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instrumentation and software for research

MED SCREEN IMAGE DOWNLOADER

ENV-131M-DL IMAGE DOWNLOADER and SOF-400 APPLICATION

USER'S MANUAL

DOC-249
Rev. 1.1

Med Associates, Inc.
P.O. Box 319
St. Albans, Vermont 05478

Phone: 802.527.2343
Fax: 802.527.5095
www.med-associates.com

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NOTES

DIAGRAMS

CHAPTER 1 - INTRODUCTION

The SOF-400 Med Screen Image Loader software package creates and edits bitmap images, organizes image albums, and transfers image albums to the ENV-131M-DL Image Downloader.

The ENV-131M-DL Image Downloader can then be used to load (transfer) the image album to one or more of the Med Associates' ENV-131M Response Key with LCD Stimulus Display or ENV-132M LCD Stimulus Display products. This is a process often referred to as "cloning", whereby all of the ENV-131M and/or ENV-132M units that the ENV-131M-DL is temporarily attached to will conveniently end up with the same image album stored in their internal image "album" memory.

More information on how to clone an image album can be found in Chapter 7 – Transferring Images to an ENV-131M or ENV-132M Device, page 11.

The ENV-131M and ENV-132M display bitmap images that are 240 pixels wide by 320 pixels high with 16 bits of color information per pixel. The ENV-131M replaces the obsolete ENV-130M Response Key, which displayed 7 white shape images, plus a blank image, on 5 colored backgrounds, in addition to a black background, using a rear projector and incandescent lamps.

The SOF-400 computer software application ships with a sample album of 64 images, named Sample.alb. The first 48 sample images match the images available on the obsolete ENV-130M Response Key. The last 16 images contain a white number "48" through "63" on a blue background.

The Med Screen Image Loader application uses the Microsoft® Paint program to edit bitmap images of the appropriate dimensions for use with any of the ENV-131M or ENV-132M Stimulus Display products. The edited images are stored in a collection of images called an album. The Med Screen Image Loader can store up to 64 images in an album file. Image album files have a .alb file extension.

Specifications for the ENV-131M-DL Image Downloader

Power Requirement:

6 Volts DC @ 500 mA (maximum) – from the POW-6VDC-500MA Power Supply included

For alternate mains voltages and frequencies (other than 115 VAC, 60 Hz) an appropriate Power Supply will be provided that has the same 6V DC output and DC plug configuration.

NOTE 1: For ease of use, the ENV-131M-DL will also draw operating power from the ENV-131M or ENV-132M product that it is connected to, via the PROGRAM cable (see Figure 2.3, page 2) while the image album is being transferred into those products (as they are being cloned) in the field.

Dimensions:

Height: 2.25" / 5.7 cm
Width: 6.00" / 15.2 cm
Depth: 3.13" / 8.0 cm

Weight:

0.45 lbs / 0.2 kg

CHAPTER 2 - HARDWARE

The SOF-400 Med Screen Image Loader software application communicates via USB 2.0 with an ENV-131M-DL Image Downloader device, shown in Figure 2.1 below.

The ENV-131M-DL is supplied with a power supply, as shown in Figure 2.1 below, a Type A Male to Type B Male USB cable as shown in Figure 2.2 below and a PROGRAM cable as shown in Figure 2.3 below.

Figure 2.1 – ENV-131M-DL Image Downloader w/ POW-6VDC-500MA Power Supply

Figure 2.2 – CAB-USB-AM-BM-6 USB Type A-to Type B-Male Cable, 6'

Figure 2.3 – CAB-CAT5-S/T-BLU-7FT Cat5 Cable, Straight-Thru, Blue, 7'

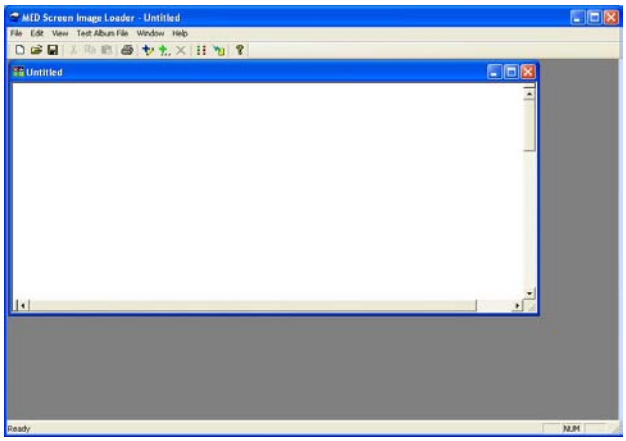
CHAPTER 3 - SOFTWARE

The MED Screen Image Loader software (SOF-400) is used to manage image albums that may be displayed on our ENV-131M or ENV-132M products with LCD-equipped stimulus displays. The software utilizes Microsoft® Paint functionality to create and edit custom images. The Screen Image Loader software is also used to download image albums to the Med Associates' Image Downloader (ENV-131M-DL).

