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Flight Standardization Board (FSB) Report

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Manufacturer
Gulfstream Aerospace Corporation

Type Certificate Data Sheet (TCDS)	TCDS Identifier	Marketing Name	Pilot Type Rating
A12EA	GIV-X	G350/G450	G-V
A12EA	GV	GV	G-V
A12EA	GV-SP	G500/G550	G-V

Approved by: Transport Aircraft Long Beach Branch
Federal Aviation Administration (FAA)
Aircraft Evaluation Division
3960 Paramount Boulevard, Suite 100
Lakewood, CA 90712-4137

Office Telephone: (562) 627-5317
Office Fax: (562) 627-5210
Office Email: 9-AVS-AFS-100@faa.gov

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RECORD OF REVISIONS

Revision Number	Section(s)	Page(s)	Date
Original	All	All	7/21/1997
1	1.2, 1.4, 1.7, 1.9.1, 2.1, 6.5.2, 7.1, 7.3, 9.2, 9.3, 13.1 14.1 Appendices 3 thru 6		3/26/2002
2	Appendix 6	37, 38	6/03/2002
3	All	All	6/17/2001
4	1.1 thru 1.5, 1.7, 1.9.3, 2, 3, 4, 5.1, 5.4, 6.1, 6.4, 6.5, 7.1, 8.1, 9.1 thru 9.3, 14.1, MDR Table, Appendix 2, Appendices 6 thru 8	7 thru 18, 20, 22, 24 thru 50, 102, 104 thru 139	9/29/2004
5	1.1, 1.3, 1.7, 1.9.2, 1.9.3, 1.9.6 thru 1.9.10, 2.1, 9.3, ODR Tables, Appendices 3 thru 11	9, 11 thru 15, 22, 37, 38, 42, 43, 45, 48 thru 50, 53 thru 55, 64, 71, 79, 97, 104 thru 107, 112, 135, 142 thru 144	5/05/2008
6	1.7, 1.9.2, 1.9.11, 1.9.12, Appendix 3, Appendix 6, Appendix 9, Appendix 10, Appendix 12	12, 13, 15, 54, 103 thru 105, 143, 144, 146, 147	10/14/2009
7	1.7, 1.9.8, 1.9.13, Appendix 6, Appendix 7, Appendix 13	12, 14, 15, 104, 106, 148	11/01/2011
8	1.9.14, Appendix 14	16, 150	07/11/2012
9	Cover Page, 1.7, 1.8, 1.9.15, 10.1.1, Appendix 14, Appendix 15	8 thru 10, 13, 20, 136, 137	04/08/2014
10	1.6.1, 1.7, 1.9.8, 1.9.16, 6.2.1, 6.3.1, 6.5.1, 7.1, 7.1c, 7.2, 7.3, 10.1.1, 10.2.1, 12.1.1, Appendix 2, Appendix 6, Appendix 7, Appendix 16	7 thru 9, 12 thru 14, 17, 18, 20, 23, 90, 91, 93,138	12/22/2015
11	13.1, Appendices 3 thru 6, Appendix 8, Appendix 17, Appendix 18	3, 7, 12, 16 thru 18, 20, 22, 39 thru 44, 48, 58 thru 60	11/23/2016
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13	Cover Page, Table of Contents, Record of Revisions, Highlights of Change, 1.7, 1.9.3, 9.1, Appendix 3, Appendix 5	1 thru 5, 7 thru 10, 19, 60, 64	02/21/2019

HIGHLIGHTS OF CHANGE

Revision 13: On Cover Page, change to Gulfstream Aerospace Corporation. Updated Table of Contents Appendix 5 to Enhanced Flight Vision System (EFVS) Operations. Updated paragraph 1.9.3, Enhanced Flight Vision System (EFVS) Operations. Updated title of Appendix 5 in Appendix 3. Changed title in Appendix 5 to Enhanced Flight Vision System (EFVS) Operations.

1. PURPOSE AND APPLICABILITY

- 1.1. The primary purpose of this report is to specify Federal Aviation Administration (FAA) master training, checking, and currency requirements applicable to crews operating GIV-X, GV, and GV-SP model airplanes. The GV-SP is a variation of the GV. Major changes from the GV to the GV-SP are the addition of a Honeywell Primus Epic avionics suite, which consists of four multifunction 14-inch flat panel liquid crystal display (LCD) units, two cockpit side-mounted Cursor Control Devices (CCD), triple MC-850 multifunction control display units (MCDU), main entry door relocation approximately 2 feet forward, additional seventh cabin window, new cockpit observer's seat, drag reduction modifications on the airframe, increased engine thrust, and a 500-pound increase in maximum ramp and takeoff weights.
- 1.2. The Gulfstream GIV-X, GV, and GV-SP are listed on FAA Type Certificate Data Sheet (TCDS) #A12EA, and are hereafter referred to as the "GIV-X", "GV", and "GV-SP". The GIV-X may be modified by Gulfstream Aerospace Corporation (GAC) through Aircraft Service Changes (ASC) to be identified as either a "G450" (ASC 005) or a "G350" (ASC 004). The G450 ASC is simply a change of the aircraft data plate. The G350 ASC changes the data plate, reduces the amount of fuel the aircraft will carry, and makes the Visual Guidance System (VGS) (Head-Up Display (HUD)) and Enhanced Vision System (EVS) optional equipment. The GV-SP may be modified by GAC through ASCs to be identified as either a "G550" (ASC 011) or a "G500" (ASC 010). The G550 ASC is simply a change of the aircraft data plate. The G500 ASC changes the data plate and reduces the amount of fuel the aircraft will carry, and makes the VGS (HUD) and EVS optional equipment.
- 1.3. The GIV-X is essentially a G-IV airframe with a GV-SP cockpit. It has a Honeywell Primus Epic avionics suite, which consists of four multifunction 14-inch flat panel LCD units, two cockpit side mounted CCDs, triple MCU-850 MCDUs, VGS, EVS, Tay 611-8C full-authority digital electronic control (FADEC) engines, a Honeywell 36-150 auxiliary power unit (APU), a cockpit observer's seat, and drag reduction modifications on the airframe. The flight control hydraulic boost ratios have been modified to replicate the handling characteristics of the GV and GV-SP.
- 1.4. This report will aid Title 14 of the Code of Federal Regulations (14 CFR) part 135 operators, FAA Principal Operations Inspectors (POI), and 14 CFR part 142 training centers and their FAA Training Center Program Managers (TCPM) in the development and approval of parts 135 and 142 training programs. Provisions of this report are effective

until amended, superseded, or withdrawn by subsequent Flight Standardization Board (FSB) determinations.

- 1.5.** This report also addresses certain issues regarding the operation of the GIV-X, GV, and GV-SP other than under the regulatory requirements of part 135. Provisions of the report include:

1.5.1 Defining pilot type rating.

1.5.2 Description of Master Common Requirements (MCR).

1.5.3 Description of Master Differences Requirements (MDR) for crews requiring differences qualification for mixed fleet flying or transition.

1.5.4 Examples of acceptable Operator Differences Requirements (ODR) tables.

1.5.5 Description of an acceptable training program, special emphasis items, and training device characteristics when necessary to establish compliance with pertinent MDRs.

1.5.6 Setting checking and currency standards, including specification of those checks that must be administered by the FAA or operators.

1.5.7 A listing of regulatory compliance status (compliance checklist) for 14 CFR parts 91 and 135, advisory circulars (AC), and other operationally related criteria that was reviewed and evaluated by the Aircraft Evaluation Group (AEG) or FSB.

- 1.6.** This report also provides:

1.6.1 Minimum pilot training, checking, and currency requirement that must be applied by: FAA field offices (i.e., MCRs, MDRs, ODRs), FAA aviation safety inspectors (ASI), part 135 air carrier check pilots and instructors, airline transport pilots (ATP) instructing in air transportation service, certificated flight instructors (CFI), certificated ground instructors, Designated Pilot Examiners (DPE), Pilot Proficiency Examiners (PPE), and Training Center Evaluators (TCE).

1.6.2 Information which is advisory in nature, but may be mandatory for particular operators if the designated configurations apply and if approved for that operator (e.g., MDR footnotes and acceptable ODR Tables).

1.6.3 Information which is used to facilitate FAA review of an airplane type proposed for use by an operator. Various sections of this report are qualified as to whether compliance (considering the provisions of the current edition of FAA AC 120-53, Guidance for Conducting and Use of Flight Standardization Board Evaluations, is required or is advisory in nature.

1.7. Acronyms are defined as follows:

14 CFR	Title 14 of the Code of Federal Regulations
AC	Advisory Circular
ACARS	Aircraft Communications Addressing and Reporting System
ACO	Aircraft Certification Office
ADS-C	Automatic Dependent Surveillance-Contract
AEG	Aircraft Evaluation Group
AFCS	Automatic Flight Control System
AFM	Airplane Flight Manual
AFMS	Airplane Flight Manual Supplement
AGM	Advanced Graphics Module
AP	Autopilot
APU	Auxiliary Power Unit
ASC	Aircraft Service Change
ASI	Aviation Safety Inspector
AT	Autothrottle
ATC	Air Traffic Control
ATN	Aeronautical Telecommunications Network
ATP	Airline Transport Pilot
CAS	Crew Alert System
CAT	Category
CCD	Cursor Control Device
CDU	Control Display Unit
CFI	Certificated Flight Instructor
CMF	Communication Management Function
CMO	Certificate Management Office
CMU	Communications Management Unit
CPDLC	Controller-Pilot Data Link Communication
CPT	Cockpit Procedures Trainers
CRT	Cathode Ray Tube
CVR	Cockpit Voice Recorder
DAU	Data Acquisition Unit
DC	Display Controller
DMU	Data Management Unit
DPE	Designated Pilot Examiner
DU	Display Unit
EDM	Emergency Descent Maneuver
EDS	Electronic Display System
EEC	Emergency Evacuation Crewmember
EFB	Electronic Flight Bag
EFIS	Electronic Flight Instrument System
EFVS	Enhanced Flight Vision System
EGPWS	Enhanced Ground Proximity Warning System
EICAS	Engine Indicating and Crew Alerting System
EPU	Estimated Position Uncertainty
EVS II	Second Generation Enhanced Vision System

EVS	Enhanced Vision System
FAA	Federal Aviation Administration
FADEC	Full-Authority Digital Engine Control
FANS 1/A+	Future Air Navigation System 1/A+
FFS	Full Flight Simulator
FGS	Flight Guidance System
FMA	Flight Mode Annunciator
FMS	Flight Management System
FPA	Flight Path Angle
FPV	Flight Path Vector
FSB	Flight Standardization Board
FSTD	Flight Simulation Training Device
FTD	Flight Training Device
FWC	Fault Warning Computer
GAC	Gulfstream Aerospace Corporation
GLSSU	GPS Landing System Sensor Unit
GNSSU	Global Navigation System Sensor Unit
GPS	Global Positioning Satellite
HA	hold to altitude
HGS	Head-Up Guidance System
HSI	Horizontal Situation Indicator
HUD II	Rockwell-Collins Head-Up Guidance System Model 6250
HUD	Honeywell Head-Up Guidance Display Model 2020
ICBI	Interactive Computer-Based Instruction
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
IRS	Inertial Reference System
ITF	Integration Test Facility
LAN	Local Area Network
LCD	Liquid Crystal Display
LDI	Lateral Deviation Indicator
LNAV	Lateral Navigation
LOF	Line Oriented Flight
LPV	Localizer Performance with Vertical Guidance
MAU	Modular Avionics Unit
MCDU	Multifunction Control Display Units
MCR	Master Common Requirements
MDR	Master Differences Requirements
METAR	Aviation Routine Weather Report
MLW	Maximum Landing Weight
MMEL	Master Minimum Equipment List
ND	Navigation Display
NEXRAD	Next Generation Weather Radar
NSP	National Simulator Program
ODR	Operator Differences Requirements
OEI	One-Engine Inoperative

