Tybee Jet

AFMatic®

Program Documentation

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Introduction

Thank You!

Thank you for selecting AFMatic for your off-aircraft performance computation needs. At Tybee Jet, we are committed to providing you with the most reliable software and service available. Please contact us whenever you have questions about the software, suggestions for future upgrades, or customer service needs. It will be our pleasure to serve you. Email anytime, or call during office hours, Monday through Friday, 9:00 AM until 6:00 PM, Central Time. Current contact information can always be found in AFMatic on the Help menu, Contact function.

Overview

As the name suggests, AFMatic is an automatic Airplane Flight Manual, a computer program that calculates takeoff and landing performance using the data provided in the AFM (and much more). Included in the software package is the worldwide airport database, described below. There is no longer any need for digging through approach plates or Airport Facilities Directories for runway data! All you have to do is enter the airport identifier (ICAO or IATA) and the database will provide the information, and if you don't know the airport identifier, you can easily search for the airport. AFMatic also allows you to enter and store takeoff obstacle data, as many as 20 obstacles per runway. These data may be obtained from Airport Obstruction Charts or Aeronautical Information Publications, or from Jeppesen OpsData in electronic form. AFMatic can import the Jeppesen obstacle files directly, eliminating the need for typing in the data.

AFMatic is updated on the AIRAC 28-day revision cycle. The latest worldwide airport database is provided, along with all revisions to the Airplane Flight Manual data and any changes to the software itself. The AFMatic update service is offered on a subscription basis, renewable annually.

Worldwide Airport Database

AFMatic includes a worldwide airport database, which is made up of two components. The domestic airport database is provided by the Federal Aviation Administration (FAA). This database contains approximately 4,000 airports in the United States and its territories, having more than 11,000 hard-surfaced runways that are at least 3,000 feet in length. The Jeppesen NavData database contains over 3,600 non-U.S. airports, with more than 8,400 hard-surfaced runways that are at least 4,000 feet in length. For each airport, location and position, elevation, time zone, and available fuel types and services information are provided. For each runway, position, length, slope, runway surface, PCN when available, and lighting are provided.

Physical obstacles and SID / DP required climb gradients are not included in the worldwide airport database. The user may easily add these data, and they will be stored in the user airport database for later use in calculations.

Install

Requirements

AFMatic is a 32-bit Windows program, making full use of the capabilities of Microsoft's Windows operating systems. It has been designed for, and tested on, Windows 95, 98, Millennium Edition, NT, 2000, and XP operating systems, and requires one of them. It is not compatible with previously available operating systems, such as MS-DOS and Windows 3.1. Windows is designed for use on Intel compatible personal computers. There are some software emulators available that allow Windows programs to be executed on other computer hardware, such as the Apple Macintosh. AFMatic has been briefly tested with Virtual PC for the Power Macintosh, and found to be fully functional. However, extensive testing has not been conducted, and no guarantees are made with respect to the functionality of AFMatic under software emulation.

AFMatic requires approximately 10 MB of hard disk space for a full installation. A CD-ROM drive or a connection to the internet is required for installation of the software. After installation, the CD-ROM is not required to run AFMatic.

Internet Download

AFMatic updates may be downloaded from the Tybee Jet website, in addition to the normal distribution by CD-ROM. This may come in handy for those times when you will be away from your home base for an extended period, or for international operators whose delivery of the CD-ROMs is delayed by customs processing.

To begin using the internet download service, send an email to support@tybeejet.com, with a list of email addresses to which you would like the notifications to be sent. When each AFMatic update is ready for download, an email message will be sent to your list of recipients, including instructions for downloading the update as well as your current installation serial number and aircraft code for each aircraft for which you have an AFMatic subscription. Then you just download the AFMsetup.exe file and execute it to install the latest update.

Install Procedure

Place the AFMatic distribution CD-ROM in the CD-ROM drive. If you have the Autorun feature enabled on your computer, the setup program will start automatically. If it does not, then from the Windows Start menu, select RUN. Type in D:AFMSETUP.EXE, where D is the letter corresponding to your CD-ROM drive. The setup program will lead you through the steps required for installation. During the process you will be able to specify the disk and directory where AFMatic will be placed. You will also be asked to provide your name, your company's name, and a serial number. The serial number is critical to the operation of AFMatic, so it is important that you type it in correctly. You will find the serial number on the card that accompanies the installation disk. DO NOT LOSE THIS CARD! The serial number printed on

it will be required again if you need to reinstall the program for any reason, or if you need to install it later on another computer.

Updates may be installed in the same directory as the previous version, without uninstalling the old version. The installation will overwrite the old distribution files. However, the UserApt and ProgIni files, described below, and any other files that are not a part of the software distribution, will be left undisturbed.

Once the installation is complete, you may remove the CD-ROM from the computer. AFMatic execution does not require the CD-ROM, since all of its required files are stored on the hard disk.

Files

After installation, the directory in which you installed AFMatic will contain a number of files. A brief listing follows:

AFMatic.exe	This is the program executable
AFMatic.ini	Program initialization data, DO NOT EDIT MANUALLY!
Apt.dat	Worldwide airport database
Apt.inx	Worldwide airport database index
XXXXX.dat	Aircraft data files, XXXXX is aircraft type and certification, e.g. G5FAA
XXXXX.inx	Aircraft index files, named to match the data files
AFMatic.hlp	Online help file
AFMatic.cnt	Online help file
AFMatic.pdf	Program documentation in Adobe Acrobat (PDF) format
Readme.txt	Information about the current release, including What's New
License.txt	Software end user license agreement
Unins000.exe	Uninstaller program executable
Unins000.dat	Uninstaller data file

After the program is executed for the first time, several new files will be created, as follows:

UserApt.dat	User storage for airport, runway, obstacle, and SID/DP data
UserApt.inx	Index for user stored airport, runway, obstacle and SID/DP data

Progini.dat	Preferences and aircraft data (serial number specific)
Progini.inx	Index for preferences and aircraft data

It is recommended that you back up the UserApt and ProgIni files periodically, since they cannot be restored by reinstalling from the AFMatic distribution disk. If you are installing AFMatic on several computers, you may want to use one computer to input all of your obstacle and SID information, and then copy the UserApt files to the other computers that are running AFMatic. The same is true of multiple aircraft serial numbers: just input the data on one computer and then copy the ProgIni files to the others.

Installation Serial Number and Aircraft Code

During the installation process, you will be asked to enter your name, your company name, and a serial number. Your name and company name will be used in the header of printouts of calculations that you make with AFMatic. The serial number that you will need in order to complete the installation is found on the card that is enclosed with the AFMatic CD-ROM, and is labeled "Installation Serial Number". This number is a part of the program's security system, which ensures that users of the software have purchased a software license for use of the program. If there is an error in the Installation Serial Number, you will be presented with an opportunity to correct the number during the installation. **Note: The characters contained in the Installation Serial Number include the numbers 0-9 and letters A-F only. There are no letters I, O, or Z.**

In addition to the installation serial number, each aircraft for which you have purchased a license to use AFMatic will require an aircraft code to be entered at the time you define the aircraft characteristics in the New Aircraft editor. This aircraft code is located on the card that is enclosed with the AFMatic CD-ROM, and is labeled "Aircraft Code". It will have an aircraft serial number to identify the aircraft with which it is to be used. Embedded within this aircraft code is the aircraft serial number, aircraft type, and certification basis. It is not possible to configure the program for more than one aircraft using a single aircraft code. **Note: The characters contained in the Aircraft Code include the numbers 0-9 and letters A-F only. There are no letters I, O, or Z.**

Run For The First Time

Do This First

The first time you execute AFMatic, you will automatically be placed in the New Aircraft editor so that you may enter the specifics for your aircraft. See the section on New Aircraft later in this documentation for instructions on how to use this function. After entering the aircraft specifics, you are ready to begin using AFMatic.

Primary Functions

To make performance or weight and balance calculations, or view weather reports and graphics, select the appropriate function by clicking on the buttons arrayed across the top of the main program window.

Database Menu

You may access the database editors to enter airport / runway, obstacle, or SID data, and import obstacle data, by selecting the appropriate function from the database menu.

Options Menu

Select the aircraft, by tail number, from those that you have configured and saved with the New Aircraft Editor. Toggle the visual component hints. Set program preferences with the Preferences Editor.

Help Menu

The help menu provides access to the online help system through the Help Topics function, general information about AFMatic and revision information on the data it uses through the About function, and information on contacting Tybee Jet through the Contact function.

Visual Component Hints

Nearly every visual component of AFMatic has some additional information which can be viewed by simply placing the cursor over the component. The hint will be displayed on the status line of the main program window, as well as attached to the tail of the mouse cursor.

Uninstall

Should you need to uninstall the program for any reason, the means to do so has been provided. To remove AFMatic from your computer, from the Windows Start menu, select Programs, then AFMatic, and click the Uninstall AFMatic item. Alternately, from the Windows Start menu, select Settings, then Control Panel, and double-click on the Add/Remove Programs icon. You will be presented with a list of installed programs. Select AFMatic, and then click the Add/Remove button. AFMatic will be removed from your computer.

There will be several files left behind in the directory where AFMatic was located, specifically the UserApt and ProgIni files, as well as the AFMatic.ini file. These files were created by AFMatic after installation, and contain program initialization information and user-provided airport/runway/obstacle/SID data. They may be deleted if you do not wish to save the user-provided data for later use.

If you have moved AFMatic from the directory where it was originally installed, the uninstall procedure will fail, since it is unable to find the location of the files. In this event, you may manually delete the files in the AFMatic directory. This will not completely remove the program, however, since there are also items on the Windows Start menu. These may be manually removed.

Primary Functions

General

The primary functions of AFMatic are accessed by pressing one of the buttons arranged across the top of the screen, just below the menu bar. Upon selecting any of these functions, you will see the input and output for that function formatted with a notebook metaphor, having tabs across the top for the major subdivisions within the primary function. Clicking on any of these tabs will change the display to show the contents of that page. The results page is only shown after a computation has been performed, and is disabled at any time that any of the associated inputs is changed. To perform the computation, when you have established the desired inputs for the calculation, press the Compute button located at the right end of the primary function buttons. The computation will be performed, and the results displayed.

Data may be entered in any order, and will remain in the input fields after the computation is performed, so that you may return to the inputs to view them, or make changes and recompute. You may freely move between notebook pages within a primary function, or switch back and forth between functions.

Takeoff Computation

General

The takeoff computation is the centerpiece of the program. It gives you the ability to analyze takeoff performance from any runway in the world, including optional obstacle clearance and SID/DP minimum required climb gradient compliance. Airport and runway are selected from the worldwide airport database, or from the user database, which contains any runways that the user enters and saves. Atmospheric data are entered, and the aircraft configuration is defined. Then the Compute button is pressed, and a half-hour of manual labor is performed for you in a few seconds time.

Airport

General

On the airport page, select the airport and runway which will be used for computation, make adjustments to runway length (for example, if a NOTAM closes a portion of the runway for construction), add obstacles, and select a SID/DP for a required climb gradient check.

Airport Identifier

Enter the 4-letter ICAO identifier, or the 3-letter IATA identifier. Click on the ICAO or IATA button to select which identifier has been specified. Press Enter or click on the Retrieve button to retrieve the airport from the database. You may view the airport information by clicking on the View button, either before or after pressing the Retrieve button. When the airport has been retrieved, the Airport / Runway Info box will contain the airport name and city, state, and country. The text on the Retrieve button will change color from red to green when an airport has been read into memory. Click the Search button to search for an airport in the database by name, city, or location.

Runway

When the airport data are retrieved from the database, the runway identifier drop-down list is filled with a list of the runways that are available for this airport in the database. Select the desired runway from this list by clicking on it or using the arrow keys to highlight your choice, and then press Enter or click on the Retrieve button to retrieve the runway data from the database, or the View button to retrieve the data and view it. When the runway has been retrieved, the Airport / Runway Info box will contain the runway identifier, length, and end elevation. The text on the Retrieve button will change color from red to green when a runway has been read into memory.

Shorten Runway

You may shorten the runway at either the brake release end or the liftoff end. This is useful for accounting for a partial closure for construction, for example, or for an intersection takeoff. Line up distance is included as a means of accounting for the distance between the physical end of the runway and the nosewheel of the airplane. Its default setting is 100 feet, and it may be adjusted permanently in the Preferences dialog, accessed through the Options menu. Runway length is adjusted by all three of these entries, and obstacle distance from brake release is adjusted by the line up distance and shortening at the brake release end of the runway. Units for all runway lengths are in feet.

Obstacles

If there are any obstacles in the user database for the selected runway, the number of obstacles found for this runway will be shown, and the Use Obstacles check box will be checked. You may decide not to include obstacles in the calculation, if for example it is a clear day and they are easily avoided. In that event, click on the Use Obstacles check box to deselect it. You may also add up to 5 temporary obstacles, by clicking on the Add Temp Obs. button. This will open a dialog box for adding the obstacles. Be sure to add obstacles beginning on the top line of the temporary obstacle table, since the first line having a zero for the distance value denotes the end of the temporary obstacles. To add obstacles permanently to the user airport database, select the Edit Obstacle Data function from the Database menu.

SID / DP

SID (Departure Procedure) required climb gradients are not included in the airport database provided with AFMatic, but may be added to the user database by using the Database / Edit SID function. If there are any SIDs in the user database for the selected runway, the number of SIDs found for this runway will be shown. The Use SID check box will initially be unchecked, indicating that no SID will be used for the calculation. To add a SID required climb gradient check to the computation, select the SID from the list under the Use SID check box, and click on the Use SID check box to activate the calculation. To add SIDs permanently to the user airport database, select the Edit SID Data function from the Database menu. The methods available for computing SID required climb gradient performance are listed below the list of available SIDs. Select the desired climb profile to be used in the calculation from the list. Note that the SID climb procedures that are available for the GIV and GV are not available to be used in conjunction with calculations involving physical obstacles. To compute a SID at the same time as computing physical obstacle clearance, you must select either the Treat as Obstacle method or the Simple Gradient method. This is a limitation imposed by the Operational Information Supplement. The default SID method may be set using the aircraft editor, by selecting the Edit Aircraft function from the Database menu. For the military airplanes only (C-37 and C-20), below the SID method list, you may select an amount by which the SID gradient is to be reduced, either no reduction, 48 FT/NM (0.8%) reduction, or 96 FT/NM (1.6%) reduction.

