
Ant's Airplanes
DH82
Tiger Moth
Pilot's
Handbook

INTRODUCTION

Thank you for purchasing this virtual replication of the De Havilland DH82A Tiger Moth.

The Tiger Moth first flew in 1931 and quickly became a commerically successful aircraft (8,868 produced) and was the primary military trainer for many Commonwealth nations leading up to and during World War II.

After the war many of those Tiger Moths went into private ownership andbecame a popular training aircraft at flight clubs. Even today there are still around 650 airworthy Tiger Moths and it is arguably the most famous biplane ever built.

SYSTEM REQUIREMENTS

Microsoft Flight Simulator (released in 2020)

850MB Free hard drive space

This add-on is not compatible with Flight Simulator X or Prepar3D.

SUPPORT

If you are having problems with the operation of the aircraft please email me at support@antsairplanes.com. Please try to describe the problem as best you can and also include which simulator you are using and the operating system. Problems with downloading the package should be directed to the retailer as they are responsible for delivery of the download.

INSTALLATION

This aircraft is designed for Microsoft's Flight Simulator 2020 (including the Steam version). It is not compatible with Flight Simulator X or Lockheed Martin's Prepar3D. Installation is handled by an installer program which attempts to place the files into the Community folder.

The Community folder is where all 3rd party add-ons should be installed.

The Community folder can be difficult to find the location will depend on the version installed (MS Store or Steam) or if the user has set a custom location. The installer will attempt to find the UserCfg.Opt file and will read the Community folder location from that file. If the installer cannot find the Community folder you will need to manually browse to your Community folder.

By default the Community folder will be could be in any of these locations:

Windows Store default
C:\Users\[Your User Name]\AppData\Local\Packages\Microsoft.FlightSimulator_8wekyb3d8bbwe\LocalCache\Packages\Community

Steam default
C:\Users\[Your User Name]\AppData\Local\Packages\Microsoft.FlightDashboard_8wekyb3d8bbwe\LocalCache\Packages\Community

or

C:\Users\[Your User Name]\AppData\Roaming\Microsoft Flight Simulator\Packages\Community

Ensure that the last folder in the install location is "Community".

If you accidentally install to the incorrect location you can manually move the installed folders into the Community folder. There are no links to the installed folders so manually moving them will not cause any issues.

WHAT'S NEW IN V1.10

- Fixed issue where user key input for primer wasn't updating carburetor prime.

- Fixed issue where some clickspots weren't working for Xbox controller users in mouse mode.

- Updated textures for gauge glass

- Fixed missing glass texture on front airspeed indicator

- Fixed locked/unlocked tooltip on flaps lever

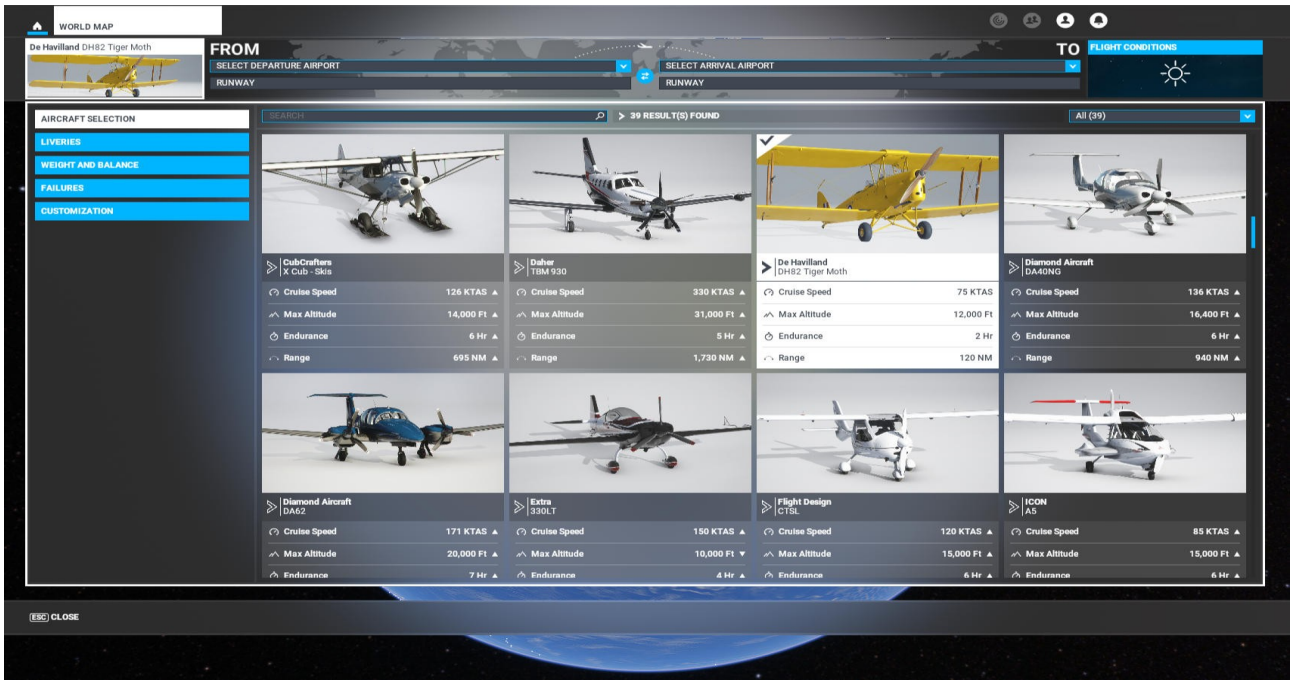
WHAT'S NEW IN V1.01

Changed key assignments for toggling GPS and Tablet which was causing issues with Honeycomb control panels. The new key assignments are Increase and Decrease Nav4 volume respectively.

AIRCRAFT SELECTION

The Tiger Moth will appear in the Aircraft Selection screen under De Havilland - DH82 Tiger Moth.

Clicking on the LIVERIES tab will allow you to select from the various repaints.



QUICK TIPS

ATTENTION

While the Tiger Moth is a simple aircraft to fly it is also a very old aircraft (it's over 90 years since the first one was produced) so the way some of the systems operate in this aircraft may be a bit unusual or something the modern pilot is not used to. Please read the following quick tips which highlight some of the main differences you can expect to see compared to a modern aircraft.

Tablet and GPS
A computer tablet and the default Aera GPS unit are stowed down beside the pilot's seat on the right hand side. Clicking on either of these will move them into position within the cockpit. The Tablet can be used to set various user prefences, has a checklist to assist engine starting, and access to a rudimentary autopilot and radio/transponder. The Tablet and GPS can be moved to various positions within the cockpit so you can set them up however you like.

Stopping the engine
The recommended method of stopping the engine is turn both magnetos off. The mixture control cannot be moved into a cutoff position and turning off the fuel means the engine can keep running for up to a minute as it uses the fuel remaining in the fuel lines.

Mixture control
The mixture (altitude) control on a Tiger Moth operates very differently to what you may expect on a modern aircraft. First of all, it's in reverse. So pulling the lever back towards the pilot is full rich and moving it forward, away from the pilot leans the mixture. Secondly, there is a gate on the throttle and this prevents the mixture lever from being in front of the throttle. With the throttle fully closed the mixture will always be fully open.

Magnetos
There are two sets of magnetos located outside of each cockpit on the left side of the fuselage. By default the magnetos will operate together but using the Tablet you can set them to operate as two independent sets just like the real thing.

The magnetos are not visible from the standard cockpit view. Switching to the landing view changes the view to look out the left side of the cockpit (a common method of seeing where you are going with Tiger Moth pilots) and the magnetos are accessible this way.

Starting the engine
The Tiger Moth is hand started by pulling the propeller and does not include a starter motor. Please read the section below about Starting the Engine for a detailed explanation

of the procedure to hand start the Tiger Moth. If you want to get flying quickly then using the Auto-Start key command will start the engine without needing to follow the full start procedure.

Auto slots

Auto slots are fitted to the top mainplanes and are provided with a locking gear. The operating lever and quadrant are situated on the right hand side of the rear cockpit.

When the operating lever is in the rear-most position the slots are locked. With the lever in the forward position the slots should be quite free.

The Auto slots will extend automatically as the aircraft approaches stalling speed to provide additional lift. The Auto slots should be locked when taxying or before performing aerobatics (including spins).

NOTE: Using any flaps up key command will close and lock the Auto slots and any flaps down key command will unlock the Auto slots

Brakes

Tiger Moth aircraft are not fitted with wheel brakes. However, in MSFS the Tiger Moth will respond to braking commands.

Applying the parking brake will install the wheel chocks.

Oil Consumption

The Tiger Moth will simulate oil consumption. The Gipsy Major installed in the Tiger Moth consumes roughly 0.21 gallons of oil per hour and the oil tank holds a total of 5 gallons. The oil level may be set using the MSFS fuel window. If the oil level drops below 50% expect oil pressure to start to drop. If the oil level drops below 20% the engine will fail.

