

PART II
LIMITATIONS

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PART II—LIMITATIONS

Chapter 1 — AIRFRAME LIMITATIONS

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1 General

The aircraft is cleared for world-wide operation ashore in ambient temperatures not exceeding 40°C and subject to any stores limitations and the following limitations.

2 CG position

The CG limits are from 16.52 in. to 26.6 in. aft of datum, undercarriage down.

3 Airfield operation**(a) Weight**

The maximum weight for take-off, blow on or off, is 46,000 lb.
 The normal maximum weight for landing is 36,000 lb.
 The emergency maximum weight for landing is 40,000 lb.

NOTE: Above 34,500 lb., vertical rate on touch-down must not exceed 14 ft./sec.

(b) *LCN*

<i>Weight (lb.)</i>	<i>Minimum LCN</i>
38,000	30
42,000	34
46,000	38
50,000	43

(c) *Runway length*

- (i) The normal minimum runway length is 2,000 yd.
- (ii) For unblown landings above 37,000 lb. the minimum length is 3,000 yd. In this case maximum use of aerodynamic braking must be made.

(d) Take-off and Landing with a crosswind component greater than 25 knots is not recommended.

4 *Maximum speeds*

Clean aircraft (includes clean pylons or clean practice bomb carriers) ...	580 knots or 0.95M
Undercarriage down ...	225 knots
Arrester hook lowering ...	400 knots
For selecting BLC on ...	300 knots
With aileron gearing set for low speed ...	300 knots

For various configurations the maximum speeds are:—

<i>Configuration</i>	<i>BLC on Knots</i>	<i>BLC off Knots</i>
0-10-10	280	280
15-10-10	280	280
30-10-10	250	250
30-20-20	220	Prohibited
45-10-10	200	200
0-25-25	200	Prohibited
45-25-25	200	Prohibited

5 *Minimum speeds*

(a) The minimum speed in the circuit is the datum speed appropriate to the configuration and weight. (See Pt. III, Ch. 3).

(b) For practice purposes slow flying down to datum minus 5 knots with two engines (or the datum speed with one engine) is permissible in the height band 4,000 to 8,000 ft. AMSL, providing a minimum blow pressure of 20 PSI is available.

6 Pressure errors

Pressure errors result in over-reading of altimeter and air-speed indicator; the following corrections should, therefore, be subtracted from the indicated readings to provide rectified readings.

Configuration and correction	◀127 knots▶ 33,000 lb at SL		450 knots 35,000 lb. at SL		580 knots 35,000 lb. at SL	
	Mod. 691		Mod. 691		Mod. 691	
<i>No external stores</i> ASI Altimeter	Pre	Post	Pre	Post	Pre	Post
		3	4	0	1	1
	50	70	20	70	110	110
<i>2 × 250 gal. fuel tanks</i> ASI Altimeter	3	4	3	4		
	50	70	130	180		
<i>2 × 250 gal. fuel tanks and 2 × 1,000 lb. bombs on pylons</i> ASI Altimeter	3	4	3	4		
	50	70	130	180		
<i>4 × 1,000 lb. bombs on pylons</i> ASI Altimeter	3	4	0	1		
	50	70	20	70		

7 Height limitations

◀(a) High speed flight with the tailplane autostabiliser engaged should not be attempted below 200 ft. AGL owing to possible height loss if the autostabiliser fails. ▶

(b) The AAL with GCA is 300 ft.
With Search radar it is 400 ft.

8 General flying

(a) The maximum sustained angle of climb or dive is 60°.

(b) The maximum acceleration with no aileron applied is +6G at 37,000 lb., reducing linearly to +5G at 42,000 lb.

(c) Either the rudder autostabiliser or the standby yaw damper must be engaged at all times.

(d) BLC must not be used for more than 45 minutes in any sortie.

(e) Calibrated ADD equipment must be in operation.

9 Spinning and stalling

(a) Intentional spinning is prohibited. If an inadvertent spin occurs, recovery action as recommended in Pt. III, Ch. 2 should be initiated immediately.

