

## PART 2

### CHAPTER 2 — AIRFRAME LIMITATIONS

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#### 1 General

The aircraft is cleared for use by day and night in temperate climates.

#### 2 Weight Limitations

The maximum permitted AUW are:

(a) Take-off	...	25,000 lb
(b) Normal landing	...	18,500 lb
(c) Emergency landing	...	23,400 lb

Note 1: Particular care is necessary when taxiing at high AUW because of the high landing gear loads which may be experienced.

Note 2: The rate of descent at touchdown should be minimised when landing at AUW above 18,500 lb.

Note 3: At the maximum permitted take-off weight, the LCN is 10.

### 3 CG Limitations

The CG limits for flight with landing gear down are:

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

### 4 Speed Limitations

The maximum permitted speeds are:

- (a) Clean or with inboard drop tanks only ... 620 knots, no mach limit

- (b) With outboard drop tanks:

Sea level to 10,000 feet ...	0.86M	} or the onset of buffet if earlier
10,000 to 20,000 feet ...	0.87M	
Above 20,000 feet ...	0.88M	

- (c) In Manual:

Sea level to 15,000 feet ...	...	...	...	0.75M
Above 15,000 feet ...	...	...	...	0.85M

- (d) Landing gear\* ... 250 knots

- (e) Flaps\*:

Up to 38° ...	...	...	300 knots/0.90M
Over 38° ...	...	...	250 knots

- (f) Windscreen wiper operation ... 300 knots

- (g) Brake parachute streaming ... 160 knots

\*Note: The speeds quoted are for the operation of the service and for flight with the service in the extended position.

### 5 Altitude Limitations

The maximum safe cabin altitude is 50,000 feet (AEA limitation). If the canopy is lost, the cabin altitude exceeds the aircraft altitude by up to 8000 feet. For this reason, the maximum safe operating altitude is 42,000 feet.

## 6 Normal Acceleration Limitations

### (a) Positive:

With fuel in the outboard tanks ... 3g

All other configurations ... 7g

### (b) Negative:

All configurations ... minus 3.75g

## 7 Aerobatics

(a) Normal aerobatics are permitted in the clean configuration within the speed and normal acceleration limitations given in para 4 and para 6.

(b) Normal aerobatics are permitted when carrying stores within the limitations appropriate to the store.

## 8 Stalling

Deliberate stalling is not permitted and the stall must not be approached beyond the buffet stage. The minimum height for practice approaches to the stall is 25,000 feet. With the landing gear down, approaches to the stall should be made at about 25,000 feet as the landing gear position indicator may not function correctly above this height; the recovery must be completed by 22,000 feet.

## 9 Low Speed Flying

Low speed flying to the following limitations is permitted provided that the underwing stores are limited to two empty drop tanks on the inboard pylons:

(a) With flaps and landing gear up, the speed may be reduced in level flight at 10,000 feet or above to the initial onset of buffet, or to a minimum of 140 knots, whichever occurs first.

(b) With flaps and landing gear down, the speed may be reduced in level flight at 10,000 feet or above to the initial onset of buffet, or to a minimum of 130 knots, whichever occurs first.

## **10 Spinning**

Intentional spinning is not permitted.

## **11 Drop Tank Limitations**

In addition to the speed and normal acceleration limitations given in para 4 and para 6, the following limitations must be observed when carrying drop tanks:

(a) Aerobatics are permitted but, with fuel in the outboard drop tanks, each manoeuvre in the rolling plane must be limited to 360°.

(b) Low speed flying to the limits given in para 9 is only permitted when the underwing stores are limited to two empty drop tanks on the inboard pylons.

(c) The drop tanks may only be jettisoned in straight and level flight, without yaw or sideslip, between 200 and 450 knots or in a dive up to 10°, without yaw or sideslip, between 300 and 450 knots.

## **12 Asymmetric Loads**

(a) With the flying controls in Power, there are no restrictions on landing with asymmetric loads.

(b) With the 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 (see Part 3, Chapter 4).

## **13 Crosswind Limitations**

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

## **14 Aircraft Category**

The aircraft category for approaches is Category D. ►

## 15 Brake Parachute Limitations

◀ The brake parachute is not to be streamed before touchdown. The maximum permitted stream speed is 160 knots. ▶

## 16 Arresting Gear Trampling

The aircraft is cleared to trample the tensioned and supported centre span of the following types of arresting gear at speeds up to Vr:

Chain arresting gear (CHAG)

Purpose-use arresting gear (PUAG)

Rotary hydraulic arresting gear (RHAG)

Spray arresting gear (SPRAG)

BAK 9, BAK 12 and 500S arresting gear.

## 17 Arrestor Hook Limitations

◀ The arrestor hook is stressed to 1.5g. If certain combinations of weight/entry speed are exceeded, airframe damage may result. The weight/entry speed combinations for various types of arresting gear are given in the Flight Reference Cards; if the engagement is significantly off-centre, the entry speeds quoted are reduced by 5%. ▶

**WARNING:** The hook should not be lowered prior to touchdown otherwise damage to the hook damper and airframe may result.

