

# **Runway Incursion Severity Calculator (RISC) 4.2 User Guide**

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**May 2009**



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## **RISC Overview**

### **Welcome to Runway Incursion Severity Calculator (RISC)**

The Runway Incursion Severity Calculator (RISC) is a tool for categorizing the severity of the outcome of a runway incursion. RISC produces standardized ratings and enables comparisons of runway incursions between different facilities on an international level. RISC provides a reliable method of rating the severity of runway incursions and, can be used for measuring risk of surface operations and improving risk management worldwide.

### **Assumptions and Caveats**

This calculator is not designed to classify events involving helicopters or vertical flight aircraft in the air. If such aircraft are stationary on the ground, they are classified as aircraft on the ground and treated by the model as obstacles. It is also not appropriate for conflicts involving three or more aircraft, or pedestrians.

### **How the Calculator Works**

The foundation for the rating of the severity of the outcome of the incursion is the closest proximity, that is, how close the two aircraft or aircraft and vehicle came in vertical and horizontal space. The model then considers other factors that influence the probability of a collision. There are several factors, such as aircraft speed, that are relevant, but not usually available in incursion reports. Relevant factors used by the model fall into the following categories:

- a. Visibility
- b. Type of aircraft (weight and/or performance characteristics)
- c. Characteristics of avoidance maneuver executed (including time available for pilot response)
- d. Runway characteristics and conditions (width, braking action reported)
- e. Degree to which the situation was controlled or uncontrolled (e.g., type of pilot/controller errors involved, whether all parties were on frequency, whether the controller was aware of all of the parties involved)

Subsumed within each factor are elements. Elements within the factor of visibility are levels of RVR (runway visual range), reported ceiling height and visibility, and day/night. Runway characteristic factors include the width of the runway in situations in which an aircraft on the runway conflicts with an aircraft or vehicle approaching it from the side. This factor also includes the runway conditions (dry, wet, braking action reported as poor or fair) in scenarios that involve avoidance maneuvers in which braking action is a relevant factor (for example, hard braking action, aborted takeoff). There are several elements within the factor "controlled/uncontrolled". One element concerns communication issues such as aircraft not on

the correct frequency, partially- or totally-blocked transmission, pilot accepting another aircraft's clearance, readback/hearback error, etc. The other elements map to a lack of awareness on the part of the controller (for example, the controller forgot about an aircraft) or pilot (for example, pilot landed on the wrong runway).

The role of the factors is to increase the severity rating beyond that which is suggested solely by closest proximity in situations in which closest proximity alone is insufficient to describe the risk. That is, an examination of the critical factors determines whether the same outcome could reasonably be expected to occur again, given the same situation. For example, consider two aircraft that had landed on intersecting runways and stopped 100 meters from each other. In perfect visibility and without severe braking executed by either pilot, the outcome that the aircraft would come no closer than 100 meters has a higher chance of recurring than it would in poor visibility (where there is degraded information for all parties) or with extreme avoidance maneuvers having been executed. Similarly, if available response time for one of the pilots was extremely short (for example, less than 5 seconds), more variability would be expected in the outcome of the pilot's response (and hence, the severity of the outcome) than if the available response time was long. Therefore, each factor that adds to the variability of the outcome of the incursion is considered in the rating and the more conservative rating is applied. This means that each relevant factor has the potential to make the rating of severity higher than it would have been if it were defined solely by the closest proximity. It should be noted that this is not the same as basing the rating on the worst possible, or worst credible, outcome of the scenario. The model does not rate the severity of the incursion based on everything that could have gone wrong. Rather, it looks at the critical sources of variability within the scenario, assigns a weight to each factor (and to each element within the factor) that contributes to the variability, and generates a rating based on the assigned weights of the factors and the elements within each factor. While it may be helpful to think of the weights as scaling the "severity" level of the factor (for example, a pilot's acceptance of clearance intended for another aircraft is more serious than a partially-blocked transmission), they actually represent the level of variability that the factor introduces into the severity of the outcome.

### ***Closest Proximity***

The foundation for the severity classification for the outcome of an incursion is the proximity to collision. The model assumes that the closest vertical and lateral (horizontal) proximities entered are accurate. There is no logic in the model that can detect proximity values that are illogical given the other details in the report. Below are guidelines for determining the appropriate proximity values for incursions involving more than one aircraft or an aircraft and a vehicle.

- The closest proximity is the distance between the two aircraft or between the aircraft and vehicle at the end of the conflict. This is defined as either when both parties have stopped or when all parties are aware of the situation and have the aircraft under control at taxi speed or less. In most cases, this distance can be represented as a straight line

(either vertical or horizontal). For events that involve intersections, however, the closest proximity is computed by adding the distance from each aircraft (or aircraft and vehicle) to the intersection. For example, if an aircraft that aborted its takeoff stopped 100 meters from the intersection with another runway on which another aircraft landed and stopped 150 meters from the intersection, the closest proximity to be entered into the model is 250 meters.

- In an incursion in which there is a vertical and horizontal proximity reported, you may use whichever value is more representative of the risk incurred in the event. However, vertical proximity should always be used whenever there is a direct overflight, that is, whenever an aircraft flies directly over an aircraft or vehicle on takeoff or landing.
- When proximity between two vehicles was decreased by an intentional maneuver, the proximity to which the vehicles came as the result of unintentional actions should be the one entered into the model. For example, if at some point, a pilot or vehicle driver elected to go closer to the other aircraft (e.g., so as to go around each other on a runway), the proximity that is entered into the model should be the proximity at which both aircraft were aware of the situation and were under control at taxi speed or less.

### *Scenarios*

The mechanics of the model start with a set of situations, or "scenarios", that broadly subsume all types of runway incursions (with the exception of those involving helicopters or pedestrians). These scenarios define the parties involved (for example, two aircraft or an aircraft and a vehicle) and the action of the parties at the point of the incursion (landing, taking off, crossed the hold short line, etc.). The scenario can involve, for example, two landing aircraft on intersecting runways, one landing aircraft and one takeoff aircraft, one landing aircraft and a taxiing aircraft or vehicle crossing the runway, etc. The Scenario Selector is a tool that takes the description of the conflict and assigns a scenario number that is to be entered into the model.

Each scenario has a specific table associated with it. The table defines a proximity at or below which the classification will always be an "A" and another proximity at or above which, the classification will always be a "C". For proximities in between these extreme values, the severity calculation starts with the closest proximity and then assigns a classification based on the proximity and a set of factors that are weighted for that scenario.

### *Errors*

The set of "errors" in the model are the pilot, controller, and vehicle driver errors that contribute to the variability of the outcome of the incursion. Examples include: the controller forgetting about an aircraft on the runway, a pilot landing on the wrong runway, a vehicle crossing the runway without a clearance. Communication errors include one of the parties not being on frequency, blocked transmissions (two parties try to transmit at the same time), and "readback/hearback" errors. A "readback" error occurs when a pilot reads back something different from what the controller said. For example, if the controller issued a clearance to land

on Runway 23L and the pilot read back the clearance as "cleared to land 23 Right". If the controller did not correct the error, this is referred to as a "hearback" error.

### ***Avoidance Maneuvers***

Avoidance maneuvers describe actions taken by the aircraft and/or vehicle. Examples include:

- Aircraft rotated early on takeoff to avoid a collision
- Aircraft delayed rotation to avoid a collision
- Aircraft aborted takeoff (in which case the distance rolled should be reported)
- Aircraft or vehicle swerved to avoid a collision
- Aircraft or vehicle applied hard/maximum braking
- Aircraft executed a go-around (executed a missed approach)

### ***Incident Types and Ratings***

After the information is entered, clicking the "Calculate Rating" button will display an FAA or ICAO alpha rating. In addition to an alpha rating, the RISC model displays the calculated numeric value. *See Sheridan, 2004 for a detailed discussion of the mathematics behind the model.* The RISC model calculates ratings for the following incident types.

- Incursion involving two aircraft or an aircraft and vehicle - This category of incursions involves a runway and two objects, at least one of them being an aircraft. An example is a vehicle crossing a runway in front of an aircraft which is approaching the runway for a landing.
- Incursion involving one aircraft or a vehicle - An example would be an aircraft that was told to hold short of a runway, but crossed the hold-short line before stopping short of the runway.
- Runway Operations on a Taxiway - This category is for incidents involving takeoffs or landings on taxiways or ramps with no other aircraft or vehicle present in the area at the time of the incident.
- Runway Operations on a taxiway, with a conflict - This category is for incidents involving aircraft that either takeoff, land, or attempt to takeoff or land on a taxiway or ramp and conflicts with another aircraft or vehicle.

**Note:** When entering information into the calculator, the tool allows you to select from only three different incident types: an incursion involving two aircraft or an aircraft and a vehicle, an incursion involving one aircraft or a vehicle, or a Surface Incident. When calculating a rating for Runway Operations on a taxiway or Runway Operations on a taxiway with a conflict, select the incident type, Surface Incident.

The following table displays the FAA and ICAO ratings, the calculated numeric values, and rating description.

|  | FAA/ICAO Rating | Calculated numeric values | Rating Description   |
|--|-----------------|---------------------------|--|
| <b>Incursions involving two Aircraft, or an Aircraft and Vehicle</b> |                 |                           |  |
|  | A               | $\geq 3.5$                | A serious incident in which a collision was narrowly avoided.  |
|  | B               | $< 3.5$ and $\geq 2.5$    | An incident in which separation decreases and there is a significant potential for collision, which may result in a time-critical corrective/evasive response to avoid a collision.  |
|  | C               | $< 2.5$ and $> 1.5$       | An incident characterized by ample time and/or distance to avoid a collision.  |
| <b>Incursion involving one Aircraft or Vehicle</b>                   |                 |                           |  |
|  | D               | $< 1.5$ and $\geq 1.17$   | An incident that meets the definition of runway incursion, such as incorrect presence of a single aircraft or vehicle on the protected area of a surface designated for the landing and take-off of aircraft, but with no immediate safety consequences. |
| <b>Runway Operations on a Taxiway</b>                                |                 |                           |  |
| RT   | RT              | -                         | Since these are technically not incursions, they do not receive an incursion rating. For the purposes of the RISC software, these events are automatically rated "RT" to signify this.   |
| <b>Runway Operations on a Taxiway, with a Conflict</b>               |                 |                           |  |
| RTC  | RTC             | -                         | These are technically not incursions. For the purposes of the RISC software, these events are automatically rated "RTC" to signify this.   |

|  |  |  |   |
|--|--|--|---|
|  |  |  | <p>However, the software also calculates the RISC rating for the user and does so using the same rules had it occurred on the runway. In other words, the events will be rated RTC: A, RTC: B, or RTC: C. Note: Currently there are no scenarios in the model where a landing aircraft would go around, so there is currently no RTC: D rating.</p> |
|--|--|--|---|

### ***RISC Dialog Boxes***

The application consists of the following dialog boxes:

- **RISC Main**

The RISC Main dialog box provides access to the RISC (Database Version), RISC (Calculator Version), RISC Analysis, RISC Scenario Tool, and the Measurements and Settings dialog boxes.

- **RISC Calculator**

Both the RISC (Database Version) and RISC (Calculator Version) dialog boxes allow you to enter the details of a runway incursion, and calculate a severity rating. The information used to calculate a rating includes data on closest proximity (horizontal and/or vertical), visibility and braking conditions, the aircraft or vehicles involved, avoidance maneuvers, and pilot or controller errors.

The RISC (Database Version) dialog box provides the added capability to save incursion reports to a database and manage incursion records.

- **RISC Analysis**

The RISC Analysis dialog box provides access to the Average Numerical RISC Rating report. The RISC Average Numerical RISC Rating report lists the application's alpha ratings for a specified year range, the corresponding average numerical rating, the counts for the alpha ratings, and the standard deviation.

- **RISC Scenario Tool**

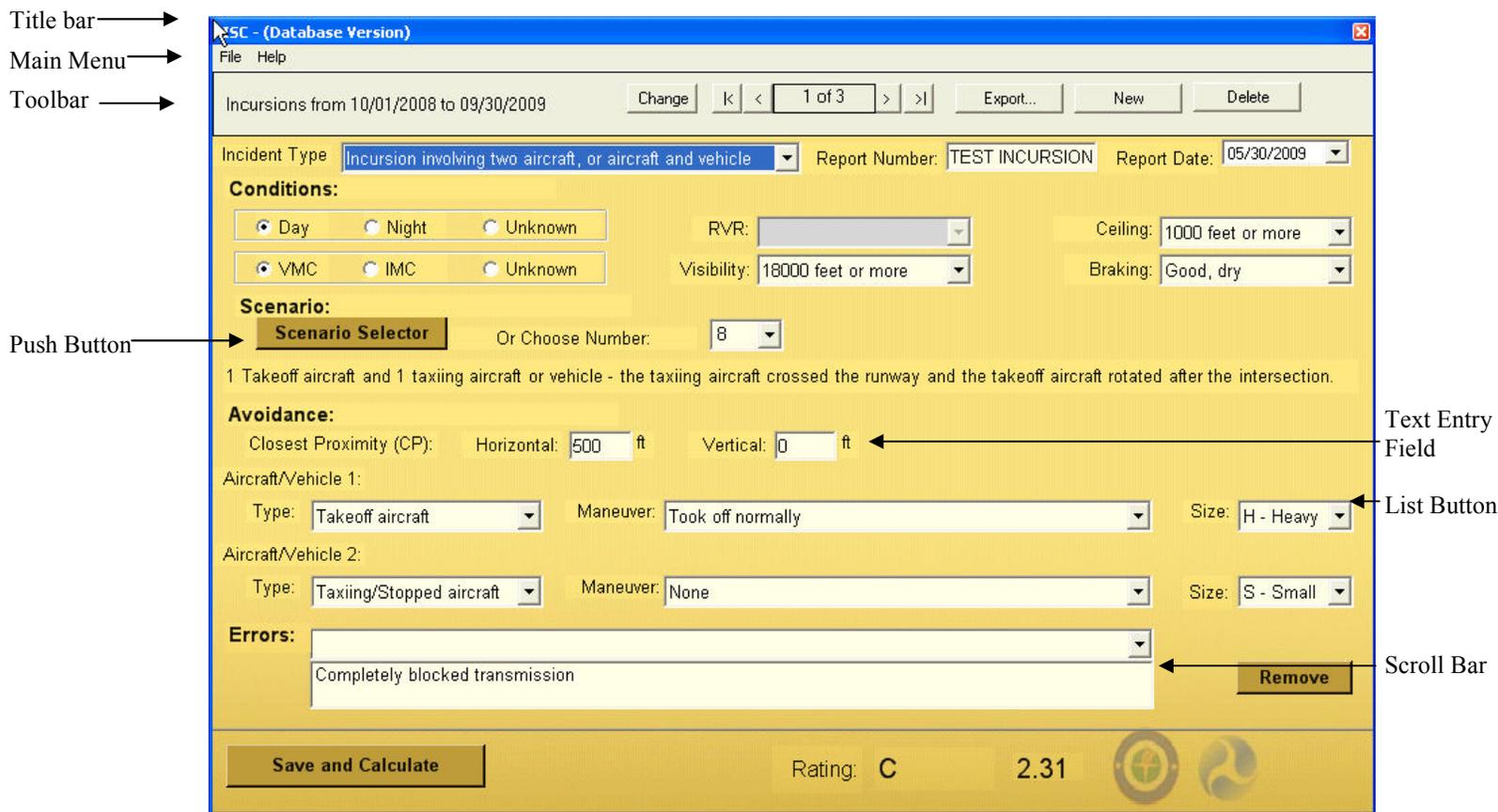
The RISC Scenario Tool guides you through the process of determining the scenario for a runway incursion. Using the tool, you generate a scenario "number" after you identify the parties involved, their orientation at the point of the incursion, and the action each party took.

