MULTI ENGINE SYSTEMS

PA44-180 Seminole

A. ENGINE

1. Make .....Avco Lycoming
2. Model:
   - Right Engine.....LO-360 E1A6D(turning counter clockwise from the cockpit)
   - Left Engine O-360 E1A6D
3. Type:
   - 4 cylinders
   - Horizontally opposed
   - Normally aspirated(No turbo charge)
   - Air cooled (Engine oil and fuel helps cooling)
   - Direct drive

   Propeller is attached to the crank shaft directly without any reduction gear or transmission.

   - Carburetor equipped
4. Horsepower .....180 BHP
5. Cowl flap: Manually operated. There are three positions; Full open, intermediate and full closed.

B. PROPELLER

1. Make:.....Hartzell
2. Model:
   - Right engine.....HC-C2Y(K,R)-2CLEUF/FJC7666A-2R
   - Left engine.....HC-C2Y(K,R)-2CEUF/FC7666A-2R
3. Type.....Constant speed, full feathering propeller
4. What is a constant speed prop?

   The propeller which maintains the RPM selected by propeller control lever constant regardless of airplane's pitch attitude or throttle position within some range.

5. The advantage of a constant speed prop.

   The pilot can select the most efficient blade angle for each phases of operation. By selecting low pitch/high RPM, you can get maximum power for takeoff. By selecting high pitch/low RPM, you can fly faster at low RPM and you can save the fuel for cruise.

6. How does it work?

   When the airplane rise it's nose, it start climb. As it climb, airspeed goes down. The RPM is also going down due to increasing drag on the blade. However, blade angle is decreased automatically to reduce the drag to maintain the RPM constant.

   When the airplane drops it's nose, it start to descend. As it descend, airspeed will increase. The RPM is also increased due to decreasing drag on the blade. However, blade angle is increased automatically to increase the drag to maintain the RPM constant.

7. Where is the governor located?

   In front of the engine.

8. What does governor do?

The fly weight inside the governor senses the change in RPM by sensing the change in centrifugal force. It opens the pilot valve. When the RPM increase, the valve opens the line without the pump. It drains the oil back from propeller hub to increase the blade angle. When the RPM decrease, the valve opens the line with the pump. The pump send the oil to propeller hub to decrease the blade angle.

9. What makes it high pitch?

Spring, nitrogen charged in the hub and counter weight at the root of the propeller blades.

10. What makes it low pitch?

High pressure of the oil and aerodynamic force on the prop.

11. What does pilot do when he move the prop lever in the cockpit? What will happen to governor?

It change the tension of the speeder spring. High tension requires more centrifugal force on the fly weight. It increase the RPM. Low tension requires less centrifugal force on the fly weight. It decrease the RPM.

12. Where is the oil from?

Engine oil reservoir at the bottom of the engine.

13. What will happen if you lose engine oil completely?

It become high pitch. Moves toward feathering.

14. How can you feather manually?

Move the propeller lever all the way down to the feather detent.

15. What is the purpose of feathering?

To reduce the drag caused by windmilling. To avoid further damage to the engine.

16. What force makes it feather?

Spring, nitrogen charged in the hub and counter weight at the root of the propeller blades.

17. How can you unfeather the prop?

Use starter.

