SimCoders.com

Reality Expansion Pack for X-Plane

Piper PA-31 Navajo

Checklists & References

Before Starting Engines

1. Preflight inspection ..... COMPLETED
2. Cabin doors ..... SECURE
3. Passengers briefing ..... COMPLETED
4. Seats ..... ADJUSTED
5. Belts and harness ..... SECURE
6. Parking brake ..... ON
7. Controls ..... CHECKED
8. Fuel selectors ..... INBOARD
9. Fuel crossfeed ..... OFF
10. Fuel fire wall shutoff ..... ON
11. Alternate air ..... OFF
12. Circuit breakers ..... CHECKED
13. Electrical switches ..... OFF
14. Alternator CB switches ..... ON
15. Avionics switches ..... OFF
16. Alternate static souce ..... OFF
17. Mixtures ..... IDLE CUT-OFF
18. Master switch ..... ON
19. Cowl flap ..... OPEN
20. Gear lights ..... 3 GREEN
21. Annunciator panel ..... TEST
22. Alternator inop lights ..... ON

Before Starting Engines (continued)

1. Pneumatic source malf. lights ..... ON
2. Door ajar lights ..... OUT
3. Fuel flow lights ..... CHECKED
4. Fuel Boost Pumps ..... OFF
5. AP/FD Switch ..... OFF
6. Seat belts/No smoking sign ..... ON

ENGINE START (NORMAL)

1. Master Switch ..... ON
2. Anti-collision lights ..... ON
3. Throttle ..... OPEN 1/2 INCH
4. Prop control ..... FORWARD
5. Mag switches ..... ON
6. Mixture ..... RICH
7. Fuel Boost Pump ..... ON TILL 6 GPH, THEN OFF
8. Mixture ..... IDLE CUT-OFF
9. Prop ..... CLEAR
10. Starter ..... ENGANGE
11. Mixture ..... ADVANCE (when eng. starts)
12. Throttle 1000RPM
13. Oil and fuel pressure ..... CHECK
14. Alternator Inop Light ..... OUT
15. Pneumatic Malf. Light ..... OUT
16. Start Procedure ..... REPEAT FOR SECOND ENGINE

ENGINE START (HOT)

1. Master Switch ..... ON
2. Anti-collision lights ..... ON
3. Throttle ..... OPEN 1/2 INCH
4. Prop control ..... FORWARD
5. Mag switches ..... ON
6. Emergency Fuel Pump ..... ON (do not prime)
7. Prop ..... CLEAR
8. Starter ..... ENGANGE
9. Mixture ..... ADVANCE (when eng. starts)
10. Throttle 1000RPM
11. Oil and fuel pressure ..... CHECK
12. Alternator Inop Light ..... OUT
13. Pneumatic Malf. Light ..... OUT
14. Emergency Fuel Pump ..... OFF after approx 3 min.
15. Start Procedure ..... REPEAT FOR SECOND ENGINE

ENGINE START (FLOODED)

1. Master Switch ..... ON
2. Anti-collision lights ..... ON
3. Mixture ..... IDLE CUT-OFF
4. Mag Switches ..... ON
5. Throttle ..... FULL OPEN
6. Prop ..... CLEAR
7. Starter ..... ENGAGED
8. Mixture ..... ADVANCE (when eng. starts)
9. Throttle 1000RPM
10. Oil and fuel pressure ..... CHECK
11. Alternator Inop Light ..... OUT
12. Pneumatic Malf. Light ..... OUT
13. Emergency Fuel Pump ..... OFF after approx 3 min.
14. Start Procedure ..... REPEAT FOR SECOND ENGINE

BEFORE TAXIING

1. Avionics Switches ..... ON
2. Gyros & Altimeters ..... SET
3. Electric Trim ..... ON and CHECK
4. Autopilot ..... CHECK OFF
5. Fuel Valves ..... ALL POSITIONS CHECK
6. Radios ..... SET
7. Parking brake ..... RELEASE

TAXIING

1. Brakes ..... CHECKED
2. Flight Instruments ..... CHECKED

ENGINE RUNUP

1. Parking Brake ..... ON
2. Mixtures ..... RICH
3. Prop Control ..... FORWARD
4. Cowl Flaps ..... OPEN
5. Engine Instruments ..... CHECK
6. Throttles 1500RPM
7. Prop Controls ..... FEATHER CHECK
8. Vacuum ..... CHECK
9. Alternator ..... CHECK
10. Alternator Inop. Lights ..... CHECK
11. Annunciator Panel Lights ..... CHECK
12. Throttles 2300RPM
13. Magnetos ..... CHECK
14. Prop Controls ..... EXERCISE
15. Throttles ..... IDLE THEN 1000 RPM

