

REV 9.0



GULFSTREAM

G450 / G550

Expanded Notes +

Including Nester
and Dichiaro Notes!

Revision 9.0

Featuring links to **CODE450**

IVAN LUCIANI'S SYSTEMS GUIDES

& **CODE7700**



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For corrections, suggestions, or to be added to the revision distribution list please email:

steven@code7700.com

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Thank you,



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SOURCES AND SPECIAL THANKS

GULFSTREAM
FLIGHT SAFETY INTERNATIONAL
CAE SIMUFLITE
www.code7700.com
www.code450.com
JAMES ALBRIGHT
IVAN LUCIANI
DAVID NESTER
JOHN DICHIARA
NAT IYENGAR
STEVE THORPE

ACRONYMS

ACC AIR CONDITIONING CONTROLLER
ACM AIR CYCLE MACHINE
ACP AUDIO CONTROL PANEL
ACS AIR CONDITIONING SYSTEM
ADC AIR DATA COMPUTER
ADM AIR DATA MODULE
ADS AIR DATA SYSTEM
AUTOMATIC DEPENDENT SURVEILLANCE
AEER AUX ELECTRONIC EQUIPMENT RACK
AFCS AUTOMATIC FLIGHT CONTROL SYSTEM
AGM ADVANCED GRAPHICS MODULE
ASC AIRCRAFT SERVICE CHANGE
ASCB AVIATION STANDARD COMMUNICATIONS BUS
ATN AERONAUTICAL TELECOMMUNICATIONS NETWORK
BAAV BLEED AIR AUGMENTATION VALVE (G550 ONLY)
BAC BLEED AIR CONTROLLER
BAS BLEED AIR SYSTEM
BIT BUILT-IN TEST
BITE BUILT-IN TEST EQUIPMENT
BPCU BUS POWER CONTROL UNIT
BTMS BRAKE TEMP MONITORING SYSTEM
CAS CREW ALERT SYSTEM
CCD CURSER CONTROL DEVICE
CDU CONTROL DISPLAY UNIT
CMC CENTRAL MAINTENANCE COMPUTER
CMF COMMUNICATIONS MANAGEMENT FUNCTION
CPC CABIN PRESSURE CONTROLLER
CPCP CABIN PRESSURE CONTROL PANEL
CPOP CO-PILOT OVERHEAD PANEL
CPSP CABIN PRESSURE SELECTOR PANEL
CPIP CABIN PRESSURE INDICATOR PANEL
CSD CONSTANT SPEED DRIVE
DAU DATA ACQUISITION UNIT
DC DISPLAY CONTROLLER
DMU DATA MANAGEMENT UNIT
DU DISPLAY UNIT
EBDI ELECTRONIC BEARING AND DISTANCE INDICATOR
ECS ENVIRONMENTAL CONTROL SYSTEM
ECU ELECTRONIC CONTROL UNIT
EDS ELECTRONIC DISPLAY SYSTEM
EDM EMERGENCY DESCENT MODE
EEC ELECTRONIC ENGINE CONTROL
EVM ENGINE VIBRATION MONITOR
EVS ENHANCED VISION SYSTEM
FGCP FLIGHT GUIDANCE CONTROL PANEL
FGC FLIGHT GUIDANCE COMPUTER
FCOC FUEL COOLED OIL COOLER
FPV FLIGHT PATH VECTOR
FMU FUEL METERING UNIT
FRTT FUEL RETURN TO TANK VALVE (G550 ONLY)

FSECU FLAP/STAB ELECTRONIC CONTROL UNIT
FQSC FUEL QUANTITY SIGNAL CONDITIONER
FWC FAULT WARNING COMPUTER
GCU GENERATOR CONTROL UNIT
GP GUIDANCE PANEL
GSCP GROUND SERVICE CONTROL PANEL
HOPS HARDOVER PROTECTION SYSTEM
HMG HYDRAULIC MOTOR GENERATOR
HUD HEAD UP SYSTEM
IDG INTEGRATED DRIVE GENERATOR
I-NAV INTEGRATED NAVIGATION
IRU INERTIAL REFERENCE UNIT
LAN LOCAL AREA NETWORK
LEER LEFT ELECTRONIC EQUIPMENT RACK
LPV LOCALIZER PERFORMANCE WITH VERTICAL GUIDANCE
LRU LINE REPLACEABLE UNIT
MAU MODULAR AVIONICS UNIT
MCDU MULTIFUNCTION CONTROL DISPLAY UNIT
MWS MONITOR AND WARNING SYSTEM
NBPT NO BREAK POWER TRANSFER
ND NAVIGATION DISPLAY
NIC NETWORK INTERFACE CARD
PDP POWER DISTRIBUTION PANEL
POP PILOT OVERHEAD PANEL
PTU POWER TRANSFER UNIT
REER RIGHT ELECTRONIC EQUIPMENT RACK
RVDT ROTARY VARIABLE DIFFERENTIAL TRANSDUCER
SAV STARTER AIR VALVE
SEP STANDBY ELECTRICAL POWER
SFD STANDBY FLIGHT DISPLAY
SVO START VALVE OPEN
SVS SYNTHETIC VISION SYSTEM
SV-PFD SYNTHETIC VISION PRIMARY FLIGHT DISPLAY
TCS TOUCH CONTROL STEERING
TLA THRUST LEVER ANGLE
TROV THRUST RECOVERY OUTFLOW VALVE
VGP VNAV GLIDE PATH
VSD VERTICAL SITUATION DISPLAY

NOTES

Series of horizontal dotted lines for taking notes.





GENERAL			
DIMENSIONS:	G450		G550
▪ LENGTH	89' 3" Δ 7'2"		96' 5"
▪ WINGSPAN	77' 4" Δ 16'2"		93' 6"
▪ TAIL HEIGHT	25' 2"		25' 11"
▪ WHEELBASE	39' 1" X 13' 8"		45' X 14' 4"
▪ MIN TAXI STRIP FOR 180° TURN	55' 3"		62'
NOTE: THE G450 TAIL REQUIRES MORE CLEARANCE THAN THE WING. WING GROWTH 2' 1". NOTE: THE G450 IS 11" LONGER THAN A GIV.			
WEIGHTS:	G450		G550
▪ MAX RAMP	75,000 LBS (ASC 016)		91,400 LBS / 75,000 LBS (ASC 008A)
▪ MAX TAKEOFF	74,600 LBS (ASC 016)		91,000 LBS / 75,000 LBS (ASC 008A)
▪ MAX LANDING	66,000 LBS / 58,500 LBS (ASC 007C)		75,300 LBS / 75,000 LBS (ASC 008A)
▪ MAX ZERO FUEL	49,000 LBS / 48,000 LBS (ASC 008)		54,500 LBS / 53,500 LBS (ASC 009A)
SPEEDS:	G450		G550
▪ VMO / MMO	FL280, <u>340 KTS</u> FL280-340, .85-.88 M _T >FL340-43.5, <u>.88 M_T</u> >FL43.5, .874 M _T		>8,000', <u>340 KTS</u> <8,000', 300 KTS FL290-320, .85 M _T FL320-440, <u>.885 M_T</u> FL440-510, .86 M _T
▪ MAX RVSM MACH	.85 M _T		.87 M _T
▪ VTURB >10,000'	270 KTS / 0.75 M _T		270 KTS / 0.80 M _T
▪ VTURB <10,000'	240 KTS		240 KTS
▪ FLAPS 10°/20°/39°	250 / 220 / 180 KTS (0.60 M _T)		250 / 220 / 170 KTS (M.60 M _T)
▪ VMCG / VMCA / VMCL	109 / 106 / 99 KTS		86-107 / 112 / 110 KTS
NOTE: VMCG DECREASES LINEARLY AT THE RATE OF APPROXIMATELY ONE KNOT PER THOUSAND FEET FROM SEA LEVEL TO 15,000 FEET.			
▪ DEMONSTRATED X-WIND	24 KTS		28 KTS
▪ MIN APPR SPEED, FLAPS < 20°	----		125 KTS
▪ INOP TRIM (MACH/ELEC)	0.75 M _T		0.80 M _T
▪ INOP STAB / JAMMED ELEV	270 KTS / 0.75 M _T		210 KTS MINIMUM
▪ INOP YD MAX ALTITUDE	FL410		FL450
▪ INOP YD AIRSPEED ABOVE 20,000'	210 KTS MINIMUM		260 KTS / .80 M _T MAXIMUM, 210 KTS MINIMUM
▪ INOP YD AIRSPEED BELOW 20,000'	PER CHART: QRH ED-26		PER CHART: QRH ED-30
▪ MINIMUM MANEUVERING SPEEDS FLAPS 0°/10°/20°/39°	200 / 180 / 160 / VREF +5 KTS		200 / 180 / 150 / VREF +5 KTS
▪ VLE / VLO / EMER	250 / 225 / 175 KTS (0.70 M _T)		
▪ VA			206 KTS
▪ TIRE LIMIT			195 KTS

CRUISE:	G450	G550
▪ NORMAL CRUISE	M.80 4,350 NM	M.83 6,000 NM
▪ LONG RANGE CRUISE	M.77 4,450 NM Δ 2,300 NM ~5,100 SM	M.80 6,750 NM ~7,750 SM

TAILWIND: SLOWING DOWN DOES HELP REDUCE BURN, MARGINALLY
HEADWIND: SPEEDING UP DOES NOT HELP REDUCE BURN

G450	MACH	NM/LB	DIST	WIND	TIME	BURN
SLOWER	0.73	0.1678	500NM	100 TWC	00:58	2405
				100 TWC	00:57	2414
MAX RANGE	0.746	0.1679	500NM	0	01:10	2978
				100 HWC	01:31	3886
FASTER	0.778	0.1646	500NM	100 HWC	01:26	3915

ISA, FL410, 62,000LBS.

TAILWIND: SLOWING DOWN DOES HELP REDUCE BURN, MARGINALLY
HEADWIND: SPEEDING UP DOES HELP REDUCE BURN, MARGINALLY

G550	MACH	NM/LB	DIST	WIND	TIME	BURN
SLOWER	0.705	0.1895	500NM	100 TWC	00:59	2115
				100 TWC	00:58	2121
MAX RANGE	0.725	0.1900	500NM	0	01:12	2632
				100 HWC	01:35	3465
FASTER	0.765	0.1895	500NM	100 HWC	01:29	3417

ISA, FL430, 65,000LBS.

ALTITUDES:	G450	G550
▪ MAX OPERATING	45,000'	51,000'
▪ SINGLE PACK	-----	48,000'
▪ INOP YD AND MACH TRIM	41,000'	45,000'
▪ MAX FIELD ELEV	14,500' / 15,000' (ASC 068)	14,500' / 15,000' (HFLE EQUIPPED)
▪ BAGGAGE COMPARTMENT ACCESS	-----	≥FL400, MAX 5 MIIN NO ACCESS ≥FL450 WHEN SINGLE PACK
▪ FLAPS 10° / 20°		25,000'
▪ LDG GEAR / FLAPS 39°		20,000'

MINIMUM MACH TABLE	
STATIC AIR TEMPERATURE	MINIMUM MACH
-70°C	0.67 M _T
-72°C	0.71 M _T
-74°C	0.76 M _T
-76°C	0.80 M _T
-78°C	0.84 M _T
-80°C	0.87 M _T

MISC:	
▪ MAX SLOPE	± 2%
▪ MAX OCCUPANTS	22
▪ MAX PASSENGERS	19

G550, AN ADDITIONAL TRAINED CREWMEMBER IS REQUIRED ON ALL FLIGHTS WITH ≥10 PASSENGERS.

FLIGHT LOADS (-/+G):	
▪ FLAPS 0°	- 1 / + 2.5
▪ FLAPS 10° OR 20°	- 0 / + 2.0
▪ FLAPS 39° < MLW (66,000 / 75,300)	- 0 / + 2.0
▪ FLAPS 39° > MLW (66,000 / 75,300)	- 0 / + 1.5



MAXIMUM VERTICAL ACCELERATION REPORTING

"G METER"

THE LANDING "MAXIMUM VERTICAL ACCEL" (PEAK Nz, "G") IS FOUND IN THE END OF FLIGHT REPORT PAGE ON THE CMC. THE READING CAN BE USED IN DETERMINING IF EITHER A HARD LANDING INSPECTION (>2.3 Gs) OR OVERWEIGHT LANDING INSPECTION IS REQUIRED. OVERWEIGHT LANDING – QRH: MISC-EI

TYPES OF AIRPLANE OPERATIONS PERMITTED

- TRANSPORT CATEGORY – LAND
INSTRUMENT AND NIGHT FLYING
CATEGORY 1 APPROACH OPERATIONS
FLIGHT INTO KNOW ICING
EXTENDED OVERWATER FLIGHT
POLAR NAVIGATION
CATEGORY II OPERATIONS (ASC 020 REQUIRED)
AFN, ADS-C, AND CPDLC DATA LINK OPERATIONS
RVSM

NAVIGATION SPECIFICATION

- OCEANIC AND REMOTE AREAS OF OPERATION (FORMERLY CLASS II NAVIGATION)
DUAL GNSS – MAXIMUM PREDICTED FDE UNAVAILABILITY IS 51 MIN
SINGLE GNSS AND SINGLE IRS – MAXIMUM PREDICTED FDE UNAVAILABILITY IS 51 MIN
DUAL IRS ONLY – 6.2 HOURS MAXIMUM

EU DATA LINK MANDATE

ALL G450 AIRCRAFT HAVE A PERMANENT ATN-B1 EXEMPTION; ADD "Z" TO ITEM 10 AND "CPDLCX" TO THE DAT/ CODE (ITEM 18) OF THE FLIGHT PLAN.

G550 AIRCRAFT WITH A CofA BEFORE FEB 5, 2020 ARE ALSO PERMANENTLY EXEMPT. AIRCRAFT WITH A CofA AFTER FEB 5, 2020 WILL REQUIRE ATN-B1 (COMING WITH ASC 115).

NOTE: FOR ILS, LOC, LOC-BC, LOA, AND SDF APPROACHES THE ACTIVE NAVIGATION SOURCE MUST BE LOC OR BC (GREEN NEEDLES) PRIOR TO CROSSING THE FAF.

- NAT HLA (FORMERLY MNPS)
RNP-10 / RNAV-10 (OCEANIC AND REMOTE CONTINENTAL OPERATIONS)
B-RNAV / RNAV-5 / RNP-5 (CONTINENTAL OPERATIONS)
RNP-4 (OCEANIC AND REMOTE CONTINENTAL OPERATIONS)
RNAV-2 / RNAV-1 (DPs AND ARRIVALS) / PRNAV / Q & T ROUTES
RNP-2 (OCEANIC AND REMOTE CONTINENTAL OPERATIONS)
RNP-1 (TERMINAL OPERATIONS)
RNP APCH – RNAV(GPS), RNAV(GNSS), OR RNP RWY XX
RNP AR – TO A MINIMUM VALUE OF RNP 0.1
ADVANCED RNP (A-RNP)
ENROUTE, TERMINAL, AND APPROACH VNAV
CVR DATA LINK RECORDING

- DATA LINK COMMUNICATIONS – FANS 1/A+
CPDLC AT RCP 240 USING VDL M0/A/2
ADS-C AT RSP 180 USING SATCOM (INMARSAT)
CPDLC-DCL
SBAS – WASS, EGNOS, GAGAN, AND MSAS
ADS-B OUT

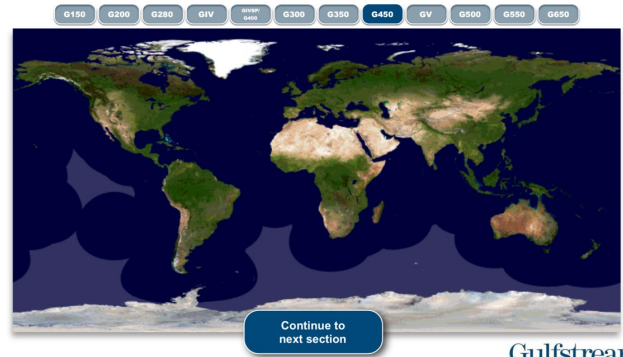
NON-ETOPS AREA-OF-OPERATION (135)

SINGLE ENGINE 180 MINUTE AREA-OF-OPERATION USING WORST-CASE WEIGHT ASSUMPTION:
G450: 1210 NM
G550: 1106 NM

NOTE: INDIVIDUAL OPERATORS HAVE THE OPTION TO DEVELOP THEIR OWN SINGLE ENGINE SPEED AND RANGE CAPABILITY.

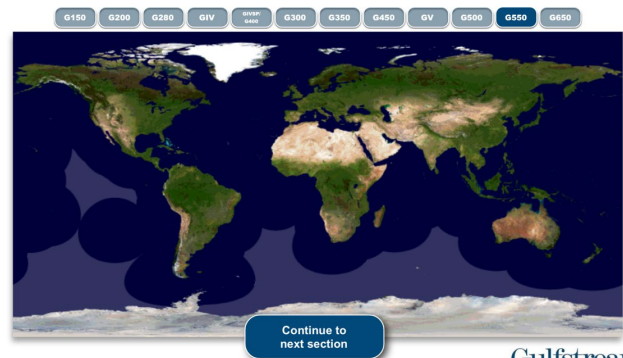
G450

Gulfstream non-ETOPS Area per Table 2 of Large Cabin GAC-OIS-03 and Mid Cabin GAC-OIS-05. After selecting an aircraft, lighter areas indicate that ETOPS authorization is required:



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G550



NOTE: "A COMMON MISCONCEPTION IS THAT ER IS FOR EXTENDED RANGE OVER WATER FLIGHTS AND APPLIES TO FAR PART 91 OPERATIONS...ER REFERS TO EXTENDED RANGE OPERATIONS (ETOPS) OF AN AIRPLANE WITH OPERATIONAL APPROVAL TO CONDUCT ETOPS IN ACCORDANCE WITH THE APPLICABLE REGULATIONS."



NOTES

- TOP 20 REMOVAL COMPONENTS (1Q21)

NUMBER IN SERVICE

G350/G450,
364 AIRCRAFT

G500-5000/G550,
620 AIRCRAFT

E-BATT, AGM, MCDU, CCD, DC, DU, MAIN BATT CHARGER, COCKPIT SIDE WINDOW, PITOT-STATIC PROBE, DC, NIM, 60 HZ CONVERTER, WINDSHIELD, MLG SPINDLE, ACP, TRIM AIR VALVE, SINGLE GEN I/O, HF RCVR/XMITTER, NIC PROC MODULE, T/R ECU, MLG STRUT, SDU, ENG NOSE COWL, CLOCK, FUEL QUANTITY PROBE, AOA PROBE TRANSDUCER, E-INV, APU EXHAUST DUCT, DRAIN MAST.

NOTE: 870 GIV/GIV-SP/G300/G400/G350/G450 AIRCRAFT. SN4365 IS THE LAST G450.

ASCs

NOTE: CMP PROVIDES A LIST OF YOUR AIRCRAFT'S ASCs.

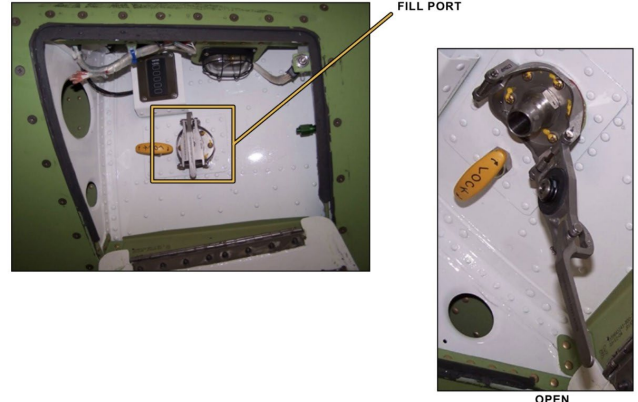
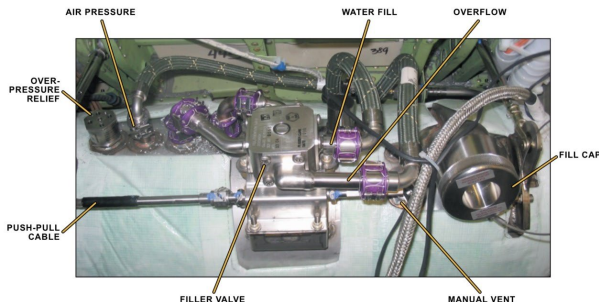
PLANEVIEW

- G450 ASC 906
 - G450 ASC 907
 - G450 ASC 908
 - G450 ASC 909
 - G450 ASC 909B
 - G450 ASC 910
 - G450 ASC 911A
 - G450 ASC 912A/B
 - G450 ASC 913
 - G450 ASC 007C
 - G450 ASC 008
 - G550 ASC 008A
 - G550 ASC 009A
 - ACTIVATION / DEACTIVATION
- CERT D, OCT 2007, SN 4001-4102
 - CERT E, SEP 2008, SN 4001-4114
 - CERT F, JUN 2010, SN 4001-4229
 - DEC 2011, SN 4212-4224
 - APR 2013, SN 4001-4282 W/ ASC 909
 - APR 2013, SN 4001-4282
 - AUG 2014, SN 4001-4310, 4311 AND SUB
 - CPDLC LATENCY TIMER FIX
 - CURRENTLY IN DEVELOPMENT
 - 58,500 LB MAX LANDING WEIGHT
 - RE-CLASSIFIES THE G450 AS A CAT C AIRCRAFT
 - 48,000 LB MAX ZERO FUEL WEIGHT
 - REQUIRED IF BOW < 43,001 LBS TO OPERATE UNDER FAR 91 AND/OR 135 (NOT FAR 125)
 - 75,000 LB MAX RAMP/TAKEOFF/LAND WEIGHT
 - FOR AIRPORTS WHERE REDUCED WEIGHT LIMITATIONS ARE REQUIRED - NOISE ABATEMENT AND RUNWAY WEIGHT BEARING CAPACITY
 - 53,500 LB MAX ZERO FUEL WEIGHT
 - REQUIRED IF BOW < 48,501 LBS TO OPERATE UNDER FAR 91 AND/OR 135 (NOT FAR 125)
 - MAINTENANCE ACTION REQUIRING:
 - LOGBOOK ENTRY
 - AFM SUPPLEMENT (INSERTION OR REMOVAL)
 - COCKPIT PLACARD (REVERSAL)

- TEMPERATURE UNITS
- FUEL SYSTEM: CELSIUS
- PNEUMATIC SYSTEM: FAHRENHEIT
- HYDRAULIC SYSTEM: CELSIUS

WATER / WASTE

- POTABLE WATER
- ONE 30 GAL (40 GAL OPTIONAL) CONFORMAL TANK
- FOR LAVATORIES AND GALLEY USE
- PRESSURIZED BY AN ELECTRIC AIR COMPRESSOR AND BLEED AIR (35-43 PSI)
- SUPPLY LINE HEATERS
- SERVICED EXTERNALLY VIA WATER SERVICE PANEL OR INTERNALLY VIA MANUAL FILL CAP



- V6 VALVE
- LOCATED NEAR THE BOTTOM OF THE WATER TANK
- AIRCRAFT WITH RINSE VALVE P/N 7600268/269 REQUIRE THE V6 VALVE TO BE CLOSED TO PREVENT THE TOILET FROM OVERFLOWING ON OVERTIGHTS
- V6 HANDLE - FORWARD IS OPEN, AFT IS CLOSED



NOTE: PURGE INSTRUCTIONS ARE LOCATED ON THE BACK OF THE WATER TANK PANEL.

NOTE: TO PURGE WATER LINES BUT RETAIN TANK WATER CLOSE THE V6 VALVE, THEN PERFORM PURGE. (G450 MOL-11-0007)

NOTE: WHEN PURGING IN THE AIR THE CYCLE WILL NOT END UNTIL AFTER LANDING.

GULFSTREAM:
▶ PURGE

- PURGE
- COLD WEATHER OPERATING MANUAL (CWOM)
 - ≤ 32°F (0°C) PURGE WATER IF CABIN IS LEFT UNHEATED > 90 MIN
 - ≤ 19°F (-7°C) PURGE WATER IF CABIN IS LEFT UNHEATED > 30 MIN
 - ≤ 5°F (-15°C) PURGE WATER SYSTEM REGARDLESS OF CABIN TEMP
- PURGE PROCEDURE (SELECT CABIN MANUAL):
 - WATER SYSTEM – ON
 - SYSTEM PURGE **PURGE** ICON PRESS AND HOLD FOR 3 SEC, CONFIRM "YES"
- PURGE CYCLE CONTINUES TILL TANK EMPTY SIGNAL OR 15 MINUTES HAVE ELAPSED
- ONCE PURGE IS COMPLETE:
 - SINK FAUCETS (GALLEY AND LAV) – OPEN FOR 3 MINUTES
 - NOTE: LAVS WITH FIXED SINKS REQUIRE WEIGHT TO ON THE FLOOR MAT TO ENSURE THE FAUCET IS OPEN.
 - TOILETS – FLUSH TWICE
 - COFFEE/ESPRESSO FILL VALVES – PRESS FOR 5 SEC
 - COFFEE/ESPRESSO MAKER VENTS – OPEN
 - ICE DRAWER DRAINS – CLOSE



SYSTEM START UP IN COLD WEATHER FOLLOWING PURGE

- 1) **WATER SYSTEM** ON/OFF **ICON – ON**
- 2) **WATER SYSTEM** **HEATERS ON/OFF** **ICON - ON**

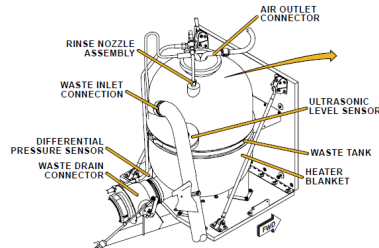
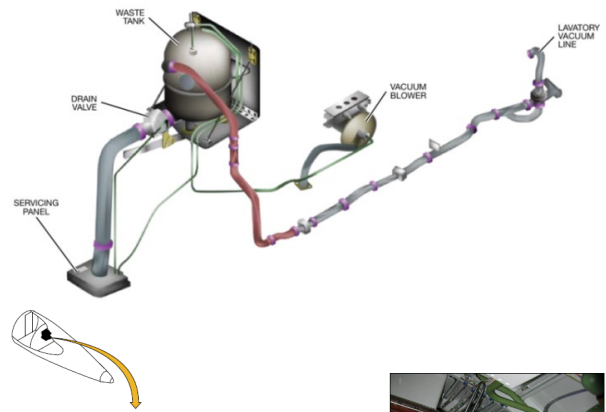
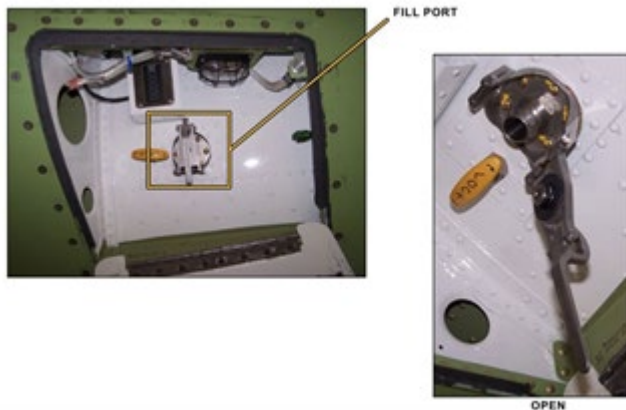
NOTE: ONLY TURN ON THE **WATER SYSTEM** HEATERS, DO NOT TURN ON THE GALLEY OR LAVATORY WATER HEATERS.

AFTER 20 MINUTES

- 3) **WATER SYSTEM – FILL, AND OPEN ALL FAUCETS UNTIL WATER FLOWS**
- 4) **WATER HEATERS GALLEY AND LAVATORY** **ICONS – ON**

SERVICING THE WATER SYSTEM EXTERNALLY

- 1) TURN AND PULL CONTROL HANDLE TO OPEN FILL VALVE (V1)
- 2) REMOVE EXTERNAL FILL CAP
- 3) CONNECT SERVICE HOSE TO FILL PORT
- 4) TURN ON GND SVC BUS SWITCH
- 5) FILL UNTIL WATER OVERFLOWS FROM DRAIN MAST
- 6) REMOVE SERVICE HOSE FROM FILL PORT
- 7) PUSH AND TURN CONTROL HANDLE TO CLOSE FILL VALVE
- 8) ALLOW EXCESS WATER TO DRAIN FROM FILL PORT AND DRAIN MAST (1 MIN)
- 9) TURN OFF GND SVC BUS SWITCH
- 10) SECURE FILL CAP



FLUSH CYCLE:

- < 16,000', THE VACUUM BLOWER STARTS AND RUNS FOR 15 SEC
- > 16,000', NO BLOWER
- AT 2 SEC: FLUSH VALVE OPENS
- AT 2.1 SEC: THE RINSE VALVE OPENS AND ALLOWS WATER FLOW FOR 0.7 SEC
- AT 3 SEC: THE FLUSH VALVE CLOSES



NOTE: WATER FLOW CAN BE STOPPED WITH THE FLUSH VALVE MANUAL SHUTOFF HANDLE LOCATED AT THE BASE OF THE TOILET (G450 SNs 4001-4139, G550 SNs 5001-5212)

TEST PANEL:

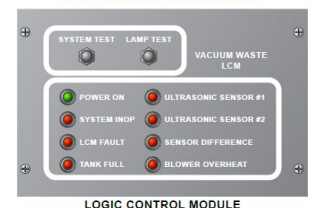
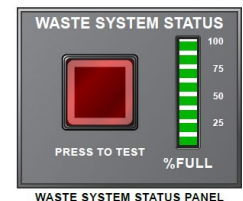
- LOCATED BEHIND THE WATER TANK PANEL
- IF A BAD SENSOR IS PREVENTING THE TOILET FROM FLUSHING PRESS THE **LOGIC CONTROL MODULE (LCM)** "SYSTEM TEST" BUTTON **OR** THE **WASTE SYSTEM STATUS** "PRESS TO TEST" BUTTON
 - 5 – 15 SEC WINDOW TO FLUSH
 - ALLOWS UP TO 6 FLUSHES, NO MORE

WASTE DISPOSAL

COMPONENTS:

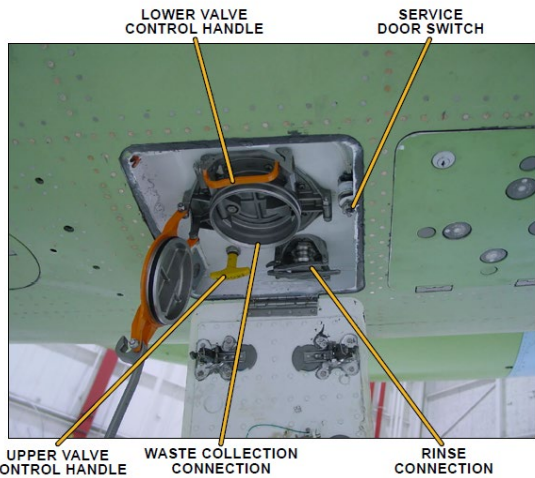
- VACUUM TOILET SYSTEM
- FLUSH SWITCH
- VACUUM BLOWER
- LOGIC CONTROL MODULE
- STATUS PANEL
- VACUUM LINES (TITANIUM)
- BLOWER CONTROL RELAY
- PRESSURE SWITCH
- SERVICE DOOR SWITCH
- 12-GAL WASTE TANK ASSEMBLY – LOCATED IN THE AFT EQUIPMENT COMPARTMENT
- TANK STATUS IS VISIBLE ON THE GALLEY TOUCHSCREEN (ELITE INTERIOR), WHEN THE TANK REACHES THE "FULL TANK" LEVEL SIX MORE "EMERGENCY" FLUSHES ARE AVAILABLE
- THERMOSTAT
- HEATERS (RIBBON)
- WASTE TANK HEATER BLANKET

NOTE: THE VACUUM TOILET SYSTEM IS BASED ON THE PRESSURE DIFF BETWEEN THE CABIN AND THE WASTE TANK.





- LAV SERVICE PANEL:**
- DUMP VALVE (PUSH-PULL HANDLE)
 - FILL PORT – ALLOWS PRESSURIZED WATER INTO THE WASTE TANK FOR RINSING DURING SERVICING
 - RINSE THE WASTE TANK EACH TIME THE LAV IS SERVICED
 - WHILE RINSING ENSURE THE DUMP VALVE REMAINS OPEN
- HANDLE / CABLE ASSY “DUMP VALVE”**
- ALLOWS FOR OPENING AND CLOSING OF THE BALL VALVE AT THE WASTE TANK DRAIN PORT
 - TO OPEN: ROTATE COUNTER-CLOCKWISE, PULL
 - TO CLOSE: PUSH, ROTATE CLOCKWISE
- RINSING:**
- CONNECT WATER SUPPLY (30-50 PSI)
 - RINSE FOR 3-5 MINUTES
 - AFTER RINSING, DO NOT ADD WATER TO THE TANK



- FUEL TANKERING
 - SEE AOM CHAPTER 11, FUEL TANKERING EVALUATION
 - G450 AOM 11-07-00
 - G550 AOM 11-08-10
 - FUEL COST RATIO IS THE COST PER GALLON OF FUEL AT THE OPTIONAL POINT OF REFUELING DIVIDED BY THE COST PER GALLON AT THE DEPARTURE POINT.
 - IT IS PROFITABLE TO TANKER ANY AMOUNT OF FUEL WHEN THE ACTUAL FUEL COST RATIO EXCEEDS THE BREAK-EVEN FUEL COST RATIO READ FROM THE TABLE.
 - TO DETERMINE THE TANKERED FUEL COST SAVINGS, SUBTRACT THE BREAK-EVEN FUEL COST RATIO FROM THE ACTUAL FUEL COST RATIO AND MULTIPLY THE DIFFERENCE BY THE GALLONS OF TANKERED FUEL TIMES THE DEPARTURE POINT COST PER GALLON.

G450

11-07-10: Break-Even Fuel Cost Ratios

Cruise Mach	Flight Time - Hours						
	1	2	3	4	5	6	7
0.77	1.026	1.058	1.091	1.124	1.159	1.194	1.230
0.80	1.027	1.062	1.098	1.136	1.175	1.216	1.258
0.83	1.026	1.075	1.126	1.179	1.234	1.292	1.352
0.85	1.028	1.085	1.146	1.209	1.274	1.343	1.413

Fuel cost ratio is the cost per gallon of fuel at the optional point of refueling divided by the cost per gallon at the departure point.

G550

Cruise Mach	Flight Time - Hours							
	3	4	5	6	7	8	9	10
0.80	1.090	1.127	1.165	1.203	1.242	1.282	1.323	1.365
0.83	1.094	1.133	1.172	1.213	1.255	1.298	1.343	1.388
0.85	1.107	1.153	1.201	1.251	1.303	1.357	1.413	1.471
0.87	1.133	1.191	1.253	1.319	1.391	1.467	1.549	****

G450 EXAMPLE:

- GIVEN**
- CRUISE MACH, 0.80
 - FLIGHT TIME, 5.0 HOURS
 - DEPT FUEL COST, \$2.90/GAL
 - DEST FUEL COST, \$4.17/GAL
- SOLUTION**
- BREAK-EVEN FUEL COST RATIO = 1.175 (FROM ABOVE CHART)
 - ACTUAL FUEL COST RATIO = 1.438 (\$4.17 / \$2.90)
 - COST SAVINGS PER GAL = \$0.26/GAL (1.438 – 1.175)
- RULES OF THUMB**
- PAYLOAD BURNS THE EQUIVALENT OF 2.5% TO 5% OF ITS OWN WEIGHT IN FUEL PER FLIGHT HOUR
 - USING 4%, EVERY 100 LBS OF EXTRA FUEL CARRIED WILL RESULT IN AN EXTRA 4 LBS OF FUEL BURN PER HOUR
 - SO (USING 4%) TO CARRY AN EXTRA 1,000 LBS OF FUEL IT COSTS 40 LBS OF FUEL (6 GAL) PER HOUR

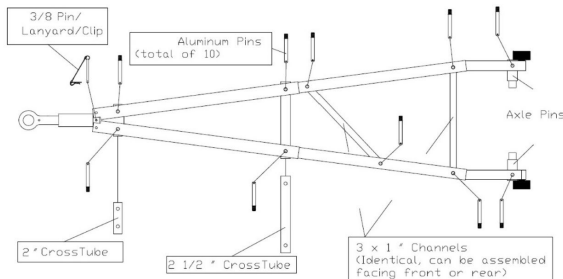
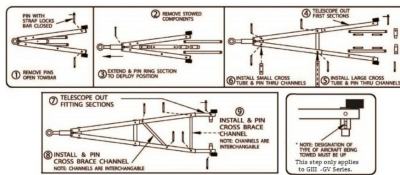
▶ GULFSTREAM: [FUEL TANKERING GUIDANCE](#), INCLUDING SPREADSHEET

CLEANING

- CARPET**
- “NEVER USE A VACUUM CLEANER WITH A BEATER BAR ON CARPET THAT CONTAINS SILK FIBERS. USE A VACUUM WITH SUCTION ONLY”
 - “MOST COMMON CARPET CLEANERS ARE DESIGNED TO ATTACK PROTEIN. SILK IS 100% PROTEIN. IMPROPER CHEMICAL USAGE CAN SUBSTANTIALLY DAMAGE THE CARPET”
 - “DO NOT USE A RUBBING OR SCRUBBING MOTION ON SPOTS. RUBBING OR SCRUBBING

- TOWBAR ASSEMBLY
- [ASSEMBLY VIDEO](#)

NESTER NOTE:
USE A SUITABLE G550 TOWBAR ONLY AND A TUG WITH A MINIMUM DRAW OF 15,000 LBS.





- DESTROYS THE SPUN FIBER..."
- BLOT: "USE A CLEAN, WHITE, 100% COTTON TOWEL TO PAT, DAB OR FIRMLY PRESS THE CONTAMINATED AREA BEGINNING AT THE OUTSIDE EDGE AND WORKING TOWARDS THE MIDDLE"

SPOT REMOVAL FOR 100% WOOL CARPETING

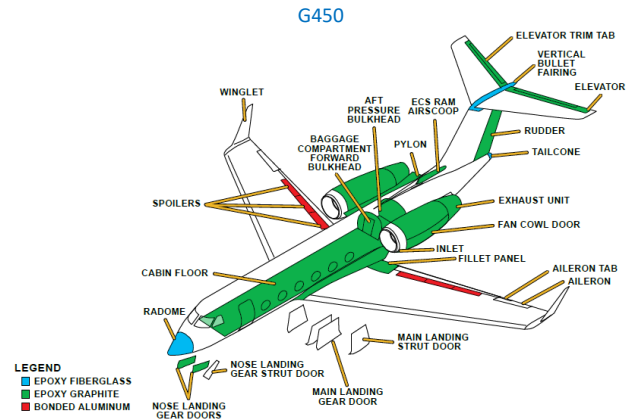
TYPE OF TREATMENT	
1	COLD WATER. ONE TEASPOON OF WOOL DETERGENT
2	WITH ONE TEASPOON OF WHITE VINEGAR AND ONE LITER OF WARM WATER (<100°F).
3	CLEAR HOUSEHOLD DISINFECTANT.
4	WHITE SPIRITS (USE ONLY ON DRY CARPET). CHILL WITH ICE CUBES IN A PLASTIC BAG. PICK OR SCRAPE OFF GUM.
5	MIX 1/3 CUP OF WHITE VINEGAR WITH 2/3 CUP OF WATER.
6	WARM WATER (<100°F).
7	SURGICAL ALCOHOL.
9	SEEK ASSISTANCE FROM A PROFESSIONAL CARPET CLEANER.

CONTAMINANT	ORDER AND TYPE OF TREATMENT		
FRUIT JUICE	1	2	
BLOOD	1	2	
SOFT DRINKS	1	2	
URINE (FRESH)	1	2	3
COFFEE / TEA	1	2	6
VOMIT	1	2	6
ALCOHOL	1	3	
FECES	2	3	9
SALAD DRESSING	2	4	
WINE	4	2	
CHOCOLATE	4	2	
INK (FELT TIP)	4	2	
LIPSTICK	4	2	
UNKNOWN	4	2	
GUM	5	4	
SAUCES	7	2	
TOMATO SAUCE	7	2	
INK (BALLPOINT)	8	2	
URINE (OLD)	9		

- LEATHER
- "MOST LIQUIDS ARE INITIALLY REPELLED BY THE LEATHER. IF LIQUIDS ARE ALLOWED TO STAY ON THE LEATHER THEY CAN BE ABSORBED"
 - "DO NOT WIPE OR RUB THE SPILL AS THIS MAY DAMAGE THE LEATHER"
 - "BLOT THE SPILL WITH A CLEAN TERRY TOWEL. REPEAT BLOTTING WITH A CLEAN PORTION OF THE TOWEL UNTIL THE TOWEL REMAINS WHITE"
 - "DO NOT APPLY ANY CLEANER OR CONDITIONER DIRECTLY TO LEATHER...SPRAY CLEANER ONTO A CLEAN TERRY TOWEL AND USE THE TOWEL TO CLEAN AND CONDITION THE LEATHER"

G-V TYPE RATING COVERS →	GIV-X (2004 – SN 4001)		GV	GV-SP (2003 – SN 5001)	
	G350	G450	GV/ C-37A	G500	G550/ C-37B
MAX RANGE (NM)	3,800	4,350	6,500	5,800	6,750
MAX FUEL (LBS)	26,000	29,500	41,300	35,200	41,300
MAX TAKEOFF WT	70,900	74,600	90,500	85,100	91,000
MAX LANDING WT	66,000		75,300		

COMPOSITE MATERIALS



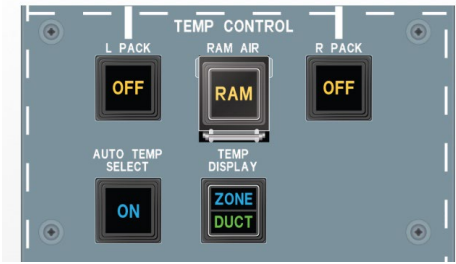
GULFSTREAM SCHEDULED MAINTENANCE	INSPECTIONS 1 THROUGH 6	500 HR INTERVALS 12 MONTH INTERVALS
NOTE: "A" INSPECTIONS ARE HOUR BASED, "C" INSPECTIONS ARE CALENDAR BASED.	1A	500 HR
	1C	12 MONTH (1 YR)
	2A	1,000 HR
	2C	24 MONTH (2 YR)
	3A	1,500 HR
	3C	36 MONTH (3 YR)
INSPECTION 8	4A	2,000 HR
	4C	48 MONTH (4 YR)
	5A	2,500 HR
INSPECTION 10	5C	60 MONTH (5 YR)
	6A	3,000 HR
	6C	72 MONTH (6 YR)
INSPECTION 12	7A	4,000 HRS TOTAL
	7C	96 MON (8 YR)
INSPECTION 12	10A	5,000 HRS TOTAL
	12C	12 YRS OLD

- MEL REPAIR CATEGORIES
- CATEGORY A: TIME SPECIFIED
- CATEGORY B: 3 DAYS
- CATEGORY C: 10 DAYS
- CATEGORY D: 120 DAYS

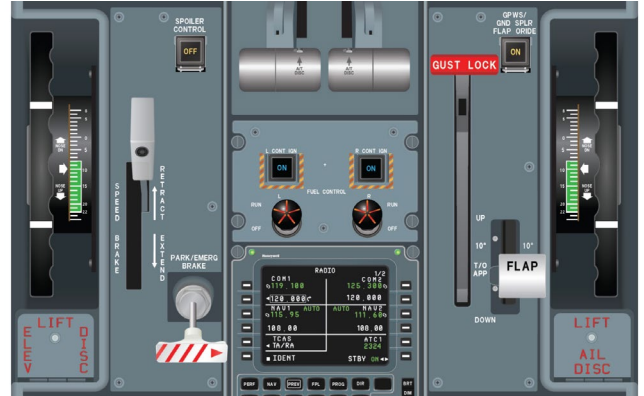
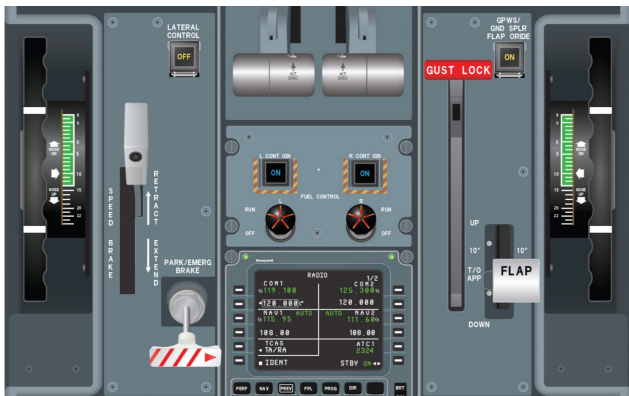
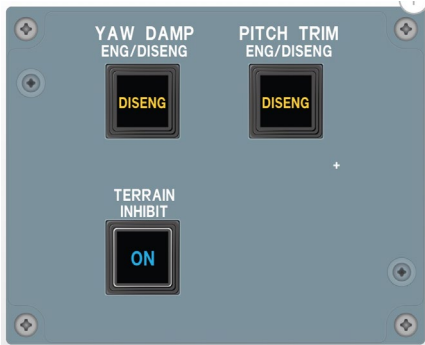
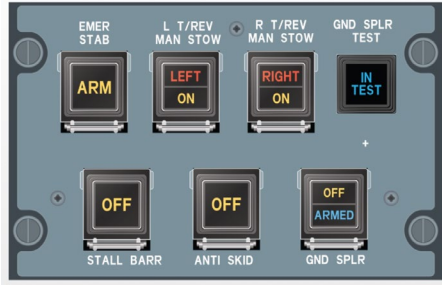
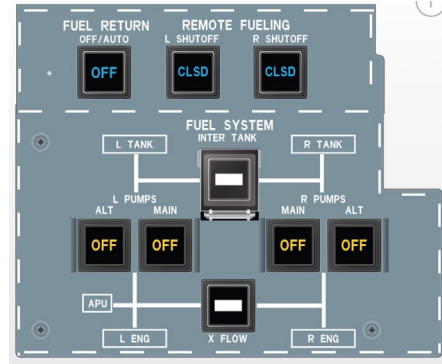
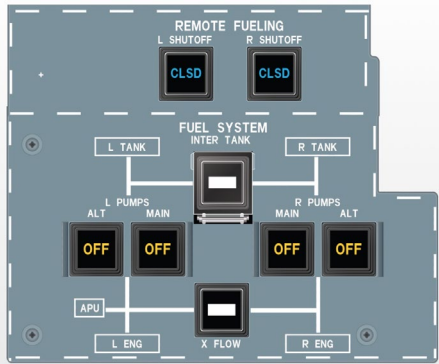
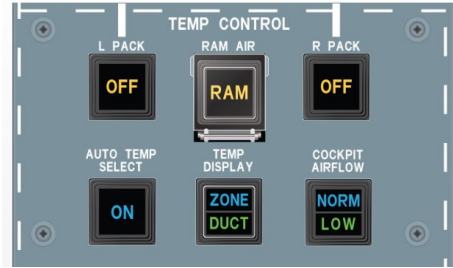
NOTE: PART 91 MEL USERS (D095/D194 LOAs) ARE NOT REQUIRED TO COMPLY WITH THE REPAIR CATEGORIES, BUT WILL COMPLY WITH ANY PROVISOS DEFINING A REPAIR INTERVAL (FLIGHTS, FLIGHT LEGS, CYCLES, HOURS, ETC).

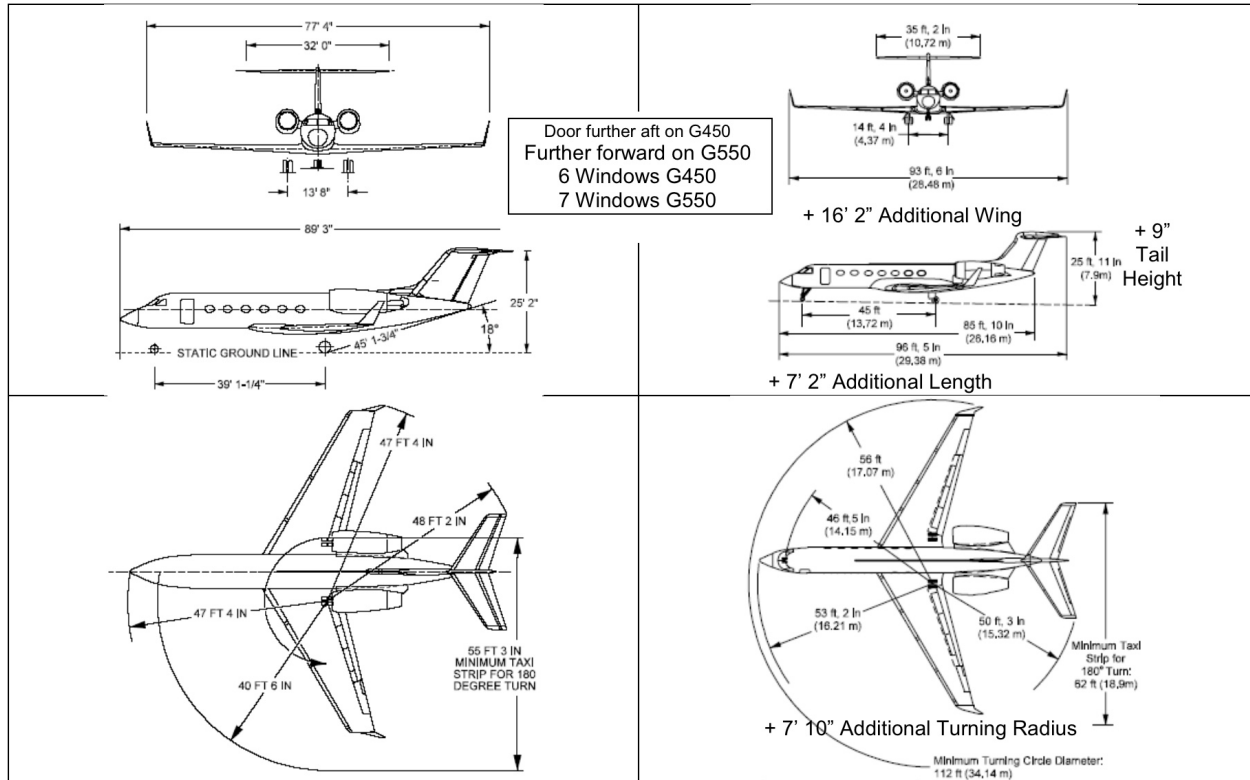


G450



G550





G450 / G550 TAKEOFF MATRIX

YES	NO	NOTE	N/A
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		RATED		FLEX		RUNWAY				A / I		IN OP		
		FLAPS 20	FLAPS 10	FLAPS 20	FLAPS 10	WET	CONTAM	TAIL-WIND	DOWN-SLOPE	COWL	WING	GROUND SPOILERS	ANTI-SKID	THRUST REVERSER
RATED	FLAPS 20	/	/	/	/	YES	YES	YES	YES	YES	YES	YES	YES	YES
	FLAPS 10	/	/	/	/	YES	NO	YES	YES	YES	YES	NO	NO	YES
FLEX	FLAPS 20	/	/	/	/	YES	NO	Use AFM or TOLD	Use AFM or TOLD	YES	NO	YES	NO	YES
	FLAPS 10	/	/	/	/	YES	NO	Use AFM or TOLD	Use AFM or TOLD	YES	NO	NO	NO	YES
RUNWAY	WET	YES	YES	YES	YES	/	YES	YES	YES	YES	YES	YES	NO	+600'
	CONTAM	YES	NO	NO	NO	YES	/	YES	YES	YES	YES	NO	NO	NO
	TAIL-WIND	YES	YES	Use AFM or TOLD	Use AFM or TOLD	YES	YES	/	/	YES	YES	YES	YES	YES
	DOWN-SLOPE	YES	YES	Use AFM or TOLD	Use AFM or TOLD	YES	YES	YES	/	YES	YES	YES	YES	YES
A / I	COWL	YES	YES	YES	YES	YES	YES	YES	YES	/	YES	NO	NO	YES
	WING	YES	YES	NO	NO	YES	YES	YES	YES	YES	/	NO	NO	YES
IN OP	GROUND SPOILERS	YES	NO	YES	NO	YES	NO	YES	YES	NO	NO	/	NO	YES
	ANTI-SKID	YES	NO	NO	NO	NO	NO	YES	YES	NO	NO	NO	/	YES
	THRUST REVERSER	YES	YES	YES	YES	+600'	NO	YES	YES	YES	YES	YES	YES	/

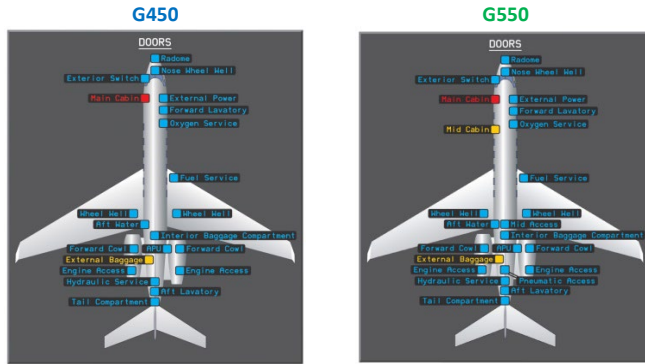


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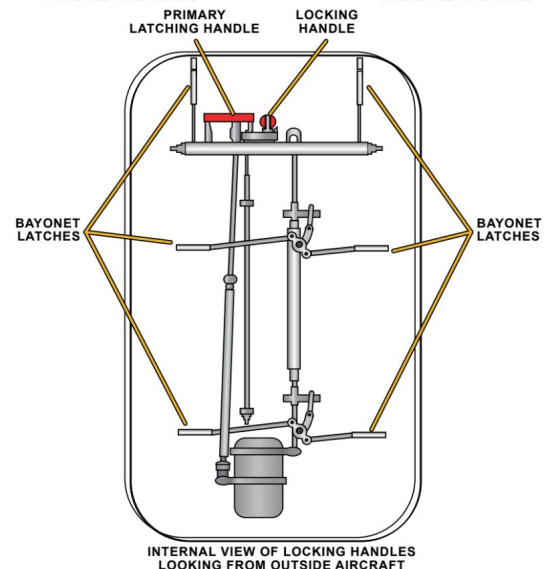
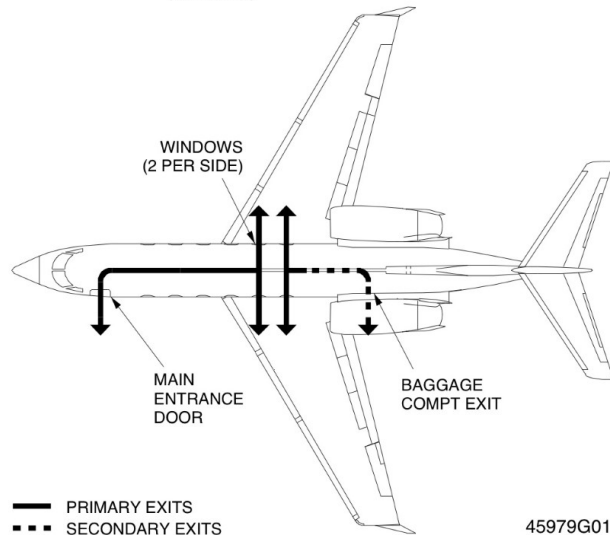
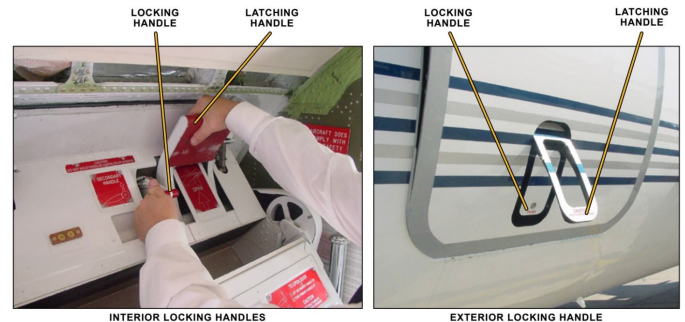
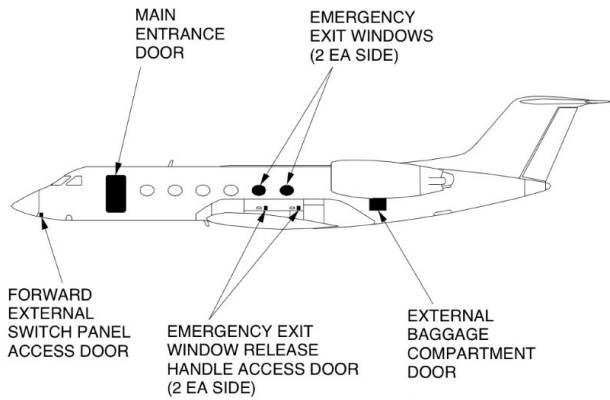
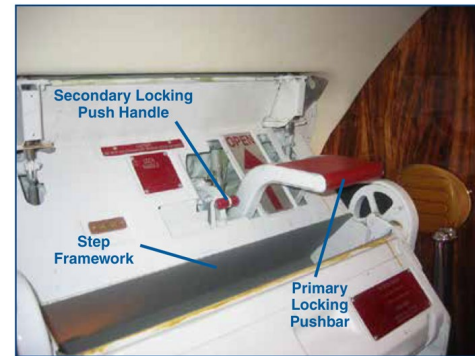
DOORS

- MAIN ENTRANCE DOOR LOCATION
- G450 vs GIV
- MOVED AFT 24 IN
- G550 vs GV
- MOVED FWD 24 IN



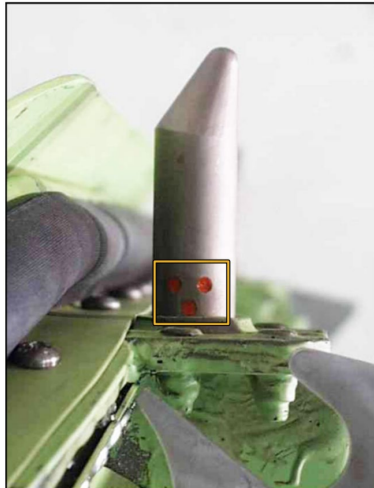
MAIN ENTRANCE DOOR
36 X 60 INCHES

- EMERGENCY EXITS
- PRIMARY (LAND EVAC)
- MAIN ENTRANCE DOOR
- SECONDARY
- CABIN WINDOWS (4)
- BAGGAGE DOOR

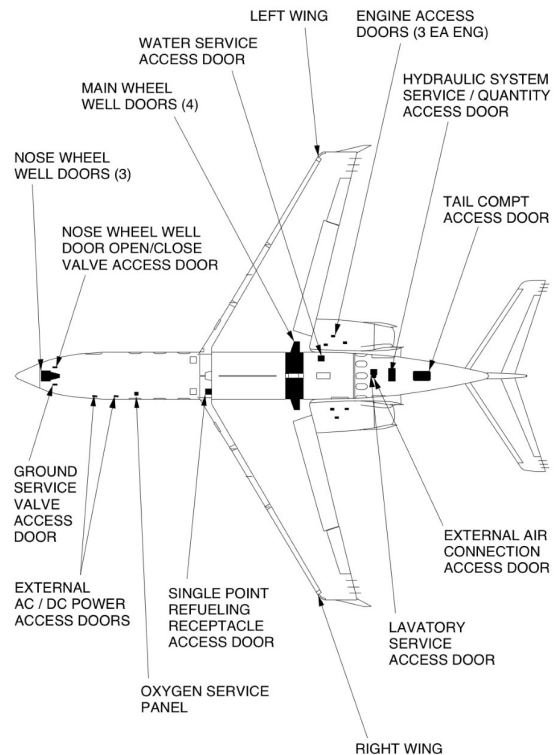




MED BAYONET ENGAGEMENT INDICATORS ◀ LINK



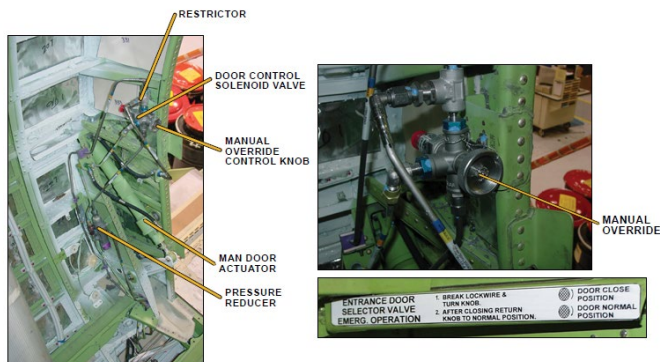
- SERVICE DOORS
- RADOME
- EXTERNAL AC POWER
- EXTERNAL DC POWER
- OXYGEN SERVICE
- HYDRAULIC SERVICE
- FORWARD EXTERNAL SWITCH PANEL
- FUEL SERVICE
- LAVATORY SERVICE
- TAIL COMPARTMENT



NESTER NOTE: NON-REPORTING SERVICE DOORS (NO ANNUNCIATION ON CAS, IF OPEN):
 - GROUND SERVICE VALVE ACCESS PANEL (FORWARD RIGHT FUSELAGE)
 - NOSE GEAR DOOR CONTROL VALVE ACCESS PANEL (FORWARD LEFT FUSELAGE)
 - EXTERNAL AIR DOOR

- MAIN ENTRANCE DOOR CLOSE SWITCHES (3)
- OVERHEAD VESTIBULE EXTERIOR
- DOOR SAFETY SWITCH DISABLES ALL 3 DOOR SWITCHES

NOTE: THERE IS AN AUXILIARY VALVE LOCATED NEAR THE FLOOR NEXT TO THE MAIN ENTRANCE DOOR THAT CAN BE UTILIZED IF THE DOOR WON'T CLOSE. REVIEW THE SYSTEM/PROCEDURES (OM ⇒ CHAPTER 9 HANDLING AND SERVICING PROCEDURES ⇒ DISPATCH UPGRADE PROCEDURES ⇒ MANUALLY OPENING AND CLOSING MAIN ENTRANCE DOOR) BEFORE ELECTING TO USE THE VALVE TO CLOSE THE DOOR.



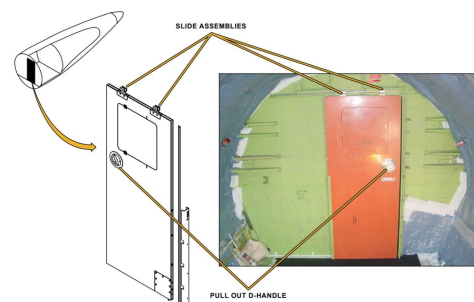
NOTE: THE OUTSIDE DOOR SWITCH USES ONLY THE RIGHT BATTERY UNLESS THE EXTERNAL BATTERY SWITCH IS TURNED ON IN WHICH CASE IT WILL USE BOTH BATTERIES.



- DOOR SEALS
- LOSS OF BAGGAGE DOOR SEAL – CDL, AFM APPENDIX B
- LOSS OF MAIN ENTRANCE DOOR SEAL – CDL, AFM APPENDIX B

- MAIN ENTRANCE DOOR SEAL
- MADE OF FLEXIBLE KNITTED FABRIC COATED WITH RUBBER
- HAS EIGHT SMALL PORTS/VENTS WHICH ALLOW PRESSURIZED AIR FROM THE CABIN TO ENTER THE SEAL INTERIOR, THUS INFLATING THE SEAL – THE GREATER THE DIFF PRESS, THE GREATER THE SEAL

- INTERNAL BAGGAGE DOOR (G450)
- HEIGHT: 64" (5' 4")
- WIDTH: 26" (2' 2")





▪ BAGGAGE DOOR

G450



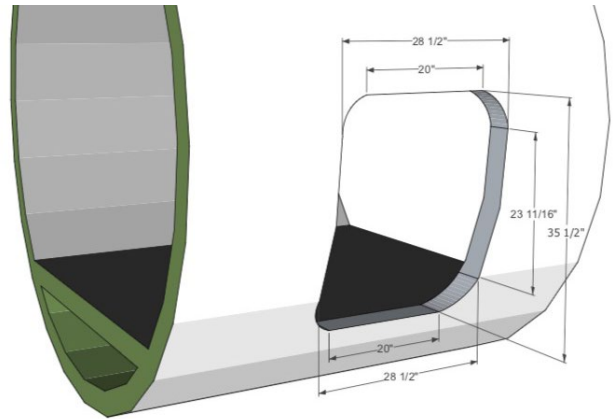
BAGGAGE COMPARTMENT DOOR
28.5 X 35 INCHES

G550



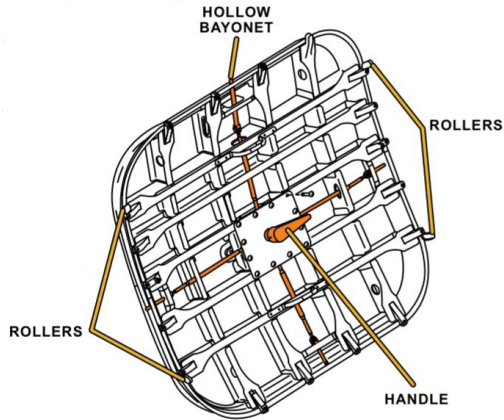
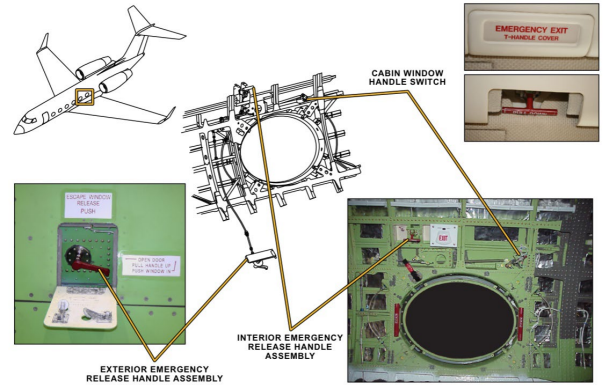
BAGGAGE COMPARTMENT DOOR
40 X 36 INCHES

G450



NOTE: BAGGAGE COMPARTMENT MAXIMUM FLOOR LOADING IS **65 LBS PER SQ. FT.**
(G450) MAXIMUM WEIGHT IN BAGGAGE COMPARTMENT IS **950 LBS.**

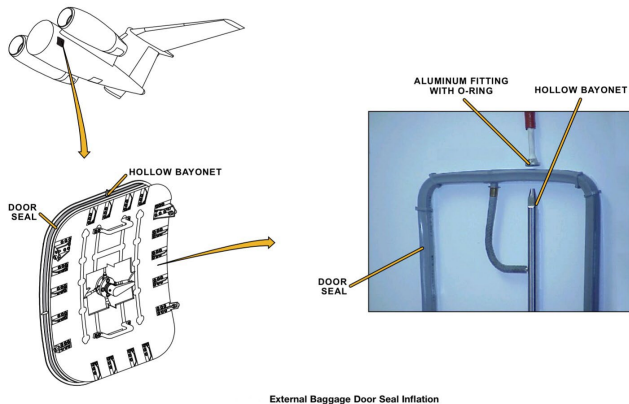
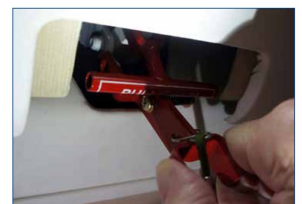
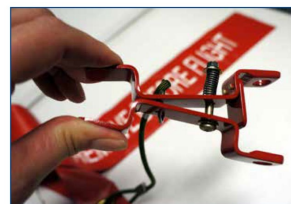
▪ OVERWING EMERGENCY EXIT



▪ OVERWING EMERGENCY EXIT T HANDLE



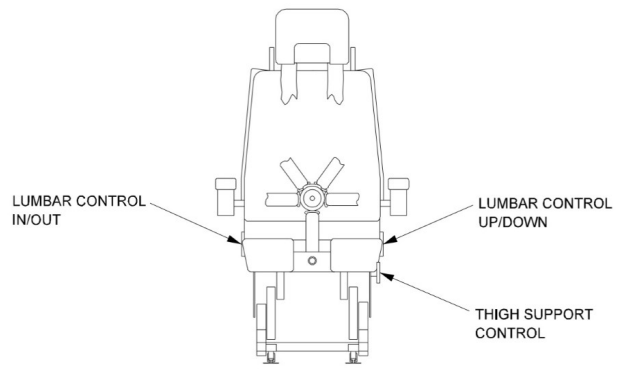
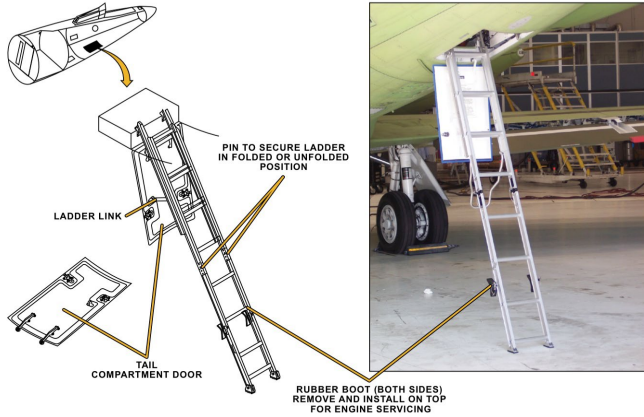
▪ OVERWING EMERGENCY EXIT LOCK



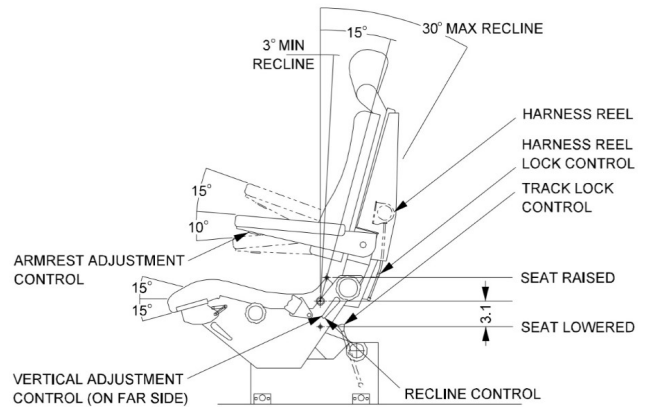
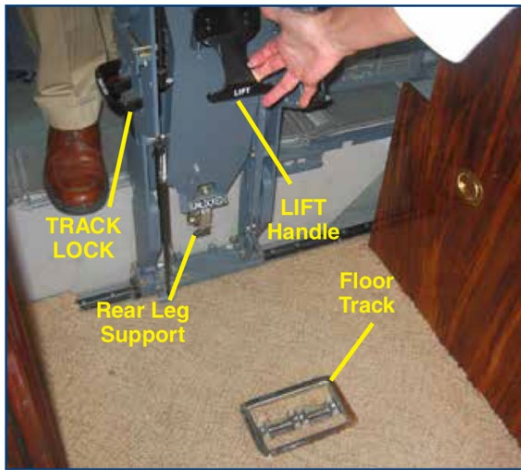
External Baggage Door Seal Inflation



TAIL / AFT EQUIPMENT COMPARTMENT ACCESS



- JUMPSEAT
 - OUTBOARD FLOOR TRACK POSITION IS FOR TAKEOFF AND LANDING
 - INBOARD FLOOR TRACK POSITION IS FOR IN-FLIGHT USE ONLY



NOTES

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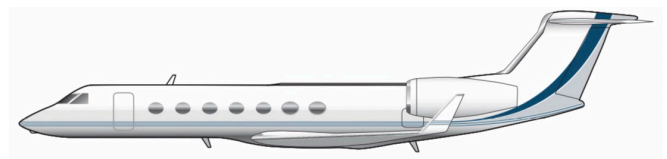
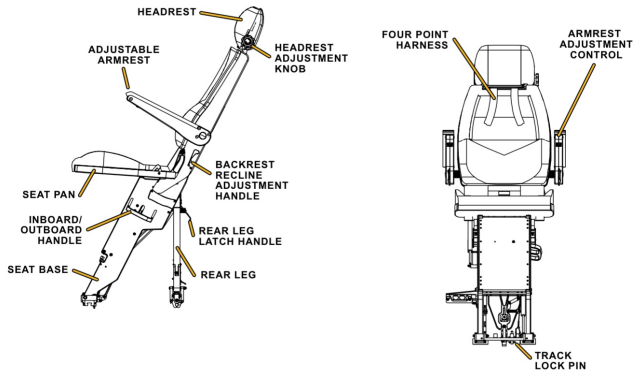
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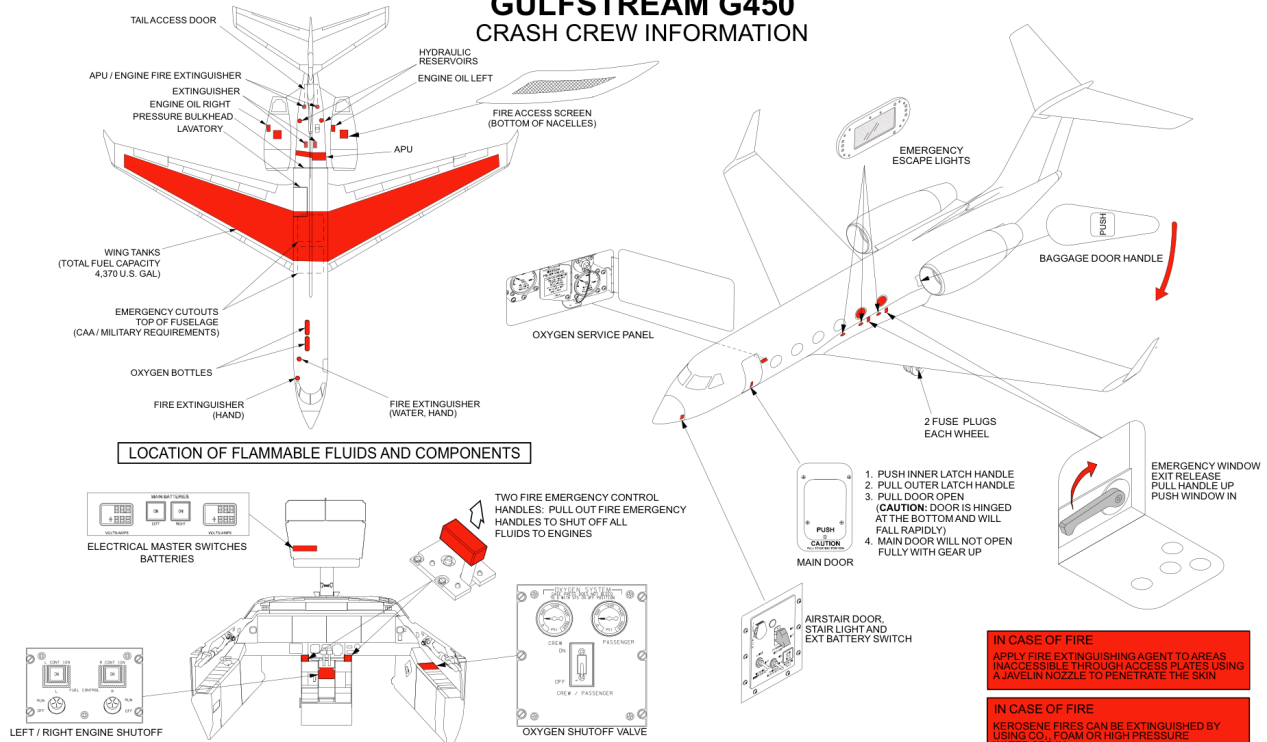
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GULFSTREAM G450 CRASH CREW INFORMATION

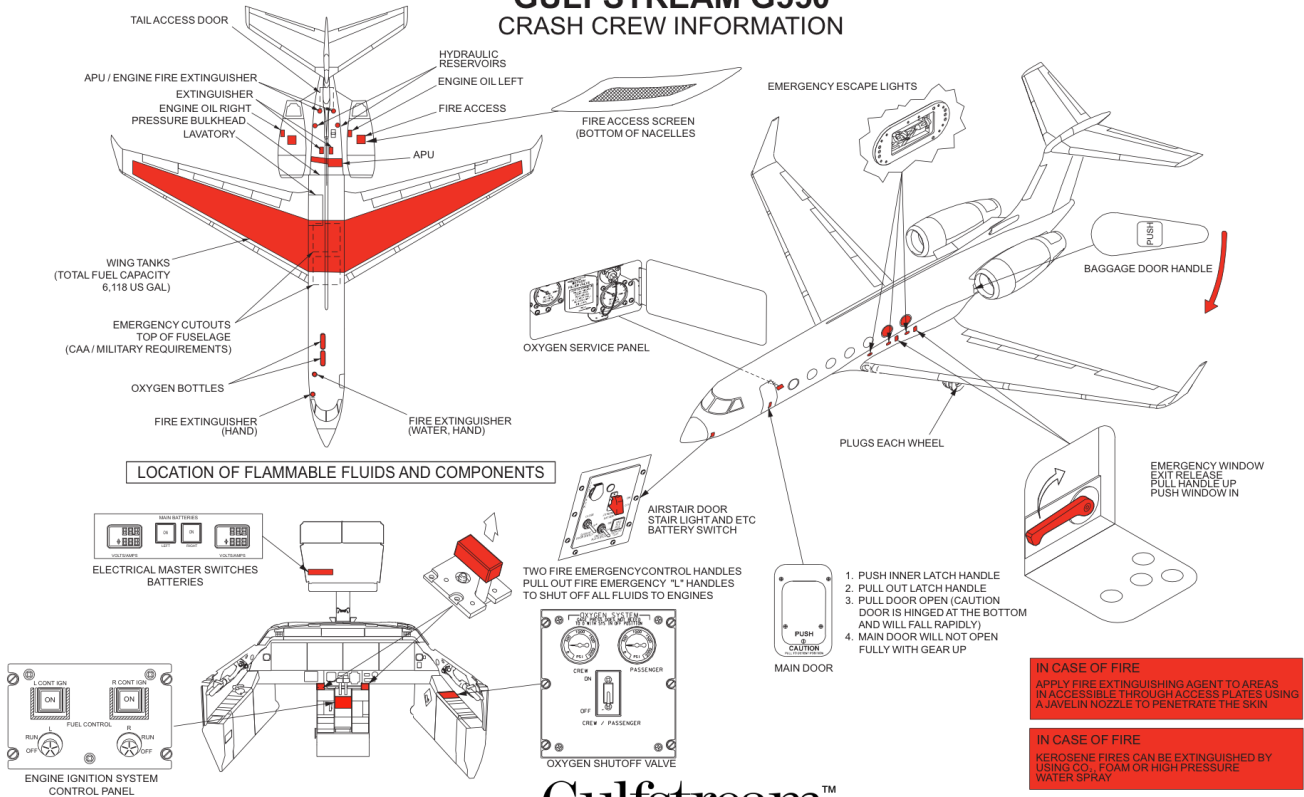


IN CASE OF FIRE
APPLY FIRE EXTINGUISHING AGENT TO AREAS INACCESSIBLE THROUGH ACCESS PLATES USING A JAVELIN NOZZLE TO PENETRATE THE SKIN

IN CASE OF FIRE
KEROSENE FIRES CAN BE EXTINGUISHED BY USING CO₂, FOAM OR HIGH PRESSURE WATER SPRAY



GULFSTREAM G550 CRASH CREW INFORMATION



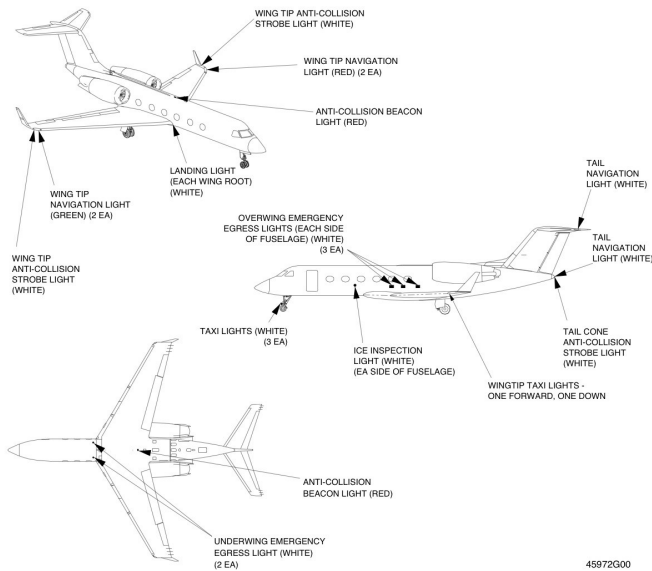
IN CASE OF FIRE
APPLY FIRE EXTINGUISHING AGENT TO AREAS INACCESSIBLE THROUGH ACCESS PLATES USING A JAVELIN NOZZLE TO PENETRATE THE SKIN

IN CASE OF FIRE
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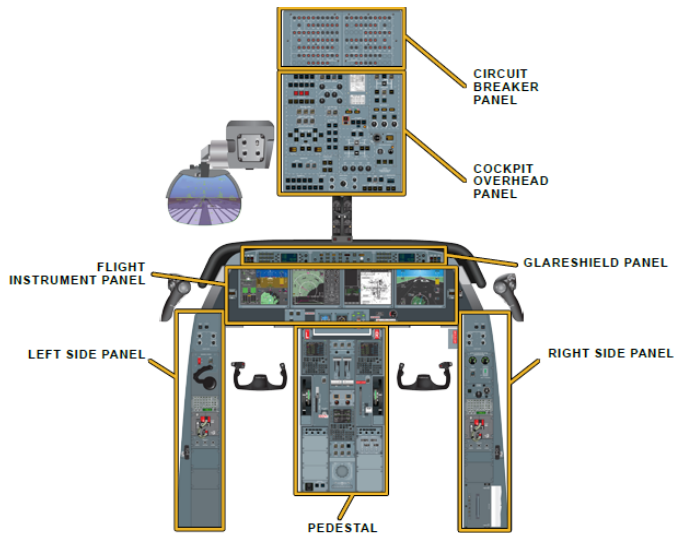
LIGHTING



45972G00

- SUBSYSTEMS
 - FLIGHT DECK LIGHTING
 - CABIN LIGHTING
 - EXTERIOR LIGHTING
 - SERVICE PANEL LIGHTING
 - EMERGENCY LIGHTING

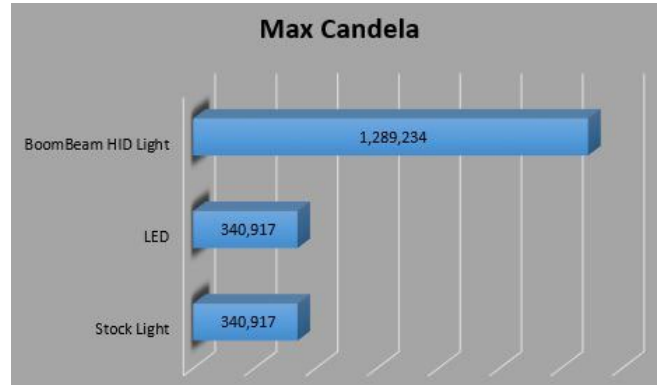
▪ FLIGHT DECK LIGHTING ZONES



- EXTERIOR LIGHTING
 - BEACON, STROBE, NAV, ICE INSP, LOGO, RAMP, LANDING, PULSE, TAXI, WING TIP TAXI, AND WHEEL WELL LIGHTS
 - STROBE LIGHT – 2 IN EACH LOCATION
 - STROBE LIGHT FAULT INDICATOR
 - NAV LIGHTS – 2 IN EACH LOCATION
 - TAXI LIGHTS (3) – AUTO OFF ON GEAR RETRACTION
 - LANDING LIGHTS – AUTO OFF AT **18,000'**
 - **LANDING LIGHT OPERATION LIMITED TO 5 MINUTES WHEN ON THE GND – G450 ONLY**

NOTE: THE LANDING LIGHTS WILL NOT OPERATE ABOVE 18,000' - ONLY THE PULSE LIGHTS WILL.

NOTE: BOOM BEAM (LOPRESTI) HID LANDING LIGHTS ARE AVAILABLE FOR G450 AND G550 VIA STC : [WHELEN AEROSPACE TECHNOLOGIES](http://www.wheelen.com)



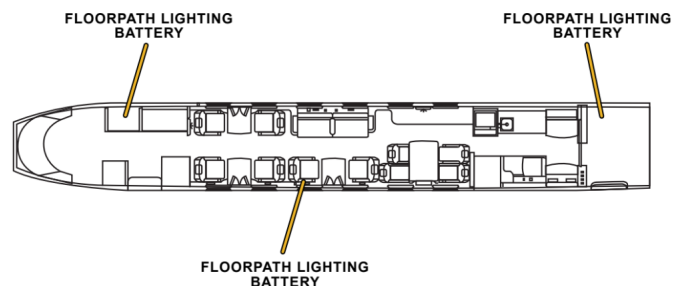
- SERVICE PANEL LIGHTS
 - SINGLE POINT REFUELING
 - LAVATORY SERVICE
 - WATER SERVICE
 - FORWARD EXTERNAL SWITCH PANEL
- BAGGAGE COMPT SWITCH PANEL
 - RAMP (PYLON LIGHTS, 2 ON THE LEFT PYLON, 1 ON THE RIGHT PYLON)
 - EQUIP (TAIL COMPARTMENT LIGHTS)
NOTE: THE AFT PRESSURE BULKHEAD HAS A SMALL SIGHT WINDOW INTO THE AFT EQUIPMENT COMPARTMENT.
 - BAG (BAGGAGE COMPARTMENT LIGHT)

NOTE: A FLASHLIGHT IS MOUNTED IN A RECHARGER OUTLET IN THE BAGGAGE COMPARTMENT.

- TAIL COMPT LIGHTING
 - FIVE (5) OVERHEAD LIGHTS
 - CONTROLLED BY TWO LIGHT SWITCHES
 - THE LIGHT SWITCH LOCATED IN THE TAIL COMPARTMENT TURNS ON ALL FIVE (5) LIGHTS
NOTE: WHEN THE TAIL COMPARTMENT DOOR IS CLOSED POWER IS INTERRUPTED TO THE SWITCH AND THE LIGHTS GO OUT.
 - THE LIGHT SWITCH LOCATED IN THE BAGGAGE COMPARTMENT LABELED "EQUIP" WILL TURN ON TWO (2) OF THE TAIL COMPARTMENT LIGHTS REGARDLESS OF WHETHER THE TAIL COMPT DOOR IS OPEN OR CLOSED
NOTE: THE AFT PRESSURE BULKHEAD HAS A SMALL SIGHT WINDOW INTO THE AFT EQUIPMENT COMPARTMENT.

- EMERGENCY LIGHTING
 - OVERWING EGRESS, UNDERWING EGRESS, EMER LIGHT BATTERIES, EMER CONTROL SWITCHES, AND MAIN ENTRANCE DOOR EMER LIGHTS
 - WHEN ON E-BATTS ONLY THE MASTER LIGHTING CONTROL KNOB FUNCTIONS

- FLOORPATH LIGHTING
 - POWERED BY THREE (3) 22 VDC BATTERIES
 - BATT LOCATION: REER (1), MID-CABIN (1), & AEER (1)
 - THE BATTERIES ARE CHARGED VIA MAIN DC BUS





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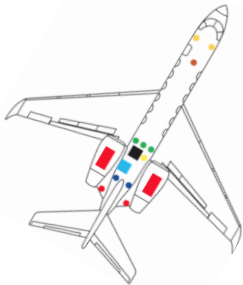


FIRE PROTECTION



NOTE: ALL COMPONENTS OF THE FIRE AND OVERHEAT DETECTION SYSTEM ARE ESS DC - WITH BATT POWER ALL FIRE DETECTION AND TESTING IS AVAILABLE.

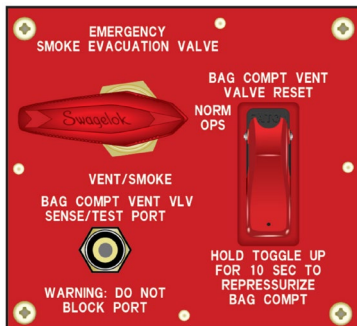
- | | | |
|------------|-------------------------------|----------------------------|
| COMPONENTS | SMOKE DETECTION | BAG COMP |
| | SMOKE EVAC HANDLE | DEFLATES BAG DOOR SEAL |
| | ENG FIRE DETECTION | TWO FIRE LOOPS |
| | | FIRE DETECTOR CONTROL UNIT |
| | PYLON OVERHEAT | 250°F |
| | | SINGLE LOOP |
| | APU FIRE DETECTION | SENSES FIRES AND FAULTS |
| | PAX COMP AND TAIL COMP O'HEAT | THERMAL SWITCHES |
| | | 150°F |



NOTE: COMMUNICATIONS CAN BE ESTABLISHED WITH THE CREWMEMBER OPERATING THE SMOKE EVAC HANDLE VIA THE JUMPSEAT ACP HOT MIC. IF THE SMOKE MASK IS BEING USED PLACE HEADSET MICROPHONE AGAINST THE THROAT TO COMMUNICATE.



- G550, BAG COMPT VENT VALVE RESET
- TOGGLE SWITCH NEXT TO THE SMOKE EVAC HANDLE - HOLD FOR 10 SEC
- OPENS THE BAGG COMP SHUTOFF VALVE
- RESTORES PRESSURIZATION TO THE BAGG COMP



- PAX COMP AND TAIL COMP O'HEAT DETECTION
- HEAT DETECTORS
- 250°F THERMAL SWITCHES (10)
- INDICATE A BLEED AIR LEAK
- LEER, REER, AEER
- FWD, L AFT, CNTR AFT, R AFT FLOOR
- AFT EQUIPMENT
- 22 TOTAL
- PYLONS - Pylon Hot
- QRH FIRST STEPS: APU AIR OFF
- AFFECTED ENGINE BLEED AIR OFF
- TAIL COMPARTMENT (2) - Aft Equipment Hot

NOTE: POSSIBILITY EXISTS THAT A HIGH PRESSURE DUCT HAS BLOWN OR THAT A FIRE IS IN PROGRESS.

- QRH FIRST STEPS: APU AIR OFF
- AFFECTED ENGINE BLEED AIR OFF

NOTE: HIGH TGT OR FF INDICATIONS, LOW EPR, OR AN ABNORMALLY LOW BLEED AIR INDICATION MAY AID IN IDENTIFYING THE AFFECTED ENGINE.

- R AFT FLOOR NEAR HOT AIR DUCTING (3) - R Aft Floor Hot
- QRH FIRST STEP: WING ANTI ICE OFF
- CNTR AFT FLOOR NEAR HOT AIR MANIFOLD (2) - C Aft Floor Hot
- QRH FIRST STEP: WING ANTI ICE OFF

- L AFT FLOOR NEAR HOT AIR DUCTING (3) - L Aft Floor Hot
- QRH FIRST STEP: WING ANTI ICE OFF

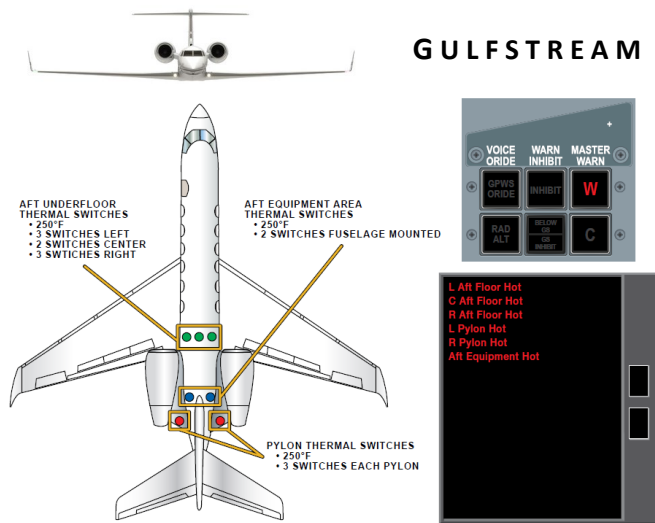
- 150°F THERMAL SWITCHES (12)
- INDICATE ELECTRICAL / TRU OVERHEAT
- AFT BAGG / AEER (2) - Baggage EER Hot
- QRH FIRST STEPS: AFT EQ FAN: LEER F-8 CB CHECK
- TEMP CONTROLS MANUAL, FULL COLD

NOTE: INSPECT BAGGAGE COMPARTMENT TO ENSURE AIRFLOW TO ELECTRONIC EQUIPMENT IS NOT BLOCKED BY LUGGAGE.

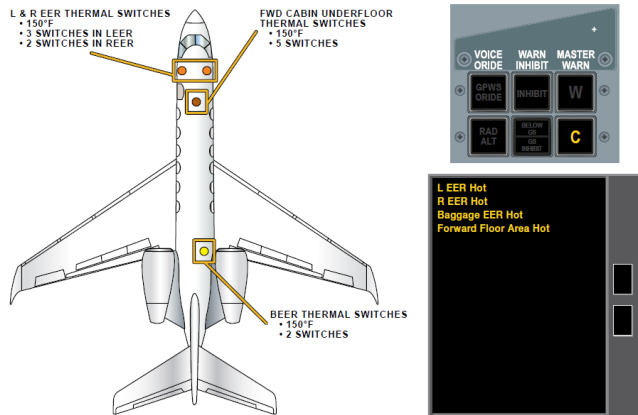
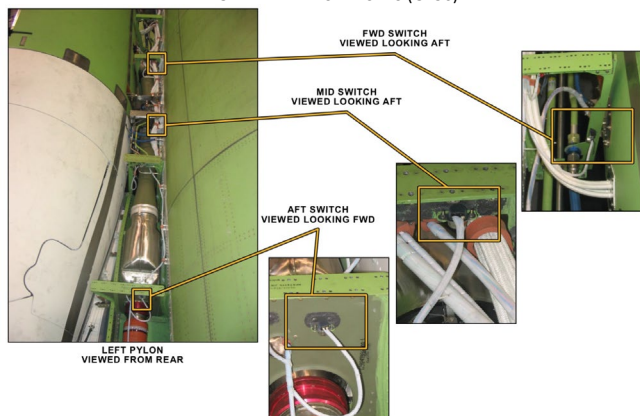
- CABIN FLOOR BENEATH MED AREA (5) - Fwd Floor Area Hot
- QRH FIRST STEPS: L PSU FAN CB: LEER F-7 CHECK
- TEMP CONTROLS MANUAL, FULL COLD

NOTE: WHEN FORWARD CABIN TEMPERATURE IS 106°F (41°C), THE MAX TRU LOAD IS 50%.

- LEER (3) - L LEER Hot
- QRH FIRST STEPS: L LEER FAN CB: LEER D-8 CHECK
- TEMP CONTROLS MANUAL, FULL COLD
- REER (2) - R EER Hot
- QRH FIRST STEPS: R EER FAN CB: LEER D-7 CHECK
- TEMP CONTROLS MANUAL, FULL COLD

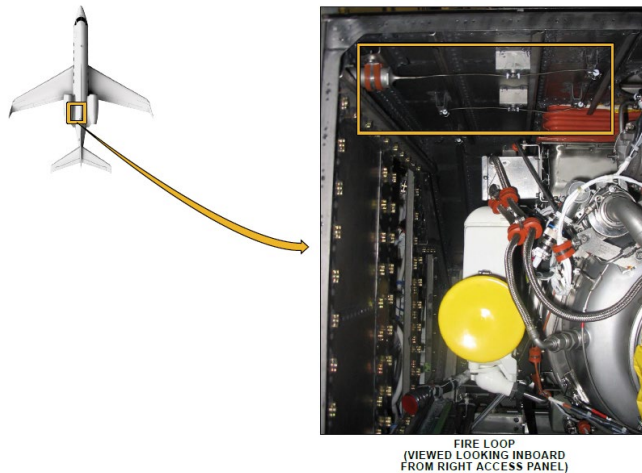


PYLON THERMAL SWITCHES (G450)



- APU:
- FIRE DETECTION
 - HIGH GAS PRESS SENSOR →
 - LOW GAS PRESS SENSOR →
 - FIRE BELL (GND)
 - SEALED TUBE (7 FT)
 - HEAT PRODUCES HIGH PRESSURE →
 - LOOKS FOR RUPTURED TUBE →
 - HELIUM GAS (PRESSURE TYPE)
 - **APU Fire**
 - AUTO-SHUTDOWN
 - **APU Fire Det Fail**
 - NO AUTO-SHUTDOWN

APU Fire QRH FIRST STEPS:
APU MASTER OFF
APU FIRE EXT DEPRESS



NOTE: IF A FIRE IS DETECTED THE APU ECU SHUTS OFF FUEL TO THE APU AT THE **FUEL CONTROL UNIT**. THE APU MASTER SWITCH CONTROLS THE APU **FUEL SHUTOFF VALVE** ON THE LEFT WING REAR BEAM STRUCTURE.

▪ APU FIRE TEST

▪ 6 LIGHTS, 2 CAS MSGS

"EIGHT LIGHTS"

FIRE TEST
 L ENG, APU, R ENG
 LOOP A, TEST, LOOP B

FIRE TEST
 APU
 TEST

FIRE EXT
 FIRE

MASTER WARN
 W, C

MASTER WARN
 W, C

APU Fire

APU Fire Detector Fail

▪ A TEST WILL NOT SHUTDOWN THE APU

▪ FIRE BELL WILL ONLY SOUND ON THE GND

▪ BEFORE STARTING THE APU CONFIRM **Fire Bottle Discharge, L-R** NOT DISPLAYED

Essential AC-Bus Fail

- APU FIRE EXTINGUISHING SYSTEM
- L ESS DC BUS
- SINGLE SHOT - LEFT BOTTLE (#2) ONLY
- EXTINGUISHING AGENT IS ROUTED TO THE ENTIRE APU COMPARTMENT



NOTE: SOME AIRCRAFT HAVE AN OPTIONAL THIRD BOTTLE DEDICATED FOR THE APU.

- SMOKE DETECTOR
- BAGGAGE COMPARTMENT CEILING
 - PHOTOELECTRIC SMOKE DETECTOR
 - **Aft Baggage Flame**
 - **Aft Baggage Smoke**

SEE: [FIRE/SMOKE EMERGENCY](#)

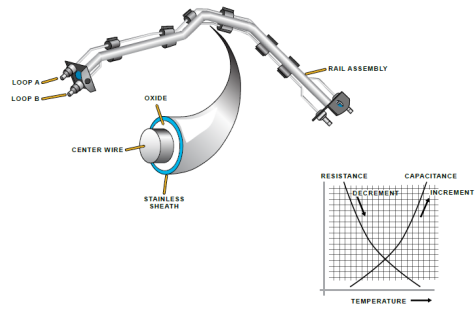
QRH FIRST STEPS:
OXYGEN MASKS AND SMOKE GOGGLES ...DON, SET TO EMERGENCY
SEATBELT / NO SMOKE.....ON
PASSENGER OXYGEN MASK.....DEPLOY / VERIFY
ALL MASTER SWITCHESOFF
EMERGENCY POWER.....ON
RAPID DESCENT BEGIN

NOTE: USE OF AUTOPILOT AND AUTOTHROTTLES IS RECOMMENDED.

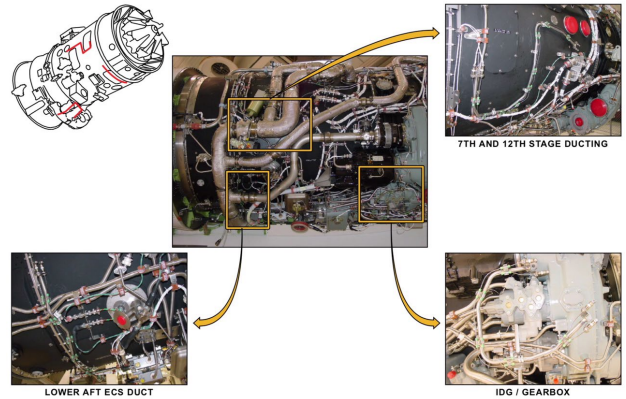


ENG:

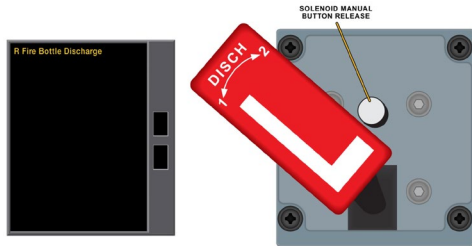
- SENSORS MOUNTED ON RAILS (5 DUAL LOOP SENSORS)
 - SHEATHS OF STAINLESS STEEL SURROUNDED BY GLASS OXIDE MATERIAL. HEAT AFFECTS CURRENT (RESISTANCE TYPE)
 - FIRE HANDLE SHUTS OFF:
 - **FUEL** – AT THE TANK; THE FUEL SHUT-OFF VALVE CLOSES
 - **HYD** – BETWEEN THE HYD RESERVOIR AND THE HYD PUMP; THE HYDRAULIC SHUT-OFF VALVE CLOSES
 - **ELEC** – AT THE IDG
 - 2 FIRE BOTTLES (L AND R)
- NOTE: THERE ARE NO FIRE BOTTLE PRESSURE GAUGES.
- HALON 1301 (CF3Br)
 - 600 PSI AT 70°F
 - **Fire Bottle Discharge** CAS WHEN AT 200 PSI
 - RIGHT BOTTLE - #1 SHOT
 - LEFT BOTTLE - #2 SHOT
 - INTENTIONAL DISCHARGE → THE ENG NACELLE
 - THERMAL DISCHARGE → THE TAIL COMPARTMENT



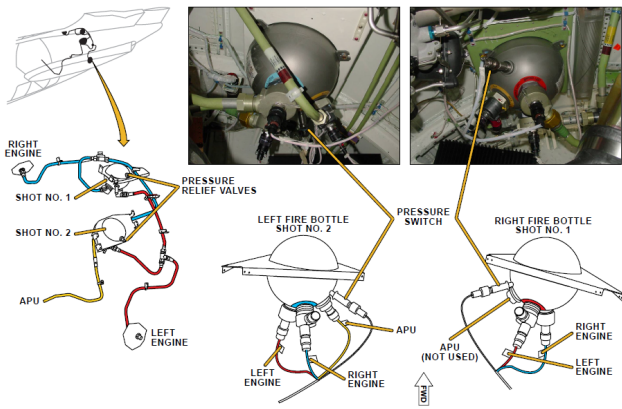
G450 SENSOR ELEMENTS



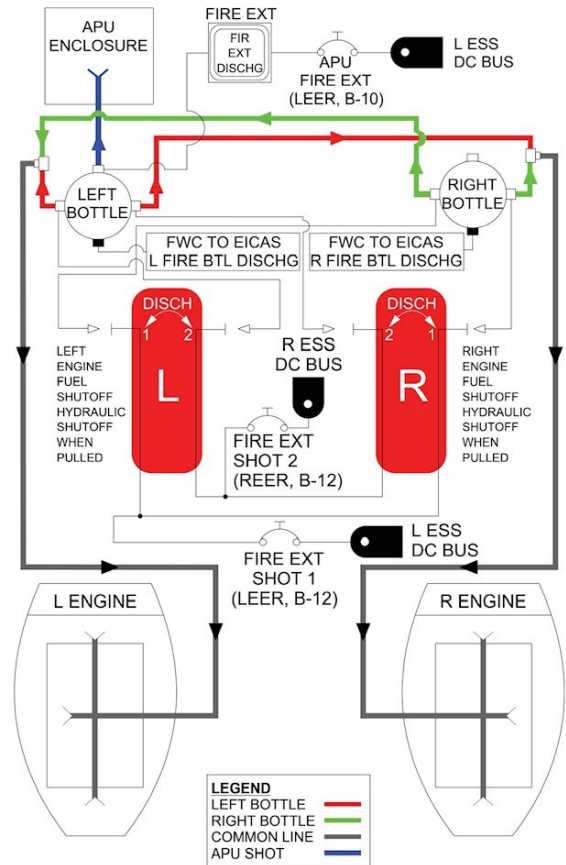
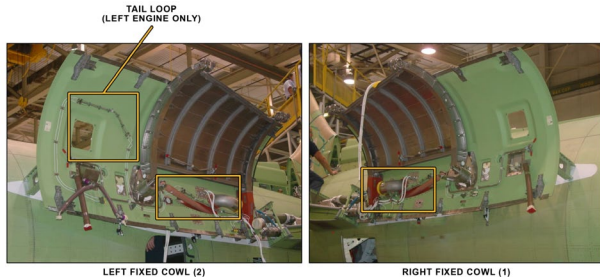
LEFT ENGINE FIRE HANDLE



G450 FIRE BOTTLES



G450 ENGINE FIRE LOOPS



LEGEND
 LEFT BOTTLE
 RIGHT BOTTLE
 COMMON LINE
 APU SHOT



L/R ENGINE FIRE TEST

"EIGHT LIGHTS"



NOTE: THE FIRE DETECTION CONTROL UNITS MONITOR THE LOOPS FOR A CHANGE IN VOLTAGE.

+ 5 VOLTS WILL CAUSE AN INDICATION OF A FIRE.

- 5 VOLTS WILL CAUSE AN INDICATION OF A FAULT.

6 LIGHTS, 2 CAS MSGS:

- LOOP A LOOP B LIGHTS (2)
MASTER WARN LIGHTS (2)
FIRE HANDLE LIGHTS (1)
L/R FUEL CONTROL SWITCH LIGHTS (1)
THREE-CHIME AURAL WARNING TONE
ENGINE FIRE CAS MESSAGE (1)
ENGINE FIRE LOOP ALERT CAS MESSAGE (1)

NOTE: FOR EVERY ENG FIRE THERE WILL BE TWO CAS MSGS:

L or R ENGINE FIRE & L or R ENGINE FIRE LOOP

ENGINE FIRE IN FLIGHT

IMMEDIATE ACTION:

- AFFECTED ENGINE IDENTIFY
AFFECTED ENGINE POWER LEVER IDLE
AFFECTED ENGINE FUEL CONTROL OFF
AFFECTED ENGINE FIRE HANDLE PULL
AFFECTED ENGINE FIRE HANDLE ROTATE OUTBOARD
CALL "ENGINE FIRE IN FLIGHT CHECKLIST" (EC-2)

NOTE: G550 QRH, "THE IMPORTANT ACTION FOR CONTROLLING AN ENGINE FIRE IS TO SHUT THE AFFECTED ENGINE DOWN AND SHUTOFF THE COMBUSTIBLE FLUIDS AS QUICKLY AS POSSIBLE" (G550 QRH EC-2).

FIRE DETECTION LOOP FAULT CAS

- SELECT FAULTY LOOP OFF
PERFORM FIRE TEST
"GOOD TEST, GOOD ENGINE"
"BAD TEST, BAD ENGINE"

ENGINE FIRE DETECTION FAULT TEST

"EIGHT LIGHTS"



EIGHT (8) AMBER LIGHTS:

- TEST LEGEND IN THE FAULT TEST SWITCH (1)
FAULT LEGENDS IN THE LEFT/RIGHT LOOP A/B SWITCHES (4)
TWO MASTER CAUTION (2) AND TWO-CHIME AURAL CAUTION TONE
Fire Detection Loop Fault CAS MESSAGE (1)

NOTE: PERFORMING THE FAULT TEST CHECKS THE CONDITION OF ONLY THE FAULT DETECTION CIRCUIT OF THE FIRE DETECTION CONTROL UNIT, NOT THE LOOPS.

FIRE DETECTION CONTROL UNITS

MONITOR THE LOOPS FOR A CHANGE IN VOLTAGE. + 5 VOLTS ON EITHER LOOP A OR B WILL CAUSE A PARTIAL INDICATION OF A FIRE:

CODE450:

ENGINE FIRE LOOP ALERT

- LOOP A or B
Engine Fire Loop Alert CAS MESSAGE (1)
MASTER WARN LIGHTS (2)

- 5 VOLTS WILL CAUSE AN INDICATION OF A FAULT

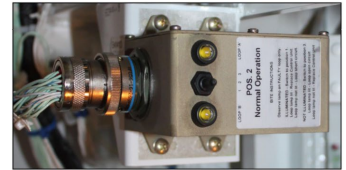
- Fire Detection Loop Fault CAS MESSAGE

IF BOTH LOOPS SHOW + 5 VOLTS A FULL INDICATION OF A FIRE WILL BE SHOWN:

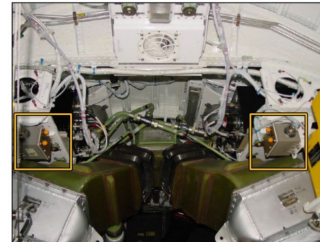
- 6 LIGHTS, 2 CAS MSGS:
LOOP A LOOP B LIGHTS (2)
MASTER WARN LIGHTS (2)
FIRE HANDLE LIGHTS (1)
L/R FUEL CONTROL SWITCH LIGHTS (1)

- THREE-CHIME AURAL WARNING TONE
Engine Fire CAS MESSAGE (1)
Engine Fire Loop Alert CAS MESSAGE (1)

FIRE DETECTION CONTROL UNIT (G450)



CONTROL UNIT



AFT EQUIPMENT BAY LOOKING FORWARD

PORTABLE FIRE EXTINGUISHERS

NOTE: THERE, SEALED, SECURED (TSS).

- HALON (8.2 LBS) - FOR OIL, GREASE, AND ELEC FIRES (CLASS A, B, OR C FIRES)
- DURATION: 9-12 SEC
- DISCHARGE DISTANCE: 6-12 FT
- HAS A PRESSURE GAUGE
- EXTINGUISHES BY STOPPING THE CHAIN REACTION
- WORKS BEST IN CONFINED AREAS
- FUMES TOXIC IF INHALED
- PRODUCTION HALTED IN 1994 (OZONE)
WATER AND ANTIFREEZE (7 LBS) - FOR PAPER OR CLOTH FIRES (CLASS A FIRES)
- DURATION: 30 SEC
- DISCHARGE DISTANCE: 12-18 FT

"P.A.S.S."

- PULL
AIM - AT THE BASE OF THE FLAMES
SQUEEZE
SWEEP

TRASH BIN FIRE EXTINGUISHERS "KIDDE"

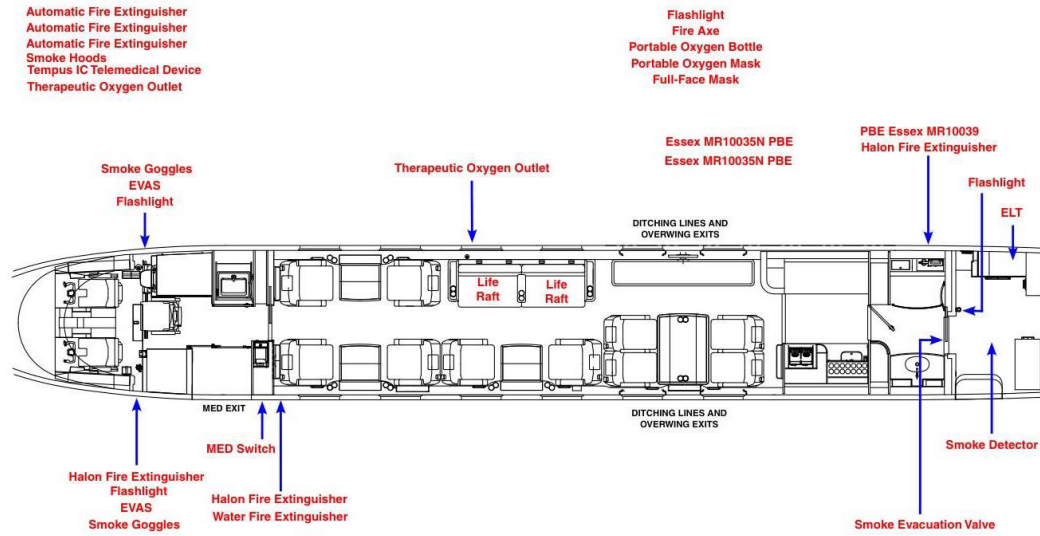
- GALLEY & LAV
INTEGRATED FIRE DETECTOR AND HALON EXTINGUISHING UNIT (9 CU IN. EXT AGENT)
CAPPED FUSIBLE ALLOY (170°F)
DISCHARGE INTO TRASH BINS (3-15 SEC)



NOTE: TRASH BIN EXTINGUISHERS ARE NOT REQUIRED BY REGULATION. SOME S/Ns DO NOT HAVE GALLEY OR LAV EXTINGUISHERS DUE TO THE FIREBOX DESIGN OF THE TRASH BINS AND CUSTOMER FEEDBACK.



