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Federal Aviation Administration Aircraft Evaluation Division Operations and Human Factors Evaluation Aid for Synthetic Vision Guidance Systems

Kelene A. Fercho, Ph.D.[1]
Bryan L. Watson[2]

[1]Flight Technologies and Procedures Division
Flight Research and Analysis Group
Federal Aviation Administration
6500 S. MacArthur Blvd.
Oklahoma City, OK 73169

[2]Cherokee Federal Solutions
6500 S. MacArthur Blvd.
Oklahoma City, OK 73169

Civil Aerospace Medical Institute

6500 S. MacArthur Blvd.

Oklahoma City, OK 73169

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12. Abstract

This evaluation aid is designed to assist the Federal Aviation Administration (FAA) Aircraft Evaluation Division (AED) personnel in evaluating the human factors aspects of a synthetic vision guidance system (SVGS) and aircraft combination for operational suitability evaluations and operational evaluations. This aid supports the evaluation of new or modified SVGSs on different types of aircraft and with different display implementations. This aid may facilitate early identification of human factors issues that may influence safety or human performance during tasks, procedures, maneuvers, or operations conducted with an SVGS. Additionally, the use of this aid may support AED personnel in reviewing the applicant's Evaluation Plan and may facilitate the development of an AED Summary Report, Flight Standardization Board Report, Letter of Authorization, Letter of Authorization Report, Operational Suitability Letter, Operational Suitability Report, or Type Inspection Authorization. This aid takes the form of a workbook, and each chapter can be used alone or in conjunction with other chapters. This aid comprises five chapters and one appendix—"Introduction"; "Operational Suitability Evaluation"; "Operational Evaluation: Training Recommendations"; "Operational Evaluation: Checking Recommendations"; "Operational Evaluation: Currency Recommendations"; and "Appendix: Key References for the Federal Aviation Administration Aircraft Evaluation Division Operations and Human Factors Evaluation Aid for Synthetic Vision Guidance Systems." The "Operational Evaluation: Training Recommendations" and "Operational Evaluation: Checking Recommendations" chapters also include decision trees to support the determination of training difference levels or checking difference levels for a modified SVGS and aircraft combination, respectively. Links to key FAA regulatory, policy, and guidance materials are provided within each chapter and in the appendix.

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Preface

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Feedback on this document should be sent to Dr. Kelene Fercho (kelene.a.fercho@faa.gov).

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List of Abbreviations

AC	advisory circular
ACFT	aircraft
ACS	Airman Certification Standards
ACSAA	Aircraft Certification, Safety, and Accountability Act
ADS-B	Automatic Dependent Surveillance–Broadcast
AED	Aircraft Evaluation Division
AFM	airplane flight manual
AIR	Aircraft Certification Service
AP	autopilot
AR	augmented reality
ASA	aircraft state awareness
AWO	all weather operations
CFR	Code of Federal Regulations
CHDO	Certificate Holding District Office
CPT	cockpit procedures trainer
CSS	cockpit system simulator
CVS	combined vision system
DA	decision altitude
DH	decision height
DRIL	depiction of the runway of intended landing
DT	differences table
EFB	electronic flight bag
EFVS	enhanced flight vision system
EP	evaluation plan
EVS	enhanced vision system
FAA	Federal Aviation Administration
FCOM	flightcrew operations manual
FCTM	flightcrew training manual

List of Abbreviations

FD	flight director
FFS	full flight simulator
FMS	flight management system
FOEB	Flight Operations Evaluation Board
FOR	field of regard
FOV	field of view
FPARC	flight path angle reference cue
FPV	flight path vector
FS	Flight Standards Service
FSB	Flight Standardization Board
FSBR	Flight Standardization Board Report
FTD 2-5	flight training devices (levels 2–5)
FTD 6-7	flight training devices (level 6 or 7)
GPA	glidepath angle
HDD	head-down display
HUD	head-up display
HWD	head-worn display
ICBT	interactive computer-based training
IFR	instrument flight rules
InFO	Information for Operators
LOA	Letter of Authorization
LOAR	Letter of Authorization Report
MDA	minimum descent altitude
MDR	Master Differences Requirements
MMEL	Master Minimum Equipment List
MSpec	management specification
MR	mixed reality
NAS	National Airspace System

List of Abbreviations

OE	operational evaluation
OEM	original equipment manufacturer
OpSpec	operations specification
OSE	operational suitability evaluation
OSL	Operational Suitability Letter
OSR	Operational Suitability Report
PAPI	precision approach path indicator
PF	pilot flying
PFD	primary flight display
PM	pilot monitoring
POH	pilot operating handbook
PTS	practical test standards
PTT	part task trainers
QRH	quick reference handbook
RFM	rotorcraft flight manual
RVR	runway visual range
SAFO	safety alerts for operators
SMGCS	Surface Movement Guidance and Control System
SOP	standard operating procedure
SU	stand-up lectures
SVGS	synthetic vision guidance system
SVS	synthetic vision system
TAWS	Terrain Awareness and Warning System
TCAS	Traffic Collision Avoidance System
TCPM	Training Center Program Manager
TERPS	terminal instrument procedures
TIA	Type Inspection Authorization
V	video

List of Abbreviations

VASI	visual approach slope indicator
VDA	vertical descent angles
VDP	vertical descent points
VFR	visual flight rules
VGSI	visual glide slope indicator
VR	virtual reality
XR	extended reality

1. Introduction

The purpose of the *Federal Aviation Administration Aircraft Evaluation Division Operations and Human Factors Evaluation Aid for Synthetic Vision Guidance Systems* is to assist U.S. Federal Aviation Administration (FAA) Aircraft Evaluation Division (AED) personnel in an operational suitability evaluation (OSE) and operational evaluation (OE) of a synthetic vision guidance system (SVGS) and aircraft combination. The primary focus of this aid is fixed-wing aircraft; additional considerations specific to non-fixed-wing aircraft may be necessary. This aid may facilitate early identification of human factors issues that may influence safety or human performance during procedures and operations using an SVGS. Additionally, this aid may support AED personnel when reviewing the applicant's Evaluation Plan (EP), and it may facilitate the development of an AED Summary Report, Flight Standardization Board Report (FSBR), Letter of Authorization (LOA), Letter of Authorization Report (LOAR), Operational Suitability Letter (OSL), Operational Suitability Report (OSR), or Type Inspection Authorization (TIA).

This aid was written to be consistent with terminology, definitions, and operational concepts as established in U.S. regulations and articulated in FAA guidance materials; see 14 Code of Federal Regulations (CFR) § 1.1 for general definitions. The FAA distinguishes between synthetic vision systems (SVSs) and SVGSs and their uses and operational credit through FAA orders and advisory circular (AC) guidance. For example, according to AC 20-185A Section 2.1.1

> Pursuant to 14 CFR 1.1, Synthetic Vision means a computer-generated image of the external scene topography from the perspective of the flight deck that is derived from aircraft attitude, high-precision navigation solution, and database of terrain, obstacles and relevant cultural features. [SVSs] are an electronic means to display a synthetic vision image of the external scene topography to the flightcrew. Synthetic vision's key features can also be applied to [SVGSs], which enable instrument approaches with lower decision altitudes [DAs], and aircraft state awareness [(ASA) SVSs], which improve the pilot's awareness of the aircraft's attitude and energy state.

The International Civil Aviation Organization and other foreign civil aviation authorities may use terminology and operational concepts that differ from those of the FAA.

This aid is focused on supporting OSEs and OEs of an SVGS. This aid may also be used for SVSs and ASA SVSs, with the understanding that only an SVGS enables instrument approaches with lower DAs. SVSs and ASA SVSs are intended to support or enhance pilot or flightcrew situation awareness but do not meet the criteria of an SVGS for instrument approaches with lower approach minimums. An SVGS is a flight guidance display with high-precision position assurance monitors that provide position assurance and accurate rendering of the synthetic depiction throughout the approach, which may allow operations on published instrument approaches that contain a lower set of approach minimums (see RTCA DO-407, *Minimum Aviation System Performance Standards [MASPS] for Synthetic Vision Systems, Synthetic Vision Guidance Systems and Combined Vision Systems* for more information on SVGS intended functions).

FAA Order 8400.13F CHG 1 authorizes Special Authorization (SA) Category I (CAT I) approaches with a decision height (DH) as low as 150 feet and a minimum visibility as low as runway visual range (RVR) 1400 feet on suitable instrument landing system equipment at runways with reduced lighting. These operations require the use of airborne equipment in accordance with AC 120-118, and the list of airborne systems includes SVGSs; see also Operations Specification (OpSpec) C059, SA CAT I Instrument Approach and Landing Operations.

The aid supports the evaluation of a new or modified SVGS on different types of aircraft and with different displays (e.g., head-up, head-down, head-worn). Although an SVGS may be implemented on a head-up display (HUD) or equivalent (such as a head-worn display [HWD]), this aid is not intended to be used for OSEs or OEs of HUDs or equivalent displays. Any mention of HUD or equivalent display items in this aid applies only to those that are specific and unique to SVGSs. For evaluations of HWDs or Enhanced Flight Vision Systems, separate reports are available.[1]

This aid does not replace FAA regulatory or guidance materials but rather is intended to provide structure to the AED processes for OSEs and OEs of specific aircraft and SVGS combinations. Current FAA regulatory and guidance material takes precedence over the material herein. This aid is the product of research led by the FAA Flight Technologies and Procedures Division. It is understood that there may be aspects of a specific SVGS and aircraft combination that were not anticipated during the development of this aid. The directions and guidance described herein are not meant to unnecessarily restrict trained AED personnel, and it is expected that the judgments and expertise of the AED personnel will be applied.

This aid is not intended to train FAA AED personnel in the use of SVGSs or AED processes. AED personnel and qualified pilot test subjects who will manipulate the controls of an aircraft or act as pilot in command of an aircraft during operations using an SVGS as a part of an OSE and/or OE should be familiar with the SVGS and aircraft combination. It is assumed that users of this evaluation aid are personnel trained in AED processes and procedures.

This aid focuses on functions performed by the FAA AED. There are aspects of an AED operational suitability evaluation and operational evaluation of an SVGS and aircraft combination that are also evaluated by the FAA Aircraft Certification Service (AIR); however, the perspectives of these two organizations differ. AIR is responsible for oversight of design, production, airworthiness certification, and continued airworthiness programs for all U.S. civil aviation products and foreign import products. Thus, AIR is concerned with determining *compliance* of an aircraft and equipment with certification rules and policies. The AED

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[1] Fercho, K. A., & Watson, B. L. (Forthcoming). *Federal Aviation Administration Aircraft Evaluation Division Operations and Human Factors Evaluation Aid for Head-worn Displays*. United States. Department of Transportation. Federal Aviation Administration.

Fercho, K. A., & Watson, B. L. (2024). *Federal Aviation Administration Aircraft Evaluation Division Operations and Human Factors Evaluation Aid for Enhanced Flight Vision Systems* (No. DOT/FAA/AM-24/21). United States Department of Transportation, Federal Aviation Administration. https://rosap.ntl.bts.gov/view/dot/85381

contributes an operational perspective to engineering activities and identifies applicable operating regulations. Thus, the AED is concerned with determining the *suitability* of an aircraft and equipment with operational rules and policies, and for use within the national airspace system. AED functions include the evaluation of an aircraft, engine, or propeller and associated systems for operational relevance; flightcrew type rating requirements; minimum equipment required for dispatch; continued airworthiness; and review and acceptance of Instructions for Continued Airworthiness. For an SVGS and aircraft combination, the AED considers how the SVGS and aircraft components interact with each other, and support the completion of tasks, maneuvers, procedures, or operations conducted by the pilot flying and the pilot monitoring while completing their roles and responsibilities. AED personnel evaluate both current and proposed operations, taking into account the experience of the pilot end-users and the potential impact on operational safety, pilot or flight crew workload, situational awareness, decision-making, and performance. This assessment is conducted within the context of normal, abnormal, non-normal, or emergency procedures. The AED and AIR should collaborate in developing the operational suitability EP.

1.1(a) Overview and Evaluation Aid Organization

This aid draws evaluation points from human factors standards, guidelines, research, and FAA regulatory and guidance materials. The content was developed and refined during focus group discussions with experienced FAA AED Flight Standardization Board (FSB) Chairs, AED Human Factors Specialists, and SVGS subject matter experts. This development process resulted in valuable information and feedback that were used to improve each iteration of the aid.

To facilitate the user's ability to reference key FAA regulatory, policy, or guidance materials, links to the original source materials are provided within each chapter and in the Appendix. The information in this aid is accurate as of the publication date, but the source material that is referenced is regularly changed or updated. The user is encouraged to check the source material to ensure that the materials are current and accurate, as well as to understand the full context of the references.

This aid takes the form of a workbook that can be completed by AED personnel conducting OSEs and OEs of an SVGS and aircraft combination. The aid comprises five chapters and one appendix. Chapter 1 is the introduction, and chapters 2 through 5 include checklists specific to the content of the chapter (Table 1). The "Operational Evaluation: Training Recommendations" and "Operational Evaluation: Checking Recommendations" chapters also include decision trees to support the determination of training difference levels or checking difference levels for a modified SVGS and aircraft combination, respectively. Each chapter can be used alone or in conjunction with other chapters.

Table 1.
Topics, Chapters, and Appendix in the *Federal Aviation Administration Aircraft Evaluation Division Operations and Human Factors Evaluation Aid for Synthetic Vision Guidance Systems*

Chapter	Title	Contents
1	Introduction	• Introduction • Overview and evaluation aid organization • Coordination and preparation tasks

2	Operational Suitability Evaluation	• Operational suitability evaluation conditions
		• Document review
		• SVGS imagery
		  ○ Pilot flying display
		  ○ Secondary display
		• Aircraft flight information and flight symbology
		  ○ Pilot flying display
		  ○ Secondary display
		• Master Minimum Equipment List (MMEL) requirements

3	Operational Evaluation: Training Recommendations	• Ground training • Flight training • Special emphasis areas • Training difference levels for a modified SVGS and aircraft combination
4	Operational Evaluation: Checking Recommendations	• Proficiency check required by 14 CFR Part 61 • Competency check required by 14 CFR Part 91 Subpart K • Proficiency check required by 14 CFR Part 121 • Competency check required by 14 CFR Part 125 • Competency check required by 14 CFR Part 135 • Checking difference levels for a modified SVGS and aircraft combination
5	Operational Evaluation: Currency Recommendations	• Recommended SVGS recent flight experience • Recommended SVGS refresher training • Recommended reestablishing SVGS recency of experience • Recommended currency for SVGS abnormal, non-normal, or emergency procedures
Appendix	Key References for the *Federal Aviation Administration Aircraft Evaluation Division Operations and Human Factors Evaluation Aid for Synthetic Vision Guidance Systems*	Provides a list of key references that AED personnel may find helpful to prepare for and accomplish an SVGS OSE or OE. These key references include FAA regulations, orders, notices, information for operators (InFO), safety alerts for operators (SAFO), ACs, and other technical resources.

1.1(b) Coordination and Preparation Tasks

To prepare for an SVGS OSE or OE, AED personnel should coordinate with the project technical points of contact both within and external to the FAA, gain familiarity with and knowledge of applicable FAA regulations and guidance materials, and gather background information on related projects. Suggested coordination tasks are provided in Table 2, and suggested preparation tasks are provided in Table 3.

Table 2.
Suggested Coordination Tasks

Task No.	Suggested Coordination Tasks
1	Accomplish established certification project processes. This includes checking the Certification Project Notification, establishing an FSB, establishing a Flight Operations Evaluation Board (FOEB; if required), and developing an Issue Paper (if appropriate).
2	For domestic SVGS products, coordinate with the FAA Aircraft Certification program manager from the appropriate Aircraft Certification Office. Identify the flight test pilot and flight test engineer assigned to the project.
3	For international SVGS products, coordinate with the international branch program manager. Consider discussing the project with the international certification authority's AED counterpart for information.
4	If an operator is sponsoring the evaluation and providing resources such as an aircraft or flightcrew, consider informing the Certificate Management Office/Certificate Handling District Office. Consider Aircrew Program Manager or Principal Operations Inspector involvement in the FSB process.
5	If a 14 CFR Part 142 training provider is sponsoring an evaluation and providing resources such as a flight simulator or instructors, consider informing the Training Center Program Manager (TCPM). Consider TCPM or Flight Training Program Manager involvement in the FSB process.
6	If a full flight simulator (FFS) will be used for the evaluation, consider notifying the FAA National Simulator Program Branch (AFS-205).

Table 3.
Suggested Preparation Tasks

Task No.	Suggested Preparation Tasks
1	Ensure FSB members required to accomplish SVGS procedures and operations as a part of an OSE or OE have knowledge of SVGSs and can perform duties necessary for tasks, procedures, maneuvers, and operations using an SVGS. Training and qualification should include ground training and flight training to ensure safe aircraft operation for instrument procedures in normal and non-normal conditions. If minima are sought or authorized using an SVGS, the training program should assure an appropriate level of knowledge and proficiency using the SVGS (see AC 120-118 Section 5).
2	Review the list of key references in the Appendix.
3	Become familiar with existing SVGS-focused OSRs and FSBRs.
4	Notify the FAA Flight Technologies and Procedures Division, Flight Operations Branch (AFS-410), to garner any background information concerning similar projects.
5	Coordinate inclusion of the operational suitability determination and, if applicable, OE in the TIA or LOA.

2. Operational Suitability Evaluation

The "Operational Suitability Evaluation" chapter of the *Federal Aviation Administration Aircraft Evaluation Division Operations and Human Factors and Evaluation Aid for Synthetic Vision Guidance Systems* is intended to support operational suitability evaluations (OSEs) of a synthetic vision guidance system (SVGS) and aircraft combination. This chapter may help inform the determination of operational acceptability or unacceptability of a new or modified SVGS and aircraft combination in accordance with Federal Aviation Administration (FAA) Order 8110.4C, FAA Order 8430.21A, FAA Order 8900.1, and Advisory Circular (AC) 120-53B. When Aircraft Evaluation Division (AED) personnel are evaluating an SVGS and aircraft combination, this chapter may help ensure that human factors considerations related to operational suitability will be identified and recorded in the Type Inspection Authorization (TIA), Letter of Authorization (LOA), AED Summary Report, Flight Standardization Board Report (FSBR), Letter of Authorization Report (LOAR), Operational Suitability Letter (OSL), or Operational Suitability Report (OSR). Additionally, this evaluation aid may support AED personnel when reviewing the applicant's operational suitability evaluation plan (EP).

This aid does not replace FAA regulatory and guidance materials but rather is intended to provide structure to the OSE of a specific SVGS and aircraft combination. The directions and guidance described herein are not meant to unnecessarily restrict trained AED personnel, and it is expected that the judgment and expertise of personnel will be applied.

AED personnel and qualified pilot test subjects who will act as required flightcrew members of an aircraft during an operation using an SVGS as a part of an OSE and/or OE should be trained in accordance with AC 120-118 (see Section 5). Training and qualification should include ground training and flight training to ensure safe aircraft operation for instrument procedures in normal and non-normal conditions.

2.1 Overview

The AED evaluates operational factors to determine if an SVGS and aircraft combination may be used in the National Airspace System (NAS) and meets the applicable operational regulations (e.g., Title 14 of the Code of the Federal Regulations [14 CFR] Parts 61, 91, 97, 121, 125, 133, and 135), FAA ACs, and FAA policies.

Regarding this chapter:

AED personnel are encouraged to review the regulatory, advisory, and guidance materials provided in

- Table 4, Table 5, Table 6, Table 7, Table 8, Table 9, and the List of Key References in the Appendix.
- If questions arise during the SVGS OSE, AED personnel may wish to contact the FAA Flight Standards Service (FS), Flight Technologies and Procedures Division, Flight Operations Branch (AFS-410).

Of note, Master Minimum Equipment List (MMEL) relief is not directly addressed in this evaluation aid. If the original equipment manufacturer (OEM) requests MMEL relief related to the SVGS, AED personnel should follow the Flight Operations Evaluation Board (FOEB) process. The Master Minimum Equipment List (MMEL) Requirements checklist is intended to identify whether the requested relief is related to the SVGS. The answers to this checklist item may indicate that an FOEB should be initiated.

2.1(a) Chapter Organization

This chapter includes suggestions for OSE conditions and OSE points for SVGS documentation, SVGS imagery, aircraft flight information, and flight symbology. The chapter is organized into the following sections:

2.1(b) Terminology

The following terminology and descriptions are used in the context of the *Federal Aviation Administration Aircraft Evaluation Division Operations and Human Factors Evaluation Aid for Synthetic Vision Guidance Systems* and do not replace definitions provided elsewhere in FAA regulatory and guidance material:

- ***Aircraft flight information.*** Aircraft flight information may represent data about the aircraft's current state, including airspeed, vertical speed, aircraft attitude, heading, altitude, height above ground level, command guidance as appropriate for the approach to be flown, path deviation indications, or flight path vector (FPV).
- ***Evaluation plan (EP).*** An EP is submitted by the applicant and accepted by the AED to outline the FSB's operational activities, including crewmember training, checks, and identification of gaps in operational suitability arising from simulator crewmember training (e.g., equipment differences, night conditions, instrument flight rules [IFR]). The EP should also include a manufacturer-proposed Master Differences Requirements (MDR) table and differences tables (DT) in accordance with AC 120-53B, Guidance for Conducting and Use of Flight Standardization Board Evaluations, if the applicant is seeking differences credit.
- ***Flight symbology.*** Flight symbology may translate information into a visual depiction or representation, such as a flight path angle reference cue (FPARC) with a pitch scale, zero pitch reference line, depiction of the runway of intended landing (DRIL), flare prompt or flare guidance (if provided), runway and extended runway centerline symbology (presented during the approach phase), approach or runway lighting infrastructure depicted as symbology, and supplementary vertical information (for situation awareness below decision altitude [DA]/decision height [DH] or minimum descent altitude [MDA]).
- ***Modified SVGS.*** A modified SVGS refers to an SVGS that has been altered or upgraded through modification, typically to enhance performance, comply with new regulations or guidance, or fulfill a specialized mission. For FSB purposes, a modified SVGS evaluation may be for a previously certified SVGS that has received a modification to its hardware or software but is still installed in the same model of aircraft (e.g., an SVGS certified on aircraft model "X" is modified but still installed in aircraft model "X").
- ***New SVGS.*** A new SVGS refers to an SVGS in its original design. For FSB purposes, a "new" SVGS evaluation is either (1) an SVGS that has never been certified by the FAA or (2) an SVGS that was previously certified by the FAA in a specific aircraft model and is then installed in a different aircraft model (e.g., an SVGS certified for aircraft model "X" is installed in aircraft model "Y").
- ***Operational evaluation (OE).*** An OE is an AED process to determine pilot type rating, minimum crewmember training, checking and currency requirements, and the unique or special airman certification requirements (e.g., specific flight characteristics, no-flap landing).
- ***Operational suitability evaluation (OSE).*** An OSE is an AED determination that an aircraft or system may be safely used in the NAS and meets the applicable FAA policies and regulatory requirements.

2.1(c) Operational Suitability Chapter References

Table 4.
FAA Regulations Included in the "Operational Suitability Evaluation" Chapter

14 CFR Regulation	Title
§ 1.1	General Definitions
§ 25.771	Pilot Compartment
§ 25.773	Pilot Compartment View
§ 25.1322	Flightcrew Alerting
§ 25.1581	General
§ 91.175	Takeoff and Landing Under IFR
§ 91.1039	IFR Takeoff, Approach and Landing Minimums
§ 121.651	Takeoff and Landing Weather Minimums: IFR: All Certificate Holders
§ 125.325	Instrument Approach Procedures and IFR Landing Minimums
§ 125.381	Takeoff and Landing Weather Minimums: IFR
§ 135.225	IFR: Takeoff, Approach, and Landing Minimums

Table 5.
Orders Included in the "Operational Suitability Evaluation" Chapter

Order No.	Title
Order 8110.4C	Type Certification
Order 8260.3G	United States Standard for Terminal Instrument Procedures (TERPS)
Order 8400.13F	Procedures for the Evaluation and Approval of Facilities for Special Authorization Category I Operations and All Category II and III Operations
Order 8430.21A	Flight Standards Division, Aircraft Certification Division and Aircraft Evaluation Group Responsibilities
Order 8900.1, Vol. 3, Ch. 32, Sec. 5	Flight Manuals for Parts 121 and 135
Order 8900.1, Vol. 3, Ch. 32, Sec. 12	Aircraft Checklists for 14 CFR Parts 121/135
Order 8900.1, Vol. 4, Ch. 2, Sec. 3	Safety Assurance System: Approval of U.S. Operators for Operations Below Standard Category I—Parts 91 (Other Than Small Category A), 91K, 121, 125, 125 LODA Holders, and 135

Order No.	Title
Order 8900.1, Vol. 19, Ch. 5, Sec. 1	General
Order 8900.1, Vol. 19, Ch. 5, Sec. 2	Flight Operations Evaluation Board Composition
Order 8900.1, Vol. 19, Ch. 5, Sec. 3	Procedures
Order 8900.1, Vol. 19, Ch. 5, Sec. 4	Original Equipment Manufacturer Managed Flight Operations Evaluation Board Process
Order 8900.1, Vol. 19, Ch. 5, Sec. 5	Master Minimum Equipment List Development Procedures

Table 6.
Information for Operators Included in the "Operational Suitability Evaluation" Chapter

InFO No.	Title
InFO 16022	Inadvertent Selection of Concentrically-Centered Controls

Table 7.
Safety Alerts for Operators Included in the "Operational Suitability Evaluation" Chapter

SAFO No.	Title
SAFO 09016	Rejected Landing Due to Loss of Visibility
SAFO 10005	Go-Around Callout and Immediate Response
SAFO 15004	Scenario-Based Go-Around Training
SAFO 15011	Roles and Responsibilities for Pilot Flying (PF) and Pilot Monitoring (PM)

Table 8.
Advisory Circulars Included in the "Operational Suitability Evaluation" Chapter

AC No.	Title
AC 20-167A	Airworthiness Approval of Enhanced Vision System, Synthetic Vision System, Combined Vision System, and Enhanced Flight Vision System Equipment
AC 20-185A	Airworthiness Approval of Synthetic Vision Systems, Synthetic Vision Guidance Systems and Aircraft State Awareness Synthetic Vision Systems
AC 25-11B	Electronic Flight Displays

AC No.	Title
AC 25.1322-1	Flightcrew Alerting
AC 25.1581-1	Airplane Flight Manual
AC 120-53B	Guidance for Conducting and Use of Flight Standardization Board Evaluations - With Change 1
AC 120-71B	Standard Operating Procedures and Pilot Monitoring Duties for Flight Deck Crewmembers
AC 120-109	Stall and Stick Pusher Training
AC 120-111	Upset Prevention and Recovery Training
AC 120-118	Criteria for Approval/Authorization of All Weather Operations for Takeoff, Landing, and Rollout
AC 120-123	Flightpath Management

Table 9.
Other Technical Resources Included in the "Operational Suitability Evaluation" Chapter

Resource	Title
DO-407	RTCA SC-213 Minimum Aviation System Performance Standards (MASPS) for Synthetic Vision Systems, Synthetic Vision Guidance Systems and Combined Vision Systems

2.2 Operational Suitability Evaluation Conditions

Most operational suitability tasks should be conducted in an aircraft to help ensure that any unique characteristics of the display type, the aircraft, and representative weather and environmental conditions are holistically evaluated; it is practically impossible to recreate this combination of factors accurately in a flight simulator. A flight simulator may be used to evaluate conditions that are too difficult to accomplish in an aircraft or for tasks, maneuvers, procedures, or operations that do not require the flight environment provided by an aircraft in the real world. Examples of these tasks, maneuvers, procedures, or operations may include abnormal, non-normal, or emergency scenarios; system malfunctions or failures (e.g., SVGS imagery or symbology misalignment or failures); or evaluation of flightcrew task-sharing procedures such as crew coordination and callouts.

The OSE should include conditions representing the full operational envelope of the SVGS. The following examples are provided for consideration but do not constitute an exhaustive list. Each SVGS and aircraft combination is unique and requires trained AED personnel to use their expertise when evaluating the applicant's EP. Examples of OSE conditions may include the use of the SVGS:

- During approach and landing operations to the proposed minimums
- In various terrain environments to evaluate the synthetic terrain depiction
- At various runways to evaluate the SVGS depiction of the texture of the runway surface and depiction of markings (e.g., runway identifier, touchdown zone, hold short lines, taxiway lines, runway markings)
- In environments with various obstacles to evaluate the obstacle symbology depiction
- At various airports to evaluate the SVGS depiction of buildings
- In conditions to evaluate the presentation of traffic (if applicable)
- In conditions to evaluate the compatibility of the SVGS display color palette with the color palettes used by integrated aircraft systems or alerts (e.g., Terrain Awareness and Warning System [TAWS], Traffic Collision Avoidance System [TCAS], Automatic Dependent Surveillance–Broadcast [ADS-B], weather radar indications); many of these systems use common colors, and it is important that the colors are distinguishable
- With approach guidance deviation, such as the maximum allowable glidepath and lateral deviations
- When airspeed varies due to wind conditions
- For offset approaches up to the maximum allowable or to airplane flight manual (AFM) limitations (whichever is lesser)
- At the maximum terminal instrument procedures (U.S. Standard for Terminal Instrument Procedures [TERPS]) glidepath angle (GPA) allowed for various approach categories (A, B, C, D, E) or by the AFM or AFM Supplement
- In various sunlight conditions, such as nighttime, dynamically changing background (ambient) lighting, direct bright sunlight, or sunlight combined with fog or haze
- In precipitation, such as rain, fog, haze, or snow
- During operations authorized by an operations specification (OpSpec), management specification (MSpec), or LOA
- During high workload conditions, such as while multitasking; distracted; performing time-sensitive tasks; responding to various system failures or aircraft alerts; experiencing pilot

fatigue; or conducting operations during turbulent flight, at terrain-challenged airfields, or at busy airports with traffic

- During operations over water to evaluate the SVGS depiction of the surface of the water; for example, the SVGS should accurately depict the ocean surface, including waves, which may serve as a visual indication of wind speed and direction for rotorcraft pilots conducting offshore operations

2.3 Operational Suitability Evaluation Points: Document Review

OSE tasks may include reviewing existing SVGS documentation and/or analyzing proposed SVGS documentation. For example, an analysis of the SVGS limitations provided in the AFM or AFM Supplement, or in the rotorcraft flight manual (RFM) or RFM Supplement, is necessary.

Of note, an MMEL is developed through the FOEB process; however, during the OSE, the AED may have the opportunity to review some of the SVGS MMEL items, though later evaluation of certain MMEL items in an aircraft may be required through the FOEB process.

Document Review Overview and Instructions

SVGS documentation should be reviewed and analyzed to verify that descriptions of the SVGS are accurate and appropriate. Importantly, this documentation review and analysis should result in concurrence with the AFM and AFM Supplement (or RFM and RFM Supplement) in accordance with FAA Orders 8110.4C and 8900.1. If other documents are reviewed, AED personnel should verify that SVGS-related information is consistent with the AFM and AFM Supplement (or RFM and RFM Supplement). The checklists in this section will aid AED personnel in this process.

OSE points for the following categories of documents are included in this section:

- AFM and AFM Supplement (or RFM and RFM Supplement): Limitations (1.1)
- AFM and AFM Supplement (or RFM and RFM Supplement): Normal Procedures (1.2)
- AFM and AFM Supplement (or RFM and RFM Supplement): Abnormal, Non-normal, or Emergency Procedures (1.3)
- AFM and AFM Supplement (or RFM and RFM Supplement): System Descriptions (1.4)
- QRH or Equivalent (1.5)
- FCOM, POH, or Equivalent (1.6)
- FCTM or Equivalent (1.7)

Whenever possible, examples are given to provide context for the checklist item. The examples are *not* intended to serve as an exhaustive list, and the examples may not be applicable to every SVGS and aircraft combination.

For each checklist item

1. Review the OSE point.
2. Select the appropriate “yes,” “no,” or “N/A” suitability determination response for each phase of flight.
3. Provide additional comments on any noteworthy observations.

