

DMT'S IMAGE VIEWER

Replay and Analyze Automated Snapshots from
DMT's Capture Image Function

Abstract

The DMT's Capture Image Function automatically captures images from intruders entering a user-defined area. The Image Viewer is the playback and analyze program for the images captured. Using functions like the grid overlay, the user can determine boat or vehicle lengths and heights.

Description

The *DMT Image Viewer* is a special purpose tool intended for viewing video files created by the *DMTRemClient* program operating the *Capture Image* function.¹

The files are JPEG images of objects (people, ships, etc.) taken by a FLIR PT series camera with the key geometry parameters of the viewing scene being saved with the file. These parameters are then used by the *DMT Image Viewer* to construct a calibrated distance grid which may be displayed over the original image for estimating distance values relative to the viewed object.

Geometry

The basic geometry anticipated with these image files is shown in Figure 1. Here the camera is pointing at the center of a designated area of interest (Zone 2) while the viewed object moves through this area. Periodic snapshots of the camera video are taken and stored as JPEG files during this transit.

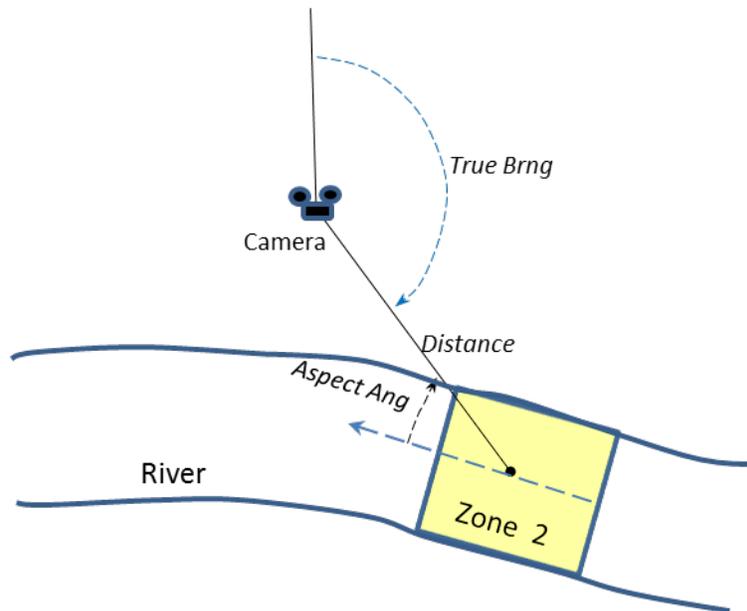


Figure 1 Geometry of the *Capture Image* files viewed by this viewer.

The filename for each image is formatted to include the key geometry parameters noted above, described as follows using the filename template:

`CThhmss-dddd-aa-ff-nnnn.jpg`

where:

¹ See the document *Capture Image Function Rev1.pdf* for a description of how these files are created.

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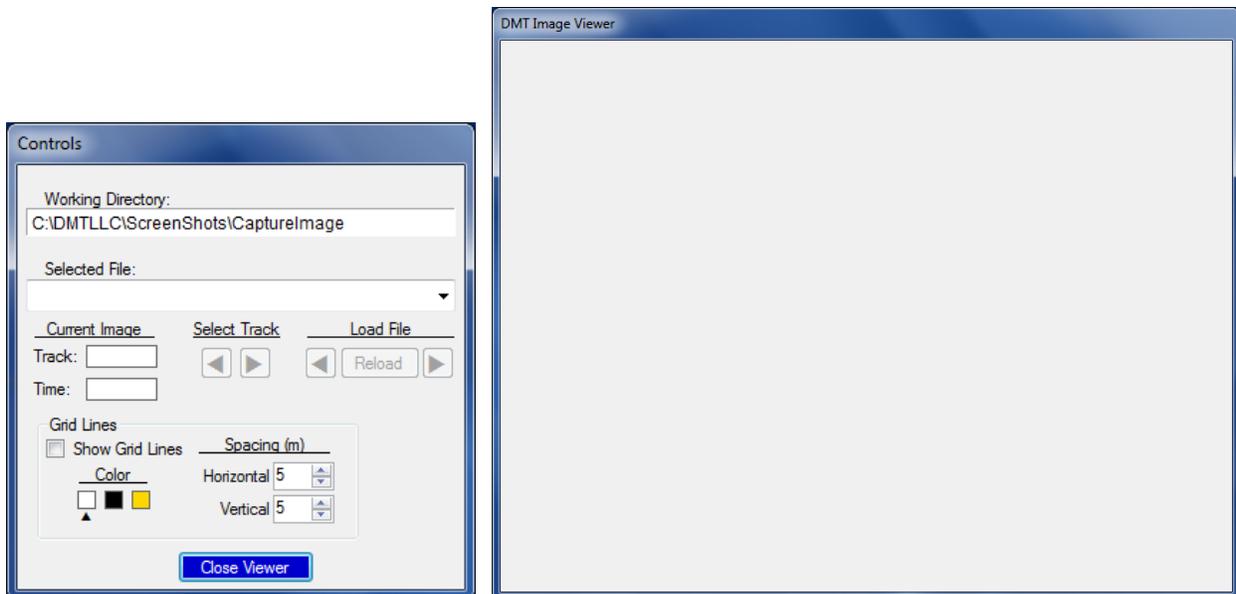
- CT -- leadoff identifier (only filenames starting with “CT” are processed by this tool)
- hhmmss -- time stamp
- dddd -- Distance from camera to center of area of interest (meters)
- aa -- Aspect angle (smaller angle between camera look and area orientation)
- ff -- Camera field of view (degrees)
- nnnn -- Track number associated with this object

