Cockpit Display of Traffic Information (CDTI) and Airport Moving Map Industry Survey

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Final Report — August 2016
DOT-VNTSC-FAA-16-14

Prepared for:
Federal Aviation Administration
Human Factors Division
800 Independence Avenue, SW
Washington, DC 20591

U.S. Department of Transportation
John A. Volpe National Transportation Systems Center

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REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	August 2016	Final Report

4. TITLE AND SUBTITLE
Cockpit Display of Traffic Information (CDTI) and Airport Moving Map Industry Survey

5a. FUNDING NUMBERS
FA16; FAN2

6. AUTHOR(S)
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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
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5b. CONTRACT NUMBER

8. PERFORMING ORGANIZATION REPORT NUMBER
DOT-VNTSC-FAA-16-14

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Department of Transportation
Federal Aviation Administration
Advanced Concepts & Technology Development Office
Human Factors Division (ANG-C1)
800 Independence Avenue, SW
Washington, D.C. 20591

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES
Program Manager: Regina Bolinger and Tom McCloy PhD

12a. DISTRIBUTION/AVAILABILITY STATEMENT

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)
This document provides an overview of Cockpit Display of Traffic Information (CDTI) products as of May 2016, including those with airport moving map functionality, and airport moving map applications without traffic depiction. This document updates and replaces the Volpe Center's 2009 airport moving map industry survey. The information for this report was gathered through industry contacts, websites, and online product brochures. This report was conducted in support of the Federal Aviation Administration (FAA), but the information is intended to be of use to anyone interested in CDTI and airport moving map products. Nineteen manufacturers and two research organizations participated in this industry survey. Each provided a description of software and hardware components (when applicable), including display characteristics, depiction of traffic, airport moving map information elements, and other functions and capabilities. Participating manufacturers were classified into three categories based on their products: CDTI Installed, CDTI Portable, and Airport Moving Map Only (without traffic depiction). Note that although some manufacturers provide a portable CDTI function, a CDTI is NOT considered an Electronic Flight Bag (EFB) function per AC 120-76C, and can not be authorized for use for Part 121, 125, 135, 91F and 91K operations via the AC.

14. SUBJECT TERMS
Cockpit Display of Traffic Information, CDTI, Airport Moving Map, AMM , Airport Moving Map Display, AMMD, Surface Moving Map, SMM, avionics, industry survey, flight deck technology, moving map display, airport map, traffic symbology, traffic display

15. NUMBER OF PAGES
199

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. 239-18
298-102

SI (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in²	square inches	645.2	square millimeters	mm^2
ft²	square feet	0.093	square meters	m^2
yd²	square yard	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi²	square miles	2.59	square kilometers	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft³	cubic feet	0.028	cubic meters	m^3
yd³	cubic yards	0.765	cubic meters	m^3
		NOTE: volumes greater than 1000 L shall be shown in m^3		
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
oz	ounces	28.35	grams	g
		TEMPERATURE (exact degrees)		
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
		ILLUMINATION		
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m^2	cd/m^2
		FORCE and PRESSURE or STRESS		
lbf	poundforce	4.45	newtons	N
lbf/in²	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
		VOLUME		
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	cubic meters	35.314	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
mL	milliliters	0.034	fluid ounces	fl oz
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
g	grams	0.035	ounces	oz
		TEMPERATURE (exact degrees)		
°C	Celsius	1.8C+32	Fahrenheit	°F
		ILLUMINATION		
lx	lux	0.0929	foot-candles	fc
cd/m^2	candela/m^2	0.2919	foot-Lamberts	fl
		FORCE and PRESSURE or STRESS		
N	newtons	0.225	poundforce	lbf
kPa	Kilopascals	0.145	poundforce per square inch	lbf/in^2

SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380. (Revised March 2003)

Acknowledgements

This technical report was prepared by the Aviation Human Factors Division at the Volpe National Transportation Systems Center. This research was completed with funding from the Federal Aviation Administration (FAA) Human Factors Division (ANG-C1) in support of the Aircraft Certification Service Avionics Branch (AIR-130). We would like to thank our FAA program managers, Regina Bolinger (ANG-C1) and Tom McCloy (formerly ANG-C1), as well as our technical sponsor Cathy Swider (AIR-134). We also thank Michelle Yeh (AIR-134) and Colleen Donovan (formerly ANG-C1) for their valuable guidance and feedback. Lastly, we thank the many manufacturers and research organizations who generously provided information for the industry survey.

The views expressed herein are those of the authors and do not necessarily reflect the views of the Volpe National Transportation Systems Center or the United States Department of Transportation.

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Contents

List of Tables ..... **ix**

List of Acronyms ..... **xi**

Executive Summary ..... **xiii**

1. Introduction **1**

2. Technical Approach **5**

1.1 Participating Manufacturers and Research Organizations 5

1.2 Methods 7

3. Industry Overview **9**

4. CDTI Manufacturers **39**

4.1 Installed CDTI Manufacturers 39

Aspen Avionics 39

Astronautics 45

Aviation Communication & Surveillance Systems (ACSS) 52

The Boeing Company 59

Dynon Avionics 66

Garmin 72

GENESYS Aerosystems 81

Honeywell 90

L-3 Communications 100

Rockwell Collins, Inc. 106

4.2 Portable CDTI Manufacturers 112

Advanced Flight Systems, Inc. (AFS) 112

AvMap 117

FlightPrep, Inc. 122

ForeFlight, LLC 127

SkyVision 132

X-Avionics, LLC 137

5. Airport Moving Map Only Manufacturers **141**

Jeppesen (Product 1 of 3) 141
Jeppesen (Product 2 of 3) 145
Jeppesen (Product 3 of 3) 149
Lufthansa Systems 154
TerraVision Flight Deck Applications 161
6. Research Organizations 167
MITRE 167
NASA Ames Research Center 172
References 177
Appendix A: Additional CDTI and Airport Moving Map Publications 181

List of Tables

Table 1. Participants 5

Table 2. Approvals/Compliance 11

Table 3. CDTI Traffic Symbols 18

Table 4. Airport Moving Map Information Elements 30

Table 5. CDTI and Airport Moving Map Capabilities 36

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List of Acronyms

Abbreviation	Term
AC	Advisory Circular
ACAS	Airborne Collision and Avoidance System
ADS-B	Automatic Dependent Surveillance-Broadcast
AFD	Airport Facility Directory
ASA	Aircraft Surveillance Applications
ASAS	Aircraft Surveillance Applications Systems
CAA	Civil Aviation Authority
CAASD	Center for Advanced Aviation System Development
CAS	Crew Alerting System
CDTI	Cockpit Display of Traffic Information
EASA	European Aviation Safety Agency
EFB	Electronic Flight Bag
EFIS	Electronic Flight Information System
FAA	Federal Aviation Administration
FMS	Flight Management System
GPS	Global Positioning System
IMA	Integrated Modular Avionics
ITP	In-Trail Procedures
MFD	Multi-Function Display
NASA	National Aeronautics and Space Administration
NMEA	National Marine Electronics Association
PED	Portable Electronic Device
PFD	Primary Flight Display
STC	Supplemental Type Certificate
TAS	Traffic Alerting System
TC	Type Certificate
TCAS	Traffic Alert and Collision Avoidance System
TIS	Traffic Information System
TIS-B	Traffic Information System – Broadcast
TSO	Technical Standard Order

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Executive Summary

This industry survey provides an overview of currently available Cockpit Display of Traffic Information (CDTI) and airport moving map products and capabilities as of May 2016. This report was conducted in support of the Federal Aviation Administration (FAA) but the information is intended to be of use to anyone interested in CDTIs and airport moving map displays. Nineteen manufacturers and two research organizations participated in this industry survey. Each provided a description of software and hardware components (when applicable), including display characteristics, traffic symbols and airport moving map information elements (e.g., runways, taxiways, ramp areas, etc.), as well as other functions and capabilities.

Participating manufacturers were classified into three categories based on their products: CDTI Installed, CDTI Portable, and Airport Moving Map Only (without traffic depiction). Note that the FAA considers only an airport moving map an Electronic Flight Bag (EFB) function, per Advisory Circular (AC) 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Electronic Flight Bag. The FAA does not consider a CDTI an EFB function. AC 120-76C is not applicable to Part 91 (excluding subparts F and K) operators, however, so these operators may utilize functions and capabilities that are not authorized for use by Part 121, 135, 91F and 91K operators. This industry survey is divided into eight main sections:

- Section 1 provides a brief introduction to the survey and lists applicable FAA regulatory and guidance material and industry documents.
- Section 2 lists the participants and describes the method for the survey.
- Section 3 provides an overview of products, including four tables summarizing product approvals and compliance, traffic symbols, airport moving map elements, and capabilities offered by manufacturers and research organizations.
- Section 4 contains detailed information tables for 19 manufacturers that provide CDTI products.
- Section 5 includes detailed information tables for three manufacturers with only airport moving map applications that do not currently support traffic depiction.
- Section 6 includes detailed information tables for two research organizations.
- The References section includes regulatory and guidance material, industry and research documents listed in this document.
- Appendix A provides a list of documentation related to CDTI and airport moving maps in addition to those provided in the References section.

The material presented in each detailed information table was gathered through collaboration with the participating manufacturers, from information provided at demonstrations, and in websites or brochures. A picture of each display and/or application is provided where available. For manufacturer displays and applications, information on FAA approvals received or in progress is also included as applicable. This document updates and replaces the Volpe Center's 2009 *Surface Moving Map Industry Survey* (Yeh & Eon).

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1. Introduction

Cockpit Displays of Traffic Information (CDTIs) provide a dynamic display of traffic to the flightcrew to support position awareness and visual acquisition of traffic out the window. In some implementations, In-Trail Procedures (ITP) and traffic indications may also be supported. CDTIs may also have airport moving map a capabilities. These implementations incorporate an underlay of the airport surface, allowing the depiction of surface traffic, which may also include Automatic Dependent Surveillance-Broadcast (ADS-B) equipped vehicles. CDTIs and airport moving map applications may also be developed and used exclusively of one another, for example, an airport moving map application that displays ownship but does not present traffic.

The implementation of CDTIs and airport moving map displays may vary widely in terms of the type of hardware platform used (e.g., a dedicated display, multi-function display or portable electronic device), traffic symbology, airport moving map information elements depicted, and functions that may be performed (e.g. decluttering, zooming, taxi route guidance).

The purpose of this effort is to provide the Federal Aviation Administration (FAA) with industry trends about current CDTI and airport moving map products through periodic industry surveys. Although this document was prepared in support of the FAA, it is also intended to be useful to anyone interested in CDTI and airport moving map technologies, including other aviation or transportation authorities, customers, manufacturers, and researchers. This document is not intended to evaluate manufacturer compliance with specific FAA standards.

This industry survey provides an overview of currently available CDTI and airport moving map products as of May 2016. Manufacturers and research organizations were identified for this industry survey based on participation in previous surveys and a web search. Although efforts were made to provide as comprehensive a survey as possible, some manufacturers declined to participate or did not respond to the invitation. In total, 19 manufacturers and two research organizations participated in this industry survey.

Participating manufacturers were classified into three categories based on their products: CDTI Installed, CDTI Portable, and Airport Moving Map Only (without traffic depiction). The FAA only considers an airport moving map an EFB function, per Advisory Circular (AC) 120-76C, *Guidelines for the Certification, Airworthiness, and Operational Use of Electronic Flight Bag*. A CDTI is not an EFB function, per the AC. AC 120-76C is not applicable to Part 91 (excluding subparts F and K) operators, however, so those operators may utilize functions and capabilities that are not authorized for use by Part 121, 135, 91F and 91K operators.

The FAA provides guidance for CDTIs and airport moving maps in the following documents:

- Advisory Circular (AC) 20-172B, *Airworthiness Approval for ADS-B In Systems and Applications*;
- Technical Standard Order (TSO)-C165a, *Electronic Map Display Equipment for Graphical*

Depiction of Aircraft Position (Own-Ship);
- Technical Standard Order (TSO)-C195b, *Avionics Supporting Automatic Dependent Surveillance – Broadcast (ADS-B) Aircraft Surveillance Applications (ASA);*

FAA guidance is also provided for obtaining authorization for the operational use of airport moving map in:

- Advisory Circular (AC) 120-76C, *Guidelines for the Certification, Airworthiness, and Operational Use of Electronic Flight Bag*; and
- *Surface Ownship – Operator Checklist – FAA Job Aid – 02-14-2014* (at http://fsims.faa.gov/).

FAA guidance regarding flight deck displays in general in provided in:

- Advisory Circular (AC) 25-11B, *Electronic Flight Displays*; and
- Technical Standard Order (TSO) C113a, *Airborne Multipurpose Electronic Displays*.

Additional guidance for displays, airborne equipment, electronic map displays, traffic indications and alerts, and symbology is provided in the following industry documents:

- RTCA DO-160G, *Environmental Conditions and Test Procedures for Airborne Equipment;*
- RTCA DO-178C, *Software Considerations in Airborne Systems and Equipment Certification*;
- RTCA DO-200B, *Standards for Processing Aeronautical Data;*
- RTCA DO-254, *Design Assurance Guidance for Airborne Electronic Hardware;*
- RTCA DO-257A, *Minimum Operational Performance Standards for the Depiction of Navigational Information on Electronic Maps*;
- RTCA DO-272D, *User Requirements for Aerodrome Mapping Information*;
- RTCA DO-317B, *Minimum Operational Performance Standards (MOPS) for Aircraft Surveillance Applications (ASA) System*; and
- SAE AS AS8034B, *Minimum Performance Standard for Airborne Multipurpose Electronic Displays*.

The remainder of this industry survey is divided into seven sections:

- Section 2 lists the participants and describes the method for the survey.
- Section 3 provides an overview of products, including four tables summarizing product approvals and compliance, traffic symbols, airport moving map elements, and capabilities offered by manufacturers and research organizations.
- Section 4 contains detailed information tables for 19 manufacturers that provide CDTI products.
- Section 5 includes detailed information tables for three manufacturers with only airport moving map applications that do not currently support traffic depiction.
- Section 6 includes detailed information tables for two research organizations.
- The References section includes regulatory and guidance material, industry and research documents listed in this document.
- Appendix A provides a list of documentation related to CDTI and airport moving maps in

addition to those provided in the References section.

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2. Technical Approach

1.1 Participating Manufacturers and Research Organizations

Nineteen manufacturers and two research organizations participated in this industry survey. Although all efforts were made to be as comprehensive as possible, some manufacturers declined to participate or did not respond to the invitation. Manufacturers were classified into the following categories based on their products:

- *CDTI Installed* – manufacturers of installed CDTI products that may also provide airport moving map functionality, or a separate airport moving map application without traffic depiction (10 manufacturers)
- *CDTI Portable* – manufacturers of portable CDTI products (including software) that may also provide airport moving map functionality, or a separate airport moving map application without traffic depiction[1] (6 manufacturers)
- *Airport Moving Map Only* – manufacturers with airport moving map applications that do not currently support traffic depiction (3 manufacturers)

Table 1 lists participating manufacturers by product type followed by research organizations. The table includes the name of the manufacturer or research organization, their product(s), and a website where more information can be found. Although the displays used by research organizations are not implemented products, the results of these efforts are publicly available, and manufacturers may incorporate some of the lessons learned in their product development.

Table 1. Participants

Manufacturer or Research Organization	Product(s)	Website
CDTI Installed Manufacturers		
Aspen Avionics	Evolution: 1000C3 Pro PFD, 1500C3 PFD+MFD, 2000C3 PFD+MFD, 2500C3 PFD+MFD, 1000 MFD, 500 MFD, VFR PFD, 1000 Pro PFD, 1500 PFD+MFD, 2000 PFD+MFD, 2500 PFD+ MFD, 1000H MFD, 500H MFD, 1000H Pro PFD, 1500H PFD+ MFD, 2000H PFD+MFD, 2500H PFD+MFD	www.aspenavionics.com
Astronautics	Universal Cockpit Display of Traffic Information (UCDTI) including Airport Moving Map (AMM), NEXIS™ Flight-Intelligence System	www.astronautics.com

[1] Portable CDTIs can not be authorized for use per AC 120-76C.

Table 1. Participants (continued)

Manufacturer or Research Organization	Product(s)	Website
CDTI Installed Manufacturers		
Aviation Communication & Surveillance Systems (ACSS)	SafeRoute™ (software suite): Universal Cockpit Display of Traffic Information (U-CDTI) U-CDTI option 1: Cockpit Display of Traffic Information (CDTI) U-CDTI option 2: Surface Area Movement Management (SAMM) U-CDTI option 3: CDTI Assisted Visual Separation (CAVS) U-CDTI option 4: Merging and Spacing (M&S) U-CDTI option 5: In-Trail Procedures (ITP)	http://www.acss.com/
Boeing	787 Display and Crew Alerting System (DCA) and Integrated Surveillance System (ISS) 747-8 Integrated Display System (IDS)	www.boeing.com
Dynon Avionics	SkyView	www.dynonavionics.com
Garmin	Apps: Garmin Pilot® (available for iOS and Android), SafeTaxi® (available on Garmin Pilot, certified and portable avionics) Certified Avionics: G500, G600, G950, G1000, G2000, G3000, G5000, GMX 200, GTN 6XX/7XX series Portable GPS: Aera 5XX series, Aera 7XX series, GPSMAP 49X series, GPSMAP 6XX series Sport/Experimental Avionics: G3X, G3X-Touch	www.garmin.com
GENESYS Aerosystems	3D Synthetic Vision EFIS IDU III, IDU-680, IDU-450	http://genesys-aerosystems.com
Honeywell	Honeywell 2D Airport Moving Map, Honeywell CDTI SURF, Honeywell 3D Airport Moving Map, Honeywell CDTI AIR-B and VSA	www.honeywell.com
L-3 Communications	Lynx NGT-9000	http://www.l-3com.com
Rockwell Collins	Pro Line Fusion® Integrated Avionics System	www.rockwellcollins.com
CDTI Portable Manufacturers[2]		
Advanced Flight Systems, Inc. (AFS)	AFS-5400, 5500, 5600, 5800	www.advanced-flight-systems.com
AvMap	EKP V, EKP IV, EKPIV pro	www.avmap.us/index.php

[2] Portable CDTIs can not be authorized for use per AC 120-76C.

Table 1. Participants (continued)

Manufacturer or Research Organization	Product(s)	Website
CDTI Portable Manufacturers		
FlightPrep, Inc.	ChartBook-3,Helm X650, ChartCase Professional	www.flightprep.com
ForeFlight	ForeFlight Mobile	www.foreflight.com
SkyVision	Xtreme Vision	www.skyvisionxtreme.com
X-Avionics, LLC	Xavion	xavion.com
Airport Moving Map Only Manufacturers		
Jeppesen	Jeppesen Airport Moving Map software and database for EFB systems, Jeppesen FliteDeck Pro 7.X, AMM Module Jeppesen Mobile Solutions: Jeppesen Mobile FliteDeck, Jeppesen FliteDeck Pro, Jeppesen Mobile FliteDeck VFR JeppView Solutions: JeppView FliteDeck, JeppView MFD	www.jeppesen.com
Lufthansa Systems	Lido Airport Moving Map	www.lhsystems.com
Terra Vision Flight Deck Applications	FollowTheGreen	www.terravision.co.il
Research Organizations		
MITRE	Center for Advanced Aviation System Development (CAASD) CDTI prototype	www.mitre.org
NASA-Ames	Airport Moving Map Airport Moving Map Standard Display & Magic Carpet Display	www.nasa.gov/centers/ames

1.2 Methods

To gather information for this industry survey, the Volpe Center contacted CDTI and airport moving map manufacturers and research organizations. Once the manufacturer or research organization agreed to participate, the Volpe Center worked with the representative to collect information about each product. The information collected is intended to highlight human factors and usability aspects of the interface (e.g., the information depicted and the interactivity provided) rather than the technical aspects of implementation. Each participating manufacturer and research organization was asked for the following information regarding their products:

- Product name
- Website(s) where more information can be found
- A brief overview of the product and product images

- FAA approvals received or in progress, and compliance with regulatory and guidance material
- Characteristics of the hardware system(s) on which the application can be displayed (i.e., portable/installed, size, resolution, controls)
- Operating system and software capabilities (e.g., decluttering, panning, and zooming)
- Airport moving map data format (i.e., geo-referenced electronic chart or database driven), and the airport moving map information elements depicted
- Traffic display information (e.g., data source, symbol images, and data tag information)

A table containing this information for each participant was initially drafted by the Volpe Center based on previous information obtained from industry contacts, demonstrations, websites, and brochures. The draft table was sent to the representative at each participating manufacturer or research organization to review and edit, as needed. This document reflects the results of this collaborative effort.

3. Industry Overview

This section presents three tables that summarize the information provided by manufacturers and research organizations about their products:

- Table 2. Approvals/Compliance
- Table 3. CDTI Traffic Symbols
- Table 4. Airport Moving Map Information Elements
- Table 5. CDTI and Airport Moving Map Capabilities

Table 2. Approvals/Compliance summarizes approvals and compliance for all 19 manufacturers. Research organizations are not included, as they generally do not seek approval for research displays. A filled circle (•) indicates that the manufacturer currently has an approval. An open circle (o) indicates that the manufacturer is in the process of obtaining an approval. The products listed are installed CDTIs unless otherwise noted. A single asterisk (*) beside a manufacturer indicates that the manufacturer is a portable CDTI. Two asterisks (**) indicate that the manufacturer currently only provides an airport moving map application without traffic depiction. Note that three vendors did not indicate approvals or compliance with regulatory and guidance material in their respective surveys.

The following 22 documents listed below are applicable to CDTIs and/or airport moving maps, as well as the hardware they may be presented on. These documents were included in manufacturer survey responses, and are summarized in Table 2. Approvals/Compliance. To simplify the table, document versions are not indicated, but are included in each individual manufacturer's survey. It is important to note that the FAA currently limits the display of ownship on portable electronic devices (PEDs) to surface operations only, at ground speeds of 80 knots or less.

FAA Guidance Material:

- TSO-C112c, *ATCRBS/Mode S Airborne Equipment*
- TSO-C113a, *Airborne Multipurpose Electronic Displays*
- TSO-C147a, *TAS Airborne Equipment*
- TSO-C154c, *UAT ADS-B Equipment Operating on Frequency of 978 MHz*
- TSO-C165a, *Electronic Map Display Equipment for Graphical Depiction of Aircraft Position (Own-Ship)*
- TSO-C166b, *Extended Squitter ADS-B and Traffic Information*
- TSO-C195b, *Avionics Supporting ADS-B ASA*

- AC 20-159, *Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems*
- AC 20-165A, *Airworthiness Approval of ADS-B Out Systems*
- AC 20-172B, *Airworthiness Approval for ADS-B In Systems and Applications*
- AC 25-11B, *Electronic Flight Deck Displays*
- AC 120-76C, *Guidelines for the Certification, Airworthiness, and Operational Use of Electronic Flight Bags*

Industry Guidance Documents:

- RTCA DO-160, *Environmental Conditions and Test Procedures for Airborne Equipment*
- RTCA DO-178, *Software Considerations in Airborne Systems and Equipment Certification*
- RTCA DO-181, *MOPS for ATCRBS/Mode S Airborne Equipment*
- RTCA DO 200, *Standards for Processing Aeronautical Data*
- RTCA DO-254, *Design Assurance Guidance for Airborne Electronic Hardware*
- RTCA DO-257, *MOPS for the Depiction of Navigation Information on Electronic Maps*
- RTCA DO-260, *MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B*
- RTCA DO-272, *User Requirements for Aerodrome Mapping Information*
- RTCA DO-282, *MOPS for UAT ADS-B*
- RTCA DO-317, *MOPS for ASA System*

Table 2. Approvals/Compliance

Note: All information was provided by the manufacturers and has not been verified with the FAA.

	Authority			Certificate			Technical Standard Orders (TSOs)								Advisory Circulars (ACs)						Industry Documents										
Manufacturer Products	FAA	EASA	Other	TC	STC	Aircraft	C112	C113	C147	C154	C165	C166	C195	Other	20-159	20-165A	20-172B	25-11B	120-76C	Other	RTCA DO-160	RTCA DO-178	RTCA DO-181	RTCA DO-200	RTCA DO-254	RTCA DO-257	RTCA DO-260	RTCA DO-272	RTCA DO-282	RTCA DO-317	Other
Advanced Flight Systems (AFS)* AFS-5400, 5500, 5600, 5800																															
Aspen Avionics Evolution: 1000C3 Pro PFD, 1500C3 PFD+MFD, 2000C3 PFD+MFD, 2500C3 PFD+MFD, 1000 MFD, 500 MFD, VFR PFD, 1000 Pro PFD, 1500 PFD+MFD, 2000 PFD+MFD, 2500 PFD+MFD, 1000H MFD, 500H MFD, 1000H Pro PFD, 1500H PFD+MFD, 2000H PFD+MFD, 2500H PFD+MFD	•	•		•	•	TC: R22, R44, R66. STC: Approved Model List of Classes I, II and III Part 23 airplanes		•			•		•	C-157a (incomplete)		•	•				•	•		•		•				•	

Table 2. Approvals/Compliance (continued)

	Authority			Certificate			Technical Standard Orders (TSOs)								Advisory Circulars (ACs)						Industry Documents										
Manufacturer Products	FAA	EASA	Other	TC	STC	Aircraft	C112	C113	C147	C154	C165	C166	C195	Other	20-159	20-165A	20-172B	25-11B	120-76C	Other	RTCA DO-160	RTCA DO-178	RTCA DO-181	RTCA DO-200	RTCA DO-254	RTCA DO-257	RTCA DO-260	RTCA DO-272	RTCA DO-282	RTCA DO-317	Other
Astronautics Universal Cockpit Display of Traffic Information (UCDTI) including Airport Moving Map (AMM), NEXIS™ Flight-Intelligence System	•	•			•	A319, A320, A321					•	•			•				•	Order 8900.1	•	•			•	•				•	DO-275a
Aviation Communication & Surveillance Systems (ACSS) SafeRoute™ (software suite)	•				•	B757, B767		•	•	•	•	•	•		•	•	•		•		•	•	•	•	•	•	•	•	•	•	
AvMap* EKP V, EKP IV, EKPIV pro																															
Boeing 787 Display and Crew Alerting System (DCA) and Integrated Surveillance System (ISS) 747-8 Integrated Display System (IDS)	•	•		•		B787, B747-8						•	•			•	•				•	•	•	•	•	•	•	•		•	Various (7)
Dynon Avionics SkyView							•					•				•					•										

Table 2. Approvals/Compliance (continued)

Manufacturer Products	Authority			Certificate			Technical Standard Orders (TSOs)								Advisory Circulars (ACs)						Industry Documents										
	FAA	EASA	Other	TC	STC	Aircraft	C112	C113	C147	C154	C165	C166	C195	Other	20-159	20-165A	20-172B	25-11B	120-76C	Other	RTCA DO-160	RTCA DO-178	RTCA DO-181	RTCA DO-200	RTCA DO-254	RTCA DO-257	RTCA DO-260	RTCA DO-272	RTCA DO-282	RTCA DO-317	Other
FlightPrep* ChartBook-3,Helm X650, ChartCase Professional	•																		•	AC 91-78, Order 8900.1		•									
ForeFlight* ForeFlight Mobile	•		Nav Canada																•												
GENESYS Aerosystems 3D Synthetic Vision EFIS IDU III, IDU-680, IDU 450	•	•			•	Various		•						Various (20)						20-129, 20-131A, 23.1311-1B, 25-15, 90-80B	•	•									Various (27)
Garmin[3] G500, G600	•	•	ANAC, TCCA	•	•	Various		•	•		•		•	Various (15)		•	•		•	Various (# not provided)	•	•		•	•	•			•	Various (# not provided)

[3] Garmin offers installed, portable and software products.

Table 2. Approvals/Compliance (continued)

Manufacturer Products	Authority			Certificate			Technical Standard Orders (TSOs)								Advisory Circulars (ACs)						Industry Documents										
	FAA	EASA	Other	TC	STC	Aircraft	C112	C113	C147	C154	C165	C166	C195	Other	20-159	20-165A	20-172B	25-11B	120-76C	Other	RTCA DO-160	RTCA DO-178	RTCA DO-181	RTCA DO-200	RTCA DO-254	RTCA DO-257	RTCA DO-260	RTCA DO-272	RTCA DO-282	RTCA DO-317	Other
Garmin (continued) G950, G1000, G2000, G3000, G5000, GTN 6XX/7XX series	•	•	ANAC, TCCA	•	•	Various	•	•	•		•		•	Various (15)		•	•		•	Various (# not provided)	•	•	•	•	•	•				•	Various (# not provided)
GMX 200	•	•	ANAC, TCCA	•	•	Various		•	•					C63c, C110a,C118		•			•	Various (# not provided)	•	•		•							Various (4)
Garmin Pilot®, SafeTaxi®, Aera 5XX series, Aera 7XX series, GPSMAP 49X series, GPSMAP 6XX series, G3X, G3X-Touch																															
Honeywell Honeywell CDTI AIR-B	•	•		•		Not provided		•			•		•	C119c			•	•		120-86		•								•	DO-289,DO-338,DO-243, DO-259, DO-319

Table 2. Approvals/Compliance (continued)

Manufacturer Products	Authority			Certificate			Technical Standard Orders (TSOs)								Advisory Circulars (ACs)						Industry Documents										
	FAA	EASA	Other	TC	STC	Aircraft	C112	C113	C147	C154	C165	C166	C195	Other	20-159	20-165A	20-172B	25-11B	120-76C	Other	RTCA DO-160	RTCA DO-178	RTCA DO-181	RTCA DO-200	RTCA DO-254	RTCA DO-257	RTCA DO-260	RTCA DO-272	RTCA DO-282	RTCA DO-317	Other
Honeywell (continued) Honeywell CDTI VSA	•	•		•		Not provided		•			•		•	C119c			•	•		120-86		•								•	DO-289,DO-338,DO-243, DO-259, DO-314
Honeywell CDTI SURF	•	•		•		Not provided		•			•		•	C119c			•	•		120-86		•								•	DO-289,DO-338,DO-243, DO-259, DO-322
Honeywell 2D Airport Moving Map	•	•		•		Not provided		•			•				•							•		•		•				
Honeywell 2D Airport Moving Map	•	•		•		Not provided																•		•			•				

Table 2. Approvals/Compliance (continued)

Manufacturer Products	Authority			Certificate			Technical Standard Orders (TSOs)								Advisory Circulars (ACs)						Industry Documents										
	FAA	EASA	Other	TC	STC	Aircraft	C112	C113	C147	C154	C165	C166	C195	Other	20-159	20-165A	20-172B	25-11B	120-76C	Other	RTCA DO-160	RTCA DO-178	RTCA DO-181	RTCA DO-200	RTCA DO-254	RTCA DO-257	RTCA DO-260	RTCA DO-272	RTCA DO-282	RTCA DO-317	Other
Jeppesen** Jeppesen Airport Moving Map software and database for EFB systems	•	•		•	•	Various													•					•		•		•			
Jeppesen FliteDeck Pro 7.X, AMM Module, Mobile FliteDeck, FliteDeck Pro, Mobile FliteDeck VFR, JeppView FliteDeck, JeppView MFD	•	•																	•					•		•		•			
L-3 Communications Lynx NGT-9000	•				•	Various	•	•	•	•		•	•	C145c, C157a		•	•				•	•	•	•	•		•		•	•	DO-229D, DO 267A
Lufthansa Systems** Lido Airport Moving Map	o	•									•				•			•	•	Order 8900.1		•		•		•		•			DO-291, ARINC 816

Table 2. Approvals/Compliance (continued)

Manufacturer Products	Authority			Certificate			Technical Standard Orders (TSOs)								Advisory Circulars (ACs)						Industry Documents										
	FAA	EASA	Other	TC	STC	Aircraft	C112	C113	C147	C154	C165	C166	C195	Other	20-159	20-165A	20-172B	25-11B	120-76C	Other	RTCA DO-160	RTCA DO-178	RTCA DO-181	RTCA DO-200	RTCA DO-254	RTCA DO-257	RTCA DO-260	RTCA DO-272	RTCA DO-282	RTCA DO-317	Other
Rockwell Collins Pro Line Fusion® Integrated Avionics System	•			•		EMB Legacy 450, 500					•										•	•				•					
SkyVision* Xtreme Vision																													•		DO-267B
TerraVision Flight Deck Applications** FollowTheGreen	•		CAA								•				•							•		•				•			ARINC 816
X-Avionics LLC* Xavion																															

Error! Reference source not found. presents all CDTI traffic symbols used by the 15 CDTI manufacturers, and two research organizations with CDTI products. The symbols have been categorized based on their attributes (i.e., airborne vs. ground, proximate vs. non-proximate). Symbols will generally appear in more than one column, as each symbol has more than one attribute (e.g., airborne, directional and proximate). The products listed are installed CDTIs unless otherwise noted. A single asterisk (*) beside a manufacturer indicates that the manufacturer is a portable CDTI.

Table 3. CDTI Traffic Symbols

Note: All information was provided by the manufacturers and has not been verified with the FAA.

