# Pilot's Operating Handbook (POH)

## • Part I - Systems, Procedures, Performance •

## *Rockwell 695 / JetProp Commander 840*

For use with x-plane flight simulator only!


Lowcost payware for X-Plane version 8.50+.

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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 savest 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 continious demand for higher service altitudes, which could hardly be met by piston engines. This lead 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 Tubo Commanders, upgraded by Twin Commander Aircraft LLC, which keep these aircraft up to the latest level of technology and flight performance. With 290 kn TAS cruise speed and 35.000 ft service ceiling, the JetProp 840 has a remarkable performance for an aircraft of it's class.

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

The real JetProp 840 registered under YV-893CP is in private possesion in Venezuela.

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 POH, 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 perfomance is contingent upon engine manufacturere'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
Turning Radius: 43.88ft/13.37m  Cabin Entry Door: 2' 21"x3.92'/.67x1.19m
Cabin Height (Inside Interior): 4.48'/1.35m
Cabin Length : 14.25'/4.34m
Cabin Width (Inside Interior): 4.12'/1.25m
Cabin Volume (inc. cockpit): 224 cubic feet/6.34m
Baggage compartment height: 3.25'/1.07m
Baggage compartment width: 3.82'/1.25m
Baggage compartment length: 6.57'/2.15m
Baggage compartment volume: 70 cubic feet/1.98 cubic meters
Baggage door height: 2.60'/.79
Baggage door width: 2.08'/.63
Baggage compartment load limit: 600lbs/272m

## Propellers

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

## Power Plant

(2) AiResearch TPE-331-5-254 K Engines

## Operating Speeds

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

Maximum Cruise (100%, 12,000 ft. TAS @ MCP): 334mph/290kts/537kmh

Normal Cruise Speed (18,000 ft. TAS @ MCP, 5,486m average cruise weight):
330mph/287kts/532kmh

| | |
|---|---|
| Twin Engine Best Rate of Climb Speed (IAS) Sea Level: | 155mph/135kts/250kmh |
| Twin Engine Best Angle of Climb Speed (IAS) Sea Level: | 97mph/84kts/156kmh |
| Single Engine Best Rate of Climb Speed (IAS) Sea Level: | 130mph/113kts/209kmh |
| Single Engine Best Angle of Climb Speed (IAS) Sea Level: | 110mph/96kts/178kmh |
| Minimum Control Speed (IAS): | 107mph/93kts/172kmh |
| Stall Speed, Clean (CAS): | 89mph/77kts/143kmh |

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

## Airspeed Limits

| | |
|---|---|
| Maneuvering: | 158 m.p.h. (137K) CAS |
| Maximum Operating: | 280 m.p.h. (243K) CAS .52 MACH |
| Flaps extended - half: | 207 m.p.h. (180K) CAS |
| Flaps extended - full: | 161 m.p.h. (140K) CAS |
| Landing gear extended: | 230 m.p.h. (200K) CAS |

## Engine Limits

| | |
|---|---|
| Take-off: | 733 SHP/101% N1/650°C EGT |
| Maximum Continuous: | 733 SHP/101% N1/650°C EGT |

## Maximum Cabin Pressure Differential: 5.2 P.S.I. ITT/0.36 bars

## Cruising Ranges *(The x-plane model is optional fuel equipped)*

Long range cruise at 285mph/248kts/459kmh (TAS) average at 31,000 ft., 9,449 meters, LRCP with 45 min. fuel reserve:
2,047 SM/ 1,780 NM, 3,295 KM (standard fuel)
2,346 SM/ 2,040 NM, 3,776 KM (optional fuel)

High speed cruise range at 307mph/267kts/495kmh (TAS) average at 31,000 ft., 9,449 meters, MCP with 45 min. fuel reserve:
1,985 SM/ 1,726 NM, 3,196 KM (standard fuel)
2,272 SM/ 1,976 NM, 3,660 KM (optional fuel)

