NORMAL OPS

Cruise Power Setting Table						
Press	Std Temp		110HP 55%	130HP 65%	150 HP - 75%	
Alt Ft	F	C	2400	2400	2400	RPM
SL	59	15	20.4	22.9	25.5	MANIFOLD PRESSURE
1000	55	13	20.2	22.7	25.2	
2000	52	11	20.0	22.5	25.0	
3000	48	9	19.8	22.2	24.7	
4000	45	7	19.5	22.0	24.4	
5000	41	5	19.3	21.7	24.2	
6000	38	3	19.1	21.5	23.9	
7000	34	1	18.9	21.2	23.6	
8000	31	-1	18.7	21.0	23.4	
9000	27	-3	18.5	20.7	23.1	
10000	23	-5	18.3	20.4	22.9	
11000	19	-7	18.1	20.2	22.6	
12000	16	-9	17.8	19.9	22.3	
13000	12	-11	17.6	19.7	22.1	
14000	9	-13	17.3	19.4	21.8	

To maintain constant power, correct manifold pressure approximately 0.16" Hg for each 10° F variation in inlet air temperature from standard altitude temperature. Add manifold pressure for air temperatures above standard; substract for temperatures below standard.

From POH 9-10. PERFORMANCE CHARTS ISSUED: JULY 13, 1973

DO NOT MAINTAIN A MP HIGHER THAN RPMs

PRE-START

1 PREFLIGHT - **COMPLETE**	6 ALTERNATE AIR - **OFF**
2 SEATS AND BELTS - **ADJUST**	7 PARKING BRAKE - **SET**
3 PASSENGERS - **INSTRUCT**	8 PROP - **HIGH RMP**
4 FLAPS - **UP**	9 GEAR - **DOWN**
5 CIRCUIT BREAKERS - **CHECK**	10 AVIONICS - **OFF**

STARTING

1 MASTER SWITCH - **ON**
2 GEAR LIGHTS - **THREE GREEN**
3 FUEL SELECTOR - **FULLEST TANK**
4 (DAY) ANTI COLLISION LIGHTS - **ON**
5 (NIGHT) NAV / POSITION LIGHTS - **ON**
6 THROTTLE - **½" OPEN**
7 BOOST (FUEL) PUMP - **ON**
PRIME: (COLD START ONLY)
→ MIXTURE - RICH ("3 COUNT"), THEN CUT-OFF
HOT START: NO PRIME
8 PROPELLER AREA - **CLEAR**
9 BOOST PUMP - **OFF**
10 STARTER - **ENGAGE**
11 MIXTURE (*WHEN ENGINE CATCHES*) **HALF RICH -> FULL RICH**
12 WARMUP - **800 - 1000 RPM**
13 OIL PRESSURE - **CHECK**
14 RADIOS - **ON / FREQUENCY SET**
15 TRANSPONDER - **1200 & STANDBY**
16 PARKING BREAK - **OFF**
17 TAXI SLOWLY - **CHECK BRAKES**
18 PARKING AREA - **CHECK FOR LEAKING FLUIDS**

PRE-TAKEOFF RUN UP

1	PARKING BREAK - **SET**
2	PROPELLER - **HIGH RPM**
3	MIXTURE - **RICH**
4	THROTTLE - **SMOOTHLY TO 2000 RPM (BELOW RED ARC)**
5	ENGINE INSTRUMENTS - **WITHIN GREEN**
6	ALTERNATE AIR - **CHECK**
7	MAGS - **CHECK (175 MAX DROP, 50 DIFF)**
8	PROPELLER - **EXERCISE (MAX 500 RPM DROP)**
9	VACUUM - **4.8" - 5.1"**
10	AMMETER - **CHECK**
11	THROTTLE - **1000 RPM**
12	ANNUNCIATOR PANEL - **PRESS TO TEST**
13	FLIGHT INSTRUMENTS - **CHECK & SET**
14	FLIGHT CONTROLS - **FREE & CORRECT**
15	BOOST PUMP - **ON**
16	FUEL PRESSURE - **CHECK**
17	FLAPS - **AS REQUIRED**
18	TRIM (RUDDER & ELEVATOR) - **SET**
19	GEAR AUTO EXTEND - **NORMAL POSITION**
20	FUEL SELECTOR - **CONFIRM FULLEST** (Wait if switched tanks)
21	ENGINE GUAGES - **CHECK**
22	SEATS - **CHECK TRACKS LOCKED**
23	RESTRAINT SYSTEM - **FASTENED**
24	DOOR & WINDOW - **CLOSED & LATCHED**
25	MIXTURE - **SET**
26	PROPELLER - **HIGH RPM**
27	RADIOS - **FREQUENCY SET**
28	TRANSPONDER - **SQUAWK & ALT**

TAKEOFF AND CLIMB OUT

ROTATE - **75 - 85 MPH**	Vx	**96**	85
50' AGL - **TAP BREAKS / GEAR UP**	Vy	**100**	95
500' AGL - **2500 RPM / 25"**, FUEL PUMP - **OFF**			
ENROUTE CLIMB - **120 MPH**			
GEAR AUTOEXTEND - **NORMAL POSITION**			

APPR & LANDING - BGUMPLS (verbalize)

B	BOOST PUMP - **ON**	VFE - **125 MPH**
G	GAS - **FULLEST TANK**	VLO - **150 MPH**
U	UNDERCARRIAGE - **DOWN & 3 GREEN**	VREF - **85-90 MPH**
M	MIXTURE - **RICH**	*NOTE: SWITCH FUEL TANKS*
P	PROPELLER - **FORWARD**	*ONLY WHEN YOU CAN MAKE*
L	LANDING LIGHT - **ON**	*A SAFE LANDING IN THE*
S	SEATS & BELTS - **CHECK**	*EVENT OF ENGINE FAILURE*

"GUMP CHECK" ON BASE, "100' - 3 GREEN" ON FINAL

AFTER LANDING

1 FLAPS - RETRACTED	2 - BOOST PUMP - **OFF**
3 LANDING LIGHT - OFF (DAYTIME)	4 - TRANSPONDER - **STDBY**

SHUTDOWN

1 AVIONICS MASTER SWITCH - **OFF**
2 THROTTLE - **1000 RPM**
3 MIXTURE - **IDLE / CUT OFF**
4 MAGNETOS - **OFF**
5 ALL LIGHTS - **OFF**
6 MASTER SWITCH - OFF
7 HOBBS / TACH - **RECORD**
8 SEATBELTS - **SECURE AROUND WHEEL**

NOTE: REMOVE ALL TRASH & PERSONAL ITEMS. SECURE CHAINS. INSTALL AIRCRAFT COVER.

COMMERCIAL MANEUVERS

Maneuver	Initial Power Inches	RPM	Gear MPH	Flaps MPH
Mixture / Prop	Final Power			
Steep Turns	**20"**	2400		
Trim, 2 turns @ 50 deg.	**23"-24"**			
Slow flight	**15"**	2400	150	125
65-70 MPH, maint alt.				
Leave Alone	**18-20" @ 75MPH**			
Power-**Off** Stall	**15"**		150	125
idle glide@80, nose to Vy				
Leave Alone	**idle @ 80MPH**			
Power-**On** Stall	**15"**		150	
nose up to 2x Vy, stall				
fwd@80MPH	**full @ 80MPH**			

Speeds in MPH	GEAR	UP	DOWN
	Vx	96	85
	Vy	100	95
	Vg	105	
	Va	134-105 Maneuvering	
	Vle		150

COMMERCIAL MANEUVERS

STALL RECOVERY

Pitch Down, Power up (Prop/Thr FWD)**, Pitch Up**

Clean up: Flaps 25 / Positive Rate / Gear up
Flaps 10 / Positive Rate / Flaps up

Climb up: 100 MPH

STEEP SPIRAL

Select suitable gnd ref

Alt: +5000' AGL (3 turns @ 1000'). Exit 1500' AGL

Drop: Gear UP.

Chop: Power smoothly to idle.

Prop: Full back. (reduces stress on engine.)

- Enter on downwind, 110 MPH. 45^{o} bank, 3 Turns

CHANDELLE

Select suitable gnd ref

Alt: +1500' AGL. **Mix**: Reach below 3000'

Begin: Same airspeed, 20" @ 2400 rpm, 130 mph

1st 90^{o}: 30^{o} Bank. Prop/Throttle Fwd. Slowly increase pitch to 15^{o} at 90^{o} point and 100 mph

2nd 90^{o}: 15^{o} Constant pitch. Reduce Bank.

LAZY 8s

Select suitable gnd ref

Alt: +1500' AGL. **Power**: 20" @2400rpm, 130mph

Two climb & descending 180^{o} turns, one each dir.

Aprox 500' alt gain, 30-45^{o} bank at 90^{o} point

8s on Pylons

Select suitable gnd ref

P-Alt: 900'-1000'AGL. **Power**: 18"-20"@2400 RPM

Enter downwind, max bank 30^{o} to 40^{o}

OPERATING NOTES

TAKEOFF

Normal: **Vr 75 MPH Then Vy**

Soft: **Flaps 25, Nose up, Vx, G/E, 80 MPH**

Short: **Flaps 25, Vr 60, 80-85 MPH to obstacle**

CLIMB

To 1000' AGL, F/T 100 MPH

After 2500 RPM/25", Fuel Pmp Off, 110-120 MPH

CRUISE

65% POWER AT 2400 RPM

2000' = 22.5" / 4000' = 22.0"

6000' = 21.5" / 8000' = 21"

PATTERN

DOWNWIND: 2400RPM, 18", F/PUMP ON, HOLD ALT

NUMBERS: G/D, 3 GREEN, 13", FLAPS 15, 105MPH

BASE: FLAPS 25, 90 MPH

FINAL: FULL FLAPS, PROP FWD, 85 MPH

LANDING

Normal: Full Flaps, Prop High, Ease power on flare

Short: Full Flaps, App @ 75mph. Idle before abv flare
Brake heavily.

Soft: Full Flaps, carry power into flare, land on mains
Nose down Easy

180° : Abeam t/d point, idle & prop back, pitch level,
Gear down, 90 MPH

OPERATING NOTES

GO AROUND **Power up (mix/prop/throttle)**
Flaps 25, pitch for Vy, pos rate
Gear, Flap, Flap.

PRACTICE GEAR EXTEND

Speed: below 95 MPH. Pull Gear Pump Breaker.
Landing gear handle down. Check bulbs, panel lights, master, breakers. Emergency gear extend lever down, fishtail, check for three greens. Reset emergency gear extend lever, reset breaker, cycle gear.

EMERGENCIES

LIGHTGUN SIGNALS

Color / Type	On the Ground	In the Air
	Clear for take off.	Clear to land.
	Clear to taxi.	Return for landing (Followed by sty green)
	Stop.	Continue circling. Give way to other A/C.
	Taxi / Clear the runway.	Airport unsafe. Do not land.
	Return to starting point.	N/A.
	Exercise extreme caution.	Exercise extreme caution.

ENGINE POWER LOSS ON TAKE OFF

1) If sufficient runway remains for a normal landing, leave gear level up and land straight ahead

2) If the area is rough or need to clear obstructions, Gear UP and select the latch of the autoextender in Override.

3) If you have enough altitude to attempt a restart:
   - A) MAINTAIN SAFE AIRSPEED - **BEST GLIDE 110 MPH**
   - B) FUEL SELECTOR - **SWITCH TANKS WITH FUEL**
   - C) ELECTRICAL FUEL PUMP - **ON**
   - D) MIXTURE - **RICH**
   - E) ALTERNATE AIR - **ON**
   - F) EMERGENCY GEAR LEVER - **AS REQUIRED**

NOTE

Landing gear will extend automatically when IAS < 105 MPH. Glide distance with gear extended is roughly halved. If conditions dictate, the gear can stay up by latching the lever in the override up position.

NOTE

If engine failure was caused by fuel exhaustion, power will not be regained after tanks are switched until empty fuel lines are filled, which might take up to 10 seconds.

If power is not regained, proceed with the *POWER OFF LANDING* procedure

ENGINE POWER LOSS ON IN FLIGHT

If it occurs at low altitude, prepare for **POWER OFF LANDING.**

Lever override, Gear and Flaps up, 110 MPH

A) FUEL SELECTOR - **SWITCH TANKS WITH FUEL**

B) ELECTRICAL FUEL PUMP - **ON**

C) MIXTURE - **RICH**

D) ALTERNATE AIR - **ON**

E) Engine Gauges - Check for cause.

F) If no fuel pressure, check tank selector

When power is restored Alternate Air - **Off**

Electrical Fuel Pump - **Off**

If no power is restored, prepare for Emergeny Landing. If time permits:

A) Ignition Switch - "L" then "R" then back to "BOTH"

B) Throttle and Mixture - Different settings

C) Try another fuel tank

NOTE

If engine failure was caused by fuel exhaustion, power will not be regained after tanks are switched until empty fuel lines are filled, which might take up to 10 seconds.

If power is not regained, execute *POWER OFF LANDING*

PROPELLER OVERSPEED

Caused by a malfunction in the prop governor, or low oil pressure, which allows the propeller blades to rotate to full low pitch. If this should occur, proceed as follows:

A) THROTTLE - **RETARD**

B) OIL PRESSURE - **CHECK**

C) PROPELLER - **FULL DECREASE RPM THEN SET IF AVAIL**

D) REDUCE AIRSPEED

E) THROTTLE - **AS REQUIRED BELOW 2700 RPM**

OPEN DOOR

An open door will not affect normal flight characteristics, normal landing can be made. A slip to the right will assist with procedure.