BEFORE TAKEOFF

1. Fuel Selectors ..... INBOARD
2. Fuel Quantity ..... CHECK
3. Mixtures and Props ..... FORWARD
4. Flaps ..... 0° (Normal T/O) - 15° (Short T/O)
5. Autopilot ..... OFF
6. Trim ..... SET
7. Surface Deice ..... OFF
8. Pitot and Prop Heat ..... AS REQ.
9. Windshield Heat ..... AS REQ.
10. Avionics ..... SET
11. Direction Indicator ..... SET
12. Radar ..... AS REQ.
13. Controls ..... CHECKED
14. Fuel Boost Pumps ..... ON
15. Landing lights ..... ON
16. Anti collision lights ..... ON
17. Transponder ..... ALT
18. Parking Brake ..... RELEASE

NORMAL TAKEOFF

1. Brakes ..... APPLY AND HOLD
2. Throttles ..... FULL FORWARD
3. Manifold Pressure ..... CHECKED
4. Prop Speed ..... 2575 RPM
5. Brakes ..... RELEASE
6. Rotate ..... 83 KIAS min.
7. Gear ..... UP
8. Accelerate to ..... 89 KIAS

SHORT FIELD TAKEOFF

1. Brakes ..... APPLY AND HOLD
2. Throttles ..... FULL FORWARD
3. Manifold Pressure ..... CHECKED
4. Prop Speed 2575RPM
5. Brakes ..... RELEASE
6. Rotate ..... 76KIAS min.
7. Accelerate to ..... 91 KIAS
8. Gear ..... UP
9. Flaps ..... UP
10. Accelerate to ..... 94 KIAS

CLIMB

1. Power ..... 39.5 2400 RPM Max
2. Mixture ..... LEAN AS REQUIRED
3. Cowl Flaps ..... AS REQUIRED
4. Fuel Boost Pumps ..... OFF

CRUISE

1. Fuel Boost Pumps ..... AS REQUIRED
2. Fuel Selectors ..... AS REQUIRED
3. Power ..... SET
4. Cowl Flaps ..... AS REQUIRED
5. Mixture ..... LEAN AS REQUIRED

DESCENT

1. Mixtures ..... SET
2. Fuel Selectors ..... INBOARD
3. Power ..... SET
4. Cowl Flaps ..... AS REQUIRED
5. Pitot and Windshield Heater ..... AS REQUIRED

BEFORE LANDING

1. Fuel Boost Pumps ..... ON
2. Mixtures ..... RICH
3. Prop Controls 2400RPM
4. Gear (below 156KIAS) ..... DOWN
5. Gear Lights ..... 3 GREEN
6. Gear Mirror ..... CHECKED
7. Brake Pressure ..... CHECKED
8. Autopilot ..... OFF
9. Flaps ..... AS REQUIRED
10. Landing Lights ..... AS REQUIRED
11. Radar ..... OFF

BALKED LANDING

1. Props ..... FULL FORWARD
2. Power ..... AS REQUIRED
3. Flaps ..... 15°
4. Gear ..... UP
5. Flaps ..... UP
6. Airspeed ..... 94 KIAS min.

AFTER LANDING

1. Cowl Flaps ..... OPEN
2. Flaps ..... UP
3. Fuel Boost Pumps ..... OFF
4. Prop Controls ..... FULL FORWARD
5. Anti collision lights ..... OFF
6. Landing lights ..... OFF
7. Transponder ..... Standby

SHUTDOWN

1. Parking Brake ..... ON
2. Avionics ..... OFF
3. AP/FD ..... OFF
4. Throttles ..... IDLE
5. Mag Grounding ..... CHECK
6. Throttles ..... 1000 RPM
7. Mixtures ..... IDLE CUT-OFF
8. Mags ..... OFF
9. Master Switch ..... OFF

SPEEDS

1. Vxse ..... 90 KIAS
2. Vyse ..... 94 KIAS
3. Va ..... 159 KIAS
4. Vne ..... 236 KIAS

ENGINE SECURING (FEATHERING)

