STRIKEMASTER

The version of the BAC 167 featured as a front cover illustration is fitted with an underwing configuration of two 75 gallon jettisonable fuel tanks and two ML 100 Carriers suitable for practice or anti-personnel bombs and flares. Also clearly shown is armour plate protecting the cockpit just forward of the engine air intakes.

BAC

British Aircraft Corporation Limited

Warton Aerodrome Preston PR4 1AX LANCASHIRE ENGLAND

Tel.: St. Annes 21255

BAC 167 STRIKEMASTER

Rolls Royce Viper 20-F20 Mk 535

Pilot Training
Weapons Training
Ground Attack

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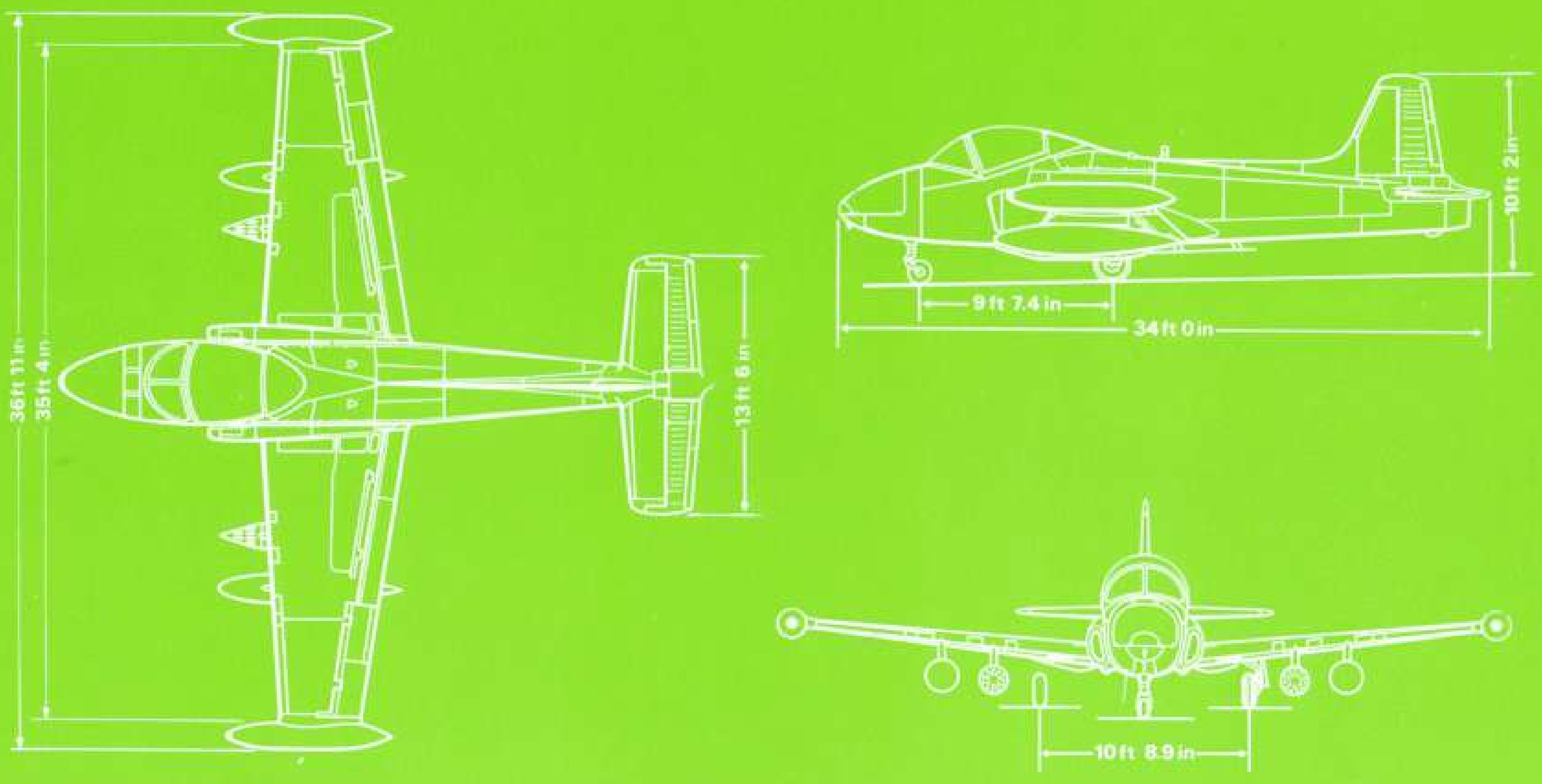
General Arrangement



Aerodynamic Data and Leading Particulars

Main Plane

Aerofoil section — at root	NACA 23015 modified
Aerofoil section — at tip	NACA 4412 modified
Incidence — at root	3 deg.
Incidence — at tip	0 deg.
Dihedral	6 deg.
Aspect ratio	5.84

Tail Plane

Incidence	2 deg.
Dihedral	0 deg.

Alighting Gear

Main wheels

Type	Dunlop
Tyres (tubeless)	Dunlop
Pressure (normal)	98 p.s.i.

Brakes

Type	Dunlop
Brake pressure	1100 p.s.i.

Nose wheel

Type	Dunlop
Tyre	Dunlop
Tube	Dunlop
Pressure (normal)	90 p.s.i.

Hydraulic System

Fluid	OM-15
Operating pressure (nominal)	2100 p.s.i.
Main accumulator	air pressure 1100 p.s.i.
Wheel brakes accumulator	air pressure 1100 p.s.i.

Fuel System

Fuel	AVTUR 40 — J.P.1 or AVTUR 50 or AVTAG — J.P.4
Total usable capacities	
Main plane tanks	270 imp. gall. (324 U.S. gall.)
Tip tanks (if fitted)	96 imp. gall. (115 U.S. gall.)
Overload underwing tanks (each)	73 imp. gall. (88 U.S. gall.) or 48 imp. gall. (58 U.S. gall.)

Oil System

Oil OX-38	13 pints

Power Unit

Bristol Siddeley,
Viper Series 20, F.20 (Mk.535)

Basic engine type	Axial flow, annular combustion engine
Compressor	Eight stage, axial
Combustion system	Annular, with vaporiser type burners
Turbine	Single stage, axial
Static thrust	3,410 lb.
Oxygen system	3000 litres gaseous

Constructional Details and General Description

The fuselage is an all-metal, stressed-skin structure comprising bulkheads, built-up frames and longerons, the whole assembly being covered with light-alloy panels.

The front fuselage accommodates the alighting gear nose wheel unit and incorporates the pressurised cockpit, located between two bulkheads, and the engine compartment immediately aft of the cockpit. A hinged nose cap gives access to the pressurisation, air conditioning, oxygen, radio and electrical equipment installed in the front fuselage.

The rear fuselage, extending aft from the engine compartment, houses the jet pipe.

Each main plane comprises a main and subsidiary spar, the root-ends of which form a three-point attachment to the fuselage. The aerodynamically balanced ailerons and hydraulically operated flaps are carried by the subsidiary spar. Hydraulically operated airbrakes and lift spoilers retract into recesses aft of the subsidiary spar.

The alighting gear main wheel units, mounted between two spanwise beams, retract inwards into the main plane. All main units and doors are operated through a single hydraulic jack and a continuous cable and chain system, thus ensuring synchronised operation at all times.

The cockpit canopy consists of a sliding hood and clear-view windscreen. The hood is automatically jettisoned on operation of the ejection seats ; it can also be jettisoned manually in flight and on the ground from inside and outside the aircraft. The sliding hood has been designed to allow pilot ejection in emergency with the hood closed.

The Bristol Siddeley, Viper 535 series engine of 3,410 lb. thrust is mounted on two tubular steel, tripod-type mountings with a third attachment point for steadying purposes. The engine-driven accessories, including the starter/generator and hydraulic pump, are conveniently situated on the front cover section of the engine.

Three crashproof, bag-type tanks and one integral tank are installed in each main plane ; the bag-type tanks, two forward of the main spar and one between the main and subsidiary spar, are all housed in bays formed by internal skinning. The integral tank is located outboard of the bag-type tanks, at the wing tip and forward of the ailerons.

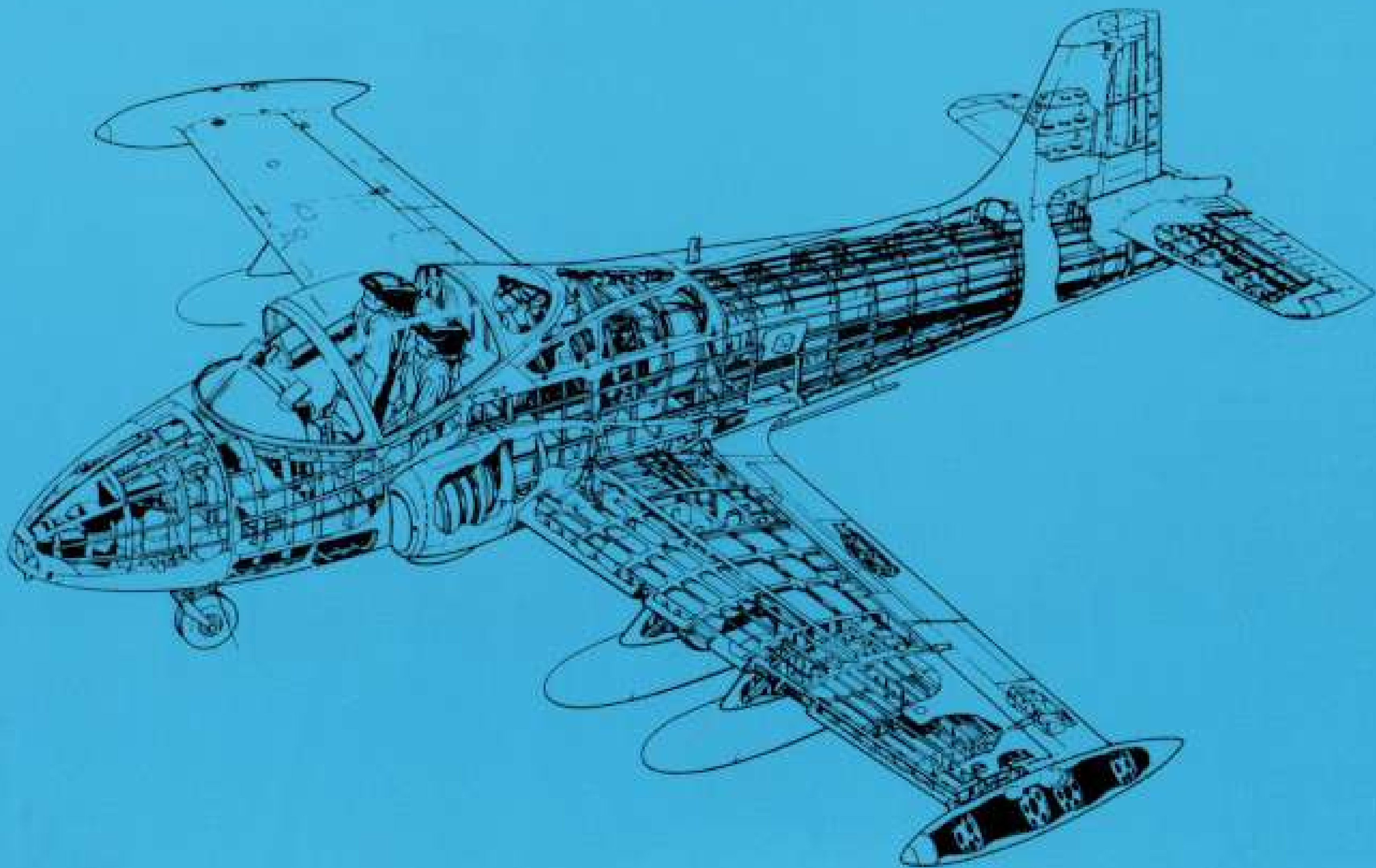
The main tanks in each wing are all filled through a single flush-fitting filler cap adjacent to the wing tip. The wing tip and underwing tanks, are filled separately through their own filler caps.

