



EC-121 Warning Star

User Manual

Introduction

Designed from the outset as an early-warning aircraft, the WV-2 was officially named "Warning Star" although "Willy Victor" became the more common name. The original C-69 which became the prototype model for the 1049 Super Constellation, was also used for the prototype of the WV-2. The PO-1W/WV-1 tested the electronic equipment to be used on the WV-2s. In 1962 the WV-2s became EC-121Ks. This was followed by many designation changes due to aircraft modifications. In August 1964, the Tonkin Gulf Incident caused VW-1, the "Early Warning Squadron" to be tasked with daily airborne early warning coverage in support of combat operations in Vietnam. Bases were initially set up at Sangley Point, Philippines and later moved to Chu Lai, South Vietnam and later Danang.



Support

Should you experience difficulties or require extra information about the Virtavia (E)C-121 Warning Star/Constellation package, please e-mail our technical support on tech.support@virtavia.com

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Installation

The .msi installer puts the Virtavia model files into C:\Program Files (x86)\Virtavia. All Virtavia P3D aircraft will be put into this folder, as recommended by Lockheed Martin.

!! The files must be copied or moved into the P3D directory structure before the aircraft will appear in P3D **!!**

!! Note there are custom Effects files (.fx) which have to be moved/copied manually to their homes in P3D **!!**

Installation procedure

1) Open Windows Explorer in TWO windows.

2) In one Explorer window, locate and open the folder:

C:\Program Files (x86)\Virtavia (or Win8/10 equivalent)

Here you will find a single folder :

‘Virtavia Constellation’

3) In the other Explorer window, locate and open the folder:

C:\Program Files\Lockheed Martin\Prepar3D v4\SimObjects\Airplanes

4) Position the two Explorer windows side-by-side.

DRAG and DROP the ‘Virtavia Constellation’ folder into :

C:\Program Files\Lockheed Martin\Prepar3D v4\SimObjects\Airplanes

Once you have done that, check you now have this structure :

C:\Program Files\Lockheed Martin\Prepar3D v4\SimObjects\Airplanes\
Virtavia Constellation

*** Custom Effects ***

5) The model will run now but you should also copy the effects files over to P3D too ! The effects files are inside a folder called ‘_Effects’ in the Virtavia Constellation folder, so look for. :

C:\Program Files\Lockheed Martin\Prepar3D v4\SimObjects\Airplanes\
Virtavia Constellation_Effects

Inside '_Effects' are two .fx files. Copy these two .fx files into the main Effects folder in P3D, which is here :

C:\Program Files\Lockheed Martin\Prepar3D v4\Effects

***** Aircraft Manual *****

The User Manual in PDF format can be found in the Virtavia Constellation folder:

C:\Program Files\Lockheed Martin\Prepar3D v4\SimObjects\
Airplanes\Virtavia Constellation_Manual

The installer will create a shortcut to the original installation, so if you have moved or deleted that, you will need to re-create the shortcut to reflect the manual's new position in the P3D file structure.

If you experience any difficulties with this procedure, please e-mail tech.support@virtavia.com

Exterior Model

The exterior model has all the usual animations such as landing gear, elevators etc. Here is some additional ones :

Cowl Flaps : ctrl-shift-C and ctrl-shift-V

Opening cockpit windows using Exit commands -

pilot window : shift-e + 2

colpilot window : shift-e + 3

(windows can be opened using the mouse inside the cockpit)

Exterior windows toggle on/off and are not animated.

Togglable crew figures : ctrl-w

Oil cooler flaps : use switches on Flight Engineer's panel

Exterior Lighting

Pressing the L key will turn on all lights, you may however wish to turn them on using the appropriate switches in the cockpit, as the L key also puts all lights on simultaneously.

Shift-L will toggle the nav lights and the cockpit lights.

Crtl-L will toggle the landing lights.

Please refer to the cockpit section of this manual for information regarding light switch location.

**** Known lighting bugs :**

Landing lights will partially illuminate the cockpit interior, beacon light is also slightly visible at rear of cockpit.

Nav lights are visible slightly forward of the tip tanks. This is due to the scaling of the virtual cockpit and the visible exterior parts, necessary to have the correct scale in VR.

These issues will be rectified with an update once a solution presents itself.

Alternative views

Cockpit Views





Virtual Cockpit Functions

Over the next few pages are several diagrams designed to aid in cockpit familiarisation. Whilst the exterior aeroplane may differ in configuration, the cockpit is uniform throughout.

Many of the instruments and switches are explained in more detail in other sections of this manual. Refer to the table of contents at the beginning of this manual for specific sections such as Autopilot, Navigation instruments etc.

