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Strategic Air Command (SAC) Aircrew Scheduling Aid (SASA) User's Guide

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The Strategic Air Command (SAC) Aircrew Scheduling Aid (SASA) prototype is a scheduling system designed to allow a SAC scheduler to build a weekly flying schedule for training missions. SASA is a computerized version of the scheduler's manual environment, providing additional checks and balances. The SASA User's Guide is an extensive tutorial designed to help the reader use the SASA prototype.

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The authors wish to acknowledge the insightful contributions of Major R. Gowen (ESD/SZP) whose technical guidance in development of the SASA prototype was invaluable towards the completion and demonstration of the prototype. His previous experiences with scheduling helped us tailor our system to the needs of the users, a goal that is often sought after but not always achieved.

TYPOGRAPHIC CONVENTIONS

This User's Guide uses several typographic conventions in the text to highlight important points and to distinguish user inputs from system output.

> A note like this supplies you with additional information or serves to clarify a point.

Button labels, menu names, menu options, dialog names, and data entry field labels are shown in Helvetica typeface.

Specific keys on the computer keyboard are identified by their key label in small uppercase letters set in HELVETICA typeface. For example, the return key is denoted as RETURN.

Characters that you must enter are shown in `Courier` typeface.

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SECTION 1

INTRODUCTION

Purpose of SASA

The Strategic Air Command (SAC) Aircrew Scheduling Aid (SASA) is a prototype system designed to help the SAC scheduler build a weekly flying schedule for training missions. A SAC crew is required to fly a certain variety of missions during a specified period in order to maintain combat readiness. Crewmembers have to adhere to both currency and training requirements. Currency is defined as a period of time during which a crewmember must complete a certain task (e.g., a landing every 45 days to maintain a pilot's landing currency). Training requirements state that crewmembers must complete a specific number of tasks within a certain period of time (e.g., seven landings every six months). SASA will mimic the manual scheduling process in an electronic format, providing additional checks and balances. SASA will help the scheduler maintain a daily schedule at a glance.

This document describes the SASA prototype as of July 1991. The prototype is not complete, and many of the goals that have been set for the SASA system have not yet been reached. A significant amount of work remains to be done in order to make the system completely functional.

Scope

This section provides a high-level overview of features currently in the prototype and lists some desirable features that are not included. The remaining sections are designed to help the reader use the SASA prototype. Section 2 provides an overview of the SASA prototype by giving a high-level description of the various screens. Section 3 describes the features of the SASA prototype in detail. Section 4 provides a tutorial on how to use the SASA prototype to schedule missions by using four specific, step-by-step examples. Appendix A provides some information regarding user interface conventions (e.g., use of the mouse, windows, scrolling). Appendix B describes what you will need to run the SASA prototype, including hardware and software. Appendix C describes the data needed to run the SASA prototype. Appendix D describes the development platform and the software design of the SASA prototype. Appendix E is a questionnaire for users.

Overview of SASA Prototype Features

The SASA prototype maintains daily schedules containing the normal data that a crew needs to plan its mission. The scheduler can select crew names from a list and assign them against mission numbers, choose a flight profile from a list of standard profiles or build a new profile. An aircraft and remarks can be assigned to the mission. The scheduler can repeat this process for every crew scheduled to fly on a particular day and print the day's schedule.

The SASA prototype (table 1) provides checks and balances to help the scheduler perform his job more quickly. It maintains monthly operations plan (MOP) data for each crew and its

crewmembers. If a scheduler assigns a crew that is not scheduled to fly that day (according to the MOP), the crew name will be highlighted in red, indicating a conflict has occurred. If the scheduler finds out that a particular crewmember is unavailable to fly with his usual crew for some reason (e.g., he has gone on temporary duty (TDY)), the scheduler can select an alternate from a prioritized list of available alternates, sorted by training needs. If the scheduler wants to add or modify training requirements, he can do so. When the scheduler builds profiles, the system uses the flight times between events that have been previously stored in the data files.

Table 1. Summary of Current SASA Prototype Features

• View the crew's monthly operations plan (MOP) data for the week and month
• Drag a crew nametag from the crew storage area to the schedule board
• View the crewmembers associated with a particular crew
• Select an alternate crewmember
• View red-bordered crew conflicts at a glance
• Remove a crew from the schedule board
• Move crew to different mission lines
• View the crewmember's training requirements and currency status
• Select a standard profile to be assigned to a mission
• Modify a profile
• Create a new profile
• Save a profile
• View the timing data and events associated with the profile
• Assign an aircraft to the mission
• Add remarks to the mission
• View, add, and modify training requirements
• Print a schedule
• Save a schedule (including saving draft and 60-9 schedules)
• Add further crewmembers (e.g., instructors)
• Wing-level system setup (e.g., showing Zulu time difference from local time)
• Adjust to different aircraft types (e.g., B-2)
• Manually add to the list of contracted events (horseblanket)
• Remove an event from profile
• Handle Multiple squadrons

As stated previously, the SASA prototype is not complete, and although we have incorporated many features, more still need to be added. Table 2 provides a list of some desired features that the current SASA prototype does NOT include.

Table 2. Some Desired Features NOT in the Current SASA Prototype

• Ground training schedule • MOP changes • MOP designator • MOP key • Crewmember unavailability annotation • Indication that alternate is flying • Print alternates • User defined fuel requirements

Data Needed to Run SASA Prototype

The SASA prototype needs data in order to run. Some of this data has been obtained from the SAC Scheduling Assistance System (SAS). The SAS program develops a unit training plan over a three month period. SAS schedules an equitable number of crew training flights that are designed to accomplish all training requirements (see the document *Scheduling Assistance System (SAS 5.0) Operator's Manual*, D. R. Coote, HQ SAC/DOOM, January 1991). The SAS program generates data files which we use in their ASCII format as input to the SASA prototype.

Data in the following categories are obtained by the SAS program:

- Crews and Crewmembers
- MOP Data
- Training Requirements

In addition, the SASA prototype uses mock data in the following areas:

- Available Aircraft
- Available Airspace
- Crewmembers' Progress
- Event Enroute Times
- Available Profile Events and Standard Profiles

Appendix C provides more information on the data needed in each of these categories.

SECTION 2

SASA PROTOTYPE OVERVIEW

Getting Started

The SASA prototype system should be installed for you by your system administrator. Information on what is needed to install this software is provided in appendix B.

Using the Computer

You should have some familiarity with a computer, including using a mouse, windows, and scrolling. For those less familiar with computers, appendix A provides a detailed summary of the items you will need to know. This section serves to summarize appendix A and point out the most important information needed to use the SASA prototype.

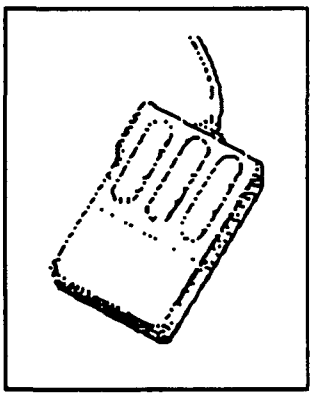
The mouse we use has three buttons (figure 1a); we use the left and middle mouse buttons in the SASA prototype. This User's Guide specifies which button to use to select various options.

Two types of windows are used in SASA (figures 1b and 1c). In general, windows that let you edit information have buttons or (selectable text) at the bottom of the window (e.g., GO, ABORT, EXIT) (figure 1b). These words are always selected with the left mouse button. One of these must be clicked to make the window disappear. Any window that simply provides additional information for viewing does not have selectable text, and will disappear when the cursor is moved outside the window's borders.

Some windows contain scrollable lists, to show additional data (figure 1c). To scroll up (or down), place the cursor inside the box at the top (or bottom) of the vertical scroll bar and click the left mouse button. You can also scroll by dragging the scroll thumb (the shaded box) up or down.

- Dragging: When you select an item with the left mouse button, keep the mouse button pressed, and move the mouse, the item moves also. This action is referred to as "dragging". Not all items are draggable.

  In certain places you can enter text into a field (figure 1B). You must click in the text field with the left mouse button or move the cursor into the text field and press the RETURN key in order to begin typing text into the text field. You can also edit existing text in a text field by clicking in the text field you want to edit. After you have finished entering or editing text, you must press the RETURN key to have the system accept your text.



a. Three button mouse

LOW LEVEL INFORMATION

Route:	504	
Entry:	1800	z
Exit:	1920	z
TOT:	1820	z
	1840	z
	1855	z
	1910	z

GO ABORT

b. Window with editable text fields

CREW MEMBER REQUIREMENTS | CURRENCY

Name: MACDONALD Crew: 8 Overall % 29%
Position: RADAR NAVIGATOR Min Currency 22 days

	1Jan–1Jun	Curr	Reqs
Q020 - Tac Evaluation		178	0/0
P098 - Opp Seat Exer		39	0/0
N009 - TalEvs Nav Leg		64	2/5
D006 - SRTA Tng Sortie		45	2/6
C014 - Agm LO Alt Run		65	6/18
B066 - Act Wpn Release		85	7/20
B001 - HI|LO Bomb Run		22	10/30

1Jan 1Feb 1Mar 1Apr 1May 1Jun

c. Window with scroll bar, without editable text fields

Figure 1. Input Device and User Interface Characteristics of the SASA Prototype

Front Pages

Welcome Screen

The first screen you will see is shown in figure 2. This display is intended to welcome you to the SASA prototype and provides four options:

- EXIT SASA
- Information
- SASA Setup
- Start Scheduling

EXIT SASA

You can exit the program at any time by selecting this option. Select it by moving the cursor into the box and clicking the left mouse button.

Information

By selecting this option, you can learn more about the SASA prototype online. Select this option by moving the cursor onto the box labeled Information and clicking the left mouse button. You will be presented with a menu providing options to view additional information (figure 3). You can obtain additional information on the following:

• Purpose of SASA	See Section 1, page 1
• Scheduling Page	See Section "Overview of SASA Prototype Worksheet," page 12
• Windows	Appendix A, page 59
• Scrolling	Appendix A, page 60
• Databases	Appendix C, page 65

- Cancel
- EXIT SASA

Selecting the Cancel option will return you to the previous display. EXIT SASA will exit the program. Selecting any of the other options with the left mouse button will provide you with the appropriate additional information.

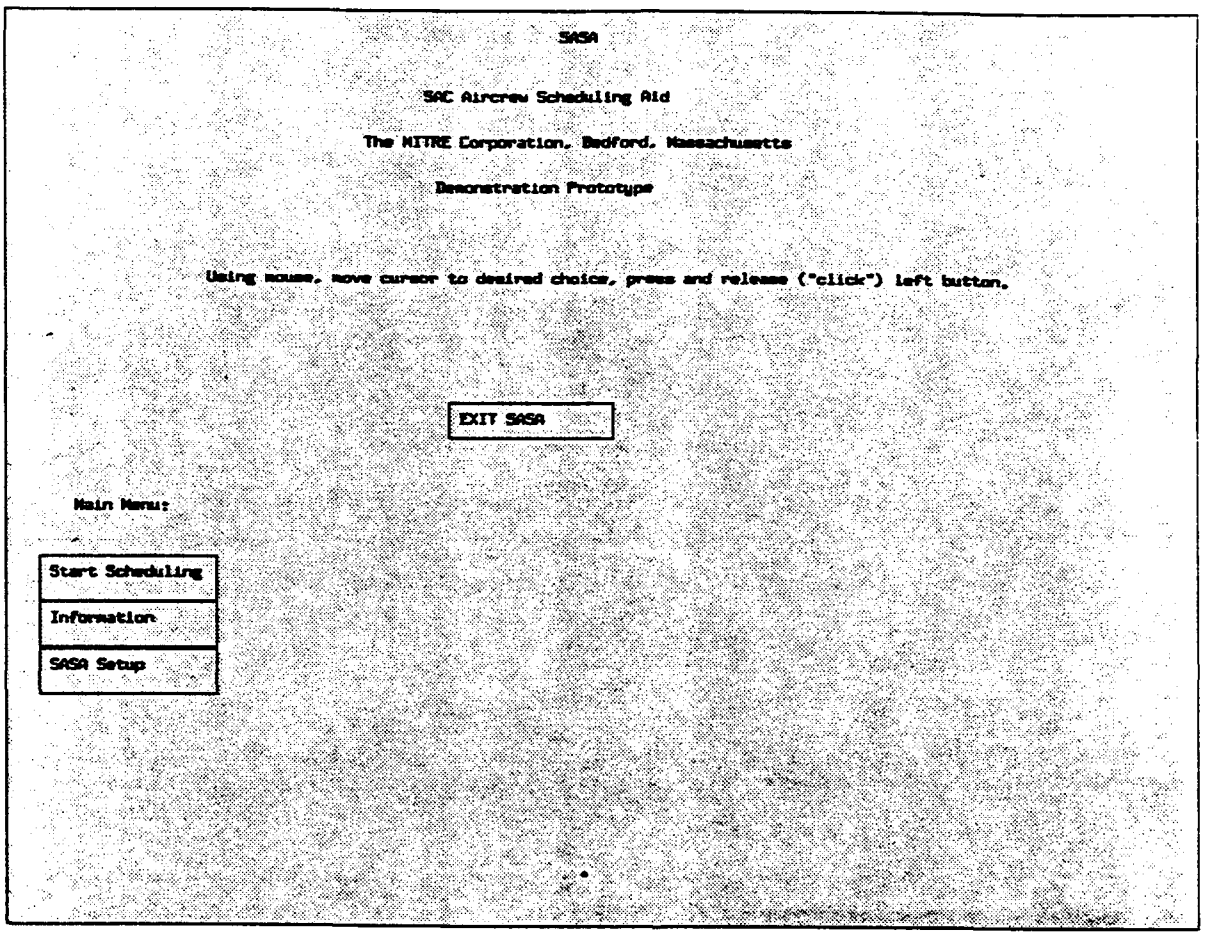


Figure 2: Introductory SASA Screen

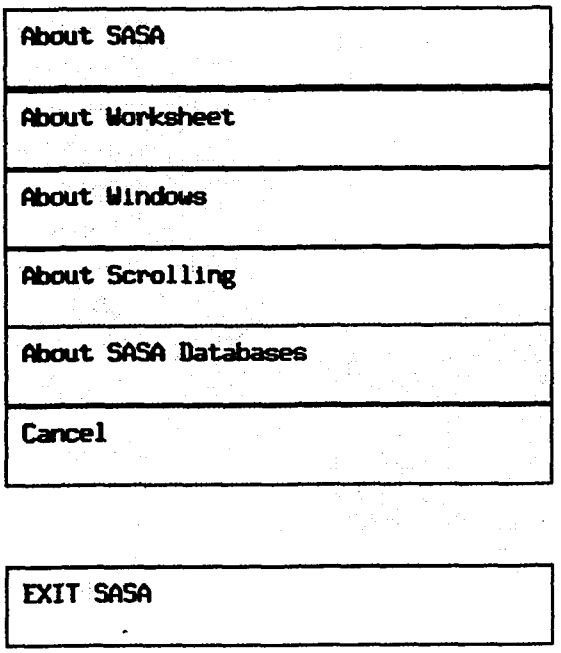


Figure 3. Information Menu

SASA Setup — This option will allow you to bring up a setup screen to select the squadrons whose crews you wish to schedule. You can also enter the local to Zulu time difference and the name of the printer you would like the SASA prototype to access when printing.

