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Contents

1.72.1 Available under license

1.73 Module::Runtime 0.14

1.73.1 Available under license

1.74 Moo 2.000001

1.74.1 Available under license

1.75 Moose 2.1403

1.75.1 Available under license

1.76 MooseX::FollowPBP 0.05

1.76.1 Available under license

1.77 MooseX::Getopt 0.68

1.77.1 Available under license

1.78 MooseX::Params::Validate 0.16

1.78.1 Available under license

1.79 MooseX::Role::Parameterized 1.08

1.79.1 Available under license

1.80 MooseX::Singleton 0.29

1.80.1 Available under license

1.81 MooseX::Types 0.35

1.81.1 Available under license

1.82 MooseX::Types::Path::Class 0.06

1.82.1 Available under license

1.83 MooX::Types::MooseLike 0.28

1.84 Mozilla::CA 20160104

1.84.1 Available under license

1.85 namespace::autoclean 0.24

1.85.1 Available under license

1.86 namespace::clean 0.23

1.87 Number-Compare 0.03

1.87.1 Available under license

1.88 Package::DeprecationManager 0.13

1.88.1 Available under license

1.89 Package::Stash 0.33

1.89.1 Available under license

1.90 Package::Stash::XS 0.28

1.90.1 Available under license

1.91 PadWalker 2.0

1.91.1 Available under license

1.92 pango 1.36.8

1.92.1 Available under license

1.1 atk 2.14.0

1.1.1 Available under license :

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1.2 B::Hooks::EndOfScope 0.14

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Appendix: How to Apply These Terms to Your New Programs

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To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey

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"copyright" line and a pointer to where the full notice is found.

    <one line to give the program's name and a brief idea of what it does.>
    Copyright (C) 19yy <name of author>

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    Gnomovision version 69, Copyright (C) 19xx name of author
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    This is free software, and you are welcome to redistribute it
    under certain conditions; type `show c' for details.

The hypothetical commands `show w' and `show c' should show the
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You should also get your employer (if you work as a programmer) or your
school, if any, to sign a "copyright disclaimer" for the program, if
necessary. Here a sample; alter the names:

    Yoyodyne, Inc., hereby disclaims all copyright interest in the
    program `Gnomovision' (a program to direct compilers to make passes
    at assemblers) written by James Hacker.

    <signature of Ty Coon>, 1 April 1989
    Ty Coon, President of Vice

That's all there is to it!

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The End

1.3 cairo 1.14.0 :Feb 10 2013 Chris Wilson

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1.4 Cairo perl bindings 1.105

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1.5 cairo/util 1.14.0 :Feb 10 2013 Chris Wilson

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1.6 cairo_utils/cairo-trace 1.12.14

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  customarily used for software interchange.

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  (including a physical distribution medium), accompanied by a
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  long as you offer spare parts or customer support for that product
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  medium customarily used for software interchange, for a price no
  more than your reasonable cost of physically performing this
  conveying of source, or (2) access to copy the
  Corresponding Source from a network server at no charge.

  c) Convey individual copies of the object code with a copy of the
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  alternative is allowed only occasionally and noncommercially, and
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  d) Convey the object code by offering access from a designated
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  may be on a different server (operated by you or a third party)

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1.17 Data::Dumper 2.154

1.17.1 Available under license :

1.18 Data::OptList 0.107

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1.20 DateTime (perl) 1.18

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attach them to the start of each source file to most effectively convey
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1.33 Exporter::Tiny 0.042

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Upstream-Contact: Toby Inkster (TOBYINK) <tobyink@cpan.org>
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Richard Clamp <richardc@unixbeard.net> from a suggestion by Tatsuhiko Miyagawa

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<snip>
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1.35 File::HomeDir 1.00

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1.39 GD 2.53

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1.41 Getopt::Long::Descriptive 0.092

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1.42 gettext 0.19.3

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entire whole, and thus to each and every part regardless of who wrote
it.

Thus, it is not the intent of this section to claim rights or contest
your rights to work written entirely by you; rather, the intent is to
exercise the right to control the distribution of derivative or
collective works based on the Library.

In addition, mere aggregation of another work not based on the Library
with the Library (or with a work based on the Library) on a volume of
a storage or distribution medium does not bring the other work under
the scope of this License.

 3. You may opt to apply the terms of the ordinary GNU General Public
License instead of this License to a given copy of the Library. To do
this, you must alter all the notices that refer to this License, so
that they refer to the ordinary GNU General Public License, version 2,
instead of to this License. (If a newer version than version 2 of the
ordinary GNU General Public License has appeared, then you can specify
that version instead if you wish.) Do not make any other change in
these notices.
^L
 Once this change is made in a given copy, it is irreversible for
that copy, so the ordinary GNU General Public License applies to all
subsequent copies and derivative works made from that copy.

 This option is useful when you wish to copy part of the code of
the Library into a program that is not a library.

 4. You may copy and distribute the Library (or a portion or
derivative of it, under Section 2) in object code or executable form
under the terms of Sections 1 and 2 above provided that you accompany

it with the complete corresponding machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

 If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

 5. A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a "work that uses the Library". Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

 However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a "work that uses the
library". The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

 When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

 If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

 Otherwise, if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.
^L
 6. As an exception to the Sections above, you may also combine or
link a "work that uses the Library" with the Library to produce a
work containing portions of the Library, and distribute that work
under terms of your choice, provided that the terms permit
modification of the work for the customer's own use and reverse
engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license
restrictions of other proprietary libraries that do not normally
accompany the operating system. Such a contradiction means you cannot
use both them and the Library together in an executable that you
distribute.
^L
 7. You may place library facilities that are a work based on the
Library side-by-side in a single library together with other library
facilities not covered by this License, and distribute such a combined
library, provided that the separate distribution of the work based on
the Library and of the other library facilities is otherwise
permitted, and provided that you do these two things:

  a) Accompany the combined library with a copy of the same work
  based on the Library, uncombined with any other library
  facilities. This must be distributed under the terms of the
  Sections above.

  b) Give prominent notice with the combined library of the fact
  that part of it is a work based on the Library, and explaining
  where to find the accompanying uncombined form of the same work.

 8. You may not copy, modify, sublicense, link with, or distribute
the Library except as expressly provided under this License. Any
attempt otherwise to copy, modify, sublicense, link with, or
distribute the Library is void, and will automatically terminate your
rights under this License. However, parties who have received copies,
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 9. You are not required to accept this License, since you have not
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You are not responsible for enforcing compliance by third parties with
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11. If, as a consequence of a court judgment or allegation of patent
infringement or for any other reason (not limited to patent issues),
conditions are imposed on you (whether by court order, agreement or
otherwise) that contradict the conditions of this License, they do not
excuse you from the conditions of this License. If you cannot
distribute so as to satisfy simultaneously your obligations under this
License and any other pertinent obligations, then as a consequence you
may not distribute the Library at all. For example, if a patent
license would not permit royalty-free redistribution of the Library by
all those who receive copies directly or indirectly through you, then
the only way you could satisfy both it and this License would be to
refrain entirely from distribution of the Library.

If any portion of this section is held invalid or unenforceable under
any particular circumstance, the balance of the section is intended to
apply, and the section as a whole is intended to apply in other
circumstances.

It is not the purpose of this section to induce you to infringe any
patents or other property right claims or to contest validity of any
such claims; this section has the sole purpose of protecting the
integrity of the free software distribution system which is
implemented by public license practices. Many people have made
generous contributions to the wide range of software distributed
through that system in reliance on consistent application of that
system; it is up to the author/donor to decide if he or she is willing
to distribute software through any other system and a licensee cannot
impose that choice.

This section is intended to make thoroughly clear what is believed to
be a consequence of the rest of this License.

12. If the distribution and/or use of the Library is restricted in
certain countries either by patents or by copyrighted interfaces, the
original copyright holder who places the Library under this License
may add an explicit geographical distribution limitation excluding those
countries, so that distribution is permitted only in or among
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the limitation as if written in the body of this License.

13. The Free Software Foundation may publish revised and/or new
versions of the Lesser General Public License from time to time.
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but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Library
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programs whose distribution conditions are incompatible with these,
write to the author to ask for permission. For software which is
copyrighted by the Free Software Foundation, write to the Free
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of all derivatives of our free software and of promoting the sharing
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everyone can redistribute and change. You can do so by permitting
redistribution under these terms (or, alternatively, under the terms
of the ordinary General Public License).

 To apply these terms, attach the following notices to the library.

It is safest to attach them to the start of each source file to most
effectively convey the exclusion of warranty; and each file should
have at least the "copyright" line and a pointer to where the full
notice is found.

   <one line to give the library's name and a brief idea of what it
does.>
   Copyright (C) <year> <name of author>

   This library is free software; you can redistribute it and/or
   modify it under the terms of the GNU Lesser General Public
   License as published by the Free Software Foundation; either
   version 2 of the License, or (at your option) any later version.

   This library is distributed in the hope that it will be useful,
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   You should have received a copy of the GNU Lesser General Public
   License along with this library; if not, write to the Free Software
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   MA 02110-1301, USA

Also add information on how to contact you by electronic and paper
mail.

You should also get your employer (if you work as a programmer) or
your
school, if any, to sign a "copyright disclaimer" for the library, if
necessary. Here is a sample; alter the names:

 Yoyodyne, Inc., hereby disclaims all copyright interest in the
 library `Frob' (a library for tweaking knobs) written by James
Random Hacker.

 <signature of Ty Coon>, 1 April 1990
 Ty Coon, President of Vice

That's all there is to it!
The gettext-runtime package is partially under the LGPL and partially under
the GPL.

The following parts are under the LGPL, see file intl/COPYING.LIB:
 - the libintl and libasprintf libraries and their header files,
 - the libintl.jar Java library,
 - the GNU.Gettext.dll C# library,

- the gettext.sh shells script function library.

The following parts are under the GPL, see file COPYING in the toplevel
directory:
 - the _programs_ gettext, ngettext, envsubst,
 - the documentation.
The libasprintf package is under the LGPL, see file COPYING.LIB.
This subpackage is under the GPL, see file COPYING in the toplevel directory.
@c The GNU Lesser General Public License.
@center Version 2.1, February 1999

@c This file is intended to be included within another document,
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[This is the first released version of the Lesser GPL. It also counts
as the successor of the GNU Library Public License, version 2, hence the
version number 2.1.]
@end display

@subheading Preamble

 The licenses for most software are designed to take away your
freedom to share and change it. By contrast, the GNU General Public
Licenses are intended to guarantee your freedom to share and change
free software---to make sure the software is free for all its users.

 This license, the Lesser General Public License, applies to some
specially designated software---typically libraries---of the Free
Software Foundation and other authors who decide to use it. You can use
it too, but we suggest you first think carefully about whether this
license or the ordinary General Public License is the better strategy to
use in any particular case, based on the explanations below.

 When we speak of free software, we are referring to freedom of use,
not price. Our General Public Licenses are designed to make sure that
you have the freedom to distribute copies of free software (and charge
for this service if you wish); that you receive source code or can get
it if you want it; that you can change the software and use pieces of it
in new free programs; and that you are informed that you can do these
things.

To protect your rights, we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the @dfn{Lesser} General Public License because it does @emph{Less} to protect the user's freedom than the ordinary General

Public License. It also provides other free software developers Less
of an advantage over competing non-free programs. These disadvantages
are the reason we use the ordinary General Public License for many
libraries. However, the Lesser license provides advantages in certain
special circumstances.

 For example, on rare occasions, there may be a special need to
encourage the widest possible use of a certain library, so that it becomes
a de-facto standard. To achieve this, non-free programs must be
allowed to use the library. A more frequent case is that a free
library does the same job as widely used non-free libraries. In this
case, there is little to gain by limiting the free library to free
software only, so we use the Lesser General Public License.

 In other cases, permission to use a particular library in non-free
programs enables a greater number of people to use a large body of
free software. For example, permission to use the GNU C Library in
non-free programs enables many more people to use the whole GNU
operating system, as well as its variant, the GNU/Linux operating
system.

 Although the Lesser General Public License is Less protective of the
users' freedom, it does ensure that the user of a program that is
linked with the Library has the freedom and the wherewithal to run
that program using a modified version of the Library.

 The precise terms and conditions for copying, distribution and
modification follow. Pay close attention to the difference between a
``work based on the library'' and a ``work that uses the library''. The
former contains code derived from the library, whereas the latter must
be combined with the library in order to run.

@subheading TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

@enumerate 0
@item
This License Agreement applies to any software library or other program
which contains a notice placed by the copyright holder or other
authorized party saying it may be distributed under the terms of this
Lesser General Public License (also called ``this License''). Each
licensee is addressed as ``you''.

 A ``library'' means a collection of software functions and/or data
prepared so as to be conveniently linked with application programs
(which use some of those functions and data) to form executables.

 The ``Library'', below, refers to any such software library or work
which has been distributed under these terms. A ``work based on the

Library" means either the Library or any derivative work under
copyright law: that is to say, a work containing the Library or a
portion of it, either verbatim or with modifications and/or translated
straightforwardly into another language. (Hereinafter, translation is
included without limitation in the term ``modification''.)

 ``Source code'' for a work means the preferred form of the work for
making modifications to it. For a library, complete source code means
all the source code for all modules it contains, plus any associated
interface definition files, plus the scripts used to control compilation
and installation of the library.

 Activities other than copying, distribution and modification are not
covered by this License; they are outside its scope. The act of
running a program using the Library is not restricted, and output from
such a program is covered only if its contents constitute a work based
on the Library (independent of the use of the Library in a tool for
writing it). Whether that is true depends on what the Library does
and what the program that uses the Library does.

@item
You may copy and distribute verbatim copies of the Library's
complete source code as you receive it, in any medium, provided that
you conspicuously and appropriately publish on each copy an
appropriate copyright notice and disclaimer of warranty; keep intact
all the notices that refer to this License and to the absence of any
warranty; and distribute a copy of this License along with the
Library.

 You may charge a fee for the physical act of transferring a copy,
and you may at your option offer warranty protection in exchange for a
fee.

@item
You may modify your copy or copies of the Library or any portion
of it, thus forming a work based on the Library, and copy and
distribute such modifications or work under the terms of Section 1
above, provided that you also meet all of these conditions:

@enumerate a
@item
The modified work must itself be a software library.

@item
You must cause the files modified to carry prominent notices
stating that you changed the files and the date of any change.

@item

You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

@item
If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)
@end enumerate

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

@item
You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify

that version instead if you wish.) Do not make any other change in
these notices.

  Once this change is made in a given copy, it is irreversible for
that copy, so the ordinary GNU General Public License applies to all
subsequent copies and derivative works made from that copy.

  This option is useful when you wish to copy part of the code of
the Library into a program that is not a library.

@item
You may copy and distribute the Library (or a portion or
derivative of it, under Section 2) in object code or executable form
under the terms of Sections 1 and 2 above provided that you accompany
it with the complete corresponding machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

  If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

@item
A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a ``work that uses the Library''. Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

  However, linking a ``work that uses the Library'' with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a ``work that uses the
library''. The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

  When a ``work that uses the Library'' uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

  If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative

work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

 Otherwise, if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

@item
As an exception to the Sections above, you may also combine or
link a ``work that uses the Library'' with the Library to produce a
work containing portions of the Library, and distribute that work
under terms of your choice, provided that the terms permit
modification of the work for the customer's own use and reverse
engineering for debugging such modifications.

 You must give prominent notice with each copy of the work that the
Library is used in it and that the Library and its use are covered by
this License. You must supply a copy of this License. If the work
during execution displays copyright notices, you must include the
copyright notice for the Library among them, as well as a reference
directing the user to the copy of this License. Also, you must do one
of these things:

@enumerate a
@item
Accompany the work with the complete corresponding
machine-readable source code for the Library including whatever
changes were used in the work (which must be distributed under
Sections 1 and 2 above); and, if the work is an executable linked
with the Library, with the complete machine-readable ``work that
uses the Library'', as object code and/or source code, so that the
user can modify the Library and then relink to produce a modified
executable containing the modified Library. (It is understood
that the user who changes the contents of definitions files in the
Library will not necessarily be able to recompile the application
to use the modified definitions.)

@item
Use a suitable shared library mechanism for linking with the Library. A
suitable mechanism is one that (1) uses at run time a copy of the
library already present on the user's computer system, rather than
copying library functions into the executable, and (2) will operate
properly with a modified version of the library, if the user installs
one, as long as the modified version is interface-compatible with the
version that the work was made with.

@item

Accompany the work with a written offer, valid for at
least three years, to give the same user the materials
specified in Subsection 6a, above, for a charge no more
than the cost of performing this distribution.

@item
If distribution of the work is made by offering access to copy
from a designated place, offer equivalent access to copy the above
specified materials from the same place.

@item
Verify that the user has already received a copy of these
materials or that you have already sent this user a copy.
@end enumerate

 For an executable, the required form of the ``work that uses the
Library'' must include any data and utility programs needed for
reproducing the executable from it. However, as a special exception,
the materials to be distributed need not include anything that is
normally distributed (in either source or binary form) with the major
components (compiler, kernel, and so on) of the operating system on
which the executable runs, unless that component itself accompanies the
executable.

 It may happen that this requirement contradicts the license
restrictions of other proprietary libraries that do not normally
accompany the operating system. Such a contradiction means you cannot
use both them and the Library together in an executable that you
distribute.

@item
You may place library facilities that are a work based on the
Library side-by-side in a single library together with other library
facilities not covered by this License, and distribute such a combined
library, provided that the separate distribution of the work based on
the Library and of the other library facilities is otherwise
permitted, and provided that you do these two things:

@enumerate a
@item
Accompany the combined library with a copy of the same work
based on the Library, uncombined with any other library
facilities. This must be distributed under the terms of the
Sections above.

@item
Give prominent notice with the combined library of the fact
that part of it is a work based on the Library, and explaining

where to find the accompanying uncombined form of the same work.
@end enumerate

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distribute the Library is void, and will automatically terminate your
rights under this License. However, parties who have received copies,
or rights, from you under this License will not have their licenses
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1.45 glib 2.42.1

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1.46 Glib perl bindings 1.307

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1.47 gtk+ 2.24.21

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numbered 2 because it goes with version 2 of the ordinary GPL.]

