

R.A.A.F. PUBLICATION No. 416

February, 1944



**PILOT'S NOTES
FOR
TIGER MOTH AIRCRAFT**

(To be used in Conjunction with A.P.1732A)

Issued for the Information and Guidance of All Concerned

By Command of the Air Board.

A handwritten signature in black ink, appearing to read 'J. Mulhoney', with a horizontal line underneath.

**Air Force Head-Quarters
Melbourne, S.C.I.**

Secretary.

PILOT'S NOTES - TIGER MOTH
LIST OF CONTESTS

PART 1 DESCRIPTIVE

	Paragraph
General Data	1
Fuel System	2
Oil System	3
Electrical System	4
Flying Controls	5
Control Locks	6
Elevator and Rudder Trim	7
Automatic Slots	8
Undercarriage	9
Tail Skid	10
Engine Controls	11
Instruments	12
Cockpit Equipment	13
Stowage Space	14
Blind Flying Hood	15

PART II - HANDLING

Preparation for Flight	16
Before Going Solo	17
Before Startomg Engine	18
Starting	19
Warming Up	20
Running Up	21
Taxying	22
Take Off	23
Climbing	24
Cruising	25
Stalling and Spinning	26
Steep Turns	27
Aerobatics	28
Descending	29
Low Flying	30
Approach and Landing	31
Precautionary Approach and Landing	32
Mislanding	33
Stopping the Engine	34

PART III - OPERATING DATA

	Paragraph
Engine Limitations	35
Desired Operating Figures	36
Mixture Control	37
Flying Limitations	38
Fuel Consumption	39

PART IV - EMERGENCIES

Fire Appliance	40
First Aid	41
Abandoning the Aircraft	42

PART I - DESCRIPTIVE

1. General Data

(i) Nomenclature

R.A.A.F. Serial No:	A17
British Mark No:	DH82A
Manufacturer:	De Havilland Aircraft Co. (Aust.)
Purpose:	Elementary Trainer
Type:	Single engine two seater fabric covered biplane

(ii) Airframe

Span:	29 ft. 4 in.
Length:	23 ft. 11 in.
Height (T.U.):	8 ft. 9½ in.
Track:	5 ft. 3 in.
Gross Wing Area:	239 sq ft.
Airscrew clearance:	24 in.

(iii) Weights

Tare Weight:	1180 lb
Maximum permissible weight:	1825 lb.
Maximum permissible weight - aerobatics	1770 lb.

The maximum permissible weight is made up as follows:-

Tare weight:	1180 lb.
Crew of two with parachutes:	400 lb.
Fuel - 19 gallons:	142 lb.
Oil - 2.1 gallons:	18 lb.
Stowage:	85 lb.
	<hr/>
	1825 lb.
	<hr/>

(iv) Arscrew

2 bladed, wooden fixed pitch.

(v)	Engine:	
	Maker:	De Havilland Aircraft Ltd
	Name:	Gypsy Major
	Series:	1 Type 1
	No. of cylinders:	4 in line inverted
	Cooling:	air
	Octane of fuel:	73
	Oil:	DTD 109
	Weight dry:	330 lb.
	Take Off Power:	130 B.H.P. 2350 R.P.M.

2. Fuel System

- (i) The fuel tank is installed between the centre-section struts above the front cockpit, its capacity being 19 gallons.
- (ii) A fuel cock is fitted on the lower left-hand side of the tank and can be operated manually by push-pull rods on the left-hand side of each cockpit.
- (iii) The fuel flows by gravity through the fuel cock to a filter on the front bulkhead and thence to the carburettor. Embodied in the fuel tank is a water and dirt trap to which is fitted a drain cock.
- (iv) The carburettor is fitted with a spring loaded plunger which when depressed floods the carburettor and is used when starting the engine,
- (v) The fuel level in the tank is indicated by a float type gauge situated at the rear of the tank and is visible from both cockpits.

3. Oil System

- (i) The correct grade of aviation oil used is DTD 109 or .100 oil seconds with an alternative of DTD109 120.

- (ii) The oil tank is mounted externally on the port side of the fuselage, behind the engine cowling its capacity being 2.1 gallons. Cooling is effected by the slipstream on the exposed portion of the tank.
- (iii) The oil level is measured by a dip stick attached to the tank filler cap.

4. Electrical System

- (i) On Tiger Moth aircraft equipped for night flying, provision is made for a 12 volt battery in the front cockpit centrally situated in front of the control column.
- (ii) On these aircraft, the navigation light switches, emergency flare switch, release button and identification switch are operated from the rear cockpit only. The navigation light switch and emergency flare switch and release button are situated on a panel mounted centrally on top of the control box in front of the rear control column. The identification and signalling switch is situated on the right-hand side of the rear cockpit above the slot locking lever.
- (iii) Both cockpits are fitted with panel lights and operate from a rheostat type of switch situated on the right hand side of the instrument panels below the panel lights.

5. Flying Controls

- (i) Dual controls are fitted being interconnected between the cockpits. Solo flying must be carried out in the rear cockpit and for this purpose the controls in the front cockpit are readily detachable.
- (ii) The front control column is removed by withdrawing the safety locking pin, and the control column should then be stowed in the fittings provided in the luggage compartment.