18. How does the unfeatering accumulator work?(if it is equipped)

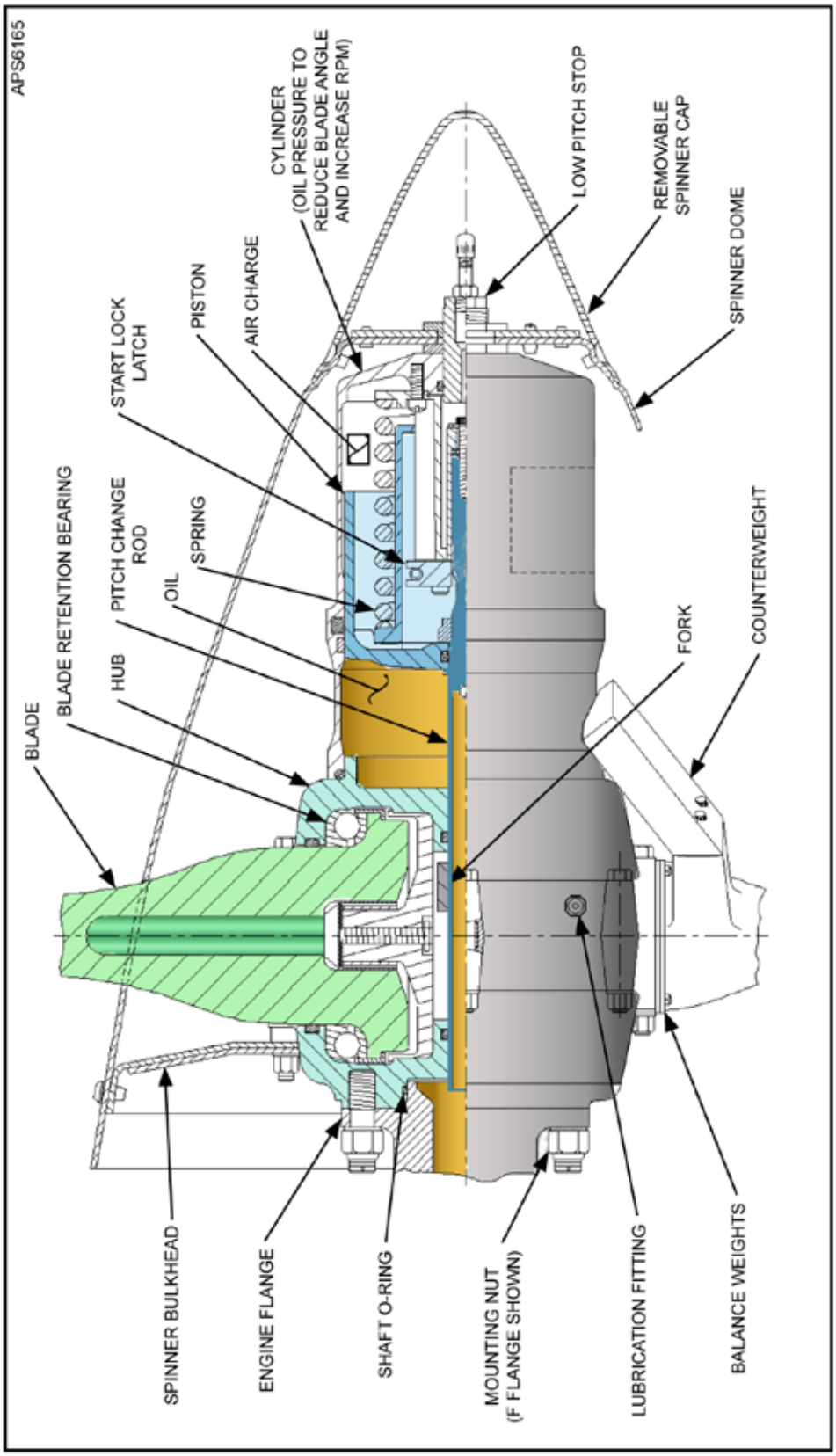
It has diaphragm inside. Nitrogen is charged in one side. Engine oil is pumped in on the other side from the governor during normal operation. When the propeller lever is moved down to feather position, the valve is closed to keep high oil pressure inside the accumulator(300 PSI). When the prop lever is moved to high RPM position, the valve is opened and the nitrogen push the oil back. The oil is sent to the hub through the governor and crankshaft to decrease blade angle. Once the blade angle changes, the wind pick up the prop to start windmill. In this way, the engine can be restarted without stress on the cylinders(N2967D , N79JT do not have unfeathering accumulator).

19. Will the prop feather when you shut down the engine after landing? Can you feather the prop when engine is not running?

No. There is anti-feather lock pin which prevent the prop from feathering below 950 RPM(N2967D, 800 RPM for N79JT). When the RPM is high, the pin hide inside sleeve due to centrifugal force. When the RPM is low, the spring push out the pin to stop the movement of the prop.

HARTZELL

Propeller Owner's Manual
115N



Cutaway of -2 Series Constant Speed, Feathering Propeller ( )HC-( )( )Y( )-2
Figure 2-2

C. FUEL SYSTEM

1. What is the fuel system of the Seminole?

   Fuel pump system.

2. How many fuel pumps are there?

   4. Each engine has engine driven fuel pump and electrical fuel pump.

   Also, heater has one electrical pump.

3. What drives fuel pumps?

   Engine driven and electrical motor.

4. When do you use electrical fuel pump?
   - To start the engine.
   - Takeoff, climb and landing.
   - When the engine driven pump is inoperative.

5. How many fuel tanks are there?

   One tank in each engine nacelles. Total two tanks.

6. What is the capacity of each tanks(total/usable)?

   55 gallons in each tanks. Total 110 gallons. 2 gallons unusable each side makes usable fuel of 108 gallons.

7. How many fuel gauges are there?

   Two. Fuel quantity gauges. Fuel pressure gauges.

8. Can you send the fuel from right tank to left engine? How?

   Yes. Select cross feed on the left fuel selector valve. The P.O.H says fuel selector valve for the inoperative engine should be “off”.

9. When can you use the cross feed line?

   Only in cruise.

10. Can you select cross feed on both engine?

    P.O.H said "NO" though you can physically position it.

11. What is the purpose of cross feed?

    To balance the weight laterally when one engine is inoperative. For longer range/endurance.

12. Draw the fuel system.

    Refer P.O.H.

13. How many drains are there? Where are they located?

    Two. There are two quick drains on the right side of the fuselage. Those are the drain from the fuel filters.

14. What is the minimum grade of fuel?

    100.

15. How can you make sure you have correct fuel?

    Color. 100 is green. 100 LL is blue.

D. LANDING GEAR

1. Type of the landing gear?

   Tri-cycle, retractable.

2. How does it work?

   It is electrical-hydraulic system. Pilot can select the position(up/down) by the gear handle. The electrical motor rotate the hydraulic pump which send the hydraulic fluid from reservoir to three actuators. The fluid move the piston in each actuators to move the push-pull rod which are connected to the landing gears.