A note on SID computation methods: Operators use a number of different methods of checking compliance with SID required climb gradients. AFMatic supports four of them. The first is the SID Climb – 1 Engine method (known as V2-Direct - 1 Engine for C-37A and C-20), which is described in an Operational Information Supplement for the GIV and GV. In this method, the aircraft stays in the second segment configuration and continues climbing until the SID altitude has been reached. The second method, SID Climb – All Engines (V2-Direct - All Engines for C-37A and C-20), is flown in the same way, but assumes all engines are operating. Neither of these methods may be used when physical obstacles are to be included in the calculations, as discussed in the OIS. The third method, Treat As Obstacle (1500-Accel for C-37A and C-20), converts the gradient and "up to" altitude into an imaginary obstacle located at the end of the SID climb. Then, the engine-out net takeoff flight path is analyzed for obstacle clearance in the same way that other obstacles are analyzed. The last method is the simplest. The Simple Gradient method determines in which segment of the net takeoff flight path the SID "up to" altitude occurs, and compares the climb gradient available in that segment with the climb gradient required by the SID. This method does not take into account the path that the airplane takes in reaching that point, and should therefore be used only in those cases where one of the other methods cannot be used.

Net or Gross, and why should I care?

So, what's all the fuss about net or gross performance, and what difference does it really make? **Gross** performance is what the airplane will actually do, assuming the engines and other systems are performing according to spec, and the pilot flies the procedure as specified. The FAA mandates that obstacle clearance performance be presented in the Airplane Flight Manual which has been degraded by 0.8% climb gradient, which is equivalent to 48 FT/NM. Data which have this performance margin built in are said to represent **net** performance. All

calculations for clearing physical obstacles are based on **net** performance, and use the obstacle clearance charts from the AFM. The Treat as Obstacle and Simple Gradient methods of SID/DP clearance are also based on **net** performance. The SID Climb - 1 Engine and SID Climb - All Engines methods are calculated using the data from the SID climb OIS, and are based on **gross** performance. Why are the SID climb procedures based on gross performance while other obstacle clearance is based on net? Because civilian SID required climb gradients contain an additional 0.8% performance margin. In order to keep you from having to overcome redundant performance margins, which would be overly conservative and rob you of a significant amount of utility from your airplane, the Gulfstream engineers have removed the 0.8% performance margin from the obstacle clearance data in the SID climb tables. Thus, the SID climb data are **gross**, while the obstacle clearance data are **net**. In the case of physical obstacle clearance, the 0.8% margin is accounted for in the performance data, and in the case of a SID required climb gradient, the 0.8% margin is accounted for in the SID gradient itself. In either case, your calculations will include the FAA required 0.8% performance margin, and if you are using the Treat as Obstacle or Simple Gradient methods for SID clearance, you will have a 1.6% performance margin. Please feel free to contact Tybee Jet if you would like to discuss this in more detail.

Atmospherics

General

The Atmospherics page provides a place to input information relating to the atmospheric conditions at the time of takeoff. Ambient temperature, altimeter setting, wind speed and direction, and FLEX limiting temperature may be input here.

Temperature

Airport ambient temperature is entered here. You may specify the temperature in either degrees Celsius or Fahrenheit. Click on the appropriate button for which. Temperature is limited to the range shown in the AFM Limitations for the pressure altitude specified. If the temperature is outside the range, you will be notified at the time of calculation that the temperature specified is outside the limits.

Altimeter Setting

Specify the altimeter setting, and click on the appropriate units of measurement. Altimeter setting is used to adjust the field elevation to pressure altitude for use in the calculations.

Wind Direction and Speed

Specify the wind direction, in degrees magnetic. For those few airports in the far north that make use of true instead of magnetic bearings, enter the wind direction in degrees true. The runway direction in the database for these airports is in true bearing, so the headwind and crosswind components will be resolved correctly. Specify wind speed and gust speed. Select the units of measurement for the input wind speed by clicking on the appropriate button.

FLEX (Reduced Thrust) Takeoff

You may enable or disable calculation of FLEX takeoff performance by checking the Compute FLEX Takeoff box. In addition, you may elect to limit the assumed temperature in the calculation, in order to introduce conservatism, by checking the Restrict Assumed Temp. box. Then enter the temperature to which you wish to restrict the calculations, in the same units as the ambient temperature.

Runway Condition

C-37A & C-20

Enter Runway Condition Reading (RCR) and Runway Surface Contamination (RSC). RCR is limited to a range of 5 (icy) to 23 (dry). RSC is limited to a range of 0.00 to 0.30.

Gulfstream V, IV, IV-SP, III, and IIB

Contaminated runway performance may be computed, using the data from the Contaminated Runway Operational Information Supplement. Select runway condition from Dry, Wet, or Icy. Wet or Icy may optionally have contamination. If there is contamination present, select the type of contamination and enter the depth of the contaminant. **Note: Contaminated runway data presented in the Operational Information Supplement published by Gulfstream are Advisory Only, and are not FAA approved.**

Gulfstream 350, 450, 500, and 550

Contaminated runway performance may be computed, using the data from the Contaminated Runway Operational Information Supplement. Select runway condition from Dry, Wet, or Contaminated. If there is contamination present, select the type of contamination and enter the depth of the contaminant. **Note: Contaminated runway data presented in the Operational Information Supplement published by Gulfstream are Advisory Only, and are not FAA approved.**

Configuration

General

The configuration page allows you to enter information pertaining to the configuration of the airplane. Weight, flap setting, anti-ice, anti-skid, ground spoilers, and power setting method are input here.

Weight

Takeoff weight is specified, and the appropriate units are selected by clicking on the units button. If the weight field is left at its default value of 0, the maximum takeoff gross weight will

be substituted when the calculation is made. Thus, this is a shortcut for determining the maximum weight for the specified conditions. If the specified weight is greater than the maximum takeoff gross weight, you will be notified that you exceed the limiting weight and must reduce it. If the weight specified is less than the minimum weight for which flight manual data are available, that minimum weight will be substituted when the calculation is made.

You may fill in the weight with the takeoff weight from a previously computed weight and balance calculation, by clicking on the W&B TOGW button in the weight input box. If a takeoff gross weight is not available, this button will be disabled.

Flaps

Select the flap setting for takeoff from the available choices in the drop-down list by clicking on the flap setting. The calculation will be made for the selected flap setting. If you check the Optimize box and the takeoff is limited to a weight that is less than the specified weight, the other flap setting will be computed. Whichever setting results in the highest takeoff weight will be presented in the results. If Optimize is not checked, calculation will be made with the selected flap setting only.

Anti-ice

Select the anti-ice configuration by clicking on the appropriate button. If the temperature is outside the limit for the selected configuration, you will be notified of the error at the time of calculation.

Anti-skid

Select the anti-skid configuration by clicking on the appropriate button. If this results in a configuration that is prohibited by the limitations, you will be notified of the error at the time of calculation.

Ground Spoilers

Select the ground spoilers configuration by clicking on the appropriate button. If this results in a configuration that is prohibited by the limitations, you will be notified of the error at the time of calculation.

Power Setting

Select power setting method, EPR or LP RPM.

Increased Rotation Speed (C-37A & C-20)

Increased rotation speed may be specified if desired. This will be included in field length computations. Range of the input is from 0 to 10 knots.

Environmental Control System (G550 & G500)

Environmental control system (ECS) may be selected on or off as desired.

Results

General

Upon clicking the Compute button, the takeoff calculation is performed. When the calculation is complete, the Results page is enabled and displayed. It contains the results of the computation for both rated thrust and reduced thrust. There are 9 screens full of output information available. Initially, the Basic screen is displayed. You may access the other output screens by clicking the buttons at the bottom of the Results page. Results may be printed by selecting Print from the File menu, or pressing CTRL-P. Results may be saved to a text file by selecting Save from the File menu, or pressing CTRL-S.

Basic

Rated Thrust

Standard Output

The flap setting that was used for the displayed calculation is shown. This may differ from your selected flap setting if you checked the optimize box and the selected weight was higher than the limits allow. The ambient temperature is shown in the selected units. Next is the Maximum Takeoff Weight. This weight represents the maximum that could be taken off within all limitations. Next, a description of the limiting condition is shown. This tells you what factor is most limiting. The actual takeoff weight is shown next. This will be the lesser of the weight specified on the Configuration page and the limiting weight. Next, you will see the takeoff speeds. V1 is shown first. In the Preferences function of the Options menu, you may specify which V1 will be displayed, choosing from the minimum, maximum, or balanced. Whichever you choose, you may see all three by placing the cursor over the V1 speed value. VR, V2, VFS, and VSE are all shown next. When increased rotation speed is used for the C-37A or C-20, the increase is included in the displayed VR and V2 speeds, and the increase is noted in parentheses. VRef is shown for an immediate return for landing, using the normal landing flap setting and landing on the same runway under the same atmospheric conditions as were present for the takeoff. In the event that the landing field length required exceeds the landing field length available for an immediate return to the same runway, a red asterisk will appear beside the VRef speed, and the Weight and Landing button text will change to red to lead you to additional information. The landing will not limit the takeoff weight. The landing is computed based on a weight that is reduced by the estimated fuel for the pattern circuit. Finally, the takeoff EPR for rated thrust, or LP RPM if selected, is shown, accompanied by Climb EPR for those aircraft that may use the Quiet Flying procedures.

Additional Information

You may view additional program output by placing the cursor over the output values that are displayed.

Flap Setting:	Tells whether the selected flap setting was used, or if the alternate setting was used to increase the available takeoff weight.
Actual Temperature:	Temperature difference from standard day, pressure altitude, density altitude, headwind and crosswind components.
Max Takeoff Weight:	The maximum structural takeoff weight, and limiting weights for takeoff distance, climb, tire speed, brake energy, obstacle clearance, and SID/DP clearance.
Limited By:	If takeoff is impossible, a brief message indicating the reason is shown.
Actual Takeoff Weight:	Takeoff field length, accelerate-go distance, and accelerate-stop distance.
V1:	Minimum V1, Balanced V1, and Maximum V1 are shown. For aircraft with brake inspection speed, it will be shown if it is less than Maximum V1.
VR:	For C-37A or C-20, if Increased Rotation Speed is used, it is noted here.
V2:	Altitude up to which V2 should be maintained and elevation of highest obstacle and SID/DP up to altitude, if applicable.
VFS:	No additional information.
VSE:	No additional information.
VRef:	Landing field length for an immediate return.
Rated EPR:	LP RPM.

Impossible Takeoff

Whenever a takeoff is impossible at any weight, the Maximum Takeoff Weight will be set to zero, along with the Actual Weight and all of the speeds and power setting. The complete list of limit weights is still available by placing the cursor over the Maximum Takeoff Weight value, and a more detailed message may be viewed by placing the cursor over the Limited By value. A message will also pop up to inform the user.

FLEX Thrust

Standard Output

If the FLEX takeoff is computed, the results are shown on the right side of the Results page.

Flap setting is first, and will always match the flap setting for the rated thrust takeoff. Next comes the assumed temperature. This is the maximum temperature at which the actual weight from the rated thrust takeoff may be taken off within the limitations. Next comes the description of the factor that is most limiting, followed by the actual weight, which will match the actual weight in the rated thrust takeoff. Then follow the V-speeds, matching the weight and assumed temperature. Lastly, the FLEX EPR is shown, accompanied by Climb EPR for those aircraft that may use the Quiet Flying procedures.

Additional Information

You may view additional program output by placing the cursor over the output values that are displayed.

Flap Setting:	Tells whether the selected flap setting was used, or if the alternate setting was used to increase the available takeoff weight.
Assumed Temperature:	The maximum temperature allowed, and limiting temperatures for takeoff distance, climb, tire speed, brake energy, obstacle clearance, and SID/DP clearance.
Limited By:	No additional information.
Actual Takeoff Weight:	Takeoff field length, accelerate-go distance, and accelerate-stop distance.
V1:	Minimum V1, Balanced V1, and Maximum V1 are shown. For aircraft with brake inspection speed, it will be shown if it is less than Maximum V1.
VR:	For C-37A or C-20, if Increased Rotation Speed is used, it is noted here.
V2:	Altitude up to which V2 should be maintained and elevation of highest obstacle and SID/DP up to altitude, if applicable.
VFS:	No additional information.
VSE:	No additional information.
VRef:	Landing field length for an immediate return.
FLEX EPR:	No additional information.

Impossible Takeoff

There are a number of restrictions on FLEX takeoffs that can prohibit the use of a reduced thrust takeoff, such as a wet runway, soft-surfaced runway, etc., as outlined in the FLEX Appendix in the AFM. In addition, there are several things that make a FLEX takeoff have no value, for example, if the temperature spread between the ambient temperature and assumed temperature falls on the flat part of the takeoff EPR curve, such that there is no reduction in EPR, even though there is a significant difference in temperature. Whenever it is not possible to make a reduced thrust (FLEX) takeoff, the FLEX output box will be hidden, and the message

"Reduced Thrust Takeoff not possible:" will be displayed, followed by a line stating the reason that the FLEX takeoff cannot be made..

Weight

Rated Thrust

Maximum weights are listed for the respective categories. The most restrictive of these is the maximum takeoff weight that is displayed on the Basic screen. If obstacle or SID/DP clearance are not computed, the numbers are replaced with N/A.

FLEX Thrust

Maximum temperatures are listed for the respective categories. The most restrictive of these is the assumed temperature that is displayed on the Basic screen. If a FLEX thrust takeoff was not computed, a message will be displayed.

Loading

The basic operating weight, which was entered with the New Aircraft function, is displayed. The payload from a weight and balance computation, if one was done, is shown next. The fuel load at max weight is computed by taking the maximum allowable weight, adding start/taxi/ takeoff fuel, and subtracting basic operating weight and payload. Similarly, the fuel load at actual weight is computed by taking the actual weight, adding start/taxi/takeoff fuel, and subtracting basic operating weight and payload.

Runway

Input

The runway length, slope, clearway, and stopway that were used in making the computations are displayed. Runway length is TORA, as shown in the runway viewer, minus lineup distance and runway shortenings that were entered on the Takeoff Airport page. Clearway is TODA minus TORA. Stopway is ASDA minus TORA. If the runway was shortened at the liftoff end, both clearway and stopway will be set to zero, in the assumption that these are not available for this takeoff.

Rated Thrust

For minimum V1, maximum V1, and V1 for balanced field length, the accelerate-go and accelerate-stop distances are shown. If the balance point would be higher than the maximum V1, the balanced V1 will be set to maximum V1. Likewise, if the balance point would be lower than minimum V1, the balanced V1 will be set to minimum V1. If there is no V1 range available for this takeoff, all three speeds, and their associated distances, will be the same.

FLEX Thrust

For minimum V1, maximum V1, and V1 for balanced field length, the accelerate-go and accelerate-stop distances are shown. If the balance point would be higher than the maximum V1, the balanced V1 will be set to maximum V1. Likewise, if the balance point would be lower than minimum V1, the balanced V1 will be set to minimum V1. If there is no V1 range available for this takeoff, all three speeds, and their associated distances, will be the same. If a FLEX thrust takeoff was not computed, a message will be displayed indicating the reason.

