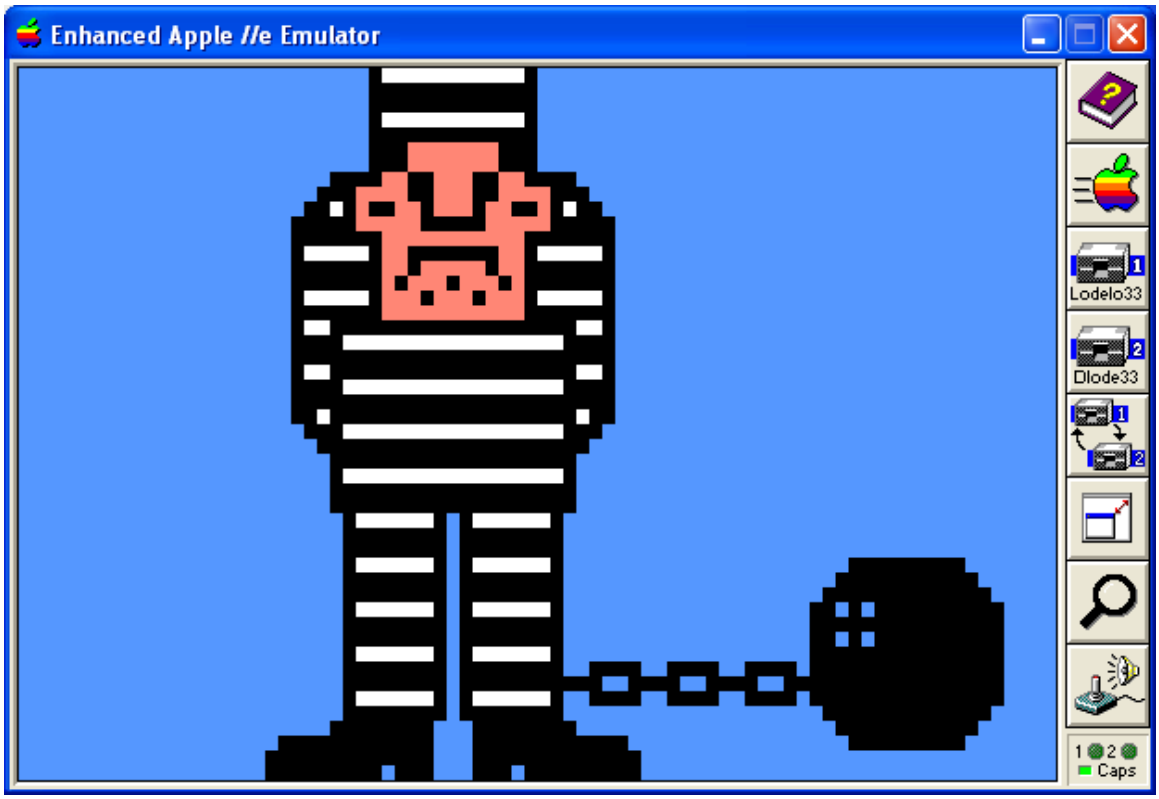
Using BMP2LO to Create DLOGR (Double Lo-Res Graphics) Files
By Bill Buckels – December 19, 2012



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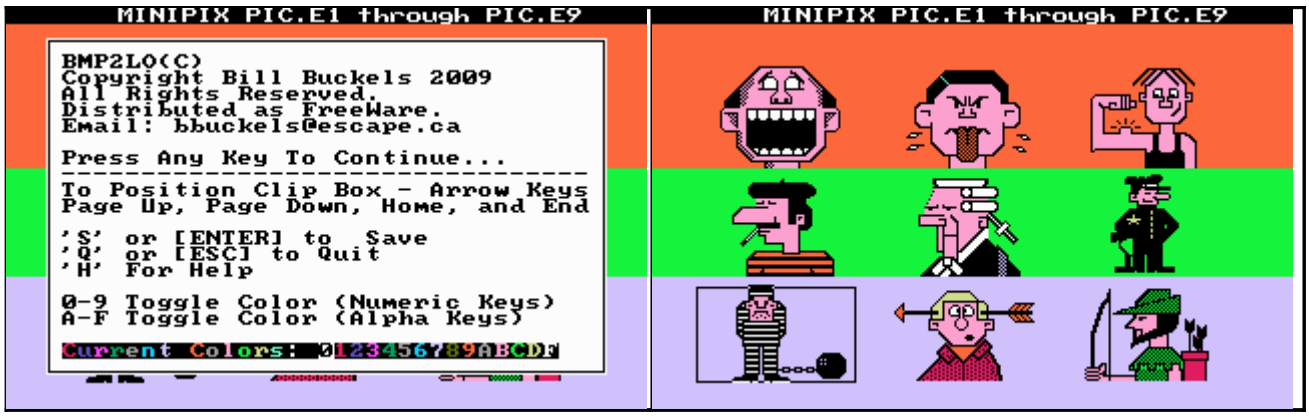
Intended Audience

