MANUEL de VOL
FLUGHANDBUCH
FLIGHT MANUAL

DR 400/180R

avions pierre robin

F L I G H T M A N U A L

Aircraft Type : DR 400 - 180 R

Registration n° :

Serial n°

Type Certificate : n° 45 dated Nov. 28th, 1972

Makers : Avions PIERRE ROBIN

21121 FONTAINE-LES-DIJON
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THIS MANUAL IS APPROVED BY S. G. A. C

Chapter	Pages	Dates
2	2.1 to 2.5	1972.12.04
3	3.1 to 3.2	"
5	5.1	"

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.

P.O.
05.09.74

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MISES A JOUR

N°	Pages révisées	N° de l'édition	Nature des amendements	Date Approbation du S. G. A. C.
-	-	1	Edition originale	4.12.1972
1	1.7 - 2.5 7.1	2	Hélice Hoffmann	25.02.1975
2	0.3 7.7 - 7.8	3	Stabilisateur de roulis	28.05.1976
3	0.2-1.13 1.13 a 1.13 b	4	Instrument panel Nr 2	11.07.1977
4	0.3 1.17 7.9-7.10-7.11-7.12 7.13	5	Control surface deflections Electrical system and instrument panels	18.07.1979

SECTION 1 - GENERAL

1. Description and Characteristics

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

WING

The "Jodel" type wing is of the single spar type, covered with DACRON fabric.

Aspect ratio	5.35
Dihedral (wing-tip)	14°
Chord (rectangular section)	67.4"
Area	146,39 sq.ft

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 means of a rudder bar and cables.

Rudder deflection angles (see page 1.17)

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.
Wheel base	5 ft. 5 ins.
Whell size	380 x 150
Tyres	

Tyre Pressures (p.s.i.)	Front	25
	Rear	28
Oleo leg strokes	Front	6.28"
	Rear	7.08"
Oleo leg inflating pressures (p.s.i.)	Front	64
	Rear	78

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

BRAKES

Hydraulic braking system (independant 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 O-360-A3A

4 horizontally opposed cylinders, direct drive, aircooled engine.

Max. contiuous RPM	2700
Compression ratio	8.5 : 1
Max. cylinder head temp.	260°c.
Max. cylinder temp	160°c.
Direction of rotation	Clockwise
Firing order	1 : 3 : 2 : 4

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)
30°C to -20°C	SAE 40 (80)
Max oil temperature	118°c.

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 fuel control cock is mounted on the instrument panel tunnel.

ENGINE CONTROLS

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

PROPELLORS

	1	2	3	4
Makers	SENSENICH	SENSENICH	SENSENICH	SENSENICH
Type	76 EM 8S50.64	76 EM 8S50.68	76 EM 8S50.58	76 EM 8S50.54
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: Avoid continuous use between 2150 and 2350 RPM

* No reduction in diameter is permitted.

In Addition :

Propellor HO-27-HM-180/138
(Ø : 1,80 m, pitch : 1,38 m)
Minimum speed : 2400 RPM No RPM limitation

CABIN

Fitted with sliding jettisonable canopy, opening from rear to front.

The two front seats are adjustable (6 positions).

Front and rear seats are all 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 manofold.

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
Oil pressure indicator
Fuel pressure indicator

Warning lamps for :	flaps
	fuel reserve level (front & rear)
	oil pressure
	alternator
	Hook release
Circuit breakers for :	warning lamps
	indicators
	electric pump
	stall warning
	starters
	services
	alternator

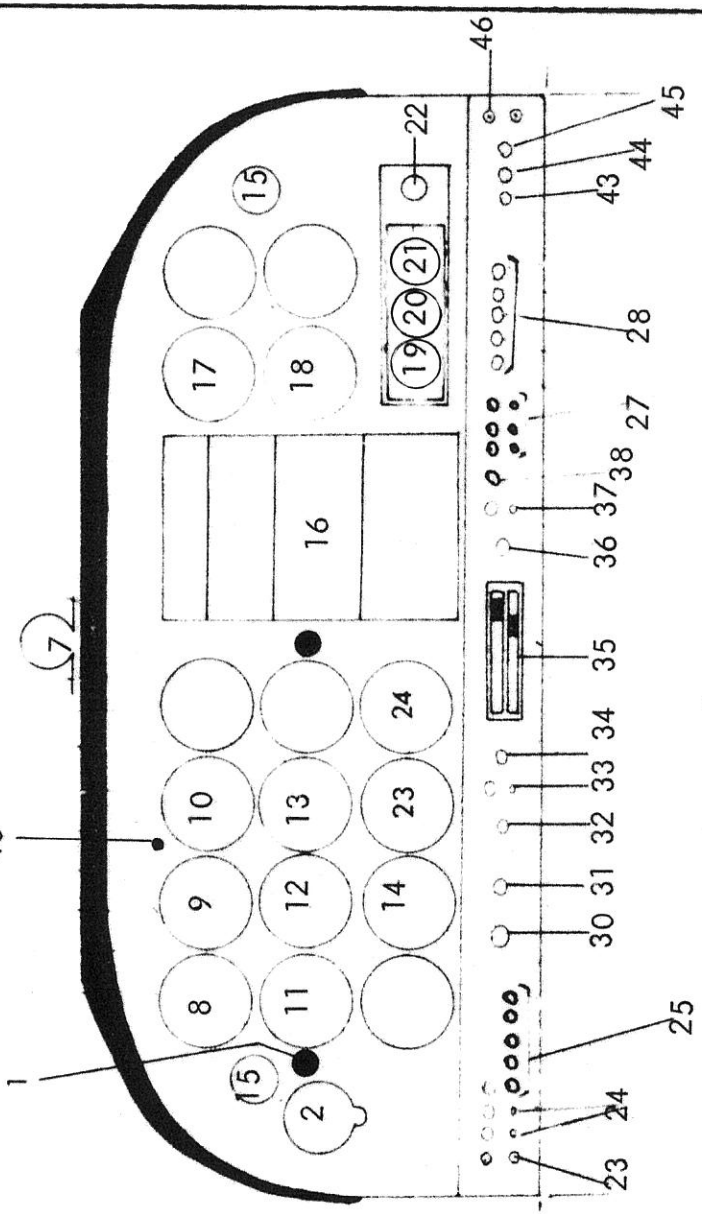
Tow hook and hook release haudle
Cylinder Head Temerature gauge

b. OPTIONAL EQUIPMENT

OAT gauge (canopy mounted)
OAT gauge (tansmission 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
HF Radio