Software Overview

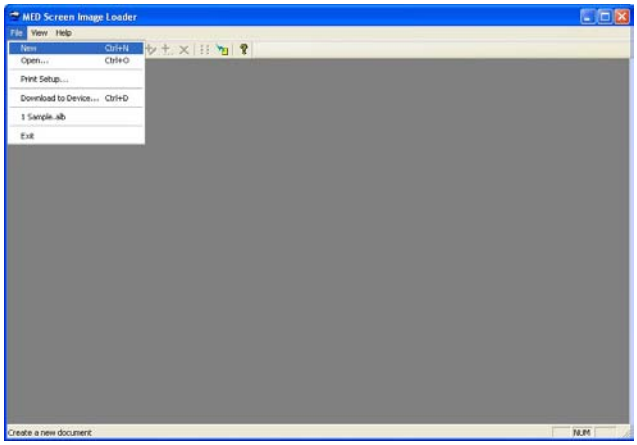
Open the MED Screen Image Loader software and the main screen shown in Figure 3.1 below will appear.

Figure 3.1 – MED Screen Image Loader main screen



The software uses dynamic menus and the options will change if an album is open. Figure 3.2 below shows the **File** menu when no albums are open. Note that when an album is not open, the menu options change to File, View and Help only.

Figure 3.2 – MED Screen Image Loader File menu with no albums open



Menu Options with No Open Album

File

New – Launches a new album window.
Open – Displays a window for browsing existing albums.
Print Setup – Sets the default printer and printing options.
Download to Device – Opens the window for transferring a selected album to the Image Downloader.
1 Sample.alb – Albums created with the MED Screen Image Loader software are designated with the **.alb** filename extension; the four most recently used albums are displayed in the **File** menu.
Exit – Closes the MED Screen Image Loader software.

View

Toolbar – Provides an option to display the icon toolbar below the menus.
Status Bar – Provides an option to display the information status bar at the bottom of the software window, if the status bar view is enabled, an explanation of each icon in the toolbar will be displayed if the mouse is hovered over it.

Help

Manual… – Displays the MED Screen Image Loader User's Manual.
About MED Screen Image Loader… – Displays the version number and copyright date of the software.

Additional Menu Options with Album Open

File

Close – Closes an open album.
Save – Saves the album with the same title and location.
Save as – Saves the album with options to change the name and location.
Properties – Displays the open album's size, location, and other attributes.
Print – Prints the album images.
Print Preview – Displays a preview of the printed album.

Edit

Cut – Copies and Deletes a selected image.
Copy – Copies a selected image.
Paste – Pastes cut or copied images.
Delete – Deletes a selected Image
Delete All – Deletes all images in the album.
Insert New Bitmap – Opens a new canvas in Microsoft Paint.
Insert Existing Bitmap – Opens the Windows file viewer to choose an existing bitmap file to add to the album.

Test Album File

Test – Opens album addressing test window, See Chapter 5.

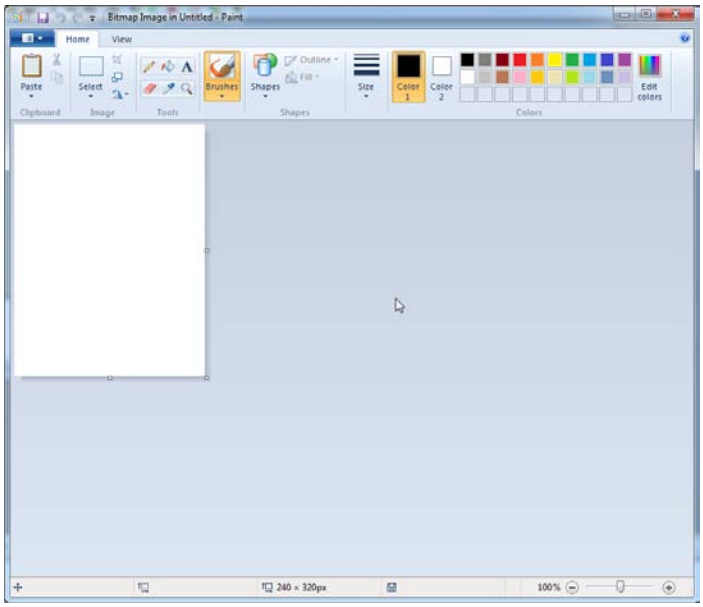
Window

New Window – Launches a new album window.
Cascade – Arranges open windows in a cascading manner.
Tile – Arranges open widows to fill main program window equally in a tiled fashion.
Arrange Icons – Arranges minimized windows in their icon state.
1Untitled – Shows all open windows and allows you to select the active window and bring it forward. Active window is shown with a checkmark.

CHAPTER 4 - CREATING and EDITING IMAGE ALBUMS

Starting the software will default to having a new untitled album open, see Figure 3.1, page 3. Clicking on **Edit | Insert New Bitmap** or the corresponding icon in the Toolbar will open Microsoft Paint as shown below.

Figure 4.1 – Microsoft® Paint



Images then can be drawn or pasted into the open canvas. Note: The canvas will automatically resize to fit a pasted image. Figure 4.2 below shows a larger image being pasted into the canvas. You can then move the pasted image by clicking and dragging the image to the desired placement. Closing the Paint program will automatically resize the image to 240 x 320 pixels and add the image to your album, see Figure 4.3, page 6.