Based on the parameters read from each filename, the DMT Image Viewer will construct a grid overlay to be displayed with that file. The grid shows lines with vertical and horizontal spacing in meters specified by the user. The spacing of these lines on the image (in pixels) is calculated using the reported distance, camera FOV value, and the size (width/height) of the JPEG image in pixels.

The spacing of the vertical grid lines is further adjusted to account for a look aspect angle less than a “broadside” look (90°). This is done by multiplying the broadside spacing by the Sine of the aspect angle ($\sin aa$), which moves the lines closer together to provide the correct distance scale for the oblique viewing aspect.

Controls

The controls for the *DMT Image Viewer* consist of a controls form and a separate, resizable viewing window, which appear as shown in Figure 2 after program startup.



Controls Form

Viewing Window

Figure 2 DMT Image Viewer controls at program startup.

Controls Form

The *Working Directory* box shows the directory from which the next *get files* operation will retrieve files. The user performs a *get files* operation by clicking on this window and following the user dialog described later in the *Operation* section.

The *Selected File* box is a drop down list box which contains the filenames for all loaded image files, where the current “selected” file appears in the window. A file is selected by either (1) choosing a file from the drop down list directly, or (2) clicking on one of the five “load” file buttons. The selected file is the image that is presented on the *Viewing Window*.

The “load” file buttons are the arrow buttons (◀ and ▶) and the *Reload* button shown under the *Select Track* and *Load File* headings. Clicking on one of these buttons will load an image file as follows:

- *Reload* -- always reloads the current selected file. (Normally used to reload the same image after adjusting the grid controls).
- *Select Track* -- Selects the initial image in the previous track (◀) or the next track (▶) as the selected file and loads that image.
- *Load File* -- Selects the previous image (◀) or the next image (▶) for the current track as the next selected file and loads that image.

The *Grid Lines* control box allows the user to adjust the appearance of the grid lines shown in the viewed image as follows:

- *Show Grid Lines* checkbox shows or hides the grid lines.
- *Color* buttons choose the color for lines (with selected color indicated with ▲)
- *Spacing* selection boxes choose the horizontal/vertical spacing of lines in meters.

Note that any adjustments to the Grid Line controls will not appear until clicking on one of the “load” buttons described above.

Viewing Window

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The *Viewing Window* is a separate window which displays the video image from the current selected file (i.e., file appearing in the *Selected File* drop down list box). An image is displayed automatically when a *get files* operation is performed, when one of the five “load” buttons is depressed, or when the user selects a file directly using the drop down list box. This window may be repositioned or resized as desired. To resize the window, the user uses the mouse to pull the side or bottom edge of the window in the desired direction. The resizing operation will automatically adjust the other dimension (bottom or side) to maintain the original aspect ratio of the image.

Operation

The *DMT Image Viewer* program begins operation by loading an initial set of image files² with a *get files* operation. At any time after loading the initial set of files, the user may discard the set and load a different set of files with another *getfiles* operation.