Preamble

 The licenses for most software are designed to take away your
freedom to share and change it. By contrast, the GNU General Public
Licenses are intended to guarantee your freedom to share and change
free software--to make sure the software is free for all its users.

 This license, the Library General Public License, applies to some
specially designated Free Software Foundation software, and to any
other libraries whose authors decide to use it. You can use it for
your libraries, too.

 When we speak of free software, we are referring to freedom, not
price. Our General Public Licenses are designed to make sure that you
have the freedom to distribute copies of free software (and charge for
this service if you wish), that you receive source code or can get it
if you want it, that you can change the software or use pieces of it
in new free programs; and that you know you can do these things.

 To protect your rights, we need to make restrictions that forbid
anyone to deny you these rights or to ask you to surrender the rights.
These restrictions translate to certain responsibilities for you if

you distribute copies of the library, or if you modify it.

 For example, if you distribute copies of the library, whether gratis
or for a fee, you must give the recipients all the rights that we gave
you. You must make sure that they, too, receive or can get the source
code. If you link a program with the library, you must provide
complete object files to the recipients so that they can relink them
with the library, after making changes to the library and recompiling
it. And you must show them these terms so they know their rights.

 Our method of protecting your rights has two steps: (1) copyright
the library, and (2) offer you this license which gives you legal
permission to copy, distribute and/or modify the library.

 Also, for each distributor's protection, we want to make certain
that everyone understands that there is no warranty for this free
library. If the library is modified by someone else and passed on, we
want its recipients to know that what they have is not the original
version, so that any problems introduced by others will not reflect on
the original authors' reputations.

 Finally, any free program is threatened constantly by software
patents. We wish to avoid the danger that companies distributing free
software will individually obtain patent licenses, thus in effect
transforming the program into proprietary software. To prevent this,
we have made it clear that any patent must be licensed for everyone's
free use or not licensed at all.

 Most GNU software, including some libraries, is covered by the ordinary
GNU General Public License, which was designed for utility programs. This
license, the GNU Library General Public License, applies to certain
designated libraries. This license is quite different from the ordinary
one; be sure to read it in full, and don't assume that anything in it is
the same as in the ordinary license.

 The reason we have a separate public license for some libraries is that
they blur the distinction we usually make between modifying or adding to a
program and simply using it. Linking a program with a library, without
changing the library, is in some sense simply using the library, and is
analogous to running a utility program or application program. However, in
a textual and legal sense, the linked executable is a combined work, a
derivative of the original library, and the ordinary General Public License
treats it as such.

 Because of this blurred distinction, using the ordinary General
Public License for libraries did not effectively promote software
sharing, because most developers did not use the libraries. We
concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the
users of those programs of all benefit from the free status of the
libraries themselves. This Library General Public License is intended to
permit developers of non-free programs to use free libraries, while
preserving your freedom as a user of such programs to change the free
libraries that are incorporated in them. (We have not seen how to achieve
this as regards changes in header files, but we have achieved it as regards
changes in the actual functions of the Library.) The hope is that this
will lead to faster development of free libraries.

 The precise terms and conditions for copying, distribution and
modification follow. Pay close attention to the difference between a
"work based on the library" and a "work that uses the library". The
former contains code derived from the library, while the latter only
works together with the library.

 Note that it is possible for a library to be covered by the ordinary
General Public License rather than by this special one.

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addressed as "you".

 A "library" means a collection of software functions and/or data
prepared so as to be conveniently linked with application programs
(which use some of those functions and data) to form executables.

 The "Library", below, refers to any such software library or work
which has been distributed under these terms. A "work based on the
Library" means either the Library or any derivative work under
copyright law: that is to say, a work containing the Library or a
portion of it, either verbatim or with modifications and/or translated
straightforwardly into another language. (Hereinafter, translation is
included without limitation in the term "modification".)

 "Source code" for a work means the preferred form of the work for
making modifications to it. For a library, complete source code means
all the source code for all modules it contains, plus any associated
interface definition files, plus the scripts used to control compilation
and installation of the library.

 Activities other than copying, distribution and modification are not

covered by this License; they are outside its scope. The act of
running a program using the Library is not restricted, and output from
such a program is covered only if its contents constitute a work based
on the Library (independent of the use of the Library in a tool for
writing it). Whether that is true depends on what the Library does
and what the program that uses the Library does.

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warranty; and distribute a copy of this License along with the
Library.

 You may charge a fee for the physical act of transferring a copy,
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 2. You may modify your copy or copies of the Library or any portion
of it, thus forming a work based on the Library, and copy and
distribute such modifications or work under the terms of Section 1
above, provided that you also meet all of these conditions:

  a) The modified work must itself be a software library.

  b) You must cause the files modified to carry prominent notices
  stating that you changed the files and the date of any change.

  c) You must cause the whole of the work to be licensed at no
  charge to all third parties under the terms of this License.

  d) If a facility in the modified Library refers to a function or a
  table of data to be supplied by an application program that uses
  the facility, other than as an argument passed when the facility
  is invoked, then you must make a good faith effort to ensure that,
  in the event an application does not supply such function or
  table, the facility still operates, and performs whatever part of
  its purpose remains meaningful.

  (For example, a function in a library to compute square roots has
  a purpose that is entirely well-defined independent of the
  application. Therefore, Subsection 2d requires that any
  application-supplied function or table used by this function must
  be optional: if the application does not supply it, the square
  root function must still compute square roots.)

These requirements apply to the modified work as a whole. If

identifiable sections of that work are not derived from the Library,
and can be reasonably considered independent and separate works in
themselves, then this License, and its terms, do not apply to those
sections when you distribute them as separate works. But when you
distribute the same sections as part of a whole which is a work based
on the Library, the distribution of the whole must be on the terms of
this License, whose permissions for other licensees extend to the
entire whole, and thus to each and every part regardless of who wrote
it.

Thus, it is not the intent of this section to claim rights or contest
your rights to work written entirely by you; rather, the intent is to
exercise the right to control the distribution of derivative or
collective works based on the Library.

In addition, mere aggregation of another work not based on the Library
with the Library (or with a work based on the Library) on a volume of
a storage or distribution medium does not bring the other work under
the scope of this License.

 3. You may opt to apply the terms of the ordinary GNU General Public
License instead of this License to a given copy of the Library. To do
this, you must alter all the notices that refer to this License, so
that they refer to the ordinary GNU General Public License, version 2,
instead of to this License. (If a newer version than version 2 of the
ordinary GNU General Public License has appeared, then you can specify
that version instead if you wish.) Do not make any other change in
these notices.

 Once this change is made in a given copy, it is irreversible for
that copy, so the ordinary GNU General Public License applies to all
subsequent copies and derivative works made from that copy.

 This option is useful when you wish to copy part of the code of
the Library into a program that is not a library.

 4. You may copy and distribute the Library (or a portion or
derivative of it, under Section 2) in object code or executable form
under the terms of Sections 1 and 2 above provided that you accompany
it with the complete corresponding machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

 If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a "work that uses the Library". Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

 However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a "work that uses the
library". The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

 When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

 If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

 Otherwise, if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

 6. As an exception to the Sections above, you may also compile or
link a "work that uses the Library" with the Library to produce a
work containing portions of the Library, and distribute that work
under terms of your choice, provided that the terms permit
modification of the work for the customer's own use and reverse
engineering for debugging such modifications.

 You must give prominent notice with each copy of the work that the
Library is used in it and that the Library and its use are covered by
this License. You must supply a copy of this License. If the work
during execution displays copyright notices, you must include the
copyright notice for the Library among them, as well as a reference
directing the user to the copy of this License. Also, you must do one
of these things:

 a) Accompany the work with the complete corresponding

machine-readable source code for the Library including whatever
changes were used in the work (which must be distributed under
Sections 1 and 2 above); and, if the work is an executable linked
with the Library, with the complete machine-readable "work that
uses the Library", as object code and/or source code, so that the
user can modify the Library and then relink to produce a modified
executable containing the modified Library. (It is understood
that the user who changes the contents of definitions files in the
Library will not necessarily be able to recompile the application
to use the modified definitions.)

b) Accompany the work with a written offer, valid for at
least three years, to give the same user the materials
specified in Subsection 6a, above, for a charge no more
than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy
from a designated place, offer equivalent access to copy the above
specified materials from the same place.

d) Verify that the user has already received a copy of these
materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the
Library" must include any data and utility programs needed for
reproducing the executable from it. However, as a special exception,
the source code distributed need not include anything that is normally
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components (compiler, kernel, and so on) of the operating system on
which the executable runs, unless that component itself accompanies
the executable.

It may happen that this requirement contradicts the license
restrictions of other proprietary libraries that do not normally
accompany the operating system. Such a contradiction means you cannot
use both them and the Library together in an executable that you
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7. You may place library facilities that are a work based on the
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<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

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 For example, if you distribute copies of the library, whether gratis
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you. You must make sure that they, too, receive or can get the source
code. If you link other code with the library, you must provide
complete object files to the recipients, so that they can relink them
with the library after making changes to the library and recompiling
it. And you must show them these terms so they know their rights.

 We protect your rights with a two-step method: (1) we copyright the
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modified by someone else and passed on, the recipients should know
that what they have is not the original version, so that the original
author's reputation will not be affected by problems that might be
introduced by others.

 Finally, software patents pose a constant threat to the existence of
any free program. We wish to make sure that a company cannot
effectively restrict the users of a free program by obtaining a
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 Most GNU software, including some libraries, is covered by the
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is quite different from the ordinary General Public License. We use
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 When a program is linked with a library, whether statically or using
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combined work, a derivative of the original library. The ordinary
General Public License therefore permits such linking only if the
entire combination fits its criteria of freedom. The Lesser General
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We call this license the "Lesser" General Public License because it
does Less to protect the user's freedom than the ordinary General
Public License. It also provides other free software developers Less
of an advantage over competing non-free programs. These disadvantages
are the reason we use the ordinary General Public License for many
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special circumstances.

 For example, on rare occasions, there may be a special need to
encourage the widest possible use of a certain library, so that it becomes
a de-facto standard. To achieve this, non-free programs must be
allowed to use the library. A more frequent case is that a free
library does the same job as widely used non-free libraries. In this
case, there is little to gain by limiting the free library to free
software only, so we use the Lesser General Public License.

 In other cases, permission to use a particular library in non-free
programs enables a greater number of people to use a large body of
free software. For example, permission to use the GNU C Library in
non-free programs enables many more people to use the whole GNU
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system.

 Although the Lesser General Public License is Less protective of the
users' freedom, it does ensure that the user of a program that is
linked with the Library has the freedom and the wherewithal to run
that program using a modified version of the Library.

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a

table of data to be supplied by an application program that uses
the facility, other than as an argument passed when the facility
is invoked, then you must make a good faith effort to ensure that,
in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by this function must
be optional: if the application does not supply it, the square
root function must still compute square roots.)

These requirements apply to the modified work as a whole. If
identifiable sections of that work are not derived from the Library,
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entire whole, and thus to each and every part regardless of who wrote
it.

Thus, it is not the intent of this section to claim rights or contest
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exercise the right to control the distribution of derivative or
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In addition, mere aggregation of another work not based on the Library
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that copy, so the ordinary GNU General Public License applies to all
subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of
the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or
derivative of it, under Section 2) in object code or executable form
under the terms of Sections 1 and 2 above provided that you accompany
it with the complete corresponding machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a "work that uses the Library". Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a "work that uses the
library". The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or

link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

 You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

  a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

  b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

  c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

  d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

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 For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for

reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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1.48 gtk-mac-integration 2.0.7

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 If distribution of object code is made by offering access to copy
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1.49 Gtk2 perl bindings 1.2495

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1.53 Imager 1.001

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1.54 IPC::Run3 0.048

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1.55 jpeg 9a

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```
*
* These routines may need modification for non-Unix environments or
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software will individually obtain patent licenses, thus in effect
transforming the program into proprietary software. To prevent this,
we have made it clear that any patent must be licensed for everyone's
free use or not licensed at all.

 Most GNU software, including some libraries, is covered by the ordinary
GNU General Public License, which was designed for utility programs. This
license, the GNU Library General Public License, applies to certain
designated libraries. This license is quite different from the ordinary
one; be sure to read it in full, and don't assume that anything in it is
the same as in the ordinary license.

 The reason we have a separate public license for some libraries is that
they blur the distinction we usually make between modifying or adding to a
program and simply using it. Linking a program with a library, without
changing the library, is in some sense simply using the library, and is
analogous to running a utility program or application program. However, in
a textual and legal sense, the linked executable is a combined work, a
derivative of the original library, and the ordinary General Public License
treats it as such.

 Because of this blurred distinction, using the ordinary General
Public License for libraries did not effectively promote software
sharing, because most developers did not use the libraries. We
concluded that weaker conditions might promote sharing better.

 However, unrestricted linking of non-free programs would deprive the
users of those programs of all benefit from the free status of the
libraries themselves. This Library General Public License is intended to
permit developers of non-free programs to use free libraries, while
preserving your freedom as a user of such programs to change the free
libraries that are incorporated in them. (We have not seen how to achieve
this as regards changes in header files, but we have achieved it as regards
changes in the actual functions of the Library.) The hope is that this
will lead to faster development of free libraries.

 The precise terms and conditions for copying, distribution and
modification follow. Pay close attention to the difference between a
"work based on the library" and a "work that uses the library". The

former contains code derived from the library, while the latter only
works together with the library.

 Note that it is possible for a library to be covered by the ordinary
General Public License rather than by this special one.

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 TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

 0. This License Agreement applies to any software library which
contains a notice placed by the copyright holder or other authorized
party saying it may be distributed under the terms of this Library
General Public License (also called "this License"). Each licensee is
addressed as "you".

 A "library" means a collection of software functions and/or data
prepared so as to be conveniently linked with application programs
(which use some of those functions and data) to form executables.

 The "Library", below, refers to any such software library or work
which has been distributed under these terms. A "work based on the
Library" means either the Library or any derivative work under
copyright law: that is to say, a work containing the Library or a
portion of it, either verbatim or with modifications and/or translated
straightforwardly into another language. (Hereinafter, translation is
included without limitation in the term "modification".)

 "Source code" for a work means the preferred form of the work for
making modifications to it. For a library, complete source code means
all the source code for all modules it contains, plus any associated
interface definition files, plus the scripts used to control compilation
and installation of the library.

 Activities other than copying, distribution and modification are not
covered by this License; they are outside its scope. The act of
running a program using the Library is not restricted, and output from
such a program is covered only if its contents constitute a work based
on the Library (independent of the use of the Library in a tool for
writing it). Whether that is true depends on what the Library does
and what the program that uses the Library does.

 1. You may copy and distribute verbatim copies of the Library's
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all the notices that refer to this License and to the absence of any
warranty; and distribute a copy of this License along with the
Library.

You may charge a fee for the physical act of transferring a copy,
and you may at your option offer warranty protection in exchange for a
fee.

 2. You may modify your copy or copies of the Library or any portion
of it, thus forming a work based on the Library, and copy and
distribute such modifications or work under the terms of Section 1
above, provided that you also meet all of these conditions:

  a) The modified work must itself be a software library.

  b) You must cause the files modified to carry prominent notices
  stating that you changed the files and the date of any change.

  c) You must cause the whole of the work to be licensed at no
  charge to all third parties under the terms of this License.

  d) If a facility in the modified Library refers to a function or a
  table of data to be supplied by an application program that uses
  the facility, other than as an argument passed when the facility
  is invoked, then you must make a good faith effort to ensure that,
  in the event an application does not supply such function or
  table, the facility still operates, and performs whatever part of
  its purpose remains meaningful.

  (For example, a function in a library to compute square roots has
  a purpose that is entirely well-defined independent of the
  application. Therefore, Subsection 2d requires that any
  application-supplied function or table used by this function must
  be optional: if the application does not supply it, the square
  root function must still compute square roots.)

These requirements apply to the modified work as a whole. If
identifiable sections of that work are not derived from the Library,
and can be reasonably considered independent and separate works in
themselves, then this License, and its terms, do not apply to those
sections when you distribute them as separate works. But when you
distribute the same sections as part of a whole which is a work based
on the Library, the distribution of the whole must be on the terms of
this License, whose permissions for other licensees extend to the
entire whole, and thus to each and every part regardless of who wrote
it.

Thus, it is not the intent of this section to claim rights or contest
your rights to work written entirely by you; rather, the intent is to
exercise the right to control the distribution of derivative or
collective works based on the Library.

In addition, mere aggregation of another work not based on the Library
with the Library (or with a work based on the Library) on a volume of
a storage or distribution medium does not bring the other work under
the scope of this License.

 3. You may opt to apply the terms of the ordinary GNU General Public
License instead of this License to a given copy of the Library. To do
this, you must alter all the notices that refer to this License, so
that they refer to the ordinary GNU General Public License, version 2,
instead of to this License. (If a newer version than version 2 of the
ordinary GNU General Public License has appeared, then you can specify
that version instead if you wish.) Do not make any other change in
these notices.

 Once this change is made in a given copy, it is irreversible for
that copy, so the ordinary GNU General Public License applies to all
subsequent copies and derivative works made from that copy.

 This option is useful when you wish to copy part of the code of
the Library into a program that is not a library.

 4. You may copy and distribute the Library (or a portion or
derivative of it, under Section 2) in object code or executable form
under the terms of Sections 1 and 2 above provided that you accompany
it with the complete corresponding machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

 If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

 5. A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a "work that uses the Library". Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

 However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a "work that uses the
library". The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

 When a "work that uses the Library" uses material from a header file

that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more

than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy
from a designated place, offer equivalent access to copy the above
specified materials from the same place.

d) Verify that the user has already received a copy of these
materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the
Library" must include any data and utility programs needed for
reproducing the executable from it. However, as a special exception,
the source code distributed need not include anything that is normally
distributed (in either source or binary form) with the major
components (compiler, kernel, and so on) of the operating system on
which the executable runs, unless that component itself accompanies
the executable.

It may happen that this requirement contradicts the license
restrictions of other proprietary libraries that do not normally
accompany the operating system. Such a contradiction means you cannot
use both them and the Library together in an executable that you
distribute.

