Athena System Release 6.3A

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1. Introduction

This document describes the software changes in Athena System Release 6.3A. It contains an overview of the important changes, and detail on the release as a whole. The release notes are written as a set of changes to release 6.2A. Changes that appeared in earlier releases but were accidentally overlooked in the release notes as well as corrections and additions to the original 6.3A release notes are marked with changebars.

2. Major User-Visible Changes

2.1. All Systems

2.1.1. Andrew File System

Support for the Andrew File System (AFS) is introduced. This is largely kernel support, but also includes the following user level programs:

```
bin/fs
bin/tokens
bin/unlog
etc/afsd
```

Other user programs relating to AFS are not being included in this release; the final versions for Athena are not yet ready. *unlog* is being provided only as a **temporary** utility to destroy the tokens held by the cache manager in case the AFS protection database goes berserk and one cannot access the copy stored in AFS. *aklog* is not being provided since the use of this interface is being discouraged; we hope to provide *nfsid* as the authentication interface to AFS. The final interface will consist of the familiar *attach*, *detach*, and *nfsid* programs, but in order to successfully do this, SMS and Hesiod will also have to be modified to support a new filesystem type.

The documentation that CMU releases with the Andrew File System in *vdoc* has not been installed yet. It is still undecided how much of the AFS system will be installed and what documentation should be provided.

2.1.2. X Display Manager

The X Display Manager (XDM) is being introduced. This will allow users to customize their entire X session and not be required to have a login window whose attributes are not customizable. Currently, only the *xlogin* and *console* sub-systems are ready. The overall control program, *xdm*, which will replace *toehold*, *activate*, and *deactivate* is not ready yet.

- Console messages are now displayed in a pop-up window rather than causing a

black-bar message or cluttering a user's xterm.

- The login xterm is replaced by a more versatile login dialog box.

- There are three login levels, which a user can choose from when they login:
  - *User default*: This will run the user's .xsession file if one exists. If no such file exists, it will then execute a *xterm -ls* and behave similar to the current login setup. This is the default login level.

  - *System default*: This will start up an *xterm -ls* window. This will emulate the current Athena environment, including starting *uwm* and loading the user's *.Xresources*. However, if the user has customized his login sequence not to include Athena's startup files and if they conditionalize the login on *ttyv0*, their login sequence may not work as expected.

  - *Custom login*: If a user selects this option, he will be able to specify a command line after he has entered his username and password. This will run the entered command line.

- *ttyv0* is no longer the primary tty. This may cause some login customizations to fail if they were improperly implemented. However, the standard X commands (such as *uwm*) that were started in the default prototype files will continue to work.

- The login window is customizable, even without the use of a *.xsession* file. The default startup will first load a default resource database and then merge in the user's resource database prior to starting any windows. Thus, a user may customize his login in his *.Xresources* file. The name of the login window is *login*, so if a user wishes to change the defaults, he may use lines such as the following in his *.Xresources*:

```
login*geometry:          80x24+0+0
```

2.2. RT/PC

2.3. VAXstations

3. Kernel Changes

3.1. Kernel Fixes in Common

The following files were added/changed in order to support AFS in the kernel.