1.1 AFM and AFM Supplement (or RFM and RFM Supplement)		
Limitations	**Phase of Flight**	**Suitable?** (Select One)
The limitations section is accurate and suitable for the safe operation of the SVGS. For example, SVGS usage does not impede operations conducted within the U.S. NAS (e.g., consider GPA limitations, lateral offset limitations, and maximum crosswinds). Any limitations for operations conducted with an SVGS are provided. For example, a limitation may be that approaches conducted using the SVGS are limited to Satellite-Based Augmentation System (SBAS)–covered areas and prohibited in other remote areas.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: Order 8900.1, Vol. 3, Ch. 32, Sec. 5; AC 120-118
Secondary References: § 25.1581; Order 8110.4C; Order 8400.13F; Order 8430.21A; AC 25.1581-1

1.2 AFM and AFM Supplement (or RFM and RFM Supplement)		
Normal Procedures	**Phase of Flight**	**Suitable?** (Select One)
The normal procedures section (and supplementary procedures section, if provided) provides logical information with clear, comprehensive, and accurate descriptions of SVGS procedures. The information is integrated into checklists appropriately, and adequate information is communicated. Any required steps and/or callouts are clear and concise, with consideration for operational tempo and logical sequence of action. SVGS normal procedures do not require excessive mental effort or physical demand during flight operations. Mental and physical effort reflects strain from performing SVGS procedures under various environmental conditions for each phase of flight, coupled with the expected capability of the pilot to respond to those imposed demands. Excessive mental or physical effort may result in performance decline that affects the pilots' ability to perform their roles and responsibilities or even incidental effects such as fatigue or stress.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: *Order 8900.1, Vol. 3, Ch. 32, Sec. 5*; *Order 8900.1, Vol. 3, Ch. 32, Sec. 12*; *AC 120-118*
Secondary References: *§ 25.1581*; *Order 8110.4C*; *Order 8400.13F*; *Order 8430.21A*; *AC 25.1581-1*

1.3 AFM and AFM Supplement (or RFM and RFM Supplement)		
Abnormal, Non-normal, or Emergency Procedures	**Phase of Flight**	**Suitable?** (Select One)
The abnormal, non-normal, or emergency procedures section(s) provide logical information with clear, comprehensive, and accurate descriptions of SVGS abnormal, non-normal, and/or emergency procedures. This may also include abnormal procedures for malfunctions that affect SVGS usage, such as one engine inoperative; flight director (FD) failures; Global Positioning System (GPS) interference, spoofing, or failures; or other system malfunctions or failures. The information provided includes specific and detailed procedural information related to the unique characteristics of the aircraft and SVGS combination. The information may be provided in a variety of formats, such as narrative or sequential, step-by-step formats. Any required steps and/or callouts for critical situations or emergencies are easily located, clear, and concise, with consideration for operational tempo and logical sequence of action. Importantly, SVGS malfunctions or failures may be annunciated or un-annunciated. The descriptions provided should include any expected auditory, visual, or tactile indicators and support the quick and accurate identification of the problem. SVGS abnormal, non-normal, or emergency procedures do not require excessive mental effort or physical demand during flight operations. Mental or physical effort reflects strain from performing SVGS procedures under various environmental conditions during each phase of flight, coupled with the pilot's expected ability to respond to the demands imposed. Excessive mental or physical effort may result in performance decline that affects the pilots' ability to perform their roles and responsibilities, or even incidental effects, such as fatigue or stress. **CHECKLIST CONTINUED ON NEXT PAGE**	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A

1.3 AFM and AFM Supplement (or RFM and RFM Supplement)

Abnormal, Non-normal, or Emergency Procedures

Observations:

Primary References: Order 8900.1, Vol. 3, Ch. 32, Sec. 5; Order 8900.1, Vol. 3, Ch. 32, Sec. 12; AC 120-118
Secondary References: § 25.1581; Order 8110.4C; Order 8430.21A; AC 25.1581-1

1.4 AFM and AFM Supplement (or RFM and RFM Supplement)		
System Descriptions	**Phase of Flight**	**Suitable ?** (Select One)
The system descriptions section (if present) describes the SVGS in a manner appropriate to a qualified pilot trained in the use of an SVGS. Information provided should include a description and location of the SVGS controls as well as the effect that control manipulations have on the SVGS display, aircraft flight information, or flight symbology. Additionally, information on the SVGS software, including terrain, runway, and obstacle database information, should be included. Figures or diagrams must be accurate and should include the SVGS controls, SVGS mode indications, and SVGS alerts. The system description should also include the minimum equipment required to conduct an operation using an SVGS for the specific aircraft and SVGS combination.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: *Order 8900.1, Vol. 3, Ch. 32, Sec. 5*; *AC 120-118*
Secondary References: *§ 25.1581*; *Order 8110.4C*; *Order 8430.21A*; *AC 25.1581-1*; *AC 20-153B*

1.5 QRH or Equivalent		
	Phase of Flight	**Suitable?** (Select One)
The AED is not required to review the quick reference handbook (QRH) or equivalent as part of an OSE. However, if a QRH or equivalent is provided, it is important to review the documentation for information relevant to the SVGS and to bring any safety-related concerns to the OEM's attention. For example, it is important that SVGS information is consistent across documentation. Any SVGS procedural steps or limitations associated with the SVGS equipment should be consistent with those provided in the AFM or AFM Supplement (or RFM or RFM Supplement). Language should be clear and concise, and information should be easy to locate.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: *Order 8900.1, Vol. 3, Ch. 32, Sec. 5*; *Order 8900.1, Vol. 3, Ch. 32, Sec. 12*; *AC 120-118*
Secondary References: *§ 25.1581*; *Order 8110.4C*; *Order 8430.21A*; *AC 25.1581-1*; *AC 20-153B*

1.6 FCOM, POH, or Equivalent		
	Phase of Flight	**Suitable?** (Select One)
The flightcrew operations manual (FCOM), pilot operating handbook (POH), or equivalent is typically issued by the manufacturer as a guideline for operators to develop their own standard operating procedures (SOPs) in accordance with applicable requirements for SVGS operations. The AED does not review the FCOM, POH, or equivalent for operational suitability but rather provides feedback to the applicant. This document should accurately reflect AFM or AFM Supplement (or RFM or RFM Supplement) limitations; normal procedures; and abnormal, non-normal, or emergency procedures. All system descriptions and procedures must be consistent with system descriptions included in other documents provided by the OEM. The FCOM should include a thorough explanation of how all the SVGS controls function and the effects controls have on the SVGS image or other aircraft systems, including the SVGS approach minimum settings. The level of detail should be sufficient for the pilot to understand the operation of the SVGS, crew coordination, and SVGS callouts. Figures or diagrams must be accurate and should include the SVGS controls, SVGS mode indications, and SVGS alerts.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: *Order 8900.1, Vol. 3, Ch. 32, Sec. 5*; *Order 8900.1, Vol. 3, Ch. 32, Sec. 12*; *AC 120-118*
Secondary References: *§ 25.1581*; *Order 8110.4C*; *Order 8430.21A*; *AC 25.1581-1*

1.7 FCTM or Equivalent		
	Phase of Flight	**Suitable?** (Select One)
The flightcrew training manual (FCTM) or equivalent provides the pilot with practical information on maneuvers and techniques for operating the aircraft. The AED does not review the FCTM for operational suitability but rather provides feedback and suggestions to the applicant. The language should be comprehensive, given that the FCTM is provided as guidance for training SVGS maneuvers and techniques. The FCTM may include separate sections on normal, abnormal, non-normal, or emergency procedures as well as information on crew coordination and callouts. All system descriptions and procedures must be consistent with system descriptions included in other documents provided by the OEM. Figures or diagrams must be accurate and should include the SVGS controls, SVGS mode indications, and SVGS alerts.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: *Order 8900.1, Vol. 3, Ch. 32, Sec. 5*; *Order 8900.1, Vol. 3, Ch. 32, Sec. 12*; *AC 120-118*
Secondary References: *§ 25.1581*; *Order 8110.4C*; *Order 8430.21A*; *AC 25.1581-1*

2.4 Operational Suitability Evaluation Points: Synthetic Vision Image

2.4.1 Pilot Flying Display

AC 20-185A describes an SVGS as a flight instrument display that is most often implemented on a primary flight display (PFD), and Section 2.2.1 states that

> The SVGS flight instrument display provides a continuous, geo-spatially correct depiction of the external scene topography, including obstacles, augmented by the display of the runway of intended landing. The SVGS display is implemented on a head-down or head up PFD, designed to the guidance provided by AC 25-11B. SVGS goes beyond [synthetic vision system (SVS)] by including additional symbology elements, integrity and performance monitors, and annunciations.

The OSE points in this section may be used for an SVGS pilot flying (PF) display, which means that the SVGS is implemented on a PFD. Guidance on operational credit for the use of an SVGS during Special Authorization (SA) Category I (CAT I) operations is provided in AC 120-118, and additional details may be provided in the OpSpec, MSpec, or LOA relevant to operations conducted with the SVGS (e.g., C059).

Additional descriptions and information concerning SVGS display and SVS secondary displays can be found in DO-407 - *Minimum Aviation System Performance Standards (MASPS) for Synthetic Vision Systems, Synthetic Vision Guidance Systems and Combined Vision Systems*. If questions arise during the SVGS OSE, AED personnel should contact the FAA Flight Technologies and Procedures Division, Flight Operations Branch (AFS-410).

Pilot Flying Display Synthetic Vision Image Overview and Instructions

PF display: The OSE points in this section are relevant to the synthetic vision image on an SVGS PF display. The *synthetic vision image* refers to the computer-generated image of the external scene topography from the perspective of the flight deck that is derived from aircraft attitude; high-precision navigation solution; and database of terrain, obstacles, and relevant cultural features (14 C.F.R. § 1.1).

OSE points for the following categories are included in this section:

- Visual References (2.1.1)
- Display Size and Location (2.1.2)
- Display FOV, FOR, and Minification (2.1.3)
- Control Integration (2.1.4)
- Control Adjustability (2.1.5)
- External Scene Perception (2.1.6)
- Deactivation and Reactivation (2.1.7)
- Safe Flight Operations (2.1.8)
- Supports Manual Aircraft Control (2.1.9)
- SVGS Operations at the Proposed Minimums (2.1.10)
- SVGS Image Color Interference (2.1.11)
- SVGS Display Color Compatibility (2.1.12)
- Offset Approaches (2.1.13)
- Maximum Crosswinds (2.1.14)
- Distracting Glare or Reflection (2.1.15)
- Synthetic Terrain Depiction (2.1.16)
- Alerts and Messages (2.1.17)
- Position Assurance Monitoring (2.1.18)
- Stall and Upset Recovery (2.1.19)

Whenever possible, examples are given to provide context for the checklist item. The examples are *not* intended to serve as an exhaustive list, and the examples may not be applicable to every SVGS and aircraft combination.

For each checklist item

1. Review the OSE point.
2. Select the appropriate “yes,” “no,” or “N/A” suitability determination response for each phase of flight.
3. Provide additional comments on any noteworthy observations.

2.1.1 Synthetic Vision Image: Pilot Flying Display

Visual References	Phase of Flight	Suitable? (Select One)
Not all SVGS displays will depict the runway threshold, threshold lights, runway end identifier lights, touchdown zone landing surface, touchdown zone lights, touchdown zone markings, or runway lights. However, if these visual references are depicted on the synthetic image, then their positions, sizes, colors, and overall likenesses should be representative of the real-world visual references. If presented, symbology elements for these visual references are distinctly perceptible, identifiable, and comprehendible from other synthetic elements and symbology on the SVGS display. For an SVGS or a combined vision system (CVS) implemented on a head-up display (HUD) or head-worn display (HWD), the real-world, external scene visual references are perceptible, identifiable, and comprehendible when viewed through the display, in both full and decluttered modes.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: § 25.773; § 91.175; AC 20-185A; AC 25-11B; AC 120-71B; DO-407
Secondary References: § 91.1039; § 121.651; § 125.325; § 125.381; § 135.225; Order 8110.4C; Order 8260.3G; Order 8430.21A; SAFO 09016; SAFO 10005; SAFO 15004; SAFO 15011; AC 25.1581-1; AC 120-118; AC 120-123

2.1.2 SVGS Image: Pilot Flying Display

Display Size and Location	Phase of Flight	Suitable? (Select One)
Both the location and size of the SVGS display can influence pilot spatial awareness, crew coordination, and flight performance. Larger displays may support more precise flying, enhanced spatial and situation awareness, and accurate deciphering of terrain and obstacles. Larger displays may also support easier interpretation of parameters such as airspeed, altitude, and vertical speed. Retrofit SVGS installations may utilize a smaller existing flight deck display for the SVGS. For both large and small SVGS displays, flight controls should not obstruct the view of the SVGS display image. The presentation of terrain, obstacles, symbology, and aircraft flight information should be distinctly perceptible, identifiable, and comprehendible.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: § 25.773; AC 20-167A; AC 20-185A; AC 25-11B; DO-407
Secondary References: § 91.1039; § 121.651; § 125.325; § 125.381; § 135.225; Order 8110.4C; Order 8260.3G; Order 8430.21A; SAFO 10005; SAFO 15011; AC 120-123

2.1.3 SVGS Image: Pilot Flying Display		
Display FOV, FOR, and Minification	**Phase of Flight**	**Suitable?** (Select One)
The field of view (FOV) and the field of regard (FOR)[2] are factors in the operational suitability of SVGS displays. A larger FOV and FOR permit the pilot to view larger areas and are useful during maneuvering or in turbulence. However, larger FOVs deviate from the conformal condition because objects in the image do not subtend the same angles that they do in the real world. Therefore, larger FOVs cause objects to appear farther away (objects are minified). Narrow objects, such as runways, are more visible with conformal or lower-FOV displays. Display minification may also affect the presentation of symbology and aircraft flight instrumentation. Conformal SVGS displays provide the size, shape, and location of the terrain to the pilot exactly as it would appear if the SVGS display were a window. The SVGS image should portray terrain, the horizon, obstacles, and other objects so that the information is easily and accurately interpreted by the pilot for all phases of flight. Symbology and flight information should accurately represent the aircraft's current position and state.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: § 25.773; AC 20-167A; AC 20-185A; AC 25-11B; DO-407
Secondary References: § 91.1039; § 121.651; § 125.325; § 125.381; § 135.225; Order 8110.4C; Order 8260.3G; Order 8430.21A; SAFO 10005; SAFO 15011; AC 120-123

[2] According to AC 20-185A, *field of view* (FOV) refers to "the angular extent of the display that can be seen by either pilot with the pilot seated at the pilot's station" (D.1.12), and *field of regard* (FOR) refers to "the angular extent of the external world that is represented on a display" (D.1.11); *minification* refers to the "perceived visual compression effect stemming from the display of imagery with a wider [FOV] than the conformal [FOV] of the display device" (D.1.26), and the *minification factor* is the "[FOV] of the imagery being displayed to the pilot divided by the conformal [FOV] of the display" (D.1.27).

2.1.4 SVGS Image: Pilot Flying Display

Control Integration	Phase of Flight	Suitable? (Select One)
The SVGS controls are integrated into the aircraft so they are accessible and discernible to the PF and do not interfere with existing equipment or procedures or the PF's roles and responsibilities. The SVGS controls should be functionally grouped with unambiguous labels. Functionally related controls should be located together so that they can be viewed without the PF having to take an awkward posture. Labels should be readable in all ambient lighting conditions. Controls should be sufficiently spaced apart for easy manipulation and to reduce the likelihood of inadvertent activation, which may be more likely in turbulent conditions. Ideally, controls are identifiable by touch alone, without the need to look at them; touch-identifiable controls reduce the likelihood of inadvertent activation.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: AC 20-185A; AC 120-71B; InFO 16022; AC 25-11B; DO-407
Secondary References: Order 8110.4C; Order 8430.21A

2.1.5 SVGS Image: Pilot Flying Display

Control Adjustability	Phase of Flight	Suitable? (Select One)
The SVGS controls (e.g., brightness) are easily adjustable, and the association between the controls and the display is obvious. The use of SVGS controls should be consistent with the PF's expectations, with consideration for basic capabilities such as strength, dexterity, memory, reach, and vision. The movement required to activate a control should be simple and easy to perform, and the direction of control movement should be intuitive (e.g., toggle up = on, toggle down = off). For example, adjusting the controls to reduce display illumination when the PF needs to be in a head-down position to perform other tasks should be intuitive and able to be completed with a quick glance and without error. Display brightness and contrast for each integrated display system may be independently adjustable (e.g., SVGS, PFD, CVS). The relationship between the control and the effect on the display should be obvious. For example, for a CVS, the SVGS image and the enhanced flight vision system (EFVS) sensor image are on different layers, and each layer has its own controls; the relationship between the control and the effect on the CVS image should be obvious; and there should be no confusion about which layer is being adjusted.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: AC 20-185A; AC 120-71B; InFO 16022; AC 25-11B; DO-407
Secondary References: Order 8110.4C; Order 8430.21A

2.1.6 SVGS Image: Pilot Flying Display

External Scene Perception	Phase of Flight	Suitable? (Select One)
The relationships among the SVGS image, the aircraft's position and orientation, and the PF's out-the-window view are obvious. For an SVGS or a CVS implemented on a HUD or an HWD, the controls are easily and intuitively adjustable so that the PF can clearly perceive and comprehend elements in the external visual scene over a wide range of weather and ambient lighting conditions. Elements in the external visual scene may include visual references (e.g., runway threshold, threshold lights, runway end identifier lights, touchdown zone landing surface, touchdown zone lights, touchdown zone markings, approach lighting system, or runway lights), terrain, obstacles, traffic, or the airfield and runway environment. Weather and lighting conditions may include various types of obscurations to visibility, such as bright sunlight or night.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: *§ 25.773*; *AC 20-167A*; *AC 20-185A*; *DO-407*
Secondary References: *Order 8110.4C*; *Order 8430.21A*

2.1.7 SVGS Image: Pilot Flying Display

Deactivation and Reactivation	Phase of Flight	Suitable? (Select One)
The SVGS controls provide the means to quickly, easily, and accurately deactivate and reactivate the SVGS image without the PF removing their hands from the flight or thrust controls. This may be necessary in several situations. As one example, the SVGS image may need to be deactivated due to a database failure or a frozen image. As a second example, for an SVGS or a CVS implemented on a HUD or an HWD, deactivating the SVGS or CVS image may be necessary during an approach to allow the PF to maintain continuous visual contact with external scene visual references. As a third example, for a CVS, deactivation may be necessary if the PF perceives a visual artifact, such as blooming (which can occur with an EFVS), during an approach with low fog and bright runway lighting.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: § 25.773; § 91.175; AC 20-185A; AC 25-11B; InFO 16022; DO-407
Secondary References: Order 8110.4C; Order 8430.21A; AC 120-118

2.1.8 SVGS Image: Pilot Flying Display		
Safe Flight Operations	**Phase of Flight**	**Suitable?** (Select One)
The SVGS image is aligned to the external visual scene, and the SVGS image updates without significant lag as the aircraft's position and orientation change. Further, jitter, or high-frequency positional oscillations, are minimized. The SVGS display should not distract the PF, nor should the PF focus so intently on the SVGS display that they would be likely to miss other relevant information provided by other flight deck displays or external sources during ground maneuvering or flight operations. The PF should be able to transition from the SVGS display to the external visual scene quickly for all phases of flight.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: § 25.773; § 91.175; AC 20-185A; AC 25-11B; AC 120-71B; DO-407
Secondary References: Order 8110.4C; Order 8430.21A; AC 120-118; AC 120-123

2.1.9 SVGS Image: Pilot Flying Display		
Supports Manual Aircraft Control	**Phase of Flight**	**Suitable?** (Select One)
The SVGS image supports the PF with manual control of the aircraft within the required flight technical error for all phases of flight. This should be possible without excessive concentration or workload.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: § 25.773; § 91.175; AC 20-185A; AC 25-11B; AC 120-71B; DO-407
Secondary References: Order 8110.4C; Order 8430.21A; AC 120-118; AC 120-123

2.1.10 Synthetic Vision Image: Pilot Flying Display		
SVGS Operations at the Proposed Minimums	**Phase of Flight**	**Suitable?** (Select One)
The SVGS image supports the PF with visually transitioning to the external visual scene, including at the proposed minimums and for missed approach maneuvers at the DA or DH. The SVGS should clearly indicate the missed approach point on the approach path.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: *§ 25.773*; *§ 91.175*; *AC 20-185A*; *AC 25-11B*; *AC 120-53B*; *AC 120-71B*; *DO-407*
Secondary References: *SAFO 09016*; *SAFO 10005*; *SAFO 15011*; *AC 120-118*

2.1.11 SVGS Image: Pilot Flying Display		
SVGS Image Color Interference	**Phase of Flight**	**Suitable?** (Select One)
The use of color does not interfere with the PF's ability to detect and interpret aircraft alerts, indicators, messages, aircraft flight information, or symbology elements. For an SVGS or a CVS implemented on a HUD or an HWD, display color should not interfere with the PF's perception of the external visual scene, including color perception of visual glideslope indicators (VGSIs) or colored airfield lighting.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: AC 20-185A; AC 25-11B; DO-407
Secondary References: § 25.773

2.1.12 SVGS Image: Pilot Flying Display		
SVGS Display Color Compatibility	**Phase of Flight**	**Suitable?** (Select One)
There may be cases in which the PF has more than one colored SVGS (or CVS) display, such as an SVGS implemented on both a head-down display (HDD) and on a HUD or an HWD. If the PF has more than one colored SVGS display, colored SVGS imagery should be compatible across displays. Using different colors for SVGS terrain or symbology elements may lead to confusion, misinterpretation, or excessive cognitive workload, or may hinder the PF's transition between the SVGS implemented on an HDD and the SVGS implemented on a HUD or an HWD.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: AC 20-185A; AC 25-11B; DO-407
Secondary References: § 25.773

2.1.13 SVGS Image: Pilot Flying Display		
Offset Approaches	**Phase of Flight**	**Suitable?** (Select One)
The display FOV and FOR[3] are usable for the maximum offset approach allowed by the AFM or AFM Supplement (or RFM or RFM Supplement). The SVGS display should support approaches conducted with the maximum allowable offset in conjunction with the maximum allowable crosswind.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: § 25.773; § 91.175; AC 20-185A; DO-407
Secondary References: § 25.1581; Order 8260.3G; Order 8430.21A; AC 25-11B; AC 25.1581-1; AC 120-71B; Order 8110.4C; AC 120-118; AC 120-123

[3] According to AC 20-185A, *field of view* (FOV) refers to "the angular extent of the display that can be seen by either pilot with the pilot seated at the pilot's station" (D.1.12), and *field of regard* (FOR) refers to "the angular extent of the external world that is represented on a display" (D.1.11).

2.1.14 SVGS Image: Pilot Flying Display

Maximum Crosswinds	Phase of Flight	Suitable? (Select One)
The display FOV and FOR[4] are usable for the maximum crosswind allowed by the AFM or AFM Supplement (or RFM or RFM Supplement). The SVGS display should support approaches conducted with the maximum allowable offset in conjunction with the maximum allowable crosswind.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: § 25.773; § 91.175; AC 20-185A; DO-407
Secondary References: § 25.1581; Order 8260.3G; Order 8430.21A; AC 25-11B; AC 25.1581-1; AC 120-71B; Order 8110.4C; AC 120-118; AC 120-123

[4] According to AC 20-185A, *field of view* (FOV) refers to "the angular extent of the display that can be seen by either pilot with the pilot seated at the pilot's station" (D.1.12), and *field of regard* (FOR) refers to "the angular extent of the external world that is represented on a display" (D.1.11).

2.1.15 SVGS Image: Pilot Flying Display		
Distracting Glare or Reflection	**Phase of Flight**	**Suitable?** (Select One)
The SVGS display does not create distracting glare or reflections on other flight deck displays that would distract the PF while performing their normal duties.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: *§ 25.773*; *AC 20-167A*; *AC 25-11B*; *DO-407*
Secondary References: *Order 8110.4C*

2.1.16 SVGS Image: Pilot Flying Display		
Synthetic Terrain Depiction	**Phase of Flight**	**Suitable?** (Select One)
The terrain texture should portray enough spatial information to support the PF in developing and maintaining an accurate mental model of the external visual scene, but the display should not have so many synthetic or symbology elements that it is cluttered or distracting. The colors used to represent elements in the external visual scene should be distinguishable. For example, the blue used for water should be distinguishable from the blue used for the sky. The colors used for the SVGS terrain should be distinguishable from the colors used for the aircraft systems integrated into the SVGS display. For example, the red used for radar should be distinguishable from the red used for terrain. For a TAWS overlay on the SVGS, terrain, including the depiction of terrain elevation and clearances, should be easily understood. For operations over water, the SVGS depiction of the surface of the water should be accurate. For example, for an SVGS that depicts waves on an ocean surface, the depiction of the waves should be accurate because it may serve as a visual indication of wind speed and direction for rotorcraft pilots conducting offshore operations. For a monochromatic SVGS or CVS implemented on a HUD or an HWD, the synthetic terrain elements should be intuitive and should support the PF's spatial awareness, including their estimation of relative angles, distances, heights, and positions to terrain elements in the external visual scene. This may be accomplished through luminance, contrast, and/or texture to represent elements in the external visual scene. **CHECKLIST CONTINUED ON NEXT PAGE**	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A

2.1.16 SVGS Image: Pilot Flying Display

Synthetic Terrain Depiction

Observations:

Primary References: *§ 25.773*; *AC 20-185A*; *AC 25-11B*; *DO-407*
Secondary References: *Order 8110.4C*; *AC 20-167A*

2.1.17 SVGS Image: Pilot Flying Display		
Alerts and Messages	**Phase of Flight**	**Suitable?** (Select One)
There should be no confusion or conflict between flightcrew alerts or annunciations displayed by the SVGS and flightcrew alerts or annunciations from other aircraft systems. Furthermore, the SVGS alerts should be consistent with the overall alerting philosophy of the flight deck. Alerts should be clear, concise, easily identifiable, attention-getting, and conspicuous to support short flightcrew detection and response times.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: § 25.773; § 25.1322; § 91.175; § 91.1039; DO-407
Secondary References: § 25.771; § 121.651; § 125.325; § 125.381; § 135.225; Order 8110.4C; Order 8400.13F; Order 8900.1, Vol. 3, Ch. 32, Sec. 5; Order 8900.1, Vol. 4, Ch. 2, Sec. 3; SAFO 09016; SAFO 15011; AC 20-185A; AC 25-11B; AC 120-123

2.1.18 SVGS Image: Pilot Flying Display		
Position Assurance Monitoring	**Phase of Flight**	**Suitable?** (Select One)
The SVGS incorporates integrity, continuity of service, availability, time-to-alert, and position assurance as part of an airborne guidance system. Problems with these features should be made obvious to the PF. Alerts or annunciations for errors in SVGS depiction, navigation signal integrity, and excessive deviation (flight technical error) should be presented in the PF's primary FOV and should be quickly detected to support the accurate identification of the problem. For example, there should be a clear and unambiguous annunciation, indicator, or alert when excessive deviation from the defined flight path navigation system or SVGS scene position occurs.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: *§ 25.773*; *AC 20-185A*; *DO-407*
Secondary References: *§ 25.1322*; *Order 8110.4C*; *AC 20-167A*; *AC 25-11B*; *AC 25.1322-1*

2.1.19 SVGS Image: Pilot Flying Display		
Stall and Upset Recovery	**Phase of Flight**	**Suitable?** (Select One)
The SVGS image should support stall recognition and upset recovery in a timely fashion. For example, the SVGS may include elements like a roll and pitch recovery display element and/or additional PFD symbology elements, such as pitch or a flight path limit or margin to stall, that facilitate quick detection and recognition of the problem and the proper control response to recover from flight upsets. If the synthetic terrain depiction is maintained during unusual attitude events, it does not confuse the pilot, delay pilot response, or lead to erroneous control inputs.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: AC 20-185A; AC 120-109; AC 120-111; DO-407
Secondary References: § 25.773; § 25.1322; Order 8110.4C; AC 20-185A; AC 25.1322-1

2.4.2 Secondary Display

Aircraft equipped with an SVGS for the PF may also include an SVS secondary display. The features of the SVS secondary display may vary, and AC 20-185A has limited equipment requirements. The operational suitability of an SVS secondary display largely depends on its intended functions. For example, some SVS secondary displays have advanced features intended to help prevent spatial disorientation and loss of control in-flight by improving the pilot's awareness of attitude, energy state, and topography. The operational suitability of this SVS secondary display would depend on its ability to support its intended functions. Other displays may not have these advanced features, and determinations of operational suitability would be based on different considerations.

An SVS secondary display may be implemented on an electronic flight bag (EFB), navigation display, or other type of display, and may be intended solely for situation awareness. This type of SVS secondary display may have a variety of features, but it is not intended to have the same function as an SVGS presented on a PFD. However, some aircraft may have a dual-SVGS installation with both SVGSs implemented on PFDs, and both displays intended to support operations in which additional credit is sought. In this case, both SVGS displays should meet the more extensive OSEs in the section 2.4.1 Pilot Flying Display to be operationally suitable for their intended function. The SVS secondary display OSE points (2.4.2 Secondary Display) are applicable to SVS implementations that are not intended to support operations in which additional credit is sought (e.g., SVS implemented on a navigation display or EFB).

Both AC 120-118 and the RTCA DO-407 provide additional guidance relevant to this discussion, especially if the SVGS is intended to be used for SA CAT I operations. AC 120-118 Section 3-7 states that "[s]ingle-pilot operations are prohibited from using SA CAT I landing minima," and D0-407 states that

> ASA SVS is SVS on a PFD with two primary element enhancements beyond what is defined for SVS: enhanced external scene depiction and enhanced primary flight symbology. To achieve this intent, additional ASA features on an SVS PFD are required to be presented full-time in flight to both pilots (if two pilots are required for the operation). ASA SVS instrument includes energy state cues, full color depiction of 3D terrain, and graphical elements to provide perception of aircraft motion. ASA SVS features may be included on a HUD; however, because today's HUDs may be stored and to date commercial HUDS are not full color, hence they do not currently meet the intended function of ASA SVS. ASA SVS features are common elements for SVGS.

Additional descriptions and information concerning SVGS displays and SVS secondary displays can be found in DO-407 - *Minimum Aviation System Performance Standards (MASPS) for Synthetic Vision Systems, Synthetic Vision Guidance Systems and Combined Vision Systems*. If questions arise during the SVGS OSE, AED personnel should contact the FAA FS, Flight Technologies and Procedures Division, Flight Operations Branch (AFS-410).

SVS Secondary Display Image Overview and Instructions

SVS secondary display: The OSE points in this section are relevant to the synthetic vision image on an SVS secondary display, such as an EFB or navigation display.

OSE points for the following categories are included in this section:

- Visual References (2.2.1)
- Display Size and Location (2.2.2)
- Display FOV, FOR, and Minification (2.2.3)
- Control Integration (2.2.4)
- Control Adjustability (2.2.5)
- External Scene Perception (2.2.6)
- Deactivation and Reactivation (2.2.7)
- Safe Flight Operations (2.2.8)
- SVS Image Color Interference (2.2.9)
- SVS Display Color Compatibility (2.2.10)
- Distracting Glare or Reflection (2.2.11)
- Synthetic Terrain Depiction (2.2.12)
- Alerts and Messages (2.2.13)
- Stall and Upset Recovery (2.2.14)

Whenever possible, examples are given to provide context for the checklist item. The examples are *not* intended to serve as an exhaustive list, and the examples may not be applicable to every SVGS and aircraft combination.

For each checklist item

1. Review the OSE point.
2. Select the appropriate “yes,” “no,” or “N/A” suitability determination response for each phase of flight.
3. Provide additional comments on any noteworthy observations.

