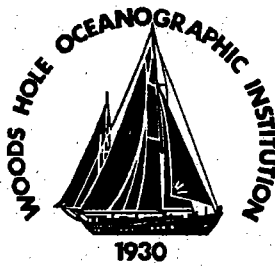


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***MapTool* Version 2**

User's Manual

by

Peter Lemmond

May 1994

Technical Report

Funding was provided by the Office of Naval Research under
Grant N00014-90-J-1621.

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Peter Lemmond

Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543

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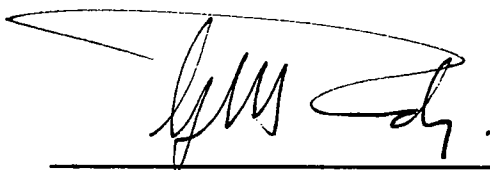
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MapTool Version 2

User's Manual

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Woods Hole Oceanographic Institution

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Abstract

MapTool is an interactive computer program for the display of common marine geophysical data. At present, the program displays isolines, color-filled contours, navigation tracklines, and navigated scalar values in a variety of styles. A variety of map projections are supported. This document describes the basic requirements for running the *MapTool* program, for creating various displays, and generating hard copy output. The supported data file formats are described. All of the options, displays, menus, and windows are documented.

Acknowledgments

Portions of this software were developed at the WHOI Deep Submergence Laboratory (DSL). Jonathan Howland of DSL reviewed this document, and assisted in the testing of the software. Development of this software was supported by ONR Grant N00014-90-J-1621.

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Section 1 — Introduction

MapTool is an interactive, workstation based computer program for displaying some common marine geophysical data. It uses the OpenLook™ and XView™ toolkits for its graphical user interface, and the Uniras agX/Toolmaster™ as its graphical programming interface. It operates in an X11 environment for interactive use, and supports a variety of hard copy devices.

A few of the features of the *MapTool* program include:

- Interactive display of contour isolines, with optional color-fill between isolines. Also supports missing data, and filtering interpolated data.
- Display of navigation tracklines, with full control of annotations, tickmarks, label orientation, and color.
- Supports the "Drag-and-Drop" metaphor for importing data files from the OpenWindows File Manager.
- Produces PostScript, rasterfile, and metafile hardcopy outputs.
- Displays scalar values in a variety of styles, including actual value, wiggle-style, scaled symbols, and value filtering.
- Supports a variety of map projections and ellipsoids.
- Interactive range and bearing measurements.

The purpose of this document is to provide basic information about running the *MapTool* program, importing data, creating a map display, and generating hard copy output. This document explains all of the options, displays, menus, windows, necessary and optional features, system requirements, and data file formats. Examples of windows, files, and outputs are given.

The development of the *MapTool* software has been done under the auspices of the WHOI Digital Image Analysis Laboratory (DIAL). The DIAL facility has been established within the Geology and Geophysics Department in order to establish and centralize capabilities for the processing, display, and archiving of a wide variety of large-volume, marine geological and geophysical digital data sets.

1.1 System Requirements

The *MapTool* program requires the use of an interactive, X11-based, Unix workstation. The following are the characteristics of a *MapTool* compatible system:

- SunOS Version 4.1.3, or Solaris 2.2 or higher.
- OpenWindows Version 3
- XView Version 3

- 8-bit Color display
- 24 MB of system memory. Additional memory will be needed for anything more than a simple chart display.
- Uniras agX/Toolmaster run-time support, Version 6V3B.

As an X11-based program, *MapTool* can also operate as a client program on a remote host, with the local server managing the display, mouse, and keyboard. This is accomplished by setting the `DISPLAY` environmental variable on the client host, and authorizing remote access on the server host. Consult the appropriate X11 and OpenWindows documentation for further details concerning the configuration of an appropriate client-server relationship.

