UNIVERSAL™ AVIONICS

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InSight™ OPERATOR'S MANUAL

SCN 1026.0.X
EFI-1040P System

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APPLICATION

This Operator's Manual,

34-25-01.01

is applicable to all

EFI-1040P ADVANCED FLIGHT DISPLAY SYSTEMS
possessing:

Software Control Number (SCN) 1026.0.X
with

Alphanumeric Keyboard (ANK) and EFIS Control Display Unit (ECDU)

SCN 1027.0.X

Refer to approved
Airplane Flight Manual Supplement
for certified version.

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Retain this record in front of the manual. Upon receipt of revision, insert and remove pages according to the *List of Effective Pages*. Then enter on this page the revision number, issue date, insertion date and your initials.

RECORD OF TEMPORARY CHANGES

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2	92	26 Oct 21	26 Oct 21/UA	UA
3	92	26 Oct 21	26 Oct 21/UA	UA
4	25	2 May 22	2 May 22	UA
5	33	2 May 22	2 May 22	UA
6	35	2 May 22	2 May 22	UA
7	40	2 May 22	2 May 22	UA
8	44	2 May 22	2 May 22	UA
9	45	2 May 22	2 May 22	UA
10	46	2 May 22	2 May 22	UA
11	79	2 May 22	2 May 22	UA
12	211	2 May 22	2 May 22	UA
13	214	2 May 22	2 May 22	UA
14	47	1 Aug 22	1 Aug 22	UA
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RECORD OF TEMPORARY CHANGES (CONT.)

Change No.	Page No.	Issue Date	Insertion Date & Initials	Removal Date /Initials/Reason
17	211	1 Aug 22	1 Aug 22	UA
18	18	1 Aug 22	1 Aug 22	UA
19	36	1 Aug 22	1 Aug 22	27 Oct 23/UA/Superseded
20	187	16 Feb 23	16 Feb 23	UA
21	30	16 Feb 23	16 Feb 23	UA
22	55	16 Feb 23	16 Feb 23	UA
23	47	16 Feb 23	16 Feb 23	UA
24	256	16 Feb 23	16 Feb 23	UA
25	33	27 Oct 23	27 Oct 23	UA
26	36	27 Oct 23	27 Oct 23	UA
27	55	27 Oct 23	27 Oct 23	UA
28	77	27 Oct 23	27 Oct 23	UA
29	180	27 Oct 23	27 Oct 23	UA
30	211	27 Oct 23	27 Oct 23	UA
31	182	27 Oct 23	27 Oct 23	UA
32	245	27 Oct 23	27 Oct 23	UA

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RECORD OF TEMPORARY CHANGES (CONT.)

Change No.	Page No.	Issue Date	Insertion Date & Initials	Removal Date /Initials/Reason
33	246	27 Oct 23	27 Oct 23	UA
34	40	27 Oct 23	27 Oct 23	UA
35	35	27 Oct 23	27 Oct 23	UA
36	24	27 Oct 23	27 Oct 23	UA
37	32	27 Oct 23	27 Oct 23	UA

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LIST OF EFFECTIVE PAGES

Page No.	Date
Cover	7/26/21
APPL-i	7/26/21
ROR-1	7/26/21
ROTC-1	7/26/21
ROTC-2	7/26/21
LOEP-1	7/26/21
LOEP-2	7/26/21
LOEP-3	7/26/21
LEOP-4	7/26/21
LEOP-5	7/26/21
TOC-1	7/26/21
TOC-2	7/26/21
TOC-3	7/26/21
TOC-4	7/26/21
TOC-5	7/26/21
1	7/26/21
2	7/26/21
3	7/26/21
4	7/26/21
5	7/26/21
6	7/26/21
7	7/26/21
8	7/26/21
9	7/26/21
10	7/26/21
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32	7/26/21
33	7/26/21
34	7/26/21
35	7/26/21
36	7/26/21
37	7/26/21
38	7/26/21
39	7/26/21
40	7/26/21
41	7/26/21

Page No.	Date
42	7/26/21
43	7/26/21
44	7/26/21
45	7/26/21
46	7/26/21
47	7/26/21
48	7/26/21
49	7/26/21
50	7/26/21
51	7/26/21
52	7/26/21
53	7/26/21
54	7/26/21
55	7/26/21
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67	7/26/21
68	7/26/21
69	7/26/21
70	7/26/21
71	7/26/21
72	7/26/21
73	7/26/21
74	7/26/21
75	7/26/21

Page No.	Date
76	7/26/21
77	7/26/21
78	7/26/21
79	7/26/21
80	7/26/21
81	7/26/21
82	7/26/21
83	7/26/21
84	7/26/21
85	7/26/21
86	7/26/21
87	7/26/21
88	7/26/21
89	7/26/21
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91	7/26/21
92	7/26/21
93	7/26/21
94	7/26/21
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98	7/26/21
99	7/26/21
100	7/26/21
101	7/26/21
102	7/26/21
103	7/26/21
104	7/26/21
105	7/26/21
106	7/26/21
107	7/26/21
108	7/26/21
109	7/26/21

Page No.	Date	Page No.	Date
110	7/26/21	145	7/26/21
111	7/26/21	146	7/26/21
112	7/26/21	147	7/26/21
113	7/26/21	148	7/26/21
114	7/26/21	149	7/26/21
115	7/26/21	150	7/26/21
116	7/26/21	151	7/26/21
117	7/26/21	152	7/26/21
118	7/26/21	153	7/26/21
119	7/26/21	154	7/26/21
120	7/26/21	155	7/26/21
121	7/26/21	156	7/26/21
122	7/26/21	157	7/26/21
123	7/26/21	158	7/26/21
124	7/26/21	159	7/26/21
125	7/26/21	160	7/26/21
126	7/26/21	161	7/26/21
127	7/26/21	162	7/26/21
128	7/26/21	163	7/26/21
129	7/26/21	164	7/26/21
130	7/26/21	165	7/26/21
131	7/26/21	166	7/26/21
132	7/26/21	167	7/26/21
133	7/26/21	168	7/26/21
134	7/26/21	169	7/26/21
135	7/26/21	170	7/26/21
136	7/26/21	171	7/26/21
137	7/26/21	172	7/26/21
138	7/26/21	173	7/26/21
139	7/26/21	174	7/26/21
140	7/26/21	175	7/26/21
141	7/26/21	176	7/26/21
142	7/26/21	177	7/26/21
143	7/26/21	178	7/26/21
144	7/26/21	179	7/26/21

Page No.	Date	Page No.	Date
180	7/26/21	214	7/26/21
181	7/26/21	215	7/26/21
182	7/26/21	216	7/26/21
183	7/26/21	217	7/26/21
184	7/26/21	218	7/26/21
185	7/26/21	219	7/26/21
186	7/26/21	220	7/26/21
187	7/26/21	221	7/26/21
188	7/26/21	222	7/26/21
189	7/26/21	223	7/26/21
190	7/26/21	224	7/26/21
191	7/26/21	225	7/26/21
192	7/26/21	226	7/26/21
193	7/26/21	227	7/26/21
194	7/26/21	228	7/26/21
195	7/26/21	229	7/26/21
196	7/26/21	230	7/26/21
197	7/26/21	231	7/26/21
198	7/26/21	232	7/26/21
199	7/26/21	233	7/26/21
200	7/26/21	234	7/26/21
201	7/26/21	235	7/26/21
202	7/26/21	236	7/26/21
203	7/26/21	237	7/26/21
204	7/26/21	238	7/26/21
205	7/26/21	239	7/26/21
206	7/26/21	240	7/26/21
207	7/26/21	241	7/26/21
208	7/26/21	242	7/26/21
209	7/26/21	243	7/26/21
210	7/26/21	244	7/26/21
211	7/26/21	245	7/26/21
212	7/26/21	246	7/26/21
213	7/26/21	247	7/26/21

Page No.	Date
248	7/26/21
249	7/26/21
250	7/26/21
251	7/26/21
252	7/26/21
253	7/26/21
254	7/26/21
255	7/26/21
256	7/26/21
257	7/26/21
258	7/26/21
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268	7/26/21
269	7/26/21
270	7/26/21
271	7/26/21
272	7/26/21
273	7/26/21
274	7/26/21
275	7/26/21
276	7/26/21
277	7/26/21
278	7/26/21
279	7/26/21
280	7/26/21
281	7/26/21

TABLE OF CONTENTS

APPLICATION ..... **i**

RECORD OF REVISIONS **1**

RECORD OF TEMPORARY CHANGES **1**

LIST OF EFFECTIVE PAGES **1**

TABLE OF CONTENTS **1**

INTRODUCTION **1**

USE OF COLORS IN DISPLAY FORMATS **3**

PRIMARY FLIGHT DISPLAY (PFD) FIXED FORMAT **5**

Attitude Direction Indicator (ADI) 6
Aircraft Symbol 6
Pitch Scale 7
Roll Index and Sky Pointer 9
ADI SVS Terrain 11
ADI Annunciators 14
Flight Guidance 29
Flight Director Steering Cues 29
Flight Path Marker and Flight Path Angle Reference Cue 30
Flight Guidance Status (FGS) Annunciators 31
Single Channel Flight Director Mode Annunciations 38
AFCS Modes for Approach 39
Air Data 40
Baro Altitude Data 40
Radio Altitude Data 41
Airspeed Indicator 42
Airspeed Tape 42
Airspeed Tape Markings 43
Selected Airspeed/Mach 47
Airspeed Failure 49
Supported Airspeed Markings 50
Speed Bug Data Block 55
Angle of Attack Indicator 55
Fast / Slow Indicator 58
Vertical Speed Indicator (VSI) 60
VSI Failure Annunciation 61
Altitude Tape 62
Altitude Miscompare 63
Altitude Failure 63

Vertical Deviation Scale 64
Vertical Failure Deviation 65
Glideslope Pointer 66
Lateral Deviation Scale 67
Standard Lateral Deviation Scale 67
Lateral ANP/RNP Indicator 69
Horizontal Situation Indicator (HSI) 71
360° Compass Rose 71
Arc Compass Rose 72
Aircraft Symbol 72
Current Window Heading 73
Selected Heading Bug and FMS Heading Bug 74
Course Pointers 75
Course Deviation Scale 76
Wind Vector 76
Selected Track Mode 77
Navigation Data Blocks 78
Primary Nav Data Block 78
Primary Nav Data Block for LRN 78
Primary Nav Data Block for SRN 78
Secondary Nav Data Block 79
Bearing Data Blocks 79
Primary Bearing Data Block 79
Secondary Bearing Data Block 80

CAT II OPERATIONS 81

CAT II Excessive Deviation Rules and Annunciators 81
Excessive Localizer Deviation 81
Excessive Glideslope Deviation 82
Excessive Deviation Annunciators 83
Excessive Indicated Airspeed Deviation 84
ILS Miscompare Functions 85

PFD inset Windows 86

Display of Engine Data 86
EIU Status 86
Display of Map Data 87
Display of Flight Plan Status 87
Display of Video Data 88
Aircraft Models 89
PFD Display of Full Time Annunciators and Status 89
PFD Display of AFCS 90

MFD DISPLAY 91

Display of Engine Data 91
Full Engine Detail Display 92
Compressed Engine Display 92
EIU Fail Annunciation 92
Display of Map Data 93
Basic Heading Up Map 93
Basic North Up Map 93
Compass Rose 93
Range 94
Flight Plan Display 95
Waypoint Display 96
Display of Airways 99
Automatic Decluttering 101
Traffic 102
Weather 105
Universal TAWS Terrain 111
Terrain (708) 112
Display of Controlled Airspace 113
Display of Obstacles 114
Functional Limitations for Degraded Map States 130
Display of Status Bar 131
Display of 3D Map View 133
Extended Runway Centerline 138
Display of Obstacles 139
Display of Video Data 141
Display of Charts 141
Georeferenced Airport Diagrams 145
Waypoint Search 147
Display of AFCS 153
Aircraft Models 153
Twin engine Turboprop – Low Wing 154
Twin Engine Turboprop – High Wing 155
Twin Engine Business Jet 156
Three Engine Business Jet 157
RC-135 158
C-130 159

REVERSIONARY OPERATIONS 160

Display Reversion 160
Attitude/Heading Reversion 160
ADC Reversion 162
Control Reversion 162

Display Formats 163

PFD Fixed Format 163
PFD Selectable Space 163
MFD 163
Traffic and Terrain Pop-Up Formats 166
Display of Engines 169
Startup Database Status Display 170
Configuration Pages 171
Display of System Status 171
Display Fail Annunciations 174

USER INTERFACE 175

Primary Interface 175
Basic Control Philosophy 176
HOME Pages 180
EFIS Home Page 1 180
EFIS Home Page 2 193
PFD Main Pages 212
PFD Main Page 1 212
PFD Main Page 2 226
MFD 230
MFD Startup Page 230
ENG Key 238
Tune 240
COM 242
NAV 244
ADF 246
XPDR (ATC) 247
NAV/BRG 249
NAV /BRG Source Select Page 1 249
NAV / BRG Source Select Page 2 252
DISP Revert Key 253
MSG Key 255
IDENT Key 256
NEXT and PREV Keys 256
Page Back LSK 256
FMS Control 256
Secondary Interfaces 257
External Course / Heading Control 257
External Reference Select Control 257
External Weather Radar Control 257
External Cursor Pointing Devices 258

APPENDIX A – LOW ALTITUDE MODE (LAM) 267

Low Altitude Mode (LAM) 267

INDEX..... 269

SYSTEM DESCRIPTION

INTRODUCTION

The EFI-1040P is a flat-panel electronic flight instrument designed for both retrofit and OEM applications as a high-quality alternative to older electro-mechanical, electronic CRT, or older LCD flight instruments. It incorporates the functions of separate ADI, HSI, Airspeed, Altitude, Vertical Speed, and turn coordination instruments onto one flat panel PFD, thus providing a streamlined integrated solution to the pilot's "basic T" with the PFD "digital T" solution.

The EFI-1040P system provides accurate and instant visual data and offers a wide range of cutting-edge features. Accessible design allows the operator to select and display required information on demand as flight data changes.

Additionally, it provides for expanded situational awareness by incorporating engine information, charts, navigation and mapping, weather, terrain, and synthetic vision display on adaptable PFD display space or on additional MFD display panels. Multiple panels per installation extend support of display items by dynamically reallocating display space in accordance with user selection and system alert functions. Thus, all functions may be supported with little loss of option and capability in the event of one of more panel failures.

Pilot interface with the EFI-1040P displays is accomplished via the model 5100 EFIS Control/Display Unit (ECDU) or the touch screen capable model 5101 ECDU and model 5104 Alphanumeric Keyboard (ANK). The touch display has been demonstrated usable with MIL-811188C (or equivalent) gloves for glove use.

The ANK expands ECDU and EFIS capabilities by providing a keyboard for data entry and an SD Card slot, which provides database storage and server capabilities. The ANK includes FMS specific keys for interface to the UA Flight Management System (FMS).

The SDCS provides an SD card slot and the database server capabilities of the ANK. The SDCS takes the place of the ANK and intended for installations that do not require keyboard functionality or the UA FMS interface

To support the wide range of fixed wing and rotary aircraft systems and to provide enough I/O to properly support variable aircraft installation requirements, additional I/O concentration and translation for the Electronic Flight Instrument System (EFIS) is contained outside of the EFI displays within the model 4310 Data Concentrator Unit (DCU II).

NOTE: In the functional requirements throughout this document, the term "EFIS" is often used to describe the source or destination of certain aircraft signals. This means that the signal source/destination may be a PFD, MFD, or DCU II. With few explicitly defined exceptions, the ECDU only communicates with the EFI displays and DCU II, not the aircraft.

USE OF COLORS IN DISPLAY FORMATS

The EFIS is designed with a standard color set; however, where not otherwise specified, the following color choices will be used to provide uniformity:

Black	Fixed position display objects such as the ADI aircraft symbol, digital display windows, warning annunciator backgrounds, contrasting text for light colored backgrounds, occlusion zones and outlining to provide contrast for information displayed as an overlay on other dynamic data.
Blue	ADI sky, bodies of water, certain manufacturers' depiction of ground proximity water (distinctly different than sky), certain manufacturers' depiction of weather radar uncertainty ranges, and some controlled airspaces.
Brown	ADI ground and certain manufacturers' depiction of ground proximity ground.
Cyan	Symbol and information types not coupled to flight guidance, bearing pointers and annunciators, highlighted selectable text on maps and menus, ECDU cursors, Touch Screen Guide window borders, MFD Main Map and Inset Borders, and large numeric displays, and reference displays.
Grey	Options, controls, or features that are unavailable due to flight state or failure, secondary course data block, secondary course and glideslope indicators, alternative flight plan, some FMS status annunciators, and display area demarcation lines.
Green	Normal, true, valid, OK indications, altitude and airspeed trend, FMS progress information, bearing pointers and annunciators, weather, traffic, and terrain mode annunciators in normal condition, ECDU active choices and values and valid radio information.
Magenta	Flight guidance information and symbology and information types coupled to flight guidance, secondary flight guidance targets, some controlled airspaces, and flight plan information related to the TO waypoint and / or current leg.

Yellow	Denotes a caution condition which requires immediate crew awareness and near-term crew action, cross-side data source annunciations, low criticality invalid annunciations, traffic advisories, terrain, and weather caution areas.
Red	Denotes a warning condition which requires immediate crew action, higher criticality fail annunciations, no-fly zones in speed and altitude scales, traffic resolution advisories, terrain, and weather warning areas.
White	Available, armed, not yet active, display marking artifacts (ranges rings, tick marks, scales, tapes, etc.), bearing pointers and annunciators, some flight plan and flight path guidance information. In-range indications for airspeed, altitude, and engine parameters not in caution or warning conditions. **NOTE**: Black may also be used if the display background in each format is such that it provides a greater contrast.

NOTE1: The color palette used for SVS formats and overlays is distinct from this table. It is custom designed for a realistic depiction of sky, terrain, water, and runways.

NOTE2: The color palette for satellite weather is distinct from this table. It is custom designed for unambiguous representation of selectable satellite weather overlays.

PRIMARY FLIGHT DISPLAY (PFD) FIXED FORMAT

The PFD is a fixed format display of primary flight information. The PFD is controlled through the ECDU. The PFD interfaces with external controls for Course and Heading, SPEED, ALT PRESELECT (ASEL), BARO, Weather Radar control and Cursor Control.

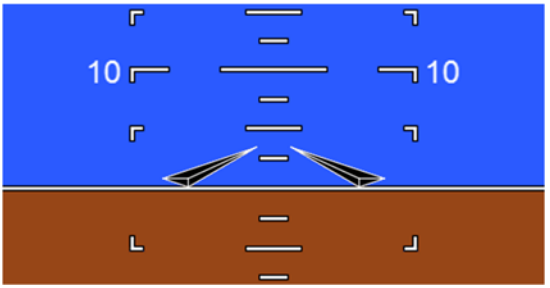
PFD Format

For color and placement of on-side and cross-side information, the PFD considers systems on the cockpit side on which it is installed or single source items to be on-side. All other systems are considered cross-side information.

Attitude Direction Indicator (ADI)

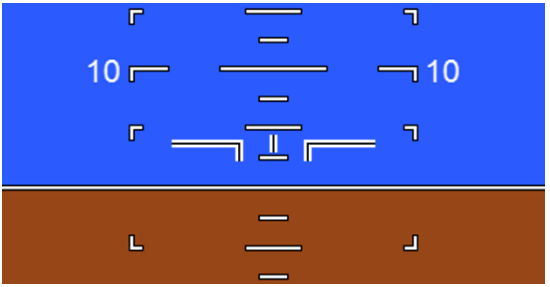
Aircraft Symbol

The single cue aircraft symbol on the PFD is represented by a black inverted chevron outlined in white.



Single-Cue Aircraft Symbol

The dual cue aircraft symbol is displayed as a white rectangle bisected by a black vertical line and located at the center of the display. See the PFD1 Home Page section of the User Interface for control options of the Cross-Pointer.



Dual-Cue Aircraft Symbol

An optional digital pitch attitude readout may be displayed just below the aircraft symbol to indicate actual pitch in degrees and tenths of degrees + or – of zero. The pilot can turn this display off or on when it is available.

The aircraft symbol and the digital pitch readout with its associated data field are fixed in the center of the ADI area of the PFD and overlay all other symbols within that area, including the pitch scale. See the PFD2 Home Page section of the User Interface for control options of the Digital Pitch.

Pitch Scale

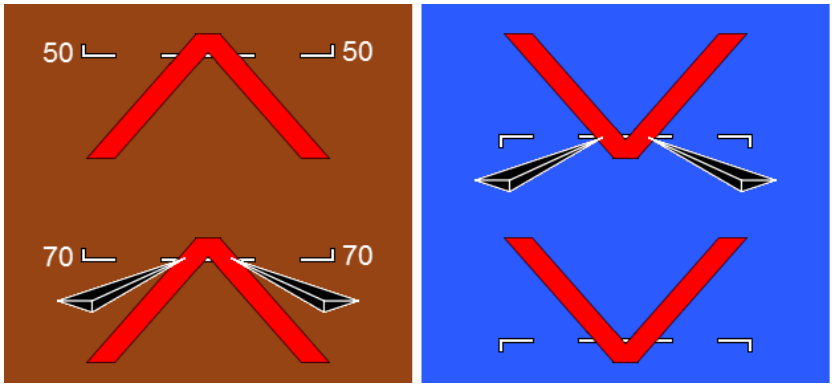
A dynamic pitch attitude scale (pitch ladder) is displayed behind the aircraft symbol, and the flight director cues.

The pitch scale displays a white horizon line corresponding to zero pitch that runs the entire width of the PFD.

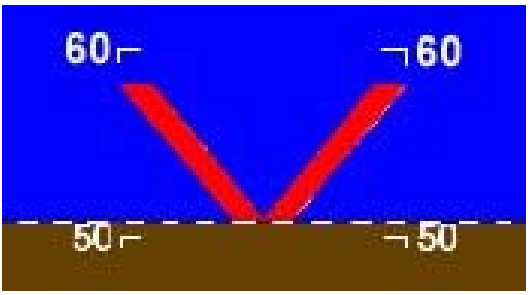
The pitch scale is composed of white horizontal tick marks drawn at the left and right edge of the scale. Each mark contains a tail that points towards the horizon. The marks are drawn at 5 degree intervals from 5° to 50° and -5° to -30°. In addition, at ± 5°, ±10°, ±15°, and ±20° horizontal lines are drawn at the center of the pitch scale, with the 10° and 20° marks being slightly wider. Between these pitch marks, slightly shorter horizontal pitch lines at ±2.5°, ±7.5°, ±12.5°, and ±17.5° are displayed.

Unusual Attitude Display

The unusual attitude display consists of large red chevrons positioned at the centerline and oriented to point to the horizon. There are two in the positive half of the scale and three in the negative half of the scale.



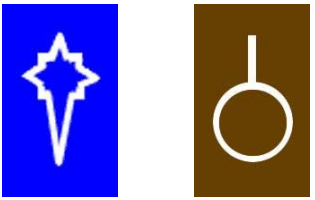
Unusual Attitude Chevrons



Ghost Horizontal Line

In unusual attitude conditions, the PFD displays a small amount of the sky or ground color at the edge of the ADI area in the direction that color exists, even when all other indications of that color are out of view. The represented sky or ground area is bordered by a dashed horizon line, or *ghost* horizon line. The center of the ghost horizon line is adjusted in pitch only.

The zenith symbol and nadir symbol appear as indications of unusual attitude. The zenith symbol appears at the 90° pitch up marking as an eight pointed white star with a point extended to the shortest direction to the horizon line. The nadir symbol appears at the 90° pitch down marking as a white circle with a line pointing to the shortest direction to the horizon line.



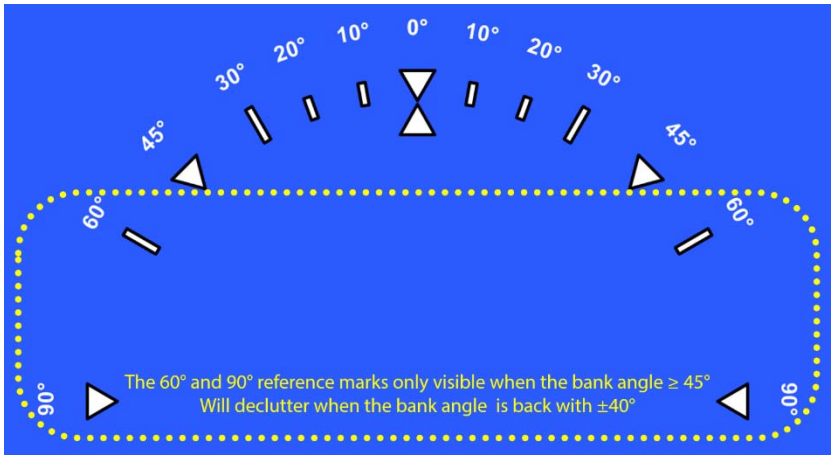
Zenith Symbol and Nadir Symbol

The ADI area is also decluttered of SVS terrain, marker beacon annunciations, display of radio altitude, RA and DA minimum settings, and the flight director steering cue during unusual attitude conditions. Safety warnings such as miscompares and terrain warning annunciations will still be displayed. The declutter condition is triggered when the Ghost Horizon is enabled. Information that was decluttered will return to the display once the attitude comes back within range.

Roll Index and Sky Pointer

The roll index is located at the top of the ADI area of the PFD and consists of an arc with white roll angle reference tick marks at ±60°, ±30°, ±20° and ±10° along it. The roll angle reference marks at ±30° and ±60° are twice the length of the other roll angle reference marks, and reference marks consisting of white-filled triangles pointing toward the aircraft symbol are positioned at -90°, -45°, 0°, +45°, and +90°. The ±60° and ±90° reference marks are not displayed unless the aircraft's roll is greater than or equal to ±45°. The reference marks will come into view at that time and not declutter until the aircraft's roll is back within ±40°.

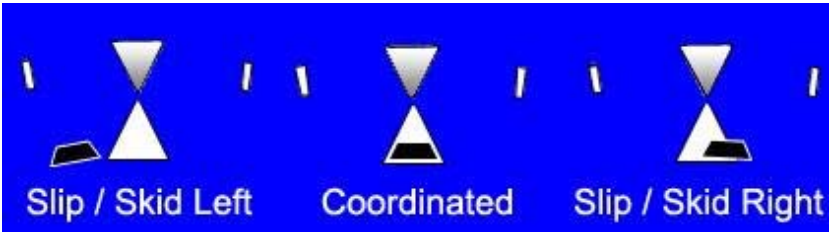
The sky pointer consists of a white triangle inside the roll index arc that always points toward the sky regardless of aircraft roll angle.



Roll Index and Sky Pointer

Slip/Skid Indicator

A slip / skid indicator is presented as a black trapezoid against the white sky pointer. In coordinated flight, the trapezoid is aligned with the sky pointer. When the aircraft is in a slip or skid, the trapezoid is deflected in the direction of the slip or skid



ADI SVS Terrain

In place of the ADI blue/brown background, the ADI SVS Terrain view may be displayed. The ADI SVS Terrain is a full-color terrain image of the area in front of the aircraft.

ADI SVS Terrain Depiction

ADI SVS Terrain may be manually removed by de-selecting it or is automatically removed for declutter or safety reasons in the event of any attitude or heading miscompare between the attitude and heading data provided to the SVS processor and the attitude and heading data reported from the SVS processor, if the image update average rate falls below 12 frames per second for approximately five seconds, if the imbedded safety pattern is detected to be invalid, or in unusual attitude conditions.

In the event of automatic removal, the ADI SVS Terrain view will only return when the fault conditions are resolved.

Terrain caution and warning colors may be enabled by selecting the On option for the TAWS Colors toggle key on ECDU Home Page 2. Red warning bands are displayed on terrain above the current altitude and yellow caution bands on terrain in a band near the current altitude. The yellow caution band and its width are determined by the phase of flight rules for required obstacle clearance provided by the TAWS system and is suppressed when on the ground. Red will always be displayed if the Alert option for SVS Colors is selected. If TAWS generates a caution or warning pop-up condition, the color bands will also be enabled for display.

SVS with TAWS Colors On

Terrain elevations greater than 50 feet above the aircraft elevation are rendered in red.

Terrain elevations greater than the aircraft elevation minus required obstacle clearance (ROC) and less than 50 feet above the aircraft elevation are rendered in yellow.

The rendering of terrain elevations in yellow will be suppressed (drawn normal terrain colors) when the aircraft is on the ground.

Obstacle data for display on the ADI SVS is derived from the DO-200A approved database hosted within the EFIS data server and is available for selection as described in the User Interface section of this manual. Point obstacles are displayed as inverted chevrons at the height and location contained in the obstacle database if they are greater than 200 feet in height. Point obstacles less than 200 feet in height are not shown.

A point obstacle is displayed in red if its height is greater than 50 feet above the aircraft's current altitude or in yellow if the obstacle's height is between the aircraft's current altitude and the required obstacle clearance (ROC) value received from TAWS, up to the red color threshold. Otherwise point obstacles are displayed in green.

A green point obstacle will linearly fade to transparency if the aircraft's current altitude is between 2000 to 2500 feet above the its height, with 2000 feet being opaque and 2500 feet being at the threshold of transparency. A point obstacle is completely decluttered if the difference between the aircraft's current altitude and the obstacle's height is more than 2500 feet.

Obstacles on the ADI SVS

ADI Annunciators

Annunciators are used within the ADI area to indicate conditions, cautions and warnings. The graphic below shows several of the available annunciators.

ADI Annunciators

The following ADI Annunciators graphic is applicable to EFI-1040P Advanced Flight Display Systems installed with SCN 1026.0.5 Only.

ADI Annunciators

Terrain Alert Annunciators

If the PFD is connected to a Universal Avionics TAWS system or EGPWS system, the alert annunciators appear on the ADI presentation. All these annunciators appear enclosed and in defined colors. Supported annunciators are listed in the following TAWS and EGPWS Alert Annunciators tables.

NOTE: Refer to the applicable Universal Avionics TAWS Operator's Manual for detailed information relating to TAWS and EGPWS Alert Annunciators.

TAWS Alert Annunciators				
Priority	**Description**	**Alert Message**	**Level**	**Color**
1	Windshear warning	WINDSHEAR	Warning	Red
2	Mode 1 pull up	PULL UP	Warning	Red
3	Mode 2A pull up	PULL UP	Warning	Red
4	Mode 2A terrain	PULL UP	Warning	Red
7	Terrain above airplane best climb path	PULL UP	Warning	Red
7	Terrain above airplane altitude	PULL UP	Warning	Red
7	Terrain below airplane altitude	PULL UP	Warning	Red
9	Mode 2B pull up	PULL UP	Warning	Red
9	Mode 2B terrain	TERRAIN	Caution	Yellow
9	Mode 2A terrain caution	TERRAIN	Caution	Yellow

TAWS Alert Annunciators				
Priority	**Description**	**Alert Message**	**Level**	**Color**
11	Terrain above airplane best climb path caution	TERRAIN	Caution	Yellow
11	Terrain above airplane altitude caution	TERRAIN	Caution	Yellow
11	Terrain below airplane altitude caution	TERRAIN	Caution	Yellow
12	Mode 4 Terrain	TERRAIN	Caution	Yellow
13	MGCB caution	TERRAIN	Caution	Yellow
16	Mode 4A gear	TERRAIN	Caution	Yellow
17	Mode 4B flaps	TERRAIN	Caution	Yellow
18	Mode 1 sink rate	TERRAIN	Caution	Yellow
19	Mode 3 don't sink	TERRAIN	Caution	Yellow
20	Mode 5 loud glide slope	GLIDE SLOPE	Caution	Yellow
21	Mode 5 soft glide slope	GLIDE SLOPE	Caution	Yellow
22	Windshear caution	WINDSHEAR	Caution	Yellow

EGPW Alert Annunciators				
Priority	**Description**	**Alert Message**	**Level**	**Color**
1	Windshear warning	WINDSHEAR	Warning	Red
2	Pull up	PULL UP	Warning	Red
2	Terrain pull up	PULL UP	Warning	Red
2	Terrain ahead pull up or obstacle ahead pull up	PULL UP	Warning	Red
3	Obstacle	OBSTACLE	Warning	Red
4	Terrain or terrain-terrain	TERRAIN	Caution	Yellow
4	Caution terrain	TERRAIN	Caution	Yellow
4	Terrain ahead	TERRAIN	Caution	Yellow
5	Caution obstacle	OBSTACLE	Caution	Yellow
6	Too low terrain	TERRAIN	Caution	Yellow
6	Too low gear	TERRAIN	Caution	Yellow
6	Too low flaps	TERRAIN	Caution	Yellow
6	Sink rate - pause - sink rate	TERRAIN	Caution	Yellow
6	Don't sink - pause - don't sink	TERRAIN	Caution	Yellow
7	Glide slope	GLIDESLOPE	Caution	Yellow
8	Windshear Caution	WINDSHEAR	Caution	Yellow

Marker Beacons

The PFD displays inner, middle, and outer marker beacon annunciators when the aircraft crosses these beacon signals.

The outer marker appears as an OM on a cyan field, the middle marker as an MM on a yellow field, and the inner marker as an IM on a white field.

Marker Beacon Annunciators

Traffic Annunciators

If a traffic advisory system such as TCAS is installed and a traffic advisory or resolution advisory is received, a TRAFFIC annunciator is displayed for approximately two seconds on the ADI. The TRAFFIC annunciator is in the same field as the terrain system annunciators. It will be depicted in yellow for TAs and in red for RAs (refer to the Vertical Speed Indicator (VSI) section of this manual). In the event of simultaneous TRAFFIC and TERRAIN alert annunciators, the TERRAIN annunciator will take priority.

TRAFFIC Caution

The "TRAFFIC" annunciation, MFD traffic pop-up and aural caution/warning are suppressed ≤ 600 feet AGL on departure and < 400 feet AGL on approach.

TRAFFIC Warning

Miscompare Annunciators

If the PFD determines that its directly received attitude or heading information is outside comparator limits with its secondary (cross-side) information, it will annunciate a miscompare to the pilot on the ADI. These annunciators will blink when triggered and continue to blink until the pilot activates a Comparator Reset or Alert Cancel causing the annunciator to become solid. An annunciated warning, whether blinking or solid, will only be removed when the miscompare condition resolves for > 1 second.

PITCH COMP

If the miscompare is limited to Pitch, the annunciation is PITCH COMP in yellow text outlined by a yellow box.

ROLL COMP

If the miscompare is limited to Roll, the annunciation is ROLL COMP in yellow text outlined by a yellow box.

ATT COMP

If both roll and pitch data disagree, the annunciation is ATT COMP in yellow text outlined by a yellow box to indicate that the full attitude display may be incorrect.

HDG COMP

Heading miscompares are annunciated as HDG COMP in yellow text outlined by a yellow box.

Heading comparator functions are only active if both on-side and cross-side instruments are using the same heading reference (either magnetic or true.

RALT COMP

Radio Altitude miscompares are annunciated as RALT COMP in yellow text outlined by a yellow box indicating that the radio altitude does not agree with the secondary sensed input.

ASPD COMP

Airspeed miscompares are annunciated as ASPD COMP in yellow text outlined by a yellow box indicting that the airspeed does not agree with the secondary sensed input.

ALT COMP

Altitude miscompares are annunciated as ALT COMP in yellow text outlined by a yellow box indicating that the altitude does not agree with the secondary sensed input.

Pitch, Roll, and Attitude Fail Annunciators

If the PFD stops receiving all attitude data or attitude component data (Pitch and Roll) it will remove attitude display entirely from the PFD.

PITCH

Pitch failure annunciates as PITCH.

ROLL

Roll failure annunciates as ROLL.

ATT

Full Attitude failure (both Pitch and Roll) such as losing a digital AHRS or IRS annunciates as ATT.

Fail Annunciators

FMS Annunciators

If the PFD receives FMS integrity, position uncertain and/or dead reckoning status from an FMS source, it will display the annunciators above the Primary Navigation Data Block on the PFD.

INTEG, POS and DR Annunciators

Primary Source Annunciators

The primary source annunciators for air data and attitude are located to the left of the HSI. The bottom contains the annunciator for primary attitude and heading source, and the top contains the annunciator for the primary air data source. Each indicates the primary source in yellow that the PFD is using for air data, attitude, and heading if either pilot's PFD is using a source other than its normal on-side source.

If the primary input fails and the EFIS uses the secondary input in installations with multiple inputs for the primary source, an EFIS message indicating that the primary input has failed is displayed.

If all of the inputs for the active primary data source are stale or if any of the inputs for the active primary data source are failed, the display using that source as its primary source will display the annunciator with a red "X" over it to indicate the failure. Additionally, if no primary annunciator is shown and all of the inputs for the active on-side data source are stale or if any of the inputs for the active on-side data source are failed, the failure annunciator for the normal source will be shown.

Primary Source Failed Annunciators

ADI Status Bar

The ADI Status Bar is displayed on the top portion of the ADI. This status bar displays (from left to right) the Autopilot Status Annunciators, the Flight Guidance Lateral Mode block, an FMS Status block, the Flight Guidance Vertical Mode block, and the Message Annunciator field.

ADI Status Bar

Refer to the Flight Guidance section of this manual for a detailed description of the Autopilot Status Annunciators, the Flight Guidance Lateral Mode Block, and the Flight Guidance Vertical Mode block.

FMS Status Block

The FMS status block contains two rows. The first row displays the From ► To ► and Next waypoints on the current flight plan if provided by the FMS. The second row displays LRN Mode annunciation or level of service (LOS) status annunciators, distance to go to the Next waypoint, and the time to go to the Next waypoint if provided by the FMS. If any or all this data is not displayed, the allocated field for it will be blank.

Message Annunciators

A flashing, white MSG annunciator is displayed above the airspeed tape if an EFIS or FMS condition generates a message that requires pilot awareness. The MSG key on the ECDU must be pressed to see the message. The MSG annunciator is removed once the ECDU message page has been selected.

MSG Annunciator

ATC Message Annunciator

The ATC annunciator is displayed in white above the normal (FMS) MSG annunciator on the ADI Status Bar if UniLink is configured and installed and initiates an ATC CPDLC message input to the EFIS.

ATC MSG Annunciator

ECDU FAIL Annunciator

If an ECDU has completely failed, ECDU# is displayed in yellow above the Primary Nav Source Data Block, where # is the number of the ECDU that failed. If both ECDU1 and ECDU2 are failed, the annunciator will show ECDU1 and 2. This annunciator does not flash and will displayed until the ECDU is detected to be operational.

ECDU Fail Annunciators

AHS-525 Annunciators

If a Universal AHS-525 AHRS is put into in-flight alignment mode, AHRS ALIGN is annunciated in yellow on the ADI above the current heading widow. If the AHRS is in reversionary mode, the annunciator will be AHRS REV.

AHS-525 AHRS ALIGN Annunciator

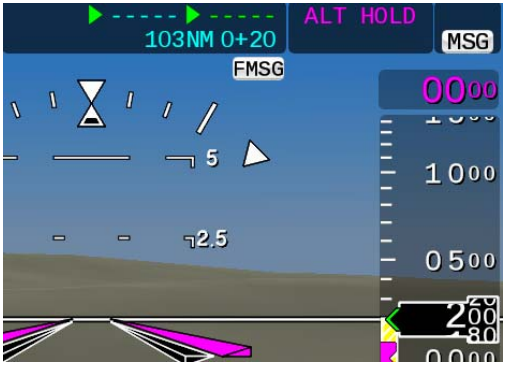
Vertical Waypoint Alert

When the InSight EFIS is connected to the NZ-2000 FMS, and the Vertical Waypoint Alert is configured and set from the selected FMS, "VTA" (Vertical Track Alert) is annunciated in white below the ADI status bar. This annunciation flashes then remain steady for as long at selected FMS sets the VTA.

Vertical Waypoint Alert

FMS Message Alert

When the InSight EFIS is connected to the NZ-2000 FMS and the selected FMS indicates an FMS Message Alert is active, FMSG is annunciated in white below the right side of the ADI Status Bar. This annunciation flashes as long as the selected FMS indicates an FMS Message Alert is active.



FMS Message Alert

Function Not Available Banner (For SCN 1026.0.5 Only)

The FUNCTION NOT AVAILABLE banner is annunciated centered on the ADI below the SKY POINTER when a PFD FUNCTION NOT AVAILABLE banner is required. It is displayed in white text on a black background within a white box and removed from the display after two seconds.

The FUNCTION NOT AVAILABLE banner is annunciated on the PFD if the EFIS configuration contains only a single attitude / heading source for a cockpit side and when the AT/HD revert key is pressed.

FUNCTION NOT AVAILABLE Banner on a PFD

Chronometer

A chronometer is available as a count up timer (Stopwatch) or countdown timer (Timer).

When the chronometer is enabled (ON), it is located on the PFD to the bottom left of the HSI, right of the primary NAV source block and above the primary bearing block. It is also displayed in the center of the "Chronometer Control" page on the ECDU. Digitally, the chronometer appears on the PFD as a 4-digit numerical time format, in the form XX:YY in large white text surrounded by a white box.

On the PFD, the chronometer is always displayed on top when selected for display.

Chronometer Fixed Display

The chronometer XX:YY digits fills "XX" with minutes and "YY with seconds when the value is less than 60 minutes. In addition, when the value is less than 60 minutes, the label "MM:SS" (where "MM" represents minutes and "SS" represent seconds) is displayed above the XX:YY format.

If the chronometer value is greater than 60 minutes, the XX:YY digits fill "XX" with hours and "YY" with minutes. In addition, when the value is greater than 60 mins the label is displayed as "HH:MM" (where "HH" represents hours and "MM" represent minutes).

The numeric range for the chronometer is 00 to 60 (minutes and seconds) and 00 to 24 (hours).

Upon factory power-up the chronometer's Stopwatch value initiates at 00:00 and the Timer value initiates at 02:00. After factory startup, the Timer value defaults to the last known timer value set by the pilot, but the Stopwatch always defaults to 00:00.

The chronometer is controlled via selections on the ECDU PFD pages or a configuration option. The start, stop, and reset functions of the chronometer can be independently controlled by the optional chronometer discrete input or the ECDU Chronometer Control LSKs.

With the chronometer configured, the first momentary activation starts the count up/down timer. The second momentary activation stops the count up/down timer. If the discrete input is active for greater than two seconds, the chronometer resets to 00:00 (for Stopwatch) or to the last known Timer set value (for the Timer).

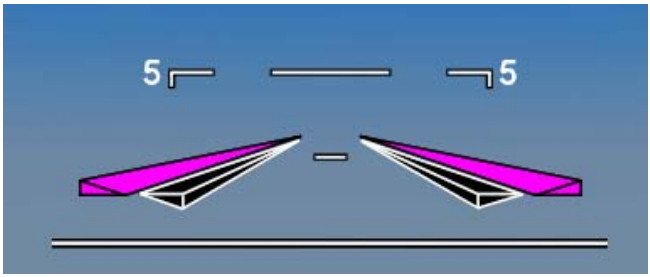
When the Timer reaches zero, the EFIS will start counting up and flashing the reading between normal and black text on white background for 5 seconds. After 5 seconds, the readout is displayed in inverse video. If configured, the Timer Alert Tone will be set when the Timer reaches zero until the pilot cancels the alert.

Chronometer Fixed Display (Timer Expired and Counts Up)

Flight Guidance

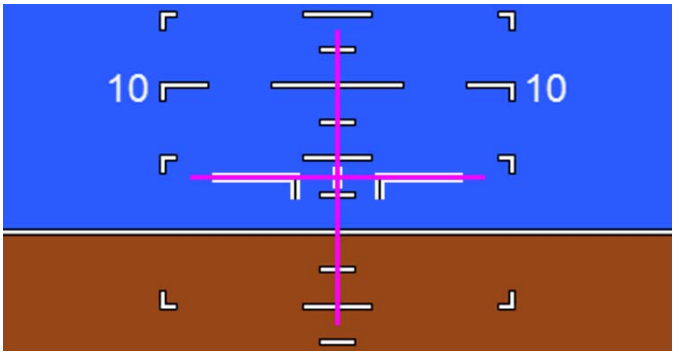
Flight Director Steering Cues

The flight director steering cue (V-bars) display roll and pitch commands. It appears as an inverted magenta chevron that rests directly on the aircraft symbol when satisfied.



