

Pilot's Operating Handbook (POH)

- Part I - Systems, Procedures, Performance •

Rockwell 695 / JetProp Commander 980

For use with x-plane flight simulator only!



Lowcost payware for X-Plane version 8.40+.

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Introduction

The Twin Commander's history goes back to the late 40's. It turned out to be one of the safest and best twin engine props ever built, maybe the best one.



L-3085 The Aero Commander prototype

Courtesy of Jane's Information Group

Many piston engine versions have been built by the original company named Aero Commander which was taken over by Rockwell in the 50's. Many of those aircraft have been (and still are) in service for aero photo and remote sensing missions, which resulted in a continuous demand for higher service altitudes, which could hardly be met by piston engines. This led to the Turbo Commander, built by Rockwell and later by Gulfstream, and to a tremendous increase in engine power and flight performance.

The Jetprop models are Rockwell or Gulfstream Turbo Commanders, upgraded by Twin Commander Aircraft LLC, which keep these aircraft up to the latest level of technology and flight performance. With 315 kn TAS cruise speed and 39,900 ft service ceiling, the JetProp 980 has a remarkable performance for an aircraft of its class.

<http://www.twincommander.com/index.htm>

The real JetProp 980 registered under D-IHSI is a rare aircraft in Europe. It is registered by an Aircraft Leasing Company in Germany. Remarkable is the unique livery, which took me a week to realize, and maybe cuts off 2 years of my lifetime...

The x-plane model is meant to be a simulation of this great aircraft, rather than a toy, which demands for some attention to this manual, in particular to the descriptions and the legends of the engine's controls and instruments as well as the start-up and shut down procedures.

SPECIFICATIONS & PERFORMANCE

Performance Conditions

Performance conditions are based upon U.S. Standard (1962) atmospheric conditions, and performance is contingent upon engine manufacturer's guaranteed performance as indicated in FAA Type Certificate. All speeds are guaranteed within plus or minus 3%, and all climbs, ranges and altitudes are guaranteed within plus or minus 8%.

Dimensions

Wing span: 52.12'/15.89m

Length: 42.98'/13.10m

Height: 14.95'/4.56m

Tread: 15.42'/4.70m

Cabin Entry Door: 2' 21"x3.92' 11" / .67x1.19m

Cabin Height (Inside Interior): 4.47' / 1.35m

Cabin Length : 14.25' / 4.34m

Cabin Width (Inside Interior): 4.01' / 1.22m

Cabin Volume: 224 cubic feet/6.34m

Baggage compartment height: 3.81' / 1.16m

Baggage compartment width: 3.50' / 1.07m

Baggage compartment length: 4.83' / 1.47m

Baggage compartment volume: 46.5 cubic feet/1.32cubic meters

Baggage door height: 2.60' / .79

Baggage door width: 1.64' / .50

Baggage compartment load limit: 600lbs/272m

Propellers

(2) Dowty Rotol, 3 bladed, full feathering and reversible

Power Plant

(2) AiResearch TPE-331-10-501 K (980 THP) Engines

Operating Speeds

@ 10,325 lbs/4,683 kg unless otherwise noted

Maximum Cruise (22,000 ft./6,706m, average cruise weight TAS @ MCP): 363mph/315kts/583kmh

Normal Cruise Speed (18,000 ft. TAS @ MCP, 5,486m average cruise weight):
352mph/306kts/567kmh

Minimum Control Speed (IAS): 107mph/93kts/172kmh

Stall Speed, Clean (CAS): 89mph/77kts/143kmh

Stall Speed, Gear and Flaps Down (CAS): 86mph/75kts/139kmh

Engine Limits

Take-off: 980 SHP/100% N1/923°C ITT

Maximum Continuous: 980 SHP/100% N1/923°C ITT

Maximum Cabin Pressure Differential: 6.7 P.S.I. ITT

Cruising Ranges

Long range cruise at 276mph/240kts/445kmh (TAS) average at 31,000 ft., 9,449 meters, Full Fuel with 45 min. fuel reserve: 2,071 SM/ 1,800 NM, 3,333 KM

High speed cruise range at 345mph/300kts/556kmh (TAS) average at 31,000 ft., 9,449 meters, MCP with 45 min. fuel reserve: 1,821 SM/ 1,582 NM, 2,930 KM