Clicking on the *Working Directory* box launches a directory selector dialog, which the user uses to navigate to and select a directory containing image files. Figure 3 shows an example of this dialog where the day directory³ **7-23-2013** has been selected by highlighting it.

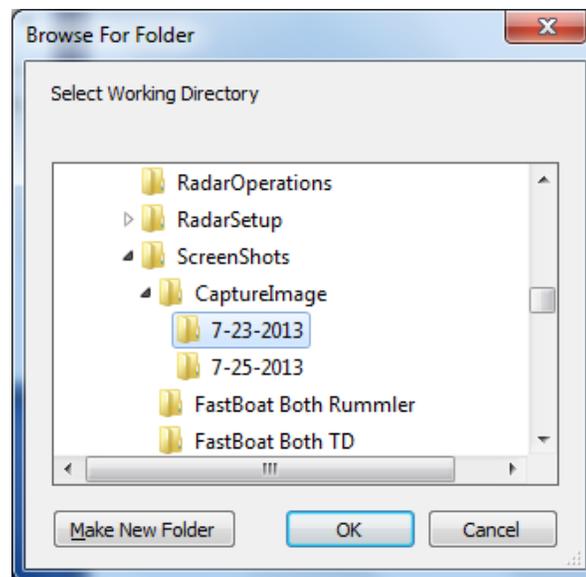


Figure 3 Windows folder selector dialog example.

² Valid image files are JPEG files created with the *Capture Image* function on the DMTRemClient program. These files are identified from their filenames which are selected using the *regular expression* filter “CT* . jpg”

³ *Capture Image* files are normally saved into individual “day” directories -- named with the date string for the day images were created -- which are located under the parent directory C:\DMTLLC\ScreenShots\CaptureImage.

Complete the directory selection sequence by clicking on the dialog's OK button. The *DMT Image Viewer* program will then perform the following actions:

- Load all valid *Capture Image* files into the *Selected File* drop down list box control, arranged in chronological order with the earliest file appearing in the window.
- Further organize image files by track number -- grouping all files from the same track together into internal lists, and making them selectable as a track group.
- Select the earliest file as the "selected" file by displaying this file in the *Selected File* drop down list box window.
- Fill in the track number and the time stamp of the selected file in the boxes under the *Current Image* heading.
- Update the load button controls, enabling or disabling the arrow buttons as appropriate, and adding the track index and file index labels below the respective load buttons.

After loading the working directory selected above, the *DMT Image Viewer* windows will appear as shown in Figure 4.

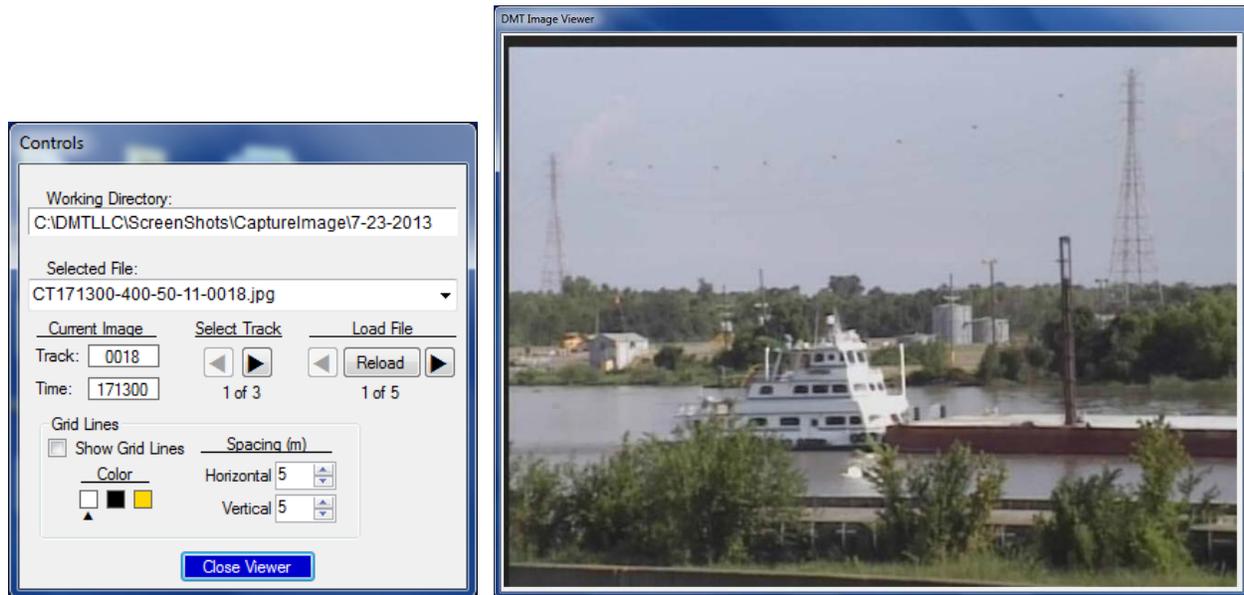


Figure 4 DMT Image Viewer controls after loading new set of files.

