

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

1A17
Revision 19
Gulfstream

G-159

April 15, 1987

TYPE CERTIFICATE DATA SHEET NO. 1A17

This data sheet, which is a part of Type Certificate No. 1A17, prescribes conditions and limitations under which the product for which the type certificate was issued meets the airworthiness requirements of the Federal Aviation Regulations.

Type Certificate Holder: Gulfstream Aerospace Corporation
P.O. Box 2206
Savannah, GA 31402-2206

I - Model G-159, Gulfstream I, (Transport Category), Approved May 21, 1959

Engines 2 Rolls-Royce Dart Mark 529-8E, Mark 529-8H, Mark 529-8X, Mark M529-8X (Mod 1814), Mark 529-8Y, or Mark M529-8Z. (Turboprop) (See Note 6 for required modifications and procedures for Engines Mark 529-8X (Mod 1814), Mark 529-8Y and Mark 529-8Z). Reduction Gearing 0.093.1.

Fuels (fuels shall conform to the specifications as listed) Kerosene Type U.S. : ASTM D.1655-74
Jet A and A-1

MIL-T-5624-J
Grade JP-5

British : D. Eng. R.D. 2498
Issue 6

D. Eng. R.D. 2494
Issue 7
Amendment 1

D. Eng. R.D. 2453
Issue 3
Amendment 1

Canadian : 3-GP-23h
3-GP-24g

Wide-Cut Fuels U.S. : ASTM D.1655-74
Jet B

MIL-T-5624-J
Grade JP-4

British : D. Eng. R.D. 2486
Issue 8

Amendment 1
D. Eng. R.D. 2454
Issue 3
Amendment 1

Canadian: 3-GP-22h

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Fuel Specification D. Eng. R.D. 2453 and D. Eng. R.D. 2454 already include HITEC-E515 (formerly Santolene C) and anti-icing additive to Specification E. Eng. R.D. 2451 (Issue 2, or later issue) to approved limitations.

Approved deviations

Fuels with the following deviations from Specification D. Eng. R.D. 2494 are acceptable:

Flash point:	Minimum 28 deg. C. (82.4 deg. F.)
Mercaptan sulphur content:	Maximum 0.005 per cent by weight

Mixing of fuels

Any mixture of the above type fuels may be used without readjustment of the engine fuel control unit and without loss in engine power or aircraft performance.

Wide-Cut Fuel

The use of wide-cut fuel, as agreed to by the Operator, Rolls-Royce and appropriate Airworthiness Authority may result in a reduction in H.P. fuel pump life.

Fuel conforming to emergency fuel specification ES-2-74 may be used on an exception basis.

Refer to Airplane Flight Manual for approved fuel additives.

Water/Methanol	Refer to Rolls-Royce Specification
Mixture:	AEP-1-W/M, latest issue.

Oil (engine, gearbox and APU)

ESSO/EXXON Extra Turbo Oil 274
CASTROL 98
CASTROL UK 98
CASTROL 98 Gas Turbine Oil
AEROSHELL Turbine Oil 750
TEXACO Synthetic Aircraft Turbine Oil 35 (T.S.A.T.O. 35)
Also marketed as CALTEX Synthetic Turbo Oil 35

And those oils as approved for common usage in the engine, propeller and gearbox by Rolls Royce, Dowty Rotol, and the Civil Aviation Authority (U.K.) in DART OPERATING INSTRUCTIONS (F-DA-7-G), Rolls Royce Service Bulletins and Dowty Rotol Maintenance Manuals No. 865/1 and 865A/1 for G-159 aircraft and for use in APU Model No. GTC 85-37-2 in AiResearch Maintenance Manual 6A-243.