1.2 Document Conventions

This document uses typographical methods to denote various components of the *MapTool* program:

- Words, phrases, and titles taken directly from *MapTool* windows are displayed in a fixed-width, sans-serif font. For example, the title of the main window of the *MapTool* program is shown as "MapTool: Version 2.1".
- Interactive, command-line based dialogues are also shown using a mono-spaced, typewriter font. When appropriate in such dialogues, user responses will be highlighted in bold. For example, in the following dialogue (*not* part of the *MapTool* program), the user types the word "date" followed by [RETURN], and the operating system responds by displaying the current date and time:

```
% date
Thu Feb 3 10:55:15 EST 1994
%
```

- Special key sequences are denoted by enclosing in square brackets, and using small capital letters. A fixed-width, sans-serif font is also used. For example, the sequence [RETURN] refers to pressing the key labelled "Return." The sequence [SELECT] refers to pressing the "Select" button on the mouse or pointing device. When more than one key or button need to be pressed simultaneously, then the entire sequence is enclosed in square brackets, with individual sequences separated by the "/" character. For example, the sequence [SHIFT/SELECT] refers to simultaneously pressing the "Shift" key on the keyboard and the "Select" button on the mouse.

Section 2 — Setup and Start-up

Prior to using *MapTool*, it is necessary to configure the Unix user environment. This will typically take the form of adding statements to a user's `.cshrc` and `.Xdefaults` files. In addition, it may be necessary to gain access to file systems containing the *MapTool* software. This section will provide information for a common configuration.

On-line copies of these setup file modifications can be found in the file `$DIALHOME/samples/dial_setup`. Other files (sample data files, attribute files, and so forth) can also be found in the same directory.

2.1 File System Access

If the *MapTool* software is not available on a locally mounted file system, it will be necessary to remotely mount from another host. The preferred method is to use the automount facility provided with SunOS. This service automatically and transparently mounts an NFS file system as needed. The configuration and operation of the automounter and NFS is well beyond the scope of this user manual. If needed, consult the system administrator for your local host system.

In a simple case, where the local host is running Sun OS 4.1.x, with a single automount file, the following sequence can be used (must be the root user):

1. Add an entry into the automount file (typically `/etc/auto.mount`):

```
/home/Dial -ro tone:/files/tone/Dial
```

2. If the automount daemon is currently running, kill it. Note that one must send a `SIGTERM` signal (via `kill -15`) to properly terminate the automount daemon.
3. Restart the automount daemon. Under SunOS 4.1.x, the automount daemon is usually started from the file `/etc/rc.local`. Look in this file to see the proper way to initiate.

In this example, the remote host `tone` contains the necessary *MapTool* program files, which are then locally mounted to the file system `/home/Dial`. In cases where either Yellow Pages or NIS systems are in effect, different procedures will be required. Again, consult the system administrator for your local host system for implementation details.

2.2 User Environment

Prior to starting *MapTool*, it is necessary to set up the user environment. Since this procedure must be followed every time a user logs into the system, it is common to place these commands in a user's `.cshrc` file. A typical entry would consist of the following:

```
# define where DIAL software resides
setenv DIALHOME /home/Dial

# if Uniras software available, then initiate
if ( -e $DIALHOME/unirasrt/6v3b/base/uni.login ) then
    source $DIALHOME/unirasrt/6v3b/base/uni.login
    setenv LD_LIBRARY_PATH $UNIDIR/lib:$OPENWINHOME/lib
else
    unsetenv DIALHOME
endif

# add software to path (optional)
set path = ($path $DIALHOME/bin)

# set names for various hardcopy files (optional)
setenv unipict $HOME/unipict.upi
setenv unirast $HOME/unirast.rdb
setenv POST    $HOME/unipost.ps
setenv SUNRAS  $HOME/sunrast.ras
setenv HPGL2   $HOME/plotfile.hpgl2
```

In addition, in order to properly interact with the X11 server on the local display host, each user should add the following entries to the file `$HOME/.Xdefaults`:

```
uniras.numfonts: 0
uniras.colors: 256
uniras.colormodel: virtual
```

Note again that these initialization settings are samples only — your local configuration may be different. After making these changes to `.cshrc` and `.Xdefaults`, it is best to log out, then log back in to make sure the changes are set properly within the X Window Manager.