Main Panel



- | | |
|-----------------------------|-------------------------------|
| 1. G-Meter | 8. Altimeter |
| 2. Clock | 9. Turn & Slip Indicator |
| 3. Airspeed Indicator | 10. Vertical Speed Indicator |
| 4. Direction Indicator | 11. Radio Magnetic Ind. |
| 5. Artificial Horizon | 12. Autopilot set ALT display |
| 6. G2 Gyro Compass | 13. Nosewheel steering |
| 7. Radar Altitude Indicator | 14. Autopilot & Sim Icons |

Copilot Panel



1. Clock
2. Flap Assymetry Indicator
3. Flaps Test switch & lamp
4. Airspeed Indicator
5. G2 Gyro Compass
6. Artifical Horizon

7. Course Deviation Indicator
8. Altimeter
9. Turn & Slip Indicator
10. Vertical Speed Indicator
11. Radio Magnetic Indicator

Glareshield Panel



- 1. Panel Lights Switch
- 2. Cabin Lights Switch
- 3. NAV1 / NAV2 Selector

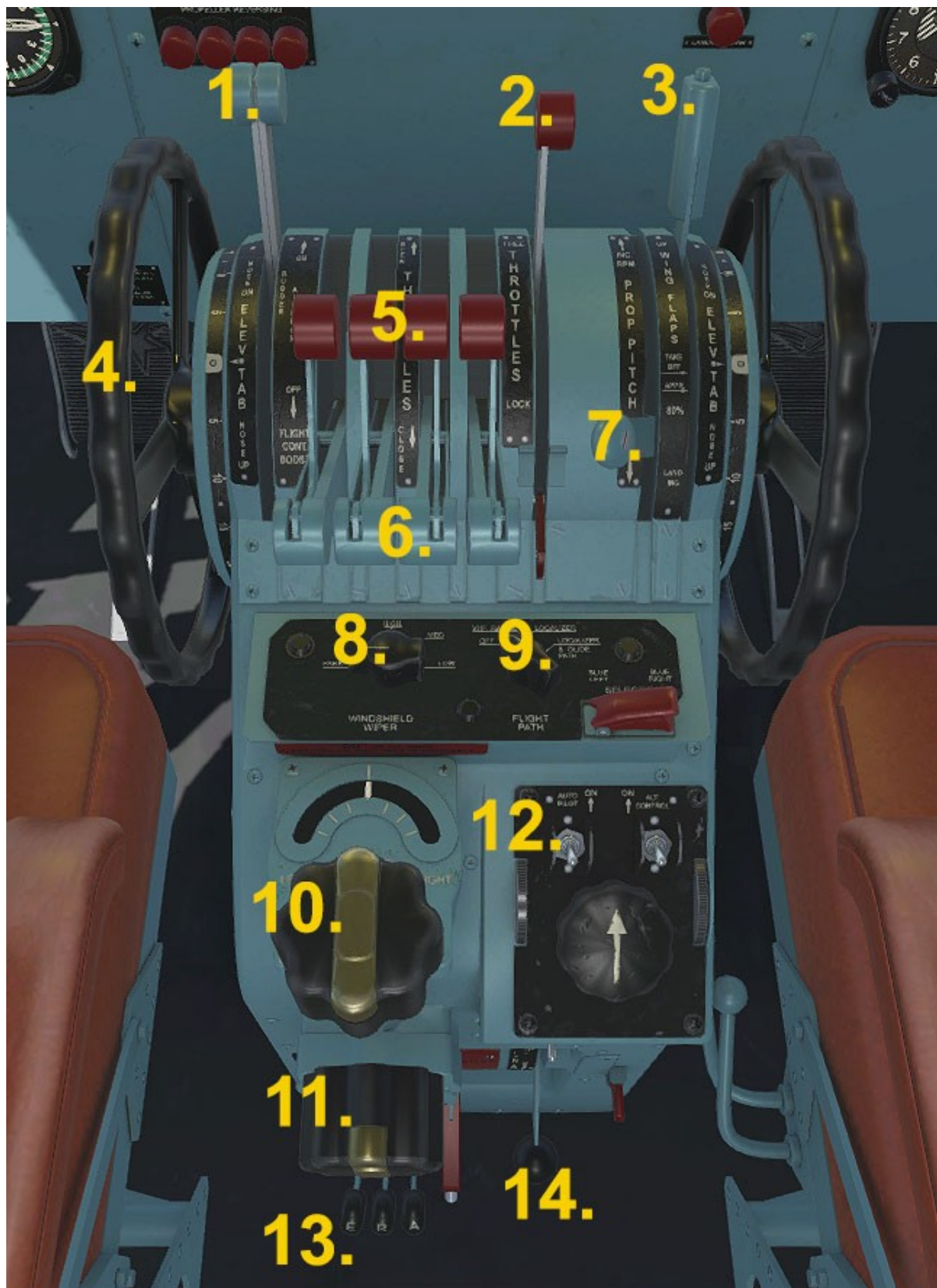
- 4. Course Deviation Indicator
- 5. Radio Magnetic Indicator
- 6. DME Indicator