7. You may place library facilities that are a work based on the
Library side-by-side in a single library together with other library
facilities not covered by this License, and distribute such a combined
library, provided that the separate distribution of the work based on
the Library and of the other library facilities is otherwise
permitted, and provided that you do these two things:

a) Accompany the combined library with a copy of the same work
based on the Library, uncombined with any other library
facilities. This must be distributed under the terms of the
Sections above.

b) Give prominent notice with the combined library of the fact
that part of it is a work based on the Library, and explaining
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DAMAGES.

END OF TERMS AND CONDITIONS

Appendix: How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest
possible use to the public, we recommend making it free software that
everyone can redistribute and change. You can do so by permitting
redistribution under these terms (or, alternatively, under the terms of the
ordinary General Public License).

To apply these terms, attach the following notices to the library. It is
safest to attach them to the start of each source file to most effectively
convey the exclusion of warranty; and each file should have at least the
"copyright" line and a pointer to where the full notice is found.

    <one line to give the library's name and a brief idea of what it does.>
    Copyright (C) <year> <name of author>

    This library is free software; you can redistribute it and/or
    modify it under the terms of the GNU Library General Public
    License as published by the Free Software Foundation; either
    version 2 of the License, or (at your option) any later version.

    This library is distributed in the hope that it will be useful,
    but WITHOUT ANY WARRANTY; without even the implied warranty of
    MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU
    Library General Public License for more details.

    You should have received a copy of the GNU Library General Public
    License along with this library; if not, write to the Free
    Software Foundation, Inc., 675 Mass Ave, Cambridge, MA 02139, USA.

Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your
school, if any, to sign a "copyright disclaimer" for the library, if
necessary. Here is a sample; alter the names:

 Yoyodyne, Inc., hereby disclaims all copyright interest in the
 library `Frob' (a library for tweaking knobs) written by James Random Hacker.

 <signature of Ty Coon>, 1 April 1990
 Ty Coon, President of Vice

That's all there is to it!

1.59 libffi 3.2.1

1.59.1 Available under license :

libffi - Copyright (c) 1996-2014 Anthony Green, Red Hat, Inc and others.
See source files for details.

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IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY
CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT,
TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE
SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.
#!/bin/sh

***** BEGIN LICENSE BLOCK *****
Version: MPL 1.1/GPL 2.0/LGPL 2.1
#
The contents of this file are subject to the Mozilla Public License Version
1.1 (the "License"); you may not use this file except in compliance with
the License. You may obtain a copy of the License at
http://www.mozilla.org/MPL/
#
Software distributed under the License is distributed on an "AS IS" basis,
WITHOUT WARRANTY OF ANY KIND, either express or implied. See the License
for the specific language governing rights and limitations under the
License.
#
The Original Code is the MSVC wrappificator.
#
The Initial Developer of the Original Code is
Timothy Wall <twalljava@dev.java.net>.
Portions created by the Initial Developer are Copyright (C) 2009

```
#
# GCC-compatible wrapper for cl.exe and ml.exe. Arguments are given in GCC
# format and translated into something sensible for cl or ml.
#

args_orig=$@
args="-nologo -W3"
static_crt=
debug_crt=
cl="cl"
ml="ml"
safeseh="-safeseh"
output=

while [ $# -gt 0 ]
do
 case $1
 in
  -fexceptions)
    # Don't enable exceptions for now.
    #args="$args -EHac"
    shift 1
  ;;
  -m32)
    shift 1
  ;;
  -m64)
    ml="ml64" # "$MSVC/x86_amd64/ml64"
    safeseh=
```

```
      shift 1
  ;;
  -clang-cl)
    cl="clang-cl"
    safeseh=
    shift 1
  ;;
  -O0)
    args="$args -Od"
    shift 1
  ;;
  -O*)
    # Runtime error checks (enabled by setting -RTC1 in the -DFFI_DEBUG
    # case below) are not compatible with optimization flags and will
    # cause the build to fail. Therefore, drop the optimization flag if
    # -DFFI_DEBUG is also set.
    case $args_orig in
      *-DFFI_DEBUG*)
        args="$args"
      ;;
      *)
        # The ax_cc_maxopt.m4 macro from the upstream autoconf-archive
        # project doesn't support MSVC and therefore ends up trying to
        # use -O3. Use the equivalent "max optimization" flag for MSVC
        # instead of erroring out.
        case $1 in
          -O3)
            args="$args -O2"
          ;;
          *)
            args="$args $1"
          ;;
        esac
        opt="true"
      ;;
    esac
    shift 1
  ;;
  -g)
    # Enable debug symbol generation.
    args="$args -Zi"
    shift 1
  ;;
  -DFFI_DEBUG)
    # Enable runtime error checks.
    args="$args -RTC1"
    defines="$defines $1"
    shift 1
```

```
;;
-DUSE_STATIC_RTL)
  # Link against static CRT.
  static_crt=1
  shift 1
;;
-DUSE_DEBUG_RTL)
  # Link against debug CRT.
  debug_crt=1
  shift 1
;;
-c)
  args="$args -c"
  args="$(echo $args | sed 's%/Fe%/Fo%g')"
  single="-c"
  shift 1
;;
-D*=*)
  name="$(echo $1|sed 's/-D\([^=][^=]*\)=.*/\1/g')"
  value="$(echo $1|sed 's/-D[^=][^=]*=//g')"
  args="$args -D${name}='$value'"
  defines="$defines -D${name}='$value'"
  shift 1
;;
-D*)
  args="$args $1"
  defines="$defines $1"
  shift 1
;;
-I)
  args="$args -I$2"
  includes="$includes -I$2"
  shift 2
;;
-I*)
  args="$args $1"
  includes="$includes $1"
  shift 1
;;
-W|-Wextra)
  # TODO map extra warnings
  shift 1
;;
-Wall)
  # -Wall on MSVC is overzealous, and we already build with -W3. Nothing
  # to do here.
  shift 1
;;
```

```
-pedantic)
  # libffi tests -pedantic with -Wall, so drop it also.
  shift 1
;;
-Werror)
  args="$args -WX"
  shift 1
;;
-W*)
  # TODO map specific warnings
  shift 1
;;
-S)
  args="$args -FAs"
  shift 1
;;
-o)
  outdir="$(dirname $2)"
  base="$(basename $2|sed 's/\.[^.]*//g')"
  if [ -n "$single" ]; then
    output="-Fo$2"
  else
    output="-Fe$2"
  fi
  if [ -n "$assembly" ]; then
    args="$args $output"
  else
    args="$args $output -Fd$outdir/$base -Fp$outdir/$base -Fa$outdir/$base"
  fi
  shift 2
;;
*.S)
  src=$1
  assembly="true"
  shift 1
;;
*.c)
  args="$args $1"
  shift 1
;;
*)
  # Assume it's an MSVC argument, and pass it through.
  args="$args $1"
  shift 1
;;
esac
done
```

```
# If -Zi is specified, certain optimizations are implicitly disabled
# by MSVC. Add back those optimizations if this is an optimized build.
# NOTE: These arguments must come after all others.
if [ -n "$opt" ]; then
  args="$args -link -OPT:REF -OPT:ICF -INCREMENTAL:NO"
fi

if [ -n "$static_crt" ]; then
  md=-MT
else
  md=-MD
fi

if [ -n "$debug_crt" ]; then
  md="${md}d"
fi

if [ -n "$assembly" ]; then
  if [ -z "$outdir" ]; then
    outdir="."
  fi
  ppsrc="$outdir/$(basename $src|sed 's/.S$/.asm/g')"
  echo "$cl -nologo -EP $includes $defines $src > $ppsrc"
  "$cl" -nologo -EP $includes $defines $src > $ppsrc || exit $?
  output="$(echo $output | sed 's%/F[dpa][^ ]*%%g')"
  args="-nologo $safeseh $single $output $ppsrc"

  echo "$ml $args"
  eval "\"$ml\" $args"
  result=$?

  # required to fix ml64 broken output?
  #mv *.obj $outdir
else
  args="$md $args"
  echo "$cl $args"
  # Return an error code of 1 if an invalid command line parameter is passed
  # instead of just ignoring it.
  eval "(\"$cl\" $args 2>&1 1>&3 | \
      awk '{print \$0} /D9002/ {error=1} END{exit error}' >&2) 3>&1"
  result=$?
fi

exit $result
```

```
% texinfo.tex -- TeX macros to handle Texinfo files.
%
% Load plain if necessary, i.e., if running under initex.
```

\expandafter\ifx\csname fmtname\endcsname\relax\input plain\fi
%
\def\texinfoversion{2013-02-01.11}
%
% Copyright 1985, 1986, 1988, 1990, 1991, 1992, 1993, 1994, 1995,
% 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006,
% 2007, 2008, 2009, 2010, 2011, 2012, 2013 Free Software Foundation, Inc.
%
% This texinfo.tex file is free software: you can redistribute it and/or
% modify it under the terms of the GNU General Public License as
% published by the Free Software Foundation, either version 3 of the
% License, or (at your option) any later version.
%
% This texinfo.tex file is distributed in the hope that it will be
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% General Public License for more details.
%
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% along with this program. If not, see <http://www.gnu.org/licenses/>.
%
% As a special exception, when this file is read by TeX when processing
% a Texinfo source document, you may use the result without
% restriction. This Exception is an additional permission under section 7
% of the GNU General Public License, version 3 ("GPLv3").
%
% Please try the latest version of texinfo.tex before submitting bug
% reports; you can get the latest version from:
%   http://ftp.gnu.org/gnu/texinfo/ (the Texinfo release area), or
%   http://ftpmirror.gnu.org/texinfo/ (same, via a mirror), or
%   http://www.gnu.org/software/texinfo/ (the Texinfo home page)
% The texinfo.tex in any given distribution could well be out
% of date, so if that's what you're using, please check.
%
% Send bug reports to bug-texinfo@gnu.org. Please include including a
% complete document in each bug report with which we can reproduce the
% problem. Patches are, of course, greatly appreciated.
%
% To process a Texinfo manual with TeX, it's most reliable to use the
% texi2dvi shell script that comes with the distribution. For a simple
% manual foo.texi, however, you can get away with this:
%   tex foo.texi
%   texindex foo.??
%   tex foo.texi
%   tex foo.texi
%   dvips foo.dvi -o # or whatever; this makes foo.ps.
% The extra TeX runs get the cross-reference information correct.
% Sometimes one run after texindex suffices, and sometimes you need more

% than two; texi2dvi does it as many times as necessary.
%
% It is possible to adapt texinfo.tex for other languages, to some
% extent. You can get the existing language-specific files from the
% full Texinfo distribution.
%
% The GNU Texinfo home page is http://www.gnu.org/software/texinfo.

\message{Loading texinfo [version \texinfoversion]:}

% If in a .fmt file, print the version number
% and turn on active characters that we couldn't do earlier because
% they might have appeared in the input file name.
\everyjob{\message{[Texinfo version \texinfoversion]}%
 \catcode`+=\active \catcode`_=\active}

\chardef\other=12

% We never want plain's \outer definition of \+ in Texinfo.
% For @tex, we can use \tabalign.
\let\+ = \relax