Start Scheduling — By selecting this option from the first display (figure 2), you will be prompted, in order, to enter the following information:

- Password
- Squadron
- Date

Enter a Password — The password prompt is shown in figure 4. Currently no password capability is programmed into the SASA prototype; this prompt is included to show that a password capability could easily be incorporated into the system. If you select the Cancel box, the password prompt will disappear and you will be back to figure 2.

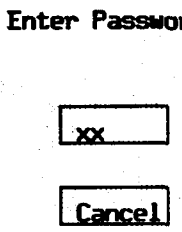


Figure 4. Password Prompt

By clicking in the XX box, you will advance to the next choice (select a squadron).

Select a Squadron

The squadron selection menu is shown in figure 5.

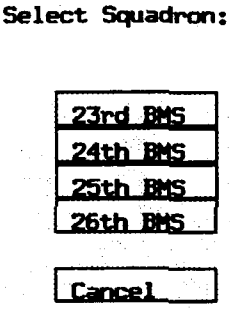


Figure 5. Select Squadron

The squadrons listed are the ones selected on the SASA Setup screen. Clicking on one of the choices with left mouse button will advance you to the Enter the Date window. If you select the Cancel box, the squadron menu will disappear and you will be back to the Enter Password prompt (figure 4).

Enter the Date

The date menu is shown in figure 6.

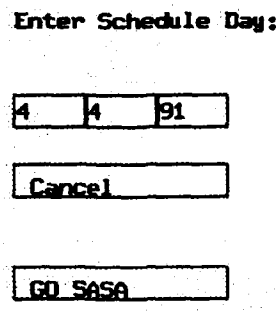


Figure 6. Enter Schedule Date

A default date will be displayed in the boxes (shown as mm/dd/yy). If you wish to change the date, move the cursor to the appropriate box, click in the box with the left mouse button, and type the new month, day, and/or year. After you finish typing the new month, day, and/or year, you must press the RETURN key. If you select the Cancel box, the date menu will disappear and you will be back to the squadron selection menu (figure 5).

If you select the GO SASA button, the SASA prototype worksheet will appear and you are ready to start scheduling.

Overview of SASA Prototype Worksheet

Figure 7 shows the SASA prototype worksheet. For description purposes, it is divided into five sections:

- Header
- Schedule Board
- Crew Nametag Storage Area
- Documentation Line
- Main Menu

Header

The header consists of two lines. The first line contains, in the upper left corner, the organization or squadron that was selected. Then the schedule date is displayed. The current schedule is displayed (default is New Sched). The two red boxes at the far right on this line are for the Supervisors of Flight (SOFs).

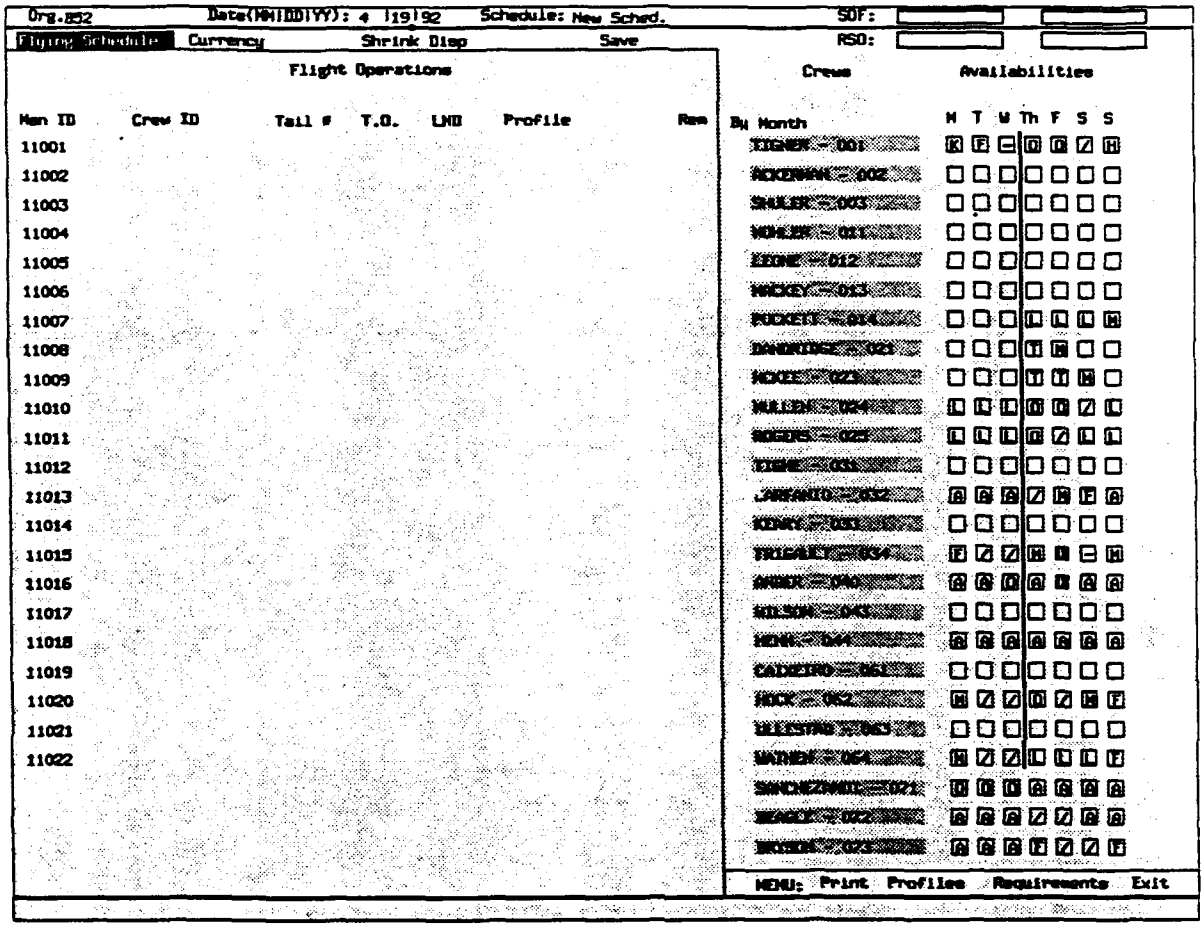


Figure 7: SASA Prototype Worksheet

The left side of the second line of the header says Flying Schedule | Currency, an option that allows you to change displays. Most of this document discusses the Flying Schedule display. By clicking on Currency, you will see the Currency Board display, which shows the status of crewmembers' training requirement completion by crew position (for more information about this display, see the section entitled "Currency Board," page 45). Towards the center of this area are the words Shrink Disp. Clicking the left mouse button on this text will allow you to shrink the display to approximately one fourth of its original size. Shrinking the display will allow more room on the screen to bring up other applications. When the display size is reduced in this way, the text will be changed to Enlarge Disp. Clicking on this text will return the display to its original size. In the center of this area is the word Save. Clicking on this text will allow you to save the schedule you are building (for more information about saving, see the section entitled "Saving Your Schedule," page 44). The two red boxes at the far right are for the the Runway Supervising Officers (RSOs).

Nametag Storage Area

On the right portion of the screen below the header lines is the crew nametag storage area. This area lists the crews and their associated crew numbers, together with their availabilities as determined by the MOP.

Below the header lines, on the left portion of the screen, is the schedule board. At the top of the schedule board is the title Flight Operations. The following columns are displayed:

Msn ID	Mission Identification Number: Format is xxxnn, where xxx is the julian day of the year and nn is a numerical ordering (1 through 21).
Crew ID	Crew Identification Number: Displays crew name and crew number of crew selected for mission (see section entitled "Dragging Crews," page 19.
Tail #	Tail Number: Displays the aircraft tail number of the mission (see section entitled "Assigning an Aircraft," page 40).
T.O.	Takeoff Time: Displays mission takeoff time after a profile is selected (see section entitled "Timing Data Box (Takeoff and Landing)," page 37).
LND	Landing Time: Displays mission landing time after a profile is selected (see section entitled "Timing Data Box (Takeoff and Landing)," page 37).

Profile — Profile Description: Displays mission profile description (see section entitled "Profiles," page 29).

Rem — Remarks: Displays an asterisk if remarks have been entered for the mission (see section entitled "Adding Remarks," page 40).

The MOP data contained in the boxes, under the days of the week, is coded according to the codes used in the SAS program (table 3).

Table 3. MOP Data Key

A	Alert
O	Crew time off following alert duties
L	Leave
F	Fly days
G	Ground activities
H	National holidays
K	Prevents a fly day from being scheduled
M	Normal mission planning day
P	Mission planning day while assigned alert duties
T	Temporary Duty (TDY)
V	Reserved day
-	Crew day off following a late night flight
/	Saturday and Sunday

MOP data obtained from the SAS program includes the one character identifier for each day plus characters denoting more specifics. For example, the first character denotes the activity (e.g., flying); a second character might denote the location of the activity, and a third character the kind of activity (e.g., air refueling). While SASA currently displays only the first character in the MOP data, SASA stores the additional data for future use (e.g., suggested scheduling options using MOP key data).

The label By Month is displayed at the top left of the crew nametags. If you click on this label with the left mouse button, you can see the MOP data for the month being scheduled (see the section entitled, "Crew MOP Data," page 18).

Documentation Line — The lower left portion of the screen is reserved for a documentation line. As you move the cursor with the mouse over various parts of the worksheet, the message in the documentation line changes, providing you with additional information to help you perform your scheduling tasks. For

example, it may tell you which mouse button to click in order to get additional information on an item.

Main Menu

The lower right portion of the screen contains a menu with the following options and subsequent actions:

Print	Print a schedule (see the section entitled "Printing a Schedule," page 43)
Profiles	Build new profiles (not operational)
Requirements	View, add, or modify training requirements (see the section entitled "Viewing and Adding Training Requirements," page 41)
Exit	Exit from the current schedule and return to the introductory screen (figure 2)

SECTION 3

SASA PROTOTYPE FEATURES

Introduction

This section describes the various features of the SASA prototype in detail. The section is divided as follows:

1. Crews and Crewmembers
   - Viewing the Monthly Operations Plan (MOP) data
   - Dragging a crew nametag from the crew nametag storage area to the schedule board
   - Viewing the crewmembers associated with a particular crew
   - Adding additional crewmembers
   - Crewmember substitutions
   - Crew conflicts and replacing a crew
   - Removing a crew from the schedule board
   - Moving a crew to a new mission line
   - Swapping crews
   - Viewing the crewmembers' training requirements and currency status

2. Profiles
   - Selecting a standard profile to be assigned to a mission
   - Modifying a profile
   - Removing profile events
   - Creating a new profile
   - Saving a profile
   - Modifying additional mission information
   - Viewing the timing data and events associated with the profile

3. Miscellaneous
   - Assigning an aircraft to the mission
   - Adding remarks to the mission
   - Viewing and adding training requirements
   - Assigning the SOFs and RSOs
   - Printing a schedule
   - Saving a schedule
   - Loading a schedule

4. Currency Board

Crews and Crewmembers

Crew MOP Data To schedule a crew to fly a mission, first pick a crew whose MOP data indicates they are available to fly. The crew's weekly activities are displayed to the right of the crew nametags (see figure 7). The column to the immediate right of the vertical line shows the day before the day being scheduled. The activities for the day being scheduled appear in the column under the day abbreviation highlighted in red.

- The activity boxes for the day being scheduled that contain an F are highlighted in blue because they would be the most likely candidates to fly.

- Crews with an M are scheduled for a regular mission day and can be scheduled to fly without a conflict appearing.

To view additional crew MOP data, click the left mouse button on the text By Month at the top left of the crew nametag storage area, which causes a MOP data window to appear (figure 8).

This window lists each crew and their activities for the entire month, with the activities for the day being scheduled to the immediate right of the vertical line on the window. A horizontal guide bar can be moved up and down on the window by holding down the left mouse button while moving the cursor up or down on the bar. When you are done, move the cursor outside the window's borders and the window will disappear.

- If you accidentally move the cursor outside the window's borders before you are done viewing the data, the window will disappear. To get the window to reappear, you must select By Month again.

