

Manipulator Tutorial Manual



Team ISE Image Selective Encryption

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Introduction:

The ISE JPEG Manipulator is an application designed to allow the user to examine, manipulate and create images from the data of pre-existing JPEG images. This document is a short tutorial to provide users with step-by-step instruction for some the Manipulator's more common operations. This document uses the "splash.jpg" image included with the Manipulator in the main program directory. You can use this image to follow along with the tutorial. Also, for a complete listing of all of the specific functionality of the ISE JPEG Manipulator, be sure to refer to the Manipulator User Manual.

1. Installing the ISE JPEG Manipulator:

The Manipulator comes prepackaged with a full installation script that performs all the necessary functions to properly install the Manipulator with a minimal degree of user effort. If a previous version of the Manipulator was installed prior to this installation, be sure to completely remove the previous version before proceeding with this installation, otherwise this installation will not complete properly. Uninstalling the Manipulator is covered under section 1.4 of the user manual or section 2 of this document.

The Manipulator has several system requirements needed as a minimum to properly install and run the Manipulator. These requirements are as follows:

1. Microsoft Windows NT/2000/XP Operating System.
2. Microsoft .NET framework version 1.1.
3. A monitor, mouse and keyboard for the host computer.
4. 100 MB of free Hard Disk space.
5. 300 MHz or faster CPU.
6. 64 MB of RAM.

If your system meets all minimum system requirements and there is no previous version of the Manipulator installed, you are now ready to begin the installation process. To install the ISE JPEG Manipulator, complete the following steps:

1. If the ISE JPEG Manipulator has not been previously downloaded, be sure to download the installation package to the computer where you wish to install the program. Be sure to save the download some place that can be easily accessed, like your "Desktop." You can download the JPEG Manipulator from:

<http://128.138.75.184/code/ISEManipulator107.zip>

2. Once the file has completed downloading, double-click on the file to begin the installation process.
3. Follow through on-screen instructions to successfully complete the installation. Team ISE recommends using all of the default settings for installation.

2. Uninstalling the ISE JPEG Manipulator:

The Manipulator installation package also includes an uninstall script to remove all of the application files, if the need arises. The uninstaller will remove all data copied and created during the installation process. Please note that images created by the user or any original JPEG pictures used will not be removed, unless they are saved within the ISE program folder (the folder created in the programs files during installation). To perform the uninstall process, complete the following steps:

1. Go to “Start” >> “Settings” >> “Control Panel”
2. Once you click on the “Control Panel,” you should see the contents of the Control Panel folder. Double-click on the “Add/Remove Programs” icon.
3. Within the Add/Remove Programs utility, find the “JPEG Manipulator” entry and click on it to highlight it in blue and then click on the “Remove” button next to it.
4. Follow through the on-screen instructions to successfully complete removal of the application.

Please note that you must uninstall any previous versions of the ISE JPEG Manipulator before installing any updated versions.

3. Running the JPEG Manipulator Application:

Once the Manipulator has successfully completed installation, you should be able to instantiate the application without further delay. If the default installation was chosen, then the program can be invoked by going to:

Start Button >> Programs >> ISE >> JPEG >> JPEG Manipulator

Otherwise, if a different location for the program menu has been chosen, then go to the folder where the program was installed and then go to:

ISE >> JPEG >> JPEG Manipulator

Once the JPEG Manipulator icon is clicked, you will start the JPEG Manipulator application and can begin working with JPEG images. Although the application is designed to work specifically with the Baseline compression standard for JPEG images, the application should work with other JPEG formats as well.

Once the application has been opened, you should be at the main application window. Figure 1 is a picture of the main application window:

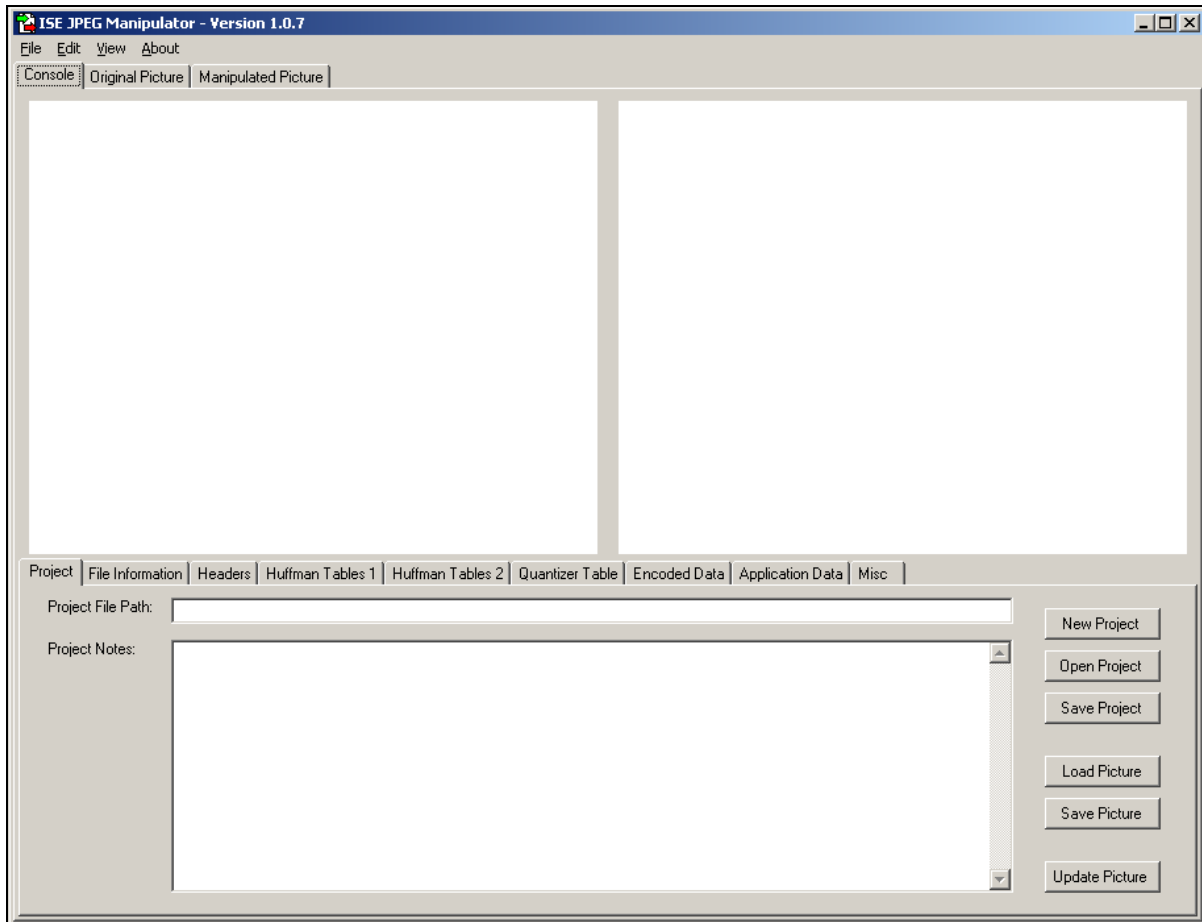


Figure 1: The Manipulator Main Window.

From this window you can perform almost any function within the application and this is the main window you will do work from. When the application is invoked, the “Console” tab (on the top-right of the window) will be the default tab selected and is where most of the work in the application is done. The “Console” tab has a number of sub-tabs that contain all of the data for the current project and/or images loaded within the application. Also, it is possible to view both the original and the manipulated images in a larger window by clicking on the “Original Picture” or “Manipulated Picture” tabs (respectively), located to the right of the “Console” tab. At the top of the window is a main menu to allow the user to perform common operations during use of the application.

Each of the sub-tabs found on the “Console” tab are related to the data found in a JPEG image or a Project file. The following is a brief description of each sub-tab’s purpose:

1. “Project” sub-tab: Contains project file and project note data. Also contains buttons for performing common tasks within the manipulator.
2. “File Information” sub-tab: Contains original and manipulated picture file names and paths and any file comment data.
3. “Headers” sub-tab: Contains the data found in the SOF0 frame, if the image loaded is a Baseline standard compression.

4. “Huffman Tables 1 & 2” sub-tabs: Contains the compression data found in any compression frame markers ffc1 to ffcf in the JPEG image.
5. “Quantizer Table” sub-tab: Contains the data found in the DQT frames of the JPEG image.
6. “Encoded Data” sub-tab: Contains the SOS frame data and the first 20,000 bytes of the encoded data stream.
7. “Application Data” sub-tab: Contains the data for all of the APP frames (if included with the JPEG image).
8. “Misc” sub-tab: Contains any other frame data not included on any other tab.