## 18 Arrestor Barriers

◀ The aircraft is cleared to engage RAF Mk 5, 6, 12 and 12A arrestor barriers and also RAF Type A and Type B arrestor barriers. ▶

## 19 Canopy

The canopy must not be opened on the ground if the windspeed is above 40 knots. The aircraft must not be taxied or towed with the canopy partially open unless the taxiing strut is in position.

## **20 Radio Equipment**

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

(b) Use of the standby UHF is unrestricted in temperate conditions above 5000 feet. Below 5000 feet, the standby UHF must not be used at speeds in excess of 250 knots; below 250 knots, its use is restricted to 25 minutes.

Note: If the above limitations are exceeded, the equipment performance is degraded and failure may result from overheating.

## **21 Ground Attack Manoeuvres**

Ground attack manoeuvres in any configurations are permitted subject to the following restrictions:

- (a) The tailplane interconnection must be switched off.
- (b) The maximum mach number is 0.88M.

## **22 Rocket Launchers (2 inch RP)**

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 36,000 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 36,000 feet.

## **23 Rocket Launchers (68 mm RP)**

- (a) The aircraft is cleared to carry and fire SNEB 68 mm

RP 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 10,000 feet	...	...	520 knots/0.84M*
10,000 to 20,00 feet	...	...	0.86M*
Above 20,000 feet	...	...	0.88M*

\*or onset of buffet if earlier.

*Modified Nose Cone Only.*

*(ii) OAT +16°C to +30°C*

Sea level to 10,000 feet	...	...	450 knots/0.84M*
10,000 to 20,00 feet	...	...	0.86M*
Above 20,000 feet	...	...	0.88M*

\*or onset of buffet if earlier.

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 over-heating 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 the launcher:

*Nose Cone Fitted with Diaphragm Only.*

(i) *OAT up to +35°C*

Sea level to 10,000 feet	...	...	450 knots/0.84M*
10,000 to 20,000 feet	...	...	0.86M*
Above 20,000 feet	...	...	0.88M*

\*or onset of buffet if earlier.

(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 10,000 feet	...	...	520 knots/0.84M*
10,000 to 20,000 feet	...	...	0.86M*
Above 20,000 feet	...	...	0.88M*

\*or onset of buffet if earlier.

(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 RP 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.

## **24 Practice Bombs (25 and 28 lb)**

The carriage and release of 25 and 28 lb practice bombs from the inboard and outboard pylons is permitted subject to the following restrictions:

(a) *Carriage.*

Maximum speed ... .. 500 knots/0.90M\*



(b) *Release.*

Maximum speed	...	...	...	450 knots/0-90M*
Minimum height (25 lb bomb)	...			50 feet AGL/ASL
Minimum height (28 lb inert bomb)	...			100 feet AGL/ASL
Minimum height (28 lb smoke and flash bomb)	...	...	...	500 feet AGL/ASL
Attitude	...	...	...	Straight and level or up to 60° dive

\*or onset of buffet if earlier.

(c) *Carriage with Drop Tanks.*

Drop tanks must be on the inboard pylons when mixed loads of practice bombs and drop tanks are carried.

**25 CBLS with 4 lb Practice Bombs**

The carriage and release of 4 lb (retarded, smoke and flash) practice bombs from CBLS is permitted subject to the following restrictions:

(a) *Carriage on Inboard Pylons Only.*

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

(b) *Release from Inboard Pylons.*

Maximum speed	...	...	...	600 knots/0-90M
Maximum height	...	...	...	1000 feet AGL/ASL
Attitude	...	...	...	Straight and level ( $\pm 5^\circ$ )

(c) *Carriage on Outboard Pylons with either Drop Tanks or CBLS on Inboard Pylons.*

Maximum speed:

Sea level to 10,000 feet	...	...	...	0-84M*
10,000 to 20,000 feet	...	...	...	0-86M*
Above 20,000 feet	...	...	...	0-88M*

\*or onset of buffet if earlier.

*(d) Release from Outboard Pylons.*

Maximum speed	...	...	...	...	0.84M
Maximum height	...	...	...	1000 feet	AGL/ASL
Attitude	...	...	...	Straight and level ( $\pm 5^\circ$ )	

*(e) Jettison.*

The jettisoning of CBLS is not recommended.

## **26 CBLS with 3 kg Practice Bombs**

The carriage and release of 3 kg (smoke and flash) practice bombs (without drag plates) from CBLS on outboard pylons with drop tanks on the inboard pylons is permitted subject to the following restrictions:

*(a) Carriage.*

Maximum speed:

Sea level to 10,000 feet	...	...	...	0.84M*
10,000 to 20,000 feet	...	...	...	0.86M*
Above 20,000 feet	...	...	...	0.88M*

\*or onset of buffet if earlier.

*(b) Release.*

Maximum speed	...	...	...	550 knots
Maximum height	...	...	...	1000 feet
Attitude	...	...	...	Straight and level or up to $10^\circ$ dive

*(c) Jettison.*

The jettisoning of CBLS is not recommended.



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