- **RISC Measurements and Settings**

The RISC Measurements and Settings dialog box allows you to select the units of measure you will use to calculate a severity rating on the RISC Calculator dialog box.

## Using RISC Dialog Boxes

Dialog boxes are windows that enable you to specify choices or enter information instructing an application on what to do. The following graphic shows the RISC (Database Version) dialog box.



### Title Bar

The title bar displays the name of the dialog box and can be used to drag the dialog box to a different location. To do this, with your pointer in the title bar, depress the left mouse button and drag the dialog box to a new location.

### Main Menu

A main menu displays under the title bar providing access to the **File** and **Help** menus. To select an option on a menu using the mouse, do the following:

1. Click the menu name. A drop-down menu displays.
2. Highlight an option.

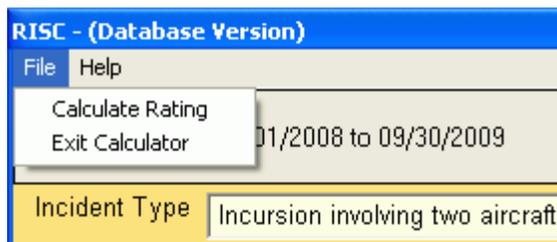
3. Click the left-mouse button.

To select an option on a menu using the keyboard (for example, **File**), do the following:

1. Press the **Alt** and **F** keys simultaneously. Notice that the **File** drop-down menu displays and the first option is highlighted.
2. To select the first option, press the **Enter** key . To select another option, use the down-arrow key to highlight the option and then press the **Enter** key.

## OR

1. Press the **Alt** and **F** keys simultaneously. Notice that the **File** drop-down menu displays and the first option is highlighted.
2. Press the key for the letter that is underscored in the option name. If no letter is underscored, press the key for the first letter in the first word of the option name. For example, to select the option **Calculate Rating**, you would press the **R** key because the letter R is underscored. To select the option **Exit Calculator**, you would press the **E** key.



**Note:** Press the Alt and H keys simultaneously to access the Help menu.

### ***Toolbar (Database Version)***

A toolbar under the main menu allows you to manage records in the RISC database. For more information on the toolbar see the topic, Using RISC (Database Version).

### ***Text Entry Field***

Text entry fields allow you to use the keyboard to type in information. If you make an error, backspace to remove characters.

**Note:** The Closest Proximity (CP) text fields accept a numeric value only.

### ***List Buttons***

Many text entry fields on the calculator dialog boxes have a list button. A list button provides a pull-down list of choices. List buttons are represented by an arrow. To select a list button using the mouse, move the pointer over the button and click the left mouse button. A pull-down list of choices displays. Highlight the desired selection and click the left mouse button.

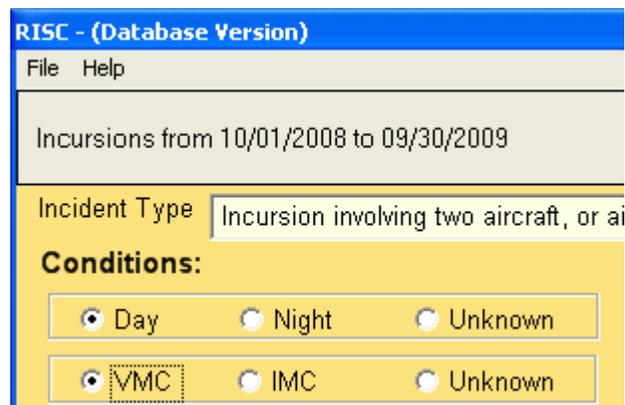
If a text entry field has a list button and you use the keyboard to type in information, do the following to avoid receiving an error message:

1. With the cursor in the field, press the **F4** key. A pull-down list of choices displays.
2. Press the down arrow key on the keyboard and highlight the desired selection.
3. Press the **F4** key.
4. Press the **Tab** key to move to the next field.

### ***Radio Buttons***

Radio buttons are used to select one option exclusively from a group of options. To select a radio button using the mouse, move the pointer over the radio button and click the left mouse button. When one of these buttons is selected, the other options become deselected. To select a radio button using the keyboard, do the following:

1. Press the **Tab** key until a dotted line surrounds a radio button label of any entry in the group. In the example below, VMC is selected.



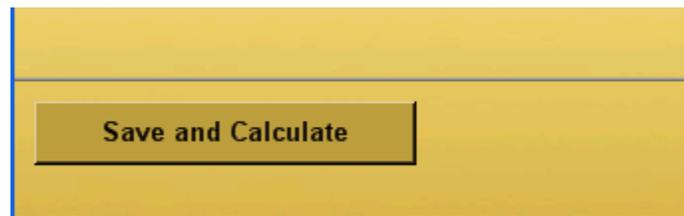
2. To move to the Visibility field, press the **Tab** key. If you want to select another entry in the radio button group, press the right or left arrow key until a dotted line surrounds the radio button label of the entry. In the example below, IMC was selected using the right-arrow key. To move to the RVR field, you would press the **Tab** key.

### ***Push Buttons***

Push buttons perform a specific action when selected. The action is indicated by the label on the button.

To select a push button using the mouse, move the pointer over the push button and click the left mouse button. To select a push button using the keyboard, simultaneously press the **Alt** key and the key for the letter that is underscored in the button label. The image below displays the **Save and Calculate** button on the RISC (Database Version) dialog box. In this example, you would press **Alt** and **C** to save the report and calculate a rating.

**Note:** If the push buttons on a dialog box do not display underscored letters, press the **Alt** key. After pressing the **Alt** key, the underscored letters will display.



### ***Scroll Bar***

Some lists of options are too long to be displayed in a dialog box so only a portion of the entire list is displayed at any time. You can use the scroll bar on the right side of the list to view all options.

- To scroll using the arrow keys, press the up arrow to move up one line in the list and the down arrow to move down one line.
- To scroll using the slider, move the pointer onto the slider, depress the left button, and drag the slider up or down to move through the list. Then release the button. The position of the slider indicates the relative position of the items displayed within the list.
- To scroll using the trough region, click in the trough above the slider to move up one window or below the slider to move down one window.

## Using RISC Help

### *Invoking RISC Help*

To access the Help using the mouse, do the following:

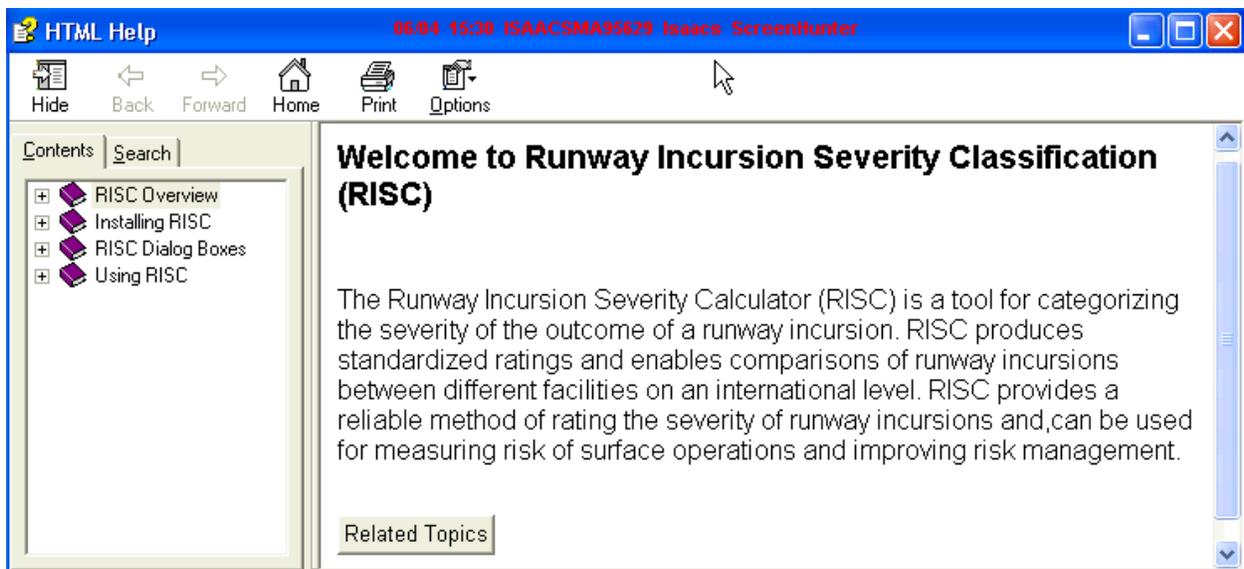
1. Click the **Help** button on the main menu. A drop-down menu displays.
2. Highlight the **Help** option.
3. Click the left mouse button.

To access the Help using the keyboard:

1. Press the **Alt** and **H** keys simultaneously. A drop-down menu displays with the **Help** option highlighted.
2. Press the **Enter** key.

### *Navigating RISC Help*

The RISC Help contains a navigation pane and a topic window. The navigation pane, located on the left-hand side of the screen, allows you to navigate the Help system. The topic window located on the right-hand side of the screen displays help topic content.



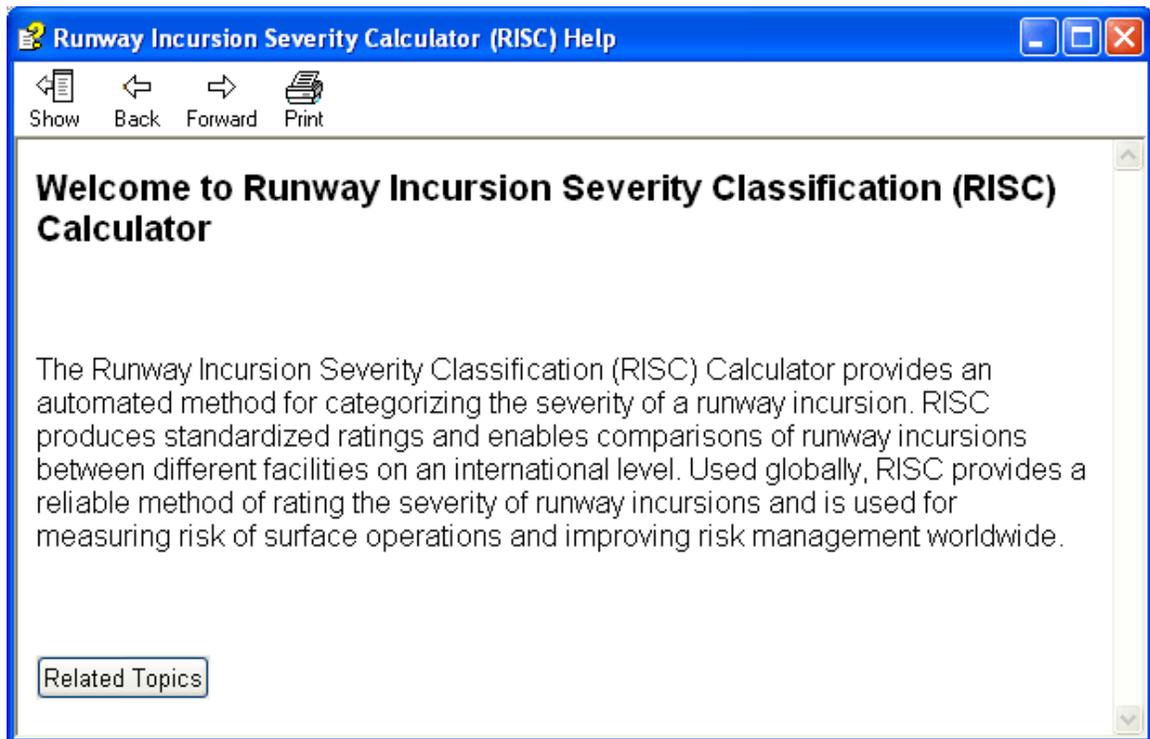
The navigation pane includes the following buttons and tabs:

- Show/Hide Buttons
- Backward/Forward Buttons

- Print Button
- Contents Tab
- Index Tab
- Search Tab

### ***Show/Hide Buttons***

To hide the navigation pane and view the topic window only, click the **Hide** button located under the title bar. When you click the **Hide** button, the navigation pane closes and a **Show** button appears under the title bar. To open the navigation pane again, click the **Show** button.



### ***Back/Forward Buttons***

To browse backwards through topics you have previously viewed, click the Back button. To browse forward, click the Forward button.

### ***Print Button***

To print a selected topic or all topics under a selected heading or book, click the Print Button. After you click the Print button, a dialog box appears which lets you choose your print option.

**Note:** A heading or book is selected if it is highlighted in the navigation pane. A topic is selected if it is highlighted in the navigation pane and appears in the topic window.

### ***Contents Tab***

To scroll through the table of contents for Help, click the **Contents** tab. The Contents tab displays books and topic pages that represent the categories of information in the RISC Help. When you double click a closed book () , it opens to display its content (sub-books and topic pages). When you double click an open book () , it closes. When you click a topic page () , that topic page displays in the topic window.

### ***Index Tab***

To scroll through or search the index, click the **Index** tab. Type a keyword in the search field to find a matching index term or scroll through the list of index terms. Click on an index term to display its related topic(s). A help topic page will automatically open if there is only one topic related to the index term. If there is more than one related topic, a pop-up menu will appear with a list of topics to choose from.

### ***Search Tab***

When you want to search for specific terms or phrases, click the **Search** tab. Type a search term in the search field and press the <**Enter**> key on your keyboard. A list of matching topics is generated. Double-click on a topic title to open that topic.

### ***Viewing Related Help Topics***

To view information related to a particular topic click [Related Topics](#) at the bottom of a topic page. A related help topic page will automatically open if there is only one related topic. If there is more than one related help topic, a pop-up menu will appear with a list of related topics to choose from.

## Installing RISC

### RISC System Requirements

To use the RISC software, your system should be equipped with the following:

- Windows 2000 or higher only
- Microsoft .NET Framework 1.1 (English version is included on the install CD and can be run directly from the install file\*)
- Microsoft Data Access Component (MDAC) 2.6 or higher (2.8 is included on the install CD)

**Note:** RISC software is not supported if it is installed on a machine using Windows Vista operating system.

RISC software is best viewed using a display setting of small fonts (96 dpi) and a minimum screen area of 800 X 600 or higher.