   When the hydraulic pressure reached to certain amount (1800 PSI), the pressure switch disconnect the circuit to stop the pump. When the hydraulic pressure decrease (by 200 to 400 PSI), pressure switch activate the motor to pump the hydraulic fluid.

   Each landing gears (nose gear and right, left main gear) have up limit switch and down limit switch. Up limit switch extinguish the red unsafe light when all three are pressed. Down limit switch stop the motor when all three are pressed. It also turns on the green lights.

3. Where is the power pack located?

   Behind the baggage compartment.

4. What is the color of the hydraulic fluid?

   Red.

5. What will happen in the case of loss of hydraulic fluid?

   The gear will drop by gravity and spring.

6. How can you make sure it is down and locked?

   Three green lights and no red unsafe light.

7. Is there anything to tell you the position of the nose gear?

   There is a mirror on the both cowling to check nose gear position

8. Lock systems(up/down).

   Up-No mechanical lock. Only supported by hydraulic pressure.

   Down-Over center lock supported by spring and finger hook.

9. What is the maximum speed you can extend/retract the gear?

   Vle is 140 KIAS. However, for retraction, it must be below 109 KIAS.

10. Is there any system which warns you when you forget to extend the gear for a landing?

    There is warning horn. When the throttle is reduced(14") with gear up, it beeps. When the flap is extended at 25 or 40 degree with gear up, it beeps. It beeps on the ground when the gear handle is up.

    And gear unsafe light (red) illuminates if it not fully down or fully up.

11. What will happen if you move gear handle up while you taxi on the ground?

    The warning horn beeps. And gear unsafe light (red) illuminates The gear will not go up because of the squat switch located on the left main gear strut.

12. What would you do if you don't see green light after you move the gear handle down?

    Check master switch on, circuit breaker in, push the light bulb for test, switch the light bulb, turn the navigation light off(navigation light dims green lights). Check if you hear warning horn or not.

Check unsafe light.

13. Explain the manual extension procedure.
    - Use check list.
    - Slow down .....100 KIAS.
    - Landing gear lever.....Down.
    - Emergency gear extension knob Pull
    - Three green lights.....Check
    - Leave emergency gear extension knob pulled.
14. What makes gear down when you use manual extension system?

    It release the hydraulic pressure. The gravity and the spring pulls gear down.

15. Is brake still effective in the case of loss of hydraulic fluid?

    Yes. Because they are separate system.

E. ELECTRICAL SYSTEM

1. What is the primary source of electricity?

   Alternator

2. How many alternators are there?

   Two

3. What drives the alternator?

   Engine

4. What is the voltage and capacity of the alternator?

   14 volt, 60 Am

5. How can it maintain the voltage constant while the engine RPM changes from phase to phase?

   Voltage regulator maintain it at 14 volt regardless of RPM.

6. How many voltage regulators are there?

   Two. Each alternator has its own voltage regulator.

7. What is happening if you see over voltage warning light?

   Over voltage relay shut down the alternator field as a result of over voltage(more than 17 volt) caused by spike or voltage regulator failure. Recycle the master switch and/or alternator.

8. How can you make sure one of the alternators is working or not?

   Turn off the alternator one at a time. If the other load increase, the alternator you turned off was working.

9. What is bus bar? Location?

   Bus bar is a piece of metal used for the distribution of the electricity. It simplify the wiring. It is located behind the circuit breakers.

10. How can you detect the alternator failure? What would you do then?

    One or both load meters indicate zero. If only one indicates zero, turn off the other one to make sure it is working. If both indicate zero, check master switch on, circuit braker, recycle alternator. If it still indicate zero, turn off the master switch to conserve the battery. Also alternator announciator light on.

11. How many batteries are there? Location?

One battery in the nose.

12. What is the voltage and capacity of the battery?

    12 volt, 35 amh.

13. How long does the battery last after losing alternator?

    Depend on the load. If you use 35 am continuously, it last 1 hour. If you use 70 am continuously, it last 1/2 hour.

F. FLIGHT CONTROL SYSTEM

Conventional cable and pulley system.

G. FLAP

1. Type of flap.....Single slotted
2. How does it work?

   Flap is actuated manually by human power.

3. Maximum deflection .....40°
4. Vfe.....111 KIAS.

H. VACUUM SYSTEM

1. Purpose

   To operate the gyro instruments. AI and HI.

2. Source of vacuum

   Two engine driven vacuum pumps.

3. Normal indication.....5 in-hg±0.2
4. How to detect the failure

   There are red flags on the vacuum gauge.

I. STALL WARNING SYSTEM

Electrical warning horn activated with tabs. There are two tabs on the left wing. The out board is activated for flap 0° and 10°. Inboard one is for 25° and 40°.

However, the system is off on the ground due to the squat switch.

J. HEATER

Combustion type heater is located in nose cone. Aviation fuel is supplied from left tank with electrical fuel pump. It uses about 0.5 GPH.

