ROM✗
Apple][,][+

User Guide

JD MICRO

Contents

ROMX Overview

Thank you for purchasing ROMX! We hope that you enjoy experimenting with various different ROM's for your Apple][system.

We will be sharing tools, ROM images, and related documentation at www.theromexchange.com – be sure to check the site regularly for updates.

This user guide documents the features available with firmware version 0.992 If you have an earlier version of the firmware installed, we recommend updating your ROMX firmware to the current release.

So, what is ROMX? ROMX is an in-system programmable device that replaces the system ROM's in your Apple][or][+ computer. It will store up to 15 ROM images and present them for selection via an on-screen menu system. In addition, the menu system itself (the ROMX firmware) is updateable in-system.

What do we mean by In-System Programmable? This simply means that you can re-program ROMX with your own ROM images without removing the device from your computer, and without need for any external programmer. Uploading of new ROM images is done through either the ROMX boot menu, or by running the ROMX.DISK utility from the ROMX System and Utilities Disk image.

If you purchase the optional ROMX text ROM bundle, one of 16 text ROMs (fonts) can be selected from the ROMX menu also, or associated with a specific system ROM. The text ROMs support upper and lower case text. See the Text ROM section for the list of available fonts.

ROMX firmware v0.992 supports linking of a ROM image with a DOS image loaded into a ROM slot. When a ROM image is linked to a DOS image, DOS will be loaded the instant the ROM is selected!

ROMX ships with a default set of system ROM images pre-installed. The following menu selection represents the out-of-box ROMX configuration:

ROMX Hardware

There are currently 3 ROMX modules available – ROMX, the optional ROMX 2316B Text ROM for Rev 7 motherboards, and an optional ROMX 2513 compatible Text ROM for pre-Rev 7 motherboards.
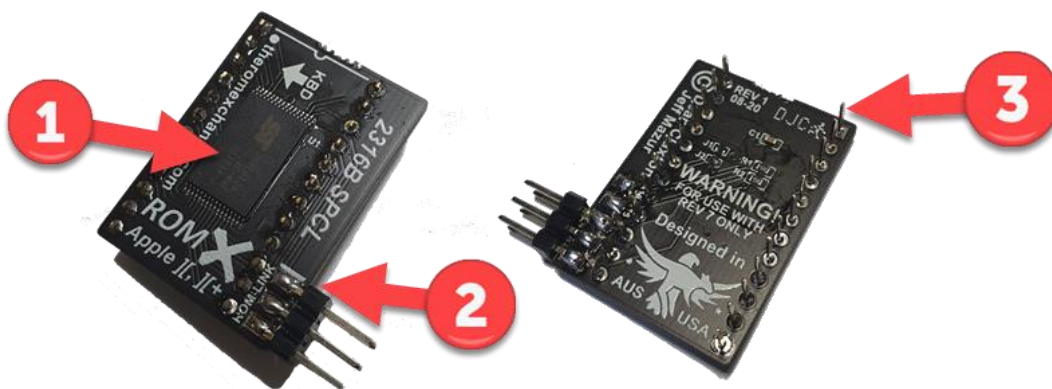
ROMX
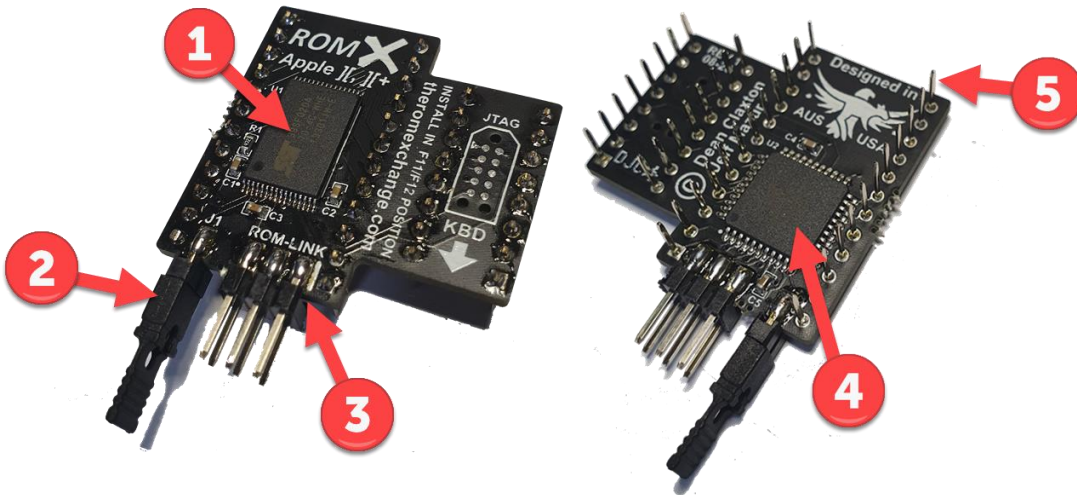
1. 2Mbit Flash Memory
2. Recovery Jumper (normally installed). Remove to enable recovery mode. See the Recovery Mode section for further details).
3. ROM-Link header linking the optional ROMX Text ROM – Pin 1 end (white bar on PCB)
4. CPLD (Complex Programmable Logic Device)
5. Pin headers (legs)

## ROMX 2316B SPCL Text ROM

The ROMX 2513B SPCL text ROM contains 16 different fonts – many include upper and lower case.

1. 1Mbit Flash Memory
2. ROM-Link Header – Pin 1 end (white bar on PCB)
3. Pin headers (legs)

ROMX 2513 Text ROM

The 2513 Text ROM is a two board set that has been designed to upgrade the text capabilities of a pre-rev 7 motherboard to that of a rev 7 without requiring any hardware modification. It is a plug in upgrade as shown below, consisting of the main 2513 PCB which plugs into the 2513 socket, and a U-Board that spans the B9 and B11 sockets.
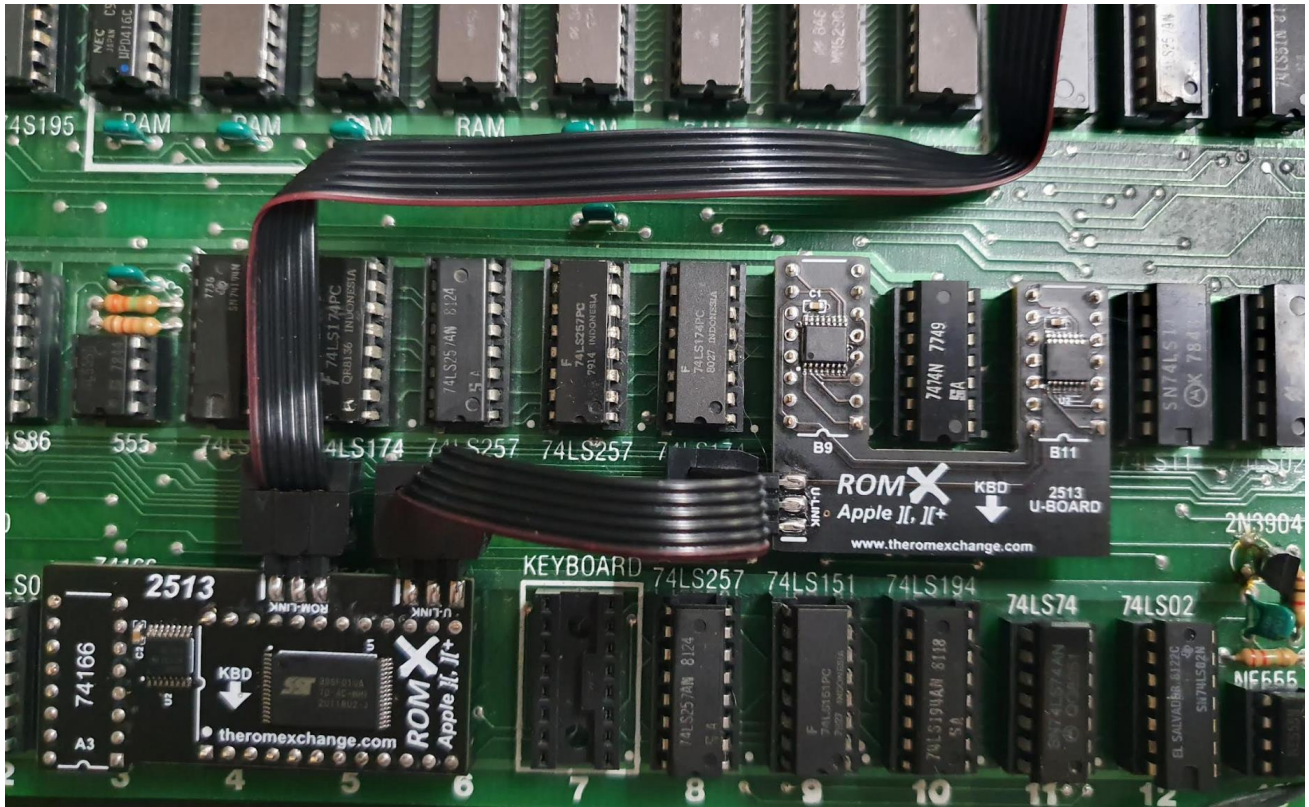
The 2513 board has a ROM-Link header that is used to connect it to the ROMX board, as well as a U-Link header to connect the U-Board.