Center Panel



- | | |
|-------------------------------|-------------------------------|
| 1. Manifold Press. Engs 1 & 2 | 6. Outside Air Temp. Ind. |
| 2. Manifold Press. Engs 3 & 4 | 7. Ldg. Gear & Flaps Ind. |
| 3. RPM Ind. Engs 1 & 2 | 8. Prop. Reverse Warning |
| 4. RPM Ind. Engs 3 & 4 | 9. Gear in Transition Warning |
| 5. Control Surface Trim Ind. | 10. Engine Fire Warning |

Center Console



- | | |
|------------------------------|-----------------------------|
| 1. Rudder/Aileron Boost Lvr. | 8. Windshield Wipers Switch |
| 2. Throttle Lock Lever | 9. Autopilot Approach Sw. |
| 3. Wing Flaps Lever | 10. Rudder Trim Knob |
| 4. Pitch Trim Wheels | 11. Aileron Trim Knob |
| 5. Prop. Reverse Levers | 12. Autopilot On/Off Switch |
| 6. Throttle Levers | 13. Autopilot Control Lvr. |
| 7. Propeller Pitch Lever | 14. Landing Gear Lever |

NOTES

Items **1.** and **2.** are animated and mousable, but have no function in the simulator.

Item **5.** - the reverse thrust levers are operable, but awkward to use collectively. A keyboard press (F2 and hold) or joystick button is preferable. Set joystick button to 'Throttle decrease quickly' to engage reverse thrust. Then, either press F1 or quickly 'blip' the throttle controller to return the throttle and reversers back to idle.

Item **7.** - it has not been possible to make a continuously variable lever to adjust all 4 propellers simultaneously, therefore this lever is actually a switch. Left-click will set all props to MIN pitch (no thrust), right-click will reset the props to MAX. pitch (the normal flight setting). Warning - if this lever/switch has been clicked inadvertently, no forward thrust will be available. Become familiar with the usual lever position – TOWARDS the pilots.

Item **12.** - It is preferable to use the Autopilot Icons for all AP commands (except APP, which has a switch at item **9.**, above). The AP Icons are bottom left of the pilot's panel and each has a corresponding amber lamp to indicate when the function is active.

Items **13.** (AP levers) are operable, but it is preferable to use the AP Icons (see above).

Item **14.** (Landing Gear Lever) is operable, but it is preferable to use a key press or joystick button to toggle the gear, due to the awkward position of this lever from the pilots' perspective.

Overhead Panel



- | | |
|------------------------------|---------------------|
| 1. Magneto Switches | 6. COMM 1 radio set |
| 2. Landing Light Extend Sws. | 7. NAV 1 radio set |
| 3. Landing Light Switches. | 8. ADF radio set |
| 4. OHD Panel Text Light Sw. | 9. COMM 2 radio set |
| 5. Transponder knobs | 10. NAV 2 radio set |

Side Console Pilot



1. Flare Release Switches

3. Structural Anti-Ice Lamp

2. Lights Switches

4. Structural Anti-Ice Switch

NOTES

Items 1. switches are animated and mousable, but have no function in the simulator.

Item 2. - all switches are animated and mousable, however only Beacon, Navigation, Taxi, Cabin and Panel lights switches are functional. The Panel light switch on this console only toggles the red text illumination on this console, NOT the main panel and instrument lights.

Side Console Copilot



1. Panel Light Switch

4. Defog Blower Switch

2. Pitot Heater Switches

5. Mast De-Ice Switch

3. Pitot Heat ON Lamps

6. NESA system Switch

NOTES

Items **1.** - The panel light switch on this console only toggles the red text illumination on this console, NOT the main panel and instrument lights.

