

# Centronics (Parallel Interface) Printer Emulator

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It is not uncommon for electronic enthusiast to use an outdated test gears in their labs. Actually it is pretty common even for companies to rely on vintage instruments born in 80s/90s/00s. There is probably a good reason for it, these relics are usually moderately priced and indestructible. They are extremely well built, can withstand hurricanes and small nuclear explosions. These tools are obviously outdated and lacking modern features, but pretty adequate for most cases.

The problem I am typically having (and probably other users of these antique tools) is that I can't easily take a screenshot of the instrument. You can obviously take a picture of an old CRT screen, but it just doesn't look professional. Some instruments have GPIB/HP-IB interfaces and if you are a lucky owner of GPIB adapter you can use [HP 7470A Emulator](#) emulate printer over GPIB. But what if you don't have GPIB adapter handy or your instrument don't have a GPIB port?

Fear no more - Centronics printer emulator is to the rescue! It saves whatever it sees on the parallel port to the file on the SD card. When your instrument thinks that it send screensnot to the printer it actually sends it to the SD card. After that you can use your favorite viewer to view/print this file. This emulator can be built in probably less than an hour, using readily available parts. It built around Arduino Mega board with SD card and LCD modules.

## SD card pinout

I did not have SD card breakout board, so I used Ethernet shield, witch happened to have microSD card connector. I don't remember where exactly I got this shield from, but it seems to be pretty standard part. For example this one looks identical to mine: [Ethernet shield](#)

This shield uses the following pins for the SD card communication:

SD card pin name	Arduino pin
MOSI	pin 11
MISO	pin 12
CLK	pin 13
CS	pin 4
GND	GND

## LCD pinout

I used the simples LCD module I can find in the random parts pile. It is 2x16 display module. Again, I am not 100% sure, but this one looks identical to mine: [LCD](#)

Only the following pins are connected to the LCD shield. I left other pins disconnected:

LCD pin name	Arduino pin number
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LCD pin name	Arduino pin number
RS	pin 8
EN	pin 9
D4	pin 4
D5	pin 5
D6	pin 6
D7	pin 7

Here are a few pictures on the shields stackup:

## Parallel interface

Centronics parallel interface is pretty old and it was well documented in nineties, so it was easy to figure out how to connect Arduino to it.

Name	Centronics pin. DB25 connector	Arduino pin	Arduino pin direction	Notes
Strobe	1	pin 18	Input	Pullup enabled. Attached to falling edge interrupt.
Error	15	pin 22	Output	Not used. Forced high.
Select	13	pin 24	Output	Not used. Forced high.
Paper Out	12	pin 26	Output	Not used. Forced high.
Busy	11	pin 28	Output	Set high on the falling edge of Strobe. Set low after acknowledging data.
Ack	10	pin 30	Output	Generate falling edge to acknowledge data.
D0	2	pin 39	Input	Parallel data.
D1	3	pin 41	Input	Parallel data.
D2	4	pin 43	Input	Parallel data.
D3	5	pin 45	Input	Parallel data.
D4	6	pin 47	Input	Parallel data.
D5	7	pin 49	Input	Parallel data.
D6	8	pin 46	Input	Parallel data.

Name	Centronics pin. DB25 connector	Arduino pin	Arduino pin direction	Notes
D7	9	pin 48	Input	Parallel data.

## How to use it

Insert SD card and press reset button on the Arduino. It should display "Ready" message on the LCD.

Configure your instrument to use Centronics (parallel port) for printing.

Configure printer type. The device saves whatever it sees on the parallel port to the file on the SD card, so we should probably select a printer with standard protocol.

- HP 54522A oscilloscope. Select "HP 7470A" plotter. The output would be a standard HP-GL format.
- Tektronix TDS2024 scope. Configure "RLE" format. You can open these files with MS Paint
- HP 8594E spectrum analyzer. Select Plotter ("PLT") option. The output would be a standard HP-GL format. Press "Print" (or "Copy") button, wait for "Done" message on the device LCD.

To view HP\_GL files I am using free and open-source [HP-GL Viewer](#) from CERN. But you should be able to use any other HP-GL viewers, including [HP 7470A Emulator](#) I mentioned above.

RLE is a standard bitmap, you should be able to open it with Microsoft Paint or any other graphic editor.

