ROMXce+

Apple II, II+, IIc, IIc+, IIe

User Guide

Revision 1.2.0 – April 2024

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JD MICRO

Contents

ROMX Overview

Thank you for purchasing ROMX! We hope that you have some fun playing around with different ROM images, and maybe even have a go at ROMifying some utilities/games/applications to share!

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

This user guide documents the features available on ROMX Apple IIc, IIc+, IIe and ROMX+ Apple II, II+ for firmware version 1.2.0. If you have an earlier version of the firmware installed, we recommend updating your firmware to the current release (see Updating the ROMX Firmware in this guide).

ROMX is an in-system programmable device that replace the system ROM(s) in your Apple II, II+, IIc, IIc+ or Apple IIe computer. It stores up to 15 ROM images and presents them for selection via an on-screen menu system. In addition, the menu system itself (the ROMX firmware) is programmable in-system.

Being in-system programmable means that you can re-program ROMX with your own ROM images without removing the device from your computer, and without need for an external programmer. Uploading of new ROM images is done through either the ROMX menu, or by running the ROMXCE.DISK utility from the ROMXce Utility Disk image. The firmware is also upgradeable using the same process.

A ROM image doesn't have to be a system ROM! We've ROMified DOS images as well as games and utilities. Linking a System ROM image to a DOS image means you can boot DOS *instantly*. ROMified games also load instantly. There are also a number of diagnostic ROM images available.

ROMX Apple IIc, IIc+, IIe and ROMX+ Apple II, II+ have an on-board real-time clock with battery backup. A custom clock driver has been built for ProDOS allowing you to boot ProDOS instantly, with support for the real-time clock.

They also feature a ROM-Link interface that connects the ROMX board to an optional ROMX text/video ROM module. The ROMX menu allows you to select one of 16 fonts to use as the default, or to associate a font with a specific ROM image. For ROMXc/c+/e, a second bank of 16 fonts can be enabled by using a switch (stock keyboard switch for 28pin video ROM, or user installed switch for 24 pin video ROM), giving a total of 32 fonts. See the Text/Video ROM section for the list of available fonts.

Note that the text/video ROM module is not in-system programmable, however the programming adapter PCB design has been made freely available. Using the adapter, the video ROM can be reprogrammed in an EPROM programmer if you would like to further customise the font selection.

Should a firmware update fail for any reason (power outage, etc), ROMX includes a physical recovery jumper. By removing the jumper, a special recovery menu is launched from where you can boot the system and re-flash the firmware.

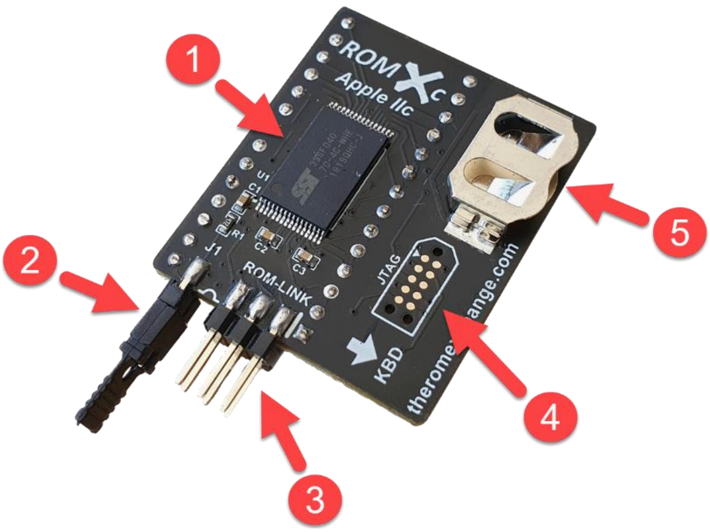
Firmware 1.2.0 supports accelerators such as ZIP chips, UltraWarp, and FASTchip as well as the built-in accelerator in the Apple //c+. Per image acceleration settings are available (see the I)nfo for image section in this guide for further details).

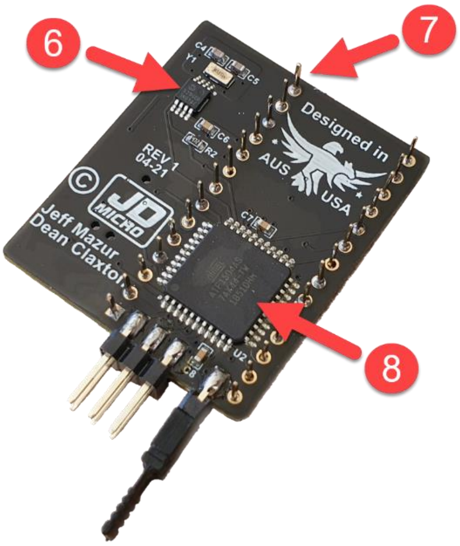
ROMX ships with a default set of system ROM images pre-installed for your enjoyment.

ROMXc Hardware

When the Apple IIc was first introduced, a 16KB Monitor ROM known as ROM 255 or ROM $FF was used. The hardware was designed with onboard solder jumpers to enable a 32KB ROM however, and later machines shipped with a 32KB Monitor ROM.

ROMXc includes images of all the major ROM revisions that were shipped. If you have a 16KB ROM machine you will need to perform the 32KB ROM modifications – see the ROMXc Installation Guide for further details.



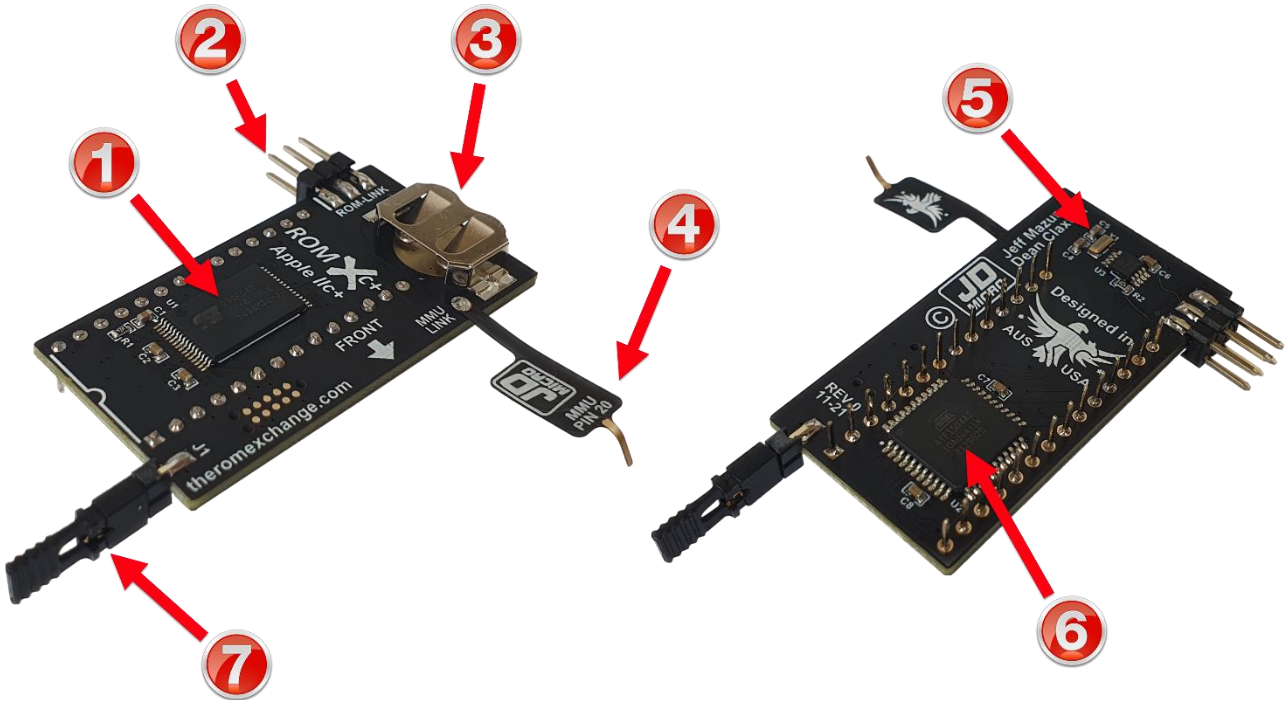


1. 4Mbit Flash Memory
2. Recovery Jumper (normally installed). Remove to enable recovery mode. See the Recovery Mode section for further details).
3. ROM-Link header for link to the ROMXce Video ROM – Pin 1 end (white bar on PCB)
4. JTAG header (production programming only – do not use)
5. Battery holder for CR1220 RTC backup battery
6. Real Time Clock
7. Pin headers (legs)
8. CPLD (Complex Programmable Logic Device)

ROMXc+ Hardware

The Apple IIc+ was the sixth and final model in the Apple II series, and had a few major enhancements versus the Apple IIc. It included a 3.5" floppy disk drive for greater storage capacity (800KB), a built-in cpu accelerator that could run at speeds of up to 4MHz, and an internal Sony power supply in place of the external "Brick On a Leash" IIc power supply.

1. In order to support this device with ROMX it was necessary to connect to a signal on the MMU. The flexible MMU-Link PCB shown below was designed for this purpose – it sits underneath the MMU with the gold pin inserted into the MMU socket. An alternative MMU-Link method is also available for modules that will see multiple installation cycles (see document ROMXc+ MMU Link Options.pdf on theromexchange.com for further details).

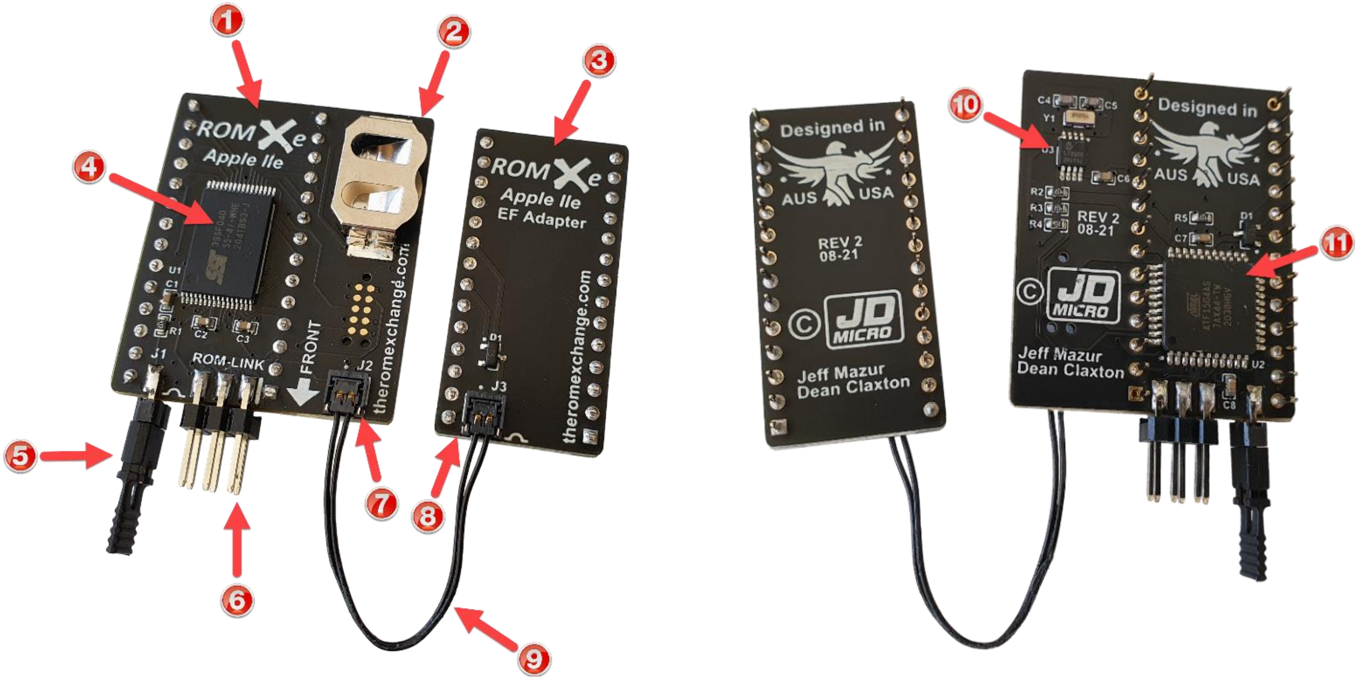


1. 4Mbit Flash Memory.
2. ROM-Link header for link to the ROMXce Video ROM – Pin 1 end (white bar on PCB).
3. Battery holder for CR1220 RTC backup battery.
4. MMU-Link flex cable.
5. Real Time Clock circuitry.
6. CPLD (Complex Programmable Logic Device).
7. Recovery Jumper (normally installed). Remove to enable recovery mode.

ROMXe Hardware

When the Apple IIe was first introduced, the 16KB System ROM was stored in two 8KB ROM chips. These are known as the CD ROM ($**C**100-$**D**FFF), and the EF ROM ($**E**000-$**F**FFF). Later, when the Extended Keyboard or Platinum Apple IIe was introduced, the 16KB System ROM was stored in a single 16KB ROM chip known as the CF ROM ($**C**100-$**F**FFF).

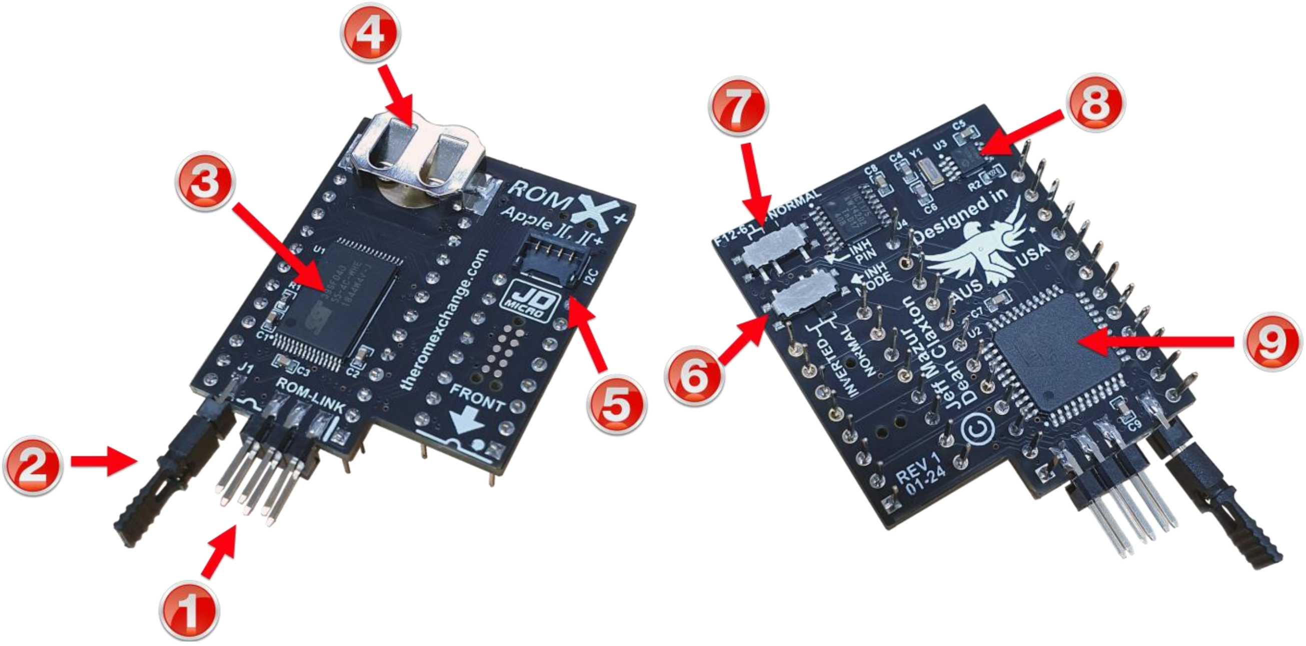
ROMXe was designed to support both single and dual ROM socket configurations – the main ROMXe printed circuit board (PCB) is used alone for single socket (CF ROM) motherboards, and used in conjunction with a ROMXe EF Adapter PCB for dual socket (CD, EF ROM) motherboards. In the dual socket configuration, an EF-Link cable is used to connect the ROMXe EF Adapter PCB to the main ROMXe PCB.



1. ROMXe Printed Circuit Board (PCB).
2. Battery holder for CR1220 RTC backup battery.
3. ROMXe EF Adapter PCB.
4. 4Mbit flash memory chip.
5. Recovery jumper.
6. ROM-Link header – Pin 1 end (white bar on PCB).
7. EF-Link J2 header.
8. EF-Link J3 header.
9. EF-Link cable.
10. RTC (Real-Time Clock).
11. CPLD (Complex Programmable Logic Device).

ROMX+ Hardware

ROMX for Apple II/II+ was the first product developed by JD Micro. Later products such as ROMXc, ROMXc+ and ROMXe were all built upon its success, adding features such as the real-time clock, and a larger flash memory to support 32KB ROM images. With ROMX+ we've been able to circle back to the Apple II/II+ platform and bring the original ROMX up to the same specification. In fact we went a step further, and added a header for I2C (Inter-Integrated Circuit) devices such as a small LCD display that can be used to display the ROM selection.



1. ROM-Link header – Pin 1 end (white bar on PCB).
2. Recovery Jumper
3. 4Mbit flash memory chip.
4. Battery holder for CR1220 RTC backup battery.
5. I2C Header (see ROMX+ Installation Guide for pinout).
6. Inhibit polarity inversion switch.
7. Inbibit pin selection switch.
8. RTC (Real-Time Clock).
9. CPLD (Complex Programmable Logic Device).

When installing ROMX+, ensure that the switches on the underside of the board are in the correct positions for your motherboard. For a genuine Apple computer, set them both to the NORMAL position (this is the default shipping position). Some clone motherboards invert the Inhibit signal in which case the Inhibit polarity switch should be set to INVERTED.

ROMX+ emulates the INTCXROM soft switch, enabling use of 16KB ROM space versus the stock Apple II/II+ 12KB ROM space (this feature can be disabled via the CXROM.CONTROL program if a compatibility issue should arise).

ROMX Text/Video ROMs

ROMX text/video ROMs contain multiple fonts (including the stock Apple fonts) that you can use as the system default, or link with specific system ROM images. The font selection is controlled through the ROMX menu system, and the ROMX text/video ROM is supplied with a ROM-Link cable that is used to connect it with the ROMX module (see the installation guide for your ROMX version for further detail).

For the Apple IIe, IIc, and IIc+ platforms we created two versions of the ROMXce video ROM. A 28 pin version for Apple IIc/IIc+ and international IIe, and a 24 pin version for US Apple IIe. Both versions contain the same content - 32 fonts, divided into 2 banks of 16 fonts.

See APPENDIX 1 : ROMXce Video ROM Fonts for a list of included fonts for the ROMXce 24/28 pin video ROMs.

For the Apple II, II+ platform we created the ROMX text ROM again in two different versions – the ROMX 2316B SPCL for revision 7 motherboards, and the ROMX 2513 for pre-revision 7 motherboards. Each contains the same content - 16 fonts.

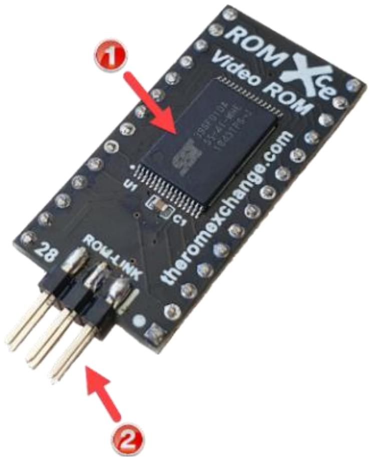
See APPENDIX 2: ROMX+ 2316B/2513 Text ROM Fonts for a list of included fonts for the ROMX 2316B SPCL and 2513 text ROMs.

NOTE for ROMX+ : Whilst the ROMX text ROMs contain many fonts that include lower case characters, the Apple II/II+ does not natively support lower case text entry. You will have to install the Shift Key Mod if you wish to be able to enter lower case text.

ROMXce 28 Pin Video ROM

The 28 pin ROMXce video ROM is used in Apple IIc, IIc+, and international Apple IIe computers.

Font bank selection is via the stock keyboard switch fitted to the underside of the international Apple IIe keyboard, or the Keyboard switch on the top side of the Apple IIc and IIc+.

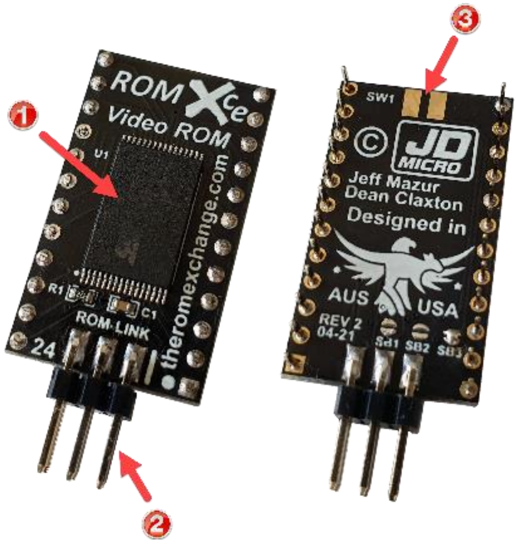


1. 1 Mbit Flash Memory.
2. ROM-Link Header – Pin 1 end (white bar on PCB).

ROMXce 24 Pin Video ROM

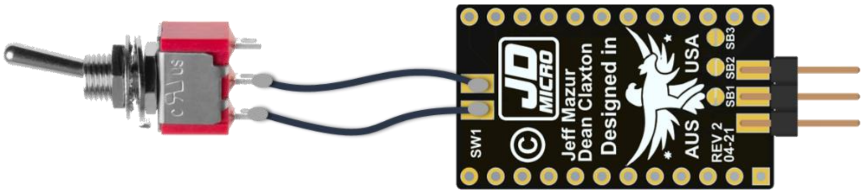
The 24 pin ROMXce video ROM is used in US Apple IIe computers with 24 pin video ROM sockets.

Font bank selection is via a user installed switch or jumper on the SW1 pads.



1. 1Mbit Flash Memory.
2. ROM-Link Header – Pin 1 end (white bar on PCB).
3. Connection pads for external keyboard switch.

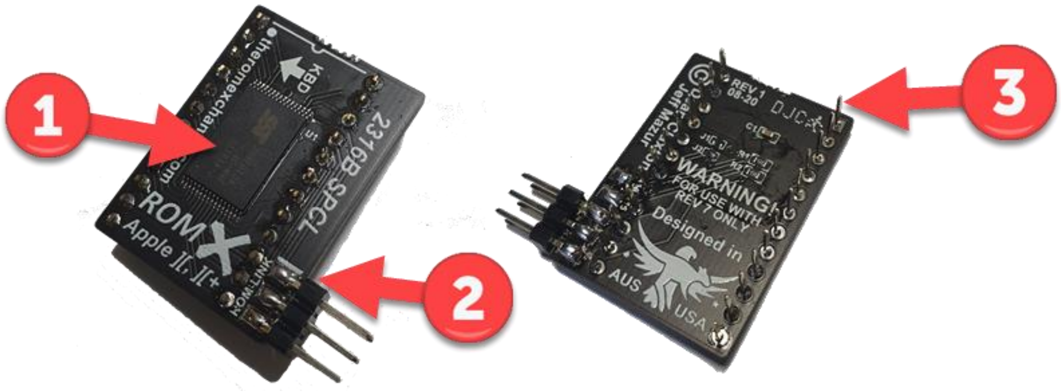
A user installed bank selection switch can be installed as shown below:



In this example font bank 1 would be selected with the switch in the up position, and switch bank 2 when switched to the down position.

ROMX+ 2316B SPCL Text ROM

The ROMX 2513B SPCL text ROM supports Rev 7 Apple II+ motherboards which would be originally fitted with 2316 SPCL ROM. It contains 16 different fonts – many include upper and lower case.

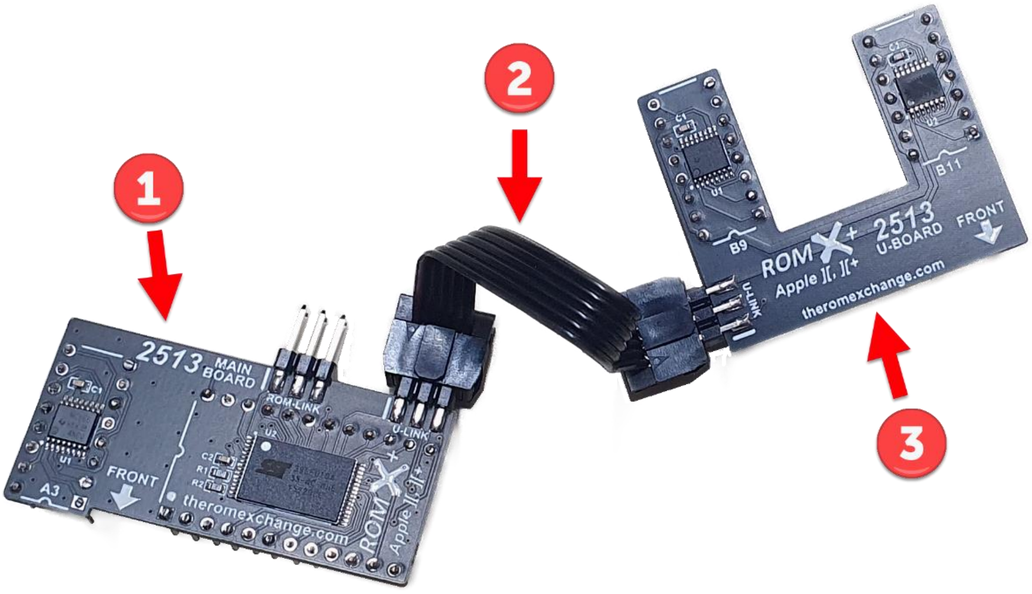


1. 1Mbit Flash Memory
2. ROM-Link Header – Pin 1 end (white bar on PCB)
3. Pin headers (legs)

See APPENDIX 2: ROMX+ 2316B SPCL/2513 Text ROM Fonts for a list of included fonts.

ROMX+ 2513 Video 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 consisting of the main 2513 PCB which plugs into the A3 and 2513 sockets, and a U-Board that spans the B9 and B11 sockets. The two boards are connected via a U-Link cable that connects to a U-Link header on each board.



1. 2513 Main Board with 1Mbit Flash Memory
2. U-Link Cable
3. U-Board

The 2513 Main Board also has a ROM-Link header that is used to connect it to the ROMX+ board via the ROM-Link cable.