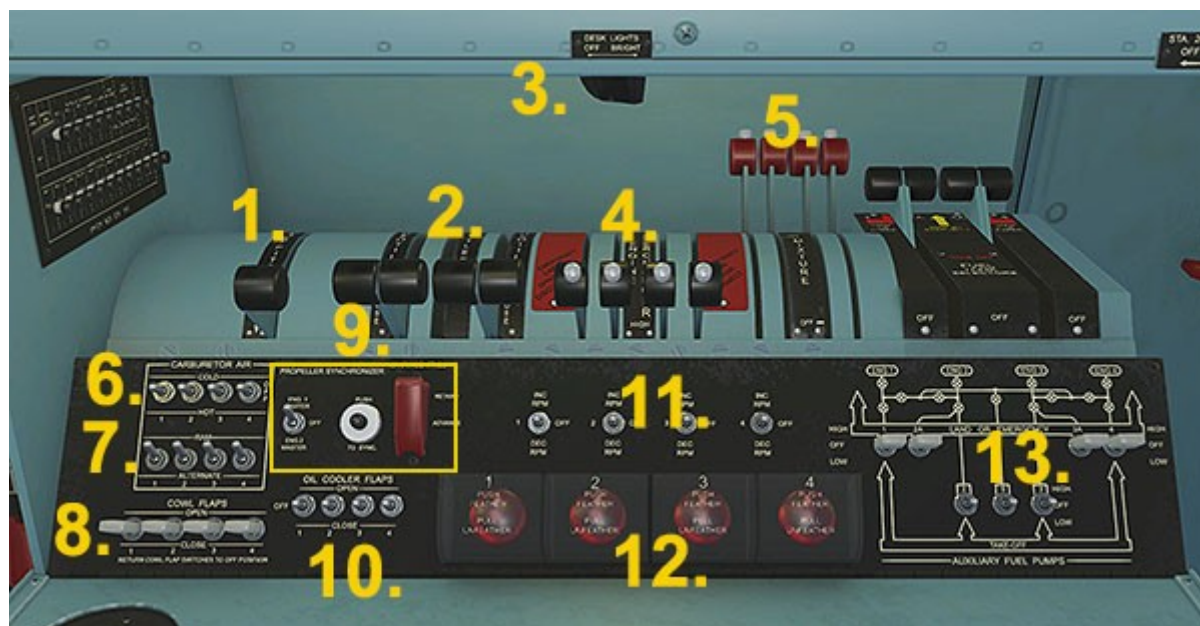
Item **2.** - Because the simulator does not support multiple pitot heaters, both Pitot Switches operate simultaneously.

Item **4.** - This switch activates a blower sound, but has no function in the simulator.

Item **5.** - This switch operates but has no function in the simulator.

Item **6.** - This switch causes the adjacent light to illuminate and is linked to the NESA power switch on the MJB panel, but has no function in the simulator (NESA = heated windshield system).

Flight Engineer Console



- | | |
|------------------------------|-------------------------------|
| 1. Propeller Pitch Lever | 8. Cowl Flap Switches |
| 2. Throttle Levers | 9. Prop. Synch Switches |
| 3. Panel Lights Switch | 10. Oil Cooler Flaps Switches |
| 4. Supercharger Levers | 11. Prop. Pitch Switches |
| 5. Mixture Control Levers | 12. Prop. Feather Switches |
| 6. Carb. Air Heater Switches | 13. Fuel Pump Switches |
| 7. Carb. Ram Air Switches | |

NOTES

Item 1. - it has not been possible to make a continuously variable lever to adjust all 4 propellers simultaneously, therefore this lever is actually a switch. Left-click will set all props to MIN pitch (no thrust), right-click will reset the props to MAX. pitch (the normal flight setting). Warning - if this lever/switch has been clicked inadvertently, no forward thrust will be available. Become familiar with the usual lever position – TOWARDS the Flight Engineer.

Item **3.** - This switch toggles all panel and instrument lights.

Item **4.** - Supercharger levers are operable but have no function in the simulator.

Item **7.** - Ram Air Switches are operable but have no function in the simulator.

Item **9.** - Prop. Synch. & Spark Control Switches are operable but have no function in the simulator.

Flight Engineer Engines Panel



1. Inclinometer

2. Cylinder Head Temperature Selector Switch

3. Synchroscope

NOTES

Nearly all the gauges and lamps are clearly labelled and so need no further explanation.

Item **2.** - this switch is operable but has no function in the simulator.

Item **3.** - The synchroscope instrument is used to match the revolutions per minute of propellers 2, 3 and 4 to propeller 1. The small indicator needles will rotate clockwise if the propeller in question is turning faster than propeller 1, they turn anti-clockwise if that propeller it is turning slower than propeller 1. Also, the speed of rotation indicates the extent of the rotational speed difference, ie. a slow rotation shows there is little difference compared to propeller 1. A fast rotation shows that the difference is substantial and should be addressed. The ideal situation is no movement of the needles at all. The needles can be adjusted by moving the throttle levers or the propeller pitch switches. Similarly, feathering a propeller (other than prop. 1) will cause a rotational discrepancy.