Engine Limits

Static Sea Level Ratings

	MK.529	
	-8E & 8H	-8X, -8Y, -8Z
Wet Takeoff (5 min.)		
Shaft Horsepower (Shp.)	1950	1990
Jet Thrust (Lb.)	510	520
Dry Takeoff (Unrestricted)		
Shaft Horsepower (Shp.)	1910	1910
Jet Thrust (Lb.)	500	500
Max. Continuous (Unrestricted)		
Shaft Horsepower (Shp.)	1910	1910
Jet Thrust (Lb.)	500	500

Engine Limits (cont'd)

	Engine Speed (R.P.M.)	Max. Permissible Turbine Gas Temp.
		(GT) °C
		Mk. 529-8E, -8H, -8X, -8Y, -8Z
Wet Takeoff (5 min.)	15,000	860
Dry Takeoff (5 min.)	15,000	825
Max. Continuous (Unrestricted)	15,000	850 (-8E, -8H, -8X)
For airplanes incorporating ASC 246; Max. continuous TGT at 15,000 RPM:		-8X Engines = 870°C -8Y Engines = 910°C -8Z Engines = 920°C

Starting Momentary

930

At low altitude at temperature below ISA, the engines may produce more power at takeoff than the airplane has been certified for. Under these conditions, the placarded torquemeter limitations should not be exceeded.

Oil Inlet Temperature:

Maximum	+120°C
Minimum for Starting	-30°C
Minimum for Opening Power Lever	-15°C

Propeller and
Propeller Limits

2 Rotol Model (C) R 184/4-30-4/50, with 4 R.A. 25907 blades each.
Diameter: 11.5 feet (nominal)
Minimum allowable for repairs 11' 4". No further reduction permitted.
Pitch setting at .7 radius:
Ground fine pitch 0
Flight fine pitch +20°
Cruise pitch +34° 30'
Feathered +85° 30'
Maximum governing e. r.p.m. 15,000
Minimum governing e. r.p.m. 11,000
E. r.p.m. limit (max. 20 sec.) 17,000
See NOTE 2(b) for idling e. r.p.m. limitations.

Airspeed Limits (IAS)

V _{mo} (max. operating) 12,000 ft. and below	290 knots	(334 m.p.h.)	
M _{mo} M = .54 above 12,000 ft. is indicated by red & white limit on airspeed indicator.			
V _a (maneuvering)	174 knots	(200 m.p.h.)	
V _{fe} (flaps down 12.5°)	219 knots	(252 m.p.h.)	
V _{fe} (flaps down 20°)	162 knots	(187 m.p.h.)	
V _{fe} (flaps down 33°)	143 knots	(165 m.p.h.)	
V _{lo} (landing gear operation)	193 knots	(222 m.p.h.)	
V _{le} (landing gear extended)	193 knots	(222 m.p.h.)	
V _{mc} (minimum control one engine inoperative)			
Feathered	101 knots	(116 m.p.h.)	Gear up. T.O. flaps
Feathered	113 knots	(130 m.p.h.)	Clean
Windmilling	127 knots	(146 m.p.h.)	Gear up. T.O. flaps
Windmilling	138 knots	(159 m.p.h.)	Clean
V ₁₁ (Landing light extension and operation)	290 knots	(334 m.p.h.)	
V _{db} Dive brake extension	310 knots	(357 m.p.h.)	
Dive brake retraction	199 knots	(229 m.p.h.)	

C.G. Range

%MAC Sta.

%MAC Sta.

Takeoff & Landing (landing gear and flaps down)				
20,000 lbs.	14.3	298.0	28.2	311.8
23,700 lbs.	14.3	298.0	- - -	
26,100 lbs.			30.4	313.9
33,600 lbs.	20.8	304.4	31.9	315.5
34,285 lbs.	21.2	304.8	32.0	315.6
35,100 lbs.	21.8	305.4	32.2	315.8
36,000 lbs.	22.3	306.0	32.3	315.9

Linear variation of limits between points shown. Landing gear retraction moment is -30,000 in.-lb. Flap retraction moment is -6,600 in.-lb.