All the tanks are pressurised by a combination of ram air and bleed air from the engine. A similarly pressurised recuperator is fitted, which contains fuel for inverted flight.

A dual transfer valve in the fuselage collector tank ensures balanced consumption from all tanks.

In addition to the main plane and wing tip tanks, connections are provided for two underwing tanks each of 75 gallons capacity outboard and 50 gallons inboard on each wing. The pilot has control of the emptying of the underwing tanks, when fitted.

Constructional Details and General Arrangement

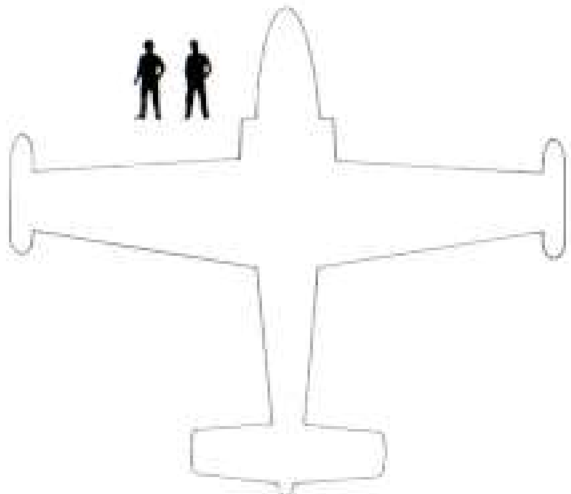


Weight Breakdown

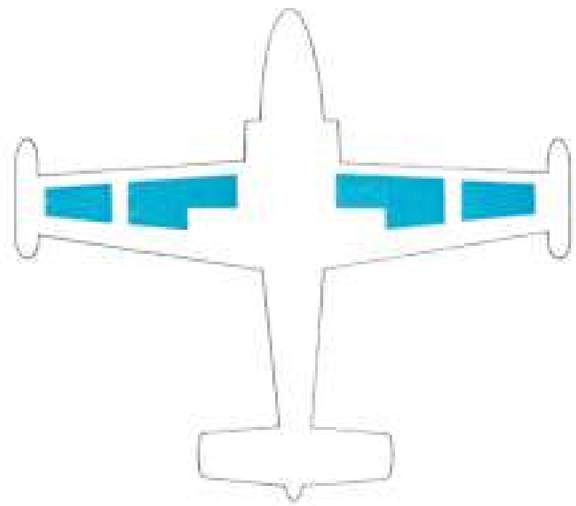
The weights shown indicate the maximum take-off weights likely to be achieved in various training roles. The equipped weight of 6,195 lb. includes tip-tanks, two crew members,communications radio, radio compass, and full provision for armament and underwing stores.

In the pilot training role with the wing fuel tanks filled with Avtur (JP1) at 8 lb. per Imperial gallon the 270 imp. galls. carried (324 U.S. galls.) are more than adequate for normal training sorties of one hour duration. For navigation training exercises of longer range and duration the wing-tip tanks of 48 imp. galls. (58 U.S. galls.) can be filled. The total capacity of 366 imp. galls. (440 U.S. galls.) then provides a safe range of over 900 nautical miles and an endurance of over 3 hours 15 minutes. For more advanced and extended navigation or ferry purposes 2 × 75 imp. galls. (2 × 90 U.S. galls.) and 2 × 50 imp. galls. (2 × 60 U.S. galls.) underwing fuel tanks can be carried providing a total fuel capacity of 608 imp. galls. (730 U.S. galls.) giving a range of 1,200 nautical miles and a total endurance of 4 hours 38 minutes.

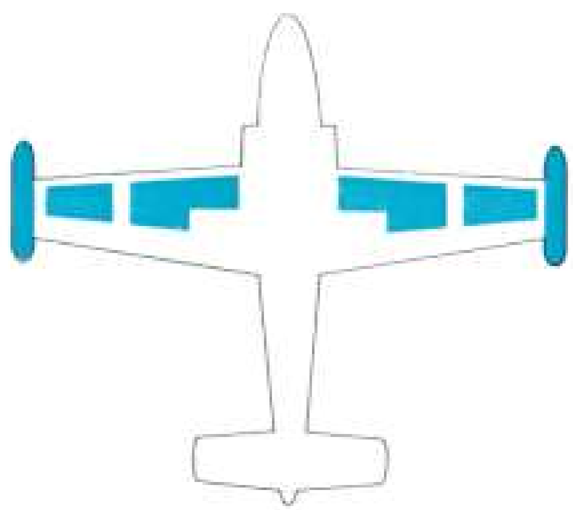
In the armament training role depicted is shown a typical sortie carrying machine guns, practice bombs (8), and 36 rockets with adequate fuel (366 imp. galls.) to enable numerous attacks to be practised. The take-off weight in this configuration will be less than 10,500 lb.



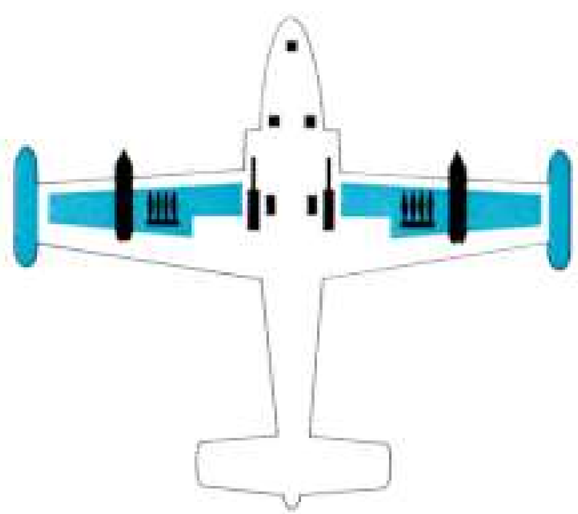
EQUIPPED WEIGHT 6195 LB



PILOT TRAINING 8355 LB



NAVIGATION TRAINING 9143 LB



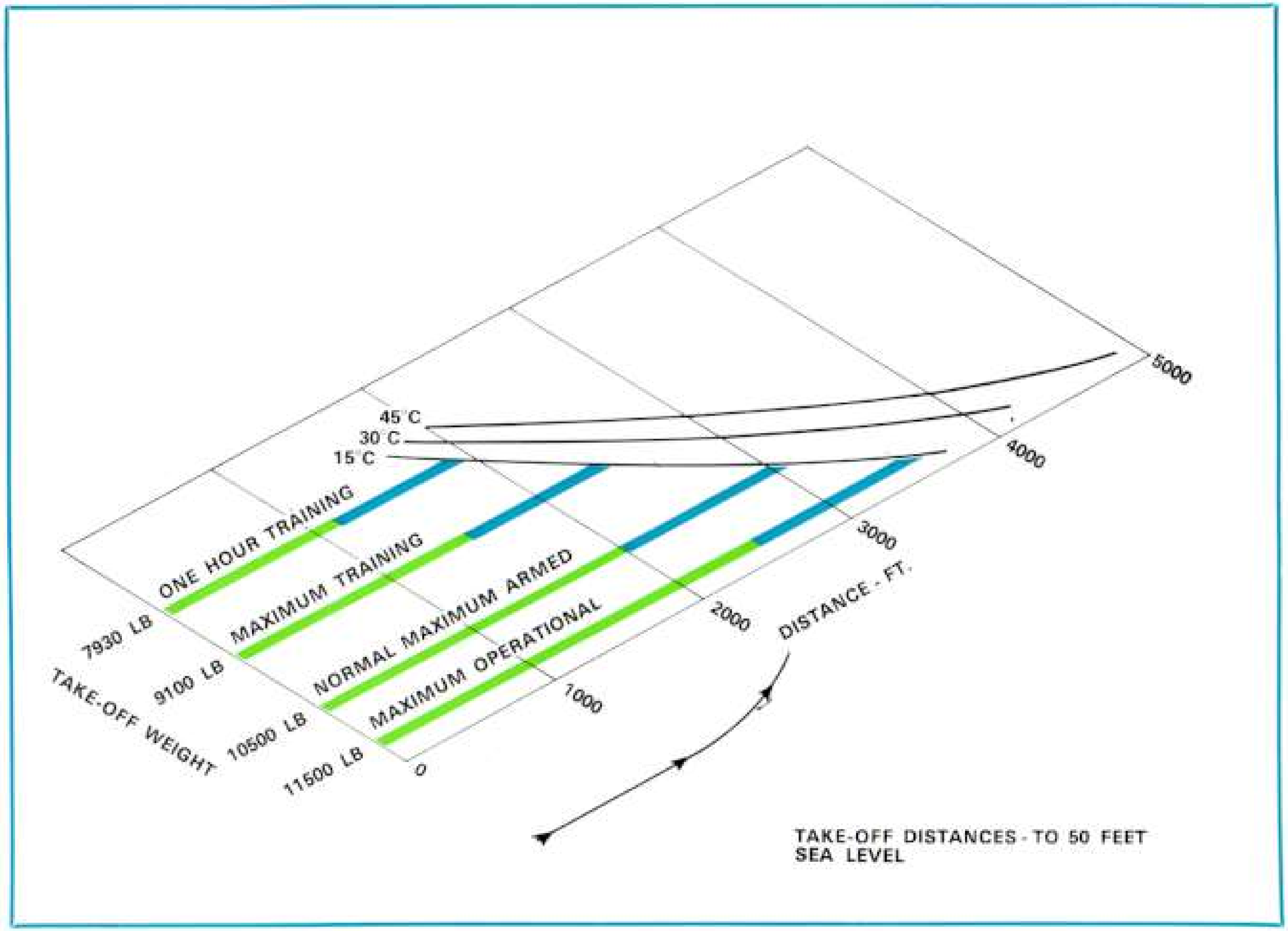
ARMAMENT TRAINING 10500 LB

Take-off Performance

The diagram illustrates the distances taken for ground roll and to clear a 50 ft. screen in various ambient temperatures at sea level.

The take-off technique assumed requires the aircraft to be accelerating between unstick and passing through the 50 foot point.