V-Bars Aligned

An optional dual cue cross pointer may be selected by the pilot. The dual cue cross pointer appears as a pair of magenta lines that bisect each other at zero on the alternate aircraft symbol when satisfied.



Cross Pointer Aligned

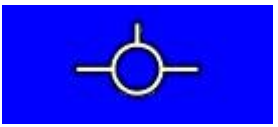
The flight director steering cues will not be visible if the flight director indicates that they are out of view or if an analog source indicates data outside the range of ±90°.

In the event that flight director information is not received or is determined to be invalid by the PFD, the flight director is removed from the ADI and a flight director failure annunciator consisting of a black-outlined yellow block with FD in black letters is placed on the ADI. A single cue of the dual cue flight director may be displayed if only that cue is valid.

A configuration option is provided to filter the pitch steering or the roll steering cue movement. When FILTER STEERING CUE PITCH and/or FILTER STEERING CUE ROLL configuration options set to YES, all changes in steering cue movement will be continuous and smooth. Setting the steering cue filters to YES may be required for some steering cue inputs. The InSight EFI also limits the roll steering cue gain to 70% of its normal value when the STEERING CUE ROLL filtering configuration option is set to YES.

Flight Path Marker and Flight Path Angle Reference Cue

As a configuration option, a Flight Path Marker showing the real-time projected flight path of the aircraft consisting of a white circle with wing and tail lines may be displayed on the ADI when valid flight path, pitch, and track angle information is available.



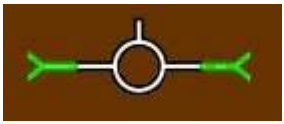
Flight Path Marker

A Flight Path Angle reference cue may be manually adjusted from 0.0° to -10.0°, in 0.1° increments, below the horizon line. When the flight path marker is displayed, the center markings between 0.0° and -10.0° are removed from the normal blue/brown pitch ladder.

The reference cue is displayed as two inward pointing, headless arrows.

Flight Path Angle Reference Cue

The Flight Plan Marker fits inside the reference cue when the aircraft is guided to the reference cue and the two symbols align.



Flight Path Marker Aligned with Flight Path Angle Reference Cue

Flight Guidance Status (FGS) Annunciators

The Autopilot and Yaw Damper status annunciators appear at the top left corner of the PFD.

The autopilot annunciation (AP) appears green when engaged. In some applications, the annunciation may be white when disengaged and red when failed. If multiple autopilots are available, the annunciator specifies AP 1, AP 2, etc.

The yaw damper annunciation (YD) appears green when engaged. In some applications, the annunciation may be white when disengaged and red when failed. If multiple yaw dampers are available, the annunciator specifies YD 1, YD 2, etc.

When multiple FGS systems are installed, or a single FGS system coupled to the left or right side systems, a green pointer indicates which display system is providing data at the FGS.

In dual channel flight guidance systems that support both channels being coupled, both left and right coupled arrows will be displayed simultaneously when the dual coupling status is indicated.

Depending upon the aircraft's autopilot and yaw damper systems, the autopilot status annunciators may flash on disconnect or failure.

NOTE: In installations with a Collins FGC-80 flight guidance system, an autopilot Turbulence Mode is supported. When configured, the PFD will display a TRB annunciation in the Flight Guidance Status area when the mode is active. TRB replaces the AP annunciator for installations that have this mode.

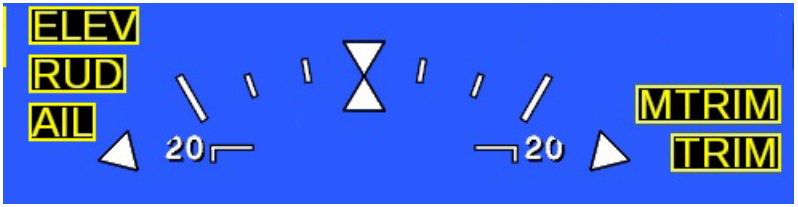
NOTE: In some installations, the autopilot system incorporates a Control Wheel Steering (CWS), Touch Control steering (TCS), or SYNC (SYN) mode that allows the pilot to temporarily disengage autopilot servos and manually steer the aircraft. The PFD supports display of CWS, TCS, or SYN mode annunciations that temporarily replace the AP annunciation when this mode is active.

Directly below the autopilot engaged annunciators is an autopilot status annunciator. It displays AP1 or AP2 in white to show which autopilot is active and online. This annunciator informs the pilot of the autopilot state and only appears when the autopilot is not engaged. This same display field is used for the status of Category II approach request.

Autopilot annunciators for Pitch Trim (TRIM), Mach Trim (MTRIM), Elevator (ELEV), Aileron (AIL), and Rudder (RUD) status and failure conditions are located in the upper right and left areas of the ADI.

TRIM is annunciated in yellow if the trim system fails for either pitch or yaw. MTRIM is also annunciated yellow if triggered.

ELEV, AIL, and RUD are displayed in yellow if triggered by the flight director.



Autopilot Caution Annunciators

The autopilot status can also display special modes in place of the AP# annunciation.

- If a control wheel steering (CWS) discrete is configured and active, the CWS will be displayed in white.
- If a synchronization steering (SYNC) discrete is configured and active or a synchronization warning is triggered by the autopilot, SYN will be displayed in white.
- If the touch control steering (TCS) discrete is configured and active, TCS will be displayed in white.
- Lastly, a green TRB annunciator will be displayed if that flight guidance mode is true.

Flight Guidance Lateral Mode Block

The Flight Guidance Lateral Mode Block is located to the right of the AP engaged annunciators and contains two rows. The first row displays the mode used for flight director lateral navigation. This active mode annunciator is displayed in magenta on the coupled side to indicate that it is coupled to the flight director. It is displayed in cyan on the uncoupled side.

When FD HALFBANK is active or a digital flight guidance system indicates Half Bank, the active lateral mode will be appended with a white "1/2" symbol to indicate that the flight director bank command is limited to half the normal bank limitation.

The second row displays the navigation source armed for capture to be used for flight director lateral navigation. The armed mode annunciator is displayed in white to indicate that it has not yet been captured as the active source.

If either an armed or active mode is not selected, its mode display field is not displayed. The list of available annunciators is dependent upon the source external systems configured upon installation; the following lateral navigation modes are supported:

Available Armed Lateral Modes		
Annunciator	**Description**	**Armed FD Mode**
BC	Back Course Mode	BC / NAV / APPR
FMS	Flight Management System	NAV / APPR
FMS APPR	FMS Approach Mode (not PLOC or FLOC)	NAV / APPR
FMS LOC	Lateral guidance from LOC, FMS available for missed approach	NAV / APPR
FMS PLOC	FMS approach armed providing Pseudo Localizer display & guidance	NAV / APPR

Available Armed Lateral Modes		
Annunciator	**Description**	**Armed FD Mode**
INS	Inertial Navigation System Capture	NAV / APPR
LOC	Localizer Capture	NAV / APPR
VOR	VOR Capture	NAV / APPR
VOR APPR	Narrow tolerance flight guidance to VOR	VOR APPR ARM

Available Active Lateral Modes		
Annunciator	**Description**	**Armed FD Mode**
BC	Back Course Mode	BC / NAV / APPR
FMS	Flight Management System	NAV / APPR
FMS APPR	FMS Approach Mode (not PLOC or FLOC)	NAV / APPR
FMS HDG	FMS indicating FHDG	NAV / APPR
FMS LOC	Lateral guidance from LOC, FMS available for missed approach	NAV / APPR
FMS PLOC	FMS approach active providing Pseudo Localizer display & guidance	NAV / APPR
FMS SXTK	FMS Selected Crosstrack Mode	NAV / APPR
GA	Go Around	NAV / APPR
HDG	Heading Capture. Note: May be active with a NAV/APPR mode armed	HDG

Available Active Lateral Modes		
Annunciator	**Description**	**Armed FD Mode**
INS	Inertial Navigation System Capture	NAV / APPR
LVL	FC-530 LVL Lateral Mode Capture	N/A
LOC	Localizer Capture	NAV / APPR
ROLL	Roll Hold Mode	ROLL
TRK	Track Capture	TRK
VOR	VOR Capture	NAV / APPR
VOR APPR	Narrow tolerance flight guidance to VOR	VOR APPR

Flight Guidance Vertical Mode

The Flight Guidance Vertical Mode block is located to the right of the FMS Status Block and contains two rows. The first row shows the mode used for flight director vertical navigation. The second row shows the navigation source armed for capture to be used for flight director vertical navigation.

The list of available annunciators is dependent upon the source external systems configured upon installation, but the following vertical navigation modes are supported:

Available Armed Vertical Modes		
Annunciator	**Description**	**Armed FD Mode**
ASEL	Altitude Preselect Armed. Note: Cannot be armed if the active mode is FGS, GS, GS EXT, or PGS	ASEL
DECEL	Deceleration Mode	DECEL
FGS	Glideslope providing deviation and guidance, FMS available for missed approach	GS

Available Armed Vertical Modes		
Annunciator	**Description**	**Armed FD Mode**
GS	Glideslope	GS
GSEXT	Glideslope Extend Mode. Note: GS EXT will also be an active input.	GS
PGS	FMS Pseudo Glideslope deviation and guidance	GS, FMS, or VNAV (if the FMS is in approach mode)
VALT	VNAV Altitude Hold Armed	ALT (hold)
VNAV	FMS Vertical NAV Mode selected. Note: May be selected with FMS, GPS, HDG, INS (any LRN that supports it) active lateral modes.	VNAV (if the FMS is not approach mode)
VNAV/ASEL	FMS Vertical NAV Mode and ASEL armed	VNAV / ASEL

Available Active Vertical Modes		
Annunciator	**Description**	**Armed FD Mode**
ALT HOLD	Altitude Hold	ALT (hold)
ASEL CAP	Altitude Preselect Capture (as PSA CAP)	ASEL CAP
ASEL	Altitude Preselect Active (Captured)	ASEL
CLM	Climb Mode	CLIMB
CLMxxx	Climb Mode with digital rate of climb in KIAS to maintain for the climb (rounded to nearest whole KIAS).	CLIMB
CLMxxxL	Climb Mode with digital rate of climb in KIAS to maintain for the climb (rounded to nearest whole KIAS), light acceleration as indicated by the FD	CLIMB

Available Active Vertical Modes		
Annunciator	**Description**	**Armed FD Mode**
CLMxxxM	Climb Mode with digital rate of climb in KIAS to maintain for the climb (rounded to nearest whole KIAS) medium acceleration as indicated by the FD	CLIMB
CLMxxxH	Climb Mode with digital rate of climb in KIAS to maintain for the climb (rounded to nearest whole KIAS) heavy acceleration as indicated by the FD	CLIMB
DECEL	Deceleration Mode	DECEL
DSC	Descent Mode	DSC
DSCxxxx	Descent Mode with digital rate of descent in ft/m	DSC
FGS	Glideslope providing deviation and guidance, FMS available for missed approach	GS
FLC IASxxx	Flight Level Change with digital airspeed value (rounded to nearest whole KIAS)	FLC
FLC MACH.xx	Flight Level Change with digital Mach value	FLC
GA	Go Around	GA
GS	Glideslope	GS
GS/ASEL	Glideslope and ASEL armed	GS / ASEL
GSEXT	Glideslope Extend Mode	GS EXT
IAS	Indicated Airspeed Hold (rounded to nearest whole KIAS)	IAS HOLD
IASxxx	Indicated Airspeed Hold with digital airspeed value (rounded to nearest whole KIAS)	IAS HOLD
MACH	Mach Hold	MACH HOLD

Available Active Vertical Modes		
Annunciator	**Description**	**Armed FD Mode**
MACH.xx	Mach Hold with digital Mach value	MACH HOLD
PITCH	Pitch Hold	PITCH
PGS	FMS providing Pseudo Glideslope deviation and guidance	GS, FMS, or VNAV (if the FMS is approach mode)
RALT HOLD	Radio Altitude Hold Mode	RALT HOLD
SPD	Airspeed Hold (rounded to nearest whole KIAS)	SPD HOLD
VASL	VNAV Altitude Preselect (ASEL)	ASEL
VALT	VNAV Altitude Hold	ALT (hold)
VERT HOLD	Vertical Speed Hold (FX-700)	VERT HOLD
VFLC	VNAV Flight Level Change	FLC
VNAV	FMS Vertical NAV Mode selected. Note: May be selected with FMS, GPS, HDG, INS (any LRN that supports it) active lateral modes.	VNAV (if the FMS is not approach mode)
VNAV/ASEL	FMS Vertical NAV Mode and ASEL active	ASEL
VS	Vertical Speed Hold	VS
VSxxxx↓	Vertical Speed Mode with digital ft/min down	VS
VSxxxx↑	Vertical Speed Mode with digital ft/min up	VS

Single Channel Flight Director Mode Annunciations

For single channel flight guidance systems, the same lateral and vertical mode information is sent to both coupled and uncoupled cockpit sides. The modes sent to the displays on the uncoupled side will be the same as the flight director modes on the coupled side, regardless of the selected navigation source, the active mode will be displayed in cyan. Flight director steering cues will be displayed on the uncoupled side if configured. Steering cues will be magenta in color for both cockpit sides.

FMS Level of Service (LOS) Annunciations

If a connected FMS is Satellite-based Augmentation System (SBAS) capable, selected as the primary NAV source, and sends level of service mode data to the PFD, the PFD will display the active mode in green text in the FMS status block below the From waypoint ► To waypoint ► Next waypoint. The supported modes in order of highest to lowest level of service are:

LPV	Displayed for localizer performance with vertical guidance level of service.
LP	Displayed for localizer performance without vertical guidance level of service.
LNV/VNV	Displayed for lateral navigation and vertical navigation level of service.
LNAV	Displayed for lateral navigation level of service.

If the LOS changes to a lower level or to none, the LOS annunciator will change to yellow and flash for five seconds before displaying the new LOS annunciator in green. Changing to a higher level of service will simply display the new LOS annunciator in green. Annunciations for on-side and cross-side sources are identical.

AFCS Modes for Approach

Several approach types must be flown using L/NAV and VNAV autopilot modes vs. APProach mode. This is due to the limitations of autopilots that can't process RNAV approach guidance through the APP channel form the FMS. The InSight integration in the Citation VII is one such example. Using the autopilot for ILS approaches is not affected and the flight crew can fly ILS approaches using the same techniques as done previously. However, LNAV, LNAV/VNAV, or LPV approaches must be flown using the L/NAV and VNAV modes, and the altitude preselect should be set to an altitude at or BELOW the airport altitude in order to avoid an inadvertent VNAV level off. In this case, the altitude preselect must be reset if TOGA is selected for go-around to level off correctly at the missed approach altitude.

Air Data

Baro Altitude Data

Baro Altitude Block

Below the altitude tape on the right side of the PFD is the Baro Altitude Correction setting. The displayed value will be either in inches of mercury (IN) or hectoPascals (HPA or millibars). Selection of IN, HPA or millibars is made either by the ECDU or an external control.

Altitude Select (ASEL) Data Block

The ASEL Data Block displays Selected Altitude in units of feet or meters and is located on the right side of the PFD above the altitude tape. The ASEL value is set using the connected Alphanumeric Keyboard (ANK), the Select Knob on the ECDU, or the Altitude Pre-select knob on the Reference Set Panel (RSP). Rotating the outer knob on the ECDU changes the value in 1000 ft. increments.

Data in the ASEL field will display in cyan when the FGS does not have the ASEL or ALT Pre-select mode active. Data will display in magenta when one of the modes is active. The altitude bug on the altitude tape will maintain the same value and color as the ASEL data.

Decision Altitude

The Decision Altitude displays the approach minimums as minimum barometric altitude and is located to the left of the vertical deviation scale below and to the right of the aircraft symbol. The displayed minimum is in feet unless meters mode is selected, in which case a white letter M will be displayed to the right of the numeric value. In addition to the digital value, a DA bug is displayed on the altitude tape. The DA bug comes into view on the altitude tape when the current baro altitude ≤ 1000 ft. above DA.

A configuration option is supported to automatically declutter and re-enable pilot-entered DA minimum values. If this feature is configured, the digital DA value, its field, and the DA bug will be automatically decluttered after five seconds of selection or setting inactivity, as long as the aircraft's current altitude > 2500 ft. above the DA value. Conversely, the DA field is enabled for display if the current baro altitude ≤ 2500 ft. above DA value.

Radio Altitude Data

The radio altitude minimum displays the approach minimums as minimum radio altitude and is displayed on the PFD in two places. The first field displays the current radio altitude depicted as a white numeric value and, if radio altitude is being received, is placed in the lower right of the ADI. The displayed radio altitude is in feet unless meters mode is selected, in which case a white letter M will be displayed to the right of the numeric value.

The second field displays the selected radio altitude minimum (RA) for radio altitude. Display of this minimum is placed below and to the right of the aircraft symbol on the ADI.

The displayed minimum is in feet unless meters mode is selected, in which case a white letter M will be displayed to the right of the numeric value. In addition to the digital value, an RA bug is displayed on the altitude tape. The RA bug comes into view on the altitude tape when the current baro altitude ≤1000 ft. above RA.

A configuration option is supported to automatically declutter the digital RA value and the RA bug after five seconds of selection or setting inactivity as long as the aircraft's current radio altitude is > 2500 ft. AGL. Conversely, if RALT is valid and the aircraft's altitude is ≤ 2500 AGL, all RA display objects, values, and selected minimums will be displayed and will not be decluttered unless manually turned off.

Radio Altitude Miscompares

Radio altitude miscompares are also annunciated on the PFD. If multiple radio altimeters are installed, these miscompares annunciate when the radio altitude does not agree with secondarily sensed input.

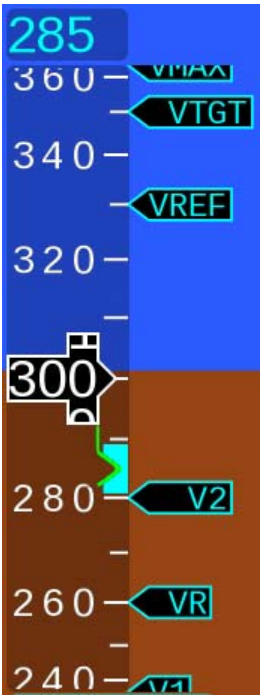
If radio altimeter data is invalid, the radio altitude and RALT label change to RA FAIL in red characters.

The annunciator blinks continually until the pilot activates the Comparator Reset switch causing the annunciator to become solid. The annunciated warning will only be removed when the miscompare condition is resolved.

Airspeed Indicator

Airspeed Tape

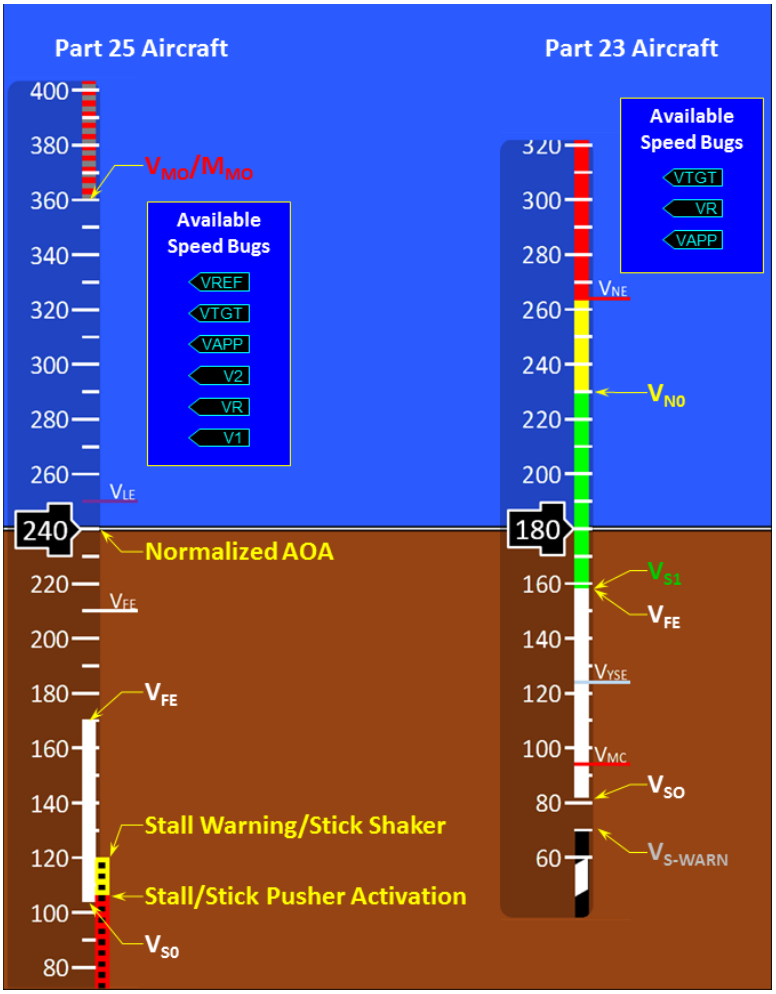
The Airspeed Tape displays on the left side of the PFD and shows current airspeed and related data.



Airspeed Tape with Airspeed Trend Vector

Airspeed Tape Markings

Normal Operating and other speed information bands may display on the airspeed tape and differ from airframe to airframe. The markings are described in the following tables. These colored bands remain in fixed position as airspeed markings to serve as an aid for safe flight. They do not change with phase of flight or aircraft conditions.



Combined figure of Supported Airspeed Tape Markings

Normal Operating Range Bands		
Band	**Color**	**Meaning**
Green Band	Green	Operating Range: Normal.
White Band	White	Flap Operating Range: the bottom is the minimum landing configuration speed at maximum weight (V_{S0}) and the top is the flaps extended speed (V_{FE}) for full landing flaps, both must be configured for the band to appear.

Low-speed Warning Bands		
Band	**Color**	**Meaning**
Minimum Control Speed (air)	Red Tick	Fixed red tick (red radial) indicating the minimum control speed with the critical engine inoperative at maximum gross weight.
Low-speed Band (in landing configuration)	White and Black Striped Barber Pole	Low-speed warning band bounded on top by V_{SWARN}, or by V_2 (when V_2 speed bug is active), or by V_{REF} (when V_{REF} speed bug is active) and bounded on the bottom by the lower limit of the airspeed tape.

The white and black striped low-speed warning conditions are not available until the aircraft is in-flight and the current airspeed has surpassed the top of this band. Once enabled, the low-speed warning band remains active until the aircraft transitions to an on-ground state.

High speed warning bands appear on the high speed end of the airspeed tape and differ from airframe to airframe.

High Speed Warning Bands		
Band	**Color**	**Meaning**
Yellow Band	Yellow/Yellow	Caution Range (for turbulent air): the bottom is V_{NO} and the top is V_{NE}.
Maximum Operating Limit: Red Tick and Band	Red Tick and Band	Maximum Operating Limit: V_{NE}.
Maximum Operating Limit: V_{MO}/M_{MO} or flap/landing gear speed limits	Interlaced Red and Gray	Maximum Operating Limit: V_{MO}/M_{MO} or a speed limit based on flap/landing gear position. The limit is marked with an interlaced red and grey band above the V_{MO}/M_{MO} or maximum speed value. V_{MO}/M_{MO} may be a configured fixed value or a value received from an external source. Maximum speed limits may be configured as a set of fixed values that are a function of landing gear and flap position.

Other Airspeed Markings

Minimum Control Speed (air) – is displayed as a fixed red tick (red radial) indicating the minimum control speed with the critical engine inoperative at maximum gross weight.

V_{MAX} – is supported by the PFD if provided by a connected Universal FMS. This speed represents maximum safe speed based on bank angle for an RF flight plan leg and is depicted by a pennant-shaped bug labeled VMAX in a color determined by the FMS. The V_{MAX} pennant takes priority over all other speed pennants.

Miscellaneous Speed Awareness Functions

The PFD supports outputs for VFE and VFE1.

Indicated Airspeed Window

The indicated airspeed window displays at the center of the airspeed tape.

- The pointer on the right side of the airspeed window provides the current speed indication point on the tape.
- The airspeed window displays current airspeed to the nearest knot.
- Airspeed digits roll to change with higher numbers rolling in from the top and lower numbers rolling in from the bottom.

Behind the current airspeed window is the semi-transparent airspeed tape with white numerals and indices. The tape scrolls to allow the operator a constant view of the current airspeed.

Major tick marks appear every 20 knots on the right side of the tape with a numeral marking to the left. Minor tick marks appear every 10 knots.

Minimum Airspeed

If the airspeed value falls below a configured Minimum, the airspeed window will show dashes (---). If the airspeed value increases above the minimum boundary, the system will consider this normal operation and airspeed values will again display in the airspeed window.

NOTE: Some Air Data systems may cause the airspeed tape to jitter while the aircraft is on the ground. The PFD suppresses all airspeed tape movement when the sensed current airspeed is less than 16 KIAS.

Mach Value

As a configuration option, the current true Mach value may be displayed in a field at the bottom of the airspeed tape. The Mach value will display if the received Mach number from the air data computer is greater than or equal to the threshold value set at time of the installation configuration or a configured flight guidance system indicates the active vertical mode is tracking selected Mach (Mach or FLC/Mach). It is displayed as a white M followed by a white three-digit decimal value (milli-Mach) with no leading zero indicating the current received Mach value.

Selected Airspeed/Mach

Selected airspeed is displayed digitally in cyan text inside of a box on top of the airspeed tape.

- This value indicates either knots indicated airspeed (KIAS) or Mach (in installations with a FGS that support a Mach selection).
- When MACH is selected, an M appears followed by a two-digit decimal value with no leading zero indicating the Mach value.
- When a KIAS selected airspeed value is set, the numbers are not followed by any unit annunciator.

The selected airspeed displayed above the tape also appears as a bug located at the proper airspeed on the right side of the tape. The airspeed bug is shaped such that the pointer for the indicated airspeed window fits exactly inside it when current airspeed coincides with selected airspeed. When the FGS system is not selected to IAS or MACH mode, the bug and selected airspeed value will be cyan in color. When the FGS system has IAS or MACH mode active, the bug will be magenta in color and will represent the speed currently selected by the FGS. Function and operation of the speed bug may vary with the FGS integration. In some integrations, the RSP speed knob controls the speed interactively with the FGS system; in other integrations the speed knob may be deactivated when IAS or MACH mode is selected on the FGS.

Display of Longitudinal Acceleration

As a configuration option, the PFD will display the longitudinal acceleration value received from a valid attitude source in the field that is normally used for the Mach value below the airspeed tape.

If the weight on wheels discrete input is in air, the longitudinal acceleration will not be displayed or replaced with the Mach value, if enabled.

The longitudinal acceleration value may be a negative or positive value expressed to two significant digits with a leading zero.

If the longitudinal acceleration is invalid, its value is replaced with white dashes.

If the indicated airspeed tape is invalid, the longitudinal acceleration is not displayed.

Speed Trend

As a configuration option, a speed trend vector appears as a green line with a pointer that appears on the airspeed tape. The pointer fits into the notch of the selected airspeed bug when the predicted 10 second value corresponds with the selected airspeed.

Airspeed Miscompare

When more than one air data source is provided to the PFD, differences between the ADC airspeed values are monitored and alerting is provided when there is significant disagreement between the sources. The miscompare warning annunciates as ASPD COMP in yellow characters. This annunciator flashes when triggered until the pilot activates Comparator Reset or presses the ALRT CNCL on the ECDU or RSP causing the annunciator to become solid (as long as the condition exists).

ASPD Miscompare

Airspeed Failure

If loss of all valid airspeed information occurs, no indices, numerics, bugs, or colored cues appear on display. A red X displays over the Airspeed Tape to indicate that the Airspeed Data is not usable.

Airspeed Tape Failed Annunciation

Supported Airspeed Markings

The indicated airspeed window is the fixed reference that the moving airspeed tape is read against. Markings listed below are configuration options and not used in all installations.

Speed Bugs			
Symbol	**Description**	**Bug or Fixed Marking**	**Data Received**
V_1	Takeoff decision speed	Pennant	Pilot entered via ECDU or FMS but not both if V_1 supported, else not enabled.
V_2	Single engine second segment climb speed	Pennant	Pilot entered via ECDU or FMS but not both if supported, else not enabled.
V_{APP}	Approach speed	Pennant	Pilot entered via ECDU or FMS but not both if supported, else not enabled.
V_{ENR}	Enroute speed substituted for VTGT by configuration setting when on-ground or if in-air and if VAPP has not been selected on. When in-air and when APP is selected on, VTGT is selectable instead of VENR.	Pennant	Pilot entered via ECDU or FMS but not both if supported, else not enabled.

Speed Bugs			
Symbol	**Description**	**Bug or Fixed Marking**	**Data Received**
V_{FE}	Max flap extended speed, top of white band	Tape color band boundary	Configuration module set static value if supported, else not enabled.
V_{FE1}	Approach flaps	Fixed labeled white tick	Configuration module set static value if supported, else not enabled.
VFS	Final takeoff climb speed for single engine climb in the enroute (clean) configuration below 1500ft AGL.	Pennant	Pilot entered via ECDU else not enabled.
V_{LE}	Maximum landing gear extended speed	Fixed labeled dark magenta tick	Configuration module set static value if supported, else not enabled.
V_{LO}	Maximum landing gear operating speed.	Fixed labeled light brown tick	Configuration module set static value if supported, else not enabled.
V_{MAX}	Maximum safe speed based on bank angle for an RF flight plan leg.	Pennant	Automatically displayed if output by the FMS.
$V_{MO/MMO}$	Maximum operating limit speed, upper boundary of the high-speed caution band	Tape color band boundary	Configuration module set static value or received from the air data computer, else not enabled.

Speed Bugs			
Symbol	**Description**	**Bug or Fixed Marking**	**Data Received**
V_{MO} CAUTION	Lower boundary of high-speed caution band	Tape color band boundary	Configuration module set static value if supported, else not enabled.
V_{MC}	Minimum control speed with critical engine inoperative.	Fixed labeled red tick	Configuration module set static value if supported, else not enabled.
V_{NE}	Maximum operating limit speed (red tick) mutually exclusive with V_{MO}/M_{MO}.	Fixed labeled red tick, beginning of solid red band	Configuration module set static value or not enabled.
V_{NO}	Maximum structural cruising speed, lower boundary of high-speed caution band	Tape color band boundary	Configuration module set static value or not enabled
V_R	Rotation speed.	Pennant	Pilot entered via ECDU or FMS but not both if supported, else not enabled.
V_{REF}	Reference landing speed.	Pennant	Pilot entered via ECDU or FMS but not both if supported, else not enabled.

Speed Bugs			
Symbol	**Description**	**Bug or Fixed Marking**	**Data Received**
V_{S0}	The stalling speed or the minimum steady flight speed in the landing configuration, lower boundary of the white band	Tape color band boundary	Configuration module set static value or not enabled
V_{S1}	The stalling speed or the minimum steady flight speed obtained in a specific configuration, lower boundary of the green band	Tape color band boundary	Configuration module set static value or not enabled
V_{SE}	Enroute climb speed for single engine climb in the enroute (clean) configuration.	Pennant	Pilot entered via ECDU else not enabled.
V_{SWARN}	Top of the low-speed awareness barber pole	Tape color band boundary	Configuration module set static value or not enabled

Speed Bugs			
Symbol	**Description**	**Bug or Fixed Marking**	**Data Received**
V_{TGT}	Reference target speed. Substituted for V_{ENR} by configuration setting or if V_{ENR} is configured V_{TGT} is substituted for V_{ENR} when in-air and if V_{APP} has been selected on.	Pennant	Pilot entered via ECDU or FMS but not both if supported, else not enabled.
V_{YSE}	Speed for best rate of climb on single engine.	Fixed labeled light blue tick	Configuration module set static value or not enabled.

The values of the airspeed bugs (V1, VR, V2, VTGT, and VREF) are determined by the flight crew and are set from the ECDU, Reference Select Panel (RSP) or from the FMS for limited aircraft types that utilize a performance database.

Speed Bug Data Block

The speed bug data block is in the lower left side of the PFD below the airspeed tape (the same location as the current Mach value display, if available).

Speed Bug Data Block

It contains the bug label digital value in cyan for the active speed bug that is currently being set. If the vertical speed bug is the active bug, the data block displays SET VS BUG in white.

Angle of Attack Indicator

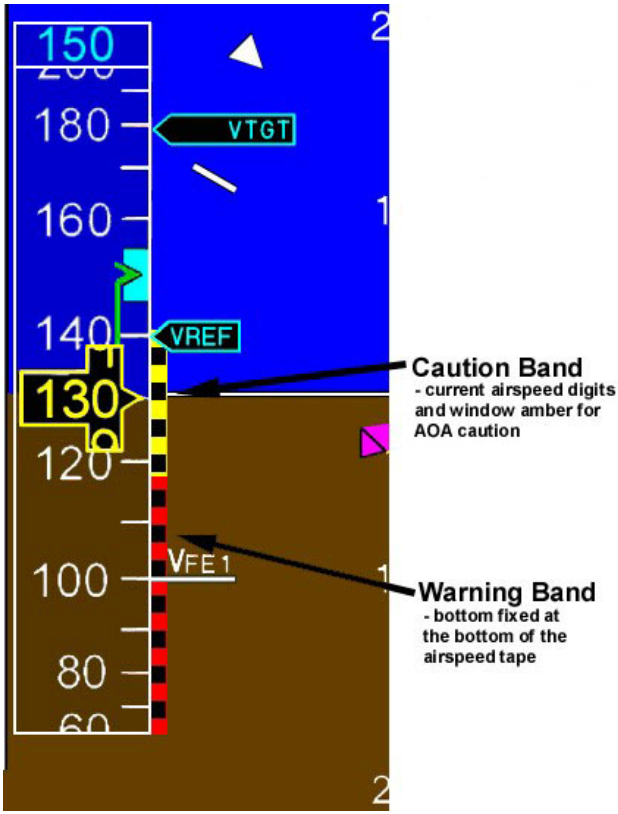
The EFI-1040P provides relative Angle of Attack when configured and installed with a compatible Teledyne angle of attack (AOA) source.

The angle of attack (AOA) indicator appears on the left side of the PFD, along the right side of the airspeed tape. The current airspeed pointer is the current AOA reference when the AOA indicator is active.

Relative AOA (Caution Band) appears as a yellow and black barber pole. This barber pole moves up and down along the edge of the airspeed tape as relative AOA changes.

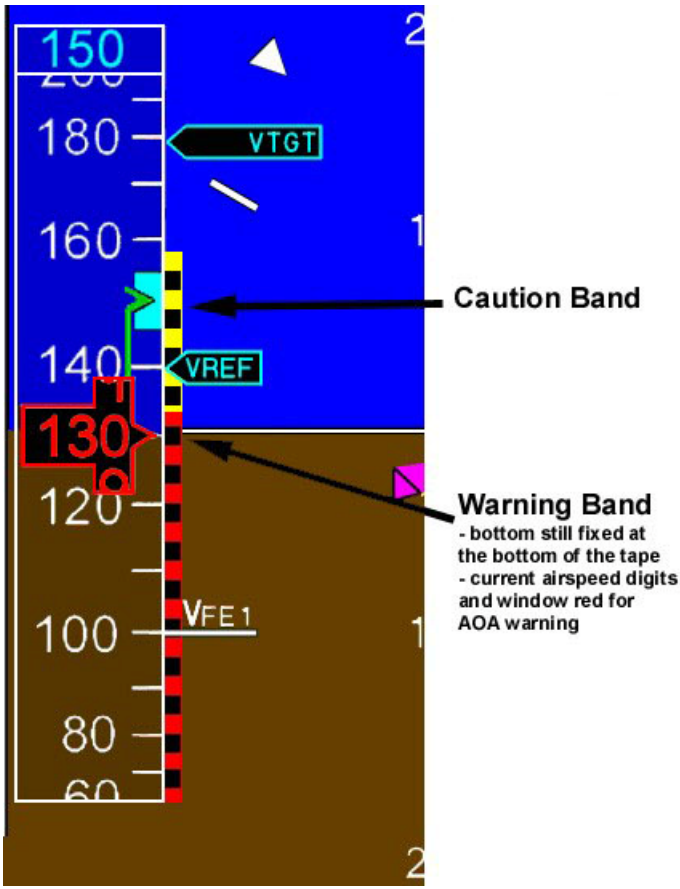
Relative AOA (Warning Band) appears as a red and black barber pole. This barber pole will grow up and down the edge of the airspeed tape as relative AOA changes.

Both types of AOA indicators end upward movement when the current displayed AOA is equal to 1.0 relative AOA (see figures following for details of AOA indicators).



AOA in Caution Condition

NOTE: Airspeed values are arbitrary in the depiction.



AOA in Warning Condition

NOTE: Airspeed values are arbitrary in the depiction.

All airspeed tape display elements have drawing priority over the AOA. If the EFIS detects a failure condition or loss of the AOA Valid signal, the AOA indicator will be removed from the display. The AOA indicator will also be decluttered when the aircraft is determined to be on-ground.

Fast / Slow Indicator

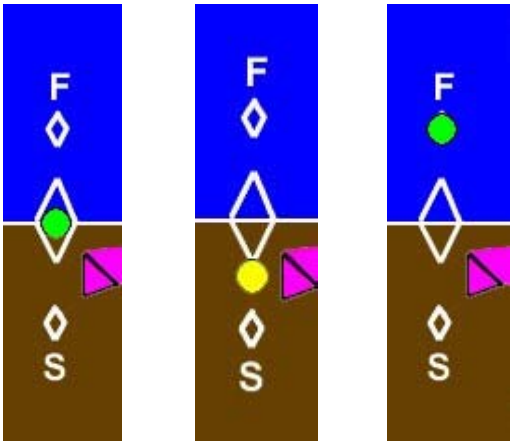
The optional FAST/SLOW indicator provides additional awareness of low and high-speed deviation from a reference AOA.

The indicator appears as a vertical column of white diamonds to the right of the current airspeed pointer. The top diamond is marked with a white F (Fast) and the bottom diamond is marked with a white S (Slow). The center is on the on-speed value.

The FAST/SLOW deviation pointer moves up and down the scale relative to the deviation from the reference airspeed or reference AOA. If the deviation pointer deflects to the fast side of the scale, the aircraft is exceeding the reference airspeed or below the referenced AOA. If the deviation pointer deflects to the slow side of the scale, the aircraft is failing to meet the reference speed or is above the reference AOA.

NOTE: No scale values are displayed. Refer to aircraft-specific Flight Manual or Flight Manual Supplement for details on display.

See the following figures for various FAST/SLOW indicators:



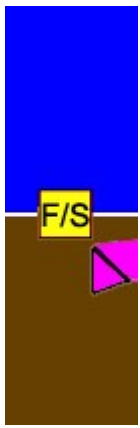
On Speed **One Dot Slow** **Two Dots Fast**

The fast / slow indicator is decluttered when the aircraft is in an on-ground state. The fast / slow pointer will "peg" at approximately two and half dots fast or slow deviation.

If the pointer remains pegged on the fast end of the scale for greater than ten seconds and the current airspeed is greater than 135 knots (or the airspeed is invalid), the entire fast / slow indicator will be decluttered from the display.

If the fast / slow pointer is not pegged at the fast end of the scale for greater than 0.5 seconds or the current airspeed is less than 130 knots (or the airspeed is invalid), the fast / slow indicator will enable automatically. This enable / declutter behavior causes the indicator to be decluttered during most normal flight conditions but is intended to automatically enable it during approach when the stall warning computer indicates that fast / slow is approaching an on-speed condition or when below 130 knots, regardless of the current fast / slow value.

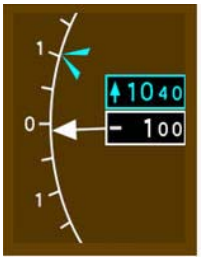
If a fast / slow input is configured and the EFIS is not receiving valid data, the deviation pointer and scale will be removed and a failure annunciator consisting of a black-outlined yellow block with F/S in black letters is displayed on the ADI where the center diamond would be. The indicator automatically resumes normal operation if valid data is restored.



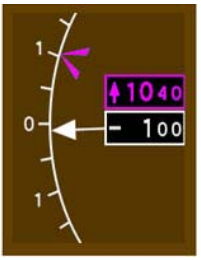
FAST / SLOW Invalid

Vertical Speed Indicator (VSI)

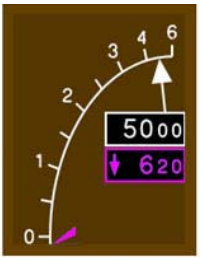
The VSI appears as a white arc with white tick in the bottom right of the PFD. If the vertical speed exceeds 6,000 feet per minute climb or descent, the needle parks at the edge of the arc at the 6,000 mark. In some installations, a vertical speed bug (VS bug) displays on the inside of, and around the VSI arc. An arrow appears as a visual cue to its direction.



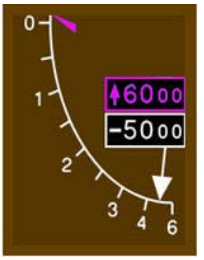
Selected V-speed not coupled to FGS



Selected V-speed Coupled to FGS



VSI Morphed to Show Upper Limit



VSI Morphed to Show Lower Limit

When the PFD is installed with a TCASII system, the VSI is also used for fly-to commands in the event of a TCAS resolution advisory condition. If a resolution advisory alert occurs, the VSI background appears black and increases in size to alert the pilot. The TCAS no-fly segment is depicted as a red arc. The TCAS fly-to segment is depicted as a green arc.

TCAS RA in red zone

TCAS RA in "fly to" zone

TCAS VSI Examples

VSI Failure Annunciation

In the event of vertical speed data loss, a red X appears over the VSI.

VSI Failure Annunciation

Altitude Tape

The altitude tape appears on the right side of the PFD, centered on the horizon line. The tape contains the current baro corrected altitude in increments of 20 feet. Increasing altitude numbers roll in from the top and decreasing altitude numbers roll in from the bottom. A pointer on the left side indicates the corresponding altitude on the moving tape. The maximum range of the altitude tape is -2000 to +90000 feet, if supported by the air data computer.

Altitude Tape

Altitude Tape in Meters

When the altitude display units are selected to meters, the text METERS will be displayed above the current altitude window in white text, and the tape scale will change its appearance so that the major tics / numerics will be every 100 meters and minor ticks will be every 20 meters.

Behind the current altitude window is the semi-transparent altitude tape with numerals and indices in white.

Altitude Miscompare

When more than one air data source is provided to the PFD system, differences between the ADC altitude values are monitored and alerting is provided. The altitude miscompare annunciator appears as a yellow ALT COMP against black next to the ASEL value. This annunciator flashes when triggered until the pilot activates the external Comparator Reset switch or the ALRT CNCL key on the ECDU or RSP which causes the annunciator to become solid (as long as the condition exists).

ALT Miscompare

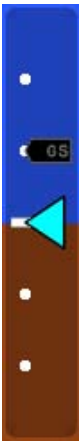
Altitude Failure

If altitude data loss occurs, a red X superimposes the Altitude Tape.

Altitude Tape Failure Annunciation

Vertical Deviation Scale

The Vertical Deviation Scale appears on the right side of the PFD just to the left of the altitude tape. It appears as a series of white dots above and below the horizon line on the ADI. A deviation pointer moves up and down off center to show the vertical deviation value.



Vertical Deviation Scale

The scale of the dots and shape of the pointer are dependent upon what source is being used for vertical deviation. Short Range Navigation (SRN) sources such as VOR/ILS are displayed as a triangular shaped pointer. Long Range Navigation (LRN) sources such as GPS, INS or FMS are displayed as a cross-shaped pointer.

