2A-31-10: General

1. **Honeywell PlaneView System Indicating and Recording Architecture:**

   The indicating and recording systems of the Gulfstream G550 reside within a highly integrated hardware and software architecture provided by the Honeywell PlaneView system. PlaneView incorporates software avionics functions hosted on processor cards and modules installed in three (3) Modular Avionics Units (MAUs) and two (2) Modular Radio Cabinets (MRCs). (The MAUs are depicted in Figure 1, Figure 2 and Figure 3.) The avionics functions communicate within the MAUs over a digital bus called the Virtual Backplane Peripheral Component Interconnect (VbPCI) using a Periodic Device Driver (PDD) and a Backplane Interface Controller (BIC). Each MAU has two (2) channels, A and B with each channel powered redundantly powered by a primary and secondary DC power source. The dual channel, dual power source configuration provides both redundancy and flexibility for module installation, since some modules require connection to only a single channel while other modules must have dual channel connections. Each MAU is also equipped with an internal fan to provide module cooling.

   The processor cards and modules within the MAUs and the communication modules residing in the MRCs exchange data over four (4) redundant version D Avionics Standard Communication Buses (ASCB-Ds) through Network Interface Controllers (NICs). The ASCBs and NICs provide bidirectional software communications at 20 Mb/sec with a frame rate of 80 Hz. The ASCBs are supplemented with a Local Area Network (LAN) that provides both a Data Management Unit (DMU) and Personal Computer (PC) interface for loading software data and performing maintenance analysis and testing. All data flow within the PlaneView system is governed by a Digital Engine Operating System (DEOS) that provides space partitioning to ensure the memory integrity within all avionics functions and additionally provides the timing separation that allows multiple software functions to run simultaneously.

   Aircraft analog devices and independent digital avionics components connect to the ASCB-Ds, linking to the MAUs and MRCs over other buses and interfaces (such as ARINC-429 buses) through Input / Output (I/O) modules. The I/O modules are directly connected to the ASCB-Ds and are integral to the MAUs. Different types of I/O modules are incorporated in the MAUs to provide accommodations for the various types of components requiring ASCB-D interface:

   - Control I/O modules - used for communicating command data from (and to) components that provide tuning, display choices or option selections such as the flight guidance panel, weather radar controller, Traffic and Collision Avoidance System (TCAS) and the Multi-function Control and Display Units (MCDUs)
   - Actuator I/O modules - provide actions such as position commands to the aircraft flight controls from the Automatic Flight Control System (AFCS) and the stall barrier / stick pusher system, trim control, yaw damper monitoring and autothrottle control
   - Generic I/O modules - used to interface data from components such as the engine Full Authority Digital Electronic Controller (FADEC), Air Data Modules (ADMs) and radio altimeters
   - Custom I/O modules - provide specialized interfaces for specific external

components that require a high volume of data interchange such as the flight data recorder.

In addition to the I/O modules, the MAUs contain:

- Aircraft Personality Modules (APMs) - two (2) housed within Timing Network Interface Controllers (TNICs) in MAUs #1 and #2 that retain aircraft configuration data such as installation serial numbers, identifiers, and configuration options (SELCAL addresses, MagnaStar phone numbers, etc.). Two (2) additional APMs are incorporated in the Modular Radio Cabinets to store communication management functions.
- Data Base Modules (DBMs) - provide non-volatile memory for navigation and terrain data bases and store aircraft maintenance data. The DBMs are accessed through the cockpit data management unit (DMU) or through the remote Personal Computer (PC) Local Area Network (LAN) data ports located on the test and monitor panel.
- Central Maintenance Computer (CMC) module - monitors the condition and health of all aircraft components interfaced with the MAUs, storing detected faults, constructing a fault history database and providing a diagnostic guide for system troubleshooting. The CMC module is equipped with a D-sub connector, enabling use of a PC for fault downloading and system checks.
- Advanced Graphics Modules (AGMs) - generate the visual information shown on cockpit display units including Primary Flight Displays (PFDs), Navigation displays, Crew Alerting System (CAS) messages, Synoptic and System Window displays, uploaded weather overlays and real-time video from aircraft cameras
- EGPWS module - provides all of the functionality of the Enhanced Ground Proximity Warning System and stores the terrain database
- Global Positioning System (GPS) modules - interpret data received by the GPS antenna to compute aircraft position. Position information is communicated to using elements within the MAUs over a dedicated ARINC-429 bus rather than through the MAU backplane. The GPS modules have separate direct bus paths to the Inertial Reference System (IRS) to provide full initial and continuous alignment data.
- Video Module - provides initial formatting of aircraft camera analog video for subsequent use by the AGMs in constructing the Cameras system display window.

The high degree of integration of all modules and functions residing in the MAUs and MRCs offers the flight crew instantaneous comprehensive oversight for all on board aircraft systems.

2. Indicating and Recording Subsystems:

Although all indicating and recording functions are distributed throughout the PlaneView system, The specific functions of the indicating / recording system are divided into the following subsystems:

- 2A-31-20: Cockpit Clock System
- 2A-31-30: Digital Flight Data Recorder System
- 2A-31-40: Data Management Unit
- 2A-31-50: Cockpit Printer

- 2A-31-60: Central Maintenance Computer System
- 2A-31-70: Monitor and Warning System
- 2A-31-80: Electronic Display System
- 2A-31-90: Weather Radar and Lightning Sensor Systems

3. Controls and Indications:

A. Circuit Breakers (CBs):

The following CBs power the MAUs:

Circuit Breaker Name:	CB Panel	Location:	Power Source:
MAU #1A PRI	POP	A-10	L ESS DC Bus
MAU #1A SEC	CPOP	A-10	R MAIN DC Bus
MAU #1B PRI	CPOP	A-9	R ESS DC Bus
MAU #1B SEC	POP	A-9	L MAIN DC Bus
MAU #2A PRI	CPOP	A-8	R MAIN DC Bus
MAU #2A SEC	POP	A-8	L MAIN DC Bus
MAU #2B PRI	CPOP	A-7	R ESS DC Bus
MAU #2B SEC	POP	A-7	R MAIN DC Bus
MAU #3A PRI	POP	A-6	L MAIN DC Bus
MAU #3A SEC	CPOP	A-6	R MAIN DC Bus
MAU #3B PRI	POP	A-5	L ESS DC Bus
MAU #3B SEC	CPOP	A-5	R MAIN DC Bus

B. Crew Alerting System (CAS) Messages:

The following CAS messages are associated with the MAUs:

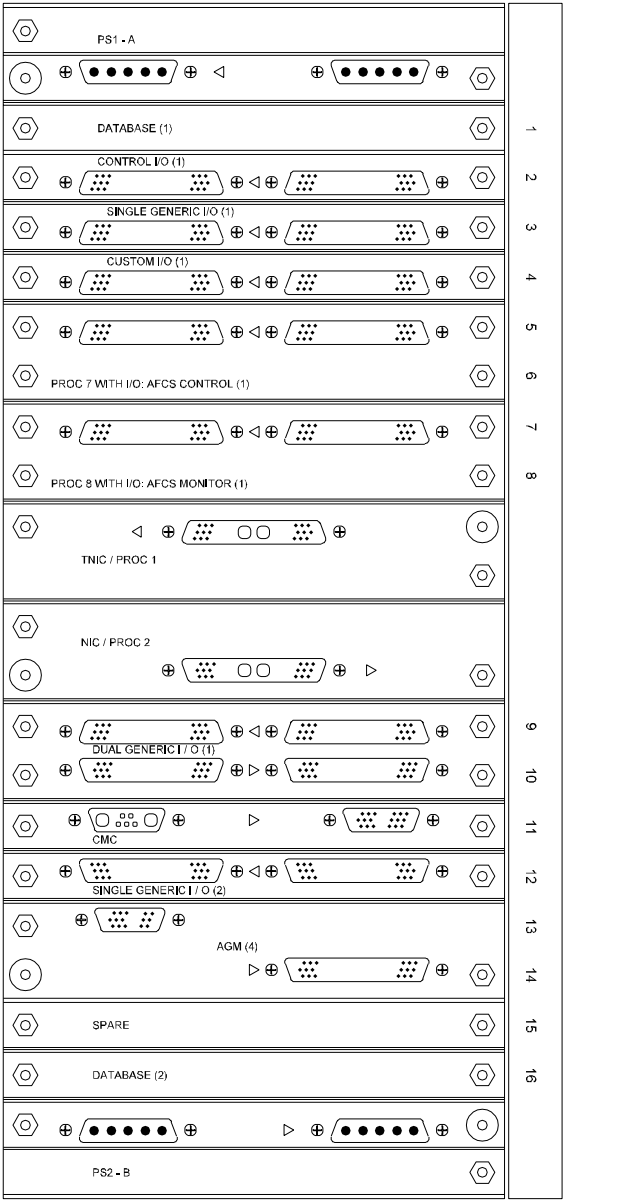
Area Monitored	CAS Message	Message Color
AGMs	AGM 1-2-3-4 Fail	Amber
APMs	APM 1-2-3-4 Fail	Amber
APMs	APM Miscompare	Amber
MAU Fans	MAU 1-2-3 Fan Fail	Amber
MAU	MAU 1A-1B-2A-2B-3A-3B OVRHT	Amber
MAU	MAU 1A-1B-2A-2B-3A-3B Fail	Amber
AGMs	AGM 1-2-3-4 Fail	Blue
APMs	APM 1-2-3-4 Fail	Blue

NOTE

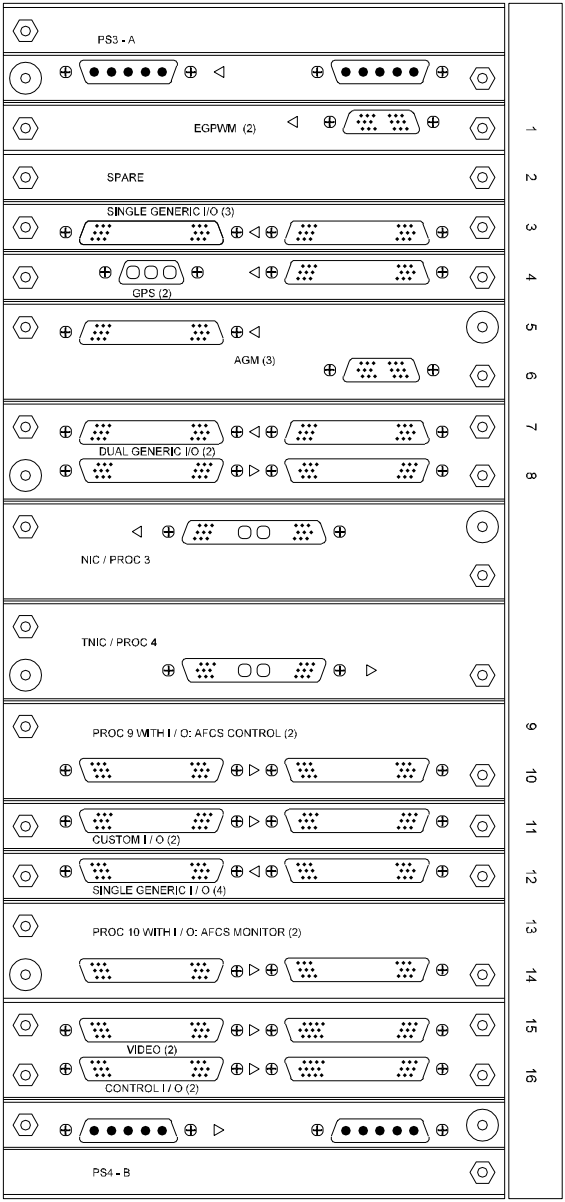
The listed caution messages may be displayed individually or in various permutations according to the configuration of the malfunction. For instance, MAU 1A-2B-3A OVRHT or MAU 1B-3A-3B Fail might be displayed if conditions warrant. Because of the extensive number of message combinations possible, only the representative root messages are included in this tabulation.

C. Limitations:

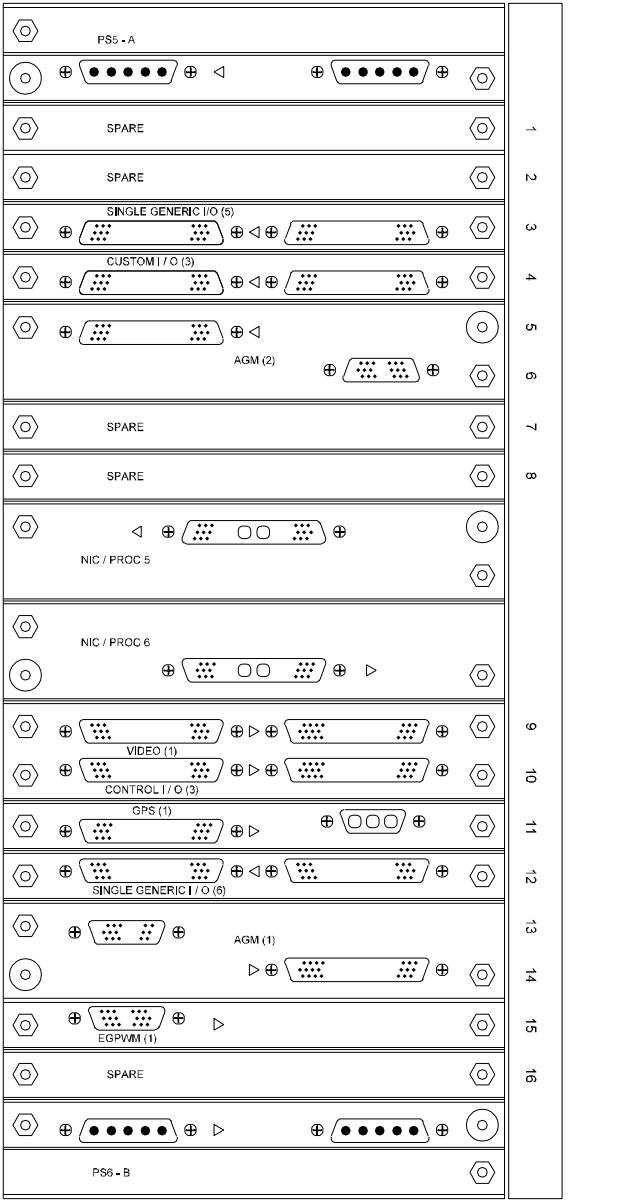
There are no limitations specific to the MAUs as of this writing.



MAU #1
Figure 1



MAU #2
Figure 2



MAU #3
Figure 3

2A-31-20: Cockpit Clock System

1. **General Description:**

   The cockpit chronometers provide accurate time displays to the flight crew.

2. **Description of Subsystems, Units, and Components:**

   There are two chronometers on the outboard sides of the forward instrument panel: #1 on the pilot side and #2 on the copilot side. Each is capable of the following time displays:

   - Greenwich Mean Time (GMT)
   - Local time (LT)
   - Flight time (FT)
   - Elapsed time (ET)

   Greenwich and local time are displayed in hours and minutes. Flight and elapsed time is displayed in minutes and seconds. Both are displayed in decimal form. The flight time display, when selected, records the elapsed time since the weight-on-wheels switch transitions from ground to flight mode.