K. ICE PROTECTION

Pitot heat, carburetor heat, defroster

L. HYDRAULIC SYSTEM

Prop, Brakes, Landing gear

M. V SPEED :KIAS

Va	135(3,800 lb) 112(2,700 lb)
Vx	82
Vy	88
Vxse	82
Vyse:	88
Vsse	82
Vmc	56
Vs	55
Vs1	57
Vno	169
Vne	202
Vfe	111
Vle	140
Vr	75

BEFORE MANEUVER CHECK

1. Seat belt.....Fasten.
2. Fuel selector valve.....On
3. Primer.....Lock
4. Mixture.....Rich.
5. Fuel pump.....On
6. Master switch .....On

CLEARING TURN

Complete 90 degrees turn to the left, and 90 degrees turn to the right. Depend on the airspace and terrain, right turn may be the first. Watch the blind spot on the left, right, behind and below. Bank should be 15 to 20 degrees.

SLOW FLIGHT

A. ENTRY

1. Throttle.....15 in, maintain altitude.

   As you reduce power, you should anticipate pitch down. Don't watch manifold pressure gauge needle to move from cruise to 15 in. Look at the horizon and cowling as you use peripheral vision. Adjust control pressure to avoid nose from dropping and adjust rudder to keep the heading constant.

2. Below 140 kt .....Landing gear-Down
3. 110 kt.....Flap 10°
4. 100 kt.....Flap 25°
5. 90 kt.....Flap 40°

   The extension of flap cause nose to move down. If you allow it, you will lose altitude. Anticipate this and you need to add slight back pressure on the control wheel to avoid this. Watch horizon and cowling. Don't fix your eyes on the airspeed indicator and the flap switch. After you set full flap, you need to apply back pressure to keep the altitude constant.

6. 88 kt (blue line) .....Prop to high RPM
7. 65 kt.....Throttle-17 in-18 in, maintain 60 kt

   PTS require you to maintain minimum controllable airspeed which is almost 55 kt for Seminole .Private pilot ACS requires 1G stall speed +5 to 10 Kt without activate stall waning. However, you need to be able to fly at any speed. Use trim. After this point, generally, pitch controls airspeed and power controls altitude. Remember the pitch attitude which gives you 60 kt.

B. CLIMB

Apply extra power. Adjust pitch to maintain the airspeed. For level off, reduce power necessary to maintain the altitude. Adjust pitch to maintain the airspeed.

C. DESCENT

Reduce power as necessary. Adjust pitch to maintain the airspeed. For level off, add power necessary to maintain the altitude. Adjust pitch to maintain the airspeed.

D. TURN

Use 10 degrees bank. Try to maintain pitch attitude and adjust it to maintain 60 kt.

E. RECOVERY

1. Throttle.....Full, maintain the altitude.

   Adjust pitch "gradually" to maintain the altitude. Don't push nose down quickly. Pitch should be changed slowly from slow flight attitude(high) to cruise attitude(level). Look at the horizon and cowling as you scan the altimeter.

2. Flap.....25°
3. 80 kt.....Landing gear-up, Flap 10°
4. 90 kt.....Flap Up

   The flap retraction cause the nose to move up. You need to anticipate and add back pressure as necessary to maintain the altitude. As airspeed increases, you don't need much right rudder anymore. Airspeed

5. 100 kt.....Throttle Cruise. Prop and mixture set back to cruise. Return to cruise flight. Use trim.

POWER OFF STALL

A. ENTRY

1. Throttle.....15 in

   Maintain altitude
2. Below 140 kt .....Landing gear-down
3. 110 kt.....Flap 10°
4. 100 kt.....Flap 25°
5. 90 kt.....Flap 40°
6. 88 kt (blue line) .....Prop to high RPM

   1 through 4 are same as slow flight.
7. Descend .....80 kt. Stabilize the descend as if you are on final.
8. Throttle .....Idle. Increase back pressure to keep altitude to reach stall.

   If you do this too aggressive, it will stall deeply. Try to maintain altitude and it will stall gently. You will hear stall warning horn and then feel the buffet.

B. RECOVERY

1. Back pressure. .....Release

   You don't need to push nose down too steep.
2. Throttle .....Full, Maintain level flight attitude.

   Don't look inside the cockpit. Your right hand is already on the throttle. Just move it forward. Look horizon and cowling. Adjust control pressure to establish level flight attitude.
3. Flap.....25°

   After retract the flap to 25°, return your right hand on the throttle. Wait for the airspeed to increase as you maintain level flight attitude.
4. Airspeed 82 kt (Vx).....Climb attitude

   Look at horizon and the cowling to establish normal climb attitude. And wait.
5. Positive climb.....Landing gear-Up, Flap 10°

   Avoid pitch change caused by flap retraction.
6. Airspeed 88 kt (Vy) .....Flap Up
7. Level off, Airspeed 100 kt..Throttle, Prop, Mixture-Cruise.