Persistent fuel and oil

Using the preferences page in the Tablet the user may set fuel and oil levels to remain persistent. This means the Tiger Moth will save the fuel and oil levels from the last flight and reload them on the next flight.

FLIGHT SIM NOTE

Persistent fuel and oil levels will be loaded a few seconds after the flight has loaded. Any changes made in weight and balance pre-flight will be overwritten by the persistent settings. You should therefore only set the fuel and oil level after loading the flight.

Checklists are available from the MSFS toolbar.

Engine Realism

By default engine realism is set to Easy. In Easy mode the Tiger Moth engine priming is not necessary to start the engine, sparkplug fouling is not simulated and low oil levels will

not damage the engine (but will be indicated in the oil pressure gauge and oil will still be consumed).

Sparkplug Fouling
The Tiger Moth can simulate spark plug fouling. If the engine is run for 5 minutes at below 900rpm carbon will start to build-up on the sparkplugs and this will quickly cause the engine to stop. Running the engine above 900 rpm will burn off the carbon build-up. Sparkplug fouling will only be simulated if the Engine Realism is set to Hard.

Camera views
Visibility for take-off and landing is poor in a Tiger Moth and you will typically see a pilot with their head leaning out of the cockpit to get a better view. Some of the default camera views have been adjusted to provide better visibility. The landing position view, for example, doesn't raise the pilot's view, it moves the pilot view out the left side of the cockpit.

The IFR cockpit view focuses on the P8 compass.

From the IFR cockpit view switching between the instrument views will take the pilot view to vairous positions outside of the cockpit and this provides easy access to the engine compartment and propeller which is necessary for the engine start procedure.

The cockpit quickview 45 deg left and right views have also been changed to provide forward views out the side of the cockpit on the left and right sides respectively.

Lighting
The Tiger Moth aircraft does not have any lights. The default headlight is available. The aircraft gauges are of the luminescent type and the markings and needles will glow green in the dark.

MOUSE INTERACTION

Interacting with the controls can be done with the mouse. There are two main types of mouse zones:

Simple toggles (Hand icon) - for switches and buttons that can be turned on or off. Left click to toggle.

Simple levers (Hand icon) - for simple levers (the Throttle lever for example). Left click and drag to move the lever.

Multiposition (Arrow icons) - for knobs, levers or multiposition switches. Left clicking on the arrow will move the control in the direction of the arrow. If you Left click and drag you can move the control in either direction). These controls may have a central mouse zone to set the control to zero (for example, the Elevator Trim has up and down arrows and a centre zone which will set the Elevator Trim to zero. The centre zone of the Altimeter knob will set the altimeter to the current barometric reading)

When using the Tablet and the GPS be aware that if there are any mouse zones behind the tablet/GPS they will still be clickable. Try moving the tablet/GPS if this is causing any issues.

KEYBOARD ASSIGNMENTS

Apart from the usual key commands being assigned to aircraft controls there are a number of special key assignments for some of the non-standard controls of the Tiger Moth. Perhaps, one day, Asobo will provide some general purpose switches which developers can assign to controls and switches that are unique to each aircraft. And while they're at it they may like to give us back the door commands.

Propeller pull through: Engine 1 Starter

Propeller pull back: Engine 2 Starter

Auto slots lock: Flaps Up, Flaps Incr

Auto slots unlock: Flaps Down, Flaps Decr

GPS visibility: Increase Nav4 volume

Tablet visibility: Decrease Nav4 volume

Compass heading rear cockpit: VOR1 OBS Increase, Decrease and Set

Compass lock rear cockpit: Toggle VOR 1 Identifier

Compass heading ring front cockpit: VOR2 OBS Increase, Secrease and Set

Compass lock front cockpit: Toggle VOR 2 Identifier

Wheel chocks: Parking Brake

Right Engine Door: Increase Cowl Flap or Cowl Flap 1 will toggle the engine door

Left Engine Door: Decrease Cowl Flap or Cowl Flap 1 will toggle the engine door

Carburetor primer: Engine Primer, Toggle Primers, Toggle Primer 1

Oil filter: Toggle Primer 2

The cockpit doors can only be opened by mouse click.

FUEL, OIL AND PAYLOAD

Adjust fuel and payload using the Fuel screen in MSFS. The fuel tank holds 20 gallons and is located between the top wings. A simple float above the fuel tank shows the fuel level.

The oil tank holds 5 gallons is located on the left hand side of the forward fuselage.

Like many vintage aircraft the Tiger Moth aircraft can consume quite a lot of oil in normal use (around 0.21 gallons per hour) and requires constant topping up. In the Fuel section of the Fuel screen there are options for Fuel tank and Oil tank levels. Ensure these are set correctly before each flight.

Low oil levels (below 50%) will lead to decreasing oil pressure.

Very low oil levels (below 20%) will lead to engine failure. You will need to quit the flight and start a new one to repair the engine.

Setting MSFS Assistance Options - Aircraft Systems - Unlimited Fuel to On will provide unlimited fuel and oil.

Persistent oil and fuel

Using the Tablet - Cockpit Preferences the user can set oil and fuel levels to be persistent from one flight to the next. This means that when you end one flight the oil and fuel levels will be saved and reloaded after starting the next flight.

Please note, that the persistent oil and fuel levels will be set a few seconds after the flight is loaded. If you set the oil and fuel levels in the flight setup screen then they will be overwritten once the flight loads. This is because the coding that reloads the oil and fuel levels can only be run once the aircraft is loaded in a flight.

If you have persistent oil and fuel set to ON and have an engine failure due to low oil then you will need to refill the oil tank the next time you load a flight otherwise the engine will fail again. You have approximately 2 minutes of engine run time when the oil level is too low.

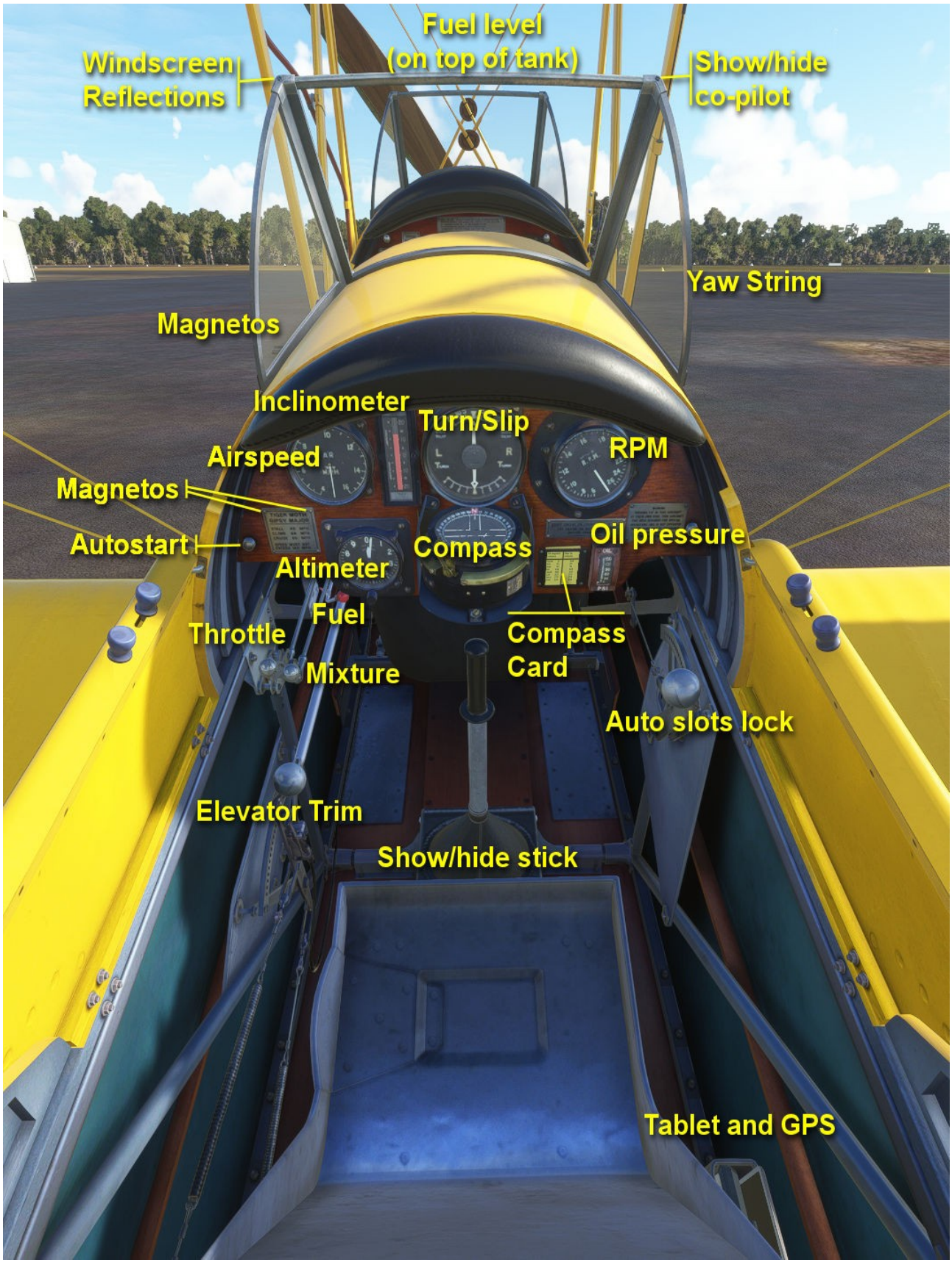
Why you don't stop the engine by cutting the fuel

As you look at the cockpit of the Tiger Moth you may notice that the fuel cutoff knob is attached to a series of rods that leads to the fuel valve on the bottom side of the fuel tank (the tank itself is between the two upper wings).