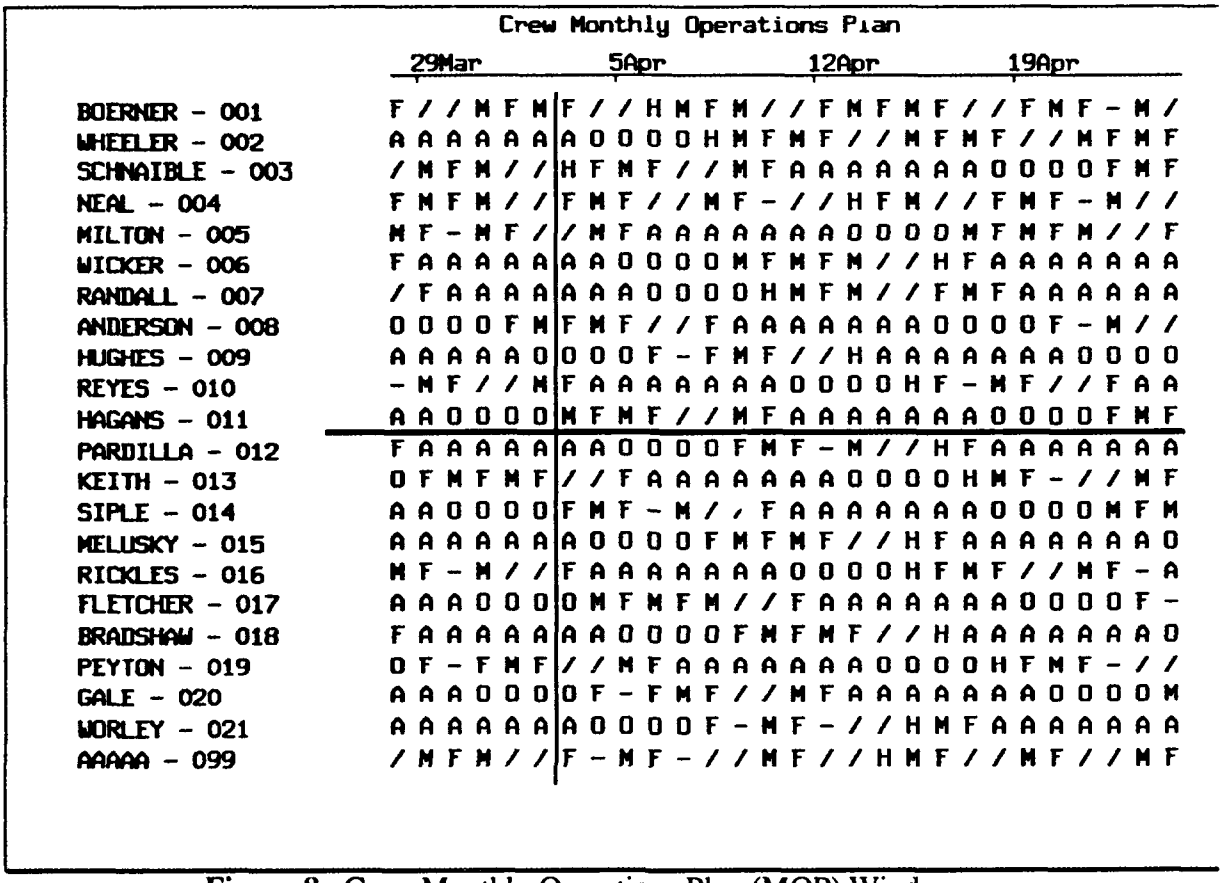


Figure 8. Crew Monthly Operations Plan (MOP) Window

Dragging Crews When you have found a crew you wish to schedule, hold down the left mouse button on the crew nametag and drag it to the scheduling board. For example, in figure 9, crew 004 with NEAL as the aircraft commander has been chosen and placed on the scheduling board.

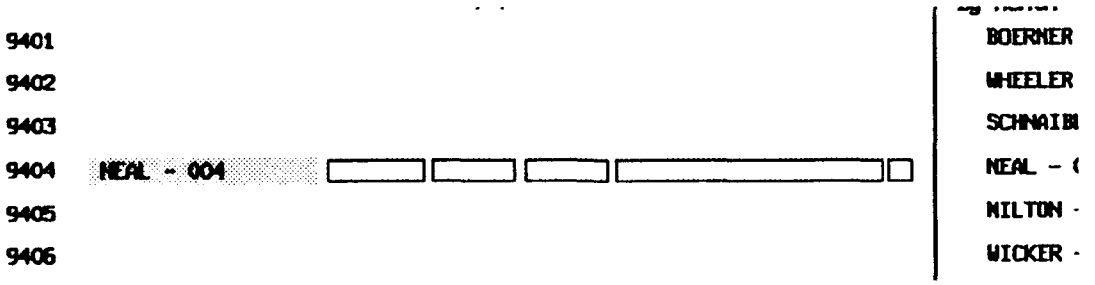


Figure 9. Crew Selected for Scheduling

- Dragging: When you select an item with the left mouse button, keep the mouse button pressed, and move the mouse, the item moves also. This action is referred to as "dragging". For example, you drag a crew nametag over to the schedule board in this way.

- As you move the nametag with the mouse along the schedule board, you will notice that regions of the schedule board become highlighted. These regions are referred to as mission lines; they are numbered consecutively down the left side of the board. You should place your selected crew nametag on one of these highlighted mission lines.

  Place the nametag in any of the mission lines by releasing the left mouse button when the desired mission line is highlighted. When the mouse button is released, the crew nametag will appear under the column labeled Crew ID with the remaining columns on the mission line containing empty boxes (see figure 9).

  In cases where an aircraft for a training mission requires two separate crews, a front end crew and a back end crew, e.g., RC135 aircraft, if a front end crew nametag is dragged onto the scheduling board the nametag will turn green. This color change serves to alert the scheduler that the training mission does not contain a back end crew and is therefore incomplete. Likewise, if a back end crew nametag is dragged onto the schedule board without a front end crew, the nametag turns blue, denoting that the training mission contains a back end crew but not a front end crew and is also incomplete. If a back end crew nametag is dragged and placed on a mission line already containing a front end crew nametag, or vice versa, the nametag on the mission line turns brown, signifying that the mission line contains both a front end and back end crew.

- When a training mission requiring two crews is scheduled, the name of the front end crew appears on the mission line when both crews are scheduled or when only the front end crew is scheduled. When only the back end crew is scheduled, the name of the back end crew appears on the mission line.

Crewmembers

To see a list of the crewmembers assigned to a crew, click the middle mouse button on the crew nametag anywhere you see a crew name (e.g., on the schedule board or in the nametag storage area). The crewmember window appears (figure 10). This window is divided into three sections, a front end crew area in the top portion of the window, a back end crew area in the middle of the window, and a scrollable list at the bottom of the window where any extra crew members are listed. The front end and back end crew areas each display the list of the members assigned to the crew, their crew position, and the crew callsign.

- Currently, the crewmember window does not display the call sign of the back end crew.

The scrollable list at the bottom of the window lists the names and crew positions of all of the extra crewmembers assigned to the crew.

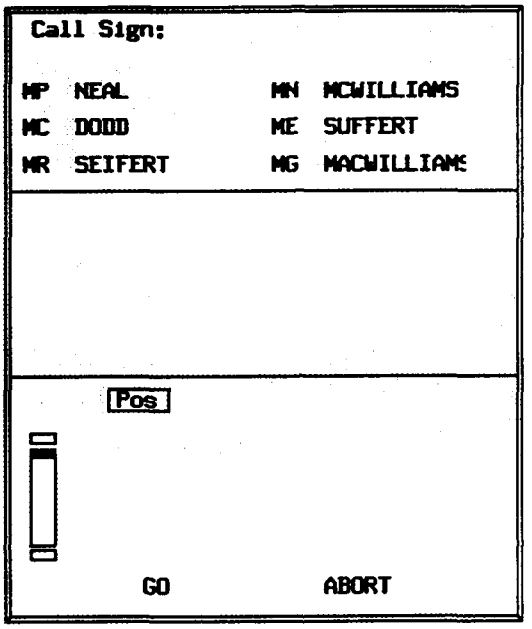


Figure 10. Crewmember Window with Front End Crew Shown

To change or add a callsign for the crew, click the left mouse button after the words Call Sign: and begin typing (press the RETURN key when done). To accept the newly entered callsign, click GO; to close the window without keeping the new callsign, click ABORT.

Adding Additional Crewmembers

To add further crewmembers, bring up the Crewmember window by clicking the middle mouse button on the crew nametag located anywhere on the display. Click the left mouse button on the button labeled POS located in the bottom portion of the window. This will bring up a window containing a scrollable list of crew positions for the extra crewmembers (figure 11a).

Click the left mouse button on the crew position for the alternate crewmember you will be adding, then select GO. The window will disappear and a button will appear on the Crewmember window next to the POS button (figure 11b). This button is labeled with the name of the crew position you have just selected. Clicking the left mouse

button on this new button brings up a window containing a scrollable list of additional crewmembers whose crew position is the same as the type shown on the button (figure 11c). Click the left mouse button on the desired additional crewmember and select GO. [The crewmember and his crew position will appear in the scrollable list located at the bottom portion of the Crewmember window.]

- Currently, the only way to remove an additional crewmember(s) is to either replace or remove the crew(s) assigned to fly the mission.

- Additional crewmember choices which have already been scheduled or who are not available will appear on the list highlighted in pink. If one of these choices is selected a scheduling conflict will occur.

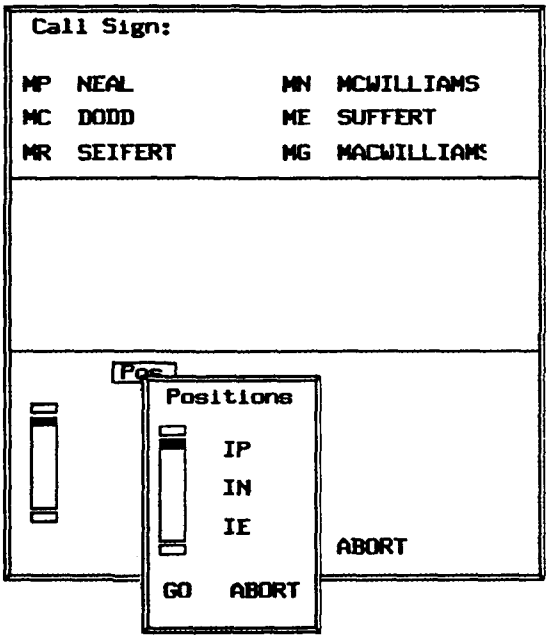


Figure 11a. Additional Crewmember Positions

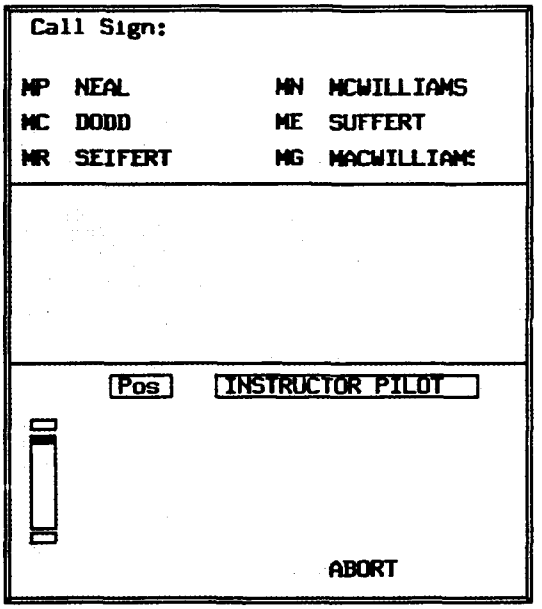


Figure 11b. Crewmember Window With Additional Crew Button Shown

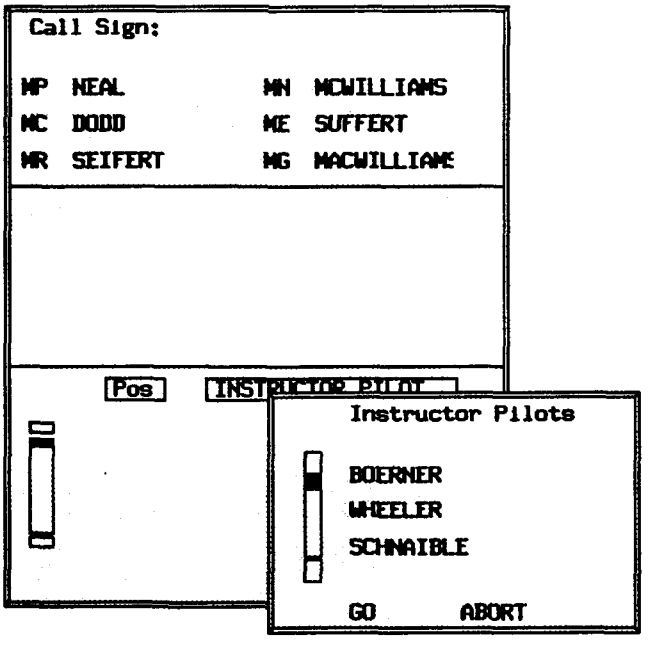


Figure 11c. Additional Crewmembers Window

Substitutions

To replace a crewmember, bring up the Crewmember window (see figure 10) by clicking the middle mouse button on the crew nametag located anywhere on the display. In the Crewmember window, in either the front end or back end crewmember areas, click the left mouse button on the desired crew position (e.g., MC - mission co-pilot) to display the Alternates for that position.

The Alternates window contains two scrollable lists of possible alternates (figure 12). Both lists contain alternate crewmembers who are available to fly and occupy the same crew position as the crewmember you are trying to substitute.

The top list of alternates shows the available alternates' names, nearest currency expiration, and the training event for which they will lose their currency soonest. The alternates are sorted according to currency expiration, from least to most time before expiration.

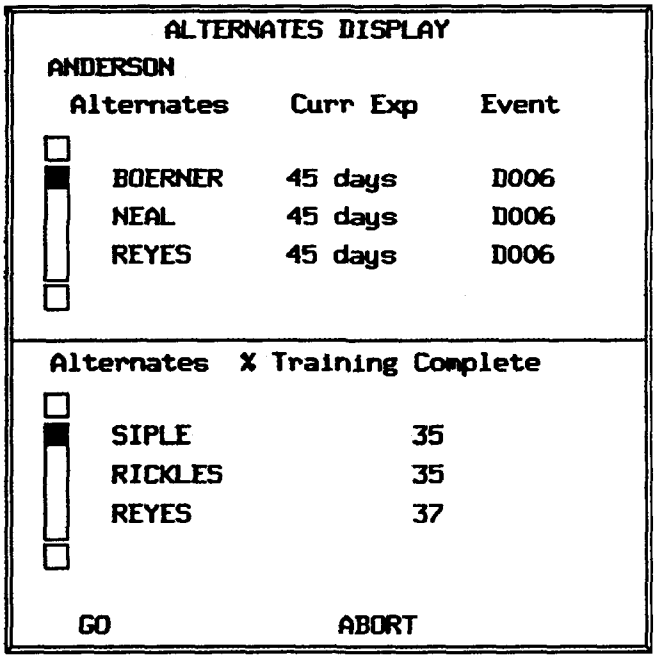


Figure 12. Crewmember Alternates Window

The bottom list of alternates shows the available alternates' names and their overall percentage of training completed. This list is sorted according to percentage of training completed, from least to most.

To select an alternate from either list, click the left mouse button on the alternate's name. The name will be highlighted. Then click the left mouse button on GO. The Alternates window will disappear and the alternate name you selected will replace the original crewmember in

the Crewmember window. If you do not wish to make a substitution, click the left mouse button on ABORT. The Alternates window will disappear and no replacement will be made.

- Crewmembers who are non-current on any training event, or those who are not scheduled to fly according to the MOP (e.g., F or M), do not appear on either list.
- Crewmembers who do not have enough crew rest are still available to fly.
- Alternate crewmembers already scheduled will appear on the list highlighted in pink. These choices, if selected, will cause a scheduling conflict.
- Crewmembers may appear in both lists.

Crew Conflicts and Replacing a Crew

When a crew without an F or an M as its activity designator is placed on the schedule board, a crew conflict will arise (figure 13).