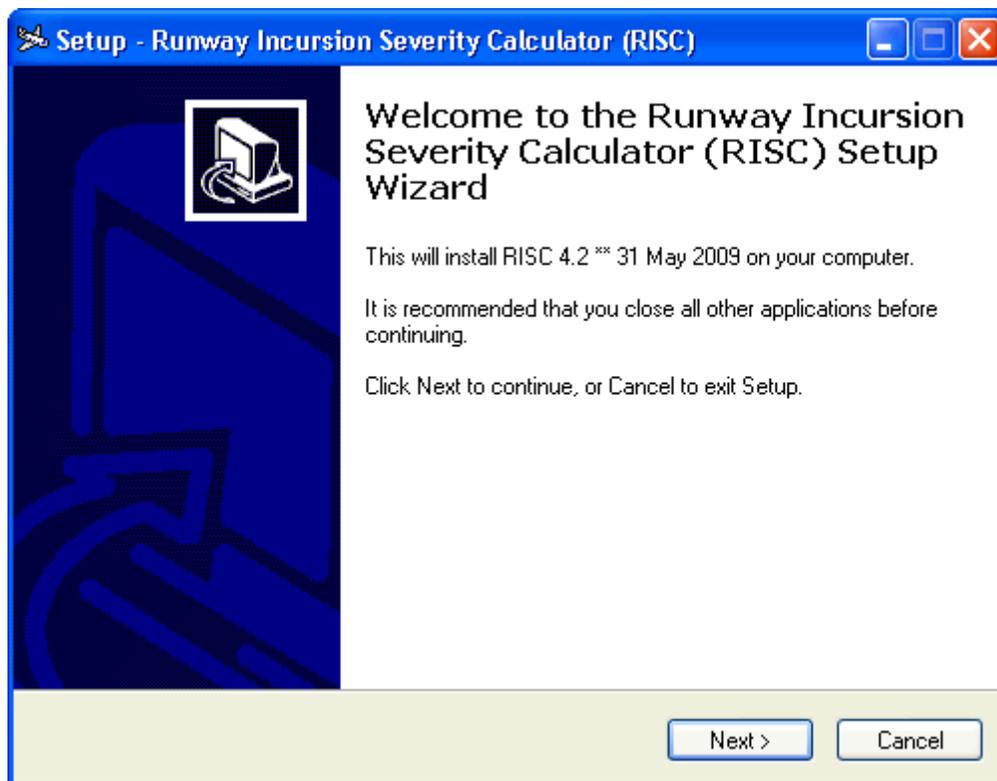
\* Due to limitations with its distributor Microsoft, it is not possible to install more than one language version of .NET framework 1.1. The version that is packaged along with RISC is the English version. If you require a non-English version, please download it from the [Microsoft website](#).

## Running the RISC Setup Wizard

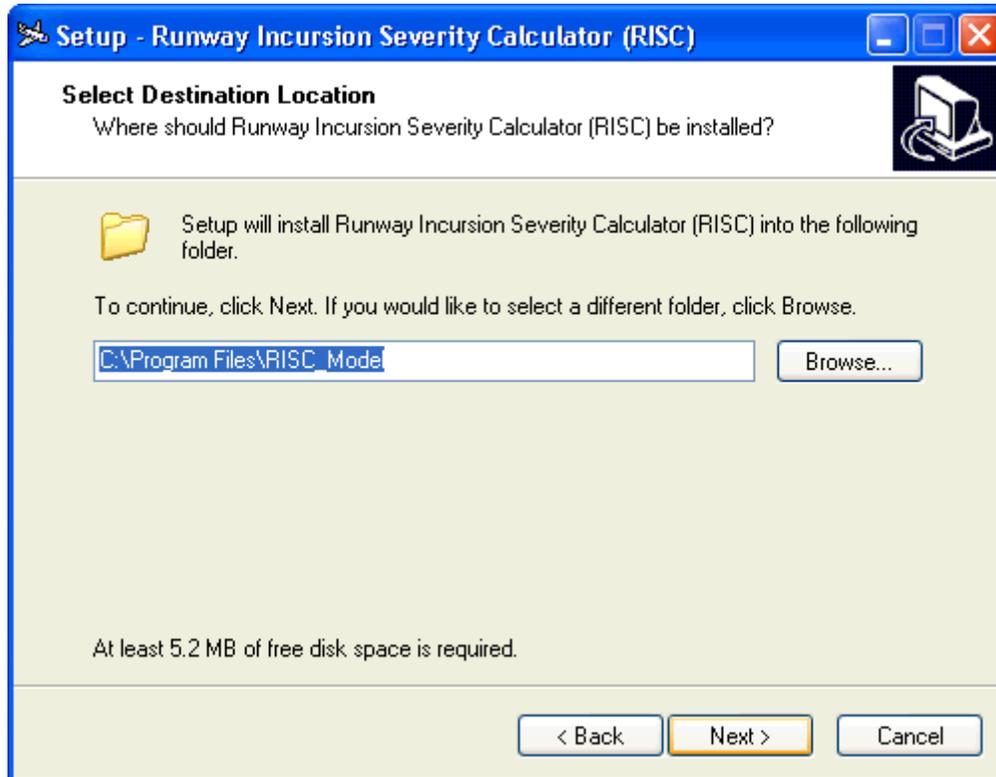
Before installing the Runway Incursion Severity Calculator (RISC) software, check that your system meets the System Requirements for using RISC. To install RISC, do the following:

1. Insert the RISC Installation CD into the CD drive on your PC. The RISC Setup program will start automatically and display the RISC Setup Wizard's *Welcome* dialog box. Close all other applications before continuing (recommended). To continue, click the **Next** button. You can exit the Setup program at any time by clicking the **Cancel** button.

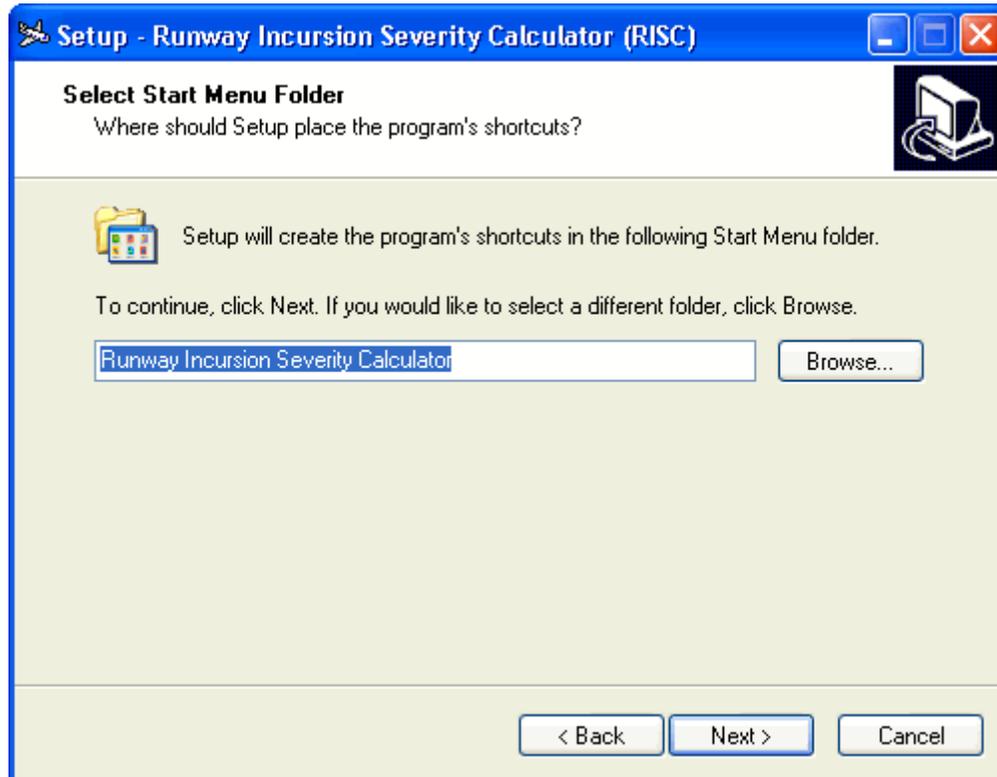
**Note:** If Setup does not start automatically, navigate to your CD drive and click the **RISC\_SetUp.exe** file in the RISC Installation folder.



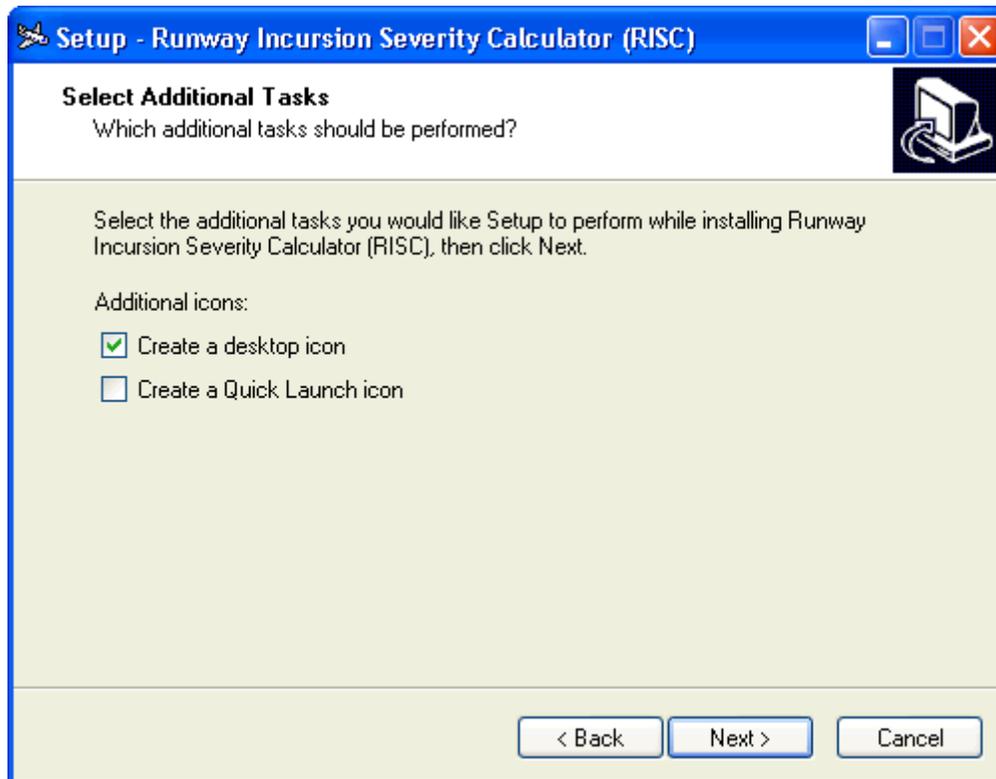
2. On the *Select Destination Location* dialog box enter the location where you want the Setup Wizard to install RISC. Use the **Browse** button to select a folder other than the default folder that appears. To continue, click the **Next** button.



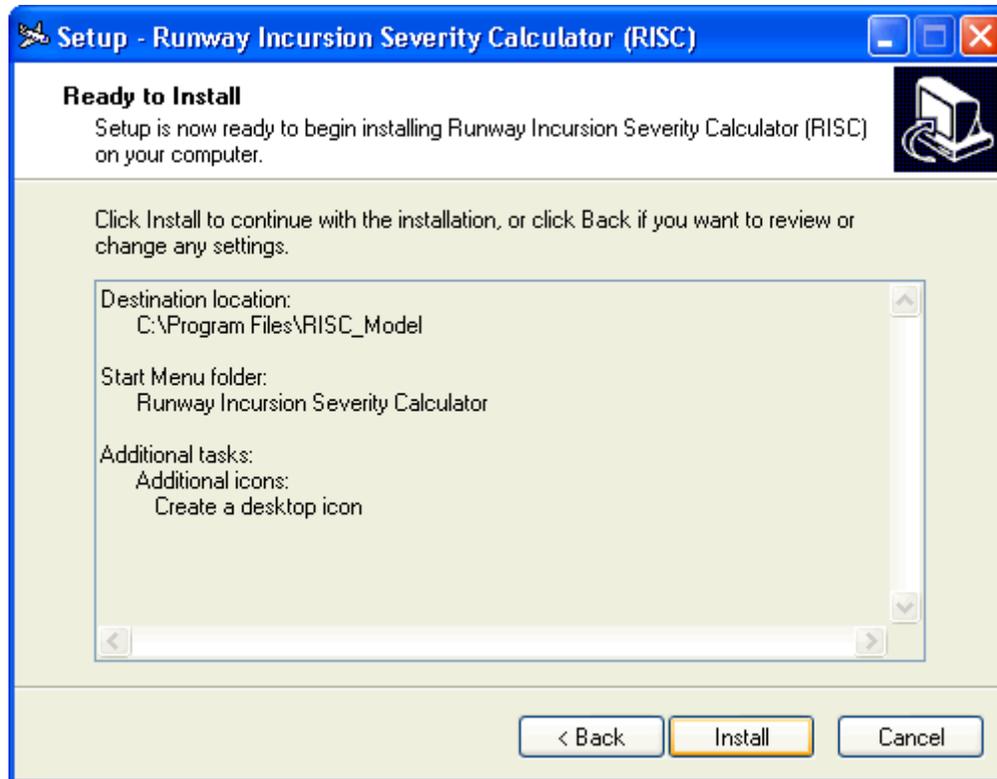
3. On the Select Start Menu Folder dialog box enter the location where you want the Setup Wizard to create the program's shortcuts. Use the **Browse** button to select a folder other than the default folder that appears. To continue, click the **Next** button.



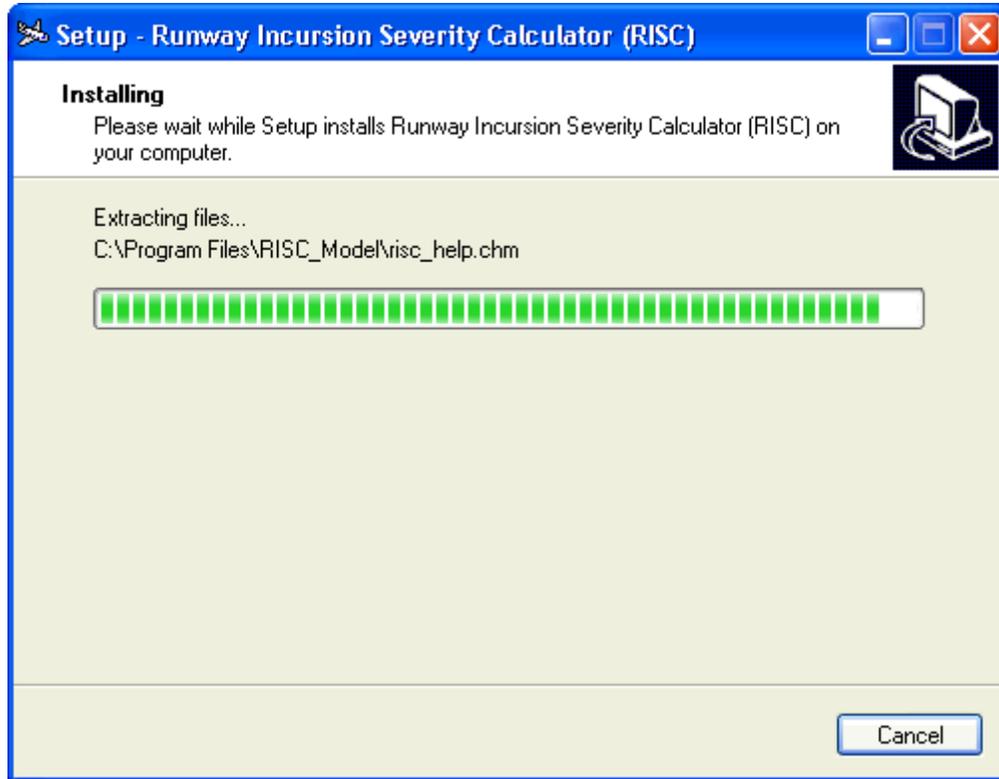
4. On the Select Additional Tasks dialog box indicate whether you want to create a desktop and/or Quick Launch icon for running RISC by clicking the appropriate checkbox(es). To continue, click the **Next** button.



