2A-27-10: General:

The flight controls system for the Gulfstream V is hydraulically powered, providing boost to mechanical linkages to overcome aerodynamic forces associated with high speed flight. Tandem type hydraulic actuators, receiving hydraulic fluid under pressure from two independent systems (Left and Right hydraulic systems), are used to move the flight control surfaces. Both hydraulic systems maintain a system pressure of 3000 psi. Loss of system pressure by one hydraulic system has no effect on operation of the flight controls, as the remaining system is capable of maintaining actuator load capacity. In the event of total loss of hydraulic pressure in both hydraulic systems, the primary flight controls revert to manual operation.

The flight controls are divided by function as follows (see Figure 2):

- **Primary Flight Controls:**

  The primary flight controls consist of the ailerons, elevators and rudder.

- **Secondary Flight Controls:**

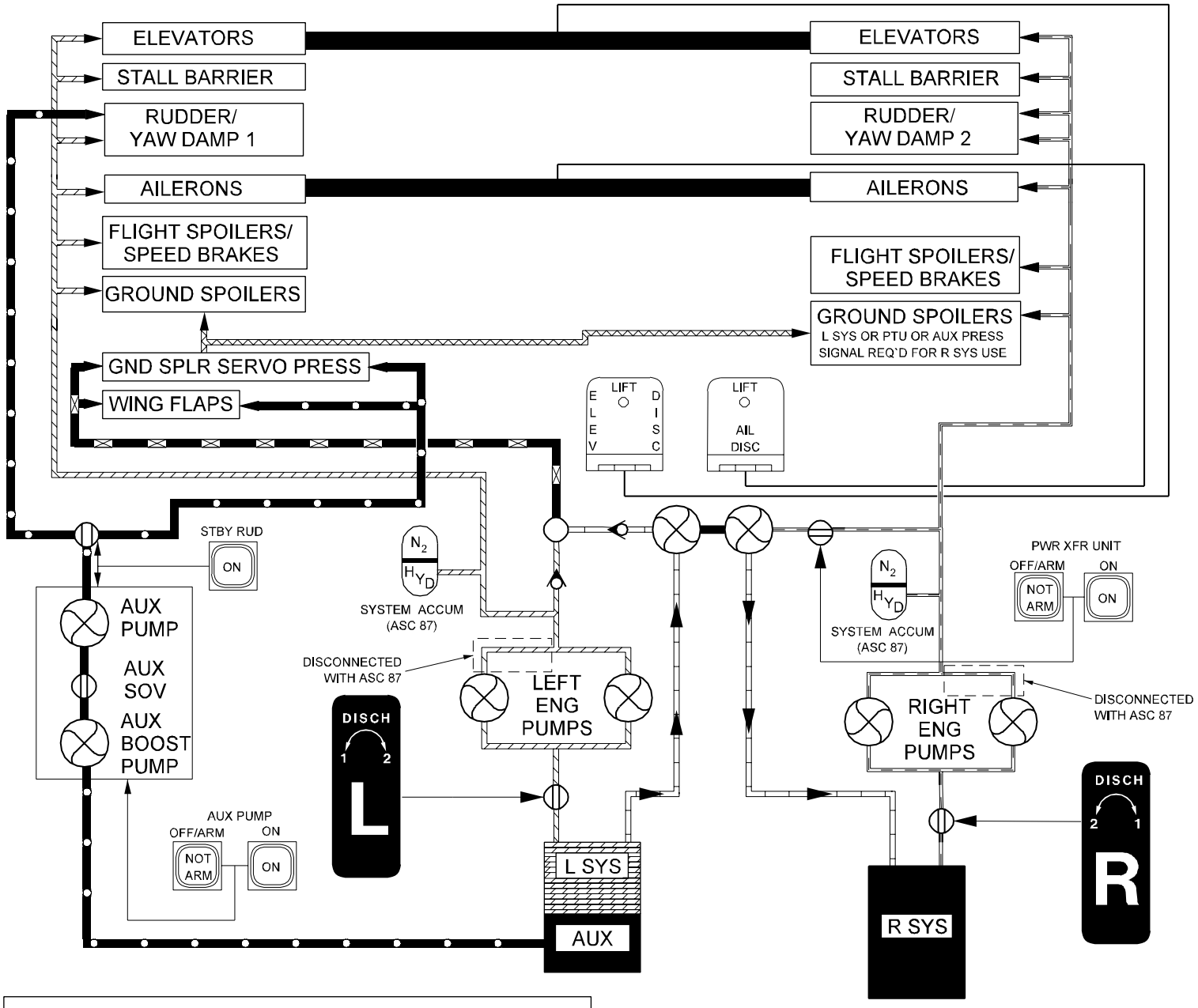
  Secondary flight controls consist of flaps and spoilers.

- **Trim Controls:**

  Trim controls consist of an aileron trim tab, horizontal stabilizer, two elevator trim tabs and a trimmable rudder. The aileron and elevator trim tabs are mass balanced to prevent control flutter.

The flight controls system is divided into the following subsystems:

- 2A-27-20: Pitch Flight Control System
- 2A-27-30: Yaw Flight Control System
- 2A-27-40: Roll Flight Control System
- 2A-27-50: Horizontal Stabilizer System
- 2A-27-60: Flaps System
- 2A-27-70: Spoiler System
- 2A-27-80: Gust Lock System



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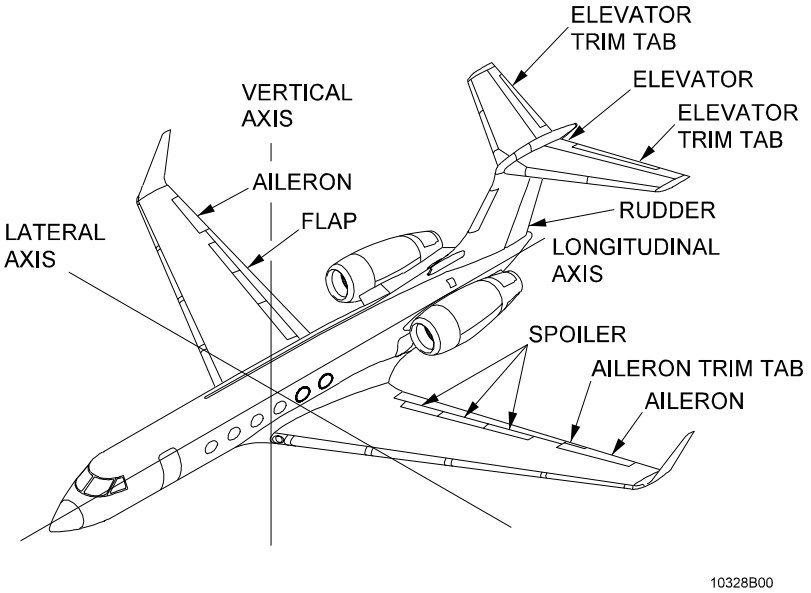
Flight Controls System:
Simplified Fluid Power
Diagram
Figure 1



Flight Controls System Components
Figure 2

2A-27-20: Pitch Flight Controls System:

1. General Description:

The elevators are manually and electrically controlled, mechanically actuated and hydraulically boosted. Elevator travel ranges from 24 degrees trailing edge up to 13 degrees trailing edge down. Elevator movement is visually depicted on the FLIGHT CONTROLS synoptic page.

An elevator trim tab is installed on each elevator. Pitch trim position is displayed on the FLIGHT CONTROLS synoptic page.

Aircraft pitch is accomplished by movement of the control columns which transmit motion through conventional mechanical linkage (cables, cranks and pushrods) to displace the elevator. Hydraulic boost to assist inputs from the control columns is provided by a dual hydraulic boost actuator. The dual hydraulic actuator contains two pistons; one piston is powered by the Left Hydraulic System (L SYS), and the other by the Right Hydraulic System (R SYS). During normal flight conditions, the elevator actuator is powered simultaneously by L SYS and R SYS at 3000 psi each. The actuators feature automatic hardover prevention. If a hardover occurs for over 0.5 second, hydraulic pressure to the actuator will be shut off.

There are two complete sets of elevator controls. Normally, elevator controls are connected to each other and this duplication is transparent to the flight crew. In

the unlikely event of an immovable elevator, the elevator controls can be separated by pulling an elevator disconnect handle, located on the cockpit center pedestal. Once separated, the operable elevator system is identified and used to fly the aircraft.

Two stall barrier systems are incorporated into the elevator control system to prevent a stall by forcing the control columns forward when the crew fails to respond either to visual indications or to stick shaker vibrations which precede an impending stall. The stall barrier system is normally left on, but if it is malfunctioning, the crew can turn the system off, using the STALL BARR switch, located on the cockpit center pedestal. When a high angle of attack is attained, a shaker trip point detector activates the control column shaker motors. When a more severe angle of attack is attained, a pusher trip detector activates its respective stall barrier pusher.

NOTE:

The control column force can be manually overcome by pilot or copilot.

2. Description of Subsystems, Units and Components:

A. Automatic Hardover Prevention System:

The elevator actuator incorporates a hardover prevention system which compares inputs and outputs. If inputs to, and outputs from, the actuator do not agree, hydraulic pressure to the affected side of the actuator is shut off and a message is prompted for display on the Crew Alerting System (CAS) display. The elevators are still operative, but without benefit of the affected side's hydraulic boost. The hardover prevention system receives power from the Left and Right Essential DC bus.

B. Elevator Control Separation System:

(See Figure 4.)

The elevator control systems are dual and separable. In the unlikely event that a single elevator control system were to become jammed, an elevator disconnect system provides the means to separate the left and right elevators from each other. This is accomplished through the use of an elevator disconnect system, located on the left side of the cockpit center pedestal and labeled ELEV DISC on its protective cover.

The elevator disconnect system consists of the protective cover, the elevator disconnect handle (labeled ELEV DISC) and a power assist trigger (labeled LIFT). If a jammed elevator is detected, the protective cover is raised and the ELEV DISC handle is pulled. With the handle fully extended, the pilot's and copilot's control columns are separated in the cockpit. The pilot controls the left elevator and the copilot controls the right elevator. The immovable elevator side will remain immovable and the movable side is now free to be used to control the aircraft. The Stall Barrier system remains functional in this configuration.

If the red power assist trigger was NOT used to actuate the ELEV DISC handle, the elevator disconnect system can be reset at the discretion of the flight crew.

If the force required to pull the ELEV DISC handle is too great, the red power assist trigger, located under the ELEV DISC handle, is pulled. This

actuates a gas-spring cartridge, providing between 110 to 150 pounds of controlled force to fully extend the handle and separate the elevator control systems.

NOTE:

If the red power assist trigger was used to actuate the ELEV DISC handle, the system cannot be reset without the use of special tools.

C. Pitch Trim System:

(See Figure 4 through Figure 6.)

(1) **Elevator Trim Tabs:**

A trim tab is installed on the trailing edge of each elevator. They are mechanically operated through trim actuators located in each elevator. The trim actuators can be operated manually or electrically as described below. Elevator trim tab travel ranges from 22 degrees trailing edge down to 8 degrees trailing edge up.

(2) **Elevator Trim Tab Actuator Heater:**

The elevator trim tab actuator heater generates heat to prevent the actuators from freezing. These heaters generate heat until the temperature rises to a threshold temperature, predetermined by the manufacturer. The heaters are controlled by the L/R ELEV TRIM HEAT circuit breakers, located on the Right Electronic Equipment Rack (REER), and receives power from the Right Main AC bus.

(3) **Manual Trim Control:**

Manual control of pitch trim is accomplished by an interconnected manual trim control wheel set. A control wheel is provided on each side of the cockpit center pedestal. With electric pitch trim disengaged, moving either manual trim control wheel adjusts pitch trim to the desired setting. With electric pitch trim engaged, the manual trim control wheels move automatically corresponding to the amount of electric pitch trim movement.

