

# MULTIPLE MIRROR TELESCOPE OBSERVATORY

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"cats"  
The MMT Catalog Browser

Anthony D. Poyner

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# The M.M.T. Catalog Browser

## 1.0 Introduction

The MMT Catalog Browser program, "cats", is an Open Windows program written in XView that allows a user to examine objects from an astronomical catalog in a variety of ways. Cats is primarily intended to be a tool to use when observing at the MMT, but it is also very useful for planning an upcoming run at the MMT or at any site for which the latitude and longitude are known.

Features of the program include:

- o Displays objects from an MMT Internal Format catalog. Parameters displayed are - RA, Dec, Proper Motions, Epoch, Magnitude and Spectral Type. RA and Dec precessed to current epoch. Azimuth, Elevation, Hour Angle, Parallactic Angle and Air Mass, Azimuth and Elevation Velocities. Time to Horizon and Time to Critical Air Mass, rising or setting.
- o Objects are selectable by catalog number or by object name.
- o "Critical" Air Mass or Elevation can be set. In cases where air mass is important to an observation, this facility tells the user how long the observation can proceed before this air mass is exceeded.
- o The time-varying elements of the display can be shown for the current UT, for the current UT plus some number of hours or minutes, or for some arbitrary date and time. This enables the user to see where the object will be in (say) two hours, or to plan an observing run for some future date.
- o A "Where" facility shows a list of objects from the selected catalog which fall in selected ranges of azimuth, elevation and/or magnitude. Any object in this list can be "clicked" on to display all its parameters in the main window.
- o A "Show/Edit" facility opens a standard XView edit window, showing the entire selected catalog, which can be edited and saved if desired. Note that the format of the catalog is FIXED, so maintaining the correct spacing, etc., is vital. The object number is not displayed. A specific object number to be displayed as the top line can be specified, or the user can use the standard text pane menu, selecting "View>" and "Select Line at Number.."
- o Audio error and (optionally) caution messages.
- o The catalog can be printed to the system printer.
- o Catalogs in user format can be translated to MMT Internal format. User formats supported are MMT New, MMT Old, Steward 90", and CfA/OIR.
- o Default values for the directories used to store catalogs or audio files, values of latitude, longitude and horizon elevation, and whether audio is on or off, can be overridden with entries in the user's .Xdefaults file or by creating a .catsrc file in the user's home directory.

## 2.0 Using the cats Program

The program is started by typing "cats" in the directory containing the cats program. It is useful to define an alias in your .cshrc file so that "cats" can be typed from any directory. This is already done for you if you are logged onto mmt as "mmtobs".

### 2.1 General Layout

The Catalog Browser main window is divided into panels. Panels that contain buttons or user-input values are colored light blue, and panels that display information are beige. We will discuss the contents of the beige display panels first.

The uppermost beige display panel shows the current date and time, and the name of the selected catalog. When the program is first started, the catalog selected is "NONE", and the display values in the lower beige panels are blank.

The top of the lower pair of beige display panels shows the coordinates, magnitude and spectral type of a selected object as read from the catalog, plus the right ascension and declination of the object precessed to the current epoch.

The bottom beige panel shows information for the object at some selected date and time. The procedure to select time/date for display is detailed below, in Section 2.2. This panel shows the values of elevation, azimuth, hour angle, parallactic angle, air mass, and azimuth and elevation velocities. Also shown are time to reach the telescope horizon (nominally 5 degrees elevation for the MMT), either setting or rising, and time to reach a user-selected critical air-mass or elevation. In some instances, the object will never fall below the horizon, or the critical airmass, or may never rise high enough. In either of these cases, a message will tell you so. At the bottom of this panel, a message in red indicates if the object is presently below the horizon, or the critical airmass. If the user selects to display the object in "real-time" (current UT, or UT plus some number of hours and minutes), the display will continuously update as UT advances. If the user selects to display the coordinates for some arbitrary date and time, the display is static.

The two blue control panels allow the user to interact with the program. The top panel contains a set of buttons which invoke the various functions of the program. These functions are detailed later in Sections 2.3 through 2.9.

The lower blue panel is used to control the object display, and is described next.

### 2.2 Controlling the Object Display

Finding a particular object in the selected catalog can be done in two ways. The catalog number for the object can be typed in the "**Find Object Number:**" field, or the number can be incremented or decremented with the arrow boxes to the right of the field. Alternatively, the object name can be entered in "**Find Object Name:**". Note that the name must be **EXACTLY** as in the catalog - spaces, punctuation, case, everything. If the object is found, its number is put into the "Find..Number" field so you can easily troll around nearby objects.

Two associated fields are "**Critical Airmass**" "**or Elevation.**" Changing either air mass or elevation (in decimal degrees) will automatically cause the other value to change to suit. This value will now be used to compute the elapsed time before the selected object reaches this elevation. When the program is first started, these fields default to 5 degrees and the corresponding air mass. This facility is useful if keeping your objects from exceeding a certain air mass is critical to your observations.