   Each chronometer receives power from the essential flight instrument bus, and has replaceable batteries to ensure operation if aircraft power is interrupted. Each installation has a two inch digital display containing the microprocessor controlled chronometer and incandescent lighting. See Figure 4.

3. **Controls and Indications:**

   (See Figure 4.)

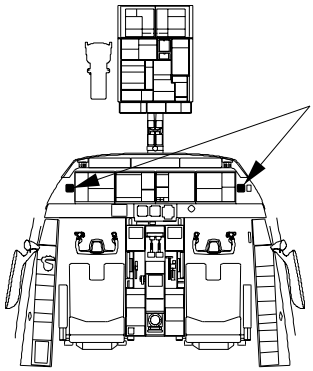
   A. Circuit Breakers (CBs):

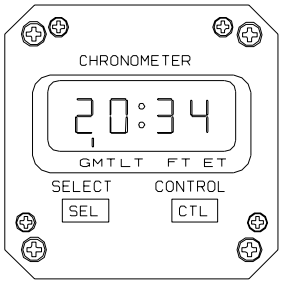
   The chronometers are protected by the following circuit breakers (CBs):

Circuit Breaker Name:	CB Panel:	Location:	Power Source:
CLOCK # 1	POP	B-4	ESS FLT INST Bus
CLOCK # 2	CPOP	B-4	ESS FLT INST Bus

4. **Limitations:**

   There are no limitations established for the cockpit clocks system at the time of this writing.





DETAIL A

TO SET GMT/LT/ET:

1. Depress SELECT key until desired time mode is displayed.
2. Depress SELECT and CONTROL keys simultaneously until digit in left-most column begins to flash.
3. Depress CONTROL key until desired digit is displayed in selected column.
4. Depress SELECT key to move to the next column. Repeat steps 3 & 4 as necessary.
5. Depress SELECT key after right-most digit column is set to return to normal function.

TO RESET FT:

1. Depress SELECT key until FT mode is displayed.
2. Depress and hold CONTROL key until FT displays 99:59, then release CONTROL key.

42601F00

Cockpit Clocks
Figure 4

2A-31-30: Digital Flight Data Recorder System

1. **General Description:**

   The digital flight data recorder (DFDR) system receives digitized dynamic aircraft flight environmental data received from the Modular Avionics Units (MAUs). In addition to the environmental data, the recorder tracks control column, control wheel forces, and has an accelerometer input. The data is transmitted to the DFDR and stored in digital memory. The DFDR is located in the tail compartment aft of the cockpit voice recorder (CVR). See Figure 6.

   DFDR operation is limited by integrated relays to record data only when the aircraft engines are running and the weight-on-wheels (WOW) switches are in the air mode. A maintenance override switch installed on the monitor and test panel will bypass the engine fuel pressure and WOW relays to allow maintenance on the DFDR system while the aircraft is static. The switch is illustrated in Figure 5.

   The flight crew may imprint an event stamp on the recorded data in the DFDR to note a significant instance of flight operations that may warrant subsequent review, for example, encountering severe air turbulence. The combined DFDR/CMC EVENT button is located on the cockpit overhead panel above the display system switching controls as shown in Figure 8.

   Like the CVR, the DFDR has an impact switch that closes at 2.5 G to stop the recording process and preserve recorded data. When the impact switch has been activated, an adjacent indicator light illuminates signalling that the DFDR has ceased recording. The impact switch may be reset on the ground. See the illustration in Figure 7.

   An underwater locator device (see Figure 6) is attached to the DFDR to facilitate recovering the recorder if the aircraft is lost over water.

2. **Description of Subsystems, Units and Components:**

   A. Digital Flight Data Recorder (FDR):

   The DFDR records and stores digitized MAU data. The data can be retrieved to assist in reconstruction of events relevant to an incident. The DFDR continuously records a minimum of 25 hours of flight data and retains data in a crash survivable memory unit (CSMU). With electrical power removed, recorded data is retained for a minimum of two years. The DFDR is located in the tail compartment aft of the CVR. It is international orange in color for high visibility and the attached CSMU has two reflective stripes.

   B. DFDR Impact Switch:

   The DFDR impact switch, which activates at an acceleration of 2.5 G, removes power from the DFDR and preserves the data in the CSMU. The impact switch is mounted in the tail compartment underneath the CVR mounting shelf. Activation of the impact switch also causes an annunciator on the switch housing to illuminate until the impact switch is reset. A reset switch is located on the switch housing.

   C. Underwater Locating Beacon (ULB):

   An acoustic underwater locating beacon (ULB) is attached to the DFDR. When activated by contact with water, it transmits an audible signal to aid underwater location of the aircraft and/or DFDR. The ULB receives power from a self-contained battery that has an expected life of six years. The protective casings of the DFDR and CSMU are designed to protect data

memory to a water depth of twenty thousand (20,000) feet.

D. DFDR Maintenance Ground Override Switch:

The DFDR maintenance ground override switch is located on the Right Electrical Equipment Rack (REER) on the system monitor test panel, and is labeled FDR MAINT GRD OVRD. If the aircraft is stationary and the Weight-On-Wheels (WOW) system is in the GROUND mode, placing the switch in the OFF position will inhibit recording by the DFDR while aircraft engines are operating. If the switch is inadvertently left in the OFF position, transfer of WOW to the AIR mode (such as during takeoff) automatically returns the switch to the AUTO position, enabling DFDR recording. Manual positioning the switch to the AUTO position is also possible.

E. DFDR / CMC EVENT Switch:

The FDR / CMC EVENT switch is located on the cockpit overhead panel. When momentarily depressed, an event stamp is placed on the FDR tape. When the event switch is depressed, the Central Maintenance Computer (CMC) saves a data block of information that spans from 30 seconds prior to switch activation and continues for one minute following release of the switch. A blue Event Record advisory message is also displayed on the Crew Alerting System (CAS).

3. Controls and Indications:

(See Figure 5 and Figure 8.)

A. Circuit Breakers (CBs):

The flight data recording system is protected by the following CBs:

Circuit Breaker Name:	CB Panel:	Location:	Power Source:
FDR	LEER	J-10	L ESS DC Bus
L FORCE SENSORS	LEER	J-9	#2 ESS AC Bus
R FORCE SENSORS	REER	E-4	#1 ESS AC Bus

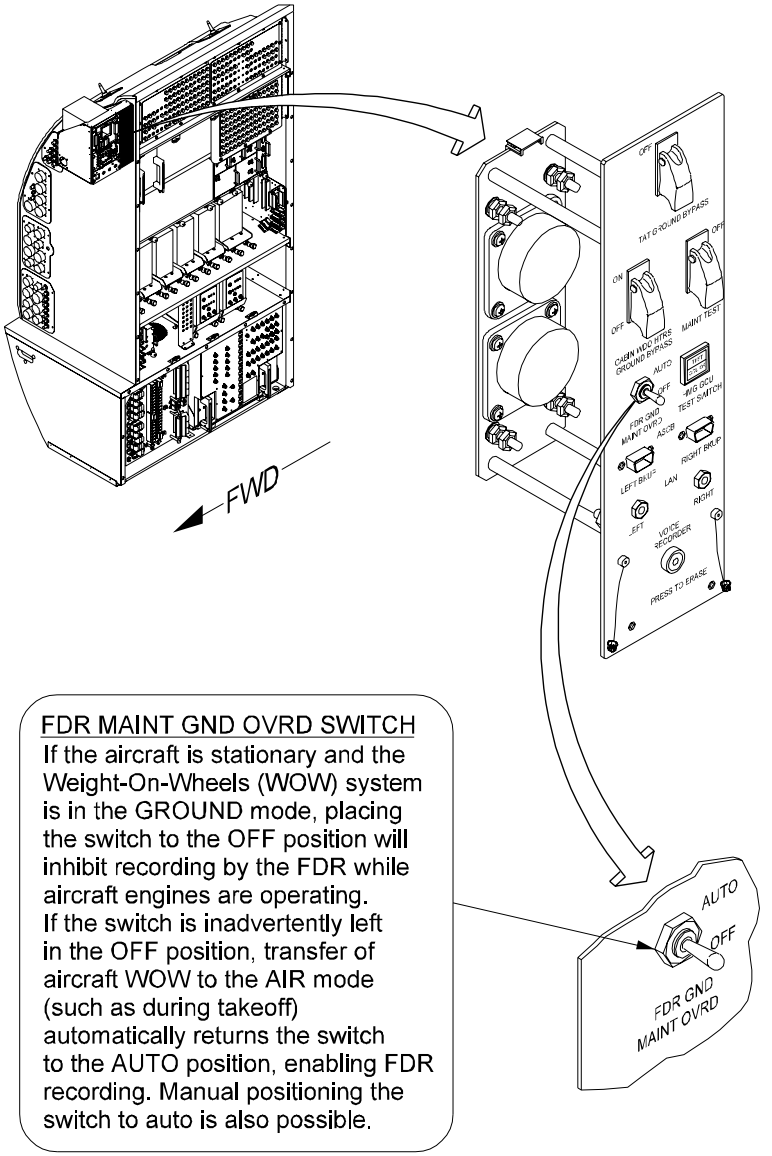
B. Crew Alerting Systems (CAS) Messages:

CAS messages associated with the flight data recording system are:

Area Monitored:	CAS Message:	Message Color:
DFDR	FDR System Fail	Blue
FDR/CMC EVENT switch	Event Record	Blue

4. Limitations:

There are no limitations established for the flight data recording system at the time of this writing.

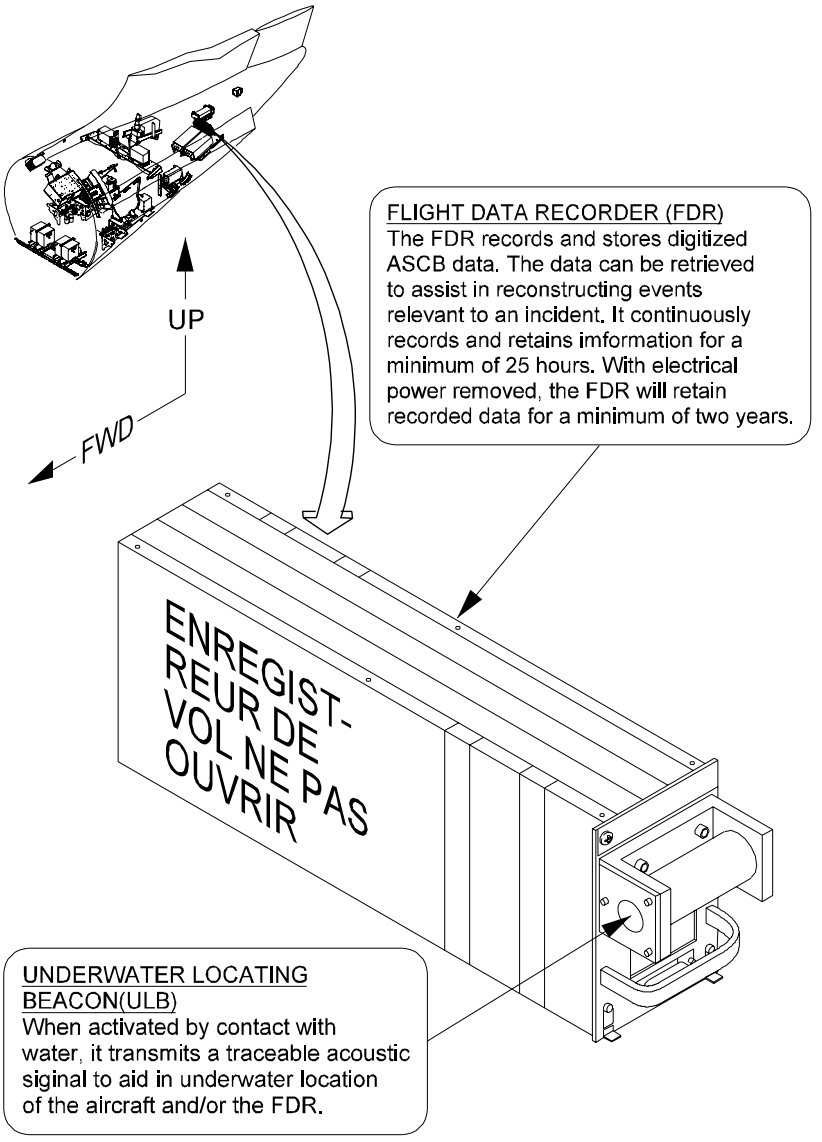


FDR MAINT GND OVRD SWITCH

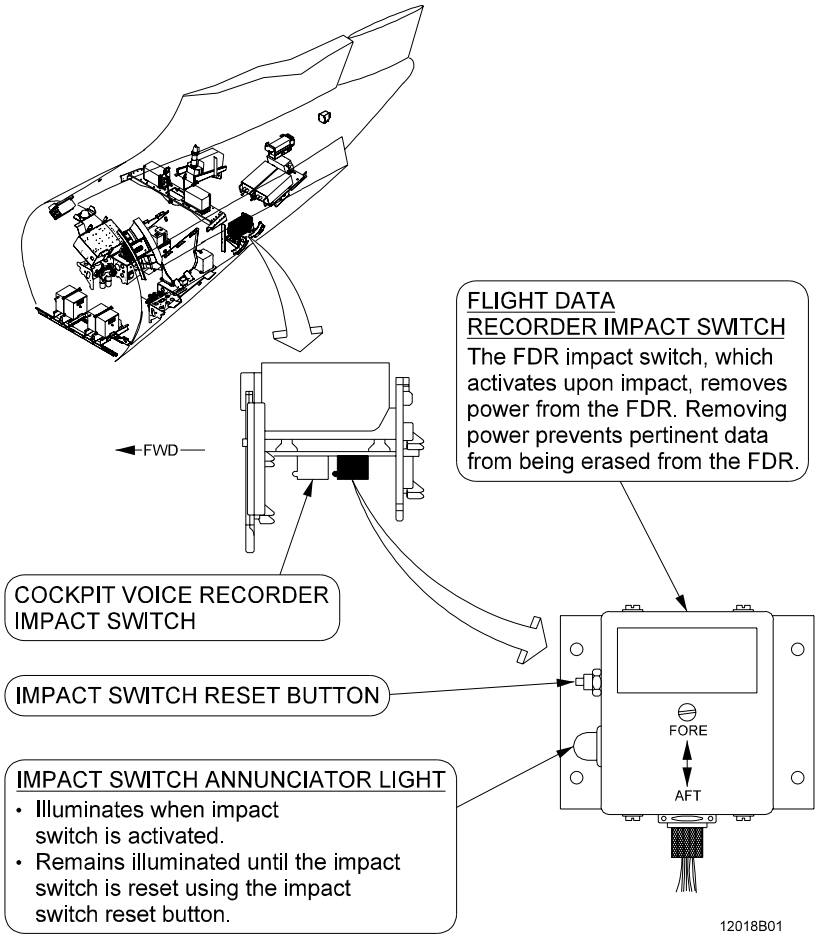
If the aircraft is stationary and the Weight-On-Wheels (WOW) system is in the GROUND mode, placing the switch to the OFF position will inhibit recording by the FDR while aircraft engines are operating. If the switch is inadvertently left in the OFF position, transfer of aircraft WOW to the AIR mode (such as during takeoff) automatically returns the switch to the AUTO position, enabling FDR recording. Manual positioning the switch to auto is also possible.