When the fuel valve is closed there is still a considerable amount of fuel in the fuel lines that run from the tank down to the engine. As this fuel is gravity fed the fuel in the fuel lines will continue to feed the engine even after the fuel valve is closed, up to 15 seconds full power.

You should therefore always stop the Tiger Moth by turning off the magnetos.

COCKPIT


Fuel level
(on top of tank)
Windscreen
Reflections
Show/hide
co-pilot
Yaw String
Magnetos
Inclinometer
Turn/Slip
Airspeed
RPM
Magnetos
Autostart
Compass
Oil pressure
Altimeter
Fuel
Throttle
Compass
Card
Mixture
Auto slots lock
Elevator Trim
Show/hide stick
Tablet and GPS

Magnetos
There are two sets of magnetos located outside of each cockpit on the left side of the fuselage. By default the magnetos will operate together but using the Tablet you can set them to operate as two independent sets just like the real aircraft.

The magnetos are not visible from the standard cockpit view. Switching to the landing view changes the view to look out the left side of the cockpit (a common method of seeing where you are going with Tiger Moth pilots) and the magnetos are accessible this way.

For easier access there are hidden clickspots for the magnetos located on the top two screws of the speeds placard.

Autostart (hidden clickspot)
There is a hidden clickspot over the lower left mounting bolt on the rear panel. This hidden clickspot provides easy access to the MSFS engine autostart routine (CTRL+E) for users who would like a quick way to start the engine without needing to follow the full manual engine start procedure.

Airspeed
Shows the airspeed. Clicking on this gauge will switch 3 different gauges, two in knots and one in MPH. The reference speed placard to the lower left of the airspeed gauge will also switch between MPH and knots depending on the gauge selected.

An additional airspeed indicator (windy) is located on the left wing leading strut. This indicator displays in mph only and may be shown/hidden by clicking on it or by using the Tablet - Exterior Preferences.

Altimeter
Shows the altitude. Clicking on this gauge will switch between an original Mk XIII Height gauge and two versions (one showing the Kohlsman dial in mb and the other inHg) of the slightly more modern Mk XIV altimeter.

The knob on the Mk XIII Height gauge adjusts the dial. Usually the dial is set to align the needle with zero on the dial and the needle will then indicate height above the airfield. Setting the dial on the ground to align the needle with the field altitude will show altitude above sea level. Aligning the dial with the fixed lubber line shown in the window on the dial indicates sea level at 29.99 inHg

Inclinometer
A fluid filled inclinometer shows the pitch of the aircraft in degrees.. Note that this is not a vertical speed gauge nor is it an Angle of Attack gauge. It simply shows the pitch of the aircraft.

Turn/Slip

A type B MK1a turn slip indicator dominates the panel. The top half shows side slip and the bottom half shows the turn rate. A turn rate of 1 indicates a full 360 degree turn in 2 minutes. Turn rates of 2,3 and 4 indicate a full turn in 1 minute, 40 seconds and 30 seconds respectively.

RPM

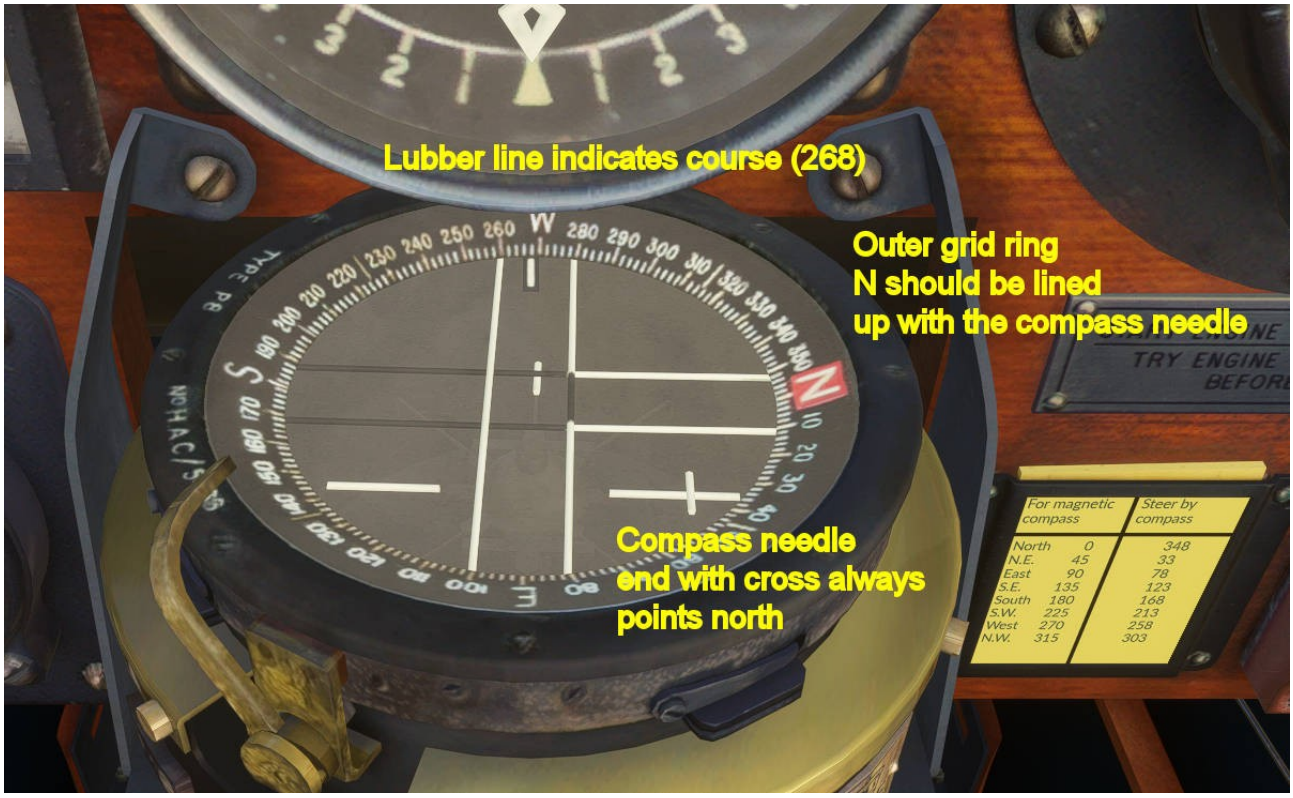
Shows the engine RPM in hundreds. Original aircraft had the indicator offset. Clicking on the dial and dragging will allow the user to rotate the instrument to their preferred position.

Compass

The P8 Compass consists of a needle that always points north, a rotatable grid ring and a lubber line. To set a course rotate the grid ring until the course lines up with the lubber line (the small white line on the far side) then turn the aircraft until the needle with the cross lines up with the red N on the grid ring.

The lever on the side is used to lock the ring.

Viewing the compass is quite difficult in the normal VFR cockpit view. Switching to the IFR cockpit view moves the pilot head to better see into the compass.



Compass Card
Provides correction information about magnetic variation. The card will automatically adjust for the local magnetic variation depending on what part of the world you are in.

Oil Pressure
Displays the engine oil pressure. Normal operating range is 30-60psi. If the oil pressure drops during normal flight this can be an indication that the oil level is getting too low.

Fuel
The fuel cutoff knob is located below the panel and to the left. It is not recommended that you use the fuel cutoff knob to stop the engine as it takes quite a long time for the fuel withing the fuel lines between the cutoff valve and the engine to be consumed. The engine should always by stopped by turning off the magnetos.

Fuel level (top of tank)
Fuel is gravity fed from the tank between the top two wings. A float on top of the tank indicates the fuel level.

Throttle
The throttle adjusts the engine RPM. Pull back to reduce RPM, push forward to increase RPM. Note that there is a gate attached to the throttle lever which limits the mixture lever (see below).

Mixture
The mixture (altitude) control on a Tiger Moth (rear cockpit only) operates very differently to what you may expect on a modern aircraft.

First of all, it's in reverse. So pulling the lever back towards the pilot is full rich and moving it forward, away from the pilot leans the mixture.

Secondly, there is a gate on the throttle and this prevents the mixture lever from being in front of the throttle. With the throttle fully closed the mixture will always be fully open.