2.3 Running *MapTool*

Provided a proper environment has been initialized, starting the *MapTool* program is best done by running the program in the background. There are at least two ways to do this. First,

from the Unix C-shell command line, type:

```
% MapTool [-f mapfilename] &
```

Note the option `-f mapfilename` parameter on the command line. This allows for the initial loading of a saved map file prior to display. Refer to Section 5.1.1 for how to create a map file. If no map file is given, then the default parameters are used.

A second method of starting the *MapTool* program is to add an entry into the file `$HOME/.openwin-menu`, which will start the program when invoked from the OpenWindows Workspace Menu. A typical entry in `$HOME/.openwin-menu` would look something like:

```
"MapTool..."          exec $DIALHOME/bin/MapTool
```

Note that *MapTool* supports the standard XView command line start-up options. For example, use the option `-wi` to start *MapTool* as a closed Icon. See the appropriate XView and OpenWindows documentation for additional start-up options.

Section 3 — *MapTool* Display

The *MapTool* program is an interactive, workstation-based program. As such, all user interaction is done through display windows. This section describes the main map display. Subsequent sections describe the various pop-up windows, menus, and buttons.

3.1 Map Display

The main display (or base) window of the *MapTool* program is a two-dimensional map, somewhat analogous to a sheet of paper. Various sized "sheets of paper" (or screens) can be selected for drawing a map (see Section 5.4.1, Program Properties); in all cases, the map that is displayed will fit the largest map possible while preserving the proper aspect ratio. The drawing "tools" used to make the map are fixed in size, such that a thin line drawn on a small screen will be the same width on a large screen. Regardless of the state of the *MapTool* program, a map is always defined. In most cases, the map will have borders, labels, and data displayed inside. However, a map can also be defined with no borders or labels, and without data being displayed. A map then is defined as simply a view of a specific geographic area. All of the elements of how that area is to be viewed are user-options, but an area is always defined.

When the *MapTool* program is first started, the base window "MapTool - Version 2.1" is displayed. Note that this is a sample display — the display a user will see will depend on default values selected.