Note that the image for the file showing in the Selected File box is now displayed in the *Viewing Window*. This file is the first of five screenshots for the first of three tracks (0018) as determined from organizing the set of files into track groups. The "previous" arrow load

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buttons (◀) are both disabled since there are no previous tracks to select or previous files for the current track.

Clicking on the “next” track arrow (▶) will select the first file for the next track , update the *Selected File* box, and display the new image in the *Viewing Window*. Similarly, clicking on the “next” file arrow will select the next file for the current target and update controls and displays for that file. Clicking on one of the “previous” arrows performs similar actions for selecting the previous track or the previous file for the current track. Clicking on the *Reload* button reloads the current selected file.

Image files may be selected directly by opening the drop down list box and selecting the desired file. Choosing a file in this manner will automatically update the *Current Image*, *Select Track*, and *Load file* controls.

To display grid lines for any image, choose the desired color and spacing for the lines and check the *Show Grid Lines* checkbox. The grid lines will appear on the next image loaded with one of the arrow buttons or the *Reload* button. Figure 5 shows the image displayed with white grid lines spaced five meters apart.

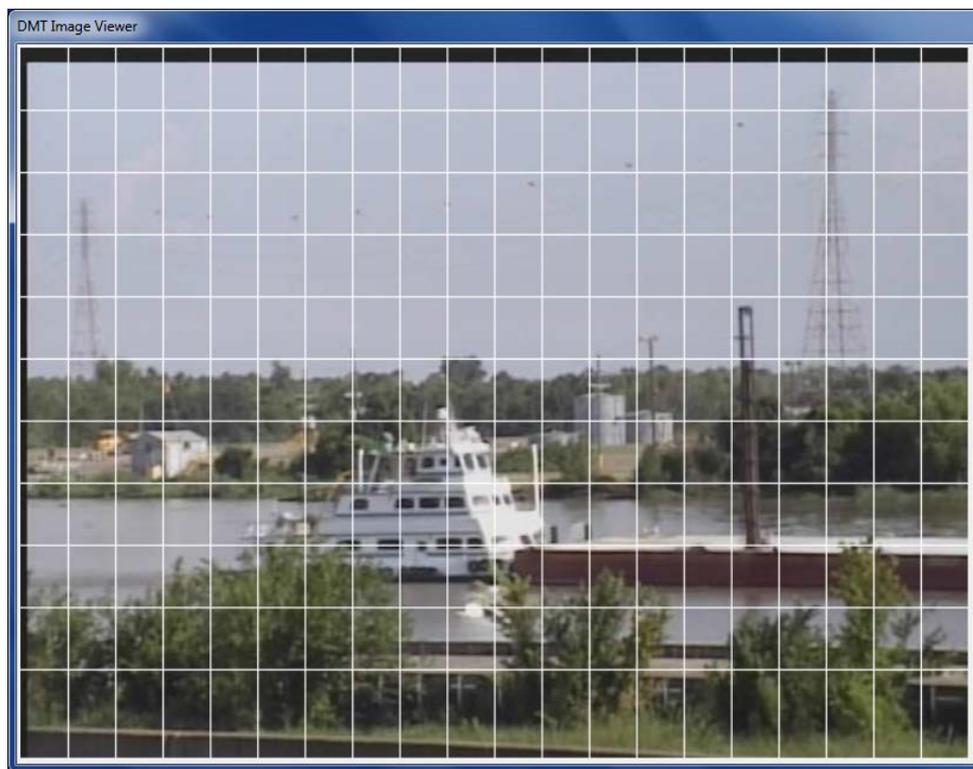


Figure 5 DMT Viewing Window with white 5 meter spaced grid lines.

To exit the *DMT Image Viewer* program, click on the *Close Viewer* button at the bottom of the *Controls* form.