CP/M 2.2 for the NABU PC

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General Notes

This release of CP/M 2.2 supports the following on the NABU PC:

- SSDD 40 TRK 48 TPI 5.25”, DSDD 80 TRK 48 TPI 5.25”, and DSDD 160 TRK 96 TPI 3.5" disks
- Dynamic BIOS reconfiguration when swapping SSDD and DSDD disks on 5.25" drives
- Serial option board
- Parallel port
- Virtual 80 column mode
- ADM-3A terminal emulation

Additional features include:

- Approximately 10k more usable memory when compared to the NABU CP/M 3 release
- Approximately 15k more usable floppy space when compared to the NABU CP/M 3 release

Commands

You will find the standard CP/M 2.2 transient commands on the disk images:

- STAT
- ASM
- DDT
- LOAD
- PIP
- ED
- SUBMIT
- DUMP
- MOVCPM
- XSUB

In addition to the standard bundled commands, the disk images include the following Digital Research and third-party utilities:

- MAC
- LINK
- ZSID
- MBASIC

This release also includes the following utilities specifically written for the NABU PC:

- FORMAT : multi-format floppy disk formatter
- SYSGEN : copies system tracks from a bootable floppy to a formatted disk
- XMRECV : xmodem receive tool to allow transfer of files to the NABU over the serial port
- XMSEND : xmodem send tool to allow transfer of files from the NABU over the serial port (xmsend supports both Checksum and CRC transfers)
- SETCOLOR : changes the text and background color of the display
- SETBAUD : changes the BAUD rate of the serial port

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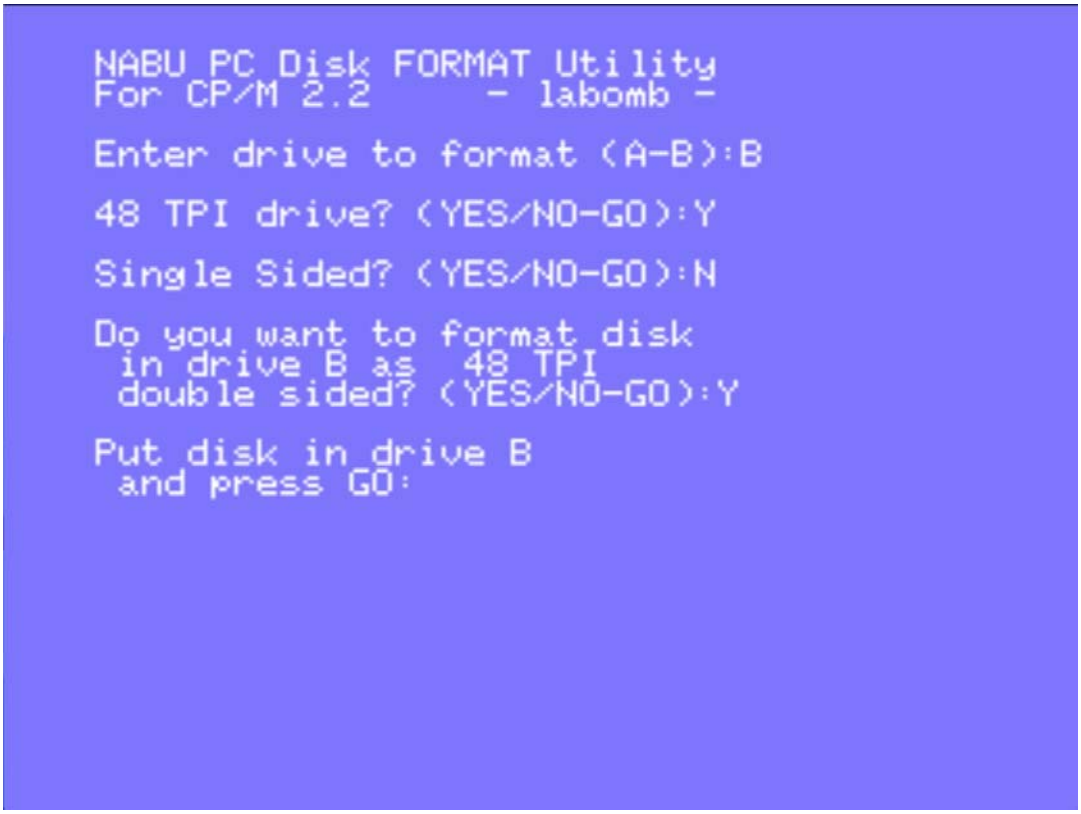
NABU Specific Command Notes

format

The floppy disk format utility is based on the original utility bundled with the CP/M 3 release. It supports all of the disk formats supported by this release of CP/M. The utility will print several prompts, and based on responses to those prompts it will proceed to format and verify the selected disk. Only the first letter of the requested responses needs to be entered.



sysgen

For those of you who may be familiar with the DOS operating system, when you wished to create a bootable disk, you could add the '/s' parameter to the format command when formatting a disk, which would simply copy two hidden system files and the ubiquitous 'command.com' file to the target disk after the format operation was complete. Another option was to use the DOS 'sys' command, which effectively did the same thing as the '/s' option when used with the format command.

The **sysgen** utility is one means to do the same thing in CP/M. It copies the contents of the system tracks from a bootable disk to the system tracks of a formatted but non-bootable disk so that it too, will be bootable.

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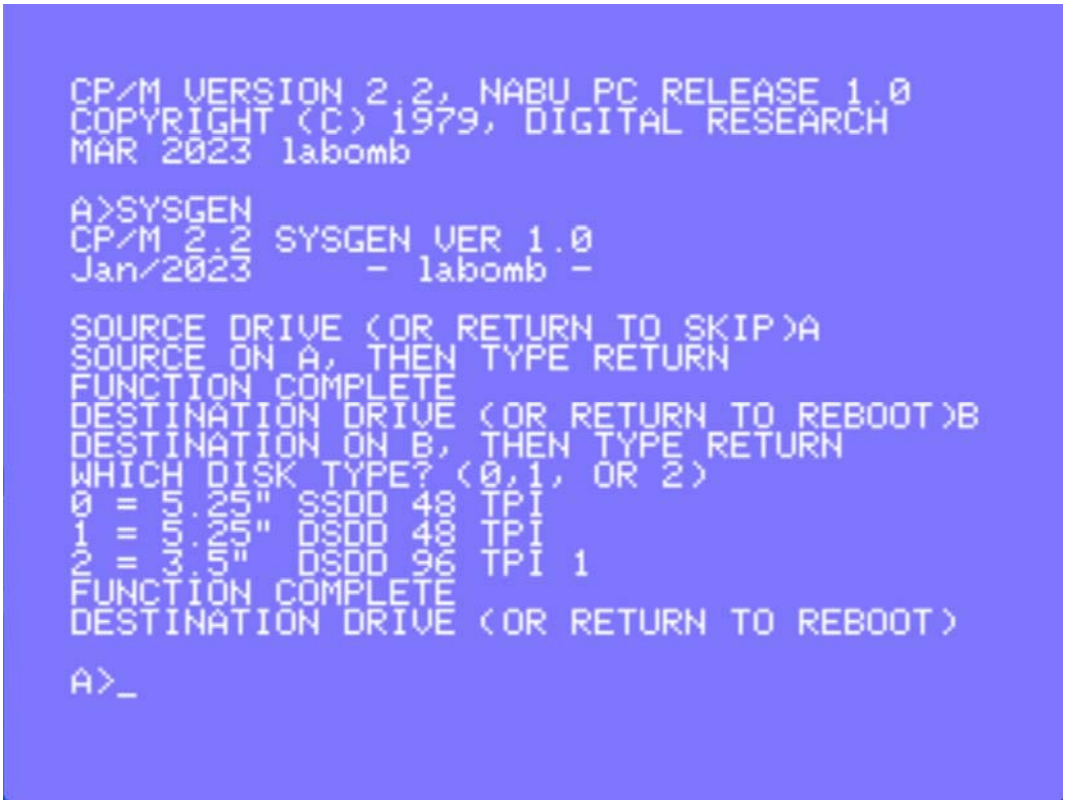
With most all CP/M 2.2 releases, the CP/M operating system is stored on the system tracks (this later changed with the release of CP/M version 3… the operating system was moved to files residing on the disk file system). The three major components that comprise a functional CP/M system are all there… the CPP, the BDOS, and the custom BIOS. The **sysgen** utility will copy the contents of those tracks to another disk. This version is based on the original source code from Digital Research.



xmrecv and xmsend

The **xmrecv** and **xmsend** utilities provide a simple way to transfer files from and receive files to your NABU PC using the widely supported XMODEM file transfer protocol. The XMODEM protocol typically works over a serial connection, and as such a serial option board is required (or if using the mame, you will need to configure a serial port when starting the NABU emulation).

