DEXES

Deployable Exercise Support
*for Civil Affairs, Peace Keeping,
and Humanitarian Operations*

User's Guide

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1.1 Concept of the Game

The Deployable Exercise Support system (DEXES) is a simulation program designed to support bilingual international training exercises in military operations other than war for the U.S. Southern Command, Quarry Heights, Panamá.

This User's Guide is for personnel who are responsible for operating DEXES workstations. It describes how to understand and use the maps, icons, charts, and menus that are presented by DEXES. It also provides instructions for how to perform all of the actions that are commonly required of DEXES users. This User's Guide does *not* describe how to create a new exercise scenario.

At the heart of DEXES there is a dynamic mathematical model of society, encompassing economic, social, political, and public health variables. This model generates the societal reactions to actions taken (or not taken!) by the peacekeeping forces, hostile military and political players, and non-governmental organizations.

An analyst can set up DEXES for peacekeeping forces from many nations, under a single military command. Each force that has its own Area of Operations (AO) is a separate player in the game. Other players include the military command, the host nation's own government, up to four opposition guerrila forces, forces from neighboring nations, and non-governmental organizations (*e.g.* Red Cross, Care International, Doctors without Borders, *etc.*). DEXES is designed to be played by operators on a network of Macintosh computers. The computers are linked on an Ethernet network, so that every action or event that occurs on one computer is immediately reflected on all others.

 Military units, the host nation's government, and non-governmental organizations can perform actions at any time during the game. Each action is chosen from a popup menu by the game's players. If an unanticipated action needs to be performed, it can be created on-the-fly by the player. The list of all anticipated actions (and their consequences) is prepared during the setup phase of the game in the form of a spreadsheet.

Events in the game can be scripted in advance, by means of another spreadsheet which gives the event description, its day and time, and its consequences. Special non-scripted events may also be specified. These are events that are triggered whenever a specific combination of conditions is encountered. Triggered events are described in their own Excel spreadsheet.

As the game unfolds, scripted and triggered events occur, and operational units take actions in response. Each military, governmental, or non-governmental unit follows a plan that is constructed and maintained by the player who controls the unit. All events and actions have consequences that are expressed in terms of changes in the state vari-

ables of the societal model that underlies DEXES. The state variables are graphed in a chart window, which can be displayed or printed at any time.

The current list of societal state variables is divided into four categories: social, economic, political, and public opinion. There are additional state variables that describe the current state (supplies, efficiency, condition, etc) of each unit.

DEXES runs on Macintosh computers (including all Mac clones), or on Unix computers from Sun or Hewlett-Packard with the **Macintosh Application Environment** installed. Multi-computer operation requires Ethernet connections. Long-distance operation via the Internet is not yet supported.

1.2   Pre-start Checklist

Before starting a DEXES workstation in an exercise with networked DEXES nodes, verify each of the items in this checklist. The first item need only be checked once, all others should be checked every day before starting up. These items are all important for the smooth functioning of the program, and care must taken that unauthorized changes are not made while the program is off-line.

❑   System 7 is running (System 7.5 is preferred). To check, pick the menu item labeled **About This Macintosh** from the Apple menu.

❑   There is a physical connection to an Ethernet network. To check the connection type, open the control panel named either **AppleTalk** or **Network**, and verify that the type of connection is **Ethernet**.

❑   Program Linking is **ON** (use the **Sharing Setup** control panel).

❑   The monitor is set to **256 colors** (use the **Monitors** control panel).

