

# **DC-3 Airways - Douglas DC-3 N1776 for FS2002**

## **with TR Panels**

**by Bill Rambow and Roy Chaffin**



**Manual written and illustrated by Bill Rambow (Best viewed in 1024 x 768 screen resolution.)**

## **INTRODUCTION**

A short time ago Charlie Wood, aka "The Boss" of *DC-3 Airways*, asked the R4D Team for permission to use our updated R4D flight model and sound package (released at Christmas time for FS2002) in Jan Visser's company ship, N1776. Charlie also wanted to use the R4D quadrant in an update he planned to do of the DCA basic training panel. Well, some time ago Roy and I had promised Charlie a panel, specially created for DCA, and this looked like an opportunity to make good on the promise. What we would produce, and what you have here, is a complete package exclusively for DC-3 Airways.

We are calling the panels TR, for Type Rating, because our initial intent was to do a replacement for the panel DCA pilots are required to use while making the six qualification flights for their DC-3 type rating. The finished product has gone a bit beyond what Charlie really wanted. It has all the functions of the old panel, although not in the same forms -- the trim indicator is not digital, for instance. It also retains large, easy to read gauges and radios, and the bare minimum in engine instruments - a Manifold Pressure Gauge and a Tachometer, like its predecessor. Unlike the old panel, it has a realistic engine starting system that we developed for our Dutch Dakota Association DC-3 (PH-DDZ) panel. Don't worry, though -- new (or lazy ;-)) pilots will not be required to use the realistic starting sequence, if they do not want to. That will be covered in the appropriate section of this manual.

Did you happen to notice that plural in the title? Yes, panels. No, it's not another dual-panel, like the R4D. All your flying will be from the Captain's seat in these. But because we wanted to keep the gauge sizes as large and readable as practical, especially for the navigation instruments, without overcrowding the panel, we decided to produce two variations of the TR panel. In this way, we could provide the instruments pilots taking their type rating flights would require for different navigation exercises and precision approaches.

We hope we are not shooting ourselves - or more accurately, the [Mid Atlantic Air Museum](http://www.maam.org/) <http://www.maam.org/> - in the foot with this panel release! The fear is that some pilots may see no need to move up to the R4D panel, now, and therefore will not bother to obtain the R4D CD or register their R4D FS2002 upgrade. That would be a shame. There are an awful lot of good and useful things on the R4D Donationware CD which make it worth the money, even if you choose to stick with this panel.

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## PACKAGE CONTENTS and CREDITS

The aircraft is of course Jan Visser's beautiful company flagship, N1776. No alterations have been made to this, of course, but Jan has hopes to upgrade the plane in the future to take advantage of FS2002 features. Questions about that, or any other feature of the aircraft model should be directed to :- Jan [jg.visser@chello.nl](mailto:jg.visser@chello.nl)

The flight model (flight dynamics) are straight from the FS2002 R4D. That means you should read and heed the v4.75 R4D manual for specifics on operating the "new" N1776. The FD was produced by Roy Chaffin, Erik Ellis, Bill Rambow, Ian Ropper, Brian Withers, and Jan Visser.

The FS2002 R4D sound package, by Alan Landsburgh and Roy Chaffin is installed. Turn up the sub-woofer and feel the thunder of those P&Ws!

The new Sperry Mark III, by Roy Chaffin, Arne Bartels, and Bill Rambow, that came out in the R4D Autopilot Upgrade v4.75 is fitted to the panel.

The complete DC-3 checklists and reference page, accessible through the Aircraft / Kneeboard menu, were adapted from real life DC-3 checklists found in the R4D CD's vintage DC-3 pilots' manuals, by Bill Rambow.

Finally, the panel and gauge graphics are by Bill Rambow, and the programming by Roy Chaffin. *(I always say, I get the fun part, and Roy gets the tedious bits. :-)*

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## INSTALLATION

Easy! Just open the "dca\_dc3.zip" (*you have already, haven't you? ;-)*) then double-click on "dca\_dc3.exe". If yours is a non-default installation of FS2002, be sure you change the path in the install routine to match, when prompted. That's all there is to it! Everything will be put in the right places and you will be ready to fly.

There is no need to delete your previous N1776 installation before installing this one. This package will be a distinct entry from any other N1776 installation you may already have in your hangar - such as an R4D panel equipped one. The aircraft folder is also named differently - it's "DC-3 DCA N1776", instead of "Douglas DC-3 DCA N1776". The shorter title not only differentiates the two, but also prevents the "can't find the model in the library" flag in the menu.

The aircraft package has only one FS2002/ Aircraft folder containing both the TR1 and TR2 panels. The two different versions are differentiated in the FS2002 Aircraft menu by the Variation suffix "TR1" and "TR2". For instance, to select the DC-3 equipped with the TR1 panel, here is the selection sequence in the FS2002 *Select Aircraft* menu:

*Aircraft manufacturer* - Douglas

*Aircraft model* - DC-3

*Variation* - DC-3 Airways N1776 TR1

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## MANUAL CONTENTS AND PURPOSE

This manual has been designed to teach and explain the operation of the TR1 and TR2 panels, and the N1776 Aircraft for FS2002. It will *not* teach you everything you need to know to participate in DC-3 Airways flight operations. That mission is amply fulfilled by the various tutorials to be found on the DCA website.

Nor will it teach you how to operate Microsoft Flight Simulator 2002. For that, you must take advantage of the various learning tools and extensive Help files located within the FS program itself.

Further information on flying the DC-3 can be found on our R4D "Donationware" CD, <http://www.roychaffin.com/R4DcdPR.htm> in the form of numerous manuals, both mine, and vintage government issued C-47 Pilot's Manuals. There is also a wealth of information to be found on the internet about this most beloved of all airliners, and links can be found to many of these on the DCA site.

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## HOW TO STAY OUT OF HOT WATER WHEN FLYING N1776, IN 9 EASY STEPS.

1. Start with a "Clean Boot-Up of your computer.
2. Always use the "Default Flight - Meigs Field" with the Cessna to start FS2002.
3. Set your display resolution as high as practical (minimum 1024 X 768).
4. Learn and use mouse points for the control quadrant.
5. Use switches (mouse points) rather than keyboard commands, when possible, to avoid out-of-synch switch conditions.
6. Follow the exact engine starting sequence, or...
7. If you use the "Lazy Man's Starting System", or the FS2002 engine start shortcut (Ctrl + E), don't forget to turn on the generator and battery switches.
8. Turn on the Nav Light switch (and keep lit when in flight) to bring the pilots to the cockpit and close the passenger door.
9. Remember to lean out the mixture as you gain altitude, to prevent power loss.

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## SYSTEM REQUIREMENTS AND RESOURCES

*To use this add-on plane, panel, and sounds you must have at least the following:*

1. A PC capable of running FS2002 with acceptable frame rates. (See *the FS2002 box for basic hardware requirements.*) A lot has been said about the relative frame rate performance of FS2002. We do not intend to enter that debate here. Frame rate acceptability is in the eye of the beholder, after all. But you will be pleasantly surprised at the frame-rate performance of this package, compared to default FS aircraft and most other add-ons. If you can run FS2002, you can run this package.