- (iii) The front rudder control can be disconnected by removing the retaining split pins and disconnecting the rod to the rear rudder bar.
- (iv) The rudder pedals in both cockpits are adjustable for leg length by removing the safety locking pins.

6. Control Locks

- (i) Provision is made in the rear cockpit for a jig which locks the elevators and ailerons in the central position.
- (ii) The rudder is locked by a V shaped wedge placed between the fin and the rudder.

7. Elevator and Rudder Trim

- (i) Longitudinal trimming is effected by spring loading the elevators. The required tension is obtained by a lever and quadrant situated on the left of each cockpit. These trimming springs are both adjustable for tension in the rear cockpit.
- (ii) Directional trimming is assisted by a tension spring fitted to the rudder bar on the right hand side of the rear cockpit. This spring should be adjusted so that no pressure is required on either rudder pedal when the engine is operating at cruising R.P.M.

8. Automatic Slots

- (i) Auto slots are fitted to the top mainplanes and are provided with a locking gear. The operating lever and quadrant are situated on the right hand side of the rear cockpit below the instrument panel.
- (ii) The operating lever should be near the rearmost position when the slots are locked. With the lever in the forward position the slots should be quite free.

9. Undercarriage

The undercarriage is the fixed divided axle type. Each leg consists of steel springs in compression aided by a friction damping device. Pneumatic tyres are fitted and the correct air pressure is 12-15 lb/sq. inch.

10. Tail Skid

A steerable tail skid is mounted at the bottom of the fin-post external to the fuselage; it is fitted with a shock absorbing spring and is steered through the medium of the rudder.

11. Engine Controls

A throttle control lever is mounted on the left-hand side of each cockpit and in addition a mixture control lever is fitted in the rear cockpit. The latter, however, is automatically closed by closing the throttle from either cockpit. Friction nuts are provided in order to adjust the tension of the controls.

12. Instruments

Limited instrument flying panels are fitted in both cockpits. Suction for the gyro instruments is supplied by two venturis. One is situated on the forward starboard centre section strut, and the other on the port side of the fuselage.

13. Cockpit Equipment

- (i) Doors. Both cockpits are fitted with a door on each side, and the front edges of each cockpit are fitted with leather covered sponge pads.
- (ii) Seats. Both cockpit seats are shaped to receive a seat type parachute, but are not adjustable for height. The front seat has spring loaded hinged flaps to facilitate adjustment of the rear rudder bar. Both cockpits are equipped with Sutton safety harness.
- (iii) Inter Communication. Speaking tubes and connections for earphones are fitted.

14. Stowage Space

- (1) A luggage compartment is situated on the star-board side of the fuselage behind the rear cockpit.
- (11) A leather compartment for stowage of navigation equipment is situated in the rear cockpit attached to the rear of the front seat.

15. Blind Flying Hood

A blind flying hood is fitted to the rear cockpit for instrument flying training. When used for this purpose it is locked in place by a spring loaded clip situated above the instrument panel. When not in use the hood is folded back and is kept in place by strong elastic cords fitted to each side of the hood and attached to clips on each side of the fuselage.

PART II - HANDLING

16. Preparation for Flight

On approaching the aircraft check that

- (i) it is in a suitable position for starting and running up:
- (ii) the pitot head is uncovered:
- (iii) the tyres are correctly inflated:
- (iv) chocks are in front of wheels:
- (v) controls are unlocked and chocks removed from rudder:
- (vi) fuel and oil is correct:
- (vii) luggage compartment locked:

17. Before Going Solo

The front cockpit must be checked to ensure that:-

- (i) The front control column has been removed and stowed correctly.
- (ii) The safety harness is securely fastened so as to prevent fouling any controls.
- (iii) If the earphone connection is of the long type, see it is removed and stowed in stowage compartment.
- (iv) The throttle lever friction nut is slackened.
- (v) Both doors are securely fastened.
- (vi) There are no loose articles in cockpit seat or on floor.

18. Before Starting Engine

Ensure that:-

- (i) Intercommunicating system is connected up:
- (ii) tail trimming lever is in the fully tail heavy position;
- (iii) all switches are off;
- (iv) fuel control is on;
- (v) throttle is closed.

19. Starting Procedure

The airman swinging the airscrew is always responsible for the front set of switches whether front seat is occupied or not.

Action by Occupant of Pilot's Seat	Action by Fitter
	Checks to see chocks are in place in front of wheels
	Calls "switches off, petrol on, throttle closed."
Checks switches off, turns petrol on, closes throttle, calls "Switches off, petrol on, throttle closed."	
	Floods carburettor, if engine is cold (and sucks in if necessary), calls "Throttle set."
Checks throttle lever in nearly closed position and calls "Throttle set".	
	Calls "Contact", puts impulse magneto switch (front knob of front switches) on contact (up).

