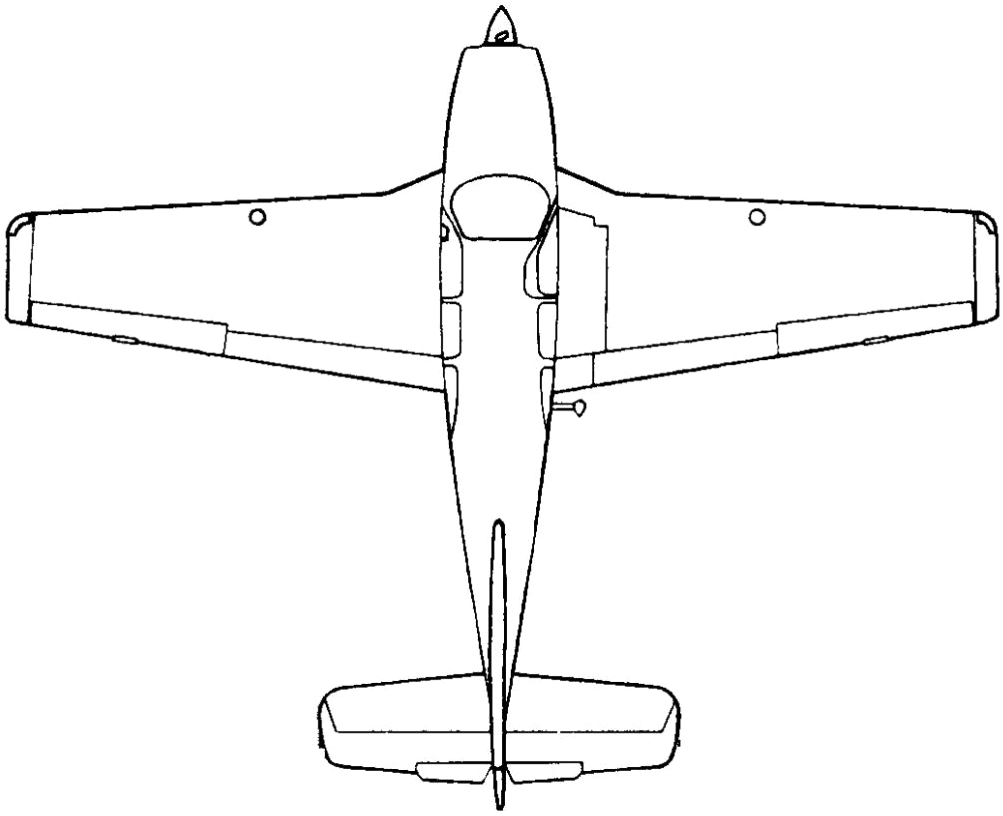
SINGLE ENGINE PISTON AEROPLANE ENDORSEMENT



ENGINEERING, DATA AND PERFORMANCE QUESTIONNAIRE

FOR____Piper PA-28R-200

(Aeroplane make and model)

Version 1 August 1996

Name:_**Tony Morris**_____ ARN:_**1007036**____

Endorsed by: _____ ARN_____

(Signature/Name)

Satisfactorily Completed on: / /

The Endorsement Questionnaire

To qualify for the issue of an aeroplane endorsement you must be able to fly the aeroplane to an acceptable standard as well as demonstrate a level of knowledge that satisfies the person conducting your endorsement that you have completed *'training in the operating limitations, procedures and systems of the type of aeroplane for which the endorsement is sought'.* (CAO 40.1.0. paragraph 4.3 Note 1).

This questionnaire should help you satisfy these knowledge requirements. It will do so in a structured and efficient manner and so enhance safety and help reduce costs.

The document will also serve as a ready reference for you in the future, particularly if you do not fly regularly.

In any case, CASA recommends that both you and your instructor retain a copy of the questionnaire for at least 12 months as proof of completion of training.

How to Answer These Questions

You should use references such as Flight Manuals, Pilot Operating Handbooks and theory texts, and make liberal use of notes and sketches. These should be completed on the applicable page of the questionnaire.