(4) **Electric Pitch Trim:**

Located on the pilot's flight panel, the PITCH TRIM ENG/DISENG switch engages or disengages the electric pitch trim. Pitch trim is automatically engaged when the autopilot is engaged. However, pitch trim is not automatically disengaged when the autopilot is disengaged. To disengage the pitch trim, the ENG/DISENG switch must be depressed, causing the DISENG legend to illuminate in the switch. Pitch trim can be engaged even if the autopilot is off by depressing the ENG/DISENG switch. Should a failure occur rendering the electric pitch trim inoperative, or pitch trim become disengaged, messages are prompted for display on CAS. The type of messages depend upon aircraft airspeed.

With electric pitch trim engaged, pitch trim can be adjusted through use of a split-half pitch trim switch installed on each control wheel, labeled NOSE DOWN / NOSE UP. Inadvertent actuation of pitch trim, including runaway, is minimized through the split-half switch design. In order for the pitch trim to be actuated, both halves of the

switch must be simultaneously moved in the same direction. When electric pitch trim reaches the nose up or nose down limit of allowable travel, messages are prompted for display on CAS. The type of messages depend upon whether or not the autopilot is engaged.

D. Stall Barrier System:

(See Figure 3, Figure 4 and Figure 6.)

The stall barrier system consists of stick shaker motors located on each control column, a stick pusher actuator located in the tail compartment and Angle of Attack (AOA) probes located on each side of the fuselage forward section.

The stall barrier system can be deactivated by depressing the autopilot disconnect switches (A/P DISC / BARR DISC) on either control wheel, or by selecting the STALL BARR switch, located on the center console, to the OFF position. When the stall barrier system is selected off, a message is prompted for display on CAS.

NOTE:

The autopilot servo input to the elevator control system is through a separate set of cables connected to the elevator actuator. Servo inputs are introduced at the actuator. The force generated by the stall barrier system will overcome autopilot force.

(1) **Stick Shaker Motor:**

Two stick shaker motors are connected to the pilot and copilot control columns. Upon activation, the motor provides a warning by shaking the control column. The pilot's stick shaker motor is connected to the Left Essential DC bus through the SHAKER #1 circuit breaker and a relay activated by Data Acquisition Unit (DAU) #1. The copilot's stick shaker motor is connected to the Right Main DC bus through SHAKER #2 circuit breaker and a relay activated by DAU #2. If a failure is detected in either stick shaker, a message is prompted for display on CAS.

(2) **Stick Pusher Actuator:**

The stick pusher actuator is controlled through two independent electro-hydraulic valves. The left valve is controlled by either channel of DAU #1 and Fault Warning Computer (FWC) #1, and the right valve is controlled by either channel of the DAU #2 and FWC #2, in order to eliminate single point failures. The #1 stick pusher valve is connected to the Left Essential DC bus through the STALL BARR VALVE #1 circuit breaker and the PUSH #1 relay. The #2 stick pusher valve is connected to the Right Main DC bus through the STALL BARR VALVE #2 circuit breaker and the PUSH #2 relay.

The actuator is normally loaded in the retracted position. When the stick pusher is activated, a message is prompted for display on CAS, the solenoids are energized and the actuator extends. Extension of the actuator provides mechanical force to push the control column forward.

The stall barrier system is constantly monitored for faults or failures. If a fault or failure in the control column pusher is detected, messages are prompted for display on CAS.

(3) **Angle of Attack Probe:**

Two heated Angle of Attack (AOA) probes provide aircraft AOA information via the Aeronautical Radio Incorporated (ARINC) 429 databus to the DAUs. The left AOA probe provides information to DAU #1 and the right AOA probe provides information to DAU #2. AOA values are displayed on the Primary Flight Display (PFD).

The AOA system is constantly monitored for faults or failures. If a probe heater failure occurs, or data transmitted by the probes to their respective DAUs is in gross disagreement, messages are prompted for display on CAS.

3. Controls and Indications:

(See Figure 3 through Figure 6.)

NOTE:

A full description of the Primary Flight Display can be found in section 2B-02-00: Electronic Display System Description. A full description of the FLIGHT CONTROLS synoptic page can be found in section 2B-03-00: Engine Instruments and Crew Alerting System Description.

A. Circuit Breakers (CBs):

The pitch flight controls system is protected by the following CBs:

Circuit Breaker Name:	CB Panel:	Location:	Power Source:
L ELEV TRIM HEAT	REER	E-16	R MAIN AC Bus
R ELEV TRIM HEAT	REER	F-16	R MAIN AC Bus
LEFT ELEV HYD S/O	POP	C-5	L ESS DC Bus
RIGHT ELEV HYD S/O	CPOP	C-5	R ESS DC Bus
STALL BARR VALVE #1	POP	E-5	L ESS DC Bus
STALL BARR VALVE #2	CPOP	E-5	R ESS DC Bus
SHAKER #1	POP	E-6	L ESS DC Bus
SHAKER #2	CPOP	E-6	R MAIN DC Bus
AOA PROBE #1 POWER	LEER	F-4	L ESS DC Bus
AOA PROBE #2 POWER	REER	F-13	R ESS DC Bus

B. Crew Alerting System (CAS) Messages:

CAS messages associated with the pitch flight controls system are as follows:

Area Monitored:	CAS Message:	Message Color:
Stall Warning System	AOA MISCOMPARE	Amber
AOA Probe(s)	AOA PROBE 1/2 FAIL	Amber
Integrated Avionics Computer(s)	EL MISTRIM NOSE DN	Amber
Integrated Avionics Computer(s)	EL MISTRIM NOSE UP	Amber

Area Monitored:	CAS Message:	Message Color:
L/R Elevator Deactivation Valve(s)	L/R ELEV HYD OFF	Amber
Electric Pitch Trim	ELEV TRIM INOP	Amber
Integrated Avionics Computer(s)	MACH TRIM INOP	Amber
Stall Warning System	STALL BARRIER 1/2	Amber
STALL BARR Switch	STALL BARRIER OFF	Amber
Stall Warning System	STCK PSH 1/2 FAULT	Amber
Stall Warning System	STICK PUSH UNAVAIL	Amber
Stall Warning System	STICK PUSH 1/2 FL	Amber
Electric Pitch Trim	EL TRIM DN LIMIT	Blue
Electric Pitch Trim	EL TRIM UP LIMIT	Blue
Stall Warning System	STICK SHAKE 1/2 FL	Blue

4. Limitations:

A. Stall Barrier / Stall Warning:

(1) **Takeoff Requirements:**

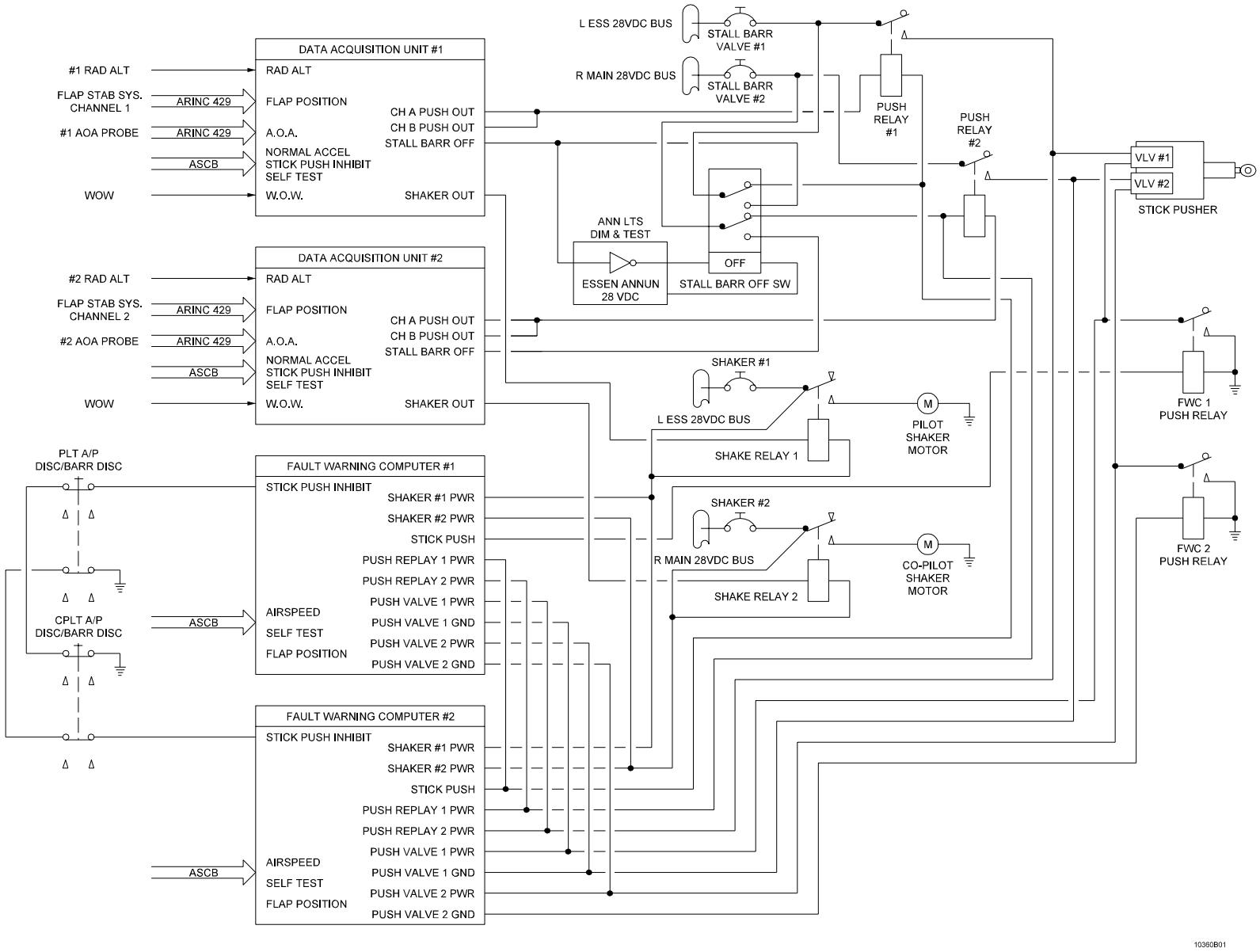
Both stall warning / stall barrier systems must be operative for takeoff.