The following sections outline the use of only some of the functionality here. Please refer to the Manipulator User Manual for a complete listing of this functionality.

4. Loading a JPEG image:

The best way to begin is to Load a JPEG image for editing. There are two ways to do this within the application: on the main menu or on the “Project” sub-tab located on the “Console” tab. The following are detailed, step-by-step instructions for loading images:

1. Click on the “File” menu option. This will cause the menu to become visible at the top of the window (shown in figure 2).
2. Then click on the “Load Picture” menu option (shown in figure 2). This will cause the “Open JPEG File” dialog box to appear (shown in figure 3).

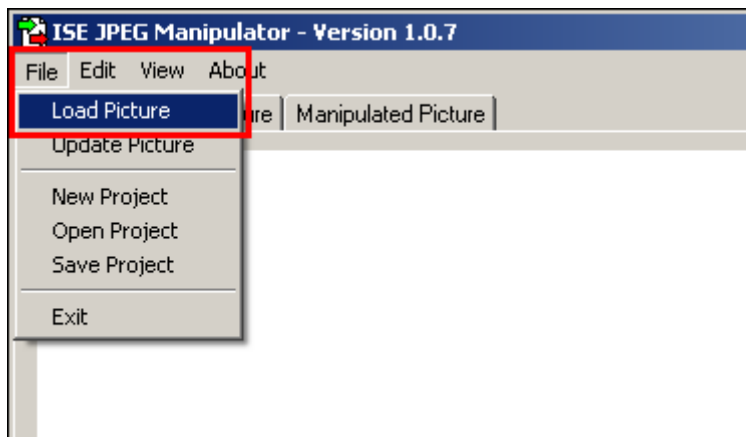


Figure 2: The “File” Menu (Load Picture Highlighted)

3. Then select an image by browsing to it and clicking on the desired image (shown in figure 3). Only images that have a JPEG extension should be visible within this window.
4. Once you have selected the desired image, click on the “Open” button located on the bottom left of the “Open JPEG File” dialog box (shown in figure 3). This will cause the image to be loaded into the Manipulator’s interface and both the picture and its data should be visible.

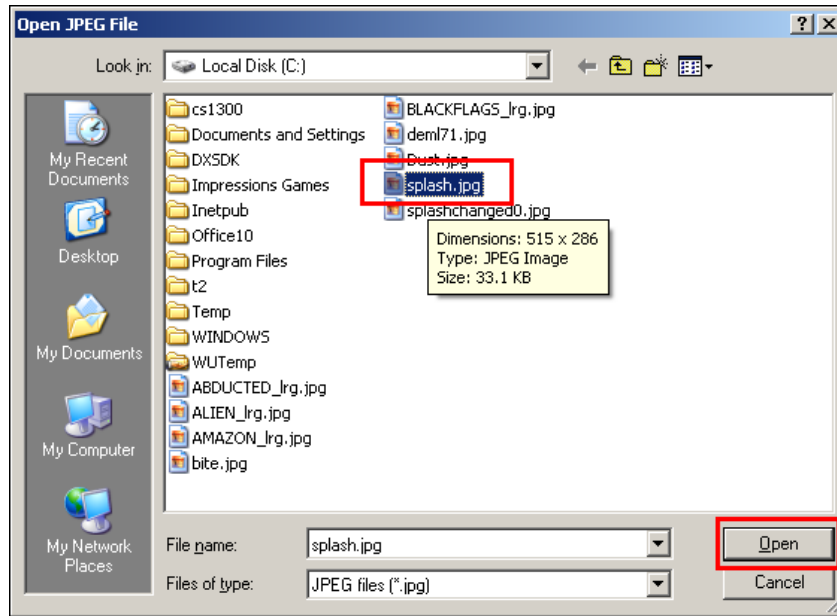


Figure 3: The “Open JPEG File” Dialog Box

Note: The image loaded here “splash.jpg” file included in the ISE folder (even though this picture shows the image in a different folder). Use this image to follow along with this tutorial.

5. Manipulating JPEG Image Data:

The most common function of the Manipulator (and the purpose for which it was designed) is to allow a user to manipulate data within a JPEG image and create a new image based upon the new data. Since there are many different pieces of a JPEG image, there are a large number of ways to make changes. Keep in mind that changing an image won’t necessarily cause it to look different, only that the new image will contain the specified data. The following are detailed, step-by-step instructions for creating these ISE project files:

1. Once a JPEG image has been loaded in the Manipulator, click on the “Huffman Table 1” sub-tab to view the compression table data. This will cause the “Huffman Table 1” tab to be displayed, with any data that is included in the image (shown in figure 4). This data is represented by each individual byte’s hexadecimal value. For example, if the table data says “0f,” this means that particular byte has a value of 15 in base ten.

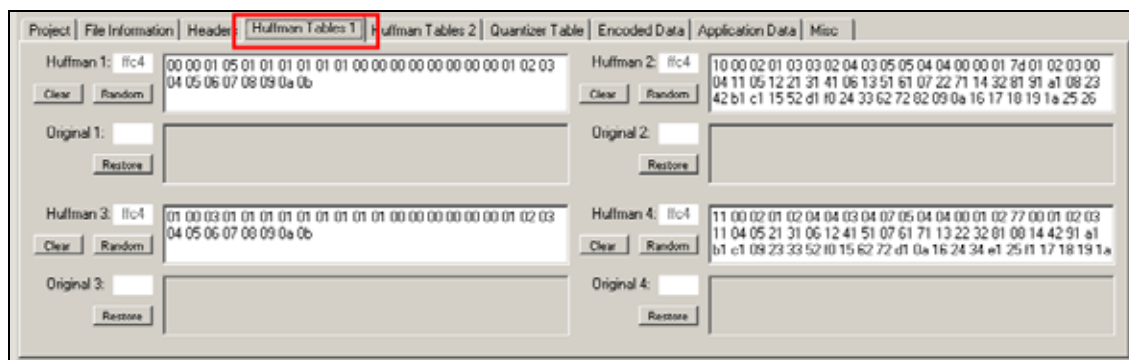


Figure 4: The “Huffman Tables 1” Sub-Tab

- Then click on any of the text boxes where the individual tables data is displayed. When any of these text boxes are selected, the original data in the table will be stored just below in the grey text box below it. This is to ensure the original data in the image can always be restored in the future and can be done at any time by clicking on the corresponding “Restore” button. Change a few values within the table to begin the process of creating a manipulated image (shown in figure 5).

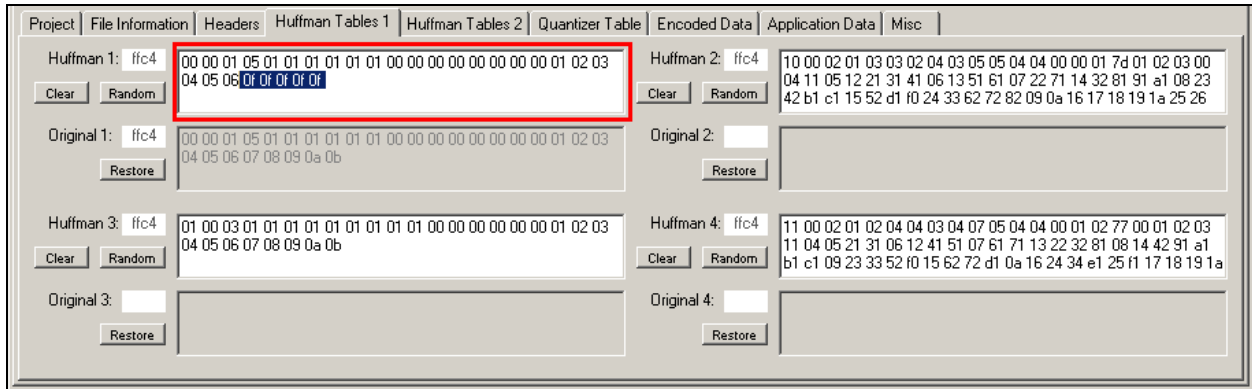


Figure 5: Manipulated Compression Table Data

- Now that we’ve made changes to the original image data, we can actually create a new image. Click on the “File” menu option. This will cause the menu to become visible at the top of the window (shown in figure 6).
- Then click on the “Update Picture” menu option (shown in figure 6). This will cause a new file JPEG file to be generated by the manipulator, based on any of the updated picture data. Once the new image has been generated, the Manipulator will attempt to load it into the “Manipulated Picture” boxes. Depending on the changes made to the image, it may or may not be viewable, but if not, then a default message image will be loaded instead. If the image is viewable, it may be the same or it may be distorted. The picture in figure 7 represents an example of how an image may look due to distortion caused by altering the image data.

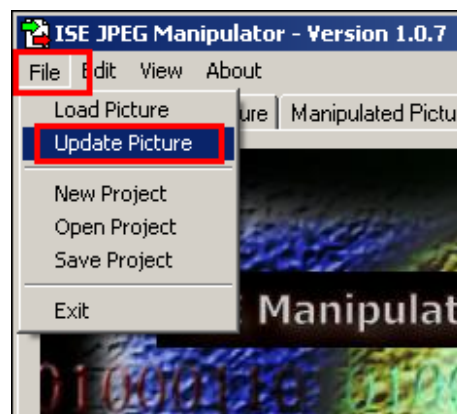


Figure 6: The “File” Menu (Update Picture Highlighted)

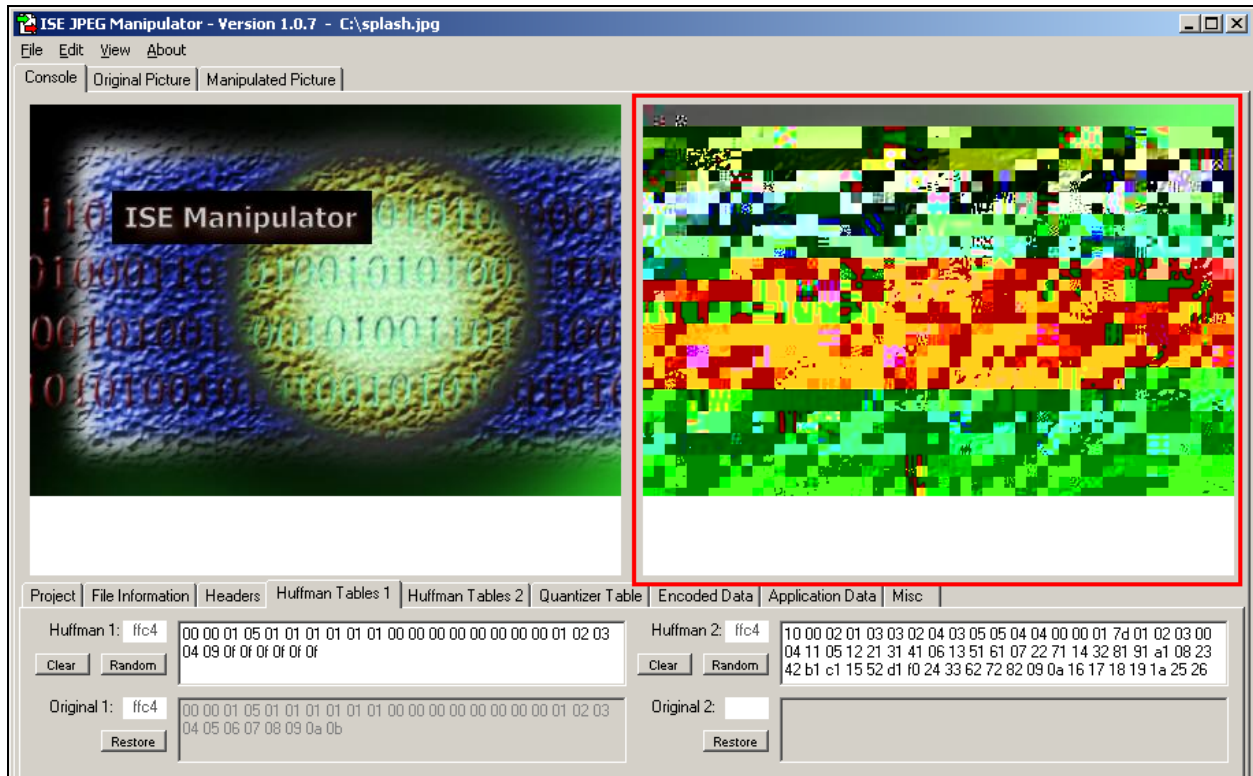


Figure 7: Example of an Manipulated Image

6. Creating an SEP Project File:

Another common function of the Manipulator is to allow the user to save information about a loaded image and any changes made to it in a project file. This project can then be loaded and updated at any time in the future, without losing data on an image that is currently a work in progress. There are two ways to do this within the application: on the main menu or on the “Project” sub-tab located on the “Console” tab. The following are detailed, step-by-step instructions for creating these ISE project files:

1. Click on the “File” menu option. This will cause the menu to become visible at the top of the window (shown in figure 8).
2. Then click on the “Save Project” menu option (shown in figure 8). This will cause the “Save SEP File” dialog box to appear (shown in figure 9).
3. Then create a new project by typing a name in the “File Name” text box or browse to an existing SEP file and click on it (shown in figure 9). Only images that have an SEP extension should be visible within this window.

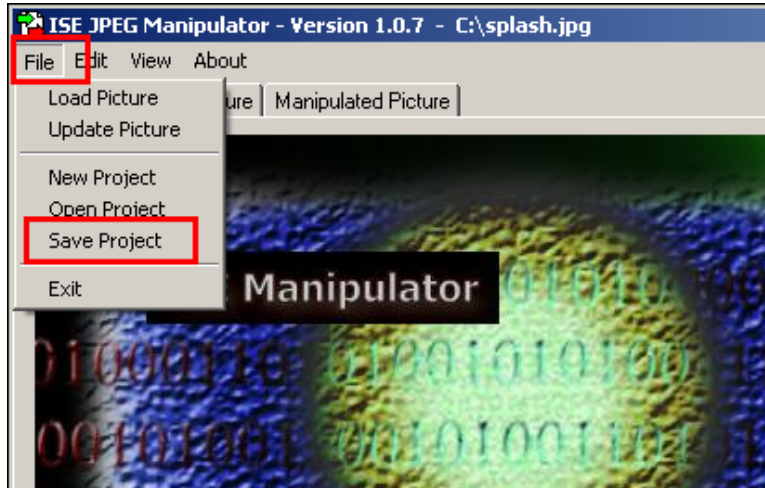


Figure 8: The “File” Menu (Save Project Highlighted)

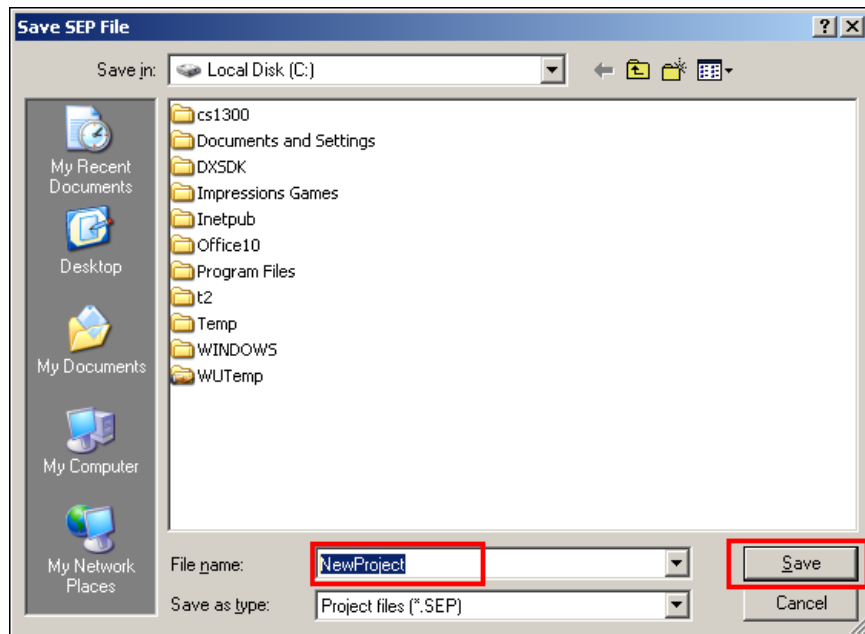


Figure 9: The “Save SEP File” Dialog Box

4. Once you have chosen the project name, click on the “Save” button located on the bottom left of the “Save SEP File” dialog box (shown in figure 9). This will cause all of the current data loaded in the Manipulator to be saved under the existing file name and path. Keep in mind that if you choose an existing file, all of the previous project file data will be overwritten with the new project information.

Closing Remarks:

As you can see, the JPEG Manipulator is designed to be a straightforward, Windows-style application, to make the learning curve extremely easy. This tutorial was designed to give a basic overview of the Manipulator, but for more specific information about any of the functions more in-depth, please see the Manipulator User Manual. Also, for more information about the JPEG file format, please see the reference section of the ISE Manipulator Manual for documents pertain to this topic.