

MANUAL  
FLIGHT REPLICAS NORTH STAR/ARGONAUT  
FOR  
FSX AND P3D



***WARNING: This Manual must not be used  
for real flight training purposes***

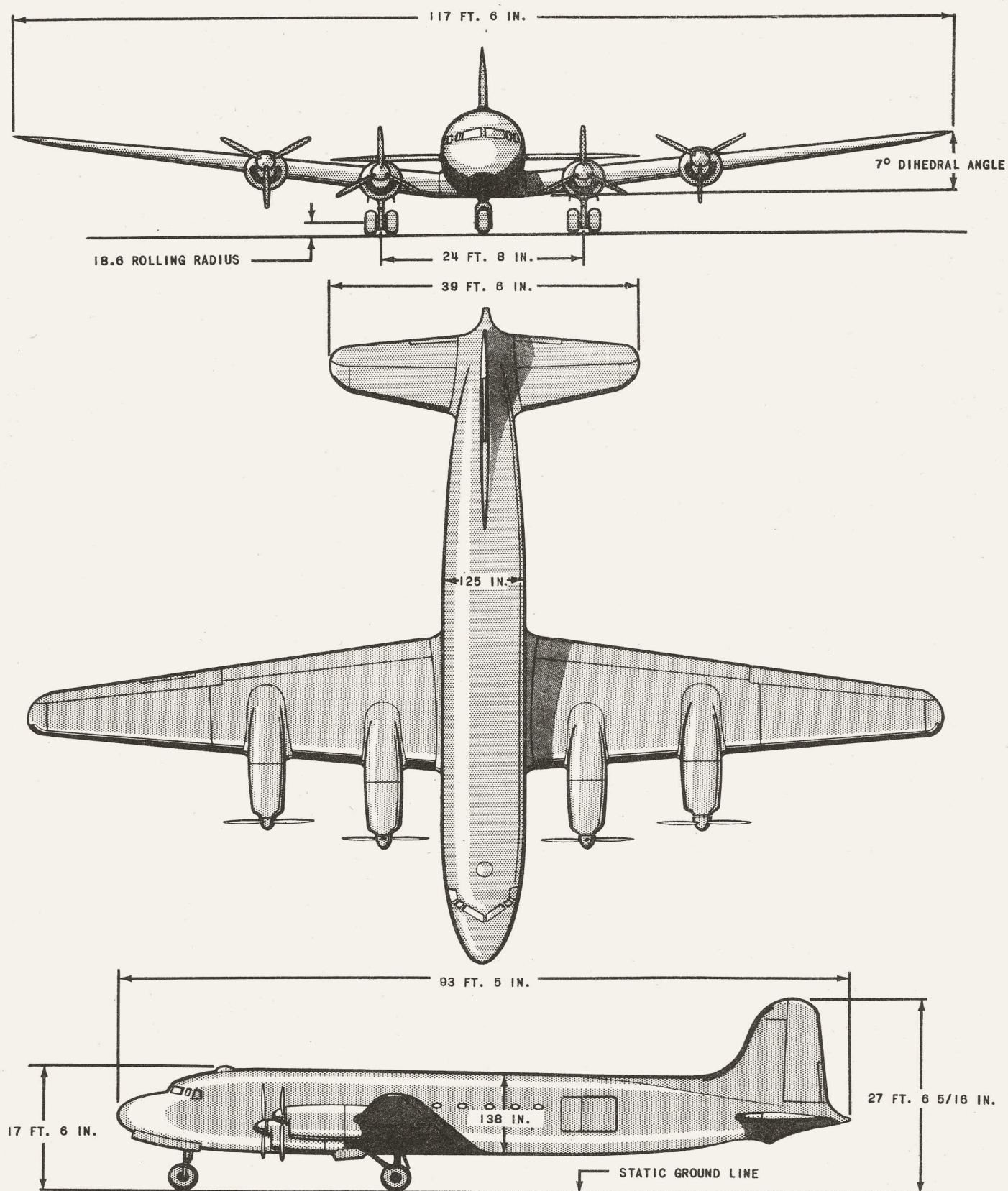


**MANUAL**  
*for*  
**THE NORTH STAR AEROPLANE**

powered by  
**FOUR ROLLS-ROYCE**  
**MERLIN ENGINES**

Issued for the information and guidance  
of all concerned.