(b) Intentional stalling is prohibited.

WARNING: Investigation of the 1G stall in the flap configuration 0-0-0 is permitted to the ADD steady note, onset of buffet or engine disturbance, whichever occurs first. The ADD equipment must be operating.

10 Aerobatics

(a) *Inverted flight with negative G*

Flight with negative G is permitted for not more than 10 secs. Deliberate sustained inverted flight is prohibited.

(b) *Looping*

Manoeuvres in the vertical plane are restricted to a half loop with a roll-off-the-top, commenced within the following manoeuvre entry conditions at ISA temperature.

Max. AUW 40,000 lb. 42,000 lb.

Max. entry height (1013 mb. set) 3,000 ft. 1,500 ft.

Max. entry speed 530 kts. 550 kts.

For each 10°C above ISA, the AUWs must be reduced by 1000 lb.

◀ NOTE: "Round the corner" is preferred escape but if half loop or OTS is essential the bomb door must remain closed when stores other than clean pylons or tanks are on wings. ▶

11 Rolling, general

(a) Either the rudder autostabiliser or the standby yaw damper must be engaged at all times. Use of rudder in rolling manoeuvres must be kept to a minimum.

(b) Although deliberate sustained inverted flight is prohibited, recovery from flight at less than +1G should be made with gentle use of aileron.

(c) *Aileron in low speed gear*

Aileron in low speed gear must not be used above 300 knots. Full aileron may be used in the circuit but attention is drawn to the configuration speed limitations.

(d) *Round the corner recovery*

While the nose is still above the horizon, bank may be increased to 110°. When the nose is on or below the horizon, bank must be limited to 90°. Recovery must be made with gentle use of aileron.

12 Aileron in high-speed gear (pre-mod. 793)

WARNING: Application of further forward or back stick from the initial conditions during rolling manoeuvres is prohibited.

(a) Rolling with no external stores

Below 300 kts.	Above 300 knots but below 0.85M	Above 0.85M
<i>From 0 to +1G</i> Rolls through 180° bank by gentle use of aileron are permitted for roll-off-the-top manoeuvres.		Prohibited
Rolls up to a maximum of 90° bank may be made with a maximum of $\frac{1}{2}$ lateral stick deflection for all manoeuvres other than that above.		
<i>Rolling in +1G flight</i>		
Rolls through 180° up to a max. of 90° bank may be made with $\frac{1}{2}$ lateral stick deflection	Rolls of not more than 360° may be made with $\frac{3}{4}$ lateral stick deflection	Rolls through 180° up to a max. of 90° bank may be made with $\frac{1}{2}$ lateral stick deflection

Below 300 knots	Above 300 knots
<i>Between +1G and onset of buffet or ADD steady note</i> Rolls up to a maximum of 90° bank may be made with $\frac{1}{2}$ lateral stick deflection	<i>Between +1 and +4G, onset of buffet or ADD steady note</i> Rolls through 180° up to a maximum of 90° bank may be made with $\frac{3}{4}$ lateral stick deflection

◀(b) *Rolling with external stores*

Individual store clearances must be observed. Otherwise, the limits above are applicable, except that in rolls at speeds above 300 knots, but below 0.85M and with +1G, only the first 180° may be made with $\frac{3}{4}$ aileron, the remainder of the roll being continued through 360° with use of gentle aileron. ▶

14 Aileron in high-speed gear (post-mod. 793)

WARNING: Application of further forward or back stick from the initial conditions during rolling manoeuvres is prohibited.