POWER ON STALL

A. ENTRY

1. Throttle.....15 in

   Maintain altitude

2. Below 140 kt .....Landing gear-Down
3. 88 kt (blue line) .....Prop-High RPM
4. 82 kt(Vx) .....Throttle 22 in, Climb attitude (slightly higher than normal climb attitude)

   No need to pull nose up very high. If the nose is too high, it will drop a lot and lose excessive altitude after stall. To avoid this, maintain the pitch slightly higher than normal climb attitude at which airspeed is decreasing gradually(about 15 degrees up). Add back pressure to keep this pitch attitude constant as airspeed decrease. Look at the horizon on the both side of the cowling to judge your attitude.

B. RECOVERY

1. Release back pressure.....Full power
2. Maintain level flight attitude.

   Release back pressure gently to return to the level pitch. Wait for the airspeed to increase.

3. 82 kt(Vx) .....Climb attitude
4. Positive climb.....Landing gear-Up
5. 88 kt(Vy).....Stabilize clime, then level off.

   Since the power on stall is the simulation of the departure stall, the altitude you begin this maneuver is the airport elevation. During recovery, you shouldn't go below the original altitude. If you do so, that mean you crash on the ground. You should finish this maneuver at higher altitude than you begin.

6. 100 kt.....Throttle, Prop, Mixture- Cruise.

ACCELERATED STALL (COMMERCIAL PILOT)

At least 3000 AGL

1. Throttle 15 in-hg, maintain altitude
2. 88 kt, Prop-High RPM
3. 68kt (= entry speed= 1.2 times unaccelerated stall speed), 45° bank coordinated turn
4. Increase back pressure to reach stall
5. Stall indication, release back pressure, increase power, bank zero, return to level flight

STEEP TURN

A. ***SET UP***

- Throttle .....18”
- Prop.....2500 RPM
- AS .....110 Kt

B. ***ENTRY***

1. Enter turn with aileron and rudder.
2. When the bank>30° .....Apply back pressure to keep ALT, Add power to keep AS
3. When the bank=45°(Private)/50°(Commercial), counter aileron to keep bank constant

C. ***RECOVERY***

1. 20° before target heading ...Start roll out with aileron and rudder
   - Release back pressure
   - Return to level flight attitude
   - Throttle .....18”

   For Commercial, reverse the course to the other direction immediately.

VMC DEMO

A. ENTRY

1. Throttle.....15", Maintain altitude.
2. Airspeed 100 Kt
   - Prop.....High RPM
   - Left engine.....Idle, Maintain heading.
   - Right engine.....Full, Maintain heading.
   - Adjust rudder.....keep heading constant during power change.
3. Nose up.....1 Kt/sec, Maintain heading with rudder.

----------Loss of directional control or any stall indication-----

B. RECOVERY

1. Right engine .....Close

   Don't decrease rudder pressure too soon. It will cause the nose to yaw to the left.
2. Nose.....Descend attitude
3. Airspeed>70 Kt .....Right engine, Full

   Add right rudder pressure as you increase power on the right engine to keep heading constant.
4. Maintain 88 kt(Blue line)

EMERGENCY DESCENT

*A. **ENTRY***

1. Throttle .....Idle, begin descent
2. Airspeed<140 ..... Gear down
3. Prop ..... High RPM
4. Maintain .....130 kt with bank as needed.

*B. **RECOVERY***

1. Target altitude+200 ft .....Level pitch
2. Airspeed<109 .....Gear up
3. Power.....Cruise

NORMAL TAKEOFF

1. Flap.....0°
2. Taxi into the runway and stop.
3. Power 2000 RPM .....Check engine gauges.

   Pump brake a couple of time before apply full power to prevent the airplane from moving.
4. Release brake.....Apply full power.
5. 75 Kt.....Rotate. Set pitch up for Vy.
6. No runway available for landing-Landing gear-Up,