To use either utility, you will need to connect a laptop or other computer that can run terminal emulation software that supports the XMODEM transfer protocol (most all emulation software apps that I am aware of do) to the serial port on your NABU PC. On Windows, I typically use TeraTerm.

This release of CP/M 2.2 configures the serial port for 9600 BAUD by default (see details on the SETBAUD utility later in this document), and an 8-bit word length, with no parity, and 1 stop bit (often shortened to 8/N/1). Your terminal emulator will need to be configured similarly.

Once connected, you simply enter the appropriate command followed by the filename to send or receive files.

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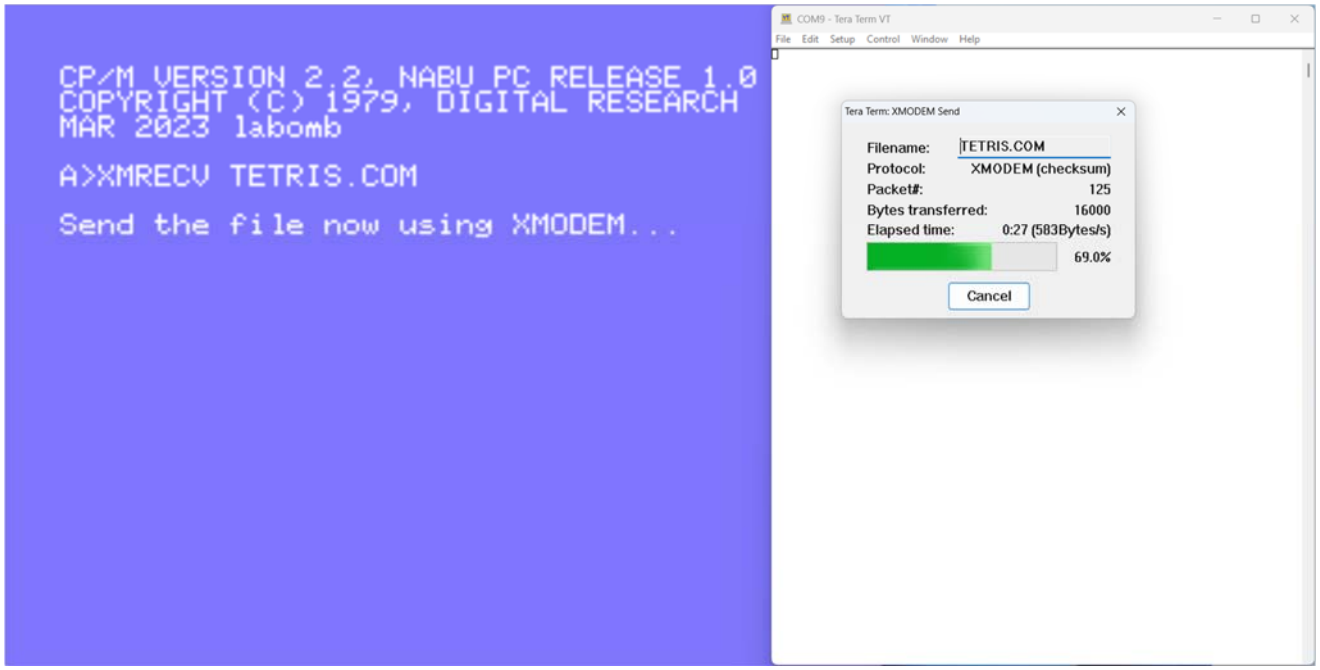
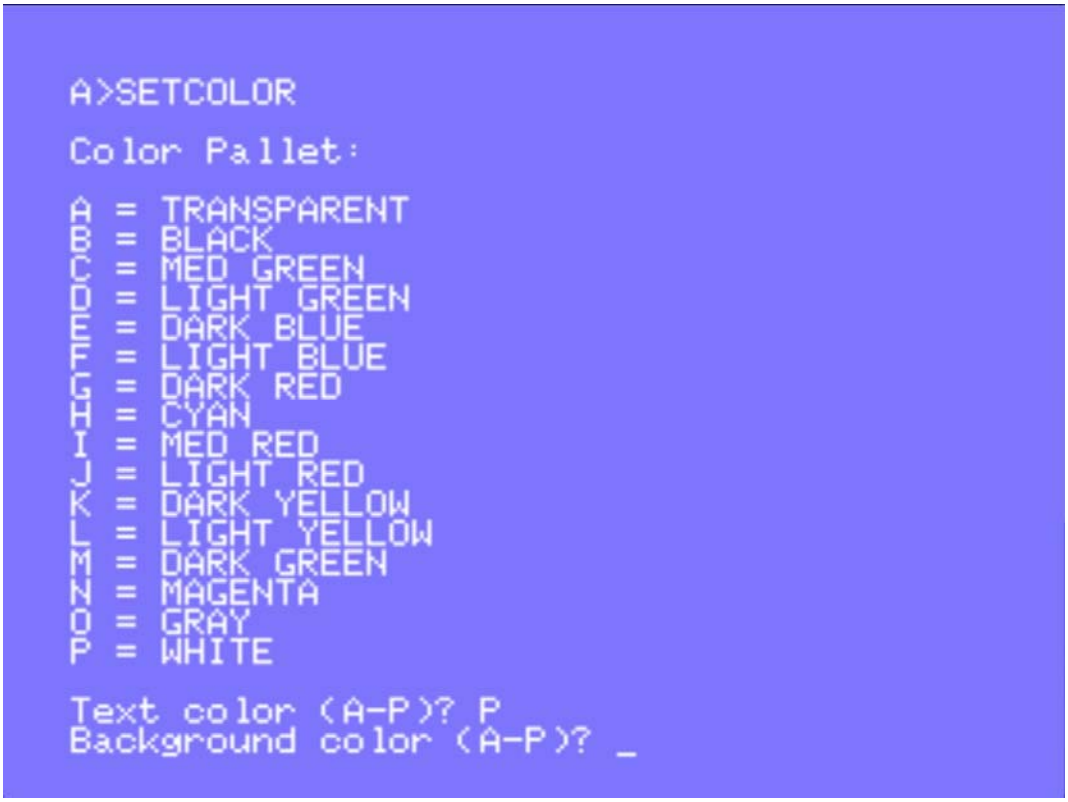


setcolor

This is a simple utility that can customize the screen text and background colors. It can be run interactively, or your desired color choices can be provided on the command line when executing the command.



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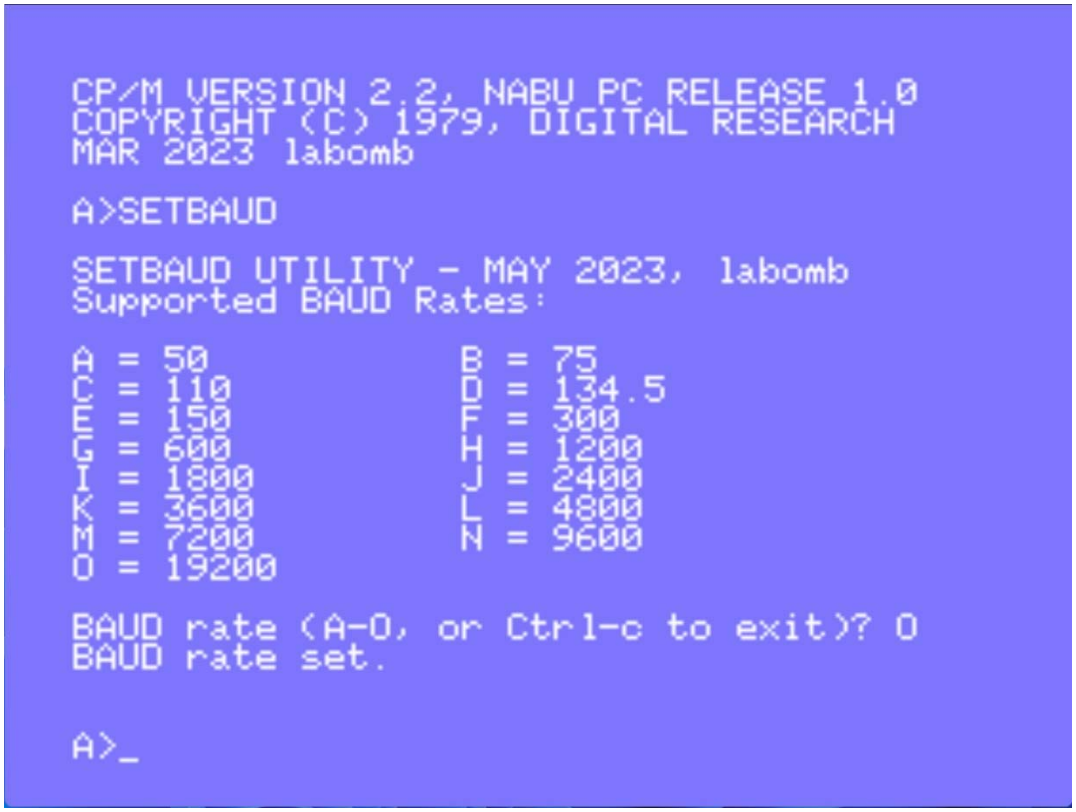
setbaud

This is another simple utility that gives you the ability to configure the BAUD rate of the serial option board. It can be run interactively, or you can provide the desired BAUD rate as a command line option (useful when running in a CP/M 'submit' batch file for example).

Enter SETBAUD ? for a brief usage summary.



As mentioned previously in this document, this release of CP/M 2.2 configures the serial port for an 8-bit word length, no parity, and 1 stop bit (often shortened to 8/N/1). In addition to the BAUD rate, you will need to ensure that your terminal and/or emulator is configured accordingly.

Note that when running this utility on the mame NABU PC emulator you will need to change the current BAUD rate setting in the 'Machine Configuration' menu to match the setting selected with this utility. In most cases, you can press the TAB key, then select the 'Machine Configuration' menu item, and then change both the 'RX Baud' and 'TX Baud' settings to match the rate that was set.

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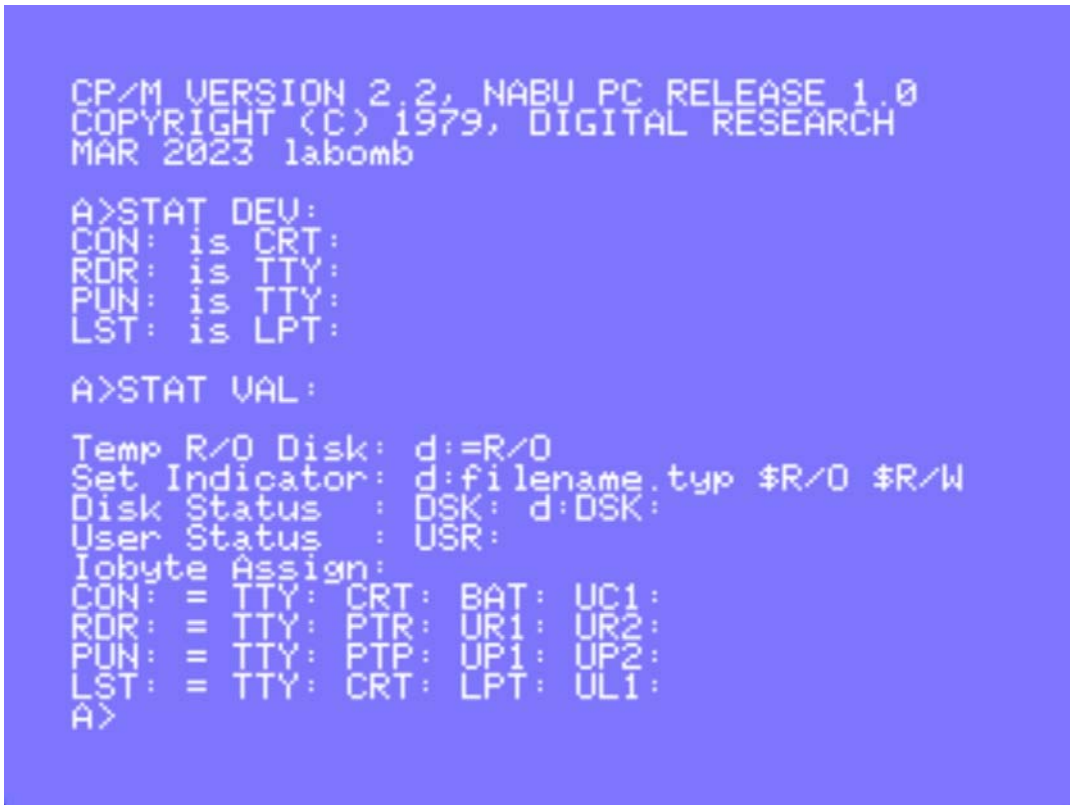
stat

While the **stat** command in of itself isn't unique to the NABU PC implementation of CP/M 2.2, the device assignments that **stat** can set/modify are. The current assignments, and possible assignments can be displayed by using the DEV: and VAL: parameters respectively with the **stat** command.



