

MILITARY VISUALIZATIONS

# DHC-2 BEAVER



PRODUCT MANUAL

**This manual is for flight simulation use only.  
Do not attempt to use any part for real flight operations.**



MILITARY VISUALIZATIONS  
**DHC-2 BEAVER**

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MILITARY VISUALIZATIONS  
**DHC-2 BEAVER**

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# INTRODUCTION

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CF-FHB, THE FIRST  
PROTOTYPE BEAVER,  
PICTURED DURING EARLY  
TESTS IN AUGUST  
1947

One of the greatest achievements in Canadian aviation isn't measured by military prowess, nor by how advanced it may have been for its time, nor by even how fast or how high it may have flown.

Instead, it's measured in usefulness and reliability, in year after year and mile after nautical mile of flying in poor weather and far flung regions where other aircraft just don't dare.

It's measured by the fact that almost 70 years after it first took to the air, not only is it still flying in large numbers, but it's still desired and used for the exact same purpose for which it was conceived.

No other aircraft so personifies a 'can-do' attitude, the very same attitude that has summed up those countless pilots and small operators bringing distant frontiers that much closer to civilization.

The story of the deHavilland DHC-2 Beaver isn't just a tale of a successful aircraft, it's a story of people and determination, of wise and considered engineering in an era when getting the job done - and done right - was what mattered most.

The Beaver is an aircraft to be truly proud of, to admire and respect; not just from a perspective of national pride but also for all who have an interest in aviation's past, for anyone who wishes to see where we've come from and in turn, witness where we're going.

Here at MilViz, we're very proud to have this opportunity to recreate this legendary aircraft for desktop simulation.

For many, desktop simulators often transcend the idea of 'game' or 'entertainment'. In addition to the simple enjoyment experienced from even the simulated act of flying, our computers can also become windows to a world which many of us may not have the opportunity to experience first-hand, or even to chapters of history long since passed.

To this end, we sincerely hope that we have succeeded in providing you, the user, with an enjoyable and accurate simulation of what we feel is a very remarkable aircraft.



# 1. FEATURES & HIGHLIGHTS

---



## 1.1 Introducing the MilViz DHC-2

The MilViz DHC-2 has been designed from the start to replicate and deliver an authentic Beaver experience.

Many aircraft developed for FSX and Prepar3D feature limitations on flight modelling that prevent the full flight envelope from being simulated. With our DHC-2, we are actively incorporating carefully designed flight dynamics in order to realistically represent the unique characteristics of this iconic aircraft.

The DHC-2 Beaver was never designed to be a difficult aircraft to fly - not in real life, and not in the simulator. However, just as in the real aircraft, the engine, pitch trim, and flaps will all need to be carefully managed in order to stay within safe flying practices. Stalls can and will develop if you approach the edge of the flight envelope without heeding proper operational limits.

We have also thoughtfully approached the day to day operation of the actual aircraft and replicated what we were able to within the limitations of a simulation platform.

The DHC-2 Beaver was engineered with certain features that are uncommon in more recent aircraft. We've strived to include some of these unique features in our model.

When you start the MilViz DHC-2, one of the first things you will be required to do is to pressure up the fuel system prior to engine start. Wobble pumps aren't unique to the Beaver, but we've included a fully operable pump handle that you'll need to become acquainted with.

As in the real aircraft, flaps in the DHC-2 are operated by means of a hydraulic pump located under the pilots seat. A pump handle is used to provide pressure and with each stroke, the flaps are raised or lowered a small amount. A



selector is used to determine whether the pilot is raising or lowering the flaps.

Functional circuit breakers are present for important electrical systems, such as the adjustable lighting and myriad of various avionics options available.

Does that yoke column prevent you from accessing or seeing your switches, or would you simply like to see what the view might be like from right hand seat? The throwover ability of the yoke installed in the MilViz DHC-2 is actually functional and animated - able to be positioned with the mouse anywhere along it's travel.

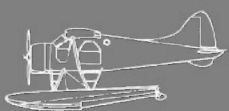
Our simulation doesn't stop there, of course. There are hundreds of smaller details that have been faithfully researched and recreated.

In truth, one of the more interesting aspects of recreating an aircraft such as this is that because it's been in service as a workhorse for so long, that there's really no standard



configuration, inside or out. We've strived to hold true to this aspect as well, with multiple models and a large selection of configuration options available.

With so many stories that the MilViz DHC-2 is capable of telling, where will your Beaver take you?



### 1.2 MilViz DHC-2 Special Features

- ▶ Professionally created & tuned, high fidelity flight model including accurate characteristics specific to the DHC-2.
- ▶ Four Body Configurations - Standard Wheels, Amphibious Floats, Skis, Tundra Tires, each with specifically tuned flight models.
- ▶ Two Body Styles - Passenger version with enlarged rear windows, cargo version with original round rear windows and cargo with selectable visibility.
- ▶ Custom fuel system with primer pump and wobble pump emulation; engine start takes into account current engine temperature and includes potential for over-priming & flooding.
- ▶ Functional cold cover - required for cold weather operation
- ▶ Custom electrical system with display of electrical load and operable circuit breakers.
- ▶ Unique flap operation which simulates the usage of the manually operated hydraulic pump and selector on the DHC-2.
- ▶ Icing effects on airframe and static instruments fully simulated.
- ▶ Functional and animated throwover ability on control column; ability to completely hide yoke and column for ease of access to important switches and controls.
- ▶ Hydraulic hand pump based on the original DHC design used in the Amphibious and Ski versions.
- ▶ Highly accurate and beautifully recreated exterior and interior 3D models.
- ▶ Richly detailed cabin with beautiful high resolution textures and smoothly operating gauges.
- ▶ Realistic and fully adjustable cabin and instrument lighting.
- ▶ Authentic sound environment, helping to enhance immersion and replicate the feel of a powerful 9 cylinder radial thumping away mere feet from the firewall.
- ▶ Milviz / REX WX Advantage Weather Radar included and available as a 3D panel option.
- ▶ Highly configurable avionics with 3D panel installations for many GPS solutions, covering popular 3rd party add-ons such as Flight1 GTN, RealityXP GNS, and Mindstar GNS.
- ▶ Professionally created liveries based on or inspired by real world aircraft.
- ▶ Available layer-based paintkit for creating your own liveries.



# 2. PRODUCT INSTALLATION & CONFIGURATION

---

## 2.1 System Requirements

The following requirements apply as a minimum to successfully install and operate the MilViz DHC-2.

Please note that choice of scenery, location, simulator settings and 3rd party utilities may place additional demands on your simulation platform.

### 2.1.1 Supported Platforms:

- ▶ Microsoft Flight Simulator X, Service Pack 2 (SP2)

Note: Service Pack 2 is required, aircraft may not function correctly with Service Pack 1 or earlier. The Acceleration expansion pack is fully supported but not required.

- ▶ Microsoft Flight Simulator X, Steam Edition
- ▶ Lockheed Martin Prepar3D, version 2
- ▶ Lockheed Martin Prepar3D, version 3
- ▶ Lockheed Martin Prepar3D, version 4

Note: This product is intended to be operated with a fully up-to-date installation of Prepar3D. This includes any released updates, patches, hotfixes, or point releases. However, because updates to Prepar3D can sometimes cause compatibility issues with existing aircraft of a complex nature, our recommendation is to check for compatibility issues or the update status of this product on our product forums prior to updating the simulator.

### 2.1.2 Supported Operating Systems:

- ▶ Windows Vista
- ▶ Windows 7
- ▶ Windows 10

### 2.1.3 Processor (CPU)

- ▶ 2.4 GHz single core processor required (3.0 GHz, multiple core processor or better recommended)

### 2.1.4 Video Card (GPU)

- ▶ DirectX 9 compliant video card with 1024 MB video ram

### 2.1.5 System Memory (RAM)

- ▶ 4 GB RAM

### 2.1.6 Hard Drive

- ▶ 2.5 GB or greater hard drive space

### 2.1.7 Gaming Controller

- ▶ Joystick, yoke, or other gaming controller

Note: All MilViz products require a functioning gaming device such as a joystick for proper operation.

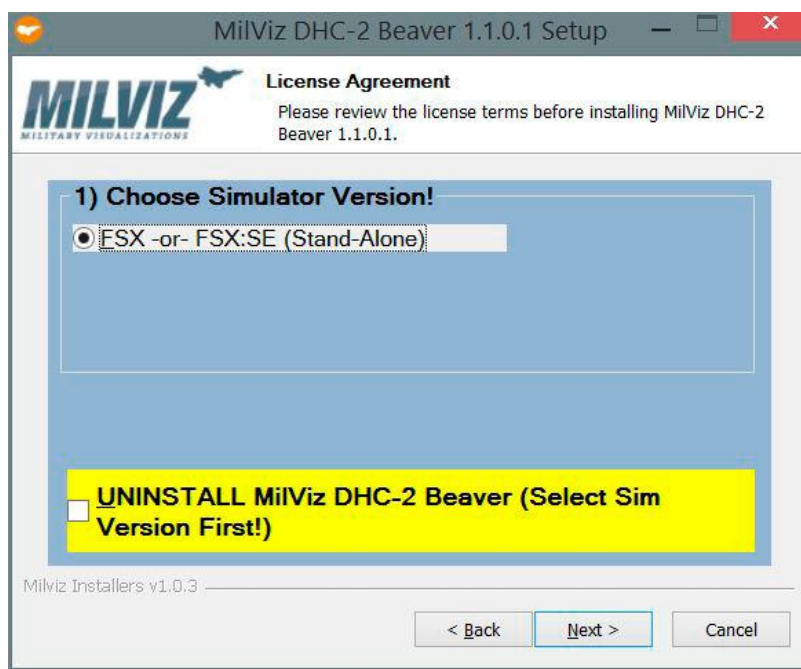


## 2.2 Installation Instructions

**Important:** As with other flight simulator addons, pre-installation precautions should involve closing other open applications, as well as temporarily disabling any active antivirus software. Please be sure to remember to re-enable your antivirus software after installation!

After purchase, you will have been given a link or an option to download a zipped (.zip) file. This compressed file contains an executable (.exe) file, which is the installer for the MilViz DHC-2.

To begin installation, please right click on the executable file and select “Run as administrator”. After clicking through on the initial setup screen and reviewing and agreeing to the license terms, you will come to the main installation window (below).



### 2.2.1 Choosing your Simulator

For a new installation, you are able to select a single option from a list of possible simulators to install into. The installer will automatically detect which simulators you have installed, and present you with only those selections.

Please note that you may only install into one simulator at a time; if you have more than one simulator installed on your computer, you are able to install to multiple simulators by re-running the installer and choosing a different simulator version.

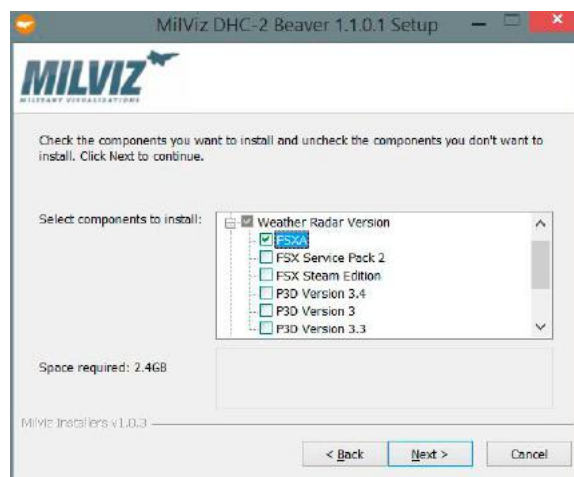
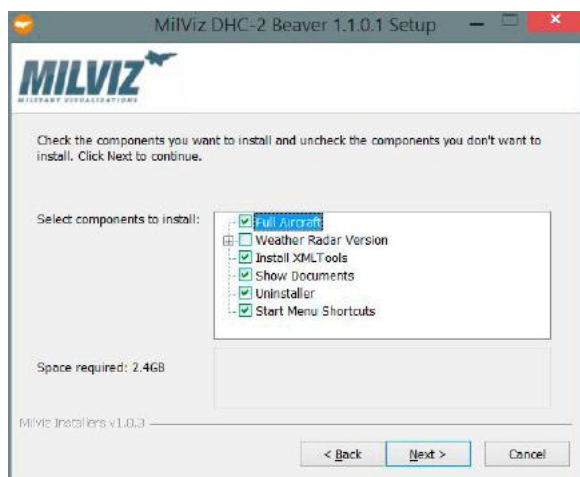
Click on the “Next” button to continue with the installation process.



### 2.2.2 Component Selection

The next screen will allow you to select (or deselect) various components that make up this installation. Although it's possible to do so, we don't really recommend deselecting any of the default options. In particular, XMLTools (a small utility that extends programming capabilities) is installed by default alongside the DHC-2, and is required for correct functionality of the aircraft.

The one area where you may freely make your own selections is within the 'Weather Radar Version' area. The MilViz DHC-2 Beaver ships complete with a copy of the MilViz / REX WX Advantage Weather Radar; you may use the selections here to install this add-on into any applicable simulator(s). When ready, click on the 'Next' button to continue.



### 2.2.3 Confirming Install Location

The last window that comes up should be pre-completed with the location of your selected simulator. If this isn't the case, or you wish for some other reason to change the simulator location that is detected, you may do so here.

When you are ready, click on the 'Install' button to proceed with the installation. During the installation process, you will see the progress of files being copied. Near the end, the installer for XMLTools will also display; please follow the prompts on this installer to ensure that XMLTools is properly installed.

### 2.2.4 Uninstalling

To uninstall the MilViz DHC-2 Beaver, simply run the installer, select your simulator version that you wish to uninstall from, then click on the checkbox option that reads "UNINSTALL...", and finally click on the "Install" button to start the uninstallation process.

Please note: This operation will only uninstall the MilViz DHC-2 Beaver from the selected simulator. To remove the product from multiple simulators, please re-run the installer and choose different simulator versions. Please be sure to back up any personalized files you may wish to keep prior to uninstallation.



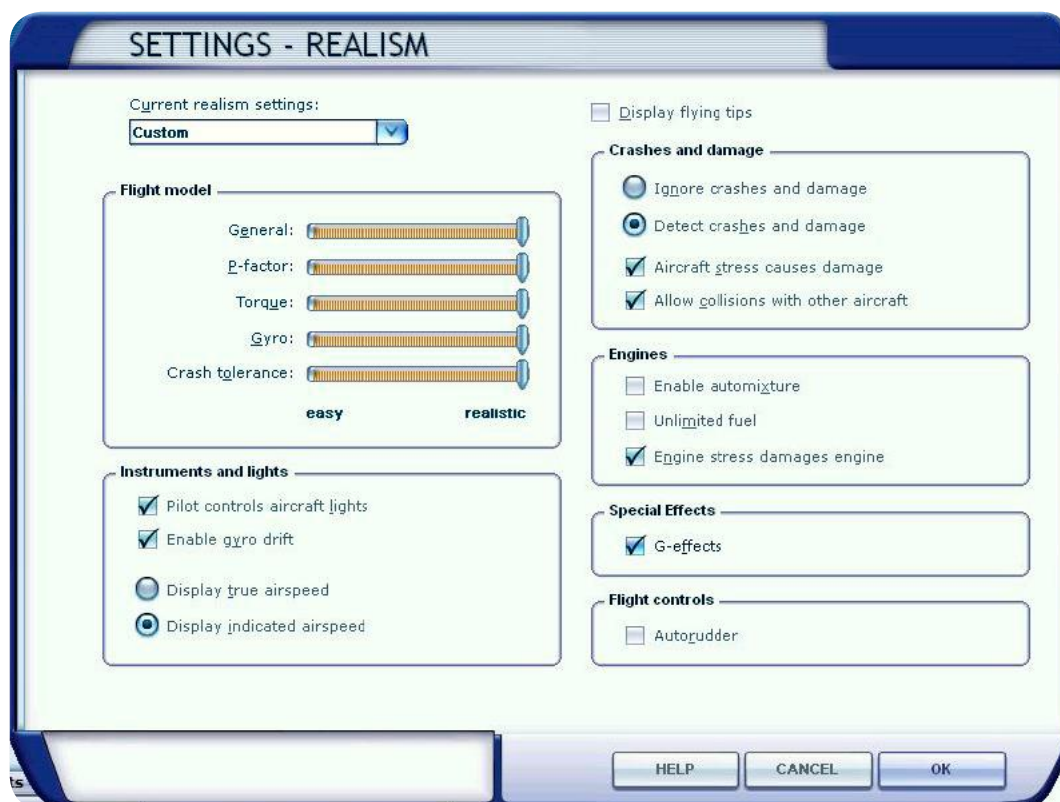
### 2.3 Realism Settings

The MilViz DHC-2 Beaver has been carefully built with a very high level of accuracy in mind. Development and testing have both been carried out using the highest realism settings available within the simulator.

In both FSX and P3D, the settings available within the Realism panel consist of changes designed to not only make the aircraft easier to fly, but to also lessen the workload of the pilot. The goal is to ensure that any settings that might impact your full enjoyment of the MilViz DHC-2 Beaver are correctly set.

The following images of the settings for FSX and P3D are meant to offer the most realistic depiction of the both the flight model as well as the general operation of the aircraft. Without these settings in place, particularly in regards to the flight model section, the aircraft may not perform as intended.

#### 2.3.1 Realism Settings - FSX



### 2.3.2 Realism Settings - P3D



### 2.3.3 Description of Settings

#### Flight Model

For the highest degree of realism, all sliders in the flight model section should be set fully to the right.

#### Instruments and Lights

The MilViz DHC-2 has a sophisticated lighting system in place, so the “Pilot controls aircraft lights” should be checked. “Enable gyro drift” and “Display indicated airspeed” are not essential, but they do add to the realistic operation of any aircraft.

#### Crashes and Damage

These settings aren’t essential, but do add to the sense of safe operation of the simulation.

#### Engines

“Enable automixture” should be disabled to allow for functionality of the mixture lever. “Unlimited fuel” is non-essential, but disabling does allow for simulating fuel management. “Engine stress damages engine” is not essential, but being present does introduce risk for engine mismanagement (Acceleration only).

#### Special effects

“G-effects” can be enabled to allow for screen effects to occur in excessive high or low G situations.