The same 16 fonts as the ROMX 2316B SPCL are supported (the 1Mbit flash chip contains the very same image), with many including lower case text.

See the Text ROM section for a list of supported fonts.

ROMX Menu System

Overview

The ROMX menu system is structured as below:

1. Asterisk to the left of the ROM image menu shows the current default ROM image.
2. ROM image selection menu - pressing a key 1 through F will immediately boot the computer using the selected ROM image.
3. ROMX command menu.
4. Example Text ROM associations (active with optional ROMX text ROM module).
5. Example DOS Image association (links ROM with DOS 3.3 Image loaded in slot F).
6. Default Boot ROM image
7. Default character generator (text) ROM image.
8. Menu delay countdown timer.

On initial power-up, the ROMX menu will be displayed for a period determined by the delay timer. By default, this is approximately 3.5 seconds. If no menu selection has been made during this time, then the system will automatically boot using the default system ROM (see items 1 and 5 above).

The delay timer has a user adjustable range from 0 to approximately 5.2 seconds. Selecting a delay of 0 will bypass the menu completely on power up. You will then have to use the disk version ROMX.DISK to make further changes.

Pressing a bank key at any time will boot the corresponding image. Any other key will stop the countdown.

Image Selection Menu

The image selection menu displays the list of ROM images 1 through F that are stored on the ROMX module.

ROM Images are selected using keys 1 though F on the keyboard. On keypress, the selected image will immediately be used to boot the system.

After an image has been booted, ROMX becomes invisible to the system. Subsequent RESETs will be handled according to the reset handler in the selected ROM image.

Images with a Text ROM association are displayed above with &T*n* at the end of the description line, where n represents a font number 0 to F. If you have the optional ROMX text ROM installed, selecting one of these images will automatically switch the font via the ROM-Link interface. Text ROM associations override the default text ROM setting.

All 15 image slots are in-system programmable – you can overwrite them or customize them as desired.

As shipped, the blank entries are populated with Applesoft Basic ROMs that display custom boot text. Rather than APPLE][, they will display IMAGE 0*n* where *n* represents the selected image number. These blank entries are great spots to add your first custom images.

Details on uploading a custom ROM image are covered in the Adding a ROM Image section.

NOTE: It is possible to programmatically switch between system ROM images and Text ROM images. See the ROMX API Reference in the Documentation section at [*https://theromexchange.com*](https://theromexchange.com)

Command Menu

Keys I, S, T, U and X are used to access the following items from the command menu:

- I)NFO FOR IMAGE
- S)ET DEFAULT BOOT IMAGE
- T)EXT CHARGEN ROM DEFAULT
- U)PLOAD NEW BOOT IMAGE
- X)IT MENU AND BOOT DEFAULT IMAGE

These command options are detailed in the following sections.

I)NFO FOR IMAGE

From the main menu, pressing the I key will invoke the I)NFO FOR IMAGE command. This displays an information page as below:
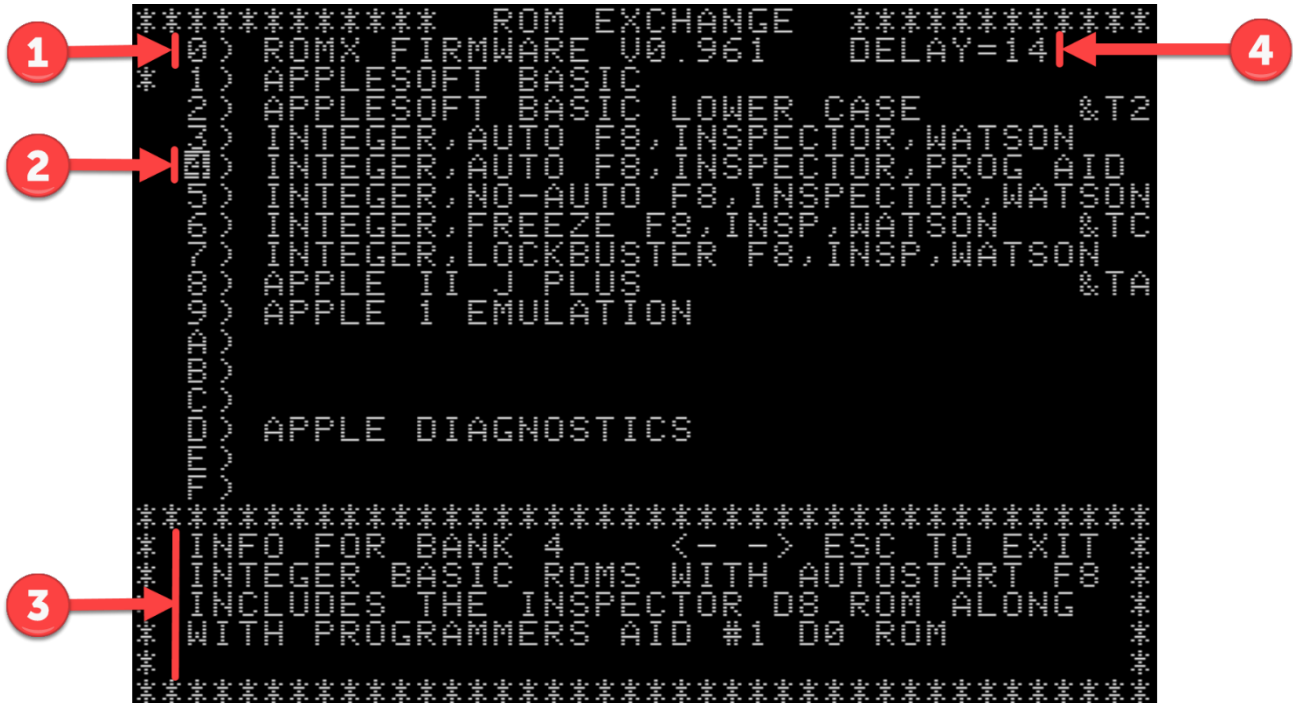
1. ROMX firmware revision.
2. Currently selected image.
3. Information for selected image.
4. Delay timer setting.