To assist you, the layout of the questionnaire corresponds to the sections of most Pilot Operating Handbooks.

Note that some questions may not apply to the aeroplane type on which you are being endorsed. You should mark these 'N/A' (not applicable).

This questionnaire is comprised of 11 pages and may be copied.

General Aircraft Data

1 (a) What is the make, type and model of the aeroplane?

Piper PA-28R-200 Single-engine piston, retractable gear, CSU

(b) In which category (categories) is the aeroplane permitted to fly?

Single-engine piston, Day VFR, Night VFR, IFR

Airspeed Limitation

Airspeeds converted from statute MPH (PoH) to KIAS

2. List the applicable airspeeds for the aeroplane type:

(a) V_{NO}; **148KIAS**

$V_{MAX\ X/W}$**; 17.3knots**

V_A (design manoeuvre speed); **114KIAS**

Vx (best climb angle); **83KIAS**

Turbulence penetration speed; **114KIAS** ***(Vb speed not in manual; use Va)***

V_S; **Vs0: 57KIAS, Vs1: 62KIAS**

V_Y (best climb rate); **87KIAS**

V_{FE} -first extension; **109KIAS**

V_{LOI} (ldg gear operation up); **109KIAS**

V_{LE} ldg gear extended)A **130KIAS**

V_{LO2} (ldg gear operation down); **109KIAS**

V_{NE}; **186KIAS**

(b) maximum landing light operating speed; **N/A**

(c) maximum load factor (flaps up) is + (d) **3.8g** **No inverted** (-g)

maximum load factor (flaps down) is + **3.8g** **No inverted** (-g)

Emergency Procedures

3 Detail the emergency procedures for the following situations if applicable:

(a) engine fire on the ground;
Fuel Selector OFF, Throttle FULL, Engine starter CRANK, Engine Running → CONTINUE. Attempt to extinguish → Fuel Selector OFF, Mixture IDLE CUT OFF

b engine failure after take-off;
Glide Speed 91KIAS, SWITCH Fuel Selector, Electric Fuel Pump ON, Mixture FULL RICH, Alternate Air ON, CHECK temps/oil pressure/fuel pressure

Landing area within 30 degrees of heading. Turnback not below 800ft AGL.

c engine fire airborne;
Fuel Selector OFF, Throttle CLOSE, Mixture IDLE CUTOFF, Heater OFF, Defroster OFF, Land immediately

d engine failure in the cruise;
Glide Speed 91KIAS, SWITCH Fuel Selector, Electric Fuel Pump ON, Mixture FULL RICH, Alternate Air ON, CHECK temps/oil pressure/fuel pressure

e electrical fire on the ground;
Master OFF, Vents OPEN, Cabin Heat OFF

f electrical fire in flight;
Master OFF, Vents OPEN, Cabin Heat OFF, Land immediately

g cabin fire in flight;
Master OFF, Vents CLOSE, Cabin Heat OFF, Land immediately

h rapid depressurisation;
NOT APPLICABLE

i emergency undercarriage extension procedure;
CHECK circuit breaker, CHECK panel lighting OFF, CHECK AND SWAP indicator bulbs, slow to 86KIAS and hold DOWN emergency gear extension lever, YAW aircraft if gear fails to extend, slow to safest speed further to assist gear if necessary

j the optimum glide speed for the aeroplane is ___**91**____ kts;

k propeller overspeed: and
Throttle 2700RPM OR LESS, CHECK oil pressure, RPM DECREASE then SET if able, Airspeed REDUCE

l waste gate failure.
NOT APPLICABLE

Normal Procedures

4. State, describe or detail:

a the start sequence for cold and hot starts;
CHECK gear lever down, Flaps RETRACT, Master ON, CHECK 3x green, CHECK avionics OFF, CHECK circuit breakers, Park brake ON, Fuel Selector LOWEST TANK, Fuel Pump CHECK AND PRIME IF COLD (Fuel Flow CHECK), Propeller FULL FINE, Fuel mixture IDLE CUT OFF, Throttle SLIGHT ABOVE IDLE, crank and fuel mixture to FULL WHEN ENGINE FIRE