(2) **Use of System:**

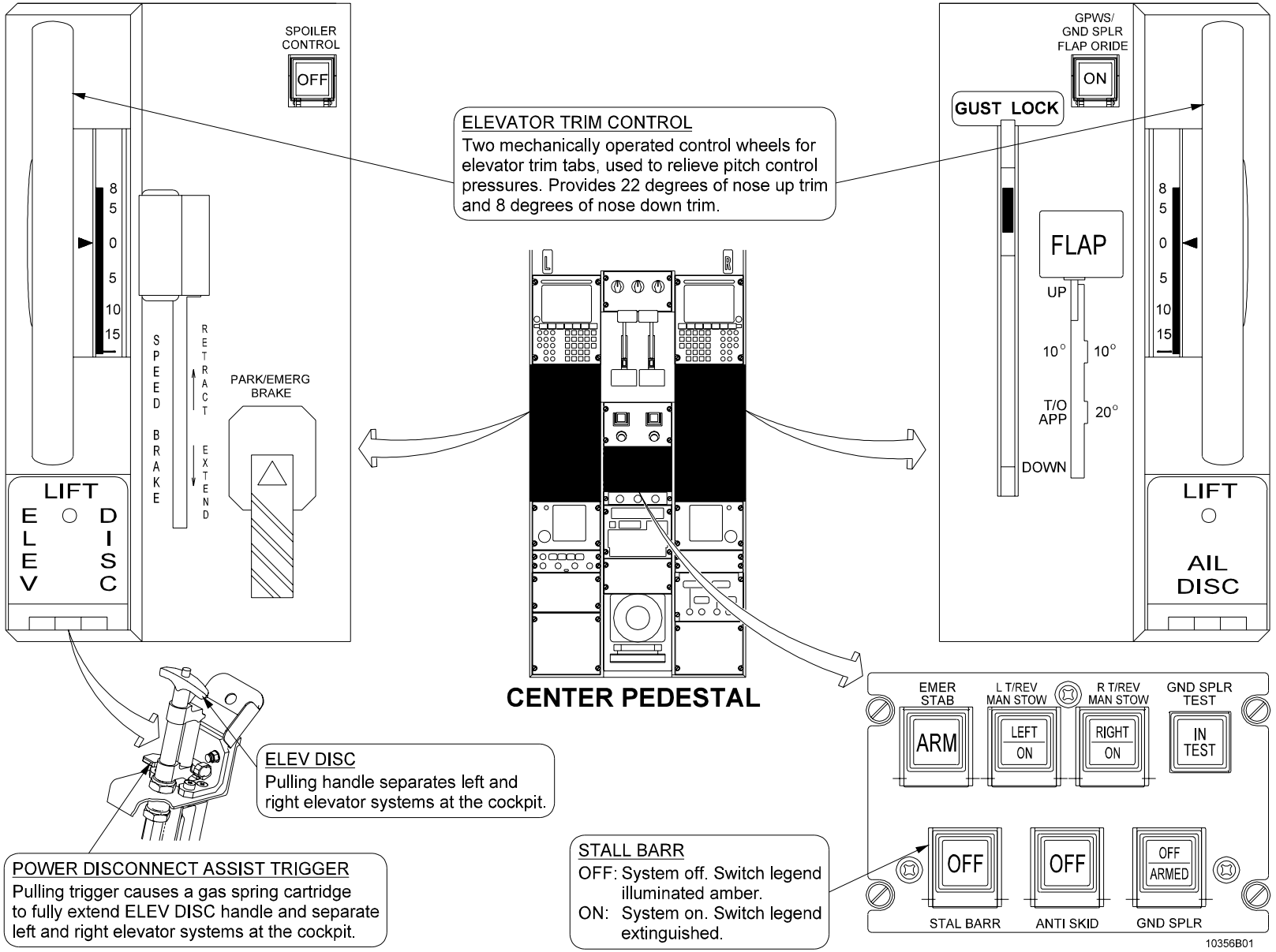
Operative stall barrier systems must be ON during all flight operations, unless required to be selected OFF for procedural reasons. Refer to Section 05-13-50: Stall Barrier Malfunction, for additional information.

B. Mach Trim / Electric Elevator Trim Inoperative Speed:

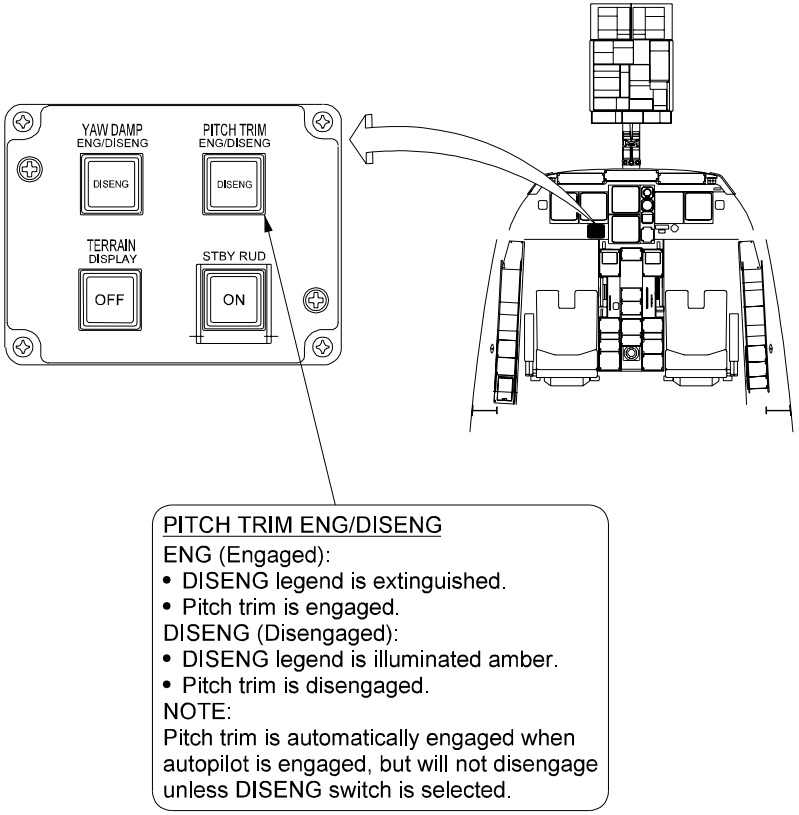
With both mach trim compensators inoperative, or electric elevator trim inoperative, the maximum operating limit speed is 0.80 MT.



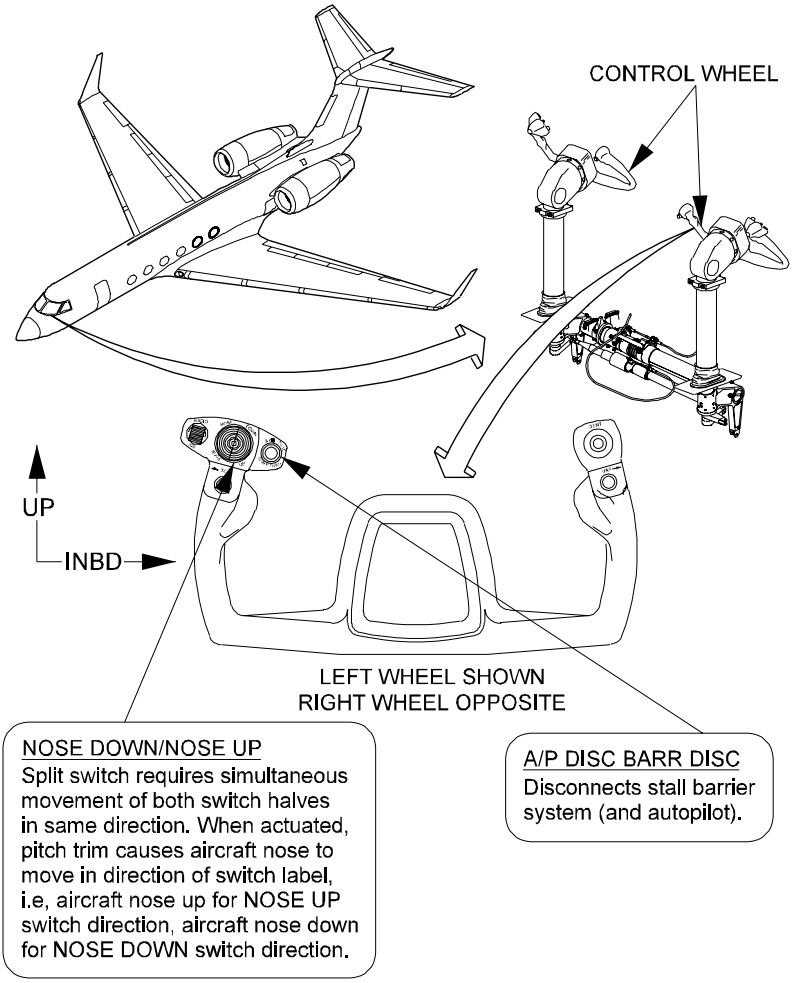
Stall Barrier System Block Diagram
Figure 3



Pitch Flight Controls
System Controls and Indications (Cockpit Center Pedestal)
Figure 4



Electric Pitch Trim Engage / Disengage Switch Controls and Indications
Figure 5



Electric Pitch Trim / Stall Barrier System Controls and Indications
Figure 6

2A-27-30: Yaw Flight Controls System:

1. General Description:

The purpose of the yaw flight controls system is to provide the crew with a means of controlling aircraft movement about the vertical axis when aircraft speed allows aerodynamic use of the rudder. The rudder is a manually and electrically controlled, mechanically actuated, hydraulically boosted airfoil located on the trailing edge of the vertical stabilizer. Total rudder travel is 22 degrees in either direction. Rudder movement is depicted on the FLIGHT CONTROLS synoptic page.

Movement of the aircraft around the yaw axis is accomplished by the movement of the rudder pedals which transmit inputs through conventional mechanical linkage (cables and bellcranks) to displace the rudder. A dual hydraulic actuator boosts inputs to the rudder surface. The rudder can be operated without the assistance of the hydraulic actuator. In the event of a loss of both normal hydraulic systems, the Auxiliary Hydraulic (AUX) system can also supply power to the rudder actuator in flight through the selection of the STBY RUD (Standby Rudder) switch on the lower portion of the pilot's flight panel.

2. Description of Subsystems, Units and Components:

A. Automatic Hardover Prevention System:

Automatic hardover prevention is incorporated into the rudder boost actuator. Switches monitor inputs to, and outputs from, the rudder actuator. If the inputs and outputs disagree for 0.5 second or longer, hydraulic pressure to the affected side of the actuator is shut off and a message is displayed on the Crew Alerting System (CAS) display. The rudder is still operative, but without benefit of the affected side's hydraulic boost. The rudder hardover prevention system receives power from the Right Essential DC bus.

B. Redundant Hydraulic Power Sources:

Hydraulic power to the rudder actuator is normally provided by the L SYS and R SYS. In addition, the AUX system can also supply power to the rudder actuator in flight through the selection of the STBY RUD switch.

C. Automatic Overload Limiting System:

Force modulating valves within the rudder actuator provide protection of the aircraft rudder against overload. Rudder surface movement is limited by these valves when airspeeds increase airloads against the rudder. When the hinge movement limit is reached, force-modulating valves shift, reducing pressure to the limit actuator load output. This action causes a logic-computed (blue RUDDER LIMIT) advisory message to be displayed on CAS. Any further input force at the pedals cannot further displace the rudder.

In addition to rudder limiting, hydraulic pressure to the rudder actuator is monitored. Should a pressure differential between the L SYS and Right Hydraulic System (R SYS) exceed 700-1000 psi, or a single summed output pressure of less than 500 psi be detected, a blue SINGLE RUDDER advisory message is displayed on CAS.

D. Standby Rudder System:

(See Figure 7.)

In the event of dual hydraulic system failure in flight, a Standby Rudder

system can be activated. Selection of the STBY RUD switch, located on the lower portion of the pilot's flight panel, to ON activates the AUX pump. AUX pressure opens a pilot-pressure operated valve to provide pressure to the rudder actuator and a message is displayed on CAS. System operation can be viewed on the HYDRAULICS synoptic page. Rudder operation will be normal from the flight crew's perspective until nose landing gear weight-on-wheels is achieved, at which point AUX pressure is removed from the actuator. The Yaw Damper system continues to function normally while the Standby Rudder system is in operation.

E. Yaw Damper System:

(See Figure 7.)

A yaw damping channel is integrated within each of the two Flight Guidance Computers (FGCs). Inputs received by the active FGC is cross-checked and valid commands are transmitted to the rudder dual trim servo for output to the rudder actuator. Detected faults prompt messages for display on CAS. The yaw damper system is fail-operational in that should one yaw damping channel (or FGC) fail, the remaining FGC can support full system operation.

Both yaw damper channels are controlled using the YAW DAMP ENG/DISENG switch, located on the lower portion of the pilot's flight panel. Power to the Yaw Damper system is provided by the Left Essential DC Bus (YD 1) and Right Essential DC Bus (YD 2). When the ENG/DISENG switch is selected to DISENG, the system is disengaged and a message is displayed on CAS.

F. Rudder Trim System:

(See Figure 8.)

The Rudder Trim system allows fine position adjustment of the rudder to a desired position. This is accomplished through a trim adjustment knob, located on the cockpit center pedestal, to a maximum indicated 7.5 degrees left or right. There is no rudder trim tab on the rudder control surface; mechanical trim inputs to the rudder actuator offset the entire surface.