Datum	Station 0 is 8 in. forward of the nose, or 45 in. forward of the jig point at the centerline of the airplane in the nose wheel well.		
M.A.C.	99.4 in. (L.E. of M.A.C. +283.8)		
Leveling Means	Longitudinal:	Lugs at left nose wheel door longeron, Sta. 61.5 and 72.5.	
	Lateral:	Lugs on rear face of Bulkhead Sta. 44.5 in nose wheel well.	
Maximum Weight	Takeoff	<p>33,600 lb. on aircraft S/N 1 through S/N 60 including S/N 114.</p> <p>35,100 lb. on aircraft S/N 61 through S/N 162 (excluding aircraft S/N 114), S/N 322 and 323 on aircraft S/N 1 thru 60 and S/N 114 when modified in accordance with Grumman Service Change No. 69.</p> <p>36,000 lb. on aircraft S/N 163 through S/N 200 and on aircraft S/N 1 through 162, S/N 322 and 323, when modified in accordance with Grumman Service Change Nos. 69 and 175.</p>	
	Landing	<p>32,000 lb. on aircraft S/N 1 through S/N 60 including S/N 114.</p> <p>33,600 lb. on aircraft S/N 61 through S/N 162, (excluding aircraft S/N 114), S/N 322 and 323, and on aircraft S/N 1 through 60 and S/N 114 when modified in accordance with Grumman Service Change No. 69.</p> <p>34,285 lb. on aircraft S/N 163 through S/N 200 and on aircraft S/N 1 through 162, S/N 322 and 323, when modified in accordance with Grumman Service Change Nos. 69 and 175.</p>	
	Zero usable fuel, oil and water/methanol (aircraft with outer wing panel fuel tank installation must include usable W/M).	<p>29,707 lb. when takeoff weight is not more than 35,100 lbs.</p> <p>27,303 lb. when takeoff weight is 36,000 lb. with linear variation between gross weights of 35,100 lb. and 36,000 lb.</p>	
Minimum Crew	2 - Pilot and Copilot		
Maximum Number of Occupants	The total number of occupants shall not exceed 23. The total number of passengers shall not exceed 19 as determined by emergency exit requirements. When Aircraft Service Change 153A is incorporated the total number of occupants shall not exceed 28. The total number of passengers shall not exceed 24 as determined by emergency exit requirements. (See Review Case Number 6.)		

Maximum Baggage

	Compartment			
	<u>Forward</u>	<u>Aft</u>	<u>Aft-Shelved</u>	
Station Boundary	133-193	525-571	525-586	525-586
Capacity (lb.)	400	736	1700*	800*
Max. Floor Loading (#/sq. ft.)	50	64	64	64
Shelf Loading	None	None	Variable	Variable
C.G.	163.0	543.0	Variable	Variable

*1700 lb. is the capacity at a Zero usable fuel, oil and W/M weight of 26,103 lb. This decreases linearly to 800 lb. at a Zero usable fuel, oil and W/M weight of 29,707 lbs.

Fuel Capacity

1550 gal. total usable fuel in 2 wing tanks of 775 gal. each (F.S. 321).
For aircraft with outer wing panel fuel tank installation, 1793.6 gal. total usable fuel (left tank 893.9 gallon, right tank 899.7 gallon) (F.S. 321).
See NOTE 1(b) for system fuel.

Water/Methanol

Aircraft S/N 1 through 106 and 114 - 84 gal.
Total usable in two parts of wing bladder tanks of 42 gallons each pair (F.S. 321).

For aircraft with outer wing panel fuel tank installation (Gulfstream Aircraft service Change No. 125), the total usable water/methanol is 47.4 gal. in two wing fillet tanks of 23.7 gal. each (F.S. 384.1).

For aircraft S/N 107 and subsequent and airplanes incorporating Gulfstream Airport Service Change No. 165, the total usable water/methanol is 46 gal. in two wing bladder tanks of 23 gal. each (F.S. 321).