Gradient / SID

Rated Thrust

Climb gradient available is shown for second segment, final segment, and enroute single engine climb at an altitude of 1500 feet above field elevation. These gradients are expressed in percent. To see the gradient expressed in feet per nautical mile, place the cursor over the percent value and the FT/NM value will appear as a hint on the status line. These gradients represent **engine-out net** performance.

FLEX Thrust

Climb gradient available is shown for second segment, final segment, and enroute single engine climb at an altitude of 1500 feet above field elevation. These gradients are expressed in percent. To see the gradient expressed in feet per nautical mile, place the cursor over the percent value and the FT/NM value will appear as a hint on the status line. These gradients represent **engine-out net** performance.

SID / Departure Procedure

If SID required climb gradient clearance was computed for this takeoff, the specification for the calculation is shown, including the SID name, transition (if any), required climb gradient, altitude up to which the gradient must be maintained, and the calculation method. The average gradient between the reference zero point, corresponding to the end of the accelerate-go distance, and the SID endpoint is shown, as well as the accelerate-go distance. [Note: The average gradient may be less than the required gradient. This will happen when the takeoff is not limited by field length. The extra runway available is used to move the reference zero point back down the runway, giving a lower required gradient necessary to reach the SID endpoint.] The maximum weight is shown at which this SID gradient can be cleared at the ambient temperature. If a FLEX thrust takeoff was computed, the maximum temperature is shown at which this SID gradient can be cleared at the actual weight. For the military aircraft (C-37 and C-20), if the gradient was reduced by using the SID gradient reduction selection, the amount of reduction from the SID required climb gradient is shown.

Obstacle

If obstacle clearance was computed for this takeoff, a table is displayed showing the position of each obstacle, an indication of whether that obstacle was within the envelope (ICAO or FAA)

that was specified in the Preferences editor, and the height by which the Net Takeoff Flight Path clears the obstacle. Values are shown for rated thrust takeoff, and FLEX thrust if that was computed. The obstacle that is cleared by the least amount in the rated thrust takeoff is highlighted for easy identification. The minimum height that an obstacle will be cleared by is 35 feet. Obstacles that are not within the computation envelope are not used in the calculations, and the clearance is shown as N/A. If any of the obstacles that were computed were entered by the user as temporary obstacles, they will be at the bottom of the list, and a note will indicate which ones they are. If obstacle clearance was not computed, a message will be displayed in place of the table.

Speed

For the rated thrust takeoff, minimum V1, maximum V1, and V1 for balanced field length are shown, as well as V1MCG and VMBE. For the Gulfstream IIB, III, C-20, IV-SP, or IV with Dunlop brakes installed by ASC, VBI (brake inspection speed) is shown. These speeds are also shown for the FLEX thrust takeoff if it was computed.

Atmospherics

Parameters relating to the atmosphere are displayed, including airport elevation, altimeter setting, pressure altitude, density altitude, the minimum and maximum temperatures allowable at the given pressure altitude from the aircraft limitations, ambient temperature and its difference from the International Standard Atmosphere, the headwind and crosswind components, and the maximum crosswind based on the selected runway condition. The maximum crosswind is not the Maximum Demonstrated Crosswind, but is based on the crosswind limit chart that appears in the contaminated runway operational information supplement (OIS).

Landing

Landing information for an immediate return to the takeoff runway is displayed. This includes the landing distance available, landing distance required, threshold speed (VRef), approach climb speed, landing climb speed, and landing weight. Landing weight is computed by subtracting the estimated fuel burn for a pattern circuit from the actual takeoff weight.

In the event that the landing for an immediate return would require more runway length than is available on the takeoff runway, a message will appear, indicating that the actual takeoff weight exceeds the landing field length limiting weight, and a red asterisk will appear beside the landing distance required. In addition, the text on the LANDING button will be changed to red. Normally, this would most likely be seen with a short, wet or icy runway.

Miscellaneous

Brake Cooling

Brake energy, predicted BTMS, cooling time, and fuse plug integrity zone are shown for the

rated thrust takeoff, and for the FLEX thrust takeoff if it was computed. This calculation assumes that the brakes were cool before the rejected takeoff. The cooling time shown is the time required to cool the brakes to zero energy. For a more detailed computation of brake energy, including multiple stops, use the brake energy calculation available by clicking the Miscellaneous button at the top of the main program window.

PCN

When data are available in the woldwide airport database for Pavement Classification Number (PCN), a calculation will be made to determine the Aircraft Classification Number (ACN) and the maximum weight that would result in ACN being less than PCN. The maximum tire pressure allowed is decoded from the PCN and shown. If there is no PCN information available, a message is shown. If ACN is greater than PCN, a message is displayed in red letters, and the text on the MISC button is changed to red.

Landing Computation

General

The landing computation gives you the ability to analyze landing performance from any runway in the world. Airport and runway are selected from the woldwide airport database, or from the user database, which contains any runways that the user enters and saves. Atmospheric data are entered, and the aircraft configuration is defined. Then the Compute button is pressed, and the results are displayed.

Airport

General

On the airport page, select the airport and runway which will be used for computation, and make adjustments to runway length (for example, if a Notam closes a portion of the runway for construction).

Airport Identifier

Enter the 4-letter ICAO identifier, or the 3-letter IATA identifier. Click on the ICAO or IATA button to select which identifier has been specified. Press Enter or click on the Retrieve button to retrieve the airport from the database. You may view the airport information by clicking on the View button, either before or after pressing the Retrieve button. When the airport has been retrieved, the Airport / Runway Info box will contain the airport name and city, state, and country. The text on the Retrieve button will change color from red to green when an airport has been read into memory. Click the Search button to search for an airport in the database by name, city, or location.

Runway

When the airport data are retrieved from the database, the runway identifier drop-down list is filled with a list of the runways that are available for this airport in the database. Select the desired runway from this list by clicking on it or using the arrow keys to highlight your choice, and then press Enter or click on the Retrieve button to retrieve the runway data from the database, or the View button to retrieve the data and view it. When the runway has been retrieved, the Airport / Runway Info box will contain the runway identifier, length, and end elevation. The text on the Retrieve button will change color from red to green when a runway has been read into memory.

Shorten Runway

You may shorten the available runway length. This is useful for accounting for a partial closure for construction, for example.

Atmospherics

General

The Atmospherics page provides a place to input information relating to the atmospheric conditions at the time of landing. Ambient temperature, altimeter setting, wind speed and direction, and flight in prolonged icing conditions are entered here.

Temperature

Airport ambient temperature is entered here. You may specify the temperature in either degrees Celsius or Fahrenheit. Click on the appropriate button for which. Temperature is limited to the range shown in the AFM Limitations for the pressure altitude specified. If the temperature is outside the range, you will be notified at the time of calculation that the temperature specified is outside the limits.

Altimeter Setting

Specify the altimeter setting, and click on the appropriate units of measurement. Altimeter setting is used to adjust the field elevation to pressure altitude for use in the calculations.

Wind Direction and Speed

Specify the wind direction, in degrees magnetic. For those few airports in the far north that make use of true instead of magnetic bearings, enter the wind direction in degrees true. The runway direction in the database for these airports is in true bearing, so the headwind and crosswind components will be resolved correctly. Specify wind speed and gust speed. Select the units of measurement for the input wind speed by clicking on the appropriate button.

Icing

Flight in prolonged icing will result in a reduction in climb capability, which must be accounted for in the approach and landing climb gradient calculations. Select the icing condition by clicking on the appropriate button.

Runway Condition

C-37A & C-20

Enter the Runway Condition Reading (RCR), with an input range of 5 (icy) to 23 (dry). The Distance selection box on the configuration page is removed, and is replaced by this Runway Condition box on the atmospherics page.

Gulfstream V, IV, IV-SP, III, and IIB

Contaminated runway performance may be computed, using the data from the Contaminated Runway Operational Information Supplement. Select runway condition from Dry, Wet, or Icy. Wet or Icy may optionally have contamination. If there is contamination present, select the type of contamination and enter the depth of the contaminant. **Note: Contaminated runway data presented in the Operational Information Supplement published by Gulfstream are Advisory Only, and are not FAA approved.**

Gulfstream 350, 450, 500, and 550

Contaminated runway performance may be computed, using the data from the Contaminated Runway Operational Information Supplement. Select runway condition from Dry, Wet, or Contaminated. If there is contamination present, select the type of contamination and enter the depth of the contaminant. **Note: Contaminated runway data presented in the Operational Information Supplement published by Gulfstream are Advisory Only, and are not FAA approved.**

Configuration

General

The configuration page allows you to enter information pertaining to the configuration of the airplane. Weight, flap setting, anti-ice, anti-skid, ground spoilers, and power setting method are input here.

Weight

Landing weight is specified, and the appropriate units are selected by clicking on the units button. If the weight field is left at its default value of 0, the maximum landing weight will be substituted when the calculation is made. Thus, this is a shortcut for determining the maximum weight for the specified conditions. If the specified weight is greater than the maximum landing weight, you will be notified that you exceed the limiting weight and must reduce it. If the weight specified is less than the minimum weight for which flight manual data

are available, that minimum weight will be substituted when the calculation is made.

Weight Limits

For normal preflight planning, it is expected that you will want to enforce the limitations, and not compute results that exceed the landing limitations. However, you may want to examine a landing that is an immediate return after takeoff, or you may be in flight and need to land at your current weight, regardless of the limitations. This is accommodated by clicking on the Allow Higher button, which will allow computations to be made at weights that are higher than the landing limitations.

Flaps

Select the landing flap setting from the available choices in the drop-down list by clicking on the flap setting.

Anti-ice

Select the anti-ice configuration by clicking on the appropriate button. If the temperature is outside the limit for the selected configuration, you will be notified of the error at the time of calculation.

Anti-skid

Select the anti-skid configuration by clicking on the appropriate button. If this results in a configuration that is prohibited by the limitations, you will be notified of the error at the time of calculation.

Ground Spoilers

Select the ground spoilers configuration by clicking on the appropriate button. If this results in a configuration that is prohibited by the limitations, you will be notified of the error at the time of calculation.

Distance

Operators who must meet the requirements of FAR 135 or 121 for landing field lengths, FAR 91 subpart K fractional operators, or FAR 91 operators who want to add conservatism to the calculations, may do so through the Distance box. To compute the landing weight limitation based on actual dry runway landing field length, select Landing Dist. To compute based on the Intended Destination Dry (or Alternate Wet or Dry) factored field length, select Intended Dry/Alt. To compute based on the Intended Destination Wet factored field length, select Intended Wet. Whichever method is selected will be the one that the field length limited weight will be based on. In any event, all three distances will be displayed in the results. When the C-37A or C-20

is the active aircraft, this Distance box is removed, and is replaced by the Runway Condition box on the atmospherics page.

When contaminated runway performance from the Contaminated Runway Operational Information Supplement is being computed, by selecting a wet or icy runway on the atmospherics page, you should set the Distance to Landing Dist. Otherwise, the combination of contaminated runway and factored field length would produce a field length limited weight that would be confusing at the minimum, and perhaps even meaningless. In the event you are computing contaminated runway performance, and must observe the factored runway limits for commercial operations, select the appropriate runway condition on the atmospherics page, set Distance to Landing Dist, and when you view the results, the limiting weight will be based on the contaminated runway computation. Then, make sure that the appropriate factored runway length is not greater than the runway available.

Increased Threshold Speed (C-37A & C-20)

Enter increased threshold speed, if desired. This will be included in landing field length computations. Range of the input is from 0 to 10 knots.

Power Setting

Select power setting method, EPR or LP RPM. This is used in determining approach and landing climb gradients.

Results

General

Upon clicking the Compute button, the landing calculation is performed. When the calculation is complete, the Results page is enabled and displayed. Results may be printed by selecting Print from the File menu, or pressing CTRL-P. Results may be saved to a file by selecting Save from the File menu, or pressing CTRL-S.

Limitations and Field Length

The flap setting used for landing computations is displayed, followed by the temperature used. As in the takeoff results, you may see the Delta ISA temperature by placing the cursor over the temperature value. Next, the maximum weight permitted by limitations is shown. You may view the list of all limiting weights that were computed by placing the cursor over the limiting weight value, in the same way as is done in the takeoff results. The maximum weight will be set to zero if the landing cannot be made within the limitations at any weight, and a message will pop up to inform the user. The description of the limiting factor comes next, followed by the actual weight that was used for the calculations. If the Weight Limits box was set to Allow Higher, the actual weight may be higher than the maximum weight. In this event, there will be a message notifying you that the actual weight exceeds the limitations. The VRef is shown,

followed by the landing distance and factored field lengths. For the C-37A or C-20, VRef includes any increased threshold speed that was specified, which is also shown in parentheses, and a more detailed note may be viewed by placing the cursor over the VRef speed. Factored field lengths are not shown for the C-37A or C-20. Wind components are shown at the bottom of the screen. For the C-37A & C-20, if the landing configuration is one for which landing ground roll data are available, landing ground roll is displayed. When data are available in the worldwide airport database for Pavement Classification Number (PCN), a calculation will be made to determine the Aircraft Classification Number (ACN). If there is no PCN information available, a message is shown. If ACN is greater than PCN, a message is displayed in red letters.

When contaminated runway performance is computed and factored field lengths are shown, the factored field lengths are factored from the dry runway performance, so if you have specified an icy runway, for example, the Landing Distance may be considerably higher than the Intended Destination (Wet).

For aircraft having brake inspection requirements, if VBI is less than VRef, a message will appear on the lower right side of the Results page informing you that "Brake inspection is required for initial braking speed of xxx or greater".

Approach and Landing Climb

Approach and landing climb results are shown to the right of the field length results. For each of them, you will see the climb gradient at the actual weight, the speed to maintain during a climb, and the maximum temperature at which you meet the minimum climb gradient requirements.

Weight and Balance

General

General

AFMatic provides the means to do weight and balance computations. Click on the Wt. & Bal. Button at the top of the main window. To make use of the weight and balance function, you must first enter the basic operating weight and horizontal arm in the aircraft editor, as well as the location of seats and additional storage areas. If you haven't done that yet, refer to the New Aircraft section of the documentation for instructions on how to set up the aircraft weights. However, if you have not yet set up the aircraft weight information, you may still do a computation by entering the BOW and arm on the Loading page.

Here you will enter the information regarding weights for the current flight. When you have completed the data entry, click Compute, and the computation will be made and the results displayed.