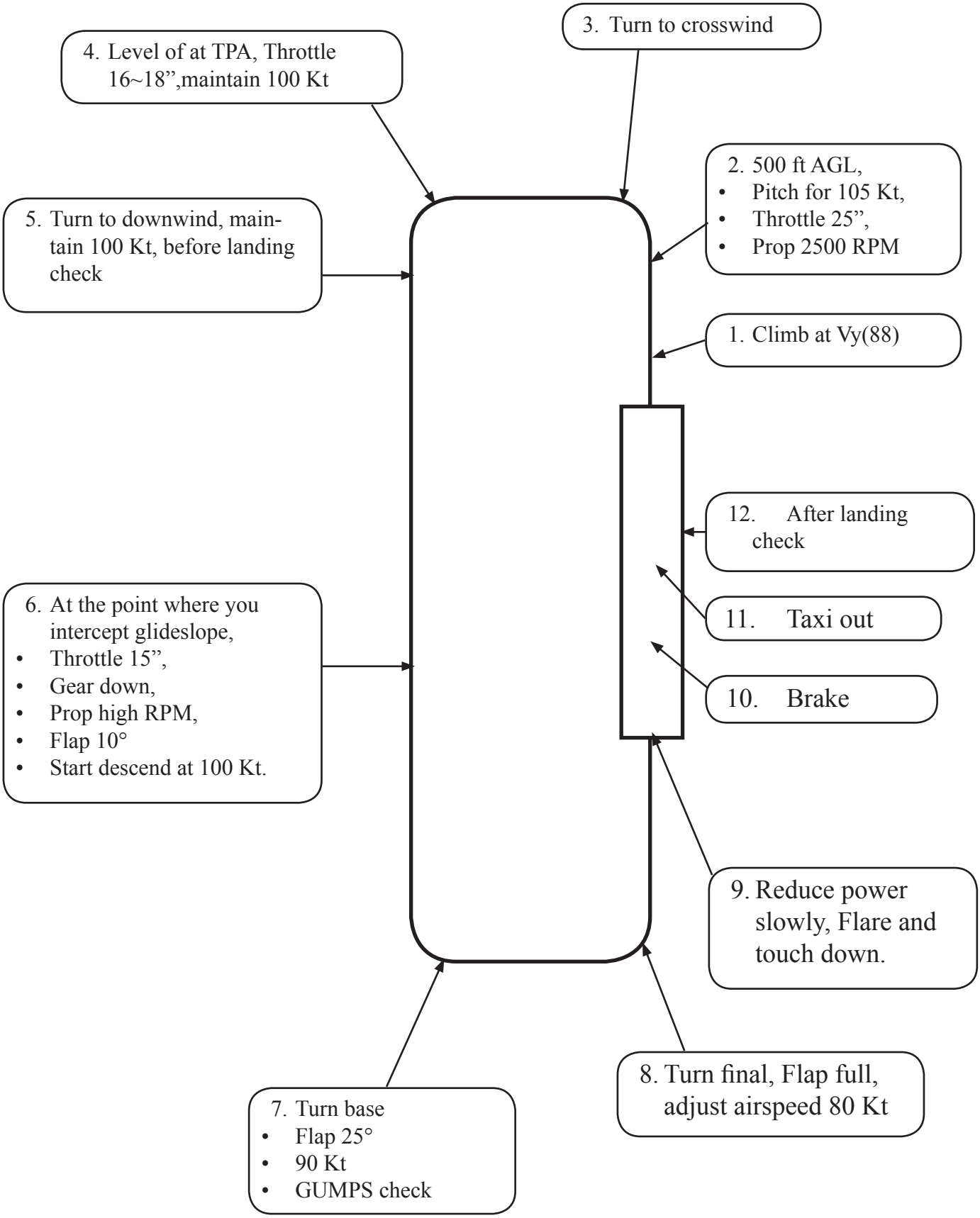
   Check “positive rate of climb” before retract.
7. Climb at 88 kt(Vy).
8. 500 AGL
   - Pitch.....105 kt
   - Throttle .....25”
   - Prop.....2,500 RPM

TRAFFIC PATTERN OPERATION

1. Climb at Vy(88)
2. 500 ft AGL,
   - Pitch for .....105 Kt,
   - Throttle .....25”
   - Prop .....2500 RPM
3. Turn to crosswind
4. Level of at TPA,
   - Throttle .....16~18”
   - Maintain.....100 Kt
5. Turn to downwind, maintain 100 Kt, before landing check
6. At the point where you intercept glideslope,
   - Throttle .....15”
   - Gear .....down
   - Prop.....high RPM,
   - Flap.....10°
   - Start descend.....100 Kt.
7. Turn base
   - Flap.....25°
   - 90 Kt
   - GUMPS check
8. Turn final, Flap full, adjust airspeed 80 Kt
9. Reduce power slowly, Flare and touch down.
10. Brake
11. Taxi out
12. After landing check

GUMPS CHECK

- **Gas-Fuel selector On**
- **Undercarriage.....Three greens**
- **Mixture.....Rich**
- **Prop.....High RPM**
- **Seat belt, Switch(fuel pump)-On**



SHORT FIELD TAKEOFF

1. Select proper lift off speed and target speed at 50 ft AGL for your weight from the performance chart.
2. Flap.....Set 25°
3. Taxi to the very beginning of the runway.

   Depend on the traffic situation, you don't need to taxi all the way to the beginning of the runway. You can taxi into position as normal takeoff.
4. Brake .....Full

   Pump brake a couple of time before apply full power to prevent the airplane from moving.
5. Power.....Full
6. Engine gauges. .....Check in green
7. Release brake.
8. Slightly before liftoff speed, rotate. Set pitch up for the target speed at 50 ft AGL.

   Try not to chase the airspeed indicator needle. Remember, airspeed indicator has lag. If you chase, airspeed may be too slow or too fast.
9. At 50 ft AGL.....lower the nose slightly.

   Again, don't chase the needle of airspeed indicator. Look at the pitch attitude. Make small change in the pitch. You still want to climb. Don't descend.
10. Positive climb.....Landing gear-Up, Flap-10°.