If the FMS is providing Vertical Deviation and the deviation display is Pseudo-Glideslope (PGS) mode, the pointer appears as the LRN cross.

In installations that support automatic (FMS) NAV to (ILS) NAV transitions, when FGS mode is active, the pointer appears as a Short Range Navigation (SRN) triangle and the selected data source is the GS.

If the Vertical Deviation Scale is displaying enroute VNAV, the pointer appears as the Long Range Navigation (LRN) cross. In this mode a field containing the VNAV full-scale value displays at the top of the Vertical Deviation Indicator above the upper dot.

The following table provides details on pointer types and shapes

Condition	SRN	LRN
FD source not active or not captured		
FD source captured		
Source is cross-side		

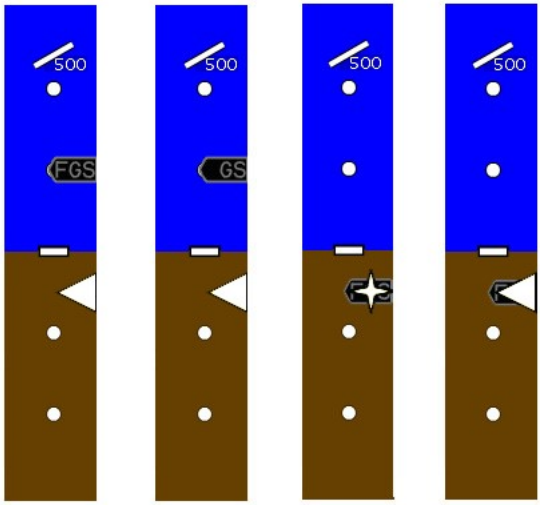
Vertical Deviation Pointers

Vertical Failure Deviation

The scale and pointer disappear from display in the event of data loss. If invalid deviation data is received, a yellow VNV or GS failure flag appears over the zero reference mark. The scale and pointer also disappear if the aircraft heading is greater than 105° from the selected ILS course (indicating a Back Course mode).

Glideslope Pointer

When the selected secondary navigation source supplies GS or FGS data, a secondary glideslope pointer appears on the vertical deviation scale. The pointer appears gray to match the secondary navigation source data block. If only the secondary glideslope pointer is displayed, then the vertical deviation scale also appears gray.

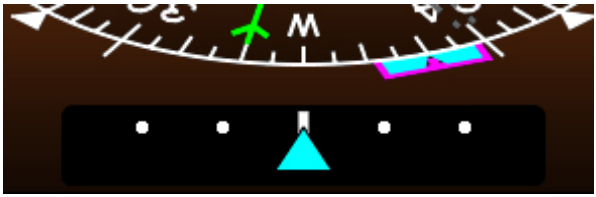


Examples of Second Glideslope Pointer

Lateral Deviation Scale

Standard Lateral Deviation Scale

The Lateral Deviation Scale appears as a series of white dots to the left and right of the white centerline. A deviation pointer moves to the left and right of center to show lateral deviation value. At the center of this field, a white line represents the centerline for zero deviation.



Lateral Deviation Scale

The scale of the dots and shape of the pointer depend upon what source provides lateral deviation. SRN sources such as VOR/ILS appear as a triangular shaped pointer. LRN sources such as INS, FMS, and GPS appear as a cross-shaped pointer.

Triangle pointer used for SRN sources		
Pointer Condition	**Pointer Color**	**Pointer**
FD source captured	Magenta	
FD not active or not captured	Cyan	
Cross-side source	White	

Cross pointer used for LRN Sources		
Pointer Condition	**Pointer Color**	**Pointer**
FD source captured (not FMS HDG mode)	Magenta	
FD not active or not captured (use for FMS HDG mode)	Cyan	
Cross-side source	White	

VOR or TACAN Source

If the source is VOR or TACAN, the pointer is depicted pointing up if flying TO the station or down if flying FROM the station.

Localizer Source

If the source is a Localizer, the pointer is the SRN triangle and the two dots represent 0.155 degree of depth modulation (ddm). When this scale is used in NAV to NAV installations, the LOC symbols display if FLOC is the active source.

Pseudo-localizer

A Pseudo-localizer source displays a LRN cross pointer and two dots represent 0.155 degree of depth modulation (ddm).

Lateral Deviation Failure

A yellow NAV failure flag replaces the pointer and scale value if the deviation source fails.

Lateral ANP/RNP Indicator

As a configuration option, the PFD is capable of displaying a lateral ANP/RNP graphical presentation when installed with a Universal Avionics FMS system configured to support ANP/RNP operations. The ANP/RNP (actual navigation performance/required navigation performance) Indicator provides deviation data to the PFD. An ANP/RNP Indicator acts as an alternate to the Standard Lateral Deviation Scale and is available when the FMS is the active NAV source.

The ANP/RNP indicator appears centered above the heading tape. The deviation pointer and ANP band move left or right with lateral deviation displacement. The ANP band width corresponds to the ANP value and is proportional to the width of the RNP value.

ANP/RNP – Flight Director Not Active

ANP/RNP – Flight Director Captured

ANP/RNP – ANP Beyond RNP Limits

ANP/RNP Indicator in Various Conditions

ANP/RNP Performance Box

When the ANP/RNP pointer displays full scale deflection left, the ANP/RNP performance box appears open on the left side. Similarly, when the ANP/RNP pointer displays full scale deflection right, the ANP/RNP performance box appears open on the right side.

ANP/RNP Performance Box Open, Full Scale Deflection

The ANP and deviation pointer are removed, and a red X placed over the indicator if invalid ANP/RNP data and invalid lateral deviation are being received.

Horizontal Situation Indicator (HSI)

The basis of the HSI depiction is to provide all the normal features of a Horizontal Situation Indicator (HSI). The primary difference in the depiction of the HSI is that it is perspective projected to align it with the three-dimensional view of the SVS.

HSI (Shown on SVS Terrain)

360° Compass Rose

The basic HSI is a white 360° compass rose oriented in the heading up or forward direction. The circular rose adjusts with the movement of the aircraft so that the current heading is always at the top.

Major tick marks are placed around the rose every 10°, and minor tick marks are placed at the 5° increments. Heading labels appear every 30° at major tick marks inside the rose beginning at the top as: N, 3, 6, E, 12, 15, S, 21, 24, W, 30, 33. The heading labels are displayed fixed on the rose with each numeral or letter placed perpendicular to its tick mark like an analog instrument.

The PFD supports additional optional markings displayed on the outside edge of the compass rose at the 30°, 60°, 120°, 150°, 210°, 240°, 300°, and 330°. The tick marks at 30°, 150°, 210°, and 330° are half the size of the remaining marks to aid in quick visual interpretation. These tick marks are fixed relative to the current heading and do not rotate with the compass card.

White triangular markings are displayed on the outside edge of the compass rose at the 45°, 135°, 225°, and 315°. These triangular markings are fixed relative to the current heading and do not rotate with the compass card.

Arc Compass Rose

When selected, an arc compass format may be displayed showing only the forward ±105° of the compass with a flat bottom. The Arc Compass Rose is located just above the ANP/RNP indicator.

Arc Compass Rose

Aircraft Symbol

A white own aircraft symbol is fixed in the center of the compass rose with the wing crossing (center of the wing) at the center of the rose. The nose of the aircraft symbol always points to the current heading.

Current Window Heading

The current heading window displays the current magnetic heading as a white three-digit number. If true heading is available and selected, a cyan T appears adjacent the current magnetic heading.

Current True Heading Window in TRUE Mode

If all sources of heading are lost, HDG in yellow text is displayed in the current heading window and the compass numerals on the HSI will be removed.

If in DG mode, HDG is still displayed but, the compass numbers on the HSI remain.

HSI in DG Mode

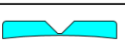
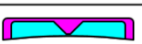
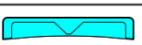
Selected Heading Bug and FMS Heading Bug

The selected heading bug appears on the outside of and rotates around the compass rose to indicate the pilot's selected heading. The bug is cyan and shaped with a triangular notch. When the selected heading matches with the current heading, the pointer on the current heading window fits into the notch on the bug. The heading bug changes to magenta when Flight Guidance is in HDG mode.

While the heading bug is being set, the digital value of the selected heading is displayed below and to the left of the current heading window. This digital value is the same color as the bug and will be removed five seconds after the value stops changing.

The same heading bug display is used for Flight Guidance heading select modes or FMS Heading mode. The FMS heading bug appears magenta when coupled to flight guidance, otherwise it appears cyan. FMS HDG submode is annunciated on the PFD as FMS HDG above the compass rose display.

When a configured FMS is selected as the primary navigation source, the FMS heading staple is also displayed on the upper edge of the tape with the three legs pointing downward. The colors and behavior of the heading bug and FMS heading staple are dependent upon the presence of valid FMS data as the primary navigation source, the mode that the FMS is in, and the active flight director lateral mode.

Primary Nav Source	FMS CMD HDG Mode	FD Mode	Display
FMS	No	Not HDG	
FMS	No	HDG	
FMS	Yes	HDG	
FMS	Yes	FMS HDG	
FMS	Yes	Neither NAV or HDG	
Not the FMS	n/a	Not HDG	
Not the FMS	n/a	HDG	

Heading Bug and FMS Heading Staple Examples

NOTE: Neither the FMS heading staple, nor the heading bug have black outlines: the outlines have been added for illustrative purposes only.

Course Pointers

All forms of course pointers rotate around the center of the aircraft symbol. Both primary and secondary course pointers, deviation bars and TO/FROM pointers match the color of their associated course data blocks. The primary course appears as a solid line with triangular pointer. The TO/FROM pointer appears wider than the primary course pointer and points towards or away from the head of the course needle. The secondary course pointer appears as a double dashed line and functions like the TO/FROM pointer.

Course and Bearing Pointers

Course Deviation Scale

The middle section of the primary and secondary course pointers consists of a variable deviation bar that shows Course Deviation.

The zero deviation or center dot is in the center of the aircraft symbol. The scale contains two dots to either side of the center dot. The deviation scale is fixed and will rotate with the course pointer and deviation bars.

The secondary course needle also has a deviation bar and its own scale based on its source; however, its scale value is not displayed.

Bearing Pointers

The HSI may display bearing indications from tuned bearing sources depicted as bearing needles on the compass rose. Two may be displayed simultaneously depicting one as a primary and one as a secondary bearing source. Source for each bearing pointer is displayed on the PFD on the left and right lower sides of the display and can be either a VOR or an ADF.

Primary bearing is shown by a green needle with a round ball set back from the head end and a single line for the length of the needle. Secondary bearing is shown by a white needle with a diamond set back from the head end and a double line for the length of the needle.

Wind Vector

Wind data may be displayed in either an X/Y component form or in a resultant vector format on the upper right of the HSI.

If wind data is not available, this symbol will not be displayed If the wind data is valid and equal to 0 knots, no indicator will be displayed in the wind box.

X/Y Component Indication

Vector Indication

Selected Track Mode

The EFIS supports Selected Track Mode for flight guidance systems that are capable of intercepting and maintaining an inertially derived track from a configured IRS.

When the configuration option AFCS TRACK Mode Enable is set to Yes, a key to toggle between Selected Track and Selected Heading is available on ECDU PFD Page 2.

When in Selected Track Mode:

- The Selected Heading Bug on the PFD HSI is replaced by a thinner and more pointed Selected Track bug. The selected track bug is set by the flight crew to achieve a desired intercept.
- A track angle line is displayed on the PFD HSI. It is depicted as a white "T" slightly wider than it is tall, that is positioned with its top along the inside edge of the compass rose circle in the same space as the tick marks. The line moves circularly around the compass scale in relation to track angle received from a selected navigation or IRS source.
- The flight crew can engage the TRK flight guidance lateral mode.

If the EFIS is configured for track and the IRS is providing track data, the track pointer is sourced from an IRS. If IRS track data is not available or is invalid, track is sourced from a configured LRN.

Navigation Data Blocks

Primary Nav Data Block

The primary navigation source data block is located to the bottom-left of the HSI. The data in this block is displayed in cyan unless the source is coupled to the flight director, in which case it is displayed in magenta. For cross-side sources, the data is in white.

Primary Nav Data Block for LRN

← Source(I indicates FMS Independent mode)
← To Waypoint
← Distance to Next Waypoint
← Desired Track
← Cross Track/Distance

NOTE: If display of ANP/RNP is enabled through configuration settings, the third row will indicate the distance to the Next (TO) waypoint on the flight plan or current vector in nautical miles (NM). The fourth row will indicate the ANP value.

Primary Nav Data Block for SRN

In the case of an SRN source, the second row indicates the station frequency in MHz. The third row indicates the selected course in ° or °T (as applicable). The fourth row indicates the DME station ID.

The fifth row indicates distance in nautical miles to the DME slaved to the identified station. The distance value is followed by the label "DME" and a white "H" is displayed next to the digital value if the DME is in hold mode. If the DME is in hold mode, the station ID will also swap places with the course.

Secondary Nav Data Block

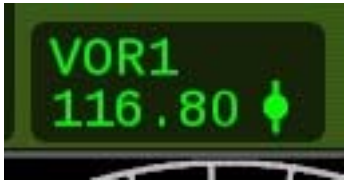
The secondary navigation source data block is located to the lower-right of the HSI and is displayed in a reduced format. The reduced format is displayed as the course / desired track next to a fixed representation of the head of the secondary course pointer with the source type and number displayed above both. The color of this information in the Secondary Nav Data Block is always grey and does not change based on source side.

Reduced Format Secondary Nav Data Block

Bearing Data Blocks

Primary Bearing Data Block

The primary bearing data block is located to the right of the primary navigation source data block. It is displayed as the bearing (in degrees) next to a fixed representation of the head of the primary bearing pointer with the source type and number displayed above both.



Reduced Format Primary BRG Data Block (SRN)

The full bearing details are displayed when the selection box is active but disappear when the selection box times out after five seconds.

Detail Format Primary BRG Data Block

Detail Format Primary Bearing Data Block for LRN

Detail Format Primary Bearing Data Block for SRN

Secondary Bearing Data Block

The Secondary Bearing data block is in the lower right corner of the HSI. Its information format is the same as the Primary Bearing Data Block

CAT II OPERATIONS

The PFD is capable of displaying CAT II status received from a configured flight guidance system when CAT II Status Display Enable (AFCS Config Options Menu) is set to YES.

The status of Category II approach request is displayed below the Flight Guidance Status Annunciators. When the flight guidance system indicates CAT II valid, InSight displays CAT II in green.

If CAT II is invalid, CAT II will be displayed in amber. Below a radio altitude of 200 feet, the CAT II amber annunciation changes to red and flashes on/off.

Below a radio altitude of 50 feet, the CAT II red annunciation is removed from the display.

CAT II Valid Annunciator

CAT II Excessive Deviation Rules and Annunciators

Excessive deviation from the limits described in this section does not trigger a miscompare warning. It is no indication of data validity, only that the aircraft has exceeded the defined limits.

Excessive Localizer Deviation

Excessive Localizer deviation and its miscompare annunciations are enabled when all the following conditions are true:

- Flight Guidance System indicates CAT II status or "Excessive LOC/GS Deviation without CAT II Status" configuration option is set to Yes
- Primary Nav Source is LOC, tuned, and providing valid localizer deviation data
- On-side radio altitude is less than or equal to 600 ft AGL
- Aircraft is not on the localizer backcourse
- Active Lateral Flight Director Mode is Localizer

The CAT II limits for localizer deviation are defined as ±1/3 dot deviation.

Excessive Glideslope Deviation

Excessive Glideslope Deviation and its miscompare annunciations are enabled when all the following conditions are true:

- Flight Guidance System indicates CAT II status or "Excessive LOC/GS Deviation without CAT II Status" configuration option is set to Yes
- Primary Nav Source is LOC, tuned, and providing valid glideslope deviation data
- On-side radio altitude is between 90 and 600 ft AGL
- Aircraft is not on the localizer backcourse
- Active Vertical Flight Director Mode is Glideslope

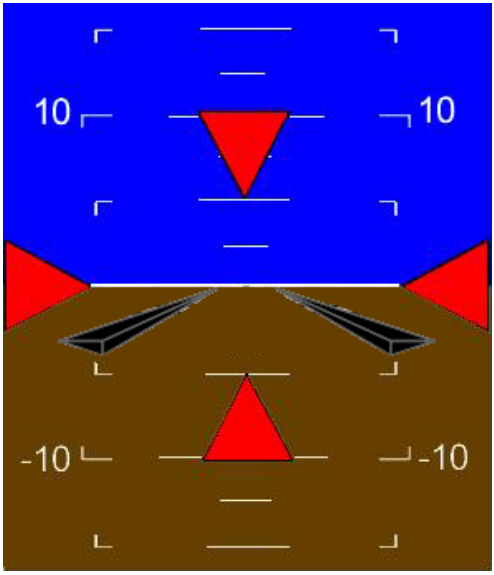
The CAT II limits for glideslope deviation are ±1 dot deviation.

Excessive Deviation Annunciators

In CAT II approaches, visual cues are provided to annunciate excessive ILS Localizer (for lateral) and excessive ILS Glideslope (for vertical) deviation.

If the PFD calculates that aircraft is exhibiting excessive lateral or vertical deviation, a red pointer is displayed on the ADI to indicate the direction needed to correct to stay within CAT II limits.

These annunciators are also displayed if the cross-side PFD detects excessive deviation, cross-side data is valid, and the on-side PFD is receiving ILS Localizer and Glideslope data.



CAT II Excessive Deviation Pointers

NOTE: The figure above shows all pointers on simultaneously for illustration only.

Excessive Indicated Airspeed Deviation

Excessive Indicated Airspeed Deviation is enabled in the PFD when the PFD has an on-side valid source of IAS, all the conditions for localizer and glideslope comparison are satisfied, and the aircraft's on-side radio altitude source indicates that it is between 15 and 1000 feet from the ground.

Comparison is disabled when any of the above are not satisfied, if the on-side instruments are in Back Course mode, or if either side's instruments are in Go Around mode.

The CAT II limits are exceeded if IAS is greater than 10 knots above or 5 knots below the reference IAS (V_{TGT} or the Selected Airspeed bug).

This excessive deviation is annunciated by a yellow arrow on a black field, labeled with either $>^{+}10$ or $<^{-}5$ and placed on the top or bottom of the current airspeed window within the Airspeed Tape.

The arrow points in the direction of airspeed correction needed, above pointing down if airspeed needs to decrease and below pointing up if airspeed needs to increase. When airspeed comes within the +10 / -5 knot limits the arrow is removed.

CAT II Excessive IAS Deviation Arrows

NOTE: The figure above shows both arrows on simultaneously for illustration only.

ILS Miscompare Functions

The localizer and glideslope comparator functions are enabled when operating in CAT II conditions (as indicated by flight guidance system) with onside and cross-side localizers both valid and tuned to the same frequency.

A Localizer Miscompare is instantaneously triggered when the difference between lateral deviation received from LOC 1 and LOC 2 exceeds the following threshold:

[2/5 DDM + 1/8(LOC1 Dev + LOC2 Dev)]

The miscompare is annunciated by displaying "LOC" in black text on an amber rectangle above the lateral deviation scale.

A Glideslope Miscompare is instantaneously triggered when the difference between glideslope deviation received from LOC 1 and LOC 2 exceeds the following threshold:

[8/15 DDM + 1/8(GS1 Dev + GS2 Dev)]

The miscompare is annunciated by displaying "GS" in black text on an amber rectangle to the left of the vertical deviation scale.

PFD INSET WINDOWS

The bottom ¼ of the PFD is reserved for configurable / selectable display information according to pilot selection, and display space available.

PFD Selectable Display Space

Display of Engine Data

The Compressed Engine Format, as described in the Display of Engine Data in the MFD Display section of this manual, is available for display at the bottom of the PFD in lieu of the inset window.

EIU Status

EIU1 and EIU2 annunciators are displayed in the lower right of the compressed engine format. The EIU annunciator is displayed in green if the data received from that EIU is valid or yellow if the data received from that EIU is invalid or stale.

If the selected EIU is providing invalid data or communication with it has been lost and the other EIU is providing valid data, the PFD displays "SELECT EIU X" (where X is the number of the valid EIU) as white text on a blue background.

If the EFIS loses communication with its secondary EIU source, the PFD displays "EIU 1 FAIL" or "EIU 2 FAIL" in black text on a red background.

If the EFIS is unable to communicate with any EIUs upon power-up of the display, the message "NO CONFIGURED EIU AVAILABLE" is displayed on the compressed engine format and no other information will be displayed.

If the EIU 1 and EIU 2 engine configuration data or ID differ from each other, the message "EIU CONFIGURATION MISMATCH" is displayed on the compressed engine format and no other information is displayed.

Display of Map Data

The PFD displays map depictions as defined in the Display Formats section. These map depictions may include flight plan, compass, range rings, traffic, weather, lightning, terrain, navaids, airways, and controlled airspaces as described in the MFD section in this document, only in a smaller format. Refer to the MFD section and applicable subsections for full descriptions of map depictions. Display of map data is selectable by the pilot using the ECDU.

Display of Flight Plan Status

LRN flight plan status and performance data are displayed in a Flight Plan Status Block. This block consists of four rows with the right side of the top row indicating the type of data displayed below it (Fuel and Weight).

The first row indicated the FROM waypoint and it always displayed in green text.

The second data row indicates the current TO waypoint by identifier, current distance to the waypoint, and time to go. If the LRN source has a performance database, the Fuel and weight are displayed on this row. The TO waypoint row is displayed in magenta if the LRN is coupled to flight guidance, cyan if it is not coupled and is being driven by an on-side LRN.

The third and fourth rows display the next (NX) and destination (DEST) waypoints in green text. The information displayed in these two rows is identical to the current flight plan. Dashes "---"are displayed for any of the flight plan data that is invalid and, if performance data is not received, it is displayed as dashes "---".

The distance to go for the TO waypoint is limited to 4095 NM. If the TO waypoint distance exceeds this limit, dashes "---"are displayed.

The NX and DEST distance to go are limited to 9999 NM. Asterisks "****" are displayed if the distance to those waypoints are exceeded. The time to go is limited to 8 + 31 for the TO waypoint, 99+59 for the NX waypoint, and 68 + 15 for the DEST waypoint. Values exceeding this limit are displayed as asterisks "**+**".

Fuel is limited to 99999 maximum pounds and weight is limited to 524287 maximum pounds.

Flight Plan Status Inset

Display of Video Data

The PFD displays video depictions as defined in the Display Formats section of this manual. These video depictions are as described in the MFD section in this document, only in a smaller format. Refer to the MFD section and applicable subsections for full descriptions of these depictions. Display and control of video data available to the pilot by using the ECDU.

Aircraft Models

InSight allows field loadable aircraft models as part of the EFI-1XXX installation kit for the display of aircraft symbols on the HIS and Map (2D). Refer to Aircraft Models in the MFD section of this manual for a full description of these depictions.

PFD Display of Full Time Annunciators and Status

If the EFIS configuration contains only PFDs, the left inset of PFD1 displays the following full-time annunciators and status that are normally displayed on the MFD status bar. The inset format is arranged in two rows of data blocks:

Row 1, Block 1 displays

- N1 or FAN real-time performance values if supplied by a performance database and COM 3 is not configured
- COM 1 frequency and TX or TST annunciator
- COM 2 frequency and TX or TST annunciator
- COM 3 frequency and TX or TST annunciator

Row 1, Block 2 displays

- N1 or FAN real-time performance values if supplied by a performance database and COM 3 is not configured
- TCAS system mode and altitude filtering setting
- ATC code and ID, mode, R, ID, or TST annunciator

Row 2, Block 1 displays

- True airspeed in knots
- SAT or TAT (as selected) in °C
- ISA in °C

Row 2, Block 2 displays

- Ground speed in knots
- ETA in hours and minutes
- UTC in hours, minutes, and seconds

Row 2, Block 3 displays

- Terrain status

The N1 or Fan performance data is displayed as take-off (T/O) in Row 1, Block 1 and climb (CLB) in Row 1, Block 2 if the airspeed is ≤ V2.

If the airspeed is > V2 the N1 or Fan performance data is displayed as climb (CLB) in Row 1, Block 1 and cruise (CRZ) in Row 1, Block 2.

VR is used as the threshold if V2 is not configured or supplied.

No engine performance values are shown if COM 3 is configured due to space limitations.

If any of these data items are not provided by a connected system, the data is not displayed.

PFD Display of AFCS

If the EFIS configuration contains only PFDs, the right inset of PFD1 may display automatic flight control system (AFCS) messages from a configured flight control system in the right inset window if selected from the System Status page on the ECDU.

MFD DISPLAY

For color and placement of on-side and cross-side information, the MFD considers systems on the cockpit side on which it is installed to be on-side; or, if installed as a center display, it considers systems on the pilot's side on which it is installed to be on-side. All other systems are colored and placed as cross-side information.

In the event of an MFD failure which includes the display of engine instrumentation, the engine instrumentation is a higher priority and will transfer to the remaining operational MFD. Electronic charts is not an automatic function at this point and will require the flight crew to manually select the electronic chart functionality which will then be displayed below the engine data.

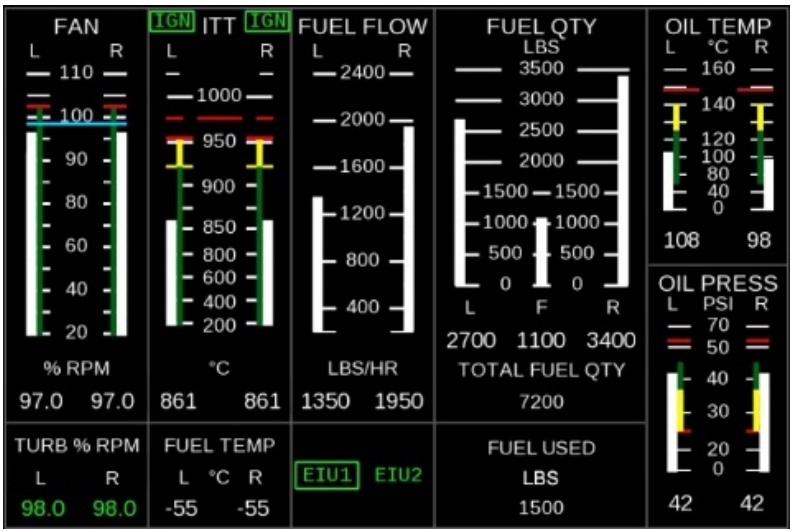
Display of Engine Data

Display of engine data is selected by the pilot using the ECDU. Compressed engines may be manually selected for display on the bottom of either or both PFDs by using dedicated toggles on the ENG page on the ECDU.

Full Engine Detail Display

The full engine detail is displayed when selected by the pilot or when the phase of flight dictates that full engine details are required.

Engine data is aligned in columns by engine (L or R) and in blocks by data type. The label of the displayed parameter is shown at the top of each indicator block while the EIU source number (1 or 2) and status is displayed at the bottom. Graphical depictions, color, error behaviors, miscompares, and supplementary symbols and annunciators are identical to that described in the PFD section.



Full Engine Format

Compressed Engine Display

The compressed engine format is displayed in a one-quarter screen inset at the top of the MFD.

EIU Fail Annunciation

The EIU Fail annunciation is identical to the EIU fail annunciation described in the PFD section.

Display of Map Data

Display of map data is selectable by the pilot using the ECDU. Heading Up and North Up Maps may be displayed by the MFD as a full screen, 3/4, 5/8, 1/2, 3/8, and 1/8 window size. These map depictions may include flight plan, navaids, airports, airways, controlled airspace, terrain, traffic, weather, and lightning data.

Basic Heading Up Map

The range for any map is displayed in the upper right corner. The number represents the distance in NM from the aircraft position to the top of the Map display.

Track Line and Selected Heading Line may be displayed on the Map.

Basic North Up Map

The North Up map will always be oriented to North with the North Up Icon highlighted to annunciate this view. The aircraft symbol is displayed in the center and changes orientation based on the current heading.

Compass Rose

When selected from the ECDU, a compass rose is displayed on the map and centered on the aircraft symbol. A compass rose and range rings may be turned on and off via the ECDU.

- The 360º compass rose is displayed for North Up maps.
- The compass will orient based on the mag/true selection for the HIS on the PFD for North Up maps.
- The Arc compass rose is displayed for Heading Up maps will orient based on the mag/true selection for the HIS on the PFD.

If the heading is lost but position is still known from an LRN, the compass will still be displayed in North Up view with a crosshairs symbol shown at the aircraft position, but heading will not be displayed.

HDG Flag on Map

Range

Map range is selectable for individual maps so that each Map displayed may have its own range. Selectable ranges are fixed at 0.25, 0.50,1, 2.5, 5, 10, 25, 50, 100, 250, 500, 1000, and 2000 nautical miles.

A range ring or arc may be displayed for all map orientations if Compass is selected on the ECDU. The selected range is displayed as a white circle centered on the aircraft symbol with perimeter at the half range location.

The half range value is displayed as a white numeral just below the bottom center of the ring.

When the main format on the MFD is configured to "Map", the "Pinch" or "Spread" gestures will change the map range.

Touch Screen Gesture	Action
Pinch 	The "Pinch" gesture is used to increase the range.
Spread 	The "Spread" gesture is used to decrease the range.

A range change can be performed from any ECDU page when the main format on the MFD is set to "Map" or eCharts. The "Pinch" or "Spread" gestures can also be used for range change on the MFD insets. If the MFD inset is not set to "Map", use the "Single Finger Single Tap" gesture in the area above the inset map icons until the map is displayed.

Flight Plan Display

The primary flight plan current leg is displayed on the moving map in cyan with all remaining legs displayed in green. If the primary flight plan source is coupled to the lateral mode of the flight guidance system, the current leg will be magenta, waypoints bounding the active leg will be the same color as the leg. Waypoints on the remainder of the flight plan will be green. Background waypoints, navaids, and airports will be white.

The source of the flight plan data is:

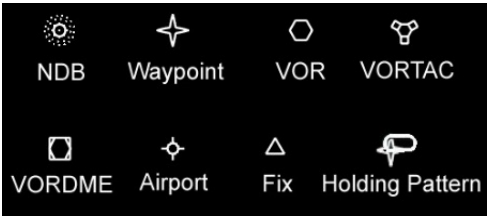
- From the selected primary navigation source if it is an LRN that supplies flight plan data.
- From the selected secondary navigation source if it is an LRN that supplies flight plan data and the primary navigation source is not an LRN that supplies flight plan data.
- From the onside LRN that supplies flight plan if neither selected navigation source provides flight plan data.
- The flight plan data block is displayed in five-rows and located below and to the left of the map for the primary flight plan.
- The first row displays the source and number, and the [I] annunciation for FMS independent mode if the connected FMS is a Universal FMS and it indicates that Independent mode is active.
- The second row displays the current TO waypoint in the flight plan.
- The third row displays the distance to go to the next waypoint in nautical miles.
- The fourth row displays the desired track in degrees magnetic.
- The fifth row displays cross track (XTK) deviation and its value in nautical miles (limited to 99.9 as a maximum value).

If any data for the second, third, fourth, and fourth rows is not received from the LRN, the rows will be blank.

When the aircraft transitions to within an LRN-defined range of the TO waypoint, the current leg of the flight plan and the TO waypoint on the flight plan will flash. The TO waypoint information displayed in the flight plan status data block, in the primary flight plan source data block, and in the primary navigation source data block also flash for the same duration.

Waypoint Display

Waypoints, navaids, and airports are displayed by different symbols. The ECDU provides an on/off selection of airports, navaids, and background waypoints. The number and type are filtered depending upon map range and current flight condition if a navigation database is present in the EFIS.

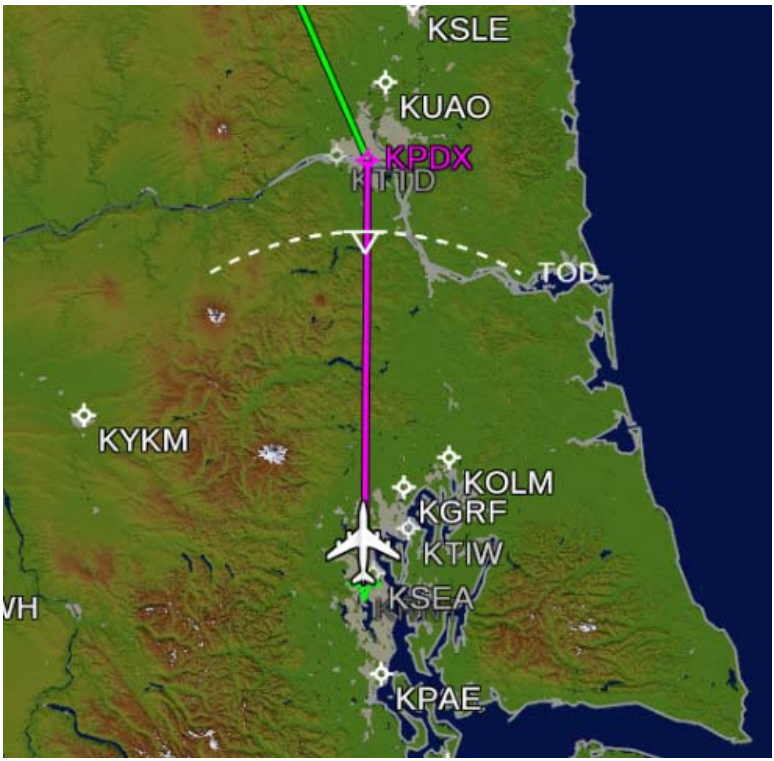


Flight Plan and Map Symbols

Graphical METAR Airport Symbols

When provided by the LRN, the location of the VNAV calculated Top of Descent (TOD) and/or Top of Climb (TOC) point is displayed on the Map as a white dashed arc.

"TOD" or "TOC" are annunciated in white text beside the arc to indicate the type of VNAV altitude transition point being displayed.



Display of Top of Descent on Map

The map automatically declutters labeling, duplicate waypoints, and navaids to prevent clutter when these display elements are collocated and/or the displayed range is such that the density of these display elements causes clutter or obscuration.

Waypoints on the flight plan are prioritized over background waypoints. Waypoints on the flight plan are also prioritized so that the TO waypoint takes the highest priority to show the termination of the current flight plan leg, followed by the DEST and FROM waypoints in second and third priority respectively.

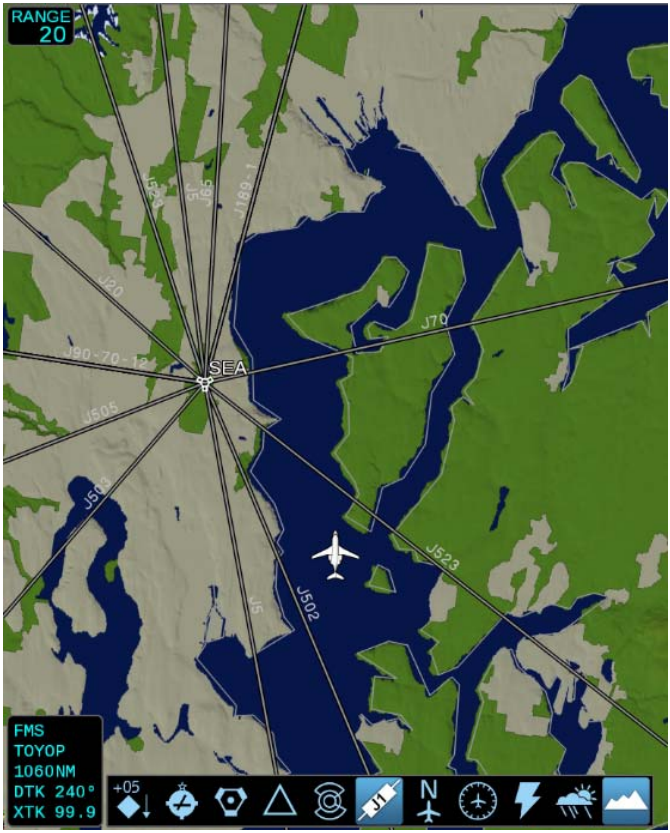
Autoranging

Automatic Ranging, LSK [1L] enables any map format showing flight plan information to automatically change to a range so that the TO waypoint is positioned as close as possible to, but not exceeding, 75% of the map range from the own-aircraft position. Unless a waypoint transition occurs that would require a new range to be within view, range changes are limited to no more than once every twenty seconds. In the case of a waypoint alert, a minimum of three seconds must pass before any autorange change.

A white "A" is displayed next to the range value when autoranging is selected. The range may be manually changed when autorange is selected, however, doing so will deselect the autoranging function. Autorange increments are limited to the normal ranges in the EFIS. If weather or terrain is displayed concurrently with the flight plan, then those ranges are used for autoranging.

Display of Airways

High and Low airways may be selected for display from the ECDU. Both airways are displayed in grey with a black outline. Airway labels are displayed next to the airways on each segment and will move as the map moves. Refer to the following examples for the airway displays.



High Airways

Low Airways

Automatic Decluttering

The map content is filtered by the map range, the further out the range, the fewer the map objects that are displayed. Lower ranges will show more details without cluttering up the display. Filter thresholds are configurable for the following items:

Airports (pre-filtered by the Airport Filters setting)

The Airports Declutter Limits setting pop-up window provides cyan sliders for Class E, Class D, Class C, and Class B airport types with a range scale of 10 NM, 25 NM, 50 NM, 100 NM, 250 NM, 500 NM, 1000 NM, and Max NM.

The maximum setting for each airport type for both the Main and Inset maps:

- Class E = 250 NM
- Class D = 500 NM
- Class C = 500 NM
- Class B = Max NM (maximum configured map range)

Airspaces

The Airspaces Declutter Limits setting pop-up window provides cyan sliders for Class D, Class C, Class B, Military, and Restricted type airspaces with a range scale of 10 NM, 25 NM, 50 NM, 100 NM, 250 NM, 500 NM, 1000 NM, and Max NM.

The maximum setting for each airspace type for both the Main and Inset maps:

- Class D = 250 NM
- Class C = 250 NM
- Class B = 250 NM
- Military = 500 NM
- Restricted = 500 NM

Airways

The Airways Declutter Limits setting pop-up window provides cyan sliders for High and Low type airways with a range scale of 10 NM, 25 NM, 50 NM, 100 NM, 250 NM, 500 NM, 1000 NM, and Max NM.

The maximum setting for each airspace type for both the Main and Inset maps:

- High = 500 NM
- Low = 250 NM

Navaids

The Navaids Declutter Limits setting pop-up window provides cyan sliders for Low and High sector NAVAIDS with a range scale of 10 NM, 25 NM, 50 NM, 100 NM, 250 NM, 500 NM, 1000 NM, and Max NM.

The maximum setting for both Low and High Navaid types for both the Main and Inset maps is 500 NM.

Fixes

The Fixes Declutter Limits setting pop-up window provides cyan sliders for Terminal, Enroute, and Off Route type Fixes with a range scale of 10 NM, 25 NM, 50 NM, 100 NM, 250 NM, 500 NM, 1000 NM, and Max NM.

The maximum setting for each Fix type for both the Main and Inset maps:

- Terminal = 25 NM
- Enroute = 500 NM
- Off Route = 50 NM

Traffic

Traffic information may be displayed on the EFIS if a supported traffic system is installed in the aircraft. Display of traffic may be automatically displayed or can be selected by the pilot using the ECDU for display on any Map view.

Traffic Symbols

Traffic is displayed by dynamic target symbols received from the traffic system. Target symbols are placed within the compass rose by latitudinal and longitudinal position relative to the aircraft symbol. The type of target symbol and threat level is determined by its relative distance from the aircraft.

Targets are assigned a relative or absolute altitude (as selected by the TCAS controls) in hundreds of feet (with a leading zero for values less than 1000 feet). If the target is above the aircraft, it is displayed with a + and the target distance above the target. If the target is below the aircraft, it is displayed with a – and the target distance below the target. If the target's vertical trend is known, an up or down arrow will also be displayed next to the target.

The number of targets displayed are pilot adjustable from 5 to a maximum of 30 targets as supplied by the TCAS computer.

Four types of targets may be displayed on the map in descending order of criticality and threat level: Resolution Advisory (red filled square), Traffic Advisory (yellow filled circle), Proximate Threat (cyan filled diamond), and No Threat (cyan outlined diamond). The display of resolution and traffic advisories cannot be suppressed by reducing the minimum displayed targets value. If present, these advisory targets are always displayed, regardless of the target minimum value.

TCAS Symbols

If the configuration option, TFC POPUP ENABLE is set to NO, the display of traffic will not automatically enable under any circumstances. This option is always available manually if the MFD is receiving valid data from the traffic computer. This option does not suppress RA fly-to commands on the VSI or "TRAFFIC" annunciators on the ADI.

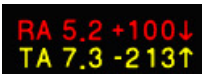
NOTE: TCAS POPUPs and alerts are inhibited below 400 feet AGL descending, and below 600 feet AGL ascending. TCAS targets may still be displayed if TCAS display is selected at the discretion of the flight crew.

Traffic Mode Annunciators

The TCAS mode is displayed in two fields in the MFD status bar. The left field displays TCAS in green if the data received is valid, TCAS FAIL in white if the data received is invalid, or TCAS OFF in white if TCAS is inoperable because it has been turned off or is in test mode. TCAS TEST and TCAS TA ONLY are also supported if triggered by the TCAS system.

The right field displays the current altitude filtering mode of the TCAS system. If TCAS is not a configured system, these fields are empty.

If close target reports do not contain enough data for TCAS to display them accurately, they appear as TCAS no bearing targets in the upper right of the map.



TCAS No Bearing Targets

Traffic Altitude Filtering

The traffic altitude filtering may be in one of four modes:

- Normal = showing all traffic between -2700 and +2700 feet relative altitude.
- Above (AB) = showing all traffic between -2700 and +9000 feet relative altitude.
- Below (BL) = showing all traffic between -9000 and +2700 feet relative altitude.
- Expanded (EXP) = showing all traffic between -9000 and +9000 feet relative altitude.

An absolute altitude mode may be selected where the displayed altitudes next to traffic targets are changed to true altitude rather than altitude relative to the ownship. There is a fifteen second timeout on this display mode, but it may be re-triggered at any time by pilot action.

Weather

Weather radar information may be displayed on the MFD. Standard digital interface weather data may be displayed concurrently with all Map depictions including display of flight plan information, background waypoints / navaids / airport symbols, and traffic information. Concurrent display with terrain depiction is not permitted as the return symbology is too similar.

Weather Presentation

Weather radar data is presented as a 120° sweep in front of the aircraft, with the center of the sweep located at current heading. The boundaries are at ±60° of current heading and the curved top of the compass rose.

Some radars output a 180° sweep and can generate data for a ±90° boundary in front of the aircraft. The MFD will display this type of data but will clip the edges of the displayed data vertically at ±60°.

Radar returns are displayed as dots and patterns of color that show the location of weather cells. The displayed colors are generally green for low level returns, yellow for medium, red for heavy, and magenta for special conditions, such as turbulence but, vary by weather system manufacturer. Refer to the specific weather radar systems operator's manual and/or flight manual.

Weather Radar Mode Annunciators

The weather mode annunciator block is displayed on the right side of the map compass below the terrain and traffic mode fields. It contains six rows; the top five rows are used to display weather system mode and data information.

The top row displays the weather mode:

- In green if the data received is valid.
- In yellow if the data received is invalid or in special target modes supported by some weather systems.
- In white if the weather system in inoperable because it has been turned off or is in a test, wait, or inhibited mode.

The second row contains the secondary mode annunciator defined by the connected weather radar, such as sector scan, identify, and various failure annunciators.

The third row contains the gain and target mode status of the radar.

The fourth row contains the status of stabilization and react mode on the radar.

The fifth row contains the tilt angle of the radar dish in degrees, or the status of autotilt.

These last five rows are always displayed in green if they are supported by the weather system and the MFD is provided valid data. If weather systems are not configured, these five rows are empty.