Finally, you cannot stop the engine by fully leaning the mixture lever. Even in the full lean position the mixture lever is still about 20% open. The engine should always by stopped by turning off the magnetos.

Elevator Trim
The Tiger Moth uses simple springs to relieve pressure on the control stick rather than a moveable trim tab that is used on modern aircraft. Moving the trim tab backwards will raise the nose, moving it forward will lower the nose. There is a mouse click spot in the centre of the trim knob and clicking on this will centre the trim.

Auto slots lock
Auto slots are fitted to the top mainplanes and are provided with a locking gear. The operating lever and quadrant are situated on the right hand side of the rear cockpit.

When the operating lever is in the rear-most position the slots are locked. With the lever in the forward position the slots should be quite free.

The Auto slots will extend automatically as the aircraft approaches stalling speed to provide additional lift. The Auto slots should be locked when taxying or before performing aerobatics (including spins).

NOTE: Using any flaps up key command will close and lock the Auto slots and any flaps down key command will unlock the Auto slots

Show/hide stick
Click on the base of the control column to show/hide the stick. A horizontal control lock bar can be installed by clicking on the spot just below the throttle and mixture levers.

Windscreen reflections
A hidden clickspot that switches the windshield between clean and dirty. The dirty windshield will also show reflections. Users who prefer a clear non-reflective windshield should set this to clean.

Show/hide copilot
A hidden clickspot that shows/hides the copilot in the front seat.

Tablet and GPS
The tablet and GPS are normally stored in this position. Click on either to move them into a more visible position within the cockpit. The tablet can be moved to ten different positions around the cockpit by clicking on the top of the tablet. The GPS can be moved to two fixed positions in front of the right side of the rear cockpit panel. It can also be moved anywhere you like along the top of the cockpit. Move the GPS by clicking in the centre of the top or bottom edge of the GPS.

The on, off and set key commands for Avionics 1 and 2 can switch the GPS and tablet between the stored and cockpit positions.

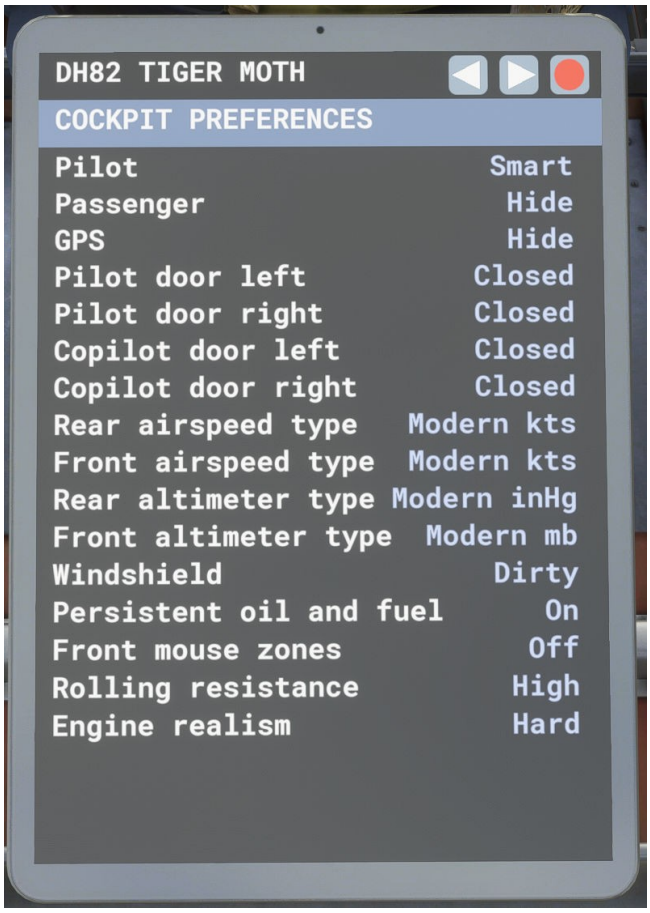
TABLET

The tablet is available to adjust Preferences as well as providing a generic autopilot and radios. The tablet (and GPS) is normally stored down by the right hand side of the rear seat. The Avionics 2 on, off and set key commands will switch the tablet between the stored position and the last used cockpit position.

There are a number of preset positions that the tablet can be moved to within the cockpit. Clicking on the hidden clickspots on the top edge of the tablet will move the tablet between the various positions. The position of the tablet is saved at the end of each flight.

The tablet has 5 pages. Navigate through the pages by clicking on the arrows at the top right of the tablet. Clicking on the red spot button in the top right will turn off the tablet and move it back to it's stowed position

PREFERENCES



The user can adjust the various Preferences on this screen. The preferences on this page will be saved at the end of each flight (compared to the exterior preferences on the next page which are not saved).

Pilot and passenger has four settings:

Hide - the pilot/passenger is never shown

Show - the pilot/passenger is always shown

Ext only - the pilot/passenger is not shown in interior cockpit views but is shown in exterior views.

Smart - the pilot/passenger is shown in exterior views. In interior views the camera selected will determine whether the pilot/passenger is shown or not.

Windshield: The Dirty windshield will also show reflections. Users who prefer a clear non-reflective windshield should set this to Clean.

Persistent oil and fuel: When set to On, will save the oil and fuel levels at the end of each flight and reload them at the start of the next. Note, that the oil and fuel levels are reloaded a few seconds after the flight is loaded therefore they will overwrite any settings you make before starting the flight.

Front mouse zones: The front cockpit is fully functional but due to the way mouse zones work in MSFS (ie you can click through solid parts that are in front of the mouse zone)

having them active while flying from the rear cockpit can result in random chaos. By default the front cockpit mouse zones are disabled and only become active in certain camera views. Setting the Front mouse zones preference to On will make the front mouse zones always active. This would only really be necessary if you have created a custom camera setting to fly from the front cockpit.

Rolling resistance: Unfortunately MSFS does not have a parameter that developers can access to set the ground rolling resistance which can lead to aircraft rolling at unrealistic speeds. In the case of the Tiger Moth it takes a very long time to roll to a stop. Setting the Rolling resistance to Hard will apply a minimum of 17% brake pressure when the aircraft is on the ground and the engine RPM is less than 1200. This helps to slow down the Tiger Moth to compensate for the very low rolling resistance of small aircraft in MSFS.

Engine realism: The realism of the engine behaviour can be set to Easy (default) or Hard.

In Easy mode:

1. The engine does not need to primed and the throttle can be any setting to start.

2. Sparkplug fouling is not simulated

3. Engine damage due to low oil levels is not simulated (oil consumption will still occur and the oil pressure indicator will show effects)

In Hard mode:

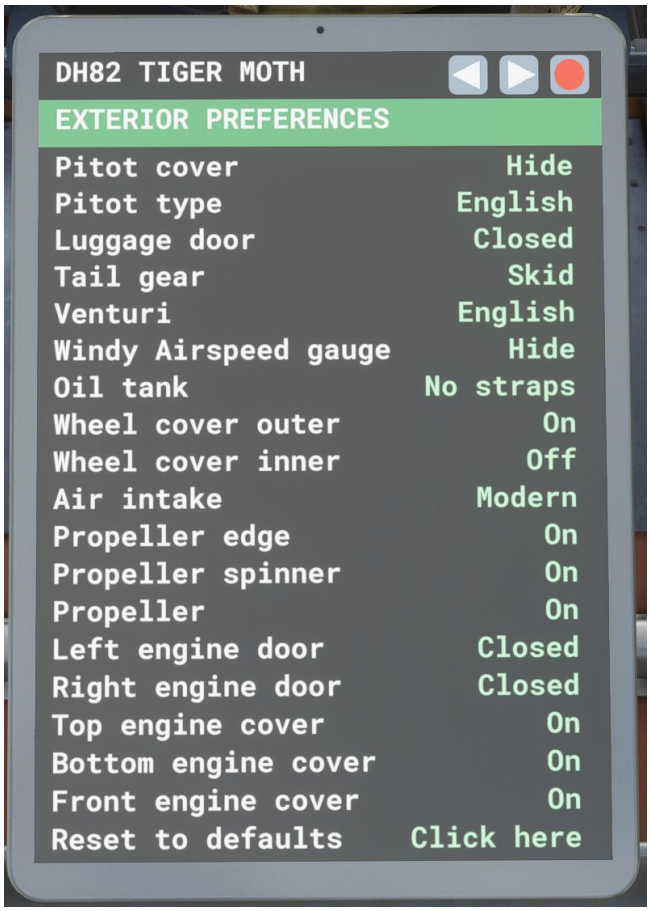
1. The engine must be primed correctly and the throttle and magnetos set correctly to start.

2. Sparkplug fouling is simulated and can cut the engine power.

3. Engine failure can occur if the oil level is too low.

EXTERIOR PREFERENCES

Various display options can be set in the Exterior Preferences screen.



