Project Identification:
FSM Version 9.0 New Features

Metron Aviation, Inc.
45300 Catalina Court, Suite 101
Dulles, VA 20166

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TABLE OF CONTENTS

Introduction

This document covers all significant changes implemented for Flight Schedule Monitor (FSM) 9.0 since FSM 8.90. The default Monitor Mode Live FSM user's interface is illustrated in Figure 1.

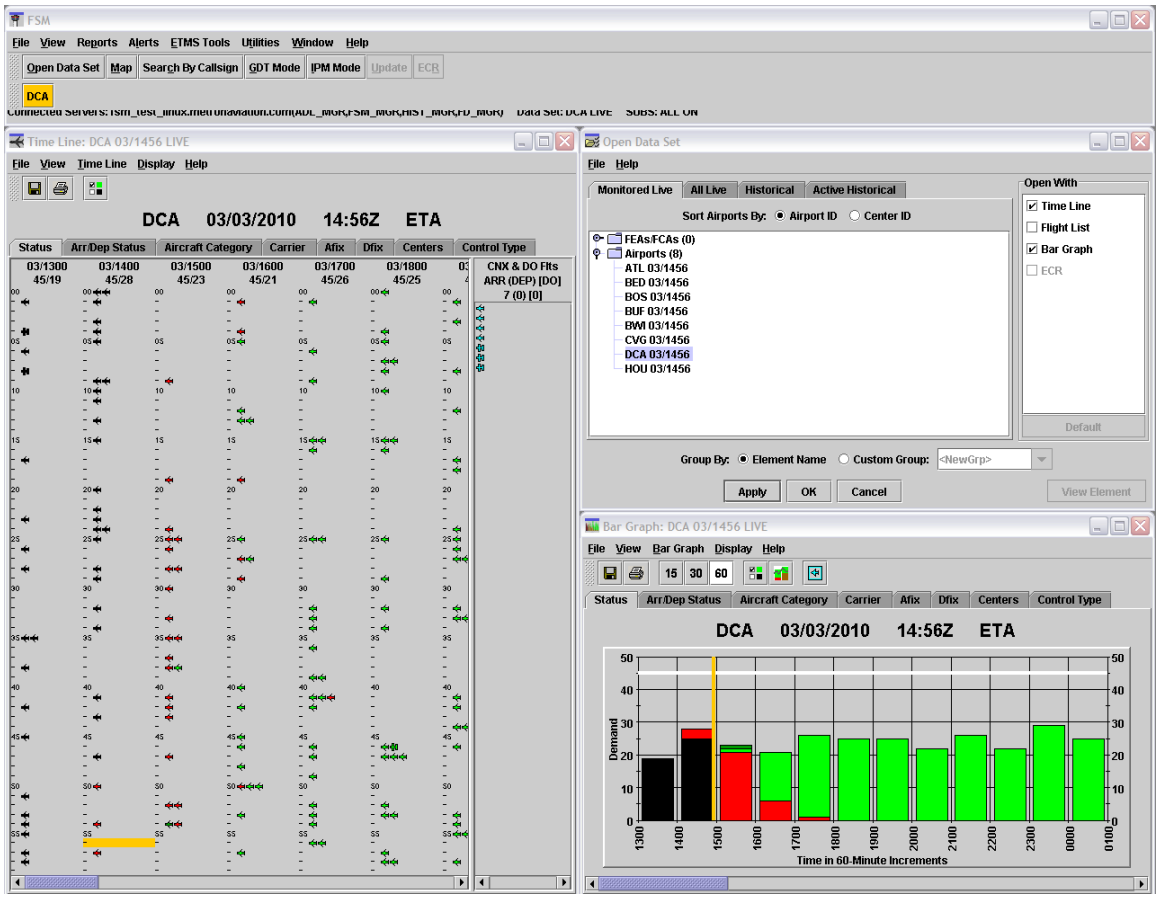


Figure 1: Flight Schedule Monitor 9.0

The FSM 9.0 User's Guide is available as a complete reference for FSM functions not included in this document. Select **Help > FSM** from the Control Panel to open FSM 9.0 online help in your browser. You also can access component-specific online help from any FSM component.

Unified Delay Program (UDP)

Currently, Ground Delay Programs (GDPs) and Airspace Flow Programs (AFPs) are issued to ensure that airport arrival capacity is fully utilized with minimal airborne delays. A major challenge to the efficiency of GDPs and AFPs is the existence of flights that are not known at the time the program is issued, i.e., pop-ups. Delay Assignment (DAS) and General Aviation Airport Program (GAAP) programs have different approaches to how delays are distributed among the flights contending for airport capacity. There are some cases where one of these approaches works well and other cases where the other approach works better, but there is also a range of intermediate cases where neither approach is quite right.

For airports with a mix of scheduled and unscheduled demand, Unified Delay Programs (UDPs) allow Traffic Managers (TMs) to implement programs tailored to the expected demand profile that better meet the target delivery rate. UDP combines DAS-GDP, GAAP-GDP, and Revised Pop-up Management Procedures (RPMP) concepts to provide smooth demand distribution and stable flight delays.

UDP automation provides a very flexible algorithm for managing the uncertainty of pop-ups. By reserving some slots for pop-ups, the initial program provides a more realistic estimation of what the final delays will be. By then allocating pop-ups to reserved slots, the demand is smoothed as much as possible, lessening the need for revisions. By selecting the right parameters for how to delay the pop-ups, equity and incentive are addressed in a desirable fashion. Finally, by applying Adaptive Compression to the unused slots, the full capacity of the airport or airspace is used and total delay is minimized.

The key to the success of UDP is in the selection of the following three parameters:

- number of reserved pop-ups
- target delay multiplier
- delay limit

FSM Control Panel Component

For traffic managers to determine the number of reserved slots, it is necessary for them to know the typical number of pop-ups for the controlled element airport. To make these pop-up estimates available to any FSM user, the estimates are included in the ADL files.

Note that historical pop-up estimates are not available for AFPs.

In Monitor Mode, a new menu option, **Utilities > Historical Pop-up Demand** has been added to the FSM Control Panel Component (see Figure 2).

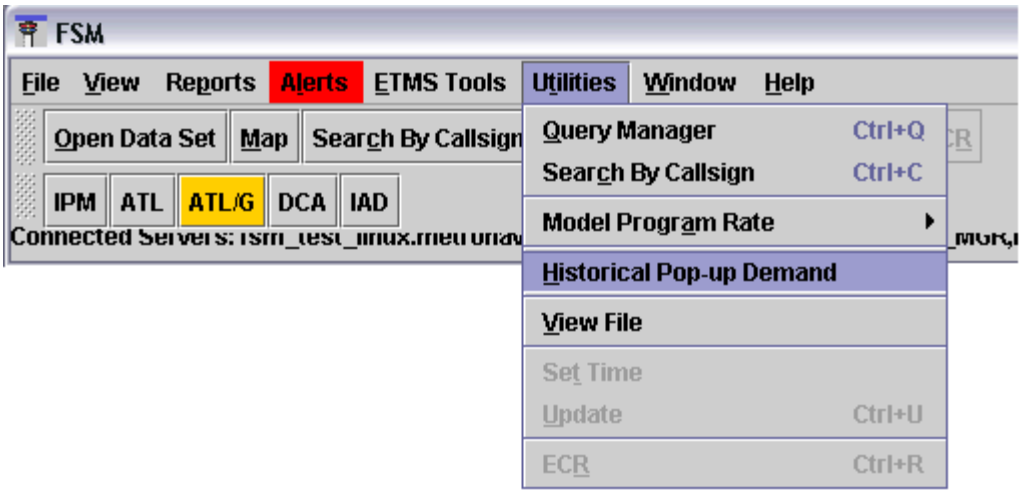


Figure 2: New Utilities Menu Option

Select **Utilities > Historical Pop-up Demand** to open the Display Historical Pop Up window (see Figure 3). This *view-only* window displays the historical pop-up prediction currently included in the ADL. This window is available at anytime regardless of whether a TMI is in place or not. Note that predictions fewer than ten per hour may include a decimal value. Predictions greater than ten per hour are whole numbers.

