

APPROVED

# FLIGHT MANUAL

FOR THE

## BEAGLE AUSTER D5

### SERIES 180



This is the Flight Manual which forms part of the  
Certificate of Airworthiness for aircraft ..... **G-ASNC** .....

This manual has been approved and forms part of the certificate of Airworthiness No. .... **2054** ..... issued by the Minister of Aviation for this aeroplane.

Date ..... **16th December 1963** .....



.....  
By authority of the Minister of  
Aviation.

This manual is applicable only to this particular aeroplane.

Constructor's Serial Number : **3678**

Nationality and Registration Marks : **G-ASNC**

Designed by :  
Beagle Auster Aircraft Ltd.,  
Rearsby,  
Leicester,  
The United Kingdom.

Constructed at : **Rearsby**

In the year : **1963**

NOTE: (1) In the case of an aeroplane registered in the United Kingdom no entries or endorsements may be made on this Flight Manual except in the manner and by the persons authorised for that purpose by the Minister of Aviation.

(2) If this Flight Manual is lost, the Secretary, Ministry of Aviation should be informed at once, the associated Certificate number being quoted. Any person finding this Flight Manual should forward it immediately to the Ministry of Aviation, London; or to the appropriate authority in the country in which the aeroplane is registered.

(3) The aeroplane must be operated in accordance with any limitations and mandatory instructions contained in this Manual.

(4) This Manual has been prepared on behalf of the Ministry of Aviation by the Air Registration Board.

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SECTION 0 I N T R O D U C T I O N

THE DOCUMENT REFERENCE NUMBER OF THIS FLIGHT MANUAL IS AR.3.3

PREFACE

This flight manual applies only to the aeroplane having the constructor's number quoted on page 1 and it is the responsibility of the flight crew operating the aeroplane to be familiar with the contents of the manual including all amendments, at the time of flight. The amendment state of this manual is given on the amendment record sheets.

Amendments are of three kinds:-

- (1) "G" (General) which at the date of issue of the amendment affect all manuals bearing the same document number.
- (2) "P" (Particular) amendments; these are changes which, at the date of issue, do not affect all the aeroplanes to which the manual relates. Such amendments may be caused by difference in the build standard between variants of the type or by differences between particular aeroplanes due to modification; they may also be caused by special requirements imposed by the authorities of a state to which the aeroplane is exported. Thus the Particular amendment record sheet will reflect any difference between the manual of one aeroplane and another.
- (3) Advance Amendment Bulletins will be issued when it is necessary to effect a change to the manual more quickly than would be possible by means of the normal amendment procedures. Each bulletin will be identified by a number, an issue number and a date. Bulletins do not necessarily affect every aeroplane which uses this document but a copy of every issue of every bulletin will nevertheless be sent for every aeroplane; each bulletin will show to which aeroplane it applies.

The bulletins do not form part of the normal amendment service to specimen copies of flight manuals but copies may be obtained by special arrangement with the Civil Aviation Authority.

Each bulletin will be issued with, or cancelled by, a bulletin record sheet which must be inserted in the flight manual to follow page 4.

Bulletins themselves will not be subject to the normal amendment procedures; changes to a bulletin will be made only by re-issue of the bulletin. The record sheet will be re-issued with each bulletin and it will show the current status, including the cancellation dates, of all bulletins. The bulletins must be embodied in the manual following the bulletin record sheet unless the letter of transmittal instructs otherwise.

Amendments to the text will be indicated by a marginal vertical line together with the amendment number except that, when a considerable change has been made or a completely new page has been issued, the amendment will be denoted at the foot of the page.

Amendments to the flight manuals of aeroplanes registered in the United Kingdom are only to be incorporated by a representative of, or a person authorised by, the Civil Aviation Authority and no changes whatsoever may be made to the contents of this manual by any other person.

This flight manual is published by the Civil Aviation Authority, Airworthiness Division, Brabazon House, Redhill, Surrey RH1 1SQ.

Doc.No.AR.3.3

Con.No.

GENERAL\* AMENDMENT RECORD SHEET

| Amendment Number | Description                                                                                                                                                                                                                                                                                               | Pages Affected                                           |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
|                  | General Amendment G/1 has previously been embodied in this manual.                                                                                                                                                                                                                                        |                                                          |
| G/2              | Provision for fitment of alternative approved propellers. Auster D5/180 increased temperature clearance.<br>Editorial revisions including Category limitations.                                                                                                                                           | 6,7,22<br>17<br>6,12,22                                  |
| G/3<br>July 1971 | Revision of certification category to reflect the Air Navigation (Second Amendment) Order 1970.                                                                                                                                                                                                           | 12                                                       |
| G/4<br>June 1972 | Assumption by the Civil Aviation Authority of ARB responsibilities.<br>Classification (ANO Schedule 1 Part A).<br>Parachuting limitations.                                                                                                                                                                | 3<br>6<br>18                                             |
| G/5<br>May 1980  | Editorial changes and corrections<br>Provision for advance amendment bulletins<br>Approved propellers<br>Addition of pound-kilogram conversion table<br>Category of certification<br>Maximum number of occupants and parachuting limitations<br>Glider towing(Auster D5-180)<br>Turbulence. Stall warning | 1,2,4,6,22.<br>3<br>6,22<br>8,11<br>12<br>17<br>18<br>19 |
|                  |                                                                                                                                                                                                                                                                                                           |                                                          |

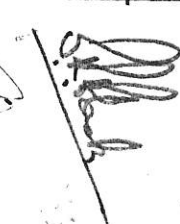
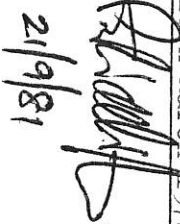
\*NOTE: See page 3 for explanation of 'General' Amendments. This Amendment record sheet will be re-issued with each 'General' Amendment

Signature.....

Date.....

20/6/80

## PARTICULAR\* AMENDMENT RECORD SHEET

| Amendment Number** | Description of Amendment and (if applicable) the associated Mod. number                                                                                   | Pages Affected                                       | Signature and date of incorporation of amendment                                                          |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| P/2                | Introduction of the D5 Series 180. Revision of description, weight and C.G. limits, handling information and performance data. (Beagle Auster mod. 3715). | 2,6,7,13,17,19, 20,21,22,24 to 36 inc. new page 32A. | <br>10th July, 1964  |
| <del>P/3</del>     | <del>Certification in the Transport Category (Passenger).</del>                                                                                           | <del>-12.</del>                                      | <del></del>          |
| P/7                | Limitations for glider towing. Beagle Auster modification 4002.                                                                                           | 12,18.                                               |                       |
| P/10               | Position error corrections and airspeeds associated with an underwing heated pitot head and static system to Auster modification 4147.                    | 16,19,20,21, 24,28,30,33, 35.                        | <br>20th October 1964 |
| P/12               | Maximum permissible weight increased by 95 lb. (Modification BME/D5/51)                                                                                   | 2<br>Appendix C<br>1, 2.                             | <br>10th March 1972    |
| P/13               | Introduce Lyman O-360-A1A engine with constant speed propeller recovery 2536C-7844A                                                                       | 6, 14, 22, 35                                        | <br>21/9/81            |

\*Note: See page 3 for explanation of 'Particular' Amendments

\*\*Note: Amendment numbers will not always be consecutive

DESCRIPTION OF AEROPLANE

## CLASS

Aeroplane (landplane)

## POWER PLANT

One Avco Lycoming O-360-A2A engine fitted with:

one McCauley type 1A200/FA-8250 propeller of 6.83 feet diameter and  
4.16 feet fixed pitch

or one McCauley type 1A200/FA-8243 propeller of 6.83 feet diameter and 3.58  
feet fixed pitch

or one Avco Lycoming O-360-A1A engine fitted with a McCauley type 2D36C14B/  
78KM-4 constant speed propeller of 6.17 feet diameter.

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## GENERAL ARRANGEMENT AND PRINCIPAL DIMENSIONS

A three view general arrangement drawing is shown on page 7. This  
shows the aeroplane in the standard configuration to which the performance  
information given in Section III applies. The principal dimensions are:

Areas

|                                 |                      |
|---------------------------------|----------------------|
| Wing (total)                    | 185 ft <sup>2</sup>  |
| Ailerons (aft of hinge)         | 15.0 ft <sup>2</sup> |
| Flaps (total)                   | 16.4 ft <sup>2</sup> |
| Tailplane (including elevators) | 26.2 ft <sup>2</sup> |
| Elevators (aft of hinge)        | 11.2 ft <sup>2</sup> |
| Fin (including rudder)          | 22.0 ft <sup>2</sup> |
| Rudder (net)                    | 9.0 ft <sup>2</sup>  |

