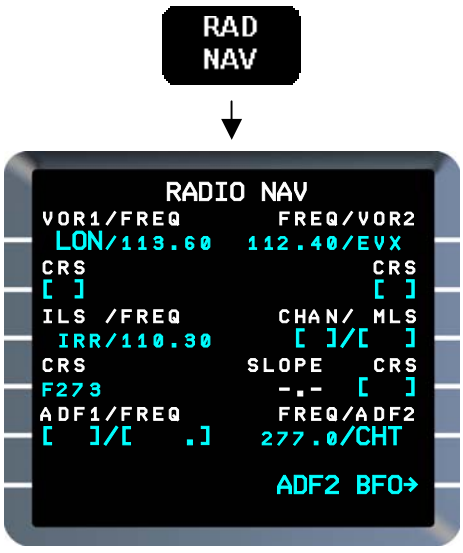
If an ILS or MLS approach is selected, check auto-tuned parameters, fields [3L/4L] – [3R/4R] respectively, or, manually tune appropriate navaids.

Ex: LON on VOR1 & CHT on ADF2

For NPA required navaids should be manually tuned.

If a NPA has been selected and an ILS/MLS is manually tuned, at less than 100NM track distance from T/D, or, in DES or APPR phase,

"CHECK APPR SELECTION" s-pad msg is triggered on MCDUs and PFD.

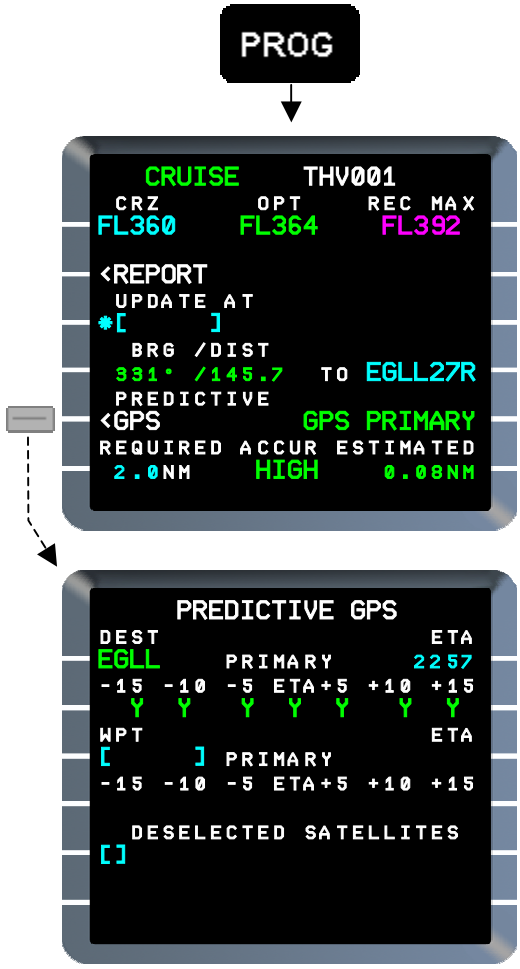


■ PROG page

PROG key .....Press
BRG/DIST: complete as desired.
Ex: EGLL27R
Check accuracy [Line 6]

For A/C with GPS:
– Check GPS PRIMARY or deselect GPS when requested,
– If GPS approach is selected.

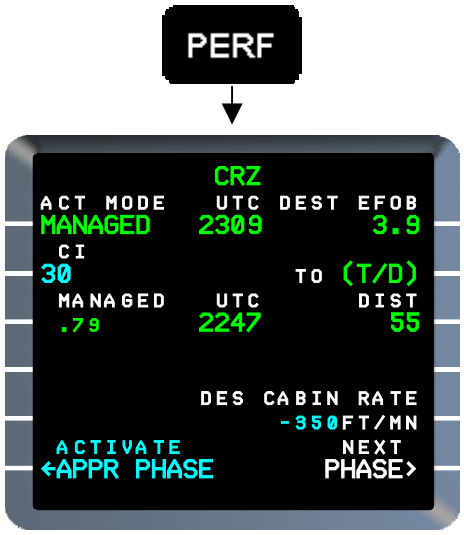
PREDICTIVE GPS [5L] .... Press/Check
See Part III: Ch 7.3 – Position Monitoring.



■ PERF PAGE

"ENTER DEST DATA" s-pad message (amber) is displayed when distance to destination is less than 180NM, and either QNH, Temp or Wind has not been inserted on PERF APPR page (CRZ or DES phase only).

PERF key .....Press
PERF CRZ page is displayed



DES CABIN RATE [5R]
This field is modifiable and defaulted to – 350 ft/mn.

(-) may be omitted.

If modified, to return to default value use CLR key.

☐ Re-pressurization segment

T/D is computed for optimized descent at idle thrust.

FMGC calculates the descent cabin rate with:

- Difference between Cabin Alt (Zc) and DEST airport Alt (Zt, corrected by QNH),
- Time from T/D to DEST.

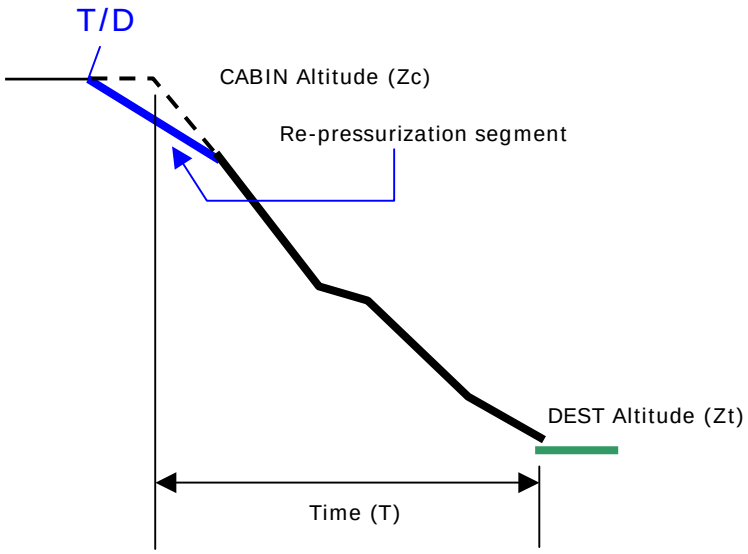
If the result is below –350 ft/mn, no change is made.

If a greater rate is calculated, T/D is adjusted backwards and a re-pressurization segment is added in order to maintain the selected cabin rate.

Pilot is advised by "CABIN RATE EXCEEDED" s-pad msg (white), which is displayed when:

- In CRZ flight phase, and,
- Within 200NM of the destination (along the F-PLN), and,
- Cabin rate of computed descent profile exceeds the maximum cabin rate.

Slope of the re-pressurization segment is 4 x cabin rate.



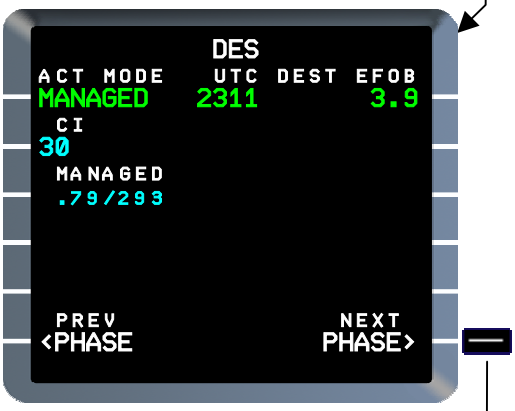
☐ Enter destination data

NEXT PHASE [6R] .....Press
PERF DES page is displayed

MANAGED speed [3L] ....Check / Modify
Mach/SPD [3L] may be modified by entering desired Mach and/or Speed.

NEXT PHASE [6R] .....Press
PERF APPR page is displayed

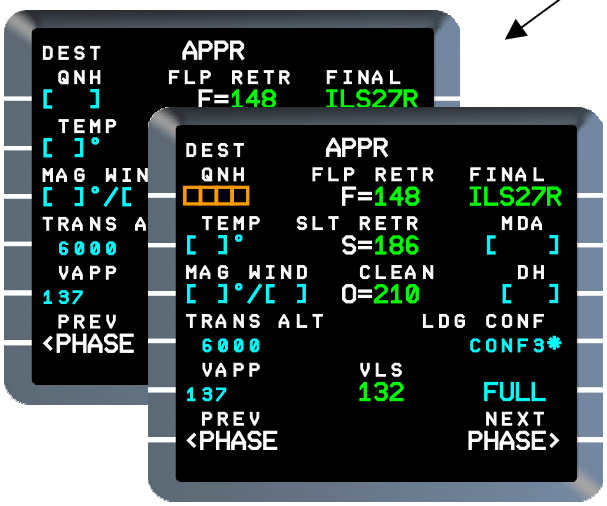
QNH [1L]:
If A/C is more than 180 NM from DEST, blue brackets are displayed and then replaced by amber boxes. Entry of QNH is mandatory for FMGC profile computation and vertical managed mode availability in DES and APPR phases.

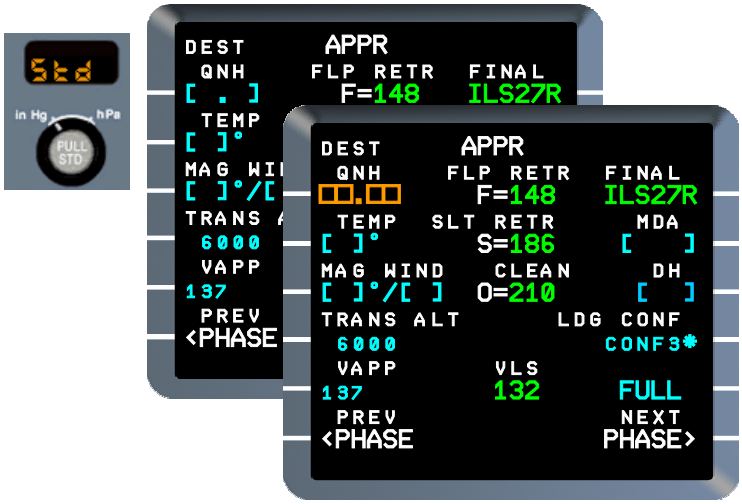


QNH units may be either Hpa or In Hg according to Baro selection on EFIS control panel.

Ex: 1015 Hpa

Once entered value cannot be cleared but may be modified.





TEMP [2L]:
The temperature should be entered in degrees Celsius.

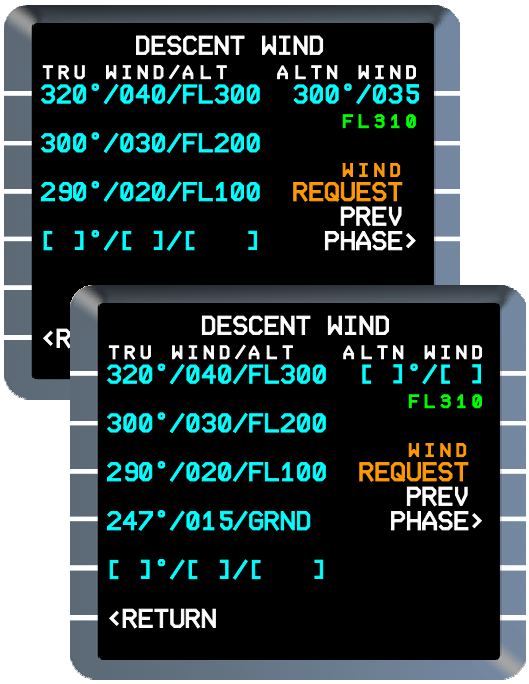
Ex: 15

If no destination airport is defined, the data line is blanked.

MAG WIND [3L]:
Wind direction is magnetic; speed unit is knot (KT).

Ex: 250/15

When entered, wind at GND level is automatically inserted or updated on DESCENT WIND page (converted to true).



TRANS ALT [4L]:
Transition altitude: NAV data base defaulted value.
If not contained in NAV data base, blue brackets are displayed.

If no destination airport is defined, the field is blank.

VAPP [5L]:
This field is modifiable even if the field is dashed.
Defaulted value is computed by the FMGC, based on:

- VLS + 5 KT + wind corr. (KT),
- Wind correction equals 1/3 entered head wind component (KT),
- Minimum Vapp is VLS + 5 and maximum VLS + 15.

FLP RETR (F), SLT RETR (S), CLEAN (O) and VLS [Center]:
These speeds are computed by the FMGC and not modifiable.

Fields are dashed if not computed.

FINAL [1R]:
This field is a reminder of the approach selected.

It is dashed if no approach has been selected.

MDA (or MDH) [2R]:
Depending on option selected in OPC file.

DH [3R]:
Displayed if an ILS/MLS or BACK BEAM approach has been inserted in the ACTIVE F-PLN.
Selecting DH will refer auto call out "MINIMUM" to radio altimeter.
Refer to Operator's policy for DH selection.

If an MDA/MDH is entered any DH previously entered is automatically cleared.

LDG CONF [4R]/[5R]:
Landing configuration is defaulted to FULL.
Pressing [4R] prompt will switch the reference configuration to CONF 3 with associated Vapp & VLS.
Pressing FULL prompt will return to the previous configuration.

NEXT PHASE [6R] .....Press
PERF GO AROUND page is displayed.

THR RED / ACC [5L] .....
.....Check / Modify

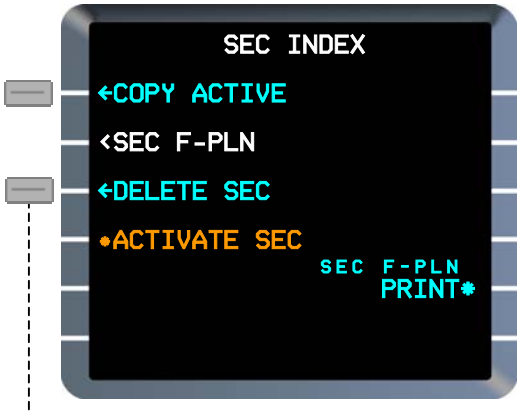
ENG OUT ACC [5R] .....
.....Check / Modify
Logic is identical to take-off
.

SECONDARY F-PLN

Use SEC F-PLN as appropriate for situation or as per Operator's policy.

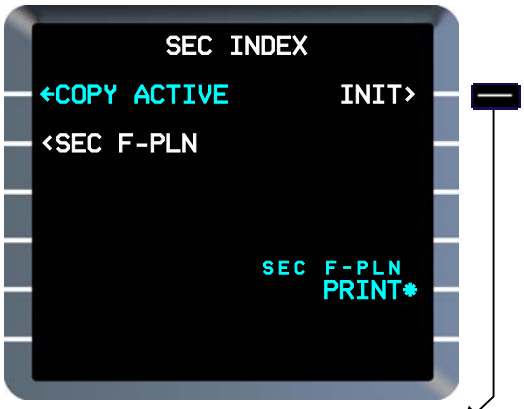
Examples of use:

1. Make a COPY ACTIVE:
   - To keep a back up of ACTIVE F-PLN, or,
   - To prepare a second arrival and/or RWY, or,
   - To prepare a circling approach.



2. DELETE SEC in order to make an INIT:
   - To prepare a second alternate route, or,
   - If option is activated make a Data Link INIT REQUEST.

See below & Part III: Ch 5 – SEC F-PLN



☐ Prepare a second Arrival or/and RWY

COPY ACTIVE [1L] .....Press
ACTIVE F-PLN and PERF are copied in SEC F-PLN.
SEC F-PLN page is displayed.

LAT REV at DEST [6L].....Press

ARRIVAL [1R] .....Press
- Select new RWY,
- Select new STAR. NO STAR may be appropriate,
- Select new VIA. NO VIA may be appropriate.

Monitor revisions on ND in PLAN mode.

Note:

If a different STAR or VIA is selected, F-PLN sequencing is required at SEC F-PLN activation.

Refer to Part II: Descent

Complete SEC PERF page:

SEC F-PLN key.....Press

PERF [2R] .....Press

NEXT PHASE [6R].....Press
To access to SEC APPR page.
Confirm or modify landing data.

MDA/DH.....Enter

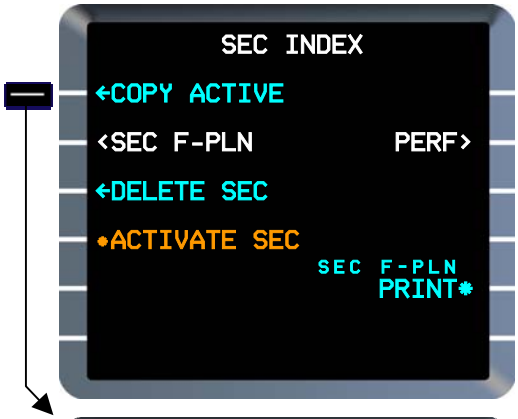
☐ Prepare a circling approach

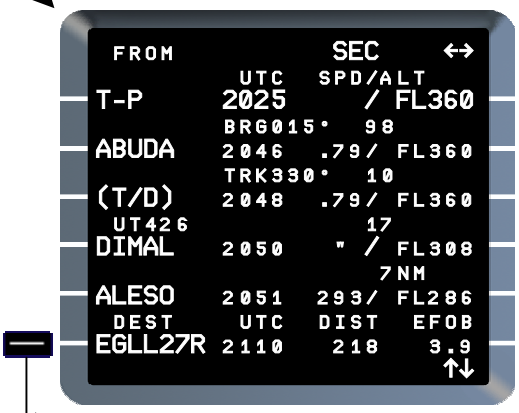
COPY ACTIVE [1L] .....Press
ACTIVE F-PLN and PERF are copied in SEC F-PLN.
SEC F-PLN page is displayed.

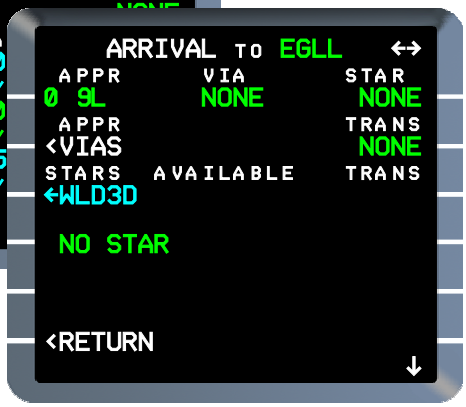
LAT REV at DEST [6L].....Press

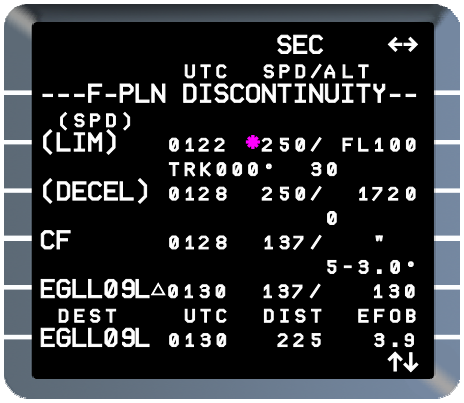
ARRIVAL [1R] .....Press
- Select new RWY
- Select NO STAR & NO VIA.

Monitor revisions on ND in PLAN mode.
Do not clear the preceding F-PLN DISCONTINUITY.









When selecting a RWY without a procedure a default WPT is netered at 5 NM to threshold with a –3° final path.

Complete SEC PERF page:
Proceed as described in paragraph above.

■ TOO STEEP PATH AHEAD s-pad message

See Part II: Ch 6 – Descent

Part II: Chapter 6 - DESCENT

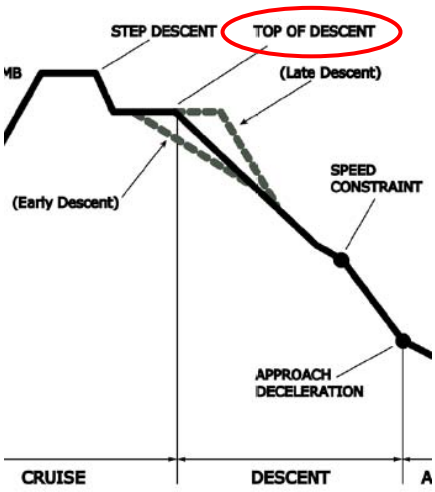
Contents

PAGE INTENTIONALLY LEFT BLANK

6.1. SWITCHING CONDITIONS

The FMGS switches automatically from CRUISE to DESCENT phase when:

- Reaching TOP of DESCENT (T/D) as computed in ACTIVE F-PLN, or,
- A lower ALT is selected on FCU at less than 200 NM to DEST (Early Descent), or,
- ALT selected on FCU is at or below the higher of FL 200 or highest DES ALT CSTR.



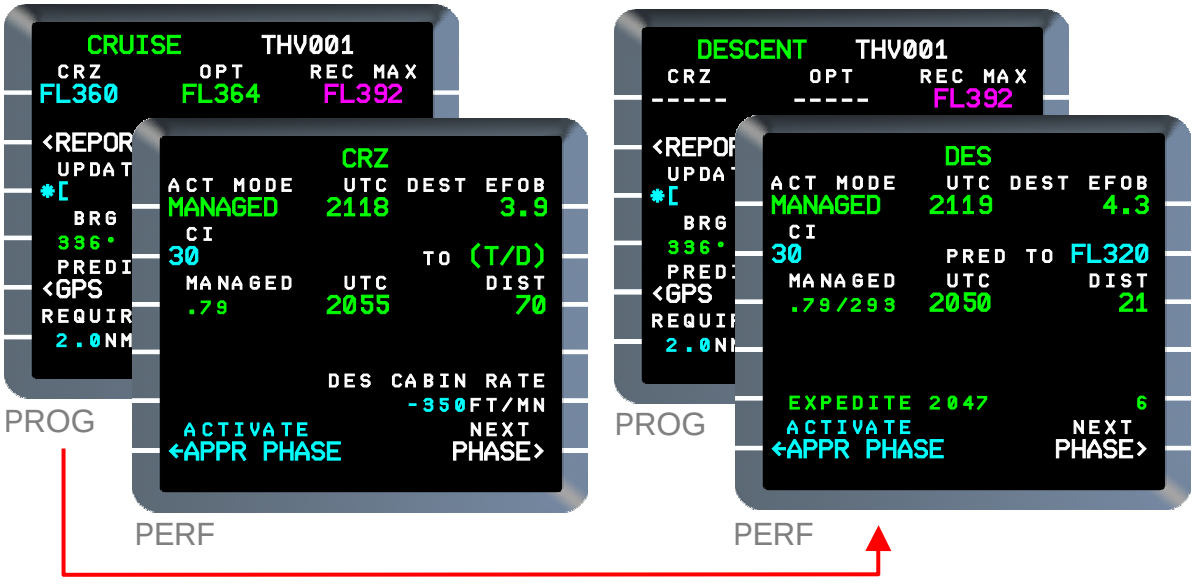
FMA

- MACH is displayed in case of early descent, or when FMGS does not immediately command idle thrust; otherwise THR IDLE is displayed,
- DES if managed mode is engaged, OP DES or V/S if selected mode is engaged.

See below

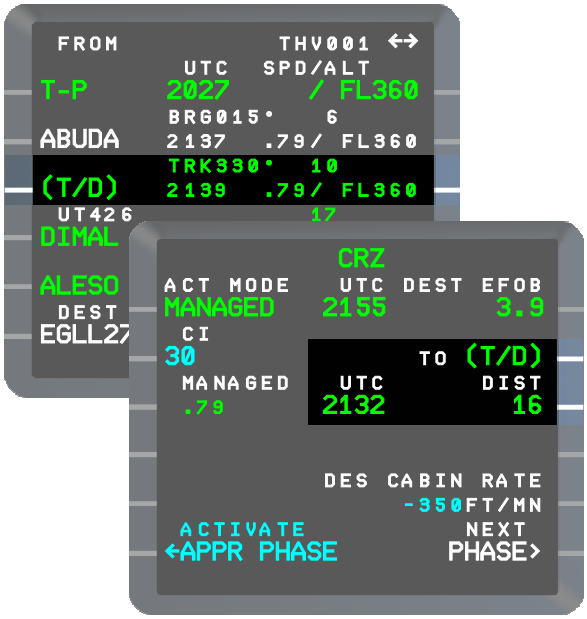
MCDU:

PERF page title becomes DES green,
PROG page title becomes DESCENT green.



6.2. NORMAL DESCENT

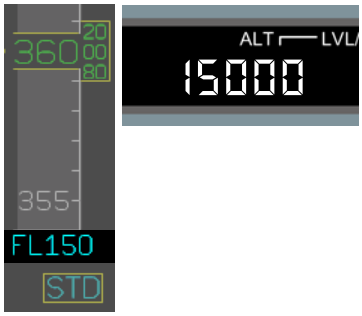
To be optimized, descent should be started at the top of descent (T/D) computed by the FMGC.
It is shown on ND by the white arrow (↘).
On MCDU F-PLN page T/D is shown as a pseudo waypoint; PROG page provides Time at (UTC) and Distance to (DIST) [3R].



ATC clearance received:.

FCU ALT.....Select

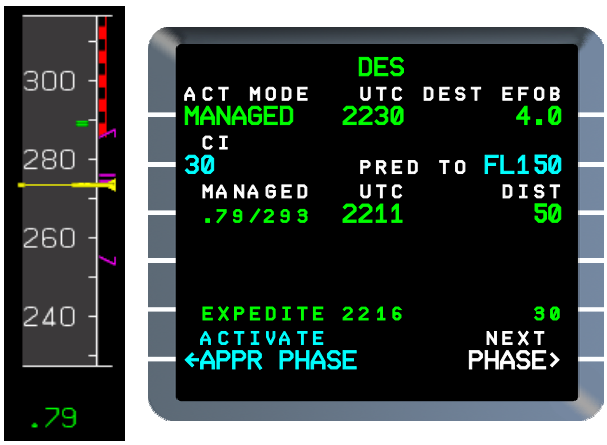
Ex: FL150



AT T/D:

FCU ALT.....Push

- FMA indicates MACH momentarily, then THR IDLE,
- Descent is initiated,
- Thrust decreases to IDLE if no re-pressurization segment is computed,
- FMGS switch to descent phase,
- Speed target is indicated on PERF DES page.



■ Selection of MCDU pages

For DESCENT should normally be:

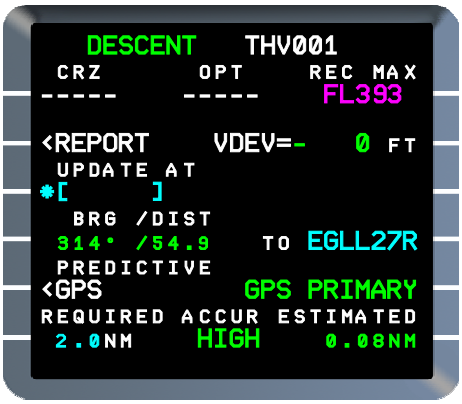
PF side:

PROG page enables following parameters to be monitored:
- VDEV,
- Direct ditance to RWY threshold,
- NAV ACCUR.

PERF page to monitor descent parameters and distance to level off.

PNF side:

F-PLN page to monitor: time, speed, altitude predictions and constraints as matched or missed.



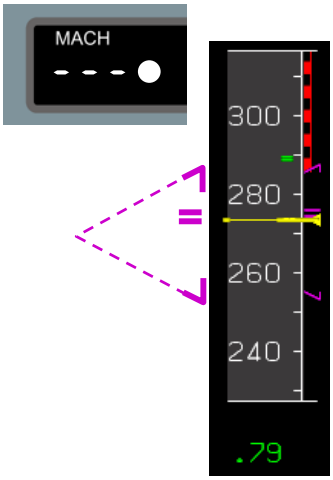
■ Speed Control

In DESCENT speed control may be either MANAGED or SELECTED.

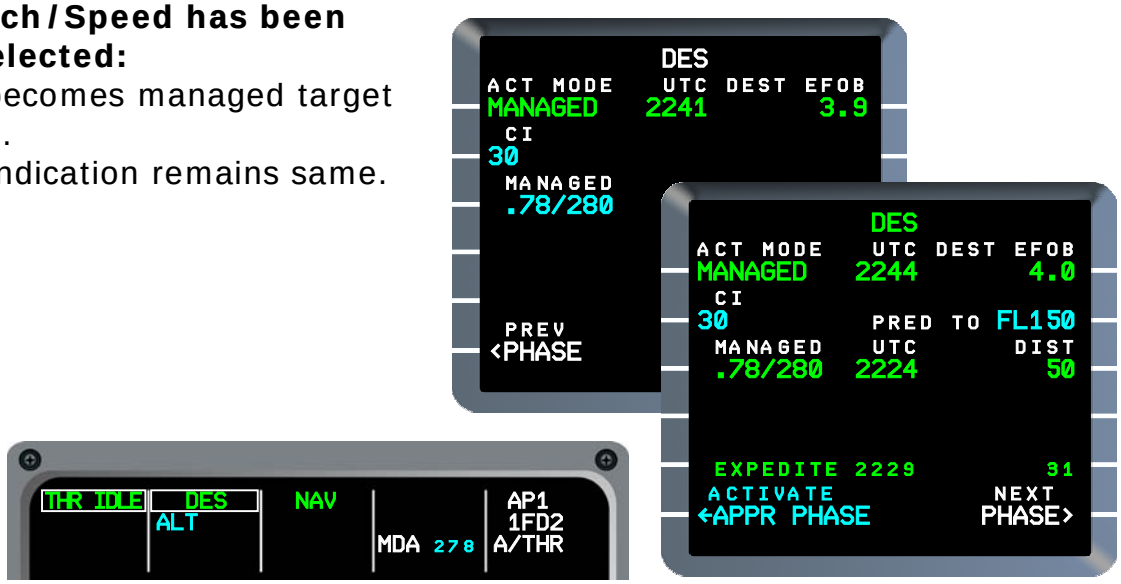
☐ Managed speed

Speed is optimized; constraints and entered speed data in ACTIVE F-PLN are taken into account by the FMGS. It is the recommended descent speed mode.

Target speed is shown by a double magenta line, but to avoid excessive thrust variations, an acceptable speed range is determined by the FMGC and shown as an enlarged speed symbol (magenta).



- **If Mach / Speed has been preselected:**
  This becomes managed target speed.
  FMA indication remains same.



Once FMGC has switched to Descent phase, managed speed cannot be modified.

☐ If a specific speed is required

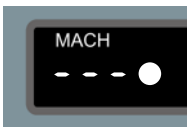
FCU SPD .....Select / Pull

- Speed target becomes blue,
- PERF Page shows SELECTED [1L] with associated value [4L],
- FMA displays THR IDLE or MACH/SPEED if FMGS needs to adjust thrust to maintain profile.

☐ To resume managed speed

FCU SPD ..... Push

- FCU speed window is dashed + Dot,
- Managed Speed return to value shown on PERF page, target speed symbol becomes magenta.



■ Lateral guidance

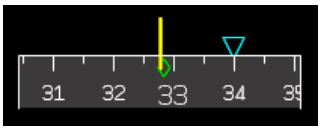
NAV mode provides guidance to maintain ACTIVE F-PLN track.

Lateral functions are described in Part III: Ch 3.

☐ If a specific heading or track is required

FCU HDG-TRK knob .... Select / Pull

FMA:
- HDG is displayed,
- HDG cursor (blue) is displayed on HDG scale,
- Vertical mode **reverts** to V/S, F-PLN **constraints are ignored**.



FCU V / S ..... Adjust
Or
FCU ALT..... Pull
To select OP DES mode.

☐ To resume NAV mode
Proceed as described in climb phase.

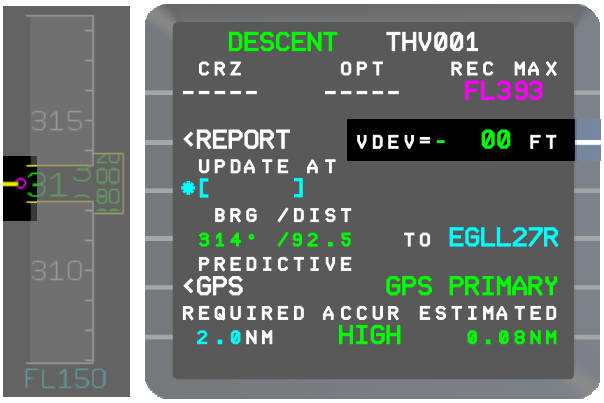
■ Vertical guidance

☐ Managed DESCENT mode (DES)

Managed DES mode is only available with **NAV mode engaged**.
In **DES** mode the FMGC computes an optimized vertical profile backwards from the destination runway threshold, missed approach point, or final end-point, to the top of descent taking into account any speed and/or altitude constraints entered in ACTIVE F-PLN and CABIN RATE selected on CRZ PERF page.
Vertical profile is computed so as to maintain the ECON speed (or pilot-entered speed) with idle thrust (fuel optimized descent).
Re-pressurization segment (when needed), deceleration, geometric segments (not necessarily at idle thrust) are included in the descent profile.
The vertical profile is recomputed if revisions are entered in ACTIVE F-PLN.

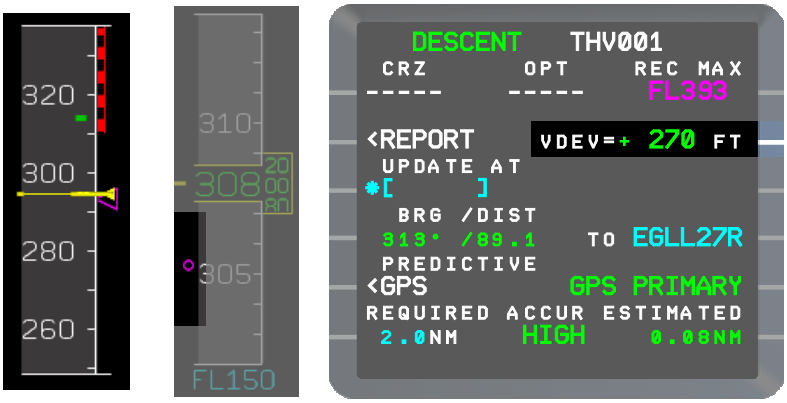
Actual position relative to the computed vertical profile may be monitored:

- On PFD by vertical deviation symbol (magenta circle).
  The range is ± 500 feet; when the VDEV value exceeds ± 500 feet, the symbol stays at the range limit.
- On PROG page by VDEV [2R].

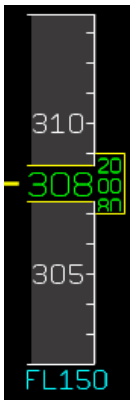


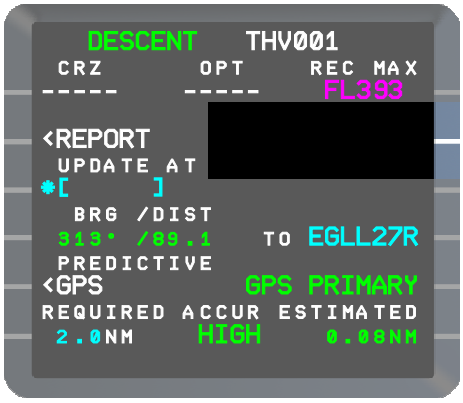
☐ Selected vertical modes (OP DES – V/S)

The vertical profile is not maintained by the FMGS.
In **OP DES** mode, descent is IDLE thrust maintaining target speed.
In **V/S** mode, thrust is adjusted to maintain target speed; if idle thrust is not enough to assure V/S requested, target speed is not maintained.
Actual position relative to the computed vertical profile may be monitored as above.



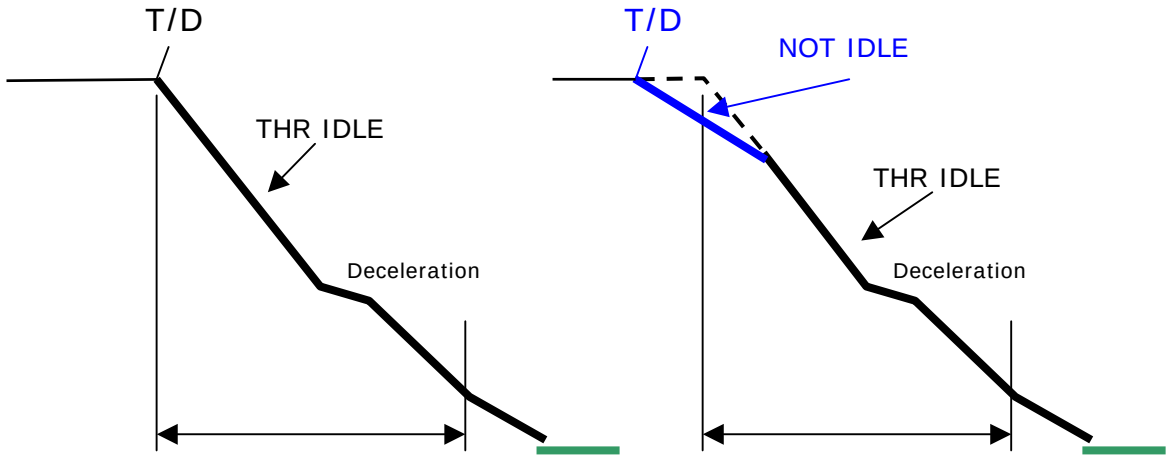
☐ <u>If HDG-TRK is selected</u>
Vertical managed mode and deviation from vertical profile are no longer available.





☐ <u>Level-off</u>
If NAV mode is engaged, position of level-off is indicated by blue arrow (↳) on ND and by predictions on PERF page [2R/3R].
These data are available in both managed and selected.

■ Typical vertical profile

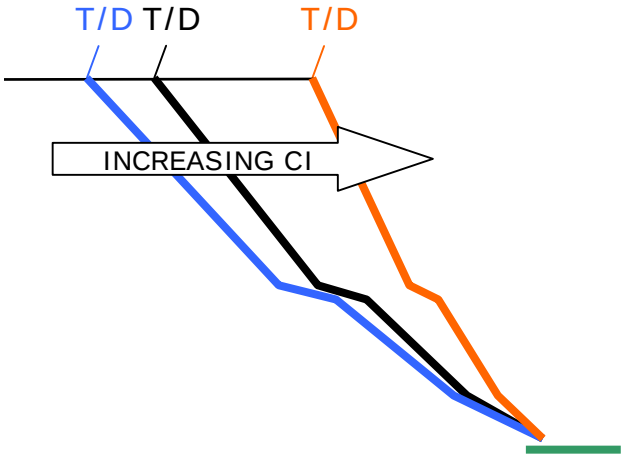


With re-pressurization segment

Descent is normally performed at idle thrust.
However in case of early descent or ,repressurization segment or, difference between CRZ and DES speed, FMGC may adjust thrust during initial descent to maintain or join the computed profile.

See PART II: Cruise - DES CABIN RATE

Cost Index value has a direct influence on T/D position as shown below:



6.3. VARIATIONS

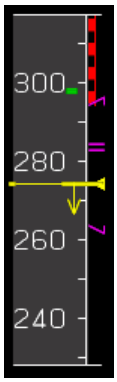
■ Early Descent (Descent before T/D)

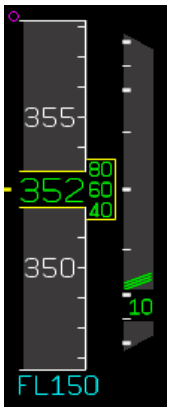
If descent is started within 200 NM from DEST, FMGS transitions to DESCENT phase.
If NAV mode is engaged, managed DES mode may be used.

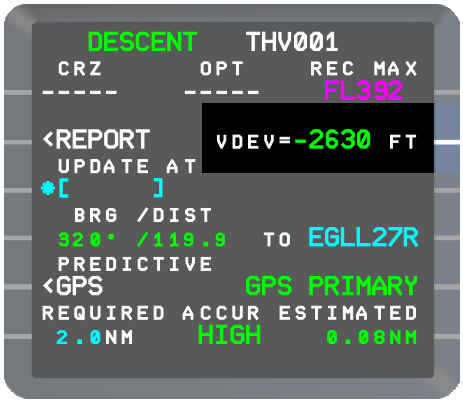
Ex: start descent at 35 NM to T/D

FCU ALT..... Select/Push

- FMA switches to MACH / DES,
- Target speed drops slowly to lower part of the managed speed range,
- FMGS adjusts thrust to maintain 1000 ft/mn rate of descent,
- Vertical deviation symbol moves up,
- ND: The "broken" blue arrow( ) shows the intercept point where the FMGS profile will be rejoined,
- PROG page indicates VDEV [2R] from computed profile.



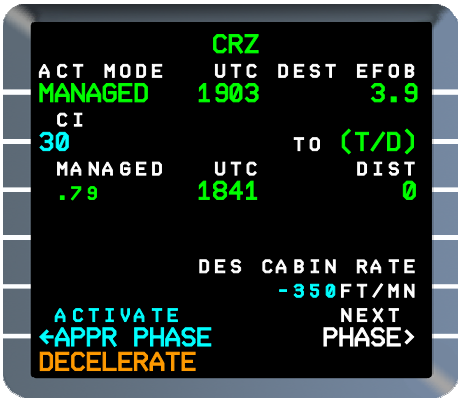




Late Descent

If descent cannot be assured at T/D:
DECELERATE is displayed on FMA (white) and scratchpad (amber).

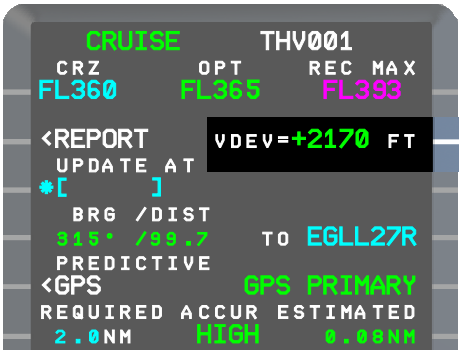
This message is cleared by the CLR key only if speed is SELECTED, or when FMGS transitions to DESCENT phase.
Deviation from computed profile is indicated on PROG page VDEV [2R].
When descent clearance is obtained:

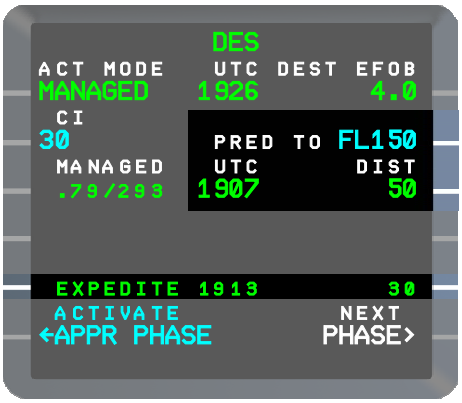


FCU ALT.....Select / Pull

- FMA displays THR IDLE/OP DES,
- Managed speed range is no longer applicable, target speed is fixed,
- ND: "broken" white arrow shows the intercept point where the FMGS profile will be rejoined,
  If necessary use speed-brakes to increase rate of descent, or select higher speed, or use **EXP** function (if installed),
  VDEV can be monitored on PROG page [2R].

See below.





☐ Expedite descent function

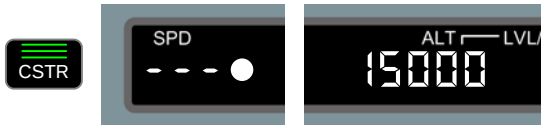
EXPED P/B ..... Press
Flight Guidance (FG) pitches the aircraft to acquire and maintain 0.80/340.

☐ To resume normal descent

FCU ALT.....Push
Or select another appropriate vertical mode.

6.4. CONSTRAINTS MANAGEMENT

Compliance with constraints can be monitored on PFD, ND and F-PLN page.
SPD and ALT constraints are shown on F-PLN page preceded by a star which is magenta if matched, amber if missed.
Constraints may be visualized on ND if CSTR p/b selected on EFIS control panel.



Principle is same as described in PART II: Climb – Ch 4.3 Constraints management.

In the example shown below:

- *ALT CST FL150 at TIGER,*
- *Speed 250 KT at D139L,*
- *Speed 220 KT at BIG,*

have been entered in ACTIVE F-PLN.

Caution

Use DES mode for constraints management as per SOPs.

- **If the ALT constraint is predicted as matched**

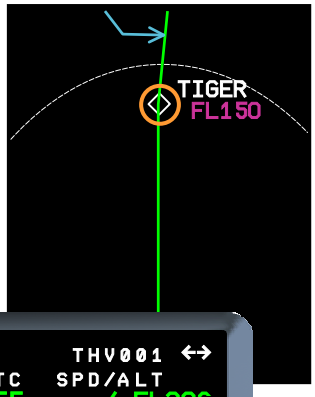
On ND:
A **magenta** circle is displayed around the WPT.
– Level-off symbol ↘ (magenta) shows position where A/C reaches either the FCU-selected altitude (blue), or the constrained altitude (magenta), if it is more restrictive than the FCU altitude.
It does not appear when the aircraft is within 100 feet above, or below, the selected altitude.
– Top of descent symbol ↘ shows position where descent is resumed (white if DES not armed, blue if DES armed).

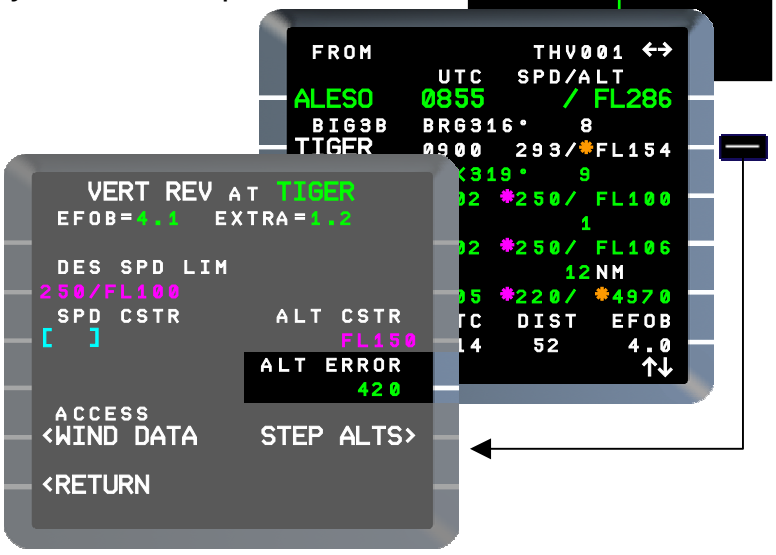
On MCDU:
A magenta star is displayed with the predicted altitude.

- **If the ALT constraint is predicted as missed:**

On ND:
– An **amber** circle is displayed around the WPT,
– Level-off symbol (blue) ↘ shows position where A/C reaches FCU-selected altitude.

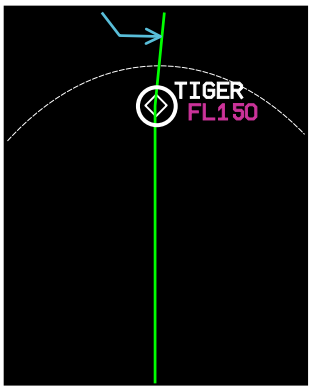
On MCDU:
– An amber star is displayed with the predicted altitude,
– ALT ERROR is shown on VERT REV page at the WPT [4R].





- **If OP DES mode is selected constraints are ignored:**

On ND:
A white circle is displayed around the WPT.



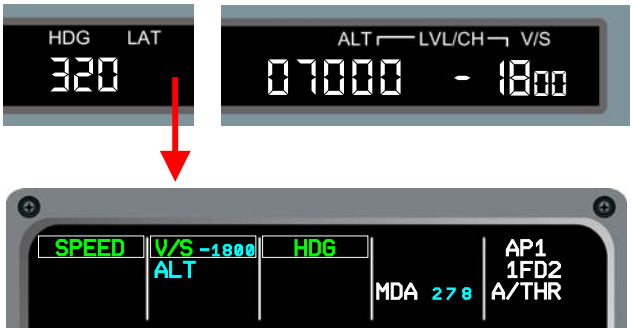
On MCDU F-PLN page:
Star is amber or magenta depending on predicted passing altitude.

FMA:

If the FCU selected altitude is lower than the constraint altitude **ALT armed and target altitude are displayed in magenta.**

Caution

If HDG mode is selected, DES mode disengages,
- FMGS **reverts** to V/S,
- **Constraints are ignored**.



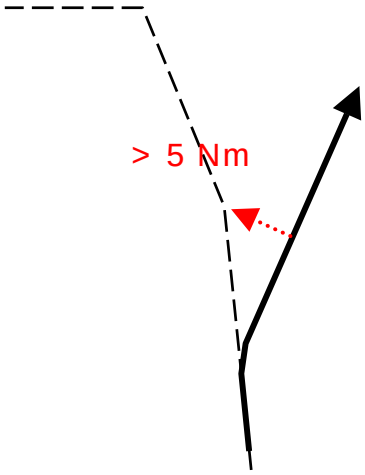
6.5. F-PLN SEQUENCING

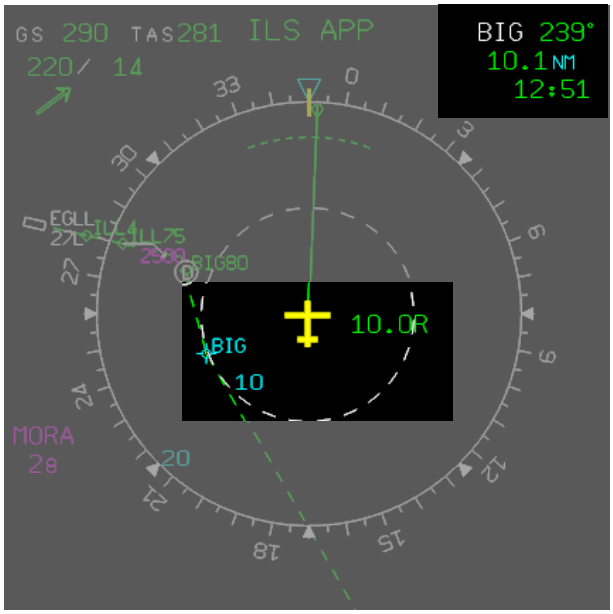
F-PLN leg switching is normally automatic.
However in certain conditions, pilot action is required to sequence the F-PLN.
This may occur, for example, when:
– A WPT is by-passed (radar vector, weather avoidance, etc.),
– A HOLD is not cancelled,
– The landing RWY or STAR or part of the STAR are changed.

If **HDG** (or TRK) mode is selected, as for **radar vectoring**, and the track deviates by more than 5 NM from the TO WPT, the F-PLN will not switch to the next leg when passing abeam this WPT. The F-PLN will no longer be in sequence with the actual position.

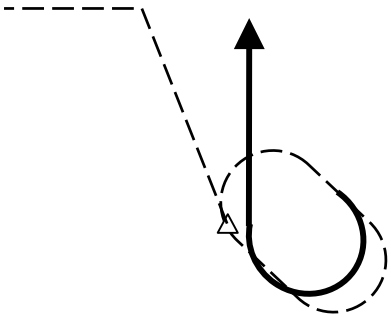
Ex: "20 miles before BIG, turn R hdg 350"

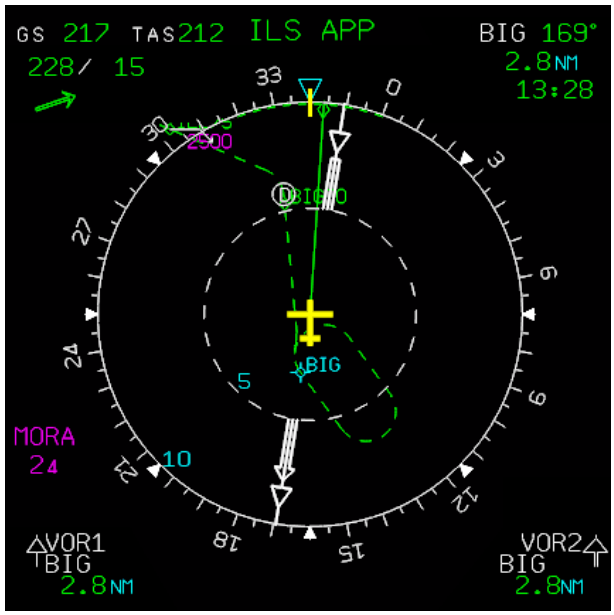
BIG is by-passed but is still shown as the TO WPT.





Similarly, if a holding pattern inserted in the F-PLN is not cleared or cancelled by selecting IMM EXIT, the holding fix will continue to be shown as the TO WPT after it is passed.
See Part III: Multiphase - Hold





To sequence the F-PLN, 3 methods can be used:
- By clearing each WPT individually,
- By collapsing a group of WPTs,
- By using the DIR TO or DIR TO RADIAL IN functions.

■ Clearing WPTs already passed individually

In the following example during descent to EGLL, A/C has been radar vectored. The TO WPT is still TIGER while A/C is abeam BIG.
Pilot action is required to sequence the F-PLN.

ND PLAN mode ..... Set
Select suitable range to visualize WPTs already passed or not wanted.

CLR key ..... Press
Use CLR key to delete all unwanted WPTs in order to obtain the next WPT as the TO WPT.

TMPY F-PLN INSERT [6R] .....
..... Press

The TO WPT is now correct and the F-PLN is again in sequence with actual position.

■ Collapsing a group of WPTs

In the following example A/C is on radar heading 320°, TIGER is by-passed but no leg switching, TIGER remains as TO WPT on ND and MCDU F-PLN page. The desired TO WPT is CI27R.

Desired TO WPT .....Enter

In this example CI27R is entered in place of TIGER.

If indicated TO WPT, in white, is not in view on F-PLN page, press F-PLN key so as to display it at [2L].

Note: HDG or TRK mode must be engaged to allow TO WPT to be inserted (in NAV mode s-pad msg "SELECT HDG/TRK FIRST" appears).

TMPY F-PLN with the entered TO WPT (*CI27R*), is displayed on the MCDU and the ND.

■ Use of DIR TO RADIAL IN function

In the following example A/C is radar vectored for final 27R.
DIR TO RADIAL IN function enables to join a specified radial **and** sequence unwanted WPTs in ACTIVE F-PLN.

DIR key .....Press
DIR TO page is displayed.

WPT ..... Select/Enter
Enter the desired WPT from which the RADIAL IN will be established. This can be done by pressing the adjacent LSK to the WPT.

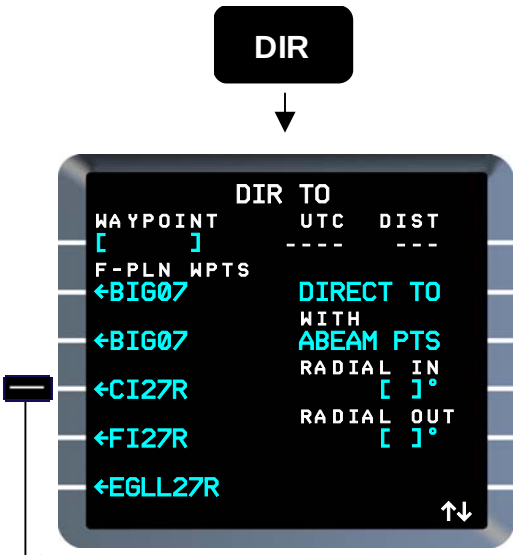
Ex: press [4L] to enter CI27R.
DIR TO title page is displayed yellow as TMPY DIR TO page.

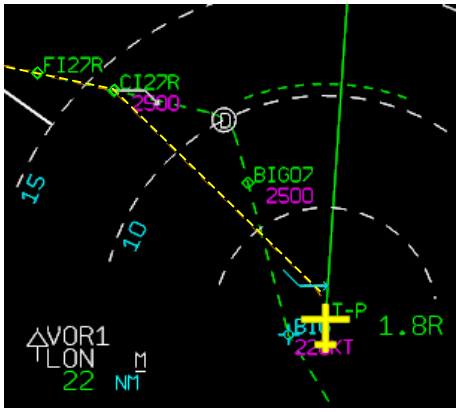
F-PLN page, if displayed on opposite MCDU, is TMPY F-PLN page (yellow).

On ND, TMPY track is displayed dashed yellow.

RADIAL IN **[4R]** is defaulted to the radial from the selected WPT to the previous WPT in ACTIVE F-PLN.

In the previous example radial from CI27R to BIG07 is 115°.





If the selected WPT is the FAF, it is thus defaulted to reciprocal of final approach course.

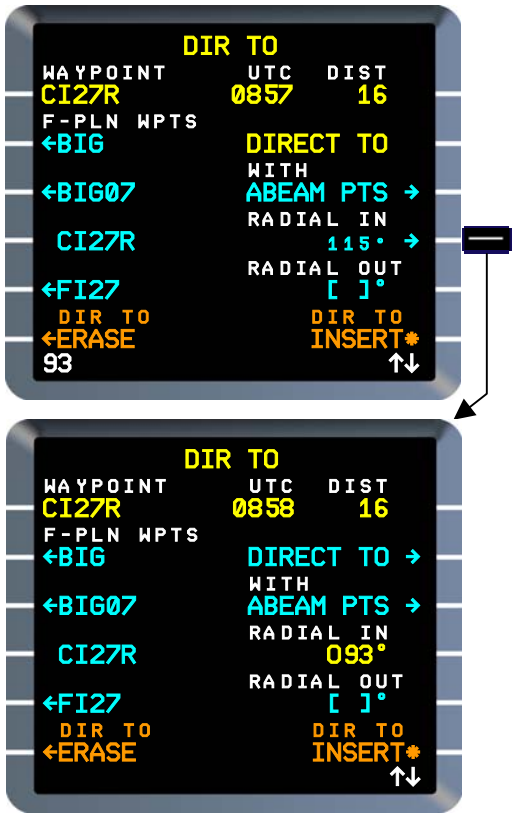
Ex: if FI27R is the DIR TO WPT selected, defaulted radial is from FI27R to CI27R (093°) which is the final approach course

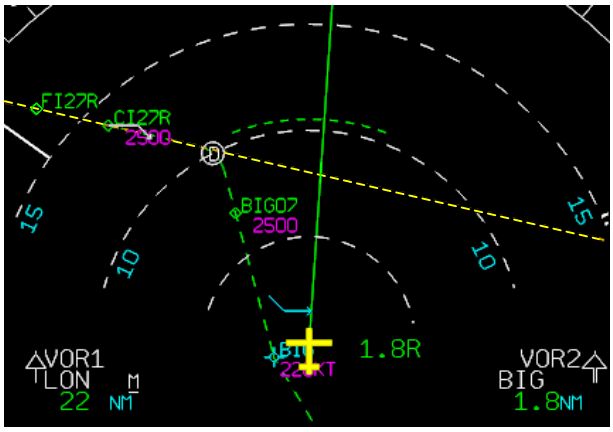
RADIAL IN [4R].....Enter

In the example to intercept LOC CRS approaching CI27R, enter reciprocal of LOC CRS, 273-180=093° as the RADIAL IN.

If defaulted value of RADIAL IN is reciprocal of approach CRS confirm by pressing LSK [6R].

On ND, RADIAL IN is shown as a dashed yellow line to the selected WPT.





D

FMA:

- Lateral mode reverts to HDG selected, unless already selected,
- **NAV mode is armed** (NAV blue) if HDG is suitable for intercept, pull HDG knob is NAV mode to disarm if desired to remain HDG mode,
- If DES mode is engaged, vertical mode reverts to V/S.

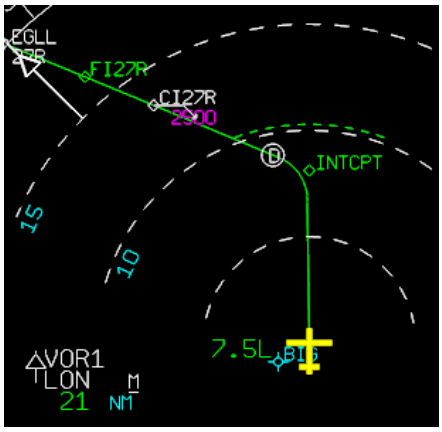
MCDU:

- ACTIVE F-PLN is displayed,
- Intermediate WPTs prior to the selected DIR TO WPT are deleted, and F-PLN is in sequence,
- "ADJUST DESIRED HDG/TRK" s-pad msg (amber) appears as a reminder to set the correct intercept HDG.

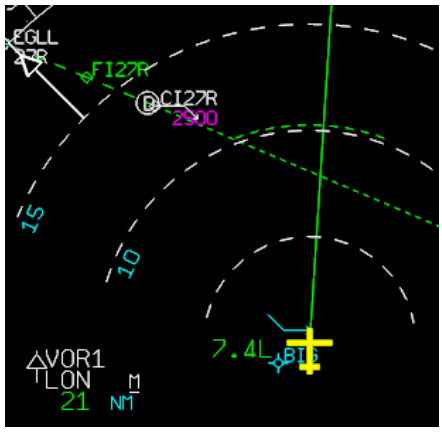
INTCPT.....Check

If NAV blue is displayed, on ND:

– The RADIAL IN changes momentarily to a dashed green line then, if HDG is suitable for intercept, pseudo-WPT INTCPT point is computed; track is displayed by a solid green line,
– NAV mode will engage just before reaching it to perform the interception, unless another lateral mode is selected, e.g. APP or LOC.



If NAV blue is not displayed the RADIAL IN remains displayed by a dashed green line.



See Part III: Multiphase - DIR TO function.

Note:

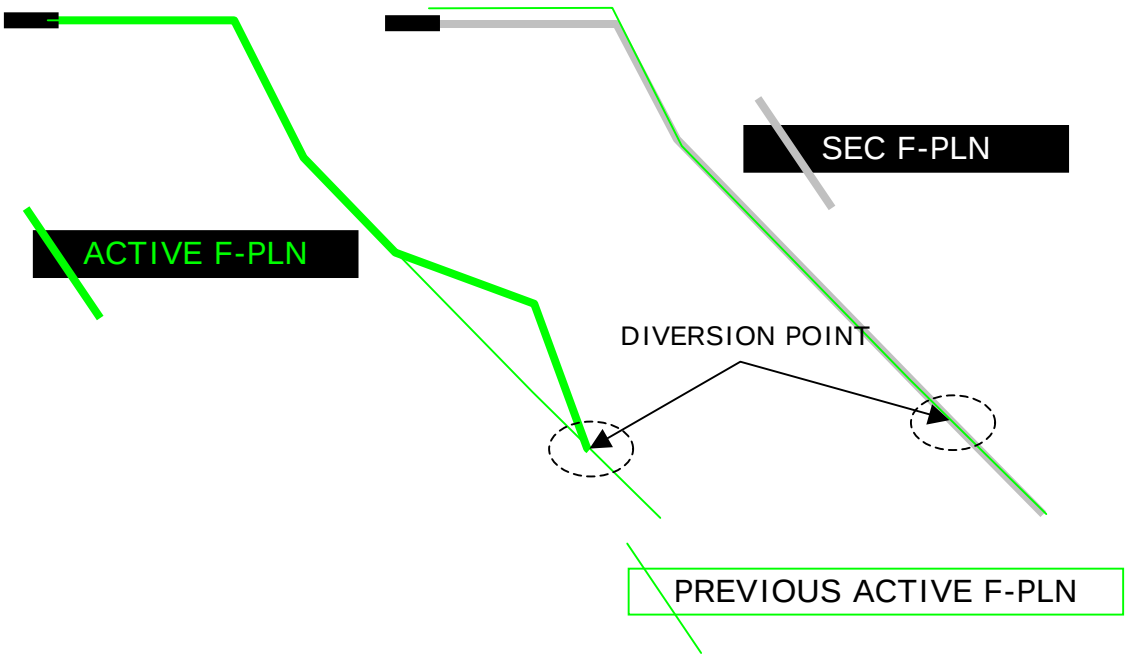
Use of DIR TO function, without RADIAL IN, to clear unwanted WPTs, causes immediate engagement of NAV mode. It should therefore only be used if there is no heading restriction.

SEC F-PLN activation

As explained during descent and approach preparation, SEC F-PLN may be used to prepare an alternative STAR and/or RWY.
When revisions are made in ACTIVE F-PLN (e.g. temporarily radar HDG), these are not copied in SEC F-PLN. Therefore SEC is no more in sequence with ACTIVE F-PLN.
At SEC F-PLN activation F-PLN sequencing is required using methods described above.

In the example below, SEC F-PLN is no longer in sequence with ACTIVE from DIVERSION POINT.

See Part III: Multiphase SEC F-PLN



6.6. Use of PERF DES page

ACT MODE [1L]:
Indicates the actual speed mode:
- MANAGED: managed speed mode is engaged. Speed is computed by the FMGC, value is displayed in [3L]; it cannot be changed.
  FCU SPD is dashed – dot
- SELECTED: selected speed mode is engaged. Speed is FCU SPD/MACH, displayed in [4L].
- EXPEDITE (as installed): expedite mode has been selected on FCU.

UTC DEST EFOB [1R]:
- (UTC) Estimated time at DEST,
- (EFOB) Estimated fuel on board at DEST according to ACTIVE F-PLN (track and profile).

CI [2L]:
Same rule applies as described for CLB & CRZ pages.
See also Part III: Multiphase – xxx

Predictions to ALT [2R]:
ALT displayed in [2R] is defaulted to FCU ALT.
UTC (Estimated Time) and DIST (Distance) to reach this altitude are displayed in:
- [3R] if speed is managed, or,
- [4R] if speed is selected, or,
- [5R] if EXPEDITE mode is used.

ALT may be overwritten enabling predictions computation at any desired ALT.
When clear, [2R] field defaults to FCU selected ALT.

ACTIVATE APPR PHASE prompt [6L]:
Same rule applies as described for CLB & CRZ pages.
Enables to switch FMGS directly to APPROACH phase in case and anticipate deceleration for approach.
See also Part II: Approach

NEXT PHASE prompt [6R]:
Enables access to APPR & GO AROUND pages for review or update landing parameters.

6.7. Use of PROG DESCENT page

Line 1: CRZ / OPT / REC MAX

- CRZ & OPT fields are dashed when transitioning to DESCENT phase,
- Entering a value in CRZ field switches the FMGS in CRUISE phase,
- REC MAX.

See Part II – CH 5 Cruise

REPORT prompt [2L]:

Refer to Part III: Multiphase – PROG page

VDEV [2R]:

Described in previous subchapters.

UPDATE AT [3L]:

See Part III: Multiphase – Position Monitor

Line 4: BRG DIST

Same as explained in Part II – CH 5 Cruise

Refer also to Part III: Multiphase – PROG page

Line 5:

- [5L] PREDICTIVE GPS prompt and,
- [5R] GPS confidence level.

Same as explained in Part II – Ch 5 Cruise

Line 6: ACCURACY

See Part III: Ch 7.3 - Position Monitoring.

6.8. CROSS REFERENCES

The following items may concern several flight phases.

■ TOO STEEP PATH AHEAD

"TOO STEEP PATH AHEAD" s-pad msg (amber) is displayed if a too steep path segment is detected in the computed descent profile, and, NAV mode engaged within 150 NM of destination.

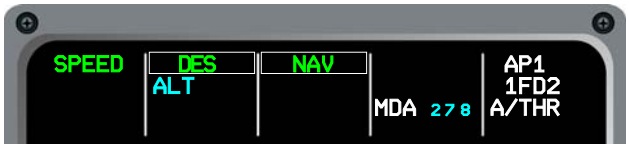
The descent profile cannot be achieved at idle thrust without extra drag.

On F-PLN page TOO STEEP PATH (F-PLN marker) shows the corresponding leg.

This could happen in case of excessive vertical constraints between two WPTs.

■ MORE DRAG

MORE DRAG message is displayed on both PFD (white) and MCDU (amber).



It means that descent profile cannot be achieved at idle thrust. Additional drag is requested, such speed-brakes, to capture the path.

Conditions for display:

- Speed is managed and, DES mode is engaged and, Flaps are not in configuration full and,
- A/C is above descent path,
- FMGC computes that interception of theoretical descent altitude profile is at less than 2 NM from the next ALT constraint (AT or AT or BELOW),
- Vertical error is greater than the altitude constraint value - 500 feet.

■ CHECK APP SELECTION

If a NPA has been selected and an ILS/MLS is manually tuned, at less than 100NM track distance from T/D, or, in DES or APPR phase, "CHECK APPR SELECTION" message is triggered on both MCDU and PFD.

■ Energy circle

See to Part II: Ch 7 – Approach.

Part II: Chapter 7 - APPROACH

Contents

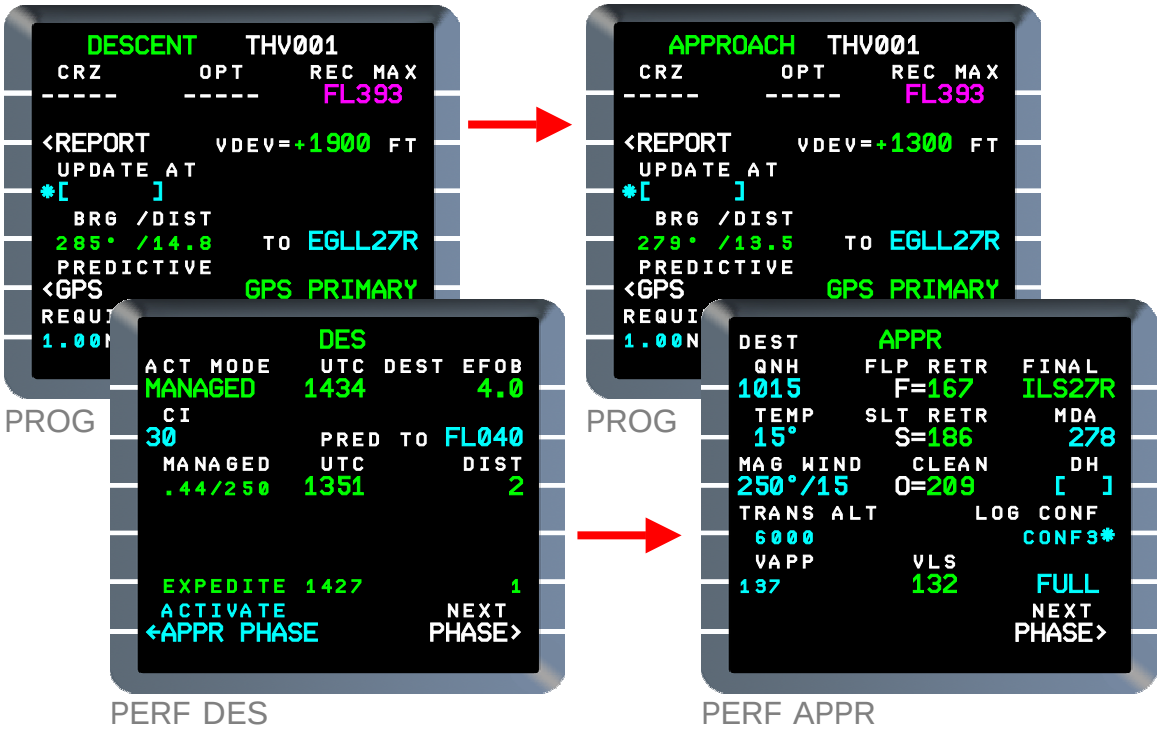
PAGE INTENTIONALLY BLANK

7.1. SWITCHING CONDITIONS

The FMGS is designed to switch **automatically** from DESCENT to APPROACH phase, on passing the DECEL pseudo-waypoint.

It may also be switched **manually** to APPROACH phase by using ACTIVATE APPROACH function from any PERF pages except TO and APPR.

After APPROACH phase activation:



7.2. BEFORE APPROACH ACTIVATION

The following actions should be performed at the appropriate time, as per SOPs (initial approach or before).

■ EFIS display

Select as necessary for approach:
- Mode / Range,
- CSTR on,
- ILS or LS (as installed) on.

■ Radio navaids

Check according to selection on RAD NAV page.

■ Energy circle

REQUIRED DISTANCE TO LAND is computed:
- During DESCENT and APPROACH phases when within 180 NM of destination, and,
- when in **selected lateral mode** (HDG or TRK).

For all A/C under these conditions REQUIRED DISTANCE TO LAND is shown on ND by energy circle as a dashed green arc (ARC or ROSE mode).
This distance is computed from the energy state.

For A/C without GPS: additional data are displayed on PROG page [Line 5]:
- REQD DIST TO LAND,
- DIR DIST TO DEST.

A/C without GPS

■ Nav Accuracy check

Refer to Operator's SOPs.

- **If GPS available:**

On PROG page,

GPS PRIMARY .....Check

When GPS PRIMARY is shown (green), the Accuracy is invariably HIGH.

If "GPS PRIMARY LOST" (amber) appears in scratchpad and on ND, proceed as for GPS not available.

ND message is not clearable.

- **If GPS not available or not installed:**

On PROG page,

Accuracy ..... Check HIGH

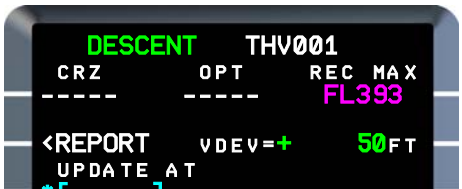
If Accuracy LOW:
Tune a suitable VOR/DME (auto or manual) on RAD-NAV page,
Ex: LON

BRG/DIST [4R] .....Enter ident

Compare BRG/DIST (FMGC computed) with radio indications on ND or DDRMI.

In the example, VOR1 needle is crossing LON (VOR FMGC symbol), showing 293° and 18 NM.

If discrepancy is below 1NM, accuracy may be assumed to be HIGH.
If accuracy is evaluated LOW, refer to SOPs, consider Raw data, EGPWS deactivation and selected modes should be used.



■ Predictive GPS

Refer to Part III: Multiphase – Position monitoring.

■ F-PLN sequencing

TO WPT .....Check correct
If not correct, manually sequence the F-PLN as described in Part II: Descent.

Caution

If F-PLN is not following in sequence with A/C progress, managed modes (NAV, CLB) cannot be engaged; track distance to landing is not correct.

■ Selection of MCDU pages

During APPROACH should normally be:

PF side: PROG or PERF.

PROG page enables following parameters to be monitored:
- VDEV,
- Direct distance to RWY threshold, (entered in BRG/DIST field),
- GPS status,
- NAV ACCUR.

PERF page shows:
- Type of approach selected [1R],
- Landing data,
- VAPP for config FULL or config 3,
- Green dot, S, F speeds.

  These speeds are computed by FMGC, whereas those displayed on PFD are computed by FAC from aerodynamic data.

PNF side:

F-PLN A page, to show:
- Approach routing,
- Altitude/Speed constraints,
- Final approach gradient,
- Missed approach routing & altitudes,
- Distance to landing, along F-PLN track,
- TO WPT is correct.

7.3. APPROACH ACTIVATION

■ Automatic activation

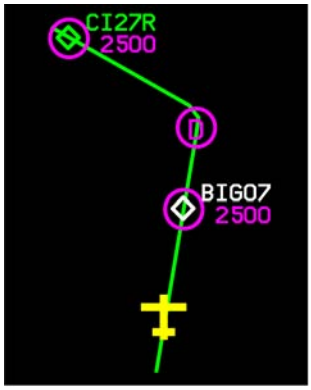
APPR PHASE is automatically activated at the DECEL pseudo-wpt, provided that NAV mode is engaged and altitude is below 7200 ft AGL.

The (DECEL) pseudo-waypoint is calculated by the FMGC to initiate deceleration in order to be stabilized at VAPP at a specified point on the approach profile, normally at 1000ft AGL.
Its position will vary with descent speed & entered winds.

(DECEL) is shown:

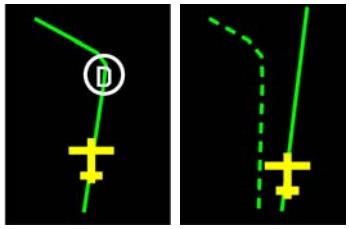
– On F-PLN page by (DECEL) pseudo waypoint.
In the flight scenario DECEL point is between BIG (the IAF) and LOC interception.
– On ND:

- **If Speed and Lateral are managed:**
  DECEL pseudo-waypoint is displayed by a Ⓓ symbol (magenta).
- **If Speed and/or Lateral mode is selected:**
  Ⓓ symbol is not normally displayed; if DECEL 2 option is selected (OPC file), it is displayed in white.



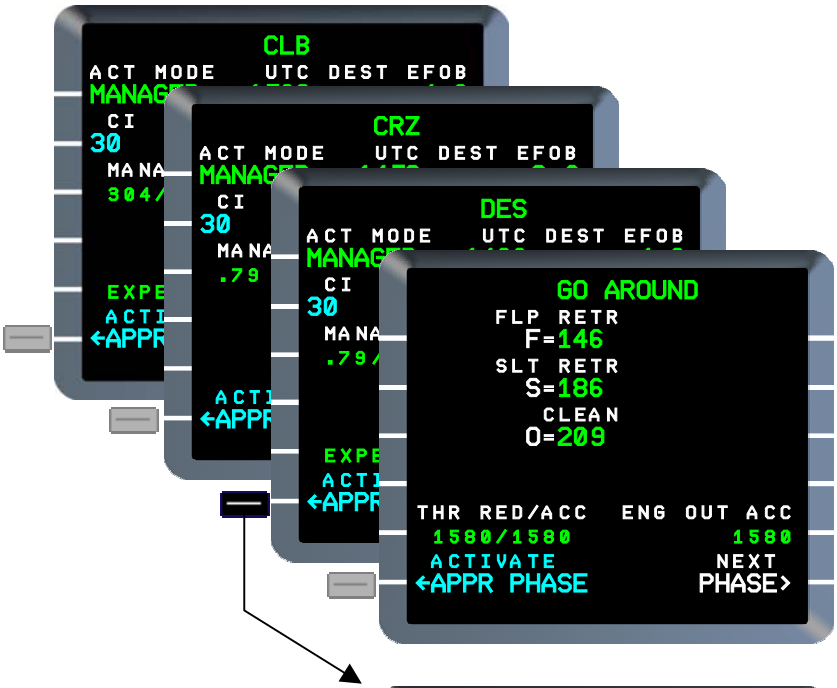
■ Manual activation

Manual activation is required if lateral mode is selected.



Manual activation can be done from any PERF page except TAKE OFF and GO AROUND.

When desired, via PERF DES page
By activating and confirming ACTIVATE APP PHASE prompt on **PERF** page, during any flight phase except take-off.



ACTIVATE APPR PHASE [6L]...
..... Press
CONFIRM APPR PHASE prompt appears.

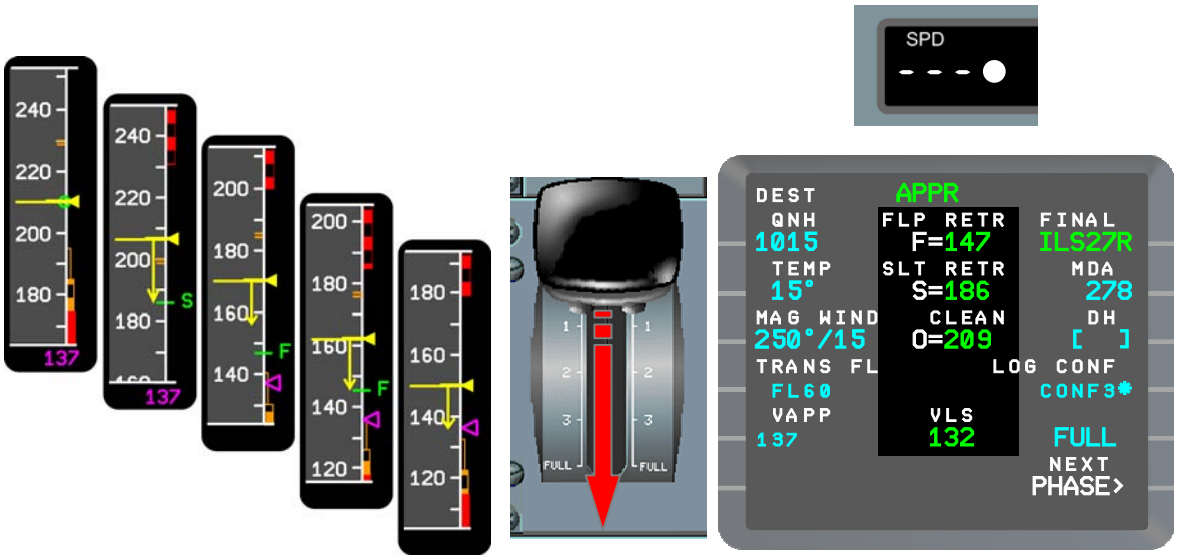
CONFIRM APPR PHASE [6L] ...
..... Press
APPROACH phase is activated, and APPR PERF page is displayed.
If not confirmed:
Press any LSK, except 6L, or any MCDU page key, page reverts to initial state.

Reversion to ACTIVATE APPR PHASE prompt also occurs:

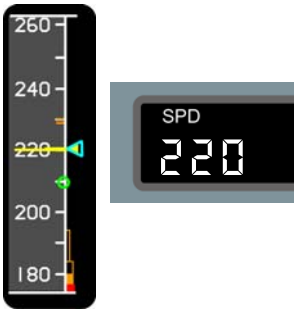
- *If actual phase transitions to another phase, or*
- *In case of FMGC reset, or*
- *After a prolonged power loss.*

Speed control

- **If speed is managed:**
  - FCU SPD is dashed + dot,
  - Target speed is VAPP shown by a magenta cursor or, if out of scale, by digits at the bottom of speed scale,
  - If A/THR is engaged speed is **controlled** to maneuvering speed for the configuration as slats/flaps are extended.



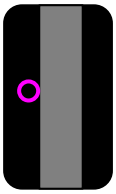
- **If speed is selected:**
  - FCU SPD window is open with selected speed,
  - Target speed is blue,
  - VAPP is not displayed.



7.4. APPROACH MANAGEMENT

■ VDEV

☐ Vertical Deviation symbol

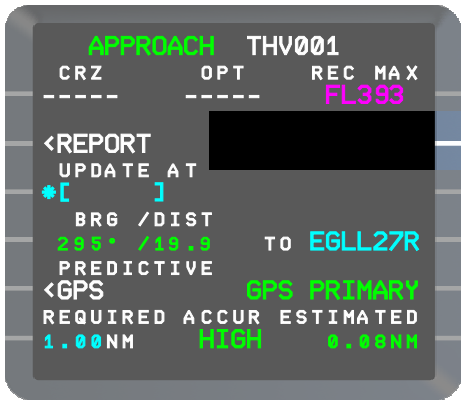


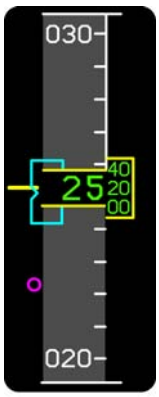
The vertical deviation from the theoretical vertical profile computed by the FMGC is displayed in the following conditions:

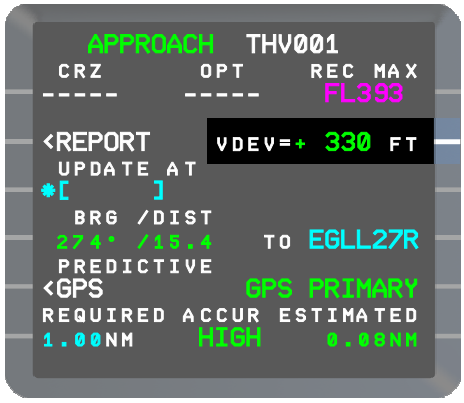
- NAV mode engaged or HDG mode with XTK lower than 4NM, and
- FMGC in DESCENT or APPROACH phase.

VDEV is shown:

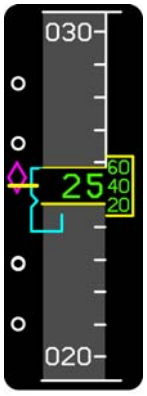
- On MCDU PROG page in field [2R],
  If conditions not met for display the field is blank.
- On PFD by a **magenta circle**.
  The range is ± 500 ft.
  If VDEV greater than ±500 ft, symbol stays at upper or lower range limit; PROG page displays exact value.
  If conditions not met for display the symbol is not shown.

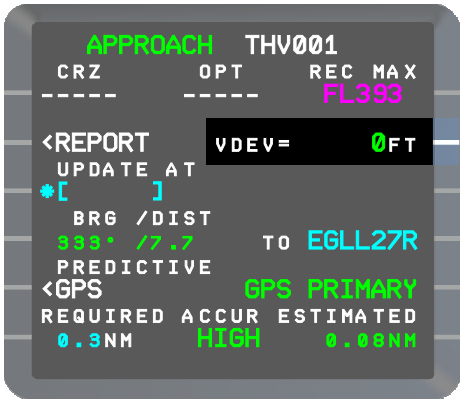




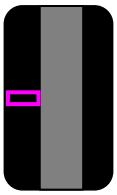


ILS approach
When established on GS, VDEV remains available on PROG page, magenta circle is no longer displayed on PFD.





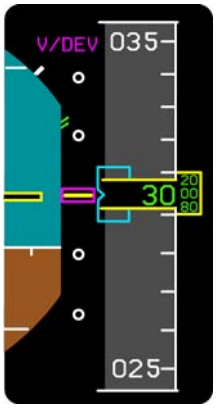
☐ Trajectory deviation symbol



A/C with GPS

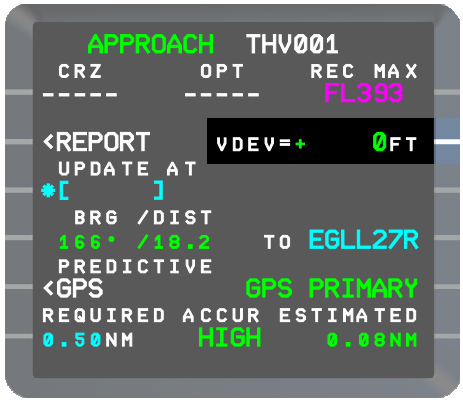
The trajectory deviation from the theoretical vertical profile computed by the FMGC is displayed in the following conditions:

- NAV mode engaged or HDG mode with XTK lower than 4NM, and,
- FMGC in APPROACH or GO AROUND phase, and,
- A **NPA** (e.g. VOR, GPS, NDB) is selected in ACTIVE F-PLN.



VDEV is shown:

- On MCDU PROG page in field [2R]. If conditions not met for display the field is blank,
- On PFD by a **magenta rectangle**. The range is ± 200 ft; each graduation represents 100 ft. If VDEV is greater ± 200 ft, symbol stays at the range limit and the PROG page displays the exact value. If conditions not met for display the symbol is not shown.

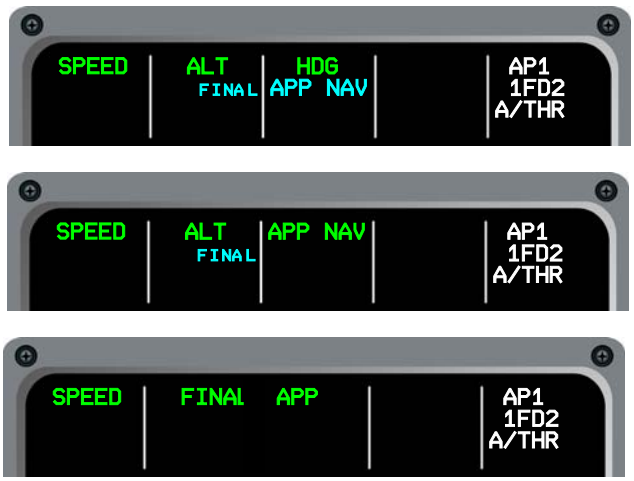


If the LS pushbutton is pressed, glide deviation has priority over vertical deviation information; an amber V/DEV message flashes above the glide scale.

MCDU and PFD information remain displayed until the MDA has been reached, or the MAP, or the runway has been sequenced.

A/C without GPS

Trajectory deviation is displayed when APPR mode is armed or engaged.
Otherwise vertical deviation (magenta circle) is displayed with logics described above.



■ ILS or MLS

Type of approach selected is confirmed at top of ND and on PERF page [1R].
ILS/MLS is auto-tuned when approach is inserted in ACTIVE F-PLN.
See approach preparation in Ch 5 - CRUISE

PFD:

- FMA provides guidance status,
- Speed scale shows VAPP when speed is managed,
- At the bottom, ILS ident and DME when available as tuned on RAD NAV page,
- Vertical deviation symbol which, if accuracy is high, may confirm glide slope interception.

Caution

Biased DME are not automatically tuned by the FMS. In this case PFD does not display the DME distance.

The response of a biased DME is modified such that it indicates distance to threshold.

ND:

- ILS APP is displayed at top of screen,
- Final descent is shown by arrow,
- Final track, distance to threshold are displayed,
- Actual wind is shown and may be correlated with VAPP variation (ground speed mini function).

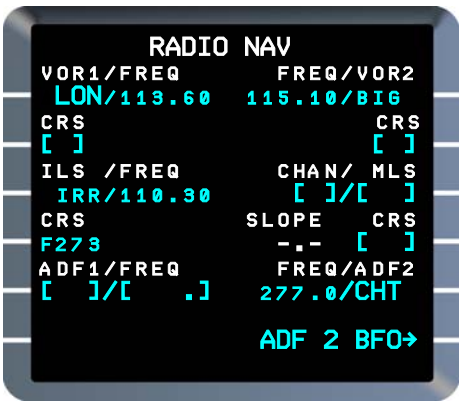
MCDU:

F-PLN page:

WPTs distance, altitude passing and path are displayed and may be correlated to approach chart and useful to detect false GS.

RAD NAV page:

May be used when necessary to check navaids information.



Notes for ILS/MLS approaches:

At 700ft RA – Approach Data are locked, i.e.

ILS or MLS freq & course are frozen in the receiver, when in APPR mode (LOC & G/S armed or engaged) with at least one AP/FD engaged. Any entry via MCDU or RMP does not affect the receiver.

Changes to data on PERF APPR page (wind, config, or Vapp) are not accepted by the FMGC, when speed is managed.

Caution

APPR mode disengages if DIR TO is selected.
Modes revert to NAV – V/S.

■ NPA (Non Precision Approach)

Type of approach selected is confirmed on PERF page **[1R]** and displayed at **top on ND**.

The Non Precision Approaches (NPA) available in NAV data base may vary according aircraft/operator options: e.g. LOC, LOC Back Course, GPS, VOR (with or without DME facility), NDB (with or without DME facility), RNAV.

When an approach procedure is inserted in ACTIVE F-PLN associated RNP is automatically entered.

Some examples are shown below.

If the NPA is not provided in NAV data base, the approach must be flown using raw data. In this case RWY only may be selected on ARRIVAL page. This automatically inserts in ACTIVE F-PLN:

– RWY threshold,
– CF point at 5 NM on a -3° slope to threshold.

Example below for LFBO RWY 14R

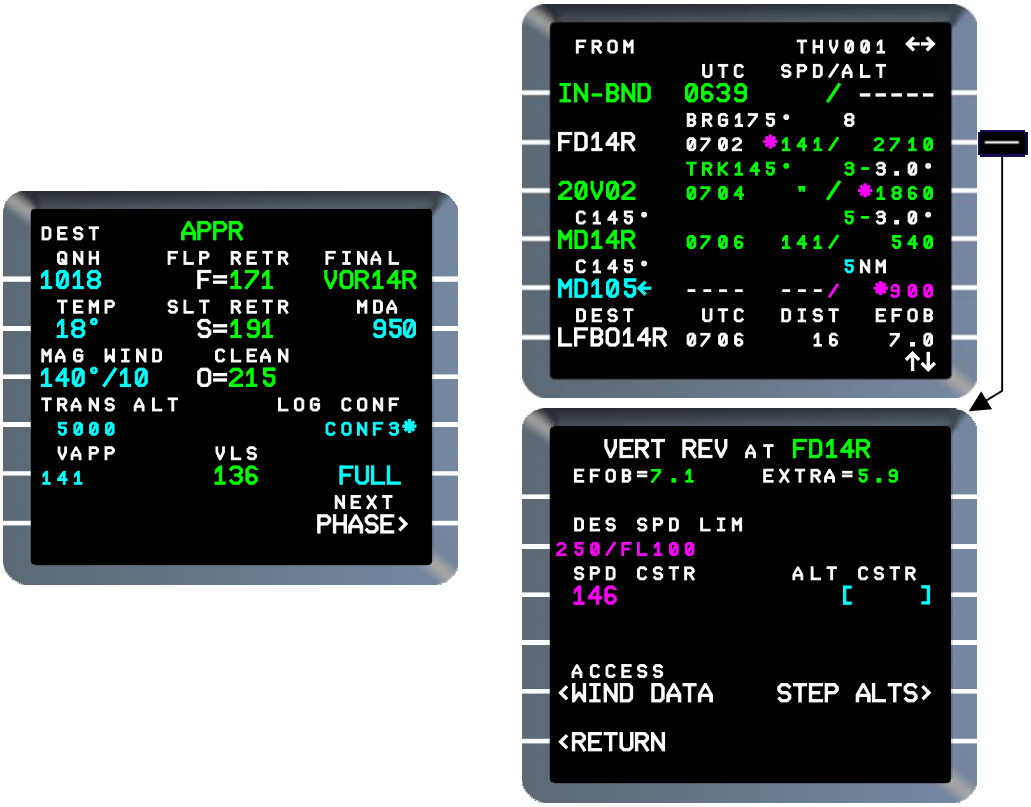
There are **three methods** for performing a NPA:

– **Selected** guidance modes: pilot controls lateral guidance through **HDG/TRK** and vertical guidance through **V/S-FPA** mode,
– **Managed** guidance modes: lateral and vertical guidance are controlled by FMGS through **FINAL APP** mode,
– Managed lateral / Selected vertical guidance modes: lateral guidance is controlled by FMS via **NAV** mode, vertical guidance is controlled by pilot via V/S-FPA mode.

For these approaches TRK FPA should be selected to display FPV & FPD.

Refer to Operator's Manual for NPA procedures.

VAPP should be entered as a SPD constraint at the FAF in order to stabilize approach at this point.



A/C WITH GPS

Example below is given for VOR 14R at LFBO

PFD:

- FMA provides guidance status,
- Speed scale shows VAPP when speed is managed,
- VDEV symbol provides vertical deviation from trajectory defined by the FMGC. If accuracy is high, can be used for vertical deviation control.

MCDU:

F-PLN page:

WPTs distance, altitude passing and path are displayed and may be compared to approach chart.

PROG page

VDEV is displayed in [2R].

A/C WITHOUT GPS

Example below is given for VOR 14R at LFBO

PFD:

- FMA provides guidance status,
- Speed scale shows VAPP when speed is managed,
- VDEV symbol is displayed by a magenta rectangle if FINAL APP mode or by a magenta circle if vertical mode is selected,
- If accuracy is high, VDEV can be used for vertical deviation information.

MCDU:

F-PLN page:

WPTs distance, altitude passing and path are displayed and may be compared to approach chart.

PROG page

VDEV is displayed in [2R].

ND:

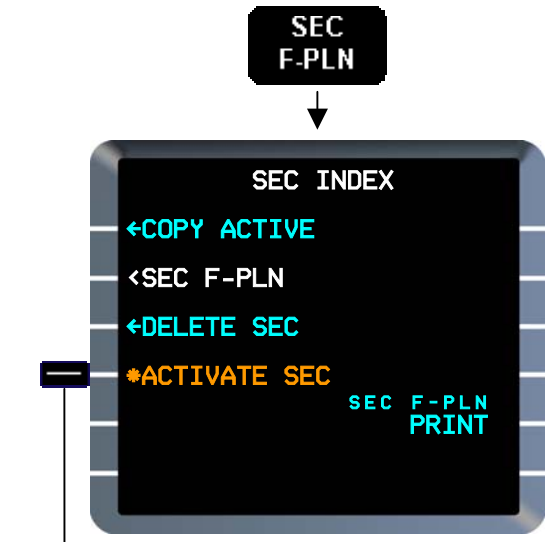
- Type of APP is displayed at top the screen,
- Final track, distance to threshold, and cross-track error (XTK) are displayed,
- Actual wind is shown and may be correlated to VAPP variation,
- Energy circle is available when HDG/TRK is selected and may be information if accuracy is high.

■ Circling

- **If SEC F-PLN has been prepared,**
  at diversion point:
  Select HDG/TRK mode.

SEC F-PLN key ..... Press
Ex: HDG 320°
Check SEC F-PLN track displayed in white on ND.

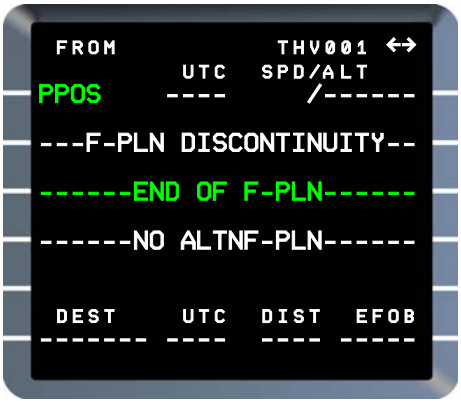
ACTIVATE SEC [4L] ..... Press
This activates SEC F-PLN and associated SEC PERF page.



Caution

Do not clear discontinuity before CF waypoint as this would cause loss of RWY due to leg switching as RWY is passed.

See screen on right



ND:

A/C position may be visualized relative to RWY (if accuracy is high).

MCDU:

Established on final managed speed is available, VAPP is based on landing data as shown on PERF page.

- **If SEC F-PLN not prepared**

  In this case, approach RWY is lost after passing threshold; landing RWY has not been entered, and thus ND does not provide position awareness relative to RWY.

  There is no input data for Ground Speed Mini protection on landing RWY, selected SPD must be used.

NAV ACCUR DOWNGRAD

Defaulted RNP values displayed on PROG page are:

- Terminal area: 1 NM,
- Precision and GPS approaches: 0.3 NM,
- Non-precision approach: 0.5 NM.

These values may be customized in OPC file.

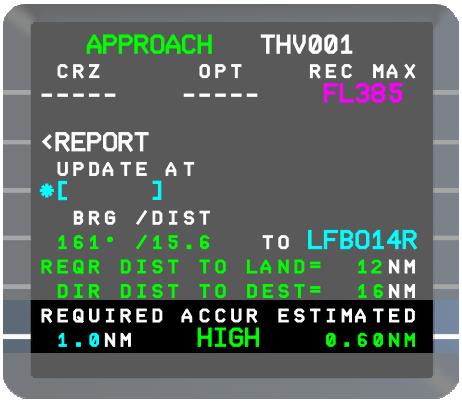
Accuracy HIGH is displayed during intermediate approach if EPE is less than REQUIRED value.

When RNP decreases to final approach value, and if this is less than existing EPE,

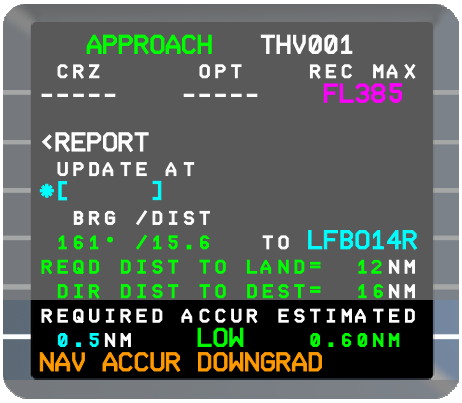
- ACC changes to LOW on PROG page,
- NAV ACCUR DOWNGRAD message is triggered on scratchpad and ND.

This frequently occurs for non GPS A/C.

During a NPA, according to SOPs, this situation may require reversion to selected modes and use of raw data.



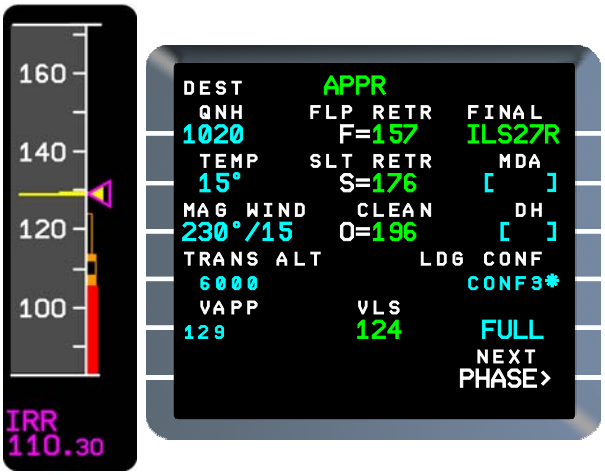
Intermediate approach



Final approach

■ Final approach speed

When managed SPD is engaged, target speed (magenta triangle) indicates VAPP corrected by wind inserted in [3L] and varies according to Ground Speed Mini protection.



7.5. SUPPLEMENTARY PROCEDURES

■ Change RWY

☐ Using SEC F-PLN

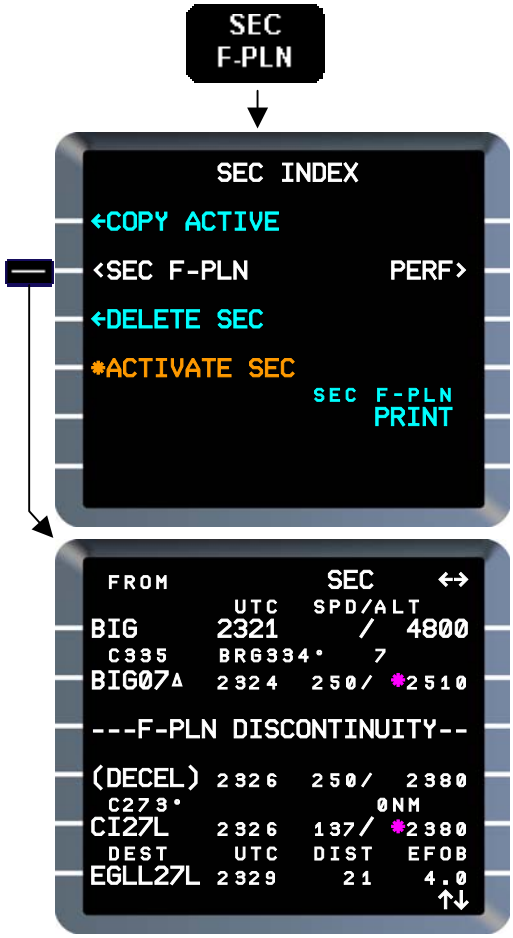
If the new RWY has been prepared in SEC F-PLN:

SEC F-PLN key.....Press

SEC F-PLN [2L].....Press

SEC F-PLN page is displayed.

Note that SEC F-PLN track is shown on ND (white line).



In the example RWY 27L has been entered in SEC with NO STAR and NO VIA.

Review SEC F-PLN page, clear discontinuity, delete or collapse undesired WPTs to get the desired TO WPT in line 2.

See F-PLN sequencing in Part II: Descent

ACTIVATE SEC [4L] ..... Press

- **If A/C is not on correct HDG:**

  HDG/TRK..... Select/Adjust
  Otherwise "SELECT HDG/TRK FIRST" s-pad msg (white) is triggered.

- **If APP modes already armed or engaged,**
  they revert to HDG – V/S.

  APP mode.....Select
  Select as required.

☐ By revision in ACTIVE F-PLN

LAT REV at DEST [6L].....Press

ARRIVAL [1R] .....Press

New RWY .....Select

NO STAR..... Select / Press

NO VIA ..... Select / Press

TMPY F-PLN [6L] ..... Press
ND Check

TMPY INSERT [6R] ..... Press
Check TO WPT

- **If A/C is not on correct HDG:**

  HDG/TRK ..... Select/Adjust
  Otherwise "SELECT HDG/TRK FIRST" s-pad msg (white) is triggered.

- **If APP modes already armed or engaged,**
  they revert to HDG – V/S.

  APP mode.....Select
  Select as required.

PAGE INTENTIONALLY BLANK

Part II: Chapter 8 – GO-AROUND

Contents

PAGE INTENTIONALLY LEFT BLANK

8.1. SWITCHING CONDITIONS

The FMGS is designed to switch automatically from APPROACH to GO-AROUND phase when all the following conditions are met:

- A/C in flight,
- Slats extended,
- Thrust levers set to TOGA detent.

8.2. Standard GO-AROUND

■ **Go-around initiation**

Example shows a go-around after a dual ILS approach. Same logic applies for other approaches.

PFD:

– FMA displays: MAN TOGA / SRS / GA TRK / ATHR blue,
– Target speed is SRS.

SRS mode provides **managed speed** guidance to existing IAS at GA initiation (or VAPP if existing IAS<VAPP) until acceleration altitude, then to green dot speed or as selected on FCU.
GA TRK mode provides lateral guidance to maintain the track existing at GA initiation, memorized by FMGC.

ND:

Missed approach becomes ACTIVE F-PLN, changing from blue to dashed green on ND.

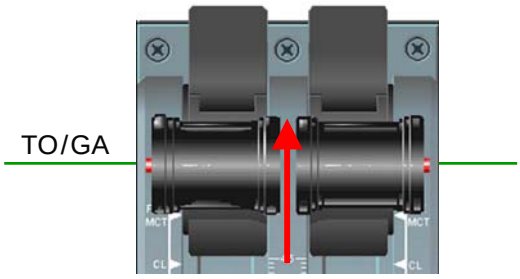
MCDU:

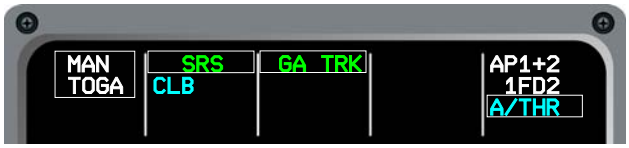
PERF APPR changes to PERF GO AROUND, showing:
– F, S, green dot speeds,
– THR RED and ACC altitudes for the go-around,
– ENG OUT ACC altitude,
– ACTIVATE APPR PHASE and NEXT PHASE prompts.

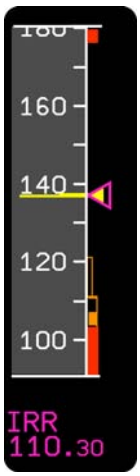
F-PLN page (A or B) shows WPTs of missed approach routing in green instead of blue, followed by a F-PLN DISCONTINUITY.
The previous APPR procedure is retained, following the F-PLN DISCONTINUITY, which can be viewed by scrolling up.
The DEST RWY remains on bottom line; the DIST to destination shown is total distance to landing, via missed approach and the retained approach, e.g. PPOS to 3000', direct to CF27R, plus approach.

Note:

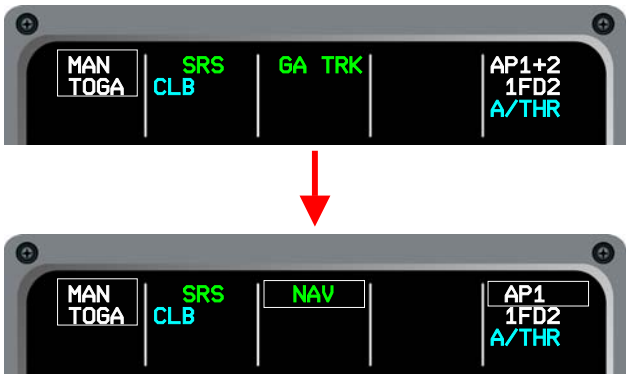
In SRS mode, vertical guidance is **not** managed. The initial altitude constraint of the missed approach procedure must be set on FCU after passing FAF on the approach.
If a constraint exists: "CSTR DEL UP TO XXXX" s-pad msg (white) is triggered.







■ Lateral guidance



☐ Managed mode

If requested to follow the missed approach route as entered in ACTIVE F-PLN:

HDG knob .....Push

NAV mode engages in place of GA TRK, provided F-PLN is in sequence. If not, NAV will not engage, but remains armed; required routing must then be flown in HDG mode.
See Ch 6: Descent - F-PLN Sequencing).

☐ Selected mode

If a specific heading has to be maintained:

HDG knob ..... Set / Pull
HDG mode engages in place of GA TRK.

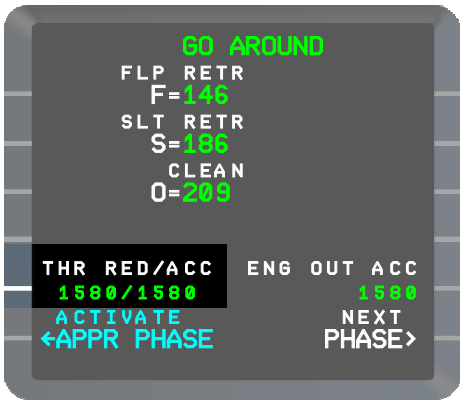
If both APs were engaged for the approach, AP2 disengages when any of the GA modes are changed.

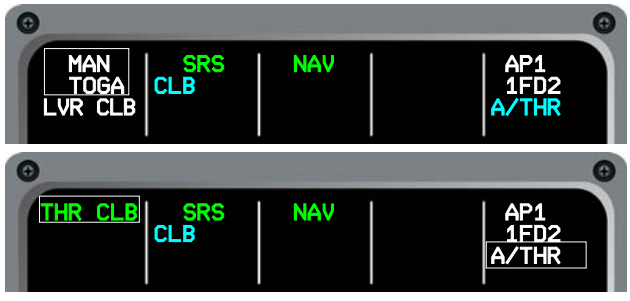
■ Acceleration

☐ At THR RED altitude

LVR CLB message flashes on FMA.

THRUST LEVERs ..... CL detent
Set to CL detent.
- A/THR becomes active in THR CLB mode,
- FMA displays THR CLB.



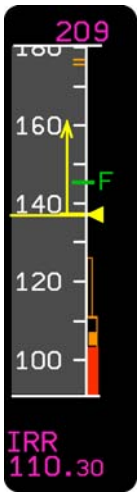


☐ At ACC ALT

- **If below GA ALT set on FCU:**
  - SRS mode switches automatically to OP CLB (new FG standard),

    Note:

    On A/C equipped with old FG computer standard, SRS must be switched manually by selecting OP CLB mode.
  - If speed is managed, speed increases to Green Dot, shown (magenta) at top of PFD speed scale,
  - Select configuration as per SOPs.



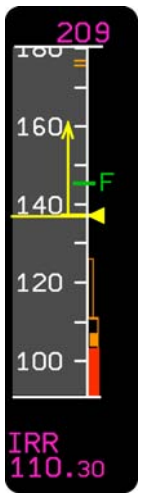
Caution

Managed CLB cannot be engaged during the GA Phase.

Therefore ALT constraints are not managed and must be selected on FCU.

- **If equal to or greater than GA ALT set on FCU:**

  When capturing FCU altitude, FMA displays:
  - SPEED, either mode engaged, managed or detected,
  - ALT*, then ALT (first altitude constraint of missed approach procedure), which has been set on FCU,
  - If speed is managed, speed increases to Green Dot, shown (magenta) at top of PFD speed scale,
  - Select configuration as per SOPs.



8.3. RETURN for another approach

The previous APPR/RWY is automatically re-strung after the F-PLN DISCONTINUITY which follows the missed approach procedure.

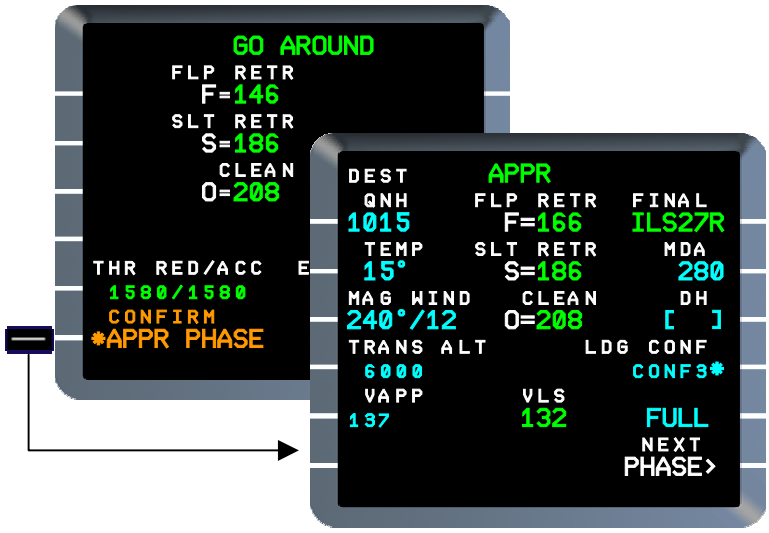
If cleared to proceeding for another approach:

On **PERF** page:

ACTIVATE APPR PHASE .....
.....Select

CONFIRM APPR PHASE.....
.....Select

GO-AROUND Phase switches to APPR Phase. Data previously entered on PERF APPR page is retained.



On **F-PLN** page:
Proceed to required revisions by inserting WPT or using DIR-TO function or other lateral revision.

For example ATC clearance is:
Proceed 3000 ft and join CHT.

Enter CHT as a WPT

HOLD function is described in Part III: Ch 3.4.

8.4. DIVERSION to ALTN Airport

■ ENABLE ALTN function

This function may be used when an ALTN airport is entered.

In the example ALTN to EHAM has been prepared with the following route:
EGLL 27R BPK6F BPK DCT CLN UL620 REDFA EHAM ILS 18R

The content of F-PLN page is:

1 GA procedure at EGLL27R
--F-PLN DISCONTINUITY--

2 New ILS EGLL27R
New GA procedure at EGLL27R
---END OF F-PLN---

3 EGLL
Alternate route to EHAM
ILS EHAM18R
GA procedure EHAM 18R
--END OF ALTN F-PLN--

To divert to EHAM:

LAT REV.....Select
Select LAT REV at the WPT from which diversion is intended.

ENABLE ALTN [4L]..... Press
Selection of this prompt enters ALT F-PLN as TMPY F-PLN, after the F-PLN DISCONTINUITY.

Provided an ALTN F-PLN has been defined ENABLE ALTN prompt is available.
It is not available at a missed appr WPT until GA PHASE initiated.

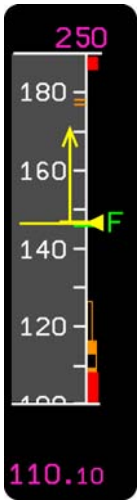
ND shows ALTN route (dashed yellow) departing from its origin, EGLL.