		Airborne Symbols												Ground Symbols											
														Aircraft									Vehicle		
Manufacturer Products	Ownship	Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Coupled	Selected	Off-Scale	Caution (Traffic Advisory or Alert)	Warning	Other	Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Caution (Traffic Alert)	Warning	Other	Directional	Non-Directional	Data Source
Advanced Flight Systems (AFS)* AFS-5400, 5500, 5600, 5800																									ADS-B, TIS-B, TIS, TAS
Aspen Avionics Evolution 10003C Pro PFD, Evolution 1500C3 PFD+MFD, Evolution 2000C3 PFD+MFD Evolution 2500C3 PFD+MFD, Evolution 1000 MFD, Evolution 1000, Evolution 1500, Evolution 2000, Evolution 2500																									ADS-B, TAS, TCAS

Table 3. CDTI Traffic Symbols (continued)

		Airborne Symbols												Ground Symbols											
														Aircraft									Vehicle		
Manufacturer Products	Ownship	Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Coupled	Selected	Off-Scale	Caution (Traffic Advisory or Alert)	Warning	Other	Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Caution (Traffic Alert)	Warning	Other	Directional	Non-Directional	Data Source
Astronautics Universal Cockpit Display of Traffic Information (UCDTI) including Airport Moving Map (AMM), NEXIS™ Flight-Intelligence System																									ADS-B, TIS-B

Table 3. CDTI Traffic Symbols (continued)

Manufacturer Products	Ownship	Airborne Symbols													Ground Symbols												Data Source
															Aircraft										Vehicle		
		Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Coupled	Selected	Off-Scale	Caution (Traffic Advisory or Alert)	Warning	Other	Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Caution (Traffic Alert)	Warning	Other	Directional	Non-Directional	
Aviation Communication & Surveillance Systems (ACSS) SafeRoute™ (software suite)																						 Selected			ADS-B, TIS-B

Table 3. CDTI Traffic Symbols (continued)

Manufacturer Products	Ownship	Airborne Symbols												Ground Symbols											
														Aircraft									Vehicle		
		Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Coupled	Selected	Off-Scale	Caution (Traffic Advisory or Alert)	Warning	Other	Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Caution (Traffic Alert)	Warning	Other	Directional	Non-Directional	Data Source
ACSS (continued) SafeRoute™ (software suite)																									ADS-B, TIS-B
																									ADS-B, TIS-B, TCAS, TAS
AvMap* EKP V, EKP IV, EKPIV pro	 white, black or magenta																								Mode C

Table 3. CDTI Traffic Symbols (continued)

Manufacturer Products	Ownship	Airborne Symbols												Ground Symbols											Data Source
														Aircraft									Vehicle		
		Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Coupled	Selected	Off-Scale	Caution (Traffic Advisory or Alert)	Warning	Other	Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Caution (Traffic Alert)	Warning	Other	Directional	Non-Directional	
Boeing 787 Display and Crew Alerting System (DCA) and Integrated Surveillance System (ISS) 747-8 Integrated Display System (IDS)	(MAP)																								TCAS
	(PLAN)												 ITP											ADS-B

Table 3. CDTI Traffic Symbols (continued)

Manufacturer Products	Ownship	Airborne Symbols												Ground Symbols											
														Aircraft									Vehicle		
		Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Coupled	Selected	Off-Scale	Caution (Traffic Advisory or Alert)	Warning	Other	Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Caution (Traffic Alert)	Warning	Other	Directional	Non-Directional	Data Source
Dynon Avionics SkyView																								ADS-B, TIS-B, TIS
FlightPrep* ChartBook-3,Helm X650, ChartCase Professional	Variety of icons available																							TIS
ForeFlight* ForeFlight Mobile																									ADS-B

Table 3. CDTI Traffic Symbols (continued)

Manufacturer Products	Ownship	Airborne Symbols												Ground Symbols											
														Aircraft									Vehicle		
		Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Coupled	Selected	Off-Scale	Caution (Traffic Advisory or Alert)	Warning	Other	Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Caution (Traffic Alert)	Warning	Other	Directional	Non-Directional	Data Source
Garmin[4] Garmin Pilot®, SafeTaxi®, G500, G600, G950, G1000, G2000, G3000, G5000, GMX 200, GTN 6XX/7XX series, Aera 5XX series, Aera 7XX series, GPSMAP 49X series, GPSMAP 6XX series, G3X, G3X-Touch									Green brackets around symbol.																ADS-B

Table 3. CDTI Traffic Symbols (continued)

Manufacturer Products	Ownship	Airborne Symbols												Ground Symbols											Data Source
														Aircraft									Vehicle		
		Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Coupled	Selected	Off-Scale	Caution (Traffic Advisory /Alert)	Warning / Resolution Advisory	Other	Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Caution (Traffic Alert)	Warning	Other	Directional	Non-Directional	
Garmin (continued) Garmin Pilot®, SafeTaxi®, G500, G600, G950, G1000, G2000, G3000, G5000, GMX 200, GTN 6XX/7XX series, Aera 5XX series, Aera 7XX series, GPSMAP 49X series, GPSMAP 6XX series, G3X, G3X-Touch																									TIS
																									TAS, TCAS

Table 3. CDTI Traffic Symbols (continued)

Manufacturer Products	Ownship	Airborne Symbols												Ground Symbols											Data Source
														Aircraft									Vehicle		
		Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Coupled	Selected	Off-Scale	Caution (Traffic Advisory or Alert)	Warning	Other	Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Caution (Traffic Alert)	Warning	Other	Directional	Non-Directional	
GENESYS Aerosystems 3D Synthetic Vision EFIS IDU III, IDU-680, IDU-450																									ADS-B, TIS-B
																									TCAS I and II, TAS, TIS-A
Honeywell Honeywell 2D Airport Moving Map, Honeywell CDTI SURF, Honeywell 3D Airport Moving Map, Honeywell CDTI AIR-B and VSA																									ADS-B, ADS-R, TIS-B, TCAS

Table 3. CDTI Traffic Symbols (continued)

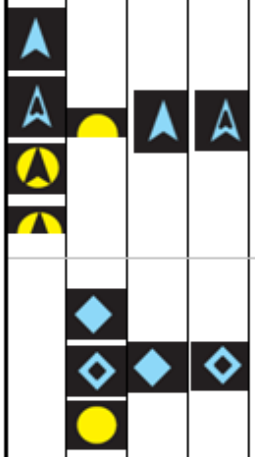
Manufacturer Products	Ownship	Airborne Symbols												Ground Symbols										Data Source
														Aircraft								Vehicle		
		Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Coupled	Selected	Off-Scale	Caution (Traffic Advisory /Alert)	Warning / Resolution Advisory	Other	Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Caution (Traffic Alert)	Warning	Other	Directional	Non-Directional	
Honeywell (continued) Honeywell 2D Airport Moving Map, Honeywell CDTI SURF, Honeywell 3D Airport Moving Map, Honeywell CDTI AIR-B and VSA																									ADS-B
L-3 Communications Lynx NGT-9000																								ADS-B, ADS-R, TIS-B, TAS
																								TAS

Table 3. CDTI Traffic Symbols (continued)

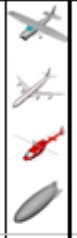
Manufacturer Products	Ownship	Airborne Symbols												Ground Symbols											Data Source
														Aircraft									Vehicle		
		Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Coupled	Selected	Off-Scale	Caution (Traffic Advisory or Alert)	Warning	Other	Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Caution (Traffic Alert)	Warning	Other	Directional	Non-Directional	
L-3 Communications (continued) Lynx NGT-9000																									ADS-B, ADS-R, TIS-B
SkyVision* Xtreme Vision																									ADS-B
																									TIS-B
X-Avionics LLC* Xavion																									ADS-B

Table 3. CDTI Traffic Symbols (continued)

Manufacturer Products	Ownship	Airborne Symbols												Ground Symbols												Data Source
														Aircraft										Vehicle		
		Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Designated	Selected	Off-Scale	Caution (Traffic Advisory or Alert)	Warning	Other	Directional	Non-Directional	Proximate	Non-Proximate	Full Data Quality	Limited Data Quality	Caution (Traffic Alert)	Warning	Other	Directional	Non-Directional		
Research Organizations																										
MITRE CAASD CDTI prototype																									ADS-B
NASA Ames Airport Moving Map Standard Display & Magic Carpet Display																										N/A

Table 4 shows the airport information elements depicted on the airport moving map each of the 15 manufacturers and two research organizations with airport moving map applications. A filled circle (•) indicates that the manufacturer currently supports a given capability. An open circle (o) indicates that a capability is under development. The products listed are installed CDTIs unless otherwise noted. A single asterisk (*) beside a manufacturer indicates that the manufacturer is a portable CDTI. Two asterisks (**) indicate that the manufacturer currently only provides an airport moving map application without traffic depiction.

Table 4. Airport Moving Map Information Elements

Note: All information was provided by the manufacturers and has not been verified with the FAA.

	Data Format		Map Elements																
Manufacturer Products	Geo-referenced	Database Driven	Ownship	Runways	Runway Centerlines	Runway Labels	Taxiways	Taxiway Centerlines	Taxiway Labels	Hold Lines	Non-Movement Areas	Ramp Areas	Grassy Areas	Buildings	Building Labels	Route Guidance	Surface Traffic	Surface Indications & Alerts	Other
Advanced Flight Systems, Inc. (AFS)* AFS-5400, 5500, 5600, 5800	•	•		•		•	•		•			•		•	•				
Aspen Avionics Evolution: 1000C3 Pro PFD, 1500C3 PFD+MFD, 2000C3 PFD+MFD, 2500C3 PFD+MFD, 1000 MFD, 500 MFD, VFR PFD, 1000 Pro PFD, 1500 PFD+MFD, 2000 PFD+MFD, 2500 PFD+MFD, 1000H MFD, 500H MFD, 1000H Pro PFD, 1500H PFD+MFD, 2000H PFD+MFD, 2500H PFD+MFD	•	•		•		•	•		•			•		•	•				

Table 4. Airport Moving Map Information Elements (continued)

Manufacturer Products	Data Format		Map Elements																
	Geo-referenced	Database Driven	Ownship	Runways	Runway Centerlines	Runway Labels	Taxiways	Taxiway Centerlines	Taxiway Labels	Hold Lines	Non-Movement Areas	Ramp Areas	Grassy Areas	Buildings	Building Labels	Route Guidance	Surface Traffic	Surface Indications & Alerts	Other
Astronautics Universal Cockpit Display of Traffic Information (UCDTI) including Airport Moving Map (AMM), NEXIS™ Flight-Intelligence System		•		•	•	•	•		•	•	•	•	•	•			•		
Aviation Communication & Surveillance Systems (ACSS) SafeRouteTM (software suite)		•		•	•	•	•		•	•	•	•	•	•		•	•		
AvMap* EKP V, EKP IV, EKPIV pro	•		 white, black or magenta	•	•	•	•		•	•	•	•		•	•				PAPI lights
Boeing 787 Display and Crew Alerting System (DCA) and Integrated Surveillance System (ISS) 747-8 Integrated Display System (IDS)	•	•	 (MAP)  (PLAN)	•	•	•	•		•	•	•	•		•	•				Deicing areas, parking stands, construction, helipads, water, service roads

Table 4. Airport Moving Map Information Elements (continued)

Manufacturer Products	Data Format		Map Elements																
	Geo-referenced	Database Driven	Ownship	Runways	Runway Centerlines	Runway Labels	Taxiways	Taxiway Centerlines	Taxiway Labels	Hold Lines	Non-Movement Areas	Ramp Areas	Grassy Areas	Buildings	Building Labels	Route Guidance	Surface Traffic	Surface Indications & Alerts	Other
FlightPrep* ChartBook-3,Helm X650, ChartCase Professional, iChart 2.5	•		Variety of icons available	•		•	•		•		•	•	•	•	•				
ForeFlight* ForeFlight Mobile	•			•		•	•		•		•	•	•	•	•	•	•	•	
Garmin[4] Garmin Pilot®, SafeTaxi®, G500, G600, G950, G1000, G2000, G3000, G5000, GMX 200, GTN 6XX/7XX series, Aera 5XX series, Aera 7XX series, GPSMAP 49X series, GPSMAP 6XX series, G3X, G3X-Touch	•			•	•	•	•		•	•	•	•	•	•	•		•		Hot spots, airport beacons

[4] Garmin offers installed, portable, and software products.

Table 4. Airport Moving Map Information Elements (continued)

Manufacturer Products	Data Format		Map Elements															
	Geo-referenced	Database Driven	Ownship	Runways	Runway Centerlines	Runway Labels	Taxiways	Taxiway Centerlines	Taxiway Labels	Hold Lines	Non-Movement Areas	Ramp Areas	Grassy Areas	Buildings	Building Labels	Route Guidance	Surface Traffic	Surface Indications & Alerts	Other
Honeywell Honeywell 2D Airport Moving Map, Honeywell CDTI SURF, Honeywell 3D Airport Moving Map, Honeywell CDTI AIR-B and VSA	•			•	•	•	•	•	•	•		•	•	•	•	•	•	•	Hot spots
Dynon Avionics SkyView	•	•		•		•	•		•		•	•		•	•				Magenta line depicts ground track
Jeppesen** Jeppesen Airport Moving Map software and database for EFB systems	•	•		•	•	•	•		•	•	•	•	•	•	•				Closed ramp/taxiway, parking stand, construction, vertical structures (e.g., trees), airport beacons, various markings, procedural notes
Jeppesen FliteDeck Pro 7 & AMM Module	•	•		•	•	•	•		•	•	•	•	•	•	•	•			
Jeppesen Mobile FliteDeck, FliteDeck Pro	•			•		•	•		•		•	•	•	•	•	•			

Table 4. Airport Moving Map Information Elements (continued)

Manufacturer Products	Data Format		Map Elements																
	Geo-referenced	Database Driven	Ownship	Runways	Runway Centerlines	Runway Labels	Taxiways	Taxiway Centerlines	Taxiway Labels	Hold Lines	Non-Movement Areas	Ramp Areas	Grassy Areas	Buildings	Building Labels	Route Guidance	Surface Traffic	Surface Indications & Alerts	Other
Jeppesen (continued)** Jeppesen Mobile FliteDeck VFR	•	•		•		•	•		•		•	•	•	•	•	•			Closed ramp/taxiway, parking stand, construction, vertical structures (e.g., trees), airport beacons, various markings, procedural notes
JeppView MFD	•		Varies	•		•	•		•		•	•	•	•	•	•			
JeppView FliteDeck	•			•		•	•		•		•	•	•	•	•	•			
Lufthansa Systems** Lido Airport Moving Map	•	•		•	•	•	•	•	•	•	•	•		•	•	o		•	CAT I/II/III Holding, parking stand
Rockwell Collins Pro Line Fusion® Integrated Avionics System		•		•	•	•	•	•	•	•	•	•		•	•				Hot spots, construction, helipads, windsocks, airport reference point, water, de-icing areas

Table 4. Airport Moving Map Information Elements (continued)

Manufacturer Products	Data Format		Map Elements																
	Geo-referenced	Database Driven	Ownship	Runways	Runway Centerlines	Runway Labels	Taxiways	Taxiway Centerlines	Taxiway Labels	Hold Lines	Non-Movement Areas	Ramp Areas	Grassy Areas	Buildings	Building Labels	Route Guidance	Surface Traffic	Surface Indications & Alerts	Other
TerraVision Flight Deck Applications** FollowTheGreen		•		•	•	•	•	•	•	•	•	•	•	•	•			•	Closed runway/taxiway, service reads, parking stand, runway exit line, runway shoulder
Research Organizations																			
MITRE CAASD CDTI prototype		•		•	•	•	•		•		•	•	•	•			•	•	
NASA Ames Airport Moving Map Standard Display & Magic Carpet Display		•		•		•	•		•			•	•	•		•	•	•	Departure spots

Table 5 lists CDTI and airport moving map capabilities for all manufacturers and research organizations. The products listed are CDTIs unless otherwise noted. The products listed are installed CDTIs unless otherwise noted. A single asterisk (*) beside a manufacturer indicates that the manufacturer is a portable CDTI. Two asterisks (**) indicate that the manufacturer currently only provides an airport moving map application without traffic depiction.

Table 5. CDTI and Airport Moving Map Capabilities

Note: All information was provided by the manufacturers and has not been verified with the FAA.

Manufacturer Products	Operating System	Decluttering	Panning	Autozoom	Manual Zoom
Advanced Flight Systems, Inc. (AFS)* AFS-5400, 5500, 5600, 5800	Linux	•	•		•
Aspen Avionics Evolution: 1000C3 Pro PFD, 1500C3 PFD+MFD, 2000C3 PFD+MFD, 2500C3 PFD+MFD, 1000 MFD, 500 MFD, VFR PFD, 1000 Pro PFD, 1500 PFD+MFD, 2000 PFD+MFD, 2500 PFD+MFD, 1000H MFD, 500H MFD, 1000H Pro PFD, 1500H PFD+MFD, 2000H PFD+MFD, 2500H PFD+MFD	Custom	•	•	•	•
Astronautics Universal Cockpit Display of Traffic Information (UCDTI) including Airport Moving Map (AMM), NEXIS™ Flight-Intelligence System	Microsoft, Linux (custom)	•	•		•
Aviation Communication & Surveillance Systems (ACSS) SafeRoute™ (software suite)	Linux, iOS	•			•
AvMap* EKP V	Windows	•	•	•	•
EKP IV, EKPIV pro	Custom	•	•	•	•
Boeing 787 Display and Crew Alerting System (DCA) and Integrated Surveillance System (ISS), 747-8 Integrated Display System (IDS)	Custom	•	•		•
Dynon Avionics SkyView	Linux	•	•		•
FlightPrep* ChartBook-3,Helm X650, ChartCase Professional	Windows	•	•		•
ForeFlight* ForeFlight Mobile	iOS	•	•		•
Garmin[5] Garmin Pilot®, SafeTaxi®,	iOS, Android	•	•	•	•
G500, G600, G950, G1000, G2000, G3000, G5000, GMX 200, GTN 6XX/7XX series, Aera 5XX series, Aera 7XX series, GPSMAP 49X series, GPSMAP 6XX series, G3X, G3X-Touch	Custom	•	•	•	•
GENESYS Aerosystems 3D Synthetic Vision EFIS, IDU III, IDU-680, IDU-450	Custom	•	•		•

[5] Garmin offers installed, portable and software products.

Table 5. CDTI and Airport Moving Map Capabilities (continued)

Manufacturer Products	Operating System	Decluttering	Panning	Autozoom	Manual Zoom
Honeywell Honeywell 2D Airport Moving Map, Honeywell CDTI SURF, Honeywell 3D Airport Moving Map, Honeywell CDTI AIR-B and VSA	Custom	•	•	•	•
Jeppesen** Jeppesen Airport Moving Map software and database for EFB systems, Jeppesen FliteDeck Pro 7.X & AMM Module	Windows	•	•		•
Jeppesen Mobile FliteDeck, Jeppesen FliteDeck Pro, JeppView FliteDeck, JeppView MFD	Windows, iOS	•	•		•
Jeppesen Mobile FliteDeck VFR	Windows, iOS	•	•	•	•
L-3 Communications Lynx NGT-9000	Windows, Linux	•			•
Lufthansa Systems** Lido Airport Moving Map	Windows, iOS	•	•	•	•
Rockwell Collins Pro Line Fusion® Integrated Avionics System	Custom	•	•		•
SkyVision* Xtreme Vision	Windows, iOS	•	•		•
TerraVision Flight Deck Applications** FollowTheGreen	Windows, Linux	•	•		•
X-Avionics LLC* Xavion	iOS	•	•	•	•
Research Organizations					
MITRE CAASD CDTI prototype	Linux		•		•
NASA Ames Airport Moving Map Standard Display & Magic Carpet Display	Linux	•			•

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4. CDTI Manufacturers

The statements made in these tables are based solely on the information that was provided by each manufacturer and has not been verified with the FAA. Per AC 120-76C, a CDTI is not an EFB function, and can NOT be authorized for use by Part 121, 125, 135, 91F and 91K operators.

4.1 Installed CDTI Manufacturers

This section includes surveys for manufacturers with installed CDTI products. These products may also provide airport moving map functionality, or in a few cases, may provide a separate airport moving map application that does not depict traffic information. Note that Garmin is included in this section, but also offers portable CDTIs and software products.

Aspen Avionics	**Location:** Albuquerque, NM
Product(s)	Evolution 1000C3 Pro PFD Evolution 1500C3 PFD+MFD Evolution 2000C3 PFD+MFD Evolution 2500C3 PFD+MFD Evolution 1000 MFD Evolution 500 MFD Evolution VFR PFD Evolution 1000 Pro PFD Evolution 1500 PFD+MFD Evolution 2000 PFD+MFD Evolution 2500 PFD+MFD Evolution 1000H MFD Evolution 500H MFD Evolution 1000H Pro PFD Evolution 1500H PFD+MFD Evolution 2000H PFD+MFD Evolution 2500H PFD+MFD
Website(s)	• www.aspenavionics.com/ • http://www.aspenavionics.com/support/
Product Overview(s)	
The Aspen Systems consist of a Primary Flight Display that is used as a CDTI, and Multi-function displays that can be used for both CDTI and airport moving maps. Display of ground traffic on the airport moving map is not presently supported.	

Aspen Avionics	**Location:** Albuquerque, NM
 *Images courtesy of Aspen Avionics*	
Approvals/Compliance	
Authority	☒ FAA Fort Worth Aircraft Certification Office ☒ EASA ☐ Other
TC/STC	☒ TC Aircraft Robinson R22, R44, R66 ☒ STC Aircraft: Approved Model List of Classes I, II and III Part 23 airplanes.
TSO	☐ TSO-C112e, ATCRBS/Mode S Airborne Equipment ☒ TSO-C113, Airborne Multipurpose Electronic Displays (TSO-C113) ☐ TSO-C147a, TAS Airborne Equipment ☐ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☒ TSO-C165, Electronic Map Display Equipment for Graphical Depiction of Aircraft ☐ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☒ TSO-C195a, Avionics Supporting ADS-B ASA (Incomplete) ☒ Other: TSO-C157a (Incomplete)
FAA Regulatory and Guidance Material	☐ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems ☒ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☒ AC 20-172B, Airworthiness Approval for ADS-B In Systems and Applications ☐ AC 25-11B, Electronic Flight Deck Displays ☐ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Portable Electronic Flight Bags ☐ Other
Industry Documents	☒ RTCA DO-160E, Environmental Conditions and Test Procedures for Airborne Equipment ☒ RTCA DO-178B, Software Considerations in Airborne Systems and Equipment Certification (Software Level: C) ☐ RTCA DO-181E, MOPS for ATCRBS/Mode S Airborne Equipment ☒ RTCA DO-200A, Standards for Processing Aeronautical Data ☐ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware ☒ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps ☐ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☐ RTCA DO-272D, User Requirements for Aerodrome Mapping Information ☐ RTCA DO-282B, MOPS for UAT ADS-B ☒ RTCA DO-317A, MOPS for ASA System ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☐ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for

Aspen Avionics	**Location:** Albuquerque, NM
	ATSA-SURF Application ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☐ Other
Other	
Hardware	
Hardware Platform(s)	PFD, MFD
Display Size	6.0” for single panel (x2 and x3 for dual and triple displays)
Display Resolution	400 x 760
Brightness	Transreflective LCD display readable in direct sunlight. Autobrightness and manual adjustment.
Controls	☒ Buttons ☐ Keyboard (e.g., USB, Bluetooth) ☐ Mouse/cursor ☐ Stylus ☐ Touch Screen ☒ Other: Rotary knobs
Capabilities	
Operating System	Aspen Proprietary
Decluttering	☒ Yes: Range, phase of flight, and pilot selectable ☐ No
Panning	☒ Yes: Rotary knob and cursor based ☐ No
Autozoom	☒ Yes: Based on current flight leg ☐ No
Manual zooming	☒ Yes: Dedicated zoom buttons ☐ No
Indications and Alerts	Traffic Alerts (when available) are presented as an amber symbol. A coverage indication is presented when available. Traffic is only inhibited by the sensor.

Aspen Avionics	**Location:** Albuquerque, NM
Taxi Route Guidance	The taxi diagram is a geo-referenced NACO airport diagram. The ownship is superimposed on the display.  *Image courtesy of Aspen Avionics*
Noteworthy Features and Applications	Angle of attack and synthetic vision are available on the PFD and MFDs.
Airport Moving Map Information Elements Depicted	
Airport Moving Map Data Format	☒ Geo-referenced: Raster ☒ Database driven
Ownship	
Runways	NACO airport diagram - Black
Runway Centerlines	NACO airport diagram – Not shown
Runway Labels	NACO airport diagram -Black text
Taxiways	NACO airport diagram - Grey
Taxiway Centerlines	NACO airport diagram – Not shown
Taxiway Labels	NACO airport diagram – Black text
Hold Lines	NACO airport diagram – Not shown
Non-movement Areas	NACO airport diagram – Not shown
Ramp Areas	NACO airport diagram - Grey
Grassy Areas	NACO airport diagram – Not shown
Buildings	NACO airport diagram - Black
Building Labels	NACO airport diagram – Black text
Other	

Aspen Avionics	**Location:** Albuquerque, NM
Traffic Display	
Data Source and Targets Displayed	☒ ADS-B: (Combined Max of 31 targets) ☒ TIS: (Combined Max of 31 targets) ☒ TIS-B: (Combined Max of 31 targets) ☒ TAS: (Combined Max of 31 targets)
Traffic Display Range	Minimum: 2 NM Maximum: 40 NM Default: 5 NM
Traffic Symbols	

Symbol Type	Description	Data Source	Image
Traffic Advisory, Directional	Traffic Advisory. If directionality is provided, the TA will be directional. For Blended ADS-B traffic, the ID can be display on the MFD. The TA parameters are generated by the traffic sensor, and controlled by the system the CDTI is interfaced to.	TAS or TCAS 1, or blended with ADS-B	
Traffic Advisory, Non-Directional	The TA parameters are generated by the traffic sensor, and controlled by the system the CDTI is interfaced to.	TAS or TCAS 1, or blended with ADS-B	
Proximity Alert, Directional	Proximity Alert. If directionality is provided from the traffic sensor, the directionality will be shown. For ADS-B or Blended ADS-B traffic, the ID can be display on the MFD. < 1200ft and 6 NM of ownship	TAS or TCAS 1, or blended with ADS-B or ADS-B alone	
Proximity Alert, Non-Directional	< 1200ft and 6 NM of ownship	TAS or TCAS 1, or blended with ADS-B	
Other traffic, Directional	Other traffic If directionality is provided from the traffic sensor, the directionality will be shown. For ADS-B or Blended ADS-B traffic, the ID can be display on the MFD. > 1200 ft and 6 NM of ownship	TAS or TCAS 1, or blended with ADS-B or ADS-B alone	
Other traffic, Non-Directional	> 1200 ft and 6 NM of ownship	TAS or TCAS 1, or blended with ADS-B	

Aspen Avionics	**Location:** Albuquerque, NM
Traffic Symbol Data Tag Information	
Data Tag Information	☒ Flight ID ☒ Altitude ☐ Actual ☒ Relative ☐ Geometric ☐ Ground speed ☒ Vertical direction/speed ☒ Above/Below 500' (climb/descent arrows) ☐ Other: ☒ Horizontal velocity vector ☒ Invalid/Unavailable data ☒ Traffic category ☒ Monitored by TCAS (or TAS overlay/blending) ☐ Other: A data block is provided for each traffic symbol with the relative altitude and vertical direction (as acquired from the sensor). Relative altitude is shown as two digits indicating the relative altitude difference, in hundreds of feet, from ownship, using a plus symbol (+) and minus symbol (-) to denote traffic above and below ownship, respectively. Arrows are used to depict vertical movement in relation to ownship. An up-arrow indicates climbing traffic, and a down-arrow indicated descending traffic. Traffic traveling at the same altitude as ownship shows an altitude of "00". TAS overlay/blending (if supported) is accomplished by the Traffic Sensor (such as the L3 NGT-9000+). The Aspen display accepts the blended results from the Traffic Sensor, but does not participate in the blending.

Astronautics	**Location:** Milwaukee, WI
Product(s)	Universal Cockpit Display of Traffic Information (UCDTI) including Airport Moving Map (AMM), NEXIS™ Flight-Intelligence System
Website(s)	• www.astronautics.com • http://www.astronautics.com/sites/default/files/ACA_NEXIS_SS031511.pdf

Product Overview(s)

Astronautics' CDTI application, co-developed with ACSS, uses ARINC-816 Airport Mapping Databases for the depiction of the AMM. CDTI operating independently presents own-ship position on the map and runway awareness. CDTI displays airport maps with own ship position, and can also display other aircraft and vehicles equipped with ADS-B In capabilities. The AMM is designed to deliver situational awareness information to the pilot by tracking aircraft and other vehicles operating in the terminal, taxi, and runway areas in relationship to own-ship position. With a Linux certified OS, CDTI can display the position of other aircraft and vehicles based on ADS-B inputs while in flight.