2.2.1 Synthetic Vision Image: Secondary Display (If Present)

Visual References	Phase of Flight	Suitable? (Select One)
Not all SVS images will depict the runway threshold, threshold lights, runway end identifier lights, touchdown zone landing surface, touchdown zone lights, touchdown zone markings, or runway lights. However, if these visual references are depicted on the SVS image, their positions, sizes, colors, and overall likenesses should be representative of the real-world visual references. If presented, symbology elements for these visual references are distinctly perceptible, identifiable, and comprehendible from other synthetic elements and symbology on the SVS display. For an SVS or a CVS implemented on a HUD or an HWD, the real-world, external scene visual references are perceptible, identifiable, and comprehendible when viewed looking through the display, in both full and decluttered modes.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: § 25.773; § 91.175; AC 20-185A; AC 25-11B; AC 120-71B; DO-407
Secondary References: § 91.1039; § 121.651; § 125.325; § 125.381; § 135.225; Order 8110.4C; Order 8260.3G; Order 8430.21A; SAFO 09016; SAFO 10005; SAFO 15004; SAFO 15011; AC 25.1581-1; AC 120-118; AC 120-123

2.2.2 Synthetic Vision Image: Secondary Display (If Present)		
Display Size and Location	**Phase of Flight**	**Suitable?** (Select One)
Both the location and size of the SVS secondary display can influence pilot spatial awareness, crew coordination, and flight performance. Larger displays may support more precise flying, enhanced spatial and situation awareness, and accurate deciphering of terrain and obstacles. Larger displays may also support easier interpretation of parameters such as airspeed, altitude, and vertical speed, if this information is presented. Retrofit SVS installations may utilize a smaller existing flight deck display for the secondary display. For both larger and smaller SVS secondary displays, flight controls should not obstruct the view of the SVS display image. The presentation of terrain and, if presented, obstacles, symbology, and aircraft flight information should be distinctly perceptible, identifiable, and comprehendible.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: § 25.773; AC 20-167A; AC 20-185A; AC 25-11B; DO-407
Secondary References: § 91.1039; § 121.651; § 125.325; § 125.381; § 135.225; Order 8110.4C; Order 8260.3G; Order 8430.21A; SAFO 10005; SAFO 15011; AC 120-123

2.2.3 Synthetic Vision Image: Secondary Display (If Present)		
Display FOV, FOR, and Minification	**Phase of Flight**	**Suitable?** (Select One)
The FOV and FOR[5] are of importance for the operational suitability of SVS displays. A larger FOV and FOR permit the pilot to view larger areas and are useful during maneuvering or in turbulence. However, larger FOVs deviate from the conformal condition because objects in the image do not subtend the same angles that they do in the real world. Therefore, larger FOVs cause objects to appear farther away (objects are minified). Narrow objects, such as runways, are more visible with conformal or lower-FOV displays. Display minification may also affect the presentation of symbology and aircraft flight instrumentation (if presented). Conformal SVS displays provide the size, shape, and location of the terrain to the pilot exactly as it would appear if the SVS display were a window. Any presented information, such as the terrain, horizon, or obstacles, should be easily and accurately interpreted by the pilot for all phases of flight. If presented, symbology and flight information should accurately represent the aircraft's current position and state. **CHECKLIST CONTINUED ON NEXT PAGE**	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A

[5] According to AC 20-185A, *field of view* (FOV) refers to "the angular extent of the display that can be seen by either pilot with the pilot seated at the pilot's station" (D.1.12), and *field of regard* (FOR) refers to "the angular extent of the external world that is represented on a display" (D.1.11).According to AC 20-185A, *minification* refers to the perceived visual compression effect stemming from the display of imagery with a wider field of view than the conformal field of view of the display device. The *minification factor* is the field of view of the imagery being displayed to the pilot divided by the conformal field of view of the display. *Field of view* refers to the angular extent of the display that can be seen by either pilot with the pilot seated at the pilot's station. *Field of regard* refers to the angular extent of the external world that is represented on a display.

2.2.3 Synthetic Vision Image: Secondary Display (If Present)

Display FOV, FOR, and Minification

Observations:

Primary References: § 25.773; AC 20-167A; AC 20-185A; AC 25-11B; DO-407
Secondary References: § 91.1039; § 121.651; § 125.325; § 125.381; § 135.225; Order 8110.4C; Order 8260.3G; Order 8430.21A; SAFO 10005; SAFO 15011; AC 120-123

2.2.4 Synthetic Vision Image: Secondary Display (If Present)

Control Integration	Phase of Flight	Suitable? (Select One)
The controls for an SVS secondary display are integrated into the aircraft so that they are accessible and discernible to the pilot and do not interfere with existing equipment or procedures or the pilot's roles and responsibilities. SVS secondary display controls should be functionally grouped and labeled unambiguously. Functionally related controls should be located together so that they can be viewed without the pilot having to take an awkward posture. Labels should be readable in all ambient lighting conditions. Controls should be sufficiently spaced apart for easy manipulation and to reduce the likelihood of inadvertent activation, which may be more likely in turbulent conditions. Ideally, controls are identifiable by touch alone without the need to look at them; touch-identifiable controls reduce the likelihood of inadvertent activation.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: AC 20-185A; AC 120-71B; InFO 16022; AC 25-11B; DO-407
Secondary References: Order 8110.4C; Order 8430.21A

2.2.5 Synthetic Vision Image: Secondary Display (If Present)		
Control Adjustability	**Phase of Flight**	**Suitable?** (Select One)
The SVS secondary display controls (e.g., brightness) are easily adjustable, and the association between the controls and the display is obvious. The use of SVS secondary display controls should be consistent with the pilot's expectations, with consideration for basic capabilities such as strength, dexterity, memory, reach, and vision. The movement required to activate a control should be simple and easy to perform, and the direction of control movement should be intuitive (e.g., toggle up = on, toggle down = off). For example, adjusting the controls to reduce display illumination when the pilot needs to be in a head-down position to perform other tasks should be intuitive and able to be completed with a quick glance and without error. Display brightness and contrast for each integrated display system may be independently adjustable (e.g., for a CVS). The relationship between the control and the effect on the SVS secondary display is obvious.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: AC 20-185A; AC 120-71B; DO-407; InFO 16022; AC 25-11B
Secondary References: Order 8110.4C; Order 8430.21A

2.2.6 Synthetic Vision Image: Secondary Display (If Present)		
External Scene Perception	**Phase of Flight**	**Suitable?** (Select One)
The relationships among the SVS secondary display image, the aircraft's position and orientation, and the pilot's out-the-window view are obvious.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: *§ 25.773*; *AC 20-167A*; *AC 20-185A*; *DO-407*
Secondary References: *Order 8110.4C*; *Order 8430.21A*

2.2.7 Synthetic Vision Image: Secondary Display (If Present)		
Deactivation and Reactivation	**Phase of Flight**	**Suitable?** (Select One)
If the SVS secondary display has controls to deactivate and reactivate the SVS image, the deactivation and reactivation can be accomplished quickly, easily, and accurately.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: *§ 25.773*; *§ 91.175*; *AC 20-185A*; *AC 25-11B*; *InFO 16022*; *DO-407*
Secondary References: *Order 8110.4C*; *Order 8430.21A*; *AC 120-118*

2.2.8 Synthetic Vision Image: Secondary Display (If Present)		
Safe Flight Operations	**Phase of Flight**	**Suitable?** (Select One)
The SVS secondary display image is aligned to the external visual scene, and the SVS image updates without significant lag as the aircraft's position and orientation change. Further, jitter or high-frequency positional oscillations, are minimized. The SVS secondary display should not distract the pilot, nor should the pilot focus so intently on the SVS display that they would be likely to miss other relevant information provided by other flight deck displays or external sources during ground maneuvering or flight operations. The pilot should be able to transition from the SVS display to the external visual scene quickly for all phases of flight.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: *§ 25.773*; *§ 91.175*; *AC 20-185A*; *AC 25-11B*; *AC 120-71B*; *DO-407*
Secondary References: *Order 8110.4C*; *Order 8430.21A*; *AC 120-118*; *AC 120-123*

2.2.9 Synthetic Vision Image: Secondary Display (If Present)		
SVS Image Color Interference	**Phase of Flight**	**Suitable?** (Select One)
The use of color does not interfere with the pilot's ability to detect and interpret aircraft alerts, indicators, messages, aircraft flight information, or symbology elements.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: AC 20-185A; AC 25-11B; DO-407
Secondary References: § 25.773

2.2.10 Synthetic Vision Image: Secondary Display (If Present)		
SVS Display Color Compatibility	**Phase of Flight**	**Suitable?** (Select One)
If the pilot has more than one colored SVS display, colored SVS imagery should be compatible across displays. Using different colors for SVS terrain or symbology elements may lead to confusion, misinterpretation, or excessive cognitive workload, or may hinder the pilot's transition between the displays.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: AC 20-185A; AC 25-11B; DO-407
Secondary References: § 25.773

2.2.11 Synthetic Vision Image: Secondary Display (If Present)		
Distracting Glare or Reflection	**Phase of Flight**	**Suitable?** (Select One)
The SVS secondary display does not create distracting glare or reflections on other flight deck displays that would distract the pilot while they are performing their normal duties.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: *§ 25.773*; *AC 20-167A*; *AC 25-11B*; *DO-407*
Secondary References: *Order 8110.4C*

2.2.12 Synthetic Vision Image: Secondary Display (If Present)		
Synthetic Terrain Depiction	**Phase of Flight**	**Suitable?** (Select One)
The terrain texture should portray enough spatial information to support the pilot in developing and maintaining an accurate mental model of the external visual scene, but the display should not have so many synthetic or symbology elements that it is cluttered or distracting. The colors used to represent elements in the external visual scene should be distinguishable. For example, the blue used for water should be distinguishable from the blue used for the sky. The colors used for the SVS terrain should be distinguishable from the colors used for the aircraft systems integrated into the SVS display. For example, the red used for radar should be distinguishable from the red used for terrain. For a TAWS overlay on the SVS, terrain, including the depiction of terrain elevation and clearances, should be easily understood. For operations over water, the SVS depiction of the surface of the water should be accurate. For example, the SVS should accurately depict the ocean surface, including waves, which may serve as a visual indication of wind speed and direction for rotorcraft pilots conducting offshore operations. For a monochromatic SVS or CVS implemented on a HUD or an HWD, the synthetic terrain elements should be intuitive and should support the pilot's spatial awareness, including their estimation of relative angles, distances, heights, and positions to terrain elements in the external visual scene. This may be accomplished through luminance, contrast, and/or texture to represent elements in the external visual scene. **CHECKLIST CONTINUED ON NEXT PAGE**	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A

2.2.12 Synthetic Vision Image: Secondary Display (If Present)

Synthetic Terrain Depiction

Observations:

Primary References: *§ 25.773*; *AC 20-185A*; *AC 25-11B*; *DO-407*
Secondary References: *Order 8110.4C*; *AC 20-167A*

2.2.13 Synthetic Vision Image: Secondary Display (If Present)		
Alerts and Messages	**Phase of Flight**	**Suitable?** (Select One)
There should be no confusion or conflict between flightcrew alerts or annunciations displayed by the SVS secondary display and flightcrew alerts or annunciations from other aircraft systems. Furthermore, the SVS alerts should be consistent with the overall alerting philosophy of the flight deck. Alerts should be clear, concise, easily identifiable, attention-getting, and conspicuous to support short flightcrew detection and response times.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: *§ 25.773*; *§ 25.1322*; *§ 91.175*; *§ 91.1039*; *DO-407*
Secondary References: *§ 25.771*; *§ 25.1322*; *§ 121.651*; *§ 125.325*; *§ 125.381*; *§ 135.225*; *Order 8110.4C*; *Order 8400.13F*; *Order 8900.1, Vol. 3, Ch. 32, Sec. 5*; *Order 8900.1, Vol. 4, Ch. 2, Sec. 3*; *SAFO 09016*; *SAFO 15011*; *AC 20-185A*; *AC 25-11B*; *AC 120-123*

2.2.14 Synthetic Vision Image: Secondary Display (If Present)		
Stall and Upset Recovery	**Phase of Flight**	**Suitable?** (Select One)
If it is an intended function, the SVS secondary display should support stall recognition and upset recovery in a timely fashion. For example, the SVS may include elements like a roll and pitch recovery display element and/or additional symbology elements, such as pitch or a flight path limit or margin to stall, that facilitate quick detection and recognition of the problem, and the proper control response to recover from flight upsets. If the synthetic terrain depiction is maintained during unusual attitude events, it does not confuse the pilot, delay pilot response, or lead to erroneous control inputs.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Observations:		

Primary References: AC 20-185A; AC 120-109; AC 120-111; DO-407
Secondary References: § 25.773; § 25.1322; Order 8110.4C; AC 20-185A; AC 25.1322-1

2.5 Operational Suitability Evaluation Points: Aircraft Flight Information and Flight Symbology

2.5.1 Pilot Flying Display

AC 20-185A describes an SVGS as a flight instrument display that is most often implemented on a primary flight display (PFD), and Section 2.2.1 states that:

> The SVGS flight instrument display provides a continuous, geo-spatially correct depiction of the external scene topography, including obstacles, augmented by the display of the runway of intended landing. The SVGS display is implemented on a head-down or head up PFD, designed to the guidance provided by AC 25-11B. SVGS goes beyond [synthetic vision system (SVS)] by including additional symbology elements, integrity and performance monitors, and annunciations.

The OSE points in this section may be used for an SVGS PF display, which means that the SVGS is implemented on a PFD. Guidance on operational credit for the use of an SVGS during SA CAT I operations is provided in AC 120-118, and additional details may be provided in the OpSpec, MSpec, or LOA relevant to operations conducted with the SVGS (e.g., C059).

Additional descriptions and information concerning SVGS display and SVS secondary displays can be found in DO-407 - *Minimum Aviation System Performance Standards (MASPS) for Synthetic Vision Systems, Synthetic Vision Guidance Systems and Combined Vision Systems*. If questions arise during the SVGS OSE, AED personnel should contact the FAA Flight Technologies and Procedures Division, Flight Operations Branch (AFS-410).

Pilot Display Aircraft Flight Information and Flight Symbology Overview and Instructions

Pilot display: The aircraft flight information and flight symbology on the SVGS display support the PF in quickly and accurately comprehending information about the aircraft state and position without distorting or obscuring the external scene and in a manner sufficient to allow the PF to accomplish their roles and responsibilities.

- Examples of aircraft flight information include airspeed, vertical speed, aircraft attitude, heading, altitude, height above ground level, command guidance as appropriate for the approach to be flown, path deviation indications, FPV, and FPARC.
- Examples of flight symbology include an FPARC with a pitch scale, zero pitch reference line, DRIL, flare prompt or flare guidance (if provided), runway and extended runway centerline symbology (presented during the approach phase), approach or runway lighting infrastructure depicted as symbology, and supplementary vertical information (for situation awareness below DA/DH or MDA).

OSE points for the following categories are included in this section:

- DRIL (3.1.1)
- Zero Pitch Reference Line (3.1.2)
- Sufficient Information and Guidance (3.1.3)
- Aircraft Flight Information and Flight Symbology Distinction (3.1.4)
- Approach Lighting Systems (3.1.5)
- Control Adjustability (3.1.6)
- Excessive Information (3.1.7)
- Clear and Concise Information (3.1.8)
- Aircraft Attitude (3.1.9)
- Ambient Lighting Conditions (3.1.10)
- Manual Control (3.1.11)
- Approach and Landing Distraction (3.1.12)
- Touchdown and Rollout Distraction (3.1.13)
- Maximum GPA (3.1.14)
- Stabilized Approach (3.1.15)
- FPARC Adjustability (3.1.16)

INSTRUCTIONS CONTINUED ON THE NEXT PAGE

Whenever possible, examples are given to provide context for the checklist item. The examples are *not* intended to serve as an exhaustive list, and the examples may not be applicable to every SVGS and aircraft combination.

For each checklist item

1. Review the OSE point.
2. Select the appropriate “yes,” “no,” or “N/A” suitability determination response for each phase of flight.
3. Provide additional comments on any noteworthy observations.

3.1.1 Aircraft Flight Information and Flight Symbology: Pilot Flying Display		
DRIL	**Phase of Flight**	**Suitable?** (Select One)
The DRIL supports the PF in visually transitioning from the SVGS display to the intended landing runway in the external visual scene. The DRIL should support the PF in developing and maintaining situation awareness, position awareness, path awareness, and energy state awareness during an approach and landing. The DRIL symbology should be accurately positioned relative to the real-world runway and should be conspicuous, easily perceptible, and identifiable. If the DRIL includes runway markings, their positions and likenesses must be accurate to the real-world runway. If more than one runway is depicted, there should be a means of distinguishing the DRIL from other runways. If the DRIL is implemented on a HUD or an HWD, it should not obscure the real-world runway or critical elements in the external visual scene, and there should be no confusion between the DRIL and elements in the external visual scene. If the DRIL is implemented on a CVS display, the DRIL should not obscure the required visual references for landing.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A

Aircraft Flight Information Observations:	Flight Symbology Observations:

Primary References: § 25.773; § 91.175; § 91.1039; DO-407
Secondary References: § 25.771; § 121.651; § 125.325; § 125.381; § 135.225; Order 8110.4C; Order 8400.13F; Order 8900.1, Vol. 3, Ch. 32, Sec. 5; Order 8900.1, Vol. 4, Ch. 2, Sec. 3; SAFO 09016; SAFO 15011; AC 20-185A; AC 25-11B; AC 120-123

3.1.2 Aircraft Flight Information and Flight Symbology: Pilot Flying Display		
Zero Pitch Reference Line	**Phase of Flight**	**Suitable?** (Select One)
The zero pitch reference line supports the PF with aircraft attitude awareness. The zero pitch reference line should be distinctly perceptible and identifiable by the PF, having a different color and contrast against the background SVGS imagery and other symbology or aircraft flight information objects.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: § 25.773; § 91.175; § 91.1039; DO-407
Secondary References: § 25.771; § 121.651; § 125.325; § 125.381; § 135.225; Order 8110.4C; Order 8400.13F; Order 8900.1, Vol. 3, Ch. 32, Sec. 5; Order 8900.1, Vol. 4, Ch. 2, Sec. 3; SAFO 09016; SAFO 15011; AC 20-185A; AC 25-11B; AC 120-123

3.1.3 Aircraft Flight Information and Flight Symbology: Pilot Flying Display		
Sufficient Information and Guidance	**Phase of Flight**	**Suitable?** (Select One)
The PF has sufficient aircraft flight information and guidance provided by the symbology for safe flight operations.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: § 25.773; § 91.175; § 91.1039; DO-407
Secondary References: § 25.771; § 121.651; § 125.325; § 125.381; § 135.225; Order 8110.4C; Order 8400.13F; Order 8900.1, Vol. 3, Ch. 32, Sec. 5; Order 8900.1, Vol. 4, Ch. 2, Sec. 3; SAFO 09016; SAFO 15011; AC 20-185A; AC 25-11B; AC 120-123

3.1.4 Aircraft Flight Information and Flight Symbology: Pilot Flying Display		
Aircraft Flight Information and Flight Symbology Distinction	**Phase of Flight**	**Suitable?** (Select One)
The aircraft flight information and flight symbology elements integrate with the SVGS image so the PF can quickly and easily recognize and understand the presented information. This means that the aircraft flight information and flight symbology have sufficiently distinct contrast and chromaticity to stand out from the background SVGS imagery.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: *§ 25.773*; *DO-407*
Secondary References: *Order 8110.4C*; *AC 20-185A*; *AC 25-11B*

3.1.5 Aircraft Flight Information and Flight Symbology: Pilot Flying Display		
Approach Lighting Systems	**Phase of Flight**	**Suitable?** (Select One)
An SVGS image may not depict approach lighting systems. Furthermore, approach lighting system symbology may depict a generic model that does not match the real-world approach lighting system. If present, approach lighting system symbology should support the visual transition from the SVGS display to the external visual scene.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: *§ 25.773*; *§ 91.175*; *DO-407*
Secondary References: *Order 8110.4C*; *SAFO 09016*; *SAFO 15011*; *AC 20-185A*; *AC 25-11B*; *AC 120-71B*

3.1.6 Aircraft Flight Information and Flight Symbology: Pilot Flying Display		
Control Adjustability	**Phase of Flight**	**Suitable?** (Select One)
The SVGS display controls, such as brightness and contrast, are easily adjustable (either automatically or manually) so that the aircraft flight information and flight symbology can be recognized and understood by the PF in support of the PF performing their normal duties.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: DO-407
Secondary References: § 25.771; § 25.773; Order 8110.4C; InFO 16022; AC 20-185A; AC 25-11B

3.1.7 Aircraft Flight Information and Flight Symbology: Pilot Flying Display		
Excessive Information	**Phase of Flight**	**Suitable?** (Select One)
The aircraft flight information and flight symbology elements are not excessive in number, size, or variety of colors or symbols. They do not obscure essential information or present distracting, disorganized, or unnecessary information. Excessive information can lead to cognitive tunneling or delay visual detection of alerts. Display clutter may increase the amount of time needed to locate and retrieve critical information.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: DO-407
Secondary References: § 25.771; § 25.773; Order 8110.4C; InFO 16022; AC 20-185A; AC 25-11B

3.1.8 Aircraft Flight Information and Flight Symbology: Pilot Flying Display		
Clear and Concise Information	**Phase of Flight**	**Suitable?** (Select One)
The aircraft flight information and flight symbology are clear and concise and do not require excessive effort or concentration to interpret. The symbol design effectively conveys the information it represents and is distinctive from other symbology elements.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: § 25.773; § 91.175; § 91.1039; DO-407
Secondary References: § 25.771; § 121.651; § 125.325; § 125.381; § 135.225; Order 8110.4C; Order 8400.13F; Order 8900.1, Vol. 3, Ch. 32, Sec. 5; Order 8900.1, Vol. 4, Ch. 2, Sec. 3; SAFO 09016; SAFO 15011; AC 20-185A; AC 25-11B; AC 120-123

3.1.9 Aircraft Flight Information and Flight Symbology: Pilot Flying Display		
Aircraft Attitude	**Phase of Flight**	**Suitable?** (Select One)
The aircraft flight information and flight symbology support a quick and accurate interpretation of aircraft attitude.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: AC 120-111; DO-407
Secondary References: § 25.771; § 25.773; Order 8110.4C; InFO 16022; AC 20-185A; AC 25-11B

3.1.10 Aircraft Flight Information and Flight Symbology: Pilot Flying Display		
Ambient Lighting Conditions	**Phase of Flight**	**Suitable?** (Select One)
The aircraft flight information and flight symbology are easily understood across a wide range of weather and dynamically changing ambient lighting conditions, including various types of obscurations to visibility, bright sunlight, and night. This is especially important for an SVGS implemented on a HUD or an HWD.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: DO-407
Secondary References: § 25.771; § 25.773; Order 8110.4C; InFO 16022; AC 20-185A; AC 25-11B

3.1.11 Aircraft Flight Information and Flight Symbology: Pilot Flying Display		
Manual Control	**Phase of Flight**	**Suitable?** (Select One)
The aircraft flight information and flight symbology are sufficient to support manual control of the aircraft during all normal and non-normal conditions.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: AC 120-111; DO-407
Secondary References: § 25.1322; AC 20-185A; AC 25-11B; AC 120-123

3.1.12 Aircraft Flight Information and Flight Symbology: Pilot Flying Display		
Approach and Landing Distraction	**Phase of Flight**	**Suitable?** (Select One)
The aircraft flight information and flight symbology do not distract the PF during an approach or landing, when executing a missed approach procedure at the DA/DH or MDA, or when operating below the DA/DH or MDA.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A

Aircraft Flight Information Observations:	Flight Symbology Observations:

Primary References: § 91.175; DO-407
Secondary References: § 25.1322; SAFO 09016; SAFO 10005; SAFO 15004; SAFO 15011; AC 20-185A; AC 25-11B; AC 120-123

3.1.13 Aircraft Flight Information and Flight Symbology: Pilot Flying Display		
Landing and Rollout Distraction	**Phase of Flight**	**Suitable?** (Select One)
The aircraft flight information and flight symbology do not distract the PF during touchdown and rollout.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: *§ 91.175*; *DO-407*
Secondary References: *§ 25.1322*; *SAFO 09016*; *SAFO 10005*; *SAFO 15004*; *SAFO 15011*; *AC 20-185A*; *AC 25-11B*; *AC 120-71B*; *AC 120-123*

3.1.14 Aircraft Flight Information and Flight Symbology: Pilot Flying Display		
Maximum GPA	**Phase of Flight**	**Suitable?** (Select One)
The aircraft flight information and flight symbology support the PF in conducting approach and landing operations at the maximum GPA allowed for the approach category (A, B, C, D, or E).	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: § 25.773; § 91.175; § 91.1039; DO-407
Secondary References: Order 8110.4C; Order 8400.13F; SAFO 09016; SAFO 15011; Order 8260.3G; AC 20-185A; AC 25-11B; AC 120-123

3.1.15 Aircraft Flight Information and Flight Symbology: Pilot Flying Display		
Stabilized Approach	**Phase of Flight**	**Suitable?** (Select One)
Maintaining a stabilized approach path is critical during an approach conducted using an SVGS. The aircraft flight information and flight symbology support the PF in maintaining a stabilized approach and facilitate rapid recognition of flight path deviations and trends in dynamic conditions, such as turbulence, gusts, or offset approach positions. The aircraft flight information and flight symbology provide sufficient information to allow the PF to manually keep the aircraft at a descent rate that allows touchdown to occur within the touchdown zone of the runway of intended landing.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A

Aircraft Flight Information Observations:	**Flight Symbology Observations:**

Primary References: AC 120-111; DO-407
Secondary References: § 25.1322; AC 20-185A; AC 25-11B; AC 120-123

3.1.16 Aircraft Flight Information and Flight Symbology: Pilot Flying Display		
FPARC Adjustability	**Phase of Flight**	**Suitable?** (Select One)
The FPARC can be manually or automatically selected and adjusted by the PF during an approach. The means of adjusting the FPARC are intuitive, and the PF can quickly and easily override erroneous guidance without taking inordinate attention away from the approach and landing operation.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: *DO-407*
Secondary References: *AC 20-185A*

2.5.2 Secondary Display

Aircraft equipped with an SVGS for the PF may also include an SVS secondary display. The features of the SVS secondary display may vary, and AC 20-185A has limited equipment requirements. The operational suitability of an SVS secondary display largely depends on its intended functions. For example, some SVS secondary displays have advanced features intended to help prevent spatial disorientation and loss of control in-flight by improving the pilot's awareness of attitude, energy state, and topography. The operational suitability of this SVS secondary display would depend on its ability to support its intended functions. Other displays may not have these advanced features, and determinations of operational suitability would be based on different considerations.

An SVS secondary display may be implemented on an electronic flight bag (EFB), navigation display, or other type of display, and may be intended solely for situation awareness. This type of SVS secondary display may have a variety of features, but it is not intended to have the same function as an SVGS presented on a PFD. However, some aircraft may have a dual-SVGS installation with both SVGSs implemented on PFDs, and both displays intended to support operations in which additional credit is sought. In this case, both SVGS displays should meet the more extensive OSEs in the section 2.5.1 Pilot Flying Display to be operationally suitable for their intended function. The SVS secondary display OSE points (2.5.2 Secondary Display) are applicable to SVS implementations that are not intended to support operations in which additional credit is sought (e.g., SVS implemented on a navigation display or EFB).

Both AC 120-118 and the RTCA DO-407 provide additional guidance relevant to this discussion, especially if the SVGS is intended to be used for SA CAT I operations. AC 120-118 Section 3-7 states that "[s]ingle-pilot operations are prohibited from using SA CAT I landing minima," and D0-407 states that

> ASA SVS is SVS on a PFD with two primary element enhancements beyond what is defined for SVS: enhanced external scene depiction and enhanced primary flight symbology. To achieve this intent, additional ASA features on an SVS PFD are required to be presented full-time in flight to both pilots (if two pilots are required for the operation). ASA SVS instrument includes energy state cues, full color depiction of 3D terrain, and graphical elements to provide perception of aircraft motion. ASA SVS features may be included on a HUD; however, because today's HUDs may be stored and to date commercial HUDS are not full color, hence they do not currently meet the intended function of ASA SVS. ASA SVS features are common elements for SVGS.

Additional descriptions and information concerning SVGS displays and SVS secondary displays can be found in DO-407 - *Minimum Aviation System Performance Standards (MASPS) for Synthetic Vision Systems, Synthetic Vision Guidance Systems and Combined Vision Systems*. If questions arise during the SVGS OSE, AED personnel should contact the FAA FS, Flight Technologies and Procedures Division, Flight Operations Branch (AFS-410).

Secondary Display Aircraft Flight Information and Flight Symbology Overview and Instructions

Secondary display: OSE points in this section are focused on the aircraft flight information and flight symbology that may be depicted on an SVS secondary display. If the SVS secondary display depicts aircraft flight information and flight symbology, it should support the pilot in quickly and accurately comprehending the presented information and guidance.

- Examples of aircraft flight information include airspeed, vertical speed, aircraft attitude, heading, altitude, height above ground level, command guidance as appropriate for the approach to be flown, path deviation indications, FPV, and FPARC.
- Examples of flight symbology include FPV cue, FPARC with a pitch scale, DRIL, flare prompt or flare guidance (if provided), runway and extended runway centerline symbology (presented during the approach phase), HUD/HDD/HWD symbology, supplementary vertical information (for situation awareness below DA/DH or MDA), and visual indication of runway of intended landing (e.g., runway outline).

OSE points for the following categories are included in this section:

- DRIL (3.2.1)
- Sufficient Information and Guidance (3.2.2)
- Aircraft Flight Information and Flight Symbology Distinction (3.2.3)
- Approach Lighting Systems (3.2.4)
- Control Adjustability (3.2.5)
- Excessive Information (3.2.6)
- Clear and Concise Information (3.2.7)
- Aircraft Attitude (3.2.8)
- Ambient Lighting Conditions (3.2.9)
- Approach and Landing Distraction (3.2.10)
- Touchdown and Rollout Distraction (3.2.11)

Whenever possible, examples are given to provide context for the checklist item. The examples are *not* intended to serve as an exhaustive list, and the examples may not be applicable to every SVGS and aircraft combination.

For each checklist item

1. Review the OSE point.
2. Select the appropriate “yes,” “no,” or “N/A” suitability determination response for each phase of flight.
3. Provide additional comments on any noteworthy observations.