Figure 4.2 – Automatically resized Paint canvas

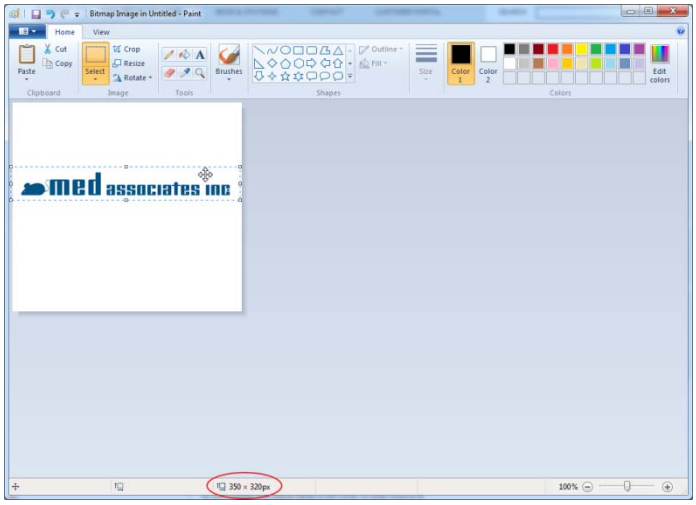
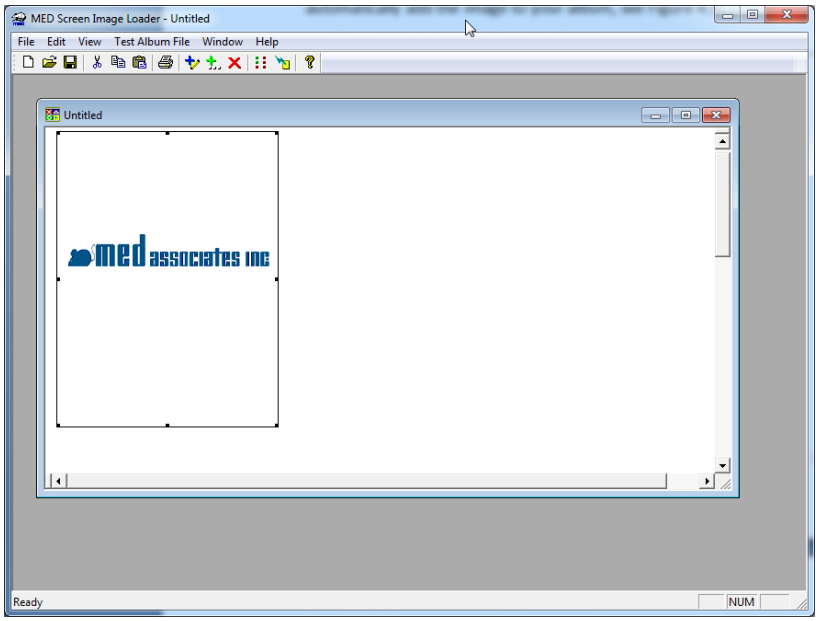
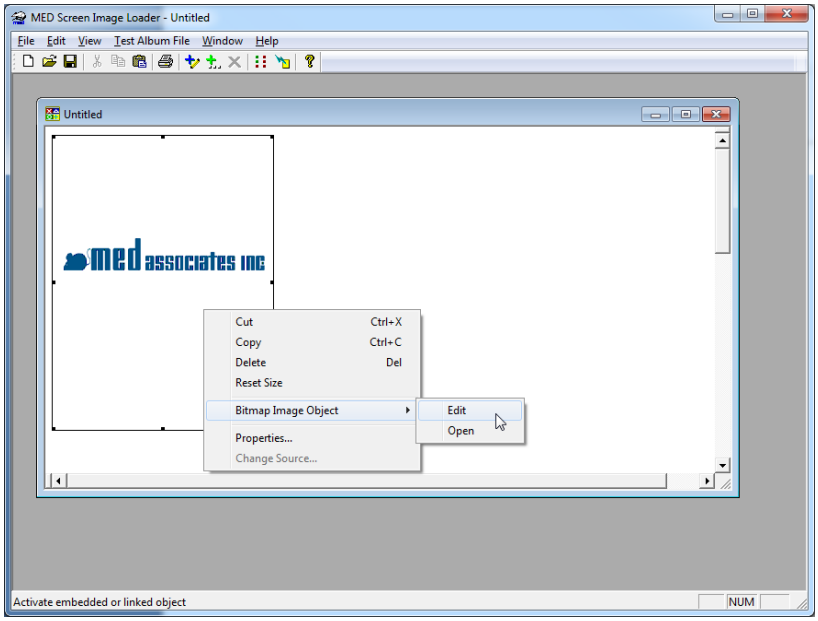


Figure 4.3 – Image automatically resized to 240 x 320 pixels



Right-clicking on an image will allow you to Cut, Copy, or Delete and image from your album. Clicking Bitmap Image Object and then Edit or Open, will re-open the image in Paint for further editing.