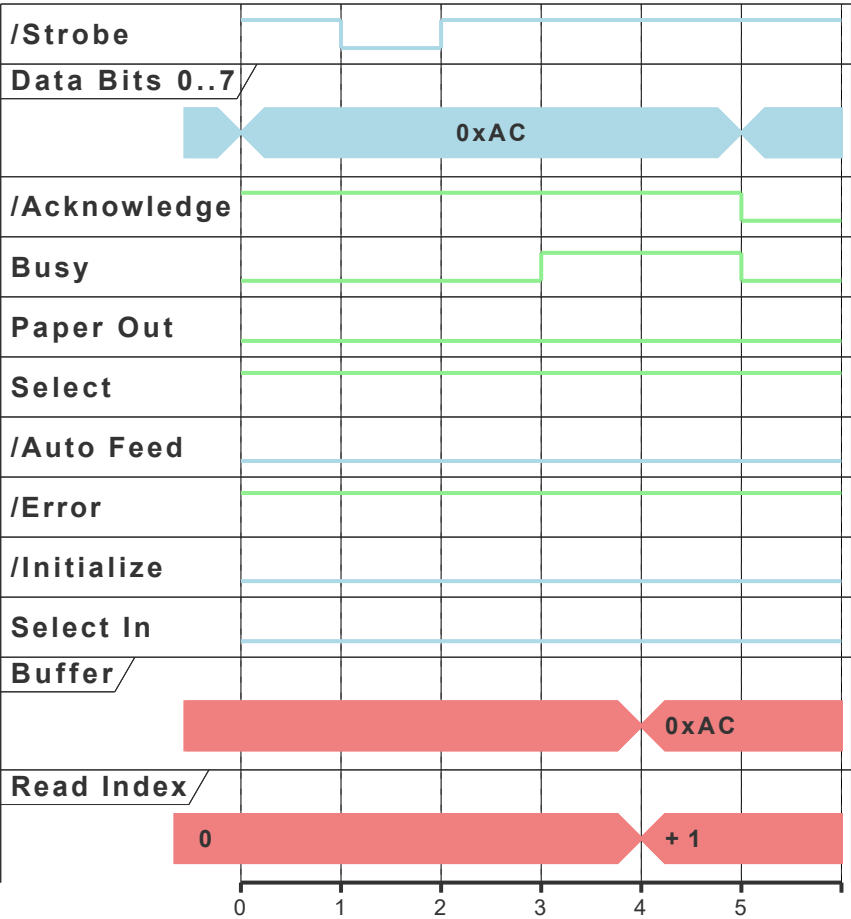
Here is a quick demonstration video: <https://youtu.be/vRhbx8HyUxA>

## Notes

- [Arduino SD Library](#)
- [SD Card with Logic Level hookup](#)
- Remove D10 from LCD shield, could cause long term damage to ATmega2560