Miscellaneous

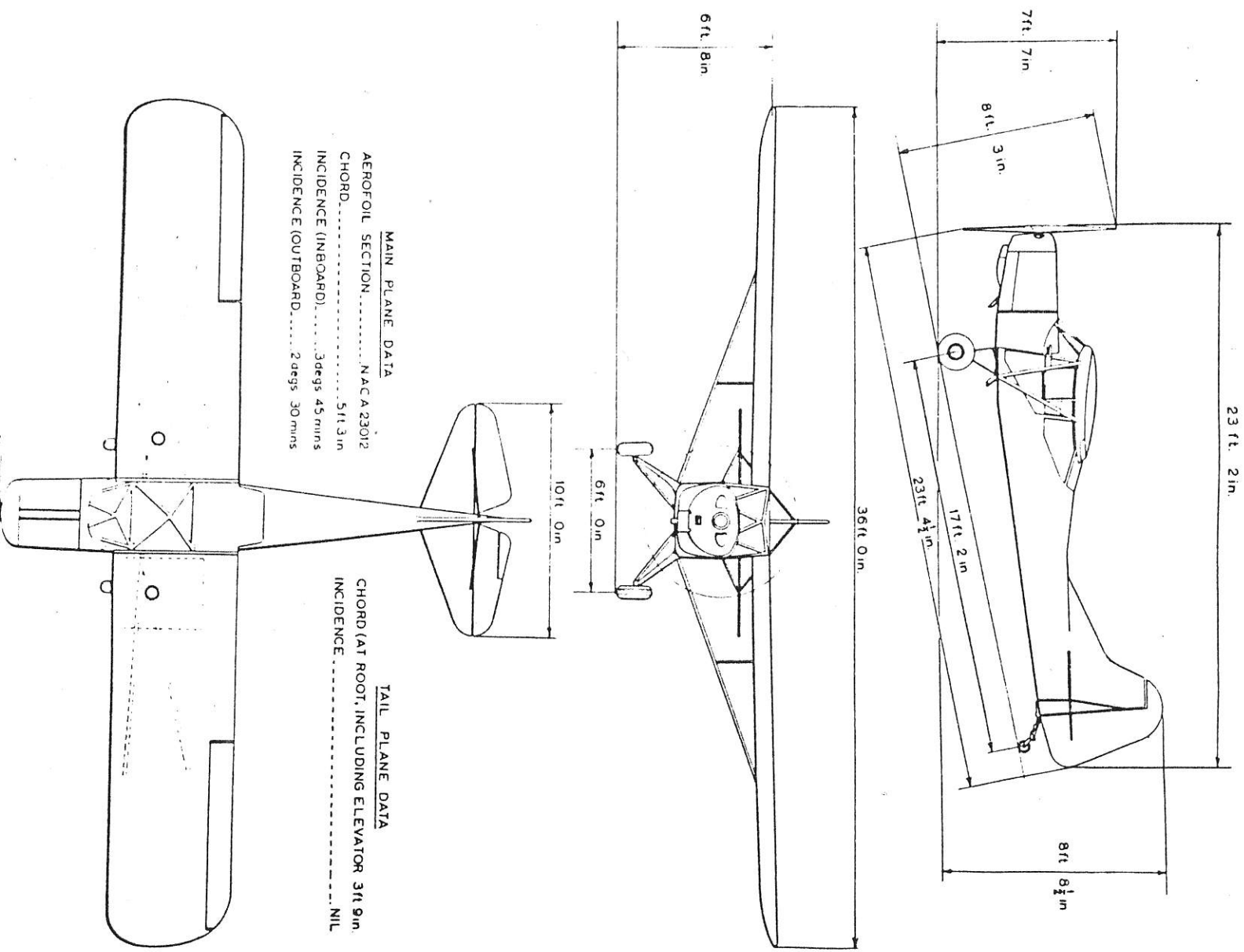
|               |     |
|---------------|-----|
| Wing dihedral | 1°  |
| Aspect ratio  | 7.0 |

Wing Flap Positions

|                        |     |
|------------------------|-----|
| Up (fully retracted)   | 0°  |
| Take-off (first notch) | 25° |
| Landing (second notch) | 50° |



ARL.D5180.GA.1



NOTE: propeller diameter and height of propeller tip above ground may differ from those shown here if a propeller of another type is fitted.

CONVERSIONS AND DEFINITIONSPage 9 Determination of temperature in relation to International Standard Atmosphere (I.S.A.)

This shows the relationship between altitude and air temperature ( $^{\circ}\text{C}$ ) in I.S.A. and in other atmospheres above and below standard. The lines are drawn assuming a constant temperature lapse rate of  $2^{\circ}\text{C}$  reduction in temperature for every 1,000 feet increase in altitude.

Page 10 Conversion of temperatures.

The graph on page 10 enables temperatures to be converted between  $^{\circ}\text{Centigrade}$  and  $^{\circ}\text{Fahrenheit}$ .

Page 11 Pound - kilogram conversion

The table on page 11 permits conversion between pounds (lb) and kilograms (kg).

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DEFINITIONS

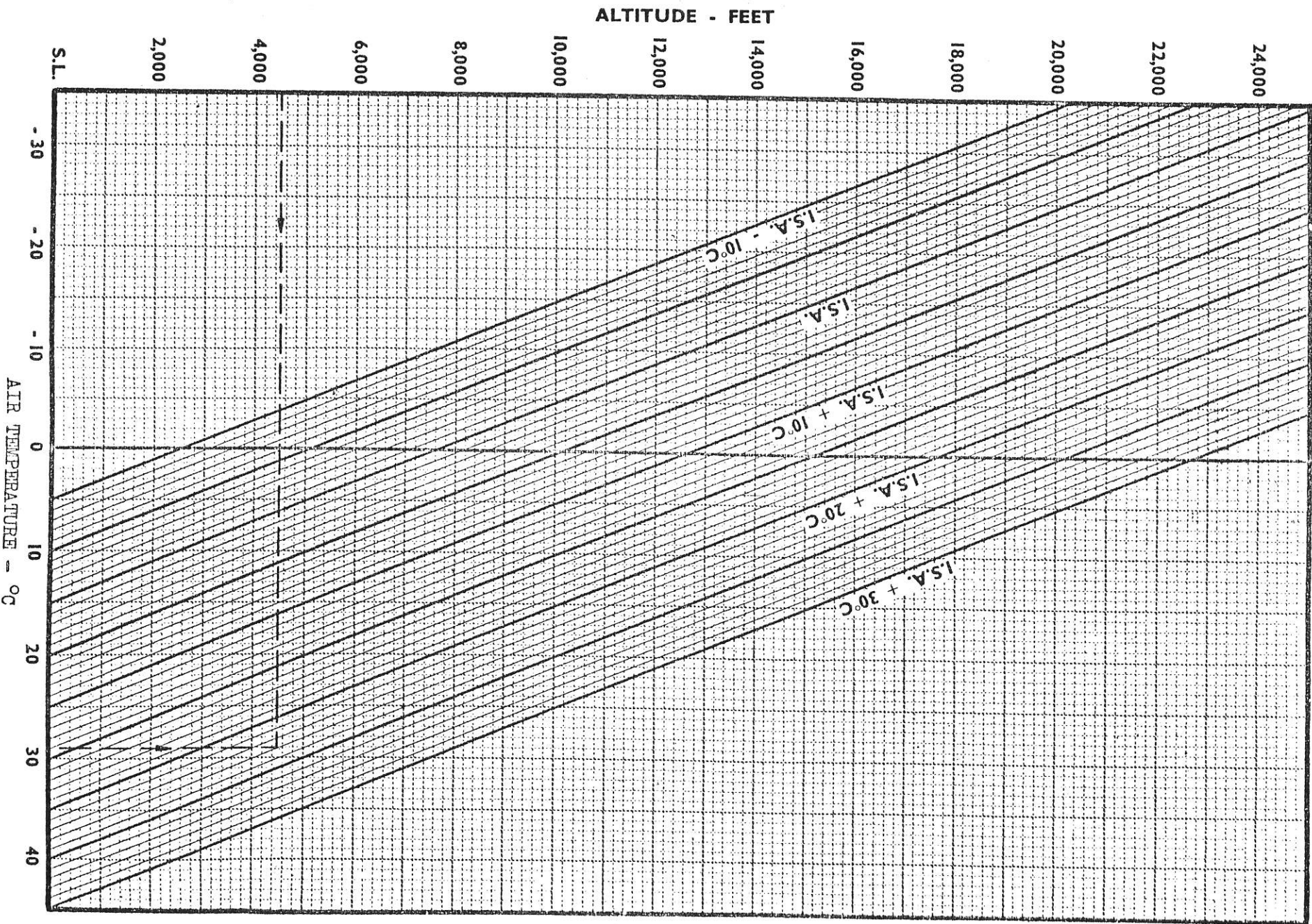
I.A.S. Indicated Airspeed, which is the reading obtained on an airspeed indicator instrument having no calibration error. Manufacturing tolerances are laid down to ensure that the calibration error is very small and for normal use it can be ignored. To obtain the value of the speed in E.A.S. - Equivalent Airspeed (T.I.A.S. - True Indicated Airspeed), the correction for pitot-static position error must be applied to the I.A.S. value.

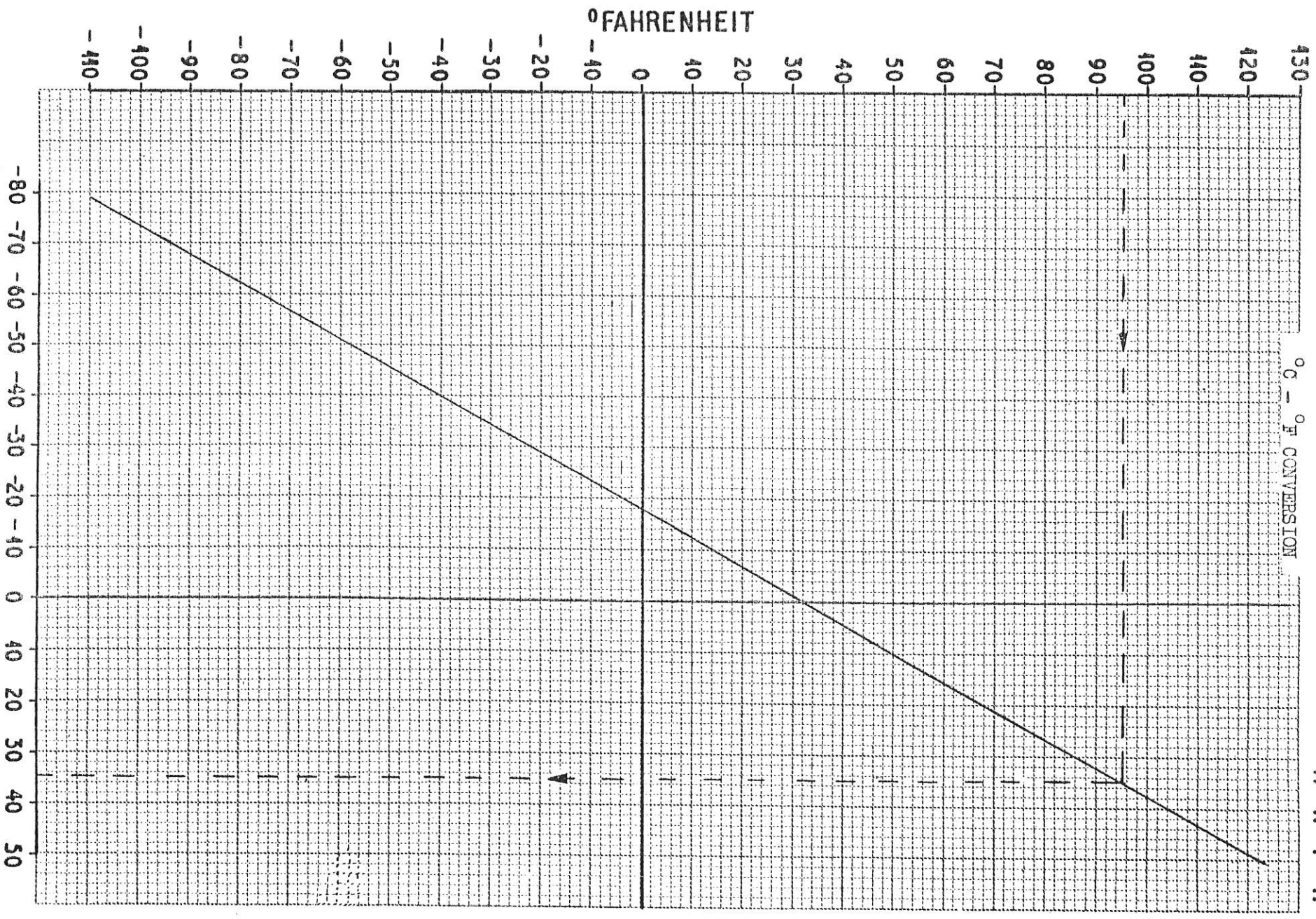
Altitude This term means pressure altitude above mean sea level and is indicated on sensitive pressure type altimeter by setting the sub-scale at 1013.2 millibars (29.92 inches or 760 millimetres of mercury).