Calculate

There are 3 methods of calculation available to you. The first, called Zone Loading, is the quickest way to do a full weight and balance calculation. With this method, the specified number of passengers are first loaded in the most forward seats they can occupy and a calculation is done. Then they are loaded in the most aft seats and another calculation is done. If the limits are not violated with either of these loadings, then it is safe for the passengers to sit in any seats, in any distribution.

The second method, called Assigned Seats, allows you to place each passenger in a specific seat, and assign each passenger a weight. When this method is selected, you will see a table with the seat locations and passenger weights.

The final method, Weights Only, just adds up the weights, and doesn't perform any center of gravity calculations. This would be most useful for a computation with an airplane that hasn't yet been set up in the aircraft editor, where you just want to compute a takeoff weight for use in the takeoff computation.

Configuration

Select the configuration from the available list. These configurations were set up in the aircraft editor. For most operators, only a single configuration is needed. However, if you have the ability to reconfigure the interior layout, you can set up as many as five different configurations and select the appropriate one when doing the calculation.

Weight Units

Select the units you will be working with, either pounds or kilograms. This will default to the value you select in the preferences editor.

AC120-27E Compliance

When this box is checked, the calculations will comply with FAA Advisory Circular 120-27E, "Aircraft Weight and Balance Control". This includes curtailment of the center of gravity limits to account for passenger and crew movement about the cabin, as well as use of average weights. Curtailment for passenger seating distribution is not necessary, because we check worst case distribution for the zone loading method, and seats are assigned for the assigned seats method.

Passenger Weights

The Passenger Weights selection is activated when AC120-27E compliance is selected. This allows you to select the weights to use in the calculations. The first weights listed are from Table 2-2, "Average Passenger Weights for Operators With a No-Carry-On Bag Program". Next are listed weights for use of Segmented Weights, as described in Section 4 of AC120-27E, for % of male passengers ranging from 90 down to 50%. Finally, a selection to allow choosing between male, female, or child passengers, based on the summer weights from

Table 2-2.

Winter Coats

The Winter Coats box may be checked to add 5 pounds to the weight of each passenger at the seat location to account for the wearing of winter clothing. However, if you expect coats to be stored in a closet instead of at the seat, leave this unchecked and add the weight in the Additional Storage location.

Basic Operating

This box displays the basic operating weight and horizontal arm that you entered in the aircraft editor. If you wish to make permanent changes, do so in the aircraft editor, or enter values for this calculation only directly in the input fields. Note that the horizontal arm ***must*** be entered as inches aft of the datum. An error message will be displayed if the arm is specified as percent mean aerodynamic chord (% MAC).

Fuel

Enter the weight of fuel that will be on board at engine start in the Total field, and the amount of fuel that will be consumed in the start/taxi/takeoff operation in the Start/Taxi/Takeoff field. Start/ Taxi/Takeoff fuel may be permanently changed in the aircraft editor. It is not necessary to enter fuel in order to compute weight and balance, since the large cabin Gulfstream aircraft will be within the fueled C.G. envelope at any fuel loading as long as it is within the zero fuel envelope. However, if you enter fuel, the C.G. will be computed at the fueled weights as well. Fuel weight may exceed the maximum shown in the AFM limitations when fuel is cold and dense. This is permissible, and will result in an information message.

Zone Loading and Weights Only

Passengers

Enter the number of passengers to be included in the calculation, and their average weight. Number of passengers does not include crew members that are accounted for in the basic operating weight. The default value for weight is 170 pounds, which may be changed in the aircraft editor, and you may change this for the individual calculation. The Seat In Order box may be checked to cause the seats to be filled in the order that was specified in the aircraft editor. If this feature is used, the forward/aft worst-case seating will not be used, but passengers will be seated in the specified seats only.

Baggage

Enter the number of bags that are stored in the baggage compartment to be included in the calculation, and their average weight. This number does not include crew baggage that is accounted for in the basic operating weight. The default value for weight is 30 pounds, which

may be changed in the aircraft editor, and you may change this for the individual calculation. Note that if you have a fixed cargo weight to store in the baggage compartment, you may enter that as 1 bag at the required weight.

Additional Storage

In the aircraft editor, you have the ability to specify up to 5 storage locations, giving them names, locations, and limiting weights. In the Additional Storage box, you may enter the weight to be placed in each of these locations. You will not be allowed to enter a weight that is greater than the limit you have specified. If you left the limit at its default value of zero in the aircraft editor, then the limit will not be checked. If you did not specify any additional storage locations in the aircraft editor for this tail number, then the Additional Storage box will not appear.

Assigned Seat Loading

Passenger Seating

If a floorplan is available, and selected in the aircraft editor, it will be displayed below the AC120-27E compliance options. To use the floorplan, simply click a passenger seat and a passenger will be placed in that seat. This will be evident by observing the Occupied column of the seating spreadsheet in the lower right corner of the screen. An X will appear for each occupied seat, and the appropriate weight will be inserted. The weight that is inserted will depend on whether you are using AC120-27E compliance, and if so, the weight you have selected in the Passenger Wts box. If you aren't using these, the weight specified as the default in the aircraft editor will be inserted. You may change each passenger's weight to another value if desired.

If no floorplan is available, the picture area will be blank, and passenger seats will be filled by clicking on the Occupied box for the selected seat.

Baggage and additional storage locations may be entered at the bottom of the seating spreadsheet. It is not necessary for the Occupied column to be checked.

Results

General

The results of the weight and balance calculation are shown on the Results page. Results may be printed by selecting the Print item from the File menu, or pressing CTRL-P. Results may be saved to a text file by selecting the Save item from the File menu, or pressing CTRL-S.

Weight

Weights are shown in the units that were selected on the Loading page. Weights are shown in the order of weight build-up beginning with basic operating weight. Payload is added to B.O.W. to give zero fuel gross weight. Fuel is added to Z.F.G.W. to give ramp gross weight. Start/taxi/ takeoff fuel is then subtracted to yield the final takeoff gross weight. If the fuel weight is zero, or

is less than the start/taxi/takeoff fuel, then the ramp gross weight, start/taxi/takeoff fuel, and takeoff gross weight are not shown, since they cannot be determined. Fuel must be added for these items to appear!

Center of Gravity - Zone Loading

The center of gravity results are shown in two columns. The first is labeled "Fwd" and represents passengers occupying the forwardmost seats in the cabin. The second column, labeled "Aft" represents passengers occupying the aftmost seats in the cabin. All CG values are shown in units of percent mean aerodynamic chord (% MAC). Zero Fuel Center of Gravity envelope limits are shown, which represent the forward and aft limits at the zero fuel gross weight which is shown in the Weight output to the left. The center of gravity range for zero fuel gross weight is shown. If the airplane is within the CG envelope for both loadings, then it will be within the envelope for all passenger seating distributions. Both ends of the zero fuel gross weight CG range for both landing gear extended and retracted are checked against the limits, and error messages will be displayed in the lower part of the results page if the limits are violated. You may notice that with either empty or full seats, the forward and aft loadings present different CG numbers. This is because the most restrictive of landing gear up or down is shown for each, and one will be with gear up and the other with gear down.

Next, the CG is displayed for the takeoff weight shown to the left. This CG is not limited by the Zero Fuel CG envelope, so it is possible, and even likely, that TOCG values will fall outside the ZFCG Limits, which is acceptable.

Finally, the recommended takeoff pitch trim setting is displayed, in trim units nose up or down. If you have not specified any fuel for the calculation, takeoff CG and pitch trim will not be shown. Fuel must be added for these items to appear!

ZFCG, TOCG, and Pitch Trim are computed by checking both landing gear down and up CG location, and using the value for each that is most limiting. Thus, if you are within the ZFCG Limits as shown in the output, you are guaranteed to be within the limits in all phases of flight.

Center of Gravity - Assigned Seats

The center of gravity limits are shown in two columns, forward and aft. The center of gravity range for zero fuel gross weight is shown. Then the Zero Fuel Center of Gravity is shown for the aircraft with passengers sitting in their assigned seats. The Takeoff Center of Gravity is shown along with the corresponding Pitch Trim. Once again, if the aircraft is within the CG limits at Zero Fuel Weight, it will be within limits at any fuel loading.

Miscellaneous Performance

Brake Cooling

General

Brake cooling calculations presented in Appendix C of the Airplane Flight Manual (or Operational Information Supplement for earlier airplanes) are provided. You may elect to perform the calculation for a single brake application, or a combination of two stops.

Input

For the first brake application, you may compute the brake energy based on the peak BTMS value displayed by the FMS after the stop, or you may compute it based on inputs of weight, brakes on speed, pressure altitude, temperature, wind component, taxi distance, and taxiway slope. If you noted the groundspeed at the time of brake application from the FMS, you may use that instead of an airspeed looked up from the AFM. If you use groundspeed, the inputs for pressure altitude, temperature, and wind are unnecessary, and will be made invisible. The optional second brake application uses the same input methodology as the first, with the exception that the peak BTMS input is not provided, on the assumption that the analysis is being done prior to the second stop. Note that the wind component input is the head/tail wind, and has a positive value for a headwind, and negative value for a tailwind. You may clear the inputs for each of the brake application calculations by clicking the Clear button at the bottom of the page. Press the Compute button to perform the calculations and view the results.

Results

The results of the brake cooling calculation are displayed at the bottom of the page, which will be automatically scrolled down to the bottom. The values shown are the brake energy generated by each brake application, in million foot-pounds, the fuseplug integrity zone, predicted peak BTMS for stops that are not computed based on BTMS, and the cooling time required between stops. In the event that only one stop is calculated, the cooling time represents the time it will take to cool the brakes to zero energy, or ambient temperature. When two stops are computed, the cooling time represents the on-ground cooling time required between the two stops to prevent the second stop from exceeding the maximum brake energy total, as explained in Appendix C (or OIS). Since a teardown inspection is required when a stop is made in the Danger Zone, if the first stop falls in the Danger Zone, the second stop will not be computed. Results may be printed by selecting the Print item from the File menu, or pressing CTRL-P. Results may be saved to a text file by selecting the Save item from the File menu, or pressing CTRL-S.

Pavement

General

Data for determining the acceptability of operation of aircraft on particular runways are provided

by the manufacturer as non-FAA-approved information. In the case of the Gulfstream V, it is in the form of an engineering report that is included in the Gulfstream V Operating Manual. Other Gulfstream airplanes have this information in Operational Information Supplements. Use of the Pavement Classification Number information is a complex subject. Please examine the manufacturer's information to obtain an understanding of how it should be used in your operations. The following discussion focuses on the means of computing the Aircraft Classification Number using AFMatic.

Input

PCN data are available in the worldwide airport database for approximately 1/3 of the runways in the database. To use the PCN data for the runway you are using, select "Database" in the PCN Source box, then enter the airport identifier and click Retrieve, followed by selecting the runway and clicking Retrieve. If PCN data are available, the Pavement Type and Subgrade Strength values will be set, and the PCN will be shown. If PCN data are not available in the database for this runway, you will be allowed to set the values for Pavement Type and Subgrade Strength. Rigid pavements are concrete and other similar pavements. Flexible pavements are asphalt and other similar pavements. Then, select the strength of the underlying subgrade soil. CBR refers to the California Bearing Ratio, a measure of subgrade strength for flexible pavements, while K is a measure of subgrade strength for rigid pavements. Subgrade strength may also be referenced by the letters A, B, C, and D, which correspond to High, Medium, Low, and Ultra Low strength, respectively. Enter the aircraft weight, in either pounds or kilograms. Most operators typically maintain a constant tire pressure for most weight conditions, however, if the aircraft is operating on a surface which is marginal for Pavement Classification Number, the tire pressure may be varied with weight in order to optimize the floatation. Select whether the tire pressure will be fixed or varied with weight. Select the pavement type, rigid or flexible.

Results

When you have completed the inputs, click Compute, and the results will be computed and displayed. The output will be the Aircraft Classification Number (ACN) and the Load Classification Number (LCN). In the United States, the ACN method is most frequently used, but the LCN method is still used internationally. Compare the results of the calculation with the Pavement Classification Number (PCN) that applies to the runway surface in question to determine whether the desired operation is possible. If PCN data are available for this runway, the comparison will be done for you, and when ACN is greater than PCN, a warning message will appear in red.

Tools

General

Several non-performance-related functions have been provided for your convenience. These generally do not relate to airplane-specific data except as specified. Tools are accessed by clicking the Tools button at the top of the main program window.

Wind Component Calculator

Input

Select the Wind page for the wind component calculator. Here you may resolve a wind direction and speed into its head/tail wind component and crosswind component for a given runway. You may determine the runway bearing either by database lookup or manual entry. If you select database lookup, you will retrieve the airport and runway data in the same fashion as in the takeoff and landing performance calculations. Click the Search button to search for an airport in the database by name, city, or location. With database lookup, the runway bearing input field is protected, so you will be unable to modify it. If you select manual entry, the airport and runway identifier inputs will be made invisible, and you will enter the runway bearing directly. An input for the James Brake Index is provided to determine the maximum allowable crosswind component based on the condition of the runway surface. For the C-37A and C-20, the JBI input is replaced by Runway Condition Reading (RCR). Click the Compute button to perform the calculation and view the results.

Results

The results of the wind component calculation will be displayed at the bottom of the page. The wind component is shown, with a notation of whether it is a headwind or tailwind. The crosswind component is shown with a note indicating which side the wind is coming from. If the crosswind exceeds the maximum demonstrated crosswind, a notation will be made on the right side of the display. If the crosswind exceeds the maximum allowable crosswind, based on JBI or RCR as appropriate, a note to that effect will be displayed, which includes the maximum allowable crosswind.

Great Circle Distance Calculator

Input

Select the Great Circle page to compute the great circle distance between two points. You may either look up the two points in the airport database, or enter them manually. If you look up the latitude/longitude in the airport database, those input fields will be protected, so you will not be able to modify them. If you enter the latitude and longitude manually, the airport identifier fields will be made invisible. You may also enter a speed, and the time required to fly from the departure airport to the arrival airport will be calculated. Speeds of less than 1.0 will be considered as zero wind Mach number, while speeds above 100.0 will be considered as ground speed in knots. Click the Compute button to perform the calculation.

Results

The results of the great circle calculation will be displayed at the bottom of the page. The great circle distance is shown, in both nautical miles and kilometers, as well as the initial true course on the path between the departure airport and arrival airport. Also shown is the distance along a rhumb line (constant course) between the two airports, and the true course along that path. Finally, if a speed greater than zero was entered, the time to fly each course is shown, in

hours, minutes, and seconds.