Action by Occupant of Pilot's Seat	Action by Fitter
<p>Holding stick fully back with right hand, puts impulse magneto switch (front knob of rear switches) on contact (up), calls "Contact" and keeps left hand on throttle.</p>	
	<p>Standing well clear checks to see elevators in "up" position, flicks over airscrew with one hand until engine fires.</p>
<p>When engine fires, puts rear knob of rear switches on contact.</p>	<p>When engine fires, puts rear knob of front switches on contact.</p>
	<p>If engine fails to start due to rich mixture, switches front switches off and calls "Switches off, throttle wide open, blow out"</p>
<p>Switches rear switches off. opens throttle fully, calls "Switches off, throttle wide open, blow out."</p>	
	<p>Turns airscrew backwards until cylinders are clear of rich mixture, calls "Throttle set, contact" Puts front knob, front switch, on contact.</p>

Action by Occupant of Pilot's Seat	Action by Fitter
Sets throttle puts front knob rear switch on contact and calls "Throttle set contact"	
	Flicks over airscrew until engine starts.
When engine fires puts rear knob of rear switch on contact	When engine fires puts rear knob of front switch on contact.

20. Warming Up

When the engine is running smoothly and the oil pressure has settled, run the engine at 900-1000 r.p.m. for at least 4 minutes and check as follows

- (i) Trimming control works freely and return it to the fully tail heavy position.
- (ii) Slacken friction nut on throttle bracket.
- (iii) Check mixture fully rich,
- (iv) Set altimeter to zero.
- (v) Check airspeed indicator. Note whether calibrated in m.p.h. or knots.
- (vi) Check instruments as far as possible for serviceability and lock compass grid ring.
- (vii) Check oil pressure normal 35 lbs/sq. in. at 1000 r.p.m.
- (viii) Check slot lever and lock slots.
- (ix) Check fire extinguisher in place and secure.
- (x) See that both sets of switches are in the "on" position i.e. both up.

- (xi) Check fuel gauge and ensure that tank shows full or that there is sufficient in tank for the flight about to be carried out.
- (xii) Test flying controls for freedom and correct movement (elevator and aileron control only: rudder to be tested when taxiing).

21. Running Up

The engine is ready to be run up and tested after 4 minutes and when oil pressure is registering 35 lbs/sq. in. minimum -

- (i) Hold stick right back.
- (ii) Open throttle to 1600 r.p.m. and test the magnetos independently (the drop in r.p.m. must not exceed 100).
- (iii) Open throttle fully, r.p.m. should be 1825 minimum, normal 2100. Check oil pressure 40-45 lbs/sq. in.
- (iv) Throttle back and check the slow running adjustment it should be 550-600 r.p.m.

22. Taxiing

- (i) See that throttle friction nut is slackened.
- (ii) Ensure that tail trimming lever is in fully tail heavy position.
- (iii) Avoid taxiing or idling for prolonged periods at low r.p.m.

23. Take Off

The setting of the controls during the drill of Vital Actions is as follows:-

- (i) Elevator trim is neutral (central position on quadrant).
- (ii) Tighten throttle friction nut.
- (iii) Mixture control right back to fully rich position.

- (iv) Fuel cock fully on tank contents sufficient for flight.
- (v) Slots unlocked (lever fully forward)
- (vi) The engine should be cleared by opening the throttle to approximately 900 r.p.m. test magnetos independently and check oil pressure, which should be 35 lbs/sq in.
- (vii) Flying controls should be tested for freedom of movement; when headed into wind the aircraft should be taxied forward with the rudder bar central in order to straighten the tail skid.
- (viii) Full throttle is to be used for take-off and the initial climbing speed is 70 m.p.h. (60 knots) and this is to be maintained until the engine is throttled back to climbing power at 2-300 ft. after which the climbing speed of 66 m.p.h. (58 knots) is to be assumed.

24. Climbing

The correct power setting is 2050 r.p.m. and the correct airspeed is 66 m.p.h. (58 knots). (If 2050 r.p.m. is unobtainable for climbing at less than full throttle setting, the engine speed should be reduced from full throttle by 50 r.p.m.)

Climbing Turns - Maintain the same power setting but lower the nose sufficiently to maintain AT LEAST the correct climbing speed. If a constant rate of climb is required, increase power to not more than 50 r.p.m. below full throttle and maintain the correct climbing speed.

25. Cruising

The correct power setting for straight and level flight is 1950 r.p.m. and the air speed should be 75-80 m.p.h. (65-70 knots). The safe endurance at these r.p.m. is 2½ hours. The power setting can be altered.

for straight and level flight but must be kept within the limitations as shown in Part III para 35 and the endurance will be as shown in para 39.

26. Stalling and Spinning

(i) Normal stall from straight glide

Engine off = 40 m.p.h. (35 knots)

Engine on = 30 m.p.h. (25 knots)

(ii) Before spinning the slots must be locked.

27. Steep Turns

(i) Adjust power to 2100 r.p.m.

(ii) Speed should not be reduced below 70 m.p.h. (60 knots).

(iii) The same speed applies for steep gliding turns.

28. Aerobatics

Before commencing aerobatics carry out the following drill:-

(i) Mixture fully rich.

(ii) Check contents of fuel tank.

(iii) Slots locked

(iv) Safety harness secure (both pilot and passenger).