Marker beacon
Carburettor temperature gauge

RH and LH landing lamps, switch and fuse
Navigation lamps

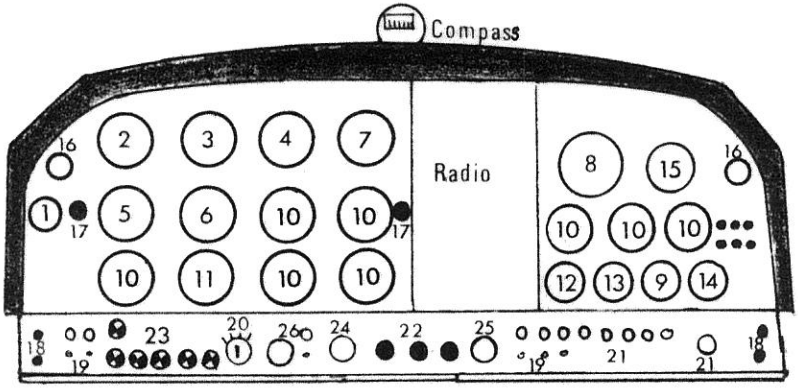


INSTRUMENT PANEL Nr 1

INSTRUMENT PANEL NR 1

1. Throttle control
2. Clock (option)
7. Magnetic compass (option)
8. Airspeed indicator
9. Artificial horizon (option) or compass
10. Altimeter
11. Turn and Slips indicator
12. Directionnal Indicator (option)
13. Vertical speed indicator
14. Suction gauge (option)
15. Fresh air vent
16. Radio (option)
17. Intake pressure (option)
18. RPM gauge
19. Rear tank gauge
20. Oil temperature
21. Anmeter
22. 40 A Fuse
23. Headset jacks (option)
24. Circuit breakers
25. Warning lights
26. Instrument panel lights (option)
27. Circuit breakers
28. Fuses
30. Magneto switches
31. Starter
32. Battery switch
33. Alternator switch
34. Mixture control
35. Heating controls
36. Carburetor heater
37. Electric pump switch
43. 44. 45. Fuses
46. Hook release warning light

