

## PART 2

## Chapter 2 — AIRFRAME LIMITATIONS

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**1 General**

The Mk 7 and Mk 7A are cleared for use by day and night in temperate climates; the Mk 7 is also cleared for use in tropical climates. Intentional spinning is prohibited. Stalling practice is not to be commenced below 25000 feet nor continued beyond the buffet stage; if the landing gear is down practice stalls should be done at about 25000 feet. Aerobatics are permitted (but see para 7 (b)).

**2 Maximum speeds**

- (a) Clean ... .. 620 knots, no Mach limit
- (b) (i) With inboard drop tanks only ... .. 620 knots, no Mach limit
- (ii) With outboard drop tanks
- |                           |        |
|---------------------------|--------|
| Sea level to 10000 ft ... | 0.86M† |
| 10000 ft to 20000 ft ...  | 0.87M† |
| Above 20000 ft ...        | 0.88M† |

† Or the onset of buffet, if earlier.

- (c) Landing gear ... .. 250 knots
- (d) Flaps:
  - (i) Lowered to any position  
between 0° and 38° ... .. 300 knots/0-90M
  - (ii) Lowered to any position  
beyond 38° ... .. 250 knots
- (e) Manual flying ... .. Sea level to 15000 ft ... 0-75M  
Above 15000 ft ... 0-85M

NOTE: Where applicable, the speeds quoted are for the operation of, and flight with, the service in the extended position.

### 3 Maximum weights

- (a) Take-off ... .. 25000 lb
- (b) Landing (except in emergency) 18500 lb

NOTE: Particular care is necessary when taxiing or landing at high all-up weight on rough or semi-prepared airfields or in conditions likely to create high landing gear loads.

### 4 CG limitations

The overall CG limits for flight with landing gear down, are:

- (a) Forward limit ... .. 1.0 in forward of datum
- (b) Aft limit ... .. 14.5 in aft of datum

### 5 G limitations

- (a) *Negative* — all configurations ... .. - 3.75G
- (b) *Positive*
  - (i) With fuel in outboard tanks ... .. 3G
  - (ii) All other configurations ... .. 7G

### 6 Flying in Manual

- (a) Speed limitations are given at para 2 (e).
- (b) Landings are not to be attempted with any asymmetric load other than a single empty inboard drop tank unless a low speed handling check has shown that lateral control is adequate at a threshold speed that will ensure a safe landing.

## **7 Drop tanks**

- (a) Speed limitations are given at para 2 (b).
- (b) Aerobatics are permitted when drop tanks are carried; when outboard tanks are carried each manoeuvre in the rolling plane is restricted to 360° until the tanks are empty.
- (c) Jettisoning must be carried out in straight and level flight with no yaw or sideslip at 200-450 knots or in a dive of up to 10° maximum angle at 300-450 knots.

## **8 Two-inch rocket launchers**

The carriage and firing of 2 inch rockets from Launchers No 3 Mk 2 fitted to the inboard pylons with or without drop tanks on the outboard pylons is permitted subject to the following limitations:

- (a) Not more than 22 rockets in ripple are to be carried in each launcher.
- (b) Speed must not exceed 480 knots.
- (c) Angle of dive is not to exceed 30° during firing.
- (d) Rockets are not to be fired at altitudes above 36000 feet.
- (e) Fired or unfired rocket launchers may be jettisoned in straight and level flight at speeds between 180 and 450 knots/0.85M up to 36000 feet.

## **9 SNEB 68 mm RPs/Matra launchers**

- (a) The aircraft is cleared to carry and fire SNEB 68 mm RPs from either Type 116 or Type 155 Matra launchers on the outboard pylons, with or without drop tanks on the inboard pylons.
- (b) *Type 116 Matra launcher*  
The nose cone of the Type 116 Matra launcher may or may not have internal ribbing which increases its resistance to high temperature but both forms are similar externally and can only be identified before

fitting to the launcher. The following limitations apply to the carriage and firing of this launcher:

*Nose cone modified or unmodified*

(i) *OAT up to +15°C*

Sea level to 10000 feet ... ..	520 knots/0.84M	} or onset of buffet if earlier
10000 feet to 20000 feet ... ..	0.86M	
Above 20000 feet ... ..	0.88M	

*Modified nose cone only*

(ii) *OAT above  
+15°C and up to  
+30°C*

Sea level to 10000 feet ... ..	450 knots/0.84M	} or onset of buffet if earlier
10000 feet to 20000 feet ... ..	0.86M	
Above 20000 feet ... ..	0.88M	

NOTE: Both forms of nose cone are limited to three flights only under the conditions listed in (i). The modified nose cone is limited to one flight only under the conditions listed in (ii).

