Winter Ops Quick Reference Ver 3.2

Gulfstream GVII-G500/G600

General

- Consider servicing tires/struts before going to cold destination
- If airplane will be cold soaked, consider fueling day of departure
- Min temperature for refueling ops (Jet A): -30°C (-22°F)
- MED may be assisted closed by pulling inboard on upper airstair

Preflight

- Release parking brake (chocks may need to have sand under them)
- *Ensure entire aircraft clean of snow/ice with following emphasis:*
  - -Ensure doors, radome, intakes, vents, inlets, exhausts, antennas, fuselage, windows, probes & ports (& forward area clear of ice), and landing gear (w/non damaging mech means or hot air)
  - -Conduct wing visual and tactile check if <10°C (50°F) or wing fuel temp ≤0°C (32°F) and: there is visual moisture, water on wing, dewpoint spread ≤3°C (~5.4°F), or its conducive to frost
  - -Hands on wing inspection to ensure upper lower wing and leading edge are clear. Remove underwing frost >1/8" (3.2mm) and all leading edge and upper surface frost
  - -Ensure eng/APU inlet is free of ice/snow; do not use deicing fluid
  - -Ensure eng inlet/fan/cone totally free of ice and fan rotates freely w/closeup vis insp if current/previous icing cond and ≤5°C (41°F)

Airplane Power-up

- Aircraft start-up prohibited to >-40°C/F with extended exposure (power off > 5hrs), <-40°C/F if power off < 5hrs
- If cold soaked < -20°C (-4°F):
  - -Warm up batteries by external means such as AC cart
  - -After APU start, warm cockpit 15 min before cont norm checks
  - -Higher than norm EGT w/lower duct pressure indicates inlet icing
  - -CPAM Fail (advisory) CAS may display; disregard until warmer cockpit with APU BLEED AIR ON
  - -HUD Symbology, OHPTS/DU/TSC operation may be delayed
- If TAT probes contam, sel TAT Probe Heat On after APU Air is oper
- Cycle PARKING BRAKE ~10 times, return to released position

Engine Starting

- Min oil temp for ground start is -40°C/F
- If oil temp <-30°C and last shutdown < 8hrs, warm eng oil >-25°C (OM 03-10-40) or wait 8hrs from last start to avoid rotorbow
- If N1 EVM >.15 IPS at idle immediately after engine start, DO NOT advance throttles; shutdown engine and reinspect for ice
- If OAT <20°C, eng gen may not come online immed; Delay running AC Power Fail CAS proc until eng oil warmed for 5 min w/eng at idle
- Oil pressure may exceed limits during start until oil temp rises
- Select COWL ANTI-ICE ON after engine start for icing/freezing fog

Taxi

- Minimum oil temp above idle is +10°C
- CAI is required for taxi and takeoff when SAT ≤10°C (50°F) and visible moisture, precipitation or wet runway is present
- Max time in freezing fog w/CAI ON: 60 min ≥-9°C(16°F); 30 min <-9°C; at limit, idle power only to park and warm/melt to reset time
- Ice shed req'd: Grnd icing cond ≤0°C(32°F): w/CAI/ WAI ON, accel eng sep to ≥60% N_1 for 2 sec, ≤10 min intervals. (AFM 03-07-10)
- Leave flaps in retract position & avoid puddles and slush when poss
- Use brakes to warm >100°C to dissipate moisture
- Avoid Thrust Reverser use to prevent FOD and ice/snow ingestion
- Be aware of jet blast with ice/snow and *snowbanks for wingtips*

De-Icing and Anti-Icing Checklist

* *Parking Brake* _____ *Set*

1. Throttles (Left and Right)_____ Idle
2. Fuel Controls (Left and Right)_____As required
3. APU _____ As required *(Off if Eng on)*
4. APU Door _____Verify Closed (if APU OFF)
5. CAI / WAI _____ Off
6. BLEED AIR (L ENG/R ENG/APU) _____OFF
7. Packs (Left and Right)_____ Off
8. TROV _____Verified Closed
9. KA HSD (TSC>Menu>Cabin Power>Page2) _____Off
10. De-icing and Anti-icing_____ Complete
11. Post De-icing Inspection _____ Complete
12. CABIN PRESSURE CONTROL _____Manual
13. TROV _____Open fully
14. BLEED AIR (L ENG/R ENG/APU) _____ As required
15. Packs (Left and Right)_____On
16. CABIN PRESSURE CONTROL _____ Deselect Manual
17. KA HSD (TSC>Menu>Cabin Power>Page3)_____On
18. If Engines are OFF _____Refer to Airplane Power-up or Engine Start Checklist
19. If Engines are ON ____Refer to Engine Start or Taxi Checklist