In figure 13a, crew 009 is chosen with Hughes as the aircraft commander. Crew 009 has an O (crew time off) as its activity designator for the day being scheduled (figure 13b). When crew 009 is placed on the schedule board, the crew nametag is outlined in red. This red box is a conflict identifier, in this case signifying that the crew is unavailable to fly and should be replaced by one that is available.

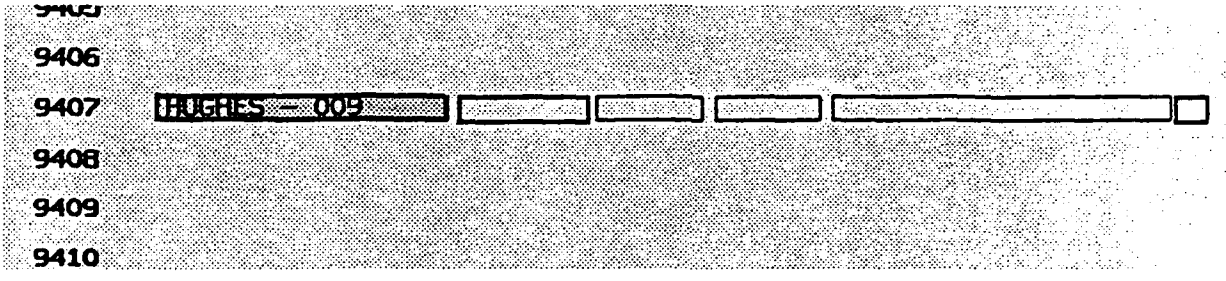


Figure 13a. Mission Line Conflict

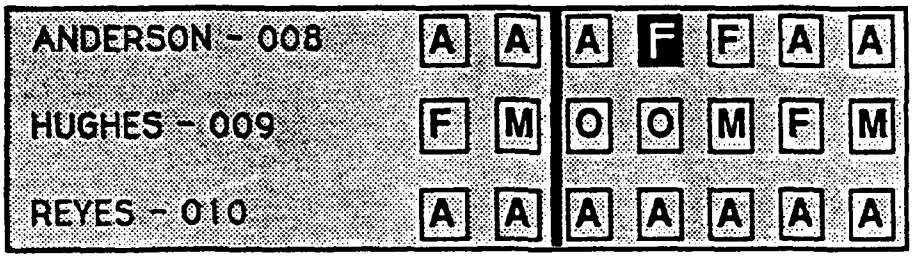


Figure 13b. Crew Activities

To replace the crew in conflict, you can drag a new crew nametag onto the same mission line. For example, you can drag crew 008 with Anderson as the aircraft commander onto the same mission line as crew 009. Crew 008 has an F (Fly day) as its activity designator for the day being scheduled (figure 13b). The crew nametag for crew 009 is then replaced by crew nametag 008, and the red box around the nametag disappears, signifying that there is no longer a conflict (figure 14).

- If a front end crew and a back end crew are assigned to the mission, dragging over a new front end crew will replace the existing front end crew without changing the back end crew, and vice versa.

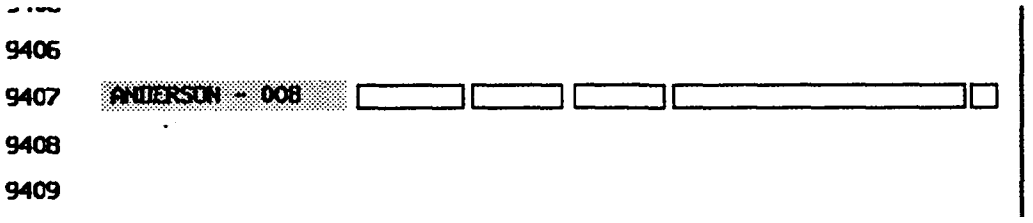


Figure 14. Replacing Crew Nametag

Moving a Crew Once a crew has been placed on a mission line, you can move it in the following ways:

- Remove the crew from the schedule board
- Move the crew to a new mission line
- Swap crews

- If more than one crew or additional crewmembers have been assigned to a mission, all the crewmembers will move as a group. For example, if a crew nametag is removed from the schedule board, the front end, back end, and any additional crewmembers will all be removed from the scheduling board.

Removing a crew After a crew nametag has been placed on the schedule board it can be removed. You can do this by dragging the nametag off the schedule board and then releasing the mouse button. The crew nametag will no longer appear on the mission line; the remainder of the mission line will be unchanged.

- Once a mission has been created, it cannot be removed from the schedule board.

Moving a crew Once a crew nametag has been placed on the schedule board, it can be moved from one mission line to another. To do so, drag the crew

nametag to a new mission line. When the new mission line is highlighted, release the mouse button and the nametag will stay on that line. The crew nametag will no longer appear on the previous mission line, but mission information will not be moved with the crew name.

Swapping crews

If two crew nametags have been placed on the schedule board, they can be swapped. To swap two crews, drag one of the crew nametags to the second mission line and release the mouse button. This will cause the nametags of the two missions to be swapped.

Training Requirements and Currency Status

To view an individual crewmember's progress, click the left mouse button on the crewmember's nametag anywhere a crewmember's name appears (e.g., in the crewmember window, in the By Month MOP data window) (figure 15).

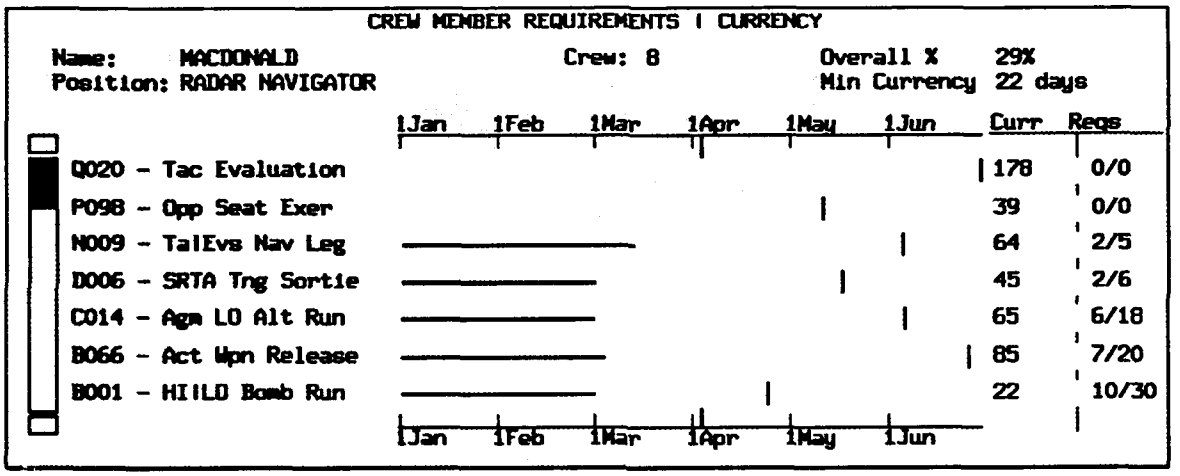


Figure 15. Crewmember Requirements I Currency Window

Across the top of the Crewmember Requirements | Currency window is the following information:

- Crewmember's name
- Crew position
- Assigned crew
- Overall training completion percentage (ratio of training events completed to total events needed)
- Minimum currency

The remainder of the window is a scrollable list of the training events the crewmember must complete to satisfy training requirements. The list can be scrolled to see additional training events and their information. Each item on the list contains the following information, from left to right:

- The training event identifier and the name of the training event
- One vertical and/or horizontal line
- A number under the CURR column
- Two numbers separated by a slash (/) under the REQS column

Above and below the list is a timeline, with vertical and horizontal lines positioned relative to it. The vertical line represents the time, relative to the timeline, when the crewmember will lose currency or has already become non-current (shown by a red line) for each of the training events listed at the left. The horizontal lines represent the percentage of training requirements completed for each of the events.

- If the crewmember has not completed any of a particular training requirement, no horizontal line will appear.

- If there is no currency requirement for a particular training event, no vertical line will appear.

The numbers under the CURR column represent the minimum currency for each training requirement. The numbers under the REQS column represent the number of training events completed out of the number needed. For example, 5/7 means that the crewmember has

completed five out of the requisite seven times needed to satisfy the training requirement for that event.

To make the window disappear, move the mouse cursor out of the window's borders.

- "Minimum currency" is the number of days remaining before the crewmember goes non-current for some training event. If the minimum currency is a negative number, the crewmember lost currency for some event that number of days ago.

- Not all the training events have both a horizontal and/or vertical line, because not all the events have currency requirements.

Profiles

Using A Standard Profile

Once you have positioned a crew on the scheduling board, you need to assign a profile to the mission. If you click the left mouse button in the profile box, the Profile window will appear (figure 16).

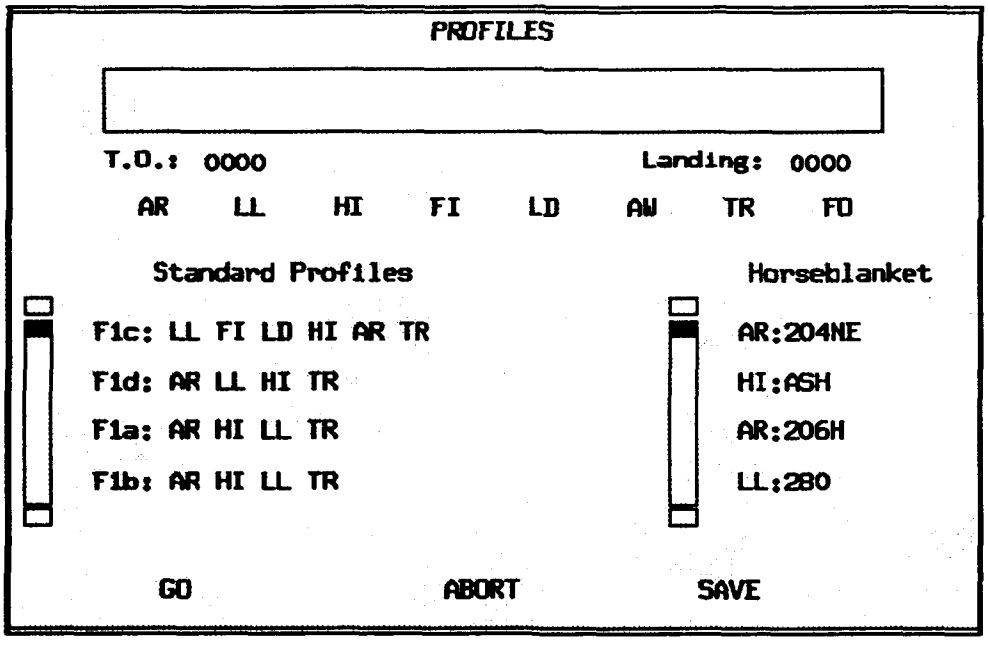


Figure 16. Profile Window

The long box located along the top portion of the window is the profile timeline. Below it (on the right and left ends) are the takeoff and

landing times. Just below these are eight buttons labeled AR, LL, HI, FI, LD, AW, TR, and FO (air refueling, low-level, hi-site, fighters, live drop, air work, transition, fire out) which will be discussed in later examples (see the section entitled "Modifying a Profile," page 31).

In the bottom half of the profile window are two scrollable lists. The left list contains the standard profiles, groups of sequenced events with associated times that have been compiled from the list of contracted events. The standard profiles are displayed by profile name, then a colon, followed by the type of events that comprise the profile (e.g., F1d: AR, LL, HI, TR).

The right scrollable list contains the contracted events (also called horseblanket events). The horseblanket events are displayed by event type followed by a colon followed by the airspace in which the event is performed (e.g., AR:204NE).

To pick a standard profile, click the left mouse button on any one. Boxes will appear in the profile timeline, and the profile's takeoff and landing times will appear (figure 17). The boxes show the events of the profile and are sized proportionate to their relative length in time.

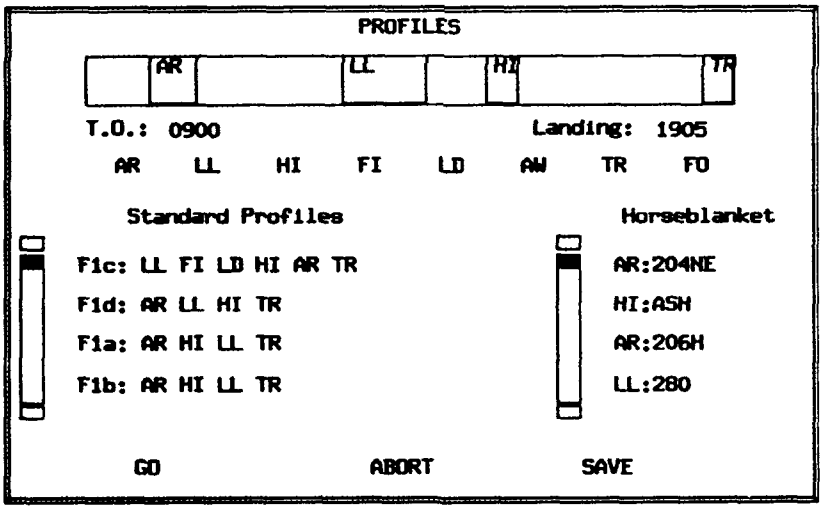


Figure 17. Profile Window with Standard Profile Displayed in Profile Timeline

Along the bottom of the Profile window are three buttons labeled GO, ABORT, and SAVE. To assign your selected profile to the mission, click the left mouse button on GO. This will cause:

- The profile window to disappear,
- The profile takeoff time to appear in the Takeoff box,
- The profile landing time to appear in the Landing box, and

- The profile name to appear in the box in the Profile column.

Clicking the left mouse button on ABORT will cause the profile window to disappear, and your selected profile will not be assigned to the mission. Clicking the left mouse button on SAVE is described in the section entitled "Saving a Profile," page 36.

If a profile event occurs for a relatively short period, the event box in the profile timeline may not be large enough to display the entire title of the event. You will know what event it is by looking at its placement in the order listed in the description of the standard profile.

Modifying a Profile

Once you have selected a profile, additional information about each of the profile events can be viewed or modified. The specific information displayed for each event is listed below. To display additional information about any event, click the middle mouse button on the box in the profile timeline. This will cause an information window to appear. Figure 18 shows the information window that appears for the AR event.