Weight The total loaded weight of the aeroplane including occupants, fuel, oil and baggage.

Doc.No.A.R.3.3  
DETERMINATION OF TEMPERATURE  
IN RELATION TO I.S.A.

Con.No.







# MAXIMUM NUMBER OF SEATS

The maximum number of seats authorised to be fitted, including seats for the crew, is *four*. The limitation relating to the maximum number of occupants is given in the limitations section of this manual.

23.4.64.

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POUND - KILOGRAM CONVERSION

| <u>LB</u> | <u>LB OR KG</u> | <u>KG</u> |
|-----------|-----------------|-----------|
| 2.204     | 1               | .453      |
| 4.409     | 2               | .907      |
| 6.614     | 3               | 1.361     |
| 8.818     | 4               | 1.814     |
| 11.023    | 5               | 2.268     |
| 13.228    | 6               | 2.722     |
| 15.432    | 7               | 3.175     |
| 17.637    | 8               | 3.629     |
| 19.842    | 9               | 4.082     |
| 22.046    | 10              | 4.535     |
| 44.092    | 20              | 9.072     |
| 66.137    | 30              | 13.608    |
| 88.184    | 40              | 18.144    |
| 110.231   | 50              | 22.680    |
| 132.277   | 60              | 27.216    |
| 154.323   | 70              | 31.751    |
| 176.369   | 80              | 36.287    |
| 198.416   | 90              | 40.823    |
| 220.462   | 100             | 45.359    |
| 440.924   | 200             | 90.718    |
| 661.386   | 300             | 136.078   |
| 881.848   | 400             | 181.437   |
| 1102.310  | 500             | 226.796   |
| 1322.772  | 600             | 272.155   |
| 1543.234  | 700             | 317.514   |
| 1763.696  | 800             | 362.874   |
| 1984.158  | 900             | 408.233   |
| 2204.62   | 1000            | 453.592   |
| 4409.24   | 2000            | 907.184   |

SECTION I

OPERATING LIMITATIONS

THE AEROPLANE MUST BE OPERATED IN ACCORDANCE WITH THE  
LIMITATIONS AND INSTRUCTIONS IN THIS SECTION AND ANY  
ADDITIONS OR CHANGES WHICH MAY BE CONTAINED IN AN  
APPENDIX IN SECTION IV

CATEGORY OF CERTIFICATE OF AIRWORTHINESS

This type of aeroplane is eligible for certification in the Transport  
Category (Passenger).

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However this aeroplane may be restricted to another Category and to a  
particular use and this will be stated in the Certificate of Airworthiness.

F/7 | The aeroplane shall not be used for public transport when towing a glider.

WEIGHT, CENTRE OF GRAVITY AND LOADING LIMITATIONS

## MAXIMUM WEIGHT

P/2 | The maximum permissible weight for take-off and landing is 2,400 lb.  
(1089 kilograms).

NOTE: This weight may have to be reduced because of operational performance considerations.

## CENTRE OF GRAVITY

P/2 | The aeroplane shall be so loaded that its centre of gravity always lies between 13.5 inches and 20.0 inches aft of the datum.

The datum is defined as the leading edge of the wing at the wing root.

## FLOOR LOADING\*

The maximum permissible intensity of loading on the rear cabin floor is 120 lb. per square foot.

NOTE: these are structural limits. In all cases the centre of gravity and maximum weight limits must be observed and to this effect it may be necessary to carry out weight and balance calculations.

SEE WT REQUIREMENTS SECTION IV (Back of Book)

\* To be placarded.

POWER PLANT LIMITATIONSFUEL

The fuel approved for use with this engine is 91/96 octane aviation gasoline and the maximum lead content 5.5 millilitres tetra-ethyl-lead (T.E.L.) per Imperial gallon.

OILSpecification

Any oil may be used provided that it complies with specification D.Eng.R.D.2472 A/O.

S.A.E. 50 grade shall be used when the average ambient temperature is + 5°C or above.

S.A.E. 30 grade shall be used when the average ambient temperature is between - 12°C and 5°C.

S.A.E. 20 grade shall be used when the average ambient temperature is - 12°C or below.

Pressure\*

The normal oil pressure is between 60 p.s.i. and 85 p.s.i.

The minimum oil pressure with the engine idling is 25 p.s.i.

The minimum oil pressure for acceptance at maximum continuous power conditions is 60 p.s.i.

Temperature\*

The maximum permissible oil temperature is 118°C.

ENGINE SPEED\*

The maximum permissible engine rotational speed is 2,700 r.p.m. at full throttle.

P/13 Continuous operation at engine speeds between 2250 and 2550 r.p.m. with manifold pressure settings below 15 inches mercury must be avoided while descending.

CYLINDER TEMPERATURE

The maximum permissible cylinder head temperature is 260°C.

NOTE: this aeroplane may not be fitted with a cylinder temperature gauge.

\* To be placarded.

POWER PLANT LIMITATIONS (Continued)

## MIXTURE CONTROL

The mixture control is only to be used to maintain "weakest mixture for maximum power" conditions when cruising at altitudes above 5,000 feet or to avoid rough running due to overrichness in all other power conditions, and must not be used to cause a drop in engine speed.

AIR SPEED LIMITATIONSNEVER EXCEED SPEED ( $V_{NE}$ )\*

P/10 | The maximum permissible speed is 138 knots (159 m.p.h.) I.A.S.

NORMAL OPERATING LIMIT SPEED ( $V_{NO}$ )\*

P/10 | The normal operating limit speed is 109 knots (126 m.p.h.) I.A.S.

This speed shall not normally be exceeded: the limitation is imposed to reduce the probability of excessive loads on the structure being caused by unexpected gusts. If this speed is exceeded, it must be done with caution and on occasions when it is the pilot's opinion that appreciable atmospheric turbulence is unlikely to be encountered.

## MANOEUVRING SPEED

P/10 | Manoeuvres likely to involve full application of the flying controls shall not be attempted at a speed greater than 97 knots (112 m.p.h.) I.A.S.

NOTE: The requirements to which the rudder is designed ensure that it can withstand steady application of full movement at this speed, but a violently checked manoeuvre might overstress it.

## WING FLAPS EXTENDED SPEED\*

P/10 | The maximum permissible speed for extending the wing flaps and for flight with the wing flaps extended is 64 knots (74 m.p.h.) I.A.S.

\*To be placarded.

MISCELLANEOUS LIMITATIONS

## MINIMUM CREW

The minimum crew is one pilot.

## NUMBER OF OCCUPANTS

The total number of persons carried shall not exceed four nor exceed that for which seating accommodation approved for use during take-off and landing is provided. Children under the age of three years who are carried in the arms of passengers may be left out of account for this purpose.

## TYPES OF OPERATION

Flight by Night: When permitted by the Air Navigation legislation the aeroplane may be flown at night provided that Auster modification 3679 or 3768 or an approved equivalent is installed and any additional equipment required by the relevant legislation is carried.

Flight in icing conditions: no de-icing equipment is fitted and the capabilities of the aeroplane in icing conditions have not been investigated. The aeroplane therefore, shall not be intentionally flown into cloud in which the possibility of icing conditions exists.

Range of Air Temperature: satisfactory operation of the aeroplane has been demonstrated in air temperatures of up to I.S.A. + 23°C. No minimum temperature has been established.

## MANOEUVRES

At a weight of 2,400 lb, (1089 kg) the aeroplane has been designed to withstand without damage, manoeuvring loads (normal acceleration) of up to 3.5g with the wing flaps retracted. With the wing flaps extended the maximum is 2.0g at all weights. Manoeuvres shall be confined to these maximum values.

Aerobatic manoeuvres are not permitted.

## PARACHUTING

Subject to dispensation from the relevant Article of the Air Navigation Order this aeroplane may be used for free fall parachuting by persons subject to the following limitations.

- 1 The starboard door and starboard control column if fitted must be removed.
- 2 If a parachutist is to be carried in the rear of the cabin the back of the starboard front seat must be removed or folded flat.
- 3 Air speed shall not exceed 120 mph (104 knots) IAS.

Notwithstanding the limitation on page 17 of this manual, seats need not be provided for parachutists. Nevertheless, unless the dropping zone is in the immediate vicinity of the aerodrome of take-off, an approved means of restraint for each parachutist shall be provided.

The aeroplane must be so loaded that before and after the dropping of parachutists, the centre of gravity of the aeroplane remains within the limits stated on page 13 of this manual.