3. Controls and Indications:

(See Figure 7 and Figure 8.)

NOTE:

A full description of the FLIGHT CONTROLS and HYDRAULICS synoptic pages can be found in section 2B-03-00: Engine Instruments and Crew Alerting System Description.

A. Circuit Breakers (CBs):

The yaw flight controls system is protected by the following CBs:

Circuit Breaker Name:	CB Panel:	Location:	Power Source:
RUDDER HYD S/O	CPOP	C-3	R ESS DC Bus
IAC #1	POP	D-8	L ESS DC Bus
IAC #2	CPOP	D-8	R ESS DC Bus

B. Crew Alerting System (CAS) Messages:

CAS messages associated with the yaw flight controls system are:

Area Monitored:	CAS Message:	Message Color:
Rudder System Deactivation Valve	RUDDER HYD OFF	Amber
Yaw Dampers 1 and 2	YD 1-2 FAIL	Amber
YAW DAMP Switch	YAW DAMPER OFF	Amber
Rudder System Logic	RUDDER LIMIT	Blue
Rudder Load Limiter Sensor	SINGLE RUDDER	Blue

4. Limitations:

A. Yaw Damper Inoperative Speed:

(1) **Above 10000 Feet:**

The maximum speed is 260 KTS / 0.80 MT.

(2) **Below 10000 Feet:**

The maximum speed is 250 KCAS.

(3) **Above 20000 Feet:**

The minimum speed is 210 KTS.

(4) **Below 20000 Feet:**

The minimum speed is in accordance with the following schedule until ready to configure for approach and landing. V_{REF} as presented on the airspeed tape is the approach speed for landing in the current flap setting.

	Sea Level to 5000 ft		5000 to 20000 ft	
Fuel - lb	**Flaps 0, 10, 20**	**Flaps 39**	**Flaps 0, 10, 20**	**Flaps 39**
23000	VREF	VREF	VREF	135
24000	VREF	VREF	VREF	141
25000	VREF	VREF	VREF	147
26000	VREF	VREF	VREF	153
27000	VREF	VREF	VREF	159
28000	VREF	VREF	147	160
29000	VREF	VREF	153	160
30000	VREF	VREF	158	160
31000	VREF	VREF	163	160
32000	VREF	VREF	168	160
33000	VREF	VREF	174	160
34000	VREF	VREF	179	160
35000	VREF	VREF	184	160
36000	VREF	VREF	189	160
37000	VREF	VREF	195	160
38000	VREF	VREF	200	160
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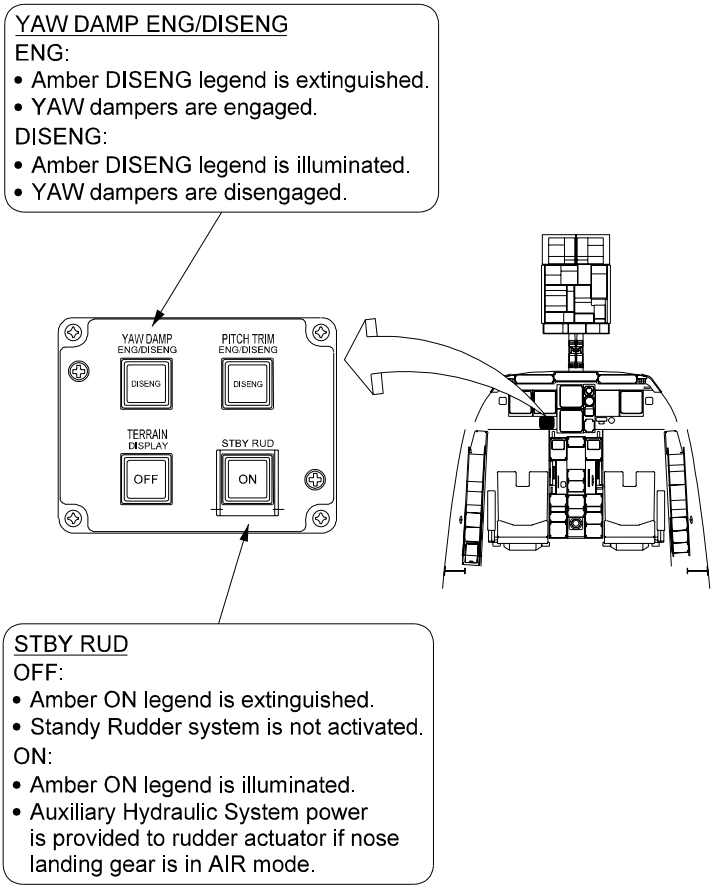
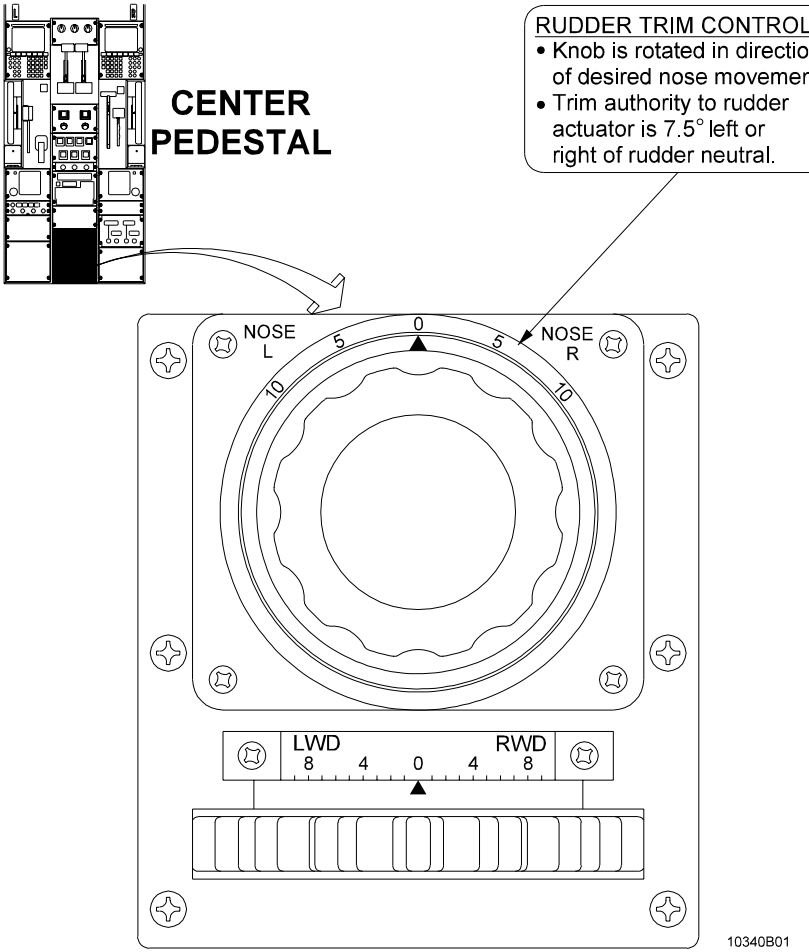


Yaw Flight Controls System Controls and Indications
Figure 7



Rudder Trim Controls
Figure 8

2A-27-40: Roll Flight Controls System:

1. General Description:

The ailerons are manually and electrically controlled, mechanically actuated and hydraulically boosted airfoils located on the outboard trailing edge of the left and right wings. Aileron travel is eleven (11) degrees up and down. Aileron movement is visually depicted on the FLIGHT CONTROLS synoptic page.

Aircraft roll is accomplished by movement of the control wheels which transmits motion through conventional mechanical linkage (cables, cranks and pushrods) to displace the ailerons. Hydraulic boost is provided by a hydraulic boost actuator to assist inputs from the control wheels. During normal flight conditions, aileron actuators are powered simultaneously by Left and Right Hydraulic Systems (L

SYS and R SYS) at 3000 psi each. In the event of a single hydraulic system failure, the actuators will remain powered by the operative hydraulic system.

2. Description of Subsystems, Units and Components:

A. Automatic Hardover Prevention:

Each aileron actuator incorporates a hardover prevention system which compares inputs and outputs. If inputs to, and outputs from, either actuator do not agree for over 0.5 second, hydraulic pressure from both hydraulic systems to both actuators is shut off simultaneously and a message will be displayed on the Crew Alerting System (CAS) display. The ailerons are still operative, but without benefit of hydraulic boost. The hardover prevention system receives power from the Left and Right Essential DC Bus.

B. Aileron Control Separation:

The aileron control systems are dual and separable. In the unlikely event that a single aileron control system were to become jammed, an aileron disconnect system provides the means to separate the left and right ailerons from each other. This is accomplished through the use of an aileron disconnect system, located on the right side of the cockpit center pedestal and labeled AIL DISC on its protective cover.

The aileron disconnect system consists of the protective cover, the aileron disconnect handle (labeled AIL DISC) and a power assist trigger (labeled LIFT). If a jammed aileron is detected, the protective cover is raised and the AIL DISC handle is pulled. With the handle fully extended, the pilot's and copilot's control wheels are separated and the aileron systems are fully isolated and independent – the pilot controls the left aileron and the copilot controls the right aileron. The immovable aileron side will remain immovable and the movable side is now free to be used to control the aircraft. If the power assist trigger was NOT used to actuate the AIL DISC handle, the aileron disconnect system can be reset at the discretion of the flight crew.

If the force required to pull the AIL DISC handle is too great, the power assist trigger, located under the AIL DISC handle, is pulled. This actuates a gas-spring cartridge, providing between 110 to 150 pounds of controlled force to fully extend the handle and separate the aileron control systems.

NOTE:

If the power assist trigger was used to actuate the AIL DISC handle, the system cannot be reset without the use of special tools.

C. Flight Spoiler Supplementation:

The outboard two spoilers on each wing act as flight spoilers in conjunction with the ailerons to improve roll response of the aircraft. Their function as supplements to the ailerons is fully automatic and transparent to the crew. Spoiler travel will vary in accordance with the control wheel inputs up to a maximum of 47(±3) degrees upward deflection. The spoilers are hydraulically powered, normally by both L SYS and R SYS, but will function normally with only one source of hydraulic pressure. The operation of flight spoilers (as well as ground spoilers and speed brakes) can be inhibited using the SPOILER CONTROL switch, located on the left side of the

cockpit center pedestal. Selection of the switch to off causes a message to be displayed on CAS.

D. Aileron Trim System:

(See Figure 9.)

(1) **Aileron Trim Tab:**

The aileron trim tab is a manually operated, mechanically actuated airfoil located on the inboard trailing edge of the left aileron. The aileron trim tab moves opposite to the left aileron (tab trailing edge down, left aileron trailing edge up; tab trailing edge up; left aileron trailing edge down) to control aircraft roll trim. It is mechanically actuated by an aileron trim wheel which is located on the aft end of the cockpit center pedestal. The range of travel for the aileron trim tab is 15 degrees up or down.

(2) **Aileron Trim Tab Actuator Heater:**

The aileron trim tab actuator heater provides heat to prevent the trim tab actuator from freezing. The heater provides heat until the temperature rises to a threshold temperature, predetermined by the manufacturer. The heater is controlled by the AIL TRIM HEAT circuit breaker on the Right Electronic Equipment Rack (REER) and receives power from the Right Main AC bus.

3. Controls and Indications:

(See Figure 9.)

NOTE:

A full description of the FLIGHT CONTROLS synoptic page can be found in section 2B-03-00: Engine Instruments and Crew Alerting System Description.