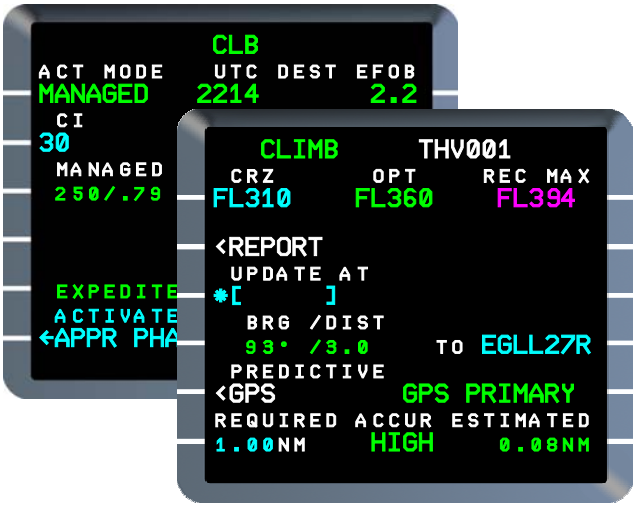
TMPY INSERT [6R].....Press

– TMPY F-PLN is inserted in ACTIVE F-PLN, after the F-PLN DISCONTINUITY,
– ND shows ALTN route (solid green), departing from EGLL.

- FMGC switches from GA to CLIMB phase.phase.

– Target speed changes from Green Dot to initial climb speed,
– Stored ALTN CRZ FL automatically set (blue on PROG page) and may be modified,
– NEW CRZ ALT –XXXXX s-pad msg is triggered.





Sequence the ACTIVE F-PLN according to ATC clearance using for example the DIR-TO function.

■ Using SEC F-PLN

In this example an alternate route has been entered in SEC for EGSS (London Stansted) via CHT and LOREL to EGSS RWY 23

Use ND to review, sequence or modify according to ATC clearance.
When SEC F-PLN is activated, FMGC switches from GO AROUND to CLIMB phase.

Refer to Part III: Multiphase - SEC F-PLN

■ Diversion not prepared

In this case the diversion should be initiated by entering the ALTN as a NEW DEST, via the LAT REV page.

LAT REV..... Press
NEW DES is displayed in [4R]

The NEW DEST function is not available on LAT REV page accessed from a "floating WPT", i.e. a WPT referenced to an altitude or Heading

NEW DEST [4R] .....Enter
Enter ICAO code of desired ALTN airport.

Ex: EGCC (Manchester)

A TMPY F-PLN is created with this new DEST following a F-PLN DISCONTINUITY.
Enter WPT, revise as desired.

TMPY INSERT [6R].....Press

- New DEST is in ACTIVE F-PLN,
- FMGC switches from GO Around to CLIMB phase,
- Target speed changes to initial climb speed,
- Defaulted CRZ FL is set, and may be modified on PROG page.

F-PLN page:
Enter / modify route as desired.

Caution

If actual DEST is entered in NEW DEST, A/C will remain in GO AROUND phase.

Part II: Chapter 9 – DONE

Contents

PAGE INTENTIONALLY LEFT BLANK

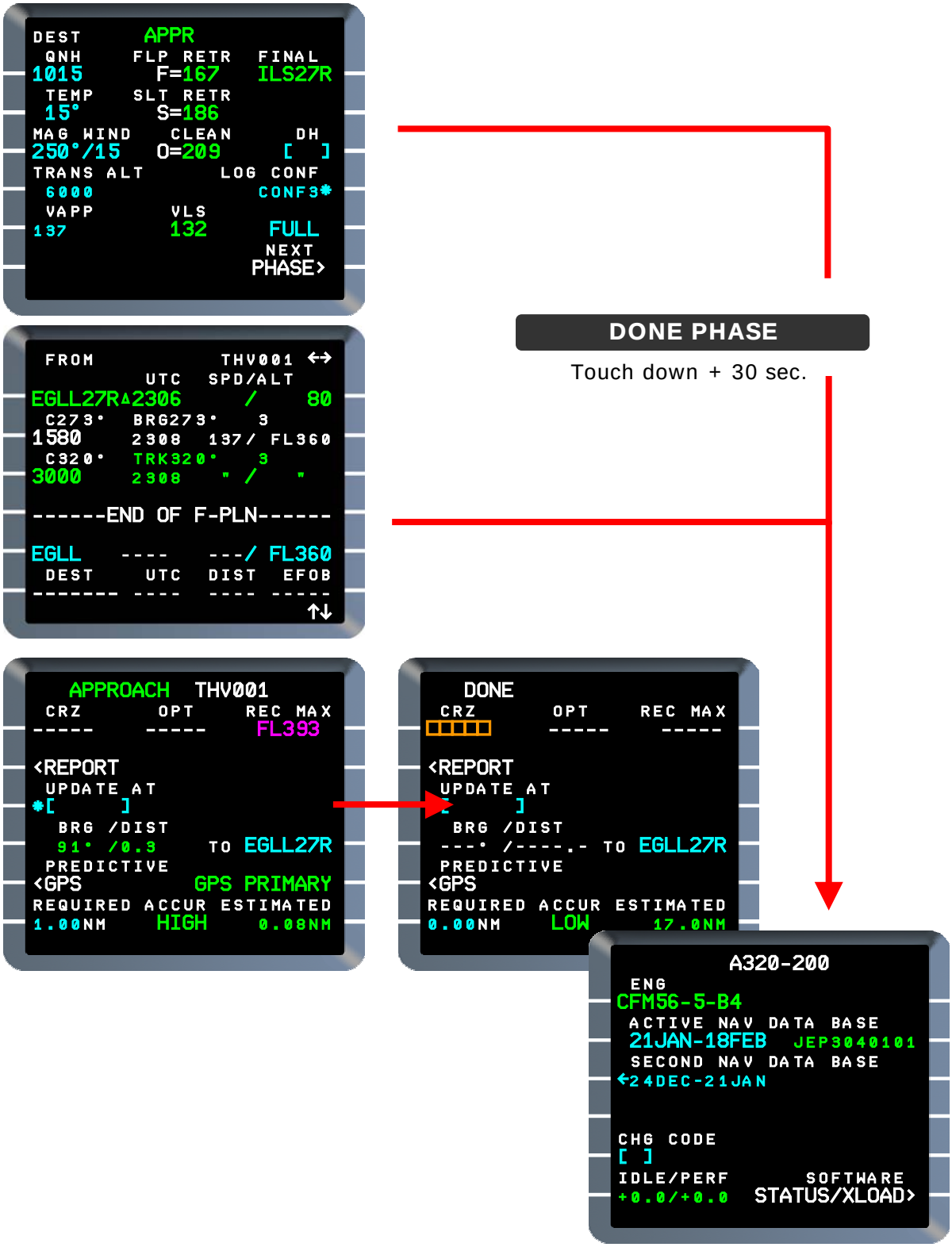
9.1. SWITCHING CONDITIONS

The FMGC switches from APPROACH to DONE phase when A/C is on ground for 30 seconds.

9.2. FLIGHT DECK INDICATIONS

APPROACH PHASE

Immediately after touch down



DONE PHASE

Touch down + 30 sec.

MCDU display:

After landing when FMGC switches to DONE phase:

- If displayed, PROG APPR page switches to PROG DONE page,
- All other pages switch to A/C STATUS page.

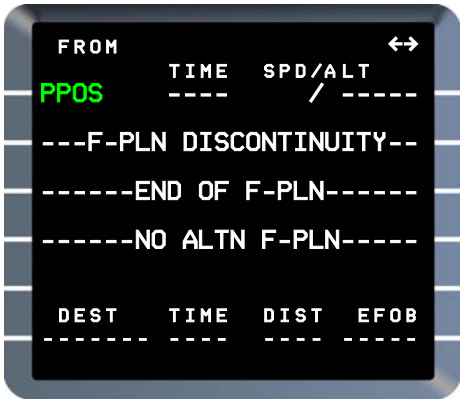
Pictures shows MCDU pages if associated key is pressed:

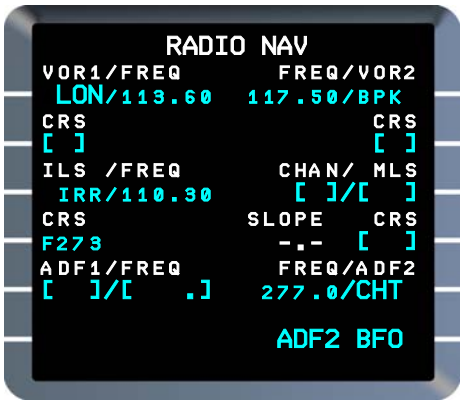
- **F-PLN:** F-PLN page shows all elements erased, first line shows PPOS, ND is blank,
- **FUEL PRED**

  INIT B page remains not available until engines are shut down,
- **RAD NAV**,
- **IRS MONITOR** page displays IRS drift.

  This page remains until IRS are either switched off or re-aligned or next TAKE OFF phase.

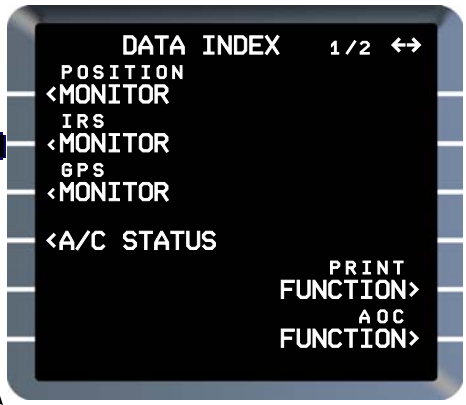
If INIT is pressed, FMGC switches to PREFLIGHT phase (See 9.4 in this chapter).





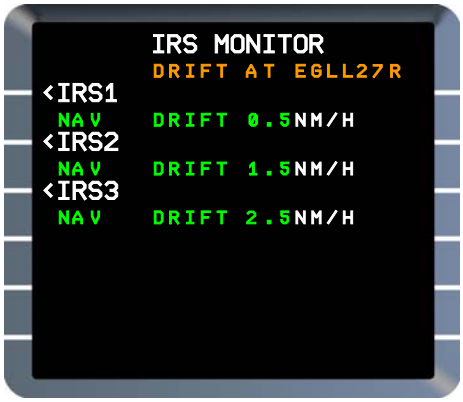
SEC F-PLN:

- If created via SEC INIT page, it is stored, and may be ACTIVATED for the next flight,
- If created by COPY ACTIVE, it is erased. This applies whether or not the SECONDARY F-PLN is sequenced.



PILOTS ROUTES:

Pilot stored routes are either deleted or retained, depending on option selected in AMI file.



9.3. SUPPLEMENTARY INFORMATION

■ Use of FMS during Base Training

☐ Touch-and-go landings

If the time between touch-down and airborne is less than 30 sec, the FMGC does not switch to DONE phase.

If ACTIVE F-PLN is in sequence, with the A/C position, the approach routing including the landing RWY is erased after passing the runway threshold, leaving the Missed Approach procedure as the remaining ACTIVE F-PLN.

If ACTIVE F-PLN is not sequenced, due to a WPT being by-passed by more than 5 NM, this WPT and subsequent legs are retained in the F-PLN.
A WPT at a sufficient distance outside the circuit pattern, or procedure, may be inserted, so that the final course and RWY are not erased.

In the example shown below, the WPTs BASE14 and CI14R are outside the actual pattern, so that the approach course and RWY are retained.

☐ Full-stop landing

The FMS phase will switch to DONE 30 sec after touch-down, and the entire ACTIVE F-PLN and PERF data are **deleted**.
It is therefore recommended to prepare the SEC F-PLN as follows.

SEC F-PLN key.....Press

- **If a SEC F-PLN exists,**

  DELETE SEC [3L] .....Press

  Then,

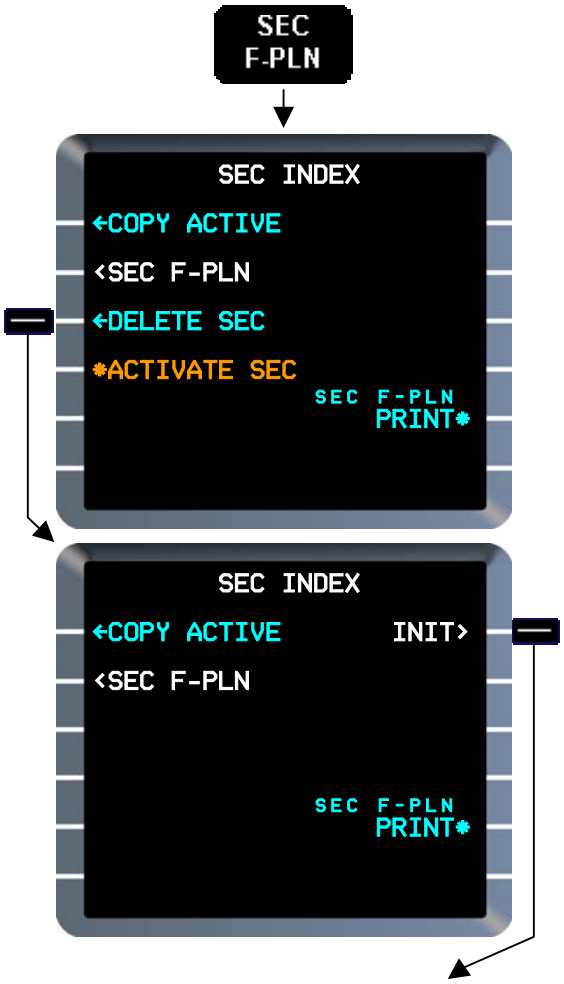
INIT [1R].....Press
SEC INIT A page is displayed.

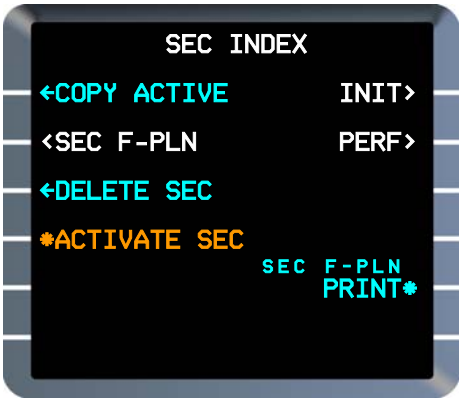
If NAV data base contains an appropriate training circuit pattern stored as a CO RTE, insert code on SEC INIT page. This pattern is then entered in SEC F-PLN and shown on ND.
Otherwise on SEC F-PLN page enter take-off RWY and approach procedure, and define circuit pattern if desired.

Complete SEC INIT B page.

Then, return to SEC INDEX page, PERF prompt is now shown,

PERF [2R] .....Press
Complete SEC PERF pages as required.





If SEC INIT B page and SEC PERF pages are not completed, managed modes are not available.

After full-stop landing with return for take-off, data can be restored by ACTIVATING SEC F-PLN.
ACTIVE F-PLN is initialized, and FMGC switches from DONE to PREFLIGHT phase.
SEC F-PLN may be also available in case of lost in flight after a touch and go.

■ SIMSOFT

The FMS contains special features for use in the simulators.
These features enable FMS Simulator synchronization during repositioning.
Refer to Simulator User manuals.

9.4. Conditions for Switching to PREFLIGHT PHASE

The FMGC is switched from DONE phase to PREFLIGHT phase when any of the following occurs:

- INIT key pressed,
- PERF key pressed,
- an ACTIVE F-PLN initialized by ACTIVATE SECONDARY function,
- an ACTIVE F-PLN initialized by an AOC uplink.

DONE phase is not switched if WPTs are inserted in F-PLN page.

Part III

MULTI PHASE PROCEDURES

PAGE INTENTIONALLY LEFT BLANK

Part III: MULTIPHASE

Contents

Chapter 7 - NAVIGATION management & monitoring

Chapter 8 - ENGINE-OUT OPERATION

Chapter 9 - DATA LINK

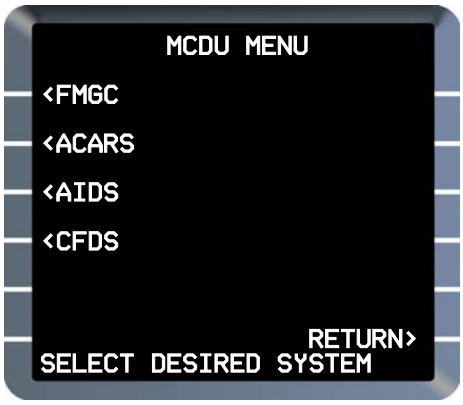
Chapter 10 - PRINT FUNCTION

Part III: Chapter 1 – MCDU MENU PAGE

Contents

PAGE INTENTIONALLY LEFT BLANK

1.1. GENERAL



The MCDU MENU page enables selection of the subsystems available for communication.

The subsystems are listed in [1L] to [6L] depending on A/C options and accessed by pressing adjacent LSK.
FMGC is always shown in [1L].

Active subsystem is shown in **green, inactive** in **white**.

If communication with selected subsystem is successful, active subsystem page is displayed.

Subsystem status is indicated as follows:
- Active - green,
- Requesting service – (REQ),
- Timed out – (TIMEOUT),
- Selected – (SEL) blue.

"SELECT DESIRED SYSTEM" s-pad msg (white) is displayed on the MCDU MENU page when any subsystem is available or becomes available for selection and a selection is not currently in progress.

This page is normally used to access to subsystems other than FMGC. In normal operation access to FMGC pages is made via the FM page keys.

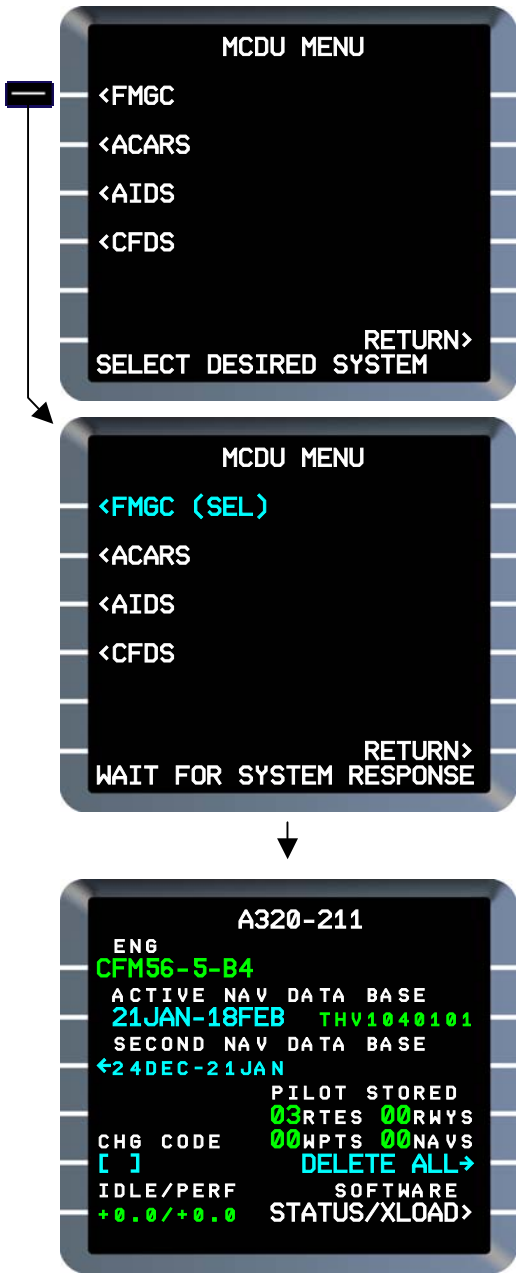
1.2. MCDU DISPLAY

■ Selection of a subsystem

Ex: Selection of FMGC

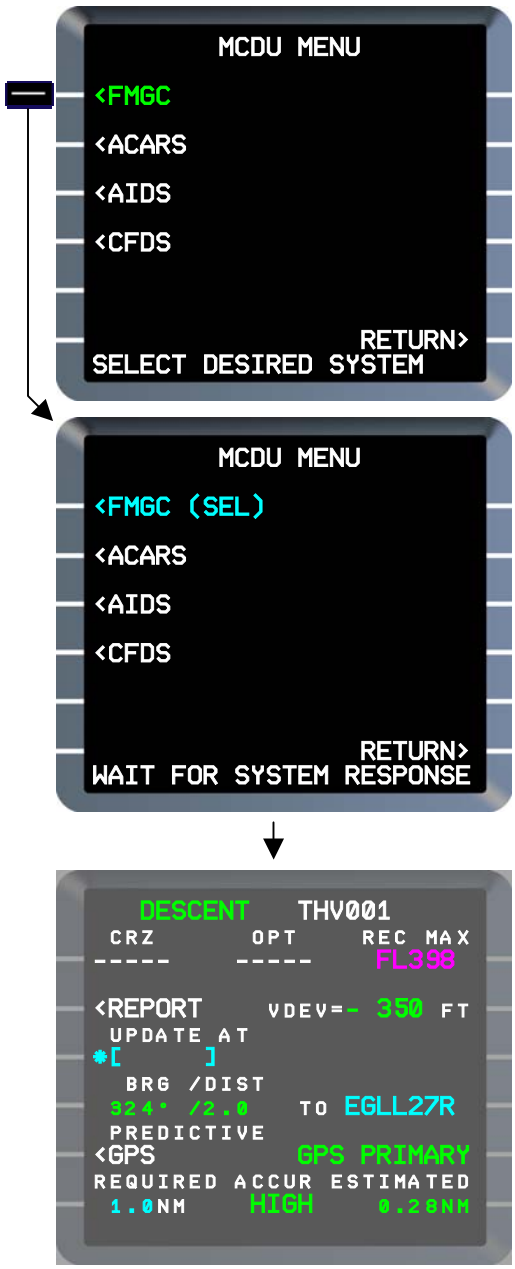
- **If FMGC is not yet active:**
  FMGC [1L] is displayed white.

  FMGC [1L] .....Press
  FMGC (SEL) is displayed blue.
  – During the time between the subsystem selection and the display of the subsystem page, the MCDU MENU page remains displayed with "WAIT FOR SYSTEM RESPONSE" s-pad msg (white),
  During this period all button pushes are ignored.
  – When FMGC becomes active, A/C STATUS page is displayed.



- **If FMGC is already active:**
  FMGC [1L] is displayed green.

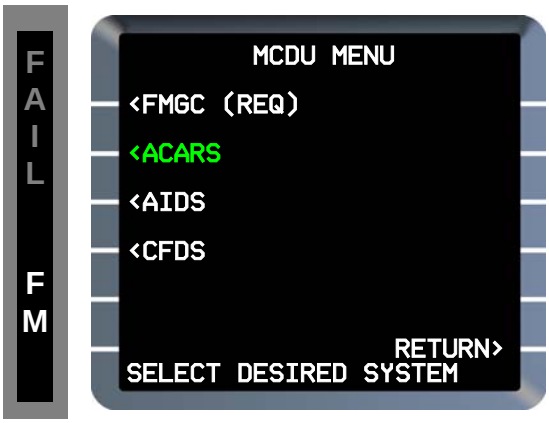
  FMGC [1L] ..... Press
  FMGC (SEL) blue is displayed.
  – During the time between the subsystem selection and the display of the subsystem page, the MCDU MENU page remains displayed with "WAIT FOR SYSTEM RESPONSE" s-pad msg (white),
  During this period all button pushes are ignored.
  – Then the last FMGC page selected is displayed.
  In the Ex: PROG page



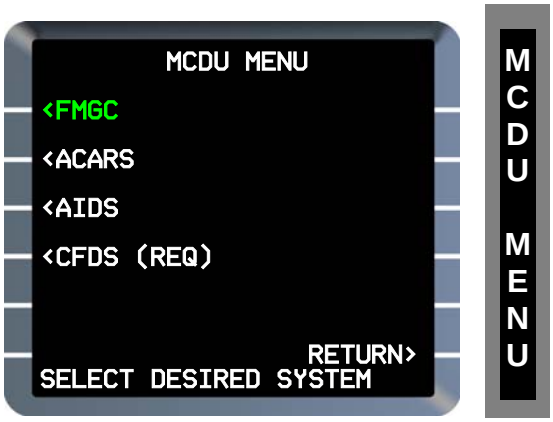
- **If communication fails,**
  The display reverts to the MCDU MENU page "SYSTEM NOT AVAILABLE" s-pad msg (white) is triggered.

■ FMGC (REQ)

FMGC (REQ) [1L] is displayed when FMGC is the non active subsystem and is requesting service.
This means that FMGC has an important message (amber in s-pad).
FM illuminates on front annunciator.



If a request is received from a non-FM subsystem, the MCDU MENU annunciator illuminates and "(REQ)" indicator is inserted after the subsystem name.



■ FMGC (TIME OUT)

■ FMGC (OWN)

■ FMGC (OPP)

These labels are described in Part IV: FMS degraded operations.

Part III: Chapter 2 - F-PLN pages

Contents

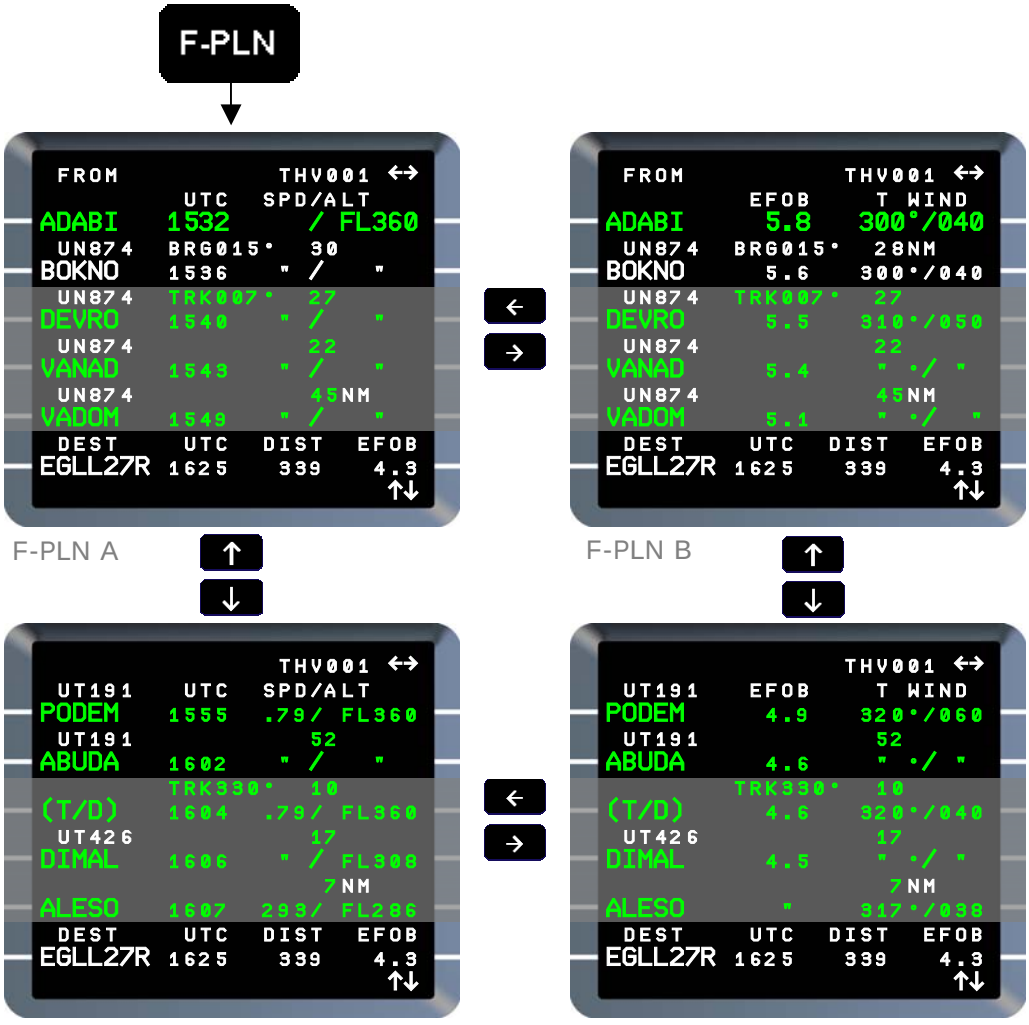
PAGE INTENTIONALLY LEFT BLANK

2.1. Overview

■ General

When F-PLN key is pressed, display is:
- **ACTIVE** F-PLN page **A**,
- Line 1: **FROM** WPT data (green),
- Line 2: **TO** WPT data (**white**),
- Line 6: **DEST** airport (white).

Horizontal slew keys enable to switch to F-PLN page **B** with the same state of waypoint display.
Vertical slew keys (↓↑) enable to scroll the F-PLN pages A & B along the ACTIVE F-PLN, any time DEST remains displayed on line 6.

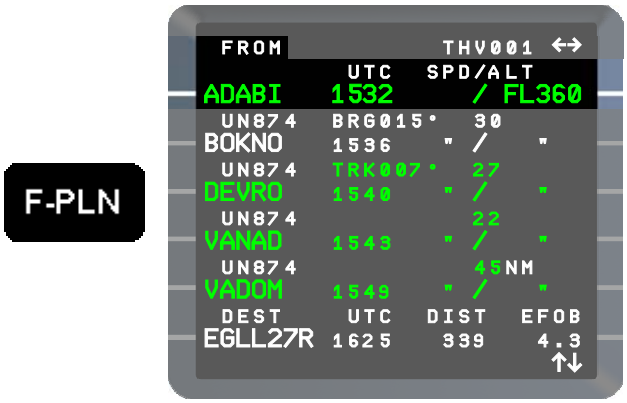


Purpose of F-PLN page A is to display flight plan and time, speed, altitude, FPA, distance, bearing, and track waypoint-by-waypoint throughout the flight plan (except on non-active missed approach and alternate flight plan).

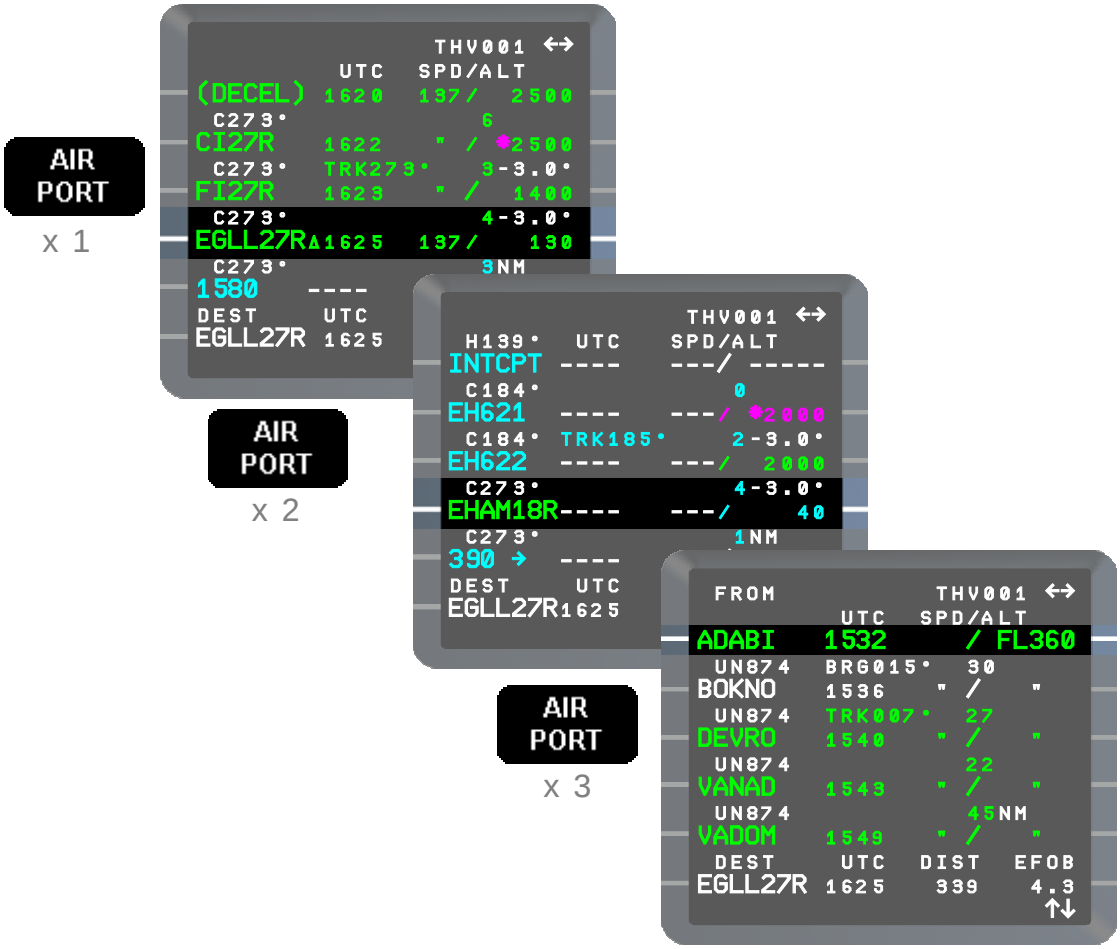
Purpose of F-PLN page B is to display the flight plan with wind, distance and estimated fuel on board. For alternate flight plan and non-active missed approach, no EFOB is available, winds and F-PLN distances are displayed.

Rules for F-PLN page display

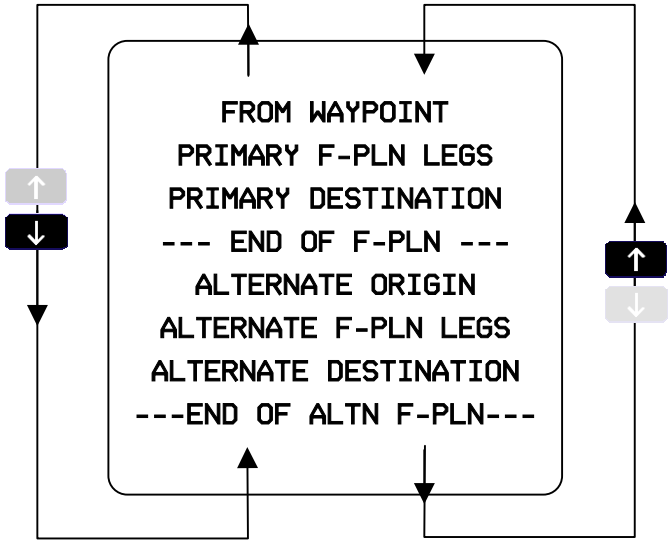
F-PLN key:
Whatever is the MCDU display, when F-PLN key is pressed, MCDU shows F-PLN page A with FROM WPT in [1L]



AIRPORT key:
Whatever is the MCDU display, when AIRPORT key is pressed:
- **ONCE**, MCDU shows F-PLN page A with DEST in [4L],
- **TWICE**, MCDU shows F-PLN page A with ALTN in [4L],
- **Third press**, display returns to FROM WPT [1L].



Vertical slew keys:
The flight plan is a closed loop display (see figure below) that means the display of the FROM waypoint follows the ALTN destination.
If the vertical slew key is pressed to display beyond the ALTN destination, the FROM waypoint is displayed following the ALTN destination.



Notes:

Neither pseudo waypoints nor flight plan markers may be displayed as the FROM waypoint.

For the non-active missed approach and alternate F-PLN, no predictions are displayed except at ALTN destination.

When predictions are invalid or are being re-computed, dashes are displayed.

If data is insufficient for predictions to run, the destination data is dashed.

WPTS abbreviations, F-PLN markers, Lateral defining legs on F-PLN page are listed in Part V: Appendices – Ch.2

LAT REV

From F-PLN pages A or B, pressing Left LSKs enable access to LATERAL REVISIONS pages (LAT REV) to make lateral revisions in F-PLN.

Pressing Right LSKs enable access to VERTICAL REVISIONS.

LAT REV is not available from:
- Pseudo waypoints,
- F-PLN markers, except F-PLN DISCONTINUITY.

LAT/LONG of the revise point is displayed in line 2 if the revise point is a fixed waypoint (not displayed if the revise point is a F-PLN DISCONTINUITY or PPOS).

Lateral Revision functions applied to SECONDARY F-PLN are accessed similarly from SEC F-PLN pages.

LAT REV FROM PPOS
- Access to OFFSET page via [2L] prompt,
- Access to HOLD page via [3L].

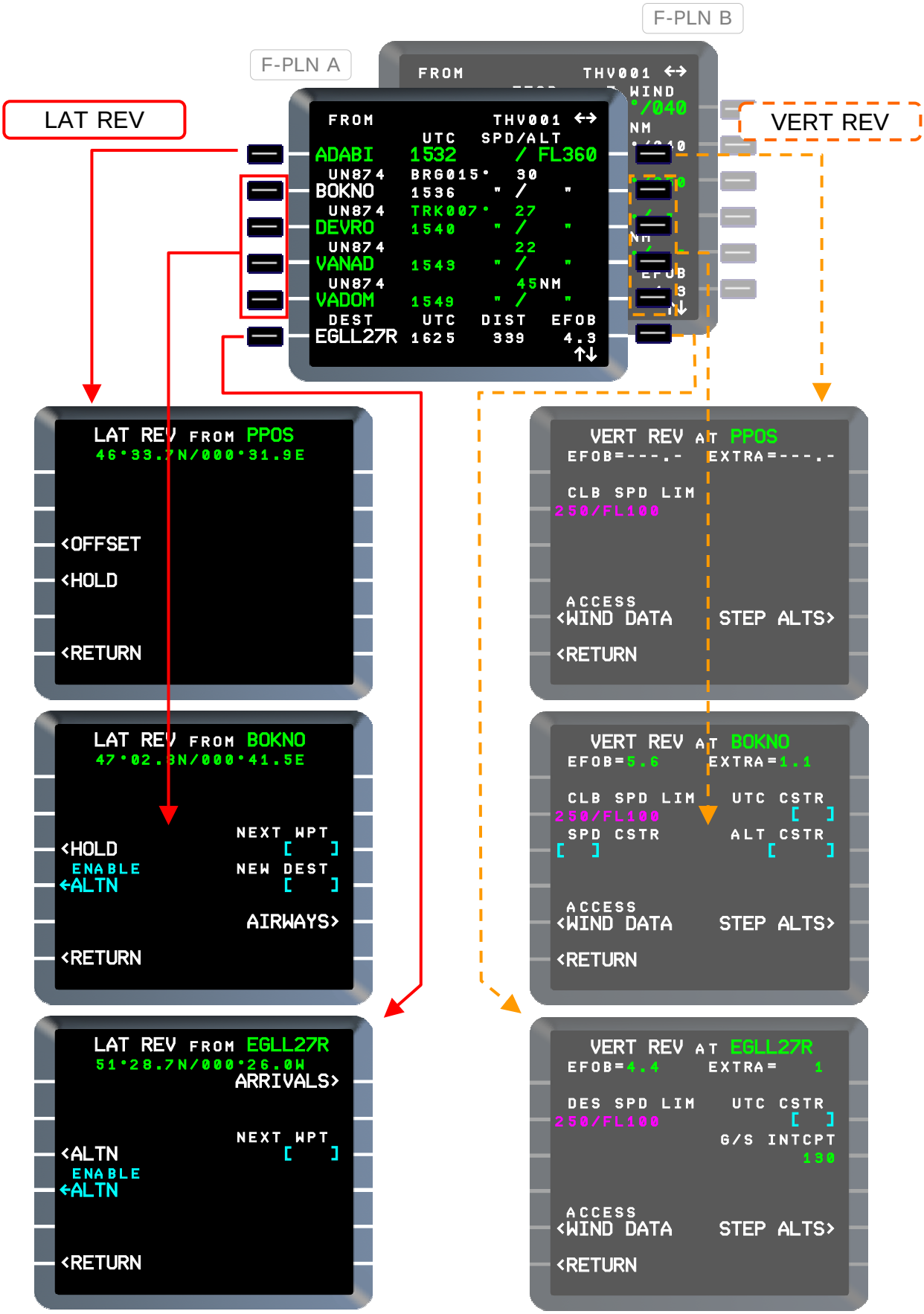
LAT REV FROM other WPT
- Access to HOLD page via [3L],
- Access to ENABLE ALTN function via [4L],
- Access to AIRWAYS page via [5R],

  This prompt is not available from LAT/LONG, PLACE/BRG/DIST, PLACE-BRG/PLACE-BRG,Along Track Offset, Abeam waypoints.
- NEXT WPT [3R], NEW DEST [4R] enable direct F-PLN revisions.

LAT REV FROM DEST
- Access to ALTN page via [3L],
- Access to ENABLE ALTN function via [4L],
- Access to ARRIVAL pages via [1R],
- NEXT WPT [3R] enable direct F-PLN revisions.

LAT REV FROM DISCON
When a LAT REV at a F-PLN DISCONTINUITY is selected, NEXT WPT [3R] and NEW DEST [4R] are only available.

Lateral functions are described in Ch 3.



■ VERT REV

From F-PLN pages A or B, pressing Right LSKs enable access to VERTICAL REVISIONS pages (VERT REV) to make vertical revisions in F-PLN.

Pressing Left LSKs enable access to LATERAL REVISIONS.

VERT REV is not available from:
- Pseudo waypoints (limited access only),
- F-PLN markers.

EFOB and EXTRA fuel at the revise point are displayed in line 2, except at PPOS.

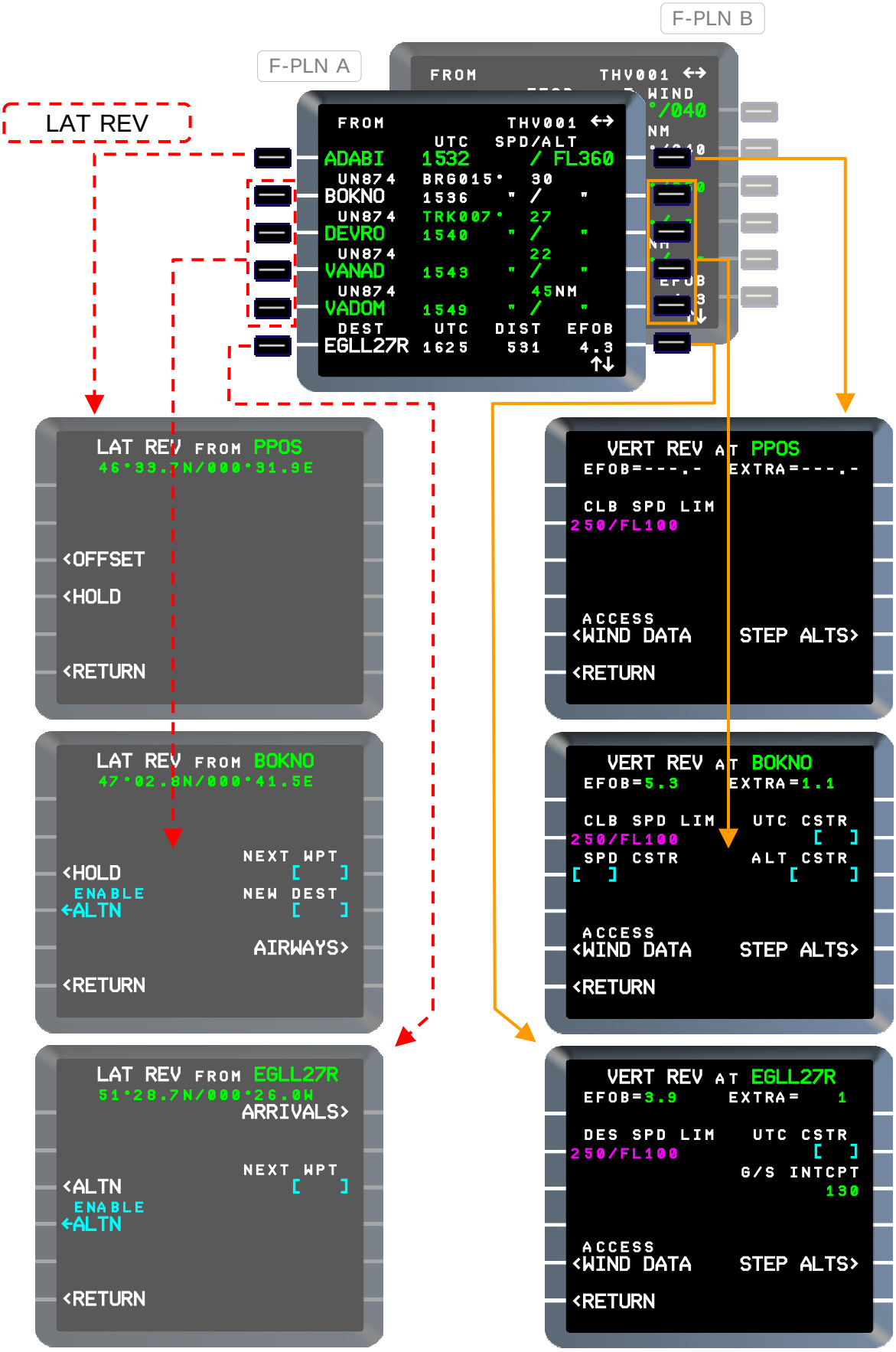
VERT REV FROM PPOS
- CLB SPD LIM [3L] is shown and may be modified.

VERT REV FROM other WPT
- CLB(DES) SPD LIM [2L] is shown and may be modified,
- SPD CSTR [3L], UTC CSTR [2R], ALT CSTR [3R]: these fields enable to enter VERT constraints,
- Access to WIND DATA function via [5L],
- Access to STEP ALTS page via [5R].

ALT ERROR is displayed in CLB or DES when an ALT CSTR error exists.

VERT REV FROM DEST
- CLB(DES) SPD LIM [2L] is shown and may be modified,
- UTC CSTR [2R] enable to enter time constraint at DEST airport,
- Access to WIND DATA function via [5L],
- Access to STEP ALTS page via [5R].

Vertical functions are described in Ch 4.



2.2. TMPY F-PLN

When any revision is made to the ACTIVE F-PLN, a Temporary Flight Plan (TMPY) is created while FMGS continues to provide guidance on ACTIVE F-PLN references.

TMPY F-PLN is displayed in yellow on MCDU and by a dashed yellow line on ND.

The main characteristics of the TMPY F-PLN in the Thales FMS are:

- **Multiple** revisions,
- Computation of track on the principle "what you see is what you'll fly",
- Computation of profile and predictions.

In the examples below, revision has been made to fly HILLY after TIGER.

- *First case shows a by-pass at HILLY,*
- *Second case shows an overfly at HILLY.*

When a revision is made F-PLN page title becomes TMPY and entire F-PLN including ALTN is displayed in yellow with associated predictions.
DEST information is no more displayed but may be accessed by scrolling.

Ex: Waypoint TUNBY is inserted after TIGER

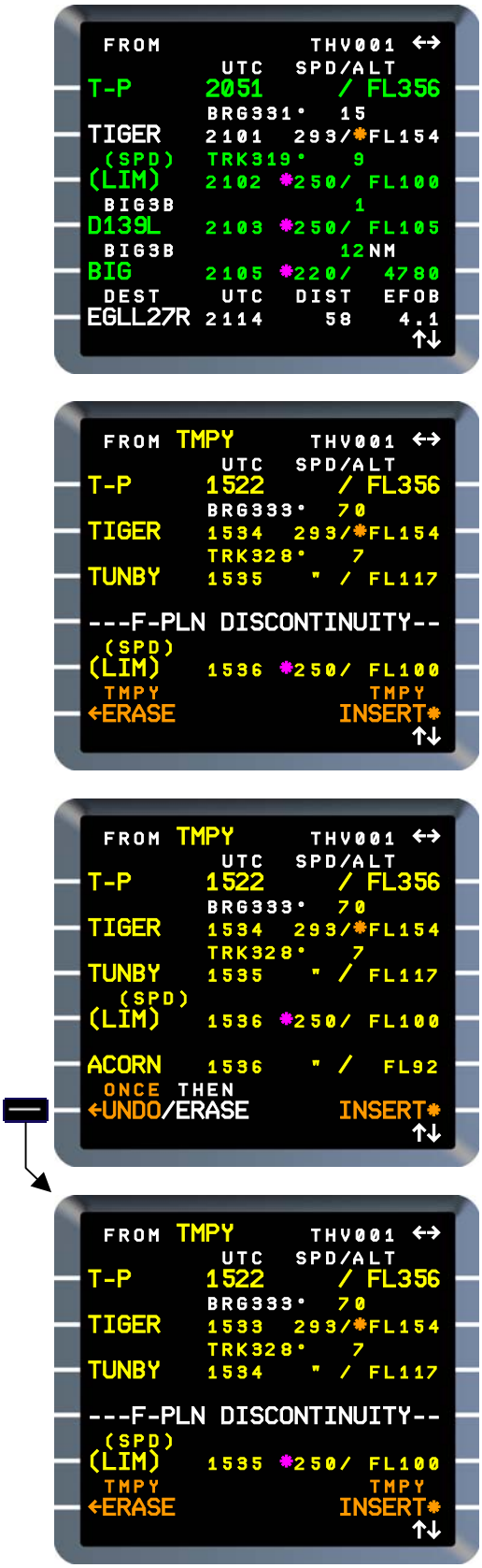
ND .....Check
Check for consistency with the desired revision.

TMPY ERASE [6L] ..... Press
To erase the entered revision,
Or

TMPY INSERT [6R] ..... Press
To activate the entered revision.

If a second or more revisions are made, TMPY ERASE prompt is replaced by
ONCE UNDO / THEN ERASE prompt.
This function enables to delete the last entered revision.

Ex: Waypoint ACORN is inserted after TUNBY. Pressing ONCE UNDO returns to the previous state



When a revision is made not directly on F-PLN page, the displayed page becomes title yellow.

Ex 1: HOLD COMPUTED at BIG

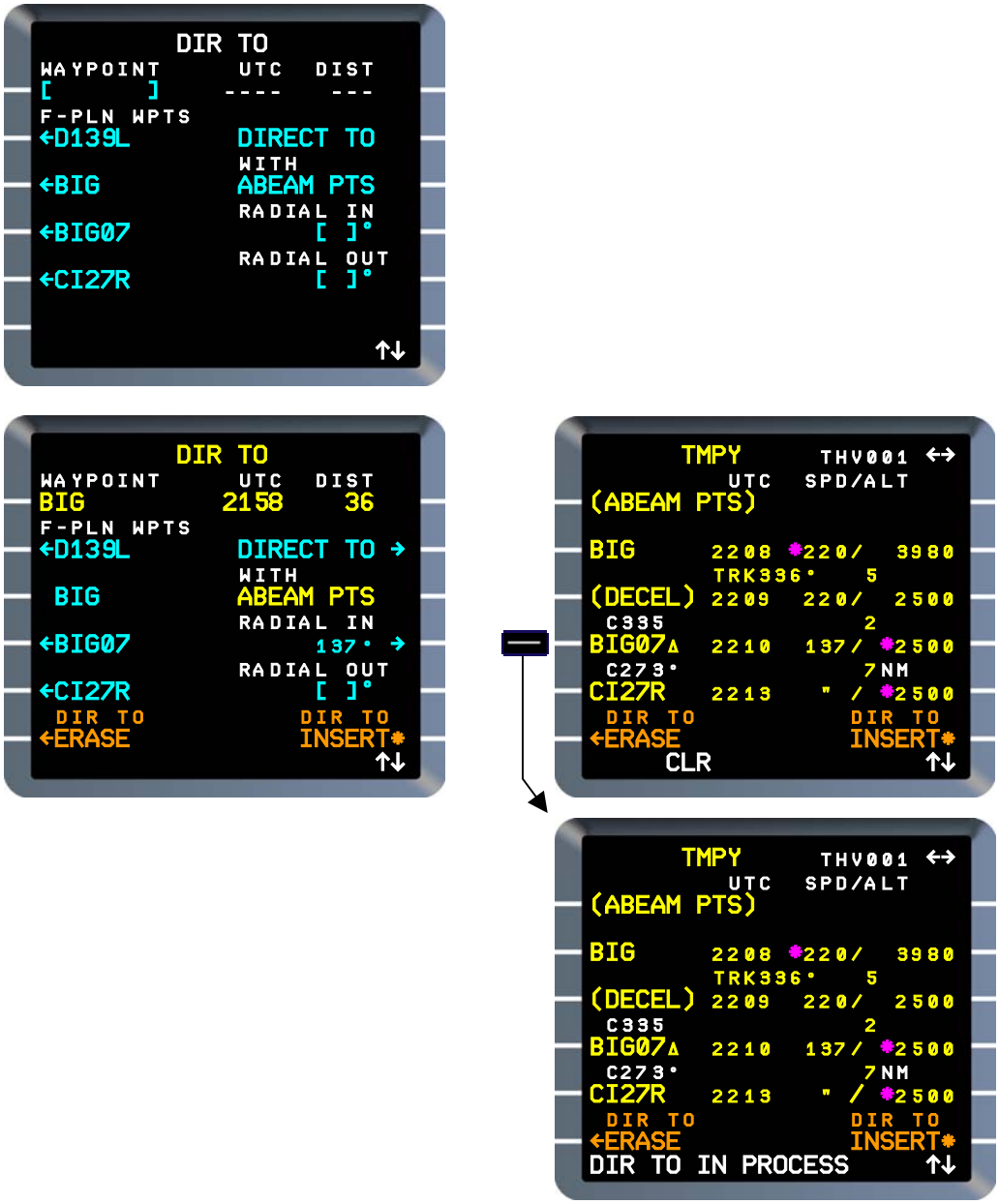
Ex 2: Change ARRIVAL to EGLL

In these cases a TMPY F-PLN prompt [6L] enables to return to F-PLN page for:

- Revision checking with ND,
- Make other revisions when necessary,
- Activation or deletion of the revisions with the above described logic.

Multiple revisions are not permitted while a DIR TO revision is pending and generates "DIR TO IN PROCESS" s-pad msg.

In the example below a DIR TO BIG has been selected and CLR of BIG07 is attempted on the other MCDU.



Examples of TMPY F-PLN are given through out this manual

PAGE INTENTIONALLY LEFT BLANK

Part III: Chapter 3 - LATERAL F-PLN management

Contents

3.1. LATERAL REVISIONS

■ Route revision

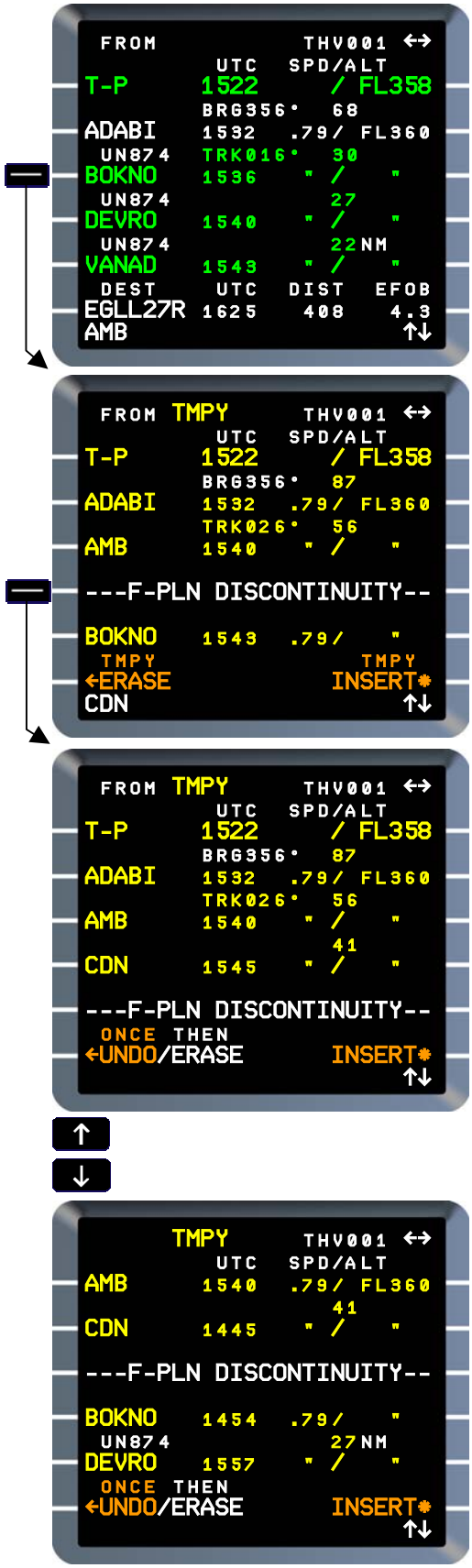
☐ INSERT WPT(s) after the TO WPT

In the example below clearance is after ADABI proceed AMB, CDN then BAMES.

WPT(s) ..... Insert
AMB is inserted after ADABI,
A TMPY F-PLN is created; following WPT appears one line further down separated by a F-PLN DISCONTINUITY.
CDN is inserted after AMB.

ND .....Check
Select ND in appropriate mode to review F-PLN after each revision.

A F-PLN DISCONTINUITY exists between the last entered WPT and the WPT pushed down.



To sequence the F-PLN, enter next required down-path WPT in F-PLN.

In the example: BAMES after CDN.

This automatically sequences the F-PLN which is re-strung, eliminating intermediate WPTs not on desired track.

Another method could be clearing all unwanted WPTs individually and last by clearing the F-PLN DISCONTINUITY.

☐ Change TO WPT

In the example AMB is inserted in place of TO WPT ADABI.

A TMPY F-PLN is created with:

– PPOS in place of FROM WPT,
– F-PLN DISCONTINUITY after PPOS.

Clearing the discontinuity between PPOS and the entered WPT is not allowed; if attempted "NOT ALLOWED" s-pad msg (white) is triggered.

Inserting TMPY F-PLN [6R] is not allowed without selection of HDG mode; if attempted "SELECT HDG/TRK FIRST" s-pad msg (white) is triggered.
After selection of HDG mode NAV is not available.
NAV may be recovered by using the DIR TO function.

☐ DELETE WPT(s)

In the example clearance is: after ADABI proceed direct to BAMES.

First method is to clear all unwanted WPT(s) individually.
Clearing a WPT creates a TMPY F-PLN and a discontinuity between the cleared and the next WPT.

In the example BOKNO, DEVRO, VANAD, VADOM are cleared successively.

ND .....Check
A discontinuity exists now between ADABI and BAMES.

Clearing the discontinuity sequences the F-PLN.
TMPY F-PLN can be inserted.

The **second method** is preferable when several WPTs or a long segment must be deleted.
In the example BAMES is entered after ADABI.
A TMPY F-PLN is created.
All WPTS between ADABI and BAMES are collapsed; F-PLN is sequenced.

ND .....Check

TMPY F-PLN can be inserted.

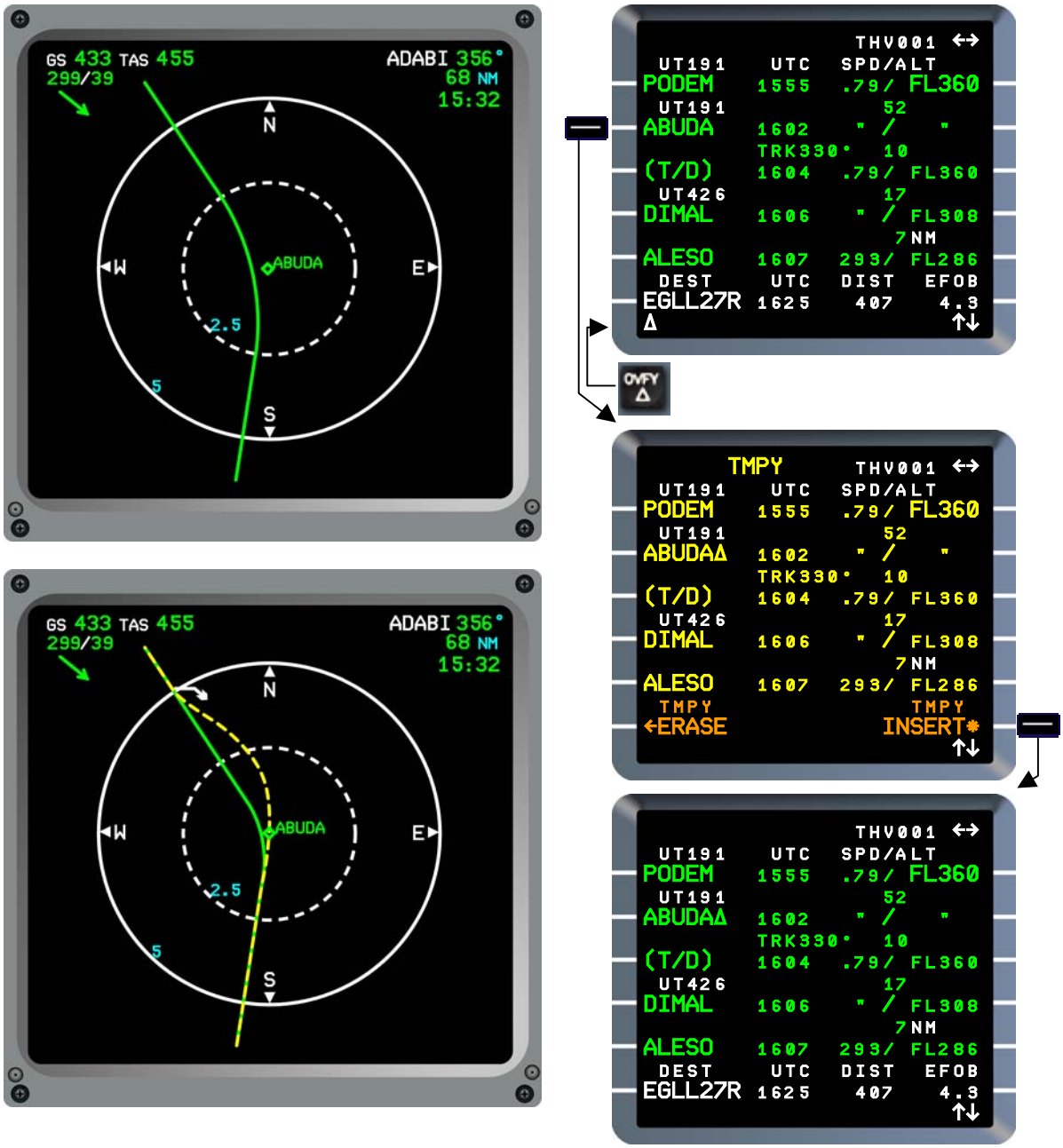
☐ OVERFLY A WPT (OVFY)

If no overfly has been specified (in NAVdb) and a turn is anticipated, the FMS computes a "by-pass" of the WPT.
Pilot may also impose overfly over WPT by the OVFY key.

OVFY key .....Press
Symbol (Δ) is entered in scratchpad

Ex: overfly ABUDA is requested

Left LSK at WPT .....Press
A TMPY F-PLN is created; WPT is displayed with suffix Δ**;** ND displays predicted track.



OVFLY symbol at the TO WPT is shown white.

☐ NEXT WPT

This function may be used to collapse several WPTs in the F-PLN.

In the example below clearance is after ADABI proceed direct to BAMES.

LAT REV at WPT..... Press

Ex: ADABI
LAT REV page is accessed.

WPT [3R] .....Enter

Ex: BAMES
MCDU reverts to TMPY F-PLN page

ND .....Check
If correct

TMPY INSERT [6R] ..... Press

If the entered WPT is not part of the ACTIVE F-PLN, a discontinuity is created.

☐ AIRWAYS

An example of use AIRWAYS function is described in Part II: Preflight Ch 2.2.

The AIRWAYS function may be used to enter or revise F-PLN containing AWYs segments, saving time and reducing risk of error.

AIRWAYS is accessed from any WPTs except PPOS, DEST, Pseudo WPTs and F-PLN markers (e.g. F-PLN DISCONTINUITY).

General rules:
- Entered AWY in VIA field [1L] must match where the revision is intended,
- Entered WPT in the TO field [1R] must belong to the entered AWY.

Otherwise entry is not accepted and "AWY/WPT MISMATCH" s-pad msg (white) is triggered.
ND should be used with appropriate mode/range to check entered revisions.

In this example AIRWAYS function is used to enter a F-PLN revision following a route change: after FOUCO proceed UT209 to TUDRA then UT158 to AMB, then UN859 to VANAD.

Proceed as follows:

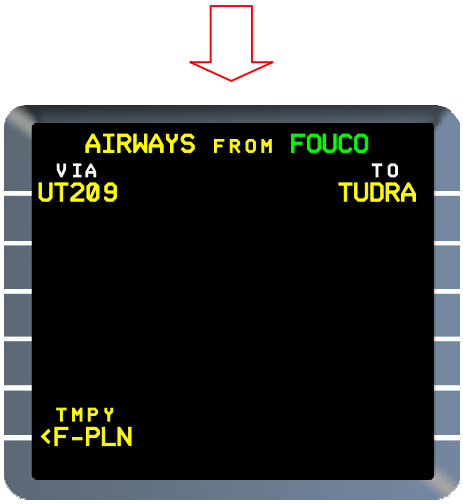
Lat REV at *FOUCO* ..... Press

AIRWAYS [5R] .....Press

VIA *UT209* [1L] .....Enter

TO *TUDRA* [1R] .....Enter

TMPY F-PLN [6L] .....Press



Then, enter following AWYs successively as *At TUDRA UT158 to AMB, at AMB UN859 to*

ND .....Check

If correct.

TMPY INSERT [6R] ..... Press

■ NEW DEST

This function is used to change the DEST airport either after a go-around if a diversion is intended or at any time for an en-route diversion.
LAT REV must be selected **at the WPT from which it is intended to divert**.

An example of diversion after a go-around is described in Part II: Go-around Ch 8.4 (Diversion not prepared).

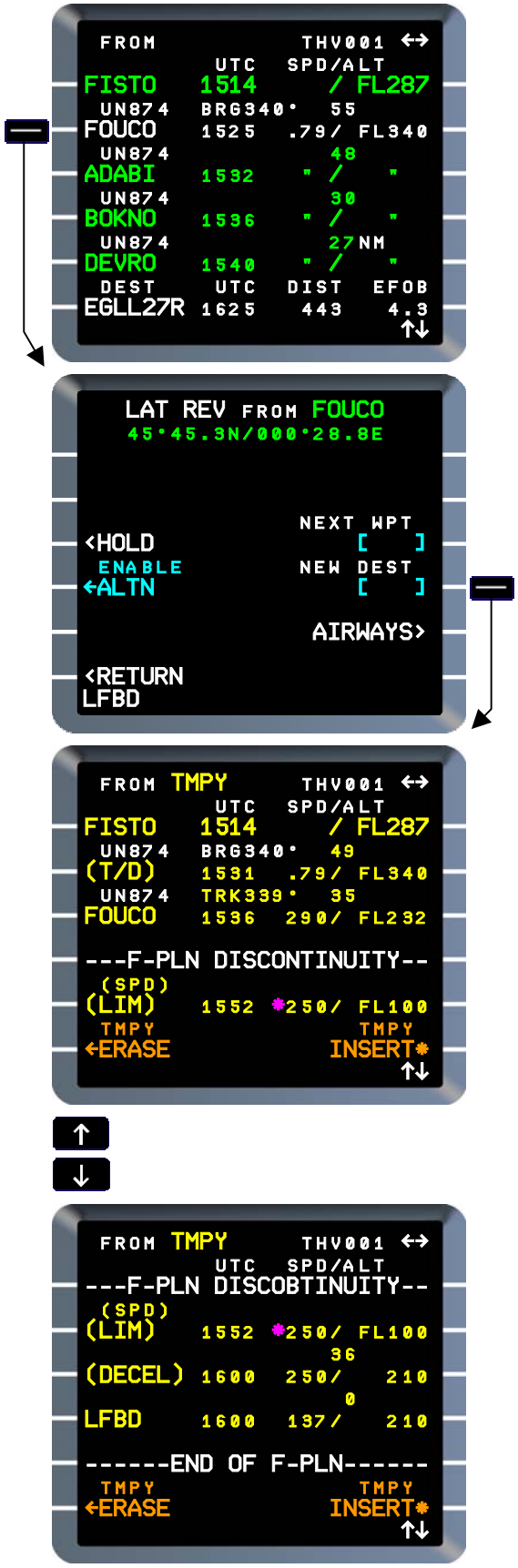
In the following example it is intended to divert to LFBD at FOUCO.

LAT REV at revise point **....Press**

NEW DEST [4R] .....Enter

Ex: LFBD
TMPY F-PLN is displayed.

All WPTs after the revise point (*FOUCO*) **are deleted**.
Route to the new DEST must be entered.

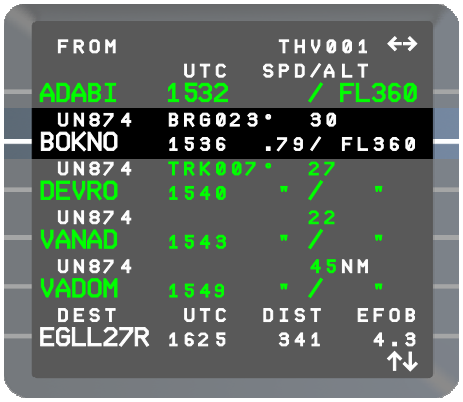


3.2. F-PLN SEQUENCING

■ Automatic sequencing

F-PLN is sequenced **automatically** when A/C overflies the WPTs of the ACTIVE F-PLN or crosses with a XTRK error less than 5NM.

In the example below, A/C is in HDG mode, ADABI has been passed with a XTRK error less than 5 NM, F-PLN is sequenced, TO WPT is BOKNO.



■ Manual sequencing

When the WPT is crossed with a XTRK error greater than 5 NM, F-PLN must be sequenced manually.

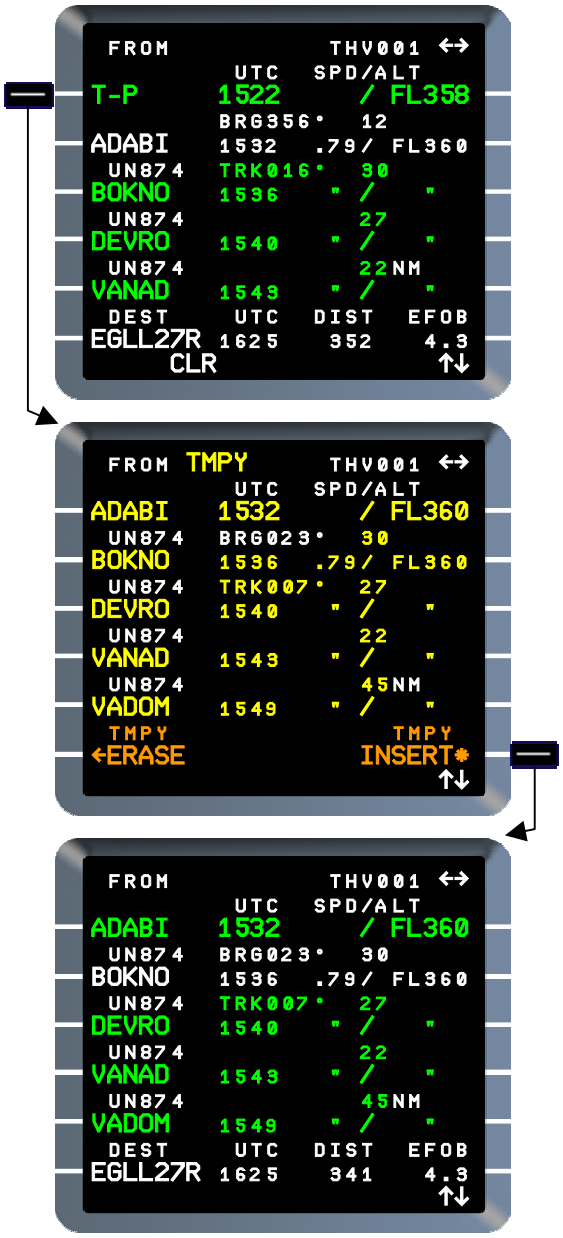
To sequence the F-PLN manually:

FROM WPT [1L]..... Clear

T-P in the example
TMPY F-PLN is displayed.

In the example ADABI becomes the FROM WPT.

TMPY INSERT [6R] .....Press
TO WPT is now BOKNO (white)



In the example HDG is towards the leg to intercept, thus an INTCPT waypoint is computed; otherwise "SELECT HDG TRK FIRST" s-pad msg would be triggered.

TO WPT displayed on ND (top right) and on F-PLN page (white color) should be monitored.

■ Stringing rules

The F-PLN is built from departure to arrival with different elements which are RWY/SID, En-route, STAR/RWY. All elements must be strung together; otherwise they are strung by a F-PLN discontinuity.

☐ At departure

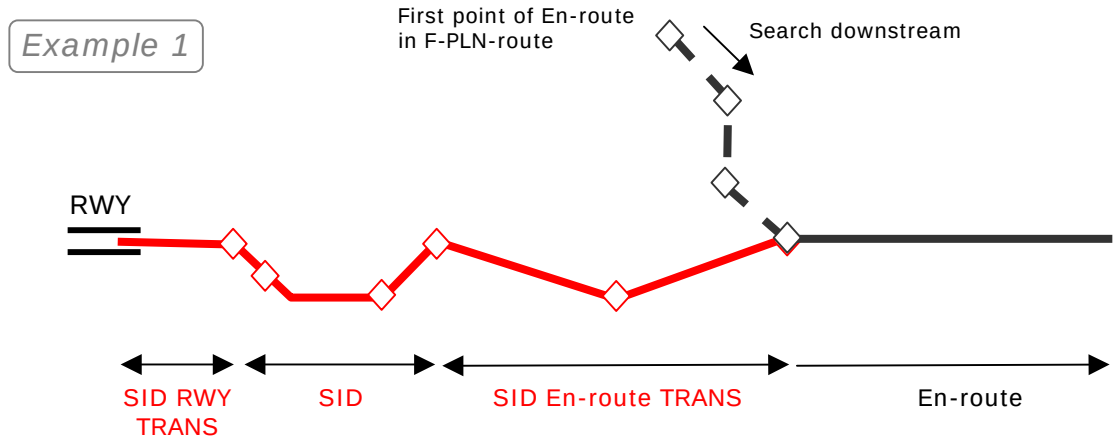
Depending on airport and NAVdb provider, departure may contain up to three segments: SID runway transition, SID and SID en-route transition. When selected from DEPARTURE page they are strung together as described below.
When an en-route segment is already entered, the FMS "searches" in F-PLN for a WPT matching the end-point of departure route.

- If found, DEP route is strung to this WPT; any preceding en-route WPTs are ignored *(example 1)*,
- If not found, DEP and en-route segments are strung by a F-PLN discontinuity *(example 2)*.

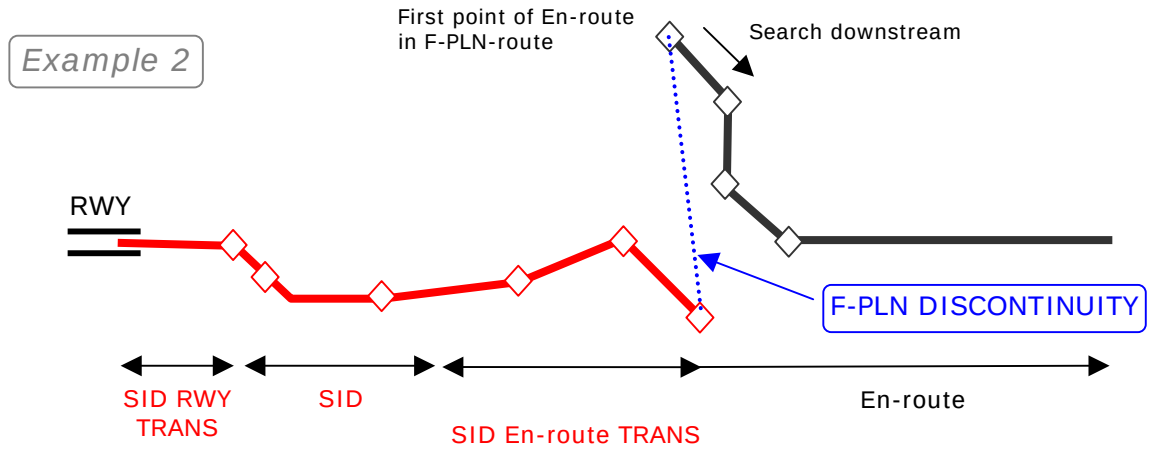
EOSID (when available) contains only one segment.

If a RWY is selected with no SID, the departure procedure is defined by RWY and a leg terminating at 1500 ft AGL on the RWY axis, followed by a F-PLN discontinuity.

Example 1

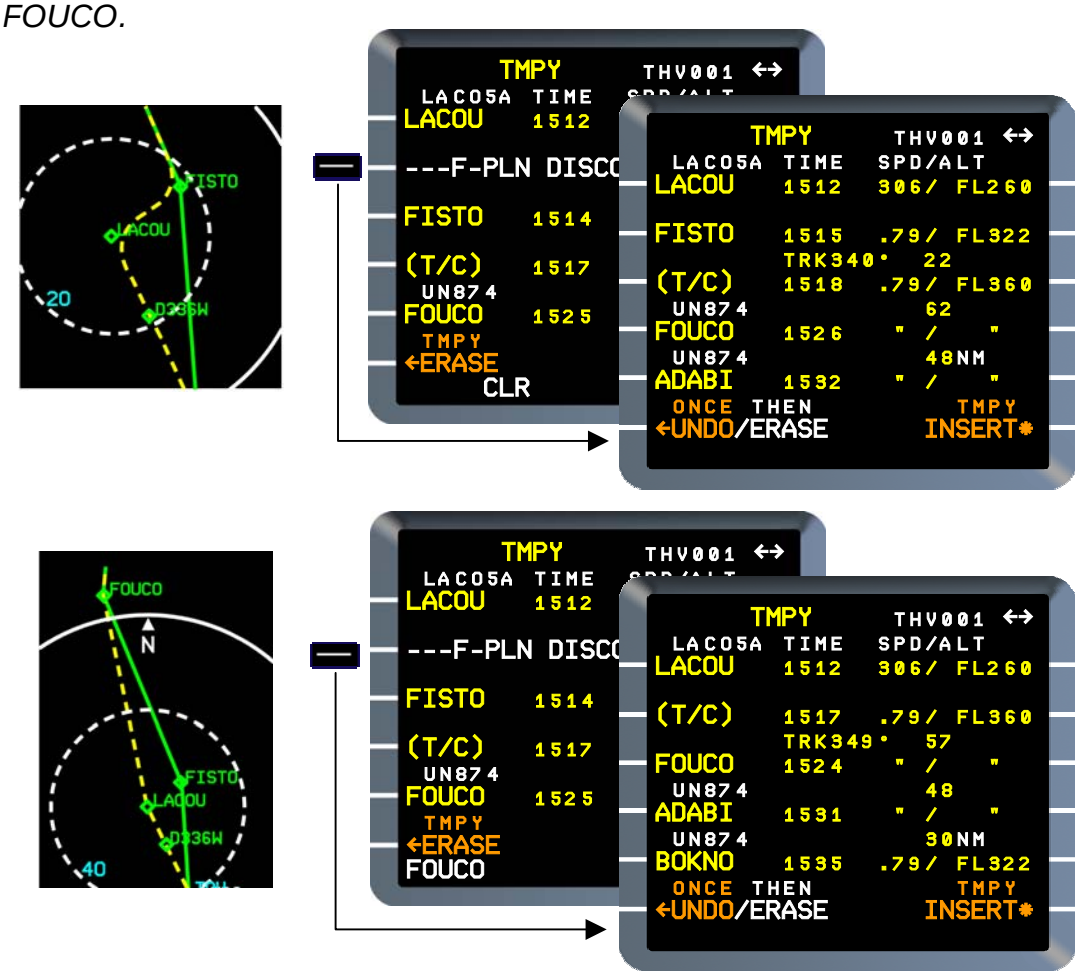


Example 2



In the following example DEP FISTO 5A at LFBO has been changed to LACOU 5A. Last WPT of departure (LACOU) does not match any en-route WPT, then a F-PLN DISCONTINUITY is created.

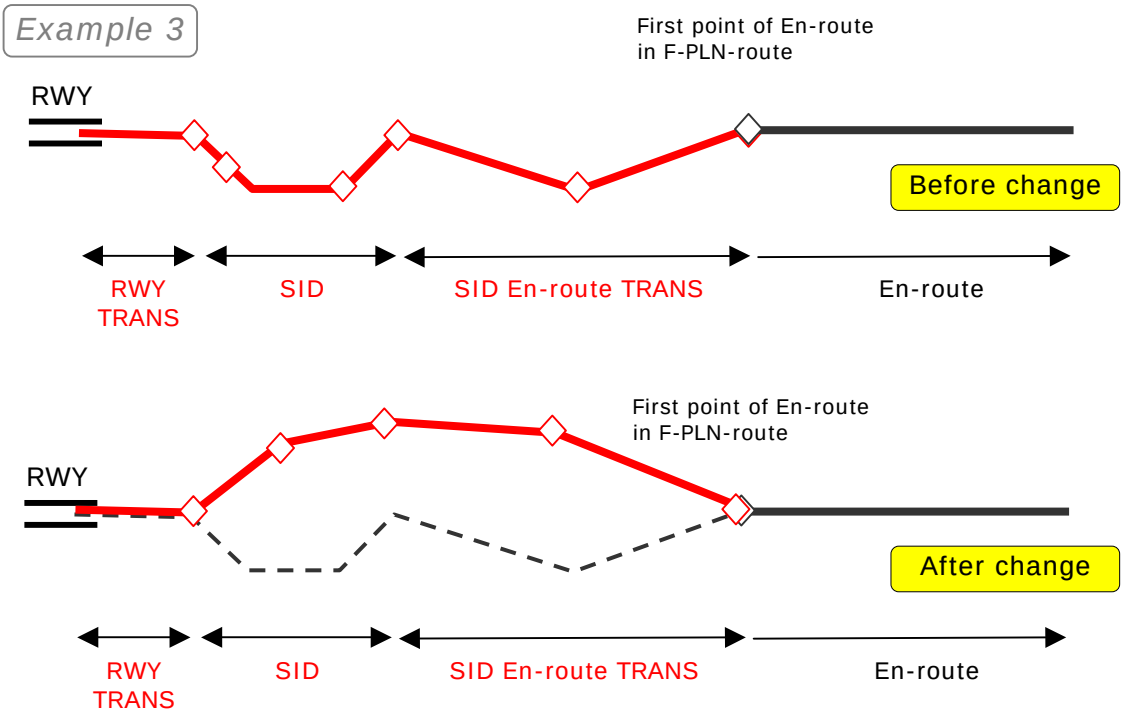
To complete F-PLN, pilot may (according to ATC clearance) either CLR the discontinuity, which will string LACOU to FISTO, or enter FOUCO after LACOU which would collapse any existing WPT(s) between LACOU and FOUCO.



☐ Change selected SID (with or without RWY change)

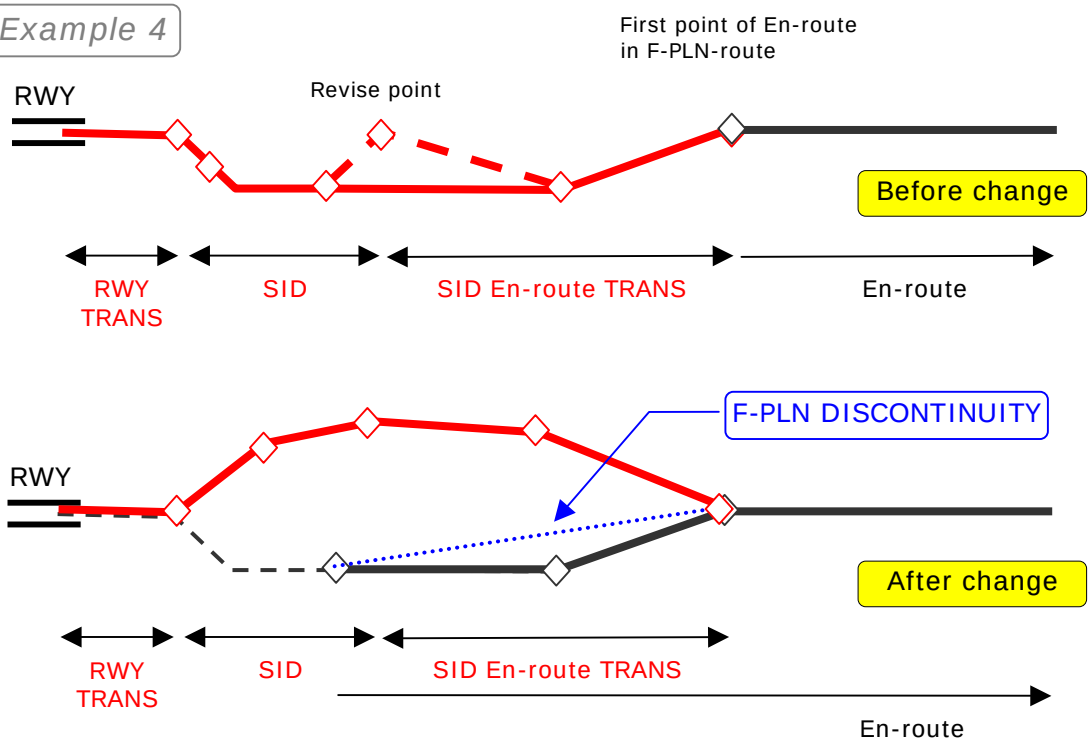
- **If no revision has been made** in the previous departure, the new SID is automatically re-strung; if last WPT of the new SID belongs to ACTIVE F-PLN, no F-PLN discontinuity exists *(Example 3)*.

Example 3



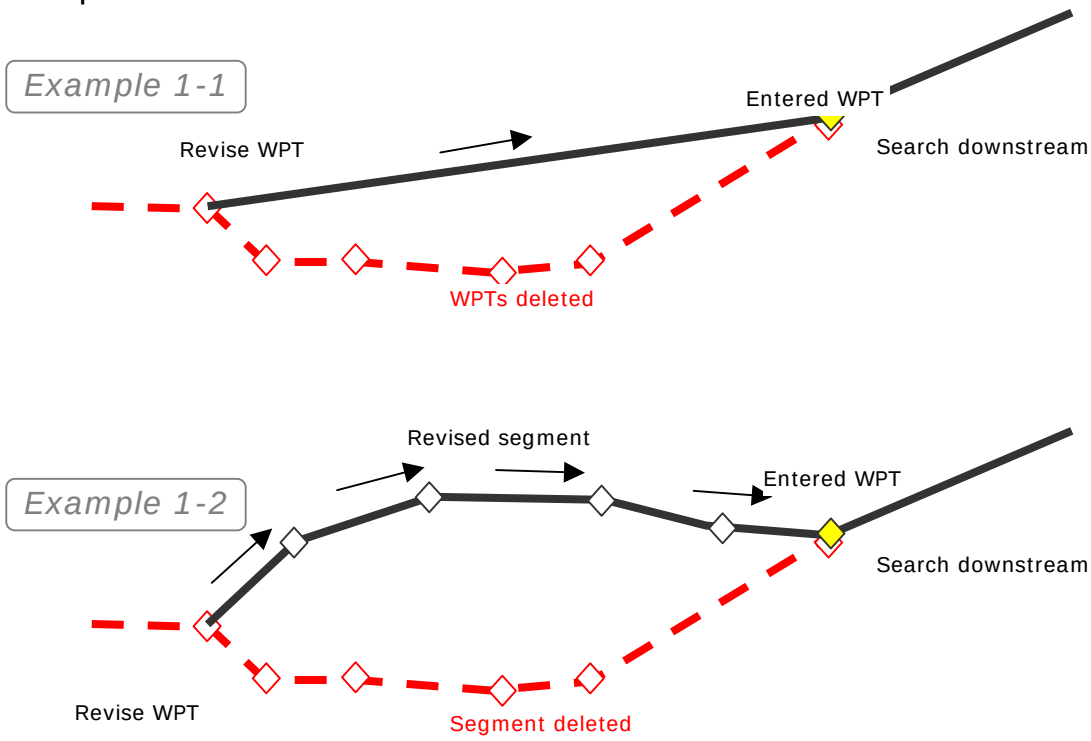
- **If a revision has been made** in the previous departure, part of SID <u>from</u> the revise point becomes part of en-route segment; a F-PLN discontinuity is created between last WPT of the new SID and start of en-route segment *(Example 4)*.

Example 4

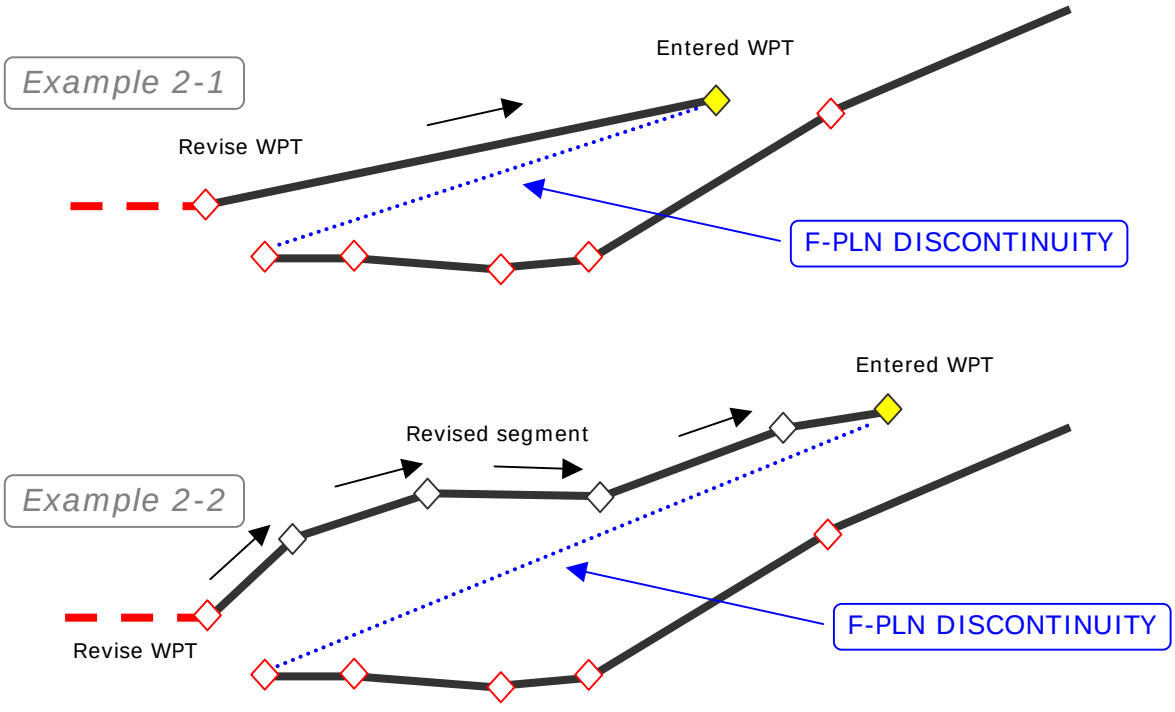


☐ En-route

If the entered WPT *(Ex.1-1)* or, the end WPT of the entered segment *(Ex.1-2)* belongs downpath to the F-PLN, intermediate WPTs are collapsed.

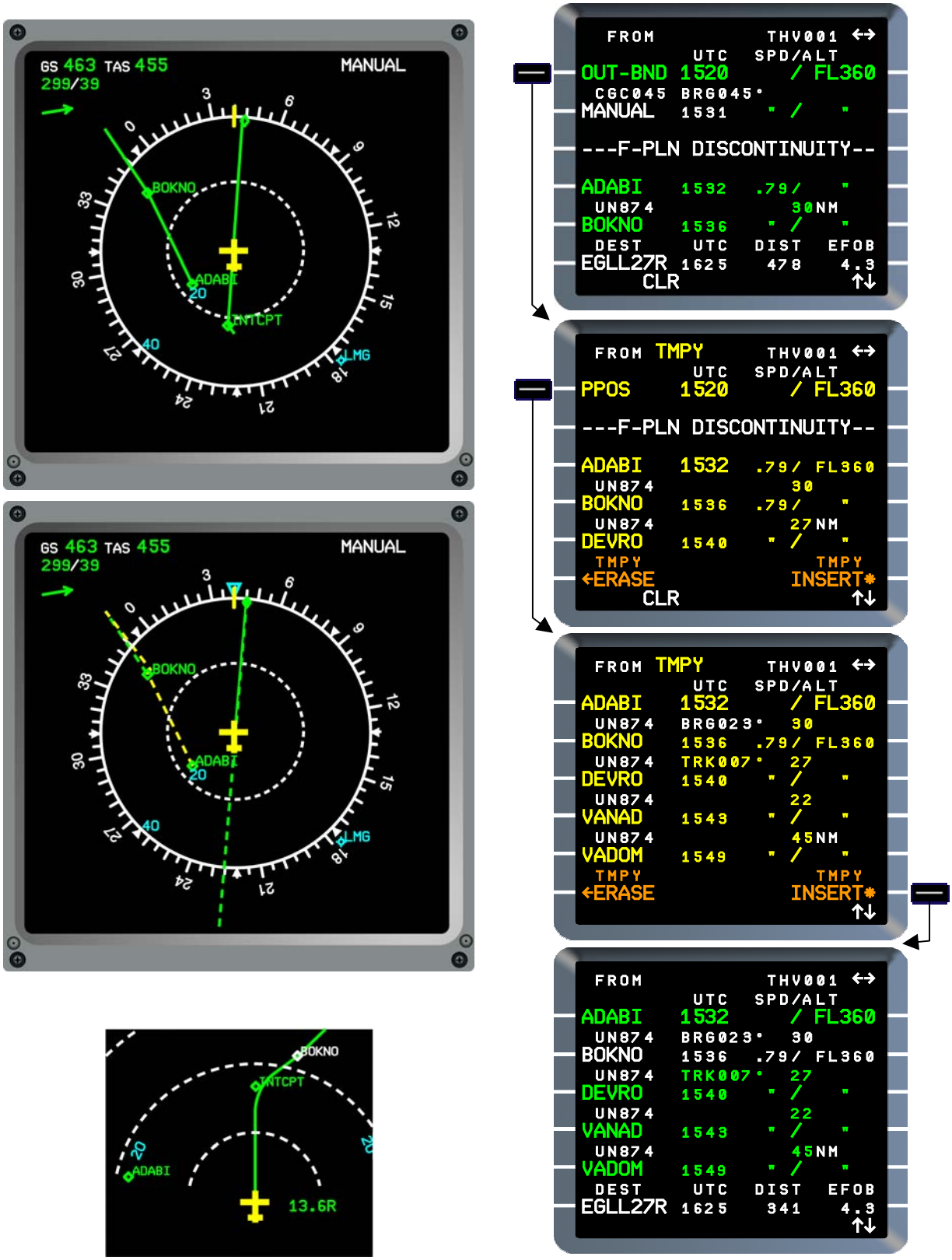


If the entered WPT *(Ex.2-1)* or, the end WPT of the entered segment *(Ex.2-2)* is not in F-PLN, the last entered WPT is strung with the WPT following the revised WPT by a F-PLN discontinuity.

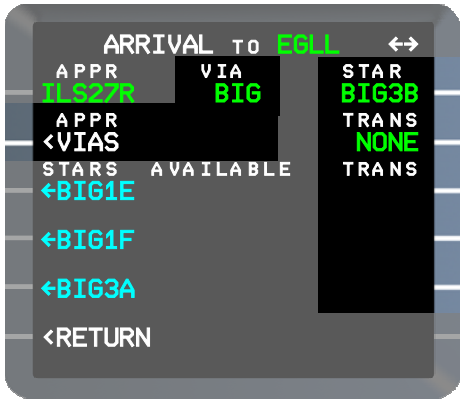


☐ Manual legs

This type of leg cannot be deleted by clearing the discontinuity. Desired leg must be selected by successive CLR actions with A/C in HDG mode. To return on track select appropriate HDG/TRK to enable INCPT to be computed; NAV mode can then be re-engaged.



☐ At arrival

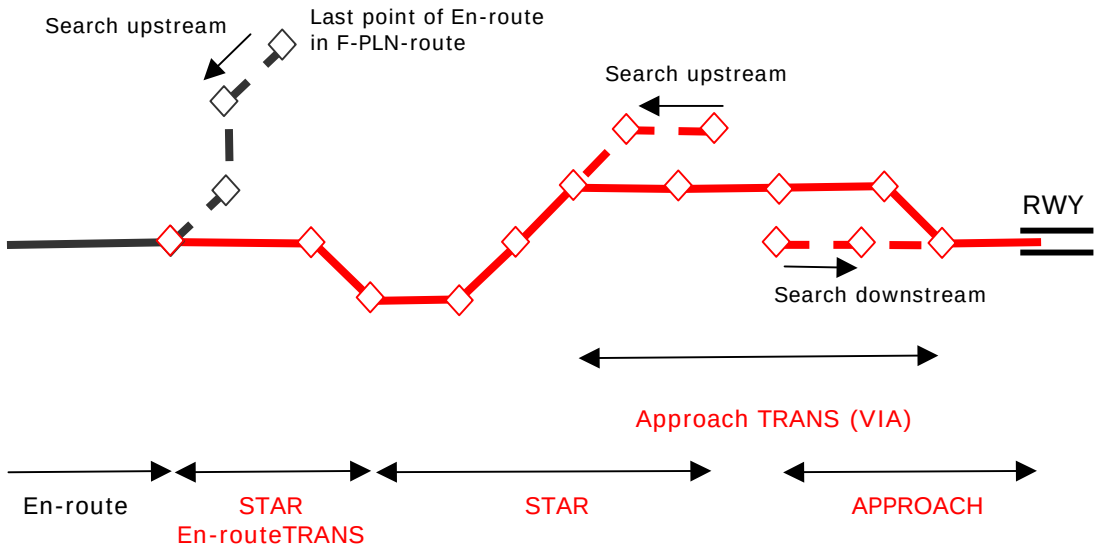


Depending on airport and NAVdb provider, arrival may contain up to four segments: TRANS (STAR en-route transition), STAR (including STAR runway transition), APPR VIA (approach transition), APPR (final approach, including runway and missed approach).
When selected from ARRIVAL page, they are strung together as described below:

- STAR en-route transition, STAR and STAR runway transition are strung to build a STAR segment,
- The approach transition is strung with the approach to build an APPR segment,
- The STAR and APPR segments are strung together to build the arrival procedure,
- The arrival procedure is strung to the F-PLN.

If RWY is selected with no STAR approach is defined as a leg starting 5 NM on RWY axis.

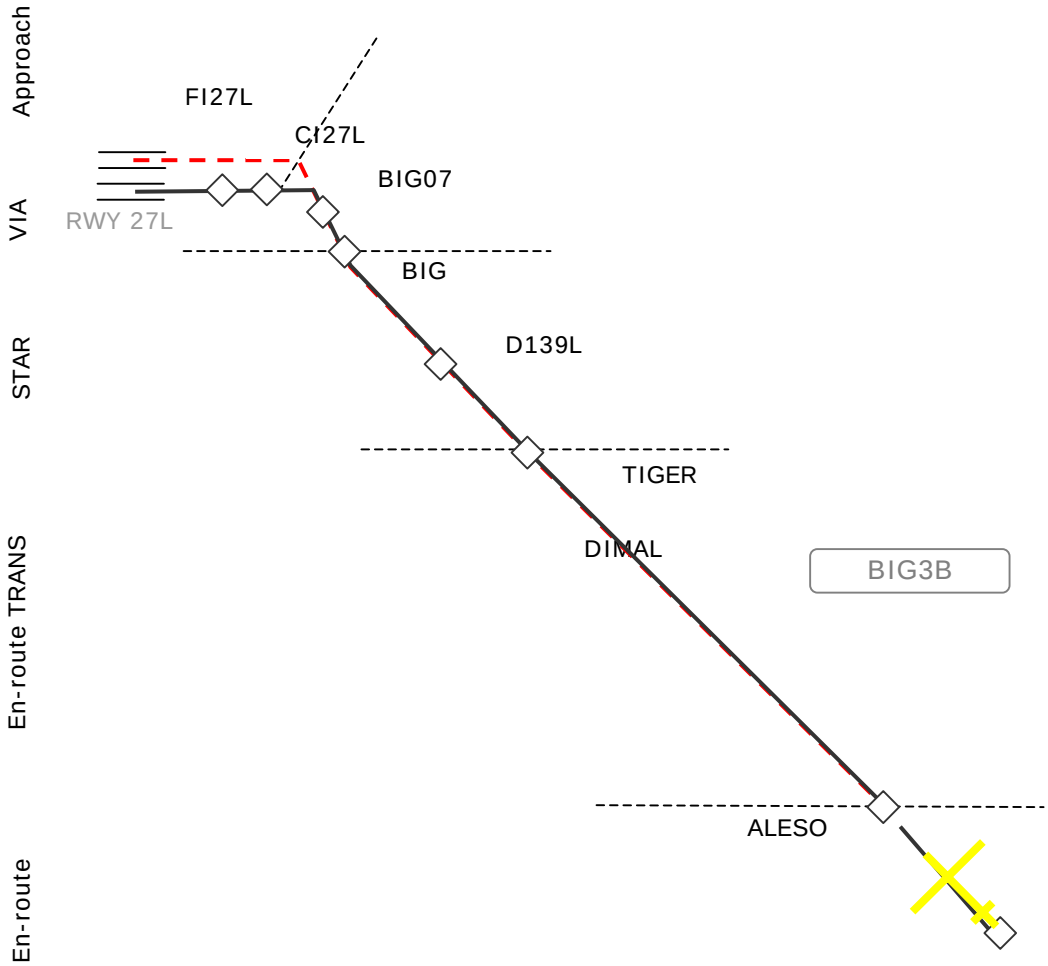
Picture below shows scheme for waypoint matching.



☐ Changes during arrival

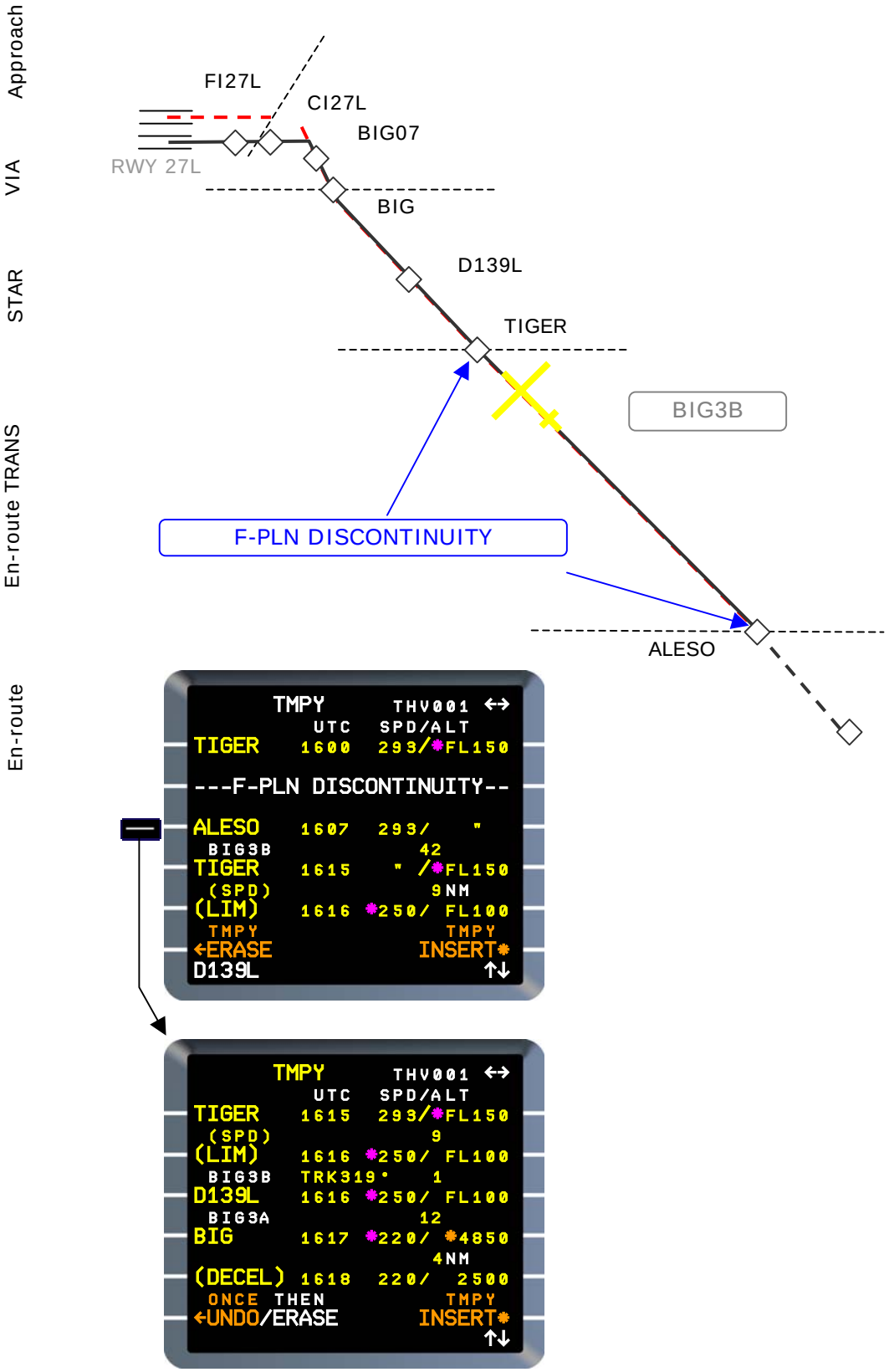
Ex: A change for RWY 27L during arrival at EGLL

- **If changes are made before starting STAR**: All WPTs are strung. No action is required.



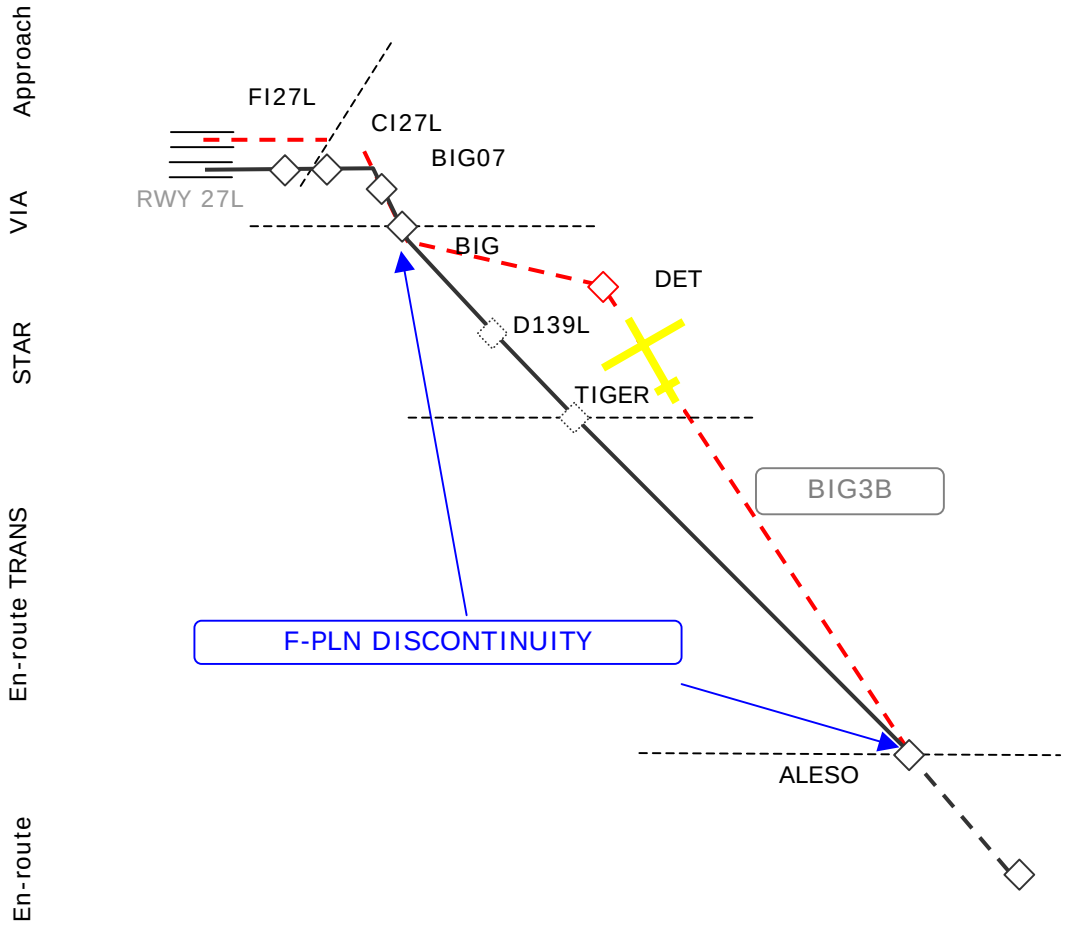
- **If changes are made during arrival**: A change to any element of the arrival procedure results in the complete re-stringing of the selected arrival elements from the NAVdb.

  In the following example, a complete arrival has been re-strung after TIGER creating a discontinuity. Entering D139L (next WPT after TIGER), re-strings the F-PLN.

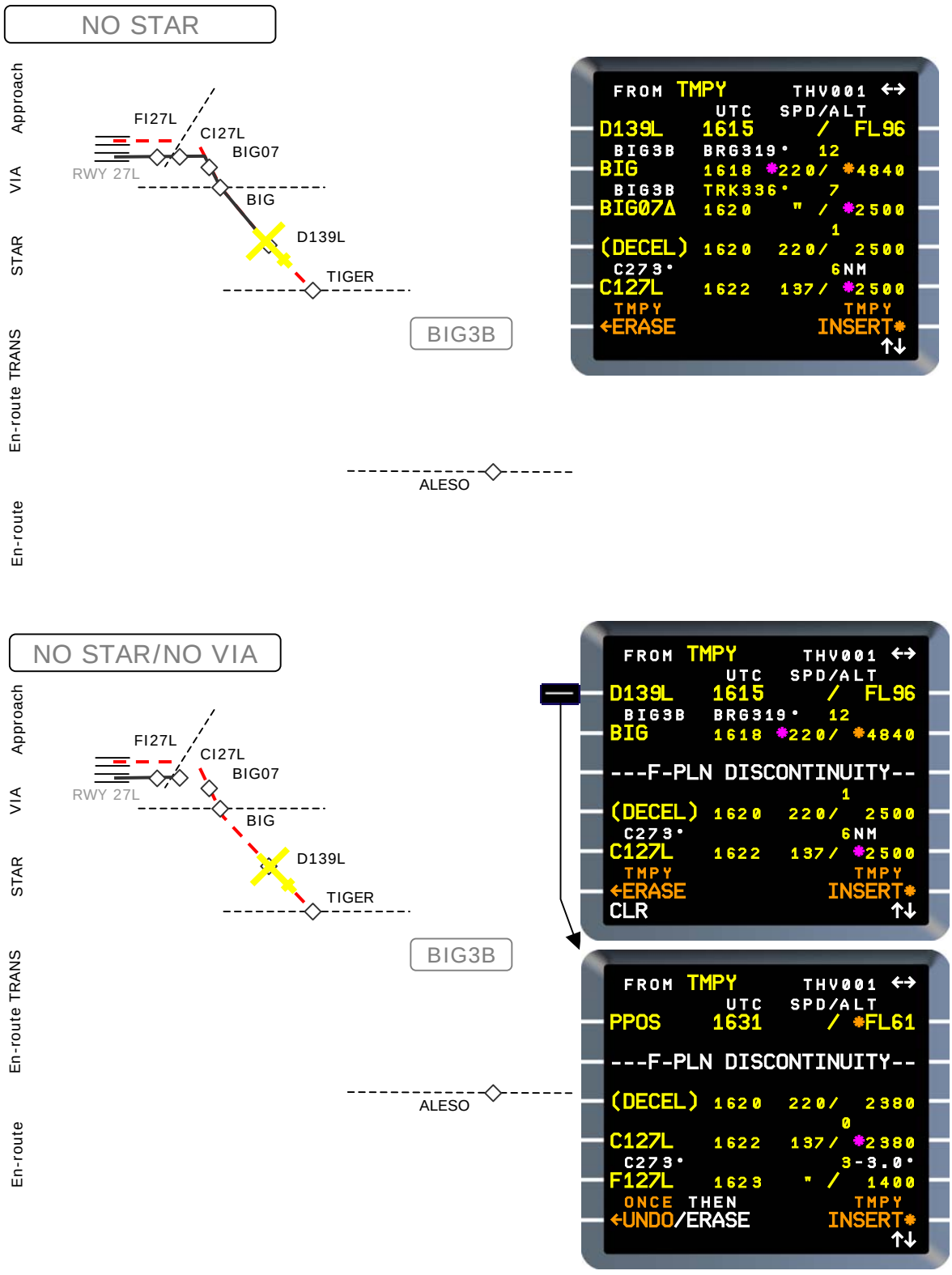


- **If changes are made during arrival and a revision has been made in the previous arrival**: arrival procedure is re-strung from the previous revise point; segments before the revise point becomes part of En-route segment.

  In the following example, revision has been entrered to proceed DET after ALESO; En-route ends is now BIG. Selection of the new arrival is re-strung from BIG; a discontinuity exists between BIG and ALESO, start of arrival procedure.



To avoid a complete re-stringing of the arrival NO STAR or/and NO VIA may be selected.



In any case, to string the F-PLN, write and enter the desired WPT after the TO WPT, which collapse the unwanted WPT(s) or segment.

Incorrect lateral trajectory

Lateral anomaly (shift) may occur in case of two consecutive legs with altitude termination.
This involves SID/EOSID and Missed Approach procedures that include a "Fix to an Altitude" leg preceded by another leg with altitude termination.
This case should be identified during preflight and approach preparation and flown in selected lateral mode (HDG/TRK).
In case of shift, raw data should be used to fly the procedure.

Refer to Operator's manual and/or Airbus OEB for more details.

Speed anomaly during a TMPY F-PLN insertion

In cruise with speed managed, a transient speed target drop may occur when inserting a TMPY F-PLN or activating a SEC F-PLN.
While re-calculating the correct target speed, FMGC may refer to an optimum speed estimated earlier in the flight.
In this case select speed as required.
Managed speed may be re-selected when the correct target speed is shown on PRF CRZ page (delay may be approx. 10 seconds).