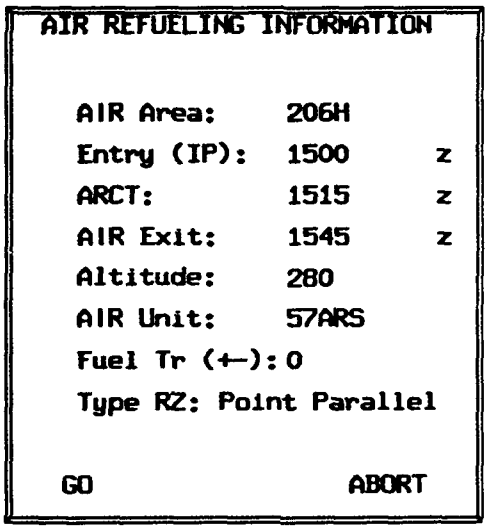


Figure 18. Information Window for AR Event

To change any data in the information windows, enter text by clicking in the text field to the right of the text field label. To have your changes incorporated into the profile, select GO with the left mouse button. Your information will be entered into the profile event and the information window will disappear. If you do not wish to change anything, select ABORT with the left mouse button. The window will disappear and no changes will be incorporated.

In addition, you can change the takeoff and landing times displayed under the profile timeline. Enter your change by clicking at the end of the time, hit the delete key to delete the previous time, and retype your modified time.

Remember to press RETURN after entering or modifying text.

For the AR events, the following items about the air refueling event are listed on the window:

- AR Area — character string (Air Refueling Area)
- Entry time — Zulu time
- ARCT — Zulu time (Air Refueling Contact Time)
- AR Exit — Zulu time (Air Refueling Exit)
- Altitude — integer
- AIR Unit — character string (Air Refueling Unit)
- Fuel Tr (+-) — integer (Fuel Transition)
- TYPE RZ — Point Parallel, Enroute, RZ-IP (Type Rendezvous)

All but TYPE RZ can be edited by clicking the left mouse button on the defaulted value to the right of the title and typing at the cursor prompt.

When the TYPE RZ value is selected with the left mouse button, a menu with the following options appears: Point Parallel, Enroute, and RZ-IP. To choose one of these options, click the left mouse button on your choice and click the left mouse button on GO. The TYPE RZ window will disappear and your selection will be registered with the other AR data. If you do not wish to change the TYPE RZ, click the left mouse button on ABORT. The TYPE RZ window will disappear.

When you have completed viewing or editing the additional information about the AR, click the left mouse button on GO (or ABORT if you do not wish any changes incorporated).

- Point Parallel is the default TYPE RZ.

- Default durations:

  AR: Exit is 45 minutes after entry time. Entry is 15 minutes before ARCT.
  LL or LD: Exit time is 1 hour + 45 minutes after entry.
  Everything else is one hour.

For the LL events, the following items about the low level event are listed in the window (see figure 19):

- Route — integer
- Entry — Zulu time
- Exit — Zulu time

- TOT's Zulu times

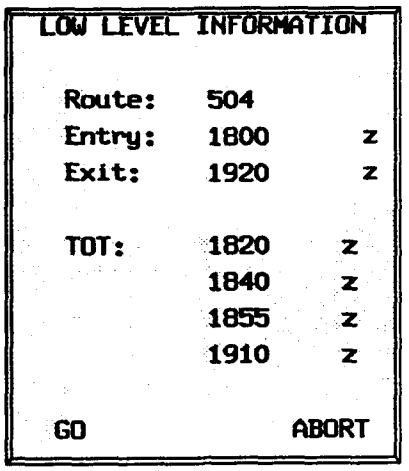


Figure 19. Information Window for LL Event

- If a Time Over Target (TOT) is entered that is less than the entry time of the low level route, the system will ignore the input.

- If a TOT is entered that is greater than the exit time, the exit time will become the same as the TOT.

For the HI, FI, FO, LD, and AW events, the following items are listed in the window (figure 20 shows the HI example):

- Area character
- Entry Zulu time
- Exit Zulu time

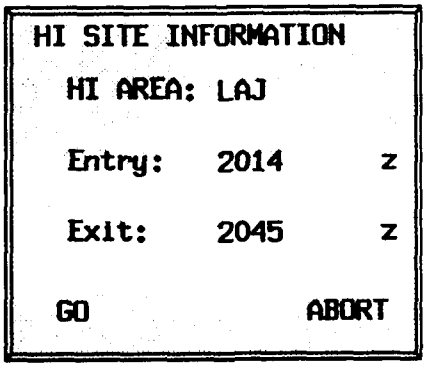


Figure 20. Information Window for HI Event

Removing Profile Events

Profiles can be modified by removing profile events from the profile timeline. To remove a profile event, click the left mouse button on the event you wish to remove and drag it completely out of the profile timeline. When you release the left mouse button the event will disappear.

➪ If you choose not to remove the profile event once it has been dragged from the profile graphic and before you have released the mouse button, drag the event back into the profile graphic. When the border of the profile graphic becomes highlighted, release the mouse button and the profile event will return to its original position within the profile graphic.

Building a New profile

If a standard profile is not sufficient for a mission, a new profile can be built. There are several ways to accomplish this:

- Use events in the horseblanket
- Use tracks and airspaces that the SASA prototype knows about (but may not be contracted for on that day)
- Use tracks and airspaces that the SASA prototype does not know about
- A combination of methods

Horseblanket

While the Profile window is active, you can build a profile using events from the horseblanket. On the right side of the Profile window is a scrollable list titled Horseblanket. This list shows all the horseblanket tracks and airspaces which have been contracted for that day. To use these events to build a profile, click the left mouse button on them one at a time, and they will be placed at the appropriate time and location on the profile timeline. When you have finished, click the left mouse button on GO to assign the profile to the mission. If you decide that you do not want to assign the profile to the mission, click the left mouse button on ABORT.

➪ The system will only accept up to six events, and will ignore any more than six.

➪ Remember that the profile events selected can be further customized, as described in the section entitled "Modifying a Profile," page 32.

Known tracks

While the Profile window is active, you can build a profile using tracks and airspaces that the SASA prototype knows about, but that may not be contracted for on that particular day. Below the profile timeline and

the takeoff and landing times are eight buttons labeled AR, LL, HI, FI, LD, AW, TR, and FO. These buttons are used to build a new profile event of the type displayed on the button.

For example, let's start with an air refueling event. Click the left mouse button on the button labeled AR and the Air Refueling window will appear. This is the same window that was described in the section entitled "Modifying a Profile" (page 32), with one difference: a box appears just to the right of the text field for the AR Area. Click the left mouse button on this box to display a scrollable list of the air refueling airspaces that the SASA prototype knows about (figure 21). Select one of these airspaces by clicking the left mouse button on it, then clicking the left mouse button on GO.

You will notice that the Air Refueling window has been filled in with information about the air refueling option chosen. The SASA prototype uses previously stored information for events that it knows about, such as enroute times. After making any changes to the AR event as described in the section entitled "Modifying a Profile" (page 32), click the left mouse button on GO. The event will appear on the profile timeline. Repeat this procedure using this or any of the other event buttons, making sure not to exceed six events for the profile. When you have finished building the profile, click the left mouse button on GO to assign the newly built profile to the mission.

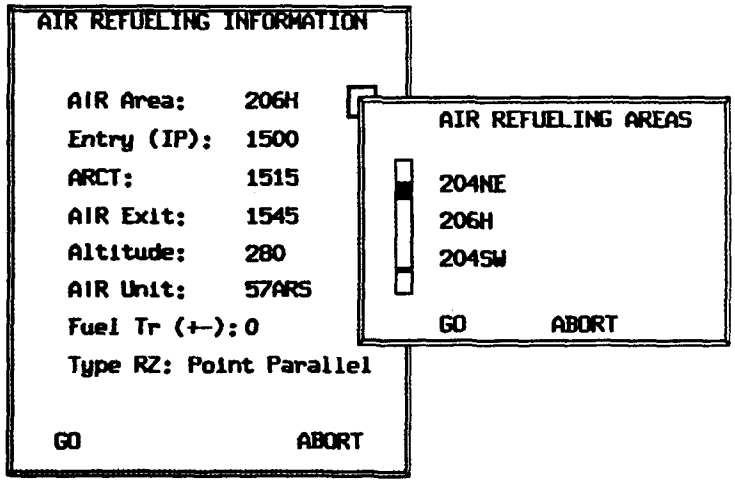


Figure 21. Known Air Refueling Areas

New Tracks

While the Profile window is active, you can build a profile using tracks and airspaces that the SASA prototype does not know about. Below the profile timeline and the takeoff and landing times are eight buttons labeled AR, LL, HI, FI, LD, AW, TR, and FO. These buttons are used to build a new profile event of the type displayed on the button.

- In building a profile using new events, you are limited to the eight events AR, LL, HI, FI, LD, AW, TR, and FO.

  For example, let's choose to build an air refueling event. When the AR button is selected, the Air Refueling window appears. This is the same window that was described in the section entitled "Modifying a Profile" (page 32). All fields will appear empty. Click the left mouse button on the text field for the AR Area. A cursor prompt will appear allowing you to enter the name of the air refueling area you wish to use.

- When an AR area is entered from the keyboard, default information about the AR will appear in the remaining text fields on the Air Refueling Information window.

  When you have finished, you can fill out the rest of the Air Refueling display as described in the section entitled "Modifying a Profile" (page 32). Click the left mouse button on GO.

- For each event, you must enter an area title (e.g., AR Area) before entering any more information for the event.

  You will notice that the box fills the entire profile timeline. Since you are using an airspace or track that the system has no prior knowledge of, the takeoff and landing times are set to be the same as the entry and exit time of the profile event, respectively. Now that you have scheduled an event, you may want to adjust the takeoff and landing times, as described in the section entitled "Timing Data Box (Takeoff and Landing)," page 38. Repeat this process for up to six different profile events, and click the left mouse button on GO to assign the profile to the mission.

Combination

The final way to build a profile is to combine any or all of the previously described profile building methods. For example, the first profile event can be taken from the horseblanket, the second event can be added to the profile using a new airspace or track, the third event can be again taken from the horseblanket, and the fourth event can be built using one of the system-known airspaces or tracks, etc. This method adds flexibility to the profile building process.

Saving a Profile

When a profile has been built using one of the methods described above, it can be saved as a new standard profile. To do this, click the left mouse button on SAVE in the Profile window. This will cause a Save Profile window to appear. Click the left mouse button on the Enter Profile Name text field and type the new profile name (and press RETURN) at the cursor prompt. When you have finished, click the

left mouse button on GO and the profile will be added to the list of standard profiles.

Mission Information (Mission Number)

If you click the left mouse button on the mission number on the schedule board, you will be presented with the window in figure 22. You can modify the following information about the mission:

- Sortie Type — character
- Fuel Load — integer
- A&E Load — integer (TBD)

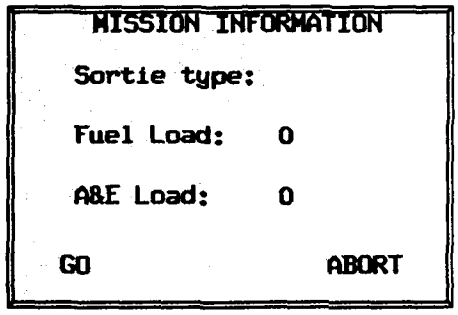


Figure 22. Information Window for Mission Number

Timing Data Box (Takeoff and Landing)

The Takeoff and Landing boxes on the scheduling board are automatically filled in with the takeoff and landing times that are associated with the selected profile. You have to select a profile for these boxes to contain the times. You cannot change the times from the takeoff or landing boxes; you have to modify them using the profile window (see the section entitled "Modifying a Profile," page 32).

If either of the boxes containing the takeoff or landing times on the scheduling board is selected with the left mouse button, the Mission window will appear (figure 23). This window shows the mission's timing information, which is derived from the profile assigned to the mission.

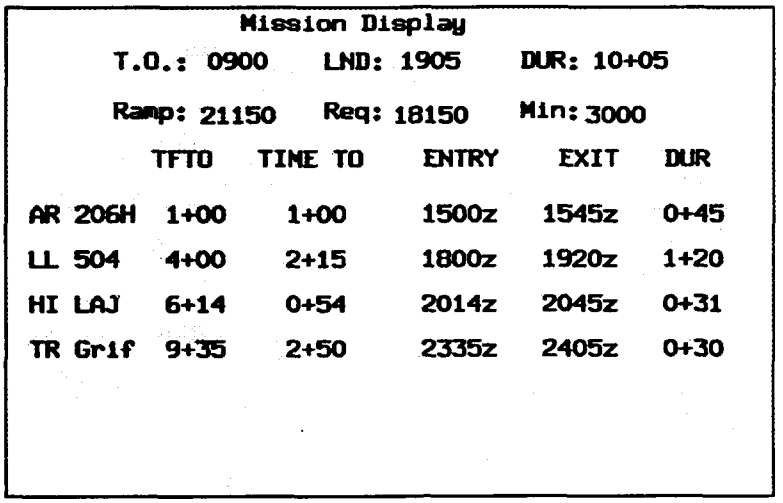


Figure 23. Mission Window Displaying Timing Information

If there is a conflict, e.g., if one of the profile events is scheduled to end after the profile itself, the profile event will have a red border around it (figure 24).

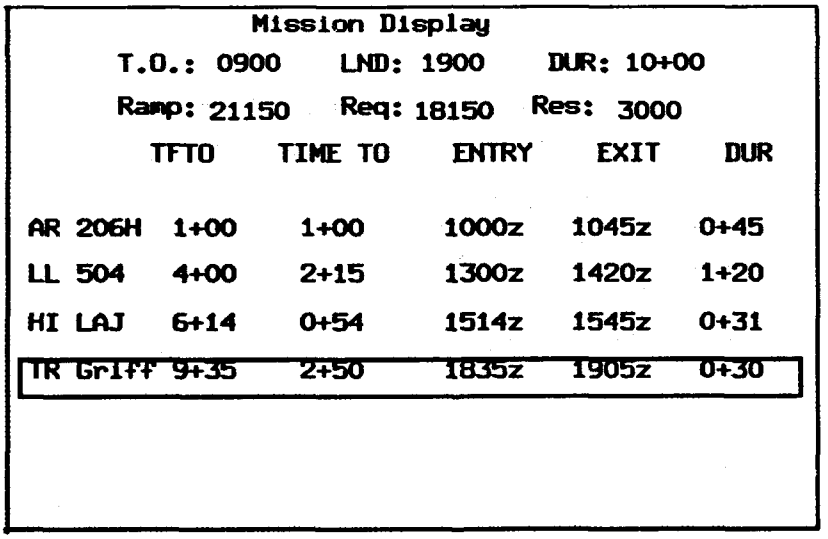


Figure 24. Mission Window With Conflict Identified

At the top of the window are the mission takeoff time and landing time (both in local time), and duration (in hours + minutes). Just below this timing information are the ramp fuel, mission fuel requirement, and minimum fuel reserve. Each of the three fuel quantities can be changed by clicking the left mouse button on the fuel quantity you

wish to alter, typing in the new quantity from the keyboard, and pressing RETURN.