A. Circuit Breakers (CBs):

The Roll Flight Control system is protected by the following CBs:

Circuit Breaker Name:	CB Panel:	Location:	Power Source:
LEFT AIL HYD S/O	POP	C-4	L ESS DC Bus
RIGHT AIL HYD S/O	CPOP	C-4	R ESS DC Bus
SPLR FLT PWR S/O	CPOP	E-3	R ESS DC Bus
AIL TRIM HEAT	REER	D-16	R MAIN AC Bus

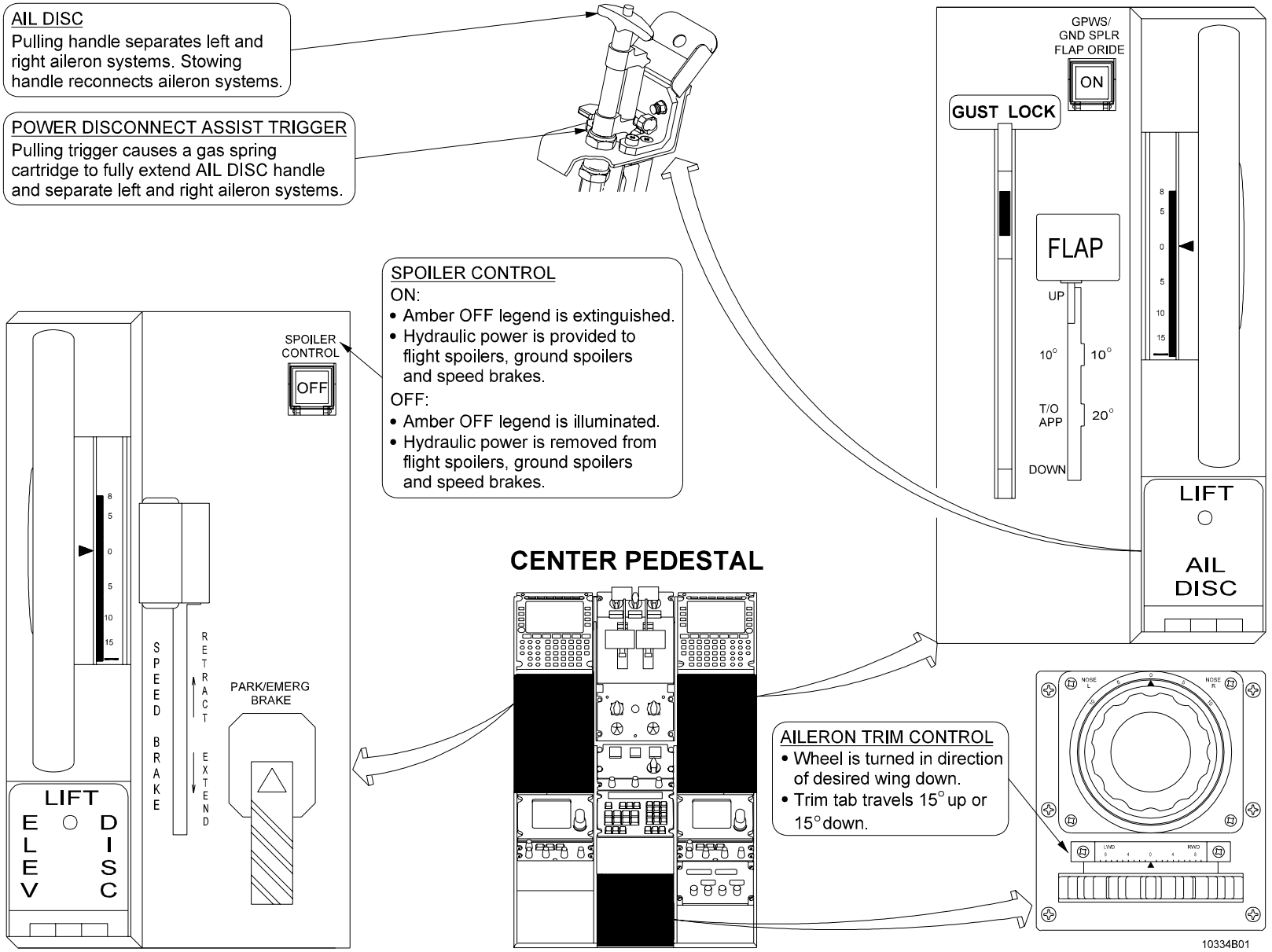
B. Crew Alerting System (CAS) Messages:

CAS messages associated with the Roll Flight Control system are:

Area Monitored:	CAS Message:	Message Color:
L/R Aileron System Deactivation Valve	L/R AIL HYD OFF	Amber
Spoiler System Deactivation Valve	SPOILERS HYD OFF	Amber

4. Limitations:

There are no limitations established for the roll flight controls system at the time of this revision.



Roll Flight Controls
System Controls and Indications
Figure 9

2A-27-50: Horizontal Stabilizer System:

1. General Description:

The purpose of the horizontal stabilizer system is to provide to the flight crew a means of automatically or manually controlling the position and the movement of the horizontal stabilizer. This movement is provided to counteract the pitch moment associated with flap movement.

The horizontal stabilizer pivots to change angle of incidence as flaps are extended or retracted. The horizontal stabilizer actuator, located in the vertical stabilizer, is electrically controlled and actuated to position the horizontal stabilizer. In addition, the horizontal stabilizer may be used to provide pitch trim in the Emergency Stabilizer (EMER STAB) mode.

Horizontal stabilizer position is displayed on the Primary Flight Display (PFD) and the FLIGHT CONTROLS synoptic page.

2. Description of Subsystems, Units and Components:

A. Flap/Horizontal Stabilizer Control Unit (FCU):

The Flap/Horizontal Stabilizer Control Unit (FCU), located in the Baggage Compartment Electronic Equipment Rack, performs control and system health functions of the Flap/Stabilizer systems. It contains two independent control channels: Channel A and Channel B. Each channel communicates with the other by comparing inputs to the two horizontal stabilizer actuator AC motors (one per channel) and outputs from the horizontal stabilizer position resolver (one output per channel). A malfunctioning channel will be inhibited and the remaining operating channel will continue to control the flaps and stabilizer.

The FCU provides system protection by completing operational status tests with Built-In-Test (BIT) and functional fault monitoring. The FCU performs the tests and monitoring and communicates the data on the Aeronautical Radio Incorporated (ARINC 429) data bus to the Crew Alerting System (CAS) through the Fault Warning Computer (FWC) and to the Maintenance Data Acquisition Unit (MDAU). The FCU accepts input information on the ARINC 429 for computed airspeed and Weight-On-Wheels (WOW).

B. Horizontal Stabilizer Actuator:

The Horizontal Stabilizer Actuator (HSA) is a electrically powered ballscrew actuator that normally moves in coordination with the flap position. The HSA is driven by two AC electric motors controlled by the two channels of the FCU. The HSA can also be used as a means of adjusting pitch trim in the Emergency Stabilizer (EMER STAB) mode. The HSA is mounted inside the upper forward section of the vertical stabilizer.

C. Emergency Stabilizer (EMER STAB) Switch:

(See Figure 11.)

The EMER STAB switch, located on the cockpit center pedestal, allows the flight crew to enable the Emergency Stabilizer (EMER STAB) mode by selection of the switch to ARM. In the EMER STAB mode, the horizontal stabilizer can be trimmed to any position (within the limits of the HSA) to help counteract excessive control forces in the unlikely event of a jammed elevator or loss of both hydraulic systems by providing additional pitch trim and control capability. Once in the EMER STAB mode, the stabilizer can be positioned anywhere between +1.50° to -4.60°, regardless of flap position.

This is accomplished through the use of the electric pitch trim switch located on each control wheel. While in the EMER STAB mode, a message is displayed on CAS.

3. Controls and Indications:

(See Figure 10 and Figure 11.)

NOTE:

A full description of the Primary Flight Display can be found in section 2B-02-00: Electronic Display System Description. A full description of the FLIGHT CONTROLS synoptic page can be found in section 2B-03-00: Engine Instruments and Crew Alerting System Description.

A. Circuit Breakers (CBs):

The horizontal stabilizer system is protected by the following CBs:

Circuit Breaker Name:	CB Panel:	Location:	Power Source:
FLAP/STAB LEFT DC	POP	C-6	L ESS DC Bus
FLAP/STAB RIGHT DC	CPOP	C-6	R ESS DC Bus
FLAP/STAB L STBY AC	POP	D-2	L STBY AC Bus
FLAP/STAB R STBY AC	CPOP	D-2	R STBY AC Bus

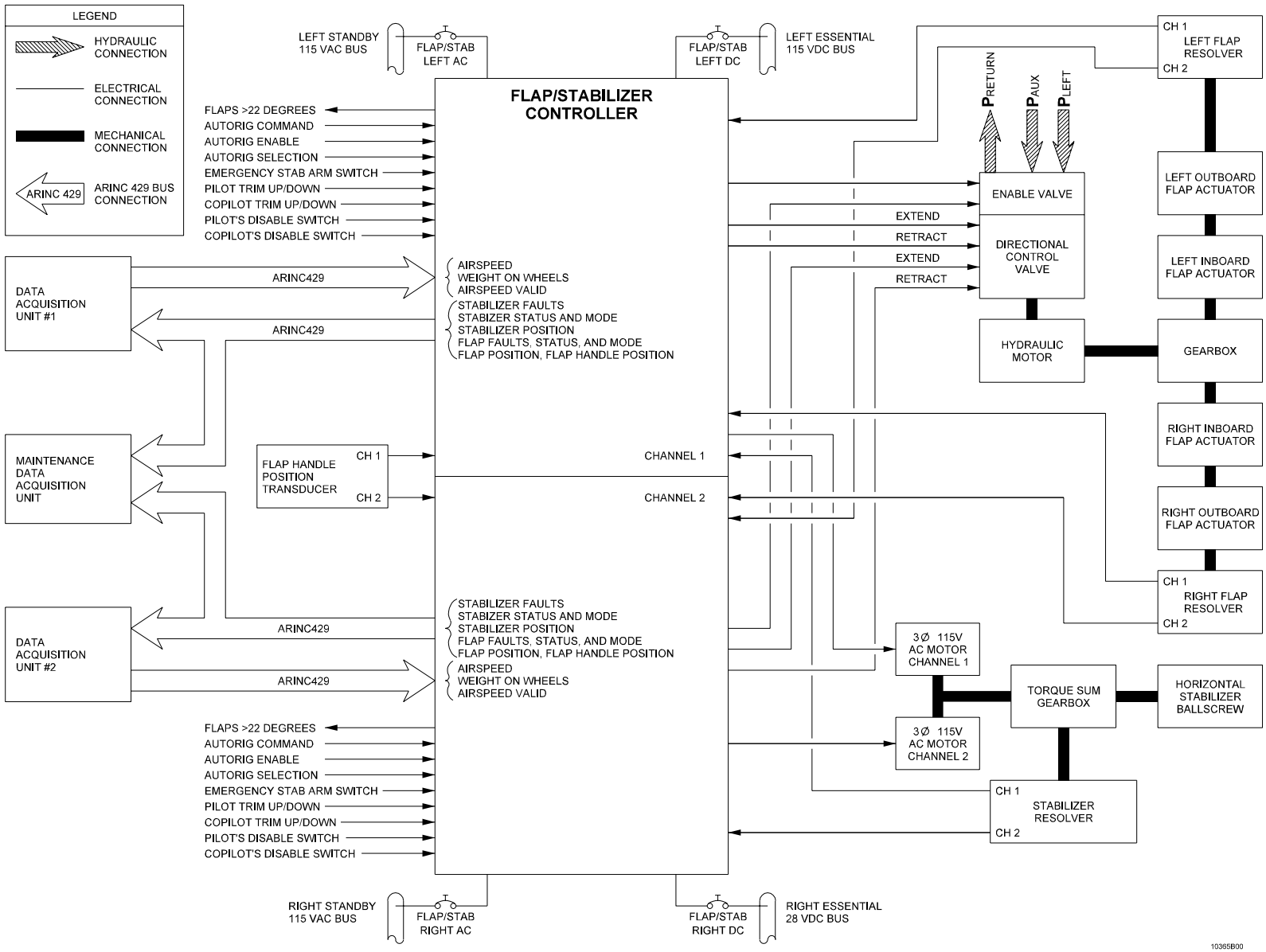
B. Crew Alerting System (CAS) Messages:

CAS messages associated with the horizontal stabilizer system are:

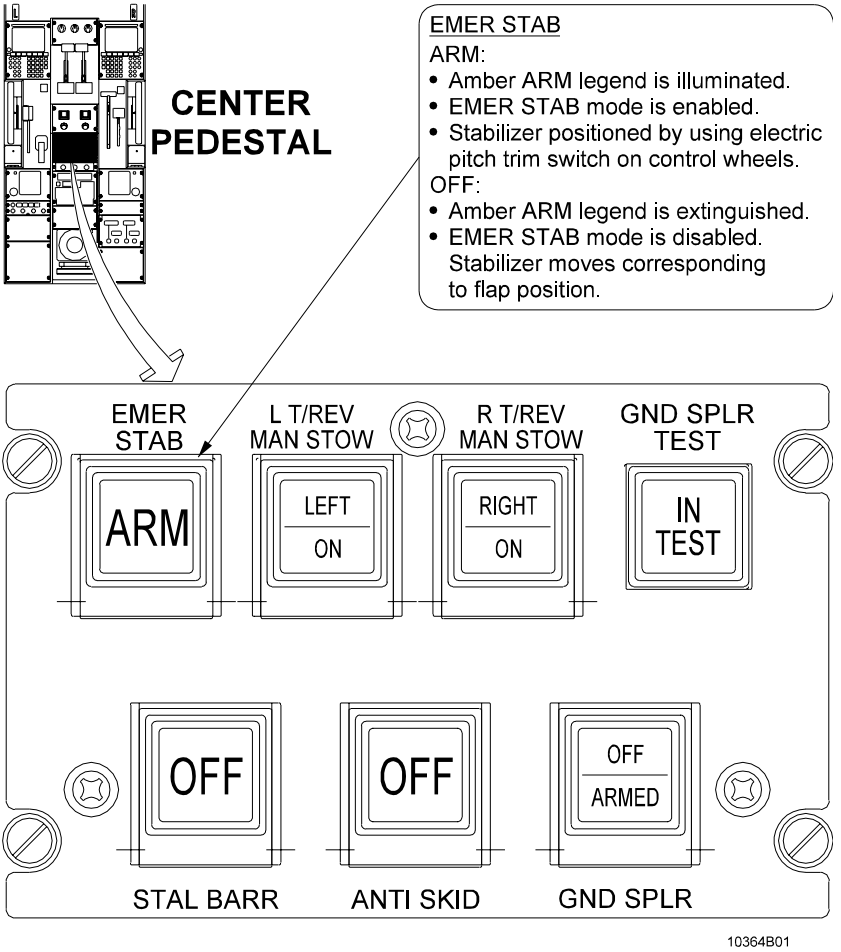
Area Monitored:	CAS Message:	Message Color:
FCU	FLAP/STAB AUTORIG	Amber
FCU	EMERG STAB ON A-B	Amber
FCU	FLP/STB SYNC FAIL	Amber
FCU	STABILIZER FAILED	Amber
FCU	UNCMDED STAB	Amber
FCU	FLP/STB MISCOMPARE	Amber
FCU	FLP/STB MX RQD A-B	Blue
FCU	FLP/STB SYS FL A-B	Blue
FCU	STAB SYNCING A-B	Blue

4. Limitations:

There are no limitations established for the horizontal stabilizer system at the time of this revision.



Flap / Horizontal Stabilizer System Simplified Block Diagram
Figure 10



Horizontal Stabilizer System Controls and Indications
Figure 11

2A-27-60: Flaps System:

1. General Description:

The flaps system for the Gulfstream V provides a means for the flight crew to control the position and movement of the trailing edge flaps, in order to allow a steeper approach and climb angles, and lower takeoff and landing speeds.

The flaps are manually operated, electrically controlled, hydraulically powered, and mechanically actuated airfoils located on the inboard trailing edge of the left and right wings. The single-slotted Fowler-type flaps are mounted on four flap tracks attached to the rear beam of each wing. A single flap handle, located on the center pedestal, controls flap extension and retraction. A hydraulic Power Drive Unit (PDU), located on the torque box in the main landing gear wheel, actuates a

mechanical system that extends and retracts the flaps.

Flap position is displayed on the Primary Flight Display (PFD) and the FLIGHT CONTROLS synoptic page.

2. Description of Subsystems, Units and Components:

A. Flap Control Handle:

(See Figure 12.)

The flap control handle provides the electrical command to the Flap/Horizontal Stabilizer Control Unit (FCU) for required flap position. The flap handle mechanically positions a dual Rotary Variable Differential Transformer (RVDT) for flap control. Power for the RVDT comes from the FCU. The flap control handle is located on the right side of center pedestal and is labeled FLAP. The flaps can be placed in four positions: UP (0°), 10°, T/O APP (20°) and DOWN (39°).

B. Flap/Horizontal Stabilizer Control Unit:

(See Figure 10.)

The Flap/Horizontal Stabilizer Control Unit (FCU), located in the Baggage Compartment Electronic Equipment Rack, performs control and system health functions of the Flap/Stabilizer systems. It contains two independent control channels: Channel A and Channel B. Each channel communicates with the other by comparing FLAP handle RVDT position and left and right flap resolver position to generate signals that drive the enable, extend or retract solenoids of the Power Drive Unit (PDU). A malfunctioning channel will be inhibited and the remaining operating channel will continue to control the flaps and stabilizer.

To compensate for pitch trim changes during flap operation, the FCU also monitors the horizontal stabilizer position information from the Horizontal Stabilizer Actuator (HSA) resolver and generates signals that drive the HSA AC motor assembly.

The FCU provides system protection by completing operational status tests with Built-In-Test (BIT) and functional fault monitoring. The FCU performs the tests and monitoring and communicates the data on the Aeronautical Radio Incorporated (ARINC 429) data bus to the Crew Alerting System (CAS) through the Fault Warning Computer (FWC) and to the Maintenance Data Acquisition Unit (MDAU). The FCU accepts input information on the ARINC 429 for computed airspeed and Weight-On-Wheels (WOW).

C. Power Drive Unit:

The Power Drive Unit (PDU) provides the interface between the FCU, hydraulic power source and mechanical drive units of the flap actuation system. Check valves located in the supply line fittings of the control valve module isolate the Left Hydraulic System (L SYS) and Auxiliary Hydraulic System (AUX) sources (including PTU) to the hydraulic motor. Pilot solenoid valves are electrically energized to port hydraulic pressure to open and close the enable/shutoff spool valve and to control hydraulic motor direction for extension or retraction of the flaps. The PDU is located at the forward area of the main landing gear wheel wells.

D. Flap Drive Torque Tubes:

The flap drive torque tubes transmit power from the PDU to the mechanical flap actuators. The torque tube drive line set consists of seven torque shaft

assemblies for each wing flap. Each wing flap torque tube drive line set is connected to the PDU and extends outboard along the rear beam of the wing to the inboard and outboard ball screw actuators.

E. Flap Actuators:

The purpose of the flap actuators is to convert rotary input torque to linear output motion and force to extend or retract the flap assemblies. The actuator contains a worm and wheel gear set to translate the torque tube rotation into linear motion. A force limiter protects the aircraft structure from PDU torque if a flap roller or track jam occurs. The force limiter is bi-directional and is self resetting by reversing the direction of rotation.

F. Flap Resolvers (Position Feedback Transducer):

The flap resolvers provide flap position feedback to the FCU. The resolvers are continuously monitored by the FCU channels. The resolvers are electromechanical devices; each resolver receives electrical inputs to the stator and mechanical inputs (rotational) inputs to the rotor. A resolver is located on each outboard flap actuator.

3. Controls and Indications:

(See Figure 12.)

NOTE:

A full description of the Primary Flight Display can be found in section 2B-02-00: Electronic Display System Description. A full description of the FLIGHT CONTROLS synoptic page can be found in section 2B-03-00: Engine Instruments and Crew Alerting System Description.

A. Circuit Breakers (CBs):

The flaps system is protected by the following CBs:

Circuit Breaker Name:	CB Panel:	Location:	Power Source:
FLAP/STAB LEFT DC	POP	C-6	L ESS DC Bus
FLAP/STAB RIGHT DC	CPOP	C-6	R ESS DC Bus
FLAP/STAB L STBY AC	POP	D-2	L STBY AC Bus
FLAP/STAB R STBY AC	CPOP	D-2	R STBY AC Bus

B. Crew Alerting System (CAS) Messages:

CAS messages associated with the flaps system:

Area Monitored:	CAS Message:	Message Color:
FCU	FLAP/STAB AUTORIG	Amber
FCU	FLAP CMD INVALID	Amber
FCU	FLAPS FAILED	Amber
FCU	FLP/STB SYNC FAIL	Amber
FCU	FLAP ASYMMETRY	Amber
FCU	UNCMDED FLAPS	Amber
FCU	FLP/STB MISCOMPARE	Amber

Area Monitored:	CAS Message:	Message Color:
FCU	FLP/STB MX RQD A-B	Blue
FCU	FLP/STB SYS FL A-B	Blue

4. Limitations:

A. Use Of Flaps In Icing Conditions:

Use of flaps in icing conditions is restricted to takeoff, approach and landing only.

B. Use Of Flaps While Holding In Icing Conditions:

Holding in icing conditions is limited to 0° (UP) flaps only.

C. Flap Extension Altitudes:

(1) Maximum operating altitude for extending landing flaps (39°/DOWN), or flying with landing flaps extended is 20000 ft MSL.

(2) Maximum operating altitude for extending flaps to 10° or 20°, or flying with flaps extended to 10° or 20° is 25000 ft MSL.

D. Flaps Extended Speeds (V_{FE} /M_{FE}):

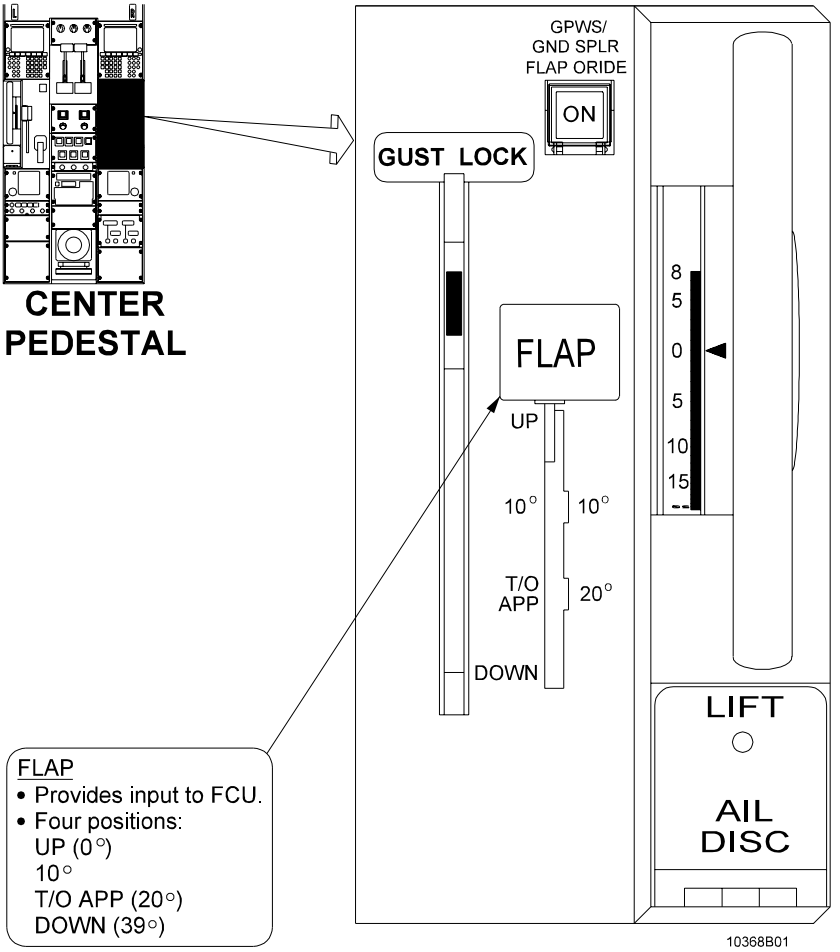
(1) **Takeoff (10°):** 250 KCAS / 0.60 MT

(2) **T/O APP (20°):** 220 KCAS / 0.60 MT

(3) **DOWN (39°):**

(a) 165 KCAS / 0.60 MT — SN 501 through 553 without ASC 19A or ASC 73A

(b) 170 KCAS / 0.60 MT — SN 554 and subs, SN 501 through 553 with ASC 19A or ASC 73A



Flaps System Controls and Indications
Figure 12

2A-27-70: Spoiler System:

1. General Description:

The spoiler system for the Gulfstream V assists the flight crew in maintaining roll control of the aircraft (as flight spoilers). They also dump lift and help slow the aircraft in flight (as speed brakes), and reduce lift and increase braking effectiveness on the ground (as ground spoilers).

