MANUEL de VOL

FLUGHANDBUCH FLIGHT MANUAL

DR 400/180

Avions Pierre Robin

FLIGHT MANUAL

Aircraft Type: **DR 400 - 180 REGENT**

Registration n°:

Serial n°

Type Certificate:**n°45 dated 10 May 1972.**

Maker : **Avions PIERRE ROBIN**
Aérodrome de Darois
21121 FONTAINE LES DIJON
Tel: 03.80.35.25.22

THIS MANUAL IS APPROVED BY S. G. A. C

Chapt	Pages	Dates
2	2.1 to 2.5	10 May1972
3	3. 1to 3.2	10 May1972
5	5.1	10 May 1972

This aircraft must be operated within the limits specified in this Flight Manual.

THIS DOCUMENT MUST BE KEPT PERMANENTLY IN THE AIRCRAFT.

Ce manuel est la traduction en langue anglaise
du manuel de vol français approuvé

UK CERTIFICATION

The SGAC Approval of this Flight Manual is validated for use by aircraft on the United Kingdom Register. The following pages, added for UK certification, are approved by the Airworthiness Division of the UK Civil Aviation Authority:

Chapter	Pages	Dates
5	5.1 to 5.5	10 May1972
6	6.1	10 May1972

When operated in the UK in the General-Purpose Category, the aeroplane is classified in Performance Group E, and the performance given in this Flight Manual shall be used for establishing compliance with the regulations.

The airspeed to be assumed for complying with the regulations governing flight over water is 110 kts (204 Kph) true air speed.

The maximum number of occupants shall not exceed four nor exceed the number of seats fitted which are approved for take-off and landing.

Notwithstanding the placard referring to DAY/VFR flights described on page 2.3 this aircraft may fly at night provided that the equipment required by the Air Navigation Order is carried and when permitted to do so by the Air Navigation Regulations.

SECTION 4 - NORMAL OPERATION

SECTION 5 - PERFORMANCE DATA

SECTION 6 - MAINTENANCE

SECTION 7 - ADDENDA

AMENDMENTS

N°	ISSUE N°	PAGES AMENDED	DESCRIPTION	C.A.A APPROVAL DATE
1	2	0.2	Reference to chapter 4 deleted	
2	3	7.1 to 7.4	Towing procedures	
3	4	1.11 – 1.11b	Instrument Panel	
4	5	7.5	Supplementary tank	
5	6	1.5	Engine Lyc. 0-360-A3A	
6	7	2.2	Addition: Cat. U	
7	8	04 7.6 – 7.7	Roll stabilizer	

AMENDMENTS

N°	ISSUE N°	PAGES AMENDED	DESCRIPTION	C.A.A APPROVAL
8	9	0.3- 1.11 1.11a – 1.11b	Instrument panel n°2	
9	10	0.4 7.8 - 7.9 - 7.10 - 7.11 - 7.12	Electrical system and instrument panels	
10	11	1.5 - 1.7- 2.5	Noise Limitation	**07.06.80**

SECTION1 – GENERAL

1.Description and Characteristics

Wingspan	28 ft. 8 ins.
Length	22 ft 10 ins.
Height	7 ft 4 ins.
Propeller ground clearance	10 ins
(With front tyre and oleo-leg deflated):	positive

WING

The “JODEL” type wing is of the single spar type, covered with DACRON fabric.

Aerofoil section	43012 modified
Aspect ratio	5.35
Dihedral (wingtip)	14°
Chord (rectangular section)	67.4”
Areas	152.85 square feet

AILERONS

Total area	12.4 square feet
Deflection angles	(see page 1.17)

The ailerons are controlled from the control column, by means of bell cranks, cables, and pulleys, and are statically balanced.

WING FLAPS

Total area 7.2 square feet

The flaps are manually operated by a lever located between the two front seats. They can be locked in three different positions.

1.Retracted
2.Take-off (15° +0° -5°) (0.6 inches)
3.Landing (60° +0° -5°) (0.6 inches)

NOTE: When set to the take-off or landing positions, a play of 0.6 inches (measured at the trailing edge) is normal.

TAILPLANE

Total area 31 square feet

The one-piece moving tailplane unit, statically balanced, is controlled by means of cables, and is equipped with a metal automatic anti-balance tab. The tab control is on the tunnel between the front seats and, an index is graduated from 0 to 10.

0 = nose fully down

10 = nose fully up

Tailplane deflection angles (see page 1.17)
Anti-tab area 2.8 square feet
Anti-tab deflection angles (see page 1.17)

FIN AND RUDDER

Rudder area	6.8 square feet

The rudder is conventionally controlled by meant, of a rudder bar and cables.

Rudder deflection angles	(see page 1.1)

LANDING GEAR

Fixed, tricycle type, with fairings and long-stroke oleo legs. The three wheels are of identical type Removal of the wheel spats will considerably reduce level speeds and rates of climb.

The front landing gear is connected to the rudder bar by means of spring rods. During flight, the front wheel is automatically locked in alignment with the aircraft axis (oleo-leg extended).

Track	8 ft. 6 ins
Wheelbase	5 ft. 5 ins.
Wheel size	380 x 150
Tyres	"DUNLOP AREO" or "KLEBER-COLOMBES"

Tyre Pressures (p.s.i.)	Front	28
	Rear	31
Oleo leg strokes	Front	6.28"
	Rear	7.08"
Oleo leg inflating pressures (p.s.i.)	Front	78
	Rear	85

Fluid used: SHELL FLUID 4 BP AERO-HYDRAULIC NO. 1

BRAKES

Hydraulic braking system (independent on each wheel)

Braking is obtained by pushing the rudder bar pedals fully forward (from front seats)

The handbrake operates the brakes on both main wheels.

PARKING: Chocks must be used

HYDRAULIC FLUID: MIL.H.5606-A

POWER PLANT

Engine: LYCOMING 0-360-A3A

4 horizontally opposed cylinders, direct drive, air-cooled engine.

Max. continuous RPM	2700
Compression ratio	8.5 : 1
Max. cylinder head temp.	260°C
Max. cylinder temp	60°C
Direction of rotation	Clockwise
Firing order	1 : 3 : 2 : 4

Note: Normal service maxi power = 260RPM

OIL SYSTEM

Wet oil sump capacity		6 quarts
Oil pressure	(idling)	25 psi
	(normal)	64 to 90 psi
Oil grades:	above 15°c	SAE 50 (100)
	from 30°C to -20°C	SAE 40 (80)

ELECTRICAL SYSTEM

A red warning lamp indicates failure to charge of the alternator. This circuit is protected by a 40-amp fuse.

FUEL

AVIATION TYPE FUEL		91/96 (MIN) OR 100/130 OR 115/145
Fuel pressure:	max:	8 psi
	desired:	3 psi
	min:	0.5 psi
MAIN (REAR) FUEL TANK CAPACITY		24.4 IG (29 USG)

The last 2.2 IG (2.6USG) of this tank can be used only in level flight.

FRONT RIGHT FUEL TANK CAPACITY	8.8 IG (10.6 USG)
FRONT LEFT FUEL TANK CAPACITY	8.8 IG (10.6 USG)

The fuel control cock is mounted on the instrument panel tunnel and allows selection of any one the three tanks or to select FUEL OFF.

ENGINE CONTROLS

The engine controls include an ON/OFF carburettor heater (pull-type) and a mixture control (yellow knob).

PROPELLORS

	1	2	3	4
Makers	SENSENICH	SENSENICH	SENSENICH	SENSENICH
Type	76 EM	76 EM	76 EM	76 EM
	8550.64	8550.68	8550.58	8550.54
Diameter *	76''	76''	76''	76''
Pitch	64''	68''	58''	54''
Min speed (full throttle, MSL, fixed pitch)	2300 RPM	2250 RPM	2500 RPM	2500 RPM

NOTE:(a) Avoid continuous use between 2150 and 2350 RPM.

* No reduction in diameter is permitted

(b) Normal service maxi power = 2600 RPM

CABIN

Fitted with sliding jettison able canopy, opening from rear to front.

The two front seats are adjustable (6 positions)

Front and rear seats are ail fitted with fast-release safety belts.

Cabin Dimensions

Length:	64''
Width:	43.4''
Height:	48.5''

Air conditioning

Two individually adjustable (flow and direction fresh air vents are located on the instrument panel.

Cabin heating and canopy demisting controls are also fitted.

Heating is provided by means of a heat exchanger fitted around the RH exhaust manifold.