Timezone Calculator

Input

Select the Timezone page to determine the local time at an airport when the time at another airport is input. Start by entering an airport identifier for the first location and retrieving the airport data. Then enter the time at that airport, either in 12-hour format using the AM and PM buttons, or in 24-hour format, ignoring the AM and PM buttons. If daylight savings time is recognized at the selected airport, a check box will be displayed for signifying that input time is based on daylight savings time. If the current date shown in your computer system falls within the range of April 1 to October 31, the daylight savings time box will automatically be checked. If this is incorrect, just uncheck it. Next, enter an airport identifier for the second location and retrieve the airport data. Like the first airport, a check box for daylight savings time will appear if it is observed at that airport, and the box will be checked or unchecked based on the state of the daylight savings time box for the first location. Finally, click Compute to determine the local time at the second location.

Results

The local time is shown for the second location, in 12-hour format, and the Universal Coordinated Time (UTC) is shown in 24-hour format. In addition, the time difference from local time to UTC is shown for each airport as it is retrieved.

Sunrise / Sunset

Input

Select the Sunrise / Sunset page to determine local times for sunrise, sunset, moonrise, moonset, dawn, and dusk. Start by entering an airport identifier and retrieving the airport data. If needed, click the Search button to search for an airport in the database by name, city, or location. Then enter the date, either manually or by use of the popup calendar, which is activated by clicking the calendar icon at the right edge of the date entry field. If daylight savings time is recognized at the selected airport, a check box will be displayed for signifying that times should be based on daylight savings time. If the current date shown in your computer system falls within the range of April 1 to October 31, the daylight savings time box will automatically be checked. If this is incorrect, just uncheck it. Finally, click Compute to determine the rise and set times.

The date input entry field is quite flexible. In addition to entering the date in the format specified by your operating system, such as MM/DD/YYYY, you can specify the date in a variety of ways. It will accept all of the following, in uppercase or lowercase: TODAY, YESTERDAY, TOMORROW, NEXT TUESDAY, LAST FRIDAY, FIRST SUNDAY, SECOND WEDNESDAY, FINAL THURSDAY, etc.

If you need to use a calendar to pick off a date, click the calendar icon at the right edge of the date entry field. It will popup with the date that is currently in the date entry field highlighted, or if the field is blank, with the current date obtained from the computer system. Navigation is done using the buttons located at the top of the calendar. Single arrows move one month forward or backward, and double arrows move one year. Move the highlighted day either with the arrow keys or by clicking on a day to select it and insert it into the date entry field. Regardless of what month and year are shown, clicking the button in the lower right corner with the letter T on it, will take you to TODAY. This calendar will display dates ranging from January 1, 1600 through December 31, 3999, so it will be useful anytime in your lifetime that you need to look up dates.

Results

Local time is shown for sunrise, sunset, moonrise, moonset, dawn, and dusk. Dawn is defined as the beginning of civil twilight, and dusk is defined as the end of civil twilight (center of the sun is 6 degrees below the horizon). These correspond to the FAA definition of night, so any time before dawn or after dusk as shown here would be considered night by the FAA. It must be understood that these time calculations are approximate. For latitudes within 60 degrees of the equator, the times are usually within 2 minutes of those predicted by more rigorous methods. Closer to the poles, the accuracy decreases. In addition, other factors, such as elevation above sea level, local terrain and obstructions, and even barometric pressure and temperature, will affect the actual local times of rise and set.

Carbon

Input

Select the Carbon page to calculate the amount of carbon dioxide that is emitted for a flight or series of flights. Optionally, the trip distance may be entered, and the carbon dioxide per kilometer is also calculated.

Enter the total amount of fuel burned on a flight, or series of flights. Do not include any fuel that was carried for reserves that was not burned, only the fuel that actually went out the tailpipe. Select the units for the weight of the fuel burned, either pounds or kilograms. Optionally, enter the trip distance, or for a series of flights, the total trip distance for all of the flights. Select the units for the trip distance, either nautical miles or kilometers. Click the Compute button.

Results

The amount of carbon dioxide (CO2) emitted for the fuel burned is shown in pounds and metric tons (tonnes). If a trip distance was entered, the tonnes per kilometer flown will also be displayed.

One Click Weather

General

Click the Weather button to gain access to over 2,100 up to date weather graphic images, and over 6,000 airport METAR/TAF reports. **This feature requires an open internet connection prior to clicking any of the Retrieve buttons.** To use One Click Weather, simply select the weather information you want to see, and click the associated Retrieve button. A window will open, the selected graphic image will be downloaded and displayed. The weather window will be maximized, filling the entire screen, so that the image will be as large and readable as possible. You can change the size of the window as desired. During download, a meter provides an indication of the progress of the download, and the download can be canceled by clicking the Cancel button. After the image has been displayed in its original size and shape, you may change its display format by selecting Stretch to Fit from the dropdown box at the top of the window. This will stretch the image to fit the entire image exactly in the space available. Note that by doing this, there will likely be distortion as the aspect ratio changes, and text may become unreadable. When viewing is complete, close the window by either clicking the Close button or the window close button on the title bar.

If you use firewall software, such as Norton Internet Security, when AFMatic attempts to download the weather graphics, it may trigger the firewall software to ask you if you want to permit this application to access the internet. You should tell it to permit access, and to always use this setting. You may have to do this each time you receive an AFMatic update, depending on the settings of the firewall software. Even then, some of these security products will prevent the download from taking place. You can make the weather download work by temporarily disabling the security software, then re-enabling it after your AFMatic session is complete.

United States

The vast majority of information available is for operations within the United States, with a good bit of overlap into southern Canada and northern Mexico.

Surface Analysis and Prognosis

Select the desired graphic, and click Retrieve. Available information includes current surface weather, including temperature and dewpoint, and prognosis for 12, 24, 36, and 48 hours.

METAR / TAF / FA

METAR and TAF text-based reports are available for over 6,000 airports. Enter the airport identifier (ICAO or IATA) and click Retrieve. Note that the airport identifiers used by NOAA may differ from the airport identifiers contained in the worldwide airport database. The internet server for METAR and TAF reports is heavily loaded and may take as long as one minute to return the data, so please be patient. Graphical depiction of the METAR data is available. Select the appropriate information type or region, and click Retrieve. Graphical depiction of the

Terminal Area Forecast (TAF) data is available. Select the appropriate forecast time and information type, then click Retrieve. Area Forecast (FA) text-based reports are available. Select the appropriate location, and click Retrieve.

Radar

The national radar composite, with either cloud tops or isobar lines, is available, as well as the latest radar image from each individual radar site. For individual sites, select the type of map desired, then from the appropriate regional dropdown box, select the radar site you want to see, and click Retrieve.

Satellite Images

Select the area and type of image (visible, infrared, or water vapor), and click Retrieve.

Winds / Temperatures

Select the forecast time, from current to 84 hours out, the wind or temperature information desired, and the altitude / flight level, then click Retrieve.

Turbulence

Select the forecast time (current, 3, 6, 9, 12 hours out) and flight level, and click Retrieve.

Clouds / Icing

For cloud content, select forecast time from current to 12 hours out, altitude, and click Retrieve. For icing, select altitude and click Retrieve. For freezing level, select forecast time, from current to 12 hours out, and click Retrieve.

Airmets / Sigmets

Select the Airmet / Sigmet type, and click Retrieve.

Pilot Reports

Select the type of report (Weather / Sky, Icing, Turbulence) and the region for the map, and click Retrieve.

International

International weather sources are not as easily found as they are for the United States, but there are some graphics and reports available.

Significant Weather

Select the forecast time and region, and click Retrieve.

METAR / TAF

METAR and TAF text-based reports are available for over 6,000 airports. Enter the airport identifier (ICAO or IATA) and click Retrieve. Note that the airport identifiers used by NOAA may differ from the airport identifiers contained in the worldwide airport database. The internet server for METAR and TAF reports is heavily loaded and may take as long as one minute to return the data, so please be patient.

Satellite Images

Select the area and type of image (visible or infrared), and click Retrieve.

Canada

Information is available for surface up to flight level 240. Select forecast time from current to 12 hours out, region, and type of information, then click Retrieve.

JetMiser

General

JetMiser is a feature whose purpose is to reduce the total cost of fuel for a multi-stop trip. It does this by using the concept of fuel tankering to optimize the amount of fuel purchased at each stop, based on the fuel price at that stop. More fuel will be bought at lower prices, and less at higher prices. Obviously, a heavier fuel load will cause more pounds of fuel to be burned to carry the load, so you don't want to carry too much fuel, or the cost to carry it will outweigh the benefit of buying it at a lower price. JetMiser finds the balance point, so that the savings are maximized.

To use JetMiser, click on the JetMiser button at the top of the main window. After providing the input data in the Trip Plan, click on the Compute button to make the calculation. JetMiser can be slow, especially on an older computer. This is because it is running tens, hundreds, or even thousands of point-to-point flight planning calculations, depending on the number of legs (up to a maximum of 50) you have specified. Particularly time consuming are very short legs. This is counter-intuitive, but occurs because JetMiser tries to make the trip at the highest possible altitude, and for a short hop it must cycle through the altitudes until it gets down to one low enough to make the flight. A progress bar is provided to give an indication of the approximate percentage completion of the calculations.

Trip Plan

Initial Fuel

The Initial Fuel input is for the amount of fuel that was left in the tanks after the last flight, and prior to fueling the airplane for the first leg in the trip to be analyzed. This amount will be subtracted from the fuel required for the first leg in order to determine the amount of fuel that will need to be added for the first leg. The default amount is 0.

End Trip With Fuel

The End Trip With input is for the amount of fuel you want to have on-board at the end of the total trip. This will be the reserves for the final leg plus the specified amount. You may want to use this if you know the fuel price for the first leg of your next trip will be more than the price at the last stop of this trip, or you may want to leave some fuel in the tanks at the end of the trip for subsequent training or maintenance flights. The default amount is reserves only.

The Spreadsheet

The spreadsheet with all of the input values for the calculation will initially be blank. As you add legs to the trip, they will appear in the spreadsheet. Data are not edited in the spreadsheet, only viewed.

ICAO

This is the ICAO code of the departure airport for this leg. The destination airport for the final leg is not shown.

Fuel Price

This is the price of fuel at the departure airport for this leg. Price is assumed to be in US dollars per US gallon, however, as long as the currency doesn't change from one fuel stop to the next, any currency will work, and the final answer will be in the currency used in the calculation. Fuel price is a single fixed number, and does not take into consideration any volume discount that may kick in as the fuel quantity increases.

Distance

This is the distance from the departure airport to the destination airport, in nautical miles.

MTOGW

This is the maximum takeoff gross weight that should be allowed for takeoff at the departure airport for this leg. The default value is the structural limited takeoff weight of the airplane.

MLGW

This is the maximum landing gross weight that should be allowed for landing at the destination airport for this leg. The default value is the structural limited landing weight of the airplane.

Passengers

This is the number of passengers to be carried on this leg of the trip.

Mach

This is the Mach number to be used during level cruising flight on this leg of the trip. If an altitude must be flown that is low enough that the selected Mach number is greater than MMO / VMO, then the calculation will be done at MMO / VMO. So, if you have a really short leg, like KHPN to KTEB for example, it is okay to specify a Mach number of .80, knowing that the leg will be flown at or below 5,000 feet, which has a very low VMO.

Wind

This is the average wind component for this leg of the trip, in knots.

Delta ISA

This is the temperature, expressed as a delta from the standard day temperature (ISA), in degrees Celcius.

Reserves

This is the specified reserves for this leg of the trip. Three types of reserves are available: fixed reserves, NBAA IFR reserves, and reserves based on the distance to the alternate airport, from the chart found in the Operating Manual (or Cruise Control Manual). For fixed reserves, you will see the amount of fuel, in pounds, that will be held in reserve. For NBAA IFR reserves, you will see the note "NBAA". And for Ops Manual reserves, you will see the distance from the destination airport to the alternate airport that has been specified.

Add Button

Click this button to add a leg to the end of the trip plan. The JetMiser Flight Leg input dialog will be activated, which allows you to enter all of the appropriate information for each leg of the trip.

Edit Button

To edit an existing flight leg, select the leg by clicking on it, then click the Edit button to activte the JetMiser Flight Leg input dialog and edit the information. Alternately, you may double click the leg.

Delete Button

To delete an existing flight leg, select the leg by clicking on it, then click the Delete button to remove the leg from the trip plan. Note that if there are any flight legs after the one to be deleted, you will need to edit the legs surrounding the deleted one to update the departure and destination airport ICAO codes and distances.

Move Up Button

To move a leg up in the trip plan, select the leg by clicking on it, then click the Move Up button, as many times as necessary to move it to the new location required. Note that you will need to edit the legs surrounding the new and old positions, to update the ICAO codes and distances.

Move Down Button

To move a leg down in the trip plan, select the leg by clicking on it, then click the Move Down button, as many times as necessary to move it to the new location required. Note that you will need to edit the legs surrounding the new and old positions, to update the ICAO codes and distances.

Clear Button

To completely clear the trip plan and start over, click the Clear button. This will not delete any trip plans that you have saved to disk, only what is visible in the trip plan.

Save Button

Setting up a trip with many stops can be a time consuming task. If you fly the same trip many times, you don't want to have to enter all the data from scratch every time. When you have the trip set up, click the Save button and save it all to disk. Then you can retrieve it at a later time and continue working with it. In addition to saving the trip plan manually, whenever you click Compute, the trip will be automatically saved in a file named LastCalc.JM, which you can retrieve at any time.

Retrieve Button

To retrieve a trip plan that was previously saved using the Save button, or the last JetMiser calculation that was done, click the Retrieve button and select the trip plan you want to retrieve. The default will be LastCalc.JM, which is the last JetMiser calculation that was performed.

Flight Leg Editor

General

The JetMiser Flight Leg dialog is used to input or edit the information for each flight leg in the trip.

Departure ICAO Code

This is the ICAO code for the departure airport. Enter the airport identifier and click Retrieve, or press Enter. You must retrieve the airport to make it possible to compute the great circle distance for the leg, and also to provide the airport elevation for the calculations. You may also search for an airport using the Search button.

Destination ICAO Code

This is the ICAO code for the destination airport. Enter the airport identifier and click Retrieve, or press Enter. You must retrieve the airport to make it possible to compute the great circle distance for the leg, and also to provide the airport elevation for the calculations. You may also search for an airport using the Search button.

Flight Distance

You may enter the distance for this flight leg if you know it (e.g. from a flight plan), or you may have AFMatic calculate it for you based on the great circle distance. To calculate, click the Calc button. The Distance Calculator allows you to add a percentage to the great circle distance, and/or add a fixed distance. So, to approximate an actual flight plan distance, you might add 2% to estimate the additional distance due to flying airways instead of direct, and 10 miles to estimate the added distance to shoot an instrument approach. After the number is calculated, click the appropriate Insert button to insert it into the Flight Distance input field.

