

DVIprint, the T_EX printerdriver for the AMIGA

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Abstract

DVIprint is a TeX printerdriver for three different printer types. It supports the NEC P6/P7, the HP DeskJet, as well as the Epson FX 80. Furthermore printing speed and flexible font managment are excelling. Plus there is the possibility, to print pages in landscape format or to store them in an IFF file. And the driver can handle fonts, which have more than 128 characters, as well.

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1. Copyright and similar

The program DVIprint is “freely distributable copyrighted software”. That means, anyone can copy and use it. The Copyright however is fully retained by me.

The program can not be commercially sold without my explicit prior consent. If distributed as PD software, the price must be below 5 DM (=3 US\$) per disk or be exactly that amount.

Further distribution is only allowed in a complete and unaltered state.

For further explanation see the README file.

2. About DVIprint

DVIprint is a \TeX printerdriver. As \TeX produces only a DVI¹ file as the single output, you need your own programs, to display the result on screen on one hand, and on the other, to be able print it. To this end, the DVI file has to be interpreted and a bitmap of every single page has to be produced. As in the DVI file only the information present of where what characters should be - but not what they look like - you can display a page of a DVI file in any particular resolution. The only thing that you need for this are the fonts in the particular resolutions.

As a speciality, DVIprint is not only a printerdriver for a single printer, but also for more at the same time. It is capable of driving the NEC P6/P7, the HP-DeskJets, the Epson FX 80 and compatible printers correctly.

¹ device independent

As the printer dependant part of the program is relatively short, it seems to be economic, to combine several drivers in one program. For the DVIPrint program a C-module is also part of the distribution, in which the printer dependant parts are present, joined together. Should you have a printer which is not compatible to one of the printers supported by the program, then you can make the necessary alterations in the C-file and send it to me. Then I will incorporate it into the program.

3. Calling from the CLI

In the present version of DVIPrint the program can only be called from the CLI. However it can be controlled very easily from there:

- ```
usage: dviprint [-?] [-a fontarea] [-b bytes] [-m bytes] [-f page]
 [-t page] [-z dpi] [-o {0|1|2|3}] [-d {1|2|3|4|5|6|7}]
 [-u] [-g] [-i] [-x] [-r] [-p] [-q] [-e bytes]
 [-l] [-s] [-h offset] [-v offset] dvifile
 and offset = real number{pt|pc|in|bp|cm|mm|dd|cc}
```
- ? Shows a short explanation of the options, without starting the program. The default values are shown too.
  - a *fontarea* Appends *fontarea* as additional directory in the search path of the fontlibraries. More on this in chapter 7.2 of the ShowDVI manual.
  - b *bytes* Size of the memory space, in which the loaded fonts are kept. The unit used is byte. The default value can be asked with the -? option.
  - m *bytes* Maximum size of the allocated page-bitmap. Size 0 disables this feature.
  - f *page* Start the printing at page *page*.
  - t *page* Last page to be printed.
  - z *dpi* Overwrites the dpi resolution.
  - o {0|1|2|3} Choice of print quality. The best quality can be achieved with 'zero' (default). With 'one' the draft quality is chosen. 'Two' and 'three' are of importance to HP-Deskjet owners. They are meant to conserve ink. To this end only every second line is printed. Otherwise 'two' corresponds with letter quality and 'three' with the draft mode.
  - d {1|2|3|4|5|6|7} Choice of printer type. 'One' and 'two' switch on the NEC-P6/P7 mode. At option two the optimization is smaller, but is better fitting for some NEC-P6/P7 compatibles. 'Three' and 'four' are both for the HP-DeskJet. They differ in that in mode three no optimization is done, and that in mode two the volume of the produced data is considerably larger. Normally mode two is preferred. The options 'four', 'five', 'six' and 'seven' are for the Epson compatible 9-pin printers. These differ in that 'six' and 'seven' of the printerdrivers do not produce ESC-\$-command sequences, as there are printers, that do not understand this command. At 6 (white)spaces are still skipped with 'spaces'.
  - u With this switch you can choose between printing bidirectionally or only unidirectionally. Zero corresponds to unidirectional and one to bidirectional.