Flight Engineer Fuel Panel



1. Carb. Ice Warning Lamps

2. Gauge Test Buttons

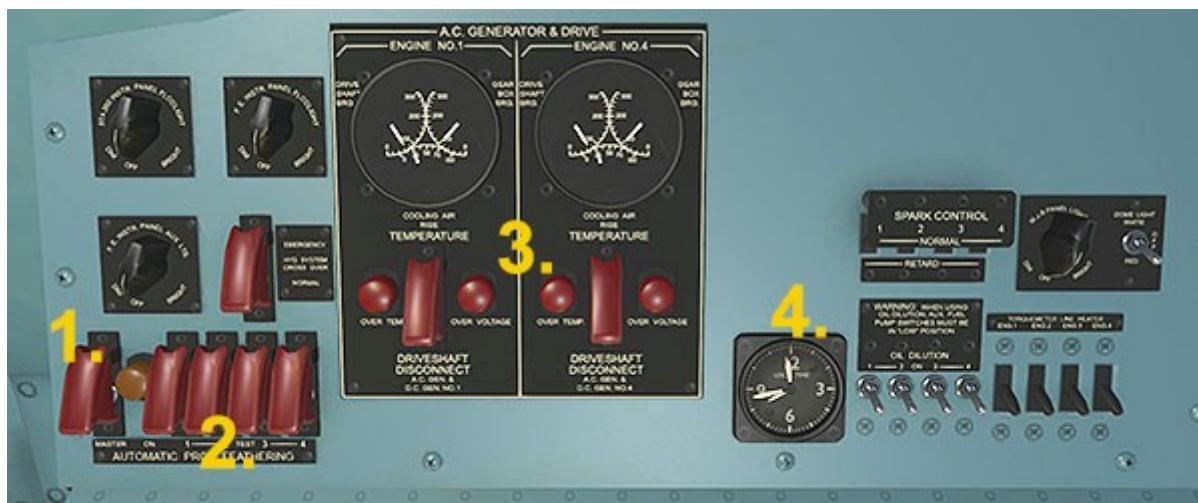
NOTES

All the gauges are clearly labelled and so need no further explanation.

Item 1. - These lamps illuminate when the outside air temperature drops below 0 deg. Celsius. When this occurs, the nearby (on the MJB Panel, to the left) Carburetor Anti Icer switches should be set to ON. The Carb Air Temperature Indicators (directly above the lamps) will then read above 0 degrees, regardless of outside air temperature, indicating a safe state for the carburetors. Incidentally, the Pitot Heaters will also need to be switched ON if the carb. air lamps have come on (Copilot side panel).

Item 2. - Press and hold the buttons and needles will swing to zero to indicate proper functionality.

Flight Engineer Top Panel

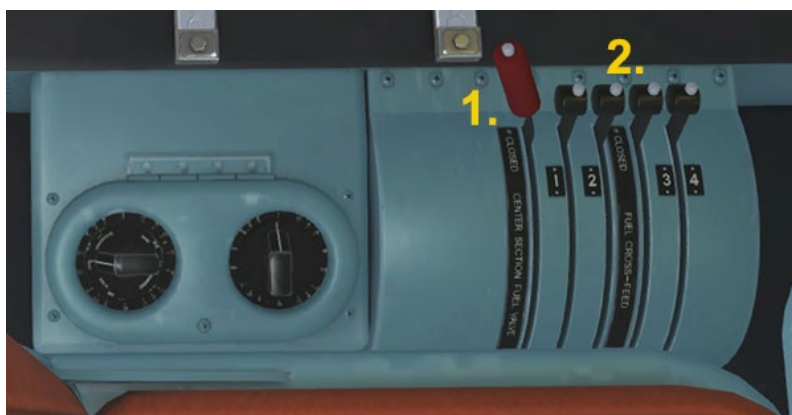


1. Prop. Feathering Master Switch
2. Prop. Feathering Switches
3. AC Generator Driveshaft Switches
4. Clock

NOTES

Item 3. - These switches will cause the gauges above to react, but have no actual function within the simulator.

Flight Engineer Floor Quad



1. Center Tank Shutoff (not supported by FSX)
2. Crossfeed Levers (not supported by FSX)

Flight Engineer MJB Panel (top)



- | | |
|--------------------------|---------------------------|
| 1. DC Voltmeter | 6. Generator Switches |
| 2. AC Voltmeter Selector | 7. Master Battery Switch |
| 3. DC Voltmeter Selector | 8. Main Inverter Switch |
| 4. AC Voltmeter | 9. NESAS System Power Sw. |
| 5. DC Ammeters | |

NOTES

Item **6.** - The generator switches 1-4 will be driven automatically to the ON position if ctrl-e autostart is used. The switches for generators 2A and 3A are simulated and have no function in the simulator, although the needles in the generator gauges will respond if they are used.

Items **8.** and **9.** - these are operable but have no simulator function. Item **9** is however linked to the NESAS power lamp on the Copilot's side panel.

Flight Engineer MJB Panel (btm)



1. Propeller De-Icing Switches
2. Engine Starter Selector Switch Warning Lamp
3. Engine Primer Button
4. Engine Starter Button
5. Carburetor Anti-Icing System Switches
6. Engine Starter Selector Switch

NOTES

Item **2.** - The warning lamp will illuminate to show that the Engine Starter Selector Switch is not in the OFF position.

Item **4.** - Engines can only be started if the Engine Starter Selector Switch is set to a particular engine, otherwise this button will be non-functional. Use left mouse click to move the switch clockwise, use right mouse click to move the switch anti-clockwise.