Max Takeoff Weight

This is the maximum takeoff weight to be allowed in the JetMiser calculations for this departure airport. The default is the structural limited takeoff weight. If you have performed a takeoff calculation for the departure airport, you may insert the takeoff weight from that calculation by clicking the Tkf Calc button. If no takeoff calculations have been performed during this AFMatic session, the button will be disabled.

Max Landing Weight

This is the maximum landing weight to be allowed in the JetMiser calculations for this destination airport. The default is the structural limited landing weight. If you have performed a landing calculation for the destination airport, you may insert the landing weight from that calculation by clicking the Ldg Calc button. If no landing calculations have been performed

during this AFMatic session, the button will be disabled.

Departure Fuel Price

This is the price of fuel at the departure airport for this leg. Price is assumed to be in US dollars per US gallon, however, as long as the currency doesn't change from one fuel stop to the next, any currency will work, and the final answer will be in the currency used in the calculation. Fuel price is a single fixed number, and does not take into consideration any volume discount that may kick in as the fuel quantity increases.

Passengers

This is the number of passengers to be carried on this leg of the trip. The zero fuel gross weight is calculated by adding the BOW and the number of passengers times the default passenger weight plus the default baggage weight per passenger, i.e. ZFGW = BOW + PASS * (PASSWT + BAGWT).

Cruise Mach Number

This is the Mach number to be used during level cruising flight on this leg of the trip. Select the desired speed from the list. If an altitude must be flown that is low enough that the selected Mach number is greater than MMO / VMO, then the calculation will be done at MMO / VMO. So, if you have a really short leg, like KHPN to KTEB for example, it is okay to specify a Mach number of .80, knowing that the leg will be flown at or below 5,000 feet with a very low VMO.

Delta ISA

This is the temperature, expressed as a delta from the standard day temperature (ISA), in degrees Celcius. Select the desired temperature from the list.

Wind Component

This is the average wind component for this leg of the trip, in knots. Select headwind or tailwind.

Reserves

Select the reserve type for this leg of the trip, then enter the appropriate value. Three types of reserves are available: fixed reserves, NBAA IFR reserves, and reserves based on the distance to the alternate airport, from the chart found in the Operating Manual (or Cruise Control Manual). For fixed reserves, you will enter the amount of fuel, in pounds, that will be held in reserve. And for Ops Manual reserves, you will enter the distance from the destination airport to the alternate airport that has been specified, in nautical miles.

Save & Add Button

When adding legs to the trip plan, clicking this button is equivalent to clicking the Save Only button, then clicking the Add button on the Trip Plan. It will save the current leg, clear the JetMiser Flight Leg dialog, place the Destination ICAO Code from the just-saved leg in the Departure ICAO Code field, and leave you ready to enter the rest of the information for the next leg. If you are editing an existing flight leg, instead of adding a new one, this button will be labeled Save & Next, and will work in a similar fashion, saving the current leg and bringing in the next one from the trip plan, ready to be edited.

Save Only Button

This button saves the current leg and returns you to the trip plan.

Clear Button

This button clears the JetMiser Flight Leg dialog, leaving you ready to input information for the current leg.

Cancel Button

This button cancels the Add or Edit operation, and takes you back to the trip plan with no changes being made.

Results

General

The results of the JetMiser calculation are shown on the Results page. Results may be printed by selecting the Print item from the File menu, or pressing CTRL-P. Results may be saved to a text file by selecting the Save item from the File menu, or pressing CTRL-S.

ICAO Code

This is the ICAO code of the departure airport for this leg.

Fuel Price

This is the price of fuel at the departure airport for this leg.

Minimum Fuel Load

This is the minimum amount of fuel that must be in the tanks prior to engine start in order to complete this flight leg with the required reserves remaining, under the specified flight

parameters.

A word of caution: The cruise calculations upon which JetMiser is based have been tested against calculations made by Gulfstream engineers. However, regardless of the confidence we have in the accuracy of these calculations, **you should never load less fuel on-board for a flight than your computerized flight plan calls for**.

Minimum Fuel Add

This is the amount of fuel that must be added to the tanks in order to have the Minimum Fuel Load on-board at engine start. For the first leg, this will be the Minimum Fuel Load minus any fuel specified as Initial Fuel. For other legs, it will be the Minimum Fuel Load minus the reserve fuel from the previous leg.

Minimum Cost

This is the cost of the fuel that must be added in order to meet the Minimum Fuel Load, based on the Fuel Price.

Optimum Fuel Load

This is the optimum amount of fuel to have in the tanks prior to engine start, in order to minimize the total fuel cost for the entire trip. The amount of fuel that is over and above the Minimum Fuel Load is the fuel that is being tankered for use on a subsequent flight leg.

Optimum Fuel Add

This is the amount of fuel that must be added to the tanks in order to have the Optimum Fuel Load on-board at engine start. For the first leg, this will be the Optimum Fuel Load minus any fuel specified as Initial Fuel. For other legs, it will depend on the amount of fuel remaining in the tanks at the end of the previous leg, including reserve fuel and tankered fuel. Sometimes you will find that it specifies that a very small amount of fuel must be added, a few hundred pounds or less. This is because the methodology finds the absolute minimum cost, even if it only saves a few dollars over tankering the total amount. In these cases you will probably want to add that fuel to the previous leg.

Optimum Cost

This is the cost of the fuel that must be added in order to meet the Optimum Fuel Load, based on the Fuel Price.

Minimum Fuel Total Cost

This is the sum of the values in the Minimum Cost column in the spreadsheet, and represents the total cost of fuel for the trip if you load only the minimum amount of fuel at each stop.

Optimum Fuel Total Cost

This is the sum of the values in the Optimum Cost column in the spreadsheet, and represents the total cost of fuel for the trip if you load the recommended optimum amount of fuel at each stop.

Savings

This is the difference in the Optimum Fuel Total Cost and Minimum Fuel Total Cost, and is the amount you would save by following the recommended optimum fuel loading.

Fuel Units

You may select the units of measurement for the Minimum Fuel Load, Minimum Fuel Add, Optimum Fuel Load, and Optimum Fuel Add columns by clicking on the desired units. The default is pounds.

Airport Search

General

The airport search function may be utilized by clicking the Search button in any Airport Identifier box throughout the program. These are found on the Takeoff and Landing Airport pages, Misc. Pavement page, Tools Wind and Sunrise/Sunset pages, and Database / Edit Obstacle Data and Database / Edit SID Data menu items. In each case, once you have found the desired airport, you may insert that airport identifier in the original airport identifier input field, and retrieve the airport data from the database.

Airport Search List

After clicking the Search button, a window will pop up with a scrollable list of all of the airports in the worldwide airport database. Depending on the speed of your computer and hard disk, it may take a few seconds for the Airport Search dialog to appear, since all of the airports in the database must be retrieved and loaded into the list. There are columns for ICAO code, IATA code, airport name, city, state, country, elevation, and length of the longest runway. You may sort the airport list by any of these columns simply by clicking on the column header. A second click on the same column header will cause the list to be sorted in reverse alphabetical order. You may either scroll the list using the scrollbar on the right, or you may search by typing in the Search input field. As you type in the Search field, the cursor in the airport list will move to the first airport in the current sort column that begins with the text you have typed in the Search field. You may format the display in any of three ways. The first is simply a spreadsheet-like list of all of the airports, which is termed "All Airports" in the format selector. Next, the airports

can be grouped by country with the "By Country" format. Finally, the airports can be grouped by country and state with the "By Country and State" format. Only the United States currently has state specified in the database, so the last format will only be useful for finding airports in the USA. When you have found the desired airport, you can insert it in the airport identifier input field where you began the search by clicking the Insert button, or pressing Enter. You may also view the airport data by clicking the View button, or you may find alternate airports to use with this airport by clicking the Find Alternates button. You may also exit the airport search dialog without selecting anything by clicking the Cancel button.

Find Alternate Airports

If you clicked the Find Alternates button in the Airport Search dialog, you will first be presented with a dialog which allows you to specify the search criteria to be used in determining which airports are suitable alternates. Enter the maximum distance between the destination airport and the alternate, in nautical miles. Then enter the minimum acceptable runway length, in feet. Click the Find Alternates button to display the list of alternates, or click Cancel to return to the Airport Search dialog. The defaults for the distance and runway length input fields may be set by selecting Options / Preferences, and clicking the Misc. tab.

Alternate Airport List

A list of all airports meeting the specified search criteria is displayed, in a similar format to the Airport Search list. However, two columns have been added, one for the distance from the destination airport, and the other for the bearing from the destination airport. The list is initially sorted on the distance column, so that airports closest to the destination are at the top of the list. You may sort this list by any of the columns, including bearing, just as with the Airport Search list. An interesting use for sorting by bearing might be if severe weather existed to the west of the destination airport, and you wanted to find suitable alternates to the east. Simply click on the bearing column header, and the airports will be sorted around the compass from 1 to 360 degrees, making it easy to pick out which potential alternates lie to the east. You may click on an airport to select it, and then click on the Insert button to insert it in the airport identifier input field where you began the search, or you may click Cancel to return to the Airport Search dialog.

File Menu

Save

Save the results of calculations and airport / runway data to a file. The default is to save all calculations in one file, and the file will be placed in the directory where the AFMatic executable is located, in a file named "Output.txt". You may change the file name and location either by typing in the file name field or by clicking the Search button and searching for the new location. You may also elect to save all airport information, or any single item, which you may select. These data will be saved in a plain text format that can later be printed or emailed to another location. The information stored with this function is identical to what is printed with the print function. Save can be invoked by pressing Ctrl-S.

Print

Print the results of calculations and airport / runway data to a printer. The default is to print all calculations. You may also elect to print all airport information, or any single item, which you may select. These data will be printed in a plain text format, using the default fixed pitch printer font. You may change the font size from the default 12 point size. This feature was primarily added in order to facilitate getting the entire printout on a single page for some printers that had preset margins that are narrower than normal. You may also invoke the printer setup dialog by clicking the Setup button at the bottom of this dialog. When ready to print, click the Print Now button. The information printed with this function is identical to what is stored with the save function. Print can be invoked by pressing Ctrl-P.

Exit

Terminate AFMatic execution. This produces the same result as clicking the close box in the upper right corner of the program window, pressing Alt-X, or pressing Alt-F4.

Database Menu

New Aircraft

General

To add a new aircraft (by serial number) to the user database, select the New Aircraft function from the Database menu. When you have finished entering the information needed to define your aircraft, clicking the Save button will save the aircraft definition to disk, where it will be available for future selection in the Select Aircraft function. Clicking the OK button will dismiss the dialog. Be sure to save prior to clicking OK. Leaving the dialog without saving will throw away your inputs.

Identification

In the registration field, you specify the aircraft's registration (tail) number, also known as N-number in the United States. This is a simple text field and no validity checking is done, so this entry will be stored just the way you enter it. This will become the identifier for this aircraft, which you will use to select it from the Select Aircraft function on the Options menu. Next is the Aircraft Code field, in which you must enter the aircraft code for this aircraft. You will find the aircraft code located on the card that is enclosed with the AFMatic CD-ROM. This 16 digit code must be correctly entered in order to properly identify your aircraft. **Note: The characters contained in the Aircraft Code include the numbers 0-9 and letters A-F only. There are no letters I,O, or Z.** When you type the last character of the code, it will be decoded and the aircraft serial number, type, and certification basis will be displayed. If these do not match your aircraft, check to see that you have entered the aircraft code correctly. If the aircraft code is correct and the decoded values are not, contact Tybee Jet for a corrected aircraft code. Lastly, if this is the aircraft that you want to be loaded automatically when the program starts up, check the Make Default box.

Mods

If there are modifications available for the aircraft type you selected on the identification page, they will be listed on the modifications page. Click on the box next to the description for the modification that you want to associate with your airplane, to put a check mark in the box. Whenever the flight manual data are loaded for your aircraft, data for any modifications that are checked will be included in the calculations.

Weights

AC120-27E Compliance

AFMatic has the ability to compute weight and balance in compliance with the FAA Advisory Circular 120-27E, "Aircraft Weight and Balance Control". Check this box to default to using AC120-27E compliant calculations. The Passenger Weights selection allows you to select the weights to use in the calculations. The first weights listed are from Table 2-2, "Average Passenger Weights for Operators With a No-Carry-On Bag Program". Next are listed weights for use of Segmented Weights, as described in Section 4 of AC120-27E, for % of male passengers ranging from 90 down to 50%. Finally, a selection to allow choosing between male, female, or child passengers, based on the summer weights from Table 2-2.

Default Weights

Default weights for passengers, baggage for each passenger, and fuel consumption for start/ taxi/takeoff, may be set here, specified in units of pounds or kilograms. These defaults will be used on the Loading page of the Weight & Balance calculation.

Configuration

It is possible to set each aircraft up with as many as 5 different configurations. This will facilitate the changing of interior configurations, such as removing a divan and replacing with a pair of executive seats, or major changes like switching between an executive interior, air ambulance, and cargo. To step through the configurations, click the Next button. To clear a configuration, click the clear button. There must be at least one defined configuration for the aircraft. Each configuration can be given a descriptive name, and each configuration must have a name specified. Click the Default box to select this configuration as the default.

Basic Operating

The basic operating weight, in units of pounds or kilograms, and the center of gravity of the aircraft at the basic operating weight, in inches aft of the datum, are specified. Basic operating weight, for purposes of this software, is defined to include the weight of the basic airplane, crew, crew baggage, and all consumables. In other words, everything except the passengers, passenger baggage, cargo, and fuel. Note that the horizontal arm ***must*** be entered as inches aft of the datum. An error message will be displayed if the arm is specified as percent mean

aerodynamic chord (% MAC).

Floorplan

If you have a floorplan available, check the Use Floorplan box and select the floorplan bitmap image in the drop-down box next to it. The floorplan files (*.bmp and *.fpd) must be located in the same directory as the AFMatic program files. These floorplan files will be customized by Tybee Jet and provided to you. They require a floorplan graphic provided to Tybee Jet by the Gulfstream Publications Department, and the page from your weight and balance report that contains the seat arm information, provided to Tybee Jet by you. If a floorplan has not yet been provided to you, please contact Tybee Jet and arrange for that. In the meantime, leave the Use Floorplan box unchecked.

Passenger Seat Locations

Enter the locations of the passenger seats in the airplane, in inches aft of the datum. The seats do not need to be in order from front to back or back to front. They will be sorted into order during the calculation. Number them in any order that suits you. The maximum number of seats that you can enter is determined by the maximum number of passengers allowed in the AFM limitations.