Each row represents an estimated confidence level of pop-up: ***High***, ***Medium***, and ***Low***. The purpose of this is to give an idea of the historical distribution of pop-ups. For example, if a traffic manager anticipates a typical pop-up day for the data set, they can view the values for the High confidence historical pop-up demand; conversely, if the traffic manager anticipates an unusual pop-up day, they can view the values for Low confidence.

Note that the first hour (column) is one hour earlier than the ADL time. The value is always "0" since the hour is in the past; therefore, no prediction is necessary.

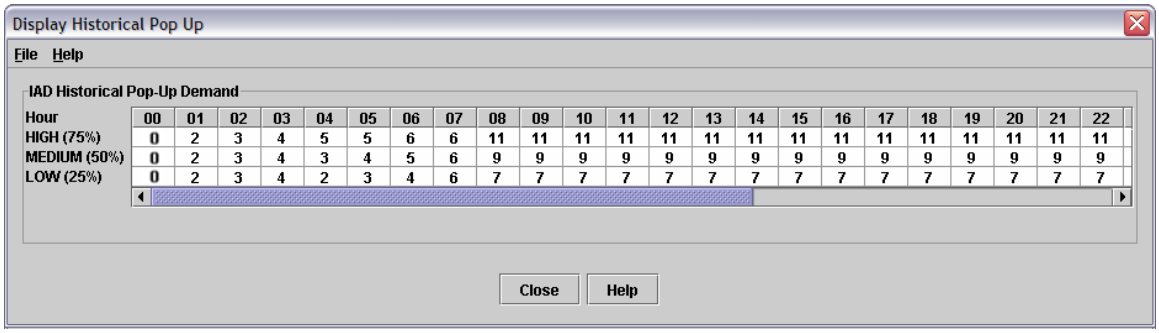


Figure 3: Display View-Only Historical Pop Up Window

The following action buttons are displayed:

- **Close** – Click to close the window.

- **Help** – Click for more information specific to the Display Historical Pop Up window.

GDT Setup and IPM Setup Parameters Tab

The GDT Setup and IPM Setup Parameters tab have been updated to allow selection of the new UDP options.

Program Types

The two new UDP programs have been added to the **Program Type** dropdown menu. GDP-UDP is displayed for airports (see Figure 4) and AFP-UDP is displayed for airspaces.

Figure 4: GDP-UDP Added to Program Type Dropdown

Program Rate

Additional changes have been made in the Program Rate options wireframe (see Figure 5).

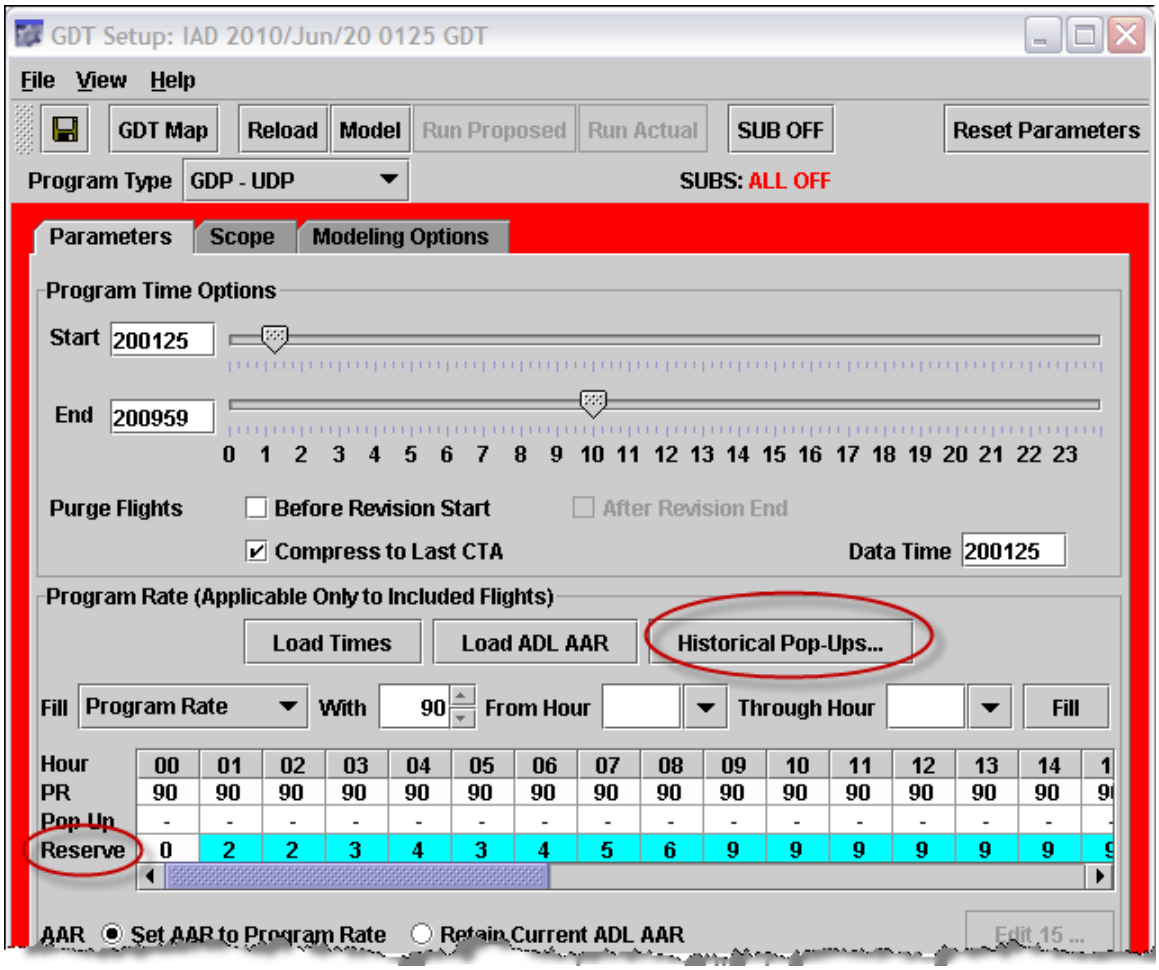


Figure 5: Changes in Program Rate Options Wireframe

In Figure 5, the ***Reserve*** row has been added below the ***Pop Up*** row in the Rates table. Use this row to set the reserved rate. Note that reserved rates fewer than ten per hour may include a decimal value. Reserved rates greater than ten per hour are whole numbers. You can also set the rate in the Historical Pop Up dialog box. Changes made to the Rates table will be reflected in the Historical Pop Up dialog box; likewise, changes made in the Historical Pop up dialog box will be reflected in the Rates table.