Part 91K	Part 91 Subpart K
PCMCIA	Personal Computer Memory Card International Association
PDB	Power Distribution Box
PEAF	Primus Elite Advanced Features
PF	Pilot Flying
PFD	Primary Flight Display
PIC	Pilot in Command
PLI	Pitch Limit Indicator
PM	Pilot Monitoring
POI	Principal Operations Inspector
PTS	Practical Test Standards
QRH	Quick Reference Handbook
RAAS	Runway Awareness Advisory System
RFMU	Radio Frequency Management Unit
RNAV	Area Navigation
RNP SAAR	Required Navigation Performance - Special Aircraft and Aircrew Authorization Required
RNP	Required Navigation Performance
RTO	Rejected Takeoff
SBAS	Satellite-Based Augmentation System
SID	Standard Instrument Departures
STAR	Standard Terminal Arrivals
SV PFD	Synthetic Vision Primary Flight Display
SVS	Synthetic Vision System
T.O.	Takeoff
TACAN	Tactical Air Navigation
TAF	Terminal Area Forecast
TAWS	Terrain Awareness and Warning System
TCAS	Traffic Alert and Collision Avoidance System
TCDS	Type Certificate Data Sheet
TCE	Training Center Evaluator
TOGA	Takeoff/Go-Around
V ₁	Takeoff Decision Speed
VGP	Vertical Glide Path
VGS	Visual Guidance System
VMC	Visual Meteorological Conditions
VNAV	Vertical Navigation
VSO	Stall Speed
VTF	Vectors to Final
WOW	Weight on Wheels
WX	Weather Radar

1.8. Terminology.

The term “must” is used in this report, even though it is recognized that this report, and AC 120-53 on which it is based, provides one acceptable means, but not necessarily the only means, of compliance with part 135 subpart H requirements. The term “must” acknowledges the need for operators to fully comply with the FSB report provisions if AC 120-53 is to be used by the operator as its means of complying with part 135 subpart H.

1.9. Background.

1.9.1 In August–September 1996 and January–February 1997, the GV FSB received a GV initial pilot ground school utilizing the training facilities of Flight Safety International and Gulfstream located in Savannah, GA. Training was conducted in classrooms and an integration test facility (ITF). The ITF was not designed as a training device; it was an engineering mockup of the GV cockpit used to validate aircraft hardware interface. In addition, a newly manufactured simulator, which was under development but not qualified by the FAA, was utilized. The FSB then received aircraft training in the GV (N505GV) in Savannah, GA. It then conducted AC 120-53 test T5, which is essentially an evaluation of the maneuvers listed in the FAA ATP practical test standards (PTS) for a pilot type rating. It also participated in four function and reliability test flights to validate proposed Airplane Flight Manual (AFM) normal, abnormal, and emergency procedures.

1.9.2 In September 1997, the GV FSB participated in an in-flight evaluation of the Honeywell HUD (Model 2020) during its development using Gulfstream’s GV aircraft. In November 1997, the FSB conducted certification flight tests along with the Los Angeles Aircraft Certification Office (ACO) in Gulfstream’s GV aircraft in Savannah, GA. Flight testing consisted of approximately 30 HUD approaches at three different airports, using Category (CAT) I and CAT II procedures, during day, night, visual meteorological conditions (VMC), and instrument meteorological conditions (IMC). The FSB also evaluated Gulfstream’s proposed GV AFM Supplement (AFMS) for HUD operations and Gulfstream’s proposed HUD CAT II appendix to the GV AFMS for CAT II operations. The FSB found the HUD operationally suitable for all phases of flight and for U.S. CAT I and CAT II operations. HUD training, checking, and currency requirements are listed in Appendix 4, Head-Up Display (HUD) Systems.

1.9.3 From February 1998 to August 2001, the GV FSB Chair participated with the Los Angeles ACO in EVS development, proof of concept, and certification flight tests. Those flights included over 50 EVS approaches conducted at approximately 15 different airports during day, night, VMC, and IMC. Gulfstream’s GV EVS AFMS was evaluated and found acceptable during the certification flight tests. In September 2001, two GV FSB members received EVS ground school, simulator, and airplane training from GAC in Savannah, GA. It was found to be operationally suitable. EVS meets the requirements of enhanced flight vision system (EFVS) as

defined in part 91, § 91.176(b). EFVS training, checking, and currency requirements are listed in Appendix 5, Enhanced Flight Vision System (EFVS) Operations.

- 1.9.4** In January–February 2003, the GV-SP FSB conducted an evaluation of the GV-SP in accordance with the process outlined in AC 120-53. One group of three pilots received a GV-SP initial pilot ground school utilizing the training facilities of Flight Safety International and a GV-SP aircraft owned by Gulfstream, both located in Savannah, GA. Another group of four previously qualified GV pilots received GV refresher training. One group then performed handling qualities comparison flight testing in the GV-SP. The test was successfully passed. Each group of pilots then received differences training in the variation airplane and underwent pilot proficiency checks in that airplane. Both groups then participated in 2 days of GV-SP flights to determine operational suitability, validate proposed AFM normal, abnormal, and emergency procedures, and evaluate the proposed new forward observer seat.
- 1.9.5** In March–May 2004, the GIV-X FSB conducted an evaluation of the GIV-X in accordance with the process outlined in AC 120-53. The purpose was to determine if Gulfstream’s proposal to allow the GV, GV-SP, and GIV-X to have the same pilot type rating was valid. One group of two previously qualified GV pilots received GV refresher training. Another group of two previously qualified GV-SP pilots received GV-SP refresher training. Both groups then performed handling qualities comparison flight testing in the GIV-X. The test was successfully passed.
- 1.9.6** Another group of four pilots then received a GIV-X initial pilot ground school utilizing the training facilities of Flight Safety International and a GIV-X aircraft owned by Gulfstream, both located in Savannah, GA. Two of those pilots then received differences training in the GV and underwent pilot proficiency checks and Line-Oriented Flights (LOF) in a GV simulator. The other two pilots then received differences training in the GV-SP and underwent pilot proficiency checks and LOF in a GV-SP simulator.
- 1.9.7** All eight pilots then participated in 2 days of GIV-X flights to determine parts 91 and 135 operational suitability and validate proposed AFM normal, abnormal, and emergency procedures.
- 1.9.8** In June 2005, the FSB conducted flight evaluations of GV-SP CAT II capability and found it, as well as the associated AFM CAT II Supplement, to be operationally suitable.
- 1.9.9** In August 2005, the FSB conducted flight evaluations of PlaneView avionics software version “C” in a GIV-X. This software added features such as charts, graphical flight planning, uplinked weather, video, enhanced envelope protection system, and vertical situation display with terrain. It, as well as the associated AFM change, was found to be operationally suitable. Training, checking, and currency requirements are listed in Appendix 6, PlaneView Avionics Software Version “C”.

- 1.9.10** In February 2007, the FSB conducted a flight evaluation of PlaneView avionics software version “D” in a GV-SP. This software added flight management system (FMS) features such as Vertical Glide Path (VGP), Required Navigation Performance - Special Aircraft and Aircrew Authorization Required (RNP SAAR), performance step climb, takeoff obstacle clearance calculations, and graphical radio tuning. It also added Runway Awareness Advisory System (RAAS). It, as well as the associated AFM change, was found to be operationally suitable. Training, checking, and currency requirements are listed in Appendix 7, PlaneView Avionics Software Version “D”.
- 1.9.11** In April and November 2007, the FSB conducted flight evaluations of PlaneView avionics software version “E” in a GIV-X. This software added Synthetic Vision Primary Flight Display (SV PFD). It, as well as the associated AFM change, was found to be operationally suitable. Training, checking, and currency requirements are listed in Appendix 8, PlaneView Avionics Software Version “E”.
- 1.9.12** In November and December 2007, the FSB conducted an evaluation of EVS II. It was found to be functionally equivalent to EVS. All training, checking, and currency requirements for EVS apply to EVS II and are listed in Appendix 5.
- 1.9.13** In June 2009, the FSB conducted flight evaluations of PlaneView avionics software version “F” in a GIV-X. This software added map functionality and three other options for operators to purchase: 1) enhanced navigation, 2) enhanced SV PFD, and 3) XM Weather. Software version “F”, as well as the associated AFM change, was found to be operationally suitable. Training, checking, and currency requirements are listed in Appendix 9, PlaneView Avionics Software Version “F”.
- 1.9.14** In June 2009, the FSB conducted flight evaluations of HUD II, which is the Rockwell-Collins Head-Up Guidance System (HGS) (Model 6250). It was found to be functionally equivalent to HUD, which is the Honeywell HUD (Model 2020). All training, checking and currency requirements for HUD apply to HUD II and are listed in Appendix 4.
- 1.9.15** In April 2011, the FSB conducted flight evaluations of PlaneView avionics software version “G” in a GIV-X. This software added the following features: early missed approach activation with the MCDU and takeoff/go-around (TOGA), localizer performance with vertical guidance (LPV) approach capture from above, maximum descent angle improvements, data link recording on the cockpit voice recorder (CVR), path-based Traffic Alert and Collision Avoidance System (TCAS) guidance on the SV PFD, listing of multiple localizer approaches to the same runway, and update to fuel tank temperature Crew Alert System (CAS) message and related synoptics for the GIV-X only. Software version “G”, as well as the associated AFM change, was found to be operationally suitable. Training, checking, and currency requirements are listed in Appendix 10, PlaneView Avionics Software Version “G”.
- 1.9.16** In November 2011, the FSB conducted flight evaluations of the display unit (DU)-885 modification to the GV. This modification includes: 1) replacement of six

Honeywell DU-880 cathode ray tubes (CRT) with six Honeywell Primus Elite DU-885 LCDs, 2) installation of two CCDs, and 3) new associated functions. The functions include: charts, maps, video, database, and DU maintenance. The LCDs, CCDs, and associated functions, as well as the associated AFM change, was found to be operationally suitable. Training, checking, and currency requirements are listed in Appendix 11, GV Display Unit DU-885 Modification.

1.9.17 In August 2012 and October 2012, the Gulfstream G-IV FSB evaluated the Honeywell NZ-2000 FMS 6.1 Software with Satellite-based Augmentation System (SBAS)/LPV Global Positioning Satellite (GPS) and found the installation to be operationally suitable. The GV FSB determined that the functionality of the NZ-2000 FMS 6.1 in the G-IV was the same as in the GV aircraft and applied the G-IV FSB findings to the GV. Training, checking, and currency requirements are listed in Appendix 12, Honeywell NZ-2000 FMS 6.1 Software.

1.9.18 In September 2015, the Gulfstream GV FSB evaluated the Honeywell Mark III Communications Management Unit (CMU) for Future Air Navigation System 1/A+ (FANS 1/A+) and found the installation to be operationally suitable. Training, checking, and currency requirements are listed in Appendix 13, Honeywell Mark III Communications Management Unit (CMU) for FANS 1/A+.

1.9.19 In February 2016, the G-IV FSB participated in an evaluation of the G-IV Honeywell CD-830 control display units (CDU) Modification for ST04037 AT-D and found it to be operationally suitable. The GV FSB determined that the functionality of the Honeywell CD-830 in the G-IV was the same as in the GV aircraft. Training, checking, and currency requirements are listed in Appendix 14, G-V Honeywell CD-830 Control Display Units (ST04037 AT-D).