The correct speeds are as follows:-

Loop	115 m.p.h.	(100 knots)
Stall turn	90 m.p.h.	(78 knots)
Inverted gliding	85 m.p.h.	(74 knots)
Slow Roll	110 m.p.h.	(95 knots)
Barrel roll	115 m.p.h.	(100 m.p.h.)
Half roll off the top of a loop	135 m.p.h.	(118 knots)
Half roll	95 m.p.h.	(82 knots)

29. Descending

- (i) For the engine-assisted descent reduce to 11-1200 r.p.m. speed 66 m.p.h. (58 knots).
- (ii) During turns maintain the same power, but lower the nose sufficiently to maintain AT LEAST the same airspeed.
- (iii) For gliding without engine the same speed 66 m.p.h. (58 knots) is to be used.
- (iv) For gliding turns the speed should be increased (by lowering the nose) up to as far as 70 m.p.h. (60 knots), depending on the steepness of the turn.

30. Low Flying

- (i) Use the same power setting as for cruising, i.e. 1950 r.p.m. 75-80 m.p.h. (65-70 knots).
- (ii) Power should be increased when turning.

31. Approach and Landing

On the down wind leg the following pre-landing vital action drill is to be carried out:-

Fuel:	Sufficient for another circuit
Mixture:	Fully rich
Slots:	Unlocked

The airspeed recommended for gliding and engine assisted approaches is 66 m.p.h. (58 knots).

32. Precautionary Approach and Landing

The correct speed for the final approach is 55 m.p.h. (48 knots) and this speed should be assumed at 250 ft.

33. Mislanding (Going Round Again)

The initial climbing speed is 70 m.p.h. (60 knots). This is to be maintained until the engine is throttled back to climbing power at 2-300 ft. The climbing speed of 66 m.p.h. (58 knots) should be assumed.

34. Stopping the Engine

- (1) See that tail trimming lever is in the fully tail heavy position.
- (ii) Throttle back to 900-1000 r.p.m.
- (iii) Hold stick fully back with right arm.
- (iv) Switch off switches with left hand and then open the throttle fully with right hand. Keep throttle fully open till airscrew stops rotating.
- (v) Return throttle to closed position.
- (vi) Fuel cock to "off" position.
- (vii) Ensure that front switches are placed in "off" position.

PART III - OPERATING DATA

35. Engine Limitations

	R.P.M.	Oil Temp	H.P.
Full throttle (8 min limit)	2350	90°C	130
Minimum take off (full throttle)	1825	30°C	104-108
Maximum climbing (30 minutes)	2100	80°C	120
Maximum cruising (30 minutes)	2100	70°C	120
Normal cruising	1900-2050	60-70°C	108-118

36. Desired Operating Figures

- (i) Unless conditions warrant otherwise the following figures should not be exceeded.

	R.P.M.	H.P.
Warm up for 4 minutes	800-1000	
Testing engine on chocks	Full throttle for not more than 10 secs.	
Normal full throttle	2100	120
Take off	2100	120
Climbing	2050	118
Cruising	1950	110-112

(ii) Oil Pressures

Normal	40-45 lbs/sq. in.
Minimum (Emergency - not more than 5 minutes)	30 lbs/sq. in.
Maximum (Emergency - not more than 5 minutes)	60 lbs/sq. in.

37. Mixture Control

It must not be used below 5000 and must not be used to cause a drop in r.p.m.

38. Flying Limitations

(i) Maximum Diving Conditions

Speed permissible	180 m.p.h. IAS (156 knots)
RPM in dive	2200

(ii) Not more than climbing power is to be used on completion of any manoeuvre. On no account must full power be used.

39. Fuel Consumption

I.A.S.		R.P.M.	Total GLS/HR.	Endurance Hours
M.P.H.	Knots			
75-80	65-70	1950	6 - 6½	2½
80-85	70-74	2050	7 - 7½	2½
85-90	74-78	2100	7½ - 8	2

If carrying out aerobatics and/or prolonged climbing, the fuel consumption increases and the safe endurance in this case is reduced to 2½ hours.

PART IV - EMERGENCIES

40. Fire Appliance

- (i) A fire extinguisher is fitted on the right-hand side of the rear pilot's seat. It is readily accessible from inside and outside the cockpit.
- (ii) It is detached by pulling forward and out of the spring clips and breaking the safety wire.

41. First Aid

- (i) A first aid kit is carried in a compartment on the port side of the fuselage behind the rear cockpit.
- (ii) To remove pull outwards on the piece of fabric provided.

42. Abandoning the Aircraft

- (i) The captain should order the other occupant to leave first.
- (ii) Both occupants should use the following procedure:-

Open cockpit door

Disconnect intercommunication lead and undo safety harness.

Slide over the side, head foremost and facing the tail.

AIR DATA PUBLICATIONS ADDENDUM

- TIGER MOTH (82A)

The prime element of this document is Publication No. 416 dated 1944 produced by the Royal Australian Air Force and from whom permission to reproduce its entire contents has been kindly given.

However to take advantage of some of the excellent and authoritative material produced generally, but not exclusively, subsequent to that date, 'AIR DATA PUBLICATIONS' sought and received permission from the appropriate sources/authorities/individuals, to reproduce selected pieces which would generate wide appeal, the outcome being an 'AIR DATA ADDENDUM' to Publication 416.