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## DIMENSIONS AND AREAS

## History

Towards the end of WWII, Trans Canada Air Lines (TCA) and the Canadian government began looking for an airliner to meet Canada's post-war needs. It was decided that the tried and tested Douglas DC-4 would fit the requirement, and a licence was obtained from Douglas to build the aircraft. It was also decided to incorporate some components from the newer DC-6. TCA would decide the power plants to be used, and after much deliberation the Rolls-Royce Merlin 620 was chosen. Design development began at Canadair in 1944, and was designated the DC-4M. First flight was on July 15, 1946.

Fundamentally, the North Star had the Douglas DC-6 nose, landing gear and fuselage (shortened by 80 inches), DC-4 empennage, rear fuselage, flaps and wing tips, C-54 middle fuselage sections, wing centre- and outer-wing panels, cabin pressurization (where used), a standardized cockpit layout and a different electrical system.

71 were built. The RCAF used a C-54-fuselaged variant with the cargo doors. BOAC ordered 22 aircraft, which they renamed the Argonaut, and which flew with the airline from 1949 to 1960.

Both TCA and BOAC received many passenger complaints about engine noise, and both companies developed crossover exhaust systems to have the exhaust pipes exit on the side of the engine away from the passengers – which reduced noise to only 93-102 decibels – still loud, if you consider that the level at which sustained exposure may result in hearing loss is 90 – 95 decibels!

In later service, surplus North Stars were used by other airlines, such as British Midland and Overseas Airways, and several other smaller private and military operators. The RCAF used the North Star until 1965, and final flights overall were in the early 1970's. Only one complete North Star still exists, residing at the Canada Aviation Museum in Ottawa, Canada.



## General Notes:

1. Fuel and Max Operating Weight: **Be careful to make sure your North Star is within weight limits for take-off and landing.** For example, a fully loaded DC-4M2-4 North Star (passengers/ baggage/cargo compartment max weights loaded) would not normally be able to carry full fuel, as it would end up 11,011 lbs overweight. Plan fuel and loads according to your planned route.
2. **The aircraft will load with full fuel tanks:** check the aircraft **Fuel and Payload** dropdown window to see what you have on board, and remove fuel or payload as needed.
3. North Stars came in a great variety of layouts and equipment. For simplicity's sake (and the size of the package), the standard factory layout has been used here.
4. You must have the default Bendix\_king\_radio.dll, KingAir\_radio.dll and fs9gps.cab in your Microsoft Flight Simulator X/ or P3D/Gauges folder for the radios to work.
5. Some areas of the model have been simplified from reality (without taking away from overall feel, to accommodate the number of polygons needed to accurately depict the model overall. As well, cockpit animations have had to be limited, as there appears to be a limit within FSX on how many animations a model can have.
6. **Paint Kit:** This is available from the Downloads page here: <http://www.flight-replicas.com/Downloads.htm> Instruction included.
7. **Support:** Please see the last page of this Manual.

## North Star Cockpit

(General View)



Flight Replicas North Star for FSX and P3D



## Cockpit Panels

The following pages contain the cockpit panels' descriptions and other relevant notes. Due to the high number of gauges, the item numbers are loosely colour-coded for easier familiarity to their group function within the aircraft. The colours are as follows:

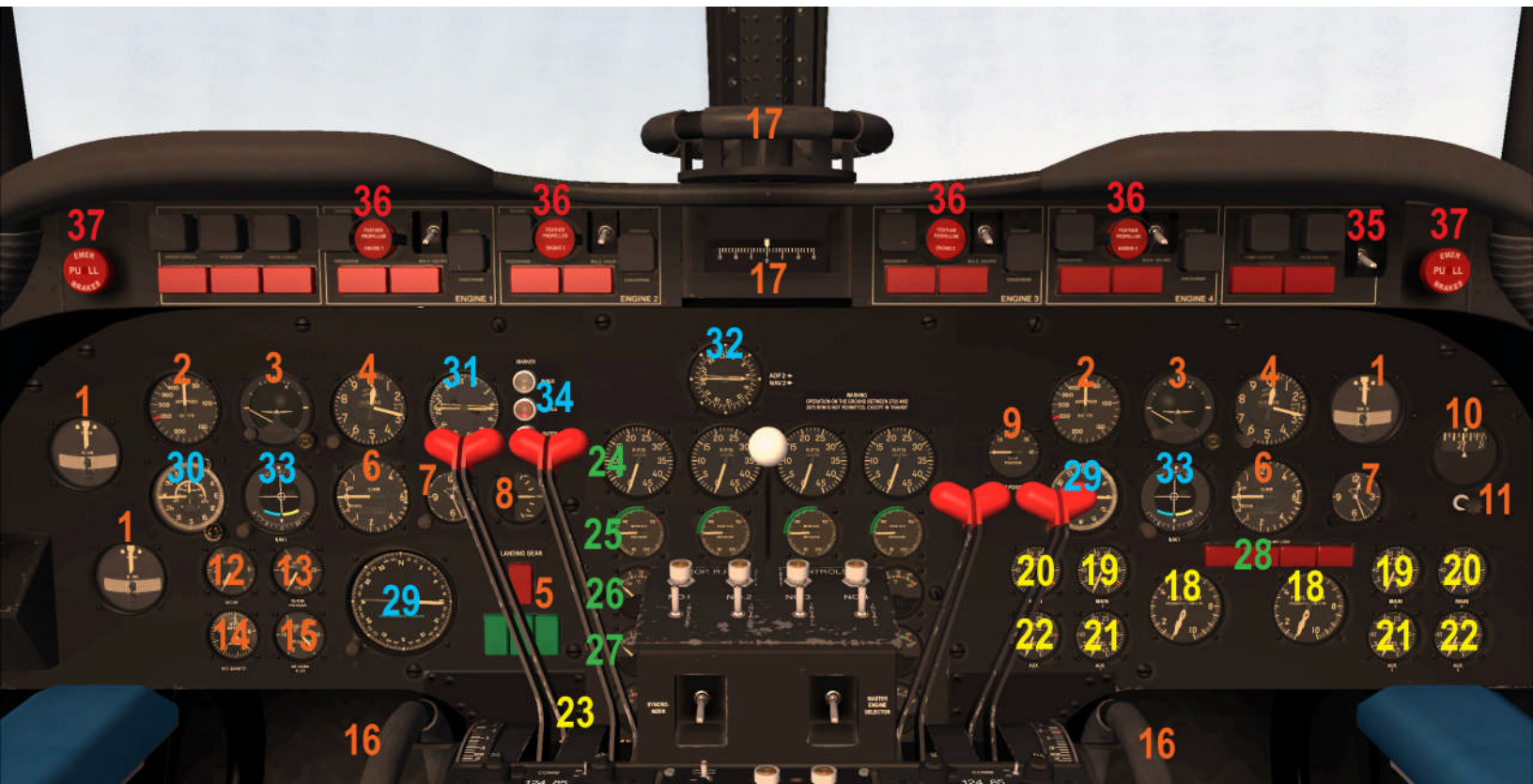
**ORANGE NUMBERS:** General

**BLUE NUMBERS:** Navigation

**GREEN NUMBERS:** Engine

**YELLOW NUMBERS:** Fuel

**RED NUMBERS:** Emergency



## Main and Emergency Panels

- |                                       |   |
|---------------------------------------|---|
| 1. Turn and slip gauges               | 20. Fuel quantity tanks Main 1 and 4        |
| 2. Airspeed                           | 21. Fuel quantity tanks Aux 2 and 3         |
| 3. Artificial Horizon and caging knob | 22. Fuel quantity tanks Aux 1 and 4         |
| 4. Altimeter                          | 23. Fuel valve levers (hidden in this view) |
| 5. Undercarriage status lights        | 24. RPM                                     |
| 6. Vertical Speed Indicator           | 25. Manifold Pressure                       |
| 7. Clock                              | 26. Coolant temperature                     |
| 8. Elevator trim position             | 27. Oil temperature                         |
| 9. Flap position                      | 28. Coolant loss warning lights             |
| 10. Gyro compass                      | 29. Compass and heading selector            |
| 11. Gyro compass adjustment knob      | 30. Master compass                          |
| 12. Suction                           | 31. RMI Nav1 and ADF1                       |
| 13. De-icer fluid pressure            | 32. RMI Nav2 and ADF2                       |
| 14. Hydraulic pressure                | 33. ILS                                     |
| 15. De-icer fluid quantity            | 34. Marker lights                           |
| 16. Elevator trim                     | 35. Emergency fire bell test                |
| 17. Rudder trim                       | 36. Propeller feathering buttons            |
| 18. Fuel flow                         | 37. Emergency braking                       |
| 19. Fuel quantity tanks Main 2 and 3  |   |