#### Flight Controls

“Autorudder” should be off so long as you have means to operate the aircraft rudder via rudder pedals or a twist axis on your joystick.



### 2.4 MVAMS Operation

MVAMS stands for MilViz Addon Management System. It represents our easy-to-use solution to the growing complexity of configurable options and choices available in our aircraft.

MVAMS is a standalone application which is installed and utilized by many of our newer releases. It was our aim to create a user-friendly environment in which our aircraft could be easily and quickly configured in terms of visual options, avionics, loadout, etc.

The MilViz DHC-2 Beaver installs (if not already present) and fully integrates with the MVAMS application, allowing the user to choose between the differing body styles, passenger or cargo load and visibility, and avionics options.

#### 2.4.1 Starting MVAMS

If this is your first MilViz product that includes the MVAMS application, running the installer will place a shortcut icon on your desktop. If this is not your first MVAMS equipped MilViz aircraft, the desktop shortcut icon may already exist.

You may use this icon to open the MVAMS application at any time while the simulator is not running to configure your DHC-2 Beaver to your preferences.

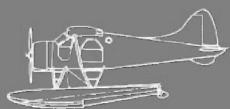
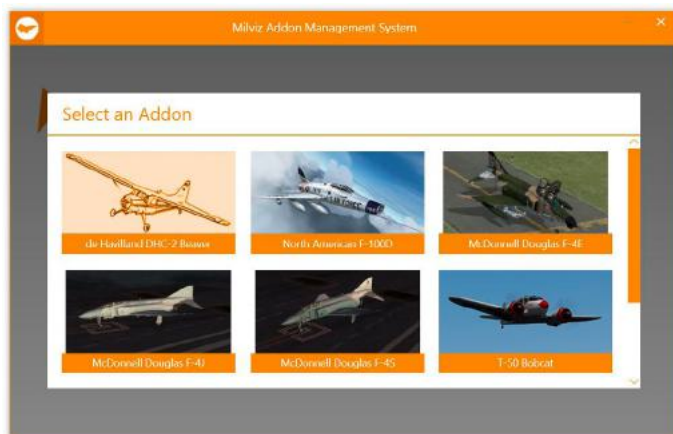


After your installation is complete, the MVAMS application will open automatically. You are not required to configure your aircraft at this time; you may choose to close it if you wish.

#### 2.4.2 Selecting your Aircraft

When you open the MVAMS application, you are presented with the instruction to select an addon from the Quick Access menu. Clicking on the top left icon will bring up visual icons of any installed MilViz addons which are integrated with the MVAMS application.

Your newly installed DHC-2 Beaver will now be available to select.



### 2.4.3 Configuring the DHC-2

One feature that we've designed into our MVAMS application is that only options that are particular to the aircraft in question are available to browse and select, meaning that you won't see military specific loadout options in your general aviation aircraft, nor will you see GPS options in your Century Series fighter jet.

For the DHC-2, four configuration tabs are available, with the first pertaining to the fuselage style and interior load, the second pertaining to the various radio & avionics options, the third being where you set the initial start-up state of the DHC-2, with the last tab pertaining to miscellaneous visual options.

### 2.4.4 Load

In the first tab, you can switch the interior layout between a passenger configuration and a cargo layout by clicking on the appropriate radio button. This change also has a visual effect on the fuselage, with the cargo layout retaining the original rearmost round windows.

Selecting between either option presents a different list of checkboxes which, by selecting any or all, changes the visual presence of passengers or cargo when the aircraft is loaded.

The selection of passengers or cargo from this screen also affects the weight of the aircraft in the simulator.

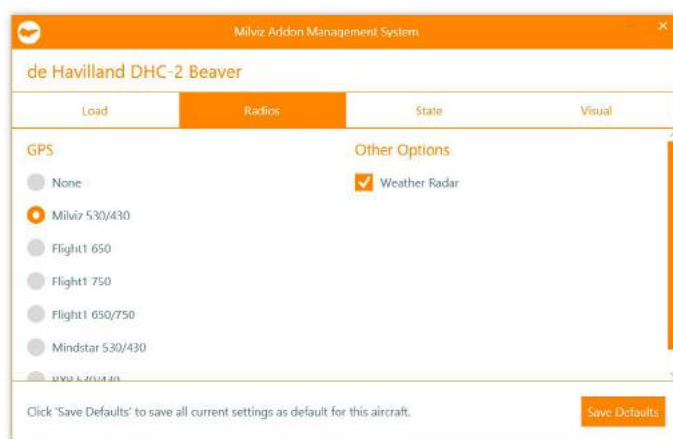


### 2.4.5 Radios

The second tab allows you to switch between various avionics options. A range of third party GPS solutions is allowed for, as well as support for the included Milviz / REX WX Advantage Weather Radar.

The 'None' option allows you to configure your cabin with analog radios only, while the Milviz 530/430 option displays the provided Milviz GPS units that are included with the aircraft.

All other GPS options require a functioning installation of a third party add-on which is not included with the Beaver.



### 2.4.6 State

The State tab allows you to specify the start-up state of the Beaver upon loading the aircraft in the simulator.

Cold and Dark allows for a completely cold and powered down aircraft, where you will have to run through a proper start-up routine to begin your flight. The aircraft is loaded as such regardless of saved flight status.

Ready to Start loads the aircraft with systems such as battery and lights being on, with the engine ready to start. Again, it will be loaded in this state regardless of how a flight was saved.

Ready To Fly loads the aircraft with preexisting aircraft state when starting from Free Flight or a previous saved flight. It is recommended to use the option if starting from a saved flight, particular if the saved flight was in progress.

### 2.4.7 Visual

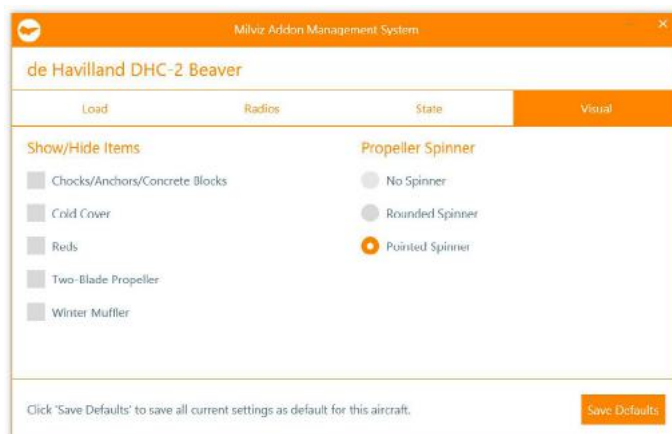
The Visual tab allows the selection of a variety of visual options.

The 'Chocks/Anchors/Concrete Blocks', 'Cold Cover', and 'Reds' options display the said visual options when the aircraft is first loaded in the simulator, at which time you have the ability to remove them before flight while in the aircraft.

Selecting the checkbox titled 'Two-Blade Propeller' will configure the aircraft to use a two-blade propeller. Leaving it unchecked will allow the aircraft to be configured with a three-blade prop.

Selecting the checkbox titled 'Winter Muffler' configures the Beaver to display, as titled, a winter muffler as a visual option.

On the right side, the 'Propeller Spinner' options allow for a style of prop spinner to be shown; none, rounded, or pointed for the two-blade prop, and rounded or pointed for the three-blade prop.



### 2.4.8 Saving & Exiting

To save your new default configuration, be sure to click on the “Save Defaults” button in the lower right corner. You do not need to do this for each tab; clicking once prior to exiting the application is sufficient to save all changes. When you next start the simulator, the MilViz DHC-2 will now reflect your selected options. Please note that these configuration options persist across all liveries as well as across all types (wheels, amphib, skis, tundra).

To exit the MVAMS application, click on the close button located on the top right corner.

## 2.5 In-Game Configuration

In addition to the MVAMS application, we’ve also provided for a variety of options to be configured while the aircraft is loaded in the simulator. The configurable options accessible in-game pertain to the passenger and/or cargo load, as well as a variety of visual options such as those relating to a cold and dark aircraft.

The in-game menu that allows access to these options is found in the menu bar, under the menu option “Add-ons”, titled “DHC-2”.

### 2.5.1 Load

Depending on the style of cabin layout configured in MVAMS, the in-game menu allows you to hide or show the passengers or cargo at each individual station.

### 2.5.2 Visual

The option is given to hide or show a few of the visual options previously set in MVAMS: Chocks/Anchors, Reds, Cold Cover, Prop Cover.

The ‘Reds’ option, in addition to hiding or showing the pitot cover, also toggles the visibility of the strap used to secure the control column as well as the rudder pedal lock.

## 2.6 Mouse Operation

As per typical convention, all controls in the MilViz DHC-2 can generally be operated by using the right or left mouse buttons, or in the case of levers, by holding a mouse button and dragging the control. Two exceptions to this convention exist: The magneto switch and the fuel selector. To prevent accidental movement to the OFF position, these controls require the middle mouse button to be used to be turned off.

## 2.7 Product Support

We strive to produce the most accurate (and enjoyable!) simulations possible within the confines of the desktop environment, yet we’re also very deeply committed to the satisfaction of our customers. If you encounter any issues



with any of our products, require installation assistance, or just have a general question, we encourage you to visit our forums at <http://milviz.com/forum/>.

Support forums for our individual products are restricted to owners of that product. To register for a specific support forum, please contact [roadburner440@milviz.com](mailto:roadburner440@milviz.com) for registration information and details. Please note that proof of purchase will be required.

### 2.8 Event Mapping

A list of command assignments and local variables has been provided for advanced users:

|                                 | Event                                               | Local Variable                    |
|---------------------------------|-----------------------------------------------------|-----------------------------------|
| <b>Lights</b>                   |                                                     |                                   |
| Instrument Lights               | PANEL_LIGHTS_TOGGLE                                 | (L:ESP_Inst_Light,bool)           |
| Beacon Lights                   | TOGGLE_BEACON_LIGHTS                                | (L:ESP_Beacon_Light,bool)         |
| Navigation Lights               | TOGGLE_NAV_LIGHTS                                   | (L:ESP_Nav_Light,bool)            |
| Strobes Lights                  | STROBES_TOGGLE                                      | (L:ESP_Pulse_Light, bool)         |
| Landing Lights                  | LANDING_LIGHTS_TOGGLE                               | (L:ESP_Land_Light,bool)           |
| Cabin Lights                    | ALL_LIGHTS_TOGGLE                                   | (L:ESP_Cabin_Light, bool)         |
| (idem)                          | TOGGLE_CABIN_LIGHTS                                 | (idem)                            |
| <b>Electrics &amp; Avionics</b> |                                                     |                                   |
| Master Battery                  | TOGGLE_MASTER_BATTERY                               | (L:DHC2_MasterBattery,bool)       |
| Master Batt & Alt               | TOGGLE_MASTER_BATTERY_ALTERNATOR                    | (not available)                   |
| Master Alternator               | TOGGLE_MASTER_ALTERNATOR                            | (L:Master Alternator,bool)        |
| Master Avionics                 | TOGGLE_AVIONICS_MASTER                              | (L:ESP_Radios_Switch,bool)        |
| Radios                          | (standard events)                                   | (not available)                   |
| Autopilot                       | (please see stand-alone manual for KAP 140 details) |                                   |
| <b>Fuel &amp; Magnetos</b>      |                                                     |                                   |
| Fuel Boost Pump                 | TOGGLE_ELECT_FUEL_PUMP                              | (L:DHC2_FuelBoostPumpSwitch,bool) |
| Wobble Pump                     | MANUAL_FUEL_PRESSURE_PUMP                           | (L:DHC2_WobblePumpHandle,bool)    |
| Primer                          | TOGGLE_PRIMER                                       | (L:DHC2_PrimerSet,bool)           |
| Magnetos (incr)                 | MAGNETO_INCR                                        | (not available)                   |
| Magnetos (decr)                 | MAGNETO_DECR                                        | (not available)                   |
| Magnetos (off)                  | MAGNETO1_OFF                                        | (not available)                   |
| Magnetos (right)                | MAGNETO1_RIGHT                                      | (not available)                   |
| Magnetos (left)                 | MAGNETO1_LEFT                                       | (not available)                   |
| Magnetos (both)                 | MAGNETO1_BOTH                                       | (not available)                   |



Other systems

|                                         |                     |                          |
|-----------------------------------------|---------------------|--------------------------|
| Carburetor Heat                         | ANTI_ICE_TOGGLE     | (not available)          |
| Pitot Heat                              | PITOT_HEAT_TOGGLE   | (L:ESP_Pitot_Heat, bool) |
| Engine AutoStart                        | ENGINE_AUTO_START   | (not available)          |
| Gear & Flaps                            | (standard events)   | (not available)          |
| Water Rudder                            | TOGGLE_WATER_RUDDER | (not available)          |
| Panel gauges related<br>(Gyro,Baro,etc) | (standard events)   | (not available)          |

Amphibious Floats / Skis

|                     |                          |                 |
|---------------------|--------------------------|-----------------|
| Wheel / Ski Retract | RETRACT_FLOAT_SWITCH_DEC | (not available) |
| Wheel / Ski Extend  | RETRACT_FLOAT_SWITCH_INC | (not available) |



# 3. DESCRIPTION OF AIRCRAFT

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## The Aircraft

Due to the fact that our DHC-2 represents a 'typical' Beaver rather than an aircraft fresh from the factory floor in Downsview, as well as there being some aspects of the aircraft that aren't reasonable nor possible to fully simulate, we've chosen to present a streamlined and abridged version of this same section from the original DHC-2 Flight Manual.

Some text has been repeated from the original DHC-2 Flight Manual, but only where it makes sense to do so; other sections are purely applicable only to the MilViz DHC-2. References to non-simulated areas or functions have occasionally been included where we felt it may be of interest, with areas of functional difference noted.

### 3.1 General

The DHC-2 Beaver is an all-metal high wing monoplane, designed to carry a pilot and seven passengers. Additional roles include that of cargo transport, ambulance, rescue operations, supply dropping, aerial survey, crop spraying and dusting.

### 3.2 Dimensions

See Figure 3-3.

### 3.3 Gross Weight

See Figure 3-3.



### 3.4 Engine

The aircraft is powered by a Pratt and Whitney "Wasp Junior" R-985SB3 nine-cylinder single row radial engine, rated at 400 BHP at 5000 ft altitude. The engine drives a Hamilton-Standard constant-speed propeller; crankshaft and propeller rotation being clockwise. The supercharger is an engine-driven single-stage centrifugal type.

### 3.5 Engine Controls

The engine control quadrants are located on the top of the pedestal. The order of controls being: THROTTLE - PROPELLER - MIXTURE as shown in Figure 3-1. Friction control knobs, one below each control lever, increase lever friction when rotated clockwise. (*Friction control knobs are non-functional.*)

#### 3.5.1 Throttle Lever

The throttle lever moves in a quadrant marked OPEN and CLOSED. The lever is connected to the throttle valve by means of push-rods and torque-tube linkage.

#### 3.5.2 Mixture Lever

The mixture lever moves in a quadrant marked as follows: FULL RICH - FULL LEAN - IDLE CUT OFF. The lever

is connected to the carburettor by means of push-rods and torque-tube linkage.

#### 3.5.3 Carburettor Heat Control Lever

The carburettor heat control lever is located below the engine instrument panel and is cable-connected to a gate valve in the carburettor air intake duct.

When the lever is selected up to the COLD position, cold ram air enters the carburettor through the air intake duct.

With the lever down in the HOT position, the ram air intake is fully closed and heated air only, from inside a heat exchanger muff surrounding a section of the engine exhaust collector, is ducted to the carburettor.

#### 3.5.4 Carburettor Air Induction System

The upper air induction system (Modification 2/1164) consists of an air scoop on the top right of the engine rear cowling feeding air through a duct, at the right side of the engine, and through a filter to the carburettor. In this installation the induction air is filtered at all times and there is no pilot control, except during emergency operation when the filter is bypassed (*Emergency air handle for filter bypass not modelled*).

#### 3.5.5 Engine Ignition Switches

A rotary four position ignition switch, located below the flight instrument panel, is marked OFF, L, R, and BOTH. (*To move this switch to OFF, please use the middle mouse button*).

#### 3.5.6 Boost Coil Switch

A boost coil switch, located on the starter panel, is spring loaded to the OFF position.