b the RPM used for checking:

b.i the ignition system;
2000 RPM

b.ii the propeller governing system (if applicable); and
CHECK x2 (note small delay in RPM recover)

ii.iii the carburettor heat;
NOT APPLICABLE

c the maximum RPM drop and RPM differential between magnetos when checking the ignition switches;
Maximum drop 175RPM, difference 50RPM

d the use of cowl flaps if fitted;
NOT APPLICABLE

e the climb power setting, IAS and fuel flow;
25 in/Hg, 2500RPM, 53L/hour

f a typical 65% power setting, TAS and fuel flow at 5000 ft pressure height;
21.7 in/Hg, 2400RPM, 40L/hour, APPROX 125KIAS

g using the aeroplane flight manual or POH, calculate the endurance for the aeroplane at 5000ft AMSL (ISA) with 65% power set; and
Assume fuel flow 40L/hour. Usable fuel capacity 181.7L. Total endurance: 4 hours and 32 minutes. Total endurance with fixed fuel reserve of 45 minutes: 3 hours and 47 minutes.

h how the mixture is leaned out in the cruise.
Using EGT slightly rich of peak, or using fuel flow indicator

Weight and Balance, and Performance

5.
a Specify the correct values of.

i.i the maximum ramp weight;
2650lb (1202.02kg)

i.ii the maximum take-off weight;
2650lb (1202.02kg)

ii.iii the maximum landing weight;
2650lb (1202.02kg)

i.iv the maximum Zero fuel weight;
Maximum total fuel: 189.27L (136.27kg)
1065.746kg (2349.55lb)

a.v the maximum number of adult persons on board (POB);
4

a.vi the maximum baggage weight; and
200lb (90.7kg)

a.vii the maximum fuel which can be carried with a full load of adult passengers (80Kg/person) and maximum baggage weight;
Standard empty weight: 1531lb (694.45kg)
Fuel(kg) = 1202.02 - (80 * 4) - 694.45 - 90.7
= 96.87kg
= 134.54L

a.b (i) do any of the weight limitations in (i) to (vii) vary from category to category?
No.

b.ii if so what are the weight limitations of each category?
NOT APPLICABLE

b.iii using the aeroplane flight manual, and a typical loading problem posed by the endorser, determine the take-off weight and balance solution (Maximum take- off weight and C of G position), the amount of fuel that can be carried and the endurance;

Sample Loading Problem
Piper PA-28R-200 VH-WJO
Front Row: 170kg
Rear Row: 85kg
Baggage: 40kg

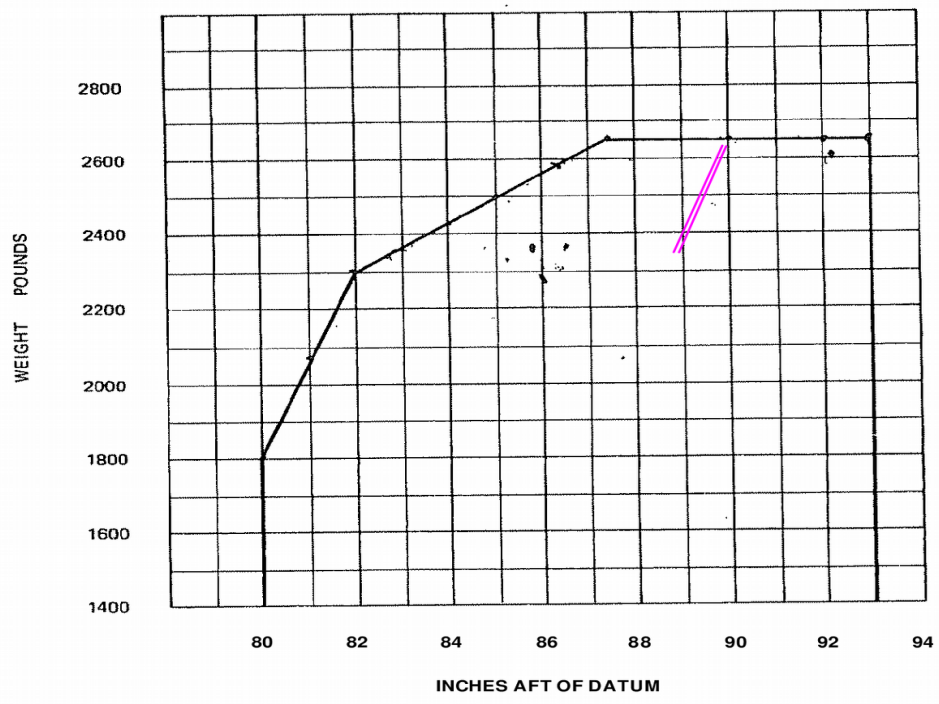
Calculation:
https://gist.github.com/tonymorris/9ef916f227df2fb0f607e8e4c90d1787