G450 SELECT CABIN
EMERGENCY EQUIPMENT LAYOUT



13 Passenger Life Vests
(In the Seat Base or Footrest of Each Single Seat, in the Seat Base Pouch of Each Double Seat and Under the Divan)

3 Crew Life Vests
(In Cockpit)

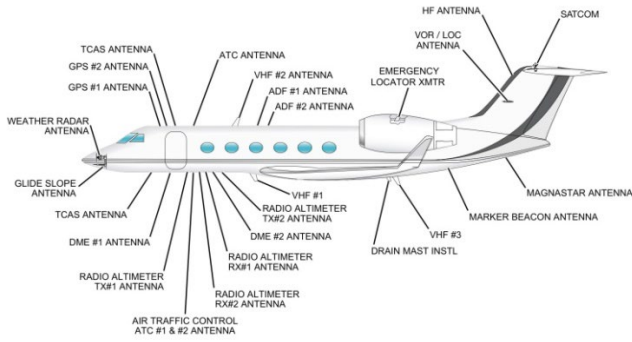
Child Restraint System
Infant Life Vest
Child Life Vest

Loose Equipment:
(The following equipment is provided as loose equipment)
First Aid Kit Advanced Aviation Medical Kit
Defibrillator
Bubble Humidifier
Therapeutic Oxygen Mask
Emergency Medical Kit



COMMUNICATIONS

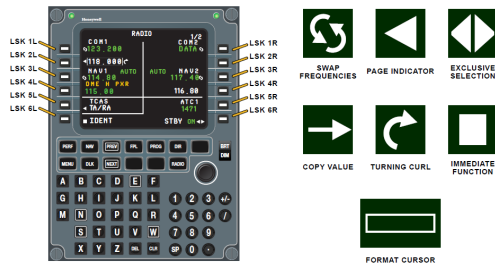
Exterior Antenna Locations



- VOICE
 - VHF (3) – TRANSCEIVERS AND ANTENNAS, (HONEYWELL TR-866B)
 - MCDU OR CCD (8.33 OR 25 kHz INCREMENTS)
 - HF (2) – TRANSCEIVERS AND COUPLER, MCDU (ROCKWELL COLLINS HF-9034A)
 - HF ANTENNA ATTACHMENT MAKES THE AIRCRAFT AN ANTENNA
 - SATCOM (HONEYWELL MCS-7000)

NOTE: VHF #3 NORMALLY USED FOR DATA.

- MCDU TUNING



- ACP
 - EMER BUTTON
 - BYPASSES ACP
 - DIRECT LINK BETWEEN HEADSET AND COM #1
 - VOLUME
 - HOLD ANY BUTTON TO 2 SEC FOR VOLUME CONTROL
 - XFER
 - A PHONE CALL RCVD IN THE COCKPIT IS TRANSFERRED TO THE CABIN
 - SELCAL
 - PRESSING THE SELCAL BUTTON DISPLAYS THE PROGRAMMED SELCAL CODE ON THE ACP SCREEN
 - THE SELCAL BUTTON ILLUMINATES GREEN WHEN A SELCAL IS RECEIVED – A BLUE CAS ADVISORY ALSO DISPLAYS. PRESSING THE SELCAL BUTTON OR A MIC BUTTON CANCELS THE TONE AND GREEN LIGHT.
 - WHEN ILLUMINATED (PRESSED) VOLUME CONTROL OF THE MAINT COM JACK (FWD. EXT SWITCH PANEL AND AFT TAIL COMP) IS CONTROLLED.
 - HAS NO FUNCTION ON SN 4110 AND SUB; ONLY WORKED ON AIRCRAFT WITH MAGNASTAR
 - MAINT
 - WHEN ILLUMINATED (PRESSED) VOLUME CONTROL OF THE MAINT COM JACK (FWD. EXT SWITCH PANEL AND AFT TAIL COMP) IS CONTROLLED.
 - FONE / CONF
- AUDIO CONTROL PANEL (HONEYWELL AV-900)
 - NOTE:
 - NORM OPS
 - ST
 - ICS
 - HDPH
 - H'MIC
 - COM 1 MIC+AUD
 - NOTE: IF THE HAND-HELD MIC IS KEYED THE ONSIDE SPKR IS AUTOMATICALLY ACTIVATED.



NOTE: THE OBSERVER'S ACP "SPKR" AND "EMER" BUTTONS HAVE NO FUNCTION.

DICHIARA NOTE: IF THE MIC BUTTON IS HELD DOWN FOR MORE THAN 30 SECONDS THE AUTO STUCK MIC PROTECTION WILL SHUT OFF THE MIC UNTIL YOU LET GO OF THE MIC PUSH TO TALK SWITCH.

- SATCOM
 - HONEYWELL MCS-7000+; (INMARSAT)
 - L-BAND COMMUNICATIONS LINK
 - ALL DIGITAL, USES BOTH VOICE AND DATA CHANNELS
 - USES THE INMARSAT SATELLITE NETWORK – GEOSTATIONARY SATELLITES (12)
 - SATCOM EQUIPMENT LIST
 - SATELLITE DATA UNIT (SDU) – SEVEN CHANNELS
 - HIGH POWER AMPLIFIER (HPA) – 20 WATTS
 - HIGH POWER GAIN ANTENNA (HGA) WITH ANTENNA CONTROLLER UNIT (ACU) – STEERABLE ANTENNA, USING IRS
 - ATTENUATOR
 - NETWORK INTERFACE MODULE (NIM)
 - MULTIFUNCTION CONTROL DISPLAY UNIT (MCDU)
 - AUDIO CONTROL PANEL (ACP)
 - NOTE: SATCOM MAY NOT BE USABLE ABOVE 70° LATITUDE.
 - NOTE: DO NOT TURN ON SATCOM MASTER WHILE IN A HANGAR.
 - SATCOM MAIN MENU; (INMARSAT)
 - MENU → SAT (6L) → DIRECTORY, (CALLING USA) ENTER 001#



SATCOM DIALING (INMARSAT)

- ENTRY FORMAT: INTERNATIONAL ACCESS CODE (00), COUNTRY CODE (XXX), CITY CODE OR AREA CODE (XXX) AND PHONE NUMBER (XXX-XXXX)

SAT (SATCOM) BUTTONS

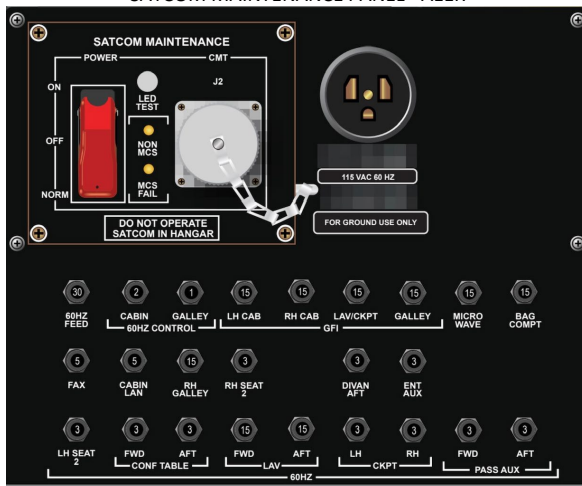
- RECTANGULAR BUTTON – MIC
- ROUND BUTTON – AUDIO
- AN INCOMING CALL CAUSES BOTH BUTTONS TO FLASH, SELECTING EITHER ONE ANSWERS THE CALL – BOTH BUTTONS GO FROM FLASHING TO STEADILY LIT
- WHEN THE MIC (RECTANGULAR BUTTON) IS DESELECTED THE CALL IS ENDED
- TO INITIATE A CALL THE MCDU MUST BE SET, THEN SELECT MIC (RECTANGULAR BUTTON)



NOTE: SN 4001-4109 HAD MAGNASTAR RADIO TELEPHONE SYSTEMS, SN 4010 AND SUB HAVE AIRCELL AXCESS IRIIDIUM IN-FLIGHT TELECOMMUNICATIONS SYSTEMS. MAGNASTAR WAS DECOMMISSIONED IN 2013.

- SATCOM TROUBLE-SHOOTING
 - CHECK MCDU FOR SDU SCRATCHPAD MESSAGES
 - CHECK WHETHER SATCOM IS AVAILABLE AND LOGGED ON, MCDU **MENU** → **SAT** (6L)
 - FROM THE HANDSET, ATTEMPT AN IRIIDIUM CALL, ENTER 9 + COUNTRY CODE + NUMBER
 - FROM THE HANDSET, ATTEMPT AN INMARSAT CALL, ENTER 9*2* + COUNTRY CODE + NUMBER
 - CHECK THE SATCOM MAINTENANCE PANEL (AEER) FOR FAULT INDICATIONS AND CYCLE POWER SWITCH IF NECESSARY

SATCOM MAINTENANCE PANEL - AEER



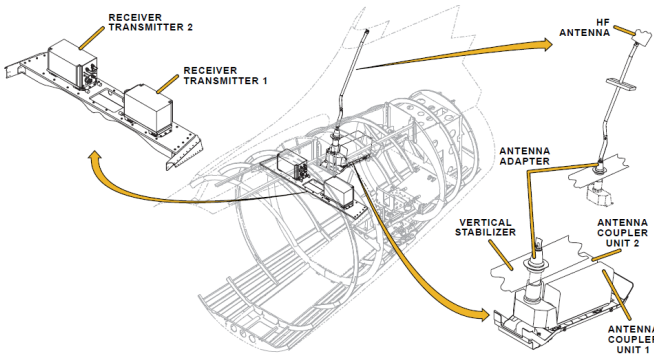
- SELCAL
 - VHF (3) AND HF (2)
 - 4 LETTER DECODER CARD IN EACH AUDIO INTERFACE UNIT (AIU)
 - WHEN THE SELCAL BUTTON IS PUSHED (ACP) THE AIRCRAFT SELCAL CODE IS DISPLAYED FOR 5 SEC
- COM 1
 - LOWER ANTENNA, FWD OF THE WING LEADING EDGE
- COM 2
 - UPPER ANTENNA
- COM 3
 - LOWER ANTENNA, ADJACENT THE DRAIN MAST

- HF DETAIL PAGE (MCDU)
 - CONTROLS:
 - TUNING
 - TUNING MODE OPTIONS
 - SIMPLEX (TX AND RX ON THE SAME FREQ)
 - SPLIT (DUPLEX; TX ON ONE FREQ AND RX ON ANOTHER FREQ)
 - EMERGENCY
 - ITU (CHANNEL NUMBERS)
 - TRANSMIT POWER OPTIONS
 - LO/MED/HI
 - OFF/LO/MED/HI
 - OPERATING MODE OPTIONS
 - UPPER SIDEBAND VOICE (UV)
 - LOWER SIDEBAND VOICE (LV)
 - AMPLITUDE MODULATING (AM)
 - UPPER SIDEBAND DATA (UD)
 - LOWER SIDEBAND DATA (LD)
 - CONTINUOUS WAVE (CW)

NOTE: ALL DASHES AT TRANSMIT MAY INDICATE A LOSS OF GAS CHARGE IN THE ANTENNA COUPLER.

- WIRED HANDSETS
 - FLIGHT DECK AND GALLEY
 - TO PLACE AN IRIIDIUM CALL, ENTER 9 + COUNTRY CODE + NUMBER
 - TO PLACE AN INMARSAT CALL, ENTER 9*2* + COUNTRY CODE + NUMBER
- INMARSAT ANALOG HANDSET
 - INCLUDED AS LOOSE EQUIPMENT
 - CONNECTS TO A 15-PIN INTERFACE PORT IN THE CABIN
 - ENTER 00 + COUNTRY CODE + NUMBER, PRESS # TO SEND
 - IF CALL FAILS, DIAL **59 TO CHECK SYSTEM CONNECTION





- HF EMER MODE
 - EMER1 (2182 kHz)
 - EMER2 (4125 kHz)
 - EMER3 (6215 kHz)
 - EMER4 (8291 kHz)
 - EMER5 (12290 kHz)
 - EMER6 (16420 kHz)



NOTE: USCG "AMVER" FREQ: PACIFIC 2828 & 5696, ATLANTIC 5696 & 8984

NOTE: AIR TO SHIP FREQ: 2182

- ITU MARITIME MODE
 - INTERNATIONAL TELECOMMUNICATIONS UNION (ITU)
 - 249 PREPROGRAMMED RECEIVER-TRANSMITTER PUBLIC CORRESPONDENCE CHANNELS
 - EXAMPLE: ITU CHANNEL 401 TRANSMITS ON 4065 kHz, RECEIVES ON 4357 kHz
<https://navcen.uscg.gov/doc/rtchan/txt>

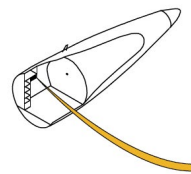


- CVR (HONEYWELL AR-120 SSCVR, OR L3)
 - 120 MIN
 - COCKPIT VOICE RECORDER UNIT – TAIL COMP – SOLID STATE DIGITAL MEMORY, WATER ACTIVATED BEACON – INTERNAL BATTERY
 - 2.5 G IMPACT SWITCH
 - BULK ERASE BUTTON
 - LOCATED IN THE REER
 - MAIN ENTRANCE DOOR MUST BE OPEN
 - HOLD FOR 7 SEC

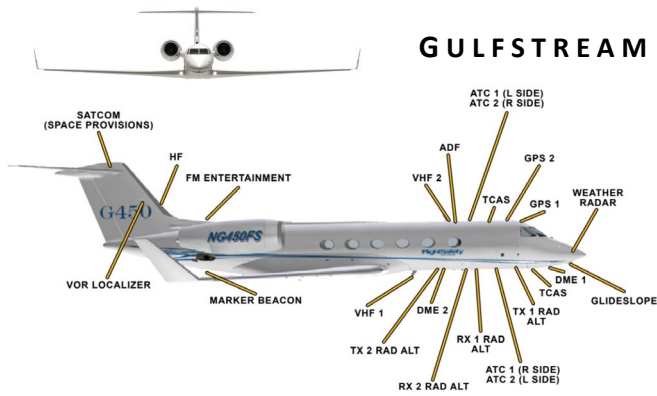
- DFDR (HONEYWELL AR-245 SSFDR, OR L3)
 - 25 HRS OF DATA – TAIL COMP
 - DFR/CMC EVENT SWITCH ON OVERHEAD (RECORDS - 30 SEC + 1 MIN)



- ELT (ACR ARTEX C604-N)
 - AIRCRAFT POWER - 28 V EMERGENCY DC BUS
 - INTERNAL BATTERIES - 4 "D" SIZE LITHIUM/MAG DIOXIDE
 - UPPER SHELF AEER
 - 4.5 FPS G-FORCE OR MANUAL ACTIVATION
 - ITS POLYCARBONATE PLASTIC CASING CAN WITHSTAND 500Gs & 1,000 LB CRUSH WEIGHT
 - TEMPERATURE RANGE: -20°C TO +55°C
 - BROADCASTS AN AUDIBLE SIREN SOUND
 - 121.5 MHz, 243.0 MHz, and SAT FREQ 406.025 MHz TRANSMISSIONS
 - LAT/LONG INTERFACE FROM IRS - POSITION DATA IS CONTINUALLY FURNISHED TO THE ELT FROM IRS #1 (100 METER ACCURACY)
 - 406 MHZ DATA TRANSMISSIONS CONTINUE FOR 24 HRS – THEN CEASE
 - 121.5 MHz, 243.0 MHz TRANSMISSIONS NORMALLY LAST FOR 50 HRS



- STATIC WICKS (17 / 15)
 - 3 – EACH WING
 - 9 / 7 – ELEVATOR AND RUDDER
 - 2 – TAIL CONE
 - FOR A MISSING STATIC WICK CHECK THE CDL, AFM APPENDIX B – "STATIC DISCHARGERS"



CODE 450

- ▶ [COMMUNICATIONS SYSTEMS](#)
- ▶ [COMMUNICATIONS SYSTEMS ABNORMALS](#)

NOTES

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Gulfstream®

SPECIAL MISSIONS



CAEW

ADVANCED AIRBORNE EARLY WARNING — G550

CONNECTIVITY

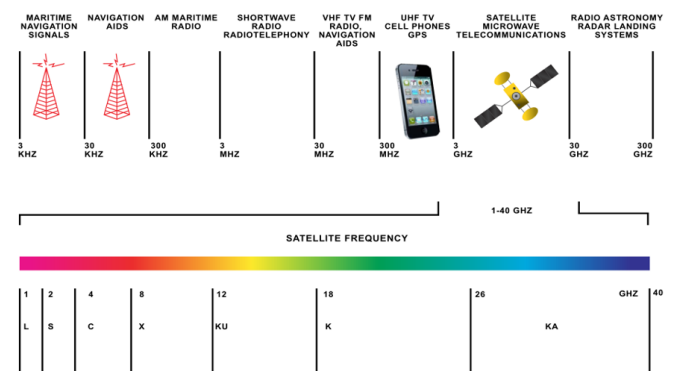
CONNECTIVITY HISTORY (GAC WHITE PAPER):

“Gulfstream first introduced in-flight connectivity IN 2004 with a **L-band** system. Known by the brand name **Swift 64**, the service provided global connectivity but at speeds limited to 64 Kbps. Network improvements led to enhanced data speeds—432 Kbps—and a rebranding three years later, and the service is now known as **SwiftBroadband**. A **Ku-band** system, **Yonder**, came online in 2006 and provided connectivity over frequently traveled routes around the world, including transoceanic tracks, at maximum speeds of 2 Mbps. Today, **Yonder** is known as **SatLink 3.0** and delivers speeds up to 4 Mbps. Yonder’s challenge is related to its use of leased satellites that contribute to reliability issues such as system interruptions and coverage limitations. **Jet ConneX** is the next generation of airborne connectivity. **Inmarsat** launched the first of the four satellites that provide the service in 2013 and the final was put into orbit in May 2017. This new satellite constellation transmits in the **Ka-band**, a high-frequency spectrum. Seldom used previously, Ka has plenty of available bandwidth, and the state-of-the-art satellites transmit using steerable spot beams to provide targeted coverage. This allows for the guaranteed connection speeds, known as committed information rates.”

BAND BASICS

“Satellite transmission frequencies are measured in gigahertz. The higher the frequency and the wider the frequency range, the greater the capacity to carry data. The **L-band** that **SwiftBroadband** occupies utilizes the 1 to 2 gigahertz frequency range. **Ku-band** ranges from 12 to 18 gigahertz. **Ka-band** is the highest frequency spectrum used commercially today and ranges from 26.5 gigahertz to 40 gigahertz”

“Another major contributing factor to reliable connectivity and speedy data rates while airborne involves satellite beam technology. Wide-beam satellites cast a single broad net over a large area. The challenge for the **Ku-band** services is this technology sacrifices speed for coverage area, and the number of users tapping into the beam at any one time further erodes speeds. Spot-beam satellites, by contrast, project hundreds of narrow but highly powerful pipes that can provide capacity where and when needed. And because the spot beams are highly focused, the satellite can use the same frequencies to transmit to multiple receivers located in different geographic locations. The recently deployed **Ka-band** satellites transmit narrow beams, and **SwiftBroadband** uses the spot beams of the **L-band** satellites. Spot beams are becoming the industry standard. The next generation **Ku-band** satellites are slated to employ that technology.”





- INTERNET
 - INMARSAT JET CONNEX ("GLOBAL XPRESS NETWORK")
 - UP TO 15 Mbps
 - Ka-BAND NETWORK
 - GLOBAL – EXCLUDES POLAR REGIONS
 - GOGO BIZ 3G
 - UP TO 3.1 Mbps
 - AIR-TO-GROUND NETWORK
 - REGIONAL – LIMITED TO THE CONTINENTAL U.S. AND PORTIONS OF CANADA AND ALASKA
 - VIASAT ("YONDER" / "BBML")
 - UP TO 2.0 Mbps
 - Ku-BAND NETWORK
 - REGIONAL – LIMITED TO POPULAR ROUTES, EXCLUDES RUSSIA, CHINA, AND INDIA
 - INMARSAT SWIFT BROAD BAND ("SBB")
 - UP TO 432 Kbps
 - L-BAND NETWORK
 - GLOBAL – EXCLUDES POLAR REGIONS

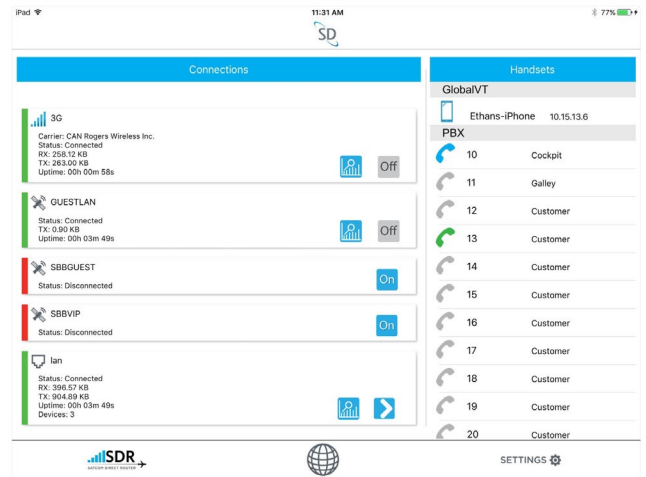
- VOICE
 - IRIDIUM
 - FULLY GLOBAL
 - VOICE AND DATA (UP TO 2.4 Kbps)
 - TWO CHANNELS
 - COMES AS STANDARD EQUIPMENT ON G450 AND G550 AIRCRAFT
 - SOME LATENCY (DELAY) CAN BE EXPECTED
 - DOES NOT SUPPORT 911 CALLING, OR TOLL-FREE NUMBERS, 800, 877, 888, ETC
 - INMARSAT VOICE
 - GLOBAL, EXCLUDING POLAR REGIONS
 - 2 VOICE CHANNELS, 1 DATA CHANNEL, WITH FAX CAPABILITY (< 64 Kbps)
 - INCLUDED WITH SWIFTBROADBAND INTERNET SYSTEM
 - CALL QUALITY CAN BE CHOPPY

- SMARTPHONE SERVICES
 - GLOBALVT
 - SATCOM DIRECT APP (iOS AND ANDROID)
 - REQUIRES A SATCOM DIRECT ROUTER
 - AVAILABLE WITH INMARSAT JET CONNEX, INMARSAT SBB, AND VIASAT SATELLITE INTERNET SYSTEMS
 - GULFSTREAM SATELLITE VOICE
 - GULFSTREAM APP (iOS AND ANDROID)
 - AVAILABLE WITH INMARSAT JET CONNEX, INMARSAT SBB, VIASAT, AND IRIDIUM
 - GOGO TEXT & TALK
 - GOGO APP (iOS AND ANDROID)
 - REQUIRES A GOGO BIZ VOICE SERVICE PLAN ADDED TO YOUR DATA PLAN
 - COMPATIBLE WITH SBB

- SATELLITE TV
 - DIRECTV VIA SATCOM DIRECT'S ONEVIEW
 - UP TO 150 DIRECTV CHANNELS
 - COVERAGE: CONTINENTAL U.S. PLUS REGIONS EUROPE, NORTHERN AFRICA, THE MIDDLE EAST, AND INDIA

NOTE: TO PREVENT PIRATING, DIRECTV SENDS OUT "PINGS" AT RANDOM INTERVALS TO REAUTHORIZE THE RECEIVER. "PING" REQUESTS MY BE REQUIRED AFTER INTERNATIONAL TRIPS. PINGS CAN BE REQUESTED BY CALLING SATCOM DIRECT OR MANUALLY VIA YOUR GOSATCOM PLANE SIMPLE ACCOUNT.

- ROUTER
 - SATCOM DIRECT ROUTER (SDR)
 - COMPATIBLE WITH SBB, Ku-BAND (VIASAT YONDER), AND Ka-BAND (JET CONNEX) SATELLITE SYSTEMS
 - iOS AND ANDROID MOBILE APPS
- INTERNET TROUBLE-SHOOTING
 - <https://ems.home/cgi-bin/webif-guest/wanprofile-select.sh>
 - SDR APP BY SATCOM DIRECT



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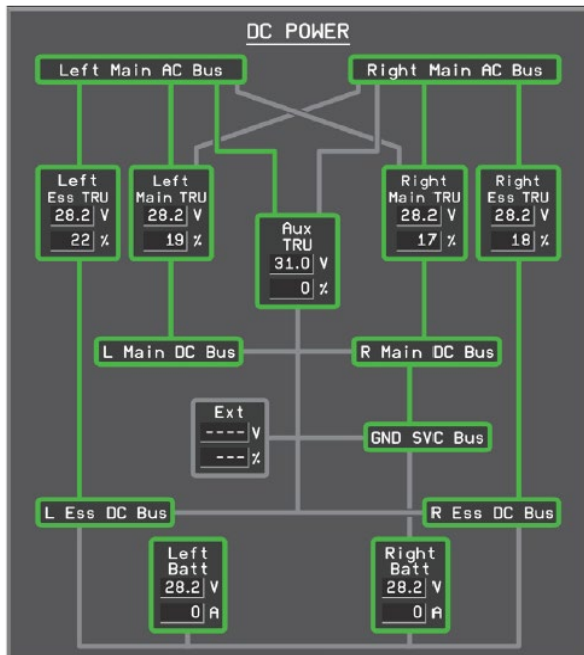
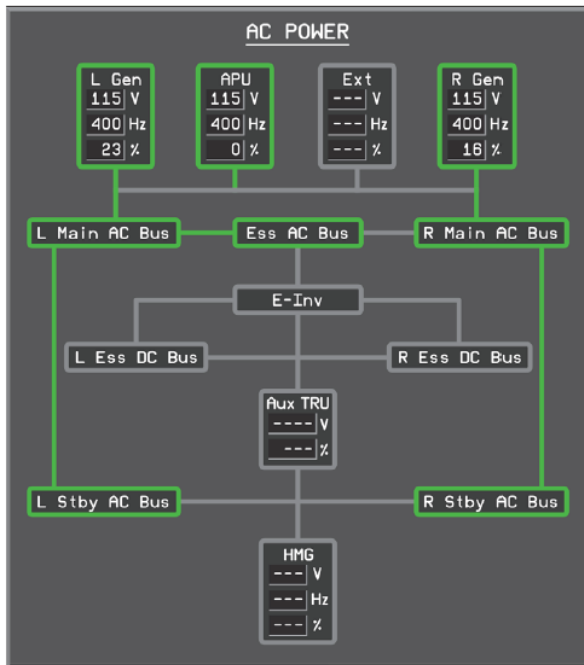
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ELECTRICAL



AC / DC SYNOPSIS 1/6

AC Power				
L Gen	APU	HMG	Ext	R Gen
V 115	115	---	---	115
Hz 400	400	---	---	400
% 34	0	---	---	21

DC Power				
LEss	LMain	Aux	RMain	REss
V 28.9	28.4	31.0	28.4	28.9
% 20	42	0	47	20

LBatt		RBatt	
V	A	V	A
28.7	0	28.7	0

SUMMARY SYNOPSIS 2/3

SUMMARY				
HYDRAULICS	Left	Aux	PTU	Right
psi	3000	0	0	3000
Qty (Gal)	2.8	0	0	0.7

AC POWER				
Volts	L Gen	APU	HMG	R Gen
115	115	115	---	115
Freq	400	400	---	400
% Load	34	0	---	21

DC POWER				
Volts	L Ess	L Main	Aux	R Main
28.9	28.4	28.4	31.0	28.4
% Load	20	42	0	47

Batt		Right	
Volts	Left	Volts	Right
28.7	28.7	28.7	28.7
Batt Amps	0	0	0

FUEL		
Quantity	Left	Right
10000	10000	10000
Fuel Temp	34°C	33°C
Tank Temp	15°C	---

BLEED AIR	
Left	Right
15 psi	15 psi

EMER GEAR BOTTLE	
Pressure	BRNKE ACCUM
3100 psi	3000 psi

CABIN PRESSURE				
Ldg Elev	Cab Alt	Rate	ΔP	Mode
1000	---	0	0.02	Auto1

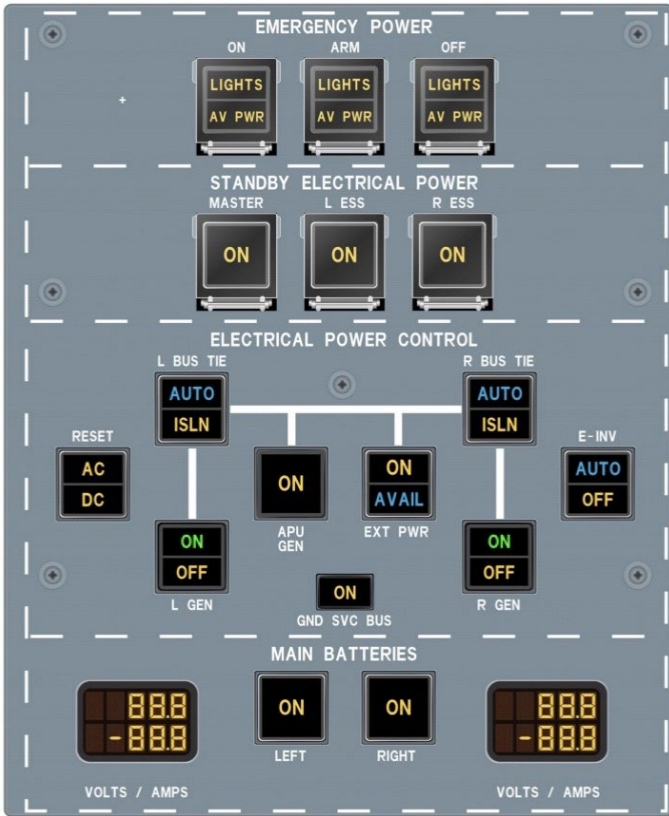
SYNOPTIC SOURCE STATUS COLOR

DISPLAY COLOR	GREY OUTLINE	GREEN OUTLINE	AMBER OUTLINE
POWER SOURCE BOXES	NOT SELECTED	OPERATING IN NORMAL RANGE	ABNORMAL OR FAILED
BUS STATUS BOXES	NOT SELECTED	OPERATING IN NORMAL RANGE	ABNORMAL OR FAILED
FEEDER LINES	NOT SELECTED	OPERATING IN NORMAL RANGE	ABNORMAL OR FAILED

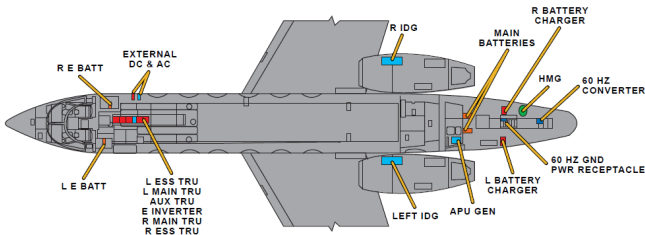
- 1 HMG (SEP) HYDRAULIC MOTOR GENERATOR (STANDBY ELECTRICAL POWER)
- 1 STANDBY INVERTER (E-INV)
- 1 (OR 2) 60 Hz CONVERTER
- 2 BATTERIES
- 2 BATTERY CHARGERS
- 2 EXTERNAL POWER
- 2 BPCUs
- 3 GENERATORS
- 4 E-BATTS
- 4 GCUs
- 5 AC BUSES
- 5 TRUs
- 6 AC SOURCES
- 7 DC BUSES
- 8 DC SOURCES
- G450, 5 Kva, 115 V, 400 Hz, 3 PHASE AC
- G550, 10 Kva, 115 V, 400 Hz, 3 PHASE AC
- 1 Kva, 115 V AC, PHASE A
- 115 V, 60 Hz, SINGLE PHASE AC
- G450, 24 V, 24 CELL, 45 AMP HR, LEAD ACID
- G550, 24 V, 53 AMP HR, NICAD
- G450, 38 AMP CRG MODE, 40 AMP TR MODE
- G550, 32 V CRG MODE, 50 AMP TR MODE
- EXTERNAL AC (115 V, 400 Hz) & EXTERNAL DC (28 V - 300 AMPS)
- BUS POWER CONTROL UNITS
- 40 Kva, 115 V, 3 PHASE AC
- 24 V, 9 AMP HR, LEAD ACID
- 2 IDG (INTEGRATED DRIVE GENERATOR)
- 1 APU GEN
- 1 HMG (SEP)
- 2 MAIN AC BUSES, L/R
- 2 STBY AC BUSES, L/R
- 1 ESS AC BUS
- 115 V AC TO 28 V DC – 250 AMPS
- 2 ESS TRUs, L/R
- 2 MAIN TRUs, L/R
- 1 AUX TRU
- 2 IDGs, L/R
- 1 APU GEN
- 1 HMG
- 1 STANDBY INVERTER (E-INV)
- 1 EXTERNAL AC
- 2 MAIN DC BUSES, L/R
- 2 ESS DC BUSES, L/R
- 2 BATT BUSES, L/R
- 1 GND SERVICE BUS
- 2 BATTs, L/R
- 5 TRUs
- 1 EXTERNAL DC



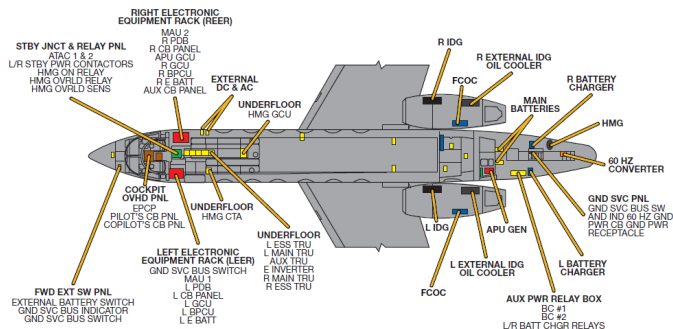
ELECTRICAL POWER CONTROL PANEL



G450, POWER SOURCE LOCATIONS



G450, ELECTRICAL SYSTEM COMPONENTS



AC POWER SOURCES

- CSD IDGs (2), 12,000 RPM

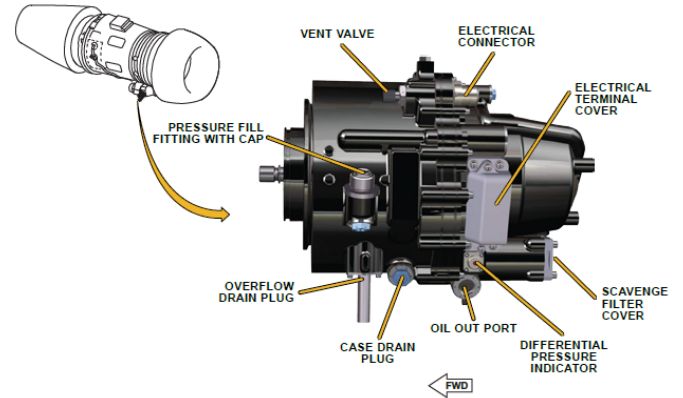
NOTE: THE FUNCTION OF THE IDGs IS TO MAINTAIN 400 HZ.

CONTROLLED & PROTECTED BY GCUs (4)

- OIL COOLED
- **RATED AT 40 Kva,**
- **PRODUCES 115 V, 400 Hz, 3 PHASE AC**

G450 IDG LOAD LIMIT

- **WHEN AMBIENT >110°F/43.5°C, LIMIT IDG LOAD TO 45% (18Kva) TO KEEP FUEL TEMP <95°C**
- **Engine Exceedance, L-R CAS**



NOTE: ENGINE SPEED IS SUPPLIED TO THE GCU BY THE HP SPEED PROBE. WHEN THE GCU DETERMINES THAT INPUT SHAFT SPEED TO THE IDG IS 4,185 RPM IT SENDS A SERVO VALVE CURRENT TO THE CSD PORTION OF THE IDG. THE SERVO VALVE CURRENT WILL ADJUST THE CSD WHICH WILL CONVERT VARIABLE INPUT SHAFT SPEED TO A STEADY SPEED OF 12,000 RPM (=400 HZ).

APU GEN

40 Kva, 115 V, 3 PHASE AC

AC POWER FLOW:

"GENERALLY, AC POWERS HEATERS, MOTORS, AND CHARGERS"

- 1) IDG/APU GEN/EXT AC
- 2) L & R MAIN AC BUSES
- 3) L & R STBY AC BUSES

L MAIN AC BUS

"5 TRUS; 7 COUNTING THE BATT CHARGERS"

- ESS AC BUS (PRIMARY)
- L ESS TRU
- L MAIN TRU
- AUX TRU (PRIMARY)
- L BATT CHARGER
- L ESS DC BUS
- L MAIN DC BUS

R MAIN AC BUS

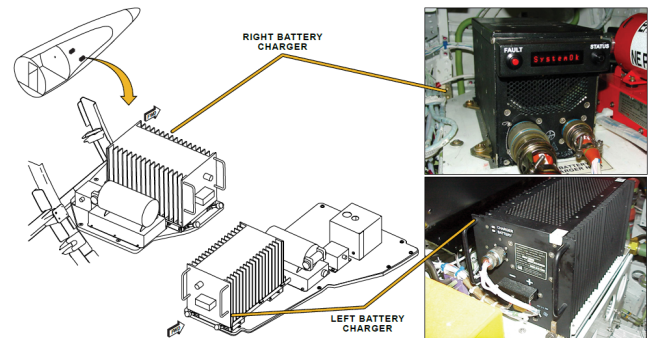
- ESS AC BUS (SECONDARY)
- R ESS TRU
- R MAIN TRU
- AUX TRU (SECONDARY)
- R BATT CHARGER
- R ESS DC BUS
- R MAIN DC BUS

MAIN BATTERY CHARGERS (5.9 LBS EACH)

- **G450 38 AMP CRG MODE, 40 AMP TR MODE**
- **G550 32 V CRG MODE, 50 AMP TR MODE**

PROTECTION

- OVERHEAT (145°F)
- OVERCURRENT (>65 AMP)
- OVERVOLTAGE (>134 V)
- UNDERVOLTAGE (<94 V)



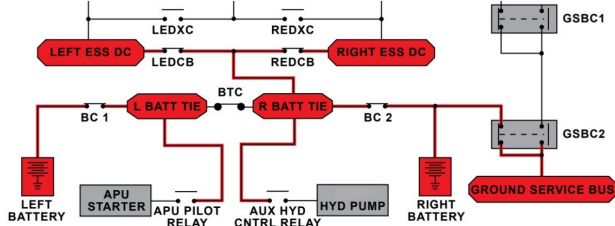


DC POWER SOURCES

- MAIN BATTS (2)
 - “2 APU START ATTEMPTS + 30 MIN”
 - NOTE: WHEN CHARGING, VOLTAGE STEADILY INCREASES FROM 28 TO AS HIGH AS 32. ONCE CHARGED VOLTAGE LOWERS TO AROUND 28.
- G450
 - 24 V, 45 AMP HR
 - SEALED LEAD-ACID (SLA)
 - 24 CELLS
- G550
 - 24 V, 53 AMP HR
 - NiCAD
 - 21 CELLS
- APU START
- AUX PUMP
- L & R ESS DC BUSES
- ESS AC BUS
- ØA VIA STBY INV
- GSB (R BATT)

NOTE: THE MAIN BATTS ARE HOUSED IN TITANIUM CASES AND WEIGH 95 LBS EACH.

NOTE: THE G450 HAS A SPLIT BATTERY TIE BUS. THE L BATT TIE BUS POWERS THE APU STARTER. THE R BATT TIE BUS POWERS THE AUX HYD PUMP.



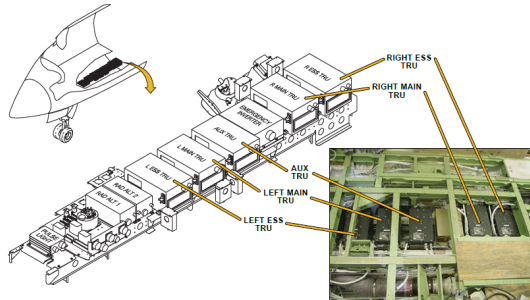
NOTE: PURE LEAD AND THE CONSTRUCTION OF THE BATTERY RESULTS IN A VERY LOW IMPEDANCE BATTERY THAT OFFERS CRANKING POWER OUTPUT EQUALING THAT OF NiCAD BATTERIES. THE BATTERIES UTILIZE EXTREMELY PURE SULFURIC ACID, BECAUSE OF THIS THE BATTERIES WILL NOT BE DAMAGED IF SUBJECTED TO FREEZING AS LOW AS -70°C. COMPARED TO NiCAD BATTERIES, THE SLA BATTERIES PERFORM WITH COMPARABLE COLD PERFORMANCE (DOWN TO -40°C). SLA BATTERIES SIGNIFICANTLY OUTPERFORM NiCADs AT HOT TEMPERATURES (ABOVE 40°C / 104°F).

NOTE: EACH BATTERY CONSISTS OF 4 (FOUR) 12-VOLT SEALED MONOBLOCKS. EACH MONOBLOCK HAS 6 CELLS. 4X6=24 CELLS.

TRUs (5) – 250 AMPS EA 115 V AC TO 28 V DC



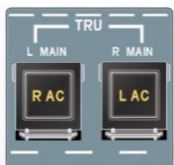
COOLING: (PSU) FANS FOR TRUs; LOW SPEED <FL350, HIGH SPEED >FL350



NOTE: WHEN FORWARD CABIN TEMP IS 106°F (41°C), THE MAX TRU LOAD IS 50%.

- AUX TRU PRIORITY: “LEFT BEFORE RIGHT, ESSENTIAL BEFORE MAIN”
- 1) L ESS DC BUS
 - 2) R ESS DC BUS
 - 3) L MAIN DC BUS
 - 4) R MAIN DC BUS
- WHEN POWERED BY THE HMG THE AUX TRU CAN POWER BOTH THE L AND R ESS DC BUSES.

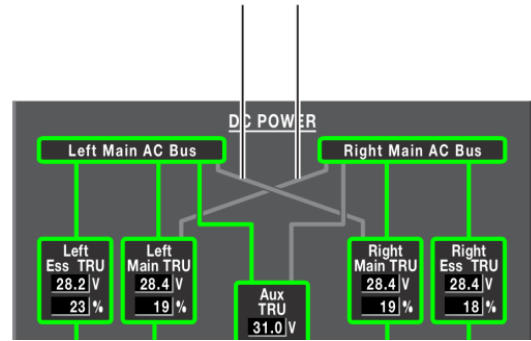
TRU SWITCHLIGHTS



- NORMALLY EACH MAIN TRU IS POWERED BY ITS ASSOCIATED MAIN AC BUS (L MAIN BUS POWERS THE L MAIN TRU). THESE SWITCHLIGHTS WILL POWER THAT MAIN TRU (L OR R MAIN TRU) FROM ITS OPPOSITE MAIN AC BUS (R OR L MAIN AC BUS)
- TWO CHECKLISTS CALL FOR THE USE OF THE TRU SWITCHLIGHTS – AC ELECTRICAL

- POWER SYSTEM FAULT, AND EPS NBPT FAIL
- IT COULD BE USED IN THE EVENT OF A LOSS OF A MAIN AC BUS AND A FAILURE OF THE AUX TRU
 - REFER TO THE SYNOPTIC PAGE

Pathways to allow Main TRUs to be powered from the opposite Main AC Buses by selecting the appropriate TRU switchlight.



- E-BATTS (4)
 - 24 V, 9 AMP HR
 - ACTIVATES IF ESS DC BUS HAS < 20 V
 - LEAD-ACID, SECURAPLANE BRAND, 30 LBS EA
 - PROVIDES 60-90 MINUTES OF POWER
- L & R E-BATTS
 - ➡
- L & R EMER DC BUSES
 - ESS FLT INST BUS
 - IRUs (3)
- FWD & AFT E-BATTS
 - ➡
- EMER LTS

NOTE: IN SERVICE, THE CB1 BREAKER SHALL BE DISENGAGED IF THE AIRCRAFT IS NOT OPERATED FOR A PERIOD IN EXCESS OF FIVE DAYS IN ACCORDANCE WITH CHAPTER 10 OF THE AIRCRAFT MAINTENANCE MANUAL (AMM).

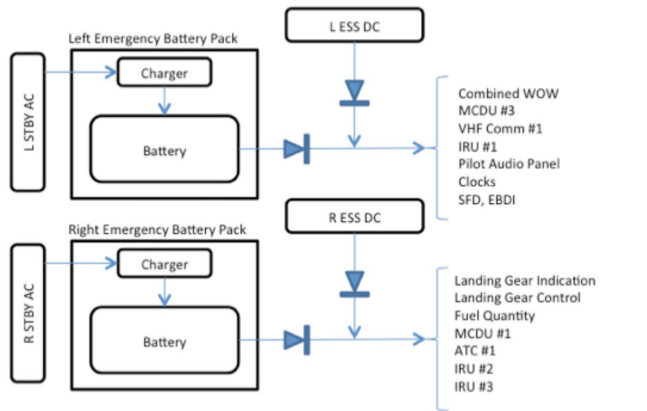
NOTE: EACH E-BATT HAS AN INTERNALLY POWERED HEATER PAD THAT ACTIVATES BELOW 60°F.

NOTE: THE AVIONICS E-BATTS ARE CALLED “IRU BACKUP BATTERIES” IN THE MEL; ONLY THE RIGHT E-BATT CAN BE MEL’D. AFFECTED ITEMS WOULD INCLUDE BACK UP POWER FOR GEAR POSITION LIGHTS, FUEL QUANTITY, MCDU#1, ATC#1, VHF#1, ETC. THERE IS NO MEL RELIEF FOR LIGHTING E-BATTS.

DICHIARA NOTE: ALL E-BATTS ARE INTERCHANGEABLE. AIRCRAFT WITH A SECURE-A-PLANE INSTALLED HAVE AN EXTRA BATTERY PACK IDENTICAL TO THE E-BATTS. IF YOU ARE STRANDED DUE TO AN INOP E-BATT CONSIDER HAVING MAINTENANCE SWAP THE SECURE-A-PLANE BATT.



- AVIONICS E-BATTS (2) POWER
- 7 ITEMS:
 - CAPT AUDIO CONTROL PANEL
 - CLOCKS (2)
 - GEAR HANDLE AND LIGHTS
 - EBDI
 - SFD
 - MCDU #1 – STBY ENG INST AND FUEL
 - MCDU #3 – BACKUP RADIO (COM,NAV,XPDR 1)
- FULL LIST OF COMPONENTS POWERED BY E-BATTS:
 - QRH EA-15, EA-16
- NOTE: ONLY MCDU #1 CAN DISPLAY THE STBY ENG INST PAGE.
- NOTE: ONLY MCDU #3 CAN DISPLAY THE BACKUP RADIO PAGE.



- E-BATT CHARGERS
- CHARGE THE E-BATTS TO 80%-90% IN 1 HR
- CHARGE THE E-BATTS TO 100% IN 1.5 HRS

EMER PWR PUSHBUTTONS



NOTE: A BREAK POWER TRANSFER WILL CAUSE THE E-BATTS TO ACTIVATE.

NOTE: IT IS RECOMMENDED THAT THE APU BE STARTED WITH EMER PWR ON. WITHOUT EMER PWR THE EEC MAY SWITCH TO ALT MODE. NORMAL ENG CONTROL CAN BE RESTORED EITHER FROM THE DISPLAY CONTROLLER (DC) OR BY CYCLING THE FUEL CONTROL SWITCH.

- ON
 - ACTIVATES THE E-BATTS
 - **Emergency Battery On** CAS
 - TURN ON THE OVERWING AND UNDERWING EGRESS LIGHTS
 - POWERS THE L/ R EMER DC BUSES, AND ESS FLT INST BUS
- ARM
 - ARMS THE SYSTEM TO ACTIVATE ANYTIME THE ESS DC BUS HAS <20 V
- OFF
 - DISARMS THE SYSTEM
 - MAY ONLY BE SELECTED OFF IF ESS DC BUS HAS >20 V

DICHIARA NOTE: THE LEFT E-BATT IS USED TO SHUTDOWN WINDOWS NT. IT TAKES OVER TWO MINUTES AFTER THE SHIPS BATTERIES ARE SWITCHED OFF TO ACCOMPLISH THIS. DO NOT TURN THE SHIPS BATTERIES BACK ON DURING THIS TIME BECAUSE IT COULD CORRUPT THE AIRCRAFT'S OPERATING SYSTEM.

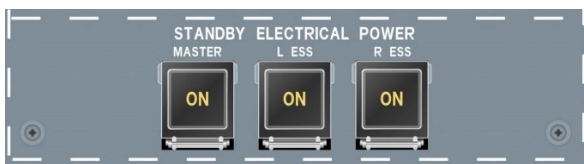
- STANDBY ELECTRICAL POWER (SEP), POWERED BY THE HYDRAULIC MOTOR GENERATOR (HMG)
- HMG
- **G450 5 Kva, G550 10 Kva**
- **115 V, 400 Hz, 3 PHASE**

5 BUSES WILL BE POWERED INCLUDING THE ESS AC BUS VIA THE STANDBY INVERTER (E-INV)

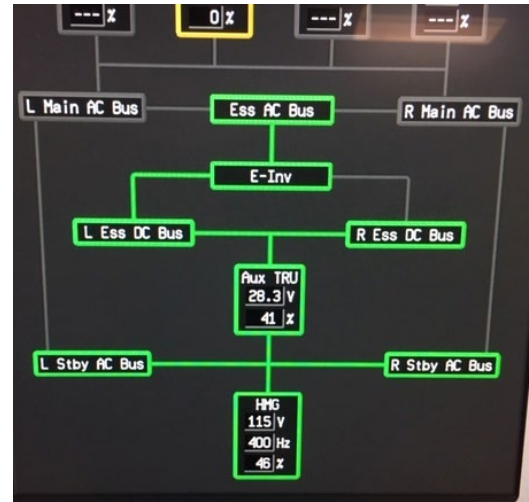
FULL LIST OF COMPONENTS POWERED BY THE SEP: QRH EA-16, EA-17

NOTE: PAUSE 10 SECONDS BETWEEN SELECTIONS: MASTER SWITCH (WAIT 10 SEC) → L ESS SWITCH (WAIT 10 SEC) → R ESS SWITCH.

- MASTER SWITCH
 - ACTIVATES THE HMG
 - POWERS THE AUX TRU + L/R STBY AC BUSES
- L ESS SWITCH
 - L ESS DC BUS VIA AUX TRU
- R ESS SWITCH
 - R ESS DC BUS VIA AUX TRU

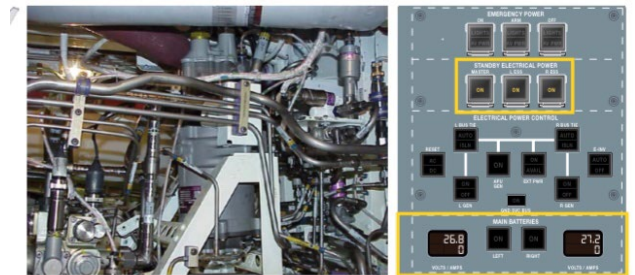


NOTE: THE HMG GCU CAN BE TESTED WITHOUT STARTING THE HMG BY PRESSING THE TEST SWITCH ON THE OBSERVER AND TEST MONITOR PANEL FOR FIVE (5) SECONDS. A SUCCESSFUL TEST IS INDICATED BY ILLUMINATION OF THE GREEN GCU OK LEGEND.



NOTE: G450 HMG – LOCATED IN THE AFT EQUIPMENT COMPARTMENT
G550 HMG – LOCATED IN THE MAIN WHEEL WELL

G550 HMG



Standby Electrical Power

NOTE: THE PRIMARY PURPOSE OF THE HMG IS TO PROVIDE AN AC POWER SOURCE TO THE AUX TRU WHEN/IF THE ENG AND APU GENs ARE UNAVAILABLE.

- THE HMG POWERS THE STBY AC BUSES WHICH POWER:
 - (G450) LEFT PITOT HEAT, (G550) LEFT UPPER PITOT HEAT AND RIGHT LOWER PITOT HEAT
 - #1 & #2 TAT HEAT
 - FLAP/STAB POWER
 - EMER BATT CHARGERS
- THE AUX TRU POWERS THE L AND R ESS DC BUSES WHICH POWER:
 - FLIGHT INSTRUMENTS
 - NAV, AND COMM RADIOS NECESSARY TO MAINTAIN FLIGHT WITH THE LOSS ALL GENs
- THE STANDBY INVERTER (E-INV), POWERED BY THE ESS DC BUSES (OR BATTS) WILL PROVIDE SINGLE PHASE AC POWER TO THE ESS AC BUS WITH THE LOSS OF ALL GENs. THE ESS AC BUS ØA ITEMS ARE:
 - CABIN PRESS CHAN 1
 - (G450) RIGHT PITOT HEAT, (G550) RIGHT UPPER PITOT HEAT
 - (G450) STBY PITOT HEAT, (G550) LEFT LOWER PITOT HEAT
 - (G550) LEFT & RIGHT (YOKE) FORCE SENSORS

G450:

ESS AC BUS
CAB PRESS CHAN 1 ØA
RIGHT PITOT HEAT ØA
STBY PITOT HEAT ØA

L STBY AC BUS
#1 TAT PROBE HEAT
L E-BATT CHARGER
LEFT PITOT HEAT

NOTE:
LEFT PITOT → ADM #1
RIGHT PITOT → ADM#2
STBY PITOT → ADM#3 & SFD

R STBY AC BUS
#2 TAT PROBE HEAT
R E-BATT CHARGER
STAB SEC AC



G550:

ESS AC BUS
 CAB PRESS CHAN 1 ØA
 R UPR PITOT HEAT ØA
 L LWR PITOT HEAT ØA
 R FORCE SENSORS ØA
 L FORCE SENSORS ØA

L STBY AC BUS
 #1 TAT PROBE HEAT
 L E-BATT CHARGER
 L UPR PITOT HEAT
 FLAP/STAB L STBY

R STBY AC BUS
 #2 TAT PROBE HEAT
 R E-BATT CHARGER
 R LWR PITOT HEAT
 FLAP/STAB R STBY

NOTE: DO NOT OPERATE THE STANDBY ELECTRICAL POWER (SEP) WITH NORMAL AC POWER AVAILABLE (MASTER SWITCH ONLY TO TEST THE SYSTEM).

NOTE: THE HMG'S GEN HAS ITS OWN PERMANENT MAGNET GENERATOR (PMG).

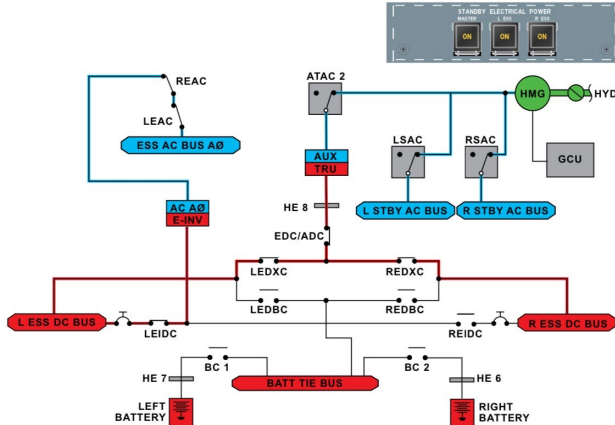
NOTE: ACTUAL ELEC POWER GENERATION IS DEPENDENT UPON HYD SYSTEM OUTPUT THAT IS IN TURN DEPENDENT UPON ENGINE POWER SETTINGS. PRIOR TO LARGE HYDRAULIC DEMANDS (e.g. GEAR AND FLAPS) INCREASE THRUST.

NOTE: HMG CAPACITY WHEN POWERED BY THE PTU IS LIMITED TO APPROXIMATELY 50% HMG ELECTRICAL LOAD. THIS EQUATES TO A SINGLE ESS DC BUS, PLUS THE ESS AC AND L-R STBY AC BUSES. FOLLOWING THE PROCEDURE (QRH EE-14) REMOVES POWER FROM THE R ESS DC BUS.

DICHIARA NOTE: A HMG OVERLOAD TRIP REQUIRES A MANUAL RESET BY CYCLING THE STBY ELECTRICAL POWER MASTER SWITCH TO OFF (DARK)(ONE SEC.) THEN BACK TO ON. DICHIARA NOTE: ON THE AC SYNOPSIS PAGE THE BUSES ASSOCIATED WITH THE HMG WILL NOT TURN GREEN UNLESS THEY ARE BEING POWERED BY THE HMG (EVEN IF THEY ARE POWERED BY ANOTHER SOURCE).

NOTE: HIGH HYDRAULIC DEMAND CAN CAUSE THE HMG TO DROP OFFLINE RESULTING IN POWER INTERRUPTIONS WHICH WILL CAUSE THE ENGINES TO REVERT TO ALTERNATE CONTROL. BE ALERT FOR ENGINE EXCEEDANCES AT HIGH POWER SETTINGS.

NOTE: WHEN THE HMG IS RUNNING OPERATE SPEEDBRAKES SLOWLY (3 SEC FOR FULL TRAVEL).



PROBES POWERED DURING HMG OPERATIONS

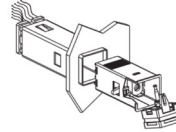
- G450:**
- #1 AOA HEAT (ESS DC BUS)
 - #2 AOA HEAT (ESS DC BUS)
 - #1 TAT HEAT (L STBY AC BUS)
 - #2 TAT HEAT (R STBY AC BUS)
 - L PITOT HEAT (L STBY AC BUS)
 - R PITOT HEAT (ESS AC BUS)
 - STBY PITOT HEAT (ESS AC BUS)

- G550:**
- #1 AOA HEAT (ESS DC BUS)
 - #2 AOA HEAT (ESS DC BUS)
 - #1 TAT HEAT (L STBY AC BUS)
 - #2 TAT HEAT (R STBY AC BUS)
 - L UPPER PITOT HEAT (L STBY AC BUS)
 - R UPPER PITOT HEAT (ESS AC BUS)
 - L LOWER PITOT HEAT (ESS AC BUS)
 - R LOWER PITOT HEAT (R STBY AC BUS)

SWITCLIGHTS:

- ALTERNATE ACTION
 - ON/OFF TYPE SWITCH WITH INTERNAL LEGEND/CAPTION
 - PRESSED IN = ACTIVATED
- MOMENTARY CONTACT
 - SWITCH THAT IS SPRING LOADED TO REMAIN EXTENDED AFTER BEING RELEASED
 - EXAMPLE: ENGINE START SWITCHES

- ANNUNCIATOR SWITCHES (KORRY 389 SERIES LED LIGHTED SWITCHES)



SYSTEM STATUS COLOR CODING:

- BLUE** – ADVISORY
- GREEN** – NORMAL IN-FLIGHT CONFIGURATION
- AMBER** – ABNORMAL IN-FLIGHT CONFIGURATION

GND SERVICE BUS (GSB)

- POWER SOURCE PRIORITY
 - R MAIN DC BUS
 - EXT DC
 - R MAIN BATT
- POWERED ITEMS
 - FUELING PANEL
 - ENG OILER
 - WHEEL WELL LTS
 - BCN LIGHT
 - UTILITY LTS
- SWITCHES (3)
 - FWD EXT ACCESS
 - TAIL COMPARTMENT
 - REMOTE REFUELING PANEL
- AUTO OFF
 - MAIN DOOR CLOSED, AND
 - FWD ACCESS DOOR CLOSED, AND
 - TAIL COMPARTMENT DOOR CLOSED

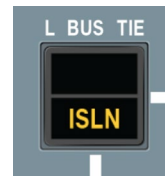
NOTE: THE BCN TURNS ON WHEN THE GND SERVICE BUS IS POWERED BY A SOURCE OTHER THAN THE RIGHT MAIN DC BUS.



- EXT BATT SWITCH
 - ALLOWS BOTH MAIN BATTERIES TO POWER THE GSB & AUX PUMP (NOT JUST THE RIGHT BATT)

- CBs
 - RED – ESS BUS
 - BLACK – MAIN BUS

- L / R BUS TIE SWITCHLIGHTS
 - AUTO
 - ALLOWS BPCU LOGIC TO OPEN AND CLOSE THE BUS TIE RELAYS AS NECESSARY TO ENSURE BUSES REMAIN POWERED IN THE EVENT OF AN IDG FAILURE
 - ISLN
 - BPCU LOGIC IS BYPASSED
 - ISOLATES THE MAIN AC BUSES
 - ONLY ALLOWS THE ASSOCIATED MAIN AC BUS TO BE POWERED BY THE ON SIDE IDG





BPCUs (2):
"LOCATED IN THE LEER AND REER"

L BPCU MONITORS:

R BPCU MONITORS:

- L & R NETWORKS
- POWER DISTRIBUTION
- POWER PROTECTION
- L MAIN AC BUS
- EXT AC
- R MAIN AC BUS
- ESS AC BUS
- EXT DC



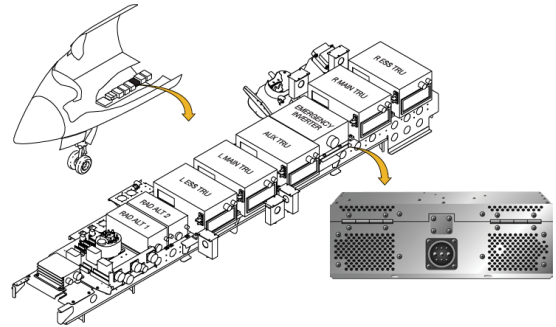
- STANDBY INVERTER (E-INV); 1Kva



28 V DC TO 1 Kva, 115 V AC → ESS AC BUS, PHASE A
NOTE: G450 ØA ITEMS ARE CAB PRESS CHAN 1, RIGHT PITOT HEAT, & STBY PITOT HEAT
G550 ØA ITEMS ARE CAB PRESS CHAN 1, RIGHT UPR PITOT HEAT, LEFT LWR PITOT HEAT, RIGHT (YOKE) FORCE SENSOR, & LEFT (YOKE) FORCE SENSOR

- CONTROLLED BY THE E-INV PUSHBUTTON ON THE OVERHEAD – NORMALLY LEFT IN **AUTO**
- COULD BE TURNED **OFF** IF NECESSARY

NOTE: THE E-INV HAS BEEN RENAMED STANDBY INVERTER AND CAN BE MEL'D PER MMEL REV NO. 9.



NOTE: AN IMPROVED STANDBY INVERTER (TRUE BLUE POWER, PN 6431200-7) IS NOW AVAILABLE. IT IS SMALLER, LIGHTER, EASIER TO INSTALL, AND IS MORE RELIABLE.

- NBPT – NO BREAK POWER TRANSFER

- CONTROLLED BY L/R BPCUs
- POWER IS TRANSFERRED WITHOUT A MOMENTARY INTERRUPTION
- BPCU MATCHES / "PARALLELS" THE PHASES OF THE IDGs AND/OR APU GEN

NOTE: ALL AUTOMATIC POWER TRANSFERS WILL BE NBPTs EXCEPT THOSE BETWEEN AN EXTERNAL AC POWER SOURCE AND THE APU GEN SINCE THE APU GEN IS NOT AN IDG.

- BREAK POWER TRANSFER
- NOTE: A BREAK POWER TRANSFER WILL CAUSE THE E-BATTS TO ACTIVATE.

- OCCURS WHEN:
- GEN FAIL
 - ENG FAIL
 - FIRE HANDLE PULLED

NOTE: DURING ENGINE SHUTDOWN, PAUSE TWO SECONDS BETWEEN SELECTING EACH FUEL CONTROL SWITCH TO OFF TO PREVENT A POSSIBLE BREAK POWER TRANSFER.

DICHIARA NOTE: IF A BREAK POWER TRANSFER OCCURS CHECK THE PFD TO SEE IF SOME OF YOUR LATERAL OR VERTICAL COMMANDS WERE LOST AS WELL AS OTHER ANOMALIES.

- AC/DC RESET SWITCHLIGHT



- ILLUMINATION OCCURS WHEN:
- A BPCU SENSES A BUS FAULT AND ISOLATES THE ASSOCIATED BUS BY TRIPPING ITS RELAY, PLACING A LOCKOUT FROM THE REST OF THE SYSTEM

- PRESSING THE AC/DC RESET SWITCHLIGHT:
- RELEASES THE LOCKOUT AND ALLOWS THE BPCU TO CLOSE THE RELAY IF A BUS FAULT IS NO LONGER SENSED

- APU RESTRICTED AIRPORT PROCEDURES

e.g. "Nice, France Procedure"

- QRH → ALTERNATE NORMALS (NG) → APU RESTRICTED AIRPORT PROCEDURES
- MINIMIZES APU OPERATING TIME WHILE USING EXT AC
- PROCEDURE PROVIDES A NBPT FROM EXT AC TO R ENG IDG

CODE450:

- ▶ **ENGINE START ON AC POWER WITHOUT A BREAK POWER TRANSFER**

- 60 HZ CONVERTER (400 HZ TO 60 HZ) (50 HZ – NON-US AIRCRAFT)



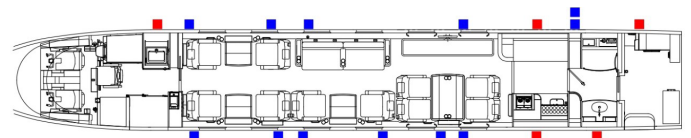
- CONVERTS 3Ø, 400 HZ, 115 V AC FROM THE RIGHT MAIN AC BUS TO 3Ø, 60 HZ, 115 V AC FOR GALLEY AND CABIN OUTLETS.
- GALLEY 60 HZ POWER AUTO SHED WHEN AIRBORNE AND REDUCED TO A SINGLE GENERATOR.

NOTE: A SECOND CONVERTER IS OPTIONAL.

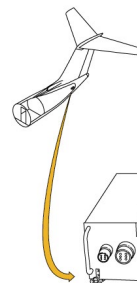
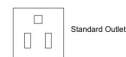
NOTE: 60 HZ POWER FOR CABIN ENTERTAINMENT MAY SHUT DOWN AUTOMATICALLY > 8,000 FT CABIN ALT (SN 4020 AND SUB).

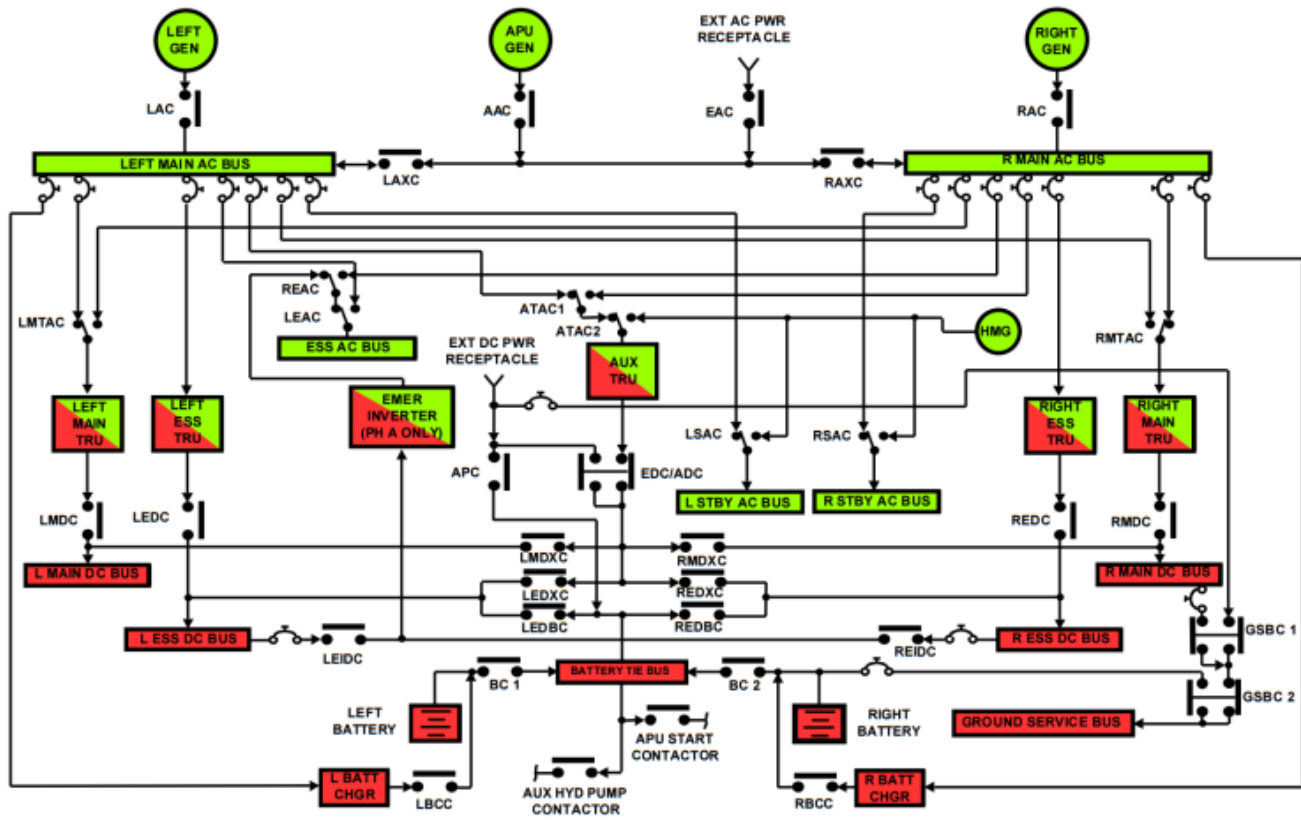
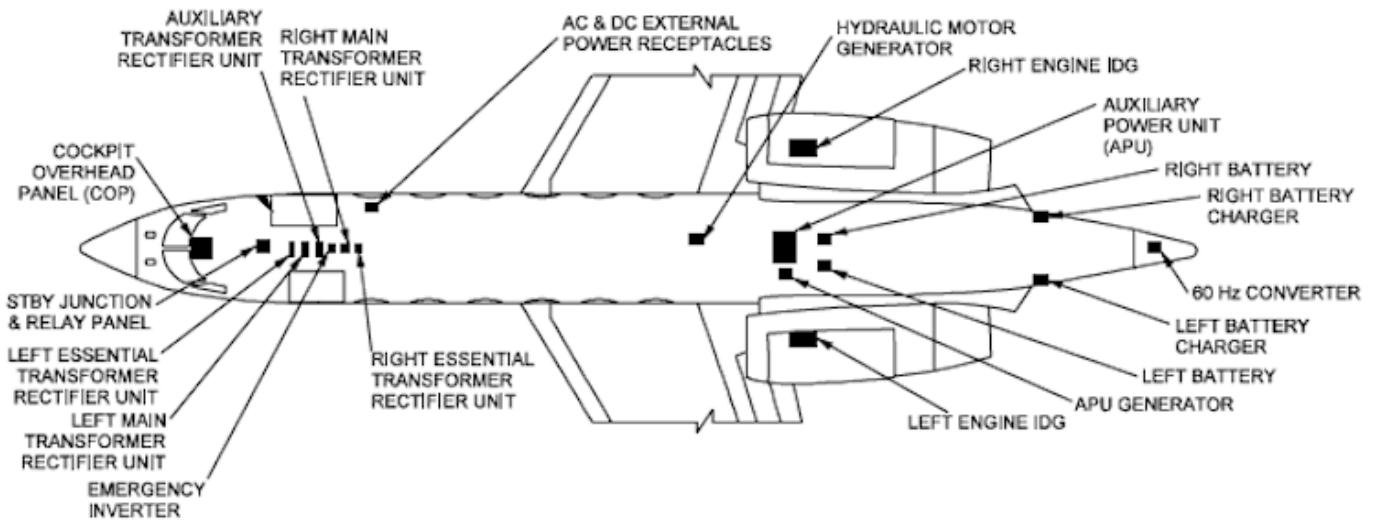
NOTE: THE CABIN OUTLETS ARE LIMITED TO 3 AMPS, BUT GALLEY, LAVATORY, AND BAGGAGE COMPARTMENT OUTLETS ARE RATED TO 15 AMPS. THE COMBINED OUTPUT POWER CANNOT EXCEED 30 AMPS.

NOTE: IF A DEVICES' LABEL DOES NOT LIST AMPS REFER TO THE WATTAGE. WATTS DIVIDED BY VOLTS EQUALS AMPS.



- 15 Amp Outlet
- 3 Amp Outlet

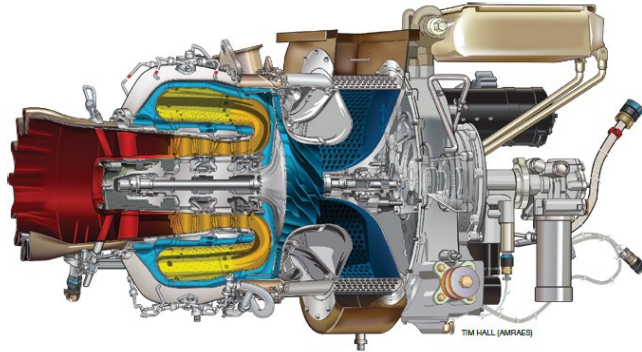






APU

- G450, HONEYWELL 36-150 "BURNS 200 PPH (30 GAL PER HR)"
- G550, ALLIED SIGNAL RE-220 "BURNS 260 PPH (39 GAL PER HR)"
- SINGLE SHAFT, CONSTANT SPEED GAS TURBINE ENGINE (61 SHP)
- ONE COMPRESSOR STAGE AND TWO TURBINE STAGES

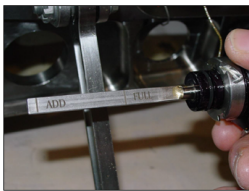
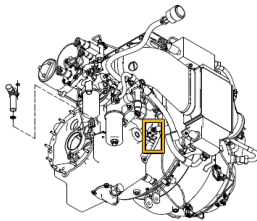


NOTE: FMS APU FUEL FLOW KEYSTROKE PATH; MCDU → PERF INDEX → FUEL MGT → 2/2

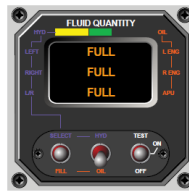
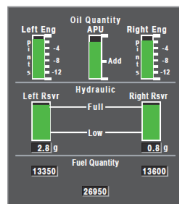
- SUBSYSTEMS
 - POWERPLANT
 - ECU
 - STARTER AND IGNITERS
 - FUEL CONTROL
 - LUBRICATION SYSTEM
 - FIRE DETECTION AND WARNING SYSTEM
 - AC GEN
 - BLEED AIR

- ACCESSORY GEARBOX
 - MOUNTED AT THE COMPRESSOR END
 - TURNED BY AN AXIAL DRIVE SHAFT
 - POWERS:
 - APU GEN
 - LUBRICATION PUMP (OIL PUMP)
 - INTEGRAL OIL RESERVOIR (2 QTS / 5.25 QTS)
 - SPEED SENSOR → ECU

G450, APU OIL SERVICING

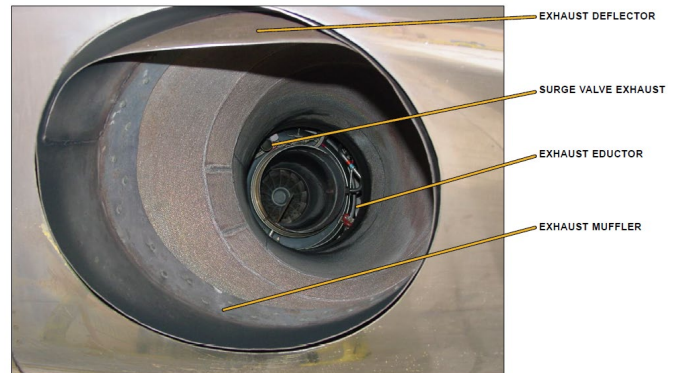


MANUAL FILL PORT DIP STICK

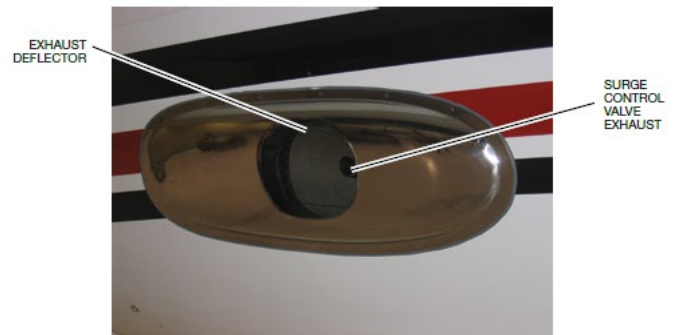


- EXHAUST SECTION
 - EJECTOR PUMP DRAWS AMBIENT AIR WHICH LOWERS EGT AND NOISE
 - THE APU CANNOT BE STARTED WITH THE RIGHT ENG COWL OPEN (AMBER WARNING LIGHT)

G450



G550



- SURGE CONTROL VALVE
 - PREVENTS COMPRESSOR STALLS
 - G450, >16,500' OPENS AT 60% RPM
 - G550, OPENS >16,000'
 - SEPARATE EXHAUST PIPE INSIDE THE APU EXHAUST PIPE
 - CYCLES WHEN THE APU IS SHUT DOWN

- ELEC – L OR R BATT BUS ↔ APU MASTER SWITCH ↔ ECU

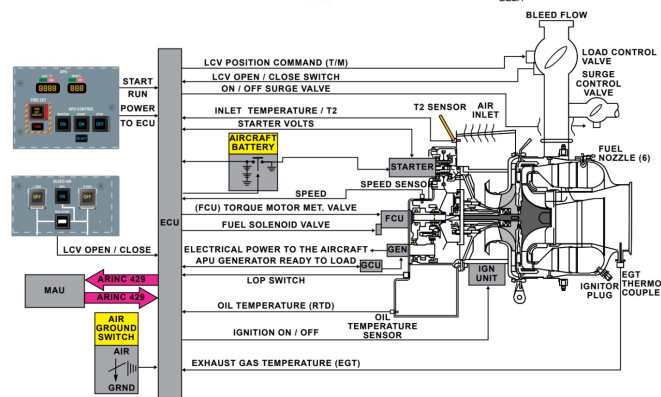
- ECU MODES
 - NON-ESS (GND)
 - ESS (AIR)
- PROTECTIVE SHUTDOWNS
 - WILL NOT PROTECTIVE SHUTDOWN FOR:
 - HIGH EGT / SENSOR LOSS
 - HIGH OIL TEMP
 - LOW OIL PRESS / SENSOR LOSS
 - REVERSE AIR FLOW
 - UNDERSPEED
 - LOSS OF INLET DOOR RVDT
 - APU Essential

NOTE: IF IN ESS MODE, THE APU WILL CONTINUE RUNNING FOR 15 MIN AFTER LANDING.

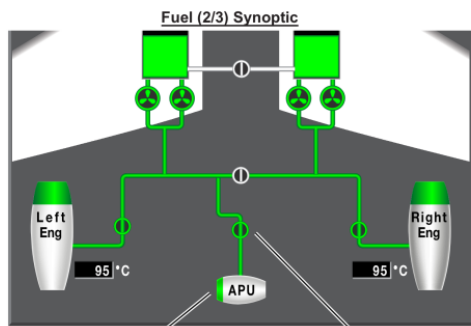
NOTE: THE APU WILL BE IN ESS MODE BY SELECTING THE APU MASTER ON WHILE IN THE AIR BUT STARTING THE APU ON THE GROUND.



- ECU
 - MICROPROCESSOR
 - LOCATED IN THE AEER
 - CONTROLS ALL FUNCTIONS OF THE APU EXCEPT FIRING THE FIRE BOTTLE



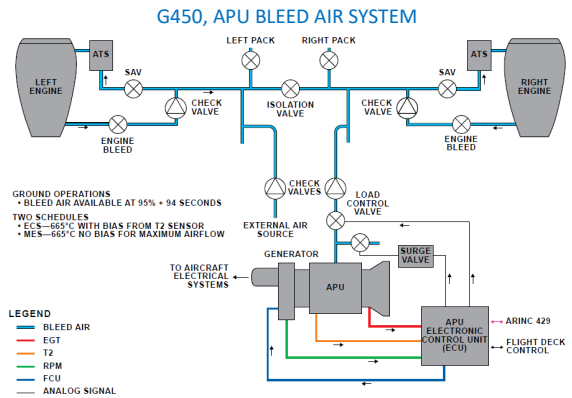
- FUEL COMPONENTS
 - L TANK/L PUMP
 - X FLOW & R PUMP
 - FUEL SHUTOFF VLV
 - APU MASTER
 - APU FUEL CONTROL
 - FIRE



NOTE: IF A FIRE IS DETECTED THE APU ECU SHUTS OFF FUEL TO THE APU AT THE FUEL CONTROL UNIT. THE APU MASTER SWITCH CONTROLS THE APU FUEL SHUTOFF VALVE ON THE LEFT WING REAR BEAM STRUCTURE.

- APU GEN
 - 40 Kva, 115 V, 3 PHASE AC
 - AUTO TIMED DELAY
 - G450, GND 95% + 4 SEC, AIRBORNE 99% + 2 SEC
 - G550, GND/AIRBORNE 99% + 2 SEC

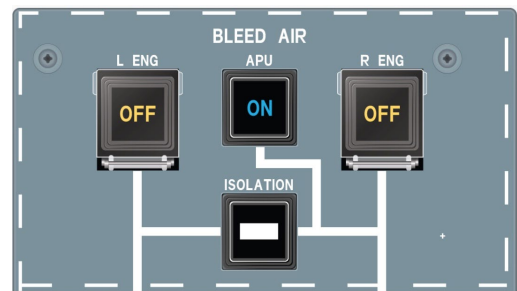
- APU AIR LOAD CNTL VLV MANIFOLD & ISOL VLV:
 - L/R ECS (PACKS)
 - ENG START



- APU AIR SWITCH
 - CONTROLS THE APU LOAD CONTROL VALVE (LCV)
 - AUTO TIMED DELAY
 - G450 "AVAIL 100% RPM + 90 SEC"
 - G550 "AVAIL 100% RPM + 60 SEC"
 - NO 60 SEC DELAY FOR APU AIR ON WHILE AIRBORNE

NOTE: 36-150 AIRFLOW
 - LOADED, 62 PPM AT 53 PSI
 - UNLOADED, 72 PPM AT 51 PSI

NOTE: IN SOME DOCUMENTATION IT SAYS THE APU AIR AUTO TIMED DELAY IS 95% + 94 SEC.



G450 RPM SCHEDULE

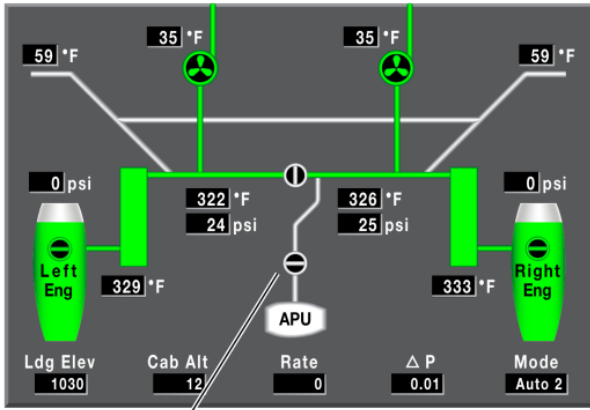
RPM PERCENT	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
STARTER MOTOR											
IGNITION											
FUEL SOLENOID											
HOUR METER											+ 4 SEC
GEN - READY TO LOAD											+ 4 SEC
LCV - READY TO OPEN											+ 94 SEC

- LOAD CONTROL VALVE (LCV)
 - ELECTRICALLY CONTROLLED (ECU)
 - PNEUMATICALLY OPERATED
 - SPRING-LOADED (CLOSED)
 - WILL AUTO CLOSE AT 1,500' AGL AFTER TAKEOFF (G550)

NOTE: THE ECU MODULATES THE LCV AS NECESSARY TO MAINTAIN THE APU EGT WITHIN LIMITS. TRIM LIMITS START AT 632° EXCEPT DURING MAIN ENGINE START IN WHICH CASE THEY START AT 665°. CONDITIONS THAT COULD CAUSE THE APU TO RIDE THE TRIM LIMITS ARE A DEGRADED POWER SECTION, A HOT-DAY / HIGH DENSITY ALTITUDE CONDITION, OR A LEAK IN THE AIRCRAFT DUCTING.

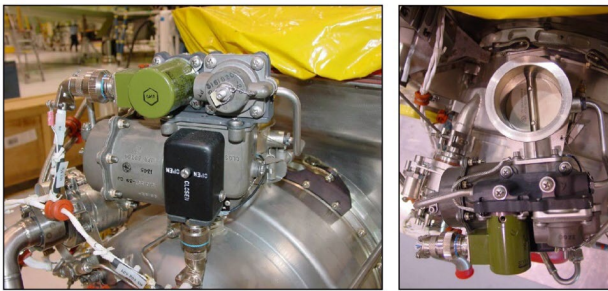
- FOR APU AIR TO ASSIST A START THE FOLLOWING MUST BE OFF
 - ENGINE BLEEDS (G450)
 - PACKS
 - WING ANTI-ICE

NOTE: THE ISOLATION VALVE AUTOMATICALLY OPENS WHEN THE APU AIR LCV OPENS.



APU Load Control Valve

G450



APU Load Control Valve

G450 NOTE: IF AN ENG START IS ATTEMPTED WITH ENG BLEED SWITCHES ON, **Bleed Configuration**, THE APU LOAD CONTROL VALVE WILL AUTOMATICALLY CLOSE ONCE THE ENG REACHES 20% HP RPM (ECU PROTECTIVE FEATURE). THIS WILL REMOVE THE AIR FROM THE SVO AND A HOT START WILL RESULT.

G450 NOTE: APU ECS OPERATION IS INHIBITED IN FLIGHT, THE LVC CLOSES AUTOMATICALLY WITH WEIGHT-OFF-WHEELS SIGNAL.

- G550, ENGINE AIR START
 - <FL300, APU AIR MAY ASSIST
 - NO 60 SEC DELAY FOR APU AIR ON

- G550, BLEEDS OFF TAKEOFF
 - APU AIR ON TILL 1,500' AGL
 - 1.4% PERFORMANCE INCREASE / INCREASE IN MAX TOGW

STARTER LIMITS

BATTERY
28 V DC MOTOR MOUNTED TO THE DRIVESHAFT OF THE ACCESSORY GEARBOX

- 3 ATTEMPTS
- 1 HR COOL DOWN

- DC CART**
 - 3 ATTEMPTS WITH 15 MIN COOL DOWN IN BETWEEN
 - 1 HR COOL DOWN

CONSECUTIVE STARTS LIMIT **SIX AT 10 MIN INTERVALS**

MINIMUM FUEL TEMP FOR APU START ON THE GND **-30°C:**

NOTE: TORCHING STARTS CAN FOLLOW AN UNSUCCESSFUL START ATTEMPT. THIS IS THE RESULT OF EXCESSIVE FUEL IN THE APU AT LIGHT-OFF. TORCHING CAN BE MINIMIZED BY WAITING FOR THE EXCESS FUEL TO DRAIN OVERBOARD BEFORE ATTEMPTING A SUBSEQUENT START.

NOTE: IT IS RECOMMENDED THAT THE APU BE STARTED WITH EMER PWR ON. WITHOUT EMER PWR THE EEC MAY SWITCH TO ALT MODE. NORMAL ENG CONTROL CAN BE RESTORED EITHER FROM THE DISPLAY CONTROLLER (DC) OR BY CYCLING THE FUEL CONTROL SWITCH.

NOTE: G550 APU STARTER MOTOR: 5.7 HP

MAX ALTITUDE / LOAD

- G450
 - <0.85 Mt **FL370 / 100%**
 - >0.85 Mt **≥ FL300 / 85%**, DUE TO APU OIL COOLER AIRFLOW

- G550
 - FL450 / 100%**

GUARANTEED START ALTITUDE

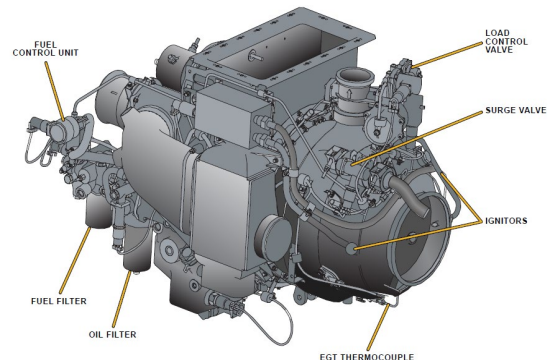
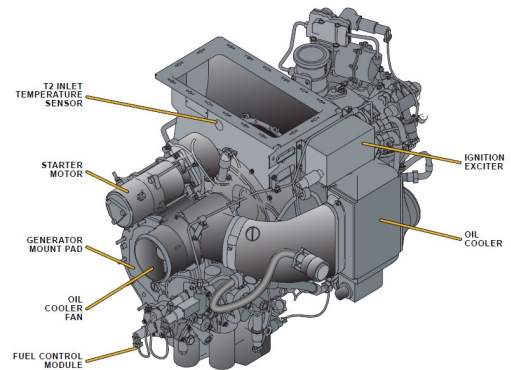
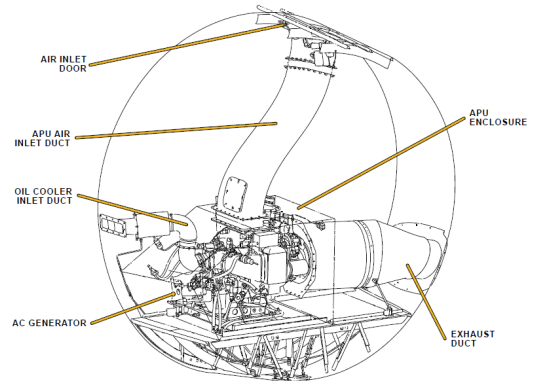
- G450
 - ≤ FL370**
- G550
 - ≤ FL390**
 - POSSIBLE BETWEEN FL390-FL430**

- G550 AIRBORNE APU START
 - RIGHT BATT OFF** FOR APU START EXCEPT WHEN DUAL GEN FAIL
 - ≥ FL350: 15 SEC DELAY FOR BAAV (BLEED AIR AUGMENTATION VALVE) TO OPEN AND ALLOW LEFT ENG BLEED AIR TO WARM THE APU INLET

NOTE: THE START SWITCHLIGHT WILL NOT ILLUMINATE ON DURING THE 15 SEC DELAY.

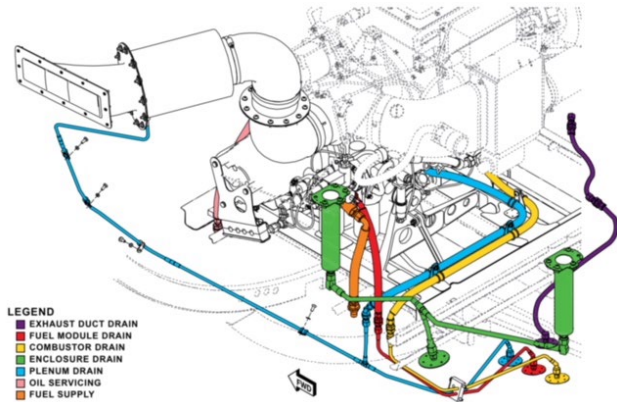
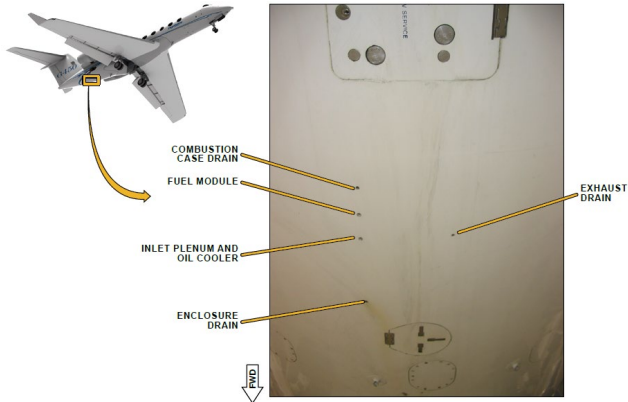
NOTE: THE RIGHT BATTERY IS TURNED OFF FOR AN INFLIGHT APU START BECAUSE BOTH BATTERIES PRODUCE TOO MUCH TORQUE AND MAY RAMP THE APU STARTER PAST THE APU START ENVELOPE AND AUTOMATICALLY SHUT DOWN.

G450





APU EXTERNAL DRAINS



APU DOOR FUSELAGE LEFT FUSELAGE RIGHT

G550

G450

APU MASTER

ACRONYM:
 B – BULB
 B – BIT
 F – FUEL
 O – OIL
 D – DOOR

- ON
- 1) ECU PERFORMS BIT (“READY” FLASHES – BULB CHECK)
 - 2) OIL TEMP SENSED
 - 3) APU DOOR OPENS (65° OR 27°)
 - 4) APU FUEL SHUTOFF VLV OPENS
 - 5) “READY” LIGHT (AFTER 15 SEC / 10-16 SEC)

G450 NOTE, DOOR OPENING:

- ON GROUND, NO ENGINES RUNNING: 65°
- ON GROUND, ENGINE(S) RUNNING: 27°
- IN-FLIGHT, 27° ONCE THE START BUTTON IS PRESSED

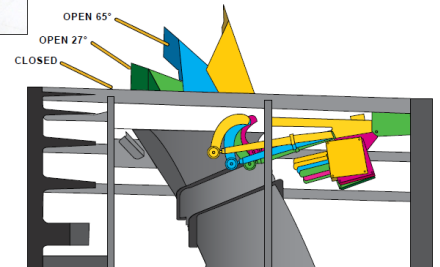
- OFF
- G450: WAIT TILL < 5% APU RPM
 - G550: WAIT TILL < 70% APU RPM
 - APU FUEL SHUTOFF VALVE CLOSES
 - IF RUNNING, THE APU WILL IMMEDIATELY SHUTDOWN – DAMAGE CAN OCCUR

NOTE: APU RPM AND EGT ARE DISPLAYED FOR 5 MIN AFTER THE APU MASTER IS SELECTED OFF.

NOTE: APU STARTING IS NOT INHIBITED WITH THE ABSENCE OF THE **READY** LIGHT. IF THE FLIGHT CREW ELECTS TO START THE APU WITHOUT THE **READY** LIGHT THE APU AIR INLET DOOR MUST BE VERIFIED TO BE OPEN (G450 QRH NG-7). INFLIGHT, CHECK THE TAIL MOUNTED CAMERA.

NOTE: IN FLIGHT THE APU OIL TANK IS HEATED, 21°C TO 43°C, REGARDLESS OF WHETHER THE APU IS RUNNING OR NOT.

G450



- START BUTTON:
 - 1) APU STARTER (LEFT BATT)
 - 2) 5% - APU FUEL CONTROL SHUTOFF VLV OPENS & IGN
 - 3) 7% / 12% - “READY” LIGHT GOES OUT
 - 4) STARTER CUT-OUT 50% / 46% ON GND, 60% IN THE AIR
 - 5) IGN CUT-OUT 95% / 50% ON GND, 98% IN THE AIR
 - 6) GEN ON, 95% + 4 SEC / 99% + 2 SEC
 - 7) AIR AVAIL, 100% + 90 SEC / 100% + 60 SEC
- “100% RPM = 62,000 RPM”
 “100% RPM = 45,586 RPM”
- MIN VOLTAGE FOR APU START: 22 V DC
- MAX EGT: 973° (START)
 746° (RUNNING)
 1050° (START)
 732° (RUNNING)
- MAX RPM: 107%

NOTE: THE G450 USES THE LEFT BATT TO START THE APU. IF THE LEFT BATT IS < 22V AND THE RIGHT BATT IS ≥ 22V, THE LEFT BATT MUST BE DESELECTED TO UTILIZE THE RIGHT BATT FOR APU START.

- STOP BUTTON
 - NOTE: THE CORRECT SHUTDOWN PROCEDURE IS TO COMMAND A SHUTDOWN FROM THE EXISTING OPERATING CONDITION.
 - AN EXISTING APU LOAD (BLEED OR SHAFT) IS NOT TO BE REMOVED PRIOR TO COMMANDING SHUTDOWN.
- G450
 - 1) OVERSPEED SIGNAL TO ECU
 - 2) THE OVERSPEED CIRCUIT SHUTS OFF FUEL TO THE APU AT THE FUEL CONTROL UNIT
 - 3) BIT TEST
 - 4) SURGE CONTROL VALVE CYCLES
 - 5) <35% RPM, ECU CLOSES INLET DOOR, WHICH TAKES 15 SECONDS TO CLOSE
 - 6) ECU MONITORS EGT AND RPM FOR 5 MIN
 - 7) AFTER 5 MIN “APU MASTER” CAS DISPLAYED

- G550
 - <FL200, 1 MIN COOL-DOWN TO 70% RPM
 - >FL200, GEN OFF, THEN 100% FOR 1 MIN
 - AT 63% RPM THE ECU CLOSES THE APU DOOR TO 10% OPEN
 - AT 40% RPM THE ECU CLOSES THE APU DOOR

NOTE: IF THE APU IS IN COOL-DOWN MODE / > 70% RPM (PRIOR TO SHUT DOWN), DEPRESSING THE START SWITCH RETURNS APU TO 100% RPM.



- HIGH ALTITUDE START CAPABILITY DUE TO:
 - BAAV – ALLOWS LEFT ENG BLEED AIR TO WARM THE APU INLET
 - OIL HEATER – THE APU OIL TANK IS HEATED, 21°C TO 43°C, REGARDLESS OF WHETHER THE APU IS RUNNING OR NOT
- FOR OPTIMIZED TURBINE SECTION LIFE
 - MINIMIZE RUN TIME AT MAX EGT
 - MINIMIZE THE NUMBER AND DEGREE OF THERMAL CYCLES
 - SHUT DOWN IN THE EXISTING OPERATING CONDITION/LOAD
 - PREVENT INGESTION OF DE-ICING FLUID
 - USE “AUTO” ACM MODE

NOTE: IT IS BETTER TO RUN THE APU IN AN “UNNEEDED” IDLE STATE THAN TO SHUT IT DOWN FOR A SHORT PERIOD AND RESTART IT.

NOTE: IN ORDER TO PREVENT COMPRESSOR SHROUD CORROSION IT IS RECOMMENDED THAT THE APU BE OPERATED (AT NO LOAD) FOR A MINIMUM OF 5 MINUTES EVERY THREE (3) TO SEVEN (7) DAYS, ESPECIALLY IN HIGH HUMIDITY CLIMATES AND SALINITY, SUCH AS COASTAL AREAS (G450 AOM 2A-49-00, PAGE 21).

- APU RESTRICTED AIRPORT PROCEDURES
 - QRR ⇒ ALTERNATE NORMALS (NG) ⇒ APU RESTRICTED AIRPORT PROCEDURES
 - OR, AFM SUPPLEMENTS ⇒ GAC-OIS-16
 - MINIMIZES APU OPERATING TIME WHILE USING EXT AC
 - PROCEDURE PROVIDES A NBPT FROM EXT AC TO R ENG IDG

APU SEALANT AIRPLANE FLIGHT MANUAL SUPPLEMENT G450-2016-01, G550-2016-01

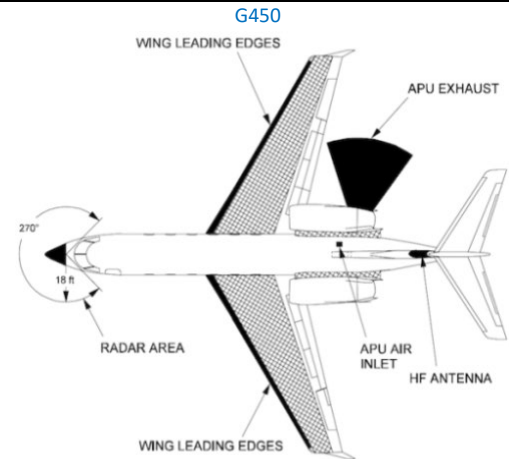
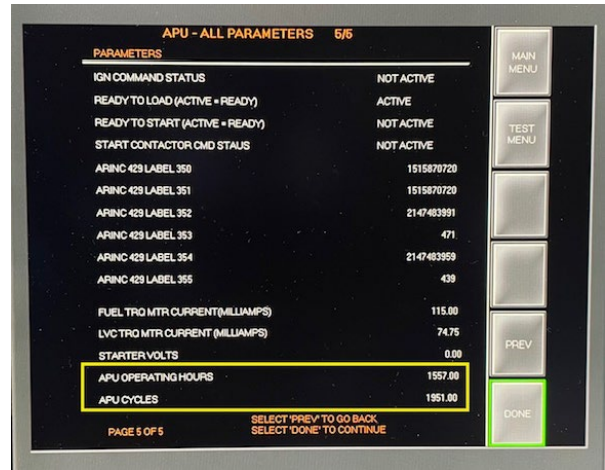
- GROUND
- UNATTENDED GROUND OPERATIONS OF THE APU ARE PROHIBITED
- FLIGHT
- USE OF THE APU DURING FLIGHT IS PROHIBITED EXCEPT FOR THE FOLLOWING CONDITIONS
 - DUAL ENGINE FAILURE
 - DUAL GENERATOR FAILURE
 - SINGLE ENGINE FAILURE
 - SINGE GENERATOR FAILURE

NOTE: DISPATCH IS NOT PERMITTED WITH ANY ENGINE GENERATOR INOPERATIVE.

G550 APU ENCLOSURE ASC 132 FOR SNs 5250-5599 IS PROJECTED FOR RELEASE IN 2022.

- HOUR METER CMC MENU → END OF FLIGHT REPORT
 - SOLID STATE DEVICE USE TO TRACK APU OPERATING HOURS
 - NO READOUT ON THE HOUR METER ITSELF, RATHER THE ECU REPORTS THE INFORMATION TO THE CMC

- START COUNTER
 - SOLID STATE DEVICE USE TO TRACK THE TOTAL NUMBER OF APU STARTS
 - RECORDS A START WHEN 95% RPM IS REACHED FOR 7 SEC
 - NO READOUT ON THE COUNTER ITSELF, RATHER THE ECU REPORTS THE INFORMATION TO THE CMC DURING ITS PRE-START BITE
- G450 CMC MENU
 → SYSTEM DIAGNOSTICS
 → 49 AUX POWER UNIT
 → 22 AUX POWER UNIT
 EEC TEST
 → DATA: ALL PARAMETERS
 → CONFIRM
 → FWD TO PAGE 5/5



CODE 450

- ▶ [G450 APU](#)
- ▶ [G450 APU ABNORMALS](#)

Ivan Luciani's Systems Guides

- ▶ [G450 APU](#)
- ▶ [G550 APU](#)



POWERPLANT

G450, ROLLS-ROYCE TAY-611-8C

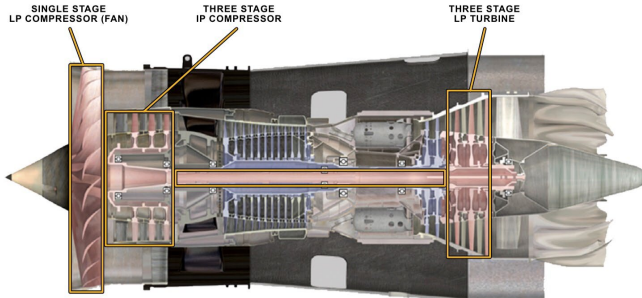
G550, BMW/ROLLS-ROYCE BR710-C4-11

- MEDIUM BYPASS TURBOFAN (PRESSURE RATIO - 16:1)
- **13,850 LBS OF THRUST AT SEA LEVEL, FLAT RATED: ISA +15°C**
- EMPTY WEIGHT DRY: 3,501 LBS
- ENGINES IN SERVICE: 720+
- **THE RIGHT ENGINE IS THE CRITICAL ENGINE** – DUE TO THRUST FROM THE APU EXHAUST, PER GAC.
- HP AND LP COMPRESSOR SECTIONS ARE DRIVEN BY THEIR OWN COAXIAL SHAFTS/SPOOLS (SHAFT WITHIN A SHAFT) – BEARINGS
- **CLOCKWISE / COUNTER-CLOCKWISE** ROTATION (VIEWED FROM THE FRONT)
- OIL COOLING VIA FUEL-OIL HEAT EXCHANGER
- 75% OF LP COMPRESSOR “FAN AIR” BYPASSES
- 25% ↻ HP SECTION ↻ COMBUSTION CHAMBER
- BYPASS AIR AND COMBUSTION AIR ARE MIXED BY A CRENELATED FLANGE

- LP / INNER SPOOL
- SINGLE STAGE **22 BLADE WIDE CHORD FAN**
- **3 / 2** STAGE LP COMPRESSOR SECTION – ENG FRONT DRIVEN BY 3 TURBINE STAGES – AFT ENG
- INLET GUIDE VANES DIRECT LP AIR IN THE COMPRESSOR TO REGULATE PRESSURE

100%=8,393 RPM
100%=7,431 RPM

G450

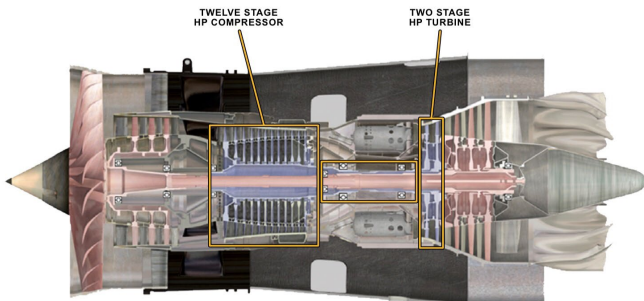


Low Pressure System

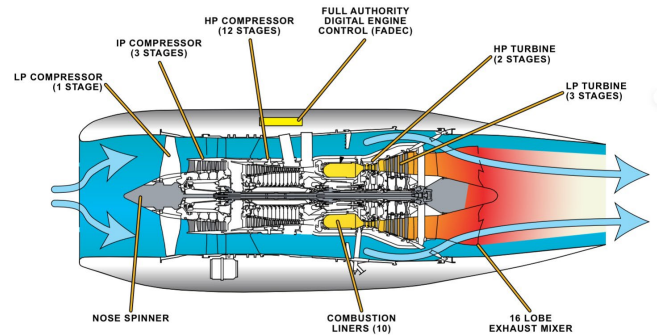
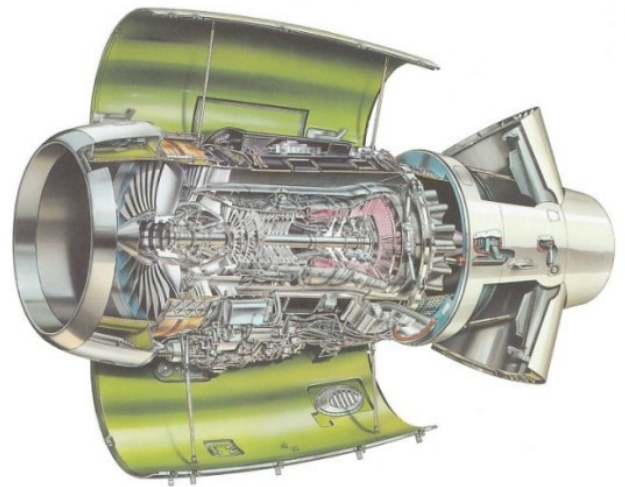
- HP / OUTER SPOOL
- **12 / 10** STAGE HP COMPRESSOR SECTION DRIVEN BY 2 TURBINE STAGES
- **FIXED STATORS ARE BETWEEN EACH COMPRESSOR STAGE**
- **STATOR VANES ARE BETWEEN EACH COMPRESSOR STAGE (FIRST THREE ARE VARIABLE, THE REST ARE FIXED)**

100%=12,484 RPM
100%=15,898 RPM

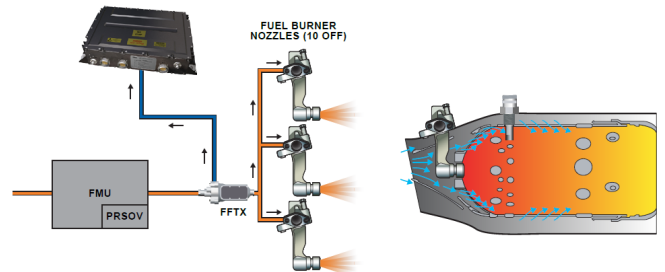
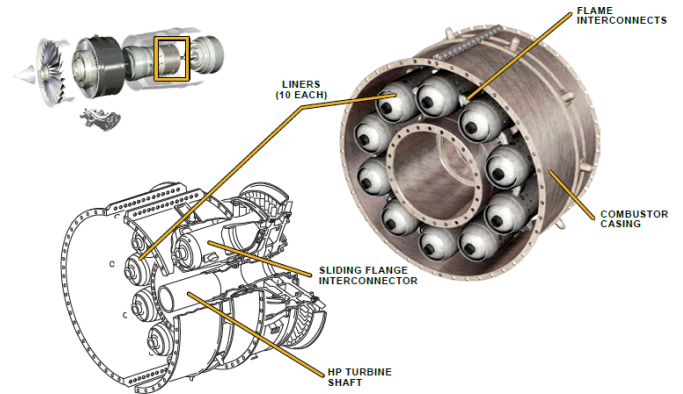
G450



High Pressure System



- COMBUSTION CHAMBER
- 10 COMBUSTION LINER ASSEMBLIES
- 10 / 20 FUEL SPRAY NOZZLES
- TWO IGN PLUGS – LINERS 4 & 8 / 4 & 7 O’CLOCK

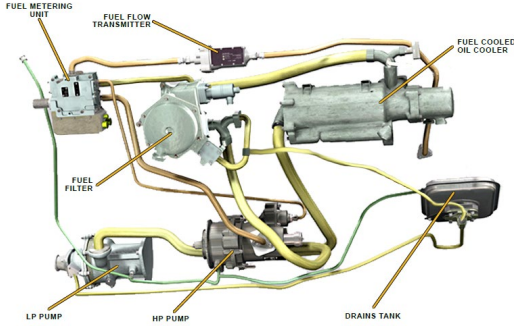


LEGEND



- ACCESSORY DRIVES
- HIGH SPEED GEARBOX ON THE HP COMPRESSOR
- LOW SPEED GEARBOX ON THE LP COMPRESSOR
- ENG FUEL SYSTEM
- TANK BOOST PUMPS (ELEC) (25 PSI) → FUEL SHUTOFF VALVES → LP PUMP (150 PSI) → FUEL-OIL HEAT EXCHANGER → FUEL FILTER (BYPASSES WITH 25 PSI DIFFERENTIAL) → LOW PRESSURE SWITCH (15 PSI) → HP PUMP (1,200 PSI) → FUEL FILTER → FUEL METERING UNIT → HP FUEL SHUTOFF VALVE → FUEL FLOW TRANSMITTER → FUEL SPRAY NOZZLES (10/20)
- THE LP PUMP CAN SUCTION FEED THE ENG <FL200
- FUEL FILTER** – EEC/LP FILTER HAS 5 PSI DIFFERENTIAL ACROSS THE FILTER
- ENGINE FUEL PRESSURE** – EEC /LP FUEL PRESSURE <15 PSI

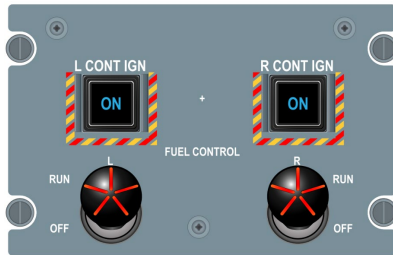
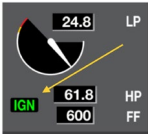
THE ELECTRONIC ENGINE CONTROL (EEC) IS A COMPONENT OF THE FADEC



NOTE: THE ENG COULD BE SHUT DOWN EXTERNALLY BY ROTATING THE FUEL SHUTOFF LEVER IN THE MAIN WHEEL WELL.