The sixth row of the weather system mode block displays the current status of the configured lightning detection system. "LX" is always displayed as the first two characters in green if the MFD is receiving valid lightning data and is replaced by "LX/F" in yellow if the received data is invalid. Additional mode annunciators supported by the lightning system are displayed in white and follow "LX/."

Supported modes and annunciators vary according to the weather system that is installed and configured to the EFIS.

Common Weather Mode Annunciators	
Mode / Condition	**Annunciator**
ARL sub-mode is true	ARL in green
Forced standby	FSTBY in white
Anticlutter sub-mode is true	GCR in green below the mode
Ground Map	MAP in green
Ground Map mode 1	MAP1 in green
Ground Map mode 2	MAP2 in green
Vertical profile mode when no vertical data is available	NO VP DATA in white
React sub-mode is true	RCT in green below the mode
Roll Offset Compensation	ROC in white
Sector Scan sub-mode is true	SECT SCAN in green
Sector Scan sub-mode is true	SECT SCAN in green below the mode
Stabilization Limit sub-mode is true	STAB LIM in yellow
Stabilization Off sub-mode is true	STAB OFF in green below the mode

Common Weather Mode Annunciators	
Mode / Condition	**Annunciator**
Stabilization Off sub-mode is true	STAB OFF in green below the mode
Standby	STBY in white
Target alert armed is true	T in green below the mode
Target Mode	TARGET in green
Test Mode	TEST in white
Target Alert sub-mode is true	TGT in yellow
Target alert is true	TGT in yellow below the mode
Turbulence	TURB in green
Turbulence alert is true	TURB in yellow below the mode
Vertical profile mode	VP in green
Wait mode (during radar warmup)	WAIT in white
Cyclic mode	WX CYC
Weather On	WX in green
Off	WX OFF in white
Weather + Turbulence mode	WX/T in green
Weather Alert	WXA in green

Vertical Profile

When available, the MFD can display Vertical Profile (VP) data. When in VP mode, the pilot may select the lateral direction of the radar dish using the track control on the ECDU WX Options page. The radar scan is vertical.

When a normal radar depiction is displayed and the track control is varied, a white line is displayed from the tip of the aircraft symbol to the edge of the window at the selected track angle. The current selected horizontal track angle value will be displayed on the ECDU and the map. If input is not received from the track control after fifteen seconds, the selected horizontal track line and numerical track value will be removed from the display.

Pressing the VP key on the ECDU will display the VP mode and replace the normal map display. All selectable normal modes for the weather radar are still available in VP mode.

When in VP mode, map referenced data, such as flight plan, navaids, traffic, or lightning data cannot be displayed.

Beacon Mode

Some weather radars support a beacon mode. If the radar system detects a beacon, it will display a colored block to show where the beacon return is relative to the aircraft.

Upon successful decoding of the beacon data, a white triangle pointing to the beacon is displayed. Also displayed are a solid white line from the aircraft symbol to the triangle and a dashed white course line from the triangle to the edge of the compass. Bearing and range for the beacon will be shown next to the symbol.

Satellite Weather

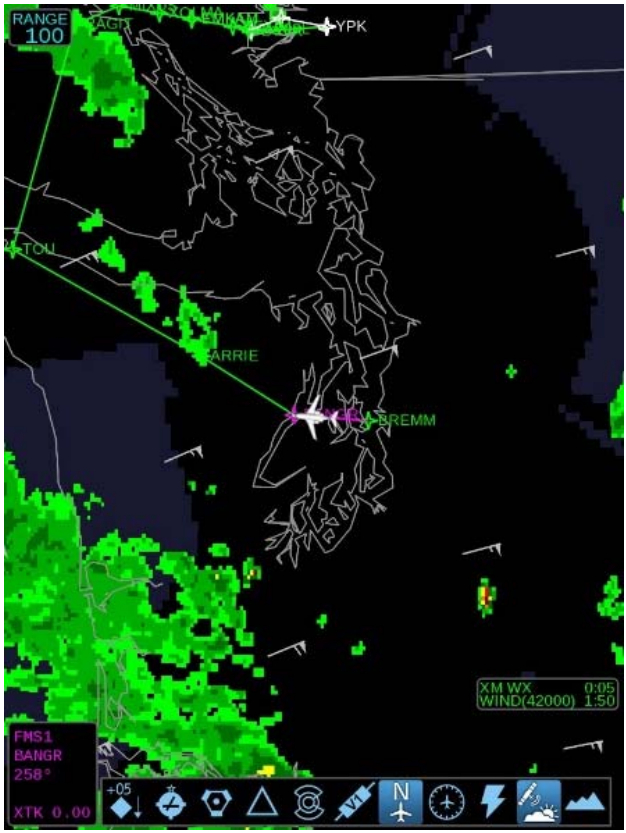
Satellite weather may be selected for display on the MFD from a connected weather uplink system. "XM" is annunciated in green if the source is valid and data is available for display. "XM Unavailable" is annunciated in white when an invalid source is selected and will remain on the display until a valid source or different display format is selected. Only NEXRAD, SCITS (combined with NEXRAD) and Lightning products are available on inset maps, however, other products will be available on the MFD main map if the satellite weather subscription provides them.

When NEXRAD and/or Lightning products are displayed, the "XM" annunciation is enclosed in a cyan box with the NEXRAD and/or Lightning status annunciations below it along with the age of each data image. This feature is restricted to the MFD main format map.

Other selectable satellite weather products include Coverage, Winds Aloft, SIGMETs, AIRMETs, TAFs, Canadian TAFs, and Canadian Warnings. Each product may be toggled on and off via the ECDU. Displayed products show (with the age for NEXRAD, Lightning, and Surface Winds) ages for SCITs, SIGMETs, and AIRMETs by individual occurrence and can be queried by clicking the item directly on the map.

If AIRMETs or SIGMETs are unavailable for any reason, the flight crew will receive a message and inhibit the display on the MFD. If the subsequent transmission of AIRMETs and SIGMETs corrects the issue, they will become available again.

The following figures show examples of the satellite weather products and indications.

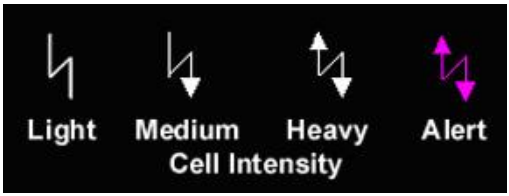


NEXRAD and Winds Data

NEXRAD and AIRMET Data

Lightning

The MFD can display lightning cell intensity if connected to a configured Lightning Detection system. Lightning data can display concurrently with all Map depictions including display of flight plan information, background waypoints / navaids / airport symbols, weather, terrain, and traffic information. Lightning activity appears within the compass rose by latitudinal and longitudinal position relative to the aircraft symbol. See figure below for lightning symbols.



Lightening Symbols

Universal TAWS Terrain

Universal TAWS may be displayed on the MFD. Color depiction for TAWS is green for terrain below current altitude, yellow for terrain near the same elevation as the aircraft, and red for terrain that is above the current aircraft altitude and that could cause collision.

TAWS will automatically be displayed in the event of a terrain alert ("pop-up" alert) and will automatically be removed if the TAWS data is determined to be invalid. In the event of simultaneous traffic and terrain alerts, the terrain alerts take priority.

Mode Annunciations

The TAWS mode annunciator is located on the right side of the MFD STATUS BAR. "TERR" is annunciated in green if valid data is being received and selected for display. "TERR" is displayed in yellow if the data being received is invalid and the terrain may not be displayed. "TERR N/A" is displayed in yellow if the TAWS system indicates that terrain data is not available. "TERR INH" is displayed in white if the terrain system has been inhibited. "GPWS INOP" is displayed in yellow if the TAWS system indicates this mode. If a terrain system is not configured, the TAWS mode field is not displayed.

Terrain (708)

ARINC 708 Terrain information may be displayed on the Map format if a supported terrain system is installed in the aircraft.

The EFIS automatically enables display of terrain on an MFD in the event of a terrain pop-up condition.

Terrain Presentation

The Honeywell Enhanced Ground Proximity Warning System (EGPWS) keyed component picture bus (KCPB) terrain system ARINC 708 terrain data, provides a left/right lateral sweep rather than an angular sweep like a typical 708 radar presentation. This depiction is bounded the same as a normal 120° sweep except that it is flattened on the sides from the ±60° marks down to ±90° of the aircraft symbol.

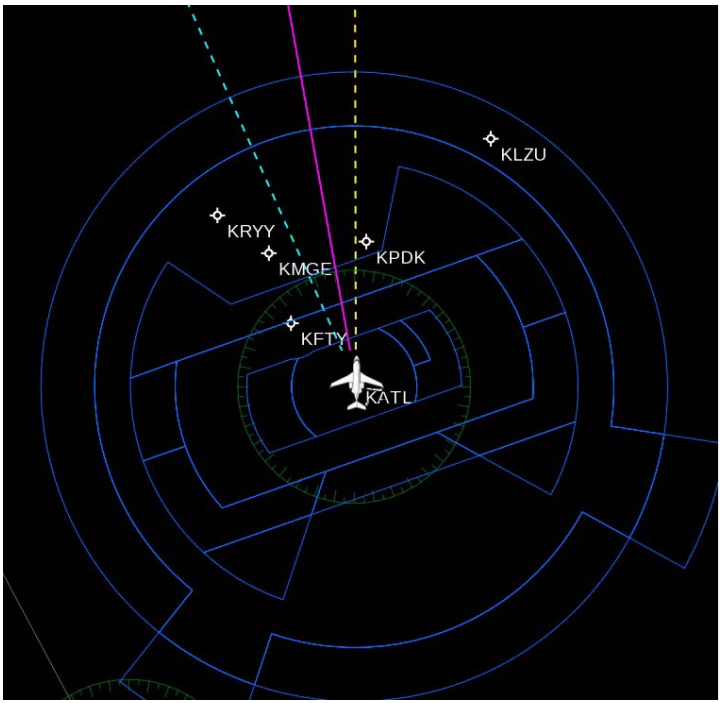
Terrain data within the displayable range is displayed as dots and patterns of color that show the relative terrain elevations. The displayed colors and patterns vary by terrain system manufacturer. Display of background waypoints/navaids/airport symbols and traffic information may be displayed as an overlay on the EGPWS terrain depiction.

Terrain Mode Annunciations

The terrain mode is displayed on the right side of the MFD STATUS BAR. "TERR" is displayed in green if the data received is valid yellow if the data received is invalid. "TERR INH" is displayed in grey if the terrain system has been inhibited. "TERR N/A" will be displayed in yellow if the terrain system supports Terrain Not Available signal to the display. If no terrain system is configured, this field is empty.

Display of Controlled Airspace

Display of defined special use airspaces (SUA) such as MOAs, warning, training areas and "Unknown Restricted Areas" are selected via the ECDU. Special use airspaces are in magenta, restricted and danger areas in translucent-filled magenta at ranged less than 100nm, and controlled airspace boundaries around airports in blue. See the figure below for an example.

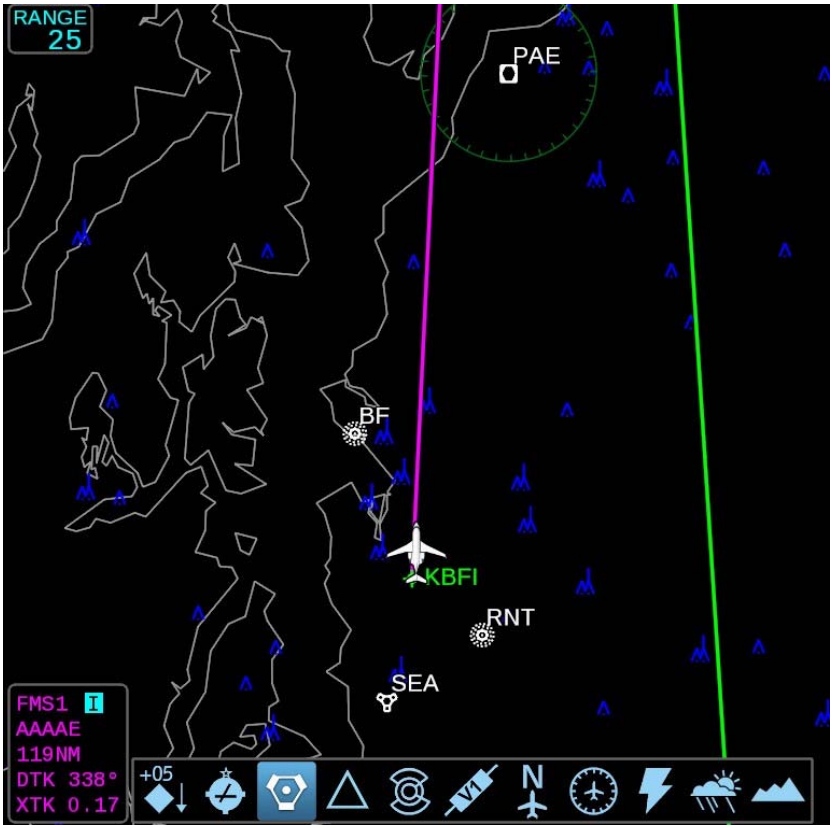


Example of Special Use Airspace around KATL

Display of Obstacles

Display of obstacle data is selected via the ECDU. Obstacles are displayed as blue inverted chevrons on the map when selected for display and distinct obstacle chevron symbols are displayed for short obstacles, tall obstacles, and groups of collocated obstacles. Line obstacles are not displayed on the 2D Map.

Short, Tall, and Collocated Obstacle Types



Obstacles on the Map

Map Cursor Operations

A compatible cursor pointing device connected to the ECDU may be utilized on the MFD Main Map format.

Map Cursor

Scrolling the cursor over map objects such as airways, airspace boundaries, navaids, airports, etc., momentarily changes them to bold lines. Clicking on these items with the "A" button will bring up an information list or a click-able menu for interrogating the object. Clicking in an area with multiple objects will first bring up a menu to allow the pilot to select the desired object. If the cursor has not been moved for thirty seconds, it will be removed from the display and be reactivated when moved again.

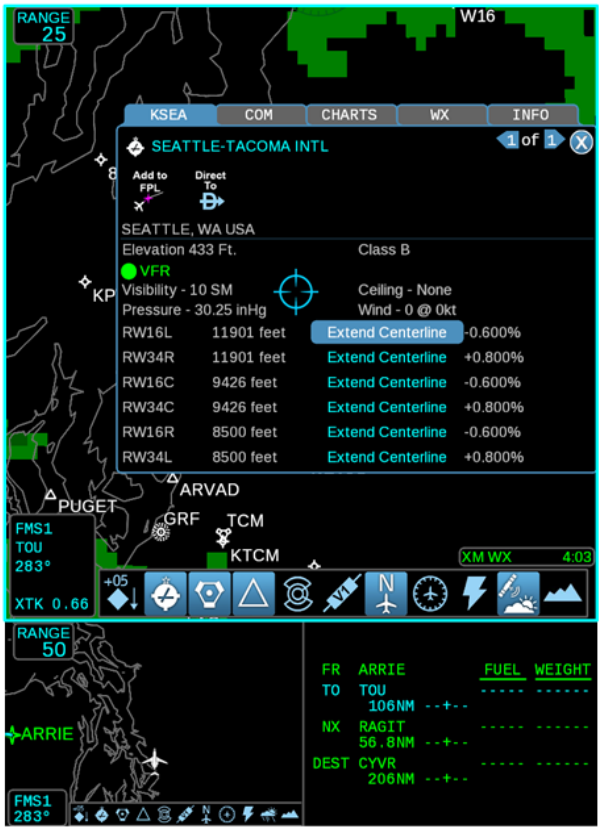
Cursor operations can also be performed on installations solely having a Touch ECDU, with no external cursor control panel. With the Touch ECDU, the user has the option to use either the touch screen or the cursor control panel itself if installed.

The following touch screen gestures are used for touch screen cursor operations:

Touch Screen Gesture	Action
Single Finger Move 	The "Single Finger Move" gesture is used for moving the cursor on the MFD Main Format set to "Map" or MFD insets. The gesture speed will determine the travel distance of the cursor. The faster the gesture, the greater the distance the cursor will travel. Multiple move gestures on the Touch ECDU will not be required to move the cursor from the top to the bottom of the EFI target display.

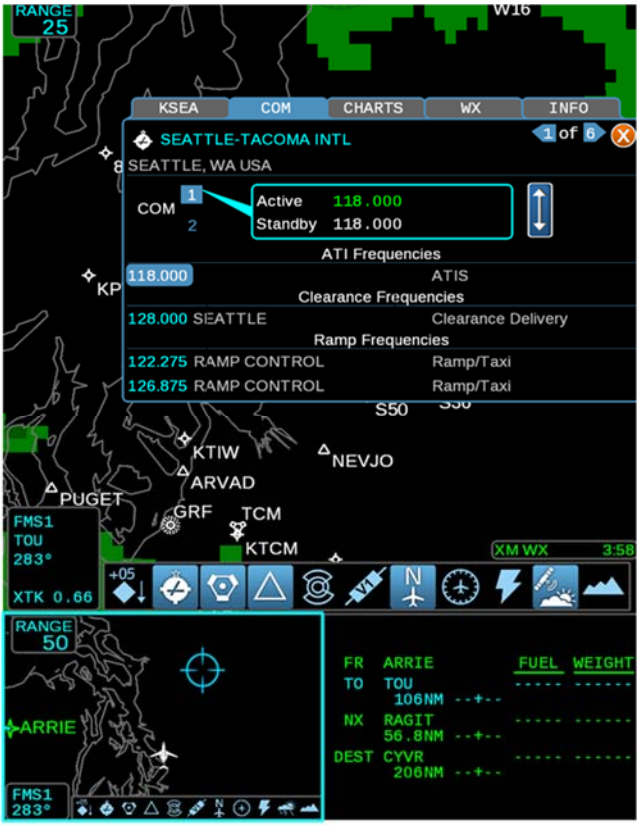
Touch Screen Gesture	Action
Single Finger Single Tap 	The "Single Finger Single Tap" gesture is used to: • Interrogate a point of interest on the MFD Main Format set to "Map". • Select map icons on the MFD Main Format and MFD insets as well. • Toggle through the various inset formats.
Two Finger Move 	The "Two Finger Move" gesture is used to perform panning.

The cursor location on the MFD controls where touch screen operations are performed. If the cursor is positioned in the MFD Main Format window, the borders of the MFD Main Format are highlighted cyan and touch screen operations are confined to this area of the MFD.



Cursor Position in Highlighted MFD Main Format

If the cursor is moved into the MFD Left Inset with the format set to Map, the borders of the MFD Left Inset are highlighted cyan and touch screen operations are confined to the MFD Left Inset.

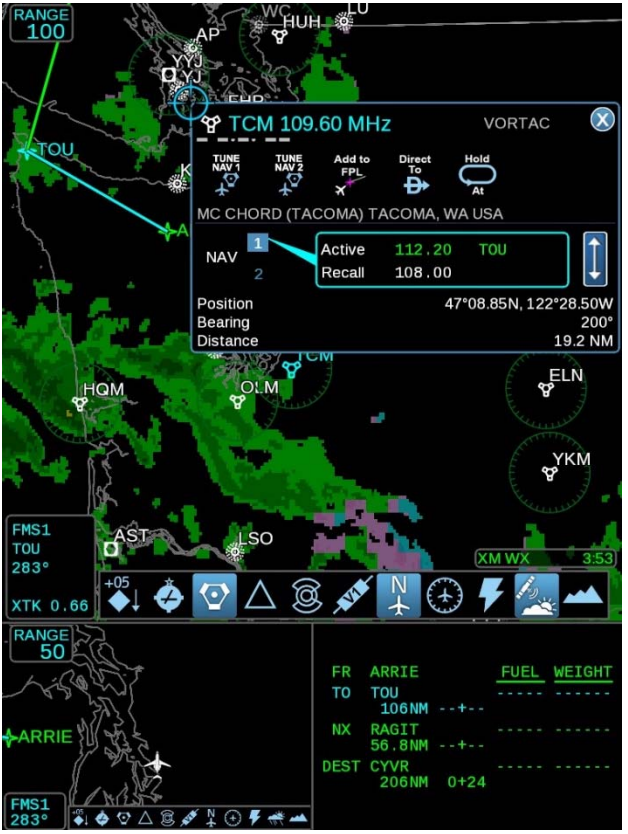


Cursor position in Highlighted MFD Left Inset

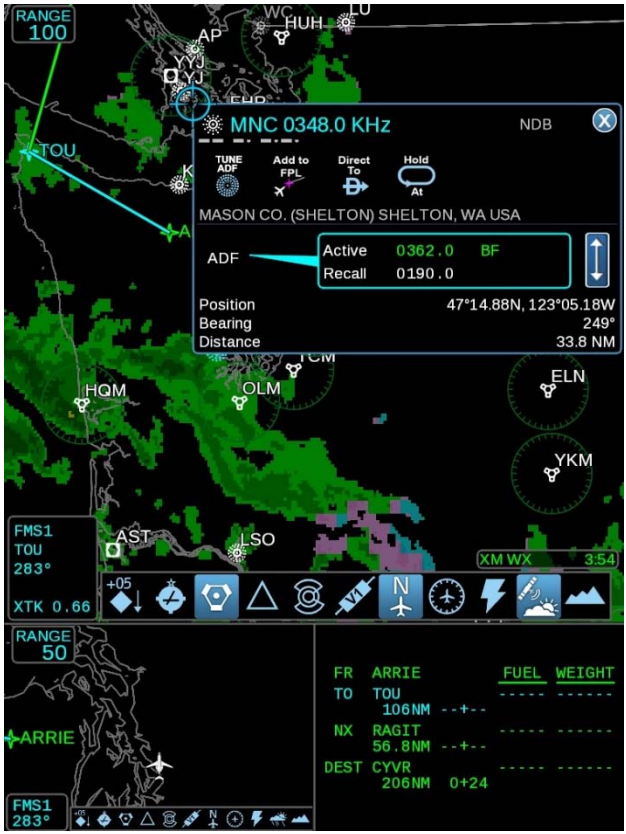
When the cursor is moved into the MFD inset, a point of interest such as airport or navaid cannot be queried like the Main MFD Map. The "Single Finger Single Tap" gesture can be used to toggle or sequence through the inset formats. Map icons at the bottom of the inset such as Display of Airways, Traffic, or North up Map may be selectable using the "Single Finger Single Tap" gesture when the cursor is moved over them. These icons are highlighted with a white box for ease of selection when the cursor is moved over them.

Airspace Query

Interrogating navaids brings up pop-up windows about them. In the case of radio stations, the pilot may select the frequency directly from the map and push it in the standby frequency location for the selected radio of that type on that ECDU radio's tuning page.



VOR Query



NDB Query

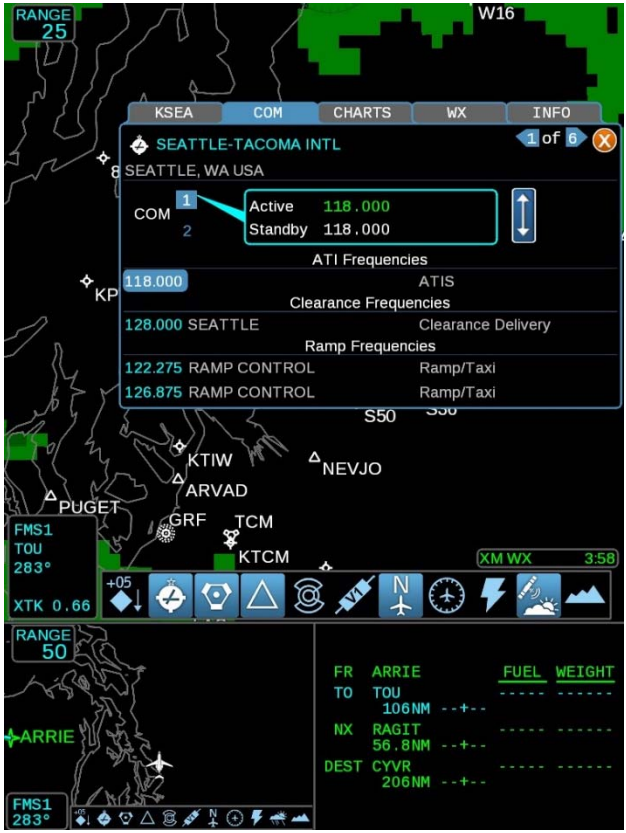
Flight plan operations can also be performed on some navaids and fixes, such as adding them to the flight plan, initiating a direct-to, or deleting them from the flight plan can be performed. If the navaid supports these operations, they will be available on the pop-up menu. This feature is only available when the InSight EFIS is connected to the Universal FMS.

Interrogating an airport will bring up a pop-up menu of all the available information for that airport, including frequencies, charts (including diagrams and terminal procedures), weather, and other airport information on labeled tabs.

Airport Query – Main Tab

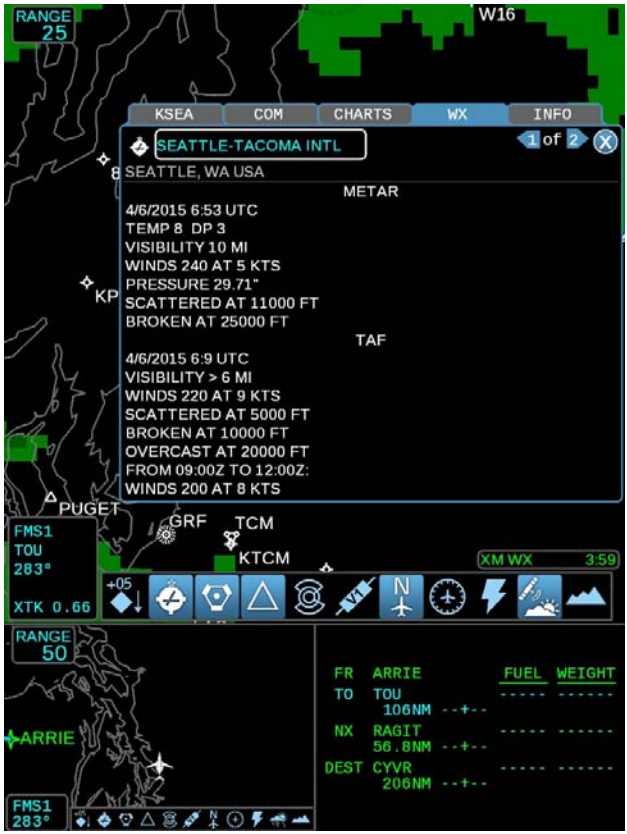
The "Single Finger Move" gesture can be used to scroll the cursor on the Touch ECDU to an airport. Use the "Single Finger Single Tap" gesture to interrogate the airport and bring up a pop-up menu of all available information on that airport.

The "Single Finger Move" gesture can be used to move the cursor to the COM tab and then the "Single Finger Single Tap" gesture to perform frequency management.



Airport Query - COM Tab

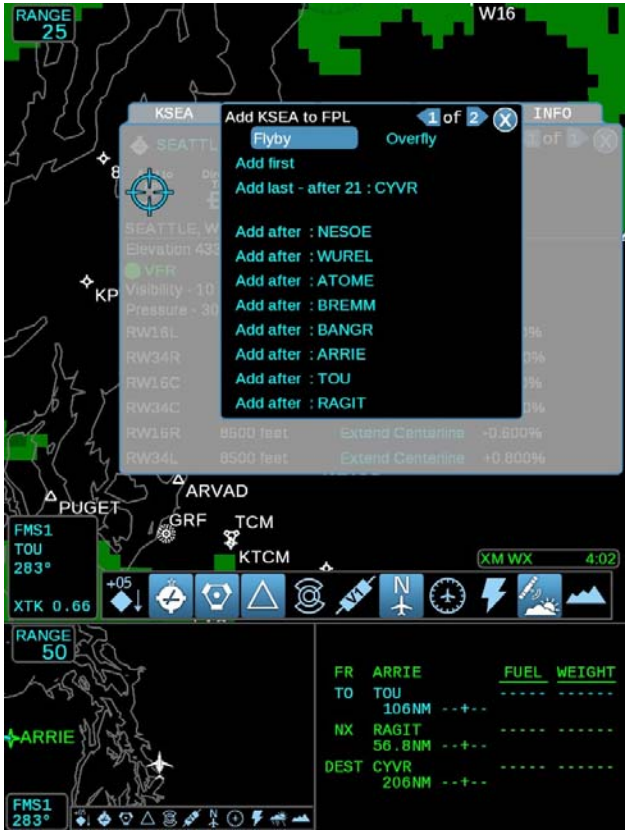
Airport Query - Charts Tab



Airport Query - WX Tab

Airport Query – Info Tab

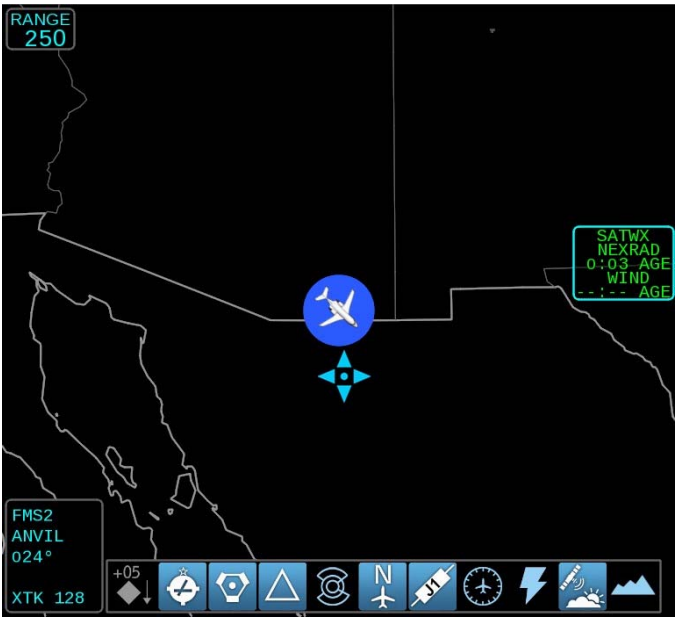
Flight plan operations such as adding an airport to the flight plan, performing a direct-to, and displaying an extended runway centerline can be performed from an airports main tab. This feature is only available when the InSight EFIS is connected to the Universal FMS.



Add an Airport to the FPL

Clicking in a free space area on the map enables a menu for creating radar waypoints with a Universal FMS and performing flight plan operations with them.

The panning mode is enabled by clicking the B button of the cursor control panel anywhere on a map. When panning mode is enabled, the cursor shape is changed and the ownship is placed in a filled blue circle. In panning mode, the cursor remains stationary on the map and the map pans behind the cursor. Clicking the B button will cancel panning mode.



Cursor Panning the Map

For Touch ECDU operations, if the "Two Finger Move" gesture is performed anywhere on the face of the ECDU, panning mode is automatically enabled. To indicate panning mode, the cursor shape is changed and the ownship is placed in a filled blue circle. In panning mode, the cursor remains stationary on the map and applying the "Two Finger Move" gesture moves the map behind the cursor. Panning mode remains active as long as the "Two Finger Move" gesture is applied on the touch screen.

Continuous panning is achieved if the "Two Finger Move" gesture is used prior to parking the two fingers on the edge of the touch screen. If the "B" button is pressed on the CCP to go into panning mode, and subsequently the "Two Finger Move" gesture is performed on the touch

screen, panning will occur but will terminate automatically once the "Two Finger Move" gesture is released from the touch screen.

If the "B" button is pressed on the CCP to go into panning mode and subsequently the "Single Finger Move" gesture is performed, it will be ignored, and no cursor actions will take place.

If the ownship has been panned away from its normal position, the ownship will remain in a blue filled circle. If the ownship is panned off screen, a blue arrow will point toward the current aircraft position.

Off-Screen Ownship

Deselecting Pan Mode and placing the cursor on the ownship symbol when it is away from its normal position and then clicking the A button will return the map to its original location with the ownship in its normal location.

Any time panning mode is active or if the ownship has been panned away from its normal position it will remain in the blue filled circle. If the ownship is panned off screen with the "Two Finger Move" gesture, the filled circle will be parked at the edge of the map nearest to the actual location of the ownship. If the "Two Finger Move" gesture is released, the cursor shape is restored, and panning mode is no longer active.

Functional Limitations for Degraded Map States

When either North Up or Heading Up map is panned using the CCP or ECDU while heading is valid:

- heading adjustment for the map depiction based on the current aircraft heading is temporarily disabled
- compass, heading line, heading bug, and track line are removed because the map is no longer oriented on the aircraft
- Range / Bearing (off the nose) based data will still be displayed relative to the aircraft symbol as long as it is valid
- 708 weather and terrain data (for Heading Up maps), will be decluttered because the map is no longer oriented on the scan origin (aircraft nose)

When heading or FMS/GPS position is invalid in Heading Up map depictions:

- all lat/long referenced map items are removed, including all overlay data except weather radar, 708 terrain, TCAS, and Stormscope
- a yellow HDG or POS flag is placed on the aircraft symbol
- panning will be inhibited as map data is not displayed

When all heading is invalid in North Up map depictions:

- all heading and range / bearing referenced map items are removed, including compass rose, heading line, heading bug, track line, TCAS, and Stormscope
- yellow HDG flag will be placed on the aircraft symbol
- heading referenced map items and Range / Bearing data are restored when a valid heading is restored to North Up map depictions

When FMS/GPS position is invalid in North Up map depictions:

- the map will be in pan mode with a yellow POSITION LOST annunciator
- most overlay data normally available for North Up pan mode will remain except for the aircraft symbol, TCAS, and Stormscope
- when position becomes valid for a North Up map, the map re-centers on the aircraft even if it had been panned using the CCP or ECDU while position was invalid

If true heading is valid but mag heading and/or mag var is invalid:

- the heading flag on the map will be white instead of yellow if the HSI is in showing mag heading
- the map will still be able to show lat/long and range/bearing referenced data because true heading is available
- toggling the HSI to true heading will re-enable the compass rose, heading line, heading bug, and track line the map, and remove the heading flag

Display of Status Bar

The MFD Status Bar will always appear at the bottom of the selected engine depiction on the MFD displaying engine data.

Column 1 displays:

If Display Com 3 Configuration Option is set to NO:

- Engine performance target if supplied by a performance database.
- COM 1 frequency and TX or TST annunciator
- COM 2 frequency and TX or TST annunciator

If Display Com 3 Configuration Option is set to YES:

- COM 1 frequency and TX or TST annunciator
- COM 2 frequency and TX or TST annunciator
- COM 3 frequency and TX or TST annunciator

Column 2 displays:

- Engine performance target if supplied by a performance database.
- TCAS system mode and altitude filtering setting
- ATC code and ID, mode, R, or TST annunciator

Column 3 displays:

- True airspeed in knots
- SAT or TAT (as selected) in °C
- ISA in °C

Column 4 displays:

- Ground speed in knots
- ETA in hours and minutes
- UTC in hours, minutes, and seconds

Column 5 displays:

- Terrain status

The N1 or Fan performance data is displayed as take-off (T/O) in column 1 and climb (CLB) in column 2 if the airspeed is ≤ V2.

If the airspeed is > V2 the N1 or Fan performance data is displayed as climb (CLB) in column 1 and cruise (CRZ) in column 2.

VR is used as the threshold if V2 is not configured or supplied

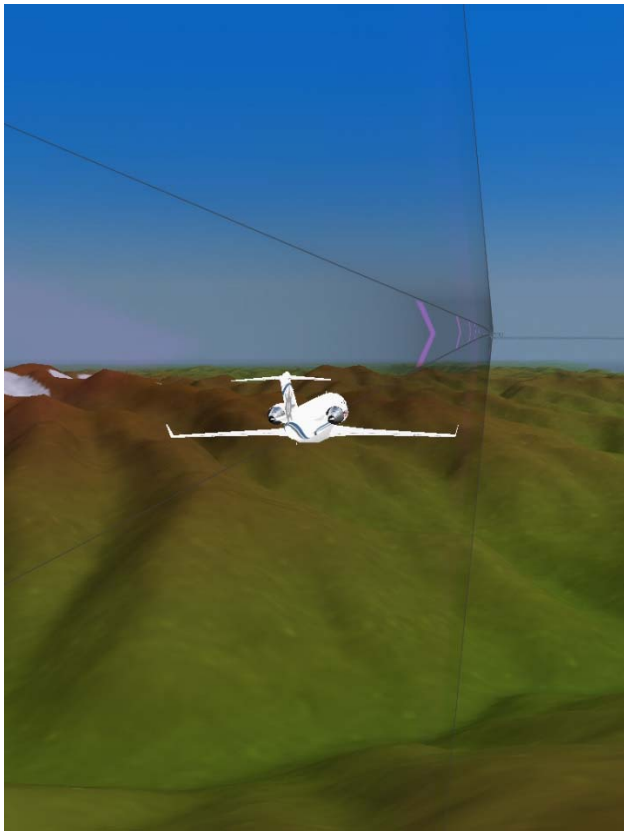
MFD Status Bar

The status bar always appears at the bottom of the selected engine depiction on the MFD displaying engine data.

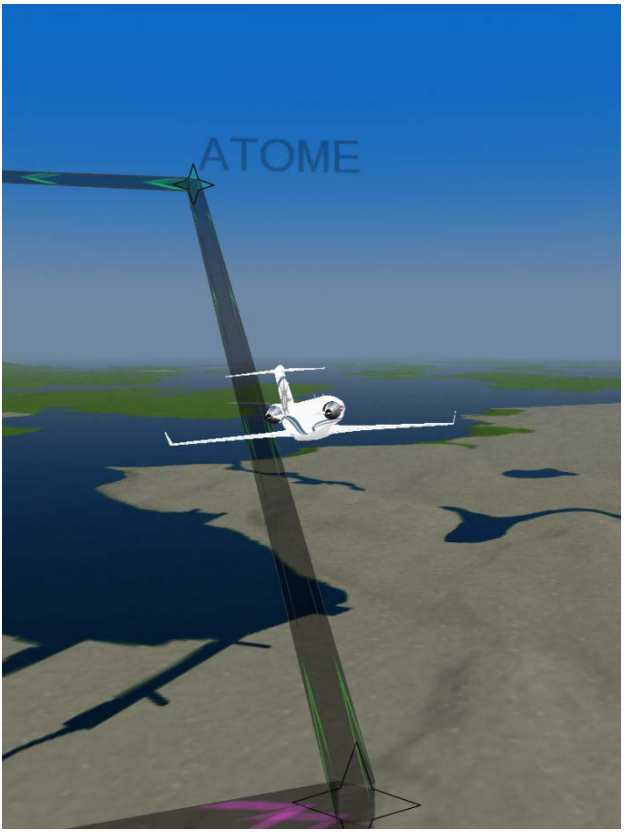
If a singly installed MFD is not displaying engine data, the status bar is displayed full time at the top of the MFD

Display of 3D Map View

The MFD may be used to display a synthetic vision 3D Map for increased situational awareness. The aircraft is displayed from an oblique angle external to the aircraft. The displayed terrain and sky shown are a real time presentation of the actual terrain and sky outside the aircraft. Flight plan, airport labels, and special use airspaces may be selected for display within the image. The ECDU supports three predefined "camera view" perspectives: above left, above right, and directly behind; with the third also being steerable in lateral and vertical rotation around the aircraft using the ECDU dual concentric knob. If the aircraft is on the ground, a fourth view is available, Taxi View, which shows a top-down view for ground operations. 3D Map is selectable for main and inset format sizes.

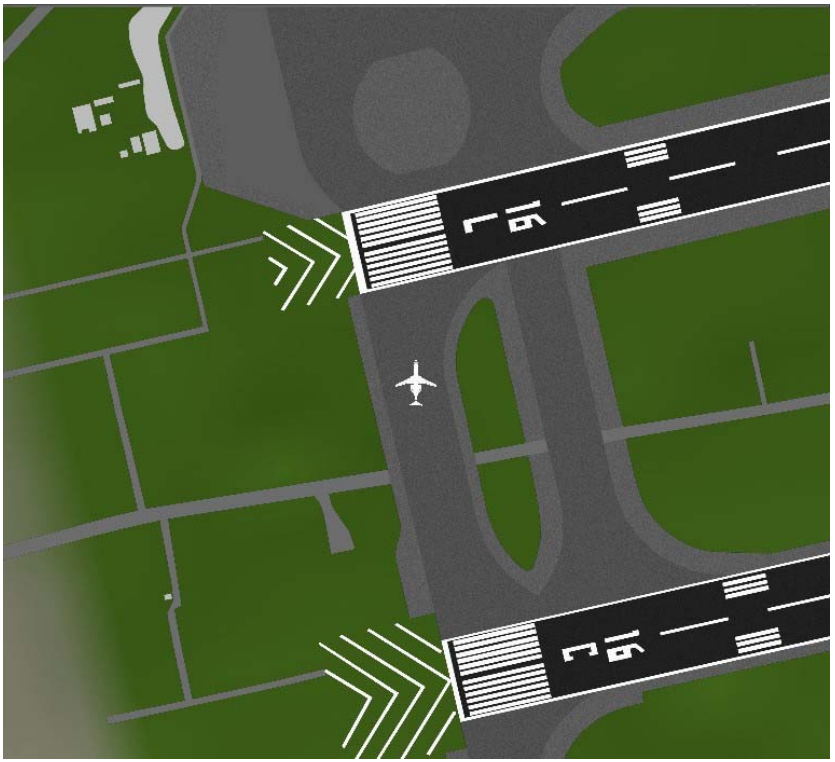


3D MAP Depiction with Flight Plan (On the Flight Plan)



3D MAP Depiction with Flight Plan (Off the Flight Plan)

3D MAP Depiction with View Steered to the Front

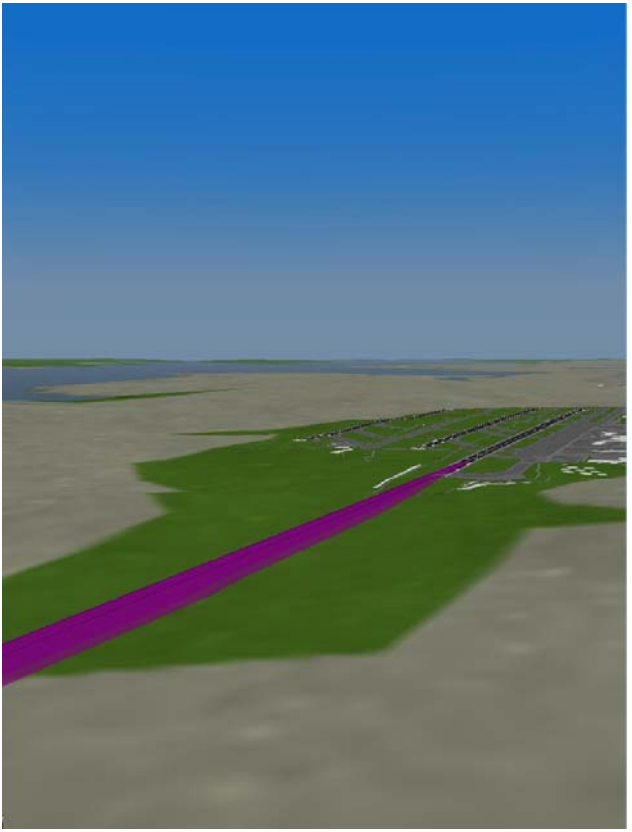


Taxi View

3D MAP Depiction with TAWS Colors

Extended Runway Centerline

An extended runway centerline that is selected for an airport on the MFD's main Map is also displayed on the 3D Map for that airport.