1.9.20 In March 2016, the G-IV FSB participated in an evaluation of the G-IV Primus Elite Advanced Features (PEAF) modification for STC04297 AT-D and found it to be operationally suitable. The GV FSB determined that the functionality of the PEAFF modification for STC04297 AT-D in the G-IV was the same as the GV aircraft. Training, checking, and currency requirements are listed in Appendix 15, GV Primus Elite Advanced Features (PEAF) Modification (STC04297 AT-D).

2. PILOT TYPE RATING REQUIREMENTS

- 2.1.** In accordance with the provisions of 14 CFR parts 1, 61, and 135, the same pilot type rating is assigned to the GIV-X (G350/G450), GV, and the GV-SP (G500/G550), and is designated "G-V".
- 2.2.** The Gulfstream GIV-X, GV, and GV-SP have not been issued a new TCDS. They were all added to the existing G-II through G-IV TCDS issued by the Atlanta ACO. The GIV-X, GV, and GV-SP aircraft, however, are not considered variations or derivatives of the Gulfstream G-IV aircraft for pilot type rating purposes. The FSB did not conduct a comparison between the G-IV and any other model aircraft for pilot type rating purposes;

therefore, no credit may be given between the G-IV and any other model aircraft for training, checking, or currency.

3. MASTER COMMON REQUIREMENTS (MCR)

3.1. MCRs for all GIV-X, GV, and GV-SP Airplanes.

3.1.1 Normal “final” landing flap setting.

The normal “final” landing flap is 39 degrees for the GIV-X, GV, and the GV-SP.

3.1.2 Automatic flight control system (AFCS).

The AFCS pilot/machine interface is the same for the GIV-X, GV, and GV-SP.

3.1.3 Electronic Flight Instrument System (EFIS).

The EFIS/pilot interface is essentially the same for the GIV-X, GV, and GV-SP aircraft. All three airplanes use the EFIS display controller as the initial interface.

3.1.4 Engine indicating and crew alerting system (EICAS).

The EICAS philosophy is the same in the GV and the GV-SP aircraft. Only minor changes to crew alerting messages and the “look and feel” of the synoptic and system pages have been made.

3.1.5 Navigation and communication:

All three aircraft share the same navigation and communication equipment. Pilot operation of the equipment is the same for the GIV-X, GV, and GV-SP aircraft.

3.1.6 Primary and secondary flight controls.

Pilot operation of the primary and secondary flight controls is the same for the GIV-X, GV, and the GV-SP under normal conditions.

3.1.7 Procedure knowledge.

Takeoff climb and descent profiles:

The takeoff, climb, and descent profiles for the GIV-X, GV, and GV-SP are identical.

3.1.8 Landing minima category (14 CFR part 97, § 97.3).

The following straight-in approach minima (based on maximum landing weight (MLW) and 1.3 times stall speed (V_{SO})) for the GIV-X, GV, and the GV-SP are as follows:

Aircraft	Landing Flap	Category
GIV-X	39°	D
GV	39°	C
GV-SP	39°	C

For the purpose of determining circling approach minima, the minimums are based on the highest speed used during a circling maneuver. As depicted in the table below, the highest speed to be flown (speed category) during the circling maneuver must be used to determine the appropriate minimums. This will ensure that the aircraft will remain within the designated maneuver area and assure obstacle clearance.

3.1.9 Approach profiles and speed:

Speed Category	Visibility in Statute Miles
Less than 91 kts	1 mile
91 to 120 kts	1 mile
121 to 140 kts	1 ½ miles
141 to 165 kts	2 miles
Above 165 kts	3 miles

The approach profiles are the same for the GIV-X, GV, and the GV-SP.

Approach speeds are dependent upon aircraft weight. All critical speeds are automatically presented to the pilot in a standardized manner for the GIV-X, GV, and the GV-SP aircraft.

3.1.10 Abnormal and emergency procedures:

Abnormal and emergency procedures are presented in quick reference handbooks (QRH) of an identical format for all three aircraft. Although some individual steps may differ or use different acronyms, these steps are carried out under the guidance of the handbook in a logical decision-making manner.

There are no memory items in the AFM for the GIV-X, GV, or the GV-SP.

4. MASTER DIFFERENCES REQUIREMENTS (MDR)

MDRs for the GIV-X, GV, and GV-SP are shown in Appendix 1, Master Differences Requirements (MDR) Table. Appendix 1 provisions apply when differences between variations exist which affect crew knowledge, skills, or abilities related to flight safety (e.g., Level A or greater differences).

5. ACCEPTABLE OPERATOR DIFFERENCES REQUIREMENTS (ODR) TABLES

ODR tables are used to show an operator's compliance method. ODR tables for operators conducting mixed fleet operations using the GIV-X, GV, and GV-SP are shown in Appendix 2, Acceptable Operator Differences Requirements (ODR) Tables. The ODR tables represent an acceptable means to comply with MDR provisions based on those differences and compliance methods shown. The tables do not necessarily represent the only acceptable means of compliance for operators with airplanes having other differences where compliance methods (e.g., devices, simulators) are different. For operators flying the GIV-X, GV, and the GV-SP, the ODR tables in Appendix 2 have been found acceptable, and therefore, may be approved by a POI for a particular operator.

5.1. Operator Preparation of ODR Tables.

Operators seeking different means of compliance must prepare and seek FAA approval from their POI of specific ODR tables pertinent to their fleet. The POI should coordinate this with the FSB Chair and the Air Transportation Division.

5.2. ODR Table Coordination.

New ODR tables proposed by operators should be coordinated with the FSB prior to FAA approval and implementation. Through this coordination, the FSB can ensure consistent treatment of variations between various operators' ODR tables and compatibility of the MDR table with MDR provisions.

5.3. ODR Table Distribution.

Originally approved ODR tables are retained by the operator. Copies of approved GIV-X, GV, and GV-SP tables are retained by the certificate management office (CMO). Copies of all approved ODR tables should be forwarded to the FSB Chair, Transport Aircraft Long Beach Branch.

6. FSB SPECIFICATIONS FOR TRAINING

6.1. General.

6.1.1 The provisions of this training section apply to the GIV-X, GV, and GV-SP, to programs for airmen having previous experience in parts 91 or 135 air carrier operations, and multi-engine turbojet or turboprop aircraft. Additional requirements, as determined by the operator's POI, the FSB, and the Air Transportation Division, may be necessary for airmen not having such experience. Appendix 3, Training Program Special Emphasis Items, contains a list of special emphasis items to be included in an approved training program.

6.2. Initial, Transition, and Upgrade Training.

6.2.1 Pilot initial, transition, and upgrade ground training is accomplished in accordance with part 135, §§ 135.343 and 135.345.

6.2.2 Pilot initial, transition, and upgrade flight training is accomplished in accordance with § 135.347.

6.3. Recurrent Training.

6.3.1 Recurrent ground training is accomplished in accordance with § 135.351.

6.3.2 Recurrent flight training is accomplished in accordance with § 135.351 and requires that the pilot be proficient in those maneuvers and procedures that are required for the original issuance of the pilot certificate.

6.4. Differences Training.

Differences training is accomplished in accordance with § 135.347. When any combination of the GIV-X, GV, and GV-SP are flown, appropriate instruction in design and systems differences will be required for both airplanes, consistent with MDR provisions listed in Appendix 1.

6.5. Other Training.

6.5.1 Flight attendant training is accomplished in accordance with §§ 135.341 and 135.349 if a flight attendant is utilized. The GIV-X, GV, and GV-SP have a maximum seating capacity of 19 seats, and therefore, do not require a flight attendant.

6.5.2 Aircraft dispatcher training, flight engineer training, and flight navigator training are not applicable.

6.5.3 Emergency evacuation crewmember (EEC) training. During the GV-SP certification process, Gulfstream asked the FAA to make an equivalent safety finding on the overwing exits because they did not meet current FAA certification standards. Gulfstream requested, and the FAA accepted, that any time more than nine passengers are carried, an additional crewmember trained in emergency evacuation for the Gulfstream elliptical exits be required onboard. The FAA found that this provides an equivalent level of safety to overwing emergency exits that would meet current FAA certification standards. Therefore, the GV-SP will require an EEC on the aircraft any time more than nine passengers are carried. The specific training that an EEC is required to undergo is specified in Gulfstream Operating Manual Supplements numbers G550-OMS-1 for the G550 and G500-OMS-1 for the G500.

The GIV-X does not require an EEC. The FAA certified the GIV-X overwing exits at an earlier certification rule amendment level based on the G-IV certification. The GV does not require an EEC.

7. FSB SPECIFICATIONS FOR CHECKING

7.1. General.

7.1.1 The provisions of this checking section apply to the GIV-X, GV, and GV-SP. Testing, checking, and evaluations specified by part 61, §§ 61.57, 61.58, 61.63, 61.67, 61.157, and 61.159, §§ 135.293 and 135.297, and FAA PTS apply.

7.1.2 The following areas of emphasis must be demonstrated during checking:

- a) Proficiency in manual and automatic (including FMS) flight in normal, abnormal, and emergency situations must be demonstrated at each proficiency/competency check by all crewmembers.
- b) The use of manual modes to operate systems such as electrical, hydraulic, pressurization, environmental, etc., and emergency equipment must be demonstrated at each proficiency/competency check by all crewmembers.
- c) Demonstration of a no-flap approach and landing during a pilot type rating or part 135 check is required per the current edition of FAA-S-8081-5F, Airline Transport Pilot and Aircraft Type Rating Practical Test Standards for Airplane, Section 2, Area of Operation VI, Task I. Refer to FAA Order 8900.1, Volume 5 when the test is conducted in an aircraft versus a full flight simulator (FFS).

7.2. Type Ratings.

Type rating practical tests are administered in accordance with §§ 61.63, 61.157, and 61.159 and the PTSs.

7.3. Competency/Proficiency Checks and Evaluations.

Competency/proficiency checks and evaluations are administered in accordance with §§ 61.58, 135.293, and 135.297.

8. FSB SPECIFICATIONS FOR CURRENCY

Currency (Recency of Experience).

Currency is considered to be common for the GIV-X, GV, and GV-SP. Separate tracking of currency for the GIV-X, GV, and GV-SP is not necessary or applicable. Currency will be maintained, or reestablished, in accordance with §§ 61.57 or 135.247.

9. AIRCRAFT REGULATORY COMPLIANCE CHECKLIST

9.1. Operating Rules Compliance Checklist.

The Operating Rules Compliance Checklists are provided as an aid to responsible Flight Standards offices to identify those specific rules or policies for which compliance has already been demonstrated to the FAA for a particular aircraft. The checklist also notes rules or policies which must be demonstrated to CHDOs by the operator. Not all rules or policies are necessarily listed or addressed. It continues to be the responsibility of the responsible Flight Standards office to review compliance with pertinent rules or policies not already satisfactorily addressed in the Operating Rules Compliance Checklist prior to part 135 approval for an operator to use the GIV-X, GV, or GV-SP in service.

The Operating Rules Compliance Checklist reflects the status of the first production GV aircraft flown by the FSB on February 6, 1997. The aircraft serial number was 505 and bore U.S. Registration Number N505GV.

The Operating Rules Compliance Checklist reflects the status of a GV-SP flight test aircraft flown by the FSB on February 18, 2003. The aircraft serial number was 5001 and bore U.S. Registration Number N5SP.