Rate of Climb

Twin Engine initial rate of climb (0° Flaps): 2,840 F/M / 866 M/N

Single Engine initial rate of climb (0° Flaps): 1,010 FPM / 308 M/M

Time to climb to 20,000 ft., 6,096 meter (Min.): 7.2

Service Ceiling

Twin Engine Service Ceiling: 39,9000 ft/12,162m

Single Engine Service Ceiling: 26,000 ft/7,925m

Take-off Performance

Take-off Distance Ground Roll: 1,830 ft/558m

Take-off Distance over 50'/15.2M Obstacle: 1,285 ft/392m

Landing Performance

Landing Distance over 50'/15.2M Obstacle with Reverse Typical Landing Weight: 2,030 ft/619m

Landing Distance with Ground Roll Reverse Typical Landing Weight: 1,330 ft/405m

Weights - Aircraft

Max Ramp Weight: 10,375 lbs/4,706 kg

Max Take-off Weight: 10,325 lbs/4,683 kg

Max Landing Weight: 9,675 lbs/4,389 kg

Standard Empty Weight: 6,721 lbs/2,845 kg

Useful Load: 4,180 lbs/1,896 kg

Baggage: 600 lbs/ 272 kg

Capacity

Usable Fuel: 425 gal/1,609 LI

Mission Profile

7 passengers and baggage (1,400 lbs) fuel to full gross weight, average equipped aircraft

Mission Distance (w/ 45-min reserve): 1.247 nm/2,309 km

Cruise Altitude: 31,000 ft/9,449 m

Time to Climb: 15 min

Cruise Speed (MCP): 300 kts/556 km/h

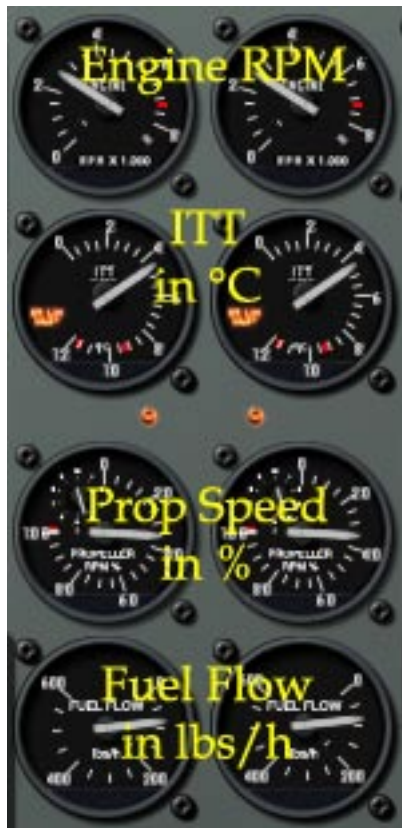
Total Time Enroute: 4.3 hrs

Mission Efficiency (nm/lb of fuel burned): 609

Systems

Engines

The JP 980 has 2 AiResearch TPE-331-10-501 K (980 SHP) Engines single-shaft turbo-prop with integral gearbox. The max. power of 980 hp at 100% N1 is also the continuous maximum power.



IMPORTANT!

On the instrument board the engine's rotation speed is indicated in RPM, the propeller's rotation speed is indicated in %.

Look at the right table see the values of %N1 and RPM, as well as the corresponding prop rotation speed in % and RPM. Since the manual reference always uses % of N1, it is recommendable to monitor the prop RPM indicator, since the percentage of prop RPM and N1 is always identical.

Be sure ITT never exceeds the limit of 923°C!

For further information refer to chapters *RUNNING UP SYSTEMS* and *ENGINE START-UP*

Engine		Gear		Propeller	
N1 %	RPM	Ratio	%	RPM	
5	395	5,1	5	77	
10	790	5,1	10	155	
15	1185	5,1	15	232	
20	1580	5,1	20	310	
25	1975	5,1	25	387	
30	2370	5,1	30	465	
35	2765	5,1	35	542	
40	3160	5,1	40	620	
45	3555	5,1	45	697	
50	3950	5,1	50	775	
55	4345	5,1	55	852	
60	4740	5,1	60	929	
65	5135	5,1	65	1007	
70	5530	5,1	70	1084	
75	5925	5,1	75	1162	
80	6320	5,1	80	1239	
85	6715	5,1	85	1317	
90	7110	5,1	90	1394	
91	7189	5,1	91	1410	
92	7268	5,1	92	1425	
93	7347	5,1	93	1441	
94	7426	5,1	94	1456	
95	7505	5,1	95	1472	
96	7584	5,1	96	1487	
97	7663	5,1	97	1503	
98	7742	5,1	98	1518	
99	7821	5,1	99	1534	
100	7900	5,1	100	1549	