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Regard should therefore be taken of current data available for the type from the appropriate Civil Aviation Authority and the manufacturer.

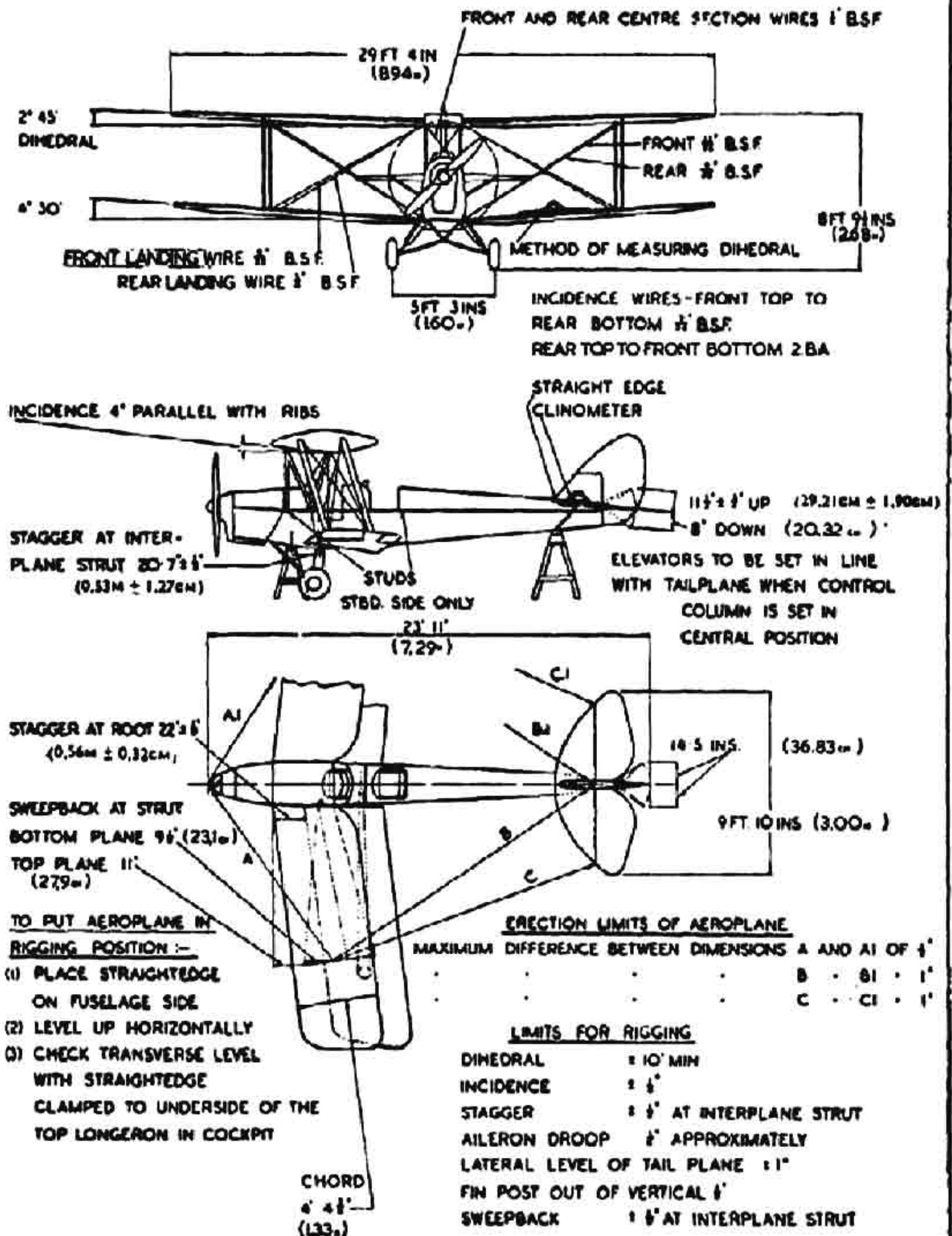
Accordingly Air Data Publications cannot be held responsible for information published in R.A.A.F. Publication 416 or this Addendum and the information published by the Civil Aviation Authorities and the manufacturer must be assumed overriding.

The comparative data provided in Part 5 of this Addendum is a pertinent example.

Pt 1	Photograph	
Pt 2	Rigging Diagram	
Pt 3	Cockpit Photograph Circa 1938	
Pt 4	Cockpit Photograph	1985
Pt 5	BLAC Update example	
Pt 6	Sketch Page (Aeromodeller)	
Pt 7	3A Drawing (Barnes)	



TIGER MOTH (82A) AIRCRAFT



RIGGING DIAGRAM



TIGER MOTH COCKPIT PHOTOGRAPH BELIEVED TO BE

CIRCA 1938



The undermentioned data is reproduced by kind permission of The British Light Aviation Centre from Tiger Moth Pilots Notes produced by The A.B.A.C Circa 1950.