- IGN
- TWO IGN PLUGS** EACH ENG (CONT IGN)
- THE IGN EXCITERS USE INVERTERS, TRANSFORMERS AND CAPACITORS TO BOOST THE 28 V POWER SUPPLY TO 3,000V / "10 JOULES"
- ONLY ONE IS USED FOR START
- NOTE: THIS SERVES TWO PURPOSES; IT EXTENDS PLUG LIFE WHILE ALSO ENSURING AN INOP PLUG IS DETECTED.
- THE EEC ALTERNATES WHICH IGN IS USED FOR START (IF NO IGN CYCLE FUEL CONTROL SWITCH TWICE – SEE *CYCLING THE FUEL CONTROL SWITCH* BELOW)
- WHEN ENCOUNTERING UNSTABLE AIR AND/OR MOISTURE (T30 PROBE IN THE HP COMPRESSOR) (G450 AOM 2A-74-00, PAGE 2)
- ALTERNATE ENG START PROCEDURE (NG-4, NG-2)
- CONT IGN – SELECT ON

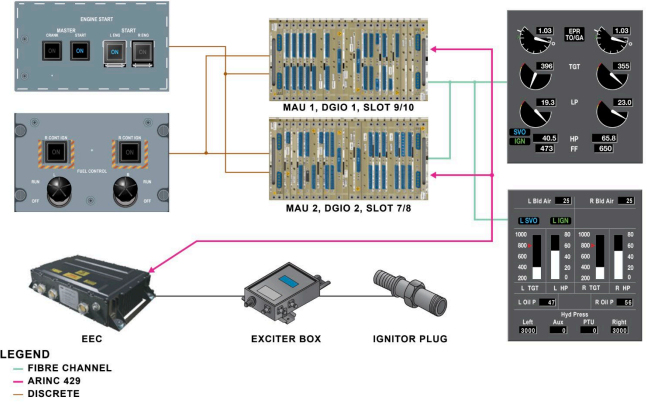
NOTE: NO CAS MSG IS ANNUNCIATED WHEN OPERATING CONT IGN; ONLY:



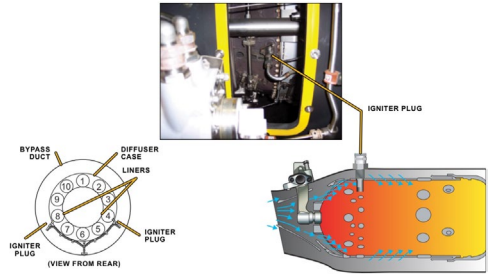
NOTE: DUE TO THE PROXIMITY OF THE FUEL CONTROL SWITCHES, EXTREME CARE MUST BE TAKEN TO ENSURE IGNITION SWITCHLIGHT ARE BEING OPERATED AND NOT THE FUEL CONTROL SWITCHES. SEE: QUICK RELIGHT, BELOW.

NOTE: THE IGNITION UNITS (PART NUMBER 9060440-1 OR -2) CONTAIN RADIOACTIVE SUBSTANCE Kr-85 WITH 0.0001 mCi LEVEL OF RADIOACTIVITY PER DEVICE.

G450 IGNITION SYSTEM BLOCK DIAGRAM



LEGEND
 — FIBRE CHANNEL
 — AIRINC 429
 — DISCRETE

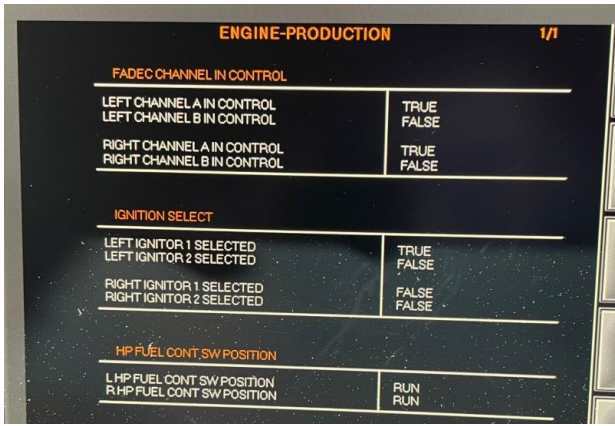


- IGN OPERATIONS
- NORMAL START (START MASTER)
- ALTERNATE START (CRANK MASTER)
- CONT IGN
- INCLEMENT WX
- AUTO RELIGHT
- QUICK RELIGHT
- USES ONLY 1 IGNITER – **AUTO IGN**
- MANUAL IGN
- MANUAL IGN
- T30 PROBE SENSES MOISTURE – **AUTO IGN**
- EEC SENSES AN ABNORMALITY WITH HP, LP, OR TGT – **AUTO IGN**
- FOR ACCIDENTAL ENG SHUTDOWN – RESELECT RUN WITHIN 30 SEC / > 35% HP RPM - **AUTO IGN**
- NO ALTITUDE RESTRICTIONS

- CYCLING THE FUEL CONTROL SWITCH
- NORM OPS:**
- SWITCHES FADEC CHANNELS
- SWITCHES IGN CHANNELS
- THE EEC ALTERNATES CHANNELS AND IGNITERS AS FOLLOWS:
- EEC CHANNEL A – EXCITER/IGNITER 1
- EEC CHANNEL B – EXCITER/IGNITER 1
- EEC CHANNEL A – EXCITER/IGNITER 2
- EEC CHANNEL B – EXCITER/IGNITER 2

- TERMINATED START** (e.g. NO LIGHTOFF):
- SWITCHES FADEC CHANNELS
- DOES NOT** SWITCH IGN CHANNELS

NOTE: TO SEE WHICH CHANNEL AND WHICH IGNITER IS ACTIVE DURING AN ENGINE START (FUEL CONTROL IN RUN) SELECT CMC MAIN MENU > SYSTEM DIAGNOSTICS > 73 ENGINE FUEL AND CONTROL > 21 ENGINE FADEC (DGIO) > DATA: CONFIGURATION FADEC RA (OR LA).



- FADEC / EEC
 - THE EEC IS AT THE HEART OF THE FADEC
 - EACH EEC HAS DUAL CHANNELS
 - EACH EEC RECEIVES INPUT FROM THE 3 MAUs AND THE 3 ADMs
 - EACH EEC OUTPUTS TO THE FWCs AND CMC
 - AT >35% HP RPM A DEDICATED GEN (3 PHASE AC, **PERM MAGNET ALTERNATOR (PMA)**), RECTIFIED BY THE PMA INTO 28 V DC) POWERS THE FADEC AND EEC
 - ELECTRICALLY LINKED TO THE POWER LEVERS AND SWITCHES
 - COMMUNICATES WITH ALL THREE MAUs OVER ARINC-429 DATA BUSES

EEC CONTROL MODES

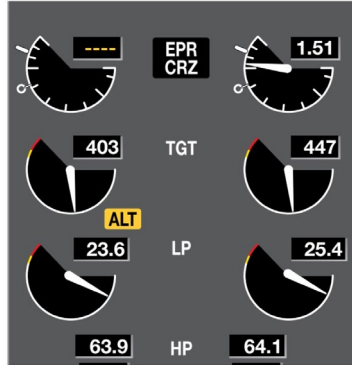
NOTE: IF EPR FAILS THE EEC SWITCHES TO ALT MODE.

NOTE: REVERSE THRUST ENGINE CONTROL MODE IS LP (N1) BECAUSE EPR INDICATION IS NOT ACCURATE WITH T/R DOORS DEPLOYED.

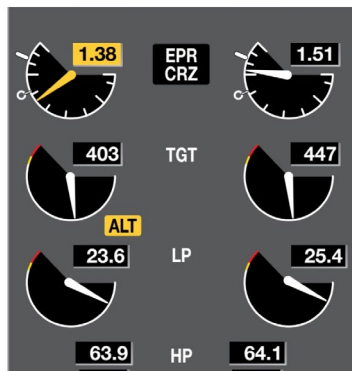
- PRIMARY CONTROL MODE**
 - USES HP FOR IDLE (LOW OR HIGH)
 - USES EPR ABOVE IDLE
- ALTERNATE CONTROL MODE – USES LP– TAKEOFF IN ALT IS PROHIBITED**, AND AUTO THROTTLES ARE INOPERATIVE
- REVERSE THRUST CONTROL MODE – USES LP**
 - “SOFT REVERSION” – EEC REVERTS TO LP, **ALT** IS DISPLAYED
 - “HARD REVERSION” – CREW SELECTS LP, **ALT** IS DISPLAYED
- DC → SENSOR → ENG ALT CTRL



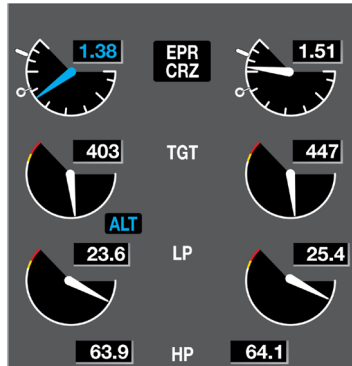
ALT MODE – SOFT REVERSION, NO EPR



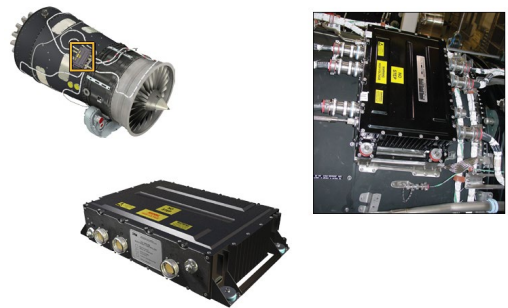
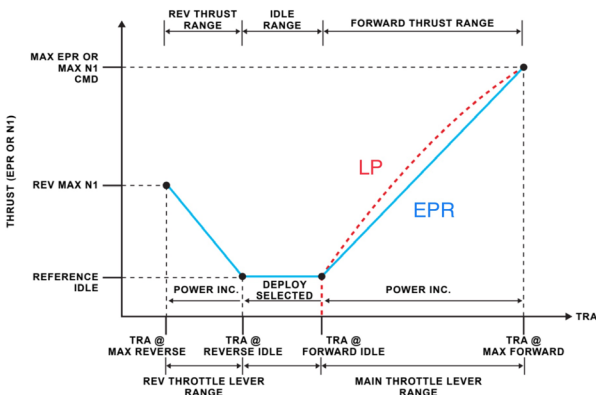
ALT MODE – SOFT REVERSION, WITH EPR



ALT MODE – HARD REVERSION, WITH EPR



NOTE: IT IS RECOMMENDED THAT THE APU BE STARTED WITH EMER PWR ON. WITHOUT EMER PWR THE EEC MAY SWITCH TO ALT MODE. NORMAL ENG CONTROL CAN BE RESTORED EITHER FROM THE DC OR BY CYCLING THE FUEL CONTROL SWITCH.



NOTE: ARINC-429 IS A PRIVATELY COPYWRITTEN SPECIFICATION DEVELOPED TO PROVIDE INTERCHANGEABILITY AND INTEROPERABILITY OF LINE REPLACEABLE UNITS (LRU) IN COMMERCIAL AIRCRAFT. THE ARINC-429 SPECIFICATION ESTABLISHES HOW AVIONICS EQUIPMENT AND SYSTEMS COMMUNICATE. THE SPECIFICATION DEFINES ELECTRICAL CHARACTERISTICS, WORD STRUCTURES AND PROTOCOL NECESSARY TO ESTABLISH BUS COMMUNICATION. ARINC-429 DEFINES BOTH THE HARDWARE AND DATA FORMATS REQUIRED FOR BUS TRANSMISSION.

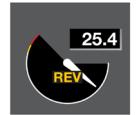


- INDEPENDENT OVERSPEED PROTECTION
 - BOTH EEC CHANNELS MONITOR LP AND HP RPM FOR EXCEEDANCES
 - BOTH EEC CHANNELS MONITOR THE LP SHAFT FOR A SHEAR
 - IF BOTH CHANNELS DETECT AN OVERSPEED OR AN LP SHAFT SHEAR THE EEC WILL COMMAND ENGINE SHUTDOWN VIA THE HPSOV

- FUEL METERING UNIT (FMU)
 - MODULATES FUEL FLOW IN RESPONSE TO FADEC COMMAND
 - THE PRESSURIZED FUEL WITHIN THE FMU IS USED AS A HYDRAULIC FORCE TO MOVE THE VARIABLE INLET GUIDE VANES AND VARIABLE STATOR VANES IN RESPONSE TO FADEC COMMAND
 - THE FMU HOUSES THE HP FUEL SHUTOFF VALVE THAT IS CONTROLLED BY THE ASSOCIATED COCKPIT FUEL CONTROL SWITCH
 - THE FMU CLOSSES THE HP FUEL SHUTOFF VALVE IF A BROKEN/OVERSPEED LP TURBINE SHAFT IS DETECTED
 - AT SHUTDOWN THE FMU DELIVERS EXCESS FUEL TO A DRAIN TANK WHICH IS RETURNED TO THE LP FUEL PUMP AT THE NEXT ENGINE START

- IDLE CONTROL HIGH IDLE:
 - “APPROACH MODE”
 - G450: 66% - 68% HP, G550: 70% - 85% HP, (DEPENDENT UPON PRESSURE ALT)
 - FLAPS > 22°
 - LANDING GEAR DOWN
 - WOW IN THE AIR
 - REMAINS IN HIGH IDLE FOR 5 SEC AFTER LANDING – FOR T/R EFFECTIVENESS
 - LOW IDLE:
 - G450: 50% - 53% HP, G550: 63% - 85% HP (DEPENDENT UPON PRESSURE ALT)

- THRUST REVERSERS
 - ELECTRICALLY CONTROLLED
 - HYDRAULICALLY OPERATED
 - 2 LOCKING LATCH MECHANISMS
 - MECHANICAL SPRINGS HOLD T/Rs SHUT, HYDRAULIC PRESSURE UNLOCKS THE HOOKS
 - NO TIME LIMIT USING REV WHILE TAXIING
 - **MAX REVERSE – G450 65% LP, G550 70% LP** DECREASES TO 55% BETWEEN 60 AND 50 KTS (30 SEC MAX)
 - **IDLE REVERSE BY 60 KTS ON LANDING**
 - IF A T/R DEPLOYS INFLIGHT THE FADEC COMMANDS IDLE THRUST, BUT THE THROTTLE DOES NOT MOVE
 - G550 – T/REV MAN STOW – EMPLOYS A DEDICATED CONTROL CIRCUIT TO SEND AN INDEPENDENT ELECTRIC SIGNAL DIRECTLY TO THE REVERSER ICU TO DIRECT HYD PRESSURE TO THE STOW SIDE OF THE REV DOOR ACTUATOR
 - **Thrust Reverser Unlock, L-R** – UNLOCKED “IN FLIGHT” (FWC > 60 KTS). **DO NOT EXCEED 200 KTS**
 - **Thrust Reverser Unlock, L-R** – UNLOCKED “ON GROUND” (FWC < 60 KTS)



NOTE: UNDER CERTAIN GROSS WEIGHT AND ATMOSPHERIC CONDITIONS A SUCCESSFUL GO-AROUND MAY NOT BE POSSIBLE WERE A REVERSER TO NOT RESTOW INFLIGHT.

OPERATION

- ON GROUND SIGNAL IS PROVIDED TO EEC BY WOW AND/OR ANTI-SKID WHEELSPEED SENSORS → PLA MUST BE AT IDLE → REVERSE LEVER INTERLOCK – THE EEC LIMITS REVERSE LEVER TRAVEL TILL THE REVERSER DOORS ARE 60% DEPLOYED → THE EEC SIGNALS THE ISOLATION CONTROL UNIT (ICU) WHICH ROUTES HYD PRESSURE TO THE HYDRAULIC CONTROL UNIT (HCU) → THE THRUST REVERSER CONTROL UNIT (TRCU) DIRECTS THE CORRECT SOLENOID VALVE IN THE HCU → THE HCU OPERATES THE LATCH / UNLATCH ACTUATOR →

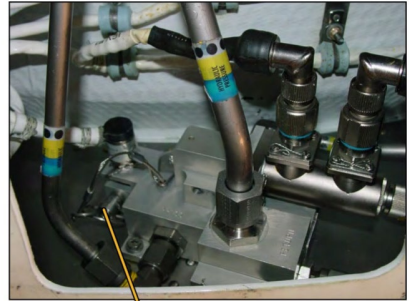
DICHIARA NOTE:
THE THRUST REVERSER LOCK OUT BOLTS ARE CARRIED INSIDE THE COWL JUST FORWARD OF THE THRUST REVERSERS.

THE TRCU THEN PRESSURIZES THE REVERSER DOOR ACTUATOR → AND THE EEC THEN LIMITS REV THRUST...

- NOTE: DOOR DEPLOYMENT IS NOT SYNCHRONIZED.
- NOTE: IF A WOW FAILS ON LANDING THE T/Rs WILL STILL DEPLOY, BUT MAY NOT STOW BELOW 47 KTS.
- NOTE: THE EEC CONTROLLED ICU (ISOLATION CONTROL UNIT) GOVERNS THE FLOW OF HYD FLUID TO EACH TRCU (THRUST REV CONTROL UNIT). THE ICU HAS THE LOCKING PIN THAT IS INSTALLED TO DISABLE THE DOORS FOR DISPATCHABILITY.

DISPATCH WITH INOPERATIVE THRUST REVERSER(S)

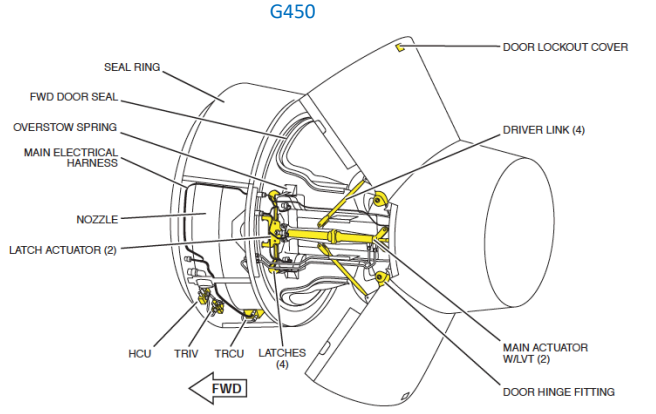
- LOCKOUT
- OM → CHAPTER 9 HANDLING AND SERVICING → DISPATCH UPGRADE PROCEDURES → THRUST REVERSER LOCKOUT

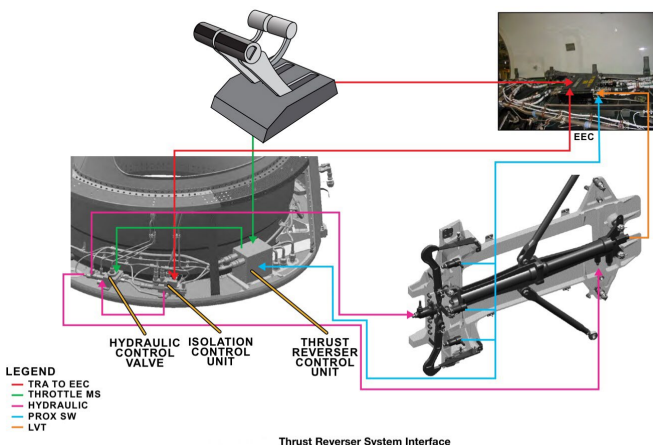
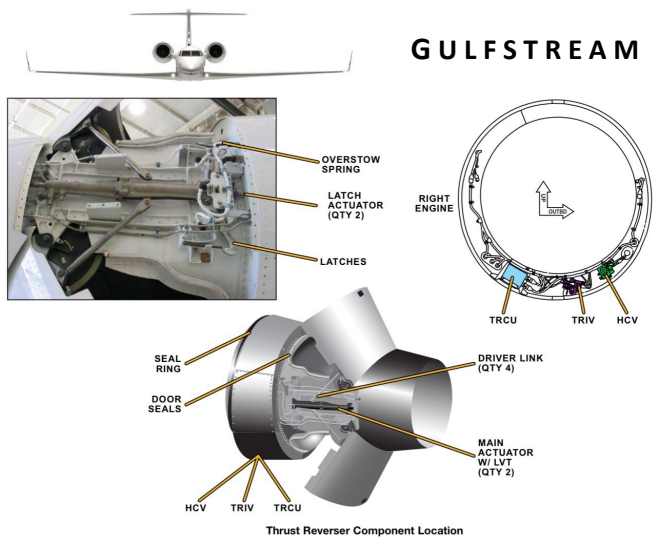


LOCKOUT PIN INSTALLED

- TAKEOFF
- WET RUNWAY: ADD 600' (G450) / 1,400' (G550) TO THE ACC-STOP DIST
- NOTE: ON TAKEOFF INIT PAGE 2/5, UNDER “THRESHOLD (2R) ENTER 700 (G450) / 1500 (G550). THE DEFAULT IS 100'. ENTERING 700 (G450) / 1500 (G550) EFFECTIVELY REDUCES THE RUNWAY AVAILABLE BY 600' (G450) / 1400 (G550). (G450 AOM 05-23-00, PAGE 4), (G550 AOM 05-23-00, PAGE 4)

- LANDING (G450-OIS-02 TABLE 47c NOTES), (G550 OIS-03 TABLE 47c NOTES)
- WET OR COMPACTED SNOW RUNWAYS: INCREASE DISTANCE BY 10%
- STANDING WATER, SLUSH, OR LOOSE SNOW: INCREASE DISTANCE BY 20% (G450) / 25% (G550)
- ICE: INCREASE DISTANCE BY 50%





- **CHECK OIL BETWEEN 5-30 MINUTES AFTER SHUTDOWN:**
 - **LAST FLIGHT OF THE DAY**
 - **G450 – 14 CUMULATIVE HRS**
 - **G550 – 24 CUMULATIVE HRS**
- ENG OIL REPLENISHING SYSTEM – 14 PINTS
- OIL TANK → OIL QUANTITY TRANSMITTER → OIL PUMP → FCOC → OIL TEMP TRANSDUCER → OIL FILTER (DPI BYPASSES AT 30 PSI) → ENG BEARINGS, RADIAL DRIVE, AND ACC GEARBOX → SCAVENGE PUMPS → MAGNETIC CHIP DETECTORS → OIL TANK...



OIL PRESS – MIN:

- TAKEOFF / MCT / IDLE
 - 30 PSI / 25 PSI / 17 PSI**
 - 45 PSI / 35 PSI / 25 PSI**

EICAS INDICATIONS

NOTE: ON TAKEOFF YOU COULD BE BELOW 30 PSI WITHOUT RECEIVING AN AMBER CAUTION.

WHITE: ≥ 25 PSI

AMBER: 16 – 25 PSI

RED: 0 – 16 PSI

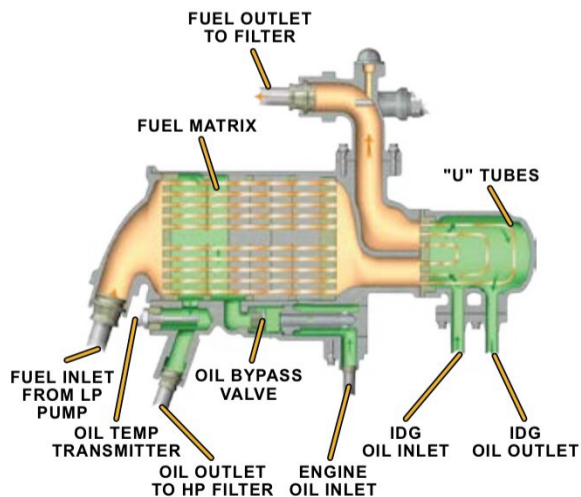
OIL TEMP:

- MIN FOR START **-40°C / -30°C**
- MIN FOR THROTTLE ADVANCE **-30°C**
- MIN FOR TAKEOFF THRUST **+20°C (QRH)**
- MAX TEMP / TRANSIENT **+105°C / +120°C (15 MIN) +160°C**

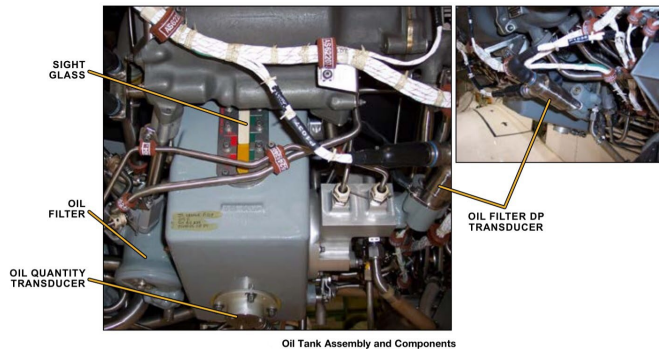
- OIL QUANTITY DISPLAYS
- GROUND SERVICE SYNOPTIC 1/6 PAGE
- OIL SERVICING PANEL – AFT EQUIPMENT COMP
- SITE GAUGE – ON THE ENGINE

▪ **ENG OIL**

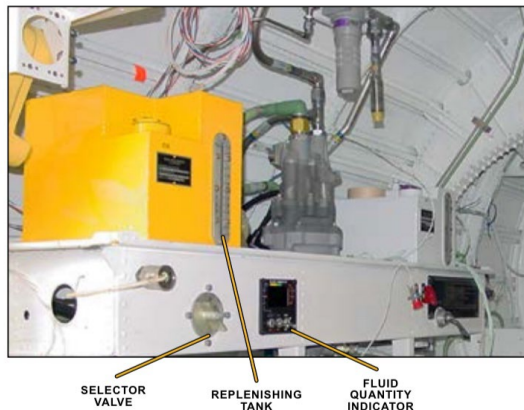
- **R ENG OIL TANK – 15.5 PINTS (10.8 USABLE)**
- **L ENG OIL TANK – 14.5 PINTS (10.8 USABLE)**
- **G550, ENG OIL TANKS – 32.8 PINTS (20.5 USABLE)**
- LUBRICATES THE ROLLER/THRUST BEARINGS AND GEARS
- PRESSURE REGULATED (200 PSI)
- TEMPERATURE CONTROLLED VIA FCOC
- OIL PUMP DRIVEN BY THE ACCESSORY GEARBOX
- FUEL-OIL HEAT EXCHANGER (FCOC), IDG FCOC



G450

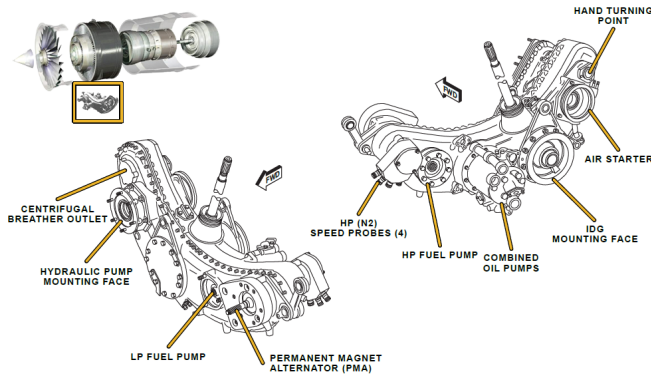


Oil Tank Assembly and Components





- ACCESSORY GEARBOX
 - THE HP COMPRESSOR POWERS THE GEARBOX VIA A DRIVE SHAFT
- POWERS:
 - IDG
 - FUEL PUMP AND METERING UNIT
 - OIL PUMP
 - HYD PUMP
 - FADEC GEN (PMA@35%)
- OTHER COMPONENTS:
 - INTEGRAL OIL TANK
 - CHIP DETECTOR
 - 4 HP SPEED PROBES
 - AIR STARTER

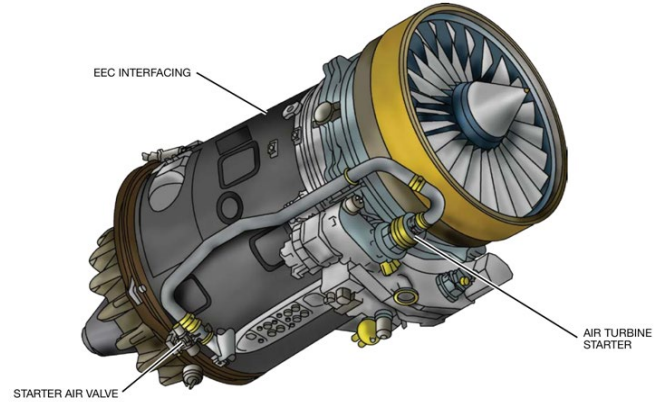


NOTE: CROSSBLEED START:
QRH ⇒ ALTERNATE NORMALS ⇒ CROSSBLEED START

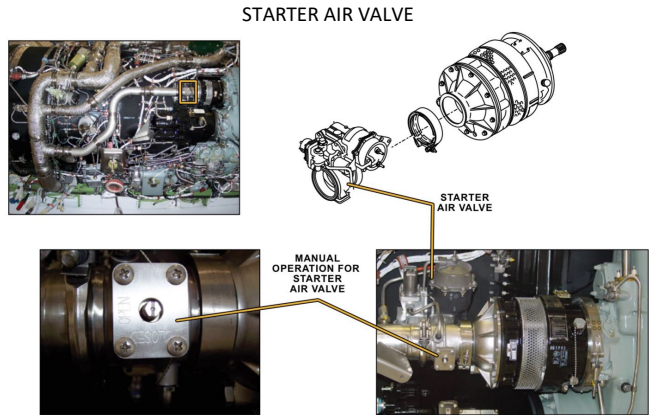
NOTE: ~85% HP RPM IS REQUIRED FOR CROSSBLEED STARTING.

G450 NOTE: THE ENGINE SHOULD BE IDLED FOR FOUR (4) MINUTES (COLD ENGINE) OR TWO (2) MINUTES (WARM ENGINE) PRIOR TO ACCELERATION ABOVE 85% HP RPM.

G550 NOTE: THE ENGINE SHOULD BE IDLED FOR FIVE (5) MINUTES PRIOR TO ACCELERATION ABOVE 85% HP RPM.



- AIR TURBINE STARTER (ATS)
 - APU AIR
 - EXTERNAL AIR
 - CROSSBLEED
- STARTER IS CONNECTED TO THE ENG ACCESSORY GEARBOX AND TURNS THE HP SECTION OF THE ENG
- SVO SHOULD CLOSE AT 41-44% HP, 47% HP**
- (G550) THE STARTER MAY BE RE-ENGAGED <42% HP RPM – COULD BE UTILIZED IN THE EVENT OF A HOT START**

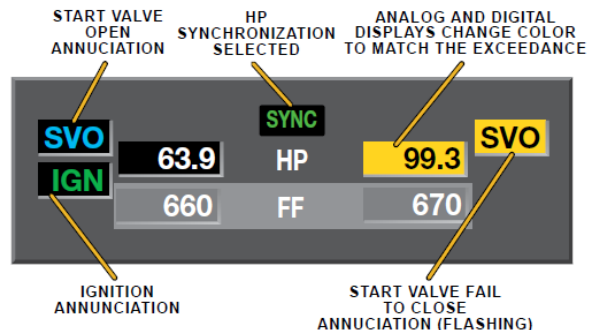
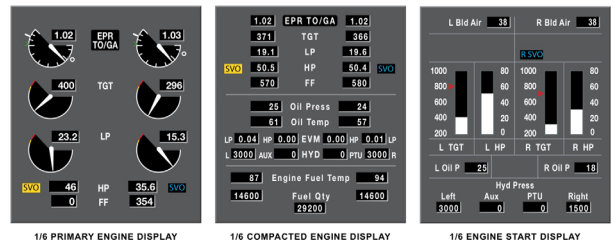


- SAV FAILS TO CLOSE
 - FLASHING **SVO**
 - DO NOT SHUT THE FUEL CONTROL**
 - THE GOAL IS TO REMOVE ALL AIR PRESSURE FROM THE STARTER, THEN SHUT DOWN THE ENG
 - QRH ⇒ ENGINES (EB) ⇒ START VALVE FAILURE TO CLOSE AFTER ENGINE START CHECKLIST

QRH FIRST STEPS (EB-29, EB-37):
START MASTER..... OFF
BLEED AIR OFF
APU / EXTERNAL AIR OFF

- SAV FAILS TO OPEN ON ENG START
 - QRH ⇒ ENGINES (EB) ⇒ START VALVE FAILURE TO OPEN ON ENGINE START CHECKLIST
 - QRH ⇒ ALTERNATE NORMALS (NG) ⇒ **MANUALLY OVERRIDING STARTER AIR VALVE**
 - OM, ⇒ CHAPTER 9 HANDLING AND SERVICING ⇒ **DISPATCH UPGRADE PROCEDURES** ⇒ **MANUALLY OVERRIDING STARTER AIR VALVE**
 - REQUIRES 3/8IN RATCHETING WRENCH AND INSULATED GLOVE, GUTS, AND GLORY

SVO INDICATIONS





G550 AIR OPERATIONS

- AUTOMATIC AIRSTARTS
 - START MASTER AND FUEL CONTROL SWITCH
 - PREFERRED METHOD OF RESTARTING AFTER AN IN-FLIGHT FLAMEOUT
 - THE EEC CHOOSES BETWEEN THE STARTER OR WINDMILLING AIR BASED ON AIRSPEED (< OR > 250 KTS)
 - ANY ANOMALY REQUIRES THE CREW TO ABORT THE START
- STARTER ASSISTED AIRSTARTS
 - CRANK MASTER AND FUEL CONTROL SWITCH
 - SIMILAR TO ALTERNATE GND START – IGN IS CONTROLLED BY THE CREW
 - ANY ANOMALY REQUIRES THE CREW TO ABORT THE START
- WINDMILLING AIRSTARTS
 - QRH PROCEDURE – USED WHEN AIRSTARTING IN ICING CONDITIONS

NOTE: THERE IS NO TGT PROTECTION FOR AN AIRSTART

- NORMAL START
 - START MASTER
 - FUEL CONTROL SWITCH
 - THE EEC PROTECTS AGAINST OVERTEMPS AND OVERSPEEDS
- ON GROUND Autostart Abort
 - TGT EXCEEDING TGT LIMITS (200°C PRIOR TO LIGHT-UP, 700°C AFTER LIGHT-UP)
 - SATISFACTORY ON FUEL CONDITIONS TIMER IS SET TO 120 SECONDS (2 MINUTES)
 - IDLE SPEED / LIGHT-UP / HUNG / STALL TIMER IS SET TO 120 SECONDS (2 MINUTES)
 - STARTER DISENGAGEMENT STARTER DUTY TIMER IS SET TO 180 SECONDS (3 MINUTES)
- ALTERNATE START, QRH NG-4, NG-2
 - CRANK MASTER SWITCH
 - FUEL CONTROL SWITCH
 - CREW SELECTS IGN
 - THE EEC DOES NOT PROTECT START

- DRY CRANK
- WET CRANK
- FUEL CONTROL SWITCH – RUN
 - FADEC LOGIC COMMANDS IGN IF START MASTER IS ON
 - HP FUEL SOV OPENS IF HP RPM > 9%
- FUEL CONTROL SWITCH – OFF
 - HP FUEL SOV CLOSES – CUTS OFF ALL FUEL TO THE SPRAY NOZZLES
 - EEC CHANNEL CHANGE
 - IGN OFF
 - QUICK RELIGHT POSSIBLE BY RETURNING SWITCH TO RUN

- GND OPS KEEP OUT OF ZONE:
 - G450, 60% - 72% LP RPM PROHIBITED >10 SEC
 - G550, 66% - 80% LP RPM PROHIBITED >10 SEC
 - AUTOMATIC PROTECTION:
 - IF PARK BRAKE IS SET
 - WHEN IN REVERSE THRUST < 31 KTS

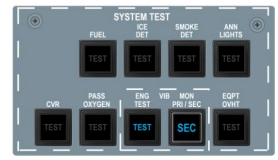
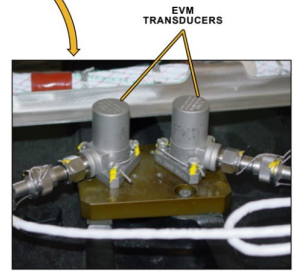
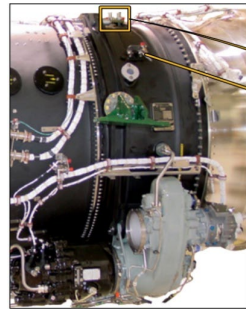
G550 NOTE: FOR TAKEOFF ACCELERATION WITH CROSSWINDS > 20 KTS, MAINTAIN < 66% LP UNTIL 20 KTS (SHOWN ON MAP DISP), THEN "SLAM" ACCEL THE POWER LEVER (<5 SEC; USE OF A/T IS ACCEPTABLE). ADD 600 FT TO FIELD LENGTH.

- EVM – ENGINE VIBRATION MONITORING
 - MONITORS THE BALANCE OF THE LP AND HP COMPRESSOR AND TURBINE ASSEMBLIES
 - IF EVM ≥0.60 LP AND/OR HP / ≥0.80 LP AND/OR HP, Engine Exceedance – RETARD THROTTLE TO KEEP BELOW 0.60/0.80
 - IF VIB IS ACCOMPANIED BY OTHER FAILURE INDICATIONS, SHUT DOWN ENG
 - IF IN ICING IT IS CONSIDERED NORMAL TO EXCEED ALERT LEVEL VIBs
 - THE EVM TEST FUNCTION IS INHIBITED WHEN THE ENG IS RUNNING; NOTE: "REFRAIN FROM TESTING THE EVM SYSTEM WITH THE MASTER START OR

NOTE: EVM INDICATIONS ALONE SHOULD NOT BE USED AS CRITERIA FOR ENGINE SHUT DOWN.
NOTE: EVM READINGS ARE INCHES PER SECOND, e.g. 0.60 IS 0.60 IN/SEC.

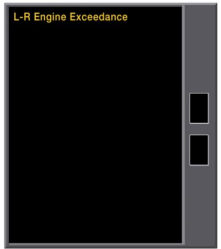
CRANK SWITCH SELECTED OR EITHER ENGINE RUNNING"

- Engine Exceedance CAS DUE TO EVM ≥0.60 LP AND/OR HP / ≥0.80 LP AND/OR HP IS INHIBITED DURING ENGINE START



2.15	LP	2.05
1.98	EVM	1.95
	HP	

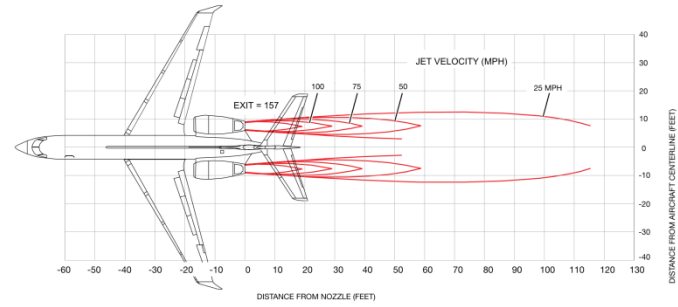
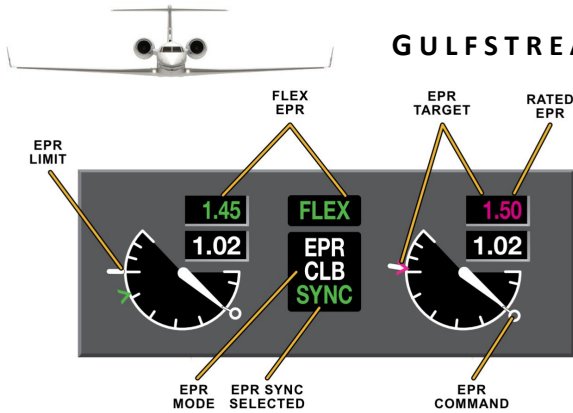
EVM READOUT



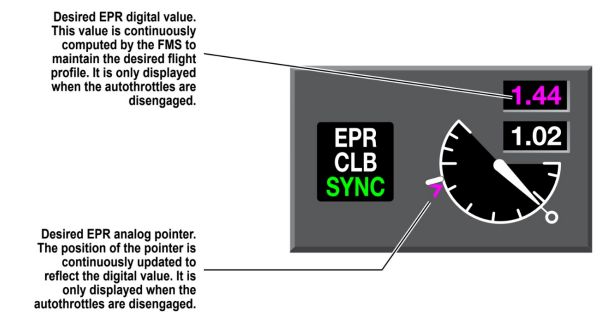
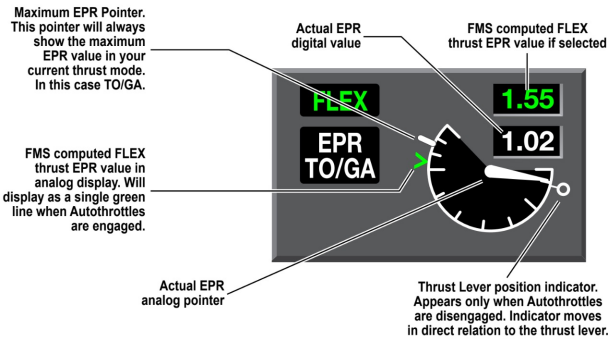
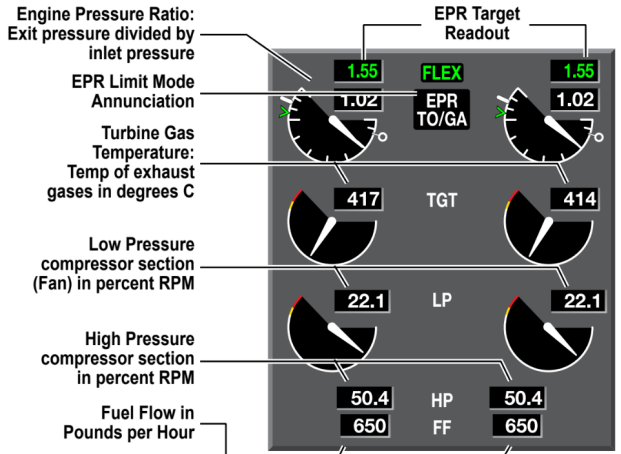
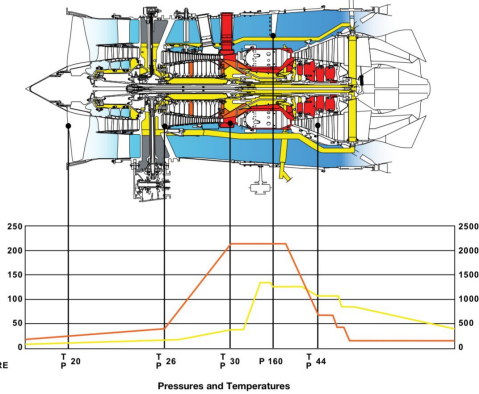
NOTE: FOR ENGINE VIBRATION TREND MONITORING AND FAN TRIM BALANCE PURPOSES THE LAST 32 FLIGHT HISTORIES ARE STORED IN THE NON-VOLATILE MEMORY AND ARE VIEWABLE IN THE CMC.

- ENGINE SHUTDOWN GUIDELINES
 - SHUTDOWN FOR THE FOLLOWING:
 - ENGINE FIRE
 - VIBRATION - EXTREME ENG VIB FELT IN THE AIRPLANE, OR IF VIB IS ACCOMPANIED BY OTHER FAILURE INDICATIONS
 - LOSS OF POWER - EXCESSIVE OR UNCONTROLLABLE POWER LOSS
 - OIL PRESSURE - SUDDEN INCREASE OR DECREASE IN OIL PRESSURE BEYOND LIMITS, OR SUSTAINED HIGH OIL PRESS ABOVE LIMITS
 - TGT - SUDDEN UNCONTROLLABLE INCREASE IN TGT BEYOND LIMITS
 - ANY OTHER ADVISABLE CONDITION

- EPR GAUGE
 - (WHITE): EPR LIMIT (MAX EPR POINTER) SHOWS THE MAX EPR FOR CURRENT THRUST MODE (IN THIS CASE "CLB")
 - (MAGENTA) EPR TARGET, DISPLAYS ONLY WHEN A/Ts ARE OFF
 - (GREEN) FLEX THRUST, DISPLAYS AS A SINGLE GREEN LINE WHEN THE A/Ts ARE ENGAGED
 - (WHITE) THRUST LEVER POSITION INDICATOR, DISPLAYS ONLY WHEN A/Ts ARE OFF



NOTE: GO-AROUNDS, TOUCH AND GO'S, AND BALKED LANDINGS COUNT AS ADDITIONAL ENGINE CYCLES, AND SHOULD BE RECORDED AS SUCH (GAC-OIS-18).



- ENG GND START:
- | | | |
|--------------------|---------------|---------------|
| | G450 | G550 |
| ▪ MAX TAILWIND | <u>25 KTS</u> | <u>20 KTS</u> |
| ▪ MAX X-WIND | <u>25 KTS</u> | <u>30 KTS</u> |
| ▪ MAX TGT TO START | <u>200°C</u> | <u>150°C</u> |
| ▪ MIN OIL TEMP | <u>-40°C</u> | <u>-30°C</u> |
| ▪ OIL TEMP <-10°C | | |
- PERFORM CRANK CYCLE (SEE QRH),
TURN GEN OFF FOR START
- START SYNOPTIC: 800° TGT SCALE (NORM 1000°) NOTE: THE SCALE CHANGES FROM 800° TO 1000° WHEN THE START IS COMPLETE.

- TAILWIND STARTS: PRIOR TO SELECTING FUEL CONTROL TO RUN:
 - WITH TAILWINDS > 10 KTS, ACHIEVE MAX CRANKING RPM AND VERIFY POSITIVE LP RPM
 - IF LP INCREASES IMMEDIATELY, CONTINUE START
 - IF LP DECREASES, PASSES THROUGH ZERO, THEN INCREASES, CONTINUE START
 - IF LP DECREASES, THEN STABILIZES, ABORT START**

- STARTER DUTY:
 - 3 START CYCLES OF 3 MIN EACH**
 - 15 SEC BETWEEN START CYCLES**
 - AFTER 3 CYCLES DELAY 15 MIN**

NOTE: STARTER TIME LIMITS CAN BE EXTENDED TO UP TO TEN (10) MINUTES INFLIGHT (QRH EB-13).

G550, THE STARTER MAY BE RE-ENGAGED <42% HP RPM (HOT START)

- START TGT: **700°C**

NOTE: FOR ENGINE STARTS WITH:

 - HIGH TGT (200°C / 150°C) ACHIEVE MAX HP RPM PRIOR TO PLACING THE FUEL CONTROL TO RUN
 - TAILWIND (>10 KTS)
 - ROTORBOW

	G450	LP%	HP%	TGT	TIME
START – GND/AIR		-	-	<u>700°C / 780°C</u>	-
OVR SPD/TEMP		96.5	101.6	820°C	20 SEC
TAKEOFF		<u>95.5</u>	<u>100.6</u>	<u>800°C</u>	5 / 10 MIN
MCT		<u>95.5</u>	<u>97.5</u>	<u>715°C</u>	-
THRUST REV		<u>65.0</u>	-	-	30 SEC
G550					
START – GND/AIR		-	-	<u>700°C / 850°C</u>	-
OVR SPD/TEMP		101.5	99.8	905°C	20 SEC
TAKEOFF		<u>101.1</u>	<u>99.6</u>	<u>900°C</u>	5 / 10 MIN
MCT		<u>101.0</u>	<u>98.9</u>	<u>860°C</u>	-
THRUST REV		<u>70.0</u>	-	-	30 SEC



G550 ROTOR SHAFT BOW "ROTOR BOW START"

- FOR ENG STARTS WITHIN 20 MIN TO 5 HRS OF LAST SHUTDOWN
- CRANK ENG AT MAX CRANKING RPM FOR 30 SEC BEFORE SELECTING FUEL CONTROL TO RUN

ROTOR BOW OCCURS DUE TO UNEVEN COOLING INSIDE THE ENG

ENG AIRSTART:

- ALTITUDE **<FL250** **<FL250**
- AIR SPEED **250-325 KTS** **>250 KTS (FOR WINDMILLING AIRSTART)**
- TGT **780°C** **850°C**

NOTE: THERE IS NO TGT PROTECTION ON AN AIRSTART. THE FADEC ONLY PROVIDES START PROTECTION WHEN ON THE GROUND AND THE START MASTER SWITCH IS USED.

NOTE: THE FADEC WILL NOT ALLOW FUEL TO THE ENGINE BELOW **9% (G450) / 8% (G550)** HP RPM.

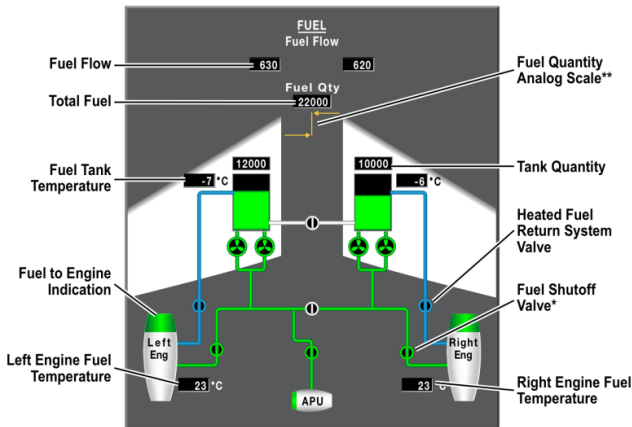
FUEL TANK TEMP:

- MINIMUM **G450, -40°C, G550, -37°C**
- MAXIMUM **+54°C – Fuel Tank Temperature**
- Fuel Tank Temperature** TANK TEMP IS -35° TO -36°C / -39°C (ASC)
- Fuel Tank Temperature** TANK TEMP IS -40°C / -37°C

ENG FUEL TEMP:

- MINIMUM **-40°C**
- MAXIMUM / TRANSIENT **G450, +95°C / 130°C (15 MIN)**
G550, 140°C / 165°C (15 MIN)
Engine Exceedance CAS

- G450 OAT >110°F / 43.5°C** **LIMIT IDG LOAD TO 45% (18Kva)**



LOWER COWL DOORS

- WEIGHT LIMIT
- TWO 190 LB PERSONS & 75 LB TOOLBOX

DRAINS:

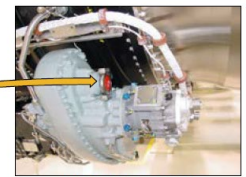
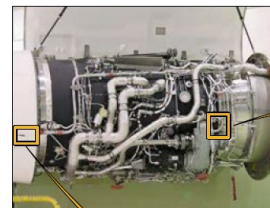
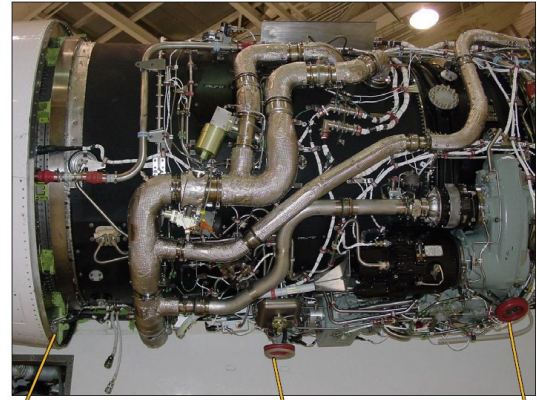
- FORWARD "DRY" DRAIN – ABNORMAL FLUID FLOW

NOTE: ANY FLUID VISIBLE AT A DRY DRAIN SHOULD BE INVESTIGATED

- AFT "WET" DRAIN - NORMAL DRAINING FLUIDS

- FUEL PUMP
- FUEL METERING UNIT
- AIR STARTER
- IDG
- HYD PUMP CASE
- HYD PUMP CAVITY
- FUEL RETURN TO TANK / OVERSPEED SPLITTER UNIT
- DRAINS TANK OVERFLOW
- COMBINED STRUCTURAL BYPASS DUCT / INTERSERVICE FAIRING
- VARIABLE STATOR VANE ACTUATOR

G450



G450





- ADDITIONAL OIL INFO
 - QRH SUPPLEMENTAL DATA
 - ENGINE AND APU OIL GRADES, NH-5
- QUIET SHUTDOWN
 - QUIET SHUTDOWN CHECKLIST, QRH NF-4

NESTER NOTE:
 THE QUIET SHUTDOWN CHECKLIST PROCEDURE IS DESIGNED TO BE USED AT TIMES WHEN THE APU IS INOPERATIVE, NOT AS AN ARBITRARY SHUTDOWN METHOD. GULFSTREAM HAS RECOMMENDED THAT THE APU BE USED AT THE END OF A FLIGHT FOR TWO PRIMARY REASONS.

- TO BE ABLE TO ROTATE THE ENGINE SHOULD A TAIL PIPE FIRE BE EXPERIENCED AT SHUTDOWN.
- APUS HAVE FAILED TO START DUE TO CORROSION WITH THE ROTATING GROUP CREATING ENOUGH FRICTION THAT THE STARTER CAN NOT SPOOL THE APU. THIS OCCURS MOST OFTEN IN AREAS WITH SALT IN THE AIR. AFTER LANDING, AN APU THAT HAS NOT BEEN STARTED WILL NORMALLY BE COLD SOAKED. THE CONDENSATION THAT FORMS WITHIN THE ROTATING GROUP CAN CAUSE SUFFICIENT CORROSION TO FORM OVERNIGHT, THAT "TIP RUB" FRICTION WILL PREVENT ROTATION ON THE FOLLOWING DAY.

NOTE: TO SEE ENG PARAMETERS, SELECT: MENU – STBY ENGINE ON MCDU #1.

NOTE: ONLY MCDU #1 HAS THE STBY ENGINE INST OPTION.

GIII TAILPIPE FIRE



BREAKFAST MINUTES
 NOVEMBER 15, 2002 VOLUME 12, ISSUE 19

GV (ATA 49): APU ROTOR SEIZURE DUE TO CORROSION
 SUBMITTED BY DARRYL SMITH, PROJECT ENGINEER, POWER PLANT/ECS

"...THE GV FLEET HAS EXPERIENCED THREE INCIDENTS OF INABILITY TO START THE APU DUE TO SEIZED ROTORS... THE OPERATOR SHUT THE ENGINES DOWN AT THE END OF A MISSION WITHOUT STARTING THE APU...GULFSTREAM RECOMMENDS THAT OPERATORS AVOID ENGINE SHUTDOWNS WITHOUT THE APU OPERATING, ESPECIALLY IF THEY ARE LANDING IN HUMID CONDITIONS... **IT IS SUGGESTED THAT THE APU BE OPERATED BRIEFLY AT SOME POINT BEFORE SHUTDOWN; THIS SHOULD CLEAR OUT ANY ACCUMULATED MOISTURE AND PREVENT CONDENSATION FROM FORMING...** UNLESS LOCAL NOISE REGULATIONS PROHIBIT THE USE OF THE APU ON THE GROUND, IT IS RECOMMENDED THAT THE APU BE STARTED AND RUN ON THE GROUND AFTER LANDING... ADDITIONALLY, **THE PROCEDURES FOR A TAIL PIPE FIRE AFTER SHUTDOWN CALL FOR THE CREW TO MOTOR THE ENGINE UNTIL THE FIRE IS EXTINGUISHED. WITHOUT THE APU RUNNING, THERE IS NO AIR SOURCE TO ACCOMPLISH THIS PROCEDURE.**"

- NOISE CERTIFICATE
 - G450, STAGE 4; QRH NH-14
 - G550, STAGE 3; QRH NH-14,15,16

- VOLCANIC ASH ENCOUNTER
 - QRH EB-27, EB-34
- INDICATIONS:
- ACRID ODOR, SIMILAR TO ELECTRICAL SMOKE
 - ENGINE SURGE, INCREASING TGT
 - ST. ELMO'S FIRE / STATIC DISCHARGE

NOTE:
[DUAL ENGINE FLAMEOUT](#) ◀ LINK
 QRH EB-5

PROCEDURE:

OXYGEN MASK DON (100%)
 COURSE REVERSE
 ATC.....NOTIFY
 AUTOTHROTTLES..... OFF
 POWER LEVERS IDLE
 CONT IGN OFF
 WINDSHIELD HEAT OFF

IF TGT CONTINUES TO RISE:
 AFFECTED FUEL CONTROL (L AND/OR R)..... OFF
 DESCENT..... 300 KTS TO 25,000 FT

NOTE: USE OF SPEEDBRAKES IS NOT RECOMMENDED.

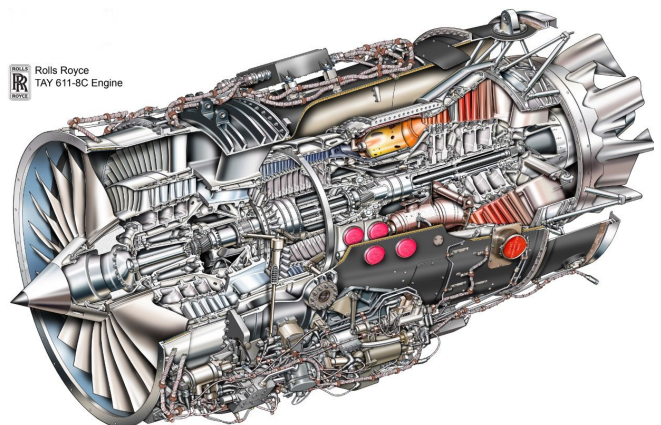
NOTE: USE OF HMG IS NOT POSSIBLE WITH BOTH ENGINES WINDMILLING.

NOTE: THE MELTING POINT OF MOST VOLCANIC ASH (~1100 TO 1200°C) IS WELL WITHIN THE OPERATING RANGES OF MOST HIGH-PERFORMANCE TURBINE ENGINES. WHEN VOLCANIC ASH REACHES THIS TEMPERATURE RANGE, IT CAN CAUSE A GLASS-LIKE BUILDUP ON STATIC HOT SECTION COMPONENTS. VOLCANIC ASH MAY ALSO CAUSE EROSION TO FAN BLADES, COMPRESSOR BLADES AND ANY OTHER COMPONENTS WHICH COME IN DIRECT CONTACT WITH THE ASH. PNEUMATIC SYSTEM COMPONENTS AND OTHER COMPONENTS THAT RELY ON MECHANICAL LINKAGES MAY ALSO BE ADVERSELY AFFECTED. DETRIMENTAL EFFECTS TO THE ENGINE FROM VOLCANIC ASH WILL BE PROPORTIONAL TO THE CONCENTRATION OF ASH AND THE PERIOD OF EXPOSURE.

- FLEX TAKEOFF RESTRICTIONS (AFM APPENDIX A)
 - NO TAILWIND*
 - NO DOWNHILL SLOPE*
 - NO CONTAMINATION ON RUNWAY (BUT WET IS OK)
 - NO WING ANTI-ICE
 - ANTI-SKID MUST BE OPERATIVE
 - AUTO GROUND SPOILERS MUST BE OPERATIVE IF FLAPS 10°, ETC...
- NOTE: USE OF FLEX IS RECOMMENDED FOR NARROW RUNWAY OPERATIONS.
- SEE: [TAKEOFF MATRIX](#)

* G550 NOTE: FLEX MAY BE USED WITH A DOWNSLOPE OR TAILWIND IF THE AFM OR TOLD IS USED TO COMPUTE FLEX THRUST.

CODE7700: ▶ [REDUCED THRUST](#)





INTENTIONALLY LEFT BLANK



FUEL

WING FUEL TANKS

THE WING 3° DIHEDRAL FORMS A NATURAL GRAVITY FLOW TOWARDS THE WING ROOT

THE WING HAS A 27° SWEEP

NOTE: USING A FUEL DENSITY OF 6.75 LBS/GAL AT 60°C.

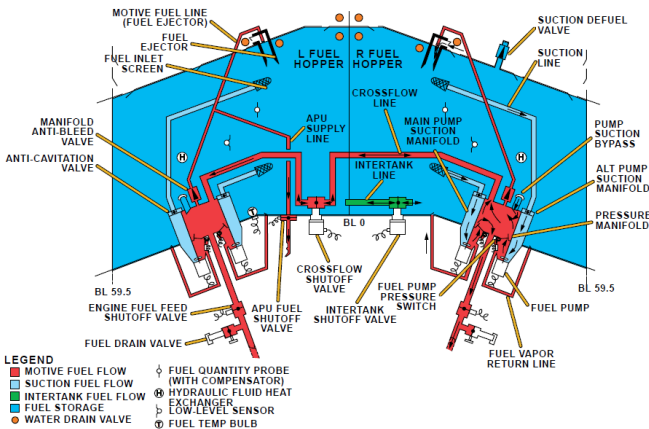
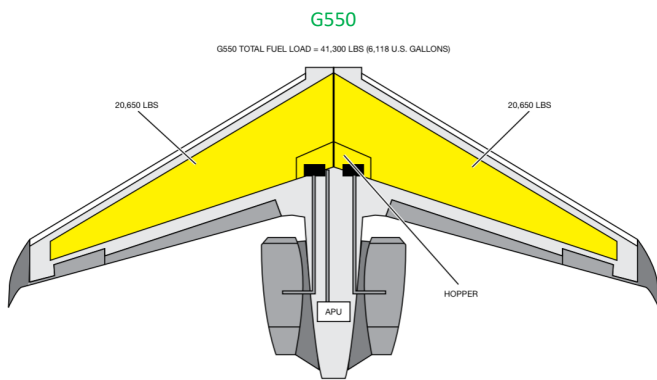
- 29,500 LBS OF FUEL
 - 41,300 LBS OF FUEL
 - 4,370 GAL
 - 6,118 GAL
- EACH WING
- FIVE COMPARTMENTS
 - 6 DRAINS
 - VENTS
 - QTY PROBES (20)
 - TANK TEMP SENSOR (LEFT HOPPER / BOTH HOPPERS)
 - TEST
- SEPARATED BY RIBS AND JOINED BY BAFFLES
- 5 V – CAPACITORS
 - MAX +54°C
 - MIN -40°C / -37°C
- 7000/7000/14000
- L-R Fuel Level Low**
- FQMS Maint Req'd**
- 190 GAL (1,283 LBS)
- FLAPPER VALVES
 - EJECTOR PUMPS OVERFLOW THE HOPPER TANK
 - HYD FLUID-TO-FUEL HEAT EXCHANGERS

G450

NOTE: "DO NOT ATTEMPT A GO-AROUND WITH LESS THAN 600 LBS IN EITHER FUEL TANK" (AFM).

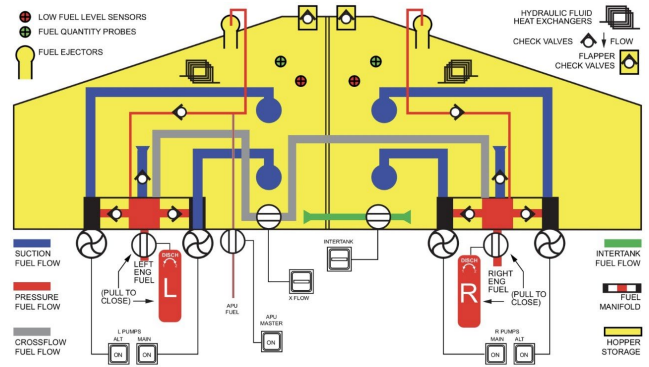
LOW LEVEL PROBE – 650 LBS (96 GAL) IN HOPPER:

Fuel Level Low

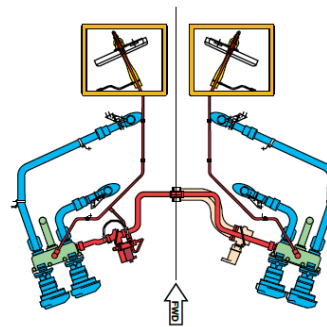


- LEGEND
- MOTIVE FUEL FLOW
 - SUCTION FUEL FLOW
 - INTERTANK FUEL FLOW
 - FUEL STORAGE
 - WATER DRAIN VALVE
 - ⊕ FUEL QUANTITY PROBE (WITH COMPENSATOR)
 - ⊕ HYDRAULIC FLUID HEAT EXCHANGER
 - ⊕ LOW-LEVEL SENSOR
 - ⊕ FUEL TEMP BULB

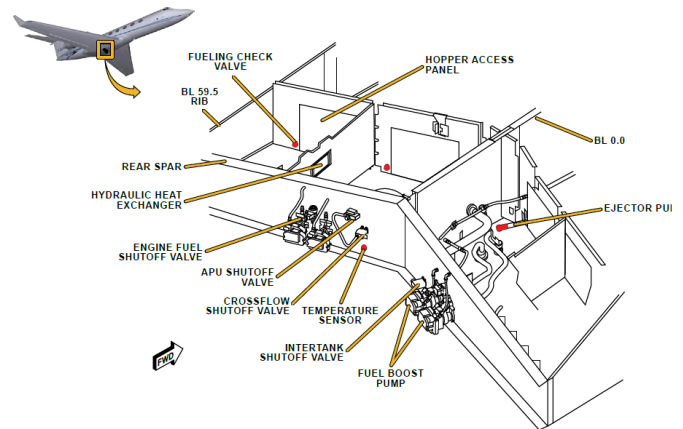
G550 FUEL SYSTEM DIAGRAM



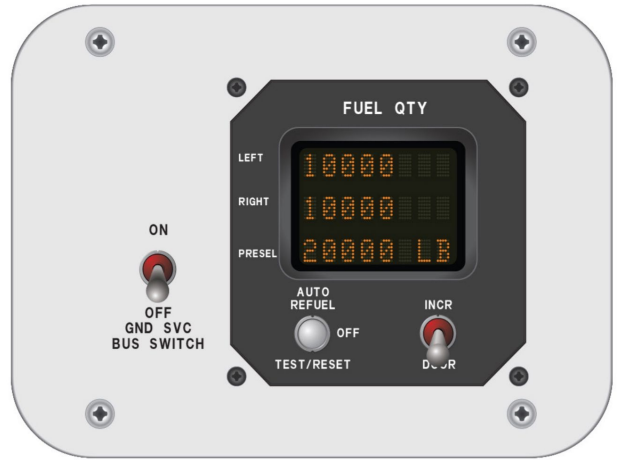
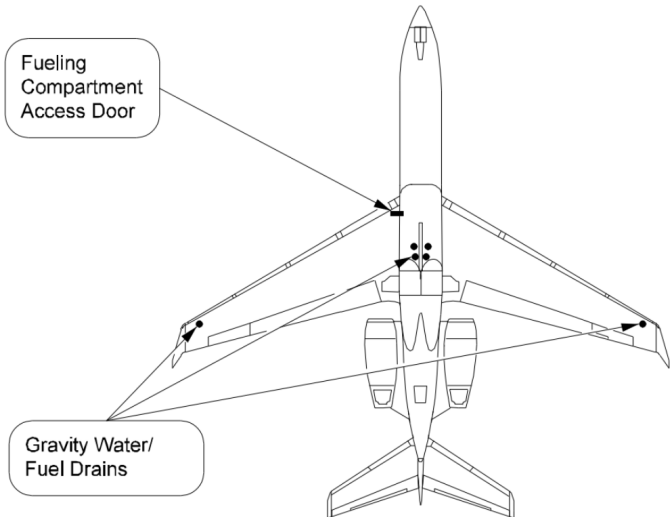
- FLAPPER VALVES
- EJECTOR PUMPS
- CAPABLE OF GRAVITY FILLING THE HOPPER AT A RATE OF 4,550 LBS/HR
- MOTIVE FLOW THE FUEL FROM BOOST PUMP PRESSURE
- FILL THE HOPPER AT A RATE OF 750 LBS/HR



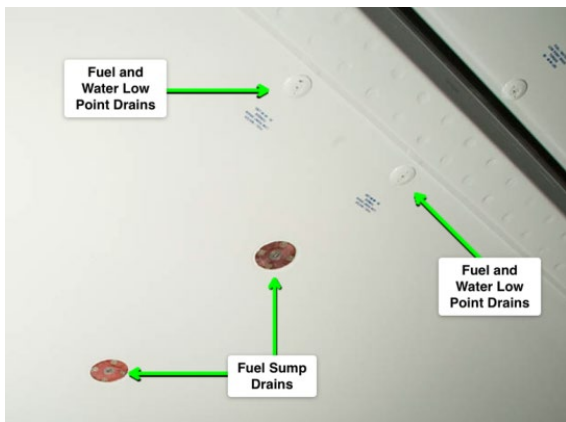
- AFT WING SPAR MOUNTS FOR:
 - BOOST PUMPS
 - FUEL SHUTOFF VALVES
 - CROSSFLOW – LEFT WHEELWELL
 - INTERTANK – RIGHT WHEELWELL
 - TEMPERATURE SENSORS



- FUEL SUMP DRAINS – 3 EACH WING
- HOPPER
- FORWARD OF THE HOPPER
- OUTBOARD FUEL VENTILATION PLENUM



NOTE: TO PREVENT IMBALANCES DURING PRESSURE FUELING THE FQSC INTERRUPTS FUELING TO THE HEAVY WING IF AN IMBALANCE OF **500 LBS** OCCURS. THE FQSC RESUMES FUELING TO BOTH TANKS WHEN THE IMBALANCE HAS BEEN REDUCED TO 100 LBS.

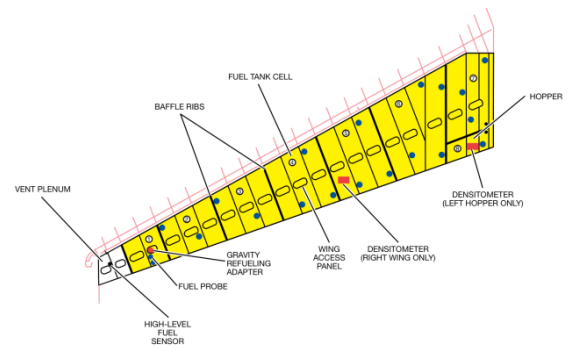


- REFUELING VARIABLES
 - AIRCRAFT ATTITUDE DURING REFUELING – NOSE DOWN (1.5°) HELPS (±150 LBS)
 - WING VOLUME
 - FQMS ACCURACY – DESIGN SPEC IS ±300 LBS
 - FUEL TEMPERATURE – BASELINE IS 60°F, EACH 10°F VARIANCE FROM BASELINE INCREASES OR DECREASES THE FUEL CAPACITY BY 200 LBS
 - FUEL DENSITY – DENSITY CAN VARY FROM 6.46 TO 6.99 LBS/GAL
 - THE US WEST COAST HAS THE HIGHEST FUEL DENSITY
 - ASIA HAS THE LOWEST FUEL DENSITY
- COMPENSATOR SENSORS – DENSITOMETERS
 - CALCULATES THE FUEL’S DIELECTRIC CONSTANT – COMPENSATES FOR LESS DENSE FUEL TO SHOW THE CORRECT LBS ON BOARD (RANGE IS BASED ON LBS)
 - 1 IN THE LEFT HOPPER
 - 1 IN THE RIGHT WING – MONITORS THE FUEL DENSITY WHILE FUELING

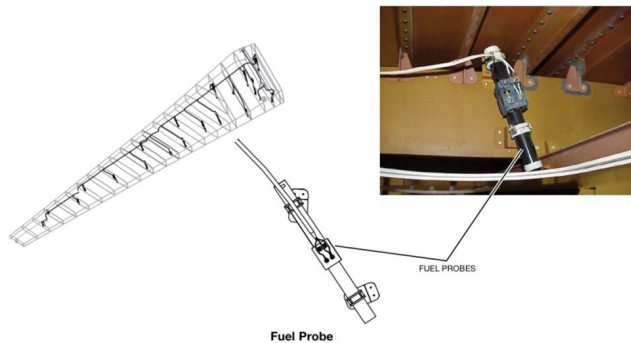
- VENT PLENUM
 - 2% FUEL EXPANSION SPACE (APPROX. 5 GALLONS)
 - THE VENT ALLOWS FUEL TO SPILL OVERBOARD THROUGH THE RAM AIR INLET IF THE FUEL TANK IS OVERFILLED

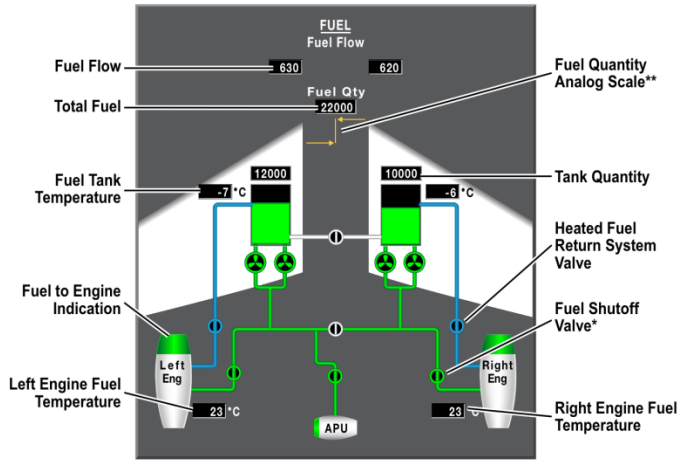
- FQSC
 - USES 20 TRANSISTORIZED CAPACITANCE PROBES
 - PROCESSES SIGNALS FROM PROBES
 - HIGH LEVEL PROBE – 1 IN EACH VENT PLENUM
 - LOW LEVEL PROBE – 1 IN EACH HOPPER (650 LBS ACTIVATES **Fuel Level Low L-R**)
 - USES 2 COMPENSATOR SENSORS TO ADJUST THE CAPACITANCE READING OF THE FUEL QUANTITY PROBES TO COMPENSATE FOR FUEL DENSITY
 - REPORTS QUANTITY TO MAUS
 - **CONTROLS AUTO REFUEL PROCESS**

FUEL QUANTITY SIGNAL CONDITIONER



- FUEL INDICATING SYSTEM
 - FUEL QTY CAN BE READ 8 DIFFERENT PLACES:
 - GND SERVICE CNTL PANEL (GSCP)
 - MCDU
 - FUEL SYNOPTIC 2/3 DISPLAY
 - SUMMARY SYNOPTIC DISPLAY
 - GND SERVICE 1/6 DISPLAY
 - SECONDARY ENGINE 1/6 DISPLAY
 - ALT PRIMARY ENGINE 1/6 DISPLAY
 - COMPACTED ENGINE 1/6 DISPLAY
 - FUEL TANK TEMP IS DISPLAYED ON THE FUEL SYNOPTIC 2/3 DISPLAY

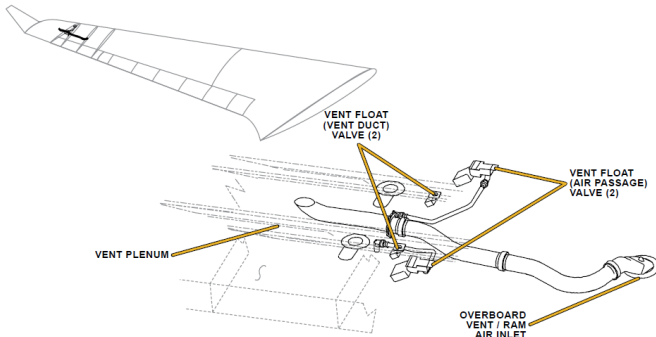




Valve Position	Display
Closed	IC-1000707
Open	IC-1000006
Transit/Indeterminate	IC-0011003
Invalid (I/O Failure)	IC-1000006

Fuel Valve Display

- VENTILATION – NACA VENT
- FORWARD AND AFT VENT DUCT
- VENT PLENUM (5 GAL / 2% FUEL EXPANSION SPACE)
- FLOAT-OPERATED VENT / RELIEF VALVES
- NONRELIEVING FLOAT VENT VALVES
- OVERBOARD LINE VENT INLET AND FLUSH VENT INLET/OUTLET (RAM AIR INLET)



- BOOST PUMPS
- PRESSURE
- 25 PSI
- 16 PSI MIN, **Fuel Pressure Low**
- L/R MAIN
- L/R ALT
- L/R ESS DC BUS
- L/R MAIN DC BUS

NOTE: EACH BOOST PUMP HAS ITS OWN INVERTER (DC TO AC)

NOTE: G450 NG-27: SELECT ONLY ONE BOOST PUMP ON AT A TIME. WAIT AT LEAST 5 SEC BETWEEN BOOST PUMP SELECTION. FAILURE TO DO SO MAY CAUSE A FAILURE IN THE FUEL PRESSURE SWITCH.

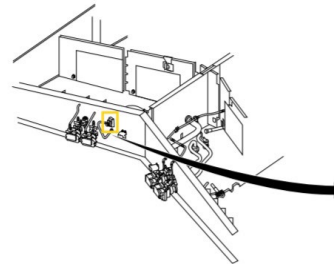
NOTE: IF THE FUEL TEMP IS BELOW 0°C, USE THE INTERTANK VALVE TO BALANCE FUEL – DO NOT TURN OFF BOOST PUMPS TO BALANCE FUEL BELOW 0°C.

- FUEL PRESSURE
- MAIN/ALT BOOST PUMPS (25 PSI)
- LP PUMP (150 PSI)
- HP PUMP (1,200 PSI)
- FUEL SHUTOFF VALVES
- CONTROLLED BY THE FIRE HANDLES (ESS DC)
- FAIL FROZEN

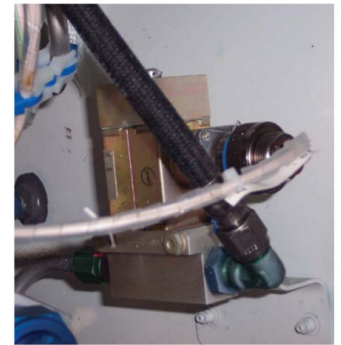
ENGINE FUEL SHUTOFF VALVE



- APU SHUTOFF VALVE
- CONTROLLED BY THE APU MASTER (ESS DC)
- FAILS FROZEN



APU Fuel Shutoff Valve



- FILTRATION
- GRAVITY FUELING SCREENS
- BOOST PUMP INLETS
- FUEL FILTER – PRIOR TO FUEL METERING UNITS (FMUs)

NOTE:

G450 FUEL FILTERS **WILL NOT BYPASS** LINK

G550 FUEL FILTERS **WILL BYPASS.**

NOTE: FOLLOWING USE OF ANTI-MICROBIOLOGICAL ADDITIVES (BIOBOR, KATHON, ETC) FUEL LOW PRESSURE AND/OR FUEL FILTER DIFFERENTIAL PRESSURE WARNINGS SHOULD BE CAREFULLY MONITORED. SUCH PRECAUTIONS ARE PARTICULARLY IMPORTANT WHEN THESE ADDITIVES ARE USED ON AN INTERMITTENT BASIS TO CURE CONFIRMED MICROBIOLOGICAL CONTAMINATION.

- SINGLE POINT REFUELING
- 35-55 PSIG
- 50 PSIG IS OPTIMUM
- ENSURE THE PRESSURE FUELING STATIC PORT IS CLEAR

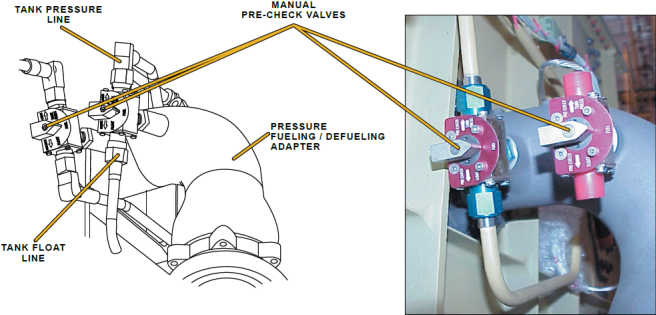
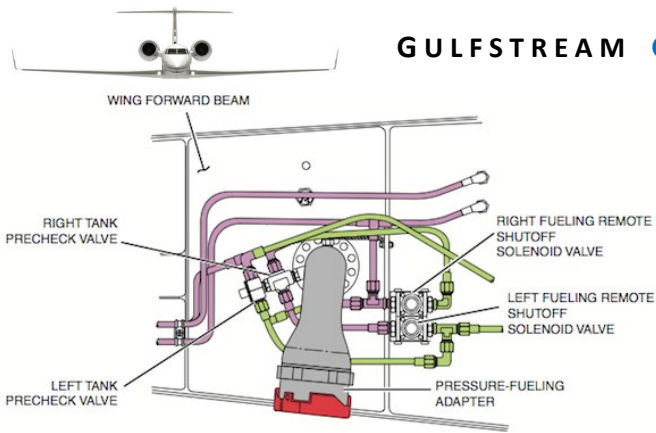
CODE450:

▶ **FUEL SERVICING**

NOTE: JET-A MENTAL MATH (LBS TO GAL). REQUIRED FUEL UPLIFT, DROP THE 0, ADD HALF.

EXAMPLE: 9,000 LBS; 900+450=1350 GAL

- PRE-CHECKS:
 - FLOAT (ROTATE DOWN) TESTS THE TOP-OFF FLOATS
 - TANK PRESS (ROTATE UP) TEST THE OVER-PRESSURE SENSOR
- G550, HAS A RED HIGH LEVEL WARNING LIGHT AND A TEST PUSHBUTTON ON THE REFUELING DOOR
 - ALERTS THAT WINGS ARE FULL AND FUEL HAS SPILLED INTO THE VENT SYSTEM
 - WILL NOT AUTO SHUT OFF FUELING
 - WHEN TOPPING OFF ADVISE FUELER TO STOP IF LIGHT COMES ON
- DEFUELING INVOLVES PULLING FIRE EXT CBs – FOLLOW THE HANDLING AND SERVICING PROCEDURE (AOM CH 9)



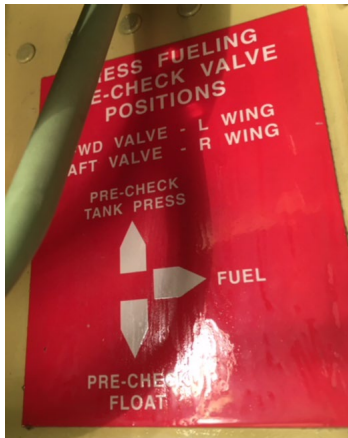
G550

DICHIARA NOTE: THERE ARE THE METHODS TO DEFUEL:

- 1) SUCTION METHOD USES THE FUEL TRUCK IN THE DE-FUEL MODE. WHEN SUCTION IS APPLIED CHECK VALVES OPEN ALLOWING FUEL TO BE SIPHONED FROM THE TANKS. ABOUT 11 GALLONS WILL REMAIN IN EACH HOPPER USING THIS METHOD. THE WATER DRAINS MUST BE USED TO REMOVE THE REMAINING FUEL.
- 2) CONNECTING A ONE INCH HOSE TO THE DRAIN FITTING ON THE FUEL SUPPLY LINE TO EACH ENGINE AND USING THE FUEL TRUCK TO DRAW FUEL THROUGH THE BOOST PUMP INTAKE LINES. THIS RESULTS IN LESS RESEDUAL FUEL BUT IS SLOWER.
- 3) USING THE SAME METHOD AS NUMBER 2 EXCEPT WITH THE BOOST PUMPS ON. THIS IS FASTER AND REMOVES THE MOST FUEL BECAUSE THE BOOST PUMPS RUN THE EJECTOR PUMPS AS WELL.

- FUEL BALANCING
- CROSSFLOW (ESS DC) – LEFT WHEELWELL
 (Fuel Crossflow Valve Open CAS AFTER 5 MIN)
- PRESSURIZED FUEL
 “PUSHES FUEL” - “LIGHT UP THE LOW SIDE”
- INTERTANK (ESS DC) – RIGHT WHEELWELL
- VALVE BETWEEN HOPPERS
 “STEP ON THE HEAVY SIDE”- FUEL FOLLOWS THE SLIP INDICATOR

- | | |
|------|---|
| G450 | <ul style="list-style-type: none"> ▪ 400 LB IMBALANCE: ≥ 60,500 LBS ▪ 2,000 LB IMBALANCE: ≤ 55,000 LBS ▪ 2,000 LB IMBALANCE: REFUELING |
| G550 | <ul style="list-style-type: none"> ▪ 1,000 LB IMBALANCE: TAKEOFF ▪ 2,000 LB IMBALANCE: IN FLIGHT ▪ 2,000 LB IMBALANCE: REFUELING |

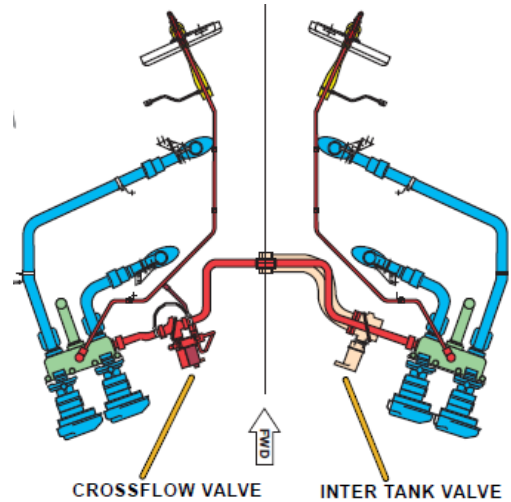


G450



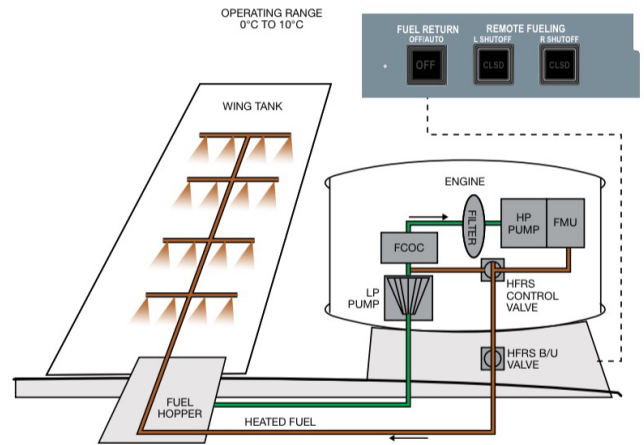
NOTE: UP TO 4,000 LBS OF FUEL IMBALANCE HAS BEEN SAFELY DEMONSTRATED. FOR APPROACH AND LANDING WITH AN ENGINE SHUT DOWN BE PREPARED TO USE FULL RUDDER AND AILERON AS NECESSARY (QRH EE-20, EE-18).

NOTE: THE FUEL BALANCING IN FLIGHT CHECKLIST (NG-27, NG-37) STATES, “VERIFY VALVE POSITION USING THE FUEL SYNOPTIC DISPLAY” WHEN ADDRESSING THE CROSSFLOW AND/OR INTERTANK VALVE.





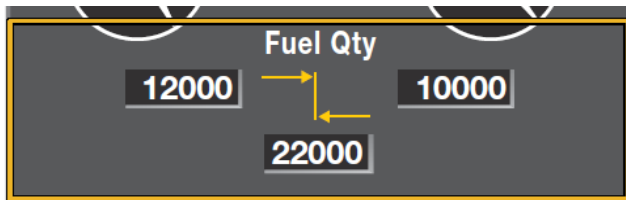
INTERTANK VALVE



Engine Heated Fuel System

- IMBALANCE INDICATION
- LEVEL
- FULL DEFLECTION
- Fuel Imbalance
- ≤ 100 LBS IMBALANCE
- ≥ 500 LBS IMBALANCE
- ≥ 1,000 LBS IMBALANCE

NOTE: IF FUEL TEMP IS 0°C OR BELOW, USE THE INTERTANK VALVE TO BALANCE FUEL – DO NOT TURN OFF A BOOST PUMP WITH FUEL TEMP 0°C OR BELOW.



- **Fuel Tank Temp** CAS
 - FUEL TANK TEMP IS -35° TO -36°C / -39°C (ASC)
 - FUEL MAY START GELLING AND NOT FLOW INTO THE HOPPER
- **Fuel Tank Temp** CAS
 - GND – FUEL TANK TEMP IS +54°C
 - AIR – FUEL TANK TEMP IS -40°C / -37°C
 - DESCEND TILL SAT ≥ -60°C

- G550, HEATED FUEL RETURN SYSTEM (HFRS)
 - FUEL IN THE WING TANKS IS WARMED BY RETURNING SOME HIGH TEMP FUEL (50°C / 122°F) FROM THE FUEL METERING UNIT BACK TO THE FUEL TANKS AT A RATE OF 3 GAL/MIN
 - ACTIVATED AT A TANK TEMP ≤ 0°C, UNTIL ≥ 10°C
 - FADEC CONTROLLED (CONDITIONAL)
 - VIA FUEL RETURN TO TANK (FRTT) VALVE

CONDITIONS:

- FUEL TANK TEMP ≤ 0°C
- FUEL FLOW < 2,250 PPH
- CROSSFLOW CLOSED
- FUEL RETURN SWITCH IN AUTO
- ENG FIRE HANDLE IN
- NO ENG LOW FUEL PRESSURE
- NO LOW FUEL QTY
- FUEL FILTER NOT BLOCKED
- FRTT VALVE POWERED AND NOT FROZEN

NOTE: IF TANK TEMP ≤ 30°C, WITH ≤ 5,000 LBS FUEL, DESCEND TIL SAT IS ≥ -60°C AND MAINTAIN ≥ M.80

- ADDITIONAL FUEL INFORMATION
- QRH SUPPLEMENTAL DATA
- ENGINE FUEL GRADES, NH-2
- ENGINE FUEL ADDITIVES, NH-3

NOTE: IF THE ZFW CG IS WITHIN THE ZFW ENVELOPE, THE FUELED AIRPLANE CG WILL BE WITHIN LIMITS FOR ALL FUEL LOADS. AFM LIMITATIONS 01-03-00, AFM 01-03-70

NOTE: SIMI-SYNTHETIC JET FUEL, aka SUSTAINABLE AVIATION FUEL (SAF) IS AFM APPROVED (ALL-MOL-20-20-0013, DATED MARCH 27, 2020). COMPOSITION: JET A WITH ~35% SAF BLEND (FLEXIBLE MIX OF RAW MATERIALS, INCLUDING WASTE, FATS, AND VEGETABLE OILS). REDUCES CARBON EMISSIONS BY ~25%.

CODE 450

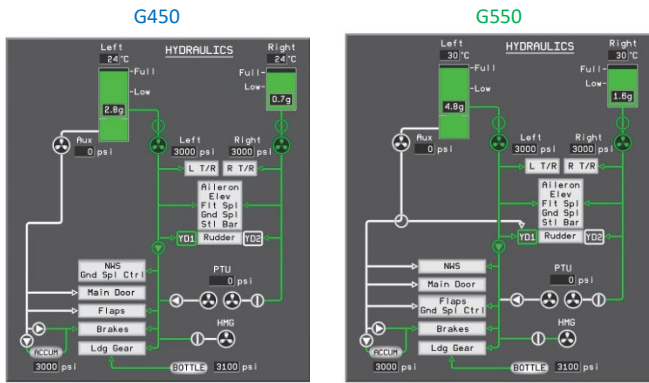
- ▶ [G450/G550 FUEL SYSTEM](#)
- ▶ [G450/G550 FUEL SYSTEM ABNORMALS](#)
- ▶ [G450/G550 FUEL SYSTEM REFRESHER](#)

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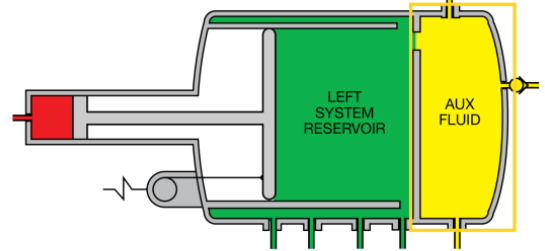
- ▶ [G450 FUEL SYSTEM](#)
- ▶ [G550 FUEL SYSTEM](#)



HYDRAULIC



- MANIFOLD – DISTRIBUTION
 - SHUTOFF VALVE
 - FILTER MANIFOLD
- NOTE: THESE 5 DPIS MAY ONLY BE RESET BY A MECHANIC.
- TOTAL CAPACITY
 - 18.4 GAL (G450)
 - 20.5 GAL (G550)
 - CLOSED BY FIRE HANDLE (ISOLATES THE PUMP FROM RESERVOIR)
 - 5 BYPASS FILTERS WITH DPIS
 - LEFT ENGINE HYD PUMP FILTER
 - LEFT HYD MAIN PRESSURE FILTER
 - LEFT HYD MAIN RETURN FILTER
 - AUX HYD RETURN FILTER
 - UTILITY HYD PUMP FILTER (PTU)



AIRCRAFT 5103 AND SUBSEQUENT

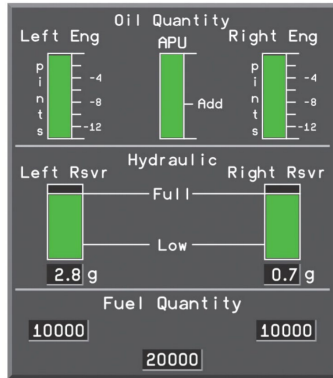
LEFT HYD SYSTEM

- ELEMENTS
 - ENG DRIVEN HYD PUMP
 - FLUID DISTRIBUTION COMPONENTS
 - RESERVOIR, FLUID REPLENISHING, AND QUANTITY GAUGE
 - ELEC AUX PUMP
 - PTU
 - HMG
 - SYSTEM DISPLAYS

RESERVOIR – STORAGE

- G450**
- 6.4 GAL (4.4 FOR LEFT, 2.0 FOR AUX)
 - RESERVOIR LABEL: FULL AT 2.8 GAL
 - RESERVOIR LABEL: LOW AT 2.2 GAL
 - MIN 2.75 GAL

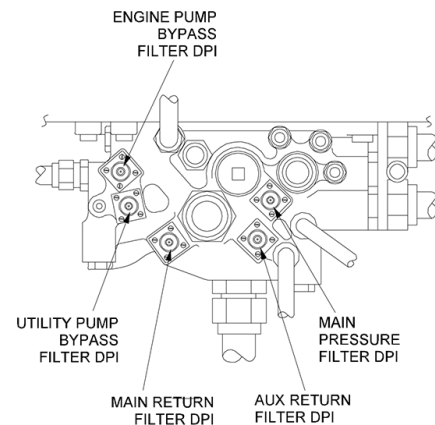
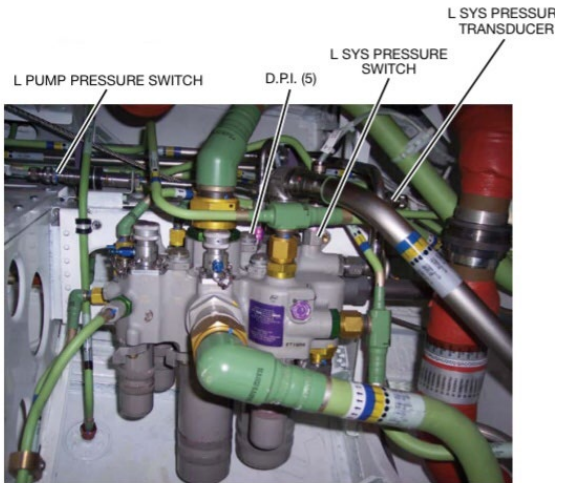
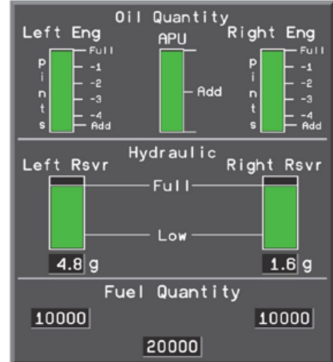
G450 GROUND SERVICE SYNOPTIC 1/6 PAGE



NESTER NOTE: THE ELECTRONIC GROUND SERVICING SYNOPTIC, 1/6 DISPLAY, IS MORE ACCURATE THAN THE HYDRAULIC SERVICING DISPLAY QUANTITY INDICATIONS AS THE ELECTRONIC DISPLAY APPLIES "GEAR DOWN" AND TEMPERATURE COMPENSATION BIASES.

- G550**
- 5.7 GAL (3.7 FOR LEFT, 2.0 FOR AUX)
 - RESERVOIR LABEL: FULL AT 4.8 GAL
 - RESERVOIR LABEL: LOW AT 2.8 GAL

G550 GROUND SERVICE SYNOPTIC 1/6 PAGE



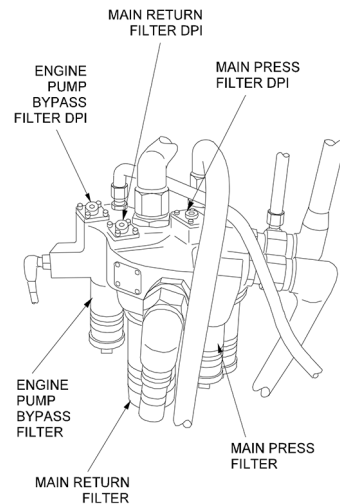
COMBINED HYDRAULIC SYSTEM FILTER MANIFOLD LAYOUT (VIEW LOOKING DOWN)

NOTE: THE NAMES "COMBINED HYDRAULIC SYSTEM" AND "UTILITY PUMP" ARE CARRY-OVERS FROM PREVIOUS GULFSTREAM MODELS (e.g. GIV, G1159, etc.). "COMBINED" IS EQUIVALENT TO THE "LEFT HYDRAULIC SYSTEM" AND THE "UTILITY PUMP" IS EQUIVALENT TO THE "POWER TRANSFER UNIT."



RIGHT HYD SYSTEM

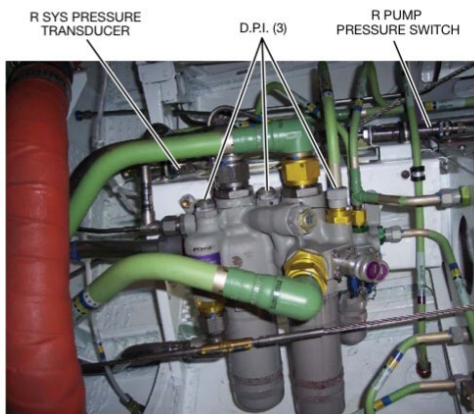
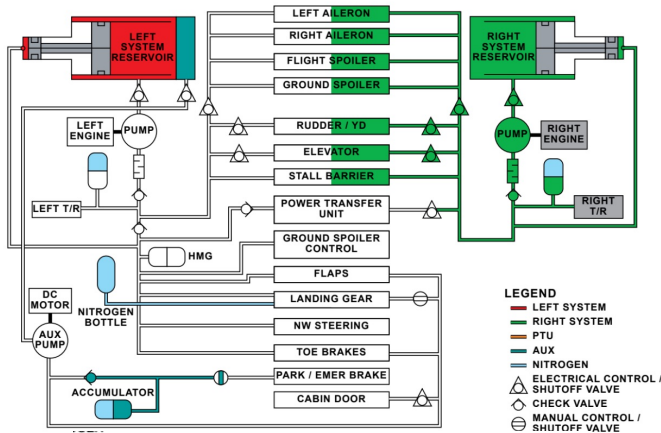
- RESERVOIR – STORAGE
 - G450
 - 1.5 GAL
 - **RESERVOIR LABEL: FULL AT 0.7 GAL**
 - **RESERVOIR LABEL: LOW AT 0.53 GAL**
 - **MIN 0.7 GAL**
 - G550
 - 1.8 GAL
 - **RESERVOIR LABEL: FULL AT 1.5 GAL**
 - **RESERVOIR LABEL: LOW AT 1.0 GAL**
 - MANIFOLD – DISTRIBUTION
 - TOTAL CAPACITY
 - 7.5 GAL (OM), 4.5 GAL (FSI)
 - 7.0 GAL
 - SHUTOFF VALVE
 - CLOSED BY FIRE HANDLE (ISOLATES THE PUMP FROM RESERVOIR)
 - FILTER MANIFOLD
 - 3 BYPASS FILTERS WITH DPIS
 - RIGHT ENGINE HYD PUMP FILTER
 - RIGHT HYD MAIN PRESSURE FILTER
 - RIGHT HYD MAIN RETURN FILTER
- NOTE: THESE 3 DPIS MAY ONLY BE RESET BY A MECHANIC.
- SOLE POWER FOR:
 - R THRUST REV
 - PTU MOTOR



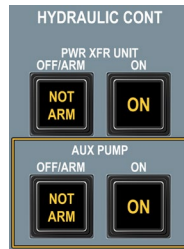
- ENG DRIVEN HYD PUMPS (LEFT AND RIGHT HYD SYSTEMS)
 - 3,000 PSI
 - 20.5 / 28 GPM – TAKEOFF
 - 14.5 GPM – FLT IDLE (~66% HP RPM)
 - 10.5 / 18 GPM – GND IDLE (~50% HP RPM)
 - 3.0 GPM APPROX – WINDMILLING 17% HP RPM (~200 KTS)
 - 0.2 GPM APPROX – WINDMILLING 2.7% HP RPM

NOTE: A WINDMILLING ENGINE (>2.7% HP) PROVIDES ENOUGH ROTATION FOR ITS HYD PUMP TO FUNCTION, HOWEVER, THE GPM FLOW WILL BE VERY LOW. HENCE THE REASON “LEFT ENGINE FAILURE AND RIGHT HYDRAULIC FAILURE” CHECKLIST (G450 QRH EB-12) CALLS FOR EMERGENCY EXTENSION OF THE LANDING GEAR EVEN THOUGH THE LEFT HYDRAULIC SYSTEM CAN GENERATING 3,000 PSI. NOTE: EB IS THE “ENGINES” TAB.

G450 RIGHT SYSTEM OPERATION



- AUX HYD PUMP
 - ELECTRIC (L ESS DC BUS AND BATTERY TIE BUS)
 - 3,000 PSI
 - 1 GPM (SN 4001-4049), 2 GPM (SN 4050 AND SUB) – TAIL COMPARTMENT
 - 2 GPM – MAIN WHEEL WELL
 - ARMED TO ACTIVATE WHEN L SYS/PTU PRESS <1500 PSI AND BRAKE PEDAL >10°, WOW – GND
 - MAN SEL ON VIA THE AUX PUMP SWITCHLIGHT AND/OR STBY RUD SWITCHLIGHT (G550)
 - PROTECTED FROM OVERHEATING – WILL SHUT OFF AT 356°C
 - PROTECTED FROM OVERLOADING – LIMITED TO 200 AMPS
 - OPERATION CONTROLLED BY 6 / 7 SWITCHES
 - HYD CONT AUX PUMP OFF/ARM SWITCHLIGHT
 - HYD CONT AUX PUMP ON SWITCHLIGHT
 - 3 CABIN DOOR SWITCHES (OVERHEAD, VESTIBULE, & EXTERIOR)
 - GND SERVICE VALVE – GEAR DOORS
 - STBY RUD SWITCHLIGHT
- AUX HYD SYSTEM MANIFOLD FILTER – DPI
 - AFT EQUIPMENT COMPARTMENT – LEFT SIDE
 - LOCATED IN THE LEFT MAIN WHEEL WELL
 - MAY ONLY BE RESET BY A MECHANIC



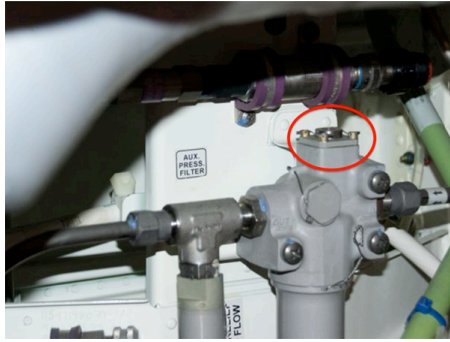
- INSIDE “AUX ON” CONTROLS:
- COCKPIT AUX PUMP “ON” SWITCHLIGHT
 - BRAKE PEDALS (WHEN AUX ARMED)
 - VESTIBULE DOOR SWITCH
 - OVERHEAD DOOR SWITCH
 - STBY RUD SWITCHLIGHT
- OUTSIDE “AUX ON” CONTROLS:
- EXTERIOR DOOR SWITCH
 - GND SERVICE VALVE

NOTE: CONTROL POWER FOR THE AUX HYD SYSTEM COMES FROM THE L ESS DC BUS, WHICH ENERGIZES THE AUX HYD PUMP CONTACTOR THAT APPLIES DC POWER FROM THE BATT TIE BUS TO THE AUX HYD PUMP ELEC MOTOR.

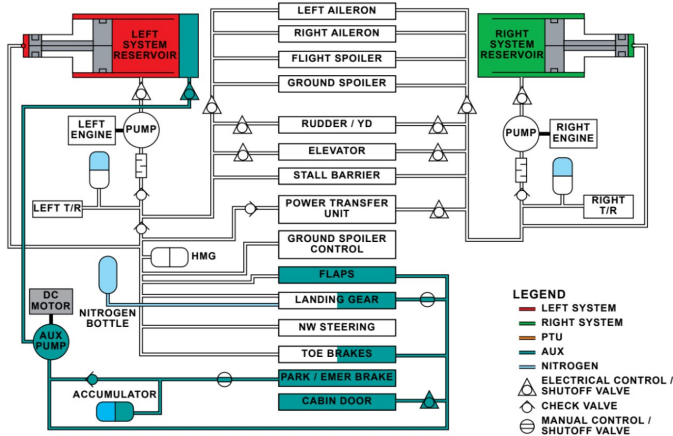
NOTE: AUX PUMP PRESSURE IS NOT USED AS AN ALTERNATE METHOD OF GEAR EXTENSION BECAUSE THE LANDING GEAR ACTUATORS REQUIRED 0.88 GAL OF FLUID WHEN EXTENDED. THE LEFT RESERVOIR PRESERVES ONLY 1.95 GAL FOR AUX PUMP PRESSURIZATION, SO SUFFICIENT FLUID WOULD NOT BE AVAILABLE FOR OTHER COMPONENTS IF THE LANDING GEAR WERE OPERATED USING AUX PUMP PRESSURE AND FLUID.



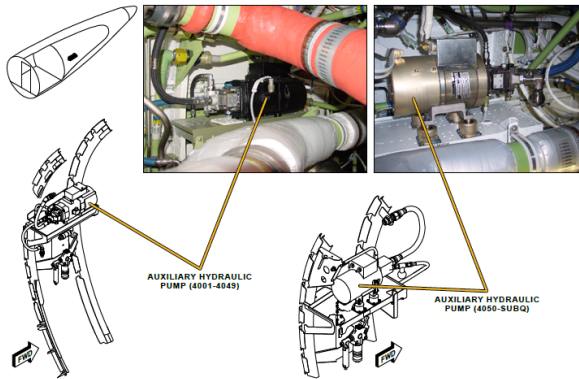
G450 AUX PUMP PRESSURE FILTER DPI



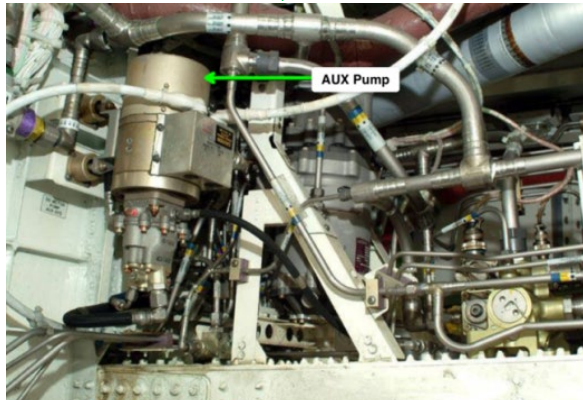
G450 AUX SYSTEM OPERATION



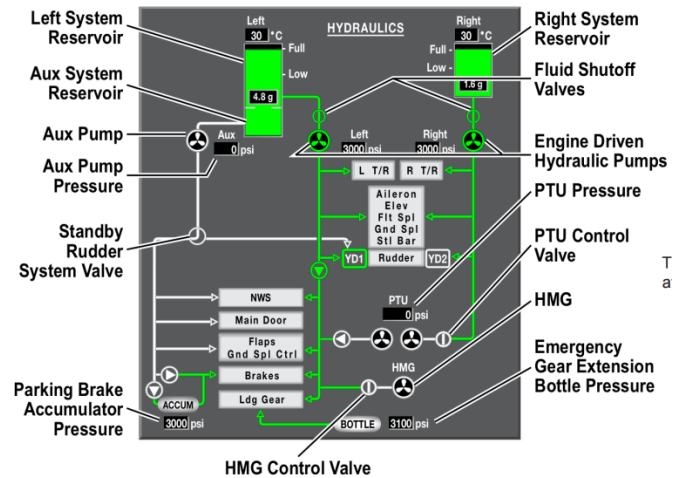
G450 AUX PUMP, AFT EQUIPMENT COMPARTMENT



G550 AUX PUMP, MAIN WHEEL WELL



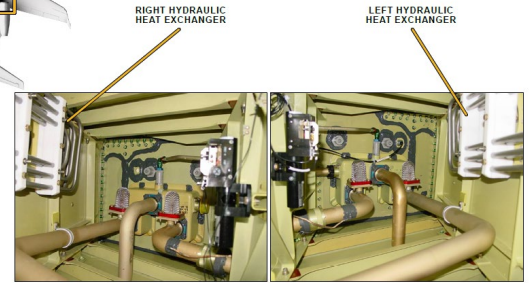
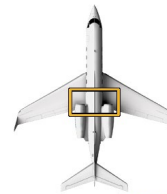
G550



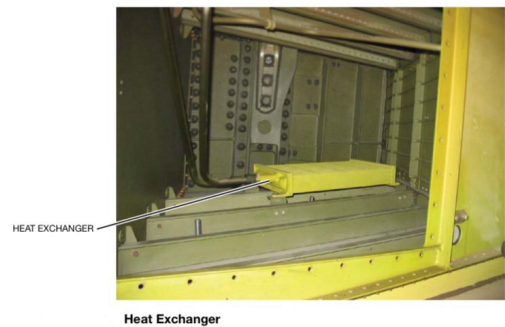
NESTER NOTE:
AS VIEWED ON THE HYDRAULIC SYNOPTIC PAGE, HYDRAULIC LINES WILL APPEAR IN AMBER WHEN HYDRAULIC PRESSURE IS BELOW 2,000 PSI. A "L-R HYD SYS FAIL" WILL APPEAR ON THE CAS WHEN THE HYDRAULIC PRESSURE FALLS BELOW 1,500 PSI.

- L & R HEAT EXCHANGERS
- IN THE L & R FUEL HOPPERS
- WARM FUEL / COOL HYD

G450



G550



NOTE: THE G450 HEAT EXCHANGERS ARE INSIDE THE ON-SIDE FUEL HOPPERS, e.g. LEFT SYSTEM HYDRAULICS ARE COOLED IN THE LEFT HOPPER.

NOTE: THE G550 HEAT EXCHANGERS ARE INSIDE THE OFF-SIDE FUEL HOPPERS, e.g. LEFT SYSTEM HYDRAULICS ARE COOLED IN THE RIGHT HOPPER. ONE POSSIBLE BENEFIT OF THIS DESIGN FEATURE IS THAT IT WOULD PROVIDE FOR SOME FUEL WARMING IN THE OFF-SIDE FUEL HOPPER IN THE EVENT OF AN ENGINE FAILURE. THE ONSIDE FUEL TANK WOULD BE CAPABLE OF BEING KEPT WARM BY THE HEATED FUEL RETURN SYSTEM.

- LEFT & RIGHT PUMP
- AUX PUMP
- PTU PUMP
- ENG DRIVEN
- ELEC DRIVEN (L ESS DC BUS AND BATT TIE BUS)
- HYD DRIVEN (BY R SYS PRESSURE)



- G550, AUX SUCTION BOOST PUMP**
 - ENSURES POSITIVE FLUID PRESSURE TO THE AUX PUMP
 - ACTIVATES IF INLET PRESSURE IS < 20 PSI
 - DEACTIVATES WHEN INLET PRESSURE IS > 25 PSI
- PTU (POWER TRANSFER UNIT)**
 - THE PTU IS A BACKUP FOR THE LOSS OF THE LEFT HYD PUMP
 - ARMED TO ACTIVATE WHEN L SYS PRESSURE < 1,500 PSI
 - 3,000 PSI (TURNS AT 3,900 RPM)
 - USES 28 GPM FROM THE R SYSTEM PRESSURE TO PRODUCE 10/ 22.5 GPM FOR THE L SYSTEM



PREVENTS AUTO PTU OPERATION

- L HYD LOW (<1 GAL), **L Hydraulic Quantity Low**
- R HYD HOT (>104°C), **R Hydraulic Reservoir Hot**

NOTE: **R Hydraulic Reservoir Hot**, IF HYDRAULIC TEMPERATURE CONTINUES TO CLIMB AND REACHES 150°C AND HYDRAULIC PRESSURE INDICATION IS AMBER READING ABOVE 3,600 PSIG, SEE ENGINE SHUTDOWN IN FLIGHT CHECKLIST.

NOTE: THE HYDRAULIC RESERVOIR TEMPERATURES ARE DISPLAYED ON THE HYDRAULICS SYNOPSIS PAGE, ABOVE THE ASSOCIATED RESERVOIR QUANTITY INDICATION.