GLIDER TOWING LIMITATIONS

This aircraft, when equipped with an approved glider tow hook installation, is approved for towing gliders, provided that:-

- 1 The weight towed, be it of one or two gliders, shall not exceed the following:-

| Glider Classification<br>Group * | Maximum Weight of Glider(s)        |                                  |
|----------------------------------|------------------------------------|----------------------------------|
|                                  | Single Occupant of<br>Tug Aircraft | Two Occupants<br>of Tug Aircraft |
| A                                | lb<br>2000                         | lb<br>1700                       |
| B                                | kg<br>1800                         | kg<br>1525                       |
| C                                | kg<br>1600                         | kg<br>1350                       |
|                                  |                                    | kg<br>779                        |
|                                  |                                    | kg<br>692                        |
|                                  |                                    | kg<br>612                        |

\* As defined in British Gliding Association document entitled "Notes for Tug Pilots"

P/7

- 2 The number of gliders on tow shall not exceed two.
  - 3 The breaking load of the towing cable, or weak link, if fitted, shall not exceed 1000 lb (454 kg) when towing one glider. A weak link, the breaking load of which shall not exceed 1300 lb (590 kg), shall be installed between the towing bridle and the tug aircraft when towing two gliders.
  - 4 Air speed shall not exceed the lesser of the maximum permitted speeds for any glider(s) under tow.
  - 5 A serviceable cylinder head temperature indicating system shall be installed and the cylinder head temperature shall not exceed the limit stated on page 14 of this manual. This limitation shall be marked with a red radial line on the cylinder head temperature indicator.
  - 6 Towing must not be carried out when outside ambient air temperature exceeds ISA + 15°C.
- Towing procedures should be in accordance with those recommended in the British Gliding Association document entitled "Notes for Tug Pilots".

PLACARDS

Such limitations as are required to be placarded including those limitations in this manual denoted by an asterisk (\*) shall be visibly displayed

## SECTION II

HANDLING INFORMATIONMAXIMUM CROSSWIND COMPONENT

The maximum crosswind component in which the aeroplane has been demonstrated to have safe handling characteristics for take-off and landing is 18 miles per hour (15 knots).

This wind relates to a height of 10 metres (33 feet) above the ground.

OPERATIONS FROM ROUGH GROUND

The aeroplane has been demonstrated to be suitable for operations from rough grass surfaces.

TAKE-OFF SAFETY SPEED

The take-off safety speed with the wing flaps extended to the take-off (1st notch) position is shown in Figure 2-1 for varying weights. This is the speed for initial climb after take-off.

APPROACH SPEED

The steady final approach speed with the flaps fully extended (2nd notch) is 50 knots (58 m.p.h.) I.A.S. This speed ensures a true margin above the stall of at least 30%.

BAULKED LANDING

The requirement for a certain minimum climb performance following a baulked landing is achieved on this aeroplane with the flaps in the take-off (1st notch) position. When discontinuing an approach using full flap, move flap lever to first notch position immediately after opening up to full power. This flap retraction does not cause any loss of height or significant change in trim.

STALLING

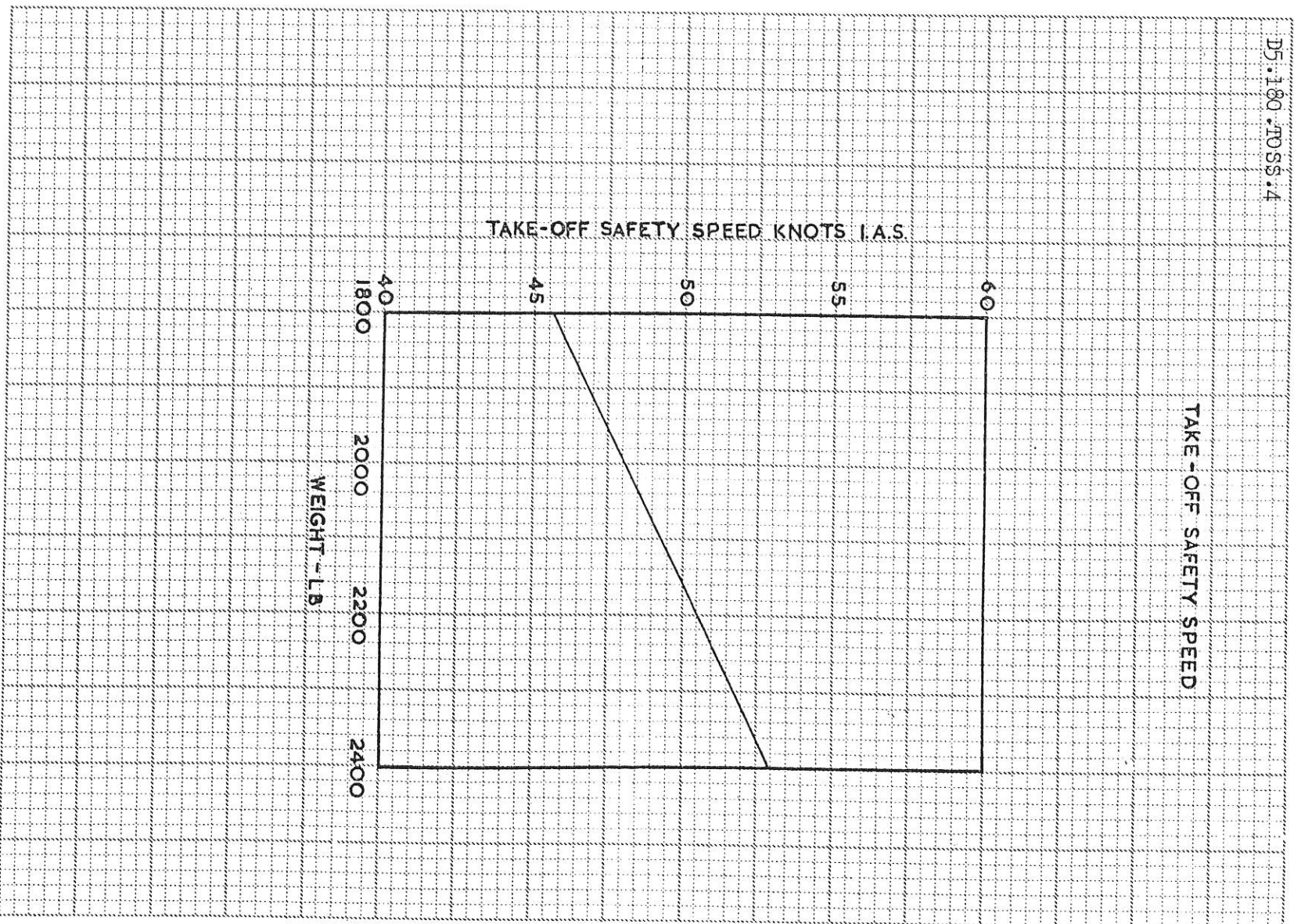
There is no natural stall warning, but the stalling characteristics are mild. Usually there is a straight nose drop, but on some occasions there may be a slight tendency to roll. The stalling speeds in I.A.S. for three configurations are shown against varying weights in Figure 2-2.

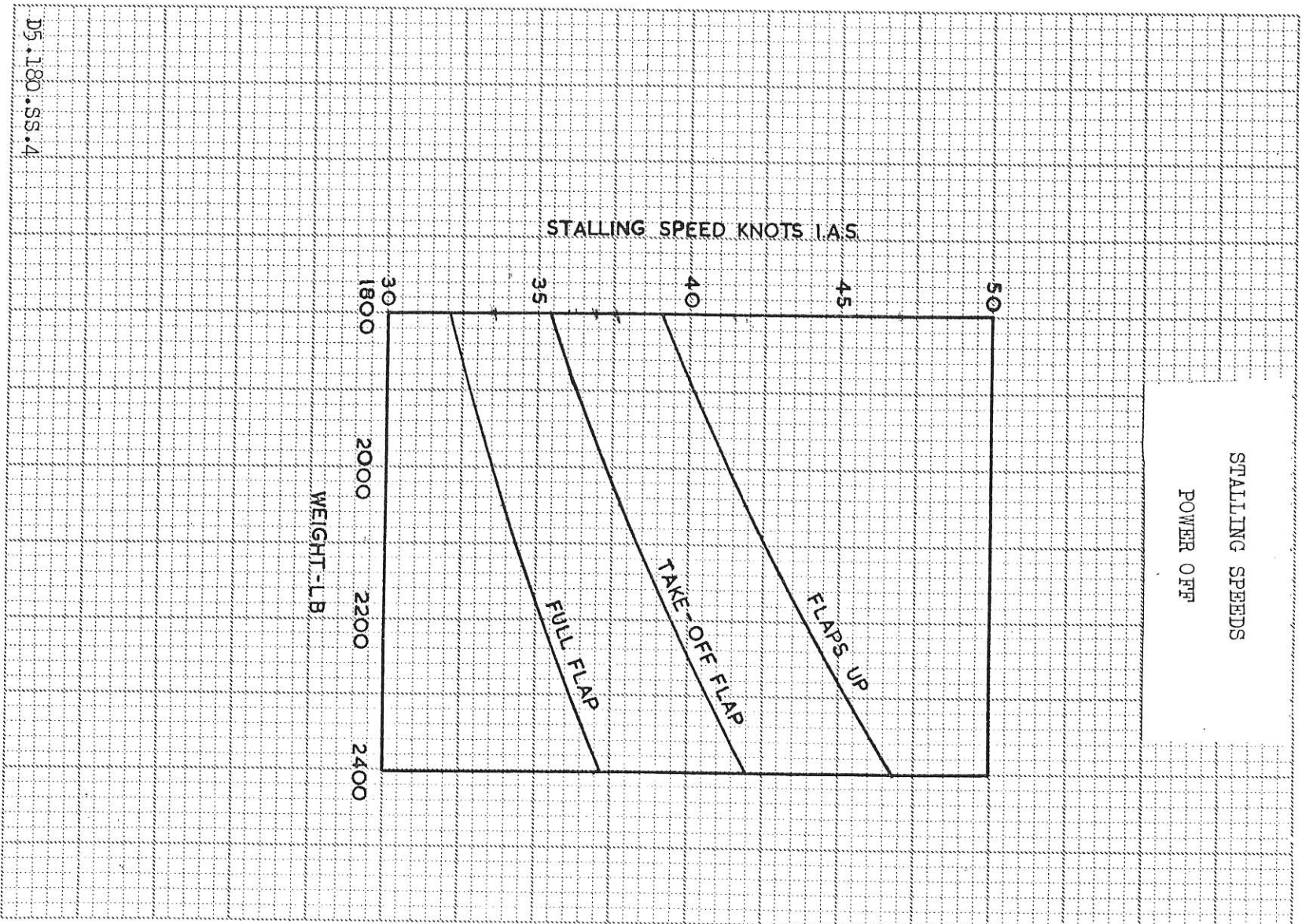
TECHNIQUE FOR SEVERE TURBULENCE

If flight in severe turbulence cannot be avoided, ensure that the flaps are fully retracted and that all occupants are strapped in their seats. The safest speed at which to fly is 83 knots (96 m.p.h.) I.A.S. but this should be the mean speed and no attempt should be made to correct for fluctuations of short duration from this speed.