Use the right and left arrow keys to change the highlighted image number – the information for the selected image will be displayed in the lower section of the display.

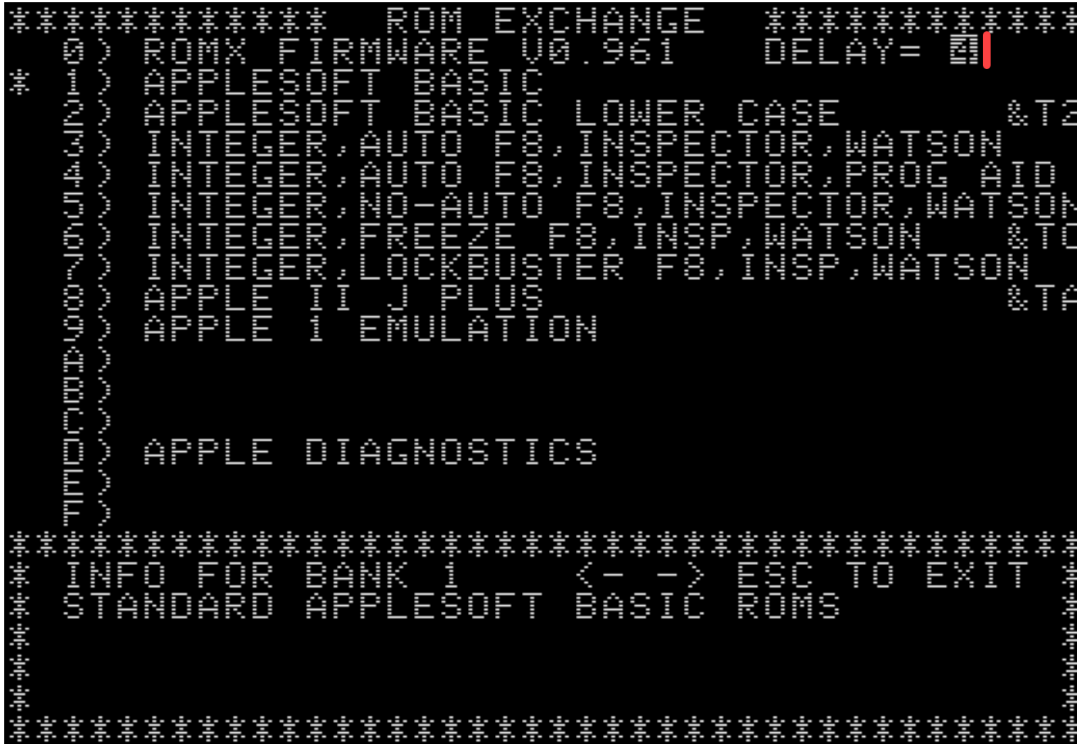Press the ESC key to return to the main menu.

There are several functions available from the information page, which are detailed in the following sections:

- View and Edit the **B**oot Delay Timer (CTRL+**B** to edit),
- View and edit the **D**escription for each ROM image (CTRL+**D** to edit)
- View and edit the stored **I**nformation for each ROM image (CTRL+**I** to edit)

Editing the Boot Delay Timer (Ctrl+B)

The boot delay timer has a default setting of approximately 3.5 seconds, with a user adjustable range from 0 to approximately 5.2 seconds in 0.346 second increments.

Using the key combination CTRL-B from the Information page, the timer delay setting may be edited:

```
********** ROM EXCHANGE **********
  0) ROMX FIRMWARE V0.961   DELAY= 04
* 1) APPLESOFT BASIC
  2) APPLESOFT BASIC LOWER CASE        &T2
  3) INTEGER,AUTO F8,INSPECTOR,WATSON
  4) INTEGER,AUTO F8,INSPECTOR,PROG AID
  5) INTEGER,NO-AUTO F8,INSPECTOR,WATSON
  6) INTEGER,FREEZE F8,INSP,WATSON     &TC
  7) INTEGER,LOCKBUSTER F8,INSP,WATSON
  8) APPLE II J PLUS                   &TA
  9) APPLE 1 EMULATION
  A)
  B)
  C)
  D) APPLE DIAGNOSTICS
  E)
  F)
***************************************
* INFO FOR BANK 1   <- -> ESC TO EXIT *
* STANDARD APPLESOFT BASIC ROMS       *
*                                     *
*                                     *
*                                     *
*                                     *
***************************************
```

Valid delay timer entries are 0 to F, resulting in the following delay times:

Delay Entry	Delay Displayed	Delay Time (seconds)	Delay Entry	Delay Displayed	Delay Time (seconds)
0	00	0 (menu not displayed)	8	10	2.769
1	02	0.346	9	12	3.114
2	04	0.692	A	14 (default)	3.46
3	06	1.038	B	16	3.806
4	08	1.384	C	18	4.152
5	0A	1.730	D	1A	4.498
6	0C	2.076	E	1C	4.844
7	0E	2.422	F	1E	5.190

If you set the delay time to zero, then the menu will not be displayed at power-up and the default system ROM image will be used. You must then use the disk version of the ROMX firmware (ROMX.DISK) to make any changes to the ROMX configuration or revert the delay timer setting. See the ROMX System and Utilities Disk section.

Editing the Image Description

Image descriptions may be edited directly from the information page. This makes it very easy to modify command suffixes also.

From the information page, use the up/down arrows to select an entry to be edited (or press the key associated with the image 1-9, A-F), then press CTRL+D to edit the description:
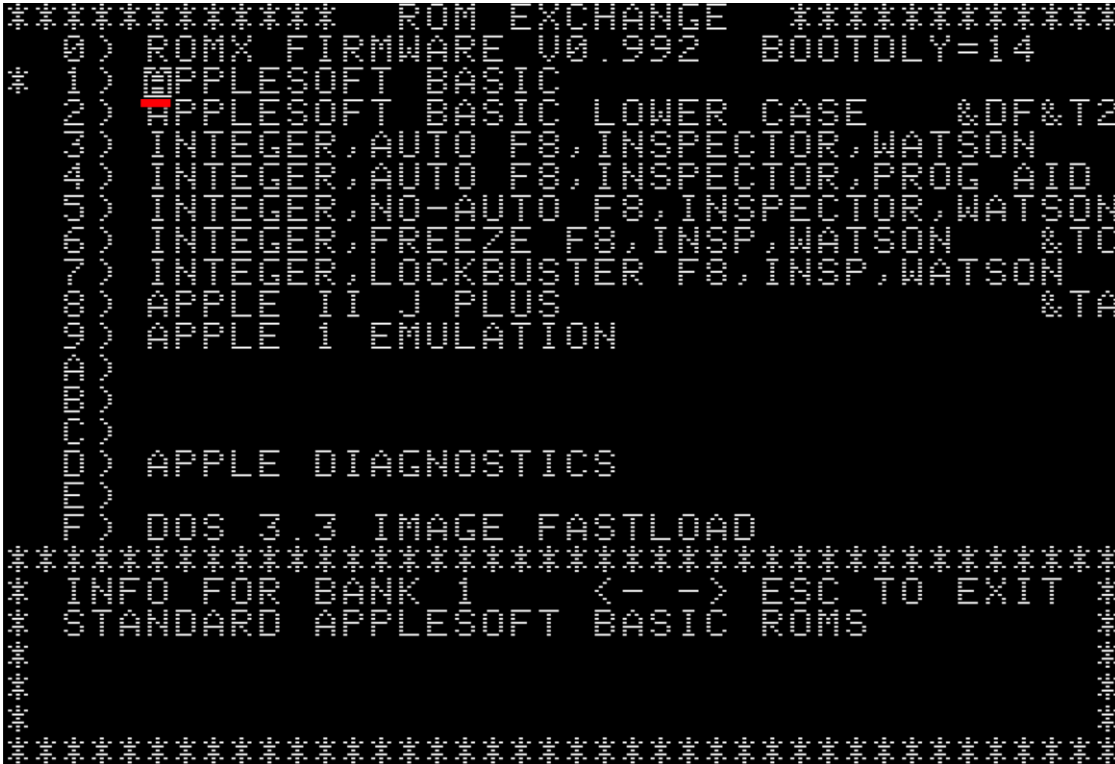
A maximum length of 35 characters is available for an image description, including any specified ROMX image link suffixes such as &Tn for text ROM association, &Dn for DOS image association (see following section).