Images cuortesy of Astronautics

Approvals/Compliance

Authority	☒ FAA Certification Office: Atlanta ACO ☒ EASA ☐ Other
TC/STC	☐ TC ☒ STC Aircraft: Airbus A319, A320, A321
TSO	☐ TSO-C112e, ATCRBS/Mode S Airborne Equipment ☐ TSO-C113a, Airborne Multipurpose Electronic Displays ☐ TSO-C147a, TAS Airborne Equipment ☐ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☒ TSO-C165a, Electronic Map Display Equipment for Graphical Depiction of Aircraft Position (Own-Ship) ☒ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☐ TSO-C195b, Avionics Supporting ADS-B ASA ☐ Other

Astronautics	**Location:** Milwaukee, WI
FAA Regulatory and Guidance Material	☒ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems ☐ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☐ AC 20-172B, Airworthiness Approval for ADS-B In Systems and Applications ☐ AC 25-11B, Electronic Flight Deck Displays ☒ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Portable Electronic Flight Bags ☒ Other: FAA Order 8900.1
Industry Documents	☒ RTCA DO-160F, Environmental Conditions and Test Procedures for Airborne Equipment ☒ RTCA DO-178B, Software Considerations in Airborne Systems and Equipment Certification (Software Level: C/D/E) ☐ RTCA DO-181E, MOPS for ATCRBS/Mode S Airborne Equipment ☐ RTCA DO-200B, Standards for Processing Aeronautical Data ☒ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware (System Development Assurance Level: C/D) ☒ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps ☐ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☐ RTCA DO-272D, User Requirements for Aerodrome Mapping Information ☐ RTCA DO-282B, MOPS for UAT ADS-B ☒ RTCA DO-317A, MOPS for ASA System ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☐ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☒ Other: DO-275A
Other	
Hardware	
Hardware Platform(s)	Class 3 EFB (installed)
Display Size	8”W x 10.3”H 10.4” diagonal
Display Resolution	1024 x 768
Brightness	High-contrast display with LED backlighting with a wide range of brightness from sunlight readable to dark flight deck operations. Further, the luminescence is compatible with other equipment in the flight deck.
Controls	The NEXIS DU can be provided with bezel keys. Other commands are controlled through soft keys through the resistive touchscreen. A virtual keyboard is also available for applications. ☒ Buttons ☒ Keyboard (e.g., USB, Bluetooth) ☒ Mouse/cursor ☒ Stylus ☒ Touch Screen ☐ Other

Astronautics	**Location:** Milwaukee, WI
Capabilities	
Operating System	Microsoft Windows (Version 7), Linux (Custom Astronautics Kernel)
Decluttering	☒ Yes ☐ No Touch screen or bezel button to remove excess information. Users can select Ground Traffic, Airborne Traffic or All Traffic to be removed separately from the display. Flight IDs and position vectors can also be independently selected for display. Additionally, traffic can be filtered by altitude.
Panning	☒ Yes: Click and drag or bezel / soft-key based panning on the Airport Plan page ☐ No
Autozoom	☐ Yes ☒ No
Manual zooming	☒ Yes: Touch screen buttons or physical bezel buttons ☐ No
Indications and Alerts	Visual alerts are presented in dialog box at bottom center of display. Alerts include prioritized advisories and cautions (only supported when the CDTI is used to select or couple airborne traffic), ASA state (target lost / degraded, application availability, faults, and designated traffic status), System state (communication failures, missing data, out of date / missing databases).
Taxi Route Guidance	Taxi route information is not included.
Noteworthy Features and Applications	
Airport Moving Map Information Elements Depicted	
Airport Moving Map Data Format	☐ Geo-referenced ☒ Database driven

Astronautics	**Location:** Milwaukee, WI

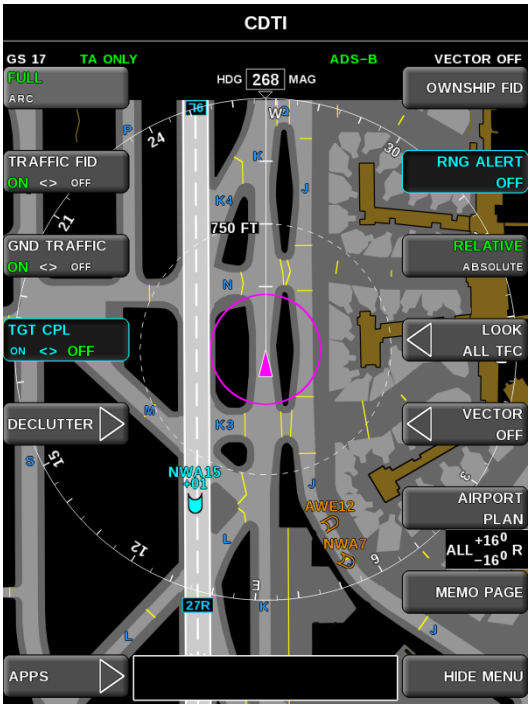


Image courtesy of Astronautics

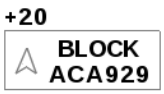
Ownship	Magenta triangle
Runways	Light grey with white border
Runway Centerlines	White dash
Runway Labels	Blue text in black text box
Taxiways	Medium grey
Taxiway Centerlines	--
Taxiway Labels	Blue text
Hold Lines	Yellow lines
Non-movement Areas	Black
Ramp Areas	Dark grey
Grassy Areas	Black
Buildings	Solid brown with a solid brown outline. (As with the range scales, colors can be customized per configuration / customer basis, provided they do not violate any MOPS requirements.)
Building Labels	--
Other	

Astronautics	**Location:** Milwaukee, WI
Traffic Display	
Data Source and Targets Displayed	☒ ADS-B: 127 ☐ TIS: ☒ TIS-B: 127 ☐ TAS:
Traffic Display Range	**Minimum:** 750 ft. **Maximum:** 300 NM **Default:** Configurable (typically 1500ft half scale / 3000ft full scale)

Traffic Symbols

Symbol Type	**Description** Proximate: <1200ft and 6 NM of ownship Non-Threat: >1200ft and 6 NM of ownship	**Data Source**	**Image**
Airborne, Non-Directional	Non-Threat	ADS-B TIS-B TCAS	
Airborne, Non-Directional	Proximate	ADS-B TIS-B TCAS	
Airborne, Non-Directional	Non-Threat	ADS-B TIS-B	
Airborne, Directional, High Accuracy	Proximate	ADS-B TIS-B	
Airborne, Directional, High Accuracy Highlighted	Non-Threat	ADS-B TIS-B	
Airborne, Directional, High Accuracy Highlighted	Proximate	ADS-B TIS-B	
Airborne, Directional, High Accuracy Coupled	Non-Threat	ADS-B TIS-B	
Airborne, High Accuracy Coupled	Proximate	ADS-B TIS-B	
Airborne, Non-Directional, Low Accuracy	Non-Threat	ADS-B TIS-B	
Airborne, Non-Directional, Low Accuracy	Proximate	ADS-B TIS-B	
Airborne, Non-Directional, Low Accuracy Highlighted	Non-Threat	ADS-B TIS-B	

Astronautics		**Location:** Milwaukee, WI	
Airborne, Non-Directional, Low Accuracy Highlighted	Proximate	ADS-B TIS-B	
Ground, Non-Directional	Non-Threat	ADS-B TIS-B	
Ground, Non-Directional	Proximate	ADS-B TIS-B	
Ground, Directional, High Accuracy	Non-Threat	ADS-B TIS-B	
Ground, Directional, High Accuracy	Proximate	ADS-B TIS-B	
Ground, Directional, High Accuracy Highlighted	Non-Threat	ADS-B TIS-B	
Ground, Directional, High Accuracy Highlighted	Proximate	ADS-B TIS-B	
Ground, Non-Directional, Low Accuracy	Non-Threat	ADS-B TIS-B	
Ground, Non-Directional, Low Accuracy	Proximate	ADS-B TIS-B	
Ground, Non-Directional, Low Accuracy Highlighted	Non-Threat	ADS-B TIS-B	
Ground, Non-Directional, Low Accuracy Highlighted	Proximate	ADS-B TIS-B	
Airport Identification			
Spacing Indicator	Where own-ship should be to achieve desired spacing; Perpendicular to track line		
Merge Waypoint on HSI			
Aircraft	Aircraft ID, Direction, and Speed (ITP traffic symbol on vertical view)		
Aircraft	Blocking Reference (ITP traffic symbol on vertical view)		
Traffic Symbol Data Tag Information			
Data Tag Information	☒ Flight ID ☒ Altitude ☒ Actual ☒ Relative ☐ Geometric		

Astronautics	**Location:** Milwaukee, WI
	☐ Ground speed ☐ Vertical direction/speed ☒ Above/Below 500’ (climb/descent arrows) ☐ Other ☐ Horizontal velocity vector ☐ Invalid/Unavailable data ☐ Traffic category ☐ Monitored by TCAS ☒ Other: On the ITP HSI, ITP blocking traffic will be indicated: 

Aviation Communication & Surveillance Systems (ACSS)	**Location:** Phoenix, AZ
Product(s)	SafeRoute™ (software suite): Universal Cockpit Display of Traffic Information (U-CDTI) U-CDTI option 1: Cockpit Display of Traffic Information (CDTI) U-CDTI option 2: Surface Area Movement Management (SAMM) U-CDTI option 3: CDTI Assisted Visual Separation (CAVS) U-CDTI option 4: Merging and Spacing (M&S) U-CDTI option 5: In-Trail Procedures (ITP)
Website(s)	• www.acss.com • http://www.acss.com/brochures/saferoute_2013.pdf

Product Overview(s)

L-3 Communications and Aviation Communication & Surveillance Systems (ACSS) provide the following SafeRoute™ Software applications:

- Surface Area Movement Management: SAMM is designed to deliver critical situational awareness information to the pilot by tracking vehicle operating in the terminal, taxi, and runway areas in relationship to own-ship position.
- CDTI/Moving Map: Enables the display of airport surface moving maps with own-ship position. When coupled with the SafeRoute-SAMM software, this application will also display the position of other traffic operating up to 1,500 feet in the terminal area.
- CDTI Assisted Visual Separation: CAVS allow flight crew to continue visual approach procedures with the use of an electronic display if visual contact with traffic-to-follow is lost.
- Merging & Spacing: M&S makes use of onboard aircraft surveillance to ensure more consistent aircraft spacing and efficient intervals while increasing the capacity and safety within the terminal airspace.
- In-Trail Procedures: ITP uses ADS-B to improve situational awareness and increase the efficiency and safety of flight level changes during oceanic or non-radar flight operations. These applications (less the Airport Moving Map) require a certified Operating System.

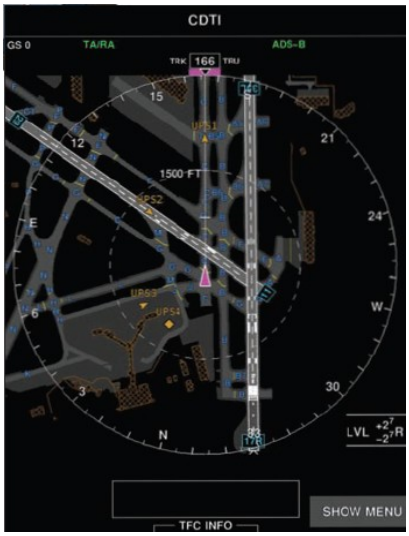


Image courtesy of ACSS®

Aviation Communication & Surveillance Systems (ACSS)	**Location:** Phoenix, AZ
Approvals/Compliance	
Authority	☒ FAA Certification Office: Los Angeles ACO ☐ EASA ☐ Other
TC/STC	☐ TC ☒ STC Aircraft: B757, B767
TSO	☐ TSO-C112e, ATCRBS/Mode S Airborne Equipment ☒ TSO-C113a, Airborne Multipurpose Electronic Displays ☒ TSO-C147, TAS Airborne Equipment ☒ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☒ TSO-C165a, Electronic Map Display Equipment for Graphical Depiction of Aircraft ☒ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☒ TSO-C195a, Avionics Supporting ADS-B ASA ☐ Other
FAA Regulatory and Guidance Material	☒ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems ☒ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☒ AC 20-172A, Airworthiness Approval for ADS-B In Systems and Applications ☐ AC 25-11B, Electronic Flight Deck Displays ☒ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Portable Electronic Flight Bags ☐ Other
Industry Documents	☒ RTCA DO-160G, Environmental Conditions and Test Procedures for Airborne Equipment ☒ RTCA DO-178B, Software Considerations in Airborne Systems and Equipment Certification (Software Level: C for Class 3 and D for Class 2) ☒ RTCA DO-181E, MOPS for ATCRBS/Mode S Airborne Equipment ☒ RTCA DO-200A, Standards for Processing Aeronautical Data ☒ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware (System Development Assurance Level: C) ☒ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps ☒ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☒ RTCA DO-272C, User Requirements for Aerodrome Mapping Information ☒ RTCA DO-282B, MOPS for UAT ADS-B ☒ RTCA DO-317A, MOPS for ASA System ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☐ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☐ Other
Other	http://fsims.faa.gov/wdocs/fsb/acss_osr_r2.htm

Aviation Communication & Surveillance Systems (ACSS)	**Location:** Phoenix, AZ
Hardware	
Hardware Platform(s)	The airport moving map may be presented on the ACSS TCAS Surveillance Processor, or can be adapted to reside on other avionics platforms. The CDTI may operate on a Class 2 or 3 EFB, EFIS, ND, or MFD.
Display Size	N/A
Display Resolution	N/A
Brightness	N/A
Controls	☒ Buttons ☐ Keyboard (e.g., USB, Bluetooth) ☐ Mouse/cursor ☐ Stylus ☒ Touch Screen ☐ Other
Capabilities	
Operating System	Linux, iOS
Decluttering	☒ Yes ☐ No • ALL button turns off; TRAFFIC FID, NAV and VECTORS • UNSELECT TGT button cancels the selection (highlight) of the currently active aircraft. No traffic will be selected and the traffic information block in the lower right corner of the CDTI will be blank. Coupled traffic is unaffected. • NO GND TFC button removes the display of all ground traffic (when below 1500 ft RA). • ALL GND TFC button displays all ground traffic (when below 1500 ft RA).
Panning	☐ Yes: ☒ No: SafeRoute does not support panning
Autozoom	☐ Yes ☒ No
Manual zooming	☒ Yes ☐ No
Indications and Alerts	ACSS demoed incursion alerting as part of an FAA – US airways A330 program for demonstration purposes only. ACSS has not developed a certified incursion and alerting function to date.

Aviation Communication & Surveillance Systems (ACSS)	**Location:** Phoenix, AZ
Taxi Route Guidance	The Runway Awareness application is designed to provide the flight crew with take-off or landing runway situational awareness relative to ownship position. The flight crew will be able to enter the runway identifier into the device, resulting in colored highlights of the desired runway.  *Image courtesy of ACSS®*
Noteworthy Features and Applications	
Airport Information Elements Depicted	
Airport Moving Map Data Format	☐ Geo-referenced ☒ Database driven

Aviation Communication & Surveillance Systems (ACSS)	**Location:** Phoenix, AZ

Image courtesy of ACSS®

Ownship	
Runways	Light grey with white border
Runway Centerlines	White dash
Runway Labels	Blue text in black text box
Taxiways	Medium grey
Taxiway Centerlines	--
Taxiway Labels	Blue text
Hold Lines	Yellow lines
Non-movement Areas	Black
Ramp Areas	Dark grey
Grassy Areas	Black
Buildings	Brown cross-thatched with brown border
Building Labels	--
Other	

Aviation Communication & Surveillance Systems (ACSS) **Location:** Phoenix, AZ

Traffic Symbols

Ground caution and warning symbols are <u>not</u> currently in use, and were part of an incursion alerting demonstration. ACSS has not developed a certified incursion and alerting function to date.

SafeRoute Symbols

Icon Type	Normal (Situational Awareness)		Caution	Warning
	Other Traffic	Proximate Traffic		
TCAS Traffic (TCAS-Only Tracks)				
Airborne non-directional (ADS-B or TIS-B Tracks)				
Airborne Directional High Accuracy				
Airborne Directional High Accuracy Selected				
Airborne Directional High Accuracy Coupled				
Airborne Directional Low Accuracy (ADS-B, TIS-B)				
Airborne Directional Low Accuracy (ADS-B, TIS-B) Selected				
Ground Non-Directional				
Ground Directional High Accuracy				
Ground Directional High Accuracy Selected				
Ground Directional Low Accuracy				
Ground Directional Low Accuracy Selected				

Image courtesy of ACSS®

Aviation Communication & Surveillance Systems (ACSS)	**Location:** Phoenix, AZ
Traffic Display	
Data Source and Targets Displayed	We display a total of 90 targets, with the intent of being able to display a minimum 30 airborne targets and 30 ground targets. ☒ ADS-B: ☐ TIS: ☒ TIS-B: ☒ TAS:
Traffic Display Range	Minimum: 1500 ft Maximum: 300NM Default: 10NM
Traffic Symbol Data Tag Information	
Data Tag Information	☒ Flight ID ☐ Altitude ☒ Actual ☒ Relative ☐ Geometric ☐ Ground speed ☒ Vertical direction/speed ☐ Above/Below 500' (climb/descent arrows) ☐ Other ☐ Horizontal velocity vector ☐ Invalid/Unavailable data ☐ Traffic category ☒ Monitored by TCAS ☐ Other

The Boeing Company	**Location:** Chicago, IL
Product(s)	787 Display and Crew Alerting System (DCA) and Integrated Surveillance System (ISS) 747-8 Integrated Display System (IDS)
Website(s)	• http://www.boeing.com

Product Overview(s)

Boeing 787 offers Airport Map as part of the Display and Crew Alerting System, which displays an airport map as an underlay on the Navigation Display. In Map mode, the airport map is displayed in a track-up orientation and rotates and translates based on ownship movement. In Plan mode, the airport map is displayed in a north-up orientation and can be panned using the cursor control device. The airport map is driven by a standard ARINC 816 database. In both ND modes, the airport map is displayed at ranges of 5nm or less (down to 0.5nm), with increasing information at each of the lower ranges such as taxiway, building, and gate identifiers. The ownship position displayed is adjusted to the pilot eye reference point.

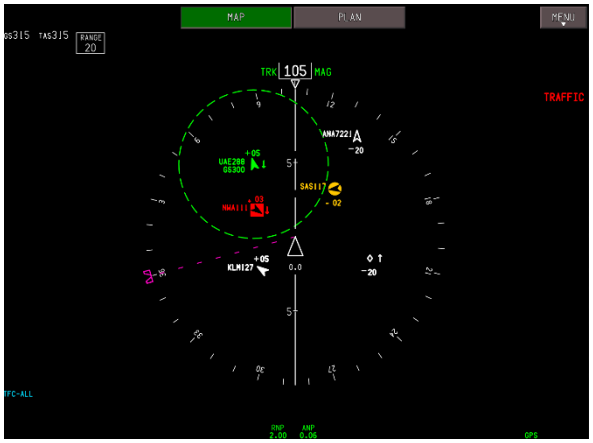
Boeing 747-8 offers Airport Map as part of the Integrated Display System, with the same capabilities described above for the 787. The 747-8 also offers a 0.25nm range.

Boeing 787 also offers ADS-B In applications Airborne CDTI (AIRB), Visual Separation on Approach (VSA), and In-Trail Procedure (ITP). Traffic tools are provided via the Navigation Display and the INFO multi-function display format. The ADS-B IN applications offer additional detailed information on surrounding airborne traffic, such as flight identification number, traffic ground speed, track, and aircraft category. They support traffic acquisition and tracking, extend the range of traffic reception, and enhance terminal area traffic data.

ADS-B In traffic symbols are integrated with TCAS traffic symbols and shown on the navigation display and MiniMap. Additional traffic details are made available in a traffic list and on the ITP graphical display. For the ITP, graphical displays present surrounding traffic at other altitudes and determine which altitudes may be available to occupy using special ITP climb or descent separation minimums. The ITP function is fully integrated with the communications management function, and automatically constructs a data link message that can be sent to air traffic control to request the desired available cruise altitude. ITP provides the crew with information that enables more fuel-efficient and comfortable cruise segments.

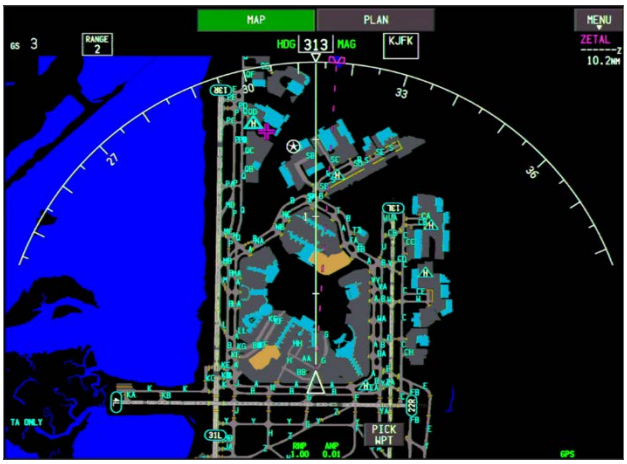
The Boeing Company **Location:** Chicago, IL

787 ITP and Traffic List formats



787 CDTI display on ND

747-8 Airport Map on ND



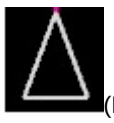
787 Airport Map

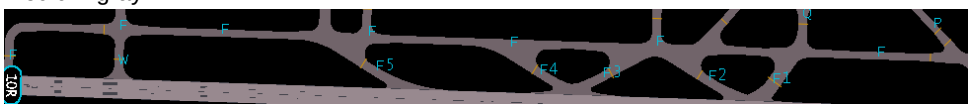
Images Courtesy of Boeing

Approvals/Compliance

Authority	☒ FAA Certification Office: Seattle ☒ EASA ☐ Other
TC/STC	☒ TC Aircraft: 787, 747-8 ☐ STC
TSO	☐ TSO-C112e, ATCRBS/Mode S Airborne Equipment ☐ TSO-C113a, Airborne Multipurpose Electronic Displays ☐ TSO-C147, TAS Airborne Equipment ☐ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☐ TSO-C165a, Electronic Map Display Equipment for Graphical Depiction of Aircraft ☒ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☒ TSO-C195a, Avionics Supporting ADS-B ASA ☐ Other

The Boeing Company	**Location:** Chicago, IL
FAA Regulatory and Guidance Material	☐ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems ☒ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☒ AC 20-172A, Airworthiness Approval for ADS-B In Systems and Applications ☐ AC 25-11B, Electronic Flight Deck Displays ☐ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Portable Electronic Flight Bags ☐ Other
Industry Documents	☒ RTCA DO-160G, Environmental Conditions and Test Procedures for Airborne Equipment ☒ RTCA DO-178B, Software Considerations in Airborne Systems and Equipment Certification (Software Level: (not provided) ☒ RTCA DO-181E, MOPS for ATCRBS/Mode S Airborne Equipment ☒ RTCA DO-200A, Standards for Processing Aeronautical Data ☒ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware (System Development Assurance Level: (not provided) ☒ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps ☒ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☒ RTCA DO-272B, User Requirements for Aerodrome Mapping Information ☐ RTCA DO-282B, MOPS for UAT ADS-B ☒ RTCA DO-317A, MOPS for ASA System ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☒ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☒ Other: RTCA DO-312, Safety, Performance and Interoperability requirements Document for the In-Trail procedure in Oceanic airspace (ATSA-ITP) Application RTCA DO-319 (AIRB) RTCA DO-219, Datalink (CPDLC) MOPS RTCA DO-314, Safety, Performance, and Interoperability Requirements Document For Enhanced Visual Separation On Approach (ATSA-VSA) ARINC 718A-4, Mode S/Extended interface functions ARINC 768 Supplement 1, Integrated Surveillance Systems ARINC 816, Embedded Interchange Format for Airport Mapping Database
Other	FAA In-Trail Procedure (ITP) Policy Memo, May 10, 2010
Hardware	
Hardware Platform(s)	Navigation Display (MFD format on main flight deck displays), INFO (MFD format on main flight deck displays)

The Boeing Company	**Location:** Chicago, IL
Display Size	787: 6”x9” or 12.1”x9” 747-8: 6.6”x6.6”
Display Resolution	787: 1400x1050 747-8: 784x784
Brightness	Enhanced for use in all lighting conditions
Controls	☐ Buttons ☒ Keyboard (e.g., USB, Bluetooth) ☒ Mouse/cursor ☐ Stylus ☐ Touch Screen ☒ Other: Rotary cursor control knob
Capabilities	
Operating System	Custom: Displays: WindRiver VxWorks ARINC 653 Real-Time OS, ISS: Green Hills INTEGRITY®-178B Real-Time OS
Decluttering	☒ Yes: Airport Map features displays based on ND range, some airport map features removed when WXR selected, and ADS-B In traffic filtered near airport. ☐ No
Panning	☒ Yes: Airport Map can be panned in ND Plan mode ☐ No
Autozoom	☐ Yes ☒ No
Manual zooming	☒ Yes: Based on ND range; Airport Map displayed at ranges from 0.25nm to 5nm ☐ No
Indications and Alerts	N/A
Taxi Route Guidance	N/A
Noteworthy Features and Applications	N/A
Airport Information Elements Depicted	
Airport Moving Map Data Format	☒ Geo-referenced ☒ Database driven
Ownship	Triangle with white border (MAP), Aircraft symbol with white border (PLAN)  (MAP)  (PLAN)
Runways	Light gray 

The Boeing Company	**Location:** Chicago, IL
Runway Centerlines	Dark gray (based on painted markings)
Runway Labels	White text with black background and blue border
Taxiways	Medium gray 
Taxiway Centerlines	No
Taxiway Labels	Cyan text
Hold Lines	Amber line
Non-movement Areas	Dark gray 
Ramp Areas	Dark gray 
Grassy Areas	No
Buildings	Cyan
Building Labels	White text
Other	Deicing Areas, Parking Stands, Construction Areas, Helipads, Water 747-8 also displays Service Roads

The Boeing Company	**Location:** Chicago, IL
Traffic Display	
Data Source and Targets Displayed	☒ ADS-B: 30 (shared) ☐ TIS: ☐ TIS-B: 30 (shared) ☒ TAS: 30 (shared)
Traffic Display Range	Minimum: 0.5nm Maximum: 1280nm Default: N/A

Traffic Symbols

(Thresholds that determine the threat level are based on current industry guidance.)

Symbol Type	Description	Data Source	Image
Airborne, Non-Directional RA	TCAS Only	TAS	
Airborne, Non-Directional TA	TCAS Only	TAS	
Airborne, Non-Directional Proximate	TCAS Only	TAS	
Other (Non-proximate)	TCAS Only	TAS	
Airborne, Directional RA	ADS-B	ADS-B	
Airborne, Directional ADS-B TA	ADS-B	ADS-B	
Airborne, Directional Proximate	ADS-B	ADS-B	
Airborne, Directional Other (Non-proximate)	ADS-B	ADS-B	
Airborne, Directional Selected (VSA)	ADS-B	ADS-B	
Airborne, Directional ITP Reference	ADS-B	ADS-B	

The Boeing Company	**Location:** Chicago, IL
Traffic Symbol Data Tag Information	
Data Tag Information	☒ Flight ID ☒ Altitude ☒ Actual ☒ Relative ☐ Geometric ☒ Ground speed ☒ Vertical direction/speed ☒ Above/Below 500' (climb/descent arrows) ☐ Other (please specify): ☐ Horizontal velocity vector ☐ Invalid/Unavailable data ☐ Traffic category - displayed on Traffic List page ☐ Monitored by TCAS ☐ Other

Dynon Avionics	**Location:** Woodinville, WA
Product(s)	SV-D1000 – SkyView 10” SV-D1000T – SkyView 10” Touchscreen SV-D700 – SkyView 7”
Website(s)	• www.dynonavionics.com • http://www.dynonavionics.com/downloads/User_Manuals/SkyView_Pilots_User_Guide-Rev_R_v11.0.pdf

Product Overview(s)

SkyView is an integrated glass cockpit system. It is configurable, and at a minimum, includes one of the above 3 display options and one or more of the modules below. A typical installation will include PFD, EMS, Map, and Autopilot functions.

- SV-ADAHRS-200: Provides airspeed, altitude, VSI, AoA, attitude, magnetic heading, etc.
- SV-EMS-220: Engine monitor with all primary engine instruments, fuel level, fuel computer, and electrical system monitoring.
- SV-GPS-250: 5 Hz WAAS GPS
- SV-XPNDR-261: TSO’d Mode-S Transponder with Extended Squitter (ADS-B OUT).
- SV-COM-C25: VHF band COM radio
- SV-INTERCOM-2S: Two place intercom
- SV-BAT-320: Lithium Ion back-up battery
- Autopilot

Images courtesy of Dynon

Approvals/Compliance

Authority	☐ FAA ☐ EASA ☒ Other Our transponder is the only module with FAA and EASA approval. The rest of the system is unapproved and thus the system as a whole is for Experimental and Light Sport aircraft.
TC/STC	☐ TC ☐ STC

Dynon Avionics	**Location:** Woodinville, WA
TSO	☒ TSO-C112c, ATCRBS/Mode S Airborne Equipment ☐ TSO-C113a, Airborne Multipurpose Electronic Displays ☐ TSO-C147a, TAS Airborne Equipment ☐ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☐ TSO-C165a, Electronic Map Display Equipment for Graphical Depiction of Aircraft ☒ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☐ TSO-C195b, Avionics Supporting ADS-B ASA ☐ Other
FAA Regulatory and Guidance Material	☐ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems ☒ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☐ AC 20-172B, Airworthiness Approval for ADS-B In Systems and Applications ☐ AC 25-11B, Electronic Flight Deck Displays ☐ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Portable Electronic Flight Bags ☐ Other
Industry Documents	☒ RTCA DO-160G, Environmental Conditions and Test Procedures for Airborne Equipment ☐ RTCA DO-178, Software Considerations in Airborne Systems and Equipment Certification ☐ RTCA DO-181E, MOPS for ATCRBS/Mode S Airborne Equipment ☐ RTCA DO-200B, Standards for Processing Aeronautical Data ☐ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware ☐ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps ☐ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☐ RTCA DO-272D, User Requirements for Aerodrome Mapping Information ☐ RTCA DO-282B, MOPS for UAT ADS-B ☐ RTCA DO-317A, MOPS for ASA System ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☐ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☐ Other
Other	
Hardware	
Hardware Platform(s)	MFD
Display Size	10” and 7” models.
Display Resolution	1024 x 600 (10") 800 x 480 (7”)
Brightness	Screens are matte finish and high brightness for sunlight-readability. A brightness sensor automatically dims the screens for night flying. Manual dim control is also available.

Dynon Avionics	**Location:** Woodinville, WA
Controls	☒ Buttons ☐ Keyboard (e.g., USB, Bluetooth) ☐ Mouse/cursor ☐ Stylus ☐ Touch Screen ☒ Other: 2 Joysticks
Capabilities	
Operating System	Linux
Decluttering	☒ Yes Map: Various map informational items (such as Distance to Waypoint, Vertical Speed Required) can be decluttered by the pilot. Traffic targets can be displayed either: always, never, or only when alerting. PFD: Traffic targets can be displayed either: always, never, or only when alerting. The HSI can be toggled to display a G-meter. EMS: Engine instruments can be turned on or off by the installer, but are not able to be decluttered by pilot. ☐ No
Panning	☒ Yes ☐ No
Autozoom	☐ Yes ☒ No
Manual zooming	☒ Yes ☐ No
Indications and Alerts	None.
Taxi Route Guidance	None.
Noteworthy Features and Applications	Terrain, weather, TFRs, METAR/TAF/Winds.
Airport Moving Map Information Elements Depicted	
Airport Moving Map Data Format	☒ Geo-referenced - SkyView supports both raster and vector data ☒ Database driven When a chart is not geo-referenced, the following icon is shown at the bottom right of the chart page: 

Dynon Avionics	**Location:** Woodinville, WA

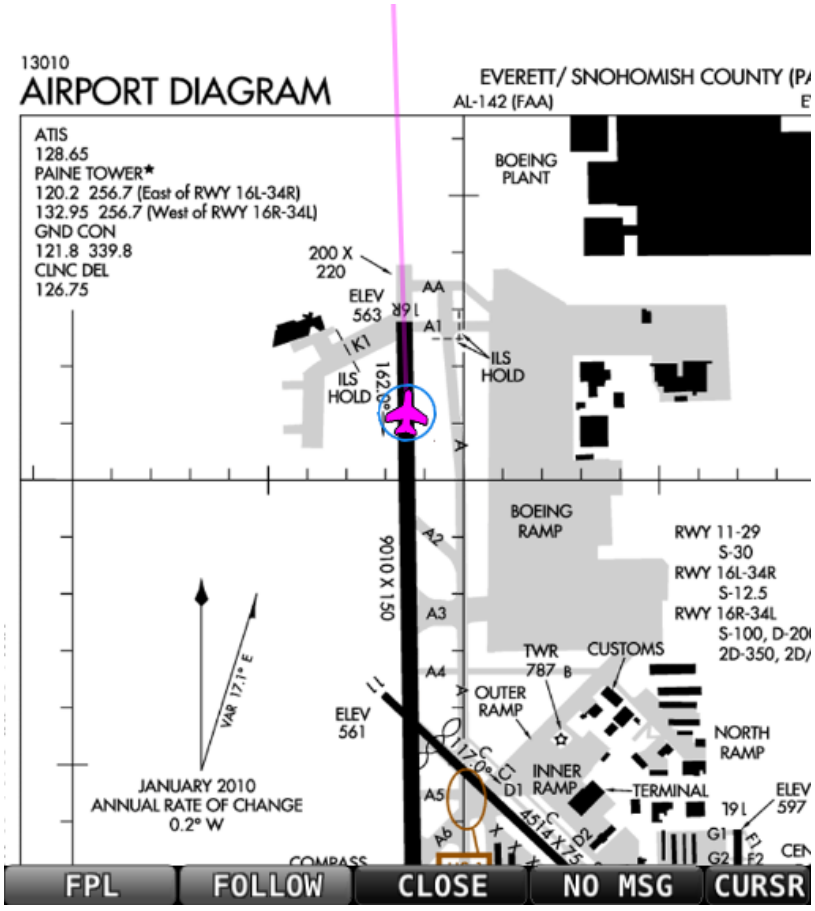


Image courtesy of Dynon

Ownship	Magenta airplane on the ground. Grey airplane when airborne.
Runways	Black
Runway Centerlines	--
Runway Labels	Black text
Taxiways	Grey
Taxiway Centerlines	--
Taxiway Labels	Black text
Hold Lines	--
Non-movement Areas	Grey
Ramp Areas	Grey
Grassy Areas	--
Buildings	Black
Building Labels	Black text
Other	Magenta line depicts ground track

Dynon Avionics	**Location:** Woodinville, WA
Traffic Display	
Data Source and Targets Displayed	☒ ADS-B: All traffic within 15 NM and +/- 5000 ft ☒ TIS: 8 highest priority targets ☒ TIS-B: All traffic within 15 NM and +/- 5000 ft ☐ TAS: Traffic receiver status is displayed in the lower right of the display, for example:  Only one device can provide traffic information to SkyView at a time. If there is more than one device, traffic sources are prioritized based on the completeness of the traffic portrait they provide: 1. SV-ADSB-470 with a full traffic portrait (ADS-B OK): Full traffic means that you have an ADS-B ground station reporting, and that ground station is receiving radar traffic. 2. TIS transponder from SV-XPNDR-26X / Garmin GTX 330 (when in an active TIS coverage area). 3. Flarm device. 4. Zaon device. 5. SV-ADSB-470 with an incomplete traffic portrait (ADS-B NO RADAR): SkyView will annunciate “Partial” traffic when it has ADS-B reception capability, but that ADS-B reception does not include either ADS-B ground station coverage or radar targets included within those ground-based ADS-B traffic reports. Therefore, the ADS-B ground station is not able to convey a full traffic picture and cannot make you aware of all possible detectable traffic.
Traffic Display Range	Minimum: All zoom levels Maximum: All zoom levels Default: All zoom levels

Traffic Symbols

Traffic displayed on the PFD page can be configured to include just Traffic Advisories (TA), all targets, or no targets. See the SkyView System Installation Guide for information on how to configure how traffic is displayed.