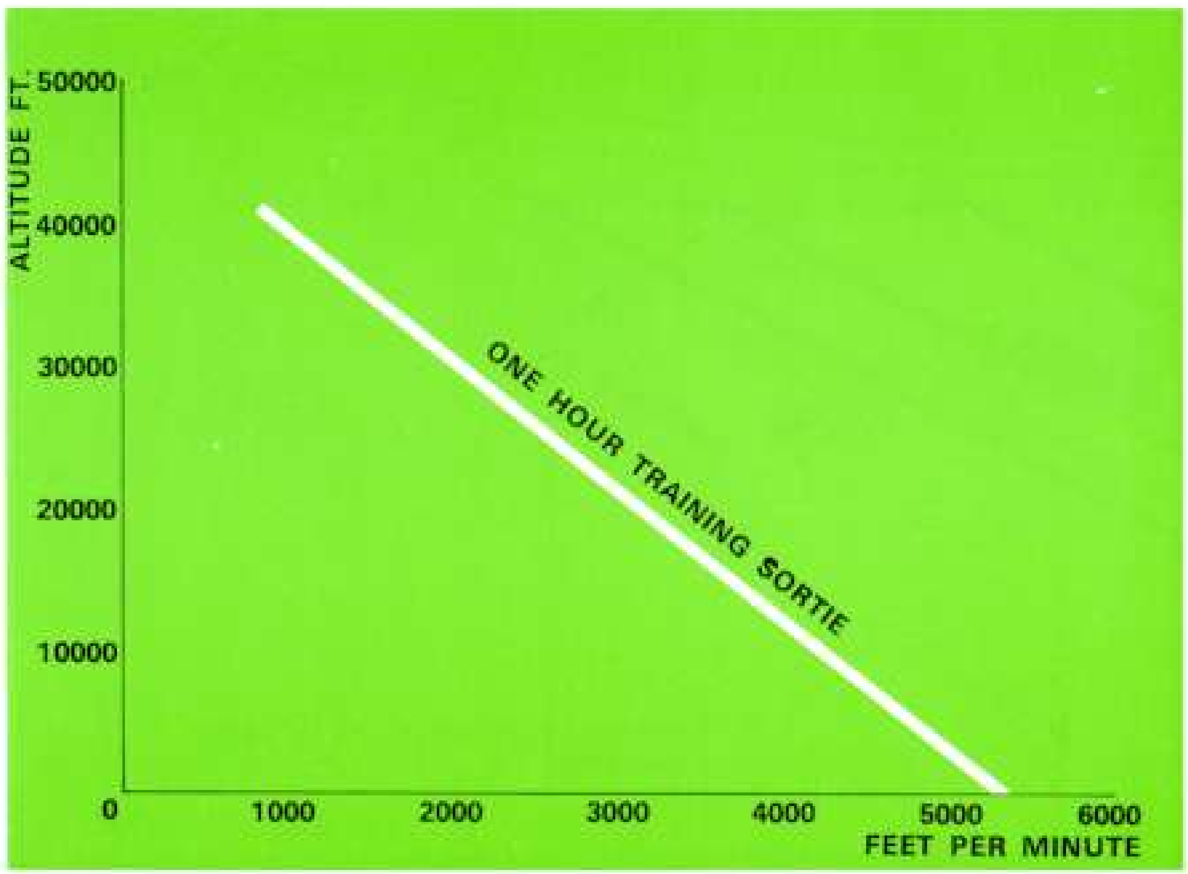
Four cases have been considered — Pilot Training with 210 imp. galls. of fuel, Navigation Training with 366 imp. galls. of fuel, Armament Training and Maximum Operational Take-off Weight. The respective take-off weights with two crew are approximately 7,900 lb., 9,100 lb., 10,500 lb. and 11,500 lb.



Rate of Climb

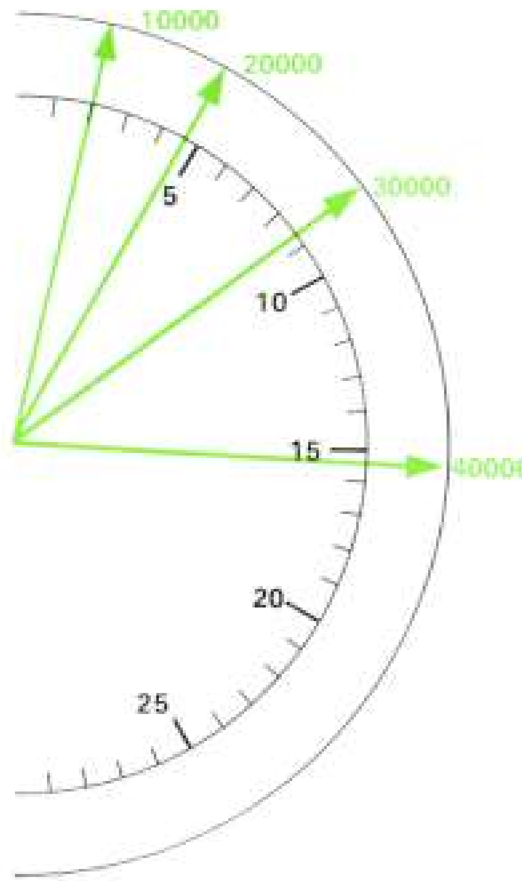
The rate of climb performance shown below is for the aircraft with two crew and sufficient fuel to meet the training sortie detailed on the opposite page.

Experience has clearly demonstrated that using the high performance and consequent training input of the BAC 167 Strikemaster an endurance of one hour is more than adequate for the average pupil during the basic stage of flying training.



Time to Height

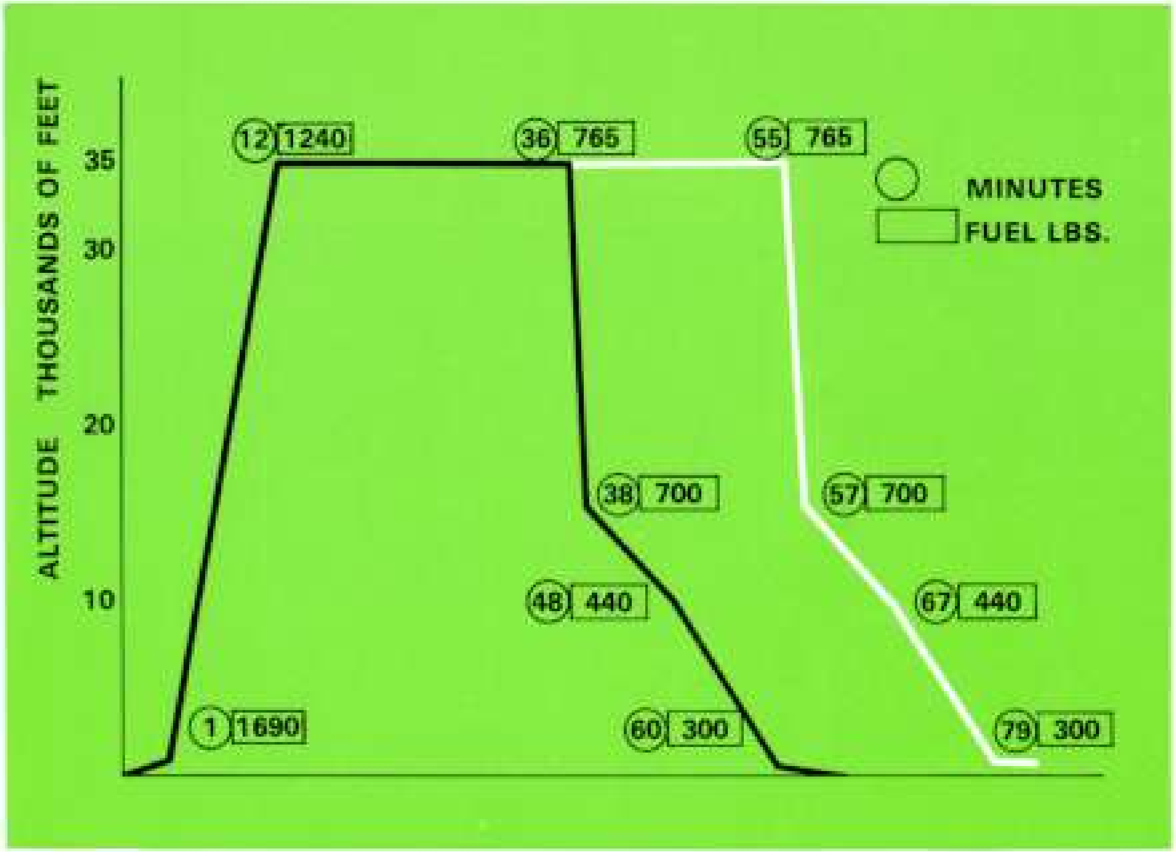
The times shown below are for the aircraft with two crew and fuel to meet the training sortie detailed on the opposite page.



Typical Training Sorties

Below are shown training sorties which include a climb to 35,000 ft., high-speed, aerobatic, stalling and spinning manoeuvres and a practice forced landing at base. All fuel allowances for start, taxi, take-off, circuit, landing and taxi in have been made. The 300 lb. fuel allowance at bottom of descent is more than adequate for the landing requirements.

The sortie time to joining circuit of 1 hour can be extended to nearly 1 hour 20 minutes by operating the engine at best endurance speed at 35,000 ft. for that portion of the exercise allocated to that altitude and shown by the white line.



Level Speeds

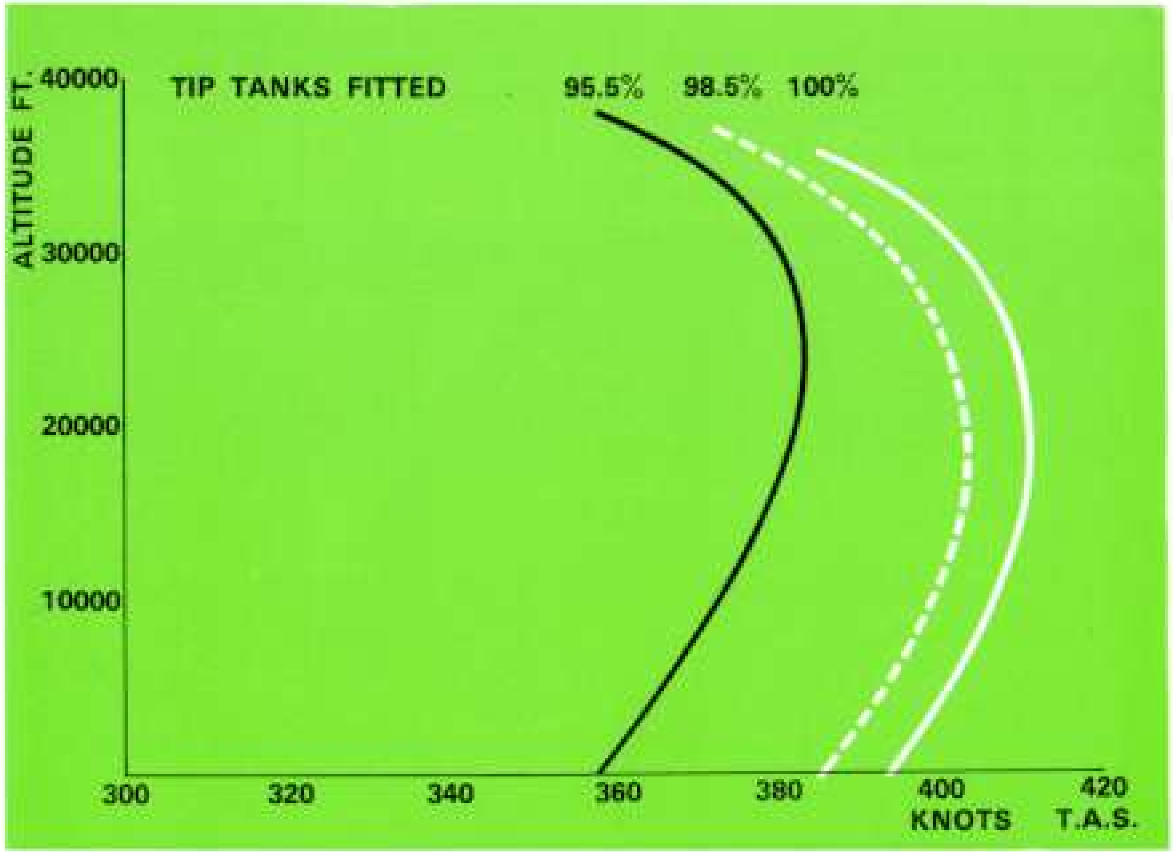
The level speed performance shown is for three permitted engine conditions as follows :—

100% — Maximum Take-off Rating — 20 minutes limit

98.5% — Intermediate Rating — 30 minutes limit

95.5% — Maximum Continuous Rating — Unlimited.