❑   The correct printer has been chosen (use the **Chooser** for this).
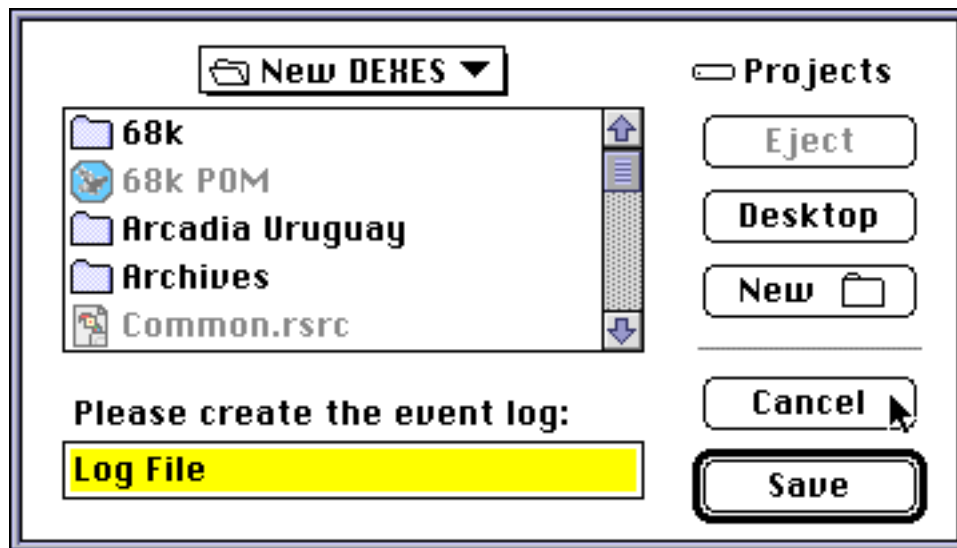
1.3   Starting Up DEXES

The folder containing DEXES must contain five items, as illustrated in the figure below:

DEXES   Test El Sal   SpanishRes   Unit Icons   El Sal Data

The icon for the DEXES program is octagonal, with an eagle on a blue field. The icon for a saved game setup file has the same eagle on a blue field, but is rectangular with a dog-eared corner, and bears the word SETUP. The two "jack-in-the-box" icons are resource files for the DEXES program. The scenario and maps for the saved game setup are stored a folder, which in the above example is labeled "El Sal Data".

To start DEXES, drag the setup file onto the program icon. Please **do not** attempt to start the program by double-clicking the setup file! This may not work as desired, because the computer's hard disk may contain many different versions of DEXES, and the wrong one may be launched by the operating system in response to a double-click.

After DEXES reads the map and scenario data files, it will display the following dialog:
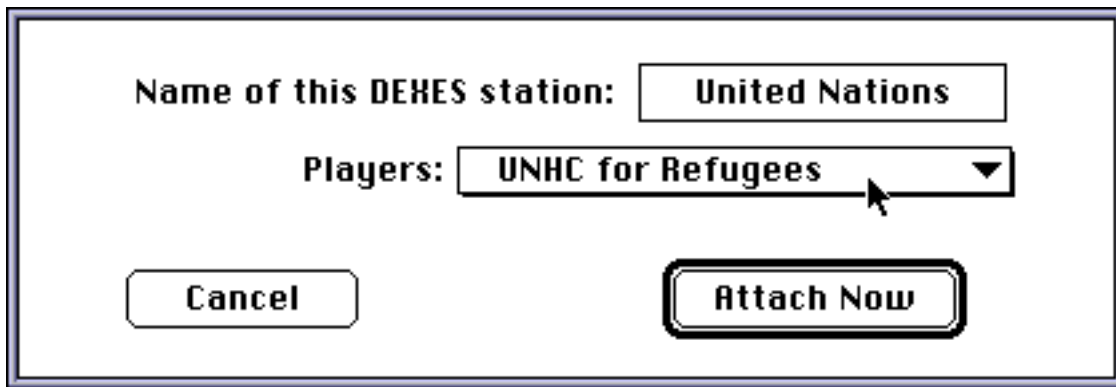