These preferences are not saved at the end of each flight (except the Pitot cover which is saved) and will be reset to the default values for each livery. Clicking on "Reset to defaults" will reset the preferences to the default for that aircraft (the information is encoded into each model's unique name in the aircraft.cfg file).

Most of these preferences can also be set be actually clicking on the model of the aircraft.

Pitot cover: A cover over the pitot tube located on the front right wing strut.

Pitot type: English or Australian style.

Luggage door: Opens/closes the luggage door on the right side of the fuselage behind the rear cockpit.

Tail gear: Switches between a vintage tail skid or modern tail wheel.

Venturi: Switches the position of the right side venturi between Australian (attached to the right strut) and English (attached to the fuselage mirroring the position of the venturi on the left side).

Windy Airspeed gauge: Shows/hides the simple wind driven airspeed gauge (in MPH) on the front left wing strut.

Oil tank: Switches between a vintage style oil tank with straps and a more modern version without straps.

Wheel cover outer and inner: Shows/hides the wheel covers on the main gear.

Air intakes: Switches between a vintage (round) and modern (tear drop shaped) air intake on the right side engine door.

Propeller edge: Shows/hides the brass strip attached to the leading edge of the propeller blades to prevent damage.

Propeller spinner: Shows/hides the propeller spinnner.

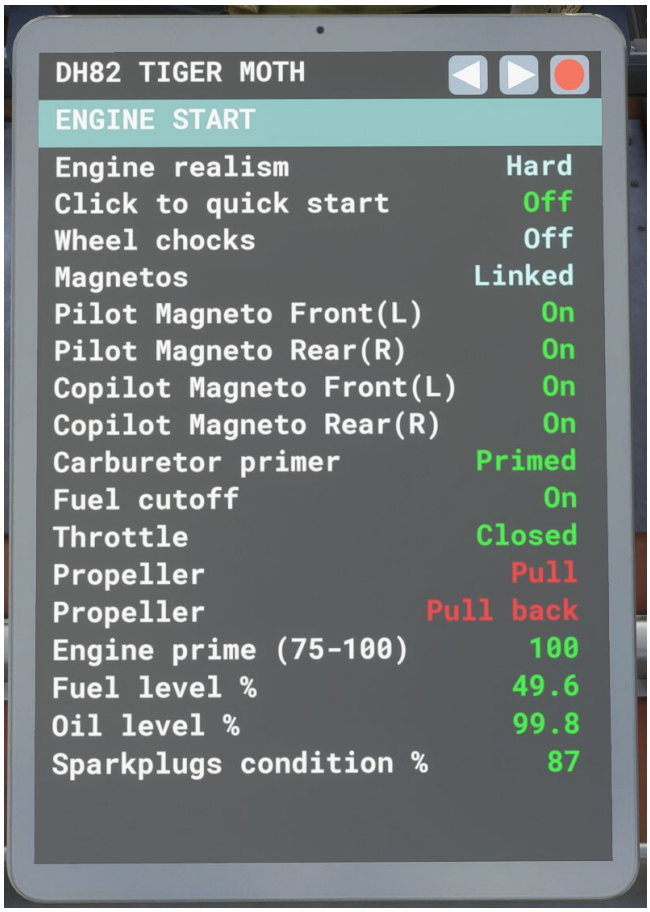
Propeller: Shows/hides the propeller itself (you can only hide the propeller when the engine is stopped).

Left and Right engine doors: Opens/closes the engine doors (the doors can only be open on the ground).

Top, Bottom and Front engine covers: Shows/hides the various parts of the engine cowling. These can only be hidden when the aircraft is on the ground and the engine is stopped. Note that the Top and Bottom engine covers must be removed before the Front engine cover can be removed.

ENGINE START

This page can be used to operate all the controls needed to start the Tiger Moth engine. It also has a handy cheat mode which tells you exactly how much the engine is primed.



Please see the Starting the Tiger Moth section below for a detailed explanation of how to start the Tiger Moth and what each parameter on this page is for.

Parameters that appear in red or green indicate if they are set correctly for current aircraft setup (this can vary depending on the Engine realism).

Sparkplug Fouling

If the Eninge realism is set to Hard then sparkplug fouling will be simulated. Whenever the engine is below 900 RPM carbon deposits will build up on the sparkplugs.

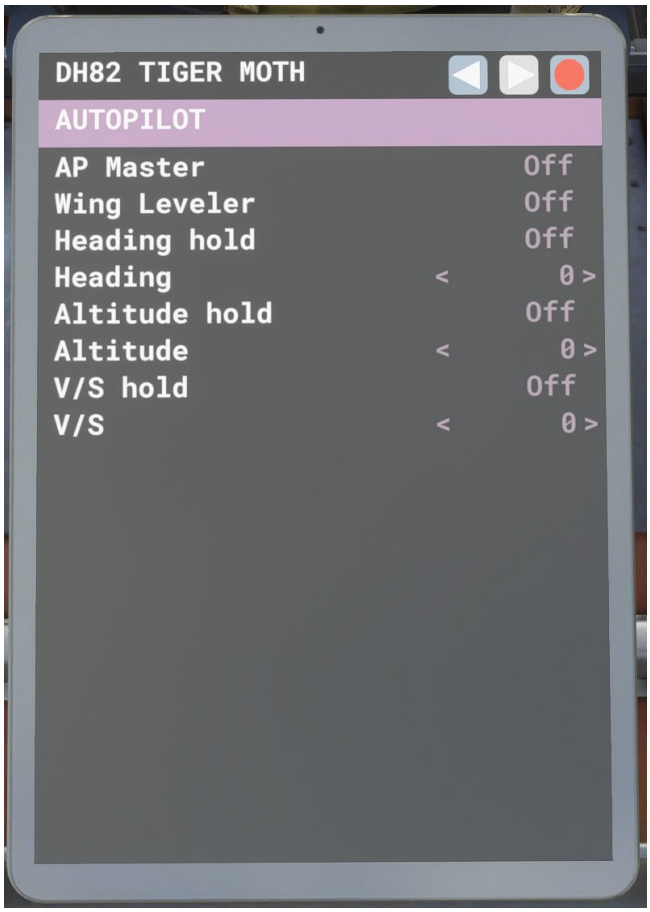
After 5 minutes (when the condition drops below 40%) this will start to affect the engine and will quickly lead to the engine stopping.

Running the engine above 900 RPM will burn-off the carbon build-up. Full RPM should clear the sparkplugs within a few seconds.

If the build-up causes the engine to stop then the sparkplugs will need to be hand cleaned either by clicking on the Sparkplugs condition parameter in the Tablet or by opening the right engine door and clicking on the sparkplugs there.

AUTOPILOT

A simple autopilot is available on this page. An autopilot in a Tiger Moth is very unrealistic but some users may like to do long flights unattended so one is available here.



Clicking on Heading hold or Altitude hold to turn on the autopilot and hold either the current Heading or Altitude respectively.

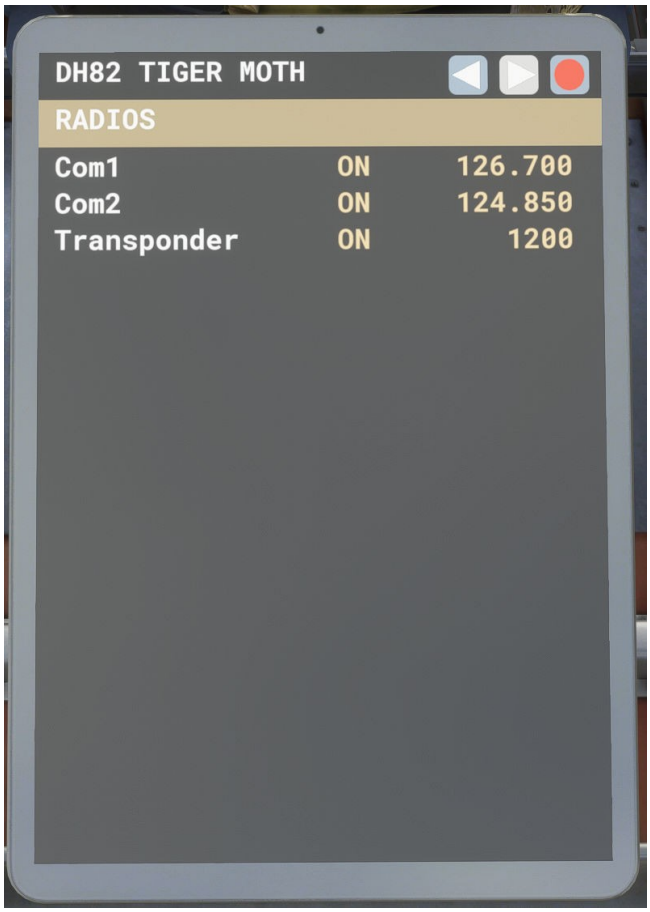
Click on the far left and right (over the arrows) of the Heading setting to change the heading by 10 degrees. Clicking closer to the centre will change the heading by 1 degree.

Click on the far left and right (over the arrows) of the Altitude setting to change the altitude by 1000 feet. Clicking closer to the centre will change the altitude by 100 feet.