% Save some plain tex macros whose names we will redefine.
\let\ptexb=\b
\let\ptexbullet=\bullet
\let\ptexc=\c
\let\ptexcomma=\,
\let\ptexdot=\.
\let\ptexdots=\dots
\let\ptexend=\end
\let\ptexequiv=\equiv
\let\ptexexclam=\!
\let\ptexfootnote=\footnote
\let\ptexgtr=>
\let\ptexhat=^
\let\ptexi=\i
\let\ptexindent=\indent
\let\ptexinsert=\insert
\let\ptexlbrace=\{
\let\ptexless=<
\let\ptexnewwrite\newwrite
\let\ptexnoindent=\noindent
\let\ptexplus=+
\let\ptexraggedright=\raggedright
\let\ptexrbrace=\}
\let\ptexslash=\/
\let\ptexstar=*

```
\let\ptext=\t
\let\ptextop=\top
{\catcode`\'=\active \global\let\ptexquoteright'}% active in plain's math mode

% If this character appears in an error message or help string, it
% starts a new line in the output.
\newlinechar = `^^J

% Use TeX 3.0's \inputlineno to get the line number, for better error
% messages, but if we're using an old version of TeX, don't do anything.
%
\ifx\inputlineno\thisisundefined
 \let\linenumber = \empty % Pre-3.0.
\else
 \def\linenumber{l.\the\inputlineno:\space}
\fi

% Set up fixed words for English if not already set.
\ifx\putwordAppendix\undefined  \gdef\putwordAppendix{Appendix}\fi
\ifx\putwordChapter\undefined   \gdef\putwordChapter{Chapter}\fi
\ifx\putworderror\undefined     \gdef\putworderror{error}\fi
\ifx\putwordfile\undefined      \gdef\putwordfile{file}\fi
\ifx\putwordin\undefined        \gdef\putwordin{in}\fi
\ifx\putwordIndexIsEmpty\undefined      \gdef\putwordIndexIsEmpty{(Index is empty)}\fi
\ifx\putwordIndexNonexistent\undefined  \gdef\putwordIndexNonexistent{(Index is nonexistent)}\fi
\ifx\putwordInfo\undefined       \gdef\putwordInfo{Info}\fi
\ifx\putwordInstanceVariableof\undefined \gdef\putwordInstanceVariableof{Instance Variable of}\fi
\ifx\putwordMethodon\undefined  \gdef\putwordMethodon{Method on}\fi
\ifx\putwordNoTitle\undefined   \gdef\putwordNoTitle{No Title}\fi
\ifx\putwordof\undefined        \gdef\putwordof{of}\fi
\ifx\putwordon\undefined        \gdef\putwordon{on}\fi
\ifx\putwordpage\undefined      \gdef\putwordpage{page}\fi
\ifx\putwordsection\undefined   \gdef\putwordsection{section}\fi
\ifx\putwordSection\undefined   \gdef\putwordSection{Section}\fi
\ifx\putwordsee\undefined       \gdef\putwordsee{see}\fi
\ifx\putwordSee\undefined       \gdef\putwordSee{See}\fi
\ifx\putwordShortTOC\undefined  \gdef\putwordShortTOC{Short Contents}\fi
\ifx\putwordTOC\undefined       \gdef\putwordTOC{Table of Contents}\fi
%
\ifx\putwordMJan\undefined \gdef\putwordMJan{January}\fi
\ifx\putwordMFeb\undefined \gdef\putwordMFeb{February}\fi
\ifx\putwordMMar\undefined \gdef\putwordMMar{March}\fi
\ifx\putwordMApr\undefined \gdef\putwordMApr{April}\fi
\ifx\putwordMMay\undefined \gdef\putwordMMay{May}\fi
\ifx\putwordMJun\undefined \gdef\putwordMJun{June}\fi
\ifx\putwordMJul\undefined \gdef\putwordMJul{July}\fi
\ifx\putwordMAug\undefined \gdef\putwordMAug{August}\fi
\ifx\putwordMSep\undefined \gdef\putwordMSep{September}\fi
```

```
\ifx\putwordMOct\undefined \gdef\putwordMOct{October}\fi
\ifx\putwordMNov\undefined \gdef\putwordMNov{November}\fi
\ifx\putwordMDec\undefined \gdef\putwordMDec{December}\fi
%
\ifx\putwordDefmac\undefined    \gdef\putwordDefmac{Macro}\fi
\ifx\putwordDefspec\undefined   \gdef\putwordDefspec{Special Form}\fi
\ifx\putwordDefvar\undefined    \gdef\putwordDefvar{Variable}\fi
\ifx\putwordDefopt\undefined    \gdef\putwordDefopt{User Option}\fi
\ifx\putwordDeffunc\undefined   \gdef\putwordDeffunc{Function}\fi

% Since the category of space is not known, we have to be careful.
\chardef\spacecat = 10
\def\spaceisspace{\catcode`\ =\spacecat}

% sometimes characters are active, so we need control sequences.
\chardef\ampChar   = `\&
\chardef\colonChar = `\:
\chardef\commaChar = `\,
\chardef\dashChar  = `\-
\chardef\dotChar   = `\.
\chardef\exclamChar= `\!
\chardef\hashChar  = `\#
\chardef\lquoteChar= `\`
\chardef\questChar = `\?
\chardef\rquoteChar= `\'
\chardef\semiChar  = `\;
\chardef\slashChar = `\/
\chardef\underChar = `\_

% Ignore a token.
%
\def\gobble#1{}

% The following is used inside several \edef's.
\def\makecsname#1{\expandafter\noexpand\csname#1\endcsname}

% Hyphenation fixes.
\hyphenation{
 Flor-i-da Ghost-script Ghost-view Mac-OS Post-Script
 ap-pen-dix bit-map bit-maps
 data-base data-bases eshell fall-ing half-way long-est man-u-script
 man-u-scripts mini-buf-fer mini-buf-fers over-view par-a-digm
 par-a-digms rath-er rec-tan-gu-lar ro-bot-ics se-vere-ly set-up spa-ces
 spell-ing spell-ings
 stand-alone strong-est time-stamp time-stamps which-ever white-space
 wide-spread wrap-around
}
```

```
% Margin to add to right of even pages, to left of odd pages.
\newdimen\bindingoffset
\newdimen\normaloffset
\newdimen\pagewidth \newdimen\pageheight

% For a final copy, take out the rectangles
% that mark overfull boxes (in case you have decided
% that the text looks ok even though it passes the margin).
%
\def\finalout{\overfullrule=0pt }

% Sometimes it is convenient to have everything in the transcript file
% and nothing on the terminal.  We don't just call \tracingall here,
% since that produces some useless output on the terminal.  We also make
% some effort to order the tracing commands to reduce output in the log
% file; cf. trace.sty in LaTeX.
%
\def\gloggingall{\begingroup \globaldefs = 1 \loggingall \endgroup}%
\def\loggingall{%
 \tracingstats2
 \tracingpages1
 \tracinglostchars2  % 2 gives us more in etex
 \tracingparagraphs1
 \tracingoutput1
 \tracingmacros2
 \tracingrestores1
 \showboxbreadth\maxdimen \showboxdepth\maxdimen
 \ifx\eTeXversion\thisisundefined\else % etex gives us more logging
   \tracingscantokens1
   \tracingifs1
   \tracinggroups1
   \tracingnesting2
   \tracingassigns1
 \fi
 \tracingcommands3  % 3 gives us more in etex
 \errorcontextlines16
}%

% @errormsg{MSG}.  Do the index-like expansions on MSG, but if things
% aren't perfect, it's not the end of the world, being an error message,
% after all.
%
\def\errormsg{\begingroup \indexnofonts \doerrormsg}
\def\doerrormsg#1{\errmessage{#1}}

% add check for \lastpenalty to plain's definitions.  If the last thing
% we did was a \nobreak, we don't want to insert more space.
%
```

```
\def\smallbreak{\ifnum\lastpenalty<10000\par\ifdim\lastskip<\smallskipamount
 \removelastskip\penalty-50\smallskip\fi\fi}
\def\medbreak{\ifnum\lastpenalty<10000\par\ifdim\lastskip<\medskipamount
 \removelastskip\penalty-100\medskip\fi\fi}
\def\bigbreak{\ifnum\lastpenalty<10000\par\ifdim\lastskip<\bigskipamount
 \removelastskip\penalty-200\bigskip\fi\fi}

% Do @cropmarks to get crop marks.
%
\newif\ifcropmarks
\let\cropmarks = \cropmarkstrue
%
% Dimensions to add cropmarks at corners.
% Added by P. A. MacKay, 12 Nov. 1986
%
\newdimen\outerhsize \newdimen\outervsize % set by the paper size routines
\newdimen\cornerlong  \cornerlong=1pc
\newdimen\cornerthick \cornerthick=.3pt
\newdimen\topandbottommargin \topandbottommargin=.75in

% Output a mark which sets \thischapter, \thissection and \thiscolor.
% We dump everything together because we only have one kind of mark.
% This works because we only use \botmark / \topmark, not \firstmark.
%
% A mark contains a subexpression of the \ifcase ... \fi construct.
% \get*marks macros below extract the needed part using \ifcase.
%
% Another complication is to let the user choose whether \thischapter
% (\thissection) refers to the chapter (section) in effect at the top
% of a page, or that at the bottom of a page.  The solution is
% described on page 260 of The TeXbook.  It involves outputting two
% marks for the sectioning macros, one before the section break, and
% one after.  I won't pretend I can describe this better than DEK...
\def\domark{%
 \toks0=\expandafter{\lastchapterdefs}%
 \toks2=\expandafter{\lastsectiondefs}%
 \toks4=\expandafter{\prevchapterdefs}%
 \toks6=\expandafter{\prevsectiondefs}%
 \toks8=\expandafter{\lastcolordefs}%
 \mark{%
          \the\toks0 \the\toks2
    \noexpand\or \the\toks4 \the\toks6
   \noexpand\else \the\toks8
 }%
}
% \topmark doesn't work for the very first chapter (after the title
% page or the contents), so we use \firstmark there -- this gets us
% the mark with the chapter defs, unless the user sneaks in, e.g.,
```

```
% @setcolor (or @url, or @link, etc.) between @contents and the very
% first @chapter.
\def\gettopheadingmarks{%
 \ifcase0\topmark\fi
 \ifx\thischapter\empty \ifcase0\firstmark\fi \fi
}
\def\getbottomheadingmarks{\ifcase1\botmark\fi}
\def\getcolormarks{\ifcase2\topmark\fi}

% Avoid "undefined control sequence" errors.
\def\lastchapterdefs{ }
\def\lastsectiondefs{ }
\def\prevchapterdefs{ }
\def\prevsectiondefs{ }
\def\lastcolordefs{ }

% Main output routine.
\chardef\PAGE = 255
\output = {\onepageout{\pagecontents\PAGE}}

\newbox\headlinebox
\newbox\footlinebox

% \onepageout takes a vbox as an argument.  Note that \pagecontents
% does insertions, but you have to call it yourself.
\def\onepageout#1{%
 \ifcropmarks \hoffset=0pt \else \hoffset=\normaloffset \fi
 %
 \ifodd\pageno  \advance\hoffset by \bindingoffset
 \else \advance\hoffset by -\bindingoffset\fi
 %
 % Do this outside of the \shipout so @code etc. will be expanded in
 % the headline as they should be, not taken literally (outputting "code).
 \ifodd\pageno \getoddheadingmarks \else \getevenheadingmarks \fi
 \setbox\headlinebox = \vbox{\let\hsize=\pagewidth \makeheadline}%
 \ifodd\pageno \getoddfootingmarks \else \getevenfootingmarks \fi
 \setbox\footlinebox = \vbox{\let\hsize=\pagewidth \makefootline}%
 %
 {%
  % Have to do this stuff outside the \shipout because we want it to
  % take effect in \write's, yet the group defined by the \vbox ends
  % before the \shipout runs.
  %
  \indexdummies         % don't expand commands in the output.
  \normalturnoffactive  % \ in index entries must not stay \, e.g., if
          % the page break happens to be in the middle of an example.
          % We don't want .vr (or whatever) entries like this:
          % \entry{{\tt \indexbackslash }acronym}{32}{\code {\acronym}}
```

```
              % "\acronym" won't work when it's read back in;
              % it needs to be
              % {\code {{\tt \backslashcurfont }acronym}
\shipout\vbox{%
  % Do this early so pdf references go to the beginning of the page.
  \ifpdfmakepagedest \pdfdest name{\the\pageno} xyz\fi
  %
  \ifcropmarks \vbox to \outervsize\bgroup
    \hsize = \outerhsize
    \vskip-\topandbottommargin
    \vtop to0pt{%
      \line{\ewtop\hfil\ewtop}%
      \nointerlineskip
      \line{%
        \vbox{\moveleft\cornerthick\nstop}%
        \hfill
        \vbox{\moveright\cornerthick\nstop}%
      }%
      \vss}%
    \vskip\topandbottommargin
    \line\bgroup
      \hfil % center the page within the outer (page) hsize.
      \ifodd\pageno\hskip\bindingoffset\fi
      \vbox\bgroup
  \fi
  %
  \unvbox\headlinebox
  \pagebody{#1}%
  \ifdim\ht\footlinebox > 0pt
    % Only leave this space if the footline is nonempty.
    % (We lessened \vsize for it in \oddfootingyyy.)
    % The \baselineskip=24pt in plain's \makefootline has no effect.
    \vskip 24pt
    \unvbox\footlinebox
  \fi
  %
  \ifcropmarks
      \egroup % end of \vbox\bgroup
    \hfil\egroup % end of (centering) \line\bgroup
    \vskip\topandbottommargin plus1fill minus1fill
    \boxmaxdepth = \cornerthick
    \vbox to0pt{\vss
      \line{%
        \vbox{\moveleft\cornerthick\nsbot}%
        \hfill
        \vbox{\moveright\cornerthick\nsbot}%
      }%
      \nointerlineskip
```

```
        \line{\ewbot\hfil\ewbot}%
      }%
     \egroup % \vbox from first cropmarks clause
     \fi
   }% end of \shipout\vbox
 }% end of group with \indexdummies
 \advancepageno
 \ifnum\outputpenalty>-20000 \else\dosupereject\fi
}


\newinsert\margin \dimen\margin=\maxdimen

\def\pagebody#1{\vbox to\pageheight{\boxmaxdepth=\maxdepth #1}}
{\catcode`\@ =11
\gdef\pagecontents#1{\ifvoid\topins\else\unvbox\topins\fi
% marginal hacks, juha@viisa.uucp (Juha Takala)
\ifvoid\margin\else % marginal info is present
 \rlap{\kern\hsize\vbox to\z@{\kern1pt\box\margin \vss}}\fi
\dimen@=\dp#1\relax \unvbox#1\relax
\ifvoid\footins\else\vskip\skip\footins\footnoterule \unvbox\footins\fi
\ifr@ggedbottom \kern-\dimen@ \vfil \fi}
}


% Here are the rules for the cropmarks.  Note that they are
% offset so that the space between them is truly \outerhsize or \outervsize
% (P. A. MacKay, 12 November, 1986)
%
\def\ewtop{\vrule height\cornerthick depth0pt width\cornerlong}
\def\nstop{\vbox
 {\hrule height\cornerthick depth\cornerlong width\cornerthick}}
\def\ewbot{\vrule height0pt depth\cornerthick width\cornerlong}
\def\nsbot{\vbox
 {\hrule height\cornerlong depth\cornerthick width\cornerthick}}


% Parse an argument, then pass it to #1.  The argument is the rest of
% the input line (except we remove a trailing comment).  #1 should be a
% macro which expects an ordinary undelimited TeX argument.
%
\def\parsearg{\parseargusing{}}
\def\parseargusing#1#2{%
 \def\argtorun{#2}%
 \begingroup
  \obeylines
  \spaceisspace
  #1%
  \parseargline\empty% Insert the \empty token, see \finishparsearg below.
}
```

```
{\obeylines %
 \gdef\parseargline#1^^M{%
   \endgroup % End of the group started in \parsearg.
   \argremovecomment #1\comment\ArgTerm%
 }%
}


% First remove any @comment, then any @c comment.
\def\argremovecomment#1\comment#2\ArgTerm{\argremovec #1\c\ArgTerm}
\def\argremovec#1\c#2\ArgTerm{\argcheckspaces#1\^^M\ArgTerm}


% Each occurrence of `\^^M' or `<space>\^^M' is replaced by a single space.
%
% \argremovec might leave us with trailing space, e.g.,
%    @end itemize  @c foo
% This space token undergoes the same procedure and is eventually removed
% by \finishparsearg.
%
\def\argcheckspaces#1\^^M{\argcheckspacesX#1\^^M \^^M}
\def\argcheckspacesX#1 \^^M{\argcheckspacesY#1\^^M}
\def\argcheckspacesY#1\^^M#2\^^M#3\ArgTerm{%
 \def\temp{#3}%
 \ifx\temp\empty
   % Do not use \next, perhaps the caller of \parsearg uses it; reuse \temp:
   \let\temp\finishparsearg
 \else
   \let\temp\argcheckspaces
 \fi
 % Put the space token in:
 \temp#1 #3\ArgTerm
}


% If a _delimited_ argument is enclosed in braces, they get stripped; so
% to get _exactly_ the rest of the line, we had to prevent such situation.
% We prepended an \empty token at the very beginning and we expand it now,
% just before passing the control to \argtorun.
% (Similarly, we have to think about #3 of \argcheckspacesY above: it is
% either the null string, or it ends with \^^M---thus there is no danger
% that a pair of braces would be stripped.
%
% But first, we have to remove the trailing space token.
%
\def\finishparsearg#1 \ArgTerm{\expandafter\argtorun\expandafter{#1}}


% \parseargdef\foo{...}
% is roughly equivalent to
% \def\foo{\parsearg\Xfoo}
% \def\Xfoo#1{...}
```

%
% Actually, I use \csname\string\foo\endcsname, ie. \\foo, as it is my
% favourite TeX trick. --kasal, 16nov03

\def\parseargdef#1{%
 \expandafter \doparseargdef \csname\string#1\endcsname #1%
}
\def\doparseargdef#1#2{%
 \def#2{\parsearg#1}%
 \def#1##1%
}

% Several utility definitions with active space:
{
\obeyspaces
\gdef\obeyedspace{ }

% Make each space character in the input produce a normal interword
% space in the output. Don't allow a line break at this space, as this
% is used only in environments like @example, where each line of input
% should produce a line of output anyway.
%
\gdef\sepspaces{\obeyspaces\let =\tie}

% If an index command is used in an @example environment, any spaces
% therein should become regular spaces in the raw index file, not the
% expansion of \tie (\leavevmode \penalty \@M \ ).
\gdef\unsepspaces{\let =\space}
}

\def\flushcr{\ifx\par\lisppar \def\next##1{}\else \let\next=\relax \fi \next}

% Define the framework for environments in texinfo.tex. It's used like this:
%
%   \envdef\foo{...}
%   \def\Efoo{...}
%
% It's the responsibility of \envdef to insert \begingroup before the
% actual body; @end closes the group after calling \Efoo. \envdef also
% defines \thisenv, so the current environment is known; @end checks
% whether the environment name matches. The \checkenv macro can also be
% used to check whether the current environment is the one expected.
%
% Non-false conditionals (@iftex, @ifset) don't fit into this, so they
% are not treated as environments; they don't open a group. (The
% implementation of @end takes care not to call \endgroup in this
% special case.)

```
% At run-time, environments start with this:
\def\startenvironment#1{\begingroup\def\thisenv{#1}}
% initialize
\let\thisenv\empty

% ... but they get defined via ``\envdef\foo{...}":
\long\def\envdef#1#2{\def#1{\startenvironment#1#2}}
\def\envparseargdef#1#2{\parseargdef#1{\startenvironment#1#2}}

% Check whether we're in the right environment:
\def\checkenv#1{%
 \def\temp{#1}%
 \ifx\thisenv\temp
 \else
   \badenverr
 \fi
}

% Environment mismatch, #1 expected:
\def\badenverr{%
 \errhelp = \EMsimple
 \errmessage{This command can appear only \inenvironment\temp,
   not \inenvironment\thisenv}%
}
\def\inenvironment#1{%
 \ifx#1\empty
   outside of any environment%
 \else
   in environment \expandafter\string#1%
 \fi
}

% @end foo executes the definition of \Efoo.
% But first, it executes a specialized version of \checkenv
%
\parseargdef\end{%
 \if 1\csname iscond.#1\endcsname
 \else
   % The general wording of \badenverr may not be ideal.
   \expandafter\checkenv\csname#1\endcsname
   \csname E#1\endcsname
   \endgroup
 \fi
}

\newhelp\EMsimple{Press RETURN to continue.}
```

% Be sure we're in horizontal mode when doing a tie, since we make space

% equivalent to this in @example-like environments. Otherwise, a space

% at the beginning of a line will start with \penalty -- and

% since \penalty is valid in vertical mode, we'd end up putting the

% penalty on the vertical list instead of in the new paragraph.

{\catcode`@ = 11

% Avoid using \@M directly, because that causes trouble

% if the definition is written into an index file.

\global\let\tiepenalty = \@M

\gdef\tie{\leavevmode\penalty\tiepenalty\ }

}

% @: forces normal size whitespace following.

\def\:{\spacefactor=1000 }

% @* forces a line break.

\def*{\unskip\hfil\break\hbox{}\ignorespaces}

% @/ allows a line break.

\let\/=\allowbreak

% @. is an end-of-sentence period.

\def\.{.\spacefactor=\endofsentencespacefactor\space}

% @! is an end-of-sentence bang.

\def\!{!\spacefactor=\endofsentencespacefactor\space}

% @? is an end-of-sentence query.

\def\?{?\spacefactor=\endofsentencespacefactor\space}

% @frenchspacing on|off says whether to put extra space after punctuation.

%

\def\onword{on}

\def\offword{off}

%

\parseargdef\frenchspacing{%

 \def\temp{#1}%

 \ifx\temp\onword \plainfrenchspacing

 \else\ifx\temp\offword \plainnonfrenchspacing

 \else

   \errhelp = \EMsimple

   \errmessage{Unknown @frenchspacing option `\temp', must be on|off}%

 \fi\fi

}

% @w prevents a word break. Without the \leavevmode, @w at the

% beginning of a paragraph, when TeX is still in vertical mode, would
% produce a whole line of output instead of starting the paragraph.
\def\w#1{\leavevmode\hbox{#1}}

% @group ... @end group forces ... to be all on one page, by enclosing
% it in a TeX vbox. We use \vtop instead of \vbox to construct the box
% to keep its height that of a normal line. According to the rules for
% \topskip (p.114 of the TeXbook), the glue inserted is
% max (\topskip - \ht (first item), 0). If that height is large,
% therefore, no glue is inserted, and the space between the headline and
% the text is small, which looks bad.
%
% Another complication is that the group might be very large. This can
% cause the glue on the previous page to be unduly stretched, because it
% does not have much material. In this case, it's better to add an
% explicit \vfill so that the extra space is at the bottom. The
% threshold for doing this is if the group is more than \vfilllimit
% percent of a page (\vfilllimit can be changed inside of @tex).
%
\newbox\groupbox
\def\vfilllimit{0.7}
%
\envdef\group{%
 \ifnum\catcode`\^^M=\active \else
  \errhelp = \groupinvalidhelp
  \errmessage{@group invalid in context where filling is enabled}%
 \fi
 \startsavinginserts
 %
\setbox\groupbox = \vtop\bgroup
  % Do @comment since we are called inside an environment such as
  % @example, where each end-of-line in the input causes an
  % end-of-line in the output. We don't want the end-of-line after
  % the `@group' to put extra space in the output. Since @group
  % should appear on a line by itself (according to the Texinfo
  % manual), we don't worry about eating any user text.
  \comment
}
%
% The \vtop produces a box with normal height and large depth; thus, TeX puts
% \baselineskip glue before it, and (when the next line of text is done)
% \lineskip glue after it. Thus, space below is not quite equal to space
% above. But it's pretty close.
\def\Egroup{%
  % To get correct interline space between the last line of the group
  % and the first line afterwards, we have to propagate \prevdepth.
  \endgraf % Not \par, as it may have been set to \lisppar.
  \global\dimen1 = \prevdepth

```
\egroup          % End the \vtop.
% \dimen0 is the vertical size of the group's box.
\dimen0 = \ht\groupbox  \advance\dimen0 by \dp\groupbox
% \dimen2 is how much space is left on the page (more or less).
\dimen2 = \pageheight   \advance\dimen2 by -\pagetotal
% if the group doesn't fit on the current page, and it's a big big
% group, force a page break.
\ifdim \dimen0 > \dimen2
  \ifdim \pagetotal < \vfilllimit\pageheight
    \page
  \fi
\fi
\box\groupbox
\prevdepth = \dimen1
\checkinserts
}
%
% TeX puts in an \escapechar (i.e., `@') at the beginning of the help
% message, so this ends up printing `@group can only ...'.
%
\newhelp\groupinvalidhelp{%
group can only be used in environments such as @example,^^J%
where each line of input produces a line of output.}


% @need space-in-mils
% forces a page break if there is not space-in-mils remaining.

\newdimen\mil  \mil=0.001in

\parseargdef\need{%
% Ensure vertical mode, so we don't make a big box in the middle of a
% paragraph.
\par
%
% If the @need value is less than one line space, it's useless.
\dimen0 = #1\mil
\dimen2 = \ht\strutbox
\advance\dimen2 by \dp\strutbox
\ifdim\dimen0 > \dimen2
  %
  % Do a \strut just to make the height of this box be normal, so the
  % normal leading is inserted relative to the preceding line.
  % And a page break here is fine.
  \vtop to #1\mil{\strut\vfil}%
  %
  % TeX does not even consider page breaks if a penalty added to the
  % main vertical list is 10000 or more.  But in order to see if the
  % empty box we just added fits on the page, we must make it consider
```

% page breaks. On the other hand, we don't want to actually break the
% page after the empty box. So we use a penalty of 9999.
%
% There is an extremely small chance that TeX will actually break the
% page at this \penalty, if there are no other feasible breakpoints in
% sight. (If the user is using lots of big @group commands, which
% almost-but-not-quite fill up a page, TeX will have a hard time doing
% good page breaking, for example.) However, I could not construct an
% example where a page broke at this \penalty; if it happens in a real
% document, then we can reconsider our strategy.
\penalty9999
%
% Back up by the size of the box, whether we did a page break or not.
\kern -#1\mil
%
% Do not allow a page break right after this kern.
\nobreak
\fi
}

% @br   forces paragraph break (and is undocumented).