Symbol Type	Description	Data Source	Image
Proximity advisory	Within 5 NM & 1200 ft. vertical	ADS-B TIS-B TIS	
Non-threat	Outside 5 NM & 1200 ft. vertical	ADS-B TIS-B TIS	

Dynon Avionics		**Location:** Woodinville, WA	
Traffic advisory	Within .25 miles & 30 seconds (20 seconds if target is not reporting altitude). Targets display a number within the circle to indicate how far away the target is (in miles, nautical miles, or kilometers, depending on your system setup) from ownship.	ADS-B TIS-B TIS	
Traffic advisory off screen	Within .25 miles & 30 seconds (20 seconds if target is not reporting altitude).	ADS-B TIS-B TIS	
Traffic Symbol Data Tag Information			
Data Tag Information	☒ Flight ID (for ADS-B OUT traffic only, when equipped with Dynon's ADS-B receiver) ☒ Altitude ☐ Actual ☒ Relative ☐ Geometric ☐ Ground speed ☒ Vertical direction/speed ☒ Above/Below 500' (climb/descent arrows) ☐ Other ☒ Horizontal velocity vector ☐ Invalid/Unavailable data ☐ Traffic category ☐ Monitored by TCAS ☐ Other		

Garmin	**Location:** Olathe, KS
Product(s)	Apps: Garmin Pilot® (available for iOS and Android), SafeTaxi® (available on Garmin Pilot, certified and portable avionics) Certified Avionics: G500, G600, G950, G1000, G2000, G3000, G5000, GMX 200, GTN 6XX/7XX series Portable GPS: Aera 5XX series, Aera 7XX series, GPSMAP 49X series, GPSMAP 6XX series Sport/Experimental Avionics: G3X, G3X-Touch
Website(s)	• www.garmin.com • Garmin Pilot: https://buy.garmin.com/en-US/US/on-the-go/apps/garmin-pilot-/prod115856.html • SafeTaxi: http://garmin.blogs.com/my_weblog/2014/05/safetaxi-keeps-getting-better-with-garmin.html • Certified Avionics: https://buy.garmin.com/en-US/US/cInTheAir-cAvionics-p1.html https://buy.garmin.com/en-US/US/cInTheAir-cFlightDecks-p1.html • Portable GPS: https://buy.garmin.com/en-US/US/cInTheAir-cPortableGPS-p1.html • Sport/Experimental Avionics: http://www.garmin.com/us/products/intheair/sport-aviation/

Product Overview(s)

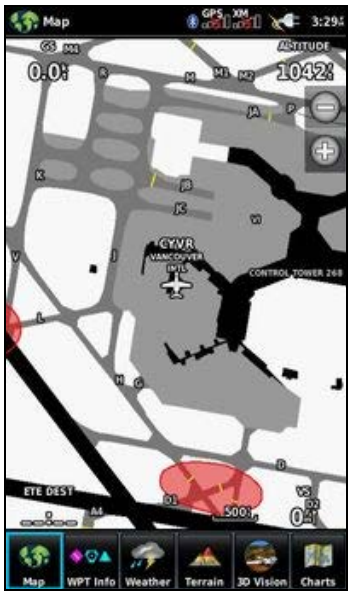
SafeTaxi® provides ownship position on database-driven airport diagrams. SafeTaxi® is offered as a function on Garmin's portable and integrated glass cockpit systems (e.g., G600, G950, and G1000). Two electronic chart functions are also offered. ChartView® provides access to geo-referenced airport charts and instrument approach plates provided by Jeppesen. FliteCharts® provides an electronic version of government approach charts and airport diagrams, Departure Procedures (DP), and Standard Terminal Arrival Routes (STARS); approach charts are geo-referenced and therefore can show ownship.

Garmin Pilot®: Mapping and weather information available worldwide. 3D Vision and SVX displays the surrounding terrain, obstacles, airport environment and more. Navigate with HSI, optional attitude information from the GDL 39 3D and georeferenced charts for the U.S., Europe and Canada. SafeTaxi® and FliteCharts® are available via optional subscription. View aviation weather while using the Internet and while in-flight with optional U.S. datalinks. File, amend and close flight plans in the U.S.

Certified Avionics, Portable GPS, Sport/Experimental Avionics: Provide various PFD and MFD function, depending on the product. Provide CDTI function for legacy traffic awareness products, portable and certified ADS-B In, SafeTaxi®, ChartView®, and FliteCharts®, and Moving Map. See individual product descriptions for supported features.

Garmin	**Location:** Olathe, KS

Various images are available for Garmin Products upon further request.



Images courtesy of Garmin

Approvals/Compliance	
Authority	☒ FAA Certification Office: Various ☒ EASA ☒ Other: ANAC, TCCA
TC/STC	☒ TC Aircraft: Various with G950 and G1/2/3/5000 integrated flight decks. Wichita Aircraft Certification Office ☒ STC Aircraft: Various with all certified avionics. Various ACOs.
TSO	Applicable to G500, G600, G950, G1000, G2000, G3000, G5000, GMX 200, GTN 6XX/7XX series only ☒ TSO-C112/c/d, ATCRBS/Mode S Airborne Equipment (G 950, G1000 and GTN 6XX/7XX series only) ☒ TSO-C113, Airborne Multipurpose Electronic Displays ☒ TSO-C147, TAS Airborne Equipment ☐ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☒ TSO-C165, Electronic Map Display Equipment for Graphical Depiction of Aircraft ☐ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☒ TSO-C195a, Avionics Supporting ADS-B ASA (excluding GMX 200) ☒ Other: Various including TSO-C2d, TSO-C3d, TSO-C4c, TSO-C6d, TSO-C8d, TSO-C10b, TSO-C34e, TSO-C36e, TSO-C40c, TSO-C41d, TSO-C43c, TSO-C52b, TSO-C63c, TSO-C87, TSO-C151b (See individual product installation manuals)

Garmin	**Location:** Olathe, KS
FAA Regulatory and Guidance Material	Applicable to G500, G600, G950, G1000, G2000, G3000, G5000, GMX 200, GTN 6XX/7XX series only ☐ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems ☒ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☒ AC 20-172B, Airworthiness Approval for ADS-B In Systems and Applications (excluding GMX 200) ☐ AC 25-11B, Electronic Flight Deck Displays ☒ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Electronic Flight Bags ☒ Other: AC 20-151A, various others.
Industry Documents	Applicable to G500, G600, G950, G1000, G2000, G3000, G5000, GMX 200, GTN 6XX/7XX series only ☒ RTCA DO-160D/E/F, Environmental Conditions and Test Procedures for Airborne Equipment (G2000, G3000 and G5000 version E; GTN 6XX/7XX version F; all others version D) ☒ RTCA DO-178B, Software Considerations in Airborne Systems and Equipment Certification (Software Level: C/D) ☒ RTCA DO-181C/D/E, MOPS for ATCRBS/Mode S Airborne Equipment ☒ RTCA DO-200A, Standards for Processing Aeronautical Data ☒ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware (System Development Assurance Level: various) ☒ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps ☒ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☐ RTCA DO-272, User Requirements for Aerodrome Mapping Information ☐ RTCA DO-282B, MOPS for UAT ADS-B ☒ RTCA DO-317A, MOPS for ASA System ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☐ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☒ Other : various
Other	

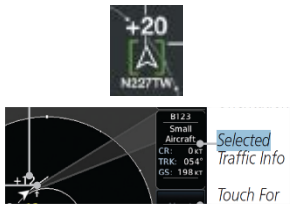
Garmin	**Location:** Olathe, KS
Hardware	
Hardware Platform(s)	G500/600 – Dual panel (Dual G500/G600 installations possible) G1000/950 - Dual or triple panel G2000 - Dual panel G3000 - Triple panel G5000 – Triple or Quad GTN, GMX 200 – single (although dual installations are not uncommon) G3X – single, dual, or triple Portable GPS - single
Display Size	G500/600 - 6.5" diagonal (each panel) G1000/950 - 10", 12", 15" options G2000/3000/5000 - 12" or 14" display GTN 650 – 4.9” diagonal GTN 700 – 6.9” diagonal GMX 200 – 6.5” diagonal G3X (GDU 370) – 7” high portrait G3X Touch (GDU 450) – 7” wide landscape G3X Touch (460) – 12.7” diagonal Portable GPS - various
Display Resolution	G500/600 - 640 x 480 G950/1000/2000/3000/5000 – various GTN 650 – 600 x 266 GTN 750 – 600 x 708 GMX 200: 640 x 480 G3X (GDU 370) – 480 x 800 G3X Touch (GDU 450) – 800 x 480 G3X Touch (GDU 460) – 1280 x 768 Portable GPS - various
Brightness	All Garmin Products designed for sunlight readable. G500/G600 and specific versions of GTN 650 and GTN 750 are night vision goggle compatible. G950/1000/2000/3000/5000 can be made NVG with external modification.
Controls	☒ Buttons ☒ Keyboard (optional for G950 and G1000) ☐ Mouse/cursor ☐ Stylus ☒ Touch Screen (G3X Touch, GTN, G2000, 3000, 5000) ☒ Other: Joystick for map panning/zooming and display zooming (e.g. CDTI)

Garmin	**Location:** Olathe, KS
Capabilities	
Operating System	Garmin Pilot® is compatible with various Android and iOS versions depending on version of Garmin Pilot® and version of device. Certified, Portable GPS, and Sport/Experimental Avionics use a Garmin-proprietary operating system.
Decluttering	☒ Yes ☐ No De-cluttering is tied to map range/scale so that features are removed as the map is zoomed out and added as the map is zoomed in. On more advanced certified avionics, some decluttering behavior is configurable.
Panning	☒ Yes ☐ No
Autozoom	☒ Yes ☐ No Varies with product. Generally, with a valid flight plan, the Auto Zoom feature will automatically change the Map page range depending on the distance to the next waypoint in the flight plan. If enabled, it will also automatically zoom to the SafeTaxi zoom range when the aircraft is on the ground. Autozoom is configurable.
Manual zooming	☒ Yes: pilot selectable via knob, rocker key or joystick. ☐ No
Indications and Alerts	Alerts for TAS/TCAS I/TCAS II are as defined for their respective TSOs. Garmin ADS-B in implements alerting for ADS-B/TIS-B targets when TAS/TCAS tracking is not available. A Traffic Alert pop-up is displayed when alerts are enabled, the aircraft is flying above 40 kts, and the display is not on the Traffic Page. When Audio alerts are enabled a 'Traffic' voice alert is also issued. The GDL 39 and GDL 88 devices automatically adjust their Traffic Alert (TA) sensitivity level to reduce the likelihood of nuisance TAs during various phases of flight. TAs are issued for traffic when they are predicted to be within a specified volume of airspace around your aircraft in a specified amount of time. The protected volume and time interval varies based on the current geodetic altitude and groundspeed. Thus, the protected volume of airspace increases with altitude and ground speed:
Taxi Route Guidance	Taxi information as described is not provided.

Altitude (Geodetic)	**Look Ahead Time (sec.)**	**Vertical Separation (ft.)**	**Horizontal Separation (nm.)**
Below 5,000	30	+/-850	.35
5,000-10,000	40	+/-850	.55
10,000-20,000	45	+/-850	.80
20,000-42,000	48	+/-850	1.10
Above 42,000	48	+/-1,200	1.10

Garmin	**Location:** Olathe, KS
Noteworthy Features and Applications	SafeTaxi® includes depiction of “hot spots” which define an area that has a history or potential for airport surface incidents. Additionally, FBO locations are identified at most airports. No other noteworthy features or applications can be released.
Airport Information Elements Depicted *(Images courtesy of Garmin)*	
Airport Moving Map Data Format	☒ Geo-referenced (raster) ☐ Database driven
Ownship	 Airplane or helicopter icon, blue or grey (depiction depends on display and installation)
Runways	White 
Runway Centerlines	Black dotted lines 
Runway Labels	Black text in white text boxes 
Taxiways	Grey 
Taxiway Centerlines	--
Taxiway Labels	White text in black text boxes 
Hold Lines	-Dark grey 
Non-movement Areas	Varies, depending on type, but generally, black, or “background color”, as in, “nothing here”. 

Garmin	**Location:** Olathe, KS
Ramp Areas	Grey 
Grassy Areas	Generally, if the grass is somewhere the airplane is not supposed to be, it will be black (background color) – See response above for non-movement areas. For cases where turf (or gravel) is used for a specific purpose, white with grey hashing denotes such an area, and an area label is provided. 
Buildings	White and Dark Grey 
Building Labels	White text in black boxes 
Other	Hot spots circled in red  Airport Beacons depicted as a white star 
Traffic Display	
Data Source and Targets Displayed	☒ ADS-B: ADS-B Receive device (e.g. GDL 39, GDL 88, GTS 8XX) (max 75 targets) ☒ TIS: GTX 33x Mode S transponder devices (max 8 targets) ☒ TIS-B: GDL 39 and GDL 88 ADS-B In receivers (max 75 targets) ☒ TAS: GTS 800, 820, and 825 are certified to TAS TSO, GTS 825, 855 certified to TCAS I, GTS 8000 to TCAS II. 3rd party TAS/TCAS devices also supported (max 75 targets)
Traffic Display Range	Maximum, minimum and default range may vary with product. Generally, the Range Rings are centered on your present position and can be configured Off, or as 2/3 Rings. When configured for 2 Rings the range can be set to AUTO, 5/10, 10/20, or 15/30. When configured for 3 Rings the range can be set to AUTO, 5/10/20, 10/20/40, or 15/30/60. When AUTO is selected the Range Rings will dynamically change from as little as 200FT to as much as 1200NM based on the current map range.

Garmin		**Location:** Olathe, KS	
Traffic Symbols *(Images courtesy of Garmin)*			
Symbol Type	**Description**	**Data Source**	**Image**
Non-threat, non-directional airborne traffic	Traffic outside 6 nautical miles and 1,200’	TAS, TCAS, or ADS-B	
Directional airborne traffic with track vector	Traffic outside 6 nautical miles and 1,200’	ADS-B	
Non-directional airborne Proximity Advisory (PA)	Traffic within 6 nautical miles and +/- 1,200’	TAS, TCAS, or ADS-B	
Directional airborne Proximity Advisory (PA) with track vector (points in the direction of the aircraft track)	Traffic within 6 nautical miles and +/- 1,200’	ADS-B	
Non-directional airborne Traffic Advisory (TA)	See parameters under “Indications and Alerts”	TAS, TCAS, or ADS-B	
Non-directional off-scale airborne Traffic Advisory (TA). Displayed at outer range ring at proper bearing.	See parameters under “Indications and Alerts”	TAS, TCAS, or ADS-B	
Directional airborne Traffic Advisory (TA) with track vector. Points in the direction of the aircraft track.	See parameters under “Indications and Alerts”	ADS-B	
Directional off-scale airborne Traffic Advisory (TA). Points in the direction of the aircraft track.	See parameters under “Indications and Alerts”	ADS-B	
Ground traffic without directional information.		ADS-B	
Directional surface traffic.		ADS-B	
Non-directional non-aircraft ground traffic.		ADS-B	
Directional non-aircraft ground traffic.		ADS-B	
Selected Traffic	Garmin Pilot®: Green brackets indicate traffic is selected on Other displays: ‘Callout’ wedge points to source of selected traffic information	ADS-B	

Garmin		**Location:** Olathe, KS	
TIS Traffic Advisory (TA)	See parameters under "Indications and Alerts"	TIS	
TIS Other Traffic	Traffic outside 6 nautical miles and 1,200'	TIS	
Traffic Symbol Data Tag Information			
Data Tag Information	☒ Flight ID ☒ Altitude ☒ Actual (available when TCAS II installed with G950, G1000, G2000, G3000, G5000) ☒ Relative ☐ Geometric ☐ Ground speed ☒ Vertical direction/speed ☒ Above/Below 500' (climb/descent arrows) ☐ Other ☒ Horizontal velocity vector ☐ Invalid/Unavailable data ☐ Traffic category ☐ Monitored by TCAS ☒ Other: When selected, closure rate, track angle, and ground speed are displayed		

GENESYS Aerosystems	**Location:** Mineral Wells, TX, USA
Product(s)	3D Synthetic Vision EFIS IDU III, IDU-680 and 450
Website(s)	• http://genesys-aerosystems.com/ • http://genesys-aerosystems.com/product-overview

Product Overview(s)

The MFD can be configured by the pilot as a reversionary PFD or navigation display at the touch of a button. The MFD can further be configured as a moving map, electronic HSI, a dedicated traffic display, a dedicated weather display, a dedicated Datalink display, or a dedicated video display.

IDU-680

IDU-450

IDU-III

Images courtesy of GENESYS Aerosystems

Approvals/Compliance

Authority	☒ FAA Certification Office: Anchorage ☒ EASA ☐ Other
TC/STC	☐ TC ☒ STC

EFIS Model	STC
IDU III	Part 23, Class I/II/III (page 1) Part 23, Class I/II/III (Page 2) Part 23, Class I/II/III (Page 3)
IDU III	Part 23, Class III/IV
IDU III	Citation 501
IDU III	Bell 204, 205, 210

<table>
<tr><th colspan="2">GENESYS Aerosystems</th><th>Location: Mineral Wells, TX, USA</th></tr>
<tr><td></td><td colspan="2">
<table>
<tr><td>IDU III</td><td>Bell 206/407</td></tr>
<tr><td>IDU III</td><td>Eurocopter AS350/355</td></tr>
<tr><td>IDU III</td><td>Eurocopter EC-120</td></tr>
</table>
The IDU III and IDU 450 and 680 have also been STC'd by third parties including Heritage Aviation, Enstrom Helicopters, Arrow Aviation and Keystone Helicopters.
FAA Certification Office: LA, Fort Worth and Anchorage
</td></tr>
<tr><td>TSO</td><td colspan="2">
☐ TSO-C112c, ATCRBS/Mode S Airborne Equipment
☒ TSO-C113a, Airborne Multipurpose Electronic Displays
☐ TSO-C147a, TAS Airborne Equipment
☐ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz
☐ TSO-C165a, Electronic Map Display Equipment for Graphical Depiction of Aircraft
☐ TSO-C166b, Extended Squitter ADS-B and Traffic Information
☐ TSO-C195b, Avionics Supporting ADS-B ASA
☒ Other:
<table>
<tr><td>IDU</td><td>TSO-C2d, TSO-C4c, TSO-C6e, TSO-C8e, TSO-C10b, TSO-C34e, TSO-C35d, TSO-C36e, TSO-C40c, TSO-C41d, TSO-C52b, TSO-C63c, TSO-C87, TSO-C110a, TSO-C113, TSO-C118, TSO-C146c (Class Gamma III), TSO-C147, TSO-C151b, TSO-C194</td></tr>
<tr><td>ADAHRS Module</td><td>TSO-C4c, TSO-C6e, TSO-C106</td></tr>
<tr><td>MSU Module</td><td>TSO-C6d</td></tr>
<tr><td>OAT probe</td><td>TSO-C106</td></tr>
<tr><td>GPS/SBAS Receiver/Antenna</td><td>TSO-C145c, TSO-C190</td></tr>
<tr><td>Weather Radar Module</td><td>TSO-C63c</td></tr>
<tr><td>ARINC Expansion</td><td>TSO-C113</td></tr>
</table>
</td></tr>
<tr><td>FAA Regulatory and Guidance Material</td><td colspan="2">
☐ AC 20-159a, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems
☐ AC 20-165A, Airworthiness Approval of ADS-B Out Systems
☐ AC 20-172B, Airworthiness Approval for ADS-B In Systems and Applications
☐ AC 25-11B, Electronic Flight Deck Displays
☐ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Portable Electronic Flight Bags
☒ Other: AC20-129, AC20-131A, AC23.1311-1B, AC25-15, AC90-80B
</td></tr>
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GENESYS Aerosystems	**Location:** Mineral Wells, TX, USA

Industry Documents

- ☒ RTCA DO-160E, Environmental Conditions and Test Procedures for Airborne Equipment
- ☒ RTCA DO-178B, Software Considerations in Airborne Systems and Equipment Certification (Software Level: A)
- ☐ RTCA DO-181E, MOPS for ATCRBS/Mode S Airborne Equipment
- ☐ RTCA DO-200A, Standards for Processing Aeronautical Data
- ☐ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware
- ☐ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps
- ☐ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B
- ☐ RTCA DO-272C, User Requirements for Aerodrome Mapping Information
- ☐ RTCA DO-282B, MOPS for UAT ADS-B
- ☐ RTCA DO-317A, MOPS for ASA System
- ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT
- ☐ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application
- ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA
- ☒ Other:

RTCA/DO-143	Minimum Operational Performance Standards for Airborne Radio Marker Receiving Equipment Operating on 75 MHz
RTCA/DO-155	Minimum Performance Standards - Airborne Low-Range Radio Altimeters
RTCA/DO-160(D-F)	Environmental Conditions and Test Procedures for Airborne Equipment
RTCA/DO-161A	Minimum Performance Standards - Airborne Ground Proximity Warning Equipment
RTCA/DO-178B	Software Considerations in Airborne Systems and Equipment Certification
RTCA/DO-179	Minimum Operational Performance Standards for Automatic Direction Finding (ADF) Equipment
RTCA/DO-185A	Minimum Operational Performance Standards for Traffic Alert and Collision Avoidance System II (TCAS II) Airborne Equipment
RTCA/DO-189	Minimum Operational Performance Standards for Airborne Distance Measuring Equipment (DME) Operating within the Radio Frequency Range of 960-1215 MHz
RTCA/DO-191	Minimum Operational Performance Standards for Airborne Thunderstorm Detection Equipment
RTCA/DO-192	Minimum Operational Performance Standards for Airborne ILS Glide Slope Receiving Equipment Operating within the Radio Frequency Range of 328.6-335.4 MHz
RTCA/DO-195	Minimum Operational Performance Standards for Airborne ILS Localizer Receiving Equipment Operating within the Radio Frequency Range of 108-112 MHz
RTCA/DO-196	Minimum Operational Performance Standards for Airborne VOR Receiving Equipment Operating within the Radio Frequency Range of 108-117.95 MHz
RTCA/DO-197A	Minimum Operational Performance Standards for An Active Traffic Alert and Collision Avoidance System I
RTCA/DO-200A	Standards for Processing Aeronautical Data
RTCA/DO-229D	Minimum Operational Performance Standards for Global Positioning System/Wide Area Augmentation System Airborne Equipment

GENESYS Aerosystems	**Location:** Mineral Wells, TX, USA

	RTCA/DO-257A	Minimum Operational Performance Standards for the Depiction of Navigational Information on Electronic Maps
	RTCA/DO-267A	Minimum Aviation System Performance Standards(MASPS) for Flight Information Services-Broadcast (FIS-B) Data Link
	RTCA/DO-283A	Minimum Operational Performance Standards for Required Navigation Performance for Area Navigation
	RTCA/DO-309	Minimum Operational Performance Standards (MOPS) for Helicopter Terrain Awareness and Warning System (HTAWS) Airborne Equipment
Other	SAE ARP4102-7	Electronic Displays
	SAE AS392C	Altimeter, Pressure Actuated Sensitive Type
	SAE AS396B	Bank and Pitch Instruments (Indicating Stabilized Type)
	SAE AS407C	Fuel Flowmeters
	SAE AS8002A	Air Data Computer - Minimum Performance Standard
	SAE AS8007	Over Speed Warning Instruments
	SAE AS8008	Flight Director Equipment
	SAE AS8013A	Minimum Performance Standard for Direction Instrument, Magnetic (Gyroscopically Stabilized)
	SAE AS8016A	Vertical Velocity Instrument (Rate-of-Climb)
	SAE AS8018A	Minimum Performance Standard for Mach Meters
	SAE AS8019A	Airspeed Instruments
	SAE AS8034	Minimum Performance Standard for Airborne Multipurpose Electronic Displays
	AFFTC-TIH-99-01	Aircraft Performance Flight Testing
	ARINC 424-19	Navigation System Data Base
	ARINC 429-16	Mark 33 Digital Information Transfer System (DITS)
	ARINC 706-4	Mark 5 Subsonic Air Data System
	ARINC 735A-1	Traffic Alert and Collision Avoidance System
	EIA-232D	Interface between Data Terminal Equipment and Data
	EIA-422A	Electrical Characteristics of Balanced Voltage Digital Interface Circuits
	FAA AC20-129	Airworthiness Approval of Vertical Navigation (VNAV) Systems for use in the U.S. National Airspace System (NAS) and Canada
	FAA AC20-131A	Airworthiness Approval of Traffic Alert and Collision Avoidance Systems (TCAS-II) and Mode S Transponders
	FAA AC23.1311-1B	Installation of Electronic Display in Part 23 Airplanes
	FAA AIM	Aeronautical Information Manual
	FAA Notice 8110.60	GPS as a Primary Means of Navigation for Oceanic/Remote Operations
	FAA Policy Memorandum	ANM-100 Policy Memorandum, “Low and High Speed Awareness Cues for Linear Tape Airspeed Displays,” September 11, 1996
	FAA Order 8150.1B	Technical Standard Order Procedures
	MIL-HDBK-217	Reliability Prediction of Electronic Equipment
	MIL-STD-1787C	Aircraft Display Symbology
	NMEA-0183	National Marine Electronics Association Interface Standard 0183

Hardware	
Hardware Platform(s)	MFD
Display Size	IDU-III and 450: 4” x 5” glass displays IDU-680: 6” x 8” glass displays
Display Resolution	640 x 480 pixel resolution and 256 colors
Brightness	Full-color, hi-res, sunlight-readable (1,000 nit) LCD screen with fully-adjustable brightness

GENESYS Aerosystems	**Location:** Mineral Wells, TX, USA
Controls	The IDU-III and IDU-450 EFIS displays each have 8 buttons, 2 control knobs. The IDU-680 EFIS display has 16 buttons and 4 control knobs. ☒ Buttons ☐ Keyboard (e.g., USB, Bluetooth) ☐ Mouse/cursor ☐ Stylus ☐ Touch Screen ☒ Other:rotary input selectors
Capabilities	
Operating System	Microsoft Windows – used for engineering simulators and updating databases Custom: Bare metal (proprietary) – IDU software is written directly to the microprocessor
Decluttering	☒ Yes: Decluttering features are available on all EFIS displays in the PFD or MFD configuration. The IDU-680 also decluttering options on the Primary Flight Instruments (PFI) and Navigational Display (ND) ☐ No
Panning	☒ Yes: When PAN MODE has been enabled, North, South, East and West tiles appear on the perimeter of the map. Pressing one of these direction buttons down will scroll smoothly across the map. ☐ No
Autozoom	☐ Yes ☒ No
Manual zooming	☒ Yes: IDU-II and 450 - The right hand knob will zoom in/out on the map display. IDU-680 – Encoders #1 and 2 will change the range of the map. #1 encoder for the bottom display and #2 encoder for the top display when applicable. ☐ No

GENESYS Aerosystems	**Location:** Mineral Wells, TX, USA
Indications and Alerts	The EFIS includes an integrated Warning, Caution and Advisory system that monitors a wide variety of parameters and provides auditory annunciations for conditions that demand pilot awareness. Auditory annunciations take the form of either a voice warning or Alert tone. Annunciations are grouped into three categories: warning, caution, and advisory. Warnings are accompanied by a red flag and repeat until acknowledged by the pilot (by pushing the EFIS MUTE button on yoke or panel) or the condition is corrected. Cautions are accompanied by a yellow flag and are annunciated once. Advisories are accompanied by a blue flag or no flag, depending on condition, and are indicated by either a voice annunciation or a chime. Annunciation volume is based on level of threat and audio is silenced immediately upon pressing the EFIS MUTE button. Overall volume can be adjusted during installation. CWA Flags are stacked in chronological order with warnings displayed on top, followed by cautions and then advisories. Pilot Actions: Red: Immediate Pilot Action Required Yellow: Pilot Attention Required Blue: Advisory Only
Taxi Route Guidance	Not Available
Noteworthy Features and Applications	The 3D Synthetic Vision EFIS from Genesys Aerosystems integrates a number of features: • 3D Synthetic Vision • Highway-In-The-Sky (HITS) navigation • Geo-referenced Hover Vector • TAWS / Helicopter TAWS (HTAWS) • Graphical Flight Management System (FMS) • And much more The 3D Synthetic Vision EFIS from Genesys Aerosystems is an integrated Electronic Flight Instrument System that is STC'd in four-classes of aircraft—Part 23, Part 25, Part 27, and Part 29—available as factory-standard on a production helicopter. • Full-color, hi-res, sunlight-readable (minimum 1,000 nit) LCD screen with fully-adjustable brightness • Dual, redundant backlight • Input: AHRS, ADC, GPS receiver (all included) • Integral HTAWS and FMS • DO-178B, Level-A Software • NVIS-A and NVIS-B Night Vision Goggle compatibility • Digital flight performance recording of last five flights • Redundant display/sensor architecture • RNP 0.3/BRNAV/PRNAV-compliant • Engine display and master caution system options • Certified with most existing autopilots • -55°C to +75°C operating range • Non-ITAR

GENESYS Aerosystems	**Location:** Mineral Wells, TX, USA
Traffic Display	
Data Source and Targets Displayed	The IDU's themselves do not have integrated traffic receivers and the data source will depend on which traffic system has been installed and providing traffic data to the IDU. (TCAS, ADS-B, etc) ☒ ADS-B: ☒ TIS: ☒ TIS-B: ☒ TAS: Available traffic protocols: TCAD/TAS (RS-232) – Ryan/Avidyne TAS computer ARINC735A (TAS/TCAS-I) – L-3 (Goodrich) Skywatch®, Skywatch® HP, or ARINC-429 TCAS computer TIS-B – Garmin GDL-90 UAT ARINC735A (TCAS-II) – TCAS-II interface
Traffic Display Range	Minimum: 2NM Maximum: 6NM Default: 6NM

Traffic Symbols

Symbol Type	Description	Data Source	Image
Other Traffic	OT is defined as traffic beyond 6 NM or ±1200 feet from ownship that is not an RA or TA.	TCAS-I, TCAS II, TAS and TIS-A	
Proximate Advisory	PA is defined as traffic that is within 6 NM and ±1200 feet from ownship that is not an RA or TA.	TCAS-I, TCAS II, TAS and TIS-A	
Traffic Advisory	TA is defined as traffic having a dangerous closest point of approach as defined by internal traffic sensor logic.	TCAS-I, TCAS II, TAS and TIS-A	(Flashing)
Resolution Advisory	RA is defined as traffic having a dangerous closest point of approach and that generates climb or descent commands as defined by internal TCAS-II sensor logic.	TCAS-I, TCAS II, TAS and TIS-A	 (Flashing)
Directional, high data quality, other traffic	Directional traffic beyond 6 NM or ±1200 feet from ownship that is not an RA or TA.	ADS-B and TIS-B	

GENESYS Aerosystems		**Location:** Mineral Wells, TX, USA	
Directional, high data quality, proximate	Directional traffic that is within 6 NM and ±1200 feet from ownship that is not an RA or TA.	ADS-B and TIS-B	
Directional, high data quality, TA	Directional traffic having a dangerous closest point of approach as defined by internal traffic sensor logic.	ADS-B and TIS-B	(Flashing)
Non-directional, high data quality, other traffic	Non-directional traffic beyond 6 NM or ±1200 feet from ownship that is not an RA or TA.	ADS-B and TIS-B	
Non-directional, high data quality, proximate	Non-directional traffic that is within 6 NM and ±1200 feet from ownship that is not an RA or TA.	ADS-B and TIS-B	
Non-directional, high data quality, TA	Non-directional traffic having a dangerous closest point of approach as defined by internal traffic sensor logic.	ADS-B and TIS-B	(Flashing)
Directional, low data quality, other traffic	Directional traffic beyond 6 NM or ±1200 feet from ownship that is not an RA or TA.	ADS-B and TIS-B	
Directional, low data quality, proximate	Directional traffic that is within 6 NM and ±1200 feet from ownship that is not an RA or TA.	ADS-B and TIS-B	
Directional, low data quality, TA	Directional traffic having a dangerous closest point of approach as defined by internal traffic sensor logic.	ADS-B and TIS-B	(Flashing)
Non-directional, low data quality, other traffic	Non-directional traffic beyond 6 NM or ±1200 feet from ownship that is not an RA or TA.	ADS-B and TIS-B	
Non-directional, low data quality, proximate	Non-directional traffic that is within 6 NM and ±1200 feet from ownship that is not an RA or TA.	ADS-B and TIS-B	
Non-directional, low data quality, TA	Non-directional traffic having a dangerous closest point of approach as defined by internal traffic sensor logic.	ADS-B and TIS-B	(Flashing)

GENESYS Aerosystems	**Location:** Mineral Wells, TX, USA

Traffic

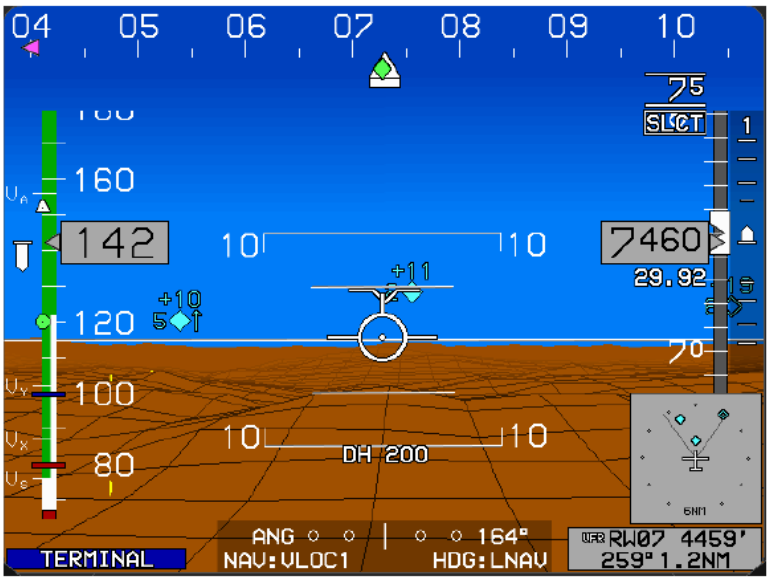


Image courtesy of GENESYS Aerosystems

Traffic Symbol Data Tag Information

Data Tag Information	☐ Flight ID ☐ Altitude ☐ Actual ☒ Relative ☐ Geometric ☐ Ground speed ☐ Vertical direction/speed ☒ Above/Below 500' (climb/descent arrows) ☐ Other ☐ Horizontal velocity vector ☐ Invalid/Unavailable data ☒ Traffic category ☐ Monitored by TCAS ☐ Other

Honeywell	**Location:** Phoenix, AZ
Product(s)	Honeywell 2D Airport Moving Map, Honeywell CDTI SURF, Honeywell 3D Airport Moving Map, Honeywell CDTI AIR-B and VSA
Website(s)	• www.honeywell.com • https://aerospace.honeywell.com/en/products/cockpit-systems/primus-epic

Product Overview(s)

Honeywell CDTI AIR-B integrates ADS-B In traffic information on the INAV Navigation Display and through dedicated interactive traffic window. Honeywell CDTI VSA supports enhanced visual separation on approach through selection and highlighting of traffic to follow. Honeywell 2D Airport Moving Map, Honeywell CDTI SURF and Honeywell 3D Airport Moving Map aid the pilot in orientation and positional awareness of ownship on the airport surface and with respect to other aircraft and ground vehicles. 2D Airport Map is a database-driven interactive moving map with north-up and track-up modes presented on the INAV® Navigation Display. CDTI SURF displays aircraft and ground vehicle traffic in the context of the 2D Map. 3D Airport Moving Map provides a complementary tactical view of the airport environment, via egocentric and exocentric modes, on the PFD.