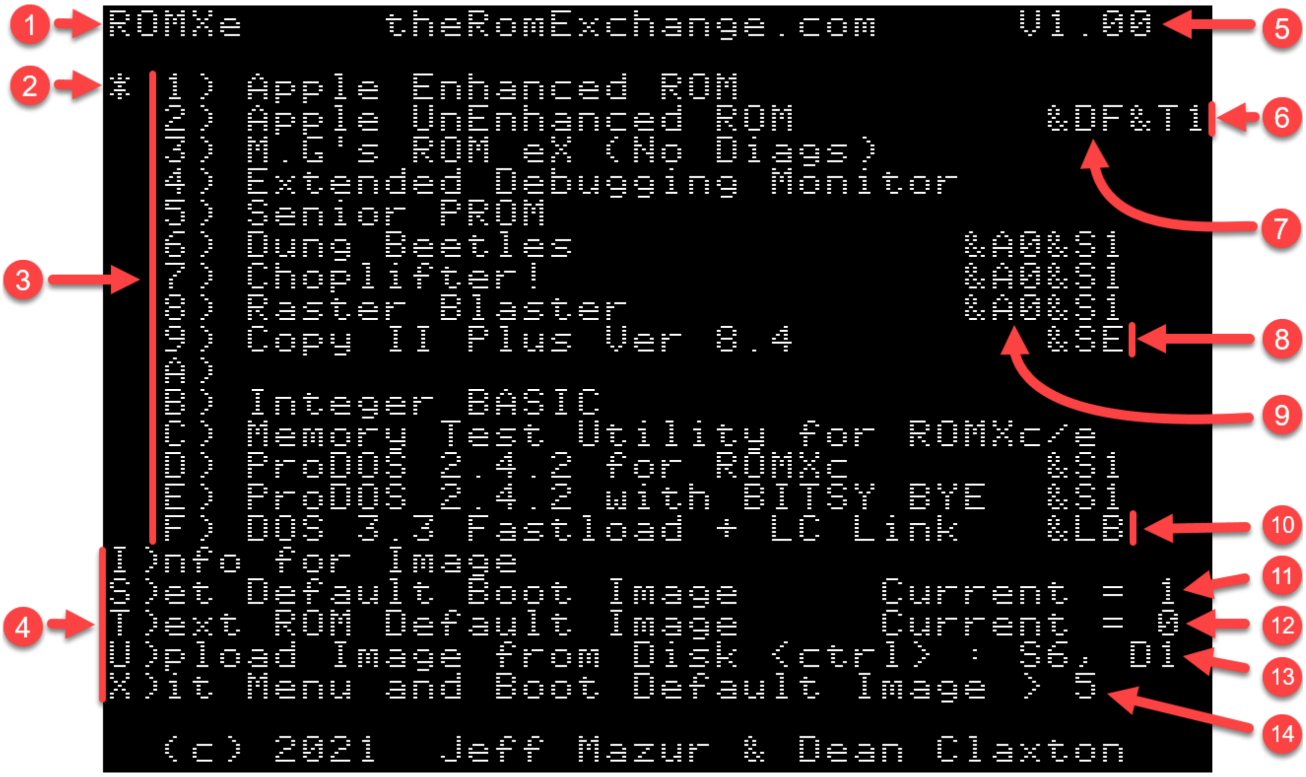
The same 16 fonts as the ROMX 2316B SPCL are supported (the 1Mbit flash chip contains the very same image), with many including lower case text. See APPENDIX 2: ROMX+ 2316B SPCL/2513 Text ROM Fonts for a list of included fonts.

ROMX Menu System

Overview

ROMX pre-loaded ROM images vary between models, however the menu system operates in the same manner.

The ROMX menu system is structured as below:



```
ROMXe     theRomExchange.com     V1.00
* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM        &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor
  5) Senior PROM
  6) Dung Beetles             &A0&S1
  7) Choplifter!              &A0&S1
  8) Raster Blaster           &A0&S1
  9) Copy II Plus Ver 8.4        &SE
  A)
  B) Integer BASIC
  C) Memory Test Utility for ROMXc/e
  D) ProDOS 2.4.2 for ROMXc      &S1
  E) ProDOS 2.4.2 with BITSY BYE &S1
  F) DOS 3.3 Fastload + LC Link  &LB
I)nfo for Image
S)et Default Boot Image     Current = 1
T)ext ROM Default Image     Current = 0
U)pload Image from Disk <ctrl> : S6, D1
X)it Menu and Boot Default Image > 5

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```

1. ROMX model (ROMXc, ROMXe, ROMXc+, ROMX+).
2. Asterisk to the left of the ROM image menu shows the current default ROM image, which is also shown at item 11.
3. ROM image selection menu - pressing a key 1 through F will immediately boot the computer using the selected ROM image.
4. ROMX command menu.
5. ROMX firmware version.
6. Example &Tn Text ROM associations (active with ROMXce video ROM module installed).
7. Example &Dn DOS Image association (links ROM with DOS 3.3 Image loaded in slot F).
8. Example &Sn System ROM link for an application (linked system ROM is loaded before launching the application image).
9. Example &An Acceleration control – sets accelerator speed for ROM image.
10. Example &Ln language card link for a DOS Image (DOS image loads the linked language card image into the language card memory).
11. Default Boot ROM image
12. Default Video/Text ROM image.
13. Default Disk][slot and drive number used for image U)pload.
14. Menu delay countdown timer.

On initial power-up, the ROMX menu will be displayed for a period determined by the boot delay setting. 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 2 and 11 above).

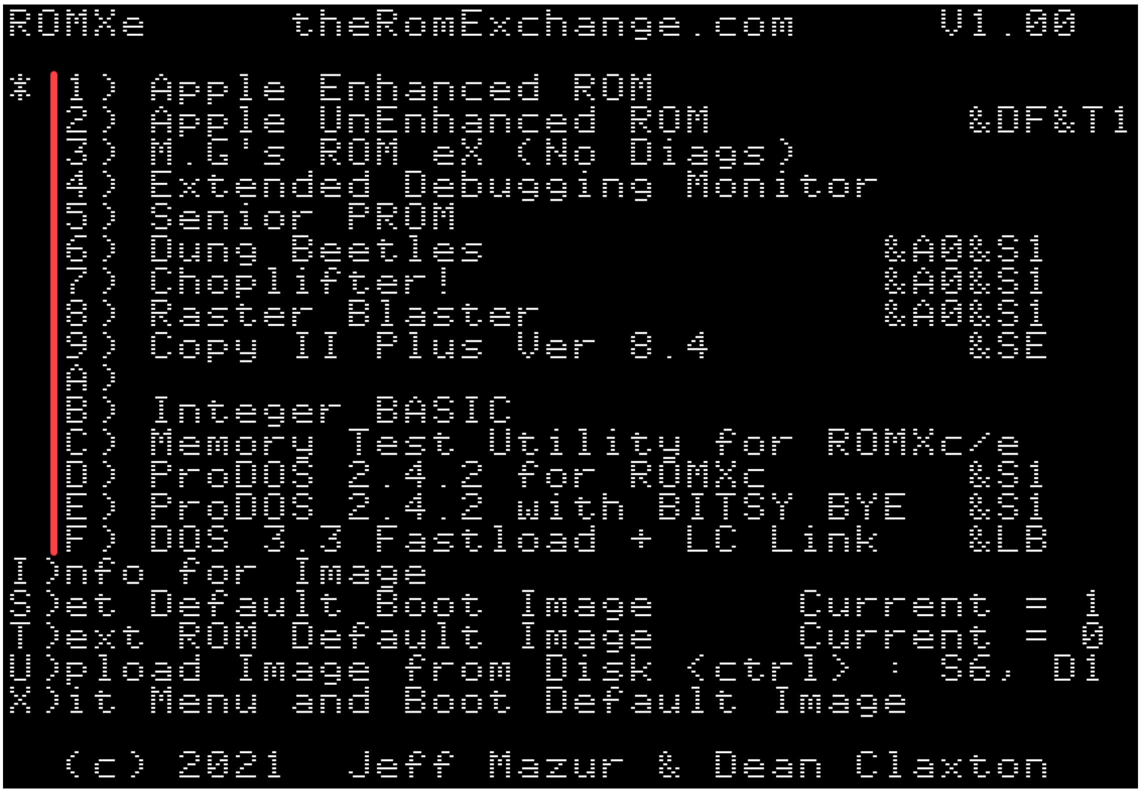
The boot delay timer has a user adjustable range from 0 to approximately 5.2 seconds. Selecting a boot delay of 0 will bypass the menu completely on power up. You will then have to use the disk version of the firmware (ROMXCE.DISK) to make further changes. See section *Editing the Delay Timer.*

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

NOTE : Firmware 1.1.4 and above treat a boot delay of F as Forever or Infinite Delay.

Image Selection Menu

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



```
ROMXe     theRomExchange.com     V1.00

* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM         &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor
  5) Senior PROM
  6) Dung Beetles              &A0&S1
  7) Choplifter!               &A0&S1
  8) Raster Blaster            &A0&S1
  9) Copy II Plus Ver 8.4         &SE
  A)
  B) Integer BASIC
  C) Memory Test Utility for ROMXc/e
  D) ProDOS 2.4.2 for ROMXc       &S1
  E) ProDOS 2.4.2 with BITSY BYE  &S1
  F) DOS 3.3 Fastload + LC Link   &LB
I)nfo for Image
S)et Default Boot Image     Current = 1
T)ext ROM Default Image     Current = 0
U)pload Image from Disk <ctrl> : S6, D1
X)it Menu and Boot Default Image

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```

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 a ROMXce Video ROM installed, selecting one of these images will automatically switch the font via the ROM-Link interface. Text ROM associations override the default video ROM setting.

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

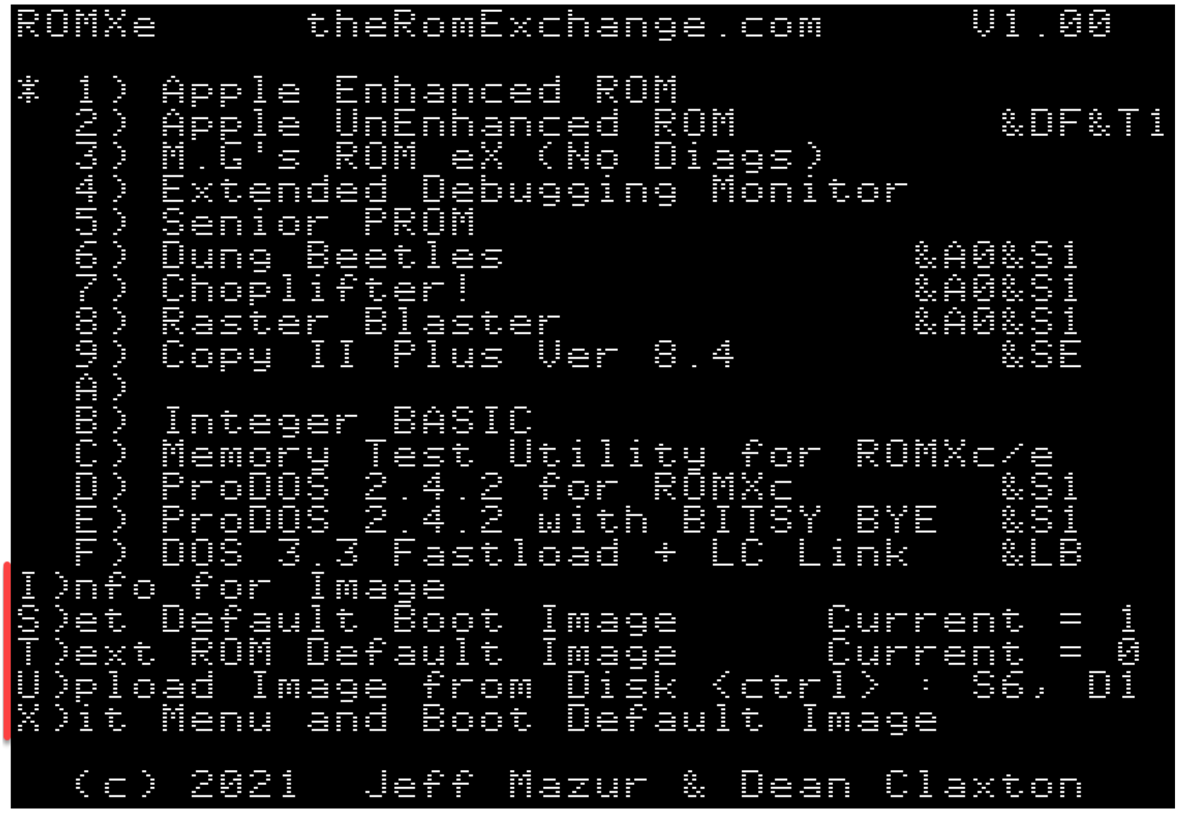
Details on uploading a custom ROM image are covered in the Adding a ROM Image section.

NOTE: It is possible to programmatically switch between system ROM images and video ROM images. See the ROMXce API Reference in the Documentation section at 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)Set Default Boot Image
- T)ext ROM Default Image
- U)pload Image from Disk
- X)it Menu and Boot Default Image



```
ROMXe     theRomExchange.com     V1.00

* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM         &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor
  5) Senior PROM
  6) Dung Beetles              &A0&S1
  7) Choplifter!               &A0&S1
  8) Raster Blaster            &A0&S1
  9) Copy II Plus Ver 8.4         &SE
  A)
  B) Integer BASIC
  C) Memory Test Utility for ROMXc/e
  D) ProDOS 2.4.2 for ROMXc       &S1
  E) ProDOS 2.4.2 with BITSY BYE  &S1
  F) DOS 3.3 Fastload + LC Link   &LB
I)nfo for Image
S)et Default Boot Image     Current = 1
T)ext ROM Default Image     Current = 0
U)pload Image from Disk <ctrl> : S6, D1
X)it Menu and Boot Default Image

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```

These command options are detailed in the following sections.

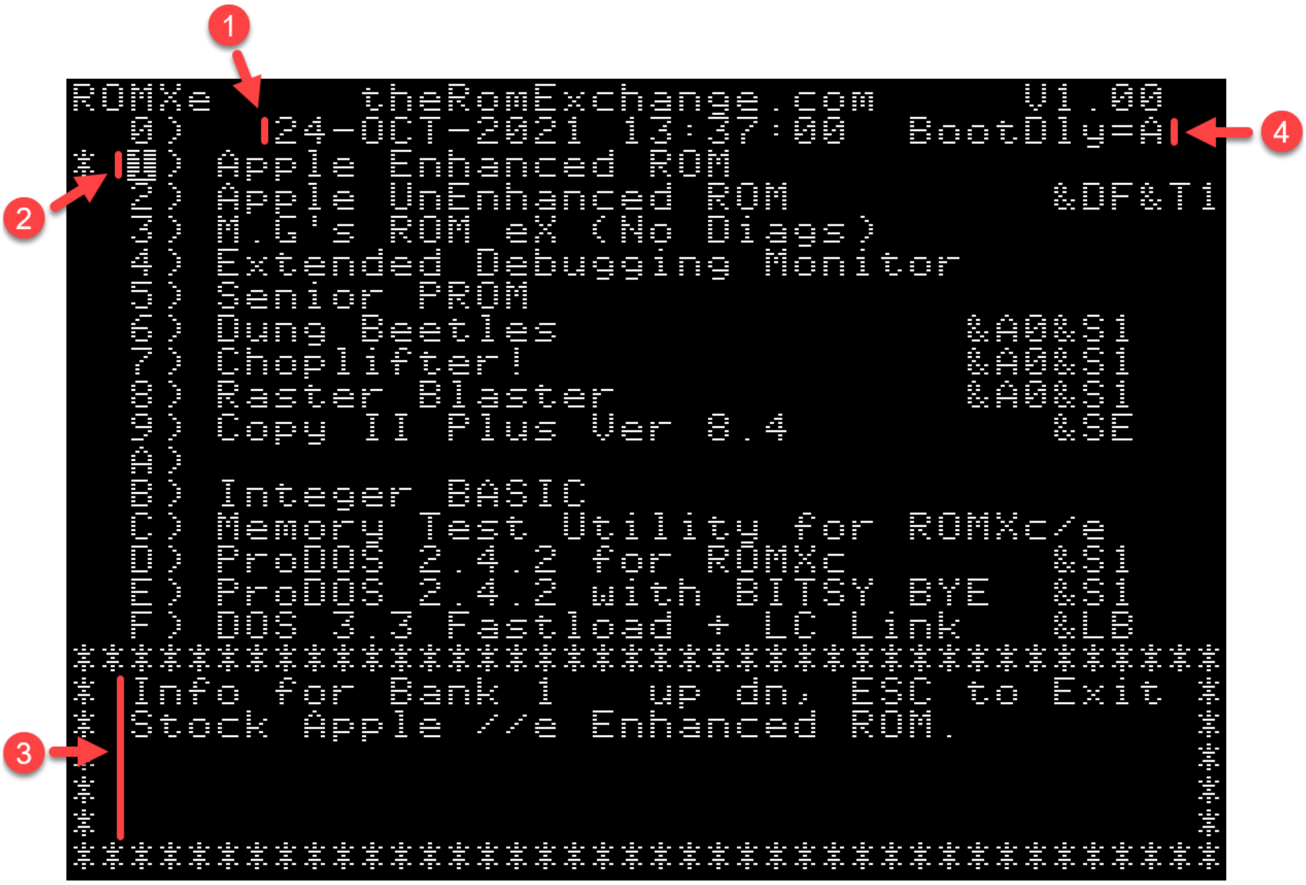
IMPORTANT NOTE for ROMX+

Since the Apple II/II+ keyboard is limited compared to later models, you will need to use these keyboard shortcuts for TAB and LEFT/RIGHT arrow keys :

TAB	=	*CTRL-I*
DOWN ARROW	=	*CTRL-J*
UP ARROW	=	*CTRL-K*

I)nfo for Image

From the main menu, pressing the I key will invoke the I)nfo for Image command, which will display the Information page:



```
ROMXe     theRomExchange.com     V1.00
  0)   24-OCT-2021 13:37:00  BootDly=A
* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM         &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor
  5) Senior PROM
  6) Dung Beetles              &A0&S1
  7) Choplifter!               &A0&S1
  8) Raster Blaster            &A0&S1
  9) Copy II Plus Ver 8.4         &SE
  A)
  B) Integer BASIC
  C) Memory Test Utility for ROMXc/e
  D) ProDOS 2.4.2 for ROMXc       &S1
  E) ProDOS 2.4.2 with BITSY BYE  &S1
  F) DOS 3.3 Fastload + LC Link   &LB
****************************************
* Info for Bank 1   up dn, ESC to Exit *
* Stock Apple //e Enhanced ROM.        *
*                                      *
*                                      *
*                                      *
****************************************
```

1. Current date and time retrieved from the Real Time Clock (RTC).
2. Currently selected image.
3. Information for selected image.
4. Delay timer setting.

You can use the up/down (or left/right) arrow keys or keys 1-F to move between images, and 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 or adjust the real time **C**lock (CTRL+**C** to edit)
- 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)

Setting the Real-Time Clock

ROMXc/c+/e and ROMX+ all use the Microchip MCP7940N Real-Time Clock chip, with the following major features:

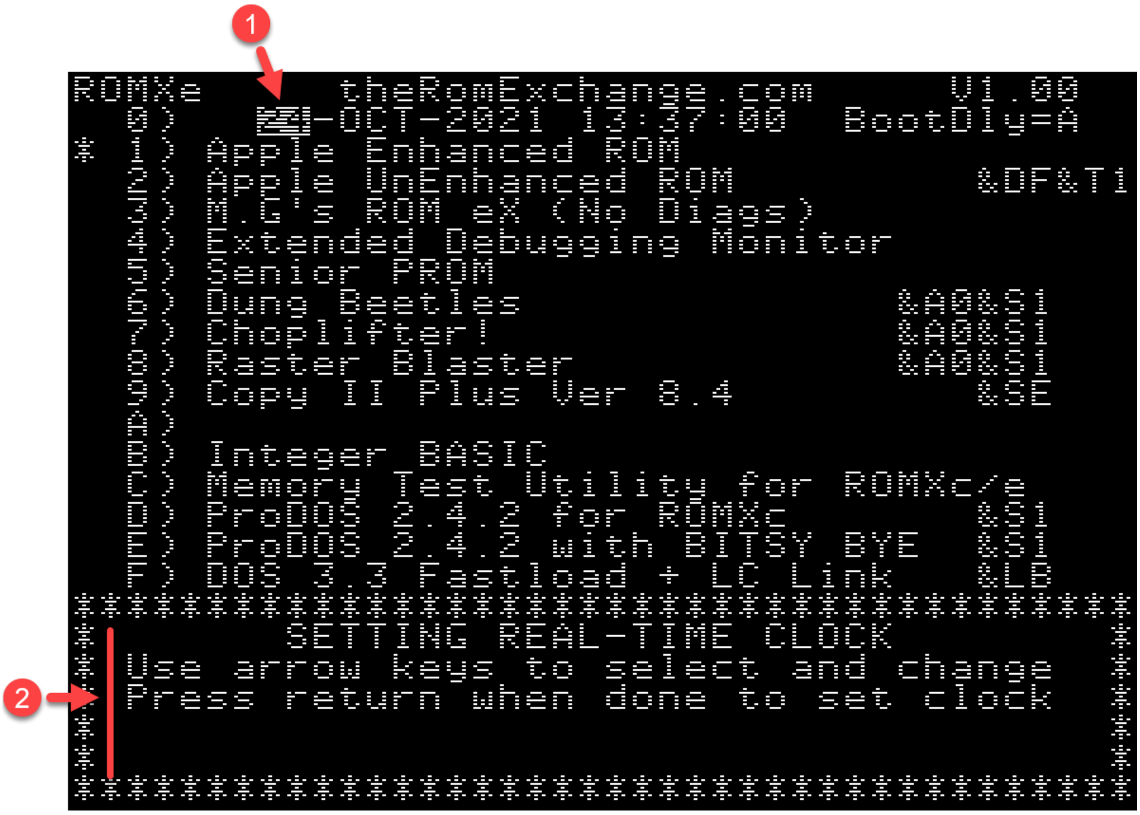
- Battery-backed Real-Time Clock/Calendar
- Hours, Minutes, Seconds, Day of Week, Day, Month, Year
- Leap year compensated to 2399
- On-chip Digital Trimming/Calibration
- 64 Bytes battery-backed SRAM

With a low typical timekeeping current of only 925nA, a quality CR1220 battery (38mAh capacity) should last in the order of 3.5 to 4.5 years.

We have developed a ProDOS driver to support this device and this is available from https://theromexchange.com/utilities/romxce/ROMX%20CLOCK%20DRIVER.zip.

NOTE: Firmware does not currently use the Day of Week register or SRAM, though these may be utilized in a future revision. The CLOCK.SET program on the ROMXce Utility Disks demonstrates how to set and read the Day of Week if you would like to make use of it.

Using the key combination CTRL-C from the Information page, the current date and time may be edited:



```
ROMXe     theRomExchange.com     V1.00
  0)    [illegible]-OCT-2021 13:37:00  BootDly=A
* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM            &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor
  5) Senior PROM
  6) Dung Beetles                  &A0&S1
  7) Choplifter!                   &A0&S1
  8) Raster Blaster                &A0&S1
  9) Copy II Plus Ver 8.4            &SE
  A)
  B) Integer BASIC
  C) Memory Test Utility for ROMXc/e
  D) ProDOS 2.4.2 for ROMXc          &S1
  E) ProDOS 2.4.2 with BITSY BYE     &S1
  F) DOS 3.3 Fastload + LC Link      &LB
****************************************
*       SETTING REAL-TIME CLOCK        *
* Use arrow keys to select and change  *
* Press return when done to set clock  *
*                                      *
*                                      *
****************************************
```

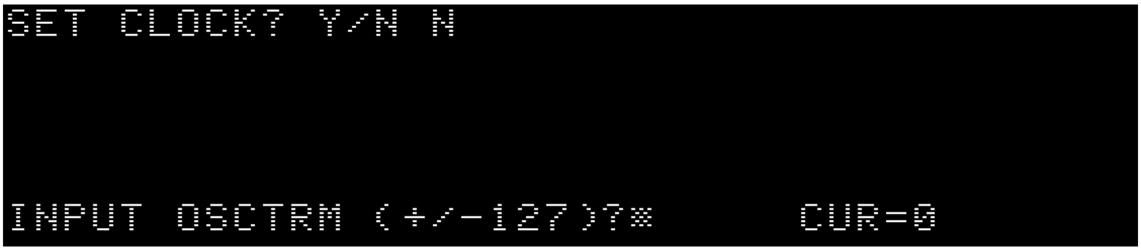
When in edit mode, the current field to be edited will be shown in inverse text as per item 1 above.

Use the left and right arrows to move across the fields (day, month, year, hour, minute, second), and the Up and Down arrows to edit the value (CTRL-K, CTRL-J for ROMX+). Press the Return key to save the changes and exit edit mode.

General instructions are shown in the information text (item 2) at the bottom of the display.

The CLOCK.SET program included on the ROMXce Utility Disk allows adjustment of the OSCTRiM register in the RTC chip. This register contains a 7-bit value plus a sign bit thus allowing a trim value between -127 and +127. Each unit represents roughly 1PPM (part per million) which translates to about 1 second every 11 days.

When using CLOCK SET to adjust the trim, you can bypass setting the clock by first pressing "N" and then enter just the trim value. Note that the current trim setting will be displayed to the right. Pressing the Return key will keep the current setting.



```
SET CLOCK? Y/N N



INPUT OSCTRM (+/-127)?▒      CUR=0
```

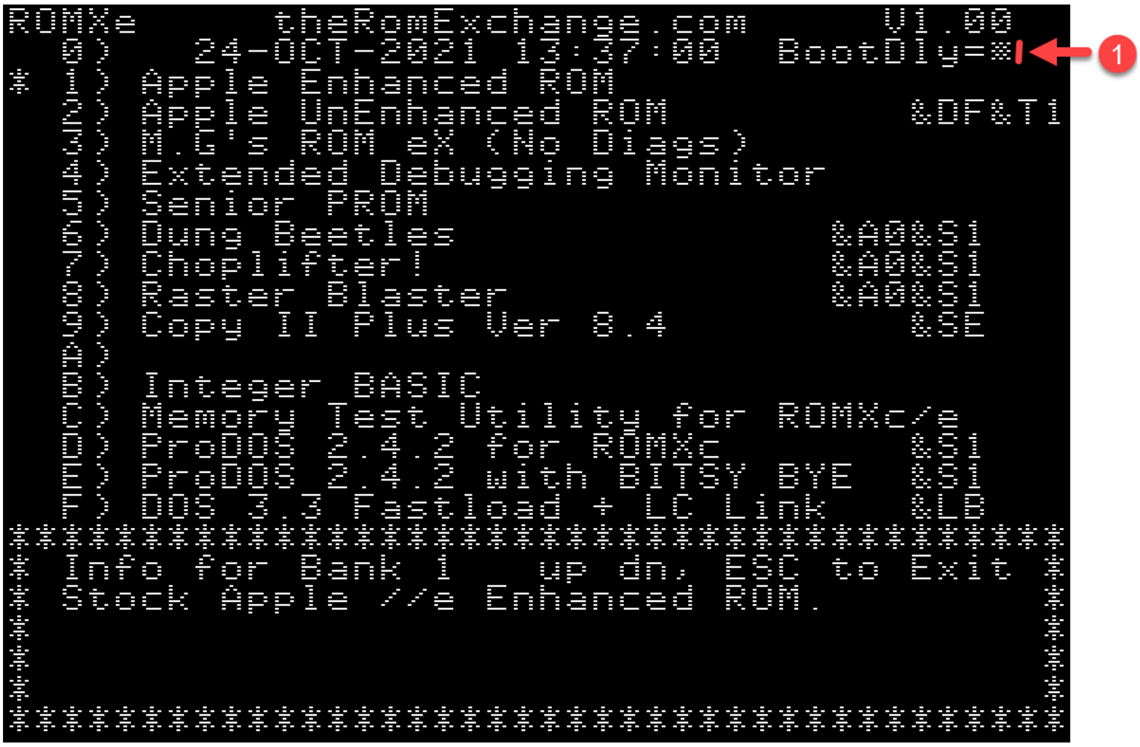
To adjust your clock accuracy, start by setting the clock to a known good time source (a modern computer synchronized to an internet time source is ideal). Then check the time again 11 days later.

If the ROMX clock is running slow, you need to lower the OSCTRIM value; if running fast, then increase it. If the clock is off by more than 1 second, change the value by 1; if off by more than 2 seconds, change it by 2, etc. This should bring the clock into the proper range.

Note that temperature changes and other factors will also determine the ultimate accuracy of the clock but you should be able to adjust the trim to achieve less than 30 seconds drift per year.

Editing the Delay Timer

Use the key combination CTRL-B from the Information page to edit the boot delay timer (BootDly).