I am assuming that you already know what an Apple II file is and you have utilities to place these on Apple II disks or disk images. I assume too that you have some knowledge of IBM PC graphics files including Windows BMP files. I am also assuming that you know how to use the Windows Clipboard and how to use Windows Paint. I am hoping as well that you also know about color palettes and screen resolutions and such. If you don't have this preliminary knowledge this document may not be for you.

Introduction



Back in 2009, as part of a larger collection of programming for the Apple II, I wrote an MS-DOS utility called BMP2LO.EXE which also runs in a Windows XP cmd window or under DOSBox, and converts IBM PC color graphics files to Apple II DLOGR (Double Lo-Res Graphics) files. In a nutshell, all BMP2LO does is remap the colors from a PC to an Apple II and saves the results. BMP2LO.EXE outputs Apple II Double Lo-res 80 x 48 x 16 color images from IBM-PC graphics files in the following formats:

- CGA 320 x 200 x 4 color BASIC BSAVED IMAGE (.BAS) Files
- CGA 320 x 200 x 4 color ZSOFT .PCX Files
- EGA 320 x 200 x 16 color Windows .BMP Files

BMP2LO is distributed with reasonably well-commented source code. For detailed information about what it is actually doing and how it does what it does read the source code and run the program. But read this document first for whatever its worth.

What's New in BMP2LO for 2012?

Just a minor change… I replaced the font routines so BMP2LO's screens work on newer computers.

Output File Formats

BMP2LO outputs a BSaved Image File pair which can be easily BLoaded in an AppleSoft BASIC program, and also outputs a raster oriented image which is more elegant, and more suitable for a C language program outside BASIC's bog and mire.

BASUC Example

```
 1   REM Simple Double Lo-Res Image Loader Example
 2   REM By Bill Buckels, December 2012
 3   D$ = CHR$(4)
 4   PRINT D$;"PR#3" : PRINT : REM ENABLE 80 COL
 5   TEXT
 6   HOME
 10  PRINT "*********************************"
 11  PRINT "*                               *"
 12  PRINT "*       DOUBLE LO-RES MENU      *"
 13  PRINT "*                               *"
 14  PRINT "* BASIC Demo                    *"
 16  PRINT "* 1 -   BLOAD EXAMPLE           *"
 17  PRINT "* ESC - EXIT TO DOS 3.3         *"
 18  PRINT "*                               *"
 19  PRINT "*********************************"
 150   GET A$
 160   IF A$ =  CHR$ (27) THEN  GOTO 800
 170   IF A$ = "1" THEN  GOTO 400
 200 GOTO 5
 400   POKE 49246,0 : REM DOUBLE LO-RES ON
 410   POKE 49238,0 : REM LO-RES ON
 430   POKE 49232,0 : REM GRAPHICS
 440   POKE 49234,0 : REM FULL GRAPHICS
 455   PRINT D$;"PR#3" : PRINT : REM ENABLE 80 COL
 460   CALL -1998 : REM CLEAR PAGE ONE
 500   POKE 49237,0 : CALL -1998 : REM CLEAR PAGE TWO
 510   PRINT D$;"BLOAD CROOK.DL1,A$400" : PRINT
 520   POKE 49236,0 : REM PAGE ONE
 530   PRINT D$;"BLOAD CROOK.DL2,A$400" : PRINT
 700 GET A$
 705   CALL -1998 : REM CLEAR PAGE ONE
 710   POKE 49247,0 : REM DOUBLE LO-RES OFF
 720   POKE 49233,0 : REM TEXT MODE
 730   POKE 49236,0 : REM PAGE ONE
 740   PRINT D$;"PR#3" : PRINT : REM ENABLE 80 COL
 750 GOTO 5
 800 TEXT
 810 HOME
 820 CALL  - 1184: CALL 42350
 830 REM  THIS IS THE END
 840 NEW
```

Please note that 2 files are loaded in the BASIC example above:

1. DL1 – The "Double-Lo 1" file is the Auxiliary Memory File
2. DL2 – The "Double-Lo 2" file is the Main Memory File

These 2 files are modeled after the AUX and BIN files that were commonly used in Apple DHGR BASIC programs and are each 1016 bytes in length and are simply 2 chunks of BSaved binary data.