* *Flight Control Check* _____ *Complete*

20. Note applicable Holdover Times prior to Takeoff

Anti-icing / De-Icing Data

Approved SAE Type Fluids: Type I glycol (AMS1424), Type I non-glycol (AMS1424), and Type II, III, and IV glycol (AMS1428)

Precip type/Snow Intensity_____

Fluid Manufacturer/Brand _____

Fluid Type _____ **Final Appl Start Time _____**

Fluid Concentration _____ **+Holdover Time _____**

Fluid LOUT _____ **=Expiration Time _____**

De-Ice / Final Inspection

- Perform hands-on inspection immediately after deice/during anti-ice of leading/trailing edges and upper/lower wing
- Visual inspection of vert/horizontal stabs, elevator, rudder, flaps, spoilers, ailerons, gear, APU/cooling intakes, vents, inlets, exhausts, antennas, fuselage, windows, probes, ports
- A pre-takeoff final inspection should be conducted within 5 min of takeoff and may be conducted from inside. If any doubt of condition of airplane, PIC must conduct hands-on inspection or De-ice again.
- Loss of effectiveness of fluid or contamination may be indicated by prog surf freezing, snow accum, or dulling of surface reflectiveness

Takeoff / Climb

- Takeoff prohibited with frost, ice, snow, or slush adhering to wings, control surfaces, engine inlets, and other critical surfaces
- WAI must be on ≥4 min prior to takeoff, ≤20 min total accumulated time with Type II, III, IV fluid applied (see OM clean proc if >20min)
- WAI must be stabilized at 130±10°F prior to takeoff with icing cond
- Min engine fuel temp for takeoff thrust is +9°C (may drop >0°C with takeoff power set due to cold fuel)

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•Contaminated runway takeoff limitations:
-Rated takeoff thrust and Flaps 20° only
-Antiskid braking system must be operative
-Max equivalent water depth: 12.7mm (.5")
-Equivalent water depth 3-6mm: minV_1/V_R=.80, maxV_1/V_R=1.0
-Equivalent water depth 6-12.7mm (.2-.5"): V_1/V_R=1.0 only
-G500 max dry snow depth: 76.2mm (3.0"); G600: 100mm (3.94")
-Dry/wet runway V_{1MCG} also applies to contaminated runways
-No credit for clearways
-For icy runways, both TRs must be operational
•Stabilize T/O Pwr before brake release or when A/C begins to slide
• Ice Detected CAS will display w/icing cond on grnd and be replaced by Ice Detected (w/single tone) at 60 kts/400 ft: takeoff is permitted
•Rejected T/O: use max T/R and anti-skid braking—resist releasing brakes even if ride is rough. Use rudder for directional control
•Delay landing gear retraction if practical
•Flight w/flaps extended in icing cond restr to T/O, appr, & landing

Enroute / Cruise

•Operation in forecasted or reported severe icing is prohibited. WAI and CAI must be ON when entry into icing is imminent or immed upon det of ice on wings, winglets, or windshield edges
•Flight into known icing prohibited in other than Normal FCL modes
•Automatic anti-ice operative 400 AGL to FL350
•Min fuel tank temp: -37°C with >5000lbs fuel; -30°C <5000lbs fuel
•If fuel temp ≤-30°C in flight with <5000lbs fuel, descend to SAT ≥-60°C, maintain ≥.80M
•During inflight icing condition, eng vibe ok <2.0 with transients >3.0
•WAI operation with Single Bleed Air System Operating:
-Restricted to single ECS pack operation
-Max altitude restricted to FL320
-WAI automatic mode is prohibited
-Requires wing temp >100°F prior to entry into icing conditions
•Ice shedding may be assist by incr power lever to MCT >5sec, then previous power setting, repeat as necessary (AFM 03-07-10)
•With WAI on in flight and TAT <0°C, higher eng idle settings will be ~47% N_1; resumes to normal with TAT >0°C or landing gear extension
•Rec min flap speed in icing: 0°200kts;10°180kts; 20°150kts;39°ref+5
•Min speed with WAI on and flaps up: 200 KCAS (unless slowing for approach and landing)
•If icing during Appr/Landing: WAI must be selected on and confirmed operating in normal temp range prior to flap extension
•Extend ops in icing conditions limited to flaps up configuration
•If flight icing conditions >10 min with flaps extended, do not retract flaps <10° until flap leading edge clear of ice (visual inspection of flaps on ground or winglet leading edge in flight)