```
ROMXe     theRomExchange.com       V1.00
  0)   24-OCT-2021 13:37:00  BootDly=▒
* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM         &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor
  5) Senior PROM
  6) Dung Beetles              &A0&S1
  7) Choplifter!               &A0&S1
  8) Raster Blaster            &A0&S1
  9) Copy II Plus Ver 8.4         &SE
  A)
  B) Integer BASIC
  C) Memory Test Utility for ROMXc/e
  D) ProDOS 2.4.2 for ROMXc       &S1
  E) ProDOS 2.4.2 with BITSY BYE  &S1
  F) DOS 3.3 Fastload + LC Link   &LB
****************************************
* Info for Bank 1   up dn, ESC to Exit *
* Stock Apple //e Enhanced ROM.        *
*                                      *
*                                      *
*                                      *
****************************************
```

Valid boot delay timer entries are 0 to F, with a default setting of A. From the table below, this equates to a default of 3.46 seconds.

A user adjustable range from 0 to approximately 4.8 seconds is available in 0.346 second increments:

Delay Entry	**Delay Time (seconds)**	**Delay Entry**	**Delay Time (seconds)**
0	0 (menu not displayed)	8	2.769
1	0.346	9	3.114
2	0.692	A	3.46
3	1.038	B	3.806
4	1.384	C	4.152
5	1.730	D	4.498
6	2.076	E	4.844
7	2.422	F	Forever

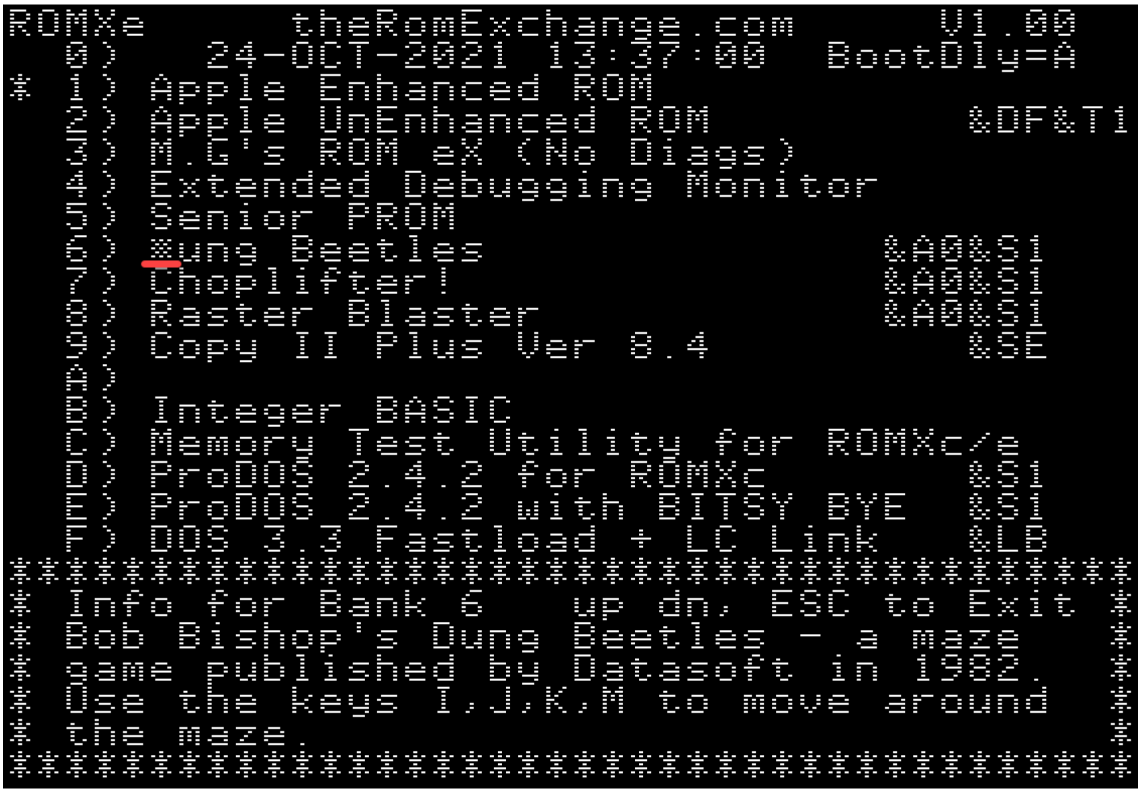
If you set the boot delay time to zero, then the menu will not be displayed at power-up and the default system ROM image will be used. You must then use the disk version of the ROMX firmware (ROMXCE.DISK) to make any changes to the ROMX configuration or revert the boot delay timer setting. See the *ROMXce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

From firmware version 1.1.4 onward, a boot delay setting of F will be treated as delay Forever – the menu will be displayed until a system ROM image is selected from the keyboard (the default ROM will not launch automatically).

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:



```
ROMXe     theRomExchange.com     V1.00
  0)   24-OCT-2021 13:37:00  BootDly=A
* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM         &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor
  5) Senior PROM
  6) ▒ung Beetles              &A0&S1
  7) Choplifter!               &A0&S1
  8) Raster Blaster            &A0&S1
  9) Copy II Plus Ver 8.4         &SE
  A)
  B) Integer BASIC
  C) Memory Test Utility for ROMXc/e
  D) ProDOS 2.4.2 for ROMXc       &S1
  E) ProDOS 2.4.2 with BITSY BYE  &S1
  F) DOS 3.3 Fastload + LC Link   &LB
****************************************
* Info for Bank 6   up dn, ESC to Exit *
* Bob Bishop's Dung Beetles - a maze   *
* game published by Datasoft in 1982.  *
* Use the keys I,J,K,M to move around  *
* the maze.                            *
****************************************
```

A maximum length of 35 characters is available for an image description, including any specified ROMX image link suffixes such as &An for accelerator cards, &Tn for text ROM association, &Dn for DOS image association, &Sn for System ROM association, or &Ln for Language Card 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.

Image Link Description Suffixes

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

&An

The firmware supports per image acceleration settings for computers fitted with accelerators. Currently ROMXce firmware supports ZIP Chip (including Apple //c+), UltraWarp and FASTchip.

You can set the accelerator speed by including &A*n* at character position 27-29 of the description line of the image, where *n* represents the speed as tabulated below:

ACCELERATOR SPEED CONTROL (MHz)				
&A	ZIP CHIP 4000	ZIP CHIP 8000	FASTChip	UltraWarp
0	ZIP OFF	ZIP OFF	1.000	1.000
1	0.667	1.334	0.200	13.000
2	0.750	1.500	0.400	13.000
3	0.800	1.600	0.600	13.000
4	1.000	2.000	0.800	13.000
5	1.067	2.133	1.000	13.000
6	1.333	2.667	1.500	13.000
7	1.500	3.000	2.000	13.000
8	1.600	3.200	3.100	13.000
9	1.667	3.333	3.800	13.000
A	2.000	4.000	5.000	13.000
B	2.667	5.333	6.200	13.000
C	3.000	6.000	8.300	13.000
D	3.200	6.400	10.000	13.000
E	3.333	6.667	12.500	13.000
F	4.000	8.000	16.600	13.000

The easiest way to enter the accelerator speed is to press the right arrow until you reach the end of the line (computer will beep), then press the left arrow 9 times and enter the link suffix &A*n*.

NOTE for Apple IIc Plus users: If you add the &A command directly to the standard ROM $05 image, it will be overwritten when that image launches (although if you hit the esc key immediately after launching the image it will revert to Normal speed). If you also add a DOS link to the ROM $05 however (e.g. &A0&DF), it will then set the speed correctly after the image is launched. Of course, you can always use the ROM 5X image which not only handles the accelerator control properly but also adds many other features (see https://github.com/mgcaret/rom4x).

&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.

&Dn

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*.

&Ln

Language Card Image Link. Used to a load a language card image (such as Integer BASIC) into memory when a DOS image is loaded. Boot to DOS instantly, with Integer BASIC loaded into the language card!

Valid for supporting DOS images only, such as the image factory installed in slot F.

You can link a DOS image to a language card image by including &L*n* at character position 30-32 of the description line of the DOS image, where *n* represents the slot number of a language image (1-F).

The easiest way to enter the Language 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 the link suffix.

&Sn

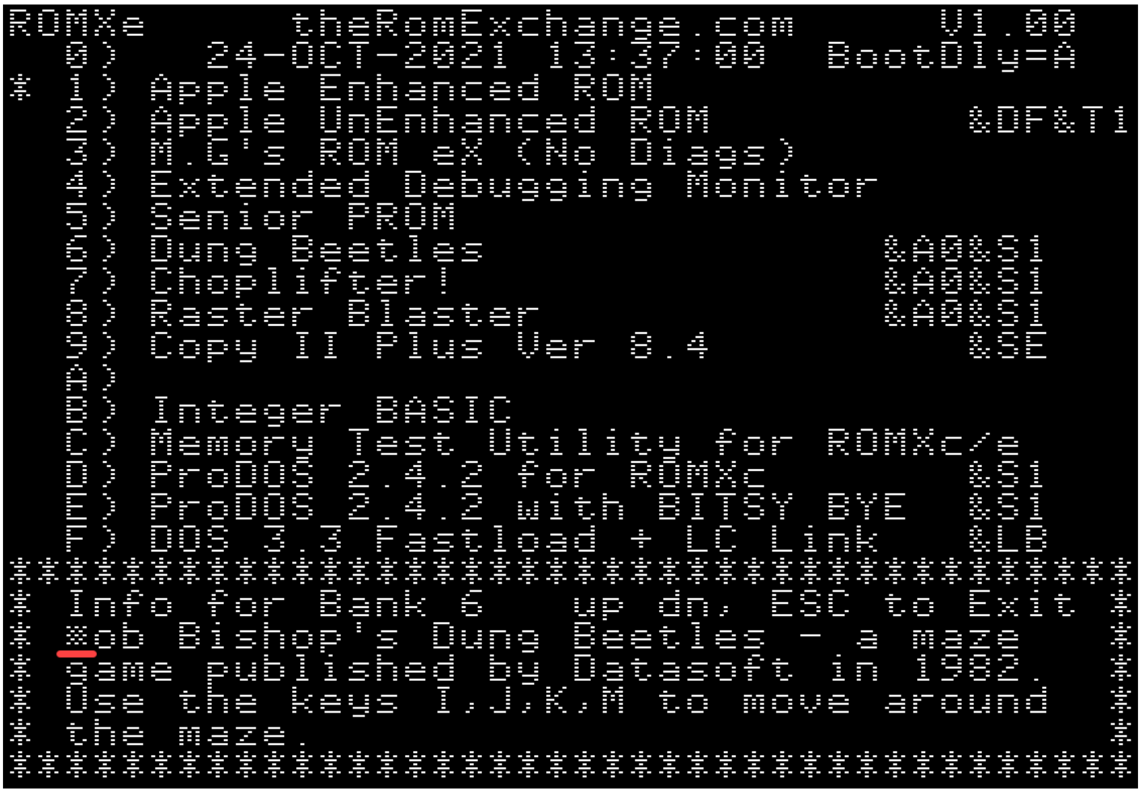
System ROM link. Used for application images that require a system ROM to operate such as the Choplifter image. When the application image is selected, the application is firstly loaded into RAM, the selected System ROM is activated, and the application is executed.

You can link a system ROM image with an application by including &S*n* at character position 30-32 of the applications description line, where *n* represents the slot number of a standard Apple F8 Monitor ROM image (or equivalent). ROMX image 1 will always be preloaded with such an image.

The easiest way to enter the System ROM 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 in the link suffix.

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:



```
ROMXe     theRomExchange.com     V1.00
  0)   24-OCT-2021 13:37:00  BootDly=A
* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM         &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor
  5) Senior PROM
  6) Dung Beetles              &A0&S1
  7) Choplifter!               &A0&S1
  8) Raster Blaster            &A0&S1
  9) Copy II Plus Ver 8.4         &SE
  A)
  B) Integer BASIC
  C) Memory Test Utility for ROMXc/e
  D) ProDOS 2.4.2 for ROMXc       &S1
  E) ProDOS 2.4.2 with BITSY BYE  &S1
  F) DOS 3.3 Fastload + LC Link   &LB
****************************************
* Info for Bank 6   up dn, ESC to Exit *
* Bob Bishop's Dung Beetles - a maze   *
* game published by Datasoft in 1982.  *
* Use the keys I,J,K,M to move around  *
* the maze.                            *
****************************************
```

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.

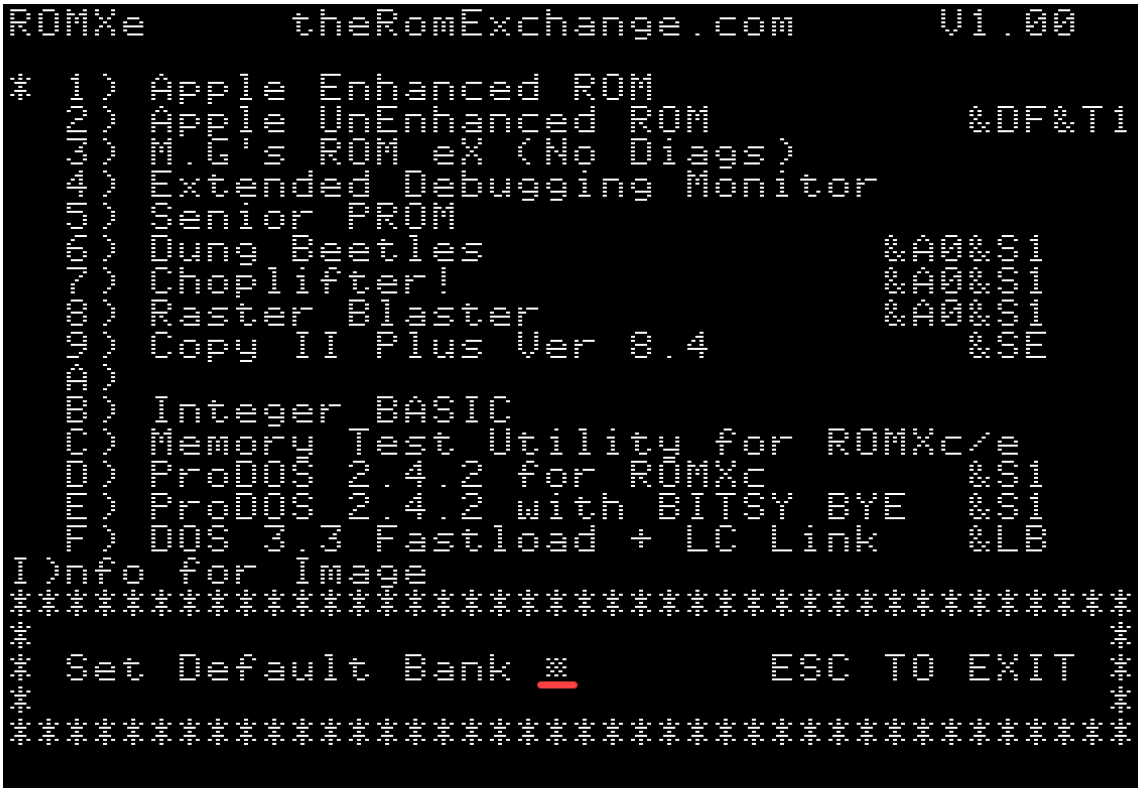
The information text will be saved after completing the fourth line.

S)et Default Boot Image

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*).

From the main menu, press the S key to invoke the S)et Default Boot Image command:

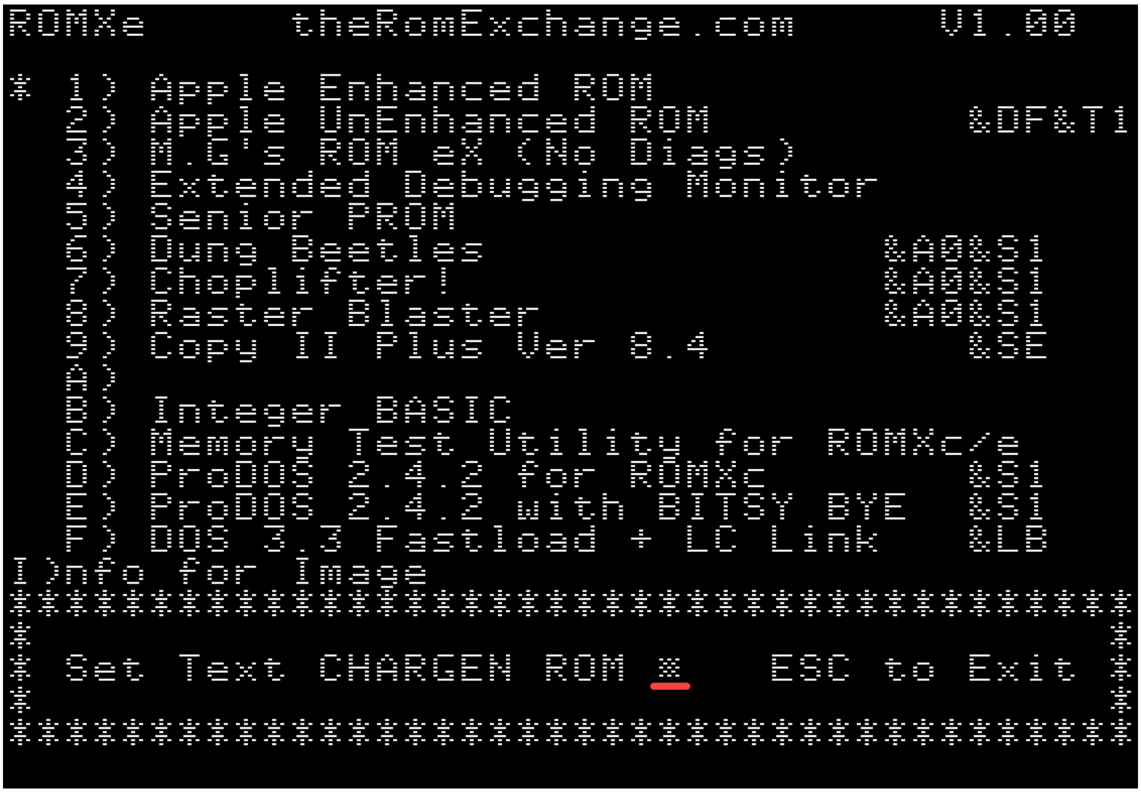


```
ROMXe     theRomExchange.com     V1.00

* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM         &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor
  5) Senior PROM
  6) Dung Beetles              &A0&S1
  7) Choplifter!               &A0&S1
  8) Raster Blaster            &A0&S1
  9) Copy II Plus Ver 8.4         &SE
  A)
  B) Integer BASIC
  C) Memory Test Utility for ROMXc/e
  D) ProDOS 2.4.2 for ROMXc       &S1
  E) ProDOS 2.4.2 with BITSY BYE  &S1
  F) DOS 3.3 Fastload + LC Link   &LB
I)nfo for Image
****************************************
*                                      *
* Set Default Bank *       ESC TO EXIT *
*                                      *
****************************************
```

Enter the default boot image 1 to F, and press Return.

T)ext ROM Default Image

From the main menu, pressing the T key will invoke the T)ext ROM Default Image command, allowing you to change the default text/video ROM image:



```
ROMXe     theRomExchange.com     V1.00

* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM          &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor
  5) Senior PROM
  6) Dung Beetles               &A0&S1
  7) Choplifter!                &A0&S1
  8) Raster Blaster             &A0&S1
  9) Copy II Plus Ver 8.4          &SE
  A)
  B) Integer BASIC
  C) Memory Test Utility for ROMXc/e
  D) ProDOS 2.4.2 for ROMXc        &S1
  E) ProDOS 2.4.2 with BITSY BYE   &S1
  F) DOS 3.3 Fastload + LC Link    &LB
I)nfo for Image
****************************************
*                                      *
* Set Text CHARGEN ROM x   ESC to Exit *
*                                      *
****************************************
```

Select the default video ROM image 0 to F. If you have the optional ROMX text/video ROM module installed, then the selected default video ROM will be used unless there is an overriding video ROM association in the system ROM image description.

If you do not have a ROMX text/video 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 (US Enhanced ROM) will be used when entering the menu after power on.

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

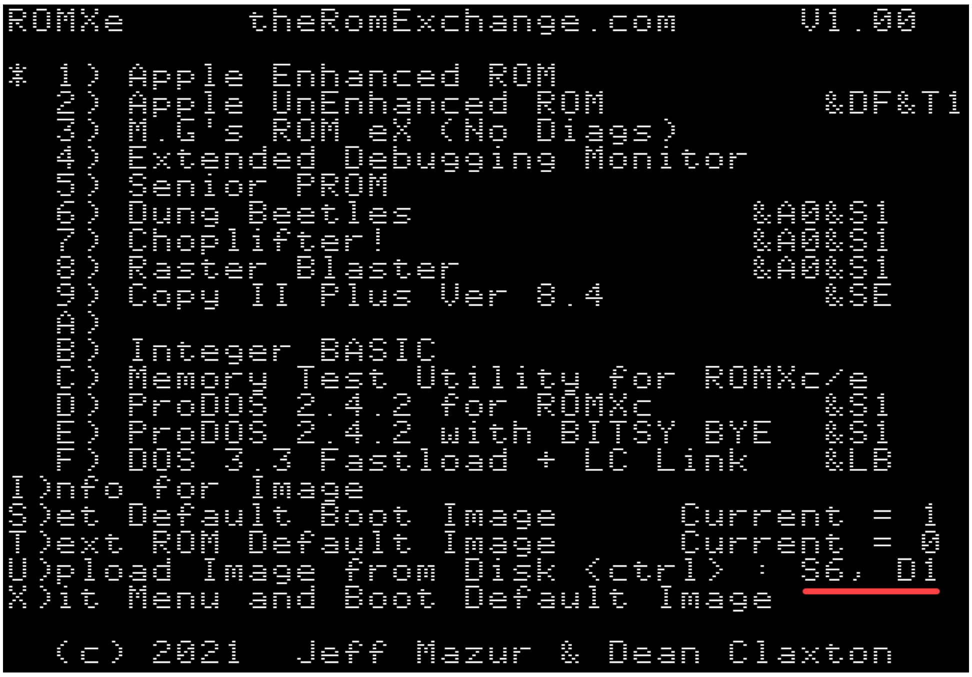
Note also that the actual font displayed will depend on the position of the keyboard switch (if installed) as the switch is used to toggle between two banks of 16 fonts.

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

U)pload Image from Disk

ROMX supports direct loading of disk based images from within the firmware using the U)pload Image from Disk command.

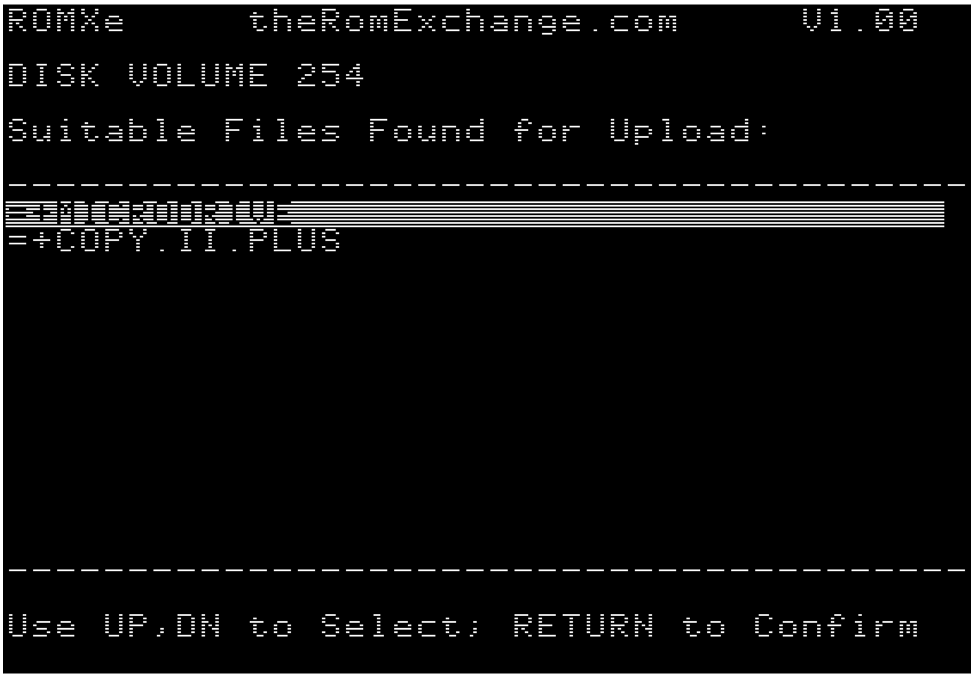
Firstly, the Disk][controller card slot and drive number must be configured from the main menu screen :



```
ROMXe     theRomExchange.com     V1.00

* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM         &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor
  5) Senior PROM
  6) Dung Beetles              &A0&S1
  7) Choplifter!               &A0&S1
  8) Raster Blaster            &A0&S1
  9) Copy II Plus Ver 8.4         &SE
  A)
  B) Integer BASIC
  C) Memory Test Utility for ROMXc/e
  D) ProDOS 2.4.2 for ROMXc       &S1
  E) ProDOS 2.4.2 with BITSY BYE  &S1
  F) DOS 3.3 Fastload + LC Link   &LB
I)nfo for Image
S)et Default Boot Image     Current = 1
T)ext ROM Default Image     Current = 0
U)pload Image from Disk <ctrl> : S6, D1
X)it Menu and Boot Default Image