The Operating Rules Compliance Checklist reflects the status of a GIV-X flight test aircraft flown by the FSB on May 3–4, 2004. The aircraft serial number was 4003 and bore U.S. Registration Number N403SR.

This information is kept on file at the Transport Aircraft Long Beach Branch, 3960 Paramount Boulevard, Suite 100, Lakewood, CA 90712-4137.

9.2. Aircraft Proving Tests.

Proving tests in accordance with § 135.145 and FAA Order 8900.1, Volume 3, Chapter 29 are appropriate when the GIV-X, GV, or GV-SP is new to a particular operator. When an operator is currently operating the G-IV, GIV-X, GV, or GV-SP and the operator introduces the G-IV, GIV-X, GV, or GV-SP into the same operations, proving tests are not required. The G-IV, GIV-X, GV, and GV-SP have similar type powerplants, and alterations between the G-IV, GIV-X, GV, and GV-SP do not materially affect flight characteristics for purposes of proving tests.

9.3. Forward Observer's Seat.

Section 135.75(b) requires that a forward observer's seat on the flight deck be provided for use by the Administrator while conducting enroute inspections. It is also required for conducting airman certification (checkrides).

GV aircraft produced in accordance with Gulfstream V product specification, Revision C, dated 12/19/1996, have a forward observer's seat installed that the FSB found operationally acceptable for conducting cockpit enroute inspections.

The FSB evaluated the GIV-X and GV-SP observer seats for compliance with the current edition of FAA AC 120-83, Flight Deck Observer Seat and Associated Equipment, and found them to be operationally acceptable for conducting cockpit enroute inspections.

10. FSB SPECIFICATIONS FOR DEVICES AND SIMULATORS

10.1. Device and Simulator Characteristics.

10.1.1 Flight simulation training device (FSTD) characteristics are specified in 14 CFR part 60.

10.1.2 The acceptability of differences between devices, simulators, and aircraft must be addressed by the POI.

10.2. Device Approval.

10.2.1 Requests for device approval should be made to the POI. The POI may approve these devices for that operator if their characteristics clearly meet the established FAA criteria and have been qualified by the National Simulator Program (NSP).

11. APPLICATION OF FSB REPORT

11.1. All relevant parts of this report are applicable to operators on the effective date of this report.

12. ALTERNATE MEANS OF COMPLIANCE TO THIS REPORT

12.1. Approval Level and Criteria.

12.1.1 The FSB Chair should be consulted by the POI when alternate means of compliance, other than those specified in this report, are proposed. Alternate means of compliance must be approved by the Air Transportation Division. If an alternate means of compliance is sought, operators will be required to submit a proposed alternate means for approval that provides an equivalent level of safety to the provisions of AC 120-53 and this FSB report. Analysis, demonstrations, proof of concept testing, differences documentation, and/or other evidence may be required.

12.1.2 In the event that alternate compliance is sought, training program hour reductions, simulator approvals, and device approvals may be significantly limited and reporting requirements may be increased to ensure an equivalent level of training, checking, and currency. The FAA will generally not consider relief through alternate compliance means unless sufficient lead-time has been planned by an operator to allow for any necessary testing and evaluation.

13. MISCELLANEOUS

13.1. Abnormal and Emergency Procedures.

Gulfstream's philosophy is to not identify any steps in the GV, GV-SP, and GIV-X abnormal or emergency procedures as "memory items", yet Gulfstream expects pilots to perform some of the initial and critical steps without reference to any documentation. Gulfstream has advised that the initial, critical pilot responses for the following emergency procedures should be performed promptly without reference to a checklist: rejected takeoff (RTO), engine failure/fire after takeoff decision speed (V_1), emergency descent, rapid decompression, autopilot (AP) or autothrottle (AT) uncommanded disconnect, engine exceedance, overspeed, stall protection/stall warning activation, flight control jams, total loss of braking, enhanced ground proximity warning system (EGPWS) alert, windshear alert, and TCAS alert. In addition, pilots are expected to don oxygen masks promptly when appropriate (e.g., when smoke is detected). Operators and training providers should ensure pilots are trained accordingly.

14. SUPPLEMENTAL BOARD REPORT - PART II

14.1. Part II of the FSB report contains historical development information used to develop Part I. This information is kept on file at the Transport Aircraft Long Beach Branch, 3960 Paramount Boulevard, Suite 100, Lakewood, CA 90712-4137.

Documents kept on file are as follows:

- GIV-X/G-V/GV-SP Master Minimum Equipment List (MMEL).
- GIV-X/G-V/GV-SP Operational Manuals.
- GIV-X/G-V/GV-SP training syllabus of FSB members.
- GIV-X/G-V/GV-SP original AFM.
- GIV-X/G-V/GV-SP FAA FSB Order (FSB member list).
- GIV-X/G-V/GV-SP Operational Issue Papers.

APPENDIX 1. MASTER DIFFERENCES REQUIREMENTS (MDR) TABLE

Related Aircraft ↓	Base Aircraft →	GV-SP	G-V	GIV-X
GIV-X		C/B/A	C/B/A	Not applicable
G-V		C/B/A	Not applicable	C/B/A
GV-SP		Not applicable	C/B/A	C/B/A

**APPENDIX 2. ACCEPTABLE OPERATOR DIFFERENCES
REQUIREMENTS (ODR) TABLES**

Definitions	ODR Training Level
“HO” = Handout	A
“ST” = Slide/tape presentations “TCBI” = <u>Tutorial</u> computer-based instruction “SU” = Stand-up instructors “VT” = Video tapes	B
“ICBI” = <u>Interactive</u> computer-based instruction “CSS” = Cockpit system simulators “CPT” = Cockpit procedures trainers “PTT” = Part task trainers “FTD 2–5” = Flight training devices (Level 2–5)	C
“FTD 6–7” = Flight training devices (Level 6–7) “SIM A–B” = Simulators (Level A or B)	D
“SIM C–D” = Simulators (Level C or D) “ACFT” = Aircraft	E
<u>NOTES:</u> An “X” in an ODR table column indicates that any of the training methods listed for that level are acceptable. If a specific instruction method is specified in an ODR table column, it must be used.	

DIFFERENCE AIRCRAFT: GV-SP BASE AIRCRAFT: GIV-X APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 20 Aircraft General	Performance Max Takeoff (T.O.) Weight 91,000 lb Increase of 17,100 lb	No	No	X				A	A
ATA 23 Communications	Selcal Test and CVR Test switches relocated	No	Minor	X				A	A
ATA 27 Flight Controls	Split flight controls added	Yes	Minor			CSS or CPT or PTT or FTD5		A	A
ATA 27 Flight Controls	Trailing edge contours (TEC) added to inboard trailing edge of flaps	No	No	X				A	A
ATA 27 Flight Controls	No Alternate Flap Switch	No	Minor	X				A	A
ATA 27 Flight Controls	Standby rudder and nose wheel steering on AUX pump capability	No	Minor		X			A	A
ATA 27 Flight Controls	Spoiler Control switch added. Lateral Control Switch deleted	Yes	Minor		X			B	A

DIFFERENCE AIRCRAFT: GV-SP BASE AIRCRAFT: GIV-X APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 27 Flight Controls	Vortex generators added to lower horizontal stabilizer surfaces and upper elevator surfaces	No	Minor	X				A	A
ATA 28 Fuel	Heated Fuel Return System	No	Minor		X			A	A
ATA 29 Hydraulic Power	Aux Hydraulic Boost Pump added	No	No	X				A	A
ATA 30 Ice and Rain Protection	Pitot Probe Heat System changed	No	Minor	X				A	A
ATA 32 Landing Gear	Four brake wear indicator pins vs. two and WOW switches	No	Minor	X				A	A
ATA 49 Airborne Auxiliary Power	Different APU installed, RE220 vs. 36-150, both supplied by Honeywell	No	Minor		X			A	A
ATA 49 Airborne Auxiliary Power	Bleeds off T.O. capability added	No	Major		X			A	A
ATA 71 Powerplant	BR710 installed vs. Tay 611-8C	No	Minor		X			A	A
ATA 78 Engine Exhaust	Thrust Reverser Manual Stow switches (two) installed	No	Minor		X			A	A

DIFFERENCE AIRCRAFT: GV-SP BASE AIRCRAFT: GIV-X APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
Limitations	Max T.O. Weight increased to 91,000 lb from 73,900 lb Max Landing Weight increased to 75,300 lb from 66,000 lb Fuel quantity 41,300 lb vs. 29,500 lb APU and Engine limitations differences	No	No	X				A	A

DIFFERENCE AIRCRAFT: GV-SP BASE AIRCRAFT: GIV-X APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
MANEUVER	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
Normal Takeoff	Bleeds Off	No	Minor	X				A	A

DIFFERENCE AIRCRAFT: GV-SP BASE AIRCRAFT: GIV-X APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 23 Communications	Selcal and CVR test switches different test methodology	No	Minor	X				A	A
ATA 27 Flight Controls	Spoiler Control switch added Lateral Control Switch deleted	Yes	Minor		X			B	A
ATA 30 Ice and Rain Protection	Pitot Probe Heat System changed	No	Minor	X				A	A
ATA 49 Airborne Auxiliary Power	Different APU installed, RE220 vs. 36-150, both supplied by Honeywell	No	Minor		X			A	A
ATA 49 Airborne Auxiliary Power	Starter assisted airstart capability for main engines	No	Major		X			A	A
ATA 49 Airborne Auxiliary Power	Bleeds off T.O. capability added	No	No		X			A	A
ATA 71 Powerplant	Thrust increased by 1,535 lb to 15,385 lb	No	No	X				A	A

DIFFERENCE AIRCRAFT: GIV-X BASE AIRCRAFT: GV-SP APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 20 Aircraft General	Performance Max T.O. Weight 17,100 lb decrease to 73,900 lb	No	No	X				A	A
ATA 23 Communications	Selcal Test and CVR Test switches relocated	No	Minor	X				A	A
ATA 27 Flight Controls	Alternate Flap Control switch added	No	Minor		X			A	A
ATA 27 Flight Controls	No split flight controls	Yes	Minor		X			A	A
ATA 27 Flight Controls	Trailing Edge Contours not installed	No	No	X				A	A
ATA 27 Flight Controls	No standby rudder and no nose wheel steering on AUX pump capability	Yes	Minor		X			A	A
ATA 27 Flight Controls	Lateral Control switch added Spoiler Control Switch deleted	Yes	Minor		X			B	A
ATA 27 Flight Controls	Vortex generators deleted from lower horizontal stabilizer surfaces and upper elevator surfaces	No	Minor	X				A	A

DIFFERENCE AIRCRAFT: GIV-X BASE AIRCRAFT: GV-SP APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 28 Fuel	No Heated Fuel Return System installed	No	Minor	X				A	A
ATA 29 Hydraulic Power	Aux Hydraulic Boost Pump deleted	No	No	X				A	A
ATA 30 Ice and Rain Protection	Pitot Probe Heat System changed	No	Minor	X				A	A
ATA 32 Landing Gear	Two brake wear indicator pins vs. four	No	Minor	X				A	A
ATA 49 Airborne Auxiliary Power	Different APU installed., RE220 vs. 36-150, both supplied by Honeywell	No	Minor		X			A	A
ATA 49 Airborne Auxiliary Power	No Bleeds Off T.O. capability	No	No	X				A	A
ATA 71 Powerplant	Tay 611-8C installed vs. BR710	No	Minor		X			A	A
ATA 78 Engine Exhaust	No Manual Thrust Reverser Stow switches installed	No	Minor	X				A	A