INSTRUMENT PANEL - Nr 2

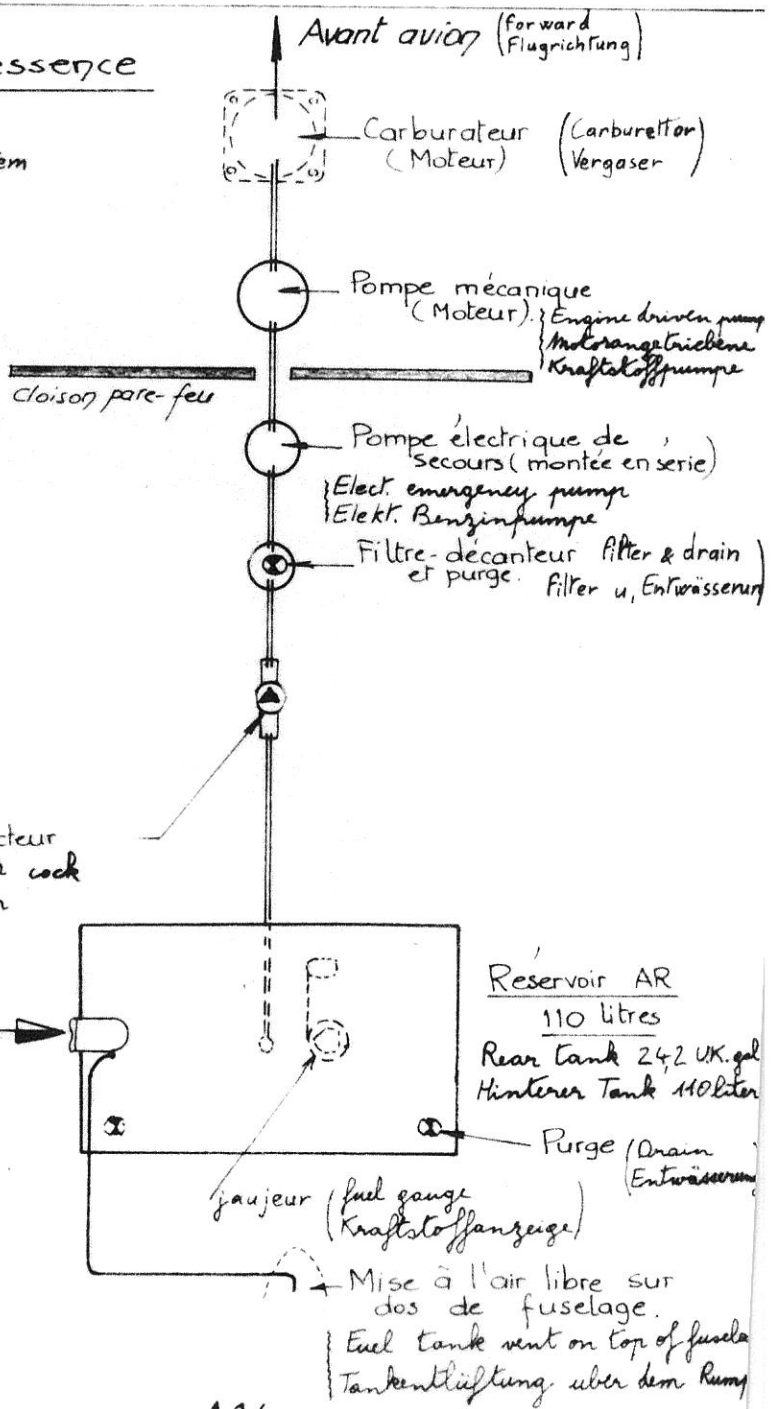


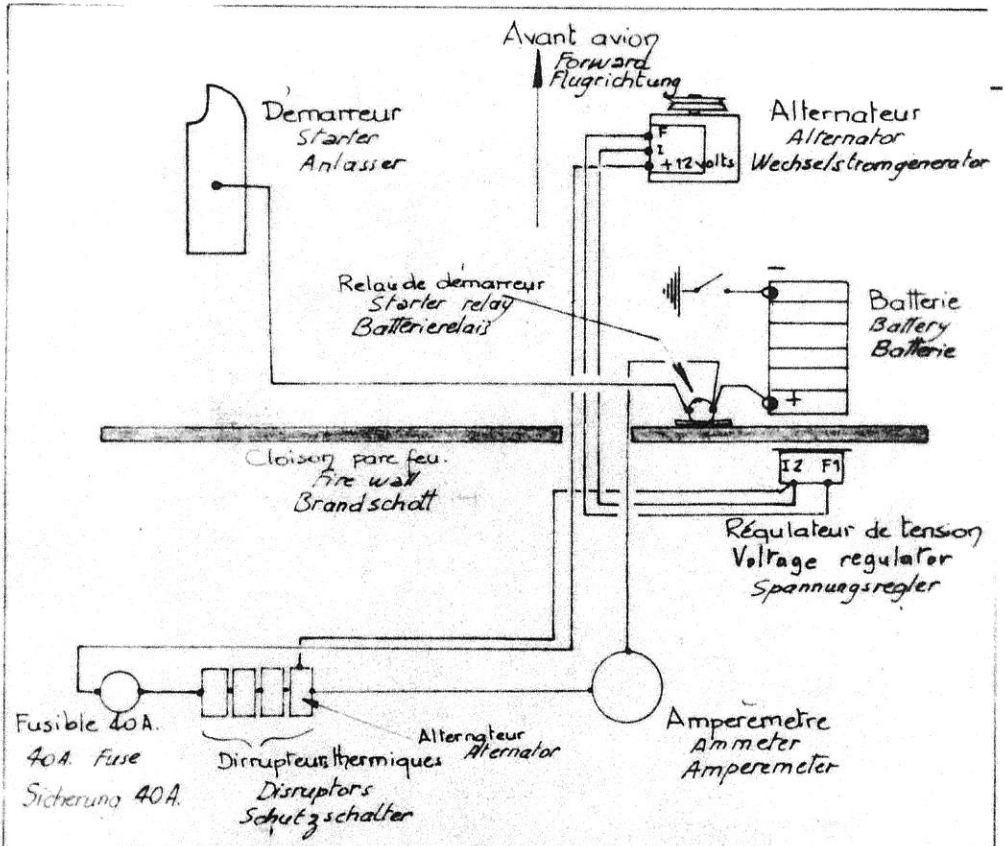
1 - Stop watch (option)
2 - Airspeed indicator
3 - Artificial horizon
4 - Altimeter
5 - Turn/bank indicator
6 - Directionnal (opt.)
7 - Rate of climb
8 - RPM indicator
9 - Fuel pressure (opt.)
10 - Options

11 - Vacuum gauge (opt.)
12 - Oil temperature
13 - Oil pressure
14 - Amp. or voltmeter
15 - Fuel gauge
16 - Freshair 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 - Carburator heater
26 - Battery and alternator switch