2. FS2002 properly installed. (*Duh!*) Hey, sometimes you have to state the obvious. We were all newbies, once. ;-)

3. It is important that you start with a clean system, especially if yours is mid-range or lower computer. \*

*\* We have found that the easiest, fastest way to accomplish a "clean slate" on start-up is to use the great Freeware utility by Neil J. Rubenking called, "End It All" <http://www.roychaffin.com/pub/enditall.zip>. It works like a charm in Win95, Win98, Windows Me, or Windows XP, closing all those extraneous programs running in the background (everything but Explorer and Systray). You may be amazed at how this will free up resources and minimize problems running FS2002.*

4. **VIRUS SCANNERS** Another thing that can affect the performance of your system is whether or not your virus scan program is running. While running FS2002, disable your virus scanner - **DO NOT UNINSTALL IT!**- and don't forget to re-enable it when you go on-line again.

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## CONTROL SENSITIVITIES

Our DC-3 flight model was designed to fly and handle properly with default FS2002 Control Sensitivities. These are set using the FS2002 Options/Controls/Sensitivities menu. If you have changed theme since installing FS2002, you should use the "Reset defaults" button.

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## DISPLAY RESOLUTION

The TR panel is best suited for higher resolutions. It was designed, nominally, for 1024x768, but if your monitor and video card will support it, 1280x1024 is even better. If you are experiencing trouble making out the small letters and numbers, give a higher resolution a try. Just go into Windows Control Panel/Display/Settings to select a higher resolution, and then adjust the FS2002 menu settings for Options / Settings / Display. You may be surprised at how much that helps the old eyestrain.

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# PANEL FEATURES

Panel TR1, shown in the diagram below, features two Omni Bearing Indicators (OBI's) and a single-needle Radio Magnetic Indicator (RMI).



The TR2 panel varies in only two details. Omni Bearing Indicator 2 (VOR 2) has been replaced with a standard Automatic Direction Finder (ADF) which has an adjustable compass card ring. To retain the VOR 2 (and keep the NAV 2 radio employed), the Radio Magnetic Indicator becomes a double-needle RMI...



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## RADIO MAGNETIC INDICATOR (RMI)

The TR2 panel's double-needle RMI...



The TR1 panel features a single-needle RMI, with only the yellow (ADF-NDB) needle, and no Heading flag.

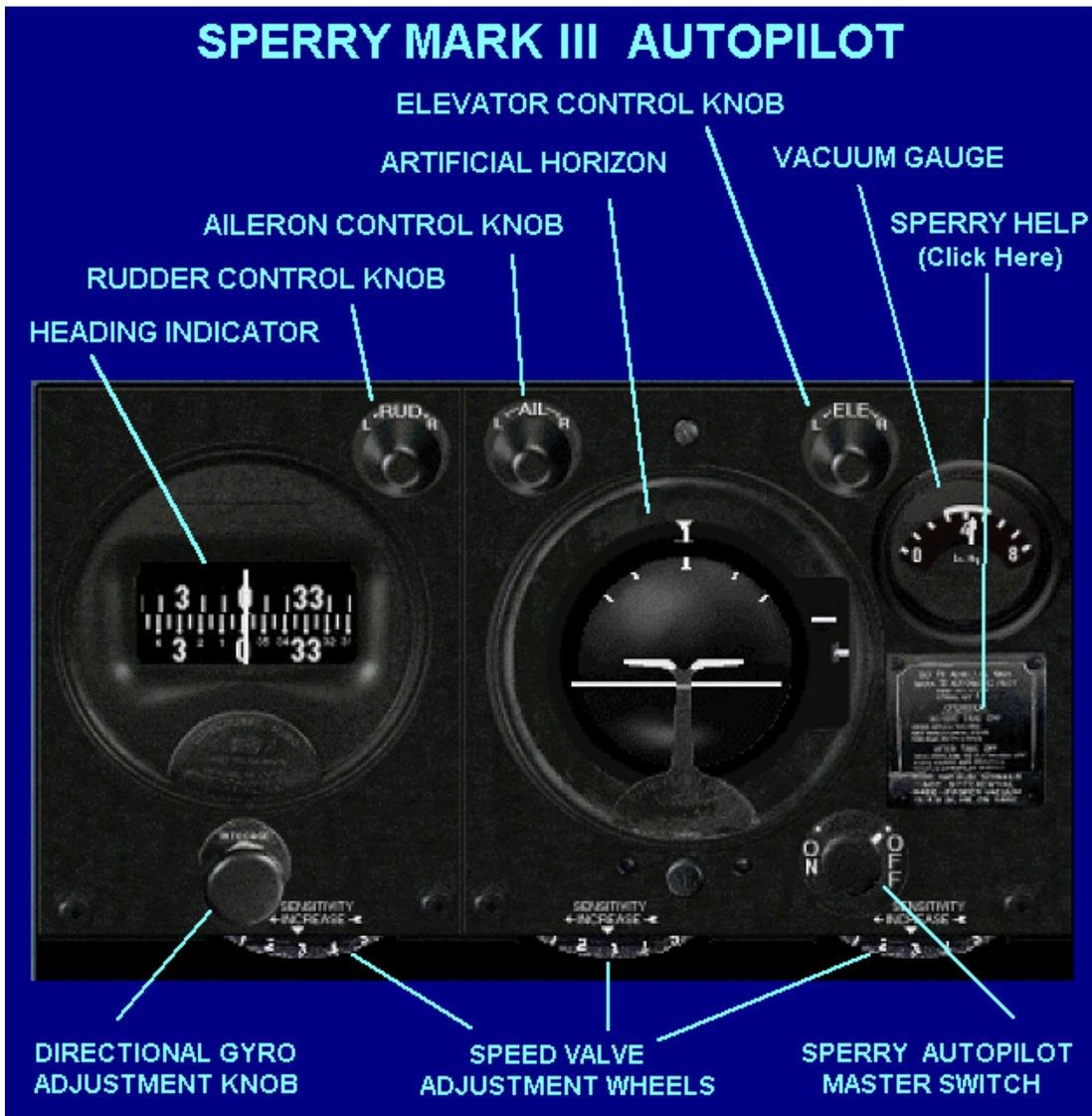
The yellow ADF needle will always point to the Non-Directional Beacon (NDB) tuned on the ADF Receiver, when the station is in range, the aircraft's nose always being oriented at the top of the compass card.

The green OBI needle will point to the Variable Omni Range (VOR) station tuned on the Nav 2 Radio Receiver, when the station is in range.

When no VOR station is being received, or there is no electrical power to the instrument, a red flag will appear in the upper left quadrant of the compass rose. Also, the needles will point to the right (*as is the yellow needle, above*) whenever they are not indicating a station.