The aircraft has three spoilers on the upper trailing edge of each wing (from inboard to outboard): a ground spoiler, inboard flight spoiler and outboard flight spoiler. The spoilers are manually and electrically operated, hydraulically powered, and mechanically actuated. They are bonded composite panels hinged to open forward when extended and close aft when retracted. Four hydraulic

actuators convert hydraulic pressure to a linear mechanical force to position the spoilers.

2. Description of Subsystems, Units and Components:

A. Flight Spoiler Control System:

The flight spoiler control system assists the ailerons in spoiling lift. As the ailerons are deployed upward, the outboard two (inboard and outboard flight spoiler) panels are also deployed on the up-aileron side, up to a maximum of 47 (±3) degrees corresponding to full up-aileron travel of 11 degrees.

NOTE:

With the control wheel turned fully in one direction and flight spoilers fully extended on the up-aileron side, the opposite wing flight spoilers may deploy slightly. This condition is acceptable.

If the SPOILER CONTROL switch, located on the cockpit center pedestal, is selected to OFF, hydraulic pressure is inhibited and the flight spoilers will be inoperative.

B. Ground Spoiler Control System:

The ground spoiler control system provides a method for full and automatic deployment of all spoiler panels upon aircraft touchdown in order to reduce lift and increase braking effectiveness on the ground. Also, if takeoff is aborted, the system provides for automatic deployment of all spoiler panels. The system is electrically controlled and hydraulically powered.

(1) **Operational Logic:**

With the GND SPLR switch selected to ARMED, the ground spoiler control system will extend all six spoiler panels in unison to 55 (±4) degrees when the following parameters are satisfied:

- L ESS DC bus available to provide power for LMLG WOW.
- R ESS DC bus available to provide power for RMLG WOW and electrical control for spoilers.
- L SYS (or AUX or PTU) hydraulic pressure available to provide servo pressure for spoiler control.
- L SYS (or R SYS) hydraulic pressure available to provide operational pressure to extend spoilers.
- Both power levers retarded to IDLE.
- SPOILER CONTROL switch selected to ON.
- LMLG and RMLG WOW in GROUND mode

OR:

At wheel spinup greater than 47 knots when:

- Flaps position is greater than 22° **OR:**
- Flaps position is less than 22° and GND SPLR FLAP OVERRIDE is selected to ON.

(2) **NO GND SPLRS Lights:**

(See Figure 14.)

There are two NO GND SPLRS lights located on the windshield center post. They are illuminated under the following conditions:

- Operational logic parameters are satisfied
- GND SPLR switch selected to ARMED
- Left wing, right wing, or left and right wing ground spoilers did not deploy

The purpose of the lights is to advise the flight crew that any or all ground spoilers did not deploy following touchdown, so that the speed brakes may be extended as a precautionary measure. When the NO GND SPLRS lights are activated, the MASTER WARN lights on the pilot's and copilot's glareshield are illuminated and a three-chime aural warning tone also sounds.

(3) **GND SPOILER Warning Message:**

The ground spoiler system is monitored by a warning circuit that will detect certain in-flight and on-ground malfunctions within the ground spoiler system. A red GND SPOILER warning message will be displayed on the Crew Alerting System (CAS) should any of the following events occur in the configuration given:

(a) In flight:

- One or both ground spoilers not fully retracted with SPEED BRAKE handle in RETRACT detent.
- One or both solenoid-operated hydraulic control valves electrically energized.
- One or both Weight-On-Wheels (WOW) relays in the GROUND mode.
- One or both power lever ground idle relays energized.
- Ground spoiler pressure switch senses hydraulic pressure.

(b) One the ground, ground spoilers not armed:

- One or both ground spoilers not fully retracted with SPEED BRAKE handle in RETRACT detent.
- One or both solenoid-operated hydraulic control valves electrically energized.
- One or both power lever ground idle relays energized.
- Ground spoiler pressure switch senses hydraulic pressure.

(c) On the ground, ground spoilers armed, either power lever not in ground idle detent:

- One or both solenoid-operated hydraulic control valves electrically energized.
- One or both power lever ground idle relays energized.
- Ground spoiler pressure switch senses hydraulic pressure.
- One or both ground spoilers not fully retracted.

(4) **GND SPLR TEST Switch:**

(See Figure 14.)

The purpose of the GND SPLR TEST switch is to operationally test the warning circuitry of the ground spoiler system. When depressed and held, the following actions occur:

- The NO GND SPLRS lights are illuminated
- The MASTER WARN lights are illuminated and a three-chime aural warning tone sounds
- A red GND SPOILER warning message is displayed on CAS
- The IN TEST legend on the GND SPLR TEST switch is illuminated blue

NOTE:

The ground spoilers do not deploy during this test.

(5) **GPWS/GND SPLR FLAP ORIDE Switch:**

(See Figure 13.)

The purpose of the GPWS/GND SPLR FLAP ORIDE switch is to override the necessity of flaps being extended greater than 22° to enable automatic ground spoiler deployment at wheel spin-up. All other parameters must still be satisfied. In addition, selection to ON inhibits the GPWS voice alarm “TOO LOW, FLAPS”.

C. Speed Brake Control System:

(See Figure 13.)

The Speed Brake Control system provides a method for manual selection of deployment of all six spoiler panels in flight to slow the aircraft airspeed and increase the descent rate.

The speed brakes are manually controlled and hydraulically powered. With hydraulic pressure available, the speed brake control system deploys all spoiler panels to 30 (±1 degree for inboard panel, ±4 degrees for two outboard panels) degrees when the SPEED BRAKE handle in the center pedestal is placed in EXTEND detent. With speed brakes extended, rotation of the control wheel in either direction will further extend the outboard two (inboard and outboard flight spoiler) panels on the side of the raised aileron, up to a maximum of 55 (±4) degrees. These panels will return to their original extended position when the control wheel is returned to neutral.

NOTE:

The two outboard (inboard and outboard flight spoiler) panels on each wing may deploy 2 to 3 degrees less than the inboard (ground spoiler) panel when the speed brakes are extended. This is due to flight spoiler breakout delay, and is normal.

If the SPOILER CONTROL switch is selected to OFF, hydraulic pressure is inhibited and the speed brakes will be inoperative.

D. Spoiler Hydraulic Actuation System:

(See Figure 13.)

A flight spoiler actuator and ground spoiler actuator are installed in each wing. Both actuators are tandem actuators that receive hydraulic pressure for operation from L SYS and R SYS. Should there be a loss of one hydraulic system, the remaining system will continue to provide operational pressure.

The ground spoiler actuators also require hydraulic control pressure, normally provided from L SYS. In the event both L SYS engine driven pumps fail, the PTU and AUX pumps can be used to provide control pressure.

Hydraulic pressure to all flight and ground spoiler actuators can be inhibited through the use of the SPOILER CONTROL switch located on the cockpit center pedestal. When selected to OFF, operation of flight spoilers, ground spoilers and speed brakes is inhibited.

E. Spoiler Position Sensing and Indication System:

The spoiler position sensing and indication system provides indication of spoiler position to Data Acquisition Units (DAUs) #1 and #2 and the Maintenance Data Acquisition Unit (MDAU). This is accomplished through the use of spoiler position resolvers installed on each wing. Flight spoiler, ground spoiler and speed brake movement is visually depicted on the FLIGHT CONTROLS synoptic page.

3. Controls and Indications:

(See Figure 13 and Figure 14.)

NOTE:

A full description of the FLIGHT CONTROLS synoptic page can be found in section 2B-03-00: Engine Instruments and Crew Alerting System Description.

A. Circuit Breakers (CBs):

The spoiler system is protected by the following CBs:

Circuit Breaker Name:	CB Panel:	Location:	Power Source:
L SURFACE XDCRS	LEER	C-18	#1 ESS 26 VAC Bus
R SURFACE XDCRS	REER	C-6	#2 ESS 26 VAC Bus
SPDBRK ALARM	REER	A-26	R ESS DC Bus
SPLR FLT PWR S/O	CPOP	E-3	R ESS DC Bus
GND SPOILERS	CPOP	E-2	R ESS DC Bus
LEFT WOW	POP	C-1	L ESS DC Bus
RIGHT WOW	CPOP	C-1	R ESS DC Bus
WHEEL SPEED	POP	C-3	L ESS DC Bus
TQA	CPOP	C-2	R MN DC Bus

B. Crew Alerting System (CAS) Messages:

CAS messages associated with the spoiler system are:

Area Monitored:	CAS Message:	Message Color:
Integrated Computing	ACFT CONFIGURATION	Red
Integrated Computing	GND SPOILER	Red
Spoiler Deactivation Valve	SPOILERS HYD OFF	Amber
Integrated Computing	GND SPOILER UNARM	Blue
Integrated Computing	SINGLE SPEED BRAKE	Blue
Speed Brake Handle Switch	SPD BRAKE EXTENDED	Blue

4. Limitations:

A. Flight Manual Limitations:

(1) **Use of Speed Brakes:**

Speed brakes are not approved for extension with flaps at 39° (DOWN) or with landing gear extended in flight.

(2) **Automatic Ground Spoilers:**

Takeoff is permitted with automatic ground spoilers inoperative provided anti-skid is operative, 20° flaps are used, and the cowl and wing anti-ice systems are not used.

If a touch-and-go landing is to be performed, the GND SPLR switch must be OFF and manual spoiler landing distances must be taken into account.

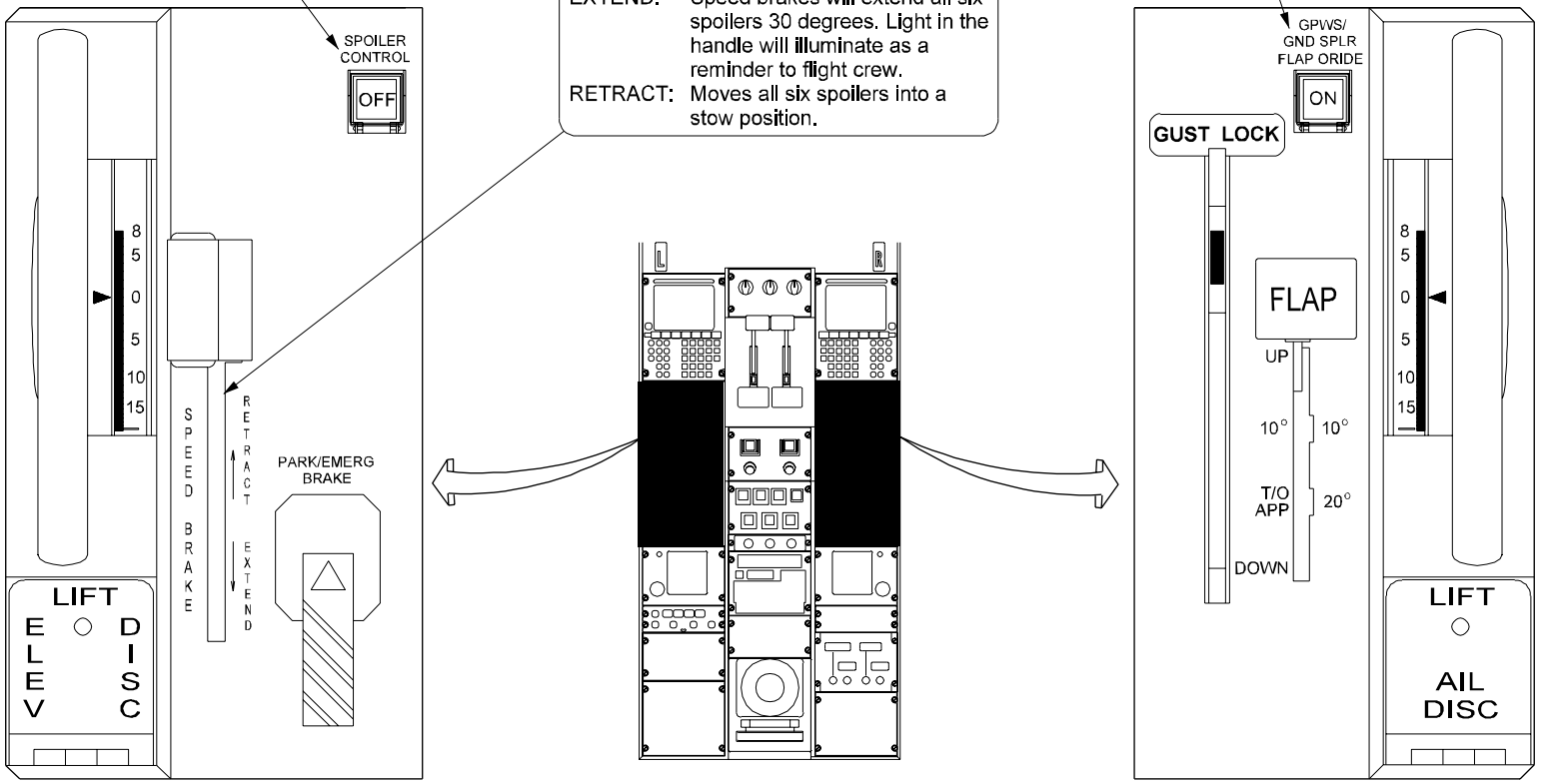
SPOILER CONTROL
ON:
- Amber OFF legend is extinguished.
- Hydraulic power is provided to flight spoilers, ground spoilers and speed brakes.

OFF:
- Amber OFF legend is illuminated.
- Hydraulic power is removed from flight spoilers, ground spoilers and speed brakes.

GPWS/GND SPLR FLAP ORIDE
ON:
- Amber ON legend is illuminated.
- Automatic ground spoiler deployment will occur if flaps are less than 22 degrees and all other parameters are satisfied.
- GPWS voice alarm, "TOO LOW, FLAPS", is inhibited.

OFF:
- Amber ON legend is extinguished.
- Automatic ground spoiler deployment will not occur if flaps are less than 22 degrees, even if all other parameters are satisfied.
- GPWS voice alarm, "TOO LOW, FLAPS", is not inhibited.

SPEED BRAKE HANDLE
EXTEND: Speed brakes will extend all six spoilers 30 degrees. Light in the handle will illuminate as a reminder to flight crew.
RETRACT: Moves all six spoilers into a stow position.



CENTER PEDESTAL

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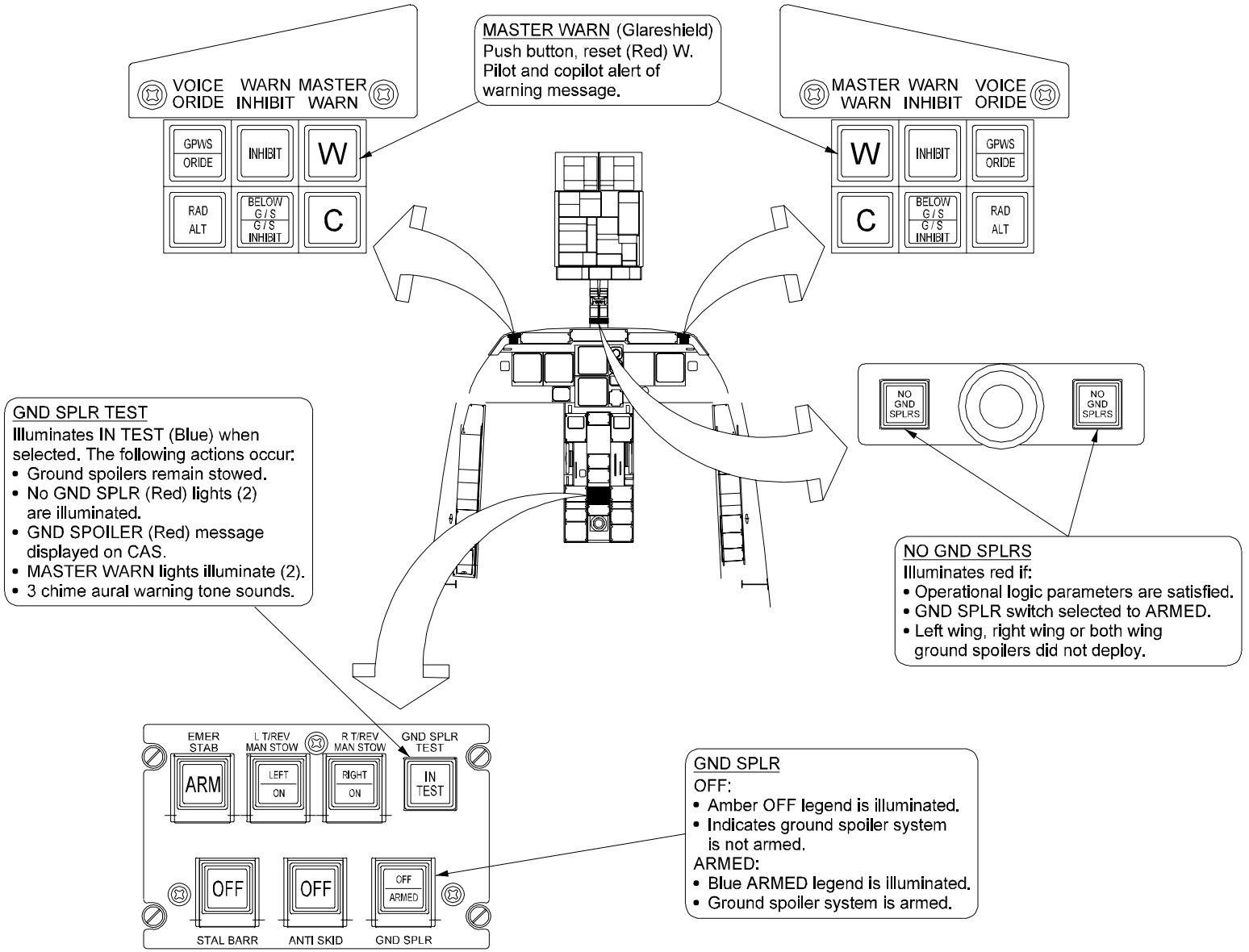
Spoiler System Controls and Indications
Figure 13



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Spoiler System Controls and Indications
Figure 14

2A-27-80: Gust Lock System:

1. General Description:

The gust lock system for the Gulfstream V provides a means for the flight crew to manually protect the unpowered flight control surfaces from movement by wind gusts while the aircraft is on the ground.

The gust lock system is a mechanical ground safety system that neither affects the flight performance of the aircraft nor receives any flight loads. The ailerons, elevators and rudder are locked against gust loads, by mechanical latches and a hook operated by the GUST LOCK handle located on the cockpit center pedestal.

2. Description of Subsystems, Units and Components:

A. Surface Lock System:

A single T-shaped handle, located on the right side of the cockpit center pedestal and labeled GUST LOCK, controls the gust lock system. A spring loaded trigger is located in the arm of the GUST LOCK handle to prevent inadvertent actuation. Raising and engaging the GUST LOCK handle actuates conventional mechanical components (cables, pushrods and mechanical latches). This locks the ailerons and rudder in the neutral position and the elevator in the trailing edge down position.

B. Mechanical Power Lever Interlock:

A mechanical interlock is incorporated in the GUST LOCK handle mechanism which restricts power lever movement to six percent above ground idle with the gust lock engaged. Force applied to advance one or both power levers simultaneously cannot override the interlock.

3. Controls and Indications:

(See Figure 15.)

4. Limitations:

A. Flight Manual Limitations:

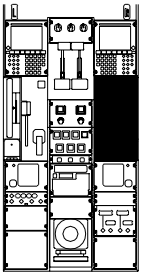
There are no limitations for the gust lock system at the time of this revision.

B. Additional Limitations:

The gust lock is only effective in protecting the flight controls in wind gusts up to 60 knots.

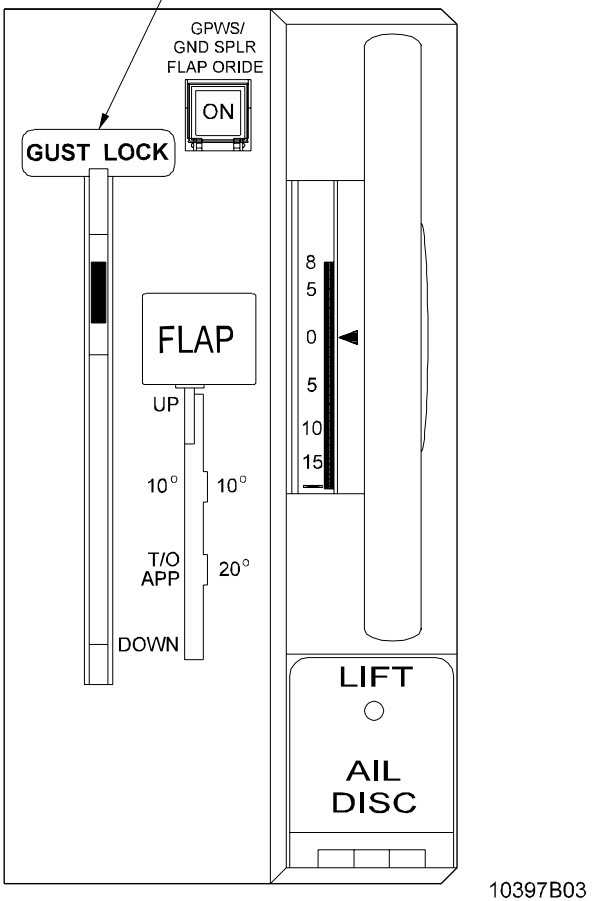
CAUTION

ENSURE HYDRAULIC PRESSURE IS DEPLETED PRIOR TO ENGAGING GUST LOCK. IT IS NOT POSSIBLE TO READ HYDRAULIC PRESSURES AS THE AIRCRAFT IS POWERED DOWN. CYCLE THE CONTROLS WITH THE CONTROL COLUMN, CONTROL YOKE AND RUDDER PEDALS TO DEPLETE THE RESIDUAL PRESSURE.



GUST LOCK HANDLE

- Foward and down ("OFF" position) releases gust locks.
- Aft and up ("ON" position) engages the gust locks, locking ailerons and rudder in neutral position and elevators in trailing edge down position. In addition, power lever movement is restricted to no more than 6% above ground idle.



Gust Lock System Controls
Figure 15