PA-38-112 “Tomahawk”

for X-Plane® 9.60

Alcalá Simulación

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Repainted textures may be delivered along with the aircraft package, but we recommend to deliver it as separate files.

Development Tools

All tools used to develop this aircraft package are freeware. A spacial thanks to all freeware tools developers for letting me have this powerful tools.

This aircraft was made and tested on Ubuntu Linux.

The Aircraft

History

The Tomahawk was Piper's attempt at creating an affordable two-place trainer. Before designing the aircraft, Piper widely surveyed flight instructors for their input into the design. Instructors requested a more spinnable aircraft for training purposes, since other two-place trainers such as the Cessna 150 or Cessna 152 were designed to spontaneously fly out of a spin. The Tomahawk's NASA GA(W)-1 Whitcomb airfoil addresses this requirement by requiring specific pilot input in recovering from spins, thus allowing pilots to develop proficiency in dealing with spin recovery. Another characteristic of the Piper Tomahawk that favors its suitability as a primary trainer is that the flight control forces mimic those of a much heavier aircraft. As a result, student pilots that learn to fly in a Tomahawk transition much more successfully to larger aircraft, hence the popularity of the Tomahawk with U.S. Air Force flying clubs.

The Tomahawk was introduced in 1977 as a 1978 model. The aircraft was in continuous production until 1982 when production was completed, with 2,484 aircraft built.

The 1981 and 1982 models were designated as the **Tomahawk II**. They incorporated improved cabin heating and windshield defroster performance, an improved elevator trim system, improved engine thrust vector, 100% airframe zirconium anti-corrosion treatment, better cockpit soundproofing, larger 6" wheels and tires for greater propeller ground clearance and improved performance on grass and dirt runways, among other enhancements.

Safety record

According to the Aircraft Owners and Pilot Association Air Safety Foundation, which published a *Safety Highlight* report on the Piper Tomahawk, the Piper Tomahawk has a one-third lower accident rate per flying hour than the comparable Cessna 150/152 series of two-place benchmark trainers. However, the Tomahawk has a higher rate of fatal spin accidents per flying hour. The NTSB estimated that the Tomahawk's stall/spin accident rate was three to five times that of the Cessna 150/152.

According to the NTSB the Tomahawk's wing design was modified after FAA certification tests, but was not retested. Changes included reducing the number of full wing ribs and cutting lightening holes in the main spar. The aircraft's engineers told the NTSB that the changes made to the design resulted in a wing that was soft and flexible, allowing its shape to become distorted and possibly causing unpredictable behavior in stalls and spins. The design engineers said that the GAW-1 airfoil required a rigid structure because it was especially sensitive to airfoil shape, and that use of a flexible surface with that airfoil would make the Tomahawk wing "a new and unknown commodity in stalls and spins."

Airworthness Directive 83-14-08 issued in September 1983 mandated an additional pair of Stall strips to be added to the inboard leading edge of the PA-38 wing to "standardize and improve the stall characteristics"

Because of its stall and spin characteristics, the PA-38 earned the nickname "Traumahawk" from some pilots and instructors.

Roles

Besides being a widely used primary trainer, it is also an effective budget cross-country aircraft for two persons with its spacious and comfortable cabin. Though it shares similar performance and costs of operation to the Cessna 152, the PA-38 has more shoulder room. It also has good cabin ventilation, using automotive-style air ducts. Common cruise speeds range from 90 to 110 knots (167 to 204 km/h).

Source: Wikkipedia. http://en.wikipedia.org/wiki/Piper_PA-38_Tomahawk

The Model

The aircraft modelled is a 1981's Piper Tomahawk. This aircraft is equipped with a Lycoming O-235-L2A (112 hp) engine, and Narco avionics.

Features of the model are:

- Complete exterior model designed in Blender, with animated parts (Control surfaces, Flaps, detailed Landing gear, nose gear steering, suspension, cabin doors, etc.)
- Four paint schemes and blank textures are Included in the package.
- 2D panel with custom instruments. All systems are emulated.
- Functional Circuit Braker Panel, in 2D panel and 3D cockpit
- Custom sounds.
- Animated 3D Pilots designed in Blender.
- Fully functional 3D cockpit, with manipulators-based technology, All systems are emulated,

X-Plane Version Compatibility

This package was developed and tested in X-Plane V9.60, and I can't guarantee compatibility in older X-plane versions than this.