PTU HYD SYSTEM MANIFOLD FILTER – DPI

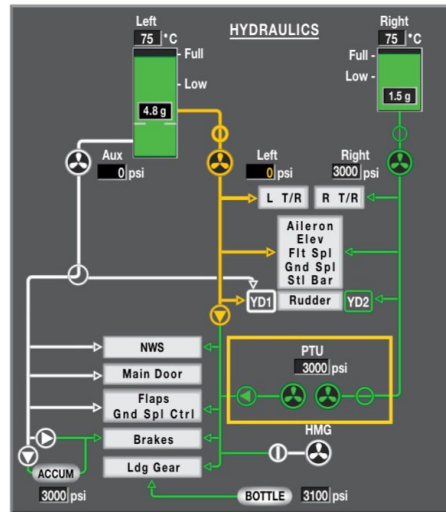
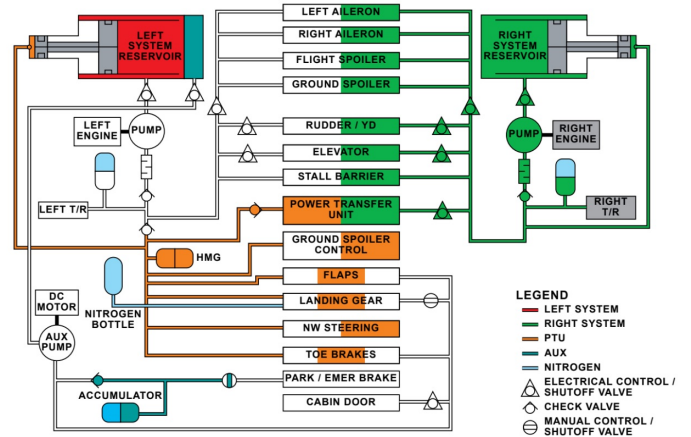
- G450:**
- ONLY DPI THAT MAY BE RESET BY A PILOT
 - RECORD TIME – 50 ADDITIONAL HRS PERMITTED
 - CHECK DPI PRIOR TO EACH FLIGHT

NOTE: ONLY A G450'S PTU DPI MAY BE RESET BY A PILOT. A G550 PTU DPI MAY NOT BE RESET BY A PILOT; FOR THE G550 IT'S THE PTU BWI THAT CAN BE RESET BY A PILOT.

PTU BEARING WEAR INDICATOR (BWI)

- G550:**
- THE BEARING WEAR INDICATOR (BWI) MAY BE RESET BY A PILOT
 - RECORD TIME – 50 ADDITIONAL HRS PERMITTED
 - CHECK BWI PRIOR TO EACH FLIGHT

G450 RIGHT/PTU SYSTEM OPERATION

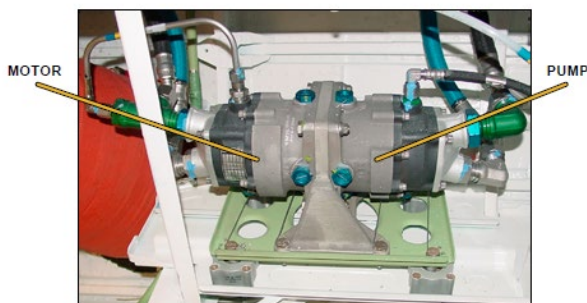
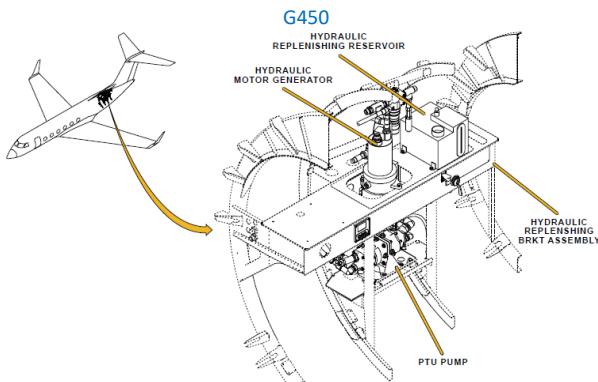


Hydraulics Synoptic Page - PTU Operation

G450 PTU DPI, VIEWED BY A MIRROR



G550



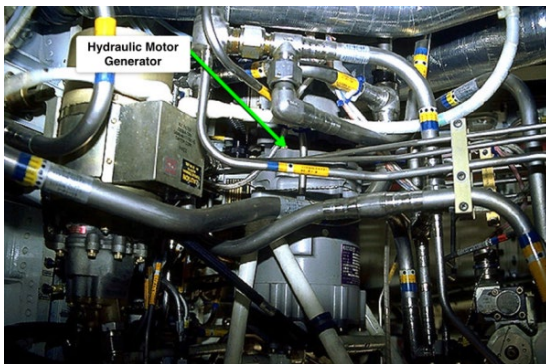


- HMG – HYDRAULIC MOTOR GENERATOR
- POWERED BY L SYS OR PTU
- **LOCATED IN THE TAIL COMPARTMENT**
- **LOCATED IN THE MAIN WHEEL WELL**
- ROTATES AT 8,000 RPM
- **CAPABLE OF 5Kva/10Kva AT 115 V, 400 Hz AC**

G450 HMG, TAIL COMPARTMENT



G550 HMG, MAIN WHEEL WELL



NOTE: THE PRIMARY PURPOSE OF THE HMG IS TO PROVIDE AN AC POWER SOURCE TO THE AUX TRU WHEN/IF THE ENG AND APU GENS ARE UNAVAILABLE.

- THE HMG POWERS THE STBY AC BUSES WHICH POWER PITOT HEAT, TAT HEAT, FLAP/STAB POWER, AND THE EMER BATT CHARGERS.
- THE AUX TRU POWERS THE L AND R ESS DC BUSES WHICH POWER THE FLIGHT INST, NAV, AND COMM RADIOS NECESSARY TO MAINTAIN FLIGHT WITH THE LOSS ALL GENS.
- THE STANDBY INVERTER (E-INV), POWERED BY THE ESS DC BUSES (OR BATTS) WILL PROVIDE SINGLE PHASE AC POWER TO THE ESS AC BUS WITH THE LOSS OF ALL GENS.
(G450 ØA ITEMS ARE CAB PRESS CHAN 1, RIGHT PITOT HEAT, & STBY PITOT HEAT)
(G550 ØA ITEMS ARE CAB PRESS CHAN 1, RIGHT UPR PITOT HEAT, LEFT LWR PITOT HEAT, RIGHT (YOKE) FORCE SENSOR, & LEFT (YOKE) FORCE SENSOR)

NOTE: DO NOT OPERATE THE STANDBY ELECTRICAL POWER (SEP) WITH NORMAL AC POWER AVAILABLE (MASTER SWITCH ONLY TO TEST THE SYSTEM).

NOTE: WHEN THE HMG IS RUNNING OPERATE SPEEDBRAKES SLOWLY (3 SEC FOR FULL TRAVEL).

NOTE: THE HMG'S GEN HAS ITS OWN PERMANENT MAGNET GENERATOR (PMG).

NOTE: ACTUAL ELEC POWER GENERATION IS DEPENDENT UPON HYD SYSTEM OUTPUT THAT IS IN TURN DEPENDENT UPON ENGINE POWER SETTINGS. DURING LARGE HYDRAULIC DEMANDS (e.g. GEAR AND FLAPS) INCREASE THRUST.

- ACCUMULATOR PRECHARGE – SHOCK ABSORPTION
- SERVICED WITH NITROGEN
- HYD SERVICE PANEL:
 - LEFT SYSTEM – 1200 PSI
 - RIGHT SYSTEM – 1200 PSI
- NOSE WHEEL WELL:
 - AUX SYSTEM 1200 PSI

NOTE: DO NOT BLEED OFF THE AUX SYSTEM PRESSURE TO CHECK THE PRECHARGE IF THE PARKING BRAKE IS SET; FIRST ENSURE CHOCKS ARE IN PLACE AND THAT THE PARKING BRAKE IS OFF.

COMPONENT	SYSTEM				
	LEFT	RIGHT	PTU	AUX	EMER
ELEVATOR(S) ●●	✓	✓			
STALL BARRIER ●●	✓	✓			
AILERONS ●●	✓	✓			
SPOILERS (FLT & GND) ●●	✓	✓			
GND SPOILER SERVO ●●(●)	✓		✓	G550	
RUDDER ●●(●)	✓	✓		G550	
YAW DAMP ●●(●)	✓	✓		G550	
L THRUST REV ●	✓				
R THRUST REV ●		✓			
PTU MOTOR ●		✓			
FLAPS ●●●	✓		✓	✓	
LANDING GEAR & DOORS ●●●●	✓		✓	GND	✓
NOSEWHEEL STEERING ●●(●)	✓		✓	G550	
BRAKES ●●●●	✓		✓	✓	✓
HMG MOTOR ●●	✓		✓		
PARK BRAKE PRESSURE ●				✓	
MAIN ENTRANCE DOOR ●				✓	

- L HYD FAIL
LOSE:
▪ L THRUST REVERSER
▪ L YAW DAMPER

- R HYD FAIL
LOSE:
▪ R THRUST REVERSER
▪ R YAW DAMPER
▪ PTU

- COMPONENTS WITH NO HYD REDUNDANCY
▪ THRUST REVERSERS (L/R)
▪ MAIN ENTRY DOOR (AUX)
▪ PARK BRAKE ACCUM (AUX)

PARK / EMERGENCY BRAKE ACCUMULATOR



PARK / EMERGENCY BRAKE ACCUMULATOR TRANSDUCER

Park / Emergency Brake Pressure Gauge, Accumulator and Transducer



- DPIS – DIFFERENTIAL PRESSURE INDICATORS
- 10 TOTAL
- 5 – LEFT FILTER MANIFOLD
- 3 – RIGHT FILTER MANIFOLD
- 1 – PTU
- 1 – AUX

NOTE: ONLY A G450's PTU DPI MAY BE RESET BY A PILOT. A G550 PTU DPI MAY NOT BE RESET BY A PILOT; FOR THE G550 IT'S THE PTU BWI THAT CAN BE RESET BY A PILOT.

ADDITIONAL HYDRAULIC INFORMATION

QRH SUPPLEMENTAL DATA

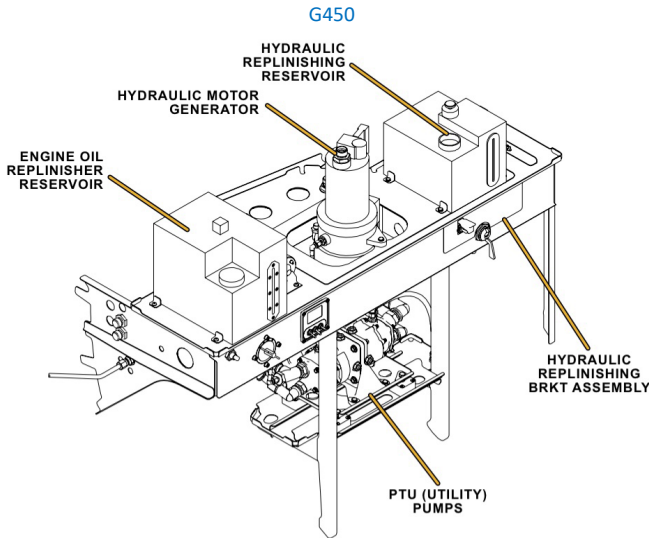
- HYDRAULIC FLUIDS, NH-1
 - SKYDROL LD-4 (PREFERRED)
 - HYJET IV -A (ALTERNATE)
 - SKYDROL 500B-4 (ALTERNATE)

NOTE: ALL TYPE IV PHOSPHATE ESTER FLUIDS ARE COMPATIBLE AND CAN BE SAFELY MIXED. HOWEVER, UP TO 15% HYJET IV IN SKYDROL 500B-4 MAY CAUSE AN INCREASE IN VALVE EROSION.

WARNING: SKYDROL TYPE IV PHOSPHATE ESTER HYDRAULIC FLUID IS COMBUSTIBLE AND CAN BE A HEALTH HAZARD. INHALATION OF VAPOR AND CONTACT WITH SKIN AND EYES SHOULD BE AVOIDED. THE FLUID SHOULD NOT BE EXPOSED TO EXTREME HEAT OR OPEN FLAMES.

CAUTION: SKYDROL TYPE IV PHOSPHATE ESTER HYDRAULIC FLUID CAN DAMAGE PAINTS, RUBBER AND PLASTIC MATERIALS. CARE MUST BE TAKEN TO PREVENT SPILLAGE FROM REMAINING ON SURFACES OR DAMAGE MAY RESULT.

- HYDRAULIC SERVICING
- REPLENISHING RESERVOIR (HOLDS 1.5 GAL)
- ELECTRIC PUMP (POWERED BY THE GSB)



NOTE: THE PUMP WILL OUTPUT 0.5 GPM AT 60 PSI TO THE RESERVOIR. DUTY CYCLE FOR THE HYDRAULIC SYSTEM PUMP IS 1 MINUTE ON/2 MINUTES OFF FOR 500 CYCLES PER OPERATION.

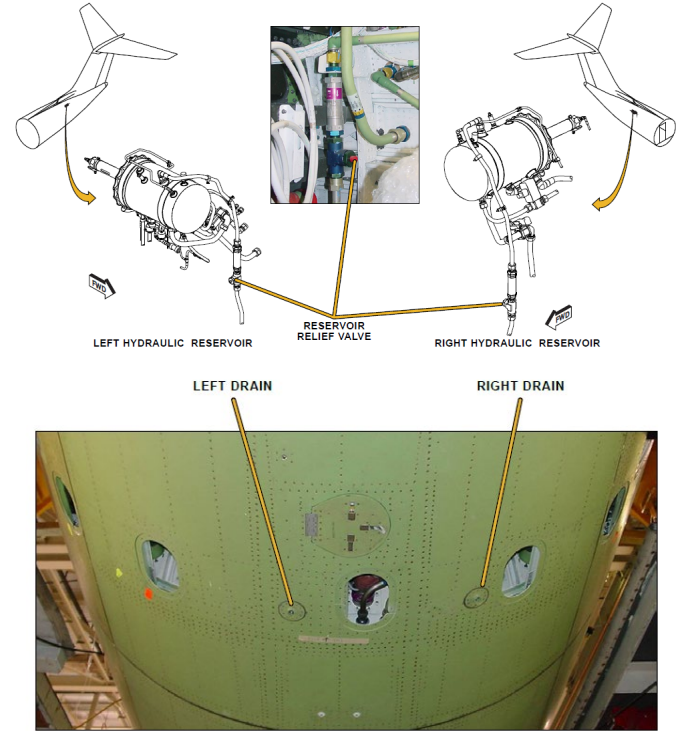
NOTE: THE RESERVOIR QUANTITY ON THE COCKPIT SYNOPTIC PAGES IS TEMPERATURE COMPENSATED TO 21 DEGREES CELSIUS WITHIN THE MAUS. THE FLUID QUANTITY INDICATOR IS CONNECTED DIRECTLY TO THE OUTPUT VOLTAGE 0-10VDC FROM THE QUANTITY INDICATOR RVDTS AND IS THEREFORE NOT COMPENSATED. THE COCKPIT INDICATION SHOULD BE USED AS THE PRIMARY REFERENCE FOR SERVICING.

APPLICABLE PORTIONS OF THE MAINTENANCE MANUAL:

- [G450 MM, §12-15, ¶1.B3] SERVICING RESERVOIR WITH ONBOARD REPLENISHER
- (3) APPLY 3000 PSI OF HYDRAULIC POWER TO APPLICABLE SYSTEM.
- (4) ROTATE SELECTOR VALVE TO APPLICABLE HYDRAULIC SYSTEM.
- (5) ON GROUND SERVICE PANEL SELECT GND SVC BUS SW TO ON.
- (6) HOLD REPLENISHER PUMP SWITCH TO ON UNTIL RESERVOIR GAGE INDICATES FULL. NOTE: DO NOT OVERFILL RESERVOIRS (MAX CAPACITY IS 3.66 GALLONS, FULL IS 2.75 GALLONS LEFT SYSTEM, 0.8 GALLON RIGHT SYSTEM).
- (7) ROTATE SELECTOR VALVE (3) TO OFF.

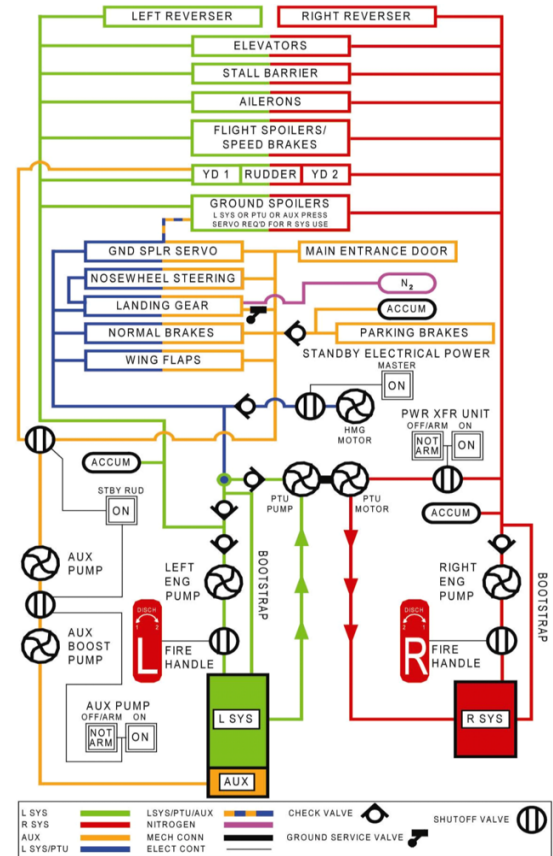
WHEN YOU ARE DONE, MAKE SURE ALL THE HANDLES AND SWITCHES ARE BACK TO THEIR ORIGINAL "OFF" AND GUARDED POSITIONS.

OVERBOARD DRAINS



Quick Reference Handbook Gulfstream G550

Hydraulic System Diagram





INTENTIONALLY LEFT BLANK



LANDING GEAR

- EXTENSION AND RETRACTION (NORM)
 - LANDING GEAR HANDLE CONTROLS THE SELECTOR VALVE VIA A SOLENOID
 - REQUIRES ELEC (ESS DC) TO OPERATE
 - REQUIRES HYD (L SYS OR PTU) TO ACTUATE COMPONENTS
 - SEQUENCING VALVES
 - GEAR ACTUATORS RETAIN APPROX 0.88 GAL WHILE RETRACTED, "THE GULFSTREAM GALLON"

NESTER NOTE:
HYDRAULIC PRESSURE DOES NOT HOLD THE MAIN GEAR UP, THE UPLOCKS DO.
HYDRAULIC PRESSURE DOES HOLD THE NOSE GEAR DOORS CLOSED.

- NITROGEN (EMER)
 - OPENS GEAR DOORS AND UPLOCKS
 - PRESSURIZES THE HYD LINES WITH NITROGEN
 - DRIVES THE GEAR DOWN AND LOCKED

	NORMAL	EMERGENCY
CONTROL	ELECTRIC	MECHANICAL
POWER	HYDRAULIC	PNEUMATIC
INDICATING	ELECTRIC	ELECTRIC

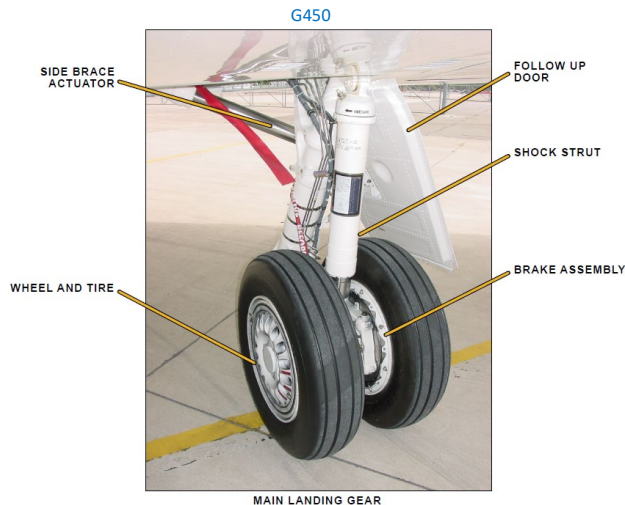
SPEED LIMITS

- VLE/VLO/EMER 250 / 225 / 175 KTS (0.70 Mt)

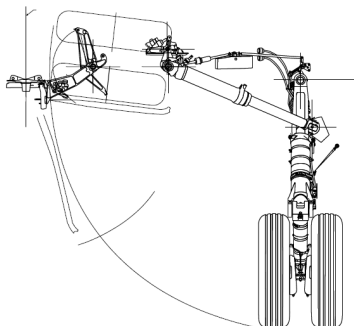
ALTITUDE LIMIT

- GEAR DOWN 20,000'

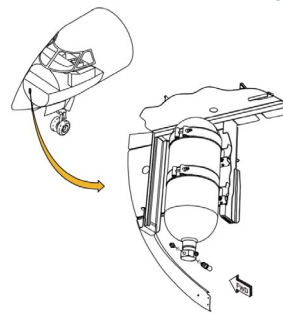
NOTE: VLE (250 KTS) IS THE SAME REGARDLESS OF WHETHER THE GEAR DOORS ARE OPEN OR CLOSED, e.g. AFTER EMER GEAR BLOW DOWN (175 KTS) THE AIRCRAFT CAN BE SAFELY ACCELERATED TO VLE (250 KTS) EVEN THOUGH THE GEAR DOORS ARE OPEN.



NESTER NOTE:
MAIN GEAR STRUT EXTENSION: 3-5 INCHES
NOSE GEAR STRUT EXTENSION: 1-3 INCHES

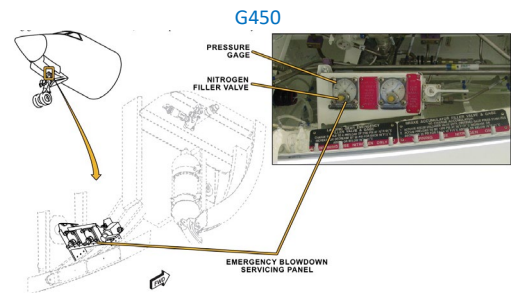


- NITROGEN BOTTLE(S)
 - PRESSURIZED TO 3,100±50 PSI AT 70°F/21.1°C
 - PRESSURE RELIEF VALVE OPENS AT 3,750 PSI
- G450 ONE BOTTLE
 - LOCATED ON THE RIGHT SIDE OF THE NOSE WHEEL WELL, CONTAINS 150 CU IN. OF NITROGEN
- G550 TWO BOTTLES
 - ONE ON THE LEFT SIDE OF THE NOSE WHEEL WELL, CONTAINS 150 CU IN. OF NITROGEN
 - ONE ON THE RIGHT SIDE OF THE NOSE WHEEL WELL, CONTAINS 412 CU IN. OF NITROGEN



Emergency Extension Nitrogen Storage Bottle

- NITROGEN PRESSURE
 - NOSE WHEEL WELL GAUGE
 - SUMMARY SYNOPTIC 2/3 DISPLAY



Emergency Blowdown Bottle Servicing Panel

- EMERGENCY LANDING GEAR HANDLE (ELGH)
 - MOVES THE DUMP SHUTTLE VALVE FROM THE HYD FLUID POSITION TO THE NITROGEN GAS EXTENSION POSITION
 - FIRES THE BLOW-DOWN BOTTLE(S)
 - DUMP CAPTION ILLUMINATES ON THE LDG GR DUMP V SWITCHLIGHT (OVERHEAD PANEL)



NOTE: THE ONLY WAY TO ILLUMINATE THE DUMP CAPTION, OTHER THAN PERFORMING AN ANN LIGHTS TEST, IS BY PULLING THE ELGH.

NOTE: RESETTING THE HANDLE CLOSES THE VALVE AND VENTS THE NITROGEN OVERBOARD, BUT DOES NOT RESET THE LDG GR DUMP V.

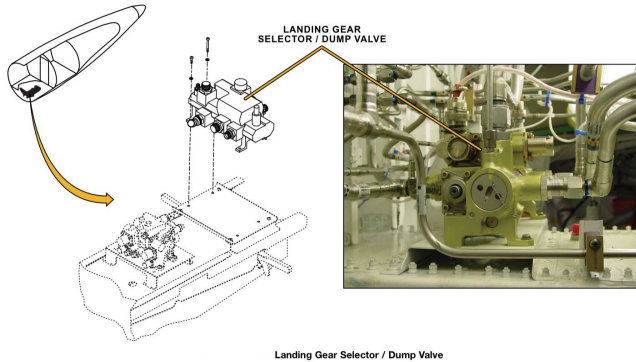
- LDG GR DUMP V, IF PRESSED
 - PROVIDES AN ALTERNATE ELECTRICAL PATH FOR THE GEAR EXTENSION CONTROL CIRCUIT.
 - ELEC MOVES THE DUMP SHUTTLE VALVE FROM THE NITROGEN GAS EXTENSION POSITION TO THE HYD FLUID POSITION
 - REMOVES HYD PRESS FROM DE-SPIN SYSTEM. IF GEAR PINS ARE LEFT IN AND THE GEAR HANDLE IS RAISED THE DE-SPIN SYSTEM APPLIES BRAKE PRESSURE. TO



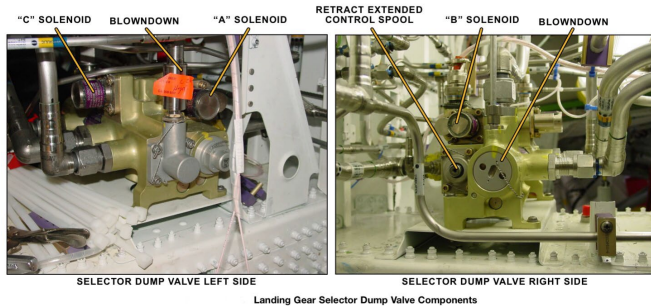


RELEASE THE BRAKE PRESSURE BEFORE LANDING THE DUMP VALVE **MUST** BE PRESSED – QRH → LANDING GEAR (EG) → ATTEMPTED LANDING GEAR RETRACTION WITH SAFETY PINS INSTALLED

NOTE: WHEN THE DUMP CAPTION IS ILLUMINATED IT MEANS **THE DUMP SHUTTLE VALVE HAS MOVED TO THE NITROGEN GAS EXTENSION POSITION** WHICH MEANS ALL HYDRAULIC FLUID IS EXCLUDED FROM PRESSURIZING THE GEAR EXTENSION SYSTEM.



Landing Gear Selector / Dump Valve



SELECTOR DUMP VALVE LEFT SIDE

SELECTOR DUMP VALVE RIGHT SIDE

Landing Gear Selector Dump Valve Components

CODE450:

▶ **“NOT YOUR FATHER’S GULFSTREAM”**

▪ BRAKES

▪ EACH BRAKE ASSEMBLY: 107 LBS

DISC STACK ELEMENTS

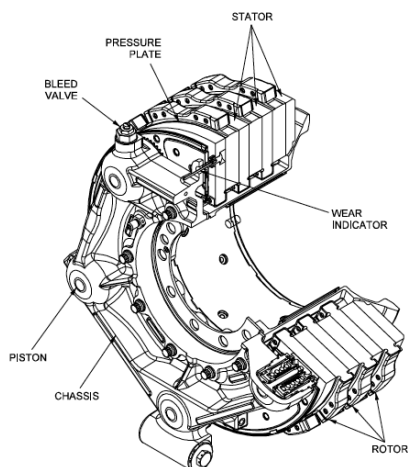
- CARBON-METALLIC ALLOYS
- 3 ROTATING DISCS (ROTORS)
- 2 STATIONARY DISCS (STATORS)
- END PLATE
- PRESSURE PLATE

BRAKE HOUSING

- 5 HYD ACTUATING PISTONS

GULFSTREAM:

▶ **BRAKES 101**



▪ BRAKING EFFORT

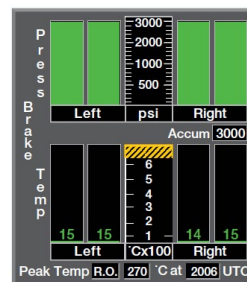
THE 20/30/40 TECHNIQUE

- IF SPEED = DISTANCE REMAINING MARKER X 20, THEN GENTLE DECELERATION IS OK (E.G. 3X20=60 KTS; GREAT SHAPE)
- IF SPEED = DISTANCE REMAINING MARKER X 30, THEN HEAVIER BRAKING IS NECESSARY (E.G. 3X30=90 KTS; GET ON THE BRAKES)
- IF SPEED = DISTANCE REMAINING MARKER X 40, THEN MAXIMUM BRAKING IS NECESSARY (E.G. 3X40=120 KTS; STAND ON THE BRAKES, LET THE ANTI-SKID WORK)

CODE7700:

▶ **JUDGING BRAKING EFFORT**

DIST REM →	4000'	3000'	2000'	1000'
X 20 RULE	80 KTS	60 KTS	40 KTS	20 KTS
X 30 RULE	120 KTS	90 KTS	60 KTS	30 KTS
X 40 RULE	160 KTS	120 KTS	80 KTS	40 KTS



▪ CARBON BRAKE WEAR

TYPE I – MOST DAMAGING

- LOW ENERGY/LOW APPLIED BRAKE PRESSURE
- WEAR DEBRIS FORMS AS PARTICULATE POWDER (SANDPAPER)
- BRAKE WEAR IS PROPORTIONAL TO THE NUMBER OF APPLICATIONS
 - THE NUMBER OF APPLICATIONS CAUSES MORE WEAR THAN THE DURATION OF APPLICATIONS
 - ONE FIRM BRAKE APPLICATION CAUSES LESS WEAR THAN SEVERAL LIGHT APPLICATIONS
- MAXIMUM WEAR OCCURS AT 150°C
 - TAXI OUT – CAUSES 79% OF BRAKE WEAR
 - LANDING – CAUSES 19% OF BRAKE WEAR
 - TAXI IN – CAUSES 2% OF BRAKE WEAR

TYPE II – LESS DAMAGING

- HIGH ENERGY/HIGH APPLIED BRAKE PRESSURE
- PLASTIC DEFORMATION OF WEAR PARTICLES FORMS A SMOOTH DEBRIS FILM
 - SMOOTH FILM REDUCES WEAR
 - SMOOTH FILM PROMOTES STRONG ADHERENT FRICTION (GLASS ON GLASS)

RECOMMENDED OPERATIONAL PROCEDURES

- AVOID RIDING THE BRAKES
- CONDUCT THE TAXI OUT STOP EVENT AT A HIGHER SPEED
- MINIMIZE THE NUMBER OF TAXI OUT STOP EVENTS
- OPTION: ALTERNATE LEFT AND RIGHT BRAKING DURING TAXI



▪ BRAKE WEAR INDICATOR PINS

NOTE: G450, INSTALLING SPACERS (SHIMMING) IS NOT AN OPTION.

NOTE: G550, EXTENDED LIFE BRAKE SPACERS ARE AN OPTION.

- PARKING BRAKE MUST BE SET
- G450, BEHIND THE STRUT
- G550, IN FRONT OF AND BEHIND THE STRUT
- NORMAL BRAKE LIFE: ~ 1,400 LANDINGS
- PIN EXTENDS FROM THE PRESSURE PLATE, THROUGH THE HOUSING, AND PROTRUDES FROM THE BRAKE ASSEMBLY
- THE AMOUNT OF EXPOSED PIN IS INDICATIVE OF THE COMBINED THICKNESS OF THE ROTOR AND STATOR DISCS
- IF THE PIN IS FLUSH, THE BRAKE ASSEMBLY NEEDS TO BE REPLACED

▪ BTMS
BRAKE TEMPERATURE MONITORING SYSTEM

CODE7700:

- ▶ [HOT BRAKES AND WHEEL FIRES](#)

CODE450:

- ▶ [BRAKE SYSTEM OVERHEAT](#)

NOTE: THE SIXTY (60) KNOT GROUND SPEED PARAMETER IS TO ENABLE RECORDING THE HIGHEST BRAKE TEMP DURING AN ABORTED TAKEOFF.

- BRAKE TEMPERATURES ARE MONITORED AND REPORTED TO WARN THE CREW OF A BRAKE OVERHEAT OR AN INDICATION OF A MALFUNCTION SUCH AS A DRAGGING BRAKE
- THE MWS STORES A READING OF THE HIGHEST BRAKE TEMP DURING EACH FLIGHT CYCLE FOR USE IN DETERMINING BRAKE COOLING TIME REQUIREMENTS
- THE MWS DELETES THE HIGHEST PREVIOUSLY RECORDED READING AND RECORDS A NEW PEAK TEMPERATURE WHENEVER GROUND SPEED EXCEEDS SIXTY (60) KNOTS OR WHEN THE LANDING GEAR IS SELECTED TO THE EXTEND POSITION
- NORMAL ZONE: < 625°C, BKE < 75 MFP
- CAUTION ZONE: 625°C – 750°C, BKE 75-91 MFP
 - **BRAKE OVERHEAT** CAS
 - FUSEPLUG RELEASE POSSIBLE
- DANGER ZONE: > 750°C, BKE > 91 MFP
 - FUSEPLUG WILL BLOW – KEEP EVERYONE CLEAR, ONLY ALLOW THE NOSEWHEEL TO BE CHOCKED
 - EVACUATE THE AIRPLANE
 - TEARDOWN INSPECTION REQUIRED
- AFM APPENDIX C: BRAKE KINETIC ENERGY (BKE) AND CARBON BRAKE COOLING



▪ MCDU TAKEOFF DATA

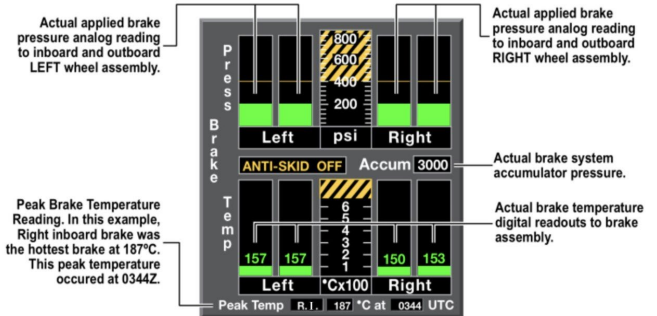
SCRATCHPAD MESSAGE “TAKEOFF OUT OF LIMITS”

- “BRAKE LIMITED”
- “REQUIRED BRAKE COOLING”
 - NOTE: IF THIS MSG IS DISPLAYED, THE REQUIRED COOLING TIME IS DISPLAYED IN HH:MM FORMAT.

▪ BRAKE COOLING

NOTE: AFM APPENDIX C: BRAKE KINETIC ENERGY (BKE) AND CARBON BRAKE COOLING; CHART ON LAST PAGE. THE QRH LINKS TO APPENDIX C VIA “BRAKE SYSTEM OVERHEAT INDICATION” G450 QRH EG-9, G550 QRH EG-14.

- IDLE REVERSE THRUST IS RECOMMENDED TO ASSIST TAXI STOPS – REDUCES BRAKE WEAR AND BKE LEVELS
- USE LIGHT PEDAL PRESSURE
 - PROLONGS STOPPING DISTANCE
 - ABSORBS SAME ENERGY
 - RESULTS IN THE SAME PEAK TEMPERATURES
- BRAKES COOL MUCH FASTER WHEN NOT SET
- POINT THE AIRCRAFT INTO THE WIND
 - CROSSWINDS DON’T REACH ALL BRAKES EQUALLY
 - TAILWINDS BLOW WARM EXHAUST OVER THE BRAKES
- IF NECESSARY, AFTER TAKEOFF LEAVE THE GEAR DOWN AND FLY VLE.

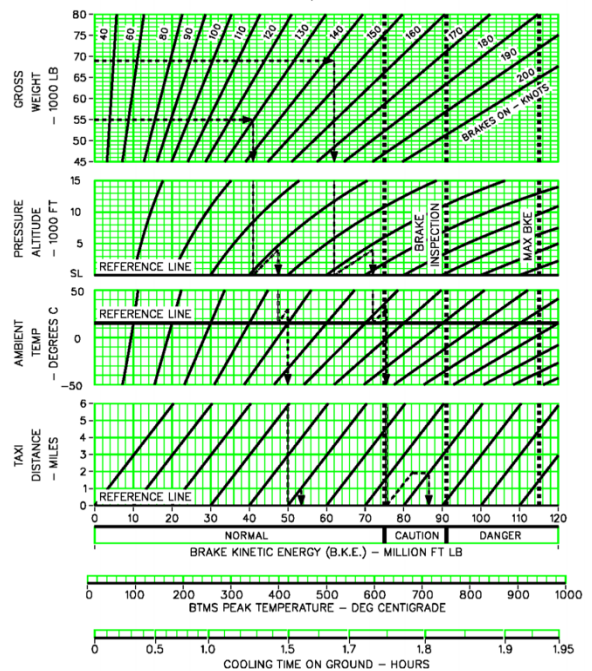


This synoptic display shows the Anti-skid switch in the OFF position. Notice the brake pressure scale change from 3,000 PSI to 800 PSI, and the maximum recommended brake pressure yellow line set at 400 PSI.

NOTE: ON OCCASION THE BTMS CAN LOSE THE LAST PEAK TEMP. IN THIS CASE THE PEAK TEMP WILL BE DASHED OUT AND TAKEOFF INIT WILL NOT BE ABLE TO BE COMPUTED UNLESS BTMS IS DISABLED (TAKEOFF INIT 5/5 1R).

BRAKE KINETIC ENERGY AND COOLING REQUIREMENTS

NOTE: FOR EACH 1% OF DOWNHILL SLOPE DURING TAXI, ADD 4 MFP (PER STATUTE MILE) TO THE COMPUTED BKE BEFORE READING THE BTMS TEMPERATURE AND/OR COOLING TIME VALUES.

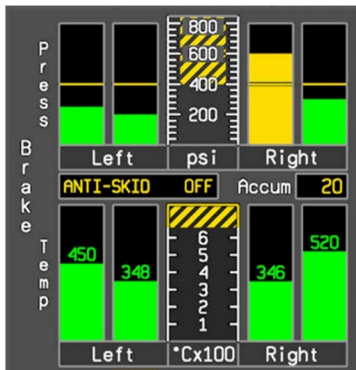
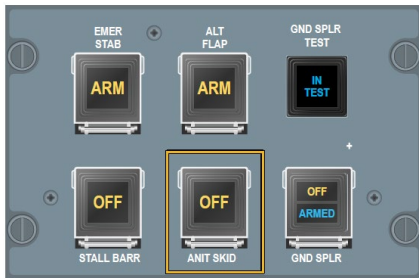


NOTE: Use of these charts is to be with reference to G450 AFM Appendix C: Brake Kinetic Energy and Carbon Brake Cooling.



- BRAKE AND WHEEL WASHING
- GULFSTREAM:
 - ▶ [BRAKE WASHING](#)

- ANTI-SKID BRAKES
 - NO PROTECTION BELOW 10 KTS (WHICH ALLOWS FOR TIGHT/LOCKED WHEEL TURNS)
 - ANTI-SKID SWITCHLIGHT ON – BRAKES SYNOPTIC 3000 PSI SCALE
 - ANTI-SKID SWITCHLIGHT OFF – BRAKES SYNOPTIC 800 PSI SCALE (BARBER-POLED > 400 PSI)
 - G550, USES IRS INPUT – IF THERE IS AN IRS FAILURE CHECK THE COMBINED WOW. IF IT IS NOT IN GND TURN ANTI-SKID OFF TO ENSURE BRAKING BELOW THE WHEEL SPIN UP SPEED (47 KTS)



- DIGITAL ANTI-SKID CONTROL UNIT (DACU)
 - G450, LOCATED IN THE AEEER
 - G550, LOCATED IN THE LEER
- SENSES
 - WOW
 - GEAR HANDLE
 - DOWNLOCKS
 - IRS (WHEN IRS GND SPEED IS < 10 KTS / < 8 KTS THERE IS NO ANTI-SKID PROTECTION)
 - WHEELSPEED MONITOR UNIT (WMU) – USES WHEELSPEED TRANSDUCERS TO DETERMINE WHEN TO ALLOW OR WITHHOLD PILOT APPLIED BRAKE PRESSURE
- DACU FUNCTIONS
 - TOUCHDOWN / HYDROPLANING PROTECTION
 - PILOT APPLIED BRAKE PRESSURE IS WITHHELD TIL THE WHEELSPEED TRANSDUCER ACHIEVES 30 KTS
 - IF AFTER 5 SECONDS OF GND CONTACT (WOW) WHEELSPEED ROTATION IS STILL <

- HYDROPLANING INFO:
 - 30 KTS, PILOT APPLIED BRAKE PRESSURE IS ALLOWED TO THE BRAKES
 - HYDROPLANING IS A FUNCTION OF WATER DEPTH, TIRE PRESSURE, AND SPEED
 - A 10 KT CROSSWIND CAN DRIFT A HYDROPLANING AIRCRAFT OFF THE SIDE OF A 200 FT WIDE RUNWAY IN 7 SEC
 - MINIMUM HYDROPLANING SPEED FOR A NON-ROTATING TIRE FORMULA:
 - $\sqrt{TIRE\ PSI \times 7.7}$
 - MINIMUM HYDROPLANING SPEED FOR A ROTATING TIRE FORMULA:
 - $\sqrt{TIRE\ PSI \times 9.0}$
 - G450 MAIN TIRE (190 PSI) HYDROPLANING SPEED:
 - EXPECT TRACTION LOSS DURING LANDING AT ~ 125 KTS
 - EXPECT TRACTION TO BE REGAINED AT ~ 106 KTS
 - G450/G550 NOSE TIRE (136 PSI) HYDROPLANING SPEED: ~ 105 KTS

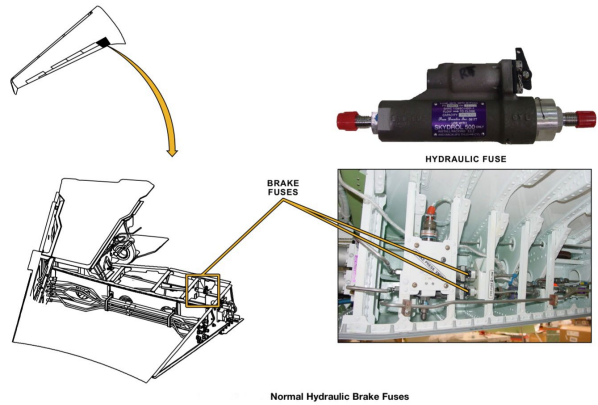
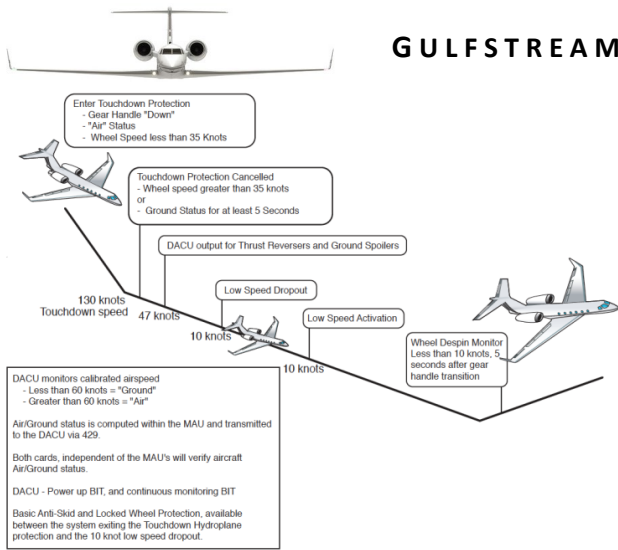
- PILOT PROCEDURES – AVOIDING HYDROPLANING
 - FLY THE AIRCRAFT ONTO THE RUNWAY – MAKE A POSITIVE TOUCHDOWN (~350 FPM)
 - IMMEDIATELY LOWER THE NOSE WHEEL
 - IMMEDIATELY DEPLOY THRUST REVERSERS – REVERSE THRUST MAY BE THE DOMINANT DECELERATION FORCE JUST AFTER TOUCHDOWN ON A WET OR SLIPPERY RUNWAY
 - FIRMLY APPLY BRAKES, DON'T MODULATE – ALLOW THE ANTI-SKID SYSTEM TO OPERATE

- LOCKED WHEEL PROTECTION
 - G450
 - [INBOARD-INBOARD WHEELSPEED COMPARISON](#)
 - [OUTBOARD-OUTBOARD WHEELSPEED COMPARISON](#)
 - IF A 70% WHEELSPEED DIFFERENTIAL IS SENSED BRAKE PRESSURE IS REDUCED TO THE SLOWER WHEEL
 - IF A WHEEL IS DECELERATING FASTER THAN REFERENCE SPEED (14 KTS/SEC), BRAKE PRESSURE IS REDUCED TO THAT WHEEL

- G550
 - COMPARES WHEELSPEED TO THE IRS GND SPEED
 - IF THE WHEELSPEED IS DECREASING 2% FASTER THAN IRS GND SPEED, BRAKE PRESSURE IS REDUCED TO THAT WHEEL
 - IF WHEELSPEED IS ≥ 50 KTS SLOWER THAN IRS GND SPEED BRAKE PRESSURE IS RELEASED TO THAT WHEEL

- ANTI-ROTATION
 - STOPS MAIN WHEEL SPIN PRIOR TO GEAR RETRACTION
 - GEAR UP PRESSURE SIGNAL → DACU → BRAKE METERING VALVES → APPLIES BRAKE PRESSURE
 - Wheel Despin Fail** CAS IF AUTOMATIC WHEEL SPINDOWN FAILED AFTER GEAR RETRACTION

NOTE: QRH FIRST STEP – EXTEND LANDING GEAR



Normal Hydraulic Brake Fuses

DISPATCH WITH ANTI-SKID INOP REQUIRES:

- **OPERATIVE GROUND SPOILERS**
- **FLAPS 20°**
- **COWL/WING ANTI-ICE OFF**
- **DRY RUNWAY**

SEE: [TAKEOFF MATRIX](#)

NOTE: ANTI-SKID INOPERATIVE INCREASES LANDING FIELD LENGTH BY 173%.

NOSE TIRES
 G450/G550

- **136 PSI** – RECOMMENDED PRESSURE FOR ALL TAKEOFF WEIGHTS
- PRESSURE RELIEF PLUG – 350 PSI
- 12 PLY TIRES RATED TO 195.5 KTS (225 MPH)

NOTE: IF THE TIRE CENTER IS WEARING TOO FAST AT 136 PSI, TRY 120-125 PSI; CHECK GRAPH.

MAIN TIRES

G450

- **190 PSI MAX** (NORMAL 189 PSI BASED ON WEIGHT ON WHEELS AND 70°F)
- PRESSURE RELIEF PLUG – 550 PSI (BOYLE'S LAW)
- 18 PLY TIRES RATED TO 195.5 KTS (225 MPH)

NOTE:

▶ [TIRE PRESSURE GRAPHS](#)

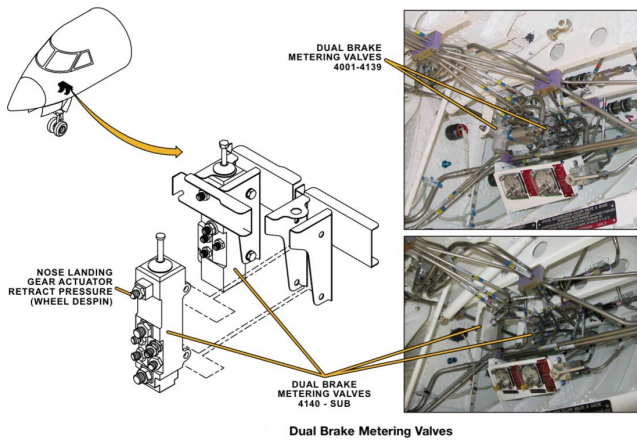
G550

- EACH TIRE: 82 LBS
- **199-207 PSI (MIN-MAX); NORMAL 198 PSI**
- PRESSURE RELIEF PLUG – 412.5 ±37.5 PSI (BOYLE'S LAW)
- 20 PLY TIRES RATED TO 195.5 KTS (225 MPH)

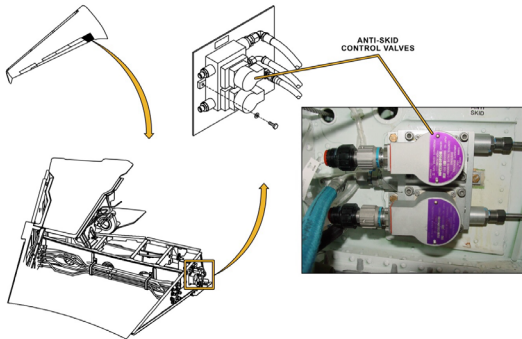
GULFSTREAM:

▶ [TIRE WEAR](#)

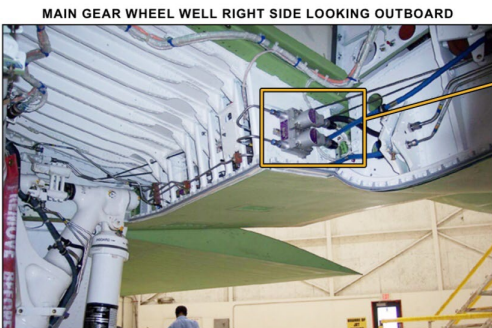
- FUSIBLE PLUGS (4) EACH WHEEL
 - SPACED EQUALLY AROUND THE WHEEL CIRCUMFERENCE
 - MELT AT 390°F (199°C)
 - RELEASE TIRE PRESSURE



Dual Brake Metering Valves



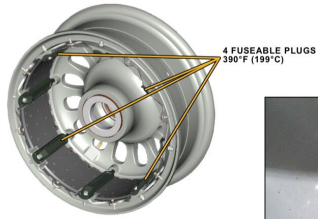
Anti-Skid Control Valve Location



MAIN LANDING GEAR STRUT

Anti-Skid Control Valve Installation





4 FUSEABLE PLUGS
390°F (199°C)



HIDDEN UNDER KEYBEAM DRIVEBARS
(GIV PICTURE SHOWN ABOVE AS EXAMPLE)

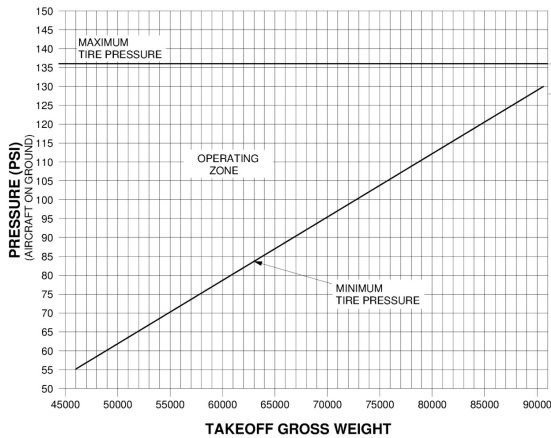
Main Landing Gear Wheel Fuse Plugs

- PROPER INFLATION PROCEDURES
- CHECK TIRES WHEN THEY ARE COOL (IT TAKES 2-3 HRS AFTER LANDING FOR TIRES TO COOL)
- INFLATE TO WORST CONDITIONS
- USE DRY NITROGEN GAS
- EQUAL PRESSURE FOR DUALS
- USE A CALIBRATED GAUGE

G450 NOSE TIRE SERVICING (MM)

NOSE TIRE INFLATION PRESSURE VS WEIGHT

TIRE P/N 1159SCL507-1 SIZE 21X7.25-10 12 PR
RATED SINGLE TIRE LOAD 6400 LBS AT 136 PSI.
CONTACT AREA 37 SQ. IN.

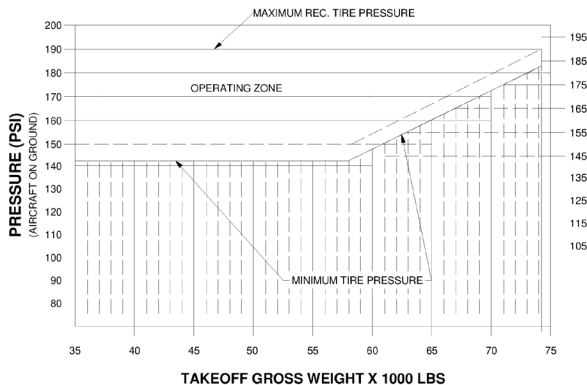


NOTE: THE RECOMMENDED NOSE TIRE PRESSURE FOR ALL TAKEOFF WEIGHTS IS 136 PSI.

G450 MAIN TIRE SERVICING (MM)

MAIN TIRE INFLATION PRESSURE SCHEDULE

TIRE P/N 1159SCL406-3 SIZE H34X9.25-18 18PR, RATED SINGLE TIRE LOAD 19,400 LBS AT 213 PSI.

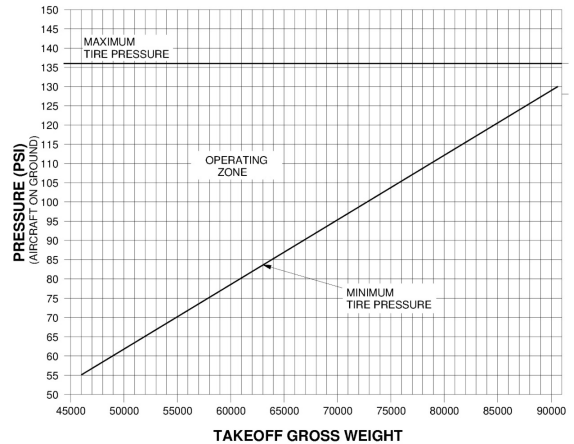


NOTE: THE RECOMMENDED MAIN TIRE PRESSURE FOR ALL TAKEOFF WEIGHTS IS 190 PSI.

G550 NOSE TIRE SERVICING (MM)

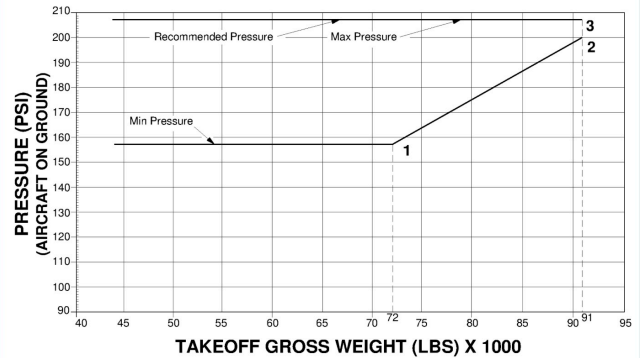
NOSE TIRE INFLATION PRESSURE VS WEIGHT

TIRE P/N 1159SCL507-1 SIZE 21X7.25-10 12 PR
RATED SINGLE TIRE LOAD 6400 LBS AT 136 PSI.
CONTACT AREA 37 SQ. IN.



G550 MAIN TIRE SERVICING (MM)

G550 MAIN TIRE INFLATION PRESSURE SCHEDULE
TIRE P/N 1159SCL506-1 SIZE H35X11.0-18 20PR, RATED SINGLE TIRE



DISCUSSION:

- 1 INDICATES THE MINIMUM PRESSURE ALLOWED. THE MINIMUM PRESSURE IS 157 PSI WITH AIRCRAFT GROSS WEIGHTS LESS THAN 72,000 LBS.
- 2 THE MINIMUM PRESSURE IS 199 PSI AT 91,000 LBS AIRCRAFT GROSS WEIGHT.
- 3 INDICATES THE MAXIMUM PRESSURE ALLOWED. THE MAXIMUM PRESSURE IS 207 PSI.

NOTE: THE CRANE SMARTSTEM TIRE PRESSURE INDICATION SYSTEM IS AVAILABLE TO THE G450/G550 FLEET PER STC: [CRANE AEROSPACE](#)

- NOSEWHEEL STEERING
 - ELEC CONTROLLED "STEER BY WIRE"- ELEC SIGNAL TO A TRANSDUCER (R ESS DC)
 - NOSE WOW SENSOR – OPEN IS GND MODE AND CLOSED (COMPRESSED BY THE TORQUE LINK) IS AIR MODE
 - HYDROMECHANICAL ACTUATION (L HYD / PTU / AUX SYS (G550))
 - TILLER STEERING: **80° TO 82°** (<18 KTS), REDUCES TO 16° BY 150 KTS
 - PEDAL STEERING: **7°** (TILLER MALFUNCTION PEDAL STEERING: 16° < 20 KTS, 10° > 60 KTS, 7° > 90 KTS)
 - CHECK VALVES HOLD TRAPPED FLUID WHICH AIDS SHIMMY DAMPENING
 - TOWING LIMITS – NWS UNIT OVERTRAVEL "POP UP" INDICATOR (> 83.6°) – AN INSPECTION OF THE COLLAR AND SHEAR PIN ARE REQUIRED PRIOR TO DISPATCH

NOTE: PEDALS DISC SWITCHLIGHT DISABLES RUDDER PEDAL STEERING.

NOTE: IF THE NWS UNIT CONTINUOUSLY CYCLES LEFT AND RIGHT ONCE NWS POWER IS TURNED ON AFTER ENGINE START TURN NWS POWER OFF, TAXI FORWARD A FEW FEET, THEN RESELECT NWS POWER; THIS MAY RESOLVE THE ISSUE.

NOTE: USE OF TILLER STEERING ABOVE 60 KCAS IS NOT RECOMMENDED.

NOTE: THERE IS A 300-MILLISECOND TIME DELAY (FADE IN) AFTER LANDING (NOSE WOW) BEFORE NOSEWHEEL STEERING IS AVAILABLE.



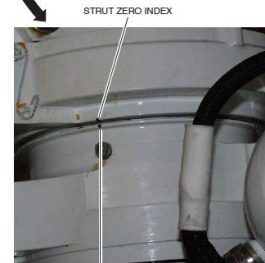
NOTE: UPON GEAR EXTENSION HYDRAULIC FLUID IS PORTED TO THE NWS UNIT AS PART OF A BIT CHECKING THE LVDT AND THE EHSV FOR CORRECT MOVEMENT. THIS PROCESS TAKES APPROXIMATELY 500 MILLISECONDS. THEN WARM HYDRAULIC FLUID IS ROUTED THROUGH THE WARMING ORIFICE OF THE BYPASS VALVE AND OUT THROUGH THE COMPENSATOR.



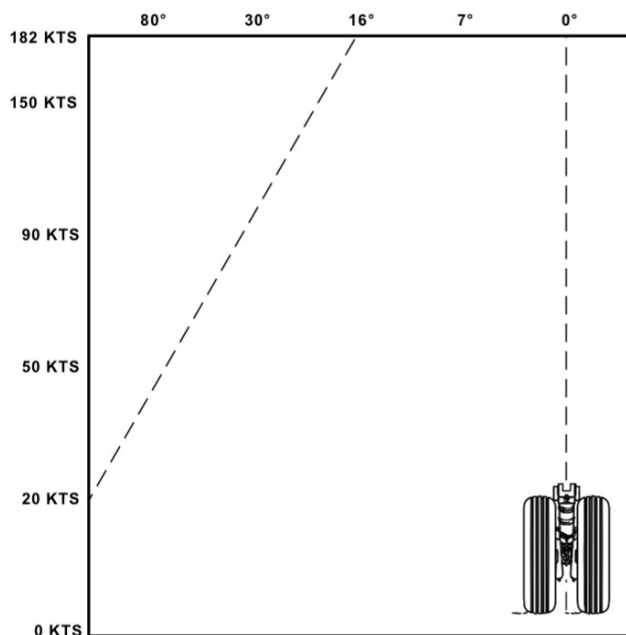
Hand Wheel Tiller/Control Panel



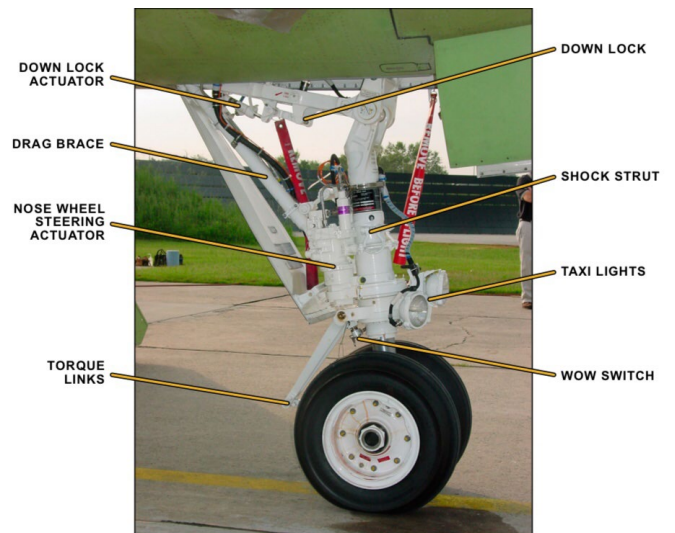
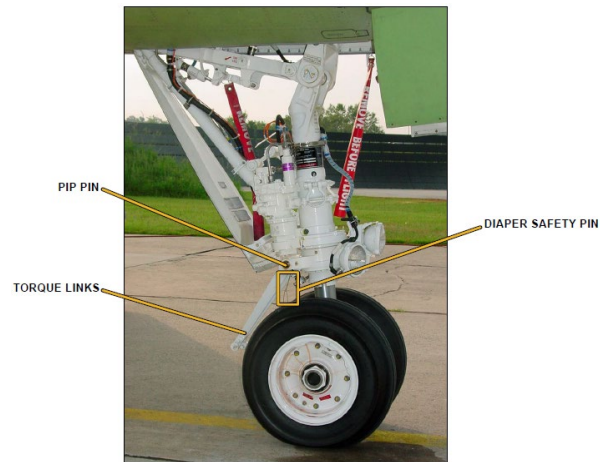
OVERTRAVEL INDICATOR



STEERING ZERO INDEX

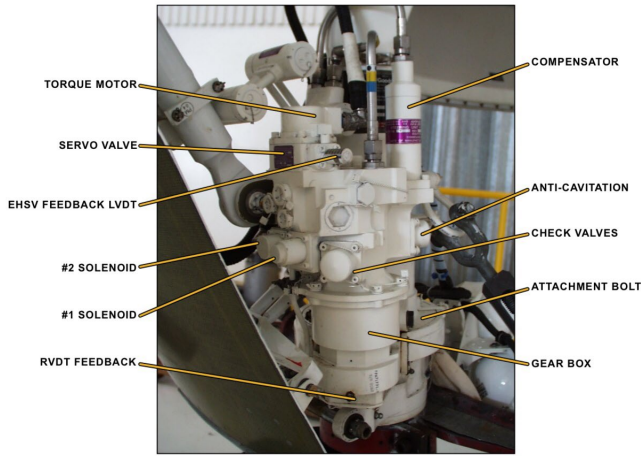


TURN RATE AUTHORITY VS °/SEC CHART
Nose Wheel Variable Gain



NOSE LANDING GEAR

NOTE: TO PREVENT POSSIBLE DAMAGE, CHECK THAT BOTH LANYARDS ARE ROUTED OVER THE TOP OF THE TORQUE LINK. THIS WILL ENSURE THE PIP PIN HANDLE IS IN THE UPRIGHT POSITION.



NWS Hydraulic Actuator Components

- **WOW**
- NOTE: IF THE COMBINED WOW CB (POP C-2) IS PULLED THE PLANE WILL BE PUT IN AIR MODE. THE GEAR COULD BE RETRACTED, AND THE AIRCRAFT COULD PRESSURIZE.
- **WOW ON EACH MAIN**
- LEFT (A), RIGHT (A)
- LEFT (A), RIGHT (G)
- LEFT (G), RIGHT (A)
- LEFT (G), RIGHT (G)
- VALID SIGNAL
- INVALID SIGNAL
- **COMBINED WOW**
- AIR
- AIR
- AIR
- GND
- WHITE
- **AMBER**

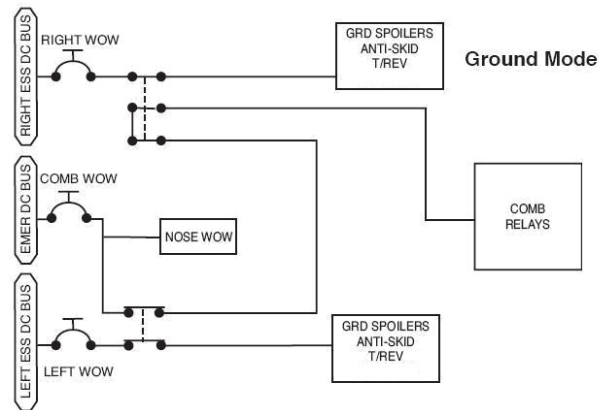
G450 COMBINED WOW RELAYS

COMBINED RELAY	DESCRIPTION
1	Bleed Air Control, Cockpit Clocks, Cabin Window Heat, Landing Gear Control and Indication
2	Galley Power, Cockpit Voice Recorder, Cockpit Clocks
3	Reserved for Future Use
4	Probe Heat, Water System
5	Nose Wheel Steering, Probe Heat
6	Cabin Window Heat, TCAS, Bleed Air Control
7	APU Control, Landing Gear Control and Indication
8	(Not Installed)
9	Windshield Rain Removal Blower, Air Flow Control
10	(Not Installed)
11	Equipment Cooling, Air Flow Control
12	(Not Installed)
13	Electronic Display System, Weather Radar
14	Electronic Display System, Weather Radar, Transponder
15	(Not Installed)
16	(Not Installed)
17	(Not Installed)
18	Cabin Pressure Control
19	Flight Data Recorder, Stall Barrier
20	Transponder, Enhanced Vision System
21	Engine Indicating/Crew Alerting System, Stall Barrier
22	(Not Installed)
23	(Not Installed)
24	Engine Indicating/Crew Alerting System

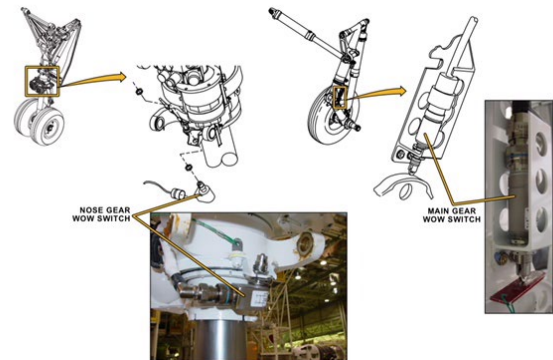
- **WOW CAS**
- **FWC PRESUMPTION**
- **WOW Fault**
- NOTE: FIRST STEP – GND SPLR SWITCH OFF
- **WOW Fault**
- NOTE: FIRST STEP – GND SPLR SWITCH OFF
- **WOW SWITCH STATUS IS COMPARED AGAINST TWO LOGIC SIGNALS: RAD ALT AND ADS (AIRSPEED)**
- AIR MODE IF RAD ALT > 150 FEET
- GROUND MODE IF AIRSPEED < 50 KT
- AIRSPEED < 50 KTS AND ANY WOW IS IN AIR MODE, OR
- RAD ALT > 150 FT AND ANY WOW IS IN GROUND MODE
- AIRSPEED > 60 KTS WITH RAD ALT > 150 FT AND BOTH MAIN GEAR WOW SWITCHES INDICATE GROUND MODE

- **MAIN GEAR WOW**
- DEDICATED SIGNAL OUTPUTS
- ON-SIDE BRAKE CONTROL AND INDICATION
- ON-SIDE THRUST REVERSER
- GROUND SPOILERS
- COMBINED WOW (THROUGH MAUs #1 & #3)

- GROUND SERVICE BUS – RIGHT MAIN WOW ONLY
- L BPCU – LEFT MAIN WOW ONLY



NOTE: THE GROUND SPOILERS, ANTI-SKID, AND THRUST REVERSERS RECEIVE DISCRETE ON-SIDE WOW SIGNALS. IF THE WOW SIGNAL IS LOST, THE WHEEL SPINUP SIGNAL WILL REPLACE THE WOW SIGNAL TO THOSE SYSTEMS. SYSTEMS OPERATING BASED ON WHEEL SPINUP WILL CEASE DURING DECLARATION (47 KTS).



- **NOSE WHEEL WOW**
- DEDICATED SIGNAL OUTPUTS
- MAU
- NWS
- **AUX HYD PUMP (G550)**



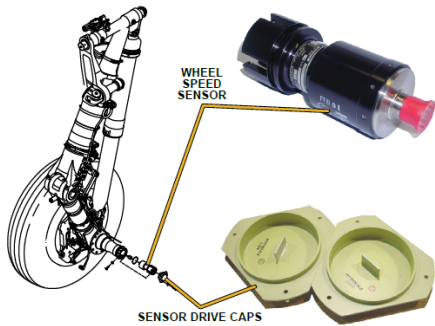
NOTE: IF THERE IS A DISAGREEMENT BETWEEN THE FWC PRESUMPTION (LOGIC) AND THE WOW SWITCHES **Wow Fault** OR **Wow Fault** WILL BE DISPLAYED, SEE WOW CAS ABOVE.

NOTE: EACH WOW HAS 25 FOUR POLE SWITCHES – EACH ASSOCIATED WITH DIFFERENT SYSTEMS AND SUBSYSTEMS.

NOTE: ONLY ONE MAIN GEAR WOW TO GND MODE IS NEEDED FOR ON-SIDE BRAKES AND THRUST REVERSER. BOTH MAIN GEAR WOW MUST BE IN GND MODE TO PROVIDE GND SPOILERS AND “ON THE GND” SIGNALS TO THE REST OF THE AIRPLANE THROUGH THE COMBINED WOW SYSTEM.



- WHEEL SPEED SENSORS (>47 KTS)
- GROUND SPOILERS
- THRUST REVERSERS



NOTE: THE LANDING GEAR POSITION INDICATION ON THE LANDING GEAR HANDLE TAKES PRECEDENCE OVER THAT DISPLAYED ON THE FLIGHT CONTROL SYNOPTIC PAGE.

- PARK BRAKE / EMER BRAKE
 - 1,700 PSI MIN TO SET (3,000 PSI RECOMMENDED)
 - UTILIZES THE ACCUM, NOT THE AUX PUMP
 - 5-6 BRAKE APPLICATIONS ON A FULL ACCUM
 - THE AUX PUMP PRESSURIZES THE ACCUM
 - NO ANTI-SKID PROTECTION

- ACN/PCN/ESWL
 - PERFORMANCE HANDBOOK, LANDING PLANNING – PC
 - WHEEL WEIGHT BEARING CAPACITY IS COMMON IN THE UNITED STATES
 - LCN/LCG IS THE BRITISH SYSTEM
 - ACN/PCN IS THE ICAO STANDARD

NOTE: IF WHEEL WEIGHT BEARING CAPACITY IS LISTED IN LIEU OF PCN FOR INTERNATIONAL AIRPORTS, WEIGHTS MAY BE PER WHEEL, NOT TOTAL AIRCRAFT WEIGHT (OPPOSITE OF FAA NUMBERS).

SAMPLE ACNs:

Aircraft	Weight Range (lbs)	ACN (Rigid, Subgrade A)	ACN (Flexible, Subgrade A)
G450	45,000 – 75,000	13 - 24	11 - 21
G550	55,000 – 90,000	17 - 32	13 - 25

NOTE: CAUTION MUST BE GIVEN AS PCN DOES NOT USUALLY APPLY TO TAXIWAYS OR RAMPS AND ONLY APPLIES WITHIN 50 FEET OF RUNWAY CENTERLINE.

FAA WHEEL WEIGHT BEARING LIMITS, e.g. S-42

- SPECIFIES A MAXIMUM AIRCRAFT WEIGHT BASED ON THE NUMBER OF WHEELS
- ADD "000" TO THE NUMERICAL FIGURE, e.g. S-42 = 42,000 LBS TOTAL AIRCRAFT WEIGHT, NOT WEIGHT PER WHEEL

TO DETERMINE THE AIRCRAFT'S MAX ALLOWABLE GROSS WEIGHT BASED ON A RUNWAY'S CAPACITY

- TAKE THE RUNWAY'S PUBLISHED CAPACITY AND MULTIPLY THAT BY THE REDUCTION FACTOR FOR THE AIRCRAFT
 - G450 REDUCTION FACTOR: 1.23
 - G550 REDUCTION FACTOR: 1.25

G450 EXAMPLE:

AN S-50 ALLOWS FOR A 61,500 LB. G450 (50,000 X 1.23 = 61,500)

G550 EXAMPLE:

AN S-50 ALLOWS FOR A 62,500 LB. G550 (50,000 X 1.25 = 62,500)

TO DETERMINE THE AIRCRAFT'S ESWL BASED ON GROSS WEIGHT

- ESWL = GROSS WEIGHT X 0.9 X 0.5 ÷ (REDUCTION FACTOR)
 - G450 REDUCTION FACTOR: 1.23
 - G550 REDUCTION FACTOR: 1.25

G450 EXAMPLE:

A 70,000 LB. G450 HAS A 25,609 LB. ESWL

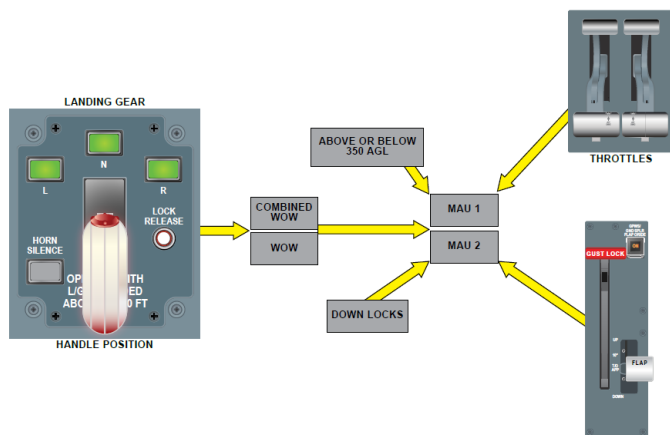
G550 EXAMPLE:

A 70,000 LB. G550 HAS A 25,200 LB. ESWL

CODE7700:
▶ [ACN V PCN](#)

EXPLANATION (JAMES ALBRIGHT): IN THE CASE OF THE G550, YOU MULTIPLY THE WEIGHT OF THE AIRPLANE BY 0.9 (HOW MUCH WEIGHT IS ON THE MAIN GEAR), THEN MULTIPLY THAT BY 0.5 (REDUCING BY HALF TO CONSIDER EACH MLG LEG SEPARATELY), THEN DIVIDE THAT BY 1.25. SO AN 80,000 LB. G550 HAS 28,800 LBS. ON EACH LEG.

- GEAR UNSAFE WARNING
- GEAR UP
- < 345' RA AND TLA < 5°
- GEAR HORN, SILENCE AVAIL IF FLAPS < 22°

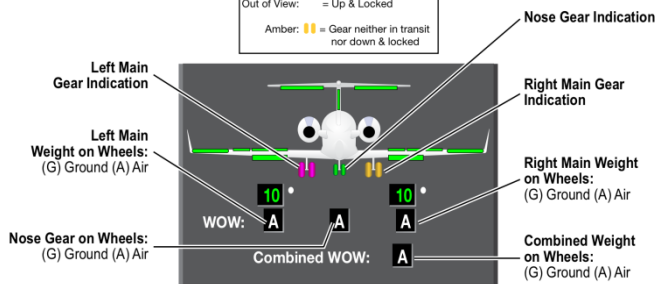


- RED LIGHT IN GEAR HANDLE
 - NOTE: LDG GEAR CONT CB (POP E-4).
 - NOTE: USE THE BELLY CAMERAS TO CHECK GEAR POSITION.
- RETRACTION (HANDLE UP)
- HANDLE DOES NOT AGREE WITH A GEAR OR DOOR POSITION
- EXTENSION (HANDLE DOWN)
- HANDLE DOES NOT AGREE WITH A GEAR POSITION

- GEAR SYNOPTIC INDICATIONS
- GREEN
- MAGENTA
- OUT OF VIEW
- AMBER
- DOWN AND LOCKED
- IN TRANSIT
- UP AND LOCKED
- DISAGREEMENT

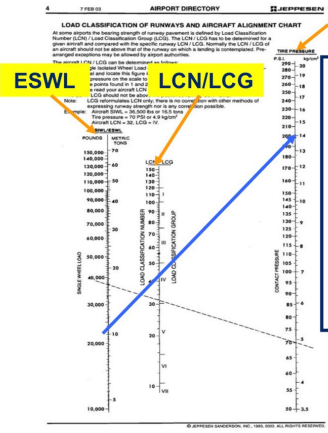
LEGEND

Green	Down & Locked
Magenta	In transit
Out of View	Up & Locked
Amber	Gear neither in transit nor down & locked





THE ESWL IS USED IN DETERMINING THE AIRCRAFT'S LCN:



TIRE PRESSURE

Draw a line from the aircraft ESWL to the tire pressure.

The line will intersect the LCN/CGR scale at the aircraft LCN and within a LCG range.

The aircraft LCN should be equal to or less than runway LCG limit.

- OPERATIONS WITH LANDING GEAR EXTENDED

G450 AFM SUPPLEMENTS (GIV-2009-01)

- MAX ALTITUDE: 20,000 FT. MSL
- MAX SPEED: 250 KTS / 0.70 Mt
- PERFORMANCE PENALTY:
 - 10,000 LB MAX TOGW PERMITTED BY CLIMB FLAPS 10 AND 20
 - 2.0% 2ND SEG CLB GRAD FLAPS 10 AND 20
 - 3.3% FINAL SEG OR ENROUTE CLB GRAD, FLAPS 0
 - 2.0% APP CLB GRAD, FLAPS 20

SIMPLIFIED FLIGHT PLANNING WITH LANDING GEAR EXTENDED
230 KCAS CLIMB / CRUISE / DESCENT

Distance (nm)	Trip Time (h:mm)		Landing Weight (lb)				
			45000	47000	49000	51000	53000
200	0:56	Fuel Req'd (lb)	3805	3834	3862	3887	3910
		Ramp Wt (lb)	48805	50834	52862	54887	56910
300	1:15	Fuel Req'd (lb)	5228	5267	5306	5345	5382
		Ramp Wt (lb)	50228	52267	54306	56345	58382
400	1:35	Fuel Req'd (lb)	6660	6710	6761	6814	6864
		Ramp Wt (lb)	51660	53710	55761	57814	59864
500	1:54	Fuel Req'd (lb)	8103	8163	8226	8294	8358
		Ramp Wt (lb)	53103	55163	57226	59294	61358
600	2:14	Fuel Req'd (lb)	9556	9626	9702	9784	9862
		Ramp Wt (lb)	54556	56626	58702	60784	62862
700	2:33	Fuel Req'd (lb)	11018	11100	11188	11284	11377
		Ramp Wt (lb)	56018	58100	60188	62284	64377
800	2:53	Fuel Req'd (lb)	12491	12584	12686	12796	12903
		Ramp Wt (lb)	57491	59584	61686	63796	65903
900	3:12	Fuel Req'd (lb)	13974	14078	14193	14317	14440
		Ramp Wt (lb)	58974	61078	63193	65317	67440
1000	3:31	Fuel Req'd (lb)	15466	15582	15711	15850	15987
		Ramp Wt (lb)	60466	62582	64711	66850	68987
1100	3:51	Fuel Req'd (lb)	16969	17097	17240	17393	17546
		Ramp Wt (lb)	61969	64097	66240	68393	70546
1200	4:10	Fuel Req'd (lb)	18481	18621	18780	18946	19116
		Ramp Wt (lb)	63481	65621	67780	69946	72116
1300	4:29	Fuel Req'd (lb)	20003	20156	20330	20511	20696
		Ramp Wt (lb)	65003	67156	69330	71511	73696
1400	4:49	Fuel Req'd (lb)	21535	21701	21890	22085	
		Ramp Wt (lb)	66535	68701	70890	73085	
1500	5:08	Fuel Req'd (lb)	23078	23256	23461		
		Ramp Wt (lb)	68078	70256	72461		
1600	5:27	Fuel Req'd (lb)	24630	24822	25043		
		Ramp Wt (lb)	69630	71822	74043		
1700	5:47	Fuel Req'd (lb)	26192	26397			
		Ramp Wt (lb)	71192	73397			
1800	6:06	Fuel Req'd (lb)	27764				
		Ramp Wt (lb)	72764				
1900	6:25	Fuel Req'd (lb)	29346				
		Ramp Wt (lb)	74346				

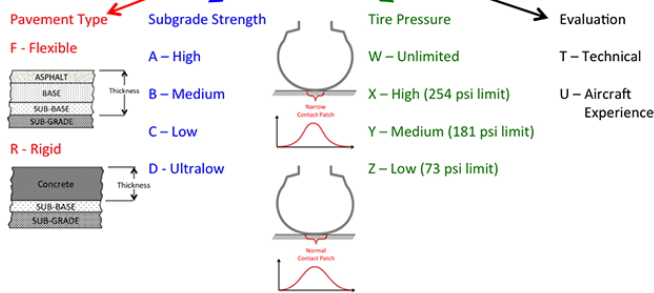
Less than ISA Temperatures
Increase Trip Time by 2% for each 10°C below ISA
Decrease Fuel Req'd by 0.5% for each 10°C below ISA (adjust Ramp Wt. accordingly)

Greater than ISA Temperatures
Decrease Trip Time by 1.5% for each 10°C above ISA
Increase Fuel Req'd by 1% for each 10°C above ISA (adjust Ramp Wt. accordingly)

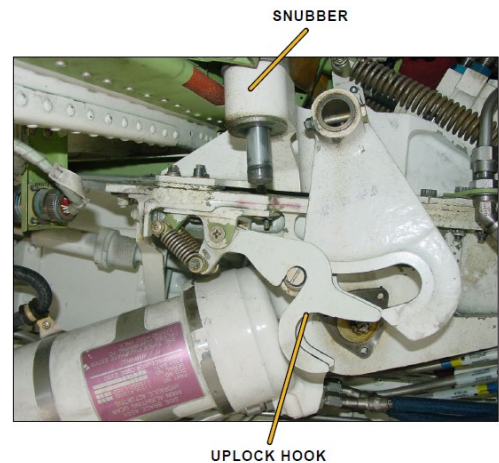
Note: For the GIV, increase the climb, cruise and descent fuel used calculations by 5%.

- IF WEIGHT EXCEEDS LIMITS:
- FAA AIRPORT DIRECTORY: "RUNWAY STRENGTH DATA...IS NOT INTENDED AS A MAXIMUM ALLOWABLE WEIGHT OR AS AN OPERATING LIMITATION. MANY AIRPORT PAVEMENTS ARE CAPABLE OF SUPPORTING LIMITED OPERATIONS WITH GROSS WEIGHTS IN EXCESS OF PUBLISHED FIGURES. PERMISSIBLE OPERATING WEIGHT, INSOFAR AS RUNWAY STRENGTHS ARE CONCERNED, ARE A MATTER OF AGREEMENT BETWEEN THE OWNER AND USER."
 - JEPESEN: "NORMALLY THE LCN/CGR OF AN AIRCRAFT SHOULD NOT BE ABOVE THAT OF THE RUNWAY ON WHICH A LANDING IS CONTEMPLATED. PREARRANGED EXCEPTIONS MAY BE ALLOWED BY AIRPORT AUTHORITIES." AND "THE APPROPRIATE AUTHORITY MAY ESTABLISH CRITERIA TO REGULATE THE USE OF A PAVEMENT BY AIRCRAFT WITH AN ACN HIGHER THAN THE PCN REPORTED FOR THAT PAVEMENT."

Example: TQPF PCN 22 / F / A / W / T



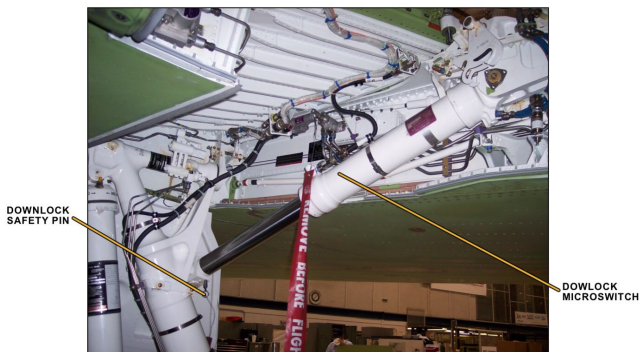
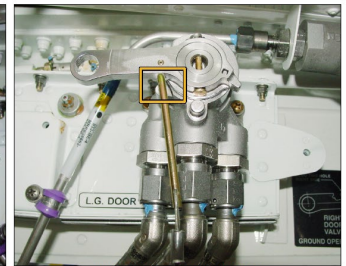
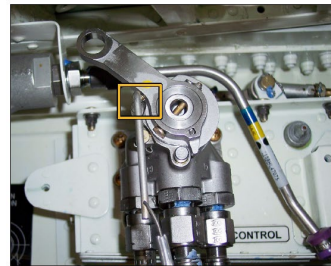
- GEAR UPLOCK OPENING
- OM ⇒ CHAPTER 9 HANDLING AND SERVICING ⇒ DISPATCH UPGRADE PROCEDURES ⇒ OPENING MAIN LANDING GEAR / NOSE LANDING GEAR UPLOCK HOOKS



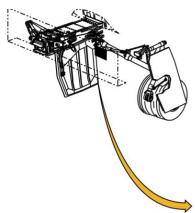
- EYE-TO-WHEEL HEIGHT
 - EYE-TO-WHEEL HEIGHT WITH UNLOADED MAIN LANDING GEAR IN THE LANDING ATTITUDE (3.3° NOSE UP) IS 13.8 FEET (G450) / 15.6 FEET (G550)
- GULFSTREAM:
▶ [EYE-TO-WHEEL](#)



- GEAR PIN HOLDER
- CAN BE PLACED BETWEEN THE GUST LOCK AND FLAP HANDLE WHILE THE GEAR PINS ARE IN:



Main Landing Gear Side Brace Actuator Installation



Main Landing Gear Door Control Valve Pin Installed

CODE 450

- ▶ [G450 LANDING GEAR SYSTEM](#)
- ▶ [G450 LANDING GEAR SYSTEM ABNORMALS](#)
- ▶ [BRAKE ENERGY](#)

Ivan Luciani's Systems Guides

- ▶ [G450 LANDING GEAR AND BRAKES](#)
- ▶ [G550 LANDING GEAR AND BRAKES](#)

NOTES

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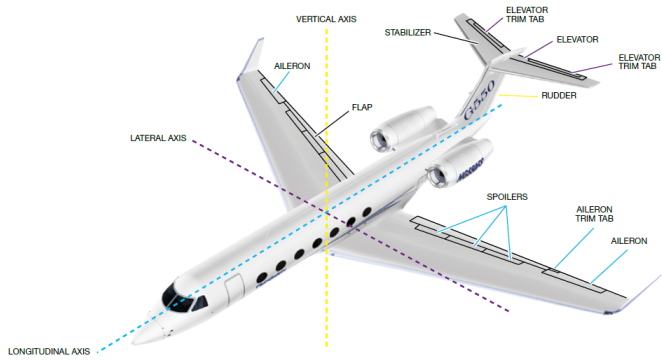
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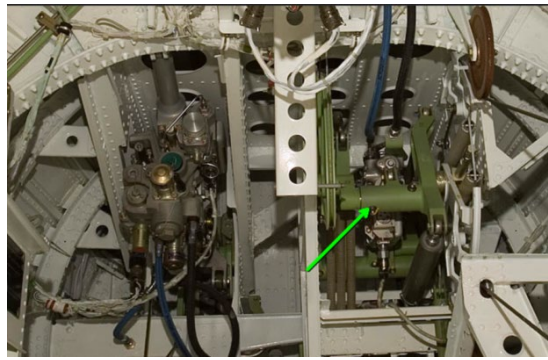
FLIGHT CONTROLS



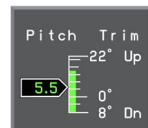
- **ELEVATOR**
- MANUALLY CONTROLLED
- MECHANICALLY OPERATED VIA CABLES, CRANKS, AND PUSHRODS
- HYDRAULIC BOOSTED VIA ACTUATOR (L,R HYD)
- TWO TRIM TABS, L & R, HEATED, 175°F

ELEVATOR DEFLECTION: 24° UP THRU 13° DOWN

G450 ELEVATOR ACTUATOR



- **ELEVATOR TRIM**
- HEATED TRIM TAB, 175°F
- ELECTRICALLY 21° UP THRU 7° DOWN,
- MECHANICALLY 22° UP THRU 8° DOWN
- ROTATING THE ELEVATOR TRIM TAB CONTROL WHEELS FORWARD MOVES THE ELEVATOR TRIM TAB TRAILING EDGE UP, RESULTING IN AIRCRAFT NOSE DOWN
- ROTATING THE ELEVATOR TRIM TAB CONTROL WHEELS AFT MOVES THE ELEVATOR TRIM TAB TRAILING EDGE DOWN, RESULTING IN AIRCRAFT NOSE UP
- ELEVATOR TRIM TAB TRAILING EDGE UP MOVES THE ELEVATOR TRAILING EDGE DOWN AND PITCHES THE AIRCRAFT NOSE DOWN
- ELEVATOR TRIM TAB TRAILING EDGE DOWN MOVES THE ELEVATOR TRAILING EDGE UP AND PITCHES THE AIRCRAFT NOSE UP

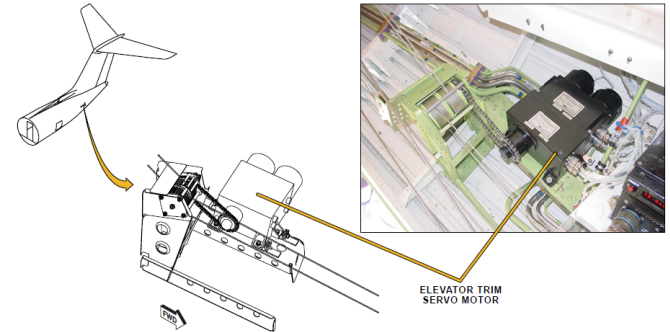


NOTE: SET TAKEOFF TRIM WITH SYNOPTIC INDICATION – NOT TRIM WHEEL SCALE.
 NOTE: EXCESSIVE FORCE APPLIED TO THE PITCH TRIM WHEEL WHEN THE PITCH TRIM IS FROZEN CAN BREAK THE SHEAR PIN, MAKING FUTURE USE OF THE PITCH TRIM NOT POSSIBLE. SEE QRH: FROZEN PITCH TRIM, THE FIRST INDICATION IS **AP 1-2 Fail**.

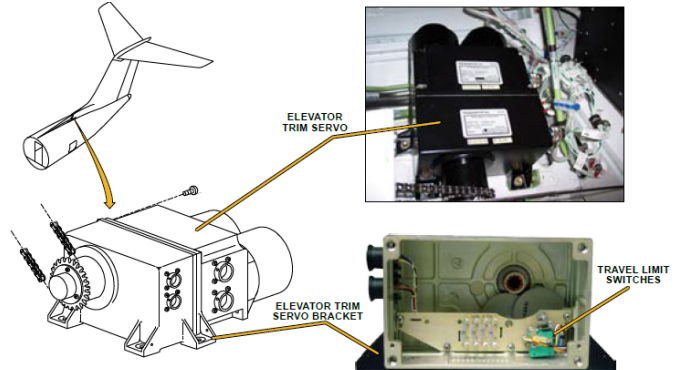
NOTE: WHEN ELEVATOR TRIM IS SET NEAR THE GREEN BAND LIMIT IT IS POSSIBLE TO GET AN **Aircraft Configuration** CAS MESSAGE CAUSED BY VIBRATION DURING THE TAKEOFF ROLL.

- **INOP TRIM (MACH/ELEC)**
- **G450, 0.75 MT**
- **G550, 0.80 MT**

G450



G550



- **MACH TRIM**
- THE MACH TRIM FUNCTION IS PART OF THE AUTOPILOT AND TRIMS THE AIRCRAFT NOSE-UP FOR INCREASING MACH NUMBER AND NOSE-DOWN FOR DECREASING MACH NUMBER DURING MANUAL FLIGHT WITHIN THE TRANSONIC FLIGHT REGION, 0.80–0.93 MACH, BY COMMANDING ELEVATOR TRIM TAB MOVEMENT

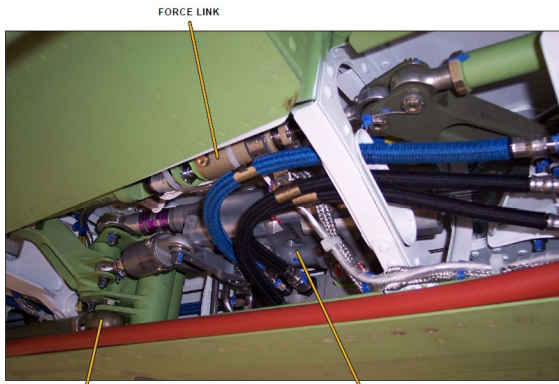
- THE MACH TRIM FUNCTION DEACTIVATES IF:
- MACH NUMBER FALLS OUTSIDE OF THE MACH TRIM RANGE
 - A/P IS ENGAGED
 - THE MANUAL TRIM SWITCH INPUTS ARE ON
 - A/P QUICK DISCONNECT INPUTS ARE ON
 - MACH TRIM SWITCH IS SELECTED OFF (TRIM ENG/DISENG SWITCH)
 - TRIM TAB SERVO IS FAILED

INOP TRIM (MACH/ELEC)

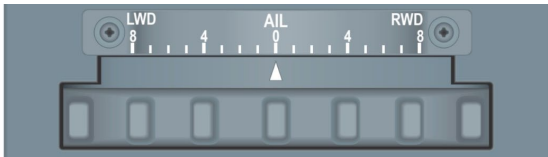
- **G450, 0.75 MT**
- **G550, 0.80 MT**

- **AILERONS**
- 11° OF TRAVEL UP AND DOWN
- MANUALLY CONTROLLED
- MECHANICALLY OPERATED VIA CABLES, CRANKS, AND PUSHRODS
- HYDRAULIC BOOSTED VIA ACTUATORS (L,R HYD) – 6 TO 1 BOOST ADVANTAGE OVER MANUAL
- L CONTROL WHEEL → L AILERON, R CONTROL WHEEL → R AILERON
- CONTROL WHEELS ARE JOINED
- TRIM TAB ON THE LEFT AILERON ONLY (**G550 HEATED, 175°F**); 15° OF TRAVEL UP AND DOWN
- THE TWO **OUTBOARD** SPOILERS ASSIST ROLL AUTHORITY (UP TO *41°/ 47°; UP TO 55° WITH FULL SPEEDBRAKES)

NOTE: IF THE AILERONS JAM, USE RUDDER TO TURN THE AIRCRAFT.



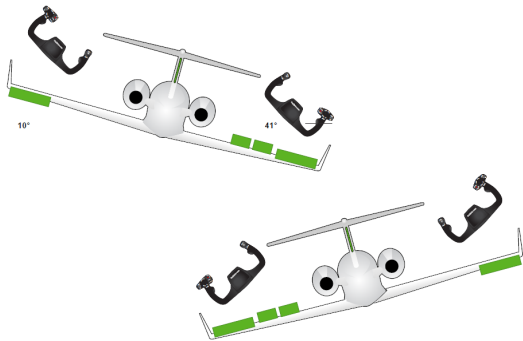
AILERON TRIM



AILERON DISPLACEMENT UP	FLIGHT SPOILER EXTENSION UP
1/2°	1/2°
1°	3° / 5.5°
7°	23° / 28°
11°	*41° / 47°
FULL AILERON WITH FULL SPEEDBRAKES	55°

* AOM SAYS 26°; THE MAINTENANCE MANUAL SAYS 41°

NOTE: USE THE FLIGHT CONTROL PAGE TO MONITOR SPOILER DEPLOYMENT DURING A CROSSWIND TAKEOFF – DON'T LIFT THE SPOILER.



▪ RUDDER

NOTE: THE RUDDER IS MOUNTED ON THREE HINGES AND IS CONSTRUCTED FROM EPOXY GRAPHITE.

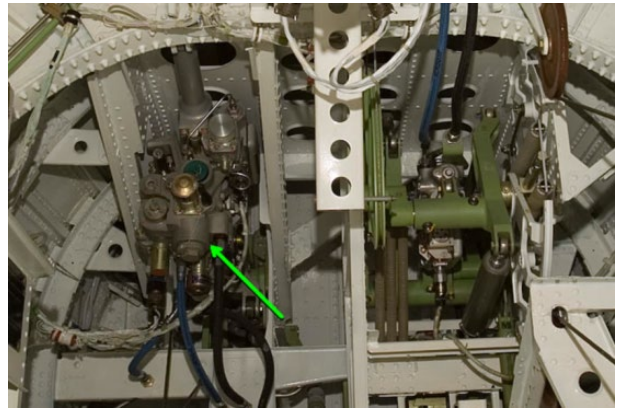
RUDDER LIMITING

NOTE: THERE IS CONTRADICTIONARY INFORMATION ON THE RUDDER LIMITING SYSTEM. THE INFORMATION HEREIN IS FROM THE AOM.

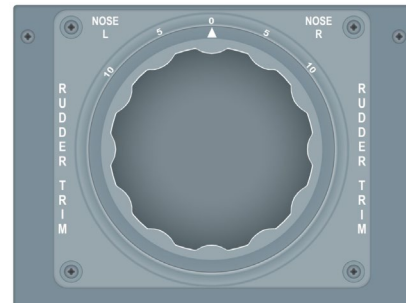
- CABLES AND BELLCRANKS
- DUAL TANDEM HYDRAULIC ACTUATOR (L, R HYD, AUX)
- 22° OF TRAVEL (WITH SURFACE FLEX UP TO 25°)
- TRIM ADJUSTS THE NEUTRAL POSITION OF THE RUDDER (10 UNITS OF TRIM = 7.5° L/R OF NEUTRAL)
- DUAL CHANNEL YAW DAMPER (L / R HYD)
- DIFFERENTIAL PRESSURE SENSING
- MWS SOFTWARE COMPUTES MAXIMUM RUDDER DEFLECTION FOR A GIVEN AIRSPEED, MATCHING AIR LOADS ON THE RUDDER SURFACE WITH THE HYDRAULIC FUNCTION OF THE RUDDER ACTUATOR
- THE RUDDER HYDRAULIC ACTUATOR USES INTERNAL PRESSURE SWITCHES TO SIGNAL THE MWS WHEN FULL HYDRAULIC PRESSURE OUTPUT OF THE ACTUATOR HAS BEEN REACHED
- **Rudder Limit** IS DISPLAYED

- DUAL LOAD LIMITING BY SUMMING PRESSURE REDUCER VALVES - TRAVEL STOPS ONCE THE AIR LOAD EQUALS THE HYD PRESSURE
 - TWO ACTUATORS, 1,500 PSI **Rudder Limit**
 - **Single Rudder** – ONE ACTUATOR, 3,000 PSI

G450 RUDDER ACTUATOR



RUDDER TRIM



▪ G550, STBY RUDDER

- IF IN FLIGHT, ACTIVATES AUX PUMP FLUID AND PRESSURE TO THE RUDDER ACTUATOR AND YAW DAMPER 1
- ON TOUCHDOWN (NOSE GEAR WOW) THE VALVE CHANGES TO PROVIDE NWS



Aux System Components



- USE OF RUDDER IN FLIGHT

RULES OF THUMB

- MAXIMUM DEFLECTION OF THE RUDDER IN A SINGLE DIRECTION MAY BE USED WHEN NEEDED SUCH AS IN THE CASE OF AN ENGINE FAILURE AT TAKEOFF. DO NOT RETURN THE RUDDER PAST NEUTRAL WHEN COMPLETING THIS MANEUVER.
- DO NOT WALK THE RUDDER IN TUNE WITH THE YAW RESPONSE EITHER WITH ABRUPT OR SMOOTH INPUTS

- YAW DAMPERS (2)
- NESTER NOTE: THE YD IS WOVW CONTROLLED. NO YD ON GROUND.*

DUAL ELECTRO-HYDRAULIC SERVO VALVES (EHSV)

- CONTROLLED BY THE MAUS / GP
- PROVIDES 5° OF TURN COORDINATION WITH FLAPS < 30°

INOP YD MAX ALTITUDE	G450: 41,000'	G550: 45,000'
INOP YD AIRSPEED ABOVE 20,000'	210 KTS MINIMUM	260 KTS / .80 Mt MAXIMUM, 210 KTS MINIMUM
INOP YD AIRSPEED BELOW 20,000'	PER CHART: QRH ED-26	PER CHART: QRH ED-30

- FLAPS (0°, 10°, 20°, 39°)

"TRAILING EDGE CONTOURS" – DON'T PUSH

NOTE: USING THE AUX PUMP TO EXTEND THE FLAPS FROM 0° TO 20° WILL TAKE AT LEAST ONE MINUTE. A **Aux Hydraulic Fail** MESSAGE WILL BE DISPLAYED DURING FLAP MOVEMENT.

FOWLER TYPE FLAPS

- 2 MODES: **NORM AND ALT / DUAL CHANNEL RVDT**
- MOVES IN CONJUNCTION WITH STABILIZER VIA FSECU
- ELECTRICALLY CONTROLLED
 - NORM MODE: FLAP HANDLE RVDT (2), ONE HAS A **COMMAND** FUNCTION, THE OTHER A **MONITOR** FUNCTION
 - ALT MODE: FLAP HANDLE POSITION SWITCHES AND FOLLOW UP SWITCHES
- HYDRAULICALLY OPERATED (L,PTU,AUX HYD) – FLAP DRIVE GEAR BOX (2 FLAP HYD MOTORS)
- THE HYD **POWER DRIVE UNIT** (PDU) IS LOCATED IN THE MAIN WHEEL WELL
- JACKSCREWS DRIVEN BY TORQUE TUBES DRIVEN BY GEARBOX – HYD MOTOR (PDU)
- FORCE LIMITERS – MONITOR AERODYNAMIC LOADS AND APPLY A BRAKE TO THE JACKSCREWS IF DAMAGE TO THE FLAPS COULD OCCUR

ALT FLAP – SECONDARY CONTROL – BYPASSES THE FSECU (ALT FLAP = "FSECU BYPASS"); SENDS EXTEND AND RETRACT SIGNALS DIRECTLY TO THE FLAP HYDRAULIC CONTROL MODULE WHICH CONTROLS THE PDU

- FLAP ASYMMETRY PROTECTION REMAINS AVAILABLE
- Alternate Flaps On** CAS

- ASYMMETRY **DETECTION** IS A FUNCTION OF THE FSECU VIA DUAL CHANNEL FLAP POSITION RESOLVERS
- ASYMMETRY **LOGIC** IS A FUNCTION OF THE MAUS
- A FLAP POSITION DIFFERENCE ≥ 0.2 INCHES WILL CAUSE THE MAUS TO SIGNAL THE FSECU TO DISABLE THE FLAP SYSTEM

FLAP INOP VREF CORRECTION "RULE OF THUMB"

HANDLE	ACTUAL	DC VREF CORRECTION
10°	0°	+10 ± 2 KTS
20°	10°	+5 ± 2 KTS
39°	20°	+5 ± 2 KTS

NOTE: ABNORMAL LANDING FIELD LENGTH TABLE – PERFORMANCE HANDBOOK (PH) G450 PC-14, G550 PC-17.

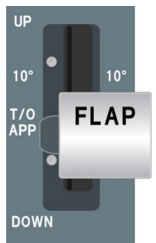
NOTE: 125 KTS IS THE MIN APPROACH SPEED WITH FLAPS < 20° – SPOOL UP TIME (LOW IDLE VS. HIGH IDLE).

ALT FLAP (G450 ONLY)



Flap Asymmetry

NOTE: STABILIZER OPERATION MAY BE REGAINED BY SELECTING THE EMER STAB SWITCH



ABNORMAL LANDING FIELD LENGTH TABLE, G450 PH PC-14, G550 PH PC-17

Performance Handbook Gulfstream G450
G450 Abnormal Landing Field Length Table GAC

Reference Landing Field Length (Feet)	Corrected, Factored (x 1.67), Dry Runway Landing Field Length (Feet) For Abnormal Landing Configuration					
	39°	20°	10°	0°	39°	20°
4200	4740	6220	4240	4380	4680	4680
4400	4880	7020	4480	4620	4820	4820
4600	5020	7840	4720	4940	5240	5240
4800	5160	8680	4960	5200	5520	5520
5000	5300	9540	5200	5500	5880	5880
5200	5440	10420	5440	5760	6280	6280
5400	5580	11320	5680	6000	6700	6700
5600	5720	12240	5920	6240	7140	7140
5800	5860	13180	6160	6500	7600	7600
6000	6000	14140	6400	6760	8080	8080
6200	6140	15120	6640	7040	8580	8580
6400	6280	16120	6880	7320	9100	9100
6600	6420	17140	7120	7600	9640	9640
6800	6560	18180	7360	7880	10200	10200
7000	6700	19240	7600	8160	10780	10780
7200	6840	20320	7840	8440	11380	11380
7400	6980	21420	8080	8720	12000	12000
7600	7120	22540	8320	9000	12640	12640
7800	7260	23680	8560	9280	13300	13300
8000	7400	24840	8800	9560	14000	14000

CAUTION: THE G450 MAXIMUM LANDING WEIGHT IS 66,000 LB (29,937 KG).

- NOTES:
- Reference Landing Field Length in first column is a FAR 135 factored, ISA-day, dry runway distance for a normal landing configuration (Flaps 39°, Anti-Skid operative and Automatic deployment of speed brakes / ground spoilers).
 - For intended destination wet, multiply landing field lengths above by 1.15.
 - For unfactored landing distances, multiply field lengths above by 0.80.
 - Field lengths seen above are based on no wind or runway slope, but may be conservatively used with headwinds or uphill runway slopes.
 - For Ground Spoilers/Manual Speed Brakes Inoperative and with Anti-Skid operative, multiply "Auto Ground Spoiler and Anti-Skid Operative" landing field length by:
- | | | | | |
|------|--------------|------|------|------|
| 39° | Flap Setting | 20° | 10° | 0° |
| 1.60 | Multiply By | 1.40 | 1.30 | 1.20 |

NOTE: ACCORDING TO THE PLANEVIEW OM AUTO THROTTLE RETARD MODE REQUIRES GEAR DOWN AND FLAPS > 31.5°. IN THE SIMULATOR HOWEVER AUTO RETARD STILL OCCURS EVEN WHEN LANDING PARTIAL FLAPS.

SPEED LIMITS

- FLAPS 10°/20°/39°
 - G450, 250 / 220 / 180 KTS (0.60 Mt)
 - G550, 250 / 220 / 170 KTS (0.60 Mt)

NOTE: FLAP AIRSPEED EXCEEDANCES INSPECTION, QRH NG-31, NG-30. "IF THE FLAP AIRSPEED EXCEEDANCE EXCURSION DID NOT EXCEED **VFE+9 KNOTS**, NO INSPECTION IS REQUIRED."