Extended Runway Centerline

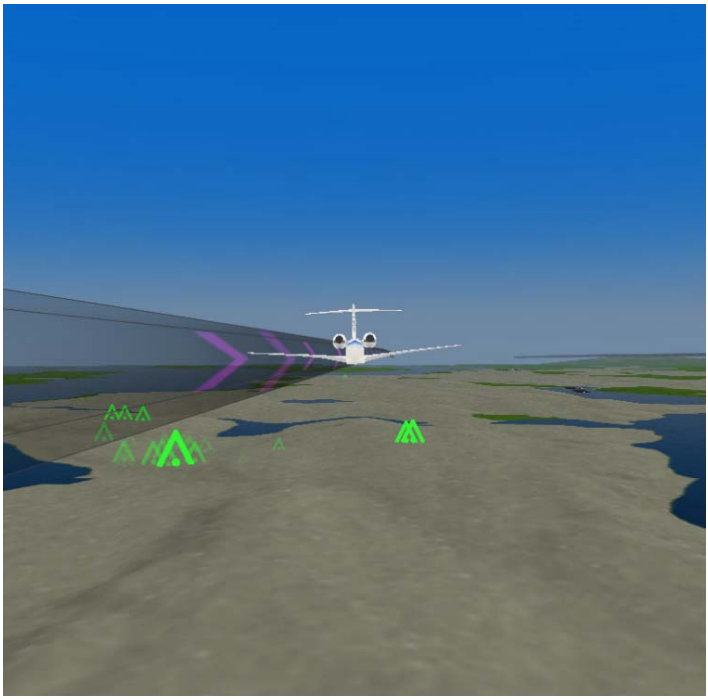
The extended runway centerline is drawn from the runway threshold to the extended distance in magenta. Its height at the runway threshold is the same as the runway, and then slopes up to 200 feet above the runway threshold elevation by the midpoint. From the midpoint to the end of the extended centerline the height is fixed at 200 feet above the runway threshold elevation. As the aircraft's altitude approaches the threshold elevation, the extended centerline will reduce its height to remain 100 feet below the current aircraft altitude.

Display of Obstacles

Obstacles are displayed as an inverted chevron at the height and location contained in the obstacle database if they are greater than 200 feet in height. Obstacles less than 200 feet in height are not shown.

An obstacle is displayed in red if its height is greater than 50 feet above the current aircraft altitude or in yellow if the obstacle's height is between the aircraft's current altitude and the required obstacle clearance (ROC) value received from TAWS, up to the red color threshold. Otherwise, obstacles are displayed in green.

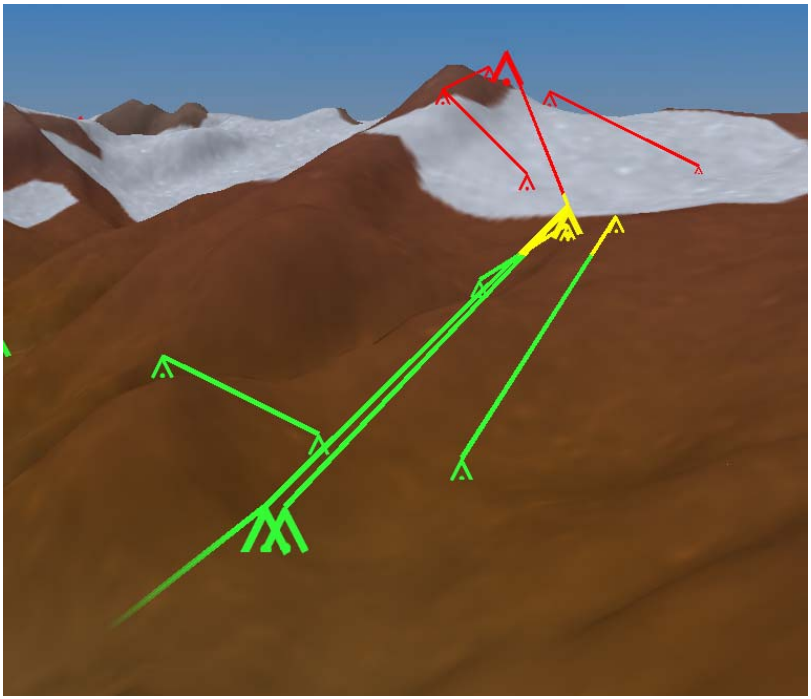
A green obstacle will linearly fade to transparency if the aircraft's current altitude is between 2000 to 2500 feet above the its height, with 2000 feet being opaque and 2500 feet being at the threshold of transparency. An obstacle is completely decluttered if the difference between the aircraft's current altitude and the obstacle's height is more than 2500 feet.



Obstacles on the 3D Map

Line obstacles such as transmission lines, ski lifts, etc. are displayed as line segments connecting chevron obstacle symbols. Each line segment is colored and fades to transparency in accordance with the same rules that apply to the chevron obstacle symbols; however, if a segment crosses a color or fade boundary along its length, the segment will be colored or fade correctly on both sides of that boundary.

NOTE: The line obstacles feature is only available in areas where the database supports display of these obstacles. Currently, this feature is not supported in the domestic US.



Line Obstacles on the 3D Map

Display of Video Data

External video can be displayed as a main or inset format on the MFD. Selection of video source and control of contrast and brightness is done via the ECDU. Refer to the operator's manual for the specific video data source.

The MFD annunciates "Video Source Not Detected" in white, if the selected video source is invalid. This annunciation remains on the display until a valid video source or different display format is selected.

Display of Charts

Charts is an optional database within the InSight system and requires a subscription to be enabled. If the Charts database is not currently a subscribed database, limitations apply to the following items:

- The Charts status will show Not Subscribed on MFD Startup format.
- The Charts status will show Not Subscribed on MFD EFIS Status format.
- The Charts LSK will be greyed out on ECDU1 and ECDU2 HOME pages.
- The Departure Data LSK will be greyed out on ECDU1 and ECDU2 HOME pages.
- The Charts tab will be missing from airport pop-up menus on both MFDs.
- The database control pages on both ECDUs will show eCharts greyed out and the cycle number as Not Subscribed.

Additionally, the following conditional messages may be shown in white text in place of a chart if there is a reason the Chart cannot be displayed when Charts is the selected display format:

Message	Condition
Initializing Data Server	If the EFIS data server is initializing
No Charts Available at Selected Airport	If the Charts database contains no entries for the nearest airport
Plate Loading	If the requested chart was not previously displayed (cached)
Insert SD Card	If the database status is reported to the EFI as the SD card not inserted
eCharts Version Unavailable	If the requested database cycle is unavailable
Charts Expired	If the requested database cycle is expired
NavRef Version Unavailable	If the status reported to the EFI is that the currently selected NavRef database version is not available on the SD card
Invalid SD Card	If the key file on the SD card is invalid
Plate Not Found	If the requested chart was not available after > 30 seconds or the database status is determined to be corrupted for the requested chart after > 30 seconds.

The MFD can also display terminal procedure (TERPS) as airport diagrams, plates, and published procedures as an MFD main format, collectively labeled Charts. The ECDU and optional cursor control panel can be used to rotate, page, and pan a displayed diagram, plate, or procedure.

In the event of an MFD failure which includes the display of engine instrumentation, the engine instrumentation is a higher priority and will transfer to the remaining operational MFD. Electronic charts is not an automatic function at this point and will require the flight crew to manually select the electronic chart functionality which will then be displayed below the engine data.

NOTE: Display of electronic charts on the InSight MFDs are intended as informational data only and are not approved for navigational purposes.

NOTE: All electronic chart errors detected by the flight crew must be recorded and reported directly to the database supplier, Jeppesen Sanderson, in accordance with Jeppesen Sanderson's reporting procedures.

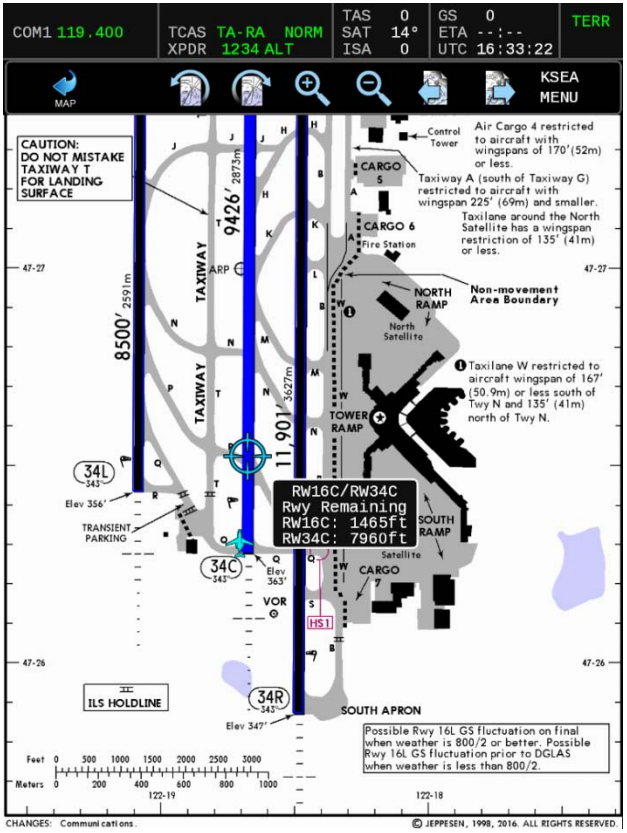
When the MFD is configured to display "Charts", the following touch screen operations may be performed:

Touch Screen Gesture	Action
Pinch 	The "Pinch" gesture is used to decrease the zoom.
Spread 	The "Spread" gesture is used to increase the zoom.

Touch Screen Gesture	Action
Single Finger Move 	The "Single Finger Move" gesture is used to move the cursor on the MFD Main Format "Charts" page.
Single Finger Single Tap 	The "Single Finger Single Tap" gesture is used to select icons that zoom, rotate, and page through available charts.
Two Finger Move 	The "Two Finger Move" gesture is used to pan the chart behind the cursor.

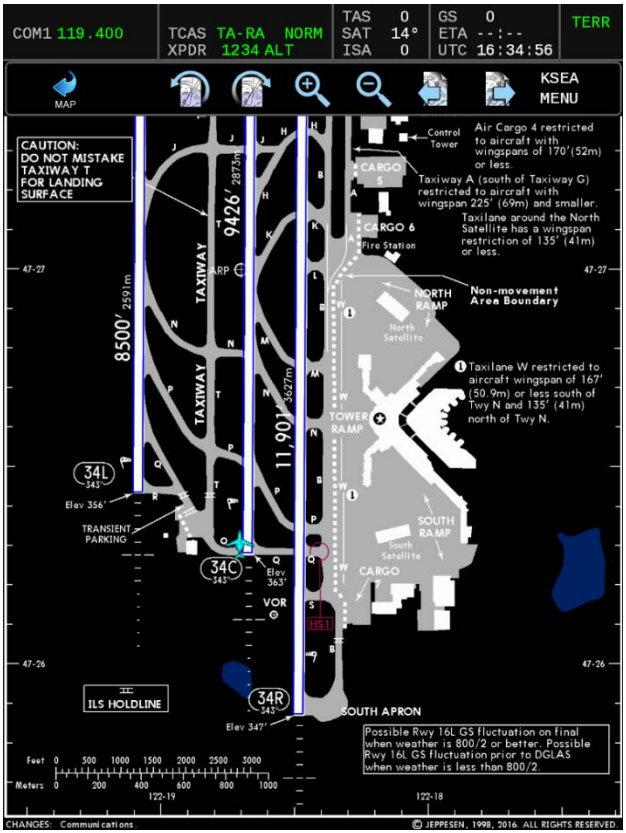
Georeferenced Airport Diagrams

Georeferenced airport diagrams, which are encoded with the appropriate latitude and longitude information, can show the ownship position on the plate if the aircraft position is within the georeferenced plate boundaries. A pulsing circle around the aircraft symbol may be toggled on and off via the ECDU. All georeferenced airport diagrams may also be queried for runway distances from the cursor position to both ends if the cursor is used to highlight a runway and is clicked.



Airport Diagram with Ownship Symbol and Remaining Runway Distance

A Night display mode is supported for the display of plates. Night mode will be selectable through configuration or if the display brightness of the EFI is set ≤ 70.



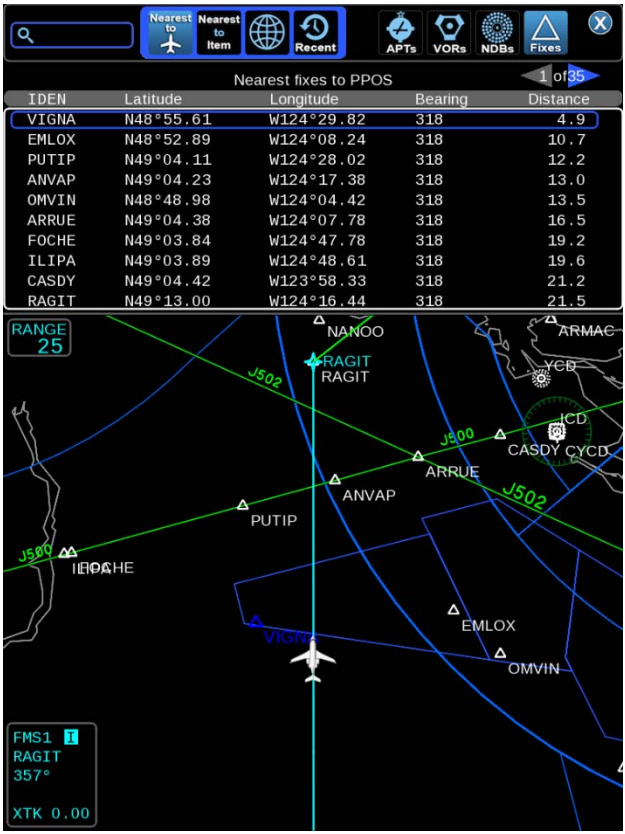
Night Mode Plate

Waypoint Search

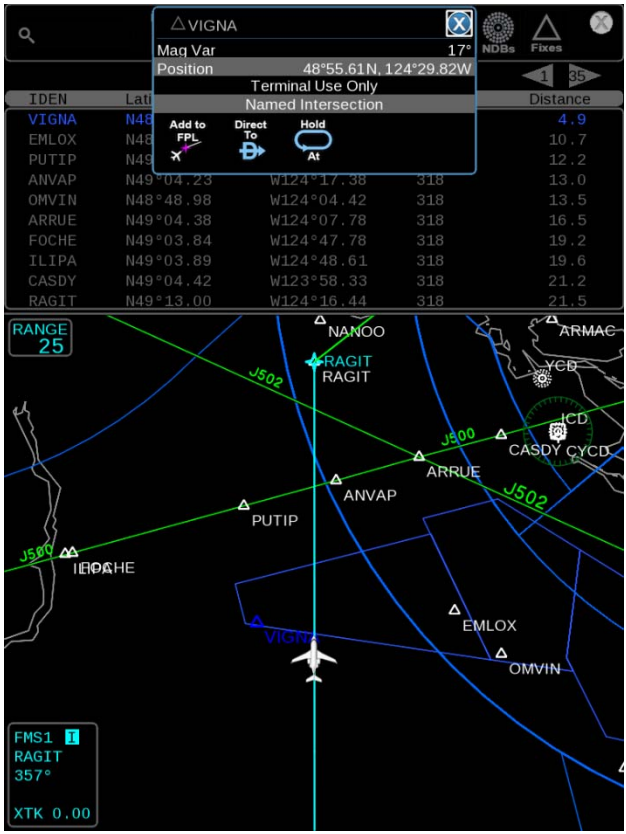
The waypoint search function, in conjunction with a Map main format, may be displayed as a main format on the MFD. Two banks of clickable icons are displayed on the top of the window. The left bank is used for the search type and consists of icons for Nearest to Aircraft, Nearest to Item, Browse, and Recent. The right bank is used for the search filters (item type) and consists of icons for Airports, VORs, NDBs, and Fixes. These same options are also available as LSK options on the ECDU.

Combinations of the search type and item type provide the search criteria for alphanumeric entries on the ANK or selected map items. A list of items within a search window is provided; scrolling through the list will center the map on each item. Clicking on them or pressing the SEL key while a list item is highlighted brings up an information pop-up about the item. Operations may be performed on the search item as available in the pop-up.

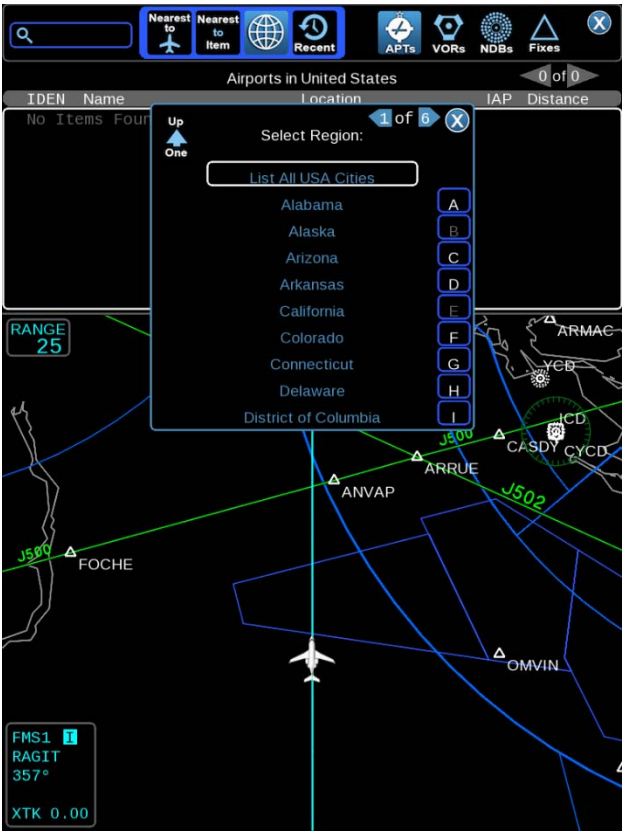
Waypoint Search – Airports Nearest to Aircraft



Waypoint Search – Fixes Nearest to Aircraft



Fix Pop-up Menu



Waypoint Search – Browse by Region (States)

Waypoint Search – Browse by Region (US Cities)

Waypoint Search – Recent

Display of AFCS

The MFD may display automatic flight control system (AFCS) messages from a configured flight control system that provided them in the right inset window if selected from the System Status page on the ECDU. The messages are ASCII text sent by the AFCS.

AFCS Inset

Aircraft Models

The aircraft symbol is displayed on the HIS, Map (2D), 3D Map, and Charts. As part of the installation kit, InSight allows field loadable aircraft models. The aircraft model is selected at installation and cannot be changed by the flight crew. Flight crews will see one of the models listed.

Current models include:

- Twin engine Turboprop – low wing
- Twin engine Turboprop – high wing
- Twin engine business jet
- Three engine business jet
- RC-135
- C-130

Twin engine Turboprop – Low Wing

HSI Model

2D Map Model

Charts Model

3D Map Model

Twin Engine Turboprop – High Wing

HSI Model

2D Map Model

Charts Model

3D Map Model

Twin Engine Business Jet

HSI Model

2D Map Model

Charts Model

3D Map Model

Three Engine Business Jet

HSI Model

2D Map Model

Charts Model

3D Map Model

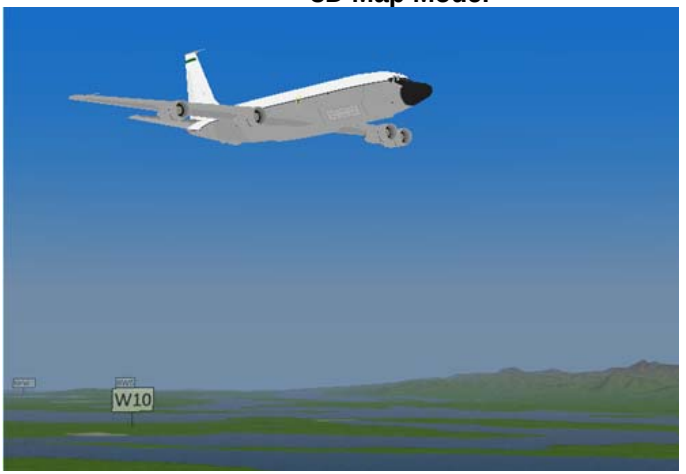
RC-135

HSI Model

2D Map Model

Charts Model

3D Map Model



C-130

HSI Model

2D Map Model

Charts Model

3D Map Model

REVERSIONARY OPERATIONS

Display Reversion

The MFD may be placed in reversionary display mode by pressing the DISP revert key on the ECDU. Triggering revert mode causes a yellow banner to displayed indicating that the PFD will be disabled in 5 seconds and a countdown timer is shown.

If an MFD is placed in reversionary display mode, it effectively becomes the PFD for the ECDU that triggered the reversionary mode, assuming all PFD display function (formats, annunciators, inputs, and outputs) as long as it is in reversionary mode. The means of control and the available formats will be the same as for the PFD. MFD functions and formats will still be available if selected via MFD controls. No formats are restricted on a reverted display and cross-side control is still possible if a cross-side ECDU or configured external control panels are present and functional.

Cancelling reversionary display mode may be accomplished by pressing the "CANCEL REVERT" LSK or the DISP revert key on the ECDU before the 5 second countdown timer expires.

Pressing the DISP revert key when the PFD is off and the MFD is reverted will return the reverted MFD to normal operation as a MFD.

Attitude/Heading Reversion

The Attitude/Heading reversion function may be controlled by an external switch in the cockpit or the AT/HD key on the ECDU. If controlled by the ECDU, successive presses of the AT/HD revert key will sequence through the available AT/HD sources in the installation. For example, the key would sequence between AHRS1 and AHRS2 or IRS1 and IRS2 or DG/VG1 and DGVG2; multiple sources can be supported, and the order of source sequence is configurable.

For EFI-1040P Advanced Flight Display Systems installed with SCN 1026.0.5 Only, if the EFIS configuration contains only a single attitude / heading source for a cockpit side, "FUNCTION NOT AVAILABLE" is displayed on the PFD and "Function Not Available" is displayed on the ECDU when the AT/HD revert key is pressed.

Function Not Available Banner (For SCN 1026.0.5 Only)

The FUNCTION NOT AVAILABLE banner is annunciated centered on the ADI below the SKY POINTER when a PFD FUNCTION NOT AVAILABLE banner is required. It is displayed in white text on a black background within a white box and removed from the display after two seconds.

The FUNCTION NOT AVAILABLE banner is annunciated on the PFD if the EFIS configuration contains only a single attitude / heading source for a cockpit side and when the AT/HD revert key is pressed.

FUNCTION NOT AVAILABLE Banner on a PFD

ADC Reversion

The ADC reversion function may be controlled by an external switch in the cockpit or the ADC revert key on the ECDU. If controlled by the ECDU, like the AT/HDG key, successive presses of the air data revert key will sequence through the available ADC sources in the installation. Multiple sources can be supported, and the order of source sequence is configurable.

Control Reversion

In the event of an ECDU display failure, the cross-side ECDU can be used to control any display.

DISPLAY FORMATS

PFD Fixed Format

The PFD fixed format space is a fixed 768 x 768 formats in which the display elements will or may be displayed.

PFD Selectable Space

The PFD selectable space will be dynamically allocated among possible formats depending on what display elements are selected. These formats in pixel dimensions are as follows:

- 768 x 256 pixel ¼ screen.
- 384 x 256 pixel ⅛ screen.

Display elements available for the 768 x 256 inset space include:

- Compressed engines display

Display elements available for the 384 x 256 inset spaces include:

- Small Multi-layer Map (includes all map and map overlay items, but limits satellite weather to only the coverage area, NEXRAD and lightning products and doesn't support Waypoint Search)
- 3D Map
- RGBS or NTSC/RS-170 Video
- Flight Plan Status
- Full time Annunciators and Status (fixed in left inset)
- AFCS (right inset only)

MFD

The MFD supports the following seven window sizes:

- Full screen.
- ¾ screen.
- ⅝ screen.
- ½ screen.
- ⅜ screen.
- ¼ screen.
- ⅛ screen.

Depending upon the selected display elements, the MFD is dynamically allocated on the following seven possible display layouts:

- One full screen main window.
- One ¼ screen engine inset window above one ¾ screen main window.
- One ½ screen engine inset window above one ½ screen main window.
- One ¾ screen window above two ⅛ screen windows arranged side by side.
- One ⅜ screen waypoint search window above one ⅝ screen map window
- One ⅜ screen waypoint search window above one ⅜ screen map window above two ⅛ screen windows arranged side by side
- One ¼ screen engine inset window above one ⅜ screen waypoint search window above one ⅜ screen map window

Display elements available for the full screen main window include:

- Full graphical engines display and textual engine source data (if the number of engines requires this much space for display)
- Multi-layer Map (includes available flight plans, controlled airspace, navaids, airports, airways, TCAS, weather, lightning, terrain)
- Airport diagrams and plates
- 3D Map
- UniLink Images
- System configuration listing (on-ground only)
- System status displays
- Inputs pages displays
- Invalid configuration displays

Display elements available for the ¾ screen main window include:

- Multi-layer Map (includes available flight plans, controlled airspace, navaids, airports, airways, TCAS, weather, lightning, terrain)
- Airport diagrams and plates
- UniLink Images

- RGBS or NTSC/RS-170 Video
- 3D Map

Display elements available for the ½ screen main window include:

- Multi-layer Map (includes available flight plans, controlled airspace, navaids, airports, airways, TCAS, weather, lightning, terrains)
- Airport diagrams and plates
- UniLink images
- RGBS or NTSC/RS-170 Video
- 3D Map
- Waypoint search

Display elements available for ⅝ screen window include:

- Multi-layer Map (includes available flight plans, controlled airspace, navaids, airports, airways, TCAS, weather, lightning, terrain)

Display elements available for the ½ screen engines inset window include on the

- Full engines display

Display elements available for ⅜ screen window include:

- Multi-layer Map (includes available flight plans, controlled airspace, navaids, airports, airways, TCAS, weather, lightning, terrain)
- Waypoint Search

Display elements available for the ¼ screen engines inset window include:

- Compressed engines display

Display elements available for the ⅛ screen inset windows include:

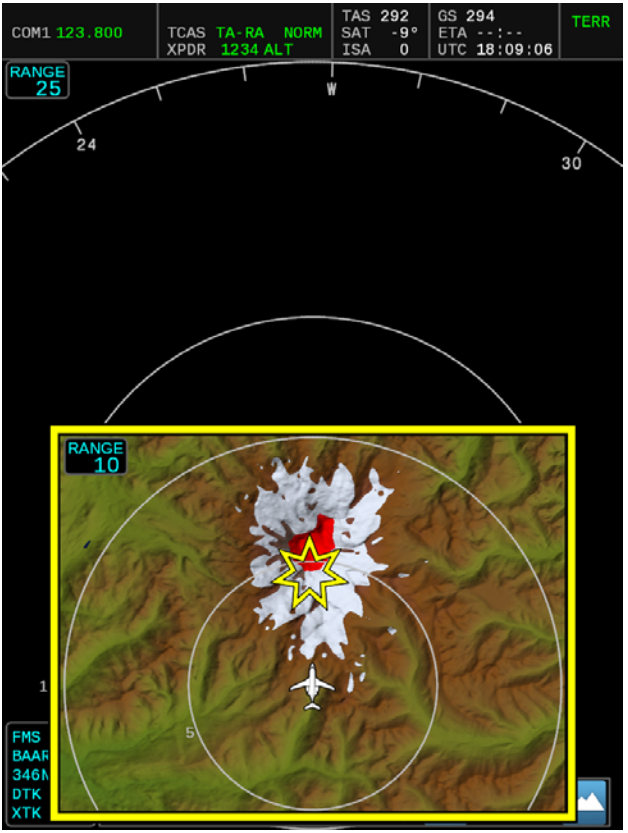
- Small Multi-layer Map (includes a single flight plan, controlled airspace, heading line, TCAS, weather, lightning, terrain)
- 3D Map
- RGBS or NTSC/RS-170 Video
- Flight Plan Status
- AFCS (right inset only)

Traffic and Terrain Pop-Up Formats

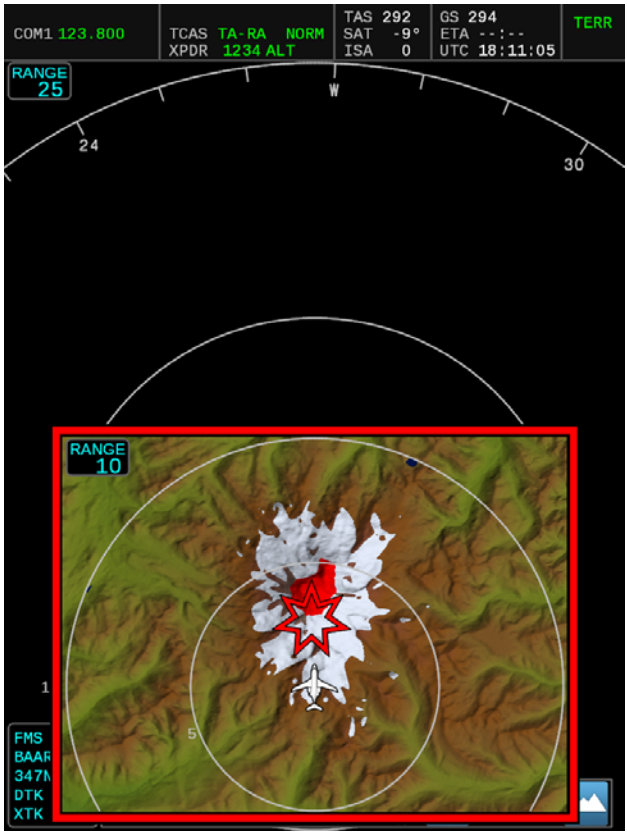
Any MFD format may be overlaid by a single 640 x 480 inset window. This inset window is used for terrain and traffic pop-up alerts and is displayed over any other MFD format.

Terrain is disabled on any map overlaid by a terrain pop-up inset while the pop-up inset it active. Range controls are restricted on the MFD while the pop-up window is active.

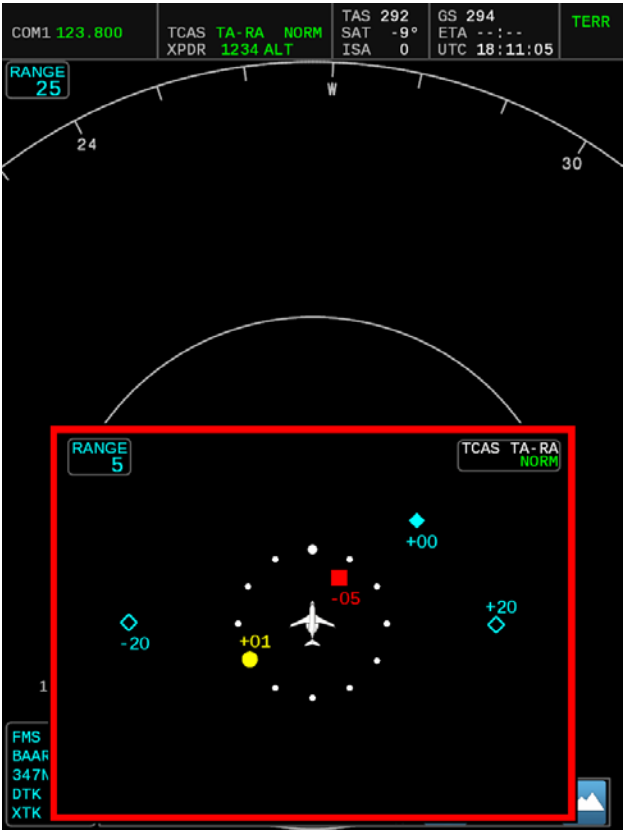
The border of the pop up inset window will match the alert criticality. If the alert is a caution, the border will be yellow. If the alert is a warning, the border will be red.



Terrain Caution Example



Terrain Warning Example



Traffic Warning Example

If the pop up inset window is present, pressing ALRT CNCL acknowledges the alert and declutters the inset window. If simultaneous terrain and traffic pop-ups occur, the terrain pop-up takes priority. Pressing ALRT CNCL will declutter them one at a time and if the alert condition is still present or re-triggers, the window will reactivate.

The MFD supports configuration options for enabling / disabling pop-ups for terrain and traffic individually.

Display of Engines

Engine data must be displayed somewhere on the EFIS at all times if the EFIS is the only means of displaying it. The startup default is for full graphical engine data to be displayed on the pilot's MFD (or the single MFD) in the largest format supported for installed engine configuration.

The ECDU provides a means on the ENG page to switch which MFD displays the engine data and whether it is displayed in full or compressed format.

Engines cannot be forced off an MFD by other format selections in a two MFD installation; they must be manually switched from the ENG page on the ECDU. Compressed engines may also be manually selected for display on the bottom of either or both PFDs by using dedicated toggles on the ENG page on the ECDU.

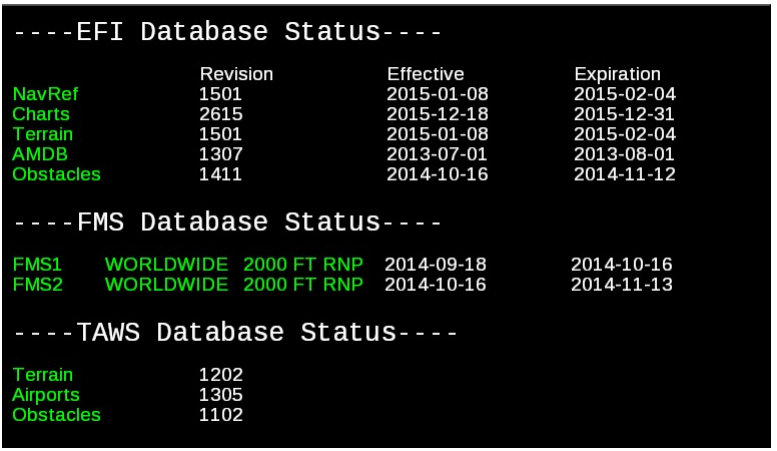
In a three display (PFD – MFD – PFD) installation or condition due to an MFD failure, the ENG page will allow manually deselecting engines from the MFD.

If a chart is selected on the same MFD on which engines are displayed, the compressed engine format will be selected if it was not already. Removing the plate will re-enable the full engines depiction if it was previously displayed.

Startup Database Status Display

Upon initial startup on the ground, the MFD defaults to a Database Status Display. This status display provides the database names, revision numbers, and important operational dates used by the Insight system. Databases that are up to date are shown in green.

NOTE: The Database Status Page also shows FMS databases which will only be displayed after a complete FMS initialization is performed.



Database Status Display

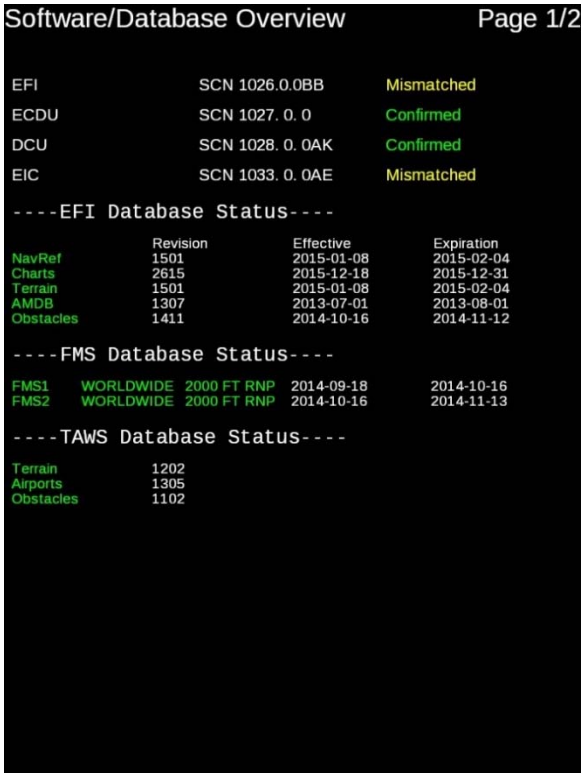
Configuration Pages

EFIS configuration pages may be selected for display via the ECDU. The selected configuration page is displayed full screen on the MFD that is onside to that ECDU or MFD1 in single ECDU installations. Configuration pages are selectable and viewable while in the air.

Display of System Status

System Status pages consist of two pages that may be selected for display via the ECDU. The selected status pages are displayed full screen on the MFD that is onside to that ECDU or MFD1 in a single ECDU installation.

Status page 1 displays an overview of field loadable software and database components that should be installed per the released software number. Mismatches or expired cycles are displayed in yellow text on this page.



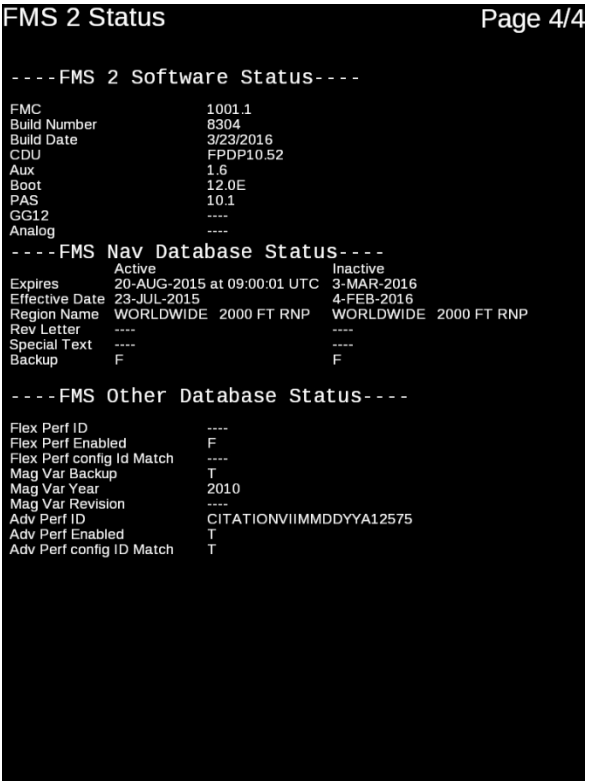
System Status Page 1 - Software/Database Overview

Status pages 2 displays the status of XM Weather products including subscription type, signal strength, product ages, and legends for NEXRAD and graphical METAR data.

System Status Page 2 – XM Radio Status

Status pages 3 and 4 display the software and database information for FMS and FMS2 if they are configured.

EFIS Status Page 3 – FMS1 Status



EFIS Status Pg 4 – FMS2 Status

Display Fail Annunciations

If the EFI detects that it is no longer able to display valid data, but still able to keep the display light on and control the display format, a large red X will be displayed across the entire surface of the display. If the EFI detects that it is no longer able to display anything because of a critical failure, it will turn off the display lamp.

If a configuration mismatch is detected between the displays and all of the configurations are valid, "Invalid Config" is annunciated.

USER INTERFACE

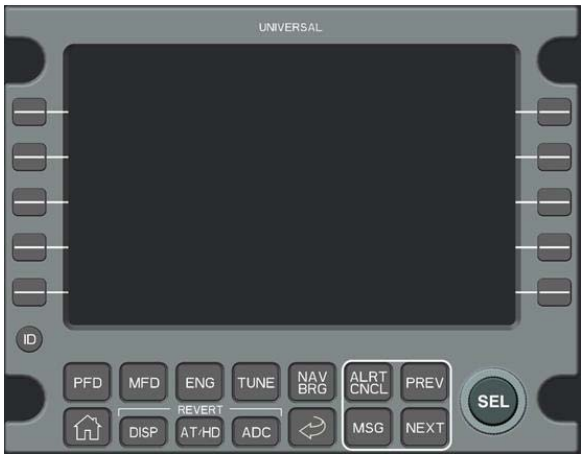
Primary Interface

The EFIS Control / Display Unit (ECDU) is the primary control device for the EFIS. The ECDU consists of a control panel with dedicated function keys and a dual concentric rotary knob with a center push action SEL function. Above the controls is a five-inch (diagonal) display with five line select soft-keys (LSK) on each side for displayed functions.

The EFI display is also designed to be compatible with the touch screen capable Model 5101 ECDU. Controls such as ECDU knob rotation, can be achieved with the Touch ECDU through various touch screen gestures. The model 5101 ECDU can also drive cursor control related symbology on the EFI through dedicated touch screen gestures as well.

The ECDU may be combined with an optional connected alphanumeric keyboard (ANK). The ECDU controls both the EFIS and on-side FMS.

The ANK provides FMS specific controls, but the alphanumeric keys can also be used for EFIS data entry.



ECDU

ANK

Basic Control Philosophy

During normal operation, the ECDU can be in one of the two following states:

- Idle - in which no control is currently active.
- Entry - in which a control is actually selected, or a default control is active.

Pressing a dedicated function key (PFD, TUNE, DTO, etc.) will change the ECDU to that function's page or enable that function (as appropriate to the key) regardless of current control state. The only two exceptions are if the function is not enabled in the installation in which case the ECDU will display a banner stating FUNCTION NOT AVAILABLE or similar message, and the FMS keys on the ANK may be context specific, FMS Menu and List are two examples. Alpha and numeric keys only function in Entry mode.

ECDU Idle State

Pressing an LSK, turning the knob, pressing a dedicated function or ANK key, or pushing a control value from the EFI will change the ECDU from its Idle state.

Pressing an LSK from the Idle state:

- Enables the Entry state for numerical controls (HDG, ASEL, frequency tuning, etc.). The LSK label is highlighted in cyan (magenta for flight guidance coupled items) and a larger format for value of the parameter (large text HDG value for example) is displayed. There is no timeout for the Entry state, the control will stay active until the SEL, ENTER, or the LSK key is pressed.
- Toggles the control value for toggle controls. This selects the next item in the toggle list in sequence or enables a pop-up list for selection. There is no highlight or timeout, and the toggle control is always live and will repeat its function as many times as the LSK is pressed.

ECDU Entry State

If the Entry state has been enabled, including automatic entry states that are enabled by selecting a particular ECDU page:

- Turning the outer knob will set the value (if appropriate to the selected control) or change the active entry field.
- Turning the inner knob will set values and move the active selection of list controls.
- Pressing SEL or ENTER exits the Entry state and returns to the Idle state.
- Pressing the LSK for the currently active function will exit Entry and return to the Idle state.
- Pressing any other labeled LSK will behave as if the LSK was pressed from the Idle state.
- Pressing alpha or numeric keys will enter data for controls that accept keyboard entry.

LSK Arrows and Icons

On all ECDU pages, the arrows and icons next to the LSKs will animate or change when the LSKs next to them are pressed. There are three types of LSK arrows:

- Outward pointing arrows (with respect to the LSK label) used to go to a new ECDU page.
- Inward pointing arrows that enable a settable parameter on the current ECDU page.
- Toggle arrows that toggle between/among the options listed next to the key.

Icons with LSKs next to them represent a symbol for the function and in many cases are replicated on the EFI as a clickable item. Highlighted icons represent functions that are activated or selected. Colored icons represent functions that are available, but not currently active or selected. Grey icons represent functions that are unavailable. Failed functions are represented by Icons with a grey X.

LSK Icons

LSK Labels

Currently selected LSK labels will be displayed in a large green text, available options in white text, and options that are not selectable in grey text.

Setting Values with the ECDU Knob

The ECDU has a dual concentric knob with a center SEL key. Turning the knob in a clockwise motion will affect a controlled item in the following manner, depending on the type of item controlled:

- moving it to the right
- moving it up
- moving it clockwise
- increasing its value

Turning the knob in a counterclockwise motion will affect a controlled item in the following manner, depending on the type of item controlled:

- moving it to the left
- moving it down
- moving it counterclockwise
- decreasing its value

Setting Values with a Connected ANK

A connected ANK may be used to enter numeric and alpha characters for values on the ECDU. If the numeric keyboard is used to set an out of range value for a selected parameter, the value will flash for approximately three seconds, return to the last valid value, and a message indicating the valid available range will be displayed if the ANK is being used for entry.

Instructions for Entry and Default State Controls

Instructions for entry and default state controls may be toggled on and off on the EFIS Settings pages.

The instructions symbolically show the functions of the dual concentric knob. The text to the left of the infographic names the function of the outer knob. The text to the right of the infographic names the function of inner knob. The text below the infographic names the function of the SEL key.

Example of Instructions

On ECDU pages where the display of the instructions overlaps the LSK label, a condensed instruction stating "HELP" is displayed until a control is selected, or the dual concentric knob is selected, or moved. Pressing the SEL button on the dual concentric knob will momentarily expand the Help instructions.