3.2.1 Aircraft Flight Information and Flight Symbology: Secondary Display (If Present)		
DRIL	**Phase of Flight**	**Suitable?** (Select One)
The SVS secondary display may not present the DRIL. If the DRIL is depicted, it supports the pilot in visually transitioning from the SVS secondary display to the intended landing runway in the external visual scene. The DRIL supports the pilot's situation awareness, position awareness, path awareness, and energy state awareness during an approach and landing. The DRIL symbology must be accurately positioned relative to the real-world runway and be conspicuous, easily perceptible, and identifiable. If the DRIL contains runway markings, their positions and likenesses must be accurate to the real-world runway. If more than one runway is depicted, there should be a means of distinguishing the DRIL from other runways.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: § 25.773; § 91.175; § 91.1039; DO-407
Secondary References: § 25.771; § 121.651; § 125.325; § 125.381; § 135.225; Order 8110.4C; Order 8400.13F; Order 8900.1, Vol. 3, Ch. 32, Sec. 5; Order 8900.1, Vol. 4, Ch. 2, Sec. 3; SAFO 09016; SAFO 15011; AC 20-185A; AC 25-11B; AC 120-123

3.2.2 Aircraft Flight Information and Flight Symbology: Secondary Display (If Present)

Sufficient Information and Guidance	Phase of Flight	Suitable? (Select One)
The SVS secondary display may not present aircraft flight information and flight symbology. If presented, aircraft flight information and flight symbology support safe flight operations.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A

Aircraft Flight Information Observations:	Flight Symbology Observations:

Primary References: § 25.773; § 91.175; § 91.1039; DO-407
Secondary References: § 25.771; § 121.651; § 125.325; § 125.381; § 135.225; Order 8110.4C; Order 8400.13F; Order 8900.1, Vol. 3, Ch. 32, Sec. 5; Order 8900.1, Vol. 4, Ch. 2, Sec. 3; SAFO 09016; SAFO 15011; AC 20-185A; AC 25-11B; AC 120-123

3.2.3 Aircraft Flight Information and Flight Symbology: Secondary Display (If Present)		
Aircraft Flight Information and Flight Symbology Distinction	**Phase of Flight**	**Suitable?** (Select One)
The SVS secondary display may not present aircraft flight information and flight symbology. If presented, aircraft flight information and flight symbology elements should integrate with the SVS secondary display image so the pilot can quickly and easily recognize and understand the presented information. This means that the aircraft flight information and flight symbology have sufficiently distinct contrast and chromaticity to stand out from the background SVS imagery.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A

Aircraft Flight Information Observations:	**Flight Symbology Observations:**

Primary References: *§ 25.773*; *DO-407*
Secondary References: *Order 8110.4C*; *AC 20-185A*; *AC 25-11B*

3.2.4 Aircraft Flight Information and Flight Symbology: Secondary Display (If Present)

Approach Lighting Systems	Phase of Flight	Suitable? (Select One)
The SVS secondary display may not present an approach lighting system. Further, approach lighting system symbology may depict a generic model that does not match the real-world approach lighting system. If present, approach lighting system symbology should support the visual transition from the SVS secondary display to the external visual scene.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A

Aircraft Flight Information Observations:	Flight Symbology Observations:

Primary References: § 25.773; § 91.175; DO-407
Secondary References: Order 8110.4C; SAFO 09016; SAFO 15011; AC 20-185A; AC 25-11B; AC 120-71B

3.2.5 Aircraft Flight Information and Flight Symbology: Secondary Display (If Present)		
Control Adjustability	**Phase of Flight**	**Suitable?** (Select One)
The SVS secondary display controls, such as brightness and contrast, are easily adjustable (either automatically or manually) so that any presented aircraft flight information and flight symbology can be recognized and understood by the pilot in support of performing their normal duties.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: DO-407
Secondary References: § 25.771; § 25.773; Order 8110.4C; InFO 16022; AC 20-185A; AC 25-11B

3.2.6 Aircraft Flight Information and Flight Symbology: Secondary Display (If Present)		
Excessive Information	**Phase of Flight**	**Suitable?** (Select One)
The SVS secondary display may not present aircraft flight information and flight symbology. If presented, aircraft flight information and flight symbology elements are not excessive in number, size, or variety of color or symbols. They do not obscure essential information or present distracting, disorganized, or unnecessary information. Excessive information can lead to cognitive tunneling or delay visual detection of alerts. Display clutter may be increased due to alerts or messages and may lead to delays in locating and obtaining critical information.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: DO-407
Secondary References: § 25.771; § 25.773; Order 8110.4C; InFO 16022; AC 20-185A; AC 25-11B

3.2.7 Aircraft Flight Information and Flight Symbology: Secondary Display (If Present)		
Clear and Concise Information	**Phase of Flight**	**Suitable?** (Select One)
The SVS secondary display may not present aircraft flight information and flight symbology. If presented, aircraft flight information and flight symbology are clear and concise and do not require excessive effort or concentration to interpret. The symbol design effectively conveys the information it represents and is distinctive from other symbology elements.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: § 25.773; § 91.175; § 91.1039; DO-407
Secondary References: § 25.771; § 121.651; § 125.325; § 125.381; § 135.225; Order 8110.4C; Order 8400.13F; Order 8900.1, Vol. 3, Ch. 32, Sec. 5; Order 8900.1, Vol. 4, Ch. 2, Sec. 3; SAFO 09016; SAFO 15011; AC 20-185A; AC 25-11B; AC 120-123

3.2.8 Aircraft Flight Information and Flight Symbology: Secondary Display (If Present)		
Aircraft Attitude	**Phase of Flight**	**Suitable?** (Select One)
The SVS secondary display may not present aircraft flight information and flight symbology. If presented, aircraft flight information and flight symbology support quick, accurate interpretation of aircraft attitude.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: AC 120-111; DO-407
Secondary References: § 25.771; § 25.773; Order 8110.4C; InFO 16022; AC 20-185A; AC 25-11B

3.2.9 Aircraft Flight Information and Flight Symbology: Secondary Display (If Present)		
Ambient Lighting Conditions	**Phase of Flight**	**Suitable?** (Select One)
The SVS secondary display may not present aircraft flight information and flight symbology. If presented, the aircraft flight information and flight symbology are easily understood across a wide range of weather and dynamically changing ambient lighting conditions, including various types of obscurations to visibility, such as bright sunlight and night.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: DO-407
Secondary References: § 25.771; § 25.773; Order 8110.4C; InFO 16022; AC 20-185A; AC 25-11B

3.2.10 Aircraft Flight Information and Flight Symbology: Secondary Display (If Present)		
Approach and Landing Distraction	**Phase of Flight**	**Suitable?** (Select One)
The SVS secondary display may not present aircraft flight information and flight symbology. If presented, aircraft flight information and flight symbology do not distract the pilot during an approach and landing, while executing a missed approach procedure at the DA/DH or MDA, or when operating below the DA/DH or MDA.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: § 91.175; DO-407
Secondary References: § 25.1322; SAFO 09016; SAFO 10005; SAFO 15004; SAFO 15011; AC 20-185A; AC 25-11B; AC 120-123

3.2.11 Aircraft Flight Information and Flight Symbology: Secondary Display (If Present)		
Touchdown and Rollout Distraction	**Phase of Flight**	**Suitable?** (Select One)
The SVS secondary display may not present aircraft flight information and flight symbology. If presented, the aircraft flight information and flight symbology do not distract the pilot during touchdown and rollout.	Taxi	☐ Yes ☐ No ☐ N/A
	Takeoff and Climb	☐ Yes ☐ No ☐ N/A
	Rejected Takeoff	☐ Yes ☐ No ☐ N/A
	Cruise	☐ Yes ☐ No ☐ N/A
	Descent	☐ Yes ☐ No ☐ N/A
	Approach	☐ Yes ☐ No ☐ N/A
	Landing and Rollout	☐ Yes ☐ No ☐ N/A
	Missed Approach	☐ Yes ☐ No ☐ N/A
	Balked Landing	☐ Yes ☐ No ☐ N/A
Aircraft Flight Information Observations:	**Flight Symbology Observations:**	

Primary References: *§ 91.175*; *DO-407*
Secondary References: *§ 25.1322*; *SAFO 09016*; *SAFO 10005*; *SAFO 15004*; *SAFO 15011*; *AC 20-185A*; *AC 25-11B*; *AC 120-71B*; *AC 120-123*

2.6 Master Minimum Equipment List Requirements

4	MMEL Requirements

The FAA-approved MMEL includes those items of equipment related to airworthiness and operating regulations, and other items of equipment that the Administrator finds may be inoperative and yet maintain an equivalent level of safety by appropriate conditions and limitations. The FAA AED reviews and issues MMELs through the FOEB process. Equipment required for tasks, procedures, maneuvers, or operations using an SVGS is provided in FAA guidance and the manufacturer's AFM or AFM Supplement (or RFM or RFM Supplement), and may be described in OpSpecs, MSpecs, or LOAs (e.g., C059).

Relief given to any of the required equipment will not allow for tasks, procedures, maneuvers, or operations using an SVGS.

Does existing or proposed MMEL relief affect the equipment required for tasks, procedures, maneuvers, or operations that require SVGS? (Select One)	Findings
☐ Yes ☐ No	

If Yes, should the FOEB process be initiated? (Select One)	Findings
☐ Yes ☐ No	

References: *Order 8110.4C*; *Order 8430.21A*; *Order 8900.1, Vol. 19, Ch. 5, Sec. 1*; *Order 8900.1, Vol. 19, Ch. 5, Sec. 2*; *Order 8900.1, Vol. 19, Ch. 5, Sec. 3*; *Order 8900.1, Vol. 19, Ch. 5, Sec. 4*; *Order 8900.1, Vol. 19, Ch. 5, Sec. 5*; *DO-407*

3. Operational Evaluation: Training Recommendations

The “Operational Evaluation: Training Recommendations” chapter of the *Federal Aviation Administration Aircraft Evaluation Division Operations and Human Factors and Evaluation Aid for Synthetic Vision Guidance Systems* is intended to aid in standardizing the Aircraft Evaluation Division (AED) process of determining Federal Aviation Administration (FAA) Flight Standardization Board (FSB) training recommendations, including special emphasis areas, for a new or modified synthetic vision guidance system (SVGS) and aircraft combination. The directions described herein are not meant to unnecessarily restrict trained AED personnel, and it is expected that the judgment and expertise of personnel will be applied.

FAA Order 8400.13F CHG 1 authorizes Special Authorization (SA) Category I (CAT I) approaches with a decision height (DH) as low as 150 feet and a visibility minimum as low as runway visual range (RVR) 1400 feet on suitable instrument landing system equipment at runways with reduced lighting. These operations require the use of airborne equipment in accordance with Advisory Circular (AC) 120-118, and the list of airborne systems includes SVGS; see also Operations Specification (OpSpec) C059, SA CAT I Instrument Approach and Landing Operations.

Training to conduct operations using an SVGS is not specifically addressed in the salient parts of Title 14 of the Code of Federal Regulations (CFR); however, FAA guidance describes the training necessary to conduct operations requiring SVGS for operational credit. For example, AC 120-118 states

> When such airborne systems are used as the basis for category(s) of minima (e.g. [head-up display (HUD)] or SVGS for [SA] CAT I; [autopilot (AP)], [flight director], or HUD for CAT I Landing Minima with Reduced Lighting (RVR 1800)), training should address the relationships between the various system components and the minima for which they are required.

Further, AC 120-118 states

> When a vision system (e.g., Enhanced Vision Systems (EVS), Synthetic Vision System (SVS), [combined vision system (CVS)], [enhanced flight vision system (EFVS)], or SVGS) is used, pilots should be familiar with the interpretation of the display to ensure proper identification of the runway and positioning of the aircraft relative to continuation of the approach to landing. Pilots should understand the limitations of these systems, operational credits available, and authorization required for use.

Additional ground and/or flight training arising from unique characteristics of the SVGS and aircraft combination may be included as a recommendation in the Flight Standardization Board Report (FSBR). The content in this chapter may help identify additional areas for recommended training specific to the SVGS and aircraft combination. This content is intended to provide suggestions on the required information needed for knowledge and familiarity with tasks, maneuvers, procedures, and operations conducted with an SVGS. It is important to note that the AED is not the approving authority for training programs, but rather provides training recommendations in the FSBR. The Certificate Holding District Office (CHDO) is the approving

office for training programs for each certificate holder, and the CHDO uses the training recommendations included in the FSBR.

As part of the operational evaluation (OE), qualified pilot test subjects are included to help identify characteristics specific to the aircraft and SVGS combination that require special emphasis, guidance, or recommended training to be included in the FSBR. It is important that the pilot test subjects have an appropriate background for the OE; factors such as familiarity with SVGS, training in accordance with AC 120-118, previous qualification in the aircraft, flight experience (including low-visibility operations), and currency should be considered. Additionally, per Section 128 of the Aircraft Certification, Safety, and Accountability Act (ACSAA) and FAA Order 8900.1, Volume 8, Chapter 2, Sections 5 and 6, the use of domestic and foreign air carrier pilots with varying levels of experience must be included as part of the sample of pilot test subjects for OEs on certain transport airplanes.

3.1 Overview

This content is intended to provide suggestions on the required information needed for knowledge and familiarity with tasks, maneuvers, procedures, and operations conducted with an SVGS. This chapter is organized in the form of checklists and decision trees, which are largely based on but do not replace the guidance in AC 120-118 and AC 120-53B. Current FAA regulatory and guidance material takes precedence over the material here. The ground training and flight training checklists can be used to identify areas for recommended training that are specific to the SVGS and aircraft combination. For differences training for modified SVGS and aircraft combinations, the provided ground training, flight training, and special emphasis checklists, as well as the decision trees, may be used to determine difference training levels.

Regarding this chapter:

- AED personnel are encouraged to review the regulatory, advisory, and guidance materials provided in Table 6 and the list of key references in the Appendix.
- If questions arise during the SVGS evaluation, AED personnel may wish to contact the FAA Flight Standards Service (FS), Flight Technologies and Procedures Division, Flight Operations Branch (AFS-410).
- Whenever possible, examples are provided to give context to the knowledge item; these examples should not be considered mandatory and do not constitute an exhaustive list.
- During the training evaluation process, AED personnel are encouraged to consider SVGS tasks, maneuvers, procedures, and operations that may be important to include as a checking item (see “Operational Evaluation: Checking Recommendations”).

3.1(a) Chapter Organization

3.1(a)(i) Checklists for Ground Training and Flight Training Requirements

Ground training and flight training should be accomplished by any pilot manipulating the controls of an aircraft or acting as the pilot in command of an aircraft during tasks, maneuvers, procedures, or operations requiring the use of an SVGS. Operational credit based on an SVGS

requires training in accordance with the OpSpec, management specification (MSpec), or Letter of Authorization (LOA). This chapter includes checklists for the following areas:

- 3.2.1 Ground Training Checklists
- 3.2.2 Flight Training Checklists
- 3.2.3 Special Emphasis Areas Checklist

3.1(a)(ii) Decision Trees for Modified SVGS Training Difference Level Recommendations

There may be times when a pilot is trained for tasks, maneuvers, procedures, and operations using an SVGS on a specific aircraft but wishes to transition to a modified SVGS on the same aircraft model (for example, if aircraft model "X" previously had an SVGS installed and the applicant chooses to modify aircraft model "X" by changing the SVGS hardware and/or the SVGS software).

For a modified SVGS, AED personnel may use the provided decision trees (starting in 3.3) to determine the recommended training to ensure the pilot has adequate knowledge of and familiarity with the modified SVGS and the procedures to be used. Guidance provided in AC 120-53B was used to inform the content of the decision trees.

- The decision trees include a series of questions and examples of training methods for each of the training difference levels—A, B, C, D, or E (see Table 10 for an overview).

For a modified SVGS and aircraft combination, AED personnel should complete the ground training, flight training, and special emphasis checklists and utilize the decision trees (3.3) to determine the recommended training based on the level of differences between the base and modified SVGS and aircraft combinations.

Table 10.
Summary of Training Difference Levels Methods of Instruction

Training Level	Method of Instruction
A	Self-instruction
B	Aided instruction
C	Systems devices
D	Maneuver devices
E	Level C or D full flight simulator (FFS) or aircraft

3.1(b) Terminology

The following terminology and descriptions are used in the context of the *Federal Aviation Administration Aircraft Evaluation Division Operations and Human Factors Evaluation Aid for Synthetic Vision Guidance Systems* and do not replace definitions provided elsewhere in FAA regulatory and guidance material:

- ***Aircraft flight information.*** Aircraft flight information may represent data about the aircraft's current state, including airspeed, vertical speed, aircraft attitude, heading, altitude, height above ground level, command guidance as appropriate for the approach to be flown, path deviation indications, or flight path vector (FPV).
- ***Evaluation plan (EP).*** An EP is submitted by the applicant and accepted by the AED to outline the FSB's operational activities, including crewmember training, checking, and identification of gaps in operational suitability arising from simulator crewmember training (e.g., equipment differences, night conditions, instrument flight rules [IFR]). The EP should also include a manufacturer-proposed Master Differences Requirements (MDR) table and differences tables (DT) in accordance with AC 120-53B, Guidance for Conducting and Use of Flight Standardization Board Evaluations, if the applicant is seeking differences credit.
- ***Flight symbology.*** Flight symbology may translate information into a visual depiction or representation, such as a flight path angle reference cue (FPARC) with a pitch scale, zero pitch reference line, depiction of the runway of intended landing (DRIL), flare prompt or flare guidance (if provided), runway and extended runway centerline symbology (presented during the approach phase), approach or runway lighting infrastructure depicted as symbology, and supplementary vertical information (for situation awareness below decision altitude [DA]/DH or minimum descent altitude [MDA]).
- ***Modified SVGS.*** A modified SVGS refers to an SVGS that has been altered or upgraded through modification, typically to enhance performance, comply with new regulations or guidance, or fulfill a specialized mission. For FSB purposes, a modified SVGS evaluation may be for a previously certified SVGS that has received a modification to its hardware or software but is still installed in the same model of aircraft (e.g., an SVGS certified on aircraft model "X" is modified but still installed in aircraft model "X").
- ***New SVGS.*** A new SVGS refers to an SVGS in its original design. For FSB purposes, a "new" SVGS evaluation is either (1) an SVGS that has never been certified by the FAA or (2) an SVGS that was previously certified by the FAA in a specific aircraft model and is then installed in a different aircraft model (e.g., an SVGS certified for aircraft model "X" is installed in aircraft model "Y").
- ***Operational evaluation (OE).*** An OE is an AED process to determine pilot type rating, minimum crewmember training, checking and currency requirements, and the unique or special airman certification requirements (e.g., specific flight characteristics, no-flap landing).
- ***Operational suitability evaluation (OSE).*** An OSE is an AED determination that an aircraft or system may be safely used in the National Airspace System (NAS) and meets the applicable FAA policies and regulatory requirements.

3.1(c) Training Recommendations Chapter References

Table 11.
FAA Regulations Included in the "Operational Evaluation: Training Recommendations" Chapter

14 CFR Regulation	Title
§ 25.771	Pilot Compartment
§ 25.773	Pilot Compartment View
§ 25.1303	Flight and Navigation Instruments
§ 25.1321	Arrangement and Visibility
§ 25.1322	Flightcrew Alerting
§ 25.1333	Instrument Systems
§ 25.1525	Kinds of Operation
§ 25.1581	General
§ 25.1583	Operating Limitations
§ 25.1585	Operating Procedures
§ 91.103	Preflight Action
§ 91.175	Takeoff and Landing Under IFR
§ 91.1039	IFR Takeoff, Approach and Landing Minimums
§ 121.419	Pilots and Flight Engineers: Initial, Transition, Conversion and Upgrade Ground Training
§ 121.422	Aircraft Dispatchers: Initial and Transition Ground Training
§ 121.651	Takeoff and Landing Weather Minimums: IFR: All Certificate Holders
§ 125.325	Instrument Approach Procedures and IFR Landing Minimums
§ 125.381	Takeoff and Landing Weather Minimums: IFR
§ 135.225	IFR: Takeoff, Approach, and Landing Minimums

Table 12.
Orders Included in the "Operational Evaluation: Training Recommendations" Chapter

Order No.	Title
Order 8400.13F	Procedures for the Evaluation and Approval of Facilities for Special Authorization Category I Operations and All Category II and III Operations
Order 8400.13F CHG 1	Procedures for the Evaluation and Approval of Facilities for Special Authorization Category I Operations and All Category II and III Operations with Change 1
Order 8900.1, Vol. 3, Ch. 18, Sec. 5	Part C Operations Specifications—Airplane Terminal Instrument Procedures and Airport Authorizations and Limitations
Order 8900.1, Vol. 8, Ch. 2, Sec. 5	Flight Standardization Boards
Order 8900.1, Vol. 8, Ch. 2, Sec. 6	Involvement on a Flight Standardization Board

Table 13.
Information for Operators Included in the "Operational Evaluation: Training Recommendations" Chapter

InFO No.	Title
InFO 16022	Inadvertent Selection of Concentrically-Centered Controls

Table 14.
Safety Alerts for Operators Included in the "Operational Evaluation: Training Recommendations" Chapter

SAFO No.	Title
SAFO 09016	Rejected Landing Due to Loss of Visibility
SAFO 10005	Go-Around Callout and Immediate Response
SAFO 15004	Scenario-Based Go-Around Training
SAFO 15011	Roles and Responsibilities for Pilot Flying (PF) and Pilot Monitoring (PM)
SAFO 21007	Risk of Potential Adverse Effects on Radio Altimeters when Operating in the Presence of 5G C-Band Interference
SAFO 24002	Recognizing and Mitigating Global Positioning System (GPS) / Global Navigation Satellite System (GNSS) Disruptions

Table 15.
Advisory Circulars Included in the "Operational Evaluation: Training Recommendations" Chapter

AC No.	Title
AC 20-153B	Acceptance of Aeronautical Data Processes and Associated Databases
AC 20-185A	Airworthiness Approval of Synthetic Vision Systems, Synthetic Vision Guidance Systems and Aircraft State Awareness Synthetic Vision Systems
AC 25-11B	Electronic Flight Displays
AC 25.1322-1	Flightcrew Alerting
AC 25.1581-1	Airplane Flight Manual
AC 120-53B	Guidance for Conducting and Use of Flight Standardization Board Evaluations - With Change 1
AC 120-57C	Low Visibility Operations/Surface Movement Guidance and Control Systems (LVO/SMGCS)
AC 120-71B	Standard Operating Procedures and Pilot Monitoring Duties for Flight Deck Crewmembers
AC 120-76E	Authorization for Use of Electronic Flight Bags
AC 120-109	Stall and Stick Pusher Training
AC 120-111	Upset Prevention and Recovery Training
AC 120-118	Criteria for Approval/Authorization of All Weather Operations for Takeoff, Landing, and Rollout
AC 120-123	Flightpath Management

Table 16.
Other Technical Resources Included in the "Operational Evaluation: Training Recommendations" Chapter

Resource	Title
ACSAA	Section 128 of ACSAA Addresses Pilot Operational Evaluation Requirements, Including the Use of Pilots from Air Carriers with Varying Levels of Experience for Transport Airplane Certification Projects
DO-407	RTCA SC-213 Minimum Aviation System Performance Standards (MASPS) for Synthetic Vision Systems, Synthetic Vision Guidance Systems and Combined Vision Systems

3.2 Pilot Training Recommendations Checklists for New or Modified Synthetic Vision Guidance System and Aircraft Combinations

Pilot Training Checklist Overview and Instructions

Training to conduct operations using an SVGS is not specifically addressed in the salient parts of Title 14 of the C.F.R.; however, FAA guidance describes the training necessary to conduct operations requiring SVGS for operational credit. For example, AC 120-118 states

> When a vision system (e.g., [EVS], [SVS], CVS, EFVS, or SVGS) is used, pilots should be familiar with the interpretation of the display to ensure proper identification of the runway and positioning of the aircraft relative to continuation of the approach to landing. Pilots should understand the limitations of these systems, operational credits available, and authorization required for use.

Operational credit based on an SVGS requires training in accordance with the OpSpec, MSpec, or LOA.

The checklists in this chapter will aid AED personnel in determining if SVGS training required by the OpSpec, MSpec, or LOA can be met and if there are any additional training recommendations specific to the SVGS and aircraft combination. These checklists can be used for both new and modified SVGSs and may be helpful for determining training recommendations in the FSBR.

This chapter includes

- 3.2.1 Ground Training Checklists
- 3.2.2 Flight Training Checklists
- 3.2.3 Special Emphasis Areas Checklist

The proposed flight simulation training device or aircraft to determine training levels should be evaluated to ensure its adequacy for FSB evaluation.

Whenever possible, examples are given to provide context for the checklist item. The examples are *not* intended to serve as an exhaustive list, and the examples may not be applicable to every SVGS and aircraft combination.

For each checklist item

1. Review the requirement, including examples.
2. Select the training level.
3. Provide additional comments on any noteworthy observations.
4. Complete the Training Difference Level Summaries (Sections 3.3.6 and 3.3.7) for ground training and flight training with the appropriate training difference level and any noteworthy findings.

3.2.1 Ground Training Checklists

1.1 Ground Training
SVGS Flight Operations and Limitations
Example topics (*not exhaustive*): • An overview of the FAA policy and guidance for procedures and operations using an SVGS; examples include SA CAT I operations outlined in AC 120-118 and OpSpecs, MSpecs, or LOAs, such as C059 • The SVGS capabilities that allow for operational credit, such as high-precision position assurance monitors • Equipment required for operations using an SVGS identified in AC 20-185A, AC 120-118, and DO-407 • Pilot flying (PF) display location, field of view (FOV), field of regard (FOR), and minification factor[6] • SVS secondary display location, FOV, FOR, and minification factor (if applicable) • PF SVGS display controls, imagery, flight information, and flight symbology • SVS secondary display intended function (if applicable) • SVS secondary display controls, imagery, flight information (if provided), and flight symbology (if provided) • Use of flight director (FD) and AP during procedures or operations using an SVGS, including AP minimum use height considerations and SVGS callouts • Required procedures in the event of system inoperability, visibility, or visual reference requirements not meeting 14 CFR § 91.175 • Determining currency of SVGS or SVS software and databases used to create the SVGS image (e.g., terrain, runway, obstacle) • Limitations specific to rotorcraft operations (if applicable) **CHECKLIST CONTINUED ON NEXT PAGE**

[6] According to AC 20-185A, *field of view* (FOV) refers to "the angular extent of the display that can be seen by either pilot with the pilot seated at the pilot's station" (D.1.12), and *field of regard* (FOR) refers to "the angular extent of the external world that is represented on a display" (D.1.11); *minification* refers to the "perceived visual compression effect stemming from the display of imagery with a wider [FOV] than the conformal [FOV] of the display device" (D.1.26), and the *minification factor* is the "[FOV] of the imagery being displayed to the pilot divided by the conformal [FOV] of the display" (D.1.27).

1.1 Ground Training	
SVGS Flight Operations and Limitations	
Evaluated at Training Level (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 120-118; § 91.175; § 91.1039; § 121.651; § 125.325; § 125.381; § 135.225; Order 8900.1, Vol. 3, Ch. 18, Sec. 5; SAFO 15004; SAFO 21007; AC 20-185A; DO-407
Secondary References: § 25.771; § 25.773; § 25.1322; § 25.1525; § 121.419; AC 20-153B; AC 25-11B; AC 120-71B; AC 120-76E

1.2 Ground Training

Airplane Flight Manual (AFM) or Rotorcraft Flight Manual (RFM) Limitations

Example topics (*not exhaustive*):

- A description of the SVGS
- Autothrottle and/or AP mandatory use (if applicable)
- Type of operations the SVGS is certified to conduct
- Specific procedures, conditions, or limitations associated with operating the SVGS
- Maximum allowable crosswind component
- Steep approach limitations
- Abnormal and emergency procedures specific to operations using the SVGS
- Limitations, procedures, and intended function for the use of an SVS secondary display (if applicable)
- Limitations related to 5G C-band interference (if applicable)

Evaluated at Training Level (Select One)	Comments?
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: § 25.1581; § 25.1583; § 25.1585; § 91.175; § 91.1039; § 121.651; § 125.325; § 125.381; § 135.225; Order 8900.1, Vol. 3, Ch. 18, Sec. 5; SAFO 15004; SAFO 21007; AC 20-185A; AC 120-118; DO-407

Secondary References: § 25.771; § 25.773; § 25.1322; § 25.1525; § 121.419; AC 25-11B; AC 120-71B; AC 120-76E

1.3 Ground Training

SVGS Imagery (Consider Day and Night)

Example topics (*not exhaustive*):

- Understanding the characteristics of the SVGS imagery, including
  - Display FOV
  - Display FOR
  - Display minification
  - Terrain texture
  - Realism (e.g., photorealistic)
  - Topographic depiction
  - Water depiction (e.g., ocean waves)
  - Colorization
  - Integrated flight deck technologies (e.g., Terrain Avoidance and Warning System [TAWS] or Traffic Alert and Collision Avoidance System [TCAS], Automatic Dependent Surveillance–Broadcast (ADS-B), weather radar, windshear detection and alert system)
- SVGS imagery brightness, contrast, and transparency (for an SVGS implemented on a HUD or head-worn display [HWD])
- Cross-checking the symbology against the SVGS imagery and the external visual scene to verify that the SVGS imagery, attitude symbology, FPV, FPARC, and other cues are aligned with and scaled to the external visual scene
- Runway, obstacle, and terrain databases
- SVS secondary display imagery characteristics (if applicable)

Evaluated at Training Level (Select One)	Comments?
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-153B; AC 20-185A; AC 120-118; DO-407
Secondary References: § 121.419; AC 25-11B; AC 120-76E

1.4 Ground Training

Aircraft Flight Information (Consider Day and Night)	
Example topics (*not exhaustive*): • Airspeed • Vertical speed • Aircraft attitude • Heading • Altitude • Height above ground level • Path deviation indications • FPV • Use of barometric and/or radio altitude at low altitudes, including temperature correction (if applicable) • SVS secondary display aircraft flight information (if applicable)	
Evaluated at Training Level (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: § 25.1303; § 25.1333; AC 20-185A; AC 120-118; DO-407
Secondary References: § 25.1321; § 121.419; AC 25-11B; AC 120-76E

1.5 Ground Training

SVGS Symbology (Consider Day and Night)

Example topics (*not exhaustive*):

- DRIL and symbology for other runways
- Zero pitch reference line
- Runway and extended runway centerline symbology (if presented)
- Obstacles
- Traffic (if presented)
- Approach lighting system (if presented)
- Flare prompt or flare guidance (if presented)
- FPARC
- Pathway guidance symbology (if presented)
- Head-down display (HDD), HUD, or HWD symbology
- SVS secondary display flight symbology (if applicable)

Evaluated at Training Level (Select One)	Comments?
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: § 25.1303; § 25.1333; AC 20-185A; AC 120-118; DO-407
Secondary References: § 25.1321; § 121.419; AC 20-153B; AC 25-11B; AC 120-76E

1.6 Ground Training	
SVGS Display (Consider Day and Night)	
Example topics (*not exhaustive*): • SVGS software and databases • Display FOV • Display FOR • Display minification • SVGS hardware, including SVS secondary display (if applicable) • SVGS display presentation during unusual attitude recovery • SVS secondary display presentation during unusual attitude recovery (if applicable) • Perspective views, such as egocentric or exocentric, and recommended use for each phase of flight (if applicable)	
Evaluated at Training Level (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-153B; AC 20-185A; AC 120-118; DO-407
Secondary References: § 25.1303; § 25.1321; § 25.1333; § 121.419; AC 25-11B; AC 120-76E

1.7 Ground Training

SVGS Controls (Consider Day and Night)

Example topics (*not exhaustive*):

- Image brightness controls
- Symbology brightness control (if applicable)
- Selectable range
- Controls for perspective views, such as egocentric and exocentric (if applicable)
- Controls for any integrated flight deck systems (if applicable)
- SVGS On/Off control
- Display controls for each layer (e.g., primary flight display [PFD] and SVGS) and using controls to select and adjust each layer
- How and where to read control labels and any challenges while flying at day or night
- Importance of seat position based on design eye position (for transitioning from SVGS to external scene depiction)
- SVS secondary display controls (if applicable)

Evaluated at Training Level (Select One)	Comments?
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; InFO 16022; DO-407
Secondary References: § 121.419; AC 25-11B; AC 120-76E

1.8 Ground Training

SVGS Modes (Consider Day and Night)	
Example topics (*not exhaustive*): • SVGS failure modes • Approach modes (if applicable) • For a CVS, mode selection among EVS, SVS, and CVS modes • SVS secondary display modes (if applicable)	
Evaluated at Training Level (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; DO-407
Secondary References: § 121.419; AC 25-11B; AC 120-76E

1.9 Ground Training

SVGS Annunciations (Consider Day and Night)

Example topics (*not exhaustive*):

- Normal, abnormal, and failure annunciations, indicators, messages, or alerts
- Location of SVGS visual alerts
- Meaning of any SVGS-related aural alerts
- Recognizing malfunctions of the navigation equipment
- Altitude alerting
- Terrain alerting
- Minimums audio callout capability
- SVGS alert active envelope
- SVS secondary display alerts and annunciations (if applicable)

Evaluated at Training Level (Select One)	Comments?
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: § 25.1322; SAFO 24002; AC 20-185A; AC 25.1322-1; DO-407
Secondary References: § 121.419; AC 25-11B; AC 120-76E

1.10 Ground Training	
SVGS-Associated Systems and Components	
Example topics (*not exhaustive):* • PFD, HUD, or HWD • Scene-generation computer and databases (e.g., runway, obstacle, terrain) • Other systems, such as TAWS, TCAS targets, ADS-B, weather radar, windshear detection and alert system, and high-precision position assurance monitors • SVS secondary display (if applicable)	
Evaluated at Training Level (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: § 25.1322; AC 20-153B; AC 20-185A; AC 25.1322-1; DO-407
Secondary References: § 121.419; AC 25-11B; AC 120-76E

1.11 Ground Training

SVGS Scene Interpretation (Consider Day and Night)

Example topics (*not exhaustive*):

- Obstacles and associated symbology
- Presentation of traffic (if applicable)
- Symbology for the DRIL and other runways, extended runway centerline, cue to the runway, depiction of airports
- Use of colors for synthetic imagery, obstacles, or associated systems (e.g., TAWS, weather radar)
- Presentation of information from any integrated flight deck system
- Interpretation of terrain awareness cues, terrain texture, and the elevation model
- Pathway guidance symbology (if applicable)
- Compellingness of the synthetic image
- Effects of the display FOR, FOV, and minification on the presentation terrain, obstacles, aircraft flight information, and flight symbology
- Transitioning from the synthetic image to natural vision
- Use of brightness controls when transitioning from daytime to nighttime conditions or when transitioning to snow, rain, or fog
- For an SVGS implemented on a HUD or an HWD, where to look for approach lighting systems
- Use and limitations of the SVS secondary display (if applicable)

Evaluated at Training Level (Select One)	Comments?
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-153B; AC 20-185A; AC 120-118; DO-407
Secondary References: § 121.419; AC 25-11B; AC 120-76E

1.12 Ground Training	
SVGS Visual Anomalies and Other Visual Effects (Consider Day and Night)	
Example topics (*not exhaustive*): • Misalignment between the synthetic imagery, aircraft flight information, or flight symbology and the external visual scene • Synthetic image jitter or lag in updating • SVGS software logic to remove the synthetic imagery from the PF display or SVS secondary display	
Evaluated at Training Level (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-153B; AC 20-185A; DO-407
Secondary References: § 25.1333; § 121.419; SAFO 24002; AC 25-11B; AC 120-76E

1.13 Ground Training	
Preflight Planning for Tasks, Maneuvers, Procedures, or Operations Using an SVGS (Consider Day and Night)	
Example topics (*not exhaustive*): • Overview of flight planning considerations for system performance and limitations • Understanding of the optimal SVGS settings for ground operations, flight operations (all phases), ambient lighting conditions, and weather conditions • Understanding of the following system preflight and in-flight procedures: (1) system tests; (2) system control adjustments, brightness, and symbology; and (3) determining database currency • An understanding of operational credit when using an SVGS during SA CAT I operations as provided in AC 120-118 and OpSpec, MSpec, or LOA (e.g., C059) • SVS secondary display use during operations and its intended functions (if applicable)	
Evaluated at Training Level (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: § 91.103; AC 20-153B; AC 20-185A; AC 120-118; DO-407
Secondary References: § 121.419; § 121.651; § 125.325; § 125.381; § 135.225; SAFO 21007; SAFO 24002; AC 120-76E; AC 120-118

1.14 Ground Training

Operational Considerations Associated with Using an SVGS During Taxi

Example topics (*not exhaustive*):