D5.180.TOSS.4





D5.180.SS.4

## SECTION III

P E R F O R M A N C EPERFORMANCE GROUP

This aeroplane is classified in Performance group D of the United Kingdom Air Navigation (General) Regulations.

SPEED FOR FLIGHT OVER WATER

P/2 For the purpose of complying with the regulations governing flights over water the true speed to be assumed is 120 m.p.h. (104 knots).

CONDITION OF AEROPLANE

P/2 The performance information in this Section relates to a standard D5 Series 180 aeroplane in the following condition:-

Power unit : Avco Lycoming O-360-A2A engine fitted with either a

McCaughey type 1A200/FA-8250 propeller of 6.83 feet diameter and 4.16 feet fixed pitch;

or a

McCaughey type 1A200/FA-8243 propeller of 6.83 feet diameter and 3.58 feet fixed pitch.

or

Avco Lycoming O-360-A1A engine fitted with a McCaughey constant speed type 2D36C14B/78KM-4 propeller of 6.17 feet diameter.

External fittings : As shown in the general arrangement drawing Figure O-1.



## DEFINITIONS

Gradient of climb : the ratio, in the same units, expressed as a percentage of:

Change in height

Horizontal distance travelled

Net data : except where stated to the contrary, all performance schedule is 'net data' which means that a safety margin has been embodied so as to allow for unexpected contingencies.

I.A.S. : indicated air speed, see definitions on page 8. The correction for position error is given in Figure 3-1.

I.S.A. : International Standard Atmosphere.

## VALIDITY OF DATA AND USE OF CHARTS

The performance information is not valid if it is obtained by extrapolation, that is to say, by using values of parameters outside the range scheduled, unless specifically permitted by the text.

In temperature conditions below I.S.A. the performance shall not be assumed to be better than that for I.S.A. conditions.

The method of reading each chart is illustrated by an arrowed, dotted line on the chart.

図表の解法

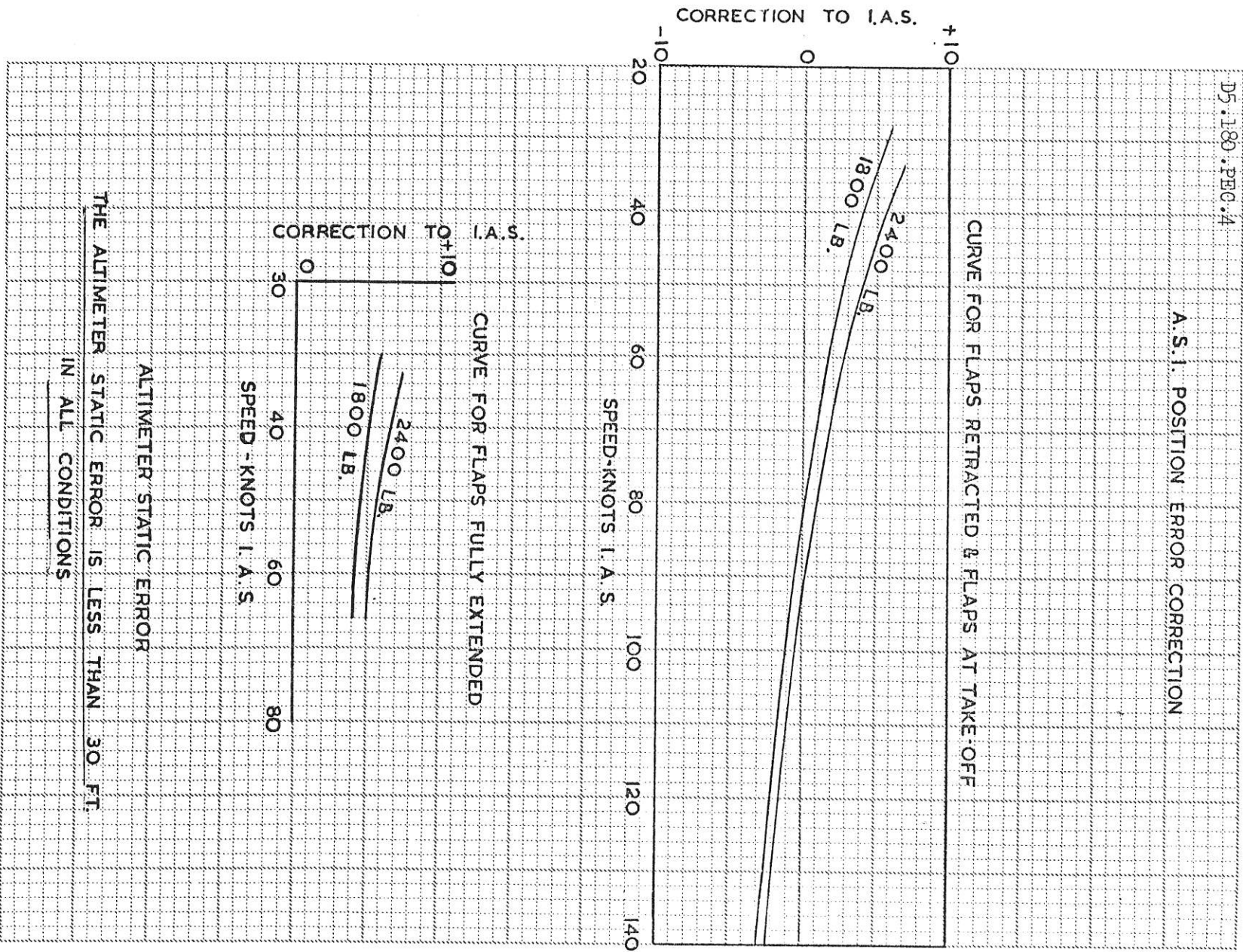
The wind correction grids are factored in such a way that not more than 50% of a headwind is obtained. Reported headwinds may be used directly in the chart.

No data on the effect of tailwinds is provided and therefore downwind take-offs or landings must not be attempted.



D5.180.PEC.4

## A.S.I. POSITION ERROR CORRECTION



MAXIMUM TAKE-OFF AND LANDING WEIGHT  
FOR ALTITUDE AND TEMPERATURE

Within the limits of altitude scheduled (6,000 feet) and the maximum air temperature in which satisfactory operation of the aeroplane has been demonstrated (I.S.A. + 15°C., See page 17) the maximum take-off and landing weight is ~~2,450~~ lb.

This weight may be restricted by other performance considerations such as take-off or landing distances, obstacle clearance, etc. becoming critical.

Figure 3-2 deleted.

TAKE-OFF RUN REQUIRED

FIGURE 3-3

The take-off run required from rest to take-off safety speed for varying altitudes, temperatures, weights and headwind components is shown in Figure 3-3. The technique assumed in establishing this distance is that the aeroplane is held down close to the ground until take-off safety speed (Figure 2-1) is reached.

ASSOCIATED CONDITIONS

|            |   |                                      |
|------------|---|--------------------------------------|
| Power Unit | : | Full throttle, maximum r.p.m.        |
| Wing Flaps | : | Take-off (first notch 25°) position. |
| Runway     | : | Hard, dry, level surface.            |

The following table shows the amount by which the take-off run required obtained from Figure 3-3 is increased, (a) for every 1% uniform uphill slope and (b) when the take-off surface is grass. Linear interpolation may be used.

| Weight lb.                         | 2,000                               | 2,400    |
|------------------------------------|-------------------------------------|----------|
| (a) % increase for 1% uphill slope | Sea level<br>5,000 feet<br>4<br>6   | 6<br>9   |
| (b) % increase for grass surface   | Sea level<br>5,000 feet<br>13<br>20 | 22<br>35 |

P/2

The correction of uphill slope is not applicable for slopes exceeding 2%.

As the effect of downhill slopes is not scheduled the take-off run appropriate to a zero slope must be used when there is a down hill slope.

The headwind grid has been factored in such a way that an effect of not more than 50% of the headwind is obtained. Reported winds may therefore be used directly in the chart.



FIG. 3-3

TAKE-OFF DISTANCE REQUIRED

FIGURE 3-4

P/101

The take-off distance required from rest to a height of 50 feet for varying altitudes, temperatures, weights and headwind components is shown in Figure 3-4. The technique assumed in establishing this distance is that the aeroplane is held close to the ground until a speed of 46 knots (52 m.p.h.) I.A.S. is reached. The climb away is carried out in such a manner that the aeroplane accelerates during transition to achieve steady climbing flight at the take-off safety speed (Figure 2-1) at the 50 feet height point.

The following table shows the amount by which the take-off distance is increased (a) for every 1% uniform uphill slope and (b) when the take-off surface is grass. Linear interpolation may be used.