Help Instructions

HOME Pages

The home pages are accessed by pressing the HOME key on the ECDU. The HOME key provides a way to return to the core EFIS functions from anywhere in the EFIS control structure with a single key press.

EFIS Home Page 1

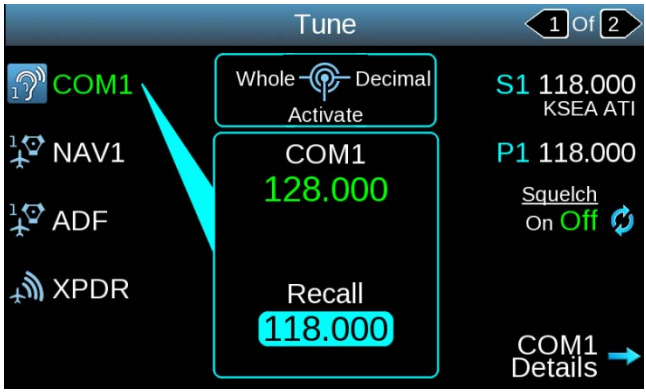
The EFIS Home Page 1 contains frequently used functions for most cruise phase of flight operations, including shortcuts to COM tuning, traffic and weather radar control, the Alternate Flight Plan page, the display of arrival and departure information, a charts control page, the minimum setting page, a shortcut to the minimum setting page, a shortcut to the active chart, and MFD map range setting. The MFD Main format range is the default inner knob active control on Home Page 1. MFD Map icon selection is the default outer knob active control on Home Page 1 if there is an MFD map displayed. Otherwise the bottom right LSK label will be greyed out and no control will be the default active control.

NOTE: If the EFIS configuration contains only PFDs, the Departure/Arrival Data LSK, Charts LSK, and MFD Rng toggle LSK are not displayed.

EFIS HOME Page 1

COM

InSight supports tuning for up to 3 configured VHF COM systems. If configured, COM3 is displayed on page 2 below all other cross-side tuning options. Selecting a COM radio displays the tuning page for that radio. Refer to the TUNE section of this manual for additional information.



COM1 Selected

The radio block in center displays the active radio frequency. This data block contains two rows:

- The active COM frequency.
- The name or identifier assigned to that frequency.

The LSKs in the upper right displays the currently selected FMS suggested or user preset frequency.

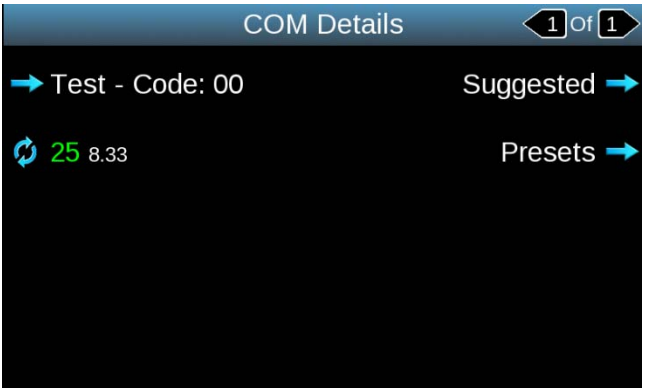
NOTE: Suggested frequencies are only displayed when configured for a Universal FMS.

Selecting the LSK next to the index value will box the data block in cyan and permit the pilot to dial the index with the knob. Releasing the knob will keep the new index. Pressing SEL or the LSK again will push the frequency into the active position.

An LSK is provided for toggling squelch ON or OFF.

Tuning a standby frequency is accomplished via the knob or a connected ANK. Pressing SEL will push the STBY frequency active and move the previously active frequency in to the RCL position.

Selecting the COM1 Details key displays the COM Details page.



COM Details Page

The VHF radio tuning mode is toggled between 8.33 and 25, if the configured radio supports both modes, with the provided LSK. If the configured radio does not support both modes, the LSK is not displayed.

LSK are also provided for Test activation and diagnostic code reporting, Suggested and Preset frequencies.

Traffic

Traffic, LSK [3L] is used to enable the TRAFFIC OPTIONS page. This page contains controls for triggering the absolute altitude mode and for setting the altitude filtering mode. Also found on the TRAFFIC OPTIONS page are a shortcut key to the transponder tune page and a toggle for setting the TCAS transponder traffic mode to standby (STBY), TA Only, and TA/RA.

TRAFFIC OPTIONS Page

Pressing Max Targets, LSK [3L] enables a setting window for dialing this value between 5 and 30. Active advisories (TA and RA) cannot be inhibited by this means.

TRAFFIC OPTIONS – Max Targets Control

WX RDR Controls

Wx Rdr Controls, LSK [4L] enables the WX Radar Options page for the cockpit side from which it was selected. The page contains controls for setting range, tilt, gain, track, roll/trim and shortcut keys to pages for selecting the mode and radar settings for that cockpit side's displays (if a dual side radar is installed) or for the entire cockpit if not.

NOTE: The available settings depend upon the installed weather radar system and its supported functions.

WX Radar Options Page

Selecting WX Mode, LSK [1L] enables the WX Radar Mode scrolling list. The available modes depend upon the installed weather radar system.

WX Radar Mode

Selecting the Tilt, Gain, Track or Roll Trim LSKs enables a setting window for dialing the selected value with the knob. The setting ranges and availability of these controls depends upon the installed weather radar system. The ANK cannot be used to set these values.

WX Radar Tilt

WX Radar Gain

WX Radar Track

WX Radar Toll Trim

Radar Settings, LSK [2L] enables the WX Radar Settings page for radar settings and sub-modes that may be toggled.

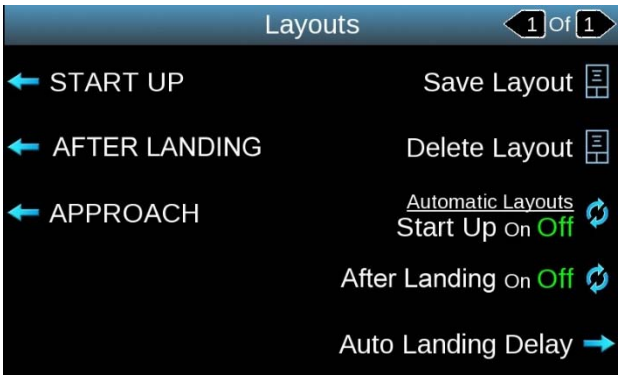
NOTE: The available settings depend upon the installed weather radar system and its supported modes. See the installed WX Radar Operator's manual for specific operating instructions.

WX Radar Settings Page

Layouts

Pressing Layouts, LSK [5L] displays a page for selecting a saved layout, saving a new layout, deleting a saved layout, and toggling automatic layout options.

Automatic Start Up, LSK [3R] and After Landing Layouts, LSK [4R] toggles are predefined default layouts that may be modified, but not deleted. START UP, LSK [1L] and AFTER LANDING, LSK [2L] may be assigned to pilot defined and named layouts.

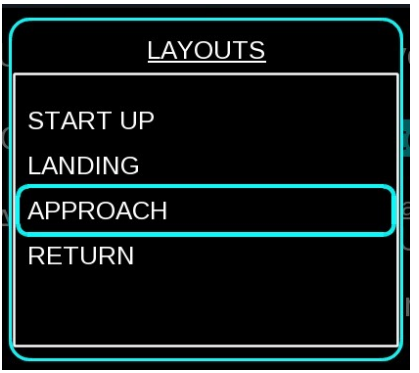


Layouts Page

A layout may be saved for the entire cockpit or any subset of the displays by pressing Save Layout, LSK [1R] to display the Save Layout pop-up window. The ECDU knob or the ENTER button on the ANK may be used to scroll through the available display options (PFD1, MFD1, MFD2, PFD2) for which the current layout will be saved. Pressing SEL on the knob changes the outer circle of the radio button to cyan indicating that the current layout will be saved for that selected display. Any combination from one to all four displays may be selected. Save the current layout by selecting SAVE.

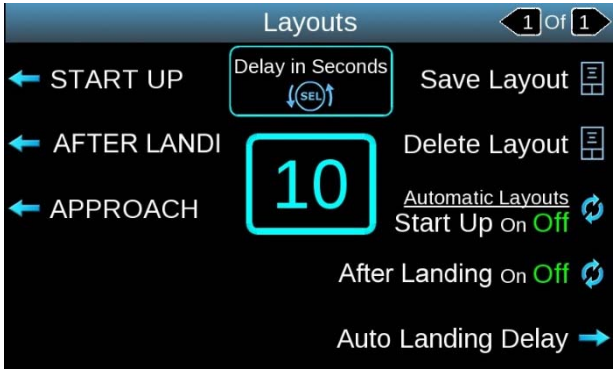
Save Layout Pop-Up

Delete a saved layout by selecting Delete Layout, LSK [2R] and choosing the layout to be deleted from a scrolling list.



Delete Layout Pop-Up

If enabled, options are provided for enabling the automatic display of Start Up, LSK [3R] and After Landing, LSK [4R] layouts and the means for setting the Auto Landing layout delay, LSK [5R].



Auto Landing Layout Delay Setting

Start Up and After Landing Saved Layouts

NOTE: All ON/OFF settings are OFF unless otherwise specified.

The default START UP layouts are:

PFD1	INHG, Feet, SVS On, FP Marker OFF Fast/Slow off, FP Angle Ref Cue (off) Left Inset: Map, Range 10, SVS Terr, North Up: On, Traffic: On, Compass: On, Nexrad Region: US, Coverage: On Right Inset: FPL STAT
MFD1	Full Engine, 3-D Exo View - Camera 3, no insets.
MFD2	Full Screen 10-9 Chart (If available for the airport), otherwise MAP, Range 100, Traffic: On, Airports: On, Navaids: On, Compass: On, SVS Terr), Insets: Off
PFD2	Same as PFD1

The default AFTER LANDING layouts are:

PFD1	Same as START UP, except the Left Inset will have Traffic OFF
MFD1	Engines Compressed, 3D Exo View - Camera 3, no insets.
MFD2	Full Screen 10-9 Chart (If available for the destination airport), otherwise, no change
PFD2	Same as PFD1

After Landings layout are automatically enable if all the following conditions are true:

- auto startup and landing layouts are configured
- automatic after landing layout is enabled
- indicated airspeed is valid
- indicated airspeed has been greater than the minimum configured airspeed tic mark for at least 2 seconds after auto landing is enabled and indicated airspeed is deemed valid (in-air for at least 2 seconds)
- groundspeed is valid
- groundspeed is ≤ a 20 knot trigger value
- the Auto Landing Delay time (defined in the User Interface section) has expired after reaching the trigger groundspeed

Alternate FPL

Alternate FPL, LSK [1R] enables the Alternate Flight Plan page for the cockpit side. The Alternate FPL LSK is only available if FMS's are not synchronized.

Alternate FPL Page

The Alternate FPL Source toggle allows an alternate flight plan received from a cross-side FMS to be selected and displayed in a scrollable pop-up. Activate FPL, LSK [2L] may be used to make alternate flight plan the active flight plan. The alternate flight plan will be retained until replaced by a subsequent upload such as a UniLink FPL or external thumb drive or until the EFIS power is cycled. The alternate flight plan may also be removed by pressing Remove FPL, LSK [3L].

Departure/Arrival Data

Departure Data, LSK [2R] is displayed when the aircraft is on the ground. When selected, an airport pop-up menu for the departure airport is displayed.

The Departure Data LSK changes to Arrival Data when all the following conditions are met:

- The active leg of the current flight plan is not part of a departure procedure.
- Weight on wheels is not active.
- The aircraft has a valid barometric pressure corrected altitude greater than 5000 feet.
- The aircraft had a valid position at takeoff and currently has a valid position
- The aircraft's current position is more than 10 nautical miles away from the aircraft's takeoff position.

The LSK will then activate the airport pop-up menu for the arrival airport.

Charts

Charts, LSK [4R] provides a shortcut to the charts control page. Refer to the Display of Charts section of this manual for detailed information.

Minimums

Pressing Minimums, LSK [4R] displays the Minimums Control page, which contains controls for setting DA minimum, the RA minimum, turning the minimums off, and the Mins Declutter function.

Minimums Controls (DA Set)

Pressing DA MIN, LSK [4R] or RA MIN, LSK [5R] altitude minimums enables setting values for either of these minimums. Only one minimum type may be set and active at a time. When either minimum is selected, its LSK label text is changed to black and is surrounded by a cyan field indicating that it is the current operation. The altitude value is displayed in a large cyan numeral in a cyan box on the ECDU display or the word OFF is displayed if no value is set.

The outer and inner knobs are used to set the selected minimum value in the center box and on the PFD in real-time. The outer knob adjusts the minimums in hundreds of feet, the inner knob will adjust the minimums in one-foot increments.

Pressing the SEL knob or the active control's LSK removes the selected cyan boxed value from the ECDU screen and sets the value in its current state on the PFD. The currently set value is also displayed next to the LSK label on the ECDU. These parameters may also be set via a connected ANK.

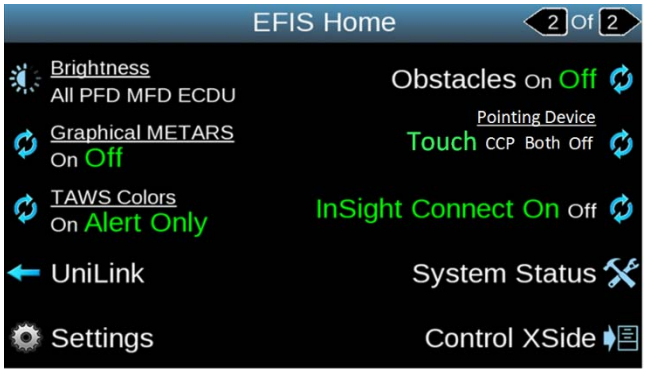
Mins Declutter, LSK [4L] function causes the enabled minimum to be decluttered from the EFI when it is not within the bounds of the altitude tape or automatically re-enables it when phase of flight is relevant.

MFD RNG

MFD RNG, LSK [4R] provides a shortcut to the MFD Map Range Settings page. Refer to Range in the MFD section of this manual for detailed information.

EFIS Home Page 2

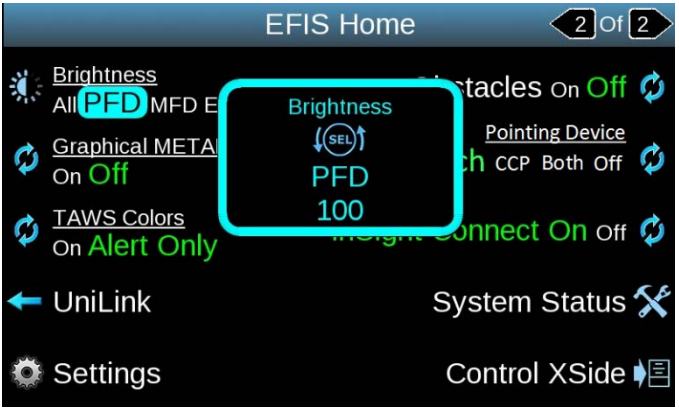
The EFIS Home Page 2 contains brightness controls for the ECDU displaying the page and the onside PFD or MFD, shortcuts to system status and EFIS settings pages. LSKs are provided to activate control of the cross-side EFIs as well as to access the FMS's UniLink control page. Toggles are provided on this page for enabling the display of TAWS Colors and Obstacles on 2D and 3D map and SVS depictions, enabling the display of graphical METAR information for airport symbols on the map, and for enabling / disabling the EFIS control inputs for the external pointing devices.



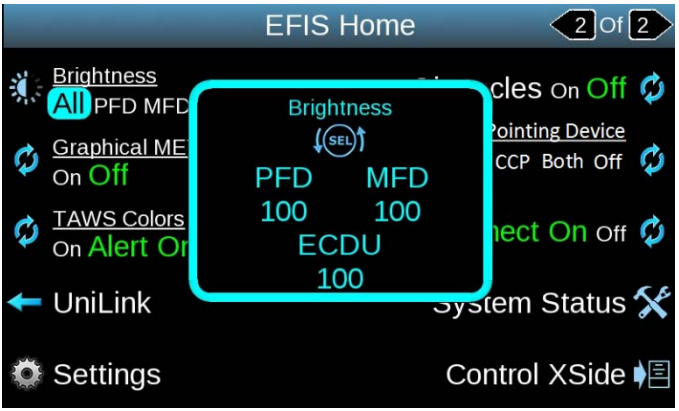
EFIS HOME Page 2

Brightness Controls

Selecting Brightness, LSK [1L] allows the control of the brightness for individually selected displays or simultaneously on all onside displays



EFIS Home Page 2 – Brightness PFD



EFIS Home Page 2 – Brightness ALL

Brightness may also be subject to installed aircraft master lighting controls.

Graphical METARS

Graphical METARS, LSK [2L] toggle enables/disables the display of the graphical METARs on MFD maps if the EFIS is configured to receive broadcast weather METARs.

TAWS Colors

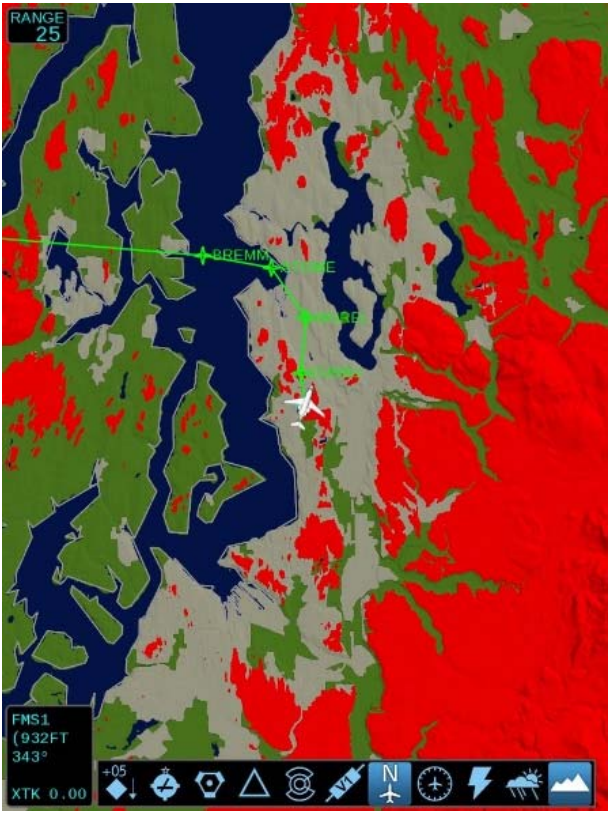
Terrain caution and warning colors may be enabled on the ECDU Home Page 2. The TAWS Colors toggle selects between On and Alert Only settings if the EFIS is configured for TAWS, or On and Off if the EFIS is not configured for TAWS. This selection determines if the red and yellow alert colors are shown full time or only when TAWS triggers an alert. Selecting the TAWS Colors option to On displays red warning bands on terrain above the current altitude and yellow caution bands on terrain near the current altitude.

The yellow caution bands and width are determined by the phase of flight rules for required obstacle clearance provided by the TAWS system. If the Alert option for SVS colors is selected, the red warning bands will always be displayed.

If a caution or warning pop-up condition is generated by TAWS, the color bands will also be enabled for display.

SVS with TAWS Colors On

Flight plan data, display of all map data, and traffic information may be overlaid on the terrain image. If traffic is overlaid, the TCAS annunciator block will be displayed in the upper right of the TAWS image.



Terrain (Plan) View with TAWS Colors On when On-Ground

Terrain (Plan) View

UniLink

UniLink, LSK [4L] provides access to the UniLink Controls for the on-side MDF if the EFIS is configured to display UniLink. Refer to the Display of UniLink Image Bus section of this manual for details.

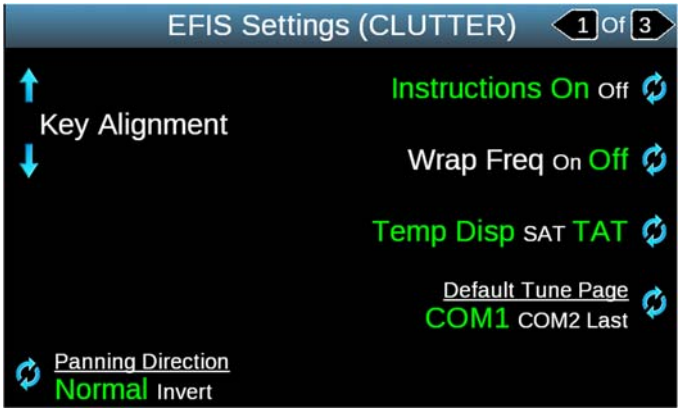
SETTINGS

Selecting Settings, LSK [5L] enables the EFIS Settings pages.

EFIS Settings Page 1

The EFIS Settings Page 1 contains alignment keys that allow the user to adjust the ECDU display up and down within its bezel to facilitate key alignment.

The EFIS Settings Page 1 also contains toggles for turning on and off instructions (default setting is On) as well as turning on and off frequency wrapping during tuning. Toggles are also available for selecting the default displayed value for SAT or TAT in the MFD status bar, for selecting the default page for when the Tune LSK is pressed and for setting the panning direction. Selecting the Default Tune Page, LSK [4R] sets COM1, COM2, or the Last Tune page viewed as the default page that is displayed when the TUNE key is pressed on the ECDU.



EFIS Settings Page 1

The Panning Direction can be changed between Normal and Invert via LSK [5L]. When Normal is selected, applying the "Two Finger Move" gesture to the left moves the map to the left. When toggled to Invert, applying the "Two Finger Move" gesture to the left moves the map to the right.

The Panning Direction is selectable regardless of Pointing Device setting on the Home page 2/2. In the case of an anomaly with the touch screen, Panning Direction is greyed out and not selectable.

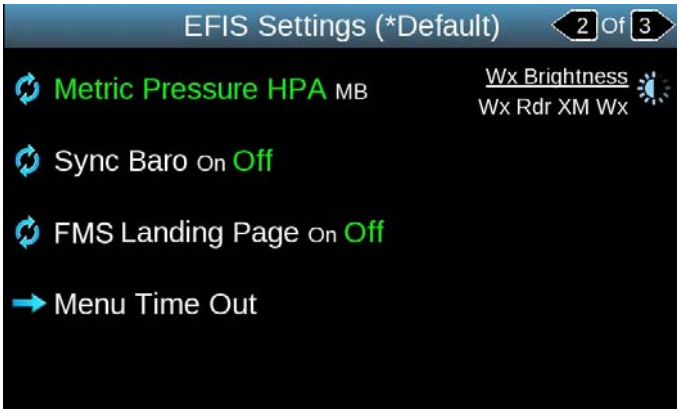
EFIS Settings Page 2

The EFIS Settings Page 2 contains options for selecting the weather brightness and the Menu Time Out. Toggles are provided for Metric Pressure HPA/MB, Sync Baro On/Off, and FMS Landing Page On/Off.

The Metric Pressure toggle selects the Metric Baro setting unit option of the on-side PFD to HectoPascals (HPA) or Millibars (MB).

The Sync Baro toggle enables and disables the cross-cockpit synchronization of baro setting if synchronize baro is configured to be pilot selectable.

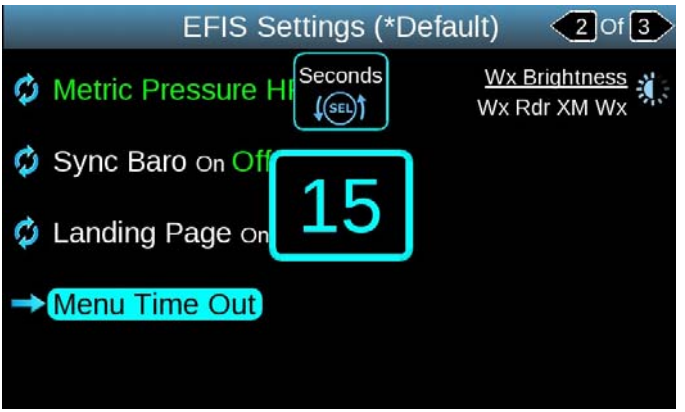
The FMS Landing Page toggle enables and disables the automatic display of the FMS Landing Page on the ECDU if a Universal FMS is configured.



EFIS Settings Page 2

Menu Time Out

The Menu Time Out, LSK [4L] allows the pilot to change the amount of time that the pop-up menus appear on the MFD. The pop-ups may be set to display from 10 to 45 seconds or No Time Out.



Menu Time Out Control

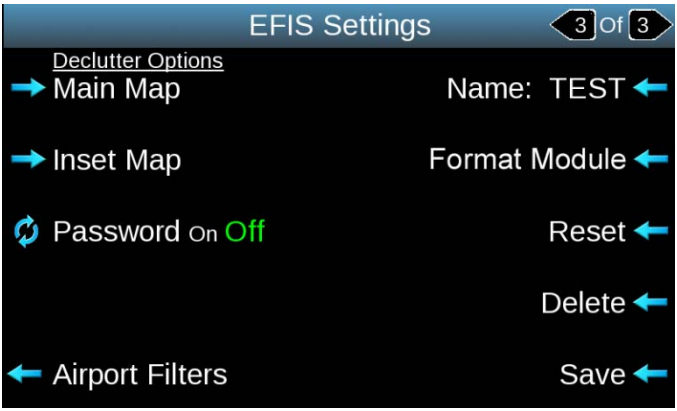
WX Brightness

Selecting Wx Brightness, LSK [1R] allows the pilot to adjust the brightness of the information displayed underneath the weather data. This control defaults to 50, which is suitable for most conditions.

Setting WX

EFIS Settings Page 3

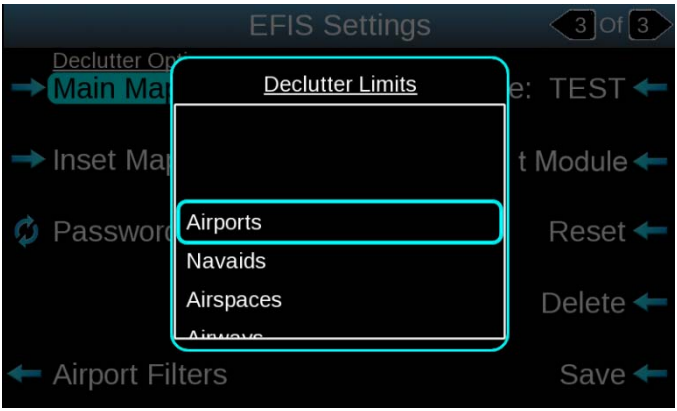
The EFIS Settings Page 3 contains Declutter Options for the main and inset maps, airport filters, and options that allow the user to name, reset, delete or save a user profile. A password on/off toggle for selecting password protection of the pilot profiles is also found on the EFIS Settings Page 3.



EFIS Settings Page 3

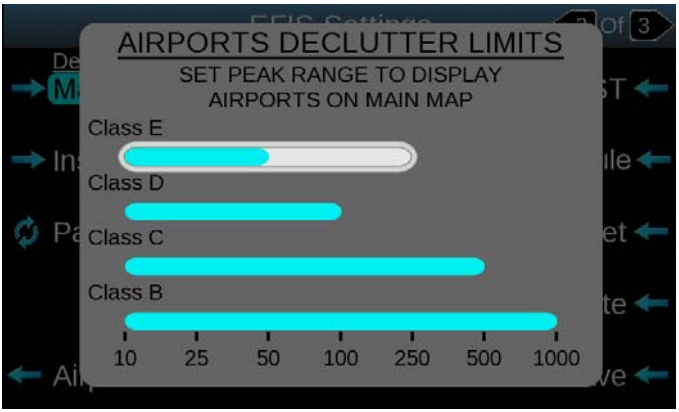
Main Map and Inset Map Declutter Options

The Main Map and Inset Map declutter options allow the user to set the declutter limits for each map via an interactive slider window.



Declutter Limits List

Each map feature is controlled by an interactive slider window that allows the user to set the declutter limit for that feature or features. The outer knob selects the field to be adjusted and the inner knob adjusts the declutter level. Declutter settings for the Main Map and for the Inset Map are independent from each other but affect all displays on the cockpit side being controlled by the ECDU being used.



Airport Declutter Sliders

Airport Filters

Additional airport filtering criteria such as runway length, runway type and additional classification criteria may be set by the pilot when Airport Filters, LSK [5L] is selected.

Airport Filters Page

Name

Selecting Name, LSK [1R] allows the pilot to select from a list of saved profiles. This allows the InSight system to have multiple default settings readily loadable depending on which pilots are flying in which positions allowing for uniformity in display settings across multiple airframes.

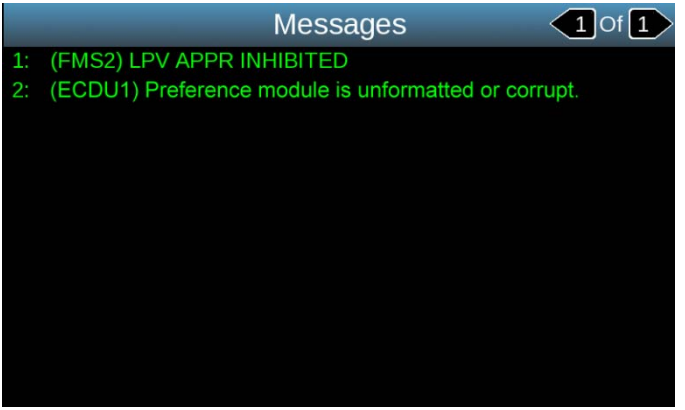
The Pilot Profile that is currently being used to configure the settings and controls states on the ECDU is displayed next to the labeled "Name" LSK, [1R] and in the title bar of the page.

An asterisk next to the Pilot Profile name indicates that settings have changed but have not been saved to the named profile.

Selecting Reset will set all settings back to default values. Selecting Delete will delete the current profile or another selected profile. Selecting Save will save all the current settings to the current profile or another selected profile, including allowing the pilot to enter a new name via the ANK or knob.

Pilot Profile Control

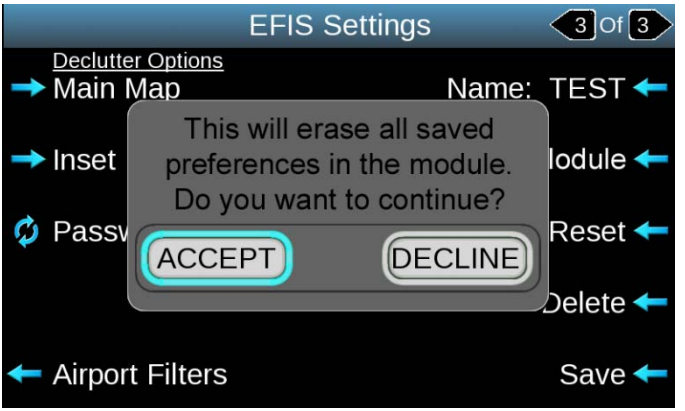
If the ECDU detects that it cannot read from the Pilot Preference Module (PPM) because the module is unformatted or due to data corruption, a message is displayed stating that the preference module is unformatted or corrupt.



PPM Unformatted or Corrupt Message

Pressing the Format Module LSK on the EFIS Settings Page 3 will clear and re-format the pilot preference module. Doing so will erase all saved preferences, so a confirmation step is included before the module is formatted.

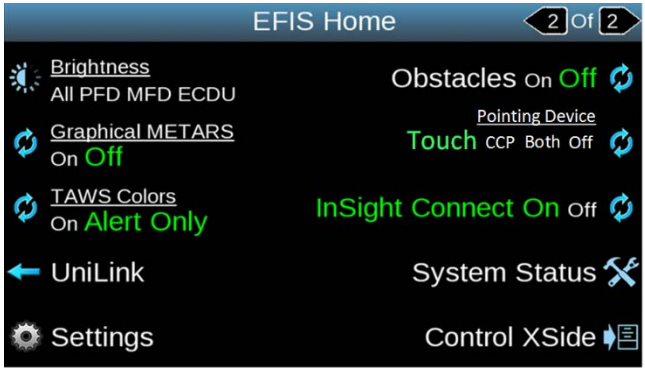
NOTE: The Format Module LSK is always present. It is not dependent upon the ECDU detection of a module issue.



Format Module Pop-Up

Pointing Device

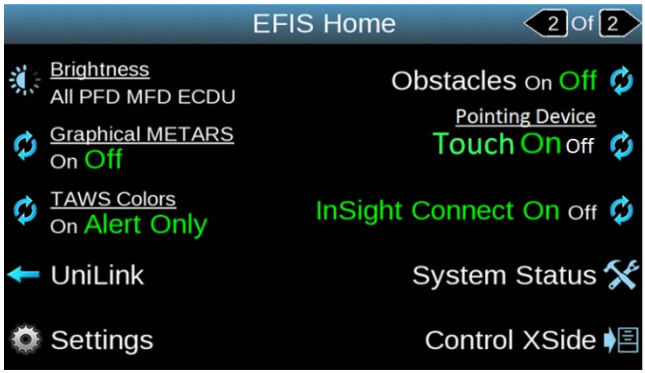
Pointing Device, LSK [2R] on the EFIS Home Page 2 provides the user interface to turn touch screen availability On. With installations that have both a Touch ECDU and an external CCP, "Touch CCP Both Off" is displayed below Pointing Device on LSK [2R].



EFIS Home Page 2 (Touch ECDU with CCP)

When LSK [2R] is toggled to "Touch", touch screen operations will be available. When the toggle is selected to "Both", both touch screen operations and the CCP will be available for operation. When the toggle is selected to "CCP" or "Off", touch screen operations will not be available.

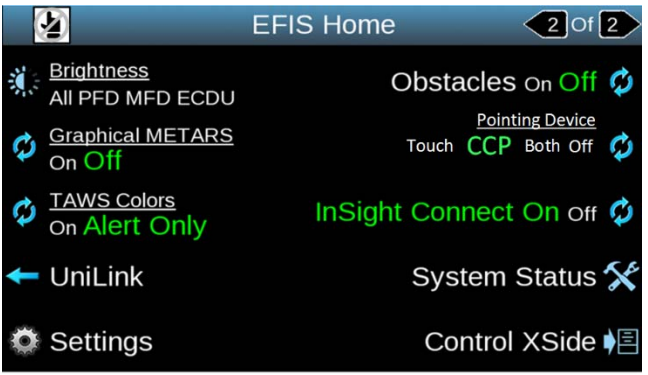
For Installations that do not have an external CCP, "Touch On Off" is displayed below Pointing Device on LSK [2].



EFIS Home Page 2 (Touch ECDU with No CCP)

When LSK 2R is toggled to "Touch On", touch screen operations will be available. When the toggle is selected to "Off", touch screen operations will not be available.

When the touch screen is not available, the No Touch Screen Available icon is display on the title bar.



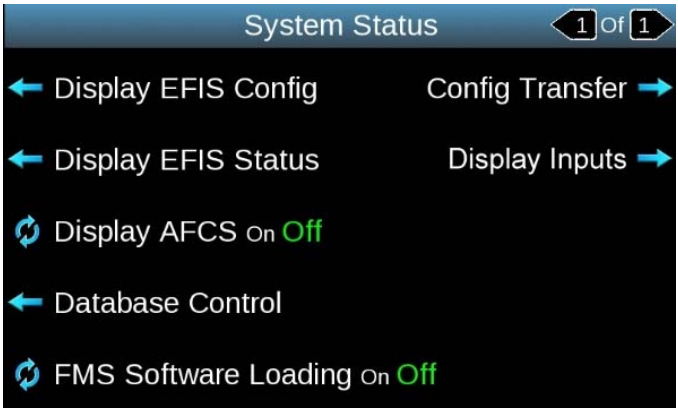
EFIS Home Page 2 – Touch Screen Operations Not Selected

If an internal fault is detected with the Touch ECDU, a message is pushed to notify the flight crew of an anomaly. The PFD annunciates a message alert and the Touch ECDU describes the touch screen failure.

The "Touch" and "Both" options are no longer selectable with the toggle and are colored in grey. If a touch screen malfunction occurs with an external cursor control panel installed, the "CCP" option is automatically selected and displayed in enlarged green text, otherwise "Off" will be selected.

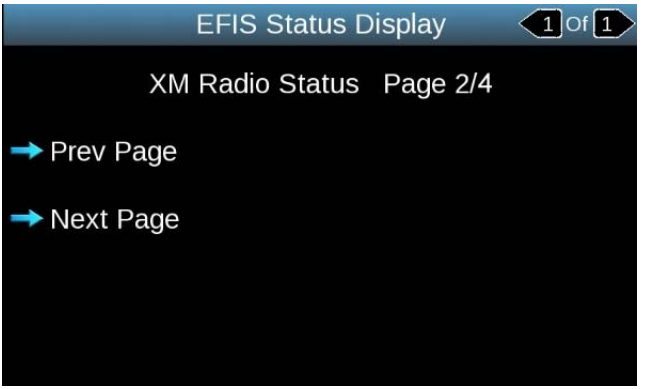
System Status

Pressing System Status, LSK [4R] on Home Page 2 displays the System Status Page. This page provides access to mostly maintenance control pages such as Display of EFIS Configuration, Display of EFIS Status, Database Control, Configuration Transfer, and Display Inputs. The Display AFCS toggle is provided to enable the display of Automatic Flight Control system text on the MFD. The FMS Software Loading toggle allows the ANK to be used to load FMS software during maintenance operations. Enabling this toggle will suspend normal FMS key functions of the ANK.



System Status Page

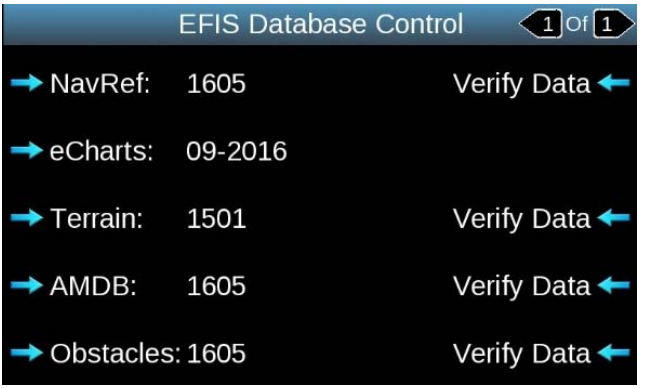
Pressing Display EFIS Status, LSK [2L] and then the NEXT key will display the XM Radio Status page located on the EFIS Status Display Page 2. This page provides a means for navigating the XM Radio Status pages which include the status of XM Weather products including subscription type, signal strength, product ages, and legends for NEXRAD and graphical METAR data.



EFIS Status Page 2

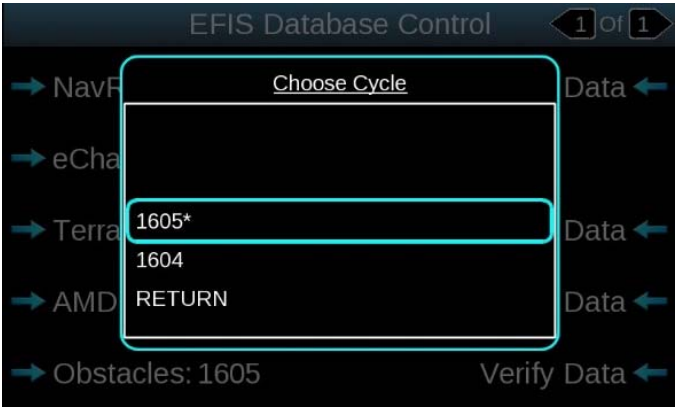
Database Control

Pressing Database Control, [4L] displays the EFIS Database Control page. This page allows for maintenance of the databases available to the EFIS. Each installed database is listed by name and by cycle number with a Verify Data option displayed opposite each database key. Invalid databases (as determined by the SVS), are shown with yellow dashes after the database name.



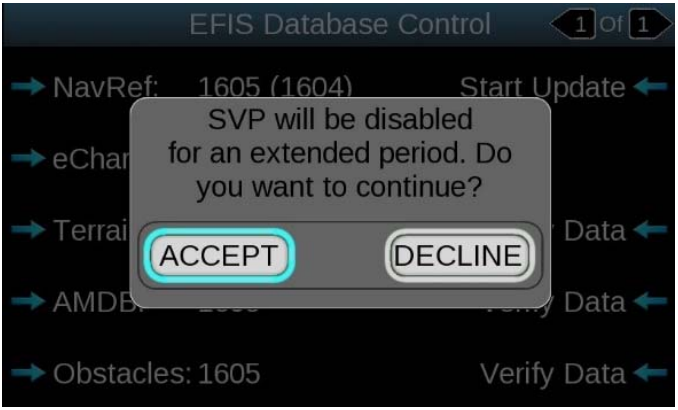
EFIS Database Control

Each database LSK enables a scrolling menu for selection of available cycle numbers. The currently loaded cycle number is shown with an asterisk next to its number on the list. The knob on the ECDU can be used to move the highlight up and down the list and the SEL key will select the highlighted cycle number.



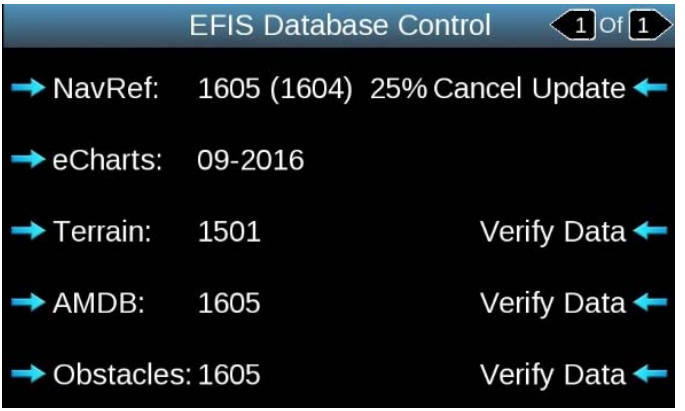
EFIS Database Control – Cycle Select

Selecting a database cycle that is different from the currently enabled cycle displays the selected cycle number in parentheses next to the active cycle number and enable an option on the right side of the ECDU to start the database update. A confirmation pop-up is provided because updating databases temporarily disables the synthetic vision processor (SVP) because it imports the databases for the display of SVS.



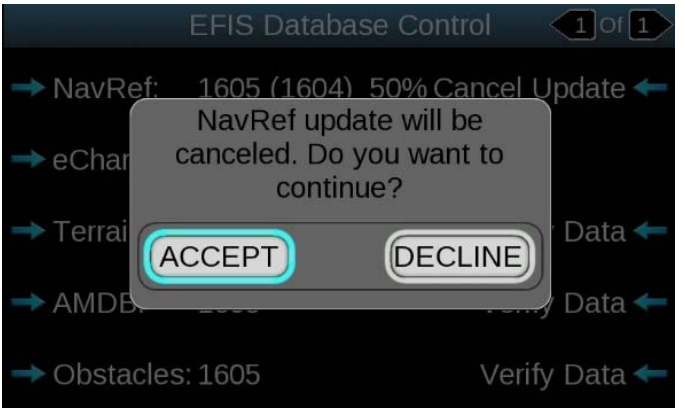
EFIS Database Control – SVP Disable

Selecting the ACCEPT option will start the update, display the update progress, and change the Start Update option to Cancel Update.



EFIS Database Control – Update Progress

Selecting Cancel enable a pop-up asking the user wishes to cancel the update, confirmation will declutter the pop-up and return to the default state of the Database Control page.



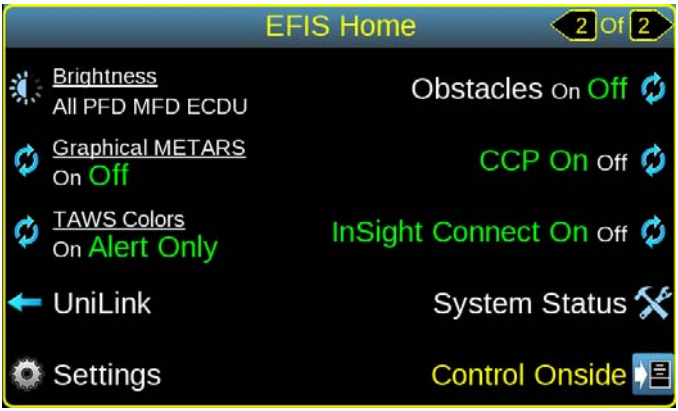
EFIS Database Control – Cancel Update

Control XSide

If an installation contains cross-side EFI displays with respect to a given ECDU, the ECDU can control them. The cross-side control must be manually selected by pressing Control XSIDE, LSK [5R].