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## THE SPERRY MARK III AUTOPILOT



## HOW THE SPERRY MARK III CONTROLS FLIGHT

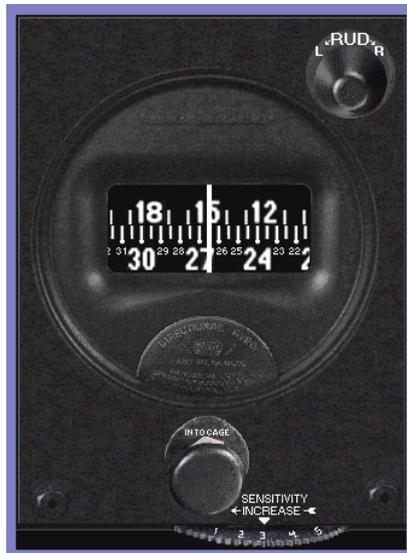
The Mark III is very different in operation from modern autopilots that hold set altitudes, headings, rates of climb and descent, and so on. The Sperry tends to control ATTITUDES, namely BANK, and PITCH angles. I say tends to control, because what the Sperry is really controlling are the angles held by the elevators and ailerons. So it really isn't accurate to claim it will hold attitudes, since these can be affected by changes in aerodynamic forces. For instance, as every pilot knows, wind will affect the angle of bank for a given aileron angle as the aircraft turns through the direction of the wind. Even Trixie, your slightly overweight stewardess, bringing you a cup of java from the aft galley will cause a change in pitch trim, even though you have the Sperry set to hold a specific elevator angle. The YAW axis is handled differently. The Sperry will hold a gyro compass heading (by use of the rudder alone). So, to summarize, the Sperry does not hold a set altitude, nor a rate of climb or descent, as the modern AP does, but it will hold a given gyro-compass heading.

The Sperry takes a bit of practice to master. But once familiar with its capabilities and quirks, many FS pilots love it. It's part of the old time charm of this plane. Besides, in this panel, it's the only one you've got! OK, here we go...

There are three gauges and a number of control knobs and wheels which make up the U.S. Navy Mark III Automatic Pilot which is mounted in the panel of N1776.



The Sperry's Master Switch is located at the bottom right-hand corner of the unit. Click on it, or use the keyboard command "z" to toggle the Sperry on and off. You will hear a tone when the autopilot is disengaged.



The first gauge is the Heading Indicator (HI) which has two moving scales or cards. The upper one is controlled by the first of three control knobs at the top of the AP. The knob is marked RUD for Rudder. The lower card is the AP's Directional Gyro (DG), adjusted by clicking on the left and right of the caging and adjustment knob, just below it. Note: This knob will also adjust the panel's main DG (*the digital display on the RMI gauge*). Pressing the D key on your keyboard will calibrate both DG's with the magnetic heading of the aircraft. If you have set up your realism options to include gyro drift, you should periodically calibrate your DG's by hitting the D key.) When the Sperry is turned ON, lining up these two cards will cause the Sperry AP to hold the present heading, using the rudder.

**IMPORTANT NOTE:** Because the Sperry controls heading by use of the rudder, alone, you must not have "Autorudder" engaged. This FS feature is found in the FS2002 / Aircraft / Realism Settings menu under Flight Controls. Be sure this box is unchecked anytime you are using the Sperry to control heading.

*The previous training panel (for FS98 and 2000) featured a push-button to toggle the Autorudder feature. Well, we have a real nice one ready to be installed in the panel, next to the Landing Gear Indicator Lights. The only problem is, due to a bug in FS2002 the thing will not work! If and when Roy manages to defeat this problem, we'll issue a patch to install it. In the meantime, if you are going to be stubborn and use Autorudder, you will have to disable and re-enable it through the Aircraft Realism menu when using the Sperry. But if you want my two cents worth, you are missing a lot of the fun and realism of the FS experience (especially with a tail-dragger!) if you are not using rudder pedals, a twist-type joystick, or some other device to control your rudders.*



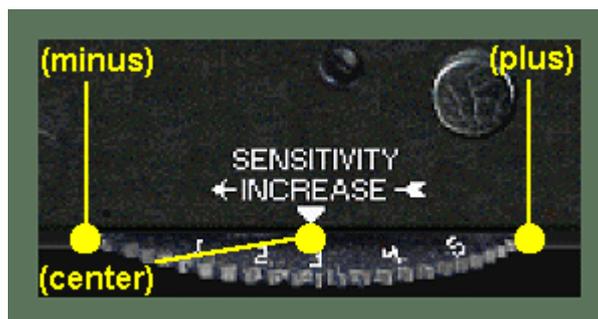
The center gauge is the Artificial Horizon (AH). This is a true AH, unlike that on Arne's earlier Sperrypilots. There are two fixed alignment index marks and corresponding moveable pointers, called follow-up indexes. The pair at the top are set by the center control knob, marked AIL. When the marks are aligned, and the unit is ON, the ailerons will hold the present roll attitude. Moving the follow-up index to the right of the alignment index will cause the ailerons to hold a banked attitude in that direction. The pair of marks on the right side of the AH are controlled by the right hand knob marked ELE and are used to maintain a set pitch attitude, using the elevators. *(Charlie's Sperry tutorial (see More Sperry Information, below) has an outstanding series of illustrations showing just how to interpret the index marks of the AH.)*



The third gauge is the Vacuum Gauge and registers the suction of the instrument vacuum system required to operate the gyros. The correct reading should be between 3.75 and 5 hg, shown by the heavy white arc on the gauge. *(Now that you know, you can forget about this one - it will take care of itself.)*

## ADJUSTING CONTROL FORCE SENSITIVITY

The three SPEED VALVE control wheels at the bottom edge of the unit are used to vary the sensitivity of the Sperry's hydraulic controls. Since it was designed specifically for this plane and panel, Arne has made the center setting of the Mark III's wheels normal for the DC-3. Just click on the center of a wheel to set it to normal. (Note: When loading N1776 into FS, the wheels will be centered by default.) Each wheel controls one axis and is situated below the corresponding gauge and control knob. Rotating the wheels toward a higher number, by clicking repeatedly on their right sides make the controls more sensitive, while clicking on the left makes them less so. *Note: You may hold the mouse button down for continuous movement.*



Don't be thrown by that arrow and the "sensitivity increase" label in relation to the mouse points. Think of the mouse points as where you would initially place your finger to rotate the wheel in the desired direction. Practice using the wheels in conjunction with the "RUD", "AIL", and "ELE" knobs to fine tune your control. Anyone can set digital readouts and push lighted buttons on a modern AP -- but it takes a virtuoso to master the Sperry's wheels and knobs to make the Douglas do your bidding!

## ON-BOARD SPERRY HELP

If you are not already familiar with it from version 2, 3, or 4 of this panel, acquaint yourself with the Sperry's operation by using Arne's illustrated HELP file. You can call it up from the panel by clicking on the label on the right side of the Sperry.