- Display FOV
- Display FOR
- Display minification
- Adjusting display brightness
- Depiction of signage, taxi markings, and taxi lighting
- Color representation
- Presentation of aircraft flight information and flight symbology
- Traffic symbology (if applicable)
- The importance of maintaining a visual scan and understanding the effect of display compellingness
- Cross-checking the symbology against both the SVGS imagery and the external visual scene to verify that the SVGS imagery, attitude symbology, FPV, FPARC, runway numbers, runway edge lines, and other cues are aligned with and scaled to the external visual scene
- Perspective views, such as egocentric or exocentric, and recommended use (if applicable)
- Parallax
- Surface Movement Guidance and Control System (SMGCS) compatibility
- SVS secondary display use during operations and any information provided by the OpSpec, MSpec, or LOA (e.g., C059)

Evaluated at Training Level (Select One)	Comments?
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-153B; AC 20-185A; AC 120-57C; AC 120-118; DO-407
Secondary References: § 121.419; § 121.651; § 125.325; § 125.381; § 135.225; SAFO 21007; SAFO 24002; AC 120-76E; AC 120-118

1.15 Ground Training

Operational Considerations Associated with Using an SVGS During Takeoff (Consider Day and Night)

Example topics (*not exhaustive*):

- Display FOV
- Display FOR
- Display minification
- Adjusting display brightness
- Color representation
- Presentation of aircraft flight information and flight symbology
- Pathway guidance symbology (if applicable)
- Traffic symbology (if applicable)
- Effect of crosswinds on the FOV, including the use of flight symbology caged and uncaged modes (if applicable)
- Depiction of signage, runway markings, and runway lighting
- Changes in visibility during the takeoff roll and abort
- Depiction of the runway surface (e.g., unimproved, asphalt, concrete)
- Limitations to the depiction of actual runway conditions (e.g., blowing snow or a snow-covered surface, water on the surface, dust, animals, runway obstructions, or risk for incursions)
- Limitations to obstacle presentation, such as obstacles below a threshold height not included in the database
- Cross-checking the symbology against both the SVGS imagery and the external visual scene to verify that the SVGS imagery, attitude symbology, FPV, FPARC, runway numbers, runway edge lines, and other cues are aligned with and scaled to the external visual scene
- Conformal portrayal of pitch attitude
- Perspective views, such as egocentric or exocentric, and recommended use (if applicable)
- The importance of maintaining a visual scan and understanding the effect of display compellingness
- SVS secondary display intended functions (if applicable)

CHECKLIST CONTINUED ON NEXT PAGE

1.15 Ground Training	
Operational Considerations Associated with Using an SVGS During Takeoff (Consider Day and Night)	
Evaluated at Training Level (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; AC 120-118; DO-407
Secondary References: § 91.1039; § 125.381; § 121.419; § 121.651; § 135.225; AC 120-76E

1.16 Ground Training

Operational Considerations Associated with Using an SVGS During Climb (Consider Day and Night)

Example topics (not exhaustive):

- Display FOV
- Display FOR
- Display minification
- Adjusting display brightness
- Color representation
- Terrain awareness
- Obstacle symbology
- Limitations to obstacle presentation, such as obstacles below a threshold height not included in the database
- Pathway guidance symbology (if applicable)
- Traffic symbology (if applicable)
- Presentation of aircraft flight information and flight symbology, including the zero pitch reference line
- Effect of crosswinds on the FOV, including the use of flight symbology caged and uncaged modes (if applicable)
- Cross-checking the symbology against both the SVGS imagery and the external visual scene to verify that the SVGS imagery, attitude symbology, FPV, FPARC, runway numbers, runway edge lines, and other cues are aligned with and scaled to the external visual scene
- Conformal portrayal of pitch attitude
- The importance of maintaining a visual scan and understanding the effect of display compellingness
- Perspective views, such as egocentric or exocentric, and recommended use (if applicable)
- SVS secondary display intended functions (if applicable)

CHECKLIST CONTINUED ON NEXT PAGE

1.16 Ground Training	
Operational Considerations Associated with Using an SVGS During Climb (Consider Day and Night)	
Evaluated at Training Level (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: *AC 20-185A*; *AC 120-118*; *DO-407*
Secondary References: *§ 121.419*

1.17 Ground Training

Operational Considerations Associated with Using an SVGS During Cruise (Consider Day and Night)	
Example topics (*not exhaustive*): • Display FOV • Display FOR • Display minification • Adjusting display brightness • Color representation • Terrain and obstacle awareness, especially when operating at lower altitudes • Traffic symbology (if applicable) • Presentation of aircraft flight information and flight symbology, including the zero pitch reference line • Pathway guidance symbology (if applicable) • Effect of crosswinds on the FOV, including the use of flight symbology caged and uncaged modes (if applicable) • Cross-checking the symbology against both the SVGS imagery and the external visual scene to verify that the SVGS imagery, attitude symbology, FPV, FPARC, runway numbers, runway edge lines, and other cues are aligned with and scaled to the external visual scene • Limitations to obstacle presentation, such as obstacles below a threshold height not included in the database • Conformal portrayal of pitch attitude • The effect of display compellingness • The importance of maintaining a head-up position • SVS secondary display intended functions (if applicable)	
Evaluated at Training Level (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; AC 120-118; DO-407
Secondary References: § 121.419

1.18 Ground Training

Operational Considerations Associated with Using an SVGS During Descent and Approach to Landing Phases of Flight (Consider Day and Night)

Example topics (*not exhaustive*):

- Display FOV
- Display FOR
- Display minification
- Adjusting display brightness
- Color representation
- Presentation of aircraft flight information and flight symbology, including the zero pitch reference line
- Pathway guidance symbology (if applicable)
- Traffic symbology (if applicable)
- Obstacle symbology
- Conformal portrayal of pitch attitude
- Effect of crosswinds on the FOV, including the use of flight symbology caged and uncaged modes (if applicable)
- Symbology representation of the extended runway centerline and approach lighting systems (if applicable)
- Presentation of the DRIL and symbology for other runways
- Symbology elements to help identify airports (if applicable)
- Symbology representation of distance markers
- Depiction of runway signage, runway markings, and approach and runway lighting
- Selection of the appropriate SVGS approach mode
- Cross-checking the symbology against both the SVGS imagery and the external visual scene to verify that the SVGS imagery, attitude symbology, FPV, FPARC, runway numbers, runway edge lines, and other cues are aligned with and scaled to the external visual scene
- Transitioning from SVGS imagery to natural vision for detecting visual references required by 14 CFR § 91.175
- Confirmation of the availability of all required SVGS equipment and systems in accordance with the AFM or AFM Supplement (or RFM or RFM Supplement), AC 20-185, and the OpSpec, MSpec, or LOA (e.g., C059)

CHECKLIST CONTINUED ON NEXT PAGE

1.18 Ground Training

Operational Considerations Associated with Using an SVGS During Descent and Approach to Landing Phases of Flight (Consider Day and Night)

- Display message when SVGS high-precision position assurance monitors are unreliable and appropriate pilot response
- Use of an SVGS for offset and steep approaches to the maximum allowed for SA CAT I operations, in accordance with FAA Order 8400.13F, AC 120-118, and the OpSpecs, MSpecs, or LOAs related to operations conducted with an SVGS (e.g., C059)
- Vertical descent angles (VDAs), vertical descent points (VDPs), visual glide slope indicator (VGSI) angles, and the significance of VDA and VGSI angles that are not coincident
- Obstacle clearance awareness, especially for nonprecision approaches with no published VDP
- Obstacles that are not represented in the obstacle database, such as those below a threshold height
- Altitude alerting, including audio callouts
- Importance of considering airfield lighting intensity, particularly for an SVGS on a HUD or an HWD
- The importance of maintaining a visual scan and understanding the effect of display compellingness
- Perspective views, such as egocentric or exocentric, and recommended use (if applicable)
- SVS secondary display intended functions (if applicable)

Evaluated at Training Level (Select One)	Comments?
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: § 91.175; AC 20-185A; AC 120-118; DO-407
Secondary References: § 91.1039; § 121.419; § 121.422; § 121.651; § 125.325; § 125.381; § 135.225; Order 8400.13F; SAFO 09016; SAFO 10005; SAFO 15004; SAFO 15011; SAFO 21007; SAFO 24002; AC 120-71B; AC 120-123

1.19 Ground Training

Operational Considerations Associated with Using an SVGS During Approach to Landing when Operating Below the DA/DH or MDA (Consider Day and Night)

Example topics (*not exhaustive*):

- Display FOV
- Display FOR
- Display minification
- Adjusting display brightness
- Color representation
- Presentation of aircraft flight information and flight symbology, including the zero pitch reference line
- Pathway guidance symbology (if applicable)
- Traffic symbology (if applicable)
- Obstacle symbology
- Conformal portrayal of pitch attitude
- Effect of crosswinds on the FOV, including the use of flight symbology caged and uncaged modes (if applicable)
- Symbology representation of the extended runway centerline and approach lighting systems (if applicable)
- Presentation of the DRIL and symbology for other runways
- Symbology elements for airports (if applicable)
- Symbology for visual guidance cues, such as precision approach path indicators (PAPIs) or visual approach slope indicators (VASIs)
- Symbology representation of distance markers
- Depiction of signage, markings, and lighting
- Recognition of improper presentation of elements in the external visual scene
- Transitioning from SVGS imagery to natural vision for detecting visual references required by 14 CFR § 91.175
- Confirmation of the availability of all required SVGS equipment and systems in accordance with the AFM or AFM Supplement (or RFM or RFM Supplement), AC 20-185, and the OpSpec, MSpec, or LOA
- Display message when SVGS high-precision position assurance monitors are unreliable and appropriate pilot response
- Use of an SVGS for offset and steep approaches to the maximum allowed for SA CAT I operations, in accordance with FAA Order 8400.13F, AC 120-118, and the OpSpecs, MSpecs, or LOAs related to operations conducted with an SVGS (e.g., C059)

CHECKLIST CONTINUED ON NEXT PAGE

1.19 Ground Training	
Operational Considerations Associated with Using an SVGS During Approach to Landing when Operating Below the DA/DH or MDA (Consider Day and Night)	
• VDAs, VDPs, VGSI angles, and the significance of VDA and VGSI angles that are not coincident • Obstacle symbology • Traffic symbology (if applicable) • Obstacle clearance awareness, especially for nonprecision approaches with no published VDP • Obstacles that are not represented in the obstacle database, such as those below a threshold height • Importance of considering airfield lighting intensity, particularly for an SVGS on a HUD or an HWD • Altitude alerting, including audio callouts • Cross-checking the symbology against both the SVGS imagery and the external visual scene to verify that the SVGS imagery, attitude symbology, FPV, FPARC, runway numbers, runway edge lines, and other cues are aligned with and scaled to the external visual scene • Accuracy of the synthetic image when close to the runway and the potential for the image to jitter • The importance of maintaining a visual scan and understanding the effect of display compellingness • Perspective views, such as egocentric or exocentric, and recommended use (if applicable) • SVS secondary display intended functions (if applicable)	
Evaluated at Training Level (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: § 91.175; AC 20-185A; AC 120-118; DO-407
Secondary References: § 91.1039; § 121.419; § 121.422; § 121.651; § 125.325; § 125.381; § 135.225; Order 8400.13F; SAFO 09016; SAFO 10005; SAFO 15004; SAFO 15011; SAFO 21007; SAFO 24002; AC 120-71B; AC 120-123

1.20 Ground Training

Operational Considerations Associated with Using an SVGS when Executing a Missed Approach

Example topics (*not exhaustive*):

- Display FOV
- Display FOR
- Display minification
- Adjusting display brightness
- Color representation
- Presentation of aircraft flight information and flight symbology, including the zero pitch reference line
- Conformal portrayal of pitch attitude
- Symbology representation of distance markers
- Pathway guidance symbology (if applicable)
- Traffic symbology (if applicable)
- Obstacle symbology
- Effect of crosswinds on the FOV, including the use of flight symbology caged and uncaged modes (if applicable)
- Confirmation of the availability of all required SVGS equipment and systems in accordance with the AFM or AFM Supplement (or RFM or RFM Supplement), AC 20-185, and the OpSpec, MSpec, or LOA
- Display message when SVGS high-precision position assurance monitors are unreliable, or when display jitter is misleading or distracting, and the appropriate pilot response
- Requirement for a missed approach if any required component of the SVGS fails, unless it is safer to continue
- SVGS symbology or flight information presented during a missed approach procedure (if applicable)
- Cross-checking the symbology against both the SVGS imagery and the external visual scene to verify that the SVGS imagery, attitude symbology, FPV, FPARC, runway numbers, runway edge lines, and other cues are aligned with and scaled to the external visual scene
- Missed approach procedures—all engines operating and one engine inoperative
- Obstacles that are not represented in the obstacle database, such as those below a threshold height
- The importance of maintaining a visual scan and understanding the effect of display compellingness
- Perspective views, such as egocentric or exocentric, and recommended use (if applicable)
- SVS secondary display intended functions (if applicable)

CHECKLIST CONTINUED ON NEXT PAGE

1.20 Ground Training	
Operational Considerations Associated with Using an SVGS when Executing a Missed Approach	
Evaluated at Training Level (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; AC 120-118; DO-407
Secondary References: § 91.175; § 91.1039; § 121.419; § 125.325; § 125.381; § 135.225; SAFO 09016; SAFO 10005; SAFO 15004; SAFO 15011; AC 120-71B

1.21 Ground Training

Operational Considerations Associated with Using an SVGS During the Landing (Consider Day and Night)

Example topics (*not exhaustive*):

- Display FOV
- Display FOR
- Display minification
- Adjusting display brightness
- Color representation
- Presentation of aircraft flight information and flight symbology, including the zero pitch reference line
- Pathway guidance symbology (if applicable)
- Traffic symbology (if applicable)
- Obstacle symbology
- Conformal portrayal of pitch attitude
- Effect of crosswinds on the FOV, including the use of flight symbology caged and uncaged modes (if applicable)
- Detecting runway incursions and what is and is not displayed on the SVGS
- Symbology representation of distance markers, and detecting runway excursions
- Depiction of runway signage, runway markings, and runway lighting
- Cross-checking the symbology against both the SVGS imagery and the external visual scene to verify that the SVGS imagery, attitude symbology, FPV, FPARC, runway numbers, runway edge lines, and other cues are aligned with and scaled to the external visual scene
- Accuracy of the synthetic image when close to the runway and the potential for the image to jitter
- The importance of maintaining a visual scan and understanding the effect of display compellingness
- Perspective views, such as egocentric or exocentric, and recommended use (if applicable)
- SVS secondary display intended functions (if applicable)

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1.21 Ground Training	
Operational Considerations Associated with Using an SVGS During the Landing (Consider Day and Night)	
Evaluated at Training Level (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: § 91.175; AC 20-185A; AC 120-118; DO-407
Secondary References: § 91.1039; § 121.419; § 121.422; § 121.651; § 125.325; § 125.381; § 135.225; Order 8400.13F; SAFO 09016; SAFO 10005; SAFO 15004; SAFO 15011; SAFO 21007; SAFO 24002; AC 120-71B; AC 120-123

1.22 Ground Training

Operational Considerations Associated with Using an SVGS During Rollout (Consider Day and Night)

Example topics (*not exhaustive*):

- Display FOV
- Display FOR
- Display minification
- Adjusting display brightness
- Color representation
- Obstacle symbology
- Traffic symbology (if applicable)
- Presentation of aircraft flight information and flight symbology, including the zero pitch reference line
- Effect of crosswinds on the FOV, including the use of flight symbology caged and uncaged modes (if applicable)
- Symbology representation of distance markers, and detecting runway excursions
- Depiction of runway signage, runway markings, and runway lighting
- Display message when SVGS high-precision position assurance monitors are unreliable and appropriate pilot response
- Cross-checking the symbology against both the SVGS imagery and the external visual scene to verify that the SVGS imagery, attitude symbology, FPV, FPARC, runway numbers, runway edge lines, and other cues are aligned with and scaled to the external visual scene
- Accuracy of the synthetic image when close to the runway and the potential for the image to jitter
- The importance of maintaining a visual scan and understanding the effect of display compellingness
- Perspective views, such as egocentric or exocentric, and recommended use (if applicable)
- SVS secondary intended functions (if applicable)

CHECKLIST CONTINUED ON NEXT PAGE

1.22 Ground Training	
Operational Considerations Associated with Using an SVGS During Rollout (Consider Day and Night)	
Evaluated at Training Level (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; AC 120-118; DO-407
Secondary References: § 121.419; SAFO 15011; AC 120-57C; AC 120-71B

1.23 Ground Training

Operational Considerations Associated with Using an SVGS During Descent and Landing Phases of Flight for Balked Landings (Consider Day and Night)

Example topics (*not exhaustive*):

- Display FOV
- Display FOR
- Display minification
- Adjusting display brightness
- Color representation
- Presentation of aircraft flight information and flight symbology, including the zero pitch reference line
- Conformal portrayal of pitch attitude
- Symbology representation of distance markers
- Pathway guidance symbology (if applicable)
- Traffic symbology (if applicable)
- Obstacle symbology
- Effect of crosswinds on the FOV, including the use of flight symbology caged and uncaged modes (if applicable)
- Confirmation of the availability of all required SVGS equipment and systems in accordance with the AFM or AFM Supplement (or RFM or RFM Supplement), AC 20-185, and the OpSpec, MSpec, or LOA
- Display message when SVGS high-precision position assurance monitors are unreliable, or when display jitter is misleading or distracting, and the appropriate pilot response
- Requirement for a missed approach if any required component of the SVGS fails, unless it is safer to continue
- SVGS symbology or flight information presented during a missed approach procedure (if applicable)
- Cross-checking the symbology against both the SVGS imagery and the external visual scene to verify that the SVGS imagery, attitude symbology, FPV, FPARC, runway numbers, runway edge lines, and other cues are aligned with and scaled to the external visual scene
- Missed approach procedures—all engines operating and one engine inoperative
- Obstacles that are not represented in the obstacle database, such as those below a threshold height
- The importance of maintaining a visual scan and understanding the effect of display compellingness
- Perspective views, such as egocentric or exocentric, and recommended use (if applicable)
- SVS secondary display intended functions (if applicable)

CHECKLIST CONTINUED ON NEXT PAGE

1.23 Ground Training	
Operational Considerations Associated with Using an SVGS During Descent and Landing Phases of Flight for Balked Landings (Consider Day and Night)	
Evaluated at Training Level (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; AC 120-118; DO-407
Secondary References: § 91.175; § 91.1039; § 121.419; § 125.325; § 125.381; § 135.225; SAFO 09016; SAFO 10005; SAFO 15004; SAFO 15011; AC 120-71B

1.24 Ground Training	
Normal Procedures when Using an SVGS	
Example topics (*not exhaustive*): • Original equipment manufacturer (OEM)-recommended flight procedures as provided in the AFM or AFM Supplement (or RFM or RFM Supplement), flightcrew training manual (FCTM), flightcrew operations manual (FCOM), or quick reference handbook (QRH)	
Evaluated at Training Level (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; AC 120-118; DO-407
Secondary References: § 25.1581; § 25.1585; § 121.419; AC 25.1581-1; AC 120-71B

1.25 Ground Training	
Abnormal Procedures when Using an SVGS	
Example topics (*not exhaustive*): • OEM-recommended abnormal procedures as provided in the AFM or AFM Supplement (or RFM or RFM Supplement), FCTM, FCOM, or QRH • Frozen image • Loss of relevant symbology for all phases of flight • Misalignment of the SVGS symbology or imagery with the external visual scene • Techniques for identifying SVGS system failures and the corresponding procedures	
Evaluated at Training Level (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; AC 120-118; DO-407
Secondary References: § 25.1581; § 25.1322; § 25.1585; § 121.419; AC 25.1322-1; AC 25.1581-1; AC 120-71B

1.26 Ground Training

Emergency Procedures when Using an SVGS

Example topics (*not exhaustive*):

- Importance of a timely recognition and an accurate and timely response to flight deck alerts, annunciations, messages, or indications
- Failure in critical phases of flight—takeoff, approach, landing, and rollout
- Misleading synthetic imagery
- Loss of SVGS approach capability
- Misleading aircraft flight information or flight symbology, particularly during final approach
- For an SVGS on a HUD or an HWD, obstruction of the view, especially during takeoff and final approach
- Upset prevention and recovery training
- Stall prevention and recovery training
- OEM-recommended emergency procedures as provided in the AFM or AFM Supplement (or RFM or RFM Supplement), FCTM, FCOM, or QRH
- Emergency procedures, both with and without an SVS secondary display (if applicable)

Evaluated at Training Level (Select One)	Comments?
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; AC 120-109; AC 120-111; AC 120-118; DO-407
Secondary References: § 25.1581; § 25.1322; § 25.1585; § 121.419; AC 25.1322-1; AC 25.1581-1; AC 120-71B

1.27 Ground Training

Crew Coordination Procedures when Using an SVGS

Example topics (*not exhaustive*):

- PF and pilot monitoring (PM) communications, to include callouts for continuing descent below the DA/DH or MDA using the SVGS, callouts to clearly communicate the decision to land or go-around, and callouts for abnormal SVGS operations
- Callouts for transitioning from SVGS to natural vision
- Failure in critical phases of flight—takeoff, approach, landing, and rollout (e.g., misleading SVGS imagery, initiating a missed approach below minimums, loss of SVGS approach capability)
- Loss of HDD-, HWD-, or HUD-based visual information or HDD-, HWD-, or HUD-relevant symbology is erroneous or misleading, particularly during final approach
- Interpretation and use of the SVS secondary display (if applicable)
- Emergency procedures, both with and without an SVS secondary display (if applicable)

Evaluated at Training Level (Select One)	Comments?
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; AC 120-109; AC 120-111; AC 120-118; DO-407
Secondary References: § 121.419; SAFO 09016; SAFO 10005; SAFO 15011; AC 120-71B

3.2.2 Flight Training Checklists

2.1 Flight Training	
Preflight and Inflight Preparation of SVGS Equipment for Tasks, Maneuvers, Procedures, or Operations using an SVGS, Including SVGS Setup and Use of the Display (Consider Day and Night)	
Example topics (*not exhaustive*): • Seat position based on design eye position (for transitioning from SVGS to external scene depiction) • Performing system tests and determining database currency (e.g., runway, obstacle, terrain) • Display unit setup, such as egocentric or exocentric perspective views and recommended use (if applicable) • Setup for any integrated flight deck technologies (e.g., TAWS or TCAS, ADS-B, weather radar, windshear detection, and alert system) • SVS secondary display setup (if applicable)	
Recommended Training Level? (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: § 91.103; AC 20-153B; AC 20-185A; AC 120-118; DO-407
Secondary References: § 121.419; § 121.651; § 125.325; § 125.381; § 135.225; SAFO 21007; SAFO 24002; AC 120-76E; AC 120-118

2.2 Flight Training

Preflight and Inflight Preparation of SVGS Equipment for Tasks, Procedures, Maneuvers, or Operations with an SVGS, Including SVGS Setup and Use of Controls (Consider Day and Night)

Example topics (*not exhaustive*):

- On/Off or Enable/Disable control
- Adjusting the brightness control for the display or symbology
- Controls for any integrated flight deck technologies (e.g., TAWS or TCAS, ADS-B, weather radar, windshear detection, and alert system)
- SVS secondary display controls (if applicable)

Recommended Training Level? (Select One)	Comments?
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: § 91.103; AC 20-153B; AC 20-185A; AC 120-118; DO-407
Secondary References: § 121.419; § 121.651; § 125.325; § 125.381; § 135.225; SAFO 21007; SAFO 24002; AC 120-76E; AC 120-118

2.3 Flight Training	
Preflight and Inflight Preparation of SVGS Equipment for Tasks, Procedures, Maneuvers, or Operations with an SVGS, Including SVGS Setup and Use of Modes and Associated Systems (Consider Day and Night)	
Example topics (*not exhaustive*): • SVGS failure modes • HDD/HUD/HWD operating modes (if applicable) • SVS secondary display modes (if applicable)	
Recommended Training Level? (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; DO-407
Secondary References: § 121.419; AC 25-11B; AC 120-76E

2.4 Flight Training

Proper Piloting Techniques Associated with Using an SVGS During Taxi (Consider Day and Night)	
Example topics (*not exhaustive*): • Display FOV[7] • Display FOR • Display minification • Possible color hue differences when transitioning from the SVGS display to natural vision • The importance of maintaining a visual scan and understanding the effect of display compellingness • Cross-checking the symbology against both the SVGS imagery and the external visual scene to verify that the SVGS imagery and symbology are aligned with and scaled to the external visual scene • Verifying position with maps or charts, signage, taxi lights, taxi markings, and natural vision • Symbology representation of buildings and traffic (if present) • SMGCS compatibility • Preferred perspective views, such as egocentric or exocentric, and recommended use (if applicable) • Use of an SVS secondary display in accordance with its intended function (if applicable)	
Recommended Training Level? (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-153B; AC 20-185A; AC 120-57C; AC 120-118; DO-407
Secondary References: § 121.419; § 121.651; § 125.325; § 125.381; § 135.225; SAFO 21007; SAFO 24002; AC 120-76E; AC 120-118

[7] According to AC 20-185A, *field of view* (FOV) refers to "the angular extent of the display that can be seen by either pilot with the pilot seated at the pilot's station" (D.1.12), and *field of regard* (FOR) refers to "the angular extent of the external world that is represented on a display" (D.1.11); *minification* refers to the "perceived visual compression effect stemming from the display of imagery with a wider [FOV] than the conformal [FOV] of the display device" (D.1.26), and the *minification factor* is the "[FOV] of the imagery being displayed to the pilot divided by the conformal [FOV] of the display" (D.1.27).

2.5 Flight Training

Proper Piloting Techniques Associated with Using an SVGS During Takeoff (Consider Day and Night)

Example topics (*not exhaustive*):

- Display FOV
- Display FOR
- Display minification
- Adjusting display brightness
- Color representation
- Presentation of aircraft flight information and flight symbology
- Pathway guidance symbology (if applicable)
- Traffic symbology (if applicable)
- Effect of crosswinds on the FOV, including the use of flight symbology caged and uncaged modes (if applicable)
- Depiction of signage, runway markings, and runway lighting
- Changes in visibility during the takeoff roll and abort
- Depiction of the runway surface (e.g., unimproved, asphalt, concrete)
- Limitations to the depiction of actual runway conditions (e.g., blowing snow or a snow-covered surface, water on the surface, dust, animals, runway obstructions, risk for incursions)
- Limitations to obstacle presentation, such as obstacles below a threshold height not included in the database
- Cross-checking the symbology against both the SVGS imagery and the external visual scene to verify that the SVGS imagery, attitude symbology, FPV, FPARC, runway numbers, runway edge lines, and other cues are aligned with and scaled to the external visual scene
- Conformal portrayal of pitch attitude
- Perspective views, such as egocentric or exocentric, and recommended use (if applicable)
- The importance of maintaining a visual scan and understanding the effect of display compellingness
- SVS secondary display intended functions (if applicable)

CHECKLIST CONTINUED ON NEXT PAGE

2.5 Flight Training	
Proper Piloting Techniques Associated with Using an SVGS During Takeoff (Consider Day and Night)	
Recommended Training Level? (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; AC 120-118; DO-407
Secondary References: § 91.1039; § 125.381; § 121.419; § 121.651; § 135.225; AC 120-76E

2.6 Flight Training

Proper Piloting Techniques Associated with Using an SVGS During Climb (Consider Day and Night).

Example topics (*not exhaustive*):

- Display FOV
- Display FOR
- Display minification
- Adjusting display brightness
- Color representation
- Terrain awareness
- Obstacle symbology
- Limitations to obstacle presentation, such as obstacles below a threshold height not included in the database
- Pathway guidance symbology (if applicable)
- Traffic symbology (if applicable)
- Presentation of aircraft flight information and flight symbology, including the zero pitch reference line
- Effect of crosswinds on the FOV, including the use of flight symbology caged and uncaged modes (if applicable)
- Cross-checking the symbology against both the SVGS imagery and the external visual scene to verify that the SVGS imagery, attitude symbology, FPV, FPARC runway numbers, runway edge lines, and other cues are aligned with and scaled to the external visual scene
- Conformal portrayal of pitch attitude
- The importance of maintaining a visual scan and understanding the effect of display compellingness
- Perspective views, such as egocentric or exocentric, and recommended use (if applicable)
- SVS secondary display intended functions (if applicable)

Recommended Training Level? (Select One)	Comments?
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; AC 120-118; DO-407
Secondary References: § 121.419

2.7 Flight Training

Proper Piloting Techniques Associated with Using an SVGS During Cruise (Consider Day and Night)	
Example topics (*not exhaustive*): • Display FOV • Display FOR • Display minification • Adjusting display brightness • Color representation • Terrain awareness, especially when operating at lower altitudes • Presentation of aircraft flight information and flight symbology, including the zero pitch reference line • Obstacle symbology • Limitations to obstacle presentation, such as obstacles below a threshold height not included in the database • Pathway guidance symbology (if applicable) • Traffic symbology (if applicable) • Effect of crosswinds on the FOV, including the use of flight symbology caged and uncaged modes (if applicable) • Cross-checking the symbology against both the SVGS imagery and the external visual scene to verify that the SVGS imagery, attitude symbology, FPV, FPARC, runway numbers, runway edge lines, and other cues are aligned with and scaled to the external visual scene • Conformal portrayal of pitch attitude • The importance of maintaining a visual scan and understanding the effect of display compellingness • SVS secondary display intended functions (if applicable)	
Recommended Training Level? (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; AC 120-118; DO-407
Secondary References: § 121.419

2.8 Flight Training

Proper Piloting Techniques Associated with Using an SVGS During Descent (Consider Day and Night)

Example topics (*not exhaustive*):

- Display FOV
- Display FOR
- Display minification
- Adjusting display brightness
- Color representation
- Presentation of aircraft flight information and flight symbology, including the zero pitch reference line
- Obstacle symbology
- Obstacles that are not represented in the obstacle database, such as those below a threshold height
- Obstacle clearance awareness, especially for nonprecision approaches with no published VDP
- Traffic symbology (if applicable)
- Pathway guidance symbology (if applicable)
- Conformal portrayal of pitch attitude
- Effect of crosswinds on the FOV, including the use of flight symbology caged and uncaged modes (if applicable)
- Symbology representation of the extended runway centerline and approach lighting systems (if applicable)
- Presentation of the DRIL and symbology for other runways
- Symbology elements to help identify airports (if applicable)
- Symbology representation of distance markers
- Depiction of runway signage, runway markings, and runway and approach lighting
- Selection of the appropriate SVGS approach mode
- Cross-checking the symbology against both the SVGS imagery and the external visual scene to verify that the SVGS imagery, attitude symbology, FPV, FPARC, runway numbers, runway edge lines, and other cues are aligned with and scaled to the external visual scene
- Transitioning from SVGS imagery to natural vision for detecting visual references required by 14 CFR § 91.175
- Confirmation of the availability of all required SVGS equipment and systems in accordance with the AFM or AFM Supplement (or RFM or RFM Supplement), AC 20-185, and the OpSpec, MSpec, or LOA (e.g., C059)

CHECKLIST CONTINUED ON NEXT PAGE

2.8 Flight Training

Proper Piloting Techniques Associated with Using an SVGS During Descent (Consider Day and Night)

- Display message when SVGS high-precision position assurance monitors are unreliable and appropriate pilot response
- Use of an SVGS for offset and steep approaches to the maximum allowed for SA CAT I operations, in accordance with FAA Order 8400.13F, AC 120-118, and the OpSpecs, MSpecs, or LOAs related to operations conducted with an SVGS (e.g., C059)
- VDAs, VDPs, VGSI angles, and the significance of VDA and VGSI angles that are not coincident
- Altitude alerting, including audio callouts
- Importance of considering airfield lighting intensity, particularly for an SVGS on a HUD or an HWD
- The importance of maintaining a visual scan and understanding the effect of display compellingness
- Perspective views, such as egocentric or exocentric, and recommended use (if applicable)
- SVS secondary display intended functions (if applicable)

Recommended Training Level? (Select One)	Comments?
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: § 91.175; AC 20-185A; AC 120-118; DO-407
Secondary References: § 91.1039; § 121.419; § 121.422; § 121.651; § 125.325; § 125.381; § 135.225; Order 8400.13F; SAFO 09016; SAFO 10005; SAFO 15004; SAFO 15011; SAFO 21007; SAFO 24002; AC 120-71B; AC 120-123

2.9 Flight Training

Proper Piloting Techniques Associated with Using an SVGS During Landing and Rollout (Consider Day and Night)

Example topics (*not exhaustive*):