Flight Eng. Fire Extinguisher Panel



1. Engine Selection Lever

2. Retardant Bottle 1 Release Lever

3. Retardant Bottle 2 Release Lever

NOTES

Item 1. - If an engine is on fire, the warning lamp for that engine will illuminate and the Selection Lever must be turned towards that lamp before attempting to release fire retardant.

Items 2. & 3. - These levers will release the fire retardant, once the Engine Selection Lever is set to the burning engine. Only one retardant bottle will be necessary to extinguish the fire. If the lever is clicked a second time, it will reset to the ready position and can be used if another engine is on fire. Each nacelle contains two bottles of fire retardant.

Flight Eng. Station 260 Upper Panel



1. Fire Detector System Test Switches

NOTES

Item 1. - These spring-loaded switches are used to test the systems. The lamp above the switch illuminates if the system is functional.

Flight Eng. Station 260 Lower Panel



1. Left & Right Cabin Heater Switches
2. Cabin Pressure Altitude Selector
3. Cabin Pressure Rate of Change Selector
4. Refrigerator Cooling Fans Switches

NOTES

Item 1. - These switches when operated will affect the nearby Discharge Duct Temperature gauge.

Items 2. and 3. - these small knobs are operated using mousewheel input only. The gauge pointer will respond but there is presently no actual function with regard to the cabin pressure due to simulator limitations.

Item 4. - These switches when operated will affect the nearby Refrig. Discharge Duct Temperature gauge.

Aircraft Systems and Operation

This section of the manual details individual systems and their operation.

Navigation Instruments

Pilot's Direction Indicator (DI)



1. Autopilot Heading Adjuster
2. NAV 1 Direction Indicator
3. Autopilot Heading Indicator Bug

G2 Gyro Compass



A standard G2 Gyro used as a backup compass.

Radio Magnetic Indicator (RMI)



The thinner pointer (marked with '1') indicates the currently tuned NDB station direction. The wider pointer (marked with '2') indicates current NAV1 station direction, unless the NAV1/2 switch is in the NAV2 position, in which case this pointer will indicate the NAV2 station direction. Both pointers lie at 90 deg. when no station is being received.

Course Deviation Indicator (CDI)



1. NAV heading (VOR-OBS) adjuster. Use left or right click or mouswheel - drag is not supported.

2. NAV heading (VOR-OBS) display.

3. TO/FROM display. Indicates if aircraft is moving towards or away from the current tuned ILS station (LOC). Blank when no station is tuned (uses NAV1 radio).

4. Glideslope pointer. Sits centrally when no ILS glideslope frequency is detected, also presents red OFF flag.

5. Localizer pointer. Sits centrally when no ILS localizer frequency is detected, also presents red OFF flag.

6. Heading Pointer. Indicates the direction of the aircraft nose in relation to the heading shown in the display (2.). When the pointer is straight up, the aircraft is aligned with the displayed heading. The above image shows the aircraft is pointing due West, relative to the heading shown (North).

Autopilot

Autopilot controls can be operated by clicking the lettered icons.

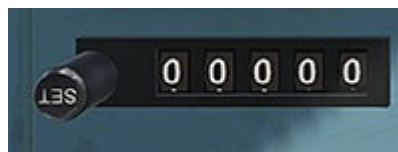


When a function is engaged the amber lamp to the left of the selected function will illuminate.

AP - Command Mode - This is the autopilot master switch. It will come on when clicked directly and also if any of the other AP functions are selected.

A - Altitude Hold - When Altitude Hold is selected the system maintains the current EXISTING altitude. Therefore setting up an altitude prior to take-off is not possible. The selected altitude can then be adjusted after take-off by clicking the altitude Set Utility, shown below.

ALT Set Utility - This gadget is not an authentic instrument, but serves as a convenient way to set the desired AP altitude. Use left or right mouse click, or mousewheel, drag is not supported.



H - Heading Hold - When engaged, the SET knob of the Pilot's Direction Indicator can be used to control the aircraft's heading.