    Check "positive rate of climb" before retract. Once you retract the flap, pitch will change. Be prepare for that.
11. Climb at 88 kt(Vy).....Flap-Up, Resume normal climb.
12. 500 AGL,
    - Pitch.....105 kt
    - Throttle .....25"
    - Prop.....2,500 RPM

SHORT FIELD LANDING

1. Select proper approach speed for your weight with the performance chart.
2. Select the aiming/touch down point.

   In the beginning, select abeam PAPI or between VASI . In that way, it will be easier for you to determined when to reduce power for flare (50 ft AGL) by checking the TCH (Threshold Crossing Height) in the chart supplement (former A/F D). You need to touch down +200/-0 ft from that point (private), +100/-0 ft (commercial) from the specified point.
3. Approach as normal. Full flap on final.
4. Maintain proper approach speed at least last 1/4 mile on final.

   You don't need to make steep or shallow approach. Just maintain normal approach path all the way to the selected aiming/touch down point.
5. Clear the brake

   Make sure that your toes don't touch the brake. Your toe must be on the lower part of the pedal to avoid locking the tire.
6. At 50 ft AGL, Reduce power, flare touchdown.

   Begin power eduction at 50 ft AGL and plan to reach idle upon touch down. Do not close throttle so quick or you will lose additional lift too quick which causes the sink rate too rapid. Do as you do for normal landing. If your approach was correct, it will touch down the point. If your approach was wrong, there is no way to correct at this point. Do no try to touch down on the point by lowering the nose or by releasing back pressure. You will land flat and damage the airplane. If you think you will over shoot, commence go around and make the better approach next time.
7. After touch down, as you maintain directional control, use NORMAL BRAKE.

   In real short field situation, you may need to use full brake and retract the flaps. However, during training, we want to avid locking the brake, making flat spot on the tires caused by improper use of " full brake". Also, some pilot get confused and retract the landing gear instead of flaps. Therefore, you don't need to retract the flaps. You call out "Full brake, flaps up" and use normal brake instead of full.

EMERGENCY (ONE ENGINE FAILURE)

A. INDICATION

Yaw & Roll. Uncontrolled yaw and roll occur and nose goes down.