afs/afs.h	afs/fcrypt.c	afsint/rx.h
afs/afs_aix_subr.c	afs/fcrypt.h	afsint/rxgen_consts.h
afs/afs_aixops.c	afs/gfs_vfs.h	conf/files
afs/afs_buffer.c	afs/gfs_vnode.h	h/mount.h
afs/afs_cache.c	afs/lock.h	rx/bcrypt.h
afs/afs_call.c	afs/osi.h	rx/rx.c
afs/afs_callback.c	afs/param.h	rx/rx.h
afs/afs_daemons.c	afs/prs_fs.h	rx/rx_bcrypt.c
afs/afs_dir.c	afs/rxkad.h	rx/rx_clock.c
afs/afs_gfs_subr.c	afs/rxkad_client.c	rx/rx_clock.h
afs/afs_gfsops.c	afs/rxkad_common.c	rx/rx_event.c

```
afs/afs_istuff.c        afs/sboxes.h            rx/rx_event.h
afs/afs_lock.c          afs/voldefs.h           rx/rx_globals.c
afs/afs_osi.c           afs/volerrors.h         rx/rx_globals.h
afs/afs_osifile.c       afsint/Kcallback.h      rx/rx_kernel.c
afs/afs_osinet.c        afsint/Kcallback.ss.c   rx/rx_kernel.h
afs/afs_physio.c        afsint/Kvice.cs.c       rx/rx_null.c
afs/afs_pioctl.c        afsint/Kvice.h          rx/rx_null.h
afs/afs_resource.c      afsint/Kvice.xdr.c      rx/rx_queue.h
afs/afs_vfsops.c        afsint/afsaux.c         rx/rx_vab.c
afs/afs_vnodeops.c      afsint/afscbint.h       rx/rx_vab.h
afs/aix_vfs.h           afsint/afsint.h         rx/xdr_rx.c
afs/auth.h              afsint/afsvlint.cs.c    sys/vfs_conf.c
afs/auxinode.h          afsint/afsvlint.h
afs/dir.h               afsint/afsvlint.xdr.c
```

3.2. VAX Kernel Fixes

The number of interrupt stack pages was increased from 3 to 8 in *vax/locore.s*. This was actually done during the 6.1A release, but was overlooked in the release notes. This change becomes more important with AFS now in the kernel.

Parallax console support was added.

```
conf/files.vax          vaxuba/plxinput.c
vax/conf.c              vaxuba/plxioctl.h
vaxuba/plx.c            vaxuba/plxmd.h
vaxuba/plx_data.c       vaxuba/plxreg.h
vaxuba/plxconstty.c     vaxuba/plxtty.c
```

A missing set of curly braces was added to *vaxif/if_se.c*.

A fix was made to *vax/cons.c* to allow a serial-line console to still operate when the virtual console has been redirected.

The emulation code in the kernel to emulate instructions on some of the larger VAXen has been changed to return an illegal instruction if there is no emulation routine. The current behavior was to simply return silently without performing any action. The way in which this was discovered was the attempt to run INGRES on a MicroVAX.

3.3. RT/PC Kernel Fixes

A serious bug in the exception handling logic that would cause some floating-point operations to fail silently and return an incorrect result. Changes were made to */usr/lib/libfp.a* in

```
genfp/f881gen.c
genfp/fpa2gen.c
```

and to the kernel in:

```
ca/ioim.h
ca/trap.c
```

The redefinition of RNDUP in the following files has been fixed:

```
rpc/kern_auth.c
rpc/svc_auth_unix.c
```

4. Manual Page Updates

4.1. New Manual Pages

```
man1/tokens.1v        man2/iinc.2c         man2/pioctl.2v        man8/xlogin.8
man1/transcript.1     man2/iopen.2v        man2/setpag.2v        man8/xdm.8
man1/unlog.1v         man2/iread.2v        man4/nit.4
man2/icreate.2v       man2/iwrite.2v       man8/etftp.8
```

4.2. Updated Manual Pages

```
man1/access_on.1      man1/ps4014.1        man1/source.1         man3/getservent.3n
man1/attach.1         man1/ps630.1         man1/su.1             man3/sms.3
man1/blanche.1        man1/pscat.1         man1/tcsh.1           man7/afm.7
man1/cp.1             man1/psdit.1         man1/unifdef.1        man7/postscript.7
man1/enscript.1       man1/psfonts.1       man1/vgrind.1         man8/pscatmap.8
man1/history.1        man1/psplot.1        man1/vwidth.1         man8/pscomm.8
man1/hostinfo.1       man1/psrev.1         man1/whatsup.1*       man8/pstat.8
man1/ispell.1         man1/psroff.1        man1/xversion.1       man8/rexecd.8c
man1/makedepend.1     man1/pssymbols.1     man1/zleave.1
man1/patch.1*         man1/ptroff.1        man1/zwgc.1
man1/prochart.1       man1/soelim.1        man2/readlink.2
```

4.3. Deleted Manual Pages

```
man1/zhide.1          man3/rd_safe_msg.3
man1/zlogin.1         man8/transcript.8
man1/zlogout.1
```

5. Workstation and Server Updates

- The update of */etc/ttys* is now dependent on the display attached to the machine and whether the machine is running as a workstation or a server.