When you have finished editing the description, use the right arrow key to move the cursor beyond the last character, and press the RETURN key to save the changes. Any text to the right of the cursor will be erased after pressing the RETURN key. You can also use the ESC key to cancel.

The following suffixes are available to allow linking of one image to another.

&T*n*

Text (Video) ROM Link used to link a specific Text ROM with a system ROM Image. When the system ROM is selected, the linked text/video ROM image will be applied.

Associate a specific text/video ROM to be used with a system ROM by including &T*n* at the end of the description line (in positions 33-35), where *n* represents the video ROM image 0-F. With this association in place (and with a ROMXce video ROM module installed), the font will change when the ROM image is selected.

The easiest way to enter the Text ROM link is to press the right arrow until you reach the end of the line (computer will beep), then press the left arrow 3 times and type the link suffix.

See the Text ROM section for a list of available fonts.

&D*n*

DOS Image Link. Used to link a DOS image to a system ROM image such that after loading the system ROM, the DOS image is loaded into RAM and executed. DOS is instantly available. You can load either DOS 3.3 or ProDOS this way.

You can link a system ROM image with a DOS image for instant DOS boot by including &D*n* at character position 30-32 of the description line, where *n* represents the slot number of a DOS image (1-F).

The easiest way to enter the DOS image association is to press the right arrow until you reach the end of the line (computer will beep), then press the left arrow 6 times and type the link suffix. You may optionally then type the video ROM association &T*n* immediately after &D*n*.

Editing the Image Information

Image information may be edited from the information page. Use the up/down arrows to select an entry to be edited (or press the key associated with the image 1-9, A-F), then press CTRL+I to edit the information:

```
************   ROM EXCHANGE   *************
   0)  ROMX FIRMWARE V0.992   BOOTDLY=14
*  1)  APPLESOFT BASIC
   2)  APPLESOFT BASIC LOWER CASE    &DF&T2
   3)  INTEGER,AUTO F8,INSPECTOR,WATSON
   4)  INTEGER,AUTO F8,INSPECTOR,PROG AID
   5)  INTEGER,NO-AUTO F8,INSPECTOR,WATSON
   6)  INTEGER,FREEZE F8,INSP,WATSON    &TC
   7)  INTEGER,LOCKBUSTER F8,INSP,WATSON
   8)  APPLE II J PLUS                  &TA
   9)  APPLE 1 EMULATION
   A)
   B)
   C)
   D)  APPLE DIAGNOSTICS
   E)
   F)  DOS 3.3 IMAGE FASTLOAD
******************************************
*  INFO FOR BANK 1    <- -> ESC TO EXIT  *
*  STANDARD APPLESOFT BASIC ROMS         *
*                                        *
*                                        *
*                                        *
*                                        *
******************************************
```

Four lines of text are available for storing information text. Each line can store up to 36 characters for a total of 144 characters.

Each of the four lines are edited in sequence using the left and right arrow keys to reposition the cursor on the current line. Once a line is complete, position the cursor to the right of any text that you wish to retain, then press the Return key. Anything beyond the cursor will be erased, and the cursor will move to the next line.

The information text will be saved after completing the fourth line.

From the main menu, pressing the S key will invoke the S)ET DEFAULT BOOT IMAGE command:

```
********** ROM EXCHANGE **********
* 1) APPLESOFT BASIC
  2) APPLESOFT BASIC LOWER CASE        &T2
  3) INTEGER,AUTO F8,INSPECTOR,WATSON
  4) INTEGER,AUTO F8,INSPECTOR,PROG AID
  5) INTEGER,NO-AUTO F8,INSPECTOR,WATSON
  6) INTEGER,FREEZE F8,INSP,WATSON    &TC
  7) INTEGER,LOCKBUSTER F8,INSP,WATSON
  8) APPLE II J PLUS                   &TA
  9) APPLE I EMULATION
  A)
  B)
  C)
  D) APPLE DIAGNOSTICS
  E)
  F)
I)NFO FOR IMAGE
*******************************************
*                                         *
* SET DEFAULT BANK ▤        ESC TO EXIT  *
*                                         *
*******************************************
```
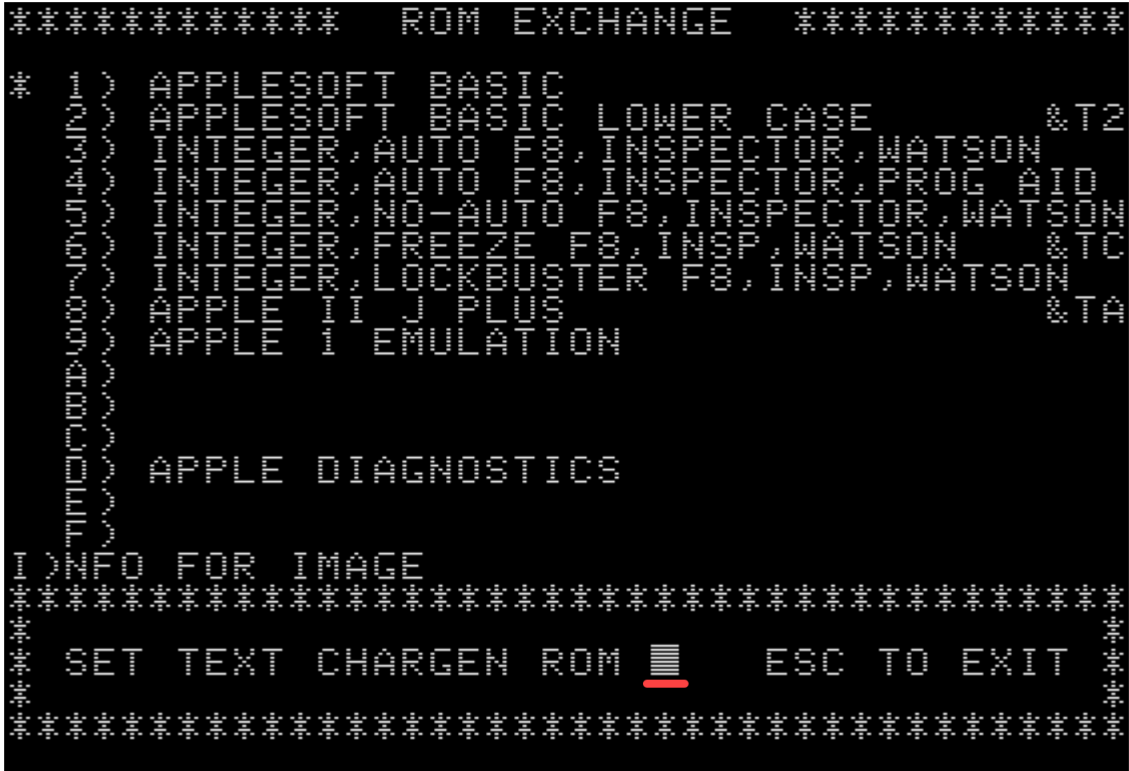
From this page you can select the default boot image 1 to F. The default boot image is used when the delay timer expires, or when the X)IT MENU AND BOOT DEFAULT IMAGE command is invoked from the main menu.