All Up Weight: 2632.60lb. In range? YES
Zero Fuel Weight: 2344.60lb
Zero Fuel CG: 88.88in
All Up CG: 89.55in
Zero Fuel CG (retracting): 89.23in
All Up CG (retracting): 89.86in

ARROW

IT IS THE RESPONSIBILITY OF THE OWNER AND PILOT TO ASCERTAIN THAT THE AIRPLANE ALWAYS REMAINS WITHIN THE ALLOWABLE WEIGHT VS CENTER OF GRAVITY ENVELOPE WHILE IN FLIGHT

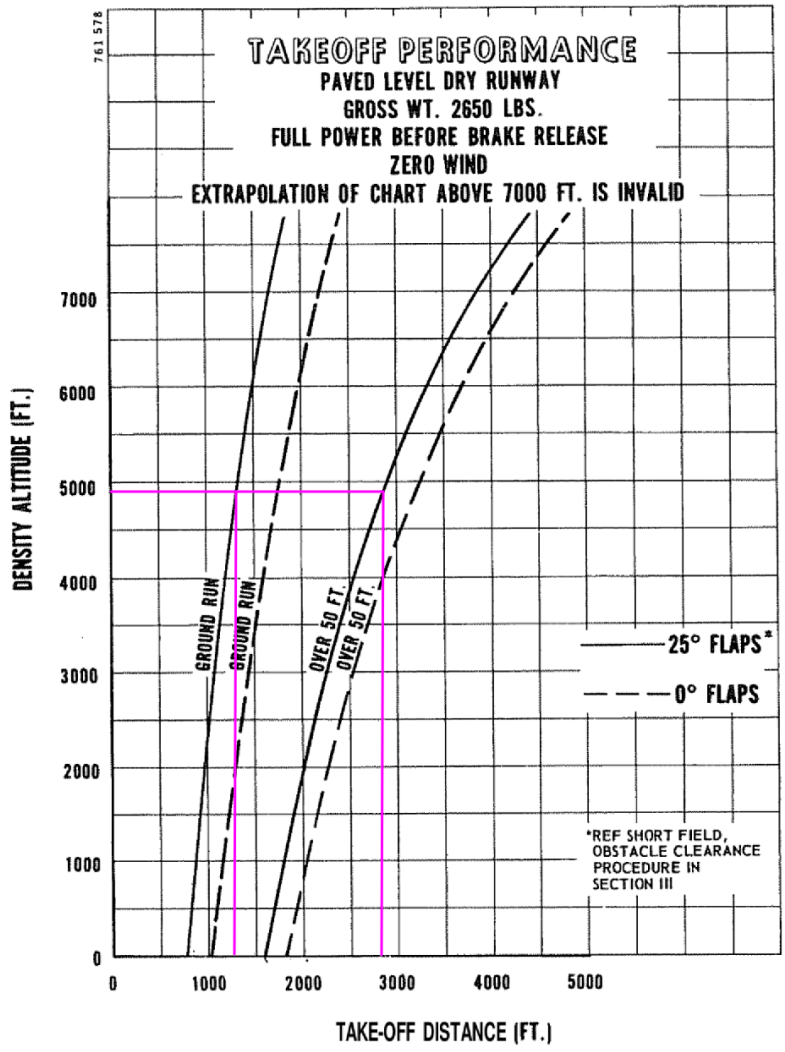
C. G. RANGE AND WEIGHT



MOMENT DUE TO RETRACTING LANDING GEAR = +819 IN. LBS

b.iv calculate the take-off distance required at maximum take-off weight, 2500ft AMSL and OAT 30°C; and

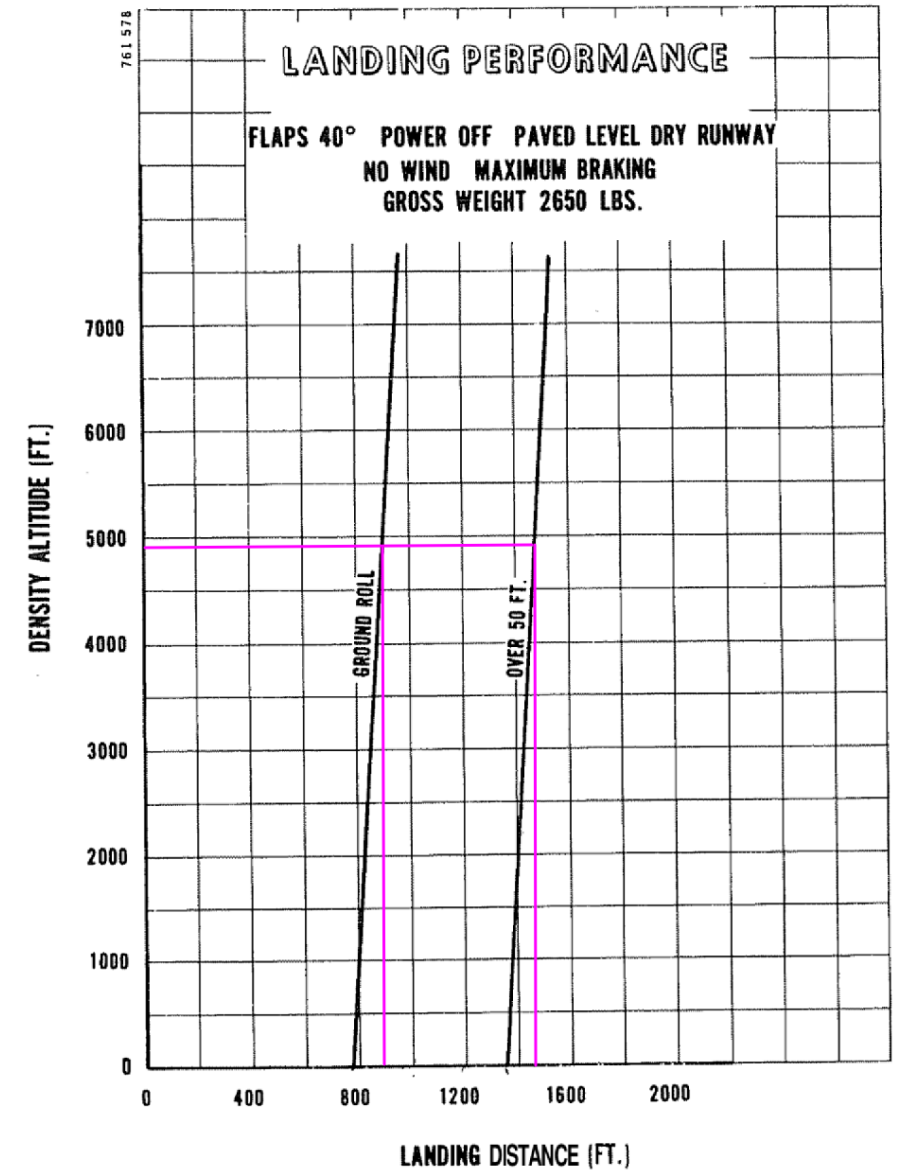
Assume QNH=1013.2hPa
ISA Temp = 15°C
Pressure ALT= 2500ft
ISA Δ = OAT - ISA Temp + Pressure ALT / 500
= 30 - 15 + 2500 / 500
= 20
Density ALT = ISA Δ * 120 + Pressure ALT
= 20 * 120 + 2500
= 4900ft



NOTE: SEE SECTION 7 FOR EFFECTS OF AIR CONDITIONING INSTALLATION ON PERFORMANCE.

GROUND RUN: 1300ft
GROUND RUN (CAO20.7.4): 1495ft
CLEAR 50ft: 2800ft
CLEAR 50ft (CAO20.7.4): 3220ft

b.v the minimum landing distance at maximum landing weight for the conditions at (iv).



NOTE: SEE SECTION 7 FOR EFFECTS OF AIR CONDITIONING INSTALLATION ON PERFORMANCE.

PERFORMANCE CHARTS
REVISED: JUNE 18, 1974

GROUND RUN: 900ft
GROUND RUN (CAO20.7.4): 1035ft
CLEAR 50ft: 1430ft
CLEAR 50ft (CAO20.7.4): 1645ft

Fuel System, Fuel and Fluids

6. State or describe/sketch for the aircraft on the following page:

a.a the correct grade of fuel;
AVGAS 100LL

a.b any approved alternate fuel;
AVGAS 100, AVGAS 115/145

a.c the location of fuel tanks and drain points;
Two tanks in each wing, drains on the bottom rear corner of each tank and a drain on the fuel strainer in the front left corner of the firewall.

a.d the total and usable fuel in each tank;
Total fuel: 189.27L (136.27kg)
Usable fuel: 181.7L (130.823kg)

a.e the position of the fuel tank vents;
The fuel tanks are vented individually by a vent tube which protrudes below the bottom of the wing at the rear outboard corner of'each fuel rank

a.f whether the engine has a carburettor or fuel injection system;
Fuel injection

a.g if applicable, the priming system and its use;
For cold start, turn electric fuel pump ON, move fuel mixture control to FULL RICH until fuel flow is observed, move fuel mixture control to IDLE CUT OFF.

a.h location of the fuel boost/auxiliary pump and when it should be used;
Unsure where the fuel pump is on the airframe, there is a rocker switch on the left side of the cockpit. Fuel pump ON during take-off and landing, when starting the engine and when switching fuel tanks

a.i what conditions apply to tank selection for take-off, landing and cruise;
OFF, LEFT or RIGHT. Select LOWEST tank at engine start, select FULLEST tank before take-off. CLEAROF checks every 30 minutes, switch tanks as necessary

a.j when refuelling to less than full tanks, what restrictions apply and how is the quantity checked;
None

a.k if applicable, the minimum and normal hydraulic fluid capacity;
The aircraft manual does not specify hydraulic fluid capacity

a.l the correct grade of oil for the aeroplane;
For typical Australian ambient temperatures:
MIL-L-6082B Mineral SAE grade 20W-50
MIL-L-22851 Ashless Dispersant SAE grade 20W-50 or 15W-50
Oil grades vary with more extreme ambient temperatures

a.m the minimum oil quantity before flight;
2 quarts

a.n the maximum quantity of oil; and
8 quarts

o the maximum, minimum and normal engine oil pressures.
Minimum 25PSI, Maximum 90PSI, Normal 60-90PSI

Engine and Propeller Details

7. Answer the following:

a What is the make/model of the engine?
Lycoming IO-360

b What is the power output, and number of cylinders?
200HP, 4 cylinders

c What is the take-off power setting and time limit?
2700RPM/27inHg/No time limit

d What is the Maximum Continuous power?
2700RPM

e Is the engine supercharged or turbo-charged?
Neither

f What is the maximum MAP permitted?
No maximum

g If turbo-charged, what
g.i is the type of waste gate fitted (Fixed, Manual or Automatic)?

g.ii is the procedure for operating the waste gate?