Landing

** Consider water system purge before landing. Ref OM Water System Purge Determination Table and COM Water System Purge*
•Cold Weather Temperature Compensation (OM 03-10-120)
•Before extend landing gear, perform 3 full PARKING BRAKE cycles
•Wet and contaminated landing limitations:
-Flaps 39° only
-Max equivalent water depth: 12.7mm (.50")
-G500 max dry snow depth: 76.2mm (3.0"); G600: 100mm (3.94")
•Make firm touchdown, lower nose immed for contaminated rwy
•Do not modulate brake pedal pressure if anti-skid is operating
•Expect possible downwind drift on slippery runways with crosswind
•Perform runway turnoff only after safe and slow taxi speed

Taxi / Parking

•Apply taxi considerations from above taxi section
•Retract flaps if slush on taxiway, but not <10° if significant ice on leading edge of flaps
•Consider Manual Ice Shedding Procedure (AFM 03-07-10)
•Release parking brake once wheel chocks are in place
•Check hydraulic system fluid quantity prior to engine shutdown

Securing Airplane

•Verify TROV closed, internal and external covers and plugs in place
•Ensure chocks in place and parking brake released
•If necessary, service eng and hyd oil ASAP after engine shutdown
•Purge potable water, drain waste tank ASAP after flight/before APU shutdown, as needed. Ref: OM Water Sys Purge Determination Table
•Drain all toilets, if waste tank drained, ensure no residual fluid before drain valve and cap closed—may be left open at <0°C (32°F)
•Ensure galley coffee makers, water boilers/heaters are drained
•Run water taps to ensure lines are empty
•If temps below indicated, remove and store items in warm location: Main & EBHA Batts: -20°C(-4°F), Life Rafts: -30°C(-22°F), Kidde halon fire bottle (-40°C/°F), Amerex halon fire bottle: -65°C(-85°F)
•Ensure no residual moisture is present on door seals or surfaces before closing all access doors
** Consider removing all freezable beverages*

Runway Condition Assessment Matrix (RCAM)

Table 3. Operational Runway Condition Assessment Matrix (RCAM) Braking Action Codes and Definitions

RUNWAY CONDITION CODE (RCC)	RUNWAY SURFACE CONDITION DESCRIPTION	PILOT REPORTED BRAKING ACTION	FMS TOLD (1) Perf Landing SELECTION
6	• Dry	N/A	Dry
5	• Frost • Wet (includes damp and 1/8 inch (3mm) depth or less of water) 1/8 inch (3mm) depth or less of: • Slush • Dry Snow • Wet Snow	Good	Wet
4	-15°C and colder outside air temperature: • Compacted Snow	Good to Medium	Compact Snow
3	• Wet ("Slippery When Wet") Runway • Dry Snow or Wet Snow (any depth) over Compacted Snow Warmer than -15°C outside air temperature: • Compacted Snow	Medium	Compact Snow
	Greater than 1/8 inch (3mm) depth of: • Dry Snow • Wet Snow		Dry Snow or Wet Snow
2	Greater than 1/8 inch (3mm) depth of: • Water • Slush	Medium to Poor	Slush (2) or Standing Water (2)
1	• Ice	Poor	Ice
0	• Wet Ice • Slush over Ice • Water over Compacted Snow • Dry Snow or Wet Snow over Ice	Nil	N/A

(1) The FMS TOLD selections are only valid for the "Perf Landing" page.
(2) User is required to select "> 0.125" as the runway depth value.