About Alcalá Simulación

Alcalá Simulación is my own and single person project, originally intended to development of freeware addons (sceneries and aircrafts) for Microsoft Flight Simulator.

In 2008, I bought a X-Plane V9, and, from this year, all developments are oriented to X-Plane.

Is important, for me, you know the following: I'm only a flight simulator enthusiast. I haven't contact with real flight word, and I never see, or flight this aircraft in real life. Although I tried to make it as real as possible based on photographs, technical data and information founded in the WWW. Unfortunately, I can't ensure or guarantee the exact similitude between this simulated model and the real aircraft. My apologies for any inconvenience this may cause.

Have good flights.

Adrián Fernández Gómez (awall86)
alcalá-sim@yahoo.com.ar
If you want to make a Paypal Donation please visit www.alcala-sim.blogspot.com

Technical Data

Specifications

Characteristics	
Seating (Crew+Pax)	1+1
Wing Loading	13,39 lb/sqr ft
Power Loading	14,9 lb/SHP

External dimensions	
Lenght	22 ft
Height	9 ft 1 in
Wing span	34 ft

Weights	
Empty Weight	1088 lb
Max. Takeoff	1670 lb
Max. Landing	1670 lb

Payload / Capacity	
Max. Payload	582 lb
Useful Load	402 lb
Max. Fuel Capacity	192 lb
(1 US gal = 6 lb/US gal)	32 US gal

Engine	
Manufacturer	Lycoming
Model	0-235
Output	112 hp
Recomended TBO	2400 hs
Propeller	Sensenich, Fixed Pitch, 72 In Dia.

Aircraft Performance

Performance	
Takeoff distance (Ground Roll)	820 ft
Takeoff distance (over 50 ft obstacle)	1,440 ft
Maximum demonstrated crosswind component	15 kt
Rate of climb at sea level	720 ft/min

Cruise Performance and Reference Speeds

Cruise Speed Endurance (fuel consumption)	
At 75% Power and 5000 ft	100 to 103 kt/4.4 Hs (35 pph 5,8 gph)

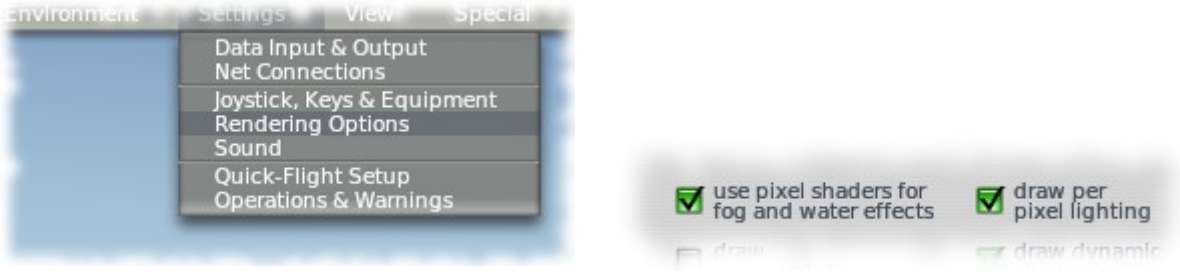
Reference Speeds (Vspeeds in Kias)	
Va (Maneuvering Speed)	103 kt.
Vfe (Max. Flap Extended)	89 kt.
Vr (Rotation Speed)	53 kt.
Vne (Never Exceed)	138 kt.
Vno (Max. Structural Cruise)	**110 kt.**
Vs (Stall Speed – Clear Configuration)	48 kt.
Vso (Stall Speed – Landing Configuration)	46 kt.
Vy (Best Rate of Climb)	61 kt.
Vx (Best Angle of Climb)	70 kt.

X-Plane Settings

Recommended X-Plane Settings

Pixel Shader Settings

In order to properly enjoy this plane you should make a series of adjustments in rendering options. To do this go to Settings and select Rendering Options. Make sure the checkbox labeled "draw per pixel lightning" is checked.



Settings for Texture resolution

If your video card supports it, is highly recommended that you select the option "extreme res! the texture resolution option.