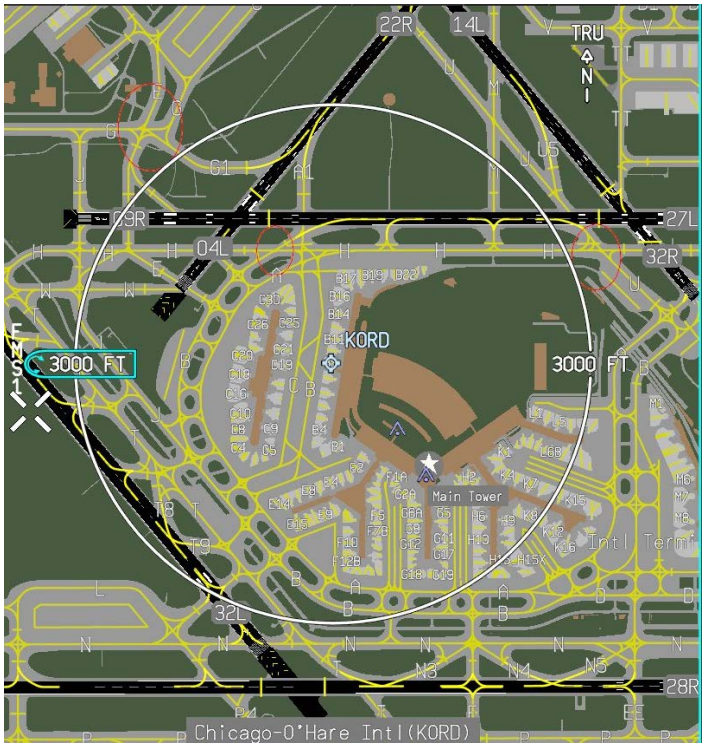
Images courtesy of Honeywell

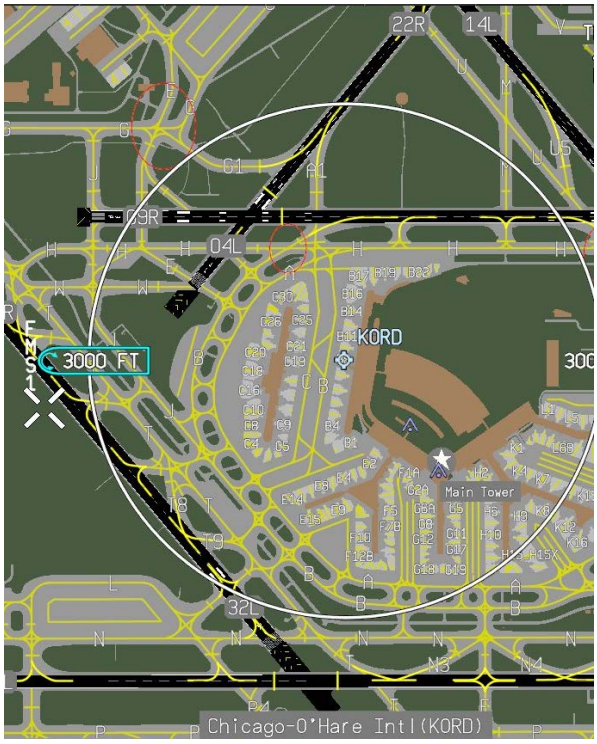
Approvals/Compliance

Authority	☒ FAA (in progress) ☒ EASA (in progress) ☐ Other

Honeywell	**Location:** Phoenix, AZ
TC/STC	☒ TC ☐ STC
TSO	Applies to all except 3d Airport Moving Map ☐ TSO-C112e, ATCRBS/Mode S Airborne Equipment ☒ TSO-C113a, Airborne Multipurpose Electronic Displays ☐ TSO-C147, TAS Airborne Equipment ☐ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☒ TSO-C165a, Electronic Map Display Equipment for Graphical Depiction of Aircraft ☐ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☒ TSO-C195a, Avionics Supporting ADS-B ASA ☐ Other
FAA Regulatory and Guidance Material	☒ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems (2D Airport Moving Map only) ☐ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☒ AC 20-172A, Airworthiness Approval for ADS-B In Systems and Applications (AIR-B, VSA, CDTI SURF only) ☒ AC 25-11B, Electronic Flight Deck Displays (AIR-B, VSA, CDTI SURF only) ☐ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Portable Electronic Flight Bags ☐ Other
Industry Documents	☐ RTCA DO-160G, Environmental Conditions and Test Procedures for Airborne Equipment ☒ RTCA DO-178B, Software Considerations in Airborne Systems and Equipment Certification (Software Level: C) ☐ RTCA DO-181E, MOPS for ATCRBS/Mode S Airborne Equipment ☒ RTCA DO-200A, Standards for Processing Aeronautical Data (2D and 3D Airport Moving Map only) ☐ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware ☒ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps (2D Airport Moving Map only) ☐ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☒ RTCA DO-272B, User Requirements for Aerodrome Mapping Information ((2D and 3D Airport Moving Map only) ☐ RTCA DO-282B, MOPS for UAT ADS-B ☒ RTCA DO-317A, MOPS for ASA System (AIR-B, VSA, CDTI SURF only) ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☒ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application (CDTI SURF only) ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☒ Other: DO-289, DO-338, DO-243, DO259 (AIR-B, VSA, CDTI SURF only) DO-319 (AIR-B only), DO-314 (VSA only)
Other	

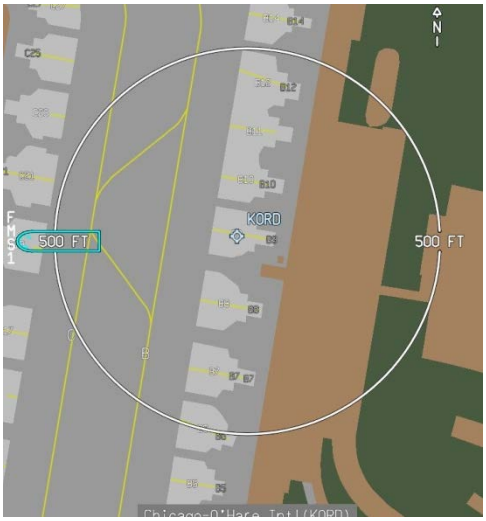
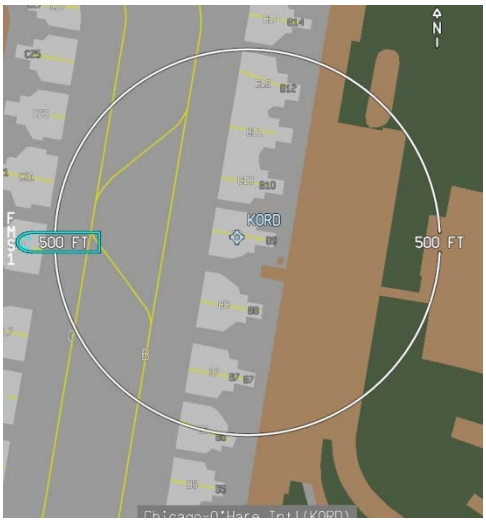
Honeywell	**Location:** Phoenix, AZ
Hardware	
Hardware Platform(s)	2D Airport Map and CDTI SURF are displayed on Honeywell Primus Epic MFDs. 3D Airport Moving Map is displayed on and Honeywell Primus Epic PFDs
Display Size	Available on all Epic Displays, including: DU-1080 (10.4" diagonal 800x600), KDU-1080 (10.4" diagonal), DU-1200 (12.1" diagonal), DU-1310-2 (14.1" diagonal)
Display Resolution	DU-1080 (800x600, IPS wide viewing angle, smart display), KDU-1080 (1024x768, IPS), DU-1200 (1024x768, IPS), DU-1310-2 (1400x1050, SMVA)
Brightness	See above
Controls	☒ Buttons ☐ Keyboard (e.g., USB, Bluetooth) ☒ Mouse/cursor ☐ Stylus ☒ Touch Screen ☒ Other: Concentric knob and joystick knob
Capabilities	
Operating System	Custom DEOS
Decluttering	☒ Yes: A mix of pilot selectable and automated decluttering (based upon range scale) which includes removal of traffic trend lines, data tag information and non-proximate traffic (by altitude and threat level) on CDTI AIR-B & SURF. Exocentric view on 3D AMM declutters some aircraft state data from the PFD that is not required for surface operation. ☐ No
Panning	☒ Yes: Panning of 2D Airport map on ground and airborne map in flight consistent with INAV display. ☐ No
Autozoom	☒ Yes: Configurable upon takeoff and landing. ☐ No
Manual zooming	☒ Yes: Multiple ranges including 5 range settings below 1NM. ☐ No
Indications and Alerts	
Taxi Route Guidance	Route guidance is not provided, although 2D and 3D AMM be used to confirm the route along the way.

Honeywell	**Location:** Phoenix, AZ
Noteworthy Features and Applications	
Airport Information Elements Depicted *(Images courtesy of Honeywell)*	
Airport Moving Map Data Format	☐ Geo-referenced ☒ Database driven
Ownship	White airplane 
Runways	Black 

Honeywell	**Location:** Phoenix, AZ
Runway Centerlines	Grey dashed 
Runway Labels	White text over grey background 

Honeywell	**Location:** Phoenix, AZ
Taxiways	Grey 
Taxiway Centerlines	Yellow line 

Honeywell	**Location:** Phoenix, AZ
Taxiway Labels	Grey text 
Hold Lines	Yellow line 

Honeywell	**Location:** Phoenix, AZ
Non-movement Areas	
Ramp Areas	Light grey 
Grassy Areas	Green 
Buildings	Brown 
Building Labels	White text 

Honeywell	**Location:** Phoenix, AZ
Other	Hotspots 
Traffic Display	
Data Source and Targets Displayed	☒ ADS-B: Included in and may fill the traffic display buffer of 127 targets ☐ TIS: ☒ TIS-B: Included in and may fill the traffic display buffer of 127 targets ☐ TAS: Note: Traffic displays can overlay all EGPWS visuals.
Traffic Display Range	**Minimum:** Minimum limit of display (varies by application) **Maximum:** Maximum limit of display (varies by application) **Default:** (varies by application)

Traffic Symbols

Thresholds for alerts vary by a number of factors including: target heading relative to own aircraft heading, vertical speeds, etc.

Symbol Type	Description	Data Source	Image
Non-directional Airborne Resolution Advisory Traffic		TCAS, ADS-B, TIS-B, ADS-R	
Non-directional Airborne Traffic Advisory Traffic		TCAS, ADS-B, TIS-B, ADS-R	
Non-directional Airborne Proximate Traffic		TCAS, ADS-B, TIS-B, ADS-R	
Non-directional Airborne Non-Proximate Traffic		TCAS, ADS-B, TIS-B, ADS-R	
Directional Airborne Resolution Advisory Traffic		TCAS, ADS-B, TIS-B, ADS-R	

Honeywell		**Location:** Phoenix, AZ	
Directional Airborne Traffic Advisory Traffic		TCAS, ADS-B, TIS-B, ADS-R	
Directional Airborne Proximate Traffic		TCAS, ADS-B, TIS-B, ADS-R	
Directional Airborne Non-Proximate Traffic		TCAS, ADS-B, TIS-B, ADS-R	
Non-directional Surface Aircraft Traffic		ADS-B	
Non-directional Surface Vehicle Traffic		ADS-B	
Directional Surface Aircraft Traffic		ADS-B	
Directional Surface Vehicle Traffic		ADS-B	
Traffic Symbol Data Tag Information			
Data Tag Information	☒ Flight ID ☒ Altitude ☒ Actual Note: Via a pilot selectable momentary display ☒ Relative ☐ Geometric ☒ Ground speed (Application specific) ☒ Vertical direction/speed ☒ Above/Below 500' (climb/descent arrows) ☒ Other: Vertical Speed available (Application specific) ☒ Horizontal velocity vector ☒ Invalid/Unavailable data (Application specific) ☒ Traffic category (Application specific) ☐ Monitored by TCAS ☒ Other: Range, Bearing, Closure Rate and Ground Track Note: CDTI can present Flight ID, relative altitude, vertical direction climb/descent arrows, and up to two other application specific data items for airborne traffic. For CDTI AIR-B, SURF and VSA, data tags provide Flight ID, category and ground speed and a horizontal velocity vector may also be provided.		

L-3 Communications	**Location:** New York, NY
Product(s)	Lynx NGT-9000
Website(s)	• www.l-3com.com • https://www.l-3avionics.com/media/8455/lynx_ngt-9000_pg.pdf

Product Overview(s)

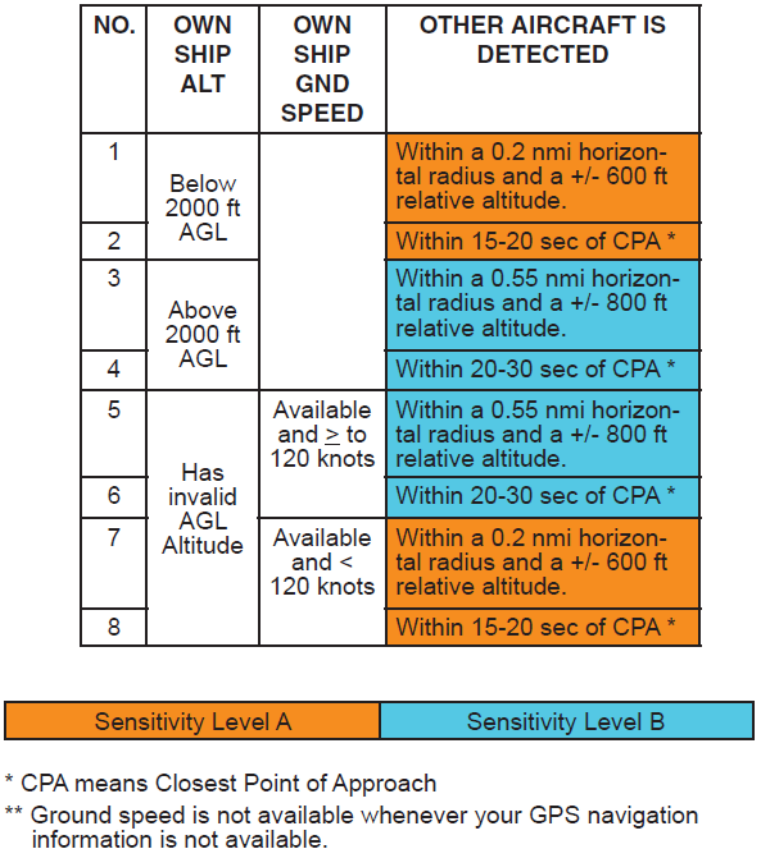
Lynx NGT-9000 is a 1090 ES Transponder which also provides a display of ADS-B traffic (ADS-B, ADS-R and TIS-B) with option for the L-3 Active Traffic enablement (TAS). This blends ADS-B with active traffic data, providing an uninterrupted display of aircraft equipped with Mode A, C and S transponders. The system also receives FIS-B data and graphically depicts weather as well as textual weather products.

Approvals/Compliance

Authority	☒ FAA Certification Office: LA ACO ☐ EASA ☐ Other
TC/STC	☐ TC Aircraft: ☒ STC Aircraft: Many. AMLSTC received.
TSO	☒ TSO-C112d, ATCRBS/Mode S Airborne Equipment ☒ TSO-C113a, Airborne Multipurpose Electronic Displays ☒ TSO-C147, TAS Airborne Equipment ☒ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☐ TSO-C165a, Electronic Map Display Equipment for Graphical Depiction of Aircraft ☒ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☒ TSO-C195a, Avionics Supporting ADS-B ASA ☒ Other: TSO-C145c, TSO-C157a

L-3 Communications	**Location:** New York, NY
FAA Regulatory and Guidance Material	☐ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems ☒ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☒ AC 20-172A, Airworthiness Approval for ADS-B In Systems and Applications ☐ AC 25-11B, Electronic Flight Deck Displays ☐ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Portable Electronic Flight Bags ☐ Other
Industry Documents	☒ RTCA DO-160D, Environmental Conditions and Test Procedures for Airborne Equipment ☒ RTCA DO-178B, Software Considerations in Airborne Systems and Equipment Certification (Software Level: C ☒ RTCA DO-181E, MOPS for ATCRBS/Mode S Airborne Equipment ☒ RTCA DO-200A, Standards for Processing Aeronautical Data ☒ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware (System Development Assurance Level: not provided) ☐ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps ☒ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☐ RTCA DO-272D, User Requirements for Aerodrome Mapping Information ☒ RTCA DO-282B, MOPS for UAT ADS-B ☒ RTCA DO-317B, MOPS for ASA System ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☐ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☐ Other: DO-229D, DO-267A
Other	
Hardware	
Hardware Platform(s)	MFD
Display Size	6.25 x 1.80 inches
Display Resolution	800 x 240
Brightness	TSO-C113a compliant, direct sunlight
Controls	☐ Buttons ☐ Keyboard (e.g., USB, Bluetooth) ☐ Mouse/cursor ☐ Stylus ☒ Touch Screen ☐ Other

L-3 Communications	**Location:** New York, NY
Capabilities	
Operating System	Windows and Linux operating system may execute the maintenance application necessary for installation and configuration.
Decluttering	☒ Yes: Vertical display mode (above, below, normal, unrestricted) ☐ No
Panning	☐ Yes ☒ No
Autozoom	☐ Yes ☒ No
Manual zooming	☒ Yes: NGT-9000 range settings: 0.5 nm, 1 nm, 2 nm, 6 nm, 12 nm, 24 nm, 40 nm ☐ No
Indications and Alerts	The traffic symbols indicate the approximate range, relative bearing, and relative altitude of intruder aircraft. Traffic data with directional data for intruder aircraft are shown as arrowheads. Traffic data without directional data for intruder aircraft are shown as diamonds. TAS functionality also has aural TA warnings (“traffic, traffic”) that are annunciated over the cockpit speaker or headset. Extended call-outs including the clock position, relative attitude and range (10 o’clock, low, 5 miles) are a configurable option selected at the time of installation. Traffic alerts which occur when the traffic display is not visible will automatically switch to the traffic display.

L-3 Communications	**Location:** New York, NY
	 *Image courtesy of L-3 Communications*
Taxi Route Guidance	
Noteworthy Features and Applications	Traffic is selectable on the screen and an info box opened to show basic aircraft information including groundspeed.
Traffic Display	
Data Source and Targets Displayed	☒ ADS-B ☐ TIS ☒ TIS-B ☒ TAS Displays 10 highest priority aircraft (aircraft tracked by multiple sources are correlated and displayed as 1 target)
Traffic Display Range	Minimum: 0.5 nm Maximum: 40 nm Default: 2 nm

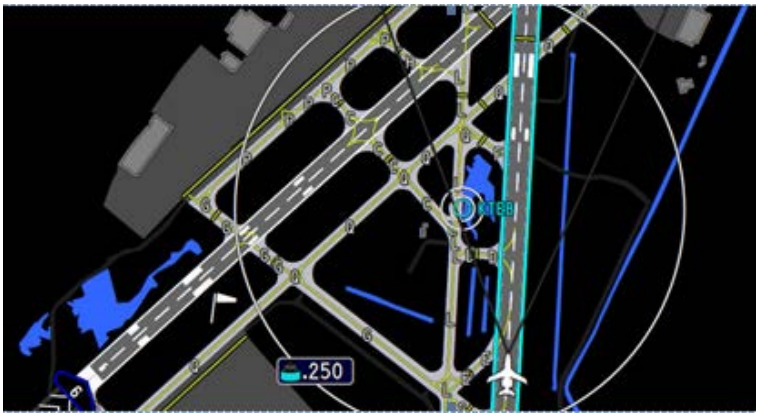
L-3 Communications		**Location:** New York, NY	
Traffic Symbols			
Symbol Type	**Description**	**Data Source**	**Image**
Ownship	White triangle		
Airborne Directional Traffic Advisory (TA)	Aircraft detected that meet the criteria stated above, under Indications and Alerts.	ADS-B, ADS-R, TIS-B Correlated with TAS	
Airborne Directional Proximity Advisory (PA)	Aircraft detected within 6 nm and 1,200 feet from ownship. May be white or cyan.	ADS-B, ADS-R, TIS-B (may be correlated with TAS)	
Airborne Directional Other Traffic (OT)	Aircraft that has been detected within the selected display range and vertical display mode, but which has not generated a TA or a PA. May be white or cyan.	ADS-B, ADS-R, TIS-B (may be correlated with TAS)	
Airborne Non-directional TA	Aircraft detected that meet the criteria stated above, under Indications and Alerts.	TAS	
Airborne Non-directional PA	Aircraft detected within 6 nm and 1,200 feet from ownship. May be white or cyan.	TAS	
Airborne Non-directional OT	Aircraft that has been detected within the selected display range and vertical display mode, but which has not generated a TA or a PA. May be white or cyan.	TAS	
On Ground Directional OT	On ground directional aircraft that has been detected within the selected display range.	ADS-B, ADS-R, TIS-B	
Ground Vehicle Directional	Directional ground vehicle that has been detected within the selected display range.	ADS-B, ADS-R, TIS-B	
On Ground Non-directional OT	On ground non-directional aircraft that has been detected within the selected display range.	ADS-B, ADS-R, TIS-B	

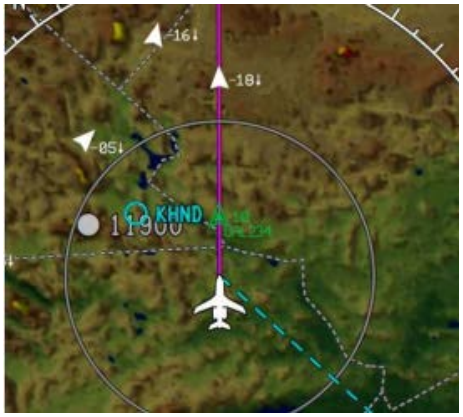
L-3 Communications		**Location:** New York, NY	
Ground Vehicle Non-directional	Non-directional ground vehicle that has been detected within the selected display range.	ADS-B, ADS-R, TIS-B	
Off-Scale TA	TA detected beyond the current display range. The symbol is displayed at a position along the outer range ring that indicates the relative bearing of the intruder aircraft.	ADS-B, ADS-R, TIS-B, TAS	
Traffic Symbol Data Tag Information			
Data Tag Information	☒ Flight ID ☒ Altitude ☐ Actual ☒ Relative (in hundreds of feet) ☐ Geometric ☒ Ground speed ☒ Vertical direction/speed ☒ Above/Below 500' (climb/descent arrows) ☐ Other (please specify): ☒ Horizontal velocity vector ☒ Invalid/Unavailable data ☒ Traffic category ☐ Monitored by TCAS ☐ Other		

Rockwell Collins, Inc.	**Location:** Cedar Rapids, IA
Product(s)	Pro Line Fusion® Integrated Avionics System
Website(s)	• www.rockwellcollins.com • http://rockwellcollins.com/Capabilities_and_Markets/Air/Business_Aviation/Embraer_Legacy_450_500.aspx

Product Overview(s)

The Pro Line Fusion® Integrated Avionics System provides optional surface management system (airport moving map) and real-time airborne traffic information capabilities. The system provides automated checks and aural advisories to the flight crew, and adds a visual overlay that highlights the target runway on the airport chart display. Fusion also supports runway safety awareness by displaying aircraft position during taxi. Should an unsafe takeoff or landing operation occur, aural alerts "not a runway" and other visual alerts provide additional situational awareness.





Images courtesy of Rockwell Collins

Approvals/Compliance

Authority	☒ FAA Certification Office: Wichita ☐ EASA ☐ Other
TC/STC	☒ TC Aircraft: Embraer Legacy 450 and 500 ☐ STC Aircraft:
TSO	☐ TSO-C112e, ATCRBS/Mode S Airborne Equipment ☐ TSO-C113a, Airborne Multipurpose Electronic Displays ☐ TSO-C147, TAS Airborne Equipment ☐ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☒ TSO-C165a, Electronic Map Display Equipment for Graphical Depiction of Aircraft ☐ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☐ TSO-C195a, Avionics Supporting ADS-B ASA ☐ Other

Rockwell Collins, Inc.	**Location:** Cedar Rapids, IA
FAA Regulatory and Guidance Material	☐ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems ☐ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☐ AC 20-172A, Airworthiness Approval for ADS-B In Systems and Applications ☐ AC 25-11B, Electronic Flight Deck Displays ☐ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Portable Electronic Flight Bags ☐ Other
Industry Documents	☒ RTCA DO-160E, Environmental Conditions and Test Procedures for Airborne Equipment ☒ RTCA DO-178B, Software Considerations in Airborne Systems and Equipment Certification (Software Level: Not provided) ☐ RTCA DO-181E, MOPS for ATCRBS/Mode S Airborne Equipment ☐ DO-200A, Standards for Processing Aeronautical Data ☐ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware ☒ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps ☐ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☐ DO-272C, User Requirements for Aerodrome Mapping Information ☐ RTCA DO-282B, MOPS for UAT ADS-B ☐ RTCA DO-317A, MOPS for ASA System ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☐ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☐ Other
Other	
Hardware	
Hardware Platform(s)	MFD
Display Size	15” LCD
Display Resolution	1050x1400
Brightness	None
Controls	☐ Buttons ☐ External Keyboard (e.g., USB, Bluetooth) ☒ Mouse/cursor ☐ Stylus ☐ Touch Screen ☒ Other: Knob
Capabilities	
Operating System	LynxOS-178

Rockwell Collins, Inc.	**Location:** Cedar Rapids, IA
Decluttering	☒ Yes: Automatic label/feature de-clutter, range based ☐ No
Panning	☒ Yes: Integrated with MFW Nav Map – cursor controller ☐ No
Autozoom	☐ Yes: ☒ No
Manual zooming	☒ Yes: Knob based ☐ No
Indications and Alerts	Indications for the following are found in the airport information block in the upper left of the map: Hot Spot Data availability for the airport displayed Non-WGS 84 compliance of the source data for the airport displayed Runways Only status (no ARINC 816 data available for the displayed airport, ARINC 424 only) Indications for the following are found in the map message field in the lower center of the map: **Loading Airport** – airport data is being processed and the map cannot yet be displayed **Off Airport Map** – the map is panned such that no airport data is shown **Map Position Fault** – GPS data does not support accurate display of ownship **Airport Map Fault** – AMM function is faulted Takeoff and landing alerts are intended to alert the crew of potential runway errors - eg. beginning a takeoff or aligned to land on a surface that's not a runway (eg. taxiway), or beginning a takeoff or aligned to land on the incorrect runway (i.e. a runway other than the one selected in the FMS flight plan).
Taxi Route Guidance	Taxi surfaces and labels are displayed along with ownship representation.
Noteworthy Features and Applications	ADS-B In capability is expected in the near future.
Airport Information Elements Depicted	
Airport Moving Map Data Format	Specify whether the airport moving map application is a geo-referenced electronic chart or database-driven display: ☐ Geo-referenced ☒ Database driven

Rockwell Collins, Inc.	**Location:** Cedar Rapids, IA

Image courtesy of Rockwell Collins

Ownship	Yes; white airplane icon with error representation based on GPS inputs.
Runways	Dark grey with white border. Generated from ARINC 816 or ARINC 424 data, includes magenta highlighting of origin/destination runways based on Flight Management System data (integrated).
Runway Centerlines	White dashed. Generated from ARINC 816 or ARINC 424 data.
Runway Labels	Blue text on black background with blue dashed border. Generated from ARINC 816 or ARINC 424 data, dynamic symbols that park at the screen edge and travel along the runway as the map is panned (with a runway moving off screen).
Taxiways	Light grey. Generated from ARINC 816 data.
Taxiway Centerlines	Yellow lines. Generated from ARINC 816 data.
Taxiway Labels	White text. Generated from ARINC 816 data.
Hold Lines	Yellow lines. Generated from ARINC 816 data.
Non-movement Areas	Black. Generated from ARINC 816 data
Ramp Areas	Dark grey. Generated from ARINC 816 data.

Rockwell Collins, Inc.	**Location:** Cedar Rapids, IA
Grassy Areas	--
Buildings	Medium grey. Generated from ARINC 816 data.
Building Labels	White text. Generated from ARINC 816 data
Other	Generated from ARINC 816 data: Graphical Hot Spots, Construction areas, helipads, windsocks, airport reference point, water, de-icing areas Generated from ARINC 816 or ARINC 424 data: Airport information: ICAO, field elevation
Traffic Display	
Data Source and Targets Displayed	☒ ADS-B ☐ TIS ☐ TIS-B ☐ TAS
Traffic Display Range	Minimum Maximum Default
Traffic Symbols	

Symbol Type	Description	Data Source	Image
Airborne Traffic		TCAS II	
Airborne Traffic (Selected)		TCAS II	
Airborne Traffic		TCAS II	
Airborne Traffic		TCAS II	
Airborne Traffic		TCAS II	

Rockwell Collins, Inc.	**Location:** Cedar Rapids, IA
Traffic Symbol Data Tag Information	
Data Tag Information	☒ Flight ID ☒ Altitude ☐ Actual ☒ Relative ☐ Geometric ☐ Ground speed ☒ Vertical direction/speed ☒ Above/Below 500' (climb/descent arrows) ☐ Other: ☐ Horizontal velocity vector ☐ Invalid/Unavailable data ☐ Traffic category ☐ Monitored by TCAS (or TAS overlay/blending) ☐ Other

4.2 Portable CDTI Manufacturers

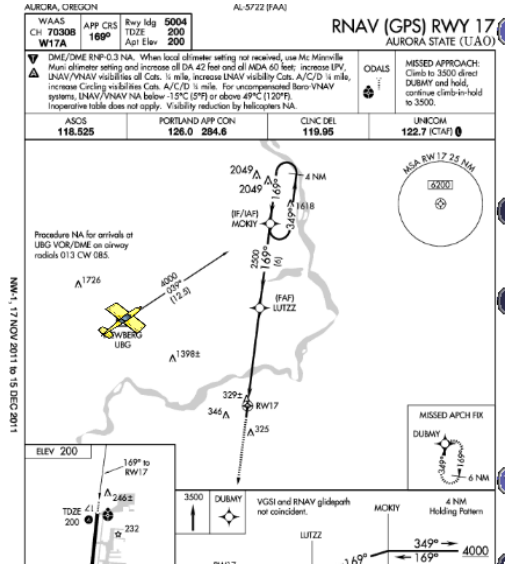
This section includes surveys for manufacturers with portable CDTI products. These products may also provide airport moving map functionality, or in a few cases, may provide a separate airport moving map application that does not depict traffic information. All information was provided by the manufacturers and has not been verified with the FAA. Per AC 120-76C, a CDTI is not considered an EFB function, and portable CDTIs can not be authorized for use.