- */etc/ttys* has been updated to work start *xlogin* rather than an *xterm* when the workstation is activated.

- Four new variables have been added to */etc/rc.conf*:

  ```
  AFSCLIENT           NOATTACH
  AFSSRV              NOCREATE
  ```

  The **NOATTACH** and **NOCREATE** variables are the appropriate variables to edit. Upon reboot, */etc/noattach* and */etc/nocreate* are created or removed depending on the settings of these variables.

- On a public workstation, all configuration files are restored to public configuration. This will also occur on **every** reboot on a public workstation.

- The AFS cache will be set-up automatically during the update procedure, if one does not already exist. The default cache-size on a public workstation will be 2000 1k blocks, and on private workstations, it will default to 1000 blocks.

- **If AFS has been previously installed on a private workstation, ensure that there is a link from */site/usr/vice* to the real location of the AFS**

client directory structure. The update script will replace /usr/vice with a
symbolic link to /site/usr/vice.

- On all servers, /usr/ucb/compress is now local. This is to allow newsyslog to
  compress the logs.

- On workstations /etc/athena/newsyslog and /etc/xterm are now symlinks to the
  srvd and /bin/df is now local. /etc/xterm now has the sticky bit set in order to
  reduce the load time.

6. Bug Fixes

[changes#569] The C compilers will now understand -J as an assembler option.

[changes#495] /bin/passwd.real has a security bug fix

[changes#775] /bin/athena/machtype -d now returns PLX if the workstation has a
Parallax display.

[changes#???] /etc/athena/toehold no longer differs between the VAX and RT for the way
console grabbing is done; a fix to the kernel console driver no longer requires this.

[changes#???] The timeout in /etc/athena/toehold has been changed from two minutes to
five minutes. Also, an additional three second pause was added between the "restart" that
is issued to the X server and the killing of the server; this will prevent the occassional
server core-dump due to lack of time to clean up all its resources.

[changes#???] /etc/init no longer differs between the VAX and RT for the way console
grabbing is done; a fix to the kernel console driver no longer requires this.

[changes#502] /etc/makespools now creates the .options file and the log and accounting
files as defined in /etc/printcap.

[changes#???] /etc/rc will do more extensive cleanup on a PUBLIC workstation. All .local
files will be removed, and many of the configuration files will be re-copied at boot-time if
the PUBLIC flag is set to true.

[changes#684] /etc/termcap now has an entry for HP bobcats

[changes#776] /usr/lib/lpd no longer does subnet testing. This will allow ZBT to access
other printers on campus, and it will also allow us to use other subnet numbers that are
just as high as ZBT's. The Palladium print system should become availabe by the end of
the summer to replace the current lpd system. lpd is not capable of supporting the features
that Athena desperately requires of its printing facilities, such as quota management.

[changes#489] /usr/bin/X11/xpr now defaults to processing an image for PostScript
printers. In order to send something to a non-PostScript LN03, specify -device ln03.

[changes#492] /usr/bin/X11/xdpr will now pass unknown option to lpr. This will allow
options such as -h to be specified.

[changes#???] /etc/Xibm has had a few bug-fixes made to it. Most notably, the use of
poly-point routines on the Megapel server no longer causes the server to crash. Also, on
monochrome displays, the background rectangle of text characters is now drawn correctly.

[changes#589] */usr/ucb/man* and */usr/etc/catman* have been changed to support multi-letter extensions in the various sections.

[changes#???] */usr/lib/gnuplot.info* has been removed since *gnuplot* is a shell script stating that it has been superseded by *xmath*.