➪ The current algorithm for fuel requirements is as follows:

ramp fuel = fuel required + minimum fuel reserve required
- fuel transfer.

where:
fuel required: total pounds
minimum fuel required: amount required when landed
fuel transfer: any due to air refueling mission

Below the fuel quantities is a list of the events which comprise the standard profile along with the timing information for each event. After each event is the following:

- Time from takeoff (TFTO) in Zulu time
- Enroute time from the previous event (Time To) in hours + minutes
- Entry and exit times given in Zulu times
- Duration of each event in hours + minutes

To make the Mission Data window disappear, move the cursor outside the window's borders.

Miscellaneous

Assigning Aircraft When scheduling a mission, you need to assign an aircraft. Clicking the left mouse button on the Tail # box in the mission line displays a scrollable list of the available tail numbers (see figure 25).

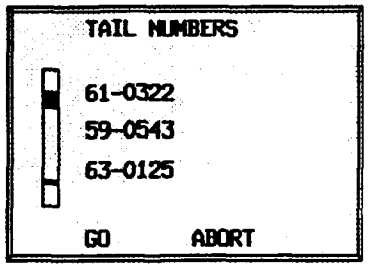


Figure 25. Window Displaying a List of Available Tail Numbers

To assign an aircraft to the mission, click the left mouse button on a tail number and then click on GO. The tail numbers window will disappear, and the tail number chosen will appear in the Tail # box in the mission line. If you click on ABORT, the window will disappear and the selected tail number will not be assigned to this mission.

Adding Remarks You may wish to add remarks about the mission. If you click the left mouse button on the Remarks box, a Remarks window will appear (figure 26).

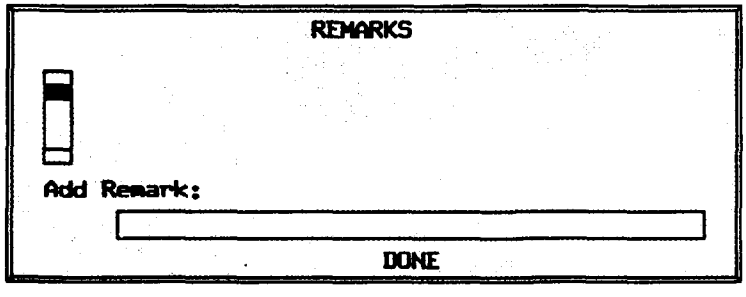


Figure 26. Remarks Window

The top portion of this window contains a scrollable list of remarks, and the bottom portion of the window contains an editable text field for entering the desired remarks.

⇨ Initially the scrollable list of remarks may be empty.

To enter a remark, click the left mouse button in the text field and begin typing your remark. When you are finished, remember to press the RETURN key. The remark you typed will be added to the scrollable list. To enter more remarks, repeat the previous steps. To edit previously entered remarks, click the left mouse button on a remark in the scrollable list and begin typing at the cursor prompt. To make the Remarks window disappear, click on DONE. When the remarks window disappears, an asterisk will appear in the Remarks box on the mission line, denoting that the mission now contains remarks.

Viewing and Adding Training Requirements

To view the training requirements, click the left mouse button on Requirements, located on the main menu (in the lower right corner of the worksheet) . The Requirements window will appear in the center of the screen (figure 27).

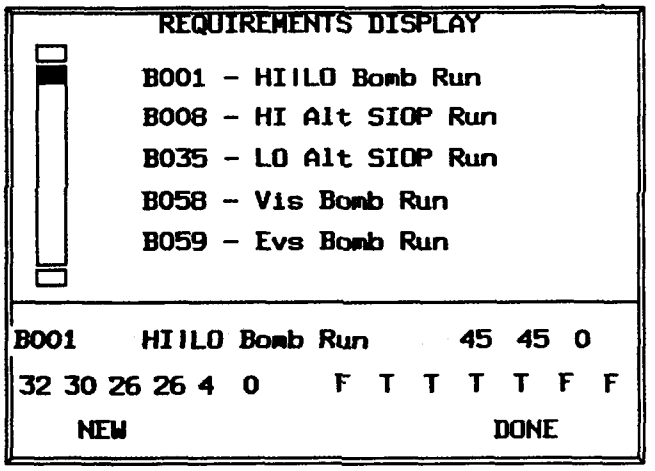


Figure 27. Requirements Window

The top half of this window contains a scrollable list of all the training requirement codes and names. If one of the items in the list is selected with the left mouse button, detailed information about the training requirement will appear at the bottom of the window: the requirement code and name and the currency requirements for basic qualifications, mission ready, and standard evaluation crews. Below will be a listing of the number of repetitions each crew position needs in order to satisfy requirements. To the right will be a series of T's and/or F's designating which crew positions must satisfy this event. A T means that the crewmember does need to satisfy the training event; an F means he does not need the training event.

- The documentation line can be used to determine what each element in this window means. The documentation line appears at the bottom of the SASA display.

  To edit a training requirement once one has been selected, click the left mouse button on the text or number you would like to edit, and begin typing at the cursor prompt, or in the case of the T's and F's, click the left mouse button on a T or F to toggle between the two letters.

- "Toggle" means that if the letter was a T when it was clicked, it will become an F, and vice versa.

  To add a new training requirement to the list, click on NEW and edit the training requirement information as described above. When you have finished, click on DONE; the Requirements window will disappear and the new requirement will be added to the list.

- When NEW is selected, some default information will appear in the detailed information section, which can be edited.

Adding SOFs and RSOs

To add the Supervisor of Flying (SOF) and Runway Supervising Officer (RSO) click the left mouse button in one of the red boxes located at the top right of the SASA display. The top two boxes are for the SOFs and the bottom two boxes are for the RSOs. Selecting one of these buttons brings up a window containing a scrollable list of suitable RSOs or SOFs (figure 28). Select your choice with the left mouse button and click on GO. The name of your selection will appear in the appropriate SOF or RSO box.

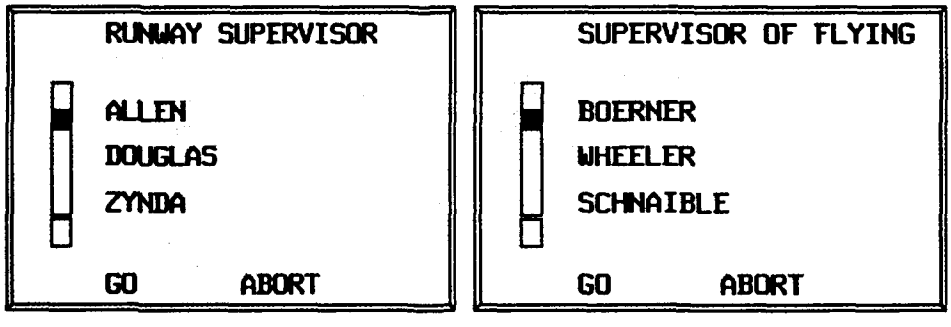


Figure 28. Runway Supervisor (RSO) and Supervisor of Flying (SOF) Windows

- SOF or RSO choices which have already been scheduled or are not available will appear on the list highlighted in pink. If one of these choices is selected a scheduling conflict will occur.

Printing schedule To print a schedule, click the left mouse button on Print on the main menu, and a Print Options window will appear in the center of the screen. Enter the number of copies you wish to print by clicking with the left mouse button on the Number of Copies text field, and enter a number from 1 to 10 from the keyboard. When you have finished, click with the left mouse button on Print. If you do not want to print, click on Cancel and the Print Options window will disappear. Figure 29 is an example of a printed schedule.

- Only those mission lines which contain a crew nametag will be printed. If you have a mission set up but do not have a crew to fly it, you must enter a temporary crew name in order to have the mission print.

- You must have a laser printer connected to your computer in order to print.

- The print capability will only work if the operating system uses the command `lpr -P<printer name>` to print.

WEEKLY FLYING SCHEDULE

ACFT	C/S	T/O	LAND	DUR	TYPE	FUEL	SORTIE
58-0363		0900	1905	10+05			Fld: AR LL HI

Aircraft Commander: BOERNER

ARCT	Unit	Track/Alt	Fuel	Exit
1000	46ARS	206H/280	40	1045

Entry	Route	TOT's	Exit
1300	5504	1330 1355 1405	1420

Remarks:
crew - pilot
extra navigator

MC DODD	04	MR SEIFERT	04
MN MCWILLIAMS	04	ME SUFFERT	04
MG MACWILLIAM	04	MR ISAACSON	02

SOF A: WHEELER	RSO A: KARASET
SOF B: BOERNER	RSO B: DOUGLAS
Page 1	Date: 4/19/91

Figure 29: A Sample of a Portion of a Printed Schedule

Saving a Schedule

To save a schedule, click on Save, located on the display header. This causes a window to appear with two options for saving a schedule (figure 30). You can elect to save the schedule either as a draft schedule or as a 60-9 schedule.

➪ The 60-9 schedule is the final version of a schedule. It is the version that gets published by the wing.

Make your choice and click on SAVE, located at the bottom of the window. If you do not wish to save the schedule, click on DON'T SAVE, also located at the bottom of the window.

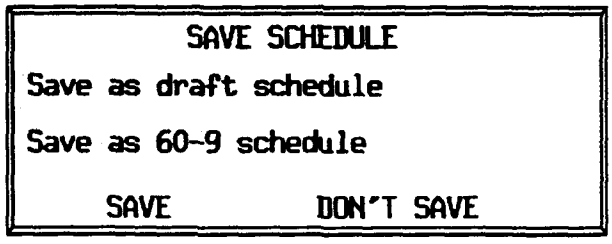


Figure 30. Save Schedule Window

➪ A 60-9 schedule can only be resaved as a 60-9 schedule. A draft schedule or new schedule can be saved as either a draft schedule or a 60-9 schedule.

Loading a Schedule

To load a previously saved schedule or a new schedule click on the text just to the right of the word Schedule:. The text will either read New Sched., Draft, or 60-9. This will bring up a window with the following choices: New Sched., Draft and 60-9 (figure 31).

➪ The choices Draft and 60-9 will only appear if previously saved draft and 60-9 schedules already exist.

To load one of these schedules, click the left mouse button on your selection and click on GO. When this is done the window will disappear, and the save schedule window will appear so you can save your current work (see the section titled "Saving a Schedule," page 44). After you have chosen whether or not to save your current work, the new selected schedule will appear on the the schedule board.

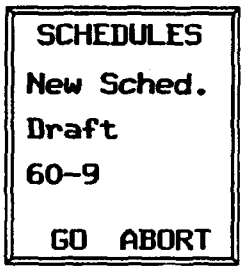


Figure 31. Schedule Choices Window

Currency Board

To view the Currency display, click the left mouse button on the word Currency, located on the left side of the header on the schedule board (figure 32).

The currency board displays a list of the crewmembers for a particular crew position and a graph showing the training progress of each crew member. The horizontal lines represent the percentage of training that each crewmember has received.

Across the top of the display are six buttons that display different crew positions. To display a list of the crewmembers and their training progress for a particular crew position, click the left mouse button on one of these six buttons.

➪ Currently, the six buttons display the following crew positions: PILOT, CO-PILOT, NAVIGATOR, RADAR NAVIGATOR, ELEC_WAR_OFF, GUNNER.

If you click the left mouse button on one of the crewmember nametags, the Crewmember Requirements | Currency window for the individual crew member will appear.

To exit from the Currency display and return to the schedule board, click the left mouse button on the word Flying Schedule, located on the left side of the header.

➪ You cannot exit from SASA if the Currency display is being viewed. To exit, you must first get back to the Schedule Board, by clicking on the text Flying Schedule at the top left of the display.

➪ When the Currency board is first displayed, the pilots are listed (by default).

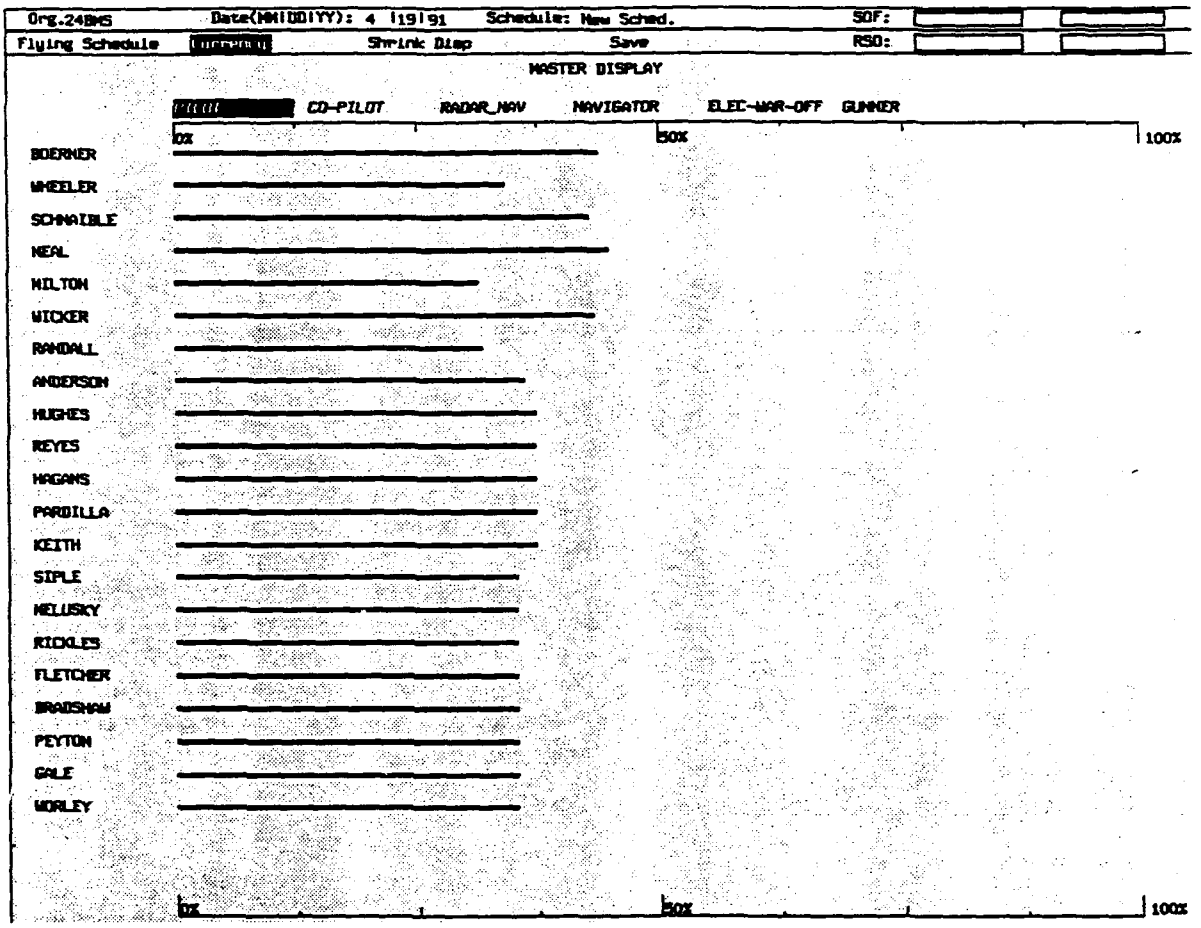


Figure 32: Currency Board

SECTION 4

SASA TUTORIAL

Introduction

By performing the exercises in this section, the user can practice scheduling crews to fly missions. The exercises should be performed in order, since the level of detail increases from one exercise to the next.