Circuit d'essence

Fuel System
Kraftstoffsystem

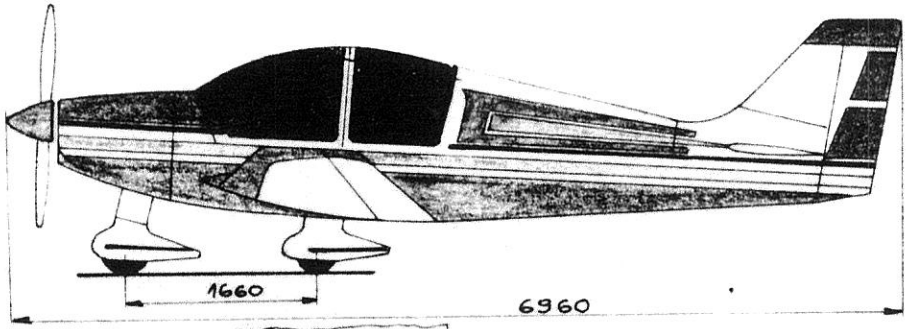




— Schéma de principe du circuit électrique —

— Electrical system —

— Schema der Elektrischen Anlage —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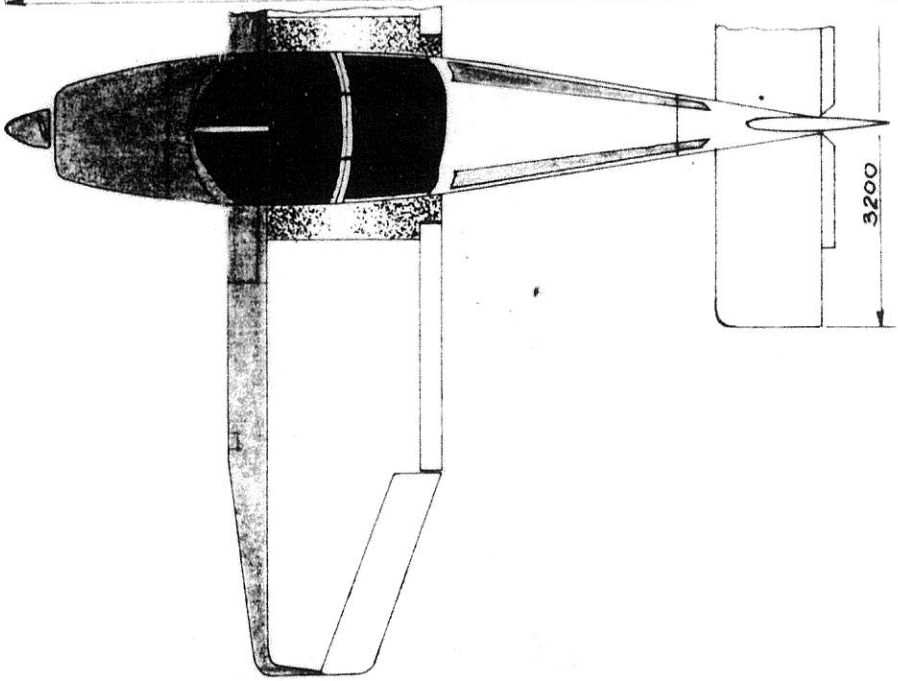
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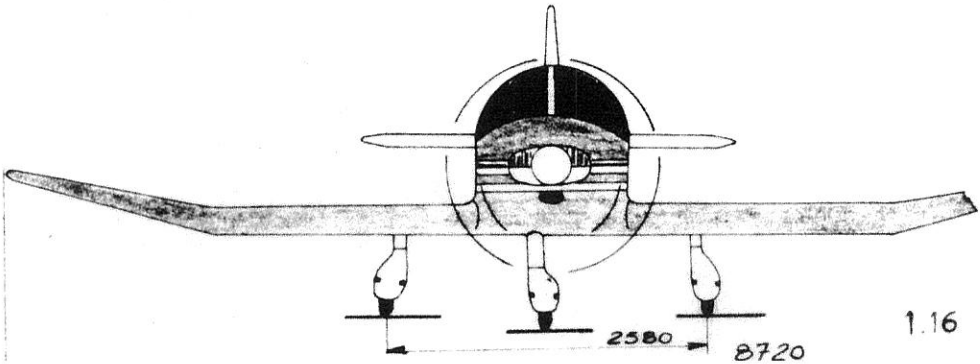
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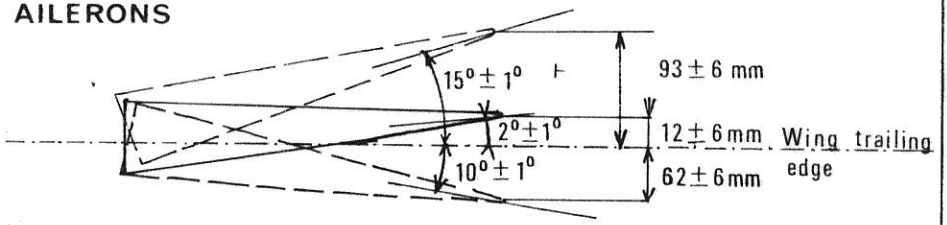
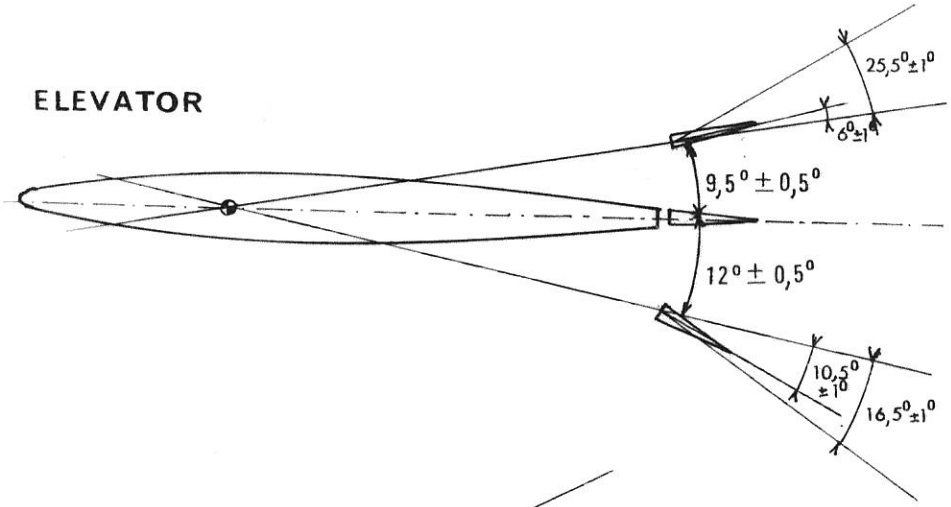
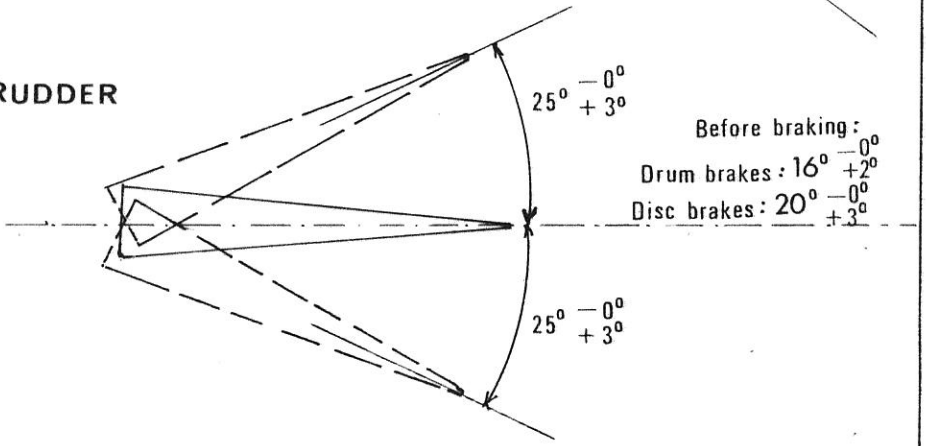
AILERONS



ELEVATOR



RUDDER



FLAPS ——— 60° −5° +0°

SECTION 2 - OPERATING LIMITS

a. Approval Criteria

The following aircraft comply with AIR 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 particularly appertaining to jettison of canopies.