The Reserve row is only available for a UDP-based program. It is disabled and populated with dashes for all other programs.

The Pop Up row is only available for a DAS program. It is disabled and populated with dashes for all other programs.

Load Historical Pop Up Demand

A **Historical Pop-Ups** button has been added adjacent to the existing **Load ADL AAR** button. Click **Historical Pop-Ups** to open the Load Historical Pop Up dialog box (see

Figure 6).

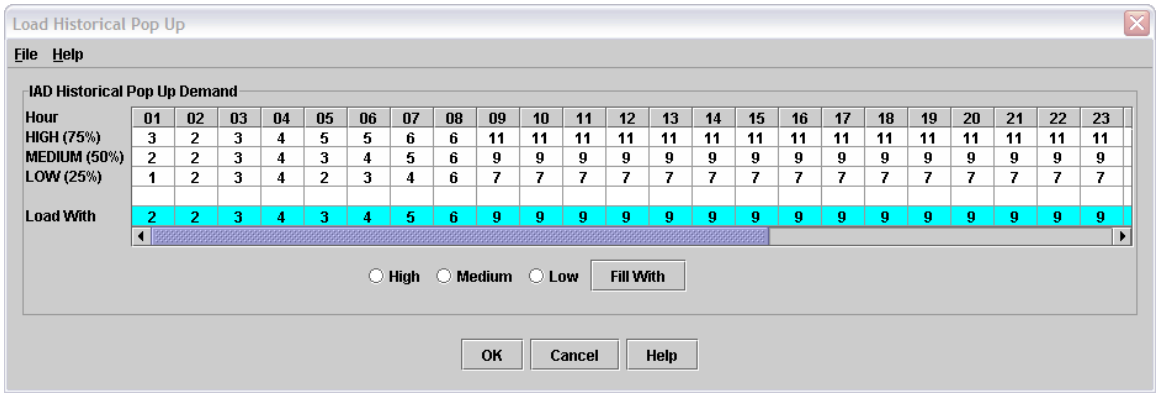


Figure 6: Load Historical Pop Up Dialog Box – Medium Predictions Loaded

Use this dialog box to select specific historical demand predictions which will be used for that Traffic Management Initiative (TMI). This window is similar to the view-only window accessed via **Utilities > Historical Pop-up Demand**; however, you can adjust the values utilized while still having the predictions visible for reference. ***High***, ***Medium***, and ***Low*** represent confidence levels for the values as listed in the ADL.

You can manually change the values, or complete the following steps:

1. Select the ***High***, ***Medium***, or ***Low*** radio button.
2. Click **Fill With**. The cells in the ***Load With*** row will be populated with the historical values for the selected confidence level. Note that the Fill With functionality is not available for FCAs.

Note: Even though you used the Fill With functionality, you can manually edit specific hours as necessary.

The following action buttons are displayed:

- **OK** – Click to save your changes and close the dialog box
- **Cancel** – Click to close the dialog box without saving your changes
- **Help** – Click to view help text specific to the dialog box

General Options

Additional changes have been made in the General Options wireframe (see Figure 7).

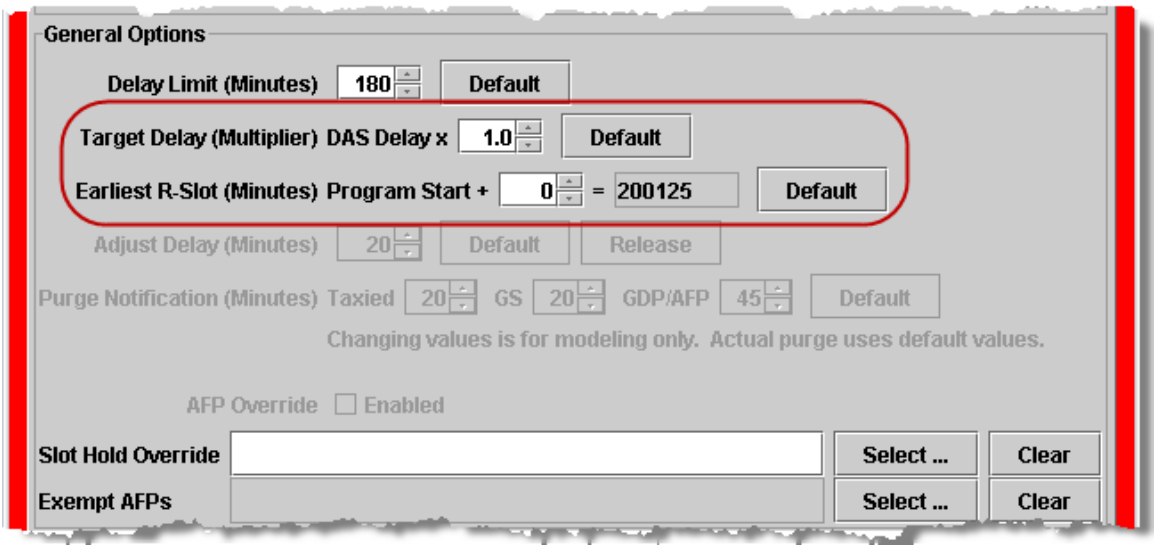


Figure 7: New Fields in General Options Wireframe

The following two fields have been added:

Target Delay (Multiplier) – This parameter is used to compute late filing pop ups' additional delay as compared to other known traffic. More specifically, it is multiplied by the average delay found in the DAS Delay Table for the 15-minute time bin in which the flight wants to arrive (ETA). A late filing pop up is currently considered a flight that has popped up within 6 hours of the flight's desired ETA. Flights that pop up outside of this 6-hour window are not subject to an increased Target Delay multiplier and the value of 1.0 is used.

For example, if flight A is a pop-up that became known to the system at 1110 and wants to arrive at 1535. Since the flight popped up less than 6 hours before the flights desired ETA the TFMS Core will find the average delay for known flights in the 1530-1544 time bin and multiply that delay by the Target Delay multiplier. So if the average delay in that 15-minute time bin is 20 minutes and the Target Delay = 1.5, Flight A's delay is calculated to be 20 x 1.5 = 30 minutes and will receive a CTA of 1535 + 30 = 1605.

This is not an editable field for DAS or GAAP programs. For DAS programs, the target delay multiplier is always 1.0 and cannot be edited. For GAAP programs, the target delay multiplier is not applicable as pop-up flights are assigned to unassigned slots or given the max additional delay.

For UDP programs, the default value is 1.0. Use the arrows to select a new value or type a new value. As you adjust the number of minutes, the time will increase in the adjacent ddhhmm field. Valid values are 1.0 to 9.9. Click **Default** to return to the default value.

Earliest R-Slot (Minutes) - This parameter is used internally within FSM to prevent allocating any reserved slots that are too close to the current time to be usable. From a

system point of view, the only restriction on the Earliest R-Slot is that it be earlier than the end time of the GDP.

Enter the Earliest R-Slot as a number of minutes that will be added to the start of the program being issued. For example, if you think the pop-up traffic for the first 2 hours of your program has already materialized, you would not want to reserve slots for pop-up flights in those hours. With the Earliest R-Slot parameter you can control when you want reserved slots to begin for pop-up flights by adding 120 minutes to the Program Start.