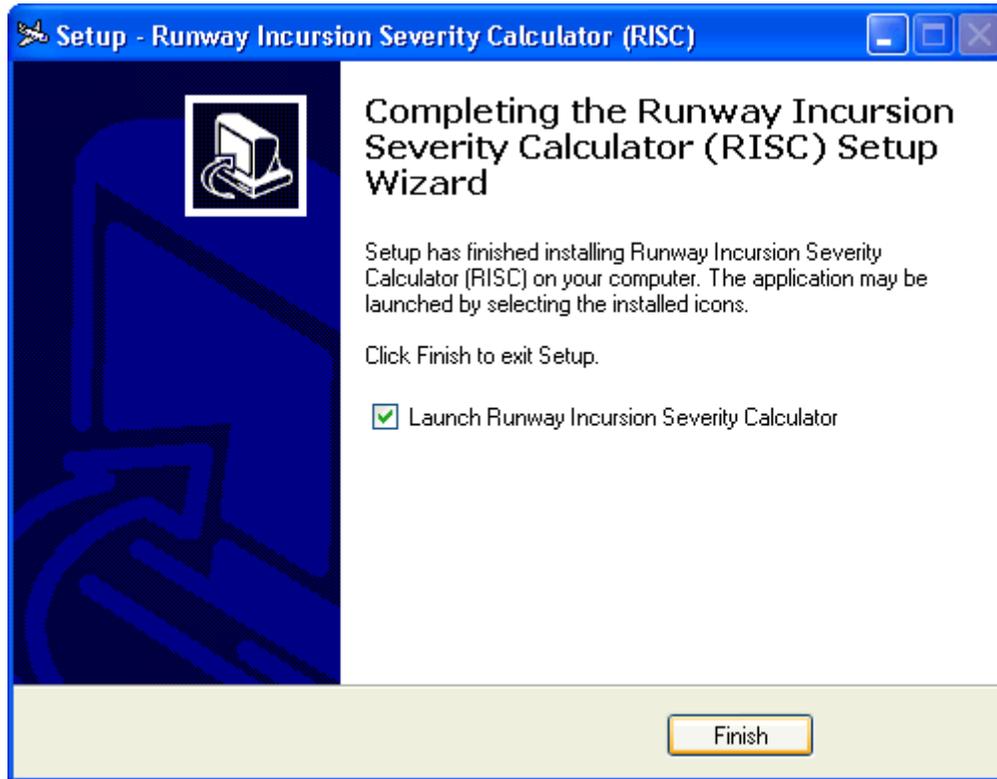
5. The Ready to Install dialog box displays your selections for review. To continue, click the **Install** button.



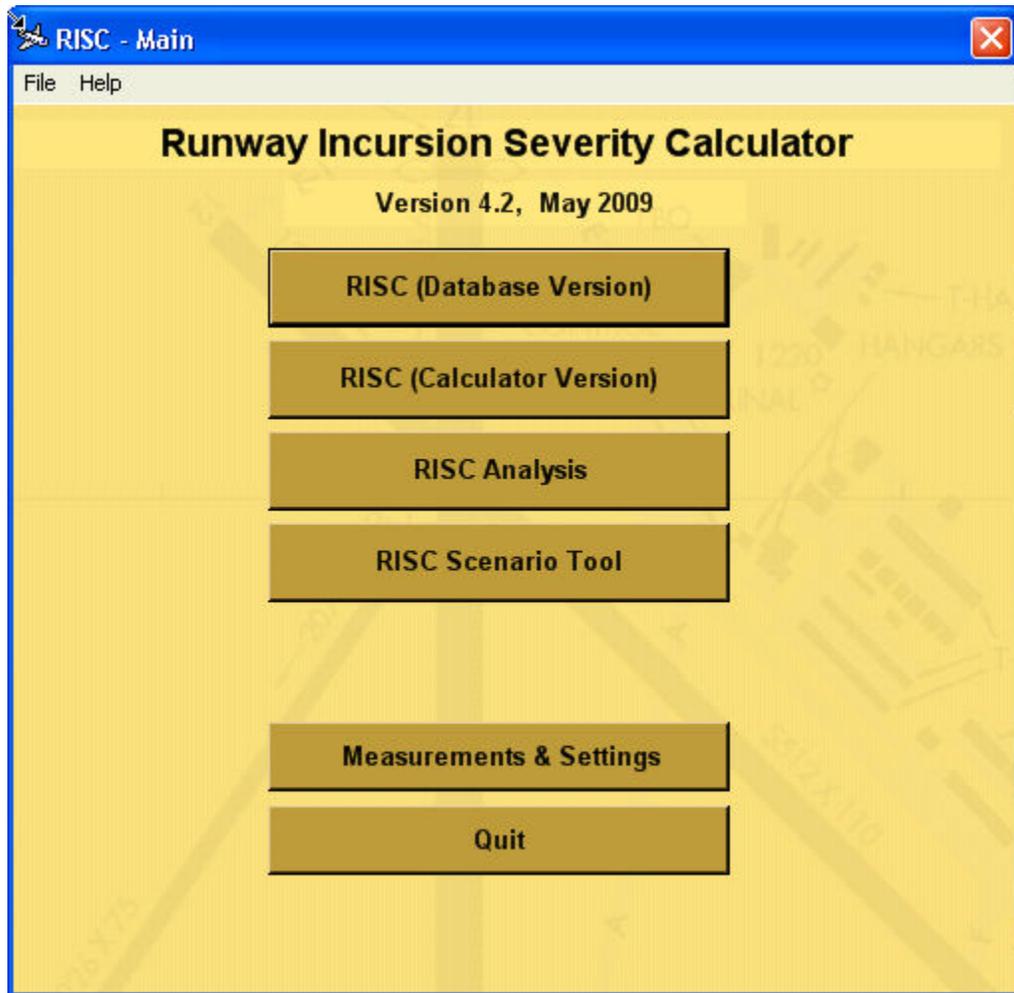
6. The Installing dialog box displays. When Setup is complete, the Wizard automatically displays the next dialog box.



7. On the Completing the Runway Incursion Severity Calculator (RISC) Setup Wizard dialog box, click the checkbox if you want to launch RISC after exiting Setup. In the example below, RISC is set to launch after exiting. To exit Setup, click the **Finish** button.



8. If you selected to launch RISC after exiting Setup, the RISC Main dialog box displays. Click the **RISC (Database Version)** or **RISC (Calculator Version)** button. If installation was successful, the calculator dialog box will display. If you encounter an error, see the section on Error Messages.



## RISC Dialog Boxes

### RISC Main

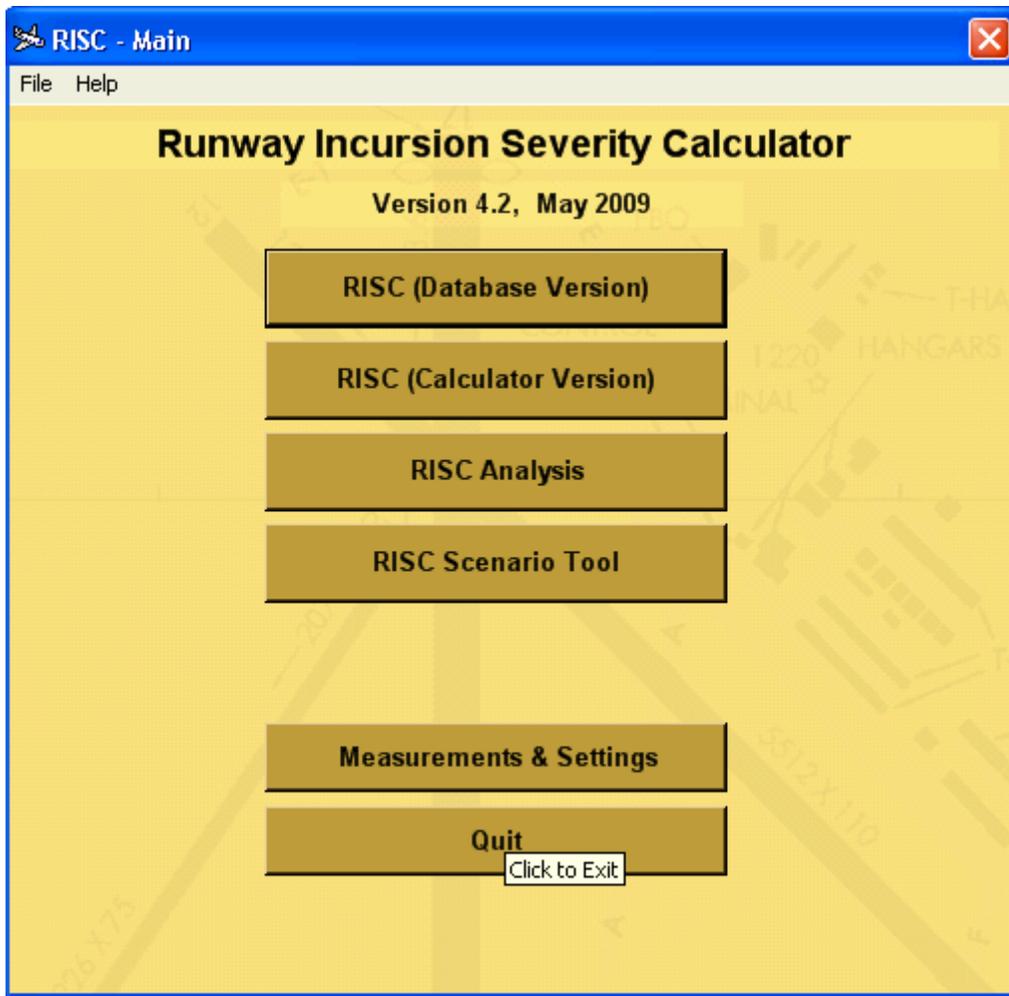
From the RISC Main dialog box you can access the RISC Calculator, RISC Analysis report, RISC Scenario Tool, and RISC Measurements and Settings. The RISC Main dialog box provides push buttons for each option and a **Quit** button for exiting the application.

#### *RISC Main Calculator Buttons*

The RISC Main dialog box displays two calculator buttons, **RISC (Database Version)** and **RISC (Calculator Version)**.

Use the **RISC (Database Version)** button to access the calculator with the capability to save incursion reports to a database and manage incursion records.

Use the **RISC (Calculator Only)** button if you want to run data through the calculator and calculate a rating without adding a new report to the database.

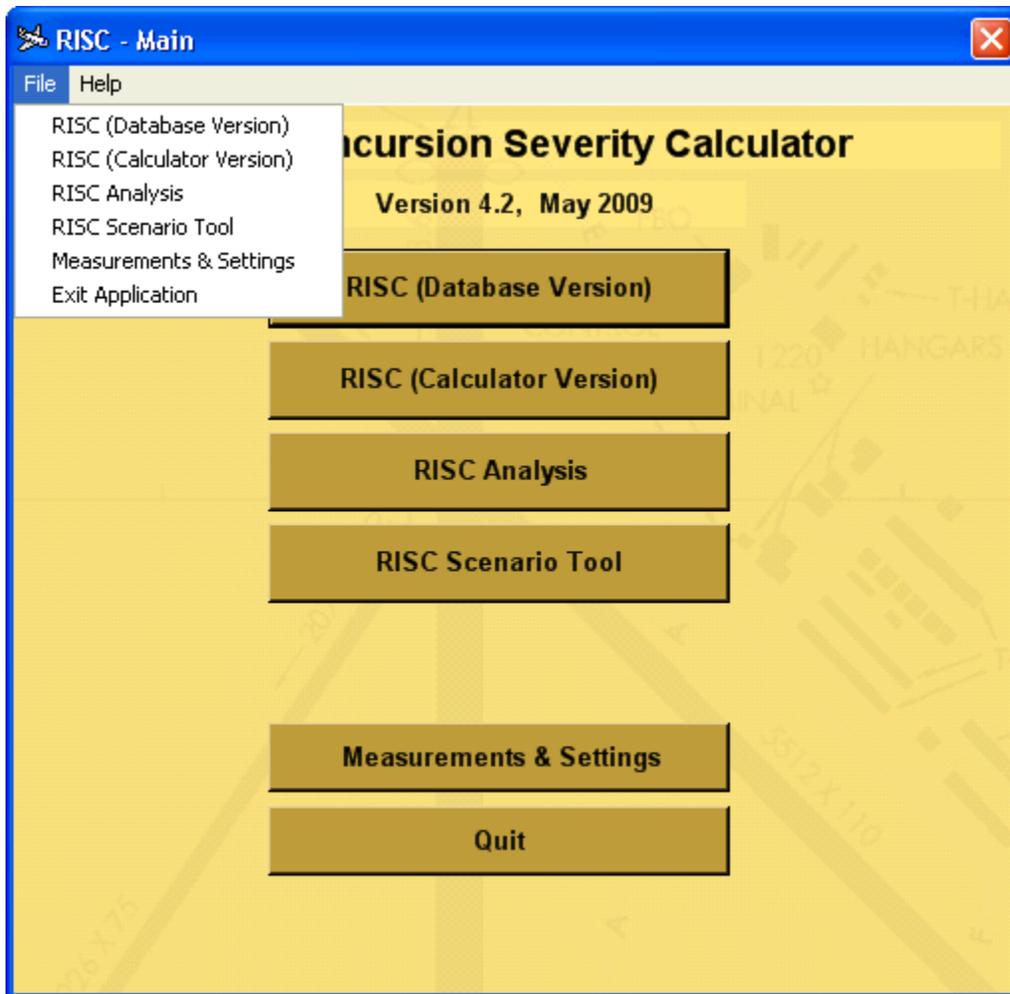


### ***RISC Main Menu***

The main menu on the RISC Main dialog box provides access to the **File** and **Help** menus.

The **File** menu provides options for accessing both versions of the calculator, RISC Analysis, RISC Scenario Tool, RISC Measurements and Settings, and exiting the application.

The **Help** menu provides options for accessing Help and viewing the current RISC version information.



## RISC Calculator

The Runway Incursion Severity Calculator (RISC) tool provides two versions of the calculator that are accessed from the RISC Main dialog box.

If you select the **RISC (Database Version)** button on the RISC Main dialog box, the calculator opens with a "records" toolbar as in the example below. In addition to calculating a severity rating, this version of the dialog box allows you to add incursion reports to a database and manage saved incursion records. **When entering a new incursion using this dialog box, you must enter a report number and report date.**

If you select the **RISC (Calculator Version)** button, the calculator opens without the toolbar and the report number and date fields. Use this version of the dialog box when you want to run data through the calculator and calculate a rating without adding a new report to the database.

**RISC - (Database Version)**

File Help

Incursions from 10/01/2008 to 09/30/2009 Change k < 8 of 20 > >| Export... New Delete

Incident Type: Incursion involving two aircraft, or aircraft and vehicle Report Number: 888666436 Report Date: 05/04/2009

**Conditions:**

Day Night Unknown RVR: 4500-5999 feet Ceiling: 500-999 feet

VMC IMC Unknown Visibility: 3000-4499 feet Braking: Fair

**Scenario:**

Scenario Selector Or Choose Number: 32

2T - Intersecting Runways: One aircraft aborted, and the other aircraft rotated before the intersection.

**Avoidance:**

Closest Proximity (CP): Horizontal: 250 ft Vertical: 0 ft

Aircraft/Vehicle 1:

Type: Takeoff Aircraft Maneuver: Aborted/Cancelled - 1000 ft roll or greater Size: S - Small

Aircraft/Vehicle 2:

Type: Takeoff Aircraft Maneuver: Early Rotate - No Damage Size: L - Large

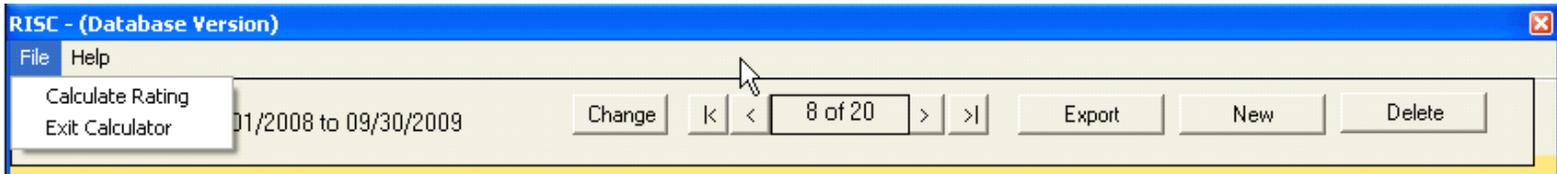
**Errors:**

Completely blocked transmission Remove

Save and Calculate Rating: A 3.84

### *RISC Calculator Main Menu*

The main menu on the calculator provides access to the **File** and **Help** menus. The **File** menu provides options for calculating a rating and exiting the calculator. The **Help** menu provides options for accessing Help and viewing RISC version information.