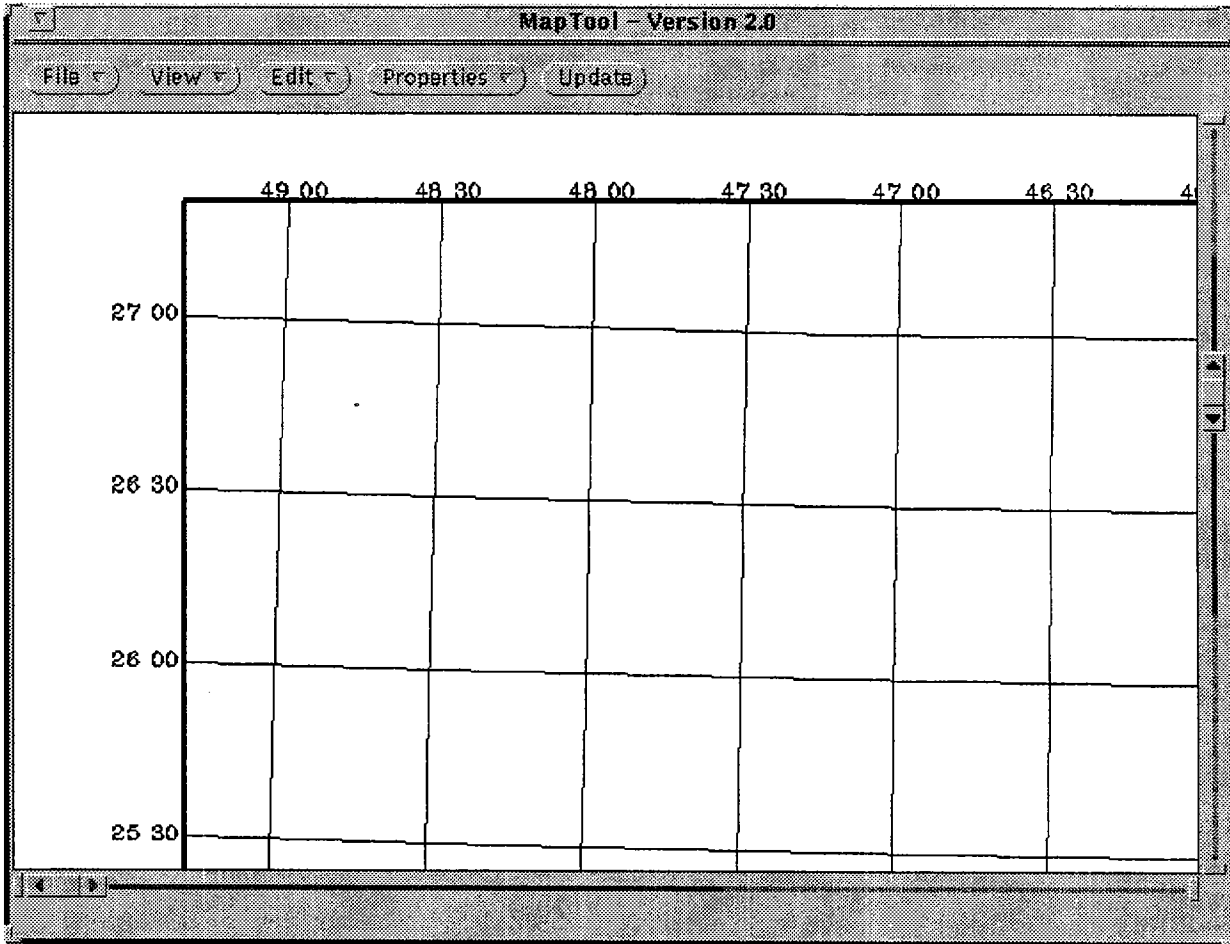


Figure 3-1. *MapTool* Base Window

3.2 Scroll Bars

Since the size of the map area may exceed a user's physical screen or size of the base window, both horizontal and vertical scroll bars are provided to view a portion of the map area. When the Screen Size attribute is set to Full Screen (see Section 5.4.1), then the scroll bars are only needed if the base window is sized less than the full screen. When Screen Size is set to 2X Full Screen or 4X Full Screen, then the scroll bars are need to view the entire map area.

3.3 Base Window Footers

Both the left and right window footer locations are used to display various information messages to the user. These messages will be described in the sections where the messages are

generated. Note also that many of the pop-up windows will also contain important information in their window footers.

3.4 [UPDATE] Button

During a typical interactive *MapTool* session, the user may import a variety of files, and then change each file's display characteristics until the desired map is drawn. The purpose of the [UPDATE] button is to redraw the current map, so that changes to data or display characteristics are shown. If the display currently shown matches all of the user settings, then the [UPDATE] button will be disabled. When the setting "Program Properties: Display Update" is set to Automatic (see Section 5.4.1), then the map display will be updated whenever necessary, and the [UPDATE] button will not be available.

Selecting the Refresh menu item from the base window frame pop-up menu will also cause the map area to be totally redrawn.

3.5 Drag-and-Drop

Two methods are available for importing data into the *MapTool* program. One method is through the use of the File: Import... menu item described in Section 5.1.4. Additionally, supported data files may be "dropped" on to the map area from programs that support "dragging" of files to selected targets. For example, the OpenWindows File Manager allows "dragging" of files to other programs. To use, use the [SELECT] button on the mouse to first select a file in the File Manager window, then, holding down the [SELECT] button, "drag" the file until its icon representation is on top of the *MapTool* map area. Release the [SELECT] button and the file will be loaded.