PART V

ENGINE LIMITATIONS

Para

45. The principal engine limitations are as follows:-

Maximum Take-off	..	2,100 r.p.m.	
Minimum Take-off	..	1,825 r.p.m.	
Climbing	..	2,100 r.p.m.	
Maximum Cruising	..	2,100 r.p.m. (not exceed 1 hour)	
Maximum Diving (not less than one third throttle)			
Gipsy Major I & IF	..	2,350 r.p.m.)	
)	
Gipsy Major IC	..	2,400 r.p.m.)	not exceeding 20 secs
)	
Gipsy Major IJ	..	2,500 r.p.m.)	
Oil Pressure	..	Minimum 30-lb per square inch, for five minutes	
		Maximum 60 lb per square inch	
		Normal 40/45 lb per square inch	

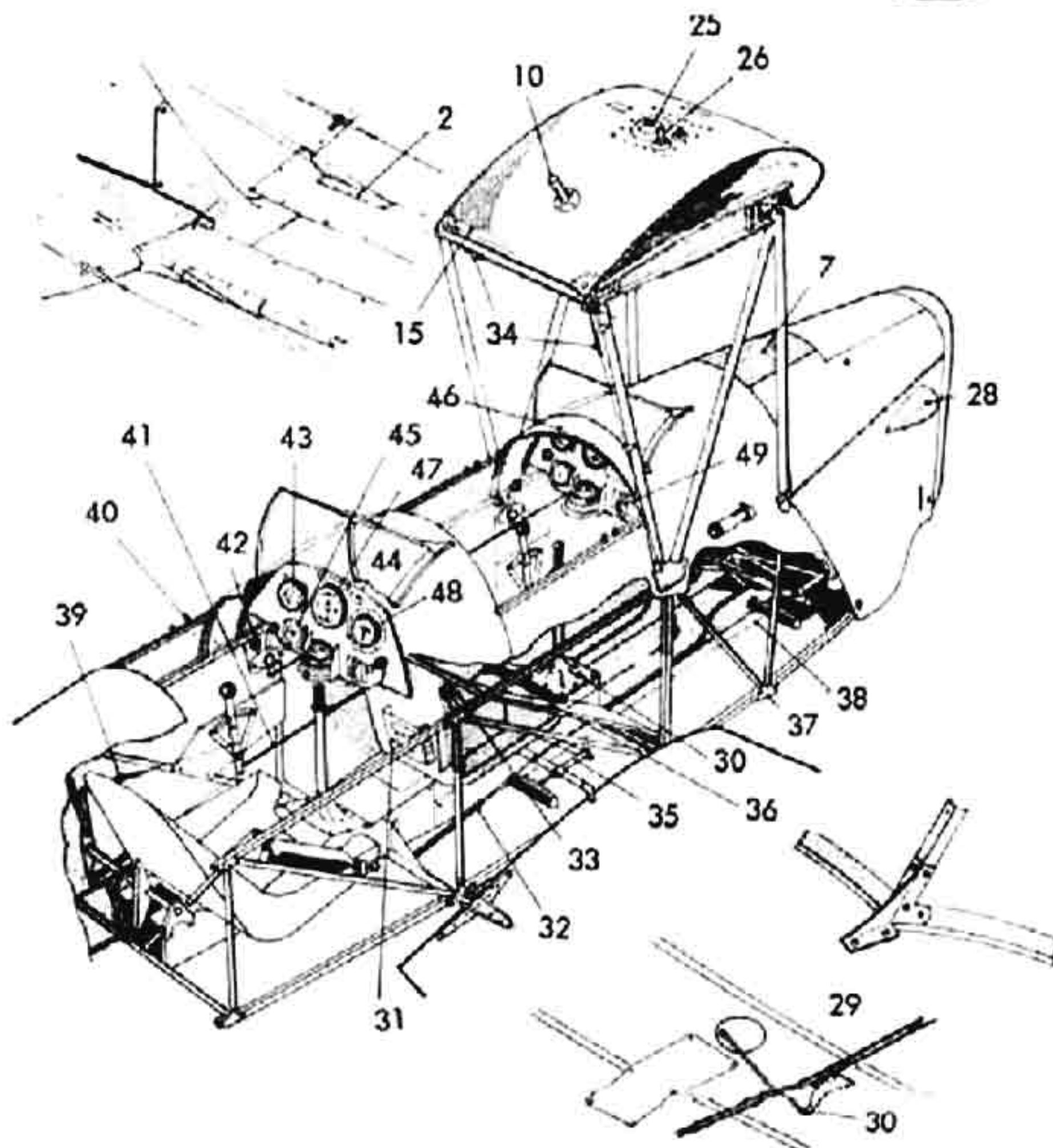
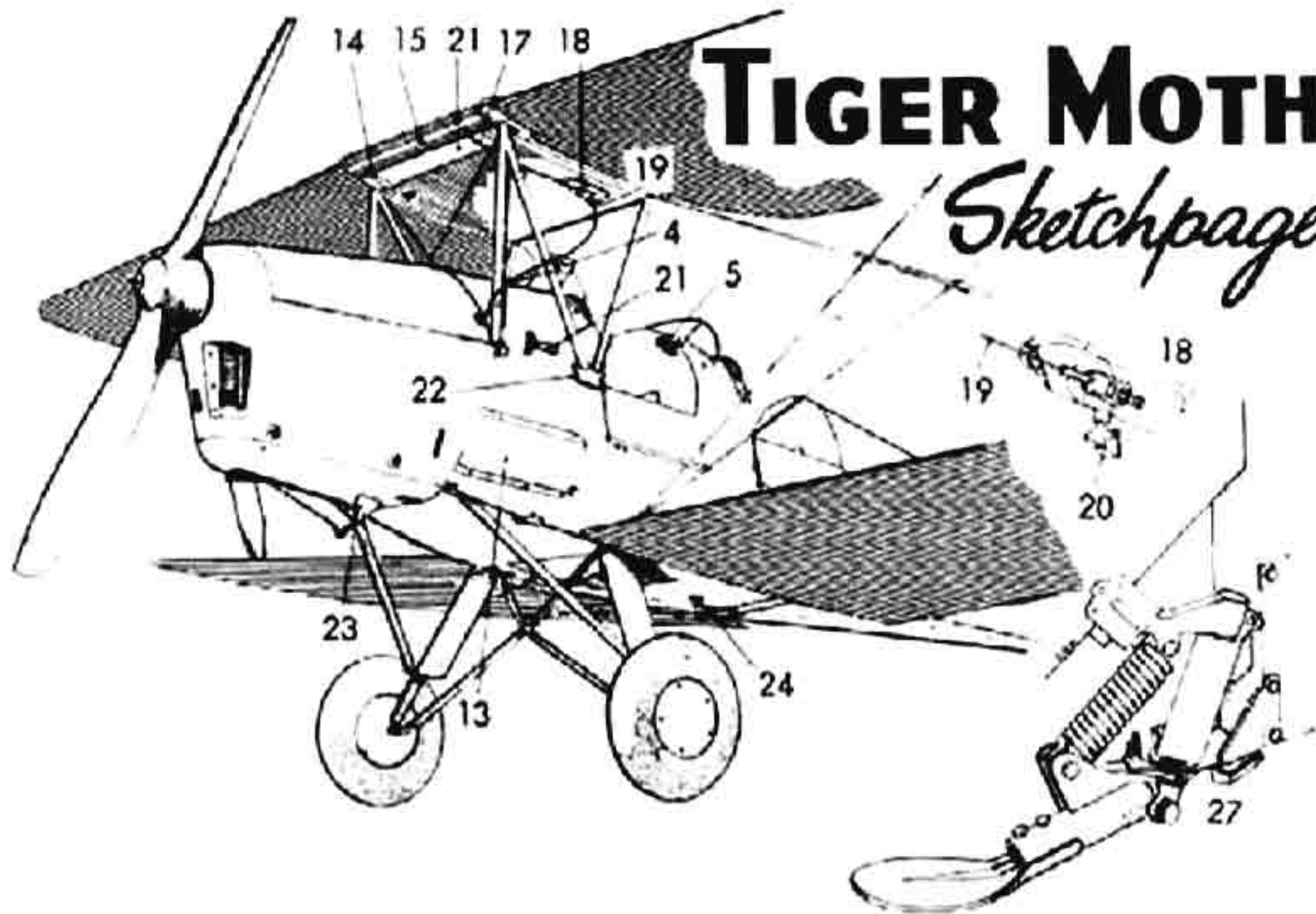
FLYING LIMITATIONS