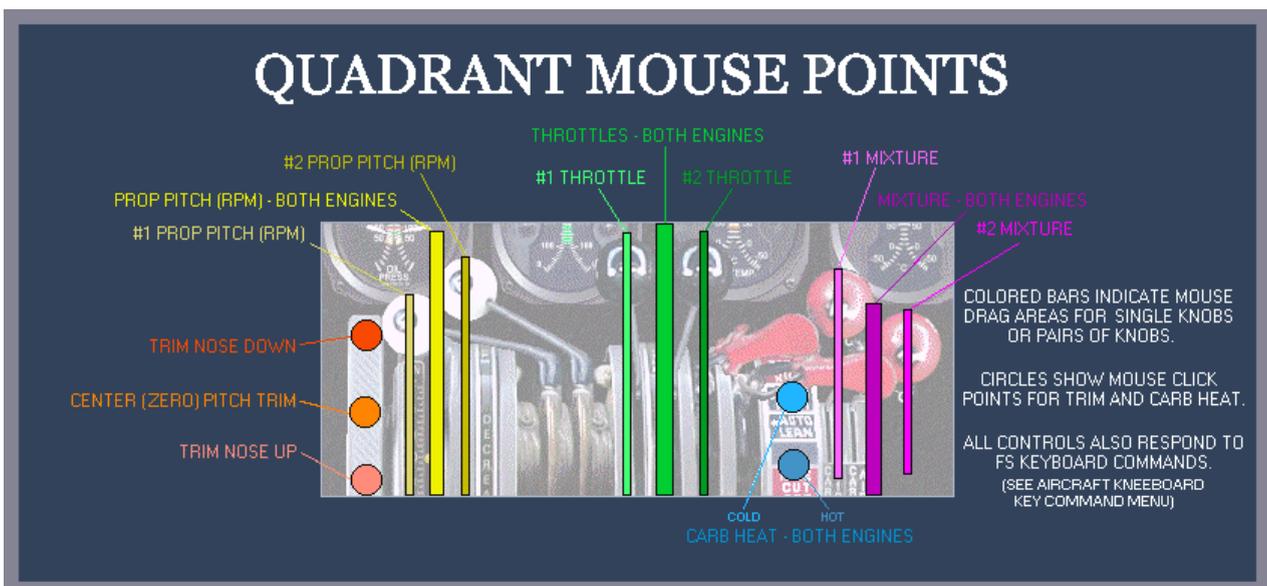
## MORE SPERRY INFORMATION

More information on the operation of the Sperry Autopilot may be found in the "Autopilot Manual" on the [7th Edition of the R4D CD](#), and in the Sperry tutorial on the [DC-3 Airways website](http://www.dc3airways.com/). <http://www.dc3airways.com/>

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## CONTROL QUADRANT

The control quadrant is directly from our R4D with no changes. This diagram shows mouse points and drag area. This was the first dual quadrant of its kind, where individual levers, or pairs of control levers could be operated by mouse. This has since become the standard for FS.



**Propeller, Throttle, and Mixture levers** can be mouse-controlled individually for each engine, or together, in the same way the pilot's hand grasps single levers or pairs together.

**Carburetor Heat Control levers** are at the right end of the quadrant and operate as a pair. To prevent interference with the Mixture levers, the mouse points are displaced to the left. Down is for Hot (On) and up is Cold (Off). If you have followed the start-up flight instructions, when you first enter the cockpit after loading the aircraft, the levers should be in the up and COLD position.

**Moving, Mouse-Adjustable Elevator Trim Wheel.** Clicking the center mouse point will ensure a neutral pitch trim setting. Upper and lower mouse points can be clicked for fine adjustment, or held down for rapid, gross adjustment.

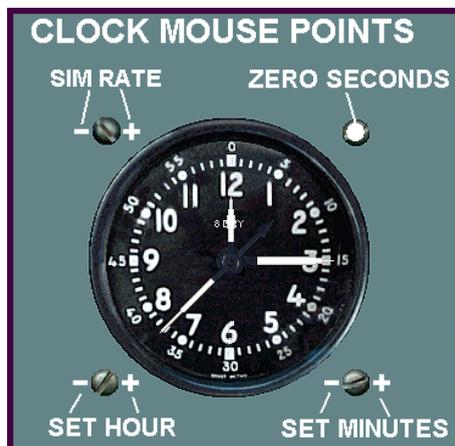


Here is a blow-up of the Elevator Trim Indicator found on the left end of the quadrant. The yellow indicator dot moves up and down along the scale as the trim wheel (which moves) is adjusted. *(The perspective is different in this shot because it was taken from the R4D First Officers's panel.)*

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## CLOCK

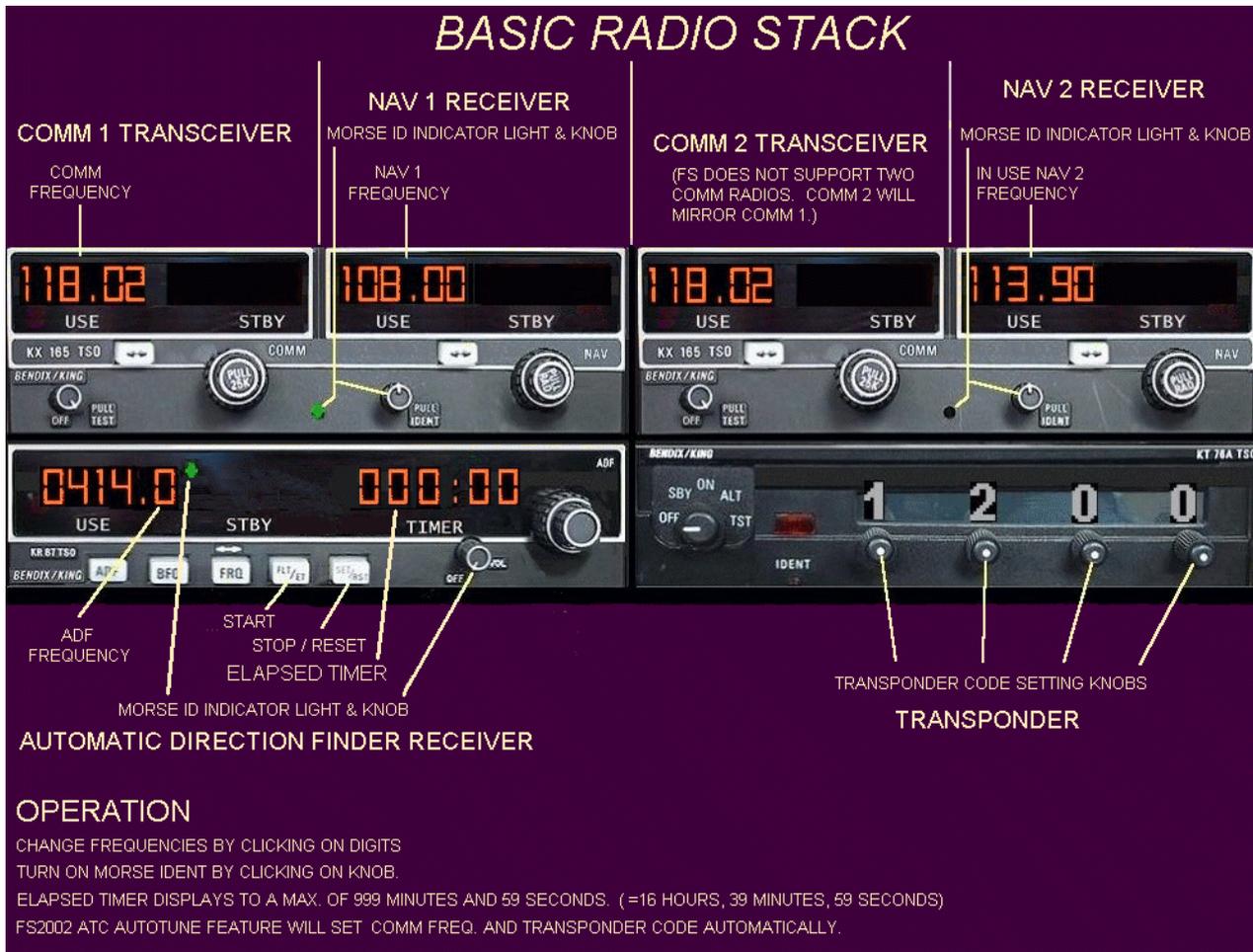
N1776's has seven mouse adjustment points. These allow you to change the simulation rate, hour, and minute, or "zero" the second hand. Of course, you still may use the FS2002 menus or keyboard commands to make these adjustments, but you should find these much handier.