- g** This option activates the “Landscape” mode. That is, the page is printed rotated over 90 degrees. This mode however functions unfortunately only on printers with the same horizontal and vertical resolution, i.e. with the HP-Deskjet and the NEC-P6/P7 printers. Mind you, this mode requires the entire bitmap of a page to be in the memory all at once. This therefore requires a well expanded memory.
- i** This option prevents the normal output on the printer. Instead, one page at a time is written to an IFF-file. The IFF-file is created in the current working directory under the name `<dvi-File>.p<page number>`. Similarly to the Landscape function, an entire page has to fit in the memory here too. For this function, the “iff.library” of Christian A. Weber is needed.
- x** When set, a form feed will not be given after the last page has been printed. This then useful, when you want to print smaller things like disk stickers or similar.
- r** Prints the pages in reversed order.
- p** Loads all fonts, which are used in the document, already at the start of the program in the internal font memory.
- q** Suppresses output of the current page number.
- e *bytes*** Size of the internal printer buffer. As two of those are needed, the program uses twice the amount you specify for these buffers.
- l** Prevents creation of a logfile.
- s** Outputs additional information in the logfile. See also chapter 8 of the ShowDVI manual.
- h *xxx*** Sets the horizontal offset to *r*. *xx* is here the unit. Following units can be chosen from:
- pt** point (is used by T<sub>E</sub>X)
  - pc** pica  $1pc = 12pt$
  - in** inch  $1in = 72.27pt$
  - bp** big point  $72bp = 1in$
  - cm** centimeter
  - mm** millimeter
  - dd** didôt point  $1157dd = 1238pt$
  - cc** cicero  $1cc = 12dd$
- v *xxx*** Sets the vertical offset to *r*. *xx* is a unit as with the **-h** option.
- dvi*file** The DVI file that is to be printed.

## 4. Fonts required

Which fonts resp. which resolutions do the particular printerdrivers need? Only the fontlibraries are considered here. Of course, you can keep the same fonts apart on your harddisk too.

### 4.1. For the NEC P6/P7

The NEC-P6/P7 driver needs the following libraries:

| Quality | mag 0 | mag 0.5 | mag 1 | mag 1.5 | mag 2 | mag 2.5 | mag 3 | mag 4 | mag 5 |
|---------|-------|---------|-------|---------|-------|---------|-------|-------|-------|
| Draft   | 180   | 197     | 216   | 237     | 259   | 284     | 311   | 373   | 448   |
| High-Q  | 360   | 394     | 432   | 473     | 518   | 568     | 622   | 746   | 896   |

#### Flib's for the NEC-P6/P7-driver

The above are given in  $DPI^2$ . Here, 180 means, that a library with the name PK0180 must/should exist.

The libraries of the magnifications *magstep 1.5* and *magstep 2.5* are not necessarily needed, but every now and then, these magnification steps occur.

### 4.2. For the HP-DeskJet

These libraries are needed by the HP-DeskJet driver. Of interest is the fact that for the draft mode the same libraries are used as for the screen driver.

| Quality | mag 0 | mag 0.5 | mag 1 | mag 1.5 | mag 2 | mag 2.5 | mag 3 | mag 4 | mag 5 |
|---------|-------|---------|-------|---------|-------|---------|-------|-------|-------|
| Draft   | 100   | 110     | 120   | 131     | 144   | 158     | 173   | 207   | 249   |
| High-Q  | 300   | 329     | 360   | 394     | 432   | 473     | 518   | 622   | 746   |

#### Flib's for the HP-DeskJet-driver

### 4.3. For the Epson FX-80

The libraries, used by the Epson FX-80, have a special trait: They are not quadratic in their resolution. The smallest fontlibrary of the draft resolution has 120dpi horizontally and 72dpi vertically. In the Letter Quality resolution, the proportions are 240dpi horizontally as opposed to 216dpi vertically.

| Quality | mag 0 | mag 0.5 | mag 1 | mag 1.5 | mag 2 | mag 2.5 | mag 3 | mag 4 | mag 5 |
|---------|-------|---------|-------|---------|-------|---------|-------|-------|-------|
| Draft   | 120   | 131     | 144   | 158     | 173   | 189     | 207   | 249   | 299   |
| High-Q  | 240   | 263     | 288   | 315     | 346   | 379     | 415   | 498   | 597   |

#### Flib's for the Epson FX-80-driver

Because of this asymmetry and the fact, that the draft resolution is sufficient for the screen resolution, the problem rears its head, that fontlibraries exist, which, although they have the same name, have an entirely different structure. These are e.g. for a screen resolution of 100dpi for example the libraries PK0120, PK0131, PK0144, PK0158, PK0173, PK0207 and PK0249. For a different resolution used for the previewer, other overlaps occur. This problem can be solved quickly and efficiently with the fontdefinition file, as there is one

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<sup>2</sup> Dots Per Inch

for the previewer and the printer driver each. You copy the libraries which exist twice to some directory and change the configuration file accordingly. As libraries, which are defined there, are first searched on the given spot, the previewer libraries are not used in the `TeX:fontlib` directory.