P/2

| Weight - lb                        |            | 2,000 | 2,400 |
|------------------------------------|------------|-------|-------|
| (a) % increase for 1% uphill slope | Sea level  | 6     | 9     |
|                                    | 5,000 feet | 10    | 15    |
| (b) % increase for grass surface   | Sea level  | 6     | 10    |
|                                    | 5,000 feet | 9     | 16    |

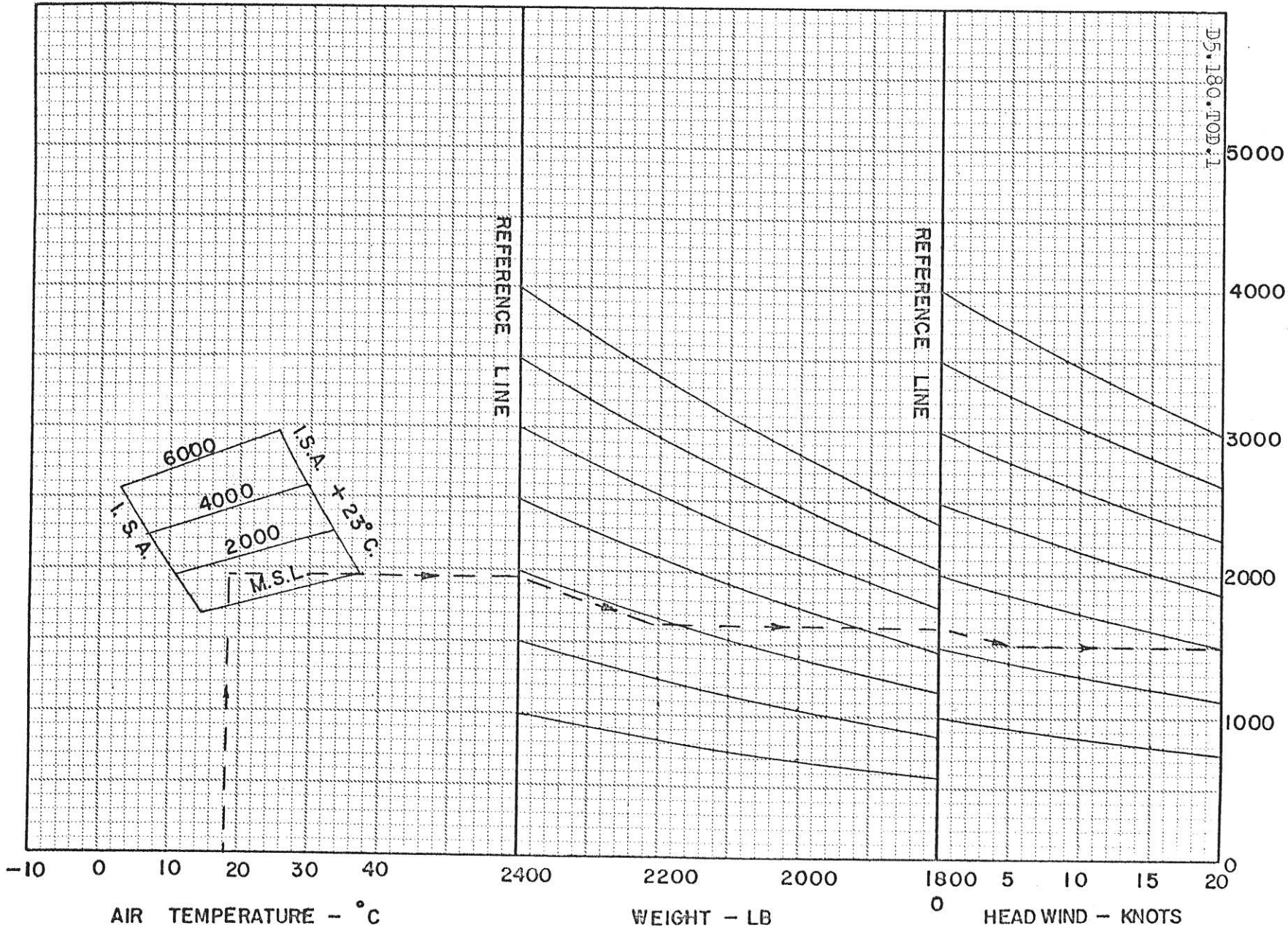
The correction of uphill slope is not applicable for slopes exceeding 2%.

As the effect of downhill slopes is not scheduled the take-off distance appropriate to a zero slope must be used when there is a downhill slope.

ASSOCIATED CONDITIONS

|            |   |                                       |
|------------|---|---------------------------------------|
| Power Unit | : | Full throttle, max. r.p.m.            |
| Wing Flaps | : | Take-off (first notch, 25°) position. |
| Runway     | : | Hard, dry, level surface.             |

TAKE - OFF DISTANCE REQUIRED - FT.  
*over 50 ft.*



TAKE-OFF FLIGHT PATH - NET GRADIENT OF CLIMB FIGURE 3-5

The net gradient of climb for varying weights, altitudes and temperatures is shown in Figure 3-5. The information is given so that the ability of the aeroplane to clear any obstacle after take-off may be assessed.

The radius of a steady rate one turn ( $180^\circ$ /minute) for the associated conditions is to be taken as 2,000 feet for all weights, altitudes and temperatures.

PERFORMANCE CEILING FIGURE 3-6

The performance ceiling for varying weights and temperatures is shown in Figure 3-6.

EN ROUTE GLIDE FIGURE 3-6A

The horizontal distance covered in zero wind with the power unit inoperative is shown in Figure 3-6A for varying altitudes and temperatures.

The effect of wind should be allowed for in the same way as in a normal navigational calculation.

The gross gradients shown on this chart must not be used for the purpose of establishing compliance with the operating regulations.

ASSOCIATED CONDITIONS FOR FIGURES 3-5, 3-6 and 3-6A

|            | <u>Flight Path</u><br><u>Fig. 3-5</u> | <u>Performance Ceiling</u><br><u>Fig. 3-6</u>                               | <u>En route glide</u><br><u>Fig. 3-6A</u> |
|------------|---------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------|
| Power Unit | full throttle                         | full throttle                                                               | inoperative                               |
| Wing Flaps | Take-off (1st notch $25^\circ$ )      | Fully retracted ( $0^\circ$ )                                               | fully retracted ( $0^\circ$ )             |
| Airspeed   | Take-off safety speed (Fig. 2-1)      | 66 knots (76 m.p.h.) at sea level reducing 1 m.p.h. per 2,000 ft. altitude. | 59 knots (68 m.p.h.) I.A.S.               |

P/10



# NET TAKE - OFF FLIGHT PATH NET GRADIENT OF CLIMB

D5.180.TOFFPL

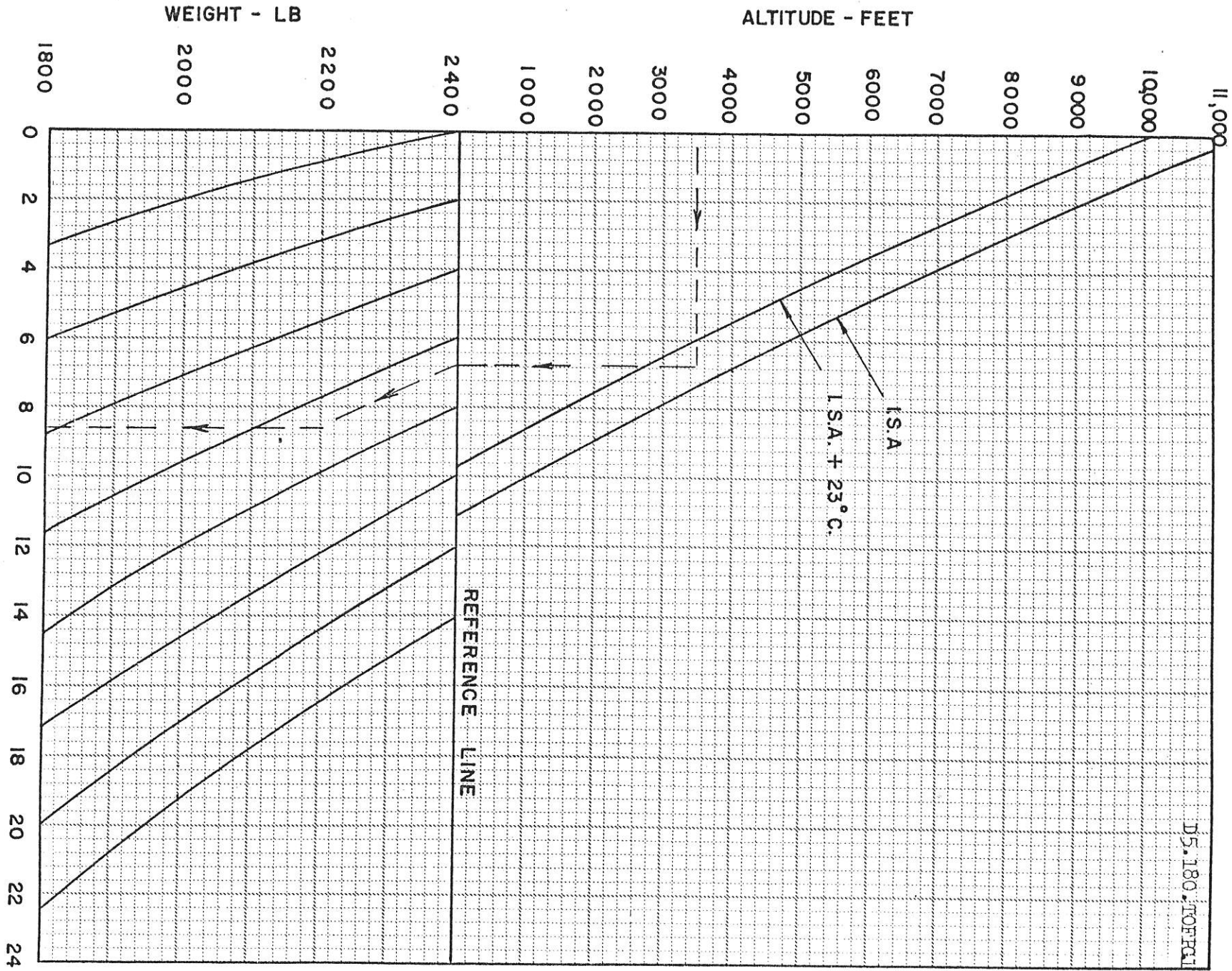
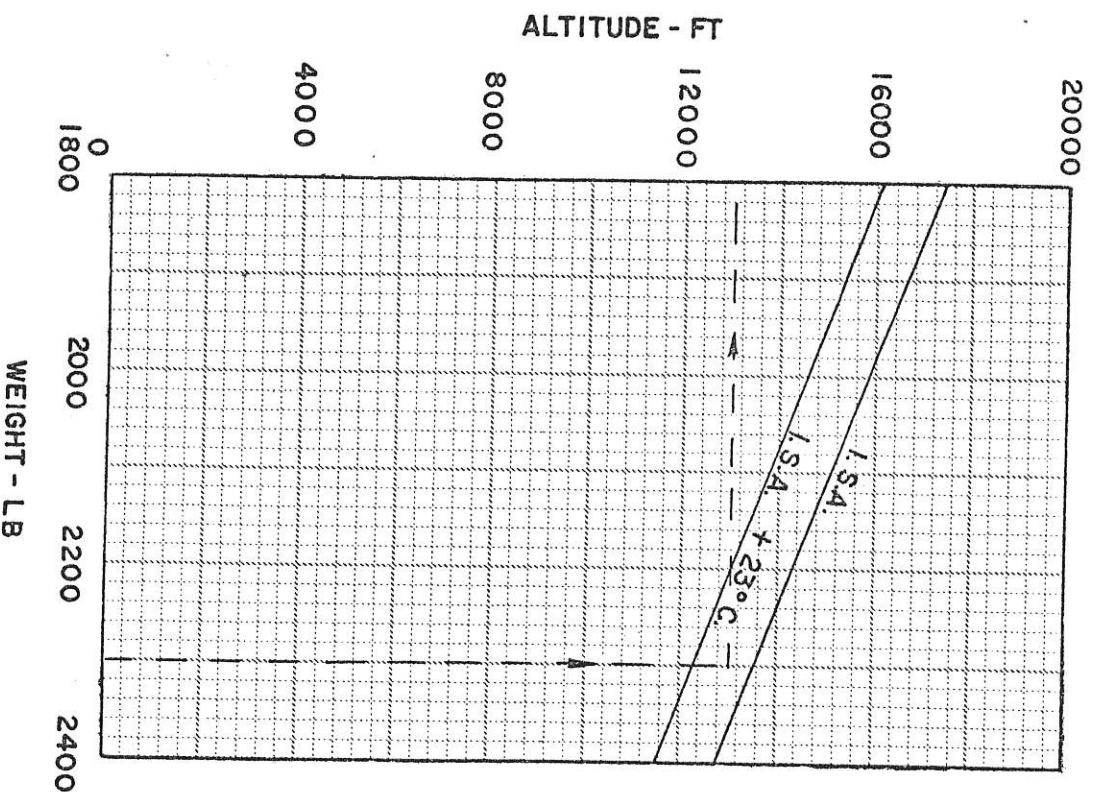