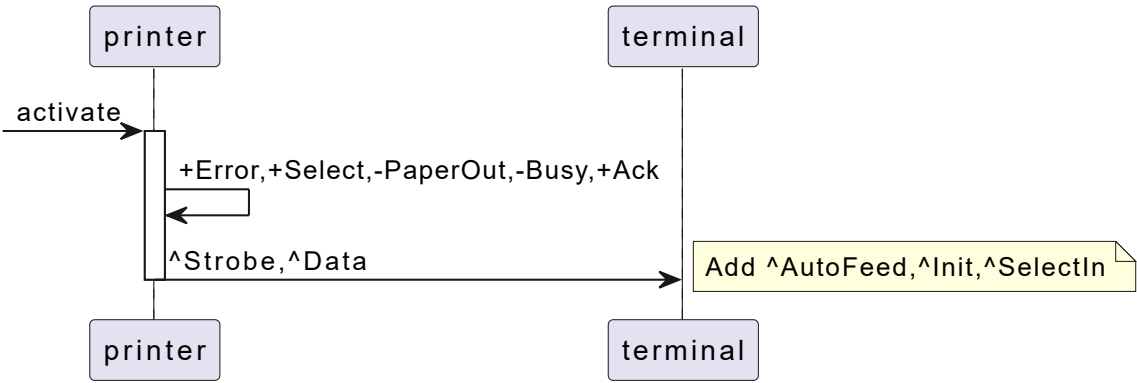
## Timing Diagrams

Parallel Port

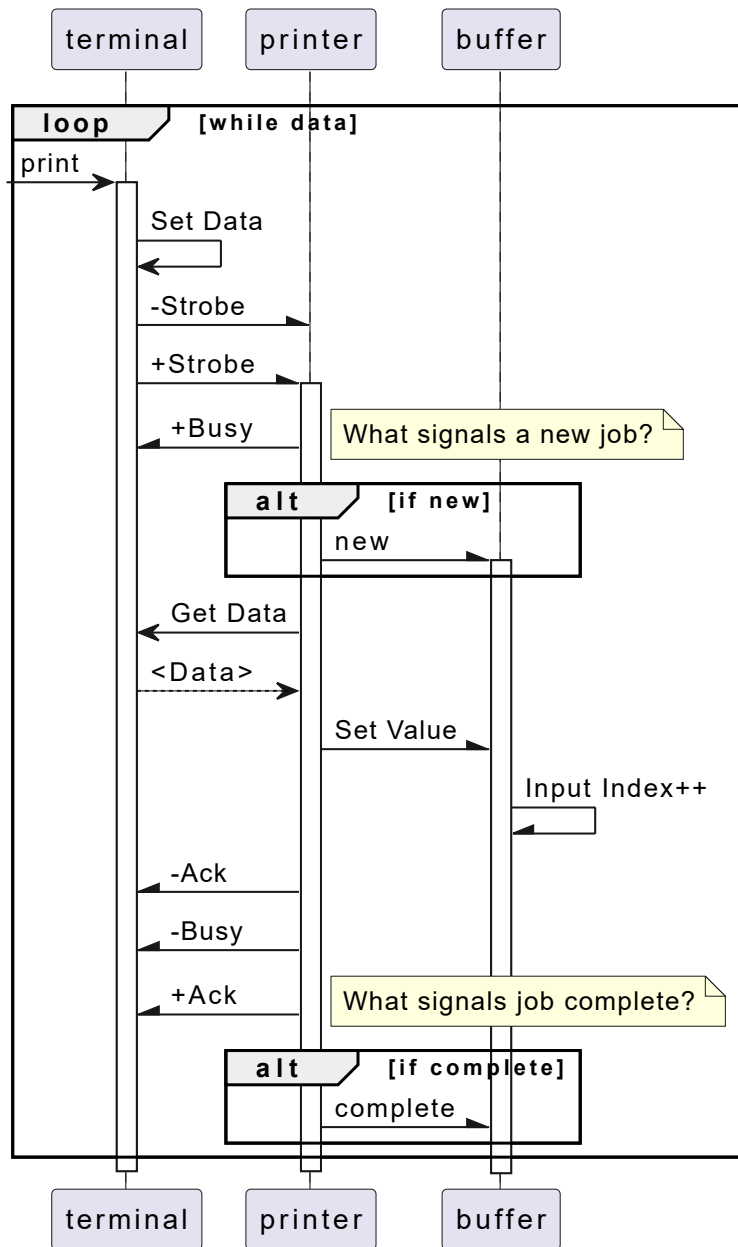


Action Sequence Diagrams

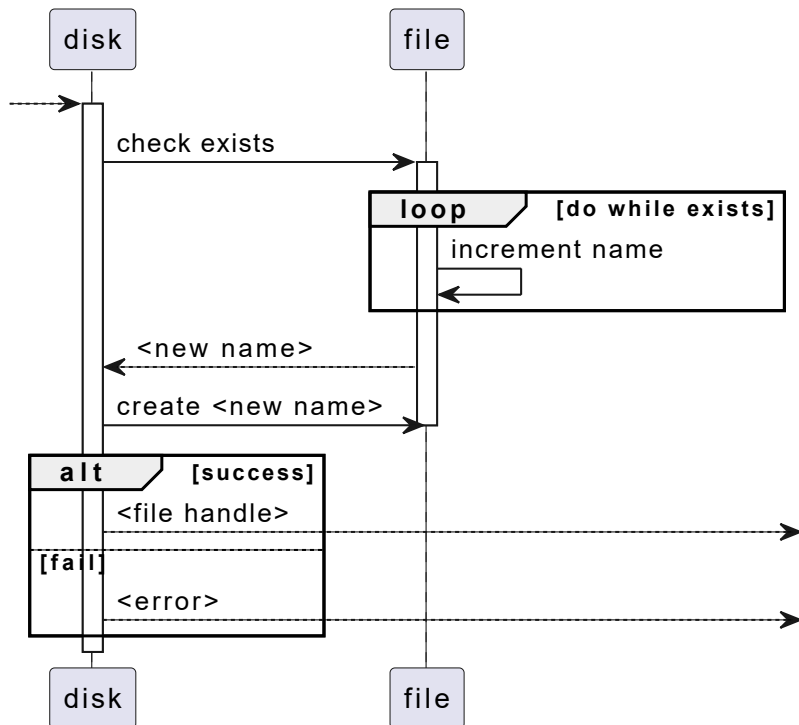
Initialize



On Print



On New File



## Buffer to File

