Using Linux’s minicom

Minicom is a lightweight, text-based terminal emulation program for Unix-like operating systems that allows users to communicate with external devices over a serial port. Acting as a classic RS-232 serial console, it provides a simple interface to configure baud rates, flow control, and parity settings, making it an ideal tool for establishing a direct data connection between a Linux host and vintage hardware like the Casio PB-2000.

Getting started

Unplug all USB devices from the Linux environment (or its host if running on a virtual machine).
Connect the USB-to-serial adapter to a USB port on your Linux environment.
If you are using a Linux VM (e.g., VMware Workstation), make sure the USB device is assigned to the VM and not the host. This usually prompts a confirmation dialog right after you plug the connector in.
Log in to Linux and enter the commands following the command prompt (indicated by $ in the following examples).

Verify that minicom recognizes the USB adapter

```
$ lsusb
Bus 001 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
Bus 001 Device 002: ID 0e0f:0003 VMware, Inc. Virtual Mouse
Bus 001 Device 003: ID 0e0f:0002 VMware, Inc. Virtual USB Hub
Bus 001 Device 004: ID 0403:6001 Future Technology Devices International, Ltd FT232
Serial (UART) IC
```

Confirm that the USB port name is /dev/ttyUSB0

```
$ ls /dev/*USB*
/dev/ttyUSB0
```

Install minicom (if not installed)

You need superuser (root) password for the following tasks.

```
$ sudo apt update
...
$ sudo apt install minicom
...
```

The ellipsis indicates the interaction with sudo apt, which has been omitted for the sake of brevity.

Verify the minicom install

```
$ minicom -v
minicom version 2.10
Copyright (C) Miquel van Smoorenburg.
...
```

The ellipsis indicates the complete version information, which has been omitted for the sake of brevity.

Create a PB-2000C minicom configuration

At the Linux prompt, enter exactly the following "Here document." It is simplest to copy and paste it directly into your Linux terminal.
This command creates a configuration file that matches the communication parameters we will set later in the PB-2000C. Note that [Enter] means press the Enter key.

```
$ cat << 'EOF' > ~/.minirc.pb2000c
pu port             /dev/ttyUSB0
pu baudrate         9600
pu bits             8
pu parity           N
pu stopbits         1
pu rtscts           No
pu xonxoff          No
EOF [Enter]

Verify your configuration file
$ cat ~/.minirc.pb2000c [Enter]
pu port             /dev/ttyUSB0
pu baudrate         9600
pu bits             8
pu parity           N
pu stopbits         1
pu rtscts           No
pu xonxoff          No

Review minicom’s documentation for additional information
$ man minicom [Enter]
```

Start minicom

```
$ minicom pb2000c [Enter]
```

The status line on the bottom line of the minicom terminal should display 9600 N81.

Add a safeguard delay to the ascii transfer

Familiarize yourself with minicom's menu system
In minicom's terminal screen
Press [CTRL]+[A] and then press [Z] to invoke minicom's command summary menu

```
+--------------------------------------------------------------------+
|                      Minicom Command Summary                       |
|                                                                    |
|               Commands can be called by CTRL-A <key>               |
|                                                                    |
|                Main Functions                  Other Functions     |
|                                                                    |
| Dialing directory..D  run script (Go)....G | Clear Screen.......C |
| Send files.........S  Receive files......R | cOnfigure Minicom..O |
| comm Parameters....P  Add linefeed.......A | Suspend minicom....J |
| Capture on/off.....L  Hangup.............H | eXit and reset.....X |
| send break.........F  initialize Modem...M | Quit with no reset.Q |
| Terminal settings..T  run Kermit.........K | Cursor key mode....I |
| lineWrap on/off....W  local Echo on/off..E | Help screen........Z |
| Paste file.........Y  Timestamp toggle...N | scroll Back........B |
| Add Carriage Ret...U                                               |
|                                                                    |
|             Select function or press Enter for none.               |
+--------------------------------------------------------------------+
```

Press [O] to "cOnfigure Minicom"

```
+-----[configuration]------+
| Filenames and paths      |
| File transfer protocols  |
| Serial port setup        |
| Modem and dialing        |
| Screen                   |
| Keyboard and Misc        |
| Save setup as pb2000c    |
| Save setup as..          |
| Exit                     |
+--------------------------+
```