## Overhead Panel

1. Magnetos
2. Charge temperature
3. Ammeter
4. Oil Quantity
5. Fuel Pressure
6. Oil Pressure
7. Pitot Ammeter (will read when pitot tube systems are on)
8. Speaker



## Overhead Switch Panel

1. Idle-Cutoff switches
2. Supercharger Changeover Switches
3. Fuel Booster Pumps
4. Aux. Fuel Booster Pumps (n/a)
5. General Switches (self explanatory labels)(for wipers, use mouse wheel to select fast or slow)
6. Landing Lights
7. Panel Night Lights
8. Cabin Night Lights (n/a)
9. Master Battery Switch
10. Generators
11. Engine Start Switches (see Starter Sub-Panel page)
12. Oil Dilution Switches (n/a)
13. Carburetor heat Switches
14. Air Cleaner Switches (n/a)
15. Aux Radiator Flap Control (n/a)
16. Radiator Flap Controls (use mouse wheel)





## Overhead Switch Panel: Starter Sub-Panel

1. Priming Pump Selector for Left or Right Engines (**left-right click**)
2. Engine Group Priming Pump Selector Switches (light will activate when on)
3. Engine Starter Switches (**rotate mouse wheel forwards for Eng1, mouse wheel backwards for Eng2; mouse wheel forwards for Eng3, mouse wheel backwards for Eng4**)

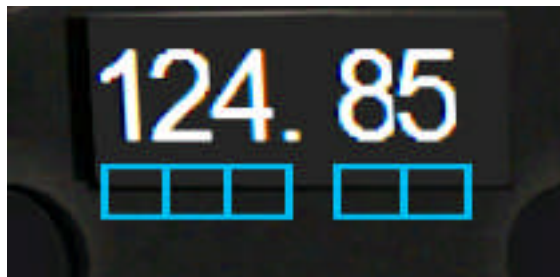


## Centre Console Radio Panel

- |                             |  |
|-----------------------------|--|
| 1. Com 1 Frequency Selector | 7. Transponder Selector Knob<br>(use mouse wheel)        |
| 2. Com 2 Frequency Selector | 8. Transponder Digit Selector<br>Knobs (use mouse wheel) |
| 3. Nav 1 Frequency Selector | 9. Transponder Transmitting<br>Indicator Light           |
| 4. Nav 2 Frequency Selector |  |
| 5. ADF 1 Frequency Selector |  |
| 6. ADF 2 Frequency Selector |  |

### Radio Click Spots:

(If the click spots are too small for easy use in the VC, substitute 2D pop-up panels are provided via Shift-1.)





## Centre Console Rear Panel

- |                        |                                 |
|------------------------|---------------------------------|
| 1. Cabin Lights Switch | 6. Autopilot Direction Selector |
| 2. Panel Lights Switch | (Small Heading Changes Only –   |
| 3. Flap Lever          | Use 2D pop Up Panel for Full    |
| 4. Landing Gear Lever  | Autopilot Functionality)        |
| 5. Autopilot On/Off    |                                 |





## Overhead Heater Panel

1. Cabin Heater Switch (“Auto” function only – needle will rise once heater temp rises) (**left-right click**)
2. Cockpit Heater And Blower Switches (“Heater on first; when temp up, switch on “Blower”)

## Radar Screens (RCAF Version)



(Continued next page)

Once on, Radar will sweep through the 150° degrees of an APS-42B radar (but without any return). Added functionality is available through provision of a gauge poly overlying the display, to which any 3<sup>rd</sup> party 2D radar gauge can be placed (with and needed controls placed in a 2D pop up window). You can then have fully functioning radar display in the VC for both Pilot and Radio Operator.

### 3<sup>rd</sup> Party Radar Gauge Installation:

In the panel.cfg, found in the “Panel” folder of the main aircraft folder, there are entries that have been placed specifically for 3<sup>rd</sup> party radar gauges. The white circle on the texture “NS\_radar\_background.bmp” in the “FR\_North\_Star” gauge folder corresponds exactly to the display area on the radar screen. (No support provided for installation as requirements may differ for different gauges.)