FIGURE 3-1 - ENGINE CONTROL QUADRANTS



## SECTION 3 - DESCRIPTION OF AIRCRAFT

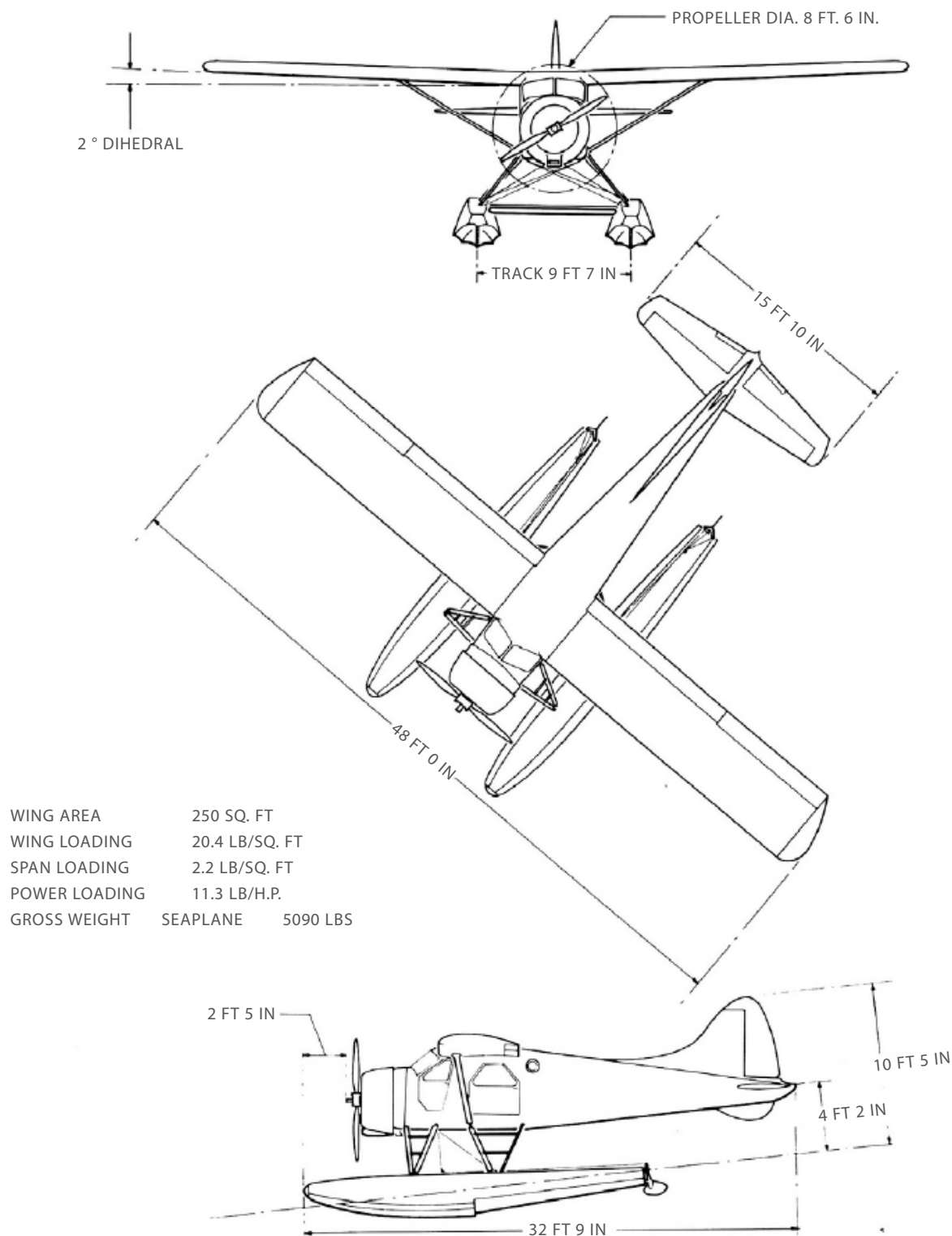


FIGURE 3-2 - THREE VIEW DIMENSIONAL DIAGRAM - SEAPLANE



## SECTION 3 - DESCRIPTION OF AIRCRAFT

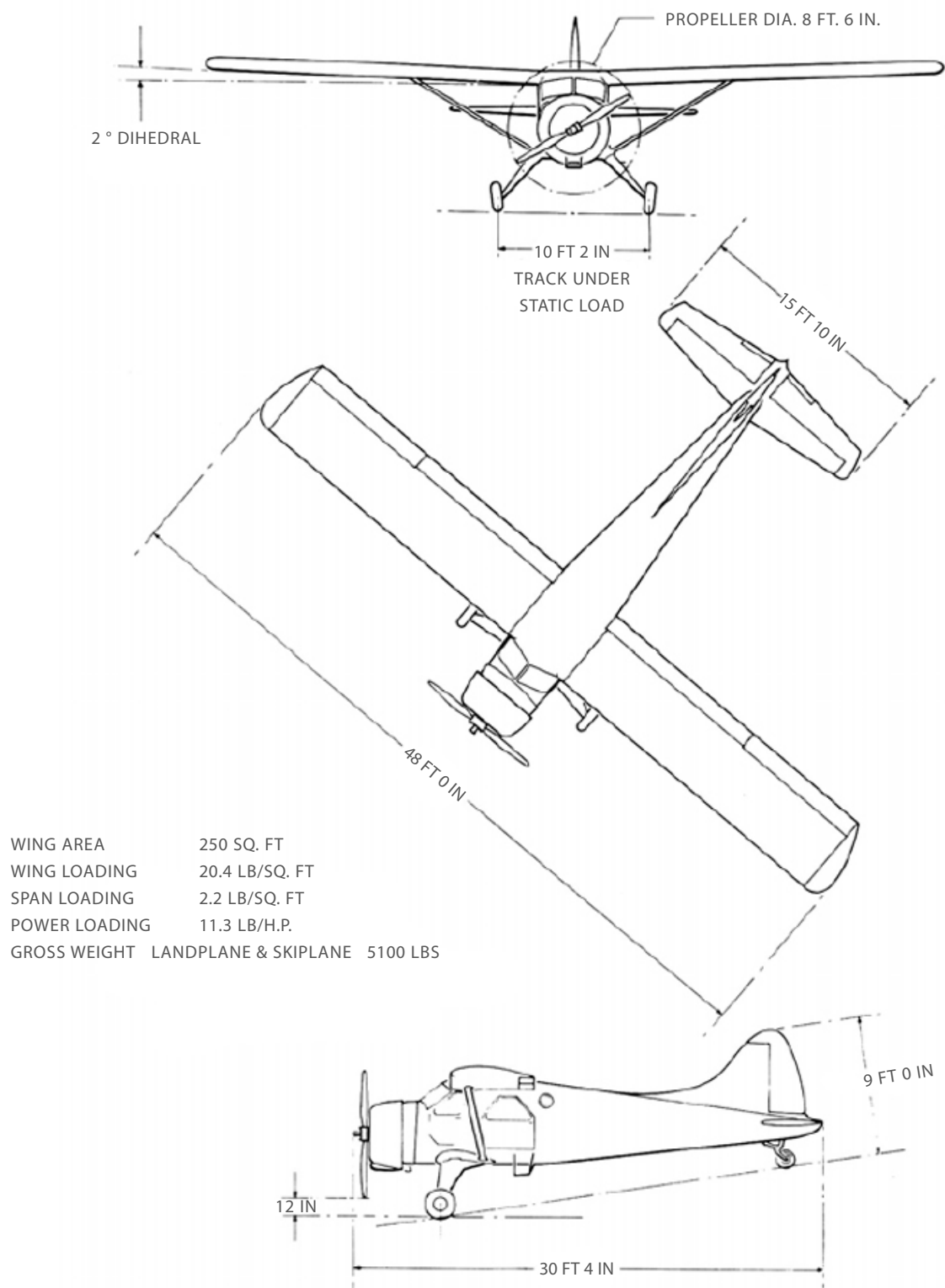


FIGURE 3-3 - THREE VIEW DIMENSIONAL DIAGRAM - LANDPLANE





FIGURE 3-4 - FLIGHT COMPARTMENT



1. Control Column
2. Flight Instrument Panel
3. Fuel & Oil Warning Lamps
4. Outside Air Temp. Gauge
5. Flap Indicator
6. Rudder Trim Wheel
7. Throttle Lever
8. Manifold Pressure Gauge
9. Elevator Trim Indicator
10. Compass
11. Elevator Trim Wheel
12. Propeller Lever
13. Tachometer
14. Rudder Trim Indicator
15. Mixture Lever
16. Radio Panel
17. Ammeter
18. Alternator Warning Lamp
19. Circuit Breaker Panel
20. Voltmeter
21. Lighting Adjustment Dials
22. Engine Instrument Panel
23. Fuel Shutoff Lever
24. Wobble Pump
25. Flap Hydraulic Hand Pump
26. Flap Selector
27. Cabin Heat Control
28. Carburettor Air Lever
29. Parking Brake
30. Rudder Pedals
31. Electrical Switch Panel
32. Fuel Selector
33. Fuel Primer Handle

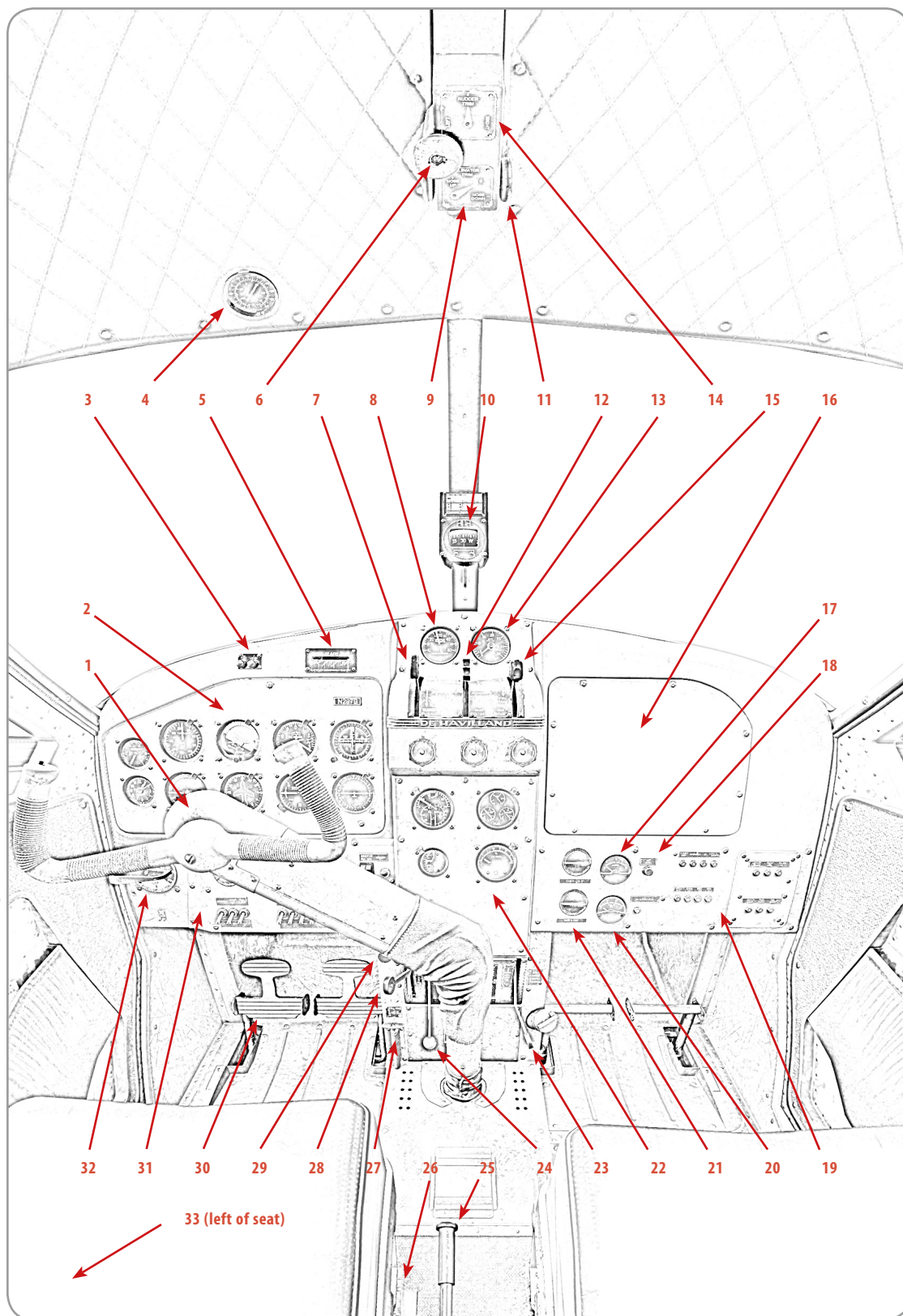


FIGURE 3-5 - FLIGHT COMPARTMENT, INDEXED



When the switch is held to the BOOST COIL position, high tension electrical current is supplied to the engine spark plugs to initiate starting. *(The boost coil switch, not always found in DHC-2's with upgraded electrical systems, has been made INOP.)*

### 3.5.7 Primer Pump

The hand operated cylinder primer pump is on the floor to the left of the pilot's seat. The pump handle is pushed down and rotated anti-clockwise to unlock and, after use, relocked by pushing it down and rotating it clockwise. *(Primer pump handle is not lockable in the simulator.)*

### 3.5.8 Starter

The engine in the MilViz DHC-2 is started by an electrical direct cranking starter motor.

### 3.5.9 Starter Switch

The starter switch for the electrical direct cranking start motor is located on the electrical switch panel below the flight instrument panel.

### 3.5.10 Engine Instruments

Conventional engine instruments are mounted on panels above and below the engine controls quadrant on the pedestal. The engine instruments consist of Tachometer (above pedestal), Manifold Pressure Gauge (above pedestal), Cylinder Head Temperature Gauge, Carburettor Mixture Temperature Gauge, combined Oil and Fuel Pressure and Oil Temperature Gauge (all below pedestal).

## 3.6 Propeller

The engine drives a Hamilton-Standard two-bladed 8 ft 6 ins. diameter constant speed, counterweight type propeller having a pitch range from 11.5° to 24°.

*(The MilViz DHC-2 may be optionally configured and flown with a three-bladed Hartzell propeller through the MVAMS utility.)*

### 3.6.1 Propeller Lever

The propeller lever is located to the right of the throttle lever in the engine controls quadrant on the top of the pedestal and slides in a gate marked RPM, DECREASE, and INCREASE. It is connected by a push/pull rod linkage to the propeller governor.

The governor retains the selected rpm constantly, within the operating range of the propeller, regardless of variations in air loads or flight attitudes.

When INCREASE RPM is selected the governor directs oil from its own engine driven pump to the propeller, at pressure, which hydraulically moves the propeller blades, in opposition to the counterweight, to lower angles.

When DECREASE RPM is selected the governor allows oil from the propeller to return to the engine sump and the counterweights move the blades to higher angles.

## 3.7 Oil System

The oil tank is located aft of the firewall and is serviced from inside the cockpit through a filler at the base of the pedestal. the capacity is 5 1/4 IMPERIAL GAL. (1 gal. air space), the air space may be reduced during oil dilution. Oil returned from the engine passes through a line to a combined oil temperature valve and cooler.

### 3.7.1 Oil Dilution

When a start in cold weather is anticipated, the oil may be diluted with gasoline before stopping the engine. *(Dilution ability is not available in this release and the corresponding dilution switch is not present.)*



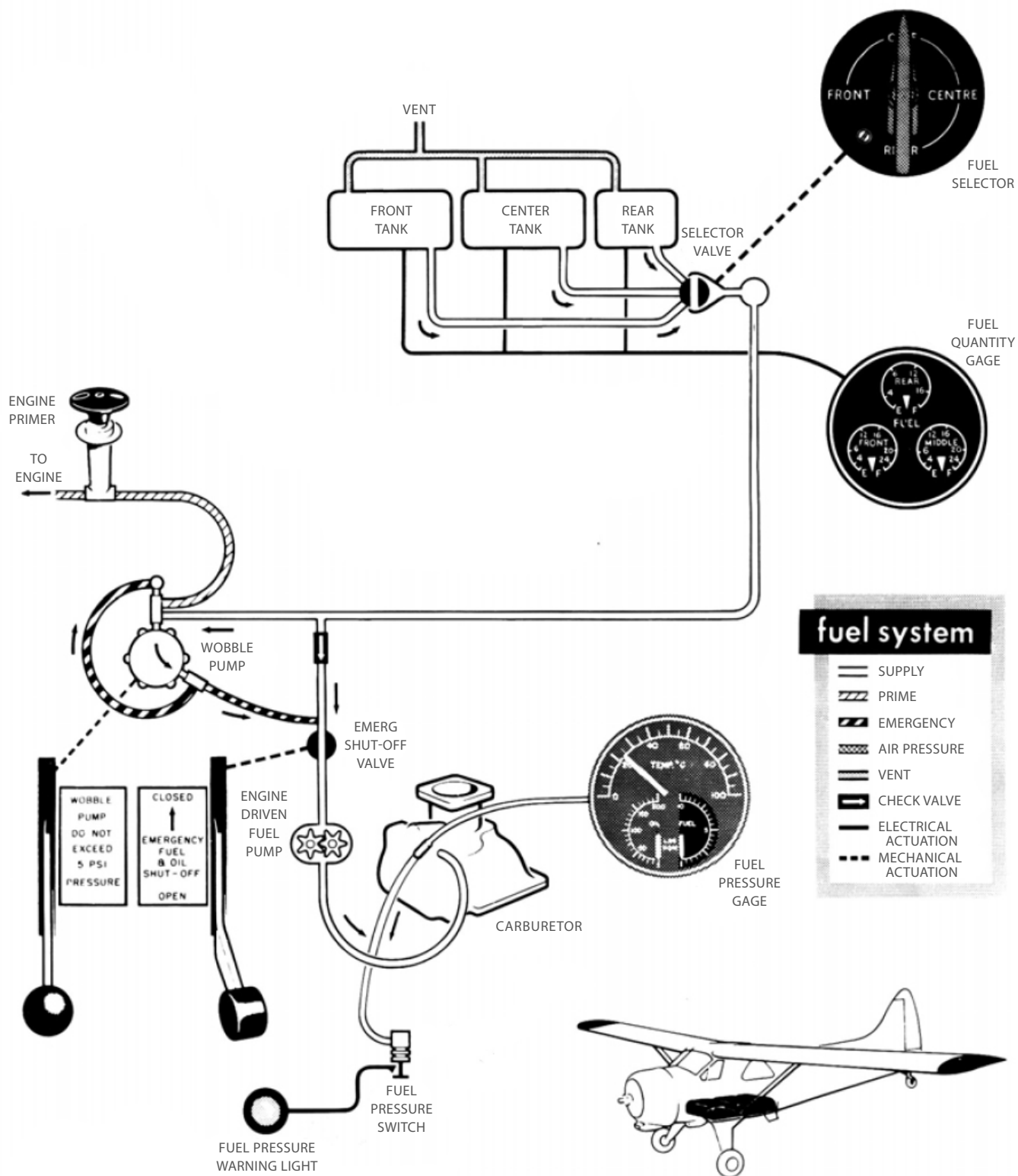


FIGURE 3-6 - FUEL SYSTEM DIAGRAM



### 3.8 Fuel System

Fuel is contained in three tanks under the cabin floor which are used separately. They are serviced through three filler necks in a filler compartment protected by a hinged door on the forward left-hand side of the fuselage, adjacent to the cockpit door.

#### 3.8.1 Fuel Capacities

|             |                        |
|-------------|------------------------|
| Front Tank  | 29 Imp. (35 U.S.) gal. |
| Centre Tank | 29 Imp. (35 U.S.) gal. |
| Rear Tank   | 21 Imp. (25 U.S.) gal. |

Total without wing tip tanks 79 Imp.(95 U.S.) gal.

### 3.9 Fuel System Controls

#### 3.9.1 Fuel Selector

Fuel is supplied from any one of the three fuel tanks by selecting FRONT TANK, CENTRE TANK or REAR TANK on the fuel selector, located to the left of the electrical switch panel, under the flight instrument panel. *(To move the selector to OFF, please use the middle mouse button).*

#### 3.9.2 Fuel Booster Pump

To assist the engine driven fuel pump, a booster pump may be incorporated into the fuel system.

The use of the booster pump should normally be confined to engine starting and flight at high altitude, when its operation would help to prevent fuel vapour locks.

#### 3.9.3 Fuel Wobble Pump

A fuel wobble pump lever, below the engine instrument panel on the pedestal, is used to build up the fuel pressure to 5 psi, for starting the engine.

In an emergency the fuel pressure can be maintained by the wobble pump should the engine driven pump fail.

#### 3.9.4 Fuel and Oil Emergency Shut-Off Lever

The emergency shut-off lever, on the right side of the pedestal, below the engine instrument panel, is normally wirelocked in the down position. When pulled sharply up to break the wire lock, and moved to the closed position, it cuts off the supply of both fuel and oil to the engine. After use it can be returned to its down position for normal operation but should be wirelocked as soon as possible to prevent inadvertent operation.

#### 3.9.5 Fuel Contents Gauge

A triple indicator fuel contents gauge, located on the right side of the engine instrument panel, is graduated in Imperial gallons.

#### 3.9.6 Fuel Pressure Gauge

A combined fuel pressure, oil pressure and oil temperature gauge is located on the left side of the engine instrument panel.

#### 3.9.7 Fuel Pressure Warning Light

A red warning light, which lights up when the fuel pressure drops to 3 psi, is positioned above the flight instrument panel.

### 3.10 Electrical System

Electrical DC energy is supplied by a 50 amp 28-30 volt alternator rectified for direct current use in conjunction with a 24 volt 17 amp/hr. battery. The alternator is regulated by a voltage regulator. A reverse-current relay is used to protect the alternator when it is not charging.

The alternator is selected by a alternator switch on the electrical switch panel to the left of the pedestal.



The battery is stowed in a compartment on the left side of the fuselage, aft of the cabin door, and is accessible through a hinged panel on the outside of the aircraft.

### 3.10.1 Electrically Operated Equipment

The following equipment and controls are operated by the electrical system:

- Starter
- Oil dilution system
- Booster pump
- Engine indicators
- Fuel contents gauge
- Interior lights
- Navigation lights
- Landing light
- Fuel pressure warning light
- Electronic equipment
- Pitot head heater

### 3.10.2 Alternator Switch

The alternator switch, located on the electrical switch panel, is of the single pole, single throw type.

### 3.10.3 Battery Master Switch

The battery master switch is located in the right-hand upper corner of the electrical switch panel. It is of the double pole, single throw type and interrupts the battery output to the electrical system.

The circuit controlling the cabin lights are independent of the master switch.

### 3.10.4 Electrical System Indicators

A left-zero ammeter, located to the left of the circuit breaker panel, indicates the load on the alternator supply. A warning lamp is located to the right of the ammeter to indicate a load greater than the alternator supply.

A voltmeter is located below the ammeter. The voltage of the alternator supply is indicated. When the alternator is not operating, the battery voltage only will be indicated.



FIGURE 3-7 - ELECTRICAL SYSTEM INDICATORS & CIRCUIT BREAKER PANEL



### 3.10.5 Circuit Breakers

A circuit breaker panel is located below the radio panel, to the right of the pedestal. Circuit breakers are provided for the isolation and protection of the installed electrical equipment.

### 3.11 Flight Control System

The control surfaces are conventionally operated by a control column and rudder pedals. The upper portion of the control column carrying the handwheel, may be "thrown-over" for use by a copilot in conjunction with the rudder pedals on the right side of the cockpit. The ailerons are differentially rigged to give a larger upward then downward displacement and are drooped when the wing flaps are lowered through the first 15°.

Trim tabs, adjustable in flight, are fitted to the elevator and rudder.

#### 3.11.1 Control Column Throwover and Lock

The control column can be thrown over during level cruising flight without disturbing the balance of the aircraft by grasping the upper portion of the column and allowing the handwheel free movement as the upper portion is "thrown-over" for use by the copilot. *(The control column may be manipulated with the mouse scroll wheel while the mouse is positioned over the handwheel.)*

A lock plunger at the hinge point of the control column locks the hinged upper portion of the column in position. *(The lock plunger is modelled but has no applicable function in this release.)*

#### 3.11.2 Elevator Trim

The elevator trim is adjusted by twin handwheels on the cockpit roof, operating in the natural sense. A pointer and scale, between the handwheels, marked NOSE UP, NOSE DOWN, indicate the the direction and degree of trim applied.

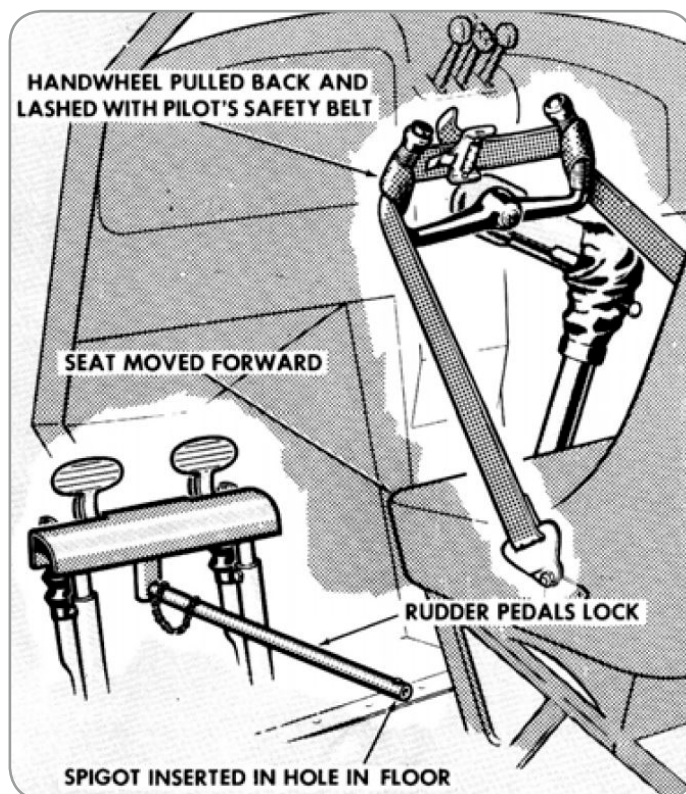


FIGURE 3-8 - FLIGHT CONTROL LOCKS

#### 3.11.3 Rudder Trim

The rudder trim is adjusted by a handwheel on the cockpit roof, just aft of the elevator trim handwheels. A pointer and scale, marked LEFT and RIGHT indicate the direction and degree of trim applied.

#### 3.11.4 Control Locks

The control column and handwheel are locked by strapping them to the pilot's seat with the safety belt. The rudder pedals are locked by a pedal lock which, when not in use, is stowed in the baggage compartment behind the cabin rear partition.

To lock the pedals, the channel portion of the lock must be fitted over the pedals and the spigots at the end of the lock-rod, which is attached to the channel portion by a chain, must be inserted into a hole in the channel and in a corresponding hole in the cockpit floor, forward



of the pilot's seat. (*The control locks are automatically set in place when the reds are shown or removed.*)

### 3.12 Wing Flaps

The wing flaps are of the slotted type and extend from the wing roots to the inboard ends of the ailerons which also droop in conjunction with the flap movement. The flaps are operated by an actuating cylinder located in the fuselage at the left-hand wing root. Hydraulic fluid is supplied to the actuating cylinder by a handpump, under the pilot's seat. This handpump has an integral reservoir, a selector valve, and a relief valve. The relief valve is set at 1000 psi.

#### 3.12.1 Wing Flaps Hand Pump Lever

The wing flap hand pump lever is at the right-hand side of the pilot's seat and is operated in a fore-and-aft direction.

#### 3.12.2 Wing Flaps Selector Lever

The wing flaps selector lever is located on the right hand side of the pilot's seat. It has two marked positions, UP and DOWN. Intermediate positions of the wing flaps are selected by moving the selector lever to UP or DOWN then pumping the wing flaps with the hand pump lever to the desired position, as shown on the wing flaps indicator.

##### WARNING

If the flaps are in any lowered position, it is essential that the selector lever is retained in the DOWN position. When the flaps are retracted, the selector lever must be retained in the UP position. Once the selector lever is set to DOWN and the flaps are pumped to the desired position, the selector lever must not be moved until it is desired to change the flap position.

#### 3.12.3 Wing Flaps Indicator

A wing flaps position indicator is situated above the flight instrument panel. It is marked FULL FLAP,

LANDING, TAKEOFF, CLIMB and CRUISE. FULL FLAP is only required for emergency landing in very restricted areas.

### 3.13 Landing Gear System

The main wheel units and the tailwheel unit are not retractable. For water based operations the wheel units are replaced by two floats which are attached to the fuselage by struts. For winter operations, the main wheels and tailwheel may be replaced by skis.

#### 3.13.1 Tailwheel Steering

The tailwheel is steerable by operation of the rudder pedals, for 25° each side of the longitudinal centre line of the aircraft. Outside of these limits, the tailwheel automatically disengages from the steering range and becomes fully castoring.

#### 3.13.2 Brake System

The main landing gear wheels are each fitted with a hydraulic brake unit which is individually actuated through an independent hydraulic line and brake master cylinder. Each brake master cylinder has an integral fluid reservoir and is connected by an adjustable linkage to its relative toe pedal. Depression of the toe pedal operates the piston in the relevant master cylinder which causes pressure to be applied, through flexible and rigid brake lines and a brake valve, to the wheel brake unit concerned. A parking brake is incorporated in the brake system.

Operation of the parking brake handle in the cockpit locks the brake units on the "on" position.

#### 3.13.3 Toe Pedals

Pressure on the toe pedals, which are the upper portions of the rudder pedals, actuates the pistons in the master cylinders and displaces hydraulic fluid into the brake units where the shoes are applied to the brake discs. The toe pedals are adjustable relative to the rudder pedals by adjusting the lengths of the master cylinder



connecting rods. The removable rudder pedals for the copilot are not connected to the brake system.

### 3.13.4 Parking Brake

When the parking brake handle is pulled, pressurized fluid is trapped in the lower part of the brake system and locks the brake units.

If the brake toe pedals are operated while the parking brake is set, hydraulic pressure greater than that existing in the system below the parking valves is created in the master cylinder and this additional pressure will push back the locking plunger of the parking valve and disengage the parking brake.

## 3.14 Instruments

A shock-mounted flight instrument panel is provided for the pilot and incorporates an altimeter, turn-and-bank indicator, rate-of-climb indicator, airspeed indicator, directional gyro, artificial horizon, course deviation indicator and ADF bearing indicator.

### 3.14.1 Pitot Static Operated Instruments

The airspeed indicator, altimeter, and the rate-of-climb indicator, are operated by the pitot static system. The static opening is incorporated in the left-hand side of the rear fuselage.

### 3.14.2 Vacuum Operated Instruments

The directional gyro, artificial horizon and turn-and-bank indicator, are operated by the vacuum system. A vacuum gauge located on the far left of the flight instrument panel indicates the vacuum in In.Hg. being applied to the instruments.

### 3.14.3 Outside Air Temperature Gauge

The outside air temperature gauge is located in the cockpit roof. It is of the direct-reading bulb type and the dial is graduated in both Fahrenheit and Centigrade scales.

### 3.14.4 Artificial Horizon

The artificial horizon is powered by the vacuum system. Its horizon bar gives a dive, climb and angle of bank indication. A knob at the bottom of the instrument dial permits adjustment of the instrument to any fore-and-aft attitude of the airplane within limits of plus or minus 7°. A caging knob on the instrument erects the gyro and locks the horizon bar in the horizontal position. This knob must be in the uncaged position before take-off to insure proper indications from the instrument.

The operating limits are set to permit 70° climbs and glides, and 100° right or left banks before the limit stops are reached. If exceeded, the caging knob provides a rapid means for resetting the artificial horizon.

### 3.14.5 Magnetic Compass

The magnetic compass is mounted on a bracket attached to the windshield center post. A compass deviation card is mounted above the compass.

## 3.15 Emergency Equipment

### 3.15.1 Hand Operated Fire Extinguisher

Hand operated fire extinguishers are stowed in quick release clips on the floor, in front of the pilot's and copilot's seats.

## 3.16 Seating Arrangement

The seating arrangement, with the exception of the pilot's seat, varies with the internal loading requirements of the flight.

### 3.16.1 Pilot's Seat

The pilot's seat is fitted with a lap type safety belt. The seat cushion has grab-lines and may be used as a life-preserver when abandoning the aircraft in or over water.



## 3.16.2 Passenger Seats

All passenger seats, including the copilot's seat, are fitted with lap type safety belts. All seats are removable. *(The passenger seats aft of the pilot's and copilot's seats are automatically removed in the cargo version of the MilViz DHC-2.)*

## 3.17 Heating System

Hot air for heating the interior of the cabin is supplied by ram air passing through a heat exchanger tube in the engine exhaust system. From a four-way outlet at the centre of the cockpit floor, the heated air is ducted to the pilot's seat and front passengers feet and to two outlet grills in the cabin floor. A heated air outlet at the top of the instrument panel permits defrosting of the pilot's windshield. A second outlet can be installed for the copilot's windshield.

All hot air outlets are controlled simultaneously by a push-pull control, on the base of the pedestal which alternates between fully ON in it's up position and fully OFF.

## 3.18 Ventilation System

Two ventilation louvers, one of each side of the cockpit roof, to the left and right of the pilot and copilot, supply ram air to the cabin from screened openings in the leading edge of each wing root.

An exhaust type circular grill and shutter ventilator in the cabin roof exhausts air from the cabin. Necessary suction is provided by a rearward facing air scoop on top of the fuselage.

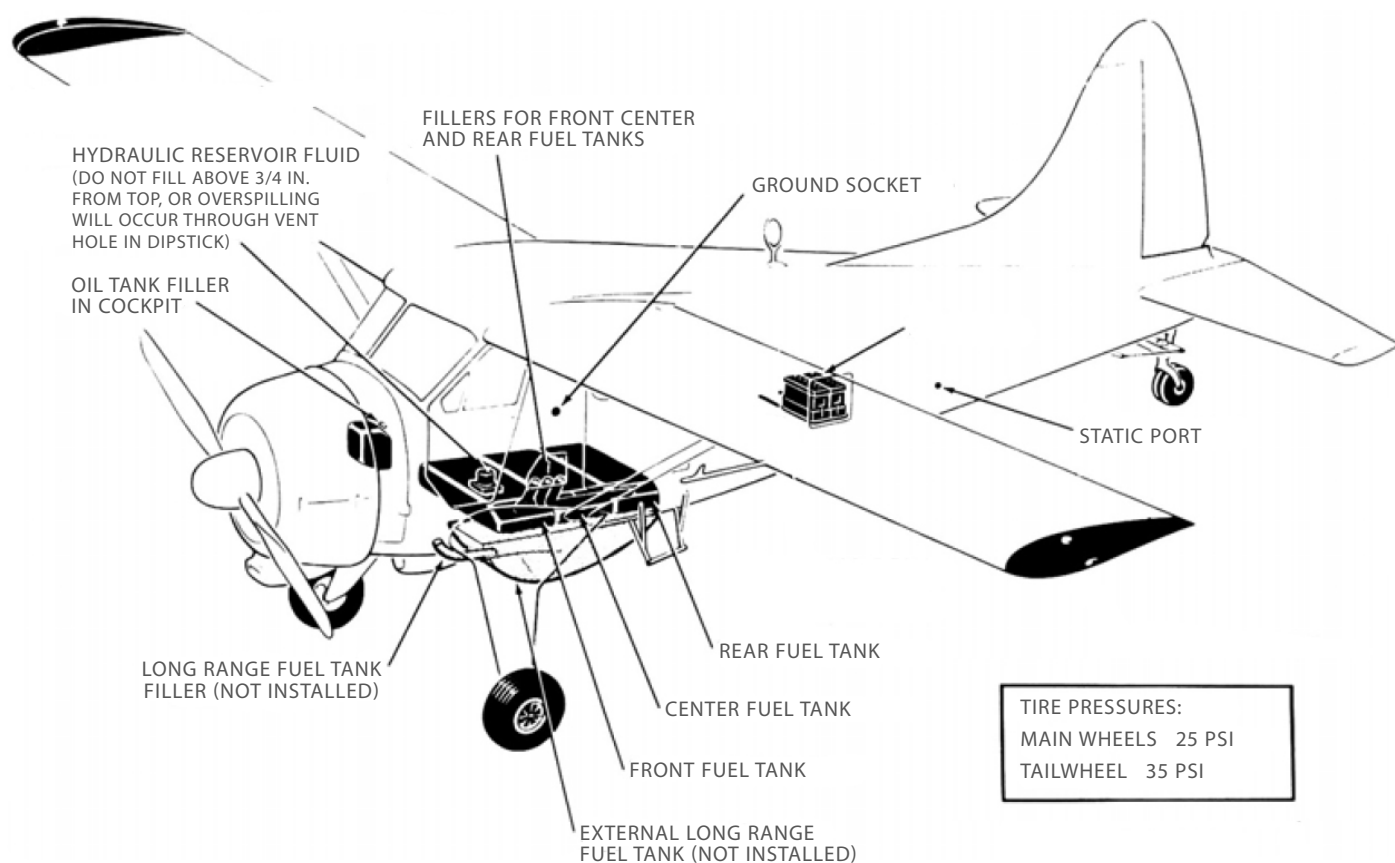
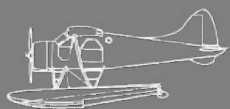


FIGURE 3-9 - ROUTINE SERVICING POINTS



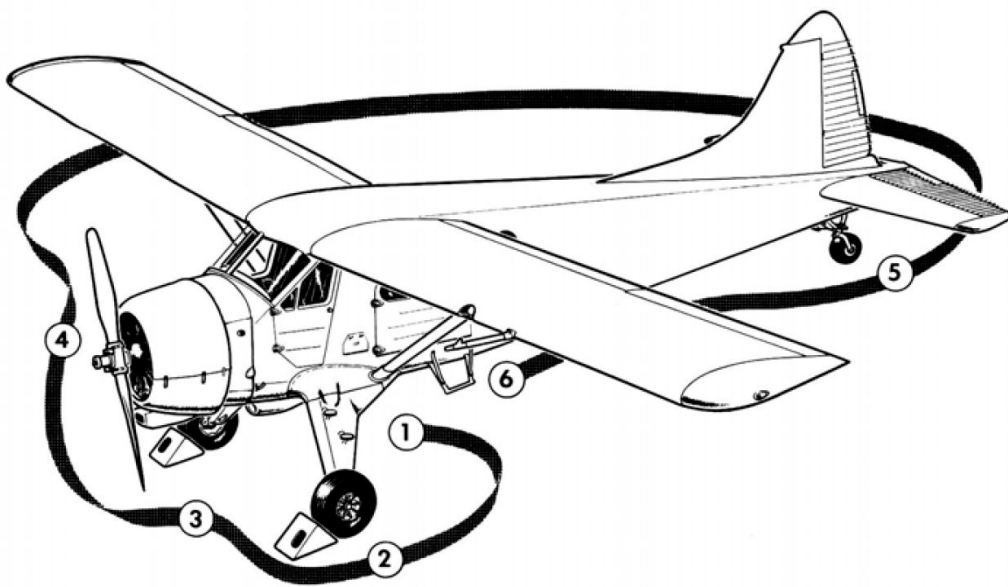
# 4. NORMAL PROCEDURES

In keeping with the previous section, we've chosen to include here some of the text from the portion of the original flight manual that covers normal procedures.

However, the original text has only been kept where it does not conflict with the actual or intended behaviour of the MilViz DHC-2. In this manner, although this section reads closely like the original flight manual, it fully represents the simulated aircraft, rather than the real DHC-2.

With that said, we may have included references to non-simulated actions or aircraft behaviour where we felt it might be of interest, with notations made where it might not be obvious that such references would not apply to the aircraft within the simulator.

Our overall goal is to let the section give an overview on how to operate the MilViz DHC-2, while also giving a bit of insight on the day-to-day operation of the real aircraft.



Starting at the pilot's cockpit, make the following checks:



While making exterior inspection, check all surfaces for cracks, distortion, loose rivets and indication of damage. Check all access doors for security. Check surfaces and hinges of all flight control surfaces.

- 1 Check security of fuel filler caps and access panel. Check that the aircraft has been serviced with required quantities of fuel, oil and hydraulic fluid.
- 2 Check that wheels are chocked. Check security of landing gear, fairings, tires for cuts, bruises and slippage. Check tire pressures and wheel brakes hose and pipes for oil leaks.
- 3 Check that carburettor and oil cooler intakes are clear.
- 4 Check propeller for nicks and oil leaks. Check cowl and panels for dents, scratches and security.
- 5 Check tailwheel tire for cuts, bruises and slippage. Check tire pressure.
- 6 Check that pitot head cover is removed.

FIGURE 4-1 - EXTERIOR INSPECTION DIAGRAM



### 4.1 BEFORE ENTERING AIRCRAFT

Carry out an EXTERNAL INSPECTION of the airplane as detailed in Figure 4-1.

Also check storage of cargo and baggage and determine load distribution and CG position.

#### 4.1.1 COLD WEATHER OPERATION

If the ambient temperature is below -25°C and the aircraft engine is cold, the aircraft will likely not start unless appropriate heat has been applied to the engine compartment. *(Please use the Cold Cover, selectable from within MVAMS or within the simulator from the Add-Ons menu, for a minimum of 2 minutes to warm the aircraft so as to allow starting.)*

### 4.2 ON ENTERING AIRCRAFT

Check the following:

- (a) Ignition - OFF.
- (b) Parking Brake - set.
- (c) Controls - unlocked.
- (d) Controls for - free, correct and full movement.
- (e) Adjust pilots seat. *(Not applicable.)*
- (f) Trims - as required.
- (g) All switches - OFF.
- (h) Battery master switch ON.
- (j) Circuit breakers - check.
- (j) Fuel quantities - check.

- (k) Altimeter - set.

When night flying is anticipated, make the following checks, possibly with the help of an outside observer:

- (a) Landing light.
- (b) Navigation lights.
- (c) Check panel lights, interior lights.
- (d) Flashlight - on board. *(Not applicable.)*

### 4.3 BEFORE STARTING ENGINE

Make the following checks:

- (a) Propeller area - clear.
- (b) All switches - OFF.
- (c) Throttle lever - 1/4 to 1/2 in. OPEN.
- (d) Propeller lever fully DECREASE RPM.
- (e) Mixture lever IDLE CUT-OFF.
- (f) Carburettor hot air lever - COLD.
- (g) Use starter to turn propeller to make sure that an excessive amount of oil is not trapped in the lower cylinders, forming a hydraulic lock. *(Possibility of hydraulic lock is not available in this release.)*

### 4.4 STARTING ENGINE

#### 4.4.1 NORMAL ENGINE START

- (a) Propeller area - clear.
- (b) Battery master switch - ON.



- (c) Fuel and oil emergency cut-off lever - OPEN.
- (d) Fuel selector to fullest tank.
- (e) Mixture lever - FULL RICH.
- (f) Throttle lever - 1/4 to 1/2 in. OPEN.
- (g) Buildup fuel pressure with wobble pump to maximum 5 psi.
- (h) Prime 4 strokes.

*(Note: Priming 4 strokes is recommended if the engine is at ISA or lower. A warm engine will only require 3 strokes, while very cold temperatures will require 6 priming strokes. It is also possible to try and start a poorly primed engine by 'throttle pumping' twice; that is, to move the throttle fully forward and back two times. )*

- (j) Ignition switch - BOTH.
- (k) Starter switch to STARTER position.

As soon as the engine fires:

- (l) Ensure starter switch in OFF position.

### CAUTION

1. As soon as engine fires, throttle back to about 500 to 800 rpm.
2. Do not pump throttle to catch a "dying" engine.
3. If oil pressure does not register on gauge within 30 seconds, stop engine and investigate.

- (m) As soon as oil pressure reaches 50 psi steady indication, select propeller lever to full INCREASE RPM position.
- (n) Alternator switch - ON.
- (o) Check that the alternator warning light is extinguished.

### 4.4.2 FAILURE IN STARTING

#### Flooded Engine

Indication of engine being flooded is given by an increase in propeller rotation speed with an engine close to catching but failing, followed by the short production of white smoke.

- (a) Ignition - OFF.
- (b) Mixture lever - IDLE CUT OFF.
- (c) Throttle lever fully open.
- (d) Clear excess fuel from induction system by using the starter to turn the propeller through 3 to 5 revolutions.
- (e) Repeat normal starting procedure.

### 4.5 ENGINE WARM-UP

- (a) Throttle to give 1000 rpm.
- (b) Move propeller lever fully forward to INCREASE RPM, as soon as oil pressure reaches 50 psi.
- (c) After oil temperature has reached 100°F (40°C), adjust to smoothest engine speed between 1000 to 1400 rpm. Mixture lever FULL RICH.
- (d) Select propeller lever to coarser pitch at 1000 rpm, to circulate the oil in the constant speed unit and propeller cylinder, then return to INCREASE RPM.
- (e) Check oil pressure, fuel pressure and temperature.
- (f) Tank feeds - check by rotating fuel selector to each tank.



### 4.6 ENGINE GROUND TESTS

The engine oil inlet temperature should be above 100°F (40°C) yet never rise above 200°F (90°C). Cylinder head temperature must not exceed 450°F (230°C).

#### Head aircraft into wind

- (a) Parking brake ON, control column fully back.
- (b) Fuel selector to fullest tank.
- (c) Propeller lever full INCREASE RPM
- (d) Set throttle lever to give 1750 rpm.
- (e) Select magneto switch to "L". Return switch to "BOTH" to allow engine speed to stabilize itself before switching to "R". Return to "BOTH".

The drop in rpm should not exceed 100 rpm; it is normally in the region of 50 to 75 rpm. (In cold weather keep the carburettor mixture temperature at 40°F (4°C) for this check).

- (f) If magneto drop is more than 100 rpm recheck at aerodrome pressure.
- (g) Set throttle lever to give 600 rpm.
- (h) Momentarily turn ignition switch OFF. The engine should stop firing completely.
- (j) Open throttle until manifold pressure is equal to aerodrome pressure.
- (k) Check rpm 2100 plus or minus 20 approximately.
- (l) Check oil, fuel and vacuum pressures, cylinder head and oil temperature within ranges.
- (m) Retard throttle to give 1600 rpm.

- (n) Move propeller lever to HIGH PITCH then return to full INCREASE RPM position. Note recover of rpm to 1600 rpm.

### 4.7 TAXIING

- (a) Flaps at CRUISE POSITION.
- (b) Propeller lever - full INCREASE RPM.
- (c) Watch oil and cylinder temperatures. If necessary, run engine at higher rpm to provide additional cooling during taxiing.
- (d) Make brake test as soon as aircraft starts moving.
- (e) Operate rudder pedals to steer aeroplane by means of steerable tailwheel (25° to each side).
- (f) Run engine at 1200 - 1400 rpm when aircraft is stopped during taxiing, to prevent spark plug fouling and to create a propeller blast for engine cooling.

#### WARNING

While on the ground, avoid prolonged engine running above 1400 rpm, particularly in hot weather, to prevent overheating of the installation.

### 4.8 TAKE-OFF CHECK

- (a) All doors and windows closed.
- (b) Elevator to meet CG requirements.
- (c) Mixture lever - FULL RICH.
- (d) Propeller lever - INCREASE RPM.
- (e) Fuel selector to desired tank position.
- (f) Flaps - TAKE-OFF position.



- (g) Artificial horizon - set.
- (h) Pitot heat ON if necessary in cold weather or when icing conditions are anticipated.
- (j) Carburettor heat - COLD.

### 4.9 TAKE-OFF

- (a) Make sure cylinder head temperature is below 450°F (230°C).
- (b) Adjust throttle lever friction knob. (*Not applicable*)
- (c) Line up on take-off runway.
- (d) Open the throttle smoothly to maximum permissible take-off power. See Figure 6-1.
- (e) Anticipate tendency of aircraft to swing to the left.
- (f) Allow aircraft to fly itself off at 55 to 65 mph, in a tail down attitude and climb at 65 mph.
- (g) As soon as safe height has been attained, reduce power to 33.5 In.Hg. and 2200 rpm if the aircraft is fully loaded, or 30 In.Hg. and 2000 rpm for normal weight.
- (h) Slowly increase airspeed to 80 mph and retrim.
- (j) At altitude of 500 ft. - flaps to CLIMB and retrim.

### 4.10 CLIMB

Best rate of climb is obtained using Maximum Continuous Power (2200 rpm, 33.5 In.Hg.). Speed for best rate of climb is 95 mph IAS; speed for best angle of climb is 80 mph IAS.

Where circumstances warrant, Maximum Continuous Power may be used giving rates of climb as stated in paragraph 6.10.1.

However, the engine manufacturer recommends, for reduced engine wear, that 2000 rpm and 30 In.Hg. be used. The rates of climb will then be 540 fpm for the landplane, 460 fpm for the seaplane.

Refer to the Cruise Power Chart in Appendix for recommended settings.

Keep cylinder head temperature within limits shown on gauge. Low rpm at High Manifold Pressure helps to maintain climbing mixture strength and materially assists engine and oil cooling.

### 4.11 CRUISE

For continuous cruise, use Maximum Weak Mixture Power or less, taking the following steps:

- (a) Flaps to "Cruise".
- (b) Throttle back to 29.7 In.Hg. or less Manifold Pressure.
- (c) Propeller lever to give 2000 rpm or less.
- (d) Mixture lever set to rich of peak. Carburettor mixture temperature 40°F (4°C).
- (e) Keep cylinder head temperature and oil inlet temperature within limits shown on gauge.

For Cruising power reduced below that obtained at maximum weak mixture use settings in Cruise Power Chart in Appendix.

#### 4.11.1 FUEL MANAGEMENT

For favourable CG travel, without long range tanks:

- (a) Empty rear tank first, if aircraft is fully loaded, in order to move CG progressively forward.



### 4.11.2 AIRSPEED CORRECTION

To correct indicated airspeed to calibrated airspeed:

Subtract 5 mph from all indicated cruising speeds.

Subtract 5 mph from the indicated airspeed when flaps in DOWN position.

### 4.11.3 WEAK MIXTURE OPERATION

Refer to Section 4.11.

### 4.12 DESCENT

- (a) Reduce airspeed and power as required.
- (b) Fuel selector to fullest tank.
- (c) Instruments in correct ranges.

### 4.13 APPROACH

- (a) Reduce airspeed to 90 mph IAS.
- (b) Propeller lever to INCREASE rpm.
- (c) Mixture lever - FULL RICH.
- (d) Flaps to LANDING or as desired.
- (e) Maintain a normal approach airspeed of 80 mph IAS. (Rate of descent will be approximately 1000 ft. per min.).

#### NOTE

Open throttle several times during approach to clear engine and to prevent too rapid engine cooling.

#### NOTE

When carburettor heat is used during approach, select "COLD" late on the final approach. This is to insure that full power will be available in case of a baulked landing.

### 4.14 LANDING

- (a) Trim as required.
- (b) Increase power to decrease rate of descent.

#### NOTE

With flaps at landing, the "Power-Off" approach produces a marked nose down attitude.

- (c) Pull back gently on the control column for three-point touch-down.
- (d) There is no tendency to swing after touchdown except in crosswinds.

#### NOTE

In normal stalled landing the tailwheel will touch first, when landing without flap.

- (e) After touch-down hold control column fully back.
- (f) Use rudder and steerable tailwheel to maintain straight path.
- (g) Apply wheel brakes, as necessary, to control landing run.

#### 4.14.1 MINIMUM RUN LANDING

Minimum run landings may be necessary under extraordinary circumstances.

Pilots familiar with the aircraft and experienced in short landing technique may perform minimum run landings by using full flap and reducing the airspeed on



the final approach to 65 - 68 mph and maintaining that speed to the point of flare-out.

### 4.14.2 CROSS-WIND LANDING

The lateral component of wind velocity at and below which it is safe to land is not more than 10 mph at 90° for landplane, skiplane and seaplane.

### 4.14.3 NIGHT LANDING

At night a "Power On" landing is recommended so that a go-around is facilitated.

### 4.14.4 SEAPLANE LANDING

- (a) Use the same procedures as for landplane.
- (b) Do not lower water rudders until aircraft has stopped planing.

### 4.14.5 SKIPLANE LANDING

Prior to landing skiplane make sure:

- (a) Snow does not deceptively cover uneven ground.
- (b) Ice is thick enough to support the aircraft.

#### NOTE

Blue ice is generally quite thick. White ice is nearly always thin, especially on fast flowing rivers.

- (c) Use power approach for landing on unmarked snow.
- (d) Do not make turns when close to snow-covered ground.

### 4.15 GO-AROUND AND BAULKED LANDING

Decide early in approach to go around, using procedure as follows:

- (a) Open throttle lever slowly to full take-off power.
- (b) Keep nose down, re-trimming if necessary, to maintain normal flap down airspeeds - 65 mps for TAKE-OFF flap, 75 - 90 mph for CLIMB or CRUISE flap settings.
- (c) Retract flaps slowly when safe altitude is reached.
- (d) Retrim as required.

### 4.16 AFTER THE LANDING

- (a) Flaps to CRUISE when the landing run is completed.
- (b) Elevator trim to neutral.

### 4.17 POST FLIGHT CHECKS

(Last flight of day only)

- (a) Set parking brakes.
- (b) Carburettor heat - COLD.

#### Ignition safety check

- (a) Engine at idling speed.
- (b) Switch OFF ignition switch momentarily - engine must stop firing completely.
- (c) Ignition ON as soon as possible to prevent backfiring. Ignition system and power check.
- (d) Control Column fully back.



(e) Advance throttle lever to aerodrome barometric pressure.

(f) RPM should be 2100 plus or minus 20.

(g) Check magnetos by selecting "L" momentarily and return to "BOTH" before selecting "R" momentarily.

### NOTE

When running on one magneto, the drop in rpm should not exceed 100 rpm.

### Idle Speed Check

(a) Retard throttle position to idling position.

(b) Engine rpm should be 450 - 550.

(c) Oil pressure and fuel pressure should remain within limits.

### 4.18 STOPPING THE ENGINE

(a) Allow engine to idle for a short period to assist it in gradually cooling down.

(b) Open throttle to give 1000 - 1200 RPM.

(c) Propeller lever to full DECREASE RPM.

(d) The RPM will drop off as the propeller changes pitch but should be maintained at 800 rpm with the throttle.

(e) Mixture lever - IDLE CUT-OFF.

(f) Switch ignition OFF after the propeller has stopped turning.

(g) Main fuel tank selector OFF.

(h) All switches OFF.

If engine fails to stop proceed as follows:

(a) Check magnetos again.

(b) Close throttle to idling.

(c) Turn fuel selector OFF.

(d) Maintain 800 rpm.

(e) Wait until engine has stopped through fuel starvation.

(f) Switch ignition OFF.

(g) Throttle lever fully closed.



# 5. EMERGENCY PROCEDURES

In simulating aircraft operations on a desktop computer, we have the luxury to render emergencies nonexistent if we wish. If only everyone were that lucky in real life!

We've included this section largely intact from the original flight manual, for those who wish to practice such procedures in the simulator.

Some of the original emergency procedures listed also add historical flavour, dating back to an era when it was simply assumed that men would be wearing a tie, for example.

We have removed or edited the original text in a few areas where it completely has no relevance to the MilViz DHC-2 as represented in the simulator.

It's worth noting that although the following procedures refer to various in-flight failures, the MilViz DHC-2 does not include any custom failure capabilities; these procedures are for emulation only.

We do have to stress that while it may be interesting to practice varying scenarios in the simulator, the text we've included is for simulation use only and should never be used in place of real aircraft procedures or instructions.

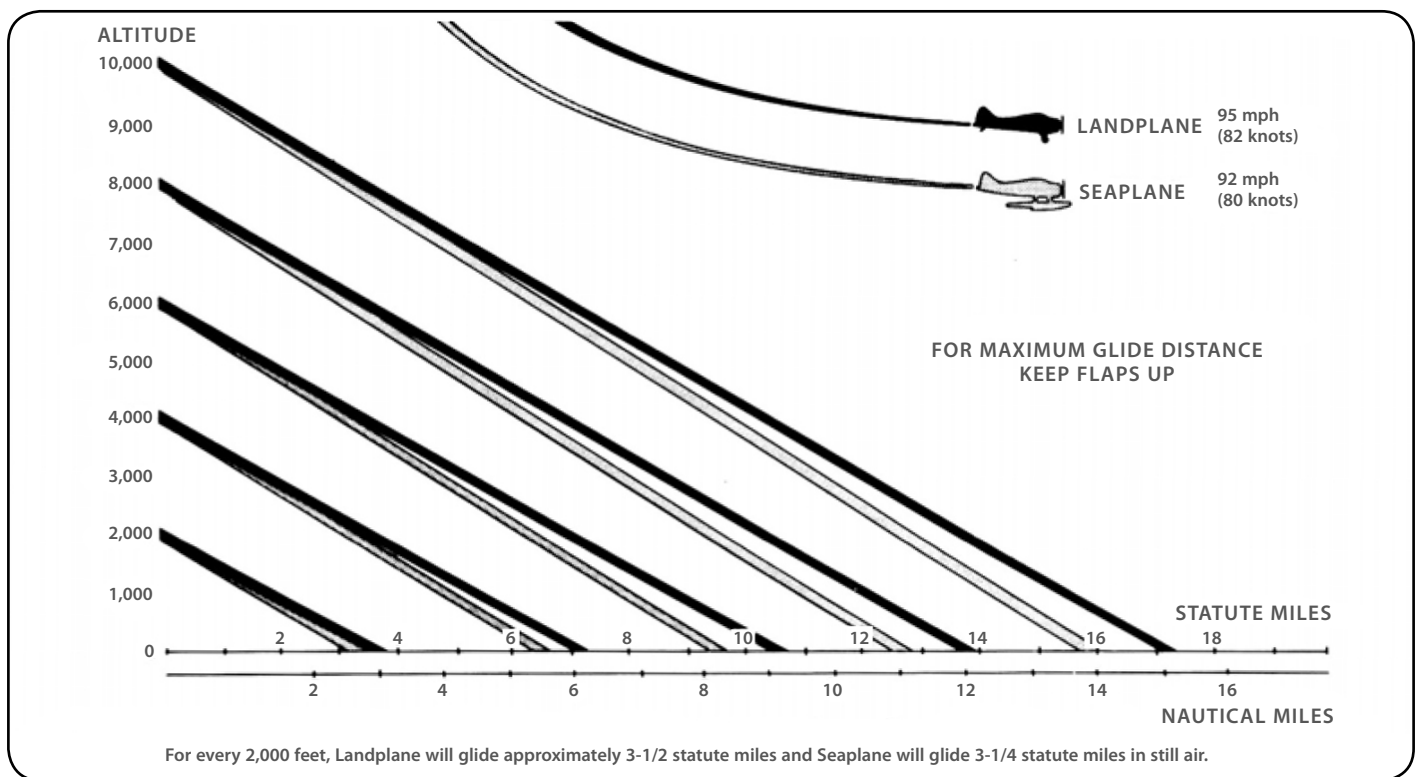


FIGURE 5-1 - GLIDING DISTANCES



### 5.1 ENGINE FAILURE

#### 5.1.1 ENGINE FAILURE DURING TAKE-OFF RUN

Remaining length of runway is sufficient for stopping safely.

(a) Apply brakes - control column fully back all the time.

(b) Mixture lever - IDLE CUT-OFF.

(c) Pump flaps fully DOWN.

(d) Ignition - OFF.

(e) Fuel Selector - OFF.

(f) Battery master switch - OFF.

Space ahead is insufficient.

(a) Take steps as above.

(b) Turn the aircraft by momentarily applying differential braking in the desired direction, rudder pedals in neutral, then apply differential braking in the reverse direction to counteract ground looping tendency.

#### 5.1.2 ENGINE FAILURE AFTER TAKE-OFF

(a) Lower nose immediately, to maintain airspeed at 65 mph.

(b) Mixture lever - IDLE CUT-OFF.

(c) Propeller lever to DECREASE RPM position.

(d) Fuel and oil emergency shut-off - pull sharply CLOSED.

(e) Ignition - OFF.

(f) Battery master switch - OFF.

(g) Fuel Selector - OFF.

(h) Warn passengers to brace feet against supports and protect their heads by placing an arm across forehead, gripping fuselage structure with the same hand.

(j) KEEP STRAIGHT AHEAD AND CHANGE DIRECTION ONLY ENOUGH TO MISS OBSTACLES. USE RUDDER ONLY.

#### CAUTION

Always maintain enough airspeed to assure full control of aircraft to point of touchdown. Coarse use of ailerons near the stall airspeed precipitates wing dropping.

#### CAUTION

It is better to ride an aircraft with a dead engine safely to a crash landing straight ahead, than to turn back to the field. Attempts to turn back have, in many cases, ended with an uncontrolled roll or spin into the ground.

#### 5.1.3 ENGINE FAILURE ABOVE 800 FT. AFTER TAKE-OFF

(a) Depress nose to gliding attitude.

(b) Flaps to CRUISE.

(c) Propeller lever to full DECREASE RPM position.

(d) Maintain airspeed of 95 mph IAS (glide gradient is 11% rate of descent 890 ft. per minute.)

(e) Decide whether to crash land straight ahead or complete the circuit and attempt to land on the airfield.

(f) Proceed as described in DEAD ENGINE LANDING.



### 5.1.4 ENGINE FAILURE DURING FLIGHT

If sufficient altitude is available:

Attempt to re-start the engine as follows:

- (a) Lower nose and maintain airspeed at 95 mph.
- (b) Fuel selector at fullest tank.
- (c) Check fuel pressure within normal range.
- (d) Check that some oil pressure is indicated. Do not attempt to re-start if there is no oil pressure.
- (e) Throttle - 1/3 open.
- (f) Check ignition switches - BOTH.
- (g) If no fuel pressure is indicated.
- (h) Booster pump - ON (if installed) or:  
Use wobble pump to build up fuel pressure and prime for a maximum of 4 strokes. If still no fuel pressure do not attempt a re-start.

If re-start fails:

- (a) Ignition switch - OFF.
- (b) Propeller lever full DECREASE RPM position.
- (c) Fuel selector - OFF.
- (d) Maintain air speed of 95 mph IAS with flaps at CRUISE for maximum glide distance.
- (e) Throttle lever - CLOSED.
- (f) Make a dead engine landing.

### 5.2 DEAD ENGINE LANDING

- (a) Maintain air speed of 95 mph IAS, flaps at CRUISE for maximum glide distance.
- (b) Propeller lever - HIGH PITCH.
- (c) Mixture lever - IDLE CUT-OFF.
- (d) Throttle lever - CLOSED.

Close to ground:

- (e) Ignition switch - OFF.
- (f) Order occupants to brace themselves.
- (g) Flaps to LANDING and maintain final approach speed of 65 - 68 mph.
- (h) Touch down slightly tail first, as nearly into the wind as circumstances permit.
- (j) Leave aircraft immediately when it has stopped moving.

### 5.3 PROPELLER FAILURE

Failure of the constant speed unit will result in the propeller going into coarse pitch and remaining there. No attempt should be made to clear the failure by increasing engine power as this will overload the engine and lead to possible engine failure.

It is recommended that a landing be made at the nearest airfield, using limited power with propeller lever in HIGH PITCH position, to have the trouble rectified.

#### 5.3.1 PROPELLER FAILURE DURING TAKE-OFF RUN

Abandon take-off as follows:



- (a) Close the throttle.
- (b) Mixture lever - IDLE CUT-OFF.
- (c) Pump flaps fully down.
- (d) Apply brakes.
- (e) When speed is low and remaining space insufficient, turn the aircraft by differential braking.
- (f) Fuel selector - OFF.
- (g) Ignition switch - OFF.
- (h) Master switch - OFF.

### 5.3.2 PROPELLER FAILURE AFTER TAKE-OFF

1. (a) If RPM too high manipulate propeller lever in attempt to bring propeller within limits.  
  
(b) If no response, throttle back to keep the RPM below 2350 rpm. Leave flaps at TAKEOFF and maintain airspeed at 65 mph minimum.  
  
(c) If unsuccessful, return to field maintaining nose up attitude and regulate the rate of descent by gentle throttle lever manipulation. Resume normal attitude on the approach to land and make a power off landing.
2. (a) If RPM too low (propeller in full coarse pitch.)  
  
(b) Increase air speed without losing altitude.  
  
(c) If possible reduce throttle to 30 In.Hg.  
  
(d) Raise flaps to CLIMB in stages, maintaining maximum air speed and climb at the slowest rate to gain sufficient altitude to complete a safe circuit and landing.

### 5.3.3 PROPELLER FAILURE DURING FLIGHT

#### Overspeeding Propeller (Sticking in low pitch)

- (a) Reduce throttle setting and pull the aircraft into a climbing altitude to decrease engine speed and increase load on the propeller.
- (b) Manipulate propeller lever in attempt to bring propeller within operating limitations.
- (c) Maintain constant check on oil pressure.

#### Oil supply breakdown

- (a) Check oil pressure; if none is indicated, pull propeller lever to HIGH PITCH.
- (b) Keep RPM to a minimum and make an emergency landing with limited power on.
- (c) If oil pressure is indicated after selecting HIGH PITCH it can be assumed that the propeller oil line has fractured so proceed as in 5.3.2.

### 5.4 DITCHING

Any high-wing monoplane should be ditched only as a last resort because even in the exceptional case where the pilot succeeds in ditching his airplane under favourable conditions, there is the almost certain possibility that the aircraft will submerge to the cabin roof in a very short time.

If, however, the aircraft has to be ditched, proceed as follows:

- (a) Keep approach speed sufficient for control down to the impact with the water.
- (b) Instruct other occupants of the aircraft.



## SECTION 5 - EMERGENCY PROCEDURES

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(c) Make approach into the wind, at right angles to the swell.

(d) Unlock cabin and cockpit doors.

(e) Ditch on the falling side of a wave crest or swell top.

(f) Touch down tail first to prevent the nose from striking a wave crest or swell top which might cause the aircraft to nose in, or dive under.

Other occupants of the aircraft should be instructed as follows:

(a) Unfasten collar and tie.

(b) Hold on to life preserver cushions.

(c) Be prepared for a double impact when first the tail, and then the engine strike water.

(d) Not to move until the aircraft has come to rest.

(e) Help each other through the doors as quickly as possible.



# 6. OPERATING LIMITS, PERFORMANCE DATA AND FLIGHT CHARACTERISTICS

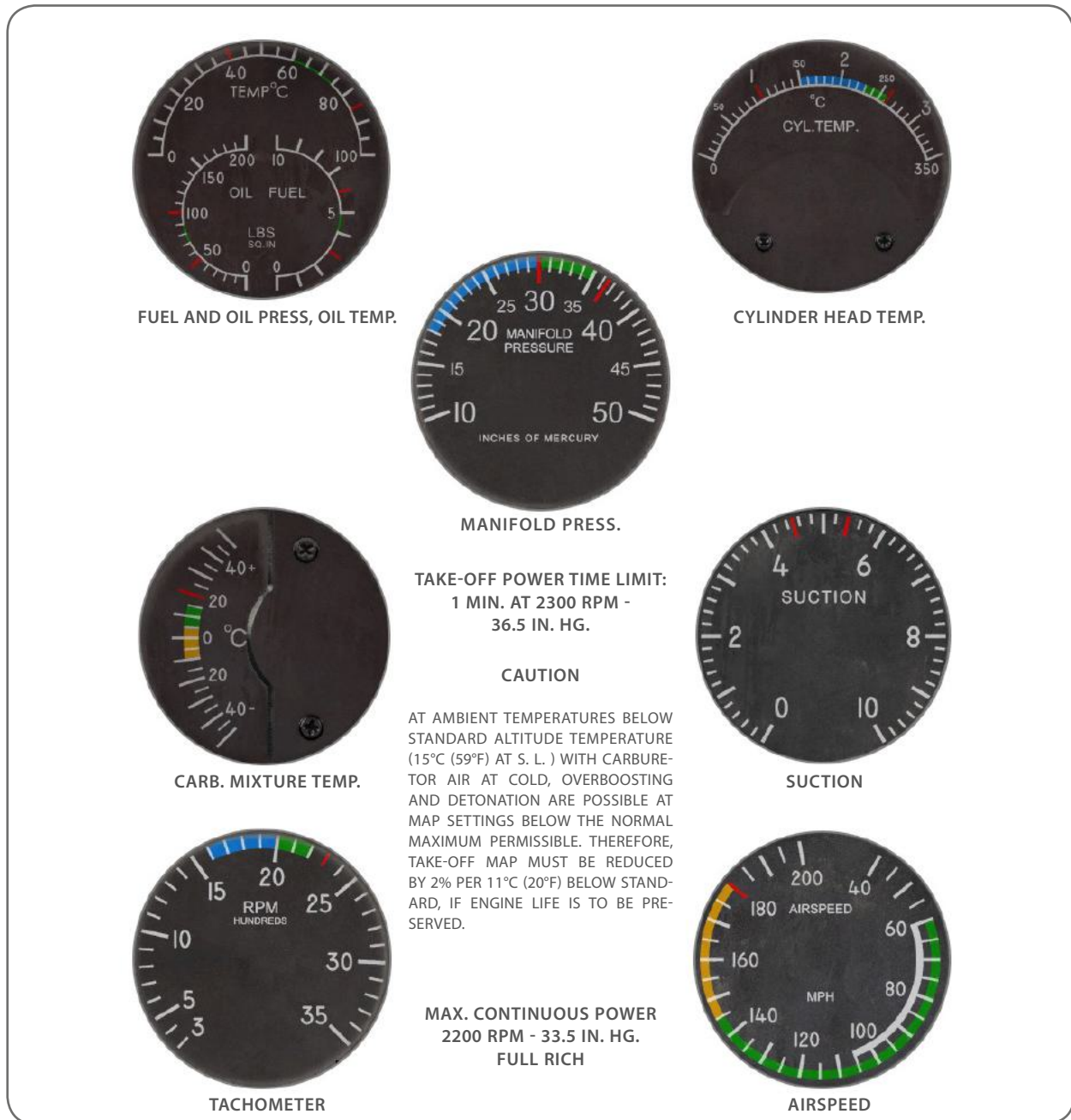


FIGURE 6-1 - INSTRUMENT LIMIT MARKINGS



## 6.1 GENERAL REMARKS

The aircraft must be operated according to the following limitations and instructions.

Instrument readings, illustrating the operating limitations, are shown on Figure 6-1. The instrument markings shown should be given close attention since they contain operational limits information which is not necessarily repeated in the following text.

7.1.1 The aircraft has been classified in the normal category of BCAR Airworthiness standards in accordance with the Type Approval.

ALL AEROBATIC MANOEUVRES, INCLUDING SPINS ARE PROHIBITED.

Stalls are permitted for demonstration purposes only.

## 6.2 ENGINE LIMITATIONS

Refer to: Instrument Markings (Figure 6-1).

### CAUTION

If engine overspeeding occurs, land at nearest airfield and have engine and propeller inspected before further flight. If engine has exceeded 2,750 rpm for more than 30 seconds, an engine change is indicated.

## 6.3 PROPELLER LIMITATIONS

Provided that the engine is operated within engine limitations, the propeller will be within its safe limits. Excessive run-up on the ground is to be avoided.

## 6.4 RESIDUAL FUEL QUANTITIES

Fuel remaining in tanks when the fuel contents gauge indicates zero, cannot be safely used in flight.

## 6.5 AIRSPEED LIMITS

For AIRSPEED LIMITATIONS as marked on Airspeed Indicator refer to Figure 6-1.

### 6.5.1 MAXIMUM PERMISSIBLE DIVING SPEED

Landplane )  
Skiplane ) 180 mph IAS  
Seaplane )

The maximum permissible speed is the never-exceed speed of flight. A higher speed may result in structural failure, flutter or loss of control.

### 6.5.2 NORMAL OPERATING LIMIT SPEED

Landplane )  
Skiplane ) 145 mph IAS  
Seaplane )

Normal cruising flight operations should be confined to speeds below this value.

The range of speed between normal operating limit speed and the maximum permissible diving speed should be intentionally entered only with due regard to the prevailing flight and atmospheric conditions, in particular turbulence.

### 6.5.3 MANOEUVRING SPEED

125 mph IAS. Manoeuvres which involve an approach to stall conditions, or full application of rudder or aileron control, should be confined to speeds below this value.



## 6.5.4 MAXIMUM SPEED FOR LOWERING FLAPS

105 mph IAS.

When flying in very rough air, or if it is necessary to perform forcible manoeuvres including full application of aileron and rudder, the airspeed should not be permitted to exceed 145 mph IAS.

## 6.6 ACCELERATION LIMITS

Limit load factors are the maximum values which the airframe may be safely subjected to in flight.

### 6.6.1 LOAD FACTORS

In tight turns, flight load factors may reach the limit loads, and may also increase the danger of an unintentional stall.

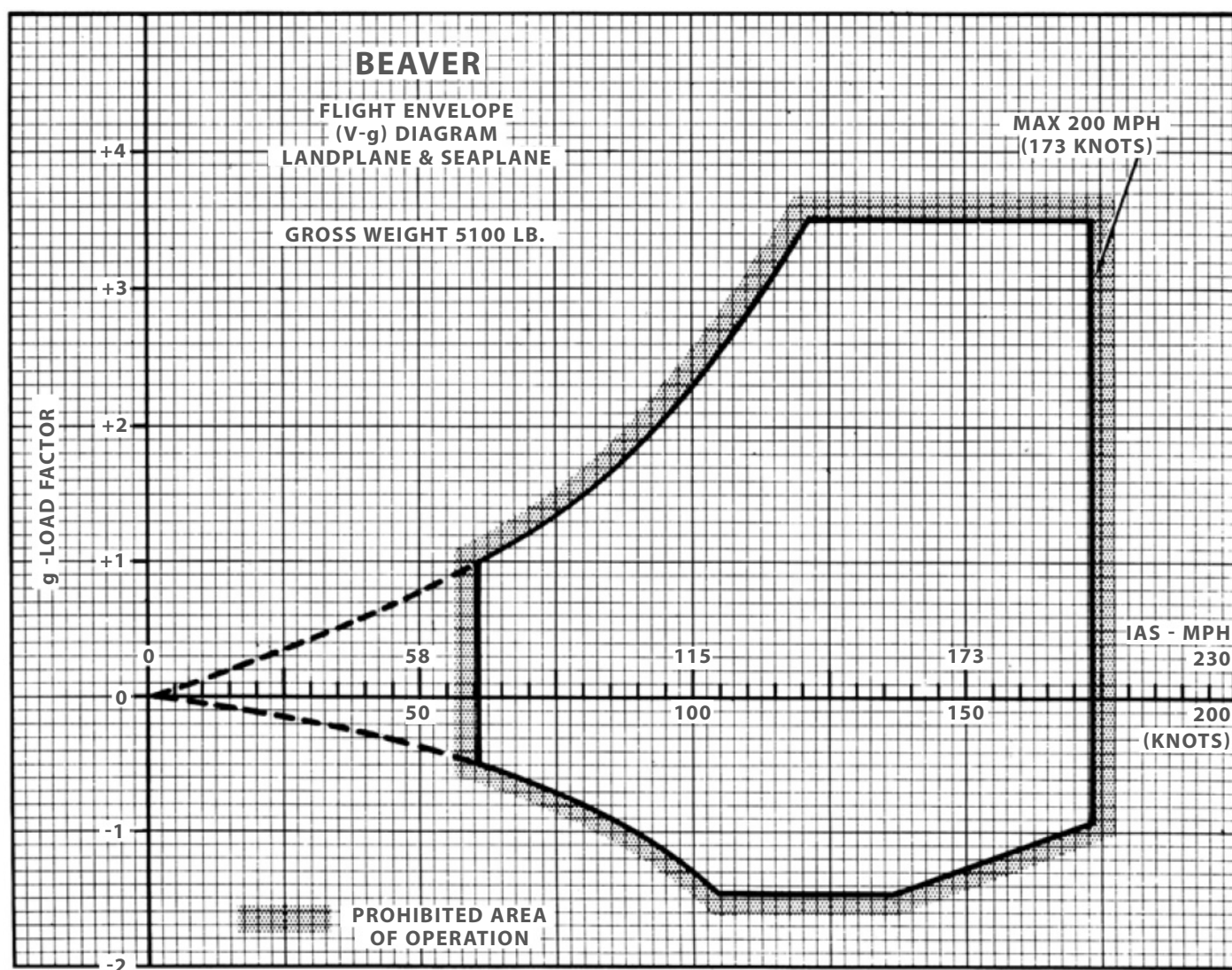


FIGURE 6-2 - OPERATING FLIGHT STRENGTH DIAGRAM



The variation of flaps-up stalling speed and load factors with angle of bank are given below:

| <u>Angle of Bank</u> | <u>Stalling Speed</u><br>mph IAS | <u>Load Factor</u> |
|----------------------|----------------------------------|--------------------|
| 0                    | 60                               | 1.0                |
| 50                   | 85                               | 1.5                |
| 60                   | 105                              | 2.0                |
| 65                   | 115                              | 2.5                |
| 70                   | 130                              | 3.0                |

### 6.8 MINIMUM FLIGHT CREW

One Pilot.

### 6.9 MISCELLANEOUS

Smoking is authorized for cockpit and cabin.

### 6.7 WEIGHT LIMITATIONS

The Design Gross Weight of the aircraft is 5,100 lb. At this weight it complies with the general performance and strength criteria.



## 6.10 PERFORMANCE AT MAXIMUM GROSS WEIGHT

### STANDARD CONDITIONS

#### 6.10.1 GENERAL

|                                                 |           | Landplane<br>(5,100 lb) | Skiplane<br>(5,100 lb) |
|-------------------------------------------------|-----------|-------------------------|------------------------|
|                                                 |           |                         | Seaplane<br>(5,090 lb) |
| Max. True Level Speed                           |           |                         |                        |
| Sea Level                                       | mph (kmh) | 156 (251)               | 144 (232)              |
| 5,000 ft.                                       | mph (kmh) | 163 (262)               | 151 (243)              |
| True Cruising Speed (300 BHP)                   |           |                         |                        |
| Sea Level                                       | mph (kmh) | 136 (219)               | 123 (198)              |
| 5,000 ft.                                       | mph (kmh) | 143 (230)               | 127 (204)              |
| Economic True Cruising Speed (240 BHP)          |           |                         |                        |
| Sea Level                                       | mph (kmh) | 125 (201)               | 110 (177)              |
| 5,000 ft.                                       | mph (kmh) | 130 (209)               | 114 (183)              |
| Stalling Speed (I.A.S.)                         |           |                         |                        |
| Flaps Up                                        | mph (kmh) | 60 (96)                 | 60 (96)                |
| Flaps "Landing"                                 | mph (kmh) | 45 (72)                 | 45 (72)                |
| Take-off distance to clear 50 ft. obstacle      |           |                         |                        |
| (Flaps "Take-off", still air<br>ICAO technique) | ft. (m)   | 1,250 (381)             | 1,610 (491)            |



## SECTION 6 - OPERATING LIMITS, PERF. DATA AND FLIGHT CHARACTERISTICS

|                                                                    |             | Landplane<br>(5,100 lb) | Skiplane<br>(5,100 lb) |
|--------------------------------------------------------------------|-------------|-------------------------|------------------------|
|                                                                    |             |                         | Seaplane<br>(5,090 lb) |
| Landing distance over 50 ft. obstacle                              |             |                         |                        |
| (Flaps "Landing", still air<br>ICAO technique)                     | ft. (m)     | 1,250 (381)             | 1,510 (460)            |
| Initial Rate of Climb (Take-off Power)                             |             |                         |                        |
| Flaps up                                                           | fpm (m/sec) | 1,020 (5.2)             | 920 (m/sec)            |
| Flaps "Take-off"                                                   | fpm (m/sec) | 730 (3.7)               | 650 (3.3)              |
| Service Ceiling                                                    |             | 18,000 (5490)           | 15,750 (4800)          |
| Rate of Climb at Max. Cont. Power                                  |             |                         |                        |
| Sea Level                                                          | fpm (m/sec) | 840 (4.3)               | 740 (3.8)              |
| 5,000 ft.                                                          | fpm (m/sec) | 795 (4.0)               | 685 (3.5)              |
| 10,000 ft.                                                         | fpm (m/sec) | 530 (2.7)               | 410 (2.1)              |
| Cruising Range at 5,000 ft. (240 BHP)                              |             |                         |                        |
| With normal fuel capacity mi (km)<br>(79 Imp. Gal.) (95 U.S. Gal.) |             | 455 (732)               | 405 (652)              |
| Cruising Endurance at 5,000 ft. (240 BHP)                          |             |                         |                        |
| With normal fuel capacity<br>(79 Imp. Gal.) (95 U.S. Gal.)         |             | 3.54 hrs.               | 3.52 hrs.              |

Note: Range and endurance results make allowance for:

- i) 10 min. warm up and take-off
- ii) Climb to 5,000 ft.
- iii) Fuel for 45 min. flight at cruise power (240 BHP)



## 6.10.2 MAX. INDICATED SPEEDS

|                     |           |           |           |
|---------------------|-----------|-----------|-----------|
| Flaps               | mph (kmh) | 105 (169) | 105 (169) |
| Diving 5,100 A.U.W. | mph (kmh) | 180 (290) | 180 (290) |
| Structural          |           |           |           |
| Cruising            | mph (kmh) | 145 (233) | 145 (233) |

## 6.11 FLIGHT CHARACTERISTICS

### 6.11.1 GENERAL

Stability is good about all axes. The aircraft is easy to fly and is docile down to the stall. Controls are normally effective throughout the airspeed range. The aircraft can be trimmed to fly hands-off from climb to maximum speeds.

### 6.11.2 TAKE-OFF

When trimmed appropriately, stick forces are moderate. The aircraft will fly itself off at airspeeds of 50 to 60 mph IAS in a tail low attitude.

### 6.11.3 SLOW FLYING

It is possible to retain full control of the aircraft at: -

75 mph IAS with flaps at CRUISE

65 mph IAS with flaps at LANDING

### 6.11.4 SPINS

Intentional spinning of the aircraft is prohibited.

### 6.11.5 STALL

The stall is gentle at all normal conditions of load and flap and may be anticipated by a slight vibration, which increases as flap is lowered. The aircraft will pitch if no yaw is present. If yaw is permitted, the aircraft has a tendency to roll. Prompt corrective action must be initiated to prevent the roll from developing.



# 7. SPECIAL INSTALLATIONS

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## 7.1 Combination Wheel-Ski Installation

The de Havilland combination wheel-ski installation permits normal operation on wheels or skis at the discretion of the pilot. It is possible to taxi immediately from snow covered ground onto cleared runways or dispersal areas and vice versa since the skis can be raised or lowered while the aircraft is being taxied.

### 7.1.1 GENERAL

The skis are raised or lowered in relation to the wheels by means of a hydraulic control unit located on the cockpit floor to the right of the pilot's seat.

The skis are raised by selecting UP on the selector lever then operating the hydraulic handpump which supplies hydraulic pressure to extend an actuator and cause the ski linkage to swivel on the axle attachments. The hydraulic pressure works in opposition to a compressed air charge, in the upper portion of the actuator housing, which is used as a pneumatic spring to cushion the landing.

To lower the skis, select DOWN on the ski selector lever which will release the hydraulic pressure and allow the pneumatic pressure in the upper portion of the actuator housing, to return the skis to the DOWN position as shown on the indicator in the selector unit.

### 7.1.2 OPERATION

To lower skis select DOWN on the ski selector lever. After a few seconds the indicator will show that the skis are in the down position.

To raise the skis select UP on the ski selector lever. Operate the hand pump until the skis are fully UP

as shown by the needle on the indicator. Approximately 100 strokes of the handpump are required to raise the skis fully. *(No worries - in the interest of sanity, the hand-pump we've installed in the MilViz DHC-2 only requires one click to activate!)*

#### NOTE

The skis trim safely in flight at any degree of retraction. Therefore, the pumping may be completed at the pilot's convenience.

### 7.1.3 AFTER TAKE-OFF

The ski position has no significant effect on air-speed, CG position or flight characteristics. The skis, therefore, may be left in either UP or DOWN position as dictated by conditions at the arrival landing field.

### 7.1.4 BEFORE LANDING

Prior to the approach to land the pilot should decide whether to raise or lower the skis, depending on forecast conditions of the landing field. Select skis as desired and when the action is complete check the ski position visually and on the indicator.

### 7.1.5 LANDING

Make a normal approach at the speeds recommended in Section 4. 13.

A tail-down or three point landing attitude should be attained on the final stage of the approach to reduce the landing run, and, when skis are extended, to ensure that lumps of snow or ice do not foul the ski tips on touchdown.



### 7.1.6 CROSSWIND LANDINGS

When landing with the skis extended the crosswind component should be carefully considered against the pilot's experience and the condition of the landing area at that time. Landings with crosswind components equal to 12 mph at 90° are not recommended.

### 7.1.7 AFTER LANDING

As soon as possible, after touchdown, ease the control column fully back to ensure directional control via the rudder pedals and tail ski and proceed as in Section 4. 16.

## 7.2 Amphibious Floats

The de Havilland amphibious floats installation enables routine flights to be made, from airfield to airfield, water to water, airfield to water and water to airfield conveniently and simply without delays in re-equipping the aircraft.

### 7.2.1 GENERAL

The floats installation replaces the complete landplane landing gear system. The floats are equipped with retractable water rudders, main and nose wheels. The retraction and extension of the wheels is accomplished by means of hydraulic pressure emanating from a hydraulic control unit, located on the floor to the right of the pilot's seat. The main wheel braking system is also operated hydraulically through actuation of the rudder toe pedals. the water rudders are actuated through a cable and pulley system for retraction, extension and steering.

### 7.2.2 TAXIING

#### Seaplane

Ensure that the wheels are retracted (UP). Extend the water rudders and proceed to take-off point. Allow the seaplane to weathercock into the wind and complete engine checks, if not already done. Retract water rudders and take-off into the wind. The water rudders may be left extended to assist in cross-wind take-offs.

#### Landplane

In addition to the checks in Section 4. 7, make sure the wheels are selected DOWN. Before commencing taxiing, check that the water rudders retraction handle is in the retracted position. Test the brakes as soon as the aircraft starts moving.

#### NOTE

Although the aircraft is in a tricycle undercarriage attitude giving better taxiing visibility more care should be taken to avoid rough or uneven ground in order to avoid damage to the floats. Furthermore, when manoeuvring, the pilot must keep in mind the additional area required for the length of the floats.

### 7.2.3 TAKE-OFF

#### Landplane

In addition to the checks in Section 4. 9 check the following:

- (a) Wheels DOWN.
- (b) Water rudders - Retracted.
- (c) Brakes - OFF.



(d) Open throttle slowly to take-off power and note that the aircraft accelerates more rapidly, because of the tri-cycle attitude. Maintain directional control by coarse use of the rudder initially.

(e) Allow the speed to increase to 60 or 65 mph before applying a slight backward pressure to the control column to assist the aircraft in unsticking.

(f) As the nose wheels lift clear of the ground a slight forward pressure should be applied to the control column to maintain the take-off attitude.

### Seaplane

Complete the normal checks in Section 4. 9 with the addition of the following:

(a) Wheels UP.

(b) Water rudders - Retracted.

(c) Open throttle smoothly and maintain direction with the airplane rudder. Allow the seaplane to fly itself off at approximately 65 mph.

### 7.2.4 CLIMBING, CRUISING AND DESCENDING

In flight whether climbing, cruising or descending, the effects of the amphibious floats are the same as those encountered with normal floats. However, to improve the flight characteristics, the wheels should be retracted during flight. The water rudders should be retracted during take-off and remain retracted until after a water landing has been completed.

### 7.2.5 LANDING

Before approaching to land at the termination of the flight, the pilot must consider his intended landing area and take action accordingly.

If the landing is to be made:

(a) On water, the wheels and the water rudders must be retracted (UP).

(b) On land, the wheels must be selected DOWN and locked and the water rudders retracted.

The water rudders retraction is simply a matter of checking that the retraction handle is in the retracted position where it should of been before take-off and during the flight.

The wheels, however, require that:

(a) The selector lever on the amphibious floats hydraulic control unit be selected as desired.

(b) The handpump is operated until the desired position is shown on the hydraulic control indicator.

### 7.2.6 OPERATING LIMITS

The All-Up Weight of the amphibian when operating on water must not exceed 5000 lb, the reduction in A.U.W. from the standard seaplane version is necessary due to the decreased buoyancy of the amphibious floats.

#### NOTE

Handling and performance are unchanged, except as stated below.

#### Handling

On wheels, if take-off is attempted at the minimum speed of 58-60 mph IAS, the nose, once lifted will tend to rise and must be checked. This is a normal nose wheel airplane characteristic and is easily controlled by the elevator. If the nose is left down until 80 mph IAS, this characteristic is absent.

#### Performance



## SECTION 7 - SPECIAL INSTALLATIONS

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There is negligible difference between the wheels up and down performance.

Runway take-off - Add 50 ft to landplane figure (Chart I).

Runway landing - Add 95 ft to landplane figure (Chart II).

Rate of climb - Subtract 50 fpm from seaplane values.

Speed at maximum weak mixture power (300 BHP) - Subtract 2-1/2 mph from seaplane values.

Speed at standard cruise (240 BHP) - Subtract 5 mph from seaplane values.



# 8. OPERATING DATA CHARTS

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## NOTE

The take-off and landing distances on the following charts assume ICAO technique during take-off and landing, namely, holding the aircraft down until the airspeed builds up to 1.2 times the stalling speed before climbing on take-off, and holding 1.3 times the stalling speed during the approach to land.

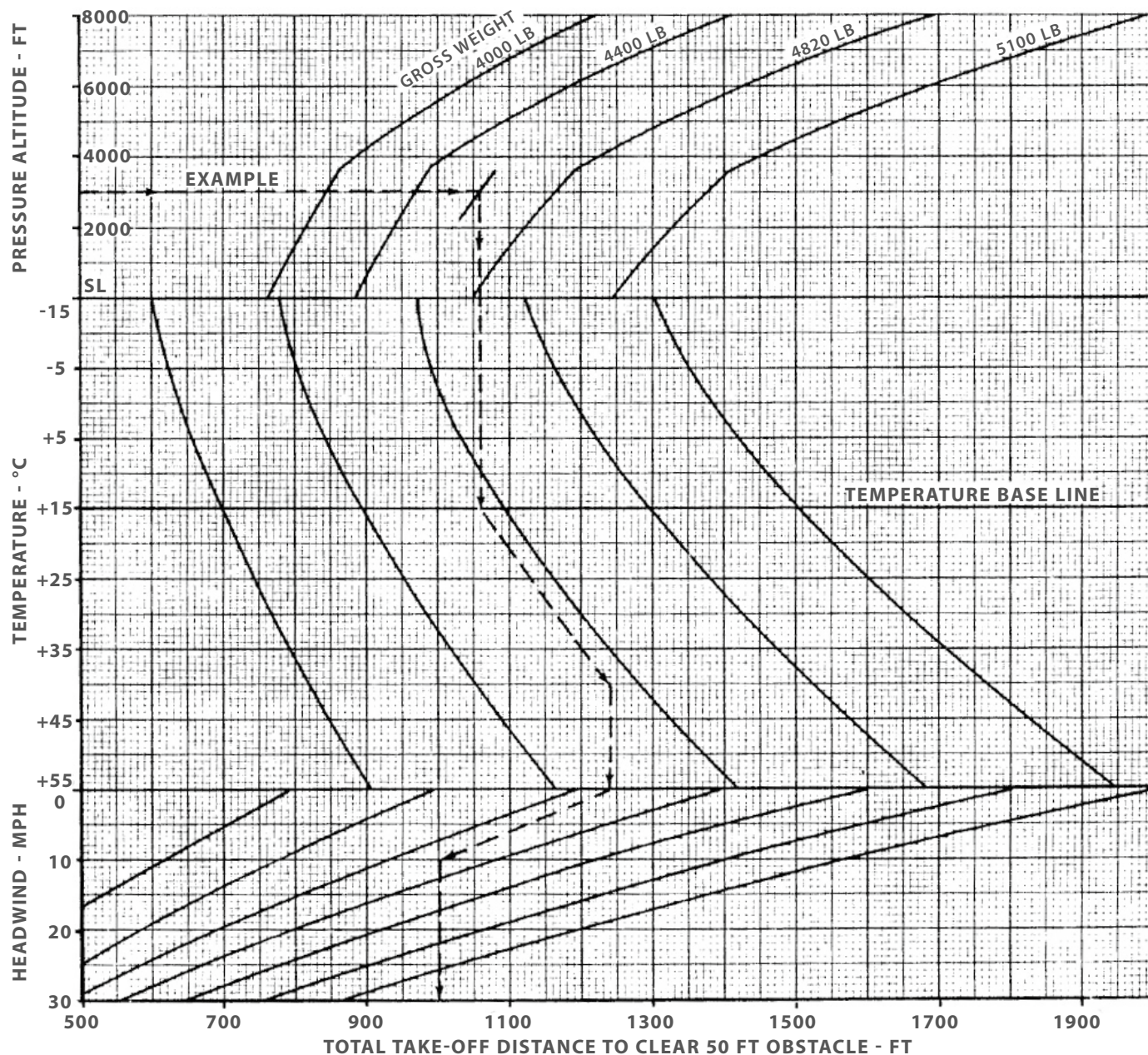


## 8.1 TAKE-OFF DISTANCE - LANDPLANE

### REMARKS:

1. Runway: Hard Surface
2. Flaps: "Take-off"

3. Ground run is approximately 55% of total distance.
4. Data: Estimated (ICAO technique)



### EXAMPLE:

1. Follow Pressure Altitude line (3000 ft) horizontally to Gross Weight contour (4600 lb)
2. Drop vertical line to Temperature Base Line
3. Follow closest Temperature contour to existing temperature line
4. Drop vertical line to zero wind line
5. Follow closest Headwind contour to existing headwind line (10 mph)
6. Drop vertical line to Distance axis and read: Total take-off distance to clear 50 ft = 1000 ft

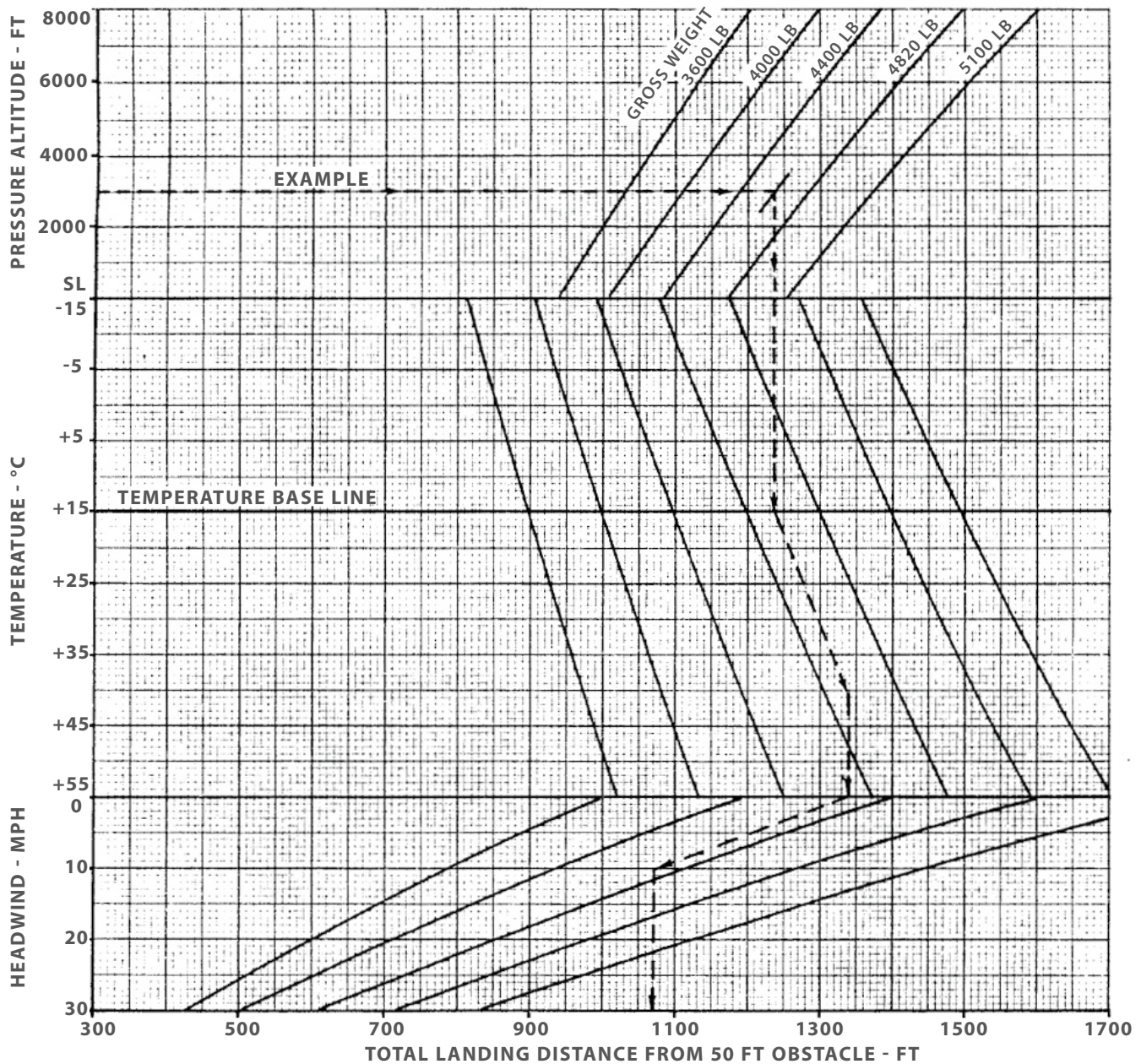


## 8.2 LANDING DISTANCE - LANDPLANE

### REMARKS:

1. Runway: Hard Surface
2. Flaps: "Landing"

3. Ground run is approximately 50% of total distance.
4. Data: Estimated (ICAO technique)



### EXAMPLE:

Follow example line using procedure given for landplane take-off and read:

Total landing distance from 50 ft obstacle = 1070 ft



### 8.3 SKIPLANE TAKE-OFF AND LANDING DISTANCES

Snow conditions being extremely variable, the sliding coefficient of friction which has an important effect on Take-off and landing ground distances, may vary between wide limits.

(  $\mu = 0.02$  to  $\mu = 1.2$  ).

#### Take-Off

- (1) Under doubtful snow conditions:
  - (a) Expect "sticky snow" ground run (  $\mu > 0.3$  ).
- (2) If the pilot is sufficiently familiar with the snow conditions to know that the sliding friction is normal (  $\mu < 0.3$  ):
  - (a) Add 1000 feet to the landplane figures to obtain length of ground run.
- (3) On very "slippery" snow or ice (  $\mu < 0.1$  ):
  - (a) Add 100 feet to the landplane figures.
- (4) In very "sticky" snow (  $\mu > 0.3$  ):
  - (a) Expect a take-off ground run in excess of 2000 to 3000 feet.

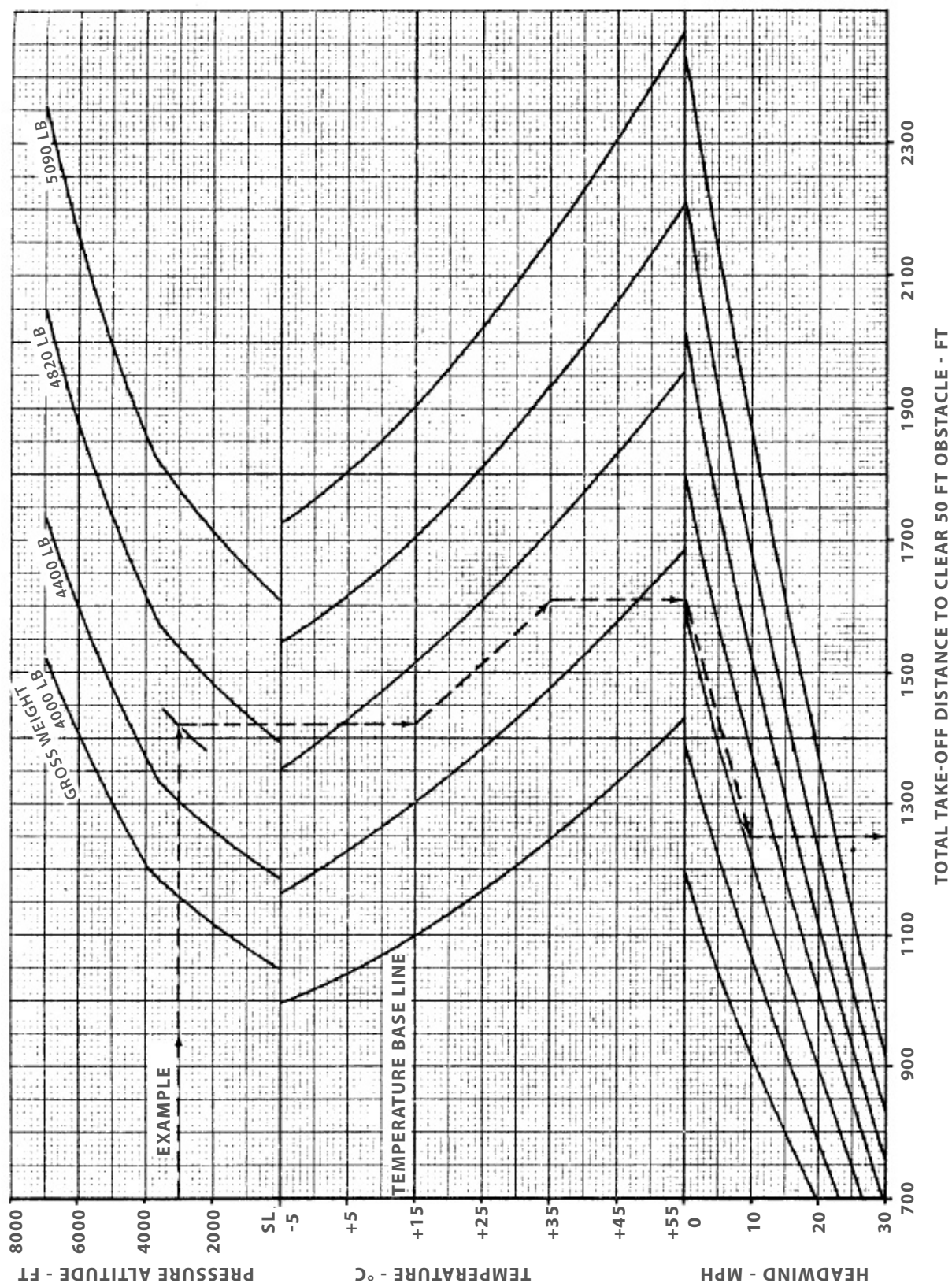
#### Landing

Since weather conditions may change rapidly, there is a possibility that snow which was "sticky" on take-off may prove very "slippery" on landing.

- (1) Under doubtful conditions:
  - (a) Allow for a ground run in excess of 2000 feet (  $\mu < 0.1$  ).
- (2) If conditions are known to be favourable:
  - (a) Add 400 feet to ground run values for the landplane (  $\mu > 0.1$  ).



## 8.4 TAKE-OFF DISTANCE - SEAPLANE



EXAMPLE:

Follow example line using procedure given for landplane take-off and read:

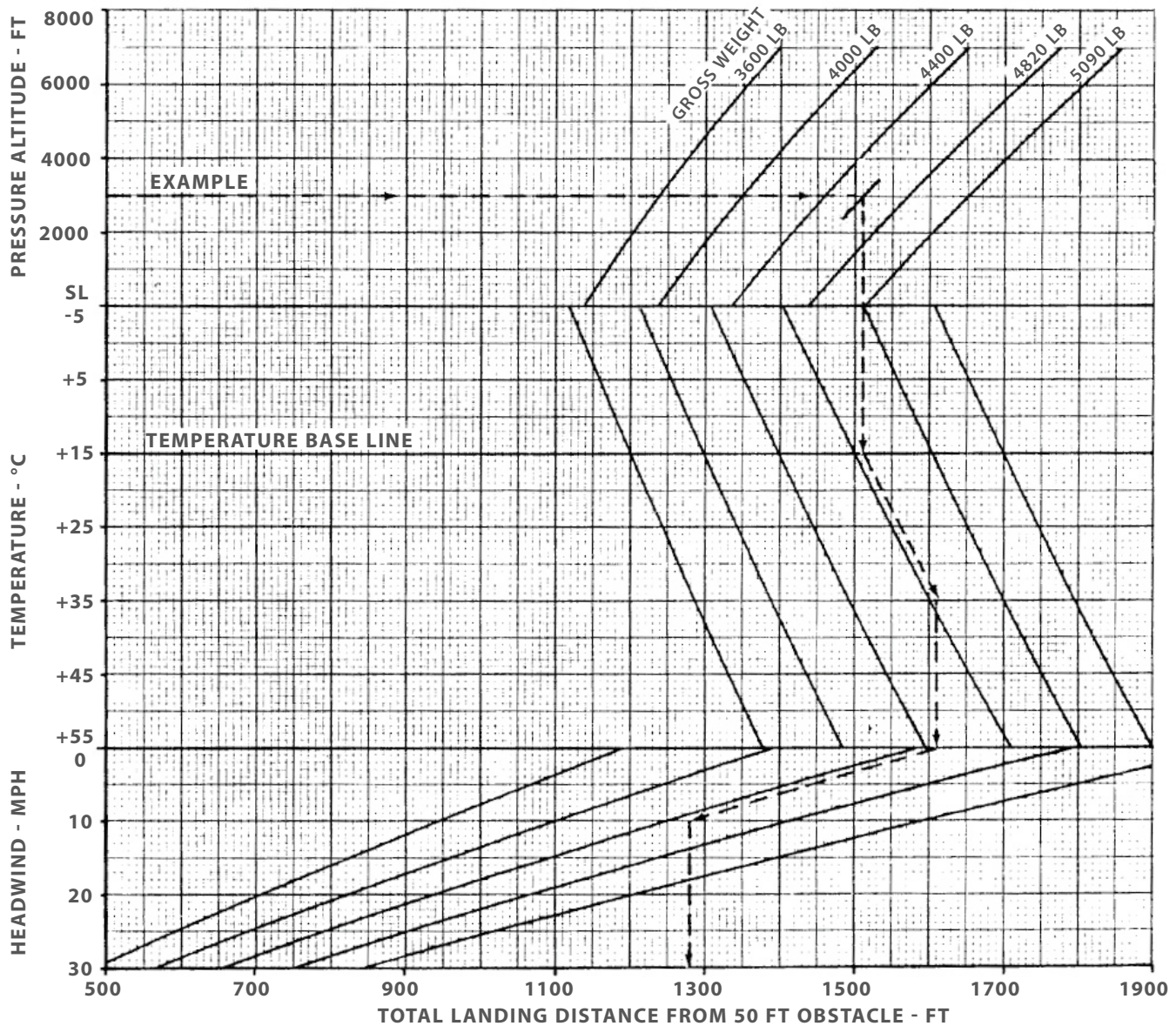
Total take-off distance to clear 50 ft obstacle = 1250 ft



## 8.5 LANDING DISTANCE - SEAPLANE

### REMARKS:

1. Water: Calm
2. Flaps: "Landing"
3. Water run is approximately 58% of total distance.
4. Data: Estimated (ICAO technique)



### EXAMPLE:

Follow example line using procedure given for landplane take-off and read:

Total landing distance from 50 ft obstacle = 1280 ft



## 8.6 CRUISE POWER CHART

ENGINE: Pratt & Whitney WASP JUNIOR R-985 (ALL MODELS)

| FUEL CONSUMPTION |      |      |      |      |      |      |
|------------------|------|------|------|------|------|------|
| Imp. Gal/hr      | 14.1 | 15.2 | 16.5 | 18.4 | 20.8 | 23.1 |
| U.S. Gal/hr      | 16.9 | 18.2 | 19.8 | 22   | 25   | 28.5 |
| B.H.P.           | 200  | 220  | 240  | 260  | 280  | 300  |

| Altitude | R.P.M. and MAINFOLD PRESSURE |             |             |             |             |             |
|----------|------------------------------|-------------|-------------|-------------|-------------|-------------|
| S.L.     | 1600 - 26.7                  | 1600 - 28.5 | 1650 - 29.5 | 1750 - 29.7 | 1900 - 29.2 | 2000 - 29.7 |
| 1000     | 1600 - 26.5                  | 1600 - 28.5 | 1650 - 29.2 | 1750 - 29.7 | 1900 - 29.2 | 2000 - 29.5 |
| 2000     | 1600 - 26                    | 1600 - 27.7 | 1650 - 29   | 1750 - 29.2 | 1900 - 28.7 | 2000 - 29.2 |
| 3000     | 1600 - 25.7                  | 1600 - 27.5 | 1650 - 28.7 | 1750 - 29   | 1900 - 28.5 | 2000 - 29   |
| 4000     | 1600 - 25.5                  | 1600 - 27   | 1650 - 28.2 | 1750 - 28.7 | 1900 - 28.2 | 2000 - 28.5 |
| 5000     | 1600 - 25.2                  | 1600 - 26.7 | 1650 - 28   | 1750 - 28.2 | 1900 - 28   | 2000 - 28.2 |
| 6000     | 1600 - 25.2                  | 1600 - 26.5 | 1700 - 27.5 | 1750 - 27.7 | 1900 - 27.7 | 2000 - 28   |
| 7000     | 1600 - 25                    | 1600 - 26.2 | 1700 - 27   | 1750 - 27.2 | 1900 - 27.5 | 2000 - 27.7 |
| 8000     | 1600 - 24.7                  | 1600 - 26   | 1700 - 26.5 | 1800 - 26.7 | 1900 - 27.2 | 2000 - 27.5 |

Note: *Above R.P.M. and Manifold Pressure chart provided for power setting reference only, simulator usage may not match above stated Fuel Consumption.*



# CREDITS

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**WX Advantage Radar** included courtesy of MilViz & REX Simulations  
**XMLTools** included courtesy of Tom Aguilo