(c) *Type 155 Matra launcher*

The nose cone of the Type 155 launcher is of metal construction and does not have the limited life of the Type 116 nose cone. The overheating caused by the build-up of air pressure in the rocket tubes can be reduced by the fitting of a diaphragm between the launcher nose and centre section or by the fitting of a heat shield and diaphragm between the nose and centre section. The following limitations apply to the carriage and firing of this launcher:

*Nose cone fitted with diaphragm only*

(i) *OAT up to +35°C*

Sea level to 10000 feet ... ..	450 knots/0.84M	} or onset of buffet if earlier
10000 feet to 20000 feet ... ..	0.86M	
Above 20000 feet ... ..	0.88M	

(ii) *OAT +36°C to +40°C*

400 knots or onset of buffet if earlier

(iii) *OAT +41°C to +45°C*

350 knots or onset of buffet if earlier

*Nose cone fitted with diaphragm and heat shield*

(iv) *OAT up to +40°C*

Sea level to 10000 feet ... ..	520 knots/0.84M	} or onset of buffet if earlier
10000 feet to 20000 feet ... ..	0.86M	
Above 20000 feet ... ..	0.88M	

(v) *OAT* +41°C to +45°C  
 510 knots or 0.78M or onset of buffet if earlier

(vi) *OAT* +46°C to +50°C  
 450 knots or 0.69M or onset of buffet if earlier

NOTE: The heat shield is subject to a life of nine carriage or firing sorties provided that it is not removed from the launcher nose cone and rockets are not inserted into tubes which are not fully covered by the heat shield.

(d) Firing of SNEB RPS from Matra launchers is permitted in all ground attack manoeuvres at angles of dive up to 30°.

(e) Jettison of Matra launchers is permitted in straight and level flight at speeds up to 450 knots/0.85M whichever is the less.

### 10 Practice bombs (25 and 28 lb)

(a) Carriage and release of 25 lb and 28 lb bombs from inboard and outboard pylons is permitted subject to the following speed limitations:

(i) Carriage at speeds up to 500 knots/0.90M (whichever is the less) or the onset of buffet if earlier.

(ii) Release at speeds up to 450 knots/0.90M (whichever is the less) or the onset of buffet if earlier.

(b) The minimum height for the release of the 25 lb bomb is 50 feet, for the 28 lb (inert) bomb, 100 feet and for the 28 lb (smoke or flash) bomb, 500 feet. The bombs may be released in straight and level flight or angles of dive up to 60°.

(c) Bombs and drop tanks may only be carried together when the tanks are on the inboard pylons.

(d) The carriage and release of 28 lb bombs from CBLS on inboard or outboard pylons is permitted subject to the above limitations and those in para 11.

### 11 CBLS and 4 lb practice bombs

Carriage and release of 4 lb practice (retarded, smoke and flash) bombs is permitted subject to the following conditions:

(a) *CBLS on inboard pylons only*

(i) *Carriage*

Up to the maximum permitted height, speed and manoeuvre limitations of the aircraft.

(ii) *Release*

Height	...	...	...	Up to 1000 feet AGL
Speed	...	...	...	Up to 600 knots/0.90M
Attitude	...	...	...	Straight and level ( $\pm 15^{\circ}$ )

(b) *CBLs on outboard pylons with either 100 gallon tanks or CBLs on inboard pylons*

(i) *Carriage*

Sea level to 10000 feet	...	0.84M	} or onset of buffet if earlier
10000 feet to 20000 feet	...	0.86M	
Above 20000 feet	...	0.88M	

(ii) *Release*

Height	...	...	...	Up to 1000 feet AGL
Speed	...	...	...	Up to 0.84M
Attitude	...	...	...	Straight and level ( $\pm 15^{\circ}$ )

(c) *Jettisoning*

Jettisoning of CBLs is not recommended.

## 12 Gun firing

- (a) The gun may be fired on the ground.
- (b) Gun firing in flight is permitted at speeds above 180 knots.
- (c) In buffet conditions, engine throttle opening time should not be less than two seconds.