DIFFERENCE AIRCRAFT: GIV-X BASE AIRCRAFT: GV-SP APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
Limitations	Max T.O. Weight decreased by 17,100 lb to 73,900 lb Max landing weight decreased to 66,000 lb Fuel quantity 29,500 lb vs. 41,300 lb APU and engine limitations differences	No	No	X				A	A

DIFFERENCE AIRCRAFT: GIV-X				COMPLIANCE METHOD					
BASE AIRCRAFT: GV-SP									
APPROVED BY				TRAINING				CHK/CURR	
(POI) _____				LVL	LVL	LVL	LVL	CHK	CURR
MANEUVER	REMARKS	FLT	PROC	A	B	C	D		
		CHAR	CHNG						
None	None	No	No						

DIFFERENCE AIRCRAFT: GIV-X BASE AIRCRAFT: GV-SP APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 23 Communications	Selcal and CVR test switches different test methodology	No	Minor	X				A	A
ATA 27 Flight Controls	Lateral Control switch added Spoiler Control Switch deleted	Yes	Minor		X			B	A
ATA 30 Ice and Rain Protection	Pitot Probe Heat System changed	No	Minor	X				A	A
ATA 49 Airborne Auxiliary Power	Different APU installed, RE220 vs. 36-150, both supplied by Honeywell	No	Minor		X			A	A
ATA 49 Airborne Auxiliary Power	No Bleeds Off T.O. capability	No	Minor	X				A	A
ATA 71 Powerplant	Thrust decreased 1,535 lb to 13,850 lb	No	No	X				A	A

DIFFERENCE AIRCRAFT: GV BASE AIRCRAFT: GIV-X APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 20 Aircraft General	Performance Max T.O. Weight 90,500 lb Increase of 16,600 lb	No	No	X				A	A
ATA 20 Aircraft General	Observer seat and location changed	No	No		VT			A	A
ATA 21 Air Conditioning	ECS Outflow valve changed to butterfly valve	No	Minor	X				A	A
ATA 24 Electrical Power	Revised Location of PDB circuit breaker panels	No	Minor	X				A	A
ATA 27 Flight Controls	Split flight controls added	Yes	Minor			CSS or CPT or PTT or FTD5		A	A
ATA 27 Flight Controls	No Alternate Flap Switch	No	Minor	X				A	A
ATA 27 Flight Controls	Standby Rudder installed with nose wheel steering on the AUX pump capability (including AUX PUMP ground spoiler pressure)	Yes	Minor		X			A	A
ATA 27 Flight Controls	Spoiler Control Switch added Lateral Control Switch deleted.	Yes	Minor		X			B	A

DIFFERENCE AIRCRAFT: GV BASE AIRCRAFT: GIV-X APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 27 Flight Controls	Vortex generators added to lower horizontal stabilizer surfaces and upper elevator surfaces	No	Minor	X				A	A
ATA 28 Fuel	Heated Fuel Return System added	No	Minor		X			A	A
ATA 29 Hydraulic Power	Aux Hydraulic Boost Pump added	No	No	X				A	A
ATA 30 Ice and Rain Protection	Pitot Probe Heat System changed	No	Minor	X				A	A
ATA 32 Landing Gear	Four brake wear indicator pins vs. two and WOW switches	No	Minor	X				A	A
ATA 49 Airborne Auxiliary Power	Different APU installed with capability for APU assisted main engine airstart and different electrical load capabilities	No	Minor		X			A	A
ATA 52 Doors	Main Door moved aft 24 inches	No	No	X				A	A
ATA 52 Doors	Aft Lav Dump Door relocated	No	No	X				A	A

DIFFERENCE AIRCRAFT: GV BASE AIRCRAFT: GIV-X APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 71 Powerplant	BR710 vs. Tay 611-8C Installed	No	Minor		X			A	A
ATA 78 Engine Exhaust	Thrust Reverser Manual Stow Switches two installed	No	Minor		X			A	A
Limitations	Max T.O. Weight increased to 90,500 lb from 73,900 lb	No	No	X				A	A

DIFFERENCE AIRCRAFT: GV BASE AIRCRAFT: GIV-X APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
MANEUVER	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
None	None	No	No						

DIFFERENCE AIRCRAFT: GV BASE AIRCRAFT: GIV-X APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 22 Autoflight	TOGA Flight Director Command Bars initiate at 12° vs. 8° on GIV-X	No	No	X				A	A
ATA 23 Communications	New Audio System	No	No			X		A	A
ATA 23 Communications	Radio Tuning Through RFMU	No	Yes			X		A	A
ATA 27 Flight Controls	Spoiler Control switch added Lateral Control Switch deleted	Yes	Minor		X			B	A
ATA 30 Ice and Rain Protection	Pitot Probe Heat System changed	No	Minor	X				A	A
ATA 31 Indicating/Recording Systems	Standby Engine Instrument on RFMU	No	Minor	X				A	A
ATA 31 Indicating/Recording Systems	DAU (Data Acquisition Unit) and FWC (Fault Warning Computer) replaces MAU (Modular Avionics Unit)	No	Minor	X				A	A
ATA 31 Indicating/Recording Systems	Display Controller	No	Minor			X		A	A

DIFFERENCE AIRCRAFT: GV BASE AIRCRAFT: GIV-X APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 31 Indicating/Recording Systems	Electronic Checklist Auto Pop-up Feature enabled	No	Minor		ST, TCBI or VT			A	A
ATA 34 Navigation	IRS ON/OFF switches deleted and replaced with MSU switches	No	Minor		X			A	A
ATA 34 Navigation	EICAS FMS Joystick Panel	No	None		X			A	A
ATA 34 Navigation	Six Display Units vs. four Display Units	No	Minor			X		B	A
ATA 34 Navigation	No CCDs Used in Conjunction with Displays	No	Minor			X		B	A
ATA 34 Navigation	HSI on RFMU	No	Minor		X			A	A
ATA 34 Navigation	LaserTrack	No	Minor			X		B	A
ATA 34 Navigation	Standby Flight instruments have different design and location	No	Minor	X				A	A

DIFFERENCE AIRCRAFT: GV BASE AIRCRAFT: GIV-X APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 49 Airborne Auxiliary Power	Different APU installed with capability for APU assisted main engine airstart and different electrical load capabilities	No	Minor		X			A	A
ATA 71 Powerplant	Thrust increased by 900 lb to 14,750 lb	No	No	X				A	A

DIFFERENCE AIRCRAFT: GIV-X BASE AIRCRAFT: GV APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 20 Aircraft General	Performance Max T.O. Weight 73,900 lb Decrease of 16,600 lb	No	No	X				A	A
ATA 20 Aircraft General	Observer seat and location changed	No	No		VT			A	A
ATA 21 Air Conditioning	ECS Outflow valve changed to thrust recovery outflow valve	No	Minor	X				A	A
ATA 23 Communications	Selcal test and CVR test switches relocated	No	Minor	X				A	A
ATA 24 Electrical Power	Revised Location of PDB circuit breaker panels	No	Minor	X				A	A
ATA 27 Flight Controls	No Standby Rudder installed or nose wheel steering on the AUX pump capability	Yes	Minor		X			A	A
ATA 27 Flight Controls	No split flight controls	Yes	Minor	X				A	A
ATA 27 Flight Controls	Lateral Control switch added Spoiler Control Switch deleted	Yes	Minor		X			B	A

DIFFERENCE AIRCRAFT: GIV-X BASE AIRCRAFT: GV APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 27 Flight Controls	Vortex generators deleted from lower horizontal stabilizer surfaces and upper elevator surfaces	No	Minor	X				A	A
ATA 27 Flight Controls	Alternate Flap Switch added	No	Minor		X			A	A
ATA 28 Fuel	No Heated Fuel Return System	No	Minor	X				A	A
ATA 29 Hydraulic Power	No Aux Hydraulic Boost Pump	No	No	X				A	A
ATA 30 Ice and Rain Protection	Pitot Probe Heat System changed	No	Minor	X				A	A
ATA 49 Airborne Auxiliary Power	Different APU installed with no capability for APU assisted main engine airstart and different electrical load capabilities	No	Minor		X			A	A
ATA 52 Doors	Main Door moved forward 24 inches	No	No	X				A	A
ATA 52 Doors	Aft Lav Dump Door relocated	No	No	X				A	A

DIFFERENCE AIRCRAFT: GIV-X BASE AIRCRAFT: GV APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
Limitations	Max T.O. Weight decreased to 73,900 lb from 90,500 lb Fuel Quantity 29,500 lb vs. 41,300 lb APU and engine limitations differences	No	Minor	X				A	A

DIFFERENCE AIRCRAFT: GIV-X				COMPLIANCE METHOD					
BASE AIRCRAFT: GV									
APPROVED BY				TRAINING				CHK/CURR	
(POI) _____				LVL	LVL	LVL	LVL	CHK	CURR
MANEUVER	REMARKS	FLT	PROC	A	B	C	D		
None	None	No	No						

DIFFERENCE AIRCRAFT: GIV-X BASE AIRCRAFT: GV APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 22 Autoflight	TOGA Flight Director Command Bars initiate at 8° vs. 12° on GV	No	No	X				A	A
ATA 23 Communications	New Audio System	No	Minor			X		A	A
ATA 23 Communications	Radio Tuning Through MCDU and graphically	No	Minor		X			A	A
ATA 27 Flight Controls	Lateral Control switch added Spoiler Control Switch deleted	Yes	Minor		X			B	A
ATA 30 Ice and Rain Protection	Pitot Probe Heat System changed	No	Minor	X				A	A
ATA 31 Indicating/Recording Systems	Electronic Checklist Auto Pop-up Feature deleted	No	Minor	X				A	A
ATA 31 Indicating/Recording Systems	Standby Engine Instruments on MCDU	No	Minor	X				A	A
ATA 31 Indicating/Recording Systems	DAU (Data Acquisition Unit) and FWC (Fault Warning Computer) replaced by MAU (Modular Avionics Unit)	No	Minor	X				A	A

DIFFERENCE AIRCRAFT: GIV-X BASE AIRCRAFT: GV APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 31 Indicating/Recording Systems	Display Controller	No	Minor			X		A	A
ATA 34 Navigation	IRS MSU switches deleted and replaced with ON/OFF switches	No	Minor	X				A	A
ATA 34 Navigation	Four Display Units vs. six Display Units	No	Minor			X		B	A
ATA 34 Navigation	Added Dual CCDs used in Conjunction with Displays	No	Minor			X		B	A
ATA 34 Navigation	LaserTrack removed	No	Minor	X				A	A
ATA 34 Navigation	Standby Flight instruments have different design and location	No	Minor		X			A	A
ATA 34 Navigation	MCDU on Emergency Power	No	Minor		X			B	A
ATA 49 Airborne Auxiliary Power	Different APU installed with no capability for APU assisted main engine airstart and different electrical load capabilities	No	Minor		X			A	A

DIFFERENCE AIRCRAFT: GIV-X BASE AIRCRAFT: GV APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHK/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 71 Powerplant	Thrust decreased by 900 lb to 13,850 lb	No	No	X				A	A