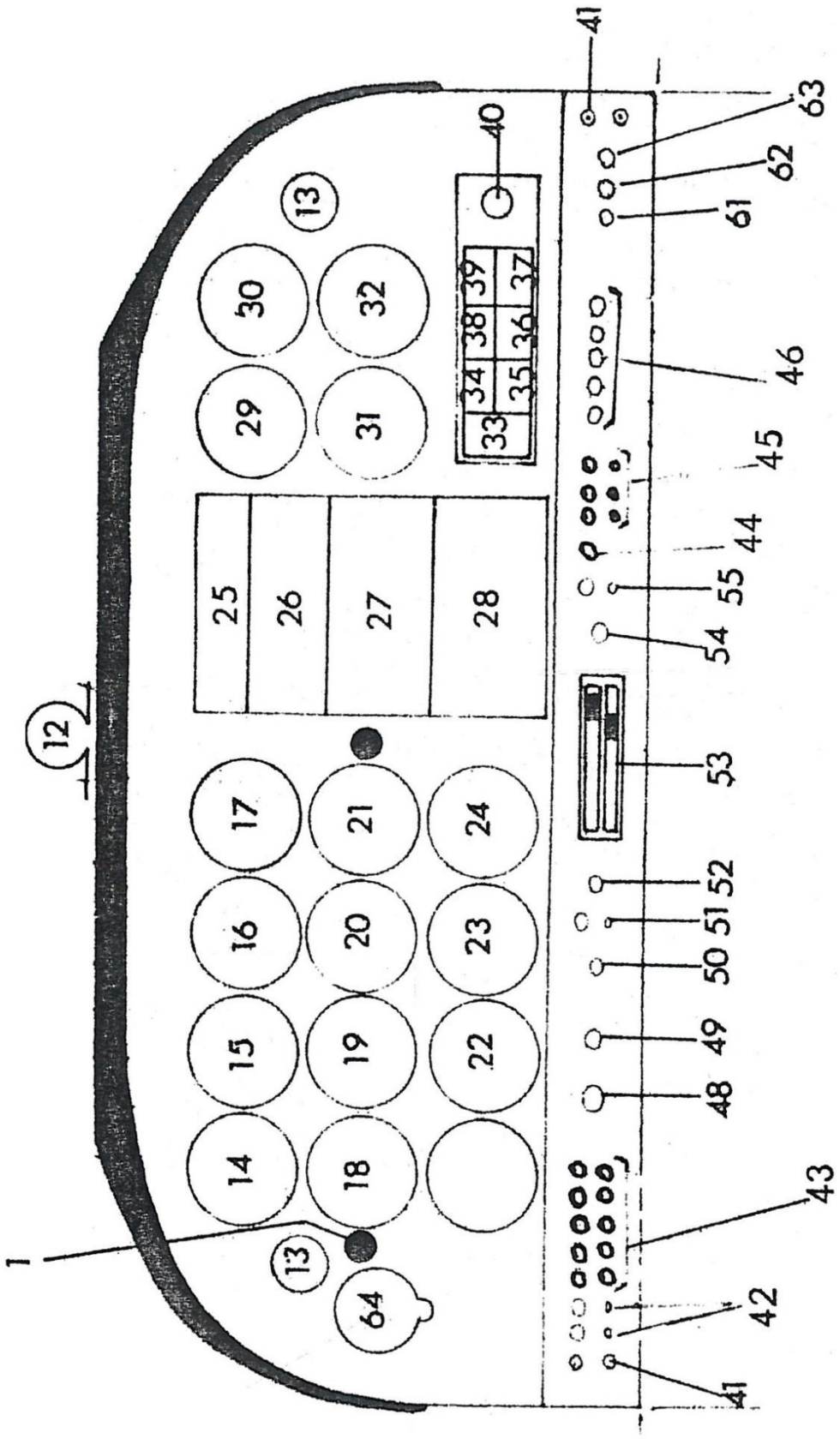
DESCRIPTION OF VARIOUS EQUIPMENT

a. STANDARD EQUIPMENT

Dual throttle controls (actuating pick-up pump)
Mixture control (yellow knob)
Carburettor heater
Battery switch
Magneto selector key
Starter button
Cabin ventilation
Cabin heater control
Canopy demist control
Fuel cock (4 positions)
Stall warning (audio) "SAFE FLIGHT 164"
Handbrake
Tab control
Fuel gauge
Oil temperature gauge
Ammeter
RPM gauge (with hours-gone indicator)
Magnetic compass
Ball-type inclinometer
Airspeed indicator
Altimeter
Vertical speed indicator
Oil Cooler with thermostatic valve
Warning lamp for:Flaps
Fuel reserve level (front & rear)
Oil pressure
Fuel pressure
Alternator
Circuit breakers for:Warning lamps
Indicators
Electric pump
Stall warning
Starters
Service
alternator

b. OPTIONAL EQUIPMENT

Oil pressure gauge
OAT gauge (canopy mounted)
OAT gauge (transmission type)
Compass (above instrument panel)
Electrical compass repeater
Mixture monitor unit
Inlet pressure gauge
3-pointer precision altimeter (in feet)
JAEGER clock
Chronometer
Vacuum pressure gauge (for blind flying panel)
Suction DI
Suction-driven Artificial Horizon
Electrical AH (with switch and fuse)
Instrument panel lighting (2 red lamps with dimmer switch)
Heated pitot head, warning lamp and switch
Turn and Slip indicator (electric, suppressed with switch)
BRITTAIN turn co-ordinator
Rotating Anti-collision beacon
VHF radio
ADF
VOR
ILS
DME
HP Radio
Marker beacon
Carburettor temperature gauge
Cylinder head temperature gauge
RH and LH landing lamps, switches and fuses
Navigation lamps

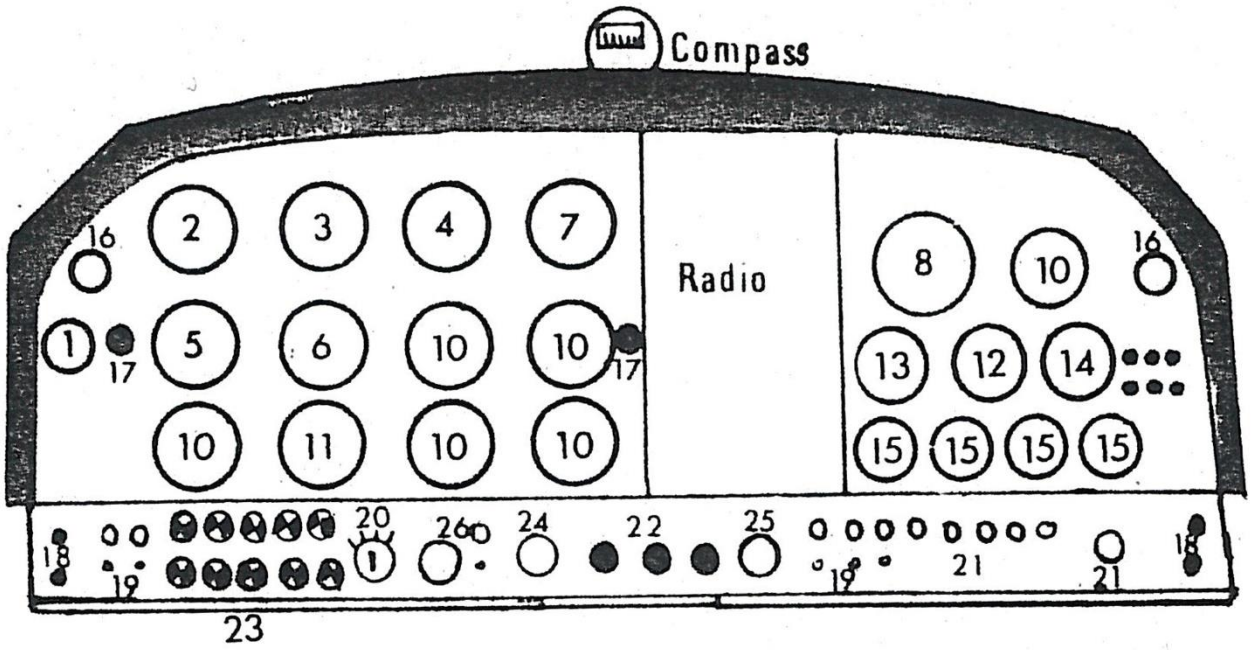


INSTRUMENT PANEL Nr 1

INSTRUMENT PANEL Nr 1

1.Throttle controls
12. Magnetic compass
13. Fresh Air Vents
14. AIS Indicator
15. Artificial horizon
16. N°1 Altimeter
17. VOR & ILS
18. T & S Indicator
19. DI
20. VSI
21. VOR Receiver
22. Suction gauge
23. N°2 Altimeter
24. Clock
25. Station Box
26. ADF
27. N°1 VHF
28. N°2 VHF
29. Manifold gauge
30. Cylinder or Sup. Fuel gauge
31. RPM gauge
32. OAT gauge
33. Ammeter
34. Oil temperature
35. Oil pressure
36. Front left fuel gauge
37. Front right fuel gauge
38. Rear fuel gauge
39. Aux. fuel gauge
40. 40 AMP fuse
41. Headset jacks
42. Circuit breakers
43. Warning lights
44. Cabin lamp
45. Circuit breakers
46. Fuses
48. Magneto switches
49. Starter button
50. Battery switch
51. Alternator
52. Mixture
53. Cabin heater
54. Carburettor heater
55. Electric pump
61. Fuse
62. Fuse
63. Fuse
64. Chronometer