(a) *Rolling with no external stores*

Below 300 kts.	Above 300 knots but below 0.85M	Above 0.85M
<i>From 0 to +1G</i> Rolls through 180° bank by gentle use of aileron are permitted for roll-off-the-top manoeuvres.		Prohibited
Rolls up to a maximum of 90° bank may be made with a maximum of $\frac{3}{4}$ lateral stick deflection for all manoeuvres other than that above.		
<i>Rolling in +1G flight</i>		
Rolls through 180° up to a max. of 90° bank may be made with full lateral stick deflection	Rolls of not more than 360° may be made with full lateral stick deflection	Rolls through 180° up to a max. of 90° bank may be made with full lateral stick deflection

Below 300 knots	Above 300 knots
<i>Between +1G and onset of buffet or ADD steady note</i> Rolls up to a maximum of 90° may be made with $\frac{3}{4}$ lateral stick deflection	<i>Between +1 and +4G, onset of buffet or ADD steady note</i> Rolls through 180° up to a maximum of 90° bank may be made with full lateral stick deflection.

(b) Rolling with external stores

Individual store clearances must be observed. Otherwise the limits above are applicable except that in rolls above 300 knots but below 0.85M with +1G, only the first 180° may be made with full lateral stick deflection, the roll being continued to 360° with gentle use of aileron.

14 Icing conditions

Flight in icing conditions should be avoided. The engine and auxiliary intakes anti-icing systems may be used. If the engine is run at 82% RPM in icing conditions it must be opened up to 90% for 30 secs. every 10 mins. In an emergency, selecting blow on will give leading edge protection.

15 Bay temperatures

The following limitations apply:

- ◀ Radio bay: (Post-mod. 601) 75°C
- (Pre-mod. 601) 40°C in IMC
- 50°C in VMC ▶

A transient increase to 10° above maximum is permitted but long term over-heating in the radio bay may cause malfunction of UHF, autostabilisers or AC power.

Wheelbay 110°C

Bomb bay 70°C (60°C with VT fuzes)

16 Radio and radar**(a) Standby UHF**

The type M4 set must not be used for a period exceeding 30 minutes, except in an emergency.

(b) Blue Parrot

Blue Parrot must be switched to standby for landing.

(c) Wide-band homer

The Wide-band homer is cleared up to a cabin altitude of 25,000 ft. With the undercarriage down, the type 107 inverter may cause interference.

(d) Radio altimeter

◀ (See Pt. I, Ch. 14, para. 25(c)). ▶

17 Single-engine flying

(a) Deliberate single-engine flying is permitted only for relighting practice.

(b) Single-engine flying may be simulated by setting one engine to idling and selecting $\frac{1}{4}$ airbrake. The minimum height for practice is 2,000 ft. AGL.

WARNING: When blow is on, slam acceleration of the idling engine may result in poor acceleration and a high JPT.

18 Flying controls integration

Integration of the flying controls and General Services hydraulic system is for emergency use only. If integration has taken place, speed must not exceed 350 knots or 0.6M. Control movements should be kept to a minimum.

19 In-flight refuelling (receiver)

- (a) Mods. 881, 992 and 5089 must be embodied.
- (b) The speed range is 230 to 290 knots (250 knots is recommended).
- (c) The maximum height is 35,000 ft.
- (d) Sortie duration may be limited by engine oil consumption or LOX capacity.
- (e) Vixen, Scimitar, Buccaneer Mk. 2 and Victor tankers.

20 Fuel jettisoning

- (a) *Internal (pre-mod. 880)*
Restricted to emergency use only because of contamination of radio bay.
- (b) *Internal (post-mod. 880 and STI/BUCC/89)*
May be used throughout the flight envelope.
- (c) *External*
 - (i) Throughout the flight envelope in straight and level flight, with or without tank pressurisation.
 - (ii) *Tanks jettisoning*

With undercarriage up ...	300 knots (max.)
With undercarriage down ...	160 knots (max.)

21 Autopilot

- ◀(a) Mods. 438, 670, 671, 691, 698, 707, 839, 882, 988 and 1232 must be embodied. ▶
- (b) The autostabiliser switches must be at high speed above 250 knots.

- (c) The Mach lock must be disengaged before levelling-out after a descent.
- (d) The autopilot must be switched off if the radio bay temperature exceeds 60°C (70°C with mod. 1019 or STI/Buccaneer/76).
- (e) Refer to Pt. I, Ch. 6, para. 13 for management.