Electrical

Refer to chapters *RUNNING UP SYSTEMS* and *ENGINE START-UP*

Hydraulic

Refer to chapters *RUNNING UP SYSTEMS* and *ENGINE START-UP*

Fuel

The JP 980 has 2 wing tanks of the following capacities:

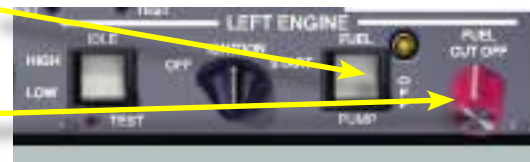
Total Capacity: 430 gal/1.627 Liter
Usable Fuel: 425 gal/1.608 Liter

The available quantities are indicated by a twin instrument on the main panel.

A Fuel Tank Selector is located on the main panel below the PFD/HSI instrument.

Each engine has a fuel pump, which are activated by a switch with an orange indicator light on the OH-panel.

The fuel flow can be interrupted for each engine independently by red turn switches located on the OH-panel



Flaps

The Flaps Handle is located on the main panel at the right side of the center console.

The Flaps Position Indicator is located on the main panel right from the engine's N1 indicators.

The flaps may be extended in 4 steps from 0° to

- 10°
- 20°
- 30°
- 40°



Under normal conditions flap settings are:

take-off	0°
approach	0°
final approach	20°
landing	40°

Landing Gear

The JP 980 has a retractable front wheel and 2 retractable mainwheels which carry the taxi lights. Only the struts of the maingear is covered by the gear doors when retracted, while the wheels remain visible from below.

All gear controls and indicators are located on the main panel left from the center console.



Pressurisation

The cabin can be pressurized with a differential maximum of 6.7 P.S.I. ITT, which allows a remarkable ceiling of 39.900 ft. The controls and indicators are located on the lower pilot's main panel.

Cabin Altitude Indicator



Set VVI

Set Cabin Altitude
(after initial climb out)

Trim

The JP 980 has trim tabs for the Rudder and the Elevators. In the REAL aircraft the trim actuators are located on the ceiling above the OH-panel.



In XP I did not find the space to display this part of the ceiling. I definitely did not want to place the trim wheels at a location on the panel, where they do not belong. Since most users actuate the trim by hardware (joystick or keyboard), rather than by fuddling around with the mouse on the panel, I opted for a compromise in placing the mouse click areas close to the real locations, but not precisely where they belong.

Anyway, I recommend to use the hardware for trim.

Here are the keys:

(7 *aileron trim*)

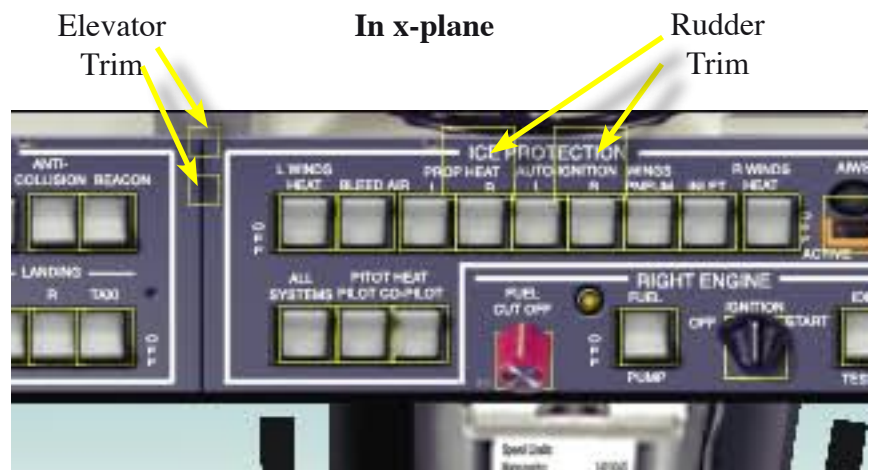
(8 *aileron trim*)

9 rudder trim

0 rudder trim

[elevator trim

] elevator trim



Navigational Systems / Avionics

Auto Pilot

The autopilot activators and indicators are located on a small center console above the main panel, as is the button to set VVI.



The selectors for Altitude and Heading are located on the main panel right above the center console.



Turning the Heading knob at the HSI Instrument will also affect the Autopilot's Heading.