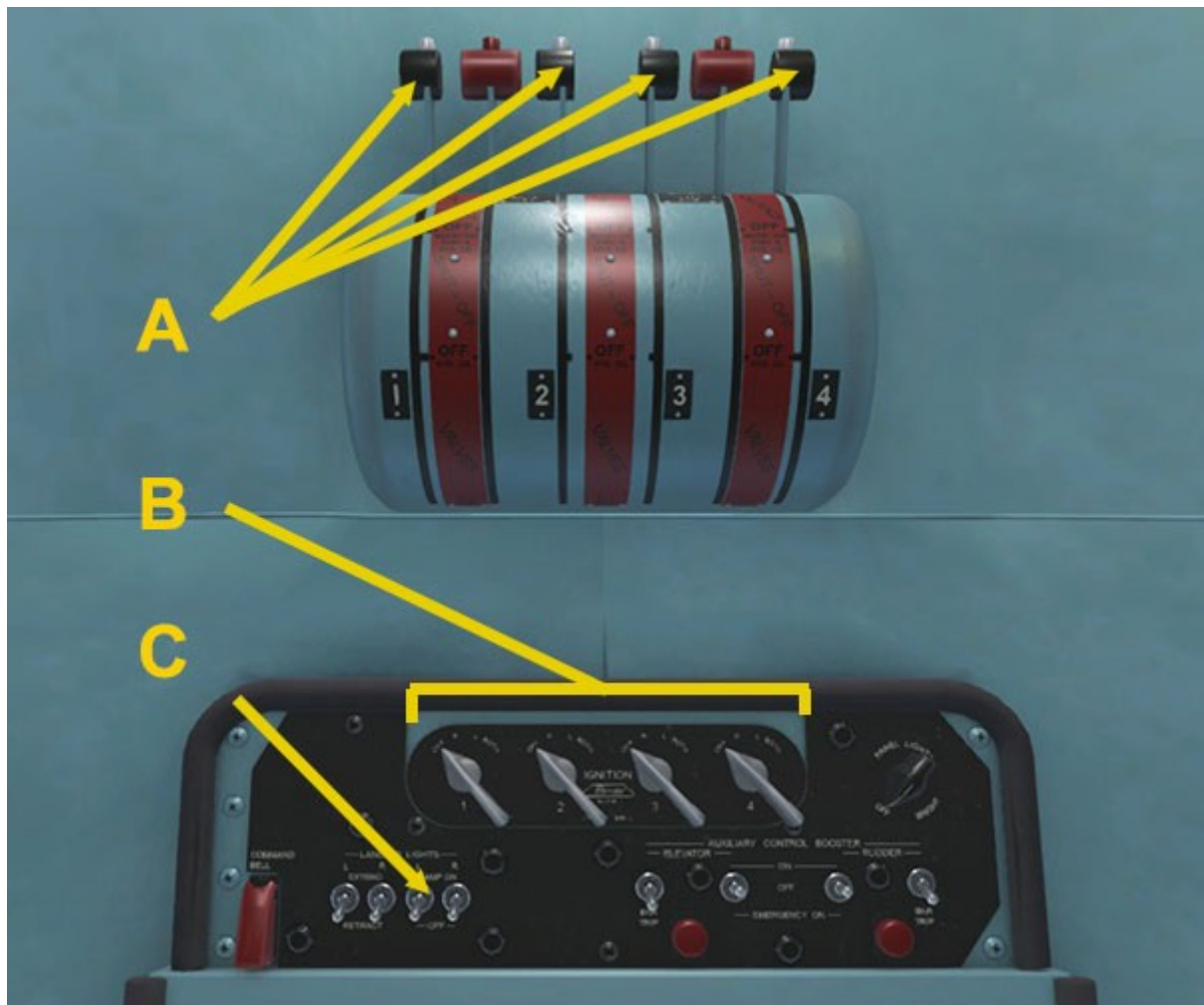
N- NAV Hold - Allows tracking of the heading value set using the Course Deviation Indicator (see above). The DI heading setting will have no effect if NAV hold is on.

P - Pitch Hold- This is just the ATT function, used to hold the current pitch of the aircraft and level the wings. The EC-121 climb rate when using ALT hold is conservative, so P can be used to obtain a more aggressive AP climb, especially if the aircraft loading is light and stalling is not likely.

APP - Approach Hold - Clicking the rotary knob on the center console toggles AP Approach mode.



Setting up a 'COLD & DARK' cockpit



A - Set fuel cutoff levers to OFF.

B - Set magnetos to OFF.

C - Set landing lights to OFF.



Check all Side Panel switches are OFF.



Set all engine levers and prop pitch lever (far left) to the OFF position.



MJB Panel:

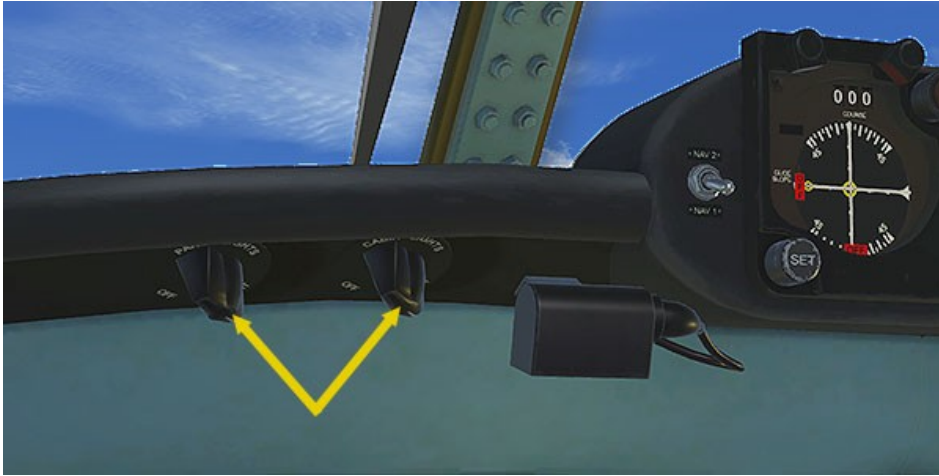
A - Set Generators to OFF

B - Set Prop De-Ice OFF

C - Check Eng. Start OFF

D - Check Carb Anti-Ice OFF

E - Set Mstr. Battery to OFF



Set Panel and Cabin Lights to OFF. Check windows are SHUT.
Cockpit is now COLD & DARK.