ALTITUDE LIMITS

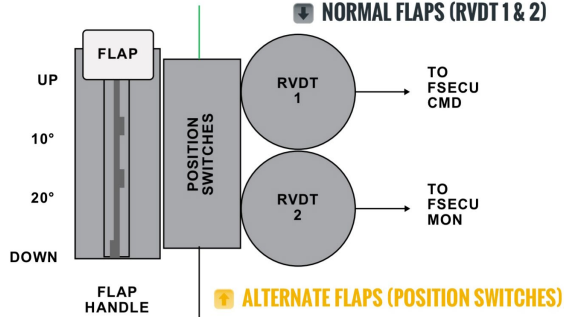
- FLAPS 10°/20°
 - 25,000'
 - 20,000'
- FLAPS 39°
 - < 245' AGL & < 160 KCAS
 - INHIBITED BY GPWS/GND SPLR FLAP ORIDE SWITCH

"TOO LOW, FLAPS" CALLOUT

G450, ALT FLAP

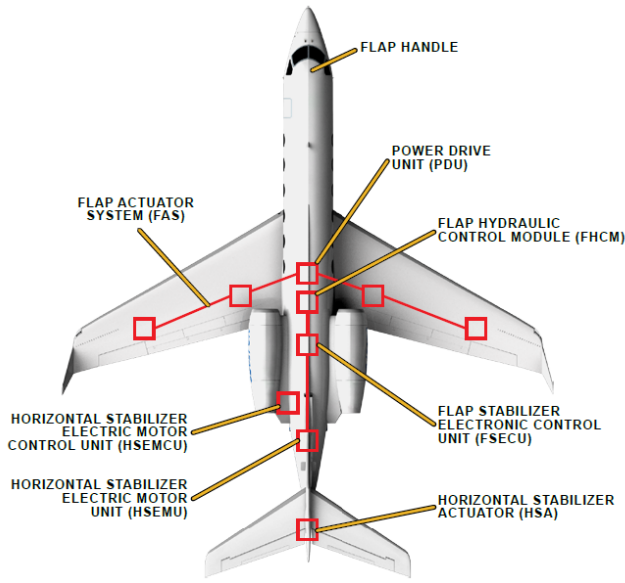


G450, NORMAL AND ALTERNATE FLAPS

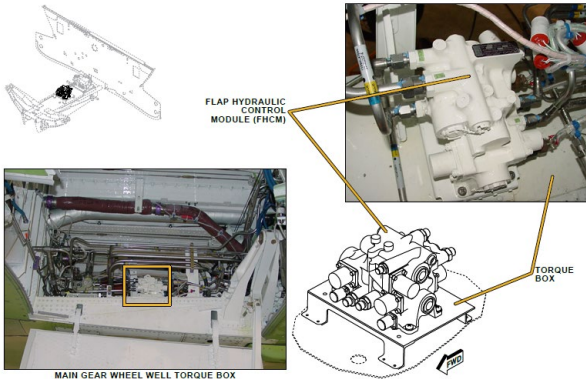




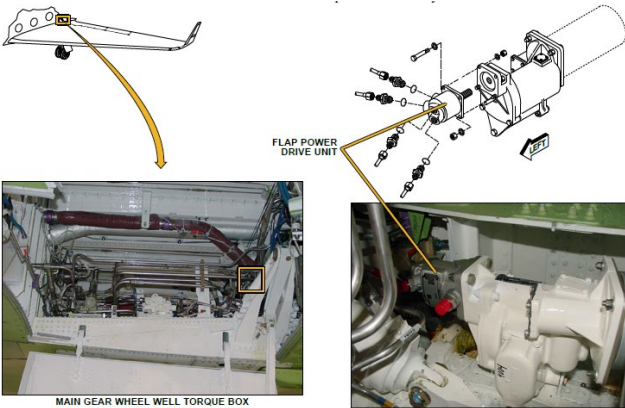
FROM IVAN LUCIANI:



G450



MAIN GEAR WHEEL WELL TORQUE BOX



MAIN GEAR WHEEL WELL TORQUE BOX

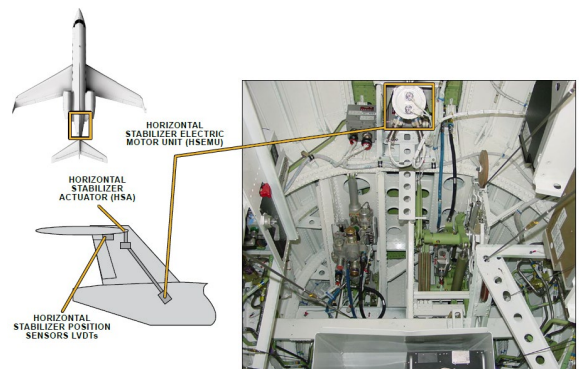
Flap 0	Flap 10	Flap 20	Flap 39
MAXIMUM EXTENSION/EXTENDED SPEED			
VFE 250 KCAS	VFE 230 KCAS	VFE G450 180 KCAS G550 170 KCAS	
MAXIMUM G-loads			
-1 To +2.5g	0 To +2g	0 To +2g	0 To +2g 0 To +1.5g (> MLW)
MAXIMUM OPERATING ALTITUDE			
≤ 25,000'	≤ 25,000'	≤ 30,000'	

- STAB
 - 2 MODES: NORM AND EMER
 - G450, -1.0° LEADING EDGE DOWN THRU -4.6° LEADING EDGE DOWN
 - G550, +1.25° LEADING EDGE UP THRU -4.6° LEADING EDGE DOWN (USING EMER STAB)
- NOTE: G450, THE HORIZONTAL STABILIZER IS 32 FT WIDE.
- NOTE: G550, THE HORIZONTAL STABILIZER IS 35.17 FT WIDE.
- NOTE: WHEN EMER STAB IS SELECTED THE STABILIZER SCALE IS EXPANDED AND AN ADDITIONAL TICK MARK IS PLACED OUTSIDE THE NORMAL SCALE ON THE UPPER END. THIS TICK MARK CORRESPONDS TO +1.5.
- ELECTRICALLY CONTROLLED
 - ELECTRICALLY ACTUATED
 - ELEC MOTOR/GEARBOX & TORQUE TUBE
 - PRIMARY CHANNEL – MAIN DC BUS
 - SECONDARY CHANNEL (EMER STAB) – R STBY AC BUS (SEP)

G450 FLAP/STAB POSITION				
FLAPS	0°	10°	20°	39°
STAB	-1.0°	-2.3°	-3.4°	-4.6°

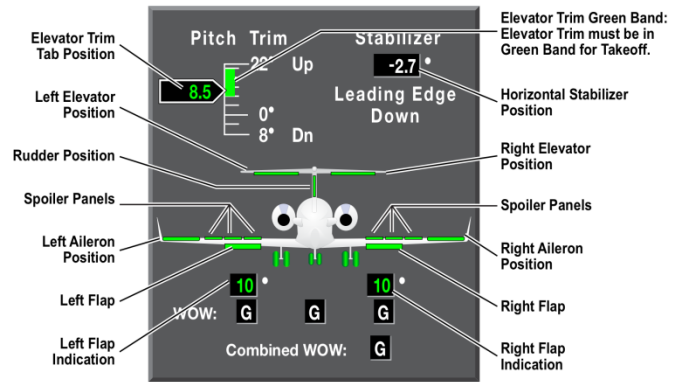
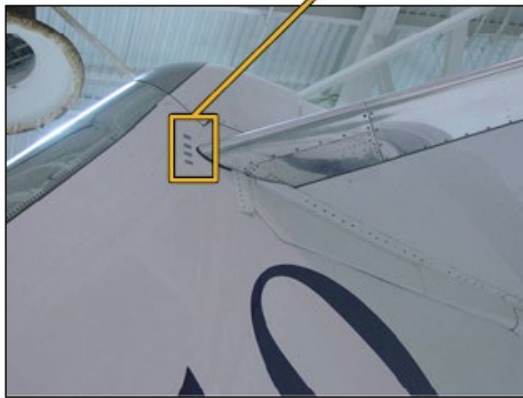
G550 FLAP/STAB POSITION				
FLAPS	0°	10°	20°	39°
STAB	-1.5°	-2.7°	-3.6°	-4.6°

G450





STABILIZER POSITION EXTERIOR MARKINGS



- SPOILERS
 - G450, DISABLED WITH "LATERAL CONTROL" OFF
 - G550, DISABLED WITH "SPOILER CONTROL" OFF

FLIGHT SPOILERS:

- ROLL AUGMENTATION
- 2 OUTBOARD PANELS – 55° LIMIT – WITH FULL SPEEDBRAKES EXTENDED AND FULL AILERON UP (SEE: [AILERONS](#))
- ELECTRICALLY CONTROLLED, HYDRAULICALLY OPERATED (L AND R HYD) VIA FLIGHT SPOILER ACTUATORS

SPEEDBRAKES:

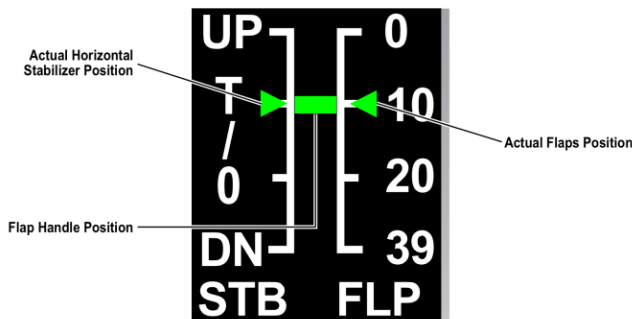
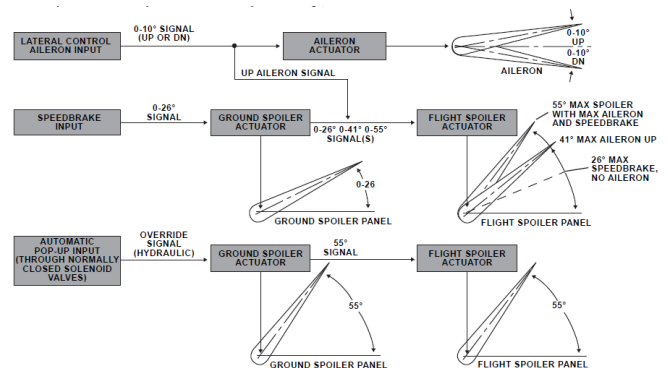
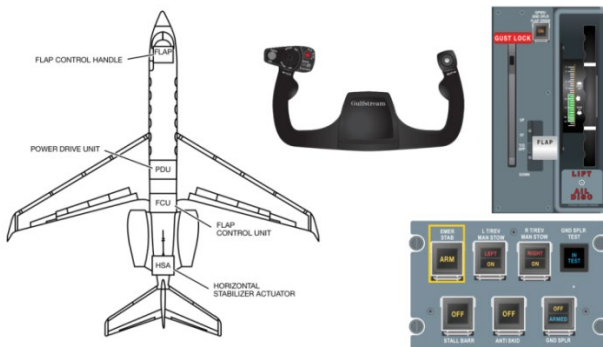
- 6 PANELS – 26°/ 30° LIMIT
- ELECTRICALLY CONTROLLED, HYDRAULICALLY OPERATED (L AND R HYD) VIA FLIGHT SPOILER ACTUATORS
- **Speed Brake Extended** CAS: SPEEDBRAKES EXTENDED, POWER LEVERS IDLE
- **Speed Brake Extended** CAS: SPEEDBRAKES EXTENDED, POWER LEVERS ABOVE IDLE

GROUND SPOILERS:

- 6 PANELS – 55°
- CONTROLLED BY **ELECTRO-HYDRAULIC SERVO VALVES** (SEE BELOW) WHICH REQUIRE LEFT SYSTEM FLUID/PRESSURE (VIA LEFT, PTU, OR AUX (G550))

- FSECU
 - COMMAND SIGNALS:
 - PRIMARY – FLAP HANDLE
 - SECONDARY – YOKE ELEV TRIM (EMER STAB)
 - SIGNALS THE FLAP POWER DRIVE UNIT TO HYDRAULICALLY MOVE THE FLAPS
 - SIGNALS 2 AC MOTORS TO DRIVE THE STAB
 - MONITORS: FLAP ASYMMETRY, FLAP/STAB MISCOMPARE, ETC...
- EMER STAB
 - G450 -1.0° TO -4.6°
 - G550 +1.25° TO -4.6°
 - CONTROLS THE STAB POSITION WITH YOKE ELEC PITCH TRIM, "PULL IT DOWN"
 - **Emergency Stabilizer On** CAS
- EMER STAB / JAMMED ELEV
 - G450, 270 KTS / 0.75 MT MAXIMUM
 - G550, 210 KTS MINIMUM
- SETTING FLAPS ON BATT POWER:

G450	G550
1. ALT FLAP – SELECT	1. EMER STAB – SELECT
2. AUX PUMP – ON	2. AUX PUMP – ON
3. FLAP HANDLE – 10	3. FLAP HANDLE – 10
4. FLAPS – VERIFY 10	4. FLAPS – VERIFY 10
5. AUX PUMP – OFF	5. AUX PUMP – OFF
6. ALT FLAP – OFF	6. EMER STAB – OFF



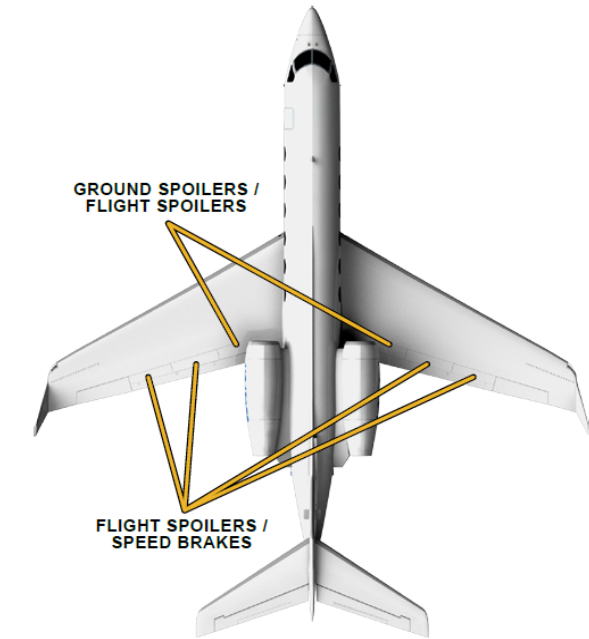


MECHANICALLY LINKED TO THE FLIGHT SPOILER ACTUATORS WHICH DEPLOY THE TWO OUTBOARD PANELS

ACTUATORS:

- HYDRAULICALLY CONTROLLED BY **LEFT** SYSTEM FLUID/PRESSURE (VIA **LEFT, PTU, OR AUX (G550) SYSTEM**)
- HYDRAULICALLY OPERATED BY LEFT AND RIGHT SYSTEM PRESSURE (REDUCED TO 1,500 PSI)
- NO GND SPLR
- LOCATED ON THE WINDSHIELD POST
- MEANS ALL CONDITIONS FOR AUTO GND SPLR DEPLOYMENT HAVE BEEN MET, BUT GND SPLRS HAVE NOT EXTENDED

NOTE: IF A TOUCH-AND-GO LANDING IS PERFORMED, THE GND SPLR SWITCH MUST BE OFF AND MANUAL SPLR LANDING DISTANCE TAKEN INTO ACCOUNT (G450 PH PC-14, G550 PH PC-17).

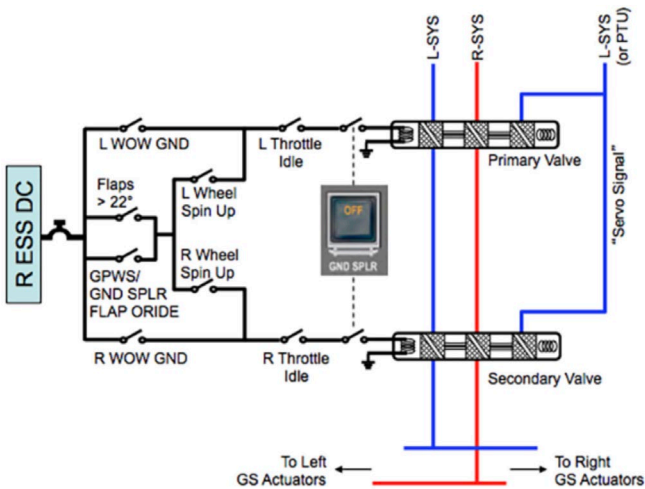


▪ GND SPOILER

DEPLOYMENT CONDITIONS:

- R ESS DC
- ARMED
- PLA – IDLE
- BOTH WOW – GND
- **OR**, BOTH WHEEL SPIN UP (>47 KTS) IF FLAPS > 22°
- **OR**, ONE MAIN WOW + THE OTHER MAIN WHEEL SPIN UP (>47 KTS)
- **OR**, WHEEL SPIN UP (>47 KTS) WITH GPWS/GND SPLR ORIDE ON (FLAPS <22° – “TOO LOW FLAPS”)

G450

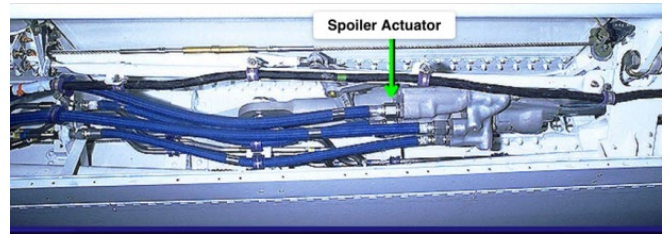


ELECTRO-HYDRAULIC SERVO VALVES:

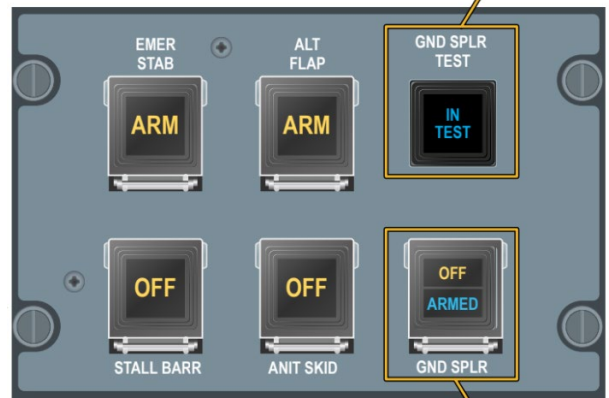
- **TWO** SERVO VALVES PLUMBED IN SERIES CONTROL THE FLOW OF HYD PRESSURE TO THE GND SPOILER ACTUATORS (SEE BELOW)
- ELECTRICALLY OPERATED (EACH SERVO IS INDEPENDENTLY POWERED) – PROVIDES “POP-UP” SIGNAL
- REQUIRES **LEFT** SYSTEM HYD FLUID/PRESSURE (VIA **LEFT, PTU, OR AUX (G550) SYSTEM**) TO CONTROL THE GND SPOILER ACTUATORS
- THE GND SPOILER ACTUATORS DEPLOY THE INBOARD SPOILER PANEL AND ARE



SPOILER ACTUATOR



TESTS THE PRIMARY SOLENOID VALVE FOR OPERATION AND VERIFIES HYDRAULIC PRESSURE



ARMS THE GROUND SPOILER SYSTEM

DISPATCH WITH GND SPOILERS INOP REQUIRES:

- **OPERATIVE ANTI-SKID**
- **TAKEOFF FLAPS 20°**
- **COWL/WING ANTI-ICE OFF**

SEE: [TAKEOFF MATRIX](#)

NOTE: G450 ADJUSTED RUNWAY LENGTH FOR **AUTO GROUND SPOILERS INOPERATIVE:**

- TAKEOFF: 500 FT
- LANDING; MULTIPLY “AUTO GROUND SPOILER AND ANTI-SKID OPERATIVE” LANDING FIELD LENGTH BY:

FLAP SETTING	39°	20°	10°	0°
MULTIPLY BY	1.6	1.4	1.3	1.2



▪ STALL BARRIER

NOTE: FOR JAA AIRCRAFT THE AOA STICK SHAKER/STICK PUSHER RATIO IS 0.9 WHEN WOW GROUND MODE AND FOR THE FIRST SIX (6) SECONDS AFTER TRANSITION TO AIR MODE. G450 OM 2A-27-00, PAGE 68.

- PLI VISIBLE AT 0.70 AOA
- SHAKER AT 0.85 AOA
- PUSHER AT 1.00 AOA

NESTER NOTE:
THE STALL BARRIER PUSHES TO:
1) THE "STOP LIMIT"
2) 2° AOA REDUCTION
3) A ½ G MANEUVER

SHAKER "RULE OF THUMB"

"DURING A MAXIMUM WEIGHT CLIMB TO ALTITUDE YOU WILL GET THE SHAKER AT A MACH TWENTY HIGHER THAN YOUR ALTITUDE IN THOUSANDS." EXAMPLE:

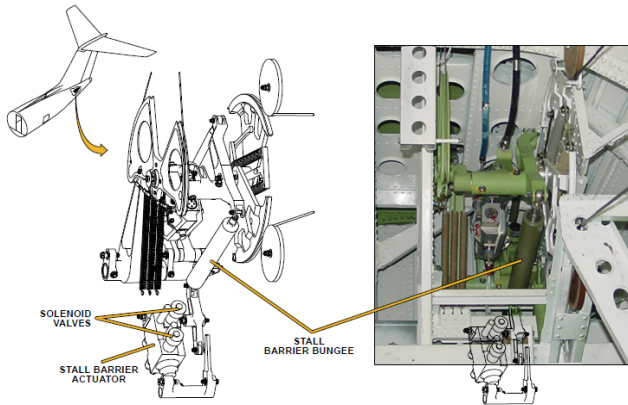
ALTITUDE	→	SHAKER AT
20,000'	→	MACH 0.40
30,000'	→	MACH 0.50
40,000'	→	MACH 0.60

STALL BARRIER MALFUNCTION QRH FIRST STEPS (QRH ED-4, ED-10):

A/P DISC.....PRESS AND HOLD
STALL BARRIEROFF
A/P DISC..... RELEASE

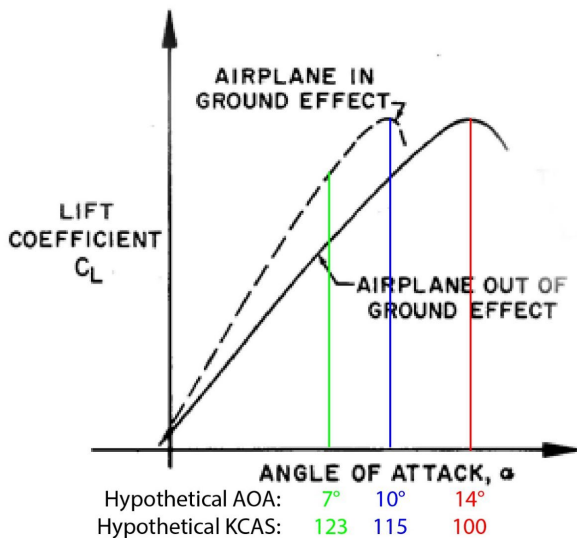
NOTE: 75 LBS OF PULL FORCE CAN OVERCOME THE PUSHER FORCE.

NOTE: WHEN THE ANTI-ICE HEATERS (AOA HEAT) ARE OFF THE STALL BARRIER SYSTEM IS DISABLED.



NOTE: AN AIRCRAFT STALLS AT A LOWER ANGLE OF ATTACK IN GROUND EFFECT THAN OUT OF GROUND EFFECT.

CODE7700: ▶ [IN GROUND EFFECT STALL](#)



▪ A/P DISC

NOTE: FOR JAA AIRCRAFT THE A/P DISC DOES NOT DISABLE THE STICK PUSHER. G450 OM 2A-27-00, PAGE 67.



"F.E.A.S.S.T"

- F – FLAPS, STOPS FLAP MOVEMENT
- E – EDM, CANCELS EDM MODE
- A – AUTOPILOT, DISCONNECTS THE AUTOPILOT
- S – STAB, STOPS STAB MOVEMENT
- S – STICK PUSHER, DISABLES THE STICK PUSHER BY REMOVING HYD POWER TO THE PUSHER – THE SHAKER STILL WORKS
- T – TRIM, STOPS TRIM MOVEMENT (STOPS A RUNAWAY)

A/P DISC IS THE FIRST STEP FOR:

- WINDSHEAR WARNING
- PULL UP, EGPWS WARNING
- FLIGHT CONTROL RUNAWAY
- PITCH TRIM RUNAWAY
- JAMMED AILERONS
- JAMMED ELEVATOR
- JAMMED RUDDER
- AILERON HOPS
- ELEVATOR HOPS
- RUDDER HOPS

▪ VORTEX GENERATORS

FOR A MISSING VORTEX GENERATOR CHECK THE CDL, AFM APPENDIX B

G450

- 20 ON EACH WING
- NONE ON THE WINGLETS
- NONE ON THE HORIZONTAL STABILIZER
- NONE ON THE ELEVATOR

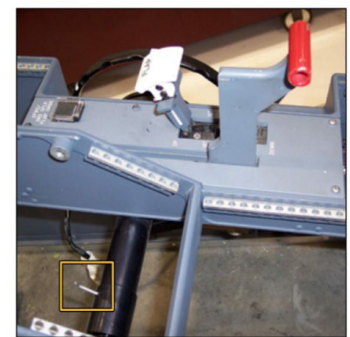
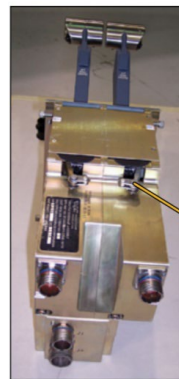
G550

- 60 ON EACH WING
- 7 OUTBOARD ON EACH WINGLET
- 22 ON THE BOTTOM OF EACH HORIZ STAB (IF MISSING, WEIGHT RESTRICTIONS APPLY)
- 13 ON TOP OF THE ELEV (IF MISSING, AIRSPEED RESTRICTIONS APPLY)

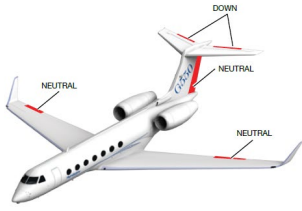
NESTER NOTE: ALL STABILIZER VORTEX GENERATORS ARE NEEDED TO HAVE ELEVATOR CONTROL IN SEVERE ICING CONDITIONS.

▪ GUST LOCK

- MECHANICAL LATCHES
- LOCKS THE AILERONS, ELEVATOR, AND RUDDER
- ≤ 60 KT GUSTS
- LIMITS THROTTLE TRAVEL: 6°



THROTTLE GUST LOCK MECHANISM



NESTER NOTE:

USE FORE AND AFT ELEVATOR CONTROL MOVEMENT OR LEFT AND RIGHT RUDDER CONTROL MOVEMENT AS OPPOSED TO AILERON CONTROL MOVEMENT TO BLEED OFF HYDRAULIC PRESSURE. THIS WILL PREVENT A POSSIBLE EVENT OF "HANGING" (EXTENDED) SPOILER PANELS.

QRH CAUTION (SHUTDOWN): ENSURE HYDRAULIC PRESSURE IS DEPLETED PRIOR TO ENGAGING GUST LOCK...CYCLE THE CONTROLS WITH THE CONTROL COLUMN, CONTROL YOKE AND RUDDER PEDALS TO DEplete THE RESIDUAL PRESSURE.

NOTE: THE GEAR PIN HOLDER CAN BE PLACED BETWEEN THE GUST LOCK AND FLAP HANDLE WHILE THE GEAR PINS ARE IN:



▪ HOPS

QRH FIRST STEPS:

AUTO PILOT OFF
SPEEDBRAKES RETRACT

- COMPARES PRESSURE SENSED INTO THE SERVOS VERSUS PRESSURE SENSED OUT OF THE SERVOS
 - PROTECTS AGAINST AN ACTUATOR THAT IS OUT OF PHASE WITH PILOT INPUT
 - PROTECTS AGAINST ACTUATOR HARDOVERS DUE TO ACTUATOR MALFUNCTION
- IF THERE IS A DIFFERENCE, FLUID IS SHUT OFF
- FORCELINKS – HOPS CAN ONLY BE RESET WITH CBs
 - LATERAL HOPS: LATERAL HYD S/O CB (POP, C-4)
 - ELEVATOR HOPS: ELEV HYD S/O CB (POP, C-5)
 - RUDDER HOPS: RUDDER HYD S/O CB (CPOP, C-3)

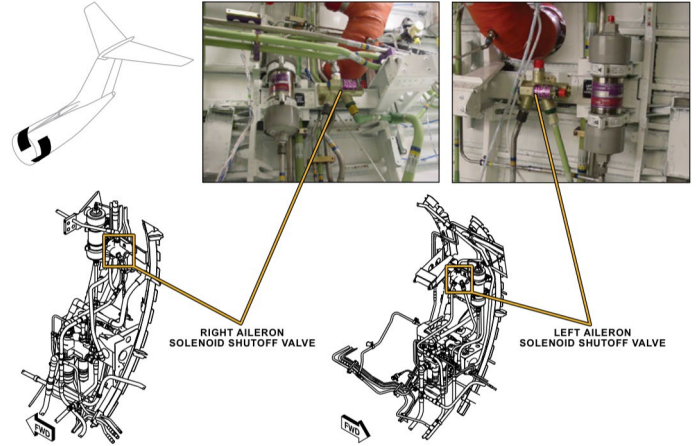
G450

AILERON HOPS

IF A HARDOVER IS DETECTED BY THE FORCE LINKS / MICROSWITCHES:

- BOTH AILERON DEACTIVATION SOLENOID VALVES (LOCATED IN THE TAIL COMPARTMENT) ENERGIZE AND SHUT OFF BOTH LEFT AND RIGHT HYDRAULIC SYSTEM PRESSURE TO THE AILERON, FLIGHT AND GROUND SPOILER ACTUATORS
- AILERON CONTROL IS BY MANUAL REVERSION THROUGH THE CABLE SYSTEM, SPOILER ASSISTANCE IS NOT AVAILABLE
- SPEED BRAKE AND GROUND SPOILERS ARE NOT AVAILABLE
- **Lateral Control Hyd Off** CAS

G450 ELEVATOR SOLENOID SHUTOFF VALVES

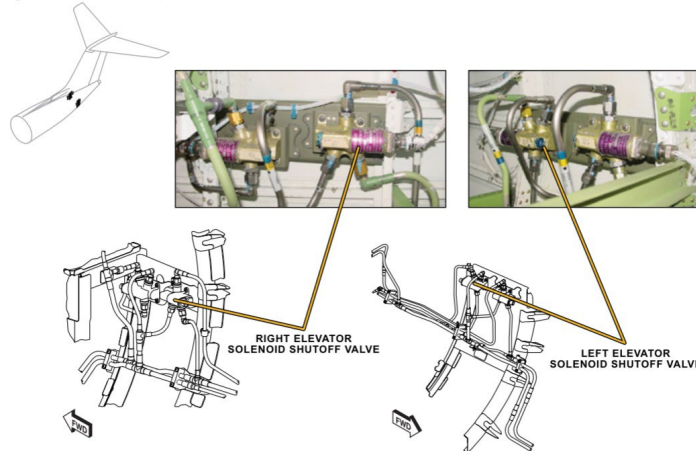


ELEVATOR HOPS

IF A HARDOVER IS DETECTED FOR MORE THAN 0.2 SEC BY THE PILOT INPUT MICRO-SWITCHES (4) AND/OR ACTUATOR DIFFERENTIAL PRESSURE SWITCHES (DPS)(4):

- ONE OR BOTH ELEVATOR DEACTIVATION SOLENOID VALVES ENERGIZE AND SHUT OFF THE LEFT AND/OR RIGHT HYDRAULIC SYSTEM PRESSURE TO THE ELEVATOR ACTUATOR.
- **Elevator Hydraulics Off** CAS

G450 ELEVATOR SOLENOID SHUTOFF VALVES



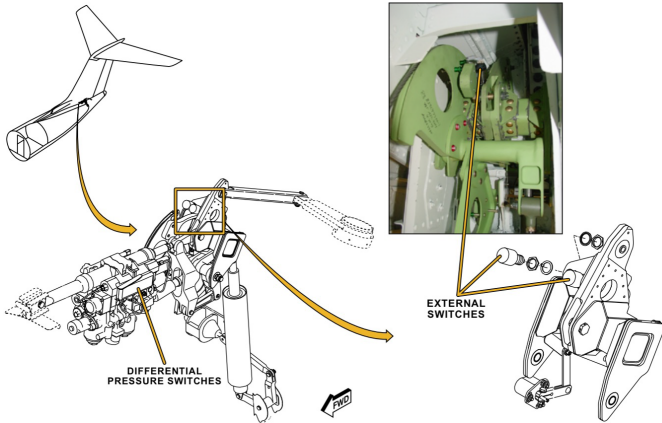
RUDDER HOPS

IF A HARDOVER IS DETECTED FOR MORE THAN 0.5 SEC BY THE PILOT INPUT MICRO-SWITCHES (4) AND/OR ACTUATOR DIFFERENTIAL PRESSURE SWITCHES (DPS)(4):

- ONE OR BOTH RUDDER DEACTIVATION SOLENOID VALVES ENERGIZE AND SHUT OFF THE LEFT AND/OR RIGHT HYDRAULIC SYSTEM PRESSURE TO THE RUDDER ACTUATOR.
- IF BOTH **Rudder Hydraulics Off** AND **Single Rudder** ARE DISPLAYED THERE IS NO REDUCTION IN CONTROL EFFECTIVENESS
- IF BOTH HYDRAULIC SOURCES ARE SHUT OFF **Rudder Hydraulics Off** IS DISPLAYED; ALL HYD PRESSURE HAD BEEN CUTOFF FROM THE RUDDER ACTUATOR (IT WILL FEEL AS THOUGH THERE IS 4° OF RUDDER PEDAL "PLAY" – DUE TO ELONGATED SLOT)
- LOSS OF RUDDER HYDRAULICS WILL ALSO DISABLE THE YAW DAMPER (QRH ED-25)



G450 RUDDER HOPS SWITCHES



G550

AILERON HOPS

HARDOVER DETECTED BY FORCE LINKS / MICROSWITCHES:

- BOTH DEACTIVATION SOLENOID VALVES (LOCATED IN THE TAIL COMPARTMENT) ENERGIZE AND SHUT OFF BOTH LEFT AND RIGHT HYDRAULIC SYSTEM PRESSURE TO THE AILERON ACTUATORS
- AILERON CONTROL IS BY MANUAL REVERSION THROUGH THE CABLE SYSTEM, SPOILER ASSISTANCE IS AVAILABLE
- **Aileron Hydraulics Off** CAS

ELEVATOR HOPS

L Elevator Hyd Off
OR
R Elevator Hyd Off

- DEACTIVATES HYD TO THE ELEVATOR ACTUATOR THAT SENSED A HARDOVER
- IN ORDER TO HAVE BOTH **L-R Elevator Hyd Off** BOTH ACTUATORS WOULD HAVE HAD TO SENSE A HARDOVER CONDITION; USE OF ELEV TRIM WILL BE REQUIRED FOR PITCH CONTROL DUE TO HIGH CONTROL FORCES

RUDDER HOPS

Rudder Hydraulics Off
AND/OR
Single Rudder

- IN THE EVENT A RUDDER ACTUATOR IS OUT OF PHASE WITH PILOT INPUT (MORE THAN 0.5 SEC) HYD SYSTEM PRESSURE TO THE ACTUATOR IS CUTOFF.
- BOTH **Rudder Hydraulics Off** AND **Single Rudder** ARE DISPLAYED; THERE IS NO REDUCTION IN CONTROL EFFECTIVENESS
- IF BOTH HYDRAULIC SOURCES ARE SHUTOFF ONLY **Rudder Hydraulics Off** IS DISPLAYED; ALL HYD PRESSURE HAD BEEN CUT OFF FROM THE RUDDER ACTUATOR

THE HOPS (HARD OVER PROTECTION SYSTEM) PROTECTS AGAINST UNCOMMANDED HYD PRESSURE FROM AFFECTING THE AILERONS, SPOILERS, ELEVATOR, OR RUDDER – 4 SEPARATE SYSTEMS.

NOTE: IF HOPS WASN'T ACTIVATED DUE TO TURBULENCE USE CAUTION RESETTING THE SYSTEM – AS SOON AS THE S/O CB IS PULLED A HARDOVER COULD REOCCUR.

NOTE: AN ELEVATOR HOPS ACTIVATION AT ROTATION MAY REQUIRE UP TO 130 LBS OF PULL-FORCE TO ACHIEVE TAKEOFF ATTITUDE. TO AVOID RUNNING OUT OF FORWARD TRIM, LIMIT SPEED.

G450, LATERAL CONTROL



- ALL HYD FLUID IS SHUT OFF (BYPASSED) TO THE AILERONS, FLIGHT SPOILERS, SPEEDBRAKES, AND GROUND SPOILERS
- EXAMPLE: UNCOMMANDED DEPLOYMENT OF ONE OF THE SPOILER PANELS
- USES THE SAME SHUTOFF VALVES AS HOPS SYSTEM
- IT "LATCHES"- TO RESTORE HYD POWER THE LATERAL HYD S/O CB MUST BE PULLED AND RESET (POP C-4)
- THERE IS NO QRH PROCEDURE THAT CALLS FOR PRESSING LATERAL CONTROL

G550, SPOILER CONTROL



- CLOSES BOTH (LEFT AND RIGHT) SPOILER CONTROL VALVES WHICH BYPASSES LEFT AND RIGHT HYD SYSTEM PRESSURE TO THE SPOILER ACTUATORS
- ALL HYD FLUID IS SHUTOFF (BYPASSED) TO THE FLIGHT SPOILERS, SPEEDBRAKES, AND GROUND SPOILERS (NOT AILERONS)
- EXAMPLE: UNCOMMANDED DEPLOYMENT OF ONE OF THE SPOILER PANELS

NOTE: IT DOES NOT "LATCH" AS IT DOES IN THE G450, NORMAL HYDRAULIC POWER CAN BE RESTORED BY RETURNING THE SPOILER CONTROL SWITCHLIGHT TO ON.

G550, FLIGHT CONTROL DISCONNECTS

ELEV DISC

- IN – BOTH CONTROL COLUMNS/CONTROL WHEELS ARE MECHANICALLY CONNECTED
- ELEV DISC PULLED OUT – THE CONTROL COLUMNS ARE SEPARATED FROM ONE ANOTHER. THE LEFT COLUMN CONTROLS THE LEFT ELEVATOR, AND THE RIGHT COLUMN CONTROLS THE RIGHT ELEVATOR.

DICIARA NOTE:

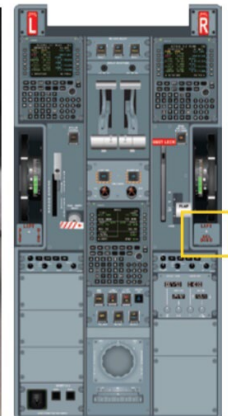
ON OLDER AIRCRAFT THE ELEVATOR DISCONNECT HANDLE ON THE CONSOLE HAS POWER ASSIST. IT USES A GAS CARTRIDGE TO ASSIST IN PULLING THE CONNECTOR PIN (THE GAS FILLED CARTRIDGE IS THE SAME TYPE AS ON A CAR TRUNK LID). IF THE JAM IS SO SEVERE THAT YOU CAN'T PULL THE HANDLE THE POWER ASSIST CAN BE ACTIVATED BY A TRIGGER BENEATH THE DISCONNECT HANDLE. IF THE ELEVATORS ARE DISCONNECTED THEY CAN BE RECONNECTED. IF THE GAS SPRING POWER ASSIST WAS USED. A SPECIAL TOOL IS REQUIRED TO RESET THE GAS SPRING. THIS SHOULD BE KEPT ON THE FLIGHT DECK. THE GAS SPRING SYSTEM HAS BEEN DISCONTINUED ON NEWER MODELS.

NOTE: IF INSTALLED USE THE GAS SPRING ASSIST ONLY AFTER YOU HAVE TRIED TO PULL THE HANDLE YOURSELF. YOU WILL NOT HAVE TO USE THE SPECIAL TOOL, TO RECONNECT THE LINKAGE IF THE GAS SPRING WAS NOT USED.

AIL DISC

- AIL DISC PULLED OUT – THE CONTROL WHEELS ARE SEPARATED FROM ONE ANOTHER. THE LEFT CONTROL WHEEL CONTROLS THE LEFT AILERON, AND THE RIGHT CONTROL WHEEL CONTROLS THE RIGHT AILERON
- PUSHING THE ELEV OR AIL DISC HANDLE IN RESTORES NORMAL OPERATION (NO CBs)

"SPLIT FLIGHT CONTROLS"



Aileron Disconnect

FLIGHT CONTROL CHECK

- WHILE PERFORMING THE ELEVATOR CONTROL CHECKS, PULL THE YOKE AFT, THEN RELEASE. THE YOKE SHOULD SLOWLY FALL FORWARD UNTIL THE ELEVATOR SURFACE REACHES ITS STOP. A FAILED BUNGEE HAS SHOWN THAT WHEN THE YOKE REACHES THE FORWARD STOP, THERE IS A SLIGHT HESITATION AND THE YOKE CYCLES APPROXIMATELY ONE (1) INCH AFT, THEN FORWARD. FOR A NORMAL BUNGEE, THERE SHOULD BE NO HESITATION OR AFT MOVEMENT AFTER THE YOKE IS RELEASED. WINDY

NESTER NOTE:

ONE MAY NOT GET THE RUDDER LIMIT SIGNAL DURING THE RUDDER LIMIT CHECK IF THE RUDDER TRIM IS WAY OFF CENTER OR IF THERE IS A STRONG CROSSWIND BLOWING AGAINST THE RUDDER.



CONDITIONS MAY INVALIDATE THE YOKE CYCLING TEST.

- DO NOT PERFORM A RAPID MOVEMENT ON THE AILERON SURFACE. THIS COULD LEAD TO AN INADVERTENT HOPS ACTIVATION.

- CONTROLLABILITY CHECK
 - NO LOWER THAN 5,000 FT AGL
 - CONFIGURE FOR LANDING, BE PREPARED TO STOP FLAP MOVEMENT IF AIRPLANE RESPONSE BECOMES OBJECTIONABLE
 - PERFORM GENTLE TURNS WHILE GRADUALLY DECELERATING TO ENSURE ADEQUATE CONTROL FOR LANDING
 - SIMULATE AN APPROACH TO LANDING AND GO-AROUND
 - PLAN FOR A WIDE PATTERN WITH SHALLOW BANK ANGLES AND A LONG FINAL APPROACH
 - IF PARTIAL FLAP ANTICIPATE SLOWER ENGINE ACCELERATION TIME DUE TO LOWER ENGINE IDLE RPM

CODE7700:

▶ CONTROLLABILITY CHECK

- G450 AREAS (FT²)
 - WING, 950.36 FT²
 - FLAP, 128.84 FT²
 - SPOILER, 49.39 FT² (6 PANELS)
 - AILERON, 29.86 FT²
 - WINGLET, 15.30 FT²
 - VERTICAL STABILIZER, 155.00 FT²
 - RUDDER, 44.75 FT²
 - HORIZONTAL STABILIZER, 202.7 FT²
 - ELEVATOR, 56.22 FT²

CODE450

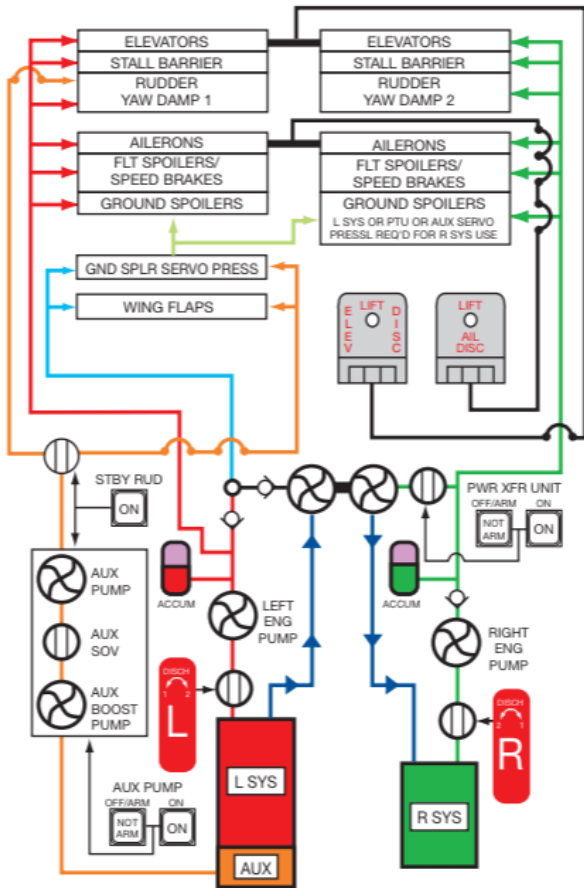
- ▶ [G450 FLIGHT CONTROL SYSTEM](#)
- ▶ [G450/G550 FLIGHT CONTROL SYSTEM REFRESHER](#)

Ivan Luciani's Systems Guides

- ▶ [G450 FLIGHT CONTROL SYSTEM](#)
- ▶ [G550 FLIGHT CONTROL SYSTEM](#)



G550, FLIGHT CONTROL HYDRAULIC OVERVIEW



NOTES

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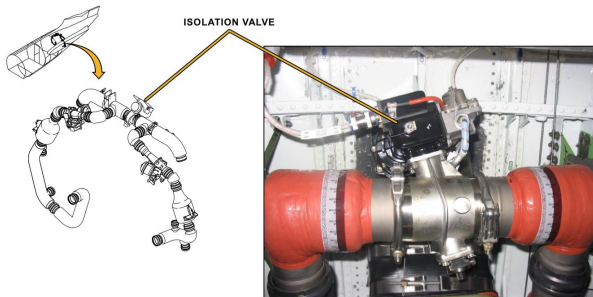
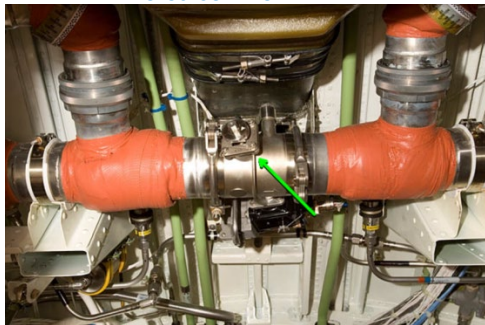
PNEUMATICS

- SOURCES OF PNEUMATIC AIR:
 - ENGINES
 - FAN INLET
 - 7TH / 5TH STAGE
 - 12TH / 8TH STAGE
 - APU
 - PRESSURE REGULATED BY LOAD CONTROL VALVE
 - EXTERNAL AIR

- TWO SEPARATE AND INDEPENDENT PNEUMATIC SYSTEMS
- CAPABLE OF BEING CONNECTED VIA ISOLATION VALVE

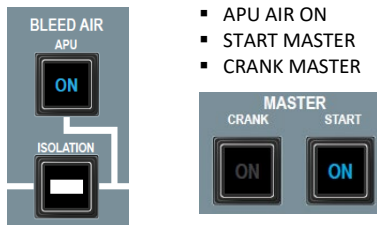
NOTE: THIS DESIGN PREVENTS TOTAL LOSS OF PNEUMATIC AIR IN THE EVENT OF A LEAK IN ONE OF THE MANIFOLDS.

G450 ISOLATION VALVE



- ISOLATION VALVE
- OPENS:
 - MANUALLY ON
 - APU AIR ON
 - START MASTER
 - CRANK MASTER

NOTE: THE ISOL VALVE IS CONTROLLED BY A ELEC SOLENOID, BUT IS POWERED BY PNEUMATIC PRESSURE - I.E. THERE MUST BE PRESSURE FROM A BLEED AIR SOURCE TO MOVE THE VALVE TO THE COMMANDED POSITION.



NOTE: OM ⇒ CHAPTER 9 HANDLING AND SERVICING ⇒ DISPATCH UPGRADE PROCEDURES ⇒ MANUALLY OVERRIDING BLEED AIR ISOLATION VALVE.

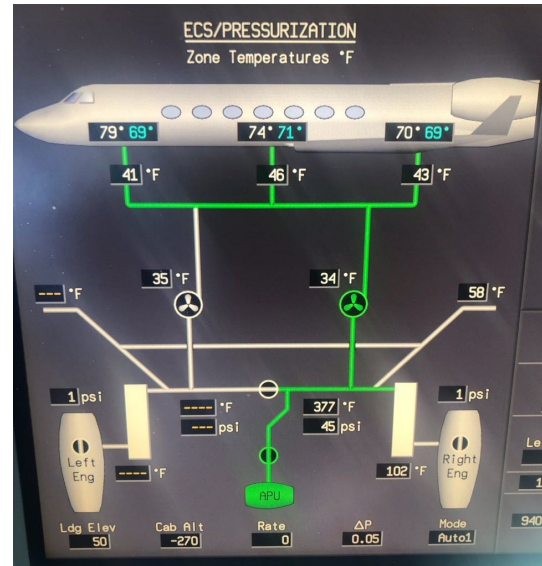
- BLEED AIR VALVES
 - ESS DC
 - CONTROLLED BY→
 - MODULATED BY THE BACs
 - FAIL CLOSED
 - BLEED AIR SWITCHES
 - 40 ±3 PSI MAXIMUM
 - 40 PSI MAXIMUM

- BLEED AIR CONTROLLERS (BAC)
 - OPENS AND CLOSES 12TH / 8TH STAGE AIR TO SUPPLEMENT 7TH / 5TH STAGE AIR AS NECESSARY
 - CONTROLS TEMP VIA PRE-COOLER
 - CONTROLS PRESSURE VIA BLEED AIR VALVES
 - CONTROLS THE WING ANTI-ICE VALVES

(ESS DC BUS)

NOTE: 12TH STAGE AIR REPLACES 7TH STAGE AIR FOR PRESSURE
 12TH STAGE AIR AUGMENTS 7TH STAGE AIR FOR TEMPERATURE
 8TH STAGE AIR REPLACES 5TH STAGE AIR FOR PRESSURE
 8TH STAGE AIR AUGMENTS 5TH STAGE AIR FOR TEMPERATURE

ECS SYNOPTIC WITH L BAC FAILURE



- MANIFOLD PRESSURE TARGET
 - G450
 - “NORMAL SYSTEM PRESSURE IS 15-40 PSI”
 - CRUISE: IF 7TH < 15 PSI 12TH STAGE OPENS
 - DESCENT: IF 7TH < 24 PSI 12TH STAGE OPENS (WITH ASC 30, < 26 PSI WITHOUT)
 - SINGLE PACK: IF 7TH < 35 PSI 12TH STAGE OPENS
 - G550
 - “NORMAL SYSTEM PRESSURE IS 14-40 PSI”
 - CRUISE: IF 5TH < 14±2 PSI 8TH STAGE OPENS
 - DESCENT: IF 5TH < 24 PSI 8TH STAGE OPENS
 - SINGLE PACK: IF 5TH < 35 PSI 8TH STAGE OPENS

NOTE: AT LOW POWER SETTINGS, e.g. DESCENT, THE PRESSURE AND TEMPERATURE OF 7TH / 5TH STAGE BLEED AIR MAY NOT BE SUFFICIENT TO SATISFY DEMAND. HENCE, THE REASON 12TH / 8TH STAGE, WHICH IS HOTTER AND AT A HIGHER PRESSURE, IS UTILIZED.”

- BAC MODES OF OPERATION
 1. **NORMAL** MODE
 - OUTLET **PRESSURE** MINIMUM: 15 / 14 PSI
 2. **DESCENT** / LOW POWER SETTING MODE
 - OUTLET **PRESSURE** MINIMUM: 24 PSI (WITH ASC 30, <26 PSI WITHOUT ASC 30)
 3. **SINGLE PACK** MODE
 - OUTLET **PRESSURE** MINIMUM: 35 PSI
 4. **WING ANTI ICE** MODE
 - OUTLET **TEMPERATURE** TARGET
 - 4a. BOTH WING ANTI ICE: 400°F
 - 4b. SINGLE WING ANTI ICE: 500°F

G550 NOTE: IF OPERATING ON A SINGLE ECS PACK, ACCESS TO THE BAGGAGE COMPARTMENT IS ALLOWED ONLY ≤ FL450.

BAC MODES OF OPERATION	PRECOOLER		MINIMUM PRESSURE
	INLET	OUTLET	
1. NORMAL			15 / 14 PSI
2. DESCENT	500°F MAX	400°F MAX	24 PSI
3. SINGLE PACK			35 PSI
4a. BOTH WING ANTI ICE	570°F	400°F	
4b. SINGLE WING ANTI ICE		500°F	
Bleed Air Hot	> 735°F / 765°F	550°F / 553°F	
Bleed Press High			> 75 PSI
Bleed Press Low			< 5 PSI

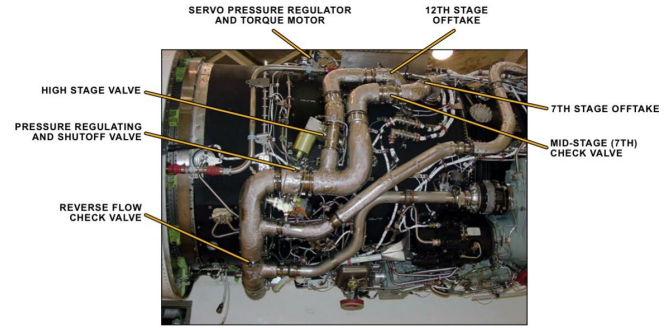
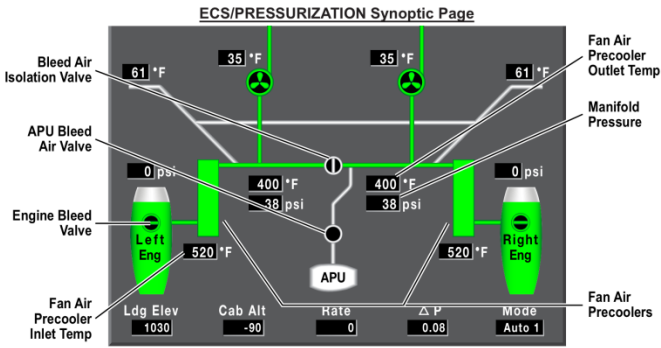
NOTE: GAC’s PNEUMATIC SYSTEM PHILOSOPHY: IF IT’S FAILED OF OVERHEATED TURN IT OFF, CHECK THE SYNOPTIC, AND COMPLETE THE CHECKLIST.

Bleed Air Hot QRH FIRST STEP:
 AFFECTED ENGINE BLEED AIROFF



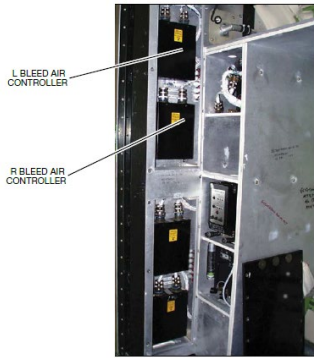
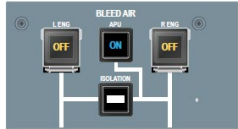
NOTE: OPERATORS HAVE EXPERIENCED MOMENTARY BLEED AIR HOT AND PRECOOLER OUTLET OVERTEMPS DURING TAKEOFF FOLLOWING BEING DE-ICED WITH ENGINES RUNNING.

Bleed Press High QRH FIRST STEP:
AFFECTED ENGINE BLEED AIR OFF

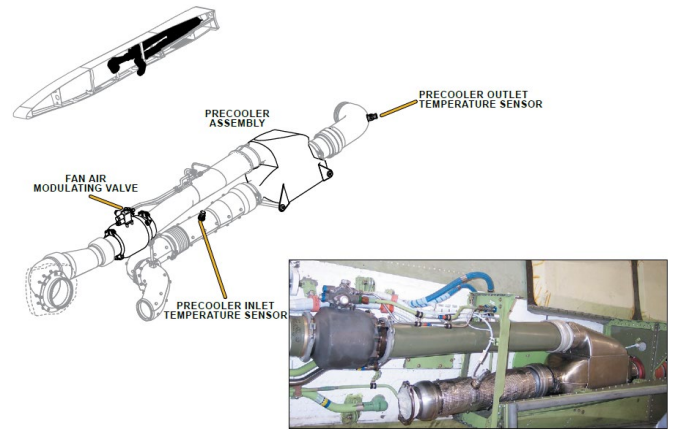
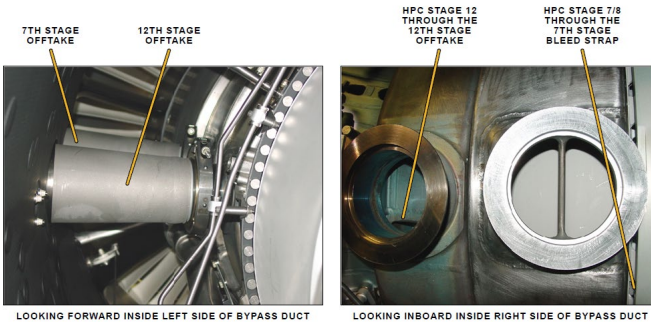
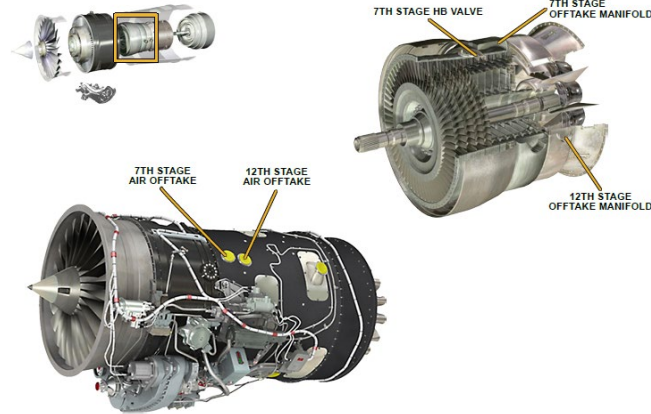


Engine Bleed Air Components

- PRECOOLER
- NOTE: THE IDEAL PRESSURE & TEMP OF THE PRE-COOLER OUTPUT IS 40 PSI & 400°F.
- USES A HEAT EXCHANGER & FAN STAGE AIR (LP) TO COOL THE BLEED AIR
- INLET AND OUTLET TEMPS ARE DISPLAYED ON THE ECS/PRESSURIZATION SYNOPTIC
- EXHAUSTS FROM BENEATH THE PYLON



G450



G450 PRECOOLER EXHAUST



- RAM AIR SWITCHLIGHT
- CLOSES BOTH PACKS
- RAM AIR VALVE OPENS (IF OUTSIDE AIR PRESSURE IS > THAN INSIDE PRESSURE)





- SITUATIONS THAT MAY REQUIRE RAM AIR SELECTION
- OVER-PRESSURIZATION DUE TO LOSS OF SYSTEM CONTROL
 - CABIN **SMOKE** REMOVAL (NOTE: TROV WILL PROBABLY CLOSE IF IN AUTO)
 - DITCHING
 - UNPRESSURIZED FLIGHT – MEL COMPLIANCE

G450 RAM AIR INLET

RAM-AIR INLET



- PNEUMATIC USERS:
 - PACKS
 - ENG ANTI-ICE
 - WING ANTI-ICE
 - STARTER
 - VALVES
 - L/R BLEED AIR VALVES (ESS DC, FAIL CLOSED)
 - L/R WING ANTI-ICE VALVES (ESS DC, FAIL CLOSED)
 - L/R STARTER VALVES (ESS DC, FAIL CLOSED)
 - ISOLATION VALVE (ESS DC, FAILS FROZEN)
 - L/R PACK VALVES (ESS DC, FAIL OPEN)
 - L/R COWL ANTI-ICE VALVES (ESS DC, FAIL OPEN)
- SUBCOMPONENTS:
- MANIFOLD PRESSURE REGULATING VALVES
 - HIGH STAGE BLEED VALVES
 - FAN AIR VALVES
 - CHECK VALVES

- Bleed Configuration**
 - APU AND ENG BLEED AIR – ON
 - L & R ENG BLEED ON AND ISOL VALVE OPEN

NOTE: IF AN ENG START IS ATTEMPTED WITH **ENG BLEED** SWITCHES ON, **Bleed Configuration**, THE APU LOAD CONTROL VALVE WILL AUTOMATICALLY CLOSE ONCE THE ENG REACHES 20% HP RPM (ECU PROTECTIVE FEATURE). THIS WILL REMOVE THE AIR FROM THE SVO AND A HOT START WILL RESULT. (G450 HOT START CHECKLIST: QRH EB-31)

- G550, BLEEDS OFF TAKEOFF
 - ALL THREE BLEED AIR SWITCHLIGHTS ARE IN THE ON POSITION FOR TAKEOFF (L BLEED, APU AIR, R BLEED ON/IN)
 - APU AIR WILL BE ON TILL 1,500' AGL
 - AT 1,500' AGL THE APU BAV CLOSES, LIGHT EXTINGUISHES
 - 1.4% PERFORMANCE INCREASE / INCREASE IN MAX TOGW
- NOTE: THE APU BLEED AIR PUSHBUTTON OVERRIDES AND DESELECTS THE ENGINE BLEED AIR.

- EXTERNAL AIR CART MUST BE CAPABLE OF:
 - 48 PSI
 - 112.8 PPM
 - 153-202°C (325-395°F)

NOTE: NEVER CONNECT EXTERNAL AIR WITHOUT ELECTRICAL POWER ON. THIS PROTECTS THE PACK VALVES WHICH FAIL OPEN WITH POWER LOSS.

NOTE: THE MAX EXTERNAL AIR PRESSURE IS 75 PSI.

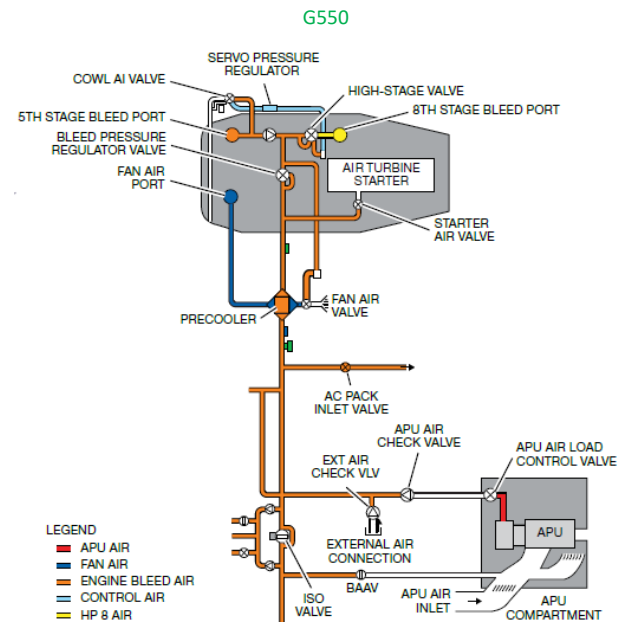
- INSULATION COLOR CODING FOR HOSES
 - HOT AIR: ORANGE/RED
 - COLD AIR: SILVER
 - LAVATORY: BROWN
 - CABIN AIRFLOW REFRESH RATE
 - AT TYPICAL CRUISE ALTITUDE:
 - 100% REFRESH RATE, NEVER RECYCLED
 - G450: CABIN AIR REPLENISHED EVERY 2.3 MINUTES
 - G550: CABIN AIR REPLENISHED EVERY 2.5 MINUTES
- GULFSTREAM:
- CABIN AIR REFRESH RATE

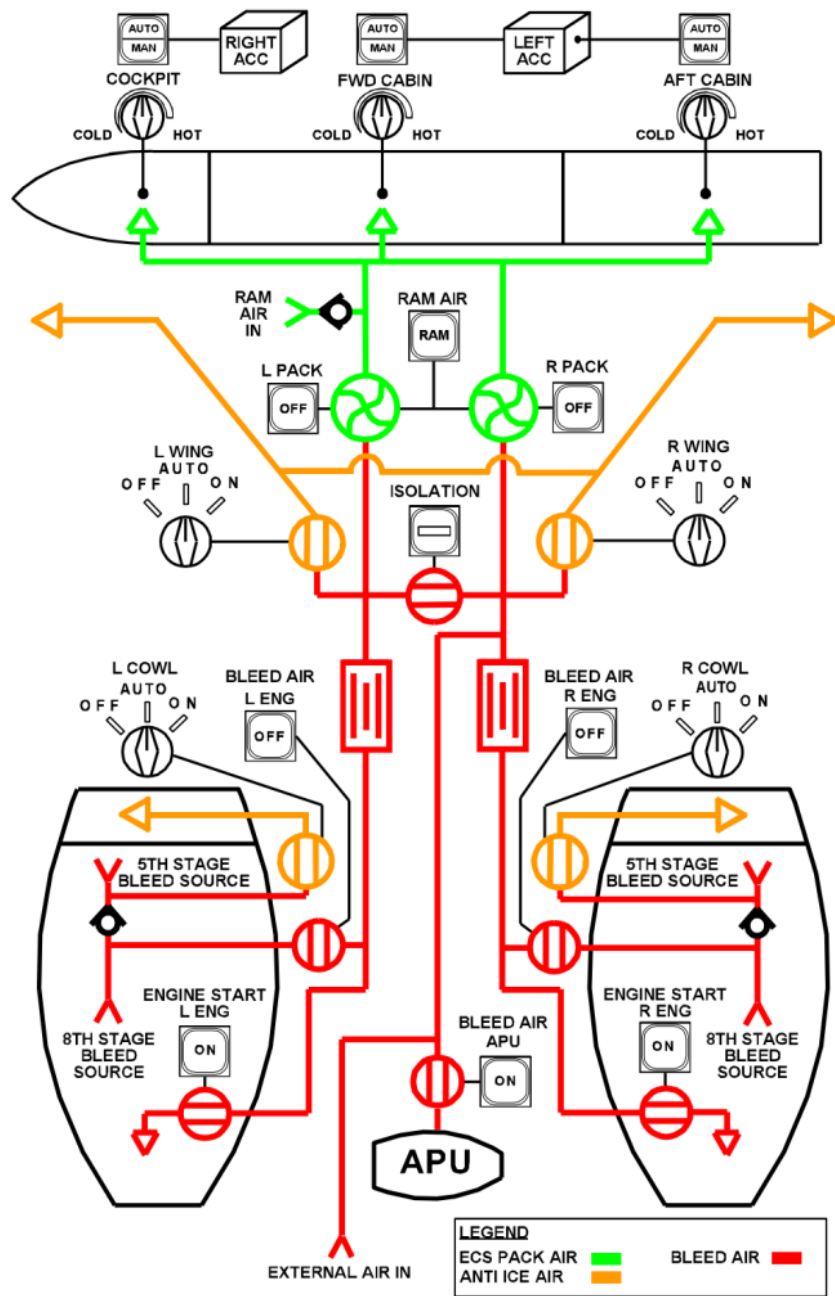
CODE 450

- G450 PNEUMATICS SYSTEM
- G450 PNEUMATICS SYSTEM REFRESHER
- G450 PNEUMATICS SYSTEM ABNORMALS

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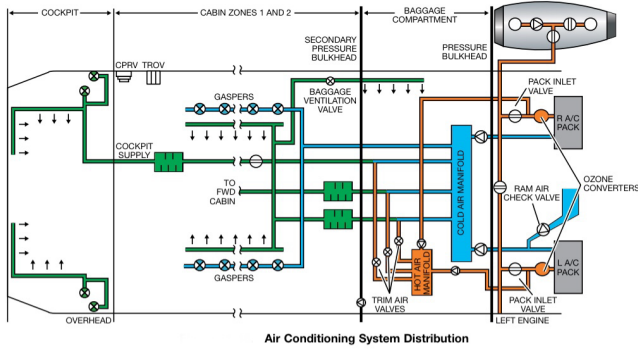
- G450 PNEUMATICS SYSTEM
- G550 PNEUMATICS SYSTEM







AIR CONDITIONING

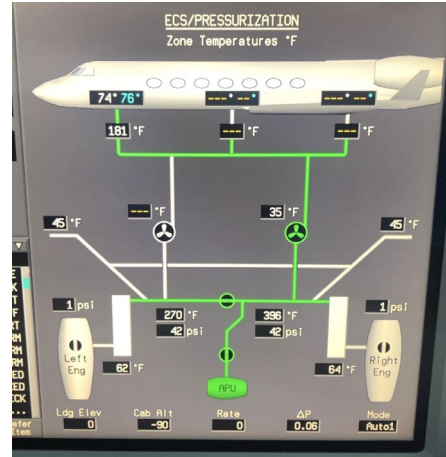


- **FUNCTIONS:**
 - CABIN AIRFLOW
 - TEMP CONTROL
 - EQUIPMENT COOLING
- **CABIN AIRFLOW AND TEMP CONTROL**
 - MODULATED VIA AIR CONDITIONING CONTROLLERS (ACC) VIA PACKS VIA TRIM AIR VALVES AND DELIVERED VIA 3 ZONE DELIVERY DUCTS
 - MANUAL TEMP CONTROL: **35°F – 230°F**
 - AUTO TEMP CONTROL: **60°F – 90°F**
 - CABIN TEMP CONTROL SYSTEM ALLOWS ±5° / ±10% FROM THE COCKPIT SETTING
- **NOTE:** SELECT A COLDER TEMP BEFORE PRESSING MAN TEMP CONTROL (12 O'CLOCK = 150°F)
- **AIR CONDITIONING CONTROLLERS (ACC)**
 - 2 ACCS – LOCATED IN THE AEER
 - BRAINS OF THE AIR CONDITIONING SYSTEM
 - **DATA INPUTS:**
 - COMPRESSOR INLET TEMP
 - PACK DISCHARGE TEMP
 - PACK OUTLET TEMP
 - VALVE SELECTION STATUS
 - ENGINE LP SPEED
 - ALTITUDE
 - SAT
 - **COCKPIT INPUTS:** AIR CONDITIONING CONTROL PANEL
 - ZONE TEMPERATURE SELECTOR
 - AUTO/MANUAL SELECTOR
 - **CONTROL OUTPUTS:**
 - PACK INLET VALVES
 - LOW LIMIT VALVES
 - TRIM AIR VALVES
 - 35K RELAY
 - **DATA OUTPUTS:**
 - MAU FOR CAS MESSAGES
 - CMC

G450 AIR CONDITIONING CONTROL PANEL



ECS SYNOPTIC WITH L ACC FAILURE



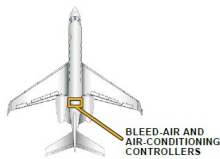
NOTE: THE ACCS HAVE A COMMON PART NUMBER WITH THE BACS. THE UNITS HAVE IDENTICAL HARDWARE AND SOFTWARE. THE UNIT IS CONFIGURED AS A COCKPIT OR CABIN ACC OR A BAC THROUGH EXTERNAL CONNECTOR IDENTITY PIN JUMPING. IN A PINCH, SWAPPING A FAILED ACC WITH AN OPERABLE BAC MAY ALLOW FOR DISPATCH PER THE MEL (PNEUMATICS, BLEED AIR SYSTEMS).

AUTO TEMP SELECT

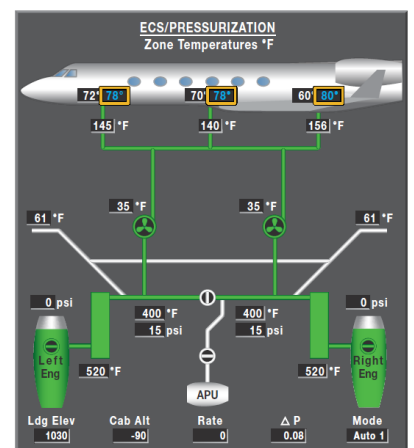
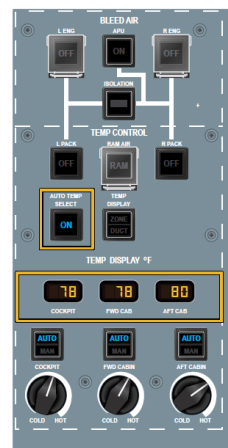
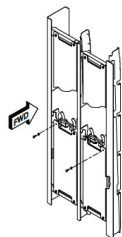


ON

- **DISABLES TEMP DISPLAY SWITCHLIGHT**
- **TEMP DISPLAY LCD WINDOWS DISPLAY DESIRED TEMPERATURES**



AIR-CONDITIONING CONTROLLERS



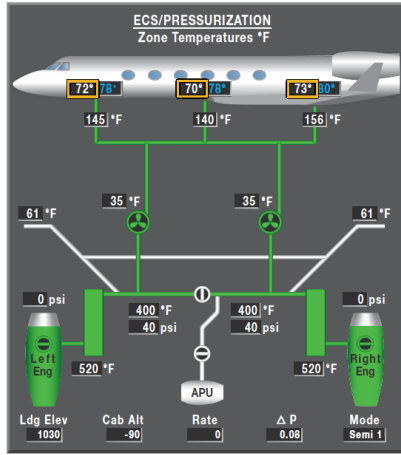
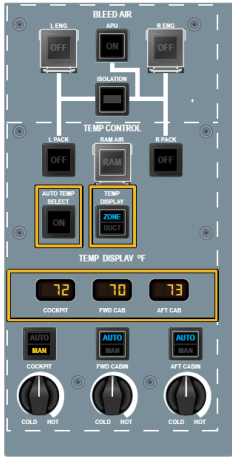


- TEMP DISPLAY SWITCHLIGHT



ZONE

- TEMP DISPLAY LCD WINDOWS DISPLAY ZONE TEMPERATURES

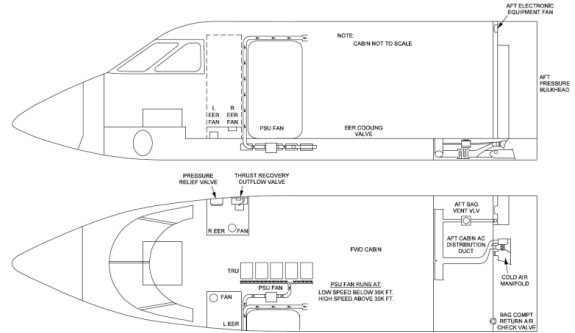


- EQUIPMENT COOLING

NOTE: EACH DU HAS AN INTEGRAL FAN.

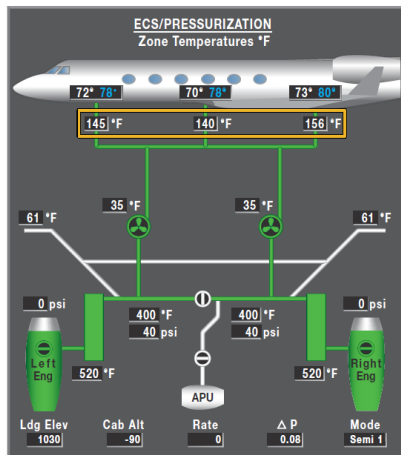
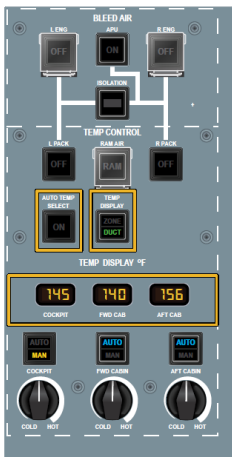
35K Altitude Trip Fail CAS INDICATES A SWITCHOVER FAILURE OF THE 35,000' RELAY

- FANS FOR LEER AND REER (L/R PSUs) HIGH SPEED <FL350, LOW SPEED >FL350
- (PSU) FANS FOR TRUs; LOW SPEED <FL350, HIGH SPEED >FL350
- THE FANS ARE CONTROLLED BY THE ACCs
- EER FANS ARE MONITORED FOR FAILURE – FAILURES GENERATE A CAS, EXAMPLE: **L EER Fan Fail**



DUCT

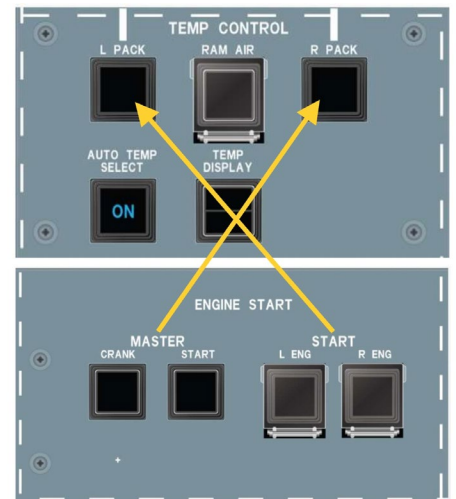
- TEMP DISPLAY LCD WINDOWS DISPLAY DUCT TEMPERATURES



ECS PACKS

- PACK VALVE CLOSES WHEN: "ENERGIZED CLOSED, FAIL OPEN"

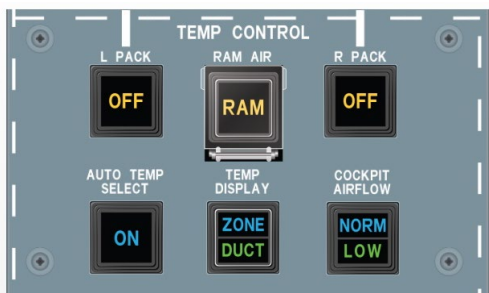
- PACK SWITCH – OFF
- RAM AIR SWITCH – ON
- MASTER CRANK SWITCH OR START SWITCH – RIGHT PACK
- START L ENG SWITCH OR R ENG SWITCH – LEFT PACK

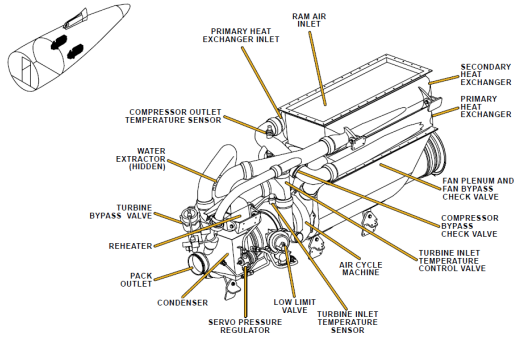


- G550, COCKPIT AIRFLOW SWITCH (ON TEMP CONT PANEL)

- NORM (BLUE) – ALLOWS NORMAL (HIGH) COCKPIT ZONE AIRFLOW
- LOW (GREEN) – REDUCES COCKPIT ZONE AIRFLOW, MAKING MORE AIR AVAILABLE FOR COOLING THE ELECTRONIC EQUIPMENT RACKS

- RAM AIR
 - COOLS THE PACK HEAT EXCHANGERS
 - A FAN RUNS WHEN ON THE GND TO DRAW AIR IN
 - AIR EXHAUSTED THROUGH LOUVERS
- PNEUMATICALLY DRIVEN TURBINES
- DIFFUSERS
- HEAT EXCHANGERS
 - PRIMARY AND SECONDARY "RADIATORS"
 - MAX TEMP 450°F
- WATER EXTRACTORS
 - AIR IS CENTRIFUGALLY SPUN FORCING MOISTURE OUT
 - MOISTURE IS ALSO VAPORIZED VIA HEAT





G450 HEAT EXCHANGER EXHAUST



G450 TRIM AIR VALVE VENT ELBOW (LEFT MAIN WHEEL WELL)



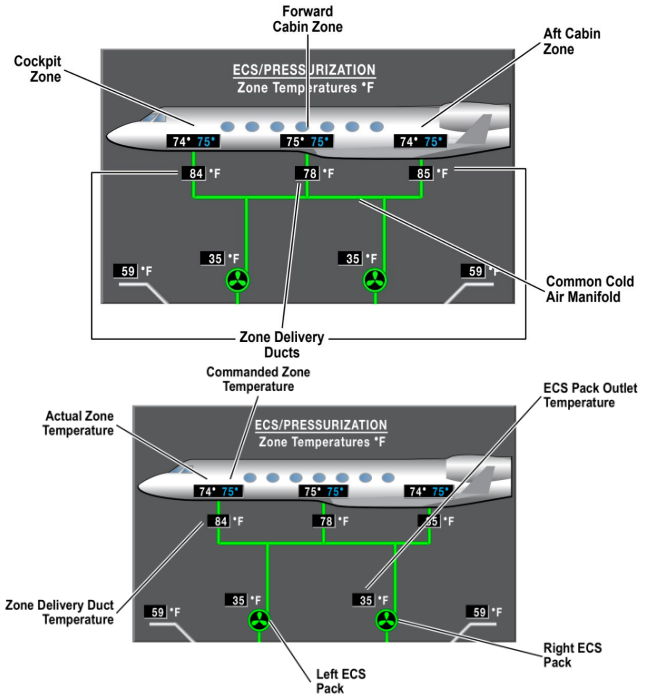
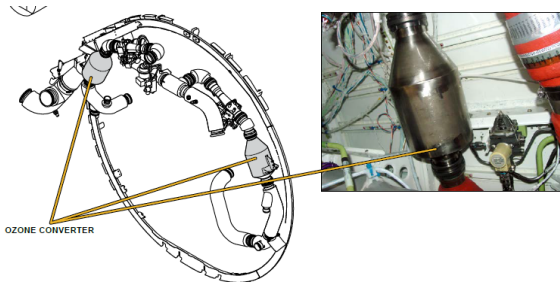
LEFT FUSELAGE AND WING (G450 EXTERIOR PREFLIGHT INSPECTION CHECKLIST) 110. COCKPIT / CABIN TRIM AIR VALVE VENT ELBOW..... CHECK / CLEAR

▶ VIDEO

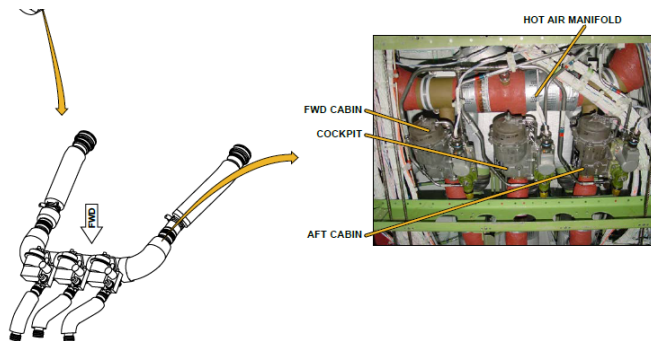
- **Cool Turb Hot**
 - DISCHARGE AIR IS ABOVE 450°F
 - QRH EH "SELECT WARMER TEMPERATURE," THIS REDUCES THE WORKLOAD ON THE PACK(S) IN HOPES OF COOLING IT DOWN
- QRH FIRST STEP:
ASSOCIATED (L or R) PACK OFF

- MANIFOLDS
 - COLD AIR MANIFOLD →
 - HOT AIR MANIFOLD
- GASPERS
 - THREE DUCTS
 - OZONE CONVERTERS
 - 400°F
- DUCTS (3)
 - COCKPIT SUPPLY DUCT
 - FORWARD CABIN SUPPLY DUCT (ZONE ONE)
 - AFT CABIN SUPPLY DUCT (ZONE TWO)
- OZONE CONVERTERS
 - SCRUBS THE AIR DOWN STREAM OF THE PACK INLET VALVES AND CONVERTS OZONE (O₃) INTO OXYGEN (O₂)

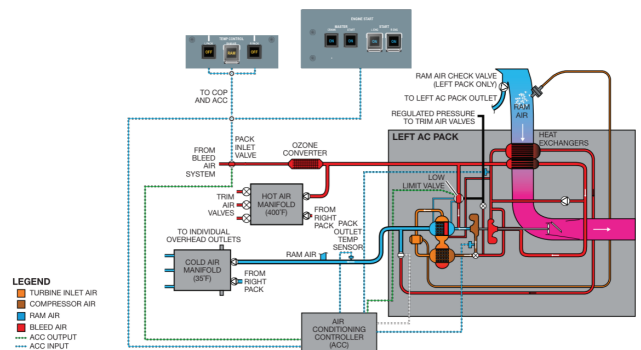
G450 OZONE CONVERTER "FILTER" SCRUBBER THING

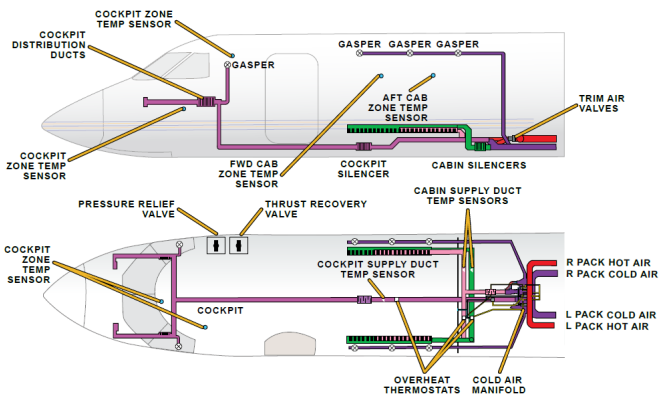


- TRIM AIR VALVES
 - MIX THE HOT AIR (400°F) WITH THE COLD AIR (35°F)



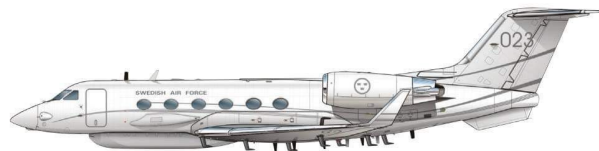
AIR CONDITIONING AIR FLOW



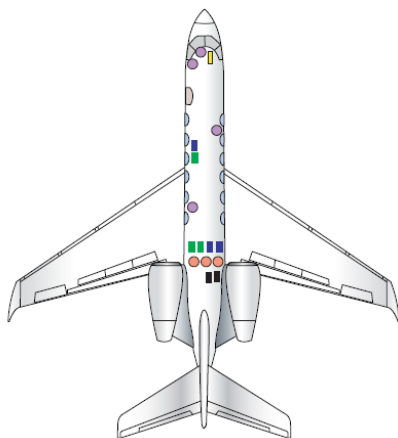


Gulfstream®

SPECIAL MISSIONS



TEMPERATURE CONTROL AND COMPONENT LOCATION



- LEGEND
- COCKPIT TEMPERATURE CONTROL PANEL
- ZONE TEMPERATURE SENSORS
- TRIM AIR VALVES
- OVERHEAT THERMOSTATS
- SUPPLY DUCT TEMPERATURE SENSORS
- AIR CONDITIONING CONTROLLERS

SWEDEN

SURVEILLANCE AIRCRAFT — GIV-SP

NOTES

A series of horizontal dotted lines providing space for handwritten notes.

CODE 450

- G450 AIR CONDITIONING SYSTEM
- G450 AIR CONDITIONING SYSTEM ABNORMALS

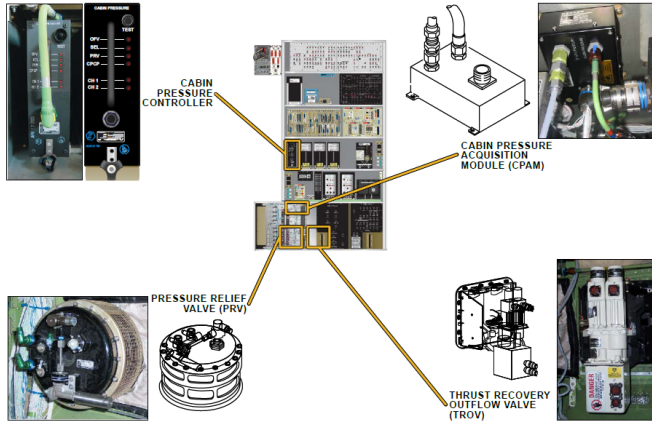
Ivan Luciani's SYSTEMS Guides

- G450 AIR CONDITIONING SYSTEM
- G550 AIR CONDITIONING SYSTEM



PRESSURIZATION

- COMPONENTS OF THE CABIN PRESSURIZATION CONTROL SYSTEM (CPCS)
 - CABIN PRESSURE CONTROLLER (CPC) – REER
 - CABIN PRESSURE CONTROL PANEL (CPCP)
 - CABIN PRESSURE ACQUISITION MODULE (CPAM)
 - CABIN PRESSURE SELECTOR PANEL (CPSP)
 - CABIN PRESSURE INDICATOR PANEL (CPIP)
 - THRUST RECOVERY OUTFLOW VALVE (TROV)
 - CABIN PRESSURE RELIEF VALVE (CPRV)
 - SMOKE REMOVAL VALVE



CABIN PRESSURE CONTROL PANEL (CPCP)

CABIN PRESSURE SELECTOR PANEL (CPSP)



CABIN PRESSURE INDICATOR PANEL (CPIP)

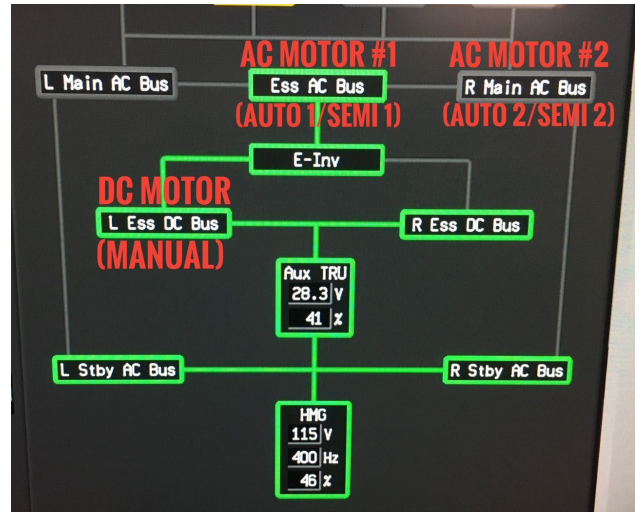
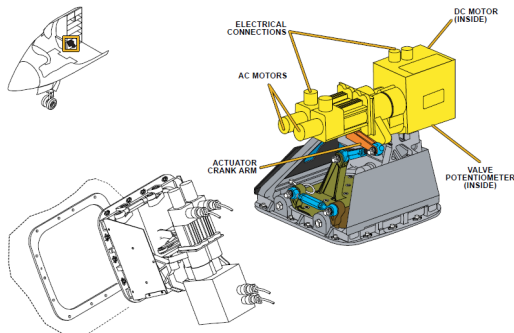


PRESSURIZATION MOTORS (3)

NOTE: THE ACTIVE CPC CHANNEL AUTOMATICALLY SWITCHES AFTER LANDING.

NOTE: CPC CHANNELS CAN BE MANUALLY SWITCHED BY CYCLING THE CPCP MANUAL PUSH-BUTTON.

- AC MOTOR #1**
 - CPC CHANNEL 1 (MODE: Auto1 / Semi1) CONTROLLED IN BOTH AUTO AND SEMI
 - ESS AC** POWERED
- AC MOTOR #2**
 - CPC CHANNEL 2 (MODE: Auto2 / Semi2) CONTROLLED IN BOTH AUTO AND SEMI
 - R MAIN AC** POWERED
- DC MOTOR**
 - MANUALLY CONTROLLED (MODE: Manual), BYPASSES THE CPC
 - L ESS DC** POWERED



- MODES:** AUTO & SEMI HAVE DUAL CHANNELS (R MAIN AC & ESS AC)



- AUTO**
 - ADS, FMS, MAU
 - SWITCHES TO FLIGHT AT 9 KTS OR PLA >15°
 - SWITCHES TO LDG AT -1,000' DESCENT
 - ↑ 500/↓ 300 FPM
- SEMI**
 - CREW SETS CABIN PRESSURE SELECTOR PANEL (CPSP)
 - CREW SELECTS **FLIGHT** / **LANDING***
 - *NOTE: EVEN IN SEMI THE FLIGHT/LANDING FUNCTION STILL FUNCTIONS AUTOMATICALLY IF THERE ARE NO MALFUNCTIONS WITHIN THE SYSTEM: [VIDEO](#)
- MANUAL**
 - MAN HOLD CONTROL KNOB
 - INDICATOR LAMP PROVIDES VISUAL INDICATION OF THE TROV'S RATE OF MOVEMENT
 - DESCEND CLOSES THE TROV
 - CLIMB OPENS THE TROV

AFTER LANDING THE CPCS

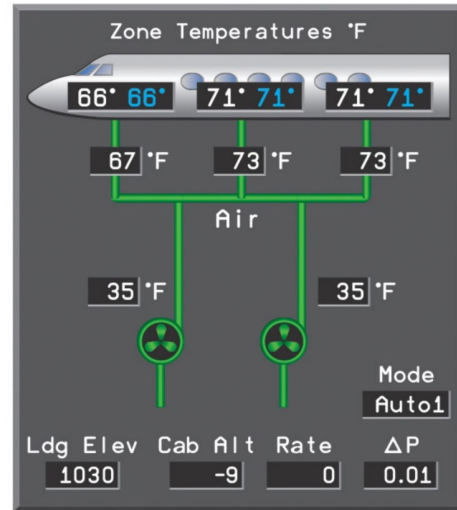
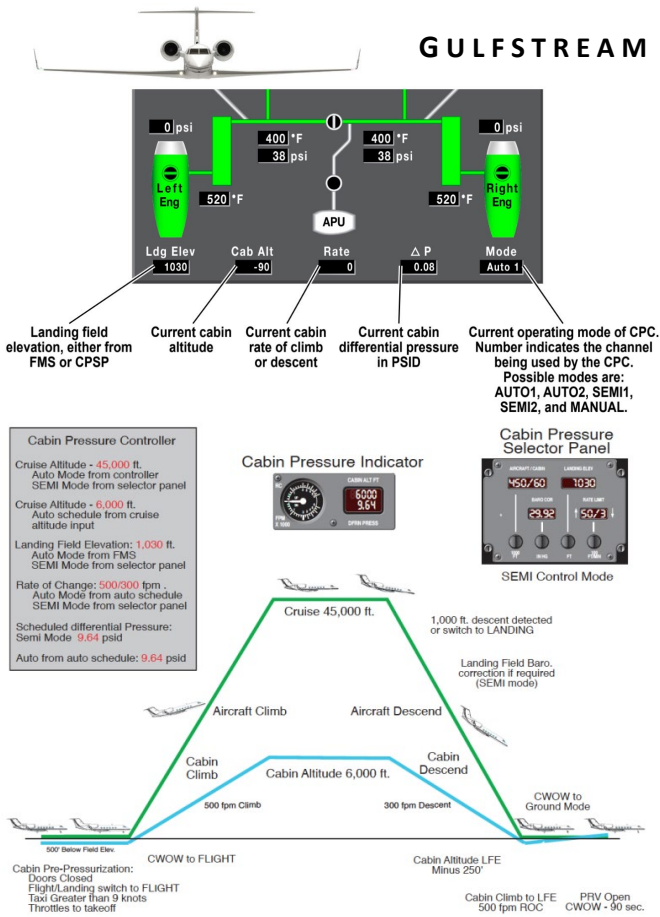
- CLIMBS THE CABIN AT 500 FPM FOR ONE MINUTE, THEN
- CLIMBS THE CABIN AT 2,000 FPM, THEN
- 90 SECONDS AFTER LANDING THE TROV AND CPRV OPEN
- THE CPC CHANGES CHANNELS

NOTE: SEMI CAN ONLY BE MANUALLY SELECTED, THE SYSTEM DOES NOT DEFAULT TO SEMI IF AUTO FAILS – A **FAULT** INDICATION (DUAL CHANNEL FAILURE) WOULD PROMPT THE CREW TO SELECT SEMI OR MANUAL.

NOTE: IN AUTO, IF THERE'S AN ENROUTE DESCENT, THE SYSTEM REVERTS BACK TO FLIGHT MODE 3 MIN AFTER LEVELOFF (>FL250).

NOTE: THE PRESSURIZATION CHANNEL CAN BE CHANGED BY CYCLING MANUAL ON, THEN BACK OFF.

NOTE: THE STBY INV (E-INV) FUNCTION CAN BE CHECKED DURING PREFLIGHT. WITH BATT PWR ONLY AND DUS OFF CHECK THE PRESSURIZATION CONTROL PANEL – IF EITHER AUTO OR SEMI IS ILLUMINATED THE STANDBY INVERTER (E-INV) IS WORKING. IF THE STBY INV IS FAILED **FAULT** WILL BE ILLUMINATED.



ECS/PRESSURIZATION SYNOPSIS 1/6

NESTER NOTE:
 IN AUTO AND SEMI MODES, THE CPC CHANGES CHANNELS DURING EACH LANDING ROLL-OUT. SWITCHING FROM AUTO OR SEMI INTO MANUAL AND BACK TO AUTO OR SEMI WILL ALSO CHANGE THE CHANNEL. THE CHANNEL CHANGING CAN BE OBSERVED ON THE ECS/PRESSURIZATION SYNOPSIS PAGE (LOWER RIGHT CORNER). THE CHANNEL AT POWER UP WILL BE "Auto1." THE SYSTEM SHOULD SWITCH OVER TO "Auto2" DURING THE PRESSURIZATION TEST. IF THERE IS NO CHANGING OF CHANNELS TAKING PLACE DURING THE TEST PROCESS, IT CAN BE ASSUMED THAT ONE CHANNEL HAS FAILED.

- CABIN PRESSURE RELIEF VALVE (CPRV)
- POSITIVE DIFF PRESSURE RELIEF – HAS TWO OVERPRESSURE METERING SECTIONS (FAIL SAFE) THAT OPEN TO RELIEVE AN OVERPRESSURE CONDITION:

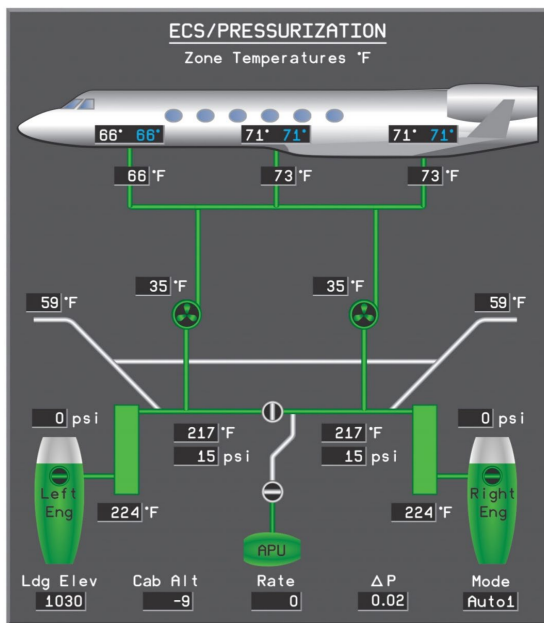
G450

- THE FIRST SECTION OPENS AT **9.74 PSID**
Cabin Differential – 9.74 CAS
- THE SECOND SECTION OPENS AT 9.94 PSID TO 10.15 PSID
Cabin Differential – 9.94 CAS

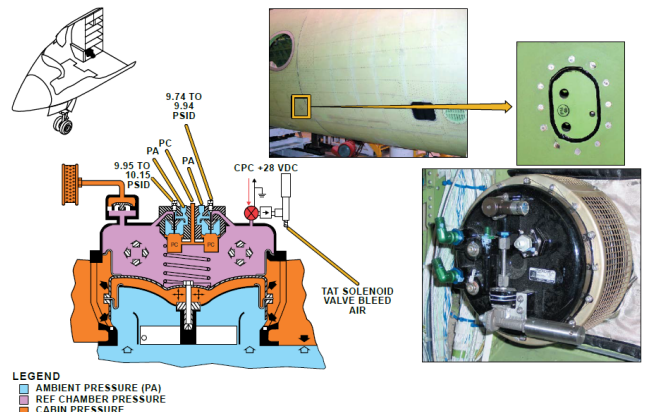
G550

- THE FIRST SECTION OPENS AT **10.28 PSID**
Cabin Differential – 10.28 CAS
- THE SECOND SECTION OPENS AT 10.48 PSID
Cabin Differential – 10.48 CAS

- NEG DIFF PRESSURE RELIEF AT **-0.25 PSID**; WILL OPEN TO PREVENT A NEGATIVE PRESSURE CONDITION
- DURING GND OPERATIONS THE CPRV OPENS WHEN THE TROV IS FULLY OPEN



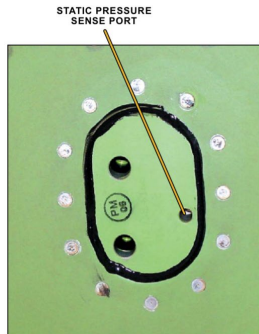
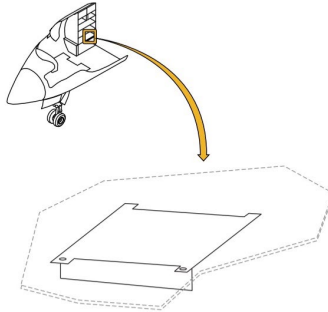
ECS/PRESSURIZATION SYNOPSIS 2/3





- CABIN PRESSURE ACQUISITION MODULE (CPAM)
 - SELF CONTAINED UNIT (LOCATED IN THE REER)
 - HAS A DEDICATED CONNECTION FOR STATIC PRESSURE (BELOW THE FIRST CABIN WINDOW ON THE RIGHT-SIDE FUSELAGE)
 - HAS AN INDEPENDENT CABIN PRESSURE SENSOR (BEHIND THE COPILOT SEAT)
 - BACKS UP THE CABIN PRESSURE CONTROL SYSTEM FOR DISPLAY, ESSENTIAL **WARNING**, AND **CAUTION** MESSAGES
 - IF CPC CHANNELS DISAGREE > 310 FT, EACH CPC CHANNEL COMPARES ITSELF WITH THE CPAM, THE CHANNEL THAT IS > 310 FT FROM THE CPAM FAILS ITSELF

CPAM



- LOSS OF AUTOMATIC PRESSURIZATION CONTROL

QRH (G450 QRH EH-3) FIRST STEPS:
FAULT / MANUAL SWITCH MANUAL MAN HOLD KNOB CONTROL TO ±500 FPM

- CABIN ALTITUDE
 - G450
 - A SEA LEVEL CABIN CAN BE MAINTAINED UP TO 26,700'
 - A 6,000' CABIN IS MAINTAINED AT 45,000' (9.64 PSID)
 - G550
 - A SEA LEVEL CABIN CAN BE MAINTAINED UP TO 29,200'
 - A 6,000' CABIN IS MAINTAINED AT 51,000' (10.17 PSID)

- LIMITATIONS
 - MAX DIFF – AIR
 - **9.94 PSID**
 - **10.45 PSID**
 - MAX DIFF – GND
 - **0.3 PSID**

- CABIN PRESSURE LOW TRIP POINTS
 - **LFE <7,500'**
 - **8,000'**
 - **LFE 7,500'-9,500'**
 - **10,000'**
 - **LFE 9,500'-14,000'**
 - **14,500'**
 - **LFE >14,000' (ASC 068)**
 - **15,500'**
 - **MANUAL MODE**
 - **10,000'**

- O2 MASK DROP
 - **14,750' ± 250'**
 - **15,750' ± 250' (HIGH ALT SWITCH, ASC 068)**

- EDM ARMED:
 - ≥FL400 &
 - AUTOPILOT ENGAGED
 - EDM ACTIVATED:
 - **"Cabin Pressure Low"**
- THE AIRCRAFT AUTOMATICALLY:
- A/T ENGAGE – GO TO IDLE
 - SPEED – MAN 340 KTS
 - HDG – 90° LEFT TURN
 - ALT – 15,000'
 - FLCH
 - AIRCRAFT TURNS LEFT 90°, DESCENDS AT VMO/MMO, LEVELS 15,000'
 - GP SPEED – MAN 250 KTS

NOTE: THE GUIDANCE PANEL WILL BE LOCKED UNTIL THE EDM HAS BEEN TERMINATED BY DISCONNECTING THE AUTOPILOT.

- EDM NOTES:
 - G550 AFM 04-21-30 Automatic Emergency Descent Mode (EDM) "...is armed anytime airplane altitude is greater than 40,000 feet..."

G550 OM 05-21-30 Automatic Emergency Descent Mode (EDM) "...is armed anytime airplane altitude is greater than 40,000 feet..."

G550 OM 2B-08-00 Emergency Descent Mode (EDM) "...the aircraft is at or above FL400,..."

G550 QRH Automatic Emergency Descent Mode (EDM) "...is armed anytime airplane altitude is greater than 40,000 feet..."

FSI G450/G550 PlaneView Avionics – Flight Guidance System 3-6 "Aircraft at FL400 or higher..."

"Looks like we will need to fix our pubs. The answer is at or above 40,000 feet. Thanks for the question"

Curt
 Chief Production Test Pilot
 Gulfstream Aerospace Corporation





CODE 450

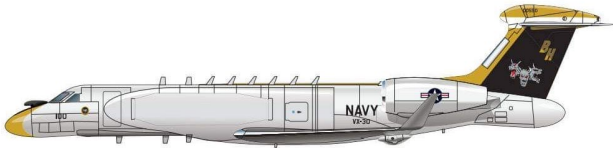
- ▶ [G450 PRESSURIZATION SYSTEM](#)
- ▶ [G450 PRESSURIZATION SYSTEM ABNORMALS](#)
- ▶ [EMERGENCY DESCENT](#)

Ivan Luciani's Systems Guides

- ▶ [G450 PRESSURIZATION SYSTEM](#)
- ▶ [G550 PRESSURIZATION SYSTEM](#)

Gulfstream®

SPECIAL MISSIONS



U.S. NAVY

TELEMETRY RANGE SUPPORT AIRCRAFT — G550

NOTES

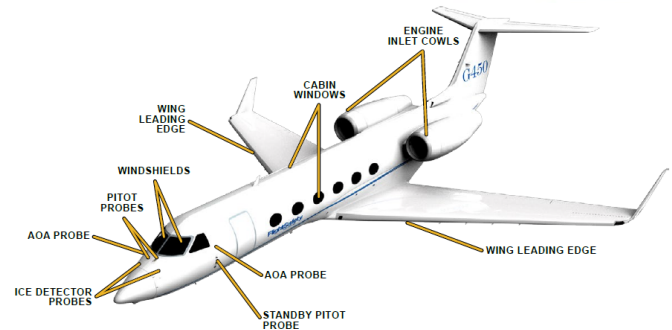
Lined area for taking notes, consisting of multiple horizontal dashed lines.



ICE AND RAIN

- PROTECTED COMPONENTS
 - WING LEADING EDGES
 - ENG COWL INLET LEADING EDGES
 - WINDSHIELDS
 - CABIN WINDOWS
 - WINDSHIELD BLOWER
 - EVS WINDOW – SAPPHIRE
 - ELEV TRIM TAB ACTUATOR
 - AILERON TRIM TAB ACTUATOR (G550)
 - PROBE SENSORS
 - AOA PROBES
 - PITOT PROBES
 - TAT PROBES
- BLEED AIR HEAT (130°F)
- BLEED AIR HEAT (19±3 PSI)
- ELEC HEAT (114°F) AND BLEED AIR
- IN THE AIR ONLY
- ELEC HEAT
- ON THE GROUND ONLY
- PER ASC
- ELEC HEAT
- ELEC HEAT (175°F)
- ELEC HEAT (175°F)
- ELEC HEAT

G450



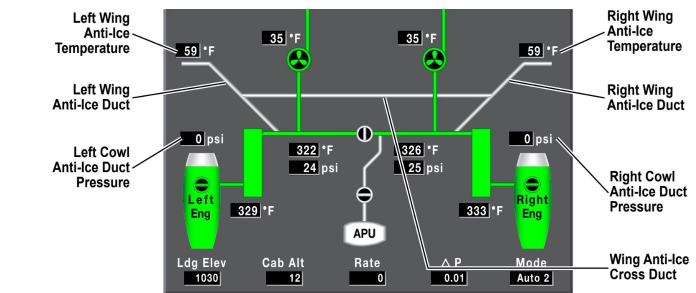
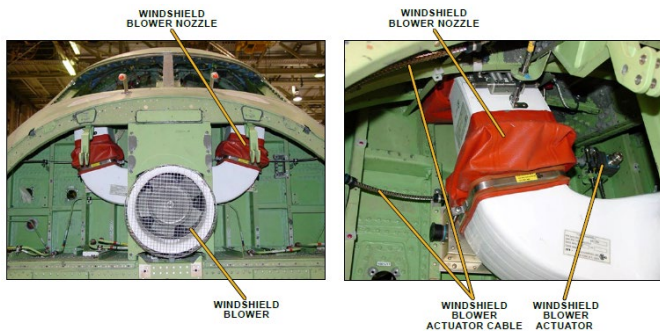
G550



NOTE: LEFT SIDE SHOWN, RIGHT SIDE IDENTICAL



Probe Heat Major Components



- PITOT PROBES
- 3 / 4 TOTAL
- 3 ADM
- 1 STBY (SFD)

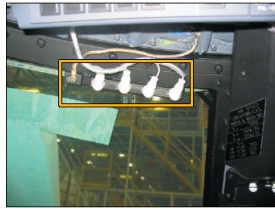
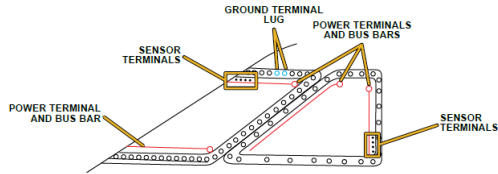
G450 PITOT	HEATER POWER SOURCE	ADM (POWER SOURCE)
LEFT	LEFT STBY AC BUS	ADM#1 (L ESS DC)
RIGHT	ESS AC BUS ØA	ADM#2 (R ESS DC)
STBY	ESS AC BUS ØA	ADM#3 (L ESS DC) AND SFD (FLT INST DC)

G550 PITOT	HEATER POWER SOURCE	ADM (POWER SOURCE)
LEFT UPPER	LEFT STBY AC BUS	ADM#1 (L ESS DC)
RIGHT UPPER	ESS AC BUS ØA	ADM#2 (R ESS DC)
RIGHT LOWER	RIGHT STBY AC BUS	ADM#3 (L ESS DC)
LEFT LOWER	ESS AC BUS ØA	SFD (FLT INST DC)

- WINDSHIELD HEAT
 - WINDSHIELD HEAT CONTROL UNIT (WHCU)
 - ON AT 104°
 - OFF AT 114°
 - LEFT SWITCHLIGHT
 - RIGHT SWITCHLIGHT
 - FRONT WINDOWS
 - SIDE WINDOWS
 - POWERS LF/RS
 - POWERS RF/LS
 - 2 PHASE UP TO 208 V
 - 4 MINUTE WARMUP
 - 1 PHASE, 115 V



NOTE: IF THE LIGHT(S) FLASH AT 1 TO 3 CYCLES PER SECOND IT INDICATES THAT A NUMBER OF POSSIBLE FAULTS HAVE OCCURRED IN THE INDICATED WINDSHIELD'S HEATING SYSTEM.



FRONT WINDSHIELD SENSORS



SIDE WINDOW SENSORS

- **COWL ANTI-ICE VALVES FAIL OPEN** (SPRING LOADED OPEN) – ELEC CONT, PNEUMATICALLY DRIVEN VIA “MUSCLE AIR”
- **7TH / 5TH AND 12TH / 8TH STAGE BLEED AIR** DOWNSTREAM OF THE ENGINE BLEED PRESSURE REGULATING SHUTOFF VALVE – NO PRECOOLER
- **THE ENG BLEED SWITCH HAS TO BE ON** TO GET ENG ANTI-ICE*

*NOTE: LATER SN G450s (SN 4293 AND SUB) HAVE THE REVERSE FLOW CHECK VALVE REMOVED. APU AIR (GROUND ONLY) AND/OR CROSSBLEED ENGINE BLEED AIR ARE CAPABLE OF REACHING THE COWL FOR COWL ANTI-ICE. IF THE “MUSCLE AIR” LINE FILTER BECOMES CLOGGED IT CAN PREVENT THE COWL ANTI-ICE VALVE FROM CLOSING, THIS CAN MAKE STARTING AN ENGINE IMPOSSIBLE DUE TO INSUFFICIENT BLEED AIR SUPPLY.

NOTE FROM **G400 (GIV) AFM** (APPENDIX D, PAGE D-5) COLD WEATHER OPERATIONS: PREHEATING THE ENGINE PRIOR TO ANY START IS HIGHLY RECOMMENDED....AN ALTERNATE PREHEAT PROCEDURE IS:

AIR CONDITIONING PACKS OFF
 COWL ANTI-ICE..... ON
 ALLOW APU BLEED AIR TO RUN THROUGH THE COWL ANTI-ICE VALVES FOR A MINIMUM OF 10 MINUTES DEPENDING ON OAT.

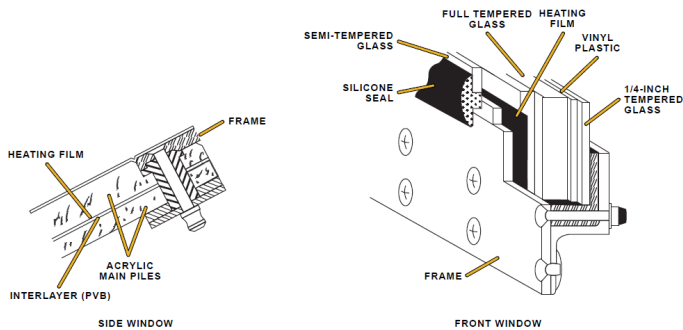
▪ **CRACKED WINDOW**

WINDSHIELD CRACKED:

- QRH – MISC INDEX – WINDSHIELD CRACKED (QRH E1-12, E1-7)
- IN FLIGHT, CONTINUED FLIGHT TO DESTINATION IS PERMITTED
- FOR AN OUTER HEATING/PROTECTIVE PLY CRACK:
 - TURN OFF WINDSHIELD HEAT
 - AVOID KNOWN ICING CONDITIONS
- FOR A MAIN STRUCTURAL PLY CRACK
 - REDUCE DIFFERENTIAL TO 7.5 PSI (SELECT CPCP TO SEMI / SET CPSP TO 7,900 FT)
 - DESCEND TO ≤FL350
 - EYE PROTECTION IS RECOMMENDED
- CHECK THE CDL, AFM APPENDIX B
- A FLIGHT (OR SERIES OF FLIGHTS) TO A MAINTENANCE BASE IS PERMITTED
- IT IS RECOMMENDED ONLY ESSENTIAL CREW BE CARRIED ON THESE FLIGHTS

CABIN WINDOW CRACKED:

- QRH – MISC INDEX – CRACKED CABIN WINDOW (QRH E1-7, E1-8)
- FOR AN INNER PANE (LAYER) OF A CABIN EXTERIOR WINDOW
 - REDUCE DIFFERENTIAL TO 7.5 PSI (SELECT CPCP TO SEMI / SET CPSP TO 7,900 FT)
 - DESCEND TO ≤FL350



COWL ANTI-ICE:

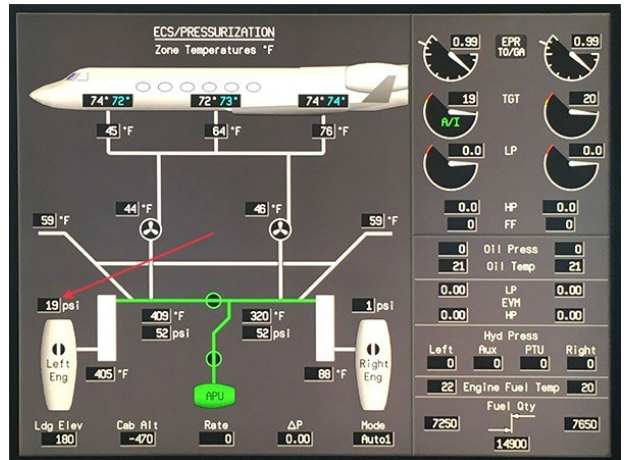
- **SAT < 10°C, VISIBLE MOISTURE**
- **SAT < 1°C, VISIBLE MOISTURE, GND OPS**

A/I ON FOR TAXI AND TAKEOFF

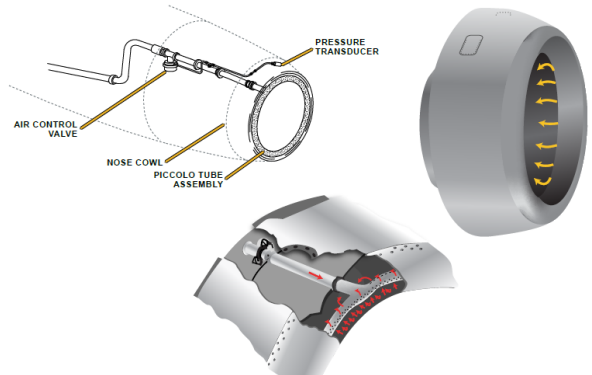
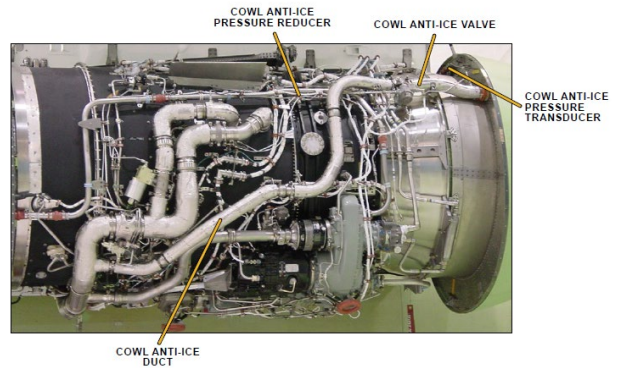
G450 - SET 85% LP FOR 2 SEC PRIOR TO T/O
G450 - SET 85% LP FOR 1 MIN EVERY HR

G550 - SET 40% LP FOR 10 SEC PRIOR TO T/O

G450 COWL ANTI-ICE PRESSURE BEING SUPPLIED BY APU AIR



G450

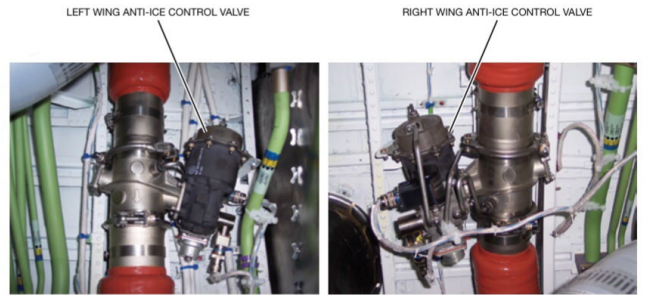




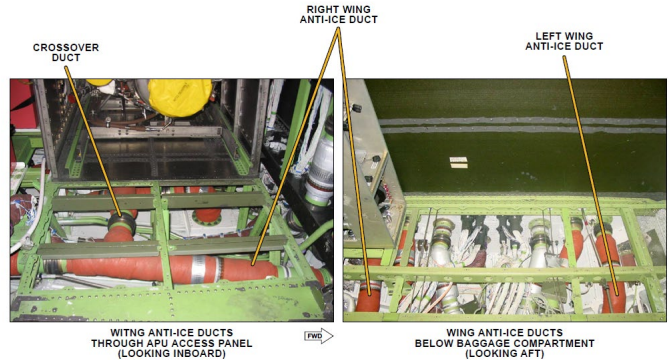
WING ANTI-ICE:

- OPERATION OF WING ANTI-ICING IS REQUIRED IF ICING CONDITIONS ARE IMMINENT, OR IMMEDIATELY UPON DETECTION OF ICE FORMATION ON WINGS, WINGLETS OR WINDSHIELD EDGE.
- THE BLEED AIR CONTROLLER (BAC) CONTROLS THE WING ANTI-ICE VALVES
- 12TH / 8TH STAGE AIR AUGMENTS 7TH / 5TH STAGE AIR TO PROVIDE 400°F (500°F S.E.) TO THE BLEED AIR MANIFOLD
- THE WING ANTI-ICE VALVES **FAIL CLOSED**
- CROSS-OVER DUCT PROVIDES REDUNDANCY
- WING LEADING EDGE PLENUM TARGET TEMP: **130°F**
- OVER TEMP CAUTION AT **180°F** **Wing Hot**
- HOT AIR IS DIRECTED ONTO THE LANDING LIGHT LENS COVERS TO PREVENT ICE FORMATION
- THE WARM EXHAUST AIR IS DIRECTED AFT THROUGH THE WHEEL WELL, ACROSS THE WHEELS AND THEN VENTS OVERBOARD

NOTE: WHEEL AND BRAKE ASSEMBLIES THAT WERE SUBJECT TO ADVERSE WEATHER CONDITIONS PRIOR TO TAKEOFF MAY BENEFIT FROM A WARM WHEEL WELL ENVIRONMENT PRIOR TO GEAR EXTENSION.