Overview

The exercises will cover the following topics:

EXERCISE 1:

- System setup
- Dragging a crew nametag from the crew storage area to the schedule board
- Viewing the crew's Monthly Operations Plan (MOP) data
- Selecting a standard profile to be assigned to a mission
- Viewing the timing data associated with the profile assigned to the mission
- Assigning an aircraft to the mission
- Adding remarks to the mission
- Viewing the Currency display

EXERCISE 2:

- Identifying crew conflicts
- Substituting crews
- Selecting an alternate crewmember
- Viewing a crewmember's training requirements and currency status
- Modifying a standard profile
- Assigning a SOF and RSO

EXERCISE 3:

- Creating a new profile
- Adding a new profile to the list of standard profiles

EXERCISE 4:

- Adding an additional crewmember
- Scheduling a back end crew
- Saving the schedule
- Retrieving the saved schedule

Exercises

EXERCISE 1 - How to Schedule a Mission

Perform System Setup

1. At the main display click on the box labelled System Setup with the left mouse button.
2. Click the left mouse button on the button to the right of the text Squadron Name 1: .
3. Click the left mouse button on the button to the right of the text Squadron Name 2: .
4. In the box next to the label Local to Zulu diff (hrs): type the number of hours' difference between local and Zulu time (e.g., 5) then press the RETURN key.
5. Click the left mouse button on the words Main Menu at the bottom of the display.
6. Click the left mouse button on the box labelled Start Scheduling.
7. Click the left mouse button on the box labelled xx.
8. Click the left mouse button on one of the squadron selections.
9. Change the date, if you wish, then click the left mouse button on the box labelled GO SASA.

➪ The schedule board will now appear.

Select a Crew to Schedule
(see section entitled "Crews and Crewmembers")

10. With the left mouse button, click on By Month at the top of the crew nametag storage area to view the crews' MOP Data display.

➪ Move the cursor outside of the window's borders to close the By Month display.

11. Select a crew nametag with the left mouse button, drag it onto the scheduling board, and release the mouse button.

View Crewmember Information:
(see section entitled "Crewmember Window")

12. Click the middle mouse button on the crew nametag under the Crew ID column to view the Crewmember display.

13. Click GO with the left mouse button to close the Crewmember display.

Assign a Standard Profile
(see section entitled "Selecting a Standard Profile")

14. Click the left mouse button on the box in the mission line under the column labeled Profile to view the Profile display.

15. From the scrolling list on the left, select a standard profile by clicking on it with the left mouse button.

16. Examine the information that appears in the profile timeline.

17. Click GO with the left mouse button to assign this profile.

⇨ The TO and LND times and the profile name appear on the scheduling board for that mission.

View Mission Timing Information:
(see section entitled "Timing Data Box (Takeoff and Landing)")

18. Click on either the TO or LND box with the left mouse button to view the Mission display and examine the mission timing information.

19. To close this window, move the cursor outside the window's borders.

Assign a Tail Number
(see section entitled "Assigning an Aircraft")

20. Click the left mouse button on the box in the mission line under the Tail # column to display a scrollable list of the available tail numbers.

21. Click the left mouse button on a tail number.

22. Click GO with the left mouse button to assign this tail number to your mission.

➪ The tail number you chose appears in the Tail # box on the scheduling board.

Add Remarks
(see section entitled "Adding Remarks")

23. Click the left mouse button on the box in the mission line under the REM column to view the Remarks display.

24. To enter a remark, click the left mouse button in the text field and type your remark. When you are finished, press the RETURN key.

25. Click DONE with the left mouse button to close the Remarks display.

➪ An asterisk has appeared in the box in the mission line under the REM column, indicating that you now have a remark associated with this mission.

View the Currency Display

26. Click the left mouse button on the word Currency located on the left side of the schedule board header.

27. The pilots and their training progress are shown.

28. Click the left mouse button on Flying Schedule to return to the schedule board.

EXERCISE 2 - Modifying a Standard Profile

1. With the left mouse button, click on a crew nametag in the crew nametag storage area for a crew that is not scheduled to fly on the day being scheduled. Drag it onto the scheduling board, and release the mouse button.

➪ A red box around the crew nametag indicating that there is a conflict with this crew.

Replace a Crew
(see section entitled "Crew Conflicts and Replacing a Crew")

2. To replace the crew, click with the left mouse button on a crew nametag in the crew nametag storage area of a crew scheduled to fly on the day being scheduled, and drag it onto the same mission line in the scheduling board as the crew scheduled in step 1. The red box will disappear.

➪ The new crew nametag has replaced the crew nametag with the conflict.

3. Click on the new crew nametag with the middle mouse button to view the Crewmember window (see section entitled "Crewmember Window").

Substitute a Crewmember
(see section entitled "Crewmember substitutions")

4. To replace an individual crewmember, for example, click on a crew position label to see the list of available alternates for that position.

5. Select an alternate from the alternates list. Click the left mouse button on the name and then click the left mouse button on GO.

➪ Your selection has replaced the original crewmember for that crew position.

6. Click the left mouse button on a crew member's nametag displaying the crewmember's Requirements/Currency display.

7. When you are finished examining the display, move the cursor outside the window's borders and the display will disappear.

8. Click GO with the left mouse button to close the Crewmember display and return to the scheduling board.

Assign a Modified Standard Profile
(see section entitled "Modifying a Profile")

9. To assign a modified standard profile to this crew, click the left mouse button on the box in the mission line under the column labeled Profile to view the Profile display.

10. From the scrolling list on the left, select a standard profile by clicking on it with the middle mouse button.

11. To view additional information about a profile event in the standard profile, click the middle mouse button on an event in the profile timeline.

12. Click in the text field labeled ENTRY: and type in a new entry time and then press the RETURN key.

13. Click in the text field labeled EXIT: and type in a new exit time and then press the RETURN key.

14. Click GO with the left mouse button to close the display.

➪ The size of the event box in the profile timeline adjusts to the new times.

15. Click GO with the left mouse button to close the Profile display.

➪ The TO and LND times and the profile name appear on the scheduling board for that mission.

EXERCISE 3 - Build a new Profile
(see section entitled "Creating a New Profile")

1. Click on a crew nametag from the nametag storage area for a crew that is scheduled to fly with the left mouse button and drag it onto the scheduling board, and release the mouse button.

2. Click the left mouse button on the box in the mission line under the column labeled Profile to view the Profile display.

Schedule an AR Event

3. Click on the AR button beneath the profile timeline.

4. Click on the arrow to the right of the label AR AREA: to see a list of the available AR areas.

5. Click on an area with the left mouse button and then click on GO with the left mouse button.

➪ The name of the AR area you selected now appears in the field adjacent to the AR AREA: label, and the timing information has been filled in.

6. Click GO with the left mouse button.

➪ An AR bar has appeared in the profile timeline.

7. At the right end of the timeline, enter a new time in the text field for LANDING time, and press the RETURN key.

➪ The AR bar shifts its position in the profile timeline.

Schedule an LL Event

8. Click on the LL button beneath the profile timeline.

9. Type a route in the ROUTE text field and press the RETURN key.

10. Type an entry time in the ENTRY text field and press the RETURN key.

➪ The EXIT time is automatically filled in.

11. Click GO with the left mouse button.

⇨ An LL bar has appeared in the profile timeline.

Schedule an FI Event

12. Click on the FI button beneath the profile timeline.

13. Enter the fighter squadron's name into the FI: text field and press the RETURN key.

14. Type the entry time in the ENTRY text field and press the RETURN key.

⇨ The EXIT time is automatically filled in.

15. Click GO with the left mouse button.

⇨ An FI bar has appeared in the profile timeline.

Schedule a TR Event

16. Click on the TR button beneath the profile timeline.

17. Type the transition location into the TR: text field and press the RETURN key.

18. Type the entry time into the ENTRY text field and press the RETURN key.

⇨ The EXIT time is automatically filled in.

19. Click GO with the left mouse button.

⇨ A TR bar has appeared in the profile timeline.

Save a new Standard Profile
(see section entitled "Saving a Profile")

20. To save this profile and add it to the standard profiles list, click SAVE with the left mouse button.

21 Type in the name "new" and click GO with the left mouse button.

22. Click GO with the left mouse button to close the Profile display.

EXERCISE 4 - Adding Extra Crewmembers, Scheduling Missions Using Multiple Crews, and Saving and Retrieving a schedule

Adding Extra Crewmembers to a Mission

1. Select and load a front end squadron.

2. Drag a crew nametag from the nametag storage area onto the scheduling board.

⇨ The nametag on the scheduling board is green because this is a front end crew. No back end crew has been assigned yet.

3. Click the middle mouse button on the green nametag to bring up the Crewmember window.

⇨ All of the crewmembers on the crew are listed at the top of the window and the middle (back end crew) area of the window is blank.

4. Click the left mouse button on the button labelled POS.

5 Click the left mouse button on one of the positions on the list and select GO.

6. Click the left mouse button on the button now labeled with the crew position just selected.

7. Click the left mouse button on one of the additional crewmembers, then select GO.

⇨ The crew position and the name of the additional crewmember appears in the scrollable list located at the bottom of the Crewmember Window.

8. Click GO on the Crewmember display

Schedule a back end crew

9. Click the left mouse button on the squadron name at the top left of the SASA display to bring up a window showing the list of squadrons.

10. Click the left mouse button on a back end squadron, then click on GO. This will cause the front end squadron's crew nametags to be replaced by the back end squadron's crew nametags.

11. Drag a back-end crew nametag to the mission line that the previously scheduled front end crew has been assigned, and release the mouse button.

➪ The nametag on the mission line is still labeled with the name of the front end crew, but the color has now changed from green to brown, signifying that both a front end and back end crew have been assigned to the mission.

12. Click the middle mouse button on the crew nametag on the mission line to bring up the Crewmember window, to see that there is both a front end and a back end crew assigned to the mission.

13. Click the left mouse button on GO to make the Crewmember window disappear.

Saving the Schedule

14. Click the left mouse button on Save, located in the center of the SASA display header.

15. Click the left mouse button on the selection Save as draft schedule, then click on GO.

➪ The schedule has now been saved as the draft schedule.

Retrieving a Saved Schedule

16. Click the left mouse button on New Sched,. which is located in the center of the SASA display header.

17. Click on Draft with the left mouse button, then click on GO. The schedule you have just saved will reappear.

APPENDIX A USER INTERFACE CONVENTIONS

Using a Mouse

The SASA prototype uses a graphic selection device, or mouse. The Sun workstation has a three button mouse. The mouse must be operated on the special pad that has been provided. As you practice tasks, using the mouse will become easier.

For the optical mouse to work correctly, the special pad must be used. Place it so that its long dimension runs right to left, and its shorter dimension runs top (away from you) to bottom (closest to you).

- Hold the mouse in your hand with your fingers close to the buttons and the cable pointing directly away from you.
- Watch the screen while you move the mouse on the mouse pad next to the keyboard. Each move you make with the mouse moves the pointer or arrow in the same direction.
- Lift the mouse from the mouse pad. Notice that the pointer on the screen does not move. If you run out of room on the pad when moving the mouse, simply lift the mouse and place it back down on the pad in any spot where more room is available.
- To move the cursor up, push the mouse away from you. To move the cursor down, pull the mouse towards you. To move the cursor to the left or right, push the mouse to the left or right.

Windows

Windows provide the scheduler with additional data, option choices, and manual input capability upon request.

Types

Two types of windows are used in the SASA prototype. Those that allow you to edit information have buttons (or selectable text) at the bottom of the window (e.g., GO, ABORT, EXIT). These buttons are always selected with the left mouse button. One of these must be clicked to make the window disappear.

Any window that simply provides additional information for viewing has no buttons, and will disappear when the cursor is moved outside the window's borders.

Windows within Windows

Windows within windows are used in some places. For example, all aircraft commanders' names on the worksheet are selectable text. Clicking on the name will open a window showing all crewmembers in the crew and their MOP schedule for a seven day period. Within this window, all crew position labels and crew names are selectable text. Clicking on a crewmember's name will open windows showing his/her currency and training accomplishments. Clicking on a crew position label will open a window listing the best available substitutes, rank ordered by training and currency needs.

Resizing

To resize a window, place the cursor on a window border and click the middle mouse button. While holding the button down, drag the mouse until the window reaches the appropriate size, then release the button.

Moving

To move a window, place the cursor inside the window and click the middle mouse button. While holding the button down, drag the window to the desired location and release the button.

You must make sure that you are clicking on the window itself, not on one of the buttons in the window.

Scrolling

Scrolling is used to save space within a number of windows where additional data or options do not fit inside the window.

- To scroll down, place the cursor inside the box at the bottom of the vertical scroll bar and push the left mouse button.
- To scroll up, place the cursor in the box at the top of the scroll bar and press the left mouse button.
- To stop scrolling, release the mouse button.
- You can also scroll by dragging the scroll thumb (the box between the two arrows).

Dragging: When you move the mouse with an item selected while holding down the left mouse button, the item selected moves also. Not all items are draggable.

Buttons

Buttons are used extensively throughout the SASA prototype. Buttons on the screen are defined as selectable text that can cause an action to occur. Typically in the SASA prototype, when a button is selected, the button is highlighted and a subsequent action occurs. For example, when you click on ABORT in a window, the window disappears. The word ABORT is called a button.

Some buttons are outlined by a box, some are not. Therefore, it may be difficult to tell whether text is a selectable button, a selectable text field, or a non-selectable heading. This User's Guide is intended to help you to know which ones are which.

Some buttons can toggle. This means that if you click on them with the left mouse button, they will change to different options automatically. For example, one button might display a T, and when selected might change to an F. This button is said to toggle between the T and F.