Interactive Clipboard

The interactive clipboard behaves like a Flight Management System (FSM). You can create, edit, load and save flight plans and assign them to the autopilot, Garmin 430 and GPS, exactly in the same way as with the FMS in XP. Of course this feature is compatible with the Goodway Flight Planning Software.

The lower area of the clipboard displays the FMS keyboard for data input. The upper part displays the selectet waypoint.

- To assign a flightplan to the autopilot, select GPS at the AP's source selector.

SELECT SOURCE:

VOR 1

VOR 2

GPS



- To assign a waypoint to Garmin 430 and GPS, press the arrow button on the interactive clipboard.



Flight Director Mode is set on
(default)!

Be sure the
AUTO

For all other instruments for Navigation and Communication turn to the REFERENCE table!

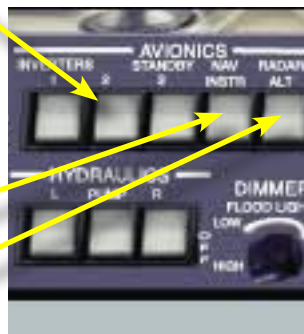
Normal Procedures

Running Up Systems - Part 1

- Engage the battery.



- Engage the following avionics systems:
Leave the 3 inverters OFF until the engines are running in order to save battery power.



Avionics Instruments

Radar Altitude (This button in XP activates the glide slope indicator in the PFD)

Engine Start Up

If your aircraft is parked close to the runway, you might wish to let the engine's oil warm up before leaving your position. If there is a significant distance to taxi, skip this section for now and return later when you are ready to leave your parking position.

Turn on the NAV. LIGHTS... the aircraft is going to be activated. Leave the ANTI-COLLISION LIGHTS turned OFF unless you are close to the runway, since they might disturb the traffic and they are high power consumers.



...and the BEACON to indicate that

Be sure the Fuel Tank Selector at the lower end of the main panel is set on BOTH (XP default). You may switch to the right or left wing tank only after climb out.



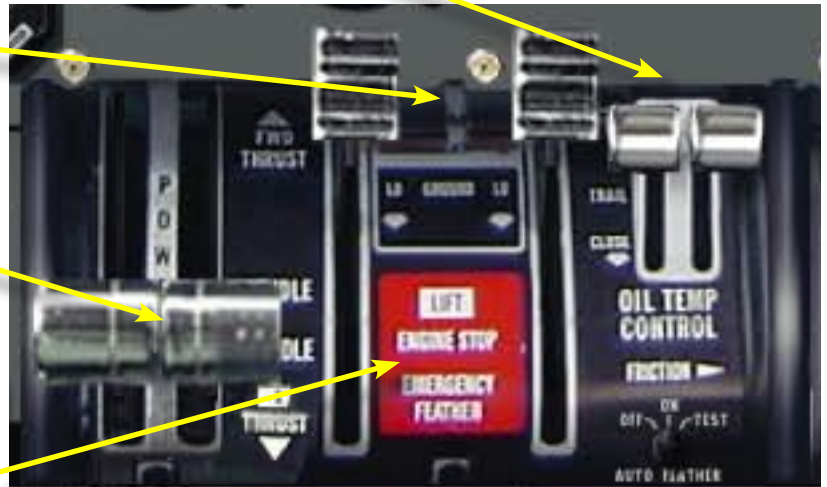
Be sure the sliders for the...

...Oil Temperature Controls are set on the upper most position,

...Propeller Controls are set on the upper most position,

...Throttles are set on Ground Idle.

Before starting the engines, be aware that there is an Emergency Button, which stops both engines and feathers both propellers, if lifted up. Make sure it is on the indicated position (XP default).



IMPORTANT!

To use the **EMERGENCY STOP** button, click on the small spot below the button. Do not click on the button directly or you will only move the prop sliders!

Make sure the Auto Feather Switch is turned OFF (ON = XP default).

To start the left engine,...

- set the FUEL CUTOFF button on the center up position, as indicated (default)

- set the IDLE button on HIGH (default) position as indicated (default). You may cut off the fuel for this individual engine with this button.



- switch ON the fuel pump. The orange indicator light must be ON, the indicator must switch to the green range.

- turn the STARTER switch from IGNITION to START and hold the button at this position for 3-5 seconds until the engine spools up to ~1.000 RPM. It will snap back to the IGNITION position. Monitor the ITT! If the temperature exceeds the first red line (923°C), turn off the engine and quit the flight. The engine will need maintenance. If the temperature stays within it's limits, the engine will spool up until appr. 3.000 RPM (as indicated). You may switch the IDLE button on the OH panel to LOW once the oil temperature is within the green range.