BMP2LO.EXE produces 3 files… the third file, the DLO ("Double-LO") file, is 1922 bytes in length and modeled after my own RAG file format for the Apple II which I first developed for Apple II Hi-Res Image Fragments (DLO files are *NOT* modeled after the A2FC DHGR consolidated BSaved binary data file format). DLO files are also raw uncompressed binary data but raster oriented (not chunks), and are not readily suitable for BASIC programs. The first two bytes in a DLO are "packet width" in bytes and "height" in rasters. DLO files, like RAG files, are suited for C programs where they result in a "smooth" load from the top to the bottom of the Apple II screen. As shown in the C program snippet below, DLO rasters are split into 2 parts of 40 bytes when loading, the first for AUX MEM and the second for MAIN MEM.

Aztec C Loader Code Snippet for DLO Files

```
fh = open(name1,O_RDONLY,4); /* open a binary file */
if (fh == -1)return -1;
c = read(fh,&fa,2);
if (c == 2)c = read(fh,&fl,2); /* get file length */

switch(fl) {

case 1922:    /* is it a DLO ? */
      c = read(fh,tempchar,2);
      if (c!=2) break;
      packet= (int)tempchar[0];height= (int)tempchar[1];
      if (height != 24 || packet != 80)break;
      for(y=0;y<height;y++) { /* read each raster to the screen */
            poke(49237,0); /* switch to auxiliary memory - page2 */
            c = read(fh,(char *)textbase[y],40);
            poke(49236,0); /* switch back to main memory - page1 */
            if (c!=40)break;
            c = read(fh,(char *)textbase[y],40);
            if (c!=40)break;
     }
     if (c == 40)status = 0;
     break;
}
close(fh);
```

How to Get BMP2LO.EXE

BMP2LO.exe is distributed as a utility and is part of the much larger Aztec C Museum project at www.aztecmuseum.ca which is targeted at C programming on legacy platforms like the Apple II. It is distributed with the Aztec C Cross-Compiler Apple33 DOS 3.3 Distribution: http://www.aztecmuseum.ca/Apple33.zip

You do not need to run the compiler to use BMP2LO.exe and it is also available as a smaller download from the Apple Oldies Graphics Page at http://www.appleoldies.ca/azgraphics33/ as an individual update for the Apple33 DOS 3.3 Distribution:

DLOGR 2012 Update for Apple33 DOS 3.3 Distribution (includes BMP2LO.exe)
http://www.appleoldies.ca/azgraphics33/DLR.zip

Minipix and Other "Big-Little Pictures" in 16 color Double Lo-res

Double Lo-res Graphics Mode for the Apple II is a pretty decent venue for displaying full-screen colored versions of Minipix (and other "little pictures"). Since Double Lo-res is 80 pixels x 48 rasters, and Minipix are 88 pixels x 52 rasters, this is close enough in size for the BMP2LO.EXE conversion utility to output these so they can be displayed on the Apple II in glorious full-screen detail and 16 discrete colors (after you color them). And since this utility works on Windows 16 color BMP files it is also easy enough to create original Double Lo-Res images of ones own design to be converted.

Graphics Files, Additional Resources, and Minipix in General

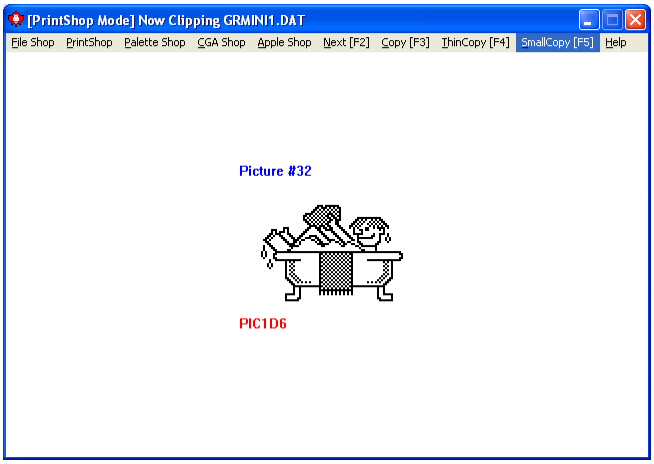
First off, the distributions for BMP2LO.exe include several samples and examples to give you a starting point for its use whether you are coming from a programming perspective or just want to have fun with this or all of the above.