Zero is the default value. Use the arrows to select a new value or type a new value. Click **Default** to return to the default value.

IPM Setup

The ***Program Type*** values, GDP-UDP/AFP-UDP and the ***Reserve*** row have also been added to IPM Setup (see Figure 8).

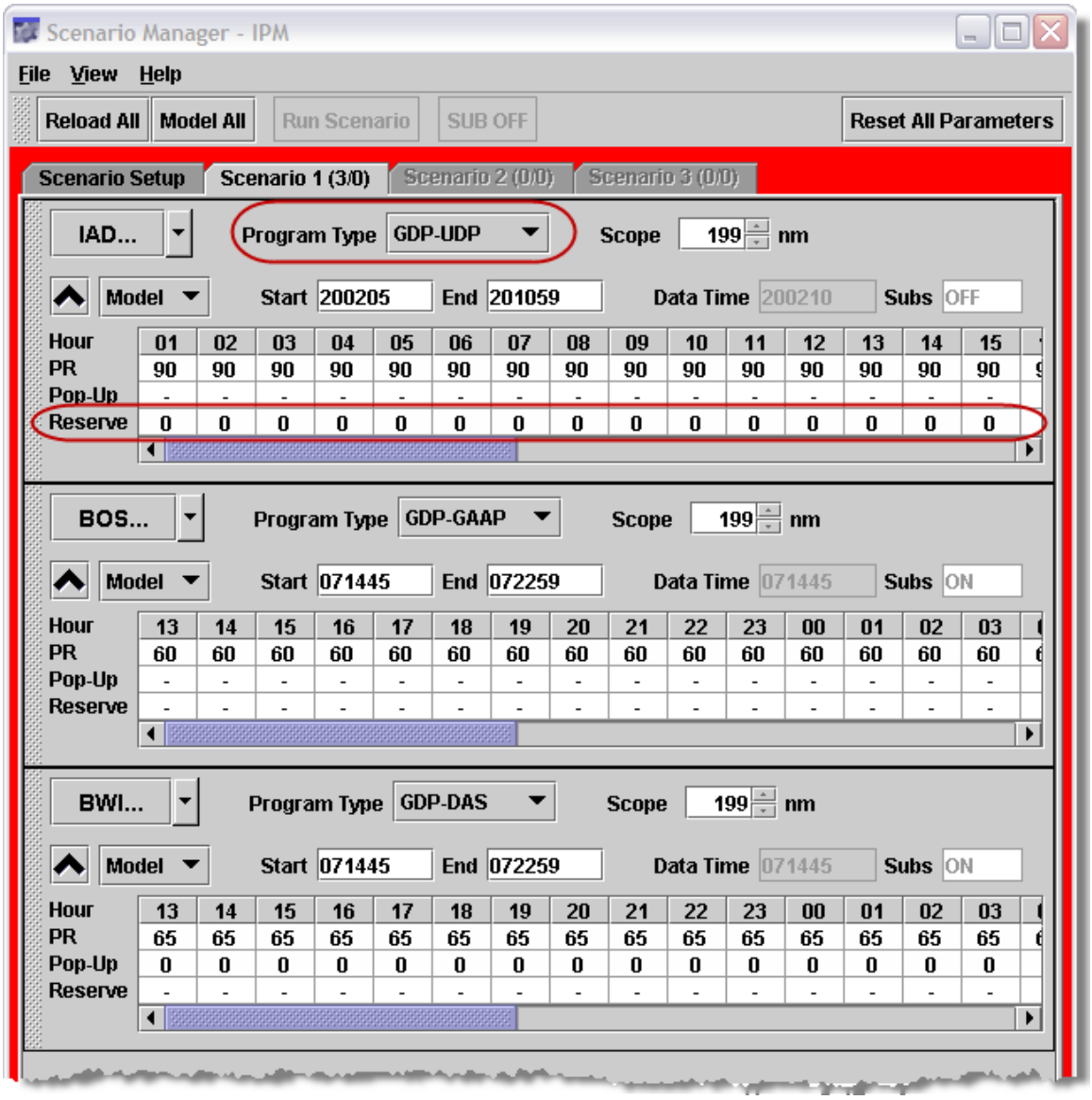


Figure 8: New Options in Scenario Manager

Coversheet Redesign

Coversheets have been redesigned such that all information is accessible from one tab. In addition, coversheets are dynamic in that they will only display TMI-specific content.

