



REDHILL AVIATION FLIGHT CENTRE

**Piper PA28R 200
ARROW**

C H E C K L I S T
GEDVL

NAME:

APRIL 2017

CHECK LIST FOR CPL/ IR TEST.
EMERGENCY PROCEDURES

ENGINE FIRE DURING START:

1	Starter	Crank engine
2	Mixture	ICO
3	Throttle	OPEN
4	Fuel pump	OFF
5	Fuel selector	OFF

ABANDON IF FIRE CONTINUES

ENGINE POWER LOSS DURING TAKE OFF

If sufficient runway remains for normal landing, Land straight ahead

If insufficient runway remains:

1	Maintain safe airspeed
2	Make only shallow turns to avoid obstructions
3	Flaps as required
4	GEAR DOWN unless very rough ground

If sufficient altitude has been gained to attempt restart:

1	Maintain safe airspeed	
2	Fuel selector	Switch to tank containing fuel
3	Fuel pump	Check ON
4	Mixture	Check RICH
5	Alternate air	ON
7	Emergency Gear lever	As required

If power not regained, proceed with power off landing

ENGINE POWER LOSS IN FLIGHT:

1	Fuel selector	Switch to tank containing fuel
2	Fuel pump	ON
3	Mixture	RICH
4	Alternate air	ON
5	Engine gauges	Check for cause of power loss
6	MAGS.	Check on both

If time select "L" then "R" then BOTH

If no fuel pressure is indicated, check tank selector to confirm it is on a tank containing fuel.

When power is restored:

1	Alternate air	OFF
2	Fuel pump	OFF

If power is not restored prepare for power off landing.

POWER OFF LANDING

Lock emergency gear lever in "Override engaged" before airspeed drops below 115 mph to

Prevent gear from free falling

1	Trim for best glide	105 mph IAS
2	Locate suitable field	
3	Establish pattern & 1000 ft area	
4	1000' above field at downwind position for normal landing approach.	

When file can be easily reached, slow to 90 mph for shortest landing

Touchdown at lowest possible airspeed with FULL flap

When committed to landing with gear down:

1	Gear down	3 GREENS
2	Throttle	CLOSED
3	Mixture	ICO
4	Magnetos	OFF
5	Master switch	ICO
6	Fuel selector	OFF
7	Seat belt / harness	TIGHT

In event of gear up landing being required, Note: the automatic gear extender MUST be locked

In the override position before the airspeed falls below 115 mph.

Also note tat the gear cannot be retracted with the Master switch OFF.

PROPELLER OVERSPEED:

Is caused by malfunction in propeller governor, or low oil pressure, which allows the propeller to rotate to full low pitch.

1	Throttle	RETARD
2	OIL pressure	CHECK
3	Propeller control	FULLY DECREASE RPM, set if any control available
4	Airspeed	REDUCE
5	Throttle	REDUCE to maintain below 2700 rpm

EMERGENCY GEAR EXTENSION:

1	Master switch	CHECK ON
2	Circuit breakers	CHECK
3	Panel lights	OFF (daytime)
4	Gear indication bulbs	Check

If landing gear does not check as down & locked

5	Airspeed	BELOW 100 mph
6	Gear selector	DOWN
7	If gear fails to lock down, move & hold the emergency gear lever down to the Emergency Down Position	
8	If gear has still failed to lock down, yaw aircraft abruptly from side to side with rudder.	
9	If nose gear not down & locked	Recycle

ENGINE DRIVEN FUEL PUMP FAILURE

1	Fuel pump	ON
2	Fuel selector	Fuller tank
3	Throttle	RESET (75% POER OR LESS)

HIGH OIL TEMPERATURE / LOW OIL PRESSURE

Monitor temp & pressure gauges

Use minimum possible power

Land at nearest airport and investigate the problem.

Prepare for power off landing.

Radio call if required

ALTERNATOR annunciator light illuminated

Ammeter Check to verify inoperative ALT
If Ammeter shows zero: ALT switch "OFF"

Reduce electrical loads to minimum.

ALT CB Check & reset if required
 ALT switch ON

If power NOT restored: ALT switch "OFF"
 Reduce electrical loads as battery is only source of power.

ELECTRICAL OVERLOAD (ALT over 20 amps above known electrical load):

For a/c with interlocked BAT & ALT switch operation:

Electrical loads REDUCE
 If ALT loads are reduced ALT switch "OFF"
 Land as soon as possible, battery is only source of power.
 Anticipate complete electrical failure.