42602F00

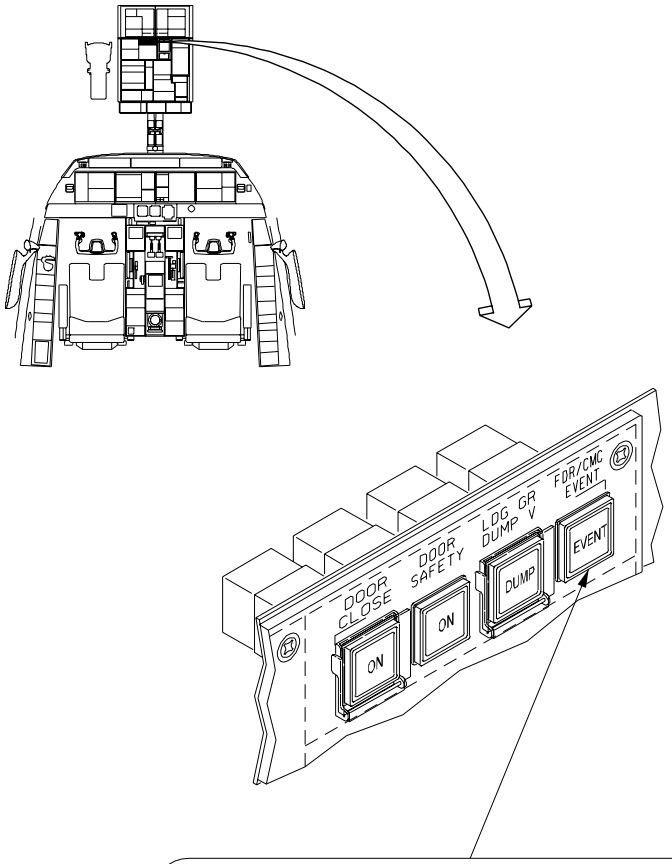
FDR Maintenance Ground Override Switch
Figure 5



Flight Data Recorder (FDR) / Underwater Locating Beacon (ULB)
Figure 6



FDR Impact Switch
Figure 7



42603F00

FDR / CMC EVENT Switch
Figure 8

2A-31-40: Data Management Unit

1. General:

A Honeywell Data Management Unit (DMU) is installed in the pilot side console for use in uploading navigation and approach plate data to the Flight Management Systems (FMS), updating the terrain database in the Enhanced Ground Proximity Warning System (EGPWS), or for maintenance diagnostics. The DMU is equipped with a tray accommodating Digital Versatile Discs (DVDs) and two (2) slots for insertion of type II and type III Personal Computer Memory Card International Association (PCMCIA) flash memory cards. The DMU is illustrated in Figure 9.

The DMU communicates with components and systems within the PlaneView avionics suite over a Local Area Network (LAN) connection, with data exchange operations controlled with the Multi-function Control and Display Units (MCDUs) or through a Personal Computer (PC) connected to a sub-D outlet on the Test and Monitor Panel. The database transfer operations are described in Section 2B-23-00. If a fault is detected within the DMU, DVD or PCMCIA card during the transfer operation, the MCDU(s) will display a message associated with the fault. A list of DMU fault messages is contained in Section 2B-34-00.

2. Controls and Indications:

A. Circuit Breaker (CB):

The following CB powers the DMU:

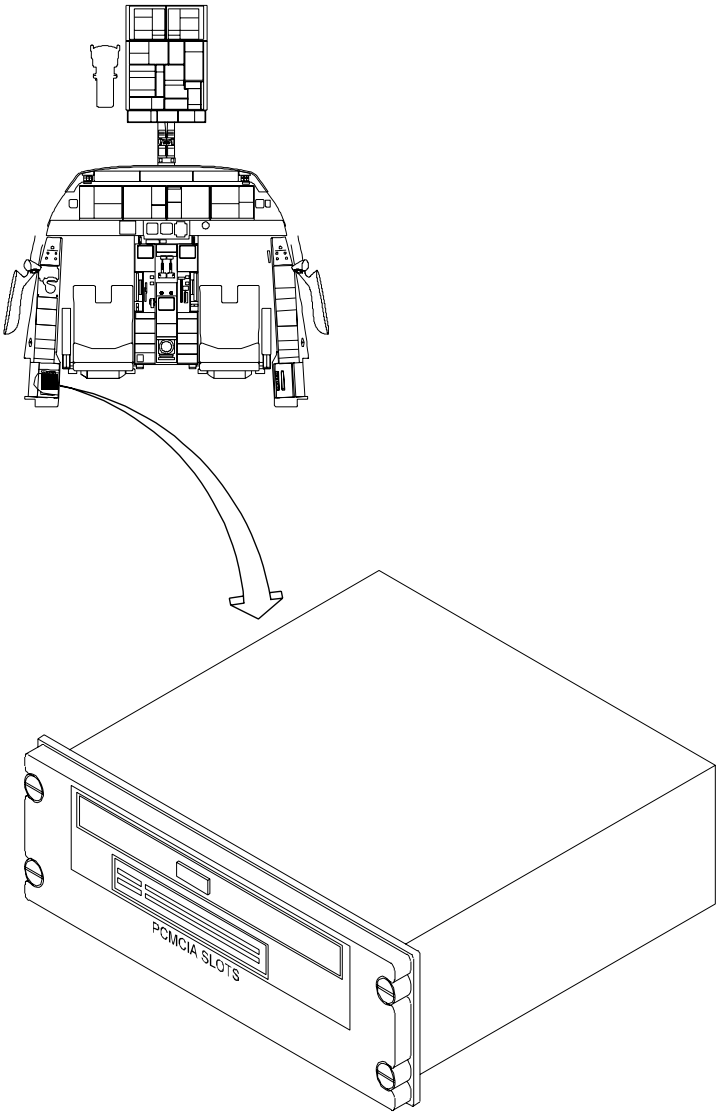
Circuit Breaker Name:	CB Panel:	Location:	Power Source:
DMU	REER	D-5	R MAIN DC Bus

B. Crew Alerting System (CAS) messages:

There are no CAS messages associated with the DMU. See Section 2B-33-00 for MCDU fault messages associated with the DMU and Section 2B-34-00 for a list of DMU fault codes.

3. Limitations:

There are no limitations associated with the DMU as of this writing.



Data Management Unit
Figure 9

2A-31-50: Cockpit Printer

1. General:

A Miltope Corporation Model TP4840 dot-matrix thermal printer is installed in the copilot side console. (See Figure 10.) The printer is interfaced with ARINC-429 bus connections to allow communication with the Mult-function Control and Display Units (MCDUs) with an additional Local Area Network (LAN) ethernet connection for data exchange with the Central Maintenance Computer (CMC) module, or a Personal Computer (PC) connected to sub-D installations on the CMC module face or the Test and Monitor Panel. The printer may be used to produce hard copies of approach plates, Notice(s) to Airmen (NOTAMS), weather information or other operational documents useful to the flight crew.

The printer is capable of producing three hundred (300) characters per second over the ARINC-429 bus connections or four (4) pages per minute over the LAN interface. In addition to printing a standard ninety-six (96) character set, the printer will also reproduce bit-map formats. Printing is accomplished on a continuous roll of thermal paper eight and one half (8.5) inches wide (216 mm) and one hundred twenty-five (125) feet (38.1 meters) long. The paper is stored inside the printer face with the bottom of the faceplate configured to provide a convenient tearing surface. Paper replenishment is accomplished by opening the faceplate with two push latches on either side of the printer.

2. Controls and Indications:

A. Printer Indications:

A horizontal row of indicators / pushbuttons is installed on the upper face of the printer. The legends within the indicators / pushbuttons are arranged vertically and may require the operating crew member to view the text sideways. The indicators and associated actions are:

- OFF - selects the printer on or off. Illuminates amber when printer power is on and printer is selected off or if a power fault occurs with printer selected on
- FAULT - illuminates amber if printer is out of paper, the printer faceplate is not secured closed, or the Built-In-Test (BIT) function has detected a fault. (The printer automatically performs a BIT whenever the printer is selected ON).
- ALRT RST - resets the alert (fault) function
- TEST - illuminates all of the indicators on the faceplate, performs a BIT test and prints a test sample. (NOTE: pressing the TEST and PPR ADV pushbuttons simultaneously will print a checkerboard and solid bar pattern sample.)
- LOW PPR - illuminates amber when only ten (10) feet (3.04 meters) of paper are remaining on the supply roll. The last six (6) feet (1.8 meters) of paper remaining are indicated by a red stripe.
- PPR ADV - advances the paper through the printer

B. Circuit Breaker (CB):

The following CB powers the cockpit printer:

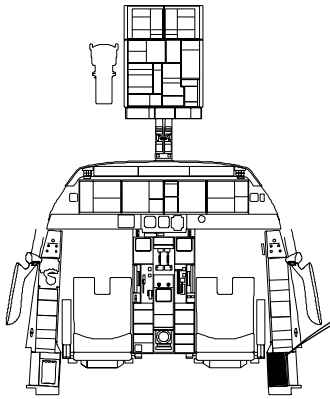
Circuit Breaker Name:	CB Panel:	Location:	Power Source:
COCKPIT PRINTER	REER	C-5	R MAIN DC Bus

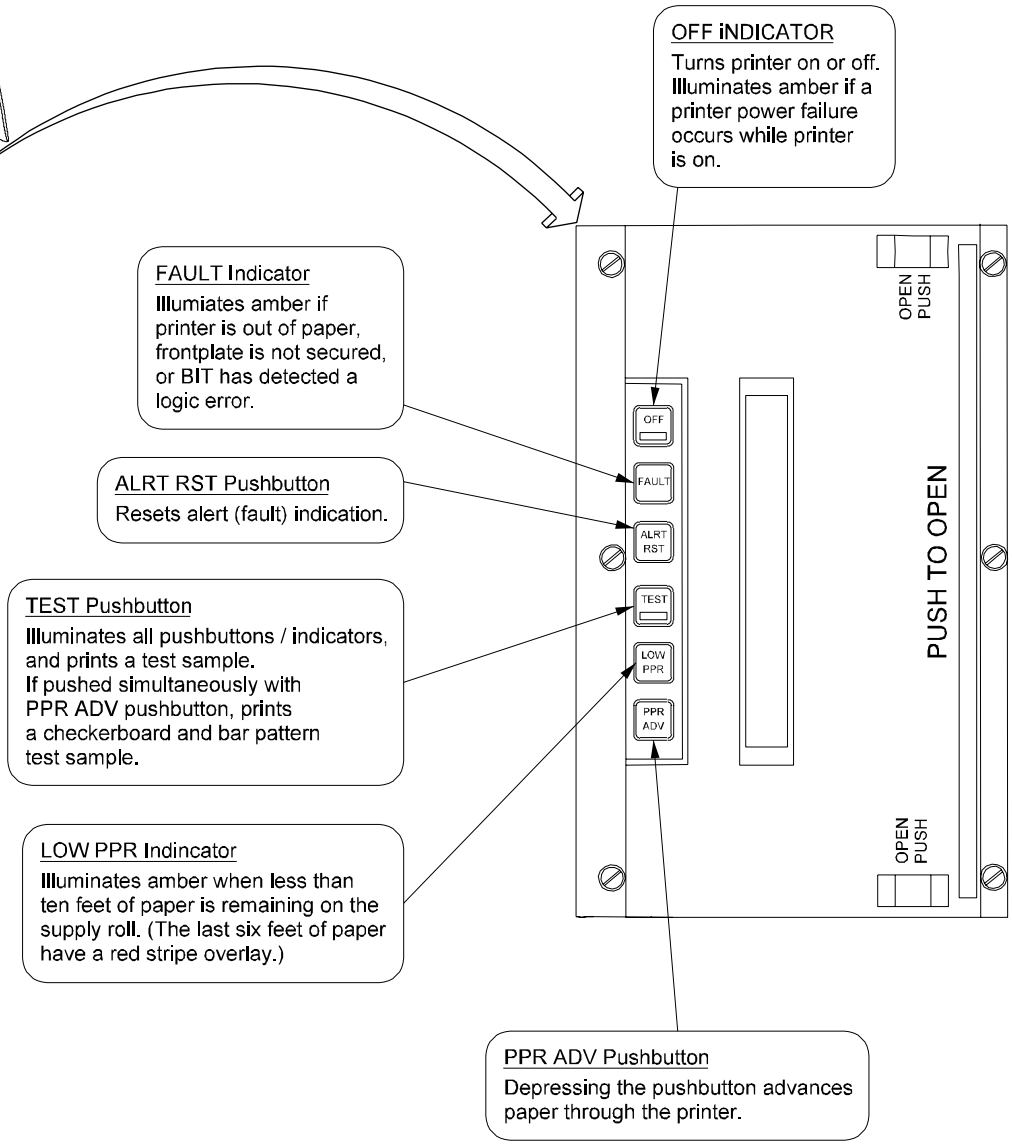
C. Crew Alerting System (CAS) Messages:

There are no CAS messages associated with the cockpit printer.

D. Limitations:

There are no limitations applicable to the cockpit printer as of this writing.





43865F00

Cockpit Printer
Figure 10

2A-31-60: Central Maintenance Computer System

1. General Description:

The central maintenance computer (CMC) system is a hardware / software installation that provides the operation, storage and interfaces for maintenance data. The flight crew may access data generated by the CMC by selecting the CMC synoptic page for view on the Display Units (DUs). Data is also downloadable by connecting a portable Personal Computer (PC) directly to the CMC module in the MAU using ethernet ports. The CMC system performs the following functions:

- Stores configuration data for installed equipment including hardware / software part numbers, serial numbers, equipment identifiers and bus addresses in a Configuration Management System (CMS)
- Provides fault monitoring for all interfaced components and subsystems to generate maintenance specific messages
- Displays parameter values and history data from monitored systems
- Records trends and exceedance / limit data
- Records events initiated by both crew switch activation and subsystem diagnostic software
- Records component operation data tracking cycles and hours of usage
- Generates and stores maintenance messages for use in troubleshooting and diagnostics (maintenance messages are formatted by ATA code, component name and nature of the fault)
- Compiles an end of flight report summarizing activity for each flight segment

The CMC system is composed of the following subsystems:

- Central Maintenance Computer module
- Digital Engine Operating System (DEOS) software helper application
- Remote terminal
- Loadable Diagnostic Information (LDI) database

2. Description of Subsystems, Units and Components:

A. Central Maintenance Computer module:

The CMC module is installed in slot eleven (11) of Modular Avionics Unit (MAU) #1. The module has a Pentium II processor, operates using a MS Windows NT software system and has two front-mounted connectors to support ethernet connections for PC readout and uploadable databases.