For my part, I have done my best to keep my websites and so-forth updated but life is short and this is only a hobby so it's all just on a best effort basis. But despite all that, over the years I have managed to accumulate a monstrous collection of Minipix which I distribute with my Clipshop program for Windows Users at www.clipshop.ca and which I hope you will take time to download and take full advantage of, if only for the Minipix alone. Clipshop comes with an extensive help file which is full of additional info about Minipix among other things.

One Way To Acquire Minipix for BMP2LO

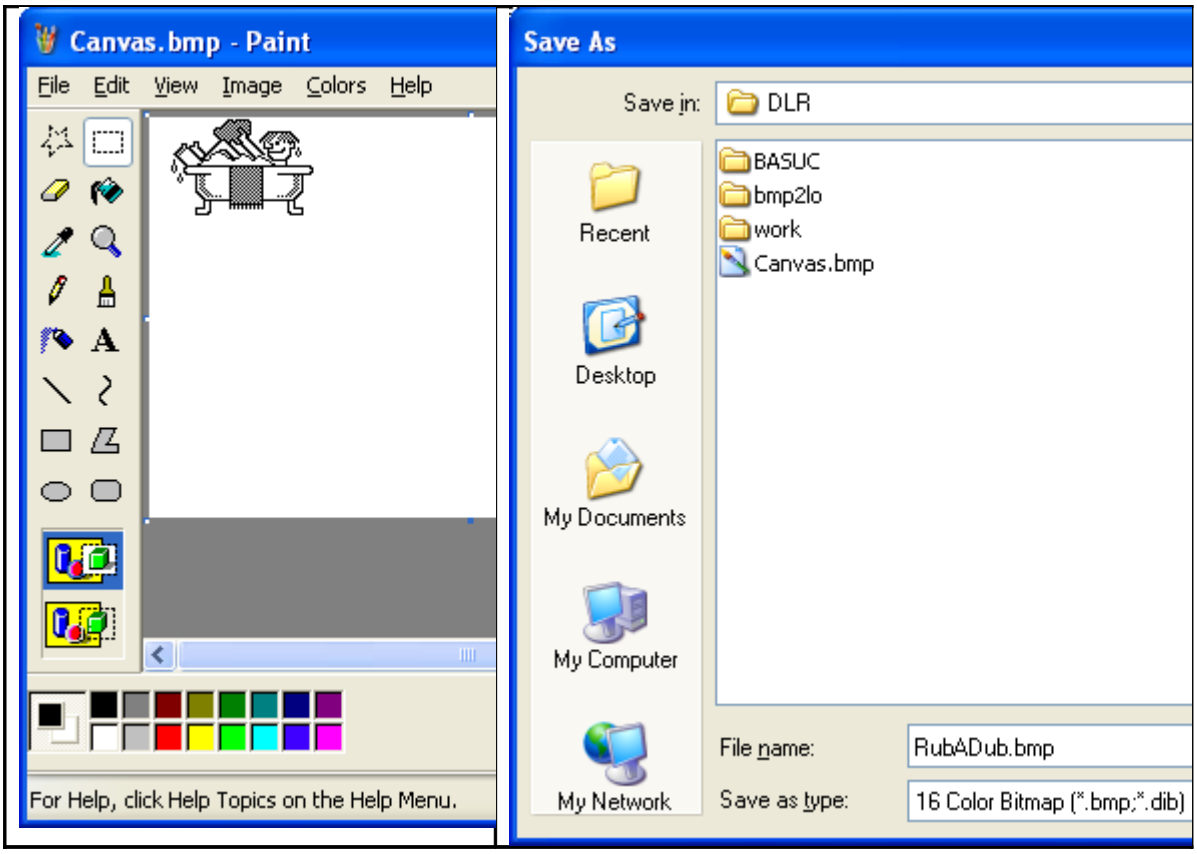
Step 1 – Copy the Graphic to the Windows Clipboard

Use Clipshop to load a Clipart Library, then **SmallCopy** the "Minipic":