REFERENCE INFORMATION

Virtavia (E)C-121 Constellation / Warning Star Checklist

Engine Start:

1. Parking brake (center console lower left) SET.
2. Set throttles to IDLE.
3. Check all Generators are OFF.
4. Turn Master Battery switch on MJB panel ON.
5. Turn Panel and Cabin lights ON.
6. Turn Beacon & Nav Lights ON.
7. Auxiliary Fuel Pump Switches (FE Console) all ON.
8. Set Engine 1 Generator switch to ON.
9. Set Engine 1 Magneto switch to RUN .
10. Set Engine 1 Mixture Lever to RICH (fully forward).
11. Engine Start Selector Switch to Engine 1 SET.
12. Engine Primer button PRESS.
13. Engine Starter Button PRESS (hold for 3 seconds).
14. Engine Manifold Pressure and RPM CHECK.
15. Steps 8-14 for Engines 2, 3 & 4 REPEAT

NOTE: For simplified procedure, use Ctrl+E for auto engine start.

Taxi:

1. Prior to taxi check flight control surfaces by moving joystick and rudder pedals and verifying free movement.
2. Parking Brake OFF.
3. Navigation Lights ON.
4. Taxi Lights ON.
5. Propeller pitch set to MAX.

6. Use the lowest amount of power necessary to start rolling. Using excessive amounts of thrust will cause you to accelerate faster than you intended.
7. Once you attain 12-15kts of taxi speed slowly reduce power so speed can be maintained.
8. Use maximum nose wheel steering deflection whenever possible. The use of differential braking is discouraged due to heat build-up in the brakes.

Engine Run-Up:

9. Parking Brake ON.
10. Autopilot OFF.
11. De-Icing & Anti-Icing Systems OFF.
12. Radios SET.
13. Prop. Pitch MIN.

Before Take-Off:

14. Engine Run-Up COMPLETED.
15. Windows CLOSED.
16. Trim NEUTRAL.
17. Wing Flaps set to TAKE-OFF.
18. Mixture Levers RICH.
19. Pitot Heaters ON.
20. Engine Temps. & Pressures NORMAL.
21. Cowl Flaps to 30% SET.
22. Landing Lights EXTENDED AND ON.

After Take-Off:

23. Landing Gear UP.
24. Wing Flaps UP.
25. Landing Lights RETRACTED AND OFF.
26. Engine Temps. & Pressures NORMAL.

Descent:

- 27. Autopilot OFF.
- 28. Altimeter Baro. SET.
- 29. Wing Flaps set to TAKE-OFF.
- 30. Mixture Levers RICH.

Before Landing:

- 31. De-Icing Systems OFF.
- 32. Landing Gear DOWN.
- 33. Landing Lights AS REQUIRED.

Go-Around:

- 34. Throttles ADVANCE & REQUEST.
- 35. Wing Flaps set to TAKE-OFF.
- 36. Landing Gear UP.

After Landing:

- 37. Cowl Flaps and Oil Cooler Flaps FULLY OPEN.
- 38. Prop. Pitch set to MAX.
- 39. Wing Flaps UP.
- 40. Pitot Heaters OFF.
- 41. Landing Lights RETRACTED AND OFF.

Engine Shutdown:

- 42. Parking Brake SET.
- 43. Mixture Levers set to LEAN.
- 44. Magnetos OFF.
- 45. Fuel Shut-Off Levers OFF.
- 46. Beacon, Taxi and Nav lights OFF.
- 47. All unnecessary switches OFF.
- 48. Master Battery Switch OFF.

Order of fuel burn (normal operation):

1. External1 and/or External2 burn 1st until empty.
2. LeftTip and RightTip burn 2nd once External1 and/or External2 are empty. Center2 burns simultaneously with LeftTip and RightTip until empty.
3. LeftAux and RightAux burn 3rd once LeftTip, RightTip, and Center2 are empty. Center1 burns simultaneously with LeftAux and RightAux until empty.
4. LeftMain and RightMain burn last after all other tanks are empty.

Reference Speeds :

Rotate : 100 kts

Take-Off (Light Load) : 110 kts

Take-Off (Med. Load) : 115 kts

Take-Off (Full Load) : 120 kts

Stall, landing config. : 80 kts

Stall, clean config. : 95 kts

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