The vertical speed will only change by 100 feet.

RADIOS

Provides access to two com radios and a transponder. Clicking on the centre to turn the radio ON/OFF.



Each frequency has 4 mouse zones. To decrease the whole number part of the frequency click on the left side of the whole number. To increase click on the right side.

To decrease the decimal part of the frequency click on the left side of the decimal number. To increase click on the right side.

The decimal part changes by 0.005 each time you click.

To change the transponder frequency click on each individual frequency. The digit will increase from 0 through to 7. There is no option to decrease the digits (the mouse zones would be too small to use effectively). You will need to cycle up through the digits.

STARTING THE TIGER MOTH

The Tiger Moth can be started a number of ways in MSFS depending on how realistic you want to be.

Operating the engine and propeller

Starting the Tiger Moth requires setting the carburettor priming on the engine itself (there is no primer control inside the cockpit) and manually pulling the propeller (there is no starter motor inside the cockpit). The user can achieve these functions either using MSFS key commands, by changing the cockpit camera view and operating the primer and propeller or by using the Tablet to operate the primer, propeller, magnetos and fuel cutoff.

Autostart

There are three ways to use the MSFS Autostart procedure if you want to quickly start the engine without having to go through the full engine start procedure:

1. Press the engine autostart key command (CTRL+E).

2. Open the Tablet, select the Engine Start page and click on "Click here to quick start"

3. Click on the hidden mouse spot that is over the lower left mounting bolt on the rear panel.

Easy Engine realism

The Easy or Hard mode can be selecting by opening the Tablet, selecting the Engine Start page and toggling the Engine Realism.

In Easy mode the carburetor and engine primer levels and throttle settings are ignored. You only need to have the fuel on and the magnetos (either single or both) on. The engine is then started by pulling the propeller through or by using the engine or magnetos start (SHIFT+ALT+G) key commands.

Hard Engine mode

The Easy or Hard start mode can be selecting by opening the Tablet, selecting the Engine Start page and toggling the Engine Realism.

In Hard Start mode the carburetor and engine primer levels, throttle and magentos need to be set correctly to start the engine.

Starting the Tiger Moth is a two man procedure. The Ground crew primes the engine, manages the front set of magnetos and pulls the prop through (clockwise when standing in front of the prop) to start the engine while the pilot manages the throttle and the rear set of magnetos.

Start up can be broken down into 3 main steps:

1. Prime the carburettor with fuel

2. Pull the prop through to get fuel into the cylinders

3. Turn magnetos on, set throttle and pull the prop to start.

Ensuring the primer level is set correctly is the key to a good start. For a cold engine pulling the prop through 4 or 5 times should be enough to prime the cylinders. For a hot engine carburettor and cylinder priming is not necessary. It's only when the engine is warm (neither hot nor cold) that setting the priming level becomes difficult.

To follow the Hard Start mode it is recommended to use the checklists within MSFS. By clicking on view icon on the right side of each checklist item the camera view can be changed to provide easy access to the engine bay, propeller, wheels, magnetos etc.

Wheel chocks: SET. Either use switch the camera view to the front wheels or use the Parking Brake key command to place wheel chocks in front of the wheels.

Crew - call: Switches off, fuel on, throttle closed. Click on the view icon to make the crew call. The crew is telling the pilot to turn off the magnetos, turn the fuel on and close the throttle.

Magentos: Off. Turn off the front set of magnetos. Both magnetos should be in the down position.

Magentos: Off. Turn off the rear set of magnetos. Both magnetos should be in the down position.

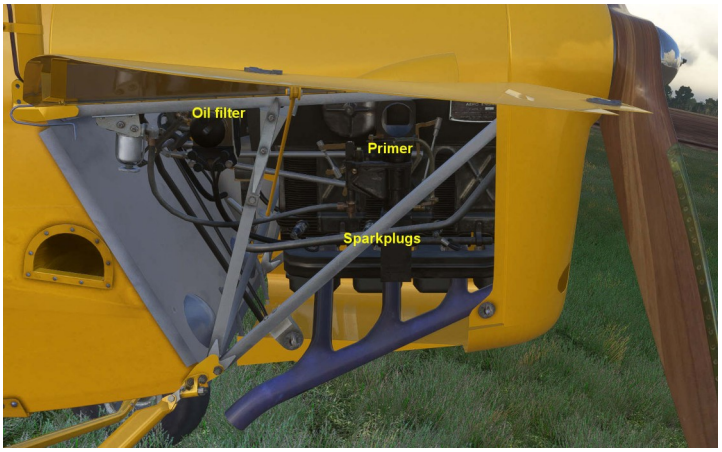
NOTE: If you have set the user preferences so the magnetos are linked then setting the front magnetos off will also set the rear magnetos off at the same time.

Fuel cock: On. Push the fuel valve in to turn the fuel on. The fuel valve is in an awkward position below the panel on the left side of the cockpit. It is the push rod with a red knob.

Throttle: Closed. Pull the throttle all the way back to close it. The gate on the throttle will set the mixture control to full rich.

Pilot - call: Switches off, fuel on, throttle closed. The pilot is confirming that the magnetos are off, fuel is on and the throttle is closed.

Primer: Press. The ground crew now floods the carburetor with fuel. Change the view to the right hand side of the engine bay. Open the engine door by clicking on either of the latches at the bottom the door. Press the small brass switch on the left hand side of the carburetor. Close the engine door by clicking on either latch.



The Tiger Moth uses an AUTO-KLEAN oil filter. Rotate the lever on the oil filter once every day.

Propeller: 4 half-turns clockwise. The engine can now be primed. Switch to the front view of the propeller and click on the top of the propeller to pull it through (clicking on the bottom of the propeller will pull it anti-clockwise). Do this 4 times for a cold engine.

Crew - call: Throttle set. Tell the pilot to set the throttle to slightly open.

Throttle: Open 1/2 inch. Set the throttle between 10 and 30%

Pilot - call: Throttle set. The pilot tells the crew the throttle is set

Crew - call: Contact. Tells the pilot to set the front magneto on.

Magnetos - Front on: The crew turns on the front (left) magneto of the front cockpit. The Tiger Moth should be started with the front magneto on only.

Magnetos - Front on: The pilot turns on the front (left) magneto of the rear cockpit.

Elevator Control - Full backward. The pilot pulls the control stick fully back to ensure the tail remains on the ground when the engine starts.

Pilot - call: Contact. The front magneto is set and the pilot tells the crew the aircraft is ready to be started.

Propeller - Pull to start. The crew pulls the propeller through to start the engine. The engine should start first go. If not, you can try a second time (pulling the propeller through . If the engine half-starts and then stops then something has not been set correctly (usually the throttle). You should follow the Engine fails to start procedure in the checklists to blow out the engine and then reprime the engine.

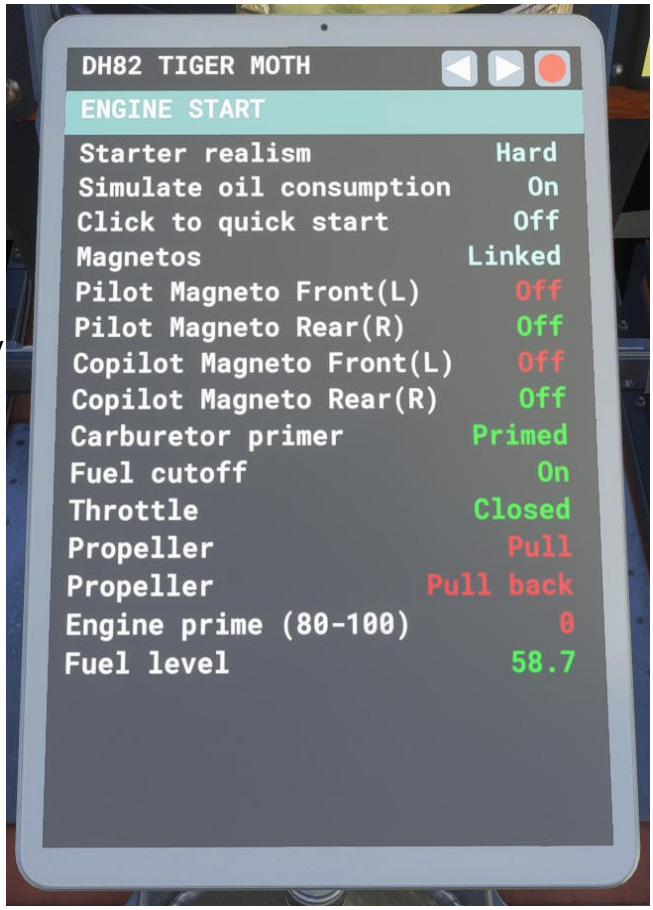
Magnetos - Both ON. The pilot puts both magnetos into the on position for the rear cockpit.

Magnetos - Both ON. The ground crew carefully steps around the rotating pilot and puts both magnetos into the on position for the front cockpit.