Refer to Operator's manual and/or Airbus OEB for more details.

3.3. DIR TO function

■ General

The following functions are available by accessing the DIR TO page.

- DIRECT TO [2R]:
  The active leg is changed to a direct track from present position to selected WPT in [1L].
- ABEAM PTS [3R]:
  Function is same as above but existing WPTs in the ACTIVE F-PLN between position and DIR TO WPT are projected onto the DIR TO leg.
- **RADIAL IN [4R] - RADIAL OUT [5R]**: a radial from the selected WPT is intercepted and tracked inbound to (radial in) or outbound from (radial out) that WPT.

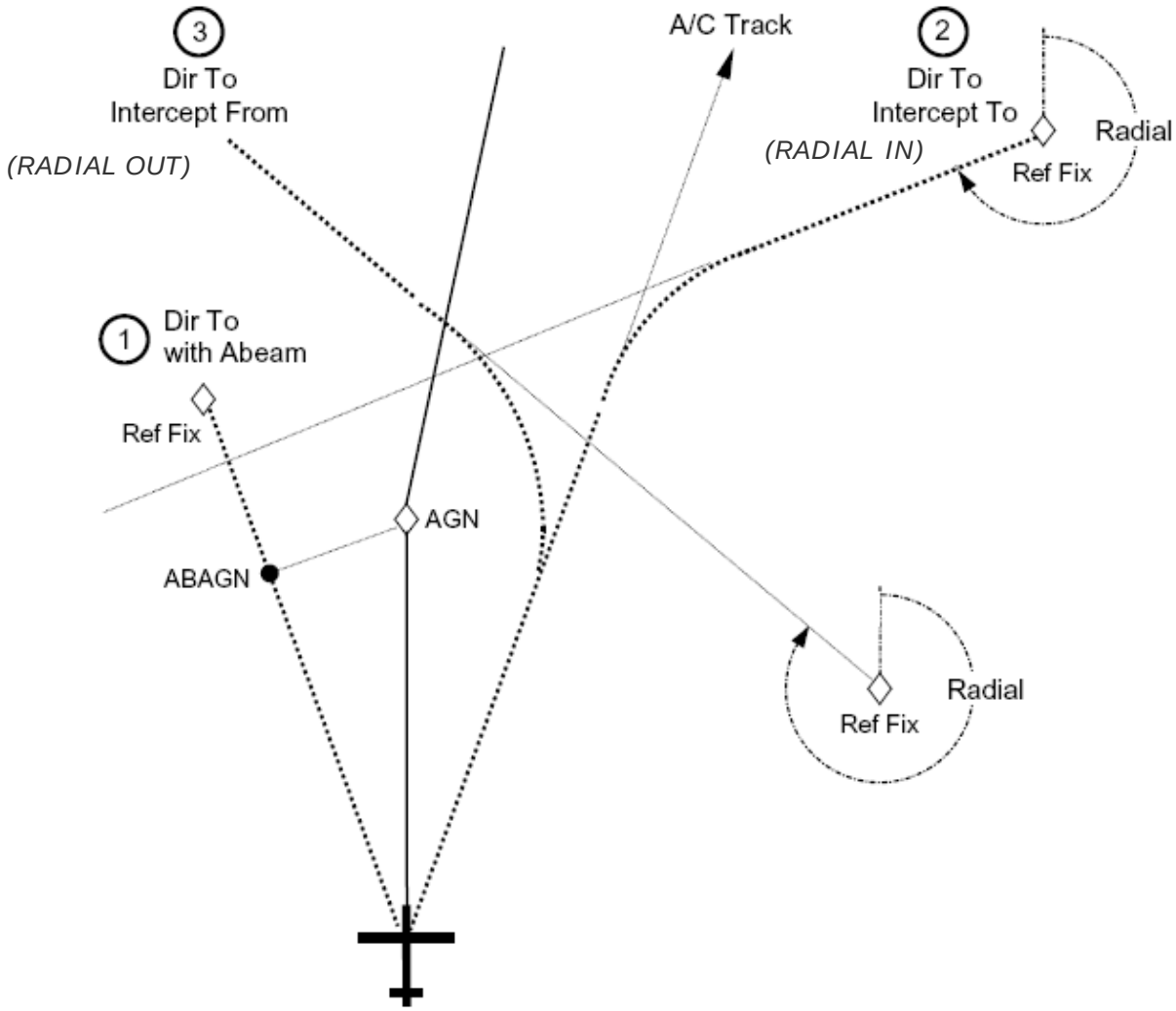
Depending on option selected in AMI file, field [3R] or [2R] of DIR TO page is defaulted yellow for direct access to ABEAM PTS (option 1) or DIRECT TO (option 2) function.

When a WPT is inserted in field [1L] a TMPY F-PLN is created, DIR TO title page becomes yellow; F-PLN page, if selected on opposite side, is titled TMPY (yellow).

Multiple revisions on TMPY F-PLN are not allowed when DIR TO is selected, which must be inserted before any other revision.
If another revision is attempted on the TMPY F-PLN, “DIR TO IN PROCESS” s-pad msg (white) is triggered.

Figure below shows the different capabilities of the DIR TO function:

1. Dir To: proceed direct to a reference fix with or without creation of abeam waypoints (DIRECT TO - ABEAM PTS function),
2. Dir To Intercept To: proceed direct to intercept a Radial TO a reference fix (RADIAL IN function),
3. Dir To Intercept From: proceed direct to intercept a Radial FROM a reference fix (RADIAL OUT function).



■ ABEAM PTS / DIRECT TO functions

DIR key .....Press
The DIR TO page is accessed, showing the next 4 ACTIVE F-PLN WPTs in L data fields; scroll up to view subsequent WPTs.

☐ If WPT is in ACTIVE F-PLN

Required WPT .... Select / Press
Scroll up if necessary to place desired WPT in view, **or** enter in scratchpad the desired WPT.

Ex: "Cleared from present position direct to VANAD". Press [3L] adjacent to VANAD.
TMPY DIR TO page is displayed on MCDU, showing selected DIR TO WPT in [1L] (yellow).

● **If ABEAM PTS are desired:**

ABEAM PTS [3R] .....
..... Confirm / Press
If Option 1 is defaulted, ABEAM PTS is displayed yellow, if not press [3R].

ND shows direct track (dashed yellow), as entered, superimposed on existing ACTIVE F-PLN.

Abeam WPTs are named ABxxxxx, xxxxx representing the first five characters of the relative WPTs.

Ex: ABADAIB, ABBOKNO, ABDEVRO

Check DIR TO track (dashed yellow) is correct on ND.

If correct:

DIR TO INSERT [6R]..... Press
F-PLN page is displayed

ACTIVE WPT .....Check
DIR TO track is now the ACTIVE leg (solid green) of F-PLN, starting at the Turning Point (T-P).

If not correct:

DIR TO ERASE [6L]..... Press
Make appropriate revision.

F-PLN page:
If selected on opposite side, title is TMPY with DIR TO leg from T-P to selected WPT.
When DIR TO is inserted, ABEAM PTS become WPTs of the ACTIVE F-PLN.

Abeam WPTs are named ABxxxxx, xxxxx representing the first five characters of the relative WPTs.

Ex: ABADABI, ABBOKNO, ABDEVRO

- **If ABEAM PTS are not desired:**

DIRECT TO [2R] .....
..... Confirm / Press

If Option 2 is defaulted, DIRECT TO is displayed yellow, if not press [2R].
ND shows direct track (dashed yellow), as entered, superimposed on existing ACTIVE F-PLN.
Check DIR TO track (dashed yellow) is correct on ND.

If correct:

DIR TO INSERT [6R]... Press
F-PLN page is displayed

ACTIVE WPT ..... Check
DIR TO track is now the ACTIVE leg (solid green) of F-PLN, starting at the Turning Point (T-P).

If not correct:

DIR TO ERASE [6L]..... Press
Make appropriate revision.

F-PLN page:
If selected on opposite side, TMPY F-PLN is displayed with DIR TO leg from T-P to selected WPT.
When DIR TO is inserted, the DIR TO WPT becomes the ACTIVE WPT (white) of the ACTIVE F-PLN.

☐ If WPT is not in ACTIVE F-PLN

Required WPT [1L]…….
……. Enter/Press
Enter new WPT via scratchpad in [1L].

Ex: "Cleared present position direct to AMB"; enter AMB [1L].

In the example DUPLICATE NAMES page is displayed as several AMB WPT/Navaids are stored in the NAVdb. See 2.2 in this chapter.

TMPY DIR TO page is displayed yellow,

Check intended DIR TO track (dashed yellow) is correct on ND.
A DISCONTINUITY is created, since the DIR TO WPT is not in original F-PLN.

If correct:

[2R] or [3R] .....Select
Choose ABEAM PTS or DIRECT TO function as described above.

DIR TO INSERT [6R].....Press
F-PLN page is displayed

ACTIVE WPT .....Check
The DIR TO track is now the ACTIVE leg from T-P.

Make appropriate revision to string the ACTIVE F-PLN.

If not correct:
Select DIR TO ERASE prompt and correct entry.

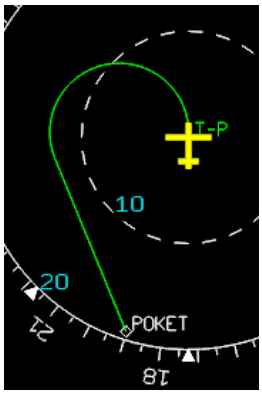
F-PLN page:
If selected on opposite side, TMPY F-PLN is displayed with DIR TO leg from T-P, followed by a F-PLN DISCONTINUITY.
When DIR TO is inserted, the DIR TO WPT becomes the ACTIVE WPT (white) of the ACTIVE F-PLN.

☐ Lateral Guidance

When DIR TO INSERT is pressed:
- NAV mode engages or remains engaged (if previously engaged).
- FMA shows NAV green.

A capture curve (from PPOS) followed by a great circle (GC) path from the end of the curve to the selected waypoint is constructed by the FMS.

Example showed on right.



Bank angle: 25% margin is applied to the normal bank angle. Folowing principle "what you see is what you fly, A/C will fly path as shown on ND.

F-PLN page first line FROM WPT is T-P (Turning Point).

☐ Notes

SPEED/ALTITUDE/TIME **constraints** associated with the original waypoint are **deleted** and not transferred to the ABEAM point.

STEP ALT point as defined in original F-PLN remains at ABEAM WPT.

WIND data for original WPTs are tranferred to ABM WPTs if it is less than 100 Nm from original WPTs; otherwise, no wind data is assumed.

■ DIR TO RADIAL IN / RADIAL OUT functions

☐ DIR TO RADIAL IN

This function is used primarily during initial or intermediate approach. The DIR TO RADIAL IN function at arrival is described in Part II: Descent – 6.5 F-PLN sequencing.
It may be used during other in-flight phases in the same way.

In the example below it is intended to proceed to AMB on radial 185.

- *DIR TO page is accessed*
- *AMB is entered in [1L]*
- *185 is entered in [4R]*
- *On ND TMPY F-PLN track is displayed in yellow.*

When DIR TO is inserted:
<u>If HDG is not correct</u> for FMS intercept (INTCPT) computation:
"NO NAV INTERCEPT" s-pad msg (white) is displayed.
HDG should be adjusted.

<u>If HDG is correct</u> for FMS intercept (INTCPT) computation:
"ADJUST DESIRED HDG/TRK" s-pad msg (amber) is displayed

F-PLN page
- *First line: FROM waypoint is named IN-BND,*
- *TO WPT is the selected DIR TO WPT.*

In the example, since AMB is not in ACTIVE F-PLN, it is followed by a F-PLN DISCONTINUITY.

See below for Lateral Guidance and INTCPT computation.

☐ DIR TO RADIAL OUT

This function is used to follow a radial out from a desired WPT.

DIR key ..... Press

Select or enter specified WPT.

In the example CGC is entered in [1L].

TMPY DIR TO page is displayed.

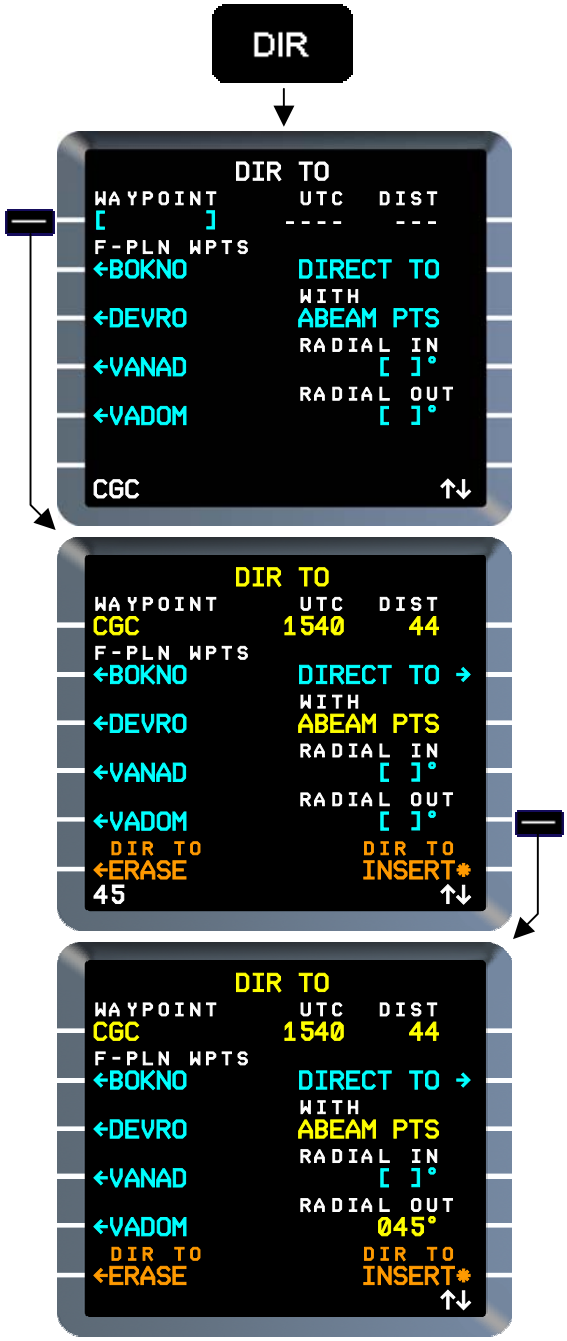
Required RADIAL OUT ....Enter

Insert desired outbound radial from the specified WPT;

Ex: radial 045° from CGC.

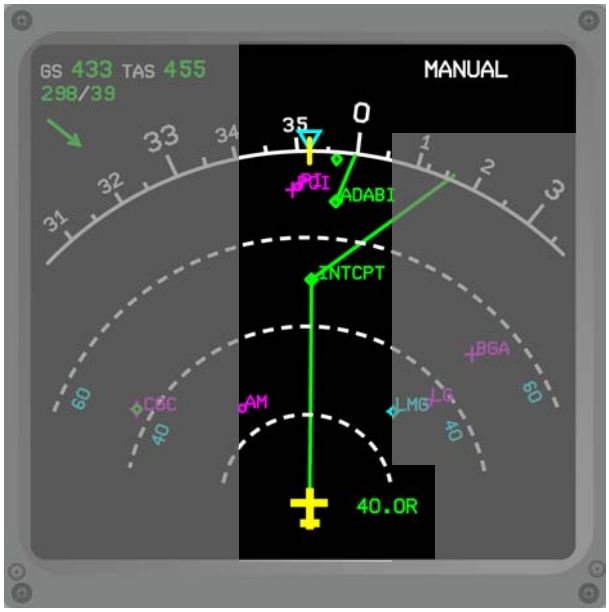
On ND, the selected RADIAL OUT is shown (dashed yellow) from this WPT.

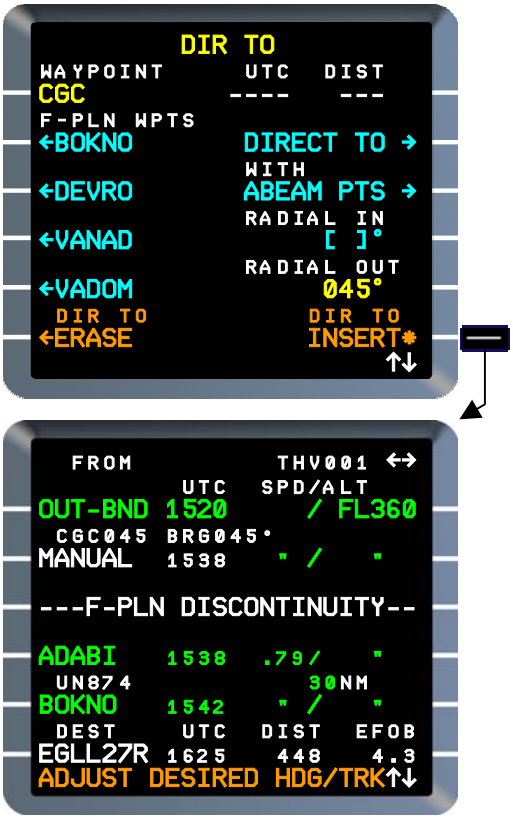
RAD OUT entry may be modified before insertion; it cannot be cleared, except by using DIR TO ERASE prompt [6L].



If correct:

DIR TO INSERT [6R] .....Press





A **MANUAL termination leg** is created along the outbound radial, starting at INTCPT point, followed by **F-PLN DISCONTINUITY**.
When established on RADIAL OUT, A/C will maintain the track until revision is made.

See below for Lateral Guidance and INTCPT computation.

F-PLN page:

- First line: FROM waypoint is named OUT-BND,
- TO WPT is **MANUAL**.
- Distance to INTCPT point is shown on ND beside actual position, in place of cross-track error.

When established on the OUT-BND leg, predictions are continuously adjusted assuming a GC between actual A/C position and next WPT.

☐ Lateral guidance

When DIR TO INSERT is pressed,

- **If course capture criteria are not satisfied:**

NAV mode is **armed (blue)**

- **If no intercept point** (INTCPT) is computed by FMS, "NO NAV INTERCEPT" s-pad msg (white) is triggered.

  In the example below DIR TO RADIAL IN 210 to BOKNO is inserted; HDG is 015°.

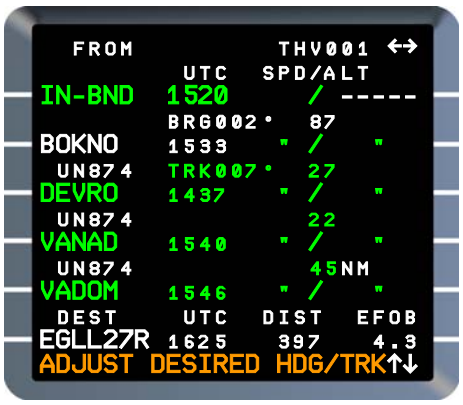
  – No FMS INTCPT computation is available because angle between HDG and selected radial is more than 160°.
  – FMS track is shown by a **dashed** green line. NAV mode will not engage.
  – If "NO NAV INTERCEPT" s-pad msg (white),is cleared by CLR key or by correcting HDG, it is replaced by "ADJUST DESIRED HDG/TRK" s-pad msg (amber).

  This message is a reminder that NAV is not engaged.

- **If an intercept point** (INTCPT) is computed by FMS, "ADJUST DESIRED HDG/TRK" s-pad msg (amber) is triggered.

  In the example below, DIR TO RADIAL IN 210 to BOKNO is inserted; HDG is 350°.

  – A FMS INTCPT computation is available because angle between HDG and selected radial is less than 160°.
  – INTCPT is displayed on ND but not on F-PLN page.
  – FMS track is shown by a **solid** green line (NAV is still armed).
  – Distance to INTCPT is shown as XTK error.
  – INTCPT point on ND is constantly updated to reflect current track and position with respect to the intercept radial.



- **When course capture criteria are satisfied:**

  – NAV mode is **captured**,
  – FMA shows NAV (**green**).

Distance to radial for NAV capture varies from different criteria (e.g. Ground Speed, angle of interception).

To leave MANUAL leg in case of RADIAL OUT refer to F-PLN sequencing in this chapter.

3.4. HOLD function

■ HOLD page

The HOLD page enables to insert, modify or review a holding pattern in F-PLN (ACTIVE, TMPY or SEC).

☐ Access

HOLD page is accessed via LAT REV from F-PLN page.
It cannot be accessed from the following WPTs:

- DEP Airport,
- DEST Airport,
- Pseudo WPTs: (S/C), (S/D), (SPD)(LIM), (DECEL), (T/C), (T/D), (INTERCEPT),
- F-PLN markers: F-PLN DISCONTINUITY, END OF F-PLN, END OF ALTN F-PLN, NO ALTN F-PLN, TOO STEEP PATH, (ABEAM PTS)

In the following example, a HOLD is intended at TIGER.

LAT REV at WPT..... Press

Ex: [2L]
LAT REV FROM TIGER page is displayed.

HOLD [3L] ..... Press

HOLD page with associated WPT is displayed, enabling holding pattern to be created or modified.

Pilot may select COMPUTED or DATABASE holding pattern or any pilot defined pattern via INB CRS, TURN, TIME DIST parameters.
LAST EXIT field provides FUEL and time predictions.

These fields are described below.

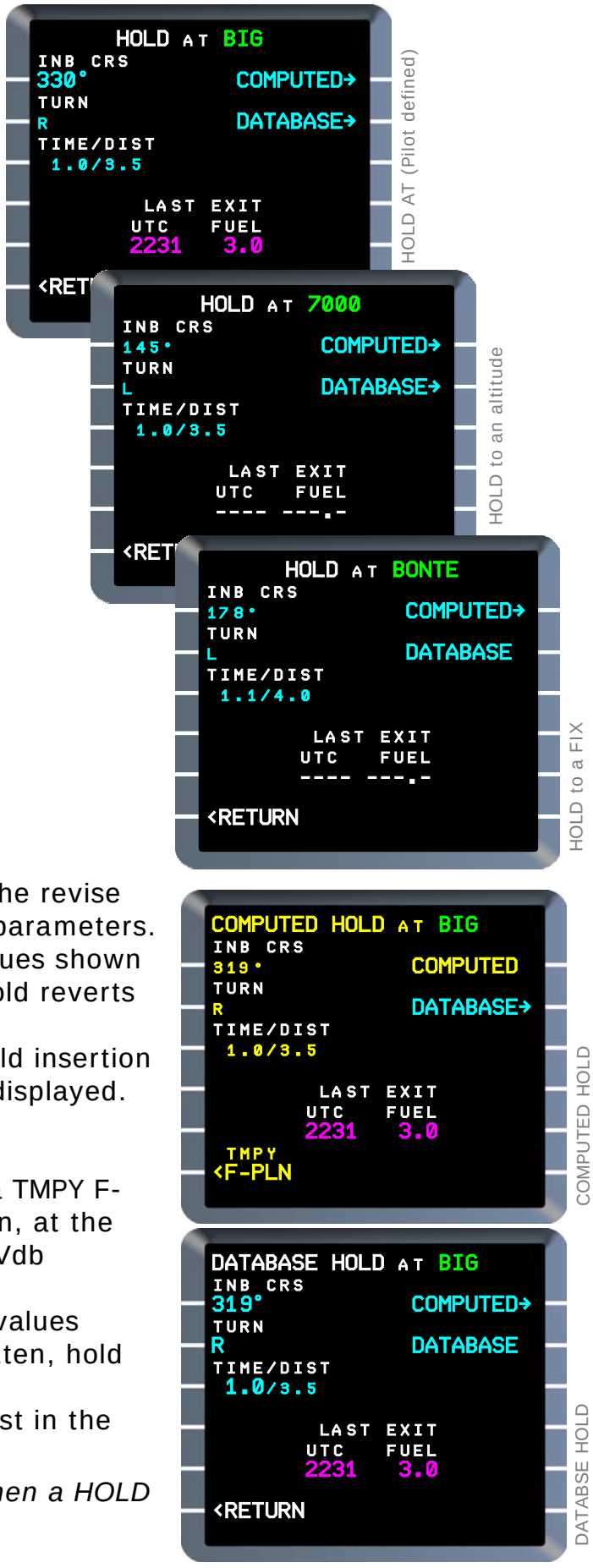
☐ Title page
- HOLD AT XXX if: pilot defined, or hold to an altitude, or hold to a fix.
- COMPUTED HOLD AT XXX if a COMPUTED hold is selected,
- DATABASE HOLD AT XXX id a DATABASE hold is selected,

☐ Color coding:
- Title is white when hold is entered in ACTIVE F-PLN, yellow during selection (TMPY F-PLN activation).
- Hold parameters are blue when hold is entered in ACTIVE F-PLN, yellow during selection.

☐ COMPUTED and DATABASE prompts

COMPUTED prompt [1R]
When pressed, FMGC creates a TMPY F-PLN and loads a computed holding pattern, at the revise waypoint, based on displayed parameters.
Fields are defaulted to FMS values shown in small font. If overwritten, hold reverts to a HOLD AT.
If conditions for COMPUTED hold insertion are not satisfied, arrow is not displayed.

DATABASE prompt [2R]
When pressed, FMGC creates a TMPY F-PLN and loads a holding pattern, at the revise waypoint, based on NAVdb parameters.
Fields are defaulted to NAVdb values shown in large font. If overwritten, hold reverts to a HOLD AT.
If DATABASE hold does not exist in the NAVdb arrow is not displayed.
This prompt is not available when a HOLD is selected at PPOS.

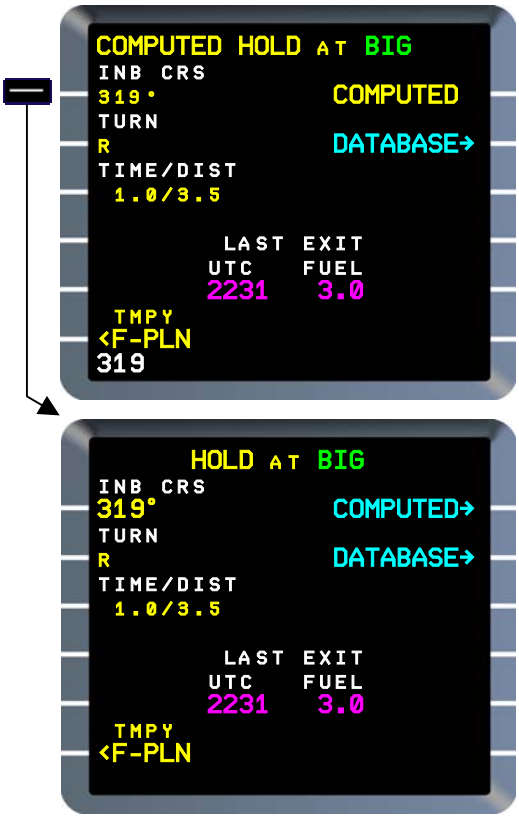


☐ Holding parameters: INB CRS, TURN, TIME/DIST

Any pilot **modification** of hold parameters is shown in large font and changes COMPUTED hold, DATABASE hold, HOLD to an altitude, HOLD to a fix in a **HOLD AT.**

INB CRS [1L]
May be:
– Pilot entry, or
– If COMPUTED HOLD, defaulted to the inbound track value (small font), or
– If DATABASE HOLD, defaulted to NAVdb value (large font).

Defaulted value may be overwritten.



TURN [2L]
– Is defaulted R, or
– If DATABASE HOLD, defaulted to NAVdb value (large font).

May be overwritten by entering L or R.

TIME/DIST [3L] (outbound leg)
Is defaulted to:
– 1,5 minutes if above FL 140,
– 1,0 minutes if at or below FL 140, or
– If DATABASE HOLD or HOLD to an altitude, or HOLD to a fix, defaulted to NAVdb value.

Defaulted values, TIME **or** DIST may be overwritten. Simultaneous entries are not accepted.

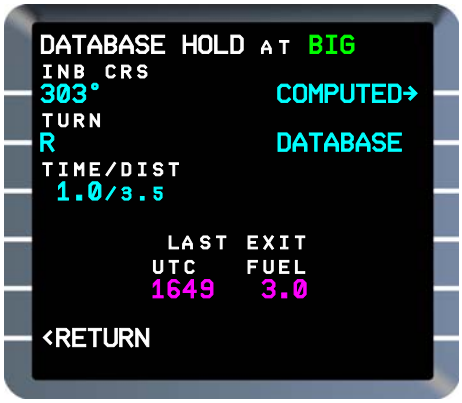
In the example a COMPUTED HOLD at BIG has been selected (TMPY F-PLN has been created), INB CRS is modified, which causes change hold in a HOLD AT BIG.

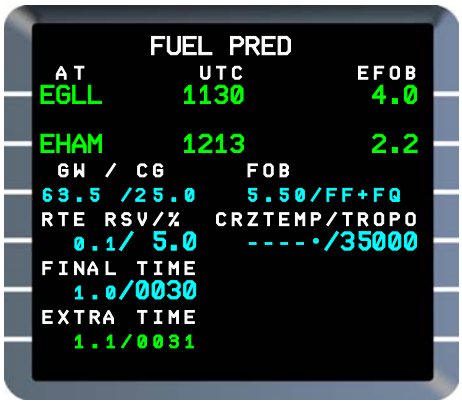
☐ LAST EXIT

UTC: This field displays **time** at which the A/C must leave the hold in order to meet fuel policy criteria defined in FUEL PRED page with EXTRA/TIME being 0.

FUEL: This field displays the EFOB when leaving HOLD at the corresponding TIME.

In the example below, based on ACTIVE F-PLN predictions and FUEL prediction to ALTN – EHAM, to comply with the FINAL/TIME reserve defined in FUEL PRED page, A/C must leave HOLD at BIG at latest time 1649 with an associated FOB of 3.0 T.





:
BIG 1618
EXTRA 0031
BIG **1649**

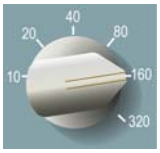
:
Trip for ALTN 1.8
RTE RSV + 0.1
FINAL + 1.0
= 2.9
+ BIG to EGLL 27R
+ 0.1
= **3.0**

See also Part III: Ch 6 Fuel monitoring

■ ND display

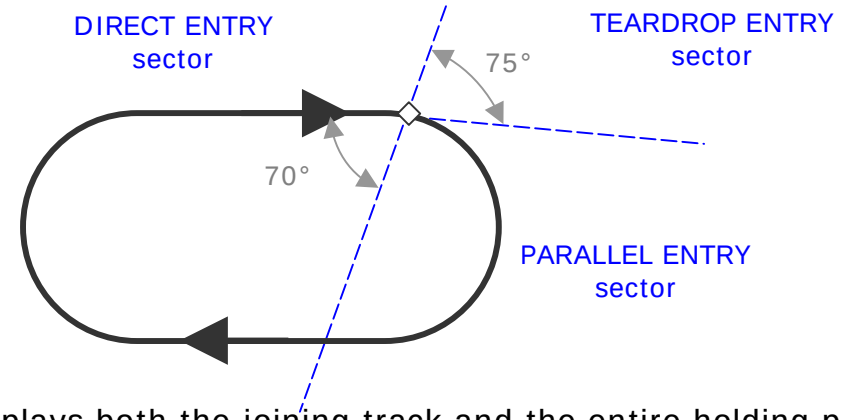
HOLD is displayed on ND either in NAV/ARC or PLAN modes.
For range scales below 160 NM display is shown at full scale following principle "what you see is what you will fly.

For range scale 160 or 320 NM, or when holding pattern is not the active or next leg, HOLD is shown by a white arrow that originates at the associated fix and indicates the direction of the turn.

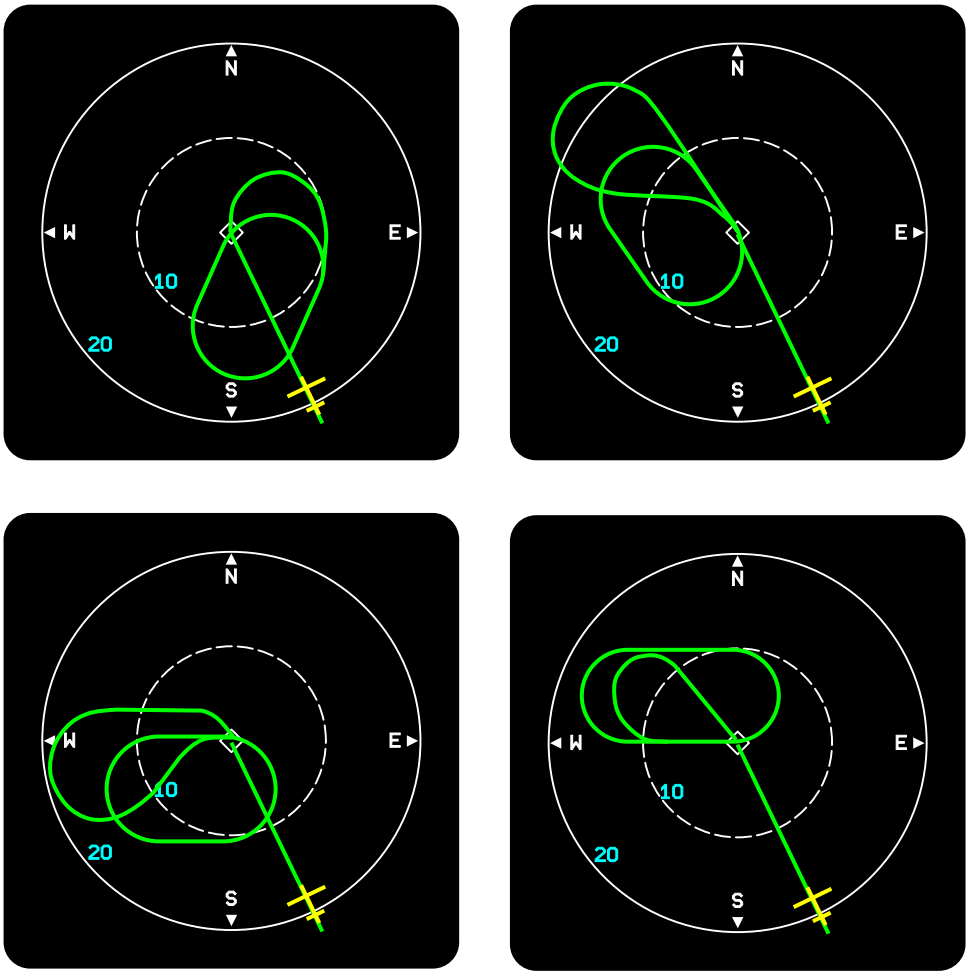


HOLD entries

When a HOLD in entered in F-PLN, FMGC computes a holding pattern entry making a Direct entry, Parallel entry or Teardrop entry as required.



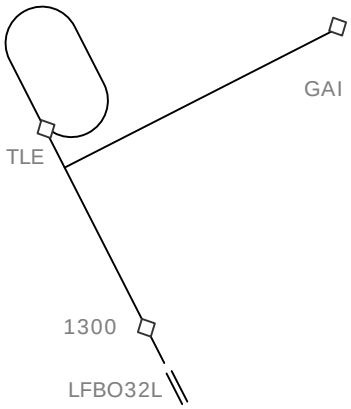
ND displays both the joining track and the entire holding pattern.
Examples are shown below.



When leg entry is "limit" between Teardrop and Parallel entry, FMGC may compute and display the two entries.

■ HOLD to an altitude (HA)

This type of hold can only be found in departure procedures when the departure airport is surrounded by high terrain.
It cannot be created by pilot; it is automatically loaded with associated departure based on NAVdb parameters.



Guidance:
- If speed is managed, speed is GD or holding speed limit if lower.
- If NAV mode is engaged, A/C flies the track as entered in the ACTIVE F-PLN.

MCDU F-PLN page reflects computed predictions.

The hold is **automatically exited** when the A/C passes the hold entry fix at or above the specified altitude.

In the following example, DEP TOUL 9 from LFBO, a HOLD is entered by the NAVdb at TLE / FL70.

A pseudo waypoint HOLD L FL70 is displayed [line 5].

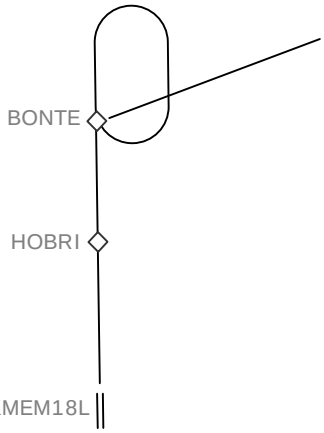
Reaching TLE, A/C will enter in holding pattern and will exit automatically when reaching FL70.

Caution

If the pilot modifies any of the parameters (INB CRS, TURN, TIME/DIST), the hold changes for a HOLD AT, hold with manual termination (HM) and the automatic exit is no longer available.

■ HOLD to a fix (HF)

This type of hold can only be found in arrival/approach procedures.
It cannot be created by pilot; it is automatically loaded with associated procedure based on NAVdb parameters.

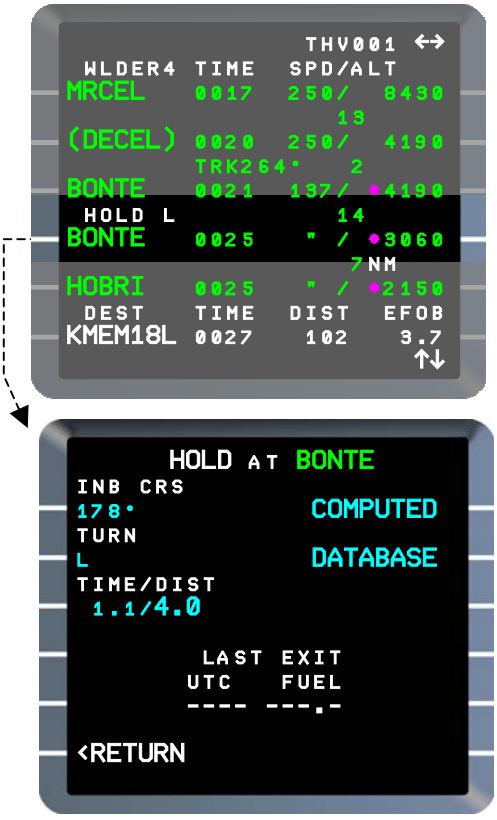


Regardless of the hold entry, the **A/C overflies the hold entry fix twice**:
- The first time when entering the hold,
- The second time when leaving the hold to begin the approach.

Guidance:
- If speed is managed, speed is maintained as computed by the FMGC.
- If NAV mode is engaged, A/C flies the track as entered in the ACTIVE F-PLN.
- If DES mode is engaged, A/C flies profile as computed by the FMGC.

MCDU F-PLN page reflects computed predictions.

The hold is **automatically exited.**



In the following example, RNAV arrival at KMEM, a HOLD at BONTE has been automatically selected.

A pseudo waypoint HOLD L BONTE is displayed [line 4].

Reaching BONTE, A/C will enter in holding pattern to fly a 4 NM outbound leg and then fly again BONTE.

Caution

If the pilot modifies any of the parameters of the holding pattern (INB CRS, TURN, TIME/DIST), the hold becomes a hold with manual termination and the automatic exit is no longer available.

■ HOLD with manual termination (HM)

Ending of the HOLD is manually activated by pilot.

☐ HOLD at PPOS

In flight, pilot can create a hold at A/C present position by making a lateral revision on the first waypoint of the ACTIVE or TMPY F-PLN.
This hold is named HOLD at PPOS.

F-PLN key..... Press

LAT REV at PPOS [1L] ... Press
Page LAT REV FROM PPOS is displayed.

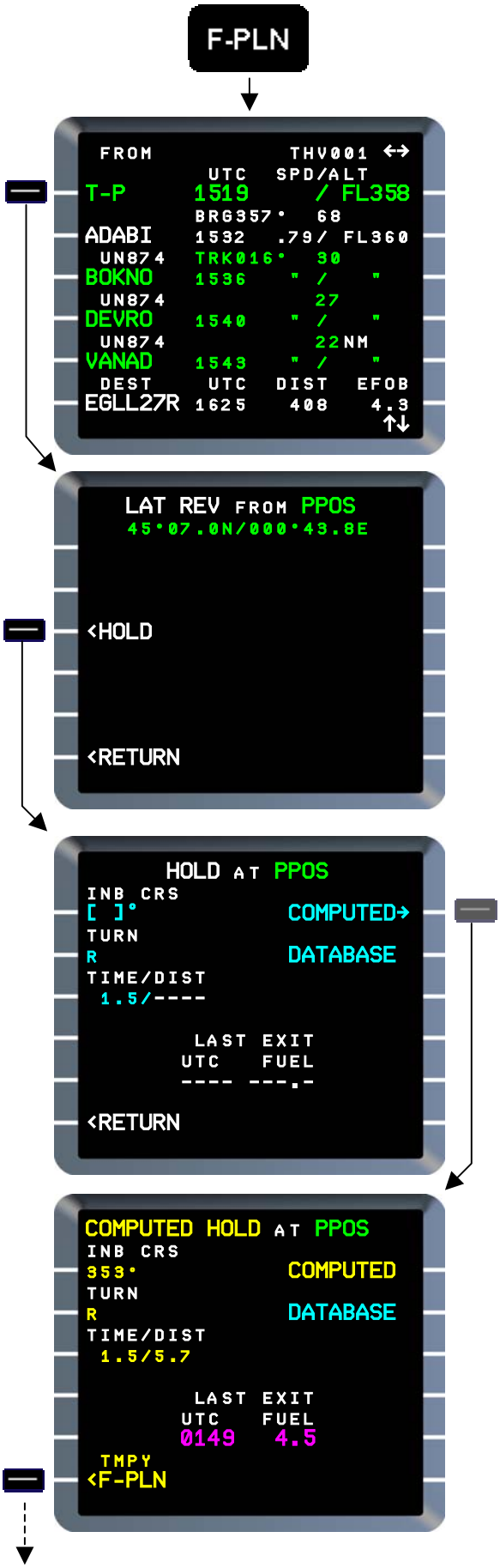
HOLD [3L] ..... Press
HOLD AT PPOS page is displayed.
Pilot may use:

- COMPUTED option; in this case INB CRS is defaulted to the inbound track, or
- Define hold parameters via fields [1L-2L-3L].

DATABASE hold is not available.

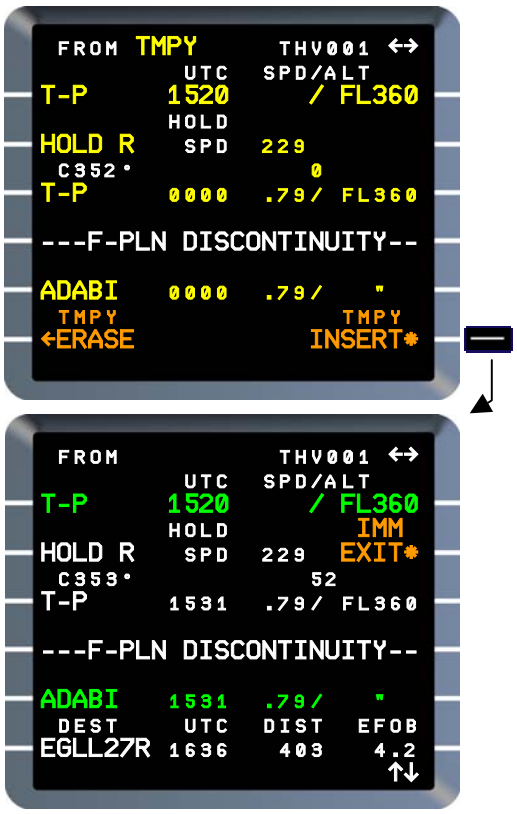
In the example COMPUTED is selected. ND shows holding pattern as it will be fly by the A/C.

ND .....Check



TMPY F-PLN [6L].....Press
A F-PLN discontinuity is created.

TMPY INSERT [6R].....Press
IMM EXIT prompt is displayed on HOLD line of F-PLN page.
Entry and exit from hold are explained later in this chapter.



☐ HOLD at a waypoint

Selection of a HOLD at a WPT may be done in flight or prepared during preflight.

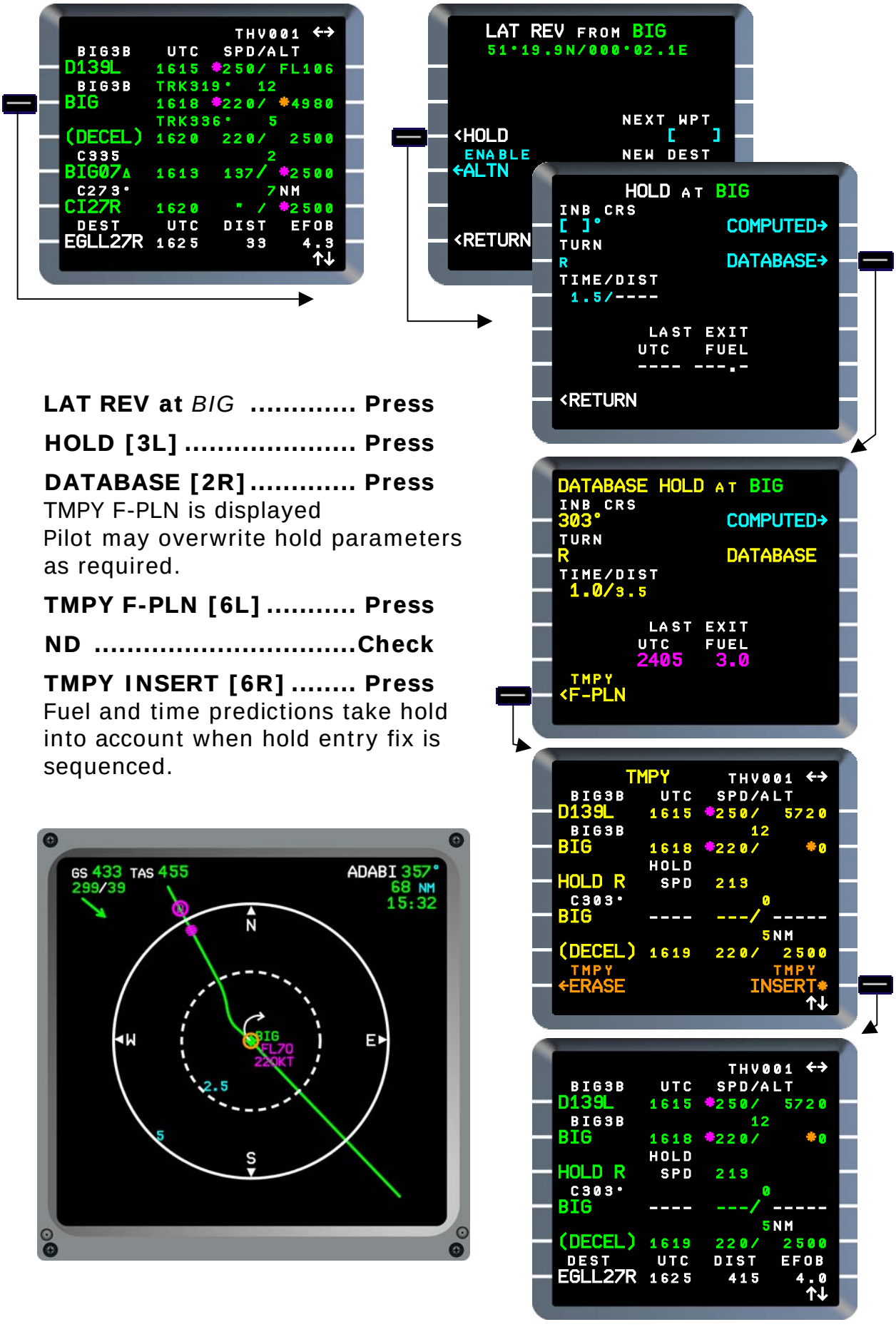
As explained above, selection may be: COMPUTED HOLD AT, DATABASE HOLD AT (if available in NAVdb), or pilot defined (HOLD AT).
When DATABASE HOLD is used, confirm hold parameters with official documentation.

Selecting a HOLD at a WPT belonging to the F-PLN does not create F-PLN discontinuity.

INB CRS for COMPUTED hold:

- *If there is no discontinuity before the revise WPT, INB CRS is the course from the preceding waypoint to the revise waypoint (if it is valid).*
- *If a discontinuity exists before the revise WPT, INB CRS is the course out of the revise waypoint to the next WPT.*
- *If discontinuities exist before and after the revise WPT, INB CRS cannot be computed. In this case arrow prompt is not available beside COMPUTED*

Example is given for a DATABASE HOLD entered at BIG.



LAT REV at *BIG* ..... Press

HOLD [3L] ..... Press

DATABASE [2R] ..... Press
TMPY F-PLN is displayed
Pilot may overwrite hold parameters as required.

TMPY F-PLN [6L] ..... Press

ND .....Check

TMPY INSERT [6R] ..... Press
Fuel and time predictions take hold into account when hold entry fix is sequenced.

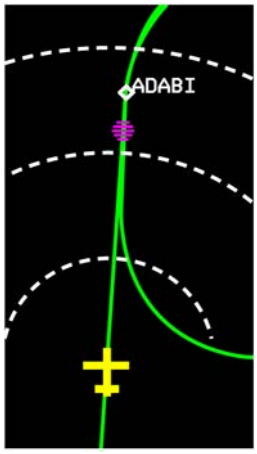
■ Predictions and guidance (HM)

When a hold is selected, the FMS computes:
- Holding speed,
- Deceleration point to enter in the holding pattern at the correct holding speed,

Predictions at the holding fix are computed once A/C is entered in the hold.

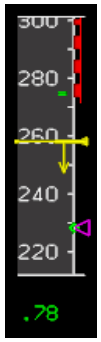
☐ Deceleration

If speed and lateral modes are managed, deceleration point is displayed on ND by SPD change symbol (magenta).



Passing deceleration point:

On PFD:
- If SPD managed, target speed becomes green dot,
- If SPD is selected "SET HOLD SPEED" s-pad msg is triggered.



On MCDU, IMM EXIT prompt is displayed right side line of the HOLD pseudo waypoint, enabling pilot to cancel or exit hold at any time.

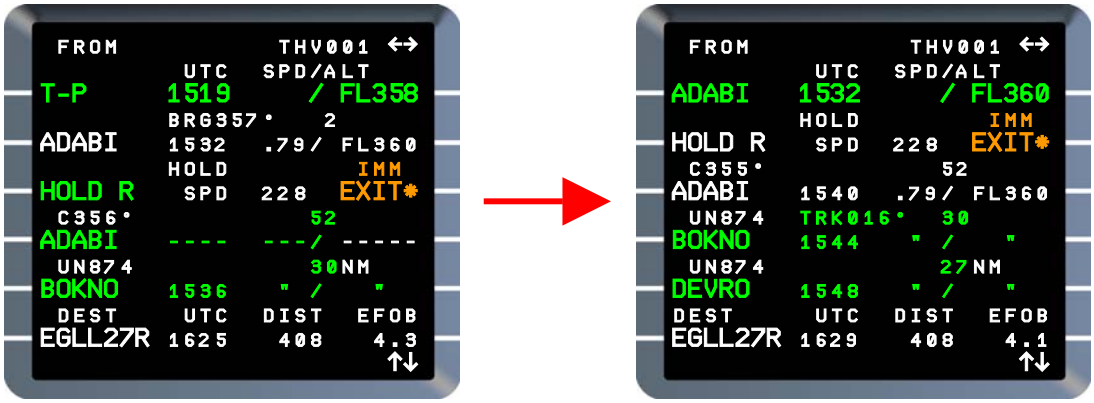
Note:

HOLD size is based on A/C predicted speed at HOLD entry fix; thus in case of overspeed the HOLD size can be above the expected size.

☐ When in HOLD

If SPD is managed, A/C maintains GD speed,
If NAV mode is engaged, A/C flies track **as shown on ND**,
– If DES mode is engaged rate of descent is adjusted at -1000 ft/mn, unless an ALT CSTR to be respected.

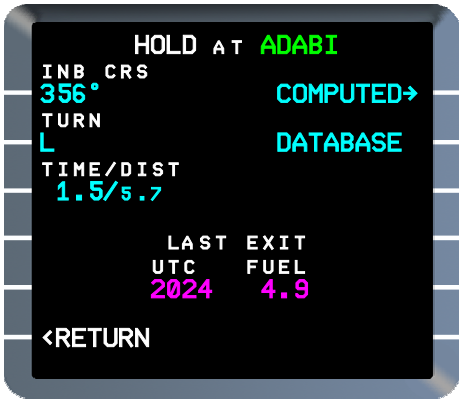
Predictions are revised, taking hold into account and assuming it is flown one time.



- **If HOLD parameters are modified**

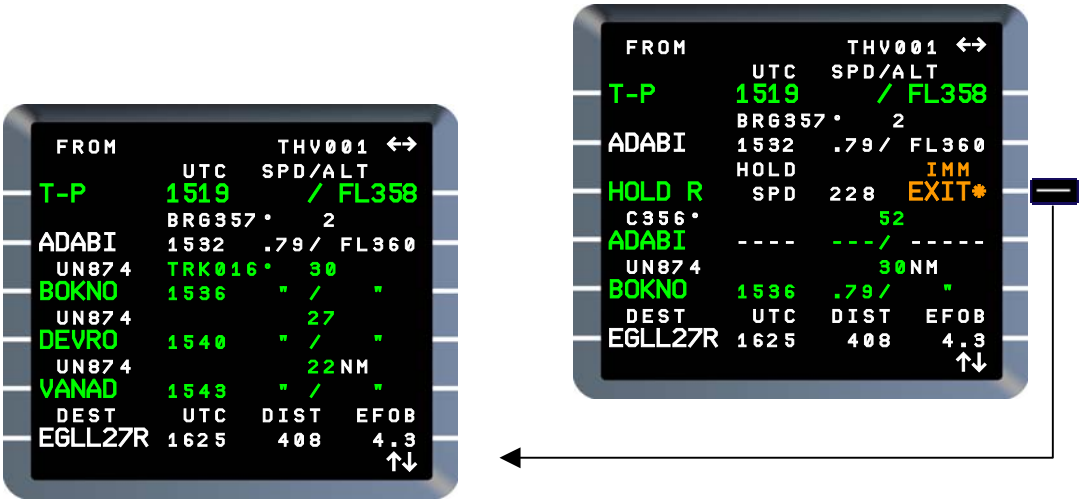
Modifications are not taken into account immediately but at the next fix overfly.

In the example below A/C is flying a HOLD R at ADABI as shown on F-PLN page. Left turn is selected on HOLD page but not yet taken into account.



☐ IMMEDIATE EXIT prompt

- **If IMM EXIT prompt is pressed before A/C enters the hold:**
Holding pattern is deleted from ACTIVE F-PLN. No discontinuity is created. A/C resumes flight along ACTIVE F-PLN.

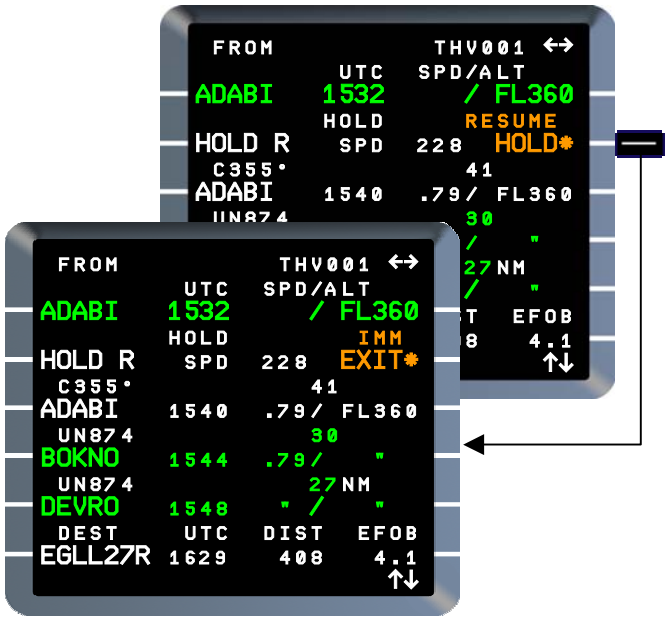


- **If IMM EXIT prompt is pressed while A/C is in the hold:**

– IMM EXIT prompt is replaced by RESUME HOLD prompt,
– FMGC computes the shortest way to the hold fix,
– Track is displayed on ND and replaces the holding pattern,
– A/C exits the hold via the holding fix.

Passing the hold fix:
– If SPD is managed, target speed returns to the applicable speed of the current flight phase,
– If DES mode is engaged rate of descent is adjusted according to vertical profile computation.

☐ RESUME HOLD prompt
When pressed:
- Enables to re-activates hold,
- IMM EXIT prompt is re-displayed.



■ TIME TO EXIT

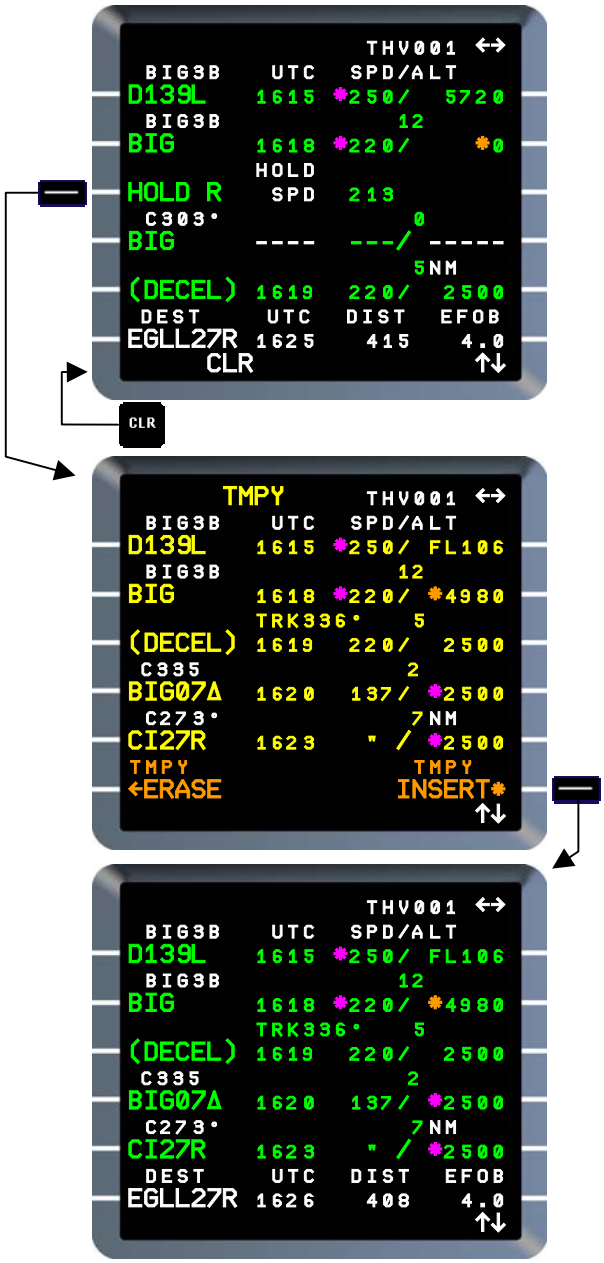
This scratchpad message (ais displayed when A/C must leave holding immediately to satisfy fuel reserve requirements (extra fuel is zero).

■ HOLD deletion

CLR key .....Press

[HOLD] .....Press
Press adjacent left LSK to the HOLD to delete.
TMPY F-PLN is displayed.

TMPY INSERT [6R].....Press



3.5. OFFSET function

■ General

The OFFSET function enables to fly parallel to the original **ACTIVE** F-PLN, laterally offset by a given distance and direction (entered by the pilot).

OFFSET function is accessed via LAT REV on F-PLN page at the **FROM WPT**.

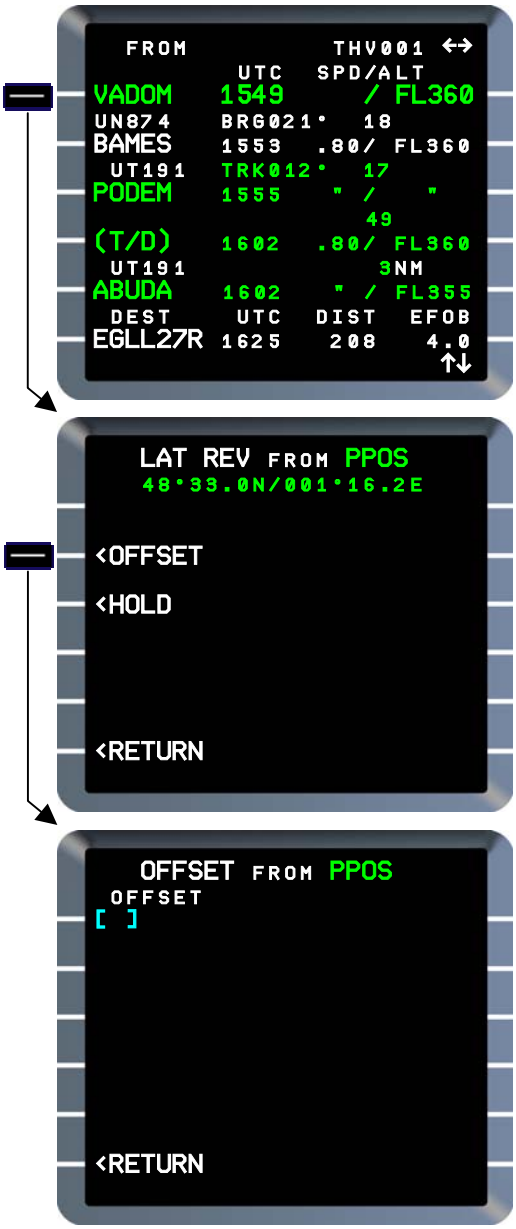
LAT REV [1L]..... Press

OFFSET [2L] ..... Press
OFFSET page at PPOS is displayed.

OFFSET function is not available if FROM–TO leg is an approach leg, or a leg for which a vertical gradient is specified, or a leg for which the course change is more than 135°.

The offset ends by default at the last consecutive "offsetable" waypoint.

OFFSET range is 1 to 50 NM.



■ OFFSET insert

OFFSET [1L] .....Enter
Enter desired Offset distance (NM) with direction (L or R).
Ex: 5L (or L5)
OFFSET title page becomes yellow.

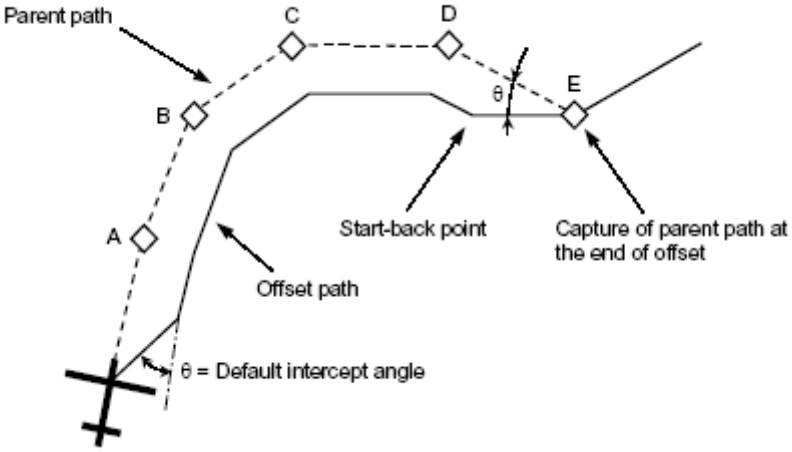
TMPY [6L] .....Press
F-PLN page is displayed as TMPY OFFSET (yellow).
On ND TMPY F-PLN is displayed dashed yellow.

If correct:

TMPY INSERT [6R] .....Press
F-PLN page title is OFST (FLT number is no longer displayed).

On ND: new active track is shown by a continuous green line, original track by a dashed green line.
OFST xx is indicated.

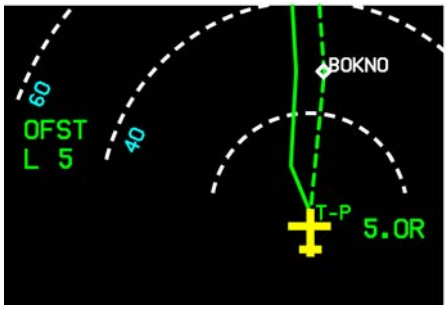
As soon as TMPY is inserted, offset path starts from the present position with an intercept angle of 30° (or value defined in AMI file), and ends at the last consecutive "offsetable" WPT. At this WPT a transition is built using the default intercept angle from a start-back point to capture the parent path.



Overfly:

When an offset applies to a WPT which has an overfly (Δ), the original overfly is ignored for guidance purposes.
However, the overfly will remain displayed on the MCDU and if the offset is cleared or canceled, the overfly will be re-applied as per normal logic.

A HOLD is not offsetable, then if a HOLD is inserted on an OFFSET path, offset is terminated at this point.



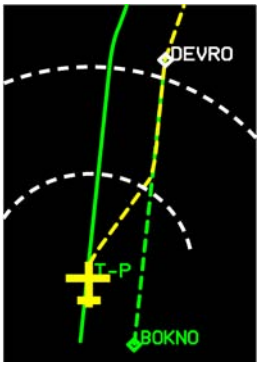
Predictions do not take into account OFFSET transitions.

■ OFFSET deletion

☐ Manual deletion

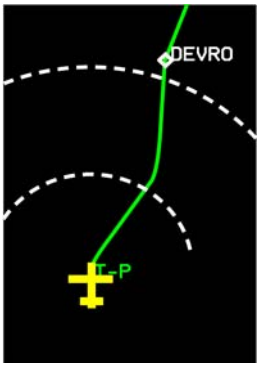
OFFSET [1L] ..... Enter / Press
Enter in scratchpad either CLR or 0.

As soon as OFFSET is reset at 0, return track to the original route is computed, loaded into TMPY F-PLN, and displayed on ND by a dashed yellow line.



TMPY [6L] .....Press
If correct:

TMPY INSERT [6R] .....Press
Return track to the original route becomes active, displayed by a continuous green line.



☐ Scratchpad messages (Automatic deletion)

OFST DELETED IN TMPY
This scratchpad message (amber) is triggered when an offset has been automatically cancelled in TMPY F-PLN.
This is the case when:
- The first leg of the TMPY is no longer "offsettable", or
- The distance remaining to the ending OFFSET WPT is less than the distance required to reach the TMPY offset path and return to the TMPY parent path.

The message is automatically cleared when a new offset is inserted in the temporary F-PLN.

OFST DELETED
This scratchpad messages (amber) is triggered when an OFFSET is selected and the SEC F-PLN is activated, deleting the selected OFFSET or, a revision is made in TMPY F-PLN, which causes deletion of the selected OFFSET.

3.6. ALTERNATE function

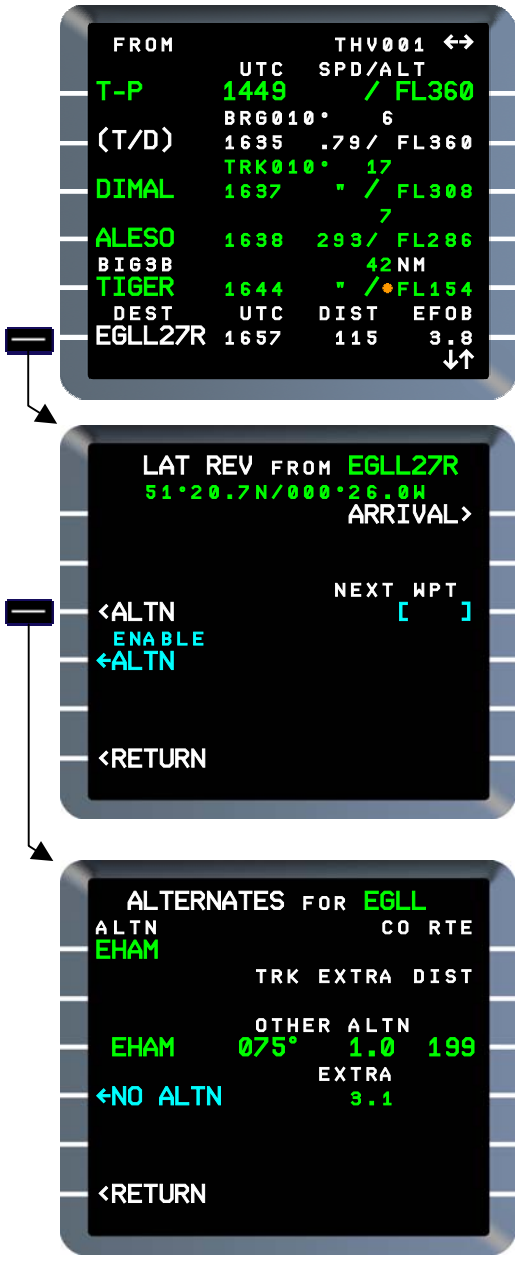
■ ALTERNATES page

ALTERNATES page enables to review and/or revise an ALTN during any flight phase.
It is accessed by ALTN prompt via LAT REV at DEST from F-PLN page A or B.

LAT REV at DEST [6L].....Press

ALTN [3L].....Press
The ALTERNATES page for the current destination is displayed.

Title is yellow if a TMPY F-PLN already exists.



☐ Without ALTN in NAVdb

If NAVdb does not contain specific ALTN(s) associated with the selected DEST airport:

- [1L] shows selected ALTN (green if associated with ACTIVE F-PLN, yellow if associated TMPY F-PLN); [1R] shows code of ALTN CO RTE if any.
- [Line 3] shows selected ALTN, with TRK (great circle), EXTRA fuel (zero wind) and DIST for the entered ALTN F-PLN route.
- [line 4] shows NO ALTN with EXTRA fuel.

Example shows EHAM (green) entered as ALTN for EGLL.

To change ALTN:

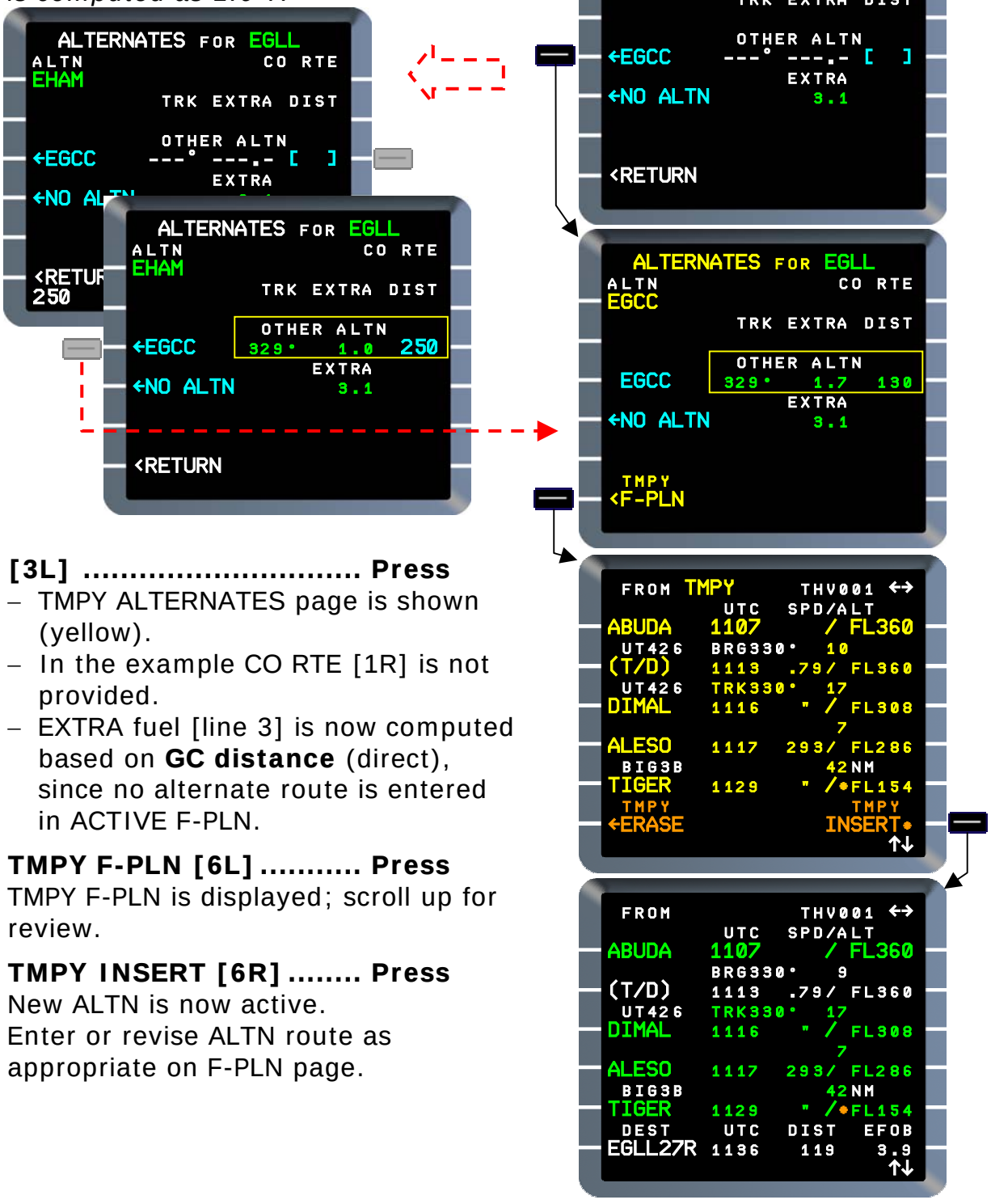
New ALTN [3L].....Enter

Ex: EGCC

Blue brackets are displayed in [3R] enabling pilot to enter a specific alternate distance, and to review predicted EXTRA fuel, based on this distance.

Ex: 250 (NM)

EXTRA fuel at EGCC with this distance is computed as 1.0 T.



[3L] ..... Press

- TMPY ALTERNATES page is shown (yellow).
- In the example CO RTE [1R] is not provided.
- EXTRA fuel [line 3] is now computed based on **GC distance** (direct), since no alternate route is entered in ACTIVE F-PLN.

TMPY F-PLN [6L] ..... Press

TMPY F-PLN is displayed; scroll up for review.

TMPY INSERT [6R] ..... Press

New ALTN is now active.
Enter or revise ALTN route as appropriate on F-PLN page.

<u>If NO ALTN has been entered and activated:</u>
the ALTERNATES page shows NONE in [1L] and brackets in [3L].

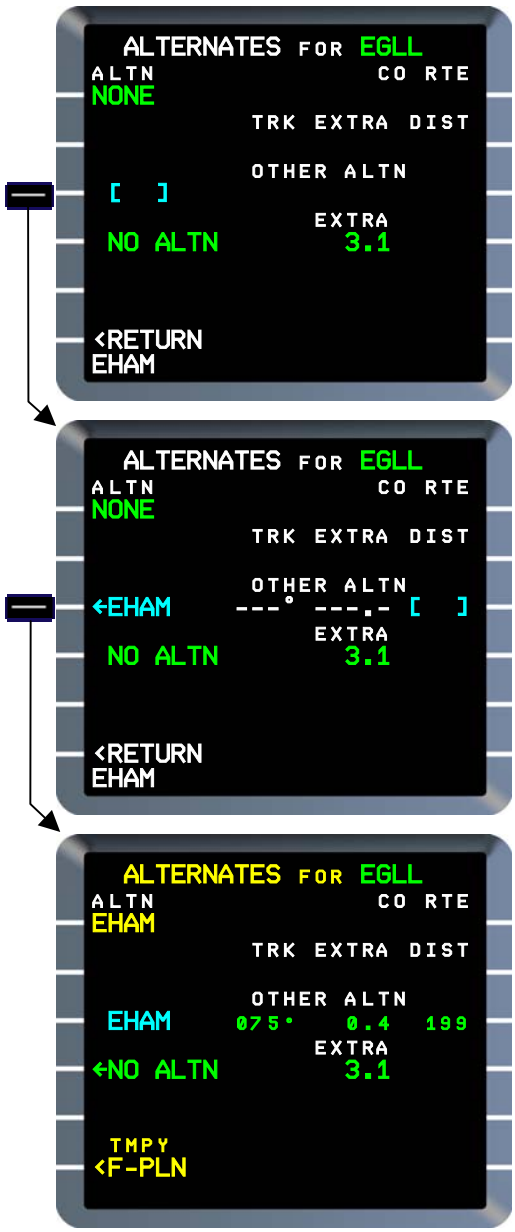
<u>To insert an ALTN:</u>

ALTN ident [3L].....Enter
Ex: EHAM

Distance may be manually entered in [3R] as described above.

[3L] .....Press
TMPY ALTERNATES page shows new ALTN (yellow) in [1L] and computed TRK, EXTRA fuel, DIST on line 3 as above.
Check fuel reserve.

Select & insert TMPY F-PLN.
Entered ALTN is now active.
Enter ALTN route on F-PLN page.



☐ With ALTN in NAVdb

If NAVdb includes ALTN(s) for the DEST airport (Operator option) the ALTERNATES page shows:
- Selected ALTN [1L] and associated CO RTE [1R] (if provided),
- List of up to 6 ALTNs linked to DEST,
- Brackets for OTHER ALTN selection,
- NO ALTN.
  (scroll up if necessary to review)

For each ALTN:
- Associated CO RTE is displayed in label line (if provided),
- Direct TRK, EXTRA fuel and ALTN DISTANCE (as defined in the NAVdb).

If NAVdb specifies a "Preferred" ALTN in the list:
- It is always displayed in [line 2] except when scrolled,
- It is automatically selected when FROM/TO field [1R] or CO RTE [1L] is filled on INIT page A.

In the example:
- *EGKK is "Preferred" alternate for EGLL and is defaulted as selected ALTN,*
- *EGSS, EGCC (with CO RTE LHRMAN1), EHAM (with CO RTE LHRAMS1), EBBR, EGPK are also listed.*

Color logic is same as Departure & Arrival pages:
- Active – green,
- Selected (TMPY) – yellow,
- Available (not selected) – blue.

To change ALTN:

New ALTN ..... Select / Press
Select desired ALTN and press adjacent LSK.

Ex: EGCC [4L]

TMPY ALTERNATES page is displayed, showing EGCC in [1L] and CO RTE LHRMAN1 in [1R].

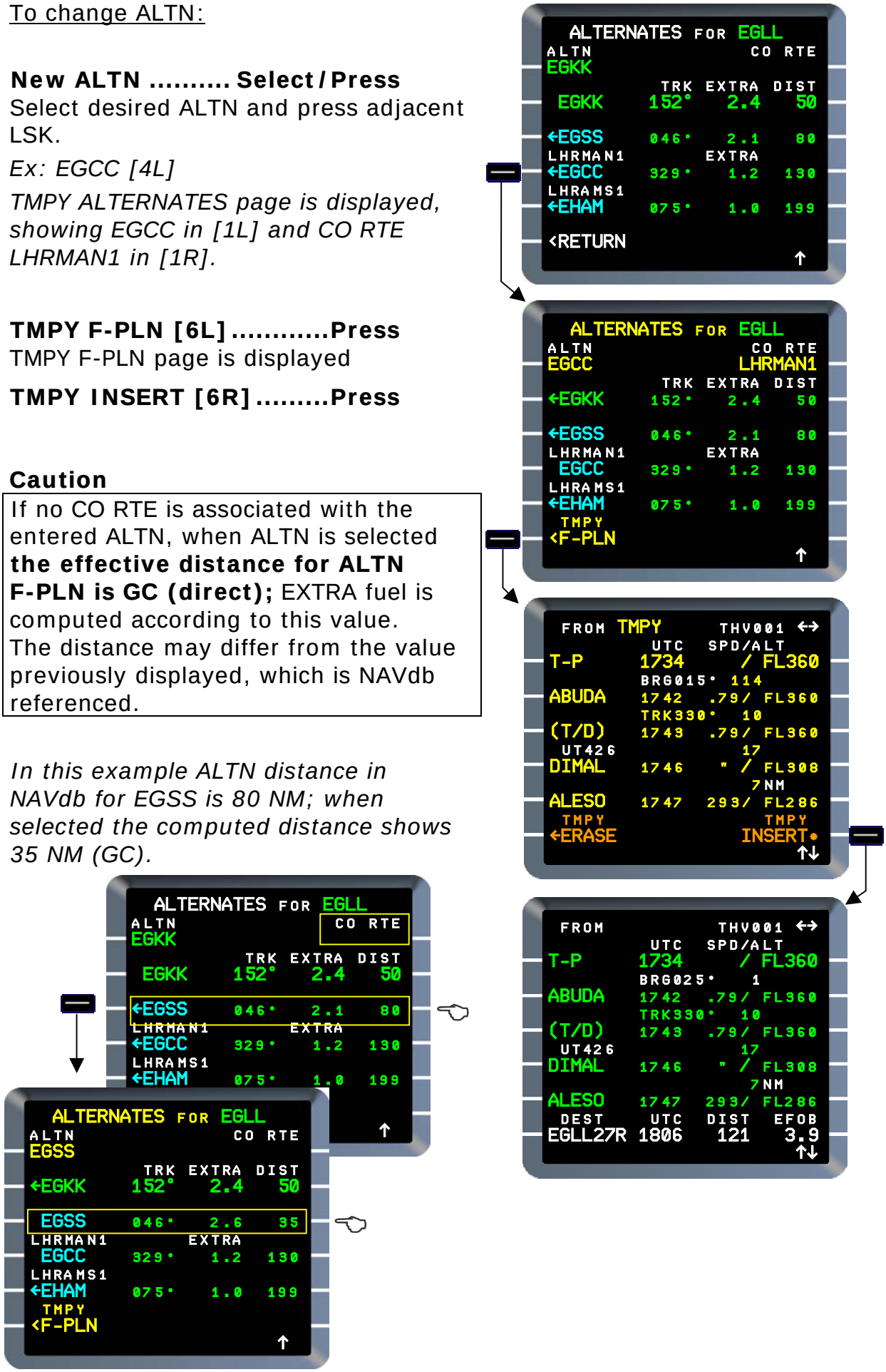
TMPY F-PLN [6L] .....Press
TMPY F-PLN page is displayed

TMPY INSERT [6R] .....Press

Caution

If no CO RTE is associated with the entered ALTN, when ALTN is selected **the effective distance for ALTN F-PLN is GC (direct);** EXTRA fuel is computed according to this value.
The distance may differ from the value previously displayed, which is NAVdb referenced.

In this example ALTN distance in NAVdb for EGSS is 80 NM; when selected the computed distance shows 35 NM (GC).



<u>To enter OTHER ALTN</u>

To enter another alternate which is not linked with this destination in NAVdb:

Scroll up if necessary to bring OTHER ALTN field into view,

Desired ALTN.....Enter

Enter desired OTHER ALTN between brackets.

Ex: LFPO in [4L]

If there is an associated CO RTE in NAVdb, ROUTE SELECTION page(s) are displayed. Select route or RETURN.

ALTERNATES page returns showing entered ALTN as available (blue).

Distance may be entered between blue brackets *(in the example [4R])*; EXTRA fuel for this distance is computed as previously described.

Entered ALTN ..... Select / Press

Ex: Press LSK adjacent to LFPO

TMPY ALTERNATES page is displayed, showing selected ALTN in [1L] (yellow).

FMS computes TRK, EXTRA fuel, for defaulted DIST on [line 3] as described above.

Check fuel reserve.

TMPY F-PLN select [6L] and insert [6R], as above.

To enter NO ALTN:

NO ALTN..... Select / Press
NO ALTN is selected.

– TMPY ALTERNATES page is displayed, showing NONE in [1L].
– Associated EXTRA fuel is shown in [line 4].

TMPY F-PLN select [6L] and insert [6R] as above.

■ ENABLE ALTN function

This function is used to initiate a diversion provided an ALTN has been defined.
The ENABLE ALTN function is accessed from F-PLN pages A or B via LAT REV at any WPT (except pseudo-WPTs).

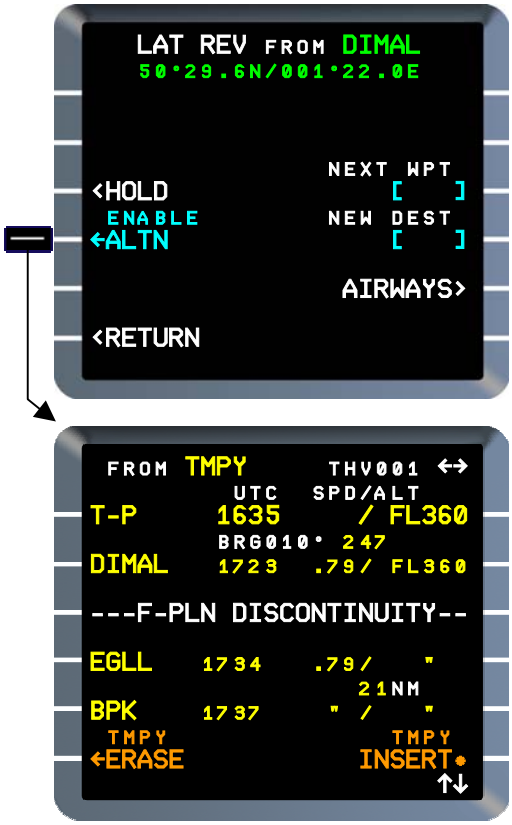
Ex: "Cleared to divert to EHAM, from DIMAL direct CLN, UL620 to REDFA"

LAT REV..... Press
Select LAT REV at appropriate WPT, *in this example, at DIMAL.*

LAT REV page at selected WPT is displayed, showing ENABLE ALTN prompt at [4L].

☐ With ALTN RTE entered in ACTIVE F-PLN
(either as an ALTN CO RTE or defined manually)

ENABLE ALTN [4L] .....Press
The TMPY F-PLN (dashed yellow) displays a DISCONTINUITY after the revise point *(DIMAL)*, followed by the ALTN RTE, **originating from primary DEST** *(EGLL)*.



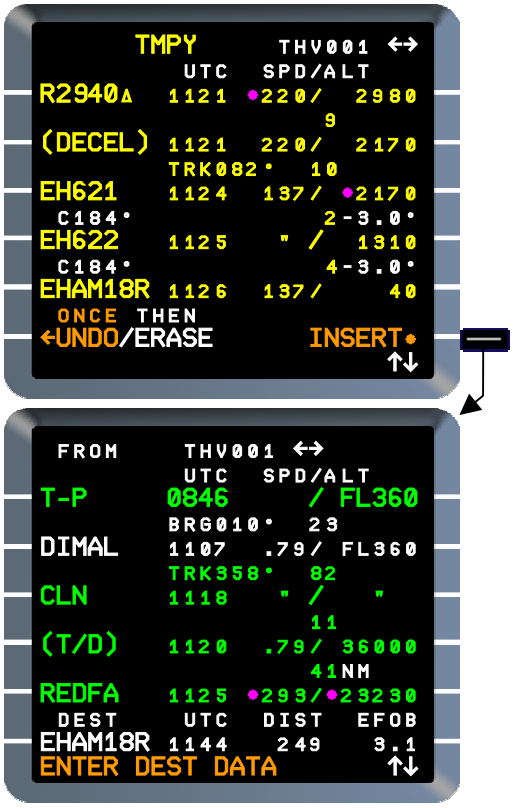
Caution:

If TMPY F-PLN is inserted, routing from revise point to primary destination is deleted.

Insert new routing from revise point, using DIR TO and/or entering WPTs and AIRWAYS as appropriate in TMPY F-PLN.

In this example, enter CLN after DIMAL. Since CLN exists in the ALTN F-PLN, WPTs between the DISCONTINUITY and CLN (EGLL, BPK) are "collapsed" (i.e. automatically deleted).

Check new routing on ND; if necessary, select PLAN mode and scroll up to view complete routing to ALTN.



If TMPY F-PLN shows desired route to ALTN, insert it in the ACTIVE F-PLN:

INSERT prompt [6R] ..... Press
The ALTN F-PLN is now the ACTIVE F-PLN.

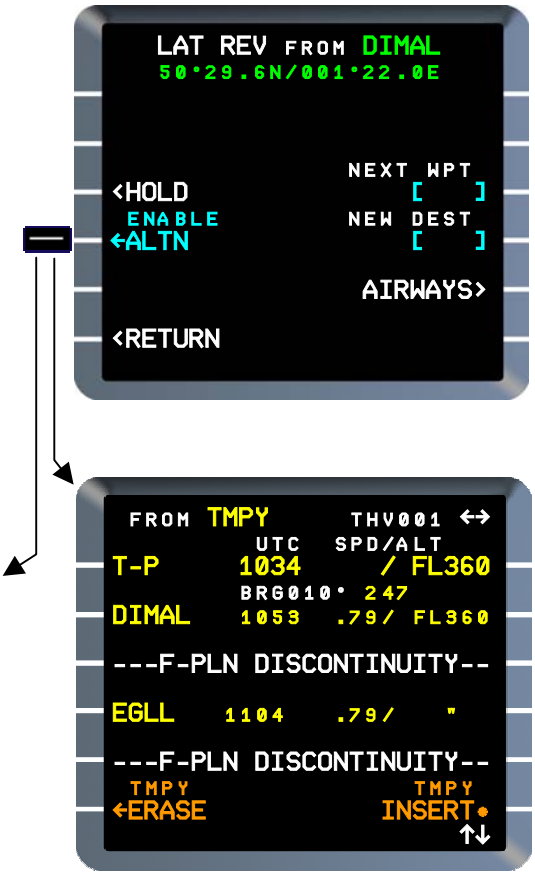
☐ Without ALTN RTE entered in ACTIVE F-PLN

On LAT REV page at appropriate WPT:

ENABLE ALTN [4L] .....Press

The TMPY F-PLN is displayed with a DISCONTINUITY after the revise point, followed by primary DEST as origin, and ALTN as end-point, separated by another DISCONTINUITY.

Only the origin and end points appear as TMPY F-PLN on ND, no route is shown.



Insert new routing from revise point to ALTN using DIR TO and/or entering WPTs & AIRWAYS as appropriate in TMPY F-PLN.
Check routing (dashed yellow) on ND, as above.
Insert TMPY F-PLN as above.

After insertion of the ALTN F-PLN, ENABLE ALTN prompt is no longer available, unless another ALTN is entered via the ALTERNATES page.

For diversion after a Missed Approach, refer to Part II: Go-around.

☐ ALTN F-PLN cruise altitude

When ENABLE ALTN is activated, CRZ ALT shown on PROG page is defaulted to FL220 if DEST to ALTN distance is below 200 NM, or FL310 if above. This value is modifiable, if FCU altitude is set above the default FL, "NEW CRZ ALT" s-pad msg is triggered.

Part III: Chapter 4 - VERTICAL F-PLN management

Contents

PAGE INTENTIONALLY LEFT BLANK

4.1. VERTICAL CONSTRAINTS

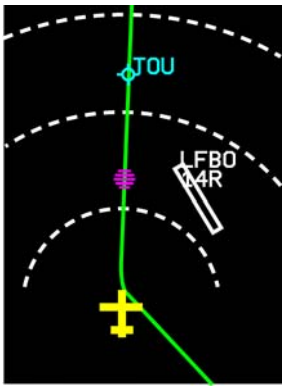
The following pages describe vertical functions accessed from VERT REV pages.

■ CLB/DES SPD LIM [2L]

Specifies speed which should not be exceeded when at or below the specified altitude or FL.
Only one CLB &/or DES SPD LIM may exist in a F-PLN.
Value is 250KT/FL100 if selected in AMI file, otherwise field is dashed; it is superseded by NAVdb value when existing or modified by pilot.

Title field is CLB SPD LIM when selected at WPTs before T/D, then DES SPD LIM.
If no T/D has been computed: CLB SPD LIM is shown at WPTs in SID, DES SPD LIM at WPTs in STAR; otherwise SPD LIM field is blank.

SPD LIM is predicted as **missed** if predicted speed exceeds SPD LIM + 10 at SPD LIM ALT, and remains missed until at or below SPD LIM + 5. Otherwise it is predicted as **matched**.
"SPD LIM EXCEEDED" s-pad msg (amber) is displayed if actual speed exceeds SPD LIM + 10 below SPD LIM ALT – 150 ft. The message remains displayed until:
Speed no longer exceeds SPD LIM +5, or
A/C is above SPD LIM ALT, or
Message is cleared.



On F-PLN pages, SPD LIM pseudo-waypoint is denoted by (SPD) (LIM). If the SPD LIM is predicted to be matched, associated limit values are shown, preceded by a * symbol (magenta); if predicted as missed, predicted speed overwrites the SPD LIM value, preceded by a * symbol (amber).

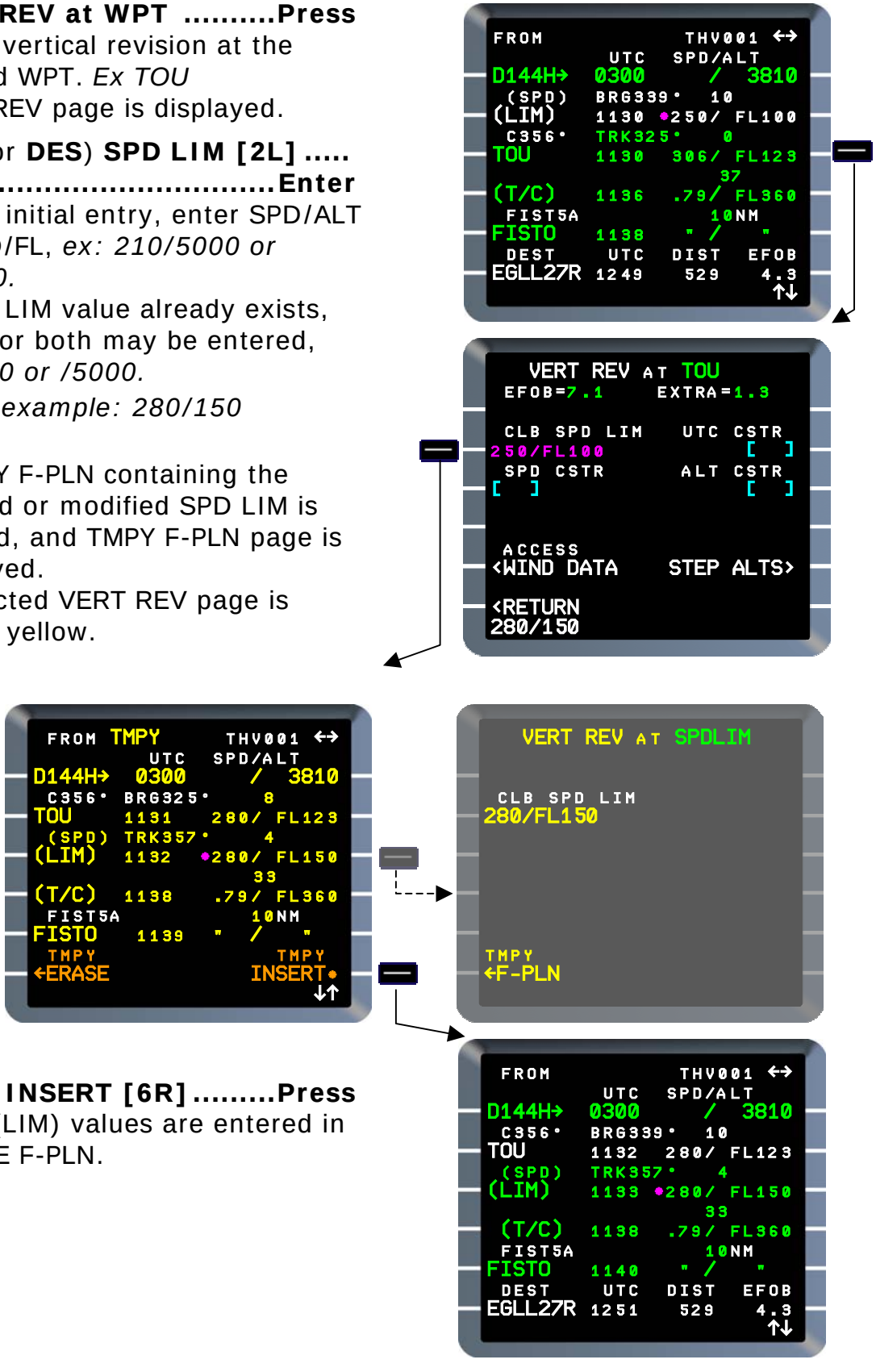
On ND, SPD LIM point is shown by a solid magenta circle.

☐ <u>To enter or modify CLB or DES SPD LIM</u>
From F-PLN page access VERT REV page by right LSK, at any WPT before T/D for CLB, or after T/D for DES.

VERT REV at WPT .....Press
Select vertical revision at the desired WPT. *Ex TOU*
VERT REV page is displayed.

CLB (or **DES**) **SPD LIM [2L] ....Enter**
For an initial entry, enter SPD/ALT or SPD/FL, *ex: 210/5000 or 210/50.*
If SPD LIM value already exists, either or both may be entered, *ex: 210 or /5000.*
In the example: 280/150

A TMPY F-PLN containing the entered or modified SPD LIM is created, and TMPY F-PLN page is displayed.
If selected VERT REV page is shown yellow.



TMPY INSERT [6R].....Press
(SPD)(LIM) values are entered in ACTIVE F-PLN.

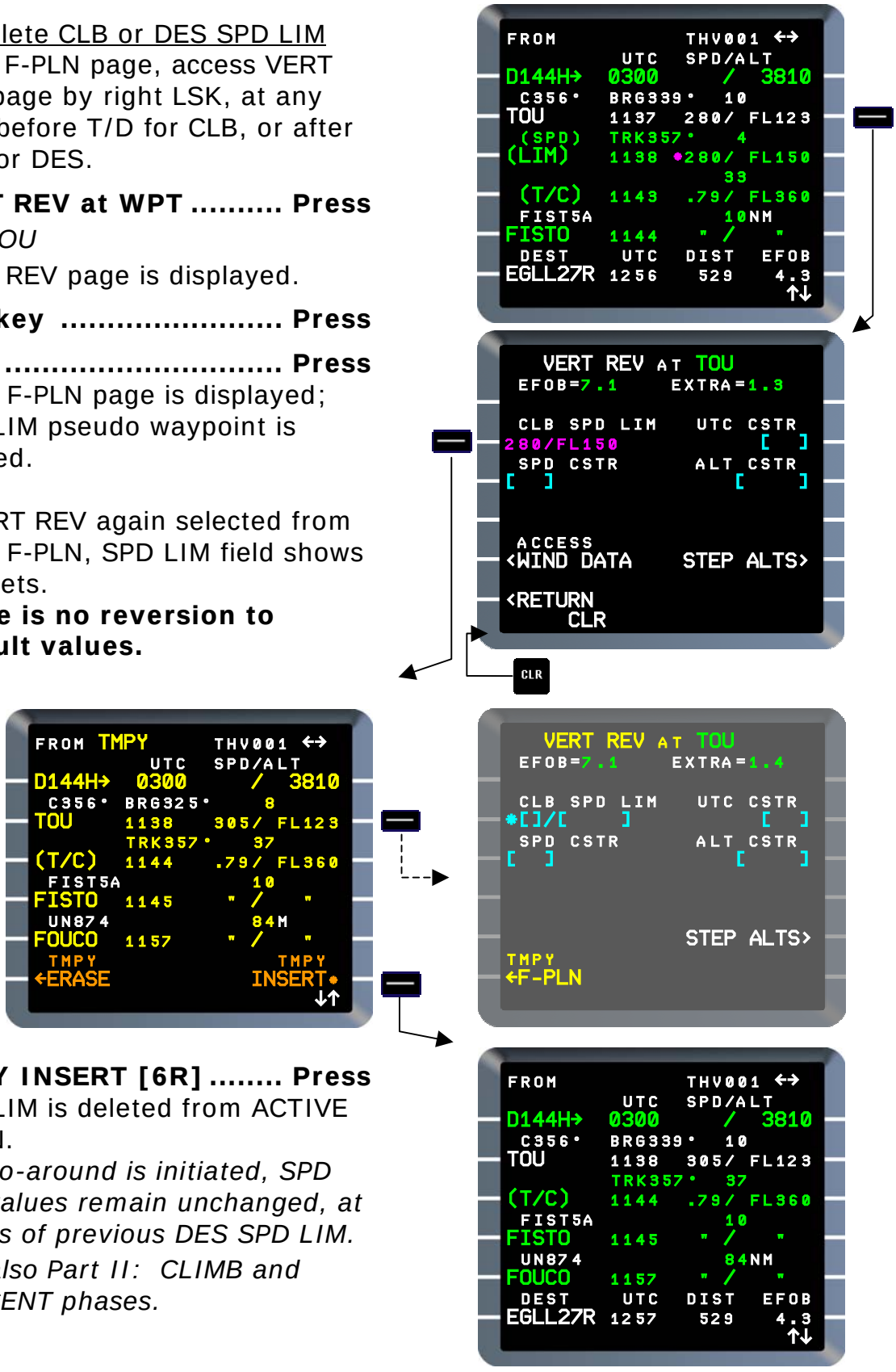
☐ <u>To delete CLB or DES SPD LIM</u>
From F-PLN page, access VERT REV page by right LSK, at any WPT before T/D for CLB, or after T/D for DES.

VERT REV at WPT ..... Press
Ex: TOU
VERT REV page is displayed.

CLR key ..... Press

[2L] ..... Press
TMPY F-PLN page is displayed; SPD LIM pseudo waypoint is deleted.

If VERT REV again selected from TMPY F-PLN, SPD LIM field shows brackets.
There is no reversion to default values.



TMPY INSERT [6R] ..... Press
SPD LIM is deleted from ACTIVE F-PLN.
If a go-around is initiated, SPD LIM values remain unchanged, at values of previous DES SPD LIM.
See also Part II: CLIMB and DESCENT phases.

<u>Note</u>
Vertical constraints may be modified or cleared directly on F-PLN pages via right LSKs.
This method **is not recommended**, since a possible simultaneous leg-switching could cause inadvertent revision of the adjacent WPT.

■ SPD CSTR [3L]

SPD CSTR at a WPT is displayed in [3L] on VERT REV page, selected at the associated WPT (revise point).

When entered, in CAS only, SPD CSTR becomes the **upper limit** for the applicable flight segment, according to phase as below:

- A "climb" SPD CSTR applies from origin up to revise point (or to T/C if the revise point is beyond T/C),
- A "descent" SPD CSTR applies from the revise point down to DEST (or T/D if T/D is beyond the revise point).

Speed constraints are not applied in Cruise or Approach phases.
A missed approach speed constraint may be entered to be respected from DEST up to the revise point belonging in the GA procedure (i.e., it is similar to a "climb" constraint).
When defaulted by NAV data base SPD CSTR value is displayed in small font; in large font when pilot-entered.

A speed constraint on a HM may only be entered via the NAV data base and cannot be modified by pilot. This speed constraint is used only for computation of holding target speed.

A SPD CSTR is considered as **matched** if the predicted speed error is 10 KT or less (shown by ✱ symbol magenta). Otherwise it is considered **missed** (shown by ✱ symbol amber); it remains missed until error decreases to 5 KT.

If SPD CSTR is predicted as missed, "SPEED ERROR AT XXXXX" (WPT ident) s-pad msg is displayed, when:

- Airborne and NAV mode engaged, and
- In CLB if missed constraint is "climb" or CRZ/DES within 150 NM of DEST if missed constraint is "descent".

☐ SPD LIMIT EXCEEDED

This s-pad msg (white) is displayed in CLIMB, CRUISE and DESCENT flight phases when:

- Speed exceeds SPEED LIMIT by 10 KT, and
- ALT is within 150 ft of SPEED LIMIT ALTITUDE.

Message is cleared when speed no longer exceeds the SPEED LIMIT + 5 KT.

See also Part II: Ch 4 Climb for example.

☐ To enter or modify a SPD CSTR at a WPT

Climb SPD CSTR

From F-PLN page, access VERT REV page by right LSK, at revise point.

Ex: CLB SPD to be limited to 220 KT to TOU

SPD CSTR [3L].....Enter

A TMPY F-PLN containing the SPD CSTR is created. SPD at revise point is preceded by ✸ symbol (magenta).

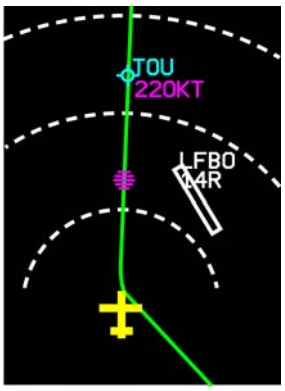
If selected, VERT REV page at revise point shows title and entered value yellow.

If speed is managed SPD at all WPTs **before** the revise point are superseded by the new speed constraint if more restrictive.

In the example speed at SPD LIM is 220.

TMPY INSERT [6R] ..... Press

ND shows CSTR speed in magenta at revise point, if CSTR p/b pushed on EFIS control panel.



Descent SPD CSTR

From F-PLN page, access VERT REV page by right LSK, at revise point.

Ex: ATC requests speed 280 at TIGER.

SPD CSTR [3L] .....Enter

Ex: 220

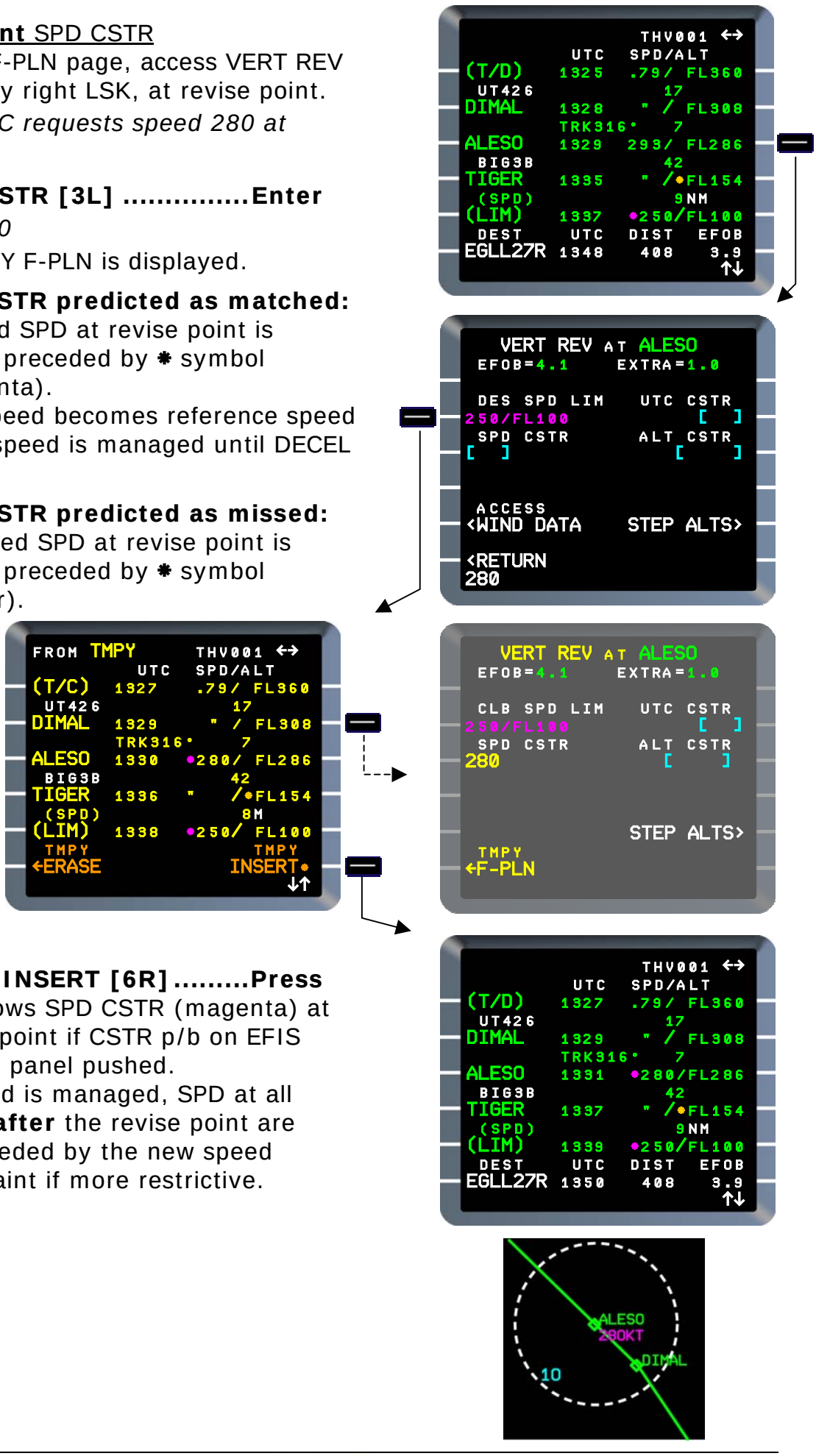
TMPY F-PLN is displayed.

- **If CSTR predicted as matched:**

Entered SPD at revise point is shown preceded by ✸ symbol (magenta).
This speed becomes reference speed when speed is managed until DECEL POINT.

- **If CSTR predicted as missed:**

Predicted SPD at revise point is shown preceded by ✸ symbol (amber).

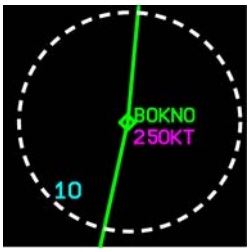


TMPY INSERT [6R].....Press

ND shows SPD CSTR (magenta) at revise point if CSTR p/b on EFIS control panel pushed.
If speed is managed, SPD at all WPTs **after** the revise point are superseded by the new speed constraint if more restrictive.

☐ SPD CSTR in CRZ

Entering a SPD CSTR at a WPT in CRZ segment has no effect on existing managed speed at that WPT, which remains unchanged on F-PLN page A. If this speed is less than the CSTR entered, it is shown as “matched”; if greater, it is shown as “missed”.
To comply with a SPD CSTR in CRZ, SELECTED SPEED must be used.
On ND, if CSTR p/b pushed on EFIS control panel, the entered CSTR speed is displayed at that WPT and can be used as a reference.



Caution

A SPD CSTR entered at a CRZ WPT is taken into from the T/D to DEST.
If such a CSTR is entered in CRZ, but is not intended for the DES, it must be deleted before WPT is sequenced, otherwise, SELECTED speed and vertical modes must be used for descent.

If FMGC is unable to determine whether CSTR is to be applied to a CLB or a DES segment, ←CLB or DES→ prompt is displayed in line [6]. Selection of appropriate prompt by [6L] or [6R] enables CSTR to be applied as required.

A SPD CSTR at a WPT in CRZ segment, entered when A/C is in CLB phase, causes this display.

☐ To delete a SPD CSTR

Select VERT REV page at the revise point.

CLR key .....Press

[3L].....Press
Display reverts to TMPY F-PLN page

TMPY INSERT [6R].....Press

Note
As previously explained modification of vertical constraints directly from F-PLN page (right LSKs) **is not recommended.**

■ UTC CSTR [2R]

UTC CSTR field [2R] enables a time constraint to be entered at a specific WPT, provided the WPT is a fixed-position (not a pseudo-waypoint) in ACTIVE or SEC F-PLNs.
The field is displayed at all WPTs if an ETT has been entered *(See Part II: Ch 2.2 Preflight)*.

Only one UTC CSTR may exist in a F-PLN; a second such entry will cause deletion of the first.

The UTC CSTR applies to time AT the WPT; "AT OR BEFORE" and "AT OR AFTER" functions are not provided.

UTC CSTR entries are not accepted in the following cases:
- ENG OUT mode active,
- No valid clock data,
- Decelerating to, or in a holding pattern,
- In DES or APPR phase, and at or below SPD LIM altitude,
- In GO-AROUND phase,
- If UTC CSTR more than 20hrs after clock time.

If a UTC CSTR already exists when any of the above occurs, it is automatically deleted, and "TIME CSTR DELETED" s-pad msg (white) is triggered.

These restrictions do not apply to entry of UTC CSTR in SEC F-PLN created by SEC INIT function.

A UTC CSTR is predicted as missed at a WPT if difference between predicted time at the WPT and constraint time exceeds the “Time Tolerance” which depends on distance of time-constrained WPT from A/C position.

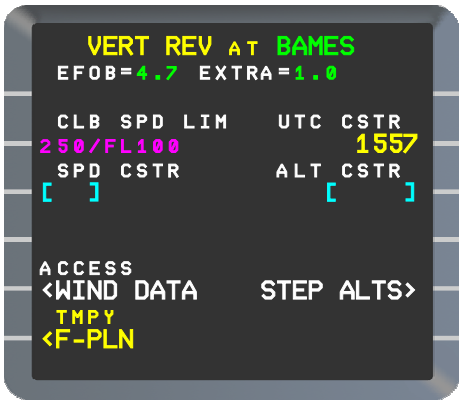
For distances up to 2000 NM, Time Tolerance is 30 sec; for longer distances it increases by 1 min/1000 NM.

UTC CSTR remains “missed” until Time Tolerance decreases to 15 sec for distances up to 2000 NM, adjusted at same rate as above for longer distances.

☐ To enter UTC CSTR at a WPT

From F-PLN page, access VERT REV page by right LSK, at revise point.
Ex: ATC requests to cross BAMES 1557 or later (current ETA at BAMES is 1553)

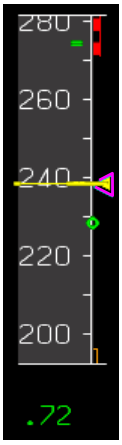
UTC CSTR [2R] .....Enter
TMPY F-PLN is displayed.
Managed speed is re-computed, within operational limits, to comply as closely as possible with time CSTR, taking account of existing limits & CSTRs. It reverts to existing ECON speed after time-constrained WPT.
If VERT REV at revise point again selected, entered time is shown yellow and may be modified (except at origin, see ETT below).



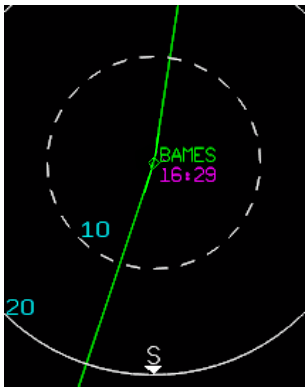
- **If UTC CSTR is predicted as matched:**
  TMPY F-PLN shows Time at revise point preceded by a ✸ symbol (magenta).
- **If UTC CSTR is predicted as missed:**
  TMPY F-PLN shows Time at revise point preceded by a ✸ symbol (amber).

TMPY INSERT [6R].....Press

If UTC CSTR is predicted as **missed**, "TIME ERROR AT XXXXX" (WPT ident)" s-pad msg (white) is triggered, if NAV mode engaged or A/C on ground.



On **PFD:**
If SPD is managed and NAV mode is engaged, speed target moves to value shown on PERF page to comply with UTC CSTR, or minimize time error,
If SPD is managed and HDG/TRK mode is engaged, FM speeds continue to be adjusted to try to match CSTR, but target on PFD is frozen until NAV mode engaged.
If managed speed is engaged when in NAV mode, or vice versa, speed target is frozen for 15 sec; "SETTING SPD/TIME CSTR" s-pad msg (white) is triggered if Managed SPEED is engaged while in NAV mode, or NAV mode is engaged while in managed speed mode.



On **ND**, UTC CSTR time is shown (magenta) at associated WPT, if CSTR p/b pushed (ETT and UTC at FRM WPT are not shown).

On **MCDU**, PERF page shows CI [2L]: TIME CSTR.
FMS computes a modified COST INDEX to derive a target speed within the operating limits to comply as closely as possible with time constraint.
PERF page of active phase shows frozen speed if in HDG/TRK, other PERF pages show updated managed speeds.

☐ <u>To enter Estimated Time of Take-off (ETT)</u>
UTC CSTR function may be used to enter an ETT.
Predicted times at en-route WPTs and ETA at DEST will then be computed and displayed on TMPY F-PLN.
(Refer to PART II: Preflight – Ch.2.2 Supplementary Procedures.)
An ETT cannot be cleared from the VERT REV page at origin, but can be modified.
An ETT may be computed by FMGC as a result of a UTC CSTR entry en-route or at DEST (*see below).*

☐ To enter Desired Time of Arrival at DEST

UTC CSTR function may be used to enter a desired time of arrival at DEST, either during PREFLIGHT phase, or when airborne.

During PREFLIGHT:

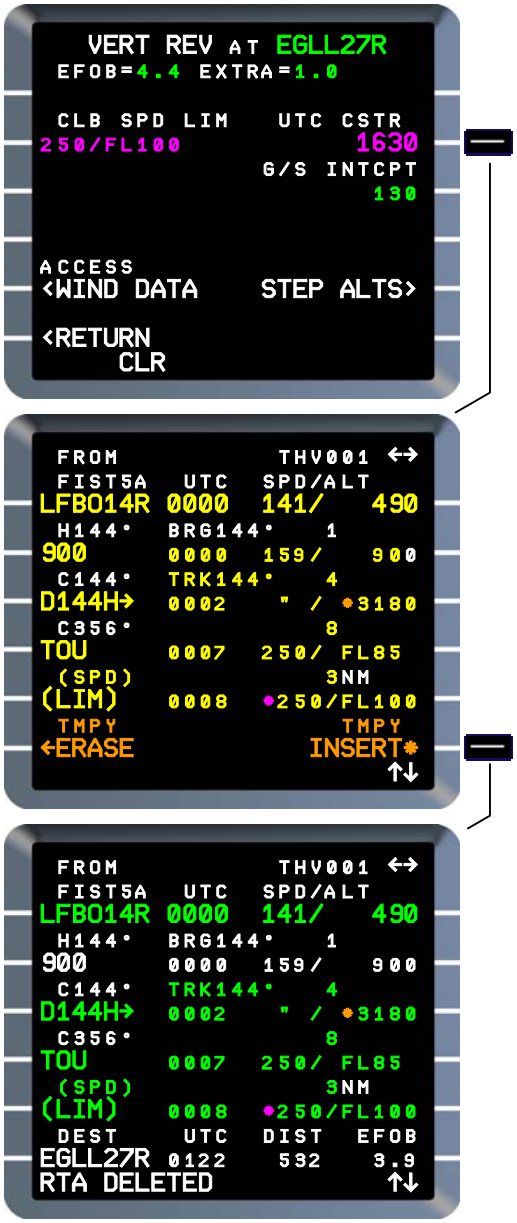
If predicted ETA can be matched with desired time, based on existing CI, the FMGC will compute the ETT necessary to comply with this arrival time. Otherwise FMGC will assume present clock time as ETT and compute a modified CI to match the desired arrival time as closely as possible, within operating limits, as described above for UTC CSTR at a WPT.

In the example a constraint 1630 at EGLL27R is entered computing an ETT at 1505.

In FLIGHT:

FMGC computes a revised CI to comply with desired arrival time as closely as possible, as described above.

☐ To delete or modify UTC CSTR
(Except ETT)



To delete:

CLR key ..... Press

CLR [2R]..... Press
TMPY F-PLN is displayed.

TMPY INSERT [6R] ..... Press

To modify:
Overwrite the value entered at the revise point.
This creates a TMPY F-PLN to be activated.

Automatic deletion:

A time constraint is automatically deleted in the following cases causing "TIME CSTR DELETED" s-pad msg (white):

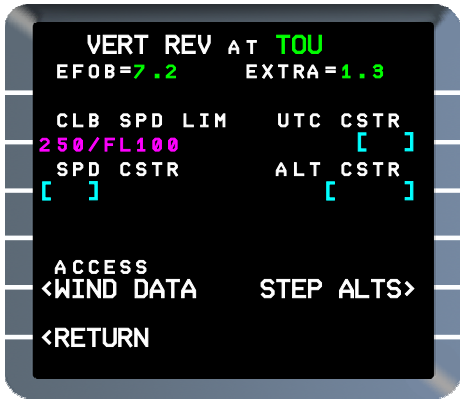
1. Time constrained waypoint is cleared or sequenced (regardless of active lateral control mode),
2. Detecting the ENG OUT mode,
3. A/C in deceleration zone to a HM or in a HM leg,
4. Loss of valid clock data to the FM,
5. Flight phase transitions to GO AROUND or switch from DES/APP to CLB/CRZ,
6. A time constraint exists in ACTIVE F-PLN and SEC F-PLN is activated in which no UTC CSTR exists or is different,
7. The Alternate F-PLN is enabled,
8. A UTC CSTR is entered in the same F-PLN at a different WPT,
9. The time constrained waypoint is projected as an ABEAM waypoint when a DIR-TO / ABEAM is performed.

Conditions 2 through 5 do not apply to a SEC F-PLN created by other means than a COPY ACTIVE.

Note
Using CLR function directly from F-PLN page (right LSKs) would cause deletion of all vertical constarints at the revise point.

☐ UTC CSTR in SEC F-PLN
Refer to Part III: Ch 5 SEC F-PLN

■ ALT CSTR [4R]



ALT CSTR at a WPT is displayed in [3R] on VERT REV page, selected at that WPT (revise point).

ALT CSTRs may be:
- AT,
- AT OR BELOW,
- AT OR ABOVE,
- WINDOW (i.e. between two altitudes).

They may be:
- Defaulted value defined in NAV data base (small font, magenta), or
- Pilot-entered (large font, magenta).

(Color changes to yellow when entered as TMPY F-PLN.)

WINDOW CSTRs can only be entered as part of procedure defined in NAV data base.

Entry rules:

ALT CSTRs are not applicable to CRZ phase, and cannot be entered at origin, DEST, FROM WPT, pseudo-waypoint, HOLD exit fix.

Before reaching CRZ:
- If an ALT CSTR is entered at a WPT prior to T/C (or in SID if no T/C exists), it is a climb CSTR,
- If an ALT CSTR is entered at a WPT belonging to the cruise segment, prompts ←CLR / DES→ are displayed to be chosen by pilot,
- If an ALT CSTR is entered at a WPT after T/D (or in STAR or Approach if no T/D exists), it is a descent CSTR.

When in CRZ, DES or APPR phases, an ALT CSTR entered at any active F-PLN WPT (except in GA procedure) is a descent CSTR.

An ALT CRST entered in a GA procedure is a climb CSTR.

A climb ALT CSTR must be above take-off THR RED ALT to be accepted after take-off; in go-around it must be above G/A THR RED ALT.

A descent ALT CSTR must be above DEST altitude + 400 ft to be accepted.

Manually entered ALT CSTRs must be below CRZ ALT, and also below all inserted step ALTS for DES.

Entries rejected for above reasons trigger "ENTRY OUT OF RANGE" s-pad msg (white).

An ALT CSTR is considered **matched** if ALT ERROR is less than or equal to 250 ft; otherwise it is considered **missed**. It remains missed until the ALT ERROR decreases to 200 ft.

☐ <u>To enter or modify ALT CSTR at a WPT</u>
From F-PLN page, access VERT REV page by right LSK, at revise point.

ALT CSTR [3R].....Enter

– For **AT** ALT CSTR, enter altitude or FL.

Ex: cross TOU at FL 80, enter 80

– For **AT OR ABOVE** CSTR, enter altitude or FL preceded or followed by "+" sign.

– For **AT OR BELOW** CSTR, enter altitude or FL preceded or followed by "-" sign.

An altitude entered in FT above TRANS ALT is automatically converted to FL and vice versa below TRANS ALT.

TMPY F-PLN is displayed.

FMGC computes profile to comply with CSTR as closely as possible, within performance limits of A/C; predicted altitude/FL at revise point are displayed.

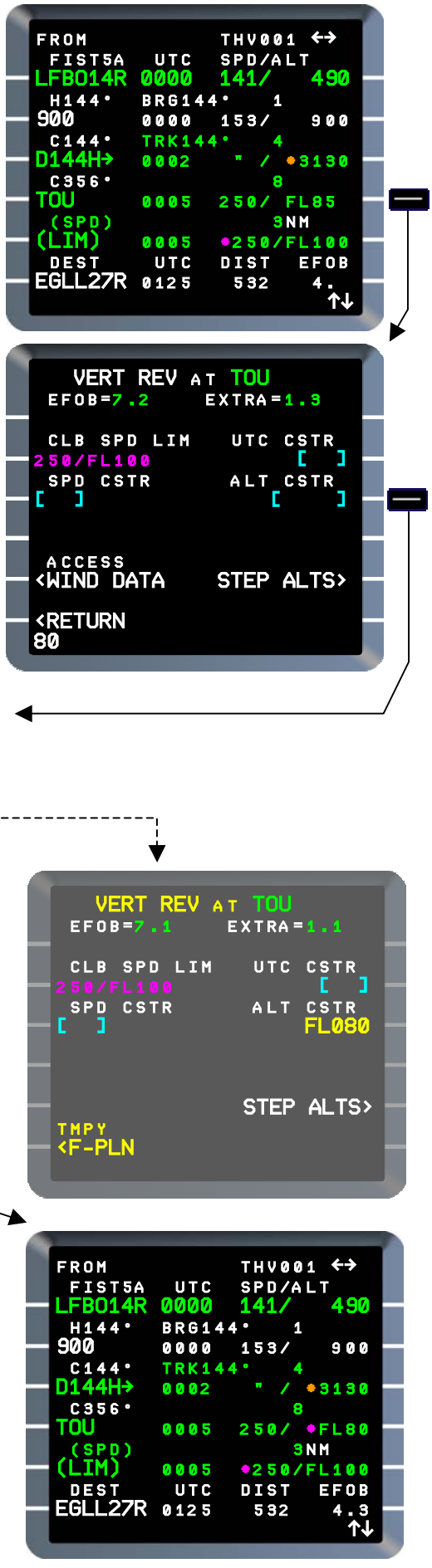
- **If ALT CSTR predicted as matched:**

TMPY F-PLN shows predicted ALT at revise point preceded by ✱ symbol (magenta).

- **If ALT CSTR predicted as missed:**

TMPY F-PLN shows predicted ALT at revise point preceded by ✱ symbol (amber).

TMPY INSERT [6R] ..... Press

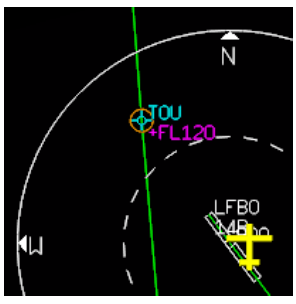


MCDU:
F-PLN page A shows predicted altitude/FL as described above.
ND:
– If managed vertical mode is engaged (CLB/DES mode) and CSTR is selected on EFIS panel, revise point is circled magenta when entered ALT CSTR is matched; if missed it is circled amber.
– If vertical mode is selected (OP CLB/OP DES) ALT CSTR is shown circled white. The constraint is ignored.

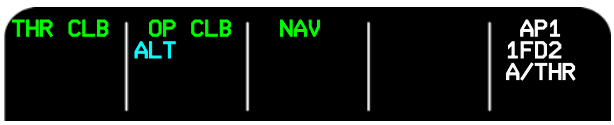
Examples below.

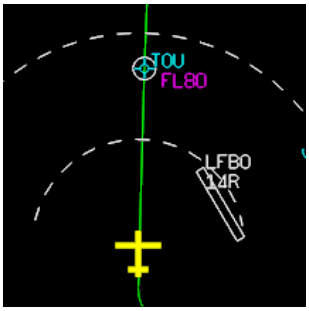
MATCHED

MISSED



IGNORED





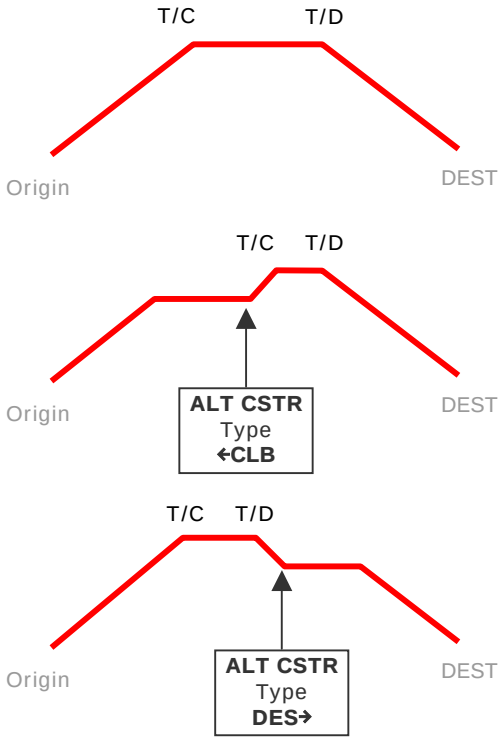
Vertical Guidance:

ALT CSTRs are taken into account by the FMGS for target altitude.

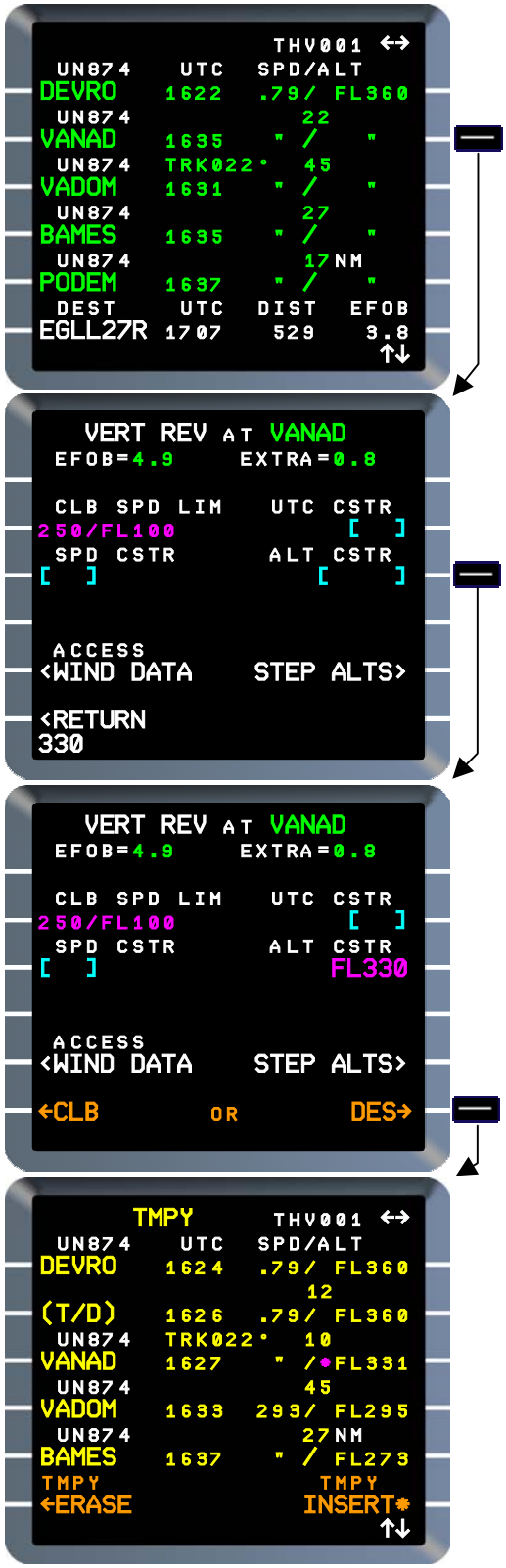
Refer to Part II: Climb - Ch 4.3 Constraints management for details.

☐ ←CLB OR DES→

When the FMGC cannot determine whether CSTR should apply to step climb from that WPT or step descent to that WPT, then "CLB" & "DES" prompts are displayed at [6L] & [6R], to be chosen as appropriate by pilot.
Vertical profile is re-computed accordingly.



In the example FL 330 is entered at VANAD which is a cruise WPT. T/D is re-computed to pass VAND at FL330



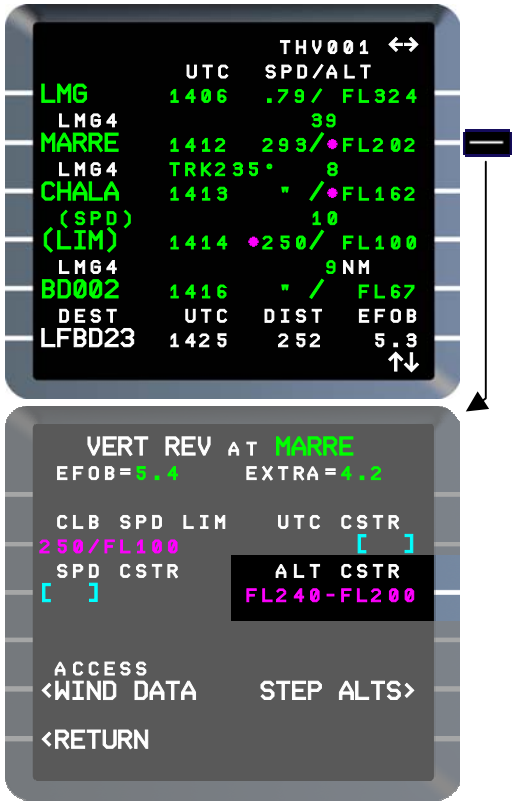
☐ ALT WINDOW CSTRs
(not selectable by pilot)

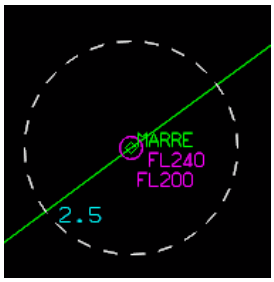
F-PLN page A shows predicted altitude/FL at associated WPT, with ✱ symbol magenta or amber as appropriate.
In the example a STAR at LFBD has been selected. A WINDOW CSTR exists at MARRE, requiring it to be crossed between FL240 and FL200.

Upper and lower altitude limits are displayed on VERT REV page at associated WPT.
Since these CSTRs can only be entered as part of a SID or STAR procedure stored in NAV data base, they are in magenta, small font.

ND shows upper and lower limits (magenta), if CSTR p/b pushed on EFIS control panel.

These constraints may be modified only by replacing with a CSTR AT, AT OR ABOVE or AT OR BELOW.





☐ To delete ALT CSTRs

All ALT CSTRs, except those manually entered at a WPT in a precision approach procedure between FAF and RWY (see below), may be manually deleted by using CLR function at [3R] on VERT REV page. Any previously existing data-base defaulted values are not recovered.

If a FPA is defined at a WPT (as at FAF in an approach procedure), deletion of the ALT CSTR at that WPT also deletes the FPA.

Automatic deletion:
ALT CSTRs are automatically deleted when:
- The associated WPT is deleted by CLR or by DIR TO functions. (CSTRs are not transferred to ABM points when this function is used).
- A GO-AROUND is initiated before DEST RWY sequenced, and conditions for re-stringing approach are met. In this case CSTRs up to DEST are deleted; "CSTR DEL UP TO XXXXX" s-pad msg (white) is displayed.
- ALTN F-PLN is enabled; CSTRs up to original DEST, and all climb CSTRs of ALTN F-PLN below actual altitude, are deleted. Same s-pad msg as above is displayed.

Note
ALT CSTRs may also be revised directly on F-PLN page A by right LSK at revise point preceded:
- Use "/" (e.g. /80, /+80) format for insertion,
- Use CLR function for deletion. In this case it will delete all vertical constraints.

As already explained this method **is not recommended** due to possible error insertion in case of simultaneous leg switching.

☐ ALT CSTRs in APPROACH procedure

An ALT CSTR cannot be entered or displayed at DEST RWY or MAPt (fields are blank on VERT REV page).

When predictions are not available, the altitude field adjacent to DEST or RWY displays DEST + 50 FT, or for a MAPt, the NAV data base ALT CSTR at MAPt (green small font).

When predictions are available, predictions will not show ✱ symbol at DEST or RWY or MAPt (ALT CSTR field on the VERT REV page is blanked).

The following rules apply when an ILS, IGS or MLS approach is strung into the flight plan:

- When predictions are not available, the altitude field adjacent to the FAF displays GS crossing altitude (green small font),
- When predictions are available, predictions will not show * symbol at the FAF,
- The ALT CSTR field of the VERT REV page is blanked at all points between the FAF and RWY (inclusive),
- If the FAF is deleted, GS crossing altitude is also deleted. Once the FAF is deleted, altitude constraints can be entered and displayed at any approach points before (and not including) the RWY.

4.2. WIND DATA

■ Access

WIND DATA for the **ACTIVE** F-PLN may be accessed from:
- DATA INDEX page 2/2 via ACTIVE F-PLN WINDS at [5L], or
- F-PLN page, via VERT REV page at a WPT and ACCESS WIND DATA prompt at [5L].

  This prompt is not available when a TMPY F-PLN exists and in go-around procedure until go-araound is initiated.

WIND DATA for the **SEC** F-PLN may be accessed from :
- DATA INDEX page 2/2 via SEC F-PLN WINDS at [6L], or
- F-PLN page, via VERT REV page at a WPT and ACCESS WIND DATA prompt at [5L] .

Access to WIND is also available from INIT page A (SEC INIT page A) via WIND prompt at [5R].

This is a normal access to ACTIVE WIND DATA during the cockpit preparation. See Part II: Ch 2.1 Preflight

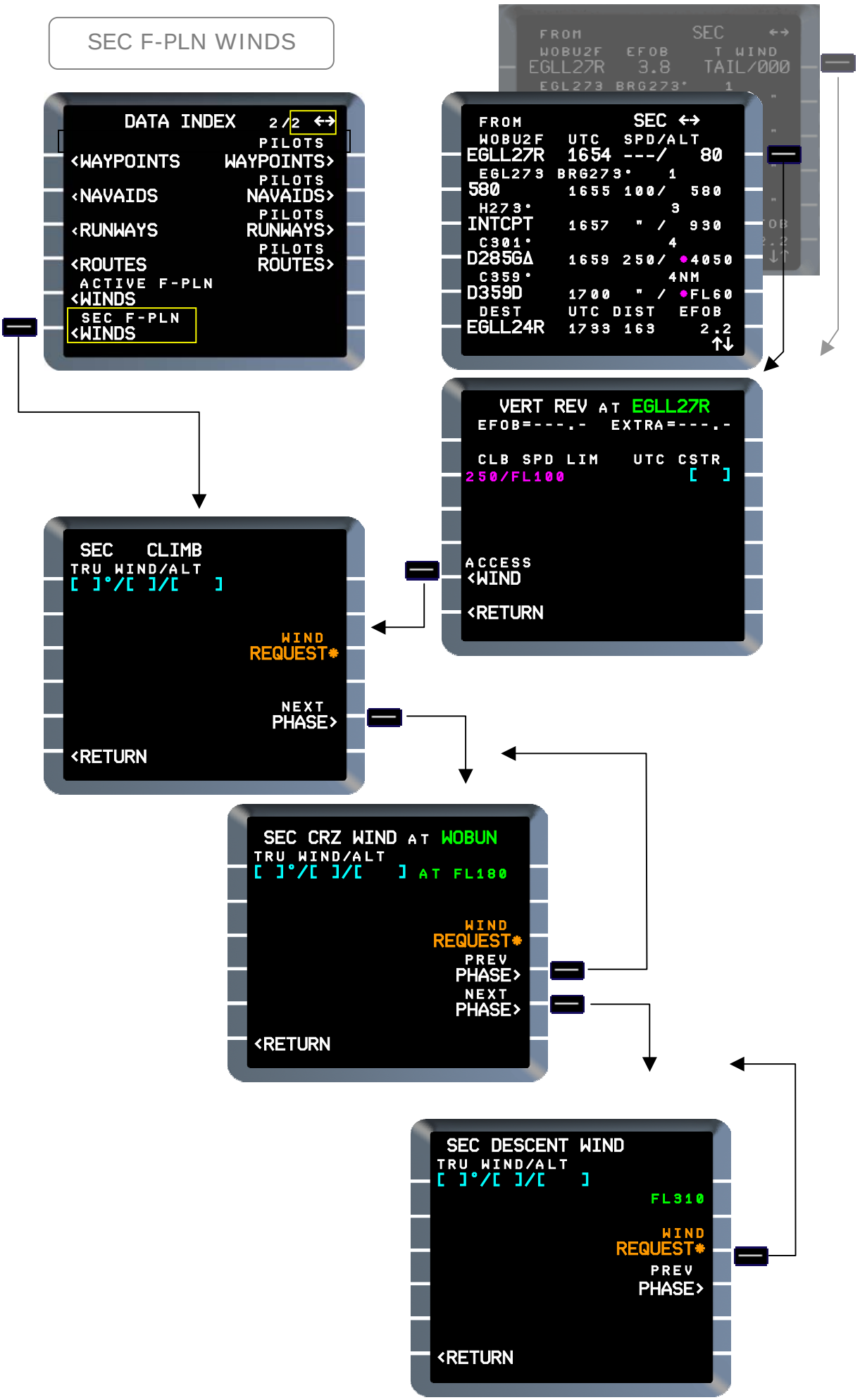
Following pages show access:
- From DATA INDEX page 2/2 CLIMB WIND page is displayed first,
- From VERT REV pages, WIND page for the current phase is displayed.

The WIND REQUEST prompt is displayed if AOC option is activated. ✱ symbol adjacent to WIND REQUEST prompt is not displayed when a request is sent or when data link is not available.

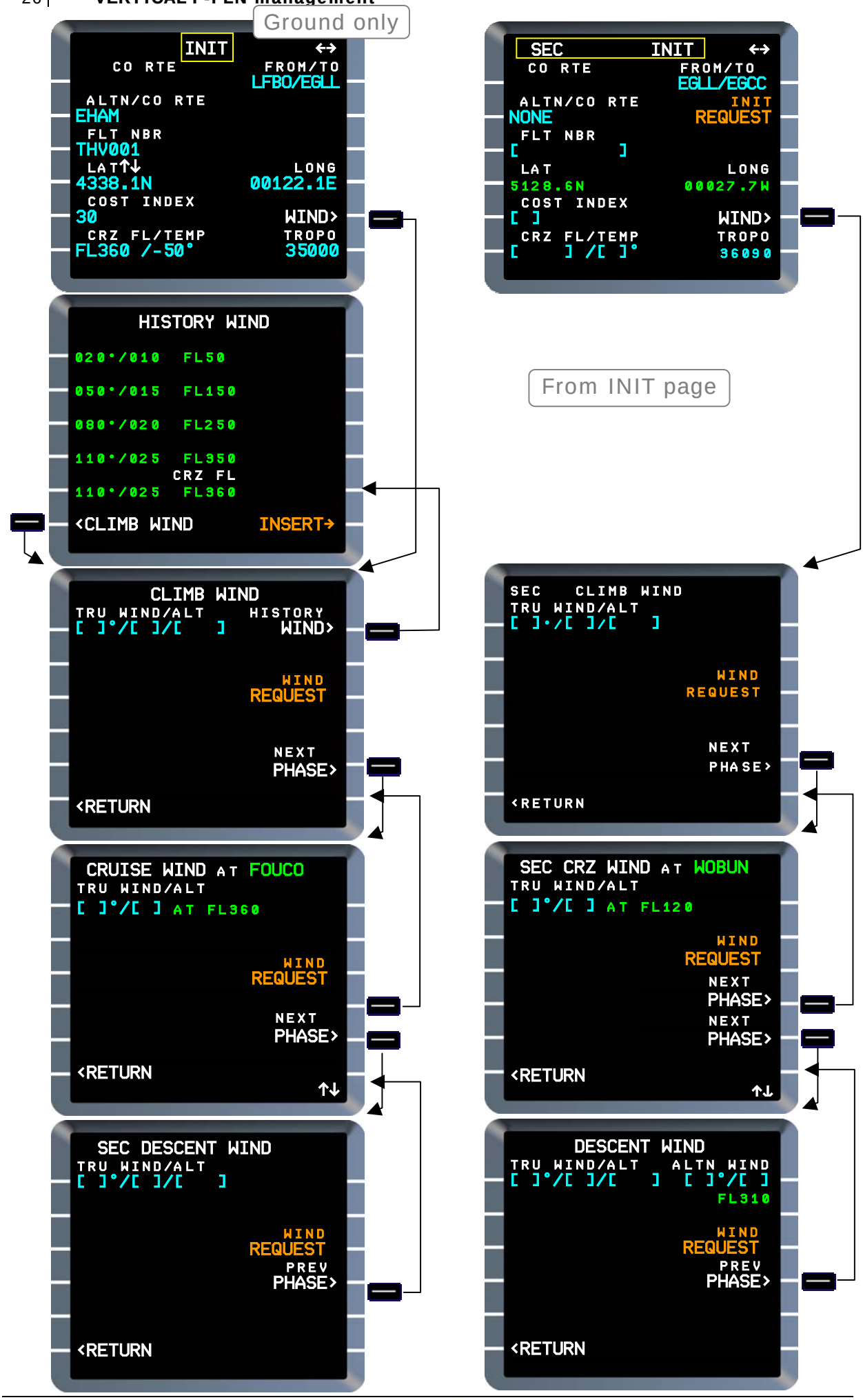
See Part III: Ch 9 Data Link

When accessed via VERT REV pages at a WPT, the display is CLIMB / CRUISE / DESCENT WIND page according to the phase at which the WPT is belonging.

ACTIVE F-PLN WINDS



Ground only



■ CLIMB WIND page

In pre-flight phase, before any pilot entry, brackets are displayed in [1L] *(Ex.1)*.

Ex. 1

Up to 5 CLIMB winds may be entered in the format NNN/NNN/ALT, where NNN is direction (TRUE referenced), NNN magnitude, ALT in altitude format below TRANS ALT or FL above.
(Ex. 2 shows a sample).
Modifications of existing data may be made by:

- Using CLR function on appropriate left LSK, or
- Overwriting existing data with the following formats: NNN/NNN/ALT, or NNN/NNN for wind only, or /ALT for altitude only.

Ex. 2

Pilot-inserted data are written large blue font, History wind data small blue font.
CLIMB winds are sorted in ascending altitude order. After each modification of an altitude, the list is resorted.
An entry of "GRND" in an altitude field is interpreted as the wind at ground level. "GRND" is displayed.

Ex. 3

When FMGC has switched to CLIMB phase wind data are green and no longer modifiable *(Ex. 3)*.
When T/C is sequenced CLIMB winds are no longer accessed.

NEXT PHASE [5R] changes display to CRUISE WIND page at first cruise WPT.
If no cruise waypoint exists, this page gives access to the DESCENT WIND page.
UPDATE CANCEL prompt [6L] reverts display to the page from which wind data has been accessed.
UPDATE INSERT [6R] performs a global insertion of all updated winds data. When this prompt is pressed, the page reverts to the respective F-PLN A page oriented with the FROM waypoint.

After sequencing the T/D, the descent winds are saved as History wind for use as climb winds for any subsequent climb or go around (providing the destination has been modified in this latter case).

Climb winds are not automatically deleted if the origin airport is changed.

☐ History wind

The HISTORY WIND is accessed on ground from CLIMB WIND page via HISTORY WIND prompt [1R] and enables a quick insert of wind data, provided data are similar to wind forecast for the intended flight.

During descent, the FMS stores measured wind at a maximum of four flight levels: CRZ FL (FLXXX), FL250, FL150, FL050 (provided that these fixed flight levels are less than FLXXX). History wind can then be used for the next flight, as a basis for the climb wind definition.

Wind at intended CRZ FL is shown provided it is already inserted.
CRZ wind value is then interpolated or limited by FL50 / MAX FL when applicable.
See examples on pictures

INSERT prompt [6R] is not displayed if:

- *No history winds are defined,*
- *History winds have been selected (It re-appears if CRZ FL is changed),*
- *History winds have been inserted,*
- *Wind uplink request is pending or a wind uplink is pending (not inserted or cancelled).*

If an altitude on the History wind page is below the previous destination runway threshold, there is no history wind recorded for that altitude; the field is dashed.

History wind data are not deleted at transition to DONE, after a NAV data base cycle change, or after a DEP airport change. They are only deleted when overwritten during the descent of the next flight leg.

■ CRUISE WIND page

Before any pilot entry, blue brackets are displayed in [1L].

Ex. 1.

Only one cruise wind can be entered at a waypoint in the following format NNN/NNN where NNN is direction (true referenced) and NNN magnitude; entered values are displayed in large blue font.

Ex. 2. Wind 300/40 has been entered at FOUCO

Once entered, wind data are **propagated** at the same altitude to other cruise WPTs (displayed in blue small font).
Vertical slew keys are used to scroll and view cruise waypoints.

Ex. 3. ADABI: propagated wind entered at FOUCO.

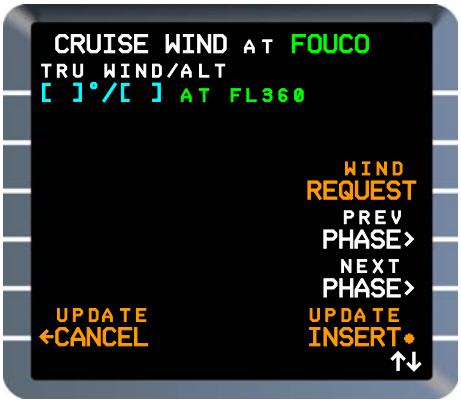
Propagated wind data may be modified by overwriting (both direction & magnitude) but not cleared. Clearing revised data will revert to the previous propagated vaues.

Ex. 4. New wind 310/50 is enterec at DEVRO, overwriting the propagated wind.

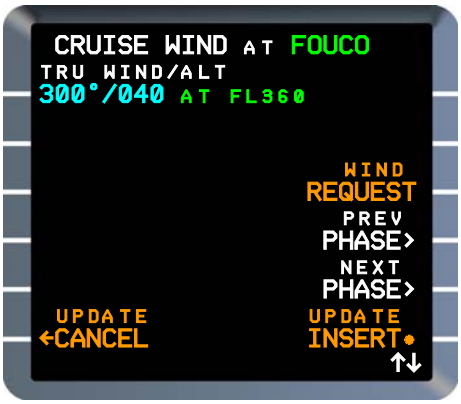
PREV PHASE [4R], NEXT PHASE [5R] changes display to CLIMB WIND and DESCENT WIND pages respectively.

UPDATE CANCEL prompt [6L] reverts display to the page from which wind data has been accessed.

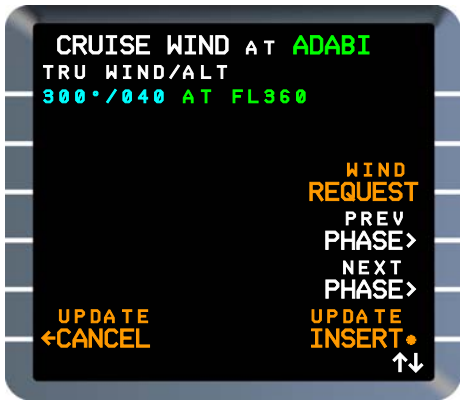
UPDATE INSERT [6R] performs a **global** insertion of all updated winds data. When this prompt is pressed, the page reverts to the respective F-PLN A page oriented with the FROM waypoint.



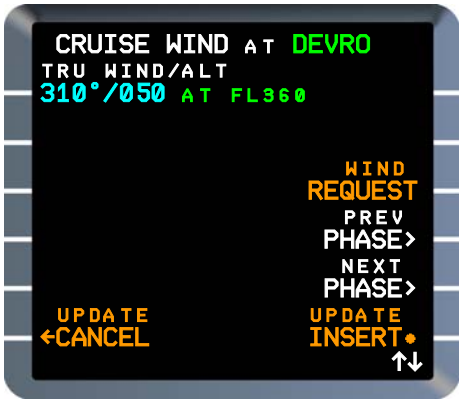
Ex. 1



Ex. 2



Ex. 3



Ex. 4

■ DESCENT WIND page

Before any pilot entry, blue brackets are displayed in [1L] (*Ex. 1).*

Up to 5 DESCENT winds may be entered in the format NNN/NNN/ALT, where NNN is direction (TRUE referenced), NNN magnitude, ALT in altitude format below TRANS ALT or FL above *(Ex. 2 shows a sample).*

Modifications of existing data may be made by:

- Using CLR function on appropriate left LSK, or
- Overwriting existing data with the following formats: NNN/NNN/ALT, or NNN/NNN for wind only, or /ALT for altitude only.

Pilot-inserted data are written large blue font.

DESCENT winds are sorted in descending altitude order. After each modification of an altitude, the list is resorted.

A GND wind inserted in APP page automatically insert or update the DESCENT WIND page (direction is converted to true). (*Ex. 3).*

When FMGC has switched to DES phase, wind data are green and no longer modifiable *(Ex. 4)*.

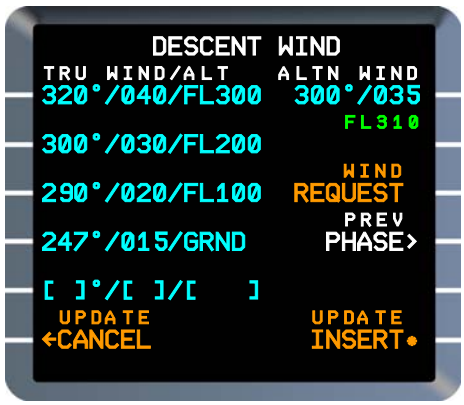
PREV PHASE [5R] prompt enables to change display to CRUISE WIND page; it is no longer available when FMGC has switched to DES phase.

UPDATE CANCEL prompt [6L] reverts display to the page from which wind data has been accessed.

UPDATE INSERT [6R] performs a global insertion of all updated winds data. When this prompt is pressed, the page reverts to the respective F-PLN A page oriented with the FROM waypoint.

Descent winds (including alternate wind) are automatically deleted if the destination airport is changed.

Ex. 1



Ex. 2

Ex. 3

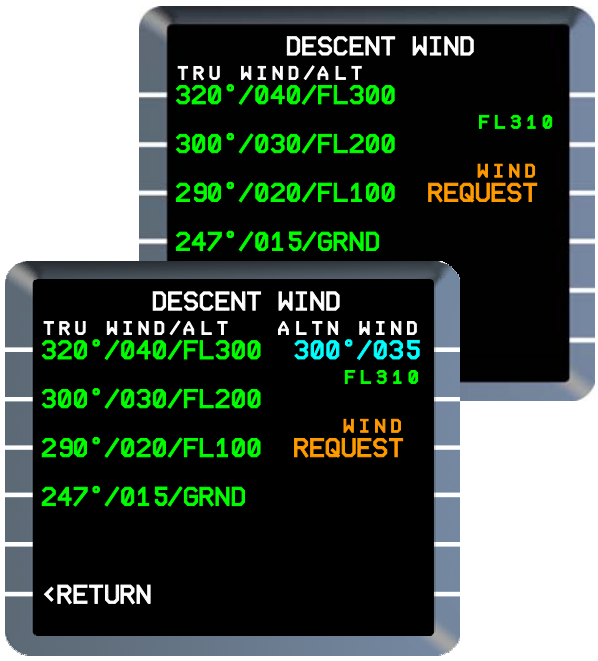
Ex. 4

☐ Alternate wind [1R]

This field enables to enter an alternate cruise wind.

Format is NNN/NNN where is direction (true referenced), and NNN is magnitude.
When cleared the field returns to brackets.
It is blank if an alternate destination is not defined.

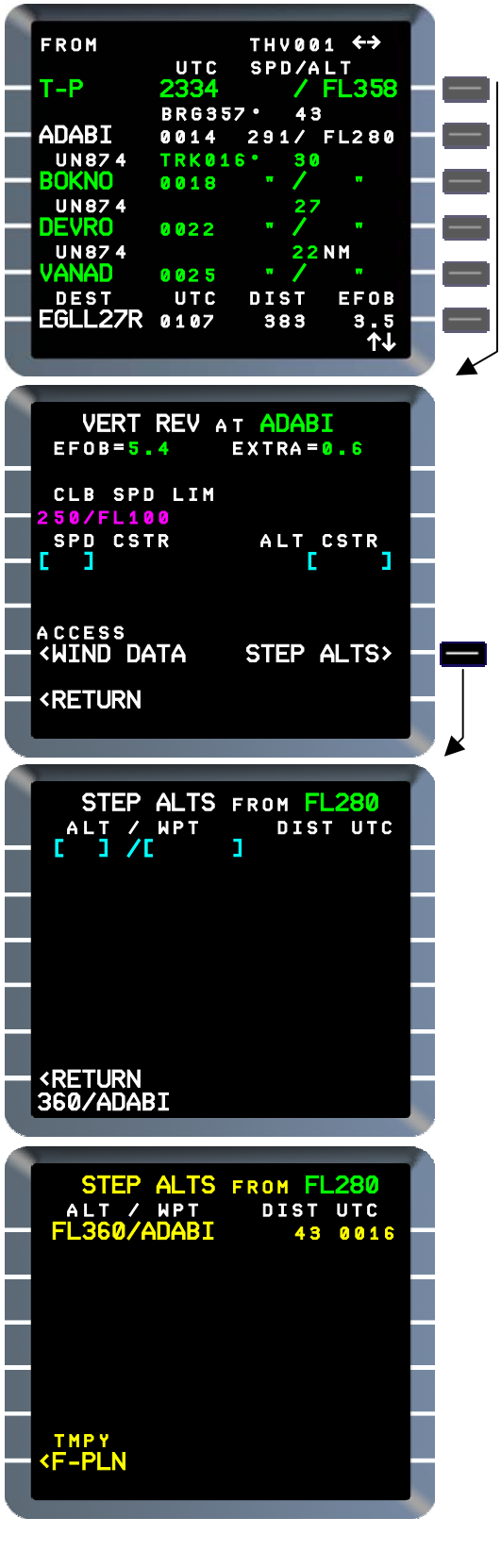
Altitude is displayed is the default alternate FMS altitude: FL220 if distance to ALTN is less than 200NM, otherwise FL310.
This field is blanked if an alternate destination is not defined.



The alternate wind is automatically deleted if the alternate airport is changed.

4.3. STEP ALTS

The STEP ALTS function enables the pilot to plan a change of cruise altitude and visualize the change in term of fuel and time predictions. It is applicable in cruise to ACTIVE and SEC F-PLNs, but not to ALTN F-PLN.
Step climbs or descents may be included in a CORTE or manually entered at WPTs from T/C to 50 NM before T/D.
Only one step is allowed in a F-PLN.
The function is not available if an Engine Out condition is active.



■ **To enter STEP CLB or DES**

From F-PLN page, at any WPT, access to VERT REV page.

STEP ALTS [5R].....Press
The STEP ALTS FROM XXX (CRZ FL or ALT) page is displayed.

STEP ALT / WPT [1L] .....Enter
Ex: 360/ADABI
TMPY STEP ALTS page is displayed, showing DIST to and UTC time at step point (S/C for step climb, or S/D for step descent).
Either or both values of ALT/WPT may be modified by overwriting or deleted by using CLR function.

STEP ALT may be entered at a specified distance after a WPT in F-PLN *(e.g. 360/ADABI/20)*. In this case a PLACE/DIST waypoint is automatically inserted in F-PLN.

Entry above MAX ALT causes "STEP ABOVE MAX FL" s-pad msg (white).

Minimum ALT change allowed is 500 ft.

TMPY F-PLN [6L] ..... Press
The temporary flight plan is displayed, showing start of step climb S/C and top of step climb T/C (or start of step descent S/D but position of level off not shown), as well as the fuel and time predictions.

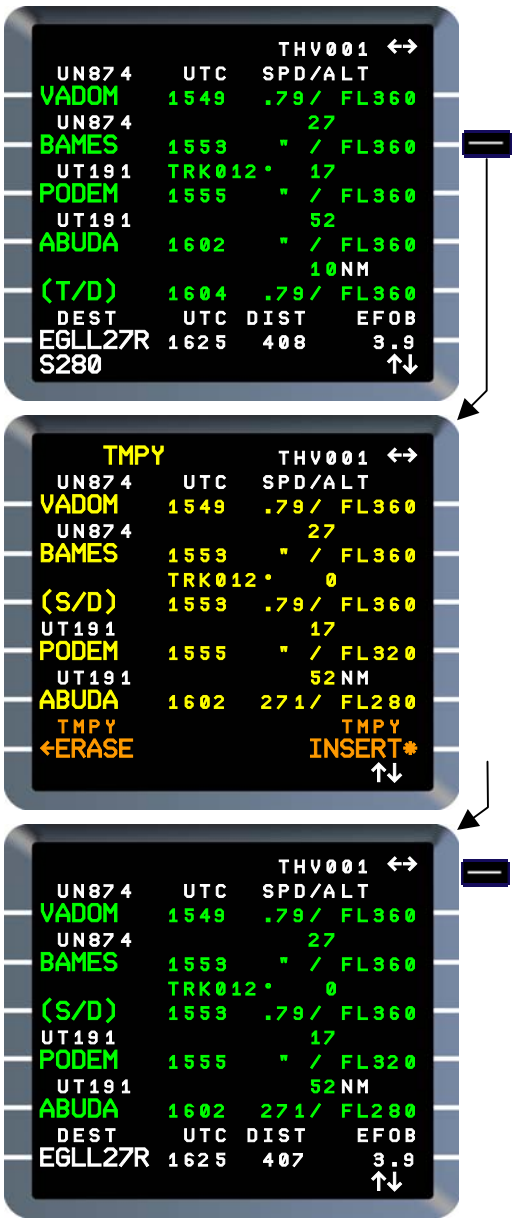
TMPY INSERT [6R] ..... Press
STEP CLB or DES is inserted in ACTIVE F-PLN.

A step which results in an end-point less than 50 NM before T/D is not accepted in F-PLN, but is retained in system in case CRZ phase is extended. It is shown on STEP ALTS page with "IGNORED" indicator.

This also applies if start point found to be before T/C, or end pointt after T/D.

A STEP ALT may also be entered directly in F-PLN page A by entering SXXX (XXX meaning STEP ALT) at the revise point. This creates a TMPY F-PLN, showing positions of S/C or S/D) and predictions.

In the example a step at FL280 is entered at BAMES.



When a step climb (or step descent) has been inserted in ACTIVE F-PLN, "STEP NOW" s-pad msg (white) is triggered when A/C is within 20 NM of the S/C or S/D point.
The step climb or step descent is not initiated automatically; FL change must be initiated by pilot via FCU.
If FL change is not initiated, "STEP DELETED" s-pad msg (white) is triggered.

■ To delete a STEP CLB or DES

From VERT REV At any WPT

STEP ALTS [5R] ..... Press

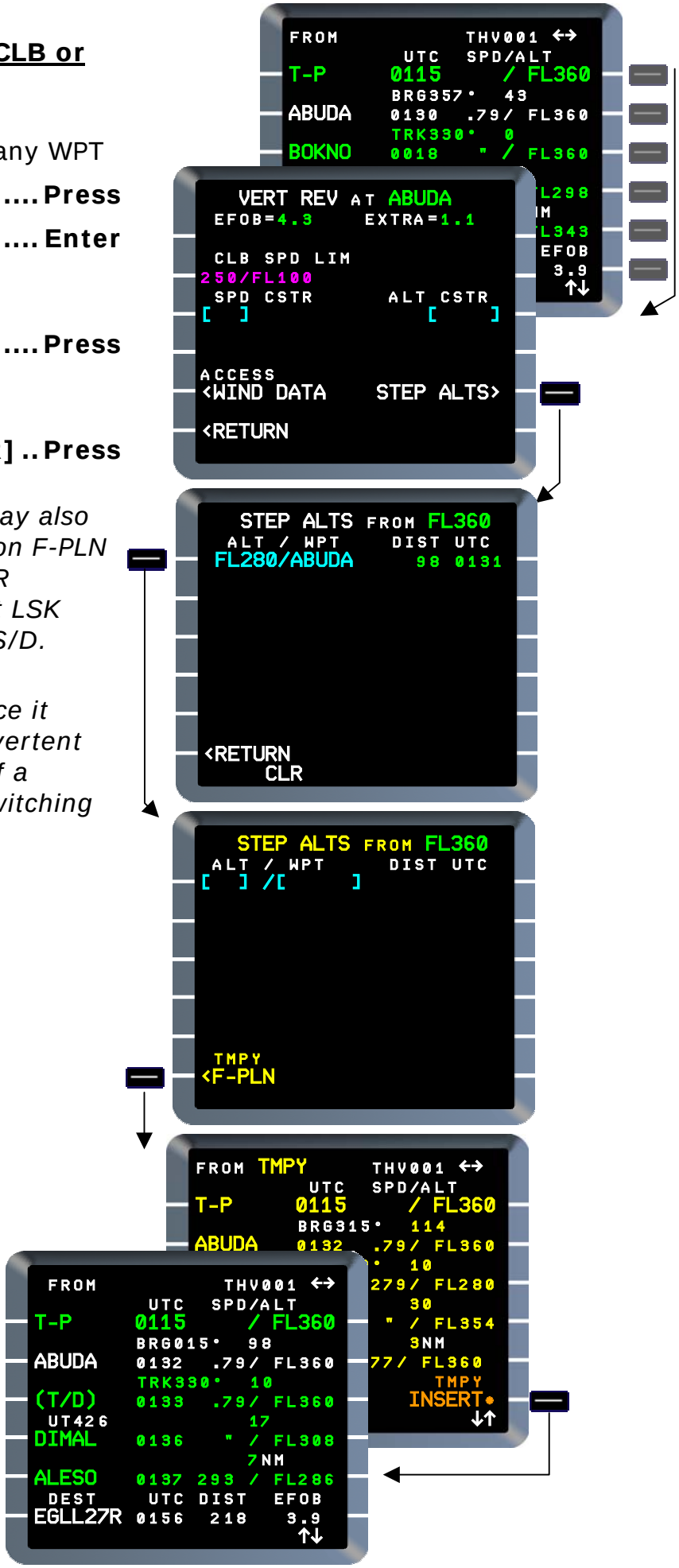
CLR [1L] ..... Enter
TMPY STEPS ALT is displayed.

TMPY F-PLN [6L] ..... Press
TMPY F-PLN page is displayed.

TMPY INSERT [6R] .. Press

STEP CLB or DES may also be deleted directly on F-PLN page A by using CLR function left or right LSK adjacent to S/C or S/D.

*This method **is not recommended** since it could result in inadvertent deletion of a WPT, if a simultaneous leg-switching occurs.*



PAGE INTENTIONALLY LEFT BLANK

Part III: Chapter 5 – SEC F-PLN

Contents

PAGE INTENTIONALLY LEFT BLANK

5.1. General

The SEC F-PLN functions enable a SECONDARY F-PLN to be defined.

Lateral and vertical revisions may be made, as described for ACTIVE F-PLN; there is no associated TMPY F-PLN.

The SEC F-PLN may be used to prepare or study alternative DEPARTURE or ARRIVAL or RWY, changes in route or ALTN RTE. It may be used to keep a back-up of the ACTIVE F-PLN.

SEC F-PLN may be stored in PILOTS ROUTES.

See Part III: Ch 7.1 Navigation data.

For use of SEC F-PLN in specific flight phases, refer to PART II: Ch 2 Preflight, Ch 5 Cruise, Ch 7 Approach.

5.2. SEC INDEX page

It provides access to SEC F-PLN functions.

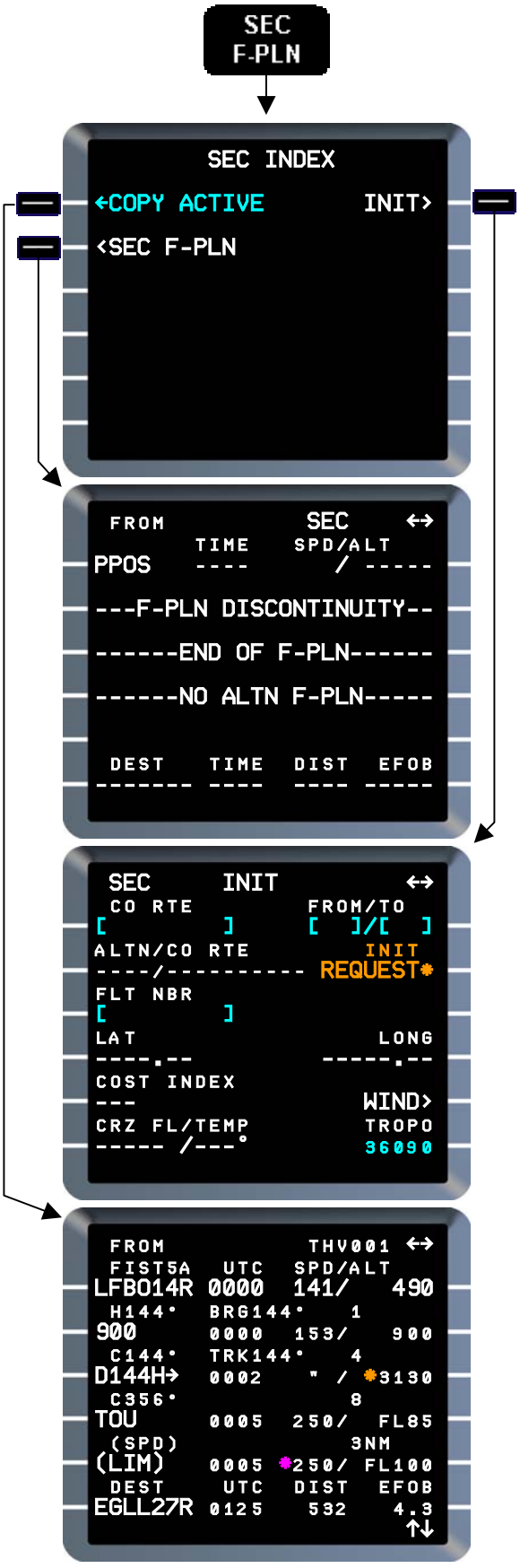
SEC F-PLN key.....Press
SEC INDEX page is displayed.

- **If no SEC F-PLN exists.**
  SEC INDEX page displays the following prompts:

  COPY ACTIVE [1L], when pressed, ACTIVE F-PLN is copied into SEC F-PLN, and SEC F-PLN page A is automatically displayed. Any existing SEC F-PLN is automatically deleted.

  SEC F-PLN [2L] enables access to SEC F-PLN pages A or B.

  INIT [1R] enables access to **SEC INIT** pages A or B to create a SEC F-PLN.



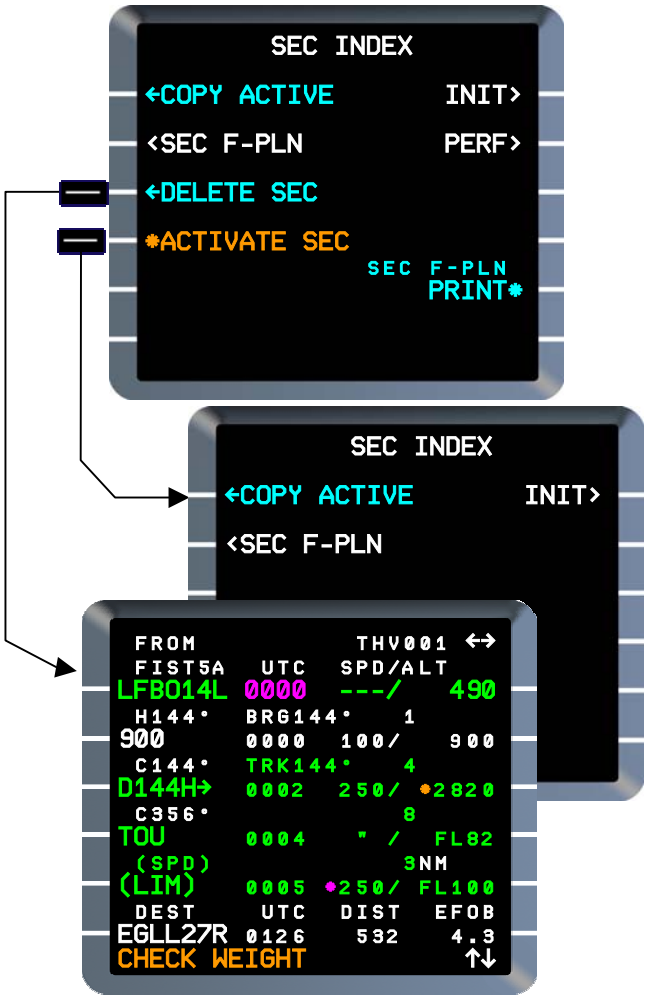
- **If a SEC F-PLN already exists.**
  In addition, DELETE SEC [3L] and ACTIVATE SEC [4L] prompts are displayed.
  If SEC F-PLN is a COPY ACTIVE: INIT [1R] prompt is not shown,
  If SEC F-PLN is not a COPY ACTIVE but has been created by INIT [1R] prompt, INIT prompt is still displayed.

DELETE SEC [3R] enables deletion of all data of SEC F-PLN.
MCDU display reverts to display described in the previous case.

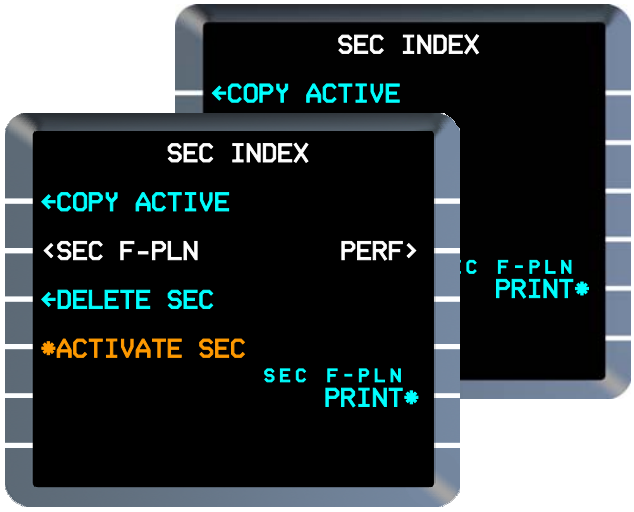
ACTIVATE SEC [4R] enables SEC F-PLN to be copied into ACTIVE F-PLN.
When pressed, F-PLN page A is automatically displayed.
ACTIVE F-PLN is **entirely** replaced by SEC F-PLN.

INIT [1R] enables access to **SEC INIT** pages A or B to create another SEC F-PLN.

SEC F-PLN PRINT [5R] is shown if PRINT option is selected in OPC file and if a SEC F-PLN exists; star symbol is then displayed if printer is available.



PERF [2R] enables access to **SEC PERF** pages.
It is **not** displayed if SEC F-PLN has been created by a COPY ACTIVE, and SEC is not in sequence with ACTIVE.



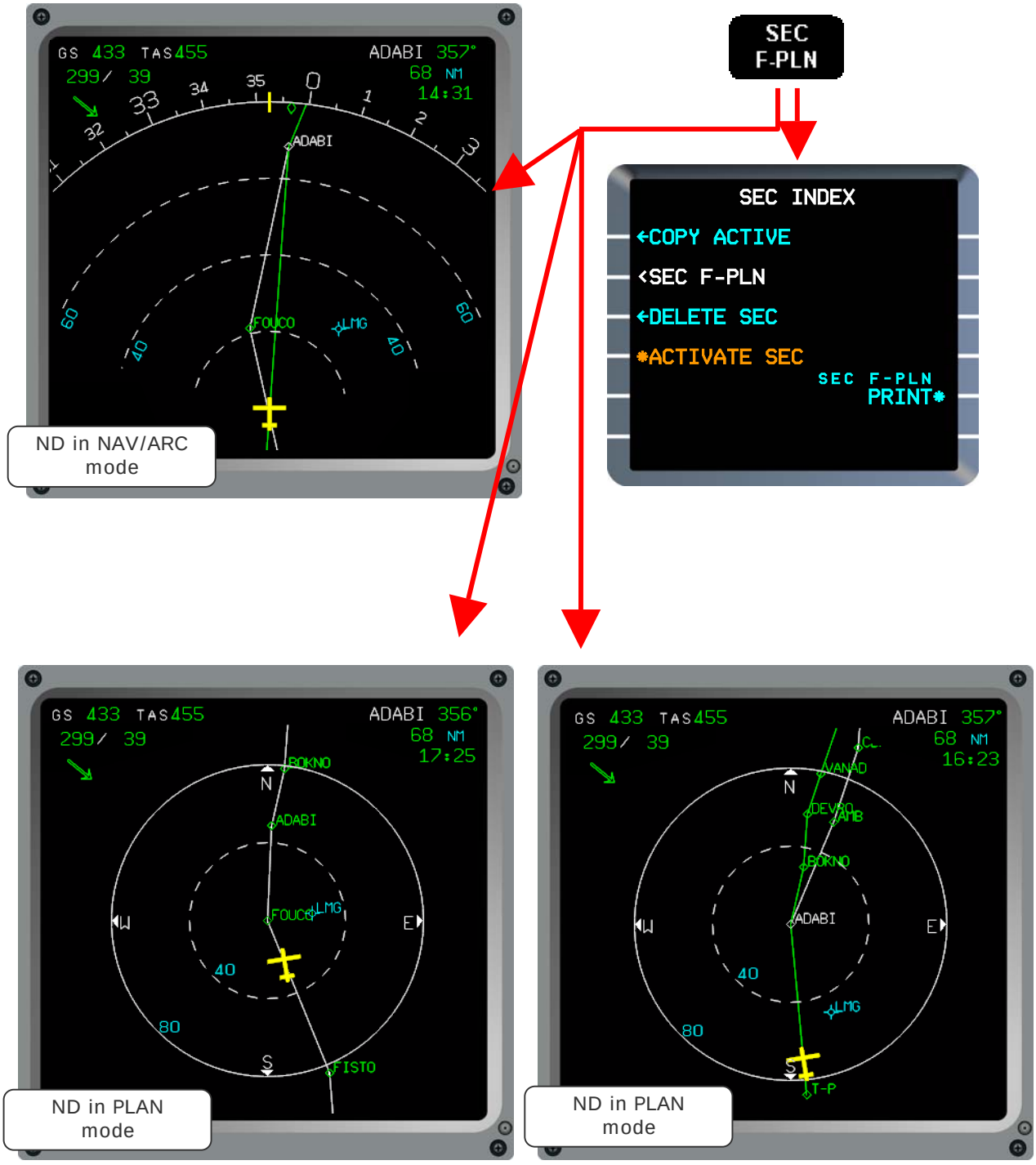
<u>SEC F-PLN page A/B</u>
Horizontal slew keys are used to switch from page A to B and vice versa.
Vertical slew keys are used to scroll and view F-PLN pages content.
Airport key is available with the same logic than F-PLN pages.
All data in SEC F-PLN pages are shown **white**.

5.3. ND display

When SEC F-PLN key is pressed, ND displays:

- In **NAV/ARC mode**, both ACTIVE F-PLN (green) **and** SEC F-PLN by a **solid white line**,
- In PLAN mode, if ACTIVE F-PLN leg matches with SEC F-PLN, both green and white lines are displayed; or if legs do not match, white line is only displayed.

A/C symbol is shown according to area displayed.

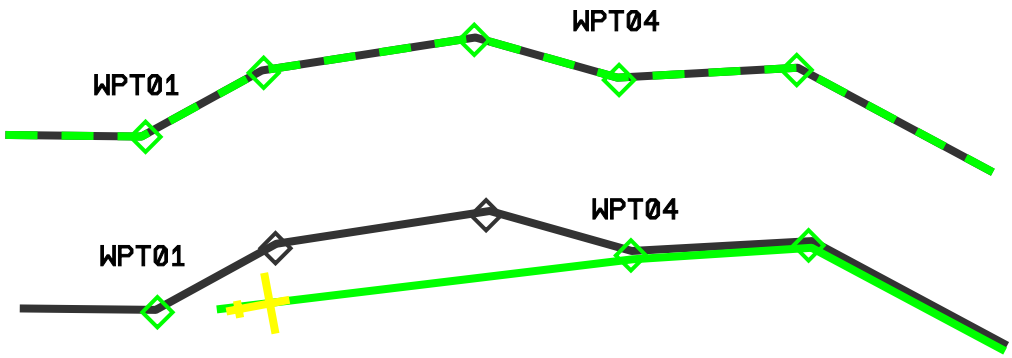


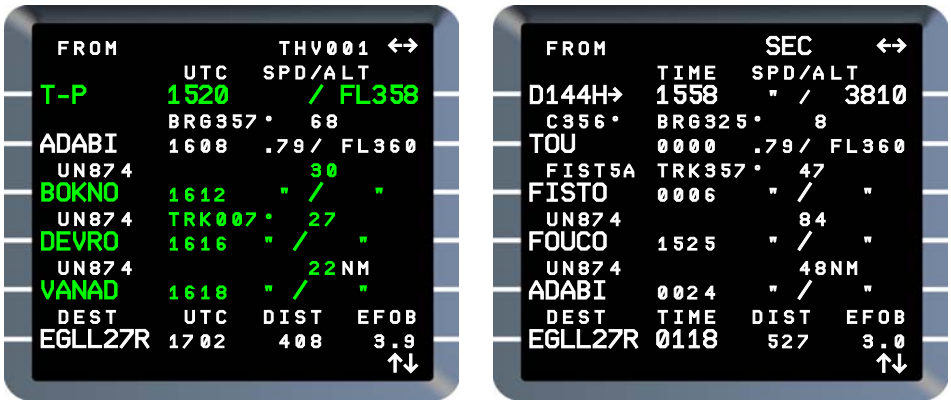
5.4. Use of SEC F-PLN

■ SEC F-PLN sequencing

Any revisions made in ACTIVE F-PLN are not tasferred in SEC F-PLN. Therefore when SEC F-PLN is created by a COPY ACTIVE and a subsequent revision is made in ACTIVE, SEC is no longer in sequence with ACTIVE.

In the example below, a DIR TO is performed after WPT01 which sequences all WPTs in ACTIVE F-PLN while SEC F-PLN remains frozen at the revise point.





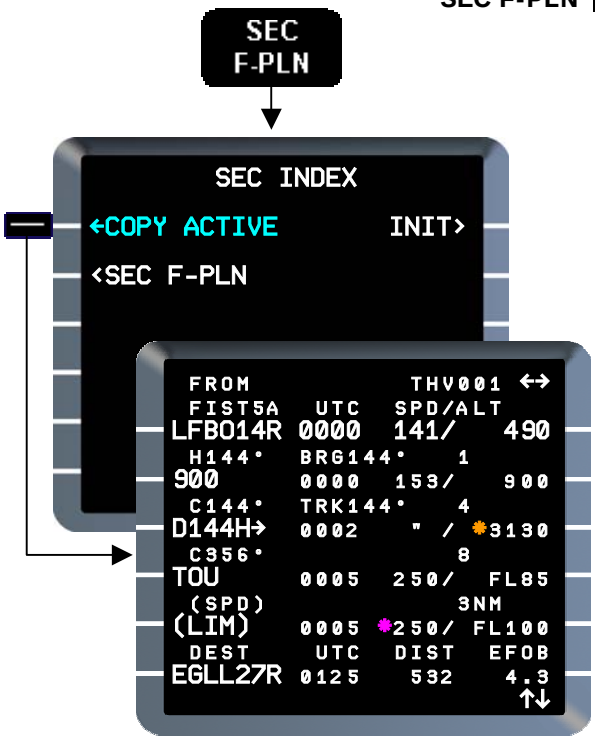
As explained above, if SEC is not sequenced as ACTIVE, PERF prompt [2R] is not displayed.

■ To create a SEC F-PLN

SEC F-PLN key ..... Press
SEC INDEX page is displayed.

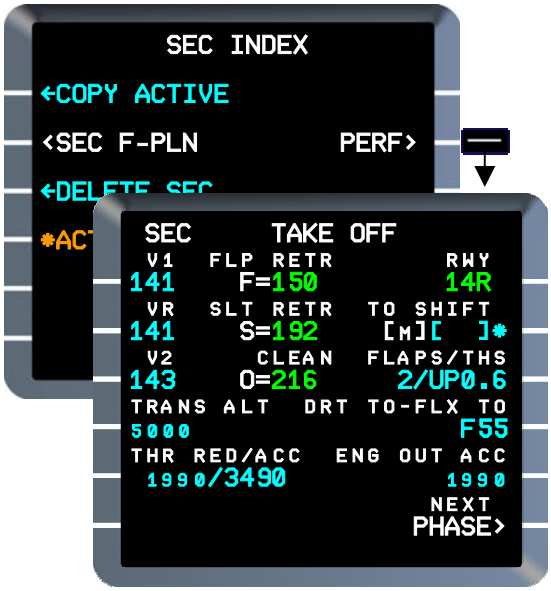
☐ By COPY ACTIVE

COPY ACTIVE [1L] ..... Press
SEC F-PLN page A is displayed.
In the example COPY ACTIVE is made at pre-flight.



All PERF data entered in ACTIVE F-PLN are also copied in SEC F-PLN.

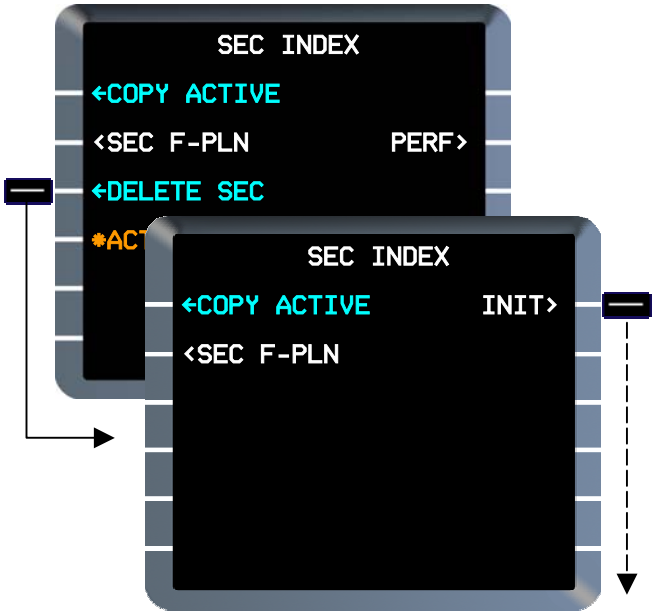
An OFFSET in ACTIVE F-PLN is not copied.



☐ From INIT
If INIT prompt [1R] is not displayed,

DELETE SEC [3L] ..... Press
This deletes all data contained in SEC F-PLN.

INIT [1R] ..... Press
SEC INIT page A is displayed.



Complete SEC INIT A and B as described in Part II: Flight phases.

In the example a RTE EGLL/EGCC is prepared.

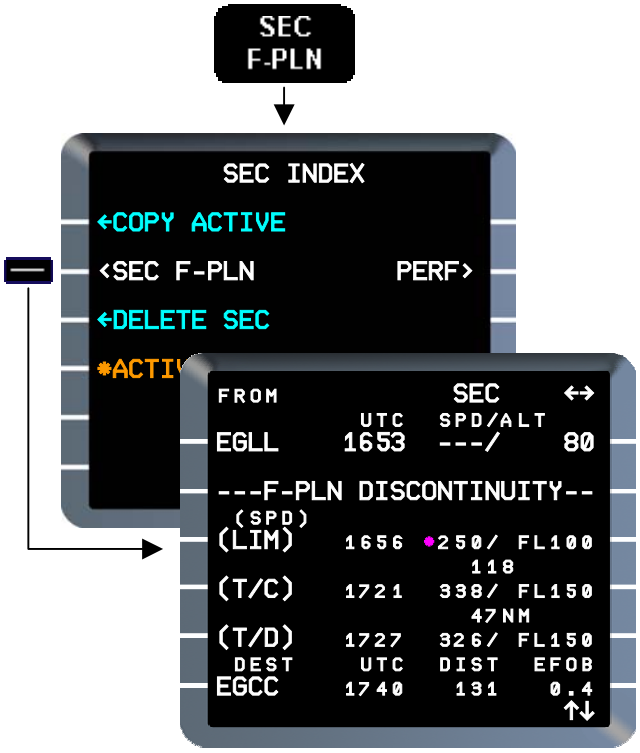
INIT REQUEST field [2R] is displayed if DATALINK option is selected in OPC file; star is displayed if data-link transmission is available.

See Part III: Ch 9 Data link.

SEC F-PLN key .....Press

SEC F-PLN [2L] .....Press
SEC F-PLN page A is displayed.
Enter route as required.

Predictions are available if valid data have been entered in SEC INIT page B.



■ To revise SEC F-PLN

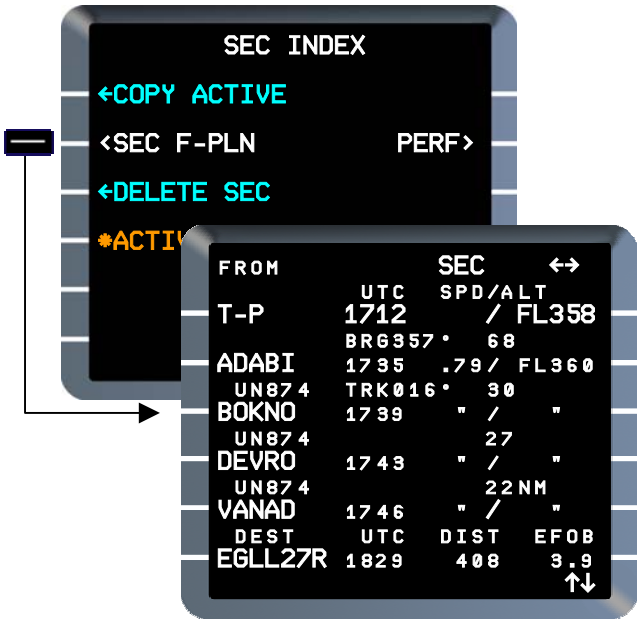
SEC F-PLN key .....Press

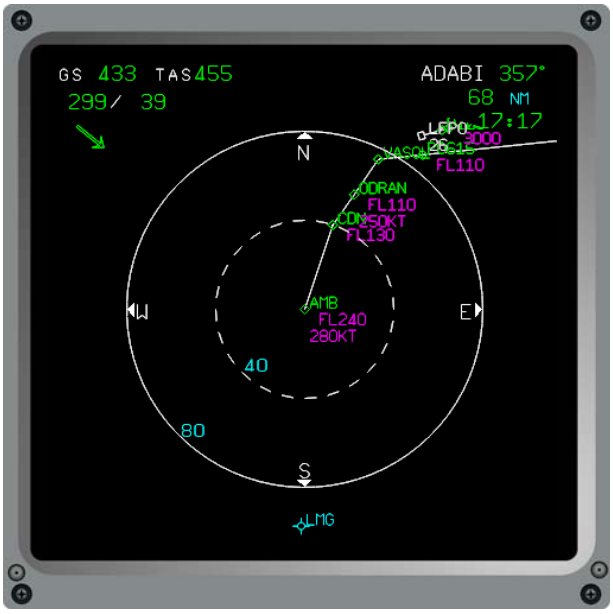
SEC F-PLN [2L].....Press

Revision of SEC F-PLN can be made at any time independently from ACTIVE F-PLN.
Any lateral (except OFFSET) or vertical revisions can be made.
Stringing rules described in Part III: Ch 3 apply.

Use ND to visualize entered revisions.

In the example below a NEW DEST to LFPO has been selected.





Note: To prepare a second RWY or SID at departure.

If SEC is made with a COPY ACTIVE, changing RWY will delete SEC PERF prompt. In this case, SEC must be prepared by using INIT prompt as described above.

To simplify SEC INIT process, it may be useful to store at first the ACTIVE F-PLN in PILOTS ROUTES; then use this CO RTE to init SEC.

■ SEC F-PLN activation

SEC F-PLN key .....Press

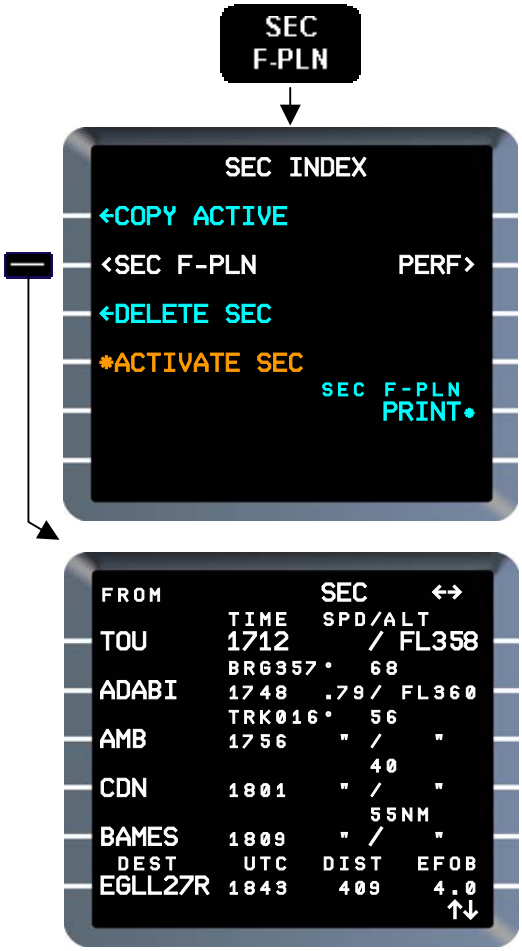
SEC F-PLN [2L].....Press

ND .....Check
Check consistency, revised as necessary.

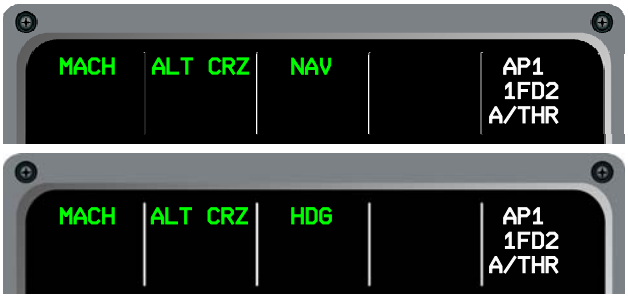
- **If first leg of SEC F-PLN matches active leg of existing ACTIVE F-PLN.**

  The example below shows a change of route has been made in SEC F-PLN: after ADABI route is AMB, CDN then BAMES.

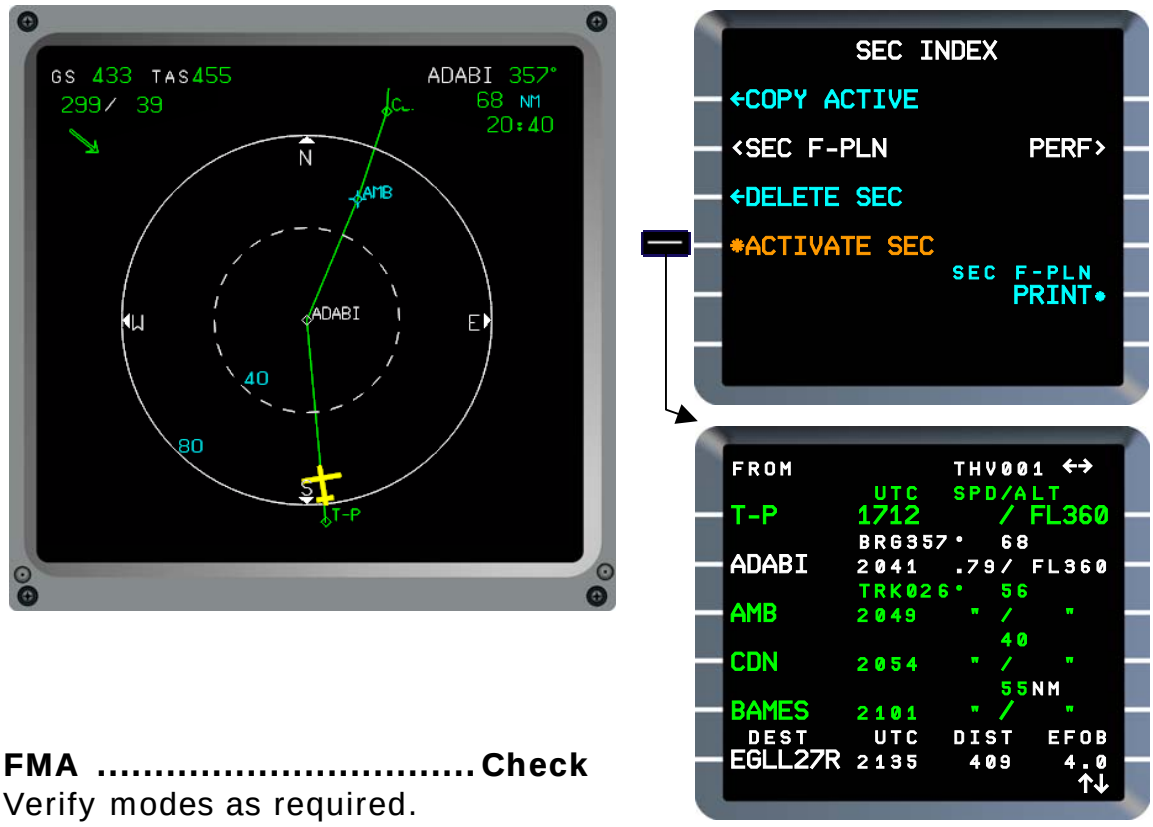
  As shown on ND, the current SEC F-PLN leg matches the ACTIVE current F-PLN leg.



In this case, in either NAV or HDG/TRK modes:



ACTIVATE SEC [4L] .....Press
MCDU display switches to F-PLN page A.
ND shows new track - green (dashed line if HDG/TRK is selected).
SEC F-PLN has replaced entirely ACTIVE F-PLN.

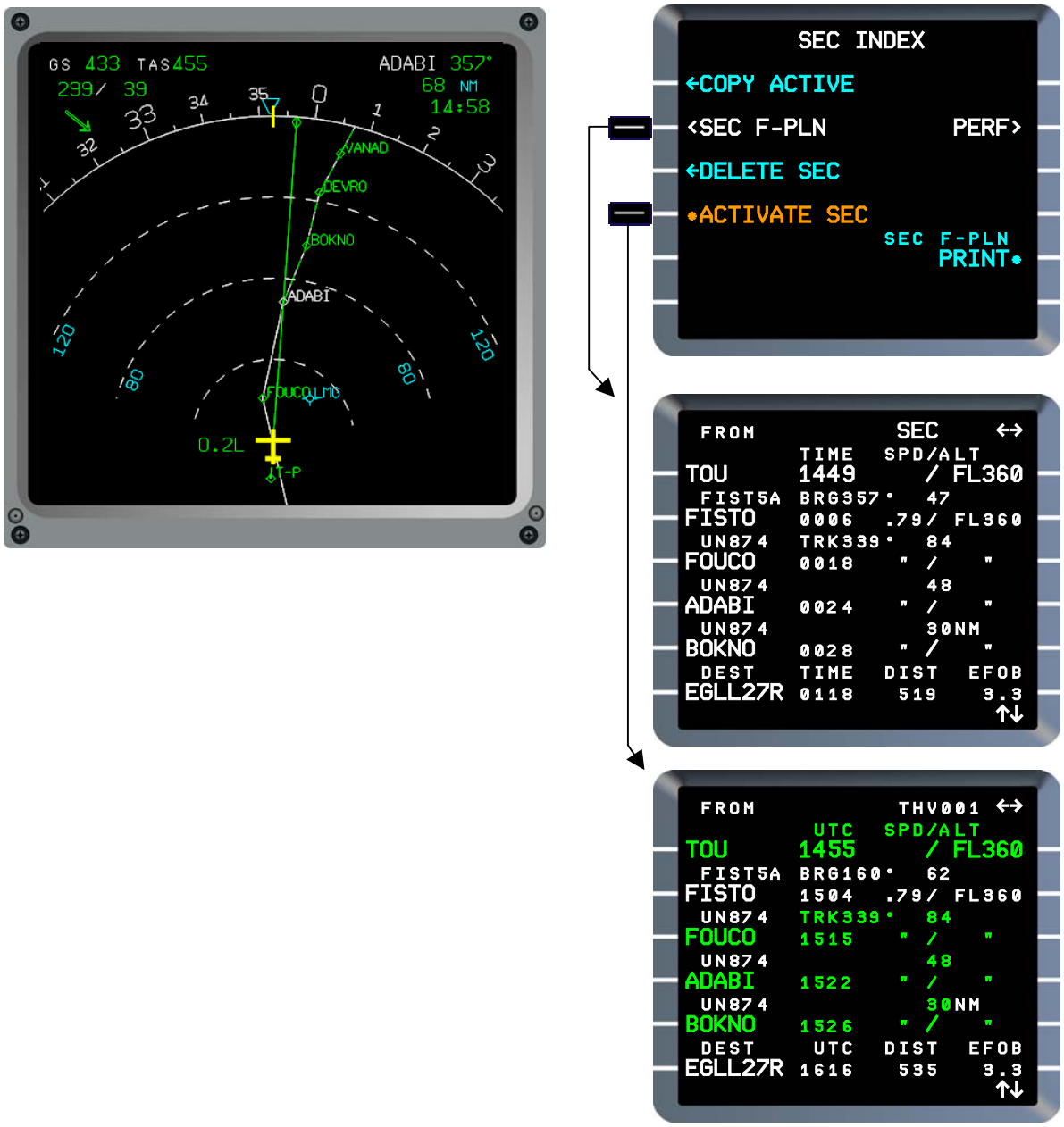


FMA .....Check
Verify modes as required.

- **If first leg of SEC F-PLN does not match active leg of existing ACTIVE F-PLN,**

  The example below shows TO WPT of ACTIVE F-PLN is ADABI while SEC is not sequenced and shows leg TOU-FISTO.

  As shown on ND, the current SEC F-PLN leg does not match the ACTIVE current F-PLN leg.



In this case select HDG/TRK, otherwise "SELECT HDG/TRK FIRST" s-pad msg (white) is triggered.

ACTIVATE SEC [4L] .....Press

MCDU display switches to F-PLN page A.
ND shows new track - green (dashed line if HDG/TRK is selected).
SEC F-PLN has replaced entirely ACTIVE F-PLN.
Perform lateral revisions as required.

See Part III: Ch 3 Lateral revisions.

FMA .....Check

Verify modes as required.

Caution

At SEC F-PLN activation, GW and/or CG entered in SEC INIT page B are transferred in ACTIVE F-PLN. In case of wrong entry this may generate "CHECK GW" s-pad msg (amber) and erroneous guidance (SPD THRUST target).

PAGE INTENTIONALLY LEFT BLANK

Part III: Chapter 6 – FUEL Monitoring

Contents

PAGE INTENTIONALLY LEFT BLANK

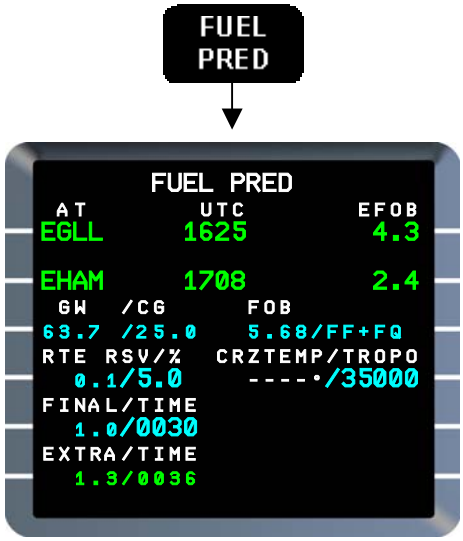
6.1. Overview

Fuel predictions during flight may be monitored on the FUEL PRED page and on F-PLN page B.
When a TMPY F-PLN exists, FUEL PRED page continues to display predictions associated to the ACTIVE F-PLN, while F-PLN page B reflects predictions associated to the TMPY F-PLN.

6.2. FUEL PRED page

■ Presentation

FUEL PRED key ..... Press



The following fuel and time data are displayed:
EFOB (estimated fuel on board)
at destination [1R],
at alternate [2R].
These computed predictions cannot be modified or cleared.

RTE RSV / % [4L]
RTE RSV fuel is the computed value corresponding to **%** value entered in second part of the field.
% is defaulted to value defined in AMI file or entered on INIT B page during preflight.
Either RTE RSV or % may be modified by pilot.
In case of AMI option for no computation of RTE RSV during flight, this field is blanked after take-off.

FINAL / TIME [5L]
FINAL fuel is the computed value corresponding to holding **TIME** entered in second part of the field.
Time is defaulted to value defined in AMI file or entered on INIT B page during preflight.
Either FINAL or TIME may be modified by pilot.

EXTRA / TIME [6L]
EXTRA fuel and **TIME** are computed values; they represent the amount of extra fuel and time available based on ACTIVE F-PLN and reserves as shown in the FUEL PRED page.
When a negative extra fuel is displayed, the extra time is dashed.

FOB (actual Fuel On Board) **[3R]**
This value is computed from both **FF** (Fuel Flow) and **FQ** (Fuel Quantity) sensors.
If both sensors are valid **/FF+FQ** is displayed, otherwise the valid sensor remaining is shown (FF or FQ).

Overwriting FOB eliminates FQ sensors from computation, /FF is shown [3R].
Ex: 6 is entered in [3R].

Pressing CLR in [3R] reverts to normal display.

If FOB is overwritten when FQ is shown as only sensor used, the entry is rejected and "SENSOR IS INVALID" s-pad msg (white) is triggered.

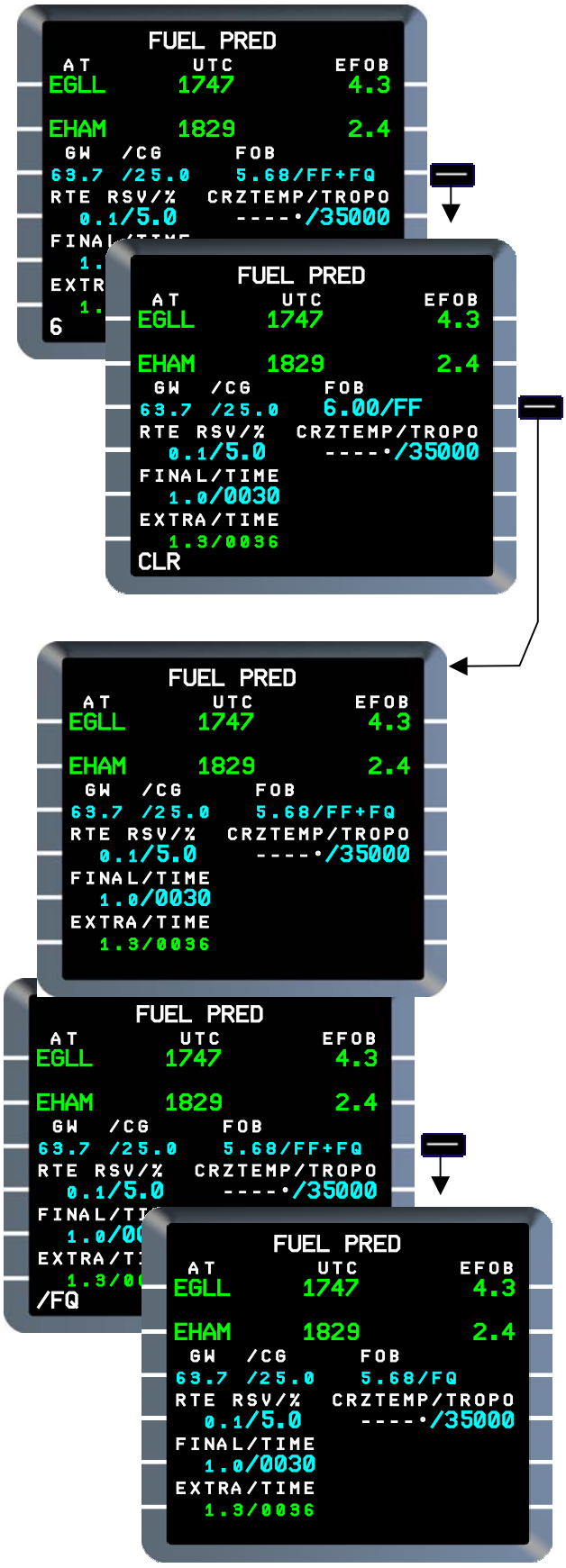
In case of unreliable FF or FQ sensors, the affected sensor may be deselected as follows:

<u>To deselect FF sensor</u>

/FQ [3R] ..... Enter
Line 3R shows FOB computed using FQ sensor only.
Example next right.

<u>To deselect FQ sensor</u>

/FF [3R] ..... Enter
Line 3R shows FOB computed using FF sensor only.
To restore a deselected sensor: either use CLR function, or re-enter / FF+FQ.

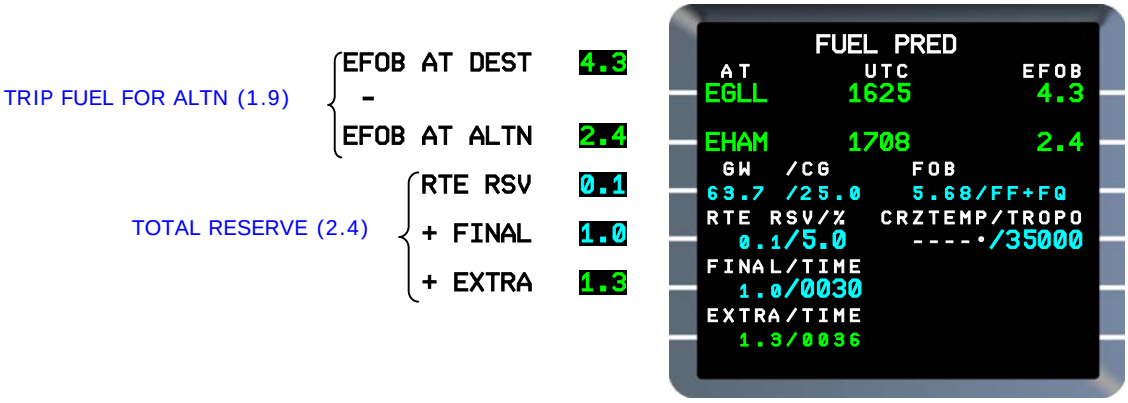


CRZTEMP/TROPO [4R]
The CRZTEMP field is identical to the CRZTEMP field on INIT page A.
When T/C is sequenced, CRZTEMP is dashed and entry is not allowed.
Default value for Tropopause is 36090; it may be modified by pilot.
Pilot entry may be cleared and field reverts to default value.
Default value cannot be cleared.

Until engine start, all FUEL PRED page fields are dashed and no entry is accepted (except 3R and 4R).

■ Fuel to Divert and EXTRA/TIME

The minimum FUEL to divert is not directly displayed on any MCDU page.



Trip Fuel for alternate is the difference between EFOB at DEST [2R] and EFOB at ALTN [1R], based on **ALTN route entered in the ACTIVE F-PLN**.
Consequently if no RTE has been entered, FMS assumes direct distance (GC) from DEST to ALTN airport.

EXTRA/TIME is computed based on trip fuel for alternate and reserves entered in [4L] and [5L].
If these values do not comply with fuel requirements or if distance for ALTN is unrealistic, EXTRA/TIME is **erroneous**.

HOLD time available displayed on HOLD page is based on EXTRA shown on FUEL PRED page. If EXTRA is not correct, HOLD TIME is also erroneous.
In this case an adjustment should be made to FINAL fuel.
See following example.

In the following example, EGKK (London Gatwick) is selected for alternate at EGLL (London Heathrow), without alternate route inserted in ACTIVE F-PLN.

ALTERNATES page shows [line 3]:

- *Distance (direct GC) 22 NM,*
- *EXTRA fuel 3.0 T, based on this distance.*

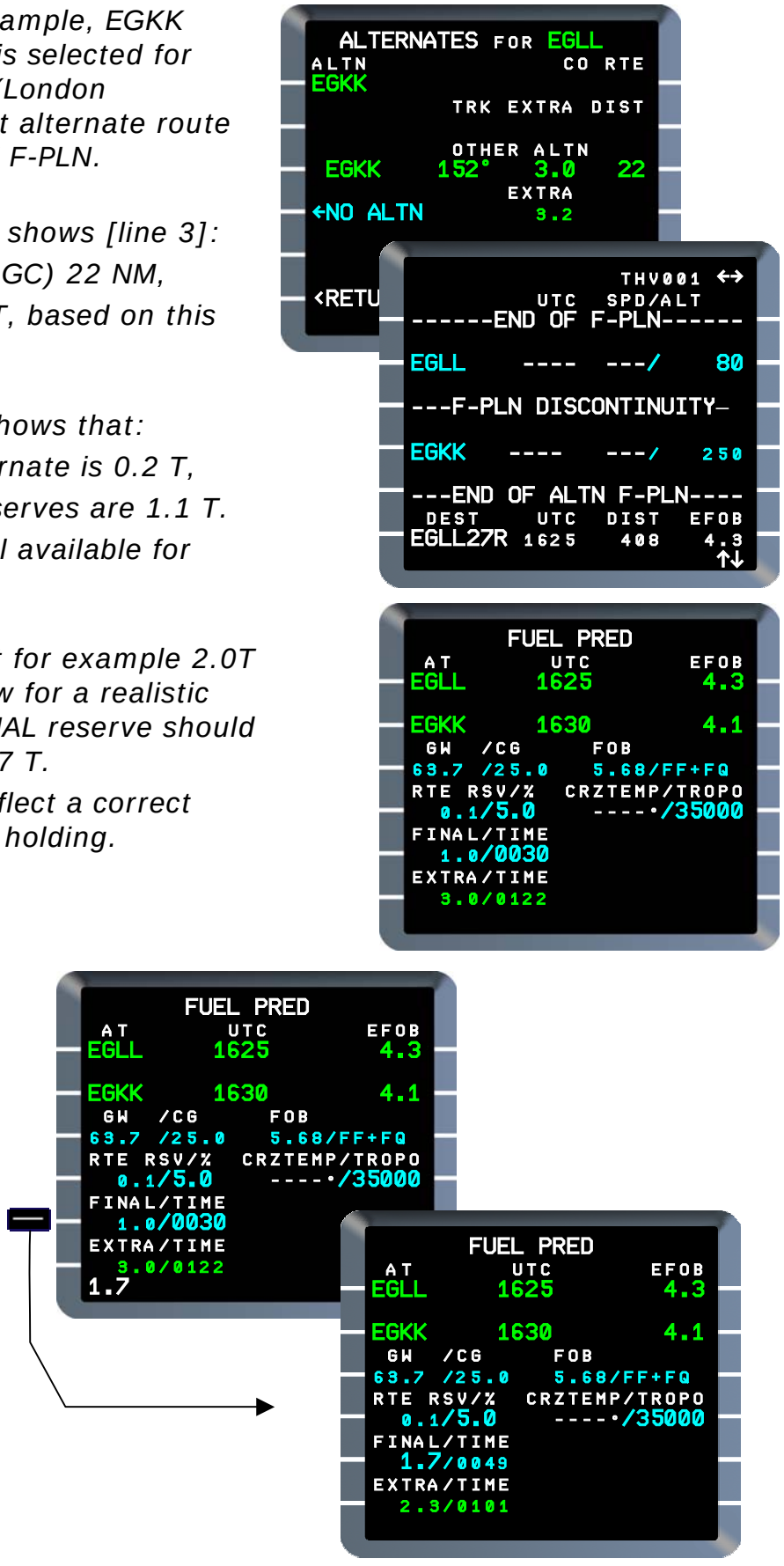
FUEL PRED page shows that:

- *Trip fuel for alternate is 0.2 T,*
- *RTE + FINAL reserves are 1.1 T.*

Therefore total fuel available for alternate is 1.3 T.

If it is decided that for example 2.0T are needed to allow for a realistic track distance, FINAL reserve should be increased by 0.7 T.

EXTRA will then reflect a correct value available for holding.



6.3.F-PLN page B

F-PLN page B provides fuel predictions at each WPT and DEST.

Access F-PLN page B from F-PLN page A by pressing horizontal slew key:

- EFOB at each WPT is shown in second column,
- EFOB at DEST is shown at [6R].

PAGE INTENTIONALLY LEFT BLANK

Part III: Chapter 7 – NAVIGATION management & monitoring

Contents

7.3. POSITION monitoring 38

7.1. NAVIGATION data

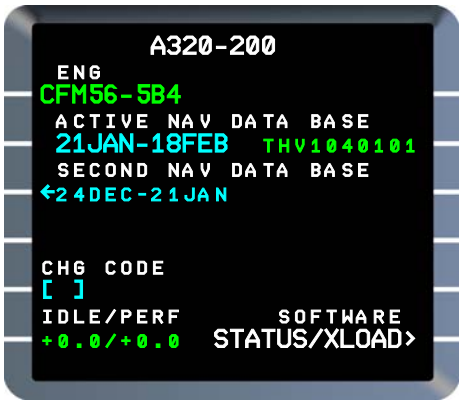
■ General

The navigation data used by the FMGC are provided by:

- **NAV data base** (NAVdb) which is updated periodically *(see Part I: Ch 3.4)*,
- **PILOT data** stored in a dedicated FMS memory.
  These pilot-defined data are entered in FMS memory either:
  - Automatically when lateral revisions are made in F-PLN using LAT/LONG, PBX, PBD, PD, Radial Intercept and abeam WPTs formats (see Part III: Ch 2.1), or
  - Manually by using PILOTS WAYPOINTS, PILOTS NAVAIDS, PILOTS RUNWAYS, and PILOTS ROUTES functions as described below.

  Memory capacity for these data is limited to 20 waypoints, 20 navaids, 10 runways, 5 routes.

The NAV data base reference is shown on A/C STATUS page.
Content is customized, according to operator request, by NAV data base provider.



NAV data base is identified by a series of letter and figures used for identification.

Ex: THV1040101

- *THV1 is customer ident,*
- *04 is for current year,*
- *01 is cycle in the current year,*
- *01 is reference number in the current cycle,*

Operator NAV data base contains only selected data requested by operator in a defined geographical area including Airports, RWYs, SIDs/STARs, approach procedures, AWYs as specified.

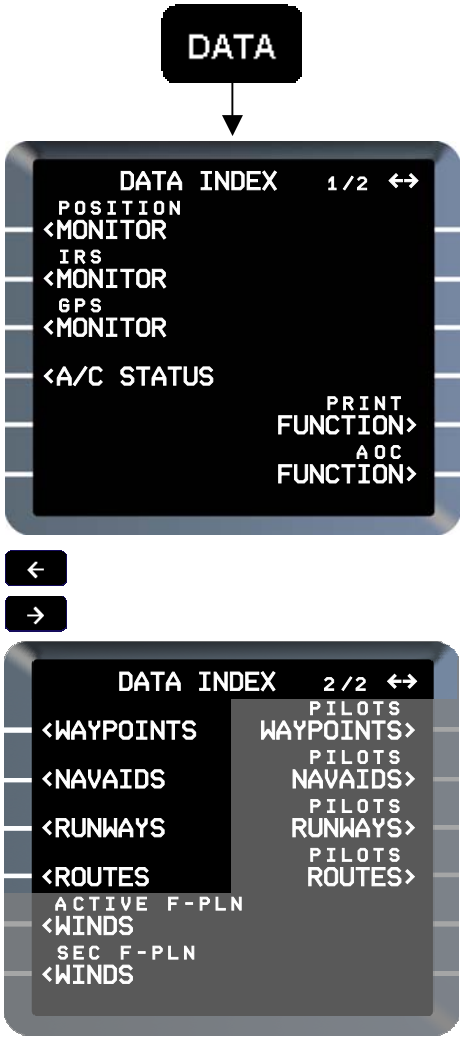
■ DATA INDEX 2/2 page (All NAV data)

All NAV data may be viewed individually via WAYPOINTS [1L], NAVAIDS [2L], RUNWAYS [3L], ROUTES [4L] prompts on DATA INDEX page 2/2.

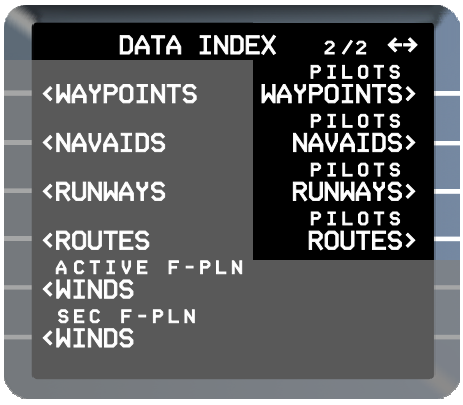
When accessed, data shown are either from NAVdb or Pilot stored data without any distinction in the display.

If intended to view **only** the PILOTS stored data, use PILOTS WAYPOINTS [1R], PILOTS NAVAIDS [2R], PILOTS RUNWAYS [3R], PILOTS ROUTES [4R] prompts.

See DATA INDEX page 2/2 (PILOTS STORED data) in this chapter.



ALL NAV data

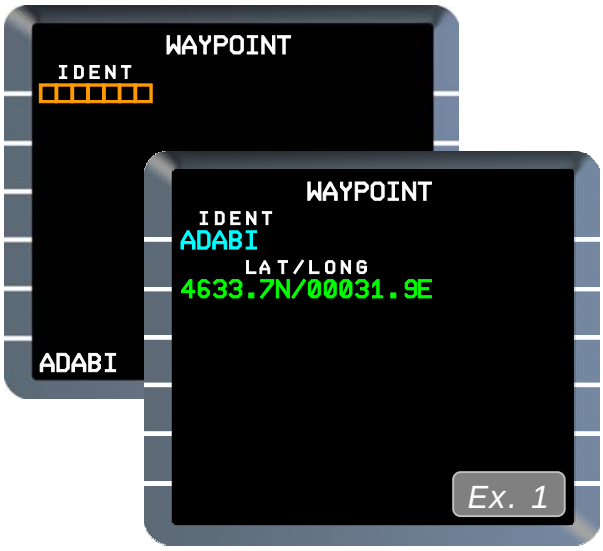


PILOTS STORED data

☐ WAYPOINT [1L]

Enables display of WPT definition data as contained in NAVdb or in pilot data memory (either defined and stored via NEW WPT page, or by F-PLN revision e.g. Lat/Long, PBD, PBX and PD).

Defined F-PLN WPTs created by F-PLN revisions, but not stored into the stored WPT list, such as abeam, radial intercept points may be reviewed as long as they are being used in a flight plan.

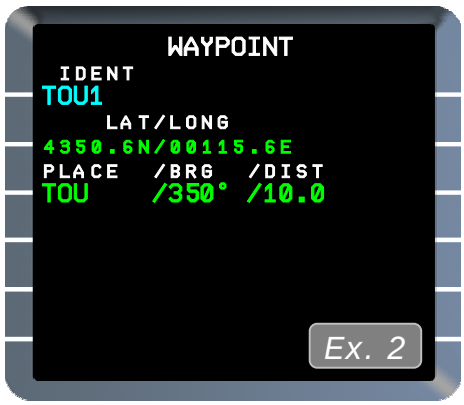


From DATA page 2/2:

WAYPOINT [1L] .....Press
Waypoint page is displayed with amber boxes in [1L].

IDENT[1L].....Enter
Enter WPT ident. LAT/LONG are displayed.

Ex 1: ADABI.



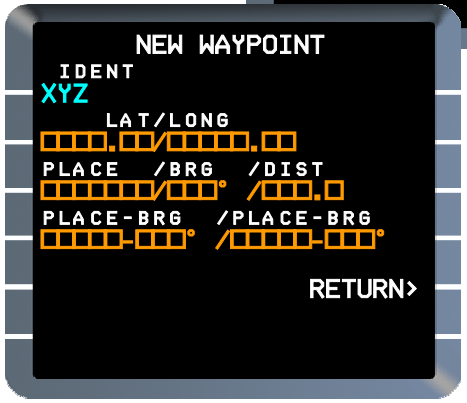
If the WPT has been defined as a PBD, PBX or PD associated data are shown.

Ex 2: TOU1 is a created WPT as TOU/350°/50NM which has been stored.

Ex 3: PD01 is a created WPT by F-PLN revision downpath TOU at 50NM.

If the IDENT is not recognized by the system, the NEW WAYPOINT page is displayed.

See Pilot data.



☐ NAVAID [2L]

Enables display of navaid definition data as contained in NAVdb or in pilot-stored navaid list.

From DATA page 2/2:

NAVAID [2L] ..... Press

Navaid page is displayed with amber boxes In [1L].

IDENT[1L] ..... Enter

Ident may be any NAVdb or pilot stored navaid.

Examples shown in this page and next are:

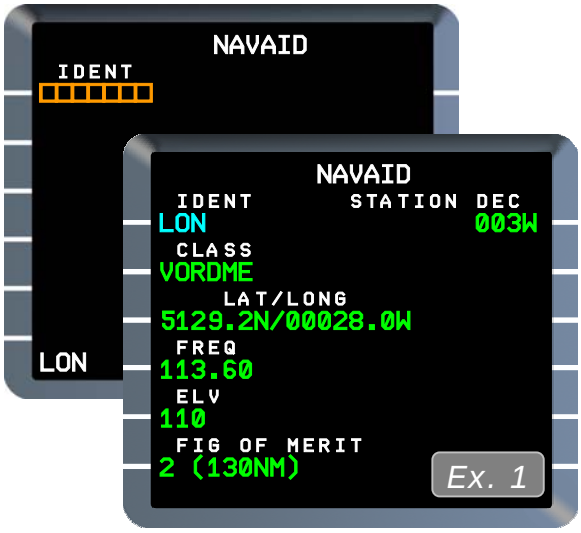
Ex 1: LON (VOR DME)

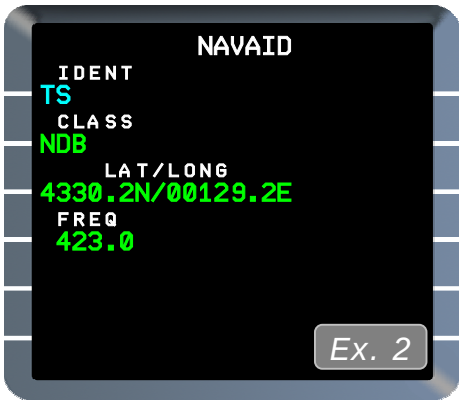
Ex 2: TS (ADF)

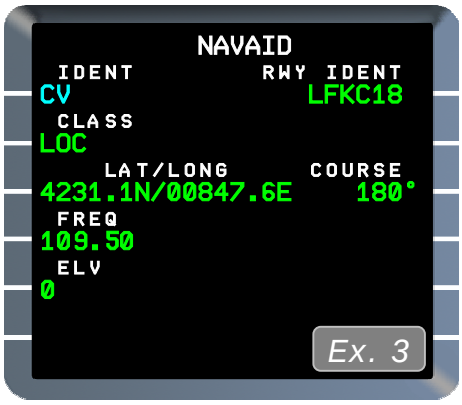
Ex 3: CV (LOC)

Ex 4: TBS (ILS DME NON-COLLOCATED)

Ex 5: MTBS (MLS)



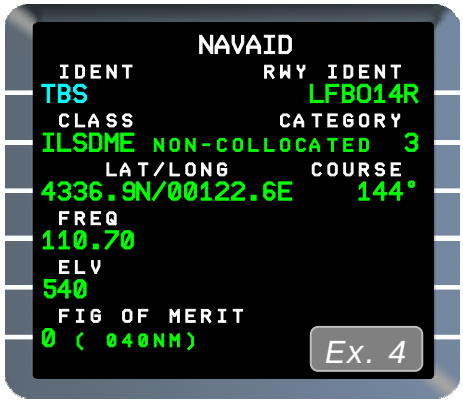




CLASS of navaid [2L] may be any of the following:
VOR, DME, LOC, ILS, NDB, ILS DME, ILS TAC, VOR TAC, VOR DME, MLS,MLS DME, TACAN.
Non-collocated VOR DME, VOR TAC, ILS DME or MLS DME, ILS TAC is written according to navaid installation.
ILS category 0 is displayed as LOC.

LAT/LONG [3L].
If a non-collocated VOR DME or VORTAC is displayed, LAT/LONG is VOR LAT/LONG.
LAT/LONG for ILS, ILS DME or ILS TAC is LAT/LONG of localizer.
LAT/LONG for MLS, MLS DME is LAT/LONG of azimuth antenna.

FREQ or CHAN [4L]. Frequency for ILS, CHAN for MLS.