In general, you do not have to create an event log. If you click the **Cancel** button, then DEXES will not create any log files. If you click **Save**, then DEXES will make three log files: one log file in English ("Log File"), one in Spanish ("La Crónica"), and one data log ("Data History") in which values of all variables are stored, once per simulated day.
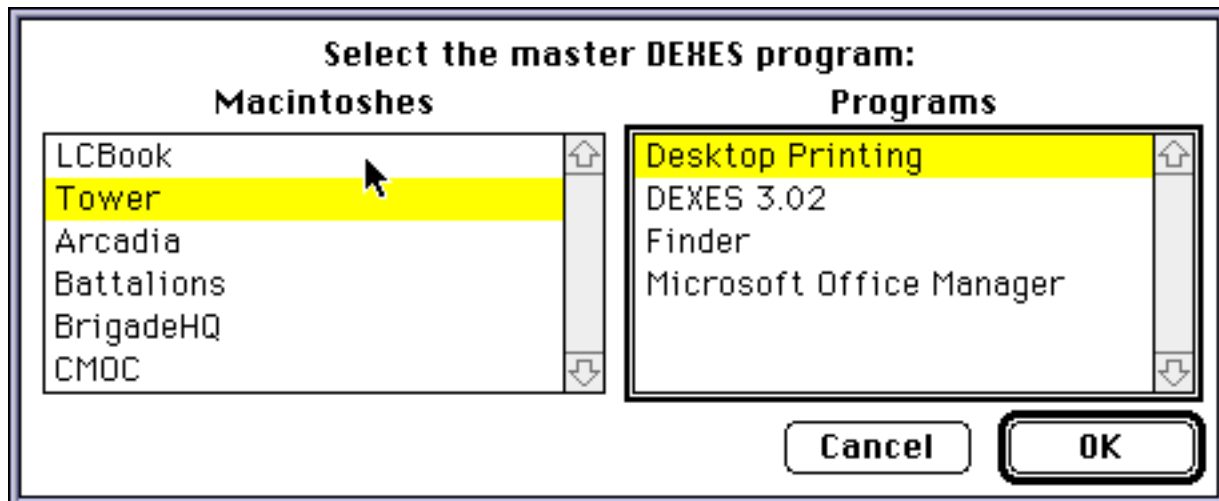
1.4   Attaching to the Network

After successfully starting DEXES on your workstation, the next task is to identify your workstation and the players who will use it to the DEXES master program, which is running on the administrative workstation in the Simulation Center.

To connect your DEXES workstation to the DEXES Master, pick the **Attach to**… item from the **File** menu. A dialog box will appear that asks for the name of this DEXES station. Enter the appropriate name, and then use the popup menu to select the names of **every** player that sits at this workstation. Then click **Attach Now**. In the example below, the name "United Nations" has been typed in for this workstation. The players that sit at this workstation have been selected with the popup "Players" menu, and the last player selected is still visible: the UN High Commissioner for Refugees.

Name of this DEXES station: United Nations

Players: UNHC for Refugees   ▼

Cancel   Attach Now

When the next dialog box appears, as shown below, you will see on the left a list of Macintosh computers that are connected to the network, with your workstation high-lighted. On the right you will see a list of programs currently running on your work-station (named, in this example, "Tower"). As you click the name of each Macintosh workstation in the left column, the list of programs running on that computer will be shown on the right.

Select the master DEXES program:

Macintoshes   Programs

LCBook   Desktop Printing
Tower   DEXES 3.02
Arcadia   Finder
Battalions   Microsoft Office Manager
BrigadeHQ
CMOC

Cancel   OK

The Master DEXES program, if it is currently running, will show up in the right column when you click on the name of the administrative computer on the left. Double-click the name "Master DEXES" when it appears in the program list on the right. Click **Okay**, and the game is ready to start. **Note:** the name of the administrative computer may change from day to day, depending on the needs of the exercise. Do not assume that the Master DEXES program will always be found on the same computer.

1.5   Map Tools

The map shown by DEXES is a background picture (usually digitized from a DoD map), with icons for cities, displaced person camps, military units, governmental units, and non-governmental units. A tool palette for selecting and manipulating these icons appears as a little window that floats above the map. To choose one of these tools,

simply click on its icon in the tool palette. The mouse pointer will change to resemble the chosen tool. The location of the mouse, in UTM (Universal Transverse Mercator) co-ordinates, appears in the lower half of this tool palette.

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There are six tools in this palette. From left to right, these are as follows:

1. **The Standard Selector**

    This tool is the ordinary Macintosh mouse cursor. It can be used to select units (but not areas or cities), and to perform normal Macintosh functions.

2. **The Magnifying Glass**

    Use this tool to zoom in on the map. Simply click with this tool on the point around which you want to see more detail. When the detailed map is in view, use this tool to zoom back out to the overview map.

3. **The Unit Tool**

    Use this tool to select a unit, by clicking on the lower left corner of its icon. When the unit has been selected, its icon will be surrounded with a dark rounded rectangle, and its planned movements (if any) will be shown. The illustration below shows what this looks like after a battalion HQ has been selected. This HQ unit has three movements in its plan. The unit selector tool is currently pointing at the second of these movements.