1) IAS - **100MPH**
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 further open and then close rapidly. Latch top latch.

LOSS OF OIL PRESSURE

- Loss of oil pressure may be either partial or complete. A partial Loss of oil pressure usually indicates malfunction in the oil pressure regulating system, and a landing should be made ASAP
- A complete loss of oil press. Indication may signify oil exhaustion or faulty gauge. Proceed towards the nearest airport, prepare for a forced landing. If the problem is not a pressure gauge malfunction, the engine may stop suddenly. Maintain altitude until then as a dead stick landing can be accomplished. Don't change power settings unnecessarily, as this may hasten complete power loss.
-Depending on the circumstances, it may be advisable to make an off airport landing while power is still avail, moreover if other indications of actual oil pressure loss, such as sudden increase in temperatures, or oil smoke, are apparent, and an airport is not close.

If engine stops, proceed to **POWER OFF LANDING**.

LOSS OF FUEL PRESSURE

1) Electric Boost Pump - **On**
2) Mixture Control - **Forward**
3) Fuel Selector - **Check on full tank.**

If problem is not an empty fuel tank,
land as soon as practicable

POWER OFF LANDING

Best glide **(IAS 105 MPH)**. It will travel approx **1.6 NM/1000FT**
Check nearest airport or suitable field. squawk **7700**
Spiral over landing spot, try to be 1000' on downwind. Reduce **IAS to 90 MPH**. If field is excessively soft or short, or landing in water, do a gear-up landing. Otherwise, select **GEAR DOWN**

GEAR DOWN LANDING

A) Gear Lever Position - **Down**
B) Gear selector switch - **Down**

GEAR UP LANDING

A) Gear Lever Position - **Override**
B) Gear selector switch - **Up**

C) Close throttle and shut off master / ignition switches
D) Flaps as desired
E) Fuel Selector - Off
F) Mixture - Idle cut0off
G) Tighten seat belts and shoulder harness.
H) Door unlatched
I) **TOUCH DOWN NORMAL AT LOWEST POSSIBLE SPEED**

NOTE

With the master switch off, landing gear cannot be retracted

FIRE - Identify Source Immediately

1) Cabin Heater and Defroster - **OFF**

ELECTRICAL FIRE - (Smoke in cabin)

2) Master Switch - **OFF**
3) Vents - **OPEN**
4) Cabin Heat - **OFF**
5) Land as soon as practicable

ENGINE FIRE IN FLIGHT

2) Fuel Selector - **OFF**
3) Throttle - **CLOSE**
4) Mixture - **IDLE CUT OFF**
5) AIS - **INCREASE**
6) If terrain permits - **LAND IMMEDIATELY**

ENGINE FIRE ON THE GROUND

A) ENGINE NOT STARTED

1) Mixture - **IDLE CUT OFF**
2) Throttle - **OPEN**
3) Turn engine with starter

B) ENGINE RUNNING

1) Continue to try pull fire into the engine

IF FIRE CONTINUES AFTER A FEW SECONDS

1) Extinguish by external means.
2) Fuel Selector - **OFF**
3) Mixture - **IDLE CUT OFF**

EMERGENCY LANDING GEAR EXTENSION

A) Master Switch - **Check On**
B) Circuit Breakers - **Check**
C) Panel Lights - **Off (in daytime)**
D) Gear Indicator Bulbs - **Check**

IF LANDING GEAR DOESN'T CHECK DOWN AND LOCKED

E) Reduce < **100 MPH**
F) Gear Selector Switch - **Down**
G) Gear Lever Position - **Override**

IF GEAR STILL FAILS TO LOCK DOWN

H) Move and hold emergency gear lever down to Emergency Down Position.
I) If gear still fails, yaw the aircraft abruptly from side to side with the rudder.

NOTE : If all electrical power is lost. Use procedure above.
NOTE : For training, use PRACTICE GEAR EXTEND procedure

SPINS - Intentional spins are prohibited

1) THROTTLE - **IDDLE.**
2) RUDDER - **FULL OPPOSITE TO DIRECTION OF ROTATION.**
3) CONTROL WHEEL - **FULL FORWARD**
4) RUDDER - **NEUTRAL (WHEN ROTATION STOPS).**
5) CONTROL WHEEL - **AS REQUIRED TO SMOOTHLY REGAIN LEVEL FLIGHT ATTITUDE.**

NOTE: The landing will extend in this flight condition, but will retract during recovery, it has no adverse effect on spin characteristics

HIGH OIL TEMPERATURE

HIGH ← **OIL PRESSURE** → LOW

Land as soon as practical at an airport

An engine failure might be eminent.
Prepare for **Power Off Landing**.