b. Limiting Speeds (IAS) at max. AUW

	KPH	KTS	MPH
VNE - Never exceed speed	308	166	191
VNO - Normal operating speed	260	140	162
VC - Design cruising speed	260	140	162
VA - Manoeuvreing speed	215	116	134
VFe - Flap extended speed	170	92	106

ASI Markings KPS (KTS)

Radial Red Line	308kph (166kts,191mph)
Yellow arc (cautionary calm air only)	260/308kph (140/166kts, 162/191mph
Green arc (normal use)	99/260kph (53/140kts, 61/162mph)
White arc (flaps extended)	87/170kph (47/92kts, 54/106mph)

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	1000 kg	(2205lbs)
Landing	1000 kg	(2205lbs)

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 1000 KG (2205 LBS) 169 inches (25%)

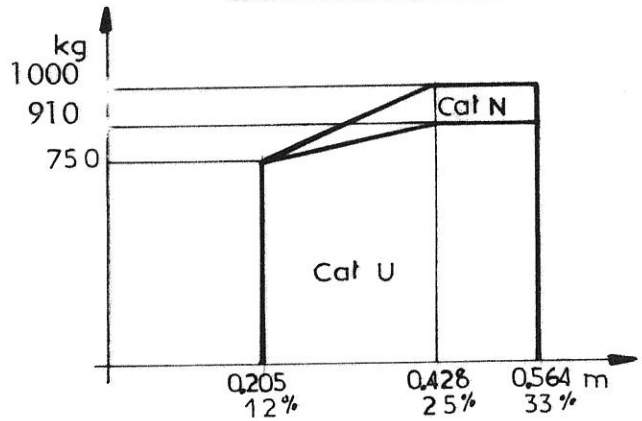
(linear variation between these weights)

AFT LIMIT : at all weights 222 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 60 KG (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.

SEE APPROVED FLIGHT MANUAL FOR TOWING INSTRUCTIONS

5

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 utilisation.

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)(134MPH) maximum manoeuvreing 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	60 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 2700 RPM
Red Line	AT	2700 RPM

For HO-27 propellor : Green arc from 2150 to 2700RPM
Red arc at 2700 RPM

i. Fuel

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

j. OIL

Reservoir Capacity	8 quarts
Min. Level	4 quarts
Max. Level	8 quarts

k. MANOEUVRES

Stalling (See Page 5.1)

ACROBATICS 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 the following conditions :

- Rear seats must be unoccupped
- Speeds in and out of the turns must be 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 increase the fuel consumption.

If icing occurse 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	16.1"
Rear seat	46.8"
Rear fuel tank	44.1"
Baggage	74.8"

EXAMPLE OF CG CALCULATIONS

Aircraft weight empty = 1130 lbs.

CG of aircraft empty = 12.4" (= 18 %)

Moment empty = 1130 × 12.4 = 14012 inch.lbs

Front passengers	= 340	× 16.1	= 5474	inch.lbs
Rear passengers	= 220	× 46.8	= 10296	inch.lbs
Fuel (rear tank)	= 176	× 44.1	= 7761	inch.lbs
Baggage	= 44	× 74.8	= 3291	inch.lbs
Sum of weights and moments	= 1910 lbs		40834	inch.lbs

CG at above load $= \frac{40834}{1910}$ = 21.4" (31.7%)

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

- 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 oleoleg (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
Lock 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 sligthly 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 sligthly 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 tigthly at low speed, apply full rudder to actuate brakes

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

Taxy very slowly over stoney ground, to prevent 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 damp 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 (57-62mph)
Level off to gain speed
Start climbing at : 65 KTS (75 mph)

TAKE 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 angle with take-off flap selected is at 70 KTS (80 mph)

Normal climb
Retract flaps
Full throttle, accelerate to : 80KTS (92mph)

Adjust elevator trim tab

Switch off electric pump

NOTE : Steep angle climp must be of short duration to avoid engine overheating.

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

9. CRUISE

Use throttle to adjust engine speed to give required power.

Adjust elevator trim tab

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

The mixture must be adjusted after each change of engine 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 92KTS-106 MPH, 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)

62 KTS (71 MPH) at 2205 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 nosewheel 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 THE WHEELS BRAKES

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 twoweeks to lubricate the internal parts of the engine.

FULL FUEL TANKS PREVENT INTERNAL CONDENSATION

SECTION 5 - PERFORMANCE DATA -

CROSSWIND LIMIT DEMONSTRATED - 22 KTS 25 MPH

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

BANK ANGLE	0°	30°	60°
FLAPS UP	53	57	75
FLAPS : TAKE OFF	50	53	71
FLAPS:LANDING	47	50	66

P.E.C. CORRECTIONS

Since the pitot/static system is well matched indicated airspeeds are for all practical pruposes 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 ENSENICH 76.58

ALTITUDE (FT)	TEMPERATURE (°C)	FEET AUW 2205 LBS (1000 KG)		FEET AUW 1874 LBS (850 KG)	
		HARD RUNWAY	GRASS	HARD RUNWAY	GRASS
0	- 5°C	1181 (590)	1345 (754)	771 (377)	836 (442)
	STD (=15°C)	1312 (672)	1492 (853)	836 (410)	218 (492)
	+ 35°C	1443 (738)	1656 (951)	918 (459)	1017 (557)
4000	- 13°C	1558 (787)	1804 (1033)	1000 (492)	1099 (590)
	STD (=7°C)	1738 (902)	2034 (1197)	1099 (541)	1230 (672)
	+ 27°C	1935 (1000)	2280 (1345)	1213 (607)	1361 (754)
8000	- 21°C	2099 (1066)	2509 (1476)	1295 (656)	1476 (836)
	STD (= - 1°C)	2345 (1214)	2854 (1722)	1460 (738)	1673 (951)
	+ 19°C	2624 (1360)	3231 (1968)	1607 (820)	1870 (1082)