## Rate of Climb

| | |
|---|---|
| Twin Engine initial rate of climb (0° Flaps): | 2,824 F/M / 861 M/N |
| Time to climb to 10,000 ft., 3,048 meters (Min.): | 3.8 |
| Time to climb to 20,000 ft., 6,096 meter (Min.): | 9.5 |
| Single Engine initial rate of climb (0° Flaps): | 1,003 FPM / 306 M/M |

## Service Ceiling

| | |
|---|---|
| Operational Ceiling Limit: | 31,000 ft/9,449m |
| Twin Engine Service Ceiling: | 34,050 ft/10,378m |
| Twin Engine Absolute Ceiling: | 35,100 ft/10,698m |
| Single Engine Service Ceiling: | 21,000 ft/6,401m |
| Single Engine Absolute Ceiling: | 22,000 ft/6,706m |

## Take-off Performance

| | |
|---|---|
| Take-off Distance Ground Roll (0° Flaps): | 1,833 ft/559m |
| Take-off Distance over 50'/15.2M Obstacle: | 1,285 ft/392m |

## Landing Performance

| | |
|---|---|
| Landing Distance over 50'/15.2M Obstacle: | 2,332 ft/711m |
| dito with Reverse Props: | 1,971 ft/601m |
| Landing Distance (Ground Roll) with Reverse Props: | 1,240 ft/378m |

## Weights - Aircraft

| | |
|---|---|
| Ramp Weight: | 10,375 lbs/4,706 kg |
| Take-off Weight: | 10,325 lbs/4,683 kg |
| Landing Weight: | 9,675 lbs/4,389 kg |
| Standard Empty Weight: | 6,702 lbs/3,040 kg |
| Useful Load: | 3.673 lbs/1,666 kg |
| Zero Fuel Weight: | 8,800 lbs/3,992 kg |
| Baggage: | 600 lbs/272 kg |

## Capacity *(The x-plane model is optional fuel equipped)*

| | |
|---|---|
| Fuel, Total Capacity: | 432 gal/1,635LI (standard) |
| Fuel, Total Capacity: | 484 gal/1,834LI (optional) |
| Usable Fuel: | 425 gal/1,609 LI (standard) |
| Usable Fuel: | 474 gal/1,794 LI (optional) |

## Mission Profile

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

| | |
|---|---|
| Mission Distance (w/ 45-min reserve): | 1.307 nm/2,422 km |
| Cruise Altitude: | 31,000 ft/9,449 m |
| Time to Climb: | 23 min |
| Cruise Speed (MCP): | 266 kts/493 km/h |
| Total Time Enroute: | 5.17 hrs |
| Mission Efficiency (nm/lb of fuel burned): | 0.631 |

# Systems

## Engines

The JP 840 has 2 AiResearch TPE-331-5-254 K (733 SHP) Engines single-shaft turbo-prop with integral gearbox. The max. power of 733 hp at 101% N1 is also the coninuous maximum power.


IMPORTANT!
On the instrument board the engines's rotation speed is indicated in RPM, the propeller's rotation speed is indicated in %.
Look at the right table to 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 EGT never exceeds the limit of 650!

*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 840 has 2 wing tanks of the following capacities (optional fuel equipped):

| | |
|---|---|
| Total Capacity: | 484 gal/1.834 Liter |
| Usable Fuel: | 474 gal/1.794 Liter |


The available quantities are indicated by a twin instrument on the main panel.
A Fuel Tank Selector is located 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 840 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 leftfrom the center console.

## Pressurisation

The cabin can be pressurized with a differential maximum of 5.2 P.S.I. ITT, which allows an operational ceiling of 31.000 ft (the aircraft's absolute ceiling is 35.000 ft). The controls and indicators are located on the lower pilot's main panel.