B. DURING TAKEOFF ROLL

Below rotation speed

- Both throttle .....Close
- Maintain directional control,
- Brake.....As needed

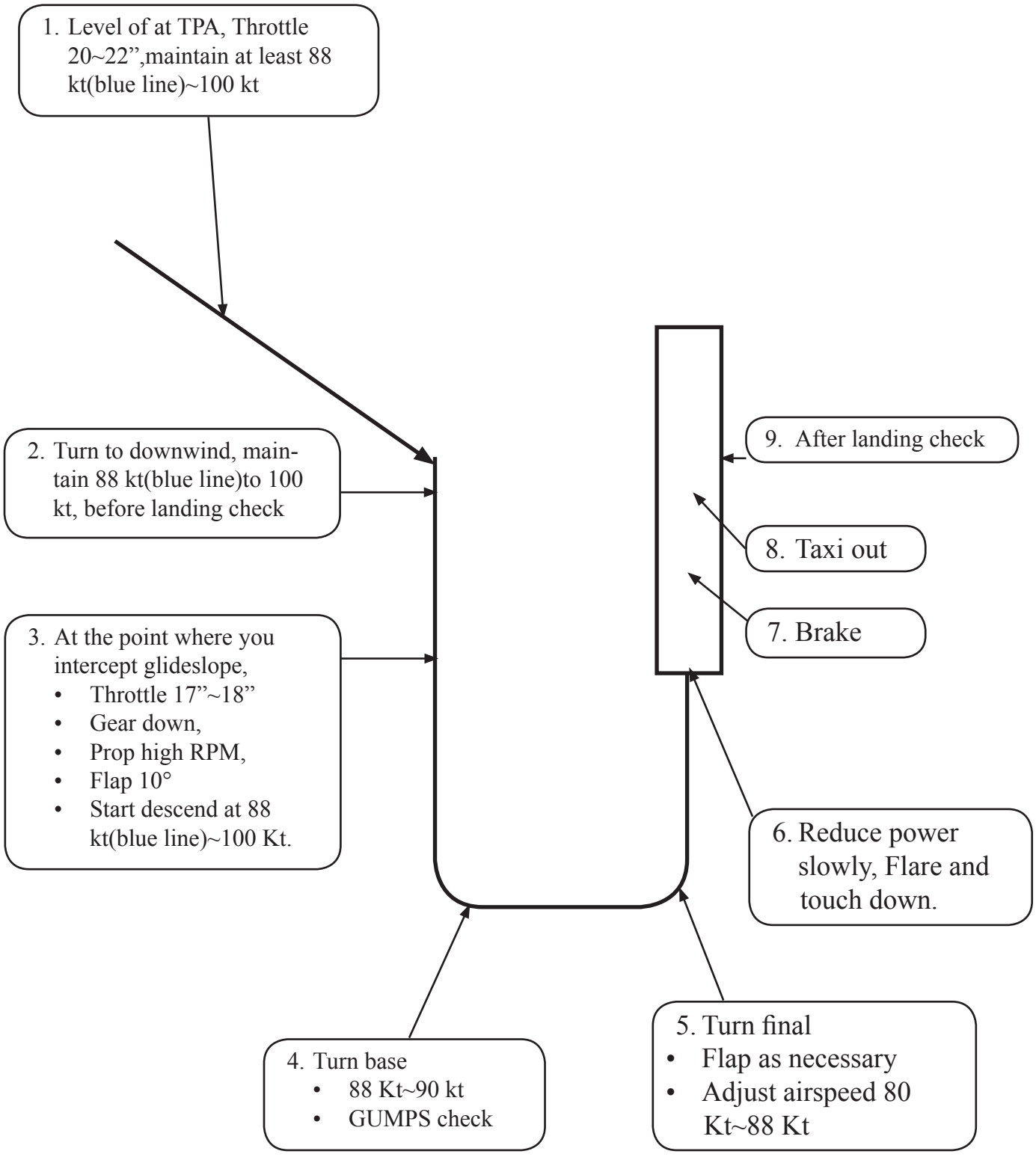
C. IN FLIGHT

1. Control
   - Directional control-rudder
   - Airspeed-Blue line(88)
2. Power
   - Mixture .....Rich
   - Prop.....High RPM
   - Throttle .....Open
3. Drag
   - Flap .....Up
   - Gear .....Up
4. Identify dead engine .....“Dead foot, dead engine”
5. Verify dead engine.....Dead engine throttle-Close
6. Check altitude
   - Lower than 2000 AGL Feather dead engine
   - Higher than 2000 AGL Trouble shoot with check list,If still dead-Feather dead engine
7. Secure dead engine with check list
8. Make a decision
   - Continue to the destination?
   - Divert to the nearest airport?

SINGLE ENGINE LANDING

After losing one engine, follow engine out procedure and feather dead engine. Enter traffic pattern. Maintain at least 88 kt(blue line) until rolling out on final.

1. Level of at TPA, Throttle 20~22",maintain at least 88 kt(blue line)~100 kt
2. Turn to downwind, maintain 88 kt(blue line)to 100 kt, before landing check
3. At the point where you intercept glideslope,
   - Throttle .....17"
   - Gear .....Down
   - Prop.....high RPM
   - Flap .....10°
   - Descend .....88 kt(blue line)~100 Kt.
4. Turn base
   - 88 Kt~90 kt
   - GUMPS check
5. Turn final
   - Flap .....As necessary
   - Adjust airspeed .....80 Kt~88 Kt
6. Reduce power slowly, Flare and touch down.
7. Brake
8. Taxi out
9. After landing check



INSTRUMENT APPROACH PROCEDURE

1. ATIS (When you are close to destination)
2. Descend check list
   - Heading indicator .....Set
   - Altimeter.....Set
   - Cowl flap .....As required
   - Fuel selector valve.....On
3. Complete approach briefing
4. Set approach configuration (on initial approach segment or vectored for downwind)
   - Throttle .....15”
   - Prop.....2500 RPM.
   - AS<111 .....Flap-10°
   - Throttle .....16” to 17” enough to maintain 100 Kt.
5. Before landing check (except gear and prop)
6. Step down
   - Throttle .....12”
   - Nose.....lower for descend
7. Level off
   - Nose.....level
   - Throttle .....16” to 17” enough to maintain 100 Kt.
8. FAF(intercepting GS for ILS)
   - Gear .....Down
   - Prop.....High RPM
   - Flap.....25°
   - Descend (500FPM for ILS)
   - 5 Ts (turn, time, twist, throttle, talk)
9. GUMPS check
10. At MDA.....Level off, Throttle-20” to 22”.
    - Runway insight.....Full flap, slow down to 80 Kt, flare and touchdown.
    - If you reach missed approach point with no visual clue, commence missed approach.
11. Missed approach
    - Throttle .....Full
    - Positive climb .....Gear up, flap up
    - Climb .....Vy(88)
    - Cowl flap .....Open
    - Comply missed approach instruction or as published
    - After takeoff check .....Complete

DRAG DEMO (CFI ONLY)

A. ENTRY (AT LEAST 4500 FT AGL)

1. Throttle.....15", Maintain altitude.
2. Airspeed 100 Kt
   - Prop-High RPM
   - Left engine- 11"(Zero thrust) Maintain heading.
   - Right engine- 19 to 21"enough to maintain blue line and altitude.
   - Adjust rudder to keep heading constant during power change.
3. Gear -Down,
   - Maintain blue line by adjusting pitch
   - Note VSI indication
   - Gear-Up, return to level flight
4. Flap-10°
   - Maintain blue line by adjusting pitch
   - Note VSI indication
5. Flap-25°,
   - Maintain blue line by adjusting pitch
   - Note VSI indication
6. Flap-40°,
   - Maintain blue line by adjusting pitch
   - Note VSI indication
   - Flap- Up, return to level flight
7. Left engine -Idle (windmill),
   - Maintain blue line by adjusting pitch
   - Note VSI indication
8. Gear and flap down,
   - Maintain blue line by adjusting pitch
   - Note VSI indication
9. Right engine- Full power,
   - Maintain blue line by adjusting pitch
   - Note VSI indication
10. Left engine- 11" (zero thrust), gear and flap up and zero side slip,
    - Maintain blue line by adjusting pitch
    - Note VSI indication