Depending on the quality of your video card you can choose a higher or lower resolution textures. At higher-resolution textures, the better the quality of the textures that you can see, and the plane and its details will be more clearly.

Operation & Warnings

In order to make the complete engine and systems startup process, you should adjust the way the plane is loaded into the simulator. To do this, go to Settings and choose the option "Operation & Warnings" Make sure the checkbox labeled "Start each flight with engines running" is unchecked. It is also recommended that the checkbox labeled "Start each flight on ramp" is checked.

The 2D Panel

Left Main Panel

1 Clock
2 Airspeed Indicator
3 Horizontal Situation Indicator
4 Open Flap-Trim Subpanel icon
5 Open Engine Instruments Subpanel icon
6 Open Compass Subpanel icon
7 Suction
8 Alternator Failure Warning light
9 Barometric Altímeter
10 ADF Indicator
11 NARCO COM 120 TSO Com1
12 NARCO ADF 141 TSO ADF1
13 Turn Coordinator
14 ADI Indicator
15 Vertical Speed Indicator
16 NARCO NAV 122A NAV1
17 Garmin GNS 430 GPS System
18 Battery Switch
19 Alternator Switch
20 Starter
21 Electrical Fuel Pump Switch
22 Landing Light Switch
23 Anti Collision Light Switch
24 Pitot Heat Switch

25 Tachometer
26 Carb. Heater Handle
27 Throttle Lever
28 Left Fuel Tank Quantity Indicator
29 Right Fuel Tank Quantity Indicator
30 Fuel Tank Selector
31 Mixture Control Lever
32 Engine Primer Handle

Right Main Panel

33 NARCO AT155 TSO Transponder
34 Alternator Ampers Indicator
35 Fuel Pressure Indicator
36 Oil Temperature Indicator
37 Oil Pressure Indicator
38 Navigation and Panel Light Switch
39 Radio Light Dimmer
40 Starter Circuit Breaker
41 Alternator Field Circuit Breaker
42 Turn Coordinator Circuit Breaker
46 NAV1 Circuit Breaker
47 ADF1 Circuit Breaker
48 Audio Mixer Circuit Breaker
49 Transponder Circuit Breaker
50 Engine Gauges Circuit Breaker
51 Aural Stall Warning Circuit Breaker
52 Landing Light Circuit Breaker
53 Navigation Lights Circuit Breaker
54 Anti Collision Lights Circuit Breaker
55 Panel Lights Circuit Breaker

43 Pitot Heater Circuit Breaker
44 Warning Light Circuit Breaker (Not Implemented)
45 Com1 Radio Circuit Breaker
56 Electrical Fuel Pump Circuit Breaker
57 Alternator Output Circuit Breaker

Pop-Up Panels

Flaps and Elevator Trim Position Indicators

To open this panel click on 

To close the panel click on 

58 Flap Handle
59 Elevator Trim Position Indicator
60 Elevator Trim Actuator

Engine Instruments Subpanel

To open this panel click on E

To close the panel click on X

34 Alternator Ampers Indicator
35 Fuel Pressure Indicator
36 Oil Temperature Indicator
37 Oil Pressure Indicator
38 Navigation and Panel Light Switch
39 Radio Light Dimmer

Magnetic Compass Subpanel

To open this panel click on C

To close the panel click on X

61 Magnetic Compass

Technical Notes about 2D Panel

Some components are not in the real position, or are ignored, for design limitations.

All handle type controllers (Throttle Levers, Flaps, Cab Heater, etc) can be operated with the mouse.

The Ilumination Panel system uses X-Plane V9 features.

The 3D Cockpit

1 Clock
2 Airspeed Indicator
3 Horizontal Situation Indicator
4 Suction
5 Alternator Failure Warning light
6 Barometric Altímeter
7 ADF Indicator
8 NARCO COM 120 TSO Com1
9 NARCO ADF 141 TSO ADF1
10 Turn Coordinator
11 ADI Indicator
12 Vertical Speed Indicator
13 NARCO NAV 122A NAV1
14 Garmin GNS 430 GPS System
15 NARCO AT155 TSO Transponder
21 Electrical Fuel Pump Switch
22 Landing Light Switch
23 Anti Collision Light Switch
24 Pitot Heat Switch
25 Throttle Lever
26 Left Fuel Tank Quantity Indicator
27 Right Fuel Tank Quantity Indicator
28 Fuel Tank Selector
29 Mixture Control Lever
30 Engine Primer Handle
31 Alternator Ampers Indicator
32 Fuel Pressure Indicator
33 Oil Temperature Indicator
34 Oil Pressure Indicator
35 Navigation and Panel Light Switch

16 Tachometer
17 Carb. Heater Handle
18 Battery Switch
19 Alternator Switch
20 Starter
36 Radio Light Dimmer
37 Circuit Breaker Panel
38 Flap Handle
39 Elevator Trim Position Indicator
40 Elevator Trim Actuator

Especial Features

Doors

To open or close the doors, simply click on the handle. You can open Left and Right doors separately.

If any door are opened you can't start engine (There is no key to start it). If the engine is running you can't open doors. This is to prevent the doors can be openined in flight. The same feature is implemented in 2D Panel

Flaps

The flap lever is both lever and position indicator. You can see actual setting and set flaps position with the lever in 2D Panel and 3D cockpit.

Flaps 0º

Flaps 21º

Flaps 34º

3D Pilot and Copilot figures

Pilot and copilot figures have the head animated. You can see pilot and copilot "checking" flight instruments and environment in external view.

Pilot and copilot are visible only if you are in external view and you have cabin doors closed

Also the co-pilot is only visible if the actual payload of the plane is over 240 lbs, that is, if your "passenger" is aboard.

Aircraft with a Payload less than 240 Lbs

Aircraft with a Payload over 240 Lbs

Circuit Breakers

The circuit breaker panel allows you to reset any failure on systems controlled by them. If a fault occurs the circuit breaker panel that controls the system will come out to indicate that the corresponding circuit is inoperative. To reset the circuit breaker panel just hit the circuit in and the system will be operational again.

You can reset the circuit from the 2D panel or from the 3D cockpit.

Navigation Lights are Inoperative

Circuit Breaker in 2D Panel

Circuit Breaker in 3D Cockpit

Altimeter Enlarge

In order to make it easier to calibrate, you can enlarge the altimeter by clicking on the hotspot marked in the image.

You can close it again by clicking again in the red interactive area marked in the image below.

Show-Hide Yokes in 3D Cockpit

In 2D panel you can click on 

icon to show or hide Yokes in 3D cockpit. You can hide yokes to easily manage buttons as master Battery switch or Starter key.

To hide yokes click on right side of the icon, to show it again click on left side of the icon.

When yokes are hidden, the icon appear in orange 

When Yokes are visible the icon appears in grey 

Preflight Inspection Checklist

Preflight Inspection

Cockpit

1. Control Lock ..... REMOVE
2. Ignition ..... OFF
3. Master Switch .....ON
4. Fuel Gauges ..... CHECK
5. Alternator Warning Light ..... CHECK
6. Master Switch ..... OFF
7. Primary Flight Controls ..... CHECK
8. Flaps ..... CHECK
9. Static Drain ..... DRAINED
10. Windows .....CLEAN
11. Baggage ..... STOWED
12. Required Papers .....ON BOARD
13. Parking Brake .....ON

Left Wing

1. Surface Condition ..... CHECK
2. Flap and Hinges ..... CHECK
3. Aileron and hinges ..... CHECK
4. Wing Tip ..... CHECK
5. Lights ..... CHECK
6. Fuel Cap ..... OPEN
7. Fuel Quantity and Color ..... CHECK
8. Fuel Cap ..... CLOSE and SECURE
9. Fuel Vent ..... CHECK
10. Fuel Tank Sump ..... DRAIN
11. Pitot Head .....UNOBSTRUCTED
12. Stall Warning ..... CHECK
13. Landing Gear and Tire ..... CHECK
14. Brake Block and Disk ..... CHECK
15. Chock and Tie Down ..... REMOVED

Nose Section

1. Fuel Strainer ..... DRAIN
2. General Condition ..... CHECK
3. Prop and Spinner ..... CHECK
4. Air Inlets .....CLEAR
5. Engine Compartment ..... CHECK
6. Oil .....CHECK QUANTITY
7. Dipstick ..... PROPERLY SEATED
8. Alternator Belt ..... CHECK TENSION
9. Cowling ..... CLOSED and SECURE
10. Nose Gear Tire ..... CHECK
11. Nose Wheel Strut ..... Proper Inflation (3”)
12. Windshield .....CLEAN