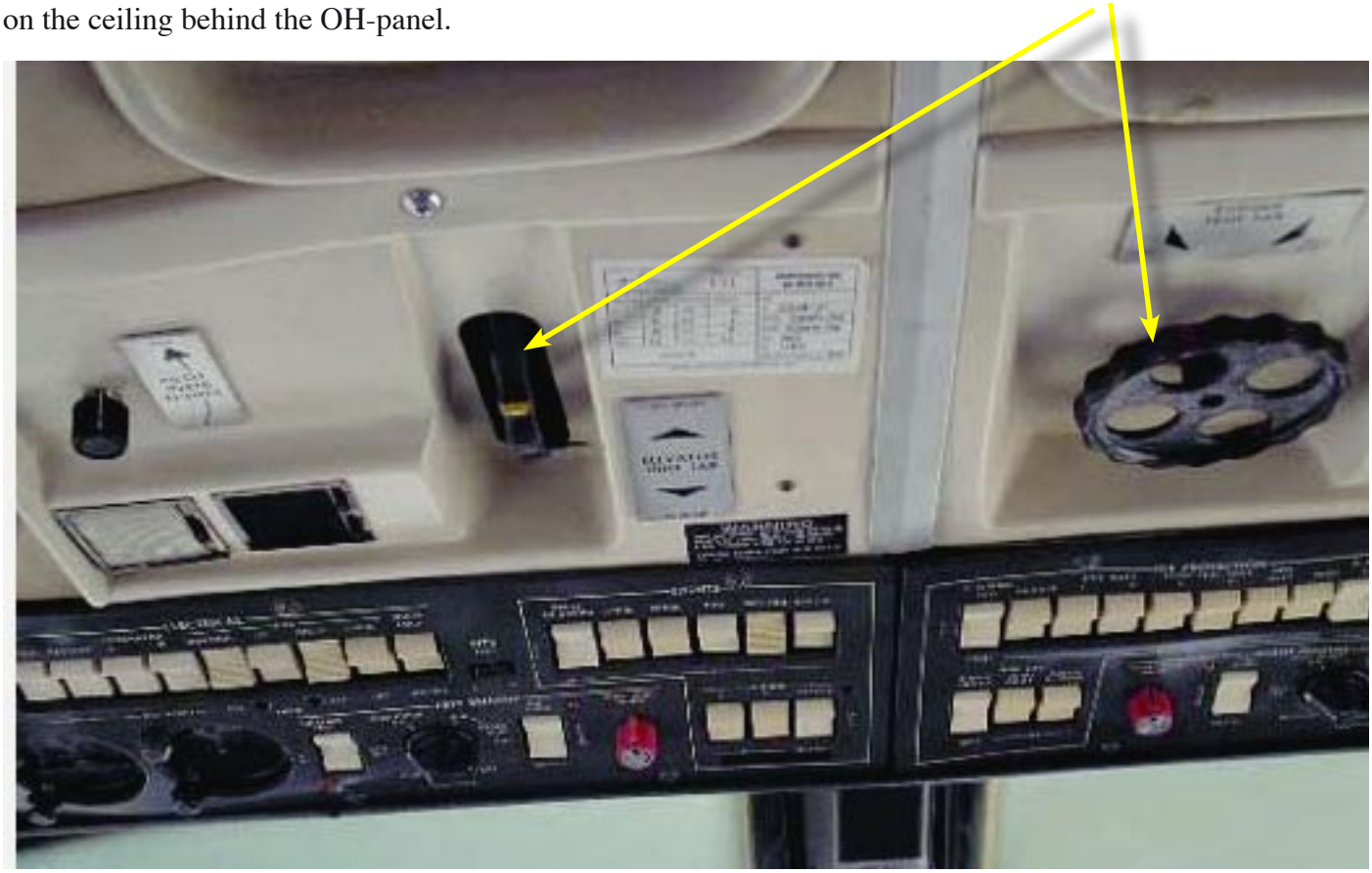

Cabin Altitude Indicator

Set VVI

Set Cabin Altitude
(after initial climb out)

**Trim**

The JP 840 has trim tabs for the Rudder and the Elevators. In the REAL aircraft the trim actuators are located on the ceiling behind the OH-panel.