Advanced Flight Systems, Inc. (AFS)	**Location:** Canby, OR
Product(s)	AFS-5400, 5500, 5600, 5800
Website(s)	• www.advanced-flight-systems.com/ • www.advanced-flight-systems.com/EFIS_Literature_2014_web.pdf • http://www.advanced-flight-systems.com/Support/AF-5600/AF-5000%20User%20and%20Installation%20Manual%20V3.00.pdf
Product Overview(s)	
The AFS 5000-series can display traffic when connected to a NavWorx ADS600-B, Garmin GTX-330, or Zaon XRX receiver, and is available in several display sizes. All models are high resolution LED backlit screens that provide high intensity brightness during the day, and a very low intensity brightness at night. All 5000 Series displays can optionally be equipped with a touch screen. Synthetic Vision is a standard feature on the AF-5000 Series.	
  *Images courtesy of AFS*	
Approvals/Compliance	
Authority	☐ FAA ☐ EASA ☐ Other
TC/STC	☐ TC Aircraft ☐ STC Aircraft:

Advanced Flight Systems, Inc. (AFS)	**Location:** Canby, OR
TSO	☐ TSO-C112e, ATCRBS/Mode S Airborne Equipment ☐ TSO-C113a, Airborne Multipurpose Electronic Displays ☐ TSO-C147a, TAS Airborne Equipment ☐ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☐ TSO-C165a, Electronic Map Display Equipment for Graphical Depiction of Aircraft Position (Own-Ship) ☐ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☐ TSO-C195b, Avionics Supporting ADS-B ASA ☐ Other
FAA Regulatory and Guidance Material	☐ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems ☐ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☐ AC 20-172B, Airworthiness Approval for ADS-B In Systems and Applications ☐ AC 25-11B, Electronic Flight Deck Displays ☐ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Electronic Flight Bags ☐ Other
Industry Documents	☐ RTCA DO-160G, Environmental Conditions and Test Procedures for Airborne Equipment ☐ RTCA DO-178C, Software Considerations in Airborne Systems and Equipment Certification ☐ RTCA DO-181E, MOPS for ATCRBS/Mode S Airborne Equipment ☐ RTCA DO-200B, Standards for Processing Aeronautical Data ☐ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware ☐ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps ☐ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☐ RTCA DO-272D, User Requirements for Aerodrome Mapping Information ☐ RTCA DO-282B, MOPS for UAT ADS-B ☐ RTCA DO-317A, MOPS for ASA System ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☐ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☐ Other
Other	
Hardware	
Hardware Platform(s)	PFD and MFD
Display Size	8.4” (AFS-5400, 5500) 10.4” (AFS 5600) 12.1” (AFS-5800)

Advanced Flight Systems, Inc. (AFS)	**Location:** Canby, OR
Display Resolution	1024 x 768
Brightness	Enhanced to 1000 nits for direct sunlight.
Controls	☒ Buttons ☐ Keyboard (e.g., USB, Bluetooth) ☐ Mouse/cursor ☐ Stylus ☒ Touch Screen ☒ Other: Joystick
Capabilities	
Operating System	Linux
Decluttering	☒ Yes: Depending on zoom level ☐ No
Panning	☒ Yes: Using joystick or touch screen ☐ No
Autozoom	☐ Yes ☒ No
Manual zooming	☒ Yes: Using joystick or touch screen ☐ No
Indications and Alerts	We have an alert area on the screen for messages and audio warnings: -Landing gear warning system -TAWS
Taxi Route Guidance	None
Noteworthy Features and Applications	
Airport Moving Map Information Elements Depicted	
Airport Moving Map Data Format	☒ Geo-referenced ☒ Database driven

Advanced Flight Systems, Inc. (AFS)	**Location:** Canby, OR



Images courtesy of AFS

Ownship	Yellow airplane icon
Runways	Black
Runway Centerlines	--
Runway Labels	Black text
Taxiways	White with black border
Taxiway Centerlines	--
Taxiway Labels	Black text
Hold Lines	--
Non-movement Areas	--
Ramp Areas	White with black border (labeled)
Grassy Areas	--
Buildings	Numbers (white text on a black circle) correspond to map legend
Building Labels	Numbers (white text on a black circle) correspond to map legend
Other	
Traffic Display	
Data Source and Targets Displayed	We display the closest 32 targets. ☒ ADS-B ☒ TIS ☒ TIS-B ☒ TAS

Advanced Flight Systems, Inc. (AFS)	**Location:** Canby, OR		
Traffic Display Range	Minimum: 0 NM Maximum: 26 NM Default: Last range setting		
Traffic Symbols			
Symbol Type	**Description**	**Data Source**	**Image**
Other Traffic	Greater than 7000ft relative altitude and greater than 7nm range	ADS-B TIS-B TIS TAS	
Proximity Traffic	Within 1200ft relative altitude and less than 6nm range	ADS-B TIS-B TIS TAS	
Traffic Advisory	Within 1200ft relative altitude and less than 3 nm range	ADS-B TIS-B TIS TAS	
Traffic Symbol Data Tag Information			
Data Tag Information	☒ Flight ID ☒ Altitude ☐ Actual ☒ Relative ☐ Geometric ☐ Ground speed ☐ Vertical direction/speed ☒ Above/Below 500' (climb/descent arrows) ☐ Other (please specify): ☒ Horizontal velocity vector ☐ Invalid/Unavailable data ☐ Traffic category ☐ Monitored by TCAS ☐ Other		

AvMap	**Location:** Falmouth, MA
Product(s)	EKPV, EKP IV & EKPIV pro
Website(s)	• www.avmap.us • http://avmap.us/products/aero/ekp_iv-4/introduction • http://avionics.avmap.it/en/products/ekp-v/

Product Overview(s)

AvMap EKP IV, IV Pro and EKP V are aeronautical navigators that feature a 7" color LCD display, which utilize a memory card preloaded with software and maps. Each unit can operate in portrait and landscape mode. Traffic awareness (Mode C) is supported when connected to ZOAN XRX receiver. ADS-B traffic is in development.

AvMap EKP V is a multifunctional display, made for panel-mounting and portable use, with 7" display, removable battery, built-in GPS receiver, operative in portrait and landscape mode, and preloaded with software and maps.

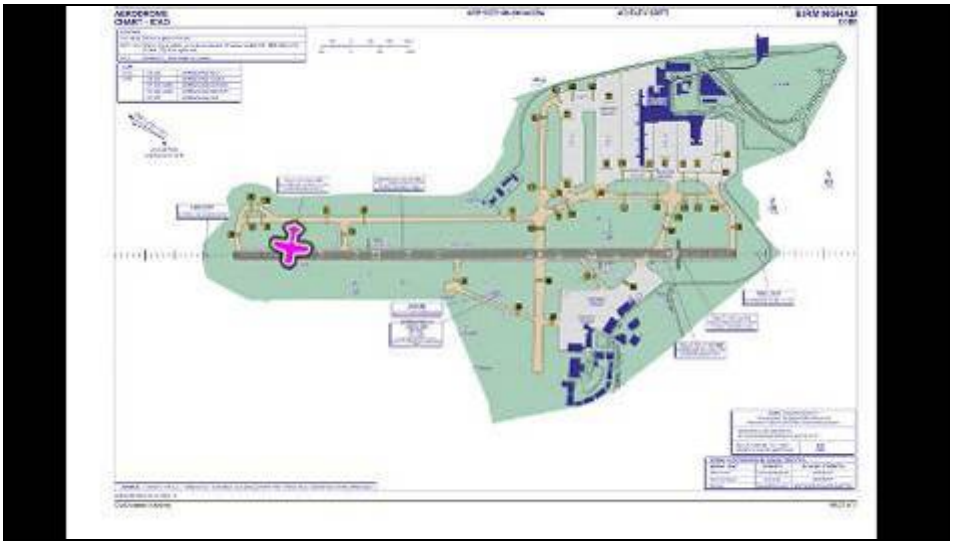
Images courtesy of AvMap

Approvals/Compliance

Authority	☐ FAA ☐ EASA ☐ Other
TC/STC	☐ TC ☐ STC
TSO	☐ TSO-C112e, ATCRBS/Mode S Airborne Equipment ☐ TSO-C113a, Airborne Multipurpose Electronic Displays ☐ TSO-C147a, TAS Airborne Equipment ☐ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☐ TSO-C165a, Electronic Map Display Equipment for Graphical Depiction of Aircraft ☐ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☐ TSO-C195b, Avionics Supporting ADS-B ASA ☐ Other

AvMap	**Location:** Falmouth, MA
FAA Regulatory and Guidance Material	☐ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems ☐ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☐ AC 20-172B, Airworthiness Approval for ADS-B In Systems and Applications ☐ AC 25-11B, Electronic Flight Deck Displays ☐ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Electronic Flight Bags ☐ Other
Industry Documents	☐ RTCA DO-160G, Environmental Conditions and Test Procedures for Airborne Equipment ☐ RTCA DO-178C, Software Considerations in Airborne Systems and Equipment Certification ☐ RTCA DO-181E, MOPS for ATCRBS/Mode S Airborne Equipment ☐ RTCA DO-200B, Standards for Processing Aeronautical Data ☐ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware ☐ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps ☐ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☐ RTCA DO-272D, User Requirements for Aerodrome Mapping Information ☐ RTCA DO-282B, MOPS for UAT ADS-B ☐ RTCA DO-317A, MOPS for ASA System ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☐ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☐ Other
Other	
Hardware	
Hardware Platform(s)	EKP IV & EKPIV PRO: MFD EKPV : MFD
Display Size	7”
Display Resolution	EKPIV & EKPV PRO: 800 x 480 EKPV: 800 x 480 (600 cd/m2)
Brightness	EKPIV & EKPV PRO: 800 x 480, LCD TFT, display colors 64k EKPV: 800 x 480 (600 cd/m2), LCD TFT, display colors 64k
Controls	☒ Buttons ☐ Keyboard ☒ Mouse/cursor Joystick ☐ Stylus ☐ Touch Screen ☒ Other: Joystick

AvMap	**Location:** Falmouth, MA
Capabilities	
Operating System	☒ Microsoft Windows (EKP V) ☐ Linux ☐ Android ☐ iOS ☒ Custom: AvMap operating System (EKP IV & EKP IV PRO)
Decluttering	☒ Yes: The user may select which objects are shown on the map and which are hidden. ☐ No
Panning	☒ Yes: When using the Joystick, the cursor will appear on the map (PAN mode). ☐ No
Autozoom	☒ Yes ☐ No
Manual zooming	☒ Yes ☐ No
Indications and Alerts	TAWS: Color depiction on the map. Alarm message pop-up with audio BEEP when Aircraft is entering the alarm zone (alarm zone customizable in 500 ft or 1000 ft). Airspace ahead alarm: Alarm message pop-up with audio BEEP when Aircraft is entering an airspace zone that is selected by the pilot to avoid or to be alarmed for (Pilot may select which airspaces to be alarmed for and may select at what distance or time he wants to be alarmed). Collision Avoidance / Traffic alarm: connecting the EKP products to ZAON PCAS XRX collision avoidance system (mode C receiver), the EKP products show the relative traffic of airplanes around your position. Position, altitude and direction of the airplanes is shown, and are indicated by colors indicating whether an aircraft is in a dangerous position or not.
Taxi Route Guidance	EKP IV & EKP IV PRO: No Taxi route Guidance EKP V: Airport Diagram (image) is Geo-referenced. You will see your aircraft position on top of the airport diagram. No specific taxi route guidance.
Noteworthy Features and Applications	EKP IV includes Jeppesen's database with ICAO airports, airfields and heliports. The EKP IV main features are: full flight planning capability, land elevation, trip computer, integration with other onboard navigation systems (autopilot, GPS, external antenna, Low Airways, TAWS, Collision Avoidance interface) and full NAVDATA page. EKP IV Pro functions include Search And Rescue (SAR) Patterns and Detailed additional Street map for address search with POI database. The EKP V features flight planning capability, Low Airways, TAWS, NAVDATA page, airspace alarm, SAR, Integration with other onboard navigation systems: autopilot, CAS, EFIS, XM Weather, NMEA out, video camera, import custom maps. ADS-B traffic in development.
Airport Moving Map Information Elements Depicted	
Airport Moving Map Data Format	☒ Geo-referenced (Vector) ☐ Database driven

AvMap	**Location:** Falmouth, MA
	 *Image courtesy of AvMap*
Ownship	White, black or magenta airplane icon
Runways	Dark grey
Runway Centerlines	White dash
Runway Labels	White numbers on runway and white textbox with blue text
Taxiways	Tan
Taxiway Centerlines	--
Taxiway Labels	Blue text and black textbox with yellow text
Hold Lines	Yellow
Non-movement Areas	Green
Ramp Areas	Light grey
Grassy Areas	--
Buildings	Blue
Building Labels	Blue Text
Other	PAPI lights
Traffic Display	
Data Source and Targets Displayed	☐ ADS-B: ☐ TIS: ☐ TIS-B: ☐ TAS: Mode C: (ZOAN PCAS XRX)
Traffic Display Range	Minimum: 1 NM Maximum: 6 NM Default: 6 NM

AvMap	**Location:** Falmouth, MA

Traffic Symbols

Mode C traffic in the upper right corner of the display

Image courtesy of AvMap

Symbol Type	Description	Data Source	Image
Mode C traffic		Mode C	See image above

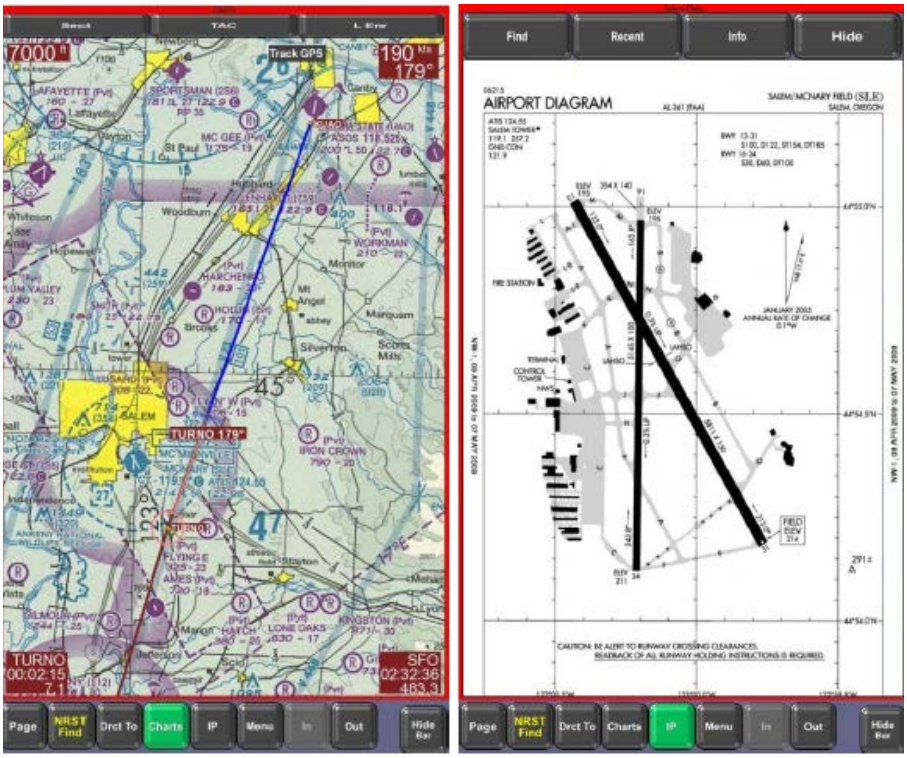
Traffic Symbol Data Tag Information

Data Tag Information	☐ Flight ID ☒ Altitude ☐ Actual ☒ Relative ☐ Geometric ☐ Ground speed ☒ Vertical direction/speed ☒ Above/Below 500' (climb/descent arrows) ☐ Other : ☐ Horizontal velocity vector ☐ Invalid/Unavailable data ☐ Traffic category ☐ Monitored by TCAS ☐ Other :

FlightPrep, Inc.	**Location:** Aurora, Oregon
Product(s)	ChartCase Professional applications ChartBook-3 EFB, Helm X650
Website(s)	• www.flightprep.com • http://flightprep.s3.amazonaws.com/Download/Manual/FlightPrepManual-6.0.0.pdf

Product Overview(s)

The ChartBook-3 EFB is a portable tablet computer that may be secured on a yoke mount or kneeboard. The Helm X650 is a portable EFB with built in GPS and clip-in panel mount. Both portable EFBs have touch screen capability, and come with FlightPrep's ChartCase Professional software package. ChartCase Profressional™ is moving map software that provides a surface application using geo-referenced electronic charts. Ownship position from GPS data can be presented on these charts. In addition to the airport diagrams, ChartCase Professional™ includes all Sectional Charts, WAC Charts, High/Low Enroute Charts, Instrument Procedures, Airport Diagrams, TAC and vector charts for the U.S. The software can be used on most Windows-based computers.



Images courtesy of FlightPrep, Inc.

Approvals/Compliance

Authority	☒ FAA (approval) ☐ EASA ☐ Other
TC/STC	☐ TC ☐ STC

FlightPrep, Inc.	**Location:** Aurora, Oregon
TSO	☐ TSO-C112e, ATCRBS/Mode S Airborne Equipment ☐ TSO-C113a, Airborne Multipurpose Electronic Displays ☐ TSO-C147a, TAS Airborne Equipment ☐ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☐ TSO-C165a, Electronic Map Display Equipment for Graphical Depiction of Aircraft Position (Own-Ship) ☐ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☐ TSO-C195b, Avionics Supporting ADS-B ASA ☐ Other
FAA Regulatory and Guidance Material	☐ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems ☐ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☐ AC 20-172B, Airworthiness Approval for ADS-B In Systems and Applications ☐ AC 25-11B, Electronic Flight Deck Displays ☒ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Portable Electronic Flight Bags ☒ Other: AC 91-78, Order 8900.1, Electronic Flight Bag Operational Authorization Process
Industry Documents	☐ RTCA DO-160G, Environmental Conditions and Test Procedures for Airborne Equipment ☒ RTCA DO-178C, Software Considerations in Airborne Systems and Equipment Certification (Software Level: E) ☐ RTCA DO-181E, MOPS for ATCRBS/Mode S Airborne Equipment ☐ RTCA DO-200B,Standards for Processing Aeronautical Data ☐ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware ☐ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps ☐ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☐ RTCA DO-272D, User Requirements for Aerodrome Mapping Information ☐ RTCA DO-282B, MOPS for UAT ADS-B ☐ RTCA DO-317A, MOPS for ASA System ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☐ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☐ Other
Other	FAA Notice N8900.17
Hardware	
Hardware Platform(s)	ChartBook and Windows-based devices.
Display Size	Chartbook: 8.1” Helm: 5” by 6”
Display Resolution	Chartbook: 1280 x 800 Helm: 640 x 800

FlightPrep, Inc.	**Location:** Aurora, Oregon
Brightness	ChartBook: Approx. 300 nits, Flight Definition Outdoor Viewable Display Helm: 1000 nits LED Backlight Fully Dimmable
Controls	☒ Buttons ☐ External Keyboard (e.g., USB, Bluetooth) ☐ Mouse/cursor ☐ Stylus ☒ Touch Screen ☐ Other
Capabilities	
Operating System	ChartBook – Microsoft Windows 8 Helm - Microsoft Windows XP ChartCase - Microsoft Windows XP Tablet/Pro/Home/Media Service Pack 2 or newer FlightPrep, Inc. provides custom software that works on most Windows-based PC's, Data Updates available in annual or 1 time downloads from FlightPrep: • Annual Subscriptions – updated every 28 days (IFR Current Update) • 1 Time data updates (also available in the form of 4 week subscriptions)
Decluttering	☒ Yes: Not available on raster charts; available on vector-based charts ☐ No
Panning	☒ Yes ☐ No
Autozoom	☐ Yes ☒ No
Manual zooming	☒ Yes ☐ No
Indications and Alerts	When traffic is detected a banner will be displayed across the top of screen. This banner will be on any screen even though traffic will only overlay the Vector Map. The red banner will indicate that traffic has been detected. Traffic Detected When traffic is within 2 NM and less than ± 1000 ft. the banner will change to… Traffic Advisory – Monitor Closure Rate When traffic is within 0.7 NM and less than ± 700 ft. the banner will change to… TRAFFIC ALERT! OBTAIN VISUAL CONTACT! Traffic symbols also indicate traffic: Traffic Advisory white diamond display for threats more than 2NM away Alerts black diamond display for those between 2NM to 0.7NM Alert yellow circles for threats closer than 0.7NM
Taxi Route Guidance	None

FlightPrep, Inc.	**Location:** Aurora, Oregon
Noteworthy Features and Applications	In-Cockpit Baron Weather, HITS (Highway in the sky) Synthetic Vision, Terrain Awareness Warning System (TAWS), Virtual Instrument Tape Overlay, User Defined Checklists, Chart, Plate Trip Kit, and Flight log printing.
Airport Moving Map Information Elements Depicted	
Airport Moving Map Data Format	☒ Geo-referenced ☐ Database driven
Ownship	A variety of icons are available to depict position. There is also the ability to adjust the transparency of the icon and to make it completely invisible for a moving map without ownship position.
Runways	Black
Runway Centerlines	--
Runway Labels	Black
Taxiways	Grey
Taxiway Centerlines	--
Taxiway Labels	Black
Hold Lines	--
Non-movement Areas	White
Ramp Areas	Grey
Grassy Areas	White
Buildings	Black
Building Labels	Black
Other	
Traffic Display	
Data Source and Targets Displayed	☐ ADS-B: ☒ TIS: ☐ TIS-B: ☐ TAS:
Traffic Display Range	Identify minimum, maximum and default traffic display range: Minimum:50' Maximum: 5-6 NM Default: Default threshold defined above and not user selectable or scalable

FlightPrep, Inc.	**Location:** Aurora, Oregon		
Traffic Symbols			
Symbol Type	**Description**	**Data Source**	**Image**
Non-Proximate traffic	Traffic detected	TIS	
Traffic advisory (Proximate traffic)	< 2 NM and ± 1000 ft.	TIS	
Traffic alert	< 0.7 NM and ± 700 ft.	TIS	
Traffic Symbol Data Tag Information			
Data Tag Information	☐ Flight ID ☒ Altitude ☐ Actual ☒ Relative ☐ Geometric ☐ Ground speed ☒ Vertical direction/speed ☐ Above/Below 500' (climb/descent arrows) ☐ Other ☐ Horizontal velocity vector ☐ Invalid/Unavailable data ☐ Traffic category ☐ Monitored by TCAS ☐ Other (please specify):		

ForeFlight, LLC	**Location:** Austin, TX
Product(s)	ForeFlight Mobile
Website(s)	• www.foreflight.com • http://cdn.foreflight.com.s3.amazonaws.com/docs/ff/6.1/v6.1%20-%20foreflight%20mobile%20pilot%20guide.pdf • https://itunes.apple.com/us/app/foreflight-mobile-3/id333252638?mt=8

Product Overview(s)

ForeFlight Mobile is an Apple iPad application for pilots providing weather, charts, flight planning, filing and briefing, documents and en route navigation.

Images courtesy of ForeFlight, LLC

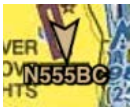
Approvals/Compliance

Authority	☒ FAA (approval) ☐ EASA ☒ Other: NavCanada
TC/STC	☐ TC Aircraft: ☐ STC Aircraft:
TSO	☐ TSO-C112e, ATCRBS/Mode S Airborne Equipment ☐ TSO-C113a, Airborne Multipurpose Electronic Displays ☐ TSO-C147a, TAS Airborne Equipment ☐ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☐ TSO-C165a, Electronic Map Display Equipment for Graphical Depiction of Aircraft Position (Own-Ship) ☐ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☐ TSO-C195b, Avionics Supporting ADS-B ASA ☐ Other

ForeFlight, LLC	**Location:** Austin, TX
FAA Regulatory and Guidance Material	☐ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems ☐ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☐ AC 20-172B, Airworthiness Approval for ADS-B In Systems and Applications ☐ AC 25-11B, Electronic Flight Deck Displays ☒ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Portable Electronic Flight Bags ☐ Other
Industry Documents	☐ RTCA DO-160G,Environmental Conditions and Test Procedures for Airborne Equipment ☐ RTCA DO-178C Software Considerations in Airborne Systems and Equipment Certification ☐ RTCA DO-181E, MOPS for ATCRBS/Mode S Airborne Equipment ☐ RTCA DO-200B, Standards for Processing Aeronautical Data ☐ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware ☐ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps ☐ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☐ RTCA DO-272D, User Requirements for Aerodrome Mapping Information ☐ RTCA DO-282B, MOPS for UAT ADS-B ☐ RTCA DO-317A, MOPS for ASA System ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☐ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☐ Other
Other	
Hardware	
Hardware Platform(s)	All iOS devices; Apple iPad 2 and later.
Display Size	N/A
Display Resolution	N/A
Brightness	N/A
Controls	☐ Buttons ☐ Keyboard (e.g., USB, Bluetooth) ☐ Mouse/cursor ☐ Stylus ☐ Touch Screen ☐ Other
Capabilities	
Operating System	iOS (version 7.1 or newer for ForeFlight Mobile version 6.1)

ForeFlight, LLC	**Location:** Austin, TX
Decluttering	☒ Yes ☐ No Filter traffic setting hides traffic that is more than 15NM away from your current GPS location and/or more than 3,500' above or below your current altitude. As you zoom out on the Map the inner rings and scale markers automatically hide to de-clutter the view.
Panning	☒ Yes: Drag your finger on the map to slide it to a new region. ☐ No
Autozoom	☐ Yes ☒ No
Manual zooming	☒ Yes ☐ No Use two fingers in a pinch or expand gesture to change the zoom scale of the map. You can also double tap the map to zoom in one level or tap once with two fingers at the same time to zoom out one level. Anytime you display a new route on the map the zoom level and region shown will auto-adjust to bring your route into view.
Indications and Alerts	Traffic Advisory: A visual alert will pop up if your aircraft is moving at over 40kts and an ADS-B traffic target comes within 1NM horizontally and +/- 1,200' of your aircraft's position. The traffic alert includes "clock" direction and relative altitude information to help you locate the target. The pop-up will display on any ForeFlight screen, unless another application is being viewed, or the display is in sleep mode. Auditory alerts are not currently available. Runway Proximity Advisor™: A visual and audio alert system triggers when you taxi near or onto a runway. This system uses GPS and geographic runway safety areas to alert pilots as they approach or enter a runway environment. The system runs automatically in the background, regardless of which part of the app is currently visible, but ForeFlight Mobile must be running and visible on the iPad. As you near the runway the system will provide an "Approaching" alert. Upon entering the runway itself, the system will provide an "Entered" alert. The system will speak the name of the runway for each alert. If the aircraft is not clearly at one particular end of the runway, the system will alert with both runway end names. For instance, it will say "02-20" instead of just "02". To receive audio alerts in your headset, use a bluetooth-capable headset and connect it to the iPad. If you are using a vibration-capable device, like the iPhone, the device will vibrate when audio alerts are given. Alerts may be manually disabled, and are automatically disabled when the aircraft is stopped or traveling faster than 40kts. Advisory pop-ups will display on any screen in ForeFlight Mobile. However, if ForeFlight Mobile is not displayed on the screen, pop-ups will not be shown; for example, while viewing another app, or the iPad or iPhone is sleeping.
Taxi Route Guidance	Shows NOTAMs and provides annotation capability. Pilots may their draw taxi route on the map using their finger.

ForeFlight, LLC	**Location:** Austin, TX
Noteworthy Features and Applications	Cockpit sharing, live flight tracking links, route editor, documents
Airport Moving Map Information Elements Depicted Specify whether the following functions are supported and if so, how the information is depicted. Please provide an image of each element, or one image depicting multiple elements.	
Airport Moving Map Data Format	☒ Geo-referenced (FAA, NavCanada and ForeFlight) ☐ Database driven
Ownship	 Blue aircraft icon
Runways	Black
Runway Centerlines	--
Runway Labels	Black text
Taxiways	Grey
Taxiway Centerlines	--
Taxiway Labels	Black text
Hold Lines	--
Non-movement Areas	Grey
Ramp Areas	Grey
Grassy Areas	Green (ForeFlight charts only)
Buildings	Black
Building Labels	Black text
Other	--
Traffic Display	
Data Source and Targets Displayed	ForeFlight Mobile supports the Appareo Stratus ADS-B receivers. Number of targets depends on the receiver. ☒ ADS-B ☐ TIS ☒ TIS-B ☐ TAS
Traffic Display Range	Three concentric rings are displayed with markers around the aircraft's current position. Based on ADS-B Network. **Minimum:** 5 NM **Maximum:** 100 NM **Default:** N/A

ForeFlight, LLC	**Location:** Austin, TX		
Traffic Symbols			
Symbol Type	**Description**	**Data Source**	**Image**
Ground, Directional	Moving targets are arrowhead shaped, pointing in the direction of travel. Ground targets are brown.	ADS-B	
Airborne, Non-directional	Stationary targets, or those without direction or speed information, are diamond shaped. Airborne targets are cyan.	ADS-B	
Airborne, Directional with TrafficTrend™	TrafficTrend™ vector is projected out of the front of the arrowhead to indicate the relative speed of the target (longer vector = faster speed).	ADS-B	
Traffic Symbol Data Tag Information			
Data Tag Information	☒ Flight ID ☒ Altitude ☐ Actual ☒ Relative (in 100's of feet) ☒ Geometric (relative altitudes are based on the Stratus' geometric/GPS altitude) ☐ Ground speed ☒ Vertical direction/speed ☐ Above/Below 500' (climb/descent arrows) ☒ Other: If the target is climbing or descending at 500 ft/min or greater, a vertical arrow indicating the climb or descent is shown to the right of the target. ☐ Horizontal velocity vector ☐ Invalid/Unavailable data ☐ Traffic category ☐ Monitored by TCAS ☒ Other: TrafficTrend™ vector is projected out of the front of the arrowhead to indicate the relative speed of the target (longer vector = faster speed). You can tap on any target to display a pop-up with additional information, which can include target tail or flight number, heading, speed, and whether the information was broadcast via 978UAT or 1090ES.		

SkyVision	**Location:** Asheboro, NC
Product(s)	Xtreme Vision™
Website(s)	• www.skyvisionxtreme.com • http://www.skyvisionxtreme.com/Documents2.html

Product Overview(s)

Xtreme Vision™ is an application designed to provide up-to-date ADS-B data, augment traffic and weather avoidance strategies. Xtreme Vision™ interfaces with several of the portable receivers, as well as the NavWorx certified transceivers.

Image courtesy of SkyVision

Approvals/Compliance

None – Portable Display – Uses Certified UAT Transceivers or Portable ADS-B Receivers

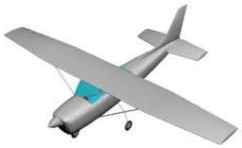
Authority	None – Portable Display – Uses Certified UAT Transceivers or Portable ADS-B Receivers ☐ FAA ☐ EASA ☐ Other
TC/STC	☐ TC ☐ STC

SkyVision	**Location:** Asheboro, NC
TSO	☐ TSO-C112e, ATCRBS/Mode S Airborne Equipment ☐ TSO-C113a, Airborne Multipurpose Electronic Displays ☐ TSO-C147a, TAS Airborne Equipment ☐ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☐ TSO-C165a, Electronic Map Display Equipment for Graphical Depiction of Aircraft Position (Own-Ship) ☐ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☐ TSO-C195b, Avionics Supporting ADS-B ASA ☐ Other
FAA Regulatory and Guidance Material	☐ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems ☐ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☐ AC 20-172B, Airworthiness Approval for ADS-B In Systems and Applications ☐ AC 25-11B, Electronic Flight Deck Displays ☐ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Portable Electronic Flight Bags ☐ Other
Industry Documents	☐ RTCA DO-160G, Environmental Conditions and Test Procedures for Airborne Equipment ☐ RTCA DO-178C, Software Considerations in Airborne Systems and Equipment Certification ☐ RTCA DO-181E, MOPS for ATCRBS/Mode S Airborne Equipment ☐ RTCA DO-200B, Standards for Processing Aeronautical Data ☐ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware ☐ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps ☐ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☐ RTCA DO-272D, User Requirements for Aerodrome Mapping Information ☒ RTCA DO-282B, MOPS for UAT ADS-B ☐ RTCA DO-317A, MOPS for ASA System ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☐ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☒ Other: RTCA-DO-267B
Other	GDL-90 Public Documents
Hardware	
Hardware Platform(s)	XtremeVision™ 3D ADS-B Display System or iPad
Display Size	8” or 9” iPad
Display Resolution	1280 x 800
Brightness	Adaptive brightness

SkyVision	**Location:** Asheboro, NC
Controls	☐ Buttons ☐ Keyboard ☐ Mouse/cursor ☐ Stylus ☒ Touch Screen ☒ Other: Can use any input device compatible with display
Capabilities	
Operating System	Microsoft Windows, iOS
Decluttering	☒ Yes: Airport identifiers decluttered based on zoom range ☐ No
Panning	☒ Yes: Touch point centers screen ☐ No
Autozoom	☐ Yes ☒ No
Manual zooming	☒ Yes: Buttons or Pinch ☐ No
Indications and Alerts	Visual and aural warnings and alerts are supported. Warning distance default is 9,000 ft (shown in yellow), and alert distance default is 6,000 ft (shown in red). Both distance and color are user adjustable. Aural warnings and alerts may also be turned on or off. Trajectory lines for ownship and other traffic.
Taxi Route Guidance	N/A
Noteworthy Features and Applications	Adding Collision Avoidance warnings based on projected 3D space in X time. Adding vector generated map with terrain and obstacles.
Traffic Display	
Data Source and Targets Displayed	☒ ADS-B: 32 ☐ TIS: ☒ TIS-B: 32 ☐ TAS: We show up 32 traffic targets based on the range selected. Typically we are receiving multiple ground stations and therefore we can show more than most and at a greater range. We do not differentiate between TIS and ADS-B in regards to showing traffic. ADS-B traffic will have the A/C "N" number whereas TIS traffic does not have that information available.
Traffic Display Range	Minimum: None Maximum: 100 nm Default: 20 nm

SkyVision	**Location:** Asheboro, NC
Traffic Symbols	
Ownship (airborne)	Shown as A/C symbol. Default is dark green – user adjustable.

Aircraft up to 12,500 lbs & Aircraft not equipped with ADS-B:



Aircraft above 12,500 lbs:

Rotorcraft:

Airships:

Aircraft with no directional information:

Ground Vehicles:

Image courtesy of SkyVision

Above characters apply only to ADS-B traffic. All TIS-B traffic travelling slower than 210kts will be displayed as small aircraft character (first image shown above). TIS-B traffic travelling faster than 210kts will be shown as the large aircraft character (second image shown above).