ELV [5L]: elevation of selected navaid in FT to nearest 10 feet.
If navaid is a non-collocated VOR DME or VOR TAC, elevation is DME or TACAN elevation.
If VOR only or NDB is displayed, elevation field will be blank.
If navaid is a non-collocated ILS DME or MLS DME or ILS TAC, elevation is ILS or MLS elevation.

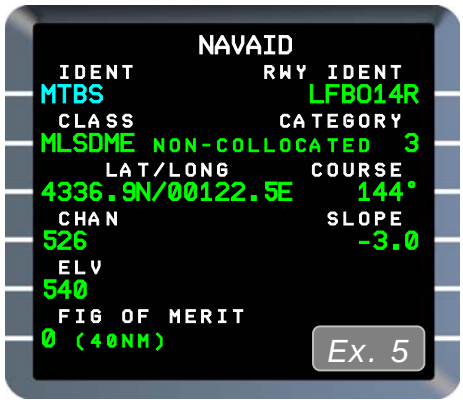
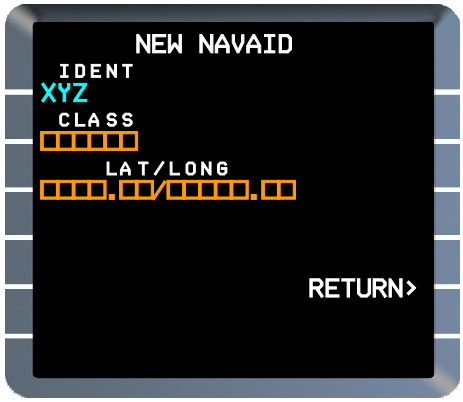


FIG OF MERIT [6L]: figure assigned to each navaid indicating maximum distance at which it can be received.
Displayed as follows: 0 (40 NM), 1 (70 NM), 2 (130 NM), 3 (250 NM).
Figure of merit does not exist for LOC, ILS, MLS or NDB; field is blank in this case.

STATION DEC or RWY IDENT [1R]: station Dec is displayed if navaid is VOR, VOR TAC or VOR DME (collocated or not).
RWY Ident is displayed if navaid is LOC, ILS, ILS DME, ILS TAC, MLS or MLS DME.

CATEGORY [2R]: navaid category if ILS, ILS DME, ILS TAC, MLS or MLS DME.
For IGS, LDA with glide-slope or SDF with glide-slope, category is 1.



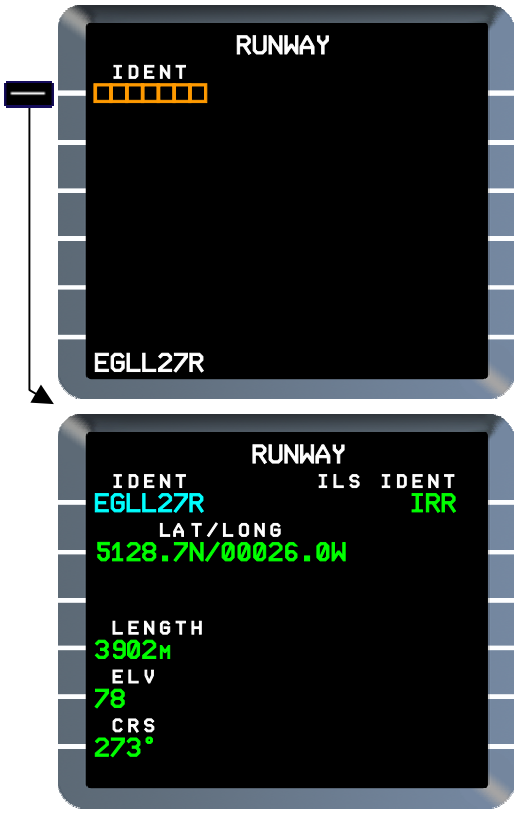
COURSE [3R]: Course of the localizer if navaid is LOC, ILS, ILS TAC, ILS DME, MLS or MLS/DME.

SLOPE [4R]: If NAVAID is MLS.

If the entered identifier is not found in NAVdb or pilot stored navaid list, NEW NAVAID page is displayed with the IDENT field
filled.

☐ RUNWAY [3L]

Enables display of runway definition data as contained in NAV database or pilot-stored RWY list.



From DATA page 2/2:

RUNWAY [3L] ..... Press
Navaid page is displayed with amber boxes In [1L].

IDENT [1L]..... Enter
ARPTNNS format must be used where:
- ARPT is the ICAO airport identifier.
- NN are two digits 01-36,
- S is either a blank or an L, R or C.

If an undefined 2 digits RWY number with a known ARPT identifier is entered, unless that ARPT has been defined by NEW RUNWAY function, "NOT ALLOWED" s-pad msg (white) is triggered.

LAT/LONG [2L]: displays LAT/LONG of the RWY threshold point.

LENGTH [4L]: displays RWY length followed by the unit (M for meters and FT for feet) as selected in OPC file.

ELV [5L]: displays threshold elevation in feet to the nearest 10 feet.

CRS [6L]: displays RWY course.

LS IDENT [1R]: if RWY is associated with a LOC, ILS or MLS, otherwise field is blank.
If both ILS and MLS facilities are available for the RWY, ILS ident has precedence over MLS.

Entry of an unknown ARPT in [1L] causes NEW RUNWAY page to be displayed with the ident inserted.

☐ ROUTE [4L]

Enables display of CO RTE in NAVdb or pilot-stored.

From DATA page 2/2:

ROUTES [4L] .....Press

Navaid page is displayed with amber boxes In [1L].

CO RTE [1L] or FROM/TO [1R] .....Enter

Enter route ident either by CO RTE ident (if known) or by FROM/TO designation.
ROUTE selection page is displayed.
If the CO RTE does not exist, "NOT IN DATA BASE" s-pad msg is triggered.

Digits after title indicate number of company routes available for the defined city pair.
Horizontal arrows are displayed (top right) if more than one CO RTE is available; CO RTEs may be displayed successively by using horizontal slew keys.

This field is blank when a company route number has been entered in [1L].

The various elements of the CO RTE are displayed from label line 2 to 6L (left to right) using every line and half line as on ROUTE SELECTION page.

(See Part II: Ch 2 Preflight)

If all the elements of a CO RTE do not fit on one page display, vertical arrows are displayed bottom right. Use vertical slew keys to scroll and see all the content.

■ DATA INDEX 2/2 (PILOT STORED data)

Enables pilot to create, delete or view NAV data via DATA INDEX 2/2 page by using PILOTS WAYPOINTS [1R], PILOTS NAVAIDS [2R], PILOTS RUNWAYS [3R] and PILOTS ROUTES [4R] functions.

☐ PILOTS WAYPOINTS [1R]
Enables creation, review and deletion of pilot-defined WPTs.

From DATA page 2/2:

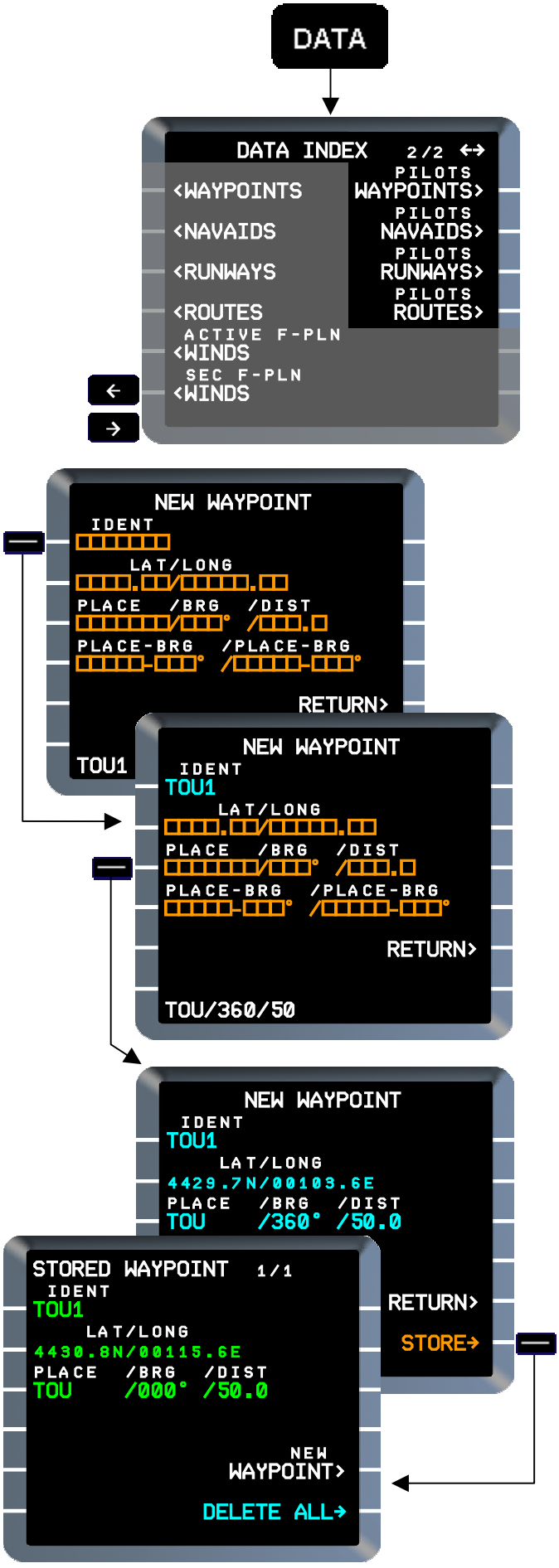
PILOTS WAYPOINTS [1R] ....Press

- **If no PILOTS WAYPOINT exists,** NEW WAYPOINT page is displayed *(Ex 1)*.
  Enter fields as followed:
  – IDENT [1L], 7 letters and/or digits are available for designation,
  – Either LAT/LONG [2L], or PLACE/BRG/DIST [3L], or PLACE-BRG/PLACE-BRG [4L].
  Refer to Part V: Ch 2.5 for formats.

  In the example waypoint TOU 1 is created as TOU radial 360/50.
  – *Enter TOU1 [1L]*
  – *Enter TOU/360/50 [3L]*

  Then,

  STORE [6R] ..... Press
  – Number in the list (top right) is updated,
  – NEW WAYPOINT prompt [5R] is available for creation of another waypoint,
  – DELETE ALL prompt [6R] (see below).



- **If PILOTS WAYPOINT(s) already exists**

The first STORED WAYPOINT is displayed; number of stored waypoints is shown top right 1/x *(Ex 2)*.
Stored waypoints may be reviewed by using horizontal slew keys.

Ex. 2

To create a new waypoint

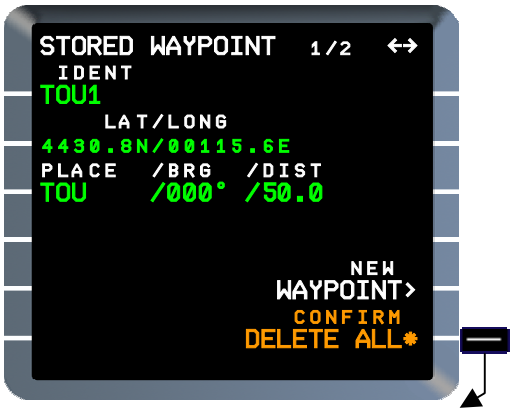
NEW WAYPOINT [5R].... Press
NEW WAYPOINT is displayed.
Proceed as described above.

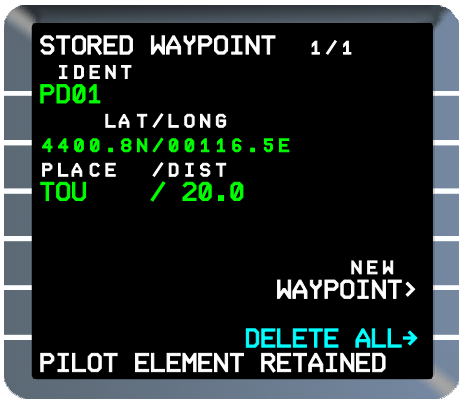
If twenty WPTs have already been stored and NEW WAYPOINT prompt is pressed, "LIST OF 20 IN USE" s-pad msg (white) is triggered.

To delete **all** stored waypoints:

DELETE ALL prompt [6R]..... ..... Press
The prompt is replaced by CONFIRM DELETE ALL prompt.
If pressed:

- All stored waypoints are deleted, page reverts to NEW WAYPOINT page, or,
- If some WPTs are part of a F-PLN or a stored route, they are not deleted and still displayed; "PILOT ELEMENT RETAINED" s-pad msg (white) is triggered.





In the example PD01 is not deleted because it is part of the ACTIVE F-PLN; 1/1 is displayed top right meaning it is the only stored waypoint remaining.

To cancel CONFIRM DELETE ALL, select another MCDU page or press a LSK other than [6R]; DELETE ALL prompt is displayed again in [6R].

To delete stored waypoints **individually**:

Insert CLR at IDENT of the intended waypoint to be cleared [1L].

In the example TOU1 is cleared; as it was the unique stored waypoint stored, page reverts to NEW WAYPOINT page.

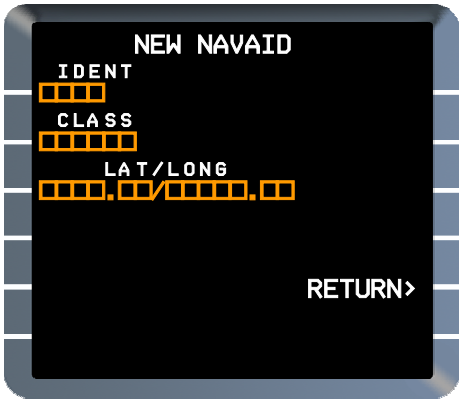
If other waypoints would be available page reverts to the next stored waypoint in the list.

Same logic as above applies for display of scratchpad messages if attempted deletion of WPT, which is part of a F-PLN or stored route.

Automatic deletion:
Stored waypoints are automatically deleted when FMGC switches to DONE phase if CO RTE retention is selected NO in AMI file.
Otherwise they are retained.

☐ PILOTS NAVAIDS [2R]

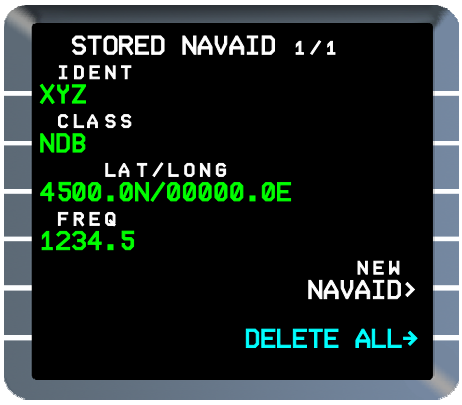
Enables creation, review and deletion of pilot-defined NAVAIDS.



From DATA page 2/2:

PILOTS NAVAIDS [2R] .. Press

Logic for display is same as PILOT WAYPOINTS: if no PILOTS NAVAID exists, NEW NAVAID page is displayed; otherwise the first stored navaid in the list is displayed.



To create a NAVAID:

If NEW NAVAID page is not shown

NEW NAVAID [5R]..... Press

NAVAID may be created by filling:

- IDENT [1L], 4 letters and/or digits are available for designation,
- CLASS, may be any of the following: VOR, DME, LOC, ILS, NDB, VOR TAC, VOR DME, MLS, TACAN.

  ILS DME, MLS DME, ILS TAC and non collocated navaids cannot be created.

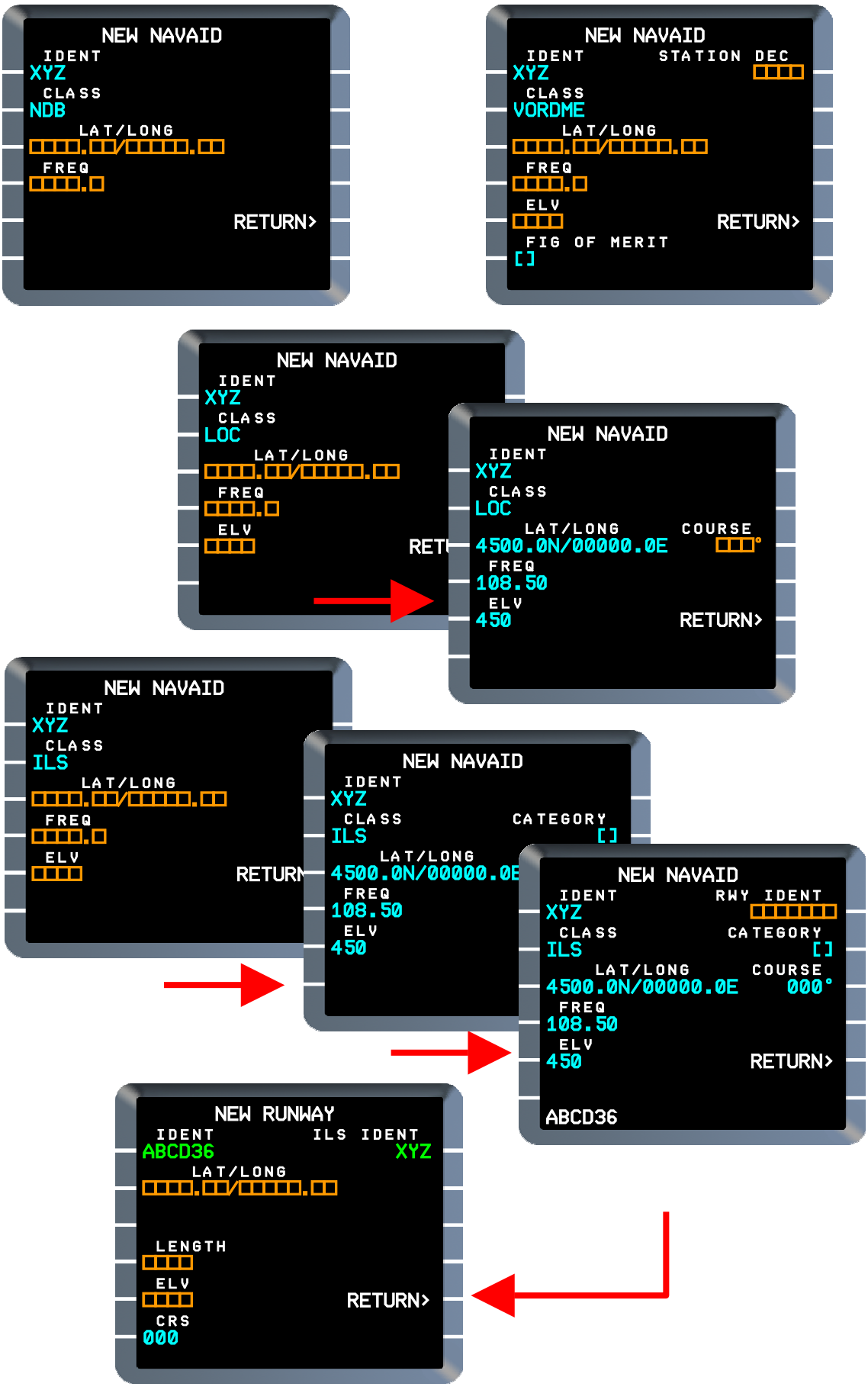
Once these fields are completed, boxes are displayed for the required information to be inserted.
Required data vary for the type of navaid to be entered.
Fields appear step by step during data insertion.
All fields must be entered for STORE prompt to appear.

Notes:

- *ILS and MLS navaids require defined RWY. If not, when RWY IDENT is filled, NEW RUNWAY page is displayed to be completed.*
- *When a new navaid has been partially entered and class is changed, all fields are erased except the IDENT and LAT/LONG. The appropriate fields for the new navaid class are displayed.*
- *FIG of MERIT: If nothing is entered, two is assumed when this LSK is pressed. Does not exist for NDB, LOC, ILS or MLS.*
- *See also NAVAIDS pages described in NAV DATA BASE sub-chapter above.*

If twenty NAVAIDS have already been stored and NEW NAVAID prompt is pressed, "LIST OF 20 IN USE" s-pad msg (white) is triggered.
Logic for deletion of stored navaids, all or individually, and associated scratchpad messages is identical that for stored waypoints.

Examples of screens are shown below:



☐ PILOTS RUNWAYS [3R]

Enables creation, review and deletion of pilot-defined RUNWAYS.

From DATA 2/2 page:

PILOTS RUNWAYS [3R] .... Press

Logic for display is same as PILOT WAYPOINTS: if no PILOTS RUNWAY exists, NEW RUNWAY page is displayed; otherwise the first stored runway in the list is displayed.

To create a RUNWAY:

If NEW RUNWAY page is not shown

NEW RUNWAY [5R] ..... Press

RUNWAY may be created by entering:

- IDENT [1L] up to 7 letters and/or digits are available for designation,
- All boxed data fields as required.

If ten RUNWAYS have already been stored and NEW RUNWAY prompt is pressed, "LIST OF 10 IN USE" s-pad msg (white) is triggered.

Logic for deletion of stored runways, all or individually and associated scratchpad messages is identical to stored waypoints.

☐ PILOTS ROUTES

Enables creation, review and deletion of pilot-defined ROUTES.

From DATA page 2/2:

PILOTS ROUTES [4R] .....
.....Press

Logic for display is same as PILOT WAYPOINTS: if no PILOTS ROUTE exists, NEW ROUTE page is displayed; otherwise the first stored route in the list is displayed.

To create a ROUTE:

If NEW ROUTE page is not shown

NEW ROUTE [6R] .....Press

CO RTE [1L] .....Enter

10 letters and/or digit are available for CO RTE designation.

Ex: TOULHR02.

ACTIVE F-PLN route or SEC F-PLN route may be stored for future use.

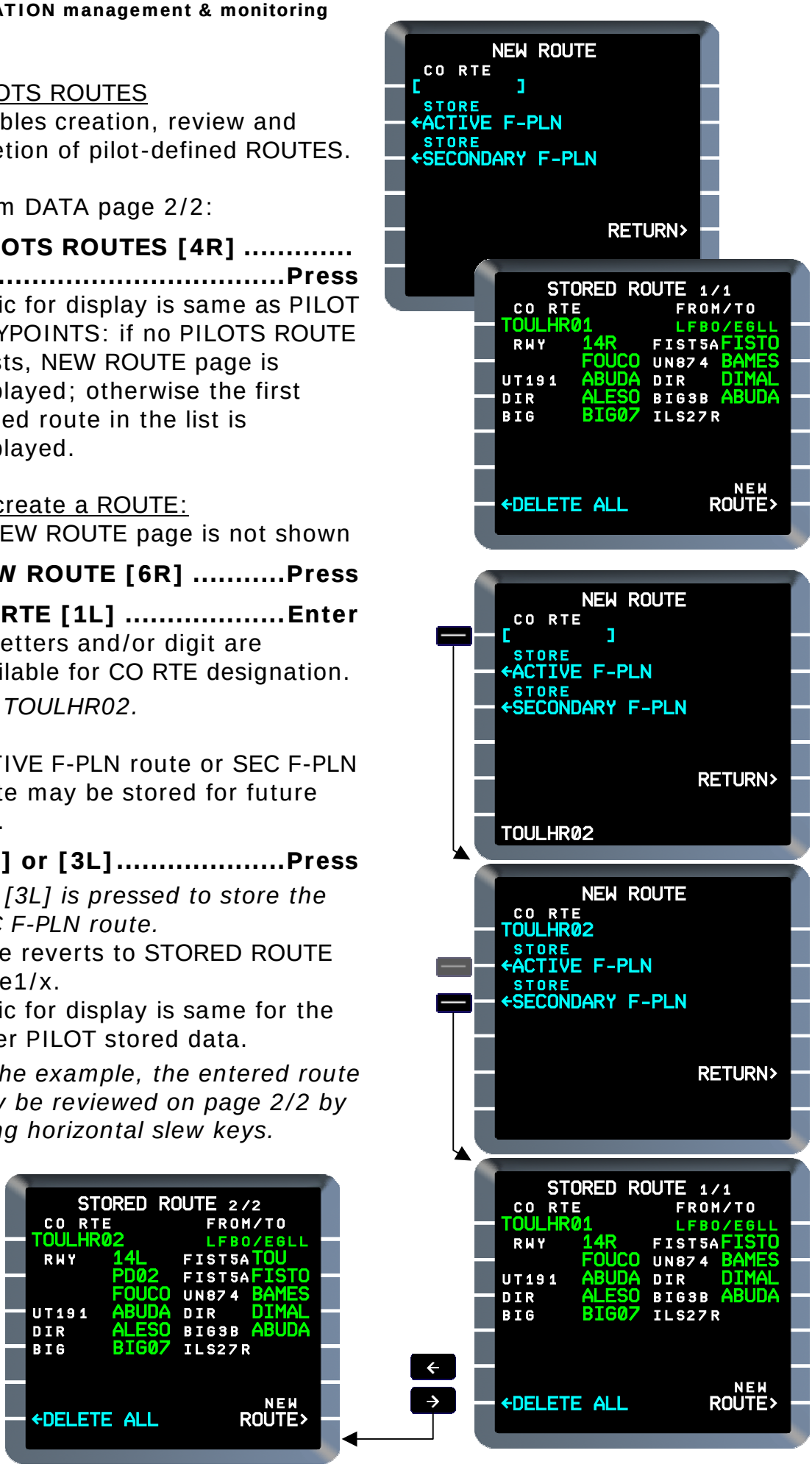
[2L] or [3L].....Press

Ex: [3L] is pressed to store the SEC F-PLN route.

Page reverts to STORED ROUTE page1/x.

Logic for display is same for the other PILOT stored data.

In the example, the entered route may be reviewed on page 2/2 by using horizontal slew keys.



If five routes have already been stored and NEW ROUTE prompt is pressed, "PILOTS ROUTES FULL" s-pad msg (white) is triggered.

Logic for deletion of stored routes, all or individually and associated scratchpad messages is identical that for stored waypoints.

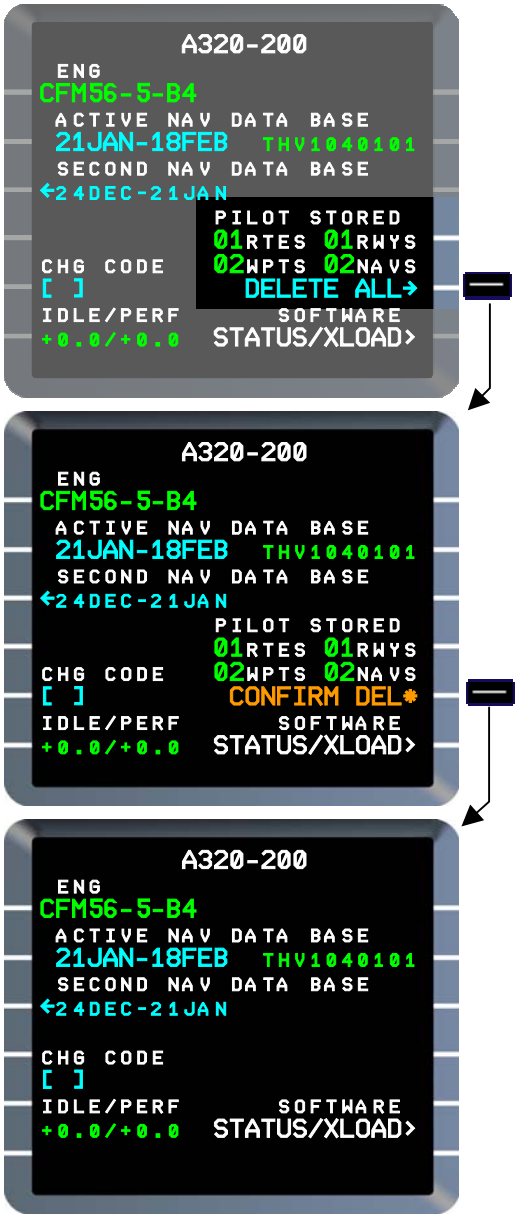
☐ AC STATUS page

Status of pilot stored data is shown on AC STATUS page.
If no pilot stored element exists the field is blank.

These elements are retained by FMGC at DONE phase if CO RTE retention is selected YES in AMI file.

DELETE ALL prompt [5R] on this page enables to delete **all** pilot stored data. To clear elements individually, use PILOTS stored pages.

See also Part I: Preflight Ch 2.1



■ DUPLICATE NAMES page

This page cannot be accessed directly.
It is automatically displayed when an ident is entered if NAVdb or Pilot stored data contain other item(s) having same ident.

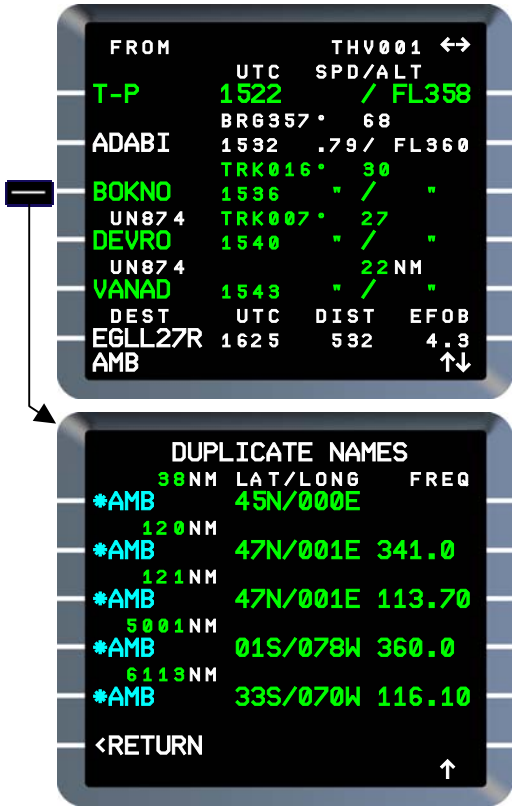
This applies to the following pages:

INIT A	: [1R], [2L]
F.PLN A	: any left LSK except 6L
F.PLN B	: any left LSK except 6L
ALTN	: other ALTN field
LAT REV	: [3R] or [4R]
AIRWAY	: any right LSK except 6R
SEC INIT A	: [1R], [2L]
SEC F.PLN A	: any left LSK except 6L
SEC F.PLN B	: any left LSK except 6L
PROG	: [3L], [4R]
NAVAID	: [1L]
WAYPOINT	: [1L]
RUNWAY	: [1L]
ROUTE	: [1R]
DIR TO	: [1L]
RAD NAV	: [1L], [3L], [5L], [1R], [3R], [5R]
SEL NAVAID	: any right LSK
NEW WAYPOINT	: [3L], [4L]
PREDICTIVE GPS	: [3L]

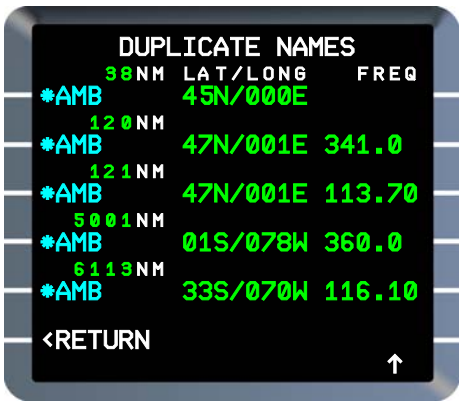
In the example it is attempted to revise ACTIVE F-PLN after ADABI to proceed to AMB.

- *AMB [3L] is entered,*
- *DUPLICATE NAMES Page is automatically displayed because AMB is not a unique ident found if NAV data references.*

DUPLICATE NAMES page is described below.



All items with **same** IDENTs existing in NAVdb and Pilot stored data are listed in order of increasing distance from PPOS (nearest first).
If more than five items exist, arrow is displayed bottom right; use vertical slew keys for scroll.



Items are identified by:

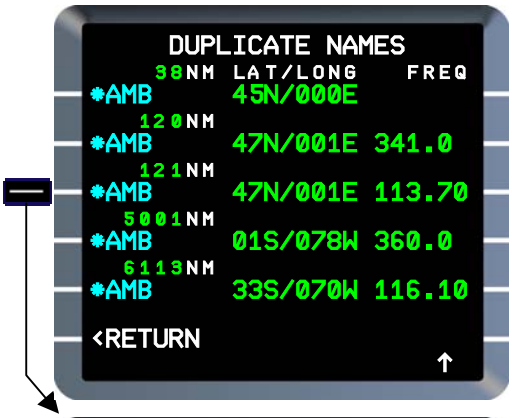
- Distance from PPOS, shown left of label line,

  If A/C position is invalid, dashes are displayed,
- Coordinates, in degrees rounded down.

  Example: waypoint 45°51.5N/000°12.6E gives 45N/000E.

  Lat/Long stored WPTs with ident over 7 characters (OPC option) may generate a non-unique identifier as a Lat/Long pilot stored WPT. In that case, the WPT ident is displayed and the complete Lat/Long without N/S, E/W. See example shown here.

- FREQ, which is displayed if the item is a navaid.



When the selection is made, adjacent left LSK is pressed, MCDU reverts to TMPY F-PLN reflecting the entered revision.

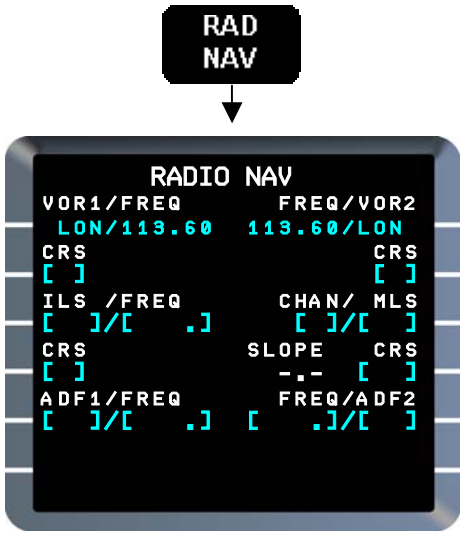
In the example, AMB VORDME freq. 113.70 is selected.

Notes:

When the DUPLICATE NAMES page is accessed for a F-PLN revision on the ONSIDE MCDU and another F-PLN revision that affects the same flight plan is performed, the DUPLICATE NAMES page reverts to the corresponding F-PLN page with no selection made.

If the DUPLICATE NAMES page is displayed on the ONSIDE MCDU and an attempt is made to delete a pilot defined element displayed on that DUPLICATE NAMES page, "PILOT ELEMENT RETAINED" s-pad msg (white) is displayed and element is not deleted.

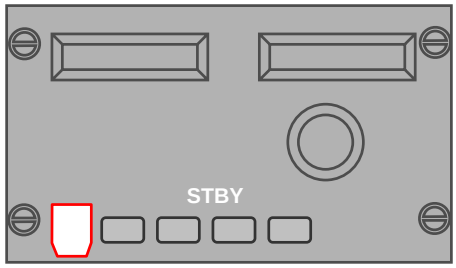
7.2. RAD NAV page



■ Overview

The RAD NAV page is accessed via RAD NAV key and displays ident, frequency and course of navaids selected automatically by the FMGC or manually by pilot.

If one or both RMPs in manual mode:
- All fields are blanked,
- Title lines are displayed but entry is not possible.



Fields [3R] MLS & [4R] ADF2 are operator options. If not activated field(s) is (are) blank.

■ General rules

A navaid may be tuned:

- By its ident which is entered in the corresponding field,
- By its frequency (or channel for MLS); "/" may be omitted.

Entry of both ident and frequency (channel for MLS) at the same time is rejected with "FORMAT ERROR" s-pad msg (white).

Manually entered data are displayed in large font (blue).
Auto-tuned data and data resulting from manual entry are displayed in small font (blue).

Until cleared, manually tuned navaid has priority over auto-tuned navaid.

RADNAV page is automatically cleared when FMS phase switches to DONE.

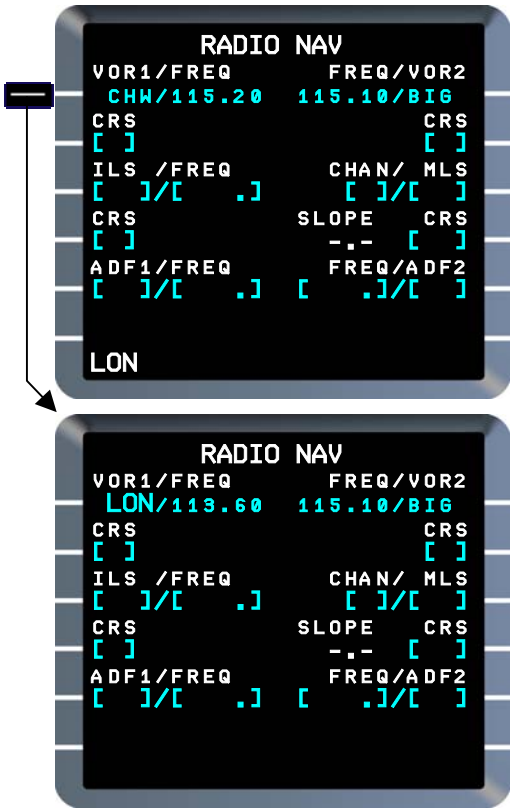
■ RADIO NAV page description

☐ VOR1/FREQ [1L] - FREQ/VOR2 [1R]
Compatible navaid types for these fields are: VOR, DME, TACAN, VOR DME, VOR TAC.

If an **ident** is entered, FMGC outputs the navaid frequency.

Ex: LON.

113,6 is auto-tuned by the FMGC.



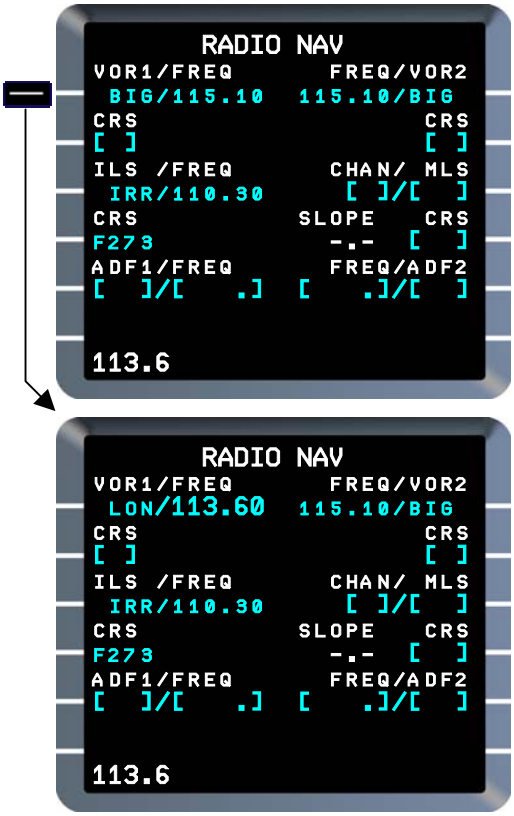
Ident of tuned navaids are displayed at bottom of ND provided VOR keys are selected on EFIS control panel.
M is shown when navaid is manually tuned.

Wrong ident may be displayed if navaid ident signal is unreliable. Use RMP for identification.

If a **frequency** is entered, the identifier (associated with the entered frequency) for the **closest** VOR, VORDME, or VORTAC is displayed.
Note: entering navaid by frequency may call up an **unwanted** navaid selection.

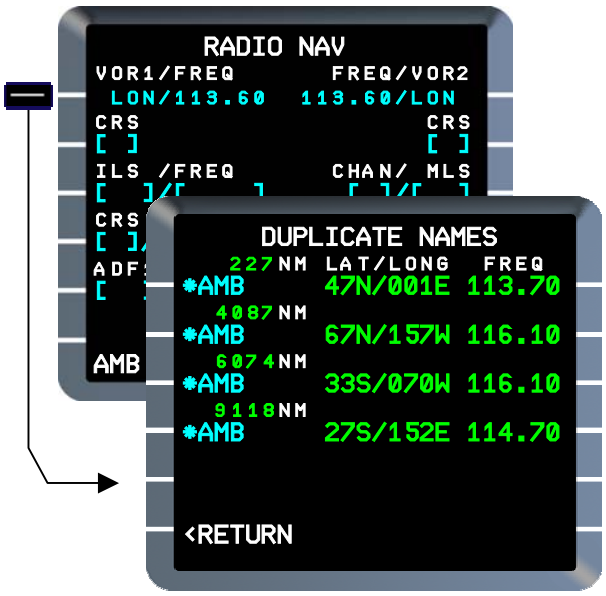
Ex: 113.6.

LON is auto-tuned by the FMGC because it is the closest VOR DME.



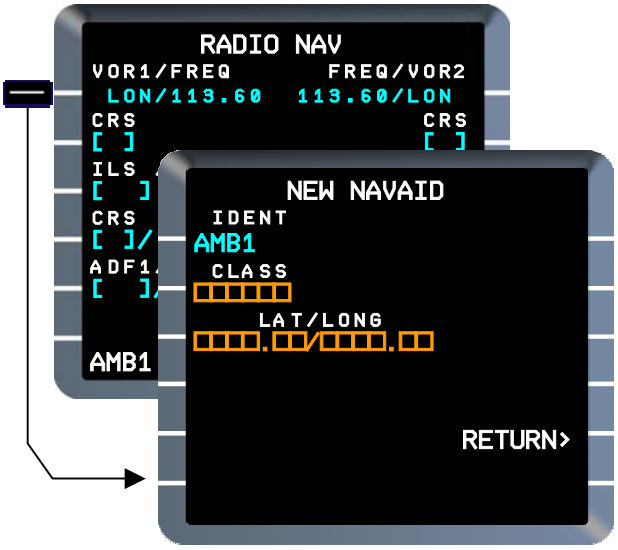
If more than one navaid in NAVdb have the same ident, DUPLICATE NAMES page is displayed.

See 7.1 in this chapter.

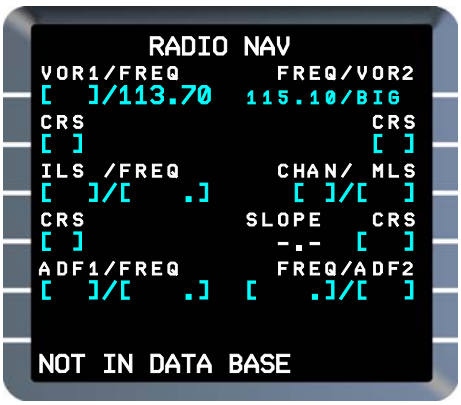


If the ident is not in the NAVdb, NEW NAVAID page is displayed.

See 7.1 in this chapter.

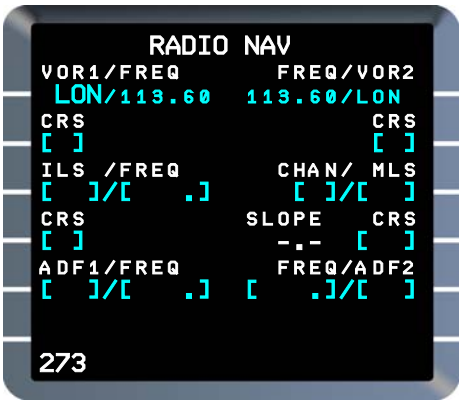


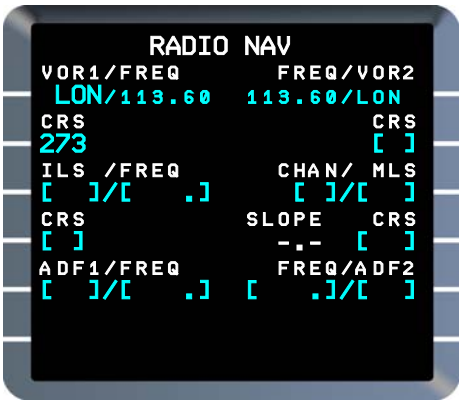
If no VOR, VORDME or VORTAC is found, only the frequency is displayed and brackets are displayed in ident field; "NOT IN DATA BASE" s-pad msg (white) is triggered. ND shows frequency only.



☐ CRS [2L] - [2R]

These fields are used to enter a course associated with VOR or VOR/DME displayed in [1L], [1R] respectively.

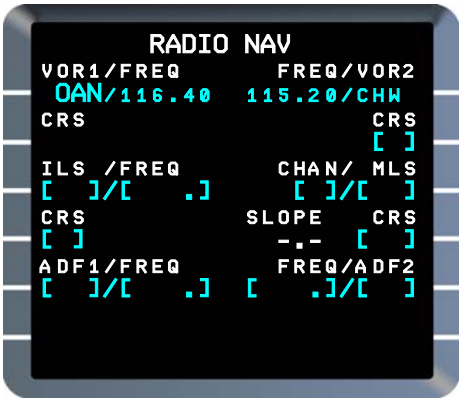


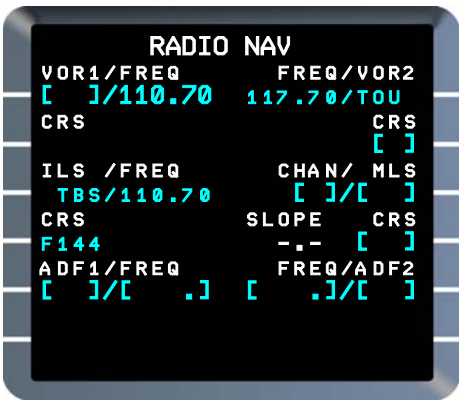


This field is blank if a DME or TACAN is entered in [1L] or [1R]; any entry is rejected with "NOT ALLOWED" s-pad msg (white).

Ex. 1: OAN (TACAN).

Ex. 2: 110.7.



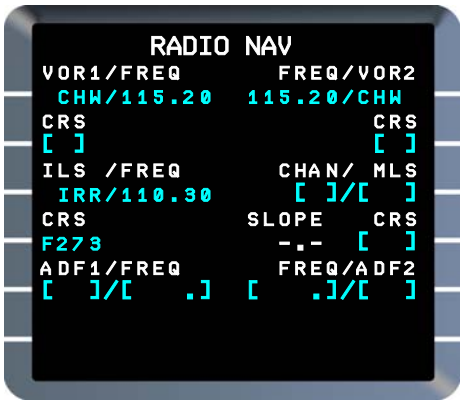


☐ ILS/FREQ [3L]

Compatible navaid types for this field are: ILS, ILS TAC, ILS DME, LOC.

Ident, frequency and course are automatically tuned if ILS is associated with DEP RWY or DEST RWY.

If no ILS is auto-tuned or manually tuned, brackets are displayed.



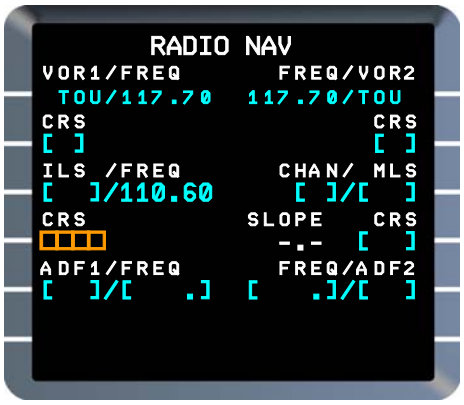
☐ ILS CRS [4L]

If an ILS is tuned (manually or automatically) the course is automatically entered preceded by "F" (for Front beam) or "B" (for Back beam).

BACK BEAM option is available if activated in OPC file.

If no course is entered four amber boxes are displayed, a course can be entered manually.

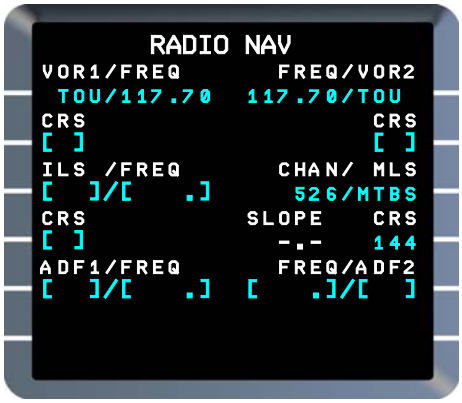
If no ILS is tuned, brackets are displayed; no entry is allowed.



When a course is displayed (entered manually or automatically), it can be modified. Only manually entered courses can be cleared.

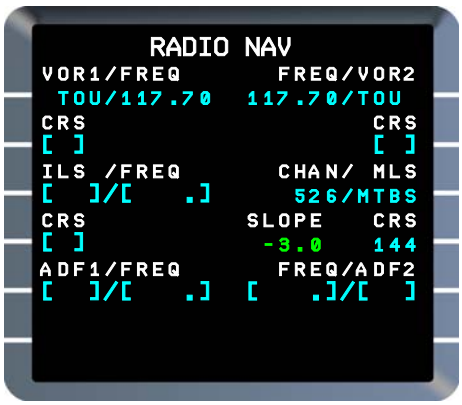
☐ MLS [3R] – [4R]

MLS is an option. If not selected field [3R] and [4R] are blank.



If a MLS is auto-tuned:
- Ident and channel are displayed in [3R],
- No slope is displayed in PREFLIGHT or TAKE-OFF phases,
- Course and slope are shown for CLB, CRZ, DES, APPR, and GO-AROUND phases.

  [4R] field refers to MLS or MLS DME classes.



The auto-tuned course is the MLS nominal azimuth.
If no MLS is selected, brackets are displayed.

If an ILS is manually tuned in [3L] while an MLS is tuned the MLS is deselected, [3R] and [4R] fields revert to brackets.

When a course is displayed (manually or automatically tuned), it can be modified. Only manually entered courses can be cleared.

☐ ADF [5L] – [5R]

ADF 2 [5R] is an option. If not selected field [5R] is blank.

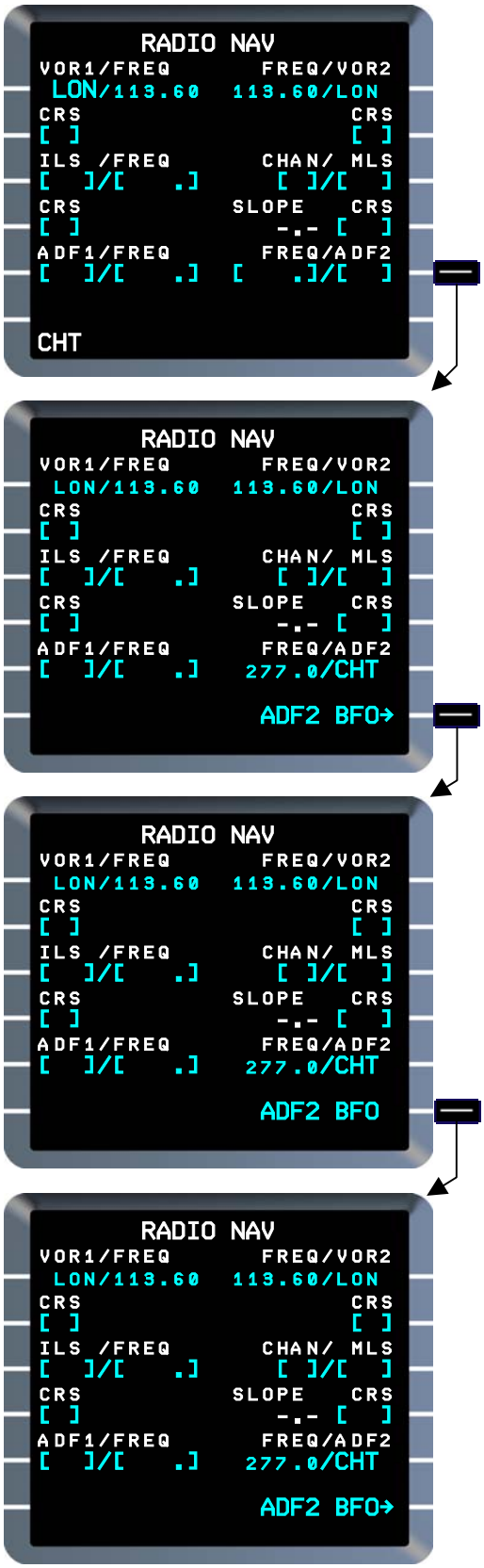
NDB(s) may be tuned manually either by entering ident or frequency.
A NDB which is part of ACTIVE F-PLN as a WPT is auto-tuned.

If an ident is entered, the NAVdb is searched for this ident. If a match is found, the ident and corresponding frequency are displayed. If no match is found, the NEW NAVAID page is displayed.
Ex: CHT.

If a frequency is entered, the NAVdb is searched and the identifier (associated with the entered frequency) for the **closest** ADF is displayed with the frequency.
If no ADF is found, only the frequency is displayed, brackets are displayed in the ident field, and "NOT IN DATABASE" s-pad msg (white) is displayed.
Note: entering a navaid by its frequency may call up an **unwanted** navaid selection.

A manual selection overrides the automatic tuning.

When an ADF 1 or ADF2 is selected, "←ADF1 BFO" [6L] or "ADF2 BFO→" [6R] prompt is shown.
Pressing the adjacent LSK changes the display to "ADF BFO" (without arrow) enabling BFO operation.
If a CLR is performed on that field, BFO operation is cancelled and arrow re-appears.
Re-tuning ADF automatically cancels BFO operation.



☐ <u>To cancel manually tuned navaids</u>

Pilot-entered data can be cleared by using the CLR key. When a navaid is cleared it returns to FMGC auto-tuning or brackets if no navaid can be auto-tuned.

Examples below.

■ Supplementary information

☐ Manual selection of an ILS by a frequency

- **In CLB, CRZ, DES, APPR or GO AROUND phase.**

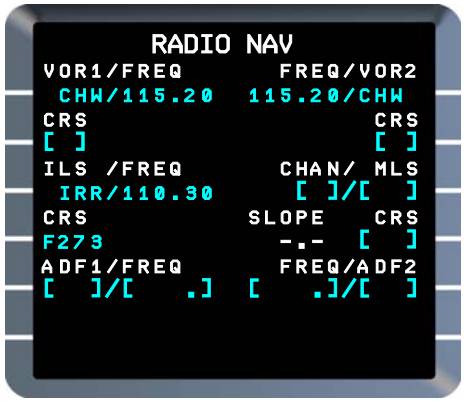
If an **ILS**, LOC, IGS, LDA, SDF or BAC approach has been selected, the entry is compared with the ILS specified for the approach:

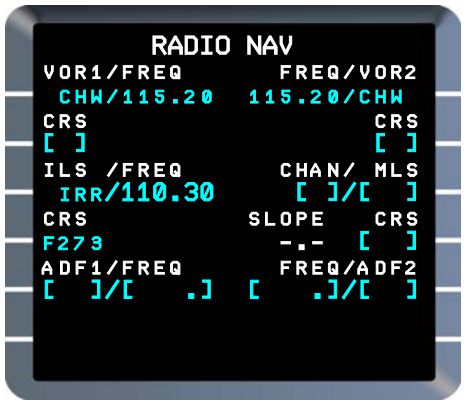
– If they are **same**, the corresponding ident is displayed with the frequency in [3L], the course is auto-tuned and displayed in [4L] with logic "F" or "B" described above,

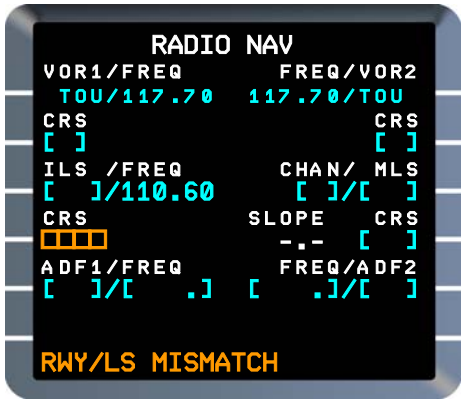
– If they are not **same**, only the frequency is displayed and brackets are displayed in [3L], no course is auto-tuned, [4L] displays amber boxes and "RWY/LS MISMATCH" s-pad msg (amber) is triggered.

If a **MLS** approach has been selected (option) only the frequency is displayed and brackets are displayed in ident [3L], no course is auto-tuned, [4L] displays amber boxes and "RWY/LS MISMATCH" s-pad msg (amber) is triggered.

If **no** ILS/LOC/BAC/IGS/LDA/SDF approach or MLS approach has been selected, only the frequency is displayed and brackets are displayed in [3L], no course is auto-tuned, [4L] displays amber boxes, no message is displayed.







- **In PREFLIGHT or TAKE OFF phase.**

  If the take off runway associated with an **ILS** has been selected, the entry is compared with it.
  – If they are **same**, the corresponding ident is displayed with the frequency in [3L], the course is auto-tuned and displayed in [4L],
  – If they are **not same**, only the frequency is displayed and brackets are displayed in [3L], no course is auto-tuned, [4L] displays amber boxes and "RWY/LS MISMATCH" s-pad msg (amber) is triggered.

  If the take off runway associated with a **MLS** has been selected (option) only the frequency is displayed and brackets are displayed in [3L], no course is auto-tuned, [4L] displays amber boxes, "RWY/LS MISMATCH" s-pad msg (amber) is triggered.

  If **no LS** (ILS or MLS) has been selected at the departure runway, only the frequency is displayed and brackets are displayed in [3L], no course is auto-tuned, [4L] displays amber boxes, no message is displayed.

☐ Manual selection of an ILS by an ident

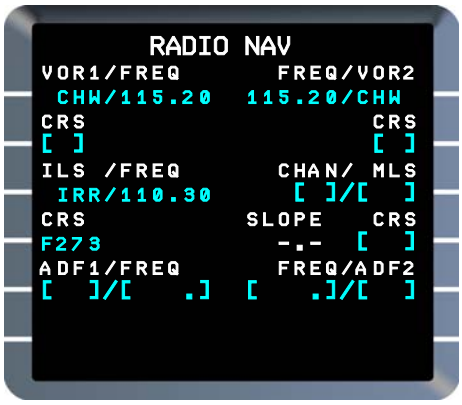
If an ident is entered and no match is found in NAVdb, then the NEW NAVAID page is displayed enabling the pilot to define the ILS.
See 6.1 in this chapter.

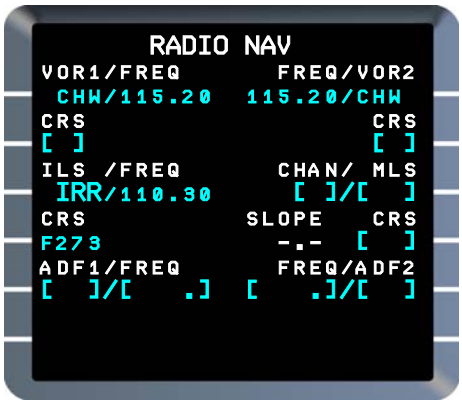
If an ident is entered and found in NAVdb, the ident and frequency are displayed in [3L], course field is defined as stated below:

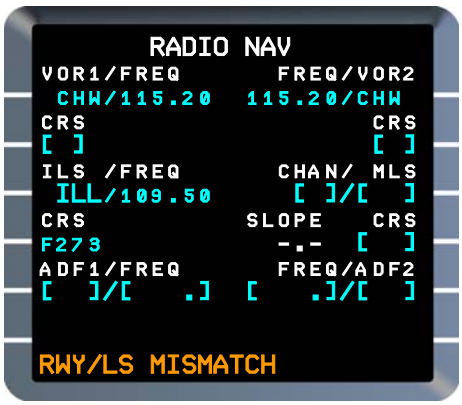
- **In CLB, CRZ, DES, APPR or GO AROUND phase.**

  If an **ILS**, LOC, IGS, LDA, SDF or BAC approach has been selected, the entry is compared with the ILS specified for the approach:
  - If they are **same**, no message is displayed; the course is auto-tuned and shown in [4L], with logic "F" or "B" described above.
  - If they are not **same**, "RWY/LS MISMATCH" s-pad msg (amber) is displayed, the LOC bearing of the entered ILS is auto-tuned and displayed in [4L], with logic "F" or "B",
  - If a **MLS** approach has been selected (option), "RWY/LS MISMATCH" s-pad msg (amber) is triggered, the LOC bearing of the entered ILS is auto-tuned and displayed in [4L], with logic "F" or "B".

  If **no** ILS/LOC/BAC/IGS/LDA/SDF approach or MLS approach has been selected, no message is displayed, the LOC bearing of the entered ILS is auto-tuned and displayed in [4L], with logic "F" or "B".







- **In PREFLIGHT or TAKE OFF phase.**

  If the take off runway associated with an **ILS** has been selected, the entry is compared with it:
  - If they are **same**, no message is displayed, the LOC bearing of the entered ILS is auto-tuned and displayed in [4L], with logic "F" or "B",
  - If they are **not same**, "RWY/LS MISMATCH" s-pad msg (amber) is triggered, the LOC bearing of the entered ILS is auto-tuned and displayed in [4L], with logic "F" or "B".

  If the take off runway associated with a **MLS** has been selected, "RWY/LS MISMATCH" s-pad msg (amber) is triggered, the LOC bearing of the entered ILS is auto-tuned and displayed in [4L], with logic "F" or "B".

  If **no LS** (ILS or MLS) has been selected at the departure runway, no message is displayed, the LOC bearing of the entered ILS is auto-tuned and displayed in [4L], with logic "F" or "B".

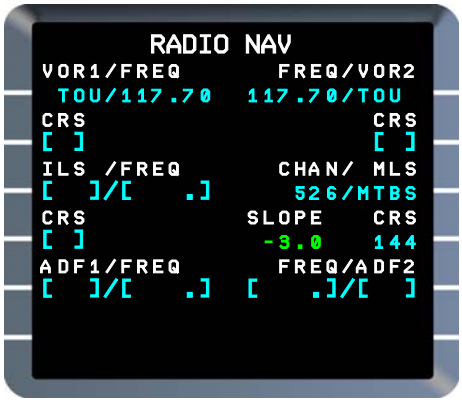
☐ Manual selection of a MLS by a channel

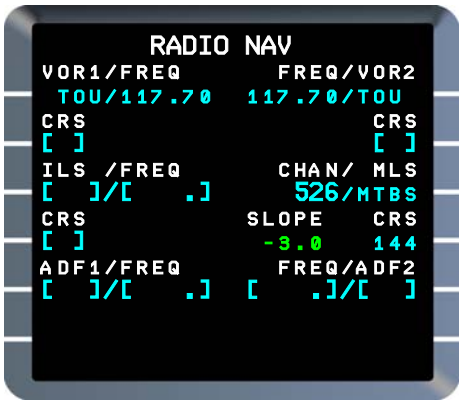
- **In CLB, CRZ, DES, APPR or GO AROUND phase.**

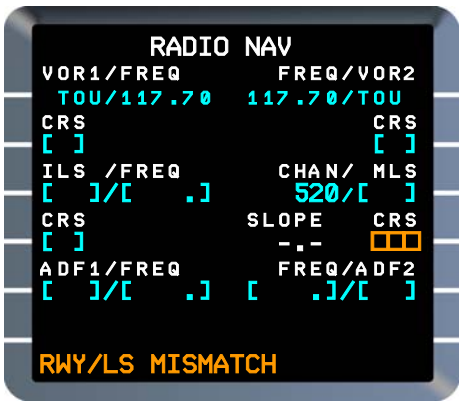
If a **MLS** approach has been selected, the entry is compared with the MLS specified for the approach:

– If they are **same**, the corresponding ident is displayed with the channel in [3R], course and slope of the DEST RWY runway are auto-tuned and displayed in [4R].
The course value is the MLS nominal azimuth.
Slope of the DEST RWY and FPA to the runway fix as defined in the MLS approach procedure are automatically displayed in [4R],

– If they are **not same**, only the channel is displayed and brackets are displayed in [3R], course and slope are not auto-tuned, [4R] displays amber boxes for the course, dashes for the slope and "RWY/LS MISMATCH" s-pad msg (amber) is triggered.







If an **ILS**, LOC, IGS, LDA, SDF or BAC approach has been selected, only the channel is displayed and brackets are displayed in [3R], course and slope are not auto-tuned, [4R] displays amber boxes for the course, dashes for the slope, "RWY/LS MISMATCH" s-pad msg (amber) is triggered.

If **no** MLS approach or ILS/LOC/BAC/IGS/LDA/SDF approach has been selected, only the channel is displayed and brackets are displayed in 3R, course and slope are not auto-tuned, [4R] displays amber boxes for the course, dashes for the slope, no message is displayed

- **In PREFLIGHT or TAKE OFF phase.**

  If the take off runway associated with a **MLS** has been selected , the entry is compared with it:
  - If they are the **same**, the corresponding ident is displayed with the channel in 3R, the nominal azimuth of the entered MLS is auto-tuned and displayed in 4R, dashes are displayed for the slope,
  - If they are **not the same**, only the channel is displayed and brackets are displayed in 3R, no course is auto-tuned, 4R displays amber boxes for the course, dashes for the slope, "RWY/LS MISMATCH" s-pad msg (amber) is triggered.

  If the take off runway associated with an **ILS** has been selected, only the channel is displayed and brackets are displayed in 3R, no course is auto-tuned, 4R displays amber boxes for the course, dashes for the slope, "RWY/LS MISMATCH" s-pad msg (amber) is triggered.

  If **no LS** (ILS or MLS) has been selected at the origin runway, only the channel is displayed and brackets are displayed in 3R, no course is auto-tuned, 4R displays amber boxes for the course, dashes for the slope. No message is displayed.

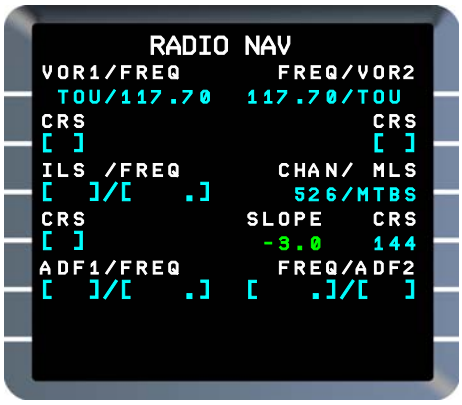
☐ Manual selection of a MLS by an ident

If an ident is entered and no match is found in NAVdb, then the NEW NAVAID page is displayed enabling the pilot to define the MLS.
See 6.1 in this chapter.

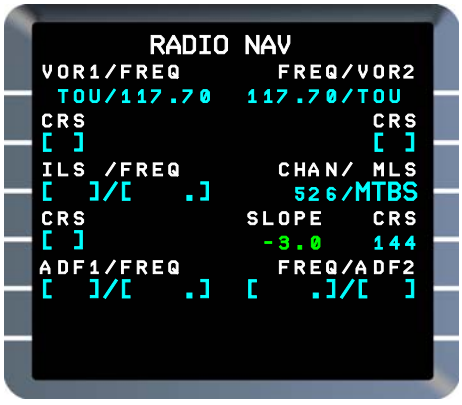
If an ident is entered and found in NAVdb, the ident and channel are displayed in [3R], slope/course field is defined as stated below:

- **In CLB, CRZ, DES, APPR or GO AROUND phase.**

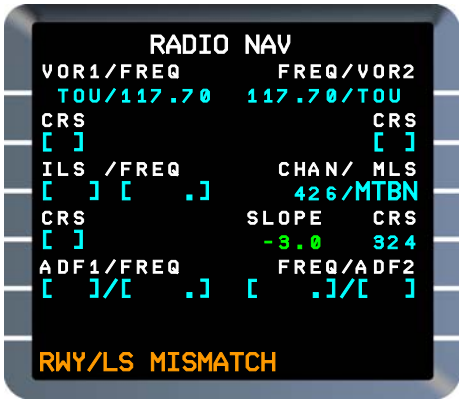
If a **MLS** approach has been selected, the entry is compared with the MLS specified for the approach:
– If they are **same**, no message is displayed. The course and slope are auto-tuned and displayed in [4R]; course value is the MLS nominal azimuth. The slope is automatically displayed in [4R], it is the FPA to the runway fix as defined in the MLS approach procedure,
– If they are **not same**, "RWY/LS MISMATCH" s-pad msg (amber) is triggered. The nominal azimuth of the entered MLS is auto-tuned and displayed in [4R]; dashes are displayed for the slope.



If an **ILS**, LOC, IGS, LDA, SDF or BAC approach has been selected, "RWY/LS MISMATCH" s-pad msg (amber) is triggered. The nominal azimuth of the entered MLS is auto-tuned and displayed in [4R]; dashes are displayed for slope.



If **no** MLS approach or ILS/LOC/BAC/IGS/LDA/SDF approach has been selected, no message is displayed. The nominal azimuth of the entered MLS is auto-tuned and displayed in [4R]; dashes are displayed for the slope.



- **In PRE-FLIGHT or TAKE OFF phase.**

  If the take off runway associated with a **MLS** has been selected, the entry is compared with it:
  - If they are **same**, no message is displayed. The nominal azimuth of the entered MLS is auto-tuned and displayed in [4R]; dashes are displayed for slope.
  - If they are **not same**, "RWY/LS MISMATCH" s-pad msg (amber) is triggered. The nominal azimuth of the entered MLS is auto-tuned and displayed in [4R]; dashes are displayed for slope.

  If the take off runway associated with an **ILS** has been selected, "RWY/LS MISMATCH" s-pad msg (amber) is triggered. The nominal azimuth of the entered MLS is auto-tuned and displayed in [4R]; dashes are displayed for slope.

  If **no LS** (ILS or MLS) has been selected at the origin runway, no message is displayed. The nominal azimuth of the entered MLS is auto-tuned and displayed in [4R]; dashes are displayed for slope.

7.3. POSITION monitoring

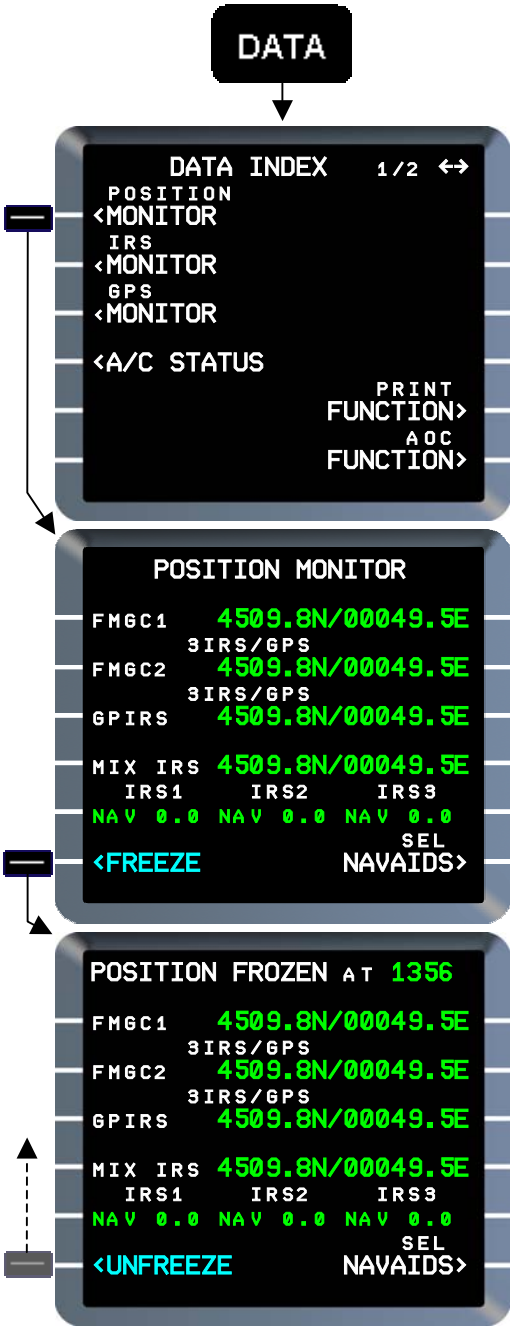
■ POSITION MONITOR page

Displays position data as computed from the available navigation systems.
Accessed by:

DATA KEY .....Press
Data Index 1/2 page is displayed.

POSITION MONITOR [1L] ....Press
Data displayed are as follows:

- [Lines 1 & 2]: Positions computed by FMGC 1 & 2; sensors providing inputs for position computation are indicated below (*e.g.* 3IRS/GPS),
- [Line 3]: GPIRS (GPS inertial), GPS (GPS autonomous), RADIO depending on installation and availability of signals,
- [Line 4]: MIX IRS position; if one IRS position gets invalid (ATT or failure), the mixed IRS position is the position of one of the 2 remaining IRS following priority order: IRS OWN, IRS 3, IRS OPP,
- [Line 5]: Mode of each IRS (NAV, ATT, ALIGN, INVAL), and drift (NM) between each IRS and onside FMGC.



Example shown is A/C equipped with hybrid GPS.

See Part I: Ch 3.3 - Navigation/Flight Management for other examples.

FREEZE prompt [6L] enables display to be frozen, to facilitate reading or recording of data.
Title changes to POSITION FROZEN AT XXXX, showing time at which display is frozen.

UNFREEZE prompt enables return to continuous updating of position data.
If another page is selected, FREEZE function is automatically cancelled.

■ IRS MONITOR page

Accessed from DATA INDEX 1/2 page:

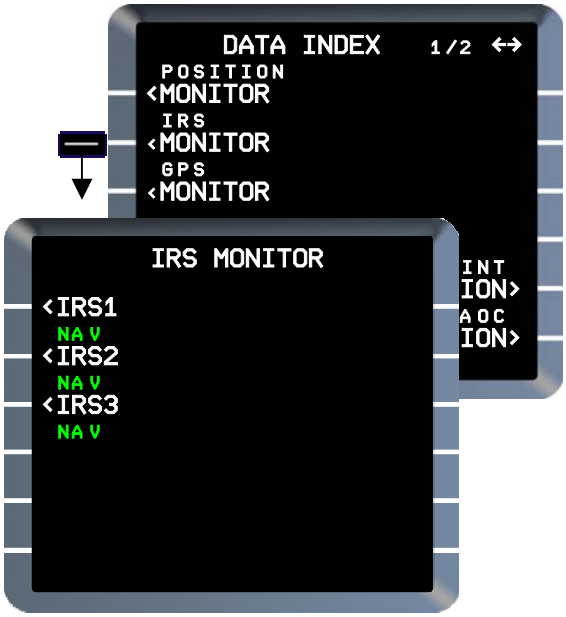
IRS MONITOR [3L] ..... Press

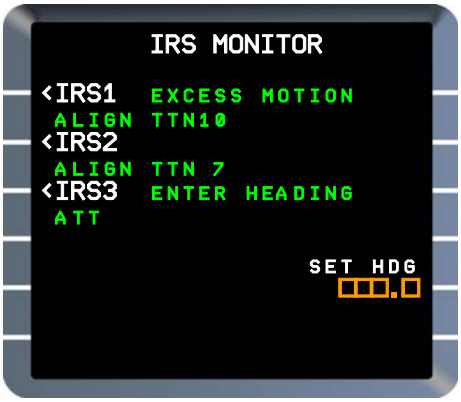
Mode of each IRS is shown: INVAL, ALIGN, NAV, ATT.

When in ALIGN mode, Time To NAV is shown as TTN XX (min).

A status message may be shown next to the associated IRS, in case of a malfunction. Possible status messages are:

- IR FAULT,
- DELAYED MAINT,
- ENTER PPOS,
- SELECT ATT,
- EXCESS MOTION,
- SWITCH ADR,
- CHECK C/B,
- CDU FAULT,
- ENTER HEADING,
- REENTER PPOS,
- SYS BELOW –15°.





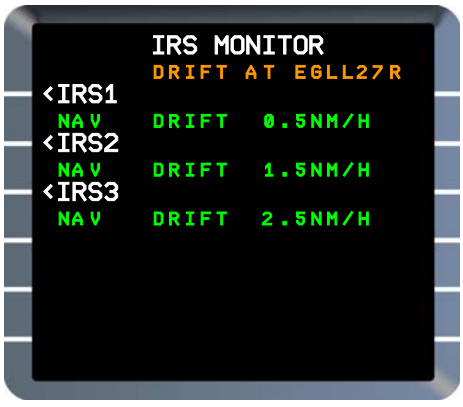
The SET HDG function (Option selected in OPC file) is described in Part IV: FMS degraded operations Ch 4.2 - IR alignment in ATT mode.

☐ DRIFT Rate display function

When FMGC switches to **DONE**, average IRS DRIFT rate is shown for each IRS, in NM/Hour, provided:

- IRS is in NAV mode,
- The landing RWY was as selected in ACTIVE F-PLN. If not, DRIFT rate computation is not correct.

See also Part II: Flight phases Ch 9 - Done



☐ IRS1, IRS2, IRS3 pages

Accessed via prompts [1,2,3L] on IRS MONITOR page.
These pages display data given by associated IRS, as shown.
If IRS is in ATT mode, MHDG label [3R] shows entered HDG.
Wind direction [4L] is True.
If a hybrid GPS/IRS system is installed GPIRS position [5L] and accuracy (in Meters) [4R] are shown; otherwise these fields are blank.

FREEZE / UNFREEZE prompts [6L] enables display of all 3 IRS data pages to be frozen and unfrozen simultaneously. Time of freezing is shown in title.

If IRS pages are deselected, FREEZE function is automatically cancelled.

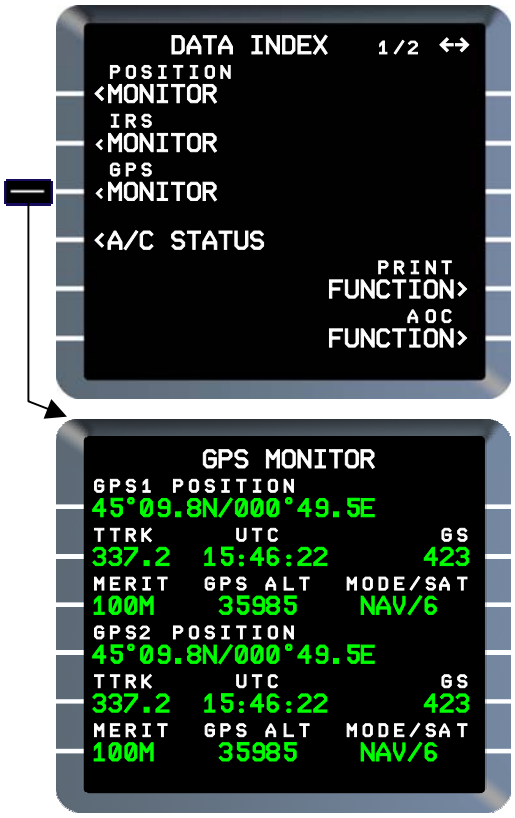
NEXT IRS> prompt allows access to other IRS data pages.

■ GPS MONITOR page

For A/C with GPS installed, this page is accessed from DATA INDEX 1/2 page via GPS MONITOR prompt [3L], and shows all GPS-derived data.

MODE/SAT, shown at [3R] & [6R] for GPS1 & 2 respectively, indicates operating mode of GPS and number of satellites tracked.
Possible modes indicated are:

- INIT,
- ACQ,
- NAV,
- TEST,
- FAULT,
- ALTAID,
- AIDED,
- DIFF.



■ SELECTED NAVAIDS page

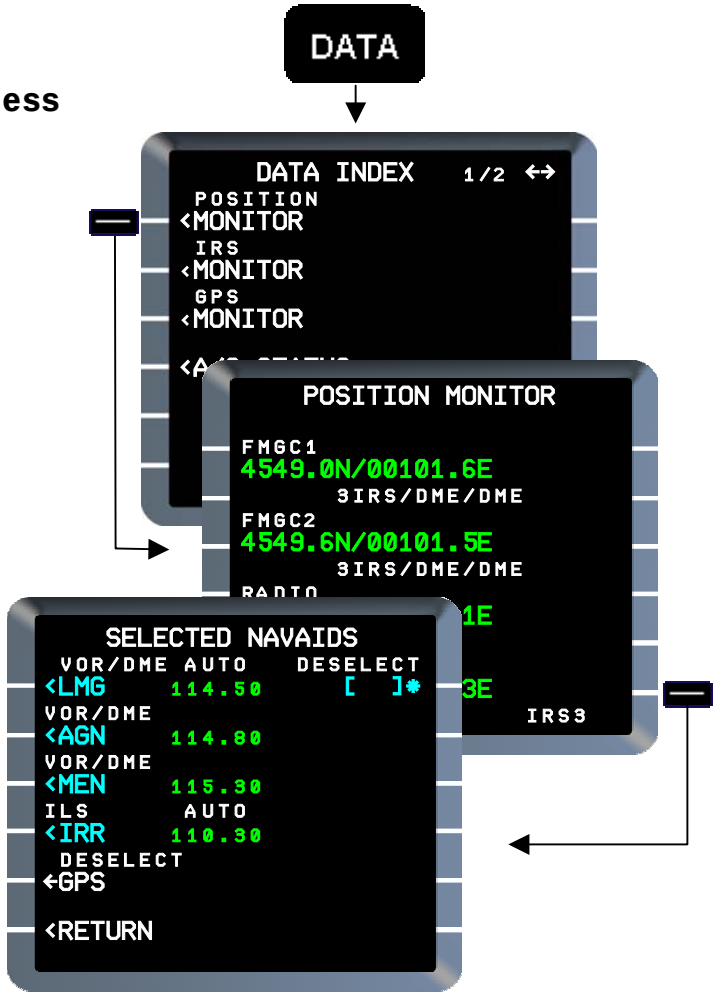
Access is via POSITION MONITOR page.

SEL NAVAIDS [6R] ..... Press

NAVAIDS tuned by onside FMGC are listed with frequency in lines [1 – 4], and class of navaid in label lines.

Tuning mode, *i.e.* AUTO, MAN or RMP, is shown in label line above frequency.
If NAVdb does not contain a navaid which has been tuned by MAN or RMP, ident and class are blank.

[1L] shows navaid displayed on ND and DDRMI.
[2 & 3L] show navaids used for radio position computation.
[4L] shows an ILS or MLS, if tuned.



☐ DESELECT NAVAID function

If a navaid is reported as unreliable or unserviceable, it should be deselected on the SELECTED NAVAIDS page:

NAVAID ident [1R].....Enter

Ex: LMG.

The entered navaid is deselected, and can no longer be auto-tuned for display or computation of position.

In this example LMG is removed from list of auto-tuned navaids, and replaced by next available VOR DME, CNA in [1L & 2L].

It may however be manually tuned by pilot entry on RAD NAV page or by RMP.

Brackets appear [2R] enabling another navaid to be deselected.

Up to 6 navaids may be deselected in this way.

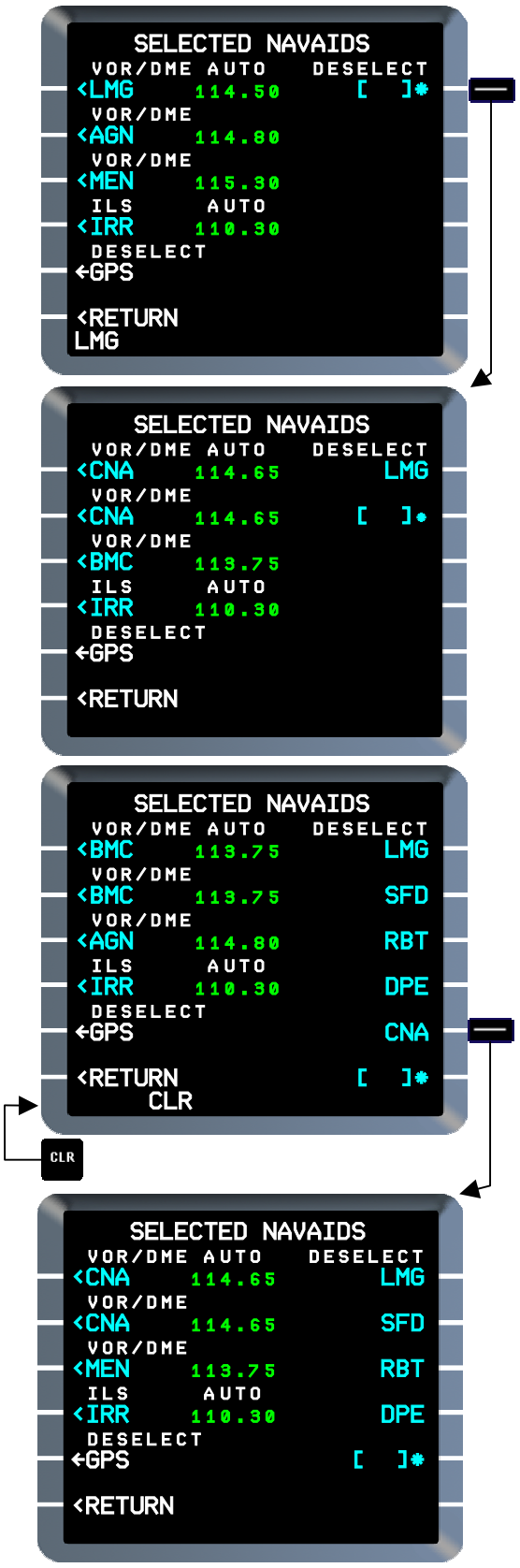
Ex: LMG, SFD, RBT, DPE, CAN.

A deselected navaid may be restored by:

- using CLR function,
- or overwriting with another navaid to be deselected.

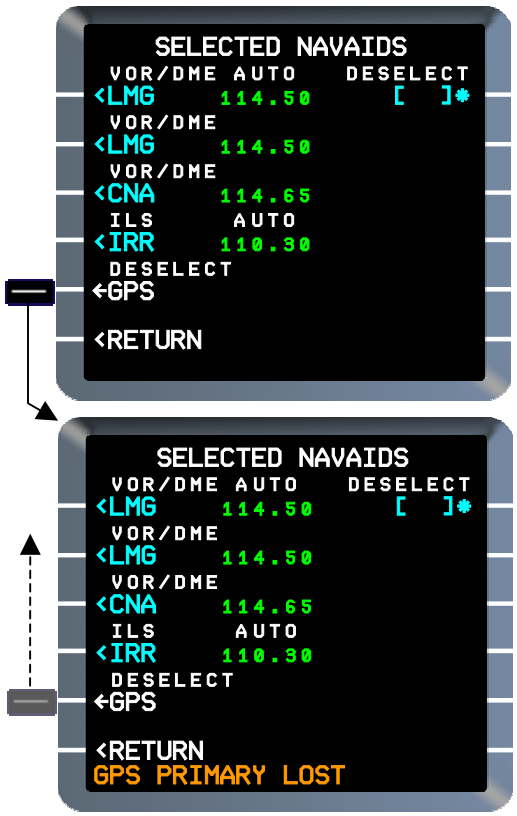
In this example deselection of CNA is cancelled by CLR function; CNA is again auto-tuned for display and position computation, shown in [1L & 2L].

Navaid deselections are cleared when FMGC phase switches to DONE, or if second NAVdb is activated.



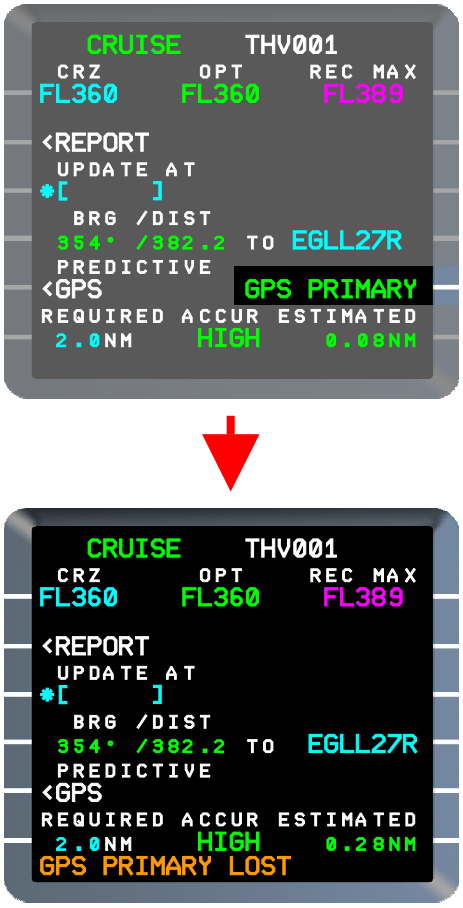
☐ <u>DESELECT GPS function</u>
(GPS-equipped A/C)
Enables all GPS inputs to FMGCs for position computation to be deselected and reselected.
Access is from SELECTED NAVAIDS page:

DESELECT GPS [5L] ..... Press
GPS PRIMARY LOST (amber) is triggered on scratchpad and ND.
Use of GPS inputs (for both hybrid GPIRS and autonomous installations) is inhibited.
Prompt [5L] changes to SELECT GPS, enabling to re-select GPS.



On PROG page, GPS PRIMARY is no longer displayed.

"GPS IS DESELECTED" s-pad msg (amber) is displayed if within 80NM of T/D, or if FMGC switches to APPR phase.



■ POSITION ACCURACY

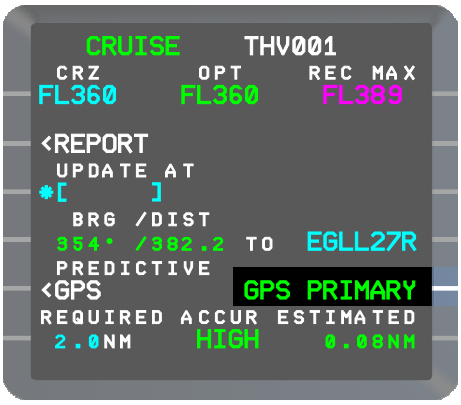
The following data related to Position Accuracy are displayed on the **PROG** page:

☐ GPS Status [5R]

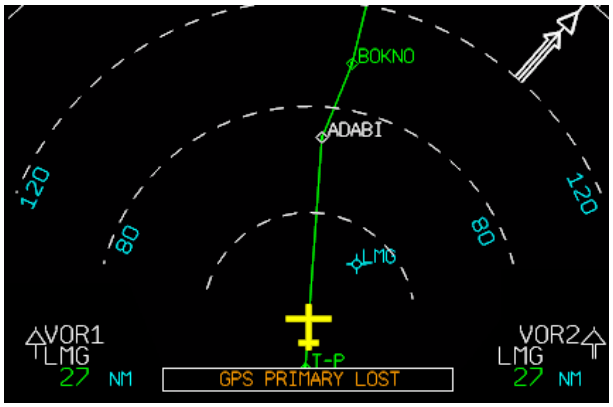
A/C with GPS installed.

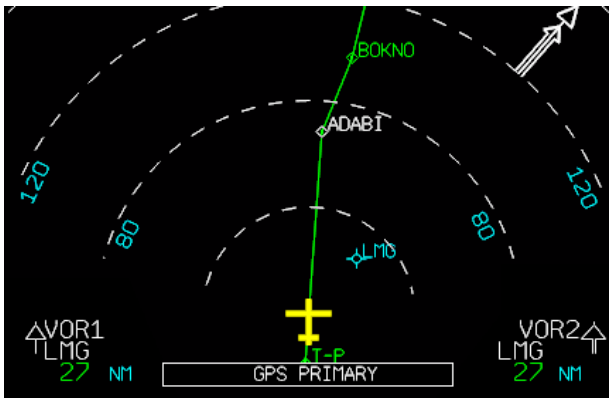
For non GPS A/C this filed is blank.

When both GPS accuracy and integrity requirements are met, the Confidence Status on GPS (autonomous system) or GPIRS (hybrid system) position is designated as GPS PRIMARY, displayed on PROG page [5R].



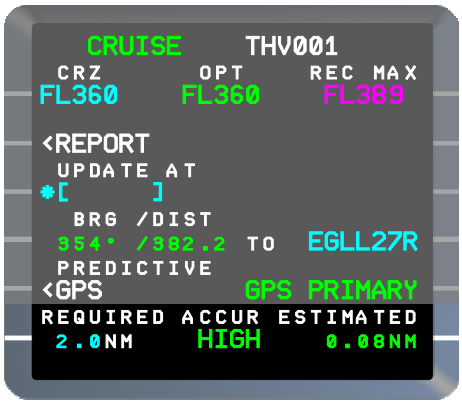
If these requirements are not met GPS/IRS mode is lost "GPS PRIMARY LOST" message (amber) is triggered on MCDU and ND of the affected side. It cannot be cleared from ND.
When GPS/IRS mode is restored "GPS PRIMARY" message (white) is triggered on MCDU and on ND; GPS PRIMARY is again displayed in [5R].





☐ REQUIRED Navigation Performance (RNP) [6L]

This field shows the RNP value (Required Navigation Performance) used as reference by the system to determine the level of confidence HIGH/LOW.

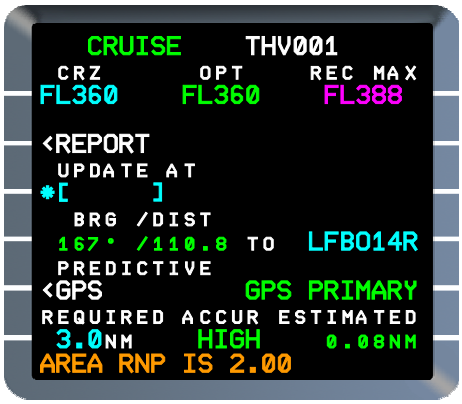


Defaulted RNP values are:
- En-route : 2NM,
- Terminal area: 1NM,
- Precision & GPS approach: 0.3NM,
- Non-precision approach: 0.5NM,

Or
- Values defined in NAVdb,

Or
- Values defined according to operator's requirements in OPC file.

These values may be modified by pilot.
When modified they are displayed large font. Use the CLR key to return to the defaulted value.



If the pilot entry is greater than the value existing in NAVdb "PROCEDURE RNP IS XX.XX" s-pad msg (amber) is triggered. This message is also triggered if the NAVdb RNP value becomes smaller than the pilot entered value.

If the pilot entry is greater than the value existing in OPC file "AREA RNP IS XX.XX" s-pad msg (amber) is triggered. This message is also issued if the OPC RNP value becomes smaller than the active pilot entered value.

☐ ESTIMATED Position Error (EPE) [6R]

This field shows the **EPE** (Estimated Position Error).
EPE is the radius of a circle of uncertainty within which the computed position is located, with a probability of 95%.

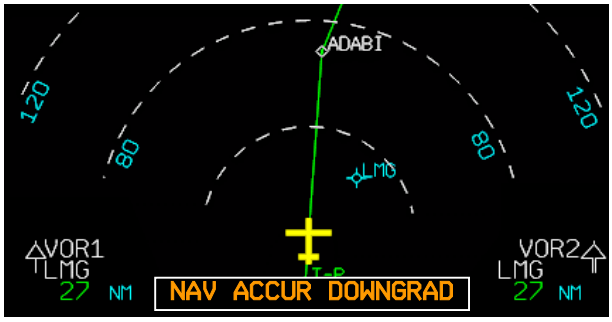
(See also Part I: ch. 3.3 Navigation/Flight Management.)
Its value is displayed at [6R] under ESTIMATED.
Current EPE is computed by the FMGC, based on navigation source data (*e.g. GPS, radio navaids, IRS)*.

☐ ACCURACY [6C]

This field shows the accuracy based on EPE and RNP:
- If EPE is below RNP, ACCURACY is HIGH,
- If EPE is above RNP, ACCURACY is LOW.

Accuracy switching HIGH to LOW triggers "NAV ACCUR DOWNGRAD" message (amber) on MCDU and on ND on the affected side. This message can be cleared on both MCDU and ND.
When accuracy becomes HIGH again "NAV ACCUR UPGRAD" message (white) on MCDU scratchpad and on ND is triggered.

See also PART II: Ch.7.4 – Approach.



Refer to Operator's SOPs when ACCUR is LOW for applicable procedures and limitations.

GPS A/C

If ACCUR becomes LOW, "GPS PRIMARY LOST" s-pad msg (amber) is displayed.
This situation should occur in exceptional cases or after a wrong MANUAL UPDATE.

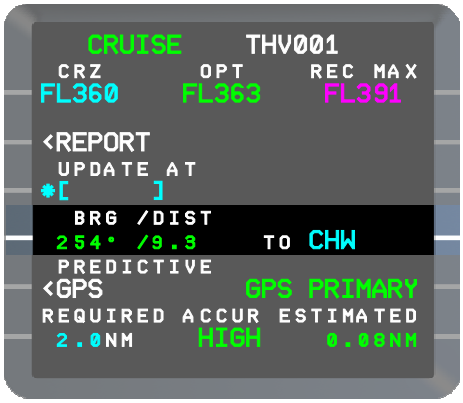
EPE is defaulted at 0.2 NM at IRS alignment.

☐ Navigation accuracy cross-check

Navigation accuracy should be periodically cross-checked with available radio-navaids.
This can be done by selecting VOR (ADF) needles on EFIS panel and:
- Checking overlay of navaid symbol (FMS data) by needles (raw data),
- Comparing distance from A/C to navaid symbol (FMS data) and DME shown at bottom on ND (raw data).

For a more accurate check, the navaid may be entered in BRG/DIST field on PROG page and values compared with raw data.
If DME is not available, bearing may be compare with two or more different navaids.

In the example below, cross-check is made by using VOR/DME CHW, which is auto-tuned by the system. Needles (raw data) are crossing precisely CHW (FMS navaid symbol); distance 9,3 NM is confirmed by the ND distance circle.



This method may be used for non auto-tuned navaids, which, in this case, must be forced manually in RADNAV page.

See also Part II: Ch.7.2 – Approach.

Note concerning BRG / DIST [Line 4] on PROG page

Any WPT, Navaid, ARPT ident, RWY ident, LAT/LONG, PLACE-BRG/PLACE-BRG or PLACE/BRG/DIST may be entered in [4R].
An entry into this field is only displayed on the onside MCDU.

Calculation is the great circle BRG/DIST from the present position to the entered WPT.
This calculation is updated every 2 seconds and is not deleted when a new MCDU page is accessed.

When a RWY is used, the distance and bearing are computed from the A/C position to the RWY threshold point.

If a LAT/LONG, PLACE-BRG/PLACE-BRG or PLACE/BRG/DIST is entered, [4R] field displays ENTRY.
Insertion of such entry does not impact the list of pilot defined WPTs.
If the entered ident is not found in NAVdb or in pilot defined file, the NEW WAYPOINT page is displayed.

If a pilot defined waypoint (WPT, NAVAID, ARPT or RWY) has been entered, and then deleted through DELETE ALL prompt on A/C STATUS page or on PILOT WAYPOINT page, the display reverts to brackets with BRG/DIST dashed.

■ PREDICTIVE GPS function

This function enables interrogation of the onside GPS receiver, to check availability of Receiver Autonomous Integrity Monitoring (RAIM):

- At DEST during the period between ETA ± 15 min,
- At any specified WPT and time, during a period of ± 15 min,
- If RAIM is predicted to be available, GPS may be used as a PRIMARY means of navigation for arrival at DEST, or at the specified WPT and time,
- PREDICTIVE GPS is accessed from PROG page.

PROG key ..... Press

PREDICTIVE GPS [5L] ... Press

PREDICTIVE GPS page is displayed.
DEST [1L] and associated ETA [1R] as defined in ACTIVE F-PLN.
[Line 2] shows predicted status at DEST at 5 min intervals during the applicable period: Y means "Yes" (primary available), N "No" (primary not available).

- If predicted status is required at a specific WPT:

Ex. EHAM.

WPT [3L].....Enter

Any WPT, NAVAID, RWY or Airport in NAVdb, or defined by pilot, may be inserted.

The entered WPT may be changed by overwriting, or cleared.

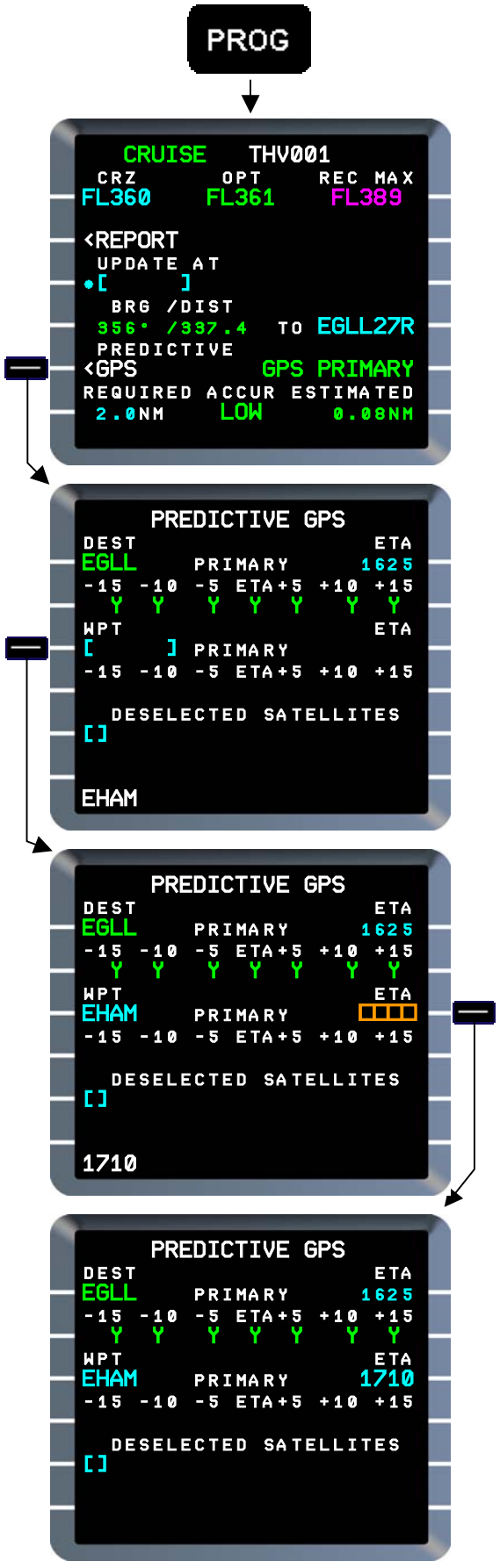
ETA field [3R] then shows amber boxes.

ETA for a WPT in existing ACTIVE F-PLN is not automatically entered, and must be inserted manually.

ETA [3R].....Enter

Ex: 1710.

Predicted GPS status is then computed and displayed.



☐ DESELECT SATELLITE function

GPS satellites may be deselected when reported as malfunctioning *(e.g. by NOTAM).*

SATELLITE ident..... Enter [5L]

Enter number of satellite to be deselected.

Ex:6.

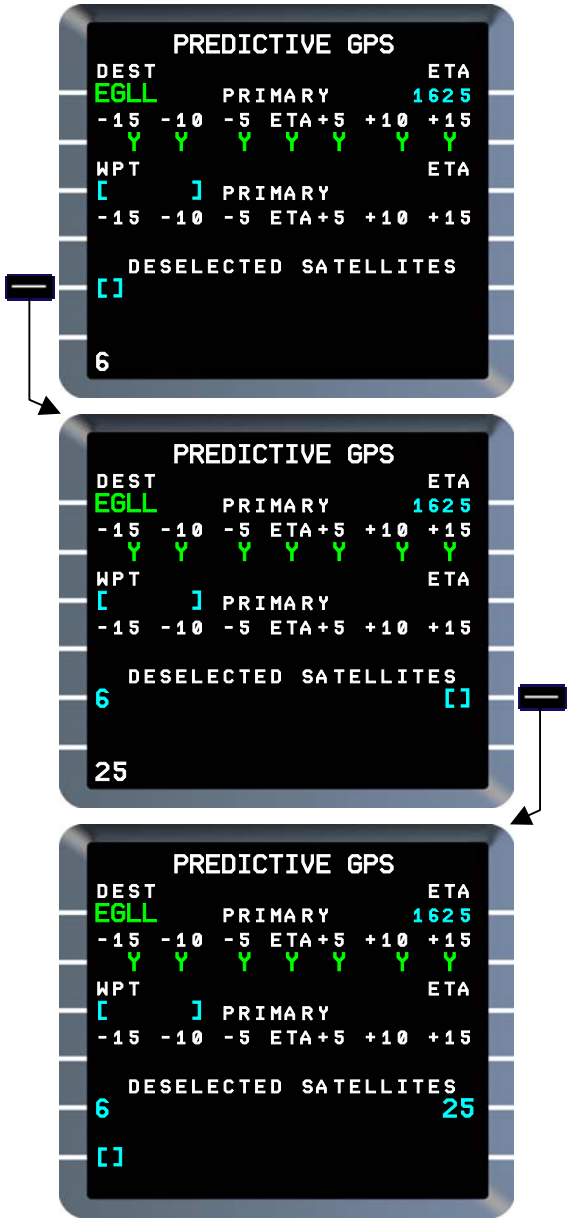
Brackets appear [5R] to enable another satellite to be deselected.

Up to 4 satellites may be deselected in this way.

A deselected satellite may be restored by using CLR function, or overwriting.

Deselected satellites are cleared when FMGC phase switches to DONE or when the second NAVdb is activated on A/C STATUS page.

To deselect all GPS inputs to position computation, use DESELECT GPS function See SELECTED NAVAIDS page in this chapter.



■ MANUAL POSITION UPDATE function

This function may be used on to update manually the FMGC position. It should be used in exceptional cases when GPS is not available or not installed. It is available on ground or in flight.

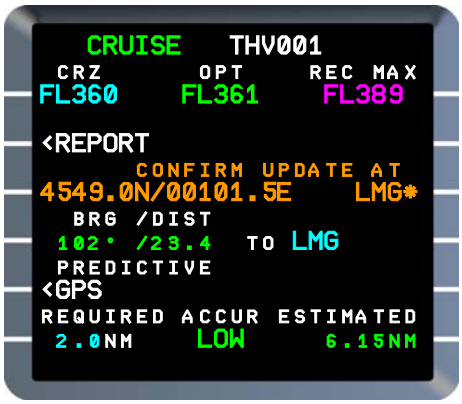
Caution:

Unless the update is performed precisely over an identified position, this procedure is likely to introduce a greater error than that which it is intended to correct.

Any NAVAID, WPT, RWY or AIRPORT which can be precisely overflown may be used to update position.

In the following example, a position error is detected: raw data shows LMG 036°/5.8 NM while map and BRG/DIST shows LMG 102°/23.4 NM.

An UPDATE position overhead LMG VOR will be performed.



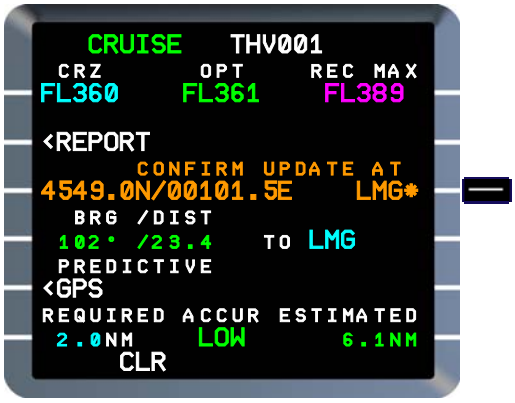
UPDATE AT [3L] .....Enter

Enter Navaid ident at which it is intended to perform the position update. LAT/LONG, PB/PB, PBD, WPT, RWY or AIRPORT ident may also be used to update position. *Ex: LMG*

- CONFIRM UPDATE AT is shown in [Line 3],
- Reference coordinates are shown at [3L],
  Cross-check with official document,
- IDENT is shown at [3R], or if defined by LAT/LONG, PB/PB, PBD, replaced by "ENTRY".

If entered ident is not in NAVdb or pilot-defined file, NEW WAYPOINT or NEW NAVAID page is displayed.

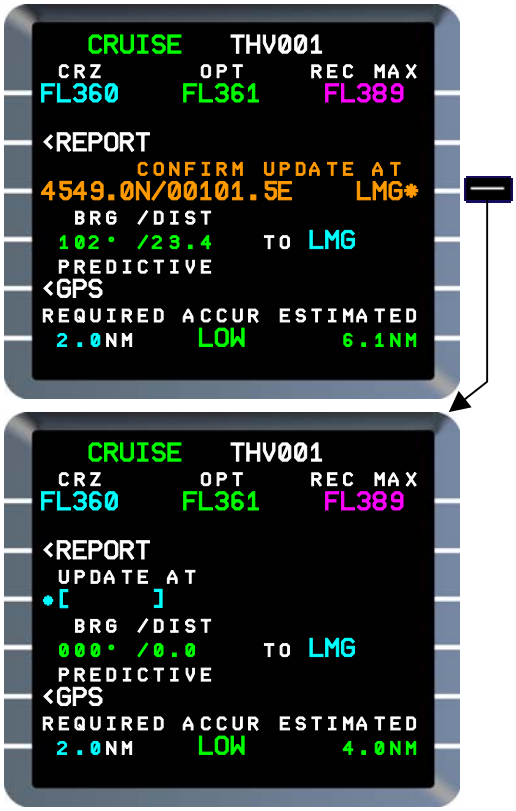
To cancel:
Use CLR function and press [3R], or select another MCDU page.
PROG page reverts to previous display.

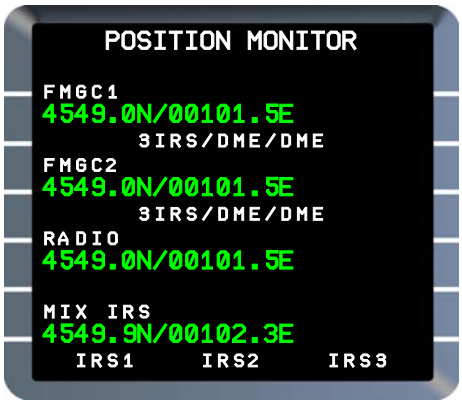


To update:
When overhead the reference point:

CONFIRM UPDATE [3R] .....
.....Press
FMGC position is then updated to LAT/LONG shown in [3L].
PROG page reverts to format prior to entry in UPDATE AT.

EPE is automatically set at 4.0 NM if update is performed in flight, at 0.2 NM if performed on ground.





■ POSITION DISCREPANCY

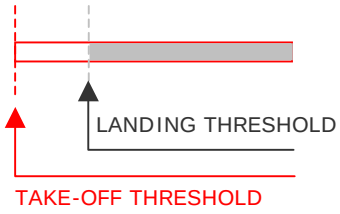
☐ FMS1/FMS2 POS DIFF
☐ CHECK IRS (1)(2)(3)/FM POSITION
Scratchpad messages (amber)
See Part IV: Degraded operations

☐ MAP-SHIFT

Map shift may occur in the following situation.

Non GPS A/C at take-off:
If the RWY used for take-off is different from the entered in ACTIVE F-PLN, updated position will be erroneous. After takeoff FMGC position will be updated based on radio position availability and will generate map-shift.

Coordinates reference for update at take-off are associated landing runway threshold coordinates. If a significant difference exists between the two values, an error is introduced at updating which is corrected gradually after take-off as FMGC position is updated.



Non GPS A/C in flight:
When navaid coverage is not sufficient, radio position is not available and FMGC position is no longer automatically updated.
FMGC position is then based on the mixed IRS position; FMGC accuracy depends on IRSs accuracy.
Once a radio position is regained FMGC position is progressively updated; pilot may observe on ND a gradual map-shift.

All A/C:
Map-shift may be due to erroneous navaid(s) data in the NAVdb.
This type of error may introduce:
- Wrong position of the navaid display on ND, and or,
- Incorrect radio position which, if used by FMGC, will generate incorrect FMGC position.

In this case:
- Cross-check and use **raw data** references,
- Identify erroneous navaid and check coordinates,

  Navaid data may be checked via DATA INDEX 2/2 as described in Ch 7.1.
- Deselect erroneous navaid via SELECTED NAVAIDS page as described above.

The example below shows contradictory information about VOR/DME XYZ. A/C flies in NAV mode to XYZ showing BRG 323°/6.8NM while raw data (needles and bottom ND) show BRG 029°/16NM.

In any case MANUAL UPDATE should be considered **carefully** and only if certainty of position used for updating.

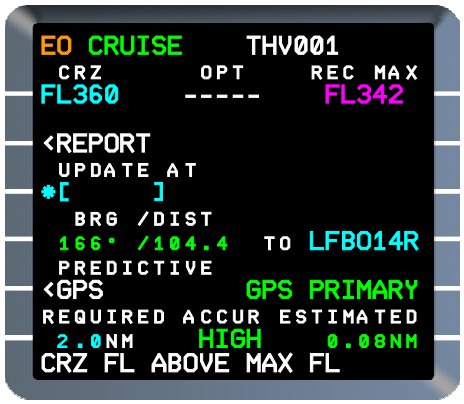
In approach FMGC position is updated by LOC (or MLS) when existing.

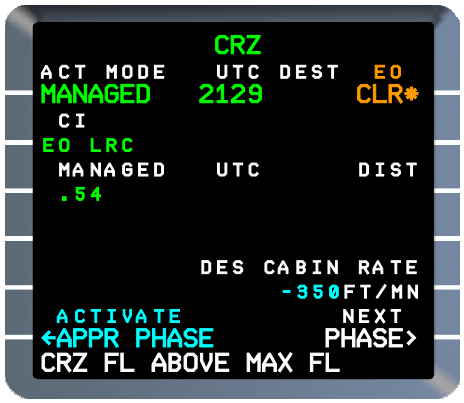
Part III: Chapter 8 – ENGINE-OUT

Contents

PAGE INTENTIONALLY LEFT BLANK

8.1. GENERAL DESCRIPTION





EO (Engine-Out) mode is activated by the master FMGC when an Engine-out condition is detected.
As soon as the EO mode is activated:

- EO (amber) appears top left of the PROG page,
- EO CLR prompt appears on the PERF page.

The EO mode remains active until:

- Engine recovery is detected,
- EO CLR prompt on the PERF page is pressed.

EO mode is deactivated if:

- **Engine recovery is detected,**
  when the following conditions are met:
  - Both FADEC are sending valid data, and,
  - Engine Master Switch ON, and,
  - N2 > IDLE on both engines, and,
  - Both thrust levers have an angle greater than 5°.

  or
- **FMGS is in DONE or PREFLIGHT phase**
  or
- **EO CLR prompt is pressed.**

Caution

Pressing EO CLR prompt deactivates EO mode. EO mode cannot be restored. It will reactivate only if an engine failure is detected again after engine recovery.

Vertical managed modes are not available in EO mode.

8.2. PREFLIGHT / EOSID

An engine-out SID (EOSID) for a given RWY is available, if defined in the NAV data base.

When available EOSID is identified in DEPARTURES page B: EOSID field (line 6 / center). If not available this field is NONE.

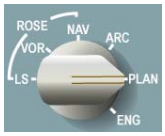
EOSID is selected automatically with the normal SID.
It can be viewed on ND in PLAN mode only after TMPY F-PLN insertion (continuous yellow line).