FIGURE 3-6

PERFORMANCE CEILING

The performance ceiling is shown in Figure 3-6 below for varying weights and temperatures. The associated conditions are stated on page 30.

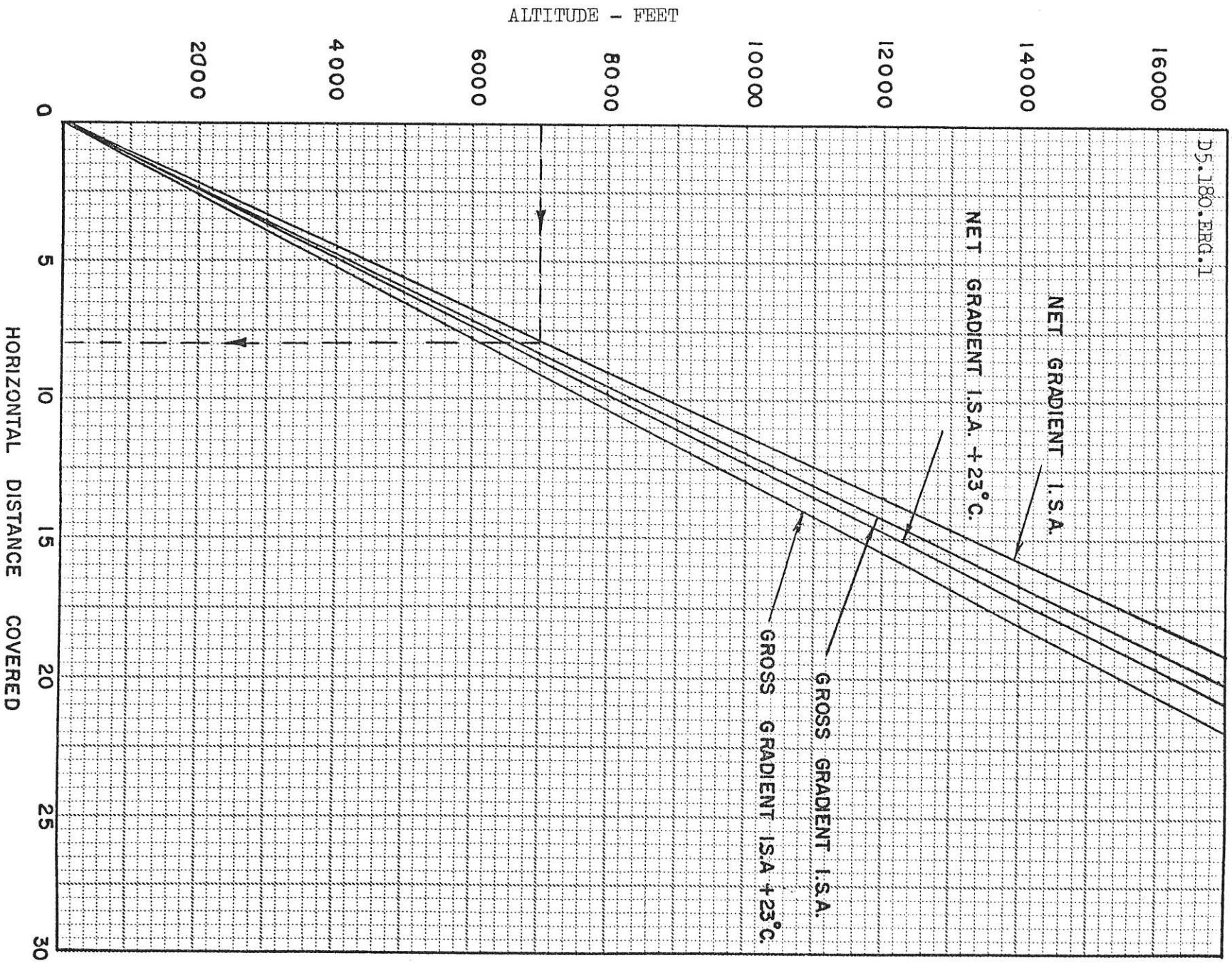
The performance ceiling is not a limitation as it does not prohibit an aeroplane flying higher than the ceiling scheduled (although at some altitudes the operating regulations may require oxygen to be carried). The performance ceiling represents the maximum altitude which the aeroplane may be regularly relied upon to achieve bearing in mind the adverse conditions likely to occur. When establishing compliance with that part of the operating regulations referring to en route flight, the calculation must not assume that the aeroplane is flying above the scheduled performance ceiling.



D5.180.PC.1

( POWER UNIT INOPERATIVE )

D5.180.FRG.1



LANDING DISTANCE

FIGURE 3-7

The landing distance required from a height of 50 feet to stop is shown in Figure 3-7 for varying altitudes, temperatures and headwind components.

## ASSOCIATED CONDITIONS:

|      |               |   |                                           |
|------|---------------|---|-------------------------------------------|
|      | Power unit    | : | Idling                                    |
|      | Wing flaps    | : | Fully extended (2nd notch, 50°) position. |
| P/10 | Airspeed      | : | 50 knots (58 m.p.h.) at 50 feet.          |
|      | Wheel-braking | : | Normal                                    |
|      | Runway        | : | Hard, dry, level surface                  |

The landing distances in Figure 3-7 are 'gross data' that is to say, unfactored. The factor to be applied to the landing distance available is given in the relevant operating regulations.

The landing distance is increased by a uniform downhill surface slope at the rate of 8% increase of distance per 1% downhill slope. This correction is not applicable to slopes exceeding 2%.

As the effect of an uphill slope is not scheduled, the landing distance appropriate to zero surface slope is to be used when there is an uphill slope.

The information given in Figure 3-7 is applicable to any weight up to the maximum permitted landing weight.

The headwind grid is factored in such a way that an effect of not more than 50% of the headwind is obtained. Reported winds may therefore be used directly in the chart.

# LANDING DISTANCE FROM 50 FEET HEIGHT

Doc.No.AR.3.3

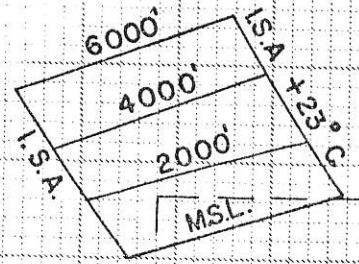
Con.No.

LANDING DISTANCE - FEET

2000  
1800  
1600  
1400  
1200  
1000  
800

D5.180.LD.1

REFERENCE LINE



HEAD WIND - KNOTS

AIR TEMPERATURE - °C

-10 0 10 20 30 40 50 0 5 10 15 20

GROSS DATAEN ROUTE GROSS RATE OF CLIMB

FIGURE 3-8

The gross rate of climb is shown in Figure 3-8 for varying altitudes, temperatures and weights.