    The actual position of a unit coincides with the lower left corner of its icon. In the case of a headquarters unit, indicated by an icon with a flag pole,

the position of the unit is the base of the flag pole. The unit selector tool is also used to relocate a movement node, by dragging the movement node to its new desired location. To open a unit or movement node, double-click the unit or node with this tool.

4. The Movement Tool

Use this tool to create a new movement for a unit. First, select the unit by clicking its location (the lower left corner of its icon). The movements in its current plan, if any, will be shown. To add a new movement onto the end of its planned sequence of moves, click on the last movement node and drag the mouse to the endpoint of the move. To insert a move between two existing moves, click on the line segment that joins two nodes, then drag the mouse to the location of the new movement node. *Note: you can also insert movements directly into a unit's plan, using the unit dialog.*

5. The Area Tool

The map of the country has been divided into Areas of Operation (AOs) for the units that participate in the military component of the operation. To see these areas, select the Area tool from the tool palette. Click any-where inside an AO with the area tool to select the AO. Double-click to open the AO. To hide the Areas of Operation, use the keyboard shortcut ⌘**A**, or, equivalently, pick the **Areas** item from the **Display** menu.

6. The City Tool

Use this tool to select or open a city or displaced person camp. Click to select, double-click to open. Cities are shown as yellow circles, and camps are shown as yellow squares. The size of the yellow circle or square is related to the population of the city or camp.

A Shortcut for Zooming the Map:

There is a shortcut method for using the Magnifying Glass that works no matter which tool is currently selected. If you hold down the Option key, the mouse pointer will turn into the Magnifying Glass tool, and it will remain so until you release the Option key.

A Shortcut for Scrolling the Map:

Use the arrow keys on the keyboard to scroll the map right and left, or up and down. This only works when the map is the front window.

Choosing a Different Coordinate System for the Map:

The mouse position is normally shown in UTM-4 coordinates, but three other modes of display are available. Click on the location display to shift to UTM-8 coordinates. Click again to see the location in decimal degrees of latitude and longitude. Click yet again to see degrees-minutes-seconds. A final click returns the display to UTM-4.
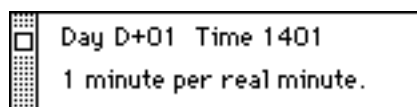
1.6   Displaying Objects on the Map

Use the Display menu (or its keyboard shortcuts) to choose whether to show or hide all of the simulated objects on the map. These are:

1. *Cities, Towns, and DP Camps:* the keyboard shortcut is ⌘**T**.

2. *Areas of Operation:* the keyboard shortcut is ⌘**A**.

3. *Units:* the keyboard shortcut is ⌘**U**.

4. *Circles of Influence for each Unit:* the keyboard shortcut is ⌘**R**.

When circles of influence are displayed, then areas of operation are not displayed, and vice versa. This eliminates the possibility of confusion between all the various colored regions on the map.

1.7   Simulation Time

DEXES is designed to run in two temporal modes: real time and accelerated time. In real time mode the simulation clock advances one simulated minute once every real minute. There is a floating window that show the current simulated day and time, and the temporal mode in which DEXES is currently operating:

```
Day D+01  Time 1401
1 minute per real minute.
```

Time is given in this window in the standard military 24 hour clock. The day is given in days since deployment. Thus day D+01 means the first day **after** deployment.

DEXES can run in three accelerated time speeds: one hour per tick, one day per tick, or one week per tick. The only difference between these modes is the frequency of updates to the visible charts. Only the DEXES administrator can change the temporal mode of the game.

Units and Plans

2.1   Selecting a Unit

To select a unit, click near the lower left corner of its icon with the standard selector (the black arrow mouse pointer) or the unit selector (the red arrow mouse pointer). When selected, the unit's icon will be surrounded by a rounded rectangle. An example of this may be seen in the right side of the picture below, in which a support battalion has been selected. If this unit has a plan that involves movement, as it does in this example, then the movements of the plan will also be shown when the unit is selected.