The current default image is highlighted with an asterisk to the left of the ROM image number, and also listed to the right of the command (CURRENT = *n*).

T)EXT CHARGEN ROM DEFAULT

From the main menu, pressing the T key will invoke the T)EXT CHARGEN ROM DEFAULT command:

From this page you can select the default Text ROM image 0 to F. If you have the optional ROMX text ROM module installed, then the selected default text ROM will be used unless there is an overriding text ROM association in the system ROM image description.

If you do not have the optional ROMX Text ROM installed, then this setting will have no effect.

Note that the Text ROM selection will not take effect until the menu system is exited, and that font 0 (Apple stock ROM) will be used when entering the menu.

The current default ROM image is displayed to the right of the command (CURRENT = *n*).

See the *Text ROM* section for a list of the available text ROMs (fonts).

U)PLOAD NEW BOOT IMAGE

From the main menu, pressing the U key will invoke the U)PLOAD NEW BOOT IMAGE command.

This command allows you to upload a ROM image or firmware image to the ROMX flash memory either from RAM (where an image has been pre-loaded at address $3000) or directly from disk.

To upload a ROM image from disk, press the P key to select the P)ICK FILE FROM DISK option. The ROMX firmware includes a cut down version of DOS and will check to see whether any valid images are contained on the disk drive referenced (default S6, D1). You can change the slot using the S key, and the drive using the D key.

A list of valid images will be displayed for selection. Images with a '+' prefix are RMX images:

Once an image is selected, you are prompted for the bank and ROM image description.

If the image you are uploading is an RMX file, the description and information text will be automatically populated. This is the optimal time to ensure that the position of any DOS image association (&D*n*) and/or Text ROM association (&T*n*) is correct.

The easiest way to enter the DOS image association is to press the right arrow until you reach the end of the line (computer will beep), then press the left arrow 6 times and type &D*n* where *n* is the image number representing the DOS image (1-F). You may optionally then type the text ROM association &T*n* immediately after &D*n*.

If you are entering just a text ROM association, press the right arrow until you reach the end of the line (computer will beep), then press the left arrow 3 times and type &T*n* where *n* represents the text ROM image 0-F.

In this example we have selected image B (FPBASIC) and will be storing this in ROMX bank B. The description used includes a link to the DOS FAST LOAD image in slot F

```
********** ROM EXCHANGE **********
* 1) APPLESOFT BASIC
  2) APPLESOFT BASIC LOWER CASE    &DF&T2
  3) INTEGER,AUTO F8,INSPECTOR,WATSON
  4) INTEGER,AUTO F8,INSPECTOR,PROG AID

*******************************************
*                                         *
* SELECT BANK TO PROGRAM: B               *
*                                         *
* ADD DESCRIPTION FOR THIS BANK:          *
* APPLESOFT BASIC - DOS 3.3    &DF█       *
*                                         *
*                                         *
*                                         *
*******************************************

S)ET DEFAULT BOOT IMAGE       CURRENT = 1
T)EXT CHARGEN ROM DEFAULT     CURRENT = 0
U)PLOAD NEW BOOT IMAGE
X)IT MENU AND BOOT DEFAULT IMAGE

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```

After selecting a bank and entering a description you will be prompted to press U to upload, or ESC to cancel:

```
********** ROM EXCHANGE **********
* 1) APPLESOFT BASIC
  2) APPLESOFT BASIC LOWER CASE    &DF&T2
  3) INTEGER,AUTO F8,INSPECTOR,WATSON
  4) INTEGER,AUTO F8,INSPECTOR,PROG AID

***********************************
*                                 *
* SELECT BANK TO PROGRAM: B        *
*                                 *
* ADD DESCRIPTION FOR THIS BANK:   *
* APPLESOFT BASIC - DOS 3.3    &DF  *
*                                 *
*                                 *
*  PRESS U TO UPLOAD, ESC KEY TO EXIT *
***********************************
S)ET DEFAULT BOOT IMAGE     CURRENT = 1
T)EXT CHARGEN ROM DEFAULT   CURRENT = 0
U)PLOAD NEW BOOT IMAGE
X)IT MENU AND BOOT DEFAULT IMAGE