### *RISC Calculator Toolbar*

The RISC toolbar allows you to manage saved incursion records. The toolbar displays the date range of the incursions selected for viewing, allows you to change the date range, and provides arrow buttons for browsing selected records. Using the toolbar, you can export records to a Comma Separated Value (CSV) file, clear the calculator to enter a new report, and delete records from the database. For more information on using the calculator with the RISC toolbar options, see the topic Using RISC (Database Version).

### *Using the RISC Calculator Dialog Box*

The RISC Calculator dialog box lets you enter data on a runway incursion and calculate a severity rating. The information used to calculate a rating includes data on closest proximity (horizontal and/or vertical), visibility and braking conditions, the aircraft or vehicles involved, avoidance maneuvers, and pilot or controller errors.

To make an entry, click in a field. Press <Tab> or use the mouse to move from one field to another. Several fields provide a list button with a pull-down list of choices. If a field has a list button but you use the keyboard to type in information, do the following to avoid receiving an error message:

1. With your cursor in the field, press the **F4** key. A pull down list of choices displays.
2. Press the down-arrow key on the keyboard and highlight the desired response.
3. Press the **F4** key. Note that the selection is now highlighted.
4. Press the **Tab** key to move to the next field.

To generate a scenario number using the RISC Scenario Tool, click the **Scenario Selector** button. To remove a pilot or controller error from the Errors field, select the error and click the **Remove** button. To calculate a severity rating after responding to all fields, click the **Save and Calculate** button.

For information on using the calculator to generate a severity rating, see the topic, *Calculating a Rating*. For information on saving incursion reports to the database, see the topic, *Using RISC (Database Version)*.

**RISC Dialog Box Fields**

The following table describes the fields and buttons on the calculator and explains how to use them.

| <b>RISC (Database Version) and RISC (Calculator Version) Dialog Boxes</b> |  |  |
|---|--|--|
| <b>Item</b>   | <b>Description</b>   | <b>What To Do</b>  |
| <b>Incident Type</b>  | The kind of incident that took place. For more information on Incident Types, see the topic, How the Calculator Works. | For two objects involving a runway, select <b>Incursion involving two aircraft, or aircraft and vehicle</b> . For a single object involving a runway, select <b>Incursion involving one aircraft or vehicle</b> . For all others, select <b>Runway Operations on a Taxiway</b> . |
| <b>Report Number</b><br>RISC (Database Version) only                      | The user-assigned number for the incursion report.   | Enter a number using any combination of alpha and/or numeric characters.   |
| <b>Report Date</b><br>RISC (Database Version) only                        | The date of the incursion report.  | To change the date that displays, click the month, date, or year in the date field and type a new value or use the calendar popup. <b>Note:</b> You cannot enter a future date.  |
| <b>Conditions</b>   |  |  |
| <b>Day/Night/Unknown</b>  | The light conditions (daylight, darkness) that existed at the time of the runway incursion.                            | Click the radio button that corresponds to the light conditions reported ( <b>Day</b> or <b>Night</b> ). If the information is not available, click <b>Unknown</b> .   |
| <b>VMC/IMC/Unknown</b>  | The weather or meteorological conditions, that existed at the time of the runway incursion.                            | Click the radio button that corresponds to the meteorological conditions reported (Visual Meteorological Conditions - <b>VMC</b> or Instrument Meteorological Conditions -   |

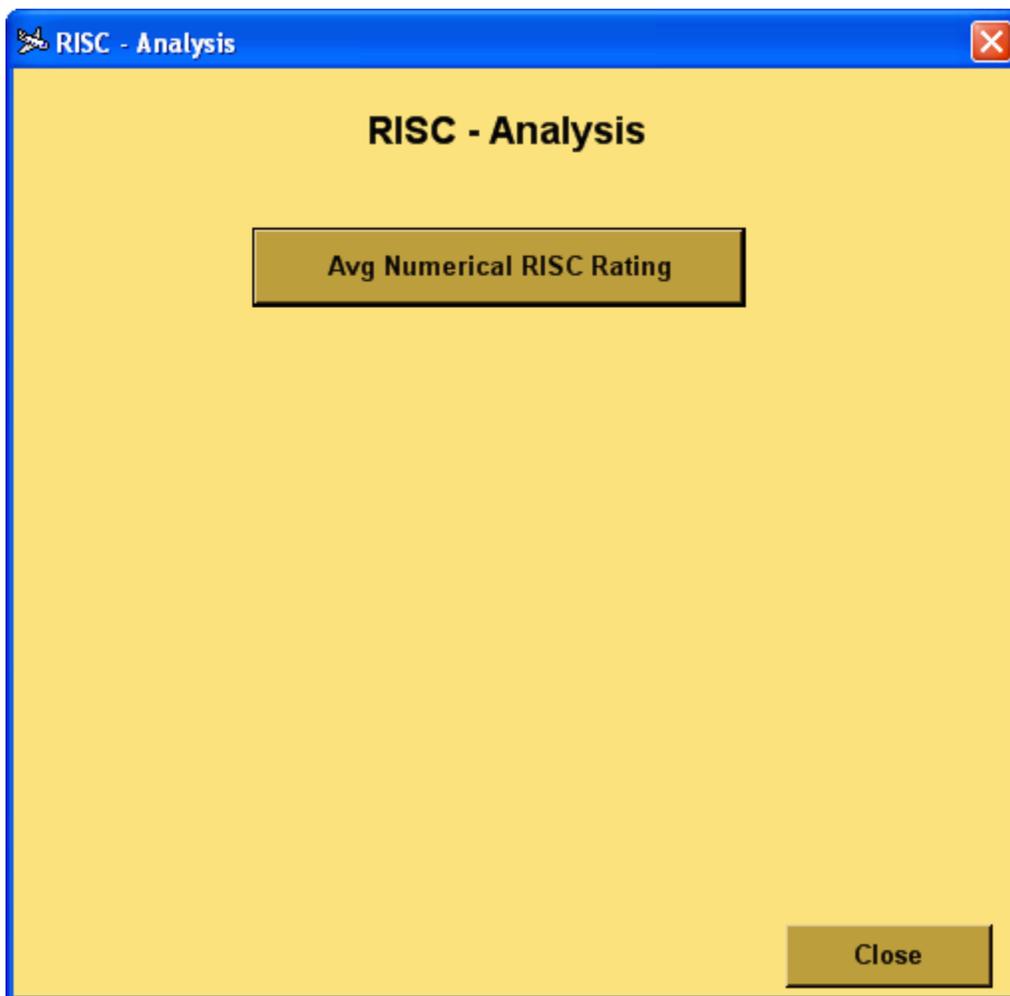
|                   |   |  |
|-------------------|---|--|
|                   |   | <b>IMC</b> ). If you select <b>IMC</b> , you are required to provide <b>RVR</b> data. If the information is not available, click <b>Unknown</b> .  |
| <b>RVR</b>        | The Runway Visual Range at the time of the runway incursion.  | Click the list button for a pull-down list of choices. Choices include, <b>&gt;=18000 feet, 6000-17999 feet, 4500-5999 feet, 3000-4499 feet, 1500-2999 feet, &lt;1500 feet,</b> and <b>N/A</b> .                           |
| <b>Visibility</b> | The Visibility at the time of the runway incursion.   | Click the list button for a pull-down list of choices. Choices include: <b>&gt;=18000 feet, 6000-17999 feet, 4500-5999 feet, 3000-4499 feet, 1500-2999 feet,</b> and <b>&lt;1500</b> .                                     |
| <b>Ceiling</b>    | The Ceiling at the time of the runway incursion.  | Click the list button for a pull-down list of choices. Choices include. <b>&gt;=1000, 500-999 feet, 200-499 feet, 100-199 feet, &lt;100 feet.</b>  |
| <b>Braking</b>    | The runway condition at the time of the incursion that affected the braking action of the aircraft.   | Click the list button for a pull-down list of choices including <b>Good, Dry; Good, Wet; Fair; Poor;</b> and <b>Nil</b> .  |
| <b>Scenario</b>   |   |  |
| <b>Scenario</b>   | The scenario defines the parties involved (e.g., two aircraft or an aircraft and a vehicle) and the action of the parties at the point of the incursion (landing, taking off, etc.). It is represented by a <i>pre-assigned</i> number and describes the circumstances of the runway incursion. | Click the <b>Scenario Selector</b> button to access the Scenario Selector Tool or click the list button for a pull-down list of choices. Select the pre-assigned number for the scenario involved in the runway incursion. |
| <b>Avoidance</b>  |   |  |

|   |   |   |
|---|---|---|
| <b>Closest Proximity (CP) (Horizontal/Vertical)</b> | The closest proximity or distance, horizontally and/or vertically, between both parties at the end of the incursion OR at the point at which both parties were aware of the situation and the aircraft was under control at taxi speed or less. | Enter the distance of closest proximity (Horizontal and/or Vertical) using the unit of measure displayed.<br><br>Note: You can change the unit of measure for closest proximity on the RISC Measurements dialog box.        |
| <b>Aircraft/Vehicle</b>                             | Aircraft or vehicle involved in the runway incursion.   | The Scenario you select determines the list of choices available. Click the list button for a pull-down list that may include the following: <b>Landing Aircraft, Takeoff Aircraft, Taxiing/ Stopped Aircraft, Vehicle.</b> |
| <b>Add Second Aircraft/Vehicle</b>                  | Allows you to add a second aircraft or vehicle.   | Click this button to display fields for a second Aircraft/Vehicle.  |
| <b>Remove</b>                                       | This button appears after you select a second aircraft or vehicle. Allows you to remove the second aircraft or vehicle.   | Click to remove the second aircraft or vehicle.   |
| <b>Maneuver</b>                                     | The action taken by the aircraft or vehicle involved in the runway incursion.   | The Scenario you select determines the list of choices available. Click the list button for a pull-down list of choices. For example, <b>Landed Over.</b>   |
| <b>Size</b>   | Size of the aircraft or vehicle involved in the runway incursion.   | Click the list button for a pull-down list of choices. Choices include: <b>S - Small, L - Large, H - Heavy, Vehicle, and Obstacle</b>   |
| <b>Errors</b>                                       |   |   |
| <b>Errors</b>                                       | Pilot or controller error(s) made during the runway   | Click the list button for a pull-down list of choices. For  |

|               |   |  |
|---------------|---|--|
|               | incursion.  | example, <b>Completely blocked transmission.</b>                                       |
| <b>Remove</b> | This button appears after selecting a pilot or controller error. Allows you to remove an error. | To remove an error from the list, select the error and click the <b>Remove</b> button. |

## RISC Analysis

The RISC Analysis dialog box provides access to an analysis report you can run on incursion data. To access the RISC Analysis dialog box, click the **Analysis** button on the RISC Main dialog box.



## Using RISC Analysis

To run the Average Numerical RISC Rating report for the current fiscal year, click the **Avg Numerical RISC Rating** button. The RISC - Average Numerical RISC Rating dialog box displays with the report results.

**RISC - Average Numerical RISC Rating**

**Average Numerical Rating**

Start Date: 10/ 1/2008

End Date: 9/30/2009

Show Results

| Rating | Avg  | Count | Std. Dev. |
|--------|------|-------|-----------|
| A      | 4.00 | 8     | 0.01      |
| B      | 2.83 | 1     | 0.00      |
| C      | 1.00 | 1     | 0.00      |
| All    | 3.58 | 10    | 0.98      |

Export...

Close

The RISC Average Numerical RISC Rating dialog box lists the application's alpha ratings for the specified date range, the corresponding average numerical rating, the counts for the alpha ratings, and the standard deviation.

To change the start or end date and run the report for a different date range, click the month, date, or year in the date field and type a new value or use the calendar popup. After specifying the date range, click the **Show Results** button. The system reruns the report for the date range entered and displays the new results.

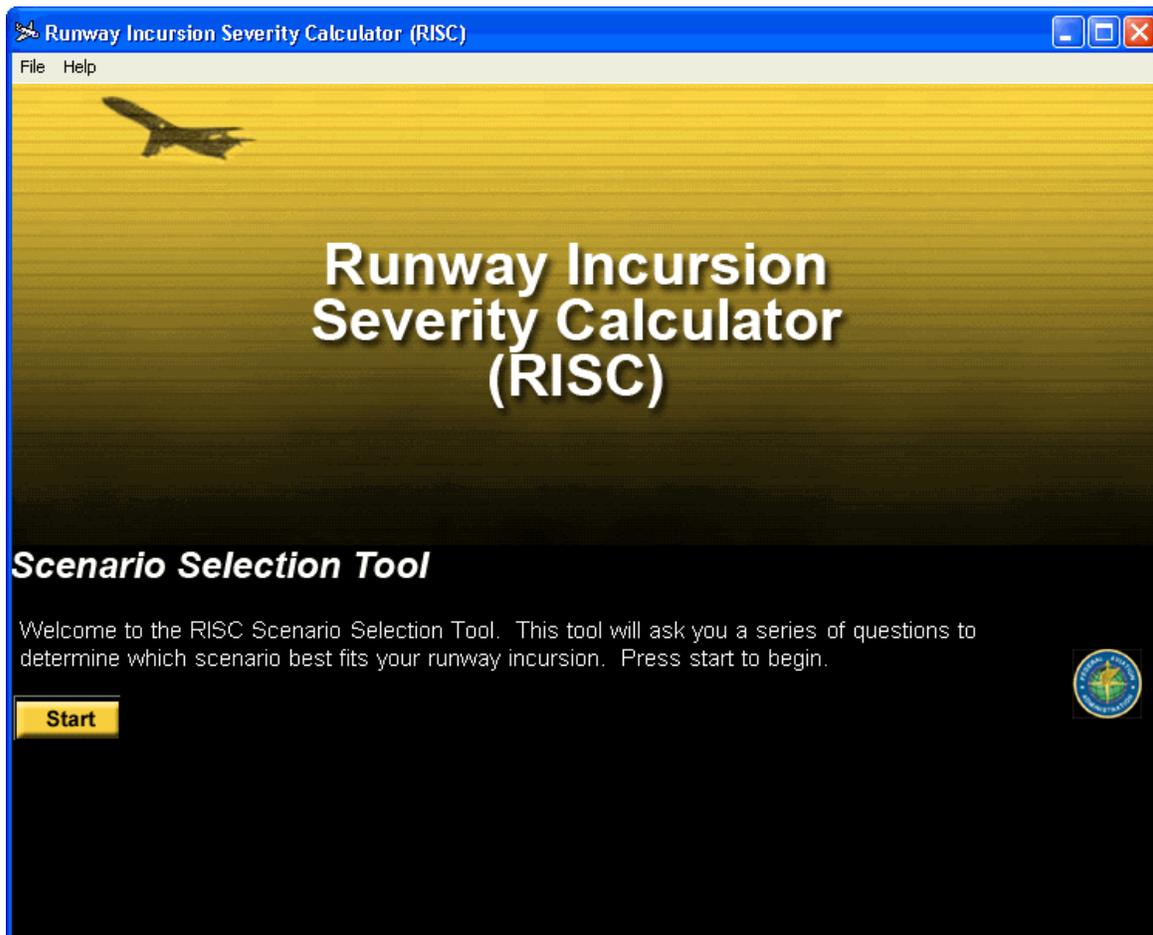
### *Exporting Report Results*

To export report results, click the **Export...** button. After clicking **OK**, the RISC Export dialog box opens. On the RISC Export dialog box select the location in which you want to save the .Excel file and enter a file name. Click the **Save** button to save the file.