g.iii prevents the engine from being overboosted?
NOT APPLICABLE

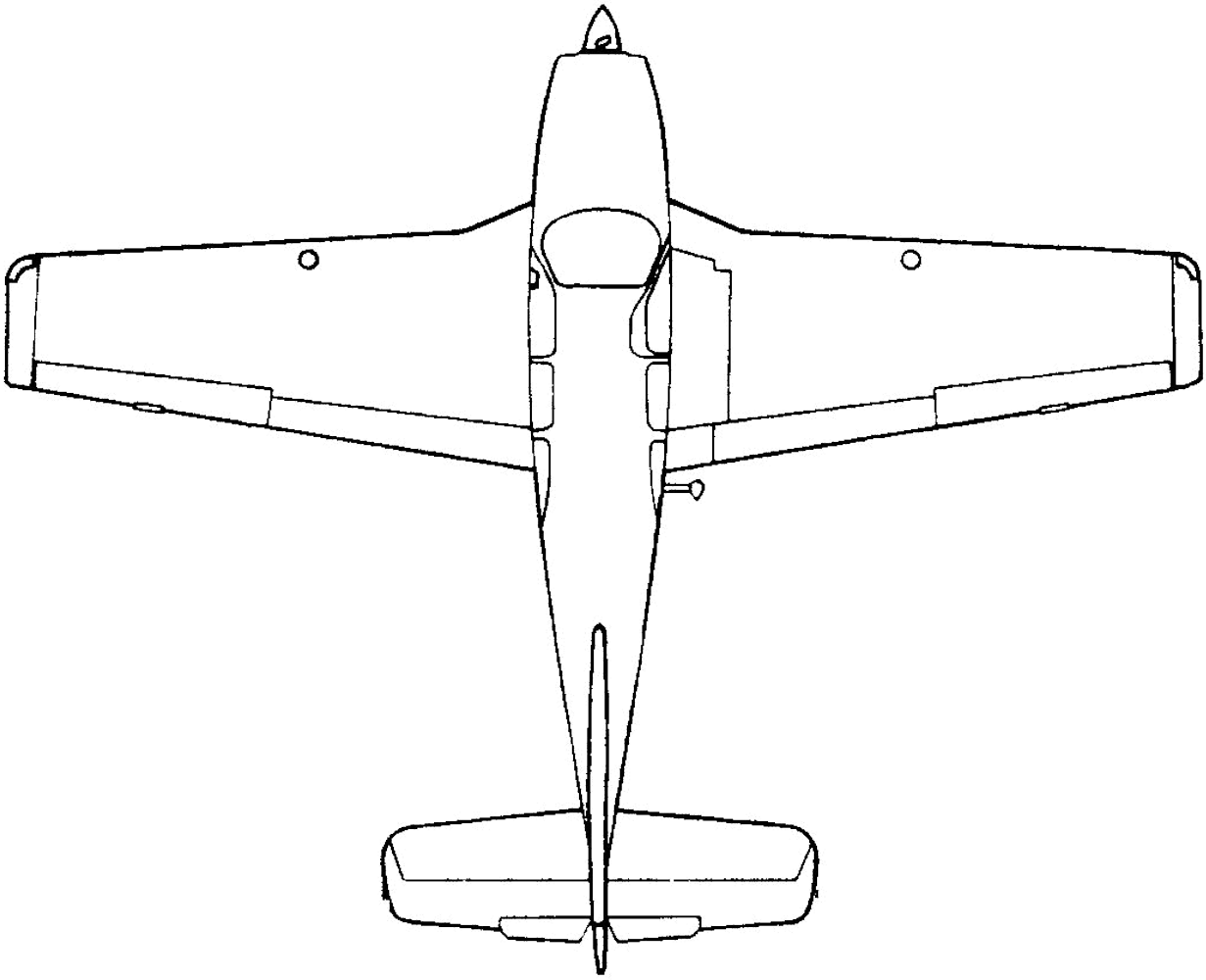
h If supercharged, what

h.i prevents the engine from being overboosted?

h.ii controls the MAP in the climb/descent?
NOT APPLICABLE

i Describe the propeller governing system.
Hartzell Hydraulic Governor. The Constant Speed Unit maintains a constant propeller (engine) RPM by adjusting propeller pitch. Propeller pitch is adjusted using oil pressure through operation of the governor.

j If the oil pressure to the propeller dome is lost, does the propeller go into coarse or fine pitch?
Fine pitch