[Window Titles]

Window00=Radio Stack

Window01=GPS

Window02=Radar

//----- Use for 2D Radar Gauge

[Window02]

Background\_color=0,0,0

size\_mm=456,378

position=4

visible=0

ident=MAIN\_PANEL\_ALT1 //do not change

window\_size= 0.500, 1.000

window\_pos= 0.000, 0.000

gauge00=xx //your gauge here

//----- Use for VC Radar Gauge

[Vcockpit03]

file\_1024\_night=NS\_radar\_background

Background\_color=0,0,0

size\_mm=1024,1024

visible=0

pixel\_size=1024,1024

texture=\$NSradar

gauge00=xx //your gauge here





## Door Opening: RCAF Version

1. Click the door handle, and the Navigator's chair, desk and lamp will be automatically stowed, following which the door will open inwards.



## Door Opening: Passenger Versions

1. Click the edge of the Navigator's table, and the table will fold down and the lamp will be stowed.
2. Click the door and the door will open outwards.



## Throttles and Propeller Levers

1. The North Star used a collective propeller lever for all four engines. This could be over-riden if needed using the box on the central pedestal, but is not implemented on the model as in FSX engines usually function identically.
2. Throttle levers.





## Engine Ignition Analyzer Panel

RCAF North Stars used an in-flight engine ignition analyzer and tuner. While this function can't be replicated, by turning on the Analyzer on a reproduction of one of the typical displays can be seen.

1. Analyzer On/Off Switch.



## General Utility Click Spots

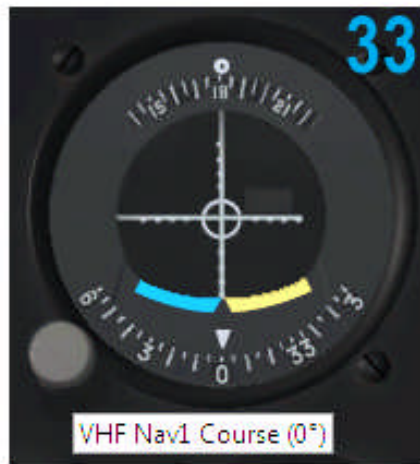
1. Add/Remove Control Yoke
2. Add/Remove Crew
3. Add/Remove Crew Stairs
4. Add/Remove Passenger Stairs

On the RCAF version, the left-hand cup holder (roughly in the position of 3 above) serves to add/remove the crew stairs. There is no 4.

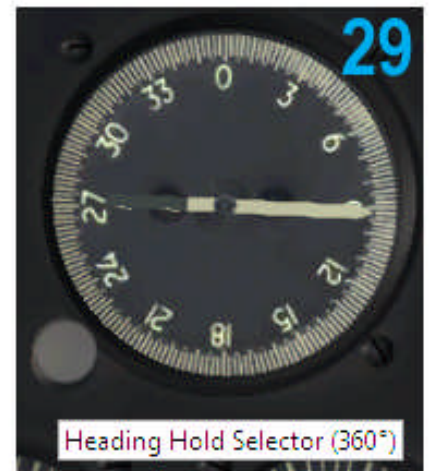
## Navigation



Master Compass



ILS



Nav Compass and  
Auto-pilot direction selector  
(when auto-pilot ON)

Nav Compass and  
Auto-pilot direction selector  
(when auto-pilot ON)



*Above: Nav instruments and their tooltips*

It wasn't possible to reproduce the navigation devices in use during the 1950's, but have replicated the functions where possible. Other instruments have been modified to enable them to use FSX/P3D functions.

Nav and ADF direction functions are displayed on the RMI instruments, and have placards which indicate which instrument is reading which radio.

*Continued next page*



Nav 1 used for ILS approaches, and is displayed on the ILS gauge (33 on the Main Panel illustration) when in range.

The ILS heading is inputted via the knob on the gauge, and the knob will display the precise direction selected via the Tooltip.

The large J-2 Gyro Magnetic Compass (29 on the Main Panel illustration) has been converted into the Auto-pilot direction selector. Use the knob to turn the face to the desired direction. The needle has the function of landing on North when the desired direction is achieved. The precise direction selected is displayed on the tuning knob Tooltip.

The second gyro compass, on the Co-pilot's panel (29 on the Main Panel illustration) has the same function as the J-2.

Full Auto-pilot functions are available via the Shift-1 2D pop-up panel.