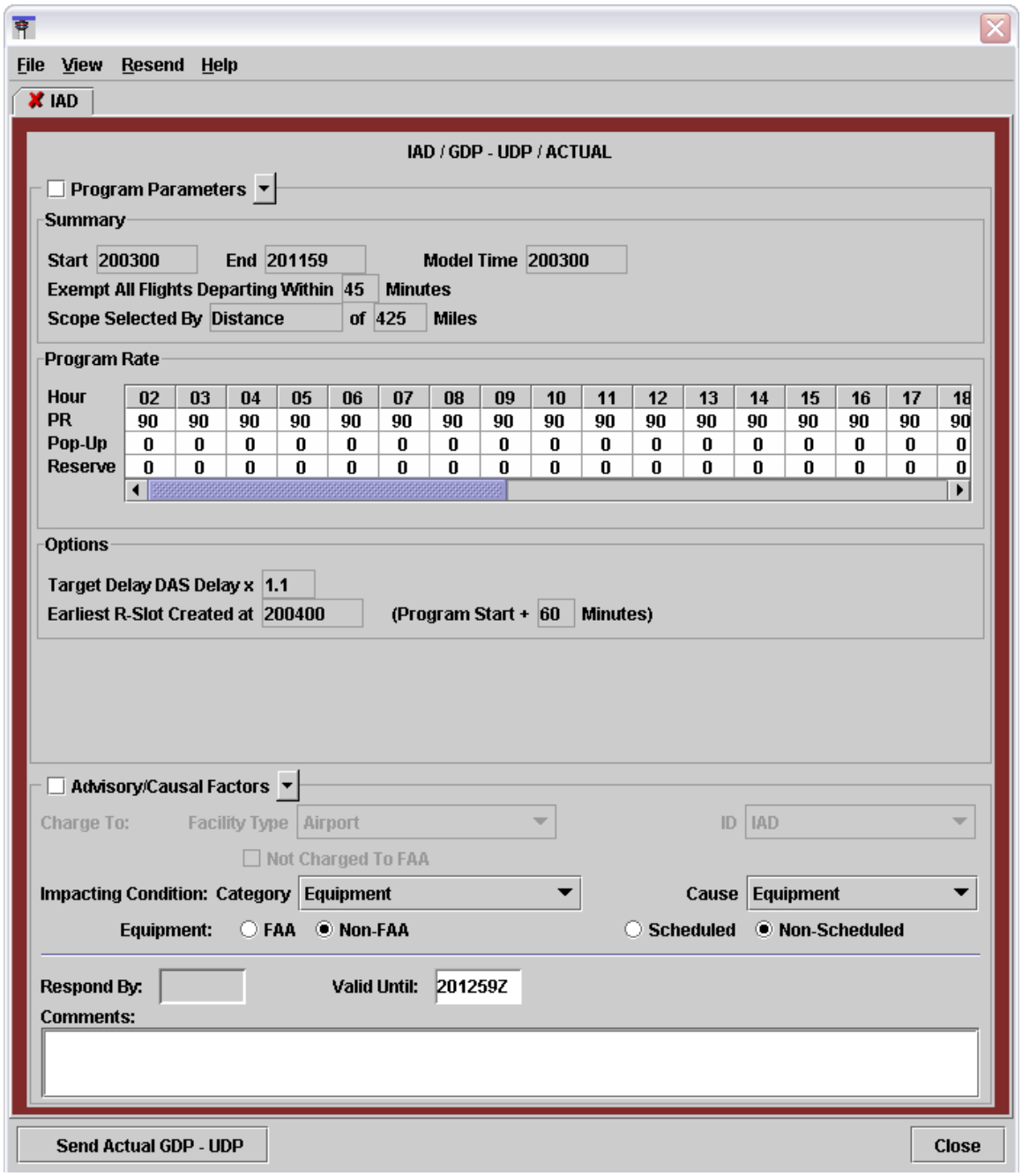


Figure 9: New Coversheet Design

The new coversheet has only one tab. The Program Results and Delay Assignment tabs have been replaced by options under ***Select the Program Parameters*** dropdown menu (see Figure 10). The information is displayed as an overlay on the coversheet. The dropdown also includes an option to view weather.

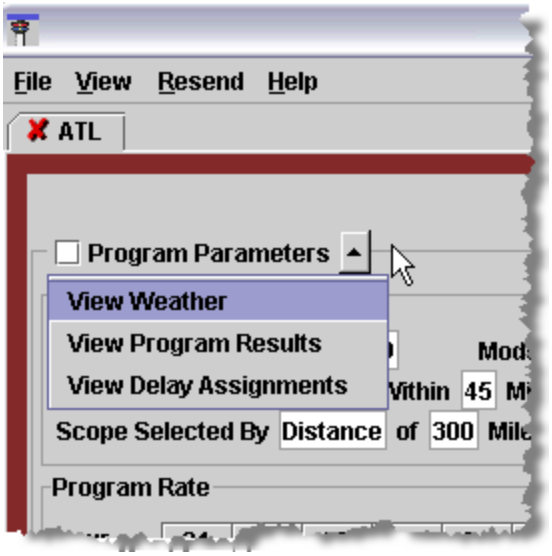


Figure 10: Program Parameters Dropdown has Replaced Tabs

Overlays

Overlays are used to review the following optional, display-only data:

- Weather (METAR/TAF)
- Program Results
- Delay Assignments
- Advisory Preview

View Weather

From the ***Program Parameters*** dropdown menu, select **View Weather** (see Figure 11). The coversheet is inactive until you click **Close** on the overlay.

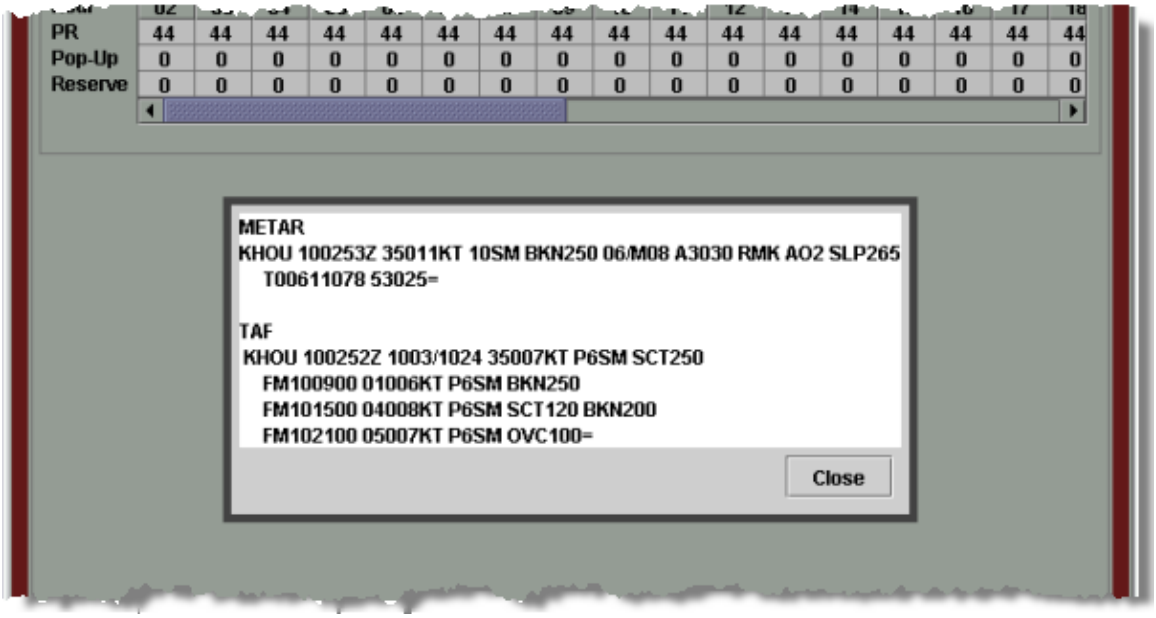


Figure 11: Weather Overlay

View Program Results

From the ***Program Parameters*** dropdown menu, select **Program Results** (see Figure 12). The coversheet is inactive until you click **Close** on the overlay.