\let\br = \par

% @page forces the start of a new page.
%
\def\page{\par\vfill\supereject}

% @exdent text....
% outputs text on separate line in roman font, starting at standard page margin

% This records the amount of indent in the innermost environment.
% That's how much \exdent should take out.
\newskip\exdentamount

% This defn is used inside fill environments such as @defun.
\parseargdef\exdent{\hfil\break\hbox{\kern -\exdentamount{\rm#1}}\hfil\break}

% This defn is used inside nofill environments such as @example.
\parseargdef\nofillexdent{{\advance \leftskip by -\exdentamount
 \leftline{\hskip\leftskip{\rm#1}}}}

% @inmargin{WHICH}{TEXT} puts TEXT in the WHICH margin next to the current
% paragraph. For more general purposes, use the \margin insertion
% class. WHICH is `l' or `r'. Not documented, written for gawk manual.
%
\newskip\inmarginspacing \inmarginspacing=1cm
\def\strutdepth{\dp\strutbox}

```
%
\def\doinmargin#1#2{\strut\vadjust{%
 \nobreak
 \kern-\strutdepth
 \vtop to \strutdepth{%
  \baselineskip=\strutdepth
  \vss
  % if you have multiple lines of stuff to put here, you'll need to
  % make the vbox yourself of the appropriate size.
  \ifx#1l%
   \llap{\ignorespaces #2\hskip\inmarginspacing}%
  \else
   \rlap{\hskip\hsize \hskip\inmarginspacing \ignorespaces #2}%
  \fi
  \null
 }%
}}
\def\inleftmargin{\doinmargin l}
\def\inrightmargin{\doinmargin r}
%
% @inmargin{TEXT [, RIGHT-TEXT]}
% (if RIGHT-TEXT is given, use TEXT for left page, RIGHT-TEXT for right;
% else use TEXT for both).
%
\def\inmargin#1{\parseinmargin #1,,\finish}
\def\parseinmargin#1,#2,#3\finish{% not perfect, but better than nothing.
 \setbox0 = \hbox{\ignorespaces #2}%
 \ifdim\wd0 > 0pt
  \def\lefttext{#1}%  have both texts
  \def\righttext{#2}%
 \else
  \def\lefttext{#1}%  have only one text
  \def\righttext{#1}%
 \fi
 %
 \ifodd\pageno
  \def\temp{\inrightmargin\righttext}% odd page -> outside is right margin
 \else
  \def\temp{\inleftmargin\lefttext}%
 \fi
 \temp
}

% @| inserts a changebar to the left of the current line.  It should
% surround any changed text.  This approach does *not* work if the
% change spans more than two lines of output.  To handle that, we would
% have adopt a much more difficult approach (putting marks into the main
% vertical list for the beginning and end of each change).  This command
```

```
% is not documented, not supported, and doesn't work.
%
\def\|{%
 % \vadjust can only be used in horizontal mode.
 \leavevmode
 %
 % Append this vertical mode material after the current line in the output.
 \vadjust{%
   % We want to insert a rule with the height and depth of the current
   % leading; that is exactly what \strutbox is supposed to record.
   \vskip-\baselineskip
   %
   % \vadjust-items are inserted at the left edge of the type.  So
   % the \llap here moves out into the left-hand margin.
   \llap{%
     %
     % For a thicker or thinner bar, change the `1pt'.
     \vrule height\baselineskip width1pt
     %
     % This is the space between the bar and the text.
     \hskip 12pt
   }%
 }%
}


% @include FILE -- \input text of FILE.
%
\def\include{\parseargusing\filenamecatcodes\includezzz}
\def\includezzz#1{%
 \pushthisfilestack
 \def\thisfile{#1}%
 {%
   \makevalueexpandable  % we want to expand any @value in FILE.
   \turnoffactive       % and allow special characters in the expansion
   \indexnofonts         % Allow `@@' and other weird things in file names.
   \wlog{texinfo.tex: doing @include of #1^^J}%
   \edef\temp{\noexpand\input #1 }%
   %
   % This trickery is to read FILE outside of a group, in case it makes
   % definitions, etc.
   \expandafter
 }\temp
 \popthisfilestack
}
\def\filenamecatcodes{%
 \catcode`\\=\other
 \catcode`~=\other
 \catcode`^=\other
```

```
\catcode`\_=\other
\catcode`\|=\other
\catcode`\<=\other
\catcode`\>=\other
\catcode`\+=\other
\catcode`\-=\other
\catcode`\`=\other
\catcode`\'=\other
}

\def\pushthisfilestack{%
  \expandafter\pushthisfilestackX\popthisfilestack\StackTerm
}
\def\pushthisfilestackX{%
  \expandafter\pushthisfilestackY\thisfile\StackTerm
}
\def\pushthisfilestackY #1\StackTerm #2\StackTerm {%
  \gdef\popthisfilestack{\gdef\thisfile{#1}\gdef\popthisfilestack{#2}}%
}

\def\popthisfilestack{\errthisfilestackempty}
\def\errthisfilestackempty{\errmessage{Internal error:
  the stack of filenames is empty.}}
%
\def\thisfile{}

% @center line
% outputs that line, centered.
%
\parseargdef\center{%
  \ifhmode
    \let\centersub\centerH
  \else
    \let\centersub\centerV
  \fi
  \centersub{\hfil \ignorespaces#1\unskip \hfil}%
  \let\centersub\relax % don't let the definition persist, just in case
}
\def\centerH#1{{%
  \hfil\break
  \advance\hsize by -\leftskip
  \advance\hsize by -\rightskip
  \line{#1}%
  \break
}}
%
\newcount\centerpenalty
\def\centerV#1{%
```

```
% The idea here is the same as in \startdefun, \cartouche, etc.: if
% @center is the first thing after a section heading, we need to wipe
% out the negative parskip inserted by \sectionheading, but still
% prevent a page break here.
\centerpenalty = \lastpenalty
\ifnum\centerpenalty>10000 \vskip\parskip \fi
\ifnum\centerpenalty>9999 \penalty\centerpenalty \fi
\line{\kern\leftskip #1\kern\rightskip}%
}

% @sp n   outputs n lines of vertical space
%
\parseargdef\sp{\vskip #1\baselineskip}

% @comment ...line which is ignored...
% @c is the same as @comment
% @ignore ... @end ignore  is another way to write a comment
%
\def\comment{\begingroup \catcode`\^^M=\other%
\catcode`\@=\other \catcode`\{=\other \catcode`\}=\other%
\commentxxx}
{\catcode`\^^M=\other \gdef\commentxxx#1^^M{\endgroup}}
%
\let\c=\comment

% @paragraphindent NCHARS
% We'll use ems for NCHARS, close enough.
% NCHARS can also be the word `asis' or `none'.
% We cannot feasibly implement @paragraphindent asis, though.
%
\def\asisword{asis} % no translation, these are keywords
\def\noneword{none}
%
\parseargdef\paragraphindent{%
\def\temp{#1}%
\ifx\temp\asisword
\else
  \ifx\temp\noneword
    \defaultparindent = 0pt
  \else
    \defaultparindent = #1em
  \fi
\fi
\parindent = \defaultparindent
}

% @exampleindent NCHARS
% We'll use ems for NCHARS like @paragraphindent.
```

```
% It seems @exampleindent asis isn't necessary, but
% I preserve it to make it similar to @paragraphindent.
\parseargdef\exampleindent{%
 \def\temp{#1}%
 \ifx\temp\asisword
 \else
   \ifx\temp\noneword
     \lispnarrowing = 0pt
   \else
     \lispnarrowing = #1em
   \fi
 \fi
}


% @firstparagraphindent WORD
% If WORD is `none', then suppress indentation of the first paragraph
% after a section heading.  If WORD is `insert', then do indent at such
% paragraphs.
%
% The paragraph indentation is suppressed or not by calling
% \suppressfirstparagraphindent, which the sectioning commands do.
% We switch the definition of this back and forth according to WORD.
% By default, we suppress indentation.
%
\def\suppressfirstparagraphindent{\dosuppressfirstparagraphindent}
\def\insertword{insert}
%
\parseargdef\firstparagraphindent{%
 \def\temp{#1}%
 \ifx\temp\noneword
   \let\suppressfirstparagraphindent = \dosuppressfirstparagraphindent
 \else\ifx\temp\insertword
   \let\suppressfirstparagraphindent = \relax
 \else
   \errhelp = \EMsimple
   \errmessage{Unknown @firstparagraphindent option `\temp'}%
 \fi\fi
}


% Here is how we actually suppress indentation.  Redefine \everypar to
% \kern backwards by \parindent, and then reset itself to empty.
%
% We also make \indent itself not actually do anything until the next
% paragraph.
%
\gdef\dosuppressfirstparagraphindent{%
 \gdef\indent{%
   \restorefirstparagraphindent
```

```
    \indent
  }%
  \gdef\noindent{%
    \restorefirstparagraphindent
    \noindent
  }%
  \global\everypar = {%
    \kern -\parindent
    \restorefirstparagraphindent
  }%
}

\gdef\restorefirstparagraphindent{%
  \global \let \indent = \ptexindent
  \global \let \noindent = \ptexnoindent
  \global \everypar = {}%
}


% @refill is a no-op.
\let\refill=\relax

% If working on a large document in chapters, it is convenient to
% be able to disable indexing, cross-referencing, and contents, for test runs.
% This is done with @novalidate (before @setfilename).
%
\newif\iflinks \linkstrue % by default we want the aux files.
\let\novalidate = \linksfalse

% @setfilename is done at the beginning of every texinfo file.
% So open here the files we need to have open while reading the input.
% This makes it possible to make a .fmt file for texinfo.
\def\setfilename{%
  \fixbackslash  % Turn off hack to swallow `\input texinfo'.
  \iflinks
    \tryauxfile
    % Open the new aux file.  TeX will close it automatically at exit.
    \immediate\openout\auxfile=\jobname.aux
  \fi % \openindices needs to do some work in any case.
  \openindices
  \let\setfilename=\comment % Ignore extra @setfilename cmds.
  %
  % If texinfo.cnf is present on the system, read it.
  % Useful for site-wide @afourpaper, etc.
  \openin 1 texinfo.cnf
  \ifeof 1 \else \input texinfo.cnf \fi
  \closein 1
  %
```

```
  \comment % Ignore the actual filename.
}

% Called from \setfilename.
%
\def\openindices{%
 \newindex{cp}%
 \newcodeindex{fn}%
 \newcodeindex{vr}%
 \newcodeindex{tp}%
 \newcodeindex{ky}%
 \newcodeindex{pg}%
}

% @bye.
\outer\def\bye{\pagealignmacro\tracingstats=1\ptexend}


\message{pdf,}
% adobe `portable' document format
\newcount\tempnum
\newcount\lnkcount
\newtoks\filename
\newcount\filenamelength
\newcount\pgn
\newtoks\toksA
\newtoks\toksB
\newtoks\toksC
\newtoks\toksD
\newbox\boxA
\newcount\countA
\newif\ifpdf
\newif\ifpdfmakepagedest

% when pdftex is run in dvi mode, \pdfoutput is defined (so \pdfoutput=1
% can be set).  So we test for \relax and 0 as well as being undefined.
\ifx\pdfoutput\thisisundefined
\else
 \ifx\pdfoutput\relax
 \else
  \ifcase\pdfoutput
  \else
   \pdftrue
  \fi
 \fi
\fi

% PDF uses PostScript string constants for the names of xref targets,
```

% for display in the outlines, and in other places. Thus, we have to
% double any backslashes. Otherwise, a name like "\node" will be
% interpreted as a newline (\n), followed by o, d, e. Not good.
%
% See http://www.ntg.nl/pipermail/ntg-pdftex/2004-July/000654.html and
% related messages. The final outcome is that it is up to the TeX user
% to double the backslashes and otherwise make the string valid, so
% that's what we do. pdftex 1.30.0 (ca.2005) introduced a primitive to
% do this reliably, so we use it.

% #1 is a control sequence in which to do the replacements,
% which we \xdef.
\def\txiescapepdf#1{%
 \ifx\pdfescapestring\thisisundefined
   % No primitive available; should we give a warning or log?
   % Many times it won't matter.
 \else
   % The expandable \pdfescapestring primitive escapes parentheses,
   % backslashes, and other special chars.
   \xdef#1{\pdfescapestring{#1}}%
 \fi
}

\newhelp\nopdfimagehelp{Texinfo supports .png, .jpg, .jpeg, and .pdf images
with PDF output, and none of those formats could be found. (.eps cannot
be supported due to the design of the PDF format; use regular TeX (DVI
output) for that.)}