1. Throttle ..... CLOSE
2. Propeller ..... Feather
3. Mixture ..... IDLE CUT-OFF
4. Cowl Flaps ..... CLOSE
5. Mags ..... OFF
6. Emergency Fuel Pump ..... OFF
7. Fuel Selector ..... OFF
8. Alternator ..... OFF
9. Electrical Load ..... REDUCE
10. Crossfeed ..... AS REQUIRED

ENGINE FAILURE DURING T/O (<83 KIAS)

If sufficient runway remains for a safe stop:

1. Throttles ..... CLOSE
2. Brakes ..... APPLY
3. Stop ..... STRAIGHT AHEAD

If insufficient runway remains for a safe stop:

4. Throttles ..... CLOSE
5. Brakes ..... AS REQUIRED
6. Mixtures ..... IDLE CUT-OFF
7. Master Switch ..... OFF
8. Fuel Selector ..... OFF
9. Magnetos Switches ..... OFF
10. Brakes ..... AS REQUIRED

ENGINE FAILURE DURING T/O (>= 83 KIAS)

1. Directional Control ..... MAINTAIN
2. Power (oper. engine) ..... MAX CONTINUOUS
3. Prop (inop. engine) ..... FEATHER
4. Gear ..... UP
5. Bank ..... 5° INTO OP. ENGINE
6. Airspeed ..... ACCELERATE TO 89 KIAS
7. Cowl Flaps (Inop. Engine) ..... CLOSE
8. Airspeed ..... 94 KIAS (after clear. obst.)
9. Engine Securing Proc. ..... COMPLETE
10. Trim ..... AS REQUIRED

ENGINE FAILURE DURING CLIMB

1. Airspeed ..... 94 KIAS
2. Directional Control ..... MAINTAIN
3. Inop. Engine ..... IDENTIFY & VERIFY
4. Inop. Engine ..... COMPLETE SECURE PROC.

ENGINE FAILURE DURING FLIGHT

1. Inop. Engine ..... IDENTIFY & VERIFY
2. Operative Engine ..... ADJUST AS REQUIRED
3. Airspeed ..... >= 94 KIAS
4. Fuel Flow (Inop. Engine) ..... CHECK
5. Fuel Quantity (Inop. Engine) ..... CHECK
6. Fuel Selector (Inop. Engine) ..... SWITCH
7. Oil Pressure (Inop. Engine) ..... CHECK
8. Magnetos Switches (Inop. Engine) ..... CHECK
9. Air Start (Inop. Engine) ..... ATTEMPT

If engine does not start:

10. Inop. Engine ..... COMPLETE SECURE PROC.
11. Power (Op. Engine) ..... AS REQUIRED
12. Mixture (Op. Engine) ..... FULL RICH
13. Fuel Quantity (Op. Engine) ..... CHECK
14. Emergency Fuel Pump (Op. Engine) ..... AS REQUIRED
15. Cowl Flaps (Op. Engine) ..... AS REQUIRED
16. Trim ..... ADJUST
17. Land ..... AS SOON AS POSSIBLE

ENGINE OVERHEAT

1. Cowl Flaps ..... OPEN
2. Mixture ..... RICHEN
3. Power ..... REDUCE
4. Airpseed ..... INCREASE (if possible)

GEAR UP LANDING

1. Normal Landing Checklist ..... COMPLETE
2. Gear Selector ..... UP
3. Autopilot ..... OFF
4. Master Switch (Daytime) ..... OFF
5. Normal Approach ..... COMPLETE
6. Master Switch (Daytime) ..... OFF

When landing is assured:

7. Mixtures ..... IDLE CUT-OFF
8. Prop Controls ..... FEATHER
9. Firewall Shutoffs ..... OFF
10. Master Switch (Night) ..... OFF

REFERENCE SPEEDS

1. Vs0	70 KIAS
2. Vs1	68 KIAS
3. Vmca	76 KIAS
4. Vref	91 KIAS
5. Vapp	100 KIAS
6. Vle	156 KIAS
7. Vlo (Retract)	129 KIAS
8. Vlo (Extend)	156 KIAS
9. Vxse	90 KIAS
10. Vyse	94 KIAS
11. Va	159 KIAS
12. Vne	236 KIAS
13. Max demonstrated crosswind	20 KIAS