The module is interfaced through the MAU to the ASCB-D bus, thus communicating with all installed aircraft components and subsystems. Components / subsystems using ARINC 429 protocols and not directly interfaced to the ASCB-D bus are linked through Input / Output (I/O) modules that interface ARINC 429 data to the ASCB-D bus. All monitored components and subsystems are considered “members” of the CMC system. The member system concept provides comprehensive maintenance and fault monitoring and has the advantage of discriminating fault / maintenance data to isolate the faulty component or subsystem. This effectively filters data to eliminate fault / maintenance reports where various components / subsystems are operationally linked and failure of

one element triggers subsequent failures of all elements within the operational link. The CMC module is interfaced with the following components / subsystems:

ARINC 429 Protocol Interfaces	
MEMBER SYSTEM NAME	PNEUMONIC
Air Conditioning Controller Left	ACC L
Air Conditioning Controller Right	ACC R
Auxiliary Power Unit EEC	APU
Bleed Air Controller Left	BAC L
Bleed Air Controller Right	BAC R
Brake Control System	BTMS
Bus Power Controller Left	BPCU L
Bus Power Controller Right	BPCU R
Cabin Pressure Control Channel 1	CPCS 1
Cabin Pressure Control Channel 2	CPCS 2
Engine FADEC LA	FADEC LA
Engine FADEC LB	FADEC LB
Engine FADEC RA	FADEC RA
Engine FADEC RB	FADEC RB
Enhanced Vision System	EVS
Flap/Stab Controller 1	FLAPSTAB 1
Flap/Stab Controller 2	FLAPSTAB 2
Fuel Quantity Measuring System	FQMS
Nosewheel Steering	NWS

ASCB-D Interface Protocol	
MEMBER SYSTEM NAME	PNEUMONIC
Actuator I/O Command Function 1	AIOC 1
Actuator I/O Command Function 2	AIOC 2
Actuator I/O Monitor Function 1	AIOM 1
Actuator I/O Monitor Function 2	AIOM 2
Advanced Graphics Module 1	AGM 1
Advanced Graphics Module 2	AGM 2
Advanced Graphics Module 3	AGM 3
Advanced Graphics Module 4	AGM 4
Air Data Application 1	ADA 1
Air Data Application 2	ADA 2
Air Data Application 3	ADA 3
Automatic Flight Control System 1	AFCS 1
Automatic Flight Control System 2	AFCS 2
Central Maintenance Computer	CMC
Communication Management Function 1	CMF 1
Communication Management Function 2	CMF 2
Control I/O Module 1 Core	CIO 1
Control I/O Module 2 Core	CIO 2

ASCB-D Interface Protocol	
Control I/O Module 3 Core	CIO 3
Custom I/O Module 1 Core	CSI01
Custom I/O Module 2 Core	CSI02
Custom I/O Module 3 Core	CSI03
Database Module 1 Core	DBM 1
Database Module 2 Core	DBM 2
FMS Function 1	FMS 1
FMS Function 2	FMS 2
FMS Function 3	FMS 3
Generic I/O (Dual) Module 1A Core	GIOM 1A
Generic I/O (Dual) Module 1B Core	GIOM 1B
Generic I/O (Dual) Module 2A Core	GIOM 2A
Generic I/O (Dual) Module 2B Core	GIOM 2B
Generic I/O (Single) Module 1 MAU1 Core	GIOM S1
Generic I/O (Single) Module 2 MAU1 Core	GIOM S2
Generic I/O (Single) Module 3 MAU2 Core	GIOM S3
Generic I/O (Single) Module 4 MAU2 Core	GIOM S4
Generic I/O (Single) Module 5 MAU3 Core	GIOM S5
Generic I/O (Single) Module 6 MAU3 Core	GIOM S6
Global Positioning System Function 1	GPS 1
Global Positioning System Function 2	GPS 2
Internal Reference Unit 1	IRU 1
Internal Reference Unit 2	IRU 2
Internal Reference Unit 3	IRU 3
MAU 1 NIC Module 1 Core	MAU1 NIC1
MAU 1 NIC Module 2 Core	MAU1 NIC2
MAU 2 NIC Module 1 Core	MAU2 NIC1
MAU 2 NIC Module 2 Core	MAU2 NIC2
MAU 3 NIC Module 1 Core	MAU3 NIC1
MAU 3 NIC Module 2 Core	MAU3 NIC2
Modular Radio Cabinet 1 NIC	MRC1 NIC
Modular Radio Cabinet 1 Processor	MRC1 PRC
Modular Radio Cabinet 2 NIC	MRC2 NIC
Modular Radio Cabinet2 Processor	MRC2 PRC
Monitor Warn Function 1	MW1
Monitor Warn Function 2	MWF2
Multi-Purpose Control & Display Unit 1	MCDU1
Multi-Purpose Control & Display Unit 2	MCDU2
Multi-Purpose Control & Display Unit 3	MCDU3
Proc Module 1 Core	PROC1
Proc Module 2 Core	PROC2

ASCB-D Interface Protocol	
Visual Guidance System	VGS

B. DEOS Software Helper Application:

The DEOS software application is separate from the CMC. It enables the CMC to compile maintenance data in functional groupings, and, since the software is hosted in a processor module residing on an emergency (battery-powered) bus, record events such as APU and/or engine start or shutdown data that would elude the CMC until the aircraft is fully powered. DEOS enables the following functions:

- Tracks engine data (start temperatures, time at high power settings such as max continuous or take-off power, periods of low oil pressure, accumulated time for specified maintenance conditions, etc.) that have time constraints for dispatch purposes.
- Captures faults while on battery power that are unavailable to the CMC
- Sorts and filters engine FADEC information to aid in troubleshooting

C. Remote Terminal:

The face of the CMC module features two D-sub connectors to accommodate a portable (laptop) personal computer via ethernet connection. Each aircraft comes equipped with a laptop programmed with the necessary Honeywell developed remote terminal software to enable maintenance troubleshooting, data downloads, software updates and component (system member) configuration. The dual connectors on the module face enable both a laptop and a printer to interface with the CMC module.

The remote terminal also allows access via the CMC to maintenance information stored in the database module on MAU #1. The database can be loaded with a complete aircraft maintenance manual, diagnostic software, Line Replaceable Unit (LRU) specifications and serial numbers, fault histories, and other maintenance related information.

D. Loadable Diagnostic Information (LDI) Database:

The loadable diagnostic information database contains a model of aircraft systems compiled by the interface with all system members (aircraft components and subsystems) over ASCB-D and ARINC-429 buses. The database contains information such as subsystem and component specifications, diagnostic tests, and maintenance messages. The database is loaded and modified through the remote terminal and allows the maintenance function to evolve, staying abreast of system changes that occur in the development and operation of the aircraft.

3. Controls and Indications:

A. Circuit Breakers (CBs):

Circuit Breaker Name:	CB Panel:	Location:	Power Source:
CMC SHUTDOWN PWR	LEER	H-6	L EMER PWR BATT PACK

B. Crew Alerting Systems (CAS) Messages:

CAS messages associated with the central maintenance computer system are:

Area Monitored:	CAS Message:	Message Color:
Configuration Management System	CMS 1-2 Fail	Amber
Software Configuration	System Config Fail	Amber
Software Configuration	Validate Configuration	Amber
Active Faults Being Recorded by CMC	Check CMC	Blue
Configuration Management System	CMS 1 (or) 2 Fail	Blue
FDR/CMC EVENT Switch	Event Record	Blue
ASCB-D, ARINC-429 Discretes	Exceedance Record	Blue
CMC	CMC Fail	Blue

4. Limitations:

There are no limitations associated with the Central Maintenance Computer as of this writing.

2A-31-70: Monitor and Warning System

1. General Description:

The monitor and warning system (MWS) for the Gulfstream G550 is a software function residing in two processor modules: one in Modular Avionics Unit (MAU) 1 and the other in MAU 2. To preserve previously established naming conventions, the MWS is termed the Fault Warning Computer (FWC) and labelled as such on the SENSOR menu of the Display Controller (DC). Normally the on-side FWC is the active system, however in event of a malfunction, selection of the alternate system is possible on the DC menu.

All monitored components, systems and subsystems are directly linked to the processor modules through the ASCB-D bus or indirectly through Input / Output (I/O) modules communicating over ARINC-429 busses. Thresholds for initiation of Warning, Caution and Advisory notifications over the crew alerting system (CAS) are software programmable and are set as part of the aircraft configuration model compiled by the ASCB-D bus. System and subsystem function CAS thresholds may be software determined or set by position information from hardware units (e.g. weight-on-wheels switches, ground spoiler position, etc.)

If a CAS threshold is exceeded, the MWS prompts the display of the appropriate text message on the cockpit Display Unit (DU) configured for CAS messages. The messages are displayed in red, amber or blue text appropriate to the urgency of the malfunction and arranged chronologically with the most recent message at the top of the category.

- Red text for warnings indicating a condition that may result in injury or loss of life
- Amber text for cautions indicating a condition that result in damage to or loss of equipment
- Blue text for advisories indicating a condition degraded from normal operational specifications

CAS message length may be up to twenty-seven (27) characters using upper and lower case text. The CAS display accommodates seventeen (17) lines for messages, with space reserved for status information and scroll buttons.

The text of warnings, cautions and advisories flashes on the CAS display when initially presented. Warnings and cautions also prompt the illumination of indicator lights located on the warning / caution inhibit panels located on the outboard sections of cockpit glareshield: a red W for warnings and an amber C for cautions (advisories do not warrant the additional indication).

CAS messages are accompanied by aural tones broadcast over the cockpit speakers and cockpit headsets. A triple chime signals a warning condition, a double chime signals a caution condition and a single chime signals an advisory condition.

The glareshield indicator lights will illuminate, aural chimes will continue to sound, and CAS message text will continue to flash until either the pilot or copilot depresses the appropriate W or C indicator light on the glareshield panel, cancelling the indication / chime and reverting the CAS text to steady display. Depressing the warning or caution indicator also re-arms the indicator for any subsequent condition requiring illumination. The flashing text and single chime accompanying advisories are active for only five seconds. The cockpit glareshield warning / caution inhibit panel contains additional functions related to the MWS, and is discussed below.

In most cases, system or equipment malfunctions that prompt CAS messages and illuminate glareshield indicator lights also cause the annunciator in the control switchlight for the associated system or equipment to illuminate. Annunciator lights are installed in panels throughout the cockpit, with most residing in the overhead and pedestal panels.

2. Description of Subsystems, Units and Components:

A. Aural Signals:

Aural signals associated with the display of CAS messages are computed by the MWS and output through the NIM interface to the cockpit audio panels and speakers.

Type of Aural Tone:	Cause:
Triple Chime	CAS Warning
Double Chime	CAS Caution
Single Chime	CAS Advisory
Klaxon Tone	Landing Gear
Clacker	Overspeed
C Chord	Altitude Alert
Fire Bell	APU Fire
Lo/Hi/Lo Tone	Autopilot Disconnect
Lo/Lo/Lo Tone	Autothrottle Disconnect

B. Warning / Caution Inhibit Panel:

(See Figure 11.)

A warning / caution inhibit panel is installed on the outboard section of the pilot and copilot side of the instrument panel glareshield. The panels contain pushbutton switches that both annunciate warning and caution

conditions and provide a means to cancel the annunciation and accompanying aural notifications. Depressing the appropriate pushbutton extinguishes the illumination in the pushbutton, silences the aural notification and rearms the system for subsequent annunciations.

The panels also contain three (3) switches that prevent the visual and aural annunciations during flight conditions where they would be distracting to the flight crew.

Each panel contains the following switches:

- Warning switch (labeled W) illuminates when a critical condition or malfunction prompts the display of a red CAS message
- Caution switch (labeled C) illuminates when a serious condition or malfunction prompts the display of an amber CAS message
- Warning Inhibit switch (labeled INHIBIT) is used to prevent the visual and aural annunciation of conditions or malfunctions other than critical warnings (red CAS message conditions) during periods when they might be distracting to the flight crew such as during takeoff. The INHIBIT switch is normally activated prior to takeoff, allowing only warning (W) conditions to annunciate until the aircraft reaches four hundred feet (400 ft) AGL. Above that altitude, the inhibit function is no longer active and normal visual and aural annunciations are possible.
- Below glideslope annunciator / glideslope annunciator inhibit switch (labeled BELOW G/S on the top half of the switch and G/S INHIBIT on the bottom half) - top portion will illuminate BELOW G/S (with an accompanying aural annunciation) during an Instrument Landing System (ILS) approach if the aircraft is flown below the lower margin of the glide slope signal. If the flight condition is intentional, depressing the annunciator will inhibit subsequent annunciations and the lower portion of the switch will illuminate G/S INHIBIT.
- Ground proximity warning system override switch (labeled GPWS ORIDE) will prevent the annunciation of EGPWS warnings and cautions except Mode 7 (windshear) annunciations.
- Radar altimeter altitude callout inhibit switch (labeled RAD ALT) prevents EGPWS Mode 6 advisory callouts of altitudes during approach and landing. If the RAD ALT inhibit switch is selected on, only the “MINIMUMS” and “BANK ANGLE” aural annunciations will remain active.

C. Maintenance Test Switch:

(See Figure 13.)

A maintenance test switch, labeled MAINT TEST, is installed on the monitor / test panel on the Right Electronic Equipment Rack (REER). When selected on, (CAS) messages that are normally suppressed can be viewed. There is also an advisory (blue) CAS message alerting the flight crew that the switch is selected on.

D. Annunciator and Warning Lights:

CAS text messages, warning and caution lights and aural cues alert the crew to abnormal or non-standard system or component performance. In most cases these indications are accompanied by the illumination of

annunciator lights within the control switch of the malfunctioning system or installation. Labels within each system or component control switchlight will illuminate whenever the associated system or component is not in the commanded operating state. In normal cockpit operations, all switchlights are dark (unless there is a known malfunction). A malfunction will power the light(s) within the switchlight illuminating the text label (typically ON, OFF or FAULT) to annunciate the failure. The switchlight will remain in the previously selected position until manually repositioned by the flight crew.

The lamp elements within the annunciator lights are powered by direct current (DC) through circuit breakers labelled either ANN LTS PWR or WARN LTS PWR. The circuits for most (but not all) annunciator lights are controlled by an Annunciator Lights Test and Dim relay that both allows the lights to be tested with a single pushbutton on the overhead console labelled ANN LIGHTS TEST, and connects the lights to the dimming function of the cockpit lighting control knobs to adjust annunciator illumination levels. (A complete discussion of annunciator lights and cockpit lighting controls is contained in Section 2A-33-20: Flight Compartment Lighting System.) The annunciators in the engine fire handles, fuel control switches and the thrust reverser manual stow switches are not dimmable and illuminate at full brightness regardless of cockpit lighting control settings.

Six (6) warning lights power (WARN LTS PWR) circuit breakers are incorporated to control L and R ESS 28v DC bus power distribution to numerous system signals and/or indications. The circuit breaker names, locations, power sources and signals and/or indications they control are listed in the following tables and shown in schematic form in Figure 12.

NOTE:

Twenty eight volt (28v) power sources for warning and annunciator lights are intermixed. The lighting power and control sources for symmetrical systems / installations (e. g. left and right) may be from either warning lights or annunciator lights power or from an unrelated power source circuit breaker. Circuit breaker / power source wiring is dependent upon load carrying ability, physical proximity or redundancy requirements.