Additional Storage Locations

You may specify up to five additional storage locations within the airplane. You do not need to include the baggage compartment, since the baggage is specified separately during calculation. Give each location a name of up to 12 characters, such as "Fwd Closet", specify the arm of the center of the storage area, and the maximum weight that can be stored in the area, in the same units as used for basic operating weight. These storage areas will appear on the weight and balance loading page, where you will enter the weight to be stored in each one.

Miscellaneous

The default flap setting for takeoff and optimize box setting, which appear on the Takeoff Configuration page are specified. The default method for calculation of SID required climb gradient clearance is selected from the list of methods available for this aircraft type. For FAR 135 operators, the Operational Information Supplements for SID Climb specify that it is necessary to clear 70 feet height at the Departure End of the Runway. You may check the box to assure that this height is achieved when using the SID Climb methods. Also, the default setting of the FLEX takeoff box which appears on the Takeoff Atmospherics page is set here.

Edit Aircraft

General

The Edit Aircraft function looks and works like the New Aircraft function, with the addition of a

Retrieve button, and a Delete button. To add a new aircraft, you must use the New Aircraft function, described above. You may edit an aircraft by selecting the registration from the drop-down list and clicking the Retrieve button. This will retrieve the aircraft data that you previously entered. You may then make changes as desired and save it to disk by pressing the Save button. You may also delete the aircraft from the database by clicking on the Delete button. Clicking the OK button will dismiss the dialog, but once again, be sure you have saved your changes before leaving the dialog.

Identification

In the registration field, you specify the aircraft's registration (tail) number, also known as N-number in the United States. This is a simple text field and no validity checking is done, so this entry will be stored just the way you enter it. This will become the identifier for this aircraft, which you will use to select it from the Select Aircraft function on the Options menu. Next is the Aircraft Code field, in which you must enter the aircraft code for this aircraft. You will find the aircraft code located on the card that is enclosed with the AFMatic CD-ROM. This 16 digit code must be correctly entered in order to properly identify your aircraft. **Note: The characters contained in the Aircraft Code include the numbers 0-9 and letters A-F only. There are no letters I,O, or Z.** When you type the last character of the code, it will be decoded and the aircraft serial number, type, and certification basis will be displayed. If these do not match your aircraft, check to see that you have entered the aircraft code correctly. If the aircraft code is correct and the decoded values are not, contact Tybee Jet for a corrected aircraft code. Lastly, if this is the aircraft that you want to be loaded automatically when the program starts up, check the Make Default box.

Mods

If there are modifications available for the aircraft type you selected on the identification page, they will be listed on the modifications page. Click on the box next to the description for the modification that you want to associate with your airplane, to put a check mark in the box. Whenever the flight manual data are loaded for your aircraft, data for any modifications that are checked will be included in the calculations.

Weights

AC120-27E Compliance

AFMatic has the ability to compute weight and balance in compliance with the FAA Advisory Circular 120-27E, "Aircraft Weight and Balance Control". Check this box to default to using AC120-27E compliant calculations. The Passenger Weights selection allows you to select the weights to use in the calculations. The first weights listed are from Table 2-2, "Average Passenger Weights for Operators With a No-Carry-On Bag Program". Next are listed weights for use of Segmented Weights, as described in Section 4 of AC120-27E, for % of male passengers ranging from 90 down to 50%. Finally, a selection to allow choosing between male, female, or child passengers, based on the summer weights from Table 2-2.

Default Weights

Default weights for passengers, baggage for each passenger, and fuel consumption for start/ taxi/takeoff, may be set here, specified in units of pounds or kilograms. These defaults will be used on the Loading page of the Weight & Balance calculation.

Configuration

It is possible to set each aircraft up with as many as 5 different configurations. This will facilitate the changing of interior configurations, such as removing a divan and replacing with a pair of executive seats, or major changes like switching between an executive interior, air ambulance, and cargo. To step through the configurations, click the Next button. To clear a configuration, click the clear button. There must be at least one defined configuration for the aircraft. Each configuration can be given a descriptive name, and each configuration must have a name specified. Click the Default box to select this configuration as the default.

Basic Operating

The basic operating weight, in units of pounds or kilograms, and the center of gravity of the aircraft at the basic operating weight, in inches aft of the datum, are specified. Basic operating weight, for purposes of this software, is defined to include the weight of the basic airplane, crew, crew baggage, and all consumables. In other words, everything except the passengers, passenger baggage, cargo, and fuel. Note that the horizontal arm ***must*** be entered as inches aft of the datum. An error message will be displayed if the arm is specified as percent mean aerodynamic chord (% MAC).

Floorplan

If you have a floorplan available, check the Use Floorplan box and select the floorplan bitmap image in the drop-down box next to it. The floorplan files (*.bmp and *.fpd) must be located in the same directory as the AFMatic program files. These floorplan files will be customized by Tybee Jet and provided to you. They require a floorplan graphic provided to Tybee Jet by the Gulfstream Publications Department, and the page from your weight and balance report that contains the seat arm information, provided to Tybee Jet by you. If a floorplan has not yet been provided to you, please contact Tybee Jet and arrange for that. In the meantime, leave the Use Floorplan box unchecked.

Passenger Seat Locations

Enter the locations of the passenger seats in the airplane, in inches aft of the datum. The seats do not need to be in order from front to back or back to front. They will be sorted into order during the calculation. Number them in any order that suits you. The maximum number of seats that you can enter is determined by the maximum number of passengers allowed in the AFM limitations.

Additional Storage Locations

You may specify up to five additional storage locations within the airplane. You do not need to include the baggage compartment, since the baggage is specified separately during calculation. Give each location a name of up to 12 characters, such as "Fwd Closet", specify the arm of the center of the storage area, and the maximum weight that can be stored in the area, in the same units as used for basic operating weight. These storage areas will appear on the weight and balance loading page, where you will enter the weight to be stored in each one.

Miscellaneous

The default flap setting for takeoff and optimize box setting, which appear on the Takeoff Configuration page are specified. The default method for calculation of SID required climb gradient clearance is selected from the list of methods available for this aircraft type. For FAR 135 operators, the Operational Information Supplements for SID Climb specify that it is necessary to clear 70 feet height at the Departure End of the Runway. You may check the box to assure that this height is achieved when using the SID Climb methods. Also, the default setting of the FLEX takeoff box which appears on the Takeoff Atmospherics page is set here.

Edit Airport

General

You may add airport and runway data to the database. The airport database is stored in two separate parts on disk. The first part is the worldwide airport database, which is read-only. This database includes all airports in the world with hard surfaced runways of at least 3,000 feet length. The other part of the airport database is the user airport database, which stores airport, runway, obstacle, and SID gradient data that are entered by the user. In the Airport / Runway Editor, you may add airport and runway data to the user airport database, or edit data that you have already added.

There are several restrictions in the way data are stored that you should be aware of. First, if an airport exists in the worldwide airport database, you may not simply add runways to it. You must create a new airport and put the new runways in it. In other words, runways cannot be split between the two databases. The second restriction is that you may not create a new airport that has the same ICAO or IATA identifier as an airport in the worldwide airport database. You may, however, retrieve an airport from the worldwide airport database and save it to the user database, by changing the ICAO identifier. For example, you could copy KSAV, Savannah International, by retrieving KSAV, changing the ICAO identifier to _SAV, for example, and then saving that.

Please note that you must save your changes and additions by clicking on the Save Airport button for airport data, or Save Runway button for runway data, before leaving the Airport / Runway Editor. These saves are not performed automatically.

Airport Section

General

The airport section contains entry fields for data relating to the airport as a whole. You may retrieve an existing airport to edit, or you may enter a new airport from scratch. After making the changes, you must save the data to the database by clicking on the Save Airport button. When you click on the Save Airport button to save airport data, you are saving only the items in the airport section. You must save runway data separately by clicking on the Save Runway button. Be sure that you have saved the airport data before dismissing the dialog. This is not automatically done for you.

You may clear the fields in both the airport and runway sections by clicking on the Clear Airport button. This resets all entry fields to their default (blank) values.

You may delete an airport that you have entered by specifying its ICAO identifier and clicking on the Delete Airport button. You may not delete an airport that is stored in the worldwide airport database.

Airport

The Airport box contains 3 entry fields, for ICAO identifier, IATA identifier, and field elevation. When adding a new airport, use these fields to enter the appropriate values. If you want to edit an airport that already exists in the database, enter either the ICAO or IATA identifier, then press Enter or click on the Retrieve button next to the identifier that you entered, and the airport data will be retrieved from the database and displayed.

Airport Location

In the Airport Location box, enter the airport name, city, state or province, and country. State or province is an optional field, and consists of a two-letter abbreviation. The country field is a 3-letter abbreviation.

Runway Section

General

Runway data are edited and stored separately from airport data. You must have an airport specified prior to editing runway data. You must save runway data separately from airport data. So, if you add a new airport and save the airport, you would then add a runway and save it, then clear the runway by pressing the Clear Runway button, add data for another runway and save it, etc. Like airport data, you must save runway data by pressing Save Runway prior to dismissing the Airport Editor dialog by pressing the OK button.

Clicking on the Clear Runway button will clear the runway data and reset all of the input fields to their default (blank) values. This will have no effect on the airport data in the airport section.

You may delete a runway that you have entered by clicking on the Delete Runway button. You may not delete a runway from the worldwide airport database.

Runway

If you are editing an existing runway, select it from the drop-down list by clicking on it or using the arrow keys to highlight your choice, and then press Enter or click on the Retrieve button. If you are adding a runway, select Add and press Enter. If editing an existing runway, be sure to retrieve the runway data before you begin changing values in the other entry fields, because when you retrieve the data from the database, it will be put in the entry fields, and overwrite any changes that you already made.

Miscellaneous

Here you enter the runway identifier for a new runway, runway magnetic bearing (or true bearing for far north airports that use true instead of magnetic), slope in percent, and elevation of the brake release end of the runway in feet. The runway identifier may be any 3 characters. It will not be forced to fit the standard runway identifier convention. To calculate a slope from runway length and elevation at both ends, press the Calc button located next to the slope entry field.

Runway Slope Calculator

You may calculate the runway slope using the Runway Slope Calculator, which is activated by pressing the Calc button located by the slope entry field on the Airport / Runway Editor screen. Enter the runway length, in feet, followed by the elevation of the brake release end of this runway, and finally the elevation of the liftoff end of this runway (brake release end of the opposite runway), also in feet. Press Enter or click the Compute button, and the slope will be computed. To insert the slope into the entry field in the Airport / Runway Editor, press Enter or click the Insert button. To cancel without inserting, press Escape or click the Cancel button. If you insert the results, the length and brake release elevation will also be inserted into the appropriate entry fields.

Lengths

Here you enter the runway length, stopway (if any), clearway (if any), and displaced threshold for landing (if any), all in feet.

Runway Surface

Select hard or soft runway surface.

Edit Obstacle

General

To enter obstacle data for a runway, you must first retrieve an existing airport and runway from the database, in order to define which runway the obstacle data will be associated with. Once you have retrieved the airport and runway, you may enter the obstacle location data for up to 20 obstacles per runway, as well as optional length, clearway, stopway, and slope data. Then click on the Save button to save the obstacle data in the database. Clicking on the OK button dismisses the obstacle editor dialog. Be sure you have saved your data before exiting, since this will not be done for you automatically.

Airport Identifier

Enter the 4-letter ICAO identifier, or the 3-letter IATA identifier. Click on the ICAO or IATA button to select which identifier has been specified. Press Enter or click on the Retrieve button to retrieve the airport from the database. You may view the airport information by clicking on the View button, either before or after pressing the Retrieve button. When the airport has been retrieved, the Airport / Runway Info box will contain the airport name and city, state, and country. The text on the Retrieve button will change color from red to green when an airport has been read into memory. Click the Search button to search for an airport in the database by name, city, or location.

Runway

When the airport data are retrieved from the database, the runway identifier drop-down list is filled with a list of the runways that are available for this airport in the database. Select the desired runway from this list by clicking on it or using the arrow keys to highlight your choice, and then press Enter or click on the Retrieve button to retrieve the runway data from the database, or the View button to retrieve the data and view it. When the runway has been retrieved, the Airport / Runway Info box will contain the runway identifier, length, and end elevation. The text on the Retrieve button will change color from red to green when a runway has been read into memory.

Runway (Optional)

Most users can ignore the input fields in this box. Its purpose is to allow a flight operations department to have total control over the data that are used in the calculation of obstacle clearance takeoffs. This would be of primary interest to a FAR 135 or 121 operator. By filling in these fields and checking the Override Apt DB Runway Info box, these values will be used in place of the values from the worldwide airport database in takeoff calculations. It is not recommended that you do this unless you have a specific need to do so, since the worldwide airport database will be updated every 28 days, and these data will change only when you change them.

Units and Measurement Basis

By default, the distance to the obstacle is measured from the brake release end of the runway (BR end), and the units of measurement for all measurements are feet. You may enter distances referenced to the liftoff end of the runway (LO end) by selecting LO End in the Dist From box. Obstacle height is always measured AGL above the liftoff end of the runway. Distances may be entered in units of feet, meters, or nautical miles, by selecting the appropriate units in the Dist Units box. Units for height above runway and offset from runway centerline may be selected in the Ht Units box, and are limited to feet and meters. Please note that these units and reference point will be applied to all obstacles that are entered in the table below. When the Save button is clicked, the obstacle positions will be converted to be referenced to the brake release end of the runway, and the units will be converted to feet. The converted obstacles will be stored in the database, and the display will be updated to reflect the conversion. Whenever the obstacles are recalled from the database, they will be shown in the default units.

Obstacles

This is where the obstacle distance, height, and offset from extended runway centerline are entered. Up to 20 obstacles may be input for each runway. By default, the distance is measured from the brake release (approach) end of the runway, in feet. The reference runway end and units of measurement can be changed with the Dist From and Dist Units boxes respectively. Height is the height above the liftoff (departure) end of the runway, in units selected in the Ht Units box. This may seem an odd combination, but has been selected to maintain consistency with the Jeppesen OpsData format. The offset is entered as a positive number if the obstacle is to the right of centerline, and a negative if it is to the left, in the units selected in the Ht Units box. Offset is used to determine if an obstacle is within the selected calculation envelope (FAA or ICAO) at the time of calculation. Be sure to enter obstacles beginning on the top line of the table and proceeding down, since the first line having a zero for the distance value denotes the end of the obstacle table.