- Display FOV
- Display FOR
- Display minification
- Adjusting display brightness
- Color representation
- Presentation of aircraft flight information and flight symbology, including the zero pitch reference line
- Obstacle symbology
- Obstacles that are not represented in the obstacle database, such as those below a threshold height
- Obstacle clearance awareness, especially for nonprecision approaches with no published VDP
- Traffic symbology and detection of runway incursions (if applicable)
- Pathway guidance symbology (if applicable)
- Conformal portrayal of pitch attitude
- Effect of crosswinds on the FOV, including the use of flight symbology caged and uncaged modes (if applicable)
- Symbology representation of the extended runway centerline and approach lighting systems (if applicable)
- Presentation of the DRIL and symbology for other runways
- Symbology elements for airports (if applicable)
- Symbology for visual guidance cues, such as PAPIs or VASIs
- Symbology representation of distance markers, and detection of runway excursions
- Depiction of runway signage, runway markings, and runway lighting
- Recognition of improper presentation of elements in the external visual scene
- Transitioning from SVGS imagery to natural vision for detecting visual references required by 14 CFR § 91.175
- Confirmation of the availability of all required SVGS equipment and systems in accordance with the AFM or AFM Supplement (or RFM or RFM Supplement), AC 20-185, and the OpSpec, MSpec, or LOA
- Display message when SVGS high-precision position assurance monitors are unreliable and appropriate pilot response

CHECKLIST CONTINUED ON NEXT PAGE

2.9 Flight Training

Proper Piloting Techniques Associated with Using an SVGS During Landing and Rollout (Consider Day and Night)

- Use of an SVGS for offset and steep approaches to the maximum allowed for SA CAT I operations, in accordance with FAA Order 8400.13F, AC 120-118, and the OpSpecs, MSpecs, or LOAs related to operations conducted with an SVGS (e.g., C059)
- VDAs, VDPs, VGSI angles, and the significance of VDA and VGSI angles that are not coincident
- Importance of considering airfield lighting intensity, particularly for an SVGS on a HUD or an HWD
- Altitude alerting, including audio callouts
- Cross-checking the symbology against both the SVGS imagery and the external visual scene to verify that the SVGS imagery, attitude symbology, FPV, FPARC, runway numbers, runway edge lines, and other cues are aligned with and scaled to the external visual scene
- Accuracy of the synthetic image when close to the runway and the potential for the image to jitter
- The importance of maintaining a visual scan and understanding the effect of display compellingness
- Perspective views, such as egocentric or exocentric, and recommended use (if applicable)
- SVS secondary display intended functions (if applicable)

Recommended Training Level? (Select One)	Comments?
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: § 91.175; AC 20-185A; AC 120-118; DO-407
Secondary References: § 91.1039; § 121.419; § 121.422; § 121.651; § 125.325; § 125.381; § 135.225; Order 8400.13F; SAFO 09016; SAFO 10005; SAFO 15004; SAFO 15011; SAFO 21007; SAFO 24002; AC 120-57C; AC 120-71B; AC 120-123

2.10 Flight Training

Proper Piloting Techniques Associated with Using an SVGS During Missed Approaches (Consider Day and Night)

Example topics (*not exhaustive*):

- Display FOV
- Display FOR
- Display minification
- Adjusting display brightness
- Color representation
- Presentation of aircraft flight information and flight symbology, including the zero pitch reference line
- Conformal portrayal of pitch attitude
- Symbology representation of distance markers
- Obstacle symbology
- Obstacles that are not represented in the obstacle database, such as those below a threshold height
- Traffic symbology (if applicable)
- Pathway guidance symbology (if applicable)
- Effect of crosswinds on the FOV, including the use of flight symbology caged and uncaged modes (if applicable)
- Confirmation of the availability of all required SVGS equipment and systems in accordance with the AFM or AFM Supplement (or RFM or RFM Supplement), AC 20-185, and the OpSpec, MSpec, or LOA
- Display message when SVGS high-precision position assurance monitors are unreliable, or when display jitter is misleading or distracting, and the appropriate pilot response
- Requirement for a missed approach if any required component of the SVGS fails, unless it is safer to continue
- SVGS symbology or flight information presented during a missed approach procedure (if applicable)
- Cross-checking the symbology against both the SVGS imagery and the external visual scene to verify that the SVGS imagery, attitude symbology, FPV, FPARC, runway numbers, runway edge lines, and other cues are aligned with and scaled to the external visual scene
- Missed approach procedures—all engines operating and one engine inoperative

CHECKLIST CONTINUED ON NEXT PAGE

2.10 Flight Training

Proper Piloting Techniques Associated with Using an SVGS During Missed Approaches (Consider Day and Night)

- The importance of maintaining a visual scan and understanding the effect of display compellingness
- Perspective views, such as egocentric or exocentric, and recommended use (if applicable)
- SVS secondary display intended functions (if applicable)

Recommended Training Level? (Select One)	Comments?
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; AC 120-118; DO-407
Secondary References: § 91.175; § 91.1039; § 121.419; § 125.325; § 125.381; § 135.225; SAFO 09016; SAFO 10005; SAFO 15004; SAFO 15011; AC 120-71B

2.11 Flight Training

Proper Piloting Techniques Associated with Using an SVGS During Balked Landings

Example topics (*not exhaustive*):

- Display FOV
- Display FOR
- Display minification
- Adjusting display brightness
- Color representation
- Presentation of aircraft flight information and flight symbology, including the zero pitch reference line
- Conformal portrayal of pitch attitude
- Symbology representation of distance markers
- Obstacle symbology
- Obstacles that are not represented in the obstacle database, such as those below a threshold height
- Traffic symbology (if applicable)
- Pathway guidance symbology (if applicable)
- Effect of crosswinds on the FOV, including the use of flight symbology caged and uncaged modes (if applicable)
- Confirmation of the availability of all required SVGS equipment and systems in accordance with the AFM or AFM Supplement (or RFM or RFM Supplement), AC 20-185, and the OpSpec, MSpec, or LOA
- Display message when SVGS high-precision position assurance monitors are unreliable, or when display jitter is misleading or distracting, and the appropriate pilot response
- Requirement for a missed approach if any required component of the SVGS fails, unless it is safer to continue
- SVGS symbology or flight information presented during a missed approach procedure (if applicable)
- Cross-checking the symbology against both the SVGS imagery and the external visual scene to verify that the SVGS imagery, attitude symbology, FPV, FPARC, runway numbers, runway edge lines, and other cues are aligned with and scaled to the external visual scene
- Missed approach procedures—all engines operating and one engine inoperative
- The importance of maintaining a visual scan and understanding the effect of display compellingness
- Perspective views, such as egocentric or exocentric, and recommended use (if applicable)
- SVS secondary display intended functions (if applicable)

CHECKLIST CONTINUED ON NEXT PAGE

2.11 Flight Training	
Proper Piloting Techniques Associated with Using an SVGS During Balked Landings	
Recommended Training Level? (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; AC 120-118; DO-407
Secondary References: § 91.175; § 91.1039; § 121.419; § 125.325; § 125.381; § 135.225; SAFO 09016; SAFO 10005; SAFO 15004; SAFO 15011; AC 120-71B

2.12 Flight Training	
Transitioning from SVGS Imagery to Natural Vision Acquisition of Required Visual References and the Runway Environment (Consider Day and Night)	
Example topics (*not exhaustive*): • Transitioning from the SVGS image to natural vision and identifying any of the required visual references over a range of actual or simulated low-visibility conditions • Understanding of the "sight picture" of relevant visual references and the effect of the display type (HDD, HUD, HWD; if applicable) • Use of the SVS secondary display (if applicable)	
Recommended Training Level? (Select One)	**Comments?**
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; AC 120-118; DO-407
Secondary References: § 91.175; § 91.1039; § 121.419; § 125.325; § 125.381; § 135.225; SAFO 09016; SAFO 10005; SAFO 15004; SAFO 15011; AC 120-71B

2.13 Flight Training

Using SVGS Imagery, Aircraft Flight Information, and Flight Symbology to Touchdown and Rollout (Consider Day and Night)

Example topics (*not exhaustive*):

- Display FOV
- Display FOR
- Display minification
- Adjusting display brightness
- Color representation
- Traffic symbology and detection of runway incursions (if applicable)
- Presentation of aircraft flight information and flight symbology, including the zero pitch reference line
- Effect of crosswinds on the FOV, including the use of flight symbology caged and uncaged modes (if applicable)
- Symbology representation of distance markers, and runway excursions
- Depiction of signage, markings, and lighting
- Display message when SVGS high-precision position assurance monitors are unreliable and appropriate pilot response
- Cross-checking the symbology against both the SVGS imagery and the external visual scene to verify that the SVGS imagery, attitude symbology, FPV, FPARC, runway numbers, runway edge lines, and other cues are aligned with and scaled to the external visual scene
- Accuracy of the synthetic image when close to the runway and the potential for the image to jitter
- The importance of maintaining a visual scan and understanding the effect of display compellingness
- Perspective views, such as egocentric or exocentric, and recommended use (if applicable)
- SVS secondary intended functions (if applicable)

CHECKLIST CONTINUED ON NEXT PAGE

Recommended Training Level? (Select One)	Comments?
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; AC 120-118; DO-407
Secondary References: § 121.419; SAFO 15011; AC 120-57C; AC 120-71B

2.14 Flight Training

Normal Procedures When Using an SVGS

Example topics (*not exhaustive*):

- OEM-recommended flight procedures as provided in the AFM or AFM Supplement (or RFM or RFM Supplement), FCTM, FCOM, or QRH

Recommended Training Level? (Select One)	Comments?
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; AC 120-118; DO-407
Secondary References: § 25.1581; § 25.1585; § 121.419; AC 25.1581-1; AC 120-71B

2.15 Flight Training

Abnormal or Emergency Procedures when Using an SVGS

Example topics (*not exhaustive*):

- Importance of timely recognition and an accurate and timely response to flight deck alerts, annunciations, messages, or indications
- Failure in critical phases of flight—takeoff, approach, landing, and rollout
- Misleading synthetic imagery
- Loss of SVGS approach capability
- Detecting runway incursions and excursions
- Misleading aircraft flight information or flight symbology, particularly during final approach
- For an SVGS on a HUD or an HWD, obstruction of the view, especially during takeoff and final approach
- Upset prevention and recovery training
- Stall prevention and recovery training
- OEM-recommended emergency procedures as provided in the AFM or AFM Supplement (or RFM or RFM Supplement), FCTM, FCOM, or QRH
- Emergency procedures, both with and without an SVS secondary display (if applicable)

Recommended Training Level? (Select One)	Comments?
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; AC 120-109; AC 120-111; AC 120-118; DO-407
Secondary References: § 25.1581; § 25.1322; § 25.1585; § 121.419; AC 25.1322-1; AC 25.1581-1; AC 120-71B

2.16 Flight Training

Crew Coordination Procedures when Using an SVGS

Example topics (*not exhaustive*):

- PF and PM communications, to include callouts for continuing descent below the DA/DH or MDA using the SVGS, callouts to clearly communicate the decision to land or go-around, and callouts for abnormal SVGS operations
- Callouts for transitioning from SVGS to natural vision
- Failure in critical phases of flight—takeoff, approach, landing, and rollout (e.g., misleading SVGS imagery, initiating a missed approach below minimums, loss of SVGS approach capability)
- Loss of HDD-, HWD-, or HUD-based visual information or HDD-, HWD-, or HUD-relevant symbology is erroneous or misleading, particularly during final approach
- Interpretation and use of the SVS secondary display (if applicable)
- Emergency procedures, both with and without an SVS secondary display (if applicable)

Recommended Training Level? (Select One)	Comments?
☐ A ☐ B ☐ C ☐ D ☐ E	

Primary References: AC 20-185A; AC 120-109; AC 120-111; AC 120-118; DO-407
Secondary References: § 121.419; SAFO 09016; SAFO 10005; SAFO 15011; AC 120-71B

3.2.3 Special Emphasis Areas Checklist

3 Special Emphasis Areas	
A Special Emphasis Area may include a training requirement unique to the aircraft, based on a system, procedure, or maneuver, that requires additional highlighting during training. It may also require additional training time, specialized flight simulation training devices, or training equipment.	
Are There Any Special Emphasis Areas for Initial Training? (Select One)	**Findings?**
☐ Yes ☐ No	
Are There Any Special Emphasis Areas for Refresher Training? (Select One)	**Findings?**
☐ Yes ☐ No	

Reference: FSBR Template (FAA Internal Only)

3.3 Training Difference Levels for a Modified Synthetic Vision Guidance System and Aircraft Combination

Training Difference Levels Overview and Decision Tree Instructions

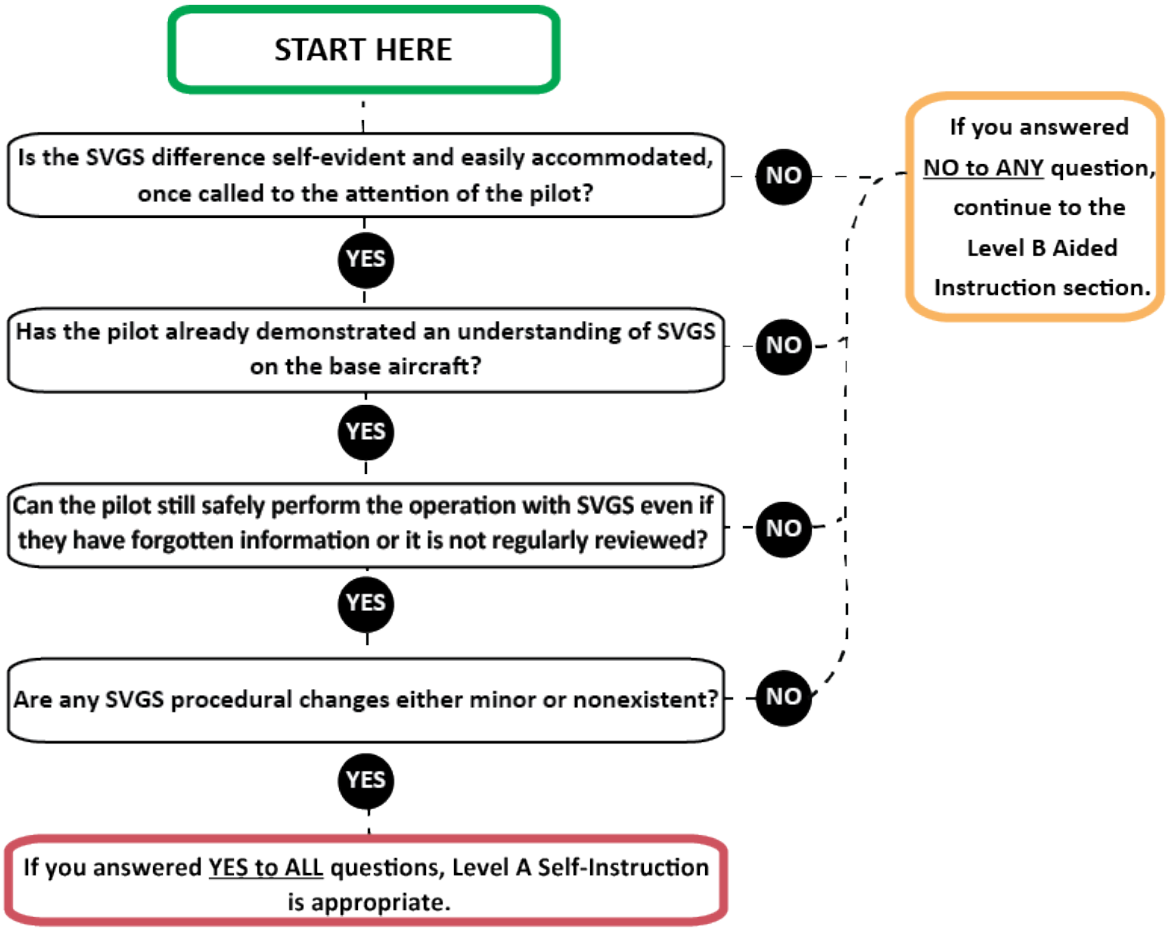
The decision trees in this section can be used to determine the recommended level of training for familiarization for a modified SVGS and aircraft combination. Decision trees and example training methods are provided for Training Difference Levels A, B, C, D, and E. This material is based on the guidance provided in AC 120-53B.

The decision trees in this section can be used to determine difference level training recommendations for a modified SVGS and aircraft combination.

Use the decision trees as follows:

1. Start with the decision tree for Training Difference Level A.
2. Answer the yes/no questions.
    a. A “no” response to any question indicates that the category training level may not be sufficient.
3. Continue to the next higher training level.
4. Complete the Training Difference Level Summary with the appropriate training difference level and any noteworthy findings.

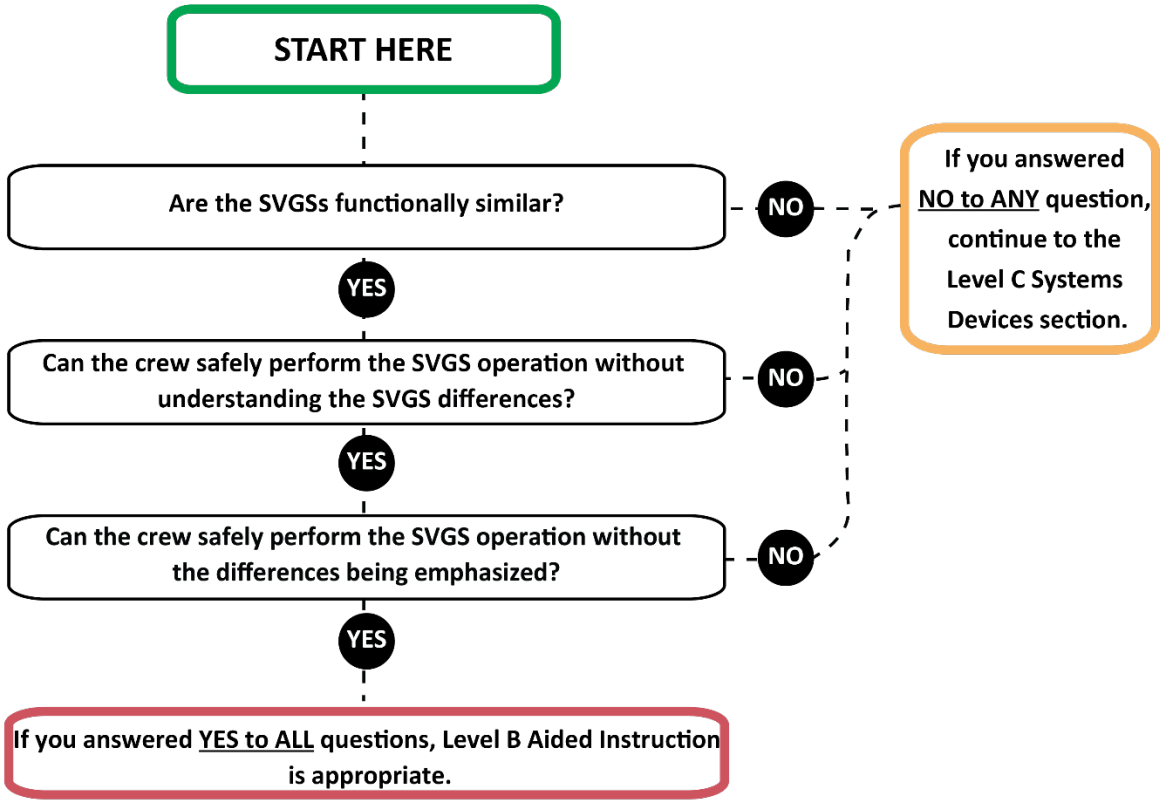
3.3.1 Category A: Difference Level A Self-Instruction Decision Tree



Category A Self-Instruction Training Methods

Difference Level A Self-Instruction Examples
Issuing operating manual page revisions (**HO**)
Dissemination of operating bulletins (**HO**)
Differences handouts to describe minor differences (**HO**)

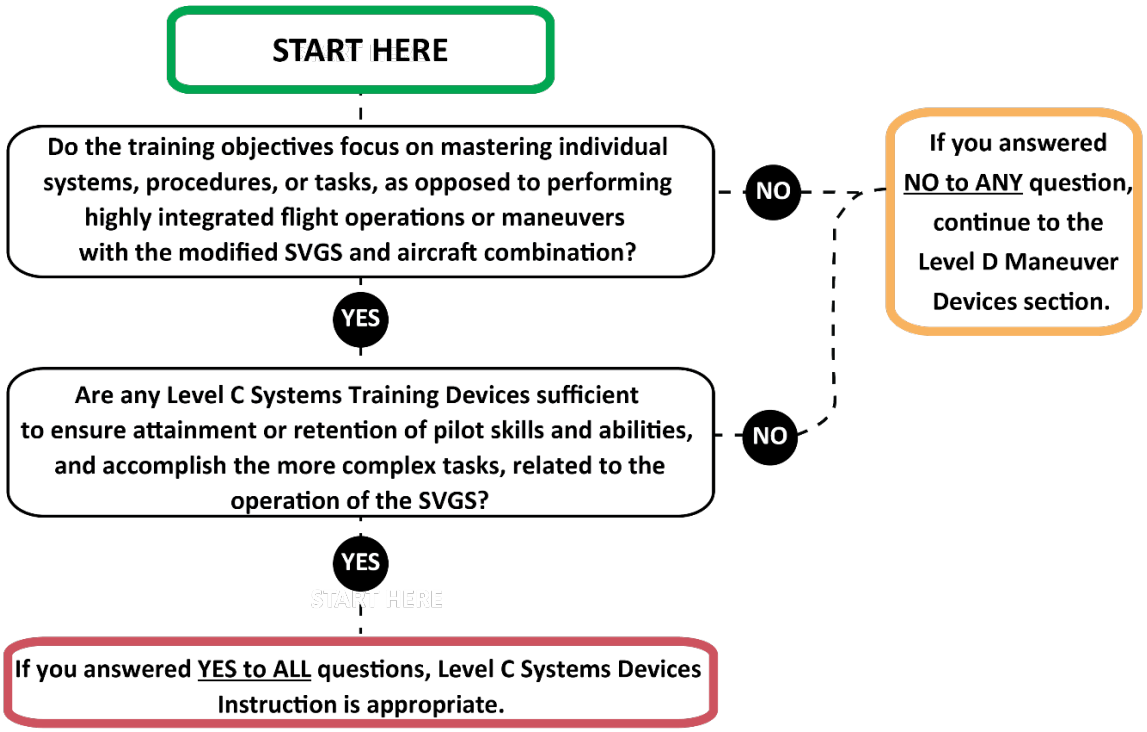
3.3.2 Category B: Difference Level B Aided Instruction Decision Tree



Category B Aided Instruction Training Methods

Difference Level B Aided Instruction Examples
Noninteractive computer-based training (CBT)
Stand-up lectures (SU)
Video (V)

3.3.3 Category C: Difference Level C Systems Devices Decision Tree

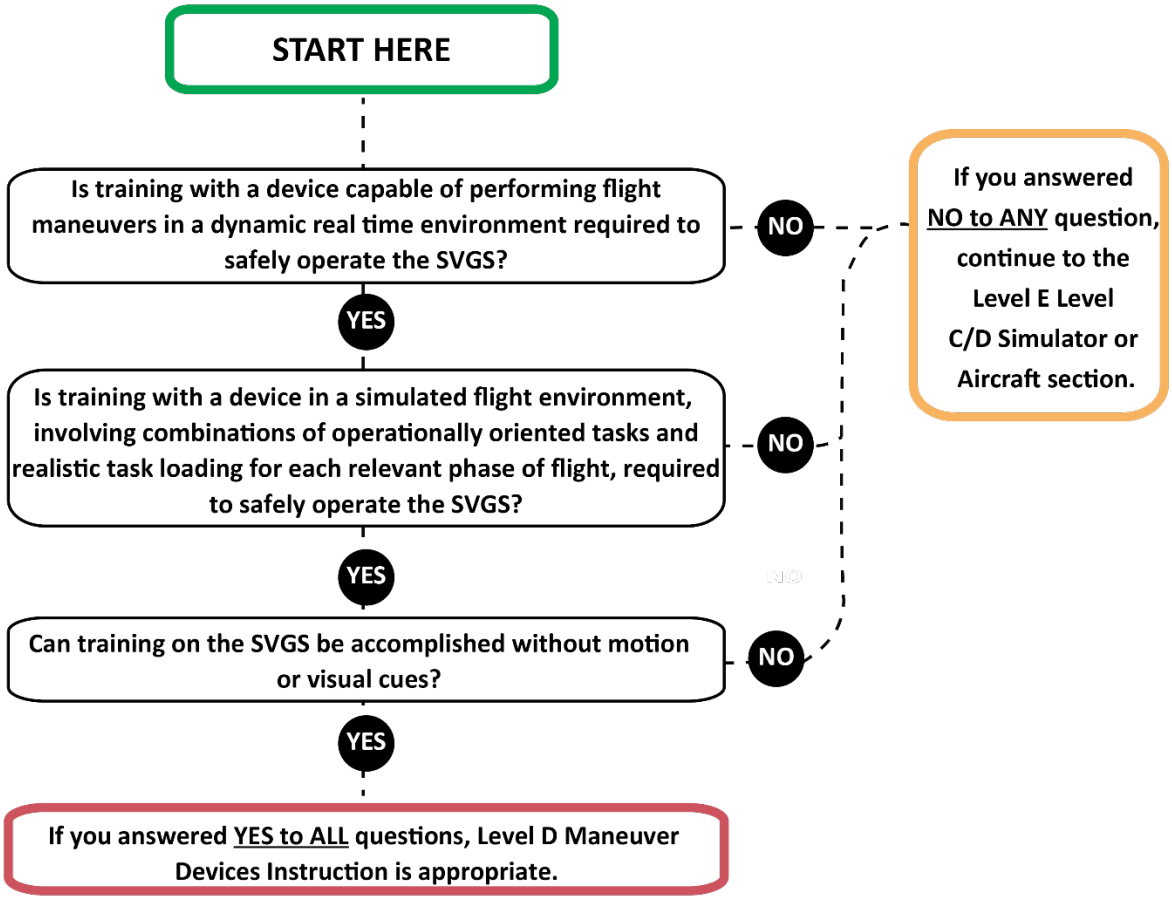


Category C Systems Devices Training Methods

Difference Level C Systems Devices Examples
Interactive computer-based training (ICBT)
Cockpit system simulator (CSS)
Cockpit procedures trainer (CPT)
Part task trainers (PTT)
Flight training devices (levels 2–5) (FTD 2-5)
Extended reality–based training (XR) [8]

[8] A system device may include extended reality (XR), such as virtual-reality (VR), augmented-reality (AR), or mixed-reality (MR) technologies. These evolving technologies that are used for education and training applications. Here, we have included XR as a Level C training device; however, AED personnel should evaluate the implementation to determine the training level categorization. Briefly, VR tries to recreate and replace the real-world environment with a virtual one; AR allows virtual objects to be overlaid on a live view of the real world; and MR is a hybrid of virtual and AR that blends the physical world with the digital world. The quality and effectiveness of the XR training may depend on the specific type of technology (VR, AR, MR), the display device (e.g., HWD, computer display), the level of interactivity, usability, immersion (e.g., presence of spatial sounds, screen resolution, frame rate, quality of graphics), and any lag among body or gesture movements, pointer movements, and display updates, as a few examples. Fidelity will vary by application, and appearance may not equate to functionality.

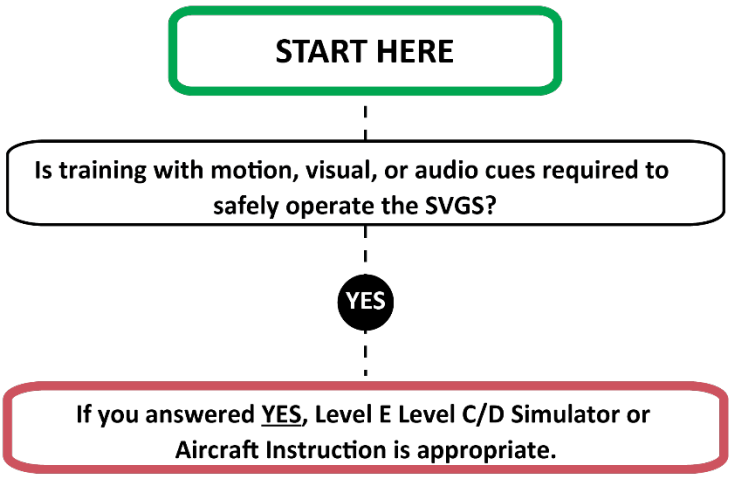
3.3.4 Category D: Difference Level D Maneuver Devices Decision Tree



Category D Maneuver Devices Training Methods

Difference Level D Maneuver Devices Examples
Flight training devices level 6 or 7 (FTD 6-7)
Simulators level A or B (SIM A-B)

3.3.5 Category E: Difference Level E Level C/D Simulator or Aircraft Instruction Decision Tree



Category E Level C/D Simulator or Aircraft Instruction Training Methods

Difference Level E Level C/D Simulator or Aircraft Instruction Examples
Simulators level C or D (SIM C/D)
Aircraft (ACFT)

3.3.6 Master Difference Level Ground Training Summary

1 Ground Training Difference Level Summary
For a New or Modified SVGS and Aircraft Combination, What Is the Highest Recommended Level for Any Individual Ground Training Item? (Select One)
☐ ☐ Level B: Aided Instruction ☐ Level C: Systems Devices ☐ Level D: Maneuver Devices ☐ Level E: Level C or D Full Flight Simulator (FFS) or Aircraft
Findings?

3.3.7 Master Difference Level Flight Training Summary

2	Flight Training Difference Level Summary
For a New or Modified EFVS and Aircraft Combination, What Is the Highest Recommended Level for Any Individual Flight Training Item? (Select One)	
☐	
☐ Level B: Aided Instruction	
☐ Level C: Systems Devices	
☐ Level D: Maneuver Devices	
☐ Level E: Level C or D Full Flight Simulator (FFS) or Aircraft	
Findings?	

4. Operational Evaluation: Checking Recommendations

The “Operational Evaluation: Checking Recommendations” chapter of the *Federal Aviation Administration Aircraft Evaluation Division Operations and Human Factors and Evaluation Aid for Synthetic Vision Guidance Systems* is intended to aid in standardizing the aircraft evaluation division (AED) process of determining Federal Aviation Administration (FAA) Flight Standardization Board (FSB) checking levels recommendations for a new or modified synthetic vision guidance system (SVGS) and aircraft combination. When AED personnel are evaluating a training curriculum recommended by an original equipment manufacturer (OEM) or training provider, they may use this chapter to ensure that recommended knowledge and skills checking specific to the SVGS and aircraft combination are identified.

This aid does not replace FAA regulatory and guidance materials but rather serves as a tool to provide structure to determine FAA FSB SVGS checking levels recommendations specific to the SVGS and aircraft combination, which may be included in a Flight Standardization Board Report (FSBR). The directions described herein are not meant to unnecessarily restrict trained AED personnel, and it is expected that the judgment and expertise of personnel will be applied. The term *check* is used in the context of AED roles and responsibilities, as defined in Appendix 1 of Advisory Circular (AC) 120-53B. AC 120-53B defines check as “[a]n assessment of crewmember proficiency during which limited training or practice is allowed. The assessment is of knowledge and skill in tasks to the standards identified by the FAA.”

As part of the operational evaluation (OE), qualified pilot test subjects are included to help identify checking items to be included as recommendations in the FSBR. It is important that the pilot test subjects have an appropriate background for the OE; factors such as SVGS training, previous qualification in the aircraft, flight experience (including low-visibility operations), and currency should be considered.

Additionally, aircraft-specific considerations for FSB OEs may be required. For example, per Section 128 of the Aircraft Certification, Safety, and Accountability Act (ACSAA) and FAA Order 8900.1, Volume 8, Chapter 2, Sections 5 and 6, the use of domestic and foreign air carrier pilots with varying levels of experience must be included as part of the sample of pilot test subjects for OEs on certain transport airplanes.

4.1 Overview

This chapter is organized in the form of checklists and decision trees, which are largely based on but do not replace the regulations in 14 Code of Federal Regulations (CFR) §§ 61.58, 91.1065(g), 121.441, 121 Appendix F, 125.287, and 135.293 and guidance in AC 120-53B and AC 120-118 (see Checking Recommendations Chapter References).

Regarding this chapter:

- AED personnel are encouraged to review the regulatory, advisory, and guidance materials provided in Table 17, Table 18, Table 19, Table 20, and Table 21 and in the list of key references in the Appendix.

- If questions arise during the SVGS evaluation, AED personnel may wish to contact the FAA Flight Standards Service (FS), Flight Technologies and Procedures Division, Flight Operations Branch (AFS-410).
- Descriptions accompany each checking item to provide context for the evaluation.