IN EACH CASE : DISTANCE (FEET) FROM STANDING START TO CLEAR 50 FT AT 1.3 Vsl
(DISTANCE OF CROUND ROLL TO REACH 1.1 Vsl)

EFFECT OF HEAD WING : FOR 10 KTS MULTIPLY BY 0.79
FOR 20 KTS MULTIPLY BY 0.64
FOR 30 KTS MULTIPLY BY 0.53

CLIMB PERFORMANCE

In standard atmosphere
Flaps up
Full throttle, optimum mixture
Propellor Sensenich 76.58

1. AT AUW OF 2205 LBS (1000 KG)

Rate of Climb at MSL : 1100 ft/minute (5,6 m/s)
Reducing by 49 ft/minute per 1000 feet
Service Ceiling 20.000 ft
Optimum Climbing Speeds:

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

2. AT AUW OF 1764 LBS (800 KG)

Rate of Climb at MSL 1515ft/minute (7,5m/s)
Reducing by 55 ft/minute per 1000 feet
Service Ceiling 25.000 ft

NOTE: Corrections for Temperature: For each 10°C above ISA, reduce the service ceiling by 1000 feet, and reduce the rate of climb by 49 ft/minute.

GUIDE PERFORMANCE :

With engine stopped the glide angle is 1 in 9.3 (with no wind) at Vi=78 KTS (90MPH)
Effects of altitude and temperature are almost negligible.

CRUISE PERFORMANCE

. AT AUW OF 1000 KG (2205 LBS)
. IN STANDARD ATMOSPHERE AND STILL AIR
. AT APTIMUM MIXTURE SETTING.
. WITH ZERO FUEL RESERVE (TODRY TANKS)
. PROPELLER SENSENICH 76.58

RPM	ALTITUDE feet	TAS knots	% POWOR	FUEL Consum-tion IG/hour	ENDU-RANCE h.min.	RANGE n.m
2700	0	124	70	8.0	3.00	373
	6000	123	63	7.3	3.17	405
	12000	122	56	6.6	3.40	445
2600	0	119	64	7.4	3.14	386
	6000	117	58	6.8	3.33	405
	1200	116	53	6.3	3.52	448
2500	0	114	58	6.8	3.33	405
	6000	112	54	6.4	3.48	427
	12000	110	50	6.0	4.00	440
2400	0	107	52	6.1	3.56	421
	6000	104	49	5.9	4.04	427
	1200	102	47	5.7	4.14	435

LANDING PERFFORMANCE - 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	- 5°C	1460 (672)	1804 (1017)	1246 (541)	1509 (803)
	STD (= 15°C)	1542 (721)	1902 (1082)	1312 (574)	1607 (869)
	+ 35°C	1640 (771)	2017 (1148)	1378 (623)	1689 (935)
4000	- 13°C	1607 (754)	1984 (1131)	1345 (607)	1640 (902)
	STD (= 7°C)	1706 (820)	2099 (1213)	1427 (656)	1755 (984)
	+ 27°C	1804 (885)	2231 (1312)	1509 (705)	1853 (1049)
8000	- 21°C	1771 (853)	2198 (1279)	1476 (672)	1820 (1017)
	STD (= -1°C)	1886 (918)	2345 (1378)	1574 (738)	1935 (1099)
	+ 19°C	2001 (984)	2493 (1476)	1656 (787)	2050 (1181)

IN EACH CASE : DISTANCE (FEET) FROM 50 FT AT 1.3 Vso to FULL STOP
(GROUND ROLL FROM TOUCHDOWN AT Vso)

EFFECT OF HEADWIND : FOR 10 KTS MULTIPLY BY 0.79
FOR 20 KTS MULTIPLY BY 0.64
FOR 30 KTS MULTIPLY BY 0.53

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.

SUPPLEMENT : TOWING PROCEDURES

Your DR 400/180 R is equipped with :

- A structural reinforcement installed on the aircraft at the production stage.
- A tube support bearing a 12 A type Aérazur 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)
  Banners : 76-54 (76-58 would enter the critical RPM - zone under normal utilisation)
- Propeller HO-27-HM-180/138 (gliders and banners)

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 140 km/H then flaps up position.
Full throttle whilst climbing.

Descent : Do not close throttle below 2500 RPM in order to avoid the engine cooling being too quick.
Recommended speed Vi = 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 where as it many exceed 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.

BANNER TOWING PROCEDURES :

In addition to the usual procedures :

- Check the correct working of the hook on the aircraft.
- Then attach the cable to the aircraft and to the banner.
- Lay the folded banner on the ground in front of the aircraft at such a distance that it has reached a sufficient speed when lifting the banner. For a pick up hooking in flight, the approach speed of the aircraft should be 105 Km/H.

  A speed very close to Vb should be maintained for the whole flight.

  For banner towing at a slow speed and under hot weather conditions, it is advised if need be to install the cooling flap (see sketch 58 - 319) on the inferior engine cowling to obtain a better engine cooling.This flap belongs to the optional equipment of the aircraft.

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

See approved flight manual for towing instructions

	1)	2)	3)
Weight of the towing aircraft in Kg	750	840	1000
Minimum glider towing speed Vr kph	110	115	125
Minimum banner towing speed Vb kph	95	100	120
Minimum authorized speed for the glide glider on tow kph	135	140	150
Maximum glider weight Vz at Vr = 0,7 m/s	970	765	420
Maximum glider weight Vz at Vr = 1,7 m/s	750	595	330
100Cx.S maximum of the banner	230	155	65

Remark :

1) Normal utilisation = 1 pilot, 110 L Fuel
2) Case of towing pilot's schooling
3) Exceptional case : Passengers transport with a light on tow or leaflets dropping with a reduced banner.