Use of Obstruction Data Sheets

Care must be taken when entering obstacle data, particularly if your source is an Obstruction Data Sheet (ODS), which is the tabulated version of the Airport Obstruction Chart. The ODS is built on the concept of the obstacles being obstructions to landing, rather than takeoff, so you must reverse the direction. For example, obstacles that are listed for runway 08 are actually takeoff obstacles for 26. Once you have the runway number straight, then you must pick the right numbers out of the tables. The obstacle height will be the value in the HAR (Height above runway) column. This will give you the desired height above the liftoff end of the runway. Distance is a little harder to obtain. You must first view the desired runway and make note of the TORA distance. The distance you will enter in the obstacle table is the value in the DEND (Distance from end) column in the ODS added to the TORA distance you wrote down from viewing the runway data. This will make the proper correction so that the distance is measured from the brake release end of the runway. Lastly, the offset is from the DCLN (Distance from centerline) column in the ODS. Since we're going the other way, enter right offset as a

negative, and left as positive. You will notice in many cases that there are obstacles with negative DEND values. These are for items that are located on the airport before you get to the liftoff end of the runway. AFMatic doesn't compute obstacle clearance for these, so you may as well not include them in the database, since they'll never be used.

Import Obstacle

You may read obstacle data files provided by Jeppesen OpsData, and store the data in the user airport data file, for later use. This function is activated by selecting Import Obstacle Data from the Database menu. Enter the name of the file in the File box. You may search for the file by clicking on the Search button, which will open the Windows Open dialog. If you type in the file name, you may include the full path. If the file is located in the same directory with the AFMatic executable program file, you may leave the path off and just enter the file name. Check the Override Apt DB Info box if you wish to have the runway length, clearway, stopway, and slope information from the OpsData obstacle file replace the information from the worldwide airport database in your calculations. This is not recommended unless you specifically need to do so, since the worldwide airport database is updated more frequently than the OpsData information, and changes to the runway may be missed if you have overridden Apt DB info. Press the Import button to perform the file import, or press Cancel to abort the operation.

To obtain Jeppesen OpsData obstacle data, contact Jeppesen.

Edit SID

General

To enter SID required climb gradient data for a runway, you must first retrieve an existing airport and runway from the database, in order to define which runway the SID data will be associated with. Once you have retrieved the airport and runway, you may enter a name for the SID, a transition (if any), and the required minimum gradient and altitude up to which that gradient must be maintained. Then click on the Save button to save the SID data in the database. After a SID has been stored, you may retrieve it for editing or deletion by selecting it from the drop-down list in the SID box, and clicking on Retrieve. Clicking on the OK button dismisses the SID editor dialog. Be sure you have saved your data before exiting, since this will not be done for you automatically.

SID climb gradient requirements developed in accordance with the TERPS procedures include a margin of 48 feet per nautical mile, which is equivalent to a climb gradient of 0.8%. Obstacle clearance data in the Airplane Flight Manual also include a margin of 0.8%, the difference between gross and net flight path. The TERPS (FAA Handbook 8260.3/AFJM 11-226, United States Standard for Terminal Instrument Procedures) require a minimum gross climb gradient for instrument departures which clears obstacles by 48 feet per nautical mile (0.8%). Thus, the use of AFM obstacle clearance data in combination with a published SID required climb gradient results in a margin of 96 feet per nautical mile, which is twice the required margin. It is

left to the operator to make, and take responsibility for, the decision of whether to reduce the SID required climb gradient by 48 feet per nautical mile in order to eliminate the double margin. If it is desired by the operator to do this, enter the reduced gradient in the Gradient field, otherwise, enter the required climb gradient as specified on the SID chart. AFMatic makes its computations based on the gradient that is entered and stored here, and does not make any adjustments internally to either the gradient required, or the gradient available. The exception to this is for the C-37A and C-20 aircraft, which have an adjustment available on the Takeoff / Airport page, in the SID / DP box. Thus, the military aircraft should perform the adjustment when computing the takeoff, and only store the published SID gradient in the database.

Airport Identifier

Enter the 4-letter ICAO identifier, or the 3-letter IATA identifier. Click on the ICAO or IATA button to select which identifier has been specified. Press Enter or click on the Retrieve button to retrieve the airport from the database. You may view the airport information by clicking on the View button, either before or after pressing the Retrieve button. When the airport has been retrieved, the Airport / Runway Info box will contain the airport name and city, state, and country. The text on the Retrieve button will change color from red to green when an airport has been read into memory. Click the Search button to search for an airport in the database by name, city, or location.

Runway

When the airport data are retrieved from the database, the runway identifier drop-down list is filled with a list of the runways that are available for this airport in the database. Select the desired runway from this list by clicking on it or using the arrow keys to highlight your choice, and then press Enter or click on the Retrieve button to retrieve the runway data from the database, or the View button to retrieve the data and view it. When the runway has been retrieved, the Airport / Runway Info box will contain the runway identifier, length, and end elevation. The text on the Retrieve button will change color from red to green when a runway has been read into memory.

SID

If you are entering a new SID, select Add New SID from the SID drop-down list. To retrieve a SID that has been saved in the database, after the runway has been retrieved, the SID drop-down list will be filled with a list of the SIDs that have been saved for this runway. Select the SID you want to edit and press Enter. The SID edit fields in the bottom half of the window will be filled with the data for the SID. At this point you may edit the data.

SID Identifier

Enter the name of the SID in the Name field, e.g. ELMOO5 or VNY7. Names are limited to 6 characters. Some airports have numerous SIDs, and multiple transitions for each SID, each of which has a different minimum climb gradient associated with it. If there is a transition for the SID, enter the name of the transition in the Transition field. Transitions are limited to 8

characters. If the transition name is longer than 8 characters, it will be truncated to 8.

SID Specification

Enter the required climb gradient in the Gradient field, and the altitude in feet up to which the gradient must be maintained in the Up to Altitude field. Climb gradient may be expressed in feet per nautical mile (FT/NM) or percent (%). Generally, civilian SIDs are expressed in FT/NM, and this is the default. If the value you enter for gradient appears not to match the units selected, you will be prompted to confirm that this is indeed the input you want. The gradient will be converted to FT/NM and stored in that format, and will also be displayed elsewhere in the program in FT/NM, but will always be shown here in the units in which it was entered.

Options Menu

Select Aircraft

To select an aircraft for use in making computations from the list of aircraft that you have entered, use the Select Aircraft function on the Options menu. You will be presented with a drop-down list of aircraft in the database. Click on desired aircraft to select it, and then click on the OK button. If you click on the Cancel button, the function will abort without making a change.

Toggle Hints

When you place the cursor over an input or output field, most of them have built-in help text, called hints, that pop up on-screen, and also at the bottom of the main program window on the status line. After you become familiar with the program, these hints may become annoying, always popping up all over the place. You may turn off the pop-up hints with the Toggle Hints function on the Options menu. If the menu item has a check mark beside it, hints are on, and if not, they are off. Click on the menu item to toggle between the two states. Doing this only has an effect until you exit the program. If you want to make a permanent change, you may do so with the Preferences function of the Options menu. Note that if you turn off hints, only the pop-up hints will be turned off. All hints will still be displayed on the status line at the bottom of the window. This is true even for other windows or dialogs that are being displayed. For example, if the Runway Viewer is displayed, it overlays the main window. You may move the runway window to another location, and see the hints displayed on the main window's status line when you pass the cursor over a value in the Runway Viewer.

Preferences

General

The Preferences function allows you to adjust the default values for program settings. Access the Preferences function from the Options menu. When you have completed the changes, click on the OK button to save the preferences and make them active in the program, or click on Cancel to throw the changes away.

Takeoff

Line Up Distance

This is the distance from the brake release end of the runway to the nosewheel. Set the amount of runway length to be set aside for line up distance, in feet.

Obstacle Envelope

Select the envelope to be used for computing obstacle clearance. The FAA envelope is a constant 600 feet wide, 300 feet each side of the runway centerline, regardless of the distance an obstacle is from the end of the runway. The ICAO envelope extends 295 feet (90 M) each side of centerline at the end of the runway, and expands out at a ratio of 8:1 to a maximum of 1969 feet (600 M) after which it remains constant. Each obstacle is evaluated based on the offset from centerline, and only those that fall within the envelope are tested for clearance. If you have no legal requirement for one or the other, the ICAO methodology is more conservative, since it will include obstacles that the FAA methodology does not consider and allows for some drift from the extended runway centerline.

V1 Display

The takeoff results display will show any one of the three V1 values that are possible, V1Min, V1Max, or V1 for balanced field length. Select the one that you want displayed in the results. You may view all of the V1 values in the results screen by placing the cursor over the V1 value, so they are all available to you after the calculation.

Landing

Distance

Select the distance that landing field length limited weight will be based on. For FAR 91 operators, Landing Dist. is appropriate. For FAR 135 and 121, or FAR 91 subpart K (fractional ownership) operators, Intended Dry/Alt would be appropriate, to make the default condition be the dry factored runway length.

FAR 91 Subpart K Factored Landing Field Length

Check this box to cause the landing field length factor of 0.8 to be applied to the Intended Dry and Intended Wet field length calculations for FAR 91 subpart K (fractional ownership) operators. If left unchecked, the landing field length factor of 0.6, appropriate for FAR 135 and 121 operators, will be applied.

FAR 91 Unfactored Landing Field Length

Check this box to use the FAR 91 unfactored landing field length calculations from the Operational Information Supplement. These are available only for Gulfstream V, IV-SP, and 550. They are only available for flaps 39, with anti-skid operative and automatic ground spoilers. Refer to the OIS text for details and conditions of use. For any calculation that can't be handled using these data, the AFM data will automatically be substituted.

Units

Select the units you wish to have as defaults for temperature, altimeter setting, weight, and wind speed.

Miscellaneous

Airport Identifier

Select which airport identifier type you wish to have as the default. Note that all airports in the worldwide airport database have ICAO identifiers. There are a large number of airports that have no IATA identifier associated with them, so it is recommended that you make ICAO the default.

Center Screen

If this is checked, whenever the program is started, the program window will be centered in the computer screen. If it is not checked, the window will be placed where it was the last time the program was executed.

Show Hints

If this is checked, the pop-up hints will be activated, and each time the cursor is placed over an item that has a hint associated with it, the hint will be displayed both on the status line at the bottom of the main window, and in a pop-up hint attached to the tail of the cursor. If unchecked, hints will be shown only on the status line.

Save On Exit

If this is checked, the configuration of the program is saved each time the program exits, and will be reinitialized to those settings at the next execution. If not checked, the program settings will not be saved.

Printer Character Size

Enter the desired printer character size for printed output, in points. The default value is 12. Some printers may require an adjustment due to having wider margins which would force the output to spill over onto a second page. Setting a smaller point size will allow the information to

fit onto one page.

Alternate Search Criteria

Enter the maximum distance in nautical miles and minimum length of longest runway in feet, to be used as the default values for the alternate search feature of the airport search dialog.

Toolbar

Define the functions assigned to the toolbar buttons. You may arrange the toolbar buttons in any desired order by selecting the function for each button. Every function must be assigned to a button, and no function may be assigned to more than one button. This will be checked when the OK button is clicked, and you will be asked to make changes if needed.

Help Menu

Help Topics

Online help is available by selecting the Help Topics function from the Help menu. The complete documentation is available online, organized by topic. You may also search the documentation for any word that appears in it. This capability will provide you with all of the information that is in this document, without having to carry the printed documentation with you.

About

The About box displays information about the program. In addition to the usual program name and copyright that are found in most other software, you will find the versions of the program and worldwide airport database, customer name and number, the active aircraft type and certification basis, and the revision number and dates of the Airplane Flight Manual and other manuals that make up the aircraft database. This is the place to go to determine the revision status of the software. Dismiss the About box by clicking on the OK button.

Contact

From time to time, you may need to contact Gulfstream for customer support or Tybee Jet for technical support. Select the Contact function from the Help menu, and you will see a dialog that provides you with several methods of contacting us. The Tybee Jet website and support email address have been turned into live links. If you click on the underlined internet addresses, and you have a default web browser or email program specified in the Windows Registry, the default web browser or email program (as appropriate) will be launched, and take you to the Tybee Jet website, or begin editing an email message. You will, of course, have to be connected with access to your internet service provider for this to function. Dismiss the Contact box by clicking on the OK button.

View the Tybee Jet website at: www.tybeejet.com

Contact Gulfstream Technical Publications for customer support by the following means:

Phone: 912-965-3204

Mail: Gulfstream Aerospace
Technical Publications
P.O. Box 2206 M/S C-20
Savannah, GA USA 31402

Contact Tybee Jet for technical support by the following means:

Phone: 615-308-7216

Mail: Tybee Jet Corporation
644 Logwood Briar Circle
Brentwood, TN USA 37027

Miscellaneous

Windows Font Size

The Windows operating system allows the user to select from two font sizes, known as "Large Fonts" and "Small Fonts", by right clicking on the Windows desktop, selecting "Properties" from the menu, clicking on the "Settings" tab, and selecting either font size from a combo box. (For Windows XP, click the "Advanced" button on the "Settings" tab, then select either "Normal size (96 DPI)" or "Large size (120 DPI)".) AFMatic has been designed using "Small Fonts", however, it will scale properly if you select "Large Fonts". It is possible that on some computer systems, some of the visual elements of AFMatic will not scale properly with "Large Fonts". If you encounter a problem with scaling when using "Large Fonts", please provide us with a report of the problem so that we can track it down and correct it.

Data Integrity

All the computation power in the world is of no use if the data that form the basis of the computations are not valid. To ensure the integrity of the worldwide airport database, the aircraft data from the Airplane Flight Manual, and the program executable itself, AFMatic incorporates a mathematical algorithm, known as a Cyclic Redundancy Check, or CRC. The CRC is computed for the program executable and the aforementioned data files each time the program is executed, and compared with the CRC value that was computed when these files were created. If so much as a single bit in a single byte in any of these files has been changed,

the program will display a message alerting you to the fact that the file integrity has been compromised, and instructing you to reinstall the software. At that point, AFMatic will terminate. You must reinstall the application to restore the files to their proper form, or alternately, if you made a backup immediately after installing the application, you may restore the files from the backup. This file integrity check provides protection from virus attack, as well as accidental corruption of the files.

Web Sites Of Interest

The wealth of information available on the Internet must not be overlooked. In addition to web sites that are directly related to Tybee Jet and the operation of AFMatic, there are some closely related sites of interest.

The Tybee Jet Corporation web site has information regarding AFMatic:

www.tybeejet.com

The Gulfstream Aerospace Corporation web site has information regarding Gulfstream products and services:

www.gulfstream.com

The Boeing web site is an excellent source of information regarding airport noise restrictions at airports throughout the world. It also has general information about noise regulations. If noise restrictions are a concern for your operations, this is a valuable resource:

www.boeing.com/commercial/noise/list.html

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