Wing Anti-Ice Control Valves



WING ANTI-ICE DUCTS THROUGH APU ACCESS PANEL (LOOKING INBOARD)

WING ANTI-ICE DUCTS BELOW BAGGAGE COMPARTMENT (LOOKING AFT)

G450 WING ANTI-ICE EXHAUST VENTS



- ICE DETECTORS (2)
- VIBRATING SENSOR
- 40,000 HZ

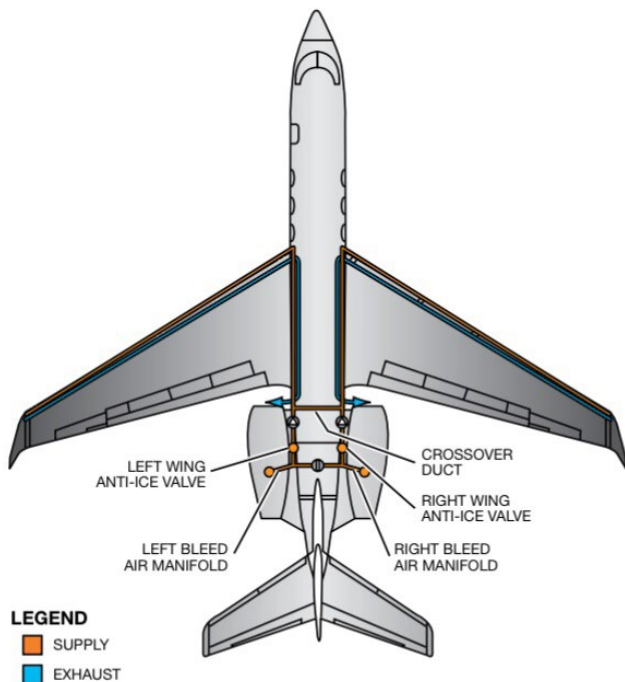
G450



LUCIANI NOTE: **Ice Detected** CAS IS INHIBITED ON THE GROUND BECAUSE ALL AMBER CAS MESSAGES ARE CONSIDERED "NO GO" MESSAGES.

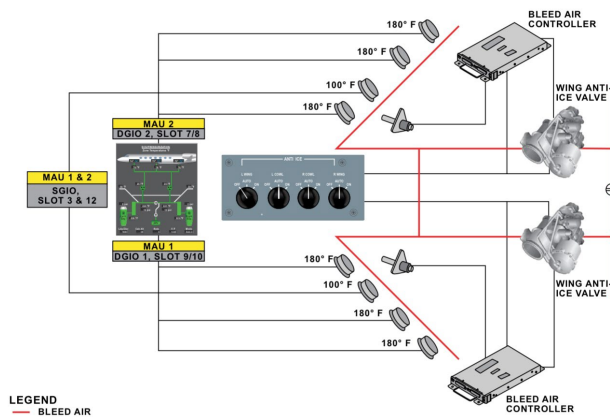
NOTE: THE SENSING PROBE IS DRIVEN MAGNETOSTRICTIVELY TO VIBRATE AT ITS RESONANT FREQUENCY OF 40,000 Hz. WHEN ICE COLLECTS ON THE PROBE, THE ADDED MASS CAUSES THE FREQUENCY DECREASE. WHEN THE PROBE'S VIBRATIONAL FREQUENCY DECREASES BY 133 Hz, EQUIVALENT TO A 0.020 ICE ACCUMULATION, THE ICE DETECTOR GENERATES AN ICING SIGNAL AND DEICES ITSELF THROUGH INTERNAL HEATING ELEMENTS. DEICING TAKES APPROXIMATELY FIVE TO SEVEN SECONDS. ONCE DEICED, THE SENSING PROBE COOLS, AND IS READY TO SENSE ICE FORMATION AGAIN. WHEN ICE RE-ACCRETES ON THE SENSING PROBE ANOTHER SIGNAL WILL BE ISSUED. SHOULD THIS OCCUR BEFORE THE PREVIOUS SIGNAL HAS TIMED OUT, THE ICING SIGNAL WILL BE CONTINUOUS.

WING ANTI-ICE DUCTING



- LEGEND**
- SUPPLY
 - EXHAUST

WING ANTI-ICE TEMPERATURE SENSOR AND SWITCH COMMUNICATION



- LEGEND**
- BLEED AIR



- AUTO MODE: ON
 - CLIMB
 - 1,500' AGL TO FL350
 - DESCENT
 - FL350 TIL WOW
- AUTO MODE: OFF
 - TIME DELAY
 - Ice Detect
 - CLEAR AFTER 1 MIN
 - COWLA/I TURNS OFF AFTER 3 MIN
 - WING A/I TURNS OFF AFTER 5 MIN

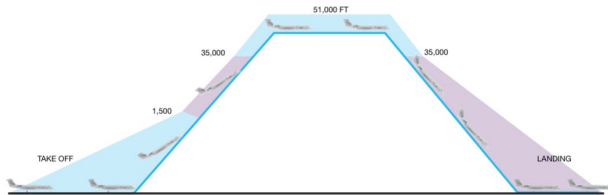
G550



ALL SYSTEMS SELECTED OFF N/A FOR FLIGHT OPS UNLESS ABNORMAL AND REQUIRED TO BE DISABLED BY APM.

AUTO INHIBIT FROM TAKE OFF UNTIL 1500 AGL. AUTO NORMAL FROM 1500 AGL UNTIL 35,000 MSL. AUTO INHIBIT ABOVE 35,000 MSL. AUTO NORMAL 35,000 MSL UNTIL LANDING.

MAY BE SELECTED TO ON AT ANY ALTITUDE AS REQUIRED BY APM.



- G550, FLAPS IN ICING CONDITIONS
 - HOLDING IN ICING CONDITIONS IS LIMITED TO ZERO FLAPS ONLY
 - USE OF FLAPS IN ICING CONDITIONS IS RESTRICTED TO TAKEOFF, APPROACH AND LANDING ONLY

- POTENTIALLY FROZEN BRAKES
 - WING HEAT ON / WAIT / OFF
 - GEAR DOWN
 - ANTI-SKID OFF
 - PEDAL BRAKES 3,000 PSI / RELEASE
 - ANTI-SKID ON

- COLD WEATHER OPERATIONS
 - REFERENCE AOM CH 7 – ALL WEATHER OPERATIONS AND PROCEDURES
 - REFERENCE COLD WEATHER OPERATIONS MANUAL (CWOM)
 - ≤ 0°C CONSULT CWOM – WATER DRAINING, SEE PURGE FOR MORE INFORMATION.
 - ALTIMETRY: QRH-NG ALTERNATE NORMALS

NOTE: DURING VERY COLD TEMPERATURES BAROMETRIC ALTIMETERS READ ERRONEOUSLY HIGH, THUS CAUSING THE ACTUAL AIRCRAFT ALTITUDE TO BE SIGNIFICANTLY LOWER THAN INDICATED ALTITUDE. G450 AIRCRAFT WITH ASC 059B HAVE TEMP COMPENSATION CAPABILITY THROUGH LANDING INIT IF SELECTED ON FLIGHT CONFIG PAGE 2.

NOTE: TEMPERATURE AND PRESSURE EXTREMES DO NOT AFFECT WAAS VERTICAL GUIDANCE. DO NOT TEMP COMP LPV APPROACH MINIMUMS.

- APU START (GND):
 - 30°C: MINIMUM FUEL TEMP FOR START
- ENG START:
 - QRH-NG, ALTERNATE NORMALS "COLD WEATHER START AND OPERATIONS"
 - 40°C: MINIMUM OIL TEMP FOR START
 - ≤ -10°C OIL TEMP – PERFORM CRANK CYCLE (QRH-NG). TURN GEN SWITCHES OFF FOR START (AOM 07-01-20).
 - ALLOW MAX LP AND HP RPM FOR 45 SEC PRIOR TO SELECTING FUEL CONTROL ON. USE AN OUTSIDE OBSERVER TO VISUALLY CONFIRM POSITIVE LP ROTATION.



NOTE: SEE PLANEVIEW AVIONICS "COLD WEATHER" FOR MORE INFORMATION.

CODE450:

- G450 COLD WEATHER START

- CODE7700:
 - COLD WEATHER REFRESHER
 - COLD WEATHER OPERATIONS

- COWL ANTI-ICE (GND AND FLT):
 - SELECT ON IF SAT ≤ +10°C (50°F) WITH VISIBLE MOISTURE / CONTAMINATED SURFACE CONDITIONS
- ENG ICING NOTES
 - CAN OCCUR BELOW 8°C
 - AS AIR IS DRAWN INTO THE ENGINE THE TEMPERATURE DROPS AND THE MOISTURE CONDENSES INTO DROPLETS. THESE DROPLETS CAN STRIKE METAL PARTS AND FREEZE
 - ICE SHEDDING PROCEDURE: REDUCE POWER LEVER (ONE AT A TIME) TO IDLE FOR 5 SEC, ADVANCE TO 85% LP (G450) FOR 2 SEC, 90% LP (G550), THEN RETURN TO NORMAL SETTING

- TAXI:
 - MINIMUM OIL TEMP FOR TAXI: -30°C
 - TAXI WITH FLAPS UP
 - HEAT BRAKES TO 100°C. THIS DISSIPATES MOISTURE FROM THE BRAKES; PREVENTS FROZEN BRAKES ON LANDING
 - WHILE STOPPED EXERCISE BRAKES TO 3,000 PSI – DON'T SET PARKING BRAKE FOR EXTENDED PERIODS
 - AVOID USING REV THRUST IF POSSIBLE
 - MIN OIL TEMP FOR TAKEOFF IS +20°C
 - PERFORM CONTAMINATION CHECK (<5 MINUTES BEFORE TAKEOFF)

IF OAT < 1°C PERFORM ENG RUN UP (<60 MIN INTERVALS):

- (G450) LP RPM 85%, PAUSE 1 MIN, RETURN TO IDLE
- (G550) LP RPM 40%, PAUSE 10 SEC, RETURN TO IDLE

- TAKEOFF PLANNING:
 - DO NOT USE REDUCED (FLEX) THRUST
 - CONSIDER USING MIN V1

- PRIOR TO TAKEOFF PERFORM ENG ICE CLEARING PROCEDURE:
 - LP RPM 85%, PAUSE 2 SEC
 - ENG OPERATION CHECK NORMAL
 - TAKEOFF POWER SET

- AFTER TAKEOFF:
 - DELAY GEAR RETRACTION, IF PRACTICAL
 - CONSIDER CYCLING THE GEAR
 - WARM WHEEL WELLS USING WING ANTI-ICE

- MINIMUM MANEUVERING SPEEDS:
 - FLAPS 0°: 200 KCAS
 - FLAPS 10°: 180 KCAS
 - FLAPS 20°: 160 KCAS (G450) / 150 KCAS (G550)
 - FLAPS 39°: VREF + 5 KTS

- PITOT SYSTEM ICING:
 - CRUISE AOA: 0.2-0.3 (3-5° PITCH)
 - APPROACH AOA: 0.4 (3-5° PITCH)
 - VREF AOA: 0.5 (3-5° PITCH)

- PITOT SYSTEM AND AOA VANE ICING:
 - USE GPS GROUND SPEED

NOTE: PERIODICALLY DISENGAGE AUTOPILOT TO CHECK TRIM AND HANDLING.

NOTE: A 100 KCAS INCREASE IN AIRSPEED CAN RAISE THE TAT 15°F.



BEFORE LANDING:

- EXTEND LANDING GEAR EARLIER THAN NORMAL
- SELECT ANTI-SKID OFF, PERFORM SEVERAL BRAKE APPLICATIONS TO 3,000 PSI, THEN SELECT ANTI-SKID ON

LANDING:

- PERFORM FIRM TOUCHDOWN
- CONSIDER PULLING SPEED BRAKE HANDLE AS A BACKUP TO THE AUTO GND SPLR SYSTEM
- LOWER NOSE IMMEDIATELY
- APPLY MODERATE-TO-FIRM BRAKE PRESSURE SMOOTHLY AND SYMMETRICALLY
- MAINTAIN CONSTANT BRAKE PRESSURE ALLOWING THE ANTI-SKID TO WORK
- BE PREPARED FOR DOWNWIND DRIFT
- NO TURNS UNTIL VERY SLOW TAXI SPEED IS ATTAINED

≤ -10°C OIL TEMP NOTE: SELECT THE LEFT AND RIGHT GEN SWITCHES (L GEN / R GEN) TO OFF PRIOR TO ENGINE START. THIS ALLOWS THE IDG OIL TO WARM WITH THE IDG UNLOADED AND PREVENTS NUISANCE UNDERSPEED / UNDERFREQUENCY TRIPS DUE TO HIGH OIL VISCOSITY. SELECT GENS ON AS REQUIRED ONCE THE ENGINES HAVE STABILIZED AT IDLE. IF THE L GEN / R GEN SWITCHES ARE NOT MANUALLY SELECTED OFF PRIOR TO START, AND THE L (R) GENERATOR FAIL AND/OR L (R) AC POWER FAIL CAS MESSAGES ARE OBSERVED AS THE ENGINE ACHIEVES IDLE, SELECT THE AFFECTED GEN SWITCH TO OFF FOR FIFTEEN (15) SECONDS, THEN BACK TO ON. (AOM 07-01-20)

RUNWAY CONDITION DEFINITIONS

DRY RUNWAY A RUNWAY IS CONSIDERED DRY IF IT IS CLEAR OF VISIBLE MOISTURE. A DAMP RUNWAY, WHICH HAS A MOISTURE LAYER THAT IS NONREFLECTIVE, IS ALSO CONSIDERED DRY.

WET RUNWAY A RUNWAY IS CONSIDERED TO BE WET WHEN THERE IS SUFFICIENT MOISTURE TO CAUSE IT TO APPEAR REFLECTIVE BUT THE DEPTH OF THE WATER IS NOT MORE THAN 3 MM (0.125 IN.).

CONTAMINATED RUNWAY A RUNWAY SURFACE IS CONSIDERED CONTAMINATED WHEN MORE THAN 25% OF THE RUNWAY SURFACE AREA IS COVERED WITH STANDING WATER, SLUSH, LOOSE SNOW (DRY OR WET), COMPACTED SNOW OR ICE.

STANDING WATER WATER DEPTH IS GREATER THAN 3 MM (.125 IN).

SLUSH PARTLY MELTED SNOW OR ICE WITH A HIGH WATER CONTENT, FROM WHICH WATER CAN READILY FLOW.

COMPACTED SNOW SNOW WHICH HAS BEEN COMPRESSED INTO A SOLID MASS SUCH THAT THE AIRPLANE WHEELS WILL RUN ON THE SURFACE WITHOUT CAUSING SIGNIFICANT RUTTING.

LOOSE SNOW SNOW ON THE RUNWAY SURFACE WHICH HAD NOT BEEN COMPRESSED BY VEHICLE OR AIRCRAFT TRAFFIC. LOOSE SNOW CAN CONSIST OF EITHER DRY SNOW OR WET SNOW.

DRY LOOSE SNOW FRESH SNOW THAT CAN BE BLOWN, OR, IF COMPRESSED BY HAND, WILL FALL APART UPON RELEASE.

WET LOOSE SNOW

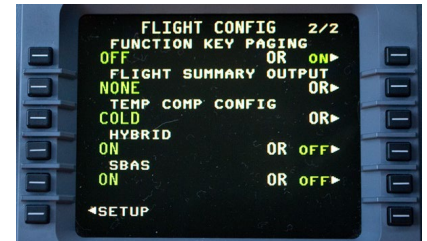
SNOW THAT WILL STICK TOGETHER WHEN COMPRESSED, BUT WILL NOT READILY ALLOW WATER TO FLOW FROM IT WHEN SQUEEZED.

ICE

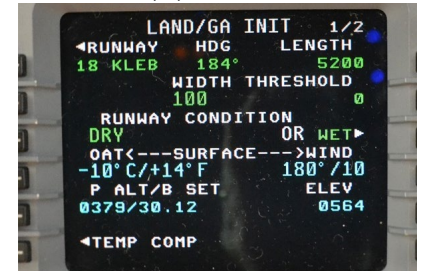
WATER WHICH HAS FROZEN ON THE RUNWAY SURFACE, INCLUDING THE CONDITION WHERE COMPACTED SNOW TRANSITIONS TO A POLISHED ICE SURFACE.

TEMPERATURE COMPENSATION

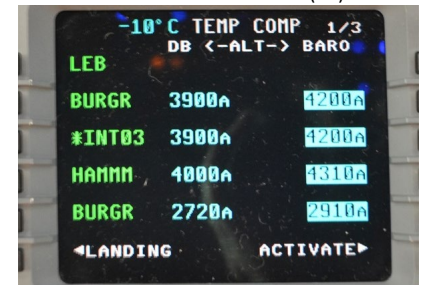
ENSURE THE TEMP COMP CONFIG IS SET IN THE MCDU: SELECT NAV ⇒ NAV INDEX PAGE 2/2 ⇒ MAINTENANCE (2R) ⇒ MAINTENANCE PAGE 2/3 ⇒ SETUP (6L) ⇒ FLT CONFIG (1R) ⇒ FLIGHT CONFIG PAGE 2/2 ⇒ TEMP COMP CONFIG (3R), SELECT COLD



FROM THE LAND/GA INIT PAGE, SELECT TEMP COMP (6L):



REVIEW THE INFORMATION. ENTER THE MDA/DA ON THE LAST TEMP COMP PAGE. WHEN DONE SELECT ACTIVATE (6R):



REVIEW THE ACTIVE FLT PLAN PAGE:





- CONTAMINATED RUNWAY RESTRICTIONS
- TAKEOFF
- FLAPS 20° ONLY
- OPERATIVE ANTI-SKID
- OPERATIVE AUTO GROUND SPOILERS
- OPERATIVE THRUST REVERSERS
- MAX STANDING WATER: 0.39 IN
- RATED THRUST ONLY, ETC...
- LANDING
- FLAPS 39° ONLY
- OPERATIVE ANTI-SKID
- OPERATIVE THRUST REVERSERS
- MAX STANDING WATER: 0.59 IN
- THRESHOLD SPEED VREF TO VREF+10

- CONTAMINATED RUNWAY/ RCAM DATA
- G450-OIS-02
- G550-OIS-03

Gulfstream G450
OPERATIONAL INFORMATION SUPPLEMENT

G450-OIS-02 ADVISORY DATA ONLY – NOT FAA APPROVED

In Table 3a is a table containing required/recommended safety factors for dispatch and enroute landing distance performance.

Table 3a. Landing Distance Factors for Dispatch and Enroute Assessments

Operator Status	Dispatch			Enroute		
	Runway Condition			Runway Condition		
	Dry	Wet	Slippery/ Cont	Dry	Wet	Cont
91	1.0 S _D	1.44 S _D	1.44 S _D	1.0 S _D	1.0 S _W	1.0 S _C
91K & 135-EOD	1.25 S _D	1.44 S _D	1.44 S _D	1.15 S _D	1.15 S _W	1.15 S _C
135 Non-EOD	1.67 S _D	1.92 S _D	1.92 S _D	1.15 S _D	1.15 S _W	1.15 S _C
EASA	1.67 S _D	1.92 S _D	1.15 S _C or 1.92 S _D whichever is greater	1.15 S _D	1.15 S _W	1.15 S _C

S_D → computed AFM landing distance on dry runway
 S_W → computed landing distance on wet runway
 S_C → computed landing distance on contaminated runway

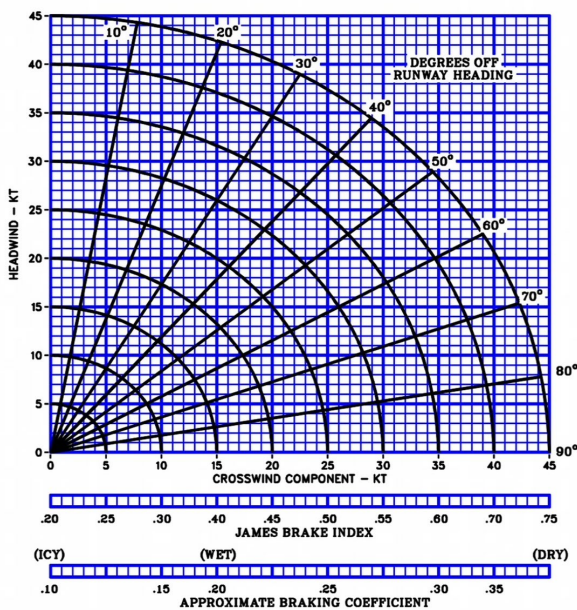
NOTE: In many instances, the dispatch landing distance is less than the enroute landing distance even if the destination runway conditions have not changed between the dispatch assessment and the enroute assessment. This is especially critical for Part 135 EOD and Part 91K operators where the dispatch factor of 1.44 for wet/slippery runways provides little, if any, safety margin for operations on these runways surface conditions. For this reason, it is strongly recommended that dispatch planning also include an assessment of the enroute landing distance to ensure that the landing can be safely performed at the destination airport.

Gulfstream G450
OPERATIONAL INFORMATION SUPPLEMENT
ADVISORY DATA ONLY – NOT FAA APPROVED G450-OIS-02

TABLE 47c. ENROUTE LANDING DISTANCES, FLAPS 39 ANTI-SKID OPERATIVE AND AUTO-GROUND SPOILER

Dry AFM/FMS Ldg Dist (FT)	Dry, Operational Dist (FT)	Wet, Depth < 3mm Operational Dist (FT)	Compacted Snow Dist (FT) ⁽¹⁾	Std Water, Slush, Loose Snow (Equip Depth > 3mm) Dist (FT) ⁽²⁾	Icy Dist (FT) ⁽³⁾
		RWY CC = 5	RWY CC = 4	RWY CC = 2 OR 3	RWY CC = 1
2600	2990	3800	4000	5300	7540
2700	3105	4000	4150	5700	7950
2800	3220	4200	4300	6070	8350
2900	3335	4420	4480	6420	8740
3000	3450	4680	4690	6780	9150
3100	3565	4850	4850	7100	9530
3200	3680	5050	5050	7450	9960

CROSSWIND LIMITS BASED ON JAMES BRAKE INDEX OR BRAKING COEFFICIENT (FOR HEADWIND CONDITIONS ONLY)



NOTE: TO FIND THE LIMITING CROSSWIND ENTER THE CROSSWIND LIMITS BASED ON JAMES BRAKE INDEX OR BRAKING COEFFICIENT CHART AT THE REPORTED RUNWAY CONDITION AND READ UPWARD TO DETERMINE THE LIMITING CROSSWIND. G450-OIS-04, ALSO AVIALABLE IN PERFORMANCE HANDBOOK (PH) PA-13 (G450).

Gulfstream G450
OPERATIONAL INFORMATION SUPPLEMENT

ADVISORY DATA ONLY – NOT FAA APPROVED G450-OIS-02

TABLE 47c. ENROUTE LANDING DISTANCES, FLAPS 39 ANTI-SKID OPERATIVE AND AUTO-GROUND SPOILER

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2700	3105	4000	4150	5700	7950
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2900	3335	4420	4480	6420	8740
3000	3450	4680	4690	6780	9150
3100	3565	4850	4850	7100	9530
3200	3680	5050	5050	7450	9960
3300	3795	5220	5220	7800	10360
3400	3910	5480	5400	8150	10780
3500	4025	5700	5600	8500	11180
3600	4140	5880	5800	8850	11580
3700	4255	6080	6000	9200	11980
3800	4370	6300	6180	9550	12390
3900	4485	6500	6340	9900	12790
4000	4600	6700	6490	10250	13200
4100	4715	6900	6680	10600	13600
4200	4830	7100	6840	10950	14000
4300	4945	7310	7010	11300	14400
4400	5060	7500	7180	11650	14800
4500	5175	7720	7380	12000	15200
4600	5290	7950	7510	12370	15620
4700	5405	8180	7700	12700	16080
4800	5520	8390	7880	13070	16490
4900	5635	8600	8080	13420	16900
5000	5750	8800	8270	13800	17300

- Notes:
- All distances in column 2-6 contain a 15% safety margin. A classic Part 91 operator can elect to remove the 15% safety margin.
 - All distances but dry runway distances assume both engines in Max Reverse Thrust (Dry runway distances assume both engines in Forward Idle Thrust). If one or both TRs are inop, increase distances by the following amounts:
 - On wet or compacted snow runways, increase distance by 10%
 - On runways covered with standing water, slush or loose snow, increase distance by 20%
 - On runways covered with ice, increase distance by 50%
 - Air distance based on 7-second EASA requirement.
 - Runway Slope Corrections:
 - Increase distance by 11% for each 1% of downhill slope.
 - Decrease distance by 10% for each 1% of uphill slope.
 - Ambient Temperature Corrections:
 - Increase distance by 3% for each 10°C above ISA
 - Decrease distance by 3% for each 10°C below ISA

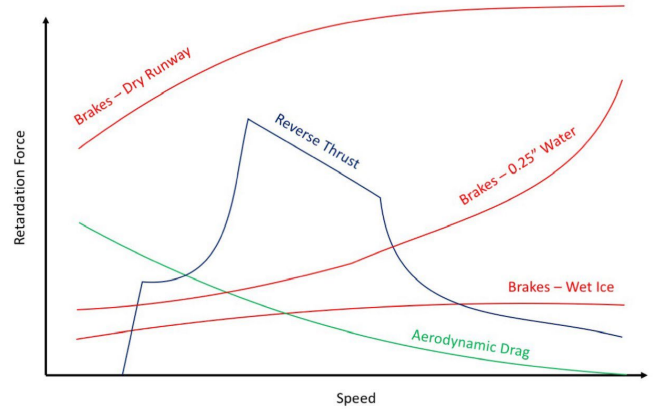


**G450/G550 RUNWAY
CONDITION ASSESSMENT
(MOL-2016-0010)**

G450-OIS-02 Revision 2, December 11, 2017

G550-OIS-03 Revision 3, November 6, 2017

Runway Condition	RwyCC	Braking Action	Takeoff Reference	Landing Reference
• Dry	6	N/A	FMS Dry	FMS Dry
• Wet • Water, slush, snow ≤ 1/8" (3mm)	5	Good	FMS Wet	FMS Wet
• Compacted snow (OAT ≤ -15°C (5°F))	4	Good to Medium	OIS Tables 1c-11c (pages 46-56)	OIS Tables 45c-47c (pages 91-93)
• Standing water, slush or snow 1/8" (3mm) to 0.2" (5mm)	3	Medium	OIS Tables 23c-33c (pages 68-78)	
• Standing water, slush or snow > 0.2" (5 to 15mm) • Compacted snow OAT > -15°C (5°F)	2	Medium to Poor	OIS Tables 34c-44c (pages 79-89)	
• Ice	1	Poor	OIS Tables 12c-22c (pages 57-67)	



CODE450

- ▶ [G450 ICE AND RAIN PROTECTION SYSTEM](#)
- ▶ [G450 ICE AND RAIN PROTECTION SYSTEM ABNORMALS](#)

IVAN LUCIANI'S SYSTEMS GUIDES

- ▶ [G450 ICE AND RAIN PROTECTION SYSTEM](#)
- ▶ [G550 ICE AND RAIN PROTECTION SYSTEM](#)

RUNWAY CONDITION ASSESSMENT MATRIX (RCAM)							
CODE	6	5	4	3	2	1	0
BA	GOOD		MEDIUM		POOR		NIL
~MU		40	35	30	25	20	

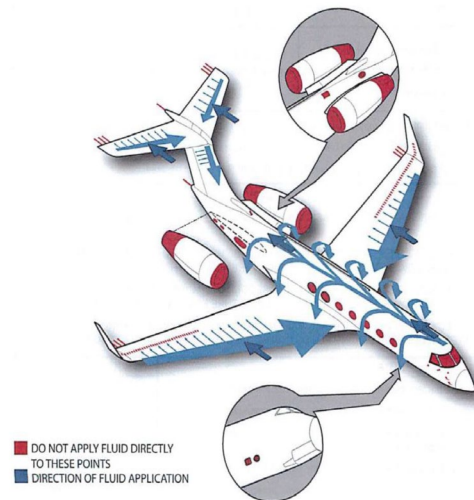
CODE450:

- ▶ [G450 LANDING PERFORMANCE](#)

CODE7700:

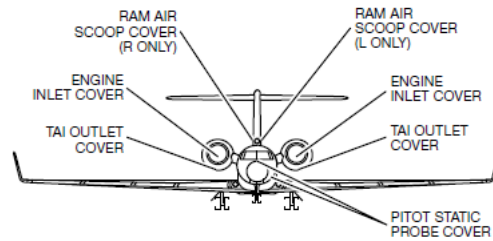
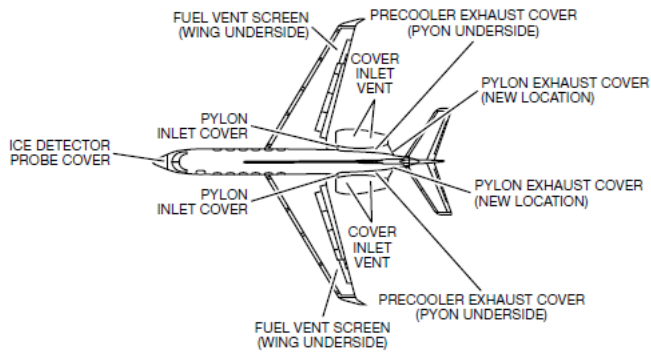
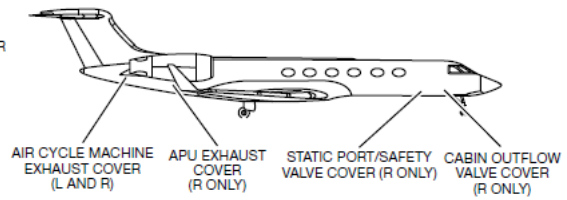
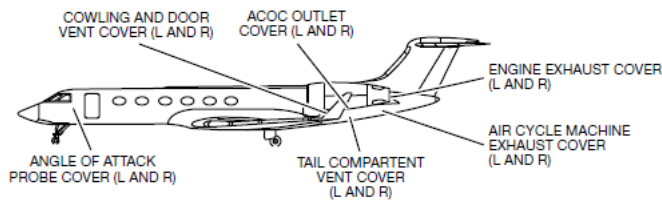
- ▶ [RCAM](#)
- ▶ [GROOVED RUNWAYS](#)
- ▶ [CONTAMINATED RUNWAYS](#)
- ▶ [WET OR CONTAMINATED?](#)

DEICE SPRAY





PROTECTIVE COVERS





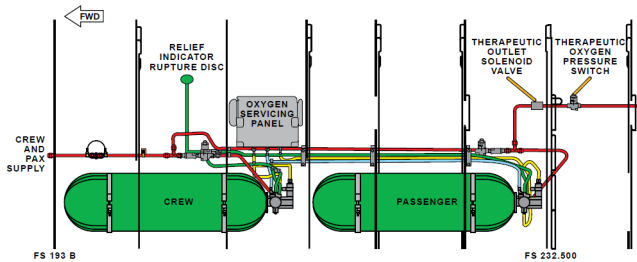
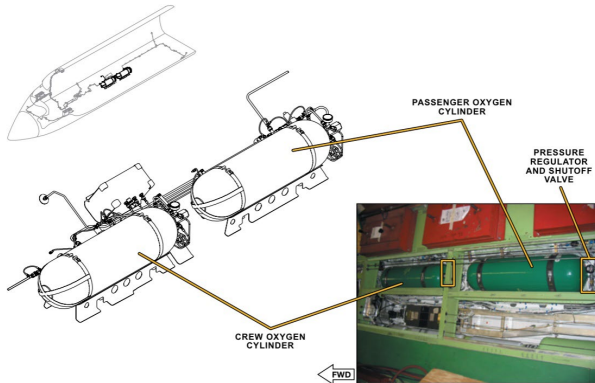
OXYGEN

- OXYGEN BOTTLES (2)
- 1,800 PSI NORMAL, 1,500 PSI MINIMUM
- 230 CUBIC FEET TOTAL (6,513 LITERS)
NOTE: FT³ TO LITERS FORMULA: L = FT³ / 0.035315
- DESIGNED TO PROVIDE A MINIMUM OF 2 HOURS TO CREW AND PAX AT 15,000' CABIN ALTITUDE
- LOCATED BENEATH THE FLOORBOARDS
- PRESSURE REGULATORS REDUCE PRESSURE TO 55-60 PSI

NOTE: THE PASSENGER OXYGEN SYSTEM DIFFERS FROM THE CREW OXYGEN SYSTEM IN THAT IT HAS A TAP OFF FOR THE THERAPEUTIC OXYGEN. THE PASSENGER AND CREW OXYGEN SYSTEMS ARE ISOLATED BY CHECK VALVES WHICH PREVENT THE CREW OXYGEN BOTTLE FROM BEING DEPLETED IF THERAPEUTIC OXYGEN IS USED.

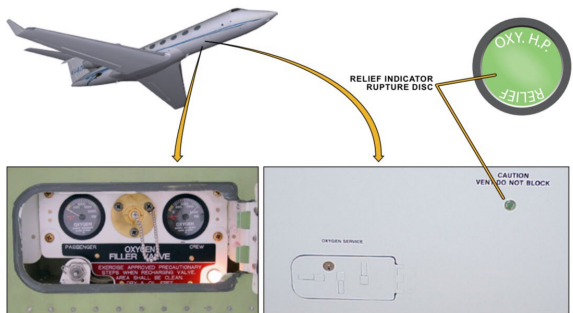
REFERENCE DOCUMENTS

- STC AFMS TAB INDEX: PASSENGER OXYGEN SYSTEM
- THE MOPP/OXYGEN HAS A HELPFUL DURATION TABLE
- G450-OMS-02 / G550-OMS-05 EXTENDED OPERATIONS (ETOPS) GUIDE, TABLE 3: OXYGEN REQUIRED FOR DEPRESSURIZATION AND CONTINUED FLIGHT



LEGEND
■ REGULATED SUPPLY PRESSURE 55-80 PSI
■ LOW-HIGH PRESSURE RELIEF
■ CYLINDER PRESSURE
■ SERVICING FILL

- OVERBOARD DISCHARGE LINE (GREEN DISK)
- BOTTLE REGULATOR (90 PSI)
- OVERPRESSURE (2,600 PSI)
- OVERTEMPERATURE (225°)

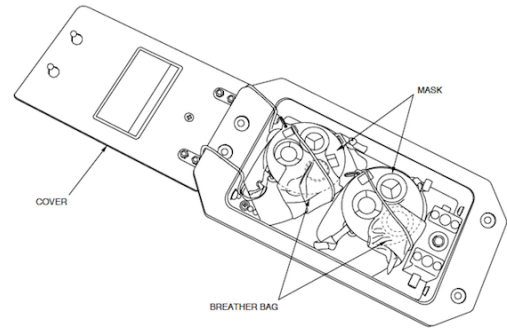


Oxygen System Servicing Panel

- PASSENGER OXYGEN CONTROL PANEL (POCP)
- INDICATES PRESSURE AVAILABLE
- CONTROLS THE FLOW OF O₂ TO THE PASSENGER MASK SUPPLY LINES
- AUTO/OFF/MAN POSITIONS
- MAN
- ROUTES O₂ DIRECTLY TO THE PASSENGER MASK SUPPLY LINES
- AUTO
- ROUTES O₂ TO AN INTERNAL ANEROID SWITCH WHICH DEPLOYS THE CABIN OXYGEN MASKS
- MASKS DEPLOY AT: **13,000' ± 500'** (G550 WITHOUT ASC 040)
- **14,750' ± 250'** (G450 WITHOUT ASC 068 AND G550 WITH ASC 040),
- **15,750' ± 250'** (G450 WITH ASC 068 AND G550 S/N 5323 AND SUB)
- AND FLOWS, ALTITUDE COMPENSATED, UNTIL THE CABIN REACHES 13,750' ± 250'.
- ILLUMINATES NO SMOKING SIGNS

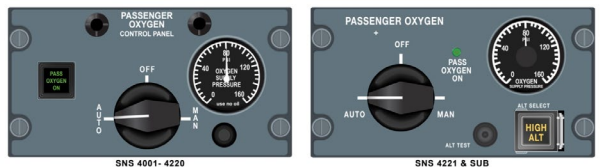
NOTE: FOR PAX O₂ TO CONTINUE TO FLOW BELOW 13,750' ± 250' ROTATE PASSENGER OXYGEN CONTROL TO MAN (MANUAL).

NOTE: THE O₂ PRESSURE FROM THE POCP PUSHES THE STOWAGE BOX RETAINING PIN OUT OF THE LATCH ASSEMBLY ALLOWING THE DOOR TO OPEN AND THE MASK TO DEPLOY.



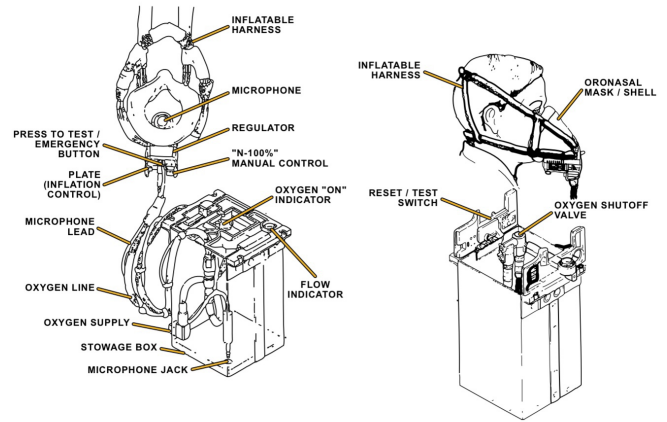
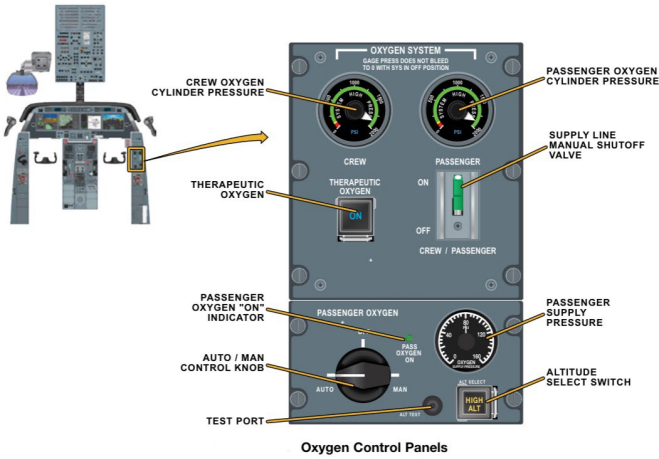
NOTE: PAX MASKS WILL NOT PROVIDE SUFFICIENT O₂ FOR PROLONGED OPERATION ABOVE 34,000' CABIN ALTITUDE. PROLONGED OPERATION ABOVE 25,000' CABIN ALTITUDE WITH PAX ABOARD IS NOT RECOMMENDED.

G450 PASSENGER OXYGEN CONTROL PANEL VARIANTS

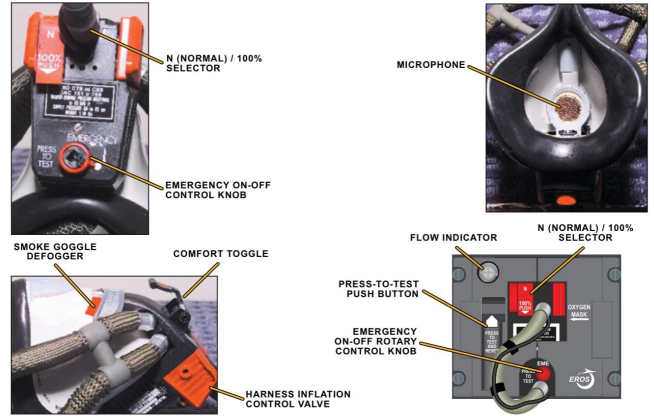


PASSENGER MASK FLOW RATES

CABIN ALTITUDE	FLOW RATE
15,000	0.8 LPM
25,000	2.28 LPM
35,000	3.02 LPM
40,000	3.29 LPM



Crew Mask Storage Box



Crew Mask and Regulator

▪ QUICK-DONNING EROS O2 MASKS

NOTE: 91.211

- DON MASK > FL410
 - DON MASK > FL350
- WHEN ONE PILOT IS OUT OF THE COCKPIT

NOTE: 135.89

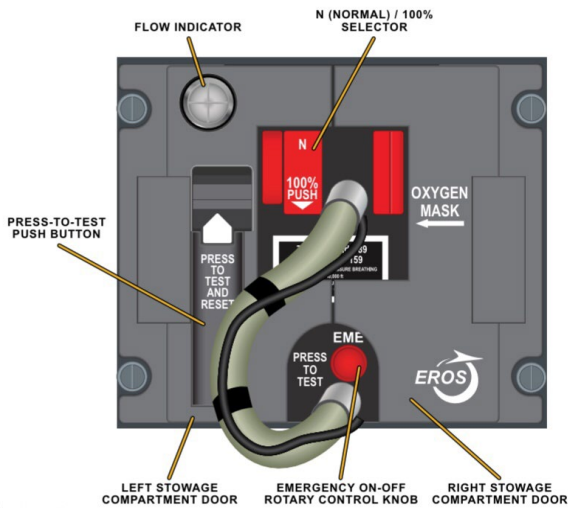
- DON MASK > FL350
 - DON MASK > FL250
- WHEN ONE PILOT IS OUT OF THE COCKPIT

- N (NORM) = DILUTED MODE
 - AUTO: PROVIDES UNDILUTED-DEMAND OXYGEN AT 27,500' CABIN ALTITUDE
 - AUTO: PROVIDES UNDILUTED-PRESSURE-DEMAND OXYGEN AT 39,000' CABIN ALTITUDE
- 100% MODE
- EMERGENCY OXYGEN ROTARY KNOB – POSITIVE PRESSURE FLOW
- CERTIFIED TO FL400
- DURING USE DO NOT CLOSE THE LEFT DOOR OF THE MASK HOLDER – IF THE DOOR IS CLOSED AND THE PRESS TO TEST IS PUSHED O2 IS SHUT OFF TO THE MASK

MCREW MASK FLOW RATES	CABIN ALTITUDE	NORM (DILUTED)	100% (UNDILUTED)
	6,000	2.23 LPM	---
	15,000	2.34 LPM	9.5 LPM
	25,000	4.10 LPM	5.9 LPM
	35,000	3.29 LPM	3.3 LPM
	40,000	2.29 LPM	2.35 LPM

▪ THERAPEUTIC OXYGEN

- 6.0 TO 7.5 LPM FLOW RATE
- SUPPLIED ONLY FROM THE PASSENGER OXYGEN BOTTLE
- THE MASK CAN BE USED WITH OR WITHOUT THE BUBBLE HUMIDIFIER (NEBULIZER)
- THE NEBULIZER HAS AN ADJUSTABLE FLOW REGULATOR; USE 7.5 LPM FOR MEDICAL PURPOSES, USE 2 LPM FOR HEADACHE OR NAUSEA



▪ INADVERTENT PASSENGER OXYGEN MASK ACTIVATION

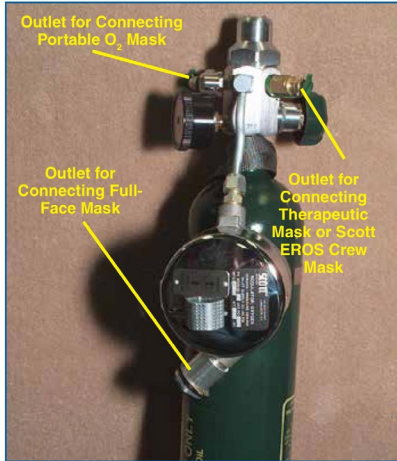
- **Passenger Oxygen On**
- FOLLOW QRH PROCEDURE, EH-14; WARN LTS PWR #5 CB
- FOLLOW QRH PROCEDURE, EH-14; WARN LTS PWR #5 CB (SN 5323 AND SUB)

▪ **Crew Oxygen Off** OR **Passenger Oxygen Off**

- OXYGEN SHUTOFF VALVE (AT BOTTLE) IS OFF, OR
- OXYGEN IS DEPLETED



- PORTABLE OXYGEN BOTTLE
- HAS THREE OUTLETS
 - THE ALUMINUM OUTLET IS FOR THE PORTABLE O₂ MASK (IN THE SMALL YELLOW BAG)
 - THE BRASS OUTLET IS FOR THE THERAPEUTIC MASK (IN THE SMALL GREEN BAG) OR THE SCOTT EROS CREW MASK
 - THE THIRD IS FOR THE FULL-FACE MASK (IN THE LARGE GREEN BAG)



G450-OMS-02

TABLE III
OXYGEN REQUIRED FOR DE-PRESSURIZATION AND CONTINUED CRUISE

CRUISE ALTITUDE (FT)	TIME (HR:MIN)	REQUIRED BOTTLE PRESSURE AT DISPATCH * NUMBER OF PASSENGERS									
		0	1	2	4	6	8	10	15	19	
25000	1:00	401	436	471	541	611	682	752	928	1068	
	1:30	496	549	602	707	813	918	1024	1288	1499	
	2:00	591	662	732	873	1014	1155	1296	1648	1930	
	2:30	687	775	863	1039	1216	1392	1568	2009	****	
	3:00	782	888	994	1205	1417	1629	1840	****	****	
	3:30	877	1001	1124	1371	1618	1865	****	****	****	
	4:00	973	1114	1255	1537	1820	****	****	****	****	
	4:30	1068	1227	1386	1703	2021	****	****	****	****	
5:00	1163	1340	1516	1870	****	****	****	****	****		
20000	1:00	358	386	414	470	525	581	636	775	886	
	1:30	429	470	512	595	678	761	844	1051	1217	
	2:00	499	555	610	720	831	941	1051	1327	1548	
	2:30	570	639	708	846	983	1121	1259	1604	1879	
	3:00	640	723	806	971	1136	1301	1467	1880	****	
	3:30	711	807	904	1096	1289	1482	1674	2156	****	
	4:00	781	891	1001	1222	1442	1662	1882	****	****	
	4:30	852	976	1099	1347	1595	1842	****	****	****	
5:00	922	1060	1197	1472	1747	2022	****	****	****		
15000	1:00	333	346	360	387	415	442	470	538	593	
	1:30	387	407	427	467	507	546	586	686	766	
	2:00	441	468	494	546	598	650	703	833	938	
	2:30	496	528	560	625	690	754	819	981	1110	
	3:00	550	589	627	704	781	858	936	1128	1282	
	3:30	605	649	694	784	873	963	1052	1276	1455	
	4:00	659	710	761	863	965	1067	1168	1423	1627	
	4:30	714	771	828	942	1056	1171	1285	1571	1799	
5:00	768	831	895	1021	1148	1275	1401	1718	1971		

BASED ON PRESSURE READING AT 70°F.

INCLUDES OXYGEN FOR THREE CREWMEMBERS BREATHING 100% OXYGEN FOR EMERGENCY DESCENT PLUS TWO MINUTES. NORMAL DILUTION FOR REMAINDER OF FLIGHT.

INCREASE OXYGEN REQUIRED BY 35 PSIG FOR EACH CREW MEMBER ON OXYGEN AT/ABOVE FL410 FOR EACH 60 MINUTES.

INCREASE OXYGEN REQUIRED BY 117 PSIG FOR EACH PASSENGER USING THERAPEUTIC OXYGEN FOR EACH 60 MINUTES.

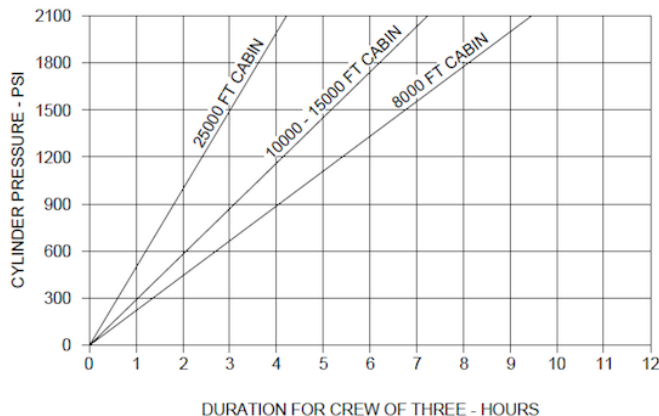
MAXIMUM SYSTEM PRESSURE IS 1800 PSIG. VALUES IN EXCESS OF 1800 ARE SHOWN FOR INTERPOLATION PURPOSES ONLY.

BOTTLE CONFIGURATION: TWO BOTTLES, 6192 LITERS TOTAL CAPACITY

OXYGEN DURATION EXAMPLE

NUMBER OF OCCUPANTS	INITIAL PRESSURE (PSI)	
	1,450	1,800
	(HRS:MIN) AT 15,000'	
3 CREW	11:16	14:29
3 CREW + 2 PAX	9:09	11:46
3 CREW + 4 PAX	7:43	9:56
3 CREW + 6 PAX	6:36	8:34
3 CREW + 8 PAX	5:50	7:32
3 CREW + 11 PAX	4:56	6:22
3 CREW + 13 PAX	4:29	5:46
3 CREW + 15 PAX	4:05	5:17
3 CREW + 17 PAX	3:46	4:52

ONE 123.4 CUBIC FOOT (3494 LITERS) USABLE CYLINDER



CODE450

- ▶ [OXYGEN SYSTEM](#)
- ▶ [OXYGEN SYSTEM ABNORMALS](#)

Ivan Luciani's Systems Guides

- ▶ [G450 OXYGEN SYSTEM](#)
- ▶ [G550 OXYGEN SYSTEM](#)



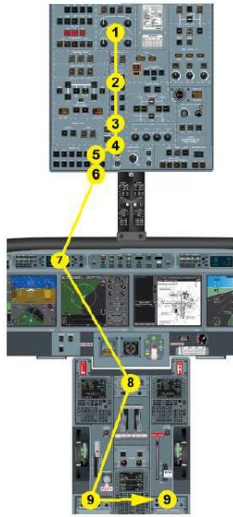
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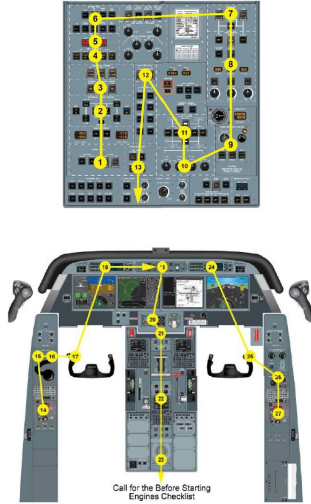
FLOWS

SYSTEM TESTS

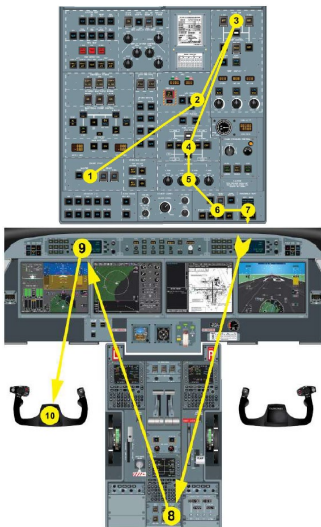
AFTER APU START



BEFORE STARTING ENGINES



AFTER ENGINE START



AFTER LANDING



"SET UP THE MISSED APPROACH" (NON-ENHANCED NAV)



NOTES

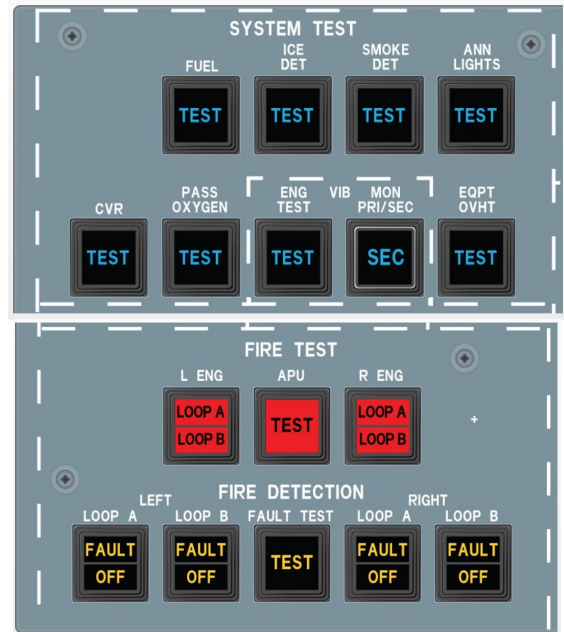
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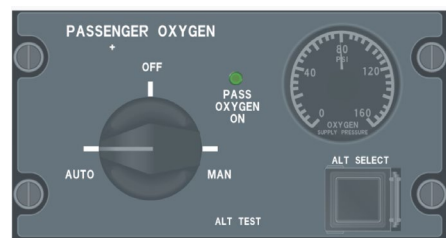
- FIRE DETECTION FAULT TEST "8 LIGHTS"
 - TEST LEGEND IN THE FAULT TEST SWITCH (1)
 - FAULT LEGENDS IN THE LEFT/RIGHT LOOP A/B SWITCHES (4)
 - MASTER CAUTION LIGHTS (2) WITH TWO-CHIME AURAL CAUTION TONE
 - Fire Detection Loop Fault CAS (1)

- L/R ENGINE FIRE TEST "8 LIGHTS"
 - 6 LIGHTS, 2 CAS MSGs:
 - LOOP A LIGHTS (2)
 - LOOP B LIGHTS (2)
 - MASTER WARNING LIGHTS (2) WITH THREE-CHIME AURAL WARNING TONE
 - FIRE HANDLE LIGHTS (1)
 - L/R FUEL CONTROL SWITCH LIGHTS (1)
 - Engine Fire CAS MESSAGE (1)
 - Engine Fire Loop Alert CAS MESSAGE (1)

- EQPT OVHT
 - TEST SWITCH LEGEND ILLUMINATES
 - Aft Equipment Hot CAS MESSAGE
 - L-C-R Aft Floor Hot CAS MESSAGE
 - L-R Pylon Hot CAS MESSAGE

- ENG VIB MON
 - EVM INDICATION OF 1.8 – 2.2
 - Engine Exceedance L-R CAS MESSAGE
 - WHILE HOLDING TEST SWITCH IN, SELECT SEC FOR SAME INDICATIONS

- PASS OXYGEN
 - PRESS AND HOLD
 - NO SMOKING SIGNS ILLUMINATE
 - PASS OXYGEN ON LIGHT ILLUMINATES ON COPILOTS SIDE CONSOLE





- CVR
 - HOLD THE CVR BUTTON ON THE ACP FOR 5-10 SEC, UNTIL THE GREEN LIGHT IS ILLUMINATED
 - PRESS AND RELEASE THE CVR BUTTON ON THE SYSTEM TEST PANEL OVERHEAD
 - A SUCCESSFUL TEST IS INDICATED BY A SINGLE 2 SEC TONE (800 HZ) HEARD IN HEADSET
 - PRESS THE CVR BUTTON ON THE ACP TO RETURN BACK TO NORMAL FUNCTION



- ANN LIGHTS
 - TESTS ALL BULBS EXCEPT 5:
 - FIRE HANDLES (2)
 - FUEL CONTROL SWITCHES (2)
 - "PAX OXYGEN ON" ON THE PASSENGER OXYGEN CONTROL PANEL (POCP)
 - CABIN RATE OF CHANGE – FULL DESCENT ON THE CABIN PRESSURE INDICATOR PANEL (CPIP)

NOTE: GUIDANCE PANEL ANNUNCIATOR LIGHTS WILL NOT TEST IN FLIGHT.

- ICE DET
 - L/R COWL AND WING ANTI ICE SWITCHES – OFF
 - ICE DET SWITCH – PRESS FOR DESIRED TEST
 - "SHORT" TEST:

L-R Ice Detect Fail CAS MESSAGE

L-R Ice Detected CAS MESSAGE

NOTE: THE ICE DETECTION SYSTEM CAN BE TESTED EITHER WITH A "SHORT" TEST OR A "LONG" TEST. WHEN PERFORMING A "SHORT" TEST, THE ICE DET SWITCH IS MOMENTARILY PRESSED. WHEN PERFORMING "LONG" TEST, THE ICE DET SWITCH IS PRESSED AND HELD.

NOTE: ENSURE THE WING ANTI ICE (2) AND COWL ANTI ICE (2) SWITCHES ARE SELECTED OFF PRIOR TO TESTING THE ICE DETECTION SYSTEM. FAILURE TO DO SO MAY CAUSE THE APU GENERATOR TO DROP OFFLINE DUE TO THE ADDITIONAL ELECTRICAL LOAD CREATED FROM THE RAPID CLOSING OF THE APU LOAD CONTROL VALVE.

- SMOKE DET **Aft Baggage Smoke** CAS MESSAGE
- FUEL
 - FUEL QTY.....**7000 L / 7000 R / 14000 TOTAL**
 - L-R Fuel Level Low** CAS MESSAGE
 - FQMS Maintenance Required** CAS MESSAGE



▶ **BEFORE STARTING ENGINES CHECKLIST**

SYSTEM CHECKS

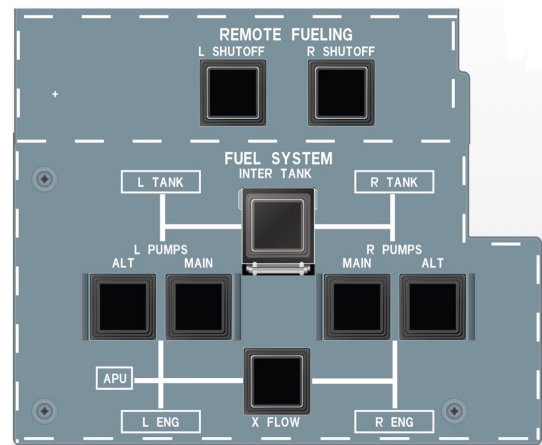
PRESSURIZATION SYSTEM



1. CABIN PRESSURE CONTROL PANEL AUTO/SEMI – SEMI
CONFIRM THAT DATA CAN BE MANUALLY INPUT INTO THE CABIN PRESSURE SELECTOR PANEL. SET THE BAROMETRIC PRESSURE ON THE CABIN PRESSURE SELECTOR TO A DIFFERENT SETTING FROM THE PLANE'S ALTIMETERS.
2. AUTO/SEMI – AUTO
OBSERVE THAT THE BAROMETRIC PRESSURE CHANGES BACK TO PILOT'S PFD ALTIMETER SETTING.
3. FAULT/MANUAL – MANUAL
NOTE: DO NOT CLOSE TROV WITH AIR ON AND DOORS CLOSED.
4. TROV INDICATION / MAN HOLD KNOB – CHECK / CLOSE
ROTATE THE MAN HOLD KNOB CHECKING MOVEMENT OF THE TROV VALVE ON THE POSITION INDICATOR. VERIFY THE AMBER MOTOR POWER INDICATOR ABOVE THE POSITION INDICATOR ILLUMINATES AS THE VALVE CLOSING AND OPENS.
5. FAULT/MANUAL – OFF (LIGHTS OUT)
6. FLIGHT / LANDING – LANDING
ON THE TROV POSITION INDICATOR, VERIFY THE TROV MOVES TO THE OPEN POSITION.

FUEL SYSTEM

1. L/R REMOTE FUELING SHUTOFF.....CLSD/CHECK/OPEN
2. X FLOW & INTERTANK..... OPEN
3. L MAIN BOOST PUMP..... OFF/CHECK
4. L ALT BOOST PUMP ON/CHECK/OFF/CHECK
5. R MAIN BOOST PUMP ON/CHECK/OFF/CHECK
6. R ALT BOOST PUMP..... ON/CHECK
7. X FLOW & INTERTANK.....CLOSED/CHECK
8. L MAIN BOOST PUMP..... ON/CHECK
9. R ALT BOOST PUMP..... OFF/CHECK



G450 NOTE: SELECT ONLY ONE BOOST PUMP ON AT A TIME. WAIT AT LEAST FIVE (5) SECONDS BEFORE TURNING THE SECOND BOOST PUMP ON. FAILURE TO DO SO MAY CAUSE A FAILURE IN THE FUEL PRESSURE SWITCH (G450 QRH NG-27).



PLANEVIEW AVIONICS



BUT FIRST: THE TURBO ENCABULATOR

- HONEYWELL PRIMUS EPIC PLANEVIEW AVIONICS
- DUs – 14 IN LCDs (4) (HONEYWELL DU-1310)
- (EDS) ELECTRONIC DISPLAY SYSTEM
- SFD (L3 GH-3100)
- INTERNAL IRU
- EBDI (L3 EBDI-4000)
- MAGNETOMETER
- DCs (2) (HONEYWELL DC-884)
- IRS 1/2/SFD
- CCDs (2) (MASON)

NOTE: FOR ATT AND HDG MISCOMPARES REFERENCE THE SFD, NOT THE EBDI. THE EBDI USES THE SAME SOURCE AS #1 PFD - IRS #1.

- MAUs (3)
- NOTE: THE MMEL PERMITS DISPATCH WITH AN INOP MAU CHANNEL PROVIDED IT'S NOT MAU 1A OR MAU 2B. MAU 1A AND MAU 2B ARE PARTICULARLY CRITICAL.
- SEE GAC-OIS-09 FOR FURTHER GUIDANCE.
- "MODULAR AVIONICS UNIT" (HONEYWELL MAU-913)
- COMPUTERS
- RECEIVE AND TRANSMIT DATA VIA ASCBs
- MAU 1 & 3 – LEER
- MAU 2 – REER
- PLUG IN CARDS (16 IN EACH MAU) – LINE REPLACEABLE UNITS/MODULES
- EACH MAU HAS DUAL PWR SUPPLIES (A&B)
- EACH MAU HAS THREE COOLING FANS
 - MAU 1-2-3 Fan Fail CAS INDICATES ONE OF THE FANS IN THE INDICATED MAU HAS FAILED
 - MAU 1-2-3 Fan Fail CAS INDICATES TWO OF THE FANS IN THE INDICATED MAU HAS FAILED

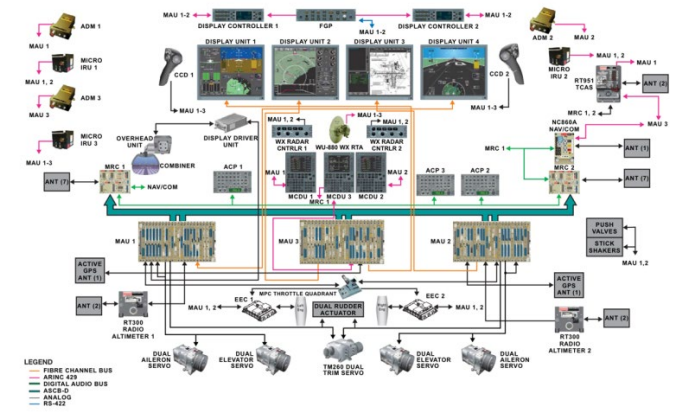
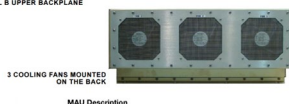
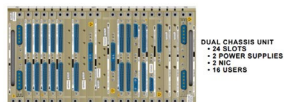
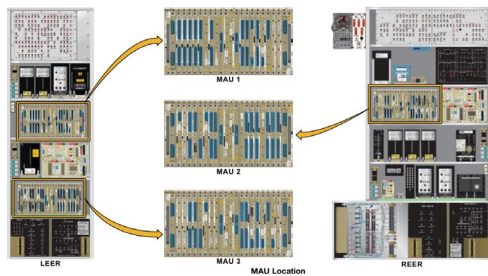
QRH EF-10 MODULAR AVIONICS UNIT (MAU) FAILURE

QRH EF-19 MODULAR AVIONICS UNIT (MAU) FAILURE / FAILURE MATRIX

MAU 1A: L ESS DC & R MAIN DC
MAU 1B: R ESS DC & L MAIN DC

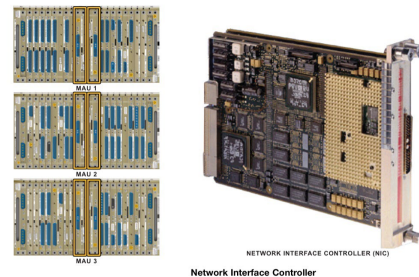
MAU 2A: R MAIN DC & L MAIN DC
MAU 2B: R ESS DC & L MAIN DC

MAU 3A: L MAIN DC & R MAIN DC
MAU 3B: L ESS DC & R MAIN DC



- MAU MODULES
- MAU, MODULAR AVIONICS UNIT
- AIRCRAFT PERSONALITY
- CONTROL MODULES
- ACTUATOR MODULES
- AGM MODULES
- AGM, ADVANCED GRAPHICS MODULE
- GPS MODULES (2)
- CMC MODULES
- DATABASE MODULES
- GP
- WEATHER CONTROLLER
- TCAS
- MCDU
- TONE, MWS
- AP/FD, YD, AT
- TRIM (PITCH,AUTO,MACH)
- STALL PROTECTION
- PFD
- ND
- CAS
- SYSTEMS
- WEATHER
- CAMERA
- ANNUNCIATION
- 1 IN MAU 2 AND 3
- NAV (IN EACH AGM)
- TERRAIN
- CHARTS

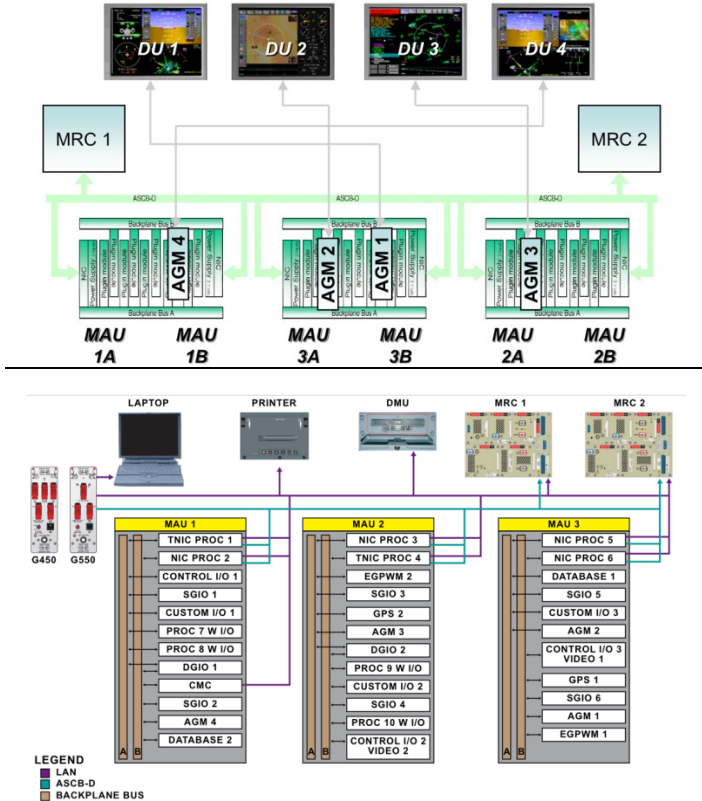
- NIC/PROCS
- "NETWORK INTERFACE CONTROLLER PROCESSOR"
- WITHIN EACH MAU - A MODULE
- THE NIC FUNCTIONS AS THE INTERFACE BETWEEN THE MAU AND THE ASCB-D BUS
- THE PROC RUNS THE APPLICATION TASKS SUCH AS FMS AND AFCS



- NIMS
- "NETWORK INTERFACE MODULE"
- THE BUSES THAT CARRY COMMUNICATION MESSAGES ARE OPERATED DIGITALLY
- NESTER NOTE: NIMS CONVERT ANALOG AUDIO TO DIGITAL FORMAT WHICH IS USED THROUGHOUT THE COCKPIT (SPEAKERS, AUDIO PANELS, MICROPHONES, ETC.)
- LOCATED IN THE L AND R MODULAR RADIO COMPARTMENTS



MAU Interconnection



INFLIGHT

- AGM REVERSION IS NOT AVAILABLE INFLIGHT, AND THE DISPLAY SYSTEM CONTROL PANEL SWITCHES (4) ARE INOPERATIVE.
- IF AN AGM FAILS INFLIGHT, THE ASSOCIATED DU WILL BE INOPERATIVE FOR THE REMAINDER OF THE FLIGHT.
- IN THE EVENT OF AN INFLIGHT DU, AGM, OR MAU CHANNEL FAILURE, A DU FORMAT CONVERSION OCCURS (AND LATCHES); TO UNLATCH HOLD THE DISPLAY CONTROLLER (DC) 2/3 BUTTON FOR 3 SECONDS, THEN MAP
- MANUALLY DIM DOWN A DISTRACTING/FLASHING DU.

QRH CONTRADICTIONS:

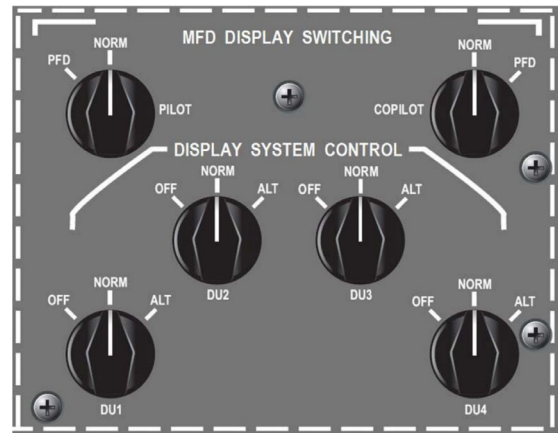
- “WITH THE AIRPLANE IN FLIGHT, THE DISPLAY UNITS WILL NOT RESPOND TO DISPLAY UNIT CONTROL SWITCH SELECTION. DO NOT CHANGE MFD DISPLAY SWITCHES OR DISPLAY UNIT CONTROL SWITCH KNOB SELECTIONS WHILE IN FLIGHT. G450 QRH EF-5 DISPLAY UNITS (DUs) BLANKING / INTERMITTENT. ALSO G450 AOM EXPANDED LIMITATIONS 01-31-00, PAGE 1
- “IN FLIGHT: USE HUD OR REVERT TO AFFECTED PFD USING THE MFD DISPLAY SWITCHES” G450 QRH EF-1 PRIMARY FLIGHT DISPLAY (PFD) MALFUNCTION.

INFLIGHT	DU 1	DU 2	DU 3	DU 4
ALL AGMs OPERABLE	PFD	INAV / ENG	INAV / CAS	PFD
AGM 1 FAILED	X	PFD / ENG	INAV / CAS	PFD
AGM 2 FAILED	PFD	X	INAV / ENG / CAS	PFD
AGM 3 FAILED	PFD	INAV / ENG / CAS	X	PFD
AGM 4 FAILED	PFD	INAV / ENG	PFD / CAS	X

ON THE GROUND

- IF AN AGM FAILS ON THE GROUND, THE DISPLAY SYSTEM CONTROL PANEL CAN BE USED TO CONFIGURE THE DUS FOR DISPATCH, PER THE MEL.
- ONLY MANUAL AGM REVERSION IS AVAILABLE WHEN THE AIRPLANE IS ON THE GROUND. AUTOMATIC SENSOR REVERSION IS INHIBITED BELOW 60 KNOTS ON THE GROUND, THEREFORE, GROUND AND AIRBORNE FAILURES PRODUCE DIFFERENT RESULTS.

ON THE GROUND	DU 1	DU 2	DU 3	DU 4
ALL AGMs OPERABLE / NORM	AGM 1	AGM 2	AGM 3	AGM 4
AGM 1 FAILED / DU 1 ALT	AGM 2	AGM 4	X	AGM 3
AGM 2 FAILED / DU 2 ALT	AGM 1	AGM 4	X	AGM 3
AGM 3 FAILED / DU 3 ALT	AGM 1	AGM 2	X	AGM 4
AGM 4 FAILED / DU 4 ALT	AGM 1	AGM 2	X	AGM 3



- DU POWER SOURCES
 - DU 1
 - DU 2
 - DU 3
 - DU 4
- L ESS DC
 - L MAIN DC / L ESS DC
 - R MAIN DC / R ESS DC
 - R ESS DC

- AGMs (4) (AGM-200)
- CREATE AND DISPLAY GRAPHICS ON DUS
- AGMs ARE IN EACH MAU
 - MAUs 1 & 2 HAVE 1 AGM EACH
 - MAU 3 HAS 2 AGMs
- CONTROLLED BY “DISPLAY SYSTEM CONTROL” SWITCHES (4) (OPERATE ON THE GND ONLY)
- OPERATES AUTOMATICALLY WHEN AIRBORNE
- SYS LOGIC BORROWS FROM DU#3/AGM#3 WHEN FAILURES OCCUR

A DU WITH X INDICATES A LOSS OF POWER TO THE AGM OR AGM FAILURE.

POWER SOURCES

- AGM 1 - MAU 3B (L ESS DC, R MAIN DC)
- AGM 2 - MAU 3A (L MAIN DC, R MAIN DC)
- AGM 3 - MAU 2A (L MAIN DC, R MAIN DC)
- AGM 4 - MAU 1B (L MAIN DC, R ESS DC)

DU BLANKING / INTERMITTENT CAUSES:

- FAULTY NIC, INDICATED BY MAU Fail
- FAULTY AGM, INDICATED BY AGM Fail

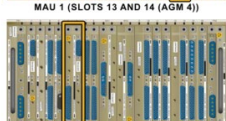
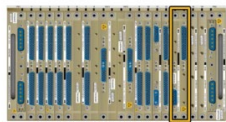
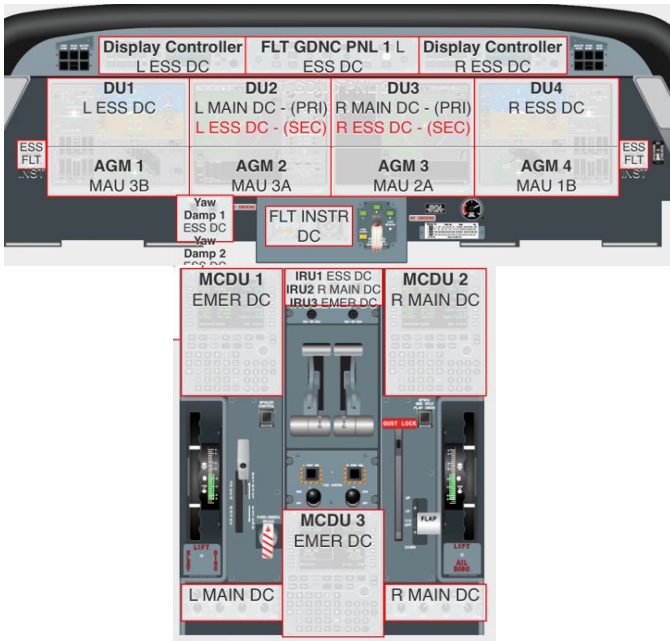


Figure EDS-9. Advanced Graphics Module (AGM)



- PLANEVIEW AVIONICS NAVIGATION SYSTEM
 - COMPRISED OF:
 - 3 FLIGHT MANAGEMENT SYSTEMS (FMS) (HONEYWELL NZ-2000)
 - 3 INERTIAL REFERENCE UNITS (IRU) THAT TOGETHER ARE THE INERTIAL REFERENCE SYSTEM (IRS) (HONEYWELL IR-600 LASERREF VI MICRO IRU)
 - 2 GLOBAL POSITIONING SYSTEMS (GPS) (HONEYWELL CMA-4024 w/ 24 CHANNELS)
 - 2 VHF NAVIGATION RECEIVERS (HONEYWELL NV-875A)
 - 2 ADF RECEIVERS (HONEYWELL DF-855)
 - 2 ATC TRANSPONDERS (HONEYWELL XS-857A)
 - 1 WEATHER RADAR UNIT (HONEYWELL WU-880)
 - 2 ENHANCED GROUND PROXIMITY WARNING SYSTEMS (EGPWS)
 - 1 TRAFFIC/ALERT COLLISION AVOIDANCE SYSTEM (TCAS) (L3 RT-951 TCAS 2000)
-
- TYPES OF AIRPLANE OPERATIONS PERMITTED**
 - TRANSPORT CATEGORY – LAND
 - INSTRUMENT AND NIGHT FLYING
 - CATEGORY 1 APPROACH OPERATIONS
 - FLIGHT INTO KNOW ICING
 - EXTENDED OVERWATER FLIGHT
 - POLAR NAVIGATION
 - CATEGORY II OPERATIONS (ASC 020 REQUIRED)
 - AFN, ADS-C, AND CPDLC DATA LINK OPERATIONS
 - RVSM
-
- NAVIGATION SPECIFICATION**
 - OCEANIC AND REMOTE AREAS OF OPERATION (FORMERLY CLASS II NAVIGATION)
 - DUAL GNSS – MAXIMUM PREDICTED FDE UNAVAILABILITY IS 51 MIN
 - SINGLE GNSS AND SINGLE IRS – MAXIMUM PREDICTED FDE UNAVAILABILITY IS 51 MIN
 - DUAL IRS ONLY – 6.2 HOURS MAXIMUM

EU DATA LINK MANDATE

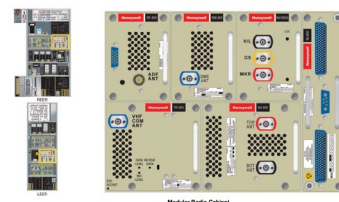
ALL G450 AIRCRAFT HAVE A PERMANENT ATN-B1 EXEMPTION; ADD "Z" TO ITEM 10 AND "CPDLCX" TO THE DAT/ CODE (ITEM 18) OF THE FLIGHT PLAN.

G550 AIRCRAFT WITH A CoFA BEFORE FEB 5, 2020 ARE ALSO PERMANENTLY EXEMPT. AIRCRAFT WITH A CoFA AFTER FEB 5, 2020 WILL REQUIRE ATN-B1 (COMING WITH ASC 115).

NOTE: FOR ILS, LOC, LOC-BC, LOA, AND SDF APPROACHES THE ACTIVE NAVIGATION SOURCE MUST BE LOC OR BC (GREEN NEEDLES) PRIOR TO CROSSING THE FAF.

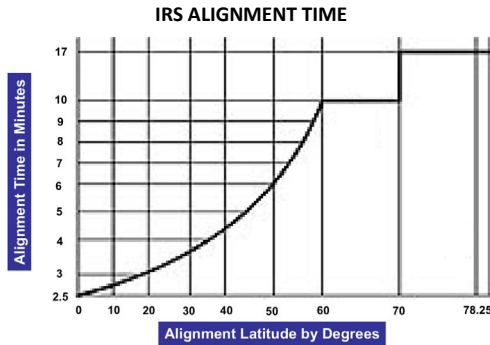
- NAT HLA (FORMERLY MNPS)
- RNP-10 / RNAV-10 (OCEANIC AND REMOTE CONTINENTAL OPERATIONS)
 - MAXIMUM PREDICTED FDE UNAVAILABILITY IS 34 MIN
 - DUAL GNSS – NO TIME LIMIT
 - SINGLE IRS AND SINGLE GNSS – NO TIME LIMIT
 - DUAL IRS ONLY – 6.2 HOURS MAXIMUM
- B-RNAV / RNAV-5 / RNP-5 (CONTINENTAL OPERATIONS)
- RNP-4 (OCEANIC AND REMOTE CONTINENTAL OPERATIONS)
 - MAXIMUM PREDICTED FDE UNAVAILABILITY IS 25 MIN
 - DUAL GNSS – NO TIME LIMIT
 - SINGLE GNSS – NO TIME LIMIT
- RNAV-2 / RNAV-1 (DPs AND ARRIVALS) / PRNAV / Q & T ROUTES
 - GNSS RAIM REQUIRED
- RNP-2 (OCEANIC AND REMOTE CONTINENTAL OPERATIONS)
 - GNSS IS REQUIRED
 - GNSS FDE FUNCTION AND DUAL GNSS ARE REQUIRED FOR OCEANIC / REMOTE RNP-2 OPERATIONS
- RNP-1 (TERMINAL OPERATIONS)
- RNP APCH – RNAV(GPS), RNAV(GNSS), OR RNP RWY XX
 - MINIMUM RNP VALUE OF RNP 0.3 (LNAV, LNAV/VNAV, AND LPV MINIMUMS)
 - MAXIMUM PREDICTED RAIM OUTAGE IS 5 MIN
- RNP AR – TO A MINIMUM VALUE OF RNP 0.1
 - SEE GAC-OIS-07: RNP SAAAR OPERATIONS
- ADVANCED RNP (A-RNP)
- ENROUTE, TERMINAL, AND APPROACH VNAV
 - VNAV OPERATIONS USING QFE ALTIMETER SETTINGS ARE PROHIBITED
- CVR DATA LINK RECORDING
- DATA LINK COMMUNICATIONS – FANS 1/A+
 - CPDLC AT RCP 240 USING VDL M0/A/2
 - ADS-C AT RSP 180 USING SATCOM (INMARSAT)
 - CPDLC-DCL
- SBAS – WASS, EGNOS, GAGAN, AND MSAS
- ADS-B OUT

- MRC (2) MODULAR RADIO CABINET
 - LEER AND REER
 - EACH MRC HOLDS LINE REPLACEABLE MODULES (LRM) THAT SUPPLY AIRCRAFT RADIO FUNCTIONS
 - EACH MRC CONTAINS FIVE RADIO MODULES: ADF, DME, MODE S TRANSPONDER (XPDR), VHF DATA RADIO (VDR), AND VOR / ILS / VDL (VIDL)





- IRU (3) LASER RING GYROS
- NOTE: FOR FLIGHT PLANNING, MAX IRS NAV WITHOUT SENSOR UPDATES IS 5.0 HRS.
- NOTE: NAVIGATION PERFORMANCE MAY BE DEGRADED IF THE IRU IS ALIGNED ABOVE 78.25°.
- EXAMPLE: [MISSILE GUIDANCE](#)
- ATTITUDE INFO FROM GRAVITY
- TRUE NORTH FROM EARTH'S TRUE EAST ROTATION
- UPDATED BY GPS (2)
- PRIMARY PWR IF INPUT >18 V DC < 36 V DC
- SECONDARY PWR (E-BATTS) IF PRIMARY PWR < 18 V DC
- STATIONARY ALIGNMENT (5-17 MIN)
- ALIGN IN MOTION (AIM) – G450 QRH EF-24, (15-30 MIN) – REQUIRES GPS INPUT; TURNS / ACCELERATING / DECELERATING HELPS
- AUTO REALIGN – UPDATES WHEN NOT IN MOTION (OCCURS BETWEEN 7.5 – 15 MINUTES AFTER STOPPING)

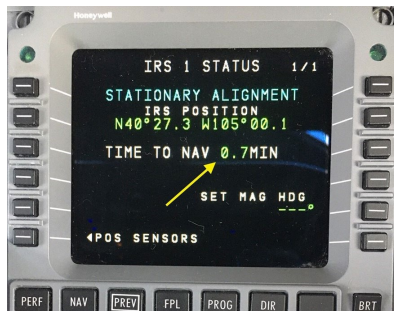


- IRS OUTPUTS
- PRIMARY ATTITUDE
 - MAGNETIC HEADING
 - AIRCRAFT LINEAR ACCELERATIONS
 - AIRCRAFT ANGULAR RATES
 - AIRCRAFT LAT/LONG BASED ON POS INIT

- IRU OPERATIONAL MODES
- POWER-UP
 - ALIGNMENT
 - STATIONARY ALIGNMENT
 - ALIGN IN MOTION (AIM)
 - AUTO REALIGN

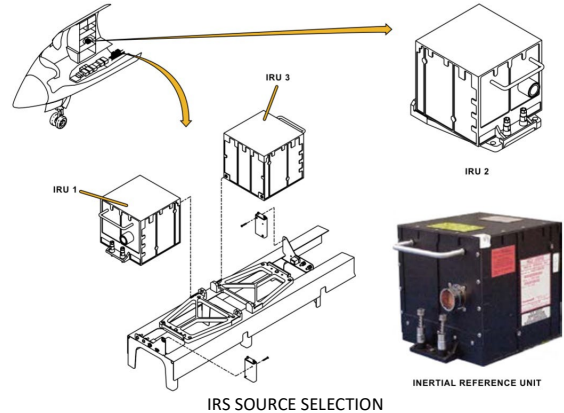
NOTE: END OF FLIGHT MODE STORES NAV PERF RECORDS AND AUTOCALIBRATION DATA IN NON-VOLATILE MEMORY.

NOTE: TIME TO NAV IS DISPLAYED ON THE IRS STATUS PAGE DURING ALIGNMENT.



- NAVIGATION
 - ATTITUDE
 - REVERSIONARY
 - ALIGN IN MOTION (AIM)
 - END OF FLIGHT (MOTIONLESS FOR 5 SEC)

- IRS STATUS PAGE
- IRS POSITION
 - IRS GROUND SPEED
 - WIND (TRUE)
 - DRIFT RATE
 - MILES FROM FMS POSITION



NOTE: IRU 1 AND 3 ARE LOCATED UNDER THE FLOOR IN THE CABIN OF THE AIRCRAFT. IRU 2 IS LOCATED IN THE REER.

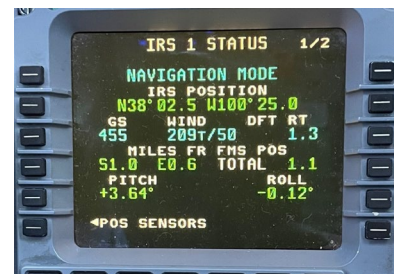
- HYBRID IRS
 - UTILIZES GPS PSEUDO-RANGES TO INDEPENDENTLY CALCULATE POSITION DATA
 - PRODUCES A TIGHTLY INTEGRATED GPS/IRS POSITION

NOTE: AT TIMES HYBRID IRS MAY HAVE A BETTER EPU THAN GPS.

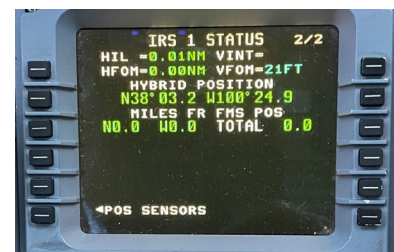
NOTE: IRS IS EXTREMELY ACCURATE IN SHORT PERIODS OF TIME YET ACCUMULATES DRIFT ERROR THAT COMPOUNDS OVER SEVERAL HOURS. GPS POSITION IS ACCURATE IN MOST PARTS OF THE WORLD BUT DOES HAVE SOME ERRORS INTRODUCED DUE TO ATMOSPHERIC CONDITIONS, SATELLITE COVERAGE AND GEOMETRY, AND INTERFERENCE. HYBRID BLENDS THE TWO, USING SENSOR-SPECIFIC ALGORITHMS TO FILTER OUT ERROR IN EACH.

NOTE: ONLY THE HYBRID PORTION OF THE IRS IS UPDATED WITH GPS, NOT THE IRS POSITION ITSELF. IRS STATUS PAGE 1/2 DISPLAYS THE IRS MILES FROM FMS POS; IRS STATUS PAGE 2/2 DISPLAYS HYBRID MILES FROM FMS POS. THEY CAN AND WILL DIFFER AS THE IRS DRIFTS.

EXAMPLE: IRS STATUS PAGE 1/2 SHOWING IRS POSITION 1.1 FROM FMS POS



EXAMPLE: IRS STATUS PAGE 2/2 SHOWING HYBRID POSITION 0.0 FROM FMS POS





- NAV SENSORS THE FMS WILL SELECT THE "BEST" SOURCE BASED ON EPU OF EACH SENSOR
- PROG PAGE 1

 1. GPS-D (GPS + SBAS)
 2. GPS
 3. HYBRID
 4. D-D (DME/DME)
 5. V-D (VOR/DME)
 6. IRS
 7. DEGRADE
 8. DR

NOTE: HONEYWELL DM-855 DME

NOTE: WHEN RECEIVING SBAS (GPS-D) A RAIM CHECK IS NOT REQUIRED.

NOTE: THE FMS CHOOSES THE BEST AVAILABLE SENSOR BASED ON THE LOWEST EPU. FOR THE FMS TO USE ANOTHER SENSOR THE NEW SENSOR HAS TO BE PERFORMING AT LEAST 5% BETTER THAN THE SENSOR CURRENTLY IN USE. THE EXCEPTION IS WHEN DME/DME OR VOR/DME IS BEING CONSIDERED. IN THIS CASE, A RADIO SOURCE MUST HAVE AN EPU AT LEAST 40% BETTER THAN A GPS OR IRS EPU TO BE CONSIDERED FOR NAVIGATION.

NOTE: ASC-912C INCLUDED A CHANGE IN FMS SENSOR LOGIC WHICH MADE IT EASIER FOR THE SYSTEM TO GO INTO HYBRID MODE AND ONCE THERE PREVENT THE SYSTEM FROM CYCLING BACK AND FORTH BETWEEN HYBRID AND GPS-D AS THE EPU FLUCTUATES. HYBRID SHOULD BE CONSIDERED NORMAL OPERATION UNLESS ACCOMPANIED BY A "CHECK GPS POSITION" OR "GPS FAILED" SCRATCHPAD MESSAGE.

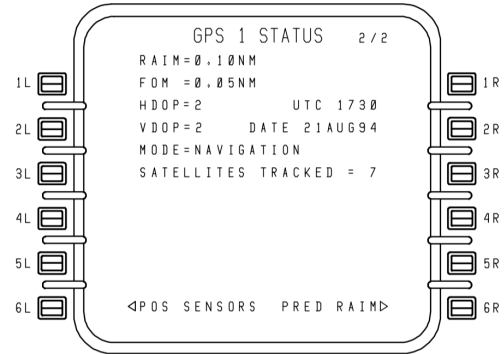
- SBAS
 - PROVIDES AUGMENTATION INFORMATION TO GPS/WAAS RECEIVERS TO ENHANCE ACCURACY AND RELIABILITY OF POSITION ESTIMATES
 - AUGMENTATION MESSAGES ALLOW GPS/WAAS RECEIVERS TO REMOVE ERRORS IN THE GPS SIGNAL
 - MAKES LPV APPROACH ACCURACY POSSIBLE
 - SBAS SYSTEMS:
 - WAAS – UNITED STATES AND CANADA
 - EGNOS – EUROPE
 - GLONASS – RUSSIA
 - MSAS – JAPAN
 - GAGAN – INDIA
 - GRAS – AUSTRALIA
 - CSTB – SOUTH AMERICA

NOTE: AN LP APPROACH IS NOT THE SAME AS AN LPV APPROACH. THE FMS HAS NOT YET BEEN APPROVED FOR LP APPROACHES. LP APPROACHES ARE NOT AUTHORIZED (SEE G450-MOL-11-0023, DATED AUG 30, 2011). LP APPROACH APPROVAL WILL BE AVAILABLE WITH ASC 913.

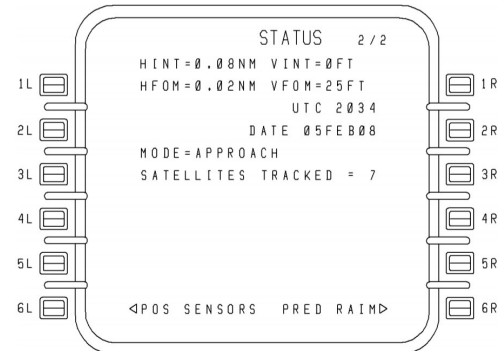
- GPS STATUS
 - HDOP & VDOP
 - HORIZONTAL & VERTICAL DILUTION OF PRECISION IS THE SATELLITE GEOMETRY FACTOR IN THE 2D HORIZONTAL AND VERTICAL POSITION SOLUTIONS; 1 BEING THE BEST GEOMETRY
 - 1-2: EXCELLENT
 - 2-5: GOOD; REPRESENTS A LEVEL THAT MARKS THE MINIMUM APPROPRIATE FOR MAKING ACCURATE DECISIONS. POSITIONAL MEASUREMENTS COULD BE USED TO MAKE RELIABLE IN-ROUTE NAVIGATION SUGGESTIONS TO THE USER
 - 5-10: MODERATE; POSITIONAL MEASUREMENTS COULD BE USED FOR CALCULATIONS
 - 10-20: FAIR; REPRESENTS A LOW CONFIDENCE LEVEL. POSITIONAL MEASUREMENTS SHOULD BE DISCARDED OR USED ONLY TO INDICATE A VERY ROUGH ESTIMATE OF THE CURRENT LOCATION
 - >20: POOR; MEASUREMENTS ARE INACCURATE
 - MODES
 - SELF-TEST
 - INITIALIZATION
 - ACQUISITION: ACQUIRING SATELLITES; NO VALID POSITION

- NAVIGATION: RECEIVING SATELLITES AND PRODUCING VALID POSITION
- DIFFERENTIAL: RECEIVING AN SBAS SIGNAL AND PRODUCING AN SBAS-CORRECTED POSITION
- APPROACH: PRODUCING SBAS-CORRECTED POSITION AND APPROACH NAVIGATION INFORMATION
- ALTITUDE AIDING
- VELOCITY AIDING
- FAILED

NON-SBAS EQUIPPED GPS STATUS PAGE



SBAS EQUIPPED GPS STATUS PAGE



- HINT/ VINT
- HFOM / VFOM
- HORIZONTAL / VERTICAL INTEGRITY
- HORIZONTAL / VERTICAL FIGURE OF MERIT

- NON WGS-84 AIRSPACE
- THE FMS WITH GPS POSITION UPDATING MAY BE USED FOR SIDS, STARS, AND ENROUTE NAVIGATION
- RAW DATA MUST BE USED FOR ILS, VOR, AND ADF APPROACHES THROUGHOUT THE APPROACH AND MISSED APPROACH

- PARTIALLY COMPLIANT WGS-84 AIRSPACE
- RNAV (GNSS) APPROACHES MAY BE FLOWN USING FMS WITH GPS UPDATING IF THE APPROACH CHART IS ANNOTATED "PANS-OPS"

- AIR DATA SYSTEM (ADS)
- 3 AIR DATA MODULES (ADMs) (HONEYWELL AZ-200)
- SOURCES: PITOT/STATIC AND TAT
- DIGITAL DATA TRANSMITTED TO THE EDS, SFD, EBDI, FMSs, FADECs, & CPAM
- THERE IS NO "AUTO TRANSFER" FOR **ADS Fail** OR **ADS Mismatch**

COMPUTES AND DISPLAYS:

- TOTAL AIR TEMPERATURE
- BARO CORRECTED ALTITUDE
- AIRSPEED
- TRUE AIRSPEED
- OVERSPEED WARNING
- PRESSURE ALTITUDE

CODE450:
▶ **DADC**



- ALTITUDE RATE
- MACH
- MAXIMUM OPERATING SPEED
- MAXIMUM OPERATING MACH

THE ADS SENDS DATA TO:

- AUTOMATIC FLIGHT CONTROL SYSTEM (AFCS)
- CABIN PRESSURIZATION SYSTEM (CPCS)
- MONITOR WARNING SYSTEM (MWS)
- INERTIAL REFERENCE SYSTEM (IRS)
- FMS
- TRANSPONDER
- RADAR
- FLIGHT DATA RECORDER
- TCAS
- EGPWS

- AUTOMATIC SENSOR REVERSION

*IN FLIGHT ONLY (>60 KTS),
INHIBITED BELOW 60 KTS.*

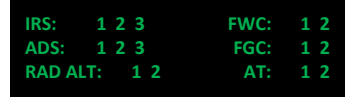
NOTE: THE FGC AND A/T SENSORS ALTERNATE EVERY FLIGHT.

G550 QRH NG-10

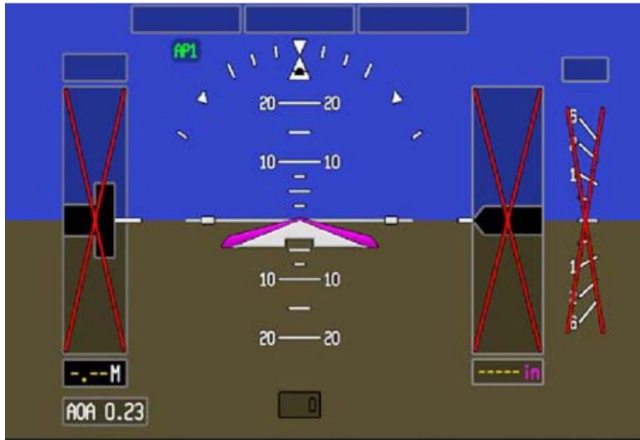
ALL SYSTEMS ON THE DC SENSOR PAGE WILL AUTO CHANGE FROM A FAILED SENSOR TO THE NEXT AVAILABLE SENSOR > 60 KTS

- FWC, FGC, AT, & RA SWITCH TO THE OTHER SENSOR
- IRS & ADS SWITCH TO THE THIRD SENSOR NORMALLY NOT BEING USED

ONLY THE FWC WILL AUTO CHANGE < 60 KTS

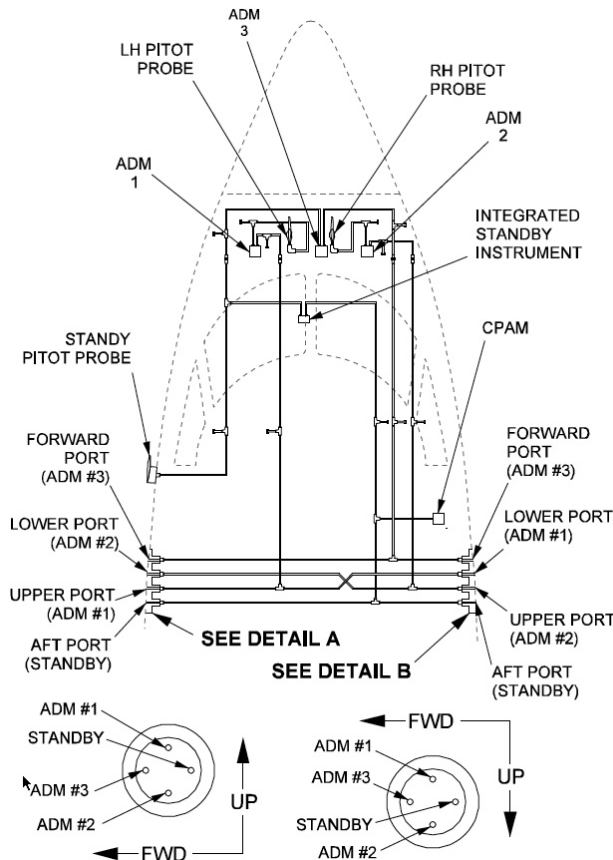


ADS FAILURE



- MONITOR AND WARNING SYSTEM (MWS)
- FWCs (2) WITHIN 2 MAUs
- **WARNING** (RED, TRIPLE CHIME)
- **CAUTION** (AMBER, DOUBLE CHIME)
- **ADVISORY** (BLUE, SINGLE CHIME)

NOTE: THE CAS WINDOW CAN DISPLAY A MAXIMUM OF 17 CAS MSG AT A TIME. IN THE EVENT OF A CCD FAILURE THE CAS SCROLL JOYSTICK ALLOWS FOR AN ALTERNATE MEANS OF CAS SCROLLING.



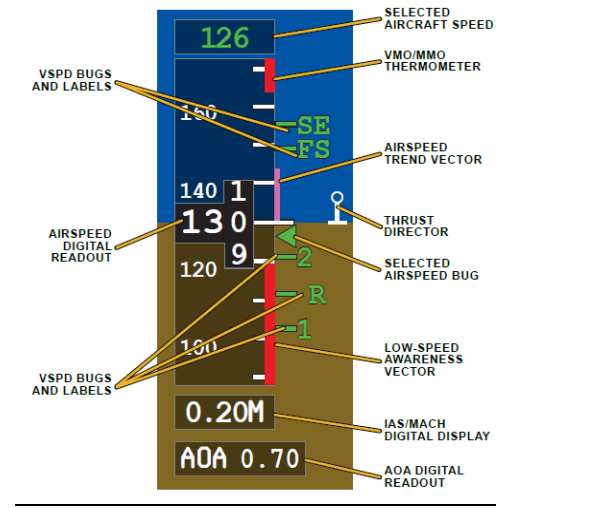
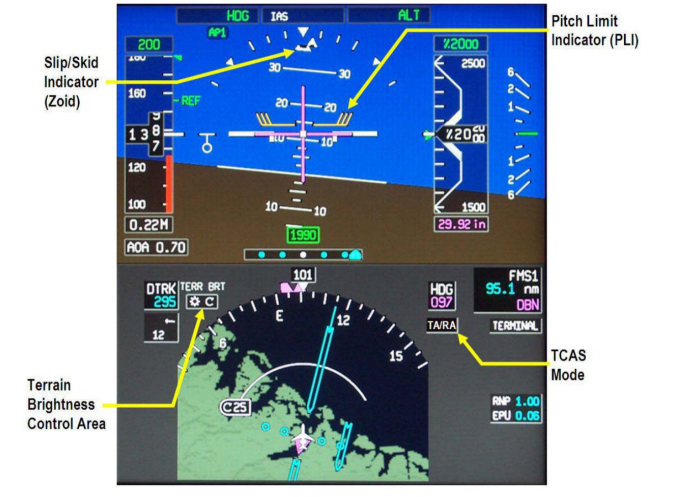
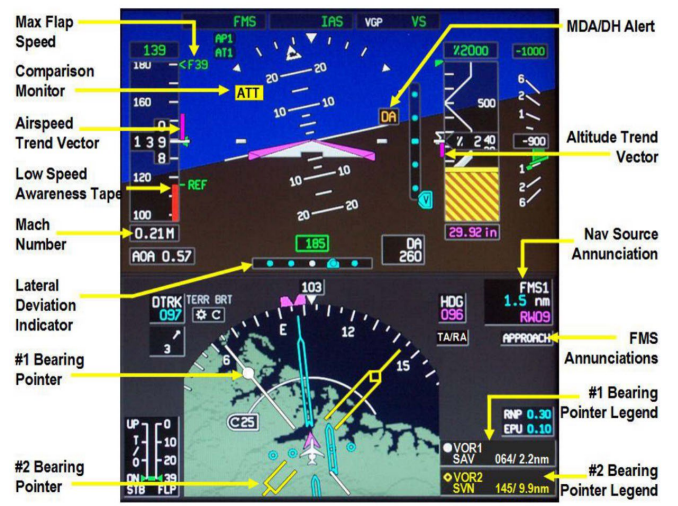
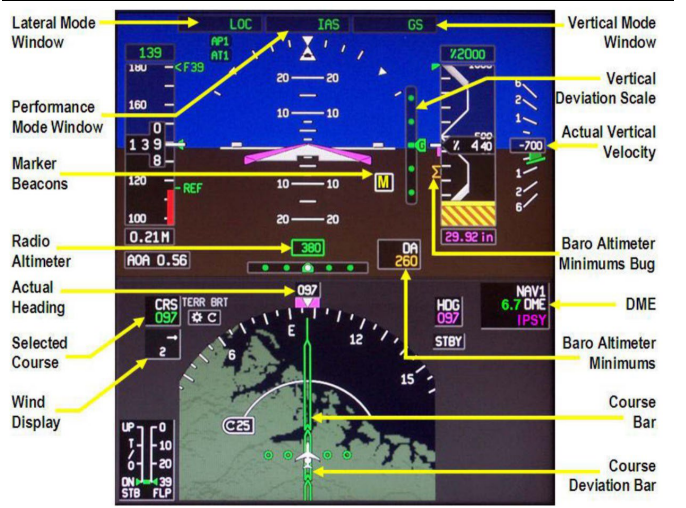
- AUDIO
 - TONE
 - LO/HI
 - CLACKER
 - "C" CHORD
 - FIRE BELL
 - LO/HI/LO SINGLE
 - LO/LO/LO SINGLE
 - TRIPLE CHIME
 - DOUBLE CHIME
 - SINGLE CHIME
- CONDITION
 - GEAR
 - OVERSPEED
 - ALTITUDE
 - APU FIRE
 - AP DISCONNECT
 - AT DISCONNECT
 - **MASTER WARNING**
 - **MASTER CAUTION**
 - URGENT ATC MSG
 - **ADVISORY**
 - STANDARD ATC MSG

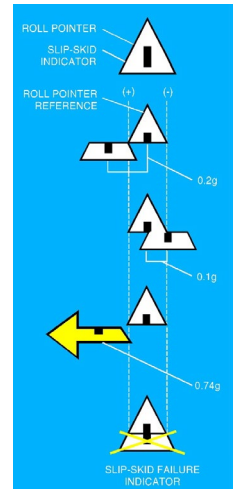
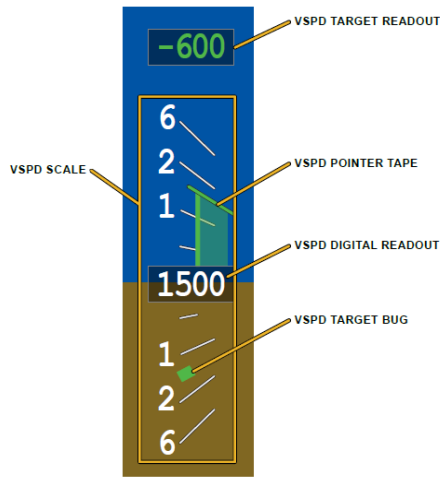
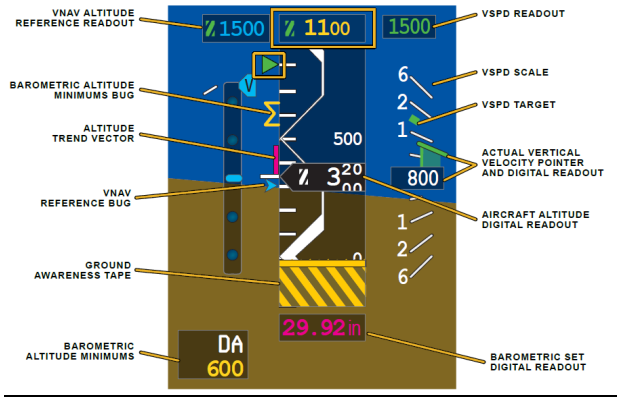


- **WARNING**
"INJURY OR LOSS OF LIFE"
- **CAUTION**
"DAMAGE OR LOSS OF EQUIPMENT"
- **ADVISORY**
"SYSTEM STATUS"
- **AIRCRAFT CONFIG WARNING**
ONE OF THE FOLLOWING (7) IS NOT CORRECT
 - FLAPS - NOT 10° OR 20°
 - ELEVATOR TRIM
 - SPEEDBRAKES HANDLE
 - PARKING BRAKE
 - THRUST REVERSER
 - GEAR HANDLE
 - GPWS / GND SPLR FLAP ORIDE SWITCH

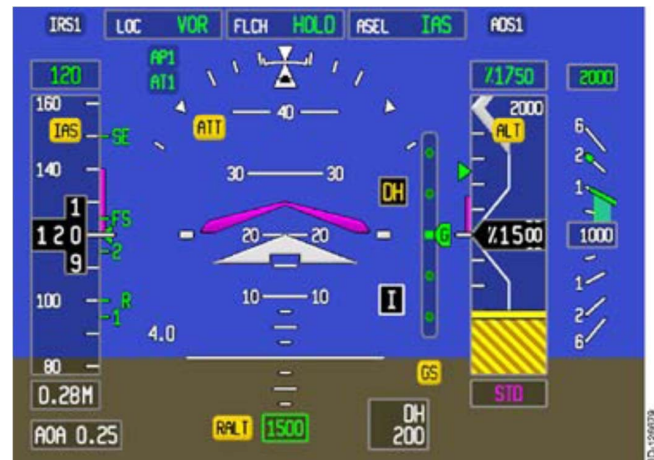
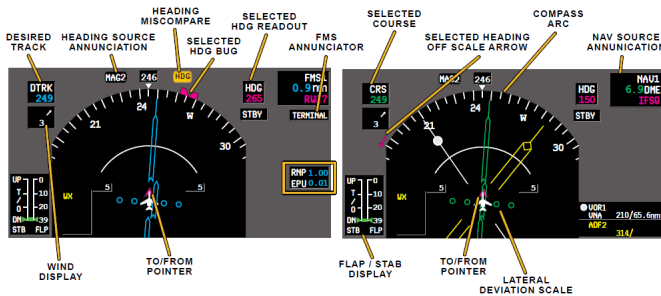
NOTE: WHEN THE ELEVATOR TRIM IS SET NEAR THE GREEN BAND LIMIT IT IS POSSIBLE TO GET AN **Aircraft Configuration** CAS MESSAGE CAUSED BY VIBRATION DURING THE TAKEOFF ROLL.

- PFDs
- PLI
- **VISIBLE AT 0.70 AOA**
- THRUST DIRECTOR
- AIRSPEED TREND VECTOR
- ALTITUDE TREND VECTOR
- WHEN ATs OFF
- AIRSPEED IN 6 SEC
- ALTITUDE IN 6 SEC





- COMPARISON MONITOR SYSTEM
- PIT – PITCH
- ROL – ROLL
- HDG – HEADING
- ALT – ALTITUDE
- IAS – AIRSPEED
- ATT - ATTITUDE
- ≥ 5°
- ≥ 6°
- ≥ 10°
- ≥ 200'
- ≥ 20 KTS
- BOTH PIT AND ROLL TRIPPED



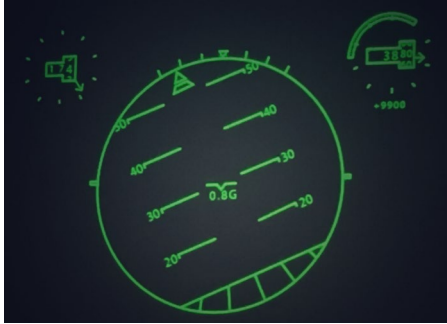
- UNUSUAL ATTITUDE DISPLAY (SVS)
- ACTIVATES WHEN:
 - PITCH ≥ 30°, OR
 - BANK ≥ 65°
- REMAINS UNTIL:
 - PITCH < 15°, AND
 - BANK < 35°
 - 2 SEC

SVS UNUSUAL ATTITUDE DISPLAY





HUD II UNUSUAL ATTITUDE DISPLAY



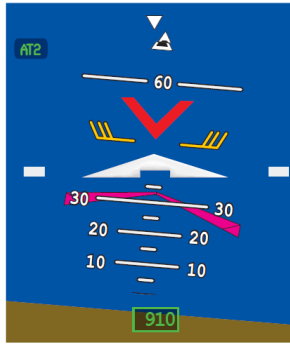
NOTE: G METER DISPLAY APPEARS BENEATH THE BORESIGHT (HUD II)

UNUSUAL ATTITUDE RECOVERY
 "PUSH, ROLL, PULL, POWER"

- 1) **P U S H** – UNLOAD THE WING
- 2) **R O L L** – PLACE LIFT VECTOR PERPENDICULAR TO HORIZON
- 3) **P U L L** – AT MAX AOA / G LOADING
- 4) **P O W E R** – MANAGE THRUST

CODE7700:

▶ **UNUSUAL ATTITUDES RECOVERY**



▪ CCDs (HONEYWELL CC-950)

▪ FUNCTIONS THAT THE CCD DOES THAT THE DC DOES NOT:

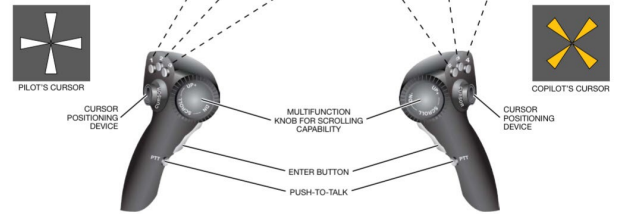
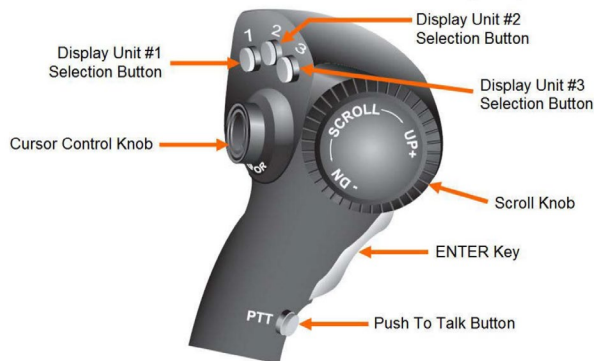
- GRAPHIC FLIGHT PLANNING
- RADIO TUNING
- AMEND ROUTE
- CHART SELECTION
- UPLINK WEATHER
- HOT MAP
- RANGE CHANGES, ETC

▪ AIRCRAFT HIGHLIGHT

- CURSER OVER AIRCRAFT, ENTER, TASK MENU:
- PPOS HOLD
 - EXIT HOLD (IF HOLDING)
 - RESUME HOLD (IF EXITING HOLD)
 - OFFSET
 - CANCEL OFFSET (IF OFFSET ACTIVE)
 - ACTIVATE VECTORS (IF IN TERMINAL MODE)



NOTE: IN PRACTICE, NOT ALL AIRCRAFT HIGHLIGHT OPTIONS ARE AVAILABLE WHEN YOU THINK THEY SHOULD BE.