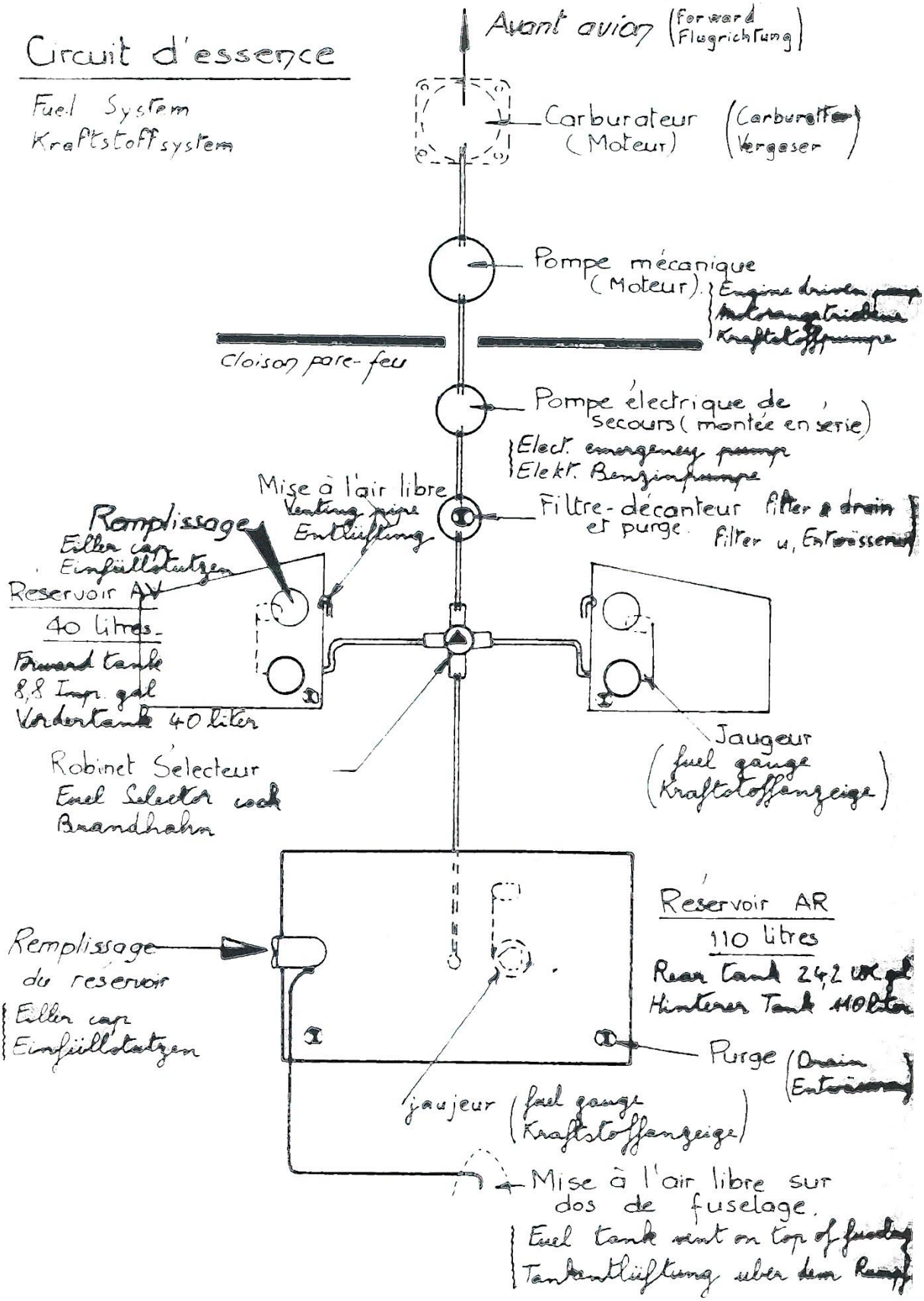
INSTRUMENT PANEL Nr 2

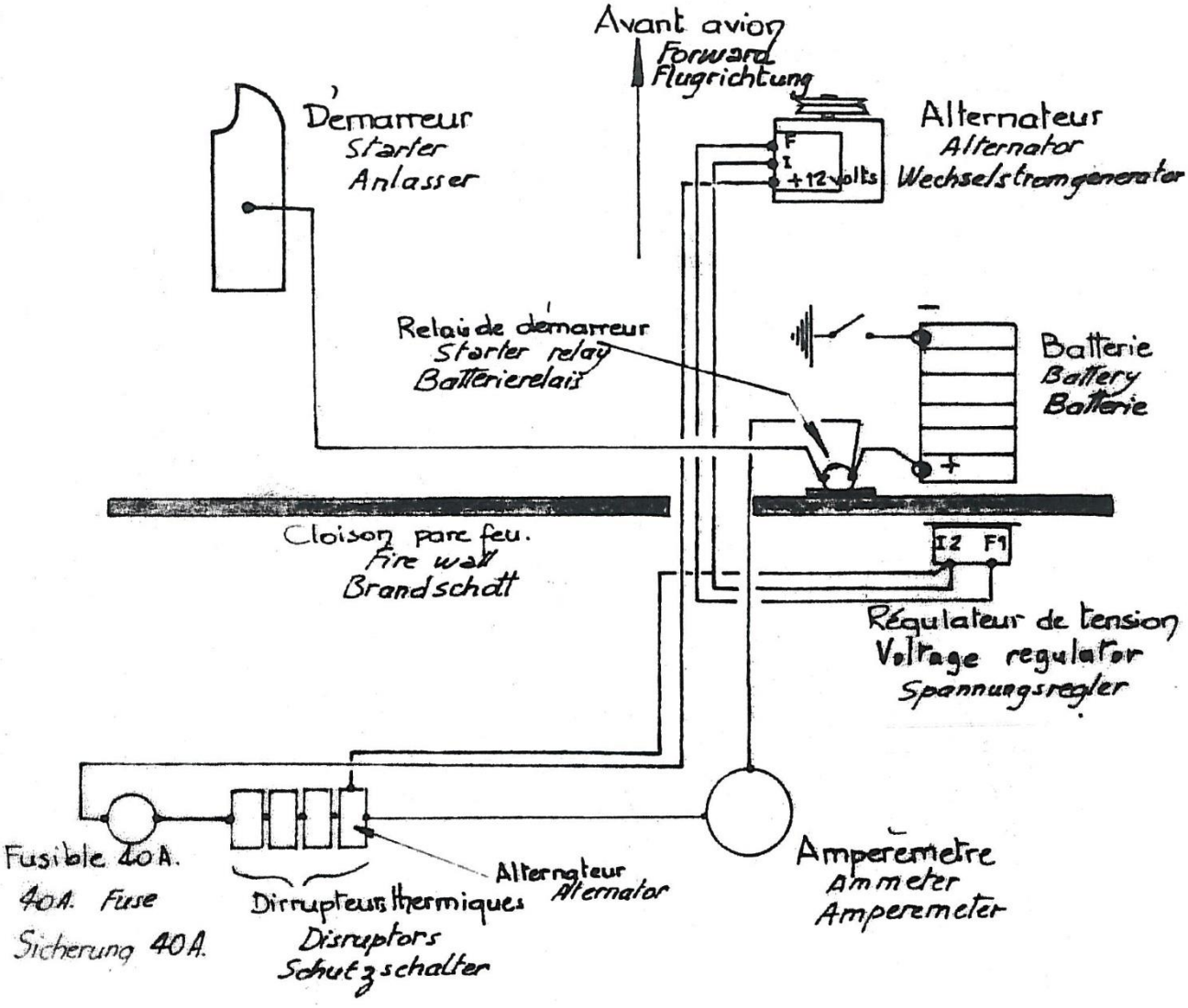


1- Stopwatch (option)
2- Airspeed indicator
3- Artificial horizon
4- Altimeter
5- Turn/bank indicator
6- Directional (opt.)
7- Rate of climb
8- RPM indicator

10- Option
11- Vacuum gauge
12- Oil temperature
13- Oil pressure
14- Amp. or voltmeter
15- Fuel gauge
16- Fresh air vent
17- Throttle control

18- Radio jacks' plugs
19- Switches-breakers
20- Magneto switch
21- Breakers
22- Heating/demisting
23- Warning lights
24- Mixture control
25- Carburettor heater
26- Battery and alternator switch

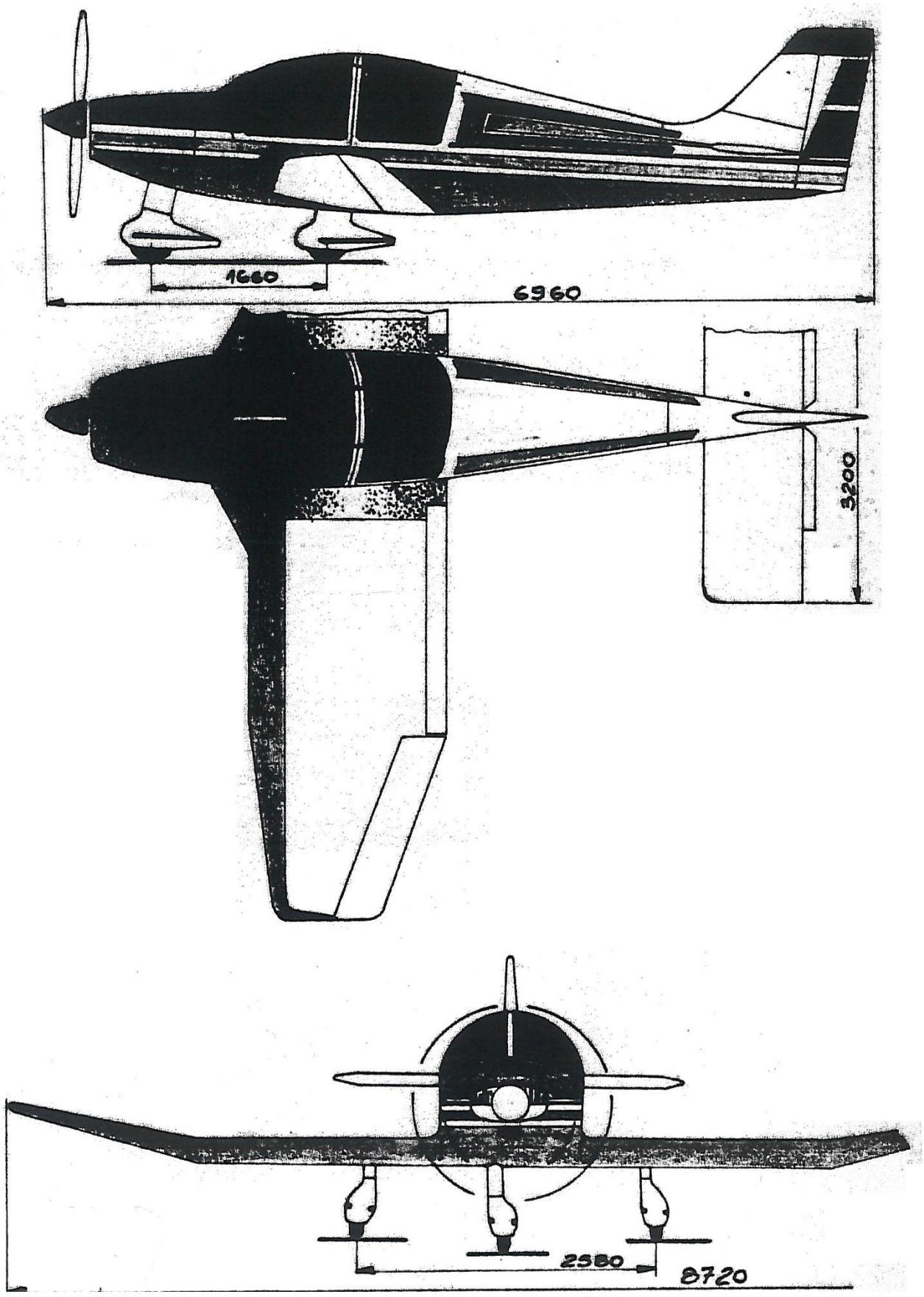

Circuit d'essence
Fuel System
Kraftstoffsystem
Avant avion (Forward Flugrichtung)
Carburateur (Moteur) (Carburettor Vergaser)
Pompe mécanique (Moteur)
Engine driven pump
Motorangetriebene Kraftstoffpumpe
Cloison pare-feu
Pompe électrique de secours (montée en serie)
Elect. emergency pump
Elektr. Benzinpumpe
Mise à l'air libre
Venting pipe
Entlüftung
Filtre-décanteur et purge
Filter a drain
Filter u. Entwässerung
Remplissage
Filler cap
Einfüllstutzen
Reservoir AV
40 litres
Forward tank
8,8 Imp. gal
Vordertank 40 liter
Robinet Sélecteur
Fuel Selector cock
Brandhahn
Jaugeur
(fuel gauge
Kraftstoffanzeige)
Réservoir AR
110 litres
Rear tank 24,2 UK gal
Hinterer Tank 110 liter
Remplissage du reservoir
Filler cap
Einfüllstutzen
Purge (Drain Entwässerung)
jaugeur (fuel gauge Kraftstoffanzeige)
Mise à l'air libre sur dos de fuselage.
Fuel tank vent on top of fuselage
Tankentlüftung uber dem Rumpf