  (c) 2021  Jeff Mazur & Dean Claxton
```

From the main menu screen, Press CTRL + S to cycle the slot number (1-7), and CTRL + D to cycle the drive number (1-2).

Press the U key to invoke the U)pload Image from Disk command – the firmware will examine the contents of the disk (or disk image) in the selected slot/drive and display a list of valid images for selection.



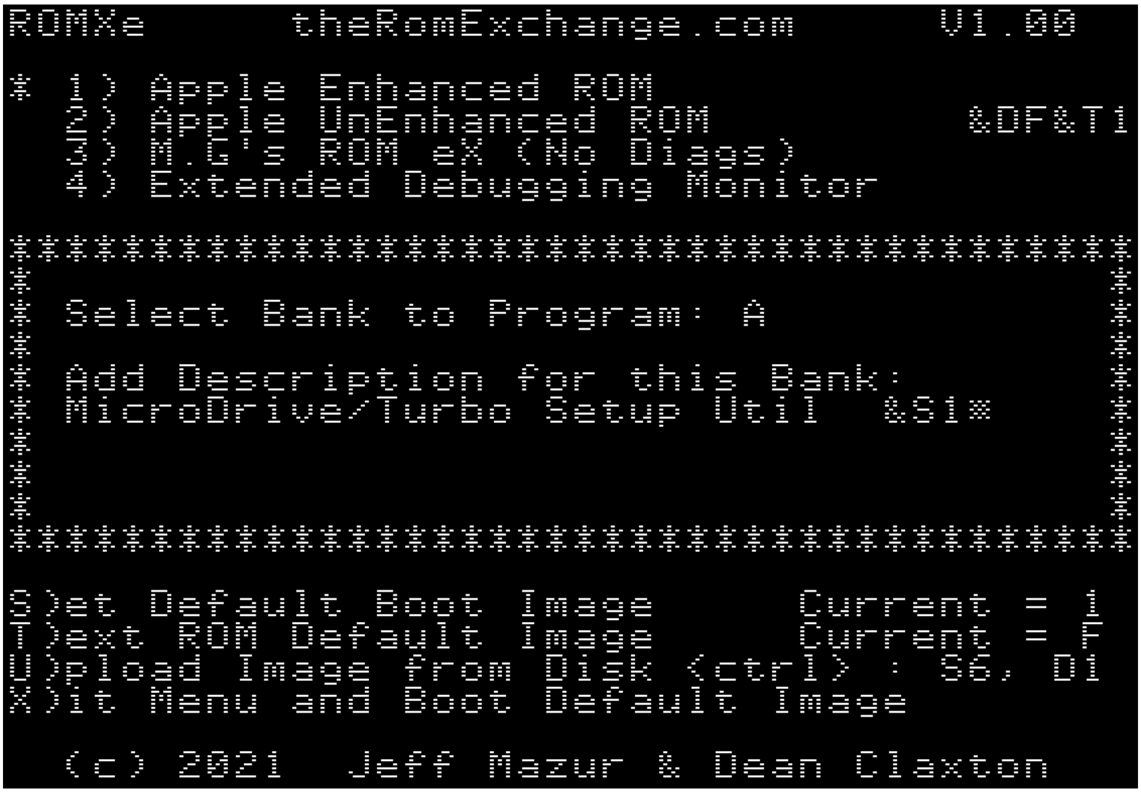
```
ROMXe     theRomExchange.com     V1.00

DISK VOLUME 254

Suitable Files Found for Upload:

----------------------------------------
=+MICRODRIVE
=+COPY.II.PLUS










----------------------------------------

Use UP,DN to Select; RETURN to Confirm
```

IMPORTANT NOTE for ROMXc users *: Before using the U)pload command, make sure that your Default image is set to a standard //c image (preferably ROM 0 or later to use Smartport devices). Otherwise, you may not see your disk devices and/or get a CHECK SLOT # error message.*

IMPORTANT NOTE for ROMX+ users *: 12KB images designed for the original ROMX product will need to be modified to work with ROMX+. The image needs $1000 (4096) bytes added to the beginning of the file to convert it to a 16KB image (bytes can be all zeroes). See section Adding a ROM Image.*

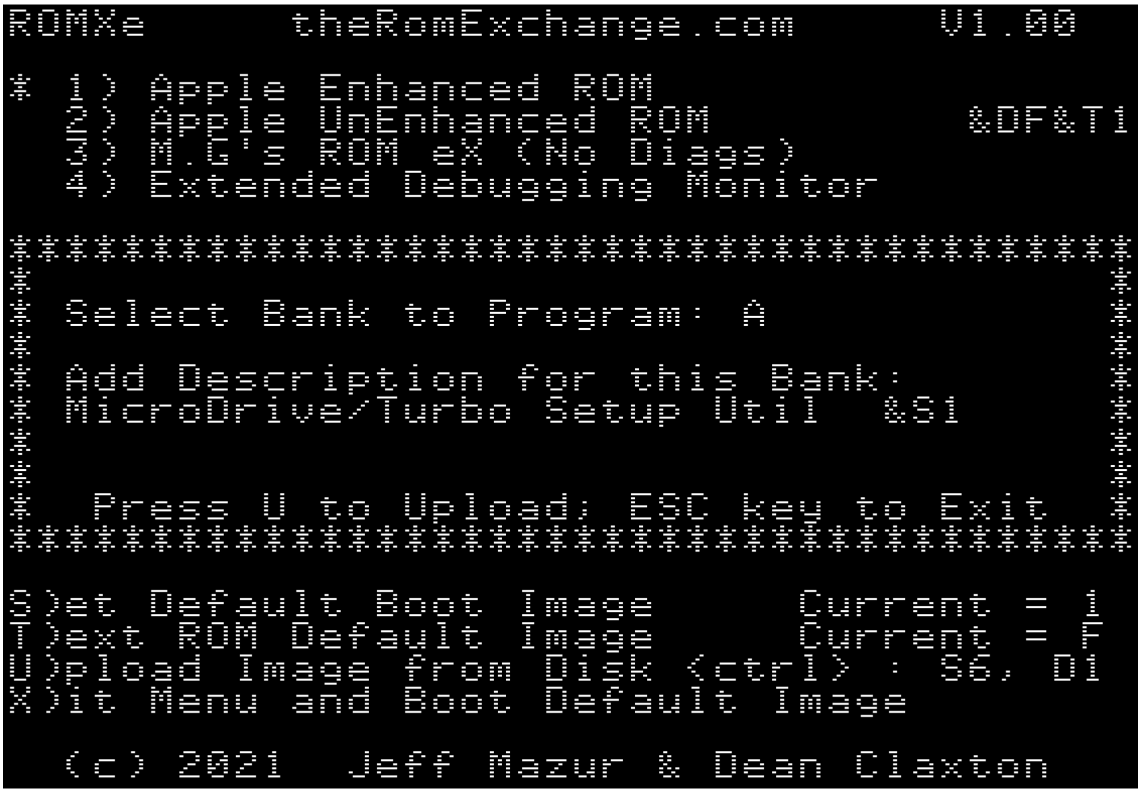
Only files that are possible images will be shown - those that are 66/67 sectors (16K) or 131/132 sectors (32K) in size. 16K images will be prefaced with a minus sign (-) while 32K images will have an equal's sign (=). Those files with RMX metadata will also show a plus sign (+) preceding the filename.

After selecting the file to Upload, select a bank into which the image will be loaded. After selecting a bank, if the file contains RMX info, the Description field will automatically populate with the suggested description. Otherwise, you can type your own description to use. Remember to add the appropriate link commands (&T, &D, &S, or &L) in the correct line position if needed (see *Editing the Image Description* for further details).



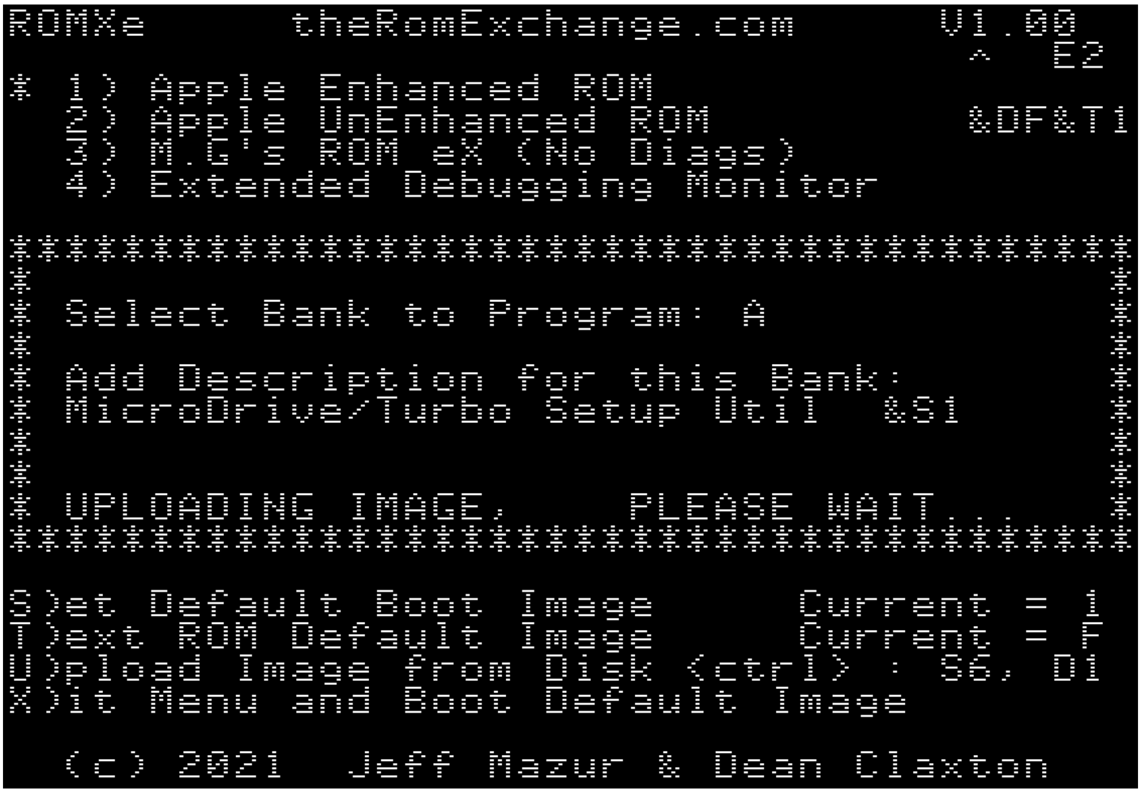
```
ROMXe     theRomExchange.com     V1.00

* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM         &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor

****************************************
*                                      *
* Select Bank to Program: A            *
*                                      *
* Add Description for this Bank:       *
* MicroDrive/Turbo Setup Util  &S1     *
*                                      *
*                                      *
*                                      *
****************************************

S)et Default Boot Image     Current = 1
T)ext ROM Default Image     Current = F
U)pload Image from Disk <ctrl> : S6, D1
X)it Menu and Boot Default Image

  (c) 2021  Jeff Mazur & Dean Claxton
```

After entering the description, you are prompted to press U to upload the image, or ESC to exit the upload process:



```
ROMXe     theRomExchange.com     V1.00

* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM         &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor

****************************************
*                                      *
* Select Bank to Program: A            *
*                                      *
* Add Description for this Bank:       *
* MicroDrive/Turbo Setup Util  &S1     *
*                                      *
*                                      *
*  Press U to Upload; ESC key to Exit  *
****************************************

S)et Default Boot Image     Current = 1
T)ext ROM Default Image     Current = F
U)pload Image from Disk <ctrl> : S6, D1
X)it Menu and Boot Default Image

  (c) 2021  Jeff Mazur & Dean Claxton
```

After pressing U, the ROM image will be uploaded :



```
ROMXe     theRomExchange.com     V1.00
                                  ^  E2
* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM         &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor

****************************************
*                                      *
* Select Bank to Program: A            *
*                                      *
* Add Description for this Bank:       *
* MicroDrive/Turbo Setup Util  &S1     *
*                                      *
*                                      *
* UPLOADING IMAGE,    PLEASE WAIT...   *
****************************************

S)et Default Boot Image     Current = 1
T)ext ROM Default Image     Current = F
U)pload Image from Disk <ctrl> : S6, D1
X)it Menu and Boot Default Image

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```
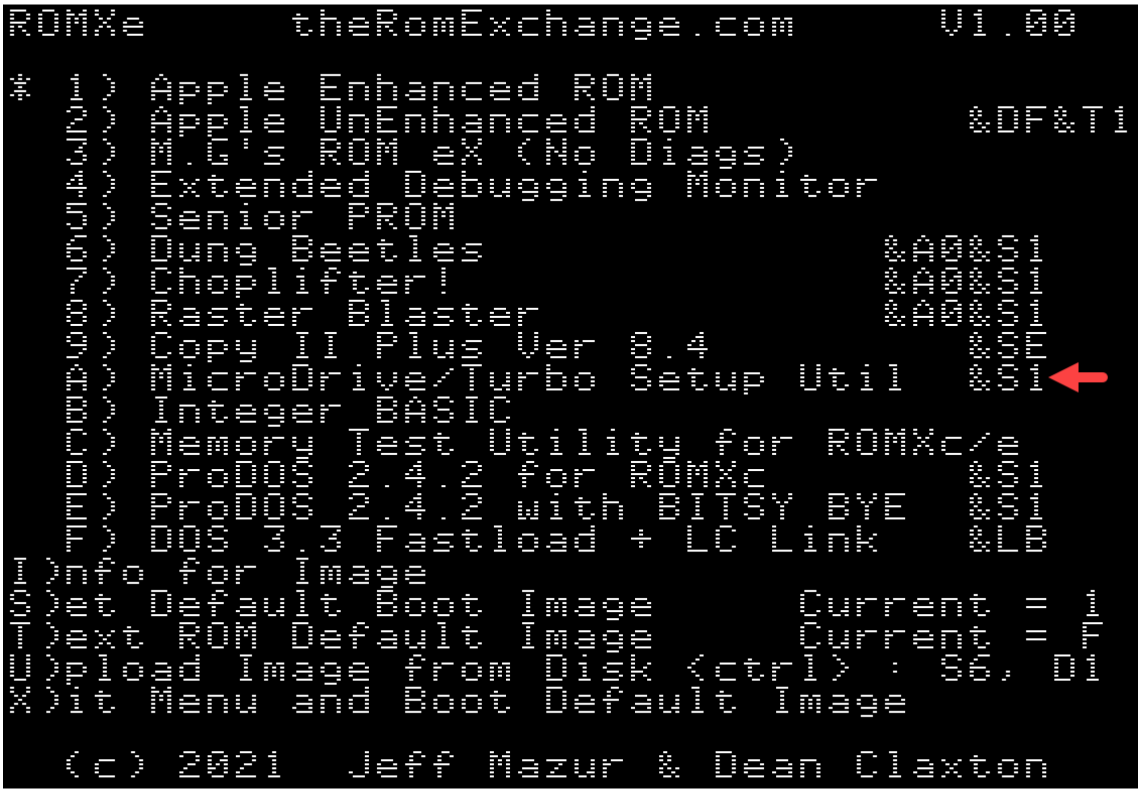

Once the Upload is complete, the new image will be displayed in the menu. You may edit the description or information text from the I)nfo page.



```
ROMXe     theRomExchange.com     V1.00

* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM         &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor
  5) Senior PROM
  6) Dung Beetles              &A0&S1
  7) Choplifter!               &A0&S1
  8) Raster Blaster            &A0&S1
  9) Copy II Plus Ver 8.4         &SE
  A) MicroDrive/Turbo Setup Util   &S1
  B) Integer BASIC
  C) Memory Test Utility for ROMXc/e
  D) ProDOS 2.4.2 for ROMXc       &S1
  E) ProDOS 2.4.2 with BITSY BYE   &S1
  F) DOS 3.3 Fastload + LC Link   &LB
I)nfo for Image
S)et Default Boot Image     Current = 1
T)ext ROM Default Image     Current = F
U)pload Image from Disk <ctrl> : S6, D1
X)it Menu and Boot Default Image

  (c) 2021  Jeff Mazur & Dean Claxton
```

X)it Menu and Boot Default Image

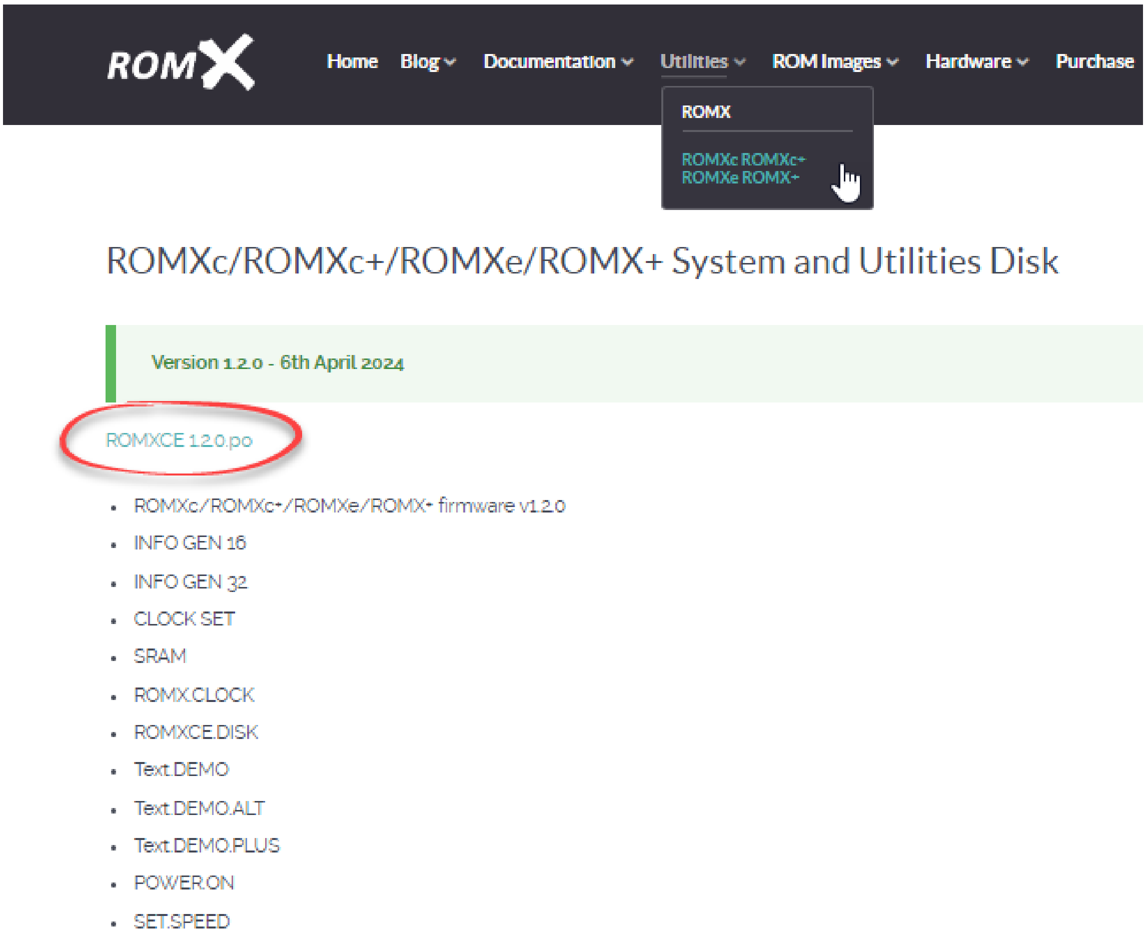
Pressing the X key from the main menu will immediately boot the computer using your default boot image. If you have installed the optional ROMXce Video ROM module, then your default Text ROM image will also be applied, else a Text ROM that has been associated with the default boot image.

ROMXce System and Utilities Disk

Overview

The ROMXce System and Utilities Disk contains several software utilities for ROMXc/ROMXc+/ROMXe/ROMX+ including the current ROMXce firmware release ROMXCE.FIRM and the disk based version of the ROMXce firmware ROMXCE.DISK.

Download the current disk image from https://theromexchange.com under the *Utilities -> ROMXc ROMXc+ ROMXe ROMX+* section :



ROMXc/ROMXc+/ROMXe/ROMX+ System and Utilities Disk

Version 1.2.0 - 6th April 2024

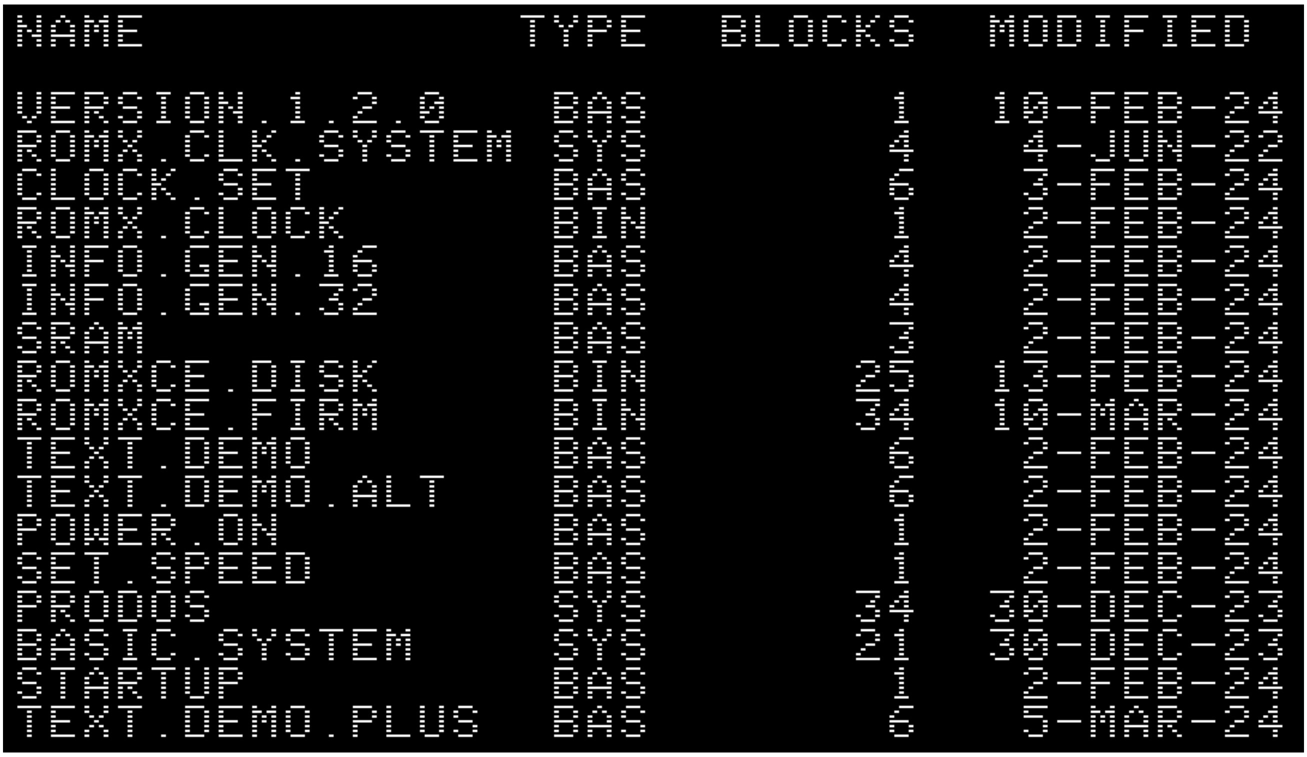
ROMXCE 1.2.0.po

- ROMXc/ROMXc+/ROMXe/ROMX+ firmware v1.2.0
- INFO GEN 16
- INFO GEN 32
- CLOCK SET
- SRAM
- ROMX.CLOCK
- ROMXCE.DISK
- Text.DEMO
- Text.DEMO.ALT
- Text.DEMO.PLUS
- POWER.ON
- SET.SPEED

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

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

The disk contents for the v1.20 release of the ROMXce System and Utilities Disk are shown below:



```
NAME           TYPE  BLOCKS  MODIFIED

VERSION.1.2.0   BAS        1  10-FEB-24
ROMX.CLK.SYSTEM SYS        4   4-JUN-22
CLOCK.SET       BAS        6   3-FEB-24
ROMX.CLOCK      BIN        1   2-FEB-24
INFO.GEN.16     BAS        4   2-FEB-24
INFO.GEN.32     BAS        4   2-FEB-24
SRAM            BAS        3   2-FEB-24
ROMXCE.DISK     BIN       25  13-FEB-24
ROMXCE.FIRM     BIN       34  10-MAR-24
TEXT.DEMO       BAS        6   2-FEB-24
TEXT.DEMO.ALT   BAS        6   2-FEB-24
POWER.ON        BAS        1   2-FEB-24
SET.SPEED       BAS        1   2-FEB-24
PRODOS          SYS       34  30-DEC-23
BASIC.SYSTEM    SYS       21  30-DEC-23
STARTUP         BAS        1   2-FEB-24
TEXT.DEMO.PLUS  BAS        6   5-MAR-24
```

- ROMX.CLK.SYSTEM – ROMXce+ clock driver for ProDOS.
- CLOCK.SET - An Applesoft BASIC program demonstrating how to set and read the clock programmatically. Also provides capability to set the oscillator trim.
- ROMX.CLOCK – Library functions to support the real-time clock (used by CLOCK.SET).
- INFO.GEN.16 - Program to add RMX metadata to 16K images.
- INFO.GEN.32 - Program to add RMX metadata to 32K images.
- SRAM – Utility to demonstrate reading and writing to 64 bytes of SRAM available on the MCP7940 clock chip. SRAM is non-volatile (backed up by the clock battery).
- ROMXCE.DISK - Program to configure ROMX (similar to the Firmware).
- ROMXCE.FIRM - The latest ROMXce firmware image. May be Uploaded into Bank 0.
- TEXT.DEMO - Demo of the video ROM fonts named as per Bank 0 of the Video ROM (ensure keyboard switch position is set for bank 0).
- TEXT.DEMO.ALT - Demo of the video ROM fonts named as per Bank 1 of the Video ROM (ensure keyboard switch position is set for bank 1).
- POWER.ON - Program to bring up ROMX menu (simulate powering on the computer).
- SET.SPEED - Program to set the speed of an accelerator board or chip, if installed.
- PRODOS - Standard ProDOS file for booting disk.
- BASIC.SYSTEM - Standard BASIC file to invoke Applesoft.
- STARTUP - File to execute when booting (displays catalog of disk).
- TEXT.DEMO.PLUS – Demo of the text ROM fonts supported by ROMX+ when optional 2316B or 2513 text ROM is installed.

Adding a ROM Image

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

1. Preparing the ROM image
2. Transferring the ROM image to disk
3. Uploading the ROM image

The following section details the steps to store a ROM in your ROMX flash memory.

Preparing the ROM Image

32KB ROM images are mapped into the $C000-$FFFF address range as two 16KB banks, and the system uses soft switches to select the active bank.

16KB ROM images are mapped into the $C000-$FFFF address range.

Address range $C000-$C0FF is not available for ROM access (this area is the hardware soft switch address range), thus a typical ROM image will have first 256 bytes of each 16KB bank containing writing credits in plain text or may be left blank ($00) as it is not accessible by the system.

ROM images downloaded from www.theromexchange.com may be distributed as 33024 byte RMX or 16640 byte RMX files. This file format includes the complete 32KB or 16KB ROM in addition to prefilled description and information text generated using the INFO GEN utility. The last 256 bytes of the file are the metadata. This file can be directly copied onto a disk and used. Refer to the following section.

Most ROMs downloaded from the internet will consist of a 32768 byte or 16384 byte file. That’s perfect and you can transfer them directly to disk and use them. Refer to the following section.

In regards to ROMX+ for the Apple II/II+, stock Apple II ROM’s are only 12KB (technically there are 6 x 2KB ROMs). These will have to be enlarged to 16KB to be used with ROMX+. This can either be done in a hex editor by adding $1000 (4096) bytes to the beginning of the file, else you can do this on the Apple II using the following commands :

```
BLOAD <old ROMX  image> , A$4000
BSAVE <new ROMX+ image> , A$3000, L$4000
```

(or `L$4100` if old file has RMX metadata)

If you would like to build an RMX file with Image metadata such as description and information added, see the section titled Creating RMX Files.

Transferring the ROM Image to Disk

Once you have a ROM image ready, the file needs to be transferred onto an Apple][disk. If you are wanting to create an RMX file to share, then it is recommended that you copy the INFO.GEN tools from the ROMXce System and Utilities Disk onto the same disk, as these utilities are required to create the metadata.