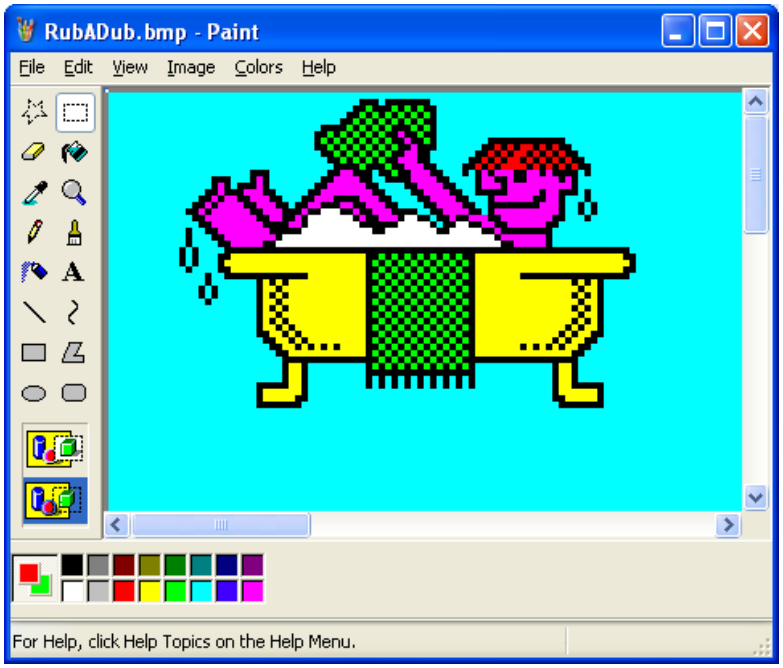


Step 2 – Paste the Graphic into Windows Paint

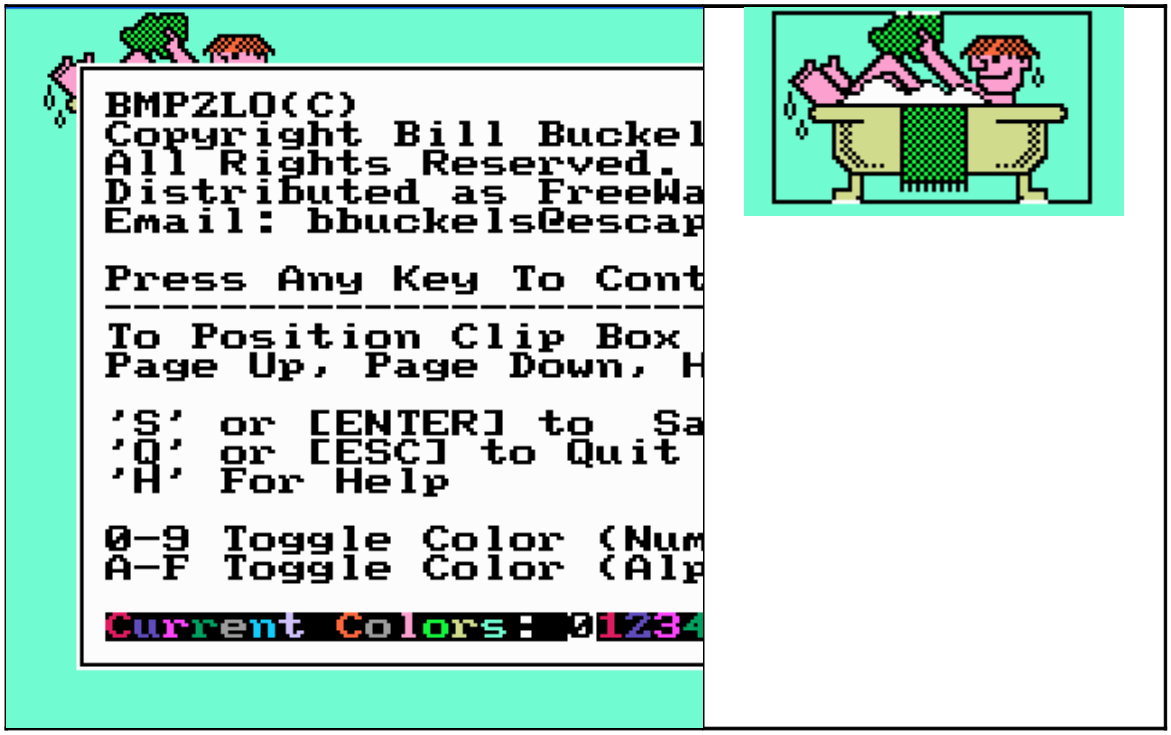
Open the Canvas.bmp that comes with BMP2LO.exe with Windows Paint, paste the Minipic, and save as a 16 color bmp with an 8 character filename:



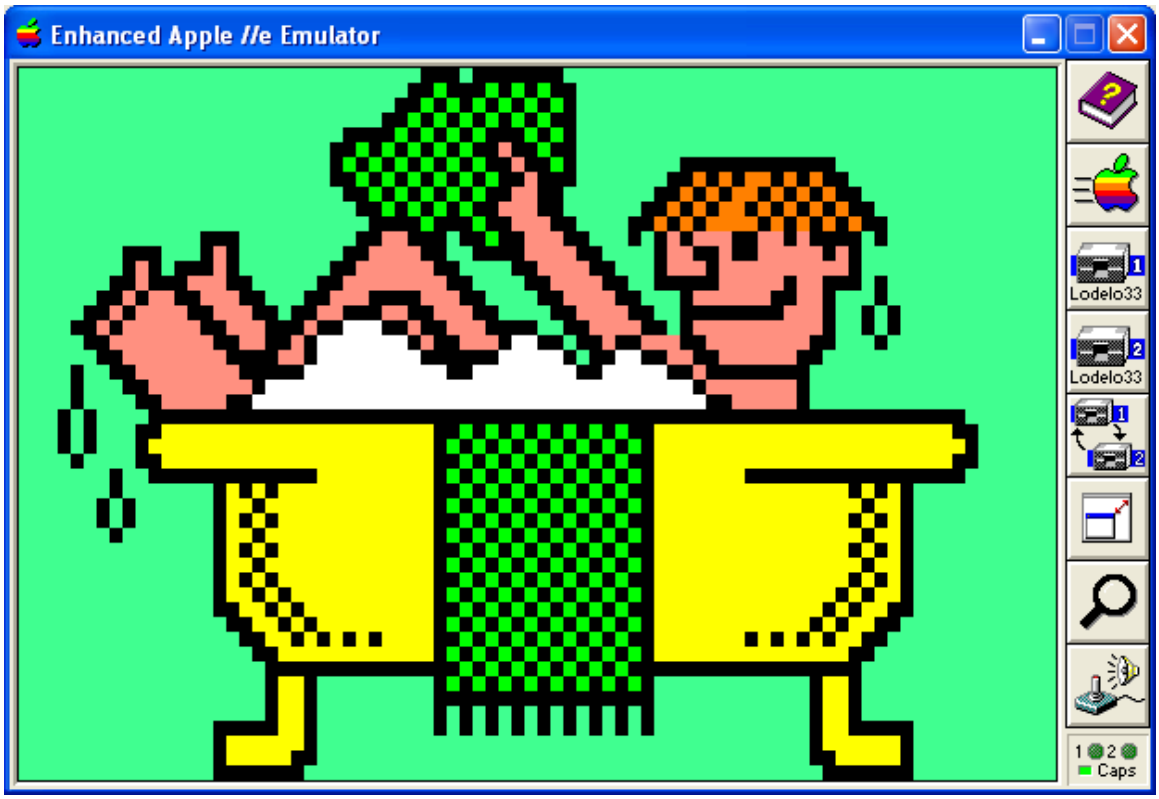
Step 3 – Color and Edit the Graphic in Windows Paint
Use “fat bits” (zoom large size) to color and edit the Minipic, then save when done:



Step 4 – Use BMP2LO to Convert to Apple II format



Step 5 – Display the Graphic on Your Apple II
Transfer the Apple II DLOGR output file(s) created by BMP2LO.exe (either the DL1 and DL2 files or the DLO file) to an Apple II Disk or Disk Image and Display on your Apple II or in your Emulator in Double Lo-Res Mode:



That's about it! I have purposely omitted much detail in the interests of brevity and because this document has already gone-on far too long. I have described but one way to acquire a graphic to convert with BMP2LO.exe. There are many variations possible and suffice to say that I could have continued ad nauseum, but I am pretty sure you get the idea here, or you will with practice, so the rest is up to you.

Please keep in mind that BMP2LO.exe is distributed without support of any kind, which in no way diminishes its entertainment value and perhaps its educational value if you are interested in the Apple II and other such things.

All the best,

Bill Buckels
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