Figure 4.4 – Right-Clicking on Album Image



CHAPTER 5 - TESTING the IMAGE ALBUM ADDRESSING

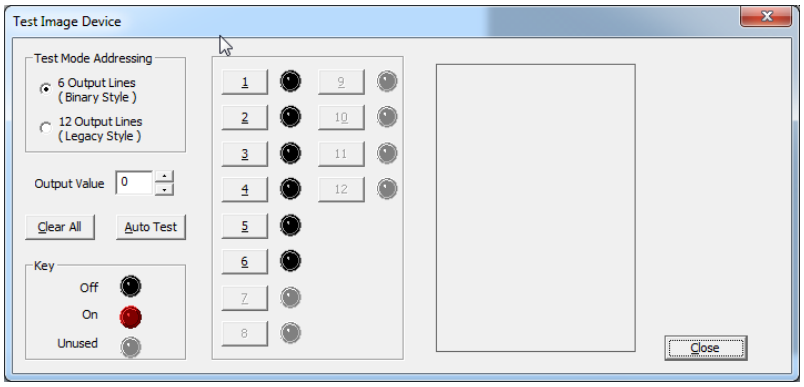
There are two protocols for controlling the ENV-131M or ENV-132M products: 6-line and 12-line control. 6 and 12 refer to the number of MED-PC® output control lines attached to the ENV-131M or ENV-132M product devices. 12-line mode is a legacy format to keep existing MED-PC® procedures viable, and allows for easier mixing of obsolete ENV-130M Response Keys (incandescent bulb style) with newer ENV-131M or ENV-132M product devices (TFT LCD style).

As an example, if the test chambers have both old and new Response Keys (ENV-130M and ENV-131M), use the 12-line control style for ease of use. If only ENV-131M LCD Response Keys or ENV-132M LCD Stimulus Displays are being used, then either 6-line or 12-line control protocols may be used.

The benefit of the 6-line protocol is more LCD-equipped stimulus displays may be controlled with the same amount of available output control lines.

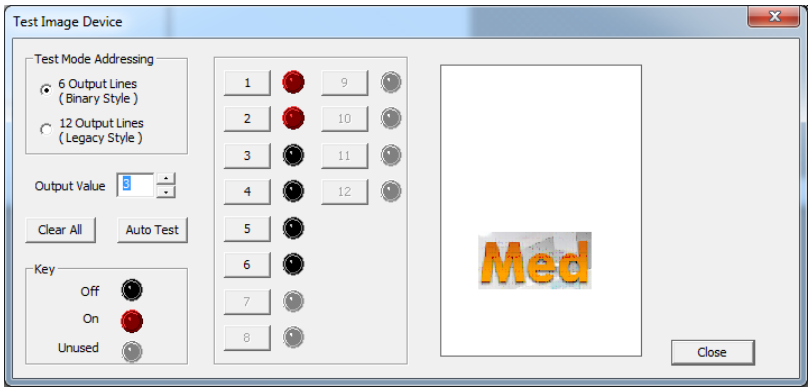
To test an open album click on **Test Album File | Test** or the **Test Album Addressing** Toolbar icon and the following window (Figure 5.1 below) will open.

Figure 5.1 – Test Image Device Window



Choose **6 Output Lines** or **12 Output Lines** under **Test Mode Addressing**. Click **Auto Test** or manually click the up and down arrows next to **Output Value** to view the value of each image and the corresponding outputs needed to be turned on, indicated by the red output lights for that value, see Figure 5.2 below.

Figure 5.2 – Test Image Device



CHAPTER 6 - DOWNLOADING IMAGE ALBUMS to the ENV-131M-DL

Connecting the ENV-131M-DL to an available USB port on the computer

The following steps will connect the ENV-131M-DL to the computer and place the ENV-131M-DL into Download Firmware Upgrade (DFU) mode so that an image album may be transferred from the SOF-400 computer software application to the ENV-131M-DL Image Downloader device:

Step 1) Insert the large end of the USB cable into an available USB port on the computer,

Step 2) Insert the energized power supply DC plug into the 6V DC power jack,

Step 3) Hold down the START button – note that the LED "1" (orange) should be lit,

Step 4) Press and release the RESET button – note that LED # 1 should go out while pressed and back on when released,

Step 5) Release the START button – note that the LED "1" (orange) should remain lit,

Step 6) Insert the small end of the USB cable into the USB connector on the Image Downloader.

NOTE 2: If this is the first time that the image downloader has been connected to the computer, the Windows Device Manager may indicate that it is installing the required device driver. When the driver installation is complete the status update will confirm that the STM Device in DFU Mode is installed.

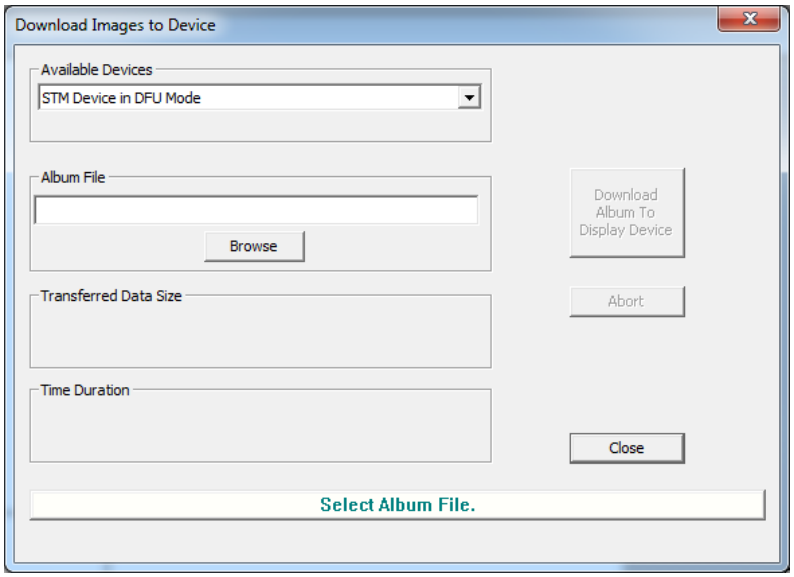
At this point the Image Downloader device should be recognized by the Windows Device Manager as an installed and functional Plug-and-Play device identified as "STM Device in DFU Mode" device.