ALTERNATOR FAILURE

1) Actuate an electrically power device (i.e. **Landing Light**)

If so,

2) Reduce electrical Load
3) Alternator Circuit Breakers - **CHECK**
4) "Alt" Switch - **OFF** (for 1 second), then **ON.**

If ammeter still indicates "0", or alternator will not stay reset

5) Maintain minimum electrical load
6) Land as soon as practical

NOTE: If battery is fully discharged, use **"EMERGENCY LANDING GEAR EXTENSION"** to lower landing gear. Position lights will not operate.

Clearing turns, landing spot, radio calls, heading

SLOW FLIGHT	
Manifold Pressure	**20”**
RPM	**2400**
IAS	**~131**
Manifold Pressure	**15”**
Gear	**Down**
IAS	**120**
Flaps	**10**
IAS	**100**
Flaps	**25**
IAS	**85**
Flaps	**40**
IAS	**74**
Manifold Pressure	**20”-22”**
RECOVERY	
Lower nose - IAS	**80**
Flaps	**25**
Positive Rate / Gear	**Up**
IAS	**90**
Flaps	**10**
IAS	**100**
Flaps	**0**
Resume navigation	

Clearing turns, landing spot, radio calls, heading

POWER OFF STALLS (GUMPS)	
Manifold Pressure	**20”**
RPM	**FWD**
IAS	**~131**
Manifold Pressure	**15”**
Gear	**Down**
IAS	**120**
Flaps	**10**
IAS	**100**
Flaps	**25**
IAS	**85**
Flaps	**40**
IAS	**74**
Manifold Pressure	**IDLE. SIM LDG**
RECOVERY	
Lower nose - IAS	**+70**
Manifold Pressure	**Full Fwd**
Flaps	**25^{o}**
Positive Rate / Gear	**Up**
IAS	**90**
Flaps	**10^{o}**
IAS	**100**
Flaps	**0^{o}**
Resume navigation and cruise power setting	

Clearing turns, landing spot, radio calls, heading

POWER ON STALLS	
Manifold Pressure	**20”**
RPM	**2400**
IAS	**~131**
Manifold Pressure	**15”**
Gear	**UP**
IAS	**80**
Flaps	**0**
RPM	**2500 or Fwd**
Manifold Pressure	**25” or Full**
Pitch	**+15^{o}**
RECOVERY	
Lower nose - IAS	**80**
Manifold Pressure	**25”**
RPM	**2500**
Altitude	**Assigned**
Manifold Pressure	**20”-24”**
RPM	**2400**
Resume navigation	

Clearing turns, landing spot, radio calls, heading

STEEP TURNS	
Manifold Pressure	**20”**
RPM	**2400**
IAS	**~131**
1 second Bank	**30 º**
2 sec Manifold Pres	**23” – 24”**
3 sec	**Pull**
Bank	**45º** (50 CSEL)
RECOVERY	
Degrees from entry	**30 º**
Manifold Pressure	**20”**
Heading	**Entry**
Resume navigation	

SHORT FIELD

TAKE OFF	
Flaps	**25°**
Rwy Use	**Max possible**
Toe Breaks	**Hold**
Power	**Full**
Toe Breaks	**Release**
VR	**75 MPH**
Positive Rate	**Gear up**
Vx @ 25° Flap	**85 MPH**
Altitude	**100' AGL**
IAS	**90 MPH**
Flaps	**10°**
Altitude	**200' AGL**
Flaps	**0°**
IAS	**VY: 100 MPH**
LANDING	
Flaps	**40°**
VREF	**75 MPH**
POWER	**IDLE 150' BEFORE TD**
BREAKS	**SIM MAX BREAK**
FLAPS	**0°**

SOFT FIELD

TAKE OFF	
Flaps	**25°**
Nose	**UP**
Power	**Full**
Altitude	**10’ AGL (Ground effect)**
IAS	**75 MPH**
Positive Rate	**Gear up**
Vx @ 25° Flap	**85 MPH**
Altitude	**100' AGL**
IAS	**90 MPH**
Flaps	**10°**
Altitude	**200' AGL**
Flaps	**0°**
IAS	**Vy: 100 MPH**
LANDING	
Flaps	**40°**
VREF	**85 MPH**
POWER	**CARRY INTO FLARE**
	LAND ON MAINS
Nose	**UP**
Breaks	**Minimal**
Power	**As necessary**
Nose	**Down Easy**