WRN LTS PWR #1 Circuit Breaker (REER A-23) Signals / Indications	
Right and left engine LOOP A / LOOP B FIRE TEST switch	Right cowl anti-ice relay and valve
Cabin Pressure Control Panel FAULT light in FAULT / MANUAL switch	Right engine Fuel Pressure Low relay and switch data to MAU #3
GPWS / GND SPLR FLAP ORIDE switch ON legend Switch position data to MAUs #1 and #3	Copilot MASTER WARN “W” switch

WRN LTS PWR #1 Circuit Breaker (REER A-23) Signals / Indications	
REER hot sensors and data link to MAU #2 Fwd Floor Area hot sensors and data link to MAU #2 Right Aft Floor hot sensors and data link to MAU #1	IRS #2 relay and select switch IRS #3 relay and select switch

WRN LTS PWR #2 Circuit Breaker (LEER A-9) Signals / Indications	
GND SPLR OFF / ARMED switch NO GND SPLRS lights on windshield center post GND SPLR TEST switch Left and right spoiler position indications	LEER hot sensor and data to MAU #1 Baggage EER hot sensor and data to MAU #1 Center Aft Floor hot sensor and data to MAUs #1 and #2 Aft Equip hot sensor and data to MAUs #1 and #2
Left engine fuel low pressure switch	Left engine FUEL CONTROL switch light
AUX PUMP OFF / ARM switch Aux pump thermal switch and data to MAU #1	Left cowl anti-ice relay and valve
IRS #1 relay and select switch	

WRN LTS PWR #3 Circuit Breaker (REER A-24) Signals / Indications	
Right engine fire / extinguisher switch	Right wing anti-ice thermal switches (inboard, mid and outboard)
Copilot WARN INHIBIT switch	

WRN LTS PWR #4 Circuit Breaker (LEER A-8) Signals / Indications	
APU fire annunciator light	Left engine fire detector test switch
L T/REV MAN / STOW switch	

WRN LTS PWR #5 Circuit Breaker (REER A-25) Signals / Indications	
Right engine FUEL CONTROL switch light	L T/REV MAN / STOW switch
Left wing anti-ice thermal switches (inboard and outboard)	Passenger Oxygen Control Panel

WRN LTS PWR #6 Circuit Breaker (LEER A-7) Signals / Indications	
APU FIRE TEST switch	Left wing anti-ice thermal switch (mid wing)
Left engine fire / extinguisher switch	Pilot MASTER WARN “W” switch Pilot WARN INHIBIT switch
IRS #1 select switch OFF light (blue) IRS #2 select switch OFF light (blue) IRS #3 select switch OFF light (blue)	

NOTE:

See Section 2A-33-20: Flight Compartment Lighting System for a list of the annunciator lights circuit breakers and associated signals and indications.

3. Controls and Indications:

(See Figure 11 and Figure 13.)

NOTE:

Additional information about the monitor and warning system operation is presented in Chapter 2B: Digital Automatic Flight Control Systems.

A. Circuit Breakers (CBs):

The monitor and warning system is protected by the following circuit breakers (CBs):

Circuit Breaker Name:	CB Panel:	Location:	Power Source:
WARN LTS PWR #6	LEER	A-7	L ESS DC Bus
WARN LTS PWR #4	LEER	A-8	L ESS DC Bus
WARN LTS PWR #2	LEER	A-9	L ESS DC Bus
WARN LTS PWR #5	REER	A-25	R ESS DC Bus
WARN LTS PWR #3	REER	A-24	R ESS DC Bus
WARN LTS PWR #1	REER	A-23	R ESS DC Bus

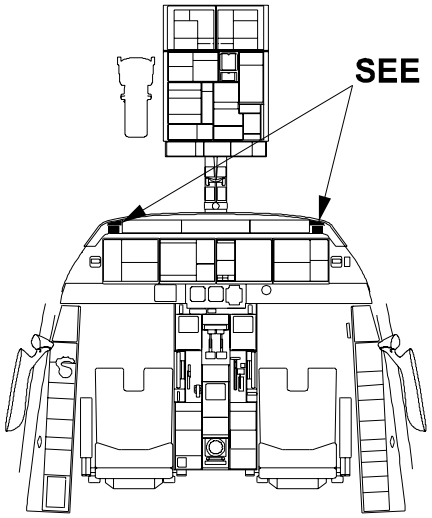
B. Crew Alerting System (CAS) Messages:

CAS messages associated with the monitor and warning system are:

Area Monitored:	CAS Message:	Message Color:
Fault Warning Computer (MWS)	FWC 1-2 Fail	Amber
MAU 1 / MAU 2	FWC 1-2 Fail	Blue
MAINT TEST SWITCH	Maintenance Switch On	Blue
MAU 1-2	Tone Generator 1-2 Fail	Blue

4. Limitations:

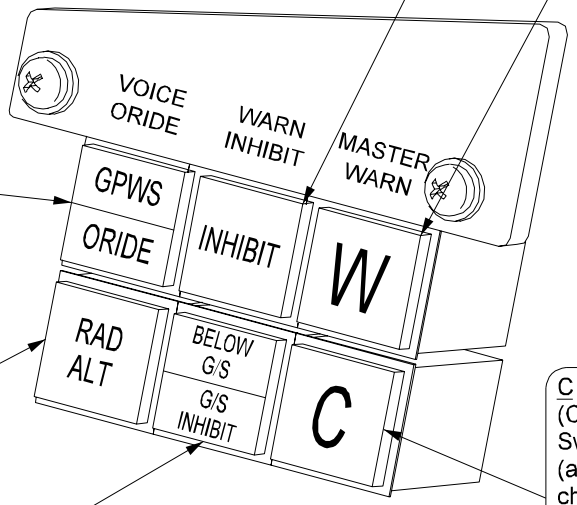
There are no limitations for the Monitor and Warning System at the time of this writing.



INHIBIT
(Crew Alerting System (CAS) Inhibit Switch) When selected, legend illuminates amber and limited CAS message / tone inhibiting is enabled. While enabled, caution annunciator acknowledgement switch illumination, and aural tones associated with caution and advisory CAS messages (double chime and single chime), are inhibited, except as noted in text.

W
(Warning Annunciation Acknowledgement Switch) Illuminates red when a warning (red) CAS message appears. A triple chime aural tone also sounds.The new CAS message is displayed flashing on top of warning (red) CAS message stack. Depressing switch reverts all flashing warning (red) and caution (amber) CAS messages to steady display and silences aural tone.

GPWS ORIDE
(Ground Proximity Warning System Override Switch) When selected, legend is illuminated blue and all GPWS alerts are inhibted except windshear.



DETAIL A

RAD ALT
(Radar Altimeter Altitude Callout Inhibit Switch) When selected, legend is illuminated blue and altitude awareness aural callouts are inhibited.

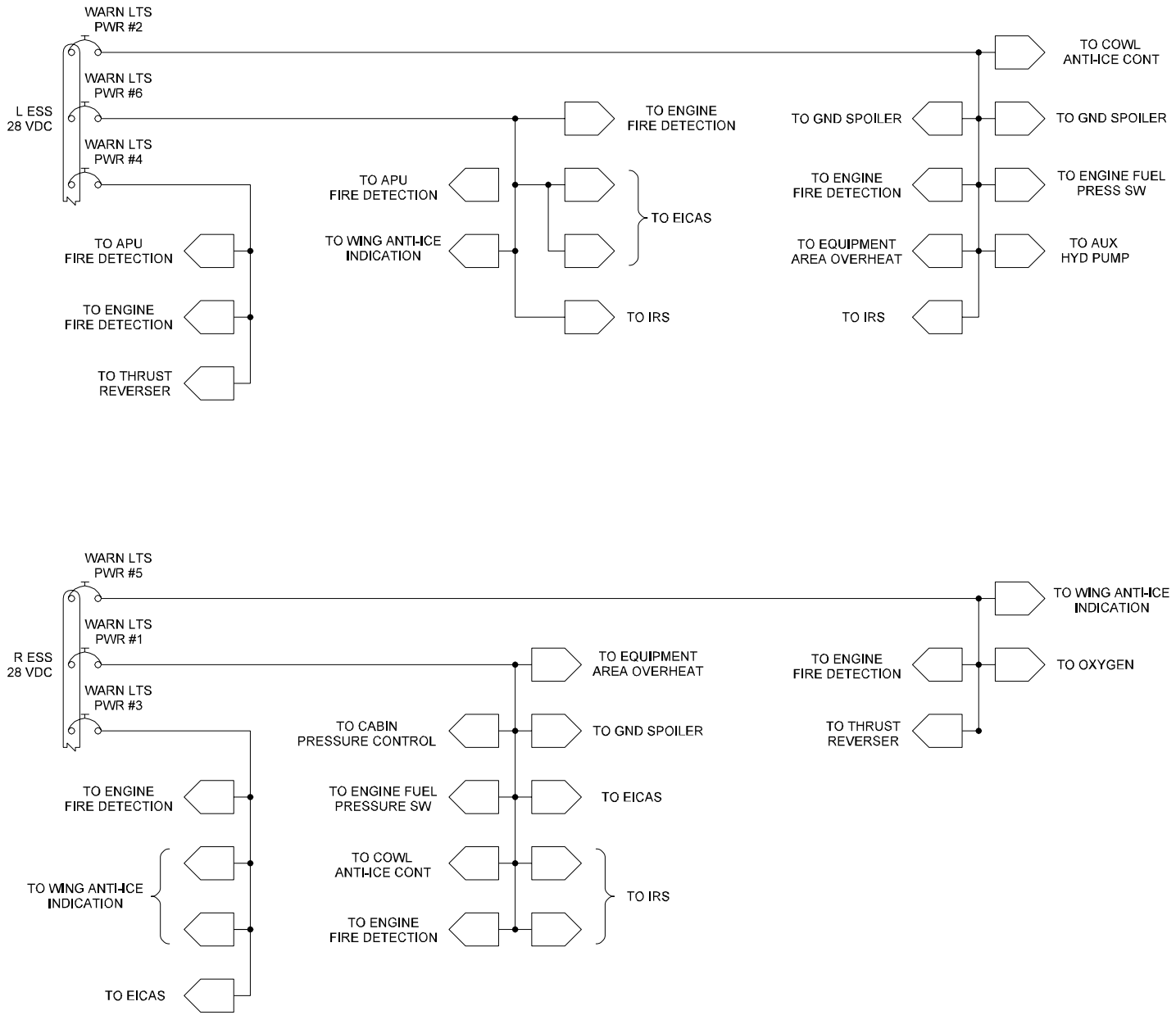
C
(Caution Annunciation Acknowledgement Switch) Illuminates amber when a caution (amber) CAS message appears. A double chime aural tone also sounds.The new CAS message is displayed flashing on top of caution (amber) CAS message stack. Depressing switch reverts flashing CAS messages to steady display and silences aural tone.

BELOW G/S
(Below Glideslope) Illuminates amber when aircraft descends below selected glideslope.
G/S INHIBIT
(Below Glideslope Warning Inhibit) When selected, legend illuminates blue and BELOW G/S warnings are inhibited.

NOTE
Pilot's panel shown.
Copilot's panel identical in function.

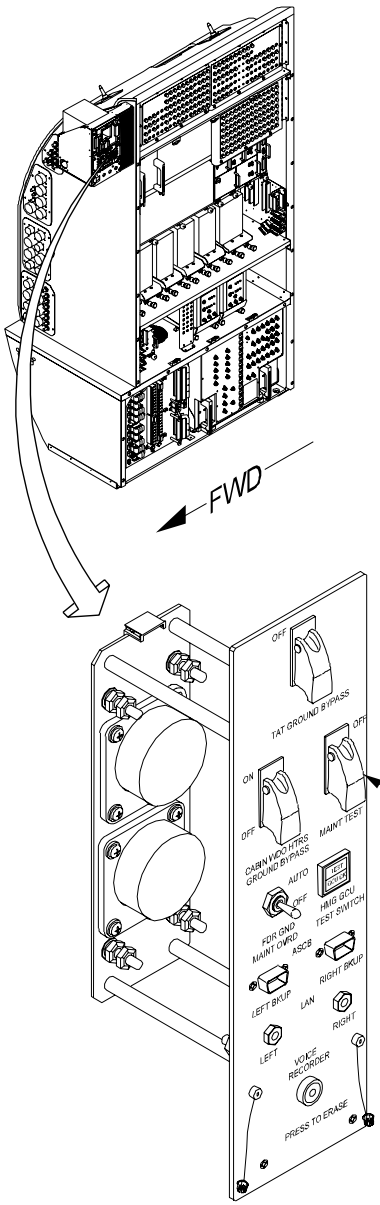
42604F00

Warning / Caution Inhibit Panels
Figure 11



40633F00

Warning Lights Power
Simplified Schematic
Figure 12



MAINT TEST SWITCH
When selected on, normally suppressed Crew Alerting System (CAS) messages can be viewed. There is also an advisory (blue) CAS message alerting the flight crew that the switch is selected on.

42605F00

Maintenance Test Switch
Figure 13

2A-31-80: Electronic Display System

1. General Description:

The G550 is equipped with the Honeywell PlaneView electronic cockpit display system. Four flat panel active matrix liquid display units with surfaces of thirteen inches by ten inches (13”X10”) provide the crew with visual presentations of instrumentation and navigation information. Display information includes:

- Primary flight displays (PFDs)
- Navigation displays
- Synoptic displays
- System displays

Display Units (DUs) #1 and #2 are on the pilot side of the instrument panel, DUs #3 and #4 are on the copilot side. Each of the displays is divided into viewable sections of logically grouped related data called windows. The windows are formatted into sizes (full window, 2/3 window or 1/6 window) and restricted to certain areas of the display. See the illustration in Figure 14. The crew is able to choose from a set of window configurations and information content by using menus on the Display Controllers (DCs) and/or menus shown on the display and selected with the Cursor Control Device (CCD). The display selection features on the CCD are shown in Figure 15.

A comprehensive discussion of the PlaneView display system is found in Sections 2B-05-00, 2B-06-00 and 2B-07-00.

2. Description of Subsystems, Units and Components:

A. Display Units (DUs):

Four DU-1310 active matrix liquid display units (numbered #1, #2, #3 and #4) are installed in the cockpit instrument panel. The DUs are identical and interchangeable and each has an internal cooling fan. The pilot normally uses #1 and #2, the copilot #3 and #4. The displays have wide viewing angles so that the information on every display may be viewed by either pilot. The DUs have no installed software, but interface with the Advanced Graphics Modules (AGMs) in the MAUs that perform display graphics processing.

The information displayed on the DUs is selected with the DCs or CCDs, with the pilot able to select information to DUs #1, #2 and #3, and copilot selections available on #2, #3 and #4.

Sections 2B-02-00 through 2B-02-08 have numerous illustrations of the varieties of information displays available on the DUs.

B. Display Formats:

Three formats are available for the display of information: full window, 2/3 window or 1/6 window. The format is limited by the type of information displayed. Full window display is limited to the primary flight display (PFD) or the instrument navigation (MAP) display. The full window PFD is confined to DU #1 and/or DU #4. Full window MAP display is restricted to either DU #2 or DU #3, but not both at once.