Para

46. (a) Maximum speed 133 kts (160 m.p.h)
- (b) Maximum all-up weight .. 1,825 lb normal flying
1,770 lbs aerobatics
- (c) The aircraft is aerobatic but flick movements, outside loops and bunts may under no circumstances be carried out.

TIGER MOTH

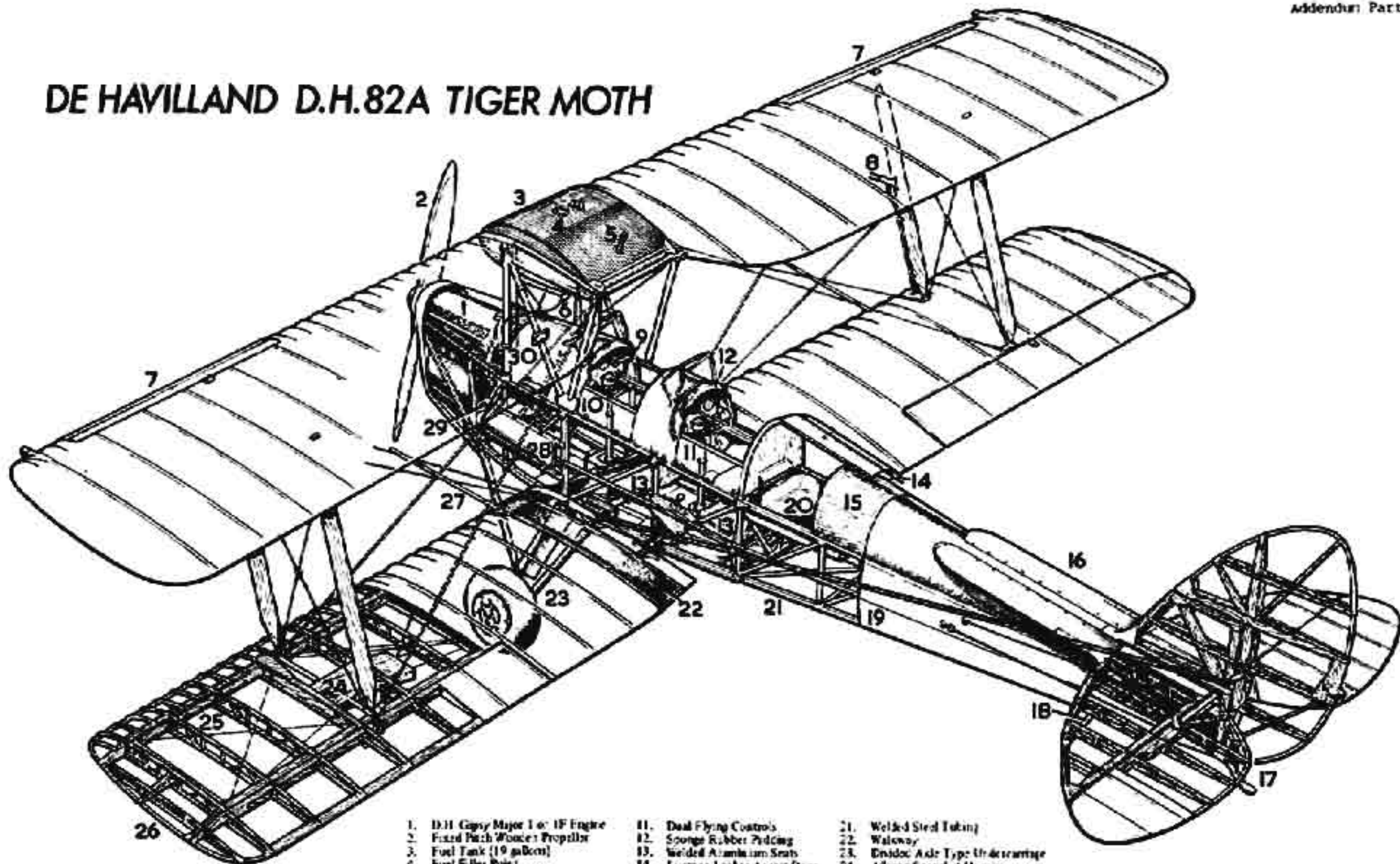
Sketchpage



KEY TO DRAWINGS

1. First-aid storage
2. Chaffing plates on end-plate covers
3. Leather-stamped wingpost
4. Rear view mirror
5. Handgrips in front cockpit only
6. Slot for safety harness
7. Corrugated wing plate
8. T.E. steps up from aileron to rudd
9. Inboard and baggage storage
10. Fuel gauge
11. Seats
12. Magneto switches
13. Oil tank mounted vertically for cooling
14. Metal retaining plates
15. Corrugated flattened leather to give a smooth strip
16. Flat cover plate over spar channel in tank
17. Corrugated plate across bridge of tank
18. Fuel pump
19. Fuel shut off rod
20. Drain cock
21. Venturi on both sides
22. Pressed aluminium fitting
23. Overflow pipe fitting
24. Snagging arm for aileron return cable
25. Filter cup
26. Overflow valve
27. Slit detail
28. Carburettor air intake
29. Aileron arm detail
30. Leather cuff
31. Map bracket
32. Spring brace on rudder
33. Rudder locking lever
34. Star locking handle
35. Perslex action rudder pedals
36. Front seat mounted in diagonal bulkhead
37. Jockey post
38. Rudder locking rod
39. Spring legs for tail strutting
40. Door catches
41. Tail arm connecting rod
42. Thrustle
43. Air speed indicator
44. Deviation wind holder
45. Airman
46. Crash pad
47. Turn and thrust indicator
48. Complete fuel tank
49. Oil pressure indicator (wall)
50. Pull tab for fuel and oil
51. 2-1/2 in. x 7-1/2 in. wood frame
52. Fuel tubes

DE HAVILLAND D.H.82A TIGER MOTH



- | | | |
|------------------------------------|--------------------------------|-------------------------------------|
| 1. D.H. Gipsy Major 1 or 1F Engine | 11. Dual Flying Controls | 21. Welded Steel Tubing |
| 2. Fixed Pitch Wooden Propeller | 12. Sponge Rubber Padding | 22. Walkway |
| 3. Fuel Tank (19 gallons) | 13. Welded Aluminium Seats | 23. Divided Axle Type Undercarriage |
| 4. Fuel Filler Point | 14. Luggage Locker Access Door | 24. Allison Speedometer Housing |
| 5. Fuel Contents Gauge | 15. Plywood Decking | 25. Spruce Spars and Ribs |
| 6. Fuel Supply Pipe | 16. Anti-Spin Strakes | 26. Light Alloy Tip |
| 7. Automatic Slats | 17. Sierra de Tail Skid | 27. Bracing Wire Spreader Bars |
| 8. Pilot Head | 18. Tailplane Bracing Tube | 28. Oil Tank (2.1 gallons) |
| 9. Intercomms. Speaking Tube | 19. Fabric Covering | 29. Oil Tank Filler |
| 10. Hinged Cockpit Side Panels | 20. Luggage Locker | 30. Rear View Mirror |