The aircraft is assumed to be at half fuel weight with wing tip tanks fitted.



Structural Strength

The design flight envelope boundaries of the BAC 167 Strikemaster in the pilot training role provide for high speed, high 'g' manoeuvres under the following conditions of loading.

(1) Full internal fuel — no wing stores
Take-off weight : 8,350 lb.
n_1 = 6.0g
V_D = 450 knots E.A.S. up to 6,500 ft.
M_D = 0.77

(2) Full internal fuel and underwing stores — Take-off weight : 11,500 lb.
n_1 = 6.0g
V_D = 400 knots E.A.S. at sea level.
M_D = 0.7

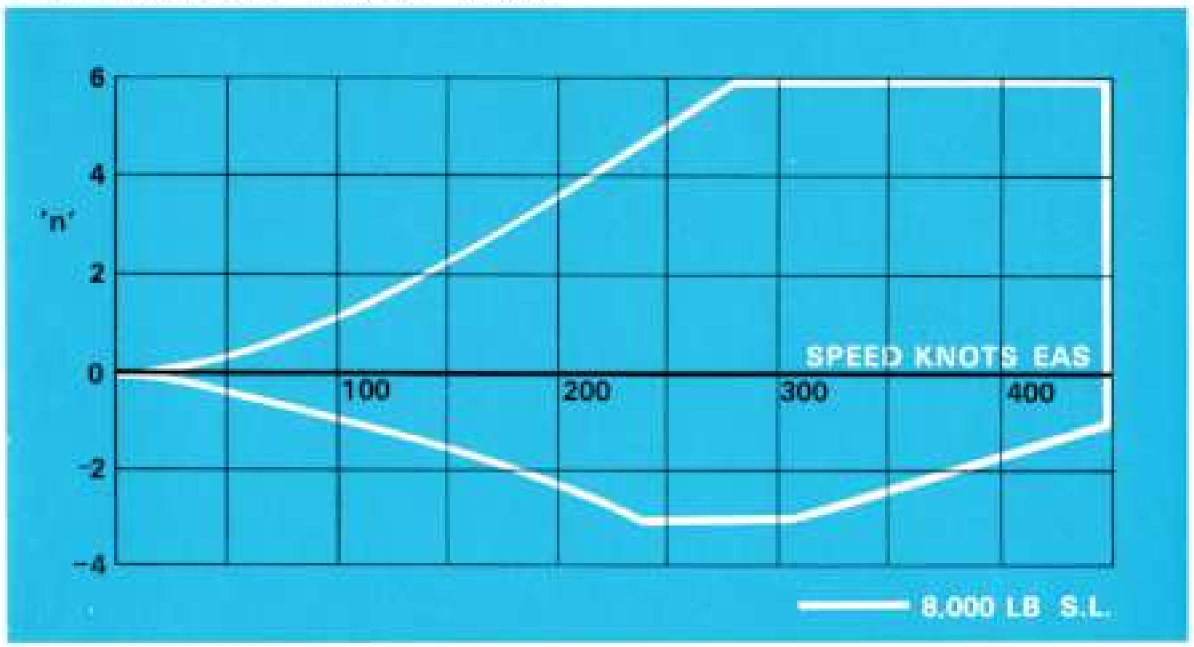
A very extensive programme of testing has been carried out demonstrating the static strength in all critical conditions ; high and low speed pull-outs, combined rolling and 'g' pull-outs, landing cases, etc.

The results confirmed the built-in ruggedness by generally showing a serviceability limit of over 7.5g

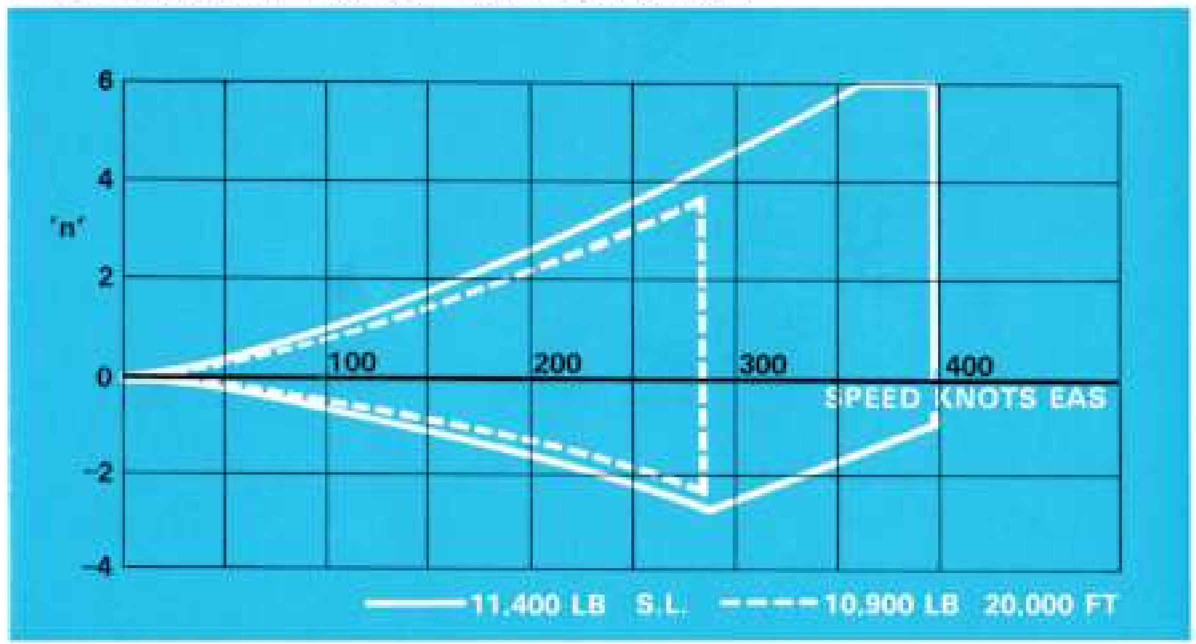
This ruggedness is further illustrated by the high descent velocity permitted for landing. This is 12 ft./sec. at a weight of 6,560 lb., 10.9 ft./sec. at the trainer take-off weight of 8,050 lb. and 8.8 ft./sec. for a normal maximum landing weight, with underwing stores of 9,500 lb. Emergency landings are permitted at maximum take-off weight of 11,500 lbs.

Tests have been performed which show the adequacy of the windscreen against bird strikes.

FLIGHT ENVELOPE BAC 167 CLEAN



FLIGHT ENVELOPE BAC 167 WITH U/W STORES



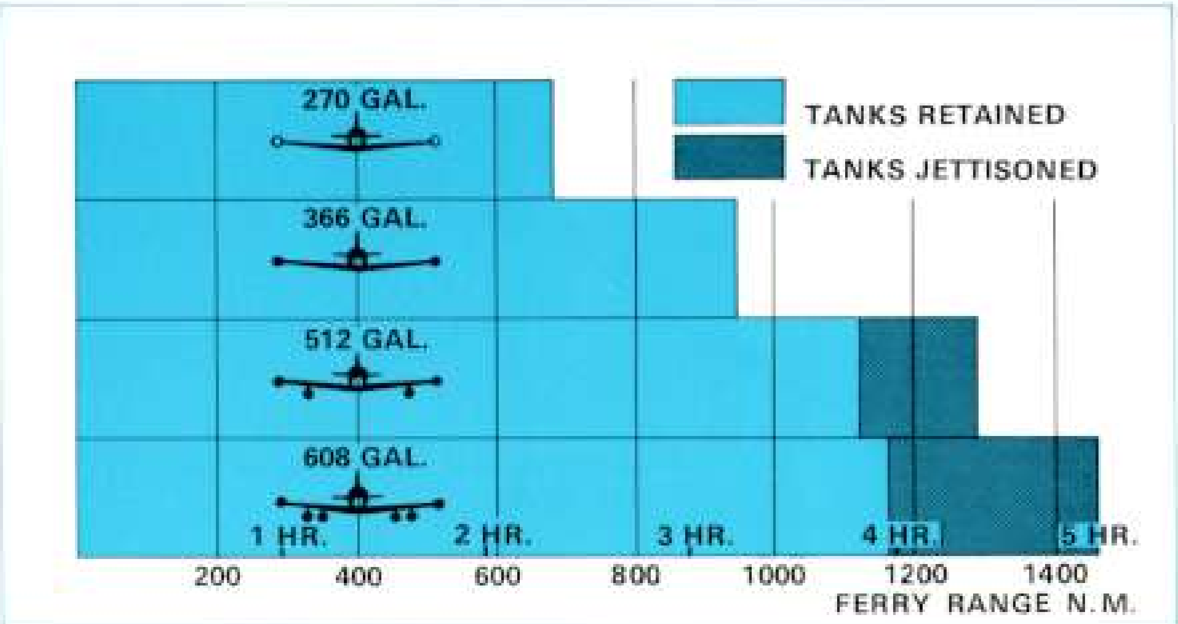
Still Air Range

The BAC 167 Strikemaster is designed to provide maximum flexibility in its fuel carrying capability.

Four different modes are available ranging from the comparatively short duration pilot training requirement through navigation and armament training needs; to the maximum requirements of operational strike and long range ferry or reconnaissance needs.

Below are shown the ISA still-air ranges and endurances available for each of the four cases with a fuel reserve of 10% internal fuel on joining the circuit allowed for in each case.

The effect of an ambient cruise temperature of ISA + 20°C will be to reduce ranges by approximately 2%.



Stalling Speeds

The diagram below shows the variation of stalling speeds with aircraft weight in three flap configurations.