Click the **Close** button to exit the RISC - Average Numerical RISC Rating dialog box.

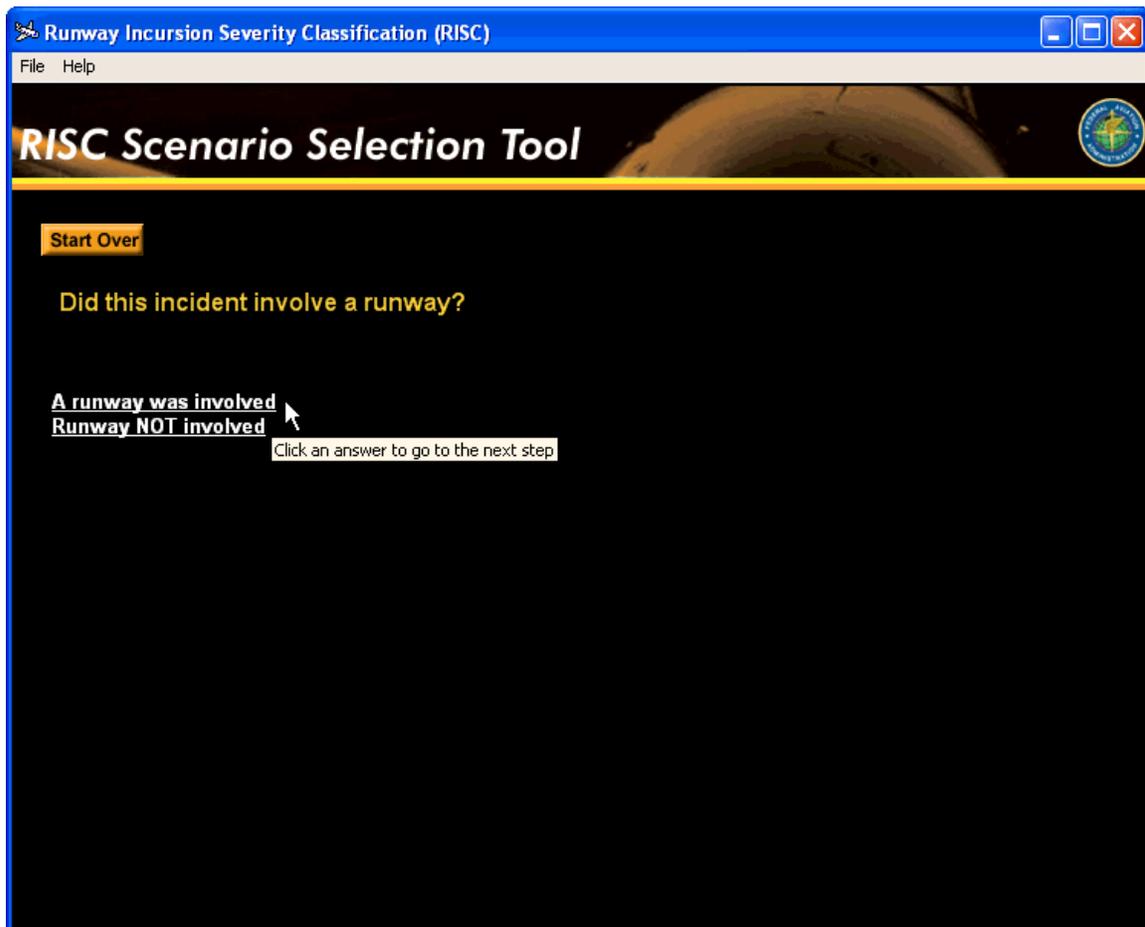
### **RISC Scenario Tool**

The RISC Scenario Tool is accessed from the RISC Main dialog box or by clicking the **Scenario Selector** button on either of the calculator dialog boxes (Calculator or Database version). The tool consists of several dialog boxes that guide you through the process of determining the scenario for a runway incursion. Using the tool, you generate a scenario "number" after you identify the parties involved, their orientation at the point of the incursion, and the action each party took.

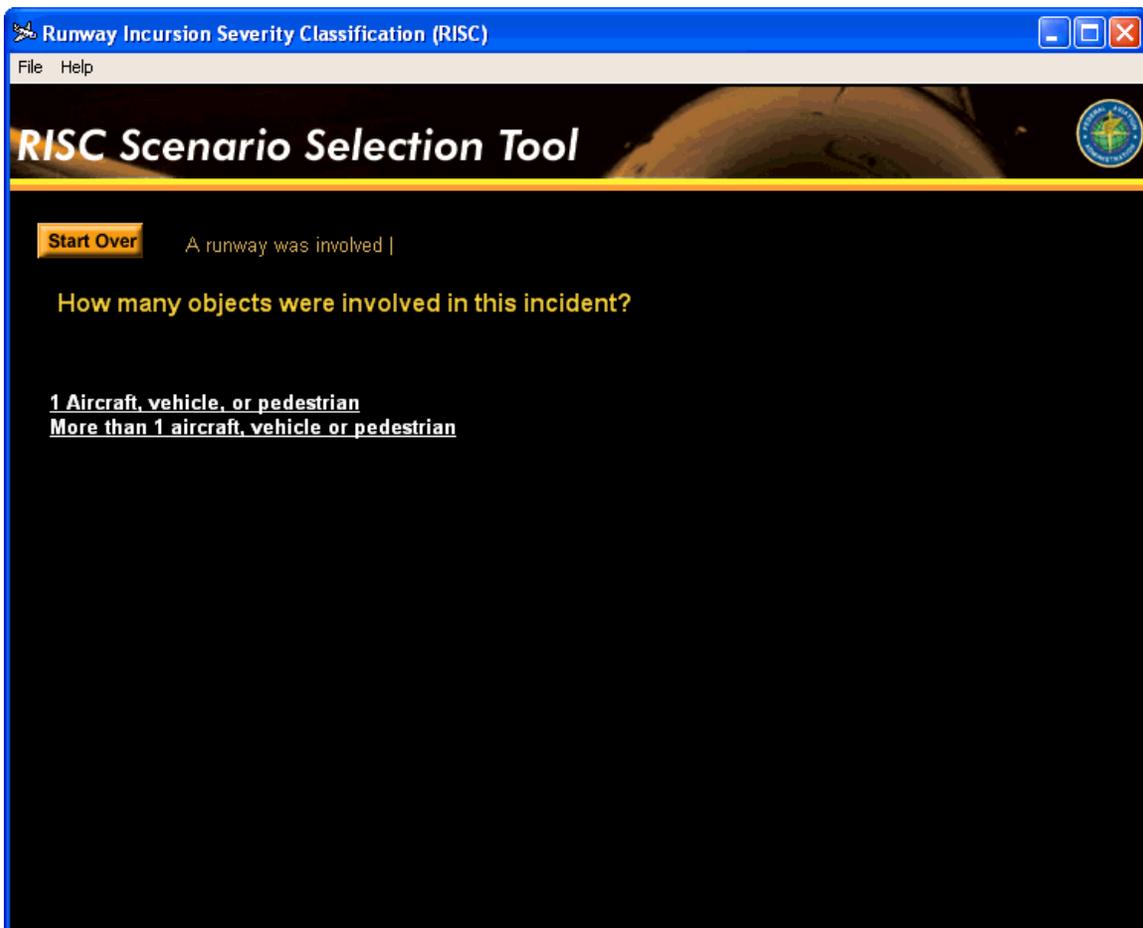


The Scenario Selection Tool dialog boxes display a question to guide you through the process of determining a scenario. A dialog box, similar to the one below, starts the

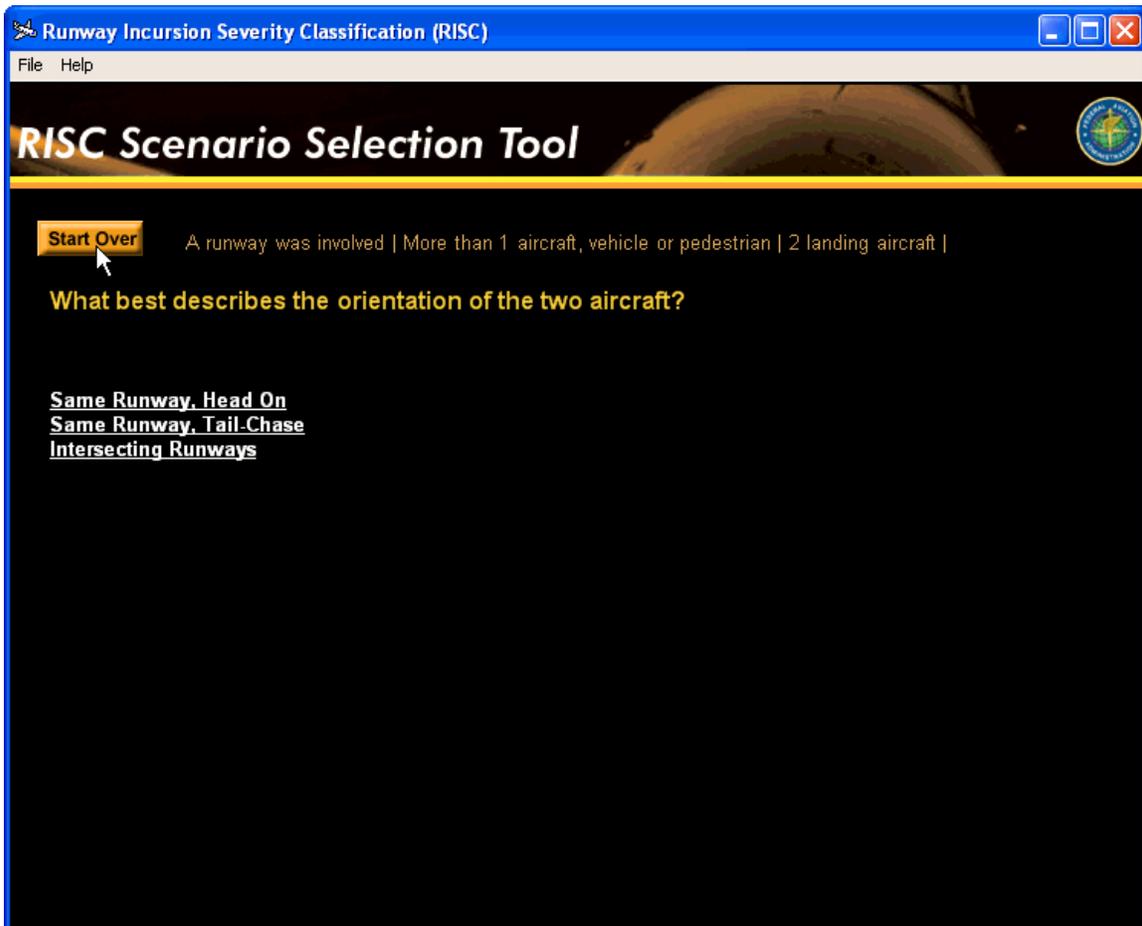
process. To select a response, position the pointer over the appropriate text and click.



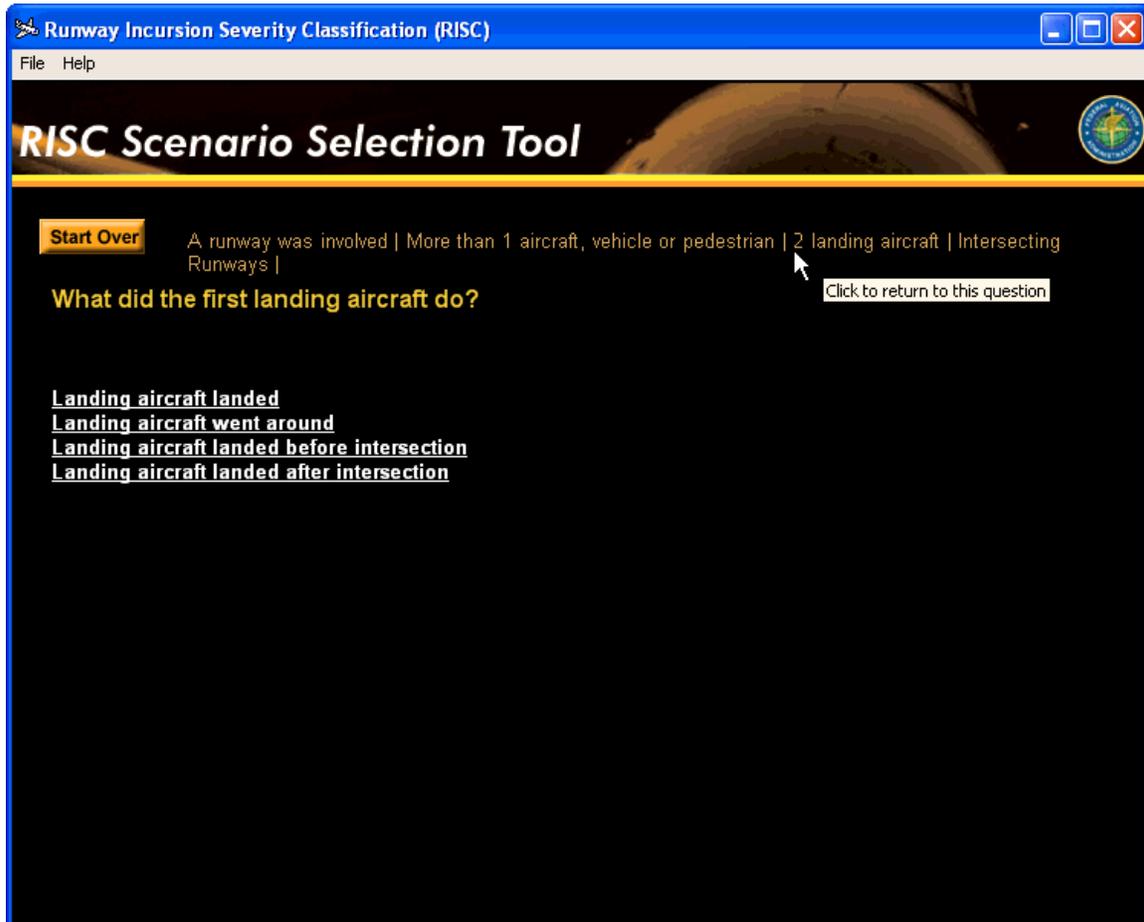
After you click on a response, the text is highlighted for an instant and the next dialog box opens.