If cross-side control is selected, all the user interface options, colors, and interfaces will function only for the selected cross-side display. The ECDU page border and title bar are changed to yellow and the EFI number is changed to the cross-side designation (i.e. MFD2 instead of MFD1, etc.).

To return to normal on-side control, Control Onside from the EFIS Home Page 2 must be manually selected.



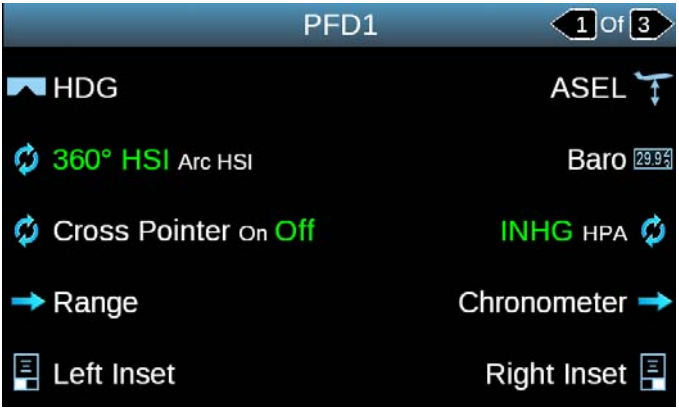
Cross-side Control

PFD Main Pages

PFD Main Page 1

The PFD Main Page 1 contain the default controls for the PFD display and may be accessed from any other page by pressing the PFD key on the ECDU. This page contains the most frequently used PFD functions for most flight operations and controls for baro setting units, HSI, and cross-pointer steering cue select. Keys are also provided for HDG/TRK, ASEL, Range, and Chronometer. Currently selected toggle options are labeled in larger green text while the available options are labeled in white text.

Pressing the NEXT key or a second press of the PFD key will display the PFD Main Page 2.

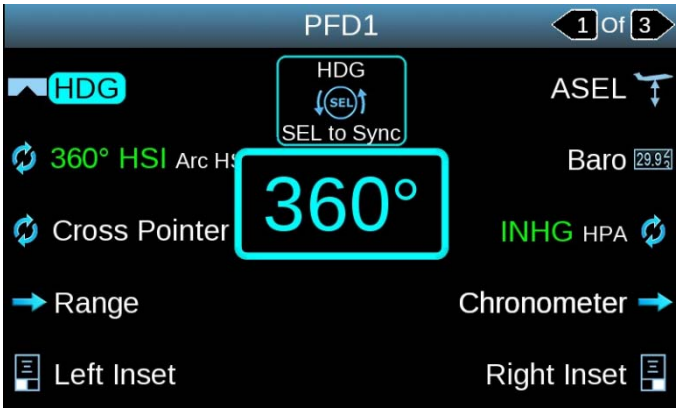


PFD Main Page 1

HDG/TRK

The HDG key on PFD Main Page 1 enables the setting of the selected heading via the ECDU knob or connected ANK. The HDG key label text changes to black and is surrounded by a cyan field to indicate that it is the current operation. The current selected heading value will be displayed in large cyan numerals in a cyan box in the center of the ECDU display.

Selected heading is always represented by three digits followed by a degree (°) symbol with 0° represented as 360°. Rotating the ECDU knob clockwise increases the value and steering of the heading bug on the HSI. Pressing the SEL key when HDG is the active control will synchronize the heading bug and digital value to the current aircraft heading. When the HDG value is coupled to the active flight director mode, the LSK, center box, and large numeric heading value will be displayed in magenta.

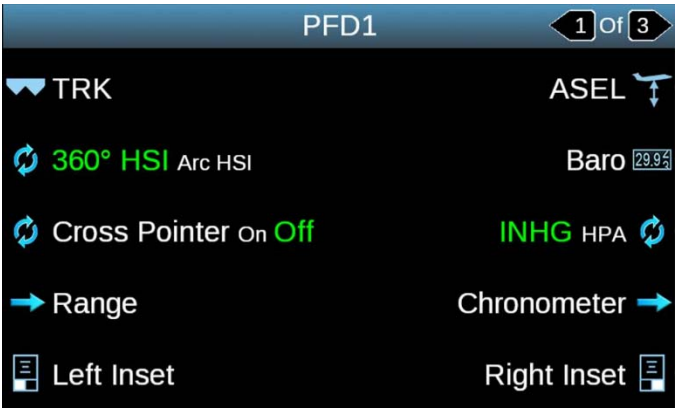


PFD Home Page 1 – HDG

When the configuration option AFCS TRACK Mode Enable is set to Yes, LSK [1L] on PFD Page 1 is either a Selected HDG control or a Selected Track control, depending on the Selected HDG/TRK toggle selection on PFD Page 2.

When Selected HDG is selected on PFD Page 2, LSK [1L] on PFD Page 1 operates as described for the Selected Heading control.

When Selected TRK is selected on PFD Page 2, LSK [1L] on PFD Page 1 becomes a Selected TRK control.



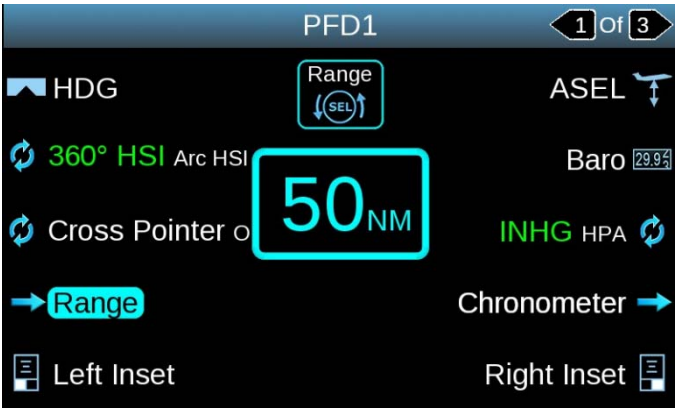
PFD PG 1 - TRK LSK

Pressing TRK, LSK [1L] on PFD Page 1 enables the setting of selected heading via the knob or connected ANK. The color of the TRK data entry field will be cyan if not coupled to an active flight director mode, or magenta if coupled to an active flight director mode.

Range

Range, LSK [4L] enables the setting of the inset map range(s). The Range label text changes to black and is surrounded by a cyan field to indicate that it is the current operation. The Range value will be displayed in large cyan numerals followed by NM in a cyan box in the center of the ECDU display.

The range values are indexed by the ECDU knob. The outer or inner knobs will change the range of any one map that is displayed on the PFD. If two maps are displayed on the PFD, the outer knob controls the left map range and the inner knob controls the right map range. If no maps are displayed on the PFD, the Range LSK will be grey.

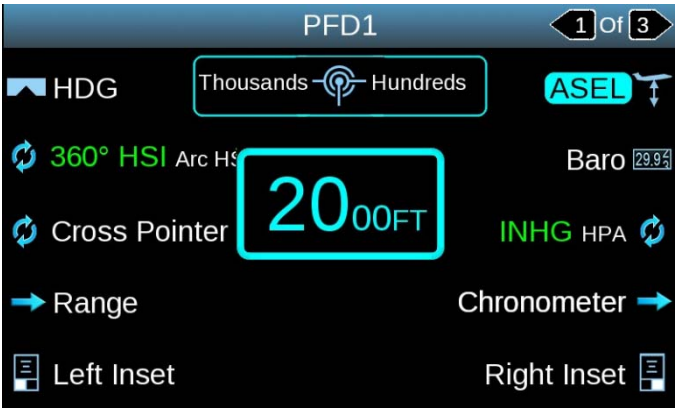


PFD Home Page 1 – Range Control (single control example)

ASEL

The ASEL key enables setting the altitude preselect value via the ECDU knob or connected ANK. The ASEL key label text changes to black and is surrounded by a cyan field to indicate that it is the current operation. The ASEL value will be displayed in large cyan numerals in a cyan box in the center of the ECDU display.

ASEL is displayed as three large digits representing tens of thousands, thousands, and hundreds of feet, followed by two smaller digits indicating tens of feet and the label "FT". The ECDU inner knob changes the ASEL value in hundreds of feet, and the outer knob changes the ASEL value in thousands of feet. If meters are the selected units, the units label will change to an "M" and the control increments will be the 100s of meters digit with the outer knob and 10s of meters digit with the inner knob. In both feet and meter conditions, a clockwise rotation of the ECDU knob increases the values. When the ASEL value is coupled to the active flight director mode, the LSK, center box, and large numeric speed value will be displayed in magenta.



PFD Home Page 1 – ASEL LSK

Baro

Pressing Baro, LSK [2R] enables the setting of the barometric correction value with the ECDU knob or the connected ANK. The Baro text changes to black surrounded by a cyan indicating that it is the current operation. The barometric correction value is displayed in large cyan numerals in a cyan box in the center of the ECDU display.

Baro is displayed as a four-digit decimal number indicating hundredths of inches of mercury followed by "INHG" and is adjusted in increments of 0.01 inch.

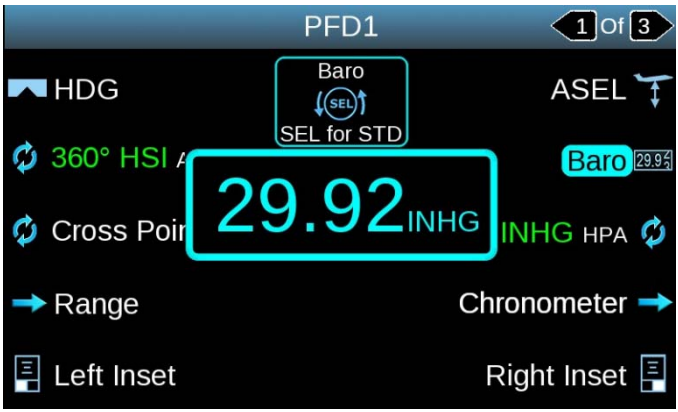
If the selected units are hectoPascals (hPA), the digits field displays a four-digit whole number barometric correction value followed by the label "HPA" with control increments in hPA.

If the selected units are millibars (mb), the label changes to "MB" and the digits field displays a four-digit whole number barometric correction value with control units in millibars.

Selection of HPA or MB units for display is configured on the EFIS Settings Page 2. Pressing Home on the ECDU, Next, Settings, LSK [5L], then Next will access the EFIS Settings Page 2.

In all unit cases, a clockwise rotation of the ECDU knob increases the value. Pressing and holding the SEL key when Baro is the active control will set standard pressure of 29.92 inHg, 1013 hPA, or 1013mb, depending on the selected units.

The BARO setting may be configured to be independent by cockpit side or synchronized across the cockpit.



PFD Home Page 1 – Baro LSK

Chronometer

A chronometer is available as a count up timer (Stopwatch) or countdown timer (Timer). When the chronometer is enabled (ON), it is located on the PFD to the bottom left of the HSI. It is also displayed in the center of the "Chronometer Control" page on the ECDU.

Pressing Chronometer, LSK [4R] displays the Chronometer Control Page. This page contains controls for turning the chronometer On/Off, selecting between Timer/Stopwatch mode, Set Timer, and selections for Start, Stop and Reset of the Timer/ Stopwatch.

When the Chronometer On/Off" LSK is toggled On, all LSK functions on the Chronometer Control page are selectable. If the Chronometer On/Off LSK is toggled Off, all other LSK functions on the Chronometer Control page are greyed out and not selectable.

NOTE: Set Timer, LSK [4R] is only selectable when the Timer option is selected.

Chronometer Control Page – Chronometer Off

With Chronometer On and the Stopwatch option selected, the chronometer appears digitally in the center of the ECDU as a 6-digit numerical time format, in the form XX:YY:ZZ in large white text.

The chronometer XX:YY:ZZ digits fills "XX" with hours, "YY with minutes and "ZZ" with seconds. The default value of the Stopwatch is 00:00:00.

The Stopwatch is started or stopped pressing Start/Stop, LSK [2L]. Pressing Reset, LSK [3L] resets the Stopwatch to 00:00:00.

Chronometer Control Page – Stopwatch

When Timer is selected, the Set Timer LSK changes from grey to white indicating that it is active and the Set Timer LSK label text changes to black surrounded by a cyan field indicating that it is the current operation.

The Timer values are displayed in large cyan numerals in a cyan box in the center of the ECDU display.

The Start/Stop LSK is greyed out to indicate that a value needs to be set before starting the Timer. The outer and inner concentric knobs on the ECDU are used to set the value of the Timer in the center box.

Chronometer Control Page – Set Timer Value (Knob)

If input is not received within three seconds, a momentary press of the SEL button or the active control's LSK changes the Timer's selected (large, cyan boxed) value to the current (large, white unboxed) Timer value. The Set Timer label text changes to white and the Start/Stop LSK is once again selectable.

Chronometer Control Page – Timer

The Timer value can also be set via an installed and connected ANK. When the Set Timer LSK is selected, the Timer value can be modified by the ANK in addition to the ECDU knob.

The ECDU knob instruction changes when modifying the Timer value. A press of the ENTER key, the active control's LSK, or if no pilot input is received within three seconds, changes the Timer's selected (large, cyan boxed) value to the current (large, white unboxed) Timer value. The Set Timer label text changes to white and the Start/Stop LSK is once again selectable.

Chronometer Control Page – Set Timer Value (ANK)

When the Timer reaches zero, the timer starts counting up and flashing the reading on the ECDU between normal and inverse video (black text on cyan background) for 5 seconds. After 5 seconds, the readout is display in inverse video. This operation can be cancelled by stopping, resetting, or deselecting the Timer.

Chronometer Control Page – Timer Expired

Display Insets

Left Inset, LSK [5L] and Right Inset, LSK [5R] control the display format of the PFD Selectable Space.

Insets cannot be turned off; one of the choices must always be selected unless replaced by the compressed engine format.

Depending on the display feature selected for either inset, that control page will display when the inset LSK is selected.

PFD MAP Inset Options

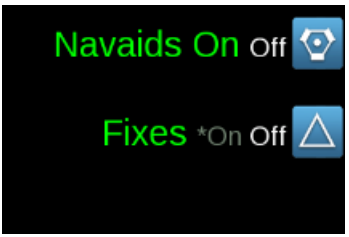
The PFD Map Inset Page 1 contains toggle controls for weather and terrain overlay as well as traffic, airports, airspaces, and the map orientation.

PFD Map Inset Options Page1

The PFD Map Inset Page 2 contains toggles for displaying the compass and range ring, airways, track line, heading line, Navaids, Fixes, and Stormscope and XM lightning data (if configured).

PFD Map Inset Options Page 2

If the map range is set so that the declutter limit settings prevent the display of airports, navaids, or fixes, the green "On" is replaced with "*On" to indicate that the item has been decluttered due to range. The same format applies to airways, but the text will be either "*Lo" or "*Hi", as appropriate. The icons at the bottom of the map will also be grey.



Decluttered Fixes LSK Labeling

Decluttered Navaids LSK Labeling (N = NDBs, V = VORs)

Decluttered Fixes Icon

The PFD Map Inset Page 3 contains toggle controls for supported satellite weather products.

PFD Map Inset Options Page 3

PFD Video Inset Options

The optional Video Inset page contains a video source toggle for selecting the channel that is providing the video for the inset video image. Brightness and contrast controls are also provided for the image. Values for the brightness and contrast are set with the ECDU knob or a connected ANK.

PFD Video Inset Options

FD FPL Stat Inset Options

The FPL Stat page contains no additional options.

PFD Flight Plan Status Inset Options

PFD Main Page 2

The PFD Main Page 2 contains PFD display options for display of digital pitch, display of the fast / slow indicator, flight path marker controls, FP Angle Reference Cue, display of the wind vector, and a shortcut key to the speed controls page. Controls are also provided to toggle between Selected Heading and Selected Track on the HSI, and to enabling the SVS egocentric view on the ADI, and Airport Labels.

PFD Main Page 2

Rad Alt Test

Rad Alt Test, LSK [4L] triggers an output from the EFIS to an external radio altimeter if one is configured. The output will remain true as long as the LSK is held or at least one second if the LSK is pressed and released. There is no indication of test on the ECDU except the Rad Alt Test label remains green as long as LSK [4L] is pressed. If the output is not configured, then the Rad Alt Test will not be available.

Flight Path Marker

Selecting FP Marker, LSK [1R] On displays the real-time projected flight path of the aircraft on the ADI when valid flight path, pitch, and track angle information is available.

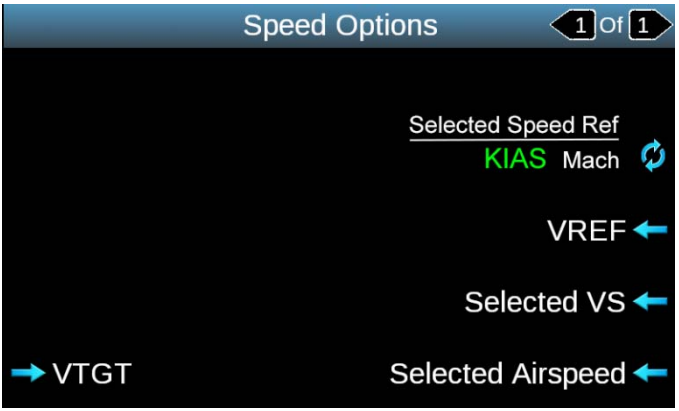
Flight Path Angle Reference Cue

Selecting Angle on the FP Angle Ref Cue, LSK [2R] enables angle to be set from 0.0º to -10.0º in 0.1º increments via the ECDU knob or the connected ANK.

Flight Path Angle Reference Cue Control

Speed Options Page

Pressing Speed, LSK [1L] on PFD Page 2, displays the speed options page on the ECDU. The Speed Options page provides an interface to modify V-Speeds (V1, VR, V2, VTGT, VREF) and Speed Reference Bugs (Selected Airspeed, Selected Mach, Selected Vertical Speeds) that are configured to be pilot selectable. The listings available on the Speed Options page varies from aircraft to aircraft by configuration.



PFD Page 2 – Speed Options Page

If a speed control value is selected via its line select key, the speed value is displayed in large cyan numerals in a cyan box in the center of the ECDU display. All large cyan numeric speed values (except selected vertical speed and selected Mach) are followed by the label KIAS. Selected vertical speed are followed by the label FT/MIN.

In installations where the Selected IAS/MACH Toggle Enable configuration option is set to "YES", LSK [4R] displays the control to toggle the Selected Speed Reference between IAS and Mach. The currently selected option is displayed in larger green text.

When the configuration option "Flight Director Controlled Speedbug" is set to Yes, this selection is transmitted to the configured flight guidance system to use as its reference for Speed Hold (FLC, MACH, IAS) vertical flight director modes. Additionally, the IAS or Mach selection drives the parameter displayed in the speed reference digital readout above the airspeed tape.

If IAS is selected, Selected Airspeed is available for selection at LSK [1R]. Otherwise, if Mach is selected, then the Selected Airspeed LSK is replaced by Selected Mach.

Instructions for the selected speed value will display the active speed parameter's name above a graphic of the knob above the cyan speed setting box. The selected speed value is set real-time in the center box and on the PFD with the knob or a connected ANK, and the settable range for each speed values is configurable.

Holding SEL when selected airspeed, selected Mach, or selected vertical speed is the active control sets the respective bug value to the current indicated speed of that type.

Pressing SEL on any active speed control parameter, or the active control's line select key sets the speed value in its current state and remove the setting box and instructions. Pressing and holding a V-speed line select key sets the V-speed to OFF.

In Selected Airspeed / Mach and Selected VS cases in which the speed value is coupled to the active flight director mode, the line select key, center box, and large numeric speed value are displayed in magenta.

In Selected Airspeed / Mach and Selected VS cases in which the speed value is output to the air data computer or flight guidance system and mismatches the received feedback value, the line select key, center box, and large numeric speed value are displayed in yellow.

If a particular speed control is not available due to the active flight director mode, its line select key label is displayed in grey and is not selectable. If a particular speed control is not available because it is not configured or is being received from an external source, its line select key label does not appear at all.

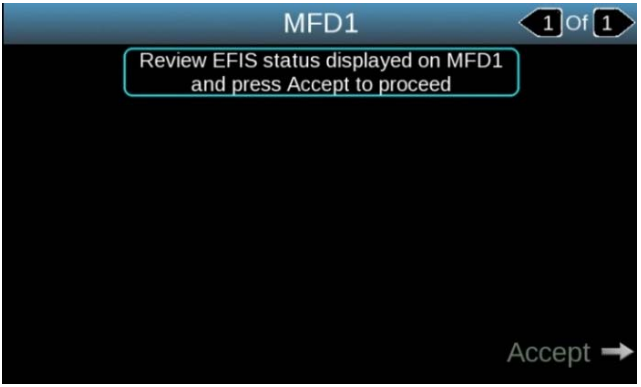
MFD

The MFD Page 1 may be accessed from anywhere in the ECDU control structure by pressing the MFD key on the ECDU. The context of the pages is dependent upon the main format that is being displayed by the MFD.

If the EFIS configuration contains only PFDs, pressing the MFD key will cause the ECDU to annunciate "Function Not Available".

MFD Startup Page

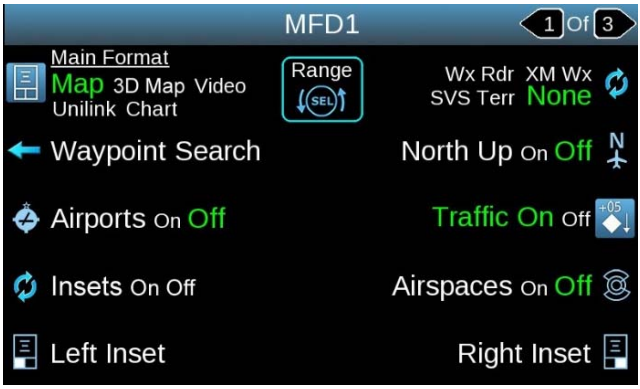
When the MFD is powered up and displaying the Database Status page, the MFD Startup page is displayed on the ECDU. MFD controls are not available until the Accept LSK is pressed.



MFD Startup Page

MFD Main Format – Map

If the MFD main format is Map, the following MFD Page 1 is displayed:



MFD Page 1 - Map Main Format

Instructions for menu navigation replace the Range instructions if a pop-up menu is active on the MFD.

Pop-Up Menu Instructions

MFD Page 2 is accessed from the MFD Page 1 by pressing the NEXT or MFD key on the ECDU.

MFD Page 2 - Map Main Format

MFD Page 3 is accessed from the MFD Page 2 by pressing the NEXT or MFD key on the ECDU.

MFD Page 3 - Map Main Format

NOTE: If XM weather is not available, these controls are grayed out, if XM weather is not configured, the MFD Page 3 is not displayed. If Canada is not the selected Nexrad Region, the Canada Warnings LSK is displayed in grey.

If the Winds Aloft is selected, a setting window is enabled in the center of the ECDU for adjusting the height of the displayed winds aloft forecast.

MFD Page 3 – Winds Aloft Control

MFD Main Format – 3D

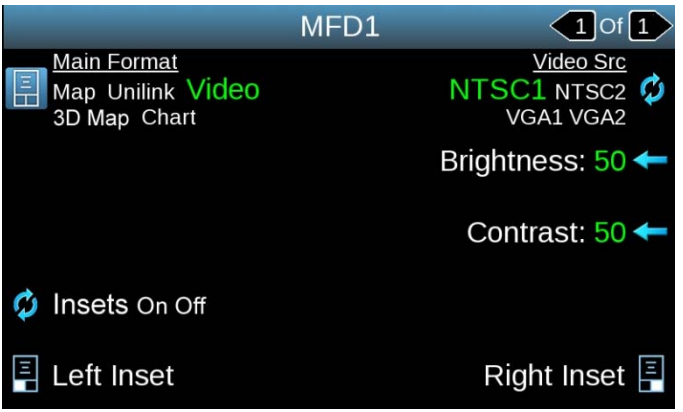
If the MFD main format is 3D Map, the following MFD Page 1 is displayed:

MFD Page 1 - 3D MAP Main Format

All controls operate identically as described for the PFD 3D Map Insert format controls.

MFD Main Format - Video

If the MFD main format is Video, the MFD Page 1 will be the same as the Map Main page except that Video is highlighted in green and no other format control except for insets are available.



MFD Page 1 - Video Main Format

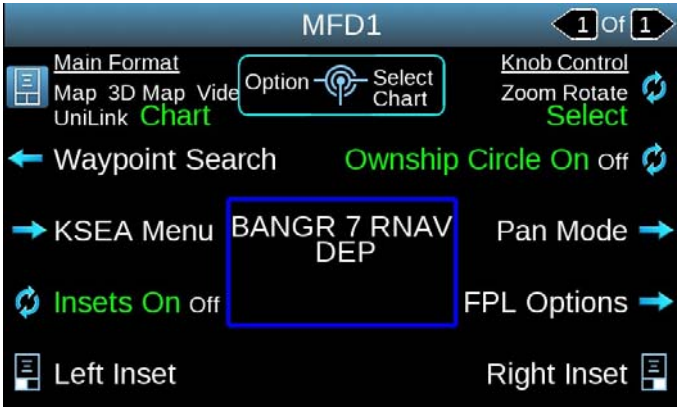
MFD Main Format – UniLink

If the MFD main format is UniLink, the MFD Page 1 will be the same as the Map Main page except that UniLink is highlighted in green and no other format controls except for Insets are available.

MFD Page 1 – UniLink Main Format

MFD Main Format - Chart

If the MFD main format is a chart, MFD Page 1 displays controls for the Chart format including toggles for changing the knob function, turning on the pulsing circle around the ownship symbol, control for turning on panning controls and an LSK for selecting the airport menus.



MFD Page 1 – Chart Main Format

If the chart is flight phase appropriate, the chart's information may be added to the flight plan by pressing the Add to FP LSK.

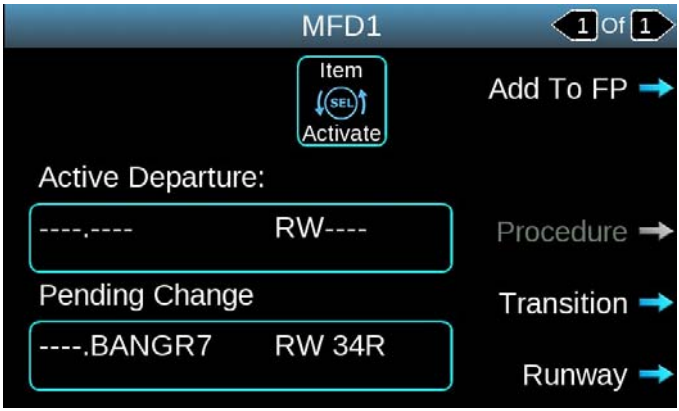


Chart FPL Options Page

Waypoint Search LSK

The Waypoint search LSK enables the Waypoint Search page for controlling the waypoint search format on the MFD.

Waypoint Search Page

Insets On / Off LSK

The Insets On / Off LSK controls the display insets to either all On or all Off. If toggled Off, both left and right insets are removed from the MFD. If toggled On, both insets are enabled to the last known state for to a default determined by a saved layout.

Pan Control LSK

Pressing Pan Mode, LSK [3R] opens the Pan Controls menu on the ECDU.

Pan Control Menu

The lower left LSK in the Pan Controls Menu toggles Pan Control On and Off.

When Pan Controls are toggled On, the ECDU knob can be used to pan the map. Turning the outer knob clockwise pans the map up, and counterclockwise pans the map down. Turning the inner knob clockwise pans the map right, and counterclockwise pans the map left.

Pressing the Center On Aircraft LSK will center the map on the aircraft when the map is panned.

The two lower right LSKs are used to pan the map to each successive waypoint in the flight plan.

The Next Waypoint LSK centers the map on the next waypoint in the flight plan. The Previous Waypoint LSK centers the map on the previous waypoint in the flight plan.

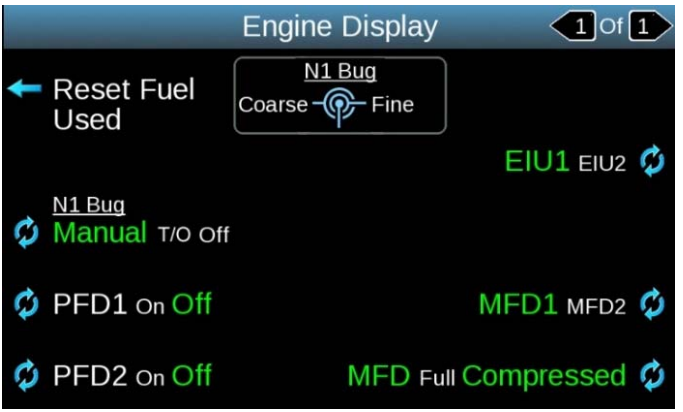
If a flight plan is not entered, these LSKs are disabled.

MFD Inset Format Options Keys

The MFD Inset Options pages and controls are exactly as described for the PFD Inset Options pages in this manual.

ENG Key

The Engine Display page may be accessed from anywhere in the ECDU control structure by pressing the ENG key on the ECDU.



Engine Display Page

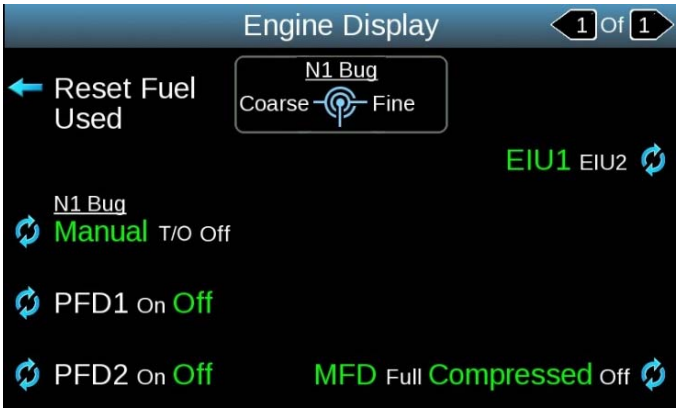
The PFD1 and PFD2 toggles enable and disable the compressed engine display on the selected PFD's single inset. If enabled, the compressed engine display takes the place of any other inset on the PFD. Turning this toggle off will return to the display state prior to enabling the compressed engines display.

The MFD1 / MFD2 toggle selects which MFD engine data will be displayed.

The MFD Full / Compressed toggle selects the format for the MFD engine display.

The EIU1 / EIU2 toggle selects the EIU providing engine display data. This is a system wide setting. Selecting SET N1 (or FAN) BUG once it is toggled on, permits the pilot to set the N1 (or FAN) visual reference bug in terms of percentage. For T/O mode both FMSs must have advanced performance initialized

In three display installations with a single MFD, an additional Off option is provided on the bottom right LSK for deselecting engines from the MFD.



Tune

The default radio Tune page defined in the EFIS Settings may be accessed by pressing the TUNE key on the ECDU. The displayed radios depend upon the installation configuration.

Each left side LSK is a shortcut key to select that radio for tuning. Additional pages are added when the configured radios will not fit on one page. The additional pages may be accessed by pressing the NEXT and PREV keys on the ECDU.

Abnormal indications:

- Yellow dashes in place of digits and/or text if radio feedback is stale (more than two seconds old).
- Yellow digits/text if radio feedback is not stale but does not match the commanded frequency.
- Green digits/text if radio feedback is not stale and matches the commanded frequency.

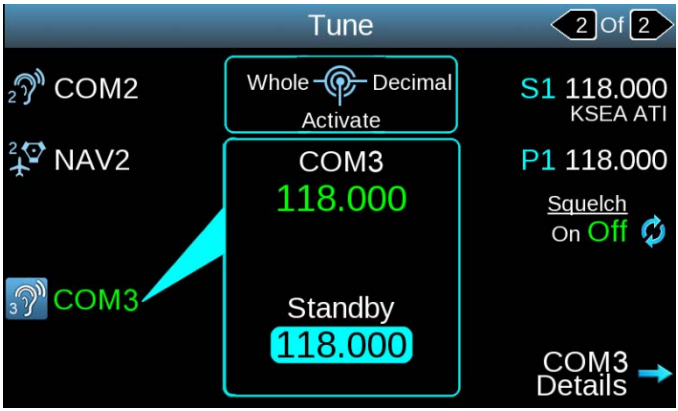
For installations that have an external tuner, which can take over COM and/or NAV tuning operations for the EFIS, Aux Tune discrete inputs may be configured for the desired radio(s).

When the AUX Tune discrete input is set for a particular radio, frequency tuning will be disabled along with commanded/feedback frequency compare operations. The active frequency will be set to the feedback frequency from the radio and displayed in green.

Tune Page 1

Selecting a COM radio displays the tuning page controls for that radio. The active radio frequency is displayed in the radio block in the center of the ECDU display. This radio block displays the active COM frequency in one row and the name or identifier assigned to that frequency in a second row. Pressing the Tune button again will cycle through the available radios.

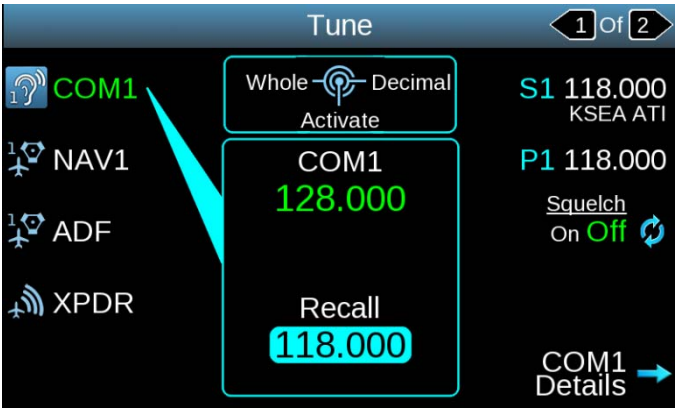
Tuning a Standby/Recall frequency is accomplished via the ECDU knob or a connected ANK. When the frequency is highlighted, pressing SEL will push the STBY frequency active and move the previously active frequency in to the RCL position.



Tune PG 2

COM

InSight supports tuning for up to 3 configured VHF COM systems. If configured, COM3 is displayed on page 2 below all other cross-side tuning options. Selecting a COM radio displays the tuning page controls for that radio.

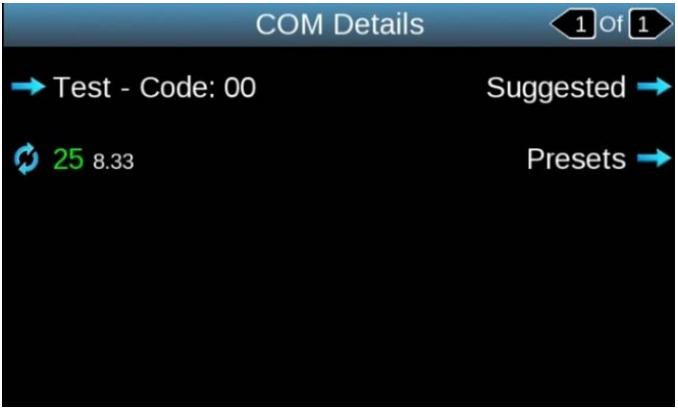


Com1 Selected

LSKs are provided for toggling the VHF radio tuning mode between 8.33 and 25 for supported radios, and for Test activation. The current modes are displayed in green.

When Test is activated and running, the LSK label changes to yellow until the test code is reported and received from the radio then the LSK label and code are displayed in green. The TST annunciator is also displayed on the EFI when test is active.

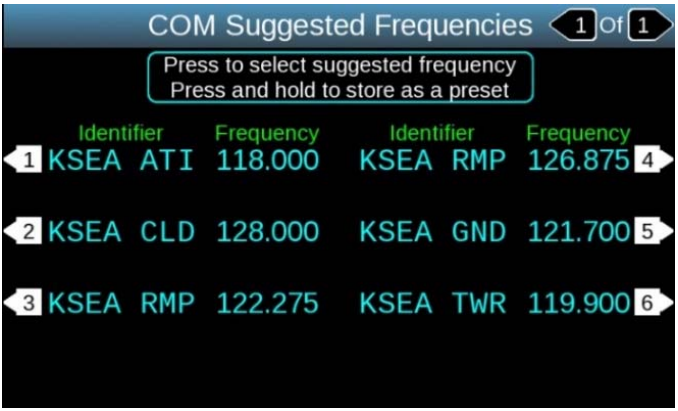
NOTE: Radios using the Honeywell RSB and HF COM radios do not return test codes.



COM Details Page

Preset Frequencies

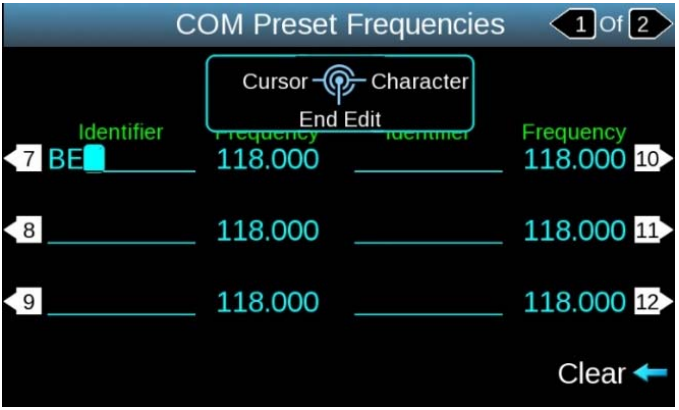
A Frequency may be stored as a preset in the next available slot by pressing and holding any LSK for more than 2 seconds.



FMS Suggested COM Frequencies

If no preset value is associated with an LSK, dashes will be displayed. Pressing the LSK for more than 2 seconds enables entry of a preset using the outer and inner ECDU knobs or the connected ANK.

Selection of the frequency field enables setting of the frequency with the inner and outer ECDU knobs or connected ANK. Exiting the page or selecting another preset commits the modified preset to memory. Pressing the Clear LSK will clear entry for that preset.



COM Preset Entry

NAV

Selecting a NAV radio displays the tuning page controls for that radio. The active radio frequency is displayed in a radio block in the center of the ECDU display. This radio block contains three rows that display the active NAV frequency, the name assigned to that frequency (if assigned) and the DME frequency and identifier if present. Suggested and Preset tuning is accomplished as described in the Presets and Suggested Frequencies section of this manual.

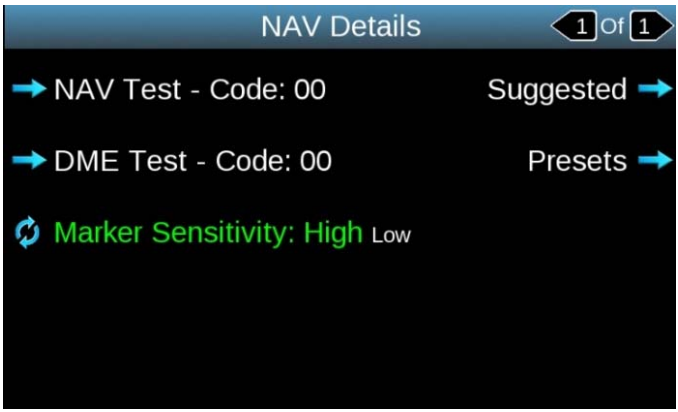
NAV1 Selected

DME Hold may be toggled On or Off via the DME-H LSK. When DME Hold is engaged, the LSK label displays DME-H and ON. The frequency, station identifier in the active frequency block change to white and DME-H also is displayed in white.

NAV1 DME HOLD

Selecting the NAV1 Details LSK displays the NAV Details page. This page contains LSKs for NAV and DME (if available) Test activation and diagnostic code reporting, NAV Marker Sensitivity High, or Low, Suggested and Preset frequency page access.

NOTE: The Suggested LSK is only displayed when configured for a Universal FMS.



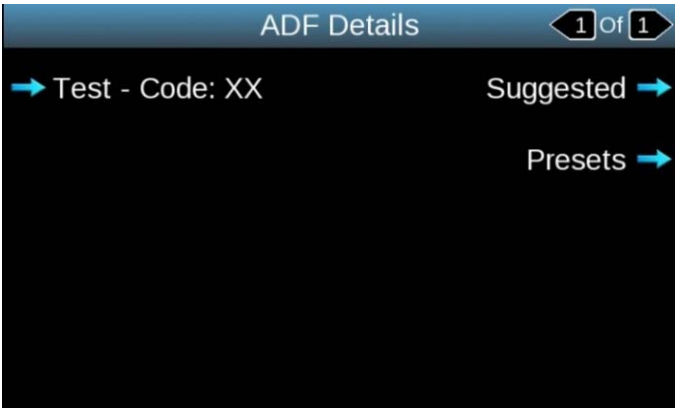
NAV Details Page

ADF

Selecting an ADF radio displays the tuning page controls for that radio. The active radio frequency is displayed in a block in the center of the ECDU display. This radio block contains the active ADF frequency and the name assigned to that frequency (if assigned). Suggested and Preset tuning is accomplished as described in the Presets and Suggested Frequencies section of this manual. LSKs are also provided for ADF mode selection of ADF or Antenna, Beat Frequency Oscillator (BFO) On or Off, and ADF Details.

ADF Page

Selecting the ADF Details LSK displays the ADF Details page. This page contains LSKs for ADF Test activation and diagnostic code reporting, Suggested and Preset tuning.

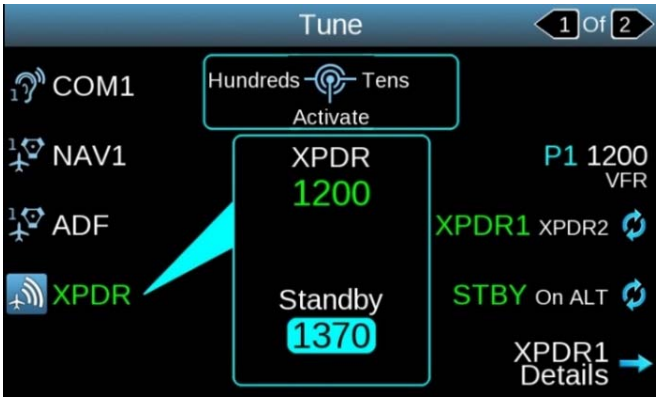


ADF Details Page

XPDR (ATC)

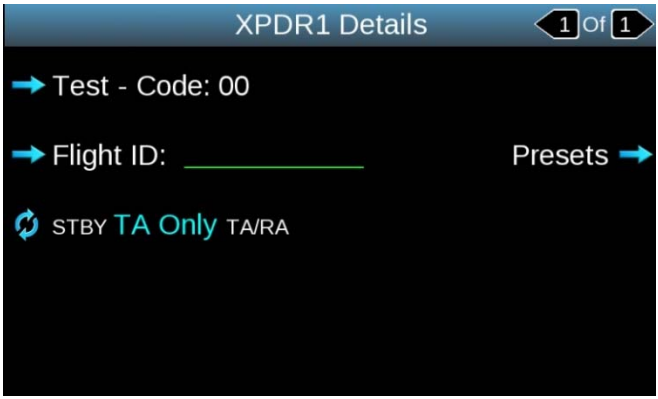
Selecting a XPDR displays the tuning page controls for that radio. The active radio frequency is displayed in a radio block in the center of the ECDU display. This contains the active transponder code. Preset tuning is accomplished as described in the Presets and Suggested Frequencies section of this manual; the FMS does not provide Suggested ATC codes.

LSKs are provided for switching the transponder mode to STBY, On, or ALT and for selecting the active transponder.