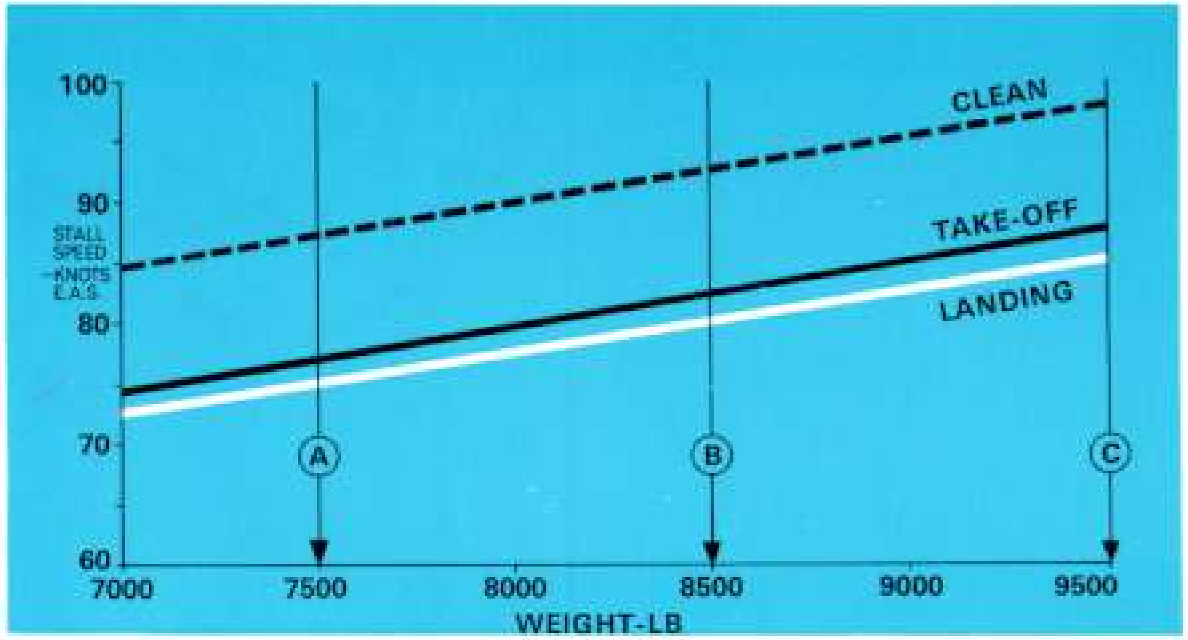
The weights depicted by the vertical lines represent landing weights very soon after a maximum weight take-off for each of three sortie conditions :—

(A) pilot training 7,500 lb.

(B) navigation training 8,500 lb.

(C) aborted armament sortie at 9,500 lb.

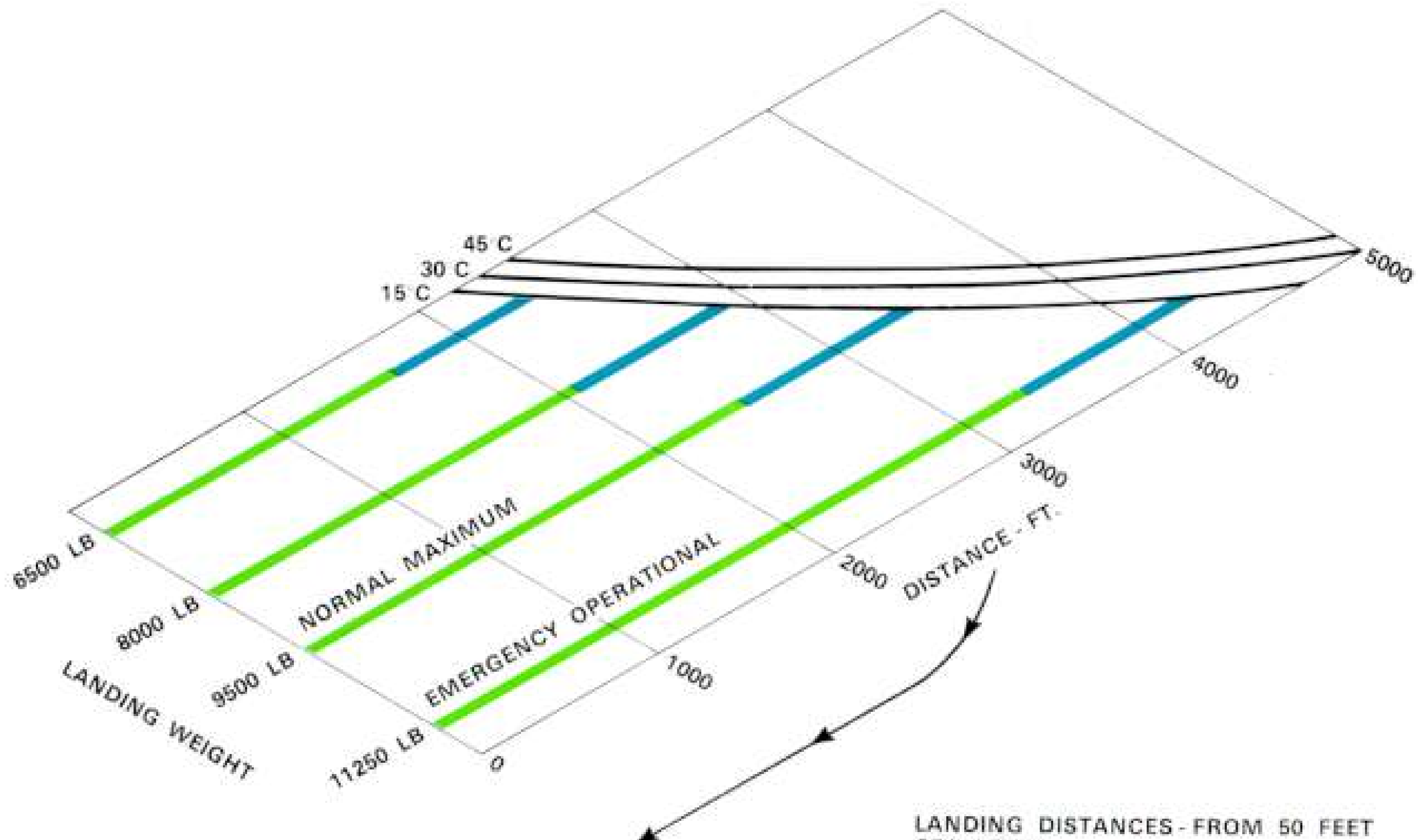
Approach speeds are assumed to be 1.25Vs at the 50 ft. point.



Landing Distances

The distances for landing from 50 ft. and including the ground roll are shown opposite for four landing conditions in the training and operational roles. The effect of increases in ambient temperature on the total landing distance is also illustrated. Emergency landing immediately after take-off is permitted at any permitted take-off weight with underwing stores fitted.

The techniques used assume a speed of 1.25Vs at the 50 foot screen decelerating to 1.15Vs at touch down with normal braking methods.



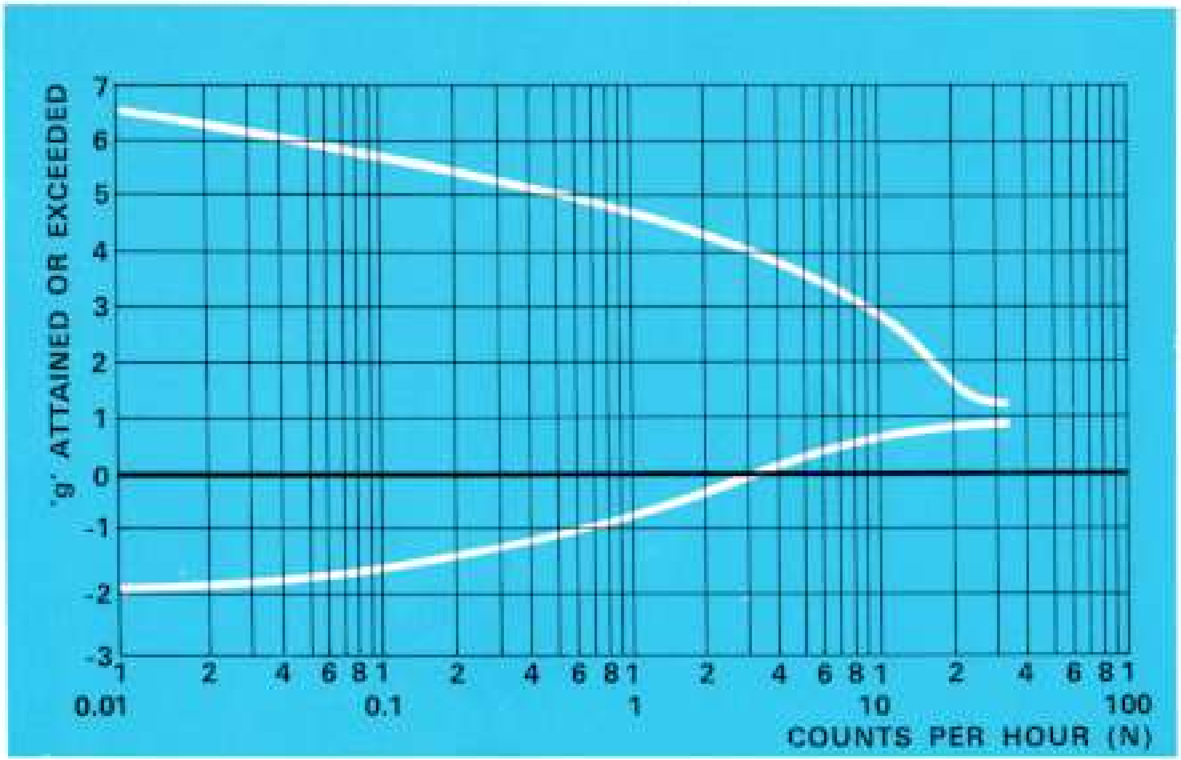
LANDING DISTANCES - FROM 50 FEET
SEA LEVEL