It may sometimes happen that two or more units are located near the point clicked, when you are trying to select a unit. In this case DEXES will display a popup menu that lists the names of all the units found near the point clicked, as shown in the center-left of the illustration below. This popup menu will be displayed as long as the mouse button is held down. The name of the unit that is closest to the point clicked is high-lighted first. Slide the mouse up or down to select a different unit. The unit actually selected will be the unit whose name is highlighted when you release the button.

It is also possible to select all of the units near the point clicked, by choosing the first item in this popup menu.

Once a unit has been selected, you can add more units to the selection by holding down the shift key while clicking additional units. The entire selection can be cleared by click-ing any point on map where no unit is located.
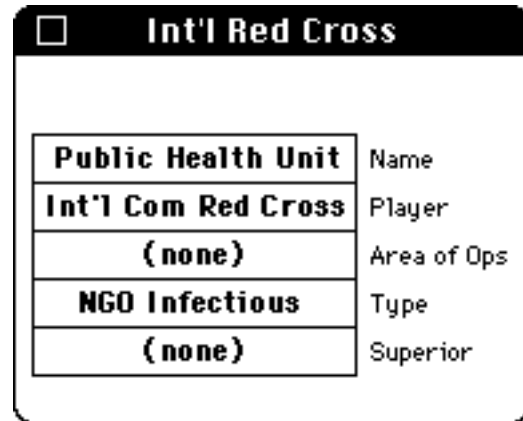
The tab key can be used to change the selection, if only one unit has been selected. Each time you press the tab key the selection will change to the next unit in the internal list of all units maintained by DEXES. There is no particular meaning to the order of this list.

It is not possible to delete or relocate a selected unit.
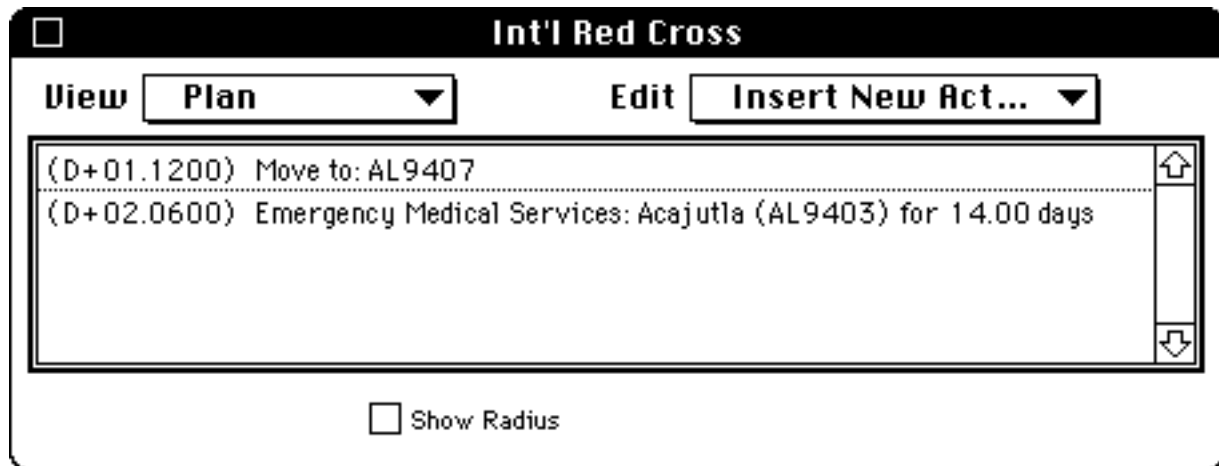
2.2   Opening a Unit

To open a unit, double-click on its position (the lower left corner of its icon). If you, as a player, do not control the unit that was selected, then this dialog appears:

In this example, the unit clicked is a Public Health Unit that belongs the the ICRC (International Committee of the Red Cross, an important NGO). The "Type" field in this dialog shows that this is an NGO Infectious Diseases Unit. Also, this unit is not assigned to any particular Area of Operations, and does not have a superior unit from which it receives command and control.