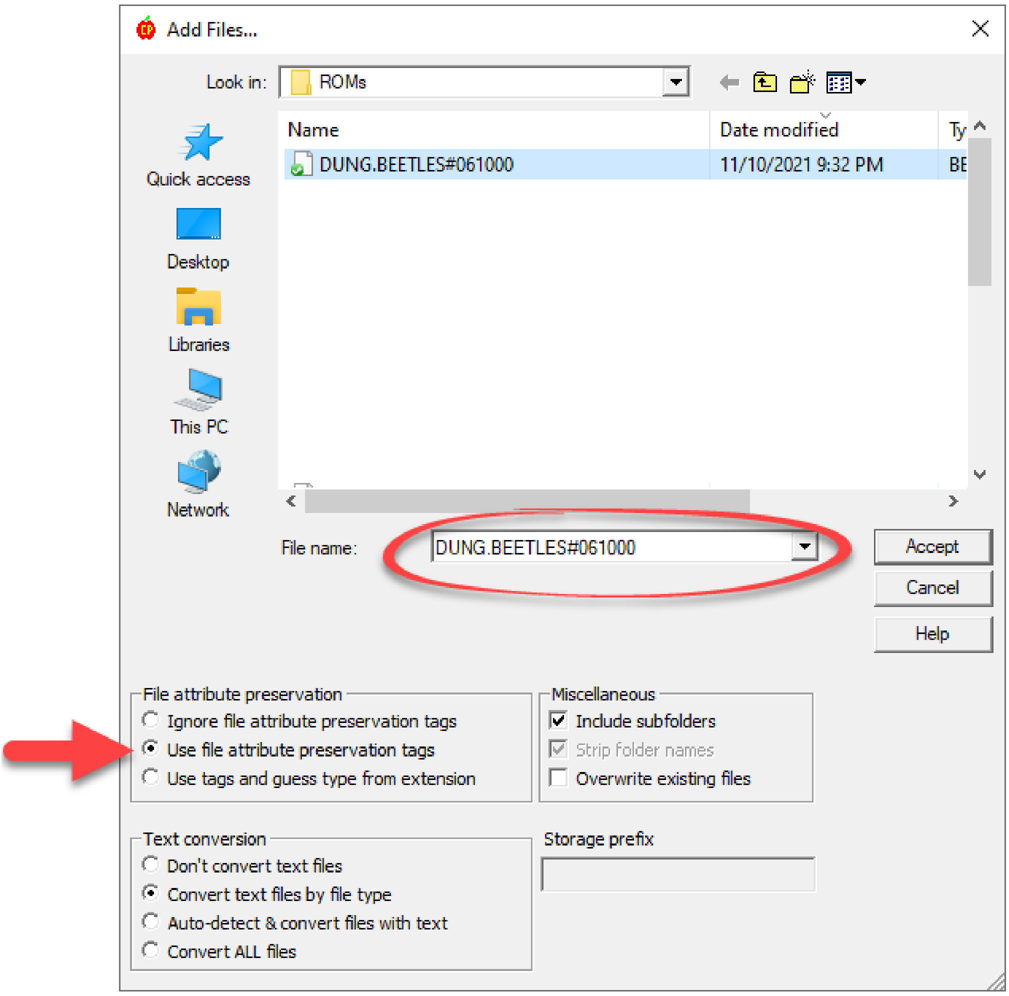
If you are a Windows user, we recommend you install CiderPress (https://a2ciderpress.com/) to complete this task. In addition to many other features, CiderPress will allow you to open the disk image file and insert the ROM image that you have created.

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

If you choose to use CiderPress, its helps to rename your ROM file to include the CiderPress attribute tag at the end of the filename. The attribute tag will ensure that the file type is set correctly as BIN (binary) and will also set the default memory address when BLOADing the file.

For 16KB ROM files, use the attribute tag **#063000**, and for 32KB ROM files use the attribute tag **#061000**

Ensure you select the option *Use file attribute preservation tags* when adding your ROM file.



Look in: ROMs

Name	Date modified	Ty
DUNG.BEETLES#061000	11/10/2021 9:32 PM	BE

File name: DUNG.BEETLES#061000

File attribute preservation
○ Ignore file attribute preservation tags
● Use file attribute preservation tags
○ Use tags and guess type from extension

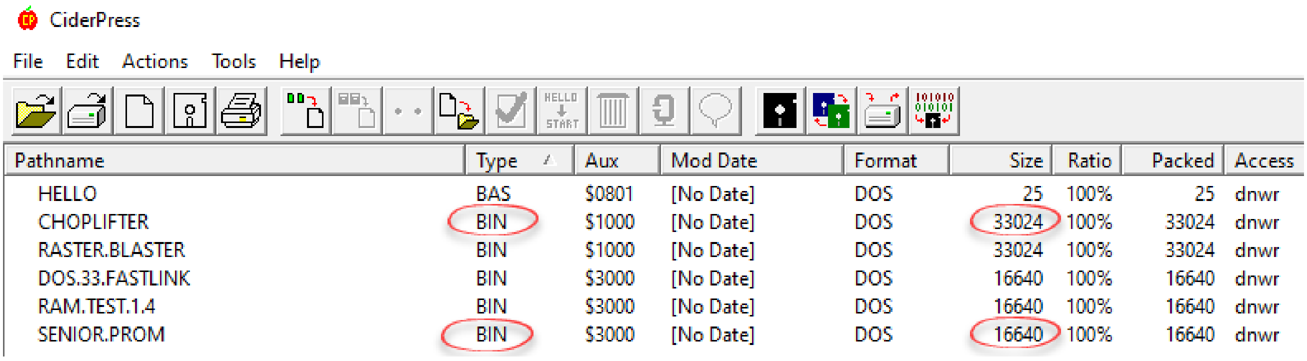
Miscellaneous
☑ Include subfolders
☑ Strip folder names
☐ Overwrite existing files

Text conversion
○ Don't convert text files
● Convert text files by file type
○ Auto-detect & convert files with text
○ Convert ALL files

Storage prefix

Whichever utility you elect to use, ensure that:

1. The file type on disk is Binary (BIN)
2. The file size on disk for a 32KB ROM is exactly 32768 bytes, or 33024 bytes for an RMX file.
3. The file size on disk for a 16KB ROM is exactly 16384 bytes, or 16640 bytes for an RMX file.



Pathname	Type	Aux	Mod Date	Format	Size	Ratio	Packed	Access
HELLO	BAS	$0801	[No Date]	DOS	25	100%	25	dnwr
CHOPLIFTER	BIN	$1000	[No Date]	DOS	33024	100%	33024	dnwr
RASTER.BLASTER	BIN	$1000	[No Date]	DOS	33024	100%	33024	dnwr
DOS.33.FASTLINK	BIN	$3000	[No Date]	DOS	16640	100%	16640	dnwr
RAM.TEST.1.4	BIN	$3000	[No Date]	DOS	16640	100%	16640	dnwr
SENIOR.PROM	BIN	$3000	[No Date]	DOS	16640	100%	16640	dnwr

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 ROMXCE.DISK. See the section titled U)pload Image from Disk for further information.

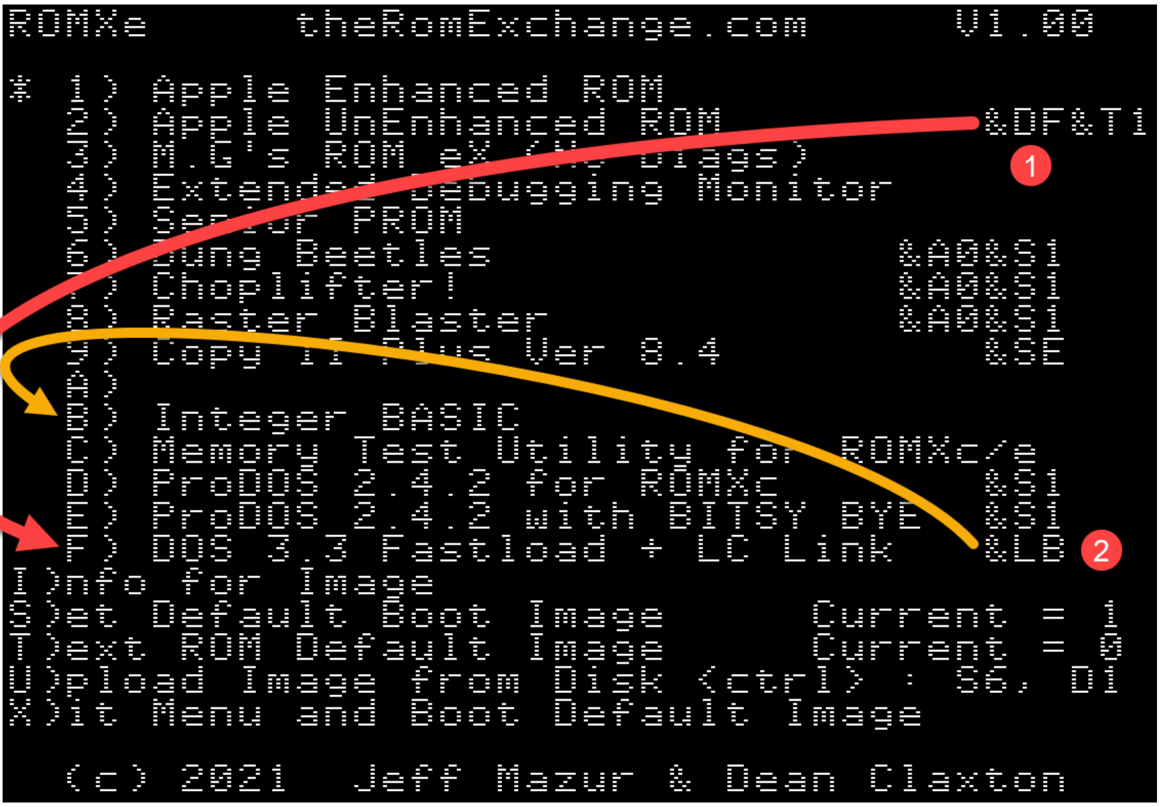
Adding a DOS Image

ROMX 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 the DOS 3.3 image in slot F has been linked to the Apple UnEnhanced ROM image in slot 2 via the &DF suffix (item 1).

This particular DOS image is a little special in that it supports a Language Card link. The Integer BASIC image in slot B has been linked to the DOS image via the &LB suffix (item 2).

The end result is that on selection of the ROM image in slot 2, DOS will be loaded into RAM, and the Integer BASIC language will be loaded into the Language Card memory space!



```
ROMXe     theRomExchange.com     V1.00

* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM         &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor
  5) Serial PROM
  6) Dung Beetles              &A0&S1
  7) Choplifter!               &A0&S1
  8) Raster Blaster            &A0&S1
  9) Copy II Plus Ver 8.4         &SE
  A)
  B) Integer BASIC
  C) Memory Test Utility for ROMXc/e
  D) ProDOS 2.4.2 for ROMXc       &S1
  E) ProDOS 2.4.2 with BITSY BYE  &S1
  F) DOS 3.3 Fastload + LC Link   &LB
I)nfo for Image
S)et Default Boot Image     Current = 1
T)ext ROM Default Image     Current = 0
U)pload Image from Disk <ctrl> : S6, D1
X)it Menu and Boot Default Image

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```

The DOS 3.3 FastLoad image is included by default, and a copy of it can be found on the ROMXce App1 disk on our web site. It’s currently set up for a drive connected to a controller in Slot 6 but can be modified as follows :

```
BLOAD DOS.33.FASTLINK (or any derivative)
CALL -151
5AE9:n0                 (where n is slot number desired; replaces $60)
5AEA:0n                 (where n is drive number desired; replaces $01)
BSAVE DOS.33.SLOTn, A$3000, L$4100  (keeps original RMX data)
```

Alternatively you can just type…

```
BSAVE DOS.33.FASTLINK
```

…to overwrite the original image file with the new drive info.

The ProDOS 2.4.3 images are included by default and copies can be found on the ROMXce App2 disk. Both ProDOS 2.4.x and ProDOS with BITSY BYE boot up with a default drive of S5,D1.

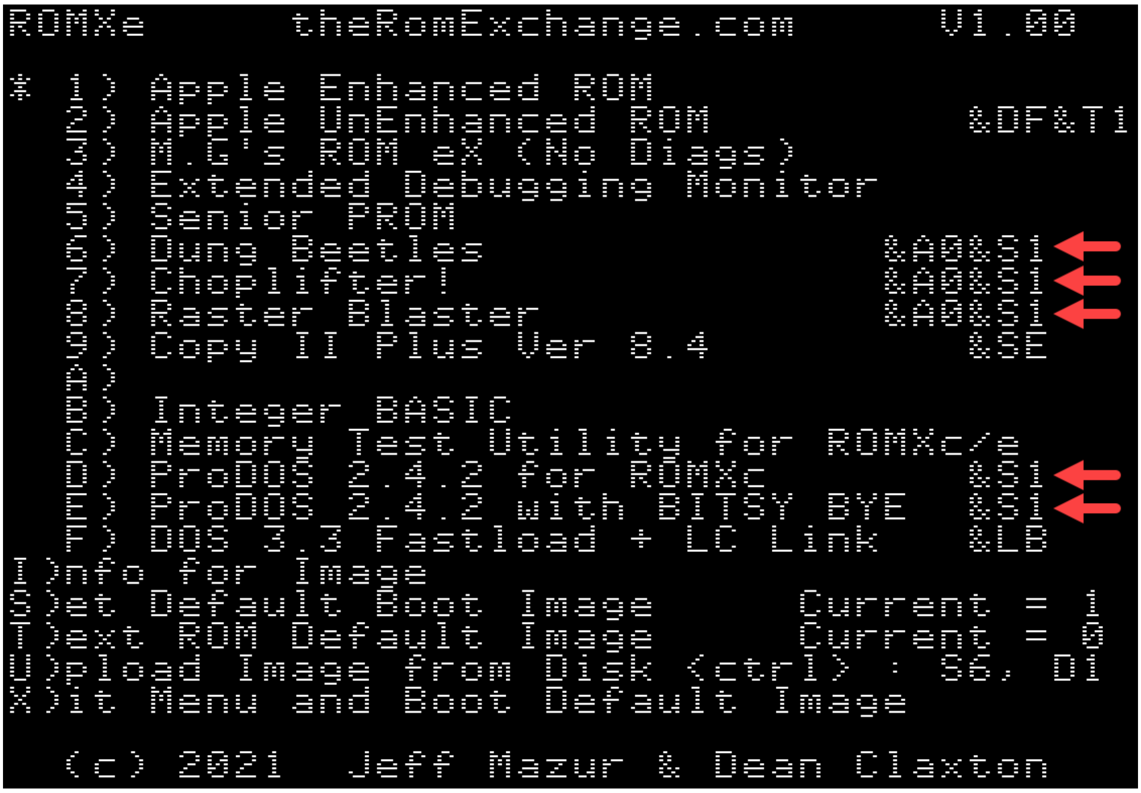
To change the default:

```
BLOAD PRODOS 2.4.3 (or any derivative)
CALL -151
4F9D:n0                 (where n is slot number desired; replaces $50)
BSAVE MYPRODOS.2.4.3, A$1000, L$8100
(keeps original RMX data)
```

One or more system ROM images may then be associated to a DOS image (see *Adding a ROM Image*).

Adding an Application Image

ROMX supports uploading of application images into ROM slots, such as the game and ProDOS images shown below :



```
ROMXe     theRomExchange.com     V1.00

* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM         &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor
  5) Senior PROM
  6) Dung Beetles              &A0&S1
  7) Choplifter!               &A0&S1
  8) Raster Blaster            &A0&S1
  9) Copy II Plus Ver 8.4         &SE
  A)
  B) Integer BASIC
  C) Memory Test Utility for ROMXc/e
  D) ProDOS 2.4.2 for ROMXc       &S1
  E) ProDOS 2.4.2 with BITSY BYE  &S1
  F) DOS 3.3 Fastload + LC Link   &LB
I)nfo for Image
S)et Default Boot Image     Current = 1
T)ext ROM Default Image     Current = 0
U)pload Image from Disk <ctrl> : S6, D1
X)it Menu and Boot Default Image

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```
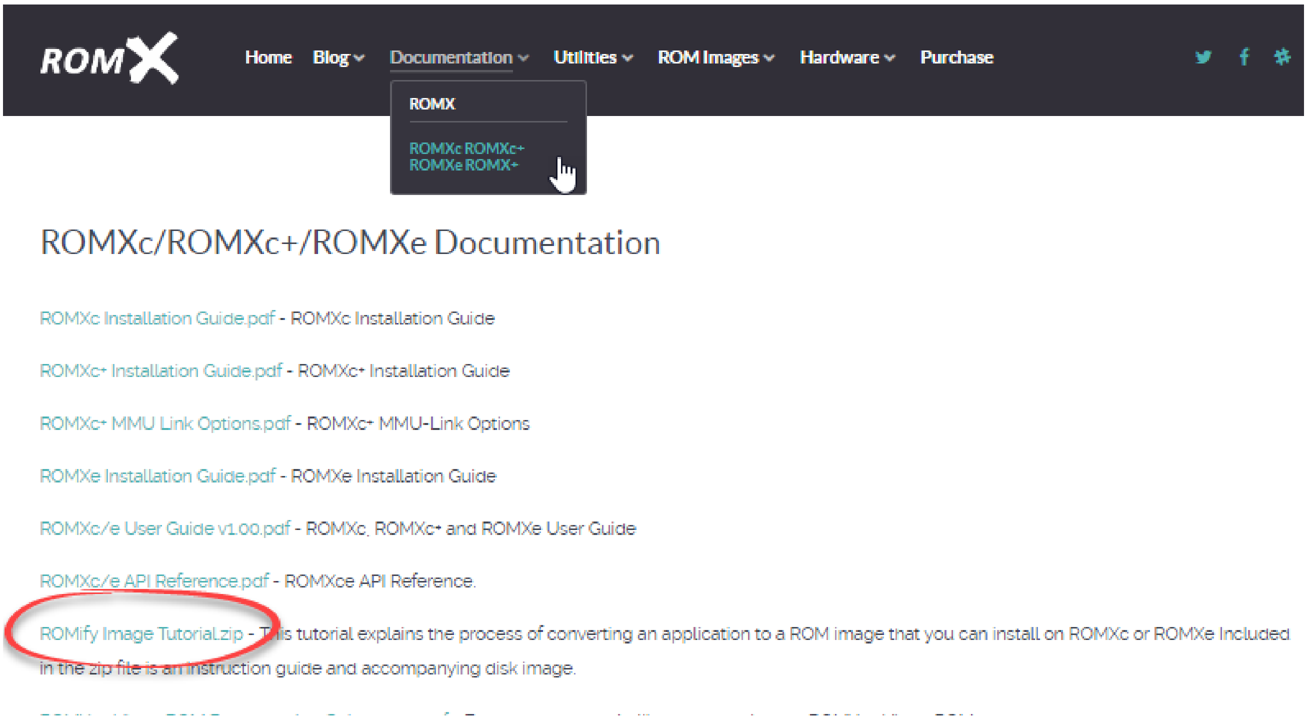

A system ROM may then be linked to the application via the &Sn suffix so that the ROM will be used when the application is executed.

Creating an Application Image

We have created a tutorial for those who are adventurous and would like to convert applications or games to run from ROM. We call this process “ROMifying” and the tutorial and accompanying disk image can be downloaded from https://theromexchange.com under Documentation -> ROMXc ROMXc+ ROMXe ROMX+.



ROMXc/ROMXc+/ROMXe Documentation

ROMXc Installation Guide.pdf - ROMXc Installation Guide

ROMXc+ Installation Guide.pdf - ROMXc+ Installation Guide

ROMXc+ MMU Link Options.pdf - ROMXc+ MMU-Link Options

ROMXe Installation Guide.pdf - ROMXe Installation Guide

ROMXc/e User Guide v1.00.pdf - ROMXc, ROMXc+ and ROMXe User Guide

ROMXc/e API Reference.pdf - ROMXce API Reference.

ROMify Image Tutorial.zip - This tutorial explains the process of converting an application to a ROM image that you can install on ROMXc or ROMXe Included in the zip file is an instruction guide and accompanying disk image.

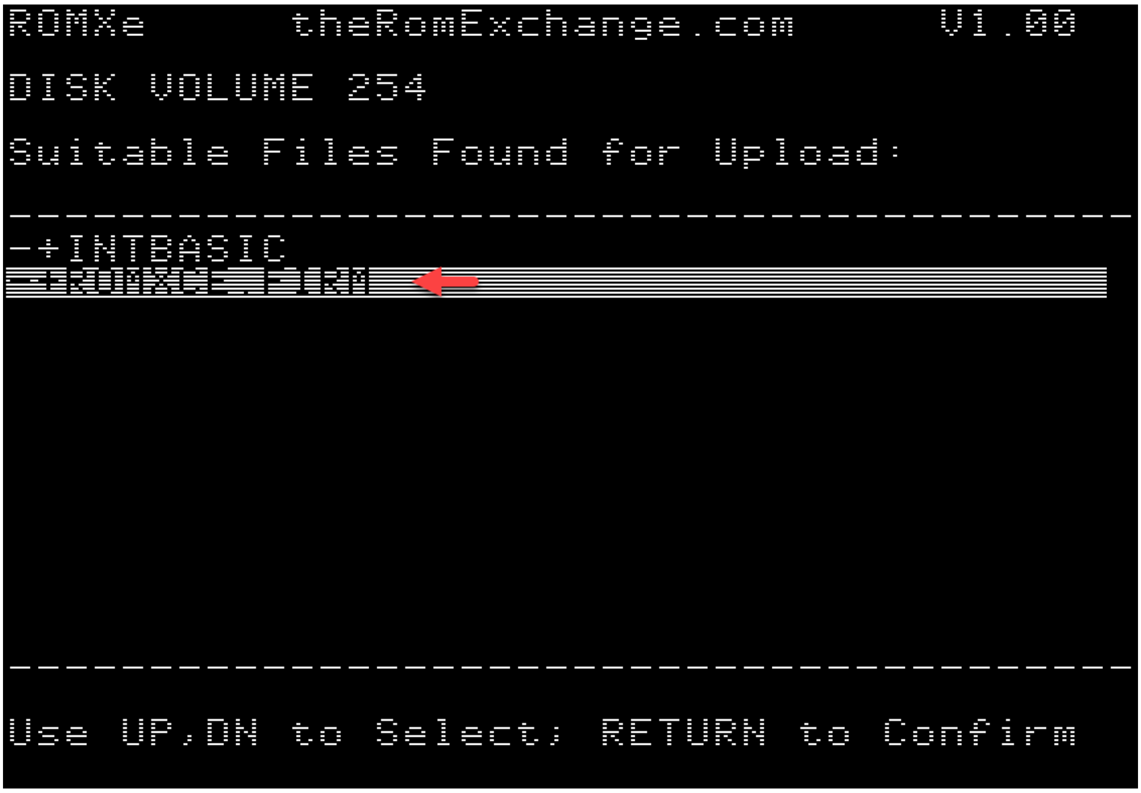
At first glance the tutorial may appear daunting, but once you start to work through it you will realize that most of the hard work has been done for you, and you can quite quickly build your own images.

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 ROMXCE.DISK.

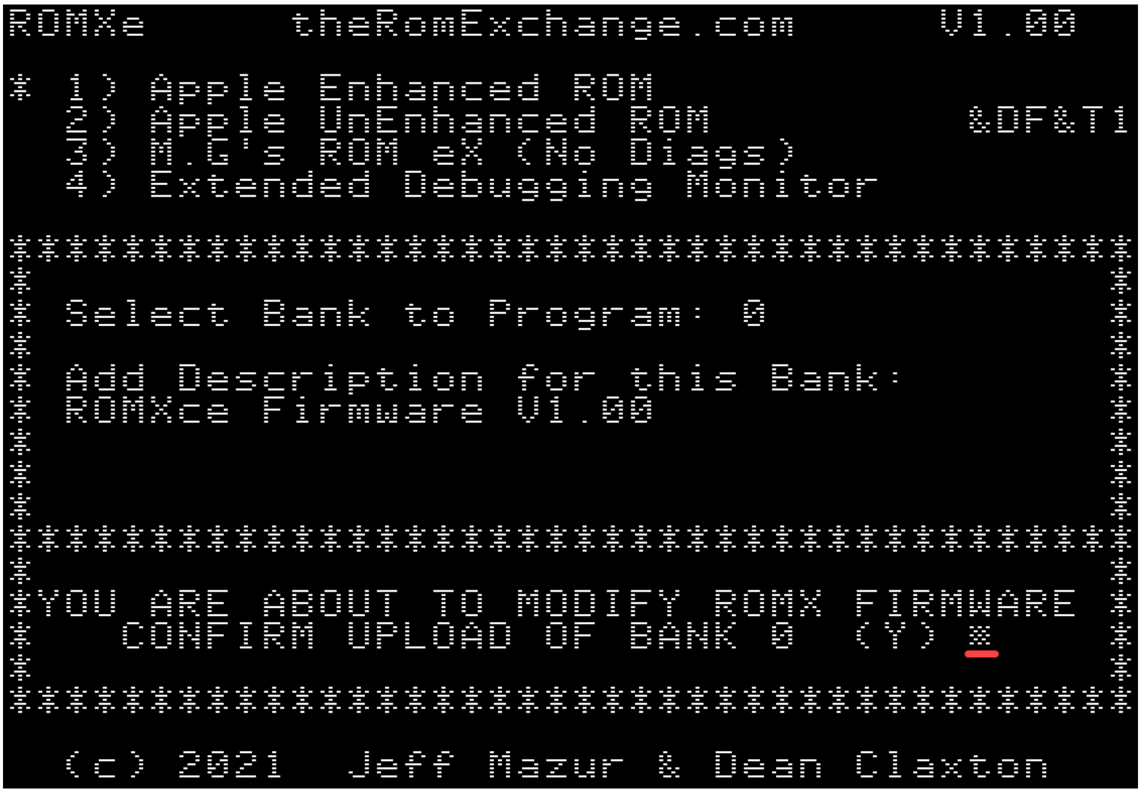
***IMPORTANT NOTE for ROMXc users** : Before using the U)pload command, make sure that your Default image is set to a standard //c image (preferably ROM 0 or later to use Smartport devices). Otherwise you may not see your disk devices and/or get a CHECK SLOT # error message.*

Insert the ROMXCE Systems and Utilities disk containing the ROMXCE.FIRM firmware file, and select U)pload from the main menu.



```
ROMXe     theRomExchange.com     V1.00
DISK VOLUME 254
Suitable Files Found for Upload:
----------------------------------------
-+INTBASIC
-+ROMXCE.FIRM





----------------------------------------
Use UP,DN to Select; RETURN to Confirm
```