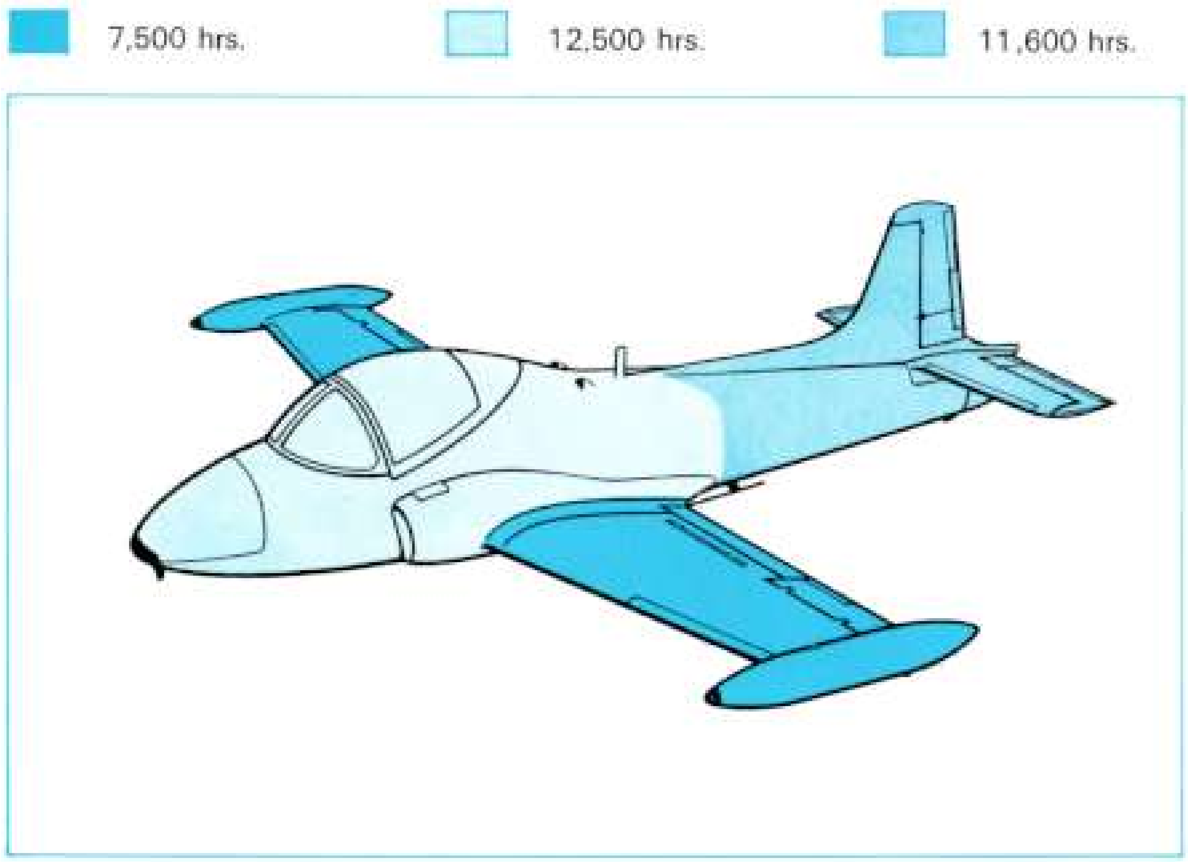
Fatigue Life

Full scale programme loaded fatigue tests have been carried out to the loading spectrum shown below which is derived from recorded data obtained in R.A.F. Training Command. Based on this loading spectrum and assuming wing internal tanks full at take-off the BAC 167 Strikemaster primary wing structure will have an average life expectancy of 7,500 hours. The BAC 167 fatigue spectrum used during these tests are decidedly more stringent than that demonstrated by similar aircraft manufactured abroad and illustrates the high regard for structural integrity implicit in all the design features of the BAC 167 Strikemaster.

The fatigue life of the fin, tailplane and rear fuselage is based on the frequency at which spins are performed and on this basis the component with the lowest safe life will be the rear fuselage at 11,600 hours. The safe life of the tailplane and fin will exceed this figure. Based on the application of full differential pressure once per flying hour, the pressurised cockpit will have a safe life of 12,500 hours.

It can be seen that with a minimum wing life of 7,500 hours, at a utilisation of 400 hours per year, a service life of over 18 years is available.





Rolls-Royce Viper Series 20 F-20 Mk 535

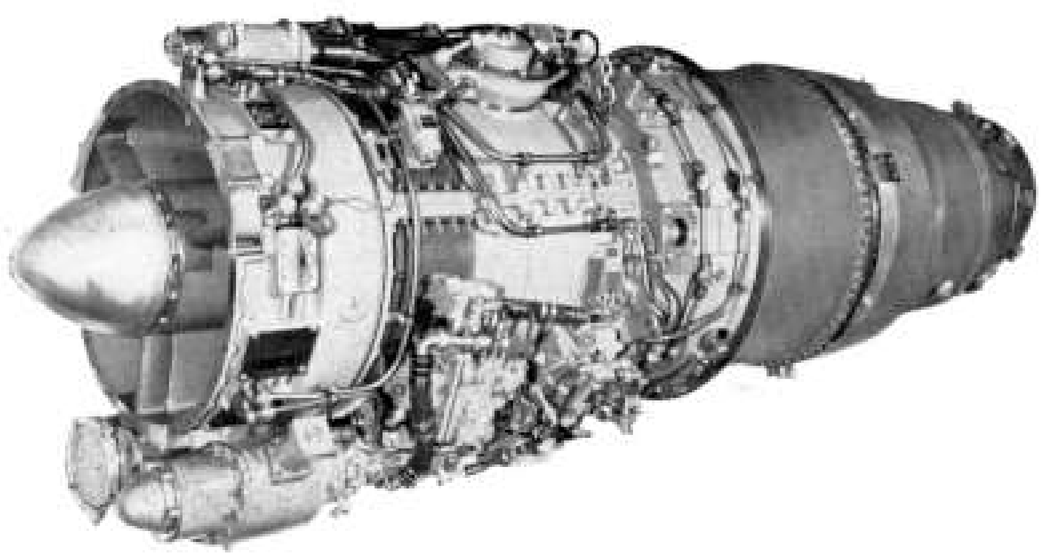
The Rolls-Royce Viper 20F-20 (Mk.535) engine of 3,410 lb. sea level static thrust is a development of the Viper 11, and has already been granted an overhaul life of over 1,000 hours with no intermediate strips for 'hot' assemblies, when fitted to the BAC 167 Strikemaster.

It has an eight-stage axial flow compressor, an annular combustion chamber with vaporiser type burners and a single stage axial flow turbine.

The Viper engine, of which over 2,000 have already been built, is fully proven in service, Viper powered Jet Provosts alone having achieved more than 500,000 flight hours.

It has ideal handling characteristics for pupil pilot operation, being virtually impossible to stall through mishandling at any altitude.

Relighting in the air is normally possible at any altitude below 30,000 ft.



WEAPONS TRAINING AND GROUND ATTACK ROLES

Introduction

The BAC 167 Strikemaster in the Army Support Role

This supplement illustrates how the BAC 167 Strikemaster aircraft offered to meet pilot and weapons training requirements can be utilised in the ARMY SUPPORT GROUND ATTACK role.

In order to meet pilot and armament training needs the take-off weight of the BAC 167 Strikemaster need not exceed 10,500 lb., but the built-in strength and ruggedness of the aircraft enables a take-off weight of 11,500 lb. to be offered.

On the following pages will be seen typical sortie patterns, due regard having been given to the particular operating conditions of tropical countries.

The armament loads are shown as a weight allowance, but typical rocket, bomb and underwing tank loads are illustrated which clearly demonstrate the good payload capabilities of the aircraft for the difficult operating conditions assumed and the outstanding patrol times which can be achieved for varying radii of action and armament loads.

Armament/Fuel Load Comparison

Opposite is a typical armament versus fuel load graph for the BAC 167 Strikemaster in the single-seat operational role. The vertical lines indicate the progressive weight increases for pylons and fuel tanks as applicable.

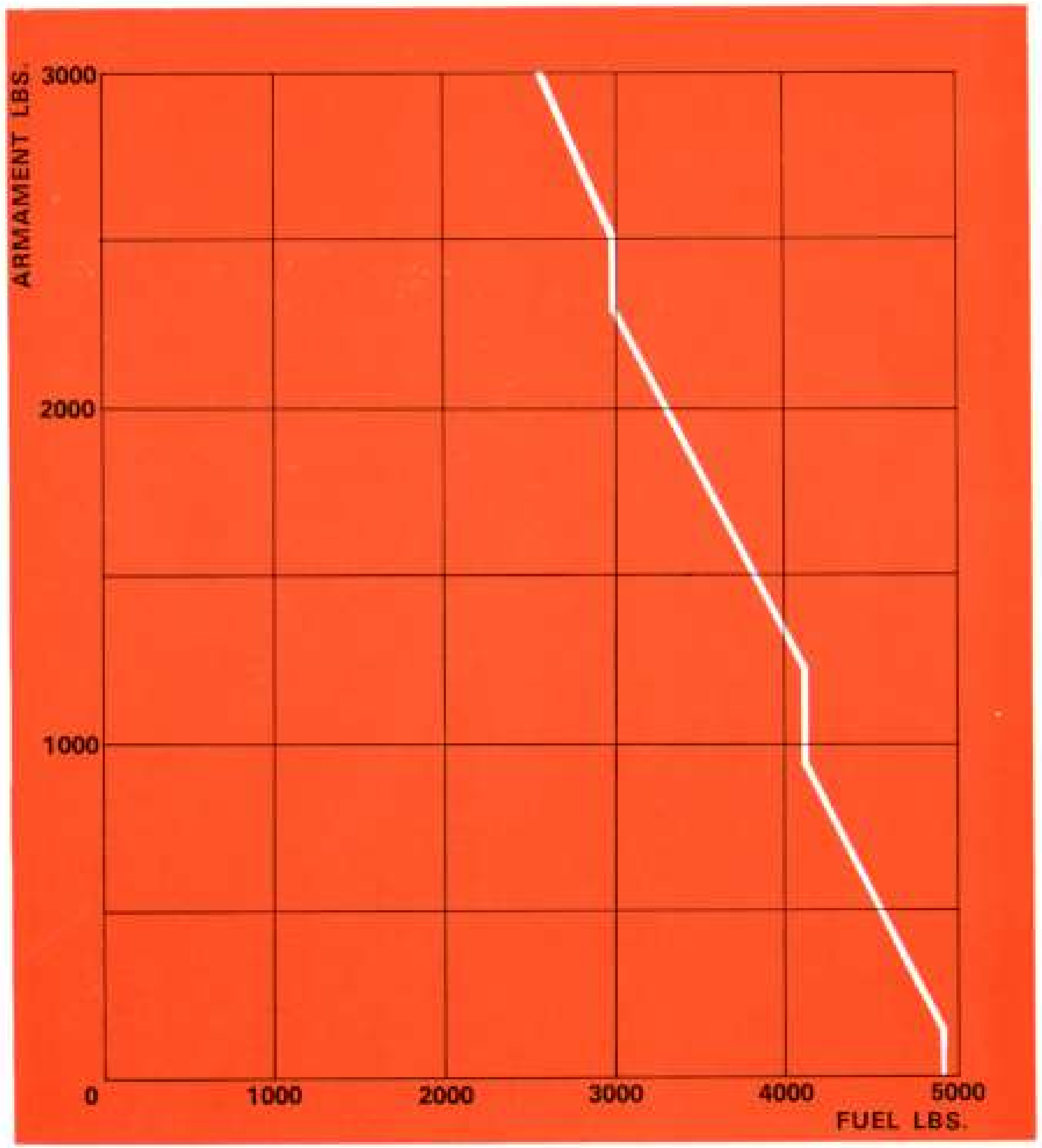
The pictorial representation provides a simple visual relationship of fuel carried to armament load as plotted on the graph beside it. (One Imp. gall. = 8 lbs.)