For a/c with separate BAT & ALT switches:

ALT switch ON
 BAT switch OFF
 If ALT loads are reduced:
 Electrical load REDUCE TO MINIMUM
 Land as soon as possible

NOTE: Due to increased system voltage & radio frequency noise, operation with ALT switch ON & BAT switch OFF should only be made when required by an electrical system failure.

FIRE IN FLIGHT**Check source of fire****Electrical fire (smoke in cabin):**

1	Master switch	OFF
2	Vents	OPEN
3	Cabin heat	OFF

Land as soon as possible

Engine fire:

1	Fuel selector	OFF
2	Throttle	CLOSED
3	Mixture	ICO
4	Auxiliary fuel pump	CHECK OFF
5	Heater & defroster	OFF

Proceed with power off landing procedure.

NOTE: If all electrical power has been lost, the landing gear must be extended using the above procedures. The landing gear indicator lights will NOT be operative.

SPIN RECOVERY:

1	Throttle	IDLE
2	Ailerons	NEUTRAL
3	Rudder	Full OPPOSITE to direction of turn
4	Control wheel	FULL FORWARD
5	Rudder	Neutral (when rotation stops)
6	Control wheel	As required to smoothly regain level flight attitude

OPEN DOOR:

If upper & side latches are open, the door will trail slightly open & airspeeds will be reduced slightly.

To close door in flight:

- | | | |
|---|------------------------|-------|
| 1 | Slow A/C to 87 kts | |
| 2 | Cabin vents | CLOSE |
| 3 | Storm window | OPEN |
| 4 | If upper latch is open | LATCH |

If lower latch is open- open top latch- push door open, then close rapidly, Latch top latch
A slip in the direction of the open door will assist in the latching process.

ENGINE ROUGHNESS:

- | | | |
|---|----------------------|-------------------------------|
| 1 | Mixture | Adjust to give max smoothness |
| 2 | Electrical fuel pump | ON |
| 3 | Alternate air | select |
| 4 | Fuel selector | Switch tank |
| 5 | Engine gauges | Check |
| 6 | Magneto switch | L then R then BOTH |

If operation is satisfactory on either one, continue on that MAG at reduced power & FULL RICH Mixture to first A/D

Prepare for power off landing.

RADIO FAILURE

- | | | |
|---|-----------------|--|
| 1 | CHECK FOR CAUSE | (a) CB's if no LED
(b) Tx set on correct box
(c) Volume control
(d) Correct Freq.
(e) Operate test switch
(f) Check audio on phone / speaker
(g) Check ammeter increase on Tx
(h) Line of sight / out of range
Out of hours? |
| 2 | ALTERNATIVES | (a) Other box
(b) Another freq.
(c) Hand mic (select audio on speaker) |
| 3 | NO CONTACT | (a) Transponder 7600 / ON
(b) Follow Radio fail procedure for A/D |

PRE-FLIGHT CHECKLIST

NB: Before entering the cockpit ensure that the aircraft is free from slush, snow, ice & hoar frost.

In particular check hinges & gaps of the flying controls, trim tabs & flaps.

COCKPIT PREPARATION

Aircraft documentation	Stowed
Parking brake	ON
IF screens	Stowed (if used)
First Aid kit	Stowed
Fire extinguisher	Checked
Magnetos switches	OFF
Gear selector	DOWN
Avionics Master switch	OFF
Circuit breakers	Check IN
Trim indicators	Correct movement / set
Flying controls	Full, free & correct movement
Battery Master switch	ON
Landing gear indicator	3 greens
Pitot heater	ON
Fuel contents	CHECK
Fuel selector	Emptier tank
Low voltage light / Annunciator Panel	Test / ON
Recognition/Landing lights	ON / CHECK / OFF
Anti-collision light	ON / CHECK / OFF
Navigation lights (leave on at night)	ON / CHECK / OFF
Pitot heater	OFF
Panel lighting	ON / CHECK / OFF
	Leave on at night (Only for night flying)
Battery switch	OFF
Pitot static drains (if fitted)	Operate
Flaps	FULLY DOWN / CHECK ALL STAGES

EXTERNAL: CABIN UPPER FUSELAGE

1	Door	Closed / flush
2	Starboard windows	Clean
3	Upper fuselage	Check / undamaged
4	Tow bar (if carried)	Stowed
5	Baggage door	Secure