Preflight Inspection

Right Wing
1. Check as Left Wing

Fuselage (Right Side)
1. General Condition ..... CHECK
2. Antennas ..... CHECK
3. Side and Rear Window ..... CHECK
4. Static Vents .....UNOBSTRUCTED

Empennage
1. General Condition ..... CHECK
2. Hinges and Attachments ..... CHECK
3. Tie Down ..... REMOVED

Fuselage (Right Side)
1. Check as Left Side

NOTE: Exterior preflight inspection is not totally aplicable to X-Plane models. This is only for information purposes.

Normal Procedures Checklist

Normal Procedures

Before Starting Engine

1. Cabin Doors ..... CLOSED AND LATCHED
2. Overhead Latch ..... ENGAGED
3. Seats ..... ADJUSTED AND LOCKED
4. Seat Belts & Harnesses ….....FASTENED
5. Circuit Breakers ..... IN
6. Parking Brake ..... SET
7. Carburetor Heat .....FULL OFF
8. Fuel Selector .....DESIRED TANK

Engine Start (COLD)

1. Prime ..... AS REQUIRED (LEAVE OUT)
2. Throttle ..... OPEN 1/2 INCH
3. Master Switch .....ON
4. Electric Fuel Pump .....ON
5. Mixture .....FULL RICH
6. Starter .....ENGAGE
7. Primer .....PUSH IN SLOWLY
8. Throttle ..... ADVANCE SLIGHTLY
9. Oil Pressure ..... CHECK
10. Electric Fuel Pump ..... OFF
11. Fuel Pressure ..... CHECK
12. Primer .....LOCKED

Engine Start (Hot)

1. Throttle ..... CRACKED
2. Master Switch .....ON
3. Electric Fuel Pump .....ON
4. Mixture .....FULL RICH
5. Starter .....ENGAGE
6. Throttle ..... ADJUST
7. Oil Pressure ..... CHECK
8. Electric Fuel Pump ..... OFF
9. Fuel Pressure ..... CHECK

Normal Procedures

Engine Start (Flooded)

1. Throttle .....OPEN FULL
2. Master Switch .....ON
3. Electric Fuel Pump .....ON
4. Mixture .....IDLE CUT-OFF
5. Starter .....ENGAGE
6. Mixture .....ADVANCE
7. Throttle ..... RETARD
8. Oil Pressure ..... CHECK
9. Fuel Pressure ..... CHECK

Starting Engine (External Power)

1. Master Switch ..... OFF
2. All Electrical Equipment ..... OFF
3. Terminals ..... CONNECT
4. External Power Plug .....INSERT
5. Proceed with Normal Start
6. Throttle .....LOWEST RPM
7. External Power Plug ..... DISCONNECT
8. Master Switch .....ON – CHECK AMMETER
9. Oil Pressure ..... CHECK

Warm Up

1. Throttle ..... 800 to 1200 RPM

Taxiing

1. Intercom .....ON
2. Radios .....ON
3. Taxi Area .....CLEAR
4. Brakes ..... CHECK
5. Steering ..... CHECK

Ground Check

1. Brakes..... SET
2. Throttle .....1800 RPM
3. Magnetos ..... 175 Max/ 50 Diff.
4. Vacuum ..... 5.0" Hg ± .1
5. Oil Temp ..... CHECK
6. Oil Pressure ..... CHECK
7. Carburetor Heat ..... CHECK
8. Throttle ..... RETARD

Normal Procedures

Before Takeoff

1. Master Switch .....CHECK ON
2. Flight Instruments .....CHECK
3. Fuel Selector .....OPER TANK
4. Mixture ..... SET
5. Electric Fuel Pump .....ON
6. Carburetor Heat ..... OFF
7. Engine Gauges ..... CHECK
8. Static Source .....NORMAL
9. Seats .....LATCHED IN TRACK
10. Seat Backs ..... ERECT
11. Belts/Harness .....FASTENED
12. Empty Seat Belt .....FASTENED
13. Flaps ..... SET
14. Trim Tab ..... SET
15. Controls.....FREE
16. Doors ..... CLOSED and LATCHED
17. Overhead Latch ..... ENGAGED
18. Transponder ..... ON ALT