3000 LBS. ARMAMENT

2520 LBS. ARMAMENT

(2 x 72 + 2 x 50 U/W TANKS)

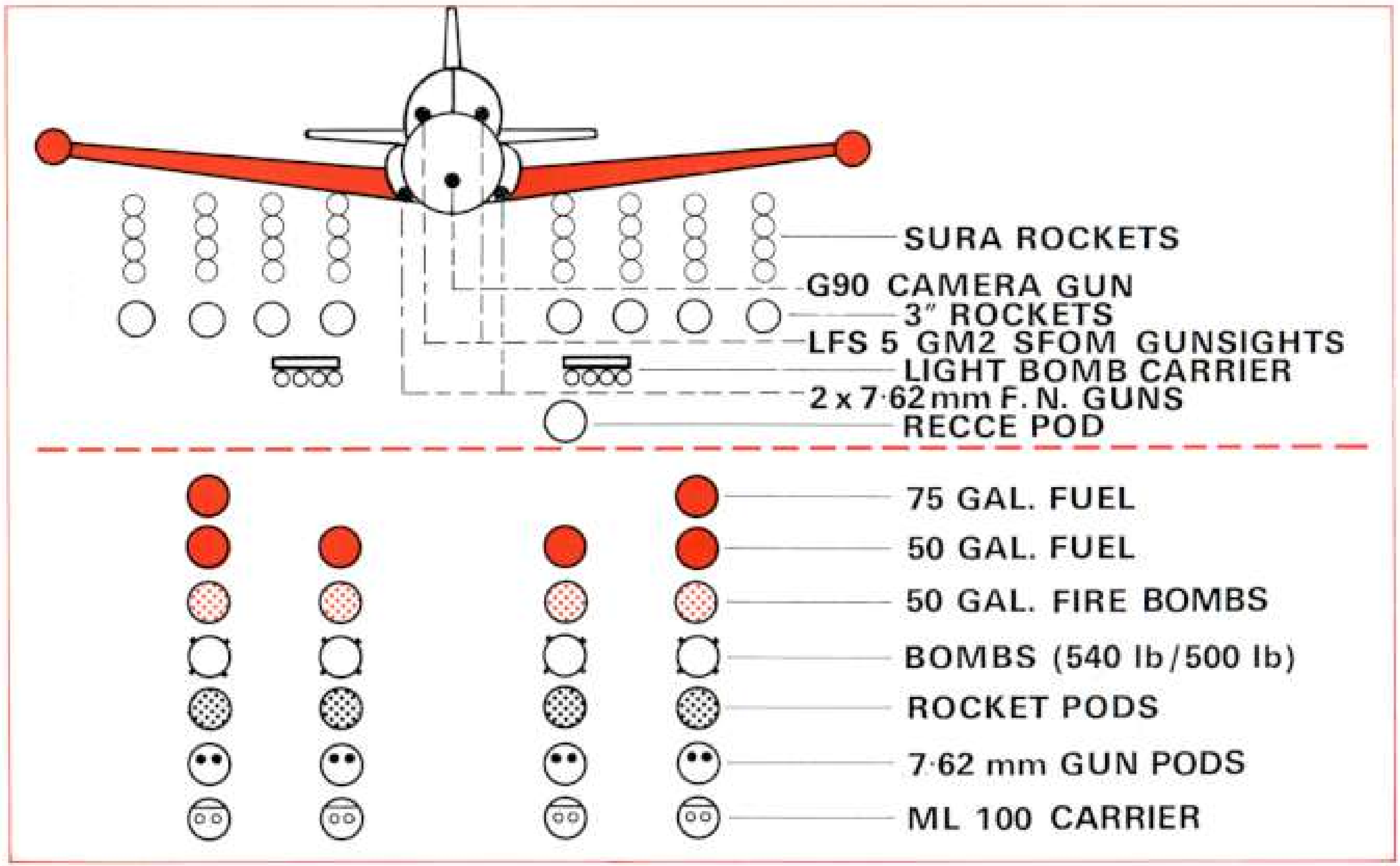
(2 x 75 + 2 x ROCKET PODS)



Weapon Loads

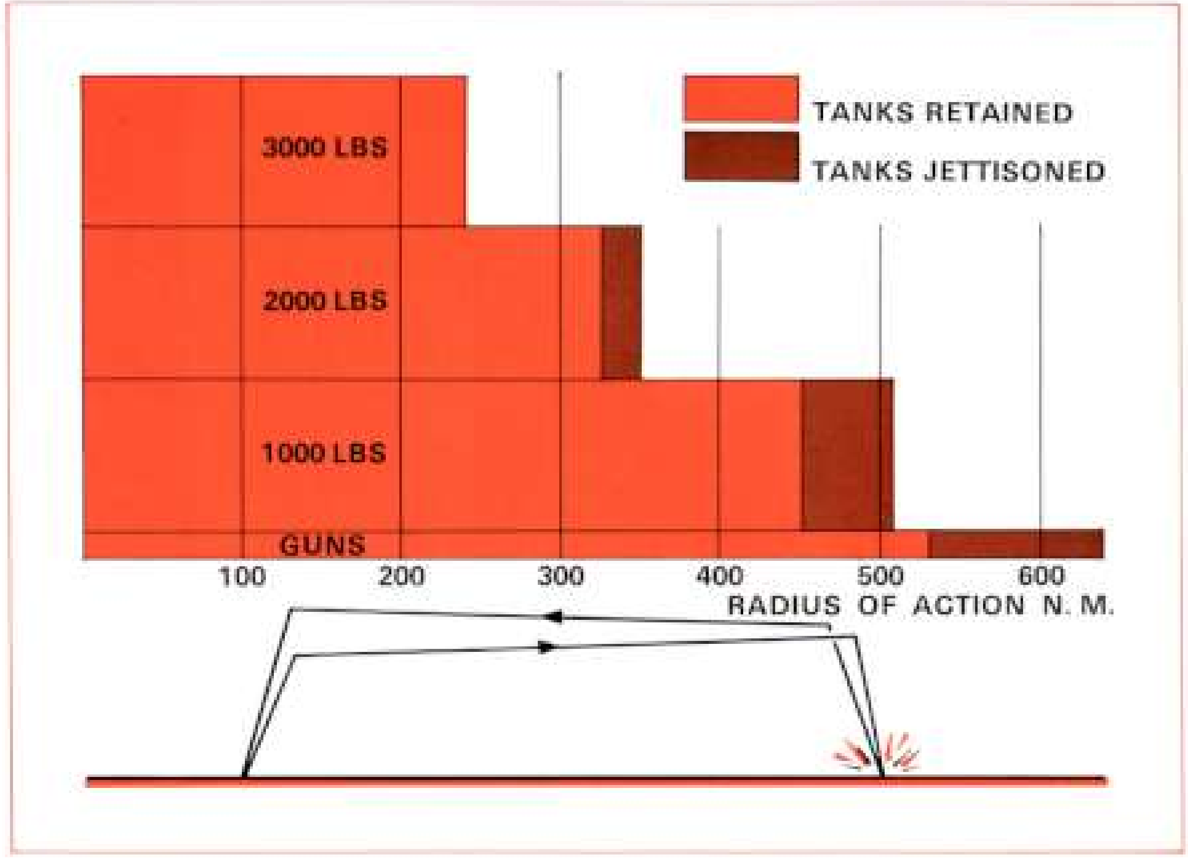
This diagram illustrates typical weapon loads capable of being carried by the Strikemaster. Numerous "mixes" of these weapons can be made to suit the operational task. Weapons above the broken line are attached direct to wing strong points. Those below require pylon carriage.

The ML100 Carrier is suitable for the carriage of practice bombs, flares, etc.



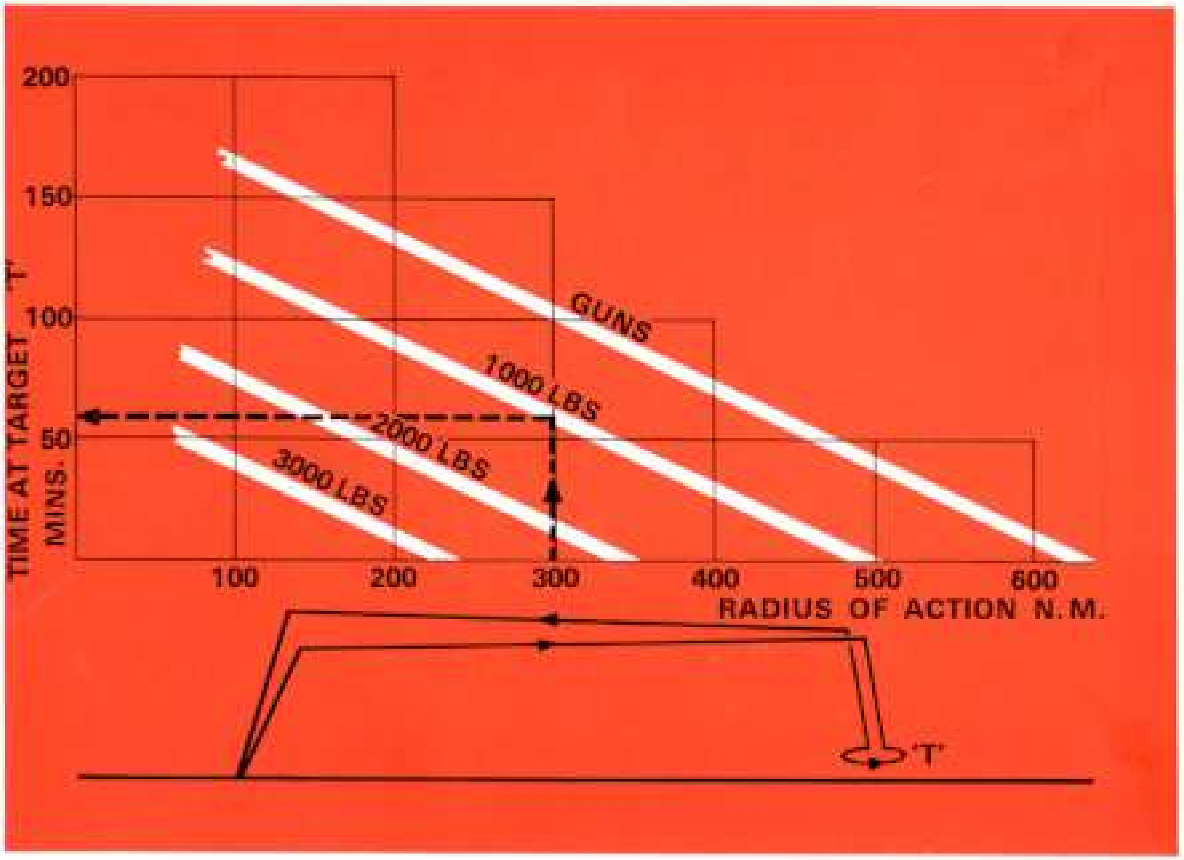
Radius of Action

The diagram illustrates the radii of action attainable with varying weapon loads. The sortie pattern is Hi-Lo-Hi where outward cruise and return are made at optimum cruise altitude; with 5 minutes target attack, and 10% internal fuel reserves on return.