The pilot can now set the engine to around 900-1000rpm and runs it for 4 minutes to warm up the engine. The oil pressure should be around 30 psi.

Using the Tablet to start the engine

Open the Tablet and select the Engine Start page.



Some items will appear either green or red. Green indicates that the item is set correctly and red indicates it is not set correctly for the current realism setting and state of the flight.

Starter Realism: Set to Easy or Hard. In Easy mode it is not necessary to prime the carburetor or engine or to have the throttle in the correct position when starting.

Click to quick start: Activate the engine autostart procedure.

Magnetos: Linked will link the front and rear sets of magnetos so changing one will change the other. Independent will require each set of magnetos to be set individually.

Pilot and Copilot magnetos: Click to switch each magneto without needing to change the camera view.

Carburetor primer: Click to prime the carburetor. The status of the primer will be showed.

Fuel cutoff: Click to turn the fuel cutoff lever on or off.

Throttle: Shows the status of the throttle.

Propeller: Click to pull the propeller clockwise (when viewed from the front) through one half turn when priming the engine.

Propeller: Click to pull the propeller anti-clockwise through one half turn when you need to clear the engine if it is flooded.

Engine prime: Shows the engine prime level. The setting for starting should be between 75-100. Above 100 and the engine is flooded and the "engine fails to start due to rich mixture procedure" should be followed.

Fuel level: Shows the fuel level for reference

Oil level: Shows the oil level for reference

Sparkplugs: Shows the condition of the sparkplugs. Click on the indication to clean the sparkplugs or change the view to the right side of the engine and clean the sparkplugs there.

FLYING NOTES

Engine warm-up

Run the engine at 900-1000 rpm for 4 minutes before running up. Keeping the RPM above 900 will avoid carbon buildup on the sparkplugs as well as provide air cooling for the engine.

Taxying

Ensure the auto slots are locked when taxying to avoid damage. Keep the engine RPM around 1200 to maintain a steady taxying speed (this assumes Rolling Resistance in the interior preferences is set to HARD). As forward visibility is very poor you may either taxi in an S fashion or select one of the camera views that places the head out either side of the aircraft.

Take off

Expect the aircraft to want to steer to the right (the propeller spins in the opposite direction to most modern aircraft) and counteract this with left rudder. Be aware of any crosswinds and use aileron to counteract them.

Climbing

Attain 60 kts (70 mph) before entering the climb. Set power to 2050rpm and climb at 58 kts (66 mph)

Aerobatics

The Tiger Moth has very responsive elevator (pitch) and rudder (yaw) but has relatively weak ailerons (roll). As a result the Tiger Moth is good at loops, spins, wingovers and stall turns but weak at any sort of roll.

As the Tiger Moth has a gravity fed carburetor inverted flight are zero gravity situations should be avoided.

The maximum weight for aerobatics is 1770lbs.

For further reading on Tiger Moth aerobatics I recommend this PDF.

https://tigermothclub.co.nz/wp-content/uploads/2020/11/aerobatics-dp.pdf

Stalling

The stall characteristics of the Tiger Moth are very benign. It actually requires quite a bit of deliberate effort to stall a Tiger Moth. There is no stall warning sound and very little buffeting. The large wings create a lot of vertical drag so the descent rate is slow. Recovery from a stall should only require moving the elevator forward to lower the nose and regain airflow over the wings before levelling out.

Spinning
From level flight close the throttle and use the elevator to keep the nose up. As the speed drops below 40 kts (45 mph) apply either full left or full right rudder and full back elevator. After the spin is established the rudder pressure may be released. Keep the stick back.

To recover apply full opposite rudder and then slowly centre the stick. Centralise the rudder as soon as the spinning has stopped and recover from the ensuing dive.

Aileron Roll
The Tiger Moth ailerons are not very powerful so roll manouvres can be difficult. Dive to 100 kts (115 mph) then raise the nose to 30 degrees above the horizon. Stop the pitch rate and apply full aileron with a bit of rudder to balance. As you pass 90 degrees push the stick forward a touch. As you go past inverted ease off on the forward stick and apply some more rudder in the direction of the roll. Aileron rolls are not easy in a Tiger Moth so don't be surprised to have a very low nose on exit.

Flick Roll
Flick rolls are particularly difficult in a Tiger Moth and not recommended. However, you can do an accelerated spin entry. From level flight and 52kts (60 mph) apply full throttle. As you accelerate pull the nose up firmly while applying full right rudder. This should flick the aircraft to the right. If you maintain the controls you will enter into a right spin, close the throttle and recover as normal. If you centre the controls once you are inverted you should be able to recover by completing a half loop.

Falling Leaf
A series of consecutive incipient spins. From straight and level flight close the throttle. As the aircraft starts to stall apply full rudder. As soon as the wing starts to drop apply full opposite rudder. Repeat the cycle with the wings rolling between 45 degrees banked each side. It takes a bit of practice to get the timing correct. Too late and you can easily enter a spin. To recover push the stick forward.

Descending
Avoid idling the engine during the descent to avoid carbon buildup on the sparkplugs. Maintain at least 1000 rpm.

Shutdown
Don't forget to use the magnetos to stop the engine.

Engine Limitations

	RPM	HP	
Full throttle	2350	130	(5 min limit)
Minimum take-off	1825	104-108	(full throttle)
Maximum climbing	2100	120	(30 minutes)
Maximum cruising	2100	120	(30 minutes)
Normal Cruising	1900-2050	108-118	

Desired Operating Figures

Unless conditions warrant otherwise the following figures should not be exceeded:

	RPM	HP
Warm up for 4 minutes	800-100	
Testing engine on chocks	Full throttle for no more than 10 secs	
Normal full throttle	2100	120
Take off	2100	120
Climbing	2050	118
Cruising	1950	110-112
Oil pressures		
Normal	40-45 PSI	
Minimum (5 minutes max)	30 PSI	
Maximum (5 minutes max)	60 PSI	

Mixture Control

Not to be used below 500' and must not be used to cause a drop in RPM

Flying Limitations

Maximum diving speed is 180 mph (156 kts) and rpm should not exceed 2200 rpm. Not more than climbing power is to be used on completion of any manoeuvre. On no account must full power be used.

Fuel Consumption

MPH	KTS	RPM	Gal/Hr	Endurance Hours
75-80	65-70	1950	6-6.5	2.5
80-85	70-74	2050	7-7.5	2.25
85-90	74-78	2100	7.75-8	2

If carrying out aerobatics and/or prolonged climbing the fuel consumption increases and the safe endurance in this case is reduced to 2.25 hours.

NORMAL PROCEDURES

The Normal and Emergency Procedures are available in the MSFS Toolbar. Move the mouse to the top of the screen and click on the small white arrow then select the Checklists.

FLIGHT SIM NOTE

The following procedures have been adapted from the real world procedures and modified for use in MSFS. They should not be used for real world aviation.

1: Preparation for flight

On approaching the aircraft check that it is in a suitable position for starting and running up, the pitot head is uncovered, the tyres are correctly inflated, chocks are in front of wheels and controls are unlocked and chocks removed from rudder.

Check fuel and oil is correct.

Check luggage compartment locked.

2: Before going solo

The front cockpit must be checked to ensure that:

The front control column has been removed and stowed

The safety harness is securely fastened

Ensure earphone is removed and stowed

The throttle lever friction nut is slackened

Both doors are securely fastened

There are no loose articles in cockpit seat or on floor

3:Before starting engine

Ensure that:

Intercommunicating system is connected up

Elevator trim lever is in the fully tail heavy position

All magneto switches are off

Fuel control is on

Throttle is closed

4:Starting procedure

Starting the Tiger Moth is a two man procedure. The Ground crew primes the engine, manages the front set of magnetos and pulls the prop through (clockwise when standing in front of the prop) to start the engine while the pilot manages the throttle and the rear set of magnetos.

Start up can be broken down into 3 main steps:

1. Prime the carburettor with fuel

2. Pull the prop through to get fuel into the cylinders

3. Turn magnetos on, set throttle and pull the prop to start.

Ensuring the primer level is set correctly is the key to a good start. On the Starting Procedure page of the Pilot's Handbook - Normal Procedures the primer level is shown as a percentage.

Ensure the primer level is between 75% and 100% before switching the magnetos on for starting. Ensure the throttle is correctly set, just slightly open.

Below 75% requires more pull throughs. Above 100% and the engine is flooded. Clear by setting the throttle wide open and pulling the prop through backwards (anti-clockwise).