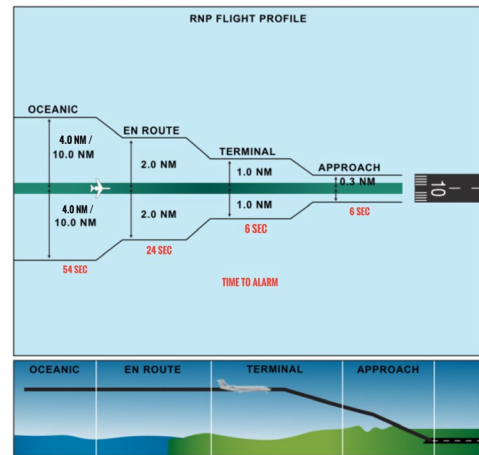


Cursor Control Devices

- | | | |
|-------------------|----------|--|
| ▪ SYNOPTIC COLORS | ▪ GREY | ▪ NOT IN USE |
| | ▪ GREEN | ▪ IN USE |
| | ▪ YELLOW | ▪ FAILED, OR DOES NOT AGREE WITH SWITCH POSITION |
-
- | | | |
|--------------|---|-----------------|
| ▪ RNP VALUES | ▪ OCEANIC/REMOTE (>200 NM FROM NEAREST NAVAID) | ▪ 4.0, ENHANCED |
| | ▪ ENROUTE | ▪ 2.0 |
| | ▪ TERMINAL (DEST<30NM OR ON SID/STAR) | ▪ 1.0 |
| | ▪ RAD (RADIO) - OVERLAY APPROACH WITHOUT GPS IN THE TITLE | ▪ 0.5 |
| | ▪ APPROACH (2 NM FROM FAF) | ▪ 0.3 |



NOTE: **APRCH ANNUNCIATION**



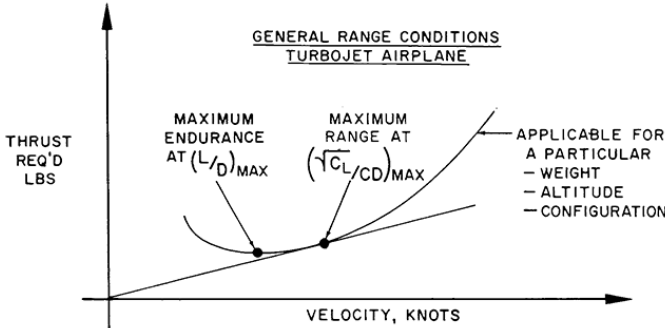
RNP SETTINGS: PROGRESS PAGE 2, ▶ 6L (RNP)





- AOA GUIDE
- CRUISE
- 0.2 TO 0.3 AOA (3° TO 5° PITCH)
- CODE7700:
 - L/D MAX
 - APPROACH
 - 0.5 AOA
 - VREF
 - 0.6 AOA

NOTE: MAXIMUM ENDURANCE SPEED GIVES YOU THE MOST TIME IN THE AIR PER POUND OF FUEL. THAT SPEED OCCURS WHEN FUEL FLOW IS AT A MINIMUM AND AT L/D_{MAX}, MOST AIRPLANES THAT CAN BE FOUND AT AN AOA OF 0.30; APPROX VREF+10.



SEE: [LONG RANGE CRUISE STEP CLIMB GUIDANCE](#)

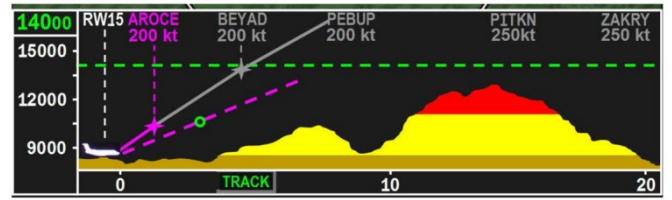
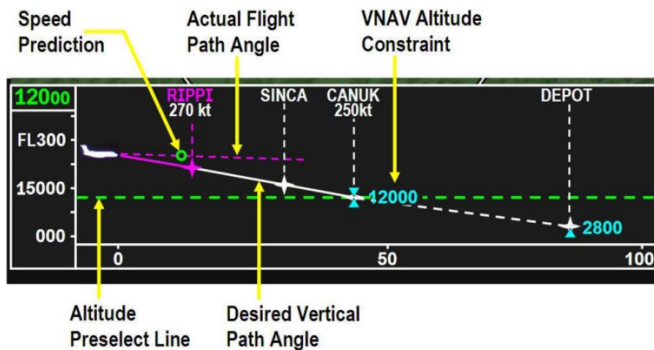
- ERRONEOUS / UNRELIABLE AIRSPEED INDICATIONS (QRH EF-2 / EF-1)
- OVERSPEED WARNING
- CLEAN
- FLAPS 10, 20, OR 39
- APPROACH
- FLAP SETTING
- IRS PITCH, ROLL, AND ACCELERATION
- TAS
- MAINTAIN AOA BETWEEN 0.3 AND 0.5**
- MAINTAIN ≤ 0.5 AOA**
- MAINTAIN ≤ 0.59 AOA UNTIL ON APPROACH**
- FLY THE APPROACH AT 0.59 AOA**

DICHIARA NOTE: CORD CHANGES IN THE WING (FLAP MOVEMENT) ARE SENSED BY THE RVDT'S WHICH REPORT TO THE FCU AND SOFTWARE SETS THE APPROPRIATE AOA VALUE. THE DISPLAYED AOA IS NORMALIZED, AND SHOWN ON THE PFD, BELOW THE AIRSPEED TAPE. SEVERAL INPUTS: FLAP SETTING, IRS PITCH, ROLL, AND ACCELERATION, TAS IS USED TO GIVE A NORMALIZED AOA READOUT BETWEEN 0.00 & 1.00. ANYTHING ABOVE 1.0 RESULTS IN A STALL.

NOTE: TAKEOFFS DURING STRONG CROSSWINDS OR GUSTY CONDITIONS MAY EXPERIENCE AN AOA MISCOMPARE AT APPROXIMATELY 60 KCAS WHICH GENERATES AMBER (CAUTION) AND CYAN (ADVISORY) MESSAGES. THESE MESSAGES WILL CLEAR AS THE AIRCRAFT ACCELERATES PAST 80 KCAS AND DO NOT AFFECT SAFETY OF FLIGHT (PER G450 QRH ND-4).

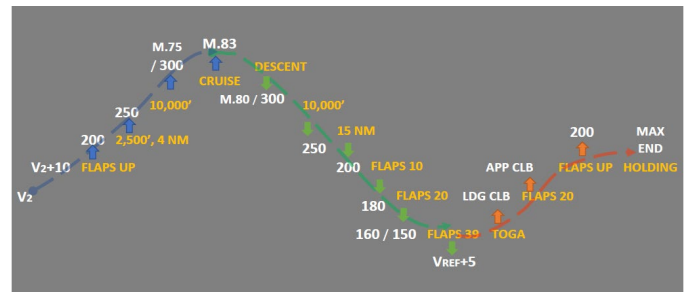
- VSD
- ACTUAL FLIGHT PATH ANGLE
- SPEED PREDICTION CIRCLE (GREEN) – WHEN THE ACTIVE WAYPOINT HAS A SPEED CONSTRAINT ASSOCIATED WITH IT
- TERRAIN UNDER FLIGHT PLAN
- TERRAIN UNDER TRACK – WHEN IN HDG MODE OR HOLDING

NOTE: THE WIDTH OF DISPLAY/PROTECTION IS WHATEVER THE CURRENT RNP VALUE IS, e.g. 4.0.

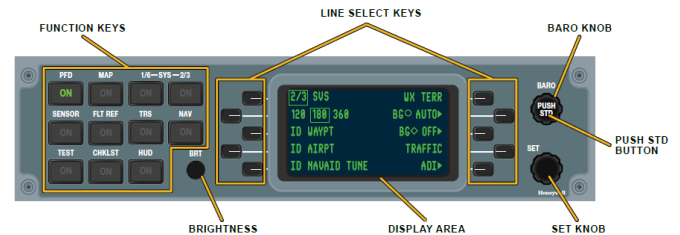


NOTE: THE TERRAIN COLOR IS GRAY WHEN THERE IS A FLYOVER WAYPOINT.

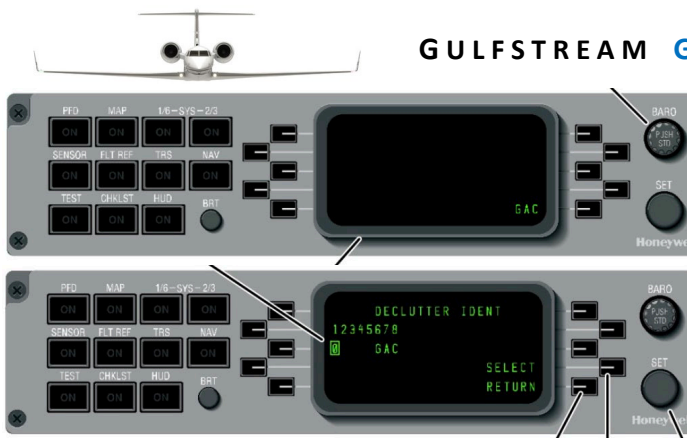
- AUTO SPEED SCHEDULE
- CLIMB
 - V2 ON TAKEOFF
 - AT 400' WITH FLAPS UP AND FLCH: 200 KTS
 - AT 1,500' V1, VR, V2 DISAPPEAR
 - AT 2,500' + 4 NM: 250 KTS
 - AT 10,000': 300 KTS / 75 M
- DESCENT
 - TOD TO 10,000': MACH/300 KTS
 - AT 10,000': 250 KTS
 - IAF OR 15 NM: 200 KTS
 - FLAPS 10°: 180 KTS
 - FLAPS 20°: 160 KTS / 150 KTS
 - FLAPS 39°: VREF + 5 KTS
- MISSED
 - TOGA: LDG CLB
 - FLAPS 20: APP CLB
 - FLAPS UP: 200 KTS
 - HOLDING: MAX END



- DISPLAY CONTROLLER (DC)
 - ANY ITEM BOXED IS BEING DISPLAYED ON THE EDS OR HUD
 - ANY ITEM NOT BOXED IS NOT BEING DISPLAYED ON THE EDS OR HUD
 - INVERSE VIDEO MEANS THE SET KNOB CAN CHANGE THE VALUE OF THE INVERSE VIDEO PARAMETER
 - MDA MUST BE "SET" AND BOXED IN ORDER TO GET TEN (10) FOOT INCREMENTS IN THE ALTITUDE SELECT WINDOW.



- DISPLAY CONTROLLER DECLUTTER IDENT
 - THE DECLUTTER IDENT IS CHANGEABLE WHEN THE AIRCRAFT IS ON THE GROUND
 - TO CHANGE, PRESS DC 5R TO ENTER THE DECLUTTER IDENT SUBMENU
 - THE DECLUTTER IDENT IS SENT TO THE FDR AND SHOULD REFLECT THE CURRENT AIRCRAFT REGISTRATION NUMBER



IF VSPEEDS DON'T BOX

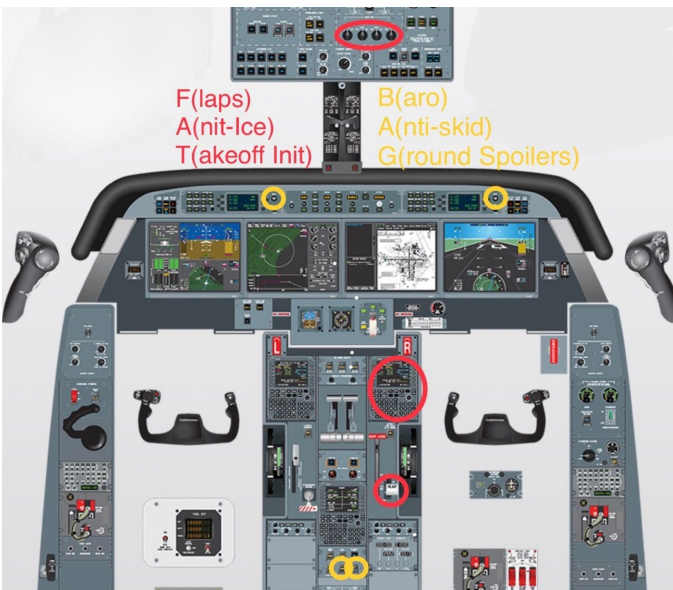
NOTE: DURING TAXI **VSPD** IS DISPLAYED ON THE AIRSPEED TAPE BECAUSE OF CONFIGURATION, e.g. GROUND SPOILERS NOT ARMED.



SEE FMS QUICK TASK ⇒ PRE-DEPARTURE ⇒ SPEEDS DON'T BOX

- DISAGREEMENT BETWEEN CURRENT CONFIG AND TAKEOFF INIT SELECTIONS:
 - FLAP POSITION
 - ANTI-ICE/ENGINE BLEEDS
- GND SPLRs - NOT ARMED
- GPWS/GND SPLR FLAP ORIDE - ON
- DISPLAY CONTROLLER SELECTIONS:
 - AUTO SPEEDS - NOT SELECTED (FLT REF PAGE 4R)
 - AUTO THRUST - NOT SELECTED (TRS PAGE 3R)
- ALTITUDE PRESELECT – NOT SET
- ALTIMETERS – NOT CORRECT OR DISAGREE
- ROUTE – DISCONTINUITY

PNEUMONIC: FAT-BAG



DC VREF

- FLAP HANDLE POSITION
- CURRENT AIRCRAFT WEIGHT

FLAP INOP VREF

HANDLE	ACTUAL	CORRECTION
10°	0°	+10 ±2 KTS
20°	10°	+5 ±2 KTS
39°	20°	+5 ±2 KTS

NOTE: VREF DOES NOT DISPLAY ON THE AIRSPEED TAPE WHEN IN MACH. TO VIEW VREF, IF DESIRED, SWITCH FROM MACH TO IAS WITH THE DISPLAY CONTROLLER: PFD ► CAS/MACH (2L)

METRIC ALTIMETRY



SELECT:

- DISPLAY CONTROLLER > PFD > ADI (5R) > METRIC ALT (5L)

PFD ALTITUDE DIGITAL READOUT:

- DISPLAYS THE BAROMETRIC ALTITUDE IN METERS (FOLLOWED BY "m") ABOVE THE ALTITUDE IN FEET
- DISPLAYS ON-SIDE PFD ALTITUDE PRESELECT IN METERS (FOLLOWED BY "m"), 50 METER INCREMENTS

NOTE: THE GUIDANCE PANEL ALT SEL DISPLAY ALWAYS REMAINS IN FEET



WARN INHIBIT

INHIBIT

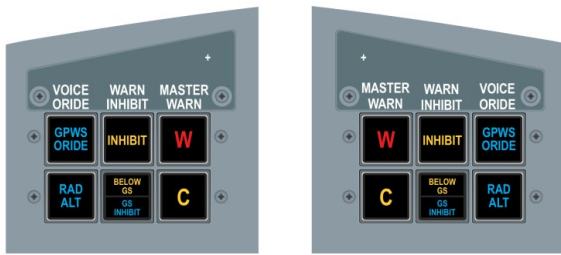
NOTE: EGPWS "WINDSHEAR," "BANK ANGLE," & "MINIMUMS" ARE NOT INHIBITED.

- GEAR MUST BE DOWN
- ON TAKEOFF – COMES OFF AT 400' (IF GEAR IS UP)
- AFTER LANDING – MUST BE DESELECTED BY CREW
- INHIBITS MASTER CAUTION AND (MOST) AMBER AND (ALL) BLUE CAS CHIMES – NOT CAS MSG
- EXCEPTIONS – CAS MSG CHIMES NOT INHIBITED:
 - WARNING (RED) MESSAGES
 - CAT 2 Invalid
 - Lateral CPL Data Invalid
 - Vertical CPL Data Invalid
 - LPV Unavailable



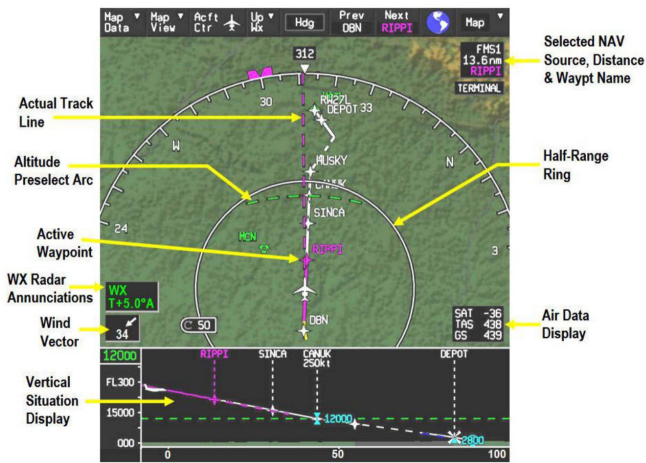
GS INHIBIT

- CAN BE SELECTED ANYTIME < 2,000' AGL
- ONCE PRESSED IT CANNOT BE MANUALLY DESELECTED UNTIL ON THE GND
- AUTOMATICALLY DESELECTS DESCENDING < 30' AGL, OR CLIMBING ABOVE 2,000' AGL



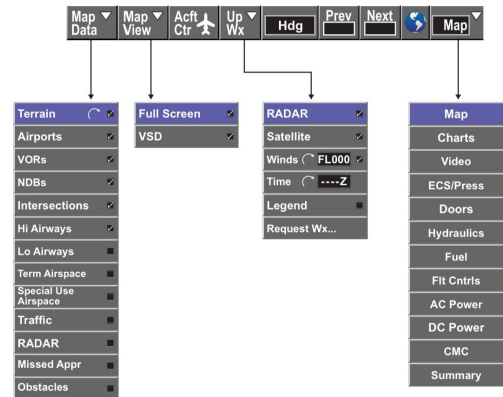
DEFAULT MAP (MFD) SELECTIONS

- TERRAIN
- OBSTACLES
- WEATHER
- TRAFFIC



NOTE: THE MAP WIND DISPLAY COMES FROM THE SELECTED FMS SOURCE AND CAN BE DISPLAYED IN EITHER VECTOR OR X-Y FORMAT VIA THE DISPLAY CONTROLLER (MAP, 5L). THESE ARE NOT INSTANTANEOUS WINDS.

NOTE: INSTANTANEOUS WINDS ARE DISPLAYED ON THE HUD AND MCDU IRS STATUS PAGE (NAV > POSITION SENSOR (4L) > IRS 1 STATUS (2R)).



Control Abstract Layer Function

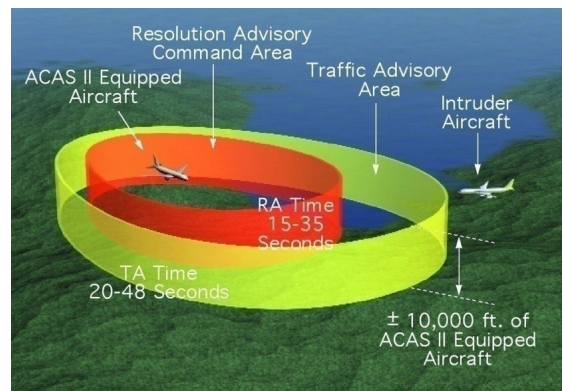
TCAS

HONEYWELL
TCAS-2000/ACAS

AMBER TARGET

RED TARGET

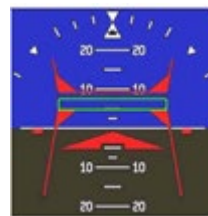
- CAN MONITOR 50 TARGETS
- CAN DISPLAY 32 TARGETS
- DETECTS MODE S TARGETS AT 120 NM
- EXCHANGES MODE S DATA AT 40 NM
- DETECTS MODE A OR C TARGETS AT 20 NM
- TRAFFIC ALERT (TA) - POSES A **COLLISION DANGER WITHIN 20 TO 48 SEC**
- RESOLUTION ALERT (RA) - POSES A **COLLISION DANGER WITHIN 15 TO 35 SEC**



TCAS CONTROL

MODE

- TA/RA
- TA-ONLY, INHIBITS RESOLUTION ADVISORIES
- STBY



NOTE: SELECT TA-ONLY WHEN SINGLE ENGINE.

ALT

- REL – RELATIVE ALTITUDE OF TARGETS
- ABS – ABSOLUTE ALTITUDE OF TARGETS (“ABS” TIMES OUT AFTER 10 SECONDS, RETURNS TO “REL”)

ADS-B

- ON
- OFF

CODE450:

- ▶ **TCAS**
- ▶ **TCAS RA**

AURAL INHIBIT:

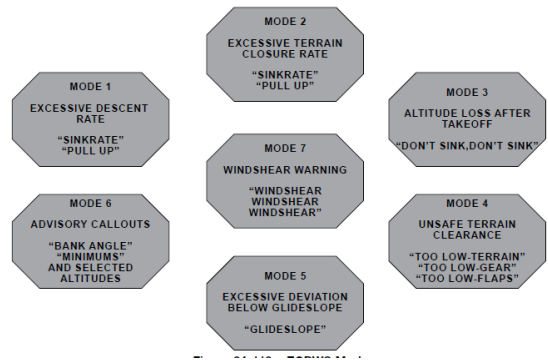
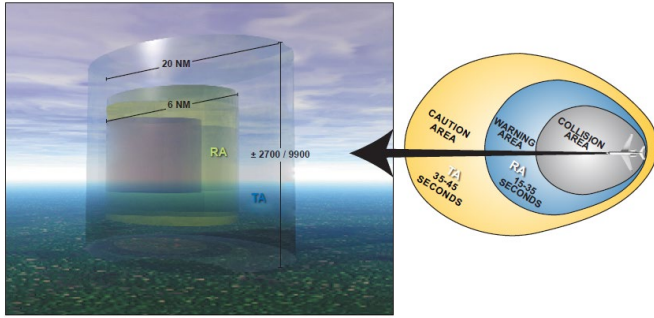
- RAs INHIBITED BELOW 500' AGL
- TAs INHIBITED BELOW 500' AGL

ALT RANGE

- ABOVE: +9,900' AND -2,700'
- BELOW: +2,700' AND -9,900'

ALT RANGE IN AUTO

- LEVEL FLIGHT: +2,700' AND -2,700'
- CLIMBING (>300FPM): +9,900' AND -2,700'
- DESCENDING (>300FPM): +2,700' AND -9,900'



WARNING TYPE	WARNING LEVEL	DISPLAY SYMBOL	AURAL WARNING (EXAMPLE)
RESOLUTION ADVISORY (RA)	HIGHEST	FILLED RED SQUARE 	CLIMB - CLIMB
TRAFFIC ADVISORY (TA)	HIGH	FILLED AMBER CIRCLE 	DESCEND - DESCEND - DESCEND
PROXIMITY TRAFFIC	LOW	FILLED CYAN DIAMOND 	TRAFFIC - TRAFFIC
NON-THREAT TRAFFIC	LOWEST	EMPTY CYAN DIAMOND 	N/A

NOTE: FIGURES IN PARENTHESES ARE VARIATIONS INDICATING INTRUDER MOVEMENT.



DICHIARA NOTE: TCAS RA ON THE HUD IS PATH BASED, ON THE PFD IS RATE BASED. USE PFD TO AVOID CONFUSION BECAUSE THE RIGHT SEAT DOES NOT HAVE A HUD.

- EGPWS (HONEYWELL EGPWM-100)
 - NOTE: THE "E" PART OF EGPWS GIVES YOU A TERRAIN DATABASE. SEE TAWS BELOW.
 - 7 MODES OF OPERATION:
 - NOTE: MAUs 2 & 3 HOUSE THE EPGWMS.
- PROXIMITY COMPUTATIONS ARE PERFORMED USING THE TOPOGRAPHICAL DATABASE AND INPUTS FROM THE:
- GPS
 - FMS
 - IRS
 - ADS
 - RAD ALT
- 7 MODES OF OPERATION:
- MODE 1 – EXCESSIVE DESCENT RATE
 - MODE 2 – EXCESSIVE CLOSURE TO TERRAIN
 - MODE 3 – ALTITUDE LOSS AFTER TAKEOFF
 - MODE 4 – UNSAFE TERRAIN CLEARANCE
 - MODE 5 – EXCESSIVE GLIDESLOPE DEVIATION
 - MODE 6 – ADVISORY CALLOUTS
 - MODE 7 – DETECTION OF SEVERE WINDSHEAR

- EGPWS TEST
- SUCCESSFUL TEST:
 - "TERRAIN TEST" DISPLAYED ON INAV/MAP
 - CHANGE OF THE INNER RANGE RINGS TO 5 MILES
 - REBUILD OF THE TERRAIN DISPLAY

NOTE: TO PROPERLY TEST THE EGPWS THE IRSs NEED TO BE ALIGNED.

NESTER NOTE:

- LONG TEST: 65 SECONDS LONG. PRESS THE GPWS TEST BUTTON FOR 2 SECONDS. TO STOP THE TEST, PRESS THE TEST BUTTON AGAIN.
- SHORT TEST: GIVE THE GPWS TEST BUTTON ONE SHORT PRESS.

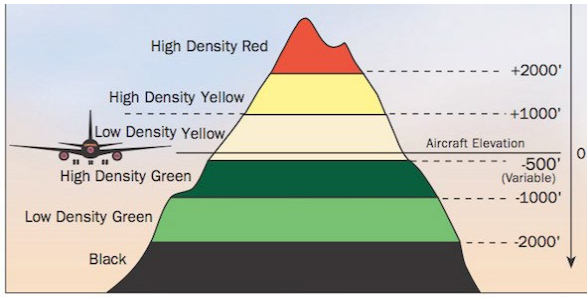
- TERRAIN AWARENESS WARNING SYSTEM (TAWS)
- TAWS IS PART OF THE EGPWS PACKAGE
- TAWS CONTAINS THE TERRAIN DATABASE
- ANY YELLOW OR RED TERRAIN DISPLAYED IS AT OR ABOVE THE AIRCRAFT'S ALTITUDE:
 - LOW DENSITY YELLOW TERRAIN IS BETWEEN -500' TO +1,000'
 - HIGH DENSITY YELLOW TERRAIN IS > 1,000' BUT < 2,000'
 - RED TERRAIN IS > 2,000'

NOTE: THE TERRAIN DATABASE IS LABELED THE "THREAT DATABASE" IN THE RED DISK UPDATE SERIES.

NOTE: IT IS POSSIBLE TO HAVE TERRAIN AND WEATHER DISPLAYED ON ONE PILOT'S SIDE BY SELECTING WEATHER OR TERRAIN FOR THE HSI, THEN THE OTHER DISPLAY FOR THE MFD MAP.

- TAWS ALERT:
- TERRAIN CAUTION OCCURS APPROX 60 SEC PRIOR TO TERRAIN CONFLICT
 - MAP AND HSI OUTER SCALE TO 10 MILE RANGE
 - GND PROX FLAG APPEARS ON BOTH ADIS
 - AURAL ALERT "CAUTION TERRAIN...CAUTION TERRAIN"
- TAWS WARNING:
- TERRAIN WARNING OCCURS APPROX 30 SEC PRIOR TO TERRAIN CONFLICT
 - PULL UP DISPLAYS ON BOTH ADIS
 - AURAL WARNING "PULL UP...PULL UP"





NOTE: SVS TERRAIN ABOVE THE HORIZON LINE IS ABOVE YOUR CURRENT ALTITUDE:

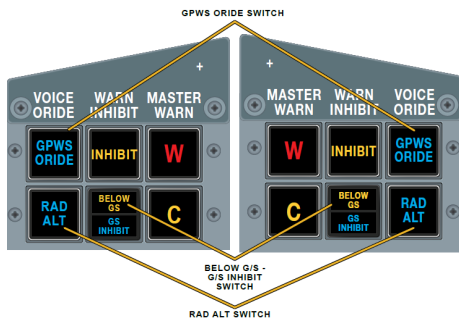


- SV PFD RANGE RINGS
- POSITIONED AT 3, 5, 10, 20, AND 30 NM
- FOLLOW THE CONTOUR OF THE TERRAIN



VOICE ORIDE:

- GPWS ORIDE
- ALL EGPWS ALERTS ARE INHIBITED EXCEPT **WINDSHEAR**
- RAD ALT (HONEYWELL RT-300)
- ALL EGPWS ALTITUDE AWARENESS AURAL CALLOUTS ARE INHIBITED EXCEPT "MINIMUMS" AND "BANK ANGLE"
- "BANK ANGLE"
 - > 150 FT AGL, CALLOUT OCCURS AT 40° BANK
 - < 150 FT AGL, CALLOUT PROGRESSIVELY REDUCES WITH ALTITUDE
 - < 30 FT AGL, CALLOUT OCCURS AT 10° BANK
 - < 5 FT AGL, CALLOUT IS INHIBITED



- SV RUNWAY DETAILING
- DISPLAYED WHEN WITHIN:
 - 1 NM LATERALLY
 - 500 FT VERTICALLY
 - 30° OF VIEW-POINT BEARING



- SV RUNWAY LEAD-IN / EXTENDED CENTERLINE
- 1 NM INTERVALS UP TO 9 NM
- DISTANCE DISPLAYED TO THE RIGHT OF THE CHEVRON



- TERRAIN INHIBIT
 - SELECT WITHIN **15 NM** OF AN AIRPORT THAT:
 - HAS NO PUBLISHED IAP
 - < 3,500' RUNWAY
 - NOT IN TERRAIN DATABASE
 - IF QFE ALTIMETER IS BEING USED IN NON WGS-84 COUNTRIES (NO GEOMETRIC ALTITUDE/GPS)



- TERRAIN AWARENESS
 - TERRAIN RANGE
 - 20 NM
 - 5 NM INNER RING
 - 10 NM OUTER RING

- SV HSI VIEW FRUSTUM "FIELD OF VIEW"
 - DEPICTS THE LATERAL LIMITS OF THE RENDERED SVS TERRAIN



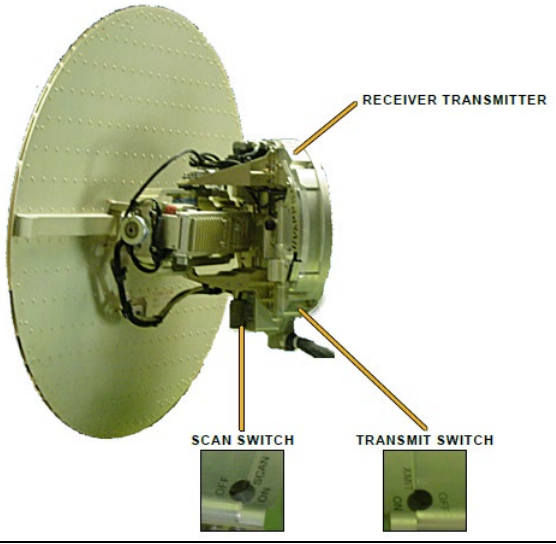
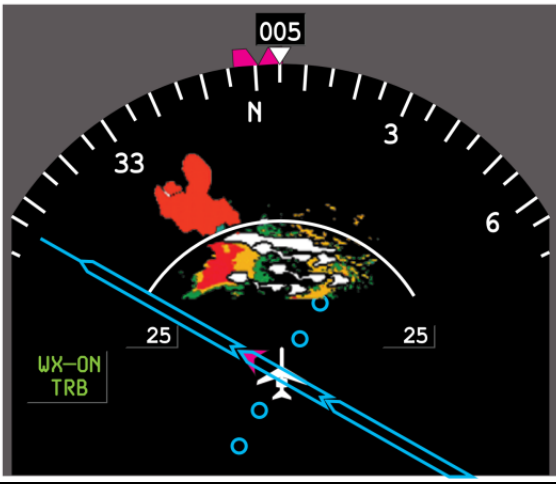
- GPWS/GND SPLR FLAP ORIDE
- PREVENTS "TOO LOW, FLAPS" FOR LANDING FLAPS 20° OR LESS
- ALLOWS GND SPOILERS TO DEPLOY WITH WHEEL SPIN UP WITH FLAPS 20° OR LESS



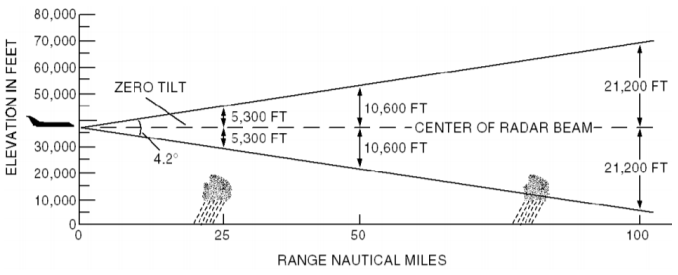
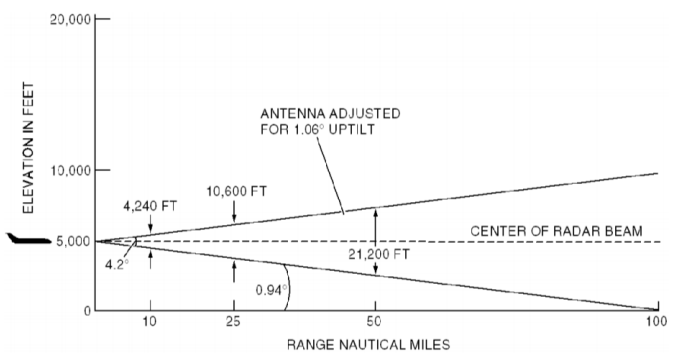
- WINDSHEAR WARNING
 - NOTE: THERE ARE NO WINDSHEAR ALERTS DURING THE TAKEOFF ROLL PRIOR TO ROTATION; BE VIGILANT FOR SIGNS OF WINDSHEAR SUCH AS AIRSPEED STAGNATION.
 - NOTE: > 1,500' AGL THERE ARE NO WINDSHEAR ALERTS. DURING A WINDSHEAR ESCAPE THE WINDSHEAR MAY NOT BE OVER JUST BECAUSE THE ALERT HAS CEASED. IT MAY JUST BE DUE TO CLIMBING > 1,500' AGL.
 - MORE INFO, SEE: [WINDSHEAR ESCAPE](#)
- TAKEOFF
- APPROACH
- MISSED APPROACH
- CAUTION (AMBER-DOUBLE CHIME)
- WARNING (RED) – TRIPLE CHIME
- ROTATION TO 1,500' AGL
- 1,500' TO 10' AGL
- TO 1,500' AGL
- INCREASING PERFORMANCE
- QRH ⇒ CAUTION MESSAGES (MB) ⇒ OTHER CAUTION ANNUNCIATIONS
- DECREASING PERFORMANCE
- QRH ⇒ WARNING MESSAGES (MA) ⇒ OTHER WARNING ANNUNCIATIONS

- RADAR – HONEYWELL PRIMUS WU-880 (24-INCH RADIATOR)
- WHILE REFUELING
- DISTANCE FROM FUELING OPS
- DISTANCE FROM PERSONNEL
- TO TURN RADAR ON WHILE ON THE GND
- VERY HEAVY RAINFALL
- HEAVY RAINFALL
- LESS SEVERE RAINFALL
- MODERATE RAINFALL
- TURBULENCE
- NEVER
- 300'
- 49'
- PRESS **STAB** BUTTON 4 TIMES IN 3 SEC
- MAGENTA
- RED
- YELLOW
- GREEN
- WHITE

CODE7700:
 ► [RADAR](#)
 ► [RADAR TECHNIQUES](#)
 ► [RADAR CONFIDENCE CHECK](#)



- TILT
 - NORMAL TILT FUNCTION IS +15° TO -15°
 - ACTUAL TILT IS DISPLAYED IN THE LOWER LEFT CORNER OF THE MAP
- "PULL ACT"
 - "ALTITUDE COMPENSATED TILT"
 - AUTOMATICALLY COMPENSATES FOR CHANGES IN RANGE SELECTION AND ALTITUDE
 - CAN BE "FINE TUNED" AT 2° INCREMENTS
 - AN "A" IS ADDED TO THE ACTUAL TILT DISPLAY





- RANGE**
- CONTROLLED BY EITHER THE RANGE KNOB OR THE CCD SCROLL KNOB
 - 1-5 NM (1-NM INCREMENTS MAP ONLY, PFD MIN RANGE IS 5 MILES), NO WEATHER IS DISPLAYED < 10 NM
 - 10 NM
 - 25 NM
 - 50 NM
 - 100 NM
 - 300 NM – MAX RANGE ON PFD – MAX RADAR RANGE
 - 400 NM – MAP ONLY, FLIGHT PLAN MODE
 - 500 NM – MAP ONLY, FLIGHT PLAN MODE

NOTE: **WX** (FLASHING) MEANS THE R/T ANTENNA IS POWERED BUT WX IS NOT DISPLAYED.

- MODE**
- OFF – WEATHER RADAR UNIT IS DEACTIVATED
 - STBY – 45 SEC WARM UP; FLASHES “WAIT”
 - TEST – COLORED TEST PATTERN; **DURING TEST THE WEATHER RADAR IS TRANSMITTING X-BAND MICROWAVE ENERGY**
 - WX – ACTIVATES THE WEATHER RADAR UNIT’S RECEIVER TRANSMITTER ANTENNA
 - GMAP – GROUND MAPPING MODE OPTIMIZES DISPLAY OF GND TARGETS

- SLV**
- THE RADAR CONTROL PANEL IS OFF & IS SLAVED TO THE OTHER RADAR CONTROL PANEL



- GAIN**
- PRESSED IN
 - NORMAL POSITION
 - GAIN IS SET TO A PRESET LEVEL OF CALIBRATION
 - OPTIMIZED FOR CONVECTIVE WEATHER AVOIDANCE
 - KNOBS ROTARY FUNCTION IS DISABLED; ROTATING THE KNOB HAS NO EFFECT
 - PULLED OUT
 - VARIABLE GAIN MODE
 - ENABLES ROTARY FUNCTION OF THE KNOB – MIN TO MAX GAIN

- BRT**
- HAS NO FUNCTION DESPITE WHAT THE OM AND FSI HANDBOOKS SAY. SEE MM 34-44-00 WEATHER RADAR SYSTEM – ADJUSTMENT/TEST.

- TGT**
- LOOKS FOR WX TARGETS 50 NM AHEAD OF THE CURRENT WX RADAR SELECTION. FLASHES TO LET YOU KNOW IF ANY MORE RED WX IS PAINTED AHEAD

- STAB**
- URNS THE GYRO STABILIZATION ON AND OFF – PITCH & ROLL
 - URNS RADAR ON WHILE ON THE GROUND WHEN PRESSED 4 TIMES IN 3 SECONDS

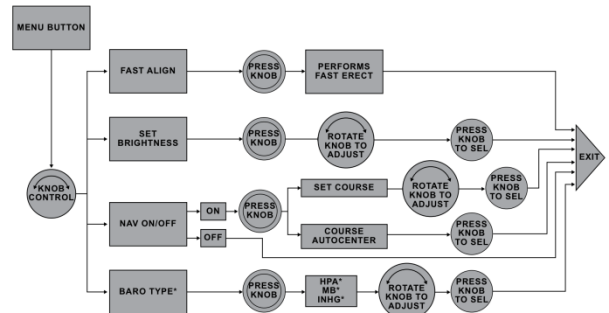
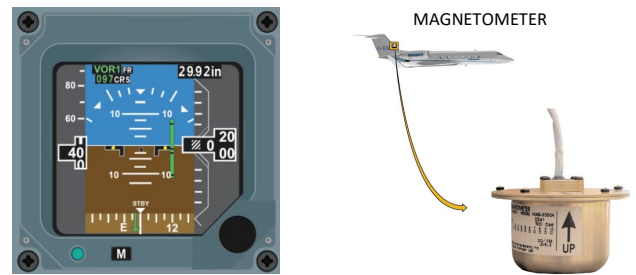
NESTER NOTE: THE RADAR POWERS UP WITH STABILIZATION FUNCTION INACTIVE. TO ACTIVATE THE STABILIZATION ON EACH UNIT PRESS THE “STAB” BUTTON ON EACH WX RADAR CONTROLLER AT POWER-UP.

- RCT**
- RAIN ATTENUATION COMPENSATION
 - TRIES TO BYPASS THE WX SO IT CAN SEE RAIN BEHIND CURRENT RADAR PAINTS
 - COMPENSATES FOR ENERGY LOSS

- TRB**
- TURBULENCE DETECTION MODE
 - ONLY AVAILABLE WITH RANGE < 50 NM
 - A “/T” IS ADDED TO THE MODE FIELD – “WX/T”
 - DETECTS MODERATE TURBULENCE WITHIN RAIN ECHOES – SHOWN IN SOFT WHITE
 - TRB MODE CANNOT DETECT CAT

- PRIMUS 880 HIDDEN MODES**
- FORCED STANDBY (FSBY)
 - EXIT METHOD: PRESS **STAB** 4 TIMES IN 3 SECONDS
 - ROLL OFFSET;
 - LOPSIDED GROUND RETURNS CAN BE ELIMINATED BY ROLL OFFSET ADJUSTMENTS (SEE PLANEVIEW MANUAL)
 - INSTALLATION SETTINGS: ROLL GAIN, PITCH OFFSET, AND PITCH GAIN

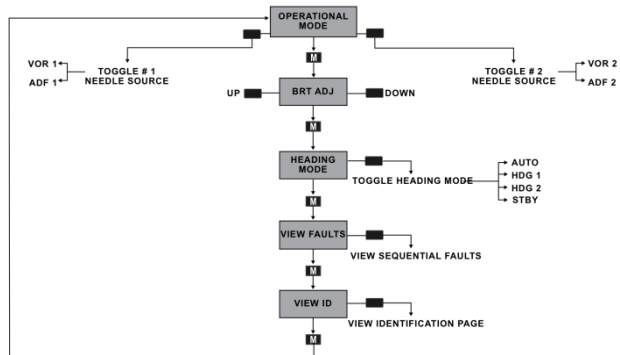
- SFD – STANDBY FLIGHT DISPLAY (L3 GH-3100)
 - HAS AN INDEPENDENT INTERNAL ATTITUDE SOURCE
 - HAS A STAND-ALONE HEADING SOURCE – MAGNETOMETER
 - HAS A DEDICATED PITOT-STATIC SYSTEM (STBY SYSTEM)



NOTE: **SSEC** DISPLAYED ON THE SFD INDICATES A LOSS OF STATIC SOURCE ERROR CORRECTION TO THE SFD. THIS IS NORMAL ON THE GROUND BEFORE ENGINE START WITH AOA HEAT OFF. IN THE EVENT OF LOSS OF SSEC INFLIGHT POSITION ERROR CHARTS ARE FOUND IN THE AFM (SECTION 05-01-00).

- EBDI – ELECTRONIC BEARING & DISTANCE INDICATOR** (L3 EBDI-4000 RMI)
 - HEADING SOURCES
 - HDG 1 – IRS 1
 - HDG 2 – IRS 2
 - STBY – SFD



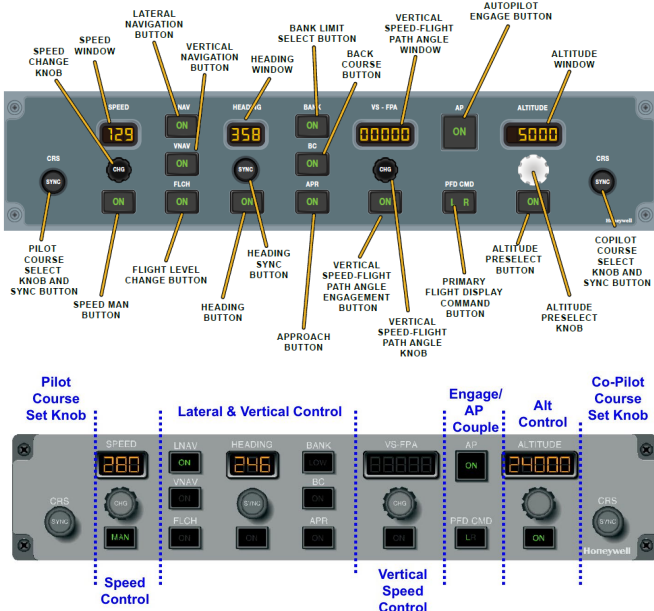


Default Sources:



CODE450: ▶ **STANDBY FLIGHT INSTRUMENTS**

- GUIDANCE PANEL (GP) (HONEYWELL GP-500)



- AFCS – AUTOMATIC FLIGHT CONTROL SYSTEM
 - NOTE: ON PERF INIT 5/5 PAGE ACCIDENTLY DELETING BOW (1L) INSTEAD OF FUEL (2L) WILL RESULT IN AN AUTOPILOT AND AUTO THROTTLE DISENGAGEMENT.
- TWO CHANNELS (1 & 2)
 - EACH CHANNEL HAS ITS OWN FLIGHT GUIDANCE CONTROL SYSTEM (FGCS)
 - EACH FGCS HAS ITS OWN:
 - AUTOPILOT
 - FLIGHT DIRECTOR
 - AUTO THROTTLE
 - YAW DAMPER
 - STALL PROTECTION
- AFCS INPUTS:
 - FMS, IRS, & GP

AUTOPILOT

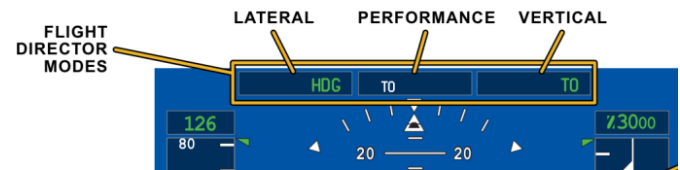
- MIN ENGAGE HEIGHT
- **200'**, EVEN FOR 14 CFR PART 135 (135.93(b)(1))

- MIN DISENGAGE HEIGHT
- PRECISION APPROACH – **60' AGL**
- NON-PRECISION – **50' < MDA**
- **LNAV/VNAV – AT DA**
- FLIGHT MODE ANNUNCIATIONS:
 - LATERAL
 - PERFORMANCE
 - VERTICAL
 - FMS, HDG, LOC, VOR, ETC..
 - IAS, FLCH, GA, HOLD, ETC..
 - ALT, ASEL, FPA, GA, ETC..

LATERAL MODES	ANNUNCIATOR	PERFORMANCE MODES	ANNUNCIATOR	VERTICAL MODES	ANNUNCIATOR
HEADING SELECT	HDG	TAKEOFF	TO	ALTITUDE HOLD	ALT
LNAV FMS	FMS	GO AROUND	GA	VERTICAL SPEED	VS
LNAV VOR	VOR	FLIGHT LEVEL CHANGE	FLCH	ALTITUDE SELECT	ASEL
APPROACH VOR	VORAP	SPEED IAS	IAS	FLCH IAS	IAS
LNAV NMS	NMS	SPEED MACH	MACH	FLCH MACH	MACH
APPROACH ILS	LOC	RETARD	RTD	APPROACH ILS	GS
APPROACH MLS	AZ	HOLD MODE	HOLD	APPROACH MLS	GP
BACK COURSE	BC	OVERVERRIDE	OVRD	TAKEOFF	TO
EMERGENCY DESCENT MODE	EDM	VMO LIMITED	VMO	GO AROUND	GA
OVERSTATION	OS	MMO LIMITED	MMO	VNAV ALT PRESELECT	VASEL
TACAN	TCN	POWER LIMITED	POWER	VNAV ALT HOLD	VALT
APPROACH TACAN	TCNAP	FLAP LIMITED	FLAPS	VNAV FLCH IAS	VIAS
		GEAR LIMITED	GEAR	VNAV FLCH MACH	VMACH
		VMIN LIMITED	VMIN	VNAV ARM	VNAV
				VNAV PATH	VPATH
				FLIGHT PATH ANGLE	FPA
				OVERSPEED	OVSPEED

HEADLINES (5):

PERFORMANCE
SPEED / LATERAL MODE / ((AUTO THROTTLE)) / VERTICAL MODE / ALTITUDE



- **FLCH** PERFORMANCE MODE
 - IAS OR MACH MODE (SPEED HOLD MODE)
 - FOR ALT CHANGE > **6,000'**:
 - CLIMB THRUST
 - IDLE THRUST

NOTE: IF CHOOSING TO CLIMB IN A MODE OTHER THAN FLCH, FLIGHT PATH ANGLE (FPA) PROVIDES BETTER UNDERSPEED PROTECTION THAN VERTICAL SPEED (VS) BECAUSE IN FPA AIRSPEED AND VERTICAL SPEED ARE PROPORTIONAL. IN FPA, IF AIRSPEED REDUCES SO WILL VERTICAL SPEED.

- **HOLD** PERFORMANCE MODE
 - ENGAGES AT 60 KTS
 - DISENGAGES AT 400'
 - THE AUTO THROTTLE DRIVE MOTORS DE-ENERGIZE AND THE CREW CAN EASILY MOVE THROTTLES

- **TO** (TAKEOFF) PERFORMANCE MODE
 - **TO** ARMED WHEN
 - EPR TARGET (RATED/FLEX)
 - V2 IN GP
 - **ISOL VALVE IS CLOSED**

- **TO** ENGAGE WHEN
 - EPR > 1.05
 - AIRSPEED < 60 KTS
 - A/T ENGAGE PRESSED
- **TO** (TAKEOFF) VERTICAL MODE
 - BOTH ENG RUNNING
 - INITIALLY 8° PITCH
 - THEN V2 TO V2 + 10
 - UNTIL FLAP CHANGE
 - ONE ENG INOP
 - INITIALLY 8° PITCH
 - THEN V2 TO V2 + 10 UNTIL 1,500' AGL
 - AT 1,500' AGL – Vse

- GO AROUND VERTICAL MODE
 - AVAIL:
 - < 16,500' MSL
 - < 200 KTS
 - < 2,000' AGL

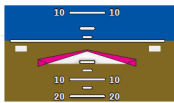
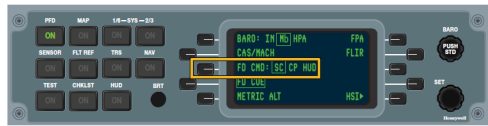


- TO/GA PRESSED: COMMANDS:
- INITIAL 12° PITCH
 - WINGS LEVEL
 - AUTOPILOT REMAINS ENGAGED
- ENHANCED NAV (ASC 84)
- MCDU, PROG, GPS-D
- AUTO SRN TO LRN TRANSITION
- WINGS LEVEL, HEADING HOLD IS AUTOMATICALLY ACTIVATED
 - THE MISSED APPROACH IS AUTOMATICALLY SEQUENCED
 - LNAV IS AUTOMATICALLY ARMED AND AUTOMATICALLY CAPTURES (>200 FT AGL)
- AUTO SPEED TARGET – FLCH (17° PITCH LIMIT):
- FLAPS 39° – VREF
 - FLAPS 20° – VREF + 5 KTS
 - FLAPS 10° – 180 KTS
 - FLAPS 0° – 200 KTS

ENHANCED NAV NOTE: WHEN GA MODE IS SELECTED WITH THE ACTIVE LATERAL MODE BEING LNAV, THE LATERAL MODE DOES NOT TRANSITION TO WINGS LEVEL/HEADING HOLD; IT REMAINS IN LNAV.

NOTE: A FULLY COUPLED AUTO MISSED APPROACH IS POSSIBLE WITH ONLY – “TOGA, FLAPS 20, POSITIVE RATE, GEAR UP, 400’, FLAPS UP” – EVERYTHING ELSE WORKS AUTOMATICALLY, - AS LONG AS THE MISSED APPROACH ALTITUDE IS SET IN THE ALTITUDE PRESELECT.

- | | |
|-------------------------|--|
| ▪ FLIGHT DIRECTOR PITCH | ▪ TAKEOFF: 8°, THEN V2 TO V2+10 |
| | ▪ GO AROUND: INITIAL 8°, THEN SPEED HOLD ON FMS SPEED TARGET OR 12° FIXED PITCH IF AUTO SPEEDS ARE NOT SELECTED; MAX PITCH COMMAND : 17° |



- | | | |
|----------------------------|-------------|------------------------|
| ▪ GP – BANK (HDG SEL MODE) | ▪ HIGH BANK | ▪ 27° (AUTO < 28,500') |
| | ▪ LOW BANK | ▪ 17° (AUTO > 29,500') |

NOTE: THE FMS BANK FACTOR DEFAULT SETTING IS SET AT 7°. IT IS RECOMMENDED BY HONEYWELL THAT THE SETTING BE CHANGED TO 15°. FROM THE MASTER MCDU SELECT NAV, NAV IDENT (3L), MAINTENANCE (6L), NEXT, SETUP (6L), FLIGHT CONFIG (1R), ENTER “15” FOR BANK FACTOR (1L).

- | | | |
|-------------------|------------------------|----------------------|
| ▪ APR BUTTON (GP) | ▪ MDA?: | NO |
| | ▪ DA/DDA?: | YES |
| | ▪ ILS, CIRCLE TO LAND: | NO, USE: LNAV+VS/FPA |

NOTE: SEE [BLUE NEEDLE AND GREEN NEEDLE APPROACHES](#)

- ARM APR ONCE:
- 1) ON A PUBLISHED SEGMENT OF THE APPROACH
 - 2) CLEARED FOR THE APPROACH, AND
 - 3) THE “ARM APR” FLAG APPEARS ON THE PFD

- IF RADAR VECTORED, ARM APR ONCE:
- 1) ON INTERCEPT HEADING FOR THE APPROACH
 - 2) ACTIVATED VECTORS
 - 3) CLEARED FOR THE APPROACH, AND
 - 4) “ARM APR” FLAG APPEARS ON THE PFD

NOTE: DDA = MDA+60 FT
EXCEPTION: APR AND VS/FPA BUTTONS ARE USED FOR A GREEN NEEDLE VOR APPROACH (VORAPP), THE ALTITUDE WINDOW WILL BE HONORED.

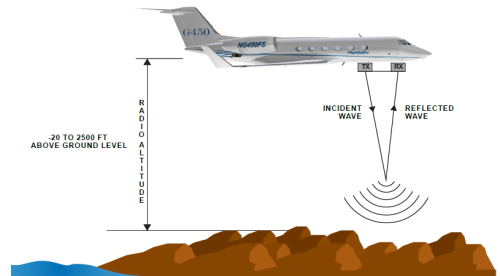
NOTE: VS/FPA AND VNAV WILL HONOR THE ALTITUDE SET IN THE ALTITUDE SELECT WINDOW. VNAV IS ONLY USED IF FMS IS THE NAV SOURCE.

- “ACTIVATE VECTORS” CONDITIONS
 - 1) WITHIN 30 NM DIRECT LINE DIST FROM DEST – “TERMINAL AREA”
 - 2) AN APPROACH FROM THE FMS HAS BEEN SELECTED AND ACTIVATED
 - 3) FMS HAS A VALID COURSE TO THE FAF
 - 4) NOT HOLDING
 - 5) NOT IN THE ENTRY SEGMENT OF A PROC TURN
 - 6) NOT WITHIN 2 NM OF THE FAF

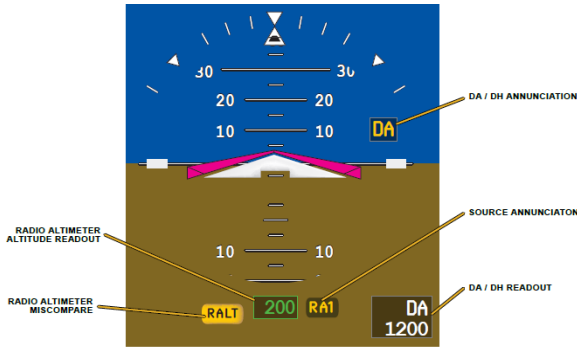


NOTE: ACTIVATE VECTORS IS AN AIRCRAFT HIGHLIGHT OPTION.

- RAD ALT (RA)
 - < 2,500’ AGL
- PFD USES RAD ALT FOR:
 - SYNTHETIC VISION TO DISPLAY TERRAIN PERSPECTIVE
 - GROUND REFERENCE INDICATION
 - RA DIGITAL READOUT
 - RA MISCOMPARE
- HUD USES RAD ALT FOR:
 - RA USED FOR FLARE CUE
 - RA USED FOR AIRPORT AND RUNWAY SYMBOLS
 - RA USED FOR RA DIGITAL READOUT
- PREDICTIVE WINDSHEAR USES RAD ALT FOR:
 - RA USED TO DEFINE THE ALERTING ZONE
- FLIGHT DIRECTOR USES RAD ALT FOR:
 - ILS DUAL COUPLED APPROACH MODE
 - BANK ANGLE LIMITING
- AUTOTHROTTLE USES RAD ALT FOR:
 - RETARD FUNCTION
- EGPWS USES RAD ALT FOR:
 - MULTIPLE MODES FOR CALLOUTS AND ALERTS
- RAAS USES RAD ALT FOR:
 - APPROACH RUNWAY (IN AIR) CALLOUT
- TCAS USES RAD ALT FOR:
 - LOW ALTITUDE FUNCTION;
 - SUPPRESSION OF RAs <900’ AGL
 - SUPPRESSION OF AURAL ALERTS <500’ AGL
- CAS USES RAD ALT FOR:
 - WARN INHIBIT FUNCTION
- GEAR WARNING HORN USES RAD ALT FOR:
 - LOW ALTITUDE WARNING HORN
- COWL AND WING ANTI-ICE USES RAD ALT FOR:
 - INHIBIT OF AUTOMATIC ACTIVATION OF COWL AND WING ANTI-ICE



NOTE: A FILTER INSERTED INTO THE COAXES FROM THE ANTENNAE ESSENTIALLY ELIMINATES THE 5G INTERFERENCE THREAT.



CODE450: ▶ RADIO ALTIMETER SYSTEM

- PFD-CMD
 - DUAL COUPLED MODE
 - ILS APP < 1,200' AGL
 - L & R LIT:
 - INDICATES NAV RECEIVER DATA IS BEING AVERAGED



NOTE: ON AN ILS, IF A GS RECEIVER FAILS THE AUTOPILOT WILL:

- > 1,200' AGL – PITCH HOLD
- < 1,200' AGL – REMAINS ON GS (DUAL CHANNEL)

- AUTOTHROTTLERS MODES
 - TAKEOFF ARM – AIRSPEED < 50 KTS, VALID SPEED TARGET, VALID EPR TARGET (TO DISPLAYED IN THE PFD A/T MODE WINDOW)
 - TAKEOFF THRUST
 - TAKEOFF THRUST HOLD – THROTTLE SERVOS DEPOWER AT 60 KTS, HOLD DISPLAYS IN THE PFD A/T MODE WINDOW
 - FLIGHT LEVEL CHANGE THRUST FLCH
 - AIRSPEED CONTROL IAS / MACH
 - RETARD (AT 50' AGL)
 - GO-AROUND GA
 - LIMIT MODES VMAX
 - GEAR LANDING GEAR VLo/MLo
 - FLAPS FLAPS EXTENDED VFe/MFe
 - POWER POWER (SELECTED EPR) LIMITED
 - VMO or MMO MAXIMUM OPERATING LIMIT SPEED
 - VMIN MINIMUM OPERATING LIMIT SPEED (VSHAKER +10 KTS)

NOTE: DURING A SINGLE ENGINE-OUT CONDITION, THE A/T CAN BE RE-ENGAGED – IT INITIALLY DISENGAGES.

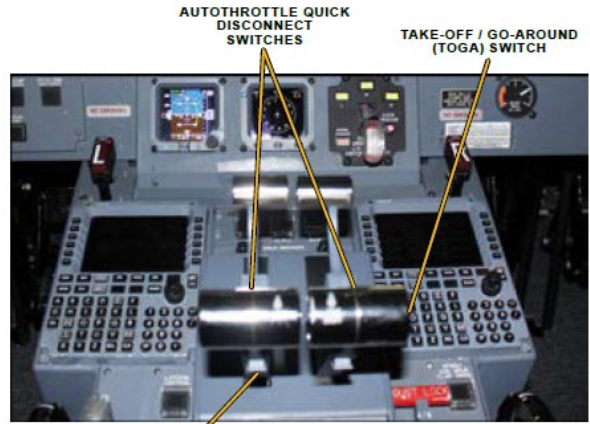
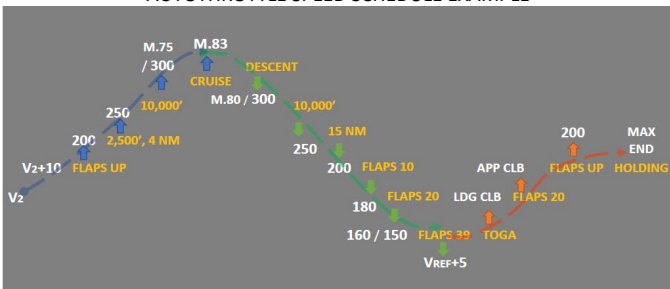
NOTE: USE OF THE AUTOTHROTTLE DURING SINGLE ENGINE APPROACH IS PROHIBITED.

NOTE: ACCORDING TO THE PLANEVIEW OM RETARD MODE REQUIRES GEAR DOWN AND FLAPS > 31.5°. IN THE SIMULATOR HOWEVER AUTO RETARD STILL OCCURS EVEN WHEN LANDING PARTIAL FLAPS.

- ENGAGEMENT
- A/T ARMED
 - >1.05 EPR
 - PRESS AN ENGAGE/DISENGAGE SWITCH

- DISENGAGED BY:
- PRESSING A/T QUICK DISCONNECT SWITCH
 - PRESSING ENGAGE/DISENGAGE SWITCH
 - MANUALLY MOVING A THROTTLE (ABNORMAL DISENGAGEMENT)
 - ENGINE ALT CONTROL MODE
 - LOSS OF A VALID EPR TARGET

AUTOTHROTTLE SPEED SCHEDULE EXAMPLE



- NAV RADIO TUNING CODES PROG PAGE
 - A
 - V
 - M
 - R
 - AUTO – THE FMS IS TUNING THE VOR
 - NAV – AUTO TUNING SUSPENDED (IN GREEN NEEDLES AND PREVIEW), BUT AUTO TUNE WILL RESUME IF THE NAV SOURCE IS RETURNED TO FMS
 - MANUAL – MCDU AUTO TUNE IS OFF (NAV PAGE 1, 1R). THE FREQ WAS MANUALLY ENTERED; THIS DEACTIVATES THE ABILITY TO TUNE FROM THE PROG PAGE ONLY.
 - REMOTE – THE FREQ WAS MADE REMOTELY

NOTE: THE TUNING MODE IS REMOTE IF THE PILOT HAS TUNED THE NAV RADIO THROUGH THE MCDU OR MAP DISPLAY. THE MCDU WILL NOT CHANGE THE TUNED FREQ.

NOTE: REMOTE TUNING IS POSSIBLE WHILE V IS DISPLAYED. V THEN CHANGES TO R.

- DME HOLD





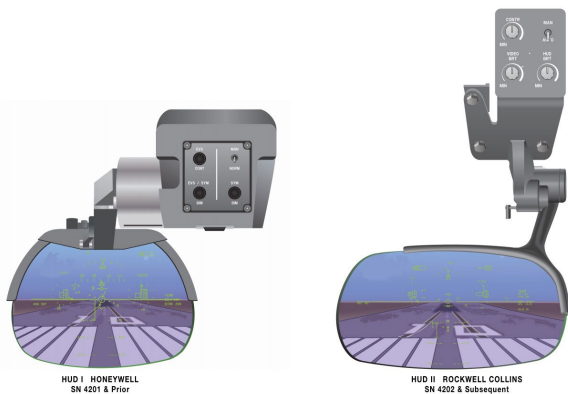
- **AUTO NAV PREVIEW (LRN TO SRN)**
 - FUNCTIONS**
 - APPROACH FREQ AUTO TUNE (WILL NOT AUTO HOLD DME)
 - AUTO SETS APPROACH INBOUND COURSE AND PREVIEWS IT
 - CONDITIONS**
 - FMS IS NAV SOURCE
 - < 75 NM FLIGHT PLAN DIST AND < 30 NM DIRECT DISTANCE FROM THE DESTINATION AIRPORT
 - AUTO TUNING IS ENABLED AND ACTIVE (NAV PAGE 1, 1R)
 - ILS, BC, LOC, SDF, OR LDA ONLY

NOTES: USING PREVIEW FOR SRN TRANSITION – THE AUTOMATIC TRANSITION FUNCTION REQUIRES THE PREVIEWED NAV SOURCE TO BE CAPTURED FROM FMS. WHEN THE APR BUTTON IS SELECTED THE SYSTEM WILL TRANSITION TO SHORT-RANGE NAV (SRN) AND CAPTURE AUTOMATICALLY.

- **HUD II**
 - ROCKWELL COLLINS MODEL 6250 HEAD-UP GUIDANCE SYSTEM (HGS)
 - SN 4202 AND SUB**
 - COMPONENTS**
 - COMBINER ASSEMBLY – 5 LBS
 - OVERHEAD UNIT (OHU) – 27 LBS
 - HUD II COMPUTER (HC) – 14 LBS
 - HUD II PERSONALITY MODULE (HPM) – 0.1 LBS

- **HUD COMBINER**
 - **FOCUSED AT OPTICAL INFINITY**
 - BRIGHTNESS CONTROL**
 - **MANUAL**
 - SETS A CONSTANT LUMINANCE
 - **NORM (HUD I) / AUTO (HUD II) – UTILIZES AN AMBIENT LIGHT SENSOR**
 - SETS A CONSTANT CONTRAST RATIO

G450



- **HUD OVERHEAD UNIT (OHU)**
 - PROJECTS THE FLIGHT SYMBOLOGY ONTO THE HUD COMBINER
- **EVS II**
 - ELEMENTS**
 - WINDOW (¼ IN THICK SYNTHETICALLY GROWN SAPPHIRE) WITH HEATING ELEMENTS (12° -14° C) AND CONTROLS – 2.5 LBS
 - INFRARED CAMERA (FLIR) WITH 30° X 22.5° FIELD OF VIEW – KOLLSMAN FORWARD LOOKING INFRARED (FLIS) ASSEMBLY – 12 LBS
 - PROCESSOR – 10 LBS
 - MONITORS THE WINDOW HEAT
 - INITIATES CAMERA ENCLOSURE COOLING
 - PERFORMS NUC – INITIAL NUC TAKES 4 MIN
 - INITIATES PBIT (POWER-UP BIT) ON EVS STARTUP (TAKES 15 SEC), THEN AN AUTOMATIC BIT (TAKES 1 MIN)

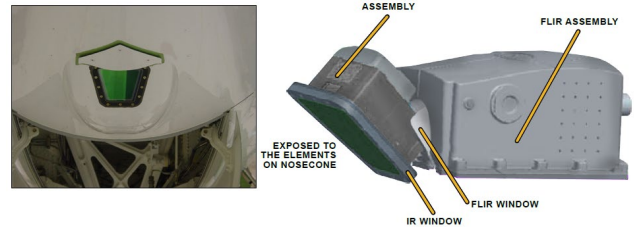
CODE450:

- ▶ [EVS](#)
- ▶ [EVS II](#)

- COMMUNICATES MALFUNCTIONS TO MAUS
- HUD COMBINER LIGHTING CONTROLS
 - SWITCH (MAN/NORM)
- DISPLAY CONTROLLER
- YOKE MOUNTED ALTERNATE DISPLAY SWITCH



EVS II Camera



- **EVS STATUS**
 - "IMAGE GAIN" HUD UPPER LEFT
 - EVS A – AUTO
 - EVS H – HIGH
 - EVS L – LOW
 - EVS C – CLEAR

NOTE: LOW "L" IS NORMALLY USED DURING CLEAR ATMOSPHERIC CONDITIONS WHERE THERE IS AMPLI TEMPERATURE CONTRAST BETWEEN GROUND AND AIR.

NOTE: HIGH "H" SELECTION IS USED FOR LOW VISIBILITY SINCE MOISTURE TENDS TO ABSORB HEAT AND BLUR THE INFRARED IMAGE CAPTURED BY THE CAMERA.

- **RASTER**
 - EVS IMAGE IN THE HUD
- **FLIR BUTTON – DISPLAY CTRL**
 - TURNS INFRARED CAMERA ON/OFF
 - EVS PERFORMS A BIT AND NUC CHECK
 - COOLS DOWN EVS CAMERA TO 77°K (-321°F/-193°C) – HUD II TAKES 15 MIN, HUD I TAKES 30 MIN



- **EVS BUTTON – DISPLAY CTRL**
 - PUTS THE RASTER (EVS IMAGE) ON THE HUD & TURNS ON FLIR IF NOT PREVIOUSLY SELECTED
- **NUC**
 - NON-UNIFORMITY CORRECTION
 - PLACES A UNIFORM HEAT SOURCE IN FRONT OF THE FLIR SENSOR SO THE PROCESSOR CAN EQUALIZE OUTPUT BY INDIVIDUAL PIXEL
- **A NUC OCCURS**
 - WHEN FLAPS 10 IS SELECTED
 - WHEN FLIR IS BOXED
 - WHEN THE NUC BUTTON IS PRESSED

NOTE: A NUC CORRECTION IS GENERALLY GOOD FOR 2.5 HRS.



HUD NOTES

NOTE: THE EVS CAN BE ALIGNED IN THE CMC.

NOTE: IF ALL 4 DUs FAIL THE HUD IS THE PRIMARY BACKUP.

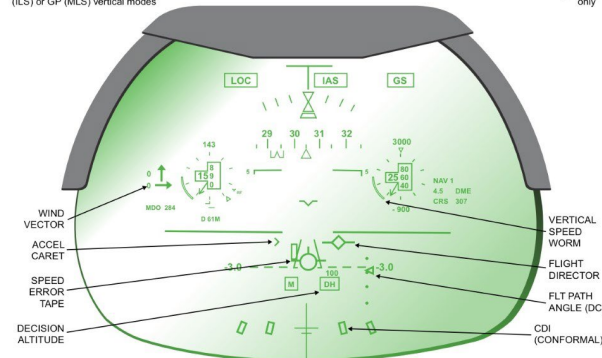
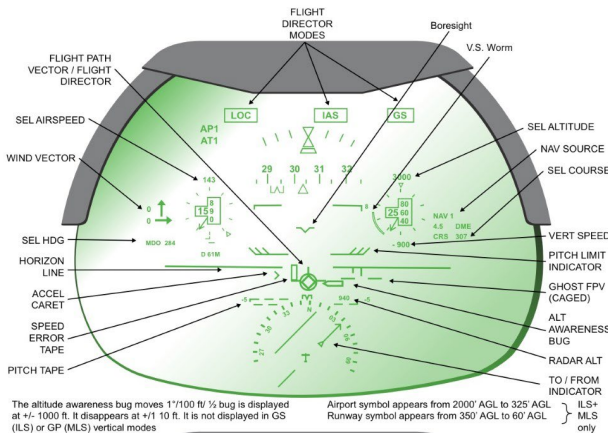
CODE450:

▶ G450 HUD

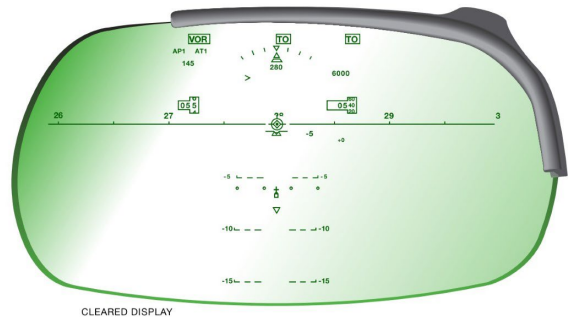
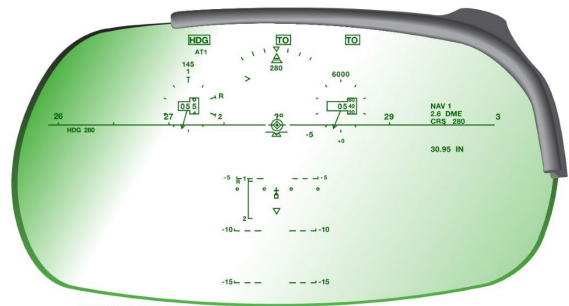
- BOX FOR EVS OPERATIONS
- AIRPORT LINES / EXTENDED CENTERLINE
- RUNWAY LINES / EXTENDED CENTERLINE
- FLARE CUE
- WIND VECTOR
- FLIR
- EVS
- AUTO, H OR L
- APPEAR AT **2,000' RA**
- DISAPPEAR AT 325' AGL
- DEPICTS 800' X 8,000' RWY
- APPEAR AT **350' RA**
- DISAPPEAR AT 60' RA
- DEPICTS 150' X 8,000' RWY
- 1,000' AIM POINT LINE
- < **100' RA**
- INSTANTANEOUS WINDS
- FROM SELECTED IRS
- VECTOR OR X-Y FORMAT SELECTABLE VIA DISPLAY CONTROLLER

QRH NOTE: THE FLARE CUE ADVISES THE PILOT WHEN AND AT WHAT RATE TO INITIATE THE FLARE FOR TOUCHDOWN. IT IS NOT FLARE GUIDANCE USED IN CATEGORY III SYSTEMS THAT GUIDES THE PILOT TO A TOUCHDOWN WITHIN A GUARANTEED TOUCHDOWN ZONE.

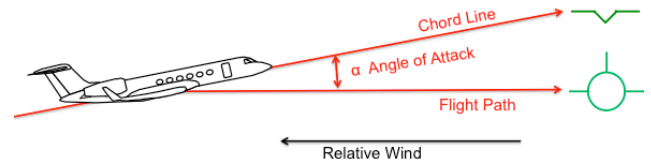
HUD I



HUD II



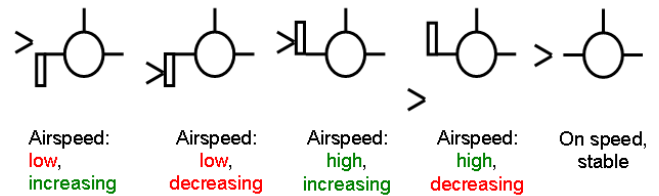
Bore sight: where the nose is pointed



Flight path vector: where the aircraft is headed

NOTE: DO NOT EXCEED 10° PITCH DIFFERENCE BETWEEN BORESIGHT AND FPV; STALL OCCURS AROUND 17° DIFFERENCE CLEAN, 13° DIFFERENCE DIRTY.

SPEED ERROR TAPE AND INSTANTANEOUS ACCELERATION CARET



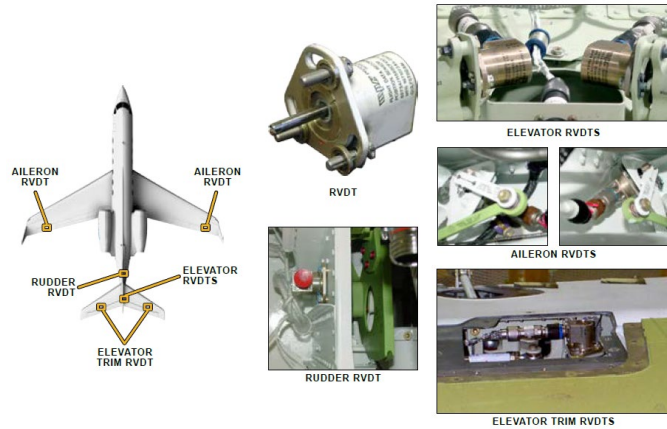


COLD WEATHER

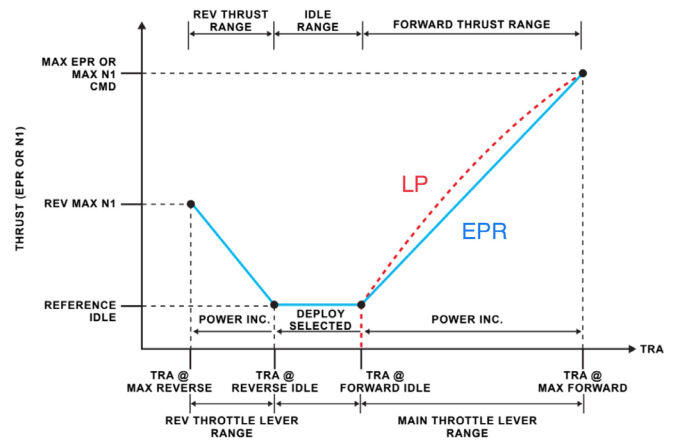
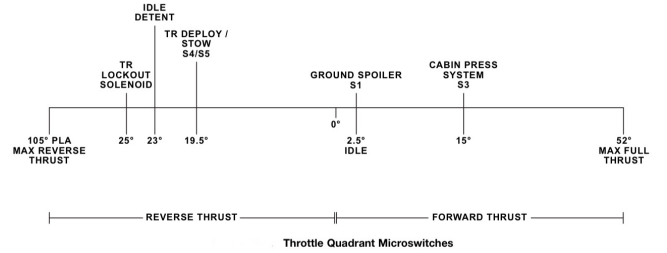
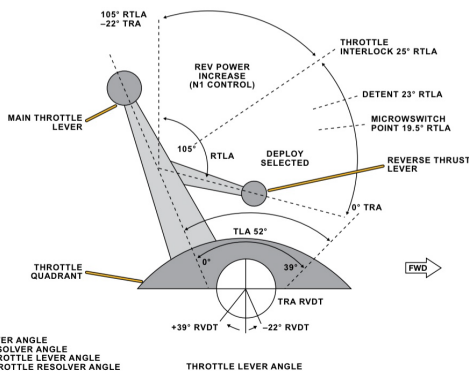
- **65°F (18°C) FOR 30 MINUTES**
 - **MIN TEMP FOR:**
 - **DUs, IRUs, EERs**
 - **SFD (CB – POP E-9)**
 - **EBDI (CB – CPOP D-9)**
- 50°F (10°C)
- 32°F (0°C)
- 14°F (-10°C)
- 5°F (-15°C)
- -4°F (-20°C)
- -20°F (-28°C)
- -22°F (-30°C)
- -40°F (-40°C)

CODE450: ▶ **COLD WEATHER OPERATIONS**

- RVDTs
 - THROTTLE RVDT ANGLE (TRA) / POWER LEVER RVDT
 - REVERSE LEVER RVDTs
 - ELEVATOR RVDT
 - ELEVATOR TRIM RVDT
 - RUDDER RVDT
 - AILERON RVDT
 - AILERON TRIM RVDT
 - FLAP CONTROL LEVER RVDTs (2)
 - FLIGHT SPOILER ACTUATOR LINKAGE RVDTs (2 – L/R)
 - HYD QUANTITY RVDTs
 - TILLER RVDT
 - NOSEWHEEL STEERING GEARBOX RVDT
 - RUDDER PEDAL RVDT (ON THE CONNECTOR ROD)
 - APU AIR INLET DOOR RVDT



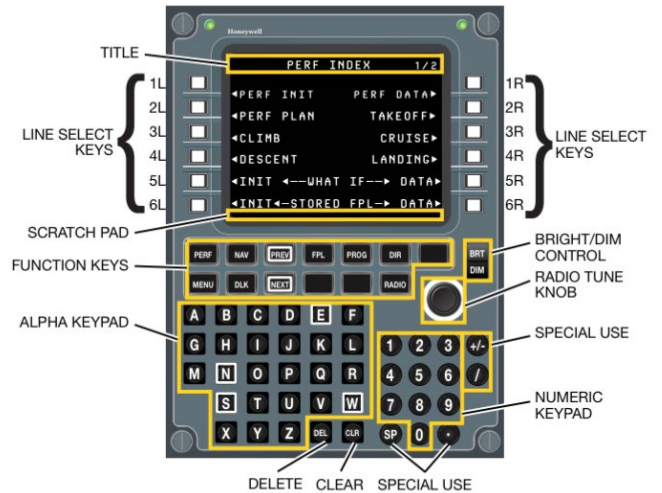
▪ **THROTTLE LEVER ANGLE (TLA)**



- LVTs
 - "LINEAR VARIABLE TRANSDUCER"
 - REVERSER ACTUATOR LVT (MONITORS REVERSER DOOR MOVEMENT)
- MCDU (HONEYWELL MC-850)
 - UNLIKE AN FMS THE MCDU PERFORMS OTHER FUNCTIONS
 - THE MCDU IS A DISPLAY CONTROLLER
 - THE ACTUAL FMSs ARE RESIDENT IN THE PROCESSOR MODULES OF MAUS

FUNCTIONS

- NAVIGATION
- RADIOS
- STBY ENG INST (MENU, STBY ENG) – *NOTE: MCDU #1 ONLY
- PERF
- DATALINK





MCDU COLOR CODING SCHEME



ASSIGNED COLOR	PARAMETER
BLUE	VERTICAL
BLUE	ATMOSPHERIC DATA
GREEN	LATERAL
YELLOW	FROM WAYPOINT
MAGENTA	TO WAYPOINT
WHITE	PROMPTS AND TITLES
YELLOW	FLIGHT PLAN NAMES
GREEN	INDEX SELECTIONS



- COMPARE THE DATALINK WAYPOINT TO THE FMS DATABASE WAYPOINT, IF APPLICABLE



NOTE: PILOTS ARE ADVISED TO REMEMBER THAT PUBLISHED CHARTS ALWAYS TAKE PRECEDENCE OVER FMS GUIDANCE – HONEYWELL FMS NEWSLETTER.

OFFSET USING THE MCDU

- LATERAL: **PROG**, PAGE 3, 1R, e.g. "R2"
- RANGE: 0.1 TO 30.0 NM
- TO CANCEL, PRESS **DEL** ⇒ *DELETE* 1R

MCDU ENTRY FORMAT

NOTE: TEMPORARY WAYPOINTS ENTERED FROM MCDU #1 ARE ASSIGNED ODD NUMBERS (e.g. *PD01). THOSE ENTERED FROM MCDU #2 ARE ASSIGNED EVEN NUMBERS (e.g. *LL02).

NOTE: ALTITUDE CONSTRAINTS CAN BE INCLUDED, EXAMPLE: P/B/D/ALT, e.g. GBN/270/45/15000.

TEMPORARY WAYPOINTS:

- PLACE/BEARING/DISTANCE – P/B/D
- PLACE/BEARING/PLACE/BEARING – P/B/P/B
- PLACE//DISTANCE – P//D
- LAT/LON, EXAMPLE: N3208.87W811.95 IS N32° 08.87 W081°11.95 (DECIMAL-MINUTES)

NOTE: TEMPORARY WAYPOINTS BEGIN WITH *, &, OR # AND ARE NOT RETAINED PAST THE CURRENT FLIGHT.

NAME ASSIGNMENTS:

ENTERED DEFINITION	WAYPOINT NAME
LAT/LONG	*LLXX (e.g. *LL02)
PLACE/BEARING/DISTANCE	*PBDXX
PLACE/BEARING/PLACE/BEARING	*RRXX
PLACE//DISTANCE	*PDXX

PRESENT POSITION HOLD

DIR → 6L (PATTERN) → 1L (HOLD) → PRESS 1L ("FROM" WAYPOINT ON THE FIRST PAGE OF THE ACTIVE FLIGHT PLAN); THE HOLDING PATTERN PAGE WITH *PPOS IS DISPLAYED, MAKE ANY NECESSARY CHANGES. → 6R (ACTIVATE)

NOTE: PRESENT POSITION HOLD CAN ONLY BE DONE WHEN LNAV IS CAPTURED AND THE CROSS TRACK ERROR IS < 0.25NM.

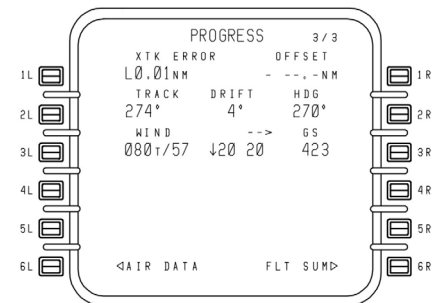
LAT/LONG FORMATS

FMS: 50N030W
ARINC: 5030N
 DECIMAL-DEGREE: 50.000000 -30.000000
DECIMAL-MINUTES: 50°0.0000'N 30°0.0000'W
 DEGREE-MIN-SEC: 50°0'0.0000"N 30°0'0.0000"W

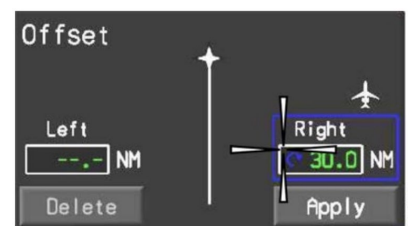
DATALINK FLIGHTPLAN WAYPOINT CONFORMITY ERROR

- REVIEW EACH WAYPOINT, IF THE FMS DATABASE DOES NOT CONTAIN THE WAYPOINT OR THE WAYPOINT DEFINITION (LAT/LONG) IS DIFFERENT THE WAYPOINT NAME WILL BE PRECEDED WITH A POUND "#" SIGN, e.g. #TIGIR

OFFSET USING THE CCD



- SELECT THE HIGHLIGHT AIRCRAFT ⇒ SELECT "OFFSET" FROM THE IMMEDIATE ACTION MENU, ENTER DATA USING THE MULTIFUNCTION KNOB (MFK) (RANGE: 0.1 TO 30.0 NM) ⇒ SELECT "APPLY"
- TO CANCEL, SELECT THE HIGHLIGHT AIRCRAFT AND CHOOSE "CANCEL OFFSET" FROM THE IMMEDIATE ACTION MENU





- RUNWAY EXTENSIONS**
- SELECT RUNWAY INTO SCRATCHPAD: AIRPORT.RUNWAY/BEARING/
 - ENTER DESIRED DISTANCE AND ALTITUDE, IF DESIRED, e.g. 5/1500

- RLATSM**
- EXAMPLE: H5230

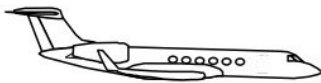
NOTE: WITH JEPPESEN NAV DATABASE THE ARINC 424 CODE "N5230" FOR RLATSM IS NOT AN ACCEPTED MCDU ENTRY.

NOTE: ARINC 424 IS AN AERONAUTICAL SPECIFICATION DEVELOPED AND MAINTAINED BY THE INDUSTRY WHICH HAS BEEN USED FOR THE EXCHANGE OF NAVIGATION AND COMMUNICATION DATA BETWEEN COMMERCIAL DATA SUPPLIERS AND AVIONIC SYSTEM MANUFACTURERS. ARINC 424 SETS FORTH THE AIR TRANSPORT INDUSTRY'S RECOMMENDED STANDARDS FOR THE PREPARATION OF AIRBORNE NAVIGATION SYSTEM REFERENCE DATA FILES.

- **FMS FLIGHT PLAN**
 - CAPACITY: UP TO 100 WAYPOINTS
 - EACH LEG OF THE FLIGHT PLAN CALCULATED GREAT CIRCLE
 - FLIGHT PLAN NAMES: 6 TO 10 CHARACTERS
 - WAYPOINT NAMES: 1 TO 5 CHARACTERS
 - NDBs: IDENT PLUS "NB," e.g. ABCNB
 - FROM WAYPOINT IS AMBER AND THE ACTUAL TIME PASSED, IF APPLICABLE, IS DISPLAYED
 - TO WAYPOINT IS MAGENTA
 - HOLDING FIXES ARE FLYOVER WAYPOINTS

NOTE: SOMETIMES DURING AN UPLINKED FLIGHT PLAN REVIEW A BLANK MCDU SCREEN WILL BE ENCOUNTERED. THIS IS DUE TO A PROCEDURE COMBINATION THAT CONTAINS > 24 CHARACTERS. THE MCDU WILL NOT DISPLAY THIS DATA AND WILL BLANK OUT THE INVALID PAGE.

- WIND AND TEMP BLENDS**
- THE FMS BLENDS ENTERED AND CURRENT POSITION SENSED WINDS AND TEMPERATURE PROPORTIONALLY TO THE DISTANCE AWAY FROM THE AIRCRAFT



Wind and Temperature	Present Position	200 nm forward	400 nm forward
Actual	100%	50%	20%
Entered in FMS	0%	50%	80%

- USE UPLINKED FPL WINDS**
- **PERF** ⇒ PERF PLAN (2L) ⇒ W/T ▶ (5R) ⇒ DLK WINDS (6L) ⇒ ACCEPT (6R)

- UPDATE FPL WINDS VIA DATALINK**
- **NAV** ⇒ DATALINK (2R) ⇒ WINDS REQ ▶ (1R) ⇒ YES (1R) ⇒ SEND REQST (6R)
 - WHEN RECEIVED, SELECT WINDS REV (2R) ⇒ ACCEPT (6R)

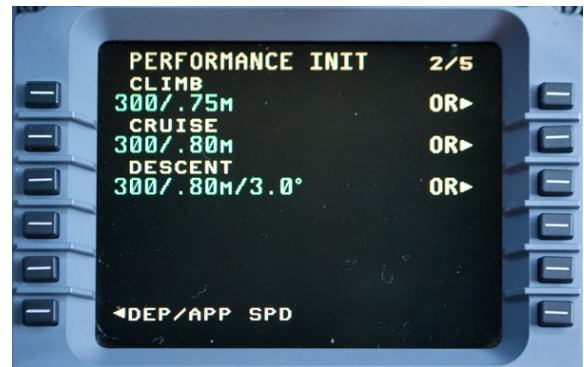
- ALTITUDE CONSTRAINTS**
- AT, e.g. MCDU: 10000, VSD:
 - AT OR ABOVE, e.g. MCDU: 10000A, VSD:
 - AT OR BELOW, e.g. MCDU: 10000B, VSD:



- TOC** ▪ SHOWN ON **PROG**, PAGE 2
TOD ▪ VERTICAL TRACK ALERT 1 MIN BEFORE REACHING

- DESCENT RULES OF THUMB**
- G450 RULE OF THUMB (JAMES ALBRIGHT):
- DESCENDING FROM 45,000' THE AIRPLANE CAN HOLD SPEED FLYING A 2.5° DESCENT. YOU CAN STEEPEN THIS ANGLE BETWEEN 35,000 AND 31,000' TO 3° AND EVEN MORE LOWER THAN THAT.
 - 3:1 - START DESCENT AT THREE TIMES YOUR ALTITUDE (IN THOUSANDS OF FEET) TO ACHIEVE A 3 DEGREE DESCENT (ACTUAL 3.3°)
 - 4:1 - START DESCENT AT FOUR TIMES YOUR ALTITUDE (IN THOUSANDS OF FEET) TO ACHIEVE A 2.5 DEGREE DESCENT (ACTUAL 2.4°)
 - IT DOESN'T TAKE MUCH FUEL TO GET DOWN, GENERALLY AROUND 500 LBS TOTAL FROM FL450 TO SEA LEVEL
 - IT TAKES ABOUT 20 MINUTES TO GO FROM FL450 TO SEA LEVEL

CODE7700:
 ▶ **TOD**



- CLIMB SPEED EVALUATION – G450
- M 0.75 VS. M 0.80 CLIMB COMPARISON CHARTS:

TIME TO FL410

WEIGHT	M 0.75	M 0.80	DIFF
70000	18.0	19.1	1.1
66000	16.3	17.2	0.9
62000	14.9	15.6	0.7
58000	13.5	14.2	0.7
54000	12.3	12.9	0.6

SUMMARY: A .75M CLIMB GETS YOU TO TOC APPROXIMATELY ONE (1) MINUTE FASTER THAN A .80M CLIMB.

BURN TO FL410

WEIGHT	M 0.75	M 0.80	DIFF	GAL
70000	1886	1991	105	16
66000	1727	1815	88	13
62000	1582	1658	76	11
58000	1449	1517	68	10
54000	1325	1387	62	9

SUMMARY: A .75M CLIMB BURNS APPROXIMATELY 75 LESS LBS OF FUEL THAN A .80M CLIMB.

TIME (H:MM)

NAM	M 0.75	M 0.80	DIFF
407	1:06	1:05	0:01
821	1:55	1:55	0:00
1338	2:59	2:58	0:01
1767	3:55	3:55	0:00
2309	5:10	5:09	0:01

SUMMARY: A .80M CLIMB REDUCES THE TOTAL FLIGHT TIME BY APPROXIMATELY ONE (1) MINUTE WHEN COMPARED TO A .75M CLIMB.



FUEL BURN (LBS)				
NAM	M 0.75	M 0.80	DIFF (LBS)	GAL
407	3842	3879	37	6
821	6068	6106	38	6
1338	9614	9644	30	4
1767	12187	12224	37	6
2309	16388	16423	35	5

SUMMARY: A .80M CLIMB INCREASES THE TOTAL FLIGHT FUEL BURN BY APPROXIMATELY 35 LBS (5 GAL) WHEN COMPARED TO A .75M CLIMB.

KNOTS					
ALT	M 0.75	M 0.80	DIFF	TIME	DISTANCE
30000	442	473	31	6 MIN	3.5 MI
40000	429	458	29		

SUMMARY: A .80M CLIMB PUTS THE AIRCRAFT APPROXIMATELY 3.5 MILES AHEAD OF A .75M CLIMB.

SAMPLE 2,500 NM FLIGHT (LANDING WITH 6000 LBS)					
CRUISE SPEED	M .75	M .77	M .80	M .83	M .85
TIME	6+02	5+55	5+43	5+33	5+27
BURN	15,453	15,444	15,850	18,351	20,494

SAMPLE 3,000 NM FLIGHT (LANDING WITH 6000 LBS)					
CRUISE SPEED	M .75	M .77	M .80	M .83	M .85
TIME	7+16	7+06	6+53	6+43	6+38
BURN	18,766	18,806	19,308	22,131	24,314

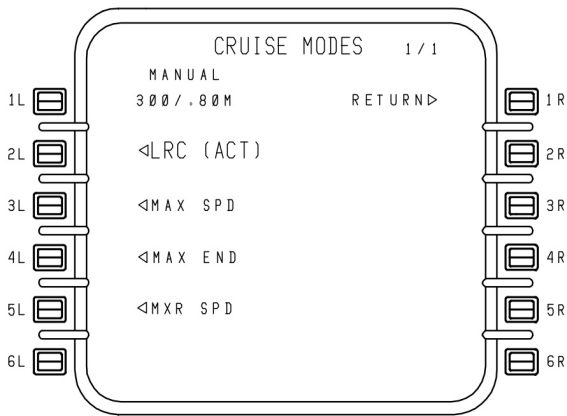
SAMPLE 3,500 NM FLIGHT (LANDING WITH 6000 LBS)					
CRUISE SPEED	M .75	M .77	M .80	M .83	M .85
TIME	8+16	8+05	7+51	7+39	---
BURN	21,735	21,779	22,382	24,766	---

SAMPLE 4,000 NM FLIGHT (LANDING WITH 6000 LBS)					
CRUISE SPEED	M .75	M .77	M .80	M .83	M .85
TIME	9+16	9+03	8+46	---	---
BURN	24,116	24,145	24,642	---	---

MACH	M.75	M.77	M.80	M.83	M.85
~ TAS KTS	430	440	460	475	487

- HIGH LATITUDE NAVIGATION
 - USE TRUE PRIOR TO 73°N OR BELOW 60°S LATITUDE
 - **"HDG FAIL"** ON PFD AND MAP
 - SELECT TRUE (MCDU, MAINTENANCE PAGE 3/3)
- AREAS WITH UNAVAILABLE MAGNETIC VARIATION DATA
- AUTOTHROTTLES WILL BE UNUSABLE
 - THRUST DIRECTOR CUE WILL BE UNAVAILABLE
 - FMS WINDS (PFD & NAV) WILL BE UNAVAILABLE, BUT IRS DERIVED WINDS ARE STILL AVAILABLE IN THE HUD
- LPV UNAVAILABLE
 - CHANGE THE APPROACH FROM LPV MINIMUMS TO LNAV/VNAV MINIMUMS
 - SELECT **NAV** ⇒ ARRIVAL (6R) ⇒ RNAV MIN (2R) ⇒ LNAV/VNAV (3L)

- CRUISE MODES
- | | |
|----------------|---|
| MODE: | OPTIMUM ALTITUDE: |
| ▪ LRC & MANUAL | ▪ NEAR THE CEILING ALTITUDE |
| ▪ MAX SPD | ▪ NEAR THE V _{MO} /M _{MO} CROSSOVER ALTITUDE |
| ▪ MAX END | ▪ WHERE THE FUEL FLOW IS MINIMIZED |
| ▪ MXR SPD | ▪ WHERE THE TRUE AIRSPEED IS MAXIMIZED WHILE ENSURING THE DESTINATION CAN BE REACHED BASED ON FUEL QUANTITY |
- NOTE: G450 MAXIMUM RANGE CRUISE TABLE, ISA: PB-7;
 74,000 LBS, FL410, .77M
 70,000 LBS, FL430, .77M
 66,000 LBS, FL430, .77M
 62,000 LBS, FL450, .77M
 58,000 LBS, FL450, .77M
 54,000 LBS, FL450, .76M
 50,000 LBS, FL450, .74M



▪ CRUISE SPEED EVALUATION – G450

SAMPLE 500 NM FLIGHT (LANDING WITH 6000 LBS)					
CRUISE SPEED	M .75	M .77	M .80	M .83	M .85
TIME	1+14	1+13	1+11	1+10	1+08
BURN	3810	3818	3859	3990	5187

SAMPLE 1,000 NM FLIGHT (LANDING WITH 6000 LBS)					
CRUISE SPEED	M .75	M .77	M .80	M .83	M .85
TIME	2+28	2+25	2+21	2+15	2+14
BURN	6447	6462	6570	7013	7505

SAMPLE 1,500 NM FLIGHT (LANDING WITH 6000 LBS)					
CRUISE SPEED	M .75	M .77	M .80	M .83	M .85
TIME	3+21	3+17	3+12	3+07	3+04
BURN	8519	8577	8769	9278	10,058

SAMPLE 2,000 NM FLIGHT (LANDING WITH 6000 LBS)					
CRUISE SPEED	M .75	M .77	M .80	M .83	M .85
TIME	4+41	4+35	4+27	4+21	4+16
BURN	12,189	12,222	12,517	13,712	15,182





- **FMS CONFIGURATION MODES**
NOTE: THE FMS BANK FACTOR DEFAULT SETTING IS SET AT 7°. IT IS RECOMMENDED BY HONEYWELL THAT THE SETTING BE CHANGED TO 15°. FROM THE MASTER MCDU SELECT NAV, NAV IDENT (3L), MAINTENANCE (6L), NEXT, SETUP (6L), FLIGHT CONFIG (1R), ENTER "15" FOR BANK FACTOR (1L).
- **SYNCHRONOUS**
AUTOMATIC TRANSFER
 - ACTIVE FPL
 - PERF ENTRIES
 - PILOT-DEFINED WPTs
 - STORED FPLs
 - OFFSIDE RADIO TUNING
- **INITIATED TRANSFER, VIA LINE SELECT KEY ON THE LAST ACTIVE FLIGHT PLAN PAGE.**
PILOT INITIATED
 - ACTIVE FPL
 - PERF ENTRIES
- **INDEPENDENT**
AUTOMATIC TRANSFER
 - OFFSIDE RADIO TUNING
- **SINGLE**
AUTOMATIC TRANSFER
 - NO DATA IS TRANSFERRED BETWEEN FMSs

- **CLOCK (2) – DAVTRON**
NOTE: FULLY CHARGED CLOCK BATTERIES CAN MAINTAIN TIME KEEPING FOR 30 DAYS.
NOTE: ACCEPTABLE TIME STANDARDS:
 - GPS CORRECTED TO UTC
 - NIST VIA HF 2500, 5000, 10000, 15000, 20000 kHz (AM/SSB).
 - NIST PHONE: 303-499-7111 OR 808-335-4363
- DISPLAYS:
 - GMT = GREENWICH MEAN TIME
 - LT = LOCAL TIME
 - FT = FLIGHT TIME
 - ET = ELAPSED TIME
- TO SET TIME:
 - PRESS SEL AND CTL KEYS SIMULTANEOUSLY, LEFT-MOST COLUMN BEGINS FLASHING
 - PRESS CTL TO CHANGE THE FLASHING DIGIT
 - PRESS SEL TO MOVE TO THE NEXT COLUMN
 - WHEN SETTING GMT, HH:MM CAN BE SET
 - WHEN SETTING LT, ONLY HH CAN BE SET. :MM IS SYNCED TO GMT :MM
- TO TEST DIGITS:
 - PRESS AND HOLD SEL FOR 3 SEC, ALL DIGITS SHOULD ILLUMINATE
- FT:
 - TO RESET HOLD CTL UNTIL 99:59 DISPLAYS
 - A FLIGHT TIME ALARM CAN BE SET AND WILL COUNT DOWN

- **PLANEVIEW ISSUES**
NOTE: CERTAIN SCENARIOS ARISE WHERE AIRCRAFT POWER WILL NEED TO BE CYCLED. OFTEN TIMES A 1 MINUTE POWERDOWN WILL BE SUFFICIENT. OTHER TIMES A MINIMUM 15 MINUTES COMPLETELY POWERED DOWN IS RECOMMENDED DUE TO "KEEP ALIVE" POWER IN THE SUB-FUNCTIONS OF DIFFERENT SYSTEMS. AN EXAMPLE IS THE CMC WHICH HAS "KEEP ALIVE" POWER FOR 12 MINUTES AFTER ALL AIRCRAFT POWER HAS BEEN REMOVED.
CODE450:
 - ▶ [REBOOT](#)
- CHECK GAC-OIS-13 PLANEVIEW OPERATIONAL ISSUES LIST
- LISTS KNOWN SOFTWARE ISSUES AND PROVIDES OPERATIONAL ADVICE BY ASC
- www.epicinds.com LISTS THE SIDs, STARs, AND APPROACHES THAT HAVE BEEN REMOVED FROM THE DATABASE DUE TO FMS ISSUES THAT COULD LEAD TO THE PROCEDURE NOT BEING FLOWN CORRECTLY

	UPDATE CYCLE	MAU MODULE
CHARTS	14 DAYS	AGM, CMC, DMU
AIRPORT DATA	28 DAYS	AGM
OBSTACLE	84 DAYS	
GEOPOLITICAL	168 DAYS	
NAVIGATION	28 DAYS	AGM, FM
AIRWAYS		
AIRSPACE		
COMMUNICATIONS		
GRID MORA		
AIRCRAFT CONFIG		
TERRAIN SERVER	6-12 MONTHS	FM
EGPWS THREAT	3-4 MONTHS	EGPWW
EGPWS ENV MOD		

CODE450: ▶ [PLANEVIEW UPDATE](#)



- ▶ [AVIONICS](#)
- ▶ [AUTO FLIGHT](#)
- ▶ [GOTCHAS](#)
- ▶ [NAVIGATION SYSTEM](#)
- ▶ [BACK COURSE LOCALIZER](#)
- ▶ [CIRCLING APPROACH](#)
- ▶ [ENHANCED VISION SYSTEM](#)
- ▶ [GO AROUND / MISSED APPROACH](#)
- ▶ [HOLDING PRESENT POSITION](#)
- ▶ [HOLD AS PUBLISHED](#)
- ▶ [ILS APPROACH](#)
- ▶ [LOCALIZER APPROACH](#)
- ▶ [LPV APPROACH](#)
- ▶ [NDB APPROACH](#)
- ▶ [P-RNAV](#)
- ▶ [QFE OPERATIONS](#)
- ▶ [RNAV\(GPS\) APPROACH](#)
- ▶ [VISUAL APPROACH GUIDANCE](#)
- ▶ [VNAV](#)
- ▶ [VOR APPROACH](#)
- ▶ [WGS-84](#)
- ▶ [TCAS RA](#)
- ▶ [VERTICAL MODE TRAP](#)



IYAN LUCIANI's NOTES

▶ [ADS-B](#)

Gulfstream®

SPECIAL MISSIONS



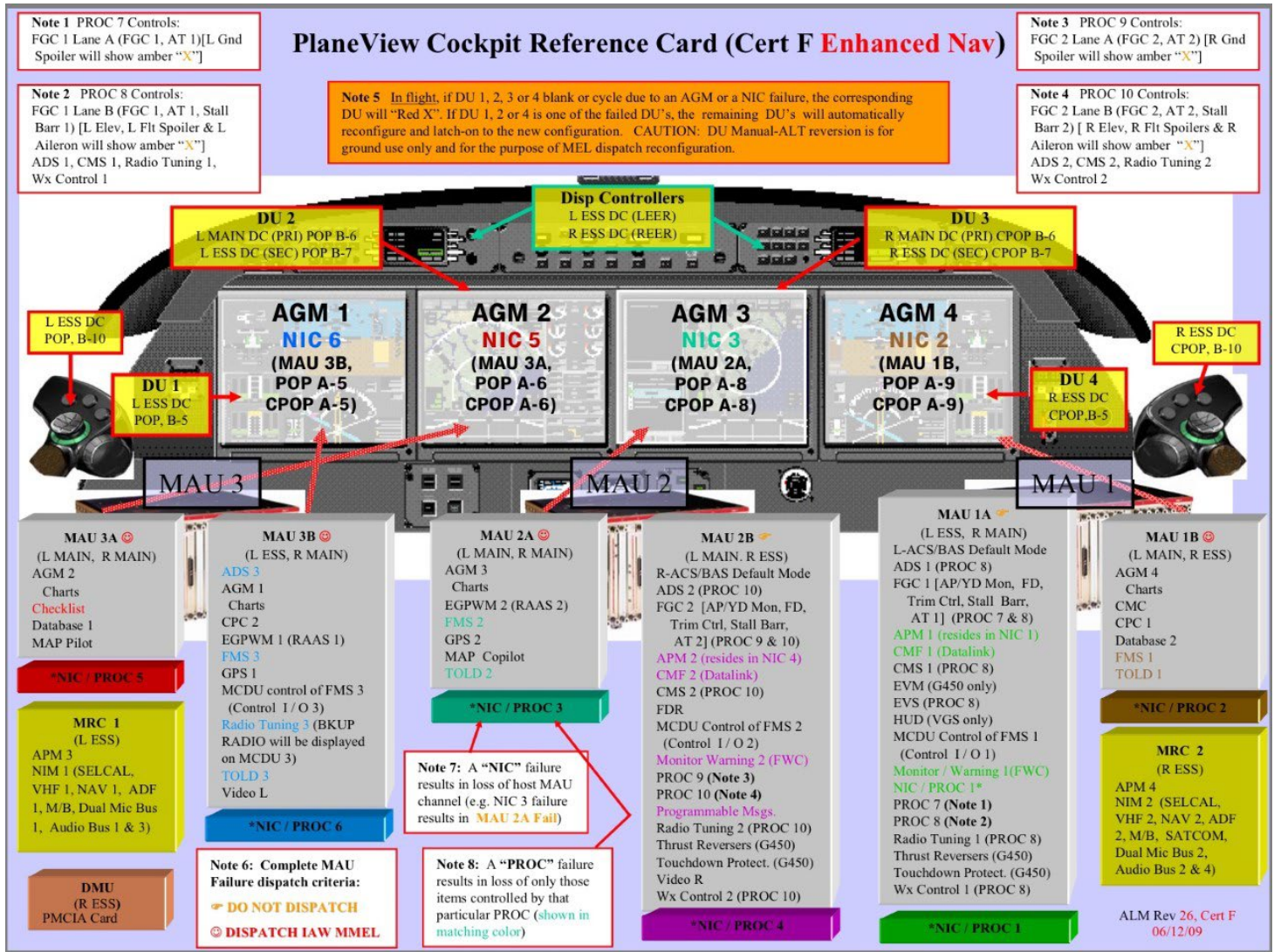
JAPAN COAST GUARD

MARITIME SURVEILLANCE AND PATROL — GV



NOTES

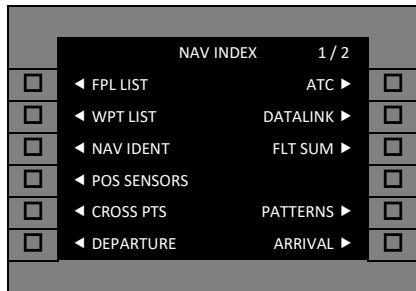
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DATALINK

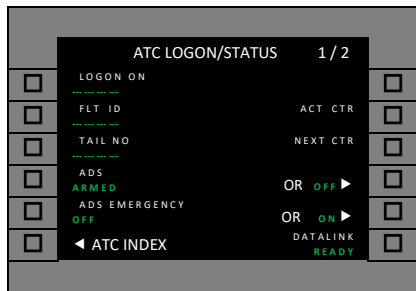
- OMS-04
 - FUTURE AIR NAVIGATION SYSTEM (FANS 1/A)
 - AUTOMATIC DEPENDENT SURVEILLANCE (ADS-C)
 - CONTROLLER PILOT DATA LINK COMMUNICATIONS (CPDLC)
- OMS-05
 - AUTOMATIC DEPENDENT SURVEILLANCE – BROADCAST OUT (ADS-B OUT)
- DATALINK GATEWAYS
 - **DLK** OR **NAV** CAN ACCESS ANY DATALINK FUNCTION
- NAV INDEX
 - **NAV**
 - **NAV** ⇒ **ATC**
 - **NAV** ⇒ **DATALINK**



- **NAV** ⇒ **ATC**
 - THE **NAV** ⇒ **ATC** (1R) SEQUENCE IS MULTI-FUNCTIONAL
 - IF NOT LOGGED-ON: **NAV** ⇒ **ATC** (1R) LEADS TO THE LOGON/STATUS PAGE
 - IF LOGGED-ON: **NAV** ⇒ **ATC** LEADS TO THE ATC INDEX

LOGON/STATUS PAGE

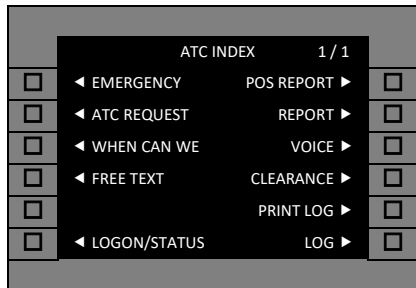
- **NAV** ⇒ **ATC** (IF NOT LOGGED ON)



ATC INDEX

- PRESS: **DLK** ⇒ **ATC LOGON** ⇒ **ATC INDEX**, OR, **NAV** ⇒ **ATC** (IF LOGGED ON)

NOTE: THE ATC INDEX IS THE STARTING POINT FOR ALL CPDLC TASKS.



NOTE: THE ATC LOG IS A GREAT PAGE TO KEEP OPEN BECAUSE ALL NEW MSGS SHOW UP ON THE TOP OF THE LIST AND CAN BE OPENED DIRECTLY FROM THERE.