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## RADIO STACK

The panels are equipped with a "basic", simplified, Bendix / King radio stack, adapted from the one we produced for PH-DDZ. The diagram below explains how to use the radios. Features not labeled are inactive.

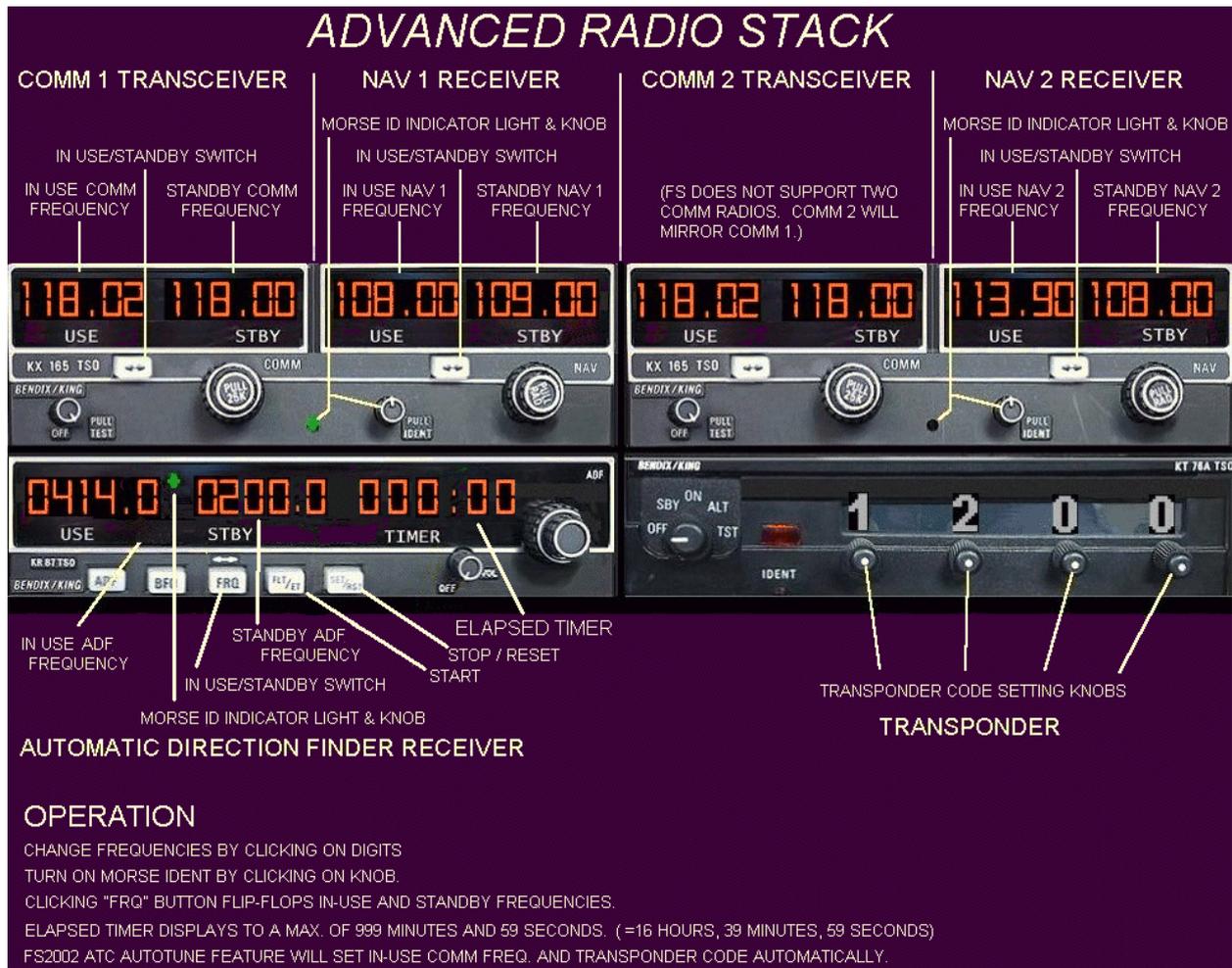


**Note:** Even though the hand cursor may not appear, you can change frequencies by clicking on the numbers.

As a little "prize in the Cracker Jack box" reward for those who bother to read this manual, the more advanced radio stack has also been placed in your FS2002 Gauges folder by the installation program. In addition to the features of the basic stack, there are Standby Frequencies so you can pre-tune the next station you will be using, or easily switch back and forth between two stations you are monitoring at the same time. To make use of this set (if you are not intimidated by all those orange digits ;-)) just do the following:

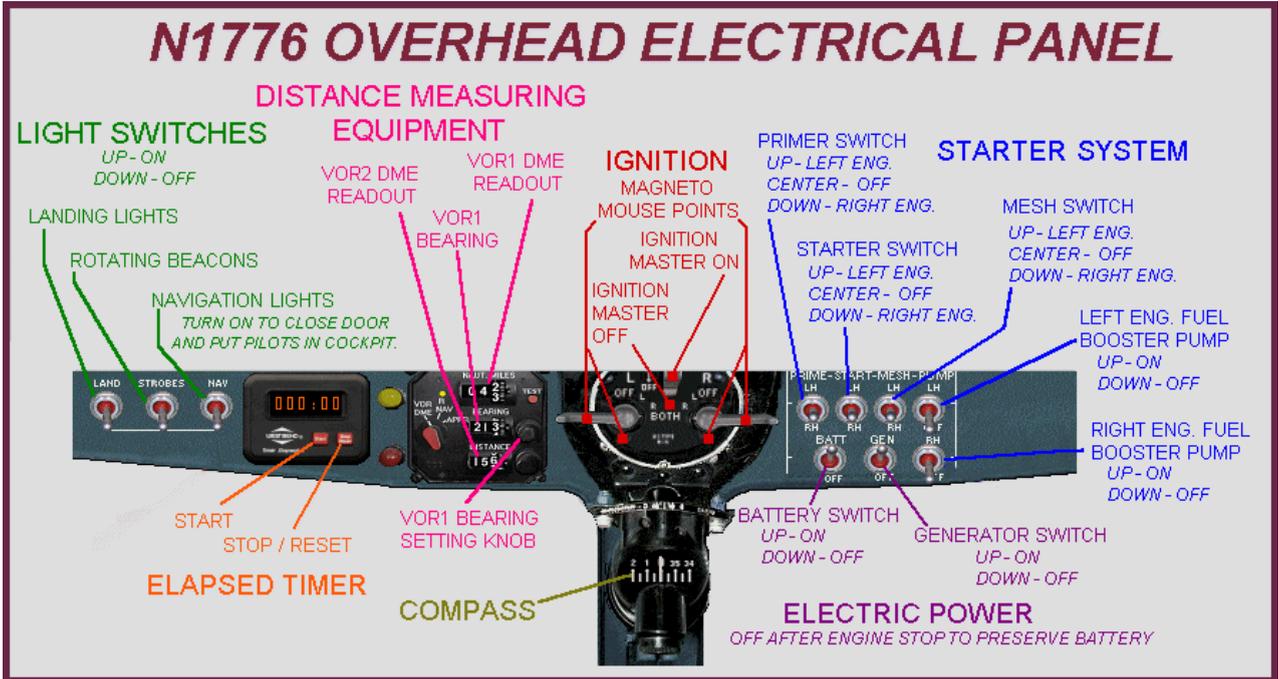
1. Open the DCA DC-3 N1776/Panel folder.
2. Right click on the "panel.cfg" file and select "Open With..."
3. Select "Notepad" from the programs list and double-click it. The panel.cfg will open.
4. Scroll down to the line reading: "gauge10=RCS-DCA-Basic-Radios-2k2-v1s, 571,523,470,132"
5. Delete "Basic-" so the line reads: "gauge10=RCS-DCA-Radios-2k2-v1s, 571,523,470,132"
6. Save the file and exit Notepad. Two notes: You can not have the DC-3 loaded while you make the edit. It's OK if FS is running, but load another plane until you are finished. Also, if you are not allowed to edit (and this goes for any file you might want to edit) right-click and select Properties, then be sure the "Read-Only" Attributes box is unchecked.