Select the ROMXCE.FIRM file and when prompted for the bank to program, select bank 0. A warning is displayed that the firmware bank is about to be modified – press Y to confirm :



```
ROMXe      theRomExchange.com     V1.00

* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM           &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor

****************************************
*                                      *
* Select Bank to Program: 0            *
*                                      *
* Add Description for this Bank:       *
* ROMXce Firmware V1.00                *
*                                      *
*                                      *
*                                      *
****************************************
*                                      *
*YOU ARE ABOUT TO MODIFY ROMX FIRMWARE *
*   CONFIRM UPLOAD OF BANK 0  (Y) ▒    *
*                                      *
****************************************

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```
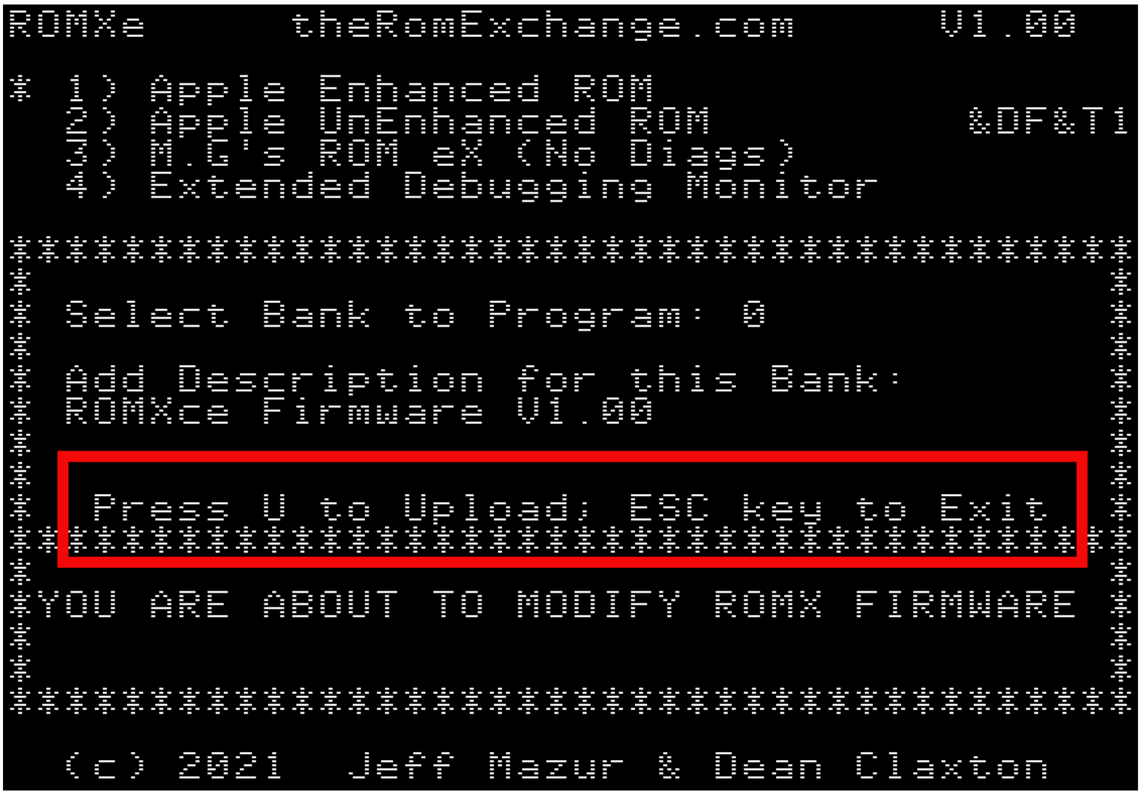

As a final step you will be prompted to press U to Upload, or ESC to cancel:



```
ROMXe      theRomExchange.com     V1.00

* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM           &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor

****************************************
*                                      *
* Select Bank to Program: 0            *
*                                      *
* Add Description for this Bank:       *
* ROMXce Firmware V1.00                *
*                                      *
*                                      *
*  Press U to Upload; ESC key to Exit  *
****************************************
*                                      *
*YOU ARE ABOUT TO MODIFY ROMX FIRMWARE *
*                                      *
*                                      *
****************************************

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```
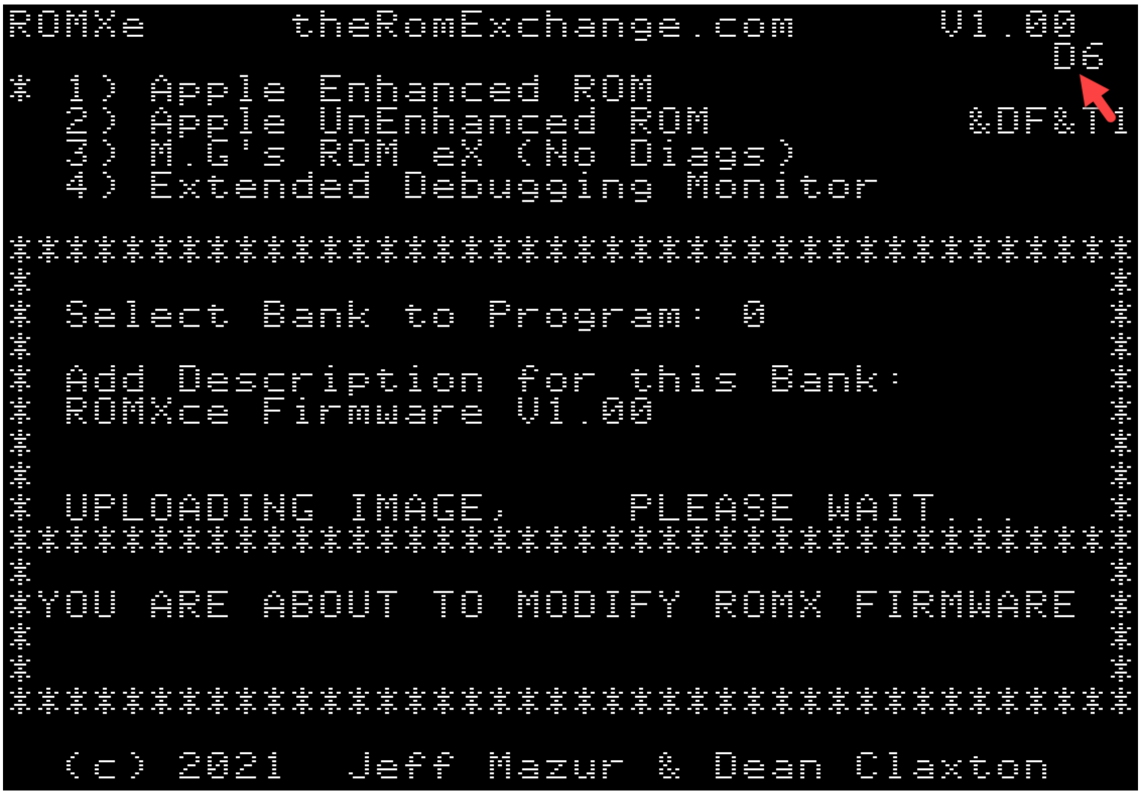

Press U to Upload – the firmware will begin and will update the various sectors of the flash chip, with the current sector displayed near the top of the screen:



```
ROMXe     theRomExchange.com     V1.00
                                    D6
* 1) Apple Enhanced ROM
  2) Apple UnEnhanced ROM         &DF&T1
  3) M.G's ROM eX (No Diags)
  4) Extended Debugging Monitor

****************************************
*                                      *
* Select Bank to Program: 0            *
*                                      *
* Add Description for this Bank:       *
* ROMXce Firmware V1.00                *
*                                      *
*                                      *
* UPLOADING IMAGE,    PLEASE WAIT...   *
****************************************
*                                      *
*YOU ARE ABOUT TO MODIFY ROMX FIRMWARE *
*                                      *
*                                      *
****************************************

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```

Once the upload is completed, the new firmware is loaded immediately, and you will see the new version number displayed at the top right corner of the screen.

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.

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 appropriate INFO.GEN utility (32KB or 16KB)
3. Save the RMX file

Loading the ROM Image Into RAM

For 32KB ROM images, load the new ROM at address $1000 using the command:

```
BLOAD filename,A$1000
```

For 16KB ROM images, load the new ROM at address $3000 using the command:

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

Generating Description and Information

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 appropriate version of the INFO GEN utility.

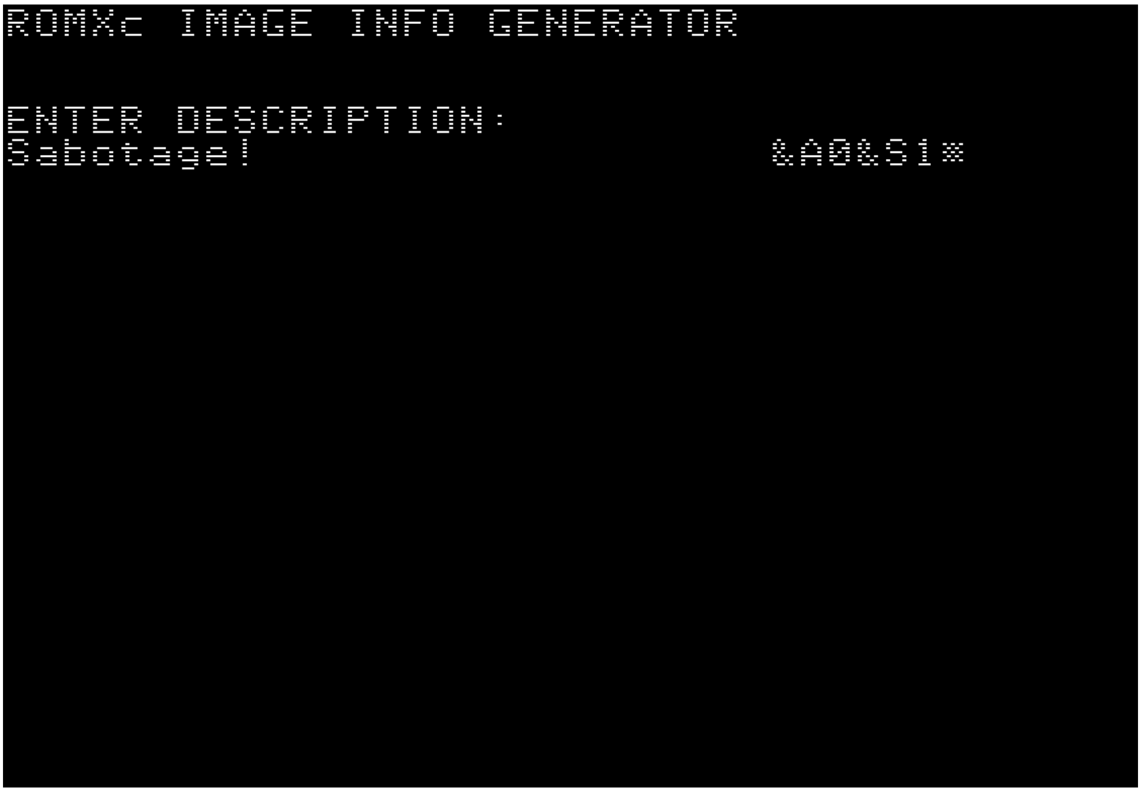
For 32KB images, run the INFO.GEN.32 utility:

```
    RUN INFO.GEN.32
```

For 16KB images, run the INFO. GEN. 16 utility:

```
    RUN INFO.GEN.16
```

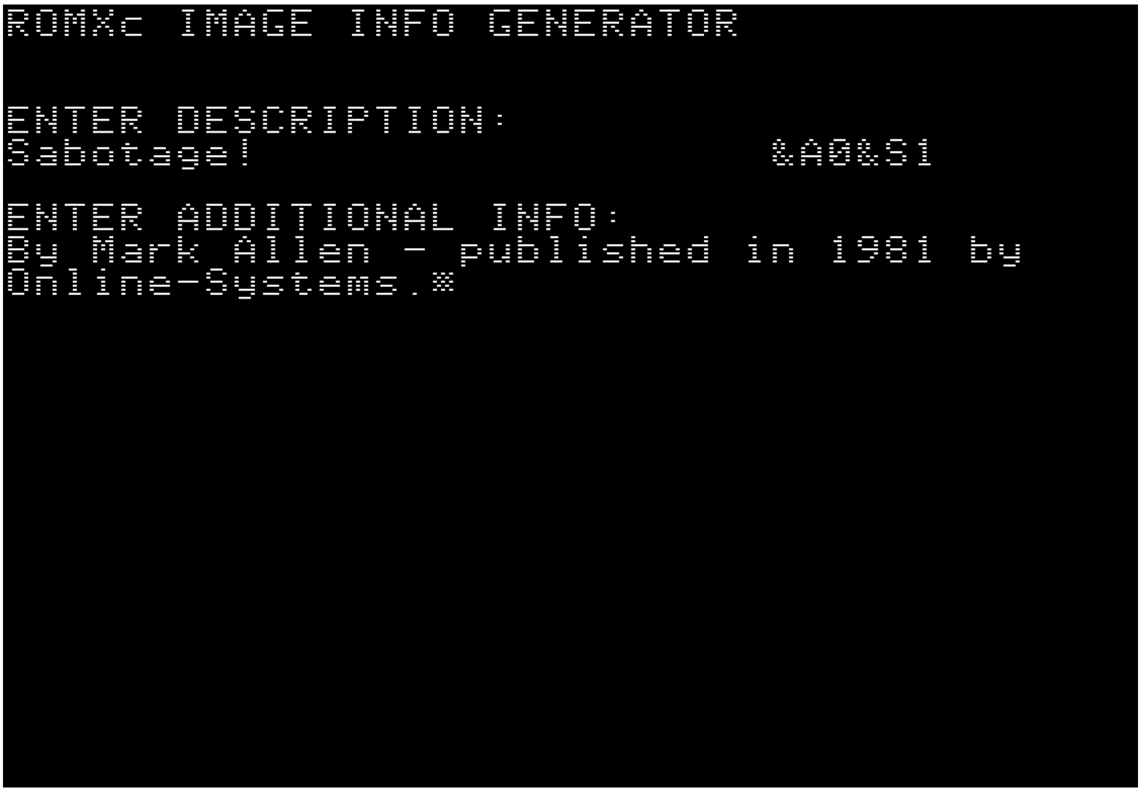
The ROM Exchange Image Info Generator should load and prompt you to enter an image description. A maximum of 35 characters is allowed, including any required link suffixes.



```
ROMXc IMAGE INFO GENERATOR

ENTER DESCRIPTION:
Sabotage!                     &A0&S1▒
```

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:



```
ROMXc IMAGE INFO GENERATOR


ENTER DESCRIPTION:
Sabotage!                  &A0&S1

ENTER ADDITIONAL INFO:
By Mark Allen - published in 1981 by
Online-Systems.▒
```

Pressing the Enter key will write the metadata to memory.

Double check the information you entered - If you made an error, re-run the appropriate INFO.GEN 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:

For 32KB ROM images, save the new ROM RMX file to disk using the command:

```
BSAVE filename,A$1000,L$8100
```

There is one slight issue however if you're going to create a 32K file. DOS 3.3 will not let you BSAVE a file with a length of $8000 (or $8100 if there is RMX info), which is required to build a 32K image. So you will need to either work in ProDOS or modify DOS 3.3 to allow this. The ROMXce Utilities Disk as well as the ROMifying Tutorial disk have such a modified DOS.

If you do find yourself ready to BSAVE a file but get a RANGE ERROR because you are in standard DOS, you can immediately eliminate the error by typing:

```
POKE 43364,255  (in Applesoft)  or
A964:FF         (in the Monitor)
```

and then try the BSAVE again.

For 16KB ROM images, save the new ROM RMX file to disk using the command:

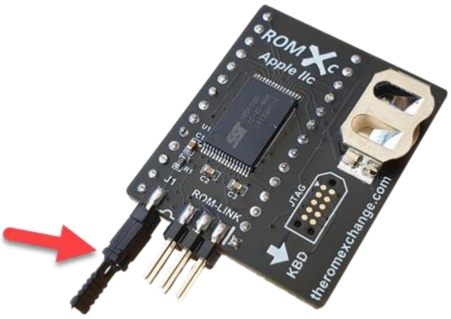
```
BSAVE filename,A$3000,L$4100
```

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 ROMXc/e either through the firmware U)pload process or by using the same U)pload function from the disk based version ROMXCE.DISK.

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.

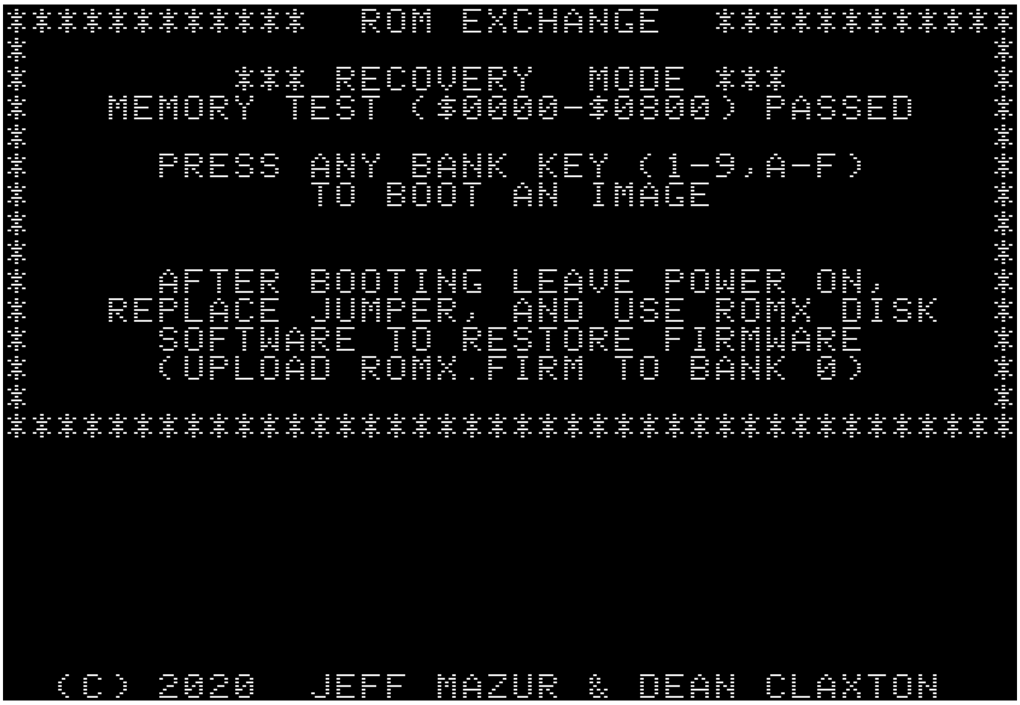
To recover from such an event, turn off the computer, open the lid of the case and touch the power supply to discharge any static electricity that may have accumulated on your body. Then remove the J1 jumper from the ROMX module to enable Recovery Mode. The J1 jumper is next to the ROM-Link header (ROMXc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



After removing the J1 jumper, turn the computer back on. Rather than running the regular ROMXce 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.

For those with an accelerator card it may be necessary to disable it, or reset the accelerator to 1MHz before rebooting into recovery mode.

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



```
************  ROM EXCHANGE  ************
*                                      *
*        *** RECOVERY  MODE ***        *
*   MEMORY TEST ($0000-$0800) PASSED   *
*                                      *
*     PRESS ANY BANK KEY (1-9,A-F)     *
*           TO BOOT AN IMAGE           *
*                                      *
*                                      *
*     AFTER BOOTING LEAVE POWER ON,    *
*   REPLACE JUMPER, AND USE ROMX DISK  *
*     SOFTWARE TO RESTORE FIRMWARE     *
*     (UPLOAD ROMX.FIRM TO BANK 0)     *
*                                      *
****************************************





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```

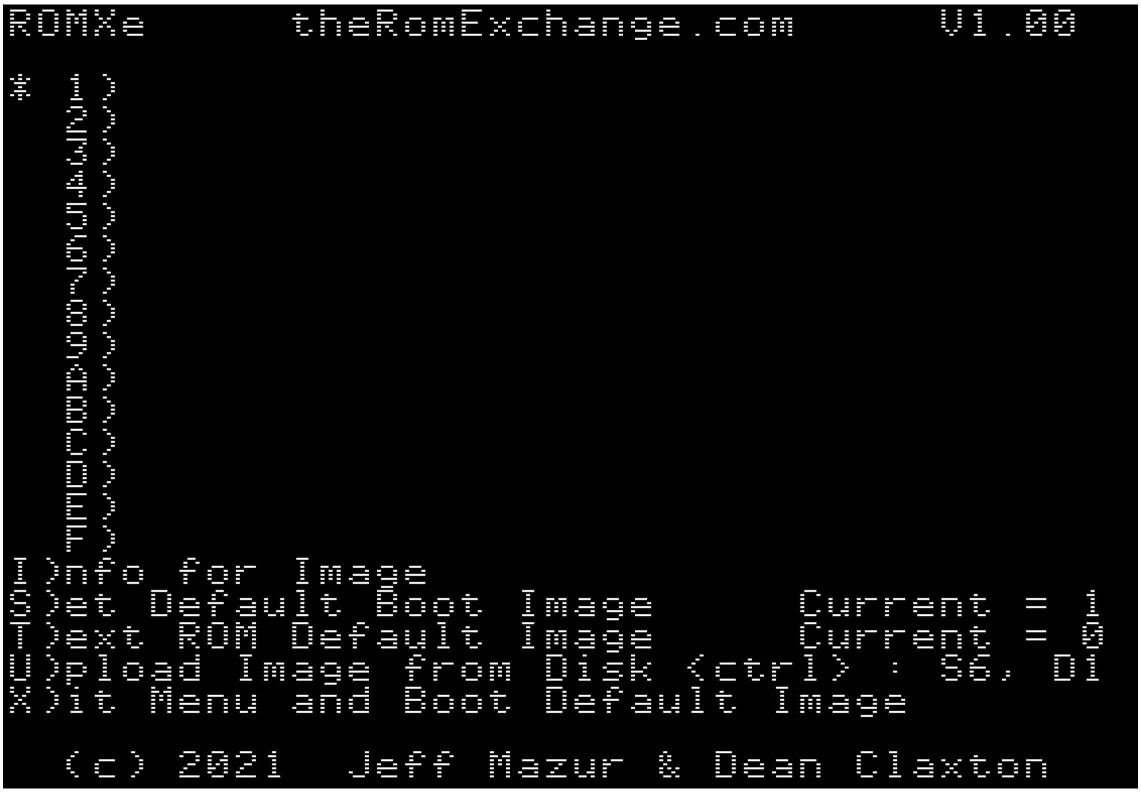
Set up your system to boot using the ROMXce System and Utilities disk image, then select a ROM image to boot by pressing a key in the range 1-9, A-F.

If for some reason you do not have any valid ROM images installed on your ROMXc/e 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 ROMXce System and Utilities disk, while leaving the computer on, reinstall the recovery jumper on the ROMXc/e module.

You can now use the ROMXCE.DISK program to re-install the firmware (upload the firmware image to bank 0).

Note that if you are recovering from a corrupted firmware image, then you may 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:



```
ROMXe     theRomExchange.com     V1.00

*  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 ROM Default Image     Current = 0
U)pload Image from Disk <ctrl> : S6, D1
X)it Menu and Boot Default Image

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```

The stock images can be downloaded and reinstalled, else you can restore the image descriptions and information from I)nfo screen using CTRL-D to edit the description, and CTRL-I to edit the informational text.

Testing

The recovery mode is quite safe to test.

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 e.g press 1 to select the stock ROM $00 image.

Note that any linkages are ignored in recovery mode (&Tn, &Dn, &Ln).

When using recovery mode you would typically replace the jumper after booting the machine, so that you can run the ROMXCE.DISK utility to re-flash the firmware. If you were to run the ROMXCE.DISK utility without firstly replacing the jumper, ROMXCE.DISK will remind you to replace it however you may get a "ROMX NOT FOUND" error and a blank menu. If this happens, power cycle the computer and then ensure that the Recovery jumper is in place before running ROMXCE.DISK.

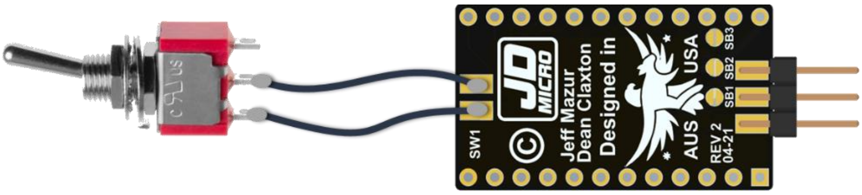
APPENDIX 1 : ROMXce Video ROM Fonts

ROMXce Video ROM Font List

The ROMXce video ROM is designed to support ROMXc, ROMXc+, and ROMXe, and is loaded with 32 fonts in 2 x 16 font banks.

For 28 pin video ROMs, font bank selection is via the stock keyboard switch fitted to the underside of the keyboard (International Apple IIe) or the Keyboard switch on the //c and //c+.

For 24 pin video ROMS, font selection is via a switch that can be added to the SW1 pads on the 24 pin Video ROM module as below :



The following table lists the fonts available in the two banks (keyboard switch off/on). The font number is used in the ROMX menu system to associate the font. The memory offset in the SST39SF010A flash memory chip is also shown should you wish to further customize the Video ROM (see the ROMXce Video ROM Programming Guide).

ROMXce	Keyboard Switch Off		Keyboard Switch On	
Font #	Address	Font Name	Address	Font Name
0	00000	US Enhanced	10000	Euro Un-Enhanced
1	01000	US Un-Enhanced	11000	Euro Enhanced
2	02000	Clinton Turner V1 Enhanced	12000	Clinton Turner V2 Enhanced
3	03000	ReActiveMicro Enhanced	13000	Improved German Enhanced
4	04000	Dan Paymar Enhanced	14000	Improved German Un-Enhanced
5	05000	Blippo Black Enhanced	15000	French Canadian Enhanced
6	06000	Byte Enhanced	16000	French Canadian Un-Enhanced
7	07000	Colossal Enhanced	17000	Hebrew Enhanced
8	08000	Count Enhanced	18000	Hebrew Un-Enhanced
9	09000	Flow Enhanced	19000	Apple][Plus Enhanced
A	0A000	Gothic Enhanced	1A000	Apple][Plus Un-Enhanced
B	0B000	Outline Enhanced	1B000	Katakana Enhanced
C	0C000	Pigfont Enhanced	1C000	Cyrillic Enhanced
D	0D000	Pinocchio Enhanced	1D000	Greek Enhanced
E	0E000	Slant Enhanced	1E000	Esperanto Enhanced
F	0F000	Stop Enhanced	1F000	Videx Enhanced

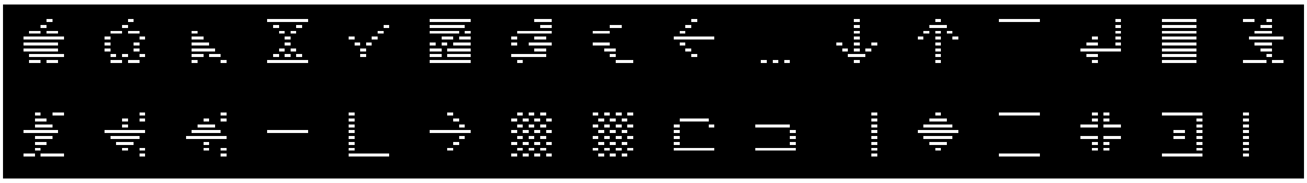
Note that the stock keyboard switch for apple IIc, IIc+, and international Apple //e also selects a second keymap via the MAP ROM. On many international machines the two key maps stored in the MAP ROM are identical however for US based Apple //c's the second key map is the Dvorak layout.

Replacement MAP ROMs can be installed so that only key map 1 is used regardless of the switch position, leaving the keyboard switch to select only the video ROM bank.

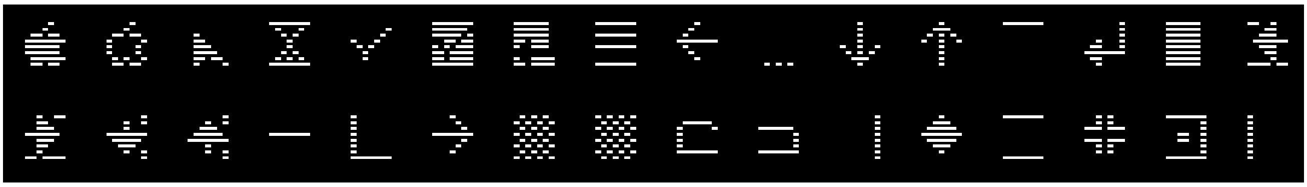
Many of the included fonts are Enhanced, meaning that they include MouseText. MouseText is a set of 32 graphical characters designed by Bruce Tognazzini, which replaced a redundant set of inverse uppercase characters and made it possible to display simple text user interfaces resembling the Macintosh GUI.

The MouseText characters were introduced with the Apple IIc and later retrofitted to the Apple IIe via the Enhancement kit which included a 65C02 processor, the updated Video ROM and updated system ROMs. All Enhanced Apple IIe machines include MouseText, and MouseText was also carried over to the IIgs with a couple of changes (they replaced the running man characters shown in positions 7 and 8 below).

The 32 MouseText characters for the IIc and IIe :



And the IIgs version of MouseText, which is included in the ReActiveMicro video ROM:

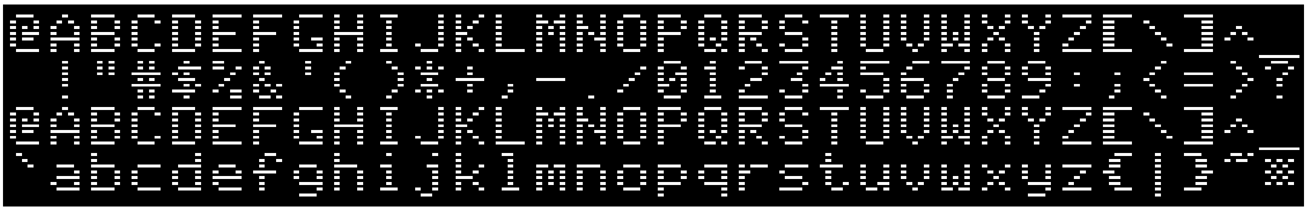


We have included a fair selection of un-enhanced fonts for older applications that may have used the alternate inverse character set (and would look terrible with MouseText).

Included on the ROMXce Utility Disk are a couple of Applesoft Text ROM Demo applications that allow you to use the arrow keys to preview each font, including the MouseText characters (see the Utility Disk section).

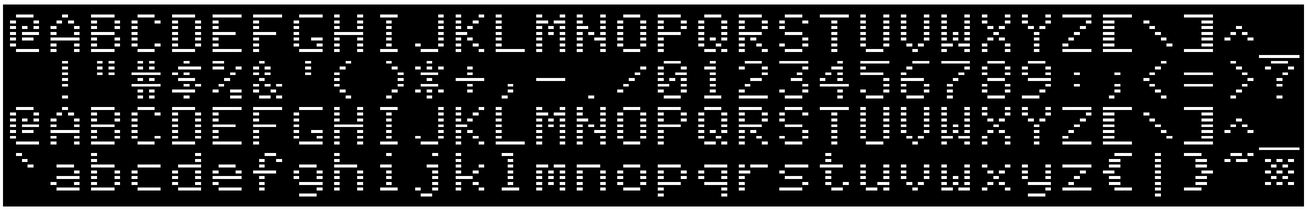
Bank 0 (Keyboard Switch OFF)

0 = Apple US Enhanced Video ROM :



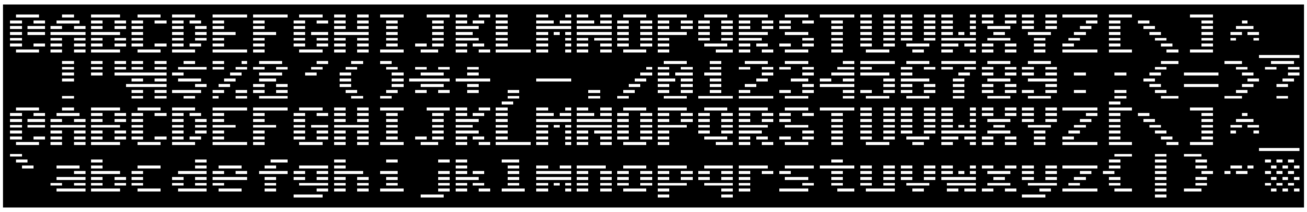
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~▒
```