LOG

- ALL MESSAGES ARE RECORDED IN THE ATC LOG (ATC INDEX ⇒ LOG (6R))
- MESSAGES ARE LISTED IN CHRONOLOGICAL ORDER WITH NEW MESSAGES AT THE TOP OF PAGE 1

RCP NOTES:

- RCP 240 (4:00)
RNP 4 AIRSPACE
30 NM SEPARATION
- RCP 400 (6:40)
RNP 10 AIRSPACE
50 NM SEPARATION

DOWNLINK MESSAGE STATUS

- “SENDING” – MSG STATUS: PENDING; NETWORK ACKNOWLEDGMENT HAS NOT BEEN RECEIVED AND THE NETWORK ACKNOWLEDGEMENT TIMER HAS NOT EXPIRED
- “SENT” – MSG STATUS: CLOSED; NETWORK ACKNOWLEDGMENT HAS BEEN RECEIVED
- “CLOSED” – MSG STATUS: CLOSED; NETWORK ACKNOWLEDGMENT HAS BEEN RECEIVED
- “EXPIRED” – MSG STATUS: CLOSED; MESSAGE WAS PENDING WHEN BOTH ATC COMM CONNECTIONS WERE TERMINATED OR ITS TIMER EXPIRED
- “QUEUED” – MSG STATUS: PENDING; IF ATC IS IN HOLD MODE ALL COMPOSED CPDLC DOWNLINKS ARE QUEUED UNTIL THEY ARE TRANSMITTED OR EXPIRED

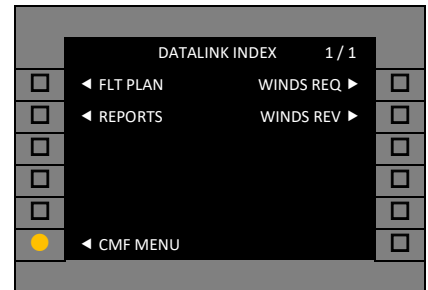
DOWNLINK MESSAGE STATUS

- “NEW” – MSG STATUS: PENDING; MSG NOT REVIEWED BY PILOT
- “OLD” – UPON ACCESSING A “NEW” MESSAGE ITS STATUS IS CHANGED TO “OLD” IF NO RESPONSE IS REQUIRED TO THE UPLINK MESSAGE
- “OPEN” – MSG STATUS: PENDING; MSG REVIEWED BY PILOT, AWAITING MSG CLOSURE RESPONSE AND NETWORK ACKNOWLEDGEMENT
- “CLOSED” – MSG STATUS: CLOSED; NETWORK ACKNOWLEDGEMENT OF CLOSURE RESPONSE RECEIVED
- “EXPIRED” – MSG STATUS: CLOSED; ATC COMM CONNECTIONS WERE TERMINATED OR TIMER EXPIRED
- “REPORT” – MSG STATUS: PENDING; REPORT NEEDS TO BE SENT FOR UM120

DATALINK INDEX

- **NAV** ⇒ **DATALINK** (2R) ACCESSES AOC FUNCTIONS; **CMF MENU** (6L) LEADS TO THE AOC MAIN MENU – SAME AS PRESSING THE **DLK** BUTTON

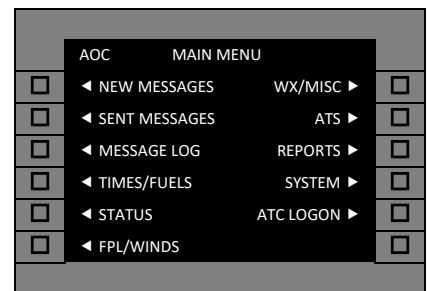
NOTE: IF THE CPDLC DOMAIN IS YOUR GOAL, **NAV** ⇒ **DATALINK** IS THE WRONG WAY. **NAV** ⇒ **ATC** IS THE CORRECT WAY.



AOC MAIN MENU

- **DLK** LEADS TO THE AOC MAIN MENU

NOTE: AOC STANDS FOR “AERONAUTICAL OPERATIONAL COMMUNICATIONS” AND REFERS TO ANY COMMUNICATIONS BETWEEN YOU AND YOUR DATALINK SERVICE PROVIDER (DSP), E.G. ARINC OR GDC.



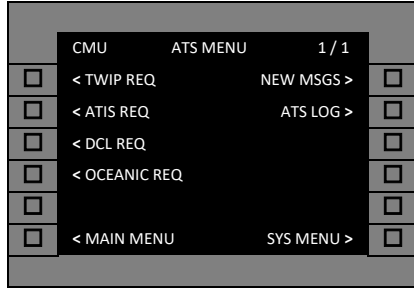


CMU ATS MENU

PRESS: **DLK** ⇒ **ATS** (2R)

COMMUNICATIONS MANAGEMENT UNIT (CMU)

AIR TRAFFIC SERVICE (ATS)



CPDLC PREFLIGHT SETUP

ATC FLIGHT PLAN

- BLOCK 7, CONFIRM AIRCRAFT ID AGREES WITH FMS FLIGHT ID **RADIO** ⇒ **TCAS** (5L) ⇒ **FLT ID** (3R)
- BLOCK 10A, CONFIRM J3 AND J5 – DATALINK SYSTEM
- BLOCK 10B, CONFIRM D1 – ADS

MASTER DOCUMENT

- ANNOTATE FIR BOUNDARIES
- CHECK FIRs VS. GOLD APPENDIX B, NOTE:
 - CPDLC STATUS
 - ADS-C STATUS
 - AFN ADDRESS
 - REMARKS

NOTE: IF COM/NAV3 FAILS, EITHER COM1 OR COM2 CAN BE CONFIGURED FOR VDL.

NOTE: IF ALL 3 VHF RADIOS ARE IN VOICE MODE ONLY THE SATCOM LINK WILL BE USED; THIS IS EXPENSIVE.

NOTE: TO FORCE SATCOM / DISABLE VHF DATA MODE, SELECT COM/NAV3 TO VOICE.

NOTE: ALTERNATE METHOD, PRESS:

FPL ⇒ **DLK FPL** (1R), ENTER FLIGHT PLAN NUMBER (2L), ⇒ **SEND REQST** (6R).

CONFIRM COM/NAV3 IN DATA MODE

- THE PURPOSE OF COM/NAV3 IS TO FUNCTION AS THE DATA RADIO FOR DATALINK, IT IS CALLED A VDR (VHF DATA RADIO); ITS LINK IS CALLED VDL (VHF DATALINK)
- COM/NAV3 IS FOUND ON RADIO TUNING PAGE 2/2; PRESS **RADIO** ⇒ **NEXT**
- IF COM/NAV3 IS TUNED TO A VOR/ILS FREQ THE ENTIRE DATA SECTION OF THE COM/NAV3 PAGE WILL BE MISSING. BOTH THE ACTIVE AND STANDBY FREQUENCIES NEED TO BE ON VOICE FREQUENCIES (118 – 137 MHz); PRESS **RADIO** ⇒ **NEXT** ⇒ **6L** ⇒ **6L**
- ON COM/NAV3 PAGE 1/1 CONFIRM 2R: MODE: DATA, IS ACTIVE

DOWNLINK THE FLIGHT PLAN

- THIS CONFIRMS THE DATA LINK IS WORKING
- PRESS **DLK** ⇒ **FLT PLAN** (1L), ENTER FLIGHT PLAN NUMBER (2L), ⇒ **SEND REQST** (6R)
- ONCE "FLT PLAN RECEIVED", SELECT: FPL REVIEW (5R) ⇒ **ACTIVATE** (6R)



CODE7700:

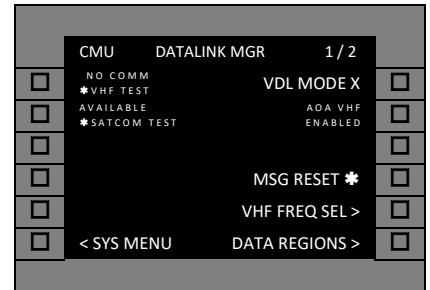
▶ [CPDLC PREFLIGHT SETUP](#)

▶ [ARINC DIRECT DATALINK QUICK CHECK](#)

CONFIRM VHF DATA LINK (VDL) AND SATCOM ARE AVAILABLE

- PRESS: **DLK** ⇒ **SYSTEM** (4R) ⇒ **DATALINK MGR** (1L)
- CHECK VHF TEST (1L) "AVAILABLE"; IF "NO COMM" CHECK VHF VDL AIRBORNE
- CHECK SATCOM TEST "AVAILABLE"

PRESS: **DLK** ⇒ **STATUS** ⇒ **TEST** (5R) ⇒ **DATALINK SEND** (6R)

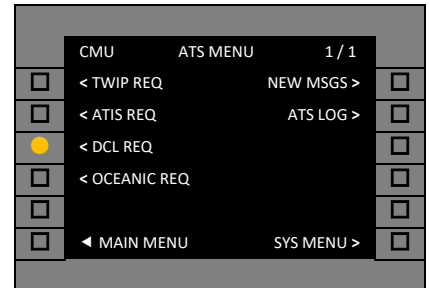


COMMUNICATIONS MANAGEMENT UNIT (CMU)

PDC

NOTE: ENTER "0" OR "FBO" FOR STAND

PRESS: **DLK** ⇒ **ATS** (2R) ⇒ **DCL REQ** (3L) ⇒ **DATALINK REQUEST** (6R)



DCL

NOTE: REQUEST DCL PRIOR TO DOWNLOADING OR CREATING AN ACTIVE FLIGHT PLAN.

THREE POSSIBLE CPDLC DEPARTURE CLEARANCES:

- CLEARED AS FILED
- CLEARED, BUT NOT AS FILED
- CLEARED, WITH CHANGES

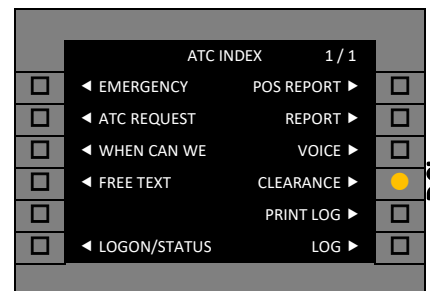
LOGON

- **DLK** ⇒ **ATC LOGON**
- ENTER "KUSA" INTO LOGON TO (1L)
- ENSURE FLT ID (2L) AND TAIL NO (3L) ARE CORRECT, PRESS SEND (6R)
- "ATC COMM ESTABLISHED" SHOULD APPEAR IN THE SCRATCHPAD

TO REQUEST CLEARANCE

▪ PRESS **ATC INDEX** (6L) ⇒ **CLEARANCE** (4R) ⇒ **SEND** (6R)

NOTE: AT SOME AIRPORTS CLEARANCE DELIVERY WILL PUSH THE DEPARTURE CLEARANCE WITHOUT WAITING FOR A REQUEST, AT OTHERS CLEARANCE DELIVERY WILL WAIT FOR A MESSAGE REQUESTING IT.



CODE7700:

▶ [PDC VS DCL](#)

- **ATC Message** CAS APPEARS
- SELECT **UPLINK / REQUEST CLEARANCE** (1L)
- REVIEW ALL PAGES, PRESS **ACCEPT** (4R) ⇒ **SEND** (6R)
- IF **REVIEW** IS DISPLAYED (3R) IT MEANS THE CLEARANCE CONTAINS A DIFFERENT ROUTE THAN FILED. SELECT **REVIEW** (3R), REVIEW ALL PAGES, FOLLOW THE **ATC CLEARANCE** LINK (1R), REVIEW ALL PAGES, SELECT **ATC UPLINK** (6L), REVIEW ALL PAGES, **ACCEPT** (2R), AS APPROPRIATE, AND **SEND** (6R); NOW SELECT **ACTIVATE** (4R)



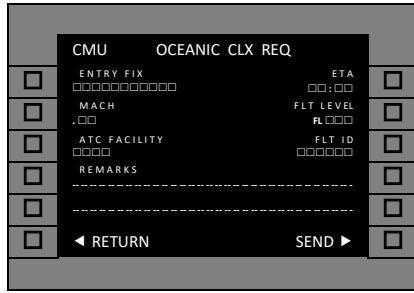
OCEANIC CLEARANCE

DATALINK SERVICE PROVIDER (DSP), E.G. ARINC OR GDC

NOTE: ALL OCEANIC AREAS, EXCEPT NEW YORK, DELIVER OCEANIC CLEARANCES VIA A DSP, NOT CPDLC. IF THE CLEARANCE IS NOT AUTOMATICALLY RECEIVED IT CAN BE REQUESTED VIA THE CMU ATS MENU PAGE.

FROM YOUR DSP (EVERYWHERE EXCEPT NY OCEANIC)

- DLK => ATS (2R) => OCEANIC REQ (4L)



NOTE: "AGCS EQUIPPED" ATC REMARK IS NOT APPROPRIATE FOR G450/G550 AIRCRAFT - IT INHIBITS THE ACKNOWLEDGE FUNCTION. "AGCS EQUIPPED" IS ONLY FOR EASTBOUND AIRCRAFT THAT DO NOT HAVE A DEDICATED OCEANIC CLEARANCE REQUEST PAGE.

COLLINS AEROSPACE:

- ATLANTIC HF FREQUENCY ASSIGNMENTS
PACIFIC HF FREQUENCY ASSIGNMENTS

CPDLC LOGON

- NOTE: FIR IDS
ICAO DOC 10037, APPENDIX B
EN ROUTE CHARTS

ATC FACILITIES NOTIFICATION (AFN) - WHEN THE FMS SENDS AN AFN CONTACT MESSAGE, ALSO KNOWN AS AN AFN LOGON, IT INDICATES THAT IT IS CAPABLE OF ADS AND ATC COMM. THIS RESULTS IN THE ATC CENTER TRYING TO ESTABLISH CPDLC SERVICES.

WHEN TO LOG ON

- OUTSIDE OF DATA LINK AIRSPACE, INITIATE A LOGON 10 TO 25 MIN PRIOR TO AIRSPACE ENTRY
OAKLAND OCEANIC CONTROL (KZAK)
DEPARTING THE WEST COAST, GUAM, AND HAWAII - DO NOT LOGON UNTIL AFTER LEAVING 10,000' MSL
LOGON AT LEAST 15-45 MIN PRIOR TO OAKLAND OCA FIR

- PRESS: DLK => ATC LOGON

ATC LOGON/STATUS PAGE 1/2

- ENSURE FLT ID (2L) AND TAIL NO (3L) ARE CORRECT
ENSURE ADS ARMED (4L)
ENSURE ADS EMERGENCY MODE IS OFF (5L)

ATC LOGON/STATUS PAGE 2/2

- ENSURE ATC COMM IS ARMED
NOTE: THE UPLINK DELAY TIME (2L) DEFAULTS TO 16 MIN; THIS DELAY TIMER WILL CHANGE A MESSAGE'S STATUS TO EXPIRED IF NOT READ WITHIN THE NUMBER OF MINUTES DISPLAYED; THIS IS NOT SAME AS A MESSAGE LATENCY TIMER

ATC LOGON/STATUS PAGE 1/2

- ENTER "LOGON TO" FIR ID (1L)
PRESS: SEND (6R)

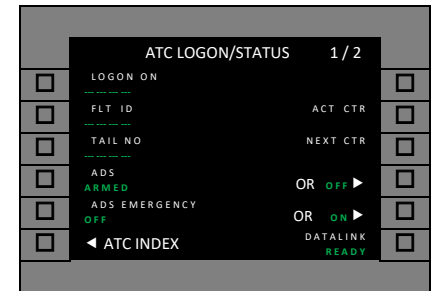
NOTE: THE CPDLC LOGON IS ALSO THE ADS-C LOGON - "ADS ESTABLISHED" DISPLAYS, AND ADS ARMED CHANGES TO ADS ACTIVE. AN ADS REVIEW OPTION BECOMES AVAILABLE AT 5L.

NOTE: PER HONEYWELL SIL, OPERATORS HAVE NOTED THAT THEY ARE UNABLE TO LOGON TO THE FANS 1/A NETWORK IN THE USA WHILE USING VHF. TESTING SHOWS THAT SWITCHING TO SATCOM (CHANGE COM 3 TO VOICE) REMEDIES THIS SITUATION.

LATENCY TIMER

NON-ASC 912

- 6R SHOWS "SENDING", THEN "SENT"
LOGON (1R) SHOWS "ACCEPTED", DATALINK (6R) SHOWS "READY"
NOTE: THE LOGON HAS BEEN ACCEPTED, BUT A CPDLC SESSION HAS NOT BEEN ESTABLISHED UNTIL ACT CTR (2R) SHOW THE FIR ID



SUCCESSFUL ATSU LOGON:

- "ATC COMM ESTABLISHED"
LOGON TO FIELD GOES BLANK (1L)
THE FIR'S ID IS SHOWN IN THE ACT CTR FIELD (2R)
ATC COMM (ATC LOGON PAGE 2/2) SHOWS "ACTIVE"

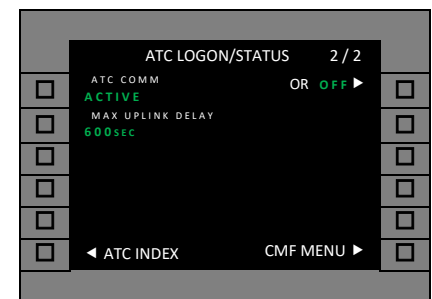
ASC 912(A/B/SUB)

NOTE: THE "+" IN FANS 1/A+ MEANS LATENCY TIMER

- IF YOU RECEIVE "CONFIRM MESSAGE LATENCY TIMER OFF" OR "SET UPLINK DELAY TO 40 SECONDS," FREE TEXT RESPONSE "TIMER NOT AVAILABLE."
THE "UPLINK DELAY TIME" FIELD IS NOT A SUITABLE "MESSAGE LATENCY TIMER." ITS FUNCTION IS TO FLAG A MESSAGE AS DELAYED THAT HAS BEEN RECEIVED BUT NOT READ. A TRUE LATENCY TIMER MONITORS NETWORK DELAYS, NOT PILOT DELAYS.
CORRECTED THE SOFTWARE TO MEET THE LATENCY TIMER REQUIREMENTS FOR FANS 1/A+
CHANGED THE "UPLINK DELAY TIME" FIELD TO "MAX UPLINK DELAY"
LATENCY TIMER DEFAULTS TO 600 SECONDS (10 MIN)
SELECTABLE (LSK 2L) FROM 0 TO 999 SEC, "0" DISABLES THE LATENCY TIMER
CPDLC AT RCP 240 USING VDL M0/A/2
ADS-C AT RSP 180 USING SATCOM (INMARSAT)
CPDLC-DCL USING SATCOM (INMARSAT)

CODE7700:

- LATENCY TIMER



NOTE: WHEN AN UPLINK IS RECEIVED, THE DELAY TIME IS CALCULATED USING THE EMBEDDED TIME STAMP IN THE UPLINK MESSAGE (TIME THE UPLINK WAS SENT BY ATC) AND THE FMS TIME OF WHEN THE MESSAGE WAS RECEIVED. IF THE DELAY TIME EXCEEDS THE TIMER VALUE THE MESSAGE WILL INCLUDE AN INDICATION THAT IT WAS DELAYED BY THE NETWORK AND THE CREW SHOULD CONTACT ATC BY VOICE.



ADS REVIEW

NAV ⇒ ATC ⇒ ADS REVIEW (5L)

NOTE: WHEN ADS GOES FROM "ARMED" TO "ACTIVE" THE ADS REVIEW PROMPT IS DISPLAYED ON THE ATC INDEX PAGE (5L).

CONTRACT TYPES:

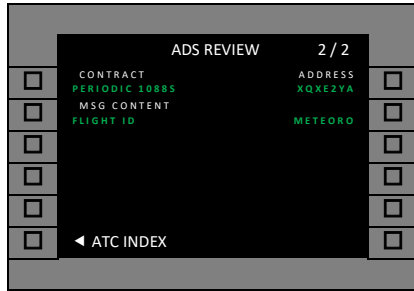
- PERIODIC CONTRACT; TWO TYPES: NORMAL AND EMERGENCY
- NORMAL PERIODIC REPORT CONTENT:
 - FLIGHT ID
 - EARTH REF
 - METEOROLOGY
 - PRED ROUTE
 - AIR REF
 - A/C INTENT

NOTE: IF THE GROUND SYSTEM DOES NOT SPECIFY A TIME INTERVAL THE AIRCRAFT WILL ESTABLISH A PERIODIC CONTRACT OF 64 SECONDS FOR EMERGENCY REPORTING AND 304 SECONDS FOR NORMAL PERIODIC REPORTING.

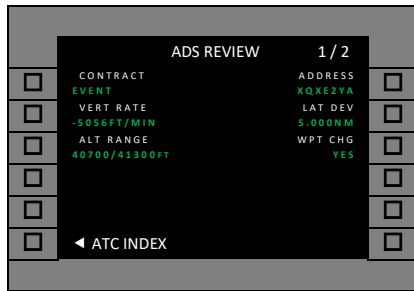
AUTOMATIC DEPENDENT SURVEILLANCE (ADS)

CODE7700:

▶ [ADS-C](#)



- DEMAND CONTRACT – A SINGLE ADS-C PERIODIC REPORT REQUESTED BY THE ATS UNIT
- EVENT CONTRACT – A SINGLE EVENT CONTRACT CONTAINS MULTIPLE EVENT TYPES:
 - WAYPOINT CHANGE EVENT (WCE)
 - LATERAL DEVIATION EVENT (LDE)
 - VERTICAL RATE CHANGE EVENT (VRE)



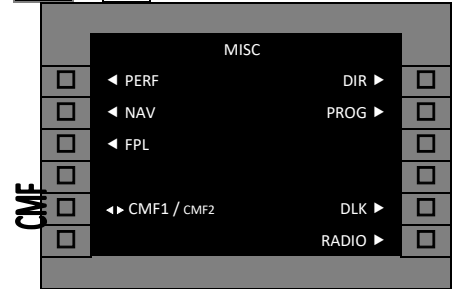
CMF SWITCHING

COMMUNICATIONS MANAGEMENT FUNCTION (CMF):

NOTE: MANUALLY SWITCHING CMFs WILL RESULT IN ALL LOGGED DATA AND THE MSG LOG BEING LOST. RECORD OOOI TIMES AND PRINT MSGs PRIOR TO SWITCHING CMFs.

- THE CMF CAN BECOME "FROZEN" – UNABLE TO LOG ON
- MANUALLY SWITCHING CMFs IS THE PRIMARY MEANS OF FORCING A NONRESPONSIVE CMF TO RELINQUISH CONTROL TO THE OTHER CMF.
- IF A MANUAL SWITCH IS ATTEMPTED AND THE STBY CMF IS UNABLE TO BECOME ACTIVE THE ACTIVE CMF RESETS AND RESUMES AFTER 3 SEC.

MENU ⇒ MISC



CODE7700:

▶ [SWITCH CMF](#)

COCKPIT PRINTER

MILTOPE

ARINC 623

ARINC 623 IS AN ACARS MESSAGING STANDARD THAT ALLOWS CPDLC FOR SPECIFIC AIR TRAFFIC SERVICE (ATS) FUNCTIONS. THIS INCLUDES D-ATIS, ACARS-DCL (DEPARTURE CLEARANCE OUTSIDE OF THE U.S.), AND OCEANIC CLEARANCE.

CODE 7700

▶ [CPDLC CHECKLIST](#)

▶ [CPDLC](#)

▶ [FANS](#)

▶ [RCP](#)

Ivan Luciani's Notes

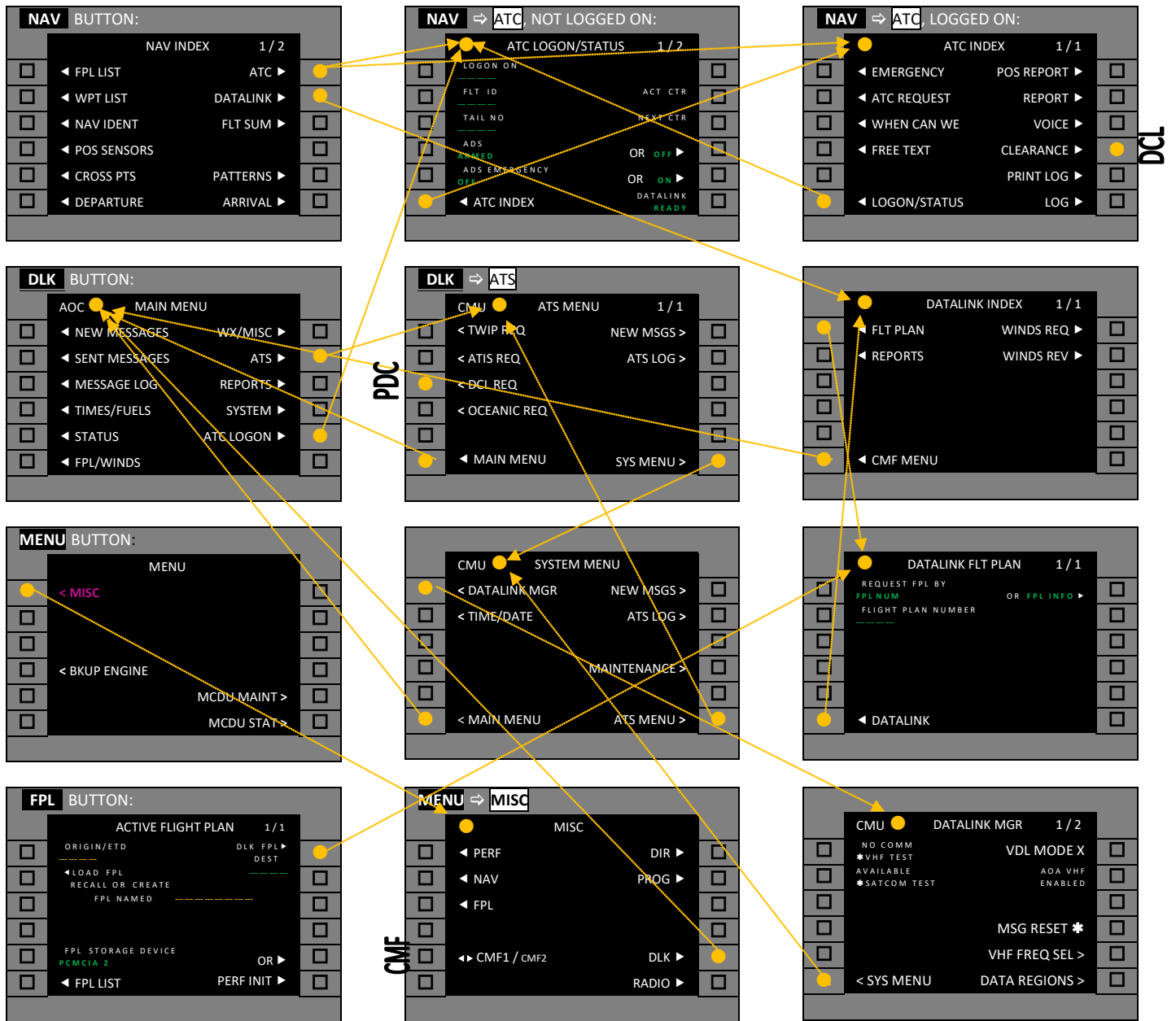
▶ [CPDLC](#)

▶ [PDC VS DCL](#)

▶ [FANS](#)

NOTES

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SOP

NOTE: AOM => CHAPTER 6 GROUND/FLIGHT CHARACTERISTICS AND PROCEDURES

BRIEFINGS

- CREW: Trip Release, Aircraft Status, Data Bases/VOR, Weather, NOTAMs / TFRs, Routing / Fuel, Turb / PIREPs, FRAT / SMS
DEPARTURE: Taxi Routes, HOT Spots, Noise Abatement, Obstacles, Terrain / MSA, APG / RWA
TAKEOFF: Runway and Condition, Configuration, Takeoff Data, Callouts, Abort Criteria, Clearance, Contingencies

GULFSTREAM HAS ADVISED THAT THE INITIAL, CRITICAL PILOT RESPONSES FOR THE FOLLOWING EMERGENCY PROCEDURES SHOULD BE PERFORMED PROMPTLY WITHOUT REFERENCE TO A CHECKLIST:

IMMEDIATE ACTION:

- REJECTED TAKEOFF, ENGINE FAILURE/FIRE AFTER V1, EMERGENCY DESCENT, RAPID DECOMPRESSION, AUTOPILOT OR AUTOTHROTTLE UNCOMMANDED DISCONNECT, ENGINE EXCEEDANCE, OVERSPEED, STALL PROTECTION/STALL WARNING ACTIVATION, FLIGHT CONTROL JAMS, TOTAL LOSS OF BRAKING, EGPWS ALERT, WINDSHEAR ALERT, TCAS ALERT, IN ADDITION, PILOTS ARE EXPECTED TO DON OXYGEN MASKS PROMPTLY WHEN APPROPRIATE (e.g. WHEN SMOKE IS DETECTED)

CODE7700: IMMEDIATE ACTION

PILOT SKILLS LIST

CREW

BRIEFINGS

- OUTLINES PLANS & DIFFERENCES, ALLOCATES TASKS, SEEKS INPUT, CHECKS UNDERSTANDING

TEAMWORK

- BALANCES RANK AUTHORITY, FLEXIBLE & SHOWS RESPECT, ACTIVELY MONITORS & SUPPORTS, THINKS INDEPENDENTLY

COMMUNICATION

- SHARES INFORMATION & IDEAS, ACTIVELY LISTENS, ASSERTIVE WHEN REQUIRED, ADMITS MISTAKES & DOUBTS

TASK

MANAGEMENT

SITUATIONAL AWARENESS

- THOROUGH PREFLIGHT PREPARATION, STAYS AHEAD & UPDATES PLANS, MAKES CONTINGENCY PLANS, KEEPS BROAD PERSPECTIVE

WORKLOAD

- RECOGNIZES HIGH WORKLOAD, TAKES OR MAKES TIME

- DEALS WITH OVERLOAD & PRIORITIZES, AVOIDS DISTRACTION & DISTRACTING

DECISIONS

- IDENTIFIES PROBLEMS & ISSUES, INVOLVES OTHERS IF NEEDED, EVALUATES OUTCOME, USES STRUCTURE IN NEW SITUATIONS

OPERATION

PROFESSIONAL STYLE

- RELAXED AND PROFESSIONAL TONE, ASPIRES TO HIGH PERFORMANCE, CONSCIENTIOUS & FLEXIBLE, SELF-AWARE & SEEKS FEEDBACK

AIRCRAFT HANDLING

- SAFE, EFFICIENT, AND COMFORTABLE, AUTOMATIC / MANUAL FLIGHT, NON-NORMALS / EMERGENCIES, MANAGES ERRORS

APPLIED KNOWLEDGE

- TECHNICAL & OPERATIONAL, USE OF CHECKLISTS, SOPs / POLICIES, COMMERCIAL / CUSTOMER AWARENESS

- NORMAL START, RIGHT ENG:

NOTE: ENSURE RESIDUAL TGT IS < 200°C / 150°C, IF NOT, PERFORM A CRANK CYCLE.

NOTE: WITH TAILWINDS > 10 KTS, ACHIEVE MAX CRANKING RPM AND VERIFY POSITIVE LP RPM PRIOR TO SELECTING FUEL CONTROL TO RUN.

MAX TAILWIND: G450 25 KTS, G550 20 KTS

NOTE: PRESS AND HOLD THE START SWITCH UNTIL SVO IS DISPLAYED. OTHERWISE YOU'LL GET A SAV Maintenance CAS MESSAGE. QRH - START MASTER OFF, CYCLE FUEL CONTROL, ATTEMPT ANOTHER START.

NOTE: WHEN THE ENG START PAGE TGT TEMP SCALE CHANGES FROM 800° TO 1000° THE ENG START IS COMPLETE.

NOTE: MIN BLEED AIR FOR START: 40 PSI, BUT 26 PSI HAS BEEN DEMONSTRATED.

CODE450: ENGINE START CHECKLIST

- ENGINE START ABNORMALS

- ENGINE FAILURE TO START (QRH EB-29, EB-37) (QRH FIRST STEP: FUEL CONTROL...OFF)

- HOT START (QRH EB-31, EB-39) (QRH FIRST STEP: FUEL CONTROL...OFF) NOTE: PERFORM A 30 SECOND CRANK CYCLE.

- STARTER VALVE FAILS TO OPEN (QRH EB-29, EB-37) (QRH FIRST STEP: START MASTER...OFF)

- STARTER VALVE FAILS TO CLOSE (QRH EB-30, EB-38) (QRH FIRST STEP: START MASTER...OFF)

- CROSSBLEED START (ALTERNATE NORMALS QRH NG-16) NOTE: ~85% HP RPM IS REQUIRED FOR CROSSBLEED STARTING.

G450 NOTE: THE ENGINE SHOULD BE IDLED FOR FOUR (4) MINUTES (COLD ENGINE) OR TWO (2) MINUTES (WARM ENGINE) PRIOR TO ACCELERATION ABOVE 85% HP RPM.

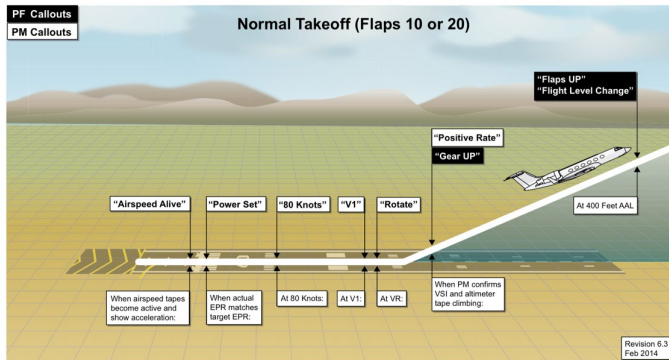


G550 NOTE: THE ENGINE SHOULD BE IDLED FOR FIVE (5) MINUTES PRIOR TO ACCELERATION ABOVE 85% HP RPM.

- **AIR START - WINDMILLING**
(QRH EB-17, EB-23)
NOTE: ≤ 25,000 FT, ≥ 250 KTS, ≥ 9% HP RPM, ≥ 8% HP RPM
- **AIRSTART – AUTOMATIC (PREFERRED)**
(G550 QRH EB-18)
- **AIRSTART – STARTER-ASSIST**
(G550 QRH EB-20)

CODE450: ▶ [G450 POWERPLANT ABNORMALS](#)

- | | | |
|------------------|-----------------------|------------------------|
| ▪ NORMAL TAKEOFF | ▪ ROTATE TO 14° | ▪ PF, "GEAR UP" |
| | ▪ PM, "POSITIVE RATE" | ▪ PF, "FLAPS UP, FLCH" |
| | ▪ PM, "400 FT" | |



CODE450:

- ▶ [G450 TAKEOFF](#)
- ▶ [G450 TAKEOFF PERFORMANCE](#)
- ▶ [G450 TAKEOFF FLAP SELECTION](#)
- ▶ [G450 NOISE ABATEMENT PROCEDURES](#)

- | | | |
|---------------|--------------------|--------|
| ▪ STEEP TURNS | ▪ 15,000', 250 KTS | |
| | ▪ DISENGAGE | 1. HDG |
| | | 2. A/T |
| | | 3. A/P |

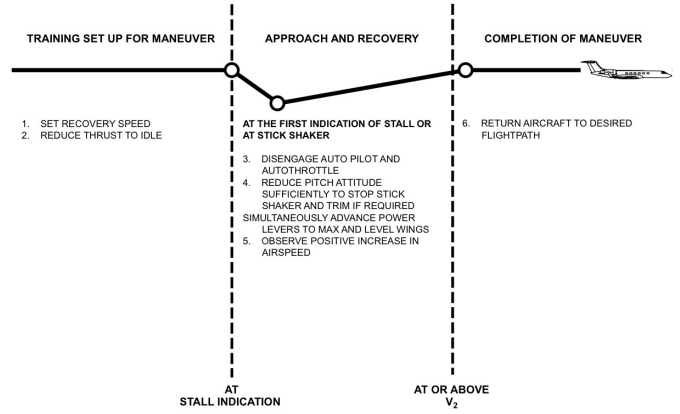
NOTE: WHEN ROLLING THROUGH ≥32° BANK, AN INVERTED TRIANGLE APPEARS AT THE 45° POSITION. IT DISAPPEARS FROM VIEW AT ≤30°.

CODE450: ▶ [G450 STEEP TURNS](#)

- | | |
|-----------------------------|--|
| ▪ APPROACH TO STALL – CLEAN | ▪ SET MAN SPEED 160 KTS |
| | ▪ BRIEF "STOP TRIM AT VREF" & "CALL 140" |
| | ▪ IDLE THRUST |
| | ▪ STOP TRIMMING AT VREF |

CODE7700:

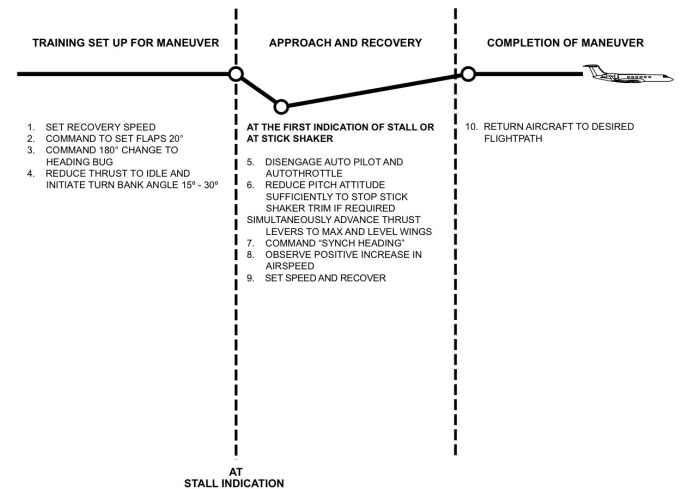
- ▶ [STALL RECOVERY](#)
- **STALL WARNING ACTIVATION IMMEDIATE ACTION:**
 - ANNOUNCE "STALL"
 - REDUCE AOA, SELECT TO/GA POWER
 - ROLL – WINGS LEVEL, OR UNLOAD THE WING (AS APPROPRIATE)
 - ATTITUDE AND BANK – RECOVER TO LEVEL FLIGHT



- | | |
|---|-------------------------|
| ▪ APPROACH TO STALL – TAKEOFF CONFIGURATION | ▪ FLAPS 20° |
| | ▪ SET HEADING CHANGE |
| | ▪ IDLE THRUST |
| | ▪ 15° – 30° BANK |
| | ▪ STOP TRIMMING AT VREF |

STALL WARNING ACTIVATION IMMEDIATE ACTION:

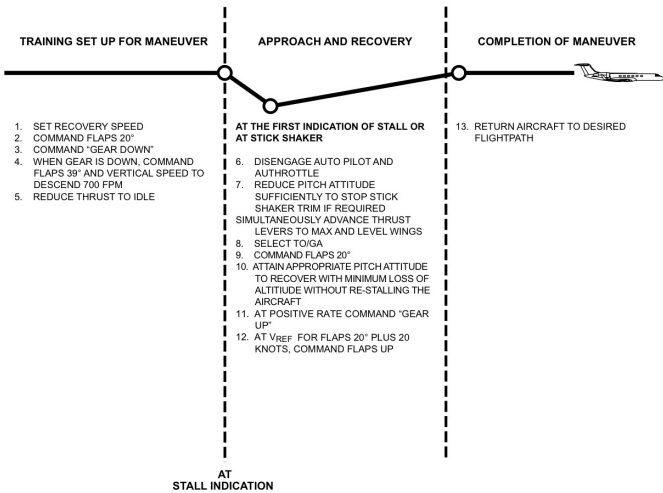
- ANNOUNCE "STALL"
- REDUCE AOA, SELECT TO/GA POWER
- ROLL – WINGS LEVEL, OR UNLOAD THE WING (AS APPROPRIATE)
- ATTITUDE AND BANK – RECOVER TO LEVEL FLIGHT
- DURING RECOVERY CALL "SYNC HEADING"



- | | |
|---|---------------------------|
| ▪ APPROACH TO STALL – LANDING CONFIGURATION | ▪ GEAR DOWN, FULL FLAPS |
| | ▪ VERTICAL SPEED -700 FPM |
| | ▪ IDLE THRUST |
| | ▪ STOP TRIMMING AT VREF |

STALL WARNING ACTIVATION IMMEDIATE ACTION:

- ANNOUNCE "STALL"
- REDUCE AOA, SELECT TO/GA, CALL "FLAPS 20"
- ROLL – WINGS LEVEL, OR UNLOAD THE WING (AS APPROPRIATE)
- ATTITUDE AND BANK – RECOVER TO LEVEL FLIGHT
- AT POSITIVE RATE, CALL "GEAR UP, HDG, FLCH"
- AT 160 KTS (OR VREF20+20), CALL "FLAPS UP"



EMERGENCY DESCENT

- EDM ARMED:
- ≥FL400 &
 - AUTOPILOT ENGAGED

EDM PROCEDURE:

- EDM ACTIVATED:
- "Cabin Pressure Low"

NOTE: THE GUIDANCE PANEL WILL BE LOCKED UNTIL THE EDM HAS BEEN TERMINATED BY DISCONNECTING THE AUTOPILOT.

IMMEDIATE ACTION:
PF DUTIES: CALL "MASKS MASKS!"

OXYGEN MASK.....DON
EDMMONITOR
SPEEDBRAKESDEPLOY (NEARING MMO/VMO)
CALL "LOSS OF PRESSURIZATION CHECKLIST"

PM DUTIES: CALL "MASKS MASKS!"

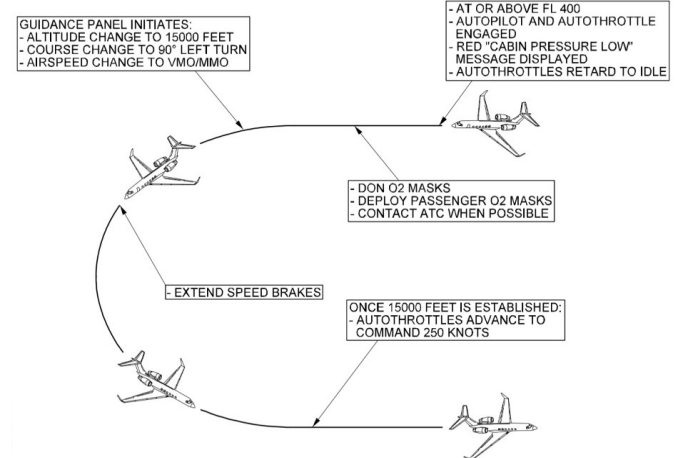
OXYGEN MASK.....DON
PASSENGER OXYGEN MASKSDEPLOY
EXTERIOR LIGHTSON
TRANSPONDER..... SET 7700
ATC NOTIFY, ASK MSA ALTITUDE
LOSS OF PRESSURIZATION CHECKLIST ... COMPLETE (QRH EH-2)

- NOTE: DONNING OXYGEN MASKS:
- REMOVE GLASSES
 - REMOVE HEADSET BY PUTTING THEM AROUND YOUR NECK
 - DON OXYGEN MASK, SELECT MIC TO MASK
 - REPLACE HEADSET OR SELECT SPEAKER ON

THE AIRCRAFT AUTOMATICALLY:

- A/T ENGAGE – GO TO IDLE
- SPEED – MAN 340 KTS
- HDG – 90° LEFT TURN
- ALT – 15,000'
- FLCH
- AIRCRAFT TURNS LEFT 90°, DESCENDS AT VMO/MMO, LEVELS 15,000'
- GP SPEED – MAN 250 KTS

NOTE: DO NOT REMOVE OXYGEN MASK UNTIL BELOW 10,000 FT – THE AIRCRAFT WILL LEVEL AT 15,000 FT.



MANUAL PROCEDURE:

NOTE: A -8000 FPM V/S DESCENT CAN BE DIALED, THE AIRCRAFT WILL NOT OVERSPEED WHEN ON AUTOPILOT DUE TO OVERSPEED PROTECTION.

NOTE: IN "MAN SPEED" THE SPEED WINDOW CAN BE QUICKLY SPUN UP; IT'LL STOP AT VMO/MMO.

PERFORM EMERGENCY DESCENT:

IMMEDIATE ACTION:
PF DUTIES: CALL "MASKS MASKS!"

OXYGEN MASK.....DON
POWER LEVERS IDLE
TCS PRESS AND HOLD
HEADING TURN 90 DEG
AIRSPEED MMO/MVO (IF NO STRUCTURAL DAMAGE)
SPEEDBRAKES DEPLOY
CALL: "SET 15,000 FT," "SYNC HEADING," "MAN SPEED, SYNC," "FLCH"
TCS RELEASE
CALL "LOSS OF PRESSURIZATION CHECKLIST" (QRH EH-2)

NOTE: AN INITIAL PITCH ATTITUDE OF 8° TO 10° NOSE DOWN IS RECOMMENDED. AS SPEED APPROACHES VMO/MMO EXTEND SPEEDBRAKES. ADJUST PITCH TO AVOID OVERSPEED.

- JAMMED AILERONS (G550)**
G550 QRH ED-2

IMMEDIATE ACTION:

 - AUTOPILOT – DISCONNECT
 - SPEEDBRAKES – RETRACT
 - AILERON DISC HANDLE – PULL
 - FREE AILERON – DETERMINE
 - CALL "JAMMED AILERONS CHECKLIST"
- JAMMED ELEVATOR (G550)**
G550 QRH ED-3

IMMEDIATE ACTION:

 - AIRSPEED – V₂+10 KTS MAXIMUM
 - BOTH PILOTS – HOLD YOKE FIRMLY
 - ELEVATOR DISC HANDLE – PULL
 - COUNTER PITCH FORCE WITH OPERABLE ELEVATOR
 - EMER STAB – ARM
 - STAB TRIM – TRIM AS NECESSARY TO CONTROL PITCH
 - CALL "JAMMED ELEVATOR CHECKLIST"
- JAMMED RUDDER (G550)**
G550 QRH ED-5

IMMEDIATE ACTION:

 - AUTOPILOT – DISCONNECT
 - RUDDER – COUNTERACT WITH STEADY STATE DIFFERENTIAL THRUST AND AILERON TRIM
 - CALL "JAMMED RUDDER CHECKLIST"
- JAMMED STABILIZER**
G450 QRH ED-2
G550 QRH ED-6

IMMEDIATE ACTION:

 - REDUCE PITCH WITH BANK / INCREASE PITCH WITH TRIM
 - ON TAKEOFF: MAINTAIN V₂+10 KTS AFTER LIFTOFF AND DURING CLIMB
 - IN FLIGHT (G450): FURTHER FLAP MOVEMENT – STOP
 - CALL "JAMMED STABILIZER CHECKLIST"

CODE450: ▶ [G450 JAMMED STABILIZER](#)
- JAMMED SPOILERS**
G450 QRH ED-4
G550 QRH ED-7

IMMEDIATE ACTION:

 - CURRENT CONFIGURATION AND AIRSPEED – MAINTAIN
 - AILERON AND/OR RUDDER TRIM – USE TO MAINTAIN LEVEL FLIGHT
 - CALL "JAMMED SPOILERS CHECKLIST"
- RUNAWAY PITCH TRIM**
G450 QRH ED-7
G550 QRH ED-11

IMMEDIATE ACTION:

 - A/P DISC – PUSH AND HOLD
 - PITCH TRIM – DISENGAGE
 - A/P DISC - RELEASE
 - CALL "RUNAWAY PITCH TRIM CHECKLIST"

CODE450: ▶ [G450 RUNAWAY PITCH TRIM](#)



NOTE: **PM DUTIES: CALL "MASKS MASKS!"**

SLOW DECOMPRESSION: >10 SEC

RAPID DECOMPRESSION: 1-10 SEC

EXPLOSIVE DECOMPRESSION: <1 SEC

OXYGEN MASK.....DON

PASSENGER OXYGEN MASKS..... DEPLOY

EXTERIOR LIGHTSON

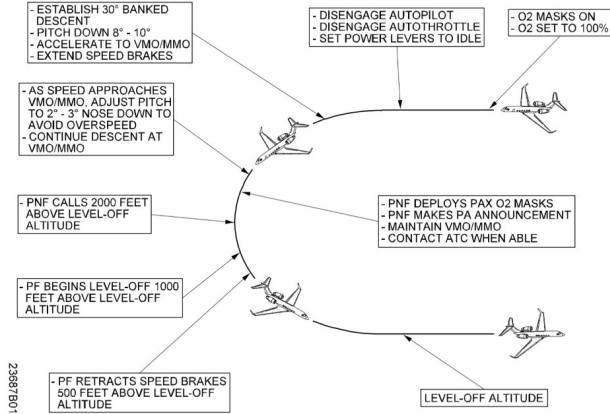
TRANSPONDER..... SET 7700

GP SET (ALT, HDG, SPEED, FLCH)

ATC..... NOTIFY, ASK MSA ALTITUDE

LOSS OF PRESSURIZATION CHECKLIST.... COMPLETE

NOTE: DO NOT REMOVE OXYGEN MASK UNTIL BELOW 10,000 FT.



CODE450: ▶ **EMERGENCY DESCENT**

- ENGINE FAILURE IN FLIGHT
- NOTE: QRH STEP "MATCH FGC TO OPERATING ENGINE." THIS SHOULD OCCUR AUTOMATICALLY WITH THE LOSS OF THE IDG.
- QRH OPTIONS:
 - ENGINE SHUTDOWN IN FLIGHT (QRH EB-13, EB-14)
 - ENGINE FAILURE ABOVE V1 ◀ LINK (QRH EB-2)
 - AIRSTART – WINDMILLING (QRH EB-17, EB-23)
 - AIRSTART – AUTOMATIC (PREFERRED) (G550 QRH EB-18)
 - AIRSTART – STARTER-ASSIST (G550 QRH EB-20)
- NOTE: DO NOT ATTEMPT AIRSTART IF:
 - FIRE
 - FOD
 - FROZEN

NOTE: USE OF THE AUTOTHROTTLE DURING SINGLE ENGINE APPROACH IS PROHIBITED.

NOTE: THE QRH HAS ENGINE OUT DRIFTDOWN CHARTS (EB-14).

NOTE: IN THE EVENT OF AN ACTUAL ENGINE FAILURE THE FMS CALCULATES ALL PERF BASED ON SINGLE ENGINE. PERF DATA TITLE PAGES AUTO CHANGE:

- PERF DATA BECOMES S.E. PERF DATA
- CRUISE BECOMES S.E. CRUISE, ETC...

LUCIANI NOTE: AN ENGINE FAILURE INHIBITS CAS MESSAGES ASSOCIATED WITH AN ENGINE FAILURE, SUCH AS: **Hyd System Fail**

- DUAL ENGINE FAILURE
- NOTE: MAXIMUM GLIDE HAPPENS AT ABOUT 0.30 AOA.
- QRH OPTIONS:
 - DUAL ENGINE FLAMEOUT
 - DUAL ENGINE FAILURE – MID-ALTITUDE
 - DUAL ENGINE OUT LANDING PROCEDURE
- NOTE: ENG AIRSTART ENVELOPE ≤ 25,000 FT, ≥ 250 KTS (G450); APU START ENVELOPE ≤ 37,000 FT (G450), ≤ 39,000 FT (POSSIBLE BETWEEN 39,000 – 43,000 FT) G550.
- NOTE: USE OF THE STANDBY ELECTRICAL POWER (HMG) IS NOT POSSIBLE WITH BOTH ENGINES WINDMILLING.

Quick Reference Handbook GULFSTREAM IV

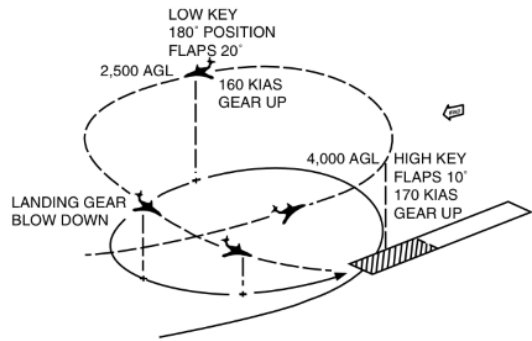
Dual Engine Out Speeds For Maximum Range CCM

Weight	75,000	70,000	65,000	60,000	55,000	50,000	45,000
KIAS	203	196	188	181	173	164	155

Glide Ratio = Approximately 15:1

GIII DOUBLE ENGINE FLAMEOUT CHECKLIST

- High key—4,000 feet AGL:
- Flaps 10°
 - 170 KIAS
 - Gear up
 - Standard rate turn (about 25°)
- Base:
- Landing gear—Blow down
 - Turn rate—Adjust bank as required
 - 160 KIAS
- Final:
- 150 KIAS
 - Speedbrakes as required (warning will sound)
 - Full flaps as required for glide slope
 - Master Battery Switch—NORMAL
 - Auxiliary Hydraulic Pump Switch—ON
 - Touchdown—As Soon As Practical
- Low Key—2,500 feet AGL (180° position):
- Wings Level (as required)
 - Flaps 20°
 - 160 KIAS
 - Standard rate turn (about 25°)



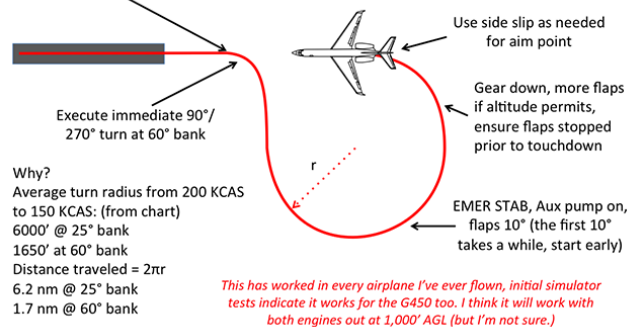
CODE7700:

- DUAL ENGINE FLAMEOUT
- DUAL ENGINE FAILURE – MID ALTITUDE
- DUAL ENGINE-OUT LANDING
- G450 TWO-ENGINE LOSS AFTER TAKEOFF

G450, Gear up, flaps up, 200 KCAS, 1500' AGL, both engines quit, only battery power left, no APU (assumes bad fuel)

G450 Two-Engine Loss at 1,500' AGL (90/270)

Theory: a higher bank angle gets you around with less altitude loss



- G550 AIRSTARTS
- AUTOMATIC (QRH EB-18)
- NO ICING CONDITIONS
- NO START MASTER FAILURE
- CRANK (QRH EB-20)
- START MASTER FAILURE
- WINDMILLING (QRH EB-23)
- ICING CONDITIONS



ENGINE FIRE / FAILURE AT V1

NOTE: A LEFT ENG FAILURE WILL CAUSE A BREAK POWER TRANSFER. IF USING FGC1 THE LATERAL MODE MAY CHANGE.

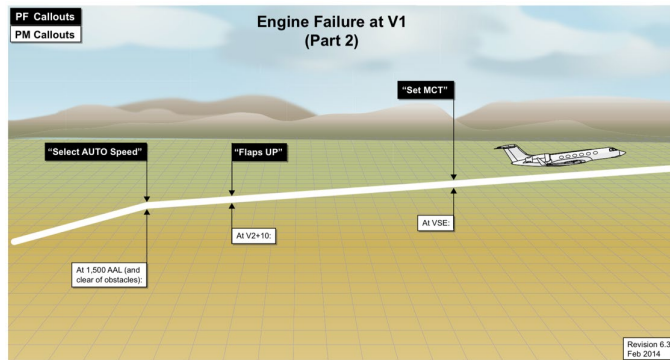
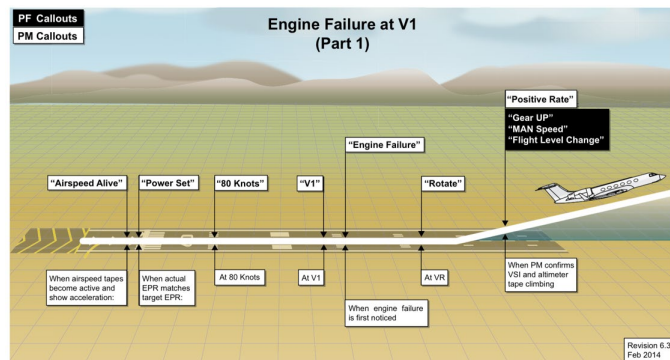
NOTE: TAKEOFF POWER MAY BE MAINTAINED FOR TEN (10) MINUTES DURING SINGLE-ENGINE OPERATIONS AS NEEDED.

IMMEDIATE ACTION:

- CALLOUT "ENGINE FAILURE"
- AT POSITIVE RATE, CALL "GEAR UP, MANUAL SPEED, FLCH"
- HOLD V2 TO V2+10
- AT 1,500' AGL (OR CLEAR OF OBSTACLES), CALL "AUTO SPEED"
- AT V2+10, CALL "FLAPS UP"
- AT VSE, CALL "SET MCT" (715°C (G450) / 860°C (G550))
- CALL "ENGINE FIRE CHECKLIST" OR "ENGINE FAILURE ABOVE V1 CHECKLIST" (AS APPROPRIATE)
- CALL "START THE APU" (APU INFLIGHT OPERATION – ALTERNATE ELECTRICAL POWER SOURCE, QRH EA-20, EA-21)
- CALL "ONE ENGINE INOPERATIVE LANDING PROCEDURE CHECKLIST" (AS APPROPRIATE)

NOTE: SHOULD ANY ABNORMAL EVENT OR EMERGENCY OCCUR, THE FOLLOWING GENERAL GUIDANCE SHALL APPLY:

- MAINTAIN CONTROL OF THE AIRCRAFT
- OTHER THAN RETRACTING THE LANDING GEAR AND SILENCING AURAL WARNINGS, TAKE NO ACTION UNTIL 400 FT AGL.
- DO NOT PERFORM ANY CHECKLIST UNTIL 1,500 FEET AGL. IN THE CASE OF AN ENGINE FIRE, PIC MAY DECIDE TO COMMAND AN INITIAL SHUTDOWN OF THE ENGINE AND SAVE ACTUAL ENGINE FIRE CHECKLIST UNTIL 1,500 FEET AGL.



CODE450:

- ▶ [G450 ENGINE FAILURE ABOVE V1](#)
- ▶ [G450 ENGINE FIRE/FAILURE ON TAKEOFF](#)
- ▶ [G450 ENGINE OUT CONSIDERATIONS](#)
- ▶ [G450 ENGINE OUT PROCEDURES](#)

ENGINE FIRE IN FLIGHT

IMMEDIATE ACTION:

- AFFECTED ENGINE IDENTIFY
- AFFECTED ENGINE POWER LEVER IDLE
- AFFECTED ENGINE FUEL CONTROL OFF
- AFFECTED ENGINE FIRE HANDLE PULL
- AFFECTED ENGINE FIRE HANDLE ROTATE OUTBOARD
- CALL "ENGINE FIRE IN FLIGHT CHECKLIST" (EC-2)

CODE450:

- ▶ [G450 ENGINE FIRE IN FLIGHT](#)
- ▶ [G450 ENGINE FIRE LOOP ALERT](#)

NOTE: G550 QRH, "THE IMPORTANT ACTION FOR CONTROLLING AN ENGINE FIRE IS TO SHUT THE AFFECTED ENGINE DOWN AND SHUTOFF THE COMBUSTIBLE FLUIDS AS QUICKLY AS POSSIBLE" (G550 QRH EC-2).

ENGINE SHUTDOWN GUIDELINES

SHUTDOWN FOR THE FOLLOWING:

- ENGINE FIRE
- VIBRATION – EXTREME ENG VIB FELT IN THE AIRPLANE, OR IF VIB IS ACCOMPANIED BY OTHER FAILURE INDICATIONS
- LOSS OF POWER – EXCESSIVE OR UNCONTROLLABLE POWER LOSS
- OIL PRESSURE – SUDDEN INCREASE OR DECREASE IN OIL PRESSURE BEYOND LIMITS, OR SUSTAINED HIGH OIL PRESS ABOVE LIMITS
- TGT – SUDDEN UNCONTROLLABLE INCREASE IN TGT BEYOND LIMITS
- ANY OTHER ADVISABLE CONDITION

LANDING URGENCY CONSIDERATIONS

LAND AS SOON AS POSSIBLE

QRH EXAMPLES

- LAND WITHOUT DELAY WHERE A SAFE APPROACH AND LANDING IS ASSURED
- BOTH G450 AND G550:
 - MAIN ENTRANCE DOOR NOT SECURE (QRH EI-5, EI-6)

G450:

- [Fuel Filter, L-R](#) (G450 QRH MB-25)

LAND AT NEAREST SUITABLE AIRPORT

QRH EXAMPLES:

- BOTH G450 AND G550:
 - [OPERATION ON AIRCRAFT BATTERIES ONLY](#) ◀ LINK (QRH EA-5, EA-5)
 - [VOLCANIC ASH ENCOUNTER](#) ◀ LINK (QRH EB-27, EB-34)
 - [AFT EQUIPMENT HOT](#) (QRH EC-15, EC-14) ◀ LINK
 - [EER HOT / PDB OVERHEAT](#) ◀ LINK (QRH EC-19, EC-18)
 - [JAMMED SPOILERS](#) (QRH ED-4, ED-7) ◀ LINK
 - DUAL HYDRAULIC SYSTEM FAILURE (QRH EE-3, EE-5, EE-3, EE-5)
 - FUEL LEAK IN FLIGHT (QRH EE-18, EE-16)
 - [SUSPECTED ERRONEOUS / UNRELIABLE AIRSPEED INDICATIONS](#) ◀ LINK (QRH EF-2, EF-1)
- G450:
 - [LOSS OF ELEVATOR CONTROL](#) (G450 QRH ED-6) QRH NOTE: "MAINTAINING POWER FOR EXISTING TRIM SPEED CONDITION WILL HELP ON INITIAL ASSESSMENT OF SITUATION."
 - [LATERAL HOPS ACTIVATION](#) ◀ LINK (G450 QRH ED-10)
 - [LEFT HYDRAULIC SYSTEM FAILURE](#) (G450 QRH EE-9 & EE-10)
 - [RIGHT HYDRAULIC SYSTEM FAILURE – LOSS OF](#)



- PRESSURE AND/OR FLUID (G450 QRH EE-11)
- LOW FUEL STATE (G450 QRH EE-22)
- G550:
 - **OPERATION ON EMERGENCY POWER ONLY**
 - ▲ LINK (G550 QRH EA-7)
 - **AIRPLANE INTERIOR FIRE/SMOKE/FUMES** ◀ LINK (G550 QRH EC-7)
 - **JAMMEDAILERONS** (G550 QRH ED-2) ◀ LINK
 - **JAMMED ELEVATOR** (G550 QRH ED-3) ◀ LINK
 - LOSS OF ALL DISPLAY UNITS (DUs) (G550 QRH EF-5)
 - **Fuel Tank Temperature** (G550 QRH MB-15)
 - HEAVY RAIN / HAIL ENCOUNTER (G550 QRH S-1)
 - TURBULENCE PENETRATION / SEVERE GUST ENCOUNTER (G550 QRH S-3)
 - LIGHTNING STRIKE (G550 QRH S-6)
 - BIRD INGESTION (G550 QRH S-10)

NOTE: IF AN ABNORMAL EVENT IS ASSOCIATED WITH THE PRIMARY OR SECONDARY FLIGHT CONTROL SYSTEMS, OR IF AIRPLANE CONTROLLABILITY IS QUESTIONABLE, PROCEED TOWARD NEAREST SUITABLE AIRPORT WITH THE LONGEST AND WIDEST RUNWAY AVAILABLE AND WITH THE MINIMUM CROSSWIND COMPONENT (QRH E-1).

LAND AS SOON AS PRACTICAL THE LANDING SITE AND DURATION OF THE FLIGHT ARE AT THE DISCRETION OF THE PILOT

- QRH EXAMPLES BOTH G450 AND G550:
- THRUST REVERSER UNLOCK OR DEPLOY DURING TAKEOFF (QRH EB-23, EB-30) - QRH NOTE: DO NOT EXCEED 200 KTS.
 - THRUST REVERSER UNLOCK OR DEPLOY DURING FLIGHT (QRH ED-24, EB-31) - QRH NOTE: DO NOT EXCEED 200 KTS.
 - **JAMMED STABILIZER** (QRH ED-2, ED-6) ◀ LINK

- **ELECTRICS (EA) EMERGENCIES** QRH REV 43/43
 - **DUAL GENERATOR FAILURE** (QRH EA-2) ◀ LINK
 - **OPERATION ON AIRPLANE BATTERIES ONLY**
 - ▲ LINK (QRH EA-5)
 - **OPERATION ON EMERGENCY POWER ONLY**
 - ▲ LINK (QRH EA-7)

CODE450: ▶ [G450 ELECTRICAL ABNORMALS](#)

- **ENGINE (EB) EMERGENCIES** QRH REV 43/43
 - ENGINE FAILURE CONSIDERATIONS (QRH EB-1)
 - **ENGINE FAILURE BELOW V₁** (QRH EB-1) ◀ LINK
 - **ENGINE FAILURE ABOVE V₁** (QRH EB-2) ◀ LINK
 - **DUAL ENGINE FLAMEOUT** (QRH EB-5) ◀ LINK
 - INADVERTENT ENGINE (ONE OR BOTH) SHUT DOWN (QRH EB-6)
 - **DUAL ENGINE FAILURE – MID ALTITUDE** ◀ LINK (QRH EB-7)
 - **DUAL ENGINE OUT LANDING PROCEDURE** ◀ LINK (QRH EB-8)
 - RIGHT ENGINE FAILURE AND LEFT AND AUXILIARY HYDRAULIC SYSTEM LOSS OF FLUID (QRH EB-10)
 - LEFT ENGINE FAILURE AND RIGHT HYDRAULIC FAILURE (QRH EB-12)
 - ENGINE SHUTDOWN IN FLIGHT (QRH EB-13, EB-14)
 - **ENGINE OUT DRIFTDOWN CHARTS** (QRH EB-16)
 - **NORMAL AIRSTART – AUTOMATIC** (QRH EB-18)
 - **MANUAL AIRSTART – STARTER ASSIST** (QRH EB-20)
 - AIRSTART – WINDMILLING (QRH EB-17, EB-23)
 - ONE ENGINE INOPERATIVE LANDING PROCEDURE (QRH EB-18, EB-24)

- **ONE ENGINE INOPERATIVE GO-AROUND PROCEDURE** (QRH EB-20, EB-26) ◀ LINK
- **ENGINE EXCEEDANCE** (QRH EB-21, EB-27) ◀ LINK
 - HIGH OIL TEMPERATURE (QRH EB-22, EB-27)
 - LOW OIL PRESSURE (QRH EB-22, EB-29)
 - LOW FUEL PRESSURE (QRH EB-22, EB-29)
 - THRUST REVERSER UNLOCK OR DEPLOY DURING TAKEOFF (QRH EB-23, EB-30) - QRH NOTE: DO NOT EXCEED 200 KTS.
 - THRUST REVERSER UNLOCK OF DEPLOY DURING FLIGHT (QRH EB-24, EB-31) - QRH NOTE: DO NOT EXCEED 200 KTS.
 - THRUST REVERSER FAILURE (QRH EB-24, EB-32)

CODE450: ▶ [G450 POWERPLANT ABNORMALS](#)

- **FIRE (EC) EMERGENCIES** QRH REV 43/43
 - **ENGINE FIRE IN FLIGHT** (QRH EC-2) ◀ LINK
 - ENGINE FIRE ON GROUND (QRH EC-4)
 - TAILPIPE FIRE (QRH EC-5)
 - APU FIRE (QRH EC-6)
 - **AIRPLANE INTERIOR FIRE / SMOKE / FUMES**
 - ▲ LINK (QRH EC-7)
 - ENGINE FIRE WARNING SYSTEM MALFUNCTION (QRH EC-12)
 - **ENGINE HOT** ◀ LINK (QRH EC-13)
 - **PYLON HOT** ◀ LINK (QRH EC-15, EB-14)
 - **AFT EQUIPMENT HOT** ◀ LINK (QRH EC-15, EC-14)
 - **AFT FLOOR HOT** ◀ LINK (QRH EC-16, EC-15)

- **FLIGHT CONTROLS (ED) EMERGENCIES** QRH REV 43/43
 - **JAMMEDAILERONS** (QRH ED-2) ◀ LINK
 - **JAMMED ELEVATOR** (QRH ED-3) ◀ LINK
 - **JAMMED RUDDER** (QRH ED-5) ◀ LINK
 - **JAMMED STABILIZER** (QRH ED-2, ED-6) ◀ LINK
 - **JAMMED SPOILERS** (QRH ED-4, ED-7) ◀ LINK
 - INADVERTENT POWERED DISCONNECT LEVER ACTIVATION (QRH ED-9)
 - **STALL BARRIER MALFUNCTION** ◀ LINK (QRH ED-4, ED-10)
 - **GROUND SPOILER FAILURE INFLIGHT** (QRH ED-11)
 - GROUND SPOILER FAILURE ON LANDING (QRH ED-5, ED-11)
 - **LOSS OF ELEVATOR CONTROL** (QRH ED-5)
 - QRH NOTE: "MAINTAINING POWER FOR EXISTING TRIM SPEED CONDITION WILL HELP ON INITIAL ASSESSMENT OF SITUATION."

CODE450: ▶ [G450 FLIGHT CONTROLS ABNORMALS](#)

- **HYDRAULIC (EE) EMERGENCIES** QRH REV 43/43
 - DUAL HYDRAULIC SYSTEM FAILURE – AUX PUMP AVAILABLE (QRH EE-3)
 - DUAL HYDRAULIC SYSTEM FAILURE – AUX PUMP UNAVAILABLE (QRH EE-5)
 - LEFT AND AUXILIARY HYDRAULIC SYSTEM LOSS OF FLUID (QRH EE-7, EE-8)
 - **FUEL TANK TEMPERATURE** (QRH EE-16) – "LAND AT NEAREST SUITABLE AIRPORT"
 - **FUEL LEAK IN FLIGHT** (QRH EE-19)

CODE450: ▶ [G450 HYDRAULICS ABNORMALS](#)



- AVIONICS (EF) **EMERGENCIES**
 - QRH REV 43/43
 - PRIMARY FLIGHT DISPLAY (PFD) MALFUNCTION (QRH EF-1)
 - **SUSPECTED ERRONEOUS/UNRELIABLE AIRSPEED INDICATIONS** ◀ LINK (QRH EF-2, EF-1)

- LANDING GEAR (EG) **EMERGENCIES**
 - QRH REV 43/43
 - **ABNORMAL GEAR CONDITION – EMERGENCY LANDING** (QRH EG-2)
 - BRAKING USING PARK / EMERG BRAKE (QRH EG-2, EG-9)
 - NOSE GEAR RETRACTED, BOTH MAIN GEAR DOWN AND LOCKED (QRH EG-3, EG-5)
 - ONE MAIN GEAR AND NOSE GEAR DOWN AND LOCKED, OPPOSITE MAIN GEAR RETRACTED (QRH EG-3, EG-6)
 - ONE MAIN GEAR ONLY DOWN AND LOCKED (QRH EG-4, EG-6)
 - BOTH MAIN GEAR RETRACTED, NOSE GEAR DOWN AND LOCKED (QRH EG-4, EG-7)
 - ALL GEAR UP LANDING PROCEDURE (QRH EG-4, EG-7)
 - **TOTAL LOSS OF BRAKES** ◀ LINK (QRH EG-6, EG-9)
- CODE450: ▶ [G450 LANDING GEAR ABNORMALS](#)

- PNEUMATICS (EH) **EMERGENCIES**
 - QRH REV 43/43
 - **LOSS OF PRESSURIZATION** (QRH EH-1, EH-2) ◀ LINK
 - **EMERGENCY DESCENT PROCEDURE** ◀ LINK (QRH EH-2)
 - **AUTOMATIC EMERGENCY DESCENT MODE** ◀ LINK (QRH EH-3)
 - **OXYGEN SYSTEM QUANTITY SHORTAGE** (QRH EH-3)
- CODE450: ▶ [G450 PNEUMATICS ABNORMALS](#)

- MISCELLANEOUS (EI) **EMERGENCIES**
 - QRH REV 43/43
 - DITCHING (QRH EI-3, EI-1)
 - IMMEDIATE RETURN FOR LANDING (QRH EI-3, EI-4)
 - **MAIN ENTRANCE DOOR NOT SECURE** ◀ LINK (QRH EI-4, EI-6)
 - OVERWEIGHT LANDING (QRH EI-5, EI-1)
 - **REJECTED TAKEOFF** ◀ LINK (QRH EI-6, EI-11)
 - **WINDSHIELD CRACKED** ◀ LINK (QRH EI-12, EI-7)

- DECLARING AN EMERGENCY
 - STATE:
 - AIRCRAFT IDENTIFICATION
 - NATURE OF EMERGENCY
 - SOULS AND FUEL ON BOARD (IN TIME)
 - PILOT'S DESIRES
 - "STANDBY, KEEP AN EYE ON US"
 - AFTER LANDING INTENTIONS
- NOTE: GAC IN-FLIGHT EMERGENCY SUPPORT: 912-965-4178
- NOTE: MEDLINK IN-FLIGHT EMERGENCY SUPPORT: 602-239-3627
- PLANNED AIRCRAFT EVACUATION CHECKLIST (QRH EI-8, EI-5)
- FLIGHT ATTENDANT BRIEF:
 - T - TYPE OF EMERGENCY
 - E - WHETHER AN EVACUATION WILL BE NECESSARY
 - S - WHAT SIGNAL WILL BE USED (AND WHEN) FOR BRACE AND EVACUATE; "EASY VICTOR, EVACUATE, ETC"
 - T - TIME AVAILABLE TO PREPARE
- CODE7700: ▶ [DECLARING AN EMERGENCY](#)

FLIGHTSAFETY CABINSAFETY PILOT LAND CHECKLIST

- 1) Secure Loose Equipment in the Cockpit
- 2) Lights to Bright / Stow Acoustical Curtain
- 3) Situation Overview to Passengers – Distribute safety briefing cards
- 4) Assign ABP(s) a Seat – Reseat other passengers
- 5) Brief ABP(s) on Exits – Primary then Secondary (Baggage Door if Applicable). Have ABPs Repeat Instructions. Show Flashlight Locations.
- 6) Seat Belt Demo (attach Shoulder Harness if equipped) - Have passengers practice operation
- 7) Brace Position Demo/Raise Headrests – Have passengers practice positions
- 8) Distribute Wet Towels (or Smoke Hood Demo – Don at "Brace" signal). Secure PBE near cockpit
- 9) Secure Cabin and Galley/Raise Window Shades – Remove dangerous items from passengers and cabin (Belts with buckles, jewelry, sharp objects, etc.)
- 10) Additional Items – Place medical kit and survival items in water proof bags and secure in cabin
- 11) Buddy System – Do not forget yourself and other crewmember
- 12) Personal preparation – Change clothes, void bladder
- 13) Review (time permitting) – Commands and procedures with passengers
- 14) Adjust Lights – To outside conditions
- 15) Advise Captain – When cabin is secure. Give total number of souls on board

After aircraft stops moving – Shout – "Stay Seated" Assess outside conditions. Open Exit (s)

Evacuation Commands: "Open Seat Belts, Leave Everything, Come This Way, Get out, Run Away From the Aircraft"



R 3.1

FLIGHTSAFETY CABINSAFETY PILOT DITCHING CHECKLIST

- 1) Flight Crew Don Life Vests – Secure loose equipment in cockpit
- 2) Lights to Bright / Stow Acoustical Curtain
- 3) Situation Overview to Passengers – Distribute safety briefing cards
- 4) Life Vests- DO NOT INFLATE INSIDE CABIN – Demo to passengers
- 5) Assign ABP(s) a Seat – Reseat other passengers
- 6) Brief ABP(s) on Life Rafts first, then Primary and Secondary Exit Operations – Have ABP(s) repeat instructions back to you. Show flashlight locations.
- 7) Seat Belt Demo (attach Shoulder Harness if equipped) – Have passengers practice operation
- 8) Brace Position Demo/Raise Headrests – Have passengers practice positions
- 9) Secure Cabin and Galley/Raise Window Shades – Remove dangerous items from passengers and cabin (Belts with buckles, jewelry, sharp objects, etc.)
- 10) Additional Items – Place medical kit and survival items in water proof bags and secure in cabin
- 11) Buddy system – Do not forget yourself and other crewmember(s)
- 12) Personal Preparation – Change clothes, void bladder
- 13) Review (time permitting) – Commands and procedures with passengers
- 14) Adjust lights – To outside conditions
- 15) Advise Captain – Cabin is Secure. Give total number of souls on board

After aircraft stops moving – Shout – "Stay Seated" Assess outside conditions. Open Exit (s)

Evacuation Commands: OPEN SEATBELTS, LEAVE EVERYTHING, COME THIS WAY, GET OUT, INFLATE VEST OUTSIDE, FOLLOW LINE TO RAFT



Rev 3.3 FOR TRAINING USE ONLY

EMERGENCY CHECKLIST LAND PILOT

EMERGENCY CHECKLIST DITCHING PILOT



- APRCH ANNUNCIATOR
 - FOR FMS FLOWN APPROACHES THE APRCH ANNUNCIATION MUST TURN ON **2 NM** BEFORE THE FAF
 - THIS CONFIRMS SENSOR CONFIGURATION IS CORRECT AND SENSOR INTEGRITY IS WITHIN LIMITS FOR THE APPROACH

BLUE NEEDLE APPROACHES NAV SOURCE: **FMS**

APCH TYPE	GP BUTTON	APCH MINS	ALT PRESELECT	VERTICAL MODE	LATERAL MODE	
RNP (LPV)	APR	DA	MAA	VGP LPV	FMS	
RNAV (LNAV / VNAV)				VGP		
RNAV (LNAV)		DDA ⁽¹⁾				
VOR						
NDB						
RNAV (CIRCLE)	LNAV	MDA	MDA	VPATH		
VOR ⁽²⁾ (CIRCLE)	VNAV					

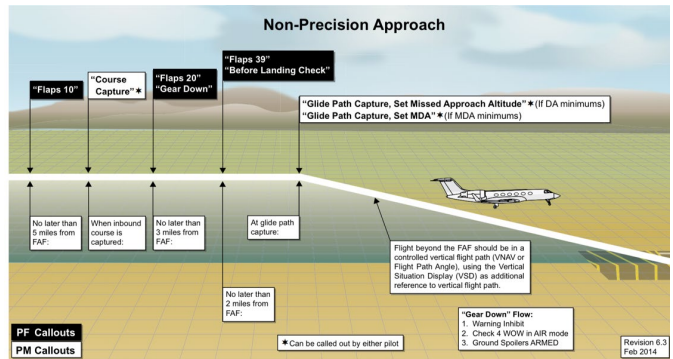
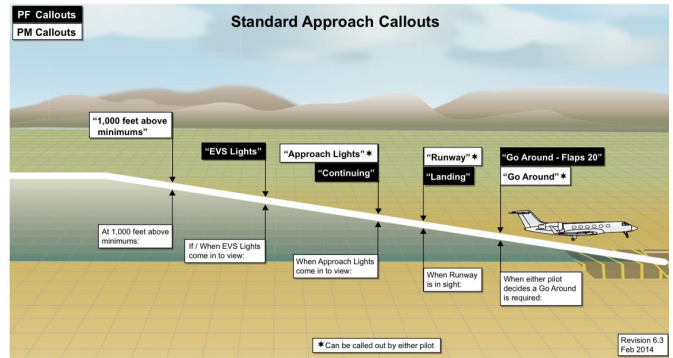
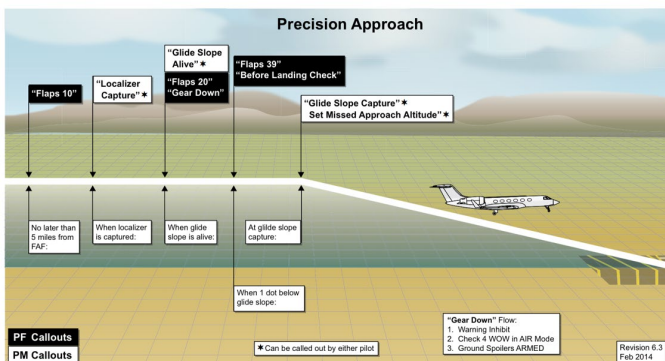


GREEN NEEDLE APPROACHES NAV SOURCE: **NAV**

APCH TYPE	GP BUTTON	APCH MINS	ALT PRESELECT	VERTICAL MODE	LATERAL MODE
ILS	APR	DA	MAA	GS	LOC
LOC	LNAV	DDA ⁽¹⁾	MAA ⁽³⁾	VS/FPA	
LOC (CIRCLE)	VS/FPA (2)	MDA	MDA		
VOR	APR	DDA ⁽¹⁾	MAA ⁽³⁾		
VOR (CIRCLE)	VS/FPA (2)	MDA	MDA		
BC LOC	BC	DDA ⁽¹⁾	MAA ⁽³⁾		
BC LOC (CIRCLE)	VS/FPA (2)	MDA	MDA		

⁽¹⁾ DDA = MDA + 60 FT
⁽²⁾ MATCH VERTICAL TRACK (DASHED MAGENTA ON VSD) TO FMS DEPICTED VERTICAL PATH
⁽³⁾ VS/FPA WILL HONOR THE ALT PRESELECT, SET MAA WHEN APPROPRIATE TO NOT INTERFERE WITH DESCENT

NOTE: APR AND VS/FPA BUTTONS ARE USED FOR A GREEN NEEDLE VOR APPROACH (VORAP), THE ALTITUDE WINDOW WILL BE HONORED.

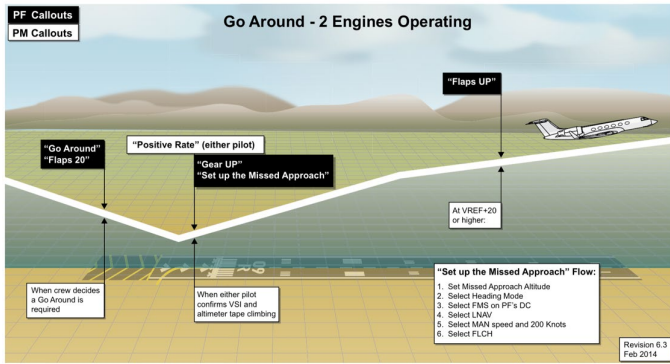


- DA IN LIEU OF AN MDA
 - GENERAL GUIDANCE:
 - DA IN LIEU OF AN MDA MAY BE USED ONLY IF THERE HAS BEEN A VISUAL SEGMENT OBSTACLE ASSESSMENT MADE FOR THE STRAIGHT-IN LANDING RUNWAY
 - AN OBSTACLE ASSESSMENT HAS BEEN MADE IF THE RUNWAY HAS A VASI OR PAPI, AN ELECTRONIC GLIDESLOPE, OR AN RNAV APPROACH WITH A PUBLISHED DA
 - NOTE: THE FINAL APPROACH COARSE MUST BE THE SAME AS THE PUBLISHED APPROACH AND THE PUBLISHED DESCENT ANGLE MUST BE COINCIDENT OR GREATER THAN THE PUBLISHED ANGLE.

- GO AROUND – TWO ENGINE*
 - *WITH ENHANCED NAV
 - CALL, **“GO AROUND, FLAPS 20”**
 - SELECT TO/GA, PITCH INTO FD
 - AT POSITIVE RATE, CALL **“GEAR UP, SET UP THE MISSED APPROACH”**
 - PM SELECTS:
 - GEAR UP
 - GROUND SPOILERS OFF
 - SET/CONFIRMS MISSED APPROACH ALT
 - CONFIRMS PF GP IN FMS
 - SELECTS MAN SPEED 200 KTS
 - SELECTS FLCH
 - AT $V_{REF}+20$, CALL **“FLAPS UP”**
 - CALL **“TRAFFIC PATTERN CHECKLIST”**

ENHANCED NAV NOTE: WHEN GA MODE IS SELECTED WITH THE ACTIVE LATERAL MODE BEING LNAV, THE LATERAL MODE DOES NOT TRANSITION TO WINGS LEVEL/HEADING HOLD; IT REMAINS IN LNAV.

NOTE: A FULLY COUPLED AUTO MISSED APPROACH IS POSSIBLE WITH ONLY – “TOGA, FLAPS 20, POSITIVE RATE, GEAR UP, 400 FT., FLAPS UP” – EVERYTHING ELSE WORKS AUTOMATICALLY, - AS LONG AS THE MISSED APPROACH ALTITUDE IS SET IN THE ALTITUDE PRESELECT.



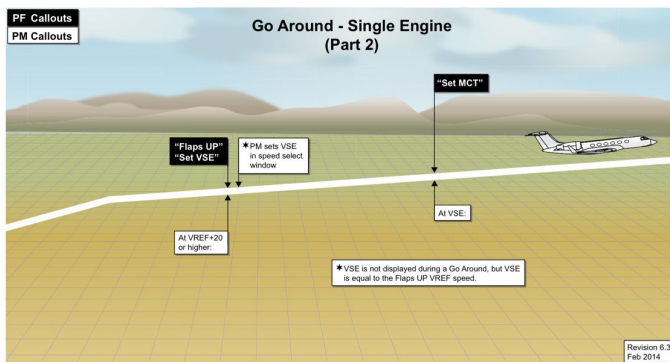
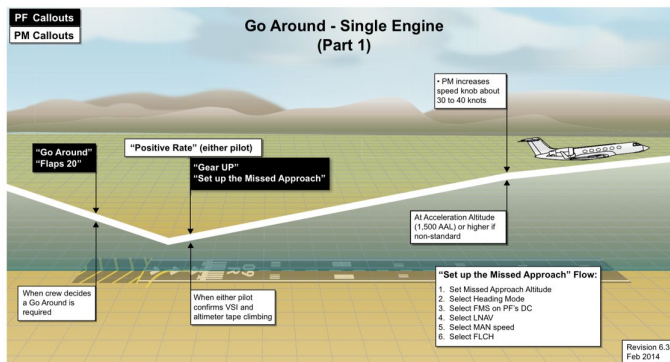
CODE450: ▶ [GO AROUND / MISSED APPROACH](#)

▶ [BALKED LANDING](#)

- GO AROUND – SINGLE ENGINE*
 - *WITH ENHANCED NAV
- CALL, **"GO AROUND, FLAPS 20"**
- SELECT TO/GA, PITCH INTO FD
- AT POSITIVE RATE, CALL **"GEAR UP, SET UP THE MISSED APPROACH"**
- PM SELECTS:
 1. GEAR UP
 2. GROUND SPOILERS OFF
 3. SET/CONFIRMS MISSED APPROACH ALT
 4. CONFIRMS PF GP IN FMS
 5. SELECTS MAN SPEED (NOT 200 KTS)
 6. SELECTS FLCH
- AT 1,500' AGL (OR CLEAR OF OBSTACLES) AND VREF +20, CALL **"FLAPS UP, SET VSE"** (VSE=0° FLAP VREF)
- AT VSE (0° FLAP VREF), CALL **"SET MCT"** (715°C / 860°C)
- CALL **"ONE ENGINE INOPERATIVE GO-AROUND PROCEDURE CHECKLIST"**
- CALL **"TRAFFIC PATTERN CHECKLIST"**
- CALL **"ONE ENGINE INOPERATIVE LANDING PROCEDURE CHECKLIST"**

NOTE: USE OF THE **AUTOTHROTTLE** DURING SINGLE ENGINE APPROACH IS PROHIBITED.

NOTE: SINGLE ENGINE **AUTOPILOT** COUPLED GO-AROUND IS NOT APPROVED.



- MIN SPEED FOR FLAP RETRACTION
- TAKEOFF, NORMAL & V1 CUT: V2+10
- GO AROUND, NORMAL AND S.E.: VREF(20) +20

- **WINDSHEAR / CFIT ESCAPE**
- **IMMEDIATE ACTION:**
 - DISCONNECT AUTOPILOT AND AUTOTHROTTLES
 - MAX POWER (ENSURE SPEEDBRAKES ARE RETRACTED)
 - 3° TO 4° PER SECOND ROTATION
 - PITCH UP TO 25° OR PLI
 - SPD, V2/VREF -20 KTS OR PLI
 - NO CONFIG CHANGES TILL CLEAR (EXCEPT SPEEDBRAKES)

QRH: SUPPLEMENTAL DATA, S-7 WINDSHEAR / MICROBURST

QRH: RED TAB, MA-7 / MA-9 AND AMBER TAB, MB-43 - OTHER WARNING ANNUNCIATIONS

MORE INFO, SEE: [WINDSHEAR WARNING](#)

NOTE: A PITCH ATTITUDE OF 25° HAS BEEN DEMONSTRATED AT MAX LNDG WT WITH FULL FLAPS.

POST WINDSHEAR:
▪ CALL "MAN SPEED 250, FLCH"
▪ ENGAGE AUTOTHROTTLES

CODE7700: ▶ [WINDSHEAR](#)

CODE450: ▶ [G450 CFIT](#)

NOTE: THERE ARE NO WINDSHEAR ALERTS DURING THE TAKEOFF ROLL PRIOR TO ROTATION; BE VIGILANT FOR SIGNS OF WINDSHEAR SUCH AS AIRSPEED STAGNATION.

NOTE: > 1,500' AGL THERE ARE NO WINDSHEAR ALERTS. DURING A WINDSHEAR ESCAPE THE WINDSHEAR MAY NOT BE OVER JUST BECAUSE THE ALERT HAS CEASED. IT MAY JUST BE DUE TO CLIMBING > 1,500' AGL.

- **TCAS ALERT**
 - **IMMEDIATE ACTION:**
 - TCS – PRESS AND HOLD
 - PITCH – FLY-TO-BOX
 - ATC – NOTIFY "TCAS RA"
 - WHEN CLEAR, "RETURNING TO ASSIGNED ALTITUDE"

MORE INFO, SEE: [TCAS](#)

CODE450: ▶ [G450 TCAS RA](#)

PRM NOTE: IF AN RA IS RECEIVED, ITS INSTRUCTION SUPERSEDES THE CONTROLLER'S CLIMB/DESCEND CLEARANCE. HOWEVER, THE PILOT SHOULD STILL FOLLOW THE ATC TURN INSTRUCTION AND INFORM ATC OF THE DEVIATION.

- CONTAMINATED RUNWAY RESTRICTIONS
 - NOTE: [G450-OIS-02, G550 OIS-03](#)
 - SEE: [CONTAMINATED RUNWAY / RCAM DATA](#)
- TAKEOFF
 - FLAPS 20° ONLY
 - OPERATIVE ANTI-SKID
 - OPERATIVE AUTO GROUND SPOILERS
 - OPERATIVE THRUST REVERSERS
 - MAX STANDING WATER: 0.39 IN
 - RATED THRUST ONLY, ETC...
- LANDING
 - FLAPS 39° ONLY
 - OPERATIVE ANTI-SKID
 - MAX STANDING WATER: 0.59 IN
 - THRESHOLD SPEED VREF TO VREF+10

CODE7700:

- ▶ [TAKEOFF CONSIDERATIONS](#)
- ▶ [CONTAMINATED RUNWAYS](#)
- ▶ [WET OR CONTAMINATED?](#)

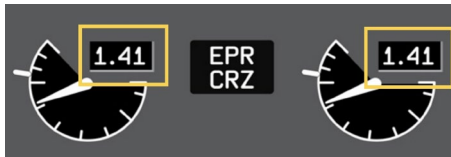
CODE450:

- ▶ [V1 VS BFL](#)
- ▶ [G450 LANDING PERFORMANCE](#)



- TAKEOFF DIST ADJUSTMENTS "RULE OF THUMB"
 - STANDING TAKEOFF
 - TAKEOFF POWER SET PRIOR TO BRAKE RELEASE = AFM PERFORMANCE
 - MODIFIED STANDING TAKEOFF
 - PARTIAL TAKEOFF POWER PRIOR TO BRAKE RELEASE = 500 FT INCREASE TO DISTANCE
 - ROLLING TAKEOFF
 - NO STOP WHILE SETTING TAKEOFF POWER = 1,000 FT INCREASE TO DISTANCE

- LONG RANGE CRUISE - STEP CLIMB GUIDANCE
 - IF THE CURRENT EPR IS 0.08 TO 0.10 LESS THAN THE CRZ EPR SHOWN ON THE DISPLAY CONTROLLER TRS PAGE THEN A STEP CLIMB CAN USUALLY BE COMPLETED WITHOUT A LOSS OF DESIRE MACH SPEED



- IF WHILE AT CRUISE AOA DECREASES BY 0.01 – 0.02 UNITS A NEXT HIGHER CRUISE ALTITUDE SHOULD BE CONSIDERED

- LANDING DIST ADJUSTMENTS "RULE OF THUMB"
 - EXCESS AIRSPEED
 - DRY RUNWAY, AN ADDITIONAL 300 FT PER 10 KTS
 - WET RUNWAY, AN ADDITIONAL 500 FT PER 10 KTS
 - EXTENDED FLARE, AN ADDITIONAL 2,500 FT PER 10 KTS
 - DOWNHILL
 - AN ADDITIONAL 10% OF LANDING DISTANCE PER 1% DOWN SLOPE
 - FLOATING
 - AN ADDITIONAL 230 FT PER SECOND
 - EXCESSIVE TCH
 - AN ADDITIONAL 200 FT PER 10 FT ABOVE TCH
 - DELAYED BRAKING
 - AN ADDITIONAL 220 FT PER SECOND
 - TAILWIND
 - 15% INCREASE FOR 10 KTS, G450 OIS-02
 - 16% INCREASE FOR 10 KTS, G550-OIS-03
 - 25% INCREASE FOR 10 KTS, G550-OIS-02

NOTE: JACOBSON FLARE TECHNIQUE

CODE450:

- G450 LANDING

CODE7700:

- THE LANDING FLARE
- LANDING
- AIM POINT VS TOUCHDOWN POINT
- CROSSWIND LANDINGS
- AUTOTHROTTLE LANDING

- WIND ADDITIVE
 - ADD TO VREF 1/2 OF THE STEADY STATE WIND PLUS THE FULL GUST TO A MAXIMUM ADDITIVE OF 20 KNOTS
 - G450: EACH 10 KT INCREASE TO VREF, INCREASES LANDING DISTANCE BY 11%
 - G550: EACH 10 KT INCREASE TO VREF, INCREASES LANDING DISTANCE BY 10%

MCDU TOUCHDOWN SPEED ADDITIVE (LAND/GA INIT PAGE 2/2)

NOTE: THE TOUCHDOWN SPD DEFAULT IS VREF. AN ADDITIVE (1 TO 10) CALCULATES THE CORRECTED LANDING DISTANCE. IT DOES NOT ADD THE ADDITIVE TO THE APPROACH SPEED IN THE GP WINDOW.



CODE7700:

- APPROACH SPEED WIND ADDITIVES
- WIND ADDITIVES

- FLEX TAKEOFF RESTRICTIONS (AFM APPENDIX A)
 - NO TAILWIND*
 - NO DOWNHILL SLOPE*
 - NO CONTAMINATION ON RUNWAY (BUT WET IS OK)
 - NO WING ANTI-ICE
 - ANTI-SKID MUST BE OPERATIVE
 - AUTO GROUND SPOILERS MUST BE OPERATIVE IF FLAPS 10°, ETC...

* G550 NOTE: FLEX MAY BE USED WITH A DOWNSLOPE OR TAILWIND IF THE AFM OR TOLD IS USED TO COMPUTE FLEX THRUST.

CODE7700: REDUCED THRUST

- NARROW RUNWAY OPERATIONS GAC-OIS-15
 - RECOMMENDATIONS:
 - GULFSTREAM'S INTERNAL FOM REQUIRES A SMS RISK ASSESSMENT/RISK MITIGATION FOR OPERATIONS INTO RUNWAYS < 75' WIDE
 - REDUCE THE ALLOWABLE CROSSWIND FOR TAKEOFF. NOTE: THE DEMONSTRATED CROSSWIND COMPONENT IS BASED ON A 150 FT WIDE RUNWAY.
 - LENGTH PERMITTING, USE FLEX THRUST
 - IF V1 IS LIMITED BY VMCG, INCREASE V1 3-5 KTS
 - FOR WET OF CONTAMINATED RUNWAYS USE THE CANADIAN RUNWAY FRICTION INDEX TO DETERMINE THE CROSSWIND CAPABILITY, APPENDIX A
 - EVALUATE THE AIRPORT DIAGRAM FOR OFF-RUNWAY OBSTACLES
 - LOAD TO A MORE FORWARD CG FOR IMPROVED DIRECTIONAL CONTROL
 - CONSIDER MEL ITEMS, e.g. NOSEWHEEL STEERING, THRUST REVERSERS, BRAKING, FLIGHT CONTROL SYSTEMS, ETC

- TOTAL LOSS OF BRAKING
 - IMMEDIATE ACTION:
 - THRUST REVERSE – MAXIMUM
 - PTU AND AUX PUMP – ON
 - BRAKES – RELEASE
 - ANTI-SKID – OFF
 - BRAKES – APPLY 400 PSI MAXIMUM
 - PARKING BRAKE – APPLY 400 PSI MAXIMUM IF BRAKE PEDALS INOPERATIVE



INTENTIONALLY LEFT BLANK



SCENARIOS

ENG FAIL AT ALTITUDE - DRIFT DOWN OPERATING ENGINESET MCT (715°C / 860°C) VS 600 FPM DOWN SET TRACK OFFSET (PROG, PAGE 3, 1R) AS REQUIRED ENGINE OUT DRIFT DOWN CHART (EB-14, EB-16) . CHECK DRIFT DOWN SPEED / ALTITUDE SET ATC / TXPR / TCAS NOTIFY/ SET ENGINE SHUTDOWN IN FLIGHT CHECKLIST.. COMPLETE S.E. CRUISE (PERF, CRUISE)..... CHECK

- CODE7700: APU START ENVELOPE G450, <= FL370 G550, FL390-FL430 ENG AIRSTART ENVELOPE <= 25,000 FT

NOTE: IN THE EVENT OF AN ACTUAL ENGINE FAILURE THE FMS CALCULATES ALL PERF BASED ON SINGLE ENGINE. PERF DATA TITLE PAGES AUTO CHANGE: - PERF DATA BECOMES S.E. PERF DATA - CRUISE BECOMES S.E. CRUISE, ETC...

IVAN LUCIANI: G450 DRIFT DOWN PROCEDURES AND SYSTEMS ASSESSMENT G550 DRIFT DOWN PROCEDURES AND SYSTEMS ASSESSMENT

- GEN FAIL AT FL450 LOSE ANY CAPABILITY? YES, GALLEY POWER ELECT TO START APU? G450, <= FL370 G550, FL390-FL430 ALTITUDE LIMITS? BAAV FOR 15 SEC HOW IS THE APU START DIFFERENT? "APU ESSENTIAL" CAS, IF ELECTING TO SHUT DOWN, HOW IS IT DIFFERENT THAN WHEN ON THE GROUND? 100% FOR 60 SEC

DUAL GEN FAIL - APU NOT AVAILABLE DUs 2 & 3 GO BLANK BOTH GENs SAY OFF IMMEDIATE ACTIONS:

- FLY THE AIRPLANE CONFIRM GP IS SET FUEL CROSSFLOW OPEN GENERATORS BOTH GEN SWITCHES OFF THEN ON AC/DC RESET

CODE450: DUAL GEN FAIL HMG MASTER SWITCH ON WAIT 10 SEC -L ESS ON WAIT 10 SEC -R ESS ON

- HMG - POWERED BY WHAT SYSTEMS? LEFT HYD OR PTU WHICH DUs ARE AVAILABLE? 1 & 4 2 & 3 ARE POWERED BUT NO AGM WHAT WILL BE DISPLAYED ON 1 & 4? PFD, ENG, CAS IS MAP AVAILABLE? YES, PRESS AND HOLD DC 2/3 BUTTON FOR 3 SEC, THEN MAP PITOT HEAT AVAILABLE? YES NORMAL PRESSURIZATION? YES

- HMG FAIL - DOWN TO BATTs ONLY 30 MIN FLY THE AIRPLANE SET GP TIME AVAIL ON BATT POWER? 30 MIN WITH TWO APU START ATTEMPTS

- QRH ELECTRICS OPERATION ON AIRPLANE BATTs ONLY PRESS CONTROL PANEL OPERATIVE? YES DUs AVAILABLE? YES, 1 & 4 PITOT HEAT? YES

- WHAT WORKS: ALL ITEMS ON E-BATTs, PLUS: TWO SCREENS (INCLUDING SYNOPTICS) CCDs AOA HEAT ALL THREE ADMs ANTI-SKID BRAKES APU CONTROL AUX HYD PUMP CABIN PRESSURE MANUAL CONTROL FADECS FIRE DETECTION AND BOTTLES FUEL VALVES GROUND SPOILERS MAIN FUEL PUMPS PACK CONTROL PITCH TRIM STEER-BY-WIRE T/R CONTROL L/R WOW, AND MORE

NOTE: CONSIDER SETTING FLAPS WHILE BATTERY POWER REMAINS; FLAPS CANNOT BE MOVED WHEN DOWN TO E-BATTs. TAKE NOTE OF VREF; ONCE DOWN TO E-BATTs THE DC WILL BE INOPERATIVE.

- BOTH BATTs FAIL - DOWN TO E-BATTs 60-90 MIN OF POWER IRSS? YES, ALL 3 NORMAL GEAR? YES FLAPS? NO TRIM? MANUAL ONLY T/Rs? NO NWS? NO COWL HEATS? YES (VALVES FAIL OPEN)

- NOTE: COCKPIT LIGHTING IS AVAILABLE VIA THE RHEOSTAT SWITCH ON OVERHEAD PANEL. G450 NOTE: ANTI-SKID INOP INCREASES LANDING FIELD LENGTH BY 173%. (PCL PAGE 25) PRESS CONTROL? NO FUEL PUMPS? NO (ENGINES WILL SUCTION FEED BELOW FL200) TOE BRAKES / EMERGENCY BRAKES? YES, BOTH, BUT NO ANTI-SKID HIGH, HOT, HEAVY - MAX TIRE SPEED? 195.5 KTS

- WOW FAILS TO SHIFT TO GND MODE AFTER TOUCHDOWN GND SPOILERS? YES, DUE TO WHEEL SPINUP MAY STOW BELOW 47 KTS DEPLOY SPEEDBRAKES BRAKES? YES, DUE TO WHEEL SPEED SENSORS POSSIBLE LOSS OF BRAKES BELOW 47 KTS IF SO, TURN OFF ANTI-SKID

- WOW Fault CAS NOTE: IF THERE IS ANY THOUGHT BRAKES WILL NOT FUNCTION CONSIDER SELECTING A RUNWAY WITH EMAS.

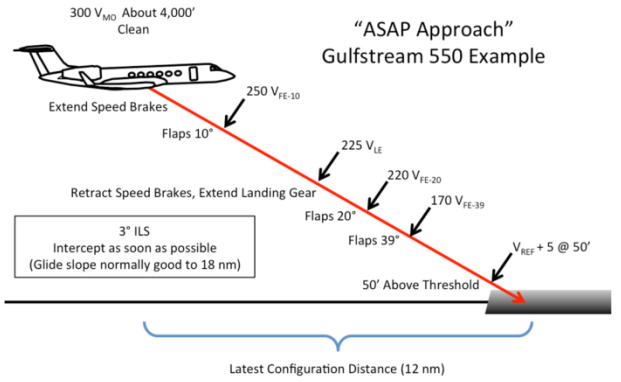


- THRUST REVERSERS
 - YES, DUE TO WHEEL SPINUP
 - **Thrust Rev Unlock** CAS
 - **STOW REVERSERS PRIOR TO 50 KTS**
- PRESSURIZATION
 - CABIN REMAINS PRESSURIZED
 - **MANUALLY OPEN TROV**

▪ **FIRE/SMOKE EMERGENCY**

- PRIORITY #1 – GET THE AIRPLANE ON THE GROUND
- IMMEDIATE ACTION ITEMS TO STARVE THE FIRE:**
- OXYGEN MASKS DON**
 - PASSENGER OXYGEN MASKS DEPLOY**
 - CABIN / GALLEY MASTERS OFF**
 - SATCOM / CAMERA / PHONE MASTERS OFF**
 - CROSSFLOW OPEN**
 - LEFT BLEED AIR OFF**
 - STANDBY ELECTRICAL POWER (3) ON**
 - LEFT / RIGHT BUS TIE ISLN**
 - LEFT / RIGHT GEN OFF**

- QRH
- ➔ FIRE / OVERHEAT / SMOKE – EC
 - ➔ AIRPLANE INTERIOR FIRE / SMOKE / FUMES



CODE7700:

- ▶ [G450/G550 CABIN FIRE](#)

CODE7700:

- ▶ [CABIN FIRE](#)

CODE 7700

- ▶ [ABNORMAL OCEANIC PROCEDURES](#)

- ▶ [OCEANIC CONTINGENCIES](#)

NAT IYENGAR / GUY GRIBBLE / MITCH LAUNIUS

- ▶ [LOSS OF ATC SERVICES WHILE OCEANIC](#)

- ▶ [OCEANIC WAYPOINT BRIEFING](#)

- ▶ [G450 DOC 4444 CONTINGENCY PROCEDURES - WORLDWIDE](#)

- ▶ [G550 DOC 4444 CONTINGENCY PROCEDURES - WORLDWIDE](#)

NOTES

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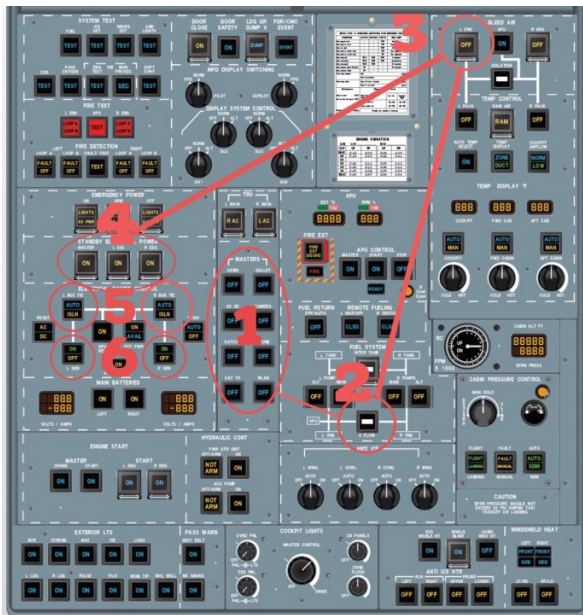
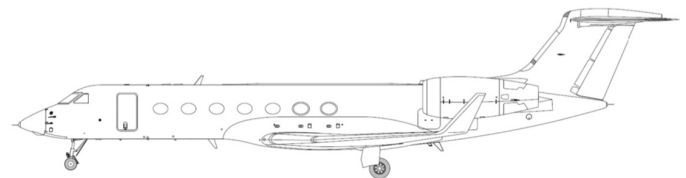
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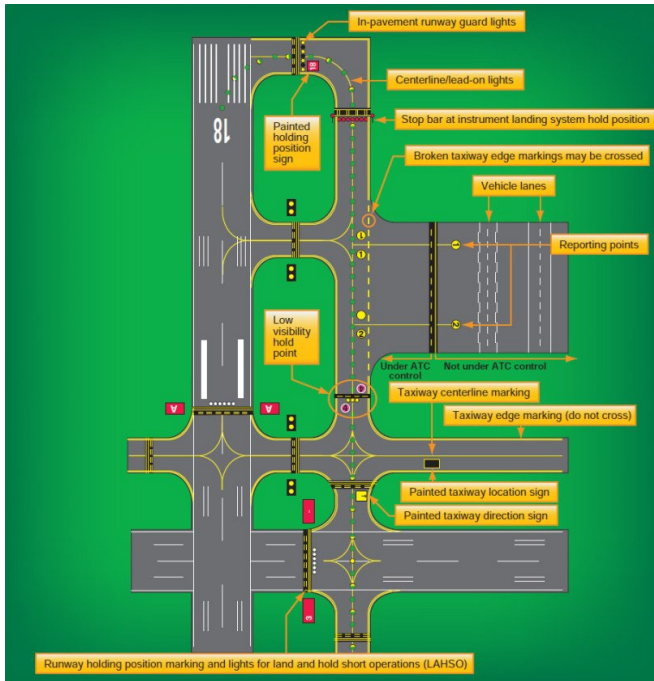
- IMMEDIATELY DON PROTECTIVE EQUIPMENT
 - IMMEDIATELY DESCEND AND HEAD FOR THE NEAREST SUITABLE AIRPORT
 - FLY VMO / MMO
 - DECLARE AN EMERGENCY
 - TUNE THE ILS
 - DEPLOY THE EVAS
- IF THE SMOKE CONTINUES, OPEN THE LEFT BLEED SWITCH AND CLOSE THE RIGHT BLEED SWITCH
- DO NOT USE SMOKE/FUME ELIMINATION PROCEDURES TO TREAT A FIRE
 - DO NOT RESET CBs, UNLESS REQUIRED FOR SAFE FLIGHT
 - HAVE PASSENGERS DON PBEs

PRIORITY #2 – FIGHT THE FIRE (IF YOU CAN)

NOTE: CONSIDER TURNING ON EMER LTs IF TURNING OFF CABIN AND GALLEY MASTER SWITCHES.



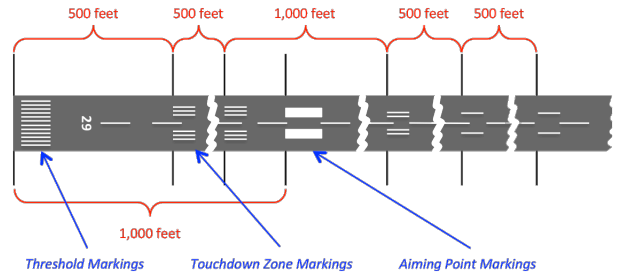
CHECKRIDE



- ABNORMALS
 - ENGINE
 - FUEL
 - ELECTRICAL
 - HYDRAULIC
 - ECS
 - FIRE DETECT
 - AVIONICS
 - FLIGHT CONTROLS
 - ANTI-ICE
 - EMER EQUIPMENT

- EMERGENCIES
 - RAPID DESCENT
 - EDM
 - FIRE/SMOKE
 - EVAC
 - ICING

- LANDINGS
 - TOUCHDOWN AT TD MARKINGS (-250' TO +500')
 - WITH NO AIM POINT, 750' TO 1500' FROM THE THRESHOLD
 - MUST DECELERATE TO < 20 KTS WITHIN CALCULATED LANDING DISTANCE PLUS 25%
 - CENTERLINE BETWEEN MAINS



▪ CIRCLING APPROACH	▪ CONSISTENTLY IN A POSITION TO LAND IN THE TDZ	▪ MAKE THE PERFORMANCE LANDING CRITERIA
STANDARD CIRCLING RADIUS	CAT C: 1.7NM CAT D: 2.3NM	<1,000FT MSL CAT C: 2.7NM CAT D: 3.6NM
		◆ EXPANDED CIRCLING RADIUS

- FAR REFERENCE
 - 61.58 - 12 MONTH PIC PROFICIENCY CHECK – 24 MONTHS IN PARTICULAR TYPE
 - 61.57(e)(4)(ii)(D) - 12 MO LANDING CURRENCY - 6 NIGHT TAKEOFFS AND LANDINGS
 - 135.293(a) - 12 MONTH ORAL
 - 135.293(b) - 12 MONTH COMPETENCY CHECK
 - 135.297 - 6 MONTH INSTRUMENT PROFICIENCY CHECK
 - 135.247(e)(3)(ii)(D) - 12 MO LANDING CURRENCY - 6 NIGHT TAKEOFFS AND LANDINGS

- ATP ACS
 - TAXI – WATCH OUT FOR RED STOP BARS
 - VMC TAKEOFF
 - IMC TAKEOFF
 - V1 CUT
 - ± 5 KTS
 - ± 5° HEADING
 - 5° BANK
 - RTO
 - SID/STAR
 - HOLDING (MCDU - DIRECT, PATTERN, HOLD, PASTE)
 - 2 PRECISION APPROACHES, 1 HANDFLOWN SINGLE-ENGINE
 - ± 5 KTS
 - LOC/GS ¼ SCALE
 - 2 NON-PRECISION APPROACHES, 1 WITH PROCEDURE TURN, 1 HAND FLOWN
 - ± 5 KTS
 - VOR/LOC ¼ SCALE
 - RMI ± 5°
 - 1 CIRCLING APPROACH
 - 2 MISSED APPROACHES, 1 FROM A PRECISION APPROACH, 1 SINGLE-ENGINE
 - ± 5 KTS
 - ± 5° HEADING
 - 3 LANDINGS, 1 FROM A PRECISION APPROACH, 1 SINGLE-ENGINE, 1 NO FLAP
 - 1 REJECTED LANDING FROM 50'
 - AIRSTART
 - STEEP TURNS, 45° BANK ± 5°, AIRSPEED ±10 KTS, ALTITUDE ±100 FT
 - APPROACH TO STALL
 - RECOGNIZE STALL WARNING
 - RECOVER AT FIRST INDICATION
 - RECOVER WITHOUT EXCESSIVE ALTITUDE LOSS
 - UNUSUAL ATTITUDE RECOVERY

- THE END – CONGRATULATIONS



NOTES

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