STARBOARD WING:

1	Flap	Check / Undamaged
2	Aileron	Undamaged-check: surface, hinges, static wicks
3	Wing tip	Undamaged
4	Strobe, Navigation & landing light	Undamaged
5	Wing surface	Undamaged
6	Fuel tank	Check: contents, cap secure, sample, no seepage
7	Main gear	Secure, oleo extension 4 ½ "
8	Tyre	Check: inflation, creep, no damage
9	Brakes	Check: pads, no hydraulic leaks, undamaged
10	Wheel bay	Check clear & door secure
11	Fresh air intake	Unobstructed

NOSE SECTION:

1	Windscreen	Clean
2	OAT probe	Check
3	Oil contents	Check, cap secure 6-8 qts, 2 qts min, (Rec. min 5 qts.)
4	Starboard cowling	Secure
5	Prop / spinner	Secure & undamaged
6	Air intake	Unobstructed
7	Alternator belt	Check tension
8	Landing light	Undamaged
9	Nose gear	Check secure Oleo extension ¾"
10	Wheel bay	Check clear, door secure
11	Tyre	Inflation, creep, no damage
12	Port cowling	Secure
13	Fuel drain	Sample, no seepage
14	Port windows	Clean

PORT WING:

1	Fresh air intake	Unobstructed
2	Brakes	Check: pads, no hydraulic leaks, undamaged
3	Tyre	Check: inflation, creep, no damage
4	Main gear	Secure, oleo extension 4½ "
5	Wheel bay	Check security & door
6	Fuel tank	Check: contents, cap secure, sample, no seepage
7	Pitot head / Static vent	Secure unobstructed
8	Stall warning vane	Undamaged / free
9	Wing surface	Undamaged
10	Wing tip	Undamaged
11	Strobe, Navigation & landing light	Undamaged
12	Aileron	Undamaged-check: surface, hinges, static wicks
13	Flaps	Check / undamaged

REAR FUSELAGE, FIN & STABILATOR:

1	Radio aerials	Secure / undamaged
2	Port fuselage & window	Undamaged, clean
3	Fresh air intake	Unobstructed
4	Fin surface	Secure, undamaged
5	Rudder & Nav. light	Undamaged
6	Stabilator	Undamaged, free movement
7	Stabilator tab	Undamaged
8	Air con scoop (if fitted)	Flush / undamaged
9	Starboard fuselage & window	Undamaged & clean

BEFORE ENGINE START CHECKS:

1	Flap	UP
2	External checks	Complete
3	Passenger brief	Completed
4	Cabin door	Closed & latched
5	Seats	Adjusted & locked
6	Seat belts & shoulder straps	Fitted / secure
7	Alternate static selector (if fitted)	Check / Normal
8	Flight instruments & Standby compass & deviation card	Check Check
9	Battery Master switch	ON
10	Annunciator / Low voltage light	Check / ON
11	Avionics Master switch	ON
12	VHF radio check	Request A/D data (or ATIS) Start request (OBTAIN if required)
13	Altimeter(s)	Set QFE +50' / -75' QNH +50' / -75' (ELEV)
14	Avionics Master switch	OFF

STARTING ENGINE:

1	Anti collision lights	ON
2	Fuel selector	Least full tank
3	Mixture	Exercise ICO
4	Throttle	Exercise 1/2 " OPEN
5	Fuel pump	ON, check pressure in Green, OFF
6	Alternate Air	Full & free movement, set OFF
7	COLD start only	Mixture fully RICH until fuel flow Indicated, return to ICO
	HOT start only	Leave mixture in ICO
8	Lookout	PROP AREA CLEAR "CLEAR PROP"
9	Magnetos / starter	Both & Operate
10	Mixture	As engine starts ADVANCE to RICH
11	Starter warning light	OUT
12	Oil Pressure	Check rising within 30 sec
13	Throttle	1300 RPM
14	Alternator	ON
15	Low Voltage light	OUT
16	Suction	Indicating
17	Magnetos	Check

ENGINE START WHEN FLOODED:

1	Throttle	Full open
2	Fuel pump	OFF
3	Mixture control	ICO
4	Starter	Operate

When engine fires: Retard throttle, mixture advance slowly to rich.