4.1(a) Chapter Organization

4.1(a)(i) Checklists for Checking Requirements

14 CFR does not include any checking requirements for pilots to conduct operations with a new or modified SVGS. However, 14 CFR addresses checking requirements (though not specific to operations with an SVGS), including in Parts 61, 91 Subpart K, 121, 125, and 135. AC 120-118 Section 5-14 provides guidance on checking for Special Authorization (SA) Category (CAT) I operations:

> In addition to CAT I qualification completion, flightcrew members should demonstrate proper use of SA CAT I related aircraft systems for which credit is being sought (e.g., head-up display [HUD], SVGS, radio altitude) as well as approved operator procedures, including any provisions specified by an applicable FSBR. Pilots should demonstrate proficiency in SA CAT I approaches. The following events may be accomplished individually or in any combination:
>
> - A normal approach to a landing at SA CAT I minima
> - A normal approach to a go-around at SA CAT I minima
> - Approaches with related aircraft system, navigation system, or flight guidance failures
> - An engine-inoperative approach
> - A go-around from an altitude below DA/DH

AED personnel may identify areas specific to the SVGS and aircraft combination, which may be included as a recommended checking item in the FSBR. This chapter includes five checklists to assist with identifying SVGS aeronautical knowledge areas, areas of operations, or tasks, maneuvers, procedures, or operations that should be included as part of a proficiency or competency check for each of the following operating rules:

- 4.2.1 Proficiency Check Required by 14 CFR Part 61
- 4.2.2 Competency Check Required by 14 CFR Part 91
- 4.2.3 Proficiency Check Required by 14 CFR Part 121
- 4.2.4 Competency Check Required by 14 CFR Part 125
- 4.2.5 Competency Check Required by 14 CFR Part 135

During the training evaluation process (see the "Operational Evaluation: Training Recommendations" chapter), AED personnel are encouraged to consider areas specific to the SVGS and aircraft combination that may be included as part of a competency or proficiency check.

4.1(a)(ii) Decision Trees for Modified SVGS Checking Difference Level Recommendations

There may be instances in which an applicant has modified an SVGS on the same aircraft model, such as installing different SVGS hardware or software. These modifications may result in SVGS tasks, maneuvers, procedures, or operations that should be included as part of a check. Section 4.3 Checking Difference Levels for a Modified Synthetic Vision Guidance System and Aircraft Combination includes decision trees that were informed by guidance in AC 120-53B. AED personnel may use the decision trees to help determine recommended checking levels to ensure the pilot has adequate knowledge of and familiarity with the SVGS and the procedures to be used following differences training. The decision trees include a series of questions and examples of checking methods for each of the Checking Difference Levels—A, B, C, D, and E.

4.1(b) Terminology

The following terminology and descriptions are used in the context of the *Federal Aviation Administration Aircraft Evaluation Division Operations and Human Factors Evaluation Aid for Synthetic Vision Guidance Systems* and do not replace definitions provided elsewhere in FAA regulatory and guidance material:

- ***Check.*** The term *check* generally refers to an assessment of crewmember proficiency during which limited training or practice is allowed or to an assessment of knowledge and skill in tasks to the standards identified by the FAA (see AC 120-53B Appendix 1 for a definition).
- ***Evaluation plan (EP).*** An EP is submitted by the applicant and accepted by the AED to outline the FSB's operational activities, including crewmember training, checking, and identification of gaps in operational suitability arising from simulator crewmember training (e.g., equipment differences, night conditions, instrument flight rules [IFR]). The EP should also include a manufacturer-proposed Master Differences Requirements (MDR) table and differences tables (DT) in accordance with AC 120-53B, Guidance for Conducting and Use of Flight Standardization Board Evaluations, if the applicant is seeking differences credit.
- ***Modified SVGS.*** A modified SVGS refers to an SVGS that has been altered or upgraded through modification, typically to enhance performance, comply with new regulations or guidance, or fulfill a specialized mission. For FSB purposes, a modified SVGS evaluation may be for a previously certified SVGS that has received a modification to its hardware or software but is still installed in the same model of aircraft (e.g., an SVGS certified on aircraft model "X" is modified but still installed in aircraft model "X").
- ***New SVGS.*** A new SVGS refers to an SVGS in its original design. For FSB purposes, a "new" SVGS evaluation is either (1) an SVGS that has never been certified by the FAA or (2) an SVGS that was previously certified by the FAA in a specific aircraft model and is then installed in a different aircraft model (e.g., an SVGS certified for aircraft model "X" is installed in aircraft model "Y").
- ***Operational evaluation (OE).*** An OE is an AED process to determine pilot type rating, minimum crewmember training, checking and currency requirements, and the unique or special airman certification requirements (e.g., specific flight characteristics, no-flap landing).

- ***Operational suitability evaluation (OSE).*** An OSE is an AED determination that an aircraft or system may be safely used in the National Airspace System (NAS) and meets the applicable FAA policies and regulatory requirements.

4.1(c) Checking Recommendations Chapter References

Table 17.
FAA Regulations Included in the "Operational Evaluations: Checking Recommendations" Chapter

14 CFR Regulations	Title
§ 61.58	Pilot-in-Command Proficiency Check: Operation of an Aircraft That Requires More Than One Pilot Flight Crewmember or Is Turbojet-Powered
§ 91.1039	IFR Takeoff, Approach and Landing Minimums
§ 91.1065	Initial and Recurrent Pilot Testing Requirements
§ 91.1069	Flight Crew: Instrument Proficiency Check Requirements
§ 121.441	Proficiency Checks
§ 121.651	Takeoff and Landing Weather Minimums: IFR: All Certificate Holders
§ 121 Appendix F	Proficiency Check Requirements
§ 125.287	Initial and Recurrent Pilot Testing Requirements
§ 125.291	Pilot in Command: Instrument Proficiency Check Requirements
§ 125.325	Instrument Approach Procedures and IFR Landing Minimums
§ 125.381	Takeoff and Landing Weather Minimums: IFR
§ 135.225	IFR: Takeoff, Approach, and Landing Minimums
§ 135.293	Initial and Recurrent Pilot Testing Requirements
§ 135.297	Pilot in Command: Instrument Proficiency Check Requirements

Table 18.
Orders Included in the "Operational Evaluations: Checking Recommendations" Chapter

Order No.	Title
Order 8900.1, Vol. 3, Ch. 18, Sec. 5	Part C Operations Specifications—Airplane Terminal Instrument Procedures and Airport Authorizations and Limitations
Order 8900.1, Vol. 8, Ch. 2, Sec. 5	Flight Standardization Boards

Order No.	Title
Order 8900.1, Vol. 8, Ch. 2, Sec. 6	Involvement on a Flight Standardization Board

Table 19.
Safety Alerts for Operators Included in the "Operational Evaluations: Checking Recommendations" Chapter

SAFO No.	Title
SAFO 09016	Rejected Landing Due to Loss of Visibility
SAFO 10005	Go-Around Callout and Immediate Response
SAFO 15011	Roles and Responsibilities for Pilot Flying (PF) and Pilot Monitoring (PM)

Table 20.
Advisory Circulars Included in the "Operational Evaluations: Checking Recommendations" Chapter

AC No.	Title
AC 120-53B	Guidance for Conducting and Use of Flight Standardization Board Evaluations - With Change 1
AC 120-71B	Standard Operating Procedures and Pilot Monitoring Duties for Flight Deck Crewmembers
AC 120-109	Stall and Stick Pusher Training
AC 120-118	Criteria for Approval/Authorization of All Weather Operations for Takeoff, Landing, and Rollout
AC 120-123	Flightpath Management

Table 21.
Other Technical Resources Included in the "Operational Evaluations: Checking Recommendations" Chapter

Resource	Title
ACSAA	Aircraft Certification, Safety, and Accountability Act (ACSAA)
FAA Practical Test Standards	Practical Test Standards (PTS)
FAA Airman Certification Standards	Airman Certification Standards (ACS)

4.2 Pilot Checking Recommendations Checklists for New or Modified Synthetic Vision Guidance System and Aircraft Combinations

Checking Chapter Checklist Overview and Instructions

There are no checking requirements in 14 C.F.R. that are specific to new or modified SVGSs. However, SVGS tasks, procedures, maneuvers, or operations may be included as part of competency or proficiency checks (see AC 120-118 Section 5-14 for SA CAT I guidance and 14 C.F.R. Parts 61, 91 Subpart K, 121, 125, and 135). The checklists in this chapter will aid AED personnel in determining checking recommendations specific to the SVGS and aircraft combination. These checklists can be used for both new and modified SVGSs.

This chapter includes checklists for the following:

Whenever possible, examples are given to provide context for the checklist item. The examples are not intended to serve as an exhaustive list, and the examples may not be applicable to every SVGS and aircraft combination.

For each checklist item

1. Consider SVGS aeronautical knowledge areas, areas of operations, or tasks, maneuvers, or procedures.
2. Select the appropriate “yes,” “no,” or “N/A” response.
3. Provide details on the items to include in the check and the frequency of the check.

4.2.1 Proficiency Check Required by 14 CFR Part 61

1 Proficiency Check Required by Part 61	
14 CFR § 61.58 addresses pilot in command proficiency checks specific to the operation of an aircraft that requires more than one pilot flightcrew member or is turbojet powered. Although § 61.58 does not directly address SVGS, AED personnel should consider the use of an SVGS for tasks, procedures, maneuvers, or operations detailed in the applicable Airman Certification Standard (ACS) or practical test standards (PTS), such as • Any SVGS-focused tasks, such as aeronautical knowledge, risk management, and skill areas • Crew coordination and timely utilization of appropriate SVGS checklists • Lowest visibility conditions allowed by the operating rule or letter of authorization (LOA)[9]	
After reviewing 14 CFR § 61.58 and AC 120-118 Section 5-14, are there any recommended SVGS aeronautical knowledge areas, areas of operations, or tasks, maneuvers, or procedures that should be included during a proficiency check? (Select One)	If yes, what are they *and* how often should they be checked? (Specify)
☐ Yes ☐ No ☐ N/A	

Primary References: § 61.58; AC 120-53B; FAA Practical Test Standards *or* FAA Airman Certification Standards
Secondary References: Order 8900.1, Vol. 3, Ch. 18, Sec. 5; SAFO 09016; SAFO 10005; SAFO 15011; AC 120-71B; AC 120-109; AC 120-118; AC 120-123

[9] The FAA Flight Technologies and Procedures Division, Flight Operations Branch (AFS-410) should be contacted for information on SVGS-focused operations specifications (OpSpecs), management specifications (MSpecs), and LOAs, such as C059.

4.2.2 Competency Check Required by 14 CFR Part 91

2 Competency Check Required by Part 91 Subpart K	
14 CFR Part 91 Subpart K does not directly address competency checks for conducting operations using an SVGS. However, AED personnel should consider the use of an SVGS for tasks, procedures, maneuvers, or operations detailed in the applicable ACS or PTS, such as: • Any SVGS-focused tasks, such as aeronautical knowledge, risk management, and skill areas • Crew coordination and timely utilization of appropriate SVGS checklists • Lowest visibility conditions allowed by the operating rule or management specification (MSpec)[10] In accordance with § 91.1065(b), the check should include any of the maneuvers and procedures currently required for the original issuance of the particular pilot certificate required for the operations authorized and appropriate to the category, class, and type of aircraft involved. In accordance with § 91.1069(d), the check should include navigation by instruments, recovery from simulated emergencies, and standard instruction approaches involving navigational facilities that the pilot is to be authorized to use.	
After reviewing 14 CFR Part 91 Subpart K and AC 120-118 Section 5-14, are there any SVGS aeronautical knowledge areas, areas of operations, or tasks, maneuvers, or procedures that should be included during a competency check? (Select One)	If yes, what are they *and* how often should they be checked? (Specify)
☐ Yes ☐ No ☐ N/A	

Primary References: *§ 91.1065(b); § 91.1069(d); AC 120-53B; FAA Practical Test Standards or FAA Airman Certification Standards*
Secondary References: *§ 91.1039; Order 8900.1, Vol. 3, Ch. 18, Sec. 5; SAFO 09016; SAFO 10005; SAFO 15011; AC 120-71B; AC 120-109; AC 120-118; AC 120-123*

[10] The FAA Flight Technologies and Procedures Division, Flight Operations Branch (AFS-410) should be contacted for information on SVGS-focused operations specifications (OpSpecs), MSpecs, and LOAs, such as C059.

4.2.3 Proficiency Check Required by 14 CFR Part 121

3 Proficiency Check Required by Part 121	
14 CFR § 121.441 does not directly address proficiency checks for conducting operations using an SVGS. However, AED personnel should consider the use of an SVGS for tasks, procedures, maneuvers, or operations detailed in 14 CFR Part 121 Appendix F: • Any SVGS-focused tasks, such as aeronautical knowledge, risk management, and skill areas • Crew coordination and timely utilization of appropriate SVGS checklists • Lowest visibility conditions allowed by the operating rule or operations specifications (OpSpec)[11]	
After reviewing 14 CFR § 121.441 and AC 120-118 Section 5-14, are there any additional SVGS aeronautical knowledge areas, areas of operations, or tasks, maneuvers, or procedures that should be included during a proficiency check? (Select One)	If yes, what are they *and* how often should they be checked? (Specify)
☐ Yes ☐ No ☐ N/A	

Primary References: *§ 121 Appendix F; § 121.441; AC 120-53B; FAA Practical Test Standards or FAA Airman Certification Standards*
Secondary References: *§ 121.651; Order 8900.1, Vol. 3, Ch. 18, Sec. 5; SAFO 09016; SAFO 10005; SAFO 15011; AC 120-118; AC 120-123*

[11] The FAA Flight Technologies and Procedures Division, Flight Operations Branch (AFS-410) should be contacted for information on SVGS-focused OpSpecs, MSpecs, and LOAs, such as C059.

4.2.4 Competency Check Required by 14 CFR Part 125

4 Competency Check Required by Part 125	
14 CFR § 125.287 and 14 CFR § 125.291 do not directly address initial and recurrent pilot testing or instrument proficiency checks for conducting operations using an SVGS. However, AED personnel should consider the use of an SVGS for any tasks, procedures, maneuvers, or operations detailed in the applicable ACS or PTS, such as • Any SVGS-focused tasks, such as aeronautical knowledge, risk management, and skill areas • Crew coordination and timely utilization of appropriate SVGS checklists • Lowest visibility conditions allowed by the operating rule or OpSpec[12] In accordance with § 125.287(b), the check should include any of the maneuvers and procedures currently required for the original issuance of the particular pilot certificate required for the operations authorized and appropriate to the category, class, and type of aircraft involved. In accordance with § 125.291(c), the check should include navigation by instruments, recovery from simulated emergencies, and standard instrument approaches involving navigational facilities that the pilot is to be authorized to use.	
After reviewing 14 CFR § 125.287 and § 125.291 and AC 120-118 Section 5-14, are there any SVGS aeronautical knowledge areas, areas of operations, or tasks, maneuvers, or procedures that should be included during a competency check? (Select One)	If yes, what are they *and* how often should they be checked? (Specify)
☐ Yes ☐ No ☐ N/A	

Primary References: § 125.287; § 125.291; AC 120-53B; FAA Practical Test Standards or FAA Airman Certification Standards
Secondary References: § 125.325; § 125.381; Order 8900.1, Vol. 3, Ch. 18, Sec. 5; SAFO 09016; SAFO 10005; SAFO 15011; AC 120-118; AC 120-123

[12] The FAA Flight Technologies and Procedures Division, Flight Operations Branch (AFS-410) should be contacted for information on SVGS-focused OpSpecs, MSpecs, and LOAs, such as C059.

4.2.5 Competency Check Required by 14 CFR Part 135

5 Competency Check Required by Part 135	
14 CFR § 135.293 and 14 CFR § 135.297 do not directly address initial and recurrent pilot testing or instrument proficiency checks for conducting operations using an SVGS. However, AED personnel should consider the use of an SVGS for any tasks, procedures, or maneuvers detailed in the applicable ACS or PTS, such as • Any SVGS-focused tasks, such as aeronautical knowledge, risk management, and skill areas • Crew coordination and timely utilization of appropriate SVGS checklists • Lowest visibility conditions allowed by the operating rule or OpSpec[13] In accordance with § 135.293(b), the check should include any of the maneuvers and procedures currently required for the original issuance of the particular pilot certificate required for the operations authorized and appropriate to the category, class, and type of aircraft involved. In accordance with § 135.297(c), the check should include navigation by instruments, recovery from simulated emergencies, and standard instrument approaches involving navigational facilities that the pilot is to be authorized to use.	
After reviewing 14 CFR § 135.293 and § 135.297 and AC 120-118 Section 5-14, are there SVGS aeronautical knowledge areas, areas of operations, or tasks, maneuvers, or procedures that should be included during a competency check? (Select One)	If yes what are they *and* how often should they be checked? (Specify)
☐ Yes ☐ No ☐ N/A	

Primary References: *§ 135.293*; *§ 135.297*; *AC 120-53B*; *FAA Practical Test Standards* or *FAA Airman Certification Standards*
Secondary References: *§ 135.225*; *Order 8900.1, Vol. 3, Ch. 18, Sec. 5*; *SAFO 09016*; *SAFO 10005*; *SAFO 15011*; *AC 120-118*; *AC 120-123*

[13] The FAA Flight Technologies and Procedures Division, Flight Operations Branch (AFS-410) should be contacted for information on SVGS-focused OpSpecs, MSpecs, and LOAs, such as C059.

4.3 Checking Difference Levels for a Modified Synthetic Vision Guidance System and Aircraft Combination

Decision Tree Instructions

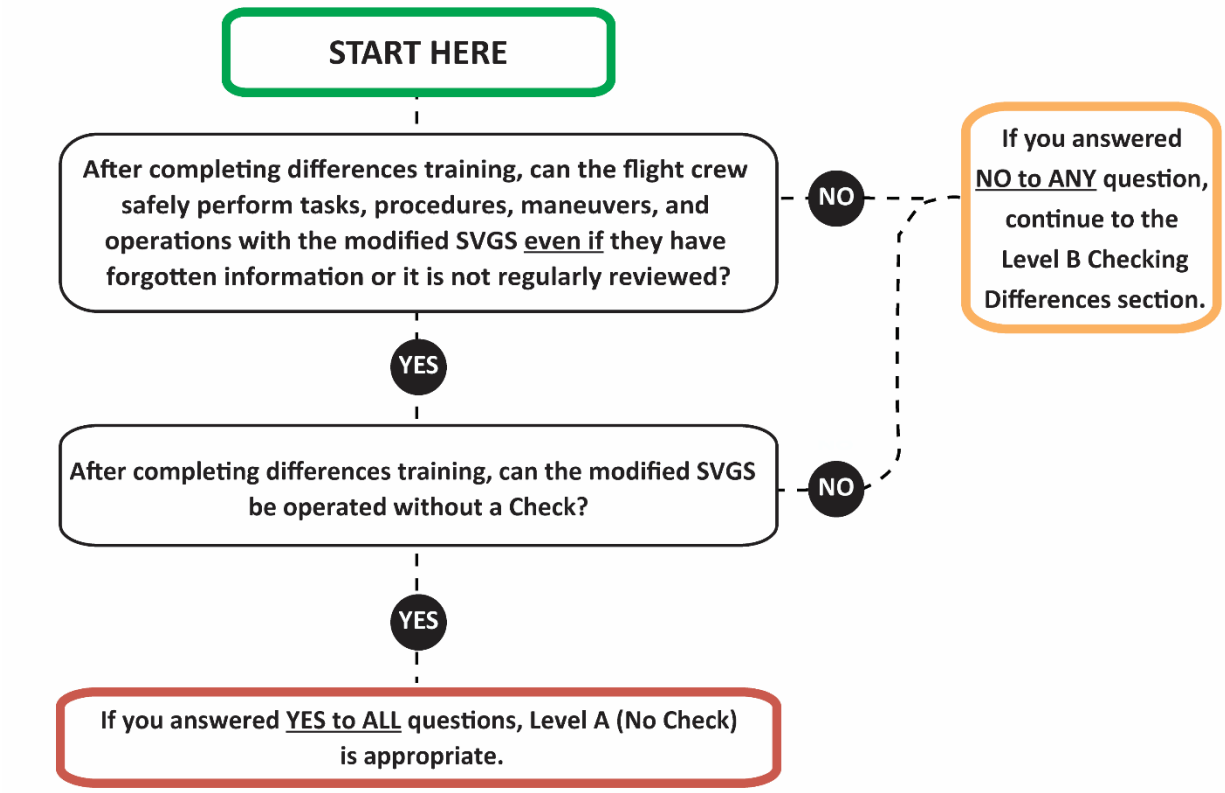
Decision trees and example checking methods are provided for Checking Difference Levels A, B, C, D, and E. This material is based on the guidance provided in AC 120-53B.

The decision trees in this section can be used to assist in determining difference level checking recommendations for a modified EFVS and aircraft combination.

Use the decision trees as follows:

1. Start with the decision tree for Difference Level A.
2. Answer the yes/no questions.
    a. A “no” response to any question indicates that the category training level may not be sufficient.
3. Continue to the next higher checking level.
4. Complete the Master Difference Level Checking Summary with the appropriate checking difference level and any noteworthy findings.

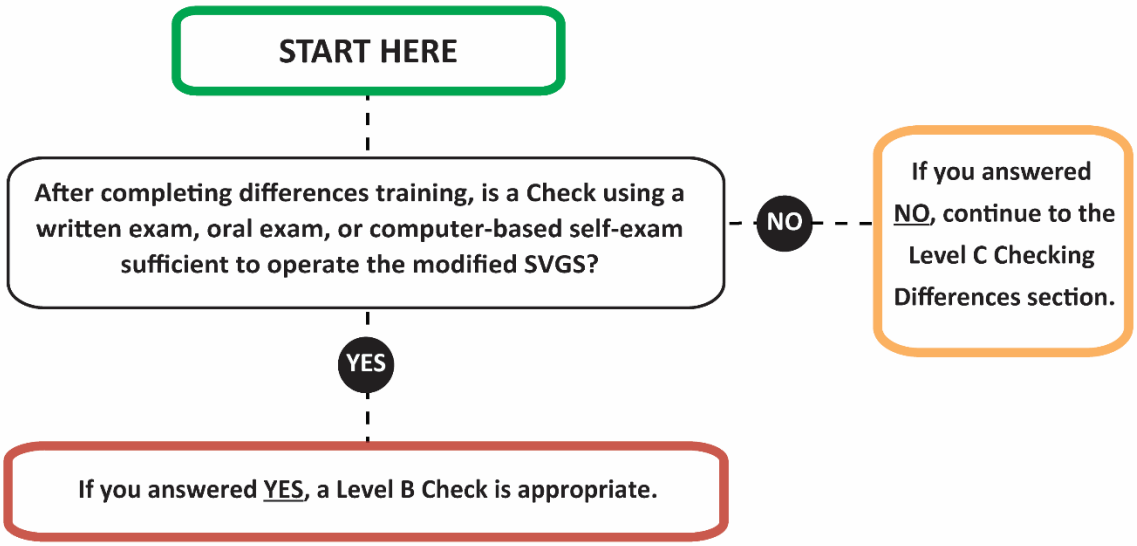
4.3.1 Level A Checking Differences



Level A Difference Check Example

Level A Difference Check Example	
Example 1	**Task Check Example 1**
A minor modification to SVGS software or hardware has been made that does not significantly affect the available functions, features, or presentation of information, and does not significantly affect any user interface or control.	Level A (No Check) is recommended after differences training because the change is minor, is not associated with any procedural changes, and does not adversely affect safety if the information is not reviewed or is forgotten.

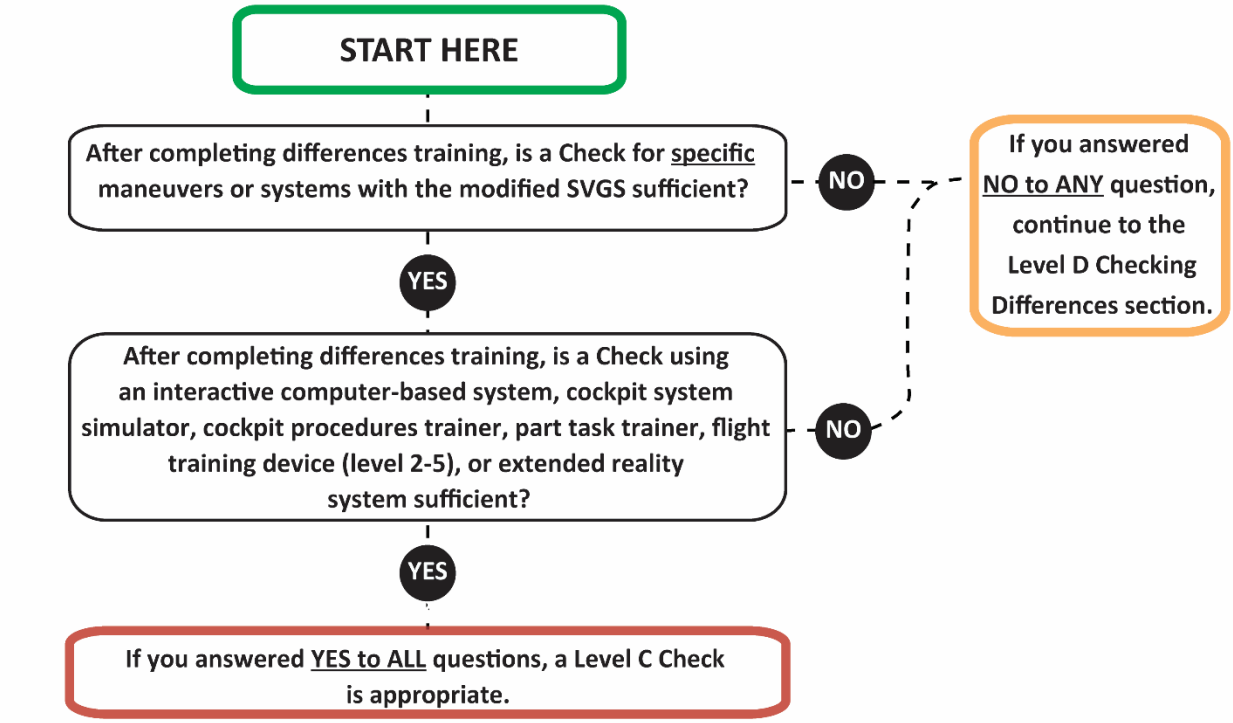
4.3.2 Level B Checking Differences



Level B Difference Check Examples

Level B Checking Examples	
Example 1	**Task Check Example 1**
An SVGS control has been replaced or modified (e.g., the control for adjusting brightness).	If the process of adjusting brightness has been modified, the pilot may be asked during the Check to describe the new process of adjusting the SVGS brightness level.
Example 2	**Task Check Example 2**
The modification to the SVGS has resulted in changes to alerting system messages or auditory annunciations, such as changes to display location or message format.	If the presentation of alerting system information has been modified, the Check may utilize a computer-based test of the alerting system messages or annunciations, including the appropriate pilot response.

4.3.3 Level C Checking Differences



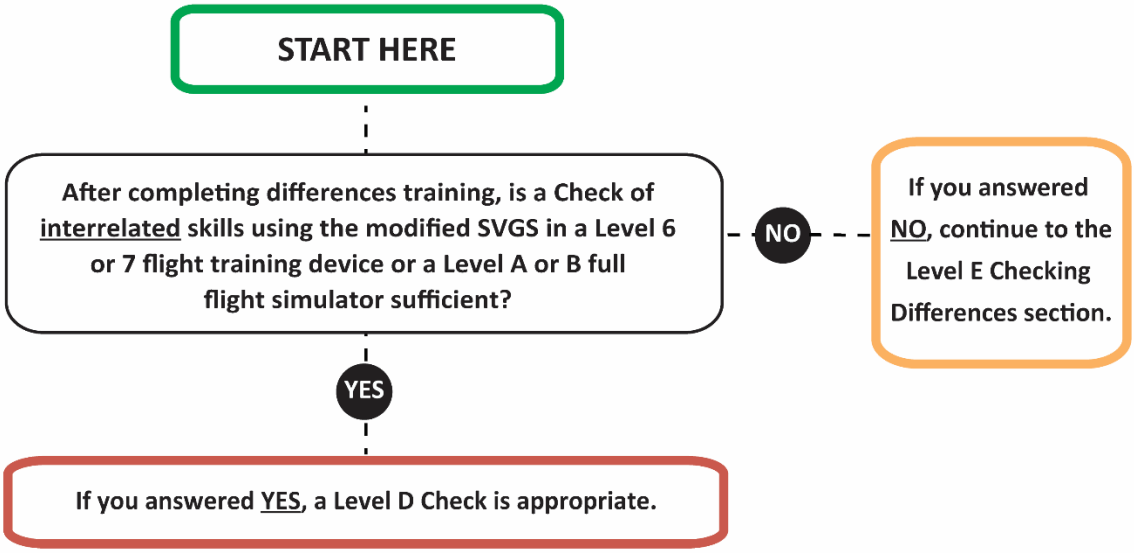
LEVEL C CHECKING EXAMPLES ON NEXT PAGE

Level C Difference Check Examples

Level C Checking Examples	
Example 1	**Task Check Example 1**
A modification has resulted in a new process for setting up the SVGS using the Flight Management System (FMS). For example, the input keys on the FMS to control auto-brightness have been modified.	A system device[14] is recommended for a Check of the pilot's ability to use the FMS to properly set up the SVGS for flight.
Example 2	**Task Check Example 2**
A new head-down display (HDD) has been installed, resulting in a modified sequence of steps for adjusting the SVGS display settings.	A system device is recommended for a Check of the pilot's ability to use the new HDD controls to properly adjust the SVGS display settings.

[14] A system device may include extended reality (XR), such as virtual-reality (VR), augmented-reality (AR), or mixed-reality (MR) technologies. These evolving technologies that are used for education and training applications. Here, we have included XR as a Level C training device; however, AED personnel should evaluate the implementation to determine the training level categorization. Briefly, VR tries to recreate and replace the real-world environment with a virtual one; AR allows virtual objects to be overlaid on a live view of the real world; and MR is a hybrid of virtual and AR that blends the physical world with the digital world. The quality and effectiveness of the XR training may depend on the specific type of technology (VR, AR, MR), the display device (e.g., HWD, computer display), the level of interactivity, usability, immersion (e.g., presence of spatial sounds, screen resolution, frame rate, quality of graphics), and any lag among body or gesture movements, pointer movements, and display updates, as a few examples. Fidelity will vary by application, and appearance may not equate to functionality.

4.3.4 Level D Checking Differences



Level D Difference Check Example

Level D Checking Example	
Example 1	**Task Check Example 1**
A modification to the SVGS has altered the interrelationships among different aircraft systems.	A Check of the pilot's understanding of the interrelated systems or skills, performed using scenarios that represent a real-time flight environment and device, is recommended. This may include a simulator or flight training device that has realistic controls and instruments. It is acceptable if the simulator or flight training has simplified visual cues, motion cues, or environmental conditions (see 14 CFR Part 60 for a description).

4.3.5 Level E Checking Differences

Level E Difference Check Example

Level E Checking Example	
Example 1	**Task Check Example 1**
A modification to the SVGS has significant full-task differences that require a high-fidelity environment.	A high-fidelity Level C or D full flight simulator (FFS) with advanced visual display and motion, or an aircraft, is recommended for a Check of the pilot's ability to conduct an operation with an SVGS (see 14 CFR Part 60 for a description).

4.3.6 Master Difference Level Checking Summary

1 Checking Difference Level Summary
For the modified SVGS and aircraft combination, what is the highest recommended level check for any individual item? (Select One)
☐ Level A: No Check ☐ Level B Check ☐ Level C Check ☐ Level D Check ☐ Level E Check
Findings?

5. Operational Evaluation: Currency Recommendations Chapter

The “Operational Evaluation: Currency Recommendations” chapter of the *Federal Aviation Administration Aircraft Evaluation Division Operations and Human Factors and Evaluation Aid for Synthetic Vision Guidance Systems* is intended to aid in standardizing the Aircraft Evaluation Division (AED) process of determining the Federal Aviation Administration (FAA) Flight Standardization Board (FSB) currency recommendations for a new or modified synthetic vision guidance system (SVGS) and aircraft combination. When AED personnel are evaluating a training curriculum recommended by an original equipment manufacturer (OEM) or training provider, this chapter may be used to ensure the recommended currency of tasks, procedures, maneuvers, or operations specific to the SVGS and aircraft combination are identified.

This aid does not replace FAA regulatory and guidance materials but rather serves as a tool to provide structure to determine FAA FSB SVGS currency recommendations specific to the aircraft and SVGS combination, which may be included in a Flight Standardization Board Report (FSBR). The directions described herein are not meant to unnecessarily restrict trained AED personnel, and it is expected that the judgments and expertise of personnel will be applied.