That's it. If you did it correctly, when you next load the DC-3, you'll see this:



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## OVERHEAD ELECTRICAL PANEL (OEP)



Always turn on the Navigation Light Switch to close the passenger door and bring the pilots to the cockpit.

See ENGINE STARTING in the OPERATION section of this manual for detailed instructions on the Ignition system, the realistic starting sequence, as well as optional starting shortcuts.

**IMPORTANT:** Don't forget to turn off the Battery Switch after engine shutdown, or the batteries will soon become exhausted. If you do forget, and find yourself with flat batteries, load a default MS FS aircraft, then switch back to N1776. Your batteries will be recharged.

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## DISTANCE MEASURING EQUIPMENT (DME)

This "DME" unit, taken from the R4D panel, is located on the Overhead Electrical Panel (OEP) of N1776. We will only discuss the features used in this panel - which by the way are the same ones used in the R4D, but not the way the real instrument works. (Intrigued? The unit is an interesting contraption, and if you care to read about RNAV and how the whole thing works in the real R4D, you will find that information in the v2 R4D manual on the R4D CD. But I digress...)

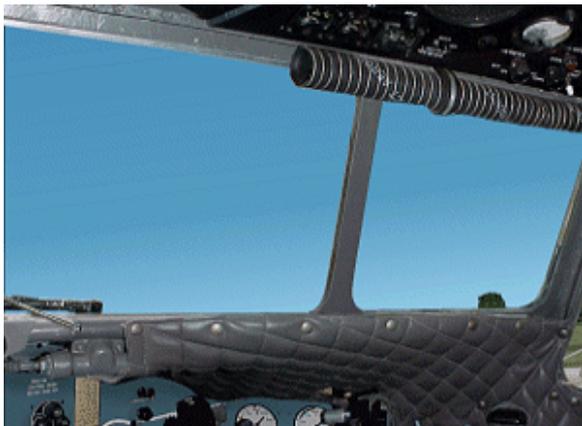


There are three odometer type readouts on this instrument. The top one, marked "NAUT. MILES" will display the distance to a DME equipped station tuned into and being received by the NAV 1 radio. The bottom display, marked "DISTANCE" gives the same DME information for NAV 2. These, of course, are the same stations being read by your Omni Bearing Indicators, more commonly known as the VOR1 and VOR2 gauges. The center indicator displays a digital representation of the bearing set on the compass ring of the VOR 1. The knob beside it and the knob on the VOR1 OBI will both rotate the digits in the DME and the ring of the OBI. You can use either knob interchangeably. It is easier, naturally, to set a precise bearing using the digital readout.

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## PHOTO-REAL COCKPIT VIEWS

The seven around-the-cockpit views were produced from digital photos of the R4D and adapted, slightly for N1776. Views are activated by the Number Pad keys when the Number Lock is engaged on the keyboard. You may also set up a point-of-view on your yoke or flight stick to control these.



If you want a view to remain on without having to hold down a key, here's how....

For example, to lock on the Left-Front view:

1. Turn on your keyboard's number lock (light on).
2. Press and hold down the keypad #9.

3. Turn the number lock off.

4. Release the #9 key.

To return to the forward view just turn on the number lock again and hit the #8 key.

Also, remember that the w key will make the aircraft interiors disappear and give you an unobstructed view, just as it does with the panel.

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## CHECKLISTS AND REFERENCE PAGE

You should consult the on-board checklists when flying the DC-3. These checklists were developed from genuine DC-3 checklists, so there are many items not found on this panel, and some functions not supported by Flight Simulator at all. Never the less, you will find that they remind you of the proper procedures in all phases of flight and you will quickly learn which items do not apply. There is also a Reference Page on the kneeboard that gives you important information about power settings and speeds.



The kneeboard can be called up through the FS menus, or with the key command Alt + a + c for checklists, and Alt + a + r for the reference page.

Because FS2002 checklists and reference pages are plain text files, you may easily print them out for ready reference. Here are the steps:

1. With Windows Explorer or My Computer, open the FS2002 / Aircraft / DC-3 DCA N1776 folder.
2. Right-click on "dca\_2k2\_check.txt" or "DCA\_ref.txt".
3. Select Print from the drop-down menu.

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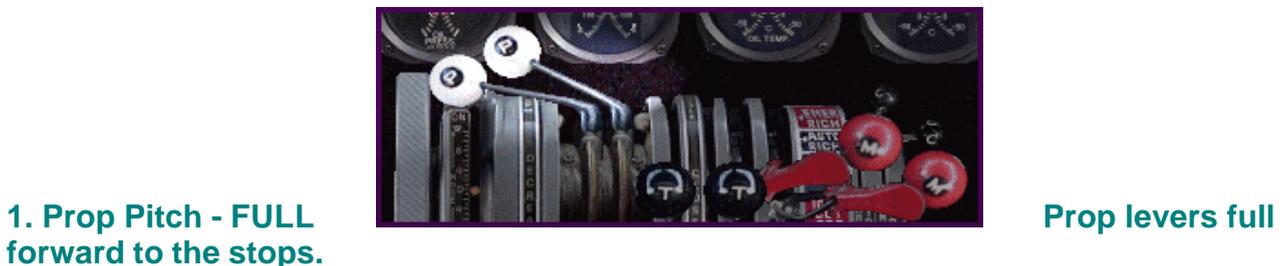
## FLIGHT OPERATION

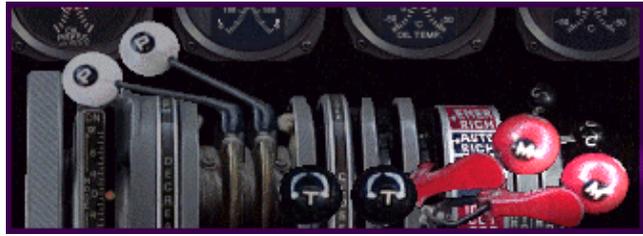
### ENGINE STARTING

The following illustrations are taken from the R4D and DDZ manuals. Except for the color difference of the background and a few partially visible gauges above the quadrant, correspond exactly to N1776.



The Primer, Starter, and Mesh switches are all three-way switches. All three function as shown above.





**3. Mixture - IDLE CUTOFF, CRACKED**

Mixture levers must be no lower than the middle of the Idle Cutoff scale, otherwise the engine will not run. (NOTE: the reference point for the mixture scale is the base of the levers where they enter the slot in the quadrant body.)