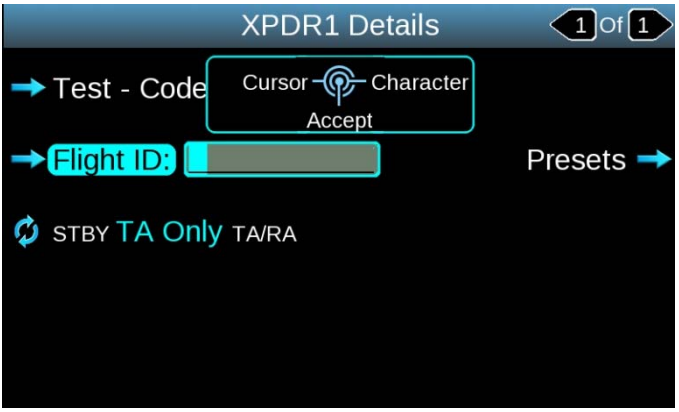
XPDR (ATC) Page

Selecting the XPDR Details key will display the XPDR Details page. This page contains LSKs for ATC Test activation and diagnostic code reporting, TCAS mode selection for STBY, TA Only, and TA/RA (in cyan when in STBY or On), and Preset tuning.



XPDR (ATC) Details Page

Selecting Flight ID brings up a selection box for setting the flight ID with a cyan cursor. Turning the inner knob scrolls through digits 0 - 9 and characters A - Z in the cursor. The cursor can be moved to the next or previous space with the outer knob. Pressing the SEL key or the FLIGHT ID LSK makes the newly selected flight ID the active flight ID. The flight ID may also be entered using the ANK and pressing ENTER.



Flight ID

Flight ID is displayed in yellow when the Flight ID received from the transponder does not match the programmed Flight ID or if the transponder data is stale or invalid.

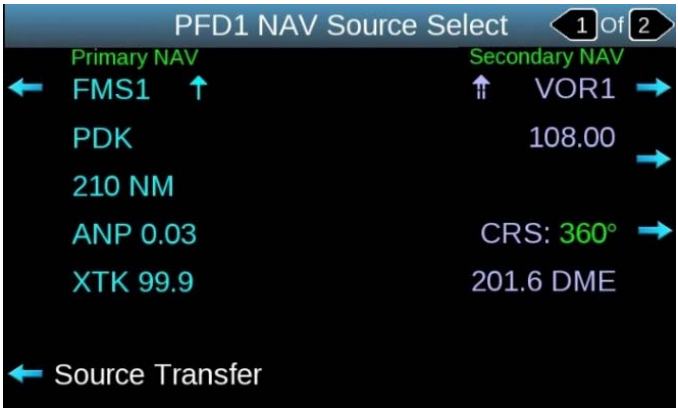
Eight (8) total characters are provided for the Bendix King MST-70B and Garmin GTX-3000, ten (10) total characters for the generic A429 Transponder input.

If the Flight ID field is blank, ADS-B messaging will also be blank, therefore, the flight crew must preflight this item based upon operational requirements.

NAV/BRG

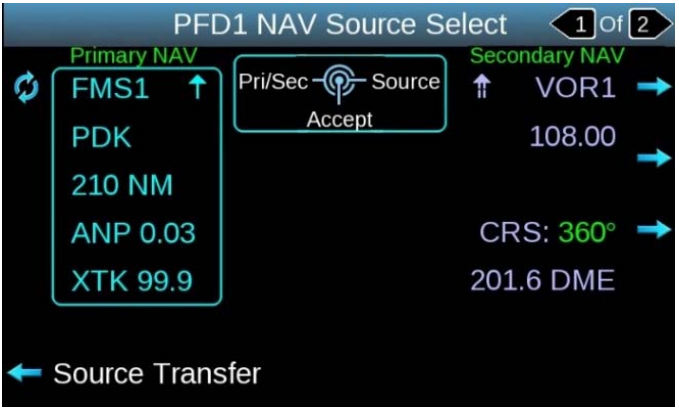
NAV /BRG Source Select Page 1

The NAV / BRG Source Select Page 1 is accessed by pressing the NAV/BRG key on the ECDU. Page 1 displays the active primary and secondary navigation source for the on-side displays.



NAV / BRG Source Select Page 1

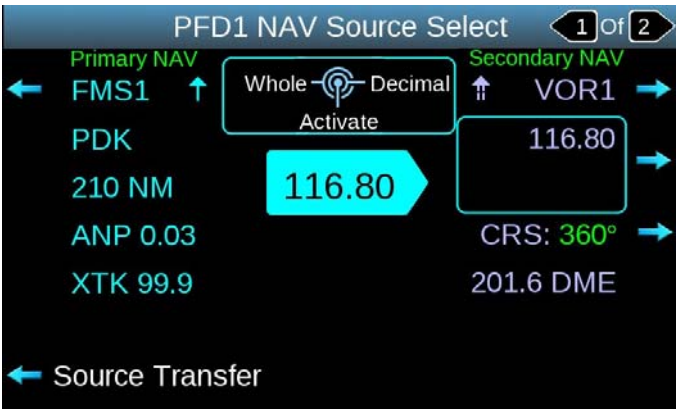
Pressing the top LSK next to either source data block enables a cyan box to surround the data block, indicating that a source selection can be made. Scrolling through the available sources is accomplished via the ECDU inner knob or successive presses of the top LSK. The outer knob moves the selection box between the primary and the secondary source. Pressing SEL or switching away from the current source (primary / secondary) with the ECDU outer knob will select the currently dialed source as the active source and disable the selection box. Pressing Source Transfer, LSK [5L] will swap the currently selected primary and secondary sources.



NAV / BRG Source Select Page 1 - NAV Source Selection

If the active source is a short range navigation (SRN) source, options appear for setting the radio frequency and the selected course. Selecting the frequency enables the cyan box to surround the frequency value and the station identifier. A cyan pennant containing the selected frequency is also enabled in the center of the ECDU display. The ECDU outer knob sets the whole number value of the frequency while the decimal value is set with the ECDU inner knob. Pressing SEL or the frequency LSK will select the new frequency as the active frequency and update the station identifier if it is defined.

If SEL or the frequency LSK is not pressed within five seconds of pilot input to the selected frequency value, the selected frequency, the pennant, and the cyan box will be removed, and the selected frequency will not become the active frequency.



NAV / BRG Source Select - Frequency Selection

Selecting CRS, LSK [3R] displays a cyan box around the course value and enables a cyan box containing the selected course in the center of the ECDU display. The ECDU knob sets the selected course value, real-time in the center box, the cyan box, and on the HSI. Pressing and holding the SEL key for approximately one second sets the course direct to the tuned station. Pressing the SEL key, the course LSK, or if no pilot input is received within five seconds, will cause a time out and remove the cyan boxes from the display.

Frequency and course values may also be entered through the ANK.

NAV / BRG Source Select - Course Selection

NAV / BRG Source Select Page 2

The NAV / BRG Source Select Page 2 displays the active primary and secondary bearing source for the PFD and is accessed from the PFD NAV / BRG Source Select Page 1 by pressing the NAV/BRG key or the NEXT or PREV keys on the ECDU.

Pressing the LSK next to either source data block enables the cyan box to surround it, indicating that a source selection can be made. Scrolling through the available sources is accomplished via the ECDU inner knob or successive presses of the top LSK. The outer knob moves the selection box between the primary and the secondary source. Pressing SEL or switching away from the current source (primary / secondary) with the ECDU outer knob will select the currently dialed source as the active source and disable the selection box. Frequencies for short range bearing sources may also be tuned here through the ECDU knob or the connected ANK.

NAV / BRG Source Select Page 2 - BRG Source Selection

DISP Revert Key

The MFD may be placed in reversionary display mode by pressing the DISP revert key on the ECDU. Triggering revert mode causes a yellow banner to displayed indicating that the PFD will be disabled in 5 seconds and a countdown timer is shown.

PFD Revert Page

If an MFD is placed in reversionary display mode, it effectively becomes the PFD for the ECDU that triggered the reversionary mode, assuming all PFD display function (formats, annunciators, inputs, and outputs) as long as it is in reversionary mode. The means of control and the available formats will be the same as for the PFD. MFD functions and formats will still be available if selected via MFD controls. No formats are restricted on a reverted display and cross-side control is still possible if a cross-side ECDU or configured external control panels are present and functional.

The display revert may be cancelled by pressing the CANCEL REVERT LSK on the lower left position or by pressing the DISP revert key before the countdown timer expires.

Pressing the DISABLE PFD NOW LSK in the lower right position will immediately disable the PFD. Additionally, pressing this LSK or allowing the countdown timer to expire will cause the reverted MFD to turn off the PFD.

The ECDU remains on the reversion selection page until the PFD shuts down or reversion is canceled. If the PFD shuts down, the ECDU transitions to the PFD Main page 1. If reversion is cancelled, the ECDU returns to the page it was displaying prior to DISP revert.

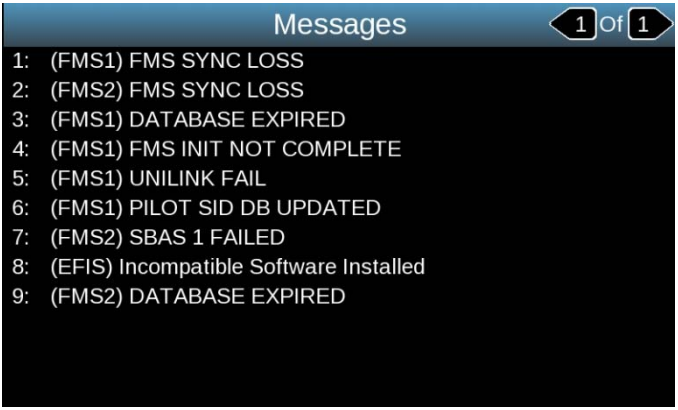
Pressing the DISP revert key when the PFD is off and the MFD is reverted will turn the PFD back on, then the reverted MFD will resume normal operation as an MFD, the PFD will resume normal operation as a PFD, and the ECDU will display PFD Main page 1.

Pressing the DISP revert key when the MFD is failed or if the EFIS configuration contains only PFDs will cause the ECDU to annunciate "Function Not Available, as there is no display to revert.

Function Not Available (for Revert)

MSG Key

The Messages Page is accessed by pressing the MSG key on the ECDU. New messages are displayed in white and messages that have been previously acknowledged are displayed in green. Messages with prompts that require action will display an LSK to acknowledge the prompt or trigger the ECDU to the correct FMS page. FMS messages will not clear while the message page is being viewed. This is to ensure that the message list does not dynamically resize in such a way as to make the list difficult to read. Messages annunciating conditions that have since resolved will clear once the page is exited.



Messages Page – New

Messages Page - Acknowledged

IDENT Key

Pressing and holding the IDENT key displays the ID annunciator in the tune window of the transponder tune page, the lower left corner of the ECDU screen, and in the MFD Status bar.

NEXT and PREV Keys

Pressing the NEXT Key on any ECDU, search, or pop-up menu page will transition from the current page to the next page in a given sequence. Pressing the PREV Key on any ECDU page will transition to the previous page in a given sequence.

NOTE: Pressing the PREV key does not necessarily go back to the page previous displayed, only the previous page in a numbered sequence. If at the end of a numbered sequence of pages and NEXT is pressed, the ECDU will transition back to the first page in the sequence. Likewise, if at the beginning page of a numbered sequence of pages and PREV is pressed, the ECDU will transition to the last page in the sequence.

Page Back LSK

The Page Back key allows the pilot to step back through previously viewed EFIS control pages (up to 10 pages). Only the last selected FMS page will be shown if FMS pages are included in the page back sequence.

Page Back Key

FMS Control

Selecting any of the FMS specific keys on a connected ANK will display the page or function from a connected Universal FMS as if it were being controlled from a Universal FMS CDU. Refer to the applicable FMS Operator's Manual for instruction.

Secondary Interfaces

External Course / Heading Control

The EFIS supports the interface of external controls for CRS and HDG when connected to the ECDU. This does not replace the previously defined knob and line select key controls for these functions and setting these values may be accomplished by either means.

Heading set with an external heading control changes the heading for the entire EFIS just like setting heading with the ECDU.

If course is set with an external control, the function is separated by source priority and type as follows:

CRS1 control will set the course for VOR1 if it is configured anywhere on the EFIS.

CRS2 control will set the course for VOR2 if it is configured anywhere on the EFIS.

If the configuration option "Automatic Selection of LOC as Secondary Nav Source with CRS Knob" is set to Yes, the EFIS automatically selects onside LOC as the secondary navigation source when the course knob is rotated with a valid localizer tuned and FMS as the primary navigation source.

External Reference Select Control

The EFIS supports the interface of external controls for SPEED, Speed SYNC, ALT PRESELECT (ASEL), ASEL Fine/Coarse toggle, HDG, HDG Sync, Feet/Meters toggle, and Alert Cancel when connected to the ECDU. This does not replace the previously defined knob and line select key controls for these functions and setting these values may be accomplished by either means.

ASEL set with an external control changes the preselected altitude for the entire EFIS just like setting heading with the ECDU.

External Weather Radar Control

The EFIS supports the interface of external controls for weather range, tilt, gain, and mode selection via connection to the EFI or DCU II. The ECDU will also support these controls with its own controls so that weather controls may be accomplished by either means.

External Cursor Pointing Devices

The EFIS supports external cursor pointing devices such as the UA Cursor Control Panel (CCP) and Model 5101 Touch ECDU to drive the cursor for MFD Map and Chart functions if either is connected to the EFIS. Specific cursor pointing device configurations supported are:

- no cursor pointing devices configured
- one CCP, no Touch ECDUs, one MFD, one cursor
- no CCP, two Touch ECDUs, one MFD, one cursor
- one CCP, two Touch ECDUs, one MFD, one cursor
- one CCP, no Touch ECDUs, two MFDs, one cursor steerable to both MFDs
- one CCP, two Touch ECDUs, two MFDs, one cursor steerable to both MFDs
- no CCP, two Touch ECDUs, one MFD, one cursor
- two CCPs, two Touch ECDUs, two MFDs, two cursors - each limited to its on-side MFDs
- two CCPs, no Touch ECDUs, two MFDs, two cursors - each limited to its on-side MFDs
- no CCP, two Touch ECDUs, two MFDs, two cursors - each limited to its on-side MFDs

If only one MFD is installed, there can be only one cursor and one CCP. If two MFDs are installed, there can be one cursor with one CCP or two cursors with zero or two CCPs.

If no CCPs are installed, there will be one cursor per MFD. Touch ECDU devices will either control their on-side cursors if there are two cursors or provide input to the single cursor if there is only one.

NOTE: A mix of Touch ECDUs and non-touch ECDUs are not supported in a single configuration, i.e. a legal configuration will have all one type.

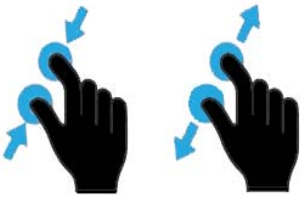
When multiple cursor pointing devices (cursor control panels and/or Touch ECDUs) provide input to a single cursor, the first device to provide input takes control and retains control as long as input is maintained and for one additional second for hysteresis. The cursor is not permitted on the PFD and cursor control panels and Touch ECDUs cursor control do not follow cross-side control if it is selected on the ECDU.

Touch ECDU Cursor Control Specifics

Cursor operations remain similar as described for the Map Cursor Operations; however, the actual actions used to perform the cursor control are different with the Touch ECDU. The user can use the entire screen of the Touch ECDU to perform cursor operations.

The touch screen gestures used for touch screen cursor operations are described in the following table:

Cursor Control Touch ECDU Gestures	
Touch Screen Gesture	**Action**
Single Finger Move 	The "Single Finger Move" gesture is used for moving the cursor on the MFD Main Format or MFD insets. The gesture speed will determine the travel distance of the cursor. The faster the gesture, the greater the distance the cursor will travel.
Single Finger Single Tap 	The "Single Finger Single Tap" gesture is used to: • Interrogate a point of interest on the MFD Main Format set to "Map" or Chart (remaining runway). • Select map icons on the MFD Main Format and MFD insets as well.

Cursor Control Touch ECDU Gestures	
Touch Screen Gesture	**Action**
Two Finger Move 	The "Two Finger Move" gesture is used to perform panning.
Pinch / Spread 	Pinch / Spread gesture is used for zoom and range control.

For example, the touch screen gestures interact with the MFD map cursor operations as follows:

The "Single Finger Move" gesture can be used to scroll the cursor over to an airport symbol on the map. The "Single Finger Single Tap" gesture will interrogate the airport and bring up a pop-up menu of all available information on that airport.

Moving the cursor via the "Single Finger Move" gesture over to the "COM" tab, and subsequently using the "Single Finger Single Tap" gesture allows the pilot to perform frequency management.

If the "Two Finger Move" gesture is performed anywhere on the map, it automatically enables panning mode. The mode is indicated by a different cursor shape and the ownship is placed in a filled blue circle. In panning mode, the cursor remains stationary on the map and applying the "Two Finger Move" gesture will pan the map behind the cursor. Panning mode remains active as long as the "Two Finger Move" gesture is applied on the touch screen.

Continuous panning can be maintained if the "Two Finger Move" gesture is used prior to parking the two fingers on the edge of the touch screen. Continuous panning can be turned on or off by toggling the Touch Continuous Panning LSK on the EFIS Settings Page 1 of 3. The default is the "Off" toggle setting.

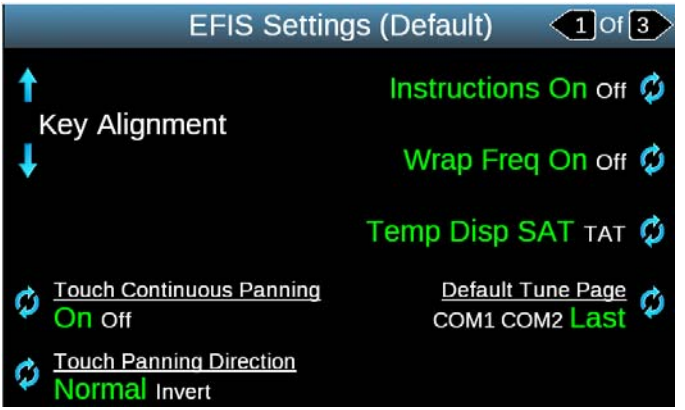
If the "B" button is pressed on the CCP to go into panning mode, and subsequently the "Two Finger Move" gesture is performed on the touch screen, panning will function as normal but will terminate automatically once the "Two Finger Move" gesture is released from the touch screen. If the "B" button is pressed on the CCP to go into panning mode and subsequently the "Single Finger Move" gesture is performed, it will be ignored, and no cursor actions will take place.

Any time panning mode is active or if the ownship has been panned away from its normal position, it will remain in the blue-filled circle. If the ownship is panned off screen with the "Two Finger Move" gesture, the filled circle representation will be parked at the edge of the map nearest to the actual location of the ownship. If the "Two Finger Move" gesture is released, the cursor shape is restored, and panning mode is no longer active.

The panning direction can also be changed by toggling the Touch Panning Direction LSK on the EFIS Settings Page 1 of 3. The default is the "Normal" toggle setting in which the "Two Finger Move" gesture to the left moves the map to the left. It can be toggled to the "Invert" setting as well, in which the "Two Finger Move" gesture to the left moves the map to the right. The panning direction will be selectable regardless of which setting of the Pointing Device is set on the Home Page 2 of 2.

The "Single Finger Move" gesture can then be used to place the cursor on the ownship symbol when it is away from its normal position, and using the "Single Finger Single Tap" gesture will return the map to its original location with the ownship in its normal location.

The Touch Panning Direction and Touch Continuous Panning options will be greyed out and not be selectable if there is a detected anomaly with the touch screen.



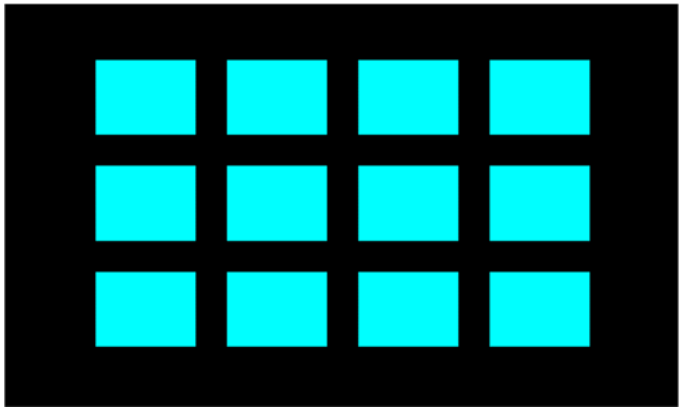
Panning Direction and Continuous Panning availability on the EFIS Settings Page 1 of 3

The cursor must be in-view for any cursor operations to be enabled including the pinch/spread range and zoom control and the two-finger pan. The cursor can also be used to select any of the icons at the bottom of the main or inset maps such as Display of Airways, Traffic, or North up Map using the "Single Finger Single Tap" gesture.

Touch Screen Maintenance

The Touch ECDU provides maintenance and functional test pages, allowing a field technician or maintenance personnel to verify operation of the touch screen when the aircraft is on the ground. It is recommended that these functional test pages be tested with conductive gloves.

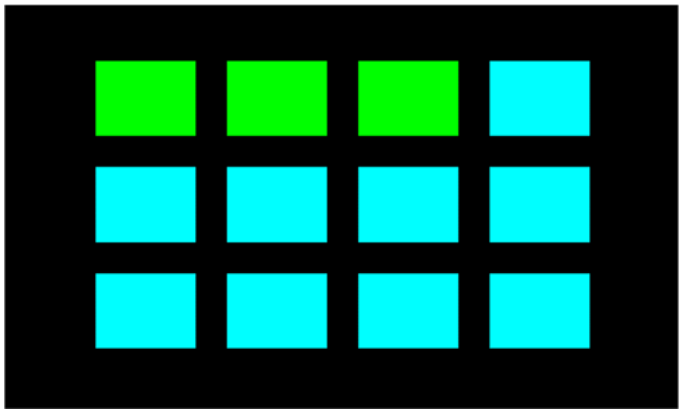
Press and hold LSK [1L], LSK [5L], LSK [1R] and LSK [5R] simultaneously for approximately 5 seconds. Once the 5 seconds have lapsed, the maintenance page will be visible:



Touch ECDU Maintenance Page 1- Inactive Touch Areas

The Touch ECDU Maintenance Page 1 consists of twelve touchable cyan areas which are in an inactive state.

The touchable areas become green once they are activated by the "Single Finger Single Tap" gesture. A touchable area will remain cyan if the Touch ECDU does not detect a touch in the area in question.

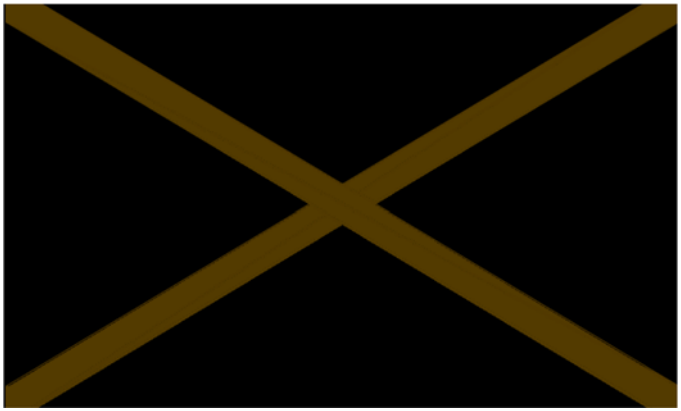


Touch ECDU Maintenance Page 1- Active Touch Areas in Green

Pressing the SEL button on the ECDU knob reverts all the touch areas back to the inactive state. If contact is made outside these touch areas, the screen will not display the touch areas, and will show a yellow color for as long as the operator is touching the screen.

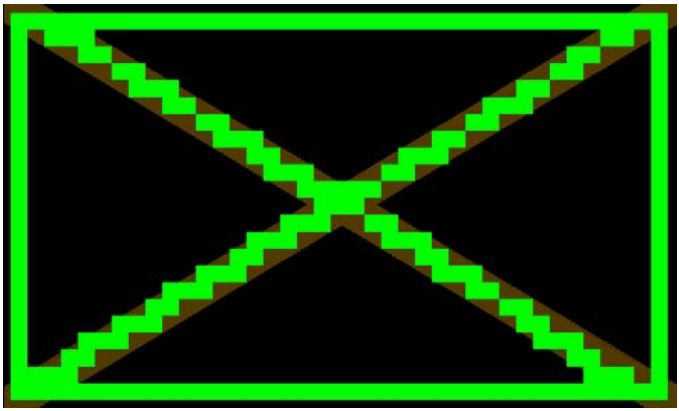
Pressing the NEXT key on the Touch ECDU displays Touch ECDU Maintenance Page 2.

The "X" pattern serves as a guideline to assist in verifying the projected capacitive sensors of the touch screen.

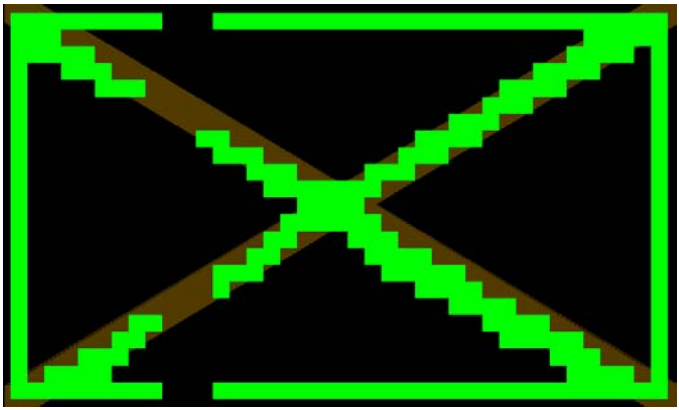


Touch ECDU Maintenance Page 2- Inactive "X" Pattern

Move a finger along the brown "X" pattern using the "Single Finger Move" gesture. A green colored line will be overlaid displaying a trace of the path of contact with the touch screen. Also outline the border along the edge of the touch screen display, ensuring in both cases that there are no broken segments that are not colored green. This confirms that every row and every column of the touch screen is working properly.



Touch ECDU Maintenance Page 2- Successful Test Pattern



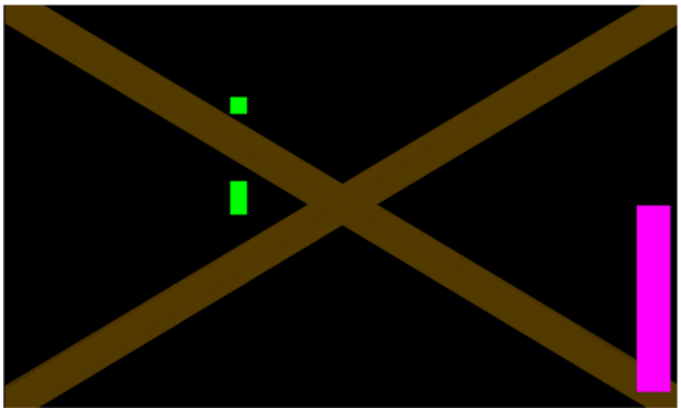
Touch ECDU Maintenance Page 2- Failed Test Pattern

Pushing the "SEL" key on the ECDU knob clears the green tracing and reverts back to the inactive "X" pattern in brown.

The operator can then perform a "Pinch" or "Spread" gesture on the Touch ECDU Maintenance Page 2. The purpose of this test is to verify multiple contacts being applied simultaneously to the touch surface.

Apply two fingers on the touch screen and repeatedly increase and decrease the separation between the two. These gestures will display a magenta colored vertical column right justified that will either increase or decrease in amplitude.

If the magenta column does not appear or does not fluctuate in height corresponding to the "Pinch" or "Spread" gestures, this functional test is considered a failure.



Touch ECDU Maintenance Page 2- Multi-Touch Verification using Pinch/Spread Gesture

Pressing the NEXT key on the Touch ECDU displays Touch ECDU Maintenance Page 1.

At any time, the operator can leave either of these maintenance-related functional test pages by pressing one of the following keys: PFD, MFD, ENG, TUNE, NAV BRG, HOME, Page Back, or MSG.

APPENDIX A – LOW ALTITUDE MODE (LAM)

Low Altitude Mode (LAM)

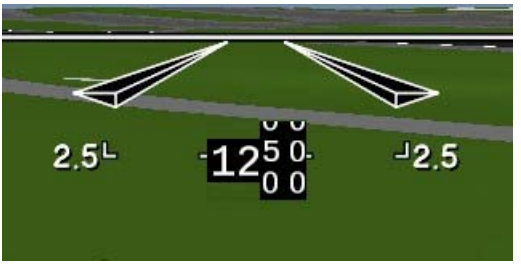
If the LOW ALTITUDE MODE is enabled, it displays an exaggerated representation of the VSI and RALT information to aid in low altitude flying. When the LAM option is enabled, the EFI allows the configuring of the arming and triggering AGL altitudes that affect the display of the LAM depiction.

A configured LOW ALTITUDE MODE INHIBIT discrete input is required which, when active, will remove and disarm the LAM depiction. The LAM arming altitude and triggering altitude is configurable from 50 feet to 2000 feet.

The system will be armed when LOW ALTITUDE MODE INHIBIT is inactive and the radio altitude has been above the configured armed altitude for two seconds. If LAM has been armed, the aircraft's radio altitude is less than or equal to the configured LAM triggering altitude, and LOW ALTITUDE MODE INHIBIT is inactive:

- The VSI will display full scale, non-morphing arc, with a black background and increase in size to obscure the bottom of the Altitude Tape and the right side of the Heading Tape.
- The barometric pressure setting, and actual vertical speed value is displayed within the VSI.
- The display of RALT will be enlarged and displayed in white digits on a black background.
- The RALT window displays the radio altitude with rolling ones and tens digits in increments of 10 ft. below 1000 ft. AGL, 50 ft. above 1000 ft. AGL, 5 meters below 300 meters AGL, and 20 meters above 300 meters AGL.

If the radio altitude is 30 feet greater than the LAM triggering altitude or the LOW ALTITUDE MODE INHIBIT discrete input is active, the VSI and RALT display will resume their normal depictions and behavior.



LAM RALT Depiction

LAM VSI Depiction

If the LAM depiction is enabled and the radio altitude transitions below a pilot-set RA Minimum, ALTITUDE is annunciated in red on a black background and boxed in red on the ADI. This annunciator remains displayed until the radio altitude transitions above the RA Minimum, or the LAM depiction is disabled due to a change in altitude or landing gear position.

INDEX

3

360° Compass Rose 71
3D MAP Depiction with TAWS Colors 137
3D Map View 133

A

Activate FPL LSK 190
ADC Reversion 162
ADC Revert Key 162
Add an Airport to the FPL 127
ADF Details Page 246
ADF Page 246
ADI 6
ADI Annunciators 14
ADI Status Bar 23
ADI SVS Terrain 11
After Landings layout 190
AIL 32
Aileron 32
Air Data 40
Aircraft Models 89, 153
Aircraft Symbol 6, 72
Airport Diagram with Ownship Symbol 145
Airport Filters 202
Airport Query - Charts Tab 124
Airport Query - COM Tab 123
Airport Query – Info Tab 126
Airport Query – Main Tab 122
Airport Query - WX Tab 125
Airport Symbols 96
Airspace Query 119
Airspeed Failure 49
Airspeed Indicator 42
Airspeed Miscompare 48
Airspeed Tape 42
Airspeed Tape Markings 43
Alphanumeric Keyboard 40

ALT COMP....21
Alternate Flight Plan page....190
Alternate FPL LSK....190
Altitude Failure....63
Altitude Miscompare....63
Altitude Select (ASEL) Data Block....40
Altitude Tape....62
Altitude Tape Failure Annunciation....63
Angle of Attack Indicator....55
ANK....40, 176
ANP/RNP Performance Box....70
AOA Caution Band....56
AOA Warning Band....56
Arc Compass Rose....72
Arrival Data....191
ASEL....216
ASPD COMP....21
AT/HD Revert Key....160
ATC Message Annunciator....23
ATT....21
ATT COMP....20
Attitude Direction Indicator....6
Attitude/Heading Reversion....160, 162
Auto Declutter....191, 192
Auto Landing Layout Delay Setting....189
Automatic Decluttering....101
Autopilot and Yaw Damper status annunciators....31
autopilot annunciation....31
Autopilot Caution Annunciators....32
Autopilot Status Annunciators....32
Autopilot warning annunciators....32
Autoranging....98

B

Baro....217
Baro Altitude Block....40
Baro Altitude Correction....40
Baro Altitude Data....40
Basic Control Philosophy....176
Basic Heading Up Map....93
Basic North Up Map....93
Beacon Mode....108

Bearing Data Blocks 79
Bearing Pointers 76
Brightness 194

C

camera view 133
CANCEL REVERT 160
CANCEL REVERT LSK 253
CAT II Excessive Deviation Pointers 83
CAT II Excessive IAS Deviation Arrows 84
CAT II Operations 81
Category II approach request 32
Chart FPL Options Page 235
chronometer 27
chronometer-PFD Page 1 218
Collocated Obstacle Types 114
COM Details 182, 243
COM radio tuning 241
COM Select 181, 242
Comparator Reset 20, 41, 48, 63
Compass Rose, MFD 93
Compressed Engine Display 92
Control Reversion 162
Control XSide 211
Controlled Airspace 113
Course and Bearing Pointers 75
Course Deviation Scale 76
Course Pointers 75
Cross Pointer Aligned 29
Current Window Heading 73
Cursor Panning Mode 128

D

DA MIN 192
Database Control 208
Decision Altitude 40
Declutter Limits List 201
Degraded Map States 130
Delete Layout Pop-Up 188
Departure Data 191
Detail Format Primary BRG Data Block (SRN) 80
deviation pointer 67

DISABLE PFD NOW LSK....253
DISP Revert Key....160, 253
Display Insets....223
Display of Airways....99
Display of Charts....141
Display of Controlled Airspace....113
Display of Engine Data....86, 91
Display of Flight Plan Status....87
Display of Map Data....93
Display of Obstacles....114
Display of Video Data....141
DME Hold....245
double cue cross pointer....29
DR Annunciator....22
dual cue aircraft symbol....6

E

ECDU....175
ECDU Entry State....177
ECDU FAIL Annunciator....24
ECDU Idle State....177
ECDU Knob....178
ECDU MFD Main Format - 3D Map....233
ECDU MFD Main Format - Chart....235
ECDU MFD Main format - Map....231
ECDU MFD Main Format - UniLink....234
ECDU MFD Main Format - Video....234
EFIS configuration pages....171
EFIS Database Control....208
EFIS Home Page 1....180
EFIS Home Page 2....193
EFIS Settings LSK....198
EFIS Settings Page 1....198
EFIS Settings Page 2....199
EFIS Settings Page 3....201
EFIS Status Page 2....208
EGPW Alert Annunciators....18
EGPWS....16
EIU Status....86
ELEV....32
Elevator....32
ENG Key....238

Engine Display Page 238
Excessive Deviation Annunciators 83
Excessive Glideslope Deviation 82
Excessive Indicated Airspeed Deviation 84
Excessive Localizer Deviation 81
Extended Runway Centerline -3D Map View 138
External Course Control 257
External Heading Control 257
External Reference Select Control 257
External Weather Radar Control 257

F

Fail Annunciators 21
Fast / Slow Indicator 58
FGS 31
flight director failure annunciator 30
Flight Director Steering Cues 29
Flight Guidance 29
Flight Guidance Lateral Mode Block 33
Flight Guidance Status Annunciators 31
Flight Guidance Vertical Mode 35
Flight ID 248
Flight Path Angle Reference Cue 30, 227
Flight Path Marker 30
Flight Plan and Map Symbols 96
Flight Plan Display 95
Flight Plan Status 87
FMS Annunciators 22
FMS Control 256
FMS Heading Bug 74
FMS Level of Service (LOS) Annunciations 39
FMS Message Alert 25
FMS Status Block 23
FMS Suggested COM Frequencies 243
FP Angle Ref Cue LSK 227
FP Marker 227
Frequency Wrapping LSK 198
Full Attitude failure 21
Full Engine Detail Display 92
Full Time Annunciators and Status, PFD 89
FUNCTION NOT AVAILABLE 176
FUNCTION NOT AVAILABLE banner 26, 161

G

georeferenced airport diagrams....145
Ghost Horizontal Line....8
Glideslope Pointer....66
GPWS INOP....111
Graphical METARS....194
Green Band....44

H

HDG COMP....21
HDG/TRK....213
High airways....99
High Speed Warning Bands....45
HOME Pages....180
Horizontal Situation Indicator....71
HSI....71

I

IDENT key....256
ILS Miscompare Functions....85
Indicated Airspeed Window....46
Inset Map....201
Instructions for entry....179
Instructions LSK....198
INTEG Annunciator....22
Inward pointing arrows....178

K

Key Alignment LSKs....198

L

LAM....267
Lateral ANP/RNP Indicator....69
Lateral Deviation Failure....68
Lateral Deviation Scale....67
Layouts LSK....187
Layouts Page....187
Level of Service....39
Lightening Symbols....111

Lightning 111
Line Obstacles 140
LNAV 39
LNV/VNV 39
Localizer Source 68
Long Range Navigation 64
LOS 39
Low airways 100
Low Altitude Mode 267
LOW ALTITUDE MODE INHIBIT 267
Low-speed Band 44
Low-speed Warning Bands 44
LP39
LPV 39
LRN 64
LRN Mode Annunciation 23
LSK Arrows and Icons 178
LSK Icons 178

M

Mach Trim 32
Mach Value 46
Main Map 201
Map Cursor 115
Map Cursor Operations 115
Map Data 87
Marker Beacon Annunciators 19
Marker Beacons 19
Max Targets LSK 183
Maximum Operating Limit 45
Menu Time Out 200
Menu Time Out Control 200
Message Annunciators 23
Messages Page 255
MFD DISPLAY 91
MFD display formats 163
MFD Display of AFCS 153
MFD Inset Format Options Keys 237
MFD Map Range 192
MFD Page 1 ..... 230, 231
MFD Page 2 232
MFD Page 3 232
MFD Startup page 230

MFD Status Bar 131
Minimum Airspeed 46
minimum barometric altitude 40
Minimums Control page 191
Minimums LSK 191
Miscellaneous Speed Awareness Functions 46
Miscompare Annunciators 20
Model 5101 ECDU 175
MSG Key 255
MTRIM 32

N

nadir symbol 8
Name 203
NAV / BRG Source Select Page 1 ..... 249, 252
NAV Details Page 245, 246
NAV radio tuning 244
NAV Source Select Page 1 252
Navigation Data Blocks 78
navigation source 66
NDB Query 121
NEXRAD 108
NEXRAD and AIRMET Data 110
NEXRAD and Winds Data 109
NEXT Key 256
Next waypoint 23
Night Mode Plate 146
No Threat 103
No Touch Screen Available 206
Normal Operating Range Bands 44

O

Obstacles 139
Off-Screen Ownship 129
Outward pointing arrows 178

P

Page Back key 256
Panning Direction 198
PFD 5
PFD Display of AFCS 90

PFD fixed format space 163
PFD Format 5
PFD FPL Stat Inset Options 226
PFD Main Page 1 212
PFD Main Page 2 226
PFD MAP Inset Options 223
PFD Map Inset Page 1 223
PFD Map Inset Page 2 224
PFD Map Inset Page 3 225
PFD Selectable Display Space 86
PFD selectable space 163
PFD Video Inset Options 225
Pilot Profile Control 203
Pilot WX Radar Options page 184
PITCH 21
PITCH COMP 20
Pitch Scale 7
Pitch Trim 32
Pointing Device 205
Pop-Up Menu Instructions 231
POS Annunciator 22
PREV Key 256
Primary Bearing Data Block 79
Primary Bearing Data Block for LRN 80
Primary Bearing Data Block for SRN 80
Primary Flight Display 5
Primary Interface 175
Primary Nav Data Block 78
Primary Nav Data Block for LRN 78
Primary Nav Data Block for SRN 78
Primary Source Annunciators 22
Proximate Threat 103
Pseudo-localizer 68

R

RA bug 41
RA FAIL 41
RA MIN 192
Rad Alt Test 227
Radar Settings 187
Radio Altitude Data 41
radio altitude minimum 41
Radio Altitude Miscompares 41

RALT COMP 21
Range 94
Range Control 215
Range, MFD Map 94
Red Tick and Band 45
Reduced Format Primary BRG Data Block (SRN) 79
Reduced Format Secondary Nav Data Block 79, 80
Remove FPL 190
Resolution Advisory 103
reversionary display mode 160, 253
ROLL 21
ROLL COMP 20
Roll Index 9
RUD 32
Rudder 32

S

Satellite Weather 108
Satellite WX 108
Save Layout Pop-Up 188
SCITS 108
Second Glideslope Pointer 66
Secondary Bearing data block 80
Secondary Interfaces 257
Secondary Nav Data Block 79
Selected Heading Bug 74
Selected Track Mode 77
Setting Values with an ANK 179
Short Obstacle Types 114
Short Range Navigation 64
Single Channel Flight Director Mode Annunciations 38
single cue aircraft symbol 6
Sky Pointer 9
slip / skid indicator 10
Speed Bug Data Block 55
Speed Bugs 50, 51, 52, 53, 54
Speed Options page 228
Speed Trend 48
SRN 64
standard color set 3
START UP layouts 189
Startup Database Status Display 170

SUA 113
Supported Airspeed Markings 50
SVS Terrain Depiction 11
System Status Page 207
System Status Page 1 171
System Status Page 2 172

T

Tall Obstacle Types 114
TAWS 16
TAWS Alert Annunciators 16
TAWS Colors 195
TAWS mode annunciator 111
Taxi View 133, 136
TCAS 104
TCAS FAIL 104
TCAS No Bearing Targets 104
TCAS OFF 104
TCAS TA ONLY 104
TCAS TEST 104
TERR 111, 112
TERR INH 111, 112
TERR N/A 112
Terrain (708) 112
Terrain Alert Annunciators 16
Terrain Mode Annunciations 112
Terrain Presentation 112
TFC POPUP ENABLE 103
Toggle arrows 178
Top of Climb on Map 97
Top of Descent on Map 97
Touch ECDU 175
Touch ECDU Cursor 115
Touch ECDU Cursor Panning 128
Touch Screen Gesture - Charts 143
Touch Screen Gesture - ECDU Cursor 115
Touch Screen Gesture - Range 94
Traffic 102
Traffic Advisory 103
Traffic Altitude Filtering 104
Traffic and Terrain Pop-Up Formats 166
Traffic Annunciators 19
TRAFFIC Caution Annunciator 19

Traffic LSK 183
Traffic Mode Annunciators 104
TRAFFIC OPTIONS page 183
Traffic Symbols 103
TRAFFIC Warning Annunciator 20
TRIM 32
Tune Pages 240

U

UniLink 197
UniLink ATC MSG annunciator 23
Universal TAWS Terrain 111
Unusual Attitude Display 7
User Interface 175

V

V-bars 29
V-Bars Aligned 29
Vector Indication 76
Vertical Deviation Pointers 65
Vertical Deviation Scale 64
Vertical Failure Deviation 65
Vertical Profile 107
Vertical Speed Indicator 60
Vertical Waypoint Alert 25
VFE 46
VFE1 46
Video Data 88
VOR or TACAN Source 68
VOR Query 120
VP mode 107
VSI 60
VSI Failure Annunciation 61

W

WAAS LOS status annunciators 23
Waypoint Display 96
Waypoint Search 147
Waypoint Search Page 236
Weather 105
weather mode annunciator block 105

Weather Presentation 105
Weather Radar Mode Annunciators 105
White Band 44
Wind Vector 76
Wind Vector - X/Y Component Indication 76
WX Brightness 200
WX Mode LSK 184
Wx Rdr Controls LSK 184

X

XPDR (ATC) Details Page 247
XPDR (ATC) Page 247

Y

yaw damper annunciation (YD) 31
Yellow Band 45

Z

zenith symbol 8