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```

The ROM will be uploaded and added to the menu system :

```
********** ROM EXCHANGE **********
* 1) APPLESOFT BASIC
  2) APPLESOFT BASIC LOWER CASE    &DF&T2
  3) INTEGER,AUTO F8,INSPECTOR,WATSON
  4) INTEGER,AUTO F8,INSPECTOR,PROG AID
  5) INTEGER,NO-AUTO F8,INSPECTOR,WATSON
  6) INTEGER,FREEZE F8,INSP,WATSON    &TC
  7) INTEGER,LOCKBUSTER F8,INSP,WATSON
  8) APPLE II J PLUS              &TA
  9) APPLE 1 EMULATION
  A)
  B) APPLESOFT BASIC - DOS 3.3     &DF
  C)
  D) APPLE DIAGNOSTICS
  E)
  F) DOS 3.3 IMAGE FASTLOAD
I)NFO FOR IMAGE
S)ET DEFAULT BOOT IMAGE     CURRENT = 1
T)EXT CHARGEN ROM DEFAULT   CURRENT = 0
U)PLOAD NEW BOOT IMAGE
X)IT MENU AND BOOT DEFAULT IMAGE

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```

If desired, you can now enter ROM information from the I)NFO menu.

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X)IT MENU AND BOOT DEFAULT IMAGE

Pressing the X key from the main menu will immediately boot the computer using your default system ROM. If you have installed the optional ROMX Text ROM module, then your default Text ROM image will also be applied.

Text ROM

The optional ROMX Text ROM contains a total of 16 different fonts. Use the image numbers below when selecting a font. Note that for all except Katakana the inverse and flashing character sets are not shown as they are the same as the main characters, but obviously inverse or flashing - Katakana is a special case.

0 = Apple 7341-0036 (stock ROM):

1 = Apple with lower case (Videx):

2 = Apple with lower case (Z-ROM - Bob Brown):

3 = Apple with lower case (Dan Paymar):

4 = Blippo Black (adapted from The DOS Toolkit):

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5 = Byte (adapted from The DOS Toolkit):

6 = Colossal (adapted from The DOS Toolkit):

7 = Count (adapted from The DOS Toolkit):

8 = Flow (adapted from The DOS Toolkit):

9 = Gothic (adapted from The DOS Toolkit):

A = Katakana - custom Apple J Plus ROM that Nick Westgate put together (if you load up the J Plus ROMX System ROM, CTRL-T toggles Katakana and Roman text as per standard J Plus behavior). Rather than an inverse character set it has normal Katakana, but does also have flashing Katakana in addition to the roman character set (the second "band" of characters shown below in inverse is actually flashing). Ultimately this means that you can experience the J Plus without having to modify your motherboard. Lowercase added as well :

B = Outline (adapted from The DOS Toolkit):
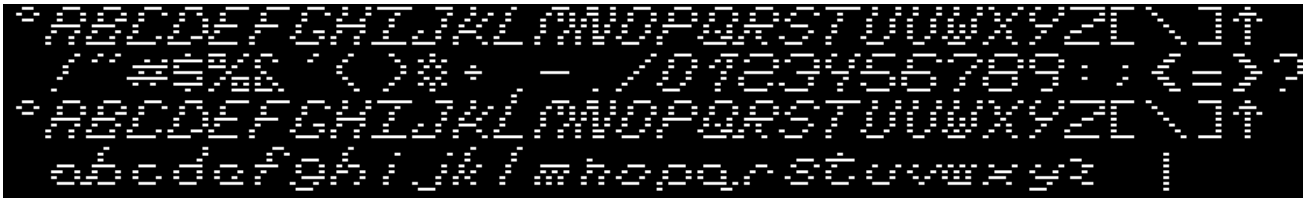

C = Pig Font (Keith Comer):

D = Pinocchio (adapted from The DOS Toolkit):

E = Slant (adapted from The DOS Toolkit):

F = Stop (adapted from The DOS Toolkit):

ROMX System and Utilities Disk

Overview

The ROMX System and Utilities Disk contains several software utilities for ROMX, including the current ROMX firmware release.

You may download the current disk image from https://theromexchange.com under the Utilities -> ROMX section :

If you have a floppy emulator such as a Floppy Emu or wDrive, you can copy this disk image straight onto the SD card and use it to boot the system.

If you are using physical media, you can transfer the disk image to the Apple II using ADTpro (see https://www.adtpro.com/).

The disk contents for the ROMX BETA 992 release of the ROMX System and Utilities Disk are shown below:

Note that some of these utilities are written in Applesoft Basic, and therefore you will need to firstly select an Applesoft Basic ROM from the ROMX menu before booting this disk.
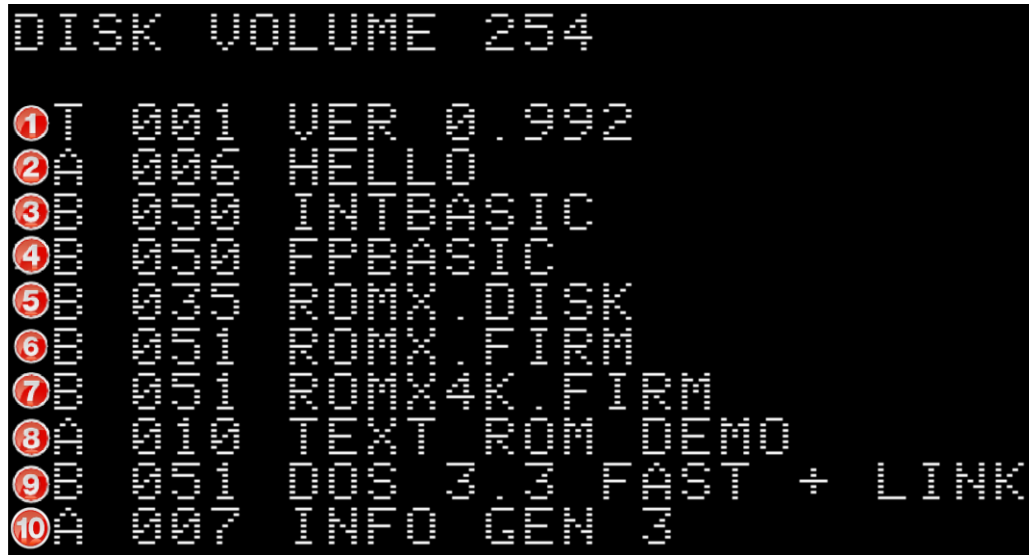
A brief description of each file is shown below :

1. VER 0.992 – ROMX.DISK and ROMX.FIRM release version (0.992).
2. HELLO – boot utility – loads INTBASIC into slot 0 RAM card if present and CATALOGs the disk.
3. INTBASIC – Integer Basic ROM Image.
4. FPBASIC – Applesoft Basic ROM Image.
5. ROMX.DISK – disk based version of the ROMX firmware.
6. ROMX.FIRM – current ROMX firmware release image.
7. ROMX4K.FIRM – cut down version of the ROMX firmware that will run with only 4K RAM.
8. TEXT ROM DEMO – demonstration Applesoft Basic utility that displays the various fonts if you have the optional ROMX Text ROM installed.
9. DOS 3.3 IMAGE FAST – DOS 3.3 image that can be loaded into a ROM slot. This FAST version boots instantly to a prompt without running HELLO.
10. INFO GEN 3 – utility to generate the description and info contents before uploading a ROM.

System ROMs can be associated with DOS images, leading to a near instant boot into DOS. See Adding a DOS Image.

Creating a ROM Image

ROMX supports up to 15 user ROM images. The typical upload process involves 3 major steps :

1. Prepare the ROM image
2. Transfer the ROM image to disk
3. Upload the ROM image to ROMX

If you are creating an image for distribution, then you may wish to store the image description and information text within the image file. This can be done by creating an RMX image file. See the section titled Creating an RMX File.

Prepare the ROM Image

The Apple][ROM address space is a 12KB (12288 bytes) block from address $D000 through $FFFF. On a stock machine this is made up by the contents of 6 individual 2KB (2048 bytes) ROM chips:

ROM Chip	Address Start	Address End
D0	$D000	$D7FF
D8	$D800	$DFFF
E0	$E000	$E7FF
E8	$E800	$EFFF
F0	$F000	$F7FF
F8	$F800	$FFFF

Complete ROM images downloaded from https://theromexchange.com may be distributed as 12544 byte RMX files. This file format includes the complete ROM in addition to prefilled description and information text generated using the INFO GEN utility. The first 12288 bytes of this file is the ROM image, and the remaining 256 bytes is the metadata. This file can be directly copied onto a disk and used. Refer to the following section.

Some ROMs downloaded from the internet have also been accumulated into a single 12288 byte file. That's perfect for ROMX and you can transfer them directly to disk and use them. Refer to the following section.

Some ROMs though will be distributed as individual 2KB files for each of the F8, F0, E8, E0, D8 and D0 ROMs.

Whilst you *could* manually load the individual 2KB files into the $3000 - $5FFF address space and use the ROMX U)PLOAD MEMORY function to store them in ROMX, its easiest to work with a single 12KB image file that you have pre-built on PC or Mac using a hex editor such as HexEd.It (https://hexed.it/).

Using a hex editor, create a new ROM file that is $3000 (12288) bytes in size, then copy the individual 2KB files into your new ROM file using the following offsets:

ROM Chip	File Offset Start	File Offset End
D0	$0000	$07FF
D8	$0800	$0FFF
E0	$1000	$17FF
E8	$1800	$1FFF
F0	$2000	$27FF
F8	$2800	$2FFF

Using the above table for reference, it is quite easy to manipulate ROM images. You may wish to extract the F8 ROM from one image to use in another, for example. From the table, the F8 ROM resides at file offset $2800 through $2FFF - you can simply copy that block of bytes out into a new F8 ROM file.

Ensure that your new ROM file ends at offset $2FFF – it should be exactly 12288 bytes in length.

Transferring the ROM Image to Disk

Once you have a 12KB ROM image ready, the file needs to be transferred onto an Apple][disk. It is recommended that you copy the file onto the ROMX System and Utilities Disk as this disk contains the tools required to complete the upload process.
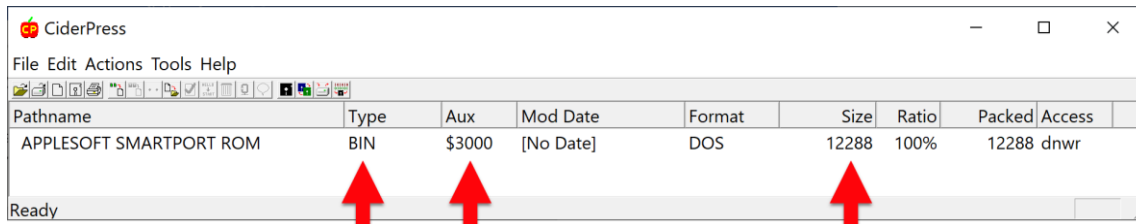
If you are a Windows user, we recommend you install CiderPress (https://a2ciderpress.com/) to complete this task. In addition to many other features, CiderPress will allow you to open the disk image file and insert the ROM image that you have created.

An alternative utility, and one that also supports Mac OS and Linux, is AppleCommander (http://applecommander.sourceforge.net/).

If you choose to use CiderPress, rename your ROM file to include the attribute tag **#063000** at the end of the filename, then select the option *Use file attribute preservation tags* when adding your ROM file:
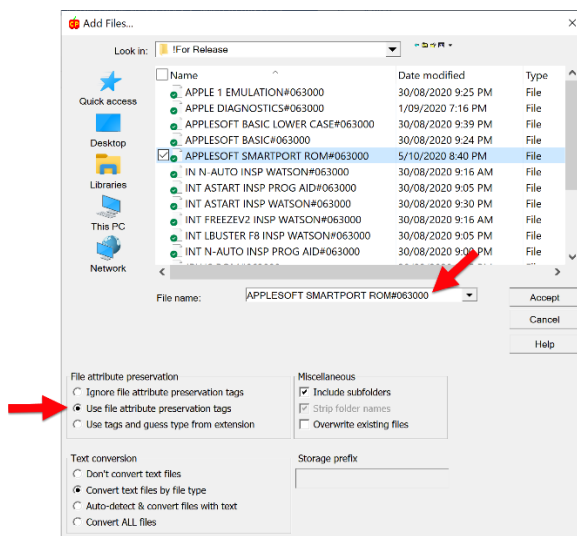
The #063000 tag will ensure that CiderPress sets the file attribute to Binary (type 06) with a default load address of $3000.

Whichever utility you elect to use, ensure that:

1. The file type on disk is Binary
2. The file size on disk is exactly 12288 bytes, or 12544 bytes for an RMX file.

If you are using a floppy emulator such as Floppy Emu or wDrive, you may now copy the disk image to SD card and use it to boot the computer. If you are using physical media, you can transfer the disk image to the Apple II using ADTpro (see https://www.adtpro.com/).

Uploading the ROM Image

The ROM image may now be uploaded via the U)pload command from the ROMX menu, or alternatively using the same command from the disk based version of the firmware ROMX.DISK. See the section titled U)PLOAD NEW BOOT IMAGE for further information.

Creating an RMX File

If you are looking to create an image to share with other ROMX users, then it is recommended that you use the RMX format. An RMX file contains an additional 256 bytes of metadata at the end of the ROM image, where the metadata is the Description and Information text which will be pre-populated when the image is uploaded to ROMX.
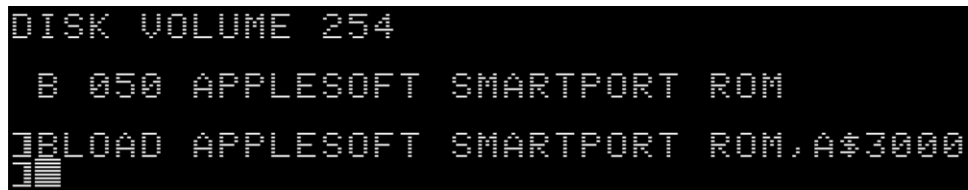
To create an RMX file:

1. Load the ROM Image into RAM
2. Generate the metadata using the INFO GEN 3 utility
3. Save the RMX file

Loading the ROM Image Into RAM

Load the new ROM at address $3000 using the command:

```
BLOAD filename,A$3000
```

```
DISK VOLUME 254

 B 050 APPLESOFT SMARTPORT ROM

]BLOAD APPLESOFT SMARTPORT ROM,A$3000
```

Generating Description and Information Text

ROMX supports a ROM description of up to 35 characters, which will be displayed alongside the image number on the main menu.

In addition to the image description, 144 characters of additional information or notes for the image can be stored and displayed on the information page.

When building an RMX file, this metadata can be created by running the INFOGEN utility that is found on the 992 ROMX Utility disk.

Run the INFOGEN utility using the command:

```
RUN INFO GEN 3
```

The ROM Exchange Image Info Generator should load and prompt you to enter an image description. A maximum of 35 characters is allowed, including any required link suffixes.

```
ROM EXCHANGE IMAGE INFO GENERATOR


ENTER DESCRIPTION:
APPLESOFT BASIC SMARTPORT PATCH &T1▓
```

After accepting the description by pressing the Enter key, you will be prompted to enter the image information that will be displayed on the I)NFO page. You can use the left and right arrows to move from line to line. What you see here is exactly as it will be displayed in the I)NFO page:

```
ROM EXCHANGE IMAGE INFO GENERATOR


ENTER DESCRIPTION:
APPLESOFT BASIC SMARTPORT PATCH &T1

ENTER ADDITIONAL INFO:
APPLESOFT BASIC WITH PATCHED F8 ROM
TO ALLOW DISCOVERY OF SMARTPORT
DEVICES WITH SOFTSP CARD ETC.▓
```

Pressing the Enter key will write the metadata to memory.

Double check the information you entered - If you made an error, re-run the INFO GEN 3 utility and edit the information. Whilst description and information text can be edited after the image is uploaded, it is important to ensure that the RMX file is correct in the first instance if you intend to share it.

Save the ROM Image

Once the information has been generated, the RMX file can be saved to disk. This is a simple matter of using the BSAVE command to save the memory contents to disk:

Save the new ROM RMX file to disk using the command:

```
BSAVE filename,A$3000,L$3100
```

The resulting image file can now be shared via jdmicro@jdmicro.com (we'll put it up on the web page with credit) and uploaded to your own ROMX either through the firmware U)PLOAD process or by using the same U)PLOAD function from the disk based version ROMX.DISK.

Adding a DOS Image

ROMX firmware v0.963 upward supports uploading of DOS images into ROM slots. A system ROM image may then be linked to a DOS image – when the system ROM is selected the computer will instantly boot DOS! This can be quite a time saver – DOS commands can be executed immediately after selecting the ROM.

In the example below a DOS 3.3 image has been uploaded into slot F (item 1). An Applesoft Basic image (FPBASIC from the ROMX System and Utilities Disk) has then been loaded into slot A and associated with the DOS image by placing &DF in the description (item 2) where F refers to the DOS image slot number. The &D*n* has to be in positions 30-32 of the description line – see Adding a ROM Image for further detail.