Navigate to “File transfer protocols” (Down arrow, [Enter])

```
+-------------------------------------------------------------------------------+
|     Name             Program                  Name U/D FullScr IO-Red. Multi  |
| A  zmodem     sz -vv -b                        Y    U    N       Y       Y    |
| B  ymodem     sb -vv                           Y    U    N       Y       Y    |
| C  xmodem     sx -vv                           Y    U    N       Y       N    |
| D  zmodem     rz -vv -b -E                     N    D    N       Y       Y    |
| E  ymodem     rb -vv                           N    D    N       Y       Y    |
| F  xmodem     rx -vv                           Y    D    N       Y       N    |
| G  kermit     kermit -i -l %l -b %b -s         Y    U    Y       N       N    |
| H  kermit     kermit -i -l %l -b %b -r         N    D    Y       N       N    |
| I  ascii      ascii-xfr -sv -c 10 -l 20        Y    U    N       Y       N    |
| J    -                                                                        |
| K    -                                                                        |
| L    -                                                                        |
| M  Zmodem download string activates... D                                      |
| N  Use filename selection window...... Yes                                    |
| O  Prompt for download directory...... No                                     |
|                                                                               |
|   Change which setting? (SPACE to delete)                                     |
+-------------------------------------------------------------------------------+
```

Press [I] to configure ascii.
Press [Enter] to navigate to the ascii-xfr parameters
Add -c 10 -l 20 (as in the picture). Character and line transfer ms delays
Press [Enter] to confirm
Press [Enter] repeatedly until you return to the previous menu

```
+-----[configuration]------+
| Filenames and paths      |
| File transfer protocols  |
| Serial port setup        |
| Modem and dialing        |
| Screen                   |
| Keyboard and Misc        |
| Save setup as pb2000c    |
| Save setup as..          |
| Exit                     |
+--------------------------+
```

Select “Save setup as pb2000c” [Enter]
Select “Exit” to go back to the minicom terminal screen

Sending a file to the PB-2000C

Put the PB-2000C in [load] [RS232C] mode.
load ”COM0:7,8,N,1,N,N,N,N,N [EXE]
This selection matches the 9600 N81 configuration in Minicom. Make sure that the DIP switches on the bottom of the FA-7 interface are also set for 9600 baud.
Once set, the cursor on the PB-2000C will stop blinking, indicating that the device is ready to receive data over the serial line.

On minicom, [CTRL]+[A]+[Z] to invoke the main menu.
Select S for “Send files”

```
+-[Upload]--+
| zmodem    |
| ymodem    |
| xmodem    |
| kermit    |
| ascii     |
+-----------+
```

Select ascii
Select the file to transfer and press [Enter]
There will be a monitoring window showing the transfer progress

```
+----------------[ascii upload - Press CTRL-C to quit]-----------------+
|ASCII upload of "rom0.cfg"                                           |
|Line delay: 20 ms, character delay 10 ms                             |
|                                                                     |
|0.8 Kbytes transferred at 97 CPSS                                    |
|                                                                     |
|                                                                     |
|                                                                     |
+---------------------------------------------------------------------+
```

When the transfer ends, you will return to the Minicom terminal session.

Press [CTRL]+[Z] to indicate the end of the file.

The PB-2000C will then confirm that the transfer has finished and a new, unnamed file will be available. Typically, your next step will be to change the file's name and type.

Receiving a file from the PB-2000C

Minicom does not provide an ascii transfer option.
This activity is registered in the terminal window.
Open minicom’s terminal window
Configure your PB-2000C to [save][RS232C] file and press [EXE]
The file content should appear on the terminal window.
You can copy the screen content and paste into a document.
Pressing [CTRL]+[A]+[Z]+[Q] open the quit minicom menu.
Leave without reset [YES]

Topics not covered in this tutorial

Enabling flow control. Note that the serial port configuration in these examples did not include flow control (XON/XOFF or RTS/CTS).

Troubleshooting. You may occasionally experience FR (Framing) errors on the PB-2000C. Lowering the transmission speed usually fixes this problem. Additionally, using low-quality or excessively long cables can negatively affect data transfer reliability.

Binary Data Capture. This tutorial does not cover binary data capture, which is required for transferring compiled machine language programs or non-text data from the PB-2000C.

Advanced Features and Scripting. Minicom's advanced automation tools, such as its built-in runscript utility. Scripting allows users to automate the serial connection.

Acknowledgments

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