AFTER START CHECKS:

1	Avionics switch	ON
	Check:	I/C ON, check VOL
		COMMS 1 & 2 ON
		NAV 1 & 2 ON
		ADF ON
		TRANSPONDER standby
		DME ON
2	Electric trim	Check
3	Flight Instruments	Check clock-UTC
		Wind stopwatch
		AI erect & set
		VSI \pm 200', ASI zero
		Turn coordinator, "OFF" flag away
		HSI heading flag away
		Cross check HSI / RMI heading
		Standby compass
		Slaving meter control, slaving
		Deviation cards fitted
4	Avionics, Check as required:	ADF function on 2 freq. Set for departure
		VOR ILS & DME if possible set for departure
		Transponder: Test, set Standby
5	Auto pilot	OFF
6	Radios	As required
7	Altimeter(s)	Check set

TAXI CHECKS:

1	Brakes & nose wheel steering	CHECK (for both pilots)
2	Flight instruments	HSI, RMI, standby compass
		Turn coordinator
		Attitude Indicator
		ADF needle tracking

POWER CHECKS:		
1	Position	INTO WIND Clear of obstructions & loose stones
2	Parking brake	ON
3	Fuel selector	Change tanks to fullest
4	Lookout	Clear all round
5	Throttle	2000 rpm
6	Alternate air	Select ON / OFF Negligible change in MP
7	Fuel pump	Select OFF, check pressure Select ON
8	Magnetos	Check, reset to both (Max drop 175 rpm, Max difference 50 rpm)
9	Alternator output	Check
10	Suction	4.9 - 5.1 Ins Hg
11	T's & P's	Check in normal limits
12	Propeller control	Exercise (3 times if cold) Down to 1500 rpm & to MAX rpm
13	Throttle	CLOSE, check idle 600 / 800 rpm Reset 1300 rpm

PRE TAKE OFF CHECKS:

1	IF screens	As required
2	Trimmers	SET
3	Throttle friction	SET
4	Mixture	RICH
5	Magnetos	ON BOTH
6	Alternate air (if fitted)	OFF
7	Fuel selector	ON Fuller tank, check contents
8	Fuel pump	ON
9	Flaps	Set normal-UP, Short / soft field 25°
10	Engine instruments	Check: OIL- T's & P's, Fuel pressure
11	Compasses	Check
12	Seat belts / seat backs	Secured / erect
13	Cabin door	Latched & locked
14	Flying controls	Full, free & correct movement
15	Departure clearance	Obtain review
16	Avionics	Confirm radio Nav set for departure
17	Flight instruments	Check Altimeters set
18	Take-off brief	Review: Take-off speeds Cross-wind component Emergency procedures

WHEN GIVEN LINE-UP CLEARANCE:

A	Anti collision light	ON
T	Transponder	ON
P	Pitot heat	ON
L	Lights, (landing & recognition)	ON

AFTER TAKE-OFF / GO AROUND

1	Brakes	ON / OFF
2	Gear	UP after established in climb & insufficient runway left to land Max 125 mph
3	Flaps	UP (above 200 feet aal)
4	Altimeters	A/D QNH/QFE or QFE/QNH (ct) Cleared FL 1013 / Zone / Reg QNH
5	Icing	CHECK
6	Radio Aids	Ident if req.
7	Recognition / Landing lights	OFF
8	Fuel pump	OFF above 1000'

TOP OF CLIMB CHECKS:

1	Cruise power	24" / 2400 RPM
2	Mixture	Lean
3	Engine instruments	CHECK: T's & P's, EGT, Fuel pressure

CRUISE CHECKS (FREDAI):

1	Fuel	Check: Quantity, balance
2	Radio / Nav	Set / Identified
3	Engine	Check: T's & P's, EGT, Fuel pressure Ammeter, Suction
4	DI	Synchronise
5	Altimeter	Check
6	Icing	Check (OAT)

DESCENT CHECKS (IFR):

1	MSA	Check
2	Mixture	As required (enrich during descent)
3	Altimeters	Check:
4	WX	Obtain, check minima
5	Icing	Check (OAT)

INITIAL APC CHECKS (FFREHAI):

1	Fuel	Check: Quantity, Balanced
2	Radio / Nav	Set, Identified
3	Engine & associated instruments	Check: T's & P's, Mixture, EGT, Suction Ammeter, Suction
4	DI / compass	Cross check
5	Icing	Check (OAT)
6	Altimeter	Set

PRE-LANDING CHECKS:

1	Brakes	OFF
2	Undercarriage	DOWN (3 greens)
3	Mixture	RICH
4	Propeller	2600 rpm
5	Fuel	Contents, balance, sufficient Pump ON
6	Instruments	T's & P's, QNH, DI
7	Hatch	Closed & latched
8	Harness / seat	Secure / erect
9	Landing light	ON

AFTER LANDING CHECKS (RWY VACATED):

1	Flaps	UP
2	Fuel pump	OFF
3	Recognition lights (strobe)	OFF
4	Landing lights	AS REQUIRED
5	Pitot heat	OFF
6	Trimmers	Neutral
7	Radio / Nav equipment	As required
8	Transponder standby	STANDBY

SHUT DOWN CHECKS:

1	Parking brake	ON
2	Throttle	1300 rpm
3	Magnetos	Check
4	Avionics master switch	OFF
5	Mixture	ICO
6	Throttle	Closed

When engine stops:

7	Magneto	OFF, key removed
8	Exterior lights (inc. Anti-collision)	OFF
9	Fuel selector	OFF
10	Interior lights	OFF
11	Battery & Alternator	OFF
12	Control wheel	Secure with seat straps if needed

Note: Following G/A where the subsequent approach & landing is made at the same airfield
Top of Climb, Cruise & Descent checks may at pilots discretion be omitted.

NON NORMALS**PRE-STALL CHECKS:**

1	H	Height	Sufficient to recover by 2000' AGL or 1000' above cloud
2	A	Airframe	Flap as required
3	S	Security	Seat belts & shoulder straps tight, Loose articles stowed
4	E	Engine	Mixture RICH, fuel, contents sufficient, Pump ON Fuel pressure checked, T's & P's
5	L	Location	Clear of active A/D's, built up areas, CAS, Danger areas & clouds
6	L	Lookout	Clearing turn

ALTIMETER SETTING PROCEDURES:

		No 1	No 2
PREFLIGHT	Check within +50 ft / -75 ft of datum, 50 ft of each other	Airport QFE	Airport QFE
		Airport QNH	Airport QNH
DEPARTURE	For take-off	Airport QNH	Airport/zone QNH
	Cleared to FL	1013	Airport/zone QNH
CRUISE	Above Transition Alt	1013	Regional QNH
	At or below Transition Alt	Regional QNH	Regional QNH
<i>Note: In or below TMA use TMA QNH, not regional QNH</i>			
DESCENT	Cleared to FL	1013	Zone/regional QNH
	Cleared to ALT	Zone/ airport QNH	Zone/regional QNH
FIANL APC / CTS		QFE	Airport QNH
MISSED APC		Airport QNH	Airport QNH
<i>Note: Airport QNH valid within 25 nm of airport</i>			

RECOMMENDED OPERATING SPEEDS / LIMITATIONS:

		IAS (mph)	
TAKE-OFF*	0° FLAP	62-80	
	(See perf. Graph)		
CLIMB	0° flap / Best angle / gear up Vx	96	
	0° flap / Best rate / gear up Vy	100	
	Cruise climb	110	
CRUISE	Normal / 24" / 2400 rpm (75%)	150	
	Int Apc / 20" / 2400 rpm	120	
GLIDE	Power off, flaps up, gear up	105	
APPROACH*	Normal 40 °flaps	70-90	
	See perf. Graph		
<i>* Add 5 kts to T/O speeds & VAT in strong wind / turbulence, reducing flap as necessary</i>			
Max airspeeds	FLAP	White arc	125
	VNO	Green arc	175
	VNE	Red line	214
	VA (MAUW:2900 lbs)		132
	VLE	Gear lowering	153
	VLO	Gear raising	125
Max cross wind		17 (Kts)	

Max AUW

2750 lbs

CROSSWIND COMPONENT TABLE:

WIND (Kts)	Angle between wind direction & runway heading								
	10	20	30	40	50	60	70	80	90
5	1	2	2	3	4	4	4	5	5
10	2	3	5	6	7	8	9	9	10
15	3	5	7	9	11	13	14	14	15
20	3	7	10	13	15	17	18	19	20
25	4	8	13	16	19	22	23	24	25
30	5	10	15	19	23	26	28	29	30
35	6	12	17	22	26	30	32	34	3
40	7	14	20	25	30	35	37	39	40
45	8	15	22	29	34	39	42	44	45
50	9	17	25	32	38	43	47	49	50

PA28R-200 ARROW HANDLING NOTES**PRINCIPAL DIMENTIONS:**

Span	32' 2"
Length	24' 8"
Height	8'00"
Track	10' 6"

ENGINE:

Avro Lycoming IO-369-cic, four cylinder horizontally opposed, developing 200BHP @ 2700 rpm at sea level.

TACHOMETER:

Normal operating range 500 to 2000rpm & 2350 to 2700 rpm (green arc).
Avoid continuous operation from 2000 to 2350 rpm (red arc)

PROPELLER:

Two blade, Hartzell HC-C2YK-1 / 7666A-2 constant speed variable pitch. Diameter 74"

OIL TEMPERATURE:

Maximum 118°C / 245 °F (red line)
Normal range 75° to 245°F (green arc)

OIL PRESSURE (PSI)

Maximum Red line 90
Normal range Green arc 60-90

	Minimum (idling)	Red line	25
FUEL PRESSURE (PSI):	Maximum	Red line	45
	Normal range	Green arc	14-45
	Minimum (idling)	Red line	14
SUCTION:	Normal operating range		$5.0 \pm 0.1''$
FUEL GRADE:		100LL Grade aviation fuel	
OIL GRADE:		Aeroshell W 15-W50	
TYRES:	5.00 X 5 nose wheel		30 PSI
	6.00 X 6 main wheel		27PSI
LIMITATIONS:	Maximum permissible all up weight: (Normal)		2650lbs / 1204 kgs
	Max baggage in baggage compartment		200lbs / 90 kgs
	Aircraft is not designed for aerobatics, spinning prohibited.		
C of G location:	The C of G Reference Datum is 78.4 inches ahead of the wing leading edge at the intersection of the straight & tapered section.		
Normal category C of G limits are:			
	Forward:		+87.3" / 2650lbs +82.0" / 2300lbs +80.0" / 1800lbs
	Rear limits:		93.00"
	Straight line variation between points given.		
Basic empty mass of the aircraft is approximately 1668lbs which includes unusable fuel & full oil.			
However to obtain this weight for a particular aircraft, reference must be made to the aircrafts own weight schedule.			
Fuel is taken as 7.2lbs / gallon or 0.72 kg / litre.			

SAMPLE LOADING PROBLEM:

ITEM	WEIGHT LBS	LVER ARM (ins)	MOMENT (lbs/ins)
BEM	1668	85.6	142781
USABLE FUEL (48.5usg max)	291	95.0	27645
Pilot & front seat	340	80.5	27370
passenger	340	118.1	40154
Rear seat passengers	19	142.8	2713
Baggage	-8	95	-760
Ramp weight less fuel for start & taxi			819
Moment due to gear retraction			
TOTALS	2650	90.84	240722

NOTE: The max take off weight is 2650lbs, however a ramp mass of 2658 is allowed as it assumes that 8lbs of fuel will be used prior to departure.

In the above sample loading problem the total moment is divided by the total weight, this gives a C of G of 90.84" aft of datum. This is within limits of 87.3" to 93" & weight is no more than allowable- so the loading is acceptable.

Alternatively the totals can be entered on a Co G Moment Envelope.

AIRSPEED LIMITATIONS (IAS in mph):

- V_{NE}.....214
- V_{NO}.....170
- V_A.....131
- V_{FE}.....125

ASI COLOUR MARKINGS (IAS in mph):

Red Line	214
Yellow Arc (Caution Range)	170-214
Green Arc (Normal operating Range)	71-170
White Arc (Flap Operating Range)	64-125

MAXIMUM DEMONSTRATED CROSSWIND:

For take-off & landing is 17 Kts.

STALL SPEEDS:

At gross weight, power off, speeds in mph:

FLAP DEFLECTION	ANGLE OF BANK			
GEAR DOWN	0°	20°	40°	60°
GEAR UP	71	73	81	100
40°	64	66	73	90

STALL WARNING:

The stall warning is by way of a stall warning horn which is activated by the airflow over the wing between 5 & 10 knots before the stall is reached 7 remains on up to the stall; it may be accompanied with mild airframe buffeting & gentle pitching. During pre-flight check, the stall warning horn should be checked.

FLIGHT AT NIGHT:

The aircraft is approved for night flying.

FLIGHT IN ICING CONDITIONS:

Flight in icing conditions is *strictly* prohibited.

FUEL SYSTEM:

Fuel is supplied to the engine from two tanks, one in each wing; a tab in each tank aids determining quantity if not full. The fuel selector is located on the lower left side panel forward of the pilot's seat. A metal bar stops accidental turning OFF the fuel supply.

Fuel is supplied to the engine from the selected tank by means of an engine driven pump. An electric pump should be switched ON for take-off & landing & when switching between tanks.

Each tank is equipped with a quick drain valve located under the inboard section of the wing.

A fuel strainer is used to examine the fuel for water, dirt & correct colour. A fuel strainer on the left hand side of the fire wall also has a drain valve accessible via the left nose section. Ensure that the valves are closed after use.

MIXTURE:

The mixture should be leaned in level cruise, this is particularly important above 3000'.

However, the mixture should not be leaned during climbs below 3000'.

For economy cruise the mixture should be leaned to peak EGT in accordance with the aircraft manual.

OIL SYSTEM:

A wet sump lubricating system is employed. The oil capacity is 8 qts.

Minimum safe quantity is 2 qts.

Note: The oil level reading will not be accurate if the engine has been recently running.

VACUUM SYSTEM:

Suction to the DI & AI is provided by an engine driven vacuum pump. A suction gauge is fitted on the right hand side of the instrument panel & indicates the suction below ambient pressure.

A vacuum regulator is provided in the system to protect the gyros, the valve is set to give a vacuum of 5.0" \pm 0.1" of mercury.

An electrically operated auxiliary system is fitted to some aircraft for in flight back up only. Takeoff with the main engine driven pump unserviceable is not approved.

If required in flight, all unnecessary electrical equipment should be turned off & when the AUX VAC switch is selected the AUX ON light should illuminate with an electrical load showing approximately 15 amps. If the vacuum falls below 4.8", flight in IMC should be discontinued.

ELECTRICAL SYSTEM:

Electrical energy is supplied by a 14V, direct current system powered by a belt driven alternator & a 12V battery placed in a plastic box immediately aft of the baggage compartment. A Master switch controls power to all circuits via a buss bar, except the ignition system.

The MASTER switch is usually of the split-rocker type; & the left half is BAT the right half controls the ALT. Normally both sides of the master are used together. The BAT position could be used on its own to check equipment on the ground, however this places the entire electrical load on the battery & continued operation will reduce battery power sufficiently to open the battery contacter- removing power from the alternator field and preventing alternator start.

The **Ammeter** displays in amps the load placed on the alternator; it does not indicate battery discharge. With all electrical equipment turned on (except the Master switch) the ammeter will show the amount of charging current demanded by the battery. As other equipment is turned on the reading will increase. The resulting load includes the battery and for night flying is in the region of 30 amps.

Loss of alternator output is detected by zero reading on the ammeter. This zero reading should be confirmed by loading the electrical system: if there is no increase in the ammeter reading then an alternator failure may be assumed. In this case reduce electrical load as much as possible and then reset the CB (if available), after 2 to 5 minutes cooling off period, try a voltage regulator reset by turning the ALT switch OFF for one second and then to ON.

If the ammeter continues to read zero, turn off the ALT switch, minimise the electrical load and terminate flight as soon as practicable.

"Push to reset" CB's protect most of the electrical circuits. However a period of 2 to 5 minute cooling off period should be allowed.

PITOT STATIC SYSTEM:

Pitot head is located underneath the left wing, both pitot & static pressure are sensed there & fed to gauges on instrument panel.

An alternate static source is available, the control valve being located underneath the left hand side of the instrument panel. When selected to "Alternate" feeds cabin pressure into the ASI, VSI & Altimeter. During operation of alternate static air, the cabin heater & defroster must be "ON", the storm vent & cabin vents closed.

Altimeter error should be less than 50'.

A drain valve for pitot & static lines is located on the left hand side of the pilot's seat near the floor.

LIGHTING SYSTEM:

External lighting consists of, landings lights, anti-collision lights, strobes & navigation lights each selected by individual rocker switches on the instrument panel.

Strobes should not be operated on the ground in close proximity with other aircraft as they may be distracting to other pilots.

In the air strobes can be disorientating when flying through fog or haze.

IGNITION SYSTEM:

The PA28 is equipped with a dual ignition system. There are four positions for the ignition switch: OFF, RIGHT, LEFT, BOTH, to start requires BOTH selected with an additional push & turn action.

NB: If the starter warning light remains on, the starter is still engaged & the ignition switch must be immediately turned off.