The so-called Master Compass (30 on the Main Panel illustration) was originally used to tune all the other compasses used on the aircraft. It has a fixed face, and the needle points to the direction the aircraft is travelling. The smaller needle was used to input the latitude the aircraft was flying at, which then corrected the main needle. This function isn't replicated, but the smaller needle can be used as a reference to latitude is desired.

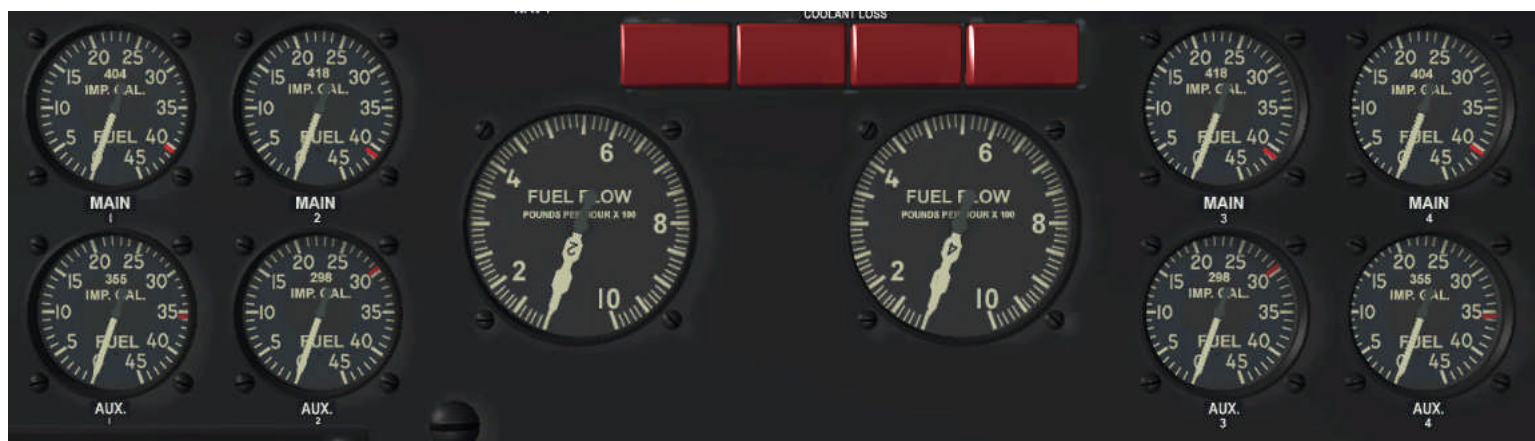
(Known bug: Nav1 RMI face, and co-pilot's heading compass/heading selector face, do not turn *at night* only. This does not prevent their respective needles and tooltips from functioning correctly.)

A GPS is provided in 2D pop-up form, using Shift-2

## Fuel Tanks

Fuel tanks read in Imperial Gallons. “Flying Notes” on page 32 give a conversion to US Gallons.

In order to have all the fuel gauges read correctly, a range of FSX –named fuel tanks and their required titles where used in the aircraft.cfg to represent the correct fuel system layout and sequence. Their names do not correspond to those within the real aircraft, and so their relationship to the gauges on the co-pilot’s instrument panel are explained here.



Leftaux	=	Main 1
Rightaux	=	Main 4
Leftmain	=	Main 2
Rightmain	=	Main 3

Lefttip	=	Aux 1
Righttip	=	Aux 4
External1	=	Aux 2
External2	=	Aux 3

The tanks will drain sequentially. During real operations, Auxiliary tanks were used first, with transfers to keep 25 Imperial Gallons deliberately left in each Auxiliary tank to protect seals from drying out. After Auxiliary tanks drained first it was standard operating procedure for the engines to run off of the main tanks for the rest of the trip. Fuel on/off levers are provided for the four engines but no crossfeed selectors are provided, although in real life a complex system of crossfeeding meant that any engine could feed off of any tank.