\ifpdf
 %
 % Color manipulation macros based on pdfcolor.tex,
 % except using rgb instead of cmyk; the latter is said to render as a
 % very dark gray on-screen and a very dark halftone in print, instead
 % of actual black.
 \def\rgbDarkRed{0.50 0.09 0.12}
 \def\rgbBlack{0 0 0}
 %
 % k sets the color for filling (usual text, etc.);
 % K sets the color for stroking (thin rules, e.g., normal _'s).
 \def\pdfsetcolor#1{\pdfliteral{#1 rg #1 RG}}
 %
 % Set color, and create a mark which defines \thiscolor accordingly,
 % so that \makeheadline knows which color to restore.
 \def\setcolor#1{%
  \xdef\lastcolordefs{\gdef\noexpand\thiscolor{#1}}%
  \domark
  \pdfsetcolor{#1}%
 }

```
%
\def\maincolor{\rgbBlack}
\pdfsetcolor{\maincolor}
\edef\thiscolor{\maincolor}
\def\lastcolordefs{}
%
\def\makefootline{%
  \baselineskip24pt
  \line{\pdfsetcolor{\maincolor}\the\footline}%
}
%
\def\makeheadline{%
  \vbox to 0pt{%
    \vskip-22.5pt
    \line{%
      \vbox to8.5pt{}%
      % Extract \thiscolor definition from the marks.
      \getcolormarks
      % Typeset the headline with \maincolor, then restore the color.
      \pdfsetcolor{\maincolor}\the\headline\pdfsetcolor{\thiscolor}%
    }%
    \vss
  }%
  \nointerlineskip
}
%
%
\pdfcatalog{/PageMode /UseOutlines}
%
% #1 is image name, #2 width (might be empty/whitespace), #3 height (ditto).
\def\dopdfimage#1#2#3{%
  \def\pdfimagewidth{#2}\setbox0 = \hbox{\ignorespaces #2}%
  \def\pdfimageheight{#3}\setbox2 = \hbox{\ignorespaces #3}%
  %
  % pdftex (and the PDF format) support .pdf, .png, .jpg (among
  % others).  Let's try in that order, PDF first since if
  % someone has a scalable image, presumably better to use that than a
  % bitmap.
  \let\pdfimgext=\empty
  \begingroup
    \openin 1 #1.pdf \ifeof 1
      \openin 1 #1.PDF \ifeof 1
        \openin 1 #1.png \ifeof 1
          \openin 1 #1.jpg \ifeof 1
            \openin 1 #1.jpeg \ifeof 1
              \openin 1 #1.JPG \ifeof 1
                \errhelp = \nopdfimagehelp
                \errmessage{Could not find image file #1 for pdf}%
```

```
        \else \gdef\pdfimgext{JPG}%
          \fi
        \else \gdef\pdfimgext{jpeg}%
         \fi
       \else \gdef\pdfimgext{jpg}%
        \fi
      \else \gdef\pdfimgext{png}%
       \fi
     \else \gdef\pdfimgext{PDF}%
      \fi
    \else \gdef\pdfimgext{pdf}%
   \fi
   \closein 1
 \endgroup
 %
 % without \immediate, ancient pdftex seg faults when the same image is
 % included twice.  (Version 3.14159-pre-1.0-unofficial-20010704.)
 \ifnum\pdftexversion < 14
   \immediate\pdfimage
 \else
   \immediate\pdfximage
 \fi
   \ifdim \wd0 >0pt width \pdfimagewidth \fi
   \ifdim \wd2 >0pt height \pdfimageheight \fi
   \ifnum\pdftexversion<13
     #1.\pdfimgext
    \else
     {#1.\pdfimgext}%
    \fi
 \ifnum\pdftexversion < 14 \else
   \pdfrefximage \pdflastximage
  \fi}
%
\def\pdfmkdest#1{{%
 % We have to set dummies so commands such as @code, and characters
 % such as \, aren't expanded when present in a section title.
 \indexnofonts
 \turnoffactive
 \makevalueexpandable
 \def\pdfdestname{#1}%
 \txiescapepdf\pdfdestname
 \safewhatsit{\pdfdest name{\pdfdestname} xyz}%
}}
%
% used to mark target names; must be expandable.
\def\pdfmkpgn#1{#1}
%
% by default, use a color that is dark enough to print on paper as
```

```
% nearly black, but still distinguishable for online viewing.
\def\urlcolor{\rgbDarkRed}
\def\linkcolor{\rgbDarkRed}
\def\endlink{\setcolor{\maincolor}\pdfendlink}
%
% Adding outlines to PDF; macros for calculating structure of outlines
% come from Petr Olsak
\def\expnumber#1{\expandafter\ifx\csname#1\endcsname\relax 0%
  \else \csname#1\endcsname \fi}
\def\advancenumber#1{\tempnum=\expnumber{#1}\relax
  \advance\tempnum by 1
  \expandafter\xdef\csname#1\endcsname{\the\tempnum}}
%
% #1 is the section text, which is what will be displayed in the
% outline by the pdf viewer.  #2 is the pdf expression for the number
% of subentries (or empty, for subsubsections).  #3 is the node text,
% which might be empty if this toc entry had no corresponding node.
% #4 is the page number
%
\def\dopdfoutline#1#2#3#4{%
  % Generate a link to the node text if that exists; else, use the
  % page number.  We could generate a destination for the section
  % text in the case where a section has no node, but it doesn't
  % seem worth the trouble, since most documents are normally structured.
  \edef\pdfoutlinedest{#3}%
  \ifx\pdfoutlinedest\empty
    \def\pdfoutlinedest{#4}%
  \else
    \txiescapepdf\pdfoutlinedest
  \fi
  %
  % Also escape PDF chars in the display string.
  \edef\pdfoutlinetext{#1}%
  \txiescapepdf\pdfoutlinetext
  %
  \pdfoutline goto name{\pdfmkpgn{\pdfoutlinedest}}#2{\pdfoutlinetext}%
}
%
\def\pdfmakeoutlines{%
  \begingroup
    % Read toc silently, to get counts of subentries for \pdfoutline.
    \def\partentry##1##2##3##4{}% ignore parts in the outlines
    \def\numchapentry##1##2##3##4{%
\def\thischapnum{##2}%
\def\thissecnum{0}%
\def\thissubsecnum{0}%
    }%
    \def\numsecentry##1##2##3##4{%
```

```
\advancenumber{chap\thischapnum}%
\def\thissecnum{##2}%
\def\thissubsecnum{0}%
   }%
   \def\numsubsecentry##1##2##3##4{%
\advancenumber{sec\thissecnum}%
\def\thissubsecnum{##2}%
   }%
   \def\numsubsubsecentry##1##2##3##4{%
\advancenumber{subsec\thissubsecnum}%
   }%
   \def\thischapnum{0}%
   \def\thissecnum{0}%
   \def\thissubsecnum{0}%
   %
   % use \def rather than \let here because we redefine \chapentry et
   % al. a second time, below.
   \def\appentry{\numchapentry}%
   \def\appsecentry{\numsecentry}%
   \def\appsubsecentry{\numsubsecentry}%
   \def\appsubsubsecentry{\numsubsubsecentry}%
   \def\unnchapentry{\numchapentry}%
   \def\unnsecentry{\numsecentry}%
   \def\unnsubsecentry{\numsubsecentry}%
   \def\unnsubsubsecentry{\numsubsubsecentry}%
   \readdatafile{toc}%
   %
   % Read toc second time, this time actually producing the outlines.
   % The `-' means take the \expnumber as the absolute number of
   % subentries, which we calculated on our first read of the .toc above.
   %
   % We use the node names as the destinations.
   \def\numchapentry##1##2##3##4{%
     \dopdfoutline{##1}{count-\expnumber{chap##2}}{##3}{##4}}%
   \def\numsecentry##1##2##3##4{%
     \dopdfoutline{##1}{count-\expnumber{sec##2}}{##3}{##4}}%
   \def\numsubsecentry##1##2##3##4{%
     \dopdfoutline{##1}{count-\expnumber{subsec##2}}{##3}{##4}}%
   \def\numsubsubsecentry##1##2##3##4{% count is always zero
     \dopdfoutline{##1}{}{##3}{##4}}%
   %
   % PDF outlines are displayed using system fonts, instead of
   % document fonts.  Therefore we cannot use special characters,
   % since the encoding is unknown.  For example, the eogonek from
   % Latin 2 (0xea) gets translated to a | character.  Info from
   % Staszek Wawrykiewicz, 19 Jan 2004 04:09:24 +0100.
   %
   % TODO this right, we have to translate 8-bit characters to
```

```
% their "best" equivalent, based on the @documentencoding.  Too
% much work for too little return.  Just use the ASCII equivalents
% we use for the index sort strings.
%
\indexnofonts
\setupdatafile
% We can have normal brace characters in the PDF outlines, unlike
% Texinfo index files.  So set that up.
\def\{{\lbracecharliteral}%
\def\}{\rbracecharliteral}%
\catcode`\\=\active \otherbackslash
\input \tocreadfilename
\endgroup
}
{\catcode`[=1 \catcode`]=2
\catcode`{=\other \catcode`}=\other
\gdef\lbracecharliteral[{]%
\gdef\rbracecharliteral[}]%
]
%
\def\skipspaces#1{\def\PP{#1}\def\D{|}%
\ifx\PP\D\let\nextsp\relax
\else\let\nextsp\skipspaces
\addtokens{\filename}{\PP}%
\advance\filenamelength by 1
\fi
\nextsp}
\def\getfilename#1{%
\filenamelength=0
% If we don't expand the argument now, \skipspaces will get
% snagged on things like "@value{foo}".
\edef\temp{#1}%
\expandafter\skipspaces\temp|\relax
}
\ifnum\pdftexversion < 14
\let \startlink \pdfannotlink
\else
\let \startlink \pdfstartlink
\fi
% make a live url in pdf output.
\def\pdfurl#1{%
\begingroup
% it seems we really need yet another set of dummies; have not
% tried to figure out what each command should do in the context
% of @url.  for now, just make @/ a no-op, that's the only one
% people have actually reported a problem with.
%
\normalturnoffactive
```

```
    \def\@{ @ }%
    \let\/=\empty
    \makevalueexpandable
    % do we want to go so far as to use \indexnofonts instead of just
    % special-casing \var here?
    \def\var##1{##1}%
    %
    \leavevmode\setcolor{\urlcolor}%
    \startlink attr{/Border [0 0 0]}%
      user{/Subtype /Link /A << /S /URI /URI (#1) >>}%
  \endgroup}
\def\pdfgettoks#1.{\setbox\boxA=\hbox{\toksA={#1.}\toksB={}\maketoks}}
\def\addtokens#1#2{\edef\addtoks{\noexpand#1={\the#1#2}}\addtoks}
\def\adn#1{\addtokens{\toksC}{#1}\global\countA=1\let\next=\maketoks}
\def\poptoks#1#2|ENDTOKS|{\let\first=#1\toksD={#1}\toksA={#2}}
\def\maketoks{%
  \expandafter\poptoks\the\toksA|ENDTOKS|\relax
  \ifx\first0\adn0
  \else\ifx\first1\adn1 \else\ifx\first2\adn2 \else\ifx\first3\adn3
  \else\ifx\first4\adn4 \else\ifx\first5\adn5 \else\ifx\first6\adn6
  \else\ifx\first7\adn7 \else\ifx\first8\adn8 \else\ifx\first9\adn9
  \else
    \ifnum0=\countA\else\makelink\fi
    \ifx\first.\let\next=\done\else
      \let\next=\maketoks
      \addtokens{\toksB}{\the\toksD}
      \ifx\first,\addtokens{\toksB}{\space}\fi
    \fi
  \fi\fi\fi\fi\fi\fi\fi\fi\fi\fi
  \next}
\def\makelink{\addtokens{\toksB}%
  {\noexpand\pdflink{\the\toksC}}\toksC={}\global\countA=0}
\def\pdflink#1{%
  \startlink attr{/Border [0 0 0]} goto name{\pdfmkpgn{#1}}
  \setcolor{\linkcolor}#1\endlink}
\def\done{\edef\st{\global\noexpand\toksA={\the\toksB}}\st}
\else
  % non-pdf mode
  \let\pdfmkdest = \gobble
  \let\pdfurl = \gobble
  \let\endlink = \relax
  \let\setcolor = \gobble
  \let\pdfsetcolor = \gobble
  \let\pdfmakeoutlines = \relax
\fi  % \ifx\pdfoutput


\message{fonts,}
```

```
% Change the current font style to #1, remembering it in \curfontstyle.
% For now, we do not accumulate font styles: @b{@i{foo}} prints foo in
% italics, not bold italics.
%
\def\setfontstyle#1{%
 \def\curfontstyle{#1}% not as a control sequence, because we are \edef'd.
 \csname ten#1\endcsname  % change the current font
}

% Select #1 fonts with the current style.
%
\def\selectfonts#1{\csname #1fonts\endcsname \csname\curfontstyle\endcsname}

\def\rm{\fam=0 \setfontstyle{rm}}
\def\it{\fam=\itfam \setfontstyle{it}}
\def\sl{\fam=\slfam \setfontstyle{sl}}
\def\bf{\fam=\bffam \setfontstyle{bf}}\def\bfstylename{bf}
\def\tt{\fam=\ttfam \setfontstyle{tt}}

% Unfortunately, we have to override this for titles and the like, since
% in those cases "rm" is bold.  Sigh.
\def\rmisbold{\rm\def\curfontstyle{bf}}

% Texinfo sort of supports the sans serif font style, which plain TeX does not.
% So we set up a \sf.
\newfam\sffam
\def\sf{\fam=\sffam \setfontstyle{sf}}
\let\li = \sf % Sometimes we call it \li, not \sf.

% We don't need math for this font style.
\def\ttsl{\setfontstyle{ttsl}}



% Set the baselineskip to #1, and the lineskip and strut size
% correspondingly.  There is no deep meaning behind these magic numbers
% used as factors; they just match (closely enough) what Knuth defined.
%
\def\lineskipfactor{.08333}
\def\strutheightpercent{.70833}
\def\strutdepthpercent {.29167}
%
% can get a sort of poor man's double spacing by redefining this.
\def\baselinefactor{1}
%
\newdimen\textleading
\def\setleading#1{%
 \dimen0 = #1\relax
```

```
 \normalbaselineskip = \baselinefactor\dimen0
 \normallineskip = \lineskipfactor\normalbaselineskip
 \normalbaselines
\setbox\strutbox =\hbox{%
  \vrule width0pt height\strutheightpercent\baselineskip
          depth \strutdepthpercent \baselineskip
 }%
}

% PDF CMaps.  See also LaTeX's t1.cmap.
%
% do nothing with this by default.
\expandafter\let\csname cmapOT1\endcsname\gobble
\expandafter\let\csname cmapOT1IT\endcsname\gobble
\expandafter\let\csname cmapOT1TT\endcsname\gobble

% if we are producing pdf, and we have \pdffontattr, then define cmaps.
% (\pdffontattr was introduced many years ago, but people still run
% older pdftex's; it's easy to conditionalize, so we do.)
\ifpdf \ifx\pdffontattr\thisisundefined \else
 \begingroup
   \catcode`\^^M=\active \def^^M{^^J}% Output line endings as the ^^J char.
   \catcode`\%=12 \immediate\pdfobj stream {%!PS-Adobe-3.0 Resource-CMap
%%DocumentNeededResources: ProcSet (CIDInit)
%%IncludeResource: ProcSet (CIDInit)
%%BeginResource: CMap (TeX-OT1-0)
%%Title: (TeX-OT1-0 TeX OT1 0)
%%Version: 1.000
%%EndComments
/CIDInit /ProcSet findresource begin
12 dict begin
begincmap
/CIDSystemInfo
<< /Registry (TeX)
/Ordering (OT1)
/Supplement 0
>> def
/CMapName /TeX-OT1-0 def
/CMapType 2 def
1 begincodespacerange
<00> <7F>
endcodespacerange
8 beginbfrange
<00> <01> <0393>
<09> <0A> <03A8>
<23> <26> <0023>
<28> <3B> <0028>
<3F> <5B> <003F>
```

<5D> <5E> <005D>

<61> <7A> <0061>

<7B> <7C> <2013>

endbfrange

40 beginbfchar

<02> <0398>

<03> <039B>

<04> <039E>

<05> <03A0>

<06> <03A3>

<07> <03D2>

<08> <03A6>

<0B> <00660066>

<0C> <00660069>

<0D> <0066006C>

<0E> <006600660069>

<0F> <00660066006C>

<10> <0131>

<11> <0237>

<12> <0060>

<13> <00B4>

<14> <02C7>

<15> <02D8>

<16> <00AF>

<17> <02DA>

<18> <00B8>

<19> <00DF>

<1A> <00E6>

<1B> <0153>

<1C> <00F8>

<1D> <00C6>

<1E> <0152>

<1F> <00D8>

<21> <0021>

<22> <201D>

<27> <2019>

<3C> <00A1>

<3D> <003D>

<3E> <00BF>

<5C> <201C>

<5F> <02D9>

<60> <2018>

<7D> <02DD>

<7E> <007E>

<7F> <00A8>

endbfchar

endcmap

CMapName currentdict /CMap defineresource pop

```
end
end
%%EndResource
%%EOF
  }\endgroup
 \expandafter\edef\csname cmapOT1\endcsname#1{%
  \pdffontattr#1{/ToUnicode \the\pdflastobj\space 0 R}%
 }%
%
% \cmapOT1IT
 \begingroup
  \catcode`\^^M=\active \def^^M{^^J}% Output line endings as the ^^J char.
  \catcode`\%=12 \immediate\pdfobj stream {%!PS-Adobe-3.0 Resource-CMap
%%DocumentNeededResources: ProcSet (CIDInit)
%%IncludeResource: ProcSet (CIDInit)
%%BeginResource: CMap (TeX-OT1IT-0)
%%Title: (TeX-OT1IT-0 TeX OT1IT 0)
%%Version: 1.000
%%EndComments
/CIDInit /ProcSet findresource begin
12 dict begin
begincmap
/CIDSystemInfo
<< /Registry (TeX)
/Ordering (OT1IT)
/Supplement 0
>> def
/CMapName /TeX-OT1IT-0 def
/CMapType 2 def
1 begincodespacerange
<00> <7F>
endcodespacerange
8 beginbfrange
<00> <01> <0393>
<09> <0A> <03A8>
<25> <26> <0025>
<28> <3B> <0028>
<3F> <5B> <003F>
<5D> <5E> <005D>
<61> <7A> <0061>
<7B> <7C> <2013>
endbfrange
42 beginbfchar
<02> <0398>
<03> <039B>
<04> <039E>
<05> <03A0>
<06> <03A3>
```

```
<07> <03D2>
<08> <03A6>
<0B> <00660066>
<0C> <00660069>
<0D> <0066006C>
<0E> <006600660069>
<0F> <00660066006C>
<10> <0131>
<11> <0237>
<12> <0060>
<13> <00B4>
<14> <02C7>
<15> <02D8>
<16> <00AF>
<17> <02DA>
<18> <00B8>
<19> <00DF>
<1A> <00E6>
<1B> <0153>
<1C> <00F8>
<1D> <00C6>
<1E> <0152>
<1F> <00D8>
<21> <0021>
<22> <201D>
<23> <0023>
<24> <00A3>
<27> <2019>
<3C> <00A1>
<3D> <003D>
<3E> <00BF>
<5C> <201C>
<5F> <02D9>
<60> <2018>
<7D> <02DD>
<7E> <007E>
<7F> <00A8>
endbfchar
endcmap
CMapName currentdict /CMap defineresource pop
end
end
%%EndResource
%%EOF
  }\endgroup
\expandafter\edef\csname cmapOT1IT\endcsname#1{%
 \pdffontattr#1{/ToUnicode \the\pdflastobj\space 0 R}%
 }%
```

%

% \cmapOT1TT

 \begingroup

  \catcode`\^^M=\active \def^^M{^^J}% Output line endings as the ^^J char.