BREAKING RESISTANCE OF THE TOWING CABLE /

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

TOWING PERFORMANCE

Weight of the towing aircraft	750 kg	840 kg	1000 kg
Stalling speed (Vo) with first stage of flaps (km/h)	83	88	96
Climbing speed at Vr at ground level with a glider under extreme conditions (conditions FAR 23 65 b)-m/s	2.65	2.8	3.05
At Vr without glider (m/s)	7.25	6.25	4.9
At Vb with extreme banner	2.65	2.8	3.05
At Vb without banner	6.35	5.45	4.5

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

WEIGHT OF TOWING AIRCRAFT = 750 KG

Weight of glider / Altitude température		300 KG	600 KG
Z = 0	St = 15º	375 (205) m	535 (300) m
	St = + 20º	415 (230)	595 (335)
Z = 4000 ft	St = 7 º	510 (285)	745 (430)
	St = + 20º	565 (325)	835 (495)

WEIGHT OF TOWING AIRCRAFT = 840 KG

Weight of glider / Altitude température		300 KG	600 KG
Z = 0	St 15 °	465 (260)m	655(375)
	St + 20°	515 (290)	730(425)
Z = 4000 ft	St = 7°	635 (365)	925(555)
	St + 20°	710 (415)	1040(635)

WEIGHT OF TOWING AIRCRAFT = 1000 KG

Z = 0	St = 15°	660 (380) m
	St + 20°	735 (435)
Z = 4000 ft	St = 7°	925 (555)
	St + 20°	1040 (635)

The figures shown represent the total distance in meters from the beginning of the motion of the aircraft untill it reaches a 50 ft height at V =1,3 Vsl
(The figures beetween brackets show the rolling distance necessary to reach 1,1 Vs 1).

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 :

Do not use the stabilizer during take off or landing.

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 OFF position) on the instrument panel.

Furthermore, the stabilizer can be easily overriden 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.
- make sure that, when the push-button switch located on the control wheel is pressed, the stabilizer is temporarily disengaged.

4.2 - Before take off and landing :

Place the stabilizer master switch in the OFF position.

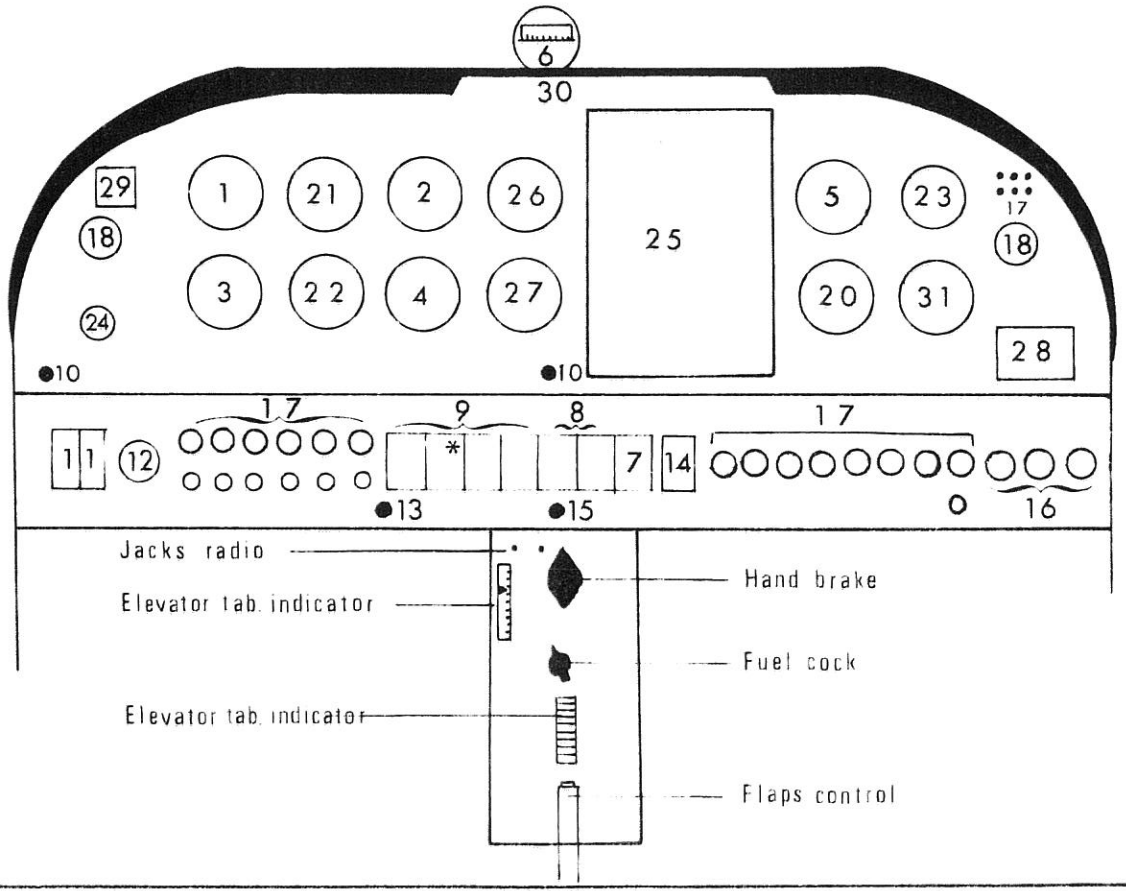
4.3 - Climbing, cruising, descent :

After having stabilized the aircraft attitude and set the elevator trim, place the stabilizer 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).