# Flying the North Star

## Pre-Flight Cockpit Check:

1. Parking brake on
2. Master Battery switch ON
3. Heater switches OFF
4. De-icers OFF
5. Upper Switch Panel: all switches OFF except:
6. Master Battery ON
7. Superchargers on MS
8. Seat Belt and No Smoking signs ON
9. Propeller anti-ice switch ON
10. Carburetor heat switches COLD
11. Main and Aux radiator flaps closed
12. Emergency Panel fire bell test
13. Main instrument panel check:
14. Undercarriage lights GREEN
15. Altimeters SET
16. Fuel quantities
17. Fuel levers ON
18. Throttles slightly open



## Starting and Warm-Up:

1. Prime engines: 5 seconds each
2. Start engines in following sequence: 3, 4, 2, 1 :
3. Magnetos ON
4. Engine start switch ON
5. Run engine at 1200 to 1500 RPM
6. Check oil pressure min 45 psi
7. Check hydraulic pressure (rising to 2650 –3000 psi)
8. Check vacuum pressure (4.25 – 4.75)

## Taxiing Procedure:

(\*Note: Taxiing slowly is recommended, as the nose wheel does not have much weight and will skid easily)

1. Prior to taxiing:
2. Primers OFF
3. Generators ON
4. Radiator flaps POSITIONED
5. External power REMOVED
6. Hydraulic pressure NORMAL
7. Carb heat HOT
8. Beacon lights ON
9. Use of full flap in congested areas helps eliminate slipstream effect and “dusting” of ground personnel and other aircraft.

## **Run-up Sequence:**

1. Parking brakes ON
2. Wing de-icers ON
3. Supercharger switches CHECKED
4. Propeller lever to full fine: propeller lights ON
5. Magnetos CHECKED L R BOTH
6. WARNING: Engine operation on the ground between 2725 and 2975 RPM is not permitted, except in transit. A vibration period exists in this range which can result in engine damage.

## **Take-off Check:**

1. De-icers OFF
2. Pitot heat both ON
3. Windshield wipers OFF
4. Superchargers MS
5. Generators ON
6. Fuel flowmeters CHECKED
7. Propellers FULL FINE
8. Magnetos CHECKED
9. Fuel Booster switches ON
10. Auto-pilot master switch OFF
11. Main radiator flaps OPEN
12. Hydraulic pressure CHECKED
13. Artificial Horizon UNCAGED
14. Fuel quantity CHECKED

15. Wing flaps 15 DEGREES (or as needed)
16. Controls FREE
17. Heaters OFF
18. Carburetor heat COLD

## **Take-off Procedures:**

1. Smoothly advance throttles to 70 in.hg +/-1 MP
2. At approximately 50 Knots the rudder should become effective
3. At 100 Knots raise the nosewheel clear of the runway
4. The aircraft should leave the ground at approximately 110 Knots (depending on weight, etc.)
5. Raise the undercarriage as soon as feasible. DO NOT operate brakes to stop the wheels spinning before raising the landing gear as structural damage may result.
6. Upon becoming airborne the aircraft should be climbed with a slow rate of climb (eg. 250 ft/min) while airspeed builds up to 135 Knots
7. When 135 Knots is attained, do an initial power reduction
8. Landing lights shall be used for night take-offs. They are turned off and retracted after the initial power reduction
9. At an altitude of 300' to 500' the flaps are fully raised
10. Fuel booster pumps OFF

## **Climb:**

1. The normal climb is made at 54" MP and 2750 RPM. The maximum rate of climb is achieved at 135 Knots; however for passenger comfort a rate of climb of 500 ft/min is normally desirable. Adjust RPM and MP as required to maintain 500 ft/min.



## **Climb at High Altitude:**

1. High altitude climb is considered to occur when desired MP cannot be maintained at 2750 RPM, in which case RPM may be increased to 2850 RPM.
2. When an MP of 48" can no longer be maintained at 2850 RPM, the superchargers should be changed from MS to FS and engine speed reduced to 2750 RPM.
3. As a climb is continued and an MP of 54" cannot be maintained at 2750 RPM, engine speed will be increased to a maximum of 2850 RPM
4. Procedure to change superchargers from MS to FS:
5. Retard engine 1 and 4 throttles to 30" MP
6. Select engine 1 and 4 to FS gear
7. Advance engine 1 and 4 to 54" MP
8. Retard engine 2 and 3 throttles to 30" MP
9. Select engine 2 and 3 to FS gear
10. Advance engine 2 and 3 to 54" MP
11. Decrease engine speed to 2750 RPM.
12. Change back from FS to MS can be made by straight selection.

## **Cruise:**

1. Normal cruise is at 2550 RPM and 48" MP, fuel flow 411 gph

## **Descent:**

1. Descent is normally made at not more than 500 fpm, for passenger comfort.
2. At approximately two minutes prior to the letdown point, reduce airspeed to 160-170 Knots IAS.