If properly recognized, the LED # "1" (orange) on the ENV-131M-DL should still be lit up.

If the ENV-131M-DL device is not properly recognized as demonstrated by the illuminated LED # 1 noted above and / or if the "STM Device in DFU Mode" device is missing from Windows Device Manager, Universal Serial Bus Controllers section, or the device listed has a warning (yellow triangle) icon, please disconnect both the USB and DC power cables from the device and retrace the steps listed above from Step 2 onward.

Once the ENV-131M-DL Image Downloader is properly connected to the computer, click **File | Download to Device** or the **Download album to device** icon in the Toolbar and the Download Images to Device screen will appear as shown in Figure 6.1, page 9.

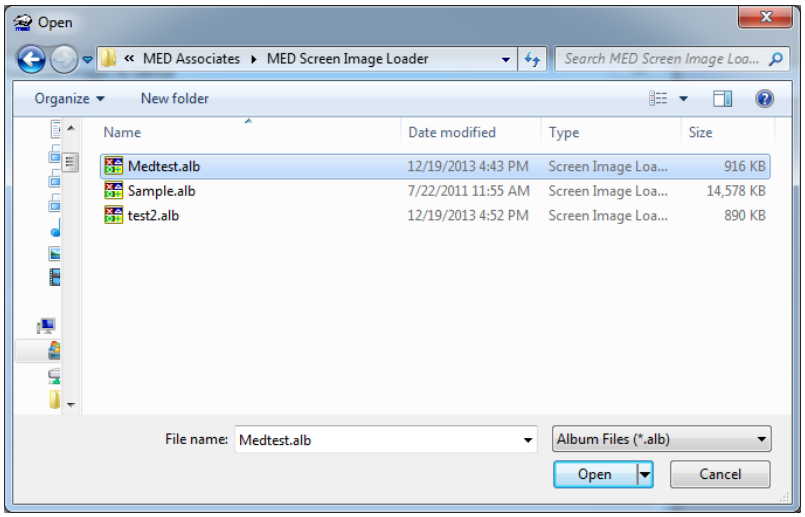
Figure 6.1 – Download Images to Device Window



Available Devices should default to **STM Device in DFU Mode** as shown in Figure 6.1 above. If that device is not shown, then refer to the Connecting the ENV-131M-DL to an available USB port on the computer section of Chapter 6, page 8, for guidance on establishing the proper hardware connection.

Click Browse to open the file viewer and select an Album file (.alb) from C:\Program Files\MED Associates\MED Screen Image Loader as shown in Figure 6.2 below.

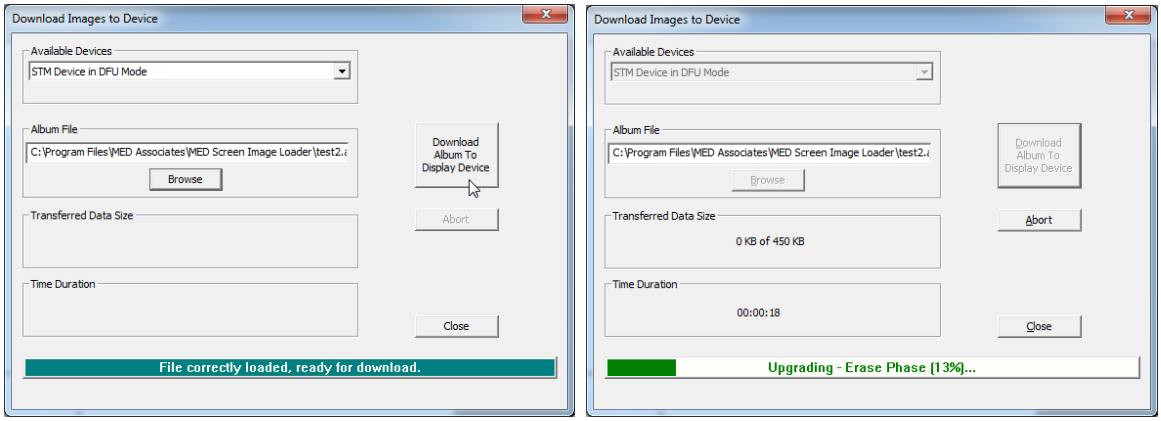
Figure 6.2 – Windows File Viewer



After highlighting the desired album, in the list of available albums, click Open to confirm the selection.

Once an album is chosen the Download Images to Device window will state **File correctly loaded, ready for download** and the **Download Album to Display Device** button will become available as shown in Figure 6.3 below. Click the **Download Album to Display Device** button to start the download process.

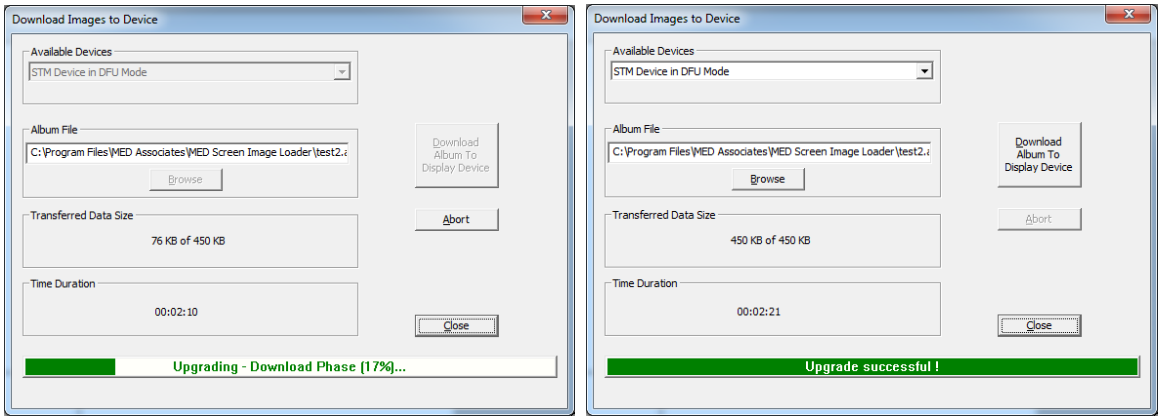
Figure 6.3 – Download Album to Display Device Phase 1



The process is a 2 phase process that begins with the Upgrading – Erase Phase, as shown in Figure 6.3 above, which removes the current album from the ENV-131M-DL.

The second phase is the Upgrading – Download Phase, as shown in Figure 6.4 below, which downloads the new album to the ENV-131M-DL.

Figure 6.4 - Download Album to Display Device Phase 2



The status bar at the bottom of the window will indicate the progress of each phase as well as successful completion of the process. When the status bar shows **Upgrade successful!**, you can now close the Download Image to Device window and the MED Screen Image Loader software. The ENV-131M-DL can be disconnected from the USB cable and the computer. It can now be used to transfer the image album it contains in its memory to any ENV-131M or ENV-132M stimulus display product in the field.

Refer to Chapter 7 - Transferring Images to an ENV-131M or ENV-132M on page 11 for details.

CHAPTER 7 - TRANSFERRING IMAGES to an ENV-131M or ENV-132M DEVICE

Step 1) Attach the SG-131 Output Control Cable to the ENV-131M or ENV-132M connector labeled TO MED OUTPUT,

Step 2) Connect the ENV-131M-DL Image Downloader RJ45 connector, labeled PROGRAM ENV-131M, to the ENV-131M or ENV-132M device RJ45 connector, labeled PROGRAM, with the CAB-CAT5-S/T-BLU-7FT Cat5 Cable,

Step 3) Apply power to the ENV-131M or ENV-132M device via the SG-131 Output Control Cable,

---

NOTE 3: It is not necessary to have an energized power supply (POW-6VDC-500MA or equivalent) connected to the 6V DC power jack on the ENV-131M-DL Image Downloader during this process.

Step 4) Put the Response Key into the "Download" Receiving mode by pressing the START button on the side of the ENV-131M or ENV-132M device. The ENV-131M or ENV-132M device's first LED ("1", orange) should now be lit,

Step 5) Put the Image Downloader into the "Download" sending mode by pressing the START button on the side of the Image Downloader. The Image Downloader's first LED ("1", orange) should light up,

Step 6) Image download will now proceed automatically without further intervention.

During the image transfer process, the Image Downloader and the ENV-131M or ENV-132M device will first engage in some brief synchronizing activity after which the second LED ("2", green) on both the ENV-131M or ENV-132M device and the Image Downloader will light up. The actual downloading starts when the third LED ("3", red) on the Image Downloader lights up. The ENV-131M or ENV-132M device remains on the second LED ("2", green). The transfer is complete when both LED's from each device turn OFF.

NOTE 4: Transfer time may take up to 10 minutes (with no progress status indication).

In the event that an internal error occurs, or the Program Cable is inadvertently disconnected, or a RESET button is pressed on either one of the devices during the downloading process, the downloading will stop with the fourth LED ("4", yellow) lit up on either device.

If either scenario happens, push the RESET button once on each device. Then pushing the START button on each device, starting with Step 4 above, will restart the image album transfer process.

After an image album is downloaded into an ENV-131M or ENV-132M device, the program cable can be disconnected from the PROGRAM jack on the device. See Note 5 below before proceeding.

It is recommended that the ENV-131M or ENV-132M device be checked to be sure all of the album images display as intended with the required control lines activated. See Note 5 below.

NOTE 5: To begin displaying the new image album **IT IS VERY IMPORTANT** to either press the RESET button (or cycle power) on the ENV-131M or ENV-132M device after an image download is completed. This will insure that the new image album is displayed rather than the old album.

CHAPTER 8 - SAMPLE MED-PC® PROCEDURES

There are four MedState Notation™ sample procedure files included with the SOF-400 application:

1. **Test_LCD_12_line.mpc**
2. **Test_LCD_6_line_3_images_OutputCtrl.mpc**
3. **Test_LCD_6_line_64_images_OutputCtrl.mpc**
4. **Test_LCD_6_line_64_images_WriteByte.mpc.**

"12" and "6" refer to the number of output control lines used. To use the "12 line" sample, the Mode Select line must be plugged into any available connection panel INPUT or OUTPUT.

During the SOF-400 computer application installation, the sample files are put in the MED-PC® MedState Notation™ directory (identified as "C:\MED-PC IV\MPC" by default).

NOTE 6: Before use with MED-PC®, the procedures must be translated and compiled into executable code using the Trans IV utility program. See the MED-PC® Programmer's Manual (DOC-003) for more information on the translate and compile process.

The sample procedures control Med outputs to display images on a MED-PC® controlled LCD-equipped stimulus display device. Due to the differences between the 12-line and 6-line control protocols, the sample MedState Notation™ procedures differ slightly.

1. 12 Control Lines Sample: Test_LCD_12_line.mpc

The 12 control lines sample program will display 48 images on the display device connected to the box running the Test_LCD_12_line.mpc protocol in MED-PC®.

The protocol has two nested loop. The inner loop cycles through the eight shapes, the outer loop cycles through the six background colors. The shapes and colors of the default album are listed in the sample.

As with all of the sample procedures shown, if an album other than the default album file is loaded to the display device, the results will differ. Characters following a "\" are ignored by the translator and are code comments.

```
\ 12 output control line test program for ENV-131M, ENV-132M
\ Displays 48 images using an inner loop to cycle through the
\ 8 foreground shapes and an outer loop to cycle through the
\ 6 background colors in the display's default album.

\   Shape (S) | OUTPUT          Color (C) | OUTPUT
\  -----------|--------       ------------|-------
\   None      |  None           Black     |  None
\   Triangle  |   1             Red       |   8
\   Circle    |   2             Green     |   9
\   Plus      |   3             Blue      |   10
\   Square    |   4             Yellow    |   11
\   X         |   5             Ecru      |   12
\   Vert Bar  |   6
\   Horz Bar  |   7
```

```
\ Variables used
\  S : Current Shape index = possible values: 0 to 7
\  C : Current Color index = possible values: 0 or 8 to 12

S.S.1,
S1,
  0.01": SET S = 0, C = 0 ---> S2       \ Start with No shape on black

S2,                                     \ wait .8 seconds,
  0.8": OFF 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16;   \ turn all OUTPUTS OFF
       ON S, C;                         \ turn ON the current Shape and Color
       SHOW 1,Shape index,S;            \ display the current Shape index
       SHOW 2,Color index,C ---> S3     \ display the current Color index

S3,                                     \ Shapes loop - 0 to 7
  0.01": IF S < 7 [@NotLast, @Last]     \ if there are more shapes,
         @NotLast: ADD S  ---> S2       \ go to the next one, else
         @Last: SET S = 0 ---> S4       \ show first shape, next color

S4,                                          \ Colors loop - 0,8,9,10,11,12
  0.01": IF C < 12 [@NotLast, @Last]         \ if there are more colors,
         @NotLast: IF C = 0 [@Zero, @NotZero] \ either C was 0 so it becomes
                   @Zero: SET C = 8 ---> S2  \ 8 or C is
                   @NotZero: ADD C  ---> S2  \ 8,9,10,11 to next value
         @Last: SET C = 0 ---> S2           \ start back at first color
```

2. 6 Control Lines Sample 1: Test_LCD_6_line_3_images_OutputCtrl.mpc

The first 6 control line test procedure displays three images in an image album. If the LCD display is loaded with the default image set, this sample will display a triangle on black background, a plus sign on red background, and a circle on green background in a repeating loop. These are images numbered 1, 11, and 18.

```
\ 6 output control line test program for ENV-131M, ENV-132M
\ Displays 3 images in a loop by turning on the OUTPUT lines
\ representing the binary value of three image indexes.
\ Sets the output lines to display images #1, 11, and 18

\ Decimal    Binary    Active Lines   Image (Default Album)
\============================================================
\    1       000001        1         Triangle on Black
\   11       001011      4,2,1       Plus sign on Red
\   18       010010       5,2        Circle on Green

S.S.1,
S1,
  0.01": ON 1; ---> S2         \Image 1: Triangle on Black, Active line: 1

S2,
  1": ON 2, 4 ---> S3          \Image 11: Plus on Red, Active lines: 1,2,4

S3,
  1": OFF 1, 4; ON 5; ---> S4  \Image 18: Circle on Green, Active lines: 2,5

S4,
  1": OFF 1,2,3,4,5,6; ---> S1 \Turn all lines OFF, start over
```

3. 6 Control Lines Sample 2: Test_LCD_6_line_64_images_OutputCtrl.mpc

The second 6 control line test procedure cycles through 64 images on a display device. The images are displayed by converting sequential image indexes to their binary equivalent, and then activating the appropriate OUTPUT lines.

```
\ 6 output control line test program for ENV-131M, ENV-132M
\ Displays 64 images in a loop by turning on the OUTPUT lines
\ representing the binary value of the image indexes 0 - 63.
\ The image indexes on the ENV-131M and ENV-132M are 0-based.

\ Variables used
\  I : Current Image identifier - possible values: 0 to 63
\  N : Bit counter              - possible values: 1, 2, 3, 4, 5, or 6
\  T : Temporary value during decimal to binary conversion of I
\  A : Line 1                   - possible values: 0 or 1
\  B : Line 2                   - possible values: 0 or 2
\  C : Line 3                   - possible values: 0 or 3
\  D : Line 4                   - possible values: 0 or 4
\  E : Line 5                   - possible values: 0 or 5
\  F : Line 6                   - possible values: 0 or 6

S.S.1,
S1,                          \ initialize variables
  0.01": SET I = 0 ---> S2

S2,                          \ wait for .8 seconds
  0.8": OFF 1,2,3,4,5,6;     \ clear all OUTPUT lines
      SET N = 1, T = I,      \ reset N to low bit 1, set Temp to Image number
      A=0, B=0, C=0, D=0, E=0, F=0 ---> S3     \ reset all 6 OUTPUT lines

                             \ decimal to binary conversion of I
S3,                          \ to set the appropriate OUTPUT lines A,B,C,D,E,F
  0.01":~WHILE (T > 0) DO BEGIN IF (TRUNC(T) MOD 2 = 1) THEN BEGIN IF N = 1
THEN A := 1;~;
         ~IF N = 2 THEN B := 2;~;
         ~IF N = 3 THEN C := 3;~;
         ~IF N = 4 THEN D := 4;~;
         ~IF N = 5 THEN E := 5;~;
         ~IF N = 6 THEN F := 6;~;
         ~END; T := TRUNC(T) DIV 2;
      N := N + 1;
      END;~; ---> S4

S4,                          \ turn ON the OUTPUT lines to represent I
  0.01": ON A, B, C, D, E, F;   ---> S5

S5,                          \ display the current Image number
  0.01": SHOW 1, Image num, I;     \ move on to the next image
      IF I < 63 [@NotLast, @Last]  \ if I is less than the last image index
        @NotLast:   ADD I ---> S2        \ then increase I
        @Last:      SET I = 0 ---> S2    \ else restart at image 0
```

4. 6 Control Lines Sample 3: Test_LCD_6_line_64_images_WriteByte.mpc

The last sample program uses the WriteByte function to eliminate converting the images' album index from decimal to binary. This sample cycles through the 64 images on an LCD display using the 6-line control mode. WriteByte is explained in detail below.

```
\ 6 output control line test program for ENV-131M, ENV-132M
\ Displays 64 images in a loop using the WriteByte function.
\ WriteByte is defined in PortIO.dll and declared in PortIO.hed.
\ The image indexes on the ENV-131M and ENV-132M are 0-based.

\ Variables used
\  I : Current Image identifier - possible values: 0 to 63

S.S.1,
S1,                                        \ initialize variable
  0.01": SET I = 0 ---> S2

                                           \ wait for .8 seconds
S2,                                        \ turn ON the bits representing I
  0.8": ~WriteByte(MG, BOX, 792, (BOX-1)*2, I);~;
       SHOW 1, Image num, I ---> S3        \ display the image index

S3,
  0.01": IF I < 63 [@NotLast, @Last]       \ loop control, if more images
       @NotLast:   ADD I ---> S2           \ move to the next image, else
       @Last:      SET I = 0 ---> S2       \ back around to the first (index 0)
```

Definition of Commands

The TEST_LCD_6_line_64_images_WriteByte.mpc MedState Notation™ procedure uses the **WriteByte** command. The WriteByte procedure is defined in PortIO.dll, and declared in PortIO.hed. During the SOF-400 computer software installation, the two PortIO files are copied to the MED-PC® installation directory, and a line is added to the User.pas file to include PortIO.hed.

WriteByte writes a byte-long (8 bits) value to an output card. Any ON bits will turn on the corresponding outputs, and any OFF bits will turn off the corresponding outputs. WriteByte converts the last parameter from a decimal value to its binary equivalent and activates the appropriate OUTPUT lines representing that binary value.

WriteByte Declaration

```
Procedure WriteByte(MPCGlobal: MPCGlobalPtr; box, port, offset, value:
                    real); stdcall; external PortIO name 'WriteByte';
```

WriteByte accepts five parameters:

1. Med Global Pointer: always represented by "MG" for Med Global.
2. Box identifier: always represented by "BOX" for the current loaded box identifier.
3. Output card Port address: varies depending on the address of the output card. 792 is the usual port address for output cards in a MED-PC® system.
4. Output card Port offset: varies according to the output card address offset. Normally, 0 is the address offset of the first chamber's output card, 2 is the second chamber's output card offset, 4 is third chamber's output card offset, 6 is the fourth output card's offset, etc.
5. Value: decimal value representing the zero-based index of the image to display.

WriteByte Examples

The first example below will cause the ENV-131M or ENV-132M stimulus display device attached to the box running the protocol in MED-PC® to show the 8th image in its album, represented by the 0-based index of 7. 7 is converted to 00000111, then OUTPUTs 1, 2, and 3 are activated on the display device.

```
~WriteByte (MG, BOX, 792, (BOX-1)*2, 7);~;
```

The command:

```
~WriteByte (MG, BOX, 792, (BOX-1)*2, 13);~;
```

converts the last parameter (13) to its 8-bit binary equivalent: 00001101, then activates OUTPUTs 1, 3, and 4 to display the 14th image in the display device.

APPENDIX A - CONTACT INFORMATION

Please contact Med Associates, Inc. for information regarding any of our products. Visit our website at www.med-associates.com for contact information and access to our Technical Manual Library, software drivers, release notes, and FAQs on our Customer Portal.

For technical questions, email support@med-associates.com.

For sales inquiries, email sales@med-associates.com.