TABLE 1: ACTIVE FROST HOLDOVER TIMES FOR SAE TYPE I, TYPE II, TYPE III, AND TYPE IV FLUIDS[1]

Outside Air Temperature[2,3,4]	Type I
-1 °C and above (30 °F and above)	0:45 *(0:35)*[6]
below -1 to -3 °C (below 30 to 27 °F)	
below -3 to -10 °C (below 27 to 14 °F)	
below -10 to -14 °C (below 14 to 7 °F)	
below -14 to -21 °C (below 7 to -6 °F)	
below -21 to -25 °C (below -6 to -13 °F)	
below -25 °C to LOUT (below -13 °F to LOUT)	

Outside Air Temperature[3,4]	Concentration Fluid/Water By % Volume	Type II	Type III[5]	Type IV
-1 °C and above (30 °F and above)	100/0	8:00	2:00	12:00
	75/25	5:00	1:00	5:00
	50/50	2:00	0:30	3:00
below -1 to -3 °C (below 30 to 27 °F)	100/0	8:00	2:00	12:00
	75/25	5:00	1:00	5:00
	50/50	1:30	0:30	3:00
below -3 to -10 °C (below 27 to 14 °F)	100/0	8:00	2:00	10:00
	75/25	4:00	1:00	5:00
below -10 to -14 °C (below 14 to 7 °F)	100/0	6:00	2:00	6:00
	75/25	1:00	1:00	1:00
below -14 to -21 °C (below 7 to -6 °F)	100/0	3:00	2:00	6:00
below -21 to -25 °C (below -6 to -13 °F)	100/0	2:00	2:00	4:00
below -25 °C (below -13 °F)	100/0	No Holdover Time Guidelines Exist		

NOTES

1 To use the HOTs in this table, ensure that the fluid and dilution being used is listed in the List of Qualified Fluids Tested for Anti-Icing Performance and Aerodynamic Acceptance table (Table 51 - Table 54). Any restrictions on the use of the fluid have to be identified and applied.
2 Type I Fluid / Water Mixture must be selected so that the freezing point of the mixture is at least 10 °C (18 °F) below outside air temperature.
3 Ensure that the lowest operational use temperature (LOUT) is respected.
4 Changes in outside air temperature (OAT) over the course of longer frost events can be significant; the appropriate holdover time to use is the one provided for the coldest OAT that has occurred in the time between the de/anti-icing fluid application and takeoff.
5 To use the Type III fluid frost holdover times, the fluid brand being used must be known. AllClear AeroClear MAX must be applied unheated.
6 Value in parentheses is for aircraft with critical surfaces that are predominantly or entirely constructed of composite materials.

CAUTIONS

- The cautions that apply to the holdover times in the table above can be found on page 8.

TABLE 50: SNOWFALL INTENSITIES AS A FUNCTION OF PREVAILING VISIBILITY

Visibility		Day		Night	
Statute Miles	Meters	-1°C and below 30 °F and below	Above -1°C Above 30 °F	-1°C and Below 30 °F and below	Above -1°C Above 30 °F
≤1/4 (≤3/8)	≤400 (≤600)	Heavy	Heavy	Heavy	Heavy
1/2 (>3/8 to ≤5/8)	800 (>600 to ≤1000)	Moderate	Heavy	Heavy	Heavy
3/4 (>5/8 to ≤7/8)	1200 (>1000 to ≤1400)	Moderate	Moderate	Moderate	Heavy
1 (>7/8 to ≤1 1/8)	1600 (>1400 to ≤1800)	Light	Light	Moderate	Moderate
1 ¼ (>1 1/8 to ≤1 3/8)	2000 (>1800 to ≤2200)	Light	Light	Moderate	Moderate
1 ½ (>1 3/8 to ≤1 5/8)	2400 (>2200 to ≤2600)	Light	Light	Moderate	Moderate
1 ¾ (>1 5/8 to ≤1 7/8)	2800 (>2600 to ≤3000)	Very Light	Light	Light	Light
2 (>1 7/8 to ≤2 ¼)	3200 (>3000 to ≤3600)	Very Light	Very Light	Light	Light
2 ½ (>2 ¼ to ≤2 ¾)	4000 (>3600 to ≤4400)	Very Light	Very Light	Very Light	Very Light
3 (>2 ¾ to ≤3 ¼)	4800 (>4400 to ≤5200)	Very Light	Very Light	Very Light	Very Light
≥3 ½ (>3 ¼)	≥5600 (>5200)	Very Light	Very Light	Very Light	Very Light