	Pressure Altitude Feet	OAT °C	Fuel Flow GPH Total B.P/B.E.	Cruise True Airspeed - Kts. 6500 Lbs. Best Power	6500 Lbs. Best Economy	6000 Lbs. Best Power	6000 Lbs. Best Economy	5500 Lbs. Best Power	5500 Lbs. Best Economy
ISA +20°C	SL	35.0	38.6/32.6	179	176	181	178	183	180
	5000	25.1	38.6/32.6	187	184	189	190	191	182
	10000	15.2	38.6/32.6	195	191	197	193	199	195
	15000	5.3	38.6/32.6	203	199	205	201	209	203
ISA	SL	15.0	38.6/32.6	175	172	177	174	179	176
	5000	5.1	38.6/32.6	183	180	185	182	187	184
	10000	-4.8	38.6/32.6	191	187	193	189	195	191
	15000	-14.7	38.6/32.6	199	195	201	197	203	199
	20000	-24.6	38.6/32.6	209	205	211	207	213	208
ISA -20°C	SL	-5.0	38.6/32.6	171	168	173	171	175	172
	5000	-14.9	38.6/32.6	179	176	181	178	183	180
	10000	-24.8	38.6/32.6	187	182	189	185	190	197
	15000	-34.7	38.6/32.6	195	191	197	192	198	198
	20000	-44.6	38.6/32.6	205	201	207	203	209	205

UISE PERFORMANCE - 230 BHP - 2400 RPM (Approx. 75%)
Figure 5-30

CRUISE PERFORMANCE - 200 BHP - 2300 RPM (Approx. 65%)
Figure 5-31

	Pressure Altitude Feet	OAT °C	Fuel Flow GPH Total B.P./B.E.	Cruise True Airspeed - Kts. 6500 Lbs. Best Power	6500 Lbs. Best Economy	6000 Lbs. Best Power	6000 Lbs. Best Economy	5500 Lbs. Best Power	5500 Lbs. Best Economy
ISA +20°C	SL	35.0	35.2/28.2	168	165	170	167	172	169
	5000	25.1	35.2/28.2	175	163	177	174	180	176
	10000	15.2	35.2/28.2	182	179	185	181	188	183
	15000	5.3	35.2/28.2	190	186	193	187	196	190
	20000	-4.6	35.2/28.2	198	193	201	196	204	199
ISA	SL	15.0	35.2/28.2	164	161	166	163	168	165
	5000	5.1	35.2/28.2	171	168	173	170	176	172
	10000	-4.8	35.2/28.2	178	175	181	177	184	179
	15000	-14.7	35.2/28.2	186	182	189	184	192	186
	20000	-24.6	35.2/28.2	194	189	197	192	200	195
ISA -20°C	SL	-5.0	35.2/28.2	160	157	162	159	164	161
	5000	-14.9	35.2/28.2	167	164	169	166	172	168
	10000	-24.8	35.2/28.2	174	171	177	173	180	175
	15000	-34.7	35.2/28.2	182	178	185	180	188	182
	20000	-44.6	35.2/28.2	190	185	193	188	196	191

	Pressure Altitude Feet	OAT °C	Fuel Flow GPH Total B.P/B.E.	Cruise True Airspeed - Kts. 6500 Lbs. Best Power	6500 Lbs. Best Economy	6000 Lbs. Best Power	6000 Lbs. Best Economy	5500 Lbs. Best Power	5500 Lbs. Best Economy
ISA +20°C	SL	35.0	29.0/24.2	156	152	160	155	163	158
	5000	25.1	29.0/24.2	162	158	166	162	170	165
	10000	15.2	29.0/24.2	169	164	173	168	177	172
	15000	5.3	29.0/24.2	175	171	179	175	183	177
ISA	SL	15.0	29.0/24.2	152	148	156	151	159	154
	5000	5.1	29.0/24.2	158	154	162	158	166	161
	10000	-4.8	29.0/24.2	165	160	169	164	173	168
	15000	-14.7	29.0/24.2	171	167	175	171	179	174
	20000	-24.6	29.0/24.2	177	173	181	177	186	180
ISA -20°C	SL	-5.0	29.0/24.2	148	144	152	147	155	150
	5000	-14.9	29.0/24.2	154	150	158	154	162	157
	10000	-24.8	29.0/24.2	161	156	165	160	169	164
	15000	-34.7	29.0/24.2	167	163	171	167	175	170
	20000	-44.6	29.0/24.2	173	169	177	173	182	176