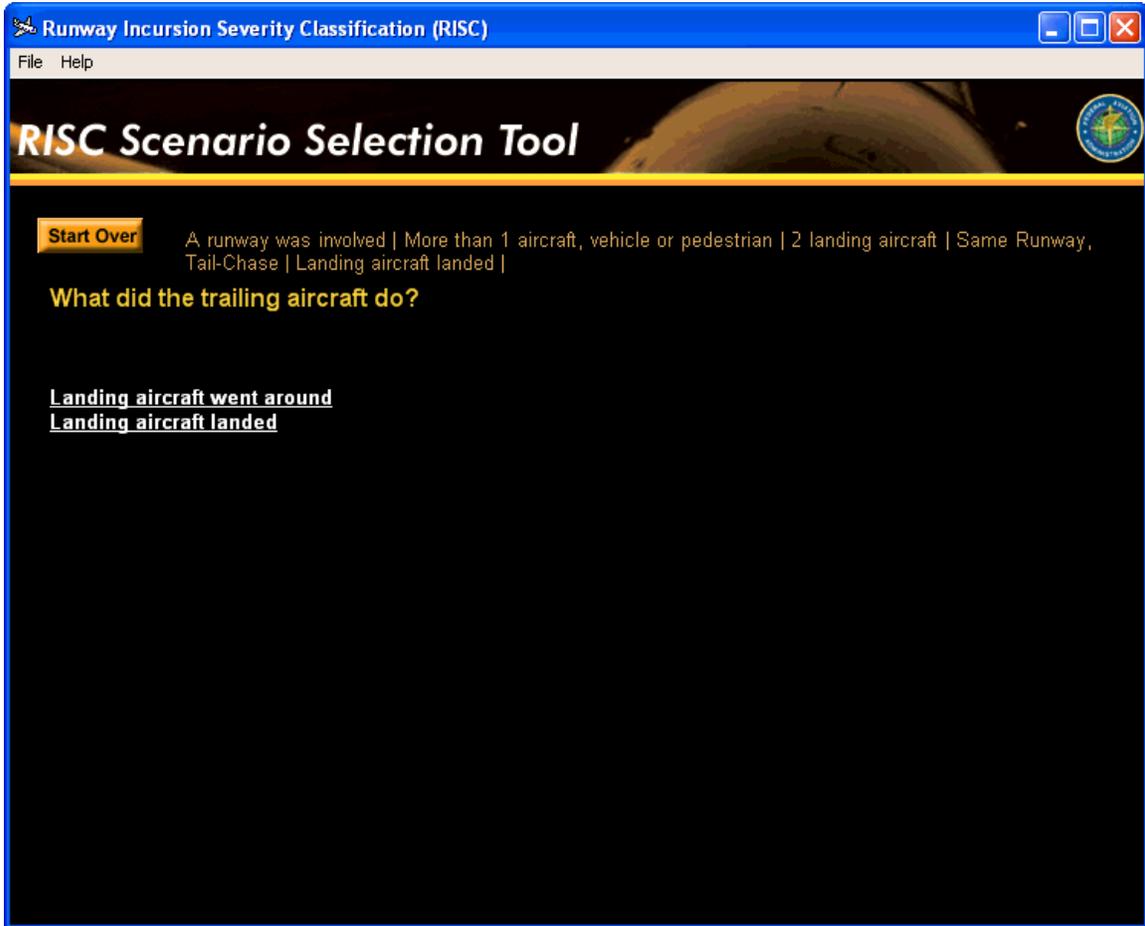
Each of the dialog boxes provides a Start Over button that allows you to stop the scenario selection process and start over at the beginning.



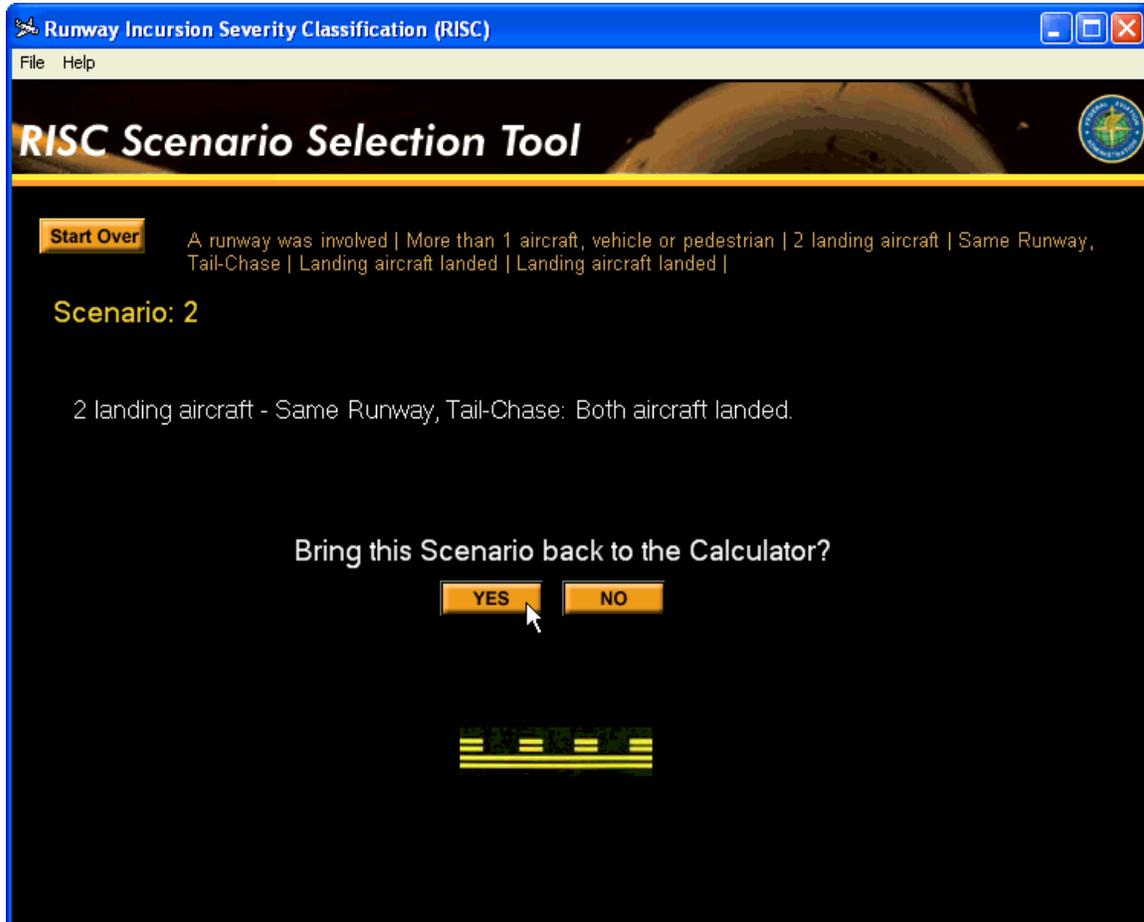
As you proceed through the Scenario Selection Tool dialog, your response to the previous dialog box appears to the right of the Start Over button. In the example below, the dialog box indicates that *2 landing aircraft* were identified as the parties involved and the orientation was *Intersecting Runways*. Click a response to navigate back to the question and change the response.



In the example below, the dialog box now indicates that the orientation was *Same Runway, Tail Chase* and the first *landing aircraft landed*.



The last dialog box displays the scenario number and a summary description of the scenario that generated the number. If the Scenario Selection Tool was accessed from a calculator dialog box, the tool asks if you want to bring the scenario number back to the calculator as in the example below.

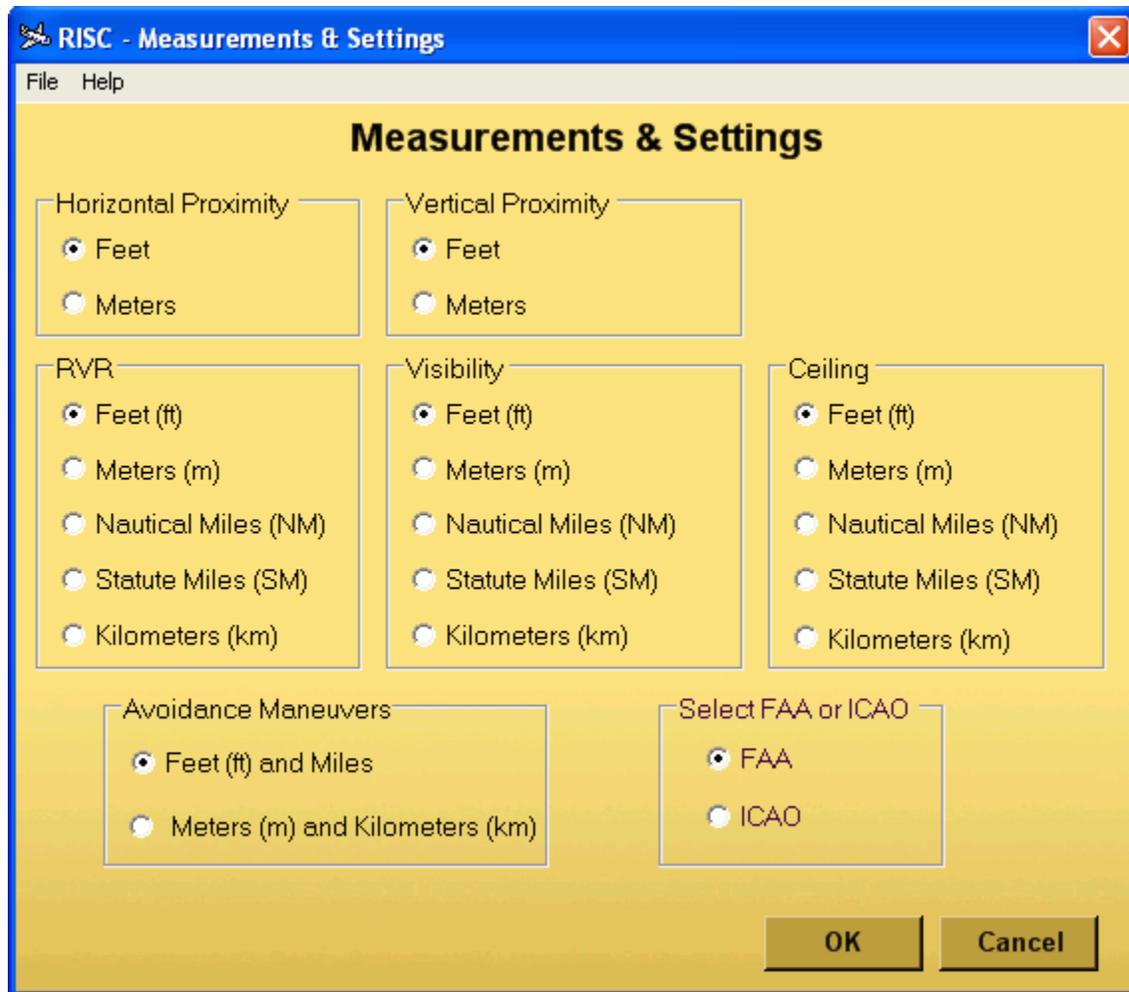


## RISC Measurements and Settings

The RISC Measurements and Settings dialog box lets you set the default units of measure you will use to calculate a severity rating on the RISC calculator dialog boxes. The RISC Measurements and Settings dialog box also allows you to specify whether the model uses FAA or ICAO rating ranges in its calculations.

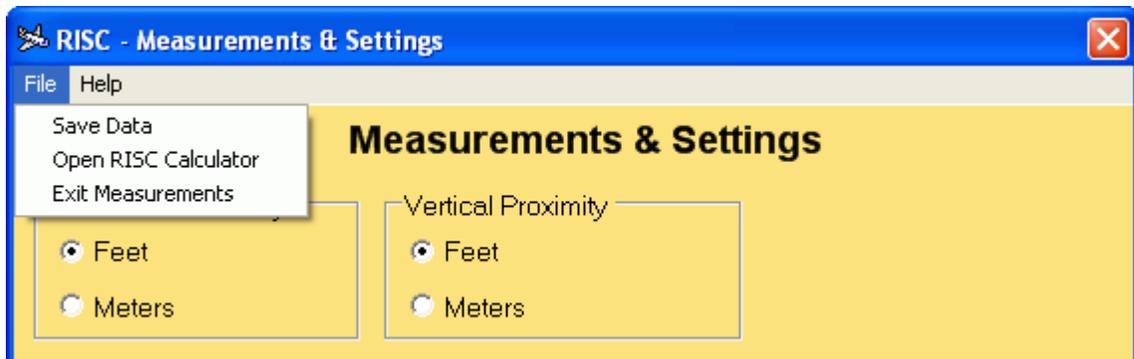
To access the RISC Measurements and Settings dialog box, click the **Measurements and Settings** button on the RISC Main dialog box.

**Note:** You can also access the RISC Measurements and Settings dialog box by selecting the Measurements and Settings option on the file menu of the RISC Main dialog box.



### *RISC Measurements and Settings Main Menu*

The main menu on the RISC Measurements and Settings dialog box provides access to the **File** and **Help** menus. The **File** menu provides options for saving new measurements settings, opening the calculator, and exiting the RISC Measurements and Settings dialog box without saving changes to the settings. The **Help** menu provides options for accessing Help and viewing RISC version information.



### *Using the RISC Measurements and Settings Dialog Box*

The RISC Measurements and Settings dialog box provides radio buttons for setting default units of measure for:

- Horizontal Proximity
- Vertical Proximity
- RVR (Runway Visual Range)
- Visibility
- Ceiling
- Avoidance Maneuvers

You can set the calculator to use Feet (ft) or Meters (m) for closest proximity or avoidance maneuvers when calculating a severity rating. In addition to Feet (ft) or Meters (m), you can set the calculator to use Nautical Miles (NM), Statute Miles (SM), or Kilometers (km) for RVR, Visibility, and Ceiling. To select a unit of measure, click the radio button for the measurement you want to use.

The RISC Measurements and Settings dialog box also provides radio buttons for specifying FAA or ICAO users. These radio buttons determine whether the RISC system uses FAA or international rating ranges when calculating a rating. For more information on FAA and ICAO ratings, see the topic *How the Calculator Works*.

**Note:** If you open the calculator and then change the default units of measure on the RISC Measurements and Settings dialog box, you must open a new session of the calculator for the settings to take effect.

## Using RISC

### *Closest Proximity and Avoidance Maneuvers*

In the Avoidance section of the calculator, enter the closest horizontal and/or vertical proximity of the object or objects involved. You must enter a value of zero or greater.

At times, entering a closest proximity requires using a formula. These formulas are known as Special Calculations. To aid in calculating closest proximity, here is a list of the Special Calculations that are used for RISC.

- Case 1: Computing closest horizontal proximity for any scenario involving an aircraft that goes around.  $CHP = DGAR + DAC2$  , where:
  - CHP = Closest Horizontal Proximity
  - DGAR = The landing aircraft's distance away from the Approach end of the runway when it begins to go around.
  - DAC2 = The other aircraft/vehicle/pedestrian's distance away from the approach end of the runway (0 if it is at the approach end.)
- Case 2: Computing closest horizontal proximity for any scenario involving one aircraft passing an aircraft/vehicle/pedestrian on a taxiway or the shoulder of the runway.  $CHP = [(RWidth / 2) - (WAC1 / 2)] + DAC2$  , where:
  - CHP = Closest Horizontal Proximity
  - RWidth = The width of the Runway
  - WAC1 = Wingspan of the aircraft that is passing.
  - DAC2 = The other aircraft/vehicle/pedestrian's distance from the runway edge line (0 if the closest portion of the aircraft is on the edge line, positive if the aircraft is over the hold line, negative if the aircraft is partially or completely on the runway.
- Case 3: Computing closest vertical proximity for any scenario involving one aircraft flying directly over another aircraft at a close distance. This calculation is not frequently used, but may be necessary depending on the type of information that is available from incursion reports.  $CVP = DAC1 - TAC2$  , where:
  - CVP = Closest Vertical Proximity
  - DAC1 = The over-flying aircraft's distance from the ground.
  - TAC2 = Tail Height of aircraft being over-flown.