  \catcode`\%=12 \immediate\pdfobj stream {%!PS-Adobe-3.0 Resource-CMap

%%DocumentNeededResources: ProcSet (CIDInit)

%%IncludeResource: ProcSet (CIDInit)

%%BeginResource: CMap (TeX-OT1TT-0)

%%Title: (TeX-OT1TT-0 TeX OT1TT 0)

%%Version: 1.000

%%EndComments

/CIDInit /ProcSet findresource begin

12 dict begin

begincmap

/CIDSystemInfo

<< /Registry (TeX)

/Ordering (OT1TT)

/Supplement 0

>> def

/CMapName /TeX-OT1TT-0 def

/CMapType 2 def

1 begincodespacerange

<00> <7F>

endcodespacerange

5 beginbfrange

<00> <01> <0393>

<09> <0A> <03A8>

<21> <26> <0021>

<28> <5F> <0028>

<61> <7E> <0061>

endbfrange

32 beginbfchar

<02> <0398>

<03> <039B>

<04> <039E>

<05> <03A0>

<06> <03A3>

<07> <03D2>

<08> <03A6>

<0B> <2191>

<0C> <2193>

<0D> <0027>

<0E> <00A1>

<0F> <00BF>

<10> <0131>

<11> <0237>

<12> <0060>

<13> <00B4>

```
<14> <02C7>
<15> <02D8>
<16> <00AF>
<17> <02DA>
<18> <00B8>
<19> <00DF>
<1A> <00E6>
<1B> <0153>
<1C> <00F8>
<1D> <00C6>
<1E> <0152>
<1F> <00D8>
<20> <2423>
<27> <2019>
<60> <2018>
<7F> <00A8>
endbfchar
endcmap
CMapName currentdict /CMap defineresource pop
end
end
%%EndResource
%%EOF
   }\endgroup
 \expandafter\edef\csname cmapOT1TT\endcsname#1{%
  \pdffontattr#1{/ToUnicode \the\pdflastobj\space 0 R}%
 }%
\fi\fi
```

```
% Set the font macro #1 to the font named \fontprefix#2.
% #3 is the font's design size, #4 is a scale factor, #5 is the CMap
% encoding (only OT1, OT1IT and OT1TT are allowed, or empty to omit).
% Example:
% #1 = \textrm
% #2 = \rmshape
% #3 = 10
% #4 = \mainmagstep
% #5 = OT1
%
\def\setfont#1#2#3#4#5{%
 \font#1=\fontprefix#2#3 scaled #4
 \csname cmap#5\endcsname#1%
}
% This is what gets called when #5 of \setfont is empty.
\let\cmap\gobble
%
% (end of cmaps)
```

```
% Use cm as the default font prefix.
% To specify the font prefix, you must define \fontprefix
% before you read in texinfo.tex.
\ifx\fontprefix\thisisundefined
\def\fontprefix{cm}
\fi
% Support font families that don't use the same naming scheme as CM.
\def\rmshape{r}
\def\rmbshape{bx}               % where the normal face is bold
\def\bfshape{b}
\def\bxshape{bx}
\def\ttshape{tt}
\def\ttbshape{tt}
\def\ttslshape{sltt}
\def\itshape{ti}
\def\itbshape{bxti}
\def\slshape{sl}
\def\slbshape{bxsl}
\def\sfshape{ss}
\def\sfbshape{ss}
\def\scshape{csc}
\def\scbshape{csc}

% Definitions for a main text size of 11pt.  (The default in Texinfo.)
%
\def\definetextfontsizexi{%
% Text fonts (11.2pt, magstep1).
\def\textnominalsize{11pt}
\edef\mainmagstep{\magstephalf}
\setfont\textrm\rmshape{10}{\mainmagstep}{OT1}
\setfont\texttt\ttshape{10}{\mainmagstep}{OT1TT}
\setfont\textbf\bfshape{10}{\mainmagstep}{OT1}
\setfont\textit\itshape{10}{\mainmagstep}{OT1IT}
\setfont\textsl\slshape{10}{\mainmagstep}{OT1}
\setfont\textsf\sfshape{10}{\mainmagstep}{OT1}
\setfont\textsc\scshape{10}{\mainmagstep}{OT1}
\setfont\textttsl\ttslshape{10}{\mainmagstep}{OT1TT}
\font\texti=cmmi10 scaled \mainmagstep
\font\textsy=cmsy10 scaled \mainmagstep
\def\textecsize{1095}

% A few fonts for @defun names and args.
\setfont\defbf\bfshape{10}{\magstep1}{OT1}
\setfont\deftt\ttshape{10}{\magstep1}{OT1TT}
\setfont\defttsl\ttslshape{10}{\magstep1}{OT1TT}
\def\df{\let\tentt=\deftt \let\tenbf = \defbf \let\tenttsl=\defttsl \bf}
```

% Fonts for indices, footnotes, small examples (9pt).
\def\smallnominalsize{9pt}
\setfont\smallrm\rmshape{9}{1000}{OT1}
\setfont\smalltt\ttshape{9}{1000}{OT1TT}
\setfont\smallbf\bfshape{10}{900}{OT1}
\setfont\smallit\itshape{9}{1000}{OT1IT}
\setfont\smallsl\slshape{9}{1000}{OT1}
\setfont\smallsf\sfshape{9}{1000}{OT1}
\setfont\smallsc\scshape{10}{900}{OT1}
\setfont\smallttsl\ttslshape{10}{900}{OT1TT}
\font\smalli=cmmi9
\font\smallsy=cmsy9
\def\smallecsize{0900}

% Fonts for small examples (8pt).
\def\smallernominalsize{8pt}
\setfont\smallerrm\rmshape{8}{1000}{OT1}
\setfont\smallertt\ttshape{8}{1000}{OT1TT}
\setfont\smallerbf\bfshape{10}{800}{OT1}
\setfont\smallerit\itshape{8}{1000}{OT1IT}
\setfont\smallersl\slshape{8}{1000}{OT1}
\setfont\smallersf\sfshape{8}{1000}{OT1}
\setfont\smallersc\scshape{10}{800}{OT1}
\setfont\smallerttsl\ttslshape{10}{800}{OT1TT}
\font\smalleri=cmmi8
\font\smallersy=cmsy8
\def\smallerecsize{0800}

% Fonts for title page (20.4pt):
\def\titlenominalsize{20pt}
\setfont\titlerm\rmbshape{12}{\magstep3}{OT1}
\setfont\titleit\itbshape{10}{\magstep4}{OT1IT}
\setfont\titlesl\slbshape{10}{\magstep4}{OT1}
\setfont\titlett\ttbshape{12}{\magstep3}{OT1TT}
\setfont\titlettsl\ttslshape{10}{\magstep4}{OT1TT}
\setfont\titlesf\sfbshape{17}{\magstep1}{OT1}
\let\titlebf=\titlerm
\setfont\titlesc\scbshape{10}{\magstep4}{OT1}
\font\titlei=cmmi12 scaled \magstep3
\font\titlesy=cmsy10 scaled \magstep4
\def\titleecsize{2074}