[changes#???] *whatsup* has been to query Hesiod correctly. It previously tried looking up *whatsup.service*, but the *service* names have been reserved for another purpose (*hes_getservbyname*). The fix required a modification to *gdb.h* and recompiling

```
/usr/athena/lib/libgdb.a
/usr/athena/bulkpost
/usr/athena/postit
/usr/athena/whatsup
```

[changes#???] */usr/athena/passwd* has been reinstalled. The VAX version was out of date and did not have a fix that allowed changing instance passwords.

[changes#??? & 571] */dev/MAKEDEV* now creates all the necessary devices needed on a visual workstation and on a print server. It will also create the appropriate floppy symlinks according to the physical devices on the machine and tape links according to the machine model.

[changes#???] A change to *ns_req.c* in */etc/named* now fixes the problem with answering cached T_CNAME requests.

[changes#???] */usr/new/mh.6.5/lib/popd* has been re-compiled and re-installed. The previous binary would return a "Generic kerberos error".

[changes#???] */usr/new/mh.6.5./lib/spop* no longer munges a string of exclamation marks.

[changes#???] *man* will no longer try reformatting man pages whose associated formatted manual page is a symlink to another formatted page. The time-stamp comparison would fail if the destination of the link was older than the manual page that did the redirection.

7. Other Changes

- *Sendmail* is now version 5.61. This version of *sendmail* supports MX records and has several security fixes. Also, in this version, name canonicalization has been fixed. In addition, *sendmail.cf* has been altered in the following ways:
  - The previous kludge of having */site/usr/lib/sendmail-host* containing the hostname in order to support the .LOCAL suffix has been removed. The rules in *sendmail.cf* pertaining to the .LOCAL suffix have been improved to also permit the use of CNAMES. The update script will remove the obsolete file and */etc/rc* has been altered to no longer create it.

  - The temporary file mode is now 0640 as opposed to the previous mode of 0644. Queued, but not yet transmitted mail on a public workstation was previously world-readable. With this change, it requires becoming root to see queued mail.

  - Mail, when sent to ATHENA.MIT.EDU, no longer has @ATHENA.MIT.EDU appended to the messages. ATHENA.MIT.EDU will append the appropriate string as necessary. This change was requested by Ron Hoffmann in the

hopes of fixing the problem that prevents the full-name of the sender from being inserted automatically; unfortunately, this change does not suffice.

- A few unused variables have been removed.

- */etc/athena/deactivate* will copy the latest version of *CellServDB* from */afs/athena.mit.edu/maint* to */usr/vice/etc/CellServDB.public* at every deactivation. This will allow easy updates to the current list of AFS cells. By default, */usr/vice/etc/CellServDB* will be a symbolic link to *CellServDB.public*, but a private workstation owner is at liberty to break this link.

- */usr/athena/makedepend* has been updated to the version that came with the X11R3 distribution. Also, an improvement has been made so that it will also generate a dependency on the source file specified. Before, this dependency was not being generated, so if the user was not generating a .o file, an explicit dependency had to be listed.

- The X10 binaries have been moved into the "x10" locker. *xswitch* will continue to work as normal, but in the case that the locker is not attached, it will inform the user that he needs to attach the locker. If the user is on an RT, it will inform him that the command will only work on a Vax.

- *xversion* has been moved to */usr/athena* since it is not version specific. Also, a new option, -r, has been added which will also display the minor revision number in the form of: *X11R3*.

- The default Athena startup files needed modification to work properly with the XDM environment. Changes were made to:

```
/usr/athena/.login
/usr/athena/lib/init/aliases
/usr/athena/lib/init/init_terminal
/usr/athena/lib/init/init_windows
/usr/athena/lib/init/login_misc
```

- *Xmh* has had several bug-fixes and is now more user-friendly. Errors such as exceeding quota while trying to incorporate mail pop up a dialog box stating this. However, due to an implementation change, several of the widget classes have changed from Command to Toggle. This will affect any user's resource specifications that use the Command class; these specifications should be modified to refer to Toggle class. The affected widges are all those which remain highlighted indefinitely after selection; namely, the folder and sequence names in the main screen and the Skip/Pick and Yes/No choices in the pick screen.

- The contents of */usr/athena/lib/gnuemacs/src* are removed from the packs. The Emacs sources used to build the release can be found in the *emacs* locker.