Normal Takeoff

1. Flaps ..... SET
2. Trim Tab ..... SET
3. Accelerate .....53 KIAS
4. Control Wheel , Back Pressure to Rotate to Climb Attitude

Short Field Takeoff, Obstacle Clearance

1. Flaps ..... 21° (first notch)
2. Accelerate .....53 KIAS
3. Control Wheel , Back Pressure to Rotate to Climb Attitude
4. Accelerate (until over obstacle) .....61 KIAS
5. Accelerate (after over obstacle) .....70 KIAS
6. Flaps ..... RETRACT SLOWLY

Short Field Takeoff, No Obstacle

1. Flaps ..... 21° (first notch)
2. Accelerate .....53 KIAS
3. Control Wheel , Back Pressure to Rotate to Climb Attitude
4. Accelerate (after breaking ground) .....70 KIAS
5. Flaps ..... RETRACT SLOWLY

Normal Procedures

Soft Field Takeoff, Obstacle Clearance

1. Flaps ..... 21° (first notch)
2. Accelerate and lift off nose as soon as possible.
3. Lift off at slowest possible airspeed.
4. Accelerate just above ground to 61 KIAS to climb past obstacle height.
5. Accelerate (after over obstacle) .....70 KIAS
6. Flaps ..... RETRACT SLOWLY

Soft Field Takeoff, No Obstacle

1. Flaps ..... 21° (first notch)
2. Accelerate and lift off nose as soon as possible.
3. Lift off at slowest possible airspeed.
4. Accelerate just above ground best rate of climb speed .....70 KIAS
5. Flaps ..... RETRACT SLOWLY

Climb

1. VX – Best Angle of Climb Speed .....61 KIAS
2. VY – Best Rate of Climb Speed .....70 KIAS
3. Electric Fuel Pump ..... OFF

Cruising

1. Normal Max. Power 75%
2. Power ..... SET PER TABLE
3. Mixture ..... ADJUST
4. Fuel Selector .....SWITCH AS NEEDED

Approach and Landing

1. Fuel Selector ..... PROPER TANK
2. Seat Backs ..... ERECT
3. Belts/Harness .....FASTEN
4. Electric Fuel Pump.....ON
5. Mixture ..... SET
6. Flaps .....SET (89 KIAS MAX)
7. Trim .....70 KIAS
8. Final Approach Speed .. ..67 KIAS

Normal Procedures

Stopping Engine

1. Flaps .....RETRACT
2. Electric Fuel Pump ..... OFF
3. Radios ..... OFF
4. Magnetos ..... CHECK GROUND
5. Throttle .....FULL AFT
6. Mixture .....IDLE CUT-OFF
7. Magnetos ..... OFF
8. Master Switch ..... OFF
9. Intercom ..... OFF

Parking

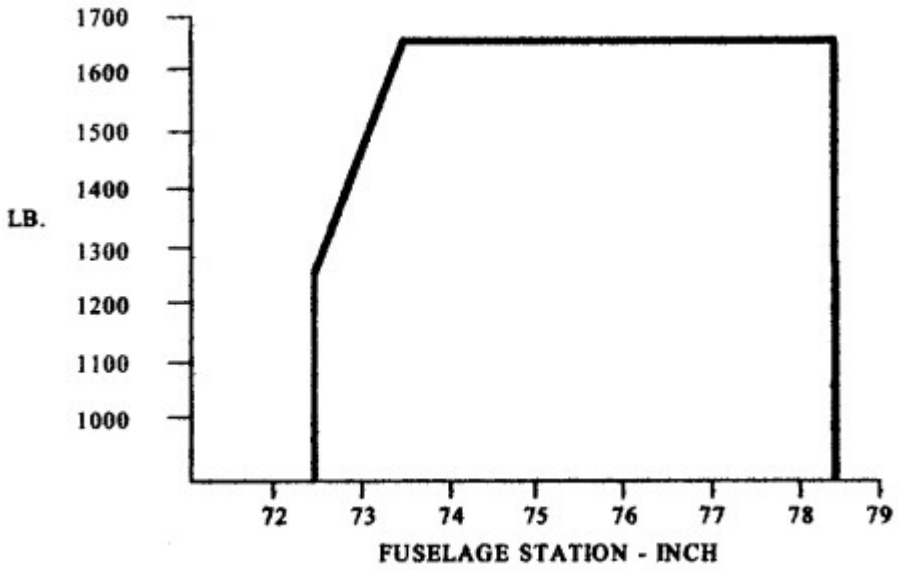
1. Parking Brake ..... SET
2. Control Wheel ..... SECURED WITH BELTS
3. Flaps ..... FULL UP
4. Wheel Chocks ..... IN PLACE
5. Tie Downs .....SECURE