DIFFERENCE AIRCRAFT: GV-SP BASE AIRCRAFT: GV APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHKG/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 20 Aircraft General	Performance Max T.O. Weight 91,000 lb Increase of 500 lb	No	No	X				A	A
ATA 21 Air Conditioning	ECS Outflow valve changed to thrust recovery outflow valve	No	No	X				A	A
ATA 24 Electrical Power	Revised Location of PDB circuit breaker panels	No	Minor	X				A	A
ATA 25 Equipment/Furnishings	Redesign and relocation of cockpit observer's seat to behind Co-Pilot's seat	No	No		X			A	A
ATA 27 Flight Controls	Trailing edge contours (TEC) added to inboard trailing edge of flaps	No	No	X				A	A
ATA 38 Water/Waste	Fuselage conformal fresh water tank	No	Minor	X				A	A
ATA 38 Water/Waste	Relocation of vacuum lavatory waste tank from baggage compartment to above APU	No	No	X				A	A
ATA 49 Airborne Auxiliary Power	Bleeds off T.O. capability added	No	Major		X			A	A

DIFFERENCE AIRCRAFT: GV-SP BASE AIRCRAFT: GV APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHKG/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 52 Doors	Main Door moved forward 24 in	No	No	X				A	A
ATA 52 Doors	Aft Lav Dump Door relocated	No	No	X				A	A
ATA 53 Fuselage	27 Boundary Layer Energizers added above the canopy	No	No	X				A	A
ATA 56 Windows	Addition of 7 th cabin window	No	No	X				A	A
ATA 57 Wings	Seven Vortex Generators relocated outboard on each wing	No	No	X				A	A
Limitations	Max T.O. Weight increased to 91,000 lb from 90,500 lb	No	No	X				A	A

DIFFERENCE AIRCRAFT: GV-SP BASE AIRCRAFT: GV APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHKG/CURR	
MANEUVER	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
Normal Takeoff	Bleeds Off	No	Minor	X				A	A

DIFFERENCE AIRCRAFT: GV-SP BASE AIRCRAFT: GV APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHKG/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 22 Autoflight	TOGA Flight Director Command Bars initiate at 8° vs. 12° on GV	No	No	X				A	A
ATA 23 Communications	New Audio System	No	Minor			X		A	A
ATA 23 Communications	Radio Tuning Through MCDU and graphically	No	No		X			A	A
ATA 31 Indicating/Recording Systems	Electronic Checklist Auto Pop-up Feature deleted	No	Minor Non Normal	X				A	A
ATA 31 Indicating/Recording Systems	DAU (Data Acquisition Unit) and FWC (Fault Warning Computer) replaced by MAU (Modular Avionics Unit)	No	Minor	X				A	A
ATA 31 Indicating/Recording Systems	Standby Engine Parameters available on #1 MCDU only	No	Minor	X				A	A
ATA 31 Indicating/Recording Systems	Different formatting on some synoptic displays	No	Minor		X			A	A
ATA 34 Navigation	IRS MSU switches deleted and replaced with ON/OFF switches	No	Minor	X				A	A

DIFFERENCE AIRCRAFT: GV-SP BASE AIRCRAFT: GV APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHKG/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 34 Navigation	Four Display Units vs. Six Display Units with different formatting	No	Major			X		B	A
ATA 34 Navigation	Added Dual CCDs Used in Conjunction with Displays	No	Minor			X		B	A
ATA 34 Navigation	Display controllers have different menus	No	Minor			X		A	A
ATA 34 Navigation	Standby Flight instruments have different design and location	No	Major		X			B	A
ATA 34 Navigation	Display Unit Controller has four overhead switches instead of three	No	Major		X			B	A
ATA 34 Navigation	RNP and Estimated Position Uncertainty (EPU) is displayed on PFD	No	Minor		X			A	A
ATA 34 Navigation	MCDU on Emergency Power	No	Minor		X			B	A
ATA 49 Airborne Auxiliary Power	Bleeds off T.O. capability added	No	Minor		ST, TCBI, SU VT			A	A

DIFFERENCE AIRCRAFT: GV-SP BASE AIRCRAFT: GV APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHKG/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 71 Powerplant	Thrust increased by 635 lb to 15,385 lb	No	No	HO				A	A

DIFFERENCE AIRCRAFT: GV BASE AIRCRAFT: GV-SP APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHKG/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 20 Aircraft General	Performance Max T.O. Weight 500 lb decrease to 90,500 lb	No	No	X				A	A
ATA 21 Air Conditioning	ECS Outflow valve changed to butterfly style	No	No	X				A	A
ATA 24 Electrical Power	Revised location of PDBs and associated circuit breakers	No	Minor	X				A	A
ATA 25 Equipment/Furnishings	Redesign and relocation of cockpit observer's seat to behind Captain's seat	No	No		X			A	A
ATA 27 Flight Controls	Trailing Edge Contours not installed	No	No	X				A	A
ATA 38 Water/Waste	Non-fuselage conformal fresh water tank	No	No	X				A	A
ATA 38 Water/Waste	Relocation of vacuum lavatory waste tank from above APU to baggage compartment	No	No	X				A	A
ATA 49 Airborne Auxiliary Power	No Bleeds Off T.O. capability	No	Minor	X				A	A

DIFFERENCE AIRCRAFT: GV BASE AIRCRAFT: GV-SP APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHKG/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 52 Doors	Main Door moved aft 24 in	No	No	X				A	A
ATA 52 Doors	Aft Lav Dump Door relocated	No	No	X				A	A
ATA 53 Fuselage	27 Boundary Layer Energizers removed from the canopy	No	No	X				A	A
ATA 56 Windows	Removal of 7 th cabin window	No	No	X				A	A
ATA 57 Wings	Seven Vortex generators relocated inboard on each wing	No	No	X				A	A
Limitations	Max T.O. Weight decreased by 500 lb to 90,500 lb	No	No	X				A	A

DIFFERENCE AIRCRAFT: GV				COMPLIANCE METHOD					
BASE AIRCRAFT: GV-SP									
APPROVED BY				TRAINING				CHKG/CURR	
(POI) _____				LVL	LVL	LVL	LVL	CHK	CURR
MANEUVER	REMARKS	FLT	PROC	A	B	C	D		
None		No	No						

DIFFERENCE AIRCRAFT: GV BASE AIRCRAFT: GV-SP APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHKG/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 22 Autoflight	TOGA Flight Director Command Bars initiate at 12° vs. 8° on GV-SP	No	No	X				A	A
ATA 23 Communications	New audio system	No	Minor			X		A	A
ATA 23 Communications	Radio tuning accomplished through RFMUs	No	Minor			X		A	A
ATA 31 Indicating/Recording Systems	Electronic Checklist has Auto pop-up Feature vs. passive checklist on GV-SP	No	Minor		X			A	A
ATA 31 Indicating/Recording Systems	MAU replaced by DAU and FWC	No	Minor			X		B	A
ATA 31 Indicating/Recording Systems	Engine Parameters available on either RFMU	No	Minor	X				A	A
ATA 31 Indicating/Recording Systems	Different formatting on some synoptic displays	No	Minor		X			A	A
ATA 34 Navigation	EICAS FMS Joystick Panel	No	None		X			A	A
ATA 34 Navigation	LaserTrack	No	Minor			X		B	A

DIFFERENCE AIRCRAFT: GV BASE AIRCRAFT: GV-SP APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHKG/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 34 Navigation	IRS ON/OFF switches replaced with IRS MSU switches	No	Minor		X			A	A
ATA 34 Navigation	Six Display Units vs. four Display Units with different formatting	No	Minor			X		B	A
ATA 34 Navigation	No CCDs installed	No	Minor			X		B	A
ATA 34 Navigation	Display controllers have different menus	No	Minor			X		B	A
ATA 34 Navigation	Standby Flight instruments have different design and location	No	Minor	X				A	A
ATA 34 Navigation	Display Unit Controller has three overhead switches instead of four	No	Minor			X		B	A
ATA 34 Navigation	RNP and Estimated Position Uncertainty (EPU) are not displayed on PFD	No	Minor		X			B	A
ATA 49 Airborne Auxiliary Power	No bleeds off T.O. capability	No	Minor	X				A	A

DIFFERENCE AIRCRAFT: GV BASE AIRCRAFT: GV-SP APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHKG/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
ATA 71 Powerplant	Thrust reduced 635 lb to 14,750 lb	No	No	X				A	A

APPENDIX 3. TRAINING PROGRAM SPECIAL EMPHASIS ITEMS

The Flight Standardization Board (FSB) has identified several aircraft systems and/or procedures that should receive special emphasis in a GIV-X, GV, or GV-SP training program.

Ground Training:

- 1) Enhanced ground proximity warning system (EGPWS).
- 2) Flight management system (FMS).
- 3) Traffic Collision and Avoidance System (TCAS).
- 4) Automatic mode of wing and cowl anti-ice systems.
- 5) Head-Up Display System (HUD) (see Appendix 4).
- 6) Enhanced Flight Vision System (EVS) operations (see Appendix 5).
- 7) PlaneView System (GIV-X and GV-SP).
- 8) Cursor Control Device (CCD) (GIV-X and GV-SP).

Systems Integration Training:

- 1) Flight guidance system (FGS).
- 2) Primary flight display (PFD) mode annunciators.
- 3) FMS.
- 4) Display controllers (DC).
- 5) HUD (see Appendix 4).
- 6) EFVS (see Appendix 5).
- 7) PlaneView System (GIV-X and GV-SP).
- 8) CCD (GIV-X and GV-SP).

Flight Training (Full Flight Simulator (FFS) - Level C or D and/or Aircraft):

- 1) Dual hydraulic system malfunctions.
- 2) Aileron/elevator disconnect (jammed controls in each axis).
- 3) Instrument landing system (ILS) approach on standby instruments.
- 4) PFD, Navigation Display (ND), engine indicating and crew alerting system (EICAS) reversionary modes.
- 5) Integrated use of EICAS messages, switch positions, and synoptic pages to determine aircraft system status.
- 6) Using autopilot for completion of the emergency descent maneuver (EDM).
- 7) Slow engine response. Engine response to full power requests is slow at high altitudes and during any maneuvers with flaps less than 22 degrees. This item must be included in initial training (GV and GV-SP only).
- 8) HUD (see Appendix 4).
- 9) EFVS (see Appendix 5).
- 10) PlaneView System (GIV-X and GV-SP).
- 11) Lateral control switch function (GIV-X).

The FSB also found that early exposure to the FGS and FMS is important, especially for pilots with no previous Electronic Flight Instrument System (EFIS) or FMS experience. Establishing early confidence in manually flying the aircraft, converting from manual to automatic (FMS controlled) flight mode and back, is equally important due to heavy reliance on the FGS. In the event of a flight path deviation due to input error or system malfunction, the flightcrew must be able to comfortably transition from automatic to manual mode and back in an orderly fashion. Crew awareness and understanding of the flight mode(s) annunciated on the Flight Mode Annunciator (FMA) is important during all phases of flight.

The FSB strongly recommends that a thorough preflight briefing, highlighting engine spool-up time, is accomplished prior to conducting training or checking in the following areas: stalls, touch-and-go landings, and simulated one-engine inoperative (OEI) maneuvers. Also, touch-and-go landings at flaps zero is not recommended.

APPENDIX 4. HEAD-UP DISPLAY (HUD) SYSTEMS

Flightcrew member training must be accomplished using a Level C simulator with a daylight visual display or a Level D simulator. The Flight Standardization Board (FSB) has determined that each pilot in command (PIC) of an aircraft equipped with a Head-Up Display (HUD) system should receive a minimum of 3 hours of ground school training followed by a minimum of 4 hours of simulator training in the left seat of a Level C with a daylight visual display or Level D simulator. A HUD equipped aircraft may also be used for in-flight training. In-flight training should consist of a minimum of 4 hours of flying in the left seat of the HUD equipped aircraft.