☐	**Int'l Red Cross**	
Public Health Unit	Name
Int'l Com Red Cross	Player
(none)	Area of Ops
NGO Infectious	Type
(none)	Superior

This is all the information that is available to a player who does not control the unit. However, if you, as a player, do control the unit that was double-clicked, then this dialog assumes a completely different form. The unit's plan is ordinarily shown first:

☐	**Int'l Red Cross**
View [**Plan** ▼]   **Edit** [**Insert New Act...** ▼]

(D+01.1200) Move to: AL9407

(D+02.0600) Emergency Medical Services: Acajutla (AL9403) for 14.00 days
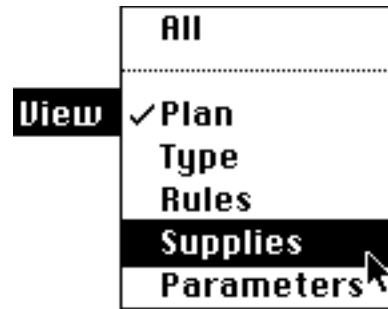
☐ Show Radius

This view of the Unit dialog contains two popup menus, **View** and **Edit**, which look like this while not "popped up":

View [**Plan** ▼]   **Edit** [**Insert New Act...** ▼]

To operate a popup menu, click within its rectangle and hold down the mouse. The menu will be revealed, with the choice shown in white letters on a black background.

There are five different views of the unit that can be displayed within this dialog. Each of these views can be selected by using the **View** popup menu. The illustration on the right shows the appearance of this popup menu as the user changes from the **Plan** view to the **Supplies** view.
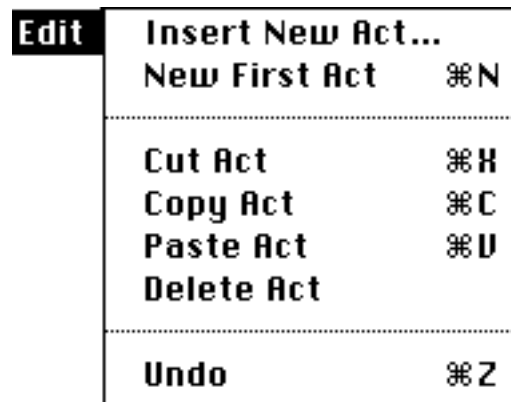
The five selectable views of this dialog are:

- **Plan**   A schedule of the movements and actions in this unit's plan.
- **Type**   Basic information about the type of this unit.
- **Rules**   The Rules of Engagement (ROEs) that apply to this unit.
- **Supplies**   The supplies currently available to this unit.
- **Parameters**   This unit's characteristics, e.g. its speed, efficiency, etc.

When the user picks the view labeled **All**, then all of the above information is shown, except Rules of Engagement. Of these views, only **Type** is available to players for units that are not controlled by the player that opens the unit.

The Edit popup menu is used for editing the unit's plan of actions. To use one of these editing commands, first select an action in the plan by clicking it, then pick the desired editing command from this menu. It will be applied to the selected action.

Use the first item, **Insert New Act...**, to insert a new action *after* the selected action in the plan summary. If no action is highlighted, then a new action is inserted after the last action. To insert a new action *before* the first action, use the second item, **New First Act**. The items **Cut**, **Copy**, **Paste**, and **Delete** have their usual editing meanings. An action can be copied from the plan of one unit and pasted into the plan for another.

Keyboard shortcuts for some of these commands are shown on the righthand side of the menu. For example, to copy the selected action to the clipboard, type **C** while holding down the ⌘ key on the keyboard. The **Undo** item removes the effect of the most recent editing command.

To edit an action, double-click on its summary in the Plan view. A new dialog will appear, which allows every aspect of this action to be studied and changed. This dialog will be discussed later in this section, after all the views of the unit have been covered.

The **Supply** view of the unit is similar to the illustration on the right. To see this view of the unit, select "Supplies" from the **View** popup men. This unit has a 500 person-day supply of food, which is enough to feed its 25 members for 20 days. The 50,000 vehicle-km supply of fuel and spare parts are enough to take its five vehicles 10,000 km. It has no ammunition, as befits an NGO medical unit. It has 3000 patient-days of medical supplies, which is normally sufficient for 100 acute-care patients for 30 days.

```
┌─────────────────────────────────┐
│ ☐      Int'l Red Cross           │
│                                  │
│  View │ Supplies          ▼ │    │
│                                  │
│  ┌───────┐                       │
│  │  500  │  Food (person-days)   │
│  ├───────┤                       │
│  │   5   │  Vehicles (all types) │
│  ├───────┤                       │
│  │ 50000 │  Fuel (vehicle-km)    │
│  ├───────┤                       │
│  │ 50000 │  Parts (vehicle-km)   │
│  ├───────┤                       │
│  │   0   │  Ammo (combat-days)   │
│  ├───────┤                       │
│  │ 3000  │  Medical (patient-days)│
│  └───────┘                       │
│                                  │
│      ◉ Actual  ○ Resupply        │
└─────────────────────────────────┘
```