The Oil Pressure Indicator must move into the green range.



- Switch ON the Generator 1.
The Amperemeter for the left engine should switch to the indicated position.

Repeat this procedure for the right engine, ending up with the engagement of Generator 2.



Running Up Systems - Part 2

Now the Annunciator Panel should look like this, leaving only 2 Inverter lights red.



The MASTER CAUTION Annunciator is flashing.

Engage Inverter 1 + 2.

- Now the final red lights must have turned to GREEN.
- The gyro compass of the HSI is active, indicating the correct heading.
- The MASTER CAUTION Annunciator is still flashing

Turn on the 3rd Inverter, which is only for standby in case another one should fail. The MASTER CAUTION Annunciator should remain extinguished now.



If you want to turn the Standby Inverter OFF, the MASTER CAUTION Annunciator will start flashing again. Turn it OFF by clicking on it.



Engage the TRANSPONDER.

Check the Hydraulic Pumps are ON (default) and the pressure is above 1.200 Psi.



Now you are ready to post your flightplan onto your clipboard, to set up your navigation instruments and for taxi.

Taxi



Engage the Taxi Light if needed, call ATC for clearance and set Transponder Frequency accordingly.



Monitor the Oil Temperature.

If the indicator should rise close to the upper end of the green range, you may control the temperature by moving the sliders on the center control DOWN (more cooling) or UP (less cooling).



Engage Anti-Collision Lights (Strobes) before entering the runway. Engage the Landing Lights to be more visible for other traffic when entering the runway. Set the AUTO-FEATHER Switch to ON.

Take-off

- Flaps are be used on rare occasions on very short runways only.
- After the oil temperature is appropriate, let the prop. RPM handles remain at the frontmost position, for the max. of 100% engine N1, and push the throttle smoothly to about 60%.
- Release the brakes, gently apply full throttle (if needed), accelerate until ~95-100 kn and take-off.
- The Initial Climb rate may be more than 3.000 fpm, depending on take-off weight.
- Retract gears, turn OFF taxi light (if active) and climb to the required obstacle clearance altitude at ~120 kn. (Best Angle of Climb Speed).
- Continue climbout at ~145 kn (Best Rate of Climb Speed) to maintain +2.500 fpm.
- Set Cabin Pressure at the desired cruising altitude (max. is for 39.900 ft. aircraft altitude) and taper climb rate until reaching your cruising altitude (max. 39.900 ft.).
- Reduce N1 to 96% and throttle appropriate for level cruise speed @ ~270-315 kn TAS, depending on altitude and desired range.

NOTE:

If you are not familiar with single-shaft (fixed) turboprop engines, you might be scared by the high N1 which is maintained during almost all flight conditions. The engines limits of maximum 100% N1/ 923°C ITT are equal for take-off and continuous maximum. So you need not care too much about exceeding any limit, with the possible exception of ITT and Oil Temperature.

- High N1 (96%) and low torque is the most economic option in respect of fuel consumption and engine stress.
- Low N1 demands for high torque (except during idling) and causes rising temperatures. So you may damage your engine very rapidly by lowering the prop RPM below 90%, but hardly by flying always close to the max. RPM.

Landing

The props act as effective airbrakes when the throttle is reduced and prop RPM is set on maximum, thus reducing the prop's pitch.

- I usually approach at a high descend rate (1.000-2.000 ft/min or more) with 85-90% N1 (high pitch) with low throttle. On on lower glide slope set N1 to 91-100%.
- On about 3 miles distant from the threshold, speed is reduced by extending flaps and gears. The respective speed limits are comfortably high:
 - 200 KIAS for wheel extension
 - 180 KIAS for flaps on 50% down
 - 140 KIAS for full flaps
- The final approach may require more power again. Set prop for 100% N1, whether a go-around may be an issue or not.
- After touchdown you may apply revers thrust, if needed. In XP prop reverse close to idle produces forward thrust. So use reverse prop as a short but strong back-push rather than with moderate power.
- Prop reverse may be used to manuevre the aircraft backwards on the ground, as long as the blast is not causing a disaster on the terrace of the nearby cafeteria...

Engine shut-down

- Turn OFF the AUTO-FEATHER switch.
- Turn the ignition/starter button to OFF (the left most position).
- Switch OFF the fuel pump and the generators.
- Turn the fuel tank selector to the OFF position.