NOTES

- The METAR/SPECI reported visibility or flight crew observed visibility will be used with this visibility table to establish snowfall intensity for Type I, II, III and IV holdover time guidelines, during snow, snow grain, or snow pellet precipitation conditions. This visibility table will also be used when snow, snow grains, or snow pellets are accompanied by blowing or drifting snow, or when snow is mixed with ice crystals or freezing fog in the METAR/SPECI.
- The use of Runway Visual Range (RVR) is not permitted for determining visibility used with the holdover tables.
- Some METARs contain tower visibility as well as surface visibility. Whenever surface visibility is available from an official source, such as a METAR, in either the main body of the METAR or in the Remarks ("RMK") section, the preferred action is to use the surface visibility value.
- If the visibility is being reduced by snow along with form(s) of obscuration such as fog, haze, smoke, etc., use of the table above may overestimate the actual snowfall intensity. However, use of the snowfall intensity being reported by the weather observer or automated surface observing system (ASOS), from the FMH-1 Table, may underestimate the actual snowfall intensity as it does not directly correlate to the snowfall intensities used when determining holdover times. Use of the visibility table in all snow conditions with or without obscurations is recommended.

TABLE 2: HOLDOVER TIMES FOR SAE TYPE I FLUID ON CRITICAL AIRCRAFT SURFACES COMPOSED PREDOMINANTLY OF ALUMINUM

Outside Air Temperature[1,2]	Freezing Fog, Freezing Mist[3], or Ice Crystals[4]	Very Light Snow, Snow Grains or Snow Pellets[5,6,7]	Light Snow, Snow Grains or Snow Pellets[5,6,7]	Moderate Snow, Snow Grains or Snow Pellets[5,7]	Freezing Drizzle[8]	Light Freezing Rain	Rain on Cold-Soaked Wing[9]	Other[10]
-3 °C and above (27 °F and above)	0:11 - 0:17	0:18 - 0:22	0:11 - 0:18	0:06 - 0:11	0:09 - 0:13	0:02 - 0:05	0:02 - 0:05	
below -3 to -6 °C (below 27 to 21 °F)	0:08 - 0:13	0:14 - 0:17	0:08 - 0:14	0:05 - 0:08	0:05 - 0:09	0:02 - 0:05	CAUTION: No holdover time guidelines exist	
below -6 to -10 °C (below 21 to 14 °F)	0:06 - 0:10	0:11 - 0:13	0:06 - 0:11	0:04 - 0:06	0:04 - 0:07	0:02 - 0:05		
below -10 °C (below 14 °F)	0:05 - 0:09	0:07 - 0:08	0:04 - 0:07	0:02 - 0:04				

NOTES

1 Type I fluid / water mixture must be selected so that the freezing point of the mixture is at least 10 °C (18 °F) below outside air temperature.
2 Ensure that the lowest operational use temperature (LOUT) is respected.
3 Freezing mist is best confirmed by observation. It is never reported by METAR however it can occur when mist is present at 0 °C (32 °F) and below.
4 Use freezing fog holdover times in conditions of ice crystals mixed with freezing fog or mist.
5 To determine snowfall intensity, the Snowfall Intensities as a Function of Prevailing Visibility table (Table 50) is required.
6 Use light freezing rain holdover times in conditions of very light or light snow mixed with light rain or drizzle. The Snowfall Intensities as a Function of Prevailing Visibility table (Table 50) is required to confirm the precipitation intensity is no greater than "light". No holdover times exist if the reported visibility correlates to a "moderate" or "heavy" precipitation intensity.
7 Use snow holdover times in conditions of very light, light, or moderate snow mixed with ice crystals.
8 Includes light, moderate and heavy freezing drizzle. Use light freezing rain holdover times if positive identification of freezing drizzle is not possible.
9 No holdover time guidelines exist for this condition for 0 °C (32 °F) and below.
10 Heavy snow, ice pellets, moderate and heavy freezing rain, small hail and hail.

CAUTIONS

- The cautions that apply to the holdover times in the table above can be found on page 10.