EOSID overlays the normal SID selected in ACTIVE F-PLN until a **diversion point**, which may or may not be a fixed waypoint.

No change in EOSID can be made during preflight phase. It can only be modified if EO mode is activated after take-off before reaching the EOSID diversion point.

In the example below, pictures show ND in PLAN mode during the preflight preparation at LFBO.

Normal SID (continuous green line)		**EOSID (continuous yellow line)**
14R 1000		14R 1000
TOU8	DIVERSION POINT	TOU8
4000 INTCPT TOU		TOE TN1



No EOSID exists for the SEC F-PLN. However, if the SEC F-PLN is activated and a departure runway with an associated EOSID is selected for this flight plan, it is automatically selected, overwriting any previous EOSID.

8.3. TAKE-OFF

During TAKE OFF, FMGS switches to EO mode as soon as engine-out is detected.

- **If engine failure occurs before the EOSID diversion point:**
  In the example diversion point is TOU8.

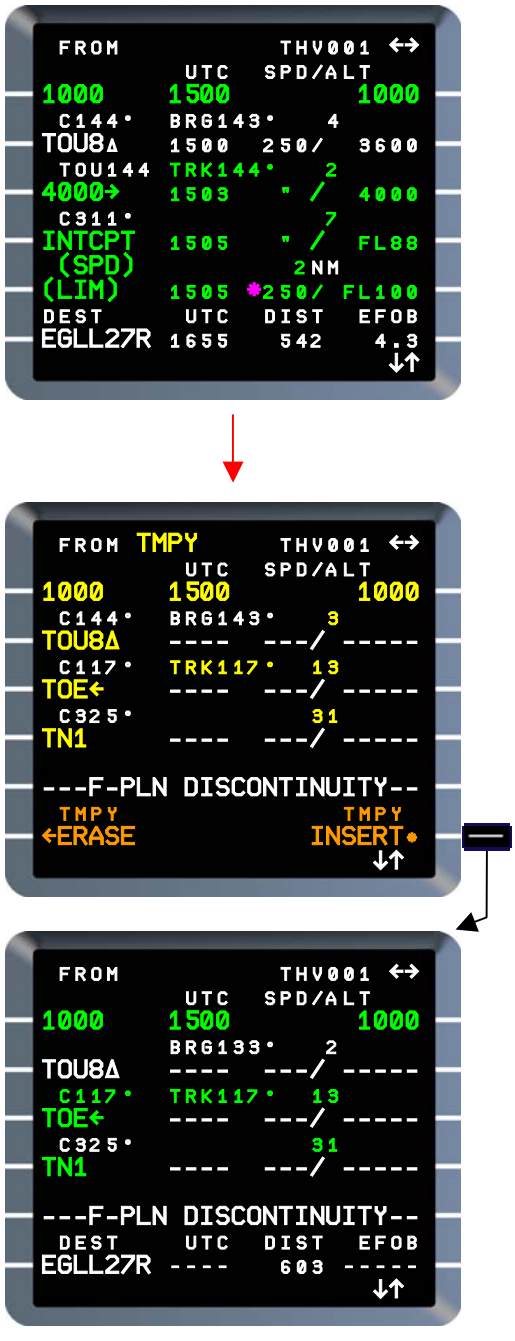
A TMPY F-PLN is automatically created and MCDUs display switches automatically to TMPY F-PLN page.
TMPY F-PLN is displayed on NDs with a dashed yellow line.

The TMPY F-PLN starts at EOSID diversion point. Any part of the EOSID before the EOSID diversion point is ignored. A discontinuity is strung between the last waypoint of the EOSID and the remaining ACTIVE F-PLN.

The pilot may:
– Choose to fly the EOSID by selecting the INSERT prompt, or,
– Modify TMPY F-PLN before activation, or,
– Disregard by selecting the ERASE prompt.

Inserting or erasing the TMPY F-PLN has no effect on the EO mode, which remains active.
TMPY F-PLN is automatically erased in case of EO recovery or EO CLR.

Predictions (Speed, altitude, fuel) are no longer computed, and are replaced by dashes on F-PLN and FUEL PRED pages.



Caution

The EOSID diversion point is often located close to the departure runway. Thus it is recommended to insert the TMPY F-PLN immediately if the pilot intends to fly the EOSID. Additional modifications to the ACTIVE F-PLN can be made subsequently.

Pictures below show the ND display when engine failure occurs.

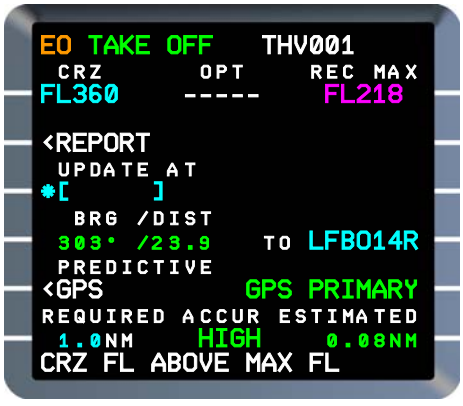
Before ENG failure

After ENG failure

- **If engine failure occurs after the EO SID diversion point:**
  - Both MCDUs switch automatically to the PERF page,
  - No temporary flight plan is created but EOSID track is displayed on ND (NAV, ARC or PLAN mode) with a continuous yellow line.

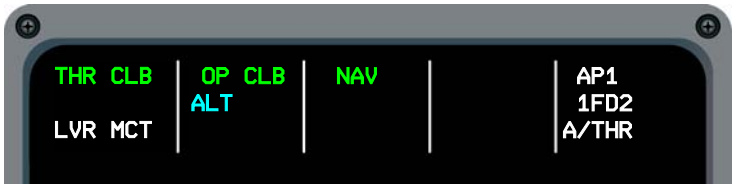
PERF page
- EO CLR* [1R] is displayed,
- ENG OUT ACC altitude [5R] is displayed.

PROG page
- Title page becomes EO TAKE OFF,
- OPT FL is dashed,
- REC MAX becomes one engine REC MAX altitude.



Proceed according to SOPs for Acceleration / Flap retraction & Thrust reduction.

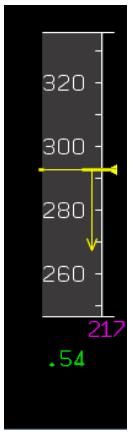
8.4. CLIMB



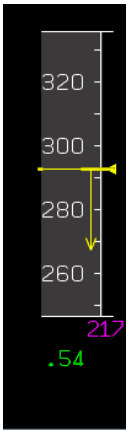
If an engine failure occurs when FMGS is in CLIMB phase, EO mode is activated and:

- LVR MCT flashes on FMA,
- Both MCDUs switch automatically to the PERF CLB page,
- Vertical mode reverts to OP CLB if engaged in managed mode.

- **If the aircraft is in climb above ACC ALT:**
  Target speed becomes GREEN DOT.



- **If the aircraft has leveled-off at an intermediate cruise altitude with the FMGS still in CLB phase:**
  Target speed becomes EO LRC MACH/SPEED.

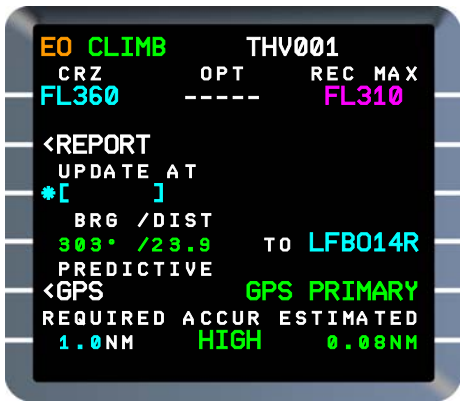


PERF page

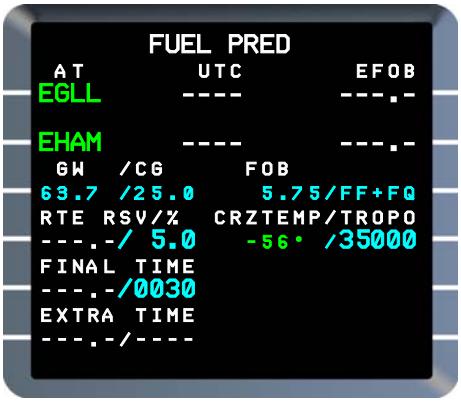
- EO CLR *[1R] is displayed,
- MANAGED speed is displayed,
- CI is defaulted to EO LRC.

PROG page

EO REC MAX altitude is displayed.



Predictions are no longer computed and replaced by dashes on F-PLN and FUEL PRED pages.

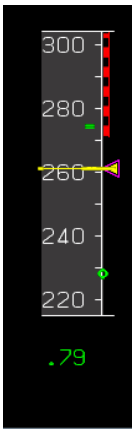


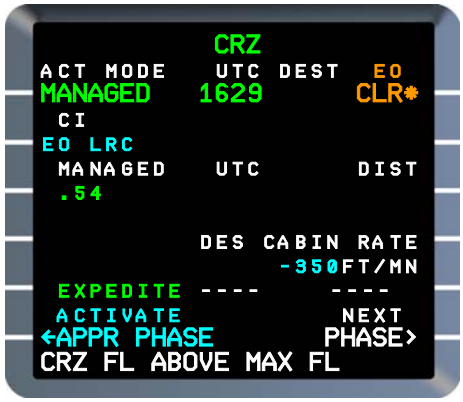
Proceed according to OPS procedures for EO procedure during climb.

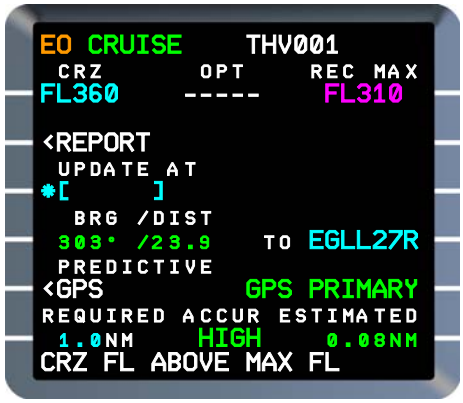
8.5. CRUISE

If an engine failure occurs when FMGS is in CRUISE phase, EO mode is activated and:

- LVR MCT flashes on FMA,
- Both MCDUs switch automatically to the PERF CRZ page,
- Target speed becomes EO LRC MACH/SPEED or the instantaneous mach/speed,
- If actual CRZ ALT is above the EO REC MAX ALT, CRZ FL ABOVE MAX FL scratchpad message (white) is displayed.







Proceed according to OPS procedures for Standard or Obstacle strategy.

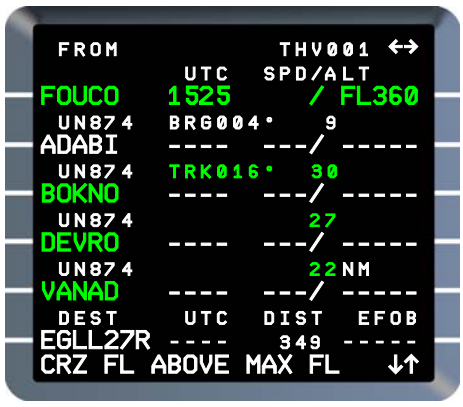
PERF page

- EO CLR *[1R] is displayed,
- EO MANAGED speed [3L] is displayed,
- CI [1L] is defaulted to EO LRC.

PROG page

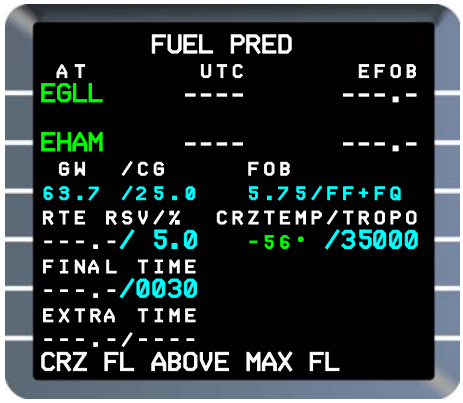
EO REC MAX [1R] altitude is displayed.

Predictions are no longer computed and replaced by dashes.

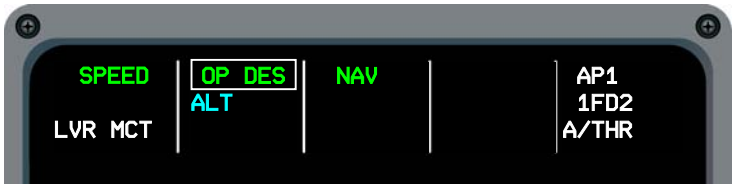


If an engine failure occurs at any phase of the flight:

- Any preplanned step inserted in the ACTIVE F-PLN is deleted,
- "STEP DELETED" s-pad msg (white) is displayed.
  No new step may be inserted in the ACTIVE F-PLN.



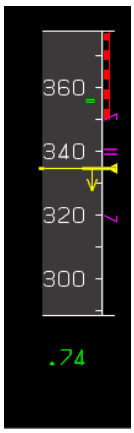
8.6. DESCENT / APPROACH

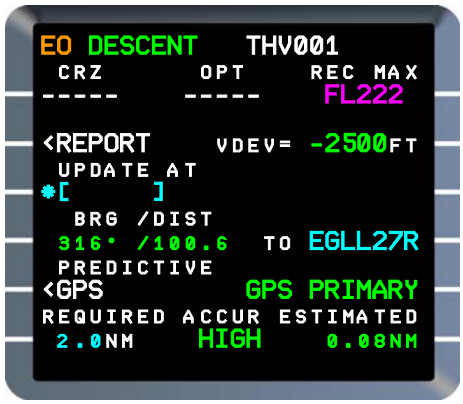


If an engine failure occurs when FMGS is in DESCENT or APPROACH phase, the EO mode is activated and:

- LVR MCT flashes on FMA,
- Both MCDUs switch to the PERF DES page automatically,
- Target speed: MANAGED speed is retained as target speed (ECON DES MACH/SPD),
- DES mode, if selected, reverts to OP DES.

Proceed according to OPS procedures for Standard or Obstacle strategy.





PERF page

- EO CLR *[1R] is available,
- EO MANAGED speed [3L] is displayed,
- CI [2L] is defaulted to EO LRC.

PROG page

EO REC MAX [1R] altitude is displayed.

Predictions are still computed for the ACTIVE F-PLN but not for the ALTN F-PLN. Speed, altitude, fuel and wind predictions for the ALTN F-PLN are replaced by dashes on the F-PLN page.

For NPA:
no reversion of FINAL APP mode if previously engaged.

8.7. GO-AROUND

If an engine failure occurs when FMGS is in GO AROUND phase, the EO mode is activated MCDUs switch to the PERF GO AROUND page automatically.
Proceed according to OPS procedures for Standard or Obstacle strategy.

Contrary to EO take-off, no specific EO Go-Around procedure is provided in NAV data base. ND displays the normal Go-Around procedure, if F-PLN is correctly sequenced.

PERF page
- EO CLR* [1R] is displayed,
- ENG OUT ACC [5R] altitude is displayed.

Part III: Chapter 9 – DATA LINK

Content

9.1. GENERAL DESCRIPTION

FMS Data Link function is optional (activated through OPC and AMI data bases).
The AOC functions (Airline Operational Control) provide:
- Uplink messages - reception of data or requests from ground station to A/C.
- Downlink messages - transmission of reports or requests from A/C to ground station.

The uplink messages are sent either in response to a pilot request, or initiated by ground station.

The different AOC functions are:
- **F-PLN INIT**, enabling provision of flight plan and associated performance data.
- **TO DATA**, enabling provision of take-off performance up to 4 runways.

WIND data, enabling uplink of climb, cruise, descent and alternate winds.
FLIGHT reports, may be downlinked manually or/and automatically, providing **Position**, **Flight progress** or **Performance** data.
AOC MINI ACARS option provides Broadcast data for periodic transmission of flight reports.

Data transmission is by A/C ACARS/ATSU system.
AOC functions are available only if A/C Data Link communication is installed and operative. This is confirmed to pilot when (✱) symbol adjacent to the AOC prompts is displayed.
(Refer to OPS Manual for configuration of communication system).

Interface

AOC functions are actioned via dedicated MCDU pages and prompts:
- INIT REQUEST, on INIT A and SEC F-PLN INIT A pages,
- WIND REQUEST, on WIND pages,
- UPLINK TO DATA, on PERF TAKE OFF page,
- REQ/SEND, on DATA / AOC FUNCTION pages,
- SEND, on PROG / REPORT page.

Scratchpad messages advise pilot of UPLINK process and status.
All the uplink data messages may be automatically **printed** based on the customer programming of the AMI file.

The table below summarizes the different UPLINK functions:

Request prompt	Type of data	Conditions	Scratchpad messages
INIT REQUEST	Active route	Before engine start, if no active flight plan exists	AOC ACT F-PLN UPLINK
	Secondary route	At any time	AOC SEC F-PLN UPLINK
	Performance data related to the route	Before takeoff, if active flight plan exists	PERF DATA UPLINK
UPLINK TO DATA	Take off runway data	In PREFLIGHT or DONE phase	TAKE OFF DATA UPLINK
WIND REQUEST	Climb winds	Before CLB phase becomes active	WIND DATA UPLINK
	Cruise winds	Before the last waypoint of CRZ phase sequences, or when DES or APPR phase becomes active	
	Descent winds		
	Alternate wind	If ALTN exists	

9.2. FLIGHT PLAN INITIALIZATION

The Flight Plan Initialization function enables REQUEST for, and UPLINK of flight plan data and general performance data from Operator's ground station.

Pilot may send an INIT REQUEST to ground station:
– Without specified Flight Ident or,
– With specified Company Route and/or a Flight Number (provided this option is enabled in the AMI database).

In response to the request, ground station may send a first message to A/C containing flight plan data and a second message containing associated performance data.

Ground station may uplink these data without pilot request.

The **Flight Plan message** may contain the following data:
– Lateral / Vertical flight plan
– Flight number
– Company route

The **Performance message** may contain the following data:
- Cruise altitude
- Cruise temperature
- Tropopause altitude
- Climb transition altitude
- Cost index
- Perf factor
- Idle factor
- ZFW CG
- ZFW
- Block fuel
- Taxi fuel
- Reserve fuel

■ FLIGHT PLAN INIT REQUEST

☐ INIT REQUEST from INIT A page

The flight plan initialization request may be made by pressing INIT REQUEST prompt on INIT A page **before engine start, provided no ACTIVE or TMPY F-PLN exists**.

INIT key.....Press

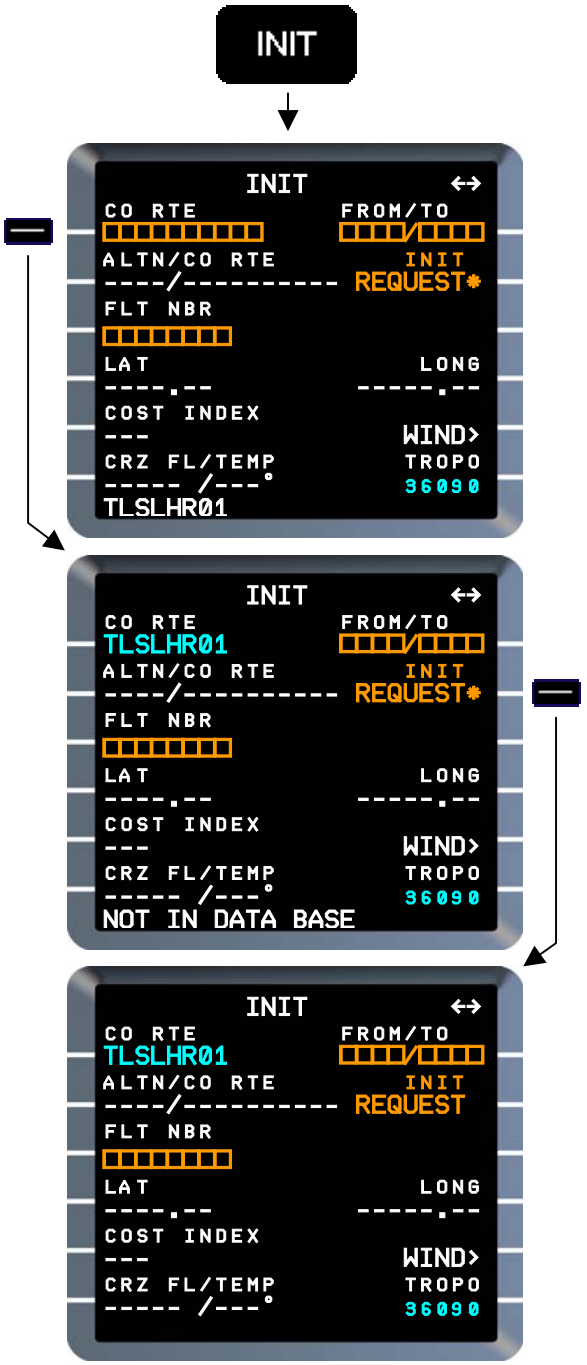
INIT REQUEST may be initiated with CO RTE or FROM/TO or FLT NBR fields filled.

- **INIT REQUEST initiated by CO RTE:**

  CO RTE [1L] .....Enter

  If CO RTE exists in NAVdb, MCDU displays the ROUTE SELECTION page(s) and the INIT REQUEST prompt is removed from the INIT A page.

  INIT REQUEST [2R].....Press
  Amber (✱) symbol disappears during Data Link transmission of the request.

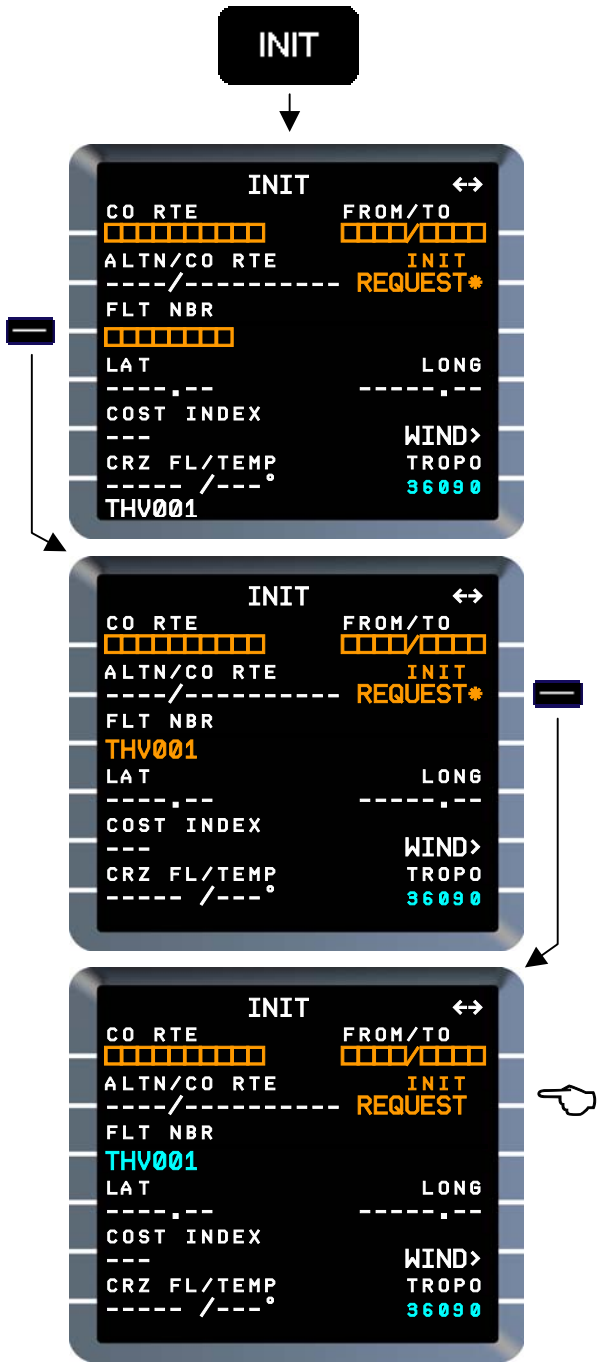


- **INIT REQUEST initiated by FLT NBR:**

FLT NBR [3L].....Enter

INIT REQUEST [2R]..... Press

Amber (✱) symbol disappears during Data Link transmission of the request.



Note: INIT REQUEST prompt [2R]
When pressed, flight plan initialization and performance REQUEST are sent to ground station.
The amber (✱) symbol disappears from INIT A page (and other DATALINK FUNCTION pages) until the request is terminated. When (✱) symbol re-appears, another INIT REQUEST can be sent.

☐ INIT REQUEST from SEC INIT page

The flight plan initialization may also be made through SEC INIT page, by pressing INIT REQUEST prompt at any time whether or not an ACTIVE or a TMPY F-PLN exists.

SEC F-PLN key.....Press

- **If INIT [1R] is not displayed:**
  This indicates that SEC F-PLN has been created by COPY ACTIVE. To use INIT REQUEST function, the existing SEC F-PLN must be deleted.

  DELETE SEC [3L] .....Press
  INIT prompt is then displayed in [1R] field.

INIT [1R].....Press

Init REQUEST may be initiated:

- **With CO RTE or FLT NBR**
  In this case,

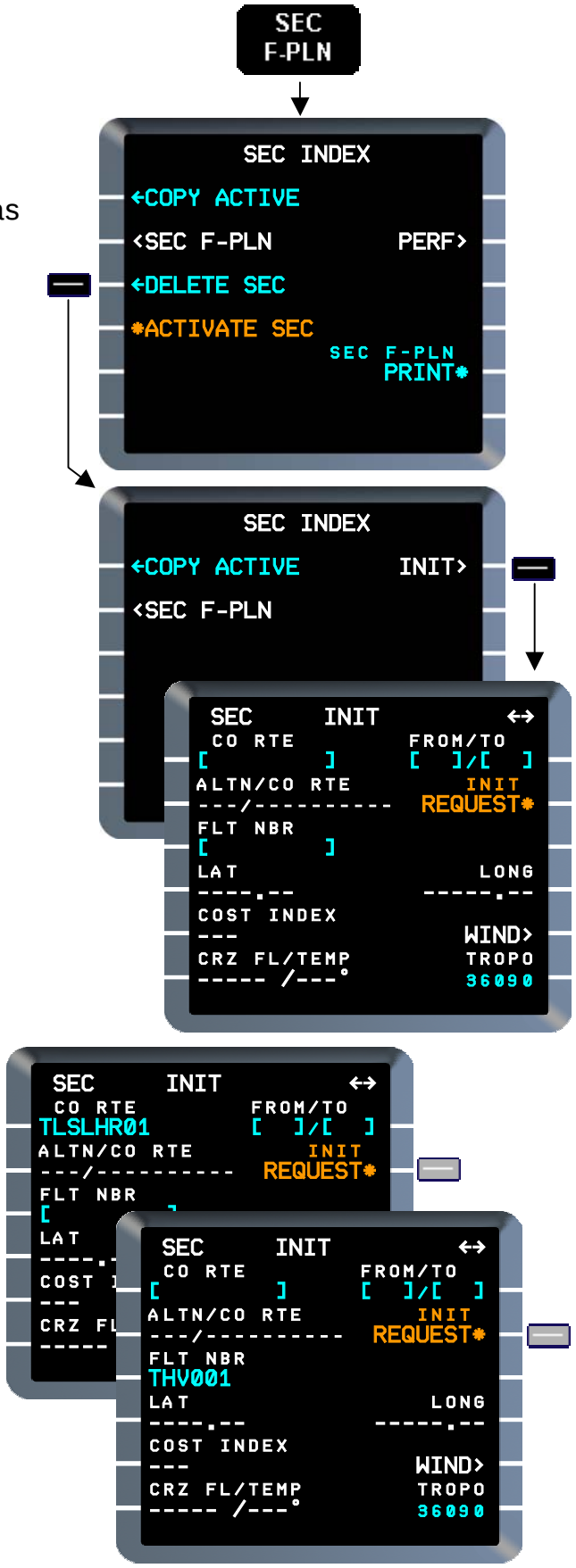
  [1L] or [2L] field .... Complete
  Complete as desired.

  INIT REQUEST [2R].....Press

- **Directly by pressing INIT REQUEST prompt.**

  INIT REQUEST [2R].....Press

Flight plan initialization and performance REQUEST are sent to ground station.
Amber (✱) symbol disappears during Data Link transmission of the request.



☐ INIT REQUEST from AOC FUNCTION page

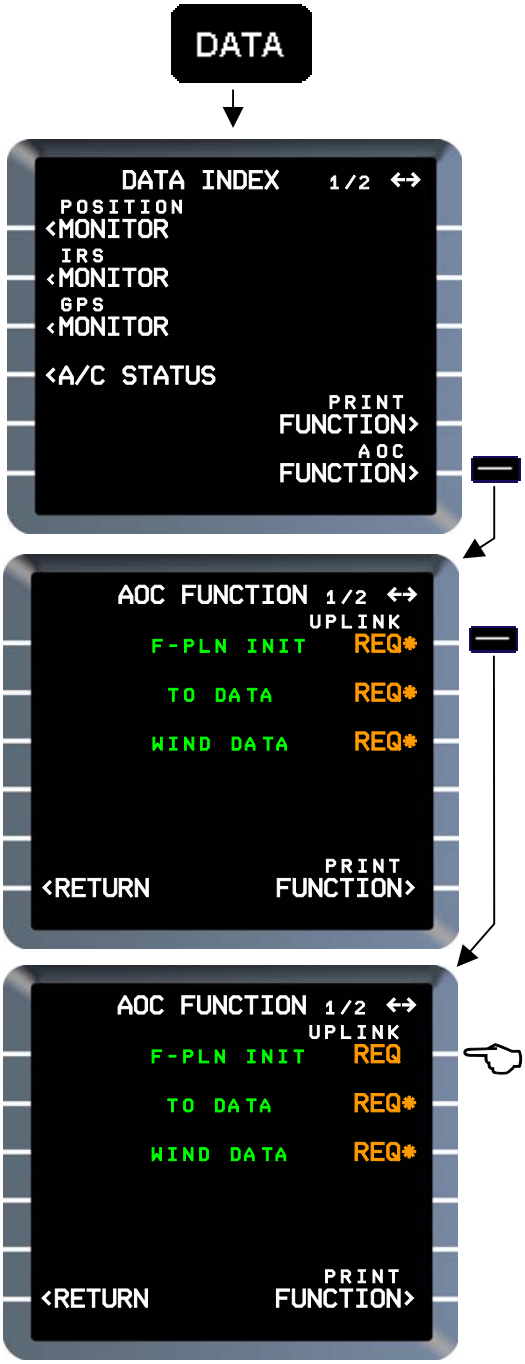
The flight plan initialization is available at any time via F-PLN INIT REQ prompt on AOC FUNCTION 1/2 pages.

DATA key..... Press

AOC FUNCTION [6R] ..... Press

F-PLN INIT REQ [1R]..... Press

Pressing the prompt sends a flight plan initialization and performance REQUEST to the ground station.
Amber (✱) symbol disappears during Data Link transmission of the request.



■ F-PLN DATA and PERF DATA UPLINK messages

Following an INIT REQUEST ground station may uplink two types of messages: F-PLN DATA and PERF DATA.
The pilot INIT REQUEST is general and does not specify F-PLN DATA or PERF DATA REQUEST. Depending on ground station capability the uplinked response contains F-PLN DATA and/or PERF DATA.

Ground station can send messages to A/C without pilot REQUEST.
Data are uplinked to ACTIVE F-PLN or SEC F-PLN depending on status specified in the message.

☐ Before Engine Start

Screens shown are examples

F-PLN DATA are uplinked and inserted automatically:
- In ACTIVE F-PLN or SEC F-PLN depending on status specified in the message.
- In SEC F-PLN if an ACTIVE F-PLN already exists.

AOC ACT F-PLN UPLINK or AOC SEC F-PLN UPLINK scratchpad messages (white) advise pilot that data have been uplinked and inserted in ACTIVE F-PLN or SEC F-PLN.

PERF DATA are uplinked and inserted automatically:
- In ACTIVE F-PLN if already exists,
- In SEC F-PLN if no ACTIVE F-PLN exists.

PERF DATA UPLINK scratchpad message (white) advises pilot that data have been uplinked and inserted).

This message is rejected without any scratchpad message if no ACTIVE or SEC F-PLN exists.

☐ After Engine Start

All **F-PLN DATA** messages are uplinked and buffered for manual insertion in SEC F-PLN only.
No additional F-PLN DATA message can be uplinked until the pilot has inserted or deleted the data uplinked in the first time.

Any **PERF DATA** message received after engine start is automatically rejected, without any scratchpad message.

The pilot can then insert the uplinked data either from the SEC INDEX page or from the SEC INIT A page.
Data cannot be viewed before being inserted.

■ F-PLN DATA insertion

Only AOC SEC F-PLN UPLINK requests a manual insertion.
This can be made via SEC INDEX or SEC INIT A pages.

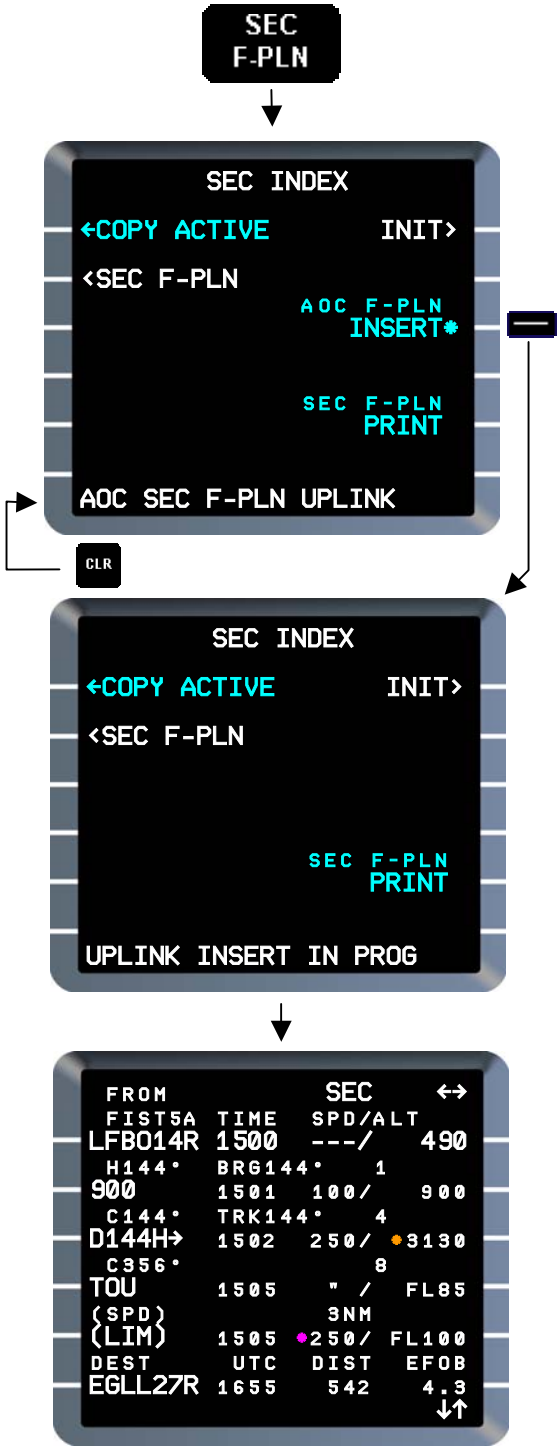
☐ Data insertion from the SEC INDEX page

SEC F-PLN key ..... Press

AOC F-PLN INSERT [3R] .....

..... Press

The uplinked F-PLN is inserted in SEC F-PLN.
During data insertion UPLINK INSERT IN PROG scratchpad message (white) is displayed; AOC F-PLN INSERT prompt disappears.



☐ Data insertion via the SEC INIT A page

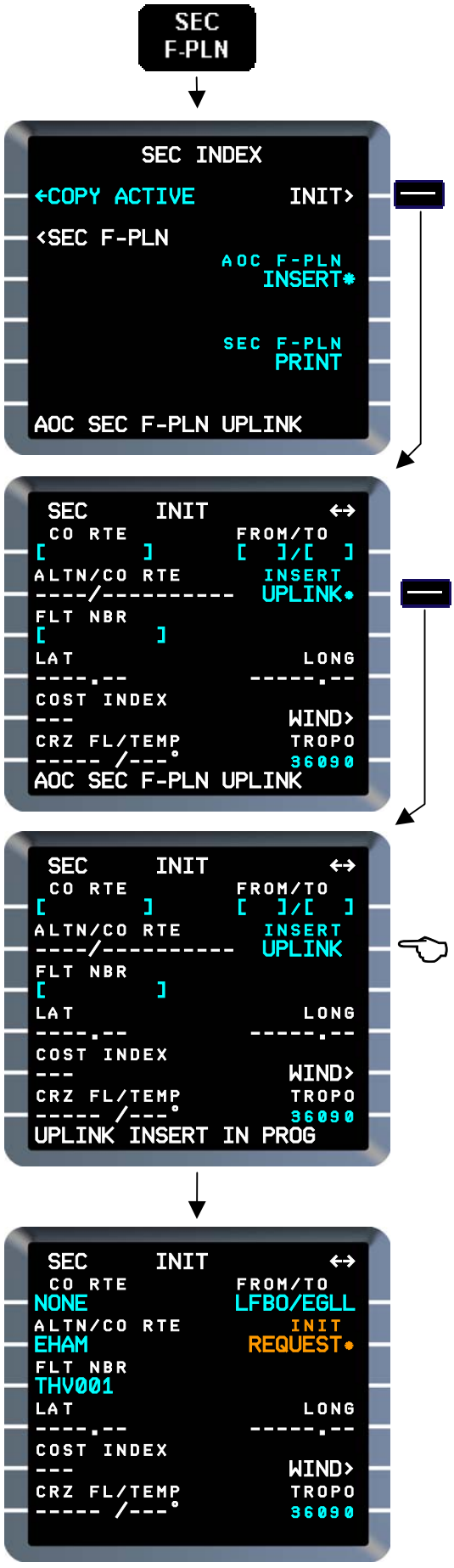
SEC F-PLN key.....Press

INIT [1R].....Press
The INIT prompt is not displayed if a SEC F-PLN already exists. In that case, insert the uplinked F-PLN data by pressing on the AOC F-PLN INSERT prompt on the SEC INDEX page.

INSERT UPLINK [2R].....Press
The uplinked F-PLN is inserted in SEC F-PLN.

During data insertion UPLINK INSERT IN PROG scratchpad message (white) is displayed; blue (✱) symbol beside INSERT UPLINK disappears.

Then amber (✱) symbol reappears; another INIT REQUEST can be made.



■ F-PLN UPLINK deletion

If the pilot wants to delete the uplinked F-PLN data:

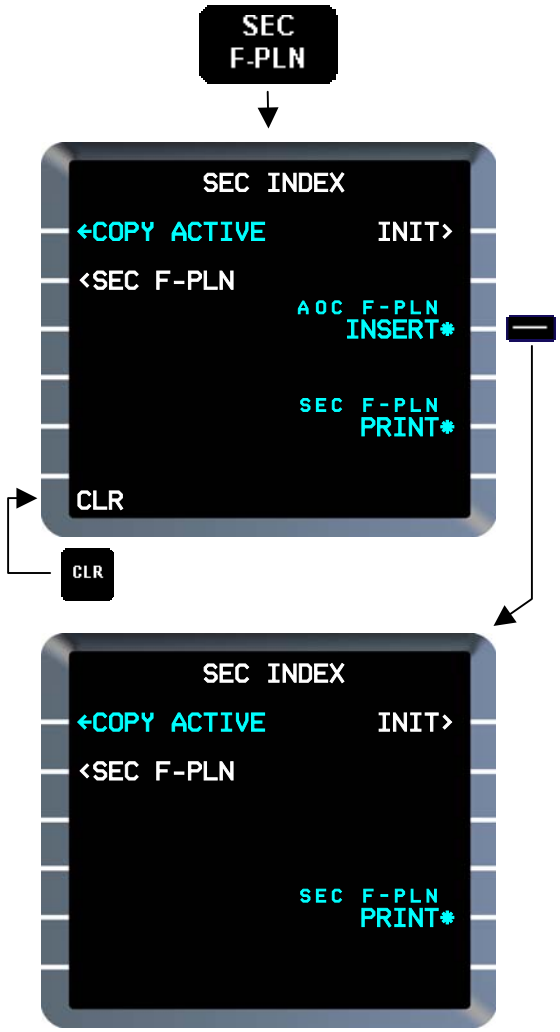
☐ Delete uplinked data via the SEC INDEX page

SEC F-PLN key ..... Press

AOC F-PLN INSERT [3R] .....

..... Clear

The uplinked F-PLN data are deleted and the AOC F-PLN INSERT prompt disappears from both the SEC INDEX and the SEC INIT pages.



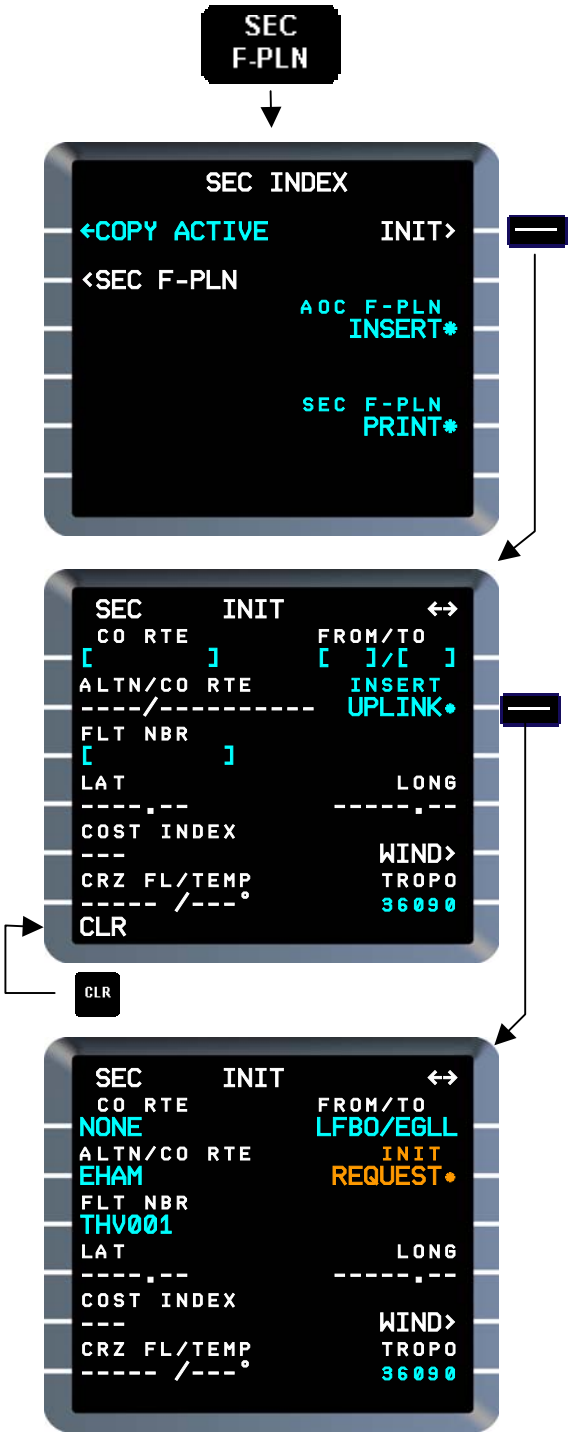
☐ Delete uplinked data via the SEC INIT A page

SEC F-PLN key .....Press

INIT [1R] .....Press

CLR key .....Press

INSERT UPLINK [2R].....Press
The uplinked F-PLN data are deleted and the AOC F-PLN INSERT prompt disappears from both the SEC INDEX and the SEC INIT pages.



■ F-PLN UPLINK scratchpad messages

During F-PLN UPLINK some scratchpad messages are displayed or stacked to indicate stage of processing.
These messages are listed below and are described in APPENDICES.

☐ Normal messages

AOC ACT F-PLN UPLINK or AOC SEC F-PLN UPLINK
Displayed when the complete flight plan uplink is processed without any error, or with minor errors, which do not cause rejection of message.

PERF DATA UPLINK
Displayed if a PERF uplink message contains complete or partial valid data.

UPLINK INSERT IN PROG
Displayed during insertion processing of a flight plan initialization uplink message (which may last several minutes).

☐ Additional messages

FLT NBR UPLINK
Displayed if a valid flight number is received while no previous flight number was downlinked; the flight number is stored for MCDU display.

F-PLN DATALINK IN PROG
When a Flight Plan Initialization request is made, any flight plan elements or weight data may be modified during the datalink period, which is completed within 4 minutes (after that, time-out occurs). However, these modifications lead to the display of the F-PLN DATALINK IN PROG scratchpad message.

Check messages

CHECK CO RTE
If a CO RTE number (active or secondary) has been sent in a flight plan downlink request message, an associated random flight plan is expected in the subsequent uplink message.
If the uplink and downlink CO RTE number are different, the valid uplinked flight plan is processed, and the CHECK CO RTE scratchpad message is triggered. The message is not displayed if the uplink message is rejected.

CHECK FLT NBR
Displayed if a valid flight number is received and different from the flight number previously sent in downlink message. The uplinked flight number is stored and displayed on the INIT A page (or SEC INIT A page if it is associated to the SEC F-PLN).

☐ Error messages

INVALID F-PLN UPLINK
Displayed if errors occurred during the decoding process, causing the rejection of the F-PLN uplinked message.

INVALID PERF UPLINK
Displayed if a PERF uplink message is rejected due to validity checking.

INVALID FLT NBR UPLINK
Displayed if an invalid flight number is received.

LIST OF 20 IN USE
During a flight plan data uplink, WPTs not in NAV Database (Lat/Long, PBD, PB/PB waypoints) become automatically part of the stored waypoints file if there is enough space available.

If there is not enough space, unused waypoints are deleted in order to store the uplinked waypoints.

If there is enough space, the waypoints are deleted from the uplinked flight plan and are replaced by discontinuities and LIST OF 20 IN USE scratchpad message (white) is displayed.

This message is only displayed once at first deletion.

NO ANSWER TO REQUEST
Displayed if no response to downlink within 4 minutes of transmission. A time-out condition occurs and NO ANSWER TO REQUEST scratchpad message (white) is displayed.
If an uplink message is received after a 4 minute timeout occurs on the downlink request, it is processed as an answer to the request and not as an unsolicited message.

9.3. TAKE OFF DATA

The UPLINK TO DATA function enables request for up to 2 runways and uplinked data for up to 4 runways of the departure airport defined in the ACTIVE F-PLN.

■ TO DATA REQUEST

Pilot may send a TO DATA REQUEST for up to 2 runways of the departure airport defined in ACTIVE flight plan.
UPLINK TO DATA function is available in PREFLIGHT or DONE phase with a departure airport defined in ACTIVE flight plan.
Only one TO DATA REQUEST may be pending at the same time.
It may be initiated via UPLINK TO DATA prompt on PERF TAKE OFF page or TO DATA REQ prompt on AOC FUNCTION page.

☐ TO DATA REQUEST via PERF TAKE OFF page

Screens shown are examples

PERF key ..... Press

UPLINK TO DATA [6L] ... Press
UPLINK TO DATA REQ page 1/2 is displayed. If runway is not defined in field [1R], all data fields are dashed.
Two pages of UPLINK TO DATA REQ are available, enabling two sets of TO PERF to be requested.

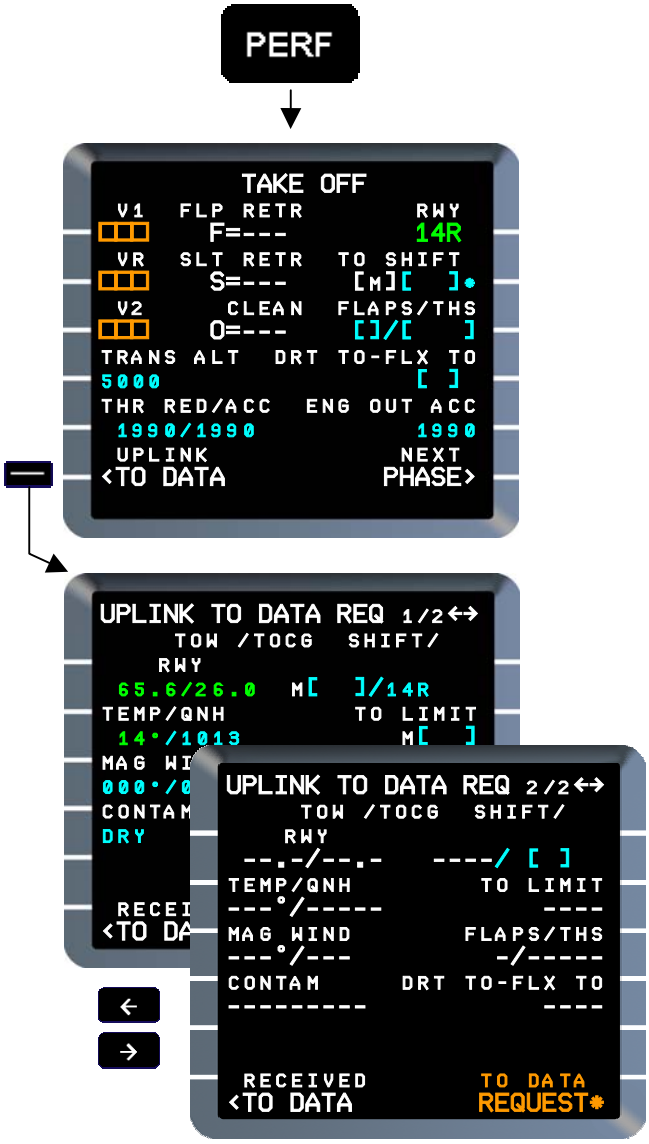
Depending of Operator's procedure, request may be sent without entering all fields.

When data are completed

TO DATA REQUEST [6R] Press
UPLINK TO DATA REQ page is displayed as long as the FMGS has not switched to the TAKE OFF phase. If the page is displayed when a transition to TAKE OFF phase occurs, the MCDU display reverts to the PERF TAKE OFF page.

Fields are described below and may be entered as appropriate

.



Screens shown are examples

[1R] SHIFT / RWY

If no departure airport is defined in ACTIVE flight plan, white dashes are displayed.
If a departure airport exists but no departure runway is defined, brackets are displayed.
If a departure runway is defined, page 1 is automatically filled with the runway identifier and SHIFT field is defaulted to the TO SHIFT value of the TAKE OFF page, if it exists. If not, the SHIFT field reverts to blue brackets.
Pilot may overwrite these default values to add a runway intersection, enter a new runway or enter a position shift.

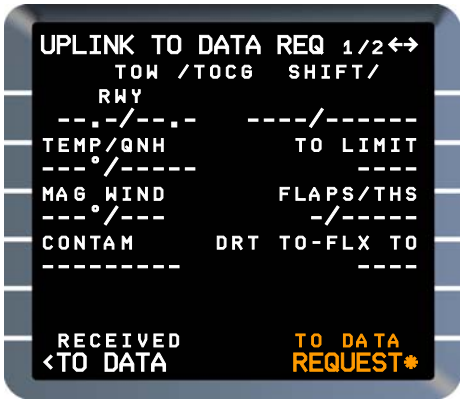
The runway ident must be filled with NNDAAA format where:
NN are two digits,

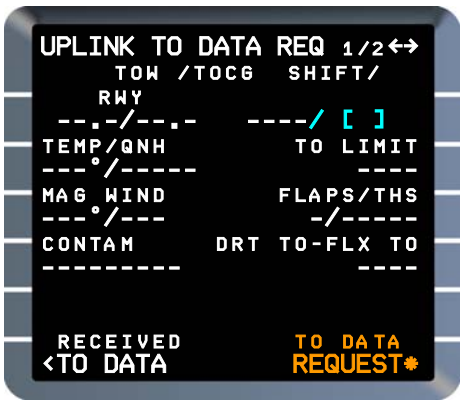
- *D is a blank or an L, R or C,*
- *AAA are blank or up to 3 alphanumeric characters, which may be used to designate displaced threshold or intersection for take-off.*

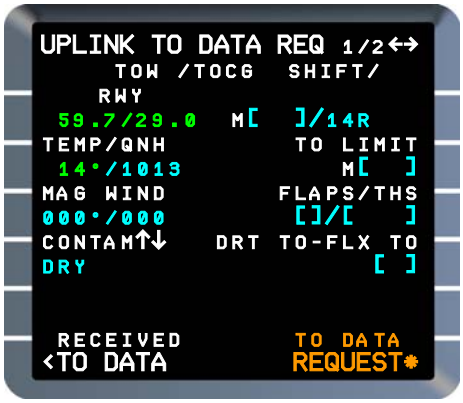
A runway entered by the pilot has priority over the departure runway in ACTIVE F-PLN, and is not affected by a next change in the ACTIVE F-PLN.

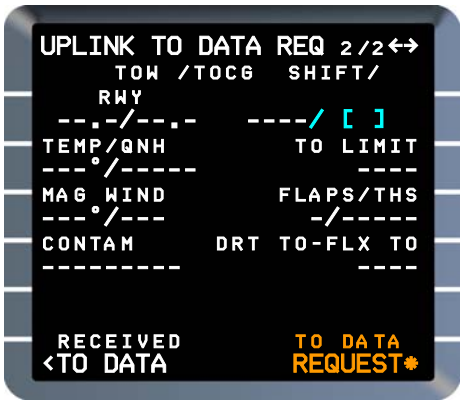
However, if the pilot-entered runway is cleared, the current departure runway will again be displayed by default.

TO LIMIT field reverts to brackets if it becomes inconsistent following a SHIFT entry (and vice versa).



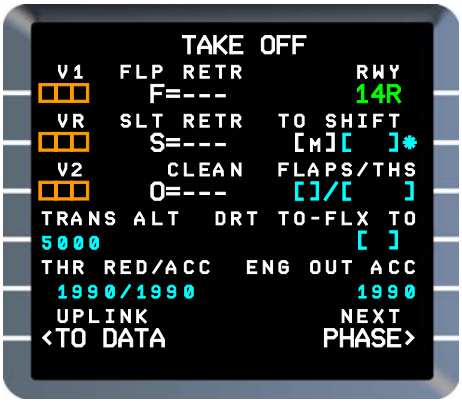


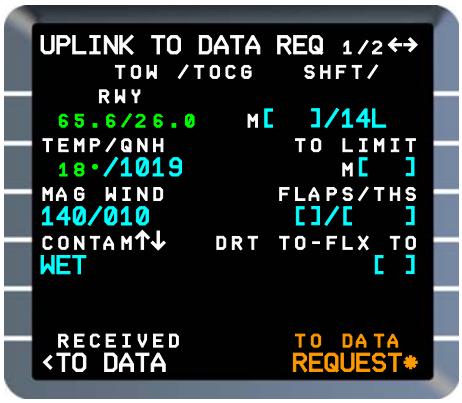




All fields in this page are dashed until a RWY is defined or entered in [1R].

Screens shown are examples





[1L] TOW / TOCG

TOW:
When runway is defined in [1R] TOW is defaulted to value displayed on INIT B page, if available; otherwise is dashed.
Displayed values cannot be changed.
TOCG:

- Before engine start, takeoff CG is computed by the FMS,
- After engine start, CG is as displayed on FUEL PRED page.

[2L] TEMP / QNH or QFE

Label line [2L] is either TEMP/QNH or TEMP/QFE according to selection on EFIS Control Panel 1.
When runway is defined in [1R], these data are displayed, if available.
Temperature comes from SAT 1 and not modifiable.
Baro setting may be entered with optional "E" or "H" denoting QFE or QNH. This letter must be placed before or after the pressure value (5 characters for hPa, 4 characters for in Hg).

[3L] MAG WIND

Is defaulted to 000°/000 if no wind exists in the system. This field is modifiable.

[4L] CONTAMINATION↑↓

Is defaulted to DRY.
Slew prompt (↑↓) allows pilot to modify the runway contamination by pressing the vertical slew keys on the MCDU keyboard.
Seven types of contamination are available on a circular loop:
WET, DRY, 1/4 WATER, 1/2 WATER, 1/4 SLUSH, 1/2 SLUSH and COMP SNOW.

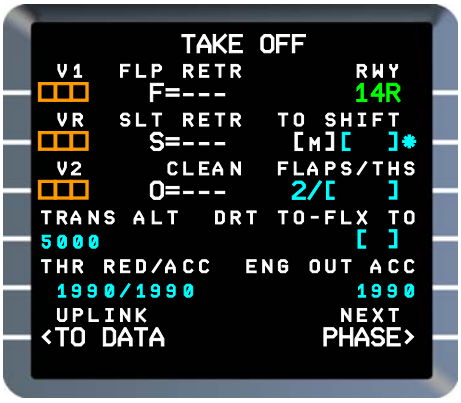
[6L] RECEIVED TO DATA prompt

This white prompt allows access to UPLINK MAX TO DATA pages for display.

Screens shown are examples

[2R] TO LIMIT

A runway length remaining may be entered.
FT or M is displayed according to the unit selected in OPC file.

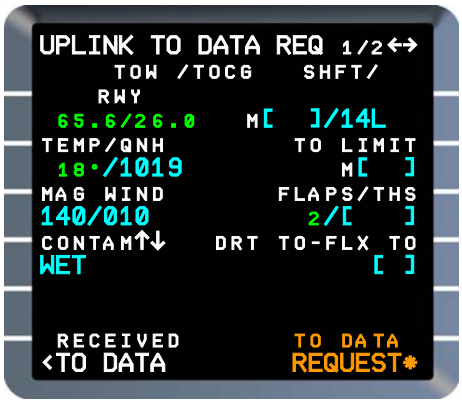


[3R] FLAPS/THS

This field is defaulted to the value(s) displayed in the FLAPS/THS field [3R] on PERF TAKE OFF page when runway matches runway defined on PERF TAKE OFF page [1R] and a Flaps/Slats configuration and/or THS value has been entered on this page.
Otherwise brackets are displayed.

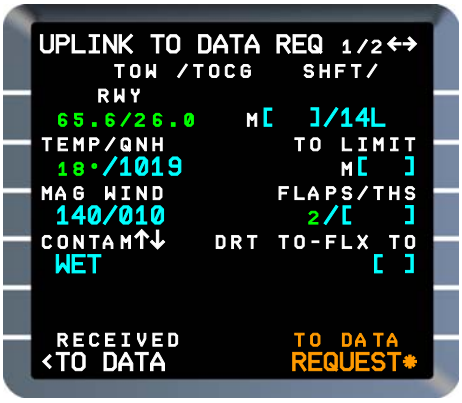
[4R] DRT TO - FLX TO

This field is defaulted to the value displayed in the DRT TO–FLX TO field [3R] on PERF TAKE OFF page when runway matches runway defined on PERF TAKE OFF page [1R] and a value has been entered on this page.
Otherwise brackets are displayed.



If the Derated Take Off option is activated, label line is DRT TO-FLX TO and either a Flex TO temperature or a Derated Take Off level can be entered.
Only one of these two modes is active at a time on a page: either FLEX TO by selecting a Flex Temperature, or DERATED TO by selecting a Derating Level. But there is no restriction for the selection of either mode on the second page.
The field title is not modified upon pilot entry.

[6R] TO DATA REQUEST prompt



Enables take off data request to be made.

The (*) symbol:

- Disappears when request is sent; it is displayed again when data are available or after an "AOC time-out" of about 4 minutes.
- Is removed if a Take Off data request has been initiated through the AOC FUNCTION page and the request is pending.
- Is not displayed if the FM is unable to communicate with the ground.

Selection of the prompt without (*) is rejected and results in NOT ALLOWED scratchpad message.

When uplinked take-off data (pilot requested or not) are received and an ACTIVE flight plan initialization uplink is pending, the uplinked take off data are buffered without scratchpad message.

The TAKE OFF pages and sub-pages continue to reflect a request pending state until the flight plan initialization is processed or invalidated (time-out expired for example).

The different fields of the UPLINK TO DATA REQ page may be cleared. When they are cleared, the display returns to the default value.

UPLINK TO DATA REQ 2/2

If UPLINK TO DATA REQ page 1 is filled with data for a runway and if UPLINK TO DATA REQ page 2 is accessed, when a runway is entered in [1R] the different fields show defaulted values (not the values displayed on page 1) except for Baro setting and Wind. Baro setting and Wind are common to the two UPLINK TO DATA REQ pages. Modification of either parameter on one page is automatically repeated on the other page.

When a Take Off data request is sent to the ground, data on UPLINK TO DATA REQ pages are locked in. Any attempt to modify a value or to make further entries is not allowed and results in "NOT ALLOWED" s-pad msg until AOC Take Off data are received or until an "AOC time out" occurs.

If an UPLINK TO DATA REQ page is displayed when a transition to TAKE OFF phase occurs, the display reverts to the TAKE OFF page.

☐ TO DATA REQUEST via AOC FUNCTION page

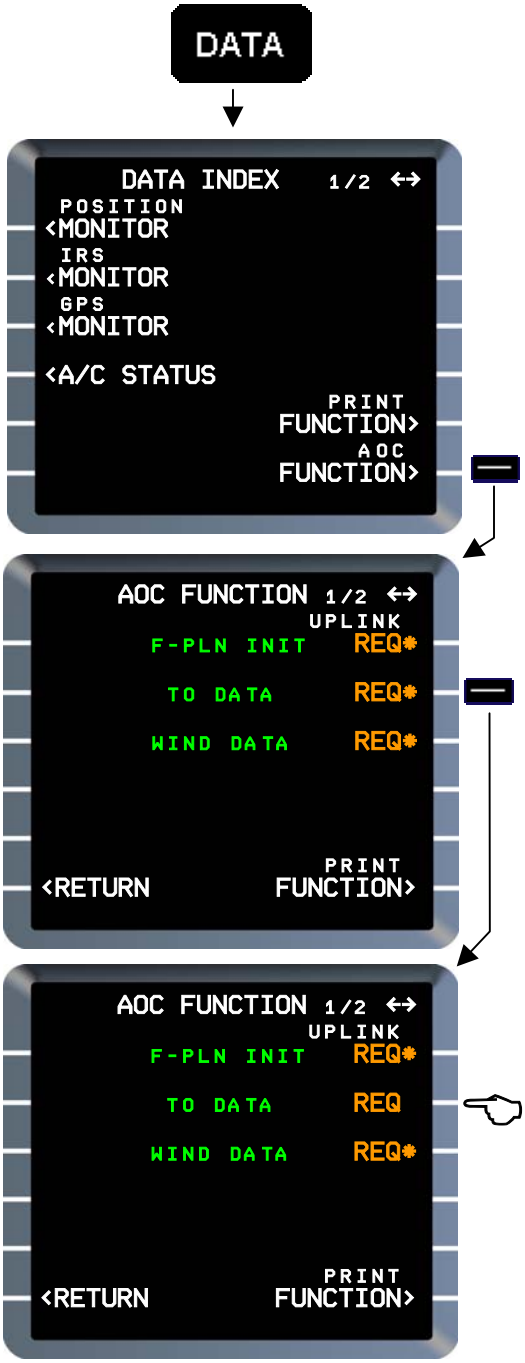
TO DATA REQUEST may be initiated from the AOC FUNCTION page.
The request message contains data defined in the UPLINK TO DATA REQ page.

DATA key .....Press

AOC FUNCTION [6R] .....Press

TO DATA REQ [2R] .....Press

When the request is sent, (✱) symbol disappears from AOC FUNCTION page and UPLINK TO DATA REQ pages. It is displayed again when data are received or when uplink process has been terminated (eg. "AOC time-out").



■ TAKEOFF DATA UPLINK message

Screens shown are examples.

Pilot is advised of uplinked take off data by TAKE OFF DATA UPLINK scratchpad message (white).

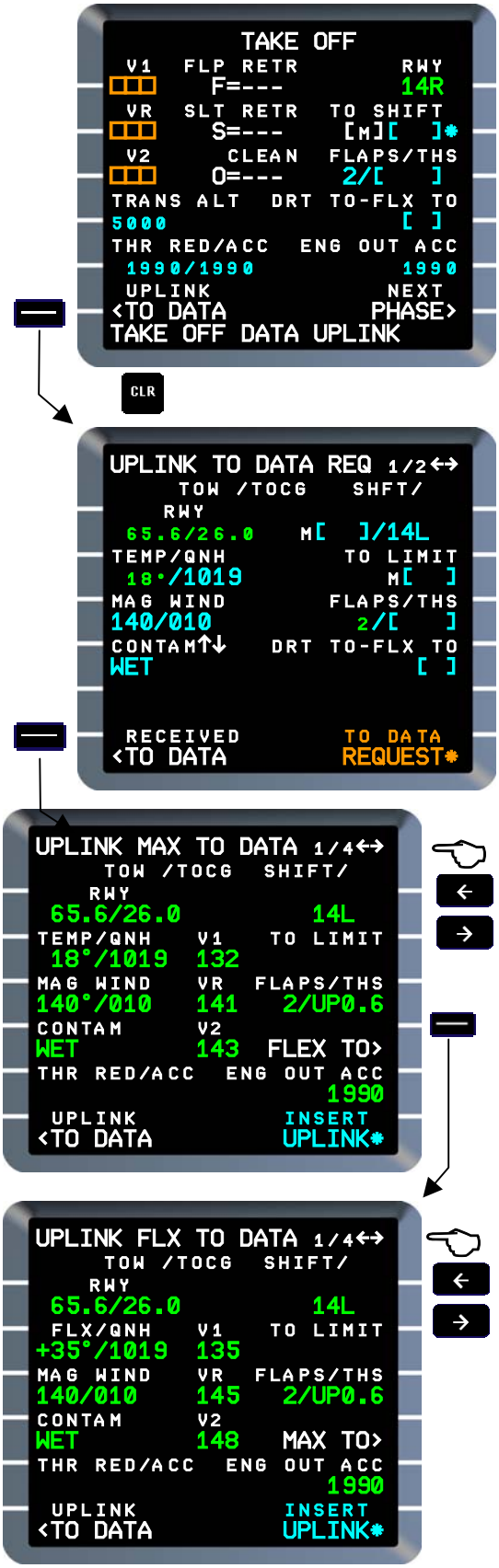
The TAKE OFF DATA uplink message contains data related to take-off performance up to 4 runways of origin airport as defined in ACTIVE F-PLN.

Access is from PERF TAKE OFF page:

UPLINK TO DATA [6L] .. Press
UPLINK TO DATA REQ page is displayed.

RECEIVED TO DATA [6L] .... Press
UPLINK MAX TO DATA 1/4 page is displayed.
Four different pages are available to receive MAX performance data sent by ground station.
Use horizontal slew keys to review at convenience.

FLEX TO [4R]..... Press
This provides access to a second set of pages for FLX performance data sent by ground station.



- **If Derated TO option is activated and page contains a DRT factor instead of FLX:**
  FLEX TO prompt is replaced by **DRT** TO prompt, and page title is: UPLINK **DRT** TO DATA.

Fields are described below.

Screens shown are examples.

[1L] TOW/TOCG field

Reference Take-off Gross Weight and Take-Off Center of Gravity.

[2L] TEMP/QNH field

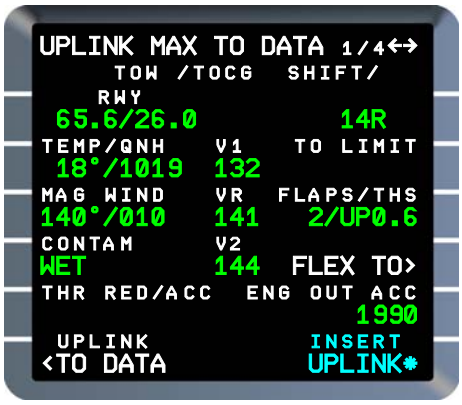
- For UPLINK **MAX** TO DATA pages, label line displays TEMP/QNH or TEMP/QFE; data line displays uplinked Max Temperature and uplinked Baro Setting.
- For UPLINK **FLX** TO DATA pages, label line displays FLX/QNH or FLX/QFE; data line displays uplinked Flex Temperature and uplinked Baro Setting.
- For UPLINK **DRT** TO DATA pages (if Derated Take-off option activated), label line displays DRT/QNH or DRT/QFE; data line displays uplinked Alternate Thrust Rating shown in DXX format uplinked Baro Setting.

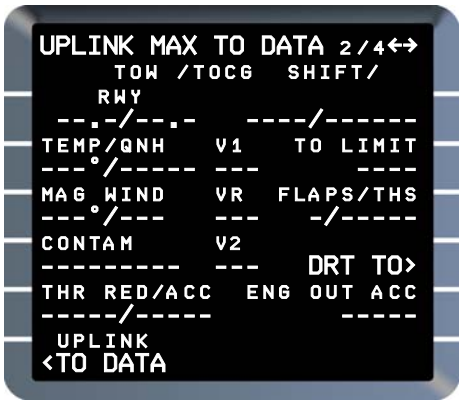
If no data is available, blanks are displayed for the corresponding field(s).

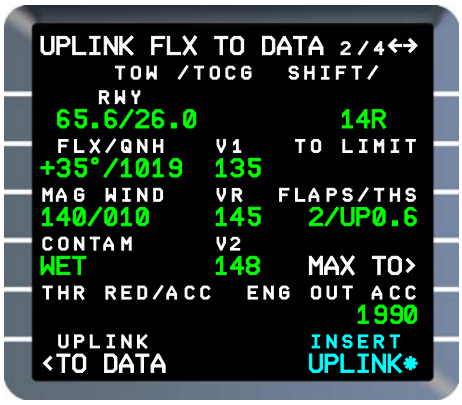
QNH/QFE:
The units are determined by the setting on EFIS Control Panel 1 at the time the uplink is processed.

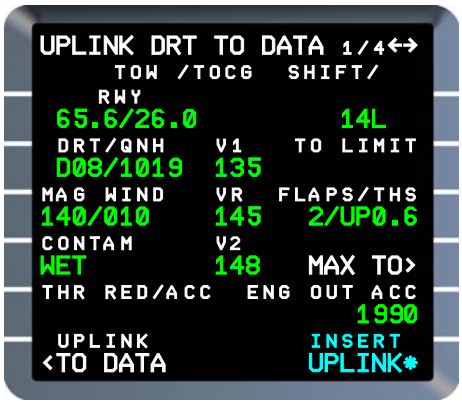
If EFIS Control Panel 1 is invalid (e.g. in single or independent modes on FMS2), the unit follows the feet/meters OPC option. No update is performed if the selected unit or reference system on the EFIS Control Panel 1 is changed.

Label line shows QNH or QFE as appropriate to uplinked baro setting. If no valid baro setting is entered, label line shows QNH.









[3L] WIND field
Uplinked Take Off Runway Wind.

[4L] RUNWAY CONTAMINATION field
Uplinked Take Off Runway Condition.

[5L] THR RED/ACC altitudes
This field displays uplinked Thrust Reduction Altitude and Acceleration Altitude. If no data is available, blanks are displayed for the corresponding field(s).

[6L] UPLINK TO DATA prompt
Provides access to UPLINK TO DATA REQ page.

V1 / VR / V2
Are displayed in center of the screen.
For uplink MAX TO DATA pages, if uplinked maximum temperature and take off speeds are received, take off speeds are displayed, else dashes are displayed.
For uplinked FLX TO DATA pages and UPLINK DRT TO DATA pages, alternate take-off speeds or dashes are displayed.

[1R] SHIFT/RWY
This field displays uplinked Take Off Runway Ident, Runway Intersection and Position Shift. The unit designator for shift (M or FT) is filled with the value of shift or dashes if no shift. If no data is available, blanks are displayed.

[2R] TO LIMIT
This field displays uplinked Runway Length Remaining. If no data is available, blanks are displayed.

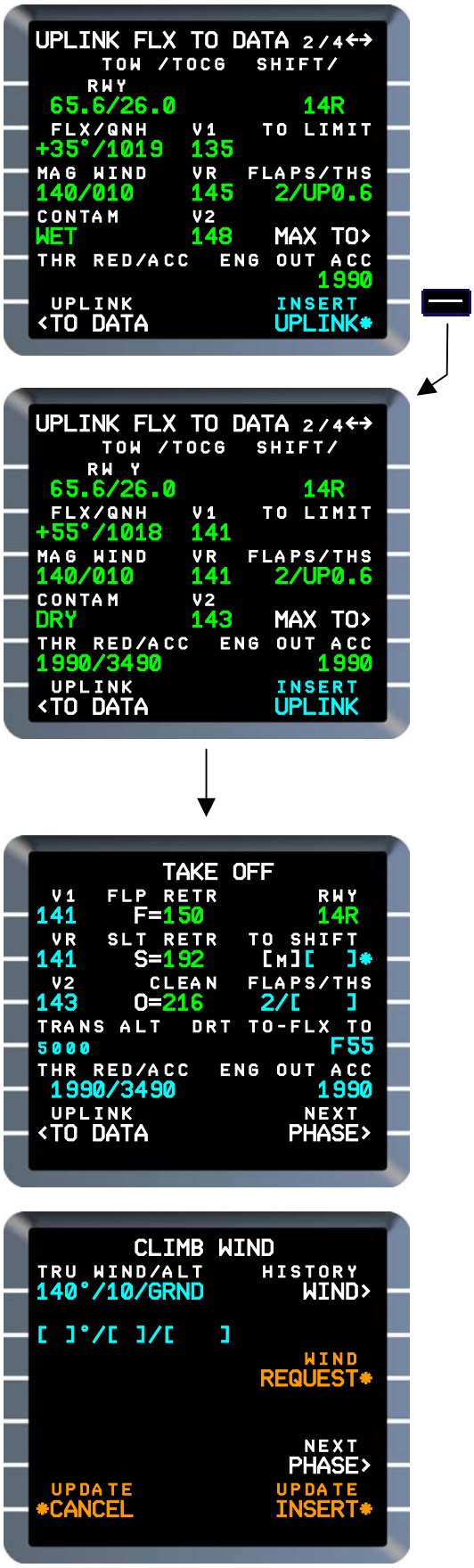
[3R] FLAPS/THS
This field displays uplinked Slat/Flap Configuration and Trim (MAX) or Alternate Slat/Flap Configuration and Alternate Trim (FLX). If no data is available, blanks are displayed for the corresponding field(s).

[4R] DRT TO / FLX TO or MAX TO prompt
This prompt provides access to DRT/FLX TO page from MAX TO page (and vice-versa).

[5R] ENG OUT ACC altitude
This field displays uplinked Engine-out Acceleration Altitude. If no data is available, blanks are displayed.

Take Off Data insertion

Uplinked takeoff performance data can be inserted only for the departure runway defined in the ACTIVE F-PLN, and only if TOW/CG associated with the uplinked data match the actual aircraft TOW/CG. Then (✱) is displayed next to the INSERT UPLINK prompt.



INSERT UPLINK [6R].....Press

(✱) symbol disappears from the UPLINK TO DATA page from which the prompt was pressed, and the display reverts automatically to the PERF TAKE OFF page with the inserted data.

According to availability in the UPLINK TO DATA page, the following set of data are inserted into the system:

- V1, VR, V2,
- THR RED/ACC ALT, ENG OUT ACC ALT,
- Magnetic Wind (considered as GRND wind on the CLIMB WIND page, after conversion in TRUE direction),
- FLAPS/THS
- Runway SHIFT (and position)
- Flex TO Temp or Derated TO Level are inserted into the system if the insertion is made from an UPLINK FLX TO DATA page.

Flex TO Temp or Derated TO Level are removed from system if the insertion is made from an UPLINK MAX TO DATA page.

- Other advisory data are displayed on these pages for advisory and have no impact on the system when INSERT UPLINK✱ prompt is depressed.

Notes:

Take off performance data available on another UPLINK TO DATA can replace data inserted initially provided the RWY ident on these pages corresponds to the departure runway of the ACTIVE flight plan.

On UPLINK TO DATA page, when the INSERT UPLINK prompt is depressed, the star is removed on that page and the display reverts to the TAKE OFF page filled with the inserted data. On this same page, the previously inserted data are not deleted but are unavailable for insertion again until another set of data has been inserted from the other UPLINK TO DATA page.

The star is once more displayed if another set of TO data relative to the runway has been inserted. When the star is removed on the UPLINK MAX TO DATA page, it is still displayed on the UPLINK FLX/DRT TO DATA page (whenever TO data are available for insertion).

When the flight phase transitions to DONE, any previous uplinked takeoff data are deleted and the UPLINK TO DATA pages revert to their initial state.

Each time a new valid Take Off Uplink message is received, all the previous received Take Off data for all runways are deleted and are replaced with the new uplinked data.

After reception of uplinked data, UPLINK TO DATA pages that contain no information display dashed fields.

■ TO DATA UPLINK scratchpad messages

During TO DATA UPLINK process some scratchpad messages are displayed or stacked to advise pilot of different steps processing. These messages are listed below and are fully described in APPENDICES.

☐ Normal message

TAKE OFF DATA UPLINK
This message is displayed when the Take off data uplink message is validated and accepted to inform the pilot that valid uplinked take off data are available for review in either ACTIVE F-PLN or SEC F-PLN.

☐ Error message

INVALID TAKEOFF UPLINK
This message is displayed in case of take off uplink data rejection.

9.4. WIND DATA

Overview

The WIND DATA uplink function enables pilot to request and receive forecast winds for climb, cruise, descent, and alternate atmospheric data.
The uplink message may be received in response to a pilot request or automatically without request.

A request is initiated from the AOC FUNCTION page or from any WIND page.
WIND DATA downlink message may be sent requesting wind data for any or all flight phases: Climb, Cruise, Descent, Alternate.
The subsequent WIND DATA uplink message may provide data for requested flight phase(s) or for additional phase(s).
The uplinked winds are displayed on the WIND pages. When inserted, valid uplinked wind data replaces all the previously defined wind data for the corresponding flight phase.

- Climb and descent winds are referenced to altitude.
- Cruise winds are referenced to WPTs at the appropriate cruise or step flight level as defined in F-PLN.

A wind request from a WIND page may be initiated from either the ACTIVE or SEC F-PLN. The subsequent uplink is then associated with the flight plan from which the request is initiated. Otherwise, when a wind uplink is received, which does not correspond to a pending request, the wind uplink is associated to the active flight plan (if defined).

If the wind data are uplinked, whether automatically or in response to a request, the pilot may view the winds prior to insertion in the receiving flight plan.
However, if the aircraft is on the ground prior to engine start and data have not yet been entered or inserted on any WIND page then wind data are directly inserted into that flight plan and cannot be reviewed.

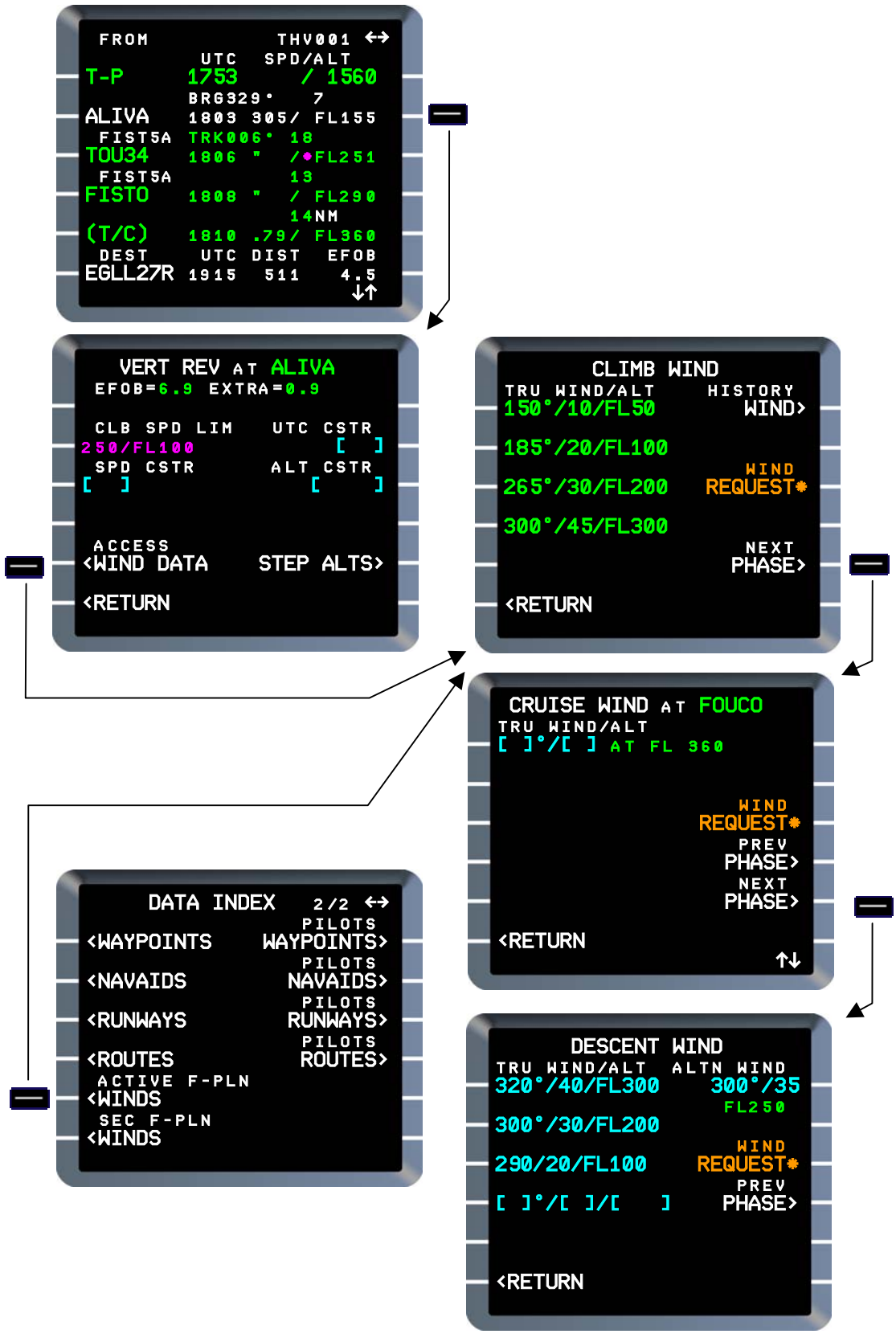
■ WIND REQUEST

The WIND REQUEST function is available on ground or in flight, provided FMGS is not in DESCENT or APPROACH phase. It may be initiated from any WIND page of the ACTIVE or SEC F-PLN or from AOC FUNCTION pages.
Only one WIND REQUEST may be pending at a time.

☐ WIND REQUEST from WIND pages

On ground, WIND pages related to ACTIVE or SEC F-PLN may be accessed from INIT A page and SEC INIT A page (provided the SEC F-PLN is not a copy active), from DATA INDEX 2/2 page or from VERT REV pages.

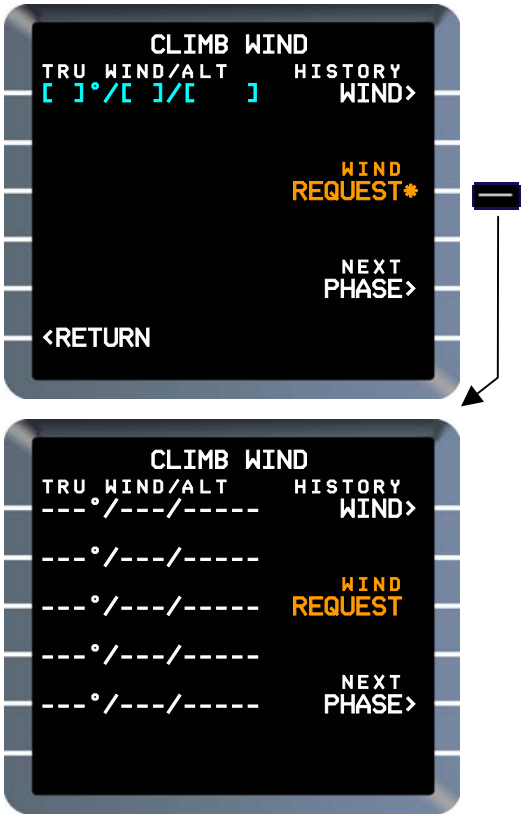
In flight, WIND pages related to ACTIVE or SEC F-PLN may be accessed from DATA INDEX 2/2 page or VERT REV pages.

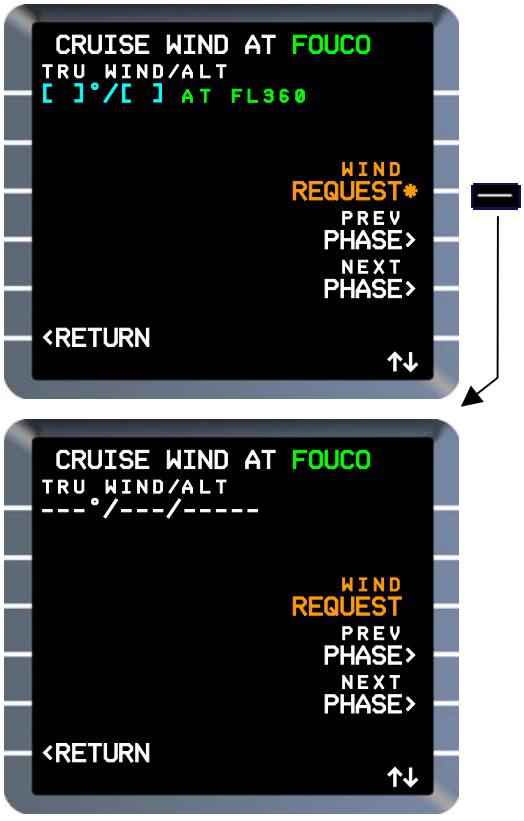


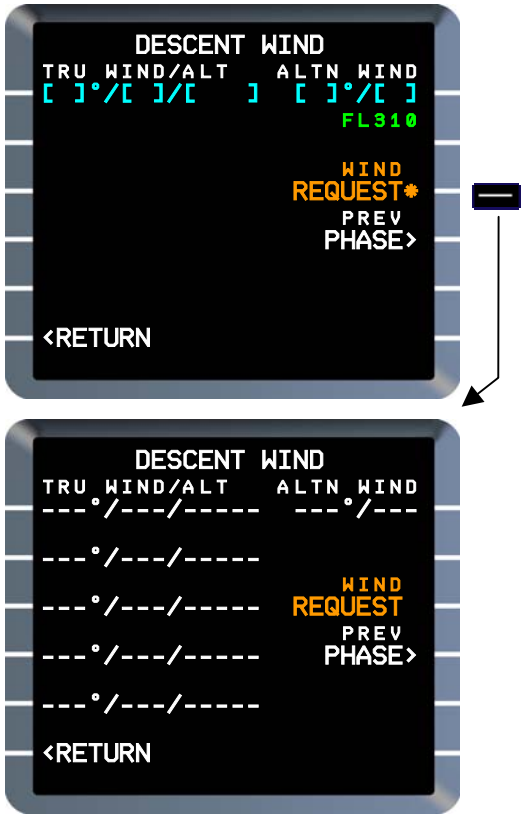
WIND REQUEST [3R].....Press
Wind request is sent **for all valid flight phases**.

While the WIND REQUEST is pending, all current wind data for the flight plan from which the request is performed are dashed until the uplinked data has been received and, if valid, inserted or if the uplink has been terminated (eg. AOC time-out of 4 minutes).

The (✸) symbol disappears on both ACTIVE / SEC F-PLN and on AOC FUNCTION page, when request is sent; it comes back when the uplinked data has been received and, if valid, inserted or if the uplink has been terminated (eg. AOC time-out of 4 minutes).





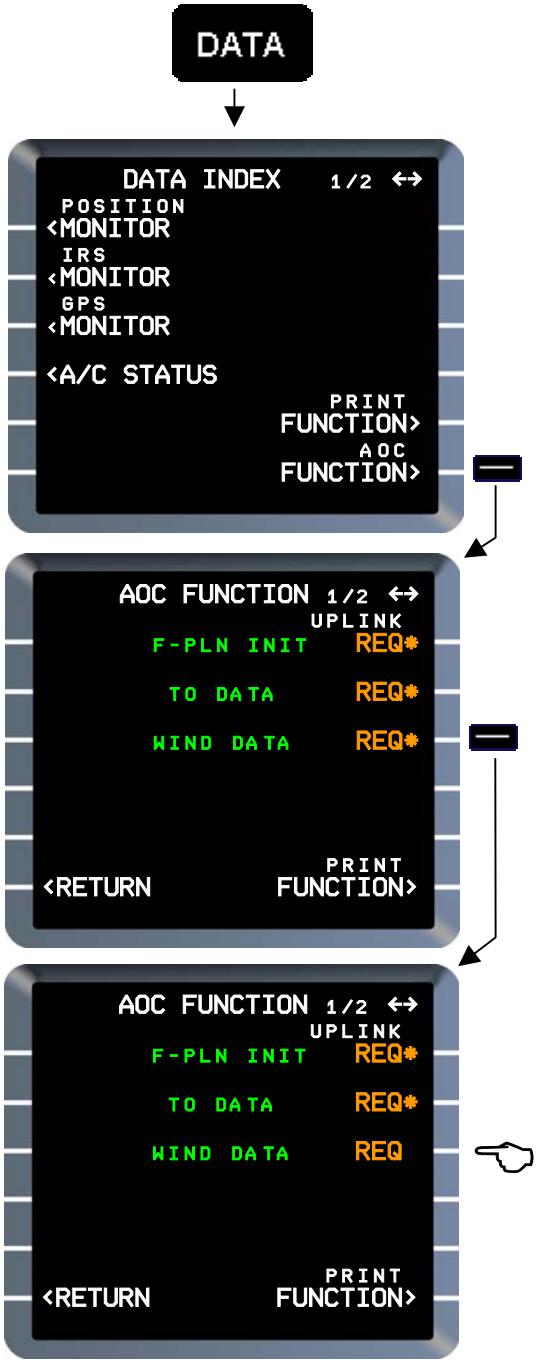


☐ WIND REQUEST from AOC FUNCTION page

A request from the AOC FUNCTION page applies to the **ACTIVE flight plan only**.

WIND DATA REQ [3R] ... Press

When the request is sent, (✱) symbol disappears from AOC FUNCTION page and from all WIND pages; it re appears when data are received or when uplink process has been terminated (eg. AOC time-out of 4 minutes).



■ WIND DATA UPLINK message

Pilot is advised of uplinked data by WIND DATA UPLINK scratchpad message (white).

■ Wind Data: insertion / deletion

- **Before engine start, provided the receiving flight plan does not contain any wind data,**
  wind data are automatically inserted into that flight plan, without the need of a pilot validation.

  In this example WIND DATA have been requested, WIND pages are empty.

  WIND DATA UPLINK scratchpad message advises pilot of incoming UPLINK message.

  UPLINK message contains data for CLB, CRZ & DES.

- **After engine start**

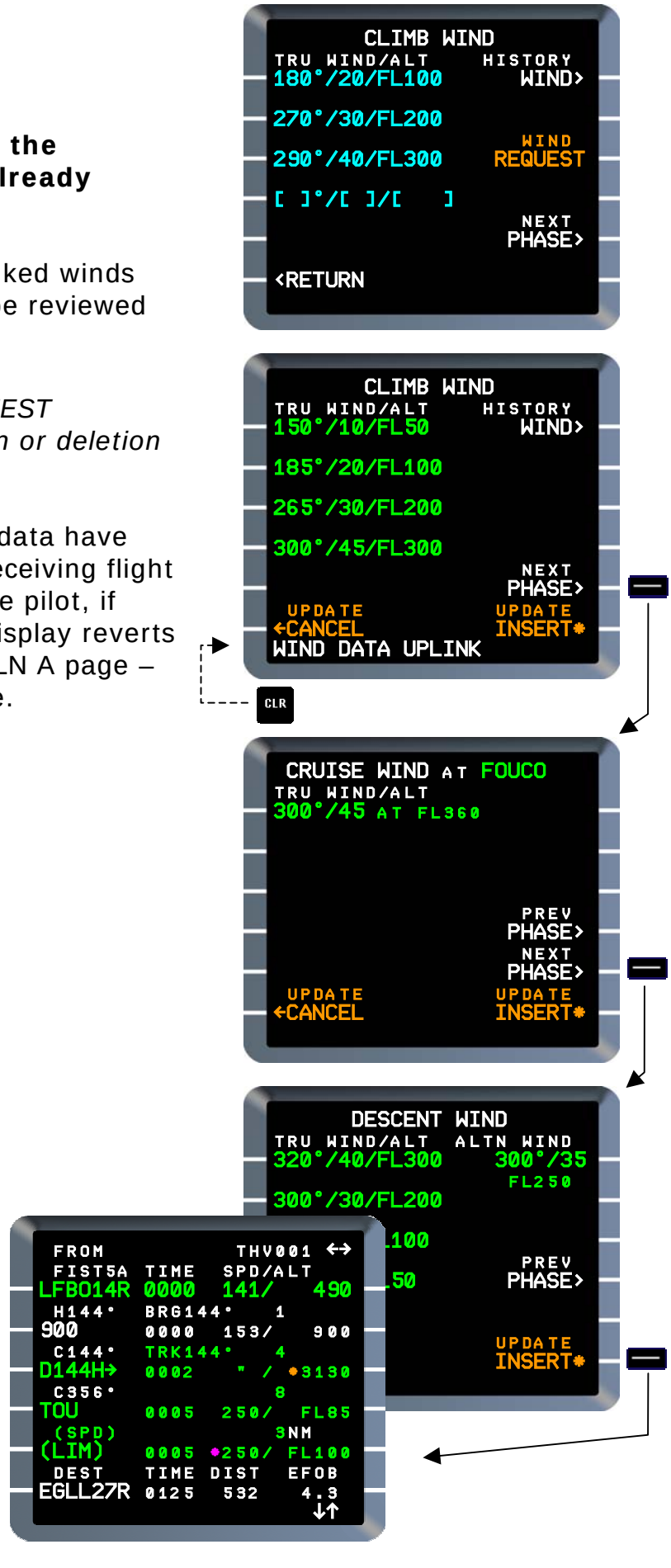
or

- **Before engine start, if the receiving flight plan already contains wind data,**

  In these cases, the uplinked winds are displayed and may be reviewed before manual insertion.

  The prompt WIND REQUEST disappears until insertion or deletion is done.

  Once the uplinked wind data have been inserted into the receiving flight plan (or cancelled by the pilot, if necessary), the MCDU display reverts automatically to the F-PLN A page – or the SEC F-PLN A page.



Notes:

Automatic page reversion following action on either UPLINK INSERT or UPLINK CANCEL is similar to the one existing after manual wind update.

If wind modifications exist and were either inserted or erased prior to receive unsolicited wind uplink then wind modifications are lost.

If valid wind data was not uplinked into a specific phase (climb, cruise or descent), the display for that phase reverts to current wind data. For that phase, wind data are displayed in green font and the format (large or small) is the same as the current state. The WIND REQUEST prompt disappears but UPLINK INSERT / UPLINK CANCEL are displayed as on other wind pages.

If the UPLINK INSERT and UPLINK CANCEL prompts are displayed on MCDU pages at transition to done, these prompts are automatically cleared.

If the FM loses communication with ACARS MU/ATSU, but has already received a valid wind uplink, the wind uplink may still be inserted. If communication cannot be regained after processing the uplink, the WIND REQUEST prompt is not displayed.

If the uplinked message is invalid or a communication error occurs which invalidates the pending uplink (e.g. a time-out occurs), the display reverts to the state preceding the request transmission and any previously existing data are redisplayed. The WIND REQUEST prompt re appears. (✱) is redisplayed provided that the FM can communicate with ground.

Selection of the WIND REQUEST prompt without (✱) symbol is rejected and results in a NOT ALLOWED scratchpad message (white). Attempting to clear at the WIND REQUEST prompt (regardless of ✱) results in the display of the NOT ALLOWED message.

The wind data displayed on the F-PLN B page remains displayed when a downlink request has been transmitted and an uplink response is pending.

Climb Wind page revisions

For the ACTIVE F-PLN, the HISTORY WIND prompt remains available. HISTORY WINDS may be viewed and inserted. However, while a wind request is pending or while uplinked climb winds have not yet been inserted or erased, any inserted HISTORY WINDS are not available for display on the active CLIMB WIND page.

The following rules apply to the ACTIVE F-PLN and SEC F-PLN when created by a COPY ACTIVE.

- *If the UPLINK INSERT or the UPLINK CANCEL prompts have not been selected on the CLIMB WIND page when flight phase transitions to climb, the display reverts to the current climb winds.*
- *If the UPLINK INSERT and UPLINK CANCEL prompts are displayed on the CLIMB WIND page at transition to climb flight phase, these prompts are automatically cleared if there is no more uplinked data for others phase (cruise, descent and alternate uplink winds). Otherwise, they are still displayed.*
- *The WIND REQUEST prompt remains available for selection on the CLIMB WIND pages during climb flight phase, per normal rules. However, uplinked climb winds cannot overwrite currently displayed climb winds in climb phase. Any climb wind uplink is ignored and the dashes are replaced with the current climb winds.*

Cruise Wind page revisions

There may be additional or fewer WPTs in the cruise wind uplink than currently defined in the F-PLN. Some (or all) WPTs in the uplink message may not exist in the F-PLN. In this case only the wind data for the matching cruise WPTs in the associated F-PLN are displayed for pilot review; the others are discarded. Pressing the UPLINK INSERT prompt inserts data only for matching cruise WPTs.

If the last CRZ WPT is sequenced or the flight phase transitions to descent, approach, or go around, the uplinked cruise wind data are lost. If the CRUISE WIND page is displayed in either of these cases, the page switches automatically to the DESCENT WIND page.

The same rules apply to SEC F-PLN.

For a flight phase transition from CRZ to CLB, the new set of cruise WPTs may cause some uplinked cruise wind data to be discarded.

The WIND REQUEST prompt remains available for selection on the CRUISE WIND pages during cruise phase. A new cruise winds message may replace existing cruise data for all applicable, down path cruise waypoints.

If wind data has not been received for an uplinked WPT at a given altitude, the TRU WIND field is blanked.

Propagation of wind data to downpath WPTs occurs, based on new uplinked cruise wind data. Thus pilot can preview the overall wind model data (uplinked and propagated), for all cruise WPTs, before insertion or cancellation.

Descent Wind page revisions

While a manual request is pending, ALTN WIND field is dashed.

Upon insertion, the uplinked alternate cruise altitude is replaced by the FMS alternate cruise flight level (either FL220 or FL310) and displayed in label line 2R in green small font.

Up to 5 descent winds may be uplinked, shown in order of decreasing altitude.

The following rule applies to ACTIVE and SEC F-PLN (if created by COPY ACTIVE):

- *If the UPLINK INSERT and UPLINK CANCEL prompts are displayed on the DESCENT WIND page at transition to descent, approach, or go-around flight phase, these prompts are automatically cleared and display reverts to the current descent winds.*
- *The WIND REQUEST prompt is not displayed in descent, approach, or go-around flight phases.*

■ WIND DATA UPLINK scratchpad messages

During WIND DATA UPLINK some scratchpad messages are displayed or stacked to advise pilot of stages in the processing.
These messages are listed below and are fully described in APPENDICES.

☐ Normal messages

WIND DATA UPLINK
Advises pilot that valid uplinked wind data are available for review in either flight plan.

☐ Additional messages

CHECK DEST DATA
Displayed in CRZ phase when distance to destination is less than 180 NM and QNH, TEMP or WIND at destination displayed on the current active APPR PERF page result from an AOC uplink.
Maybe displayed after the WIND DATA UPLINK message when a conflict exists.

CHECK ALTN WIND
Displayed if the uplinked ALTN CRZ level differs from the FMS ALTN CRZ level.

Note:

In there are several messages, the display order is: WIND DATA UPLINK, CHECK DEST DATA, CHECK ALTN WIND.

☐ Error messages

INVALID WIND UPLINK
Displayed if wind uplink message is rejected.

WIND UPLINK EXISTS
A flight plan modification (active or secondary) is attempted when uplink winds are not yet inserted.
This message is automatically cleared when the wind uplink is inserted or erased.

9.5. FLIGHT REPORTS messages

Flight reports uplink and downlink messages are processed only if AOC function is enabled.

Flight Reports provide real time information to the ground concerning the current situation and position of the A/C.

- **Position Report** provides current aircraft position information to the ground.
- **Progress Report** provides data relative to the destination.
- **Flight Plan Report** provides the active lateral flight plan route to the ground.
- **Performance Data Report** provides the active Performance Data currently used by the FMS.

Table below shows logic for REPORTS message sending logic:

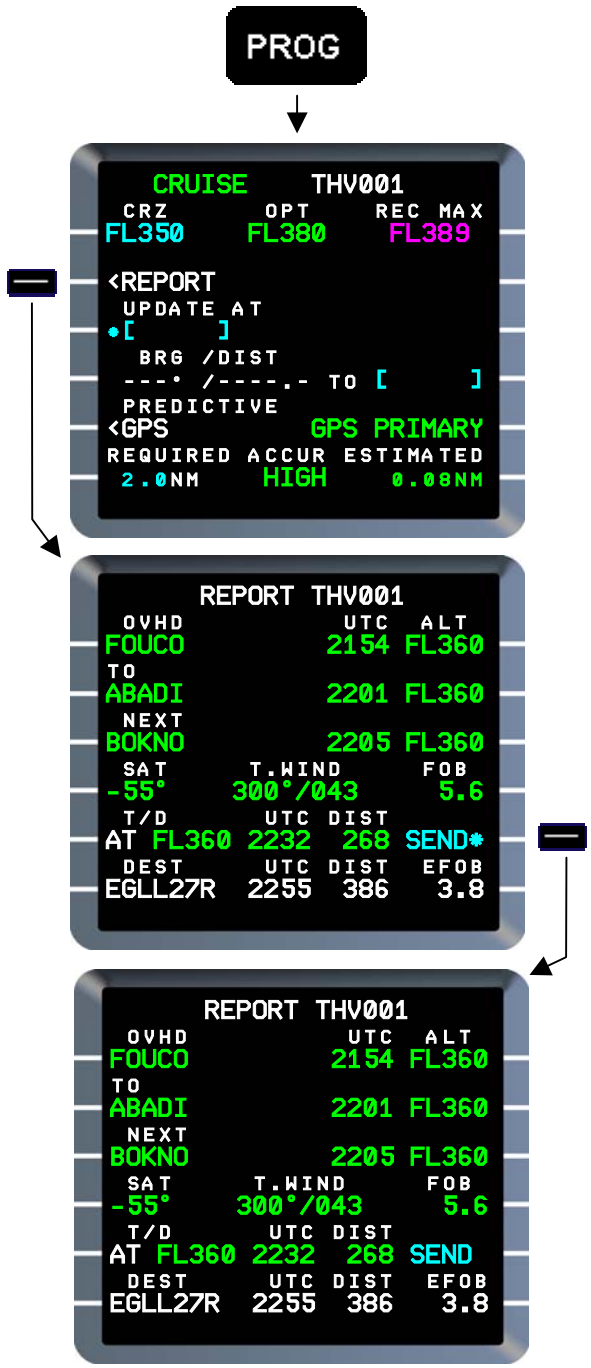
Messages	Pilot init	Ground request	Auto
POSITION REPORT	X	X	X
PROGRESS REPORT		X	X
FLIGHT PLAN REPORT	X	X	X
PERFORMANCE DATA REPORT		X	X

■ Position Report

□ Overview

The position report message (POS) contains data relative to ACTIVE F-PLN: A/C present position, time, altitude, FROM and TO waypoints. It may be sent manually via a prompt on the MCDU (provided AMI option is selected), or, sent in response to a ground request, or, automatically upon crossing a position-reporting fix designated by the ground (in POS uplink message).

☐ Manual position report from PROG page



REPORT [2L] ..... Press

SEND [5R] ..... Press
This results in the transmission of the POS downlink message to the ground

(✱) symbol
Is blank in the following cases:
- FM A/C position is invalid,
- The AOC function is not enabled.
- The Position Report option is inhibited within the AMI file,
- The FM is not able to communicate with the ground (although AOC function is enabled)
- A POS report downlink is currently pending or processing (auto or manual).

Pressing [5R] without (✱) displayed will trigger NOT ALLOWED scratchpad message (white).

☐ Manual position report from AOC FUNCTION page

DATA key .....Press

AOC FUNCTION [6R] .....Press

Horizontal slew key .....Press
Select Page 2/2

POSITION RPT prompt is available in [2R].

☐ Automatic position report

The automatic POSITION REPORT does not require pilot action.
A POS uplink message is sent by ground to specify reporting points of the ACTIVE F-PLN over which a POS report should be automatically downlinked.

If a POS uplink is received and a F-PLN Initialization is pending for the active flight plan, then the POS uplink is buffered until the F-PLN has been initilalized and processed or invalidated. No message is displayed.

If the ACTIVE F-PLN is not defined, the uplink message is directed to the SEC F-PLN.

If a F-PLN INIT request is pending for the SEC F-PLN, the POS uplink is buffered.

If the SEC F-PLN is also undefined, then the POS uplink is rejected.

■ Progress report

The Progress Report message (PRG) provides data relative to ETA and EFOB at the destination.
This message is sent in response to a ground request for progress report or automatically upon crossing a designated trigger.

Specific trigger values may be customized by the airline in the AMI file.
The PRG downlink cannot be sent manually through a dedicated prompt. However, the message may result from a pilot action (e.g. changing the destination or runway at destination).
Only Progress reports relative to the ACTIVE F-PLN are transmitted.

■ Flight plan report

The Flight Plan Report downlink message provides flight plan data from the ACTIVE F-PLN to the ground. This message is sent:
– Manually via a prompt on the MCDU, or,
– Automatically in response to a ground request.
AOC function must be enabled.
Manual sending is enabled if the "Flight Plan (FPN/FPC) Report" option is not inhibited within the AMI file.

DATA key .....Press

AOC FUNCTION [6R] .....Press

Horizontal slew key .....Press
Select Page 2/2

F-PLN REPORT prompt is available in [1R].

■ **Performance data report**

The Performance Data Report downlink message enables transmission of Performance data (GW, CG, CRZ ALT, FUEL data) from the ACTIVE F-PLN to the ground.
This message is sent automatically in response to a ground request.
AOC function is enabled.
It cannot be sent manually.

9.6. DATA LINK SCRATCHPAD MESSAGES

In addition to the scratchpad messages described in chapters 5.2/5.3/5.4, the following error messages may be triggered:

FM DATALINK UNAVAIL
This message is displayed when the ACARS buses are not ready for communication.

NOT XMITTED TO ACARS
This message is displayed when the crew manually sends a downlink message (request or report) through a MCDU page and the communication protocol fails during the data transfer (communication not established or not acknowledged).
When displayed, MCDU reverts to the page displayed before the downlink initiation.
This message is cleared when the user re-sends a downlink message, whether it is the same message or not.

PAGE INTENTIONALLY LEFT BLANK

Part III: Chapter 10 - PRINT FUNCTION

Contents

PAGE INTENTIONALLY LEFT BLANK

10.1. OVERVIEW

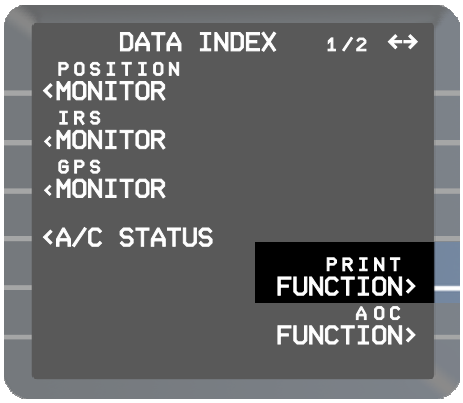
The PRINT function enables FMS reports to be printed, automatically or manually, if PRINTER INSTALLED option is activated in OPC file.

This function is accessed via PRINT FUNCTION prompt on DATA INDEX page 1/2 [5R]. If not activated, the field is blank.

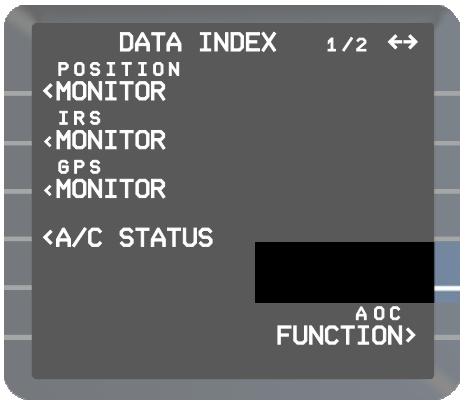
When PRINTER option is available several auto-print options are defaulted and may be customized in AMI file. Some of them are modifiable by pilot. Selectable options are:

- Auto print of AOC uplinks,
- Auto-print of flight plan uplink,
- Auto-print of take-off data uplink,
- Auto-print of wind uplink,
- Auto-print of flight report,
- Auto-print at engine start,
- Auto-print at transition to take-off,
- Auto-print at engine shut down.

See Part V: Appendices – AMI file.



PRINT FUNCTION ACTIVATED



PRINT FUNCTION NOT ACTIVATED

Availability of manual print reports depends on FMGC flight phase as summarized in the table below:

PHASES / REPORTS	PREFLIGHT	TAKE-OFF	CLIMB	CRUISE	DESCENT	APPROACH	GO AROUND	DONE
F-PLN INIT	X							
TO DATA	X	X						
WIND DATA	X	X	X	X	X	X	X(2)	
PREFLIGHT	X							
INFLIGHT		X	X	X	X	X	X	
POSTFLIGHT	(1)							X
SEC F-PLN	X	X	X	X	X	X	X	

(1) POST-FLIGHT report remains printable until INIT page FROM/TO [1R] is completed.

(2) If destination data modified.

10.2. MCDU ACCESS AND DESCRIPTION

■ Access to PRINT FUNCTION

DATA key .....Press
DATA INDEX page 1/2 is displayed:

PRINT FUNCTION [5R]...Press
PRINT FUNCTION page 1/2 is displayed showing F-PLN INIT [line 1], TO DATA [line 2] and WIND DATA [line 3].

These reports are available if AOC option is activated, otherwise fields are blank.

Manual print of these reports report is available by pressing LSK [1R], [2R], or [3R] respectively.
Auto-print status (YES or NO) of these reports is shown [1L], [2L], [3L]. Pilot can modify the status YES/NO by pressing the corresponding LSK, which reverts to opposite.

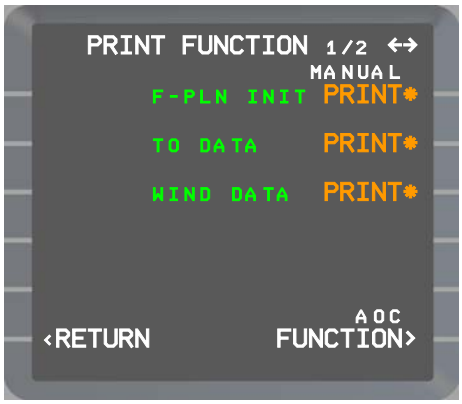
Horizontal slew key..... PRESS
PRINT FUNCTION page 2/2 is displayed showing: PREFLIGHT [line 1], INFLIGHT [line 2], POSTFLIGHT [line 3], SEC F-PLN [line 4].
Manual print and auto-print status follow the same logic as above.

When AOC function is not selected (OPC option), auto-print function is not available; all AUTO fields are blank.

Screens shown are examples.

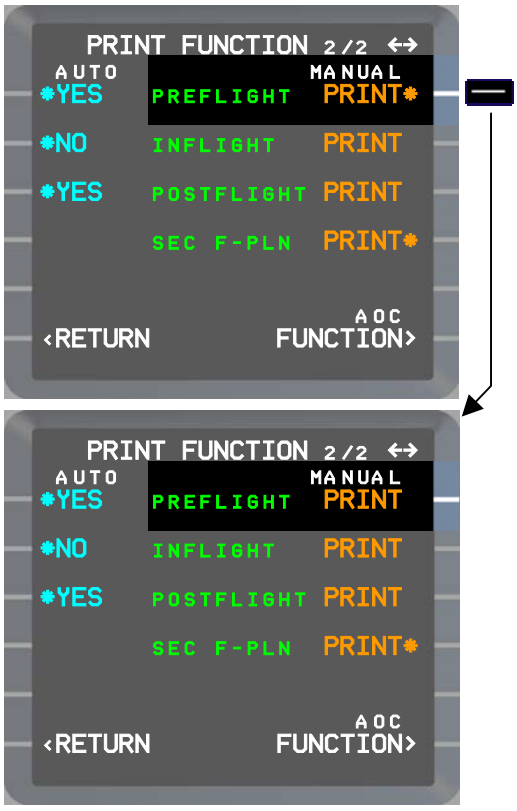
■ Manual print

Manual print is available if amber (✱) symbol adjacent to the right LSK is shown.
If not displayed the print is not available due to inappropriate FMS flight phase, or printer unavailability.



For example:

PRINT [1R] .....PRESS
PREFLIGHT PRINT is requested.



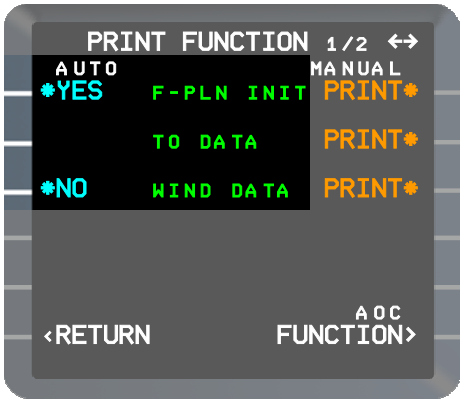
When a print is requested (✱) disappears and re-appears when print is completed.

If the print in process is aborted, (✱) re-appears.