**4. Battery Switch - ON**

engage the on board batteries.

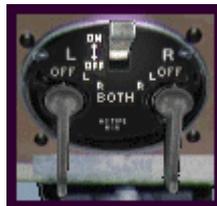
Move the switch to the up position to



**5. Generators - ON**

If you do not have the generators on-line, the batteries will eventually run down and you will find yourself without electricity. If your radios and autopilot go dark, check the generator!

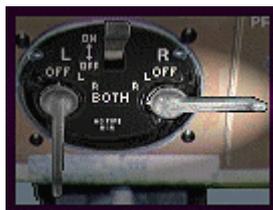
Move the switch to the up position to



**6. Ignition Master Switch - ON**

That's the large toggle between the magneto levers -- flip it up. (Note: If you find the switch is already in the On position after loading the start-up flight, just leave it on.)

That's the large toggle between the



**7. Right Magneto Lever - BOTH**

modified start-up situation the engines will start when you move the lever--- very unrealistic! Shame!

If you are *not* using a properly



**8. Right Fuel Booster Pump - ON**

No, it's not a cow with a triple stomach ache! That's a real DC-3 fuel booster pump sound. (NOTE: The sound has been intentionally faded out after a few seconds, otherwise it might tax your computer's resources. You can't hear it over the sound of running engines anyway.)

Flip the lower Pump toggle

9. Prime Switch - to RH



Move the three-position switch down.

10. Start Switch - to RH

You will hear the engine begin to turn over. Wait about four seconds, then.....



Move the three-position switch down.

11. Mesh Switch - to RH

The starter will mesh and the engine should catch. *If it does not, you have likely done something wrong, or in the wrong order. Check that the Battery, Generators, Master Ignition, Magneto, and Booster Pump switches are ALL ON. Also ensure that the Mixture is up high enough in the Idle range. Just like in the real aircraft, the engine starting sequence must be followed exactly for a successful start. This means you must work them in the exact order given. If you make a mistake, start over. Use the checklist -- that's what it's for.)*



Move the three-position switch down.

*If you can't cope with all this realism, see below "para 18" to cheat. But keep in mind our design philosophy was not to make an easy - to - operate FS airplane, it was to make a realistically operating DC-3 simulation.*

12. Mesh Switch - OFF

three-position Mesh switch back to the center position.



When the engine catches, move the

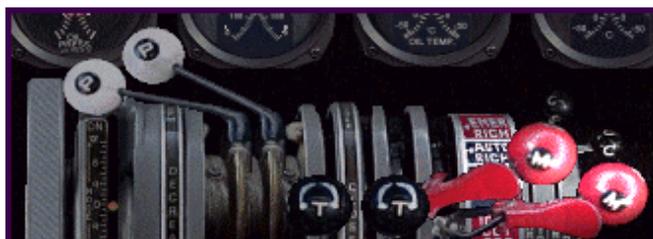
13. Start Switch - OFF  
the center position.



Move the three-position Start switch to

14. Right Mixture - Auto-Rich

Immediately move the right mixture lever to Auto-Rich. *(or if you just have to listen to that lovely P&W 1830 idle rumble, after you have heard enough, then move the lever forward. ;-)*





15. Prime Switch - OFF  
the center position.

Move the three-position Prime switch to



16. Right Fuel Booster Pump - OFF  
to the down position.

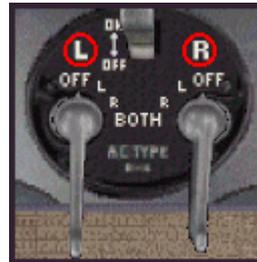
Move the RH Pump switch



17. Navigation Lights- ON

The Nav light switch will place the pilot figures in the cockpit -- and turn on the marker lights, of course.

18. Repeat procedure (steps 7 through 16) for the left, #1, engine.



### THE "LAZY MAN'S STARTING SYSTEM"

If you are too impatient to do things properly, we have had mercy on you, much as it grieves our realistic souls. (Although, if you are in such an all-fired hurry, what are you doing in an airplane that cruises at 140 knots? ;-)

For those with ants in their pants, there are two hidden hot buttons that will start the engines immediately. These are the large L and the R above the magneto levers. You *still* must pay attention to the generators, though, unless you are also too rushed to use radios and such! The batteries will die, otherwise.

**NOTE:** The reason you start #2 before #1 is that the pilot can only hear # 2, while he can hear and see #1 out his side window. You want to be able to hear what is happening with the right engine without interference from the noise of the left in your ear.

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## TAXIING THE DC-3

The DC-3, like most other tail-draggers in FS, has a shortcoming when taxiing, (as well as during takeoff and landing rollout--more on that later) one not encountered in tricycle geared planes--namely, a lack of runway visibility. You simply can not see the pavement ahead in normal cockpit view. Only sky fills the windscreen.



So how do you see to keep it going where you want it to go? There are a few techniques commonly used by experienced FS tail-dragger pilots. (*and probably a number of other methods used by less conventional sorts. I know one pilot who does all of his flying from a position behind the airplane in Spot View!*)

One method is to hit the w key. The first time you hit it, you will have a set of default, basic flight instruments (a new feature in FS2002). A second keystroke will give you a clear screen - the old "Maximum View" we are all familiar with. The addition of these instruments may make this option attractive to some flyers. The drawback of this method is transitioning from one set of instruments to another. If you are going to do it, I recommend you wait until you are in a stable climb, not at a very critical time -- just prior to rotation on takeoff!





Some pilots choose to open a second window by selecting Views / New View / Cockpit (or Spot Plane) to use while taxiing. This method carries a penalty, though: *it cuts into the frame rate*. Depending on your system and your display options setup, this may or may not be acceptable. Or it may be bearable while taxiing, but totally out of the question when taking off.



Personally, I prefer to "adjust my seat position" by hitting Shift + Enter to pan down the view -- or jack up the seat, if you will -- until the runway is in sight. A quick tap of the Space Bar takes you back to a normal view angle.

We have come a long way in ground turning ability since the first version of our DC-3. Still, you will probably find taxiing the DC-3 takes a fair amount of practice to do really well. The DC-3's tail wheel is not steerable and free-casting. This means the plane is steered by using the engines in combination with the brakes. The rudder becomes effective only when there is sufficient airflow past it, either from prop wash, forward movement, or wind.

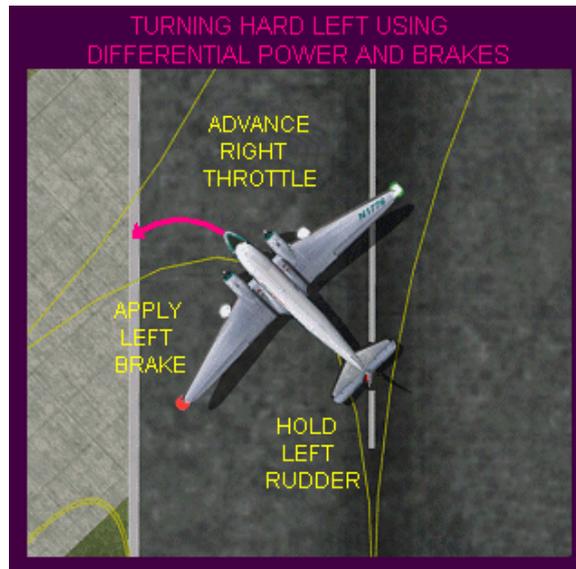
**NOTE:** You will find that rudder pedals make taxiing much easier and flying much more realistic and pleasurable. Let me reiterate that if you don't have pedals, I highly recommend you get some, or at least a joystick that has rudder (twist) capability. Without them, you are missing a good portion of the FS experience.