You can also solve this problem, in that you rename all fonts and include the horizontal and vertical resolution in the font- library- name. For that purpose the modifiers “%h” and “%v” exist, as well as “%x” and “%y”. Thus you can define the format strings in the following manner:

```
flib_str PK%04hx%04v ; format string for flib's
pk_str %hx%v/%s.%dpk ; format string for PK-files
```

With this the font `cmr10` of size `magstep1` at a resolution of  $240 \times 216$  is searched for in the library `PK0288x0259` or as a PK-file with the name `288x259/cmr10.288pk`.

## 5. Internals

How does the program function? What should be paid attention to, how can the font management be done as efficient as possible and adjusted to your own demands? These questions are to be answered in this chapter, where however the ShowDVI program manual should be referenced, as the font management is described in detail over there, here however only the small difference to the management of the previewer is elaborated on. Thus it is recommended that you read the ShowDVI manual first.

### 5.1. Creation of fonts-not-found with Metafont

In case the printer driver cannot find a font that is needed and in case the environment variable “CALLMF” is set, the contents of this variable is used for calling an ARexx script file.

This is called with the three following parameters, in order to create the font that was not found:

- with the name of the font to be created,
- with the resolution of the font in DPI and
- with the resolution, with which DVIprint is printing.

This means, that after

```
setenv CALLMF callmf
```

DVIprint would call the script with

```
callmf cmr10 360 300
```

in case the font “cmr10” with the resolution “magstep1” should not be found and the printer in HP-DeskJet mode would at the time print with a resolution of 300 dpi.

### 5.2. Remember memory :)

The fact, that more available memory is always better than less, has been rumoured for some time now. What does the DVIprint-program need the (relatively much) memory for?

Obviously, the program needs some space. This however is not really much. The program is (at the time) approximately 65 KByte large.

Then however, the bitmap that is to be printed must be kept in storage. The program reserves as much space as possible for this end, in the best case to get the entire bitmap for a page in the memory. This hunger for memory can be limited with the `-m` option, however. Then the program will divide the bitmap up in strips and will print one strip after the other. If you are printing in the landscape mode, however, the entire bitmap must be in memory and the `-m` option is ignored. In this case it can happen that the program needs a coherent chunk of memory space of 1 Megabyte.

A further, significant memory eater is the font pool. In this the fonts are loaded. Is this space chosen too small, the program has to load and purge fonts continuously, which slows down the speed of printing considerably. The default value for the memory size has been set to 100 KByte. This can however be enlarged or reduced with the `-b` option. The optimal size of the fontpool depends on the resolution of the output on the printer, as well as on the number of different fonts used in the  $\TeX$ document.

Contrary to this, the two printer buffers, which are supposed to make the printout evenly (fast), only minimal. The default is a size of 10 KByte each. Thus all in all 20 KByte is needed. You can make them smaller though, with a clear conscience, with the `-e` option. If you set it below approximately 1 KByte however, the printout will become pretty slow.

With the default values the program needs thus a maximum of 700 KByte. With the `-m` and the `-b` options, (per magnitude of resolution;  $\approx 200$ ) KByte can be saved though.

### 5.3. Font management

The font management corresponds to that of the ShowDVI program, except for a detail. This is the name of the font-configuration file. In case of the previewer, the name is `showdvi.fnt`, in the same mould the one belonging to the printer driver is called `dviprint.fnt`.

As there are no further differences, no further discussion is necessary. Please read for this the manual to the ShowDVI program.

## 6. Required soft- and hardware

In terms of software, firstly you need a program, which creates DVI files. Normally this program is called `virtex` or simply `tex`. Of great help is the “arp.library”, as you would have to give up environment variables otherwise.

Every now and then, the utility `cmd` can be of use, with which the output, which would have otherwise been sent to the printer, can be redirected to a file.

In terms of hardware, above all you need an Amiga. The most important expansion is a memory expansion. One MByte for main storage space is the absolute minimum. A harddisk is not absolutely necessary, but if you want to work reasonably, this one is a must, too. Depending on the printer driver used and the number of the fonts that are needed, upto 10 MByte of harddisk storage is necessary.

## 7. Known bugs

With my NEC-P6 it has happened once in the Letter Quality mode, that it has inserted a vertical skip. This can be avoided with a reduction of the horizontal offset (`-h` option). I have not been able to locate the cause of the error.

Now and then, the frequency depending on what type of printer you use, it occurs that the operating system displays a requester with “Printer-Trouble” and that the printer does not get any more data. After clicking on the `RETRY` gadget, the printer resumes printing without any problems. In case the requester appears more often, reducing the printer buffer with the `-e` option usually helps to eliminate these disturbances.

I have not experienced other errors as yet. Should you find one however, please send it to me in a reproducible form (with log- and DVI file).

Translated from German to English by Thomas Tavoly -Okt '90.