The 2/3 window format is available for all of the following information: PFD, MAP or Synoptic (systems management). Synoptic displays include:

- Doors
- Fuel

- Hydraulics
- AC power
- DC power
- Flight controls
- ECS pressure
- Summary
- Uplinked weather
- MAP
- Cameras (not yet activated)
- Central maintenance computer

The 1/6 window display format is available for the following aircraft systems information:

- Engine
- Alternate primary engine instrument
- Compacted engine
- Crew alerting system (CAS)
- Checklists
- Waypoint list
- Engine start
- Flight controls
- Uplinked weather
- Datalink
- Brakes
- Cameras (not yet activated)
- Traffic (TCAS)
- Ground service
- APU / bleed
- ECS / pressure
- AC / DC summary

Certain display protocols have been have been established to ensure the display of essential information. For a full description of the display window formats during various failure scenarios, see Section 2B-04-00 of this manual. The following formats are included for user convenience. Power up default settings are:

- DU #1 to 2/3 PFD with two blank (selectable) 1/6 windows
- DU #2 to 2/3 MAP with upper 1/6 window to primary engine instruments and lower 1/6 window to secondary engine instruments
- DU #3 to 2/3 MAP with upper 1/6 window to CAS and lower 1/6 window to checklist
- DU #4 to 2/3 PFD with two blank (selectable) 1/6 windows

If the secondary engine instruments 1/6 window is not displayed, the primary engine instrument window will revert to the alternate primary

engine instrument window that replaces the L/R HP and L/R fuel flow indications with L/R total fuel quantity readouts and a mismatch indicator.

Selecting a full window MAP display on DU #2 will force DU #3 to display primary engine instruments on the upper 1/6 window and CAS on the lower 1/6 window (deselecting full MAP will revert DU #3 to previous settings).

Selecting a full window MAP display on DU #3 will force DU #2 to display CAS on the lower 1/6 window (deselecting full MAP will revert DU #2 to previous settings).

In the case of any of the following events, full window MAP is not available and if displayed when the event occurs, full window MAP will revert to 2/3 window:

- Single or multiple DU failure
- A secondary engine parameter is exceeded
- A checklist is automatically called up a CAS event
- Selection of full window MAP on the adjacent DU #2 or DU #3

C. Cursor Control Devices (CCDs):

(See Figure 15.)

A cursor control device (CCD) is installed on each sidewall of the cockpit for use by the pilot and copilot. The CCDs are ergonomically positioned as armrests with an extension containing buttons and switches easily manipulated by hand movements. The CCDs provide an interactive link with the DUs to select and change items for display. Each CCD has the following features:

- Three display unit selection buttons - the pilot side can control DUs #1, #2 and #3, copilot side can control DUs #2, #3 and #4
- A movable cursor pointing device
- A rotary dial to adjust ranges or values
- An enter button to select the option designated with the cursor
- A push to talk button for communications

The crew first selects the display on which the cursor will be active using the selection buttons. The cursor then appears on the active display, formatted as a green plus (+) type symbol for the pilot cursor or a blue (x) type symbol for the copilot. The pilot cursor will appear in the upper right corner of the 2/3 window on DU #2, and the copilot cursor will appear on the upper right corner of the 2/3 window on DU #3. If DUs #1 or #4 are selected, the respective cursors will appear on the outboard edge of the Horizontal Situation Indicator (HSI). The cursor is moved within the selected display with the pointing device on the CCD. As the cursor moves across the display, interactive areas (selectable with CCD input) are highlighted, with buttons and menus appearing with a blue background and a white outline when beneath the cursor position. Pop up menus are available on all windows except the PFD, primary engine display and the CAS message windows. (The only items available for change on the PFD are the range adjustment on the HSI and a choice of displayed information - i.e. a particular navaid for an approach.)

A menu is selected with the enter button on the CCD. When a menu is selected, the cursor is automatically positioned to the first item on the pull

down list. The CCD rotary dial is used to scroll up or down a list, and the enter button to select a list item. Only one pull down menu is displayed at a time in any window. If the cursor is moved off of the menu for two (2) seconds, the menu will close, likewise the menu will close if there is no cursor activity for five (5) seconds. A menu is selected closed by clicking again on the title of the menu.

Graphical fight planning may be made using the CCD and the MAP window on DUs #2 and #3. MAP layer options can be selected from pull down menus, and the cursor positioned to a displayed navaid or position. The CCD may also be used to change range depictions of the selected layer.

D. Crew Alerting System (CAS) Display Scroll Switches:

Two (2) CAS scroll switches, each on the respective pilot and copilot side consoles forward of the lighting control panel may be used to scroll amber caution and/or blue advisory messages up or down on the CAS display window in order to declutter the window or recall previously hidden messages. See Figure 16. (Red Warning messages cannot be moved on the CAS display.) Caution messages must have been acknowledged with the glareshield switchlights and advisory messages must be displayed in steady mode in order for the scroll switch (or CCD) to move the messages on the display. When messages are scrolled from the CAS display, a status bar on the lowest line of the display will contain a numerical indication of the number of messages hidden from view with an arrow corresponding to direction that the messages have been scrolled. Caution message status is shown in amber on the left side of the display, advisory status is indicated in blue on the right of the display.

If caution and/or advisory messages are removed from the display, the annunciation of a new message will recall the previously scrolled messages. A new caution message will recall both existing caution and advisory messages, but a new advisory message will recall only scrolled advisory messages.

E. Display Controllers (DCs):

Two display controllers (DCs), one for the pilot and one for the copilot , are installed on the instrument panel glareshield. The DCs are interfaced with the control I/O modules in the MAUs to provide selection of display modes and information. The functions provided through the DCs are similar to those available using the CCDs, but require the use of pushbuttons and line select keys (LSKs). Functions available are:

- PFD
- MAP
- 1/6 SYS
- 2/3 SYS
- SENSOR
- FLT REF
- TRS
- NAV
- TEST
- CHKLST

- HUD

Each function pushbutton brings up menu items on the CRT display of the DC. The menu items are displayed next to an associated line select key (LSK). Depressing the LSK next to the menu item selects that item for view on the DU. The selected item is highlighted on the CRT in reverse video or by a box shown around the item when it is chosen from the menu. A second push of the LSK will remove the item from view on the DU. Some menu items are settings that can be changed using the rotary knob on the face of the DC, for instance Vref speeds or minimum descent altitudes (MDAs) are changed using the rotary knob.

The DC has a brightness control on the left of the CRT screen to change intensity of the pushbutton lighting and CRT display. A BARO set knob on the right side of the CRT screen is used to change the barometric setting used by the air data system (ADS). Settings can be entered in inches of mercury (Hg), millibars (Mb) or Hectorpascals (hPa). The BARO knob has a PUSH STD function that, when the knob is depressed, sets the ADS to standard atmosphere settings: 29.92 in Hg, 1013 Mb or 1013 hPa.

For more information regarding the DCs, see section 2B-02-00 of this manual.

F. DISPLAY BRIGHTNESS Panel:

(See Figure 17.) DU intensity is controlled by the rotary knobs on the DISPLAY BRIGHTNESS panel located on the cockpit center pedestal, forward of the power levers between MCDU #1 and #2. The left inner/outer knob controls the brightness of DU #1 and #2, the right inner/outer controls the brightness of DU #3 and #4. Once set, an automatic sensor on each DU adjusts brightness to maintain the selected contrast level in changing light conditions.

G. DISPLAY SWITCHING / DISPLAY CONTROL Panel:

The DISPLAY SWITCHING / DISPLAY CONTROL panel is located on the cockpit overhead panel (COP). The switches on the panel provide manual control of the DUs in case of malfunction or failure. Panel switches are in two groupings: display switching and display unit control. See the illustration in Figure 18.

(1) DISPLAY SWITCHING:

Two switches are installed to change the normal display formats. The left switch allows selection of DU #2 to NORM (MAP or other selected 2/3 window) or to PFD. The right switch allows DU #3 selection to NORM (MAP or other 2/3 window) or to PFD. When the left switch is selected to PFD, DU #2 is formatted to a 2/3 window PFD display with the 1/6 window primary engine instruments display in the upper right corner. When the right switch is selected to PFD, DU #3 is formatted to a 2/3 window PFD display with the 1/6 window CAS display in the upper left corner.

(2) DISPLAY UNIT CONTROL:

Four control switches, one for each DU, are installed on the bottom half of the panel. Each of the switches has two positions. The NORM position selects each DU to the normally sourced Accelerated Graphics Module (AGM). DU #1 to AGM #1, DU #2 to AGM #2, etc. The OFF position of each switch is only functional on

the ground (weight-on-wheels) and interrupts power to the DU in order to perform maintenance or removal of the DU.

NOTE:

A planned modification to the DISPLAY UNIT CONTROL switches will enable switching a DU to the adjacent AGM in the event of a failure of the normally associated AGM. This feature would allow for instance, the AGM of DU#2 to provide graphic displays to both DU#2 and DU#1 should the AGM of DU #1 fail. This feature is not currently available and the switch position dedicated to this function is presently labelled INOP.

3. Controls and Indications:

A. Circuit Breakers (CBs):

The electronic display system is protected by the following CBs:

Circuit Breaker Name:	CB Panel:	Location:	Power Source:
DISPLAY UNIT #1	POP	B-5	L ESS DC Bus
DISPLAY UNIT #2 PRI	POP	B-6	L MAIN DC Bus
DISPLAY UNIT #2 SEC	POP	B-7	L ESS DC Bus
DISPLAY UNIT #3 PRI	CPOP	B-6	R MAIN DC Bus
DISPLAY UNIT #3 SEC	CPOP	B-7	R ESS DC Bus
DISPLAY UNIT #4	CPOP	B-5	R ESS DC Bus
L CCD	POP	B-10	L ESS DC Bus
R CCD	CPOP	B-10	R ESS DC Bus
DISPLAY CONT #1	LEER	G-9	L ESS DC Bus
DISPLAY CONT #2	REER	C-2	R ESS DC Bus
DU REV	POP	E-10	L ESS DC Bus

B. Crew Alerting Systems (CAS) Messages:

CAS messages associated with the electronic display system are:

Area Monitored:	CAS Message:	Message Color:
ASCB-D	Check PFD 1-2	Red
AGMs	AGM 1-2-3-4 Fail	Amber
ASCB-D	Check PFD 1-2	Amber
ASCB-D	Check Vspeeds	Amber
DUs	DU 1-2-3-4 Overheat	Amber
AGMs	AGM 1-2-3-4 Fail	Blue
CCDs	CCD 1-2 Fail	Blue
DCs	Display Controller 1-2 Fail	Blue

NOTE

Numerous CAS messages are associated with the currency and accuracy of the AGM databases that supply graphic information regarding navigation data shown on the MAP display. The messages are self-explanatory and are not listed due to space requirements.

4. **Limitations:**

Synoptic / System Pages Range Marking Colors:

Normal Range Values: Green or White

Caution Range Values: Amber

Warning Range Values: Red

Powerplant Indications:

Engine Pressure Ratio (EPR): no limitation markings - 0.6 to 2.0 pilot selectable command marker

TGT°C

- 900°C and above: Red Arc
- 860°C to 900°C: Amber Arc
- 0 to 860°C: White Arc

% LP RPM (LP)

- 101.1% and above: Red Arc
- 101.0% to 101.1%: Amber Arc
- 0 to 101.0%: White Arc

% HP RPM (HP)

- 99.6% and above: Red Arc
- 98.9% to 99.6%: Amber Arc
- 0 to 98.9%: White Arc

Fuel Flow (FF): No limitation markings

Oil Temperature (OIL TEMP)

- 160°C and above: Red Digits
- +20°C to 160°C: White Digits
- -30°C to +19°C: Amber Digits
- -31°C and below: Red Digits

Oil Pressure (OIL PRESS)

- 35 psi and above: White Digits
- 26 to 34 psi: Amber Digits
- 0 to 25 psi: Red Digits

Engine Anti-ice Pressure: 33 psi and above: Amber Digits

Fuel Indications:

Fuel Tank Temperature Indications

- +54°C and above: Red Digits
- -34° to +53°C: White Digits
- -35°C to -36°C: Amber Digits
- -37°C and below: Red Digits

APU Indications

APU Exhaust Gas Temperature (EGT): No limitations Markings

APU RPM

- 106% and above: Red Digits

- 104% to 105%: Amber Digits
- 0 to 103%: White Digits

Crew Alerting System (CAS) Messages

Amber CAS messages are DO NOT DISPATCH messages. Blue CAS messages allow dispatch as the systems that generate these messages are fault tolerant. Dispatch with an active amber or blue message shall be with reference to the MMEL.

Altitude Preselect Arc

The altitude preselect arc appears on the Map Display any time the vertical speed exceeds 300 feet per minute as the aircraft either climbs or descends to the new altitude. The arc is tied to the altitude preselect value and predicts where on the lateral map the new altitude will be achieved. During VNAV operations, the arc will not be displayed if the aircraft is operated in a vertical mode that does not involve the Altitude Preselect target on the Guidance Panel, such as vertical speed. The altitude preselect arc is removed from the Map Display when the aircraft is within 1,000 feet of the preselected altitude target.