- *Scribe* defaults to version 6; that is */usr/athena/scribe* is a symlink to */usr/athena/scribe6*. *scribe5* still exists in the same directory for backwards compatibility.

- */usr/new/patch* is brought up to version 12. We were previously running version 7. Many bug fixes have been introduced as well as the ability to parse *shar* files.

- Saber 2.1 is now installed on the packs as *saber2*. Saber 1.2 has been renamed to *saber1*, and *saber* is now a symbolic link pointing to *saber2*. Both the VAX and RT versions will default to not using the X interface (such an interface currently only exists on the VAX).

- */tp/etftp* has been installed on both platforms. This binary is to allow operations to re-install a machine simply by booting this instead of */vmunix*.

- Zephyr
  - *syslogd*: fix coredump bug when certain flags were set in messages logged via zephyr

  - *zctl*: fix include path for <ss.h> (not user visible)

  - *zleave*:
    - Fixed to work with non-utmp ttys
    - Added a -m argument to specify a message and updated the man page accordingly.

  - *zstat*: Fixed the include file pathname (not user visible)

  - *zbrowser* now works with the new zwgc. The man page has been updated accordingly.

  - *zwgc*:
    - X11R3 fonts are now used by default. Bold and italic default fonts now work.
    - When run in ttymode, it now uses \r\n to format better when screen is in crmode
    - null-terminate fields to avoid displaying trailing garbage when user requests more fields than exist, or when sending program doesn't null-terminate message
    - Fixed a race condition that could cause a coredump if a user clicks too fast on windows getting expose events.
    - Added a reverse-stacking option; the man page has been updated to reflect this new option.
    - Fixed null-pointer reference problems

  - *zephyr.desc*: corrected the syntax (not user visible)

  - *zhm*: fixed a problem for one-server realms (not user visible)

  - *zpopnotify*: allow multiple usernames to be specified on the command line (not user visible)

  - *<zephyr/zephyr_conf.h>*: define KERBEROS by default (so users don't need -DKERBEROS on compile lines)

  - *zwrite*: Changed the handling of the -u argument to treat it like a normal zwrite; a recipient of '*' is no longer allowed for "urgent" zwrites. The man page has been updated to reflect this change

- The following programs have been removed. They were previously scripts that mentioned that the command was now obsolete and would be removed in the next release; it has since been about a year since these scripts were introduced.

      /usr/athena/zhide
      /usr/athena/zlogin
      /usr/athena/zlogout

`/usr/athena/zwgc`

- A new program called *xquota* is provided to allow users to actively view their quota. The program will create a small window which will update as often as the user wishes and will provide a visual warning on going over quota.

- Transcript

A new version of *transcript* is installed. Major noticeable differences include the ability for *enscript* to line-wrap words instead of truncating, and support for more PostScript fonts, not all of which can be printed on the printers Athena currently has.

The following were changed/updated in /usr/athena/lib/ps and the old contents were removed (all 248 files)

`AvantGarde-Book.afm`	`Times-BoldItalic.afm`
`AvantGarde-BookOblique.afm`	`Times-Italic.afm`
`AvantGarde-Demi.afm`	`Times-Roman.afm`
`AvantGarde-DemiOblique.afm`	`ZapfChancery-MediumItalic.afm`
`Bookman-Demi.afm`	`ZapfDingbats.afm`
`Bookman-DemiItalic.afm`	`banner.pro`
`Bookman-Light.afm`	`bogusmsg.ps`
`Bookman-LightItalic.afm`	`ditroff.font`
`Courier-Bold.afm`	`ehandler.ps`
`Courier-BoldOblique.afm`	`enscript`
`Courier-Oblique.afm`	`enscript.pro`
`Courier.afm`	`font.map`
`DIThacks.afm`	`lps40banner`
`Garamond-Bold.afm`	`lps40banner.pro`
`Garamond-BoldItalic.afm`	`lps40comm`
`Garamond-Light.afm`	`ps4014`
`Garamond-LightItalic.afm`	`ps4014.pro`
`Helvetica-Bold.afm`	`ps630`
`Helvetica-BoldOblique.afm`	`ps630.pro`
`Helvetica-Narrow-Bold.afm`	`psbad`
`Helvetica-Narrow-BoldOblique.afm`	`psbad.sh`
`Helvetica-Narrow-Oblique.afm`	`psbanner`
`Helvetica-Narrow.afm`	`pscat`
`Helvetica-Oblique.afm`	`pscat.pro`
`Helvetica.afm`	`pscatmap`
`LubalinGraph-Book.afm`	`pscf`
`LubalinGraph-BookOblique.afm`	`pscomm`
`LubalinGraph-Demi.afm`	`psdf`
`LubalinGraph-DemiOblique.afm`	`psdit`
`NewCenturySchlbk-Bold.afm`	`psdit.pro`
`NewCenturySchlbk-BoldItalic.afm`	`psgf`
`NewCenturySchlbk-Italic.afm`	`psif`
`NewCenturySchlbk-Roman.afm`	`psiflps40`
`Notice`	`psint.sh`
`Optima-Bold.afm`	`psnf`
`Optima-BoldOblique.afm`	`psof`
`Optima-Oblique.afm`	`psoflps40`
`Optima.afm`	`psplot`
`Palatino-Bold.afm`	`psplot.pro`
`Palatino-BoldItalic.afm`	`psrev`
`Palatino-Italic.afm`	`psrf`
`Palatino-Roman.afm`	`psrv`
`Souvenir-Demi.afm`	`pstext`

```
Souvenir-DemiItalic.afm             pstext.pro
Souvenir-Light.afm                  pstf
Souvenir-LightItalic.afm            psvf
Symbol.afm                          troff.font
Times-Bold.afm                      uartpatch.ps
ditroff.font/AG.map                 ditroff.font/README
ditroff.font/Ag.map                 ditroff.font/S.map
ditroff.font/B.map                  ditroff.font/SS.map
ditroff.font/BI.map                 ditroff.font/SV.map
ditroff.font/BO.map                 ditroff.font/Sv.map
ditroff.font/Bo.map                 ditroff.font/TB.map
ditroff.font/C.map                  ditroff.font/TD.map
ditroff.font/CB.map                 ditroff.font/TI.map
ditroff.font/CD.map                 ditroff.font/TR.map
ditroff.font/CO.map                 ditroff.font/ZC.map
ditroff.font/GA.map                 ditroff.font/aG.map
ditroff.font/Ga.map                 ditroff.font/afmdit
ditroff.font/H.map                  ditroff.font/afmdit.awk
ditroff.font/HB.map                 ditroff.font/afmdit.sysv
ditroff.font/HD.map                 ditroff.font/ag.map
ditroff.font/HN.map                 ditroff.font/bO.map
ditroff.font/HO.map                 ditroff.font/bo.map
ditroff.font/Hn.map                 ditroff.font/charset
ditroff.font/I.map                  ditroff.font/devspecs
ditroff.font/LU.map                 ditroff.font/gA.map
ditroff.font/Lu.map                 ditroff.font/ga.map
ditroff.font/Make.family            ditroff.font/hN.map
ditroff.font/Makefile               ditroff.font/hn.map