See NOTE 1(b) for system W/M.

Oil Capacity

8.4 gal. total "Usable" 67.2 lb. located in integral engine tanks of 4.2 gal. each (F.S. 200.5). See NOTE 1(c) for system oil.

Maximum Operating Altitude

30,000 ft. with APU or ASC 126 installed
25,000 ft. with Auxiliary Power Unit inoperative or not installed.

Control Surface Movements

Elevator	Up	$25^{\circ} + 1/2^{\circ} - 1/2^{\circ}$	Down	$14^{\circ} + 0^{\circ} - 2^{\circ}$
Elevator trim tab	Up	$3^{\circ} \pm 1/2^{\circ}$	Down	$20^{\circ} \pm 2^{\circ}$ *
	Up	$2^{\circ} \pm 1/2^{\circ}$	Down	$20^{\circ} \pm 2^{\circ}$ **
Rudder	Right	$22^{\circ} + 0^{\circ} - 1^{\circ}$	Left	$22^{\circ} + C^{\circ} - 1^{\circ}$
Rudder tab (spring or trim)	Right	$10^{\circ} \pm 1^{\circ}$	Left	$10^{\circ} \pm 1^{\circ}$
Aileron	Up	$16^{\circ} \pm 1^{\circ}$	Down	$12^{\circ} \pm 1^{\circ}$
Aileron tab (trim)	Up	$20^{\circ} \pm 2^{\circ}$	Down	$20^{\circ} \pm 2^{\circ}$
Aileron tab (spring)	Up	$15^{\circ} \pm 1$	Down	$15^{\circ} \pm 1^{\circ}$
Flaps			Down	$33^{\circ} \pm 1^{\circ}$

*For S/N 26 and subsequent excluding aircraft S/N 114.

**For S/N 1 through 25 and S/N 114.

Serial Nos. Eligible

1 and up.

Certification Basis	<p>CAR 4b dated December 31, 1953, including Amendments 4b-1 to 4b-5 inclusive, Amendment 4b-6 Items 7, 8, 12, 16, 17, 19, 22, 23, 24, 25, 26, 28, 31, 32, 34, 35, 38, 39, 42 and 44, 4b-7 all Items, 4b-8 Items 2, 5, 6, 12, 17, 20, 21, 22, and 23, Special Regulation SR 422A, and Special Conditions in Attachment A of CAA letter to Grumman dated December 2, 1957, and exemption No. 689, CAR 4b.437, "Fuel Jettisoning System." Type Certificate 1A17 issued May 21, 1959. Date of Application for Type Certificate May 14, 1957. FAR 25.771, Amendment 4. A lockable door is not required between the pilot and passenger compartments.</p> <p>Compliance with the following optional requirements has been established:</p> <p>Ice Protection CAR 4b.640.</p> <p>Data covering ditching requirements of 4b.361 including 4b.362(d) and 4b.742(e) (but excluding 4b.645 and 4b.646) are approved. When the operating rules require emergency ditching equipment, compliance with 4b.645 and 4b.646 must be demonstrated. Grumman Report 1159-GER-7, revised July 25, 1977, entitled "Outfitting Requirements for FAA Certification for Ditching," provides an acceptable means for showing compliance with 4b.645 and 4b.646. Airplane Flight Manual Interim Revision 22.3, or later FAA approved revision must be incorporated.</p>
Production Basis	<p>None. Prior to original certification of aircraft manufactured subsequent to serial numbers 1 through 12, 14 through 112, 114 through 200, plus 322 and 323, an FAA representative must perform a detailed inspection for workmanship, materials and conformity with the approved data, and a check of the flight characteristics (see NOTE 5.)</p>
Equipment	<p>The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft for certification. In addition, the following items of equipment are required:</p> <ul style="list-style-type: none"> a. FAA approved Airplane Flight Manual, dated May 21, 1959. Reissued July 1, 1960. b. Crew oxygen system installation. When an aircraft is outfitted to carry passengers, an FAA approved passenger oxygen system must be installed.
Service Information	<p>Service bulletins and other service information, when FAA approved, will carry a statement to that effect. See NOTE 4 regarding Grumman Gulfstream Service Change Number 147.</p>
NOTE 1.	<ul style="list-style-type: none"> (a) Current weight and balance report, including list of equipment included in certificated empty weight, and loading instructions when necessary, must be provided for each aircraft at the time of original certification. (b) System or unusable fuel, which must be included in the empty weight, is the amount of fuel required to fill the system plumbing and tank to the undrainable level (2.4 gal. total), plus unavailable fuel in the fuel tanks (8.3 gal. total). The total amount of "system fuel" 10.7 gal. total, 72 lb. (325). System or unusable and undrainable water/methanol are in identical quantity (3.4 gal. or 27 lb. total) and also must be included in the empty weight (325). For aircraft with outer wing panel fuel tank installation (Service Change No. 125), system water/methanol equals 1.8 gal. or 14 lb. total (346). (c) System oil, which must be included in empty weight, is the amount of oil necessary for engine lubrication and propeller operation. The total amount of "system oil" is as follows: 5.7 gal. (total) contained in engines, 45.8 lb. (200.5).
NOTE 2.	<p>The following placards must be displayed in the locations indicated:</p> <ul style="list-style-type: none"> (a) On the forward side of the passenger compartment forward door: (if installed) <p style="text-align: center;">"This door must be OPEN during take-off and landing."</p>

- (b) On the instrument panel below r.p.m. indicators:

"Avoid all continuous operation below 7000 RPM."

- (c) On aircraft serial numbers 3 and 114 adjacent to each swivel seat:

"This seat must be forward facing during take-off and landing."

- (d) On aircraft serial numbers 2, 3, and 114 on the back rest of the jump seat:

"Not to be used during take-off and landing."

- (e) On the forward side of the passenger compartment rear door: (This placard is required for 24 passenger aircraft and recommended for others.)

"This door must be OPEN during take-off and landing."

NOTE 3. Retirement Times:

The retirement times of fatigue critical life limited components are listed in Section IV, Part 1 of the Gulfstream Aerospace Model 159 (Gulfstream I) Inspection Schedule Manual. The retirement times of these life limited components cannot be increased/changed without FAA Engineering approval.

NOTE 4. Grumman Gulfstream Service Change No. 147 regarding large cargo door may be incorporated when the structural inspections specified in Service Change No. 147 are complied with. Grumman Flight Manual Supplement dated 31 August 1962 is also required for this modification.

NOTE 5. Spare parts and aircraft may be manufactured at Grumman, Bethpage, Long Island, New York, facility under their production Certificate No. 23. Spare parts may be manufactured at Gulfstream Aerospace Corporation, Savannah, Georgia, under Production Certificate No. 507.

NOTE 6. When Aircraft Service Change No. 246, "Nacelle Modification to Operate Dart Mark 529-8X, -8Y, and -8Z engines at Higher Maximum Continuous Power Settings" is installed, one of the following Airplane Flight Manual (AFM) Supplements is required.

<u>Engine</u>	<u>Supplement No.</u>
-529-8X	G1-82-002
-529-8Y	G1-82-003
-529-8Z	G1-82-004

The higher maximum continuous power settings below can be used where maximum continuous power setting follows use of wet takeoff power.

<u>*Engine</u>	<u>Rolls Royce Mod</u>	<u>RPM</u>	<u>TGT (°C)</u>	<u>Time Limit</u>
-529-8X	1814	15,000	870	Unrestricted
-529-8Y	1806	15,000	910	Unrestricted
-529-8Z	1810	15,000	920	Unrestricted

*These engines must incorporate listed Rolls Royce modifications in order to use above higher maximum continuous power settings.

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