## 13 Ground attack manoeuvres

- (a) The follow-up tailplane must be selected off.
- (b) The maximum speed is 0.88M.

## 14 Asymmetric loads

- (a) With flying controls in Power there are no restrictions on landing with asymmetric loads.
- (b) With flying controls in Manual, landings are not to be attempted with any asymmetric load other than a single empty inboard drop tank unless a low speed handling check has shown that lateral control is adequate at a threshold speed that will ensure a safe landing.

## 15 Crosswind take-off/landing limitations

The maximum permissible crosswind component for take-off and landing is 25 knots on a dry runway and 20 knots on a flooded runway.

## 16 Braking parachute

The braking parachute is not to be streamed until touchdown nor in crosswind components exceeding 25 knots on a dry runway or 20 knots on a flooded runway.

## 17 Aircraft approach limitations

GCA/ PAR	...	...	...	...	...	200 feet (true)
SRA/ PPI	...	...	...	...	...	250 feet (true)
ILS (in-line)	...	...	...	...	...	250 feet (true)
ILS (off-set)	...	...	...	...	...	270 feet (true)

NOTE: ILS limitations apply with or without glide path information. These aircraft approach limitations are to be applied in accordance with Air Force Directive AF/CX 928/69 dated 22 June 1973.

## 18 Radio installation

(a) Use of the main UHF equipment is unrestricted in temperate conditions. In Mediterranean summer conditions below 5000 feet, use of the equipment is restricted to 45 minutes from the commencement of the flight when operating at speeds in excess of 250 knots. In tropical conditions below 5000 feet, use of the equipment is restricted to 40 minutes from the commencement of the flight when operating at speeds in excess of 250 knots.

(b) Use of the standby UHF equipment in temperate conditions below 5000 feet is restricted to 25 minutes at speeds below 250 knots; it is not to be used above 250 knots. In tropical conditions below 5000 feet the equipment is not to be used when operating at speeds in excess of 250 knots; its use is restricted to eight minutes below 250 knots.

(c) If it is necessary, for operational reasons, to exceed the above limitations, a reduction in performance and/or reliability of the equipment due to overheating is to be expected.

## 19 Arresting gear

(a) The emergency arrester hook (if fitted) is stressed to 1.5G. If the following aircraft weight and entry speed limitations are exceeded,

airframe damage may result:

(i) *BAK 9 arresting gear*

15000 lb	...	...	...	...	...	...	...	134 knots
20000 lb	...	...	...	...	...	...	...	130 knots
25000 lb	...	...	...	...	...	...	...	124 knots

(ii) *BAK 12 arresting gear*

15000 lb	...	...	...	...	...	...	...	129 knots
20000 lb	...	...	...	...	...	...	...	124 knots
25000 lb	...	...	...	...	...	...	...	119 knots

(iii) *Chain arresting gear (CHAG)*

16250 lb	...	...	...	...	...	...	...	75 knots
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(iv) *Purpose use arresting gear (PUAG)*

15000 lb	...	...	...	...	...	...	...	95 knots
20000 lb	...	...	...	...	...	...	...	90 knots

(v) *Rotary hydraulic arresting gear (RHAG)*

15000 lb	...	...	...	...	...	...	...	140 knots
20000 lb	...	...	...	...	...	...	...	137 knots
21500 lb	...	...	...	...	...	...	...	136 knots
25000 lb	...	...	...	...	...	...	...	134 knots

(vi) *Spray arresting gear (SPRAG)*

15000 lb	...	...	...	...	...	...	...	115 knots
20000 lb	...	...	...	...	...	...	...	110 knots
21500 lb	...	...	...	...	...	...	...	108 knots

NOTE: The hook should not be lowered prior to touchdown otherwise damage to the hook damper and airframe may result. The engagement speeds quoted above should be reduced by 5% for engagements which are significantly off-centre.

(b) The aircraft is cleared to trample the tensioned and supported centre span of the following types of arresting gear at speeds up to  $V_R$ :

- Chain arresting gear (CHAG)
- Purpose use arresting gear (PUAG)
- Rotary hydraulic arresting gear (RHAG)
- Spray arresting gear (SPRAG)

Bliss BAK 9, BAK 12 and 500S arresting gear

## 20 Canopy

The canopy must not be opened on the ground if the wind speed is above 40 knots. The taxiing strut on the front of the canopy allows the canopy to be partially open for taxiing or towing.

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