There are three assignment options that are available for the console (CON:) device:

- CRT : the console is assigned to the NABU monitor and keyboard (default)
- TTY : the console is assigned to the terminal/emu attached to the serial port
- UC1 : output is displayed on the NABU monitor and the serial port concurrently

Device reassignments are straightforward. If you wish to use the serial port as your console, you can just enter:

STAT CON:=TTY:

To display output on both the NABU monitor and the serial attached device, just use:

STAT CON:=UC1:

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To return to the default setting, use:

STAT CON:=CRT:

The RDR and PUN devices are always assigned to the serial port, not matter what assignment is used. Likewise, the LST device is always assigned to the NABU parallel port, regardless of the assignment. The parallel port is fully supported, but note that it's up to the individual CP/M applications to support specific printer models.

Changing disk formats

Many 5.25" disk drives can support both single-sided and double-sided floppy disks. This release of CP/M supports either format dynamically. Specifically, you can swap between both formats without the need to reboot the NABU.

The BIOS will initially configure itself to support whatever format is first used in any given 5.25" drive. Should you wish to later change formats, simply enter control-c (press the ctrl key and the c key at the same time) after inserting the new disk into the drive. With CP/M, a ctrl-c initiates a warm boot, and it is during this quick process that the BIOS will examine the current disks and reconfigure itself to support the format of the disks currently in each of the drives.

Some early implementations of CP/M version 2.2 required that you enter the ctrl-c sequence whenever a disk was inserted, regardless of format. That is not required with this implementation, it is only required when changing disk formats. If you never change disk formats, there is no need to initiate a warm boot.

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CPMTOOLS

Included with the CP/M 2.2 distribution is a 'diskdefs' file that can be used with the CPMTOOLS application (either the original Unix version, or my Windows platform port). The diskdefs file contains the definitions that can be used to transfer files to, transfer files from, delete files on, etc… the included 2.2 disk images. To use these definitions, simply copy the contents of the included diskdefs file into your existing CPMTOOLS diskdef file. If you don't have an existing diskdefs file, just copy the included file to your CPMTOOLS directory.

There is a definition for each of the supported disk formats:

nabu22s4	: for single-sided, 40 track, 48 TPI, 5.25" disk images
nabu22d8	: for double-sided, 80 track, 48 TPI, 5.25" disk images
nabu22d16	: for double-sided, 160 track, 96 TPI, 3.5" disk images

examples

These examples assume that you have copied the 2.2 disk images to your CPMTOOLS directory, have additionally copied the included diskdefs file contents to the CPMTOOLS diskdef file, and have copied any files that you wish to add to your disk images to the CPMTOOLS directory as well.

To copy mbasic.com to user area 0 of a double-sided 5.25" disk image named cpm22_boot.d8.img:

cpmcp -f nabu22d8 cpm22_boot.d8.img mbasic.com 0:

To copy tetris.com to user area 1 of a double-sided 3.5" disk image named cpm22_boot.d16.img, but name it cooltet.com:

cpmcp -f nabu22d16 cpm22_boot.d16.img tetris.com 1:cooltet.com

To copy file stat.com from a single-sided disk 5.25" image named cpm22_boot.s4.img to the CPMTOOLS directory:

cpmcp -f nabu22s4 cpm22_boot.s4.img 0:stat.com stat.com

To delete file test.com from double-sided 5.25" disk image cpm22_boot.d8.img:

cpmrm -f nabu22d8 cpm22_boot.d8.img 0:test.com

To list the files on a double-sided 5.25" disk image cpm22_boot.d8.img:

cpmls -f nabu22d8 cpm22_boot.d8.img

The CPMTOOLS package is available from numerous online resources, with binaries available for Windows and Unix, as well as in source format.

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GoTEK drives

Simply place the provided img.cfg file and the disk images on the GoTEK USB drive, and select the image you wish to use as per usual. The provided image files can be renamed, but you do need to maintain the s4.img, d8.img, and d16.img file extensions, as these are the extensions that are defined in the img.cfg file.

As you have probably noted with the previous CPMTOOLS examples, the files extensions used will determine the disk format type that the GoTEK will use:

.s4.img	: for single-sided, 40 track, 48 TPI, 5.25” disk images
.d8.img	: for double-sided, 80 track, 48 TPI, 5.25” disk images
.d16.img	: for double-sided, 160 track, 96 TPI, 3.5” disk images

Virtual 80 column support

The terminal uses a ‘virtual’ 80 column implementation. The NABU PC, like several other popular computers of the day, utilized a video graphics chip that supports a text display in a 40-column x 24-line format. However, CP/M and its associated utilities and applications generally expect an 80-column display.

To accommodate the 80-column requirement, a ‘virtual’ 80-coumn mode is used that enables scrolling both left and right to view all 80 columns.

To scroll left, press this key: 

To scroll right, press this key: 

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