■ Auto-print

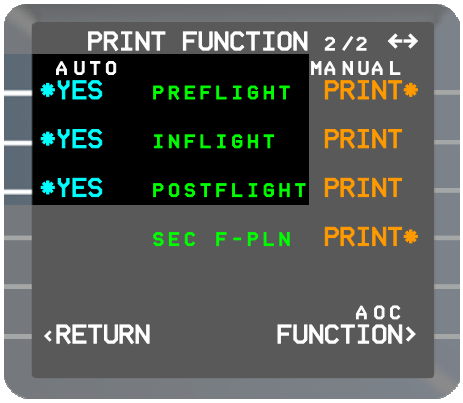
Auto print status is displayed in fields [1L] to [3L] of PRINT FUNCTION pages. Indications may be:

- ✱NO,
- NO,
- ✱YES, or
- Blank.



These indications are set according operator's selection in AMI file:

- (✱) prompt means that pilot may select the opposite status,
- If (✱) is not displayed the status is not modifiable,
- Blank field means the function is not activated.



During an auto-print, (✱) of the corresponding manual print disappears and re-appears when print is completed.

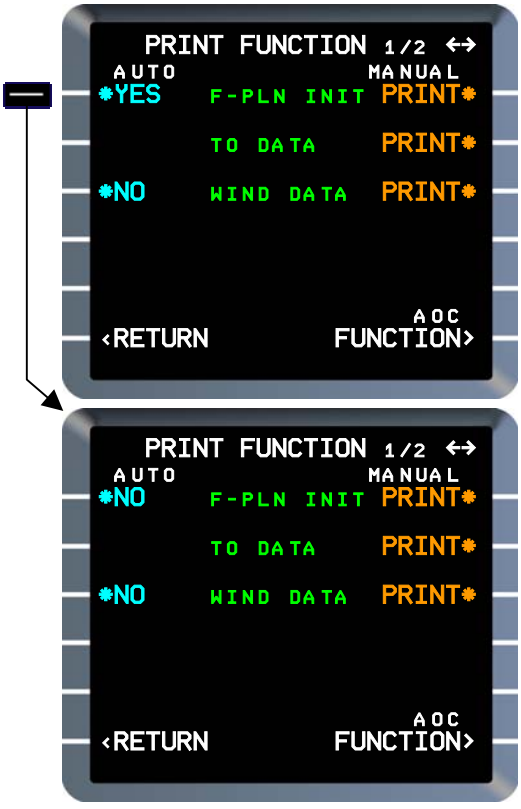
Modification of auto-print status:

For example:

[1L]..... PRESS

Auto-print status of F-PLN INIT changes from YES to NO.
Auto-print of this report is no longer available.

Print is aborted if ✱YES is pressed while a print is in process.



Auto-print reports occur:

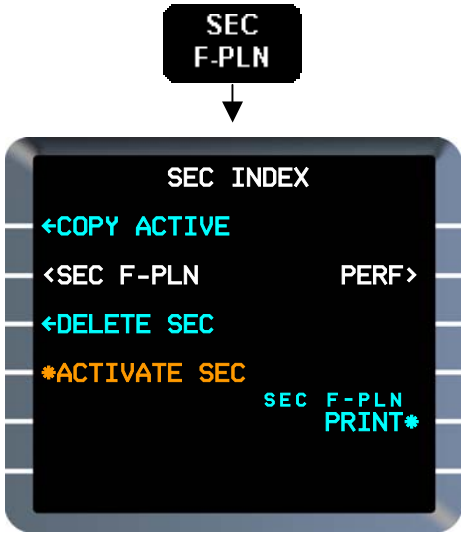
- At engine Start for Preflight report,
- When switching to Take Off phase for In-flight report,
- At engine Shutdown for the Post-flight report.

■ SEC F-PLN print

When PRINT option is activated, the SEC F-PLN print is available from the SEC INDEX page [4R], otherwise the field is blank.

(✸) is not displayed if SEC F-PLN is empty.

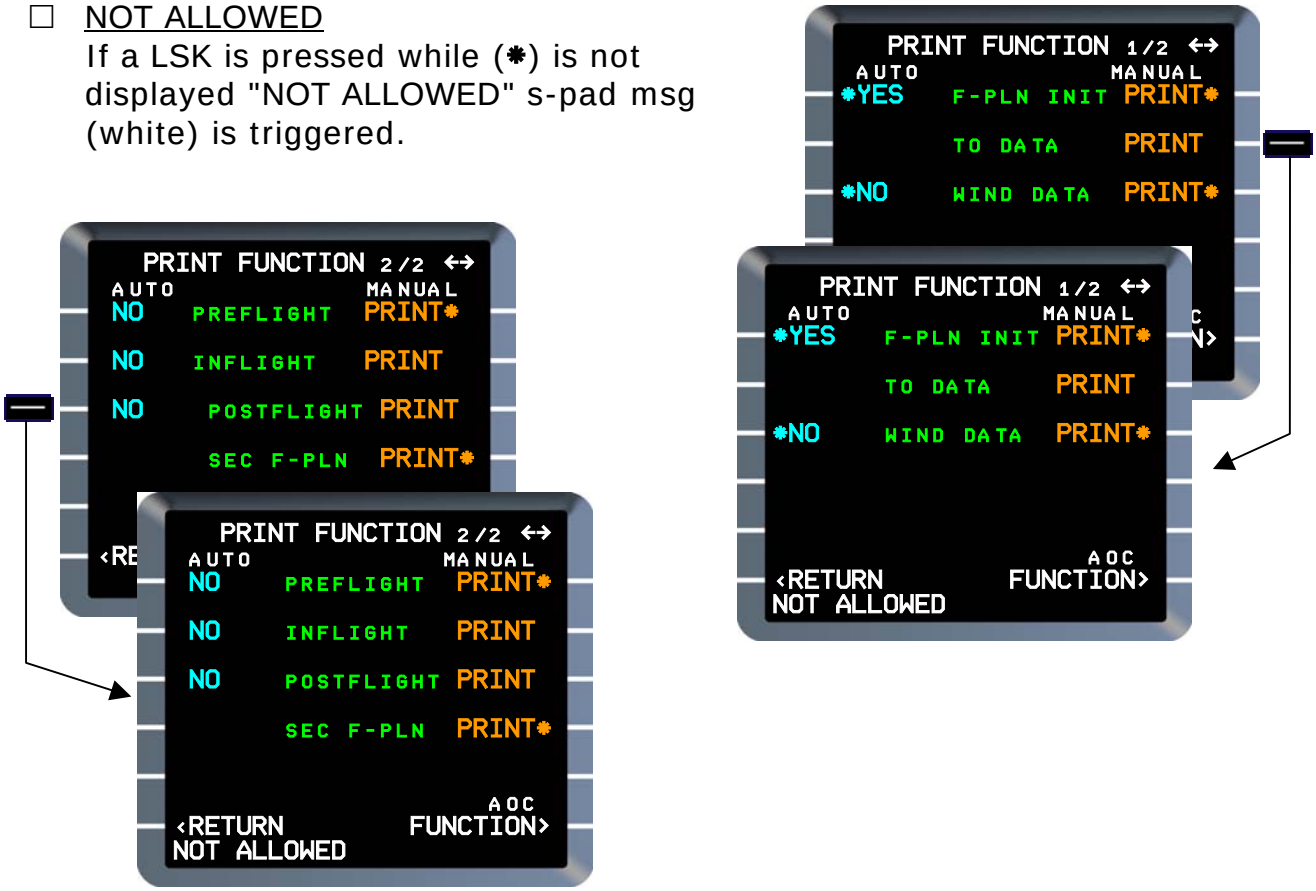
Two types of print report are available:
- Secondary Pre-flight Report in PREFLIGHT phase,
- Secondary In-flight Report during other phases.



■ Error messages

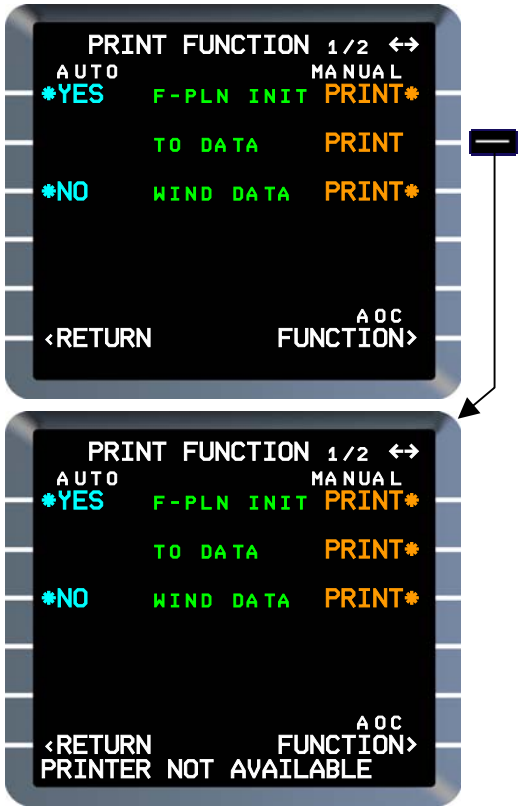
☐ NOT ALLOWED

If a LSK is pressed while (✱) is not displayed "NOT ALLOWED" s-pad msg (white) is triggered.



☐ PRINTER NOT AVAILABLE

If a printer communication error occurs while printing a report, "PRINTER NOT AVAILABLE" s-pad msg (white) is displayed; (✱) prompt reappears.



10.3. REPORT PRINT-OUT

The following pages show samples of various reports.

■ Flight Plan Init Report

```
================================================================
FM AOC UPLINK FLIGHT PLAN INITIALIZATION     DATA DATE: DD MMM YY
                                             TIME: HH:MM

   FLT NUMBER : XXXXXXXXXX       FROM/TO   : XXXX/XXXX
   CO RTE     : XXXXXXXXXX       ALTN      : XXXX
   ALTN CO RTE: XXXXXXXXXX

 PRIMARY F-PLN
 --------------
   DEP RWY: XXX
   DEP PRC: XXXXXX
   SEG : XXXXX,XXXXXXXXXXXX,
         XXXXXXXXXXXX,
         XXXXX,XXXXXXXXXXXX,BBB-XXXXX,XXXXXXXXXXXX,BBB,
         XXXXX;XXXXXXXXXXXX,BBB-NNNN
   DIR : (Same as SEG)
   HOLD: XXXXXXXXXXXX,D,BBB,X.XMN/XX.XNM
   ATO : XXXXXXXXXXXX,SDDD.D,VVV/SAAAAA
   CSTR: XXXXXXXXXXXX,VVV/SAAAAA/SHHMM
   STEP: XXXXXXXXXXXX,FLNNN
   VIA : XXXXX or XXXXXX
   TRANS : XXXXX
   ARV PRC: XXXXXX
   APR PRC: XXXXXX
   ARV RWY: XXX

   RPT PTS: LAT S DD+XX or LON SDDD+XX

 ALTN F-PLN
 ------------------

   (Same Format as for the Primary)

================================================================

================================================================
FM AOC UPLINK FLIGHT PLAN INITIALIZATION     DATA DATE: DD MMM YY
                                             TIME: HH MM

 PERFORMANCE DATA
 ----------------
   PERF FACTOR: SN.N             COST INDEX : NNN
   IDLE FACTOR: SN.N

   CRZ ALT    : FLNNN            ZFWCG      : NN.N
   CRZ TEMP   : SNN              ZFW        : NNN.N
   CLB TRANS  : AAAAA            BLOCK      : NNN.N
   TROPOPAUSE : AAAAA            TAXI       : NN.N

================================================================
```

■ Take Off Data report

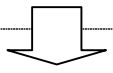
```
================================================================
  FM AOC UPLINK TAKE-OFF                      DATA DATE: DD MMM YY
                                              TIME: HH:MM
    RUNWAY   XXXX-XXX-XXX
      TOW         : NNN.N            TO SHIFT : NNNNN UU
      TOCG        : NN.N            %TO LIMIT : NNNNN UU
      SAT         : SNN              T. WIND  : DDD'/MMM
      CONTAM      : XXXXXXXXX
      MAX TO ---------------         FLEX TO -----------
          TEMP    : SNN                  FLX   : FSNN
          FLAP    : N                    FLAP  : N
          THS     : XXN.N                THS   : XXN.N
          V1      : NNN                  V1    : NNN
          VR      : NNN                  VR    : NNN
          V2      : NNN                  V2    : NNN

    RUNWAY   XXXX-XXX-XXX
                  :                           :

    RUNWAY   XXXX-XXX-XXX
                  :                           :

    RUNWAY   XXXX-XXX-XXX
      TOW         : NNN.N            TO SHIFT : NNNNN UU
      TOCG        :  NN.N           %TO LIMIT : NNNNN UU
      SAT         : SNN              T. WIND  : DDD'/MMM
      CONTAM      : XXXXXXXXX
      MAX TO ---------------         DRT TO ------------
          TEMP    : SNN                  DRT   : DNN
          FLAP    : N                    FLAP  : N
          THS     : XXN.N                THS   : XXN.N
          V1      : NNN                  V1    : NNN
          VR      : NNN                  VR    : NNN
          V2      : NNN                  V2    : NNN

     THR RED ALT : AAAAA                BARO    : ANN.NN or
     ACC ALT     : AAAAA                          ANNNN
     EO ACC ALT  : AAAAA

================================================================
```

■ Wind Data report

```
================================================================
  FM AOC UPLINK WIND DATA                          DATE: DD MMM YY
                                                   TIME: HH:MM

  CLIMB WINDS
  -----------
  T. WIND/ALT
  060'/020/GRND
  060'/030/03000
  060'/035/FL100
  040'/040/FL250
      :   :
  DDD'/MMM/FLNNN

  CRUISE WINDS
  ------------
      ALT:      FL270      FL310      FL350      FL370
      WPT     T. WIND    T. WIND    T. WIND    T. WIND    SAT/ALT
    WWWWWWW  060'/055   062'/045   062'/046   --- /---    -35/340
    WWWWWWW  065'/054   --- /---   054'/050   --- /---    -35/350
    WWWWWWW  --- /---   --- /---   --- /---   056'/054    -29/290
    WWWWWWW  --- /---   078'/079   075'/076   075'/074     --/---
    WWWWWWW  052'/043   --- /---   --- /---   --- /---     --/---
    WWWWWWW  051'/045   050'/042   050'/040   048'/035    -33/350
       :         :          :          :          :          :
    WWWWWWW  063'/045   --- /---   061'/038   --- /---    -33/360

  DESCENT WINDS
  -------------
   T. WIND/ALT
   DDD'/MMM/FLNNN
       :   :
   042'/055/FL250
   044'/049/FL190
   050'/035/02500
   060'/020/GRND

  DEST DATA
  ---------
   QNH          : 1013 or 29.92
   TEMP         : +10'
   MAG WIND     : 058'/020
   TRANS ALT    : 4000

  ALTERNATE WIND
  --------------
     040'/040/FL260
================================================================
```

■ Preflight Report

```
================================================================
  FM ACTIVE PREFLIGHT REPORT                    DATE: DD MMM YY
                                                TIME: HH:MM

    A/C TYPE     : XXXXXXXXXXX        DATABASE  : AANNNNNNNN
    ENG TYPE     : XXXXXXXXXXXXXXX    CYCLE     : DD MMM-DD MMM

    FLT NUMBER   : XXXXXXXXXX         FROM/TO   : XXXX/XXXX
    CO RTE       : XXXXXXXXXX         ALTN      : XXXX
    ALTN CO RTE  : XXXXXXXXXX

    PERF FACTOR  : SN.N               COST INDEX: NNN
    IDLE FACTOR  : SN.N

   CRUISE FL/STEP START WPT
   ------------------------
     CRZ FL 1    : FLNNN
     CRZ FL 2    : FLNNN/WWWWWWW
        :        :
     CRZ FL N    : FLNNN/WWWWWWW

   FLIGHT PLAN DATA
   ----------------
                   DIST      TIME       CRZ FL
     DEST-XXXX   : NNNN      HH:MM      FLNNN
     ALTN-XXXX   : NNNN      HH:MM      FLNNN

     DEP RWY     : XXX                  ARV PRC   : XXXXXX
     DEP PRC     : XXXXXX               APR PRC   : XXXXXX
                                        ARV RWY   : XXX

    WPT    TIME   SPD/ALT    FOB   T. WIND   TAS SAT   CRS  DIST
   ----------------------------------------------------------------
   PREDICTED VALUES
   WWWWWWW HH:MM NNN/AAAAA  NN.NN  DDD'/MMM  NNN SNN   NNNX NNNN
      :      :      :         :       :      :   :      :    :
   WWWWWWW HH:MM NNN/AAAAA  NN.NN  DDD'/MMM  NNN SNN   NNNX NNNN

   FUEL PREDICTIONS
   ----------------
     TAXI         :  N.N               ZFWCG    :  NN.N%
     TRIP (DEST)  : NNN.N              ZFW      : NNN.N
     RSV          : NNN.N              TOW      : NNN.N
     ALTN         : NNN.N              LW       : NNN.N
     FINAL        : NNN.N              CG       :  NN.N%
     EXTRA        : NNN.N
     -------------------
      BLOCK       :  NN.N

   MISC PERF DATA
   --------------
     TROPOPAUSE   : AAAAA
     CLB TRANS    : AAAAA
     CRZ TEM      : SNN
```

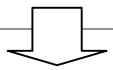


Preflight Report (Cont'd)

```
FMS 1 P/N STATUS                          FMS 2 P/N STATUS
   ----------------                          ----------------
                          FMS SOFTWARE
   xxxxxxxxxxxxxxx                           xxxxxxxxxxxxxxx
                          NAV DATABASE
   xxxxxxxxxxxxxxx                           xxxxxxxxxxxxxxx
                       FM AIRLINE CONFIG
   xxxxxxxxxxxxxxx                           xxxxxxxxxxxxxxx
                       FM OPTIONS CONFIG
   xxxxxxxxxxxxxxx                           xxxxxxxxxxxxxxx
                          PERF DATABASE
   xxxxxxxxxxxxxxx                           xxxxxxxxxxxxxxx
================================================================
```

■ Inflight Report

```
============================================================
  FM ACTIVE INFLIGHT  REPORT                    DATE: DD MMM YY
                                                TIME: HH:MM

    A/C TYPE     : XXXXXXXXXXX        DATABASE  : AANNNNNNNN
    ENG TYPE     : XXXXXXXXXXXXXXX    CYCLE     : DD MMM-DD MMM

    FLT NUMBER   : XXXXXXXXXX         FROM/TO   : XXXX/XXXX
    CO RTE       : XXXXXXXXXX         ALTN      : XXXX
    ALTN CO RTE  : XXXXXXXXXX

    PERF FACTOR  : SN.N               COST INDEX: NNN
    IDLE FACTOR  : SN.N

   CRUISE FL/STEP START WPT
   ------------------------
     CRZ FL 1     : FLNNN
     CRZ FL 2     : FLNNN/WWWWWWW
        :               :
     CRZ FL N     : FLNNN/WWWWWWW

   FLIGHT PLAN DATA
   ----------------
                    DIST      TIME       CRZ FL
     DEST-XXXX    : NNNN      HH:MM      FLNNN
     ALTN-XXXX    : NNNN      HH:MM      FLNNN

     DEP RWY      : XXX                  ARV PRC   : XXXXXX
     DEP PRC      : XXXXXX               APR PRC   : XXXXXX
                                         ARV RWY   : XXX

    WPT    TIME   SPD/ALT    FOB   T. WIND   TAS SAT   CRS  DIST
   ------------------------------------------------------------
   HISTORY VALUES
   WWWWWWW HH:MM NNN/AAAAA  NN.NN  DDD'/MMM  NNN SNN   NNNX NNNN
      :      :      :         :        :      :   :      :    :
   WWWWWWW HH:MM NNN/AAAAA  NN.NN  DDD'/MMM  NNN SNN   NNNX NNNN
   ------------------------------------------------------------
   CURRENT POSITION : DXX-XX.X/DXXX-XX.X
           HH:MM NNN/AAAAA  NN.NN  DDD'/MMM  NNN SNN   NNNX NNNN
   ------------------------------------------------------------
   PREDICTED VALUES
   WWWWWWW HH:MM NNN/AAAAA  NN.NN  DDD'/MMM  NNN SNN   NNNX NNNN
      :      :      :         :        :      :   :      :    :
   WWWWWWW HH:MM NNN/AAAAA  NN.NN  DDD'/MMM  NNN SNN   NNNX NNNN

   FUEL INFORMATION AT HH:MM
   -------------------------
      WEIGHT      CG       FOB        RSV/RSV%      FINAL       EXTRA
       NNN.N     NN.N%    NNN.N      NNN.N/N.N%     NNN.N       NNN.N
```



Inflight Report (Cont'd)

```
FMS 1 P/N STATUS                          FMS 2 P/N STATUS
   ----------------                          ----------------
                            FMS SOFTWARE
   xxxxxxxxxxxxxxx                           xxxxxxxxxxxxxxx
                            NAV DATABASE
   xxxxxxxxxxxxxxx                           xxxxxxxxxxxxxxx
                          FM AIRLINE CONFIG
   xxxxxxxxxxxxxxx                           xxxxxxxxxxxxxxx
                          FM OPTIONS CONFIG
   xxxxxxxxxxxxxxx                           xxxxxxxxxxxxxxx
                            PERF DATABASE
   xxxxxxxxxxxxxxx                           xxxxxxxxxxxxxxx

================================================================
```

■ Postflight Report

```
================================================================
  FM ACTIVE POSTFLIGHT REPORT                    DATE: DD MMM YY
                                                 TIME: HH:MM

     A/C TYPE     : XXXXXXXXXXX        DATABASE  : AANNNNNNNN
     ENG TYPE     : XXXXXXXXXXXXXXX    CYCLE     : DD MMM-DD MMM

     FLT NUMBER   : XXXXXXXXXX         FROM/TO   : XXXX/XXXX
     CO RTE       : XXXXXXXXXX         ALTN      : XXXX
     ALTN CO RTE  : XXXXXXXXXX

     PERF FACTOR : SN.N                COST INDEX: NNN
     IDLE FACTOR : SN.N

    FLIGHT PLAN DATA
    ----------------
                    DIST      TIME       CRZ FL
      DEST-XXXX   : NNNN      HH:MM      FLNNN
      ALTN-XXXX   : NNNN      HH:MM      FLNNN

      DEP RWY     : XXX                  ARV PRC   : XXXXXX
      DEP PRC     : XXXXXX               APR PRC   : XXXXXX
                                         ARV RWY   : XXX

     WPT     TIME    SPD/ALT     FOB    T. WIND    TAS SAT    CRS  DIST
    ----------------------------------------------------------------
    HISTORY VALUES
    WWWWWWW HH:MM NNN/AAAAA   NN.NN   DDD'/MMM   NNN SNN    NNNX NNNN
       :       :       :        :         :       :   :      :    :
    WWWWWWW HH:MM NNN/AAAAA   NN.NN   DDD'/MMM   NNN SNN    NNNX NNNN

    FUEL AND TIME SUMMARY
    ---------------------
      START UP                          SHUT DOWN
         FUEL    : NN.NN                   FUEL      : NN.NN
         WEIGHT  : NNN.N                   WEIGHT    : NNN.N
         TIME    : HH:MM                   TIME      : HH:MM
         TO TIME : HH:MM                   LDG TIME  : HH:MM

    IRS DATA AT: XXXXXXX
    --------------------    IRS 1          IRS 2         IRS 3
      AVERAGE DRIFT     - XX.X NM/H     XX.X NM/H     XX.X NM/H
      RESIDUAL GND SPD  - XX.X KTS      XX.X KTS      XX.X KTS

    FMS 1 P/N STATUS                              FMS 2 P/N STATUS
    ----------------                              ----------------
                              FMS SOFTWARE
    xxxxxxxxxxxxxxx                               xxxxxxxxxxxxxxx
                              NAV DATABASE
    xxxxxxxxxxxxxxx                               xxxxxxxxxxxxxxx
                            FM AIRLINE CONFIG
    xxxxxxxxxxxxxxx                               xxxxxxxxxxxxxxx
                            FM OPTIONS CONFIG
    xxxxxxxxxxxxxxx                               xxxxxxxxxxxxxxx
                              PERF DATABASE
    xxxxxxxxxxxxxxx                               xxxxxxxxxxxxxxx

================================================================
```

■ Secondary Preflight Report

```
================================================================
  FM SECONDARY PREFLIGHT REPORT                DATE: DD MMM YY
                                               TIME: HH:MM

    A/C TYPE    : XXXXXXXXXXX       DATABASE  : AANNNNNNNN
    ENG TYPE    : XXXXXXXXXXXXXX    CYCLE     : DD MMM-DD MMM

    FLT NUMBER  : XXXXXXXXXX        FROM/TO   : XXXX/XXXX
    CO RTE      : XXXXXXXXXX        ALTN      : XXXX
    ALTN CO RTE : XXXXXXXXXX

    PERF FACTOR : SN.N              COST INDEX: NNN
    IDLE FACTOR : SN.N

   CRUISE FL/STEP START WPT
   ------------------------
     CRZ FL 1    : FLNNN
     CRZ FL 2    : FLNNN/WWWWWWW
        :        :
     CRZ FL N    : FLNNN/WWWWWWW

   FLIGHT PLAN DATA
   ----------------
                   DIST     TIME      CRZ FL
     DEST-XXXX   : NNNN     HH:MM     FLNNN
     ALTN-XXXX   : NNNN     HH:MM     FLNNN

     DEP RWY     : XXX               ARV PRC  : XXXXXX
     DEP PRC     : XXXXXX            APR PRC  : XXXXXX
                                     ARV RWY  : XXX

    WPT    TIME   SPD/ALT    FOB   T. WIND   TAS SAT   CRS  DIST
   ----------------------------------------------------------------
   PREDICTED VALUES
   WWWWWWW HH:MM NNN/AAAAA  NN.NN  DDD'/MMM  NNN SNN   NNNX NNNN
      :      :      :         :        :      :   :      :    :
   WWWWWWW HH:MM NNN/AAAAA  NN.NN  DDD'/MMM  NNN SNN   NNNX NNNN

   FUEL PREDICTIONS
   ----------------
     TAXI         :  N.N              ZFWCG    :  NN.N%
     TRIP (DEST)  : NNN.N             ZFW      : NNN.N
     RSV          : NNN.N             TOW      : NNN.N
     ALTN         : NNN.N             LW       : NNN.N
     FINAL        : NNN.N             CG       :  NN.N%
     EXTRA        : NNN.N
     -------------------
      BLOCK       :  NN.N

   MISC PERF DATA
   --------------
     TROPOPAUSE  : AAAAA
     CLB TRANS   : AAAAA
     CRZ TEM     : SNN
```

Secondary Preflight Report (Cont'd)

```
FMS 1 P/N STATUS                          FMS 2 P/N STATUS
   ----------------                          ----------------
                          FMS SOFTWARE
   xxxxxxxxxxxxxxx                           xxxxxxxxxxxxxxx
                          NAV DATABASE
   xxxxxxxxxxxxxxx                           xxxxxxxxxxxxxxx
                       FM AIRLINE CONFIG
   xxxxxxxxxxxxxxx                           xxxxxxxxxxxxxxx
                       FM OPTIONS CONFIG
   xxxxxxxxxxxxxxx                           xxxxxxxxxxxxxxx
                          PERF DATABASE
   xxxxxxxxxxxxxxx                           xxxxxxxxxxxxxxx
================================================================
```

■ Secondary Inflight Report

```
================================================================
   FM SECONDARY INFLIGHT  REPORT                DATE: DD MMM YY
                                                TIME: HH:MM

     A/C TYPE    : XXXXXXXXXXX        DATABASE  : AANNNNNNNN
     ENG TYPE    : XXXXXXXXXXXXXX     CYCLE     : DD MMM-DD MMM

     FLT NUMBER  : XXXXXXXXXX         FROM/TO   : XXXX/XXXX
     CO RTE      : XXXXXXXXXX         ALTN      : XXXX
     ALTN CO RTE : XXXXXXXXXX

     PERF FACTOR : SN.N               COST INDEX: NNN
     IDLE FACTOR : SN.N

   CRUISE FL/STEP START WPT
   ------------------------
     CRZ FL 1    : FLNNN
     CRZ FL 2    : FLNNN/WWWWWWW
        :              :
     CRZ FL N    : FLNNN/WWWWWWW

   FLIGHT PLAN DATA
   ----------------
                   DIST      TIME       CRZ FL
     DEST-XXXX   : NNNN      HH:MM      FLNNN
     ALTN-XXXX   : NNNN      HH:MM      FLNNN

     DEP RWY     : XXX                  ARV PRC   : XXXXXX
     DEP PRC     : XXXXXX               APR PRC   : XXXXXX
                                        ARV RWY   : XXX

    WPT    TIME   SPD/ALT    FOB   T. WIND   TAS SAT   CRS  DIST
   ------------------------------------------------------------
   CURRENT POSITION : DXX-XX.X/DXXX-XX.X
           HH:MM NNN/AAAAA  NN.NN  DDD'/MMM  NNN SNN   NNNX NNNN
   ------------------------------------------------------------
   PREDICTED VALUES
   WWWWWWW HH:MM NNN/AAAAA  NN.NN  DDD'/MMM  NNN SNN   NNNX NNNN
      :      :      :         :        :      :   :      :    :
   WWWWWWW HH:MM NNN/AAAAA  NN.NN  DDD'/MMM  NNN SNN   NNNX NNNN

   FUEL INFORMATION AT HH:MM
   -------------------------
      WEIGHT      CG       FOB        RSV/RSV%      FINAL        EXTRA
       NNN.N     NN.N%    NNN.N      NNN.N/N.N%     NNN.N        NNN.N

   FMS 1 P/N STATUS                              FMS 2 P/N STATUS
   ----------------                              ----------------
                            FMS SOFTWARE
   xxxxxxxxxxxxxxx                               xxxxxxxxxxxxxxx
                            NAV DATABASE
   xxxxxxxxxxxxxxx                               xxxxxxxxxxxxxxx
                          FM AIRLINE CONFIG
   xxxxxxxxxxxxxxx                               xxxxxxxxxxxxxxx
                          FM OPTIONS CONFIG
   xxxxxxxxxxxxxxx                               xxxxxxxxxxxxxxx
                            PERF DATABASE
   xxxxxxxxxxxxxxx                               xxxxxxxxxxxxxxx

================================================================
```

Part IV

FMS DEGRADED OPERATIONS

PAGE INTENTIONALLY LEFT BLANK

PART IV: FMS DEGRADED OPERATIONS

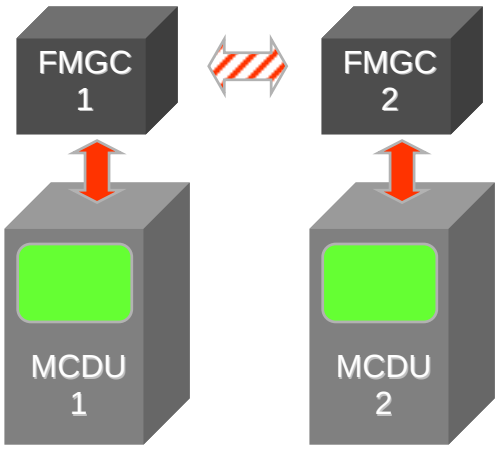
Contents

PAGE INTENTIONALLY LEFT BLANK

Chapter 1 - OVERVIEW

In the basic configuration, the aircraft is equipped with two FMGCs and two MCDUs.
One FMGC box consists of one FM (Flight Management) card and one FG (Flight Guidance) card. A failure may affect the FM or/and the FG card(s).
Additionally, an intersystem bus between the FMSs allows the FMSs to exchange information and synchronize.

Dual mode
The two FMSs are healthy and no conditions exist to prevent communication with each other. It is the normal operating mode.

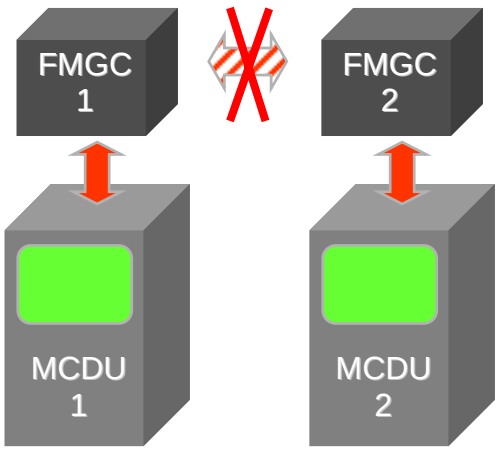


Synchronization / Reset
When in Dual mode, synchronization between the two FMS is performed:
Periodically, in order to keep the Slave FM synchronized with Master FM along the flight,
In case of difference or discrepancy between the two FMSs.
There is no cockpit indication that FM synchronization is being performed.
After any software reset, power transient or FM fail condition, automatic resynchronization from the 'healthier' FM to the 'unhealthier' FM is performed.

If errors are detected the FMS attempts to correct the situation by automatic software resets.
If the error cannot be corrected the system is considered failed. It may be latched or reset manually.

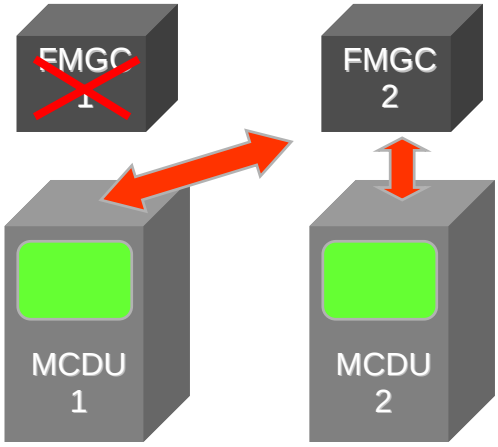
Independent mode

The two FMSs are healthy, but conditions exist to prevent communication with each other or the FMSs are in disagreement.



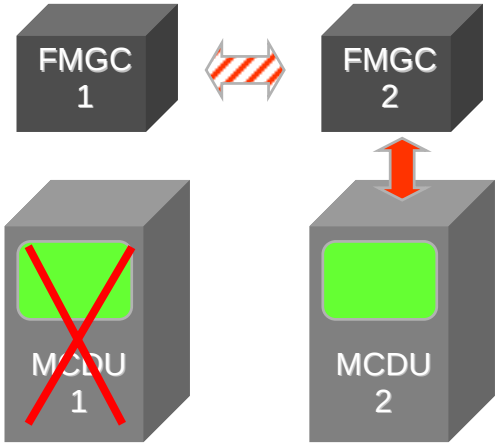
Single mode

One of the two FMSs has failed.
This mode supersedes both the DUAL and INDEPENDENT modes (e.g. a FMGC fails while in the INDEPENDENT mode, the remaining FMGC reverts to the SINGLE mode).
Note:
If FM is failed, FMGC is out of order.



MCDU failure

Failure may affect the MCDU only.
In this case FMGC access is limited to the onside operative MCDU.



Chapter 2 - FMGC RESETS AND FAILURES

An automatic FMGC reset corresponds to an interruption of the operational software processing.

A reset may be single or multiple.

A reset is always followed by a resynchronization with the other FMS.

When FM is failed, FMGC is unavailable; FM and FG are lost.

2.1. Automatic Single Reset of one FMGC

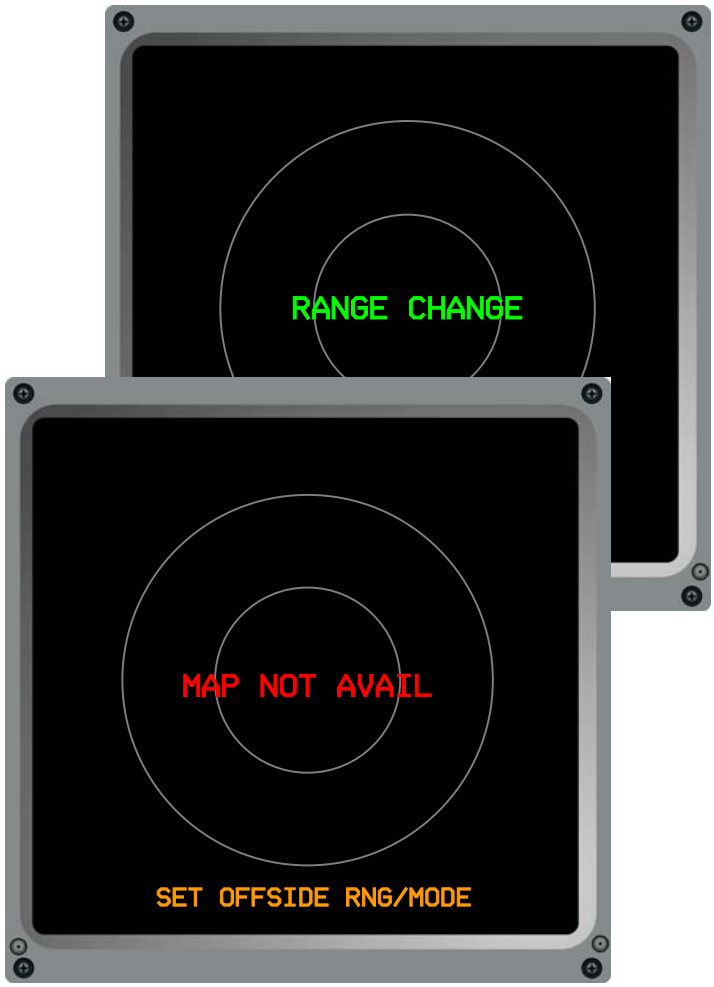
INDICATIONS IN THE COCKPIT

On ECAM

- If AP disconnects: Red warning AUTO FLT AP OFF and aural warning.
- If A/THR disconnects: Amber caution AUTO FLT A/THR OFF and aural warning.

On the affected side:

ND: RANGE CHANGE message (green), followed by red flag MAP NOT AVAIL is displayed. The SET OFFSIDE RNG/MODE message (amber) is displayed if the two ND ranges or modes selected on the EFIS control panels are different.
Navaids auto-tuning is momentarily lost.



AP: If engaged, the onside **AP** & **A/THR** may disconnect and managed modes **revert** to selected modes (HDG-V/S or TRK/FPA). Use the other AP as necessary.

FMA: Indicates auto-systems degradation.

Single reset of one FMGC (Cont'd)

MCDU failed side:
MCDU may momentarily revert to MCDU menu page with FMGC (OPP) prompt in [1L] field, which is then replaced by the FMGC (OWN) prompt. SELECT DESIRED SYSTEM message (white) is displayed on scratchpad.
The FM FAIL annunciator (amber) may illuminate momentarily.

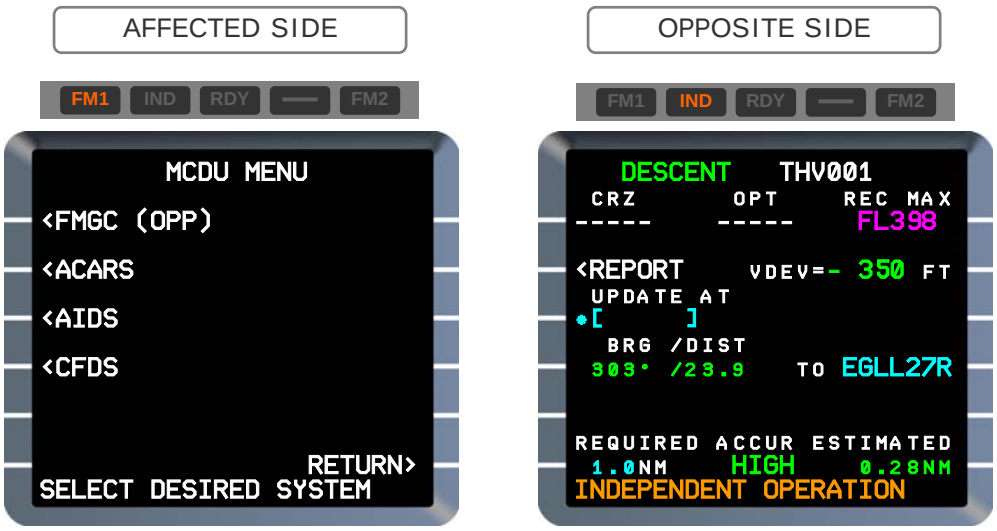
Note:

During FMGC reset, MCDU keys do not respond for FMS functions but are available for the other systems.

On the opposite side:

MCDU:
- The amber IND annunciator may illuminate momentarily and INDEPENDENT OPERATION message (amber) may be displayed on scratchpad.
- If engaged the onside **AP** is not affected.

FMA: Indicates auto-systems degradation.

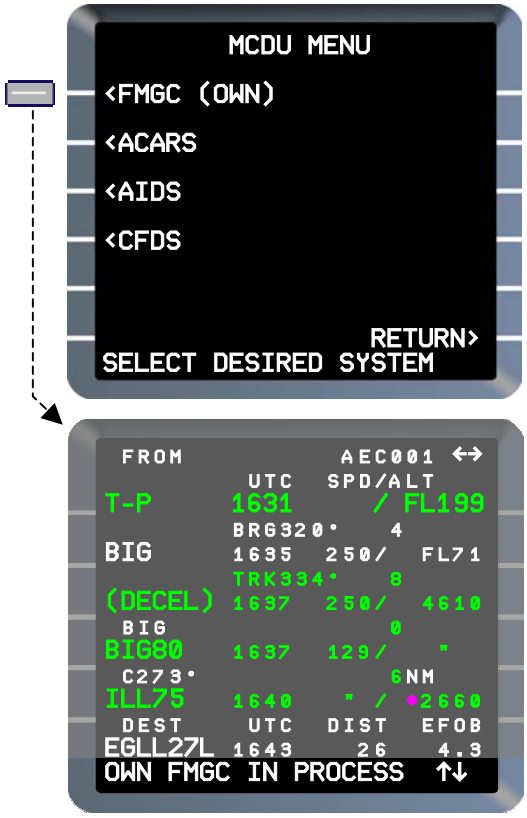


Single reset of one FMGC (Cont'd)

RECOVERY

On the affected side:

All FMS data are stored.
When FMS reset and resynchronization with the other FMS are completed, all functions are automatically recovered.



FMA .....Check
Re-engage AP/FD-A/THR modes as convenient.

- **If MCDU menu page displays:**
  FMGC (OWN) prompt in [1L] field,
  SELECT DESIRED SYSTEM message (white) on scratchpad,
  FMGC prompt [1L] page .....
  ..... Press

MCDU displays:
– Last FMS page used,
– OWN FMGC IN PROCESS scratchpad message (white).

EFIS PANEL .....
..... Mode/Range re-select
Temporarily SELECT a different mode or range on the corresponding EFIS control panel, in order to recover ND display and delete MAP NOT AVAIL and/or SET OFFSIDE RNG/MODE messages.

On the opposite side:
No action is required.

2.2. Automatic Double Reset of one FMGC

A reset is termed double when a second reset occurs within one minute following the first.

As after one reset, internal data of the FM are retrieved from the memory, the reset "context" has not changed, which can sometimes result in the same reset a second time.

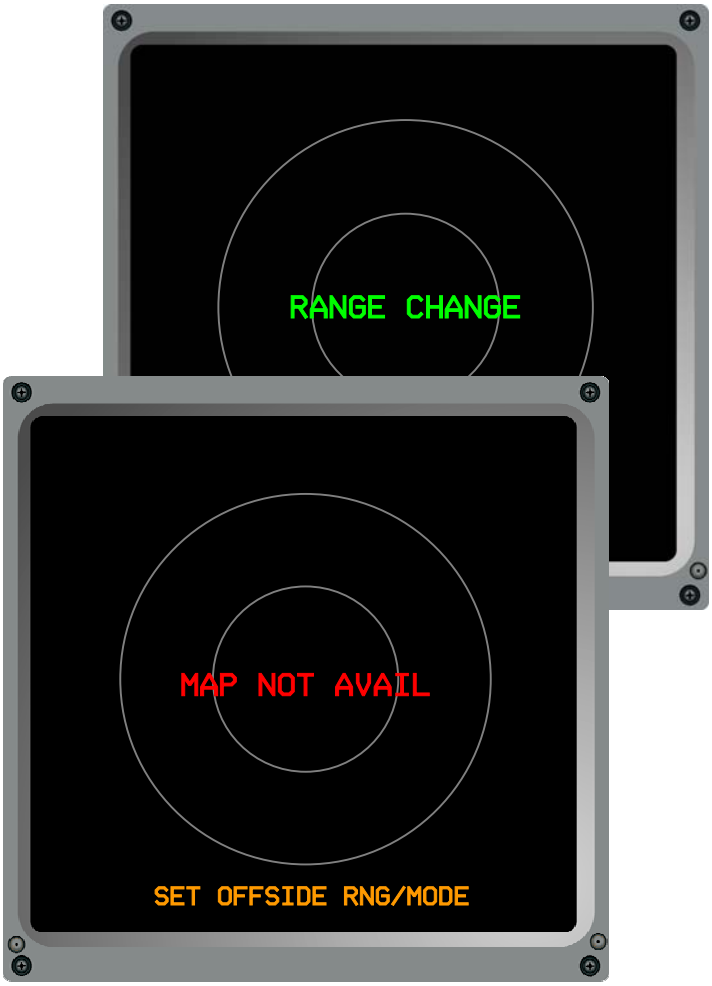
INDICATIONS IN THE COCKPIT

On ECAM

- If AP disconnects: Red warning AUTO FLT AP OFF and aural warning.
- If A/THR disconnects: Amber caution AUTO FLT A/THR OFF and aural warning.

On the affected side:

ND: RANGE CHANGE message (green), followed by red flag MAP NOT AVAIL is displayed. The SET OFFSIDE RNG/MODE message (amber) is displayed if the two ND ranges or modes selected on the EFIS control panels are different. Navaids auto-tuning is momentarily lost.



AP: If engaged, the onside **AP** & **A/THR** may disconnect and managed modes **revert** to selected modes (HDG-V/S or TRK/FPA).
Use the other AP as necessary.

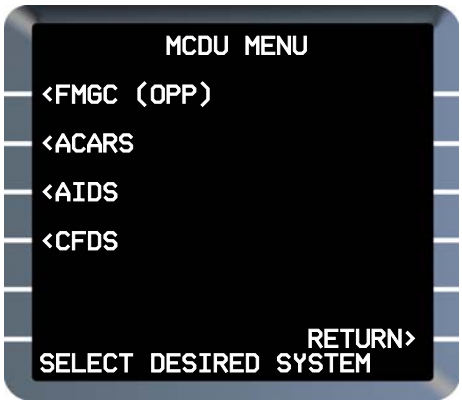
FMA: Indicates auto-systems degradation.

Double reset of one FMGC (Cont'd)

MCDU failed side:

MCDU reverts on MCDU menu page, which displays:

- FMGC (OPP) prompt in [1L] field is displayed,
- Then replaced by the FMGC (OWN) prompt.
- SELECT DESIRED SYSTEM message (white) on scratchpad.
- The FM FAIL annunciator (amber) may illuminate momentarily.



Note:

During FMGC reset, MCDU keys do not respond for FMS functions but are available for the other systems.

On the opposite side:

MCDU:

- The amber IND annunciator may illuminate momentarily and INDEPENDENT OPERATION scratchpad message (amber) may be displayed.
- If engaged the onside **AP** is not affected.

FMA: Indicates auto-systems degradation.

AFFECTED SIDE

OPPOSITE SIDE

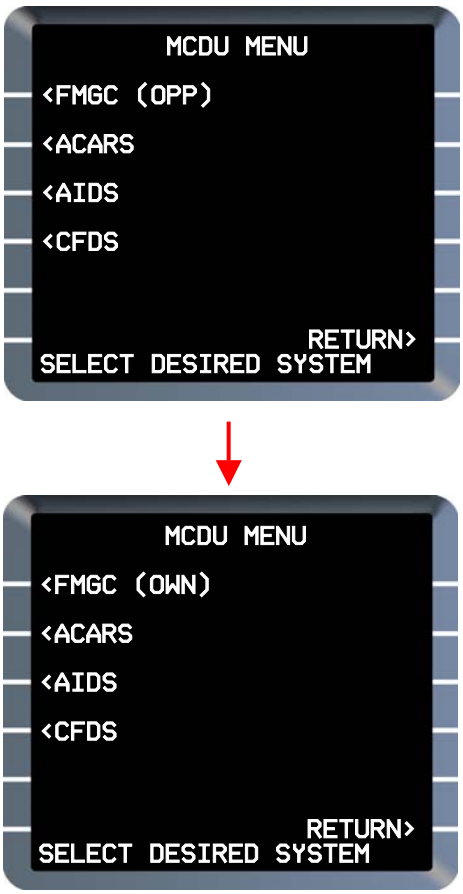
Double reset of one FMGC (Cont'd)

RECOVERY

On the affected side:

End of FMS reset and synchronization are confirmed when FMGC (OWN) replaces FMGC (OPP) prompt.
This takes few seconds.

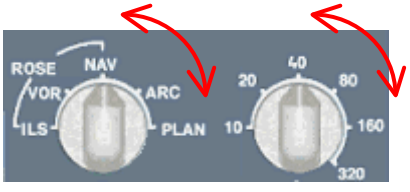
Note:
All FMS data are erased during the reset and then recovered through the dual function and synchronization with the other FMS.



FMA.....Check
Reengage AP/FD-A/THR modes as convenient.

FMGC OWN prompt [1L] page .....Press
A/C STATUS page and OWN FMGC IN PROCESS scratchpad message (white) are displayed.
Select MCDU pages as desired.

EFIS PANEL .... Mode/Range re-select
Temporarily SELECT a different mode or range on the corresponding EFIS control panel, in order to recover ND display and delete MAP NOT AVAIL and/or SET OFFSIDE RNG/MODE messages.

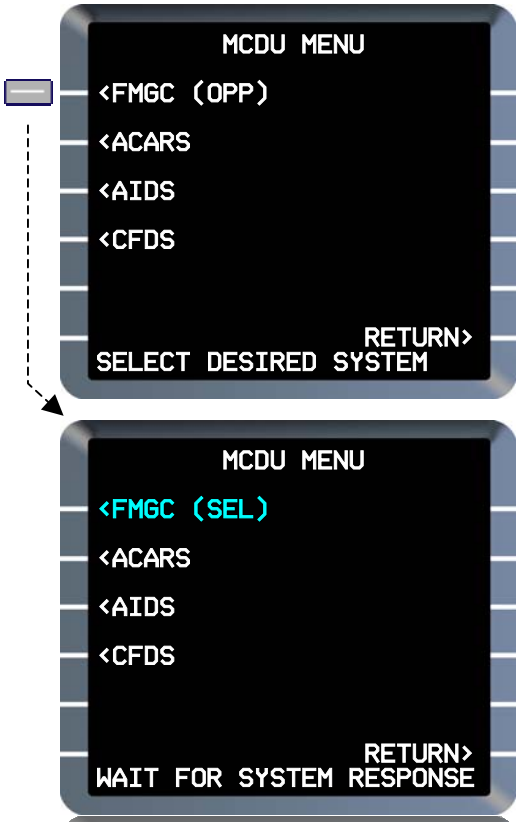


Double reset of one FMGC (Cont'd)

- **If FMGC OPP [1L] is selected before end of reset:**

Caution
This is not recommended.

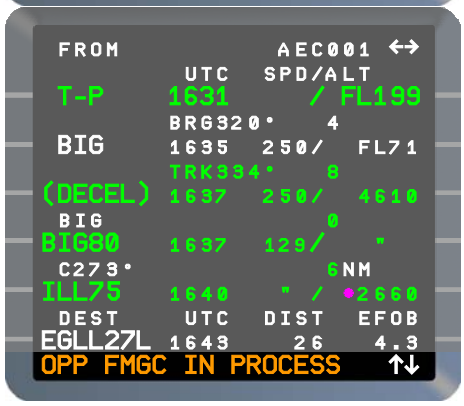
– FMGC SEL) prompt (blue) and WAIT FOR SYSTEM RESPONSE scratchpad message (white) are displayed,
– MCDU displays the last FMS page used with data coming from the opposite FMGC. This is indicated by OPP FMGC IN PROCESS scratchpad message (amber).



OR

- **If a FMS function key is pressed.**

This gives the same result as above.

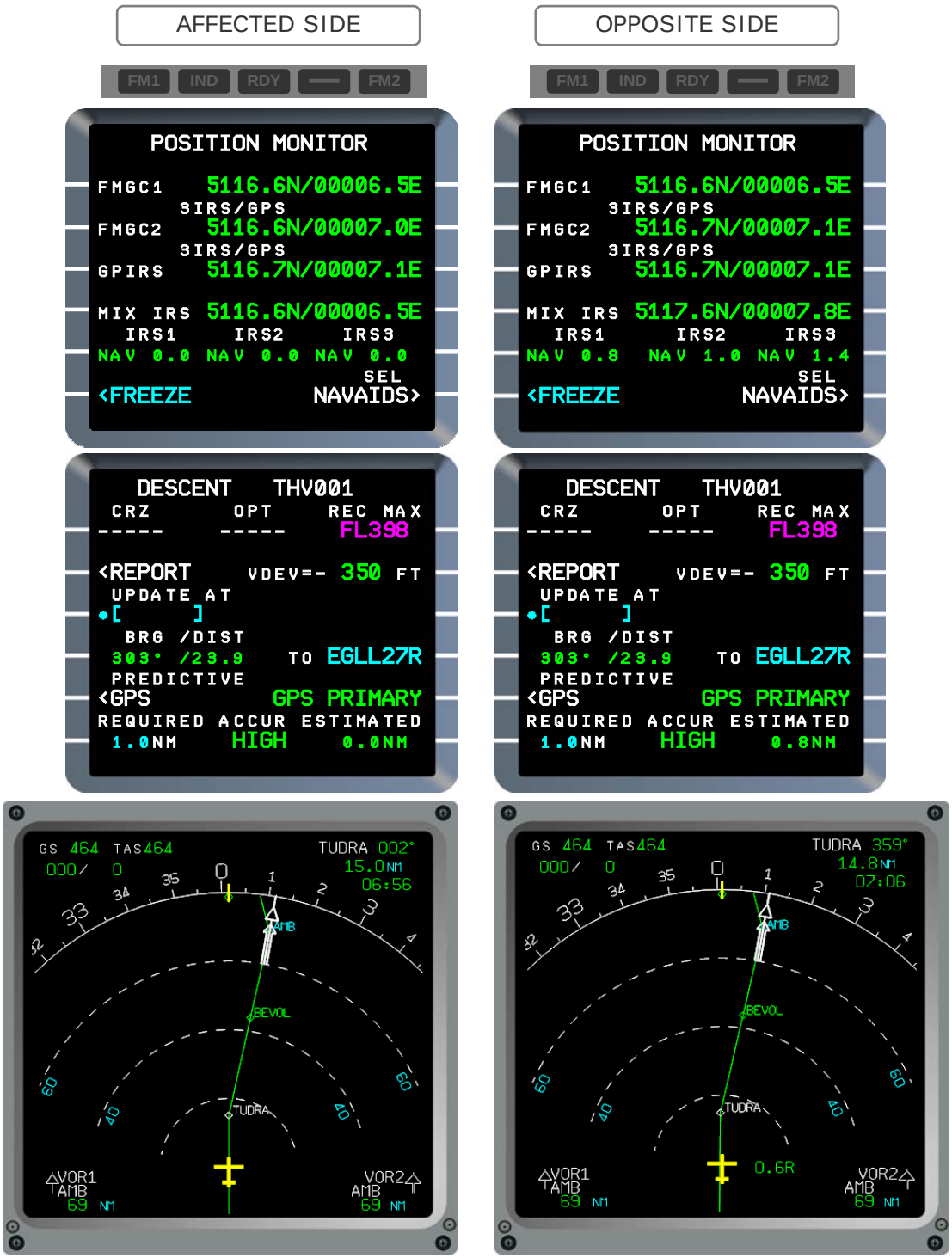


When FMS reset and synchronization are terminated, OWN FMGC IN PROCESS message (white) is displayed on scratchpad.

On the opposite side:
No action is required

Double reset of one FMGC (Cont'd)

After a double reset the affected FMS position is reinitialized to the IRS position. IRS DRIFT and EPE are reinitialized to zero. IRS drift is estimated again using GPS (if available) or Radio position. Therefore a difference may appear between the two FMSs. Select AP accordingly.



Caution

It is not recommended to perform a manual reset with C/B. Pulling the C/B during the minute following a Double Reset may lead to a “Degraded mode".

2.3. Automatic Triple Reset of one FMGC

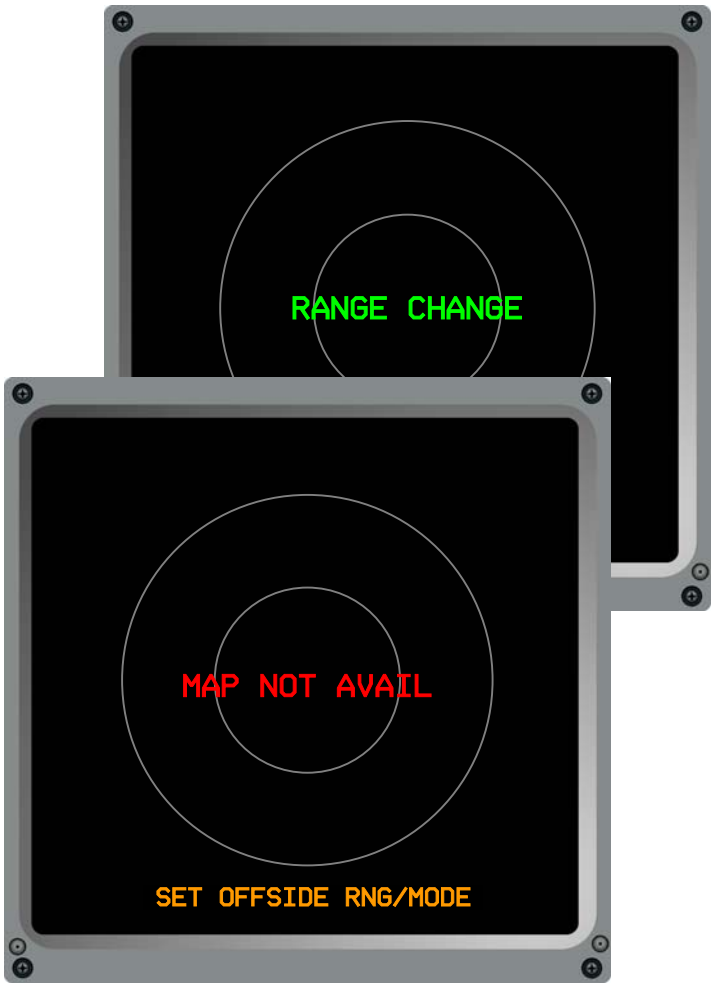
If a third reset occurs within the minute following the last one the FMS will pass in degraded SINGLE mode.

INDICATIONS IN THE COCKPIT

On ECAM:
- Red warning AUTO FLT AP OFF and aural warning.
- Amber caution AUTO FLT A/THR OFF and aural warning.

On the affected side:

ND: RANGE CHANGE message (green), followed by red flag MAP NOT AVAIL is displayed. The SET OFFSIDE RNG/MODE message (amber) is displayed if the two ND ranges or modes selected on the EFIS control panels are different. Navaids auto-tuning is lost.



AP: If engaged, the onside **AP** & **A/THR** disconnect. FD disappear.
Use the other AP as necessary.

FMA: Indicates auto-systems degradation.

MCDU failed side:
The MCDU reverts to the MCDU menu page with:
FMGC (OPP) prompt in [1L] field,
SELECT DESIRED SYSTEM message (white) on scratchpad.
The amber FM FAIL annunciator illuminates.

Triple reset of one FMGC (Cont'd)

On the opposite side:

MCDU:

- The failure is confirmed by POSITION MONITOR page on which the affected FM position is dashed.
- If engaged the onside **AP** is not affected.

FMA: Indicates auto-systems degradation.

RECOVERY

On the affected side:

The A/C is operated in **SINGLE mode** with the remaining FMGC.

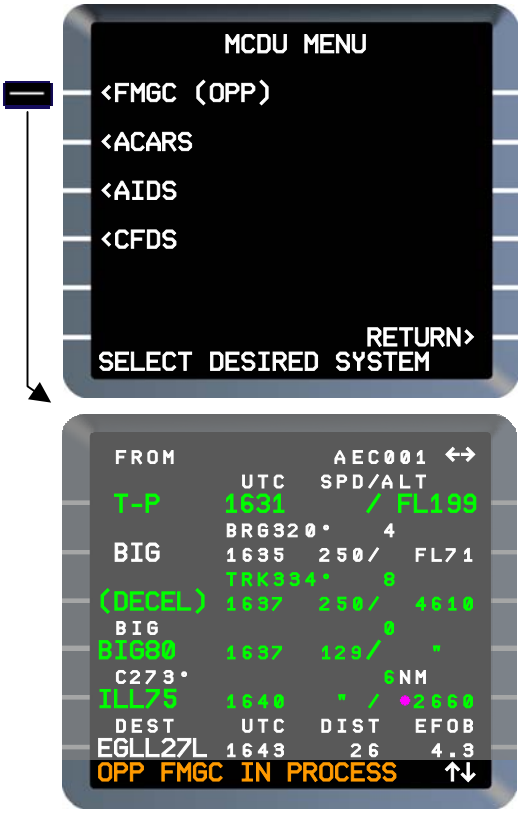
FMA.....Check
Use opposite AP.

MCDU menu page displays:

- FMGC (OPP) prompt in [1L] field,
- SELECT DESIRED SYSTEM message (white) on scratchpad.

WAIT 2 minutes to be sure that the FM is in degraded mode.
THEN,

FMGC prompt [1L] page .Press
MCDU displays the last FMS page used, with OPP FMGC IN PROCESS message (amber) on scratchpad.
Select MCDU pages as desired.



Triple reset of one FMGC (Cont'd)

EFIS PANEL .....
..... Mode/Range re-select
Temporarily SELECT a different mode or range on the corresponding EFIS control panel, in order to recover ND display and delete MAP NOT AVAIL and/or SET OFFSIDE RNG/MODE messages.

The operation in **SINGLE** mode is described in Ch. 2.7.

Caution
Manual reset may be attempted by resetting the associated C/B.
In this case, apply the following procedure:
– Pull C/B for 5 seconds,
– Wait 1 minute,
– Pull again C/B for 5 seconds.
Or
– Pull C/B for 12 minutes.

On the opposite side:
No action is required

2.4. Automatic Single Reset of both FMGCs

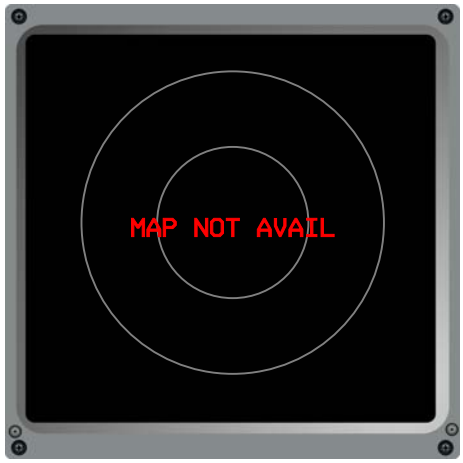
INDICATIONS IN THE COCKPIT

On ECAM

- If AP disconnects: Red warning AUTO FLT AP OFF and aural warning,
- If A/THR disconnects: Amber caution AUTO FLT A/THR OFF and aural warning.

On both sides:

ND: red flag MAP NOT AVAIL is displayed.
Navaids auto-tuning is momentarily lost.



AP: If engaged, the onside **AP** & **A/THR** may disconnect and managed modes revert to selected modes (HDG-V/S or TRK/FPA).

FMA: Indicates auto-systems degradation.

MCDUs:
May revert momentarily to MCDU MENU page, with:

- FMGC (OWN) prompt in [1L] field,
- SELECT DESIRED SYSTEM scratchpad message (white), or,
- OWN FMGC IN PROCESS scratchpad message (white)

The amber FM FAIL annunciators may illuminate momentarily.

Note:

During FMGC reset, MCDU keys do not respond for FMS functions but are available for the other systems.

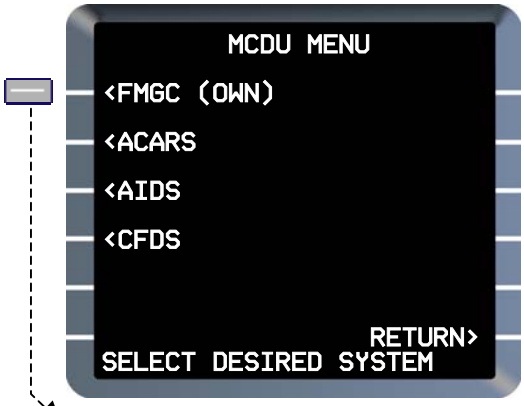
Screens shown are examples

Single Reset of both FMGCs (Cont'd)

RECOVERY

The FMs data are stored.
When FMGCs resets are terminated, data are retrieved from memory and all functions are recovered.

FMA .....Check
Re-engage AP/FD-A/THR modes as convenient.



- **If MCDU menu page is displayed,** with FMGC (OWN) prompt in [1L] field and SELECT DESIRED SYSTEM scratchpad message (white):

  FMGC prompt [1L] page Press
  The MCDU displays the last FMS page used.

MCDU displays:
– Last FMS page used,
– OWN FMGC IN PROCESS message (white) on scratchpad.

EFIS PANEL .....
..... Mode/Range re-select
Temporarily SELECT a different mode or range on the corresponding EFIS control panel, in order to recover ND display and delete MAP NOT AVAIL and/or SET OFFSIDE RNG/MODE messages.

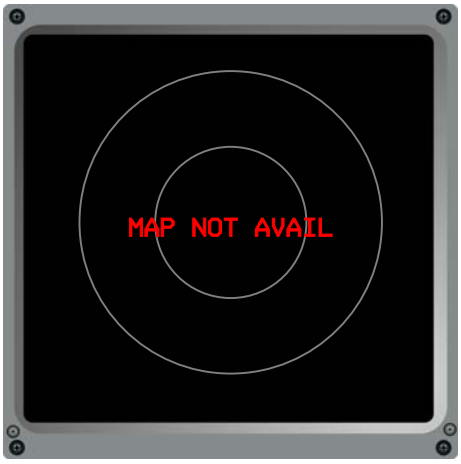
2.5. Automatic Double Reset of both FMGCs

As after one reset, internal data are retrieved from internal memory, the reset "context" has not changed, which can lead to raise, in exceptional conditions, to the same reset a second time.
In this case all FMSs data would be lost.

INDICATIONS IN THE COCKPIT

On ECAM

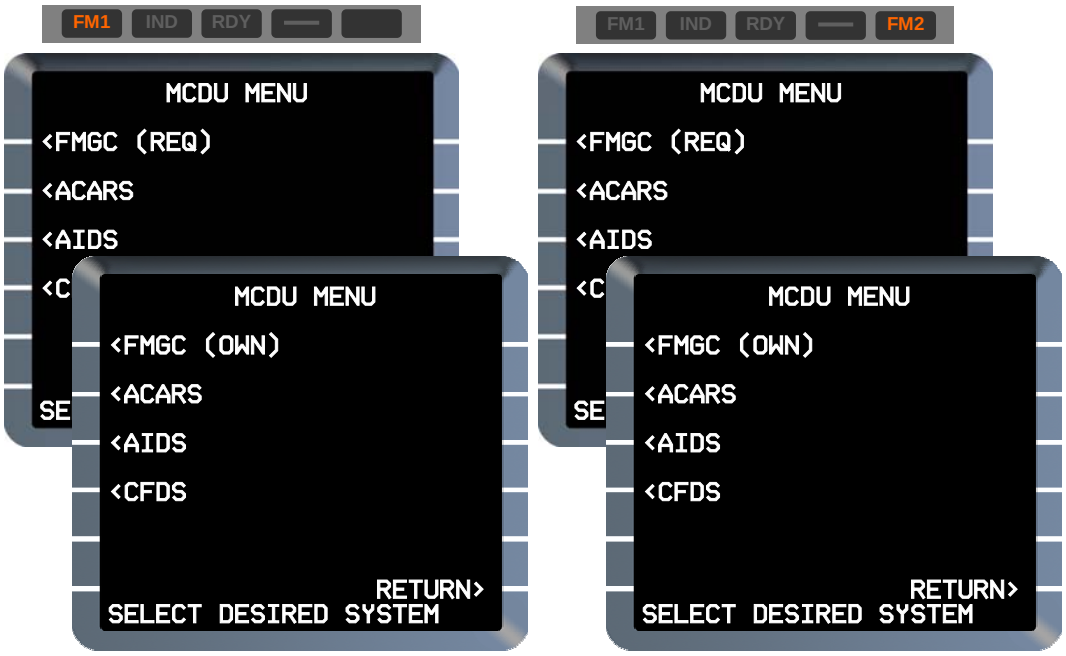
- If AP disconnects: Red warning AUTO FLT AP OFF and aural warning,
- If A/THR disconnects: Amber caution AUTO FLT A/THR OFF and aural warning.
- CAB PR LDG ELEV FAULT message is displayed.



On both sides:

ND: red flag MAP NOT AVAIL is displayed. Navaids auto-tuning is lost.
AP: If engaged, the onside **AP** & **A/THR** may disconnect and managed modes revert to selected modes (HDG-V/S or TRK/FPA).
FMA: Indicates auto-systems degradation.
MCDUs:

- MCDU menu page is displayed with FMGC (REQ) prompt in [1L] field, followed by FMGC (OWN) prompt in [1L] and SELECT DESIRED SYSTEM message (white) on scratchpad.
- The amber FM FAIL annunciator illuminates.



Double Reset of both FMGCs (Cont'd)

RECOVERY

The FMSs data are erased.
All entered data and F-PLN in the two FMSs are lost.

FMA .....Check
Reengage AP/FD-A/THR modes as convenient in selected modes.

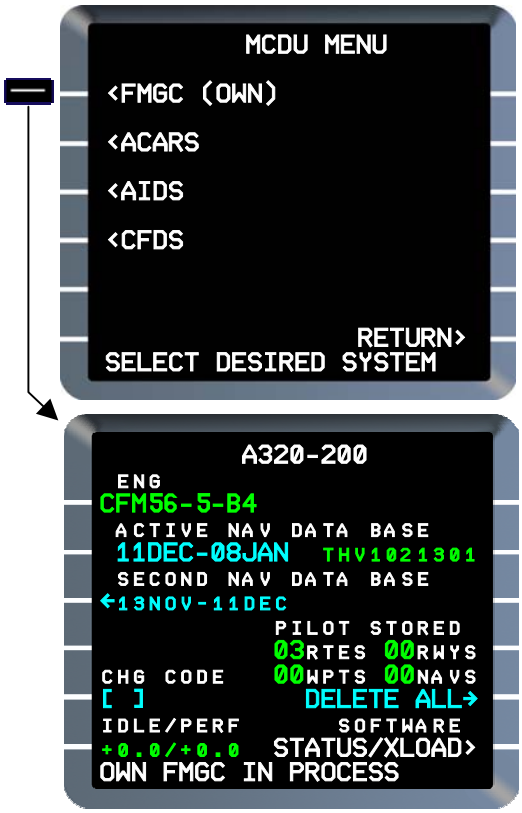
Data may be reentered from neither MCDU. The second FMGC will synchronize itself automatically.

FMGC prompt [1L] page Press
A/C STATUS page is displayed.
Some MCDU messages are stacked, such:

- OWN FMGC IN PROCESS (white)
- GPS PRIMARY (white)
- NEW CRZ ALT XXX (white)
- INITIALIZE WEIGHTS (amber)

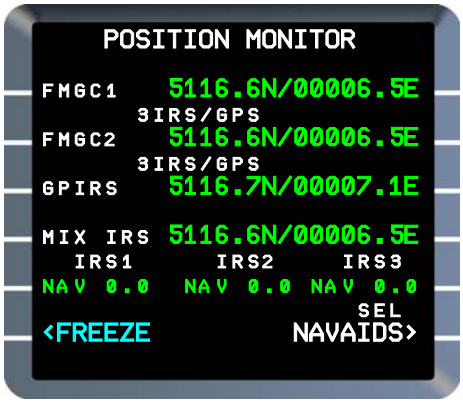
The following anomalies are encountered:

- NAV database cycle may have switched,
- F-PLN page is empty,
- FUEL predictions are lost due to loss of GW,
- On PROG page CRZ FL is reset to the FCU value,
- On PERF page CI is lost,
- Entered speeds are lost.



Double Reset of both FMGCs (Cont'd)

The affected FMS position is reinitialized to the IRS position. IRS DRIFT and EPE are reinitialized to zero.



After the FMGCs reset several messages are stacked in the scratchpad, for example:

- "GPS PRIMARY LOST"
- "GPS PRIMARY"
- "NEW CRZ ALT HHHHH"
- "USING COST INDEX XX"

Identify and clear these messages.

Perform a FMS re-initialization as described below.

Note:

Any data entered on one FMGC will be synchronized to the other through the dual mode system.

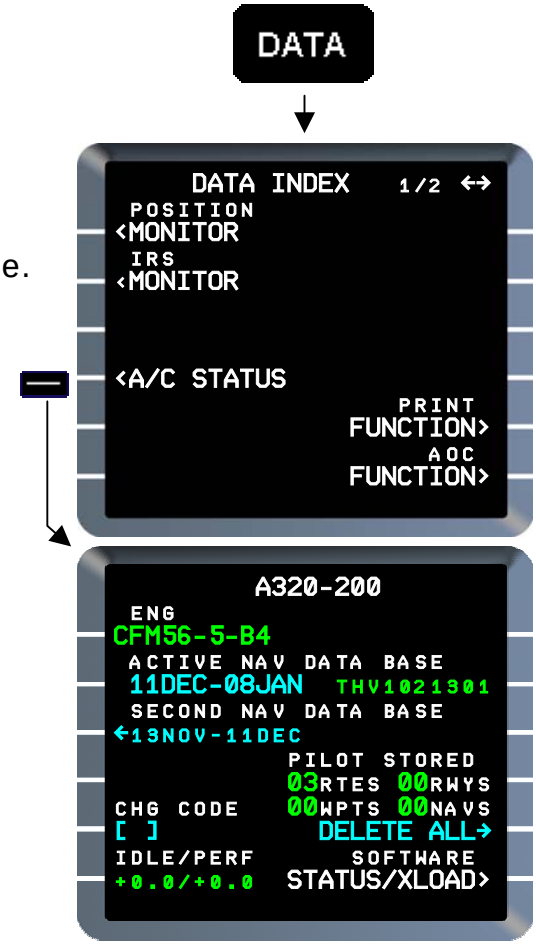
2.6. FMS re-initilization

1. DATA-A/C STATUS PAGE

DATA key ..... Press

A/C STATUS [4L] ..... Press

ACTIVE NAV DATABASE.Check
Check/Select the correct NAV data base.



2. DIR TO PAGE

DIR key .....Press

WAYPOINT [1L] .....Insert
Write and enter in scratchpad the desired TO WPT in order to initialize a leg in the active F-PLN.

- **If DUPLICATE NAMES page is displayed:**

  NAVAID .....Select

DIR TO is displayed in yellow.

ND.....Check
Check consistency of the dashed yellow line.

DIR TO INSERT .....Press
The F-PLN page is displayed.

3. F-PLN PAGE

LAT REV at TO WPT [2L] Press

NEW DEST field [4R] ..... Press
Insert the destination airport.
TMPY F-PLN is displayed.
Check ND for consistency.

TMPY INSERT prompt [6R].....

..... Press
The F-PLN page is displayed.

4. FUEL PAGE

When FMGC is reselected, INITIALIZE WEIGHTS message (amber) is displayed on scratchpad.

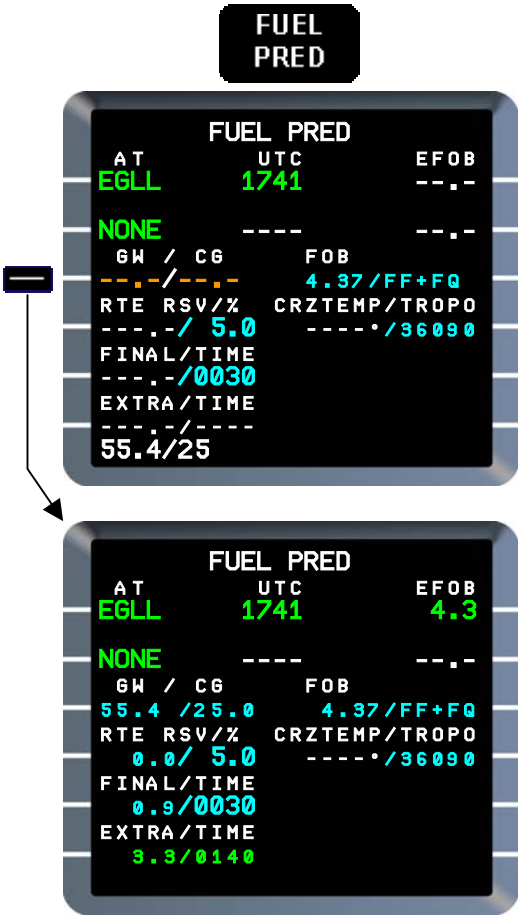
FUEL PRED key.....Press

GW/CG [2L] .....Insert
Insert the actual GW and CG.
The FMGS is now able to compute Fuel predictions.

USING COST INDEX XX message (white) is displayed on scratchpad.
COST INDEX is defaulted to the CI used in the previous flight.

Note:

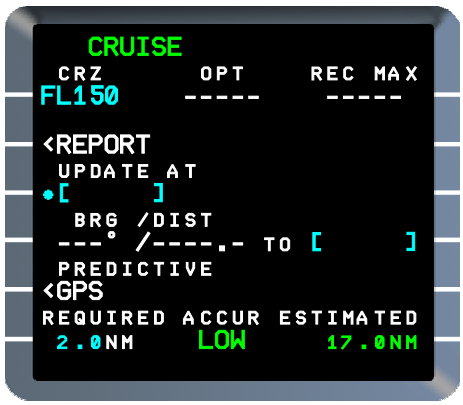
If the entered GW value differs from value computed by the FAC by more than 7 tons, CHECK GW scratchpad message (amber) is triggered.



5. PROG PAGE

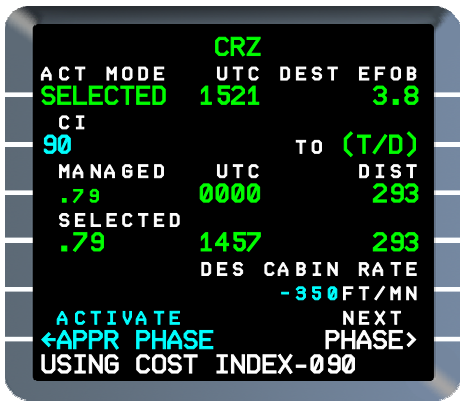
When FMGC is reselected NEW CRZ ALT XXX scratchpad message (white) is displayed. The value is defaulted to the FCU value when FMGC is reselected.

CRZ FL..... Adjust



6. PERF PAGE

Revise CI as necessary.



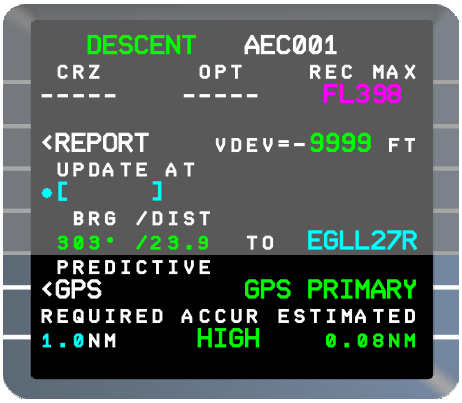
7. AP/FD

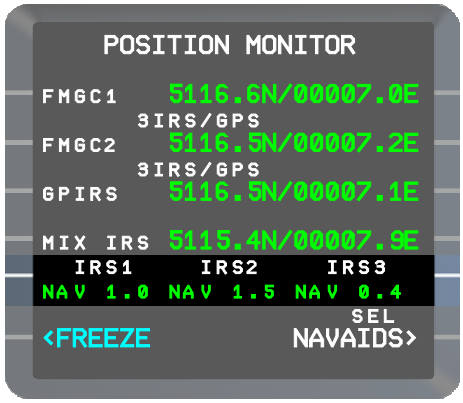
Select AP/FD modes as desired.

8. ACCURACY CHECK

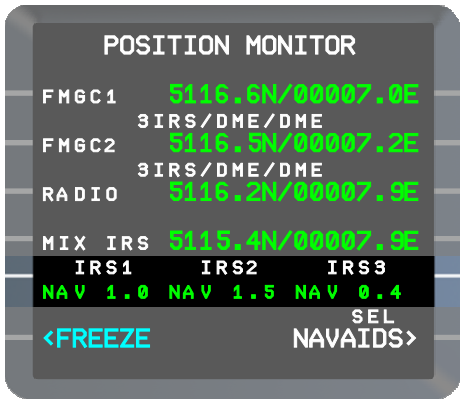
Upon the A/C configuration check ACCUR on PROG page, and the FMGC position on POSITION MONITOR page.

A/C with GPS:





A/C without GPS or if GPS is not available:



Use raw data to confirm position.

9. F-PLN PAGE

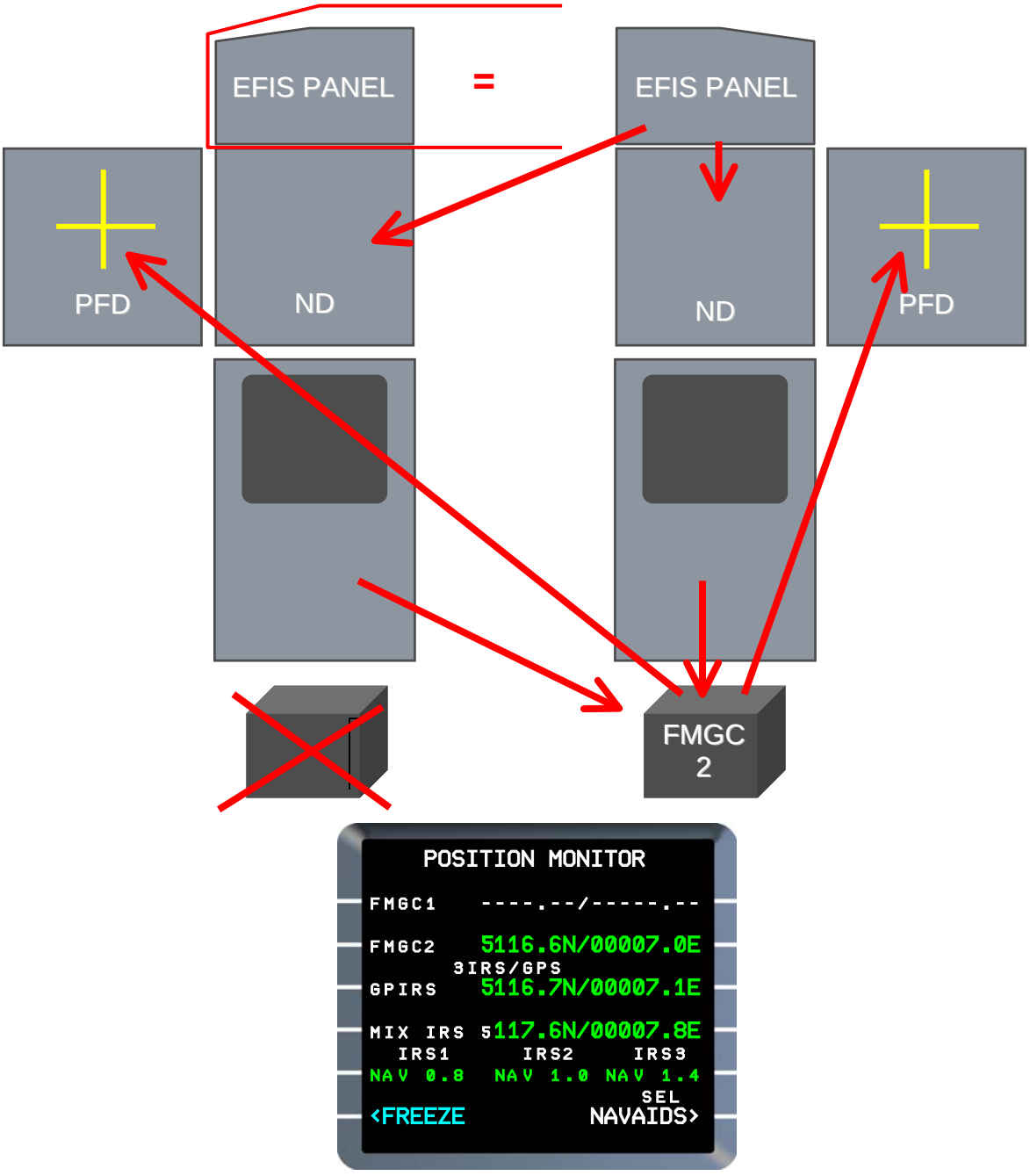
Redefine the flight plan for the remainder of the flight.

2.7. DEGRADED MODES

■ SINGLE mode

FMA .....Check
AP/FD are commanded by the remaining FMGC select AP 1/2 accordingly.

EFIS RNG/MODE .....Select
EFIS panel selection on the failed side must be identical to the remaining FM side. Display is same on both NDs, otherwise SET OFFSIDE RANGE/MODE is displayed on failed side ND.



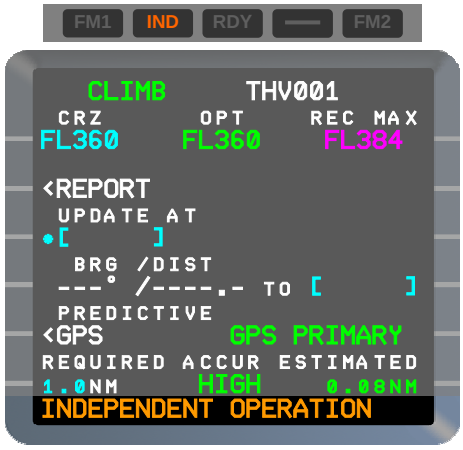
■ INDEPENDENT mode

This may occur after several attempts of resynchronization or when data base is loaded in the FMSs.
The two FMSs are healthy but in disagreement on some criteria, or cannot communicate and synchronize. Each FMGC operates independently.

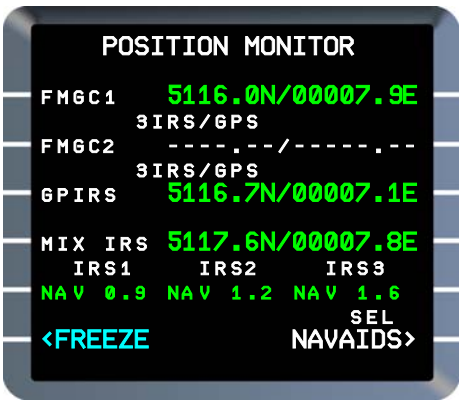
INDICATIONS IN THE COCKPIT

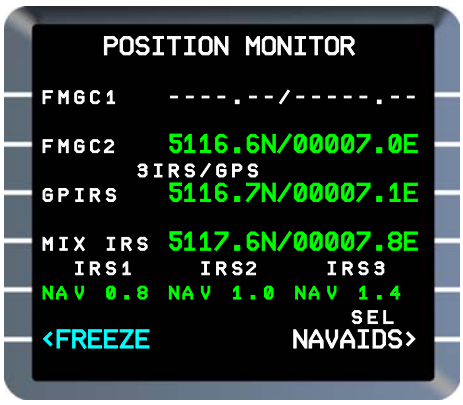
MCDUs:

- INDEPENDENT OPERATION scratchpad message (amber) is displayed.
- The front panel annunciator IND is illuminated on the two MCDUs.



- On POSITION MONITOR page the opposite FMGC position is not displayed. Discrepancies between the two FMGCs position may exist.





- On RAD NAV page navaids tuned on the opposite MCDU are not displayed. Corresponding fields are blank.

PILOT ACTION

On ground:

– CHECK Software/Databases references on each MCDU.
If difference exists, a CROSSLOAD must be performed. Refer to operator or maintenance procedure.

Note:

Crossload function is operative in the preflight or done phase only.

In flight :

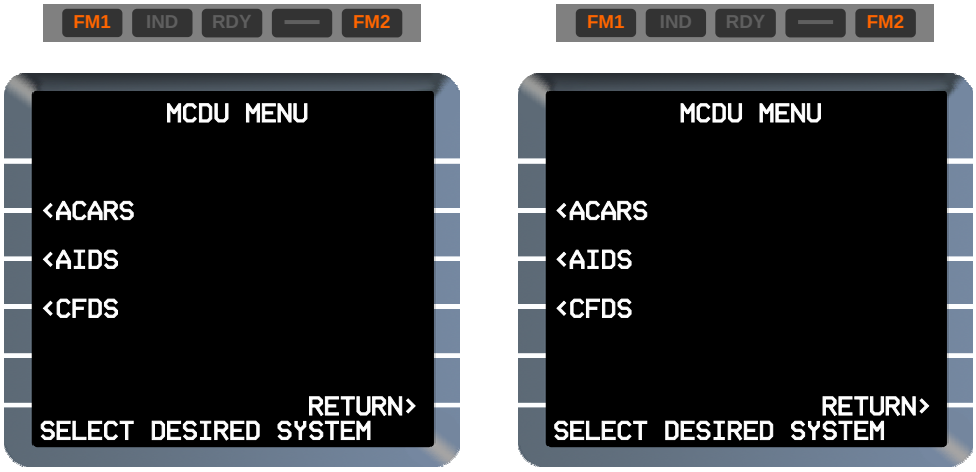
– Do not switch the NAV data bases.
– Make the same entries on both MCDUs to have similar F-PLN data and computations in both FMGC.
– If significant differences exist in the two FMGCs, identify the most accurate and use the associated AP.

> **Caution**
> Airbus does not recommend pulling one FMGC circuit breaker to force the system to operate in SINGLE mode.

■ Both FMGC failure

INDICATIONS IN THE COCKPIT

In case of Dual failure:
On ECAM the following messages are displayed:
– "CAB PR LDG ELEV FAULT",
– "AUTO FLT AP OFF", if AP was engaged,
– "AUTO FLT A/THR OFF", if A/THR was engaged.
AP/FD:
– FM and FG capability are lost. AP/FD, A/THR are lost.
NDs:
– On both NDs the red flag MAP NOT AVAILABLE is displayed.
– Navaid tuning is not performed.
MCDU:
– MCDU menu page is displayed and the FMGC prompt is no more available.

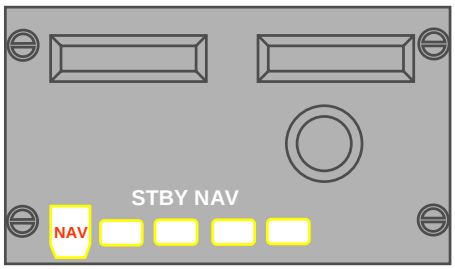


PILOT ACTION

A/C must be flown in raw data.

RMPs B/Up mode .....Select

NAVAIDS..... Manually tuned



Consider manual reset one by one of the two FMGCs.
If recovered, all pilot-entered data will have been lost.

2.8. MAP NOT AVAIL remains displayed on ND

If MAP NOT AVAIL remains displayed on ND with "SET OFFSIDE RNG/MODE" message (amber),

EFIS PANEL .....
..... Mode/Range re-select

Temporarily SELECT a different mode or range on the corresponding EFIS control panel.

Chapter 3 - MCDU ANOMALIES

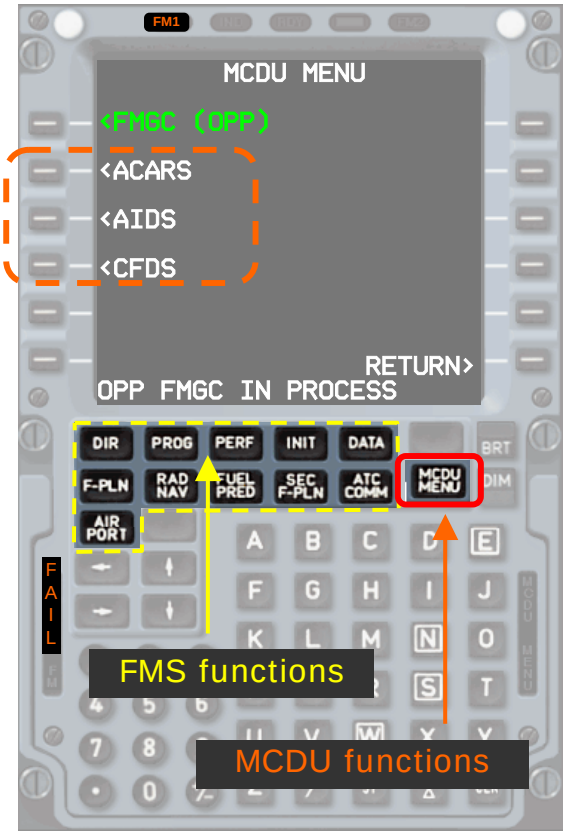
3.1. MCDU locked or blank

The MCDU allows communication with FMGC and other subsystems such ACARS, CFDS.
MCDU may become, blank or frozen.

If this occurs:

MCDU MENU key ..... Press

- **If MCDU MENU key does not respond to pilot request:**
  Failure is coming from MCDU.
  - Use the other MCDU and associated FMGC
  - The amber FAIL annunciator may be illuminated,
  - Consider MCDU reset through the associated C/B.
    Refer to Airbus FCOM or Operator's Manual for C/B location and procedure.



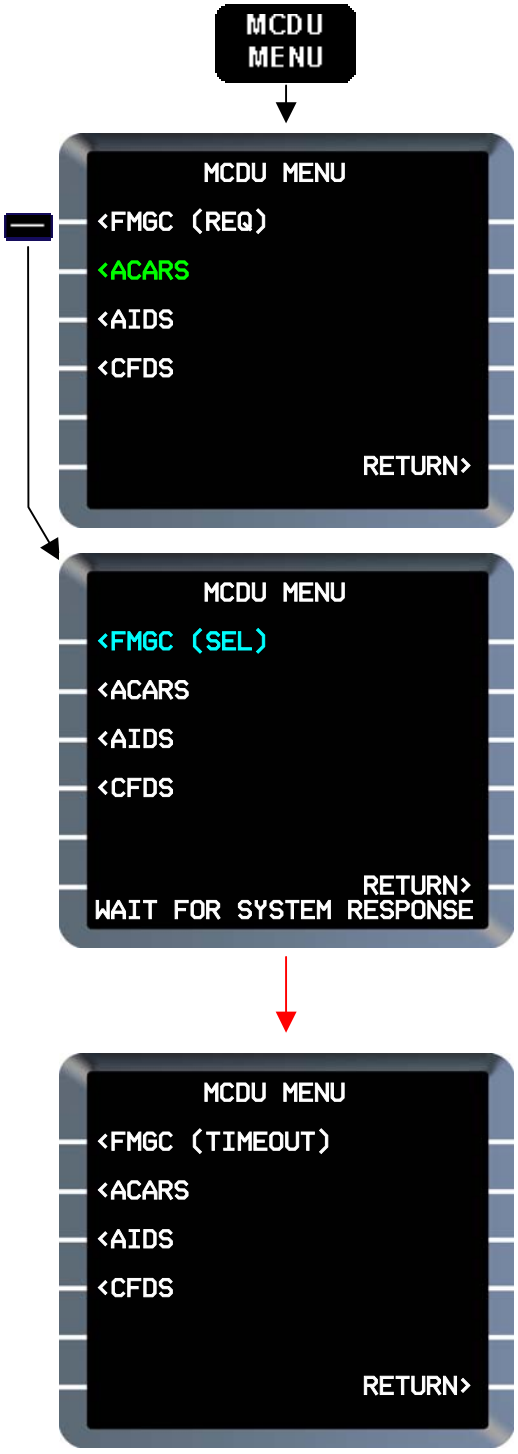
- **If MCDU MENU key responds to pilot request:**
  - The MCDU is working properly.
  - Failure is linked to the FMS or the other selected subsystem.
  - If the FMS is concerned, consider performing a manual FMS reset through the associated C/B.
    Refer to Airbus FCOM or Operator's Manual for C/B location and procedure.

3.2. FMGC (TIMEOUT)

The MCDU MENU page allows access to FMGC and other installed subsystems.

When FMGC prompt is pressed:
- MCDU calls for FMGC display,
- FMGC prompt becomes FMGC (SEL) in blue color,
- If FM display is not established rapidly WAIT FOR SYSTEM RESPONSE (white) is displayed on scratchpad,
- If MCDU cannot establish communication successfully with the FMGC, FMGC prompt becomes FMGC (TIMEOUT).

  This logic is also available for the other subsystems listed on MCDU MENU page.



Chapter 4 - OTHER DEGRADED OPERATIONS

4.1. FMS erroneous predictions

When FMS predicted values seem erroneous:

Both FMGC..... Compare

- **If value are similar on both sides:**
  - Check for erroneous PILOT INPUT data such CRZ FL, CRZ TEMP, ZFW,
  - Check for erroneous SENSOR INPUT, such FUEL, SAT.

- **If value are different on both sides:**
  - Re-enter Cost Index, which will restart a FMS computation, or
  - Make a DIR-TO the TO WPT.

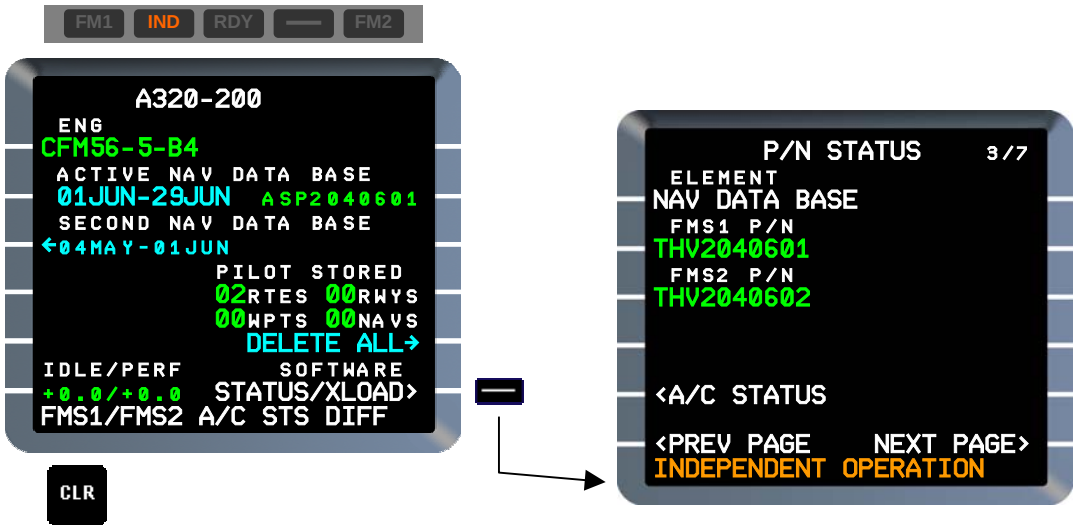
4.2. FMS messages

- **FMS1/FMS2 A/C STS DIFF**
- **FMS1/FMS2 PGM PIN DIFF**
- **UNKNOWN PROGRAM PIN**

The above scratchpad messages (white) are displayed when a difference is detected between FMGCs programs, data bases, or pin-programming.
This causes the FMSs to go in INDEPENDENT mode.

Access Software and Data Bases is via:
DATA / A/C STATUS page / SOFTWARE STATUS/XLOAD prompt [6R] field.
Reference of software/data bases are shown on 7 pages:
- 1/7 P/N XLOAD
- 2/7 P/N STATUS – FMS SOFTWARE
- 3/7 P/N STATUS – NAV DATA BASE
- 4/7 P/N STATUS – FM AIRLINE CONFIG
- 5/7 P/N STATUS – FM OPTIONS CONFIG
- 6/7 P/N STATUS – PERF DATA BASE
- 7/7 P/N STATUS – MAG VAR DATA BASE

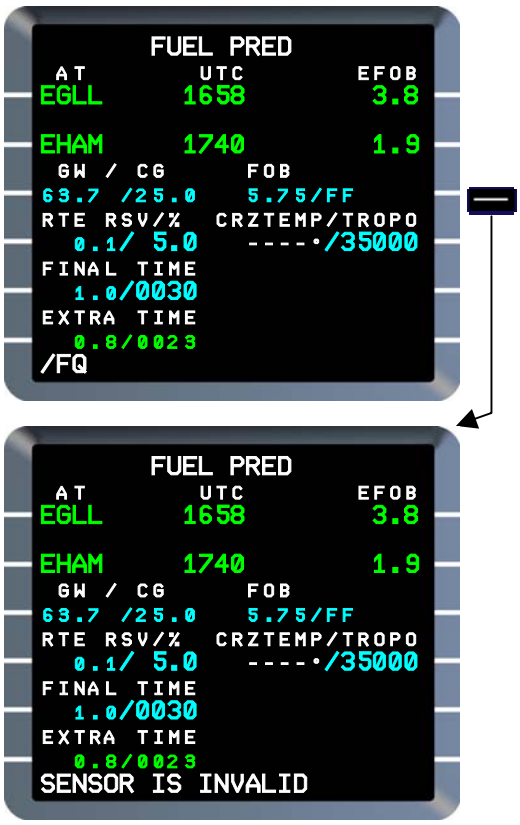
In the example below, a difference exists between the two NAV data bases loaded in the FMSs.



■ SENSOR IS INVALID

On the FUEL PRED page, if /FF or /FQ is entered (or cleared) in field [3R], the current state of the sensors is checked. If the selected sensor(s) is (are) invalid, SENSOR IS INVALID message (white) is displayed on scratchpad.
Note that the FOB calculations are dashed if the selected sensor subsequently becomes invalid.

See Part III – Multiphase procedures for more information.

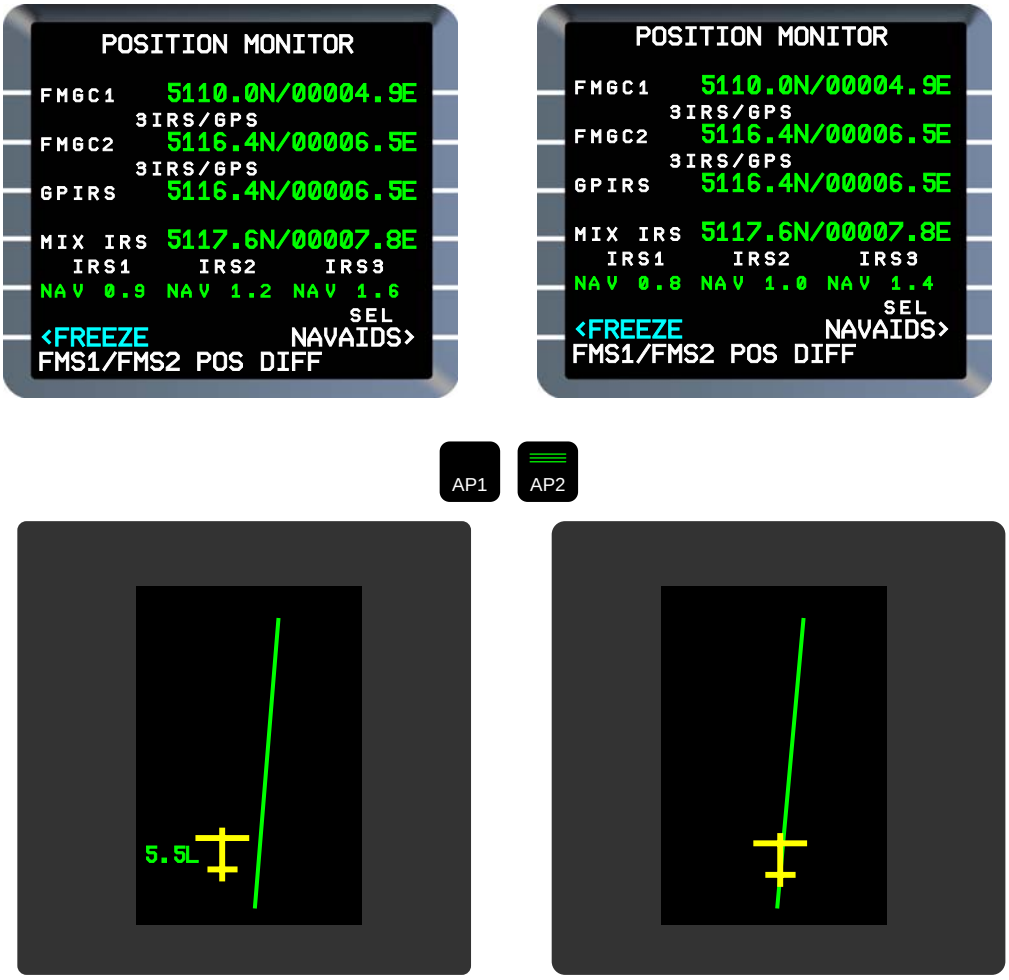


■ FMS1/FMS2 POS DIFF

This message is displayed when the difference between the position on each side is:
– More than 0.5 NM when GPS mode is active,
– More than 5NM when GPS mode is not active.

This message will disappear when cleared by pilot or when the difference between positions on each side is:
– Less than or equal to 0.3NM when GPS mode is not active,
– Less than or equal to 3NM when GPS mode is not active.

POSITION MONITOR .....Select
Try to identify the best FMGC by comparing with raw data (BRG/DIST on PROG page and RMI needles).
Select AP accordingly.
The NDs will reflect the difference between the two FMGC positions.



- **CHECK IRS1/FM POSITION**
- **CHECK IRS2/FM POSITION**
- **CHECK IRS3/FM POSITION**

If the difference between IRS & FMS positions is greater than a threshold (a function of time from alignment), CHECK IRSx/FM POSITION scratchpad message (white) is displayed.

POSITION MONITOR page.....

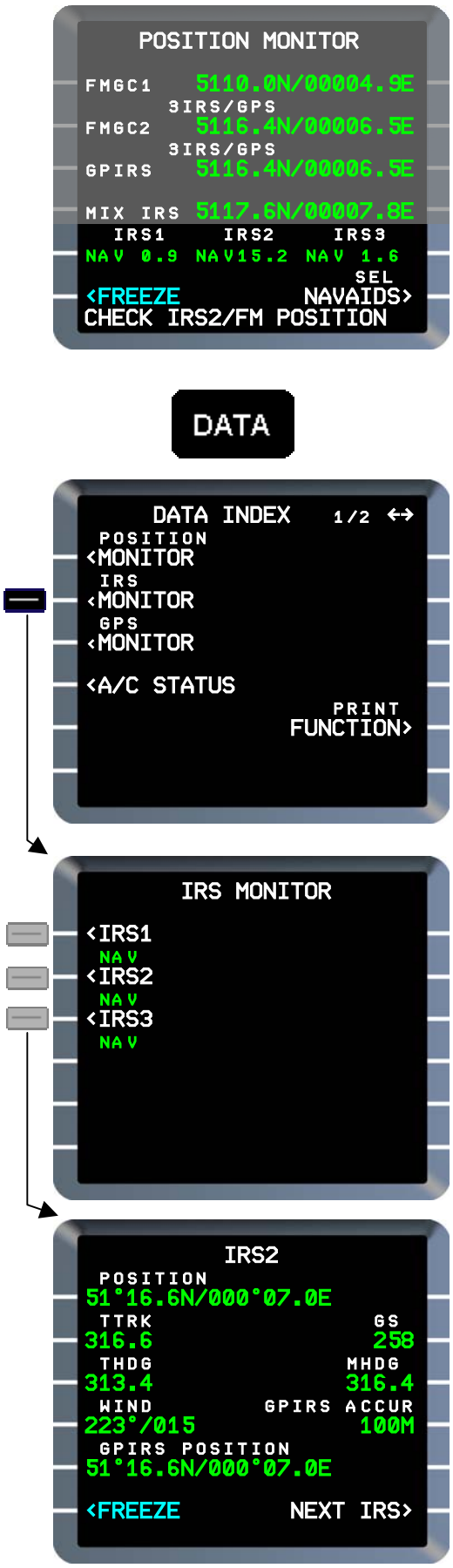
.....Select
The drift of the relevant IRS is displayed.

DATA INDEX.....Select

IRS MONITOR ..... Press

IRSx ..... Press
Additional information is available on the relevant IRS page.

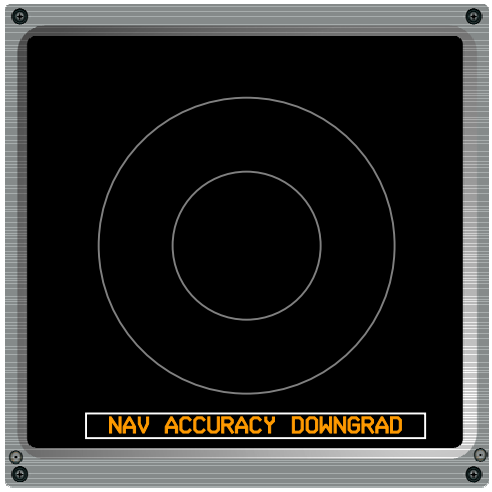
No pilot action is required on the IRS, unless requested by ECAM.



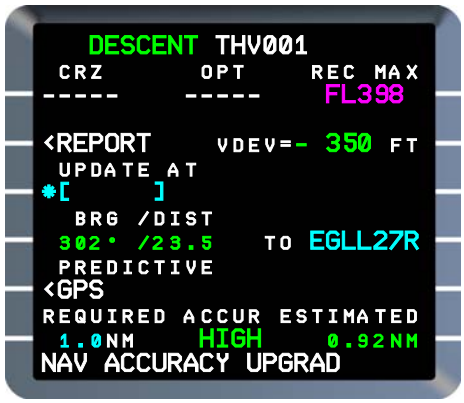
■ NAV ACCUR DOWNGRAD

Accuracy can be monitored on PROG page.
When EPE (ESTIMATED value) becomes above the REQUIRED value, NAV ACCURACY DOWNGRAD message (white) is displayed on scratchpad.
On ND message is displayed in amber.
These messages can be cleared by pilot.

PROG page .....Select
Check accuracy.
Consider adequate navigation procedures.



When accuracy improves to the required value NAV ACCURACY UPGRAD message is displayed on MCDUs and NDs.



■ IR ALIGNMENT IN ATT MODE

If IR alignment is lost, the navigation mode is inoperative (red ATT flag on PFD and red HDG flag on ND).
The A/C heading may be entered through the MCDU (if option is activated in OPC) or the ISDU on overhead panel.

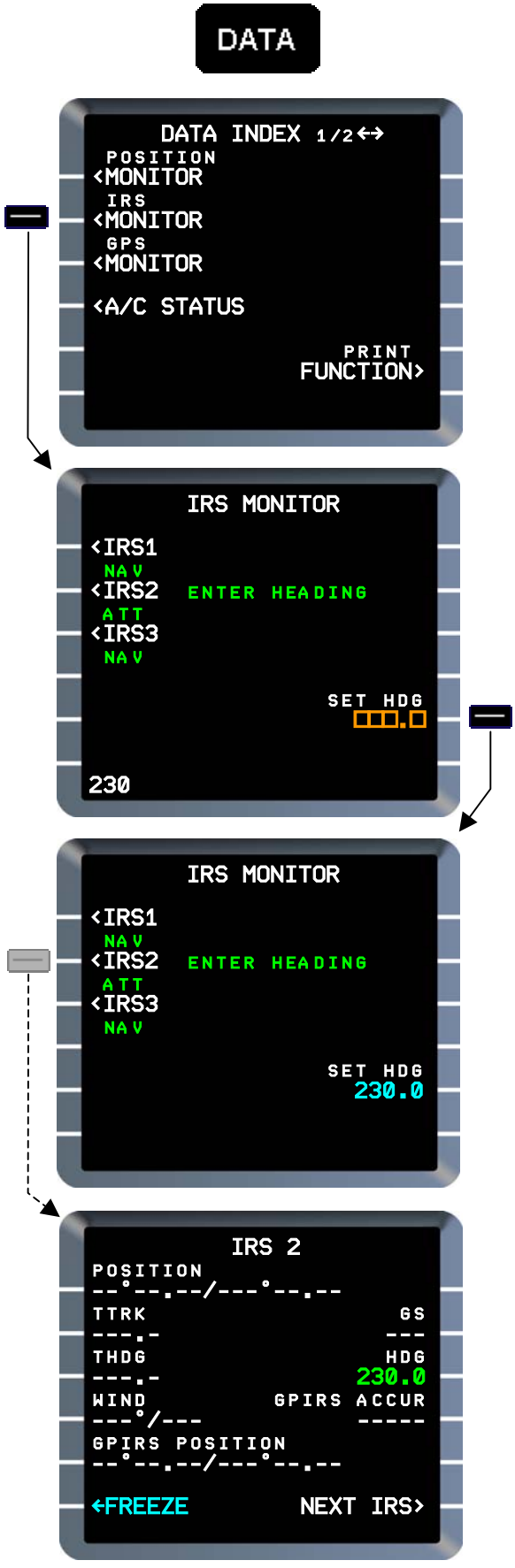
> **Caution**
> Refer to Airbus FCOM or Operator's Manual for the detailed procedure.

DATA key..... Press
The DATA INDEX page is displayed.

IRS MONITOR key [2L] . Press
The IRS MONITOR page is displayed.

A/C Heading [5R].....Enter
Use HDG value as displayed on ND.

Relevant IRS page shows entered heading, other data are dashed.



4.3. Weights

■ FMS1/FMS2 GW DIFF

This scratchpad message (white) is displayed when the difference is less than or equal to 1,5 metric tons.
This should be due to a sensor anomaly.

■ CHECK GW

When A/C is airborne, the FMS GW value (FUEL PRED page) is continuously cross-checked with the A/C GW value computed by the FAC when available.
If these weights differ by more than 7 tons (16055 Lbs), CHECK GW scratchpad message (amber) is displayed.
Check for wrong pilot entry.
GW may be overwritten on FUEL PRED page.

■ INITIALIZE WEIGHTS

INITIALIZE WEIGHTS scratchpad message (amber) is triggered when:

- **On ground at engine start,**
  either ZFW or/and FOB have not been entered.