UISE PERFORMANCE - 170 BHP - 2200 RPM (Approx. 55%)
Figure 5-32

	Pressure Altitude Feet	OAT °C	Fuel Flow GPH Total B.P/B.E.	Cruise True Airspeed - Kts. 6500 Lbs. Best Power	6500 Lbs. Best Economy	6000 Lbs. Best Power	6000 Lbs. Best Economy	5500 Lbs. Best Power	5500 Lbs. Best Economy
ISA +20°C	SL	35.0	25.2/20.1	142	138	146	142	149	145
	5000	25.1	25.2/20.1	146	142	150	146	154	150
	10000	15.2	25.2/20.1	150	146	154	150	159	154
	15000	5.3	25.2/20.1	154	150	159	154	164	159
ISA	SL	15.0	25.2/20.1	138	134	142	138	145	141
	5000	5.1	25.2/20.1	142	138	146	142	150	146
	10000	-4.8	25.2/20.1	146	142	150	146	155	150
	15000	-14.7	25.2/20.1	150	146	155	150	160	155
ISA -20°C	SL	-5.0	25.2/20.1	134	130	138	134	141	137
	5000	-14.9	25.2/20.1	138	134	142	138	146	142
	10000	-24.8	25.2/20.1	142	138	146	142	151	146
	15000	-34.7	25.2/20.1	146	150	151	146	156	151

CRUISE PERFORMANCE - 140 BHP - 2200 RPM (Approx. 45%)
Figure 5-33

POWER SETTING TABLE
Figure 5-35

Press. Alt. Feet	Std Alt. Temp. °F	Approx. 140 BHP (45%) RPM			Approx. 170 BHP (55%) RPM			Approx. 200 BHP (65%) RPM			Approx. 230 BHP (75%) RPM			Press Alt. Feet
		2200	2300	2400	2200	2300	2400	2200	2300	2400	2300	2400	2500	
SL.	59	27.7	25.0	23.9	30.0	28.5	27.3	32.1	31.3	30.5	35.5	34.1	32.7	SL.
2,000	52	25.8	23.2	22.0	28.3	26.8	25.7	31.6	30.4	29.3	34.3	33.1	31.9	2,000
4,000	45	24.5	22.3	21.1	27.4	26.0	24.9	30.9	29.3	28.0	33.2	32.1	31.1	4,000
6,000	38	23.2	21.0	19.8	26.7	24.8	23.7	30.4	28.8	27.6	32.8	31.6	30.5	6,000
8,000	31	22.4	20.2	19.1	26.2	24.4	23.3	30.2	28.7	27.4	32.8	31.5	30.3	8,000
10,000	23	22.6	20.3	19.2	26.2	24.4	23.2	30.3	28.6	27.2	33.1	31.6	30.3	10,000
12,000	16	22.9	20.4	19.3	26.4	24.7	23.2	30.8	28.9	27.3	33.3	31.8	30.4	12,000
14,000	9	24.4	20.5	19.4	26.7	24.9	23.3	31.2	29.2	27.5	33.6	32.0	30.6	14,000
16,000	2	—	—	—	27.2	25.1	23.4	31.9	29.6	27.6	34.2	32.4	30.9	16,000
18,000	-5	—	—	—	27.7	25.5	23.6	32.3	30.0	27.9	35.0	33.0	31.2	18,000
20,000	-12	—	—	—	28.3	26.3	24.3	33.1	30.6	28.4	F.T.	33.5	31.6	20,000

1. To maintain constant power, correct manifold pressure approximately 0.25" Hg for each 10°F variation in outside air temperature from standard altitude temperature. Add manifold pressure for air temperatures above standard; subtract for temperatures below standard.
2. Do not exceed 46" Hg up to 15,800 feet. Above 15,800 feet the following manifold limits must be observed:

Altitude	M.P.	Altitude	M.P.
18,000 Ft.	42.4"	24,000 Ft.	32.7"
20,000 Ft.	39.2"		
22,000 Ft.	36.0"		

3. Maximum Normal Operating Power 2400 RPM at 39.5 IN. HG. to 19,700 feet (permissible to lean to 1450° EGT or 28 GPH fuel flow, whichever occurs first, provided cylinder head temperatures (475°) and oil temperatures (245°) remain within limits). Above 19,700 feet maintain maximum allowable manifold pressure (turbine speed limit).

T: LK-1206
ISSUED: SEPTEMBER 18, 1979
REVISED: AUGUST 3, 1981