The 3 hours of ground school training listed above is intended for pilots receiving stand-alone training on the HUD system. A pilot who is progressing successfully through an initial training program that has HUD training (including all three elements listed below) integrated into the curriculum and is determined to be adequately trained and certified proficient by the instructor need not complete the 3 stand-alone hours of ground school training. Reference Title 14 of the Code of Federal Regulations (14 CFR) part 135, § 135.329(e).

The 4 hours of simulator or aircraft in-flight training listed above is intended for pilots receiving stand-alone training on the HUD system. A pilot who is progressing successfully through an initial training program that has HUD training (including all 10 elements listed below) integrated into the curriculum and is determined to be adequately trained and certified proficient by the instructor need not complete the 4 stand-alone hours of simulator/aircraft in-flight training.

The FSB recommends special training emphasis in the following areas.

Ground Training:

- 1) Crew coordination.
- 2) Crew briefings and callouts.
- 3) Duties of pilot flying (PF) and pilot monitoring (PM).

Flight Training:

- 1) Use of caged, uncaged, and clear modes (especially in crosswind conditions).
- 2) Use of the pitch limit indicator (PLI) during windshear escape.
- 3) Approaches to “black hole” airports using the Flight Path Angle (FPA).
- 4) Use of the acceleration cue as a potential FPA.
- 5) Relationship of the glidepath angle to the symbolic runway.
- 6) Use of the flare symbol as a cue in the Honeywell Head-Up Guidance Display Model 2020 and as guidance in the Rockwell-Collins Head-Up Guidance System (HGS) Model 6250.
- 7) Approaches into the top of an undercast during daylight and night conditions.
- 8) Recovery from unusual attitudes.
- 9) Traffic Alert and Collision Avoidance System (TCAS) resolution advisory.

- 10) Takeoff using the FPA to meet a required climb gradient. Checking requires a proficiency check conducted in a Level C simulator with a daylight visual display, in a Level D simulator, or on a HUD equipped aircraft.

The testing and checking will include at least one takeoff and departure procedure and one instrument approach and landing utilizing the HUD. The testing and checking will also include a minimum of one takeoff or missed approach and one instrument approach without utilizing the HUD. This is to ensure proficiency without the use of the HUD.

The GV-SP and GIV-X HUDs have been found to be functionally equivalent to the GV HUD. All requirements listed above apply to the GV, GV-SP, and GIV-X HUDs.

HUD II

“HUD II”, Rockwell-Collins HGS Model 6250, utilizes a liquid crystal display (LCD) which is different from the raster image on “HUD”, Honeywell Head-Up Guidance Display Model 2020. HUD II also has a larger combiner than HUD. Some of the HUD II symbology differs from HUD, such as the caged Flight Path Vector (FPV), the non-conformal lateral deviation indicator (LDI), and the unusual attitudes. The FSB found HUD II, as well as the associated Airplane Flight Manual (AFM) change, to be operationally suitable. Pilots transitioning from HUD to HUD II or from HUD II to HUD should be trained on the differences using a Level A handout. HUD II checking requirements are the same as those described above for HUD.

APPENDIX 5. ENHANCED FLIGHT VISION SYSTEM (EFVS) OPERATIONS

Refer to Title 14 of the Code of Federal Regulations (14 CFR) part 61, § 61.66 for training, recent flight experience, and proficiency requirements for enhanced flight vision system (EFVS) operations. Refer to the current edition of FAA Advisory Circular (AC) 90-106, Enhanced Flight Vision Systems, and 14 CFR part 91, § 91.1065(g) or part 135, § 135.293(i) as applicable for EFVS task requirements during part 91 subpart K (part 91K) or part 135 competency checks.

The Flight Standardization Board (FSB) has determined that EFVS operations are operationally suitable under § 91.176(a) or (b).

An operational suitability determination does not constitute an operational authorization.

APPENDIX 6. PLANEVIEW AVIONICS SOFTWARE VERSION “C”

PlaneView avionics software version “C” includes these functions: charts, graphical flight planning, uplinked weather, video, enhanced envelope protection, and vertical situation display with terrain. The Flight Standardization Board (FSB) found it, as well as the associated Airplane Flight Manual (AFM) change, to be operationally suitable. Pilots transitioning from PlaneView avionics software version “B” to “C” in the GIV-X or GV-SP should be trained on the differences using any one of the following Level C differences training devices: interactive computer-based instruction (ICBI), cockpit system simulators, cockpit procedures trainers (CPT), part task trainers (PTT), or Level 2–5 flight training devices (FTD). There are no checking or currency requirements for PlaneView avionics software version “C”.

The PlaneView Charts function is Federal Aviation Administration (FAA) certified as part of the aircraft’s type design. The PlaneView Charts function may fail if a Data Management Unit (DMU), local area network (LAN), or Personal Computer Memory Card International Association (PCMCIA) card fails, so either paper charts or an Electronic Flight Bag (EFB) that is accepted by the FAA and contains airport diagrams, departure, arrival, and approach charts must be readily available to the flightcrew.

APPENDIX 7. PLANEVIEW AVIONICS SOFTWARE VERSION “D”

PlaneView avionics software version “D” includes these functions: Vertical Glide Path (VGP), Required Navigation Performance - Special Aircraft and Aircrew Authorization Required (RNP SAAR), performance step climb, takeoff obstacle clearance computations, radio tuning and Runway Awareness Advisory System (RAAS). The Flight Standardization Board (FSB) found it, as well as the associated Airplane Flight Manual (AFM) change, to be operationally suitable. Pilots transitioning from PlaneView avionics software version “B” to “D” or from version “C” to “D” in the GIV-X or GV-SP should be trained on the differences using any one of the following Level C differences training devices: interactive computer-based instruction (ICBI), cockpit system simulators, cockpit procedures trainers (CPT), part task trainers (PTT), or Level 2–5 flight training devices (FTD). There are no checking or currency requirements for PlaneView avionics software version “D”. Pilots training RNP SAAR procedures should use the guidance found in the current edition of FAA Advisory Circular (AC) 90-101, Approval Guidance for RNP Procedures with AR.

APPENDIX 8. PLANEVIEW AVIONICS SOFTWARE VERSION “E”

PlaneView avionics software version “E” includes the addition of Synthetic Vision Primary Flight Display (SV PFD). SV PFD depicts terrain, obstacles, and airports with texture and colors on the primary flight display (PFD). It obtains that data from the Terrain Awareness and Warning System (TAWS) database. The Flight Standardization Board (FSB) found it, as well as the associated Airplane Flight Manual (AFM) change, to be operationally suitable. Pilots transitioning from PlaneView avionics software version “C” to “E” or from version “D” to “E” in the GIV-X or GV-SP should be trained on the differences using any one of the following Level C differences training devices: interactive computer-based instruction (ICBI), cockpit system simulators, cockpit procedures trainers (CPT), part task trainers (PTT), or Level 2–5 flight training devices (FTD). There are no checking or currency requirements for PlaneView avionics software version “E”.

APPENDIX 9. PLANEVIEW AVIONICS SOFTWARE VERSION “F”

The PlaneView avionics software version “F” “Basic Load” includes these functions: improved map identifiers declutter logic, improved map airway labeling, improvement on map to graphically join airways, Rockwell-Collins Head-Up Guidance System (HGS) Model 6250 (HUD II) interface capability, pilot-controlled communication management function (CMF) selection switch, and improved (table-augmented) performance within the flight management system (FMS). A customer option to enable automatic linking of abnormal and emergency checklists to a defined set of activated Crew Alert System (CAS) messages is an included feature. Additionally, there are customer option packages associated with Cert. “F” with the functions grouped into the following packages:

Enhanced Navigation:

- Future Air Navigation System-1 (FANS-1) Controller-Pilot Data Link Communication (CPDLC) using existing Aircraft Communications Addressing and Reporting System (ACARS) protocol.
- Global Positioning Satellite (GPS) Satellite-based Augmentation System (SBAS) reception.
- Localizer performance with vertical guidance (LPV) approach capability.
- Required Navigation Performance (RNP) 0.1 navigation capability.
- Electronic terminal charts stored on each advanced graphics module (AGM).
- Terrain elevation displayed on map at pilot-selected locations.
- Automatic preview of short-range navigation approach.
- Automatic transition from short-range navigation source to long-range navigation source and automatic arming of FMS/lateral navigation (LNAV) flight director (FD) mode upon selection of takeoff/go-around (TOGA) feature.
- Retention of FMS/LNAV FD mode upon selection of TOGA feature when using long-range navigation source.
- Temperature-compensated waypoint altitude constraints and vertical navigation (VNAV) performance in terminal area.
- Circling approach capability.

Enhanced Synthetic Vision Primary Flight Display (SV PFD):

- The enhanced SV PFD includes the following improvements to the basic version: terrain-conformal range rings, grid lines oriented north-south and east-west, terrain depicted on the horizontal situation indicator (HSI), a frustum depicted on the HSI representing the viewed area of the SV PFD, and the Terrain Awareness and Warning System (TAWS) and Traffic Alert and Collision Avoidance System (TCAS) automatic “pop-up” on the HSI.

XM Weather Radar (WX) Weather:

- The map can display the following three weather products, either individually or combined, which are automatically received at specific intervals: next generation weather radar (NEXRAD) Doppler radar, infrared composite images of clouds, and winds aloft.

Pilots transitioning from PlaneView avionics software version “D” to “F” or from version “E” to “F” in the GIV-X or GV-SP should be trained on the differences using the information provided in Table 1, Training Differences. There are no checking or currency requirements for PlaneView avionics software version “F”.

Table 1. Training Differences

From	To (1)	Training Level
Cert. “D” or “E”	Cert. “F” (Basic Load)	A
	Cert. “F” with Enhanced Navigation	C (2)
	Cert. “F” with Enhanced SV PFD	A
	Cert. “F” with XM Weather	A

NOTE 1: Any combination of customer option packages will be trained to the highest training level.

NOTE 2: Acceptable Level C training devices include: interactive computer-based instruction (ICBI), cockpit system simulators, cockpit procedures trainers (CPT), part task trainers (PTT), or Level 2–5 flight training devices (FTD). The devices must be capable of emulating FMS and cockpit displays performance, allowing pilot entry of appropriate FMS selections and presenting “real-time” information on the displays during the conduct of the flight.

The PlaneView Charts function is Federal Aviation Administration (FAA) certified as part of the aircraft’s type design in Cert. “F.” The Airplane Flight Manual (AFM) limitation applied during PlaneView avionics software version “C”, which requires “either paper charts or an Electronic Flight Bag (EFB) that is accepted by the FAA and contains airport diagrams, departure, arrival, and approach charts must be readily available to the flightcrew,” does not apply to Cert. “F” equipped aircraft.

APPENDIX 10. PLANEVIEW AVIONICS SOFTWARE VERSION “G”

PlaneView avionics software version “G” includes the addition of the following features: early missed approach activation with the multifunction control display unit (MCDU) and takeoff/go-around (TOGA), localizer performance with vertical guidance (LPV) approach capture from above, maximum descent angle improvements, data link recording on the cockpit voice recorder (CVR), path-based Traffic Alert and Collision Avoidance System (TCAS) guidance on the Synthetic Vision Primary Flight Display (SV PFD), listing of multiple localizer approaches to the same runway, and update to fuel tank temperature Crew Alert System (CAS) message and related synoptics for the GIV-X only. The Flight Standardization Board (FSB) found PlaneView avionics software version “G”, as well as the associated Airplane Flight Manual (AFM) change, to be operationally suitable.

Pilots transitioning from PlaneView avionics software version “D”, “E”, or “F” to “G” in the GIV-X or GV-SP should be trained using one of the following Level A differences training methods: PlaneView Pilot Familiarization Guide or PlaneView Pilot Operating Handbook for Cert. “G”. There are no checking or currency requirements for PlaneView avionics software version “G”.