This performance information is valid for an aircraft fitted with an approved fixed pitch propeller. If the aeroplane is fitted with a McCauley 2D36C14B/78KM-4 propeller, the en-route gross rate of climb obtained from Figure 3-8 must be reduced by:

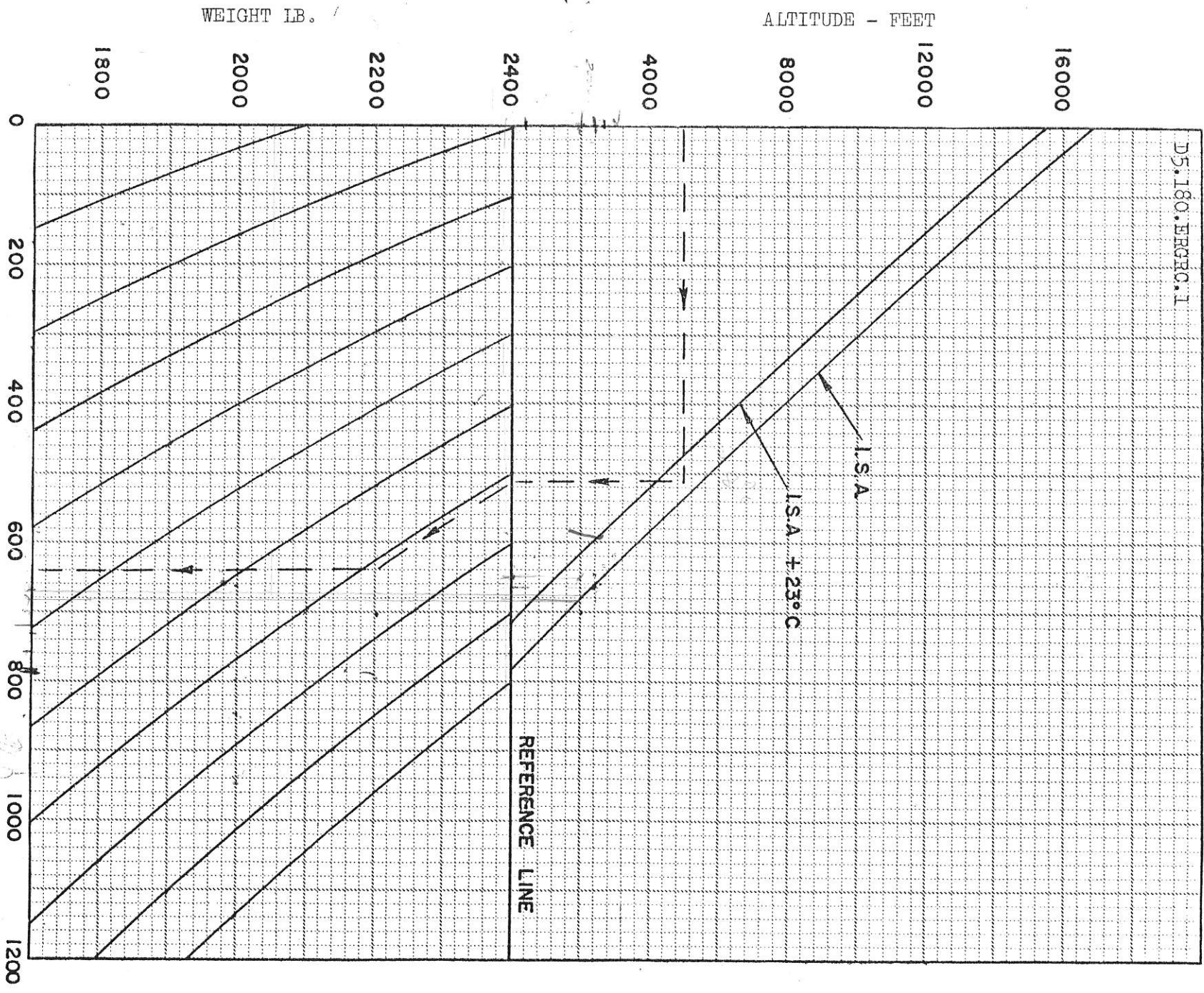
20 feet per minute at a weight of 2400 lb (1089 kg)  
100 feet per minute at a weight of 1900 lb (862 kg)  
with linear interpolation at intermediate weights.

This data is 'gross data' which is given for general information or flight test purposes. It must not be used for the purpose of establishing compliance with the operating regulations.

## ASSOCIATED CONDITIONS:

|            |   |                                                                             |
|------------|---|-----------------------------------------------------------------------------|
| Power Unit | : | Full throttle<br>Maximum r.p.m.                                             |
| Wing Flaps | : | Fully retracted (0°)                                                        |
| Airspeed   | : | 66 knots (76 m.p.h.)<br>decreasing by 1 knot per 2,000 feet<br>of altitude. |

EN ROUTE GROSS RATE OF CLIMB



SECTION IV

A P P E N D I C E S

This Section is reserved for appendices to the previous Sections of the manual, to give information on special operations which are outside the normal role of the aeroplane and which may involve some lowering of the level of safety.

The special limitations, procedures and information which are given in these appendices supersede the relevant data in the other Sections.

SECTION V

WEIGHT AND CENTRE OF GRAVITY SCHEDULE

The weight and centre of gravity schedule for the aeroplane shall be inserted in the manual to follow this page.

ARB APPENDIX CMAXIMUM WEIGHT INCREASED TO 2495 LB

The maximum weight of the aeroplane may be increased by 95 lb (43kg) above that stated on page 13 of this flight manual provided that Barton Moss Engineering Co. (Aircraft) Ltd. modification is embodied and the following limitations are complied with.

The limitations and information given previously in this manual are applicable except as given below.

MAXIMUM WEIGHT

The maximum permissible weight for take-off and landing is 2495 lb (1132 kg).

This weight may have to be reduced because of operational performance considerations.

PERFORMANCE CORRECTIONS

When the weight of the aeroplane exceeds 2,400 lb (1089 kg) the following corrections must be applied to the performance information scheduled in Sections II and III of this manual.

TAKE-OFF SAFETY SPEED

I.A.S. The take-off safety speed must be increased to 54.5 knots (63 m.p.h.)

STALLING SPEEDS

Increase the power-off stalling speeds given in Figure 2-2 for 2400 lb by

1½ knots for the flaps up and take-off flap cases;

1 knot for full flap case.



PERFORMANCE CORRECTIONS (Continued)

MAXIMUM TAKE-OFF AND LANDING WEIGHT FOR ALTITUDE AND TEMPERATURE

Within the ranges of altitude and temperature for which performance is scheduled, the maximum take-off weight and maximum landing weight are 2495 lb.

TAKE-OFF RUN REQUIRED

Obtain the take-off run appropriate to 2400 lb and the altitude, temperature, wind and runway slope and surface conditions from pages 26 and 27 and add 250 feet.

TAKE-OFF DISTANCE REQUIRED

Obtain the take-off distance appropriate to 2400 lb and the altitude, temperature, wind and runway slope and surface conditions from pages 28 and 29 and add 350 feet.

TAKE-OFF FLIGHT PATH, NET GRADIENT OF CLIMB

Obtain the gradient of climb appropriate to conditions and 2400 lb and subtract 1.2%.

PERFORMANCE CEILING

Obtain the performance ceiling appropriate to temperature for 2400 lb from Figure 3-6 and subtract 1,000 feet.

EN-ROUTE GLIDE

Obtain the en-route horizontal gliding distance by reading Figure 3-6A for an altitude 1,000 feet lower than the actual altitude.

LANDING DISTANCE

Obtain the landing distance appropriate to conditions of altitude, temperature, head wind and runway slope from Figure 3-7 and page 33 and increase it by 18%.

FINAL APPROACH SPEED

The final approach speed with flaps fully extended (2nd notch 50°) is increased to 53 knots (61 m.p.h.) I.A.S.



# **NORTHAMPTONSHIRE SCHOOL OF FLYING LTD** **AIRCRAFT MAINTENANCE SECTION**

Sywell Airport, Northampton. NN6 0BN.

## **WEIGHT AND CENTRE OF GRAVITY SCHEDULE**

|                                    |       |                                          |
|------------------------------------|-------|------------------------------------------|
| Reference                          | .. .. | FLS Aerospace report No: ATS-110-3858    |
| Produced by                        | .. .. | N Mathews                                |
| Aircraft Type                      | .. .. | Beagle D5/180                            |
| Nationality and Registration Marks |       | G - ANSC S/N 3678                        |
| Constructor                        | .. .. | Beagle Aircraft Ltd.                     |
| Maximum Authorised Weight          | ..    | 2400 lbs                                 |
| Centre of Gravity Limits..         | ..    | 13.5 inches to 20.0 inches aft of datum. |

### **Part A. BASIC WEIGHT**

- The basic weight of the aircraft is: **1600 lbs** as calculated from the weighing report reference No: **ATS-110-3858**. Dated: **24/3/95**.
- The centre of gravity of the aircraft in the same condition at this weight and with the landing gear extended is: **13.14** inches aft of the datum.
- The total moment about the datum in this condition in lb./in. is: **21,024.0**
- This datum is the one to which the limits in the Certificate of airworthiness/Flight Manual relate and is defined as: The leading edge of mainplane at the root end. The aircraft in the rigging position.
- The basic weight includes the weight of nil gallons of unusable fuel and 1.625 gallons of usable oil and the weight of the following items which comprise the list of Basic Equipment:

| Item                                                                                                                     | Weight (lb.) | Lever Arm (inches) |
|--------------------------------------------------------------------------------------------------------------------------|--------------|--------------------|
| 1. Rear bench seat complete.<br>Glider towing assembly.<br>Cessna 300 radio.<br>Propellor c/w C.S.U.<br>Scott Tailwheel. | 20 lbs       | + 58.0             |

**Part B. VARIABLE LOAD**

The weight and lever arms of the variable load are shown below. The variable load carried depends upon the role in which the aircraft is used:

| Item        | Weight lb.        | Lever Arm<br>inches | Moment lb./in. |
|-------------|-------------------|---------------------|----------------|
| Pilot (one) | To be determined. | + 20.0              |                |

**Part C. LOADING INFORMATION (DISPOSABLE LOAD)**

The total moment change when the landing gear is retracted in lb./in/ is:  
The appropriate lever arms are:

| Item              | Weight lb.                                                         | Lever Arm<br>inches | Moment lb./in. |
|-------------------|--------------------------------------------------------------------|---------------------|----------------|
| <u>Fuel</u>       | <u>Imp. Gals.</u>                                                  |                     |                |
| Main tanks:-      | 32.0                                                               | + 25.0              | 5,860.0        |
| Auxiliary Tanks:- | N/A                                                                |                     |                |
| Engine Oil:-      | Included in basic weight.                                          |                     |                |
| Baggage:-         | Rear cabin floor aft of rear seat. Max permissible floor loading:- |                     |                |
|                   | 120.0                                                              | + 63.0              | 4,320.0        |

|                          |                   |        |
|--------------------------|-------------------|--------|
| Passengers Row 1 seats:- | To be determined. | + 20.0 |
| Passengers Row 2 seats:- | To be determined. | + 49.0 |
| Passengers Row 3 seats:- | N/A               |        |

(Fuel density 7.2 lb. Imp. Gal. / Oil density 9.0 lb. Imp. Gal.)

Note: to obtain the total loaded weight of the aircraft, add to the basic weight the weights of the variable and disposable load items to be carried for a particular role.

This schedule was prepared on 24 March, 1995 and supersedes all previous issues.

Signed.....

Inspector/Engineer

on behalf of: Northampton shire School of Flying Ltd.