Time Over Target

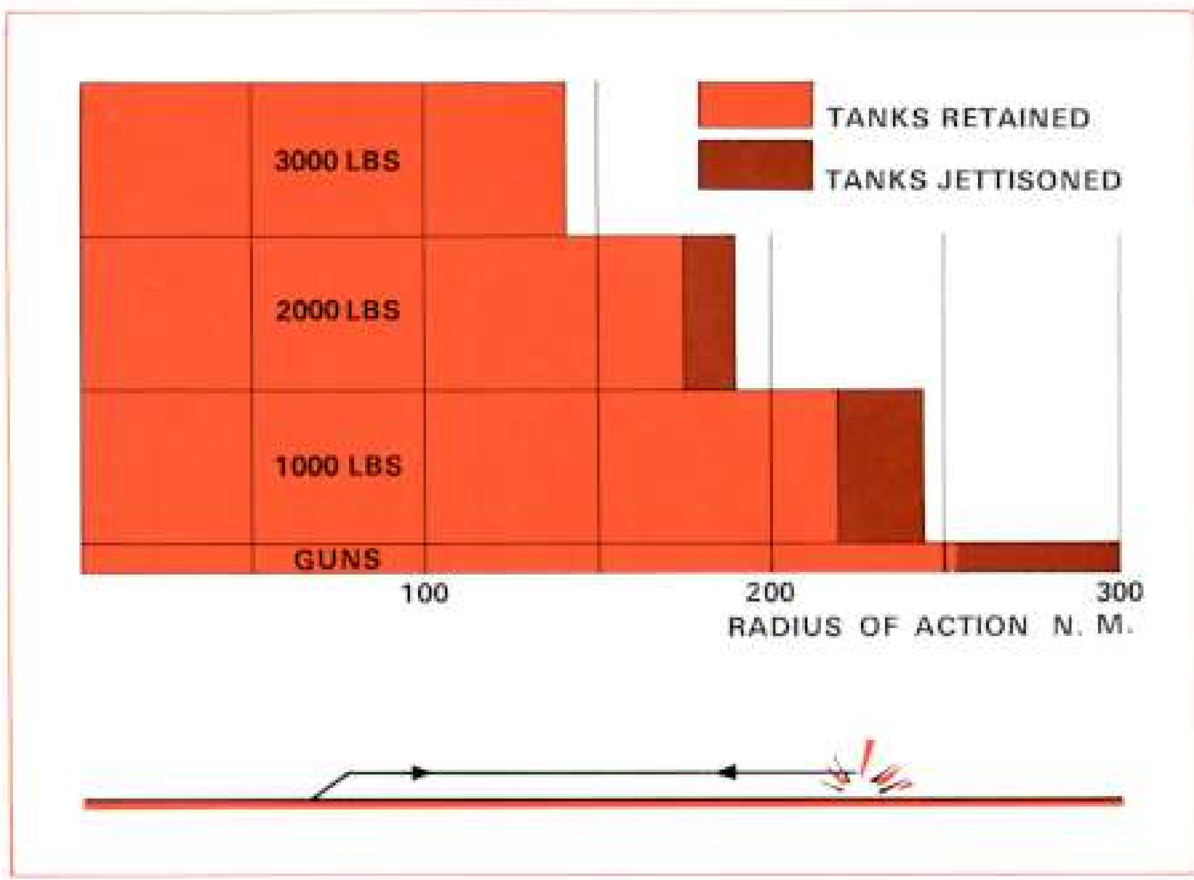
For efficient close-support operations extended patrol time in the target area is essential. This diagram illustrates the "loiter" time in the target area at low level which can be undertaken for a given radius of action and weapon load. For example: for a target located 300 n.m. from base, the Strikemaster with a 1,000 lb. weapon load can remain in the target area at 5,000 ft. on patrol for 60 minutes assuming external fuel tanks jettisoned when empty.

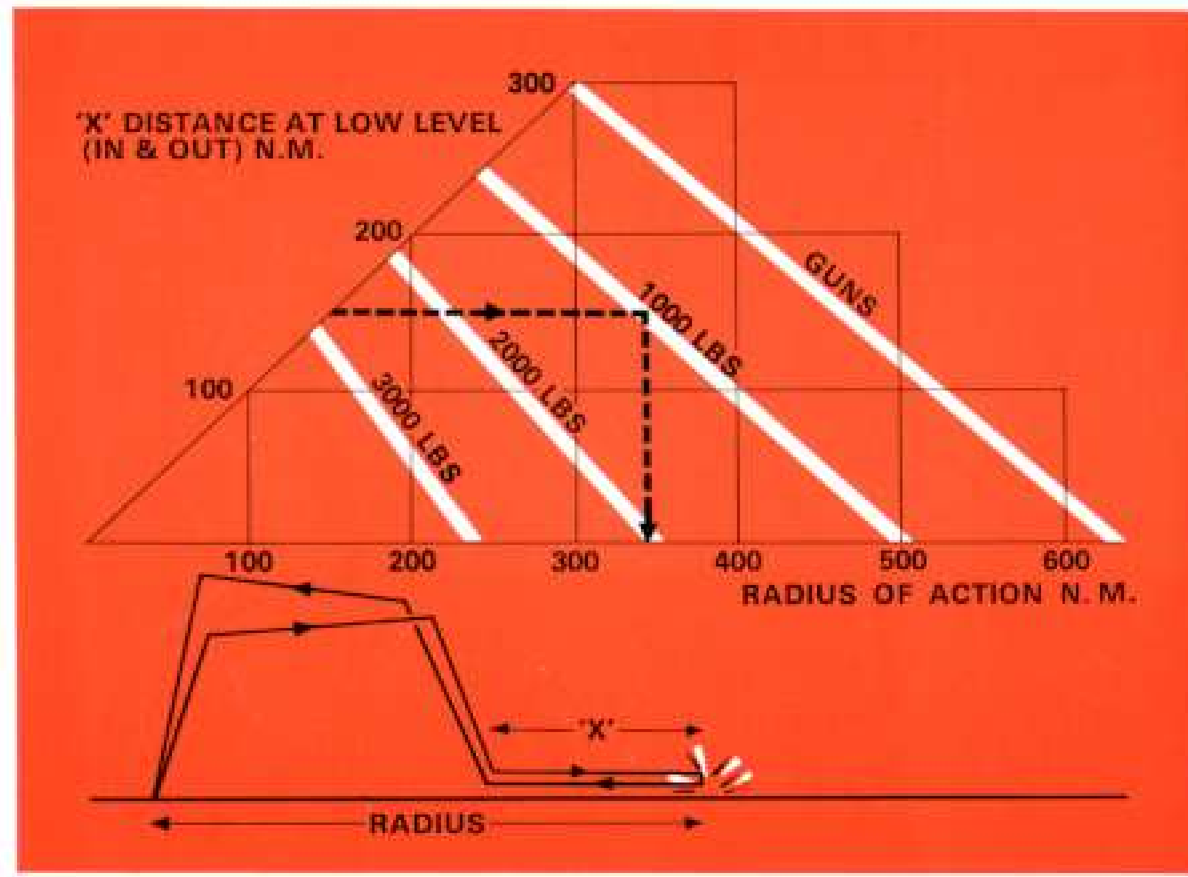


Low Level Performance

Low level performance in strike operations is a vital operational factor. This diagram shows the radii of action obtainable with varying weapon loads on a terrain-following sortie pattern calculated as at sea level.

This diagram can be used to assess the effect of flying any sector of a Hi-Hi sortie at sea level. For example : if it is required to fly 150 n.m. into the target area plus the same distance out all at low level then reference to the left side of the graph for "150" and reading horizontally across shows that with 1,000 lb. weapon load the attainable radius of action is 345 n.m. assuming external fuel tanks jettisoned when empty.



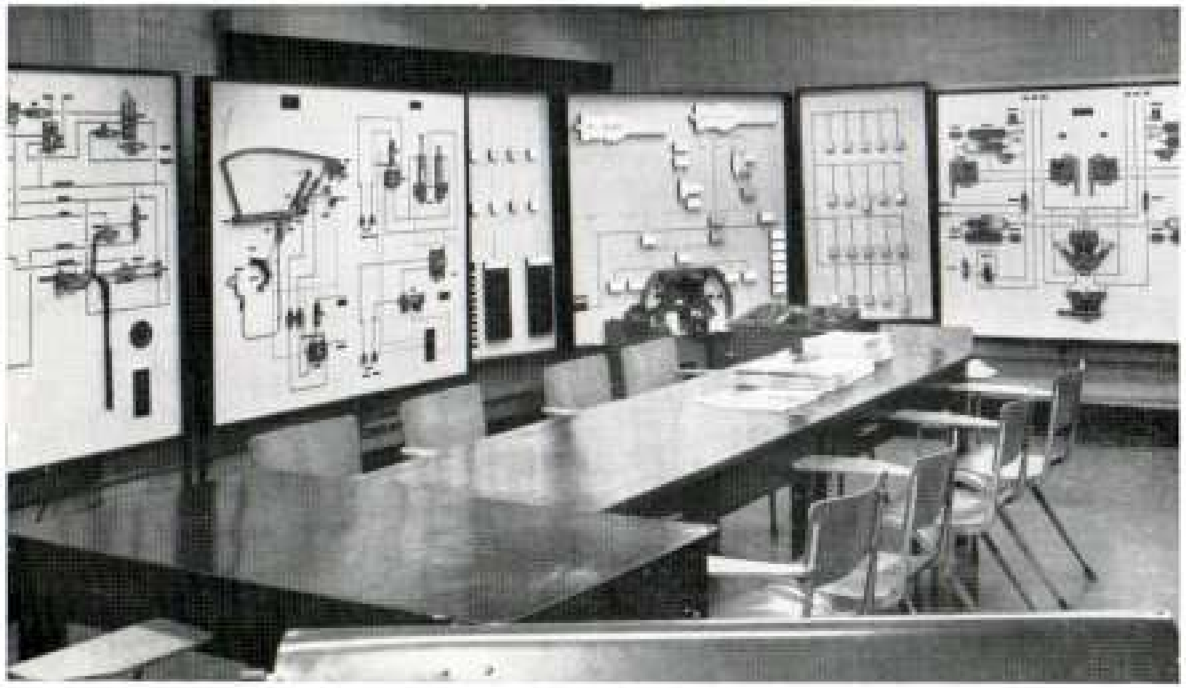


Product Support

The BAC 167 Strikemaster, the Viper engine and their respective ancillaries are supported by a comprehensive range of descriptive manuals, spare part and servicing schedules and Service organisations of world-wide experience.

Cockpit Emergency Procedure Trainers, functioning 'Systems' boards — with special sectioned models of the more important components — and coloured Wall Diagrams are available for the preflight instruction of the aircrew.

Technical assistance is rendered in many forms, typical examples being manufacturer's maintenance courses, initial spare part stock holding recommendations, resident service representatives, regular liaison visits, the preparation of repair schemes and advice, as required, of special inspections, the introduction of modifications and changes in servicing procedures.



British Aircraft Corporation

British Aircraft Corporation was formed in 1960, by a merger of the aircraft and guided weapons interests of three powerful industrial groups, The Bristol Aeroplane Company Limited, The English Electric Company Limited and Vickers Limited.

The Corporation employs over 30,000 people, has four operating divisions, seven factories, and four major test flying centres.

The present programme of BAC ranges from the Concorde supersonic airliner through long and short-haul jet transports, supersonic fighters, strike aircraft, jet trainers, advanced research aircraft, missile systems, space satellites, inertial platforms, precision instruments and a growing element of products outside the realms of aeronautics.

This programme is backed by great resources which are unequalled in Europe and unsurpassed in the world.

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