Gravity Range

Normal And Utility Category

(+72,4)	to	(+78,5)	At 1277 lbs. or less
(+73,5)	to	(+78,5)	At 1670 lbs.

Straight line variation between points given



Emergency Procedures Checklist

Emergency Procedures

Takeoff Loss of Power (aircraft on ground)

Sufficient Runway Remanining

1. Throttle ..... FULL AFT
2. Brakes ..... APPLY
3. Mantain Straight direction until plane is stopped

Insufficient Runway Remanining

1. Throttle ..... FULL AFT
2. Brakes ..... APPLY
3. Mixture .....CUTOFF
4. Fuel Tank Selector .....OFF
5. Master Switch ..... OFF
6. Starter .....OFF
7. Mantain Straight direction until plane is stopped
8. Cabin Doors ..... UNLATCHED

Takeoff Loss of Power (aircraft on air)

Sufficient Runway Remanining

1. Airspeed ..... 70 KIAS
2. Throttle ..... FULL AFT
3. Brakes ..... APPLY
4. Land in Straight direction

Insufficient Runway Remanining

1. Airspeed ..... 70 KIAS
1. Throttle ..... FULL AFT
2. Brakes ..... APPLY
3. Mixture .....CUTOFF
4. Fuel Tank Selector .....OFF
5. Master Switch ..... OFF
6. Starter .....OFF
7. Land in Straight direction
8. Cabin Doors ..... UNLATCHED

Emergency Procedures

Engine Fail in Flight

1. Airspeed ..... 70 KIAS
2. Fuel Tank Selector .....CHANGE
3. Electrical Fuel Pump ..... ON
4. Mixture .....RICH
5. Carb. Heater .....HEAT
6. Primer .....PUSH IN
7. Engine Instruments .....CHECK
8. Starter .....LEFT-RIGHT-BOTH-START
9. If the engine fails to start, Plan forced landing without power

WARNING: Above 1000 Ft AGL not attempt engine restart, only plan emergency pattern to land.

Engine Fire during Startup

1. Starter ..... ENGAGE
2. Mixture .....CUTOFF
3. Throttle ..... FULL FWD
4. Mixture .....RICH
5. Electrical Fuel Pump ..... OFF
6. Fuel Tank Selector .....OFF
7. Master Switch ..... OFF
8. Warn the Ground Crew.
9. Leave the Aircraft.

Engine Fire in Flight

1. Fuel Tank Selector .....OFF
2. Mixture .....CUTOFF
3. Throttle ..... FULL AFT
4. Electrical Fuel Pump ..... OFF
5. Master Switch ..... OFF
6. Carb. Heater .....OFF
7. Cabin Heater (Not Modelled).....OFF
8. Plan forced landing without power

Smoke in Cockpit

1. Master Switch ..... OFF
2. Cabin Heater (Not Modelled).....OFF
3. Throttle ..... FULL AFT
4. StormWindow (Not Modelled)..... OPEN
5. Land as soon as possible

Emergency Procedures

Ditching

1. Radio ..... MAYDAY CALL
2. Transponder ..... SET 7700
3. Cabin Doors ..... UNLATCHED
4. Crew/Passenger ..... BRIEFED
5. Landing Into Wind Tail Down Stalled

Fuel Pressure Fail

1. Fuel Tank Selector ..... CHANGE
2. Electrical Fuel Pump ..... ON

Alternator Fail

1. Circuit Breaker ..... CHECK IN
2. Alternator Switch ..... OFF THEN ON
3. Non Essential electrical systems..... OFF
4. If fail continues, Alternator Switch..... OFF

NOTE: Normal and emergency procedures are the **REAL** aircraft procedures. You can use it in this model because all systems are simulated. If any component is not modelled, you can see it indicated in corresponding checklist.