1 = Apple US Un-Enhanced Video ROM :



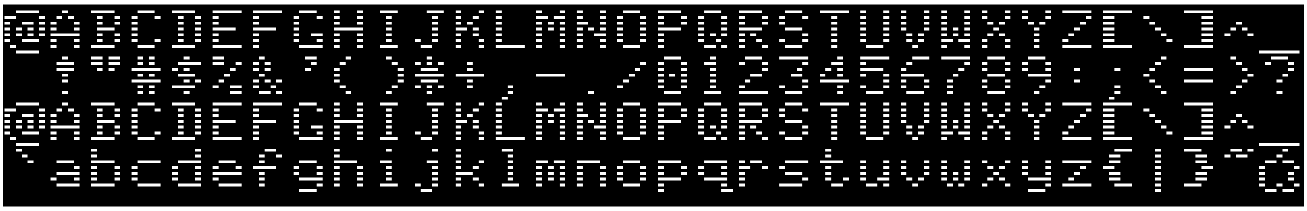
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~▒
```

2 = Clinton Turner V1 Enhanced (Clinton based his font off the Commodore 64):



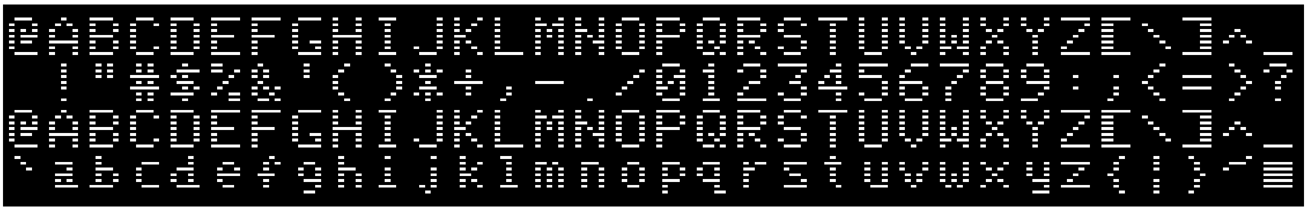
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~▒
```

3 = ReActiveMicro Enhanced (Henry S. Courbis - includes the IIgs version of MouseText):



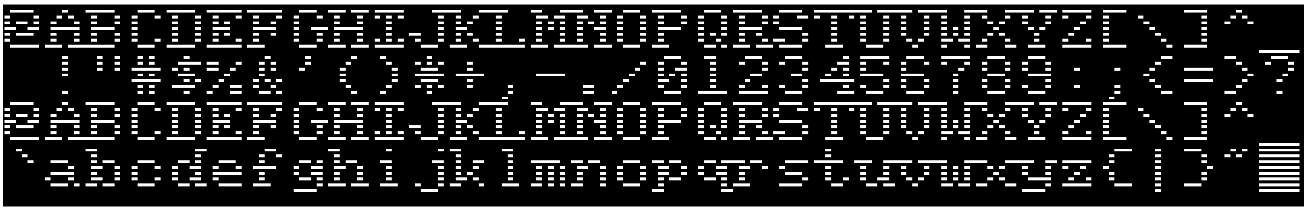
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~▒
```

4 = Dan Paymar Enhanced:



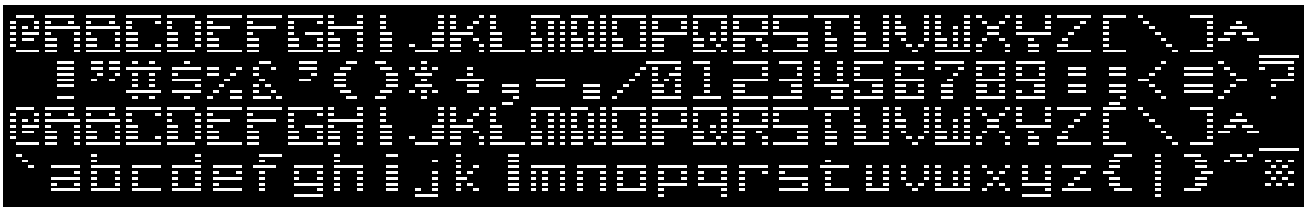
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~≡
```

5 =Blippo Black Enhanced (adapted from DOS toolkit):



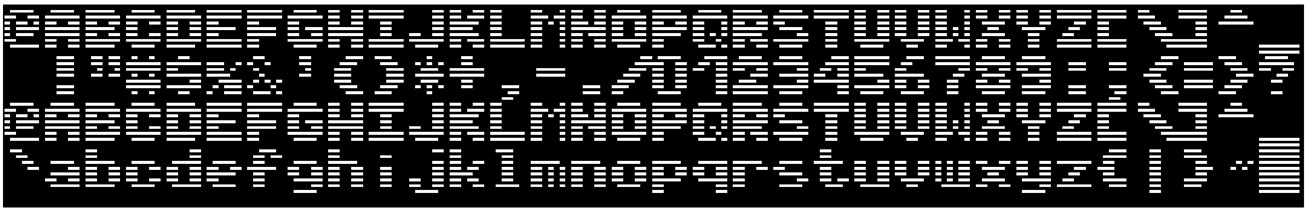
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~▤
```

6 = Byte Enhanced (adapted from DOS toolkit):



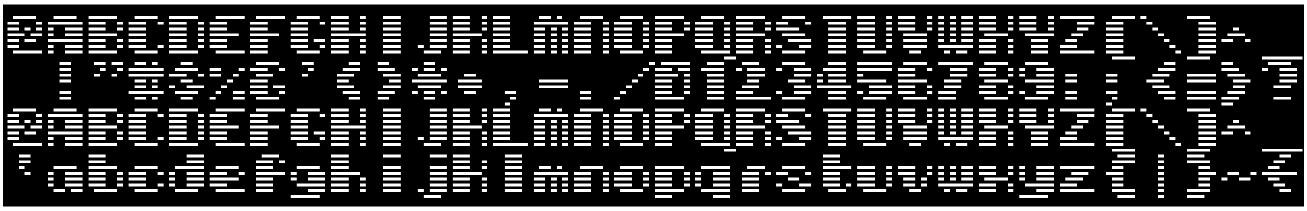
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~※
```

7 = Colossal Enhanced (adapted from DOS toolkit):



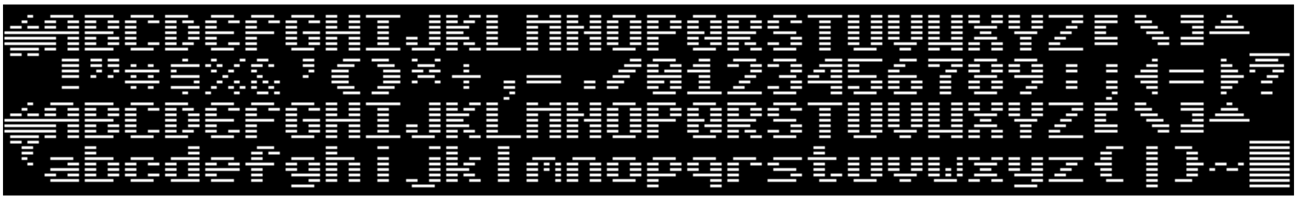
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~▤
```

8 = Count Enhanced (adapted from DOS toolkit):



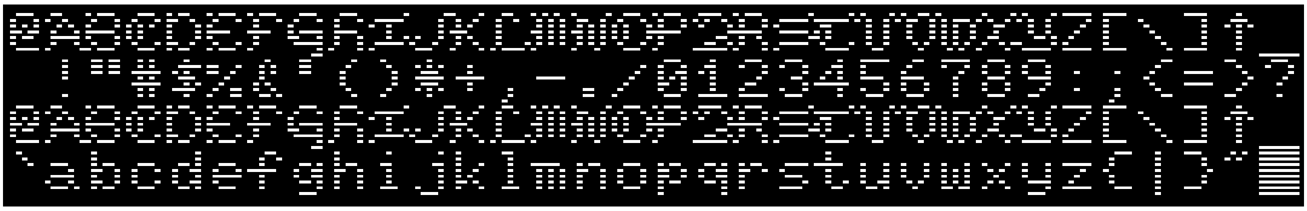
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~←
```

9 = Flow Enhanced (adapted from DOS toolkit):



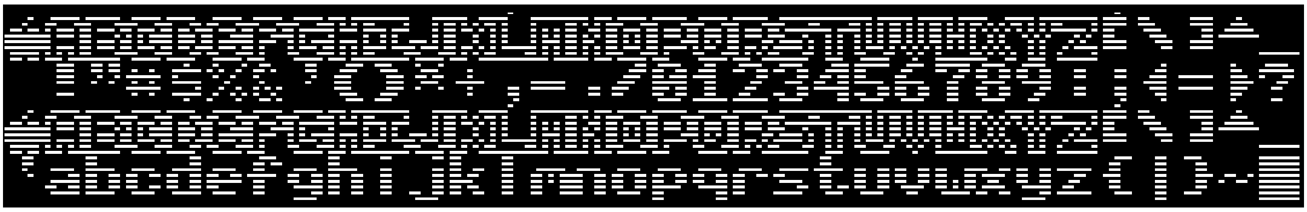
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~▤
```

A = Gothic Enhanced (adapted from DOS toolkit):

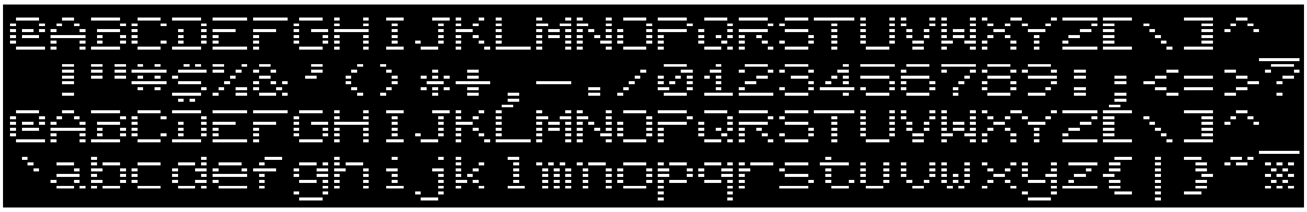


```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]↑_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]↑_
`abcdefghijklmnopqrstuvwxyz{|}~▤
```

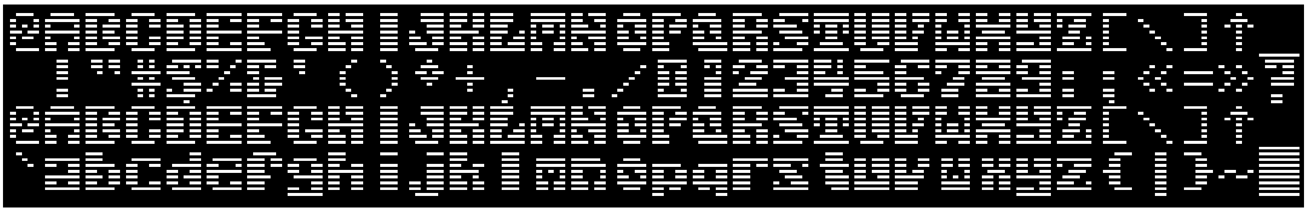
B = Outline Enhanced (adapted from DOS toolkit):



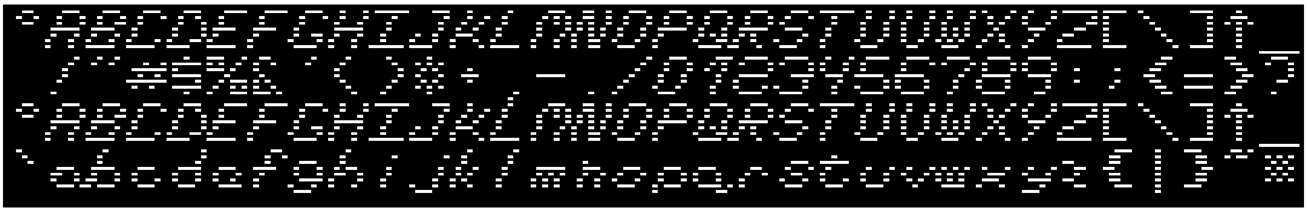
C = Pigfont Enhanced (Keith Comer):



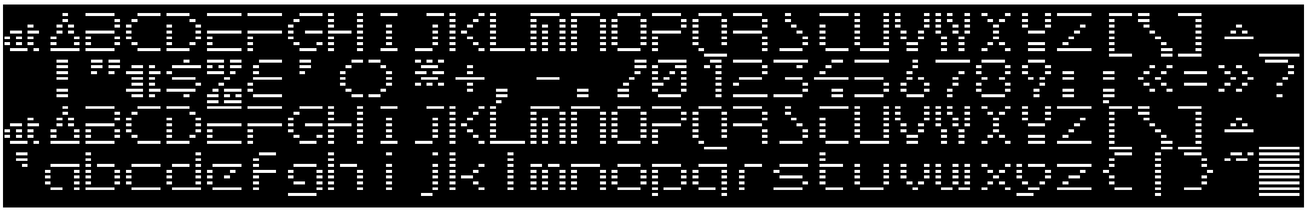
D = Pinocchio Enhanced (adapted from DOS toolkit):



E = Slant Enhanced (adapted from DOS toolkit):

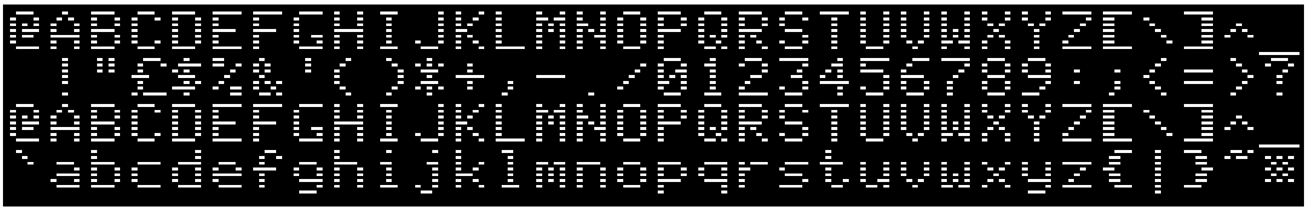


F = Stop Enhanced (adapted from DOS toolkit):



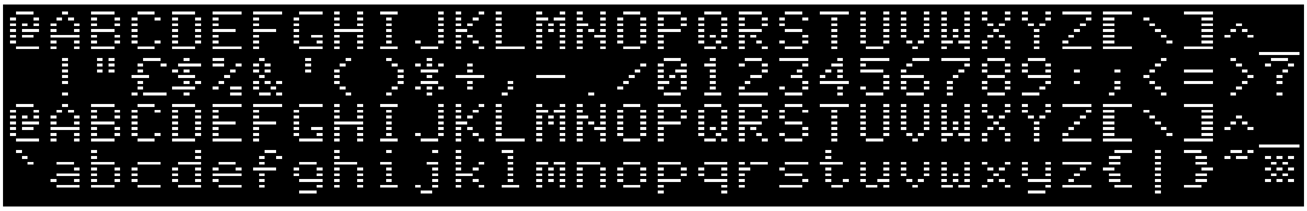
Bank 1 (Keyboard Switch ON)

0 = Apple Euro Un-Enhanced :



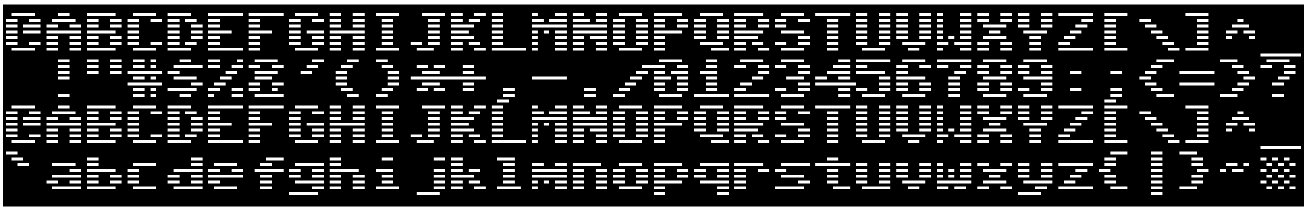
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"£$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~▒
```

1 = Apple Euro Enhanced :



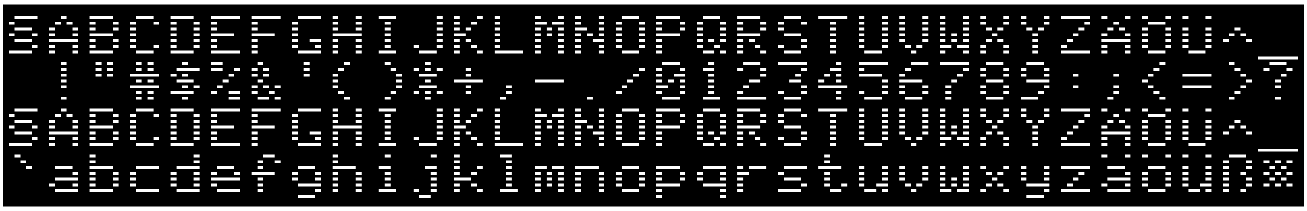
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"£$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~▒
```

2 = Clinton Turner V2 (Clinton created this version for viewing on LCD displays) :



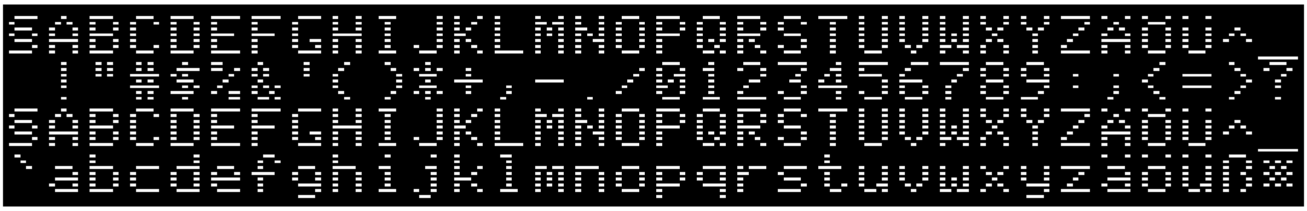
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~▒
```

3 = Apple Improved German Enhanced:



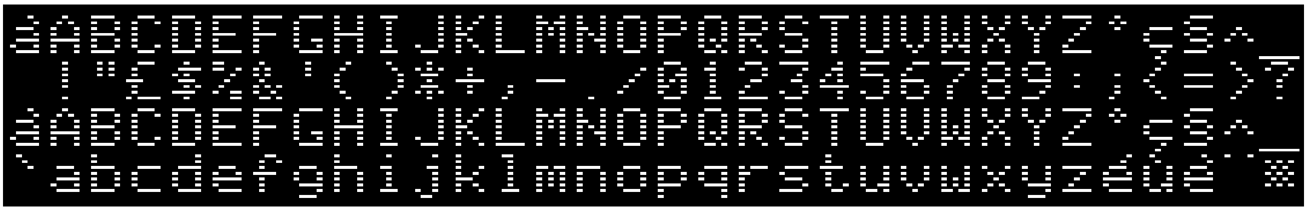
```
§ABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÜ^_
 !"#$%&'()*+,-./0123456789:;<=>?
§ABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÜ^_
`abcdefghijklmnopqrstuvwxyzäöüß▒
```

4 = Apple Improved German Un-Enhanced:



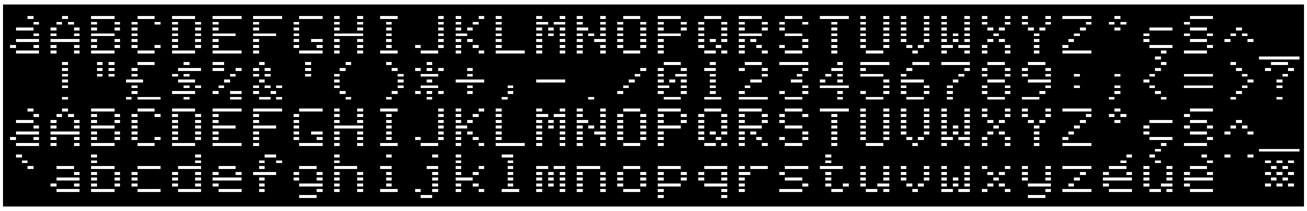
```
§ABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÜ^_
 !"#$%&'()*+,-./0123456789:;<=>?
§ABCDEFGHIJKLMNOPQRSTUVWXYZÄÖÜ^_
`abcdefghijklmnopqrstuvwxyzäöüß▒
```

5 = Apple French Canadian Enhanced:



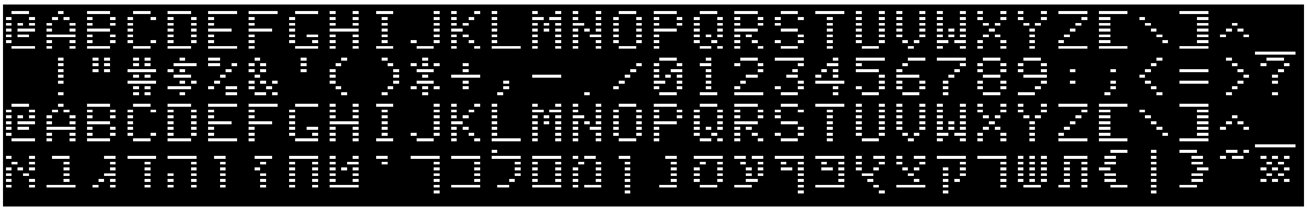
```
àABCDEFGHIJKLMNOPQRSTUVWXYZ°ç§^_
 !"£$%&'()*+,-./0123456789:;<=>?
àABCDEFGHIJKLMNOPQRSTUVWXYZ°ç§^_
`abcdefghijklmnopqrstuvwxyzéùè¨▒
```

6 = Apple French Canadian Un-Enhanced:



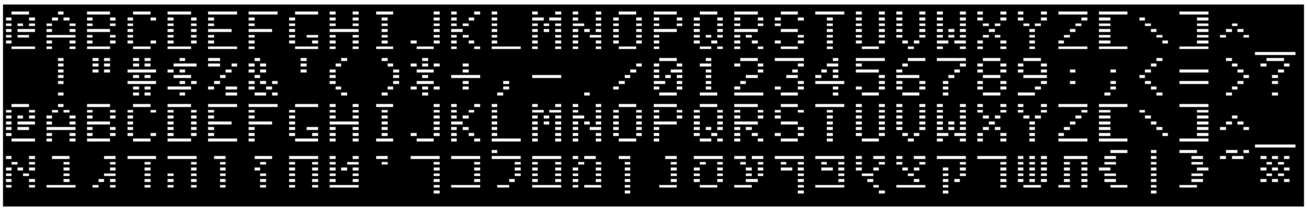
```
àABCDEFGHIJKLMNOPQRSTUVWXYZ°ç§^_
 !"£$%&'()*+,-./0123456789:;<=>?
àABCDEFGHIJKLMNOPQRSTUVWXYZ°ç§^_
`abcdefghijklmnopqrstuvwxyzéùè¨▒
```

7 = Hebrew Enhanced:



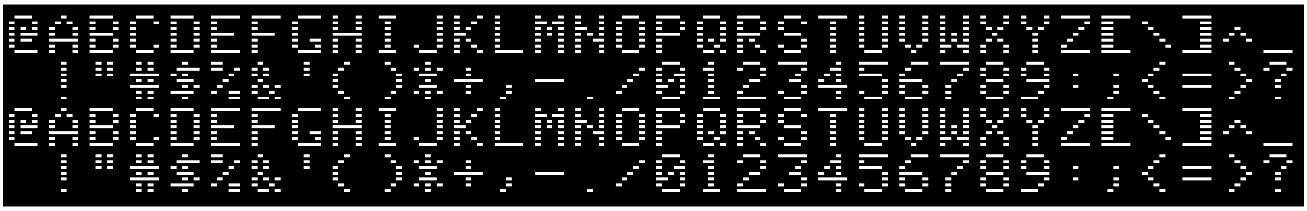
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
אבגדהוזחטיךכלםמןנסעףפץצקרשת{|}~▒
```

8 = Hebrew Un-Enhanced:



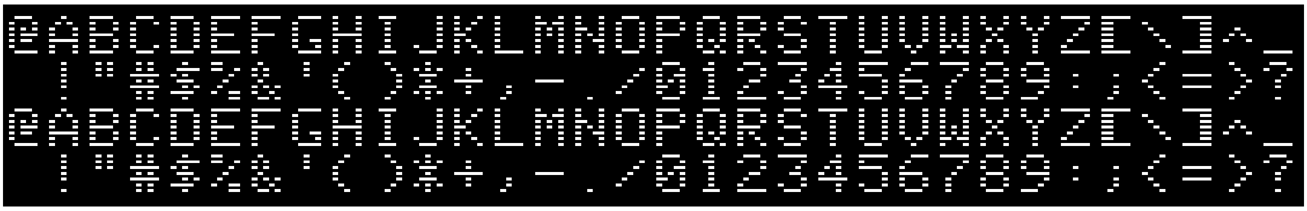
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
אבגדהוזחטיךכלםמןנסעףפץצקרשת{|}~▒
```

9 = Apple II Plus Enhanced:



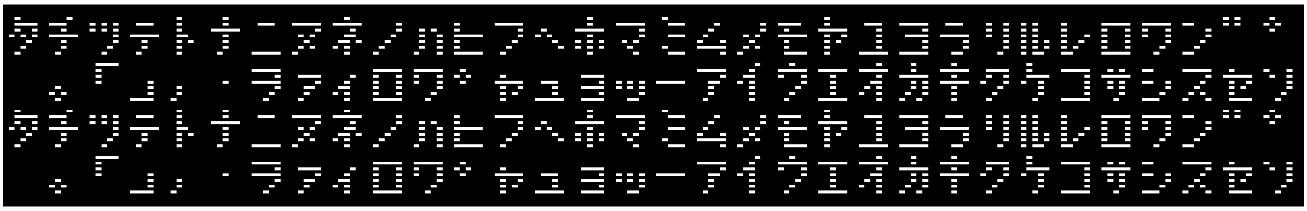
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
```

A = Apple II Plus Un-Enhanced:

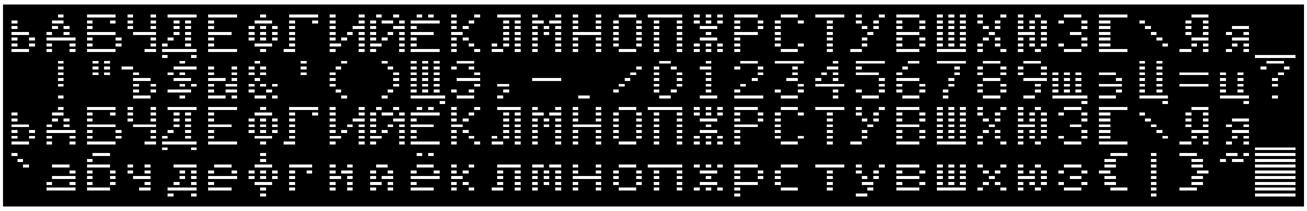


```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
```

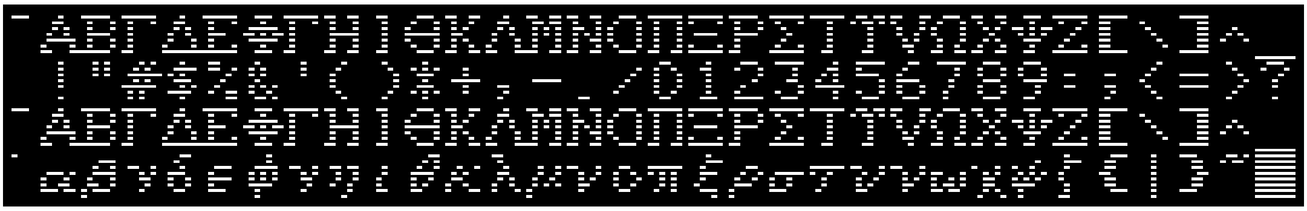
B = Katakana Enhanced (adapted from Apple J-Plus):



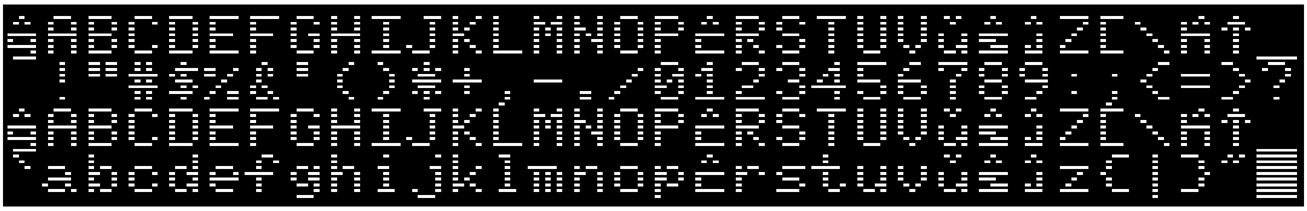
C = Cyrillic Enhanced (adapted from DOS toolkit):



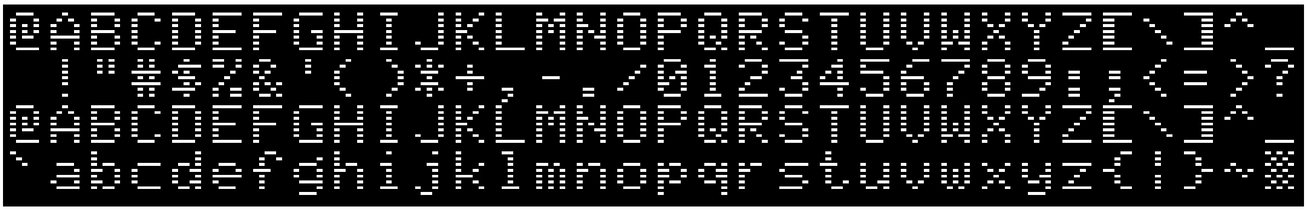
D = Greek Enhanced (adapted from DOS toolkit):



E = Esperanto Enhanced (adapted from DOS toolkit):



F = Videx Enhanced:

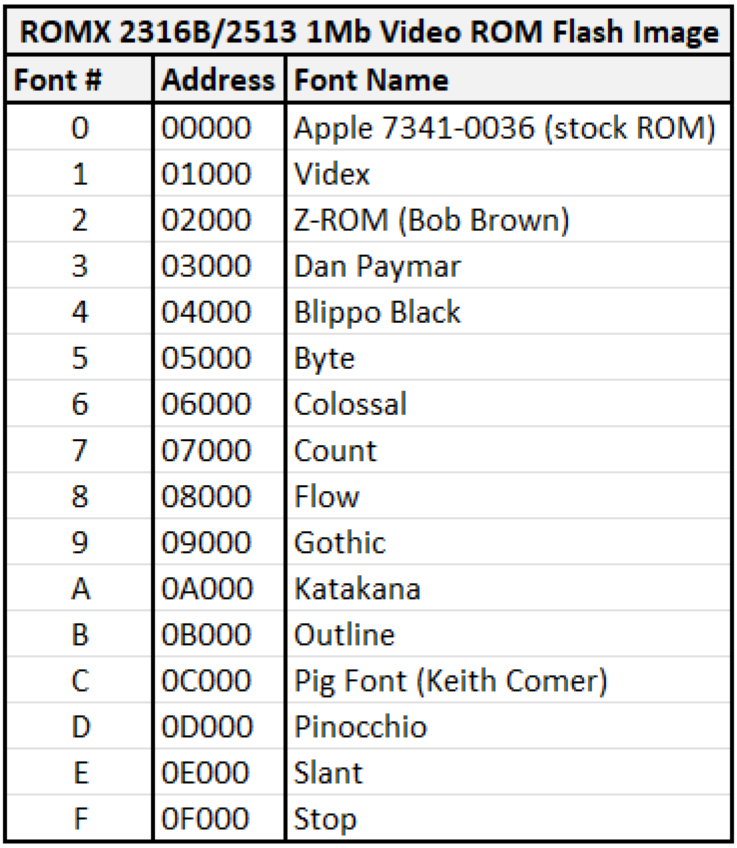


APPENDIX 2: ROMX+ 2316B SPCL/2513 Text ROM Fonts

ROMX 2316B SPCL/2513 Font List

The ROMX 2316B SPCL Text ROM (for rev 7 motherboards), and ROMX 2513 Text ROM (for pre-rev 7 motherboards) text ROMs include 16 fonts, many including lower case.

The following table lists the fonts available. The font number is used in the ROMX menu system to associate the font. The memory offset in the SST39SF010A flash memory chip is also shown should you wish to further customize the Text ROM (see the ROMXce Video ROM Programming Guide).

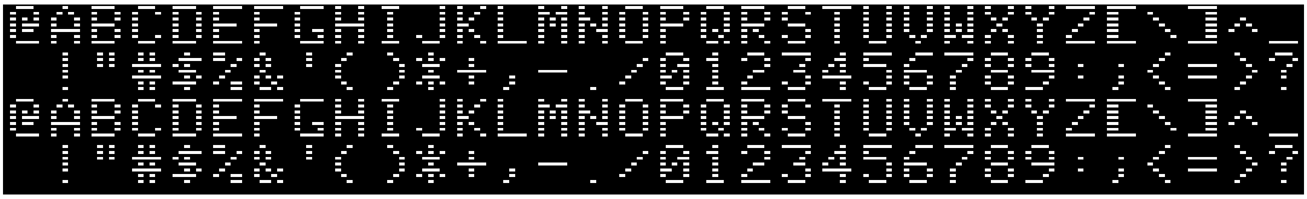


ROMX 2316B/2513 1Mb Video ROM Flash Image		
Font #	**Address**	**Font Name**
0	00000	Apple 7341-0036 (stock ROM)
1	01000	Videx
2	02000	Z-ROM (Bob Brown)
3	03000	Dan Paymar
4	04000	Blippo Black
5	05000	Byte
6	06000	Colossal
7	07000	Count
8	08000	Flow
9	09000	Gothic
A	0A000	Katakana
B	0B000	Outline
C	0C000	Pig Font (Keith Comer)
D	0D000	Pinocchio
E	0E000	Slant
F	0F000	Stop

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.

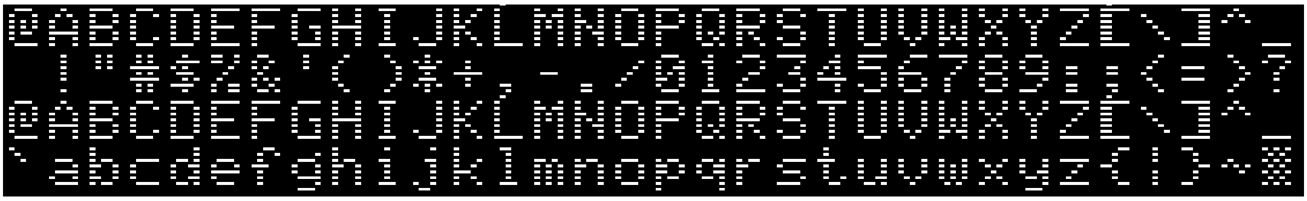
Included on the ROMXce Utility Disk is an Applesoft Text ROM Demo application that allows you to use the arrow keys to preview each font.

0 = Apple 7341-0036 (stock ROM):



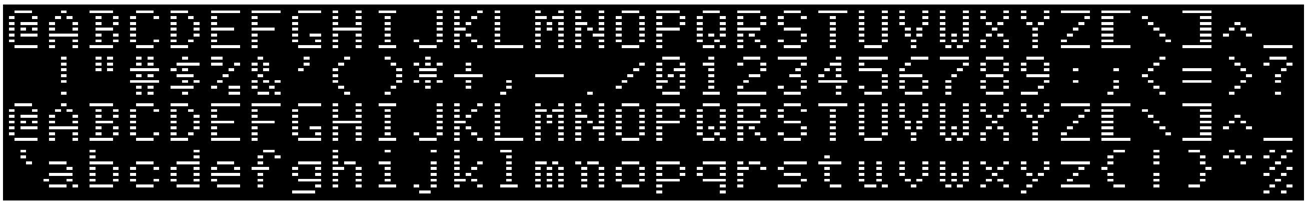
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
```

1 = Apple with lower case (Videx):



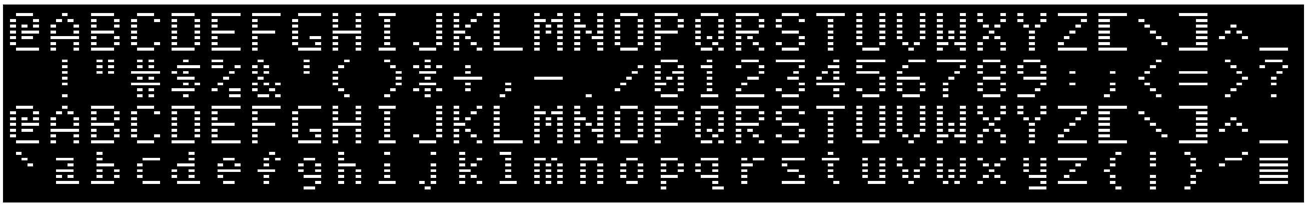
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~▒
```

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



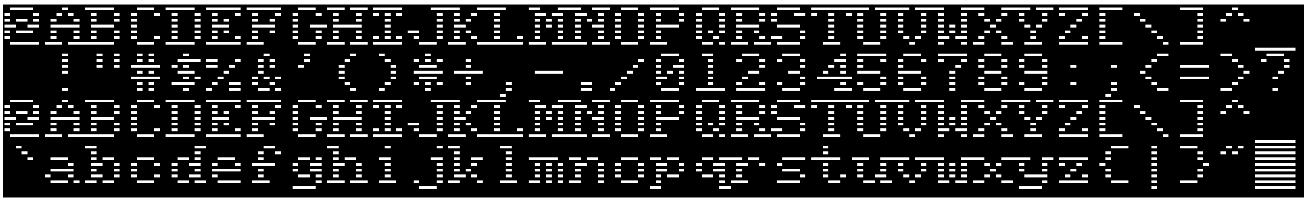
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~▒
```

3 = Apple with lower case (Dan Paymar):



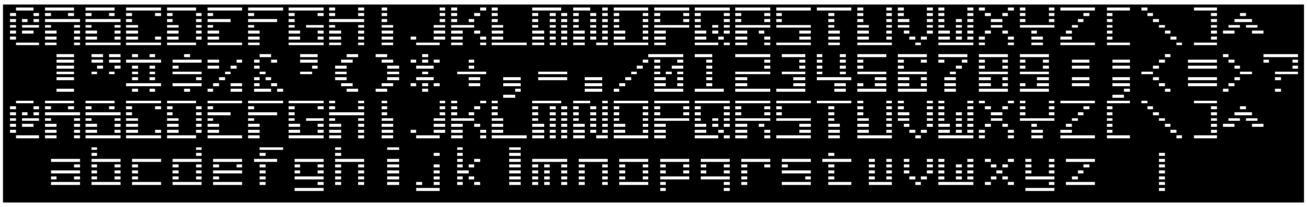
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~≡
```

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

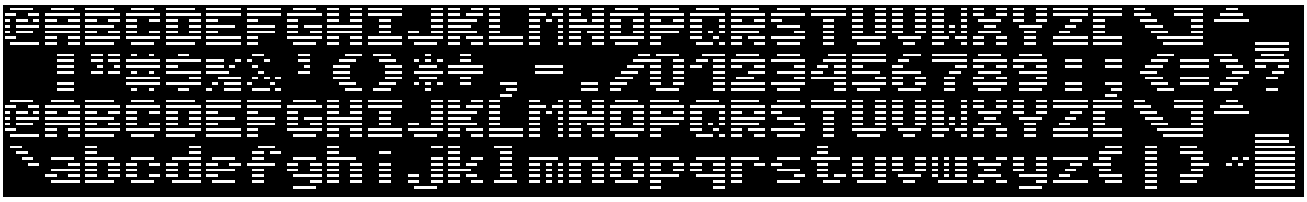


```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~≡
```

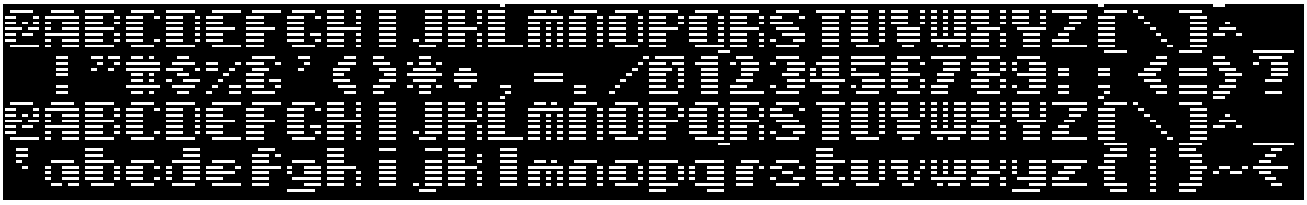
5 = Byte (adapted from The DOS Toolkit):



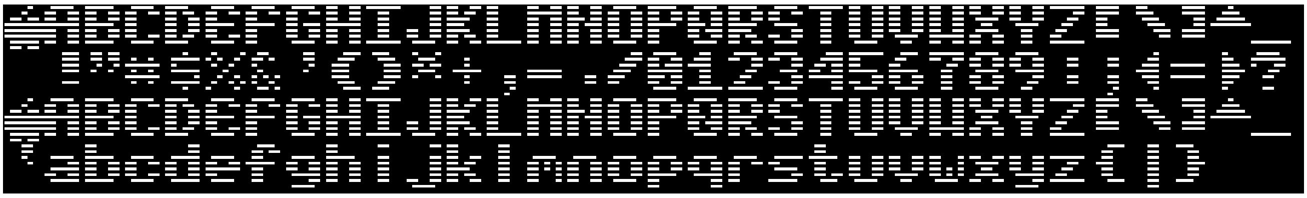
6 = Colossal (adapted from The DOS Toolkit):



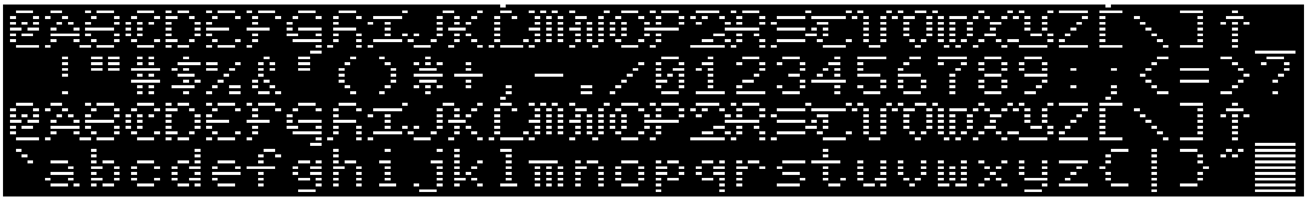
7 = Count (adapted from The DOS Toolkit):



8 = Flow (adapted from The DOS Toolkit):

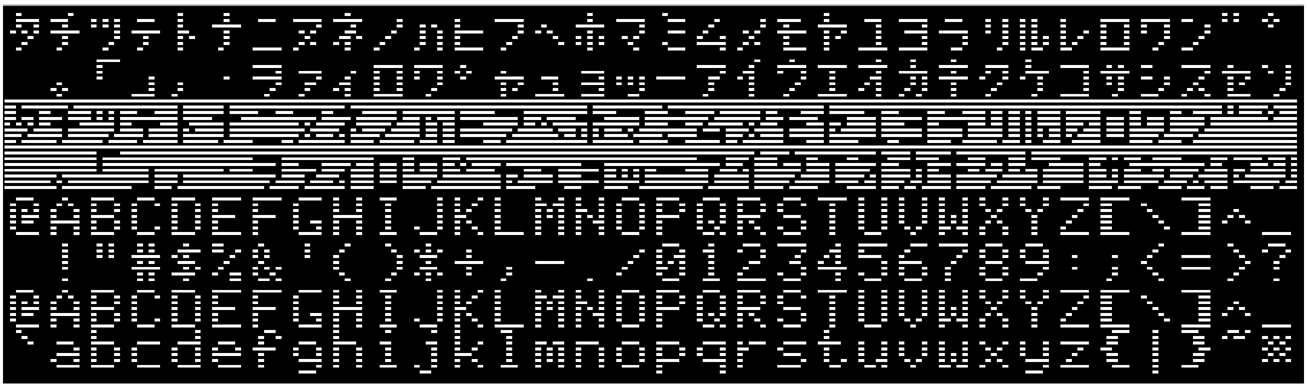


9 = Gothic (adapted from The DOS Toolkit):



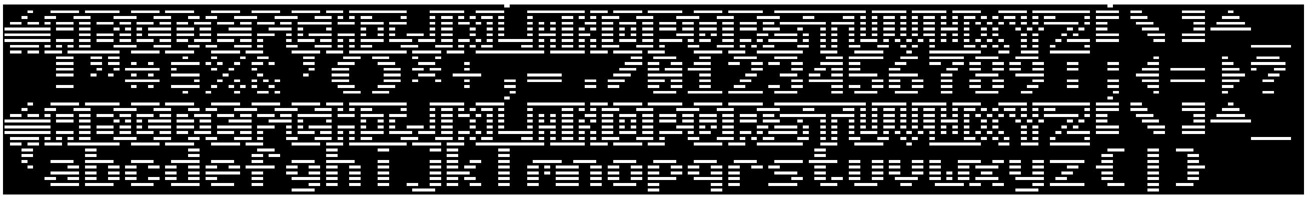
A = Katakana

This is a 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 :



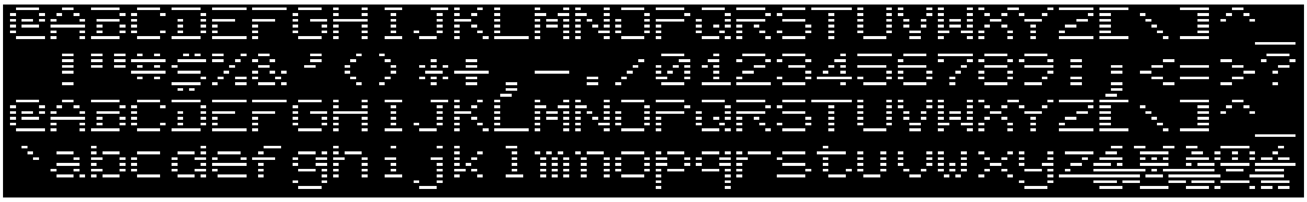
```
ﾀﾁﾂﾃﾄﾅﾆﾇﾈﾉﾊﾋﾌﾍﾎﾏﾐﾑﾒﾓﾔﾕﾖﾗﾘﾙﾚﾛﾜﾝﾞﾟ
 ｡｢｣､･ｦｧｨｩｪｫｬｭｮｯｰｱｲｳｴｵｶｷｸｹｺｻｼｽｾｿ
ﾀﾁﾂﾃﾄﾅﾆﾇﾈﾉﾊﾋﾌﾍﾎﾏﾐﾑﾒﾓﾔﾕﾖﾗﾘﾙﾚﾛﾜﾝﾞﾟ
 ｡｢｣､･ｦｧｨｩｪｫｬｭｮｯｰｱｲｳｴｵｶｷｸｹｺｻｼｽｾｿ
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}~▒
```

B = Outline (adapted from The DOS Toolkit):



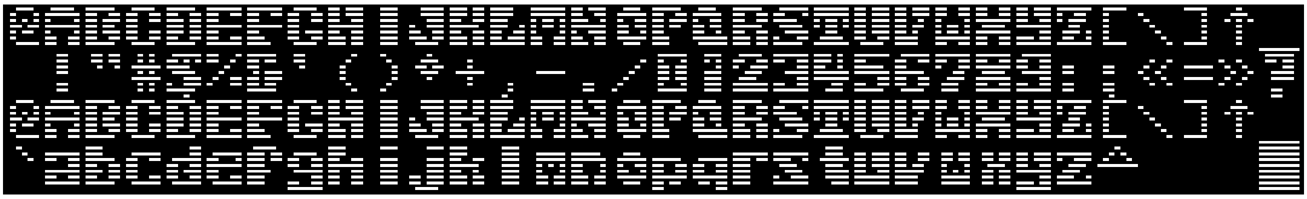
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz{|}
```

C = Pig Font (Keith Comer):



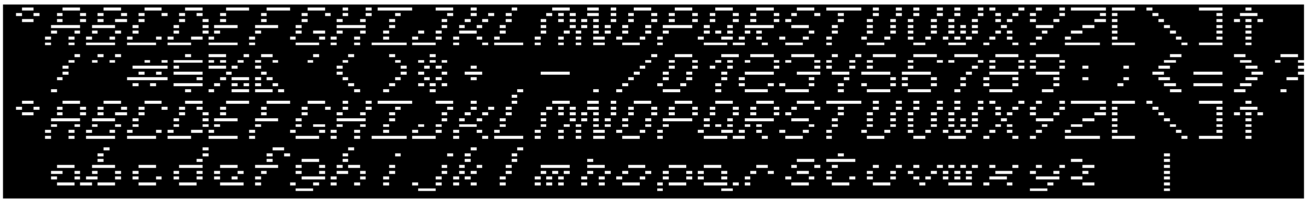
```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
`abcdefghijklmnopqrstuvwxyz
```

D = Pinocchio (adapted from The DOS Toolkit):

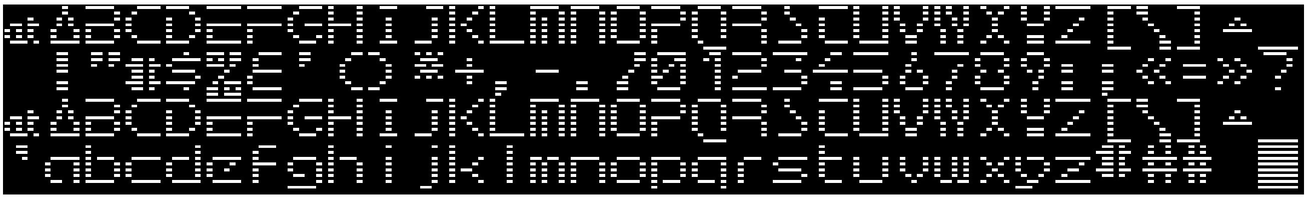


```
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]↑_
 !"#$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]↑_
`abcdefghijklmnopqrstuvwxyz^  ▤
```

E = Slant (adapted from The DOS Toolkit):



F = Stop (adapted from The DOS Toolkit):



Credits

Software Design	Jeff Mazur
Hardware Design	Dean Claxton
	Jeff Mazur
Documentation	Dean Claxton
Dual DOS	Peter Ferrie
Manufacturing	Dean Claxton

Special thanks to our Beta Testers for their valuable feedback – you've helped make ROMX an exceptional product!

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	Peter Ferrie
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	Joe Strosnider
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