The term *currency* is used in the context of AED roles and responsibilities, as defined in Appendix 1 of Advisory Circular (AC) 120-53B, and refers to the experience necessary, within a specified period of time, for the safe operation of aircraft, equipment, and systems as determined by the FSB. AC 120-118 provides guidance on criteria for approval or authorization of all weather operations (AWO) for takeoff, landing, and rollout, and includes information on operations conducted with an SVGS. For purposes of currency, AC 120-118 Section 5-6 provides guidance on recurrent flight training maneuvers involving an SVGS:

> If minima are authorized using several methods of flight control such as automatic landing, [head-up display (HUD)], [enhanced flight vision system (EFVS)], and/or SVGS, then the training program should ensure an appropriate level of proficiency using each authorized mode or system. Where minima are based on manual control using flight guidance (e.g., HUD), appropriate emphasis should be placed on failure conditions a pilot does not normally experience in line operations.

Furthermore, AC 120-118 Section 5-11 provides guidance on recency of experience as it relates to SVGS:

> In the event that special circumstances exist where crewmembers may not have exposure to the airborne system(s) upon which takeoff and landing minimum(s) are based (e.g. automatic landing system, HUD, EFVS, FD, or SVGS) for periods of time beyond that permitted by §§ 121.439, 135.247, 61.21, 61.66, or AC 120-53B, the operator should ensure the recency of experience guidelines are complied with prior to pilots conducting AWO operations predicated upon those systems.

As part of the operational evaluation (OE), qualified pilot test subjects are included to help identify currency tasks, procedures, maneuvers, or operations to be included as a

recommendation in the FSBR. It is important that the pilot test subjects have an appropriate background for the OE; factors such as previous qualification in the aircraft, flight experience (including with low-visibility operations), and currency should be considered. Additionally, aircraft-specific considerations for FSB OEs may be required. For example, per Section 128 of the Aircraft Certification, Safety, and Accountability Act (ACSAA) and FAA Order 8900.1, Volume 8, Chapter 2, Sections 5 and 6, the use of domestic and foreign air carrier pilots with varying levels of experience must be included as part of the sample of pilot test subjects for OEs on certain transport airplanes.

5.1 Overview

This chapter includes three checklists that are largely based on, but do not replace, guidance in AC 120-118 and AC 120-53B. These checklists can be used for both new and modified SVGS evaluations.

Regarding this chapter:

- AED personnel are encouraged to review the regulatory, advisory, and guidance materials provided in Table 8 and the List of Key References in the Appendix.
- If questions arise during the SVGS evaluation, AED personnel may wish to contact the FAA Flight Standards Service (FS), Flight Technologies and Procedures Division, Flight Operations Branch (AFS-410).

5.1(a) Chapter Organization

5.1(a)(i) Checklists for Currency Recommendations

Guidance in AC 120-53B and AC 120-118 was used to inform:

- 5.2.1 Recommended Synthetic Vision Guidance System Recent Flight Experience
- 5.2.2 Recommended Synthetic Vision Guidance System Refresher Training
- 5.2.3 Recommended Reestablishing Synthetic Vision Guidance System Recency of Experience

Additionally, 5.2.4 Recommended Currency for Synthetic Vision Guidance System Abnormal, Non-normal, or Emergency Procedures is included for those tasks, procedures, or maneuvers that are not mandatory and not accomplished during training or checking, but are still important to practice or demonstrate occasionally.

5.1(b) Terminology

The following terminology and descriptions are used in the context of the *Federal Aviation Administration Aircraft Evaluation Division Operations and Human Factors Evaluation Aid for Synthetic Vision Guidance Systems* and do not replace definitions provided elsewhere in FAA regulatory and guidance material:

- ***Currency.*** The term *currency* is used in the context of AED roles and responsibilities as defined in AC 120-53B Appendix 1 and refers to the experience necessary, within a specified period of time, for the safe operation of aircraft, equipment, and systems as

determined by the FSB. Currency may include, but is not limited to, recency of experience.

- ***Evaluation plan (EP).*** An EP is submitted by the applicant and accepted by the AED to outline the FSB's operational activities, including crewmember training, checks, and identification of gaps in operational suitability arising from simulator crewmember training (e.g., equipment differences, night conditions, instrument flight rules [IFR]). The EP should also include a manufacturer-proposed Master Differences Requirements (MDR) table and differences tables (DT) in accordance with AC 120-53B, Guidance for Conducting and Use of Flight Standardization Board Evaluations, if the applicant is seeking differences credit.
- ***Modified SVGS.*** A modified SVGS refers to an SVGS that has been altered or upgraded through modification, typically to enhance performance, comply with new regulations or guidance, or fulfill a specialized mission. For FSB purposes, a modified SVGS evaluation may be for a previously certified SVGS that has received a modification to its hardware or software but is still installed in the same model of aircraft (e.g., an SVGS certified on aircraft model "X" is modified but still installed in aircraft model "X").
- ***New SVGS.*** A new SVGS refers to an SVGS in its original design. For FSB purposes, a "new" SVGS evaluation is either (1) an SVGS that has never been certified by the FAA or (2) an SVGS that was previously certified by the FAA in a specific aircraft model and is then installed in a different aircraft model (e.g., an SVGS certified for aircraft model "X" is installed in aircraft model "Y").
- ***Operational evaluation (OE).*** An OE is an AED process to determine pilot type rating, minimum crewmember training, checking and currency requirements, and the unique or special airman certification requirements (e.g., specific flight characteristics, no-flap landing).
- ***Operational suitability evaluation (OSE).*** An OSE is an AED determination that an aircraft or system may be safely used in the National Airspace System (NAS) and meets the applicable FAA policies and regulatory requirements.

5.1(c) Currency Recommendations Chapter References

Table 22.
FAA Regulations Included in the "Operational Evaluation: Currency Recommendations" Chapter

14 CFR Regulation	Title
§ 61.2	Exercise of Privilege
§ 61.57	Recent Flight Experience: Pilot in Command
§ 91.1065(b)	Initial and Recurrent Pilot Testing Requirements
§ 121.427	Recurrent Training
§ 125.287	Initial and Recurrent Pilot Testing Requirements
§ 135.293	Initial and Recurrent Pilot Testing Requirements

Table 23
Orders Included in the "Operational Evaluation: Currency Recommendations" Chapter

Order No.	Title
Order 8900.1, Vol. 3, Ch. 19, Sec. 10	Flightcrew Member Training and Qualification Programs: Flightcrew Recurrent Training Curriculums

Table 24.
Advisory Circulars Included in the "Operational Evaluation: Currency Recommendations" Chapter

AC No.	Title
AC 120-53B	Guidance for Conducting and Use of Flight Standardization Board (FSB) Evaluations
AC 120-118	Criteria for Approval/Authorization of All Weather Operations For Takeoff, Landing, and Rollout

5.2 Pilot Currency Recommendations Checklists for New or Modified Synthetic Vision Guidance System Evaluations

Currency Checklist Overview and Instructions

AC 120-53B and AC 120-118 provide guidance on currency requirements for operations conducted with an SVGS. The checklists in this chapter will aid AED personnel in determining currency recommendations specific to the aircraft and SVGS combination. These checklists can be used for both new and modified SVGSs.

This chapter includes checklists for the following:

- 5.2.1 Recommended Synthetic Vision Guidance System Recent Flight Experience
- 5.2.2 Recommended Synthetic Vision Guidance System Refresher Training
- 5.2.3 Recommended Reestablishing Synthetic Vision Guidance System Recency of Experience
- 5.2.4 Recommended Currency for Synthetic Vision Guidance System Abnormal, Non-normal, or Emergency Procedures

For each checklist item

1. Consider SVGS tasks, maneuvers, procedures, or operations.
2. Select the appropriate “yes” or “no” response.
3. Provide details on the items and the frequency with which they should be performed.

For current information, please consult with FAA Flight Technologies and Procedures Division, Flight Operations Branch (AFS-410).

5.2.1 Recommended Synthetic Vision Guidance System Recent Flight Experience

1 Recommended SVGS Recent Flight Experience	
AC 120-118 Section 5-11 states that the Recency of experience requirements specified in 14 CFR §§ 121.439, 135.247, 61.21, 61.66, or in accordance with AC 120-53B normally provide an assurance of the necessary level of experience for [all weather operations (AWO)]. In the event that special circumstances exist where crewmembers may not have exposure to the airborne system(s) upon which takeoff and landing minimum(s) are based (e.g. automatic landing system, HUD, EFVS, FD, or SVGS) for periods of time beyond that permitted by §§ 121.439, 135.247, 61.21, 61.66, or AC 120-53B, the operator should ensure the recency of experience guidelines are complied with prior to pilots conducting AWO predicated upon those systems.	
After reviewing any operations specification (OpSpec), management specification (MSpec), or letter of authorization (LOA) relevant to operations conducted with an SVGS (e.g., C059) and chapters 3 and 4 of this evaluation aid, are there any SVGS tasks, maneuvers, procedures, or operations that should be performed to maintain currency specific to the SVGS and aircraft combination? (Select One)	If yes, what are they, *and* how often should they be performed? (Specify)
☐ Yes ☐ No	

Primary References: § 61.2; AC 120-53B; AC 120-118
Secondary References: § 61.57; § 91.1065(b); § 121.427; § 125.287; § 135.293; Order 8900.1, Vol. 3, Ch. 19, Sec. 10

5.2.2 Recommended Synthetic Vision Guidance System Refresher Training

2 Recommended SVGS Refresher Training	
AC 120-118 does not directly address SVGS refresher training. If determined by the FAA AED Flight Standardization Board chair, refresher training may be used to reestablish SVGS recency of experience.	
After reviewing any OpSpec, MSpec, or LOA relevant to operations conducted with an SVGS (e.g., C059) and chapters 3 and 4 of this SVGS evaluation aid, are there any SVGS tasks, maneuvers, procedures, or operations that are specific to the SVGS and aircraft combination that should be performed as part of a refresher training course? (Select One)	If yes, what are they? (Specify)
☐ Yes ☐ No	

Primary References: *§ 61.2*; *AC 120-53B*; *AC 120-118*
Secondary References: *§ 61.57*; *§ 91.1065(b)*; *§ 121.427*; *§ 125.287*; *§ 135.293*; *Order 8900.1, Vol. 3, Ch. 19, Sec. 10*

5.2.3 Recommended Reestablishing Synthetic Vision Guidance System Recency of Experience

3 Recommended Reestablishing SVGS Recency of Experience	
AC 120-118 (Section 5-11) states: In the event that the recency intervals [permitted by §§ 121.439, 135.247, 61.21, 61.66, or AC 120-53B] are allowed to lapse, a [full flight simulator (FFS)] refresher, recurrent training, checking event, line operational use in weather conditions better than basic visual flight rules (VFR) minima, flight with a check pilot, or other similar method acceptable to the [principal operations inspector] must be used to re-establish recency of experience with that system.	
Is SVGS refresher training sufficient to reestablish SVGS recency of experience for this SVGS and aircraft combination? (Select One)	Findings
☐ Yes ☐ No	
If SVGS refresher training is *not* sufficient, what are the additional SVGS tasks, maneuvers, procedures, or operations that are specific to the SVGS and aircraft combination that should be performed to reestablish SVGS recency of experience? (Specify)	

Primary References: *§ 61.2*; *AC 120-53B*; *AC 120-118*
Secondary References: *§ 61.57*; *§ 91.1065(b)*; *§ 121.427*; *§ 125.287*; *§ 135.293*; *Order 8900.1, Vol. 3, Ch. 19, Sec. 10*

5.2.4 Recommended Currency for Synthetic Vision Guidance System Abnormal, Non-normal, or Emergency Procedures

4 Currency for SVGS Abnormal, Non-normal, or Emergency Procedures	
AC 120-53B indicates that, although checking addresses competency for non-normal maneuvers or procedures, there may be abnormal, non-normal, or emergency maneuvers or procedures that are not mandatory for checking or training. Further, it states that In this situation, it may be necessary to periodically practice or demonstrate those maneuvers or procedures even though it is not required to complete them during each check. In such instances, the FSB may specify a currency recommendation for training or checking applicable to abnormal/non-normal/emergency maneuvers or procedures that are to be performed. This is to ensure that extended periods of time do not elapse in a series of repeated training and checking events in which significant maneuvers or procedures may never be accomplished.	
Are there any SVGS abnormal, non-normal, or emergency procedures specific to the SVGS and aircraft combination that are not required by 14 CFR but are still important to practice or demonstrate? (Select One)	If yes, what are they, *and* how often should they be performed? (Specify)
☐ Yes ☐ No	

Primary References: *§ 61.2*; *AC 120-53B*; *AC 120-118*
Secondary References: *§ 61.57*; *§ 91.1065(b)*; *§ 121.427*; *§ 125.287*; *§ 135.293*; *Order 8900.1, Vol. 3, Ch. 19, Sec. 10*

Appendix

Key References for the *Federal Aviation Administration Aircraft Evaluation Division Operations and Human Factors Evaluation Aid for Synthetic Vision Guidance Systems*

This appendix includes a list of key references that Federal Aviation Administration (FAA) Aircraft Evaluation Division (AED) personnel may find helpful in preparing for and accomplishing a synthetic vision guidance system (SVGS) operational suitability evaluation (OSE) or operational evaluation (OE). These key references include FAA regulations, orders, notices, information for operators (InFO), safety alerts for operators (SAFO), advisory circulars (ACs), and other technical resources.

Regulations

14 CFR Regulation	Title	Purpose
§ 1.1	Definitions and Abbreviations	This rule provides definitions and abbreviations, including those for synthetic vision and synthetic vision systems (SVSs).
§ 25.771	Pilot Compartment	This rule provides requirements for the pilot compartment and its equipment.
§ 25.773	Pilot Compartment View	This rule provides requirements for the pilot compartment view, which includes vision systems with transparent displays.
§ 25.1303	Flight and Navigation Instruments	This rule provides requirements for flight and navigation instruments and discusses aircraft flight information.
§ 25.1321	Arrangement and Visibility	This rule provides requirements for the arrangement and visibility of flight instruments.
§ 25.1322	Flightcrew Alerting	This rule provides requirements for flightcrew alerts.
§ 25.1333	Instrument Systems	This rule provides requirements for systems that operate the instruments that are located at each pilot's station.
§ 25.1525	Kinds of Operation	This rule states that kinds of operation to which the airplane is limited are established by the category in which it is eligible for certification and by the installed equipment.
§ 25.1581	Manuals, Markings, and Placards	This rule provides requirements for the Airplane Flight Manual (AFM) or Rotorcraft Flight Manual (RFM).

14 CFR Regulation	Title	Purpose
§ 25.1583	Operating Limitations	This rule provides the operating limitation requirements for the AFM or RFM.
§ 25.1585	Operating Procedures	This rule provides the operating procedures requirements for the AFM or RFM.
§ 27.1525	Kinds of Operation	This rule states that the kinds of operations (e.g., visual flight rules [VFR], instrument flight rules [IFR], day, night, icing) for which the rotorcraft is approved are established by demonstrated compliance with the applicable certification requirements and by the installed equipment.
§ 29.1525	Kinds of Operation	This rule states that the kinds of operations (e.g., VFR, IFR, day, night, icing) for which the rotorcraft is approved are established by demonstrated compliance with the applicable certification requirements and by the installed equipment.
§ 60	Flight Simulation Training Device Initial and Continuing Qualification and Use	This rule provides descriptions for flight training devices and flight simulators and includes information that may be helpful for differentiating between Levels A, B, C, and D flight simulators and Levels 4, 5, 6, and 7 flight training devices. For the purposes of SVGS OEs, § 60.15 describes initial qualification of a simulator to include subsystems (e.g., SVGSs) of the aircraft it is simulating.
§ 61.57	Recent Flight Experience: Pilot in Command	This rule addresses pilot in command recent flight experience requirements.
§ 61.58	Pilot-in-Command Proficiency Check: Operation of an Aircraft That Requires More Than One Pilot Flightcrew Member or Is Turbojet-Powered	This rule addresses pilot in command proficiency checks for operations of an aircraft that requires more than one pilot or is turbojet-powered.
§ 91.103	Preflight Action	This rule addresses pilot in command preflight action.
§ 91.175	Takeoff and Landing Under IFR	This rule delineates the required visual reference(s) required to continue below decision altitude (DA)/decision height (DH).

14 CFR Regulation	Title	Purpose
§ 91.905	List of Rules Subject to Waivers	This rule includes a list of the rules that are subject to waivers, including § 91.175.
§ 91.1039	IFR Takeoff, Approach and Landing Minimums	This rule addresses IFR takeoff, approach, and landing minimums.
§ 91.1065(b)	Initial and Recurrent Pilot Testing Requirements	This rule provides initial and recurrent pilot testing requirements for Part 91 Subpart K operations.
§ 91.1069(d)	Flight Crew: Instrument Proficiency Check Requirements	This rule provides flightcrew instrument proficiency check requirements.
§ 121 Appendix F	Proficiency Check Requirements	This appendix provides maneuvers and procedures required for a pilot proficiency check and instrument approaches.
§ 121.419	Pilots and Flight Engineers: Initial, Transition, and Upgrade Ground Training	This rule addresses upgrade ground training for pilots and flight engineers, which includes instruction applicable to their assigned duties (e.g., operations using an SVGS).
§ 121.422	Aircraft Dispatchers: Initial and Transition Ground Training	This rule addresses initial and transition ground training for aircraft dispatchers and includes instruction applicable to their assigned duties, which may include SVGS operability and dispatch procedures.
§ 121.427	Recurrent Training	This rule addresses recurrent training requirements.
§ 121.441	Proficiency Checks	This rule provides the requirements for pilot proficiency checks and references Part 121 Appendix F.
§ 121.651	Takeoff and Landing Weather Minimums: IFR: All Certificate Holders	This rule provides the requirements for takeoff and landing weather minimums for all certificate holders.
§ 125.287	Initial and Recurrent Pilot Testing Requirements	This rule provides initial and recurrent pilot testing requirements for Part 125 operations.
§ 125.291	Pilot in Command: Instrument Proficiency Check Requirements	This rule provides pilot in command instrument proficiency check requirements.

14 CFR Regulation	Title	Purpose
§ 125.325	Instrument Approach Procedures and IFR Landing Minimums	This rule provides the acceptable instrument approach procedures and IFR landing minimums requirements.
§ 125.381	Takeoff and Landing Weather Minimums: IFR	This rule provides operator takeoff and landing weather minimums.
§ 135.225	IFR: Takeoff, Approach and Landing Minimums	This rule provides operator takeoff, approach, and landing minimums.
§ 135.293	Initial and Recurrent Pilot Testing Requirements	This rule provides initial and recurrent pilot testing requirements for Part 135 operations.
§ 135.297	Pilot in Command: Instrument Proficiency Check Requirements	This rule provides the pilot in command instrument proficiency check requirements.

Orders

Order No.	Title	Purpose
Order 8110.4C	Type Certification	This order sets procedures for evaluating and approving aircraft, engine, and propeller type design data and changes to approved type design data.
Order 8110.52B	Type Validation and Post-type Validation Procedures	This order defines the policy and procedures to issue a type certificate for a product (aircraft, aircraft engine, or propeller as defined in 14 CFR § 21.1) or a supplemental type certificate for a major change to a product, as well as approves follow-on changes to these certificates when the United States is not the State of Design pursuant to 14 CFR § 21.29.

Order No.	Title	Purpose
Order 8260.3G	United States Standard for Terminal Instrument Procedures (TERPS)	This order prescribes standardized methods for designing and evaluating instrument flight procedures in the United States and its territories. It is to be used by all personnel responsible for the preparation, approval, and promulgation of instrument flight procedures. These criteria are predicated on normal aircraft operations and performance.
Order 8400.13F	Procedures for the Evaluation and Approval of Facilities for Special Authorization Category I Operations and All Category II and III Operations with Change 1	This order lists the minimum requirements for evaluation and approval of ground facilities supporting Category (CAT) I approaches and CAT II approaches to runways that do not meet all performance or equipment requirements of a U.S. Standard or International Civil Aviation Organization Standard, and for all CAT II and CAT III approaches.
Order 8430.21A	Flight Standards Division, Aircraft Certification Division and Aircraft Evaluation Group responsibilities	This order provides supplemental instructions and guidelines for regional Flight Standards Divisions, Aircraft Certification Divisions, and Aircraft Evaluation Groups assigned aircraft certification and OE responsibilities.
Order 8900.1, Vol. 3, Ch. 18, Sec. 5	Operations Specifications—Airplane Terminal Instrument Procedures and Airport Authorizations and Limitations	This order provides information on the issuance of operations specification (OpSpec) C059.
Order 8900.1, Vol. 3, Ch. 19, Sec. 10	Flightcrew Member Training and Qualification Programs: Flightcrew Recurrent Training Curriculums	This section includes information, direction, and guidance to be used by principal operations inspectors in the evaluation of a certificate holder's flightcrew member recurrent training curriculums.
Order 8900.1, Vol. 3, Ch. 32, Sec. 5	Manuals, Procedures, and Checklists for 14 CFR Parts 91K, 121, 125, and 135: Flight Manuals for Parts 121 and 135	This section includes direction and guidance to be used by principal operations inspectors in the evaluation of flight manuals for Title 14 of the Code of Federal Regulations (14 CFR) Parts 121 and 135 operators.

Order No.	Title	Purpose
Order 8900.1, Vol. 3, Ch. 32, Sec. 12	Manuals, Procedures, and Checklists for 14 CFR Parts 91K, 121, 125, and 135	This section includes direction and guidance for principal operations inspectors for the review of aircraft checklists for 14 CFR Parts 121 and 135 operators. All Parts 121 and 135 operators must provide aircraft checklists to their flightcrew members. Flightcrew members are required to use these aircraft checklists in air transportation operations. For Part 121 operators, aircraft checklists must be approved by the FAA; for Part 135 operators, these checklists must be acceptable to the FAA (see Volume 3, Chapter 32, Section 1 for definitions of acceptance and approval).
Order 8900.1, Vol. 4, Ch. 2, Sec. 3	Safety Assurance System: Approval of U.S. Operators for Operations Below Standard Category I—Parts 91 (Other Than Small Category A), 91K, 121, 125, 125 LODA Holders, and 135	This section provides operational system safety oversight, analysis, and guidance to Flight Standards Service (FS) inspectors on the authorization of operators to conduct approach operations. This section does not reference SVGS but does discuss SA CAT I approval.
Order 8900.1, Vol. 19, Ch. 1, Sec. 1	Aircraft Evaluation Division: Introduction to the Aircraft Evaluation Division	This section outlines the roles and responsibilities of the AED and includes the procedures used by AED personnel to conduct these functions. This section includes definitions related to the roles and responsibilities of the AED.
Order 8900.1, Vol. 19, Ch. 5, Sec. 1	Flight Operations Evaluation Board: General	This section provides the policy on the establishment of the FAA FS policy for the Flight Operations Evaluation Board (FOEB) process.
Order 8900.1, Vol. 19, Ch. 5, Sec. 2	Flight Operations Evaluation Board: Flight Operations Evaluation Board Composition	This section provides the policy for aviation safety inspectors (ASI) and other Federal Aviation Administration (FAA) personnel who serve as participants on a Flight Operations Evaluation Board (FOEB).
Order 8900.1, Vol. 19, Ch. 5, Sec. 3	Flight Operations Evaluation Board: Procedures	This section provides the policy on procedures to follow for an FOEB.

Order No.	Title	Purpose
Order 8900.1, Vol. 19, Ch. 5, Sec. 4	Flight Operations Evaluation Board: Original Equipment Manufacturer Managed Flight Operations Evaluation Board Process	This section includes information on the voluntary original equipment manufacturer (OEM)-managed FOEB process for AED inspectors and aircraft certification project managers. For the purposes of this section, use of the term *OEM* also applies to type certificate holders.
Order 8900.1, Vol. 19, Ch. 5, Sec. 5	Flight Operations Evaluation Board: Master Minimum Equipment List Development Procedures	This section establishes the FAA AED procedures for the development and revision of Master Minimum Equipment Lists (MMELs). Included in this section is guidance on the application and use of policy letters and additional information on Supplemental Type Certificate MMEL relief approval. For the purposes of this section, use of the term *OEM* also applies to type certificate holders.

Notices

Notice No.	Title	Purpose
Notice 8900.684	Use of Air Carrier Pilots During Flight Standardization Board Evaluations for Transport Airplanes	This notice provides information and guidance to the AED (AFS-100) regarding the use of domestic and foreign air carrier pilots during Flight Standardization Board (FSB) OEs. Based on the implementation of Section 128 of the Aircraft Certification, Safety, and Accountability Act of 2021 (ACSAA), the FSB's procedures must now include the use of air carrier pilots of varying levels of experience for transport airplane type certification projects.

Information for Operators

InFO No.	Title	Purpose
InFO 16022	Inadvertent Selection of Concentrically-Centered Controls	This InFO advises operators of the potential for inadvertently changing existing, correct selections in avionics and other systems equipped with concentrically centered controls (knobs).

Safety Alerts for Operators

SAFO No.	Title	Purpose
SAFO 09011	Parts 121 and 135 Operators: Constant Angle of Descents Techniques for Nonprecision Approaches	Operator training programs should develop and implement procedures for the use of constant angle descent techniques during nonprecision approach procedures. The use of constant angle of descents techniques should be a focal point during all flightcrew training, testing, and checking.
SAFO 09016	Rejected Landing Due to Loss of Visibility	The purpose of this SAFO is to emphasize to operators and flightcrews the importance of recognizing and acting on rapidly deteriorating weather conditions in regard to landings.
SAFO 10005	Go-Around Callout and Immediate Response	The purpose of this SAFO is to recommend that all operators should provide written policy to flightcrews emphasizing that either pilot may make a go-around callout and that the response to a go-around callout is an immediate missed approach.
SAFO 15004	Scenario-Based Go-Around Training	This SAFO encourages air carriers to incorporate scenario-based go-around training into pilot training curricula.
SAFO 15011	Roles and Responsibilities for Pilot Flying (PF) and Pilot Monitoring (PM)	This SAFO encourages operators to define roles and responsibilities for the pilot flying (PF) and pilot monitoring (PM).
SAFO 21007	Risk of Potential Adverse Effects on Radio Altimeters When Operating in the Presence of 5G C-Band Interference	This SAFO provides information and guidance to operators regarding the risk of potential adverse effects on radio altimeters when operating in the presence of 5G C-band wireless broadband signals.
SAFO 24002	Recognizing and Mitigating Global Positioning System (GPS) / Global Navigation Satellite System (GNSS) Disruptions	This SAFO provides information and guidance to operators and manufacturers regarding operations in a Global Positioning System (GPS)/Global Navigation Satellite System (GNSS)–disrupted environment.

Advisory Circulars

AC No.	Title	Purpose
AC 20-153B	Acceptance of Aeronautical Data Processes and Associated Databases	This AC describes an acceptable means, but not the only means, for showing compliance with the applicable airworthiness regulations for equipment with an installed aeronautical database.
AC 20-167A	Airworthiness Approval of Enhanced Vision System, Synthetic Vision System, Combined Vision System, and Enhanced Flight Vision System Equipment	This AC provides guidance for gaining airworthiness approval for enhanced and SVSs in aircraft. Specifically, it provides one acceptable means for complying with 14 CFR Parts 23, 25, 27, or 29 airworthiness regulations when installing an SVS, enhanced vision system (EVS), combined vision system (CVS), or enhanced flight vision system (EFVS) in an airplane or rotorcraft.
AC 20-185A	Airworthiness Approval of Synthetic Vision Systems, Synthetic Vision Guidance Systems and Aircraft State Awareness Synthetic Vision Systems	This AC provides guidance for gaining airworthiness approval for synthetic vision technology in aircraft. Specifically, when followed in its entirety, it provides an acceptable means for complying with the airworthiness regulations contained in 14 CFR Parts 23, 25, 27, and 29 when installing an SVS, SVGS, or aircraft state awareness (ASA) SVS in airplanes and rotorcraft.
AC 25-11B	Electronic Flight Displays	This AC provides guidance for showing compliance with certain requirements of 14 CFR Part 25 for the design, installation, integration, and approval of electronic flight deck displays, components, and systems installed in transport category airplanes. Revision B adds appendices F and G to the original AC and updates references to related rules and documents.

AC No.	Title	Purpose
AC 25.1322-1	Flightcrew Alerting	This AC provides guidance for showing compliance with certain requirements of 14 CFR Part 25 for the design approval of flightcrew-alerting functions. This AC addresses the types of alert function elements that should be considered (including visual, aural, and tactile or haptic elements), alert management, interface or integration of alerts with other systems, and color standardization.
AC 25.1581-1	Airplane Flight Manual (AFM)	The primary purpose of the FAA-approved transport category AFM is to provide an authoritative source of information considered necessary for safely operating the airplane. This AC identifies the information that must be provided in the AFM under the airworthiness regulations and provides guidance as to the form and content of the approved portion of an AFM.
AC 120-53B	Guidance for Conducting and Use of Flight Standardization Board (FSB) Evaluations	This AC provides a means, but not the only means, of evaluating manufactured or modified aircraft using standard systems, processes, and tests necessary to determine pilot training and qualification requirements. It also describes an acceptable means, but not the only means, of compliance with applicable 14 CFR that provides for differences in training and qualification between aircraft with the same type certificate.
AC 120-57C	Surface Movement Guidance and Control System	This AC describes the standards and provides guidance in the development of a Surface Movement Guidance and Control System (SMGCS) plan for U.S. airports where scheduled Air Carriers are authorized to conduct operations when visibility is less than 1200 feet runway visual range (RVR).
AC 120-71B	Standard Operating Procedures and Pilot Monitoring Duties for Flight Deck Crewmembers	This AC provides guidance for the design, development, implementation, evaluation, and updating of standard operating procedures (SOPs) and for PM duties.

AC No.	Title	Purpose
AC 120-76E	Authorization for Use of Electronic Flight Bags	This FS AC provides guidance on the operational use of electronic flight bags (EFBs).
AC 120-109	Stall and Stick Pusher Training	The goal of this AC is to provide best practices and guidance for training, testing, and checking for pilots, within existing regulations, to ensure correct and consistent responses to unexpected stall warnings and stick pusher activations.
AC 120-111	Upset Prevention and Recovery Training	This AC describes the recommended training for airplane Upset Prevention and Recovery Training.
AC 120-118	Criteria for Approval/Authorization of All Weather Operations for Takeoff, Landing, and Rollout	This AC provides an acceptable means, but not the only means, for obtaining and maintaining authorization of operations in CAT I, II, III landing weather minima and IFR lower-than-standard takeoff minima.
AC 120-123	Flightpath Management	This AC provides guidance and recommended practices for operators to implement operational procedures and training for the planning, execution, and assurance of the guidance and control of aircraft trajectory and energy. This is known as flightpath management.

Additional Resources

Resource	Title	Purpose
ACSAA	Aircraft Certification, Safety, and Accountability Act (ACSAA)	Section 128 of ACSAA addresses pilot OE requirements, including the use of pilots from air carriers with varying levels of experience for transport airplane certification projects.
DOT Technical Reports Database	United States Department of Transportation (DOT) National Transportation Library	This database provides access to U.S. Department of Transportation (DOT) technical reports and can be searched for scientific references related to SVGSs.
FAA AIM	Aeronautical Information Manual (AIM)	Chapter 5 addresses the use of SVGSs on instrument approaches.

Resource	Title	Purpose
FAA-H-8083-16B	Instrument Procedures Handbook (IPH)	The Instrument Procedures Handbook is designed as a technical reference for all pilots who operate under IFR in the National Airspace System (NAS) and includes a description of operations with SVGS.
FAA Published FSB Reports	Published Flight Standardization Board Reports (FSBRs)	The FAA Dynamic Regulatory System (DRS) includes completed Flight Standardization Board Reports (FSBRs) and Operational Suitability Reports (OSRs), including completed AED SVGS evaluations.
FAA Practical Test Standards	Practical Test Standards (PTS)	The FAA FS developed the practical test standards (PTS) to be used by examiners. Instructors are expected to use the PTS when preparing applicants for practical tests. Applicants should refer to these standards during their training.
FAA Airman Certification Standards	Airman Certification Standards (ACS)	These FAA Airman Certification Standards documents communicate the aeronautical knowledge, risk management, and flight proficiency standards for the instrument rating, airline transport pilot certification and type rating certification in the airplane category and the following classes: single-engine land, single-engine sea, multiengine land, and multiengine sea.
RTCA SC-213 DO-407	Minimum Aviation System Performance Standards (MASPS) for Synthetic Vision Systems, Synthetic Vision Guidance Systems and Combined Vision Systems	This Radio Technical Commission for Aeronautics (RTCA) Special Committee published Minimum Aviation Performance Standards–level guidance for SVSs, SVGSs, and CVSs. This document identifies intended operations and systems architectures, and Minimum Operational Performance Standards.