Movement of the cursor onto an area designated as a button will cause a color change; clicking the left or middle mouse button while in this area, as specified in the user's guide will open the associated window.

Not all buttons are currently functional, as they were not considered critical in demonstrating the overall functionality of the SASA prototype.

Text Fields

Certain functions in the SASA prototype require that you enter text into a field--for example, when you want to add remarks to a mission line. You can enter only one line of text at a time, and you must press the RETURN key to enter your text into the system.

APPENDIX B

What You Need To Run The SASA Prototype

Hardware

To execute the SASA prototype, you will need the following:

- A Unix workstation with the following minimum configuration
  - 4 megabytes of random access memory (RAM)
  - 6 megabytes of hard disk storage
  - Unix operating system version 4.0 (or above)
  - XWindows software version R4

In order to print schedules, you will need the following:

- A laser printer accessible from the computer running SASA

This version of the SASA software will run on any computer running as an XWindows server that is connected to a Unix workstation via a network. For example, it will run on a Macintosh running MacX (Apple's version of XWindows), connected via a network to a Sun SPARCStation (where the SASA prototype software is resident).

Another version of the software can be made available that executes directly on a Macintosh computer running either A/UX (Macintosh's version of Unix) or the Macintosh operating system. Each different version would require modifications to the Unix version.

Loading the Software

The SASA prototype software comes on a tape that you can insert directly into your workstation's tape drive. You should copy all the files off the tape into a directory (any directory should do). The files (in "tar" format) include the following:

- SASA (the executable program)
- Data files (about 10 data files)
- Any saved schedules

Executing the Software

To execute the software, you must be running the XWindows software. Be sure you are in the directory in which the software has been copied. Type the following command at the Unix prompt:

```
sasa
```

You should see a message describing the size of the window about to be displayed. You should also see the outline of a window flashing in the center of the screen. Use the mouse to move the cursor to the top left corner of the screen and press the left mouse button. The SASA prototype will take a little while (no more than 20 seconds) to initialize files and bring up the display. You are ready to begin.

Some XWindow windows managers (e.g., MWM, the Motif window manager) will bring up the SASA display for you.

APPENDIX C

SASA Prototype Data Files

The following data was obtained from the SAS program:

- Crew:
  - Crew identification number and name
  - Crewmembers assigned to crew
- Crewmember:
  - Crewmember identification number (Social Security number) and name
  - Crew position (e.g., aircraft commander)
  - Level of training (e.g., basic qualification, mission ready)
- MOP Data:
  - Crew name
  - Date
  - Event scheduled for day, denoted by the following (taken from the SAS User's Manual):
    - A: Alert
    - O: Crew time off following alert duties
    - L: Leave
    - F: Fly days
    - G: Ground activities
    - H: National holidays
    - K: Prevents a fly day from being scheduled
    - M: Normal mission planning day
    - P: Mission planning day while assigned alert duties
    - T: Temporary duty (TDY)
    - V: Reserved day
    - -: Crew day off following a late night flight
    - /: Saturday and Sunday
- Training Requirements:
  - Requirement identification number and name
  - Currency requirements for various training levels
  - Training requirements for each crew position

The SASA prototype also uses data on the following:

- Aircraft:
  - Aircraft identification number and availability

- Airspace:
    - Airspace identification number and availability

- Crewmember Progress:
    - Crewmember identification number
    - List of events, and for each event:
        - Time crewmember last completed event
        - Total number occurrences of event completed

- Point to Point:
    - Airspace identification numbers
    - Time to get from one airspace to another airspace

- Profile Events:
    - Event identification number and name
    - Default event length

- Standard Profiles:
    - Standard profile identification number and name
    - List of profile events contained in the standard profile

APPENDIX D

SASA Prototype Development

Development Platform

The SASA prototype was developed on Sun SPARCStation computers running Sun's implementation of the Unix operating system (version 4.1.1). The prototype runs under XWindows version 11, release 4. We developed the software in the C and C++ programming languages, using the Gnu g++ compiler. We used a laser printer to print schedules. Our development SPARCstation computers vary in configuration, but have the following minimum characteristics:

- 4 megabytes of random access memory (RAM)
- 6 megabytes of hard disk space

SASA Prototype Software Development

We spent one month learning the SAC scheduling problem, through frequent conversations with a SAC scheduler and reading sample schedules that we obtained from various SAC scheduling sites. Two staff members spent the remaining 3.5 months developing the application.

To speed development of the SASA prototype, a MITRE-developed tool called the Portable Resource Scheduling Aid (PRSA) was used. This tool is a library of routines developed to provide a generic capability for scheduling. The SASA prototype consists of approximately 35,000 lines of code. Since the PRSA tool consists of some 30,000 lines of code (C and C++), the SAC application adds approximately 5,000 lines of code on top of PRSA (figure D-1).

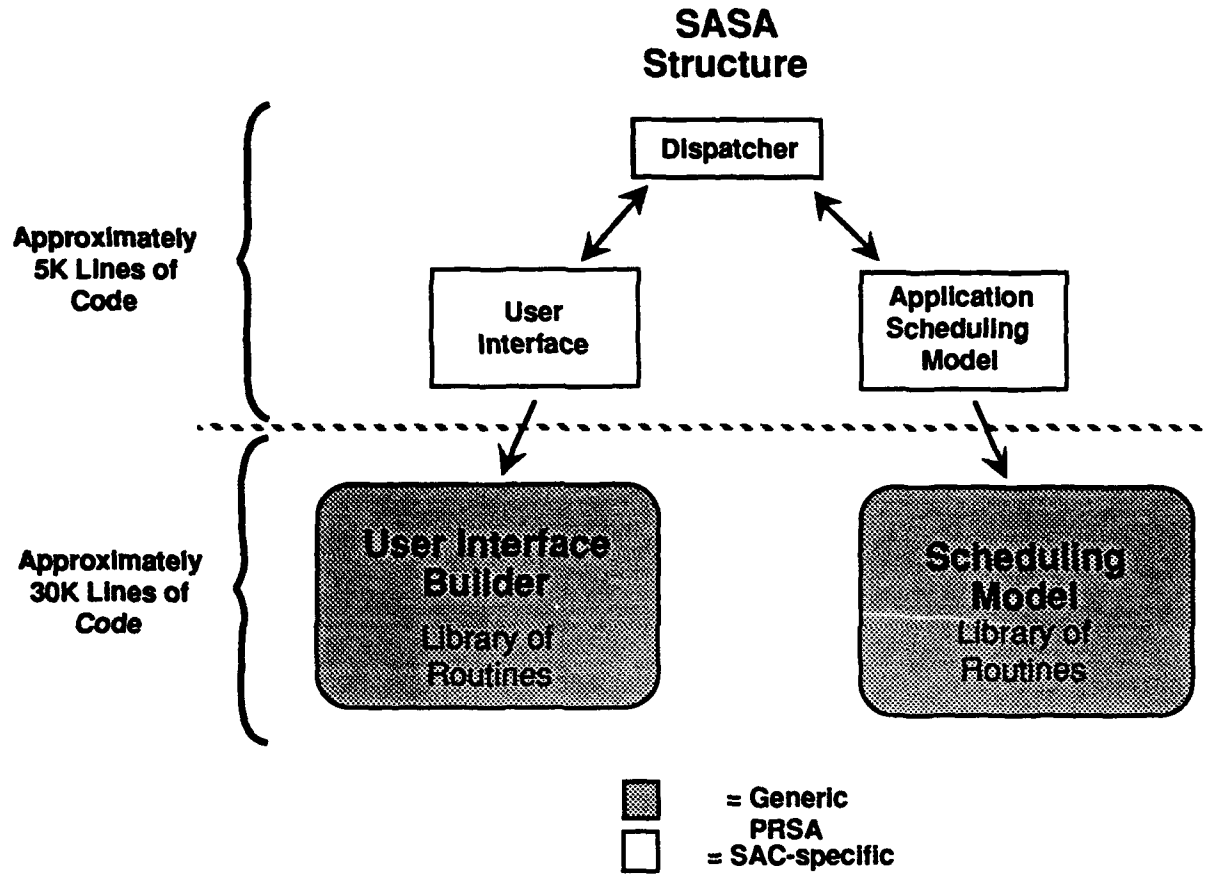


Figure D-1. High Level SASA Prototype Software Design

Portable Resource Scheduling Aid (PRSA) Tool

The Portable Resource Scheduling Aid (PRSA) provides a capability for rapidly building and refining sophisticated scheduling aid prototypes. PRSA is essentially a generic scheduling aid that can be easily customized to fit the specific needs of a variety of different scheduling problems. It is based on a model of generic scheduling entities and their interrelationships that was devised after performing a detailed study of a number of different scheduling problems. The scheduling model includes a built-in constraint propagation mechanism that checks for internal consistency whenever part of the model is changed. The scheduling model is integrated with a model of user interface entities that were modified to support a variety of scheduling aid interaction mechanisms.

Both the scheduling model and the user interface model are driven by data files that describe the objects in each model as well as their interrelationships. Thus, the behavior of the system can easily be changed by changing the data that describes the system. Both the scheduling model and the user interface model can be manipulated from inside a relatively small application-specific computer program that ties the two models together.

APPENDIX E SASA Prototype Questionnaire

SAC Aircrew Scheduling Aid

Prototype Evaluation Questionnaire

Date: _____

Name: _____

Organization: _____

Telephone: _____

FAX: _____

Mailing Address: _____

_____

_____

_____

The purpose of this questionnaire is to gather suggestions for ways to improve and enhance the SASA prototype and to evaluate the effectiveness of using an electronic method of scheduling. Your responses to this questionnaire will be helpful to us in designing new features and capabilities for future versions of SASA. We would appreciate any comments you could provide to help us achieve this objective. Thank you for your cooperation.

PART I. GENERAL

Please rate the overall quality of the SASA prototype in terms of the following criteria:

	Strongly Agree	Agree	Slightly Disagree	Disagree	Don't Know
Overall, SASA is very useful					
Simplifies the scheduling task					
Easy to learn					
Easy to use					
Easy to locate and acess information					
Easy to save and retrieve schedules					

PART II. USING SASA

Please rate the following features of the SASA prototype in terms of their ease of use:

	Very Easy	Moderately Easy	Slightly Difficult	Very Difficult	Don't Know
Windows disappear when cursor moved out					
Moving windows					
Resizing windows					
Using editable text fields					
Using multiple mouse buttons					
Using scroll bars					

PART III. LOGON SEQUENCE AND INFORMATION SCREENS

The following sequence of steps is performed prior to each SASA session. Please rate and comment on each of the steps in the sequence in terms of their usefulness and importance.

Feature or Information	Useful	Not Useful	Comment
Setup Screen			
Help Pages			
Select Squadron			
Select Date			

PART IV. SCHEDULING WORKSHEET

The scheduling worksheet can be divided into five sections: Header, Crew Nametag Storage Area, Scheduling Board, Documentation Line, and Main Menu. The tables below list the features and data provided in each section. For each table, please put a check in the appropriate column to indicate if you think that information or feature is useful. When writing comments, please consider how easy each feature is to use and the format of the information displays. For those features that are not currently functional please comment on their utility in future versions of the SASA prototype.

Header:

Feature or Information	Useful	Not Useful	Comment
Squadron Name			
Schedule Date			
Supervisor of Flight (SOF)			
Toggle between Flying Schedule and Currency displays			
Abbreviation Key			
Saving Schedule			
Runway Supervising Officer (RSO)			

Crew Nametage Storage Area:

Feature or Information	Useful	Not Useful	Comment
Display of weekly MOP data			
Crews listed by crew number			
Display of monthly MOP data			
Highlighting schedule day in red			
Providing MOP data for previous day to schedule day			
Color coding crew Fly days in blue			
Dragging crew nametags onto scheduling board			
Using front end and back end crews			

Scheduling Board:

Feature or Information	Useful	Not Useful	Comment
Display of Mission ID number			
Display of Crew ID number			
Display of Tail Number			
Display of Takeoff Time			
Display of Landing Time			
Mission Timing display			
Assigning a Profile to a mission			

Feature or Information	Useful	Not Useful	Comment
Profile Timeline			
Adding/Deleting Remarks			
Crewmembers display			
Substituting individual crewmembers			
Crewmembers Training/ Currency Requirements display			
Swapping Crews			
Moving Crews			

Documentation Line and Main Menu:

Feature or Information	Useful	Not Useful	Comment
Information dipslayed in Documentation Line			
Printing Schedule			
Format of Schedule Printout			
Information provided on schedule printout			
Training/ Currency Requirements display			

PART V. CURRENCY BOARD

Feature or Information	Useful	Not Useful	Comment
View by crew position			
Number of training reqs complete			
Crewmember status of training and currency			

Does the organization and layout of the scheduling worksheet facilitate or hinder your scheduling task?

Is all of the information displayed on the scheduling worksheet necessary? What information, if any, on the scheduling worksheet is not necessary? Is there any information not currently displayed on the scheduling worksheet that would be helpful?

When a crewmember needs to be substituted, two lists of available alternates, prioritized by currency and training needs are provided. Is this prioritization of alternates appropriate and is there any other information that should be provided in order to choose an alternate crewmember?

When a day's schedule is printed, is all of the necessary information provided in the printout?

Please provide any additional comments on the various kinds of information available via the scheduling worksheet, considering the utility and format of the information displays and any additional information that should be provided in future versions of the SASA prototype.

Please provide any additional comments regarding any current feature of the SASA prototype or any features that you would like to see added to future versions of SASA.

PART VI. USER'S GUIDE

Please rate the quality of the SASA prototype's User's Guide on the following criteria. Please put a check in the appropriate column to indicate your opinion of the User's Guide for each of the follwing areas:

	Poor	Below Average	Fair	Above Average	Excellent	Don't Know
Organization						
Format						
Clarity						
Level of Detail						

Please provide any additional comments regarding the User's Guide in terms of the criteria listed above (e.g., organization, format, comphrehensiveness, level of detail):

Does the User's Guide allow you to quickly and easily locate and read the desired information?

User's Guide Tutorial

Please rate the quality of the Tutorial exercises provided in the User's Manual in terms of the follwoing criteria. Please put a check in the appropriate column to indicate your opinion of the User's Guide Tutorials for each of the follwing areas:

	Poor	Below Average	Fair	Good	Excellent	Don't Know
Helpful						
Easy to Follow						
Accurate						
Comprehensive						

Please provide any additional comments regarding the User's Guide Tutorial in terms of the criteria listed above (e.g., helpfulness, easy to follow, accuracy, comprehensiveness):

_____

_____

What other features of the SASA prototype should be covered in tutorial exercises:

_____

_____