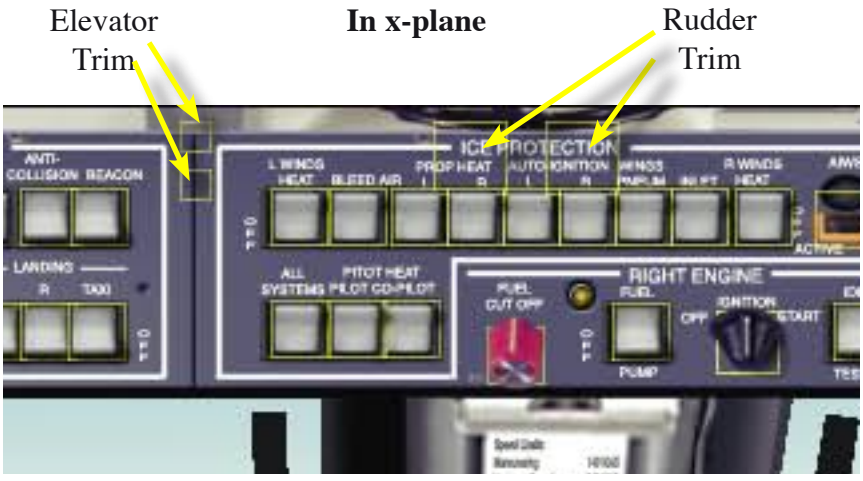


In XP I did not find the space to display this part of the ceiling. I definitely did not want to place the trim wheels at a location on the panel, where they do not belong. Since most users actuate the trim by hardware (joystick or keyboard), rather than by fuddling around with the mouse on the panel,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

**In x-plane**



# Navigational Systems / Avionics

### Auto Pilot

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

Source Selector Activators Indicators Set VVI


The selectors for Altitude and Heading are located on the main panel.


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.


Be sure the Flight Director Mode is set on AUTO (default)!

*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 the are high power consumers.


...and the BEACON to indicate that

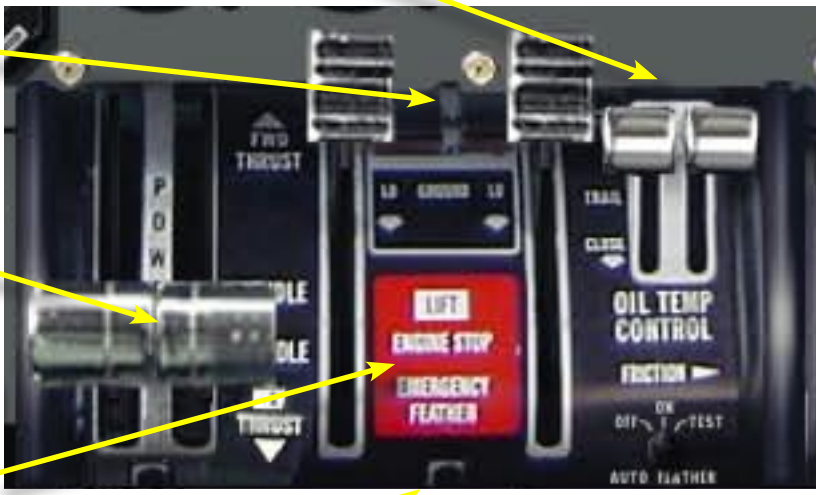
Be sure the Fuel Tank Selector at the lower end of the main panel is set on BOTH (XP default). You may switch to the right or left wing tank only after climb out.

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 CUTOUT 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 EGT! If the temperature exceeds the red line (650°C), turn off the engine and quit the flight. The engine will need maintenace.
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 butten 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.

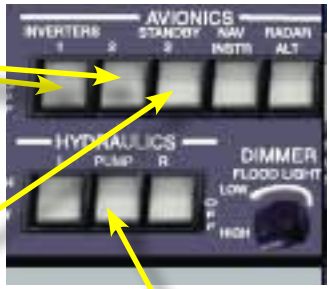
**Running Up Systems - Part 2**

Now the Annunciator Panel should look like this, leaving only the 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 Tranponder 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 100-101% 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 Climbrate 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 31,000 ft. aircraft altitude) and taper climb rate until reaching your cruising altitude (max. operational = 31,000 ft. / max. service ceiling = 34,050 ft).
• Reduce N1 to 96% and throttle appropriate for level cruise speed @ ~265-280 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 101% N1/650°C EGT are equal for take-off and continuous maximum. So you need not care too much about exceeding any limit, with the exception of EGT 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, wether 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 then 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 desaster 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.