22 Canopy

- (a) Flight with the canopy open is prohibited.
- (b) Flight with canopy off is permitted:

Pre-mod. 871

With both seats occupied	...	250 knots (max.)
With pilot only	450 knots (max.)

Post-mod. 871

With both or one seat occupied	550 knots (max.)
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NOTE: Above 450 knots the observer may have to lower his seat to enable the face-screen to be reached.

- (c) With the canopy off, circuits and landings should be made at normal datum speeds.

23 Bomb door

(a) The bomb door may be rotated in level flight up to 550 knots or 0.85M, whichever is reached first.

(b) With bomb door locked open the speed can be increased to 580 knots or 0.9M or the stores limitation if less.

(c) If the bomb door fails to lock, open or closed, normal acceleration must not exceed +4G above 0.8M, otherwise damage to the bomb door and supporting structure may result.

(d) Unless mod. 1125 is embodied, the bomb door is not to be rotated in flight when carrying one or three 1,000 lb. bombs. When two bombs are carried they are to be loaded diagonally.

(e) The bomb door is to remain closed unless the aircraft is in the range danger area. The bomb distributor mode switch must remain off until the bomb door has locked open.

24 Wing folding and spreading

(a) *Pre-mod. 82A, Pt. 1*

Using ground rig only.

(b) *Post-mod. 82A, Pt. 1*

Windspeed up to 40 knots no restriction

Windspeed 40 to 55 knots within 30° of aircraft heading only

(c) *Post-mod. 82A, Pt. 1 with external stores*

(i) Folding is permitted with any outboard stores.

(ii) Unrestricted spreading is permitted with light outboard stores but with Bullpup or 1000 lb. bombs on outboard pylons, wings should be spread with care, using the interrupt position to ensure locking pins enter bushes. These should be examined for damage at next wing-fold operation.

25 Flying with wing fold doors removed

Flying with the wing fold doors removed is permitted.

Take-off and landing speeds are unaffected.

26 Asymmetric stores

(a) For airfield take-off and landing the maximum asymmetry is 1.52×10^3 lb. rolling moment (this is equivalent to one 1000 lb. bomb on an outboard pylon).

(b) Greater asymmetry can be accepted for emergency landings, the maximum being dependent on the rudder pedal foot-load that a pilot can hold in a particular set of conditions. Foot-load can be decreased by increasing the approach speed. ▶

PART II — LIMITATIONS

Chapter 2 — ENGINE LIMITATIONS

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1 Fuel and oil reference numbers**(a) Fuel**

The engine is cleared for use with the following fuels: —

<i>Fuel</i>	<i>Stores reference</i>	<i>NATO Code No.</i>
<i>With additive anti-icing</i>		
AVTUR 50	34A/2201036	F.34
AVTAG*	34A/2201037	F.40
<i>Without additive anti-icing</i>		
AVTUR 50	34A/9431771	F.35
AVTAG*	34A/9100448	F.45
AVCAT 48	RNK/9100450	F.44

*Emergency use, temperature climates only.

(b) Oil

OX 38	34A/9100591	O-149
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2 Engine limitations, Gyron Junior Mk. 101

<i>Power rating</i>	<i>Time limit (mins) (per flight)</i>	RPM%	JPT Max. °C
Maximum with full air bleed	5	97.3	805†
Maximum without air bleed	25	98.0*	635
Intermediate	30	94.6	590
Maximum continuous	—	90.5	550
Ground idling with air bleed	—	43 (min)	—

*A rise to 99% RPM is permitted above 400 knots.

†The actual JPT for each engine is specified in the log book.
The maximum JPT for starting is 600°C.

3 Negative G

The maximum time for flight under negative G conditions is 10 seconds. Three minutes should be allowed for the recuperators to refill.

4 Minimum RPM in icing conditions

The minimum RPM in flight, in icing conditions, is 82%. If the engines are run at this speed, they must be opened up to 90% RPM for $\frac{1}{2}$ minute after every 10 minutes in icing conditions.

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