Section 4 — Mouse and Keyboard Commands

Control of the *MapTool* program is accomplished primarily through the use of the mouse and keyboard. The mouse, in conjunction with mouse buttons, is used to interact with the main display and control pop-up windows. Options are selected by clicking the mouse in check boxes and other control elements. The keyboard is used to enter values and file names into entry fields.

4.1 Mouse Tracking

While the *MapTool* program is running, the location of the mouse pointer is continuously tracked and converted to map coordinates. The default tracking action is to display the geodetic coordinates (latitude and longitude) of the tip of the mouse pointer in the left window footer. As the mouse is moved, these values will be automatically updated. If the [SHIFT] key is pressed during mouse tracking, then the projected, cartesian coordinates (X & Y) will be shown in the footer. When [SHIFT] is released, geodetic coordinates will be shown.

Note that the mouse tracking, coordinate display only occurs while the mouse pointer is *inside* the current map area.

4.2 [SELECT] Actions

While the mouse point is inside the current map area, pressing the [SELECT] button on the mouse (normally MB1, the "left" button) allows a user to measure the distance between two points. This procedure is accomplished by:

1. Move the mouse pointer to the location of the starting point of the line to be measured. Use the mouse tracking feature (see Section 4.1) to precisely locate the pointer position in geodetic coordinates.
2. Press and hold ("drag") the [Select] button. A line will be drawn from the start point to the current point. The endpoints of the line will be displayed in the left window footer. The range and bearing from the first point to the endpoint will be displayed in the right window footer.
3. Release the [Select] button. The pointer returns to normal shape, the line disappears, and the left window footer returns to coordinate tracking.

Note that the line to be measured must be *inside* of the current map area.

4.3 [ADJUST] Actions

While the mouse pointer is inside the current map area, pressing the [ADJUST] button on the mouse (normally MB2, the "middle" button) allows a user to "zoom in" to the map area by interactively determining a new set of map chart boundaries. This procedure is accomplished by:

1. Move the mouse pointer to the location of one corner of the new area. Use the mouse tracking feature (see Section 4.1) to precisely locate the pointer position in geodetic coordinates.
2. Press and hold ("drag") the [ADJUST] button. A box will appear showing the new chart boundaries, and will move as the mouse is moved. The geodetic corners of the box will be displayed in the left window footer. A small circle will appear at the tip of the mouse pointer, indicating a "drag" operation.
3. While dragging the mouse, press the [Esc] key at anytime to cancel the zoom in operation.
4. When the desired opposite corner of the chart box is displayed, release the [ADJUST] button. The chart boundary properties will be updated.

Note that it is not possible to extend the "zoom-in" operation to a point outside of the current map area. Instead, use a "zoom-out," followed by a "zoom-in."

4.4 [MENU] Actions

While the pointer is inside the current map area, pressing the [MENU] button on the mouse (normally MB3, the "right" button) activates the "Zoom Out" pop-up menu. The purpose of this menu is to expand the chart boundaries of the current map, while keeping the same map aspect ratio and center of the map. When invoked, five possible menu items are available:

10 Percent	Both the latitude and longitude spans are increased by ten percent. The increase is distributed equally between the minimum and maximum geodetic values.
33 Percent	Both the latitude and longitude spans are increase by 33 percent, equally distributed between minimum and maximum values.
100 Percent	Both spans are increased by 100 percent, equally distributed.
300 Percent	Both spans are increased by 300 percent, equally distributed.
Auto-Locate Data	When selected, the bounds of all the data currently in use is determined and the chart boundaries are adjusted so that all data will be visible.

If the attribute Program Properties: Display Update (see Section 5.4.1) is set to Manual, then the map area will be updated the next time the map is re-displayed. If set to Automatic, then the map area is updated immediately.