```
********** ROM EXCHANGE **********
* 1) APPLESOFT BASIC
  2) APPLESOFT BASIC LOWER CASE        &T2
  3) INTEGER,AUTO F8,INSPECTOR,WATSON
  4) INTEGER,AUTO F8,INSPECTOR,PROG AID
  5) INTEGER,NO-AUTO F8,INSPECTOR,WATSON
  6) INTEGER,FREEZE F8,INSP,WATSON    &TC
  7) INTEGER,LOCKBUSTER F8,INSP,WATSON
  8) APPLE II J PLUS                  &TA
  9) APPLE 1 EMULATION
  A) APPLESOFT BASIC - DOS 3.3    &DF   ◄──② 
  B)
  C)
  D) APPLE DIAGNOSTICS
  E)
 ①► F) DOS 3.3 IMAGE - S6,D1
I)NFO FOR IMAGE
S)ET DEFAULT BOOT IMAGE    CURRENT = 1
T)EXT CHARGEN ROM DEFAULT  CURRENT = 0
U)PLOAD NEW BOOT IMAGE
X)IT MENU AND BOOT DEFAULT IMAGE > 02

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```

The v0.992 disk image includes a DOS 3.3 Image that you can use. It's currently set up for a drive connected to a controller in Slot 6, but can be modified as follows.

To change the Default slot number, BLOAD the image at address $3000, and then modify location $4AE9 before running ROMX.DISK. Use Slot*16, e.g. $60=Slot 6.

To change the Default drive number, BLOAD the image at address $3000, and then modify location $4AEA before running ROMX.DISK. Use $01=Drive 1, $02 = Drive 2.

The DOS ROM is then uploaded following the regular upload process. One or more system ROM images may then be associated to it (see Adding a ROM Image).

Please note that this feature currently requires 48KB RAM in your Apple II.

Creating a DOS Image

You may create your own ROMX DOS images as below.

1. Load your favorite DOS replacement (DubbleDOS or DoubleDOS, DiversiDos, etc)
2. Insert the ROMX system and Utility Disk and BLOAD DOS 3.3 IMAGE HELLO, A$2000 (you can optionally BLOAD DOS 3.3 IMAGE FAST, A$3000 if you don't want it to run HELLO at boot).
3. Enter the monitor (CALL -151)
4. Copy data at address $9D00 through $BFFF to address $3000 using the command

   3000<9D00.BFFFM

5. Optionally, use the INFO GEN utility to add the description and information metadata
6. Save a copy of your new ROMX DOS image using the command

   BSAVE *filename*, A$3000,L$3100

7. BRUN ROMX.DISK and upload your new ROMX DOS image to a ROM bank of your choice.
8. Share the new DOS image! We can put it up on The ROM Exchange for others to enjoy (https://theromexchange.com)

Updating the ROMX Firmware

The ROMX firmware update process is almost identical to the regular ROM upload process and can be done either through the firmware when the computer is first powered on, else by running the disk based version of the firmware ROMX.DISK.

Insert the ROMX Systems and Utilities disk containing the ROMX.FIRM firmware file, and select U)PLOAD from the main menu, then P to pick a file from disk.

Select the firmware image and when prompted for the Bank to Program, select Bank 0:

If a valid firmware image is found, then you will be prompted to confirm the update – press the Y key to continue:

At the bottom of the screen you are then prompted to press U to upload or any other key to exit.

```
********** ROM EXCHANGE **********
* 1) APPLESOFT BASIC
  2) APPLESOFT BASIC LOWER CASE        &T2
  3) INTEGER,AUTO F8,INSPECTOR,WATSON
  4) INTEGER,AUTO F8,INSPECTOR,PROG AID
  5) INTEGER,NO-AUTO F8,INSPECTOR,WATSON
  6) INTEGER,FREEZE F8,INSP,WATSON    &TC
  7) INTEGER,LOCKBUSTER F8,INSP,WATSON
  8) APPLE II J PLUS                   &TA
  9) APPLE 1 EMULATION
  A)
  B)
  C)
  D) APPLE DIAGNOSTICS
  E)
********************************************
*                                          *
*YOU ARE ABOUT TO MODIFY ROMX FIRMWARE  *
*   CONFIRM UPLOAD OF BANK 0  (Y)        *
*                                          *
********************************************
PRESS U TO UPLOAD; ANY OTHER KEY TO EXIT
```

Press U to commit the firmware update to flash.

Once updated, power the computer off and back on again to ensure that the new firmware has been installed successfully. The firmware version will be displayed on the I)NFO page.

If for some reason you experience an issue when updating the firmware (such as power outage mid cycle!), then you may be left with a machine that will no longer boot.

In this scenario, follow the instructions in the Recovery Mode section to recover your ROMX module from such an event.

Recovery Mode

If you should experience an issue when updating the firmware such as a power outage mid programming cycle, then you may be left with a machine that will no longer boot.

To recover from such an event, turn off the computer, open the lid of the case and touch the power supply to discharge any static electricity that may have accumulated on your body. Then remove the J1 jumper from the ROMX module to enable Recovery Mode. The J1 jumper is next to the ROM-Link header.

After removing the J1 jumper, turn the computer back on. Rather than running the regular ROMX firmware and displaying the menu, a special recovery firmware will be executed. The computer will initially perform a memory test on the lower 2KB of RAM during which the screen will cycle through pages of inverse characters.

If you should have any RAM issues in the lower memory bank, the recovery firmware will beep out the number of the chip that is faulty from left to right (e.g. 3 beeps indicates an issue with the 3rd chip from the left, on the row closest to the keyboard).

If the RAM test passes, the following screen will be displayed:

Set up your system to boot using the ROMX System and Utilities disk image, then select a ROM image to boot by pressing a key in the range 1-9, A-F.

The ROMX module is supplied with all ROM slots filled – even the blank images slots A,B,C,E and F contain valid ROM images so the chances of you having a ROM image installed that you can boot from should be very good.

If for some reason you do not have any valid ROM images installed on your ROMX module, then please make contact via email so as we can try get you up and running again.

Once you have successfully booted the system using the ROMX System and Utilities disk, while leaving the computer on, reinstall the recovery jumper on the ROMX module.

You can now follow the section Updating the ROMX Firmware to re-install the firmware image.

Note that if you are recovering from a corrupted firmware image, then you will find that whilst the ROM images you had previously installed on the module will still be present (and can be booted by pressing keys 1-9,A-F), the text description and information for the installed images may have been lost:

```
*********** ROM EXCHANGE ***********
* 1)
  2)
  3)
  4)
  5)
  6)
  7)
  8)
  9)
  A)
  B)
  C)
  D)
  E)
  F)
I)NFO FOR IMAGE
S)ET DEFAULT BOOT IMAGE      CURRENT = 1
T)EXT CHARGEN ROM DEFAULT    CURRENT = 0
U)PLOAD NEW BOOT IMAGE
X)IT MENU AND BOOT DEFAULT IMAGE

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```

You will have to re-upload the images one by one to repair the menu. The factory RMX image files containing the ROM, description and information text are available for download from https://theromexchange.com.

Testing

The recovery mode is quite safe to test provided you follow the instructions below.

Pull the jumper and turn on the computer - it will do the memory test then display the recovery menu. Press a key 1-9, A-F to boot using the selected ROM image.

As long as you now reinstall the jumper BEFORE running ROMX.DISK then everything is back to normal, and the existing menu will remain intact if you were to the use a feature within ROMX.DISK that writes settings or data to flash.

If you were to reinstall the jumper AFTER running ROMX.DISK then the current version of ROMX.DISK would warn you that it cannot find the ROMX board and thus will show no current descriptions. It would erase the descriptions if you tried to update any settings.

This is because all the descriptions are stored in the firmware image – with the recovery jumper removed, the firmware image is not visible to ROMX as it has been swapped out for the recovery image. When running ROMX.DISK, if existing descriptions from the firmware image are not visible it sets them to blanks. A setting change to the system when in this state, will commit all the blank fields to flash.