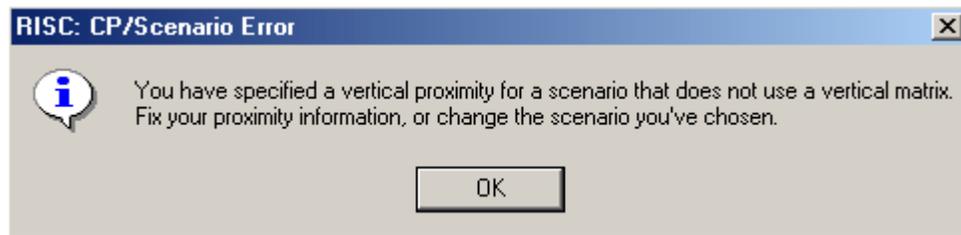
### *Field Validation and Error Checking*

After you respond to the fields on the calculator, click the **Save and Calculate** (database version) or the **Calculate Rating** (calculator version) button.

Before displaying a severity rating, the calculator checks that you have answered all fields. If a field is left blank, RISC flags the field with a red and white exclamation icon. In addition to the icon, the RISC (Calculator Version) dialog box will display an error message as in the graphic below.

### Error Messages

The RISC system displays error messages to inform users of problems with installation, startup, or with data input. An error message typically provides an explanation of the problem and instructions on how to correct it as in the example below.



### Installation Errors

The following are error messages you may encounter when installing RISC or running RISC for the first time after installation.

| Installation Errors              |   |   |
|----------------------------------|---|---|
| Error Name                       | Error Text  | Explanation   |
| <b>RISC Calculator Form Load</b> | <i>"Could not find file "C:\Program Files\RISC_Model (database name)".</i>  | Database file was renamed or not found in the installation directory. Reinstall the application.                              |
| <b>RISC Calculator Form Load</b> | <i>"The .Net Data OLE DB Provider (System.Data.OleDb) requires Microsoft Data Access Components(MDAC) version 2.6 or later. Version 2.53.6200.0 was</i> | You are using a Windows 2000 operating system but do not have Microsoft Data Access Component (MDAC) 2.6 or higher installed. |

|   |  |  |
|---|--|--|
|   | <i>found currently installed."</i>   | Navigate to the MDAC_28 folder on the installation CD and double-click the MDAC.exe file.  |
| <b>RISC Calculator.exe - Unable to Locate DLL</b> | <i>"The dynamic link library mscoree.dll could not be found in the specified path..."</i>                      | You are using a Windows 2000 operating system and do not have Microsoft.NET Framework installed. Navigate to the net framework 1.1 folder on the installation CD and double-click the dotnetfx.exe file. |
| <b>RISC Calculator.exe - Application Error</b>    | <i>"The application failed to initialize properly (0xc0000135). Click on OK to terminate the application."</i> | You are using a Windows XP operating system and do not have Microsoft.NET Framework installed. Navigate to the net framework 1.1 folder on the installation CD and double-click the dotnetfx.exe file.   |

### ***RISC Calculator Errors***

The following are error messages you may encounter when using RISC to calculate a severity rating.

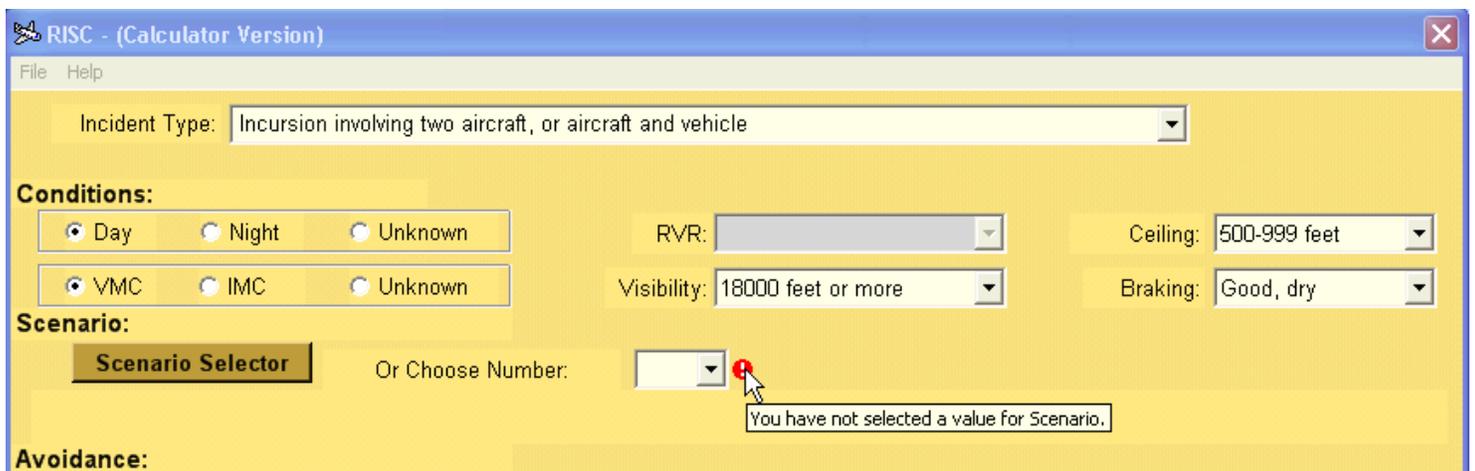
| <b>Calculator Errors</b>                                     |   |   |
|--|---|---|
| <b>Error Name</b>  | <b>Error Text</b>   | <b>Explanation</b>  |
| <b>RISC Calculator - Field Validation(s)</b><br>(Calculator) | <i>"You have not selected a value for (field name). The above field(s) are required. Please check your inputs and try again."</i> | One or more required fields are blank. Respond to the indicated fields. |

|                                      |   |   |
|--------------------------------------|---|---|
| Version) only                        |   |   |
| <b>RISC Calculator - CP/Scenario</b> | <i>"You have specified a vertical proximity for a scenario that does not use a vertical matrix. Fix your proximity information or change the scenario you've chosen."</i>           | The scenario selected describes an incursion with a horizontal proximity but a vertical proximity was entered. Enter 0 for vertical proximity and enter a value greater than 0 for horizontal proximity or change the scenario. |
| <b>RISC Calculator - CP/Scenario</b> | <i>"You have specified a horizontal proximity for a scenario that does not use a horizontal matrix. Fix your proximity information, or change the scenario you've chosen."</i>      | The scenario selected describes an incursion with a vertical proximity but a horizontal proximity was entered. Enter 0 for horizontal proximity and enter a value greater than 0 for vertical proximity or change the scenario. |
| <b>RISC Calculator - CP/Scenario</b> | <i>"You have specified two proximity values. This scenario does not use two proximities to determine a rating. Enter one proximity value, or change the scenario you've chosen"</i> | The scenario selected describes an incursion with one proximity only but both horizontal and vertical proximities were entered. Enter one proximity or change the scenario.   |
| <b>RISC Calculator - CP/Scenario</b> | <i>"You forgot to enter a proximity value."</i>   | Closest proximity is required data. Enter a value greater than 0 for either horizontal or vertical proximity.   |
| <b>RISC: Scenario Mismatch</b>       | <i>The scenario number does not correspond with your choice for incident type. Please choose another scenario from the list</i>   | In RISC, there are some Scenarios that are not permitted depending on the user's choice for incident  |

|                                      |   |   |
|--------------------------------------|---|---|
|                                      | <i>or change your incident type.</i>                                  | type.   |
| <b>RISC Calculator - CP/Scenario</b> | <i>"The (horizontal or vertical) proximity must be 0 or greater."</i> | RISC accepts a value of 0 or greater for closest proximity. For example, you cannot enter a negative value (e.g. -500) or an alpha character for closest proximity. Enter a value greater than 0 for closest proximity. |

### ***Displaying Error Text by Field***

When calculating a rating, RISC will display an error message and flag a field with a red and white exclamation icon if the field was left blank or incorrectly answered. As you correct problems with data input, you can display error text for a field by positioning the pointer over the red and white exclamation icon as in the example below.



### **Using RISC (Database Version)**

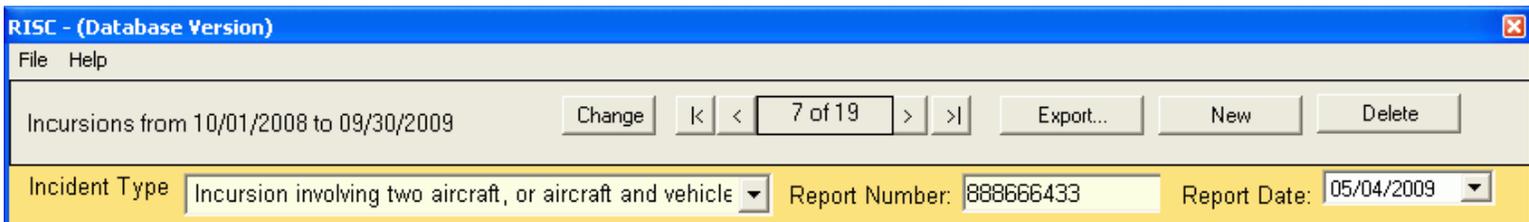
In addition to calculating a severity rating, the RISC (Database Version) allows you to maintain a database of saved incursion records by providing the capability to:

- add new incursion reports to the database
- enter a number and date for each report
- browse a date range of incursion records

- save incomplete reports
- edit saved incursion reports
- export incursion records for analysis
- delete incursion records from the database

### ***RISC Toolbar***

The RISC (Database version) dialog box provides a toolbar for managing incursion records saved to the database. The toolbar displays the date range of the incursions selected for viewing and provides the capability to specify a new date range, browse records, export records, clear the calculator to enter a new record, and delete records from the database.



### ***Changing the Date Range of Records Displayed***

To change the date range of records displayed, click the **Change** button on the toolbar. The RISC Change Dates dialog box opens.



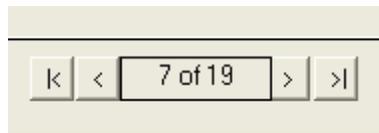
To change the start or end date, click the month, date, or year in the date field and type a new value or use the calendar popup. After you click **OK**, the dates you specified display in the "Incursions from" date range at the left end of the RISC toolbar and the first report in the date range is available for editing.

To display a single report from the database, enter the report date in both the Start Date and End Date fields. If more than one record exists with that report date, you may need to browse the records to find the report.

To close the RISC Change Dates dialog box without changing the date range, click **Cancel**.

### ***Browsing Records***

The RISC toolbar provides left and right arrow buttons for browsing incursion records. After selecting records within a specified range of dates, the first record within the date range displays on the calculator. In the example below, the record counter indicates that the record currently displayed is the first of a total of two.

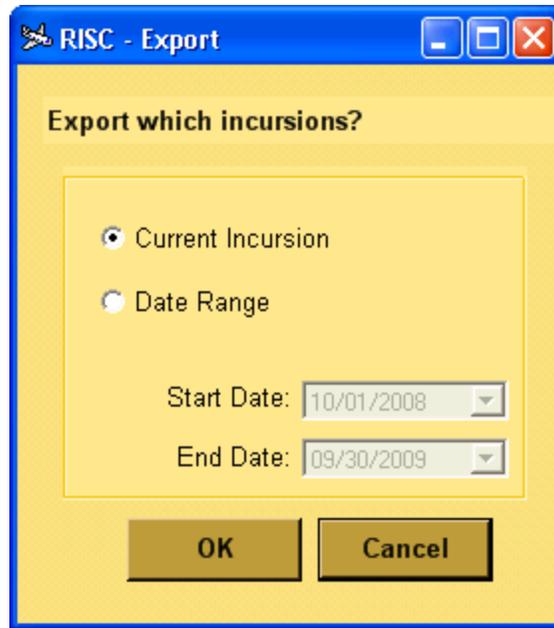


Use the right arrow button to display the next record in the date range. As you browse incursion records you can use the left arrow button to display the previous record in the date range. Use the left arrow button with a vertical line to display the first record in the date range and the right arrow button with a vertical line to display the last record in the date range.

### ***Exporting Records***

Using this function you can export the incursion record currently displayed, or a date range of incursion records, to a Comma Separated Value file (CSV). Excel recognizes the .CSV file type.

Click the **Export...** button on the toolbar to open the RISC Export dialog box.



To export the incursion currently displayed on the calculator, click the Current Incursion radio button and **OK**. To export incursion records within a specified date range, click the Date Range radio button. To change the start or end date, click the month, date, or year in the date field and type a new value or use the calendar popup. After specifying a date range, click **OK**. The Save As dialog box opens. On the Save As dialog box you select the location in which you want to save the .CSV file and enter a file name. Click the **Save** button to save the file.

To close the RISC Export dialog box without exporting any records, click the **Cancel** button.

### ***Adding a New Report***

To add a new report to the database, use the **New** button on the toolbar. The **New** button clears the calculator allowing you to enter data on a new incursion. After clicking the **New** button, the **Delete** button on the toolbar changes to a **Cancel** button. To return to the date range of records you previously selected without saving a new report, use the **Cancel** button.

**Note:** When there are no records present in the selected date range, the RISC form may appear empty. **However, to enter a new report into the database, you must still press the New button in order to do so.** Entering data in a blank form without first pressing the **New** button will result in a loss of that data when the user presses the **Save and Calculate** button.

The calculator allows you to select an incident type and the "Database Version" provides fields for entering a report number and date. These are required fields for saving reports to the database and do not display on the RISC (Calculator Version) dialog box.

You can enter a report number using any combination of alpha and/or numeric characters. The current date displays as the default report date. To change the date that displays, click the month, date, or year in the date field and type a new value or use the calendar popup.

**Note:** The report date cannot be a future date.

After you respond to all fields on the calculator, click the **Save and Calculate** button. If the field data passes all checks, an FAA or ICAO alpha severity rating and its corresponding numeric rating displays in the Rating field and the new incursion report is added to the database. The incursion report you entered displays on the calculator and is available for editing. The Incursions from date range is updated to reflect the fiscal year for that report. The record counter is updated to reflect the number of incursions for that fiscal year.

**Note:** You set the RISC model to use FAA or ICAO rating ranges in the Measurements dialog box. For more information on the ratings themselves, see the topic How the Calculator Works.

### *Deleting Records*

To delete the incursion record currently displayed, click the **Delete** button. A confirmation dialog box displays asking you to confirm you want to delete the incursion record.

### *Saving an Incomplete Report*

You can save an incomplete report to the database by leaving any calculator fields blank with the exception of the Report Number and Report Date fields. An incomplete report is saved to the database after you click the **Save and Calculate Rating** button. The RISC (Database Version) dialog box flags unanswered fields on incomplete reports with red and white exclamation icons as in the example below.

**RISC - (Database Version)**

File Help

Incursions from 10/01/2008 to 09/30/2009 Change k < 8 of 20 > >| Export... New Delete

Incident Type: Incursion involving two aircraft, or aircraft and vehicle Report Number: 888666435 Report Date: 05/04/2009

**Conditions:**

Day  Night  Unknown RVR: 6000-17999 feet Ceiling: 500-999 feet

VMC  IMC  Unknown Visibility: 6000-17999 feet Braking: Good, Wet

**Scenario:**

Scenario Selector Or Choose Number: 3

2L - Intersecting Runways: Both aircraft landed before the intersection.

**Avoidance:**

Closest Proximity (CP): Horizontal: 600 ft Vertical: 0 ft

Aircraft/Vehicle 1:

Type:  ! Maneuver:  ! Size:  !

Add Second Aircraft/Vehicle

**Errors:**  ! Remove

Save and Calculate Rating:

### *Editing a Saved Report*

You can edit data in any saved report (complete or incomplete) in the database. After you edit a field value in a previously saved report, the severity rating field displays blank requiring you to save the edited report and recalculate a rating.