CREW: Checks to see chocks in place in front of wheels. Calls "switches off, fuel on, throttle closed"

PILOT: Checks switches off, turns fuel on, closes throttle. Calls "switches off, fuel on, throttle closed"

CREW: If engine is cold floods carburettor and pulls prop 4 half turns clockwise. Calls "throttle set"

PILOT: Checks throttle lever in nearly closed position. Calls "throttle set"

CREW: Calls "Contact". Puts front magneto ON (up)

PILOT: Hold stick back (to prevent prop wash lifting tail) and puts front magneto ON (up). Calls "Contact" and keeps left hand on throttle

CREW: Checks elevator up then pull airscrew

PILOT: When engine fires puts rear magneto ON (up)

CREW: When engine fires puts rear magneto ON (up)

If the engine fails to start due to rich mixture:

CREW: Switches front switches OFF. Calls "Switches off, throttle wide open for blow out"

PILOT: Switches rear switches OFF and opens throttle fully. Calls "Switches off, throttle wide open, blow out"

CREW: Turns airscrew anti-clockwise until cylinders are clear of rich mixture (min. 6 half turns).

repeat start procedure from CREW: Calls "throttle set" step

5:Warming up

When the engine is running smoothly and the oil pressure has settled run the engine at 900-1000

rpm for at least 4 minutes and check as follows:

Trimming control at fully tail heavy

Slacken friction nut on throttle

Check mixture full rich (full back)

Set altimeter

Check airspeed indicator (mph or knots)

Check instruments for serviceability and lock compass grid ring

Check oil pressure normal 35 psi at 1000 rpm

Check slot lever and lock slots

Check fire extinguisher in place and secure

See that both sets of switches are in the ON position i.e. both up

Check fuel gauge and fuel level

Test flying controls for freedom and correct movement (elevator and aileron only, rudder to be tested when taxying)

6:Running up

The engine is ready to be run up and tested after 4 minutes and when oil pressure is registering 35 psi minimum

Hold stick right back to prevent prop wash lifting the tail

Open throttle to 1600 rpm and test magnetos independently (drop in rpm must not exceed 100)

Open throttle fully, rpm should be 1825 minimum, normal 2100 rpm. Oil pressure 40-45 psi

Throttle back and check slow running adjustment is 550-600 rpm

7:Taxying

See that throttle friction nut is slackened

Ensure that tail trimming lever is fully tail heavy

Avoid taxying or idling for prolonged periods at low rpm

Test flying controls for freedom and correct movement (elevator and aileron only, rudder to be tested when taxying)

8:Take off
Elevator trim neutral (central position)

Tighten throttle friction nut

Mixture control right back to full rich

Fuel cock fully on and sufficient fuel

Slots unlocked (lever fully forward)

The engine should be cleared by opening the throttle to 900 rpm\ttest magnetos independently and check oil pressure 35 psi

Flying control should be tested for freedom of movement. When headed into wind taxi forward with the rudder bar central to straighten the tail skid

Full throttle is to be used for take-off and the initial climbing speed is 70 mph (60 kts). Maintain until engine is throttled back to climbing power (2050rpm) at 2-300 ft after which the climbing speed of 66 mph (58 kts) is to be assumed

9:Climbing
The correct power setting is 2050 rpm and the correct airspeed is 66 mph (58 kts). If 2050 rpm is unobtainable for climbing at less than full throttle the engine speed should be reduced from full throttle by 50 rpm.

Climbing turns - maintain the same power setting but lower the nose sufficiently to maintain AT LEAST the correct climbing speed. If a constant rate of climb is required increase power to not more than 50 rpm below full throttle.

10:Cruising
The correct power setting for straight and level flight is 1950 rpm and the airspeed should be 75-80 mph (65-60 kts). The safe endurance at these rpm is 2.5 hours. The power setting can be altered for straight and level flight but must be kept within the normal cruising limits of 1900-2050 rpm.

11:Descending
For the engine assisted descent reduce to 1100-1200 rpm and speed 66 mph (58 kts).

During turns maintain the same power but lower the nose sufficiently to maintain AT LEAST the same airspeed.

For gliding without engine the same speed 66 mph (58 kts) is to be used.

For gliding turns the speed should be increased (by lowering the nose) up to as far as 70 mph (60 kts) depending on the steepness of the turn.

12:Low flying
Use the same power setting as for cruising i.e. 1950 rpm 75-80 mph (65-70 knots).

Power should be increased when turning.

13:Approach and landing
On the down wind leg the following pre-landing vital action drill is to be carried out:

Fuel: Sufficient for another circuit

Mixture: Fully rich

Slots: Unlocked

The airspeed recommended for gliding and engine assisted approaches is 66 mph (58 kts)

14:Precautionary approach and landing
The correct airspeed for the final approach is 55 mph (48 kts) and this speed should be assumed at 250ft

15:Mislanding (going round again)
The initial climbing speed is 70 mph (60 kts). This is to be maintained until the engine is throttled back to climbing power at 2-300ft. The climbing speed of 66 mph (58 kts) should be assumed.

16:Stopping the engine
Elevator trim in fully tail heavy position

Throttle back to 900-1000 rpm

Hold stick fully back with right arm

Switch off magnetos and open throttle to full

After prop stops close throttle

Fuel cock to OFF position

Ensure front magnetos are in OFF position

17:Stalling and spinning
Normal stall from straight glide

Engine off = 40 mph (35 kts)

Engine on = 30 mph (25 kts)

Before spinning the slots must be locked

18: Steep turns
Adjust power to 2100 rpm

Speed should not be reduced below 70 mph (60 kts)

The same speed applies for steep gliding turns

19: Aerobatics

Before commencing aerobatics carry out the following:

Mixture fully rich

Check contents of fuel tank

Slots locked

Safety harness secure

The correct speeds are as follows:

Loop	115 mph	(100 kts)
Stall turn	90 mph	(78 kts)
Inverted gliding	85 mph	(74 kts)
Slow roll	110 mph	(95 kts)
Barrel roll	115 mph	(100 kts)
Half roll off the top of loop	135 mph	(118 kts)
Half roll	95 mph	(82 kts)

EMERGENCY PROCEDURES

Abandoning the aircraft

The captain should order the other occupant to leave first. Both occupants should use the following

procedure:

Open cockpit door

Disconnect intercommunication lead and undo safety harness

slide over the side, head foremost and facing the tail

Action in event of fire

Fuel OFF

Throttle fully OPEN

Climb aircraft until fuel is consumed and engine cease to fire

Ignition switches OFF

Throttle CLOSED

Forced land aircraft

FAQs AND KNOWN ISSUES

Converting FSX Repaints to MSFS

The textures used in the MSFS version of the Tiger Moth are mostly the same as the ones in FSX. However, the fuselage and wing textures are now 4k and have been renamed. The panel textures have also been resized to 2k.

The leather roll over in the front of each cockpit uses completely new and remapped textures.

Encoding exterior preferences in the aircraft title

Repainters should take care to ensure the aircraft title is set correctly. The last 11 digits of the aircraft title are used to encode the exterior preferences for each repaint [FLTSIM]. Please refer to the aircraft.cfg file which contains information on how to encode this information. If the information is not encoded correctly default values will be used instead.

FSUIPC and mixture control

The Tiger Moth uses special coding to control the mixture lever (to control the throttle gate and simulate sparkplug fouling). If you are using FSUIPC to calibrate the mixture joystick axis that this will bypass the mixture lever coding in the Tiger Moth. This means the mixture lever will not animate correctly. You may need to create a specific profile for the Tiger Moth in FSUIPC.

How do I uninstall the Tiger Moth?

To uninstall the Tiger Moth you will need to manually remove/delete the antsairplanes-tiger-moth folder from the Community folder.

Where is the Community folder?

This depends on your installation of MSFS.

Windows Store default location:

C:\Users\[Your User Name]\AppData\Local\Packages\Microsoft.FlightSimulator_8wekyb3d8bbwe\LocalCache\Packages\

Steam default location:

C:\Users\[Your User Name]\AppData\Local\Packages\Microsoft.FlightDashboard_8wekyb3d8bbwe\LocalCache\Packages\

or

C:\Users\[Your User Name]\AppData\Roaming\Microsoft Flight Simulator\Packages\Community

Custom install location:

If you have installed Flight Simulator or the Community folder to a custom location you should know where that location is.

Installed Files

The following files are installed by this package. No default files are altered or deleted by this package.

Community/antsairplanes-tiger-moth

A shortcut to the Tiger Moth Pilot's Handbook is placed on your desktop.

Preferences are saved to the state.cfg file which can be found in either:

C:\Users\[username]\AppData\Local\Packages\Microsoft.FlightSimulator_8wekyb3d8bbwe\LocalCache\SimObjects\Airplanes\antsairplanes-tiger-moth

or

C:\Users\[USERNAME]\AppData\Roaming\Microsoft Flight Simulator\SimObjects\Airplanes\antsairplanes-tiger-moth\states.cfg

In my case it's the first location. The SDK says it should be the second location.

CREDITS

Modeling, sounds, textures, flight dynamics, manuals by **Anthony Lynch.** Visit my website at www.antsairplanes.com to download some free scenery.

The aircraft used as a model is VH-PCG from Tiger Moth Byron Bay, Tyagarah airfield, NSW.

Thanks to Bev and Steve for their assistance. Next time you are visiting the Byron Bay / Ballina / Northern NSW area check them out at https://tigermothbyronbay.com.au/

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