  INIT B page .....Select

  ZFW/BLOCK FUEL .....Enter

- **After engine start,**
  ZFW or FOB becomes undefined. This may happen in case of FMS data lost.

  FUEL PRED page .....Select

  GW [3L] .....Enter

I

II

III

IV

V

Part V
APPENDICES

PAGE INTENTIONALLY LEFT BLANK

Part V: APPENDICES

Contents

PAGE INTENTIONALLY LEFT BLANK

Part V: Chapter 1 - MESSAGES

Contents

PAGE INTENTIONALLY BLANK

1.1. GENERAL DISPLAY CONDITIONS

Messages may be displayed on:
one or both MCDUs, and/or
EFIS (PFD/ND).
Messages are identified with a text and a color (white or amber).
Some messages are inhibited during takeoff, go around, approach.

1.2. DEFINITION OF SCRATCHPAD MESSAGES

■ Type I / Type II messages

☐ Definition

Messages are classified as:
- Type I,
- Type II with a queuing display logic.

Type I messages are those displayed as the direct result of a pilot action.

There is no message queue for Type I messages. Consequently, a Type I message exists only if it is presently displayed in the scratchpad.

Type II messages are those that are displayed automatically to inform the pilot of a given situation or to prompt a pilot action.

Type II messages are stored in a message queue with the following logic:
- *The last message entered in the queue is displayed, if it is not inhibited. If it is inhibited, the first non-inhibited message from top to bottom of the queue is displayed.*
- *A maximum of 5 messages can be stored.*
- *Only one occurrence of a given message is generated, it is placed on the top of the queue and any previous occurrence is deleted.*
- *If the message queue is full and a new Type II message is received, the last message in the queue (the lowest message) is removed.*

☐ Illumination of FMS annunciator

The left front annunciator FM (white) will illuminate when a subsystem other than the FMS is active system and an important message (amber ones) has been sent.
Press the MCDU MENU key and the line select key adjacent to the FMGC prompt to return to the FMGS pages.

TYPE II messages – Conditions for display

A Type II message may be displayed in the scratchpad only if there is neither a Type I message nor data to be displayed.
This results in the following operations:

- A Type II message displayed in the scratchpad is removed if data is entered. The message returns when scratchpad is emptied.
- A Type II message, generated while data or a Type I message is occupying the scratchpad, is displayed only when the scratchpad is cleared.
  If a Type II message is cleared from the scratchpad, then the next one in the queue is displayed.

1.3. MESSAGE DELETION

Manual clear of messages
Any message that is displayed can be cleared by pressing the CLR key.

Automatic clear of messages

General conditions:
Type I messages are automatically cleared under the following conditions:
- When data is entered into the scratchpad, or
- When line select or page key is pressed.

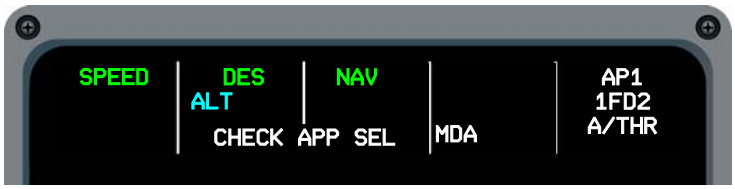
Specific conditions:
Some Type II messages are automatically cleared from the queue when they no longer apply.

At transition to DONE Phase:
Messages are cleared from the scratchpad and the message queue at transition to DONE flight phase.
Other messages may be displayed during DONE phase if appropriate.

Messages, which are displayed on both scratchpad and PFD/ND are cleared simultaneously when cleared from scratchpad, except for GPS PRIMARY LOST.

1.4. PFD FM MESSAGES

The following messages are displayed on the third line of the FMA in column 2 and 3 and simultaneously on MCDUs:



- CHECK APP SEL (White)
- SET MANAGED SPD (White)
- SET GREEN DOT SPD (White)
- SET HOLD SPD (White)
- DECELERATE (White)
- MORE DRAG (White)

SET MANAGED SPD

SET GREEN DOT SPD

SET HOLD SPD

DECELERATE

MORE DRAG

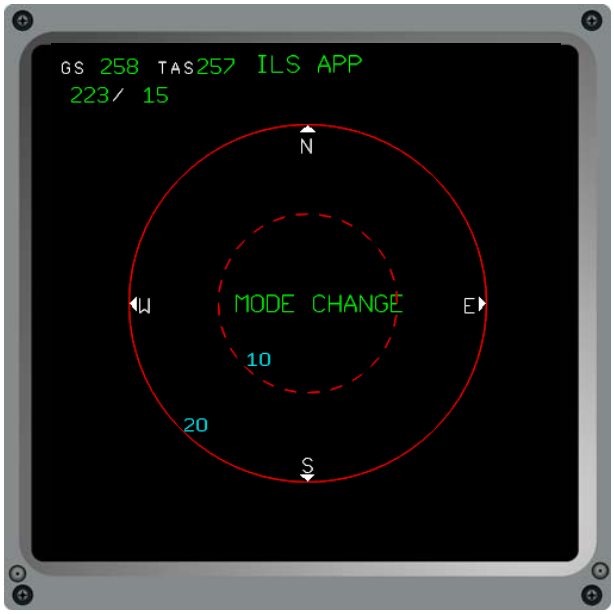
Refer to scratchpad messages chapter for definition and display conditions.

1.5. ND FM MESSAGES

■ Center of ND

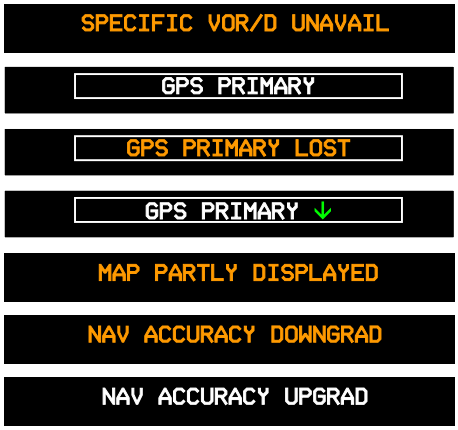
MODE CHANGE (green):
If there is a discrepancy between the selected mode on the EFIS control panel and the mode sent from the onside FMGC, or while the DMC is preparing a new page for display.

RANGE CHANGE (green):
If there is a discrepancy between the range selected on the EFIS control panel and the range sent from the onside FMGC.
A MODE CHANGE message has priority over a RANGE CHANGE message.



MAP NOT AVAIL (red):
This message is displayed when:
- The MODE CHANGE or RANGE CHANGE message has been displayed more than six seconds or
- The FMGC has failed or
- The FMGC has delivered an invalid aircraft position.

■ Bottom of ND



MAP PARTLY DISPLAYED (amber):
Data transmission between the FMGC (priority criteria) and the DMC is incomplete, or the DMC cannot draw the complete MAP. This message is also displayed when a very long leg exists in the flight plan.

A leg is considered as "very long" when the starting point (or endpoint) is located at more than 45° from the aircraft location (45° of longitude or latitude).
This DMC limitation is a compromise between accurate drawing precision and maximum leg length that can be displayed.

NAV ACCUR UPGRAD (white)
NAV ACCUR DOWNGRAD (amber)
(With associated scratchpad message):
Signals a change in navigation accuracy.

SPECIFIC VOR/D UNAVAIL (amber)
(With associated scratchpad message):
Navaid tuned for the selected approach or departure, is not available.

SET OFFSIDE RNG/MODE (amber):
Displayed on ND1(2), in case of an FMGC1(2) failure when the two ND ranges or modes selected on the EFIS control panels are different.

GPS PRIMARY (white, boxed white)
(With associated scratchpad message):
This message appears when GPS PRIMARY mode is available, or has been recovered. The pilot can clear this message by pressing the CLR key on the MCDU.

GPS PRIMARY LOST (amber, boxed white)
(With associated scratchpad message):
This message appears when GPS PRIMARY is not available, **it cannot be cleared by pilot action**.

↓ (green) Overflow arrow: displayed when more than one of the following messages are present at the same time: NAV ACCUR DOWNGRAD, NAV ACCUR UPGRAD, SPECIF VOR/D UNAVAIL, MAP PARTLY DISPLAYED, SET OFFSIDE RNG/MODE, GPS PRIMARY, GPS PRIMARY LOST

1.6. MCDU SCRATCHPAD MESSAGES

The MCDU scratchpad messages are described in the table below. They are listed in alphabetic order.

For each message, the table gives:
- Message text,
- Type: I or II,
- Color: A (amber) / W (white),
- Display on PFD/ND,
- Y (yes): message is inhibited during takeoff, approach and go-around below 800 ft,
- D: Specific Data Link message,
- Message definition.

SCRATCHPAD MESSAGE	TYPE	COLOR	EFIS	TO GA APP Disp.	DATA LINK	DEFINITION	Nbr
A/C POSITION INVALID	II	A		Y		NAV validity becomes invalid on either FM. Message is cleared when NAV is valid on both FMs (or when valid on the onside FM when in single mode).	14
ABEAM POINTS LIST FULL	II	W				ABEAM WPTs database is full. (maximum 50 ABEAM points allowed).	405
ADJUST DESIRED HDG/TRK	II	A		Y		A Direct-To, Intercept To, or Intercept From TMPY F-PLN is activated successfully.	402
ALIGN IRS	II	A				MCDU is not on INIT A page and the conditions to ALIGN or RE-ALIGN IRS exist.	12
ALTN F-PLN DELETED	II	W				The Alternate F-PLN has been automatically deleted. This occurs when the F-PLN memory is full, and the system attempts to free up some space.	10
AOC XXX F-PLN UPLINK	II	W			D	Complete F-PLN uplink message is processed without any error or with minor errors that do not cause the rejection of the message.	100
AREA RNP IS XX.XX	II	W		Y		The pilot entered RNP value is greater than the system value found in the navigation part of the AMI file or the AMI RNP value becomes smaller than the active pilot entered value.	124
AWY/WPT MISMATCH		W		Y		Displayed when entering an AIRWAY: - AWY entered under VIA does not contain the revised WPT, or - The ending point does not belong to the airway.	51
CABIN RATE EXCEEDED FM	II	W				This message is displayed when all of the following conditions exist: - in CRZ flight phase, and - within 200NM of the destination (along the F-PLN), and - cabin rate of the theoretical descent profile exceeds the maximum cabin rate. It is automatically cleared when the flight phase transitions to DES, APPR, GO-AROUND or DONE.	18
CHECK ALTN WIND	II	W			D	The uplinked alternate CRZ level is different from the FMS alternate CRZ level. In case of conflict of message display, the order of priority is: WIND DAT UPLINK, CHECK DEST DATA, CHECK ALTN WIND.	117
CHECK APPR SELECTION	II	W	PFD			A NPA is selected in ACTIVE F-PLN, and an ILS or MLS is manually tuned on RAD NAV page, and either - Less than 100NM track distance from T/D, or - In DES or APPR phase.	75
CHECK CO RTE	II	A			D	Uplinked F-PLN is valid and processed but the uplink and downlink CO RTE number are different. The message is not displayed if the uplink message is rejected.	104

SCRATCHPAD MESSAGE	TYPE	COLOR	EFIS	TO GA APP Disp.	DATA LINK	DEFINITION	Nbr
CHECK DATA BASE CYCLE	II	W				An entry is made in field 1L or 1R of the INIT A page and the clock is not within period of validity of active data base.	22
CHECK DEST DATA	II	A			D	A/C is in CRZ phase and distance to destination is less than 180 NM. QNH, TEMP or WIND at destination displayed on current active APPR PERF page result from an AOC up-link and should be checked. Also displayed after the WIND DATA UPLINK message when a conflict exists.	116
CHECK FLT NBR	II	A			D	Displayed if a flight number is received valid but different from the flight number previously sent in the downlink message.	105
CHECK GW	II	A				GW computed by FM differs from that computed by FAC by more than 7 tons. If manually cleared, message re-appears if conditions still exist.	202
CHECK IRS1/FM POSITION	II	A				IRS 1 has abnormal drift.	47
CHECK IRS2/FM POSITION	II	A				IRS 2 has abnormal drift.	96
CHECK IRS3/FM POSITION	II	A				IRS 3 has abnormal drift.	97
CHECK QFE	II	A		Y		Flight phase is Descent or Approach, a QNH value has been entered on the Approach Page, QFE has been selected, and, QFE height differs by more than 100ft from the predicted altitude (airport elevation in NAV data base).	89
CHECK TAKE OFF DATA	II	W		Y		1) Departure RWY, Flaps/THS, T/O Shift, FLX, DRT is entered or changed after V1 Vr V2 have been inserted, or 2) ACTIVATE SEC is performed during PREFLIGHT or DONE phase.	83
CLOCK IS TAKE OFF TIME	II	W				Clock time has passed the F-PLN ETT (pilot entered or system computed).	78
CLOCK/GPS TIME DIFF	II	A				The FM uses GPS time and a difference, greater than 3 mn, exists between the clock time and the GPS time. Automatically cleared if this difference decreases to 1 minute.	122

SCRATCHPAD MESSAGE	TYPE	COLOR	EFIS	TO GA APP Disp.	DATA LINK	DEFINITION	Nbr
CROSSLOAD ABORTED	II	W				Displayed: - When the cross-load state is armed or in process, and flight phase switches out of preflight, or the aircraft becomes airborne, - When a cross-load request is not accepted by the system, - If a mode key is selected on either MCDU (transmitting or receiving) while the cross-load is armed, and all mandatory loadable elements are loaded, - When the abort prompt is selected, - If a VLT (Very Long Term) Power Transient or an FMS reset occurs in the cross-load armed, or cross-loading state, - If cross-load has failed.	73
CROSSLOAD COMPLETE	II	W				Cross-load is completed successfully.	87
CRZ FL ABOVE MAX FL	II	W				Entered CRZ ALT is above max MAX ALT.	36
CSTR DEL ABOVE CRZ FL	II	W				This message occurs if, on ALTN or SEC activation, CRZ ALT is lower than a constraint.	35
CSTR DEL UP TO WPT 01	II	W				Constraints have been deleted up to a waypoint due to a pilot revision.	77
DECELERATE	II	A	PFD	Y		Displayed when each of the following conditions are true: - A/C is in climb or cruise phase, and, - A/C is beyond the T/D point, and, - A/C is in managed speed. This message may only appear once per T/D sequence.	7
DEST/ALTN MISMATCH	I	W		Y		Pilot enters an ALTN CO RTE of which origin does not match primary destination.	49
DIR TO IN PROCESS	I	W		Y		- A temporary flight plan exists due to a DIRECT-TO/INTERCEPT revision, and a revision (other than DIRECT-TO/INTERCEPT) is attempted, or - DIRECT-TO page is displayed on one side (in dual configuration), and a revision (other than DIRECT-TO/INTERCEPT) is attempted on the other side.	70
ENTER DEST DATA	II	A				In CRZ or DES phase, distance to destination is less than 180NM, and one or more of the following data has not been inserted on PERF APPR page: - Destination QNH, or - Destination Temperature, or - Destination Wind.	25
ENTRY OUT OF RANGE	I	W		Y		Entry is of correct field width, format and type but is not within the specified range.	6
FLT NBR UPLINK	II	W			D	The flight number is received valid while no previous flight number was sent in the downlink message the flight number.	106
FM DATALINK UNAVAIL	II	W		Y	D	The state of communication for both ACARS buses is NOT READY.	602

SCRATCHPAD MESSAGE	TYPE	COLOR	EFIS	TO GA APP Disp.	DATA LINK	DEFINITION	Nbr
FMS1/FMS2 A/C STS DIFF	II	W				A difference is detected between software or data bases loaded in FMGCs (FMS SOFTWARE - NAV DATA BASE - FM AIRLINE CONFIG - FM OPTIONS CONFIG - PERF DATA BASE - MAG VAR DATA BASE). Will switch the FMGCs to INDEPENDENT MODE.	5
FMS1/FMS2 GW DIFF	II	W				Difference between the both FMGCs equals to or greater than 1,5 metric tons.	30
FMS1/FMS2 PGM PIN DIFF	II	W				Program pins are not the same on both MCDU (e.g. A/C and Engine Type Program pins). This will lead the FMGCs to switch to INDEPENDENT MODE.	20
FMS1/FMS2 POS DIFF	II	A		Y		Difference between the present position on each side is: - More than 0.5 NM when GPS mode is active, - More than 5NM when GPS mode is not active. This message will disappear when cleared or when the difference between the present position on each side is: - Less than or equal to 0.3NM when GPS mode is not active, - Less than or equal to 3NM when GPS mode is not active.	21
FMS1/FMS2 SPD TGT DIFF	II	W				Target speeds computed by the FMGs differ by 5KT or more.	67
FORMAT ERROR	I	W		Y		Pilot entry in a data field exceeds the field width or is of incorrect format or type. *May be due to an inadvertent insertion of a space character.*	24
F-PLN DATALINK IN PROG	I	W		Y	D	Modification of F-PLN or Weight data is performed while a F-PLN INIT request has been sent.	102
F-PLN FULL	II	W				Pilot entry is not accepted by the system due to flight plan being full. Note that if the alternate plan exists, it is deleted, and entry is re-attempted. *See ALTN F-PLN DELETED message.*	11
GPS IS DESELECTED	II	A		Y		GPS is manually deselected while A/C is within 80NM of (T/D) or when the flight phase transitions to Approach.	55
GPS PRIMARY	II	W	ND	Y		GPS/INERTIAL is active and navigation accuracy is HIGH. Message is displayed when GPS option is active. It is deleted if GPS PRIMARY LOST is triggered.	81

SCRATCHPAD MESSAGE	TYPE	COLOR	EFIS	TO GA APP Disp.	DATA LINK	DEFINITION	Nbr
GPS PRIMARY LOST	II	A	ND	Y		GPS PRIMARY is lost. This message is generated when: - GPS/INERTIAL mode is lost, or - Accuracy is downgraded from HIGH to LOW while GPS confidence level was GPS PRIMARY, or - Accuracy is high and NAV mode is not GPS/INERTIAL with GPS option active at transition to Approach flight area. This message is only displayed when GPS option is active. It is deleted if GPS PRIMARY is triggered.	79
INDEPENDENT OPERATION	II	A				FMGCs operate independently.	13
INITIALIZE WEIGHTS	II	A		Y		At engine start either ZFW or FOB is not entered. After engine start, if FOB or ZFW becomes undefined. Message disappears when valid FOB and ZFW are entered, and a valid GW can be calculated.	201
INSRT/ERASE TMPY FIRST	I	W		Y		A DIR TO is attempted while a TMPY F-PLN exists due to revision(s) other than a DIRECT TO/INTERCEPT.	401
INVALID FLT NBR UPLINK	II	W			D	The flight number is received invalid.	107
INVALID F-PLN UPLINK	II	W			D	Errors occurred during the decoding process, uplink F-PLN message is rejected.	101
INVALID PERF UPLINK	II	W		Y	D	Displayed if uplink PERF message is rejected.	109
INVALID TAKEOFF UPLINK	II	W		Y	D	Displayed if uplink TO message is rejected.	111
INVALID WIND UPLINK	II	W			D	Displayed if uplink WIND message is rejected.	113
IRS ONLY NAVIGATION FM	II	A		Y		In enroute area or transitioning to descent or approach phase, and navigation mode is INERTIAL ONLY.	17
LAT DISCONT AHEAD	II	A				When NAV mode is engaged and next leg is a discontinuity. Displayed 30 seconds before the leg change.	2
LIST OF 10 IN USE	I	W		Y		NEW RUNWAY prompt is pressed and 10 runways have been already stored (list full).	86
LIST OF 20 IN USE	I	W		Y		NEW WAYPOINT or NEW NAVAID prompt is pressed and 20 WPTs or Navaids have already been stored.	29
LIST OF 20 IN USE	II	W		Y	D	After a flight data uplink, if there is not enough space to store the uplinked pilot waypoints. This message is only displayed once at first deletion. *See Part III - Data Link.*	605
MORE DRAG	II	W	PFD			Displayed on PFD and MCDU when descent profile cannot be achieved at idle thrust and speed-brakes are needed. *See Part II - Descent*	203

SCRATCHPAD MESSAGE	TYPE	COLOR	EFIS	TO GA APP Disp.	DATA LINK	DEFINITION	Nbr
NAV ACCUR DOWNGRAD	II	A	ND	Y		NAV accuracy downgrades from HIGH to LOW.	59
NAV ACCUR UPGRAD	II	W	ND			NAV accuracy upgrades from LOW to HIGH.	61
NEW ACC ALT HHHH	II	W		Y		Acceleration altitude has changed. *An AT or AT OR BELOW altitude constraint, below ACCEL ALT is entered.* *In this case ACCEL ALT is automatically moved to constraint altitude.* *If conditions change, so that constraint altitude no longer limits ACCEL ALT, it does not revert to its original value.*	41
NEW CRZ ALT HHHHH	II	W				CRZ ALT has changed. *Message is automatically cleared when transitioning to DES / APP phases.*	33
NEW THR RED ALT HHHH	II	W		Y		Thrust reduction altitude has changed. *An AT or AT OR BELOW altitude constraint, requiring a level-off, has been entered or defined as "CLB" (for Preflight, Take Off or Climb phase) below THR RED ALT.* *In this case THR RED ALT is automatically moved to the constraint altitude.* *If conditions change, so that constraint altitude no longer limits THR RED ALT, the THR RED ALT does not move back to its original value, but remains limited to the previous constraint.*	40
NO ANSWER TO REQUEST	II	W			D	No answer to downlink request within 4 minutes resulting in time-out condition. A time-out condition occurs. *If an uplink message is received after a timeout occurs on the downlink request, this message is processed as an answer to the request and not as an unsolicited message.*	119
NO NAV INTERCEPT	II	W				NAV mode is armed and, no INTERCEPT waypoint exists before the TO waypoint.	403
NON UNIQUE ROUTE IDENT	I	W		Y		Pilot attempts to store a RTE (NEW RTE page) with an ident already existing.	85
NOT ALLOWED	I	W		Y		Pilot attempts to enter data in a field where no data may be entered, or to select a field where none can be selected.	26
NOT IN DATA BASE	I	W		Y		The pilot enters or attempts to enter a CO RTE ident, a FROM/TO pair, a place defined by place-bearing-distance (PBD) or place-bearing/place-bearing (PB/PB) or an airport, or a waypoint runway, or a navaid, or a navaid frequency (including pilot-defined elements) that is not in the current database.	27

SCRATCHPAD MESSAGE	TYPE	COLOR	EFIS	TO GA APP Disp.	DATA LINK	DEFINITION	Nbr
NOT XMITTED TO ACARS	II	W			D	A downlink message is sent manually and the communication protocol fails during the data transfer (communication not established or non acknowledged transmission). MCDU pages revert to display prevailing before downlink message initiation. Message is cleared when the user re-sends a downlink message, whether the same or not.	118
OFST DELETED IN TMPY	II	A				An offset has been automatically cancelled in TMPY F-PLN. This is the case when: - The first leg of the TMPY is no longer offsettable, or - The distance remaining to the ending offset waypoint is less than the distance required to reach the TMPY offset path and return to the TMPY parent path. Automatically cleared when a new offset is inserted in the temporary F-PLN.	1
OFST DELETED	II	A				An OFFSET is selected and SEC F-PLN is activated, deleting the selected OFFSET.	408
ONLY SPD ENTRY ALLOWED	I	W				Pilot attempts to enter a MACH value in the PERF CLB page while A/C is not in Climb phase.	60
OPP FMGC IN PROCESS	II	A		Y		The onside FMGC has failed, and the OPP FMGC is selected on the MCDU MENU Page.	204
OWN FMGC IN PROCESS	II	W		Y		The OWN FMGC is selected on the MCDU MENU Page. *Also displayed when the onside FMGC has failed and recovered, and the OWN FMGC is selected on the MCDU MENU Page.*	206
PERF DATA UPLINK	II	W		Y	D	A PERF uplink message containing complete or partially valid data is received.	108
PILOT ELEMENT RETAINED	I	W		Y		Pilot attempts to delete a pilot-stored item (DELETE ALL), which is included in a F-PLN, or a Stored RTE, or which is a Navaid tuned on RAD NAV page.	32
PILOTS ROUTES FULL	I	W		Y		Pilot attempt to store route while the list is full. (Five routes available)	88
PLACE/WPT MISMATCH	I	W		Y		Displayed when using the Along Track Offset function, the entered PLACE is not identical to the revised point.	404
PRINTER NOT AVAILABLE	II	W			D	A printer communication error occurs while printing a report. The report printing is terminated.	120
PROCEDURE RNP IS XX.XX	II	A		Y		The pilot entered RNP value is greater than the system value found in the NAV database for the corresponding leg. Also triggered if route or NAV data base RNP value becomes smaller than the entered value.	121

SCRATCHPAD MESSAGE	TYPE	COLOR	EFIS	TO GA APP Disp.	DATA LINK	DEFINITION	Nbr
RESET IRS TO NAV	II	A				IRS alignment is completed but initial position (on INIT A page) is modified. *This message is cleared either by a clear action on the MCDU or by resetting at least one IRS into the align mode (OFF then NAV).*	58
REVISION IN PROCESS	I	W		Y		One MCDU displays an AIRWAY page and a revision is attempted on the other MCDU.	410
REVISIONS NOT STORED	II	A		Y		When a PILOT ROUTE or CO RTE (ACTIVE or SEC F-PLN) is stored, the following elements are not retained: - Pilot-entered holds, - Offsets, - Modifications to terminal area procedures, - Pilot-entered constraints, - FM created waypoints (including Radial Intercept and Abeam waypoints), - STEP ALTS.	15
RWY/LS MISMATCH	II	A				If ILS or MLS tuned on RAD NAV page is not the same as that associated with take-off or landing RWY.	43
SELECT DESIRED SYSTEM	I	W				Displayed when MCDU displays its MENU page.	46
SELECT HDG/TRK FIRST	I	W		Y		With NAV mode engaged: - The TMPY F-PLN diverges from the ACTIVE F-PLN, and a TMPY activation is attempted, - The SEC F-PLN and ACTIVE F-PLN are divergent, and a SEC F-PLN activation is attempted. If an Offset is defined, and SEC F-PLN is activated, Offset is deleted.	406
SENSOR IS INVALID	I	W		Y		/FF or /FQ is entered (or cleared) on the FUEL PRED page and the current state of the sensors are checked invalid. FOB calculations are dashed if the selected sensor is invalid.	205
SET GREEN DOT SPEED	II	W	PFD	Y		Displayed in EO condition if: - EO mode is active, and, - Speed is in SELECTED mode (FCU value is greater than G.DOT + 10 KT), and, - ALT * or ALT mode is not engaged. This message is cleared when: - FCU speed is between (G.DOT + 10 KT) and (G.DOT - 10 KT), or - Speed managed mode is active, or - Flight phase is CRZ, or - EO is no longer active.	65
SET HOLD SPEED	II	W	PFD			SELECTED speed mode is active and selected & holding SPD differ by more 5KT with 30 seconds before entering Holding fix.	84

SCRATCHPAD MESSAGE	TYPE	COLOR	EFIS	TO GA APP Disp.	DATA LINK	DEFINITION	Nbr
SET MANAGED SPEED	II	W	PFD			Displayed on MCDUs and PFDs in selected speed mode: - When FMS transitions from Climb to Cruise, and a manual speed has not been pre-selected on the CRZ PERF page, - At transition from Climb or Cruise to Descent. -	72
SETTING SPD/TIME CSTR	II	W				A time constraint exists and, - Managed SPEED engages while in NAV mode, or - NAV mode engages while in managed SPEED mode.	93
SPD ERROR AT WPT01	II	W		Y		NAV & SPD managed are engaged and the system predicts that a speed constraint will be missed by more than 10 knots. The message is cleared when the predicted discrepancy is reduced to less than 5 knots.	95
SPD LIM EXCEEDED	II	A				Displayed in CLIMB, CRUISE and DESCENT flight phases when: - Speed exceeds SPEED LIMIT by 10KTs, and - ALT is within 150 ft of SPEED LIMIT ALTITUDE. Message is cleared when speed no longer exceeds the SPEED LIMIT + 5KTs.	4
SPECIF NDB UNAVAIL	II	A		Y		Auto-tuned NDB is not available	57
SPECIF VOR-D UNAVAIL	II	A	ND	Y		Auto-tuned VOR / VOR-DME / VORTAC is not available	68
STEP ABOVE MAX FL	II	W				STEP ALT exceeds the Max Max ALT (based on predicted gross weight at the step start point).	80
STEP DELETED	II	W				The step point is sequenced without initiating the step; step is deleted and is no longer taken into account for time and fuel predictions.	38
STEP NOW	II	W				A/C is within 20NM of the active step point. *If the revision was for the TMPY, then the OFST DELETED IN TMPY message is displayed.*	411
SYSTEM NOT AVAILABLE	I	W				ATC communication via the ATSU has failed (If installed).	407
TAKE OFF DATA UPLINK	II	W		Y	D	The Take off data uplink message is validated and accepted. Take off data are available for review in either flight plan.	110

SCRATCHPAD MESSAGE	TYPE	COLOR	EFIS	TO GA APP Disp.	DATA LINK	DEFINITION	Nbr
TIME CSTR DELETED	II	W				A time constraint has been deleted due one of the following causes: - A time constraint waypoint is deleted. - An Engine Out condition is detected. - A/C is decelerating towards, or in, a HOLD. - There is a loss of valid clock data. - FMS Flight phase transitions from descent or approach to climb or cruise, or go-around. - A time constraint is defined in the ACTIVE F-PLN and an activate SEC is selected, or a TMPY F-PLN without the time constraint is inserted. - Time constraint is defined in the SEC and a COPY ACTIVE is selected. - Alternate is enabled. - A second time constraint is entered into the same flight plan at a different waypoint. - A Time constrained WPT is projected as an abeam point when a DIR TO/ABEAM is performed.	31
TIME CSTR EXISTS	I	W		Y		Pilot attempts to clear E.T.T. (Estimated Take-Off Time) computed by the FM.	74
TIME ERROR AT WPT01	II	W				FMGC predicts a time constraint will be missed while: - Airborne in NAV mode, or - On ground.	94
TIME TO EXIT	II	A				A/C must leave holding immediately to satisfy fuel reserve requirements. (Extra fuel is zero).	82
TMPY F-PLN EXISTS	I	W		Y		Pilot attempts to enter a CO RTE, FROM/TO, ALTN (Airport or Route), or to activate SEC F-PLN, while a TMPY F-PLN exists.	34
TOO STEEP PATH AHEAD	II	A				A too steep path is detected in the computed descent profile, and, NAV mode engaged in DES, or APPR, or CRZ phase (within 150Nm of destination). *This message is never issued in CLB.* *Descent profile cannot be achieved at idle thrust without extra drag.*	90
TUNE BBBB FFF.FF	II	A		Y		VOR or NDB must be tuned manually. BBBB is the navaid ident. FFF.FF is the frequency to be inserted.	63
UNKNOWN PROGRAM PIN	II	W				The system is unable to initialize, due to an incompatible or undefined A/C pin program combination (A/C type, engine type, VMO/MMO parity) in the FMGC software.	54
UPLINK INSERT IN PROG	II	W		Y	D	Uplink message is being processed (which may last several minutes).	103
USING COST INDEX - NNN	I	W		Y		NNN - VALUE OF COST INDEX Cost Index has not been entered prior to entering ZFW on INIT page B, or GW on FUEL PRED page. CI is defaulted to NNN	8
WAIT FOR SYSTEM RESPONSE	I	W				A sub-system is selected while communication is being attempted prior to display of sub-system menu.	48

SCRATCHPAD MESSAGE	TYPE	COLOR	EFIS	TO GA APP Disp.	DATA LINK	DEFINITION	Nbr
WIND DATA UPLINK	II	W			D	Valid up-linked wind data are available for review in either flight plan.	112
WIND UPLINK EXISTS	I	W		Y	D	A flight plan modification (ACTIVE or SEC) is attempted while uplink winds are not yet inserted.	115
XXXX IS DESELECTED	I	W		Y		XXXX: NAME OF NAVAID or NUMBER of a SATELLITE Pilot attempts to deselect a navaid or a satellite, which is already de-selected.	53

PAGE INTENTIONALLY BLANK

Part V: Chapter 2 – MCDU NAMING and FORMAT

Contents

PAGE INTENTIONALLY BLANK

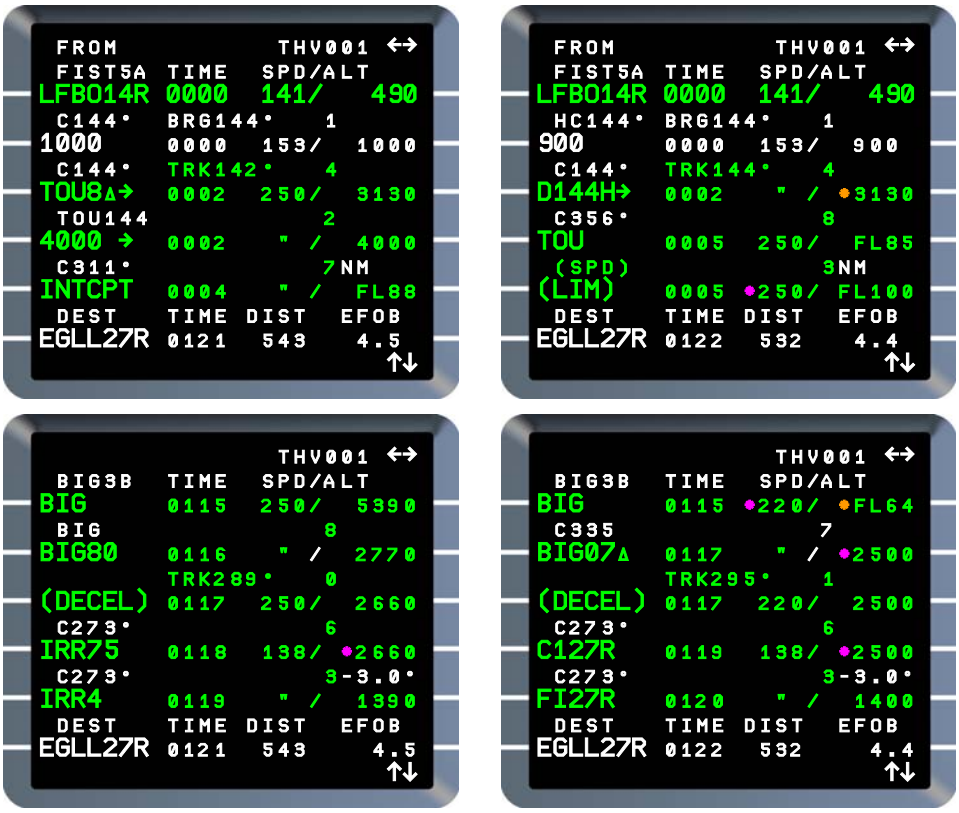
This chapter provides information on the following:

- Waypoint label and abbreviations: NAV data base WPTs, Pilot created WPTs, Pseudo WPTs,
- Flight Plan Markers,
- Lateral defining legs,
- MCDU prompts,
- DATA FORMAT.

2.1. Waypoint abbreviations

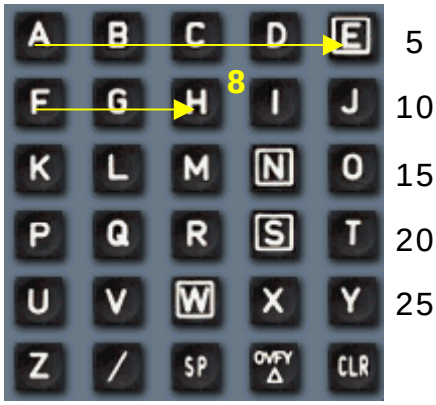
■ NAV data base WPTs

NAV data base files are encoded and released by Thales based on data from the operator's provider.
NAV data base codification must be compliant with the ARINC 424 specification.
Waypoint naming and procedures construction may differ from one provider to another. In some cases strict adherence to Authority definition is not compatible with FMS stringing rules and may be at discretion of data provider.
The example below shows DEP LFBO and ARR EGLL with two different providers.



WPT naming DNNNA:

e.g. D144H in the above example.
This WPT is defined by TOU RADIAL 144° at 8NM.
H is the eighth alphabetic letter.
As shown, alphabetic keys may be counted to determine the distance in NM, which the letter relates to.



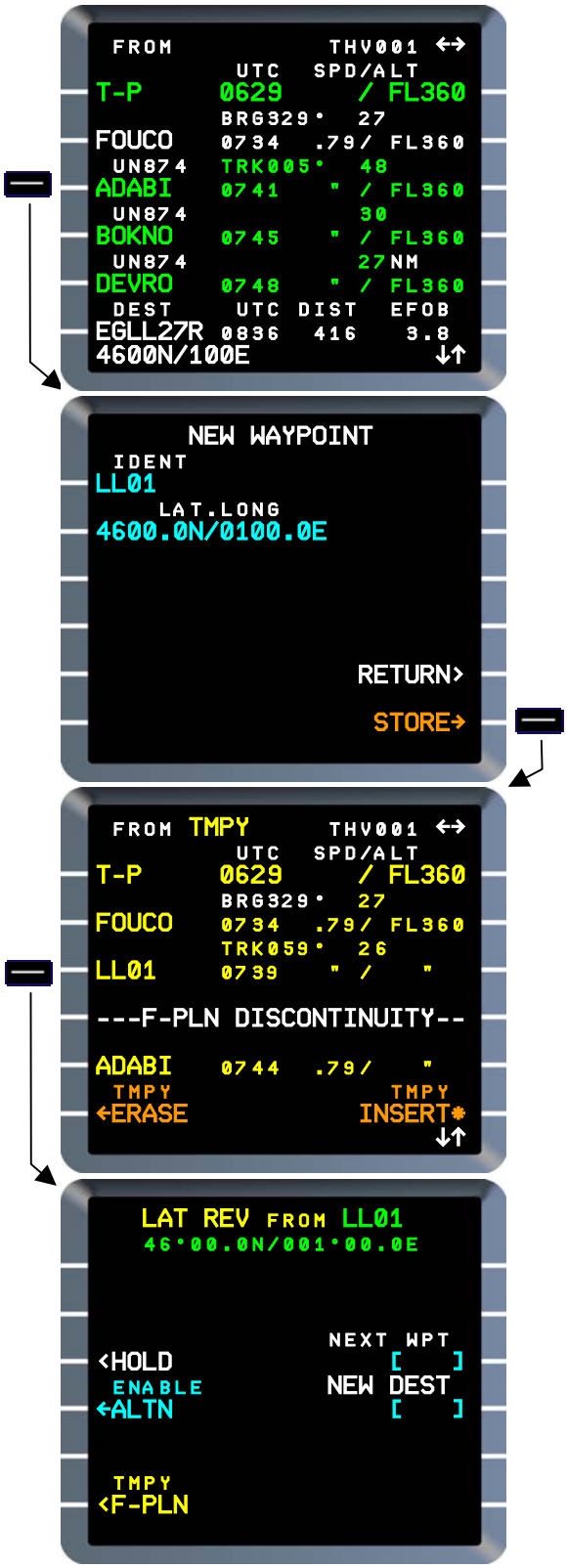
■ Pilot-defined WPTs

Certain pilot-entered waypoints in the flight plan are automatically abbreviated.
They are LAT/LONG, PLACE/BRG/DIST, PLACE-BRG/PLACE-BRG and PLACE/DIST pilot-defined waypoints, Radial Intercept, and abeam reference points.

☐ LAT/LONG (LLXX or NXXEXXX)

- **If the OPC option "WAYPOINT ABBREVIATION" is LLXX:**
  When pilot defines a waypoint by LAT/LONG, the FM abbreviates it to LLXX where XX is a two digit number indicating the number of the LAT/LONG definition.

  LLXX becomes the waypoint identifier and may be used as any other waypoint identifier.
  A waypoint defined this way becomes one of the 20 pilot defined waypoints.
  XX is the first number between 01 and 20, which is not already used for another pilot defined waypoint abbreviation in that list.

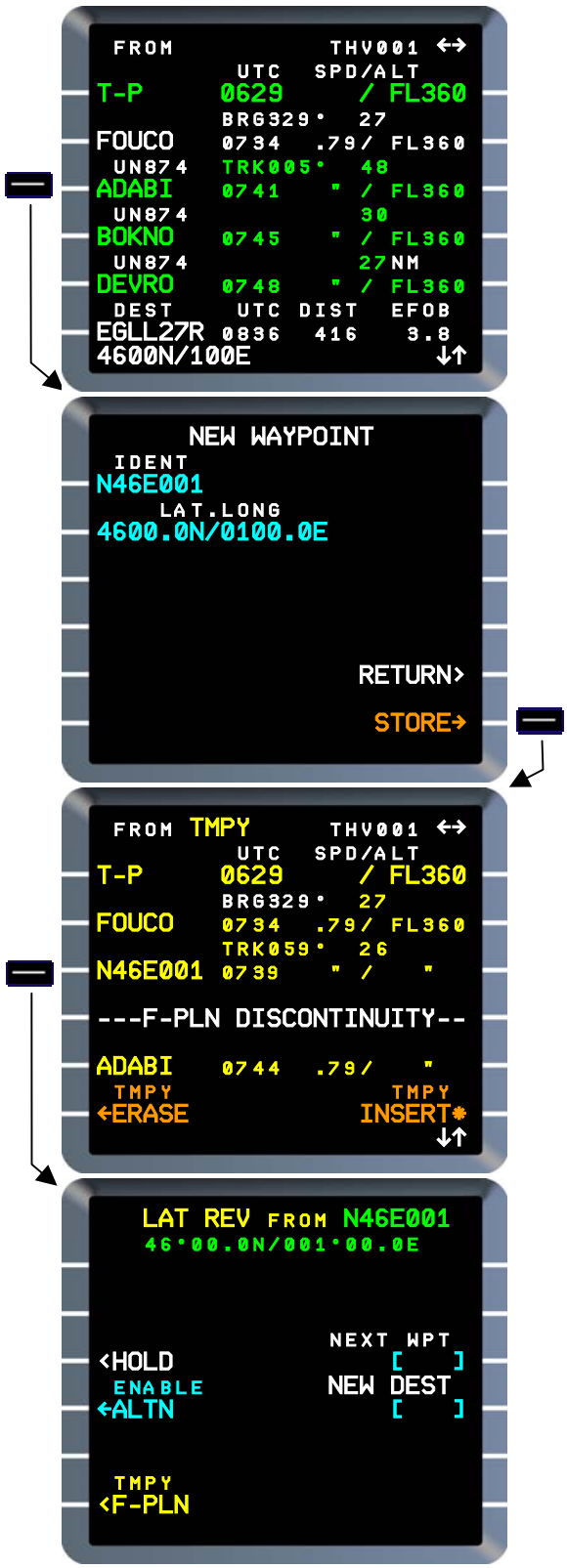


- **If the OPC option "WAYPOINT ABBREVIATION" is NXXEXXX:**

The identifier of a LAT/LONG entry inserted by pilot is abbreviated as N or S plus the first two characters of the latitude portion and E or W plus the first three characters of the longitude portion of the LAT/LONG entry.

E.g.: N45W122 would represent a waypoint located in the trapezium defined by the following marks 45°00.0'N/122°00.0'W, 45°00.0'N/122°59.9'W, 45°59.9'N/122°00.0'W and 45°59.9'N/122°59.9'W.

This identifier may be used like any other waypoint identifier. Subsequently, if more than one LAT/LONG waypoint has the same identifier, the duplicates appear on the DUPLICATE NAMES page for appropriate selection.
A waypoint defined this way becomes one of the 20 pilot defined waypoints.



Caution

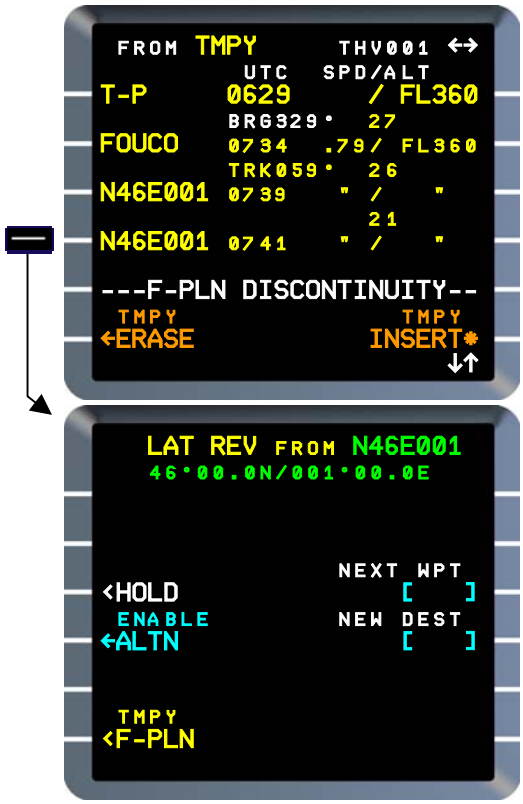
Due to the above rules, two LAT/LONG WPTs may have the same identifier.

Be careful when entering coordinates.

Any time coordinates may be reviewed via LAT REV function at the WPT.

On this page, the example is given for a LL WPT at: 46°00.0N/001°00.0E

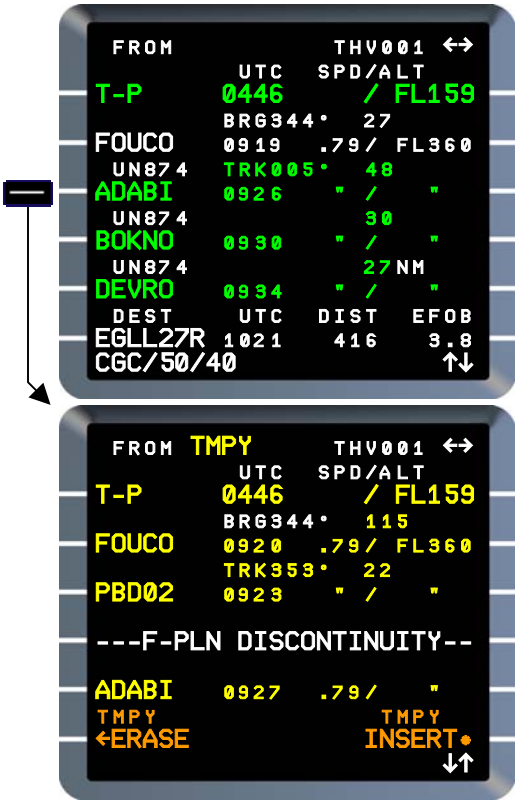
This example shows two LL WPTs.
The first one is:
46°00.0N/001°00.0E
The second one is:
46°00.0N/001°30.0E



☐ PLACE/BRG/DIST (PBD)

If the flight crew defines a waypoint as a PLACE/BRG/DIST the FM abbreviates this to PBDNN where NN is a two digit number indicating the number of the PLACE/BRG/DIST definition.

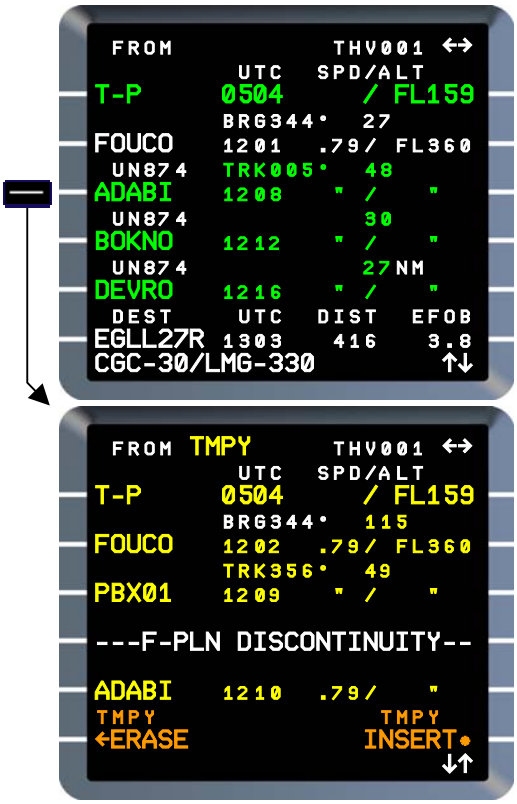
PBDNN becomes the identifier of the waypoint and may be used as for any other waypoint identifier. A waypoint defined this way becomes one of the 20 pilot defined waypoints.
NN is the first number between 01 and 20, which is not already used for another pilot defined waypoint abbreviation in that list.



☐ PLACE-BRG/PLACE-BRG (PBX)

If the flight crew defines a waypoint as a PLACE-BRG/PLACE-BRG; the FM abbreviates this to PBXNN where NN is a two digit number indicating the number of the PLACE-BRG/PLACE-BRG definition.

PBXNN becomes the identifier of the waypoint and may be used as any other waypoint identifier. A waypoint defined this way becomes one of the 20 pilot defined waypoints.
NN is the first number between 01 and 20, which is not already used for another pilot defined waypoint abbreviation in that list.



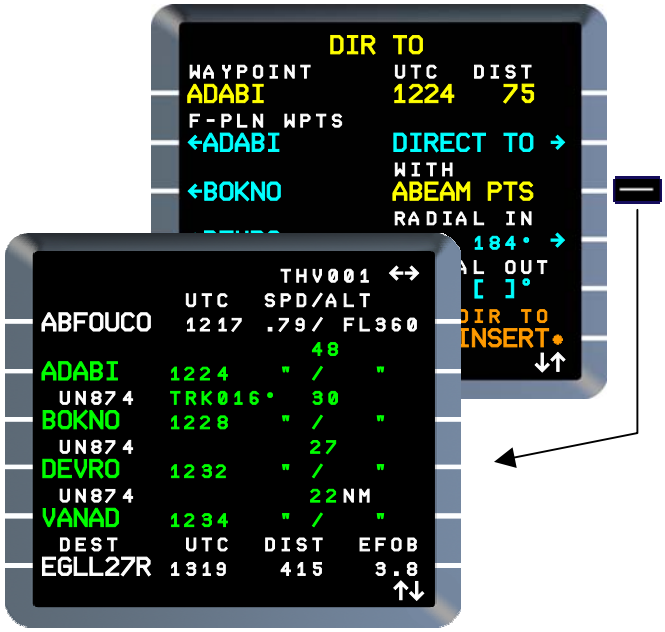
☐ PLACE/DIST (PD)

If the flight crew defines a waypoint as a PLACE/DIST (i.e. along track offset) on the F-PLN pages, the FM abbreviates this to PDNN, where NN is to two digit number indicating the number of the PLACE/DIST waypoint definition.

PDNN becomes the identifier of the waypoint and may be used as for any other waypoint identifier. A waypoint defined in this way becomes one of the twenty pilot defined waypoints.
NN is the first number between 01 and 20, which is not already used for another pilot defined waypoint abbreviation in that list.

☐ Abeam reference point (AB)

If the flight crew inserts an abeam reference point into the F-PLN via the DIR TO function, the FM abbreviates this to ABXXXXX, where AB is static and XXXXX are the first five characters of the reference, or parent, waypoint. If fewer than 5 characters exist, then only the existing characters are used.



ABXXXXX becomes the identifier of the waypoint and may be used as for any other waypoint identifier. However, this waypoint does not become one of the twenty pilot defined waypoints.

■ Pseudo-Waypoints

Pseudo-waypoints are in the flight plan for pilot reference only and cannot be displayed as a FROM/TO waypoint.
These waypoints do not cause any lateral path changes to the A/C.
They signify a vertical event in relation to the lateral flight plan.
The table below contains all the pseudo waypoints that may appear on the flight plan pages with definitions for each one. All pseudo waypoints are contained in parentheses when displayed on the F-PLN pages of the MCDU.
Predictions on F-PLN A page are provided for all pseudo waypoints. On the F-PLN B page only distance and EFOB are provided except for T/C and T/D pseudo waypoints, where forecast winds are also provided.
The SPD LIM, S/C, and S/D pseudo waypoints can be cleared by the CLR key via either the right or left LS key.

MCDU Display	Pseudo Waypoint	DEFINITION	Access to LAT REV	Access to VERT REV	CLR function available
(T/C)	Top of Climb	Inserted into the F-PLN at the point where the FM calculates the A/C will reach the cruise altitude or, descent path (if reached prior to CRZ FL) or, step altitude (if there is a step climb).	No	No	No
(T/D)	Top of Descent	Inserted into the F-PLN at the point where the FM calculates that descent should be started.	No	No	No
(S/C) (1)	Step Climb point	Inserted into the F-PLN at the point where the step climb starts. For a step at waypoint, it is displayed on the line below that waypoint.	No	No	Yes
(S/D) (1)	Step Descent point	Inserted into the F-PLN at the point where the step descent starts. For a step at waypoint, it is displayed on the line below that waypoint.	No	No	Yes
(SPD) (LIM) (1)	Speed limit	This is an altitude related speed limit. The speed limit is inserted into the F-PLN at the point where the A/C will cross the climb and/or descent speed limit altitude(s).	No	Yes	Yes
(DECEL)	Deceleration point	Starting point of deceleration for approach.	No	No	No

(1) Indicates that the pseudo waypoint may be entered or modified directly on the F-PLN page of the MCDU.

2.2.Flight Plan Markers

MCDU Display	DEFINITION	Access to		CLR function available
		LAT REV	VERT REV	
F-PLN DISCONTINUITY	There is a discontinuity between legs of the flight plan.	Yes	No	Yes (1)
END OF F-PLN	The end of the primary flight plan.	No	No	No
END OF ALTN F-PLN	The end of the alternate flight plan.	No	No	No
NO ALTN F-PLN	There is no alternate flight plan.	No	No	No
TOO STEEP PATH	The start of a Too Steep Path in the vertical F-PLN.	No	No	No
(ABEAM PTS)	There is a pending 'Direct To' with abeam points revision.	No	No	No

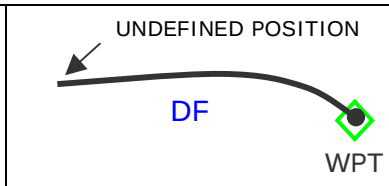
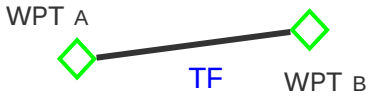
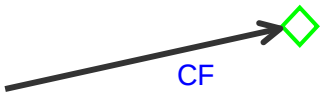
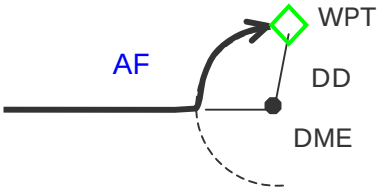
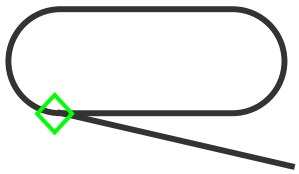
(1) A discontinuity cannot be cleared between the origin and destination when the origin and destination waypoints are the same, and there are no other lateral defining legs between them.

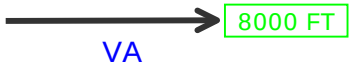
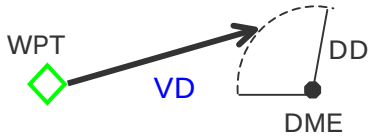
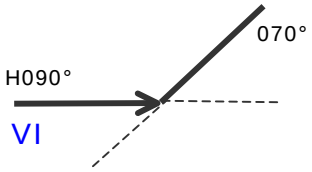
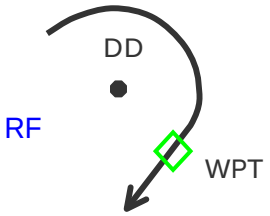
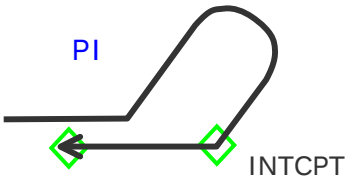
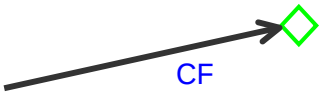
2.3. MCDU prompts

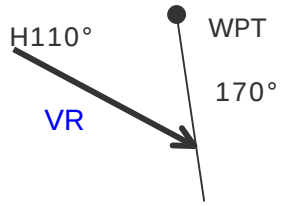
PROMPT	Result of LS key push	Pilot's guide reference
IMM EXIT*	Activates IMM EXIT function.	Part III 3.4
RESUME HOLD*	Cancels IMM EXIT function and re-inserts hold. Display reverts to IMM EXIT prompt.	Part III: 3.4
ONCE THEN ←UNDO/ERASE	Cancels the last revision in the TMPY F-PLN.	Part III: 2.2
TMPY INSERT*	Activates the TMPY F-PLN.	Part III: 2.2
TMPY ←ERASE	Deletes the whole TMPY F-PLN.	Part III: 2.2
DIR TO INSERT*	Activates the TMPY F-PLN in case of pending 'Direct To' revision.	Part III: 3.3
DIR TO ←ERASE	Deletes the TMPY F-PLN in case of pending 'Direct To' revision.	Part III: 3.3
←CLB	Assigns the entered constraint to the climb segment.	Part III: 4.1
DES→	Assigns the entered constraint to the descent segment.	Part III: 4.1

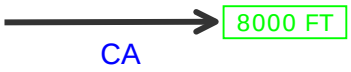
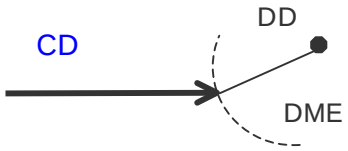
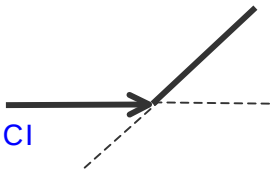
2.4.F-PLN page: lateral defining legs

The table below contains the lateral defining legs as shown on F-PLN page. These legs are coded in the NAV data base in accordance with ARINC 424 specification.
It indicates access from LAT/VERT revision. WPT represents any waypoint name.

MCDU Display naming	Path / Terminator	DEFINITION		Access to LAT REV	Access to VERT REV
WPT (1)	DF TF IF	The label line is blank for TF and DF legs that result from pilot entry or DIR TO. It is always blank for IF.		Y	Y
VIA WPT	TF DF	If defined as part of a terminal area procedure or airway, the VIA name is displayed.		Y	Y
CXXX° WPT (1)	CF	XXX is the defined course.		Y	Y
DDNAV WPT	AF	DD is the distance of the arc. NAV is the first three characters of the DME station identifier from which arc is defined from. WPT is the terminating waypoint.		Y	Y
HOLD L HHHHH (3)	HA	L/R is direction of turn. HHHHH – terminating altitude		Y	Y
HOLD L CXXX° WPT (1)	HM	L/R is direction of turn. XXX is the inbound course to the holding pattern fix. WPT is the holding pattern fix, which may be a fixed waypoint or T-P.		Y (4)	Y (2)
HOLD L WPT	HF	L/R is direction of turn.		Y	Y

MCDU Display naming	Path / Terminator	DEFINITION		Access to LAT REV	Access to VERT REV
HXXX° HHHHH (3)	VA	XXX is heading. HHHHH is terminating altitude.		Y	Y
HXXX ° NAV/DD	VD	XXX is heading. NAV is the first three characters of the DME station identifier from which distance is defined. DD is DME distance.		Y	Y
HXXX ° INTCPT	VI	XXX is heading. The following leg defines the intercept termination.		Y (5)	Y
DDARC WPT	RF	DD is the radius of the arc. WPT is the termination waypoint.		Y	Y
PROC INTCPT CXXX° WPT	PI CF	XXX is the inbound course to the procedure turn fix	 	Y (4)	Y

MCDU Display naming	Path / Terminator	DEFINITION		Access to LAT REV	Access to VERT REV
HXXX° WPTRRR	VR	XXX is heading. WPT is the first three characters of the identifier of the fixed waypoint from which the heading is defined. RRR is radial from WPT.		Y	Y
HXXX° MANUAL	VM	XXX is heading		Y	Y
WPTXXX HHHHH (3)	FA	WPT is the first three characters of the identifier of the fixed waypoint from which the course is defined. XXX is the outbound course from the previous waypoint. HHHHH is terminating altitude.		Y	Y
WPTXXX MANUAL	FM	WPT is the first three characters of the identifier of the fixed waypoint from which the course is defined. XXX is the outbound course from the previous waypoint.		Y	Y
T-P	Fixed WPT Turn Point	Displayed when a 'Direct To', hold or offset revision at present position is pending or inserted. It becomes a fixed waypoint at the LAT/LONG when the temporary F-PLN is inserted.		Y	Y
IN-BND	Fixed WPT Turn Point	Displayed when a 'Direct To / Intercept To' revision is pending or inserted.		Y	Y
OUT-BND	Fixed WPT Turn Point	Displayed when a 'Direct To / Intercept From' revision is pending or inserted.		Y	Y
PPOS		Present Position Displayed as the FROM waypoint if the A/C is in a discontinuity and does not meet the criteria for activation on the next leg.		Y	Y

MCDU Display naming	Path / Terminator	DEFINITION		Access to LAT REV	Access to VERT REV
CXXX° HHHHH (3)	CA	XXX is the course. HHHHH terminating altitude.		Y	Y
CXXX° NAV/DD	CD	XXX is the course. NAV is the first three characters of the DME station identifier from which the course is defined. DD is DME distance.		Y	Y
CXXX° INTCPT	CI	XXX is course. The following leg defines the intercept termination.		Y (5)	Y
CXXX° WPTRRR	CR	XXX is course. WPT is the first three characters of the identifier of the fixed waypoint from which the course is defined. RRR is radial from WPT.		Y	Y

Notes:
(1) Signifies that pilot may insert this leg in F-PLN. All other legs can only be entered from the Navigation Data Base.
(2) Access from WPT only.
(3) Altitude termination may be displayed as flight-level (FLHHH) or altitude (HHHHH).
Leading zeros are suppressed when altitudes are displayed.
(4) Access from either left LS key results in a LAT REV at WPT.
(5) Access from left LS key results in a LAT REV at the termination waypoint of the following leg (AF, CF, FA or FM).

2.5. Pilot entries: Data format

The table below lists data, which can be entered by pilot in MCDU.
It provides the following information relating to format, range, units, and associated MCDU pages for each entry.

FORMAT
- The field width and format,
- The symbols generally used are as follows:
  A- Alphabetic, N- Numeric, X- Alphanumeric.
- For fields that have more than one acceptable entry format but only one display format, the display format is specified.
- When pilot entry in a data field exceeds the field width or is of incorrect format or type, "FORMAT ERROR" s-pad msg (white) is triggered.

  This may be due to an inadvertent insertion of a space character.

RANGE
- Range is given for each data entry according to the unit chosen.
- When Pilot entry is of correct field width, format and type, but is not within acceptable range, "ENTRY OUT OF RANGE" s-pad msg (white) is displayed unless another message is already displayed.

UNITS
- Units are given for each entry.
- When two units are available (by OPC option), only one unit and one range are given. These are Kg for weights, meters for lengths and °C for temperatures.
- For other units, the range should be converted.
- When the maximum value of a given range is not specified, it will be defined in OPC file.

MCDU PAGE
The MCDU pages on which the data may be inserted.

DATA NAME	FORMAT	RANGE (X is input)	UNITS	MCDU PAGE
ACCEL ALT		Same as ALT	ft (MSL)	PERF TAKE OFF GO AROUND
AIRWAYS (TO)	**XXXXX** May be from 1 to 5 characters Only NavDB waypoints are accepted	N/A	N/A	AIRWAYS
AIRWAYS (VIA)	**XXXXX**	If not in data base, "NOT IN DATA BASE" s-pad msg (white) is displayed	N/A	AIRWAYS
ALT	**NNNN** or **NNNNN** (Leading zeros must be included)	Min alt = 100 ft Max alt = MAX certified ALT (from PERF Data Base). Entry and display are rounded to the nearest 10 feet	ft (MSL)	F-PLN A VERT REV SEC F-PLN A STEP ALTS PERF CLB PERF DES CLIMB WIND CRUISE WIND DESCENT WIND
ALTN	Same as ARPT	Same as ARPT		INIT A ALTN
ALTN RTE	Same as CO RTE	Same as CO RTE	N/A	INIT A
ARPT	**AAAA** ARPT IDENT may be less than 4 characters.	If AAAA is not in the Data Base airport file, NEW RUNWAY page is displayed		INIT A SEC INIT A LAT REV ALTN
BLOCK FUEL	**NN.N** if OPC option is Kg **NNN.N** if OPC option is lb Leading zeros may be omitted	0 – Max block as defined in aero model versus center tank program pin	Thousands of Kg or lb (OPC option)	INIT B
CABIN RATE	**NNN or –NNN**	100 to 999 -100 to -999 in 1 ft/mn increments	ft/mn	PERF CRZ
CATEGORY	**N**	0 – 3	N/A	NEW NAVAID
CG	**NN.N**	8.0 – 45.0	% MAC	FUEL PRED
CHANNEL	**NNN**	500 – 699		NEW NAVAID RAD NAV
CHGCODE	**XXX**	*See Part II 2.2*	N/A	A/C STATUS
CLASS (navaid)	**AAAAAA** (Refer to range for acceptable entries)	VOR, DME, VORDME, VORTAC, LOC, ILS, NDB, MLS, TACAN	N/A	NEW NAVAID
CO RTE	**XXXXXXXXXX** Up to 10 alphanumeric characters may be entered	If not in the NAV Data Base, "NOT IN DATA BASE" s-pad msg (white) is displayed	N/A	INIT A ROUTE NEW ROUTE

DATA NAME	FORMAT	RANGE (X is input)	UNITS	MCDU PAGE
COST INDEX	**NNN** May be entered as 1-3 digits Leading zeros may be omitted	0 – 999	Kg/mn or 100lb/h (according to lb/Kg OPC option)	INIT A SEC INIT A PERF CLB PERF CRZ PERF DES
CRS	**XNNN** or **NNNX** or **NNN** Leading zeros may be omitted. An entry of 360 is displayed as 0. X: F or B (1)	0 – 360	Degrees	RADIO NAV (1) NEW NAVAID
CRZ FL	Must be entered as FLIGHT LEVEL	1 – Max certified Altitude / 100	FL (STD)	INIT A SEC INIT A PROG
CRZ TEMP	See TEMP		See TEMP	INIT A SEC INIT A FUEL PRED
DH	**NNN** "NO" may be entered	0 – 700	ft	PERF APPROACH
DIST	**NN.N** Leading and trailing zeros may be omitted NNNN	0 – 99.9 in 0.1 NM increments 0 – 9999 in 1 NM increments	NM NM	HOLD ALTN
DRT TO	**"D"NN**	Eight possible values *See Part II - 2.1*		PERF TAKE-OFF
ELV	**±NNNNN** If + or – is not input, assume + Leading zeros may be omitted	-2000 to + 20470	ft (MSL)	NEW NAVAID NEW RUNWAY
EO ACCEL ALT	Same as ALT		ft (MSL)	TAKE OFF GO AROUND
ETT	**HHMMSS** or **HHMM**	0 – 23 0 – 59 0 – 59	H MN S	VERT REV
FF + FQ SENSORS	One or both may be entered. Both: **/FF + FQ** or **/FQ + FF** Fuel flow: **/FF** Fuel quantity: **/FQ**		N/A	FUEL PREDICTION
FIG OF MERIT	**N**	0 – 3	N/A	NEW NAVAID

DATA NAME	FORMAT	RANGE (X is input)	UNITS	MCDU PAGE
FINAL/TIME	Only one may be entered at a time. To input FINAL, enter **NN.N** To input TIME, enter **/HHMM** HH are hours and MM are minutes Leading zeros may be omitted, 1 or 2 digit entry is interpreted as minutes.	FINAL: 0 – 10 Tons Time: 00h00 – 01h30	Thousands of Kg or lb. (OPC option), minutes	INIT B SEC INIT B FUEL PRED
FLAPS	**N**	0, 1, 2 or 3	N/A	TAKE-OFF
FLEX TO TEMP	If De-rated TO option not implemented: same as TEMP. If De-rated TO option is implemented: **"F"+/- NN** (if no sign, assume +)		Same as TEMP NN in degrees centigrade	TAKE-OFF
FLIGHT LEVEL	**FLNNN** or **NNN** Leading zeros on NNN may be omitted	1 – Max Certified Altitude / 100	Hundreds of ft (STD)	F-PLN A PROG VERT REV INIT A, SEC INIT A SEC F-FPLN A STEP ALTS PERF CLB PERF DES CLB WIND CRZ WIND DES WIND
FLT NBR	**XXXXXXXX** Up to 8 alphanumeric characters may be entered		N/A	INIT A
FOB	**NN.NN** if OPC option is Kg **NNN.N** if OPC option is lb Leading zeros may be omitted	Same as BLOCK FUEL	Thousands of Kg or lb. (OPC option)	FUEL PRED
FREQ (ADF)	**NNNN.N** decimal point may be omitted if no decimal part Leading zeros may be omitted	190.0 – 1750.0	kHz	RADIO NAV
FREQ.	**NNN.NN** decimal point may be omitted if no decimal part	108.00 – 117.95	MHz	PROG RADIO NAV NEW NAVAID

DATA NAME	FORMAT	RANGE (X is input)	UNITS	MCDU PAGE
FROM/TO	**AAAA/AAAA** See "ARPT"		N/A	INIT A SEC INIT A ROUTE
GMT	**HHMM** Where HH are hours and MM are minutes Leading zeros may be omitted 1 or 2 digit entry is interpreted as minutes	HH: 0 – 23 MM: 0 – 59	Hours minutes	
GW	**NN.N** if Kg unit **NNN.N** if lb unit Leading and trailing zeros may be omitted	Min GW – Max GW if Kg unit (Function of ZFW range and FOB)	Thousands of Kg or lb. (OPC option)	FUEL PRED
IDLE FACTOR	**±N.N** Leading and trailing zeros may be omitted	-9.9 to +9.9	%	A/C STATUS
INB CRS	**NNN** Same as CRS	0 – 360	Degrees	HOLD
INCR	**NN**	1 – 20	Degrees	LAT REV
LAT	**DDMM.MB** or **BDDMM.M** DD: degrees, MM.M: minutes, B: direction Leading zeros may be omitted but the direction (B), N or S, is necessary. Latitude is displayed as DDMM.MB	B: N or S DD: 90° MM.M: 59.9	Degrees Minute Tenths of minutes	INIT A
LAT/LONG	LAT/LONG Same as LAT and LONG except both must be entered with / in between	Same as LAT and LONG	Same as LAT and LONG	PROG F-PLN A/B NEW WPT, NEW NAVAID, NEW RUNWAY SEC F-PLN A/B DIR TO LAT REV
LENGTH	**NNNNN** Leading zeros may be omitted	1000 – 8000 M 3300 – 26300 ft	M or ft (OPC option)	NEW RUNWAY
LONG	**DDDMM.MB** or **BDDDMM.M** DDD: degrees MM.M: minutes B: Direction Leading zeros may be omitted but the direction (B) is necessary. Longitude is displayed as DDDMM.MB	B: E or W DDD: 180° MM.M: 59.9	Degrees Minutes Tenths of minutes	INIT A

DATA NAME	FORMAT	RANGE (X is input)	UNITS	MCDU PAGE
MACH	**.NN** The decimal point is necessary Trailing zeros are not necessary	MAX = MMO As defined in Perf model	Mach Number	PERF CRZ PERF DES
MACH/SPD	MACH and SPD must be entered with a **dash** between (see MACH and SPD formats)	Same as MACH and SPD	Same as MACH and SPD	PERF DES
MDA	**NNNNN** Leading zeros may be omitted	Landing elev – Landing elev +5000 ft	ft(MSL)	APPROACH
MDH	Same as MDA	0 – 5000	ft (AGL)	APPROACH
NAVAID	**XXXX** Up to 4 alphanumeric characters may be entered	Any alphanumeric	N/A	NAVAID NEW NAVAID RAD NAV SELECTED NAVAID NEW RUNWAY
OFFSET	**NNB** or **BNN** or **0** NN: offset distance B: direction Leading zero on distance may be omitted OFST will always be displayed as BNN	B: L or R 0 ≤ NN ≤ 50	NM	OFFSET
PERF FACTOR	**±N.N** Leading or trailing zero may be omitted	- 9.9 – + 9.9	%	A/C STATUS
PLACE/BRG/ DIST	**PLACE**: can be any data base (or pilot defined) ARPT, RWY NAVAID or WAYPOINT. Entry, without decimal digit. An entry of **BRG** = 360 is displayed as 0. **DIST**: is **NNN.N** where leading zeros may be omitted; all 3 parameters must be entered with "**/**" between entries	PLACE – if not in data base, "NOT IN DATA BASE" s-pad msg (white) is displayed BRG: must be a 3 digits BRG = 000 – 360 DIST = 0 – 999.9	N/A Degrees NM	F-PLN A/B SEC F-PLN A/B LAT REV PROG NEW WPT DIR TO
PLACE-BRG/ PLACE-BRG	Same as above. A PLACE–BRG couple is entered with a **dash** in the middle. 2 couples have to be entered with "**/**" between the entries	Same as above except for PLACE: in each couple, PLACE is limited to 5 characters	Same as above	F-PLN A/B SEC F-PLN A/B LAT REV PROG NEW WPT DIR TO

DATA NAME	FORMAT	RANGE (X is input)	UNITS	MCDU PAGE
PLACE/DIST	PLACE: same as for PLACE/BRG/DIST DIST: same as for PLACE/BRG/DIST	PLACE: same as for PLACE/BRG/DIST DIST: -999.9 to +999.9	N/A NM	F-PLN A/B SEC F-PLN A/B WAYPOINT PILOT WPT STEP ALTS
QFE	**NNNN** Leading or trailing zeros may be omitted NN.NN Leading or trailing zeros may be omitted	745.0 – 1050.0 (Hpa) 22.00 – 31.01 (In Hg)	Hecto-Pascals In Hg	UPLINK TO DATA
QNH	**NNNN** Leading or trailing zeros may be omitted NN.NN Leading or trailing zeros may be omitted	745.0 – 1050.0 (Hpa) 22.00 – 31.01 (In Hg)	Hecto-Pascals In Hg	APPROACH
RADIAL IN	**NNN** Leading zeros may be omitted. An entry of 360 is displayed as 0.	000 – 360	Degrees	DIR TO
RADIAL OUT	**NNN** Leading zeros may be omitted. An entry of 360 is displayed as 0.	000 – 360	Degrees	DIR TO,
REQUIRED ACCUR	**NN.NN** Leading or trailing zero may be omitted	0.01 – 20.0	NM	PROGRESS
UTC CSTR	**HHMMSS** or **HHMM**	0 – 23 0 – 59 0 – 59	H MN S	VERT REV
RTE RSV RTE RSV%	Only one may be entered at a time. To input RTE RSV enter **NN.N** To input RTE RSV % enter **/NN.N**	0 – Max RTE RSV RTE RSV% = 0 – 15 %	Thousands of Kg or lb. (OPC option) %	INIT B FUEL PRED
RWY	**AAAANND** AAAA is same as ARPT NN is runway number (2 digits must be entered) D is L or R or C (Left / Right / Center)			RUNWAY, NEW RUNWAY NEW NAVAID

DATA NAME	FORMAT	RANGE (X is input)	UNITS	MCDU PAGE
RWY INTERSECTION	**NNDAAA** NN is runway number (2 digits must be entered), D is L or R or C, depending on the runway AAA are 3 alphanumeric characters			UPLINK TAKE OFF DATA
SAT/ALT	TEMP/ALT	See TEMP and ALT	N/A	CRUISE WIND
SATELLITE NUMBER	**NN** Leading zero may be omitted	1 – 99	N/A	PREDICTIVE GPS
SET HDG	**NNN.N** Leading and trailing zeros may be omitted Will always be displayed as NNN.N	000.0 – 359.9	Degrees	IRS MONITOR
SHIFT/RWY (2)	**NNNNN/NND**	NNNNN same as TO SHIFT NND same as RWY	Same as to SHIFT	UPLINK TO DATA REQ
SLOPE	**N.N**	0.0 – 9.9	Degrees	NEW NAVAID
SPD	**NNN** Must be 3 numeric characters	MAX = VMO MIN = 100 KT	KT (CAS)	F-PLN A SEC F-PLN A VERT REV PERF CLB PERF CRZ PERF DES
SPD LIM	**SSS/NNNNN** SSS is a speed NNNNN is an ALT or FLIGHT LEVEL (see ALT and FLIGHT LEVEL)	SSS same as SPD	KT/ft (MSL) or KT/FL	VERT REV F-PLN A
SPD/MACH	See MACH/SPD	Same as MACH and SPD	Same as MACH and SPD	PERF DES
STATION DEC	**NNND** NNN is the declination (magnetic variation) is the direction. Leading zeros may be omitted. D is not required for an entry of zero declination	NNN: 00 – 180 D: E or W	Degrees	NEW NAVAID
STEP ALT	**SNNN or NNNS** NNN is in Flight Level, or SNNNNN or NNNNNS NNNNN is in ALT Leading zeros may be omitted	Same as Flight Level or ALT	Same as Flight Level or ALT	F-PLN A

DATA NAME	FORMAT	RANGE (X is input)	UNITS	MCDU PAGE
TO LIMIT (2)	**NNNNN**	1 – Length of origin runway	M or ft (OPC option)	UPLINK TO DATA REQ
T.O. SHIFT	**NNNNN**	1 – Length of origin runway	M or ft (OPC option)	TAKE OFF
TAXI	**N.N** Leading or trailing zeros may be omitted	0 – 9.9	Thousands of Kg or lb. (OPC option)	INIT B
TEMP	± **NN** If no sign, assume +		Degrees centigrade	APPROACH, TAKE OFF
THR RED ALT	Same as ALT		ft (MSL)	TAKE OFF GO AROUND
THS	**AAN.N** or **N.NAA** AA is UP or DN (DOWN) Trailing zeros may be omitted	Max UP = 7.0 Max DN = 5.0 Min UP and DN is 0.0 the increment value is .1	Degrees	TAKE OFF
TIME	**N.N**	0 - 9.9	Minutes	HOLD
TRANS ALT	Same as ALT		ft (MSL)	TAKE OFF APPROACH
TRIP WIND	See EFF WIND		KT	INIT B SEC INIT B
TROPO	An entry of **NNNN** or **NNNNN** is considered as an ALTITUDE An entry of **NNN** or **NN** is considered as a FLIGHT LEVEL	ALT: 1000 – 99990 (Altitude entry is rounded to the nearest 10 feet) FL: 10 – 999	Same as ALT or FLIGHT LEVEL	FUEL PRED INIT A SEC INIT A
UPDATE AT	Same as WAYPOINT	Same as WAYPOINT	N/A	PROG
V1	Same as SPD		KT (CAS)	TAKE OFF
V2	Same as SPD		KT (CAS)	TAKE OFF
VAPP	Same as SPD		KT (CAS)	APPROACH
VR	Same as SPD		KT (CAS)	TAKE OFF
WAYPOINT	**XXXXXXX** May be from 1 – 7 characters. Acceptable as waypoint Ident, ARPT, NAVAID, WAYPOINT, LAT/LONG, PLACE.BRG/ PLACE.BRG PLACE/BRG/DIST PLACE/DIST may be entered to define a waypoint			WAYPOINT NEW WAYPOINT F.PLN A/B LAT REV PROG, DIR TO STEP ALTS PREDICTIVE GPS VERT REV SEC INIT A

DATA NAME	FORMAT	RANGE (X is input)	UNITS	MCDU PAGE
WIND DIR /MAG	**NNN/NNN** Both must be entered An entry of WIND DIR = 360 is displayed as 0. Leading zeros may be omitted	WIND DIR: 0 – 360 WIND MAG (magnitude= speed): 0 - 250	Degrees KT	PERF APPR, CLIMB WIND CRUISE WIND DESCENT WIND
WIND DIR /MAG /ALT	**NNN/NNN/ALT** or Flight Level An entry of Wind DIR =360 is displayed as 0 NNN: Leading zero may be omitted ALT	WIND DIR: 0 – 360 WIND MAG (magnitude= speed): 0 – 250 Same as ALT	Degrees /KT /ft (MSL)	CLIMB WIND, CRUISE WIND, DESCENT WIND
ZFW	**NN.N** if Kg unit **NNN.N** if lb. Unit Leading and trailing zeros may be omitted	35 – Max ZFW if Kg unit	Thousands of Kg or lb. (OPC option)	INIT B
ZFWCG	Same as CG	Same as CG	Same as CG	INIT B

Note (1): An entry with a Back Beam (B) or a Front Beam (F) indicator is allowed for an ILS course:
- If the "Back Course Take Off" option and if the "Back Beam Approach" option are activated (OPC file).
- Otherwise, "FORMAT ERROR" s-pad msg is triggered.

Note (2): The SHIFT and TO LIMIT values must be consistent (e.g. the runway length remaining shall be less than or equal to the runway length – position shift).

Part V: Chapter 3 – FMS RESETS SUMMARY

Contents

AUTO RESET OF ONE FMGC

	Single reset	Double reset	Triple reset
		An automatic reset is termed as double, if a second reset occurs within one minute after the first.	A reset is termed as triple, if a third reset occurs within one minute after the second.
			After a triple reset the FMGCs switch to SINGLE MODE.

	ON THE FAILED SIDE		
ND	Red flag **MAP NOT AVAILABLE**		
	SET OFF SIDE RNG/MODE message (amber) is displayed, if the two ND ranges or modes selected on the EFIS control panels are different		
AP - FD - A/THR	If engaged, AP - A/THR may be lost. If engaged, managed modes may revert to selected.		If engaged, **AP-FD-A/THR are lost**. If engaged, managed modes revert to selected.
FMA	Reflects degradation		Reflects degradation
			Failed side **FD** becomes **blank**
MCDU	M**ay revert** to MCDU MENU page	R**everts** to MCDU MENU page	
	FM FAIL may be momentarily illuminated		**FM FAIL** is illuminated
	<FMGC (OPP) prompt may be momentarily displayed, then replaced by **<FMGC (OWN)** prompt.		**<FMGC (OPP)** prompt is displayed
	ON THE OPPOSITE SIDE		
ND	Not affected		
AP - FD - A/THR	Not affected		
FMA	Reflect degradation		**AP/ATHR become** blank
			Failed side **FD** becomes **blank**
MCDU	**IND** momentarily illuminated **INDEPENDENT OPERATION** message (amber) momentarily displayed on scratchpad		On **POSITION MONITOR** page, the failed FM position remains dashed.
	ECAM and AURAL warning		
	if AP disconnects: Red warning AUTO FLT AP OFF and aural warning		Red warning AUTO FLT AP OFF and aural warning
	if A/THR disconnects: Amber caution AUTO FLT A/THR OFF and aural warning		Amber caution AUTO FLT A/THR OFF and aural warning

	RECOVERY		
FMS	All data in affected FM are **saved.**	All data in affected FM are **erased,** but through dual function, the FMGCs **resynchronize**. The affected **FM position is reinitialized to the IRS position**, and the EPE is set to zero. A position difference may appear between FMGCs.	Affected FMGC switches to **degraded** mode and is not available. FMGCs must be used in **SINGLE** mode
AP - A/THR	Re-engage as necessary		Use opposite AP
MCDU	If MCDU MENU page is displayed: Select **<FMGC (OWN)** prompt Otherwise the current page remains displayed	Select **<FMGC (OWN)** prompt	**Wait 2 minutes** Select **<FMGC (OPP)** prompt
	OWN FMGC IN PROCESS message (white) is displayed on scratchpad		
ND	If **SET OFF SIDE RNG/MODE** message (amber) is still displayed, recycle EFIS panel RNG/MODE		The **EFIS panel** on the side of the remaining FMS must be used for both NDs display.

	MANUAL RESET		
	Not required	**If C/B pulled during the minute following a Double Reset this may lead to a "Degraded mode".**	**The FMGC may be reset.** **Apply the following procedure:** **- Pull C/B for 5 seconds,** **- Wait 1 minute,** **- Pull again C/B for 5 seconds.** **Or Pull C/B for 12 minutes.**

	AUTO RESET of BOTH FMGCs	
	Single reset	**Double reset**
		Both FMs have lost their data.

	ON BOTH SIDES	
ND	Red flag **MAP NOT AVAILABLE**	
AP - FD - A/THR	If engaged, **AP may be lost**, managed modes revert to selected modes	
FMA	Reflects degradation	
MCDU	Reverts to MCDU MENU page	
	FM FAIL may be momentarily illuminated	
	<FMGC (OWN) prompt may be momentarily displayed	**<FMGC (REQ)** prompt is momentarily displayed, then followed by **<FMGC (OWN)** prompt .
	ECAM and AURAL warning	
	If AP disconnects: Red warning AUTO FLT AP OFF and aural warning	
	If A/THR disconnects: Amber caution AUTO FLT A/THR OFF and aural warning	

	RECOVERY	
FMS	All FM data are **saved**.	All FM data are **lost**.
		The affected **FM position is reinitialized to the IRS position**, and the EPE is set to zero.
		If GPS option is activated in the OPC file, the GPS is automatically selected. All deselected navaids are erased.
AP - A/THR	Re-engage as necessary	
MCDU	If MCDU MENU page is displayed: Select **<FMGC (OWN)** prompt Otherwise the current page remains displayed	Select **<FMGC (OWN)** prompt.
	OWN FMGC IN PROCESS message (white) is displayed on scratchpad	
		Data may be re-entered from either MCDU. The second FMGC will synchronize automatically.
ND	Select as appropriate	

	MANUAL RESETS
	Not required

PAGE INTENTIONALLY LEFT BLANK

Part V: Chapter 4 – OPC and AMI FILES

Contents

PAGE INTENTIONALLY BLANK

4.1. OPC FILE

Description		Default
Software OPTIONS		
Weight Units	K (kg) / L (lb)	K
Length Units	M (m) / F (ft)	M
MDA/MDH selection	A (MDA) / H (MDH)	A
2nd ADF on board	Y / N	N
GPS Option	Y / N	N
MLS Option	N	N
AOC Option *AOC OPTION ACTIVATES THE UPLINK FUNCTIONS (INIT REQUEST / PERF / WIND)*	Y / N	N
DERATED TAKE OFF Option activated	Y / N	N
GPS Configuration	H (Hybrid) / A (Autonomous)	H
BACK COURSE TAKE OFF Option activated	Y / N	N
BACK BEAM APPROACH Option	Y / N	N
IRS HDG INITIALIZATION Option activated	Y / N	N
LAT/LONG abbreviation type	L (LLxx) / N (NxxWyyy)	L
MINI ACARS Option *LIMITED AOC OPTION : BROADCAST DATA ONLY - AOC PROMPT IS NOT DISPLAYED*	Y / N	N
PRINTER INSTALLED	Y / N	N
DECEL 2 activated *D CIRCLED IN MAGENTA + D CIRCLED IN WHITE*	Y / N	N

NAV_POLICY_OPTIONS

EN ROUTE default RNP value	Nm	2
Oceanic default RNP value		0,01 - 20
TERMINAL default RNP value		1
GPS APPROACH default RNP value		0,3
PRECISION APPROACH default RNP value		0,3
NON PRECISION APPROACH default RNP value		0,5

Software DATA

Max GW	99,9	tons	99,9
Max RTE RSV	10,0		10,0
MAX ZFW	80,0		80,0
MAX BLOCK	80,0		80,0

4.2.AMI FILE

Description	Range	Unit	Default
SW_OPTIONS			
CO RTE retention *Y : Manual deletion only, N : Deleted automatically after landing*	Y / N (Y=manual deletion)		Y
Default Speed limit (250 kts/10000') Enforced	Y/N		Y
DIR TO page default selection	Y/N (N=without abeam)		N
Default Intercept Angle for OFFSET path	20° / 50°	deg	30
POLICY_OPTIONS			
Airline Ident - A/C type - Engine type			
Thrust Reduction Height	400 / 5000	ft AGL	1500
All Engines Acceleration Height	400 / 10000	ft AGL	1500
Engine Out Acceleration Height	400 / 10000	ft AGL	1500
Performance Factor	-9,9 / +9,9	%	0
Idle Factor	-9,9 / +9,9	%	0
Performance Adjustement Code	3 characters		ARM
Fuel for taxi	0 / 2000	kg	200
Percentage of trip fuel for route reserves	0 / 15	%	5
Upper limit for route reserves quantity	0 / 10000	kg	10000
Lower limit for route reserves quantity	0 / 10000	kg	0
Compute route reserve during flight	Y / N		Y
Alternate trip included in route reserve	Y / N		N
Time in which final holding pattern supposed to be flown (Used for fuel prediction)	0 / 90	mn	30
Time final holding pattern supposed to be flown Used for fuel planing	0 / 90	mn	30
Fuel burned for the final holding pattern. Used for fuel prediction	0 / 10000	kg	0
Altitude at which the final holding pattern is supposed to be flown	1500, 5000, 10000, 15000, 20000	ft AGL	1500
Final holding pattern is flown at primary or alternate destination	P / A		A

AMI FILE (Cont'd)

Description	Range	Unit	Default
AOC_POLICY_OPTIONS			
Data Link (AOC) inhibit	Y / N (Y = inhibit)		Y
Flight plan data (FPN) Request inhibit	Y / N (Y = inhibit)		Y
Performance data (PER) Request inhibit	Y / N (Y = inhibit)		Y
Take-off data (LDI) Request inhibit	Y / N (Y = inhibit)		Y
Wind data (PWI) Request inhibit	Y / N (Y = inhibit)		Y
Flight number (IEI) enable	Y / N (N = inhibit)		N
Ground address (GA) enable	Y / N (N = inhibit)		N
Company address (CA) enable	Y / N (N = inhibit)		N
Time stamp (TS) enable	Y / N (N = inhibit)		N
Scratchpad (SP) enable	Y / N (N = inhibit)		N
Position (POS) report inhibit	Y / N (Y = inhibit)		Y
Delta ETA Trigger	0 / 59	mn	0
Flight plan (FPN/FPC) Report inhibit	Y / N (Y = inhibit)		Y
Rejection message enable	Y / N (N = inhibit)		N
Response message enable	Y / N (N = inhibit)		N
Auto-print of AOC Uplinks enable	Y / N (N = inhibit)		N
Auto-print of Flight Plan Uplink default setting	Y / N (N = no default)		N
Auto-print of Take Off Data Uplink default setting	Y / N (N = no default)		N
Auto-print of Wind Uplink default setting	Y / N (N = no default)		N
Auto-print of Flight Report Uplink enable	Y / N (N = inhibit)		N
Auto-print at Engine start default setting	Y / N (N = no default)		N
Auto-print at Engine shut down default setting	Y / N (N = no default)		N
Auto-print at transition to Take Off default setting	Y / N (N = no default)		N

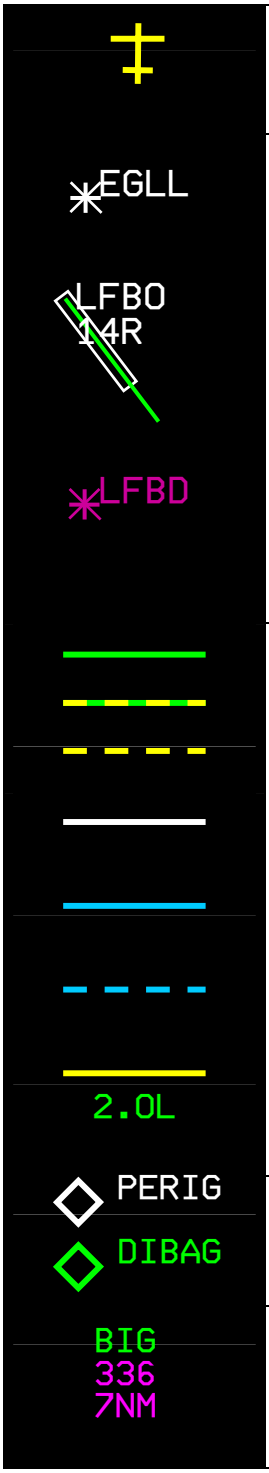
PAGE INTENTIONALLY BLANK

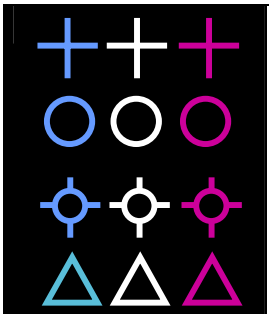
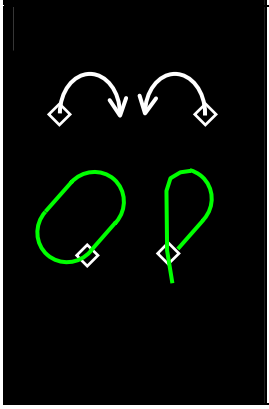
Part V: Chapter 5 – ND SYMBOLS

Contents

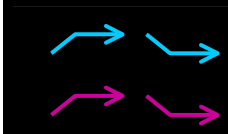
PAGE INTENTIONALLY LEFT BLANK

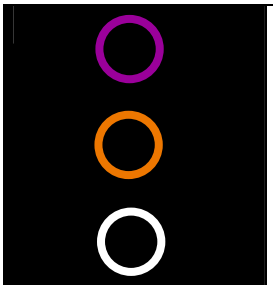
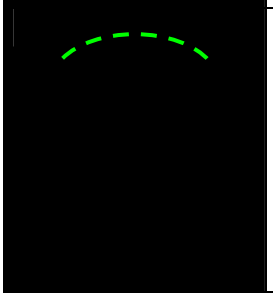
5.1. NAVIGATION LATERAL SYMBOLS

	A/C symbol	
	Airport	If the runway is not specified, airport is shown by a star with ARPT ident (white).
		If the runway is specified airport is shown by an oriented runway symbol (white). *The runway is drawn to scale (paved length) if the selected range is 10,20 or 40 NM.*
		The airports that are not displayed as part of the flight plan may be called for display by selecting ARPT on the EFIS control panel. They are shown by a magenta star.
	F-PLN	ACTIVE F-PLN is shown by a continuous green line when NAV mode is engaged.
		TMPY F-PLN shown by a dashed yellow line.
		SEC F-PLN is shown by a continuous white line.
		Missed approach procedure is shown by a continuous blue line.
		ALTN F-PLN is shown by a dashed blue line.
		EOSID (when available) is shown by a continuous yellow line.
		Cross track error.
	Waypoints	The TO WPT with label is shown in white.
		The en-route WPTs with label are shown in green.
	TRK/DIST	If CSTR is not selected on EFIS control panel, TRK and DIST from the map reference point to the next F-PLN WPT are displayed in magenta.

	Navaids	VOR DME VOR DME NDB Blue when tuned, white when TO WPT, magenta when not part of the ACTIVE F-PLN and called for display by selecting NDB or VOR.D on the EFIS control panel.
	Holding patterns	These appear only when they are part of the flight plan. For the 160 and 320 NM range scales, each one is shown by a white arrow that originates at the associated fix and indicates the direction of the turn. For shorter range scales and if the procedure turn or the holding pattern is in the next or the active leg, the display shows the full circuit or pattern.

5.2. VERTICAL AND PERFORMANCE SYMBOLS

	Level symbols	Level symbol (top of climb or level-off position), when the aircraft reaches either the FCU-selected altitude (blue), or the constrained altitude (magenta), if it is more restrictive than the FCU altitude, and if appropriate managed mode is engaged. It does not appear when the aircraft is within 100 feet above, or below, the selected altitude.
		Top of descent symbol, or continue descent symbol: White, if DES is not armed, Blue, if DES is armed.
		Start of CLIMB symbol: White, if CLB is not armed, Blue, if CLB is armed.
		Intercept point symbol : White, if only the NAV mode is engaged, Blue, if DES mode is engaged. Indicates the point at which the aircraft is predicted to intercept the descent path, if there is any vertical deviation while the aircraft is in DES mode.
	Speed change symbol	Indicates the point at which an automatic acceleration or deceleration starts to comply with SPD LIM, SPD CSTR, or HOLDING SPD.
	Decelerate point symbol	Magenta: Indicates where the aircraft will start an automatic deceleration toward VAPP (and thus switch to the approach phase). Although the symbol is always displayed, automatic deceleration only occurs if in managed speed, and NAV or approach mode is engaged. White (Option): displayed when the A/C is in HDG mode.

	ALT CSTR symbol	At constrained waypoint: Magenta, when the ALT CSTR is predicted to be satisfied, Amber, when the ALT CSTR is predicted to be missed, White, when the ALT CSTR is not taken into account by the guidance, and NAV mode is engaged.
	Vertical constraints	Vertical constraints at a WPT (ALT, SPD, TIME constraints), displayed in magenta if CSTR is selected on EFIS control panel.
	ENERGY CIRCLE symbol	Is centered on the aircraft position and oriented to the current track line. Represents the Required Distance to Land. Only displayed in the descent and approach phases, when a selected lateral mode is engaged (HDG or TRK).

Part V: Chapter 6 – ABBREVIATIONS

ABBREVIATION	DEFINITION
A/C	Aircraft
A/P	Autopilot
A/THR	Auto Thrust Function
AA	Airworthiness Authorities
ABN	Abnormal
ABV	Above
ACARS	ARINC Communication Addressing and Reporting System
ACCEL	Acceleration
ACK	Acknowledge Transmission
ACMS	Aircraft Condition Monitoring System
ACP	Audio Control Panel
ACSC	Air Conditioning System Controller
ADC	Air Data Computer (part of ADIRS)
ADF	Automatic Direction Finder
ADF	Automatic Direction Finder
ADIRS	Air Data Inertial Reference System
ADIRU	Air Data Inertial Reference Unit
ADM	Air Data Module
ADR	Air Data Reference
ADV	Advisory
AFS	Auto Flight System
AGL	Above Ground Level
AIDS	Aircraft Integrated Data System
AIME	Autonomous Integrity Monitoring Extrapolation
ALT	Altitude
ALTN	Alternate airport
AMI	Airline Modifiable Information
AMU	Audio Management Unit
ANN	Annunciator
ANP	Actual Navigation Performance
ANT	Antenna
AOC	Airline Operational Control
AP	Autopilot
APPR	Approach
ARPT	Airport
ASAP	As Soon As Possible
ASI	Air Speed Indicator
ATC	Air Traffic Control
ATS	Auto Thrust System
ATSU	Air Traffic Service Unit
ATT	Attitude
AVNCS	Avionics
AWY	Airway
BARO	Barometric
BFO	Beat Frequency Oscillator
BITE	Built-in Test Equipment
BRG	Bearing
BRK	Brake
BRT	Bright
C	Centigrade
C/B	Circuit Breaker
C/L	Checklist

ABBREVIATION	DEFINITION
CAPT	Captain, Capture
CAS	Calibrated Airspeed
CAT	Category
CDL	Configuration Deviation List
CDU	Control Display Unit
CF	Course to a Fix
CFDS	Centralized Fault Display System
CFP	Computerized Flight Plan
CG	Center of Gravity
CHG	Change
CHK	Check
CI	Cost Index
CKPT	Cockpit
CL	Climb detent (Thrust levers)
CLB	Climb
CLR	Clear
CLSD	Closed
CM 1(2)	Crewmember 1 (left seat) or 2 (right seat)
CMC	Centralized Maintenance Computer
CMD	Command
CMPTR	Computer
CO	Company
CO RTE	Company route
CONT	Continuous
CRS	Course
CRT	Cathode Ray Tube
CRZ	Cruise
CSTR	Constraint
CTL	Control
CTL PNL	Control Panel
CTR	Center
DA	Drift Angle
DCDU	Datalink Control and Display Unit
DDRMI	Digital Distance and Radio Magnetic Indicator
DECEL	Deceleration
DEG	Degree
DEP	Departure
DES	Descent
DEST	Destination
DFDR	Digital Flight Data Recorder
DH	Decision Height
DIR	Direction
DIR TO	Direct To
DISC	Disconnect
DIST	Distance
DMC	Display Management Computer
DME	Distance Measuring Equipment
DMU	Data Management Unit
DN	Down
DRT	Derated take-off
DSDL	Dedicated Serial Data Link
DSPL	Display
DTG	Distance To Go
DU	Display Unit

ABBREVIATION	DEFINITION
E	East
E/WD	Engine/Warning Display
ECAM	Electronic Centralized Aircraft Monitoring
ECON	Economic
ECP	ECAM Control Panel
EFCS	Electronic Flight Control System
EFIS	Electronic Flight Instrument System
EFOB	Estimated Fuel On Board
EGPWS	Enhanced Ground Proximity Warning System
EIS	Electronic Instruments System
ELEC	Electrics
ELEV	Elevation
ELT	Emergency Locator Transmitter
ELV	Elevation
EMER	Emergency
EMER GEN	Emergency Generator
ENG	Engine
ENG OUT	Engine Out
EO	Engine-Out
EO ACCEL	ALT Engine Out Acceleration Altitude
EO THR RED	Engine Out Thrust Reduction
EOSID	Engine-Out Standard Instrument Departure
EOT	End Of Text
EPE	Estianted position Error
EPR	Engine Pressure Ratio
EPU	Estimated Position Uncertainty
EROPS	Extended Range Operation
ESS	Essential
EST	Estimated
ETA	Estimated Time ar Arrival
ETE	Estimated Time Enroute
ETOPS	Extended Twin Operation
ETP	Equal Time Point
ETT	Estimated Time for Take-Off
ETX	End of Transmission
EXP	Expedite
EXT PWR	External Power
EXTN	Extension
F	Fahrenheit, Flap retraction speed
F/C	Flight Crew
F/O	First Officer
FAC	Flight Augmentation Computer
FADEC	Full Authority Digital Engine Control System
FAF	Final Approach Fix
FAIL	Fail, Failure
FAR	Federal Aviation Regulations
FC	Course from a FIX
FCDC	Flight Control Data Concentrator
FCMC	Fuel Control and Monitoring Computer
FCOM	Flight Crew Operating Manual
FCPC	Flight Control Primary Computer
FCSC	Flight Control Secondary Computer
FCU	Flight Control Unit
FD	Flight Director

ABBREVIATION	DEFINITION
FDIU	Flight Data Interface Unit
FDU	Fire Detection Unit
FE	Flight Envelope
FF	Fuel Flow
FG	Flight Guidance
FGC	Flight Guidance Computer
FIG	Figure
FL	Flight level
FLP, F	Flap
FLT	Flight
FLT CTL	Flight Control
FLX	Flex take-off
FLX TO	Flexible Takeoff
FM	Flight Management
FMA	Flight Mode Annunciator
FMG(E)C	generic term for FMGC and FMGEC designation
FMGC	Flight Management Guidance Computer
FMGS	Flight Management Guidance System
FMS	Flight Management System
FOB	Fuel On Board
FPA	Flight Path Angle
FPD	Fight Path Director (FPV)
F-PLN	Flight Plan
FPPU	Feedback Position Pick-off Unit
FPV	Flight Path Vector
FQI/FQU	Fuel Quantity Indication/Unit
FREQ	Frequency
FRT	Front
FRV	Fuel Return Valve
FT	Foot, Feet
FT/MN	Feet per Minute
FU	Fuel Used
FWC	Flight Warning Computer
FWD	Forward
FWS	Flight Warning System
G	Green
G.DOT	Green Dot
G/S	Glideslope
GA	Go-around
GC	Great Circle
GMT	Greenwich Mean Time
GND	Ground
GPS	Global Positioning System
GPWS	Ground Proximity Warning System
GRND	Ground
GRP	Geographic Reference Point
GRVTY	Gravity
GS	Ground speed
GW	Gross Weight
H	Hour, Hot
HC	Harness Connector
HCU	Hydraulic Control Unit
HDG	Heading
HDG/S	Heading Selected

ABBREVIATION	DEFINITION
HF	High Frequency
HI	High
HLD	Hold
HP	High Pressure
HPA	Hecto Pascal
HPV	High Pressure Valve
HUD	Head Up Display
HZ	Hertz
I/O	Inputs/Outputs
I/P	Input or Intercept Profile
IAF	Initial Approach Fix
IAS	Indicated Airspeed
IDENT	Identification
IFR	Instrument Flight Rules
IGS	Instrument Guidance System
ILS	Instrument Landing System (LOC & G/S)
IMM	Immediate
INB	Inbound
INIT	Initialization
INOP	Inoperative
INR	Inner
INST	Instrument
INTCP	Intercept
IRS	Inertial Reference System (PART OF ADIRS)
ISA	International Standard Atmosphere
ISDU	IRS System Display Unit
ISO	International Organization for Standardization
ISOL	Isolation
KG	Kilogram
KT	Knot
KT	Knot
L	Left
L/G	Landing Gear
LAT	Latitude
LAT REV	Lateral Revision
LCN	Load Classification Number
LDA	Localizer type Directional Facility
LDG	Landing
LF	Low Frequency
LH	Left-Hand
LHS	Left Hand Seat
LIM	Limitation
LIS	Localizer Inertial Smoothing
LK	Lock
LL	Latitude/Longitude
LLS	Left-Line Select key
LLSK	Lest Line Select Key
LO	Low
LOC	Localizer
LONG	Longitude
LR	Airbus Long Range family (A3330/340)
LRC	Long Range Cruise
LRRA	Low Range Radio Altimeter
LRU	Line Replaceable Unit

ABBREVIATION	DEFINITION
LS	Landing System (ILS or MLS)
LSK	Line Select Key
LT	Light
LVL	Level
LVL/CH	Level Change
LW	Landing Weight
M	Magenta, Mach, Meter
M	Meters, Mach number
MAC	Mean Aerodynamic Chord
MAG	Magnetic
MAG DEC	Magnetic Declination
MAG VAR	Magnetic Variation
MAINT	Maintenance
MAN	Manual
MAP	Missed Approach Point
MAX	Maximum
MAX CLB	Maximum Climb
MAX DES	Maximum Descent
MAX END	Maximum Endurance
MB	Millibar
MC	Master Caution
MCDU	Multipurpose Control and Display Unit
MCT	Maximum Continuous Thrust
MDA	Minimum Descent Altitude
MDH	Minimum Descent Height
MDDU	Multifunction Disk Drive Unit
MECH	Mechanic
MED	Medium
MEL	Minimum Equipment List
MIN	Minimum, Minute
MIN FUEL	Minimum Fuel
MIN TIME	Minimum Time
MKR	Marker
MLS	Microwave Landing System
MLW	Maximum Landing Weight
MMEL	Master Minimum Equipment List
MMO	Maximum Operating Mach
MMR	Multi Mode Receiver
MN	Mach Number
MORA	Minimum OFF Route Altitude
MRP	MAP Reference Point
MSA	Minimum Safe Altitude
MSG, msg	Message
MSL	Mean Sea Level
MSU	MAP Reference Point
MTBF	Mean Time Between Failure
MTOGW	Maximum Take Off Gross Weight
MTOW	Maximum Takeoff Weight
MZFW	Maximum Zero Fuel Weight
N	Normal, North
N/A	Not Applicable
N/P	Next Page
NAK	Not Acknowledge Transmission
NAV	Navigation

ABBREVIATION	DEFINITION
NAVAID	Navigation Aid (VOR/DME)
NAVdb	Navigation Data Base
NBR	Number
NCD	Non Computed Data
ND	EFIS Navigation Display
NDB	Non Directional Beacon
NM	Nautical Mile
NORM	Normal
NPA	Non Precision Approach
NWS	Nosewheel Steering
O/P	Output
OAT	Outside Air Temperature
OFST	Offset
OMS	On-board Maintenance System
OPC	Operational Program Configuration
OPP	Opposite
OPS	Operations
OPT	Optimum
OUTB	Outbound
OUTR	Outer
OVFY	Overfly
OVHD	Overhead
OVRD	Override
OVSPD	Overspeed
OXY	Oxygen
P/N	Part Number
P/P	Previous Page
PA	Passenger Address
P-ALT	Profile Altitude
PAX	Passenger
PB, pb	Pushbutton
P-CLB	Profile Climb
P-DES	Profile Descent
PDU	Pilot Display Unit
PERF	Performance
PF	Pilot Flying
PFD	EFIS Primary Flight Display
P-MACH	Profile Mach
PNF	Pilot Non Flying
PNL	Panel
POS	Position
PPOS	Present Position
PR	Pressure
PRE FLT	Preflight
PRED	Prediction
PROC	Procedure
PROC T	Procedure Turn
PROF	Profile
PROG	Progress
PROTEC	Protection
P-SPEED	Profile Speed
PT	Point
PTR	Printer
PTT	Push To Talk

ABBREVIATION	DEFINITION
PVI	Paravisual Indicator
PWR	Power
PWS	Predictive Windshear System
QAR	Quick Access Recorder
QFE	Field Elevation Atmosphere Pressure
QFU	Runway Heading
QNE	Sea Level Standard Atmosphere Pressure (1013 hPa)
QNH	Sea Level Atmosphere Pressure
QT	Quart (US)
QTY	Quantity
R	Right, Red
R/I	Radio/Inertial
RA	Radio Altitude
RAD	Radio
RAIM	Receiver Autonomous Integrity Monitoring
RAM	Random Access Memory
RAT	Ram Air Turbine
RATC	Remote ATC Box
RCDR	Recorder
RCL	Recall
RCVR	Receiver
RDY	Ready
REAC	Reactive
RED	Reduction
REF	Reference
REG	Regulation
REL	Release
REQ	Request
REV	Reverse
RH	Right-Hand
RHS	Right Hand Seat
RLSK	Right Line Select Key
RMI	Radio Magnetic Indicator
RMP	Radio Management Panel
RMP	Radio Management Panel
RNAV	RNAV procedure
RNG	Range
RNP	Required Navigation Performance
RPM	Revolution Per Minute
RPTG	Repeating
RQRD	Required
RSV	Reserves
RTA	Required Time of Arrival
RTE	Route
RTE	Route
RTL	Rudder Travel Limit
RTOW	Regulatory Takeoff Weight
RTS	Request To Send
RVSM	Reduced Vertical Separation Minimum
RWY	Runway
S	Slats Retraction Speed, South
S/C	Step Climb
S/D	Step Descent
SA	Airbus Single Aisle family (A318/319/320/321)

ABBREVIATION	DEFINITION
SAL	Subsystem Address Label
SAT	Static Air Temperature
SAT	Static Air Temperature
SD	ECAM Secondary Display
SDF	Simplified Directional Facility
SEC	Spoiler Elevator Computer
SEL	Selector
SID	Standard Instrument Departure
SIM	Simulation
SLT	Slat
SOPs	Standard Operating Procedures
SP	Space
s-pad	Scratchpad
SPATIAL	System for Acquisition and Processing of ARINC and Logic Information
SPD	Speed
SPD LIM	Speed Limit
SPD Speed	
SPLR	Spoiler
SRS	Speed Reference System
STAR	Standard Arrival Procedure
STAR	Standard Terminal Arrival Route
STAT	Static
STAT INV	Static Inverter
STBY	Standby
STD	Standard
STS	Status
STX	Start of Transmission
SW	Switch
SWTG	Switching
SYN	Synchronize (Transmission Not Understandable)
SYNC	Synchronize
SYS	System
T	Tons, Temperature, True, Turn, Total
T True	
T.O., T/O	Takeoff
T/C	Top of Climb
T/D	Top of Descent
T/L	Thrust Levers
TACAN	Ultra-high Frequency Tactical Air Navigation Aid
TACT	Tactical
TAS	True Airspeed
TAT	Total Air Temperature
TAU	Time to intercept
TBC	To Be Confirmed
TBD	To Be Determined
TCAS	Traffic Collision Alert System or Threat-Analysis/Collision Avoidance System
TEMP	Temperature
TFTS	Terrestrial Flight Telephone System
TGT	Target
THR	Thrust
THR Thrust	
THS	Trimmable Horizontal Stabilizer

ABBREVIATION	DEFINITION
TI	Track to Intercept
TK	Track angle
TKE	Track angle Error
TLA	Throttle Lever Angle
TMPY	Temporary (F-PLN)
TMR	Timer
TO	Take-off
TOGA	Take-off - Go-Around
TOGW	Takeoff Gross Weight
TOW	Takeoff Weight
T-P	Turn Point
T-R	Transmitter-Receiver
TRANS	Transition
TRK	Track
TROPO	Tropopause
TRU	Transformer Rectifier Unit
TRV	Travel
TTG	Time To Go
TTN	TimeTo Nav
TURB	Turbulent, Turbulence
ULB	Underwater Locator Beacon
UNLK	Unlock
UP	Up, Upper
UTC	Universal Coordinated Time
V	Volt
V/S	Vertical Speed
V1	Critical Engine Failure Speed
V2	Takeoff Safety Speed
VD	Heading to a DME Distance
VDEV	Vertical Deviation
VEL	Velocity
VERT REV	Vertical Revision
VFE	Maxi Velocity Flaps Extended
VFEN	VFE Next
VFTO	Velocity Final Takeoff
VHF	Very High Frequency
VI	Heading to an Intercept
VIB	Vibration
VLE	Maximum Landing Gear Extended Speed
VLS	Lowest Selectable Speed
VMAN	Maneuvering speed
VMAX	Maximum Allowable Speed
VMCA	Minimum Control Speed in the Air
VMCG	Minimum Control Speed on Ground
VMCL	Minimum Control Speed at Landing
VMIN	Minimum Operating Speed
VMO	Maximum Operating Speed
VMU	Minimum Unstick Speed
VOR	VHF Omnidirectional Range
VOR-D	VOR-DME
VORTAC	VOR-TACAN
VR	Rotation Speed
VREF	Landing Reference Speed
VS	Stall Speed

ABBREVIATION	DEFINITION
VSI	Vertical Speed Indicator
VU	Visual Unit
W	White, West, Weight
WARN	Warning
WBC	Weight and Balance Computer
WBS	Weight and Balance System
WGD	Windshield Guidance Display
WNDW	Window
WPT	Waypoint
WT	Weight
WXR	Weather Radar
XCVR	Transceiver
XFR	Transfer
XING	Crossing
XMTR	Transmitter
XPDR	Transponder
XTK	Crosstrack Error
Y	Yellow
Z	Altitude
ZFCG	Zero Fuel Center of Gravity
ZFW	Zero Fuel Weight
ZFWCG	Center of Gravity without Fuel

PAGE INTENTIONALLY LEFT BLANK

Multifunction Control and Display Unit