LANDING GEAR:

The Arrow is equipped with a retractable tricycle landing gear, which is hydraulically actuated by an electrically powered reversible pump. The pump is controlled by a selector switch to the left of the control quadrant. Landing gear is retracted or extended in about seven seconds.

The aircraft also incorporates a pressure sensing device in the system which lowers the gear regardless of gear selector position, depending on the airspeed & engine power (propeller slipstream). Gear extension is designed to occur, even when the selector is in the up position, at airspeeds below approximately 105 mph.

The extension speed will vary between 85 & 105 mph depending on power settings & altitude. The device also prevents retraction at speeds below approx. 85 mph with full power even if selected up. The speed increases with reduced power &/or increased altitude. Manual override of the device is provided by an emergency gear lever located between the front seats & to the left of the flap handle. The sensing device operation is controlled by differential air pressure across a flexible diaphragm which is mechanically linked to a hydraulic valve & an electrical switch which activates the pump motor. A high pressure & static source for actuating the diaphragm is provided in a mast mounted on the left side of the fuselage above the wing. Any obstruction in the holes in the mast will cause the gear to extend. An optional heated mast is available to alleviate obstruction caused by icing & is turned on when the pitot heat is selected on.

The emergency gear lever, when held in the raised position, can be used to override the system & gear position is then controlled by the selector switch regardless of power/airspeed settings. The emergency gear lever is provided with a latching device which may be used to lock the override lever in the up position. The latch is located on the left side panel of the console below the level of the manual override lever. To lock the override lever in the up position, raise the override lever to the full up position & push the latch in. A yellow warning light located below the gear selector switch flashes to warn the pilot that the automatic gear lowering system is disabled. The latch is spring loaded to the off position to aid disengagement. To disengage the latch, raise the override lever & release. The lever will return to its normal position & the yellow flag will extinguish.

The lever must also be used in the raised (up) position when gear-up stalls are practised. When used for emergency extension of the gear, the emergency gear lever manually releases pressure to permit the gear to free fall with spring assistance on the nose gear. The lever must be held in the downward position for emergency extension.

Gear down & locked positions are indicated by three green lights below the selector, a yellow in transit light is located at the top of the panel. An all lights out condition indicates the gear is up. The gear should not be retracted above 125 mph or lowered above 150 mph.

Two micro switches in the throttle quadrant activate a warning horn & a red "Warning gear up" light under the following conditions:

- Gear up & power reduced below 14" MAP.

- On a/c equipped with backup gear extender, if the system has extended the gear with the selector in UP, except at full throttle.

- Gear selector switch UP while on the ground.

The nose wheel is steerable through 60 degree arc via the rudder pedals. As the nose wheel retracts, the steering linkage disengages to reduce rudder pedal load in flight. The nose wheel is equipped with a hydraulic shimmy damper.

The oleo struts are of the air-oil type, with normal extension of 2.75" for nose & 2" for main wheels under normal static load (empty weight of a/c plus full fuel & oil).

The standard brake system includes toe brakes on the LHS rudder pedals & a handbrake located below & near the centre of the instrument panel. Toe brakes on the RHS are optional.

Toe brakes & hand brake have individual brake cylinder fed from a common reservoir.

A single disc, single puck brake is mounted on the main gear. A brake disc is mounted on the inboard side of the wheels, the brake housing which incorporates the pucks is mounted to the inboard side of the wheel axle.

FLIGHT CONTROLS:

The metal control surfaces operate by cables between the flying controls & surfaces.

The Stabilator is an all moving tail plane with a rear mounted trim tab controlled by a wheel between the front seats.

Rudder trim is mounted centrally below the instrument panel.

Simple flaps are manually operated & spring loaded to return to the up position. The three positions are: 10, 25 & 40 degrees.

Externally the flaps may be used as a step only when fully retracted.

CABIN HEATING & VENTILATION:

Heat for the cabin is provided by a heater muff attached to the exhaust system. Heater controls are located on the far right hand side of the instrument panel.

Fresh air inlets are situated in the leading edge of the wing near the routes. Fresh air controls are located on the side of the cabin near the floor on each side, air is exhausted through an outlet under the rear seat.

Air flow can be regulated between front & rear seats by levers located on the side of a heat duct panel situated between the front seats. When cabin heat is operated this duct becomes very hot & could result in minor burns if legs are placed too close for too long a period.