Pilots transitioning to PlaneView avionics software enhanced version “G” who have not received training on Cert. “F” enhanced navigation or enhanced SV PFD should be trained on the differences using the information provided in Table 2, Training Differences.

Table 2. Training Differences

From	To (1)	Training Level
Cert. “D”, “E”, or “F” Basic	Cert. “G” (Basic Load)	A
	Cert. “F” or “G” with Enhanced Navigation	C (2)
	Cert. “F” or “G” with XM Weather	A
	Cert. “F” or “G” with Enhanced SV PFD	A
Cert. “F” Enhanced	Cert. “G” Enhanced	A

NOTE 1: Any combination of customer option packages will be trained to the highest training level.

NOTE 2: Acceptable Level C training devices include: interactive computer-based instruction (ICBI), cockpit system simulators, cockpit procedures trainers (CPT), part task trainers (PTT), or Level 2–5 flight training devices (FTD). The devices must be capable of emulating flight management system (FMS) and cockpit displays performance, allowing pilot entry of appropriate FMS selections and presenting “real-time” information on the displays during the conduct of the flight.

APPENDIX 11. GV DISPLAY UNIT DU-885 MODIFICATION

The DU-885 modification changes the GV as follows:

- 1) Replaces six DU-880 cathode ray tubes (CRT) with six DU-885 liquid crystal displays (LCD).
- 2) Adds two Cursor Control Devices (CCD), an XM Weather receiver, and a data loader.
- 3) Adds the following functions:
 - a) Charts. Displays approach charts, airport maps, Standard Instrument Departures (SID), Standard Terminal Arrivals (STAR), and noise procedures on the enhanced navigation display (ND). Airplane position is also displayed on the charts that are geo-referenced.
 - b) Maps. Displays the flight management system (FMS) moving map over geopolitical boundaries augmented with navigational aids and XM weather on the ND.
 - c) Video. Displays multiple video inputs on the ND.
 - d) Database configuration. Displays database status on the ND and permits uploading charts and map data.
 - e) Display unit (DU) maintenance. Continuously tests the DU and displays a list of the failed tests on the ND (ground use maintenance function only).

Pilots transitioning from the DU-880 to the DU-885 system should be trained on the differences using any one of the following Level C differences training devices: interactive computer-based instruction (ICBI), cockpit system simulators, cockpit procedures trainers (CPT), part task trainers (PTT), or Level 2–5 flight training devices (FTD). There are no checking or currency requirements for this transition.

Level C differences training is the minimum training level required for GV with DU-885 modification equipped aircraft. When flightcrews are assigned to the GV with DU-885 modification, operators and training providers must ensure that the level of training given is adequate for flightcrews to fully understand the differences between these aircraft.

It should be noted that this report only addresses training, checking, and currency for GV qualified pilots that are transitioning to the GV with DU-885 modification equipped aircraft. No training, checking, or currency determinations have been made for pilots transitioning from the GV with DU-885 modification equipped aircraft to the GV aircraft.

The electronic charts function must have a current terminal chart database loaded on the DU-885s and operable on both DU two and five to not require any additional paper charts or Electronic Flight Bags (EFB).

APPENDIX 12. HONEYWELL NZ-2000 FMS 6.1 SOFTWARE

The GV flight management system (FMS) provides lateral and vertical navigation data to the Autothrottle (AT) system, automatic flight control system (AFCS), and electronic display system (EDS). A Global Positioning Satellite (GPS) Landing System Sensor Unit (GLSSU) provides GPS position sensor data to the FMS, and instrument landing system (ILS)-like guidance to the EDS and AFCS to provide Satellite-based Approach System (SBAS)/localizer performance with vertical guidance (LPV) approach capabilities. The change from a Global Navigation System Sensor Unit (GNSSU) to a GLSSU for the Gulfstream GV aircraft form the functional differences encompassed in Aircraft Service Change (ASC) 186 and adds the following functions:

- Addition of Cockpit LPV switch/annunciators.
- Software upgrade to NZ-2000 computers (NZ 6.1).
- GNSSU receivers and antennas upgraded to SBAS/LPV capable GLSSUs and antennas.
- Updated magnetic variation tables.
- Vertical navigation (VNAV) temperature compensation (departure, approach, and missed approach).
- Enroute vectored operation.
- Vectors to Final (VTF) approaches.
- FMS linked chart functionality (for DU-885 equipped aircraft only).
- Automated hold to altitude (HA) leg sequencing.
- Approach procedures support for circling and Tactical Air Navigation (TACAN) approaches and multiple Area Navigation (RNAV) approaches to the same runway (multi-RNAV approaches).
- SBAS/LPV operations, DO-229D, Class Delta-4 “ILS look alike”.
- Software enhancements to lateral guidance and flight planning for curved path calculations.
- Software enhancements to path computation to reduce vertical splits.
- Software enhancements to system speed, quality, and robustness.

Pilots transitioning to the Honeywell NZ-2000 FMS 6.1 Software with SBAS/LPV GPS should be trained on the differences using Level C training. Level C is interactive (full task) computer-based instruction (ICBI). There are no checking or currency requirements for this transition.

APPENDIX 13. HONEYWELL MARK III COMMUNICATIONS MANAGEMENT UNIT (CMU) FOR FANS 1/A+

On September 3, 2015, the Transport Aircraft Long Beach Branch conducted an evaluation of the Honeywell Mark III Communications Management Unit (CMU) for Future Air Navigation System 1/A+ (FANS 1/A+) ST-06-2014-0026 and found it to be operationally suitable.

Specific Training. Pilots flying GV aircraft equipped with the Honeywell Mark III CMU for FANS 1/A+ ST-06-2014-0026 must undergo training in the areas defined below:

- FANS-1/A+ and Aeronautical Telecommunications Network (ATN) Controller-Pilot Data Link Communication (CPLDC).
- Log on – log off.
- Clearances.
- Emergency.
- Request.
- Offset.
- RPTS (reports) list.
- Message logs.
- Position reporting.
- Automatic Dependent Surveillance-Contract (ADS-C).
- Airplane Flight Manual Supplement (AFMS).
- Pilot's Guide-Mark III CMU with control display unit (CDU) for legacy systems (including NZ 6.1 FANS).
- The current edition of FAA Advisory Circular (AC) 90-117, Data Link Communications.

Special Emphasis Items:

- Emphasis on data entry formats for FANS-1/A+.
- Emphasis on proper manual entry of air traffic control (ATC) clearances into the source flight management system (FMS).
- Emphasis on data entry for emergency mayday, pans, and associated elements.

Training – Checking – Currency Levels:

- a) The Transport Aircraft Long Beach Branch determined that the minimum pilot training required on the GV for a pilot upgrade to the Honeywell Mark III CMU for FANS 1/A+ (ST-06-2014-0026) is Level C. The minimum acceptable training method for Level C training would be interactive computer-based training (CBT), cockpit procedure trainers (CPT), or part task trainers (PTT).
- b) The minimum checking requirement is Level A (no checking requirement).
- c) The minimum currency requirement is Level A (no currency requirement).

APPENDIX 14. G-V HONEYWELL CD-830 CONTROL DISPLAY UNITS (ST04037 AT-D)

In 2016, certification flight tests were conducted on the GV. Certification credit was given from the G-IV to the GV because of the identical components they shared. The G-IV Flight Standardization Board (FSB) evaluation follows: On February 19, 2016, the G-IV FSB participated in an evaluation of the G-IV Honeywell CD-830 control display units (CDU) modification for ST04037 AT-D and found it to be operationally suitable.

The CD-830 is functionally similar to previously certified CDUs (CD-810, CD-820) with the exception of the replacement of various mechanical pushbutton keys with touchscreen targets and line selections on the CD-830 display. The following changes with the pilot interface have occurred to accommodate a larger screen:

- All line select hard keys will be moved onto the display as touchscreen buttons.
- All mode keys (PERF, NAV, FPL, PROG, DIR) will be moved from beneath the display to above the display.
- A new MENU mode key will be added above the display. The CD-820 VIDEO and GRAPHIC mode keys will be moved to line selections in the new MENU mode.
- The new MENU mode will add a Clean Touchscreen (CLEAN TS) line select key, which freezes the touchscreen display for cleaning.
- The CD-820 BACK and function (FN) hard keys will now appear as touchscreen buttons on the display.
- PREV/NEXT keys will be moved to right side of the keyboard and their orientation changed to top and bottom relationship. The BRT/DIM keys will be relocated beneath the PREV/NEXT keys and their orientation changed to a side-by-side relationship.
- Airshow video control functions may be accomplished through RTN/ENTER touchscreen buttons at the lower corners of the display.
- The CD-810/CD-820 DSPLY annunciation will no longer be displayed, as it was a carryover from the CD-800 monochrome display.
- The CD-820 MSG annunciation will now annunciate as FMS MSG when the flight management system (FMS) has issued a message to the scratchpad.
- The CD-830 is not intermixable with either the CD-810 or CD-820.

Special Emphasis Items:

None.

Training – Checking – Currency Levels:

- a) The GV FSB has determined that the minimum pilot training required on the GV for a pilot upgrade to the Honeywell CD-830 CDU (ST04037 AT-D) is level A. The minimum acceptable training method for Level A training would be achieved by issuance and familiarity with Operating Manual and Airplane Flight Manual Supplement (AFMS).
- b) The minimum checking requirement is Level A (no checking requirement).
- c) The minimum currency requirement is Level A (no currency requirement).

APPENDIX 15. GV PRIMUS ELITE ADVANCED FEATURES (PEAF) MODIFICATION (STC04297 AT-D)

In 2016, certification flight tests were conducted on the GV. Certification credit was given from the G-IV to the GV because of the identical components they shared. The G-IV Flight Standardization Board (FSB) evaluation follows: On March 15, 2016, the G-IV FSB participated in an evaluation of the G-IV Primus Elite Advanced Features (PEAF) modification for STC04297 AT-D and found it to be operationally suitable. DU-885 PEAf includes the addition of Synthetic Vision System (SVS). SVS depicts terrain, obstacles, and airports with texture and colors on the primary flight display (PFD). It obtains the data from the Terrain Awareness and Warning System (TAWS) database.

The DU-885 PEAf modification adds the following features to the GV DU-885 as follows:

- PFD with SVS.
- Traffic Alert and Collision Avoidance System (TCAS) added to the enhanced map.
- XM Satellite Weather added Aviation Routine Weather Report (METAR) and Terminal Area Forecast (TAF) features.
- Improved database loading via the DL-100.
- Added additional maintenance pages.

Special Emphasis Items:

Airspeed tape is reversed on GV SV PFD.

Training – Checking – Currency Levels:

- a) The GV FSB has determined that the minimum pilot training required on the GV for a pilot transitioning from the DU-880 or DU-885 to the G-IV PEAf modification DU-885 (STC04297 AT-D) is Level C. The minimum acceptable training method for Level C training would be interactive computer-based training (CBT), cockpit procedure trainers (CPT), or part task trainers (PTT). Gulfstream DU-885 PEAf Level C training has been found to be acceptable.
- b) The minimum checking requirement is Level A (no checking requirement).
- c) The minimum currency requirement is Level A (no currency requirement).

It should be noted that this report only addresses training, checking, and currency for GV qualified pilots that are transitioning to the GV with DU-885 PEAf modification equipped aircraft. No training, checking, or currency determinations have been made for pilots transitioning from the GV with DU-885 PEAf modification equipped aircraft to the GV aircraft.