## Approach:

1. General approach is made at 135 Knots, flap 15 degrees
2. Closer to the airport, reduce speed to 120 Knots.
3. On final approach, once undercarriage and flaps have been lowered, reduce airspeed to 115 Knots.
4. Superchargers on MS CHECKED
5. Fuel boosters ON
6. Seat Belt and No Smoking signs ON
7. Auto-pilot Master OFF
8. Carburetor Heat COLD (or as required)
9. Hydraulic pressure CHECKED
10. Fuel quantity CHECKED (Max fuel allowed: 9500 lbs / 1320 Gal)
11. Undercarriage DOWN AND LOCKED
12. Flaps as required
13. Landing Lights extended and ON
14. Trim CHECKED

## Landing:

1. Airspeed 100 Knots over the threshold
2. Touch down slightly nose up, on the main wheels.
3. Aircraft should be allowed to remain with nose wheel off the runway for some distance, but not so far that it takes considerable backpressure on the control column, or that the nose wheel cannot be gently lowered onto the runway.

## **Post-Landing Taxiing:**

1. Flaps UP
2. Fuel booster pumps OFF
3. Anti-ice systems OFF
4. Pitot heat OFF
5. Radiator flaps OPEN
6. Carb heat HOT
7. Hydraulic pressure CHECKED

## **Shutdown:**

1. Idle Cutoff switches to OFF
2. Ignition switches OFF
3. Generator switches OFF
4. Radiator flaps AS REQUIRED
5. Carburetor heat switches AS REQUIRED
6. Fuel levers OFF
7. Panel lights OFF
8. Nav and beacon lights OFF
9. Master Battery switch OFF



## Flying Notes:

### **DC4-M2-4:** (Trans-Canada Air Lines)

Empty weight	50,955 lbs
Max. Gross Weight:	78,850 lbs
Max Landing Weight:	72,000 lbs

### **C-54GM:** (RCAF; Turks Air Cargo)

Empty weight	40,000 lbs
Max. Gross Weight:	76,500 lbs
Max Landing Weight:	67,000 lbs

### **C-4 (includes crossover exhaust variant):** (BOAC)

Empty weight	45,464 lbs
Max. Gross Weight:	80,200 lbs
Max Landing Weight:	72,000 lbs

### **C-4-1:** (Canadian Pacific Airlines)

Empty weight	49,230 lbs
Max. Gross Weight:	79,850 lbs
Max Landing Weight:	72,000 lbs

(All variants in this FSX package delivered with 17668 lbs of payload on board)

### **Power and Speed Settings:**

Take-Off:	71.5" MP and 3000 RPM /110 knots
Climb:	54" MP and 2750 RPM /135 Knots or 500 fpm
Cruise:	48" MP and 2550 RPM
Descent	160-170 Knots
Approach:	135 Knots / flaps 15

Final Approach: 115 Knots / flaps as required

Threshold: 100 Knots

### **Fuel Quantities:**

Main Tanks 1 and 4: 2908.8 lbs / 404 Imp. Gal (485.18 US Gal)

Main Tanks 2 and 3: 3009.6 lbs / 418 Imp. Gal (501.9 US Gal)

Auxiliary Tanks 1 and 4: 2556 lbs / 355 Imp. Gal (426.33 US Gal)

Auxiliary Tanks 2 and 3: 2145.6 lbs / 298 Imp. Gal (357.88 US Gal)

Total (max. fuel) = **21,240 lbs** / 2950 Imp. Gal (3542.80 US Gal)

### **Speed Limitations IAS: (DC-4M2-4)**

Normal operating max speed: 215 Knots

Never exceed speed: 245 Knots

Manoeuvring speed: 155 Knots

Lowering Undercarriage: 170 Knots

Flaps extended: 15 degrees: 170 Knots

30 degrees: 143 Knots

40 degrees: 140 Knots

Min. take-off climb speed: 73,000 lbs: 101 Knots

79,850 lbs: 108 Knots

Min approach speed: 105 Knots

**Sounds:** Sounds in this package are a combination of default and custom.

## **Support:**

[support@flight-replicas.com](mailto:support@flight-replicas.com)

All requests for support must be accompanied by the following information:

1. Place/website where the North Star was purchased;
2. Order number;
3. Name used when purchasing; and
4. Date of purchase.

No support will be available without this information.

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