Section 5 — Menus

This section describes the pull-down and pop-up menus in the *MapTool* program. It is assumed that the user is familiar with the mouse actions necessary to manipulate menus. All of the menus described are part of the main *MapTool* display window (see Section 3.1).

5.1 File Menu

The *File* menu is a menu button that contains actions that deal with the input and output of files. These files may relate to data, program properties, or printing.

5.1.1 Load...

The *Load...* menu item is used to load a previously saved map-file into the *MapTool* program. A map-file contains a complete list of all display parameters and options, along with a list of all the data files used. When selected, the "MapTool: Load File:" pop-up window appears if not already visible:

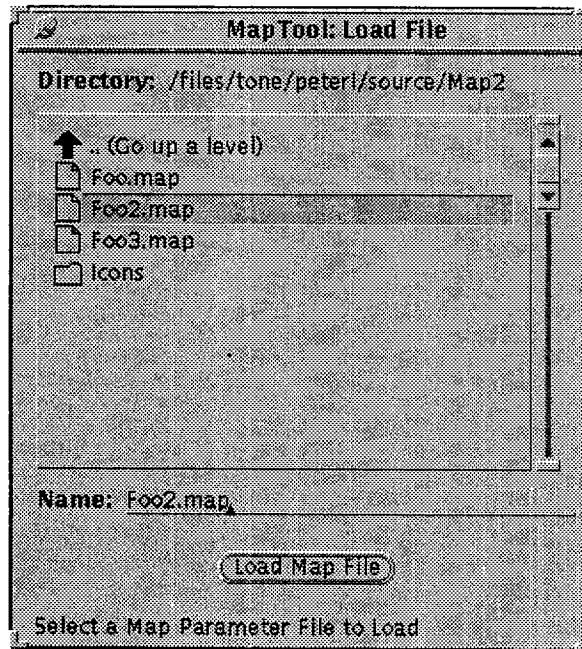


Figure 5-1. *MapTool* Load File Pop-up Window

Use the mouse and keyboard to select a map file to load. Only those files which have been created using the MapTool File: Save... function (See Section 5.1.2) will be displayed. In addition, one can directly type in a filename to be loaded.

5.1.2 Save...

The Save... menu item is used to save all of the parameters, options, and file names used to create the current map in a file for use at a later time. These files can be loaded either when starting the MapTool program (See Section 2.3) or by invoking the MapTool File: Load... menu item (see Section 5.1.1). When invoked, the "MapTool: Save File" pop-up window appears:

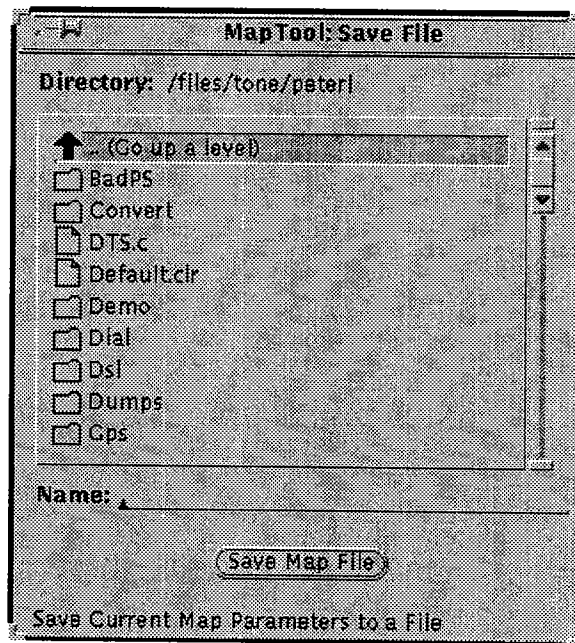


Figure 5-2. MapTool Save File Pop-up Window

Use the mouse and keyboard to enter the name of a file in the displayed directory to store the map information. All files (not just previously saved files) are shown.

5.1.3 New

The New menu item is used to reinstate the MapTool display to its initial state. When selected, the following actions are taken:

