



Airspeed Limits (IAS)	V <sub>A</sub> (Maneuvering)	156 knots (180 mph)
	V <sub>FE</sub> (Flaps Extended)	150 knots (172 mph)
	V <sub>LE</sub> (Landing Gear Extended)	150 knots (172 mph)
	V <sub>LO</sub> (Landing Gear Operating)	150 knots (172 mph)
	V <sub>MC</sub> (Minimum Control Speed)	85 knots (98 mph)
	Maximum Speed for Full Lateral Control Displacement	200 knots (230 mph)
	Above 200 knots (230 mph) lateral control displacement is limited to one-half of full displacement.	
	Maximum Speed for Skidding or Sideslipping (Rudder Assist OFF)	155 knots (178 mph)
	Maximum Speed for Skidding or Sideslipping (Rudder Assist ON)	130 knots (150 mph)
	Maximum Speed with Flaps Extended by Emergency System	130 knots (150 mph)
	Maximum Nose Wheel Ground Roll Speed	115 knots (132 mph)
	Maximum Crosswind Component for Takeoff or Landing (With No Headwind)	15.5 knots (17.8 mph)
	Maximum Crosswind Component for Takeoff or Landing (With 55 knots (63.3 mph) Headwind)	30.0 knots (34.5 mph)
	Maximum crosswind component for takeoff or landing varies linearly between specified values.	
	See Figure 5-7 on Page 5-34 of the FAA approved Airplane Flight Manual for maximum engaging speeds approved for field arrested landings and aborted takeoffs, and for approved types of arresting gear.	
Mean Aerodynamic Chord (MAC)	88.61 in.	
MAC Leading Edge Location (in. aft of reference datum '0')	+194.80	
C. G. Range (in. aft of reference datum '0' and % MAC)	+213.85 (21.5% MAC) to +220.32 (28.8% MAC), Landing Gear Extended	
	+215.27 (23.1% MAC) to +221.83 (30.5% MAC), Landing Gear Retracted	
Landing Gear Retraction Moment (in. - lbs./1000) =	+32.0	
Retracting landing gear moves C.G. AFT.		

Datum	Reference Datum '0' is 94.64 in. forward of jig point on forward face of nose landing gear uplock bulkhead located at reference station +96.0.																																														
	Reference stations are distances in inches aft of reference datum '0'.																																														
Leveling Means	Plumb bob and scribed scale in main entrance and cargo door frame on left side of airplane, at reference station +330.125. Plumb bob suspension point is located on fuselage interior structure above top of door frame. Scale is located at edge of cargo deck in bottom of door opening.																																														
Maximum Weights	<table border="0"> <tr> <td>Takeoff</td> <td>24,500 lbs.</td> </tr> <tr> <td>Normal Landing</td> <td>24,500 lbs.</td> </tr> <tr> <td>Arrested Landing</td> <td>24,200 lbs.</td> </tr> </table>	Takeoff	24,500 lbs.	Normal Landing	24,500 lbs.	Arrested Landing	24,200 lbs.																																								
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Minimum Crew	For flight in visual meteorological conditions 1 (Pilot) at ref. station +111.0																																														
Number of Seats	2 at reference station +110.9																																														
Cargo Capacity	<table border="0"> <tr> <td>Cargo compartment length</td> <td>208.75 in.</td> </tr> <tr> <td>Cargo compartment forward end location (ref. station)</td> <td>+129.25</td> </tr> <tr> <td>Cargo compartment aft end location (ref. station)</td> <td>+338.0</td> </tr> <tr> <td>Maximum distributed loading allowed on cargo floor</td> <td>220 psf</td> </tr> <tr> <td>Cargo floor crushing strength</td> <td>90 psi</td> </tr> </table> <p>Main cargo compartment is divided into five smaller compartments for cargo loading purposes, as follows:</p> <table border="0"> <tr> <td colspan="2">Compartment C (ref. stations +129.25 to +182.0)</td> </tr> <tr> <td>Average arm (ref. station)</td> <td>+156.0</td> </tr> <tr> <td>Maximum cargo weight (lbs.)</td> <td>4790</td> </tr> <tr> <td>Floor area (sq. ft.)</td> <td>21.8</td> </tr> <tr> <td>Volume (cu. ft.)</td> <td>130.8</td> </tr> <tr> <td colspan="2">Compartment D (ref. stations +182.0 to +219.0)</td> </tr> <tr> <td>Average arm (ref. station)</td> <td>+200.0</td> </tr> <tr> <td>Maximum cargo weight (lbs.)</td> <td>2990 (1760 within cargo cage)</td> </tr> <tr> <td>Floor area (sq. ft.)</td> <td>13.6</td> </tr> <tr> <td>Volume (cu. ft.)</td> <td>68.0</td> </tr> <tr> <td colspan="2">Compartment E (ref. stations +219.0 to +255.0)</td> </tr> <tr> <td>Average arm (ref. station)</td> <td>+237.0</td> </tr> <tr> <td>Maximum cargo weight (lbs.)</td> <td>2990 (1705 within cargo cage)</td> </tr> <tr> <td>Floor area (sq. ft.)</td> <td>13.6</td> </tr> <tr> <td>Volume (cu. ft.)</td> <td>68.0</td> </tr> <tr> <td colspan="2">Compartment F (ref. stations +255.0 to +291.0)</td> </tr> <tr> <td>Average arm (ref. station)</td> <td>+273.0</td> </tr> <tr> <td>Maximum cargo weight (lbs.)</td> <td>2810 (1705 within cargo cage)</td> </tr> </table>	Cargo compartment length	208.75 in.	Cargo compartment forward end location (ref. station)	+129.25	Cargo compartment aft end location (ref. station)	+338.0	Maximum distributed loading allowed on cargo floor	220 psf	Cargo floor crushing strength	90 psi	Compartment C (ref. stations +129.25 to +182.0)		Average arm (ref. station)	+156.0	Maximum cargo weight (lbs.)	4790	Floor area (sq. ft.)	21.8	Volume (cu. ft.)	130.8	Compartment D (ref. stations +182.0 to +219.0)		Average arm (ref. station)	+200.0	Maximum cargo weight (lbs.)	2990 (1760 within cargo cage)	Floor area (sq. ft.)	13.6	Volume (cu. ft.)	68.0	Compartment E (ref. stations +219.0 to +255.0)		Average arm (ref. station)	+237.0	Maximum cargo weight (lbs.)	2990 (1705 within cargo cage)	Floor area (sq. ft.)	13.6	Volume (cu. ft.)	68.0	Compartment F (ref. stations +255.0 to +291.0)		Average arm (ref. station)	+273.0	Maximum cargo weight (lbs.)	2810 (1705 within cargo cage)
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Cargo Capacity	Floor area (sq. ft.)	12.8
	Volume (cu. ft.)	64.0
	Compartment G (ref. stations +291.0 to +338.0)	
	Average arm (ref. station)	+314.0
	Maximum cargo weight (lbs.)	3120 (1200 aft of cargo cage)
	Floor area (sq. ft.)	14.2
	Volume (cu. ft.)	71.0

Maximum cargo weight in each compartment is weight that can be carried in that compartment when cargo cage is not installed, based on maximum distributed floor loading. Maximum cargo weight that can be carried within cargo cage in compartments D, E, and F is based on maximum distributed floor loading on floor area between sides of cage. Maximum cargo weight that can be carried aft of cargo cage in compartment G is based on strength of cargo cage aft stanchions and horizontal beams under forward loading. Maximum weights cannot be carried in all compartments simultaneously. Total cargo weight capacity is limited by airplane maximum weight and C.G. range.

Fuel Capacity	Total	521 gal. (2 wing tanks, 260.5 gal. each)
	Usable	518 gal. (2 wing tanks, 259 gal. each)

Reference station of fuel weight varies with fuel quantity according to the following table:

<u>Fuel Quantity in Tank</u>	<u>Reference Station</u>
1/4 Full	+233.15
1/2 Full	+230.60
3/4 Full	+229.40
Full	+227.25

Oil Capacity 27 gal. total (one 13.5 - gal. tank in each engine nacelle) at reference station +192.5

Maximum Operating Altitude 12,000 ft.

Control Surface Movements

Ailerons, measured at outboard end  
 Up 20° +/- 1°, or 3 -29/32 in. +/- 1/16 in.  
 Down 15° +/- 1°, or 2 -29/32 in. +/- 1/16 in.

Elevators, measured at inboard end (on rudder trimmer)  
 Up 25° +/- 1°, or 6 -5/16 in. +/- 1/4 in.  
 Down 15° +/- 1°, or 3 -3/4 in. +/- 1/4 in.

Rudder, measured at any station  
 Right 24° +/- 1° or 8 -5/16 in. +/- 11/32 in.  
 Left 24° +/- 1° or 8 -5/16 in. +/- 11/32 in.

Rudder Trimmer, measured at lower end (combined electric and hydraulic actuation)  
 Right 25° Ref.\*, or 10 -7/32 in. Ref.\*  
 Left 25° Ref.\*, or 10 -7/32 in. Ref.\*

\*Tolerances for rudder trimmer movements are defined only for hydraulic actuation alone and for electric actuation alone. Movements for combined hydraulic and electric actuation are given for reference only.

Rudder Trimmer, measured at lower end (hydraulic actuation only)  
 Right  $20^{\circ} \pm 1^{\circ}$ , or  $8 - 5/32$  in.  $\pm 13/32$  in.  
 Left  $20^{\circ} \pm 1^{\circ}$ , or  $8 - 5/32$  in.  $\pm 13/32$  in.

Rudder Trimmer, measured at lower end (electric actuation only)  
 Right  $5^{\circ} \pm 0^{\circ} - 10'$ , or  $2 - 1/16$  in.  $\pm 1/16$  in.  
 Left  $5^{\circ} \pm 0^{\circ} - 10'$ , or  $2 - 1/16$  in.  $\pm 1/16$  in.

Elevator Trim Tabs, measured at inboard end (from trailing edge of elevator)  
 Up  $20^{\circ} \pm 1^{\circ}$ , or  $1 - 3/8$  in.  $\pm 1/16$  in.  
 Down  $20^{\circ} \pm 1^{\circ}$ , or  $1 - 3/8$  in.  $\pm 1/16$  in.

Aileron Trim Tab (on left aileron only),  
 measured at outboard end of spring tab, 4 in. from hinge centerline  
 Up  $20^{\circ} \pm 1^{\circ}$ , or  $1 - 3/8$  in.  $\pm 1/16$  in.  
 Down  $20^{\circ} \pm 1^{\circ}$ , or  $1 - 3/8$  in.  $\pm 1/16$  in.

Rudder Tab, measured at upper or lower end (from trailing edge of  
 rudder, with  $0^{\circ}$  rudder and  $25^{\circ}$  rudder trimmer)  
 Right  $27^{\circ} \pm 2^{\circ}$ , or  $2 - 3/8$  in.  $\pm 3/16$  in.  
     (with rudder trimmer  $25^{\circ}$  left)  
 Left  $23^{\circ} \pm 2^{\circ}$ , or  $2$  in.  $\pm 3/16$  in.  
     (with rudder trimmer  $25^{\circ}$  right)

Elevator Geared Tabs, measured at outboard ends (from trailing edge of  
 elevator)  
 Down  $5^{\circ} \pm 1^{\circ}$ , or  $11/32$  in.  $\pm 1/16$  in.  
     (with elevator  $0^{\circ}$  to  $15^{\circ}$  down)  
 Down  $20^{\circ} \pm 2^{\circ}$ , or  $1 - 3/8$  in.  $\pm 1/8$  in.  
     (with elevator  $25^{\circ}$  up)

Aileron Spring Tabs, measured at outboard ends (at trim tab on left aileron),  
 4 in. from hinge centerlines  
 Up  $15^{\circ} \pm 1^{\circ}$ , or  $1 - 1/32$  in.  $\pm 1/16$  in.  
 Down  $20^{\circ} \pm 1^{\circ}$ , or  $1 - 3/8$  in.  $\pm 1/16$  in.

Outboard Flaps, measured at engine nacelles  
 Down  $27 - 1/2^{\circ} \pm 2^{\circ}$ , or  $11 - 13/32$  in.  $\pm 27/32$  in.

Inboard Flaps, measured at engine nacelles  
 Down  $40^{\circ} \pm 2^{\circ}$ , or  $17 - 11/16$  in.  $\pm 29/32$  in.

Outboard Spoilers, measured at wing station 317 spoiler hinges  
 Up  $58^{\circ} \pm 3^{\circ}$ , or  $6 - 3/16$  in.  $\pm 5/16$  in.

Inboard Spoilers, measured at wing station 233 spoiler hinges  
 Up  $38 - 1/2^{\circ} \pm 2^{\circ}$ , or  $5 - 9/32$  in.  $\pm 9/32$  in.

#### Serial Numbers Eligible

Grumman S/N 44 (U.S. Navy Bureau of Aeronautics S/N 136791)  
 The original Navy designation for the C-1A airplane was the TF-1 and this  
 designation will appear on the manufacturer's nameplate. In 1962, a new  
 numbering system was established for all U.S. military airplanes and the TF-1  
 became the C-1A.

#### Certification Basis

FAR 21.25 (a) (2) and FAR 21.25 (b) (7) effective February 1, 1965 as amended by  
 Amendment 21-42 effective February 7, 1975. Restricted Type Certificate TT00001AK  
 issued November 19, 1993 for the special purpose of carrying cargo. Application for  
 Restricted Type Certificate dated April 20, 1993.