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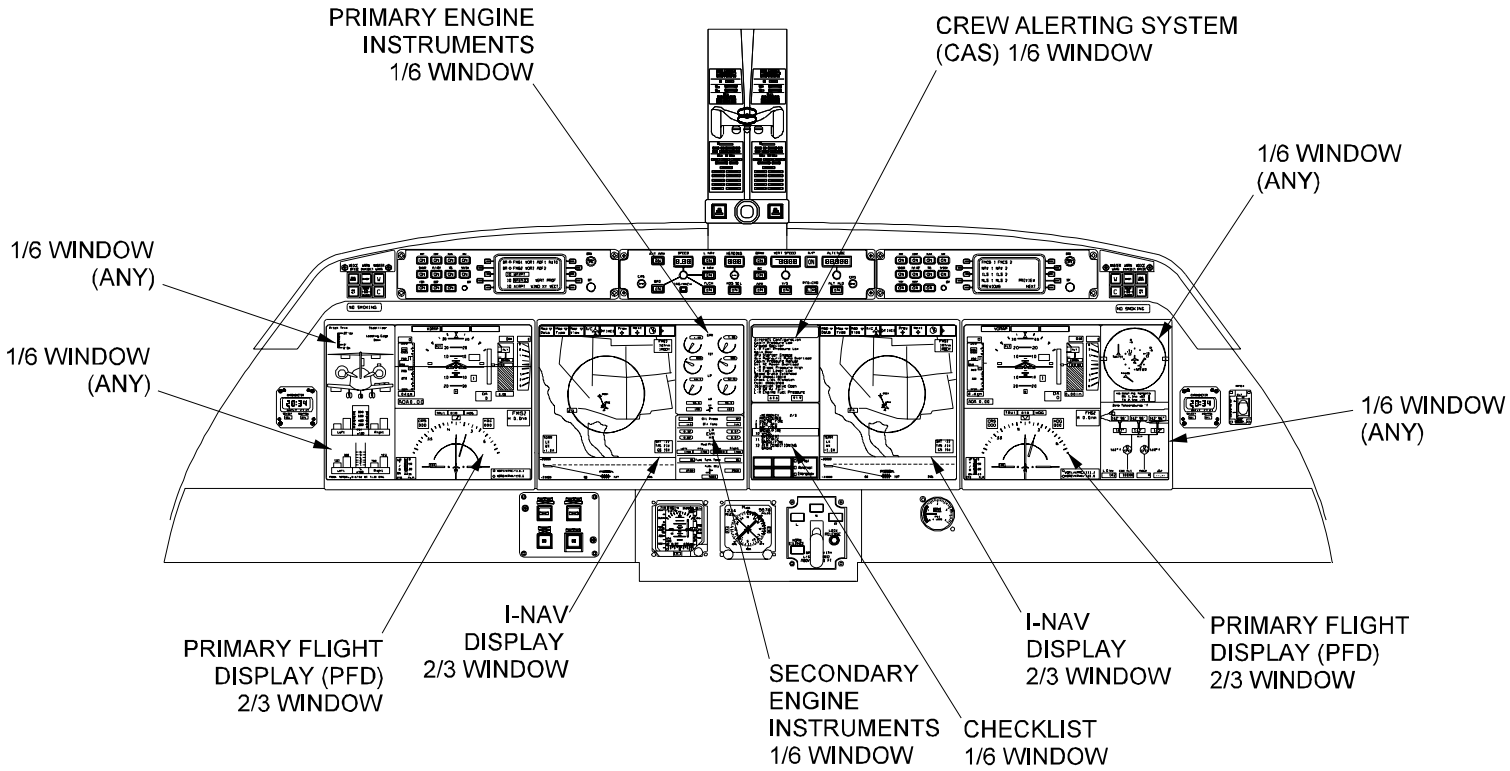
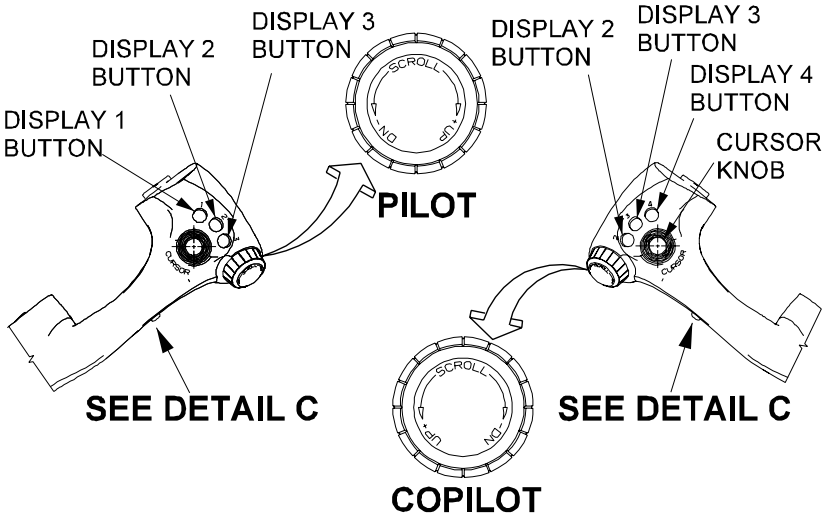
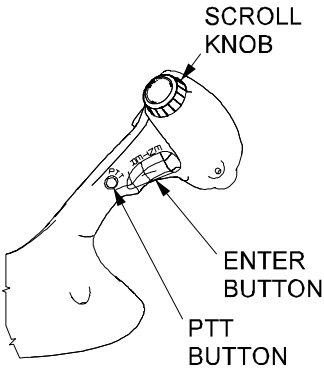


42619F00

Cockpit Display Formats
(Default Settings)
Figure 14



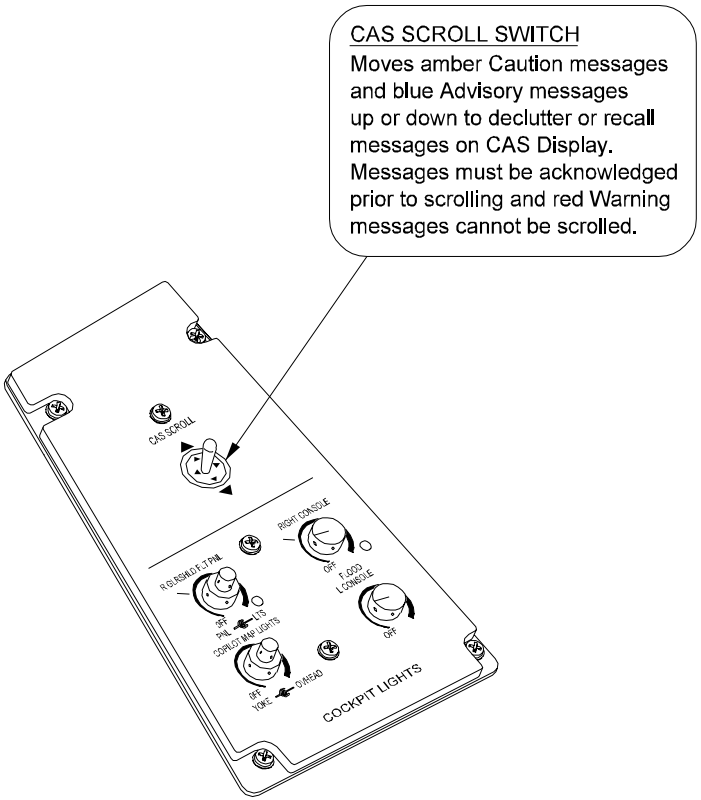
DETAIL B



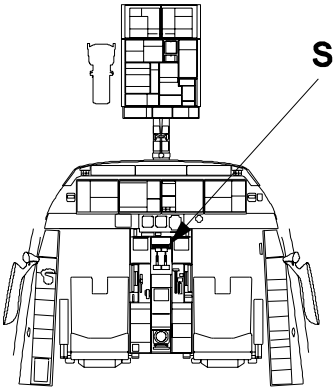
DETAIL C

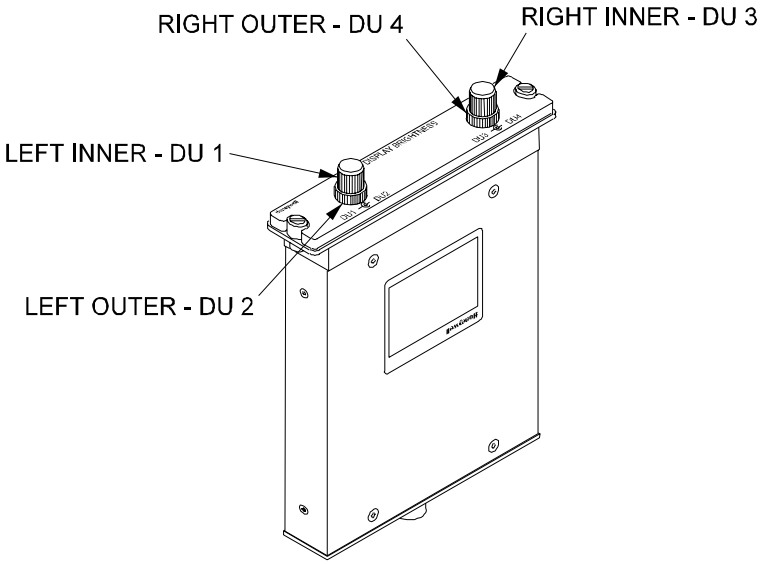
42621F00

Cursor Control Device
Figure 15



CAS Scroll Switch
Figure 16



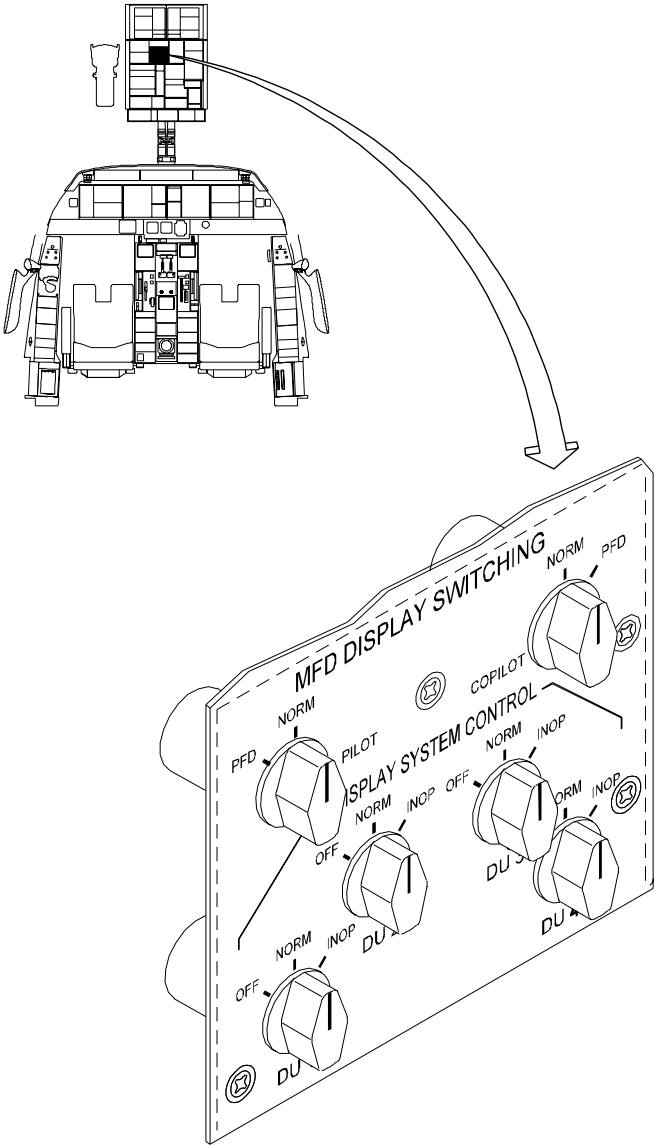


DETAIL A

DISPLAY BRIGHTNESS
CONTROL PANEL

42606F00

DISPLAY BRIGHTNESS Panel
Figure 17



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Display Switching Panel
Figure 18

2A-31-90: Weather Radar and Lightning Sensor

1. General:

The G550 is equipped with a PRIMUS-880 weather radar system incorporating a twenty-four (24) inch flat plate radar antenna mounted in the nose cone that acts as both receiver and transmitter (see Figure 19). The installation is referred to as a Receiver / Transmitter / Antenna or RTA. The RTA operates in the X-band radio frequency range (9,375 ±25 MHz) and provides both weather (precipitation) detection and ground terrain mapping.

WARNING

THE RADAR SYSTEM PROVIDES ONLY WEATHER DETECTION OR GROUND MAPPING. IT IS NOT INTENDED FOR USE NOR CAN IT BE RELIED UPON FOR GROUND PROXIMITY WARNING OR FOR ANTI-COLLISION PROTECTION.

Incorporated in the antenna installation are all of the circuits necessary for signal processing, scan conversion, output to cockpit displays and interface with the radar control panels installed in the cockpit center console.

The two (2) independent control panels on the pilot and copilot side of the console contain pushbutton switches and selector knobs to set the desired operational characteristics of the radar. Both control panels may be active at the same time, with the antenna alternating between the operational parameters set on each panel at each sweep, effectively operating as a dual radar installation. If only one (1) panel is selected ON, the inactive panel will slave to the selections made on the operating panel. (The inactive panel will indicate the slave status by illumination of the SLV light located on the bottom center of the panel as shown in Figure 20.)

Radar return data is presented graphically in color on the MAP display with pull-down menu choices using the Cursor Control Device (CCD) and/or on the Horizontal Situation Indicator (HSI) section on the lower half of the Primary Flight Display (PFD) through selections made with the Display Controller (DC). Precipitation is displayed in colors corresponding to intensity:

- MAGENTA - indicates areas of very heavy precipitation
- RED - indicates areas of heavy precipitation
- YELLOW - indicates areas of medium intensity precipitation
- GREEN - indicates areas of moderate or light precipitation

When the ground mapping function is selected, terrain features will be presented in colors corresponding to reflectivity with magenta as most reflective, yellow less reflective and cyan least reflective.

An optional Lightning Sensor System (LSS) may be installed on the aircraft to supplement weather radar information as an aid in avoiding weather related hazards. The LSS detects the electromagnetic energy associated with lightning and indicates the azimuth and range of the lightning strike as an overlay on the active weather radar display(s).

A. Radar Control and Indications:

Two weather radar control panels and integrated controllers are installed on the cockpit center console, each on the respective pilot and copilot side

of Multi-function Control and Display Unit (MCDU) #3. The panels are illustrated in Figure 20. The left (pilot) control panel / controller is powered by the left main DC bus, the right panel / controller (copilot) by the right main DC bus. Each panel selects the functions of the respective radar controller that is interfaced with all three (3) Modular Avionics Units (MAUs) to communicate operational settings to the RTA and to select display range settings on both the MAP and PFD displays.

WARNING

PRIOR TO OPERATING THE RADAR ON THE GROUND, ENSURE THAT NO PERSONNEL ARE WITHIN FORTY NINE (49) FEET OR FIFTEEN (15) METERS OF THE FRONT OF THE AIRCRAFT. ALSO DO NOT OPERATE THE RADAR WHILE REFUELING THE AIRCRAFT OR WITHIN THREE HUNDRED (300) FEET OR NINETY-TWO (92) METERS OF OTHER REFUELING OPERATIONS.

Each control panel has the following features for selecting the RTA operational mode and desired display presentation. An annunciator box is shown in the left bottom corner of the windows containing the radar display. The box provides an indication of the current radar operating mode and/or antenna tilt setting.

(1) MODE rotary knob with the following settings:

- OFF - prevents power to the RTA
- STBY - selects standby mode to power the RTA assembly without antenna movement or signal transmission
- TEST - to perform a system test with the antenna transmitting and a test pattern shown at a one hundred (100) mile range. Faults discovered during the test will be annunciated on the selected radar display.

NOTE:

The TEST mode powers the RTA transmitter. Observe the distance standoffs cited in the WARNING shown above.

- WX - selects the weather radar operational mode to detect radar returns from precipitation
- GMAP - selects the ground mapping mode to detect terrain features with the weather radar. The antenna down tilt will be automatically determined by the display range selected (tilt may be manually set if desired).

NOTE:

Precipitation areas are not calibrated (depicted in colors corresponding to intensity) when the radar is in ground mapping mode. The mode should not be used for weather detection or avoidance.

(2) RANGE rotary knob that selects the radar range on the designated display windows. The range of both the MAP display and PFD HSI are set with the knob, however the range setting may be changed from the knob selected range by using the CCD to designate a different range on window pull down menus. Although the RANGE knob has no marked scale detents, the available radar range settings are as tabulated below:

Scale Indicated on Display Window Half-Range Ring	Selected Weather Radar Scan Range
5 (nautical miles)	10 nautical miles
10 (nautical miles)	25 nautical miles
25 (nautical miles)	50 nautical miles
50 (nautical miles)	100 nautical miles
100 (nautical miles)	200 nautical miles
150 (nautical miles)	300 nautical miles

(3) TILT knob adjusts the tilt of the antenna. The antenna tilt may be manually set up or down fifteen degrees (15°). If the TILT knob is pulled out, the antenna is set to Altitude Compensated Tilt (ACT) mode enabling the antenna to automatically adjust tilt for aircraft altitude and selected display range. (Aircraft altitude information is derived from Air Data Module #2 through the interface with MAU#2.) While in the ACT mode, tilt may be refined up or down two degrees (2°) by rotating the extended TILT knob.

(4) GAIN rotary knob adjusts the RTA receiver gain. The knob is normally pushed in to select the normal calibrated gain setting. Pulling the knob out allows manual gain adjustment by turning the knob in order to increase or decrease receiver sensitivity.