ditroff.font/Makefile.sysv          ditroff.font/lU.map
ditroff.font/NC.map                 ditroff.font/lu.map
ditroff.font/Nc.map                 ditroff.font/makefamily
ditroff.font/OP.map                 ditroff.font/makeout
ditroff.font/Op.map                 ditroff.font/nC.map
ditroff.font/PA.map                 ditroff.font/nc.map
ditroff.font/PB.map                 ditroff.font/oP.map
ditroff.font/PI.map                 ditroff.font/op.map
ditroff.font/PX.map                 ditroff.font/sV.map
ditroff.font/R.map                  ditroff.font/sv.map

troff.font/AvantGarde.map           troff.font/Optima.map
troff.font/Bookman.map              troff.font/Palatino.map
troff.font/Courier.map              troff.font/Souvenir.map
troff.font/Garamond.map             troff.font/Times.map
troff.font/HelvNarrow.map           troff.font/Zapf.map
troff.font/Helvetica.map            troff.font/chartab.inc
troff.font/Lubalin.map              troff.font/doto.awk
troff.font/Makefile                 troff.font/font.head
troff.font/Makefile.sysv            troff.font/makefontdir
troff.font/NewCentury.map           troff.font/makefontdir.sysv

troff.font/AvantGarde:
font.ct          ftAg          ftI           ftS           ftag
font.head        ftB           ftR           ftaG

troff.font/Bookman:
font.ct          ftB           ftI           ftS           ftbo
font.head        ftBo          ftR           ftbO
```

```
troff.font/Courier:
font.ct          ftB              ftCB             ftI              ftS
font.head        ftC              ftCO             ftR

troff.font/Garamond:
font.ct          ftB              ftI              ftS              ftga
font.head        ftGa             ftR              ftgA

troff.font/HelvNarrow:
font.ct          ftB              ftI              ftS              fthn
font.head        ftHn             ftR              fthN

troff.font/Helvetica:
font.ct          ftB              ftHB             ftI              ftS
font.head        ftH              ftHO             ftR

troff.font/Lubalin:
font.ct          ftB              ftLu             ftS              ftlu
font.head        ftI              ftR              ftlU

troff.font/NewCentury:
font.ct          ftB              ftNc             ftS              ftnc
font.head        ftI              ftR              ftnC

troff.font/Optima:
font.ct          ftB              ftOp             ftS              ftop
font.head        ftI              ftR              ftoP

troff.font/Palatino:
font.ct          ftB              ftPA             ftPI             ftS
font.head        ftI              ftPB             ftR

troff.font/Souvenir:
font.ct          ftB              ftR              ftSv             ftsv
font.head        ftI              ftS              ftsV

troff.font/Times:
font.ct          ftB              ftR              ftTB             ftTR
font.head        ftI              ftS              ftTI

troff.font/Zapf:
font.ct          ftB              ftR              ftTB             ftZC
font.head        ftI              ftS              ftTR
```

In /usr/lib/font the following were installed. All previous files were removed. (71 files)

```
AvantGarde/devpsc          Bookman/devpsc             Courier/devpsc
Garamond/devpsc            HelvNarrow/devpsc          Helvetica/devpsc
Lubalin/devpsc             NewCentury/devpsc          Optima/devpsc
Palatino/devpsc            Souvenir/devpsc            Times/devpsc
Zapf/devpsc


devpsc/AG      devpsc/GA       devpsc/NC.map    devpsc/Sv       devpsc/ga.map
devpsc/AG.aux  devpsc/GA.aux   devpsc/NC.out    devpsc/Sv.aux   devpsc/ga.out
devpsc/AG.map  devpsc/GA.map   devpsc/Nc        devpsc/Sv.map   devpsc/hN
devpsc/AG.out  devpsc/GA.out   devpsc/Nc.aux    devpsc/Sv.out   devpsc/hN.aux
devpsc/Ag      devpsc/Ga       devpsc/Nc.map    devpsc/TB       devpsc/hN.map
devpsc/Ag.aux  devpsc/Ga.aux   devpsc/Nc.out    devpsc/TB.aux   devpsc/hN.out
```

devpsc/Ag.map	devpsc/Ga.map	devpsc/OP	devpsc/TB.map	devpsc/hn
devpsc/Ag.out	devpsc/Ga.out	devpsc/OP.aux	devpsc/TB.out	devpsc/hn.aux
devpsc/B	devpsc/H	devpsc/OP.map	devpsc/TD	devpsc/hn.map
devpsc/B.aux	devpsc/H.aux	devpsc/OP.out	devpsc/TD.aux	devpsc/hn.out
devpsc/B.map	devpsc/H.map	devpsc/Op	devpsc/TD.map	devpsc/lU
devpsc/B.out	devpsc/H.out	devpsc/Op.aux	devpsc/TD.out	devpsc/lU.aux
devpsc/BI	devpsc/HB	devpsc/Op.map	devpsc/TI	devpsc/lU.map
devpsc/BI.aux	devpsc/HB.aux	devpsc/Op.out	devpsc/TI.aux	devpsc/lU.out
devpsc/BI.map	devpsc/HB.map	devpsc/PA	devpsc/TI.map	devpsc/lu
devpsc/BI.out	devpsc/HB.out	devpsc/PA.aux	devpsc/TI.out	devpsc/lu.aux
devpsc/BO	devpsc/HD	devpsc/PA.map	devpsc/TR	devpsc/lu.map
devpsc/BO.aux	devpsc/HD.aux	devpsc/PA.out	devpsc/TR.aux	devpsc/lu.out
devpsc/BO.map	devpsc/HD.map	devpsc/PB	devpsc/TR.map	devpsc/nC
devpsc/BO.out	devpsc/HD.out	devpsc/PB.aux	devpsc/TR.out	devpsc/nC.aux
devpsc/Bo	devpsc/HN	devpsc/PB.map	devpsc/ZC	devpsc/nC.map
devpsc/Bo.aux	devpsc/HN.aux	devpsc/PB.out	devpsc/ZC.aux	devpsc/nC.out
devpsc/Bo.map	devpsc/HN.map	devpsc/PI	devpsc/ZC.map	devpsc/nc
devpsc/Bo.out	devpsc/HN.out	devpsc/PI.aux	devpsc/ZC.out	devpsc/nc.aux
devpsc/C	devpsc/HO	devpsc/PI.map	devpsc/aG	devpsc/nc.map
devpsc/C.aux	devpsc/HO.aux	devpsc/PI.out	devpsc/aG.aux	devpsc/nc.out
devpsc/C.map	devpsc/HO.map	devpsc/PX	devpsc/aG.map	devpsc/oP
devpsc/C.out	devpsc/HO.out	devpsc/PX.aux	devpsc/aG.out	devpsc/oP.aux
devpsc/CB	devpsc/Hn	devpsc/PX.map	devpsc/ag	devpsc/oP.map
devpsc/CB.aux	devpsc/Hn.aux	devpsc/PX.out	devpsc/ag.aux	devpsc/oP.out
devpsc/CB.map	devpsc/Hn.map	devpsc/R	devpsc/ag.map	devpsc/op
devpsc/CB.out	devpsc/Hn.out	devpsc/R.aux	devpsc/ag.out	devpsc/op.aux
devpsc/CD	devpsc/I	devpsc/R.map	devpsc/bO	devpsc/op.map
devpsc/CD.aux	devpsc/I.aux	devpsc/R.out	devpsc/bO.aux	devpsc/op.out
devpsc/CD.map	devpsc/I.map	devpsc/S	devpsc/bO.map	devpsc/sV
devpsc/CD.out	devpsc/I.out	devpsc/S.aux	devpsc/bO.out	devpsc/sV.aux
devpsc/CO	devpsc/LU	devpsc/S.map	devpsc/bo	devpsc/sV.map
devpsc/CO.aux	devpsc/LU.aux	devpsc/S.out	devpsc/bo.aux	devpsc/sV.out
devpsc/CO.map	devpsc/LU.map	devpsc/SS	devpsc/bo.map	devpsc/sv
devpsc/CO.out	devpsc/LU.out	devpsc/SS.aux	devpsc/bo.out	devpsc/sv.aux
devpsc/CW	devpsc/Lu	devpsc/SS.map	devpsc/gA	devpsc/sv.map
devpsc/CW.aux	devpsc/Lu.aux	devpsc/SS.out	devpsc/gA.aux	devpsc/sv.out
devpsc/CW.map	devpsc/Lu.map	devpsc/SV	devpsc/gA.map	
devpsc/CW.out	devpsc/Lu.out	devpsc/SV.aux	devpsc/gA.out	
devpsc/DESC	devpsc/NC	devpsc/SV.map	devpsc/ga	
devpsc/DESC.out	devpsc/NC.aux	devpsc/SV.out	devpsc/ga.aux	