SkyVision	**Location:** Asheboro, NC
Traffic Symbol Data Tag Information	
Data Tag Information	☒ Flight ID – If ADS-B ☒ Altitude ☐ Actual ☒ Relative – to ownship +/- ☐ Geometric ☒ Ground speed – shown in Kts ☒ Vertical direction/speed ☒ Above/Below 500' (climb/descent arrows) – Actual differential and climb /descent arrows ☐ Other ☐ Horizontal velocity vector ☒ Invalid/Unavailable data – X on screen for no UAT, text indicator if no ground station ☒ Traffic category – TIS based on speed, ADS-B based on symbol ☐ Monitored by TCAS ☐ Other Portable receivers do not provide a way to get pressure altitude input, and the FAA data provided via the ground stations for traffic is pressure altitude (what is reported to them via altitude encoders input to the aircraft transponders). Therefore, altitude differential shown is the difference between geometric (GPS) for ownship and pressure altitude for the ground station TIS reported traffic. We connect to certified UAT'S which provide altitude encoder pressure altitude which eliminates this potentially dangerous problem. In addition, we calculate the pressure altitude for TIS traffic by using the barometric pressure of the closest weather reporting station and therefore have a more valid altitude differential for traffic.

X-Avionics, LLC	**Location:** Columbia, SC
Product(s)	Xavion
Website(s)	• http://xavion.com • http://xavion.com/app/full-description/

Product Overview(s)

Running on your iPad or iPhone, Xavion provides synthetic vision, GPS navigation, instrument backups, ADS-B weather and traffic, weight & balance checks, and estimate fuel burn and time to your destination at various altitudes.

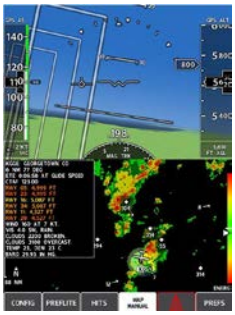


Image courtesy of X-Avionics, LLC

Approvals/Compliance

Authority	☐ FAA ☐ EASA ☐ Other
TC/STC	☐ TC ☐ STC
TSO	☐ TSO-C112e, ATCRBS/Mode S Airborne Equipment ☐ TSO-C113a, Airborne Multipurpose Electronic Displays ☐ TSO-C147a, TAS Airborne Equipment ☐ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☐ TSO-C165a, Electronic Map Display Equipment for Graphical Depiction of Aircraft Position (Own-Ship) ☐ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☐ TSO-C195b, Avionics Supporting ADS-B ASA ☐ Other

X-Avionics, LLC	**Location:** Columbia, SC
FAA Regulatory and Guidance Material	☐ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems ☐ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☐ AC 20-172B, Airworthiness Approval for ADS-B In Systems and Applications ☐ AC 25-11B, Electronic Flight Deck Displays ☐ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Portable Electronic Flight Bags ☐ Other
Industry Documents	☐ RTCA DO-160G, Environmental Conditions and Test Procedures for Airborne Equipment ☐ RTCA DO-178C, Software Considerations in Airborne Systems and Equipment Certification ☐ RTCA DO-181E, MOPS for ATCRBS/Mode S Airborne Equipment ☐ RTCA DO-200B, Standards for Processing Aeronautical Data ☐ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware ☐ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps ☐ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☐ RTCA DO-272D, User Requirements for Aerodrome Mapping Information ☐ RTCA DO-282B, MOPS for UAT ADS-B ☐ RTCA DO-317A, MOPS for ASA System ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☐ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☐ Other
Other	
Hardware	
Hardware Platform(s)	iPad, iPhone, iPad Mini
Display Size	Depends on hardware platform.
Display Resolution	1024 x 768
Brightness	Uses high-contrast colors.
Controls	☐ Buttons ☐ Keyboard (e.g., USB, Bluetooth) ☐ Mouse/cursor ☐ Stylus ☐ Touch Screen ☐ Other
Capabilities	
Operating System	iOS (7 or later)

X-Avionics, LLC	**Location:** Columbia, SC
Decluttering	☒ Yes ☐ No Obstacles, navaids, airports, and winds aloft data are removed as the user zooms out in order, such that elements do not overlap.
Panning	☒ Yes (please describe): ☐ No Drag with your fingers to slide about. Also, in normal mode (if you have not dragged with your fingers) the map follows the airplane like any aviation moving map. This may be switched to an apple maps for iPhone convention when you drag the touch screen with your fingers. Touch a button to go back to aviation standard (follow the airplane) when desired.
Autozoom	☒ Yes: Touch a button to autozoom on the glade range or flight path. ☐ No
Manual zooming	☒ Yes: Two-finger pinch to zoom as well, just like apple maps. ☐ No
Indications and Alerts	Describe when and how indicators and alerts are depicted and inhibited: "Weight Check" (if over-weight) "Gear Warning" (at reasonable altitudes) "Take-Off rwy len" (based on GPS and airport database and weather input) "Downwind T-O/land" (based on GPS and airport database and weather input) "Unusual Attitude" "Angle of Attack" "NEXRAD proximity" (based on GPS and weather input) "Terrain Collision" "Traffic Collision" "800, 400, 200 ft" (based on GPS and TCAS and terrain database input)
Taxi Route Guidance	None.
Noteworthy Features and Applications	This app constantly plans for power-off approaches to every airport in gliding range and shows you those approaches as 3-d hoops that you can fly though in order to guide you down to safety after an engine failure, if there are any airports within gliding range.
Traffic Display	
Data Source and Targets Displayed	☒ ADS-B: Currently up to 10 targets, but could be increased in the future. ☐ TIS: ☐ TIS-B: ☐ TAS:

X-Avionics, LLC	**Location:** Columbia, SC
Traffic Display Range	Minimum: 8 nautical miles Maximum: 8 nautical miles Default: 8 nautical miles

Traffic Symbols

Symbol Type	Description	Data Source	Image
Ownship (airborne)			
Traffic	Any airplane within 8 nm and 1,000 ft vertically	ADS-B	

Traffic Symbol Data Tag Information

Data Tag Information	☐ Flight ID ☐ Altitude ☐ Actual ☒ Relative (in hundreds of feet) ☐ Geometric ☐ Ground speed ☐ Vertical direction/speed ☐ Above/Below 500' (climb/descent arrows) ☐ Other ☐ Horizontal velocity vector ☐ Invalid/Unavailable data ☐ Traffic category ☐ Monitored by TCAS ☐ Other

5. Airport Moving Map Only Manufacturers

This section includes manufacturers with only airport moving map products that currently do not depict traffic information. The information was provided by the manufacturers and has not been verified with the FAA.

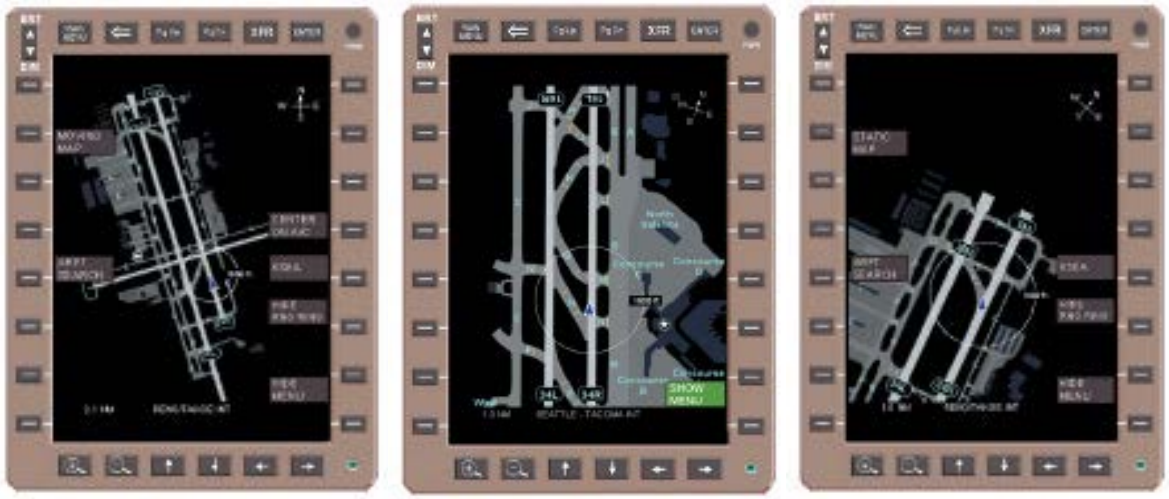
Jeppesen (Product 1 of 3)	**Location:** Englewood, CO
Product(s)	Jeppesen Airport Moving Map software and database for Boeing Class 3 EFB systems
Website(s)	• www.jeppesen.com • ww1.jeppesen.com/industry-solutions/aviation/commercial/airport-moving-map.jsp%3Bjsessionid=9KNyM2JpdDqCgDmhlpsNMxkph9zgbrt4JpMdCkGLrJv9NDsDN8sx!-240844396

Product Overview(s)

Jeppesen Airport Moving Map (AMM) for EFB renders high-resolution Jeppesen airport database maps, including runways, taxiways, ramps, structures, and movement control features. With GPS, the application depicts ownship position in both north-up and track-up (moving map) orientation. Jeppesen provides airport databases through subscription. Airport Moving Map is part of a suite of Jeppesen applications offered for EFBs. The AMM entered service on Boeing Class 3 EFB in 2003.

Jeppesen Airport Moving Map is designed to provide supplemental position awareness during taxi operations. It is a supplement to Jeppesen electronic charting solutions available for EFB.

Note: as now allowed by AC 120-76C, Jeppesen no longer manufactures AMM under a TSOA.



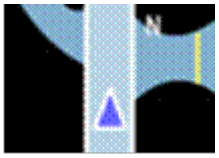
Images courtesy of Jeppesen

Approvals/Compliance

Authority	☒ FAA	Aircraft Evaluation Group : Seattle, WA, USA
	☒ EASA	Ops Group: Cologne, Germany
	☐ Other	

Jeppesen (Product 1 of 3)	**Location:** Englewood, CO
TC/STC	Applicable to hardware only, which is not supplied by Jeppesen ☒ TC Aircraft: multiple ☒ STC Aircraft: multiple
TSO	AMM is now approved/authorized as Type B EFB functionality. No TSOA. ☐ TSO-C112c, ATCRBS/Mode S Airborne Equipment ☐ TSO-C113a, Airborne Multipurpose Electronic Displays ☐ TSO-C147a, TAS Airborne Equipment ☐ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☐ TSO-C165a, Electronic Map Display Equipment for Graphical Depiction of Aircraft Position (Own-Ship) ☐ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☐ TSO-C195b, Avionics Supporting ADS-B ASA ☐ Other
FAA Regulatory and Guidance Material	☐ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems ☐ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☐ AC 20-172B, Airworthiness Approval for ADS-B In Systems and Applications ☐ AC 25-11B, Electronic Flight Deck Displays ☒ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Electronic Flight Bags ☐ Other
Industry Documents	☐ RTCA DO-160F, Environmental Conditions and Test Procedures for Airborne Equipment ☐ RTCA DO-178C, Software Considerations in Airborne Systems and Equipment Certification ☐ RTCA DO-181E, MOPS for ATCRBS/Mode S Airborne Equipment ☒ RTCA DO-200A, Standards for Processing Aeronautical Data ☐ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware ☒ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps (as modified by AC 120-76C). ☐ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☒ RTCA DO-272, User Requirements for Aerodrome Mapping Information ☐ RTCA DO-282B, MOPS for UAT ADS-B ☐ RTCA DO-317A, MOPS for ASA System ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☐ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☐ Other
Other	Jeppesen AMM technologies are addressed in various Operational Suitability reports (including EASA equivalent), and in FSB reports generated during an Operator's 8900.1 EFB Authorization process.

Jeppesen (Product 1 of 3)	**Location:** Englewood, CO
Hardware	
Hardware Platform(s)	Boeing Class 3 (“Installed”) EFB
Display Resolution	Varies by platform. 1024 x 768 minimum.
Brightness	Ability to control brightness provided. Separate Day and Night modes not supported on Class 3 (“Installed”), per Boeing specification.
Controls	☒ Buttons ☒ Keyboard (e.g., USB, Bluetooth) ☐ Mouse/cursor ☐ Stylus ☒ Touch Screen ☒ Other: Cursor Control Device (CCD)
Capabilities	
Operating System	Microsoft Windows
Decluttering	☒ Yes ☐ No Labels are always presented in read-right manner and are automatically de-cluttered to prevent label collisions and overprints. Appropriate label detail is provided at each zoom level, for example, runway identifiers and key taxiway identifiers are always shown. As the AMM is zoomed in, additional labels are added, showing more detail such as concourse and gate identifiers.
Panning	☒ Yes ☐ No Panning is supported when displaying the map in north-up orientation via touch screen.
Autozoom	☐ Yes ☒ No
Manual zooming	☒ Yes ☐ No Zooming is accomplished via dedicated physical buttons on the display bezel.
Indications and Alerts	Airport Moving Map is designed to provide supplemental position information on EFBs. Constant ownship position updating while on the ground at an airport in the database, as long as healthy position data is received from the system. Spotter will be removed and an onscreen notice will be presented to the user if position data becomes unavailable or if accuracy requirements are not met. Out-of-date AMM databases will result in a warning to the user via the EFB fault reporting system.
Taxi Route Guidance	Taxi guidance is not supported on this platform. User is provided graphical display of ownship position on the airport surface for SA only.
Noteworthy Features and Applications	

Jeppesen (Product 1 of 3)	**Location:** Englewood, CO
Airport Information Elements Depicted	
Airport Moving Map Data Format	☒ Geo-referenced ☒ Database driven
Ownship	 Directional - isosceles triangle, non-directional - circle
Runways	Light Grey - All runway markings visible from the satellite are depicted in white to match real-world paint markings.
Runway Centerlines	White runway paint markings, including runway centerlines, are depicted as seen in the real world.
Runway Labels	Runway identifier, blue text in blue oval with black background. For runways visible in the view, the runway labels are always displayed at view edge, regardless of zoom and pan setting. Closed Runways are labeled with Amber text in Amber oval with black background. An Amber X marks the runways and runway labels. Closed Displaced Runway Threshold: Same fill color as the runway, but with Amber outline and Amber X marks on both ends of the Displaced Threshold.
Taxiways	Dark grey
Taxiway Centerlines	Not shown
Taxiway Labels	White characters
Hold Lines	Amber to match the paint as seen in the real world (as allowed by DO-257)
Non-movement Areas	Dirt and grass areas are shown in black. Blast pads and overrun areas shown in light grey.
Ramp Areas	Light grey
Grassy Areas	Black
Buildings	Blue
Building Labels	White text
Other	Closed Ramp, Taxiway, Parking Stand areas: Black fill with red outline. Areas Under Construction: Bounded by a red border. Other vertical structures such as trees are shown in blue just like buildings. Hotspots are shown with amber outline. Airport Beacons are shown as a green star within a green circle on black background.

Jeppesen (Product 2 of 3)	**Location:** Englewood, CO
Product(s)	Jeppesen FliteDeck Pro 7.X, AMM Module
Website(s)	• www.jeppesen.com • http://ww1.jeppesen.com/industry-solutions/aviation/business/ifr-jeppview-electronic-charting.jsp%3Bjsessionid=L1wYGfpyjVXPhtY7hH71LZZ0qRcQg7pnnlqpqkhH1QGgfk4SlQvy!-139892223 • http://ww1.jeppesen.com/aviation/mobile-efb/index.jsp

Product Overview(s)

Jeppesen's AMM uses high-resolution airport-data to render data-driven, vector-based, airport maps. The AMM application helps orient the flight crew to the aircraft's position on the ground relative to runways, taxiways, and airport structures. The AMM's primary objective is to help operators establish and maintain positional awareness to improve safety and operational efficiency margins, and reduce flight crew workload.

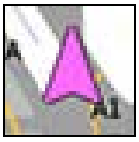
Images courtesy of Jeppesen

Approvals/Compliance

Authority	☒ FAA Certification Office: Seattle ☒ EASA ☐ Other
TC/STC	☐ TC ☐ STC

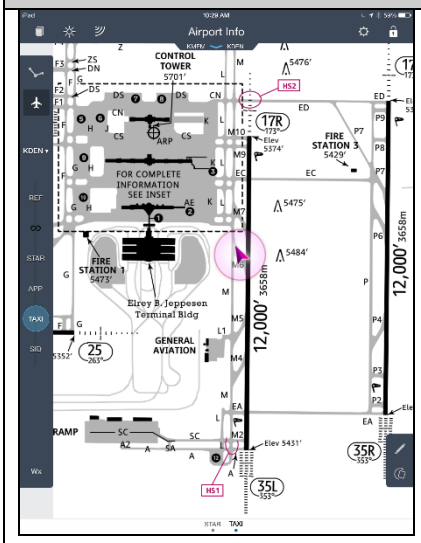
Jeppesen (Product 2 of 3)	**Location:** Englewood, CO
TSO	AMM is now approved/authorized as Type B EFB functionality. No TSOA. ☐ TSO-C112c, ATCRBS/Mode S Airborne Equipment ☐ TSO-C113a, Airborne Multipurpose Electronic Displays ☐ TSO-C147a, TAS Airborne Equipment ☐ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☐ TSO-C165a, Electronic Map Display Equipment for Graphical Depiction of Aircraft Position (Own-Ship) ☐ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☐ TSO-C195b, Avionics Supporting ADS-B ASA ☐ Other
FAA Regulatory and Guidance Material	☐ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems ☐ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☐ AC 20-172B, Airworthiness Approval for ADS-B In Systems and Applications ☐ AC 25-11B, Electronic Flight Deck Displays ☒ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Electronic Flight Bags ☐ Other
Industry Documents	☐ RTCA DO-160F, Environmental Conditions and Test Procedures for Airborne Equipment ☐ RTCA DO-178C, Software Considerations in Airborne Systems and Equipment Certification ☐ RTCA DO-181E, MOPS for ATCRBS/Mode S Airborne Equipment ☒ RTCA DO-200A, Standards for Processing Aeronautical Data ☐ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware ☒ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps ☐ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☒ RTCA DO-272, User Requirements for Aerodrome Mapping Information ☐ RTCA DO-282B, MOPS for UAT ADS-B ☐ RTCA DO-317A, MOPS for ASA System ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☐ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☐ Other
Other	Letter of Operational Suitability from FAA AEG
Hardware	
Hardware Platform(s)	Various, this software is designed to run on a variety of COTs devices.
Display Size	Various, this software is designed to run on a variety of COTs devices.

Jeppesen (Product 2 of 3)	**Location:** Englewood, CO
Display Resolution	Various, this software is designed to run on a variety of COTs devices at any resolution above the minimum of 1024x768.
Brightness	Various, this software is designed to run on a variety of COTs devices.
Controls	☒ Buttons ☒ Keyboard (e.g., USB, Bluetooth) ☒ Mouse/cursor ☒ Stylus ☒ Touch Screen ☐ Other
Capabilities	
Operating System	Microsoft Windows
Decluttering	☒ Yes (please describe): ☐ No Labels are always presented in read-right manner and are automatically de-cluttered to prevent label collisions and overprints. Appropriate label detail is provided at each zoom level, for example, runway identifiers and key taxiway identifiers are always shown. As the AMM is zoomed in, additional labels are added, showing more detail such as concourse and gate identifiers. Runway markings are never decluttered and will dynamically move to always be in view. Depending on selected zoom level, ramp, taxiway, parking stand/gate, and building names/labels may be removed for decluttering purposes.
Panning	☒ Yes ☐ No
Autozoom	☐ Yes ☒ No
Manual zooming	☒ Yes ☐ No
Indications and Alerts	Airport Moving Map is designed to provide supplemental position information on EFBs. Constant ownship position updating while on the ground at an airport in the database, as long as healthy position data is received from the system. Spotter will be removed and an onscreen notice will be presented to the user if position data becomes unavailable or if accuracy requirements are not met. Out-of-date AMM databases will result in a warning to the user via the EFB fault reporting system.
Taxi Route Guidance	Taxi routes can be entered in in two ways. 1) The user may use his finger to highlight the planned route. 2) The scratchpad can be used to enter a textual description of the route.
Noteworthy Features and Applications	
Airport Information Elements Depicted	
Airport Moving Map Data Format	☒ Geo-referenced ☒ Database driven

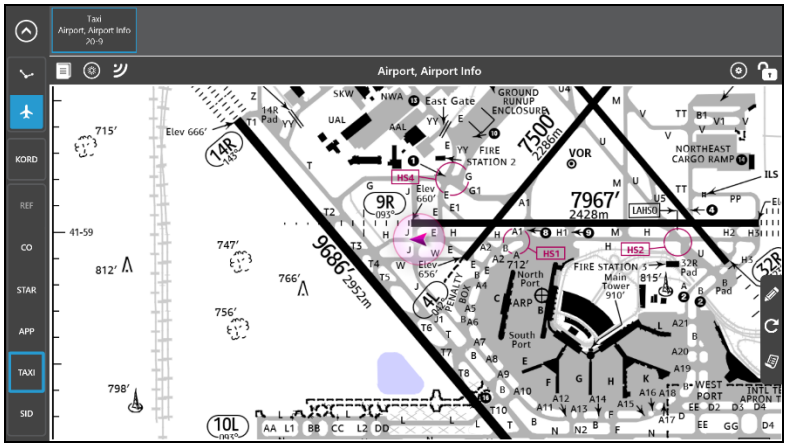
Jeppesen (Product 2 of 3)	**Location:** Englewood, CO
Ownship	 Magenta triangle
Runways	Light Grey - All runway markings visible from the satellite are depicted in white to match real-world paint markings.
Runway Centerlines	White runway paint markings, including runway centerlines, are depicted as seen in the real world.
Runway Labels	Blue text in blue oval with black background. For runways visible in the view, the runway labels are always displayed at view edge, regardless of zoom and pan setting. Closed Runways are labeled with Amber text in Amber oval with black background. An Amber X marks the runways and runway labels. Closed Displayed Runway Threshold: Same fill color as the runway, but with Amber outline and Amber X marks on both ends of the Displaced Threshold.
Taxiways	Dark grey
Taxiway Centerlines	Not shown
Taxiway Labels	White characters
Hold Lines	Amber
Non-movement Areas	Dirt and grass areas are shown in black. Blast pads and overrun areas shown in light grey.
Ramp Areas	Dark grey
Grassy Areas	Black
Buildings	Blue
Building Labels	White text
Other	Closed Ramp, Taxiway, Parking Stand areas: Black fill with red outline. Areas Under Construction: Bounded by a red border. Other vertical structures such as trees are shown in blue just like buildings. Airport Beacons are shown as a green star within a green circle on black background.

Jeppesen (Product 3 of 3)	**Location:** Englewood, CO
Product(s)	Jeppesen Mobile Solutions Jeppesen Mobile FliteDeck Jeppesen FliteDeck Pro Jeppesen Mobile FliteDeck VFR JeppView Solutions JeppView FliteDeck JeppView MFD Aviation data provided by Jeppesen for applications developed by Avionics vendors.
Website(s)	• www.jeppesen.com • Jeppesen Mobile Solutions • JeppView
Product Overview(s)	
AMM using pre-composed charts: • Jeppesen Mobile FliteDeck – an iOS application for use on iPad. • Jeppesen FliteDeck Pro – an application for iOS and Windows 8 that is available for the Commercial Air Carrier and Military markets only. • JeppView FliteDeck – a Windows application for use in-flight, marketed to the Business and General aviation markets. This application has been nearly replaced at the customer level by Jeppesen Mobile FliteDeck since 2011 though it is still available as an option with a JeppView subscription. AMM dynamically rendered: • Jeppesen Mobile FliteDeck VFR – an iOS application for use on iPad targeted primarily to the General Aviation market. This application uses dynamic rendering of aeronautical data for airports and airspace.	

Jeppesen (Product 3 of 3) **Location:** Englewood, CO

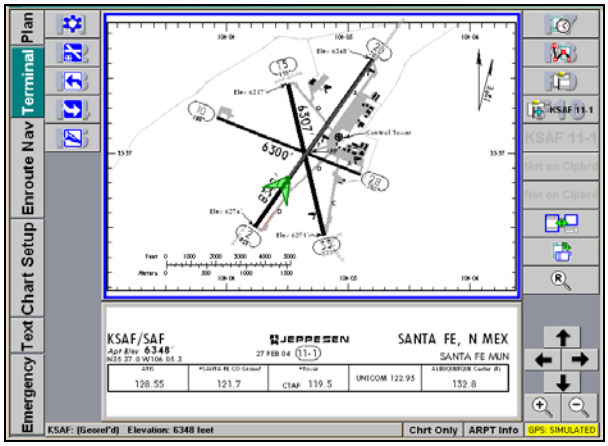


Jeppesen FliteDeck Pro (iOS)



Jeppesen FliteDeck Pro (Windows 8)

Jeppesen Mobile FliteDeck VFR



JeppView FliteDeck

Images courtesy of Jeppesen

Approvals/Compliance

Authority	☒ FAA ☒ EASA ☐ Other	Certification Office: Seattle
TC/STC	☐ TC ☐ STC	Aircraft: Aircraft:

Jeppesen (Product 3 of 3)	**Location:** Englewood, CO
TSO	AMM is now approved/authorized as Type B EFB functionality. No TSOA. ☐ TSO-C112c, ATCRBS/Mode S Airborne Equipment ☐ TSO-C113a, Airborne Multipurpose Electronic Displays ☐ TSO-C147a, TAS Airborne Equipment ☐ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☐ TSO-C165a, Electronic Map Display Equipment for Graphical Depiction of Aircraft Position (Own-Ship) ☐ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☐ TSO-C195b, Avionics Supporting ADS-B ASA ☐ Other
FAA Regulatory and Guidance Material	☐ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems ☐ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☐ AC 20-172B, Airworthiness Approval for ADS-B In Systems and Applications ☐ AC 25-11B, Electronic Flight Deck Displays ☒ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Electronic Flight Bags ☐ Other
Industry Documents	☐ RTCA DO-160G Environmental Conditions and Test Procedures for Airborne Equipment ☐ RTCA DO-178C Software Considerations in Airborne Systems and Equipment Certification ☐ RTCA DO-181E, MOPS for ATCRBS/Mode S Airborne Equipment ☒ RTCA DO-200A, Standards for Processing Aeronautical Data ☐ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware ☒ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps ☐ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☒ RTCA DO-272, User Requirements for Aerodrome Mapping Information ☐ RTCA DO-282B, MOPS for UAT ADS-B ☐ RTCA DO-317A, MOPS for ASA System ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☐ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☐ Other
Other	Jeppesen AMM technologies are addressed in various Operational Suitability reports (including EASA equivalent), and in FSB reports generated during an Operator's 8900.1 EFB Authorization process.
Hardware	
Hardware Platform(s)	Various, software is designed to run on a variety of COTs devices.

Jeppesen (Product 3 of 3)	**Location:** Englewood, CO
Display Size	Various, software is designed to run on a variety of COTs devices.
Display Resolution	Various, software is designed to run on a variety of COTs devices.
Brightness	Various, software is designed to run on a variety of COTs devices. In addition, Day vs. Night Modes supported via software function.
Controls	☒ Buttons ☒ Keyboard (e.g., USB, Bluetooth) ☒ Mouse/cursor ☒ Stylus ☒ Touch Screen ☐ Other
Capabilities	
Airport Moving Map Data Format	☒ Geo-referenced ☒ Database driven (Mobile FliteDeck VFR only at this time)
Operating System	Microsoft Windows, iOS (version 6.0 or later)
Decluttering	☒ Yes ☐ No Labels are always presented in read-right manner and are automatically de-cluttered to prevent label collisions and overprints. Appropriate label detail is provided at each zoom level, for example, runway identifiers and key taxiway identifiers are always shown. As the AMM is zoomed in, additional labels are added, showing more detail such as concourse and gate identifiers.
Panning	☒ Yes: Via touch screen or mouse depending on software variant ☐ No
Autozoom	☒ Yes (Mobile FliteDeck VFR only a this time) ☐ No
Manual zooming	☒ Yes: Via touch screen gesture, mouse, or GUI control, depending on software variant ☐ No
Indications and Alerts	Airport Moving Map is designed to provide supplemental position information on EFBs. Constant ownship position updating while on the ground at an airport in the database, as long as healthy position data is received from the system. Spotter will be removed and an onscreen notice will be presented to the user if position data becomes unavailable or if accuracy requirements are not met. Out-of-date AMM databases will result in a warning to the user via the EFB fault reporting system.
Taxi Route Guidance	The user may use his finger to highlight the planned route.
Noteworthy Features and Applications	Dynamically rendered enroute display enables customization of various data layers such as airports, airspace, NAVAIDs, waypoints and terrain. Own ship position supported on enroute display and pre-composed taxi charts which are compliant with AC 120-76C guidance. For Jeppesen Mobile FliteDeck own ship position on approach charts is also supported.

Jeppesen (Product 3 of 3)	**Location:** Englewood, CO
Airport Information Elements Depicted	
Ownship	Jeppesen Mobile FliteDeck: Magenta chevron with circle of proximity Jeppesen FliteDeck Pro: Magenta chevron with circle of proximity  Jeppesen Mobile FliteDeck VFR: Blue aircraft icon  JeppView FliteDeck: Green chevron  JeppView MFD: Varies depending on the manufacturer
Runways	Black
Runway Centerlines	N/A
Runway Labels	Black
Taxiways	Grey
Taxiway Centerlines	N/A
Taxiway Labels	Black
Hold Lines	N/A
Non-movement Areas	White
Ramp Areas	Grey
Grassy Areas	White
Buildings	Black
Building Labels	Black text
Other	Various additional airport diagram markings and procedural notes.

Lufthansa Systems	**Location:** Frankfurt, Germany
Product(s)	Lido/AMM Airport Moving Map
Website(s)	• www.LHsystems.com • https://www.lhsystems.com/solutions-services/flight-deck-solutions/lidonavigation/lidoamm

Product Overview(s)

Lido Airport Moving Map (Lido/AMM) acts as a runway incursion prevention system as well as airport information system. It replaces the (paper/static) ground chart and shows a dynamic ground map using the Lido RouteManual charting standard. Ownship position (north up or Heading up) is superimposed on the map; the application is fully data driven and integrated into the Lido/eRouteManual electronic charting solution.