(5) BRT knob adjusts the brightness of the radar presentation on the selected displays.

(6) TGT pushbutton selects the Target Alert feature that monitors for heavy (red) precipitation beyond the selected display range. If an area of heavy precipitation lies approximately five to fifty (5 to 50) miles beyond the selected display range and within seven and one half degrees (7.5°) of aircraft heading, a red arc is shown on the display window and the green TGT mode indicator box on the display changes to amber prompting the flight crew to select a increased display range.

(7) STAB pushbutton deselects automatic pitch and roll antenna stabilization. Normally the antenna uses data from Inertial Reference Units (IRUs) #2 and #3 to compensate for aircraft attitude changes in order to maintain a radar scan pattern level with the horizon. If a malfunction occurs, the STAB pushbutton may be used to establish the antenna in a fixed position.

(8) RCT pushbutton engages the Rain Echo Attenuation Compensation Technique or RCT operating mode. The RCT mode enables the RTA receiver to automatically adjust sensitivity to compensate for attenuation loss as the radar transmitting pulse passes through precipitation in order for the radar to detect additional precipitation behind the nearest area or to detect embedded areas of significant precipitation. If the radar receiver is unable to compensate for attenuation because of the topography of the precipitation areas, the non-attenuated areas will be shown in cyan and any precipitation detected displayed as magenta, the most severe condition, as a precautionary measure since the radar cannot accurately judge intensity in the non-attenuated region.

(9) TRB pushbutton enables a turbulence detection mode. In this mode the RTA transmits at a rate of approximately fourteen hundred (1,400) pulses per second at a power output of ten kilowatts (10 kW). Returns from the rapid pulses are used to detect areas of significant vertical movement of precipitation that are often associated with moderate or greater turbulence. Any area containing detected turbulence will be displayed as grey to white.

WARNING

THE RADAR SYSTEM CAN ONLY INDICATE LIKELY (BUT NOT ALL) AREAS OF TURBULENCE ASSOCIATED WITH PRECIPITATION. RADAR CANNOT DETECT CLEAR AIR TURBULENCE.

An additional automatic control mode is incorporated into the RTA, termed Forced Standby (FSBY) mode. This mode employs an input from the Weight-On-Wheels (WOW) system to place the radar system in standby whenever the aircraft is on the ground in order to preclude injury or damage from transmitter microwave pulses. The forced standby mode may be cancelled by depressing the STAB pushbutton four (4) times within three (3) seconds.

WARNING

IF THE FORCED STANDBY MODE IS CANCELLED IN ORDER TO OPERATE THE RADAR ON THE GROUND OR TO PERFORM A SYSTEM TEST, OBSERVE THE STANDOFF DISTANCES CITED ABOVE.

A complete discussion of the PRIMUS-880 radar system, accompanied by illustrations of the color-coded precipitation formats, is contained in Section 2B-13-00.

2. Lightning Sensor System:

The Lightning Sensor System (LSS) is an optional feature that may be installed to complement the weather radar system. When installed, the system uses an antenna located at the top of the vertical stabilizer to detect the electromagnetic energy released during lightning strikes within a two hundred (200) mile range of the aircraft. The system is capable of tracking up to fifty (50) areas of lightning

activity simultaneously. A system processor determines the range and bearing of the lightning energy pulse and forwards the information to the MAUs for formatting and display on the active radar presentation(s). The processor retains strike occurrences in memory in order to indicate intensity of lightning activity.

NOTE:

It is also possible to select the display of LSS lightning strike data on the MAP display or PFD HSI without weather radar information.

Lightning strikes are represented by white icons with a single strike shown as only a jagged line, medium activity as a jagged line with an arrow head at the bottom of the line, and areas of intense lightning depicted as a jagged line with arrowheads at the top and bottom of the line. See the depiction in Figure 21. The display criteria is a function of frequency of lightning strikes within a two (2) minute period for a given area. A medium intensity icon is displayed if three to five (3 - 5) strikes occur in the same vicinity within two (2) minutes, and an area that suffers six (6) or more lightning strikes within two (2) minutes is marked by the intense lightning icon. The initial icon display for a given area will change if the rate of lighting activity within the monitored time period changes - i.e. if an area of intense activity decreases to a level of four (4) strikes per two (2) minute period, the icon will change to the medium activity format.

Whenever lightning is detected by the system, an alert symbol is shown at the range perimeter of the active display window. The alert symbol is a single strike icon shown in magenta. The purpose of the alert icon is to identify for the flight crew the relative bearing from the aircraft of any lightning activity, since the crew may have selected a display range that does not encompass the strike occurrence.

The control panel for the LSS is usually mounted on the cockpit center pedestal in a location determined by the individual customer. The panel has four pushbutton controls as shown in Figure 22:

- OFF - selects the LSS off
- STBY - powers the LSS but places the system in standby mode. In standby mode the system actively tracks lightning activity and begins storing strike data in memory
- LX - selects the display lightning sensing data
- CLR/TEST - clears the processor lightning strike memory and performs a system test. During a test, a simulated strike symbol is displayed at a bearing of forty-five degrees (45°) at a distance of twenty-five nautical miles (25 nm). The symbol increases in intensity to the maximum strike icon within fifteen (15) seconds. An alert icon is also displayed only the bearing line at the perimeter of the range display. The strike icon will decrease in severity symbology and will be removed from the display after two (2) minutes.

NOTE:

The system remains active during a test period, recording and displaying any actual lightning activity in addition to the test symbology.

For additional information, see Section 2B-13-00.

3. Controls and Indications:

A. Circuit Breakers (CBs):

The following CBs protect the weather radar system:

Circuit Breaker Name;	CB Panel;	Location:	Power Source:
W RADAR R/T	COP	E-9	RIGHT MAIN DC Bus
W RADAR CONT #1	POP	E-8	LEFT MAIN DC Bus
W RADAR CONT #2	COP	E-8	RIGHT MAIN DC Bus

B. Crew Alerting System (CAS) Messages:

There are no CAS messages are associated with the weather radar system: weather radar failure is annunciated on the PFD / MAP display windows.

NOTE:

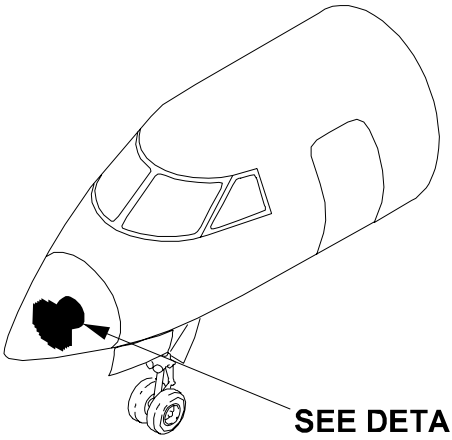
Circuit breakers and CAS messages associated with the Lightning Sensor System are defined upon system installation.

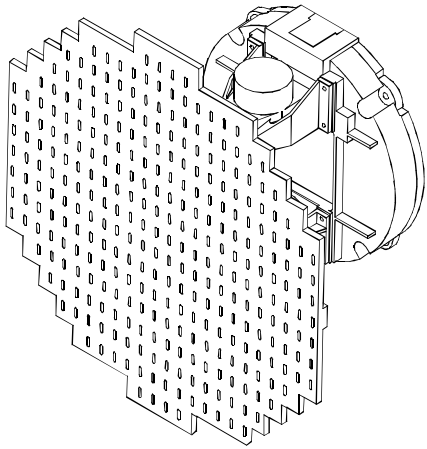
4. Limitations:

A. Flight Manual Limitations:

(1) Do NOT operate radar during refueling of the airplane nor when within 300 ft (92 meters) of other refueling operations.

(2) Do NOT operate radar within 49 ft (15 meters) of ground personnel with 24” antenna installed.





DETAIL A
WEATHER RADAR RECEIVER TRANSMITTER ANTENNA

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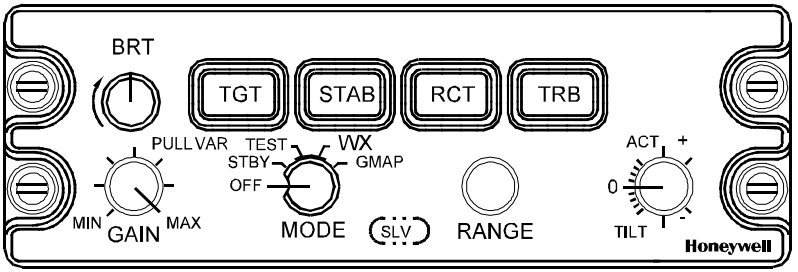
Weather Radar Antenna Installation
Figure 19



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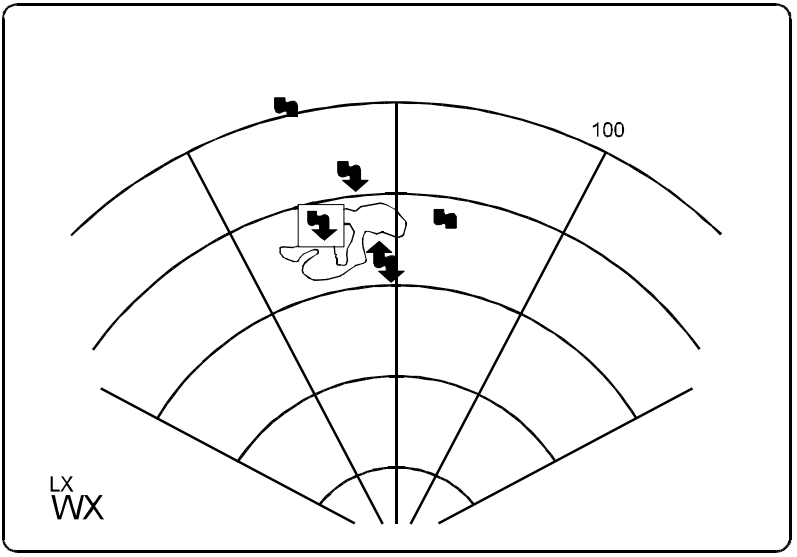
Radar Controller Panel
Figure 20



KEY:

RADAR	I-NAV/PFD HSI
	RATE ONE: SINGLE STRIKE
	RATE TWO: THREE STRIKES
	RATE THREE: SIX STRIKES

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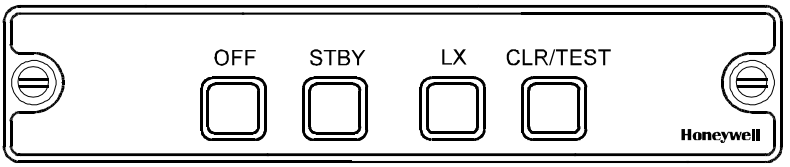
Lightning Sensor Display
Figure 21



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Lightning Sensor Control Panel
Figure 22

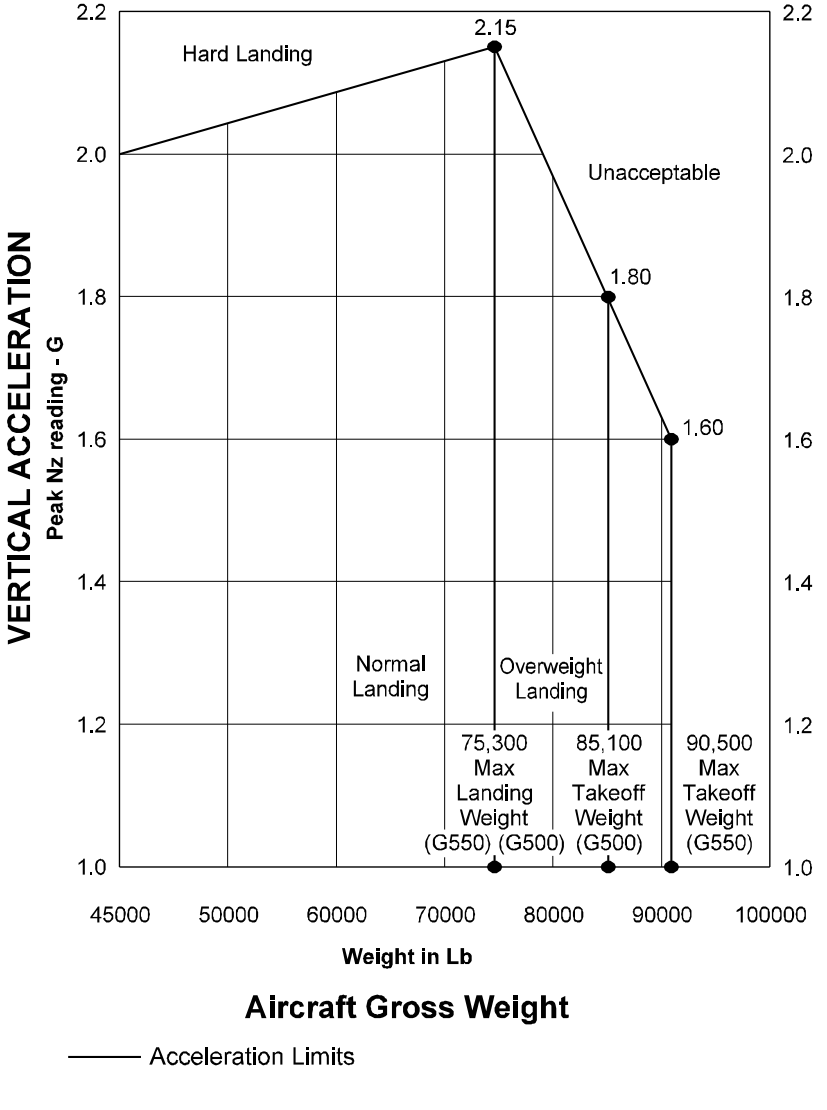
2A-31-100: Maximum Vertical Acceleration Reporting

Airplanes equipped with Honeywell's Primus EpicT PlaneView system have a Maximum Vertical Acceleration reporting system incorporated to record and display the maximum vertical acceleration (or "Peak Nz", commonly referred to as "G") experienced by the airplane during landing. Data recorded by this system is accessed through selection of the END OF FLIGHT REPORT page on the Central Maintenance Computer (CMC), and is displayed as MAX VERTICAL ACCEL. The reading display can be used in determining if either a hard landing inspection or overweight landing inspection is required.

Referring to Figure 23 on the next page, the established maximum vertical acceleration limit which determines whether a hard landing inspection is required increases with airplane gross weight from 2.0 "G" to 2.15 "G" at the G550 maximum landing weight of 75,300 lb. Conversely, the established maximum acceleration limit which determines whether an overweight landing inspection is required decreases with airplane gross weight from 2.15 "G" at the maximum landing weight of 75,300 lb (1.60 "G" at the maximum takeoff weight of 90,000 lb).

In addition to depending on actual airplane weight, the maximum vertical acceleration limit assumes that no extremely high side loads were experienced during landing. If the maximum vertical acceleration recorded during landing is within limits and no extremely high side loads were experienced, no inspection is required. If extremely high side loads were experienced during landing, or if the maximum vertical acceleration limit was exceeded, the flight crew shall log the occurrence for maintenance action.

For additional information, refer to G550 Maintenance Manual Chapter 31.



Acceleration Limits
Figure 23