% Chapter (and unnumbered) fonts (17.28pt).
\def\chapnominalsize{17pt}
\setfont\chaprm\rmbshape{12}{\magstep2}{OT1}
\setfont\chapit\itbshape{10}{\magstep3}{OT1IT}
\setfont\chapsl\slbshape{10}{\magstep3}{OT1}
\setfont\chaptt\ttbshape{12}{\magstep2}{OT1TT}

```
\setfont\chapttsl\ttslshape{10}{\magstep3}{OT1TT}
\setfont\chapsf\sfbshape{17}{1000}{OT1}
\let\chapbf=\chaprm
\setfont\chapsc\scbshape{10}{\magstep3}{OT1}
\font\chapi=cmmi12 scaled \magstep2
\font\chapsy=cmsy10 scaled \magstep3
\def\chapecsize{1728}

% Section fonts (14.4pt).
\def\secnominalsize{14pt}
\setfont\secrm\rmbshape{12}{\magstep1}{OT1}
\setfont\secit\itbshape{10}{\magstep2}{OT1IT}
\setfont\secsl\slbshape{10}{\magstep2}{OT1}
\setfont\sectt\ttbshape{12}{\magstep1}{OT1TT}
\setfont\secttsl\ttslshape{10}{\magstep2}{OT1TT}
\setfont\secsf\sfbshape{12}{\magstep1}{OT1}
\let\secbf\secrm
\setfont\secsc\scbshape{10}{\magstep2}{OT1}
\font\seci=cmmi12 scaled \magstep1
\font\secsy=cmsy10 scaled \magstep2
\def\sececsize{1440}

% Subsection fonts (13.15pt).
\def\ssecnominalsize{13pt}
\setfont\ssecrm\rmbshape{12}{\magstephalf}{OT1}
\setfont\ssecit\itbshape{10}{1315}{OT1IT}
\setfont\ssecsl\slbshape{10}{1315}{OT1}
\setfont\ssectt\ttbshape{12}{\magstephalf}{OT1TT}
\setfont\ssecttsl\ttslshape{10}{1315}{OT1TT}
\setfont\ssecsf\sfbshape{12}{\magstephalf}{OT1}
\let\ssecbf\ssecrm
\setfont\ssecsc\scbshape{10}{1315}{OT1}
\font\sseci=cmmi12 scaled \magstephalf
\font\ssecsy=cmsy10 scaled 1315
\def\ssececsize{1200}

% Reduced fonts for @acro in text (10pt).
\def\reducednominalsize{10pt}
\setfont\reducedrm\rmshape{10}{1000}{OT1}
\setfont\reducedtt\ttshape{10}{1000}{OT1TT}
\setfont\reducedbf\bfshape{10}{1000}{OT1}
\setfont\reducedit\itshape{10}{1000}{OT1IT}
\setfont\reducedsl\slshape{10}{1000}{OT1}
\setfont\reducedsf\sfshape{10}{1000}{OT1}
\setfont\reducedsc\scshape{10}{1000}{OT1}
\setfont\reducedttsl\ttslshape{10}{1000}{OT1TT}
\font\reducedi=cmmi10
\font\reducedsy=cmsy10
```

```
\def\reducedecsize{1000}

\textleading = 13.2pt % line spacing for 11pt CM
\textfonts          % reset the current fonts
\rm
} % end of 11pt text font size definitions, \definetextfontsizexi



% Definitions to make the main text be 10pt Computer Modern, with
% section, chapter, etc., sizes following suit.  This is for the GNU
% Press printing of the Emacs 22 manual.  Maybe other manuals in the
% future.  Used with @smallbook, which sets the leading to 12pt.
%
\def\definetextfontsizex{%
% Text fonts (10pt).
\def\textnominalsize{10pt}
\edef\mainmagstep{1000}
\setfont\textrm\rmshape{10}{\mainmagstep}{OT1}
\setfont\texttt\ttshape{10}{\mainmagstep}{OT1TT}
\setfont\textbf\bfshape{10}{\mainmagstep}{OT1}
\setfont\textit\itshape{10}{\mainmagstep}{OT1IT}
\setfont\textsl\slshape{10}{\mainmagstep}{OT1}
\setfont\textsf\sfshape{10}{\mainmagstep}{OT1}
\setfont\textsc\scshape{10}{\mainmagstep}{OT1}
\setfont\textttsl\ttslshape{10}{\mainmagstep}{OT1TT}
\font\texti=cmmi10 scaled \mainmagstep
\font\textsy=cmsy10 scaled \mainmagstep
\def\textecsize{1000}

% A few fonts for @defun names and args.
\setfont\defbf\bfshape{10}{\magstephalf}{OT1}
\setfont\deftt\ttshape{10}{\magstephalf}{OT1TT}
\setfont\defttsl\ttslshape{10}{\magstephalf}{OT1TT}
\def\df{\let\tentt=\deftt \let\tenbf = \defbf \let\tenttsl=\defttsl \bf}

% Fonts for indices, footnotes, small examples (9pt).
\def\smallnominalsize{9pt}
\setfont\smallrm\rmshape{9}{1000}{OT1}
\setfont\smalltt\ttshape{9}{1000}{OT1TT}
\setfont\smallbf\bfshape{10}{900}{OT1}
\setfont\smallit\itshape{9}{1000}{OT1IT}
\setfont\smallsl\slshape{9}{1000}{OT1}
\setfont\smallsf\sfshape{9}{1000}{OT1}
\setfont\smallsc\scshape{10}{900}{OT1}
\setfont\smallttsl\ttslshape{10}{900}{OT1TT}
\font\smalli=cmmi9
\font\smallsy=cmsy9
\def\smallecsize{0900}
```

```
% Fonts for small examples (8pt).
\def\smallernominalsize{8pt}
\setfont\smallerrm\rmshape{8}{1000}{OT1}
\setfont\smallertt\ttshape{8}{1000}{OT1TT}
\setfont\smallerbf\bfshape{10}{800}{OT1}
\setfont\smallerit\itshape{8}{1000}{OT1IT}
\setfont\smallersl\slshape{8}{1000}{OT1}
\setfont\smallersf\sfshape{8}{1000}{OT1}
\setfont\smallersc\scshape{10}{800}{OT1}
\setfont\smallerttsl\ttslshape{10}{800}{OT1TT}
\font\smalleri=cmmi8
\font\smallersy=cmsy8
\def\smallerecsize{0800}

% Fonts for title page (20.4pt):
\def\titlenominalsize{20pt}
\setfont\titlerm\rmbshape{12}{\magstep3}{OT1}
\setfont\titleit\itbshape{10}{\magstep4}{OT1IT}
\setfont\titlesl\slbshape{10}{\magstep4}{OT1}
\setfont\titlett\ttbshape{12}{\magstep3}{OT1TT}
\setfont\titlettsl\ttslshape{10}{\magstep4}{OT1TT}
\setfont\titlesf\sfbshape{17}{\magstep1}{OT1}
\let\titlebf=\titlerm
\setfont\titlesc\scbshape{10}{\magstep4}{OT1}
\font\titlei=cmmi12 scaled \magstep3
\font\titlesy=cmsy10 scaled \magstep4
\def\titleecsize{2074}

% Chapter fonts (14.4pt).
\def\chapnominalsize{14pt}
\setfont\chaprm\rmbshape{12}{\magstep1}{OT1}
\setfont\chapit\itbshape{10}{\magstep2}{OT1IT}
\setfont\chapsl\slbshape{10}{\magstep2}{OT1}
\setfont\chaptt\ttbshape{12}{\magstep1}{OT1TT}
\setfont\chapttsl\ttslshape{10}{\magstep2}{OT1TT}
\setfont\chapsf\sfbshape{12}{\magstep1}{OT1}
\let\chapbf\chaprm
\setfont\chapsc\scbshape{10}{\magstep2}{OT1}
\font\chapi=cmmi12 scaled \magstep1
\font\chapsy=cmsy10 scaled \magstep2
\def\chapecsize{1440}

% Section fonts (12pt).
\def\secnominalsize{12pt}
\setfont\secrm\rmbshape{12}{1000}{OT1}
\setfont\secit\itbshape{10}{\magstep1}{OT1IT}
\setfont\secsl\slbshape{10}{\magstep1}{OT1}
```

```
\setfont\sectt\ttbshape{12}{1000}{OT1TT}
\setfont\secttsl\ttslshape{10}{\magstep1}{OT1TT}
\setfont\secsf\sfbshape{12}{1000}{OT1}
\let\secbf\secrm
\setfont\secsc\scbshape{10}{\magstep1}{OT1}
\font\seci=cmmi12
\font\secsy=cmsy10 scaled \magstep1
\def\sececsize{1200}

% Subsection fonts (10pt).
\def\ssecnominalsize{10pt}
\setfont\ssecrm\rmbshape{10}{1000}{OT1}
\setfont\ssecit\itbshape{10}{1000}{OT1IT}
\setfont\ssecsl\slbshape{10}{1000}{OT1}
\setfont\ssectt\ttbshape{10}{1000}{OT1TT}
\setfont\ssecttsl\ttslshape{10}{1000}{OT1TT}
\setfont\ssecsf\sfbshape{10}{1000}{OT1}
\let\ssecbf\ssecrm
\setfont\ssecsc\scbshape{10}{1000}{OT1}
\font\sseci=cmmi10
\font\ssecsy=cmsy10
\def\ssececsize{1000}

% Reduced fonts for @acro in text (9pt).
\def\reducednominalsize{9pt}
\setfont\reducedrm\rmshape{9}{1000}{OT1}
\setfont\reducedtt\ttshape{9}{1000}{OT1TT}
\setfont\reducedbf\bfshape{10}{900}{OT1}
\setfont\reducedit\itshape{9}{1000}{OT1IT}
\setfont\reducedsl\slshape{9}{1000}{OT1}
\setfont\reducedsf\sfshape{9}{1000}{OT1}
\setfont\reducedsc\scshape{10}{900}{OT1}
\setfont\reducedttsl\ttslshape{10}{900}{OT1TT}
\font\reducedi=cmmi9
\font\reducedsy=cmsy9
\def\reducedecsize{0900}

\divide\parskip by 2  % reduce space between paragraphs
\textleading = 12pt   % line spacing for 10pt CM
\textfonts          % reset the current fonts
\rm
} % end of 10pt text font size definitions, \definetextfontsizex


% We provide the user-level command
%   @fonttextsize 10
% (or 11) to redefine the text font size.  pt is assumed.
%
```

```
\def\xiword{11}
\def\xword{10}
\def\xwordpt{10pt}
%
\parseargdef\fonttextsize{%
 \def\textsizearg{#1}%
 %\wlog{doing @fonttextsize \textsizearg}%
 %
 % Set \globaldefs so that documents can use this inside @tex, since
 % makeinfo 4.8 does not support it, but we need it nonetheless.
 %
\begingroup \globaldefs=1
 \ifx\textsizearg\xword \definetextfontsizex
 \else \ifx\textsizearg\xiword \definetextfontsizexi
 \else
   \errhelp=\EMsimple
   \errmessage{@fonttextsize only supports `10' or `11', not `\textsizearg'}
 \fi\fi
\endgroup
}


% In order for the font changes to affect most math symbols and letters,
% we have to define the \textfont of the standard families.  Since
% texinfo doesn't allow for producing subscripts and superscripts except
% in the main text, we don't bother to reset \scriptfont and
% \scriptscriptfont (which would also require loading a lot more fonts).
%
\def\resetmathfonts{%
 \textfont0=\tenrm \textfont1=\teni \textfont2=\tensy
 \textfont\itfam=\tenit \textfont\slfam=\tensl \textfont\bffam=\tenbf
 \textfont\ttfam=\tentt \textfont\sffam=\tensf
}


% The font-changing commands redefine the meanings of \tenSTYLE, instead
% of just \STYLE.  We do this because \STYLE needs to also set the
% current \fam for math mode.  Our \STYLE (e.g., \rm) commands hardwire
% \tenSTYLE to set the current font.
%
% Each font-changing command also sets the names \lsize (one size lower)
% and \lllsize (three sizes lower).  These relative commands are used in
% the LaTeX logo and acronyms.
%
% This all needs generalizing, badly.
%
\def\textfonts{%
 \let\tenrm=\textrm \let\tenit=\textit \let\tensl=\textsl
 \let\tenbf=\textbf \let\tentt=\texttt \let\smallcaps=\textsc
```

```
\let\tensf=\textsf \let\teni=\texti \let\tensy=\textsy
\let\tenttsl=\textttsl
\def\curfontsize{text}%
\def\lsize{reduced}\def\lllsize{smaller}%
\resetmathfonts \setleading{\textleading}}
\def\titlefonts{%
\let\tenrm=\titlerm \let\tenit=\titleit \let\tensl=\titlesl
\let\tenbf=\titlebf \let\tentt=\titlett \let\smallcaps=\titlesc
\let\tensf=\titlesf \let\teni=\titlei \let\tensy=\titlesy
\let\tenttsl=\titlettsl
\def\curfontsize{title}%
\def\lsize{chap}\def\lllsize{subsec}%
\resetmathfonts \setleading{27pt}}
\def\titlefont#1{{\titlefonts\rmisbold #1}}
\def\chapfonts{%
\let\tenrm=\chaprm \let\tenit=\chapit \let\tensl=\chapsl
\let\tenbf=\chapbf \let\tentt=\chaptt \let\smallcaps=\chapsc
\let\tensf=\chapsf \let\teni=\chapi \let\tensy=\chapsy
\let\tenttsl=\chapttsl
\def\curfontsize{chap}%
\def\lsize{sec}\def\lllsize{text}%
\resetmathfonts \setleading{19pt}}
\def\secfonts{%
\let\tenrm=\secrm \let\tenit=\secit \let\tensl=\secsl
\let\tenbf=\secbf \let\tentt=\sectt \let\smallcaps=\secsc
\let\tensf=\secsf \let\teni=\seci \let\tensy=\secsy
\let\tenttsl=\secttsl
\def\curfontsize{sec}%
\def\lsize{subsec}\def\lllsize{reduced}%
\resetmathfonts \setleading{16pt}}
\def\subsecfonts{%
\let\tenrm=\ssecrm \let\tenit=\ssecit \let\tensl=\ssecsl
\let\tenbf=\ssecbf \let\tentt=\ssectt \let\smallcaps=\ssecsc
\let\tensf=\ssecsf \let\teni=\sseci \let\tensy=\ssecsy
\let\tenttsl=\ssecttsl
\def\curfontsize{ssec}%
\def\lsize{text}\def\lllsize{small}%
\resetmathfonts \setleading{15pt}}
\let\subsubsecfonts = \subsecfonts
\def\reducedfonts{%
\let\tenrm=\reducedrm \let\tenit=\reducedit \let\tensl=\reducedsl
\let\tenbf=\reducedbf \let\tentt=\reducedtt \let\reducedcaps=\reducedsc
\let\tensf=\reducedsf \let\teni=\reducedi \let\tensy=\reducedsy
\let\tenttsl=\reducedttsl
\def\curfontsize{reduced}%
\def\lsize{small}\def\lllsize{smaller}%
\resetmathfonts \setleading{10.5pt}}
\def\smallfonts{%
```

```
\let\tenrm=\smallrm \let\tenit=\smallit \let\tensl=\smallsl
\let\tenbf=\smallbf \let\tentt=\smalltt \let\smallcaps=\smallsc
\let\tensf=\smallsf \let\teni=\smalli \let\tensy=\smallsy
\let\tenttsl=\smallttsl
\def\curfontsize{small}%
\def\lsize{smaller}\def\lllsize{smaller}%
\resetmathfonts \setleading{10.5pt}}
\def\smallerfonts{%
\let\tenrm=\smallerrm \let\tenit=\smallerit \let\tensl=\smallersl
\let\tenbf=\smallerbf \let\tentt=\smallertt \let\smallcaps=\smallersc
\let\tensf=\smallersf \let\teni=\smalleri \let\tensy=\smallersy
\let\tenttsl=\smallerttsl
\def\curfontsize{smaller}%
\def\lsize{smaller}\def\lllsize{smaller}%
\resetmathfonts \setleading{9.5pt}}

% Fonts for short table of contents.
\setfont\shortcontrm\rmshape{12}{1000}{OT1}
\setfont\shortcontbf\bfshape{10}{\magstep1}{OT1}  % no cmb12
\setfont\shortcontsl\slshape{12}{1000}{OT1}
\setfont\shortconttt\ttshape{12}{1000}{OT1TT}

% Define these just so they can be easily changed for other fonts.
\def\angleleft{$\langle$}
\def\angleright{$\rangle$}

% Set the fonts to use with the @small... environments.
\let\smallexamplefonts = \smallfonts

% About \smallexamplefonts.  If we use \smallfonts (9pt), @smallexample
% can fit this many characters:
%   8.5x11=86  smallbook=72  a4=90  a5=69
% If we use \scriptfonts (8pt), then we can fit this many characters:
%   8.5x11=90+  smallbook=80  a4=90+  a5=77
% For me, subjectively, the few extra characters that fit aren't worth
% the additional smallness of 8pt.  So I'm making the default 9pt.
%
% By the way, for comparison, here's what fits with @example (10pt):
%   8.5x11=71  smallbook=60  a4=75  a5=58
% --karl, 24jan03.

% Set up the default fonts, so we can use them for creating boxes.
%
\definetextfontsizexi


\message{markup,}
```

```
% Check if we are currently using a typewriter font.  Since all the
% Computer Modern typewriter fonts have zero interword stretch (and
% shrink), and it is reasonable to expect all typewriter fonts to have
% this property, we can check that font parameter.
%
\def\ifmonospace{\ifdim\fontdimen3\font=0pt }


% Markup style infrastructure.  \defmarkupstylesetup\INITMACRO will
% define and register \INITMACRO to be called on markup style changes.
% \INITMACRO can check \currentmarkupstyle for the innermost
% style and the set of \ifmarkupSTYLE switches for all styles
% currently in effect.
\newif\ifmarkupvar
\newif\ifmarkupsamp
\newif\ifmarkupkey
%\newif\ifmarkupfile % @file == @samp.
%\newif\ifmarkupoption % @option == @samp.
\newif\ifmarkupcode
\newif\ifmarkupkbd
%\newif\ifmarkupenv % @env == @code.
%\newif\ifmarkupcommand % @command == @code.
\newif\ifmarkuptex % @tex (and part of @math, for now).
\newif\ifmarkupexample
\newif\ifmarkupverb
\newif\ifmarkupverbatim


\let\currentmarkupstyle\empty

\def\setupmarkupstyle#1{%
 \csname markup#1true\endcsname
 \def\currentmarkupstyle{#1}%
 \markupstylesetup
}

\let\markupstylesetup\empty

\def\defmarkupstylesetup#1{%
 \expandafter\def\expandafter\markupstylesetup
   \expandafter{\markupstylesetup #1}%
 \def#1%
}

% Markup style setup for left and right quotes.
\defmarkupstylesetup\markupsetuplq{%
 \expandafter\let\expandafter \temp
   \csname markupsetuplq\currentmarkupstyle\endcsname
 \ifx\temp\relax \markupsetuplqdefault \else \temp \fi
}
```

```
\defmarkupstylesetup\markupsetuprq{%
 \expandafter\let\expandafter \temp
   \csname markupsetuprq\currentmarkupstyle\endcsname
 \ifx\temp\relax \markupsetuprqdefault \else \temp \fi
}

{
\catcode`\'=\active
\catcode`\`=\active

\gdef\markupsetuplqdefault{\let`\lq}
\gdef\markupsetuprqdefault{\let'\rq}

\gdef\markupsetcodequoteleft{\let`\codequoteleft}
\gdef\markupsetcodequoteright{\let'\codequoteright}
}

\let\markupsetuplqcode \markupsetcodequoteleft
\let\markupsetuprqcode \markupsetcodequoteright
%
\let\markupsetuplqexample \markupsetcodequoteleft
\let\markupsetuprqexample \markupsetcodequoteright
%
\let\markupsetuplqkbd     \markupsetcodequoteleft
\let\markupsetuprqkbd     \markupsetcodequoteright
%
\let\markupsetuplqsamp \markupsetcodequoteleft
\let\markupsetuprqsamp \markupsetcodequoteright
%
\let\markupsetuplqverb \markupsetcodequoteleft
\let\markupsetuprqverb \markupsetcodequoteright
%
\let\markupsetuplqverbatim \markupsetcodequoteleft
\let\markupsetuprqverbatim \markupsetcodequoteright

% Allow an option to not use regular directed right quote/apostrophe
% (char 0x27), but instead the undirected quote from cmtt (char 0x0d).
% The undirected quote is ugly, so don't make it the default, but it
% works for pasting with more pdf viewers (at least evince), the
% lilypond developers report.  xpdf does work with the regular 0x27.
%
\def\codequoteright{%
 \expandafter\ifx\csname SETtxicodequoteundirected\endcsname\relax
   \expandafter\ifx\csname SETcodequoteundirected\endcsname\relax
     '%
   \else \char'15 \fi
 \else \char'15 \fi
```

```
}
%
% and a similar option for the left quote char vs. a grave accent.
% Modern fonts display ASCII 0x60 as a grave accent, so some people like
% the code environments to do likewise.
%
\def\codequoteleft{%
 \expandafter\ifx\csname SETtxicodequotebacktick\endcsname\relax
   \expandafter\ifx\csname SETcodequotebacktick\endcsname\relax
     % [Knuth] pp. 380,381,391
     % \relax disables Spanish ligatures ?` and !` of \tt font.
     \relax`%
   \else \char'22 \fi
 \else \char'22 \fi
}


% Commands to set the quote options.
%
\parseargdef\codequoteundirected{%
 \def\temp{#1}%
 \ifx\temp\onword
   \expandafter\let\csname SETtxicodequoteundirected\endcsname
     = t%
 \else\ifx\temp\offword
   \expandafter\let\csname SETtxicodequoteundirected\endcsname
     = \relax
 \else
   \errhelp = \EMsimple
   \errmessage{Unknown @codequoteundirected value `\temp', must be on|off}%
 \fi\fi
}
%
\parseargdef\codequotebacktick{%
 \def\temp{#1}%
 \ifx\temp\onword
   \expandafter\let\csname SETtxicodequotebacktick\endcsname
     = t%
 \else\ifx\temp\offword
   \expandafter\let\csname SETtxicodequotebacktick\endcsname
     = \relax
 \else
   \errhelp = \EMsimple
   \errmessage{Unknown @codequotebacktick value `\temp', must be on|off}%
 \fi\fi
}


% [Knuth] pp. 380,381,391, disable Spanish ligatures ?` and !` of \tt font.
\def\noligaturesquoteleft{\relax\lq}
```

```
% Count depth in font-changes, for error checks
\newcount\fontdepth \fontdepth=0

% Font commands.

% #1 is the font command (\sl or \it), #2 is the text to slant.
% If we are in a monospaced environment, however, 1) always use \ttsl,
% and 2) do not add an italic correction.
\def\dosmartslant#1#2{%
 \ifusingtt
   {{\ttsl #2}\let\next=\relax}%
   {\def\next{{#1#2}\futurelet\next\smartitaliccorrection}}%
 \next
}
\def\smartslanted{\dosmartslant\sl}
\def\smartitalic{\dosmartslant\it}

% Output an italic correction unless \next (presumed to be the following
% character) is such as not to need one.
\def\smartitaliccorrection{%
 \ifx\next,%
 \else\ifx\next-%
 \else\ifx\next.%
 \else\ptexslash
 \fi\fi\fi
 \aftersmartic
}

% Unconditional use \ttsl, and no ic.  @var is set to this for defuns.
\def\ttslanted#1{{\ttsl #1}}

% @cite is like \smartslanted except unconditionally use \sl.  We never want
% ttsl for book titles, do we?
\def\cite#1{{\sl #1}\futurelet\next\smartitaliccorrection}

\def\aftersmartic{}
\def\var#1{%
 \let\saveaftersmartic = \aftersmartic
 \def\aftersmartic{\null\let\aftersmartic=\saveaftersmartic}%
 \smartslanted{#1}%
}

\let\i=\smartitalic
\let\slanted=\smartslanted
\let\dfn=\smartslanted
\let\emph=\smartitalic
```

```
% Explicit font changes: @r, @sc, undocumented @ii.
\def\r#1{{\rm #1}}          % roman font
\def\sc#1{{\smallcaps#1}}      % smallcaps font
\def\ii#1{{\it #1}}         % italic font


% @b, explicit bold.  Also @strong.
\def\b#1{{\bf #1}}
\let\strong=\b


% @sansserif, explicit sans.
\def\sansserif#1{{\sf #1}}


% We can't just use \exhyphenpenalty, because that only has effect at
% the end of a paragraph.  Restore normal hyphenation at the end of the
% group within which \nohyphenation is presumably called.
%
\def\nohyphenation{\hyphenchar\font = -1  \aftergroup\restorehyphenation}
\def\restorehyphenation{\hyphenchar\font = `- }


% Set sfcode to normal for the chars that usually have another value.
% Can't use plain's \frenchspacing because it uses the `\x notation, and
% sometimes \x has an active definition that messes things up.
%
\catcode`\@=11
 \def\plainfrenchspacing{%
  \sfcode\dotChar  =\@m \sfcode\questChar=\@m \sfcode\exclamChar=\@m
  \sfcode\colonChar=\@m \sfcode\semiChar =\@m \sfcode\commaChar =\@m
  \def\endofsentencespacefactor{1000}% for @. and friends
 }
 \def\plainnonfrenchspacing{%
  \sfcode`\.3000\sfcode`\?3000\sfcode`\!3000
  \sfcode`\:2000\sfcode`\;1500\sfcode`\,1250
  \def\endofsentencespacefactor{3000}% for @. and friends
 }
\catcode`\@=\other
\def\endofsentencespacefactor{3000}% default


% @t, explicit typewriter.
\def\t#1{%
 {\tt \rawbackslash \plainfrenchspacing #1}%
 \null
}


% @samp.
\def\samp#1{{\setupmarkupstyle{samp}\lq\tclose{#1}\rq\null}}


% @indicateurl is \samp, that is, with quotes.
\let\indicateurl=\samp
```

```
% @code (and similar) prints in typewriter, but with spaces the same
% size as normal in the surrounding text, without hyphenation, etc.
% This is a subroutine for that.
\def\tclose#1{%
 {%
   % Change normal interword space to be same as for the current font.
   \spaceskip = \fontdimen2\font
   %
   % Switch to typewriter.
   \tt
   %
   % But `\ ' produces the large typewriter interword space.
   \def\ {{\spaceskip = 0pt{} }}%
   %
   % Turn off hyphenation.
   \nohyphenation
   %
   \rawbackslash
   \plainfrenchspacing
   #1%
 }%
 \null % reset spacefactor to 1000
}


% We *must* turn on hyphenation at `-' and `_' in @code.
% Otherwise, it is too hard to avoid overfull hboxes
% in the Emacs manual, the Library manual, etc.
%
% Unfortunately, TeX uses one parameter (\hyphenchar) to control
% both hyphenation at - and hyphenation within words.
% We must therefore turn them both off (\tclose does that)
% and arrange explicitly to hyphenate at a dash.
%  -- rms.
{
\catcode`\-=\active \catcode`\_=\active
\catcode`\'=\active \catcode`\`=\active
\global\let'=\rq \global\let`=\lq  % default definitions
%
\global\def\code{\begingroup
 \setupmarkupstyle{code}%
 % The following should really be moved into \setupmarkupstyle handlers.
 \catcode\dashChar=\active  \catcode\underChar=\active
 \ifallowcodebreaks
  \let-\codedash
  \let_\codeunder
 \else
  \let-\normaldash
```

```
  \let_\realunder
 \fi
 \codex
}
}

\def\codex #1{\tclose{#1}\endgroup}

\def\normaldash{-}
\def\codedash{-\discretionary{}{}{}}
\def\codeunder{%
% this is all so @math{@code{var_name}+1} can work.  In math mode, _
% is "active" (mathcode"8000) and \normalunderscore (or \char95, etc.)
% will therefore expand the active definition of _, which is us
% (inside @code that is), therefore an endless loop.
\ifusingtt{\ifmmode
        \mathchar"075F % class 0=ordinary, family 7=ttfam, pos 0x5F=_.
       \else\normalunderscore \fi
       \discretionary{}{}{}}%
       {\_}%
}

% An additional complication: the above will allow breaks after, e.g.,
% each of the four underscores in __typeof__.  This is bad.
% @allowcodebreaks provides a document-level way to turn breaking at -
% and _ on and off.
%
\newif\ifallowcodebreaks  \allowcodebreakstrue

\def\keywordtrue{true}
\def\keywordfalse{false}

\parseargdef\allowcodebreaks{%
\def\txiarg{#1}%
\ifx\txiarg\keywordtrue
  \allowcodebreakstrue
\else\ifx\txiarg\keywordfalse
  \allowcodebreaksfalse
\else
 \errhelp = \EMsimple
 \errmessage{Unknown @allowcodebreaks option `\txiarg', must be true|false}%
\fi\fi
}

% For @command, @env, @file, @option quotes seem unnecessary,
% so use \code rather than \samp.
\let\command=\code
\let\env=\code
```

```
\let\file=\code
\let\option=\code

% @uref (abbreviation for `urlref') takes an optional (comma-separated)
% second argument specifying the text to display and an optional third
% arg as text to display instead of (rather than in addition to) the url
% itself.  First (mandatory) arg is the url.
% (This \urefnobreak definition isn't used now, leaving it for a while
% for comparison.)
\def\urefnobreak#1{\dourefnobreak #1,,,\finish}
\def\dourefnobreak#1,#2,#3,#4\finish{\begingroup
 \unsepspaces
 \pdfurl{#1}%
 \setbox0 = \hbox{\ignorespaces #3}%
 \ifdim\wd0 > 0pt
   \unhbox0 % third arg given, show only that
 \else
   \setbox0 = \hbox{\ignorespaces #2}%
   \ifdim\wd0 > 0pt
     \ifpdf
       \unhbox0          % PDF: 2nd arg given, show only it
     \else
       \unhbox0\ (\code{#1})% DVI: 2nd arg given, show both it and url
     \fi
   \else
     \code{#1}% only url given, so show it
   \fi
 \fi
 \endlink
 \endgroup}

% This \urefbreak definition is the active one.
\def\urefbreak{\begingroup \urefcatcodes \dourefbreak}
\let\uref=\urefbreak
\def\dourefbreak#1{\urefbreakfinish #1,,,\finish}
\def\urefbreakfinish#1,#2,#3,#4\finish{% doesn't work in @example
 \unsepspaces
 \pdfurl{#1}%
 \setbox0 = \hbox{\ignorespaces #3}%
 \ifdim\wd0 > 0pt
   \unhbox0 % third arg given, show only that
 \else
   \setbox0 = \hbox{\ignorespaces #2}%
   \ifdim\wd0 > 0pt
     \ifpdf
       \unhbox0          % PDF: 2nd arg given, show only it
     \else
       \unhbox0\ (\urefcode{#1})% DVI: 2nd arg given, show both it and url
```

```
     \fi
   \else
     \urefcode{#1}% only url given, so show it
   \fi
 \fi
 \endlink
\endgroup}


% Allow line breaks around only a few characters (only).
\def\urefcatcodes{%
 \catcode\ampChar=\active  \catcode\dotChar=\active
 \catcode\hashChar=\active  \catcode\questChar=\active
 \catcode\slashChar=\active
}
{