Airframe

8. Answer the following:

a What type is the undercarriage system (fixed/retractable/tricycle/conventional)?
Retractable

b Which control surfaces can be trimmed?
Elevator and rudder

c Describe the flap actuating system.
Manual actuation by a control cable, using a control located between the two front seats

d Describe the flap indicating system.
None. Visual and/or by a pitch change.

e What is the flap operating range?
57-109KIAS

f Sketch the location of all exits.
Right cabin door

g Describe/sketch the location of.

g.i landing/taxy lights;
Single landing light beneath the propeller spinner

g.ii fresh air intakes; and
Front of engine cowling, behind propeller spinner

g.iii fuel caps;
One on the top of each wing

h What is the wing span of the aeroplane?
32.2ft (9.8m)

Ancillary Systems

9. Answer the following questions:

a What systems are hydraulically operated?
Brakes, gear extension (electric hydraulic pump), propeller governor, nose wheel shimmy dampener

b What procedures are followed when a hydraulic system failure is suspected?
Brake failure: attempt handbrake (separate cylinder, same reservoir)
Gear failure: *as described above under Emergency Procedures*
Propeller overspeed: *as described above under Emergency Procedures*

c How many brake applications would be expected from a fully pressurised brake accumulator (if applicable)?
NOT APPLICABLE

d What are the sources of electrical power?
14V DC, 60 amp alternator and battery

e What is the DC system voltage?
12V DC

f Can an external power source be used? If so, what is the procedure?
Master switch OFF, connect POSITIVE LEAD of jumper cable to external 12V battery, connect NEGATIVE LEAD of jumper cable to external 12V battery, connect jumper cable into aircraft fuselage socket, master switch ON, normal engine start, master switch OFF, remove jumper cable from aircraft fuselage socket, master switch ON, CONFIRM ammeter output indication

g Where are the battery and external power receptacle located?
Battery: slightly after of baggage compartment
External power: right side, middle of fuselage

h How long can the battery supply emergency power?
Battery: 25Ah
Maximum continuous load: 30A

i Following an alternator/generator failure in flight, which non essential electric services should be switched off?
Second radio, transponder, pitot heat, electric trim, landing light, navigation lights, auto-pilot

j If a stall warning device is fitted, is it electrical or mechanical?
Electrical

k How is the cockpit ventilated?
Fresh air vents in the cabin with heating control

l How is the cockpit heated?
Ram air into the front of the lower cowl to the heater shroud to outlets at each seat location.

m If a fuel burning heater is installed, describe the method used to turn the heater on and off and detail any limitations.
NOT APPLICABLE

n What is the fuel consumption of the heater?
NOT APPLICABLE

o Describe the pressurisation system (if applicable); and
NOT APPLICABLE

p Show the location of the following safety equipment:

p.i fire extinguisher;
Baggage compartment

p.ii ELT;
Baggage compartment

p.iii torches;
In my pocket

p.iv survival equipment; and
Baggage compartment

p.v first aid kit.
Baggage compartment

Flight Instruments

10 Answer user the following questions:

10.a Where are the pitot head(s), static vent(s) and any water drain points for the pitot/static system located?

The pitot head and static vent are incorporate into the same head, located under the left wing. The static port also acts as a drain. The pitot/static system drain buttons are located on the left side of the cabin, near the fuel selector valve.

10.b Is there a pitot heat system fitted?
Yes

10.c Is there an alternate static source fitted?-if so
Yes

c.i where is this located?
The alternate static air inlet is located in the aircraft cabin, on the left side, under the instruments. The alternate static lever is located just above the inlet on the bottom of the instrument panel

i.ii what is the purpose of this system?
To obtain a secondary static pressure if the primary static port is obstructed

i.iii if used, what effect does it have on the pressure instruments?
Higher than actual airspeed, higher than actual altitude, a momentary climb on the VSI

d Which flight instruments are operated electrically?
Turn coordinator

e Which flight instruments are gyroscopically operated?
Attitude Indicator, Heading Indicator, Turn coordinator

f Which instruments are operated by vacuum?
Attitude Indicator, Heading Indicator

END OF QUESTIONNAIRE