Advisory or alert messages are displayed on the Lido/AMM, when:

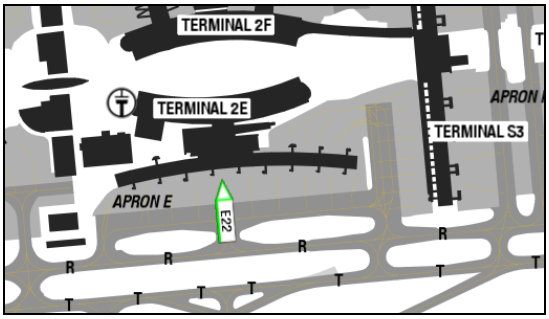
- Aircraft is approaching a runway safety area
- Aircraft is initiating a take-off roll
  - from a taxiway or
  - any non-anticipated departure runway

Image courtesy of Lufthansa Systems

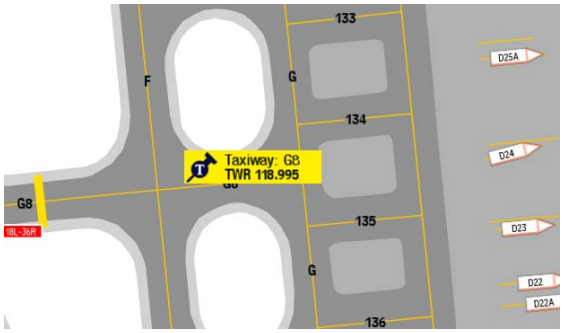
Approvals/Compliance

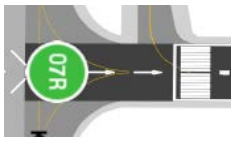
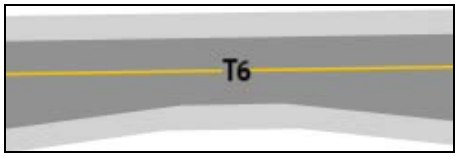
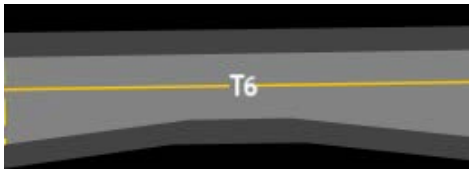
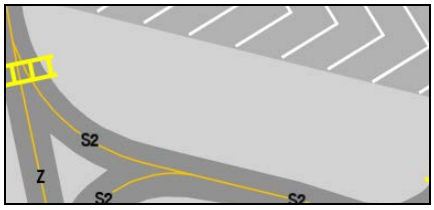
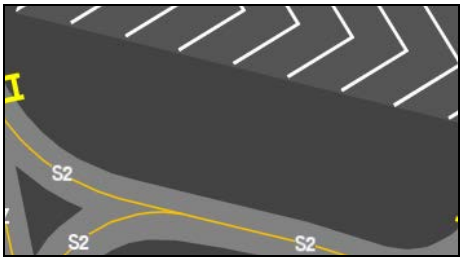
Authority	☒ FAA in progress ☒ EASA
TC/STC	☐ TC Aircraft: ☐ STC Aircraft:

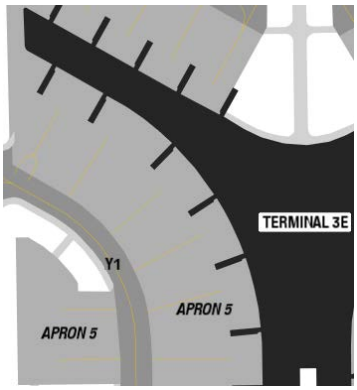
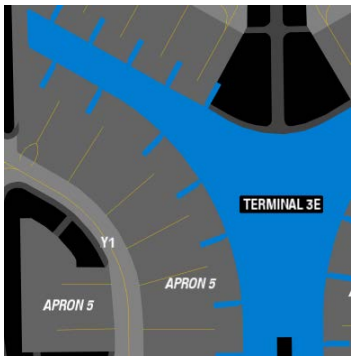
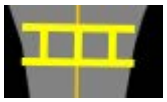
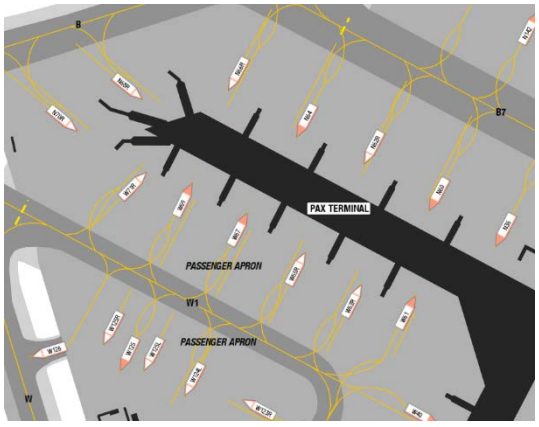
Lufthansa Systems	**Location:** Frankfurt, Germany
TSO	☐ TSO-C112e, ATCRBS/Mode S Airborne Equipment ☐ TSO-C113a, Airborne Multipurpose Electronic Displays ☐ TSO-C147a, TAS Airborne Equipment ☐ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☒ TSO-C165a, Electronic Map Display Equipment for Graphical Depiction of Aircraft Position (Own-Ship) ☐ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☐ TSO-C195b, Avionics Supporting ADS-B ASA ☐ Other
FAA Regulatory and Guidance Material	☒ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems ☐ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☐ AC 20-172B, Airworthiness Approval for ADS-B In Systems and Applications ☒ AC 25-11B, Electronic Flight Deck Displays ☒ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Portable Electronic Flight Bags ☒ Other: Order 8900.1 (Vol. 4, Ch. 15, Section 1)
Industry Documents	☐ RTCA DO-160G, Environmental Conditions and Test Procedures for Airborne Equipment ☒ RTCA DO-178B, Software Considerations in Airborne Systems and Equipment Certification (Software Level: D ☐ RTCA DO-181E, MOPS for ATCRBS/Mode S Airborne Equipment ☒ RTCA DO-200A, Standards for Processing Aeronautical Data ☐ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware ☒ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps ☐ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☒ RTCA DO-272, User Requirements for Aerodrome Mapping Information ☐ RTCA DO-282B, MOPS for UAT ADS-B ☐ RTCA DO-317A, MOPS for ASA System ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☐ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☒ Other: RTCA DO-291; ARINC 816
Other	
Hardware	
Hardware Platform(s)	Class 2 and Class 3 EFBs, tablet solution
Display Size	Normally 8 to 12 inches, no system limitation.
Display Resolution	Minimum 768X1024 and portrait and 1024X786 landscape, no system limitation.
Brightness	To adjust to the lighting conditions on the flight deck, both Day and Night modes are available for user selection.

Lufthansa Systems	**Location:** Frankfurt, Germany
Controls	☒ Buttons ☒ Keyboard (e.g., USB, Bluetooth) ☒ Mouse/cursor ☒ Stylus ☒ Touch Screen ☐ Other
Capabilities	
Operating System	Lido/eRouteManual 4.X and Lido/mPilot 2.X: Microsoft Windows, iOS
Decluttering	☒ Yes ☐ No Zooming in further shows more detail, like taxiway lines, labels, etc. - Anticipated parking stand highlighted at all map scales (other parking stand labels only displayed at higher map scales  - One-touch to display all communication frequencies applicable at that airport Pilot Annotations placed on the airport map as part of a placed pin can be selected to display edited text or are automatically displayed at higher map scales.
Panning	☒ Yes ☐ No Plan mode (North-Up) and in Heading-Up (followed by automatic map-recentering to own-ship position).
Autozoom	☒ Yes ☐ No - Aircraft ground speed dependent autozoom after landing, rejected take-off roll, approaching runway safety area, departure roll from taxiway or non-anticipated departure runway. - Function to display current aircraft position and taxi destination (parking stand or anticipated departure runway) available for user selection.

Lufthansa Systems	**Location:** Frankfurt, Germany
Manual zooming	☒ Yes ☐ No - Simple zooming in/out using pre-defined map scales are available - Rectangle zooming-in capability for zooming in into an area on the map drawn by the user - Zooming capability available in both North-Up and Heading-Up orientation modes.
Indications and Alerts	Lido/AMM is seamlessly integrated within the Lido/eRouteManual Suite. Whenever Lido/AMM triggers to display a message (see messages below) then Lido/AMM will remove any chart currently displayed within the Lido/eRouteManual Suite to display Lido/AMM together with the advisory or warning message. <u>Runway Ahead Advisory</u> Runway ahead advisory message appears when the aircraft is approaching the runway safety area (CAT I/CATII or CAT III holding line, whichever is closer to the applicable runway).  <u>Take-Off from Taxiway Warning Message</u>: Take-Off from Taxiway Warning Message is displayed when the aircraft appears to be departing from a taxiway (triggered by aircraft ground speed). <u>Take-Off from Non-Anticipated Departure Runway Warning Message</u> “Confirm Runway” message is displayed when the aircraft appears to be departing from a non-anticipated departure runway. <u>On Runway Advisory Message:</u> - “On RWY XX-YY” message appears in white when the aircraft is positioned on the runway and the aircraft heading is not aligned with runway heading. - “On RWY XX” message appears in white when the aircraft is positioned on the runway and the aircraft heading is aligned with runway heading. - “On RWY XX” message appears in green when the aircraft is positioned on the runway and the aircraft heading is aligned with anticipated departure runway heading. All messages are inhibited during aircraft landing and runway backtracks until the aircraft has left the runway safety area.

Lufthansa Systems	**Location:** Frankfurt, Germany
	Closed Airport Features: - Airport features classified as closed throughout the AIRAC Cycle are depicted accordingly: - Closed taxiways are marked by yellow crosses on the taxiway - - Temporally closed runways are marked by yellow crosses on the runway - In addition users can mark airport features (e.g. taxiway, runway, parking stand) as closed. Red crosses are placed on top of the corresponding airport feature label. Pilot Annotations: User can place pins or even add text to these pins on any arbitrary position on the airport map.  Operational Limitations applicable to aircraft type: Lido/AMM highlights in (salmon color) taxiways which are not suitable for the aircraft type due to the aircraft's physical dimension (fuselage length, wingspan, outer main gear width etc).
Taxi Route Guidance	Taxi route guidance currently under development for a future release of Lido/AMM: Colored line along taxi route. Route entered graphically and/or textually. Route could also be loaded from file (company routes) or any interface. NOTAMs to be interpreted and display, e.g., as restriction or closed taxiway.
Noteworthy Features and Applications	Lido/AMM is a fully data driven airport moving map application seamlessly integrated into the Lido/eRoute Manual Suite. All airport ground charting information (e.g. Low visibility procedures, Standard Taxi Routes etc.) will be incorporated into Lido/AMM.
Airport Moving Map Information Elements Depicted	
Airport Moving Map Data Format	☒ Geo-referenced ☒ Database driven Note: Lido/AMM consists of data driven referenced airport maps
Ownship	Orange chevron (look/color subject to change) 

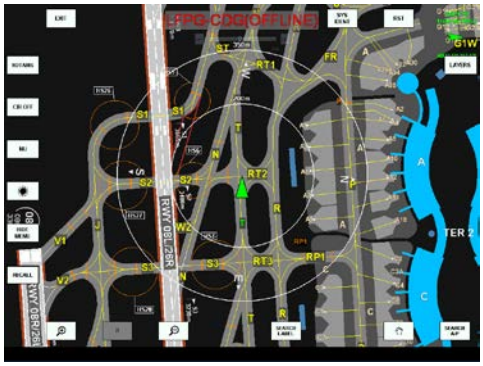
Lufthansa Systems	**Location:** Frankfurt, Germany
Runways	Light grey Night Mode:  Day Mode: 
Runway Centerlines	White dashed line in both Day and Night modes
Runway Labels	Runway Designators are depicted with a white font on a blue background in both Day and Night modes. Runway designators are displayed even if only a fraction of the runway is displayed. The runway designator of the anticipated departure runway is depicted with a white font on a green background.  
Taxiways	Grey shape Day mode:  Night mode: 
Taxiway Centerlines	Yellow line in both Day and Night modes
Taxiway Labels	De-conflicted white horizontal text in both Day and Night modes
Hold Lines	Dashed yellow line 
Non-movement Areas	Day mode (light grey):  Night mode (darker grey): 

Lufthansa Systems	**Location:** Frankfurt, Germany
Ramp Areas	Grey Day mode:  Night mode: 
Grassy Areas	Are not depicted
Buildings	Day Mode: black (see above) Night mode: blue (see above)
Building Labels	Labels are always oriented in in upright position and placed at best display real estate in real time for label de-confliction. Day Mode: black font on white background (see above) Night mode: white font on black background (see above)
Other	CAT I Holding Line label and line:  CAT II/III holding line:  Parking Stand labels: Oriented to the parking stand guidance line 

TerraVision Flight Deck Applications	**Location:** Petah Tikva, Israel
Product(s)	*FollowTheGreen*✈
Website(s)	• www.terravision.co.il • www.terravision.co.il/flightdeck/FTG.aspx

Product Overview(s)

FollowTheGreen✈ is a database driven AMMD (Aerodrome Moving Map Display) software application that incorporates all standard requirements per RTCA DO-257A with overlay data management capabilities. *FollowTheGreen*✈ can be adapted to any portable EFB (Class 1 and Class 2) system.



Images courtesy of TerraVision Flight Deck Applications

TerraVision Flight Deck Applications	**Location:** Petah Tikva, Israel
Approvals/Compliance	
Authority	☒ FAA (software authorization) ☐ EASA ☒ Other: CAA
TC/STC	☐ TC ☐ STC
TSO	☐ TSO-C112e, ATCRBS/Mode S Airborne Equipment ☐ TSO-C113a, Airborne Multipurpose Electronic Displays ☐ TSO-C147a, TAS Airborne Equipment ☐ TSO-C154c, UAT ADS-B Equipment Operating on Frequency of 978 MHz ☒ TSO-C165a, Electronic Map Display Equipment for Graphical Depiction of Aircraft ☐ TSO-C166b, Extended Squitter ADS-B and Traffic Information ☐ TSO-C195b, Avionics Supporting ADS-B ASA ☐ Other
FAA Regulatory and Guidance Material	☒ AC 20-159, Design and Productions Approval for Airport Moving Map Display Applications Intended for EFB Systems ☐ AC 20-165A, Airworthiness Approval of ADS-B Out Systems ☐ AC 20-172B, Airworthiness Approval for ADS-B In Systems and Applications ☐ AC 25-11B, Electronic Flight Deck Displays ☐ AC 120-76C, Guidelines for the Certification, Airworthiness, and Operational Use of Electronic Flight Bags ☐ Other

TerraVision Flight Deck Applications	**Location:** Petah Tikva, Israel
Industry Documents	Applicable to G500, G600, G950, G1000, G2000, G3000, G5000, GMX 200, GTN 6XX/7XX series only ☒ RTCA DO-160various, Environmental Conditions and Test Procedures for Airborne Equipment ☒ RTCA DO-178B, Software Considerations in Airborne Systems and Equipment Certification (Software Level: C/D) ☒ RTCA DO-181C/D/E, MOPS for ATCRBS/Mode S Airborne Equipment ☒ RTCA DO-200A, Standards for Processing Aeronautical Data ☒ RTCA DO-254, Design Assurance Guidance for Airborne Electronic Hardware (System Development Assurance Level: various) ☒ RTCA DO-257A, MOPS for the Depiction of Navigation Information on Electronic Maps ☒ RTCA DO-260B, MOPS for 1090 MHz Extended Squitter ADS-B and TIS-B ☐ RTCA DO-272, User Requirements for Aerodrome Mapping Information ☒ RTCA DO-282B, MOPS for UAT ADS-B ☒ RTCA DO-317A, MOPS for ASA System ☐ RTCA DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B-APT ☐ RTCA DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application ☐ RTCA DO-323, Safety, Performance and Interoperability Requirements Document for SURF IA ☒ Other : various
Other	ARINC Specification 816; The structure of the database allows continuous updates and modifications. TerraVision also provides certified AMDBs (Aerodrome Map Data Bases), compliant with accuracy and routine integrity guidelines as specified in RTCA DO-272A.
Hardware	
Hardware Platform(s)	Any portable EFB platform.
Display Resolution	Can be adjusted according the HW and the airline spec.
Brightness	
Controls	☒ Buttons ☐ Keyboard (e.g., USB, Bluetooth) ☐ Mouse/cursor ☐ Stylus ☒ Touch Screen ☐ Other
Capabilities	
Operating System	Microsoft Windows, Linux

TerraVision Flight Deck Applications	**Location:** Petah Tikva, Israel
Decluttering	☒ Yes: Map layers (i.e., geometric elements such as taxi element, runway markings and such) are de-cluttered according to zoom level automatically for cartographic readability. Information layers are divided into sub-categories; each sub-category may further divide into sub-layers; each sub-layer display is user selectable. ☐ No
Panning	☒ Yes: panning is possible by a key and panning on the touch-screen or by the mouse. ☐ No
Autozoom	☐ Yes ☐ No
Manual zooming	☒ Yes: Zooming is capable by choosing + or – icons. ☐ No
Indications and Alerts	Runway Incursion alert Upon crossing active runway a message “Entering active runway XX” is displayed and the map display is “blinking” between night and day modes (see two bottom images, p2). Runway incursion indication thresholds are based on distance between ownship to runway, the A/C speed and the geometric position between the aircraft vector (heading) and the runway. Selected parking stand Parking stand indication is based on user selection. Selected parking stand is highlighted in orange and cyan.
Taxi Route Guidance	
Noteworthy Features and Applications	User selectable information/data layers, customization per airline specific operational requirements, communication data, hot spots, RVR location, runway dimensions, NOTAMs, Manual Taxi route insertion, taxi information & limitations layers dynamically displayed according to aircraft type and actual position.
Airport Moving Map Information Elements Depicted	
Airport Moving Map Data Format	☐ Geo-referenced ☒ Database driven
Ownship	Green triangle; green circle at low speeds when heading information is unreliable
Runways	Light Grey and white text on black frame, with the RWY ID label which is always visible.
Runway Centerlines	White
Runway Labels	White text in dark grey text boxes
Taxiways	Dark grey
Taxiway Centerlines	Yellow
Taxiway Labels	Yellow or red text in black text boxes for taxi notes or alerts. The actual taxiway ID in use is in green and located behind the A/C icon.
Hold Lines	Tomato
Non-movement Areas	Black

TerraVision Flight Deck Applications	**Location:** Petah Tikva, Israel
Ramp Areas	Dark grey. Parking stands light grey
Grassy Areas	Black
Buildings	Blue
Building Labels	White
Other	Runway markings: white Closed RWY/Taxi: brown outline Service roads: dark grey Stand guidance line: yellow Parking stand location: white Runway exit line: white Runway shoulders: brown

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6. Research Organizations

This section includes two research organizations that developed CDTIs with airport moving map functionality. These research displays were developed for use in a simulator environment, and were not implemented commercially. All information was provided by the research organizations and has not been verified with the FAA.

MITRE	**Location:** McLean, Virginia
Product(s)	MITRE CAASD Cockpit Display of Traffic Information (CDTI) prototype
Website(s)	www.mitre.org

Product Overview(s)

MITRE's CDTI is a prototype used for human-in-the-loop research and development and is highly configurable with an Airport Moving Map (AMM) that allows for the display of traffic information. Display colors and shapes vary between projects. The display of traffic can be based on a configurable target generator with specifiable position uncertainties. The information in this document describes capabilities that have been used in the past but are not necessarily all currently in use. The research is intended to support requirements development of RTCA special committee 186, Working Group 1 for cockpit based runway safety indications and alerting.

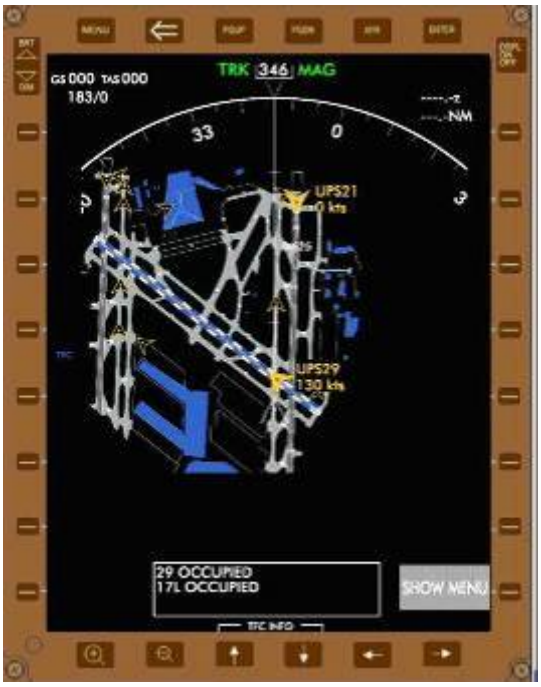
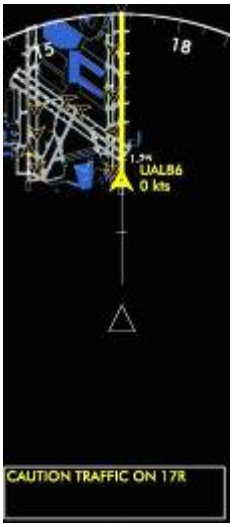


Image courtesy of MITRE

Hardware

Hardware Platform(s)	Research display. Class 2 or 3 EFB.
Display Size	Diagonal display is 11 inches.
Display Resolution	1024 x 768

MITRE	**Location:** McLean, Virginia
Brightness	None
Controls	☐ Buttons ☐ Keyboard ☐ Mouse/cursor ☐ Stylus ☒ Touch Screen ☐ Other
Capabilities	
Operating System	☐ Microsoft Windows ☒ Linux ☐ Android ☐ iOS ☐ Custom
Decluttering	☐ Yes ☒ No
Panning	☒ Yes: Ownship can be positioned in lower third or center of display. ☐ No
Autozoom	☐ Yes ☒ No
Manual zooming	☒ Yes ☐ No
Indications and Alerts	Runway Safety Indications identify runway and traffic status as relevant to own-ship operations. Traffic, as viewed from ownship's current state is considered "relevant" if that traffic position, orientation, and movement could potentially lead to a runway incursion or collision within a foreseeable period of time. Indications are intended to identify normal operational conditions to the flight crew that are generally relevant for runway safety and could be a precursor to a runway safety hazard. Indications are not intended to attract pilot awareness. Runway Status indications are provided if ownship's runway is not usable for taxi, takeoff or landing by ownship. Traffic indications are provided if the runway is currently usable by ownship but there could be a potential collision hazard in the immediate future. Indications are generally provided as a function of ownship position in relation to the runway. In contrast to indications, runway safety alerts are intended to help prevent potential collisions between two aircraft. Alerts are intended to attract pilot awareness. Alerts are provided as a function of position and closure rate between ownship and conflict traffic. Caution alerts are intended to provide immediate flight crew awareness for subsequent flight crew response. Warnings are intended to facilitate immediate flight crew awareness for immediate response. Specific alerting behavior depends on the scenarios and both levels of alerts may not be triggered in all situations. For situations when ownship is taxiing toward a runway entrance and traffic is approaching that intersection at high speed, an auditory message is presented such as: "*Traffic Ahead.*" Caution and warning alerts are presented with an auditory message, for example: *"Traffic Ahead."*
Indications and Alerts	Blue-white outlined runway: indicates occupied runway with traffic that is relevant to ownship; the traffic aircraft is converging onto a common intersection Enlarged, filled-in chevron: indicates relevant traffic currently on a runway

MITRE	**Location:** McLean, Virginia
	Flight identifier and ground speed: provides additional information about relevant traffic on a runway. Runway status box: provides textual information regarding runway occupancy, e.g., "[Runway number] occupied" For Cautions: Occupied runway and conflict traffic aircraft are drawn in yellow; yellow text in the runway status box provides alert message ("CAUTION TRAFFIC ON [Runway number]") For Alerts: Occupied runway and conflict traffic aircraft are drawn in red; red text in the runway status box provides alert message ("WARNING TRAFFIC ON [Runway number]")    *Images courtesy of MITRE*
Taxi Route Guidance	The research prototype does not provide route guidance.
Noteworthy Features and Applications	
Airport Moving Map Information Elements Depicted	
Airport Moving Map Data Format	☐ Geo-referenced ☒ Database driven
Ownship	 White unfilled triangle
Runways	Dark Grey
Runway Centerlines	White
Runway Labels	White
Taxiways	Light grey
Taxiway Centerlines	--
Taxiway Labels	White text in a black text box
Hold Lines	--

MITRE	**Location:** McLean, Virginia
Non-movement Areas	Black
Ramp Areas	Black
Grassy Areas	Black
Buildings	Blue
Building Labels	--
Other	
Traffic Display	
Data Source and Targets Displayed	☒ ADS-B: ☐ TIS: ☐ TIS-B: ☐ TAS: Simulated ADS-B surveillance with NACp encoding and commensurate position uncertainty can be displayed.
Traffic Display Range	Minimum: .25 NM Maximum: 640 NM Default: None
Traffic Symbols	

Symbol Type	Description	Data Source	Image
Ground aircraft traffic, directional, sufficient display accuracy		ADS-B	
Ground aircraft traffic, directional, insufficient display accuracy (“degraded”)		ADS-B	
Ground aircraft traffic, non-directional: same for sufficient and insufficient display accuracy		ADS-B	
Airborne traffic, directional, sufficient display accuracy		ADS-B	
Airborne traffic, directional, insufficient display accuracy (“degraded”)		ADS-B	
Airborne traffic, non-directional, same for sufficient and insufficient display accuracy		ADS-B	
SURF IA traffic with Runway Status Indication	Ground aircraft traffic, directional, sufficient display accuracy, runway occupied (relevant to ownship)	ADS-B	

MITRE		**Location:** McLean, Virginia	
SURF IA traffic with Caution Alert	Ground aircraft traffic, directional, sufficient display accuracy	ADS-B	
SURF IA traffic with Warning Alert	Ground aircraft traffic, directional, sufficient display accuracy	ADS-B	
Traffic Symbol Data Tag Information			
Data Tag Information	☒ Flight ID ☒ Altitude ☐ Actual ☒ Relative ☐ Geometric ☒ Ground speed ☐ Vertical direction/speed ☒ Above/Below 500' (climb/descent arrows) ☐ Other : ☐ Horizontal velocity vector ☐ Invalid/Unavailable data ☐ Traffic category ☐ Monitored by TCAS ☒ Other: Off-scale indication 		

NASA Ames Research Center	**Location:** Moffett Field, CA
Product(s)	Airport Moving Map (AMM) Displays used in NextGen Surface Trajectory-Based Operations (STBO) pilot-in-the-loop, simulation experiments: 1) Standard Display 2) 4-Dimensional Trajectory (4DT) ("Magic Carpet") Display
Website(s)	Lab Website: • http://hsi.arc.nasa.gov/groups/HCSL/ The following research papers describe experiments which included the *Standard AMM Display*, as well as, some of its variations (e.g., preview modes, pending clearance information, and contingency hold lines). • http://hsi.arc.nasa.gov/groups/HCSL/publications/Bakowski_et_al_2011_ISAP%20Paper.pdf • http://hsi.arc.nasa.gov/groups/HCSL/publications/AHFE_12_Bakowski_etal.pdf • http://hsi.arc.nasa.gov/groups/HCSL/publications/Bakowski_Hooey_Foyle_Wolter_Cheng_DASC13.pdf Research paper describing the *4DT ("Magic Carpet") Display* to be published next year.

Product Overview(s)

Airport Moving Maps (AMM):

1) Standard Display. Depicts the:

- Ownship (white chevron)
- Traffic (with Call Signs) that falls within a 1,250 ft radius of the ownship
- Cleared-to-Taxi Route (magenta)
- Rotating Compass Bars (grey border of map)
- Digital Heading (top center)
- Text of the Cleared-to-Taxi Route (below map; current taxiway in white)

2) AMM: 4-Dimensional Trajectory (4DT) ("Magic Carpet") Display. Same as above, and:

- A band (the "Magic Carpet"), depicted in light pink, that moves along the taxi route according to the speed profile, and represents the allowable deviation, in seconds, from the speed profile. The 4DT image below, depicts a +/- 15 sec conformance window.
- 4DT Speed Profile information (on second line of text):
  - Taxi Start Time (time at which the "Magic Carpet" begins moving along the taxi route)
  - Profile Speed (speed at which the "Magic Carpet" travels along the taxi route)
  - Queue Time (time at which the "Magic Carpet" will enter the Queue area)
- Current Ground Speed (upper left corner, "GS")

NASA Ames Research Center	**Location:** Moffett Field, CA

Standard Display

4DT "Magic Carpet" Display

Images courtesy of NASA Ames Research Center

Hardware	
Hardware Platform(s)	Dedicated display on the Flight Deck instrument panel of a B737 simulator.
Display Size	10" (diagonal)
Display Resolution	750 x 900
Brightness	n/a
Controls	☐ Buttons ☐ Keyboard ☐ Mouse/cursor ☐ Stylus ☐ Touch Screen ☒ Other: Zoom is controlled via the Nav Display zoom level knob on the MCP.
Capabilities	
Operating System	☐ Microsoft Windows ☒ Linux ☐ Android ☐ iOS ☐ Custom
Decluttering	☒ Yes ☐ No Surface traffic is displayed on the map only when it falls within a 1,250 ft radius of the ownship.

NASA Ames Research Center	**Location:** Moffett Field, CA
Panning	☐ Yes ☒ No
Autozoom	☐ Yes ☒ No
Manual zooming	☒ Yes ☐ No Zoom levels available: four zoom levels in track-up perspective and one "birds-eye" overview. Selected via the Nav Display zoom level knob on the MCP.
Indications and Alerts	Runways are displayed with a red border when occupied by an aircraft.  *Image courtesy of NASA Ames*
Taxi Route Guidance	As shown in the images above, the taxi route is depicted graphically as a magenta line, and in text format, below the map. In the text, the current taxiway is shown in white.
Noteworthy Features and Applications	The "Magic Carpet" display supports NextGen 4DT surface operations. As described above, a band (the "Magic Carpet"), depicted in light pink, moves along the taxi route according to the speed profile and represents the allowable along-track deviation, in seconds, from the defined speed profile.
Airport Moving Map Information Elements Depicted	
Airport Moving Map Data Format	☐ Geo-referenced ☒ Database driven
Ownship	 Yes, depicted as a white chevron (shown in image above)
Runways	Yes (grey; for example, see RWY 18L in "Standard Display" image above)
Runway Centerlines	--
Runway Labels	Yes (white text; for example, see RWY 18L in "Standard Display" image above)
Taxiways	Yes (black; see taxiways on above images)
Taxiway Centerlines	--
Taxiway Labels	Yes (white text; see taxiways on above images)

NASA Ames Research Center	Location: Moffett Field, CA
Hold Lines	No, airport surface hold lines (e.g., Runway, Ramp/AMA) are not represented on either AMM. (However, the display of hold lines on the AMM, prior to intersections, for Contingency Holds was explored in: http://hsi.arc.nasa.gov/groups/HCSL/publications/Bakowski_Hooey_Foyle_Wolter_Cheng_DASC13.pdf)
Non-movement Areas	--
Ramp Areas	Yes (ramp (black) areas can be seen in both images above)
Grassy Areas	Yes (green; as shown in images above)
Buildings	Yes (blue; Terminal buildings can be seen in images above)
Building Labels	--
Other	Departure spots visible in 4DT image above (yellow dots)
Traffic Display	
Data Source and Targets Displayed	n/a; Controlled experimentally
Traffic Display Range	Controlled experimentally: Traffic within a 1250 ft radius is displayed on the AMM.
Traffic Symbols	

Symbol Type	Description	Data Source	Image
Ground Aircraft	Traffic on the Surface (with Call Sign)	n/a	

Traffic Symbol Data Tag Information	
Data Tag Information	☒ Flight ID ☐ Altitude ☐ Actual ☐ Relative ☐ Geometric ☐ Ground speed ☐ Vertical direction/speed ☐ Above/Below 500' (climb/descent arrows) ☐ Other ☐ Horizontal velocity vector ☐ Invalid/Unavailable data ☐ Traffic category ☐ Monitored by TCAS ☐ Other

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FAA Advisory Circular (AC) 20-165A, *Airworthiness Approval of Automatic Dependent Surveillance - Broadcast (ADS-B) Out Systems*. Available at: http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC%2020-165A.pdf

FAA Advisory Circular (AC) 20-172B, *Airworthiness Approval for ADS-B in Systems and Applications*. Available at: http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC%2020-172A.pdf

FAA Advisory Circular (AC) 25-11B. *Electronic Flight Deck Displays*. Available at: http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_25-11B.pdf

FAA Advisory Circular (AC) 120-76C, *Guidelines for the Certification, Airworthiness, and Operational Use of Electronic Flight Bags*. Available at: http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_120-76C.pdf

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FAA Technical Standard Order (TSO)-C147a, *Traffic Advisory System (TAS) Airborne Equipment*. Available at: http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgTSO.nsf/0/39d76b4320b1caa286257d4f0061a285/$FILE/ATTENEB5.pdf/TSO-C147a.pdf

FAA Technical Standard Order (TSO)-C154c, *Universal Access Transceiver (UAT) Automatic Dependent Surveillance-Broadcast (ADS-B) Equipment Operating on Frequency of 978 MHz*. Available at: http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgTSO.nsf/0/e5a37977fbdb786b8625768200579728/$FILE/TSO-154c.pdf

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RTCA DO-178C, *Software Considerations in Airborne Systems and Equipment Certification*. Available at: http://www.rtca.org/store_product.asp?prodid=803

RTCA DO-181E, *Minimum Operational Performance Standards for Air Traffic Control Radar Beacon System/Mode Select (ATCRBS/Mode S) Airborne Equipment*. Available at: http://www.rtca.org/store_product.asp?prodid=933

RTCA/DO-200B, *Standards for Processing Aeronautical Data*. Available at: http://www.rtca.org/store_product.asp?prodid=1202

RTCA DO-254, *Design Assurance Guidance for Airborne Electronic Hardware*. Available at: http://www.rtca.org/store_product.asp?prodid=752

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Appendix A: Additional CDTI and Airport Moving Map Publications

FEDERAL AVIATION ADMINISTRATION (FAA) PUBLICATIONS:

FAA Orders

FAA Order 8900.1, Volume 4, Chapter 15, Section 1. *Flight Standards Information Management System,* Electronic Flight Bag Operational Authorization Process, April 3, 2014. Available at: http://fsims.faa.gov/PICResults.aspx?mode=EBookContents

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RTCA DO-242A, *Minimum Aviation System Performance Standards for Automatic Dependent Surveillance Broadcast (ADS-B)*. Available at: http://www.rtca.org/store_product.asp?prodid=787

RTCA DO-243, *Guidance for Initial Implementation of Cockpit Display of Traffic Information*. Available at: http://www.rtca.org/store_product.asp?prodid=783

RTCA DO-286B, *Minimum Aviation System Performance Standards (MASPS) for Traffic Information Service – Broadcast (TIS-B)*. Available at: http://www.rtca.org/store_product.asp?prodid=650

RTCA DO-289, *Minimum Aviation System Performance Standards (MASPS) for Aircraft Surveillance Applications (ASA)*. Available at: http://www.rtca.org/store_product.asp?prodid=643

RTCA DO-302, *Minimum Operational Performance Standards (MOPS) for Surveillance Transmit Processing (STP)*. Available at: http://www.rtca.org/store_product.asp?prodid=606

RTCA DO-318, Safety*, Performance and Interoperability Requirements Document for Enhanced Air Traffic Services in Radar-Controlled Areas Using ADS-B Surveillance (ADS-B-RAD)*. Available at: http://www.rtca.org/store_product.asp?prodid=1074

RTCA DO-319, *Safety, Performance and Interoperability Requirements Document for Enhanced Traffic Situational Awareness During Flight Operations (ATSA-AIRB)*. Available at: http://www.rtca.org/store_product.asp?prodid=1072

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