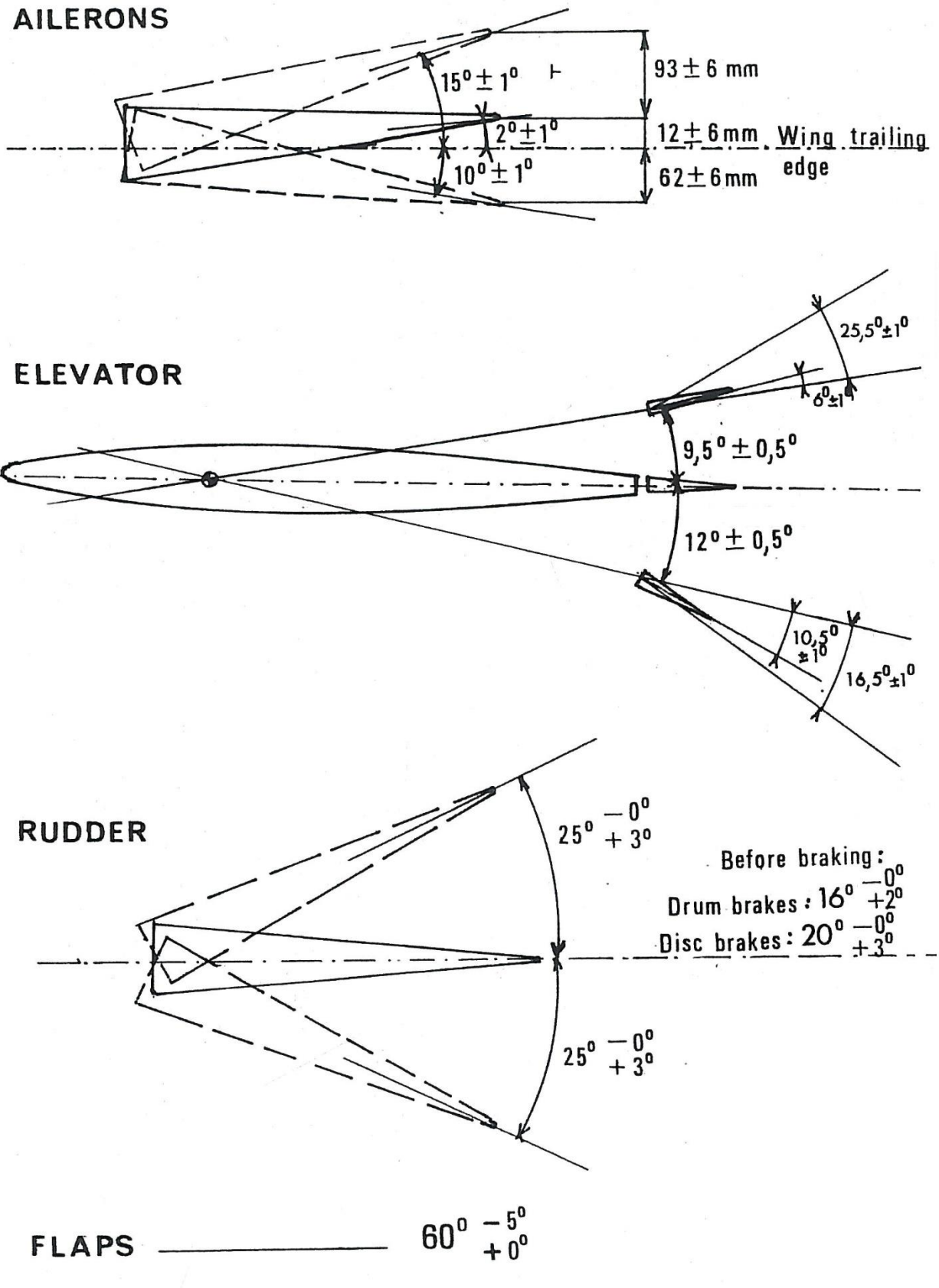


— Schéma de principe du circuit électrique —

— Electrical system —

— Schema der Elektrischen Anlage —


1660
6960
3200
2580
8720


AILERONS
15° ± 1°
2° ± 1°
10° ± 1°
93 ± 6 mm
12 ± 6 mm
62 ± 6 mm
Wing trailing edge
ELEVATOR
25,5° ± 1°
6° ± 1°
9,5° ± 0,5°
12° ± 0,5°
10,5° ± 1°
16,5° ± 1°
RUDDER
25° −0° +3°
Before braking :
Drum brakes : 16° −0° +2°
Disc brakes : 20° −0° +3°
25° −0° +3°
FLAPS
60° −5° +0°

SECTION 2 – OPERATING LIMITS

a. Approval criteria

The following aircraft comply with IAR 2052 Regulations as amended on 6 June 1966 in normal and utility categories, and conform to the conditions of FAR Part 23 amendment 7 and to the conditions particularity appertaining to jettison of canopies:

ROBIN DR 400/180: REGENT

b. Limiting Speeds (IAS) at max. AUW

		KPH	KTS
VNE	- *Never exceed speed*	308	166
VNO	- *Normal operating speed*	260	140
VC	- *Design cruising speed*	260	140
VA	- *Manoeuvring speed*	215	116
VFe	- *Flap extended speed*	170	92

ASI Markings KPH (KTS)

Radial red Line	308 (166)
Yellow arc (cautionary calm air only)	260/308 (140/166)
Green arc (normal use)	105/260 (57/140)
White arc (flaps extended)	95/170 (51/92)

The stall warning operates 5 to 8 KTS before the stall.

c. Design Load Factor Limits at Max. AUW

	n = + 4.4 and - 2,2 ("U")
Flaps up (clean)	n = + 3.8 and - 1.9 ("N")
Flaps Down	n = + 2 ("N" and "U")

d. Max. AUW Authorised

Take off	1100 KG	(2425 LBS)
Landing	1045 KG	(2303 LBS)

e.CG Limits

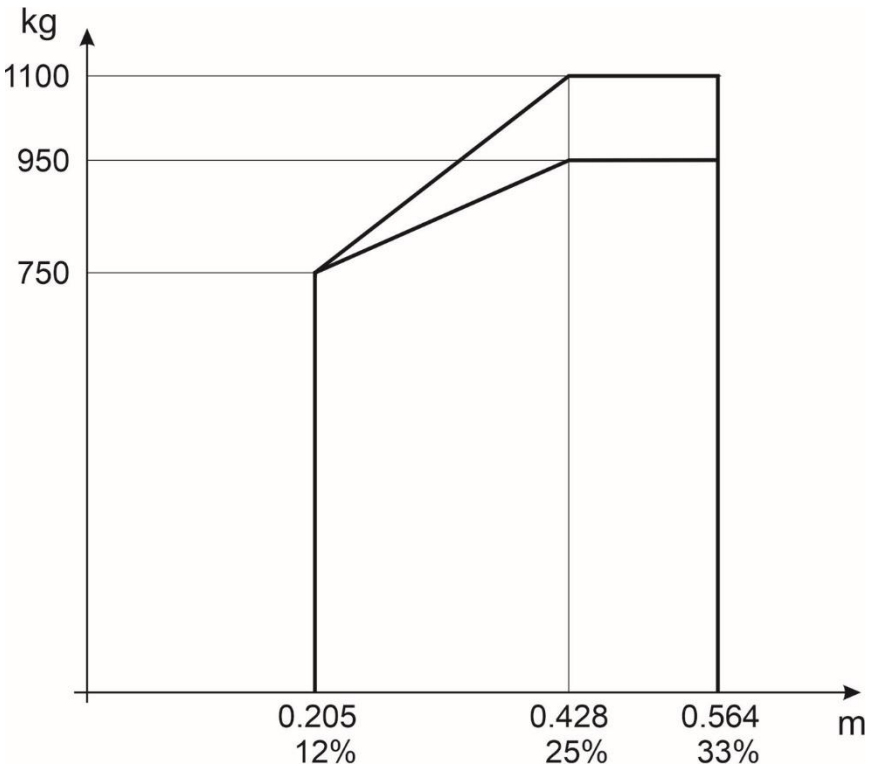
Levelling: Upper fuselage spar
CG Reference: Leading edge of rectangular wing section.
Reference Chord: 67.4 inches
Category N CG Limits:

FORWARD LIMIT:	at 750 KG (1653 LBS) 81 inches (12%)
	at 1100 KG (2425 LBS)169 inches (25%)
	(Linear variation between these weights)
AFT LIMIT:	at all weights 22,2 inches (33%)

Before loading the aircraft, the pilot must ensure (with the help of loading diagram) that weights and CG are within the specified limits.

NOTE: the rear (bench) seat must be provided with one safety belt per passenger.

WEIGHT-CG GRAPH



f. COMPULSORY WARNING PLACARDS

1.

BAGGAGE BAY MAX 60KG (132 LBS) SEE LOADING DIAGRAM

2.

NO SMOKING

3.*

APPROVED FOR DAY VFR FLIGHTS IN NON-ICING CONDITIONS

* Not applicable to aircraft on the United Kingdom Register.

4.

This aircraft must be used for NORMAL or UTILITY flying only in accordance with the approved Flight Manual.

On this aircraft, all indexes, markings and placards correspond to NORMAL utilization.

For UTILITY operation refer to the approved Flight Manual.

Aerobatics, including spinning, are prohibited when used in the NORMAL category.

Manoeuvring speed VA = 215 KPH (116 KTS) = maximum manoeuvring speed at which the control surfaces (elevator, rudder and ailerons) may be fully deflected.

g. ENGINE LIMITATIONS

Max. Continuous	2700 RPM (Red Line)
Max. Cyl. Hd. Temp.	260°C
Oil: Max. Temp.	118°C(Red Line)
Normal Pressure	64 to 90 psi (Green)
Min. (Idling)	25 psi
Fuel: Min Pressure	0.5 psi

h. RPM GAUGE MARKINGS

Red arc	2150 to 2350 RPM
Green Arc	2350 to 2600 RPM
Red Line AT	2700 RPM
Normal service maxi power =	2600 RPM

i. FUEL

Aviation Type Fuel	91/96 Octane (Min)
OR	100/130
OR	115/145
Tank Capacities Main	24.4 IG (29 USG)
Front Left	8.8 IG (10.6 USG)
Front Right	8.8 IG (10.6 USG)

j. OIL

Reservoir capacity	8 quarts
Min. Level	4 quarts
Max. level	4 quarts

k. MANOEUVRES

Stalling (See Page 5.1)

AEROBATICS PROHIBITED IN "N" CATEGORY SPINNING PROHIBITED.

CATEGORY "U" OPERATING LIMITS

The following manoeuvres are authorised within the limits of Category "U":

- Tight turns
- Lazy Eight
- Zoom Climbing turns
- Precautionary stalls

All these manoeuvres must be carried out in file following conditions:

- Rear seats must be unoccupied
- Speeds in and out of the turns must he within the normal operating range.

SECTION 3 - EMERGENCY PROCEDURES

1. Engine Fire in Flight

Cut off FUEL
Open throttle fully until fuel remaining in engine is used
Switch off ignition
Switch off battery and alternator before landing.

NOTE: Battery switch also cuts off the stall warning.

2. Engine Fire on Ground

Do not remove cowlings
Direct fire extinguisher jet into air intake or through the exhaust pipes aperture.

3. Alternator Failure

If ammeter indicates "DISCHARGE" switch off alternator and reduce electrical consumption to a minimum (radio, instruments) since electrical power is being provided solely by the battery.

There is no risk of abnormal engine operation.

4. CARBURETTOR ICING

If RPM decrease without a change in other flight parameters (speed, altitude) pull out the carb. heater control fully. (There are only 2 possible positions - ON and OFF).

The engine RPM will increase as soon as the ice has melted. Applying carburettor heat will normally cause a drop of 150 RPM and will in-crease the fuel consumption.

If icing occurs suddenly, apply carburettor heating and open the throttle fully.

5. EMERGENCY LANDING

Check Safety belts
Cut off FUEL and electrical supply. Before landing to reduce fire risks.

NOTE: In the event of any deformation of the engine cowlings following a forced landing which prevents normal opening of the canopy, use the JETTISON system lift the two red JETTISON flaps and open the central portion of the canopy.

6. ACCIDENTAL SPIN

Recovery is conventional. Apply full opposite rudder and stick neutral. Flaps must be retracted.

SECTION 4 - NORMAL PROCEDURES

1. Pre-flight Procedures

Before each flight, ensure that weight and CG are within the specified limits (e.g., by using loading diagram).

DETERMINATION OF CG FOR A GIVEN LOAD

Method 1 Use the makers loading diagram

IMPORTANT Ensure that the origin corresponds to the last weighing sheet.

Method 2 Carry out normal calculations of moments using following lever arms

Front passengers	16.2”
Rear seat	47’’
Rear fuel tank	44.2”
Baggage	75”
Front fuel tanks	4”

EXAMPLE OF CG CALCULATIONS

Aircraft weight empty	= 1130 Lbs.	
CG of aircraft empty	= 12.4” (= 18 %)	
Moment empty	= 1130 x 12.4	= 1145 ft. Lbs
Front passengers	= 340 x 16.2	= 455 ft. Lbs
Rear passengers	= 220 x 47	= 860 ft. Lbs
Fuel (rear tank)	= 176 x 44.2	= 645 ft. Lbs
Baggage	= 44 x 75	= 275 ft. Lbs
Sum of weights and moments	=1910	3380 ft.lbs
CG at above load	$= \frac{3380}{1910}$	= 21.2"(31.6%)

The CG is therefore within limits and the total weight less than the maximum.

2. PRE FLIGHT-CHECKS

(1) Select Battery switch ON

Check fuel gauge readings

Select battery switch OFF

Check - Magnetos OFF
- Fuel cock OPEN
- Mixture weak

(2) Before first flight daily and after each refuelling (allow fuel to settle) operate fuel drain cocks (see fig. 1.14)
Check - Filler caps secure
- Tank vent pipes unobstructed
- Static vents unobstructed

(3) Check - tail unit for condition
- tab (hinges free)
- rudder hinges

(4) Check condition of flaps and hinges. Ensure that, when retracted, flaps are in contact with the stops.

(5) Check aileron hinges
Remove mooring ropes and towing arm, if applicable.

(6) Check condition of main landing gear

- Tyre pressures: Front 28 psi
  Rear 28 psi

- Check that remaining oleo leg stroke is at least 2.75”
  (The top of the wheel fairing must be below the check hole in the fixed fairing when the aircraft is empty with any given amount of fuel in the tank). If not, inflate the oleo leg (pressures indicated on landing leg - or see page 1.4)

(7) Check canopy for cleanliness

(8) Check oil level – do not fly with less than 4 quarts.

Fill up when making a long flight

Check state of propeller, spinner and air baffles

Check air intake for condition and cleanliness.

Check security of exhaust pipes

Drain main filter

If necessary, remove and clean the air filter Close and lock oil inspection panel

Check security of upper engine cowling (Dzus) Carry out complete pre-flight checks before first flight of each day.

Subsequently, only control surfaces need be checked.

Before entering cabin, check security of baggage.

3. CHECKS BEFORE ENGINE STARTING

Adjust and lock seats and safety belts

Look all cabin doors

Check flying controls

Parking brake ON (White pointer to 12 o'clock)

Select battery switch ON

Set tab control to neutral

Select mixture fully rich (IN)

Check carb heater OFF (IN)

Select FUEL ON

Retract flaps.

4. ENGINE STARTING

Electrical Pump ON

When the pulses slow down, open throttle twice fully to actuate injection pump.

Close throttle

Select battery and alternator ON

LH Magneto switch ON

Operate starter button

Contact on BOTH Magnetos

Allow the engine to run at allow an RPM as possible (especially when cold) at a speed where no vibrations are felt.

Successive explosions followed by puffs of black smoke indicate a flooded engine. In this case, switch off the ignition, open the throttle fully, turn the engine over on. the starter (about a dozen times) to blow out excess fuel.

Then proceed as for normal start but without priming.

In cold weather, additional priming may be necessary.

As soon as engine starts to fire regularly, open up throttle slightly to keep it running.

In very cold weather, turn propellor by hand first, then proceed as above.

NOTE: Allow starter to cool between starting attempts; to prevent burning of windings.

5. TAXYING

Brakes ON - Open throttle slightly to depress nose (to unlock nosewheel)

Brakes OFF

Taxy slowly to avoid harsh braking.

Best engine speed for cooling when stopped = 1200 RPM

Avoid excessive use of rudders when taxying in a straight line.

Turns should always be carried out at a low taxying speed

To turn tightly at low speed, apply full rudder to actuate brakes

When taxying in a strong crosswind, move the stick into wind to improve control of the aircraft.

Taxy very slowly over stony ground, to pre-vent stones being thrown against propeller blades, wheel spats and tailplane.

NOTE : Since engine cooling rates are intended to cope with flight conditions, avoid overheating the engine during ground running, especially during engine checks.

In cold and clamp weather, apply carb. Heater for taxying and pre-take-off checks.

DO NOT FORGET TO SELECT OFF FOR TAKE-OFF

6. CHECKS BEFORE TAKE-OFF

If necessary, warm up engine at 1200 RPM

Do not carry out a ground run

Check magnetos individually at 1800 RPM
(Max RPM drop = 125 between 1 and 2 and 1+2)

Check for dead-cut around 1000 RPM

Check instruments and radio equipment

Carry out VITAL ACTIONS.

7. TAKE-OFF

Carb. heater and Mixture controls FULLY IN

Open throttle fully and gently

Check engine RPM (2200 MIN)

If RPM less than 2200, abandon take-off and have the engine checked.

To maintain a straight run, keep weight on the nosewheel

Make a clean rotation at 50-54 KTS

Level off to gain speed

Start climbing at : 70 KTS

TAXE OFF IN CROSSWIND (MAX COMPONENT 22 KTS)

Use ailerons to decrease lateral disturbance effects of crosswind.
Accelerate to a higher take-off speed than normal.
Rotate cleanly to avoid sinking back on after lift-off.
Once airborne, turn into wind to correct for drift.

8. CLIMB

Obstacle Clearance

Best climb an le with take-off flap selected is at 70 KTS (all models)

Normal climb

Retract flaps

Full throttle, accelerate to 92 KTS
Adjust elevator trim tub
Switch off electric pump

NOTE : Steep angle climp must be of short du-ration to avoid englue overheating.

The last 2.2 IG in the main tank (rear) are unusable in the climb.

9. CRUISE

Use throttle to adjust englue speed to give required power.

Adjust elevator trim tab

Adjust mixture control manually. Lean progressively until englue starts to run rough, then richen just sufficiently to restore smooth running.

The mixture must lie adjusted after each change of englue RPM or of altitude.

CRUISE ALTITUDE

To maintain constant power, the throttle must be progressively opened as height is increased. (See SECTION 5 - PERFORMANCE DATA)

There are no mechanical disadvantages in using a so-called 'fast' cruise engine speed close to, but less than max. engine speeds :

- 2700 RPM

provides power is, itself, lower than or equal to 75 %

10. DESCENT

Always apply carb. heater : engine idling
Reduce speed, Adjust elevator tab
Mixture fully RICH
Emergency electrical fuel pump ON
When speed falls below 92 KTS, select flaps as required.
Re-adjust elevator tab.

NOTE : During prolonged descent, increase RPM from time to time to maintain correct engine temperature.

11. LANDING

Approach speed (Vi = 1.3 times stalling speed)

68 KTS at 2309 LBS.

Carb. heater fully ON and LOCKED

Mixture FULLY RICH

Watch the airspeed (especially in strong winds)
Flare-out progressively.

ABORTED LANDING

Throttle may be opened fully in all configurations.

Select carb. heater OFF (IN)

Select flaps to TAKE-OFF as soon as possible.

LANDING IN CROSS WINDS (Max. component 22 KTS)

Approach with wings level, correcting for drift by "crabbing", or with one wing low (into wind) or by a combination of these two.

Level wings just before touch-down.

Maintain a straight course by use of rudder and with ailerons (stick into wind).

12. AFTER LANDING CHECKS

Retract flaps before taxying

When stopped, lower flaps to prevent damage by passengers leaving the aircraft

Handbrake ON

Engine speed 1200 RPM

Check each magneto in turn

Select mixture fully WEAK to choke engine

Switch off ignition

Switch off battery

Turn off fuel

Place chocks under main wheels

13. GROUND MANOEUVRES

Use the nosewheel steering bar

Rear loading will cause nosewheel to lock. To replease it, push tail up or pull nose down to depress nosewheel leg.

NOTE: Too great a steering angle on the nose-wheel will actuate the brakes on one of the main wheels.

14. TETHERING

Tail to wind

Lock the control column with a safety belt

Tether the aircraft by means of the two rings provided under the wings and one at the rear of the fuselage.

DO NOT APPLY TEE WHEELS

PLACE CHOCKS AGAINST THE WHEELS

Fit Canopy Cover.

15. PRECAUTIONS DURING PROLONGED PARKING

Without a canopy cover, the sun's rays will cause mottling of the Plexiglass

If the aircraft is not to be used for a certain period, keep it in a clean condition.

A SMALL EFFORT WILL ALWAYS PAY OFF

Turn the propeller by hand several times at least every two weeks to lubricate the internal parts of the engine.

FULL FUEL TANKS PREVENT INTERNAL CONDENSATION

NOISE LIMITATION*

In compliance with the Decree dated April 3, 1980, the maximum noise level permissible for the
DR 400/180aircraft , corresponding to the approved maximum gross weight of 2425 lb (1100 kg), is equal 74;7 dB (A).

The noise level determined in the conditions laid down in the above-mentioned Decree, at maximum continuous power, is equal to 73,1 dB (A) with Propeller SENSENICH 76 EM 855-0-64

In compliance with the Decree dated July 30, 1975, the DR 400/180 aircraft has been granted the type Certificate of Noise Limitation n° 45 dated March 6, 1980.

*Applicable to aircraft first flown after January 1, 1980.

SECTION 5 - PERFORMANCE DATA - INTERPOLATION

The following tables of performances data for take-off, climb and landing consist of figures for max. AUW and normal minimum operating AUW. For weights between these two extremes simple interpolation should be used to establish intermediate data

CROSSWIND LIMIT DEMONSTRATED - 22 KTS

STALLING SPEEDS (At Max AUW) "IN KTS IAS"

BANK ANGLE	**0°**	**30°**	**60°**
FLAPS UP	57	61	80
FLAPS :TAKE OFF	54	57	75
FLAPS:LANDING	51	55	72

P.E.C. CORRECTIONS

Since the pitot/static system is well matched indicated airspeeds are for all practical proposes identical to rectified air speeds.

There is therefore no need to correct indicated airspeeds other than for altitude and outside air temperature.

TAKE OFF PERFORMANCE:

in zero wind, flaps for take-off, PROPELLOR 76.68

ALTITUDE (FT)	TEMPERATURE (°C)	AUW 2425 LBS (1100 KG)		AUW 1984 LBS (900 KG)	
		HARD RUNWAY	GRASS	HARD RUNWAY	GRASS
0	STD - 20	1804 (918)	2115 (1229)	1181 (590)	1328 (737)
	STD (=15)	2001 (1033)	2378 (1410)	1312 (656)	1459 (836)
	STD + 20	2214 (1148)	2657 (1590)	1443 (737)	1640 (934)
4000	STD - 20	2411 (1229)	2952 (1771)	1557 (787)	1804 (1033)
	STD (=7)	2706 (1377)	3362 (2034)	1736 (885)	2034 (1181)
	STD + 20	3018 (1557)	3788 (2329)	1918 (984)	2263 (1328)
8000	STD - 20	3313 (1673)	4297 (2657)	2082 (1049)	2509 (1476)
	STD (= - 1)	3739 (1902)	4937 (3090)	2345 (1197)	2854 (1706)
	STD + 20	4199 (2132)	5675 (3608)	2607 (1345)	3215 (1951)

In each case : distance (feet) from standing start to clear 50 ft at 1.3 Vsi (distance of ground roll to reach 1.1 Vsi)

Effect of head wing: FOR 10 KTS MULTIPLY BY 0.81
FOR 20 KTS MULTIPLY BY 0.67
FOR 30 KTS MULTIPLY BY 0.56

CLIMB PERFORMANCE

In standard atmosphere

Flaps up

Full throttle, optimum mixture

Propellor Sensenich 76-68

1. AT AUW OF 2425 LBS (1100 KG)

Rate of Climb at MSL 826 ft/minute

Reducing by 47 ft/minute per 1000 feet

Service Ceiling 15,500 feet

Optimum Climbing Speeds:

92 KTS at MSL
reducing to 81 KTS at 15,000 feet

2. AT AUW 0F 1984 LBS (900 KG)

Rate of Climb at MSL 1141 ft/minute

Reducing by 51 ft/minute per 1000 feet

Service Ceiling 20,500 feet.

NOTE: Corrections for Temperature:
For Bach 10^0C above USA, reduce the service ceiling by 1000 feet, and reduce the rate of climb by 47 ft/minute.

CRUISE PERFORMANCE

At AUW (max) of 2425 LBS (1100 KG)
In standard atmosphere and still air
At optimum mixture setting
With zero fuel reserves (to dry tanks)
Propellor SENSENICH 76.68

POWER FUEL CONSUMPTION ENDURANCE	ALTITUDE (FT)	TAS (KTS)	RPM	RANGE (NM)
FULL THROTTLE	0	150		
	4000	147		
	8000	144		
	12000	138		
75% 8.6 IG/HOUR 4 HRS 52 MINS	0	134	2500	648
	4000	139	2600	675
	8000	144	2700	702
60% 7 IG/HOUR 5 HRS 56 MINS	0	123	2310	730
	4000	127	2400	750
	8000	130	2490	770
	12000	134	2580	793

GLIDE PERFORMANCE

With engine stopped, the glide angle is 1 in (1.56 NM per 1000 feet) at 81 KTS (Effects) of altitude and temperature are negligible).

LANDING PERFORMANCE - STILL AIR, FLAPS FOR LANDING.

ALTITUDE (FT)	TEMPERATURE (°C)	AUW 2303 LBS (1045 KG)		AUW 1862 LBS (845 KG)	
		MODERATE BRAKING RUNWAY OR GRASS	NO BRAKES GRASS	MODERATE BRAKING RUNWAY OR GRASS:	NO BRAKES GRASS
0	STD - 20	1640 (754)	2034 (1148)	1393 (623)	1706 (934)
	STD (= 15)	1738 (820)	2165 (1246)	1476 (656)	1804 (984)
	STD + 20	1837 (885)	2279 (1328)	1557 (704)	1918 (1065)
4000	STD - 20	1804 (853)	2246 (1295)	1525 (688)	1870 (1033)
	STD (= 7)	1918 (918)	2395 (1393)	1624 (754)	2001 (1131)
	STO + 20	2034 (984)	2526 (1476)	1706 (787)	2115 (1197)
8000	STD - 20	2001 (967)	2476 (1443)	1673 (787)	2066 (1181)
	STO (= - 1)	2132 (1049)	2657 (1574)	1787 (853)	2198 (1262)
	STD + 20	2263 (1115)	2821 (1673)	1886 (901)	2345 (1361)

In each case : distance (feet) from 50 ft at 1.3 Vso ta full stop
(ground roll from touchdown at Vso)

Effect of headwind : FOR 10 KTS MULTIPLY BY 0.81
FOR 20 KTS MULTIPLY BY 0.67
FOR 30 KTS MULTIPLY BY 0.56

SECTION 6 - MAINTENANCE AND OIL CHANGE

1. CLEANING

Wash with soap and water, rinse with clear water

Never use a pressure hose

Polish the paint finish with slightly abrasive products

Do not use silicone-based products

Use special plexiglass cleaners for the canopy

2. OIL CHANGE

Oil changes must be carried out every 50 hours.

NOTE : For the 50 and 100 hour inspections, refer to the Maintenance Manual.

SECTION VII - ADDENDA

1) TOWING PROCEDURES

Your DR 400/180 "Regent" is equipped with :

- A structural reinforcement installed on the aircraft at the production stage.
- A tube support bearing a 12 A type Aerazur tow-hook.
- A hook-release handle near the pilot's seat.
- An instruction placard near the hook-release handle.

Propellers approved for towing :

Gliders : 76-58, 76-54 (76-64 would enter the critical RPM - zone under normal utilisation)

GLIDER TOWING PROCEDURES

In addition to the usual procedures, check the correct working of the hooks on the aircraft and on the glider.

Towing configuration :

First stage of flaps up to Vi 75 kts (140 km/h) then flaps up position.

Full throttle whilst climbing.

Descent : Do not close throttle below 2500 RPM in or er to avoid the engine cooling being too quick.

Recommended speed Vi = 135 kts (250 km/h).

TOWING SPEED :

Gliders : Any speed is possible between the minimum aircraft towing speed Vr and the maximum authorised speed of the glider on tow.

The optimum climbing speed depends on characteristics of the glider = for gliders with a low wing loading and a medium glide ratio, the optimum speed is Vr whereas it may exceed 70 kts (130 km/h) for gliders with a high wing loading and glide ratio.

A climbing speed higher than the optimum may be necessary in case of critical engine cooling.

Following instruction placard is mandatory on this aircraft when equipped with a tow-hook :

See approved flight manual for towing instructions

		1)	**2)**
Weight of the towing aircraft	Lbs kg	1675 760	1874 850
Minimum glider towing speed Vr	Kts Kph	62 115	65 120
Minimum authorised speed for the glider on tow	Kts Kph	75 140	78 145
Maximum glider weight Vz at Vr = 138 ft/mn (0.7 m/s)	Lbs Kg	2017 915	1565 710
Maximum glider weight Vz at Vr = 335 ft/mn (1.7 m/s)	Lbs Kg	1565 710	1224 555

Remark :

1) Normal use, one pilot and 110 litres of fuel.

2) Tug pilot instruction.

BREAKING RESISTANCE OF THE TOWING CABLE :

- Maximum : 1000 daN
- Minimum : 0,8 time the weight of the glider.

TOWING PERFORMANCE

Weight of the towing aircraft	Lbs Kg	1675 760	1874 850	2205 1000
Stalling speed (Vo) with first stage of flaps.	Kph kph	47 87	50 92	54 100
Climbing speed at Vr at ground level with a glider under extreme conditions (conditions FAR 23 65 b)	ft/mn m/s	541 2,75	571 2,9	620 3,15
At Vr without glider	ft/mn m/s	1417 7,2	1220 6,2	965 4,9

TAKE OFF PERFORMANCE ON GRASS RUNWAY WITH A GLIDER EQUIPPED WITH A WHEEL.

WEIGHT OF TOWING AIRCRAFT = 1675 Lbs
(760 kg)

Weight of glider / Altitude temperature		660 Lbs	1320 Lbs
Z = 0	St = 15°	1345 (740)	1900 (1080)
	St = +20	1490 (840)	2130 (1230)
Z =4000 ft	St = 7°	1820 (1050)	2660 (1575)
	St = +20	2035 (1180)	2985 (1805)

WEIGHT OF TOWING AIRCRAFT = 1874 Lbs (850 kg)

Weight of glider / Altitude temperature		660 Lbs	1320 Lbs
Z = 0	St = 15°	1660 (935)	2330 (1360)
	St = +20°	1840 (1070)	2610 (1540)
Z = 4000 ft	St = 7°	2280 (1345)	3300 (2020)
	St = +20°	2545 (1525)	3725 (2315)

WEIGHT OF TOWING AIRCRAFT = 2205 Lbs (1000 kg)

Z = 0	St = 15°	2295 (1360)
	St = +20°	2560 (1540)
Z = 4000 ft	St = 7°	3230 (1970)
	St = +20°	3650 (2265)

The figures shown represent the total distance in feet from the beginning of the motion of the until it reaches a 50 ft height at V = 1.3 Vsl. (The figures between brackets show the rolling distance necessary to reach 1.1 Vsl).

2) SUPPLEMENTARY TANK (Optional)

Capacity : 50 liters (11 I.G.)

Lever arm : 1,61 m (63,4 inches)

Localization : under luggage compartment

To use the fuel of the supplementary tank, consume first enough fuel from the rear tank and then empty the supplementary tank fuel in the rear tank by means of the knob located on the central console.

The fuel quantity which is in the supplementary tank is indicated by a gauge located in the right upper side of the instrument panel.

3) - USE OF ROLL STABILIZER (Optional equipment)

1 - Type :

EDO-AIRE-MITCHELL CENTURY 1 - AK 306 roll stabilizer.

2 - Operating limits :

The roll stabilizer shall not be used when the aircraft is flying at a height less than 200 ft above the terrain.

3 - Emergency procedure :

In case of incorrect operation, the stabilizer can be momentarily put out of action, either by pressing the switch located on the control stick, or by means of the master switch (placed in the 0FF position) on the instrument panel.

Furthermore, the stabilizer can be easily overridden by means of the manual flight controls.

4 - Normal procedures :

4.1- Pre-flight check :

- actuate the stabilizer master switch

- rotate the "TURN" control knob to the left or to the right, and make sure that the control wheel turns in the corresponding direction.

- while taxying, with the "TURN" knob in neutral, check that the control wheel turns in the opposite direction, when a turn is made.

– check the movement of the ailerons.

4.2 – Before take-off and landing:

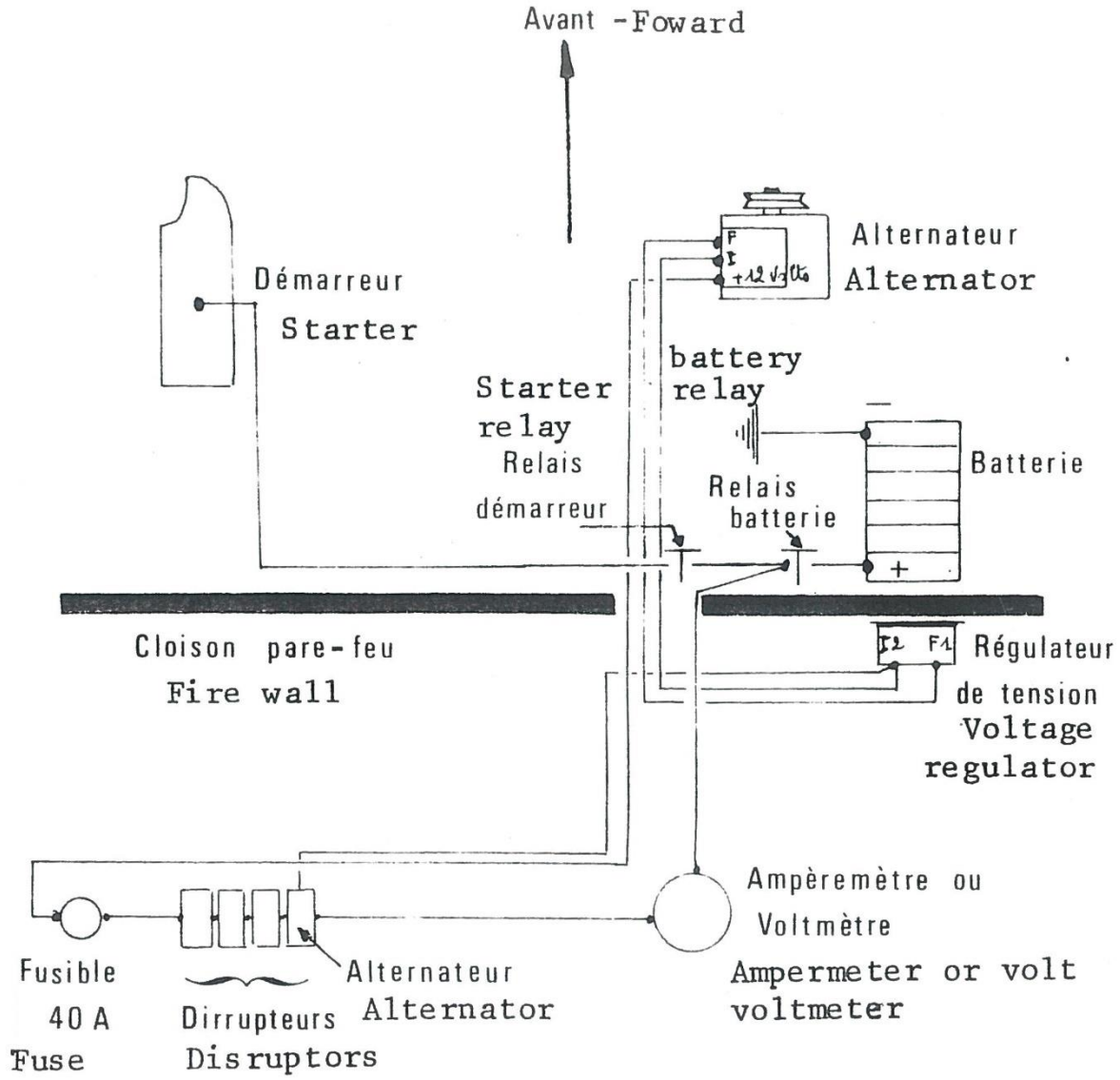
Place the stabilizer master switch in the OFF position.

4.3 – Climbing, cruising, descent:

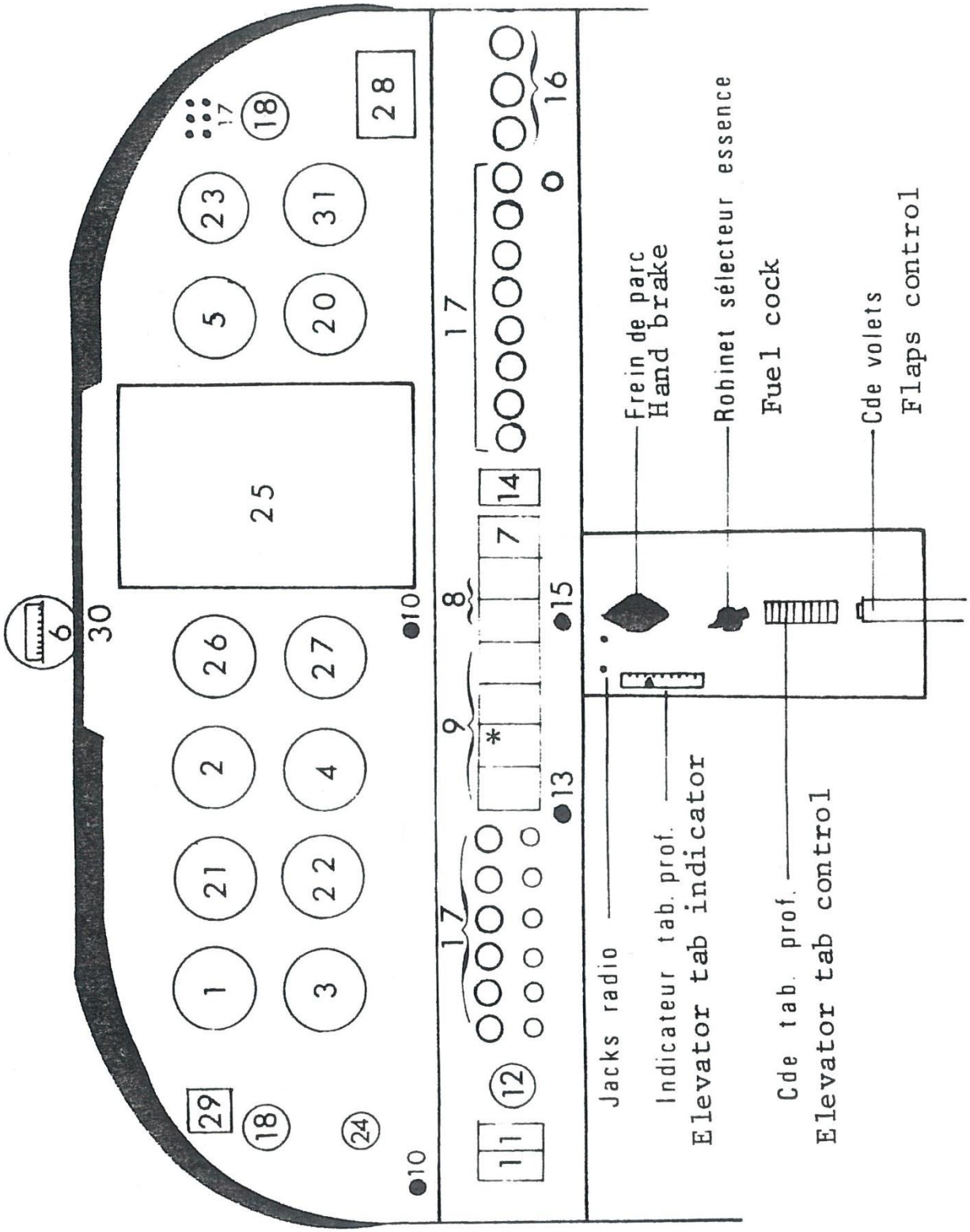
After having stabilized the aircraft attitude and set the elevator trim, place the stabilize master switch in the ON position.

With the “TURN” knob in neutral, adjust the button marked “TRIM” to prevent any heading drift.

A turn may be controlled either manually, by pressing the push-button on the control wheel and using the controls, or by turning the “TURN” knob (standard turning rate).



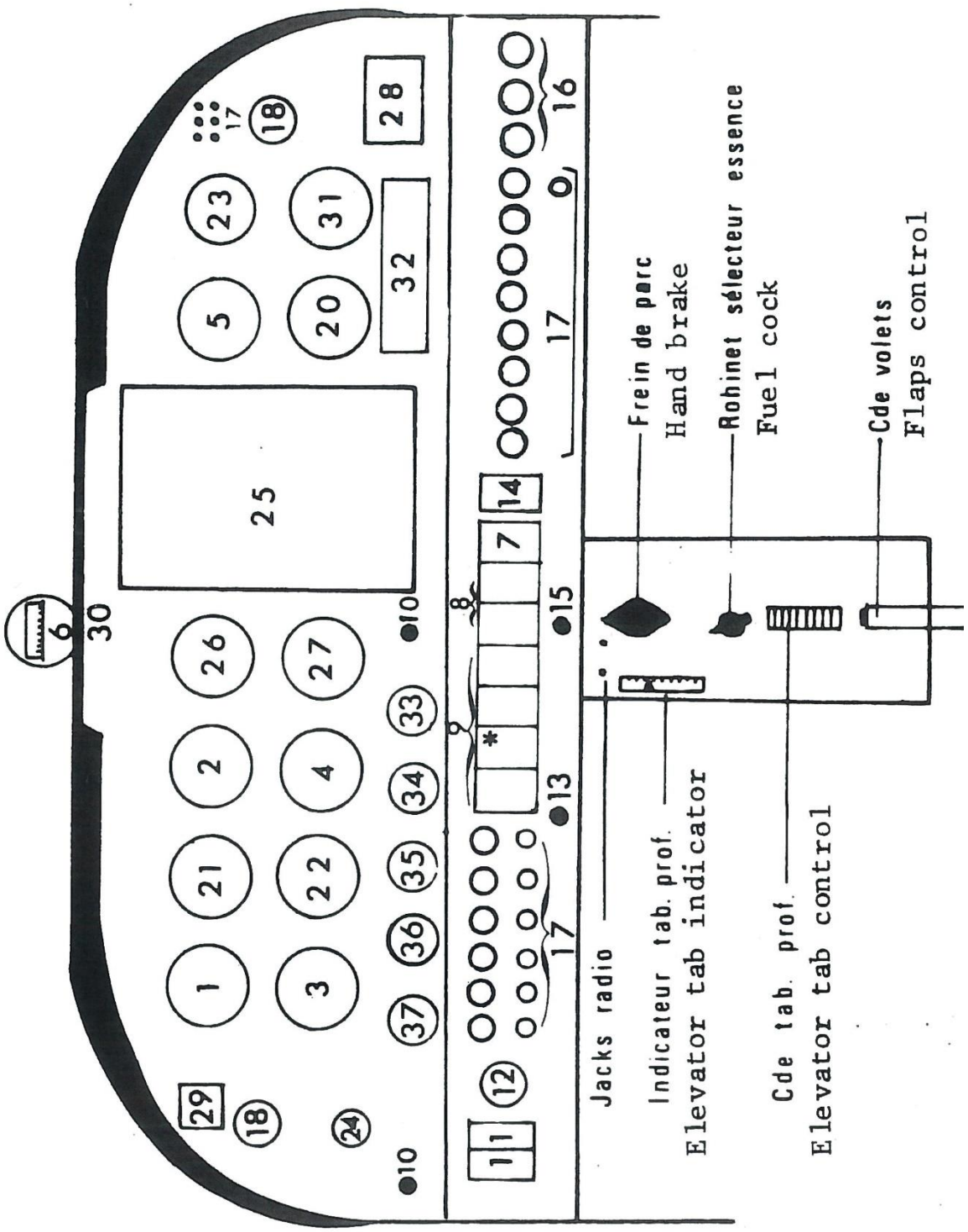
ELECTRICAL SYSTEM


Jacks radio
Indicateur tab. prof.
Elevator tab indicator
Cde tab. prof.
Elevator tab control
Frein de parc
Hand brake
Robinet sélecteur essence
Fuel cock
Cde volets
Flaps control

Equipment	Possible locations
– A.S I	1
– Altimeter n. 1	2
– Turn/bank indicator n. 1	3
– Climbing rate indicator	4-26
– Rev. counter	5-20-26
– Magnetic compass	6-21
– Amperemeter or voltmeter	7
– Oil pressure and temp. gauges	8
– Fuel content/press. gauges	9
– Throttle control	10
– Master and aux. switches	11
– Ignition switch	12
– Mixture control	13
– Electric pump	14
– Carb. heater	15
– Heating controls	16
– C/breakers and fuses	17
– Air vent	18

OPTIONNAL EQUIPMENT

– Altimeter n.2	20-5
– Artificial horizon	21
– Directional gyro	22
– Outside temperature	23
– Vacuum gauge	24
– Radio	25-26-27
– Panel lighting	28
– Stopwatch	29
– W/lights	30
– Cyl. temperature	31-20-23-9*
– E.G T	31-20-23
– Hour counter	
– Boost pressure	
– Cart. temperature	


Jacks radio
Indicateur tab. prof.
Elevator tab indicator
Cde tab. prof.
Elevator tab control
Frein de parc
Hand brake
Robinet sélecteur essence
Fuel cock
Cde volets
Flaps control

Equipment	Possible locations
– A.S I	1
– Altimeter n. 1	2
– Turn/bank indicator n. 1	3
– Climbing rate indicator	4-26
– Rev. counter	5-20-26
– Magnetic compass	6-21
– Amperemeter or voltmeter	7
– Oil pressure and temp. gauges	8
– Fuel content/press. gauges	9
– Throttle control	10
– Master and aux. switches	11
– Ignition switch	12
– Mixture control	13
– Electric pump	14
– Carb. heater	15
– Heating controls	16
– C/breakers and fuses	17
– Air vent	18

OPTIONNAL EQUIPMENT

– Altimeter n.2	20-5
– Artificial horizon	21
– Directional gyro	22
– Outside temperature	23
– Vacuum gauge	24-35-36
– Radio	25-26-27-32
– Panel lighting	28
– Stopwatch	29
– W/lights	30
– Cyl. temperature	31-33-34-35-36-37-20-23-9*
– E.G T – Hour counter – Boost pressure Cart. temperature	31-33-34-35-36-37-20-23

DR 400/180

USE OF THE WEIGHT AND BALANCE CHART

1 Calculate the total take-off weight of the aircraft : empty weight (from the weight and balance sheet). + occupants + luggage + standard fuel + auxiliary fuel (if installed). Ensure that maxi take-off weight does not exceed 1100 kg (2425 lb) in normal category and 950 kg (2094 lb) in utility category.

2 Place the empty aircraft moment (from the weight and balance sheet) on the upper scale of the opposite chart, and follow the example indicated by the dashed line. The resulting point must be within the shaded area (centre of gravity moment envelope), for the load to be acceptable.

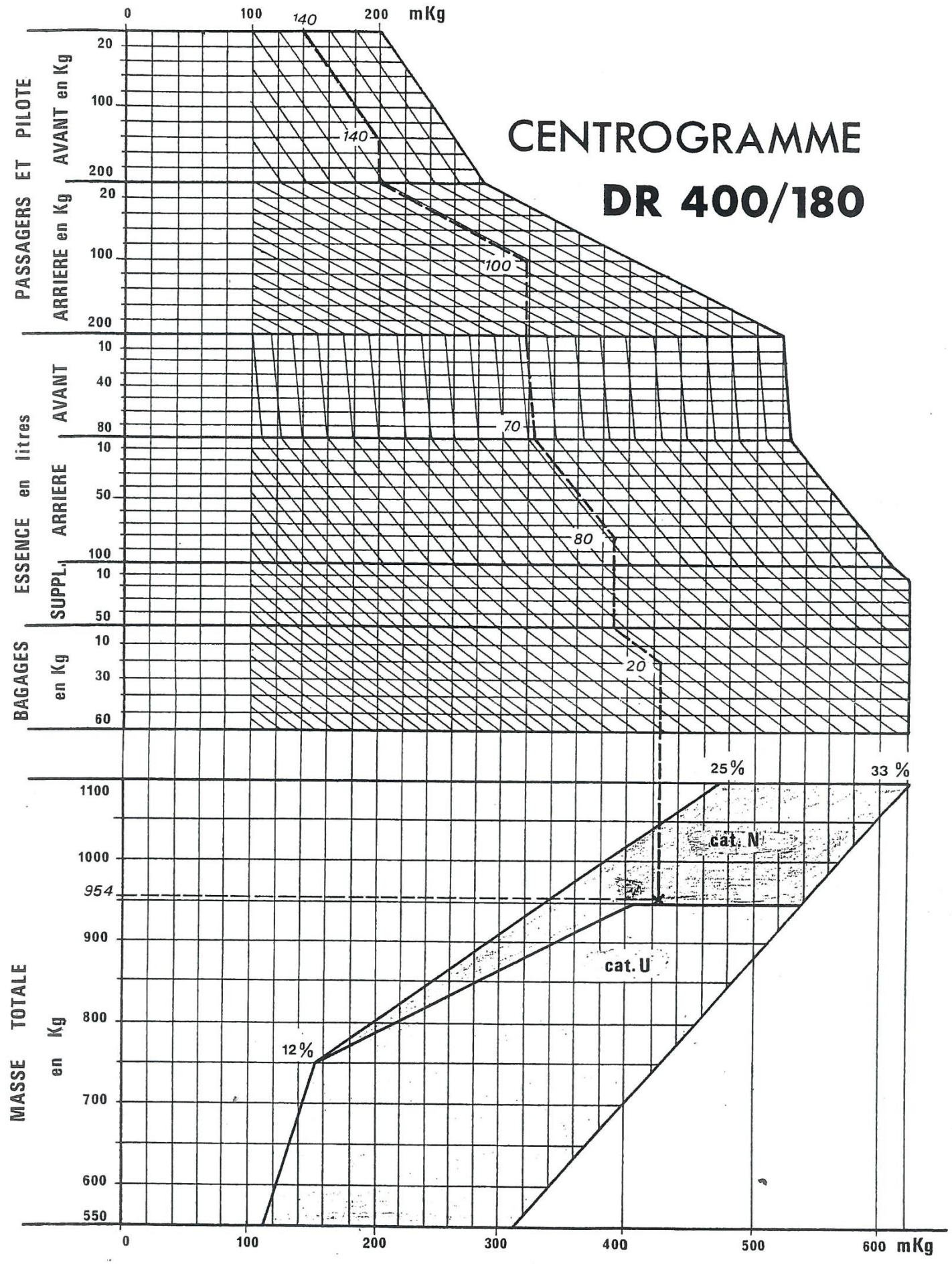
NOTE: If an auxiliary fuel tank is not installed, continue vertically across the supplemental fuel zone.

EXAMPLE:

Empty aircraft – moment	(1302 ft.lb)	180 m.kg
Empty aircraft – weight.....	(1552 lb)	704 kg
Pilot + front passengers	(331 lb)	150 kg
Rear passengers.....	(198 lb)	90 kg
Standard fuel 90 l.....	(143 lb)	64.8 kg
(23.78 US Gal/19.8 Imp gal)		
Luggage.....	(44 lb)	20 kg
TOTAL WEIGHT	(2316 lb)	1050 kg

CENTRE OF GRAVITY : within the envelope

1 litre AVGAS	= (1.6 lb)	0.72 kg
1 US gallon AVGAS	= (6 lb)	2.07 kg
1 Imp gallon AVGAS	= (7.21 lb)	3.27 kg


CENTROGRAMME
DR 400/180
PASSAGERS ET PILOTE
AVANT en Kg
ARRIERE en Kg
ESSENCE en litres
AVANT
ARRIERE
SUPPL.
BAGAGES
en Kg
MASSE TOTALE
en Kg
mKg
140
100
70
80
20
25%
33 %
12%
cat. N
cat. U
954