To begin taxiing, put the prop levers all the way forward, then a small increase in power (throttles) should get you moving. About 25 on the Manifold Pressure (MAP) should do it. You will need to pay close attention and not allow your speed to get much above 20 knots, though, or you will find steering progressively less effective. Keep your speed within limits by periodically applying the brakes, adjusting the throttle when necessary.

Once the airplane is moving, use differential braking, by applying the brake on the *inside* of the turn, as needed. Apply right brake (*keyboard F12*) for a right turn or left brake (*F11*) for a left turn. Too much brake pressure will stop the plane, though, and you have to be moving to turn.

Sharp turns, especially from a stop, may be accomplished by use of differential braking -- assisted by differential power-- an advance of the throttle of the engine on the *outside* of the turn.



So, to summarize: Easy does it on those brakes -- keep those wheels turning by just tapping the appropriate brake -- and jockey the throttles as necessary. It may seem like a rub your tummy, pat your head type of exercise at first, but eventually, with practice, you will get the hang of it. After that, there is a good deal of satisfaction in successfully wheeling the Goon around the tarmac with your head stuck out the open side window!

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## TAKEOFF AND INITIAL CLIMB

The DC-3 takes off with its tail wheel locked in a fore and aft position, and steering is accomplished by means of differential braking and, once it becomes effective, rudder. You will find, no matter how carefully you line up before applying power, that steering input is *definitely* required to counteract the torque of the engines and the effect of any wind that is not blowing straight down the center line. If you have used the "pan view down" method described above, when you are underway and the tail lifts, just when you find yourself beginning to look down at the blurring pavement to normalize the view angle...



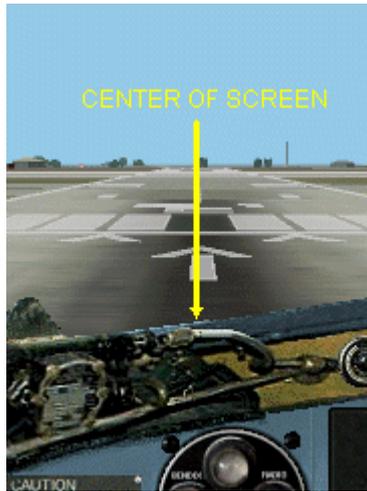
***Now that you know how to see where you are going, let's back up a bit and cover the steps in getting the DC-3 in the air....***

***After completing the Engine Run-Up Checks and the Before Takeoff Checklists..***

- 1. Center the Elevator Trim (*mouse point at center of trim wheel*).**
- 2. Gradually advance the throttles until a Manifold Pressure of 52 inches is reached. Advance your throttles evenly and steadily until you reach takeoff power. This forward movement of the throttles should take a full five seconds.**
- 3. Apply gentle, increasing right rudder to counteract torque and keep the plane tracking along the runway centerline.**
- 4. As soon as the Airspeed Indicator becomes active, apply gentle forward yoke until the tail lifts.**
- 5. When the nose comes down through the horizon, ease the forward pressure of the yoke (or stick).**
- 6. Hold the plane level and accelerate to VR - Rotation Speed. At 85 KIAS, ease back on the yoke and allow the plane to fly itself off the runway.**
- 7. Once airborne, ease the right rudder you have been holding so you avoid turning or skidding.**
- 8. When you have achieved a positive rate of climb, as indicated on the Altimeter and Vertical Speed Indicator, raise the landing gear.**
- 9. Keep the climb angle quite flat until 105 knots, which is VY -- Speed for Best Rate of Climb. Make the first power reduction to a Manifold Pressure (MAP) of 41 inches, and then adjust the angle of climb to maintain VY.**
- 10. At 500 feet AGL, reduce to climb power-- throttles to 35.5" MAP, and Props to 2400 RPM.**

***That's it--ten easy steps to becoming safely airborne in the Goon. In actual operation, you will find some of these nice neat steps running together and overlapping. It will take a little practice to get used to the routine and develop your skills so that the whole evolution goes smoothly every time.***

***You will find it easier to keep the plane from wandering back and forth across the centerline if you advance the throttles slowly, especially the first part of the acceleration. This will allow you to counteract the engine torque with the rudder pedals without the over-control that leads to a serpentine takeoff run. Use the shiny portion of the wiper motor tubing as a guide to help you stay centered, (see below). And easy does it on those pedals--keep it light as a feather.***



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## APPROACH AND LANDING

### *Here are the steps to a perfect landing:*

1. Make your first power reduction to begin descent. If you are not already at the cruise setting of 2000 RPM, you should pull the props back to that level now, and reduce the Manifold Pressure (Throttle) to 23 inches.
2. Set Mixture levers to Auto-Rich.
3. Extend flaps as desired. *Note: Flaps should be used to increase the glide angle, not to decrease the glide speed. Flaps are not speed brakes!*
4. When on downwind leg, maintain 125 KIAS. Opposite the runway, lower the landing gear. The main gear causes a lot of drag and you may need to add power, including increasing Prop RPM, depending on conditions. Conversely, the gear may be extended earlier in the approach, if necessary to reduce speed.
5. Reduce power (Manifold Pressure) to attain a descent rate of 300 to 400 feet per minute.
6. After turning base leg, make an additional power reduction to maintain 105 KIAS.
7. After you are established on final approach, make a third power reduction to hold a speed of about 85 KIAS. *Note from the USAAF C-47 Pilot Training Manual: "As every pattern differs in altitude and distance from the field, and as wind conditions vary, use your own judgment in making power reductions."*
8. The preferred method of landing the DC-3 is a "wheel landing", rather than a "3-point landing". To be specific, according to the PTM, the proper technique is a type of wheel landing called a "Tail-Low Landing". This is a landing in which the tail wheel is about one and a half feet above the ground when the main wheels touch. To perform it, reduce the manifold pressure during round-out, and then cut the throttles when the mains make contact. Alternatively, you can cut power before the flare and glide to the landing.



A TAIL- LOW, WHEEL LANDING, BY THE BOOK

## THANKS

Roy and I ask that if you like and appreciate this panel, and have not already done so, that you help our cause of getting the MAAM R4D back in the air. That's all we ask for our continuing contribution to DCA - a small contribution by you in return to our cause. Just go to <http://www.maam.org> and follow the links to order a CD, register your R4D Upgrade, or just drop a few bucks in the :-

### [Engine Replacement Fund.](#)

<http://www.avialantic.com/cgi-local/shop.pl/page=shopcart.html/buy=1/SID=1013642571.11141984/item=109>

We and MAAM will be very grateful. To all of you who already have donated, thanks very much.

## CONTACT THE TEAM

*If you care to contact us, we read and respond to every single e-mail that we get and will do our best to assist you if you have a problem. (But only if you have read and followed all the instructions in this manual, first!) Please be as specific and detailed as possible about your system and what steps you have taken. "It doesn't work" is not very useful.*

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**HAPPY LANDINGS - TAIL LOW**

**february, 2002**