The **Supply** view also has a pair of "radio buttons." These buttons are used whenever a choice is required between mutually exclusive alternatives; in this case the alternatives are "Actual" versus "Resupply" values. The current choice, **Actual**, indicates that the supply values shown in this view are the actual current supply levels. If you click the **Resupply** radio button, then the values will change to the standard amounts that will be provided when the unit is resupplied.

The **Rules** view shows the current Rules of Engagement under which this unit is operating. This view has a group of three radio buttons for the Attack rule. Rules that begin with an open square are called "checkboxes." Simply click in the open square to activate the rule (activated rules have an X in the square), and click again to deactivate. Two of these rules are associated with thresholds, which can be edited.

```
┌──────────────────────────────────────────────────────┐
│ ☐                 Int'l Red Cross                      │
│                                                        │
│  View │ Rules          ▼ │                             │
│       ◉ Never attack          ☐ Always remain within AO│
│       ○ Attack only if attacked  ☒ Never shoot civilians│
│       ○ Attack if threatened                           │
│                                                        │
│   ☐ Attack is permitted if local force ratio exceeds: │ 2 │ │
│   ☐ Withdrawal is permitted if casualties exceed:     │ 10 │%│
│                                                        │
└──────────────────────────────────────────────────────┘
```
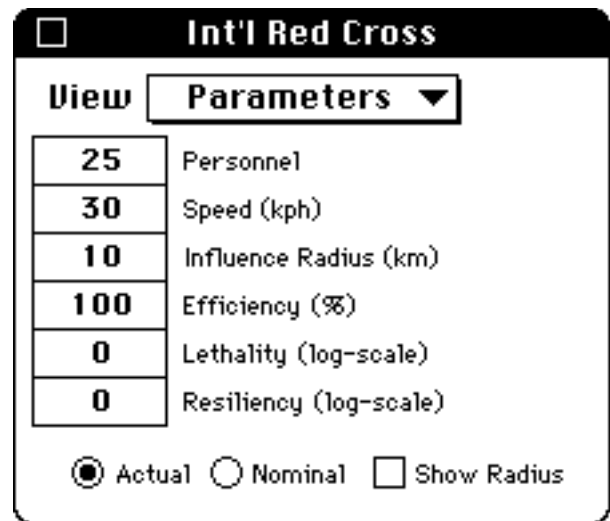
The **Parameter** view of the unit is similar to the illustration on the right. To see this view of the unit, select "Parameters" from the **View** popup men. This unit has a 25 people, and can travel at a speed of 30 kph. Its circle of influence extends 10 km from its current position, and its current efficiency is 100%. Click the **Nominal** radio button to see what these values would be if the unit were at full strength. Finally, you can click the **Show Radius** checkbox to see the unit's circle of influence depicted on the map.

The circle of influence for unit is shown on the map as a gray shaded area, as in the following illustration for this Red Cross unit. The circle is centered over a movement node, shown in red because it is the action currently selected. When no action is selected, the circle will be centered on the current position of the unit.

The "Lethality" and "Resilience" fields in the **Parameter** view are applicable only to military units. **Lethality** is a measure of the firepower of a unit, expressed on a logarithmic scale. An increase of one point in this scale increases by a factor of ten the rate at which the unit can kill enemy, in an engagement. Similarly, **Resilience** is a measure of a unit's ability to resist fire, also on a logarithmic scale.

When one military unit attacks another, both units suffer attrition according to the Lanchester equations, with some random fluctuations. The unit that disengages first is the unit whose casualties first reach its withdrawal threshold. Firepower, resilience, range, and threshold for withdrawal all affect the outcome. The range of a unit is given in kilometers in the "Influence Radius" field, seen above in Parameter view of the unit.

2.3   Opening an Action

When an action in the **Plan** view is double-clicked, a new dialog appears which gives the details for the selected action. The selected action itself is shown as popup menu. Click on this menu to change the action, or just to see the list of all the actions this unit can perform. The object of the action (i.e. to whom it is done) is shown as a group of seven radio buttons. To change the object, click a different button. For a city or point location, you will need to use the mouse to be more specific. First click the "Use Mouse to Select" button, then click the actual object on the map. DEXES will place its name in the square name field.

Radio buttons allow you to make an action happen immediately, or when the previous action ends, or at a scheduled time. If scheduled, enter the day and time. The duration of the event can be specified in four ways: minutes, hours, days, or "indefinite." DEXES will automatically enter its estimate of the duration when you select a movement, as happened in the example at right.

The "intensity" field is almost always important: a unit will perform each action in its plan at maximum intensity (i.e. as fast and fully as possible), unless you enter an intensity value of less than 100%. Movements, for example, will occur at the top speed of the unit unless a lower intensity is entered.

The "Save" button appears whenever you have changed an action in any way. Click this button to make the change permanent. This also has the effect of transmitting the changes to all other players. If you do not want to save the changes, then close the dialog (click in the little rectangle in its upper left corner). DEXES will ask if you really want to do this; the changes will be canceled if you then click the "Yes" button.

The little orange arrows that appear at the bottom of the dialog are buttons. Click the right arrow to see the next action in the plan; click the left arrow to see the previous action. The left arrow button is invisible above, because this is the first action.

Actions

3.1   Introduction

Actions are performed by units, according to the unit's action plan. Each unit's action plan is created by its owner (a player), using the interactive dialog described in the previous section. An action plan is simply a sequence of actions. Each action is executed at its stated time, for its stated duration. Actions may overlap (i.e. more than one action can be in progress at the same time).

A scheduled action that is within 20 seconds of starting is **locked** by DEXES, so that no-one, not even the administrator, can change the action during the last 20 seconds leading up to its execution. One minute before execution, the status line in the Action dialog will begin to flash a count-down, to warn you that the action is about to start.

Each action occurs at a scheduled time, or after the conclusion of the previous action in the plan, or "immediately." An **immediate** action will be started on the next action cycle *after the action dialog is closed* . During real time play there will be one action cycle every 15 seconds. Thus the term "immediate" really means "within 15 seconds after the Action dialog is closed."

During real time play, DEXES cycles through every unit's action plan once every 15 seconds, to see if there are any actions that need to be started or stopped. The Unit and Action dialogs of an open unit are momentarily suspended (i.e. dimmed and non-responsive) during the fraction of a second that DEXES is cycling through its plan.

Changes that you make to a unit's action plan become effective when you click the **Save** button. Even after the unit dialog is closed, you can still undo all the changes you made to a plan by choosing the **Undo** menu item in the **Edit** menu. The **Undo** item will be available only if the simulation is paused, not while it is running. To correct mistakes made during real time play, you will have to re-open the unit and make corrections to each action.

Every action is checked for conformity to the unit's **Rules of Engagement** at the time the action is defined (not performed). If the action is not in conformity, then you will be warned. However, you will not be prevented from planning actions that violate ROE's.

The Action dialog has a field labelled **Intensity**. This action parameter allows the player to specify the intensity with which the unit will undertake the action. Full intensity means that the unit uses its resources at the maximum possible rate, and achieves the maximum possible effect.

Every unit has an **Efficiency** parameter, which stands for a combination of morale, training, and readiness. When a unit's efficiency drops, its actions become less effective. In other words, the effects of actions taken by a unit are reduced by inefficiency.

Each unit checks its current **supply** parameters once every day, and requests resupply whenever any supply value drops to its resupply threshold. If a friendly supply unit is within range, and if it has the required supplies, then the unit will be resupplied.

Every unit consumes food supplies once per day, in proportion to its personnel. When a unit runs out of food, its efficiency will drop by 50% every day that it is without food. Fuel and spare parts are consumed whenever a unit is moving, if it is using its own vehicles. If a unit has no fuel or spare parts, then it can no longer move under its own power (it may still be transported by another unit, of course).