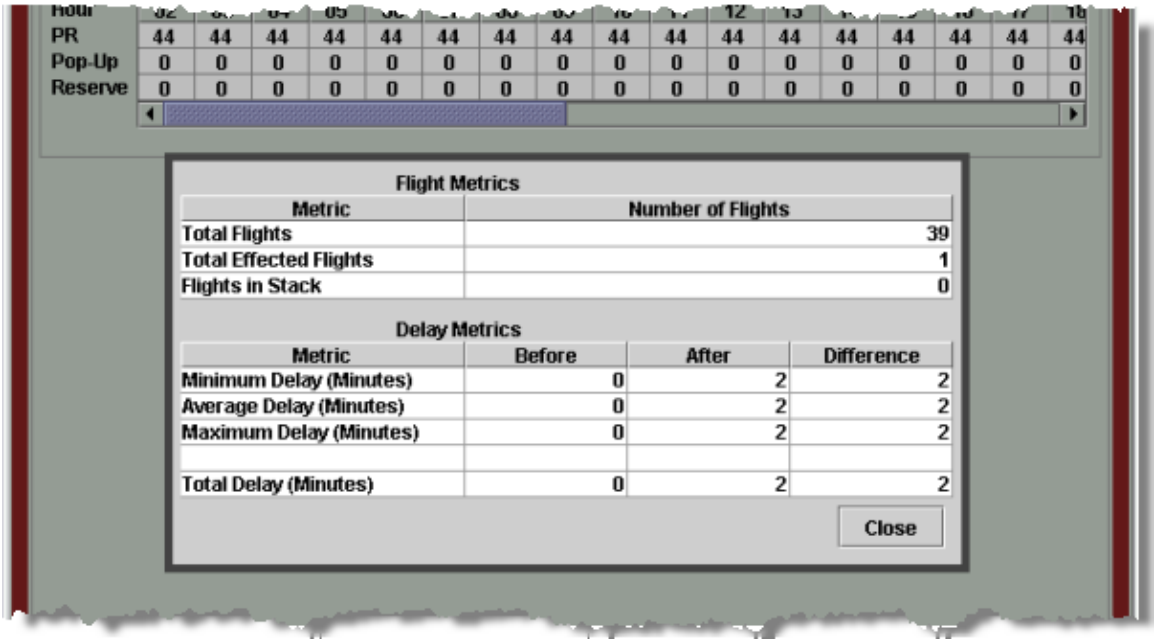
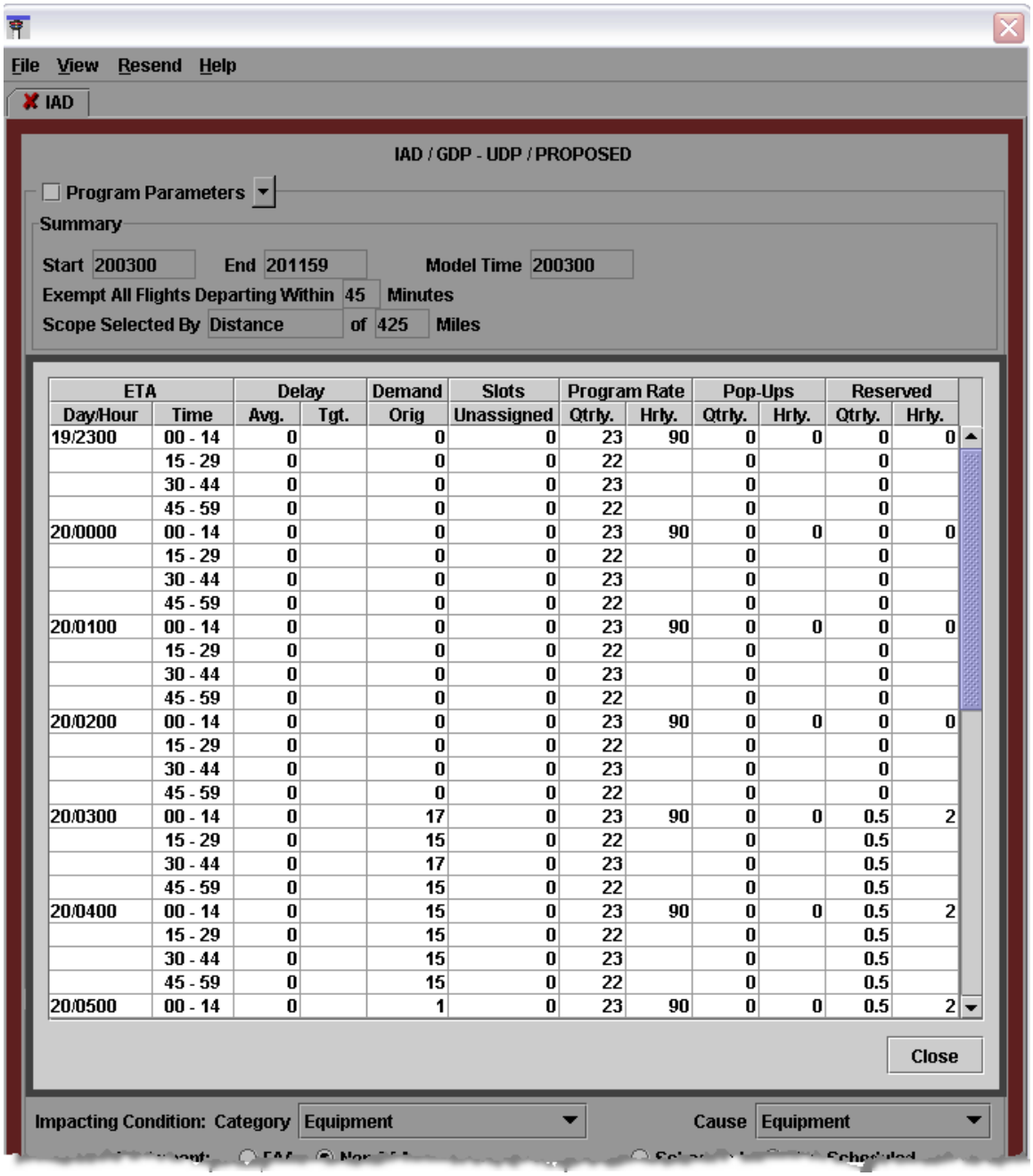


Figure 12: Program Result Overlay

View Delay Assignments

From the ***Program Parameters*** dropdown menu, select **View Delay Assignments** (see

Figure 13). The coversheet is inactive until you click **Close** on the overlay.



ETA		Delay		Demand	Slots	Program Rate		Pop-Ups		Reserved	
Day/Hour	Time	Avg.	Tgt.	Orig	Unassigned	Qtrly.	Hrly.	Qtrly.	Hrly.	Qtrly.	Hrly.
19/2300	00 - 14	0		0	0	23	90	0	0	0	0
	15 - 29	0		0	0	22		0		0	
	30 - 44	0		0	0	23		0		0	
	45 - 59	0		0	0	22		0		0	
20/0000	00 - 14	0		0	0	23	90	0	0	0	0
	15 - 29	0		0	0	22		0		0	
	30 - 44	0		0	0	23		0		0	
	45 - 59	0		0	0	22		0		0	
20/0100	00 - 14	0		0	0	23	90	0	0	0	0
	15 - 29	0		0	0	22		0		0	
	30 - 44	0		0	0	23		0		0	
	45 - 59	0		0	0	22		0		0	
20/0200	00 - 14	0		0	0	23	90	0	0	0	0
	15 - 29	0		0	0	22		0		0	
	30 - 44	0		0	0	23		0		0	
	45 - 59	0		0	0	22		0		0	
20/0300	00 - 14	0		17	0	23	90	0	0	0.5	2
	15 - 29	0		15	0	22		0		0.5	
	30 - 44	0		17	0	23		0		0.5	
	45 - 59	0		15	0	22		0		0.5	
20/0400	00 - 14	0		15	0	23	90	0	0	0.5	2
	15 - 29	0		15	0	22		0		0.5	
	30 - 44	0		15	0	23		0		0.5	
	45 - 59	0		15	0	22		0		0.5	
20/0500	00 - 14	0		1	0	23	90	0	0	0.5	2

Figure 13: View Delay Assignment Overlay

Tab Icon

The tab displays a red "X" or a green check (see Figure 14). The red "X" is the default, indicating that the coversheet has not been reviewed. A green check indicates that Advisory/Causal Factors and Program Parameters have been selected and the program is ready to be sent.

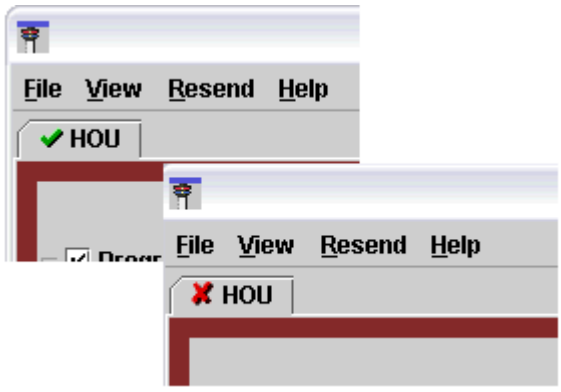


Figure 14: Tab Icon Indicates if Coversheet has been Reviewed

Actual and Proposed Program Heading and Send Button

The coversheet heading and Send button reflect whether the program is proposed or actual (see Figure 15). The heading lists the element, program type, and whether the program is actual or proposed. The Send button displays Actual or Proposed and the program type.

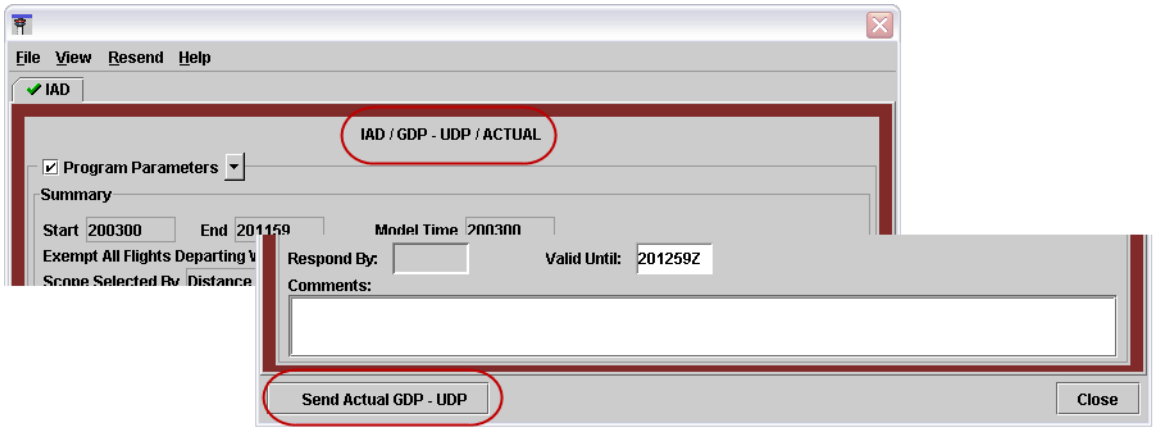


Figure 15: Coversheet Heading and Send Button Reflect Whether Program is *Actual* or *Proposed*

Dynamic Coversheet

In previous builds, coversheets grayed out information that did not apply to the TMI. Coversheets are now dynamic in that they only display TMI-specific content.

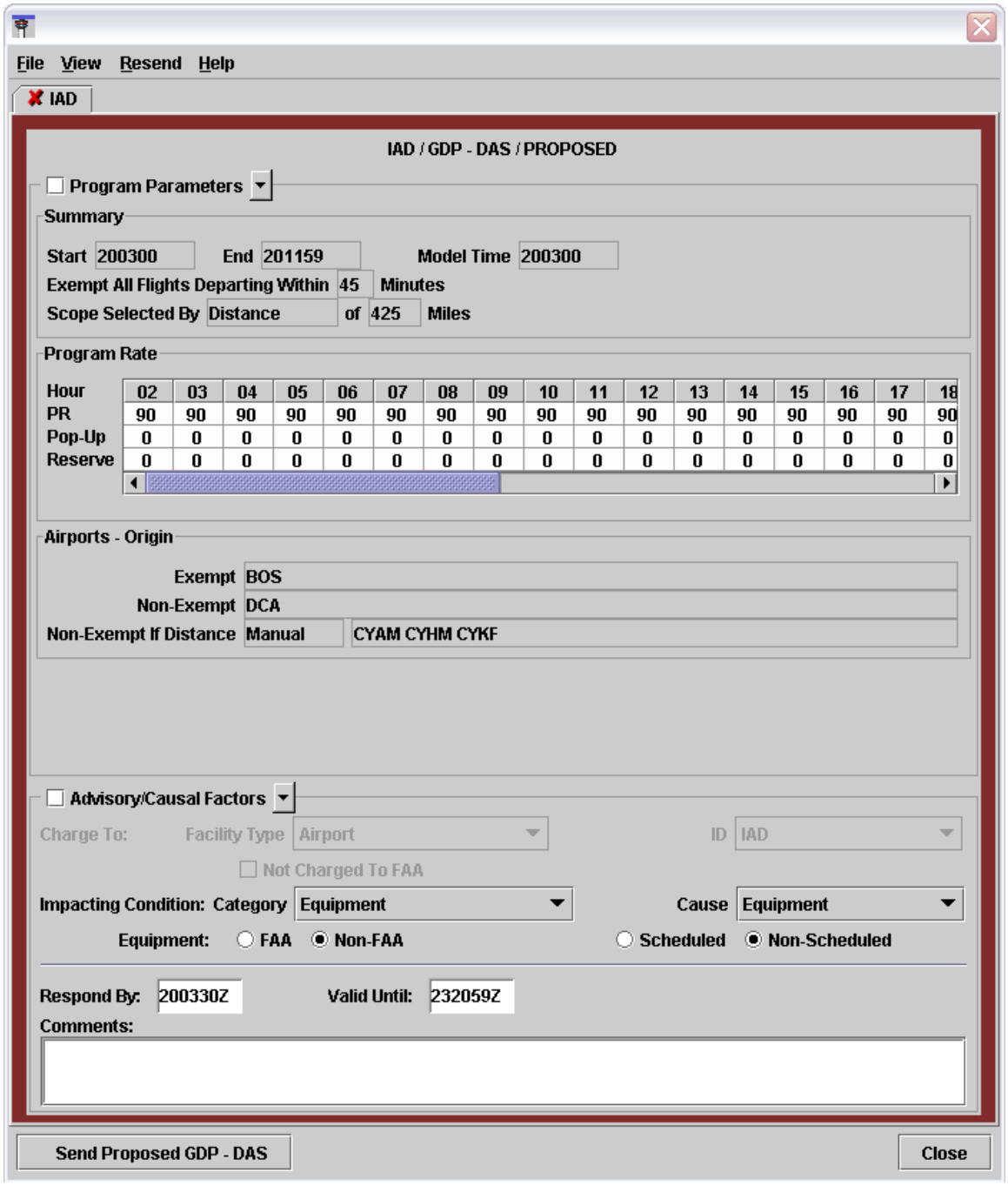


Figure 16: Typical Distance-Based Program

Note that the Airports-Origin section is displayed only if parameters were entered in GDT setup (see Figure 16). In a typical Tier-based program, Centers-Origin and Airport-Origin wireframes are displayed only if parameters were entered in GDT setup (see

Figure 17).

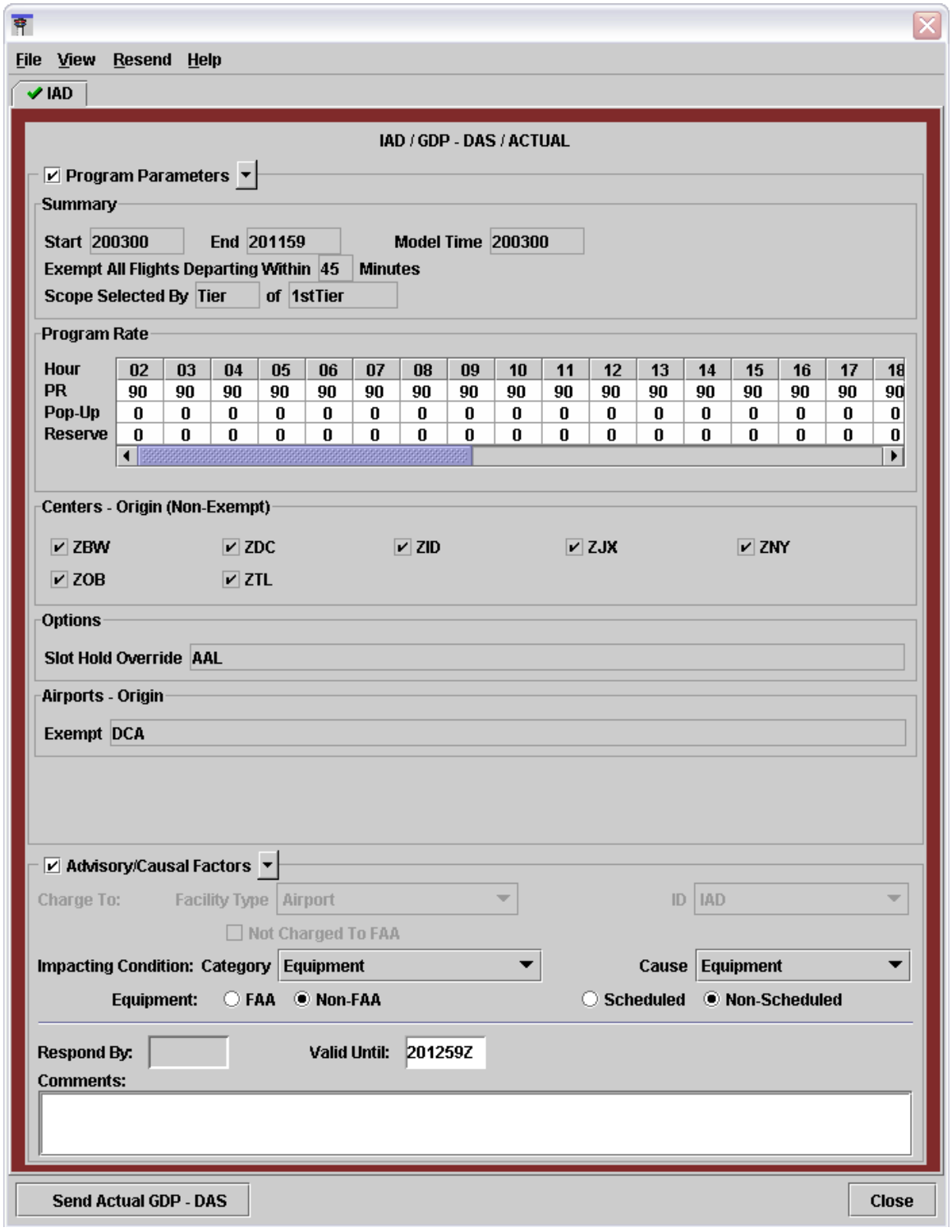


Figure 17: Typical Tier-Based Program

Miscellaneous

Visual Display of Text Fields

The graphical appearance of text fields has been modified so you can more readily determine which fields are enabled or disabled and editable or non-editable.

Each text field reflects the following two conditions:

1. Is the field editable or non-editable?
    - If the field is editable, the background is white. If the field is non-editable, the background is gray.
2. Is the field enabled or disabled?
    - If the field value is enabled or *part of the program*, the font is black. If the field value is disabled and not part of the program, the font is gray.

The background color defines whether the field is editable or non-editable. The text color defines whether the field is enabled or disabled. The following matrix graphically displays the three possible presentations of a text field (see Table 1):

Table 1: Three Possible Text Field Displays

Conditions	Visual Display
Non-Editable / Disabled	TEXT
Non-Editable / Enabled	**TEXT**
Editable / Enabled	**TEXT**

Non-Editable / Disabled fields (gray background/gray text) are not used for the program. For example, most of the fields in the General Options wireframe do not apply to a GDP-DAS program; therefore, they have gray backgrounds with gray text (see Figure 18).

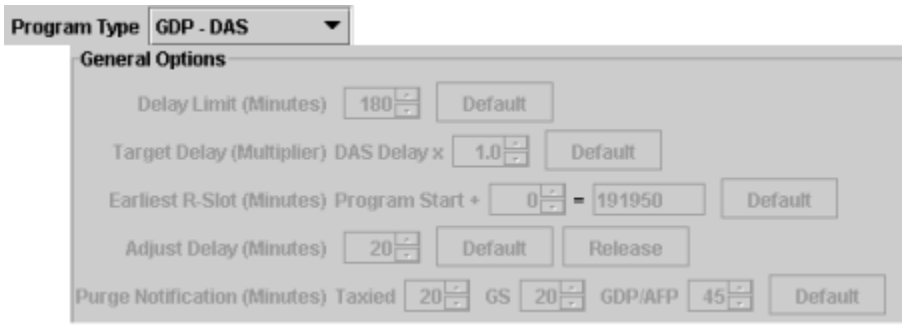


Figure 18: Non-Editable / Disabled Fields

Non-Editable / Enabled fields (gray background/black text) are used in the program but you cannot edit the values. An example is the Earliest R-Slot date and time field for a GDP-UDP program (see Figure 19). As you change the minute value, the time changes. While you cannot directly edit the time (081580), the value changes based on your inputs; therefore, the field is non-editable (gray background) and the field is *enabled* (black text) as the field value is part of the program algorithm.

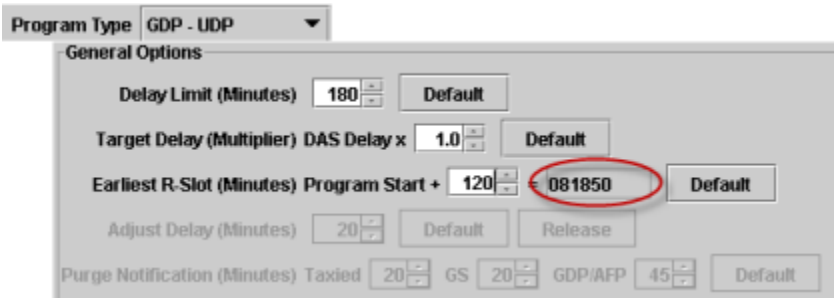


Figure 19: Non-Editable / Enabled Fields

Editable / Enabled fields (white background/black text) are used in the program and you can edit the values. An example is the Delay Limit (Minutes) field in a GDP-GAAP program (see Figure 20).

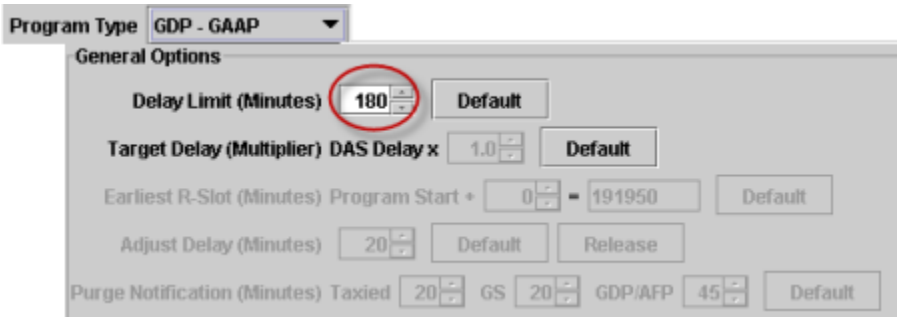


Figure 20: Editable / Enabled Fields

Note: This coloring convention does NOT apply to tables. Table fields always have a white background and black text.