NOTE : To fly horizontally and without heading drift, it is necessary to correctly set the stabilizer trim, and to keep the ball of the ball type indicator in the central position.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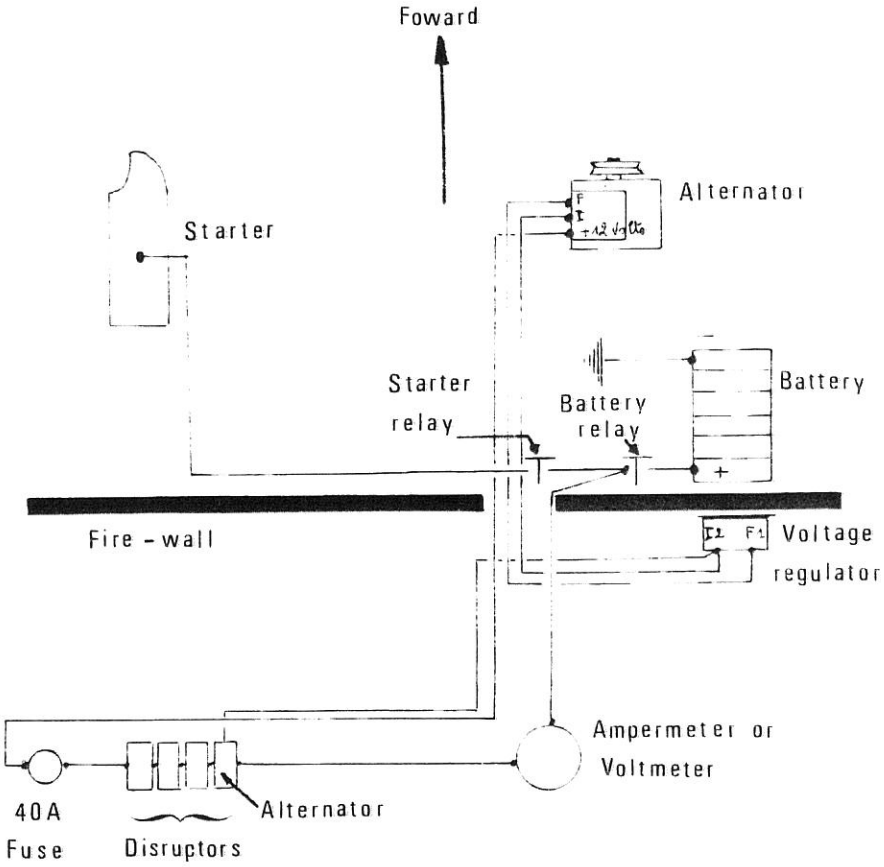
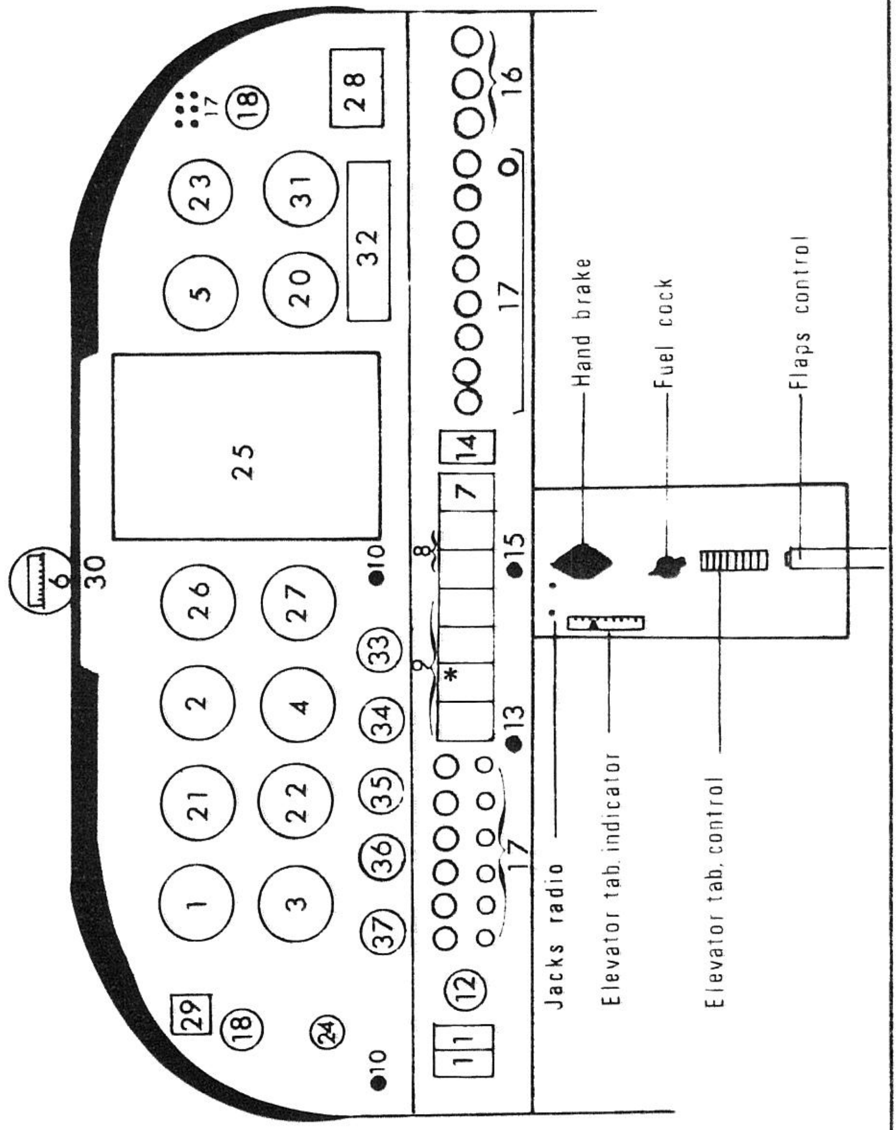
Fuel cock
Flaps control



ELECTRICAL SYSTEM

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
- Ampermeter 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
- Elektric 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
- Directionnal gyro	22
- Outside temperature	23
- Vacuum gauge	24
- Radio	25-26-27
- Panel lighting	28
- Stop watch	29
- W/lights	30
- Cyl. temperature	31-20-23-9*
- E.G.T.	31-20-23
- Hour counter	
- Boost pressure	
- Carb. temperature	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Fuel cock
Flaps control
Jacks radio
Elevator tab. indicator
Elevator tab. control
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- Cyl. temperature	31-33-34-35-36-37
- E.G.T.	20-23-9*
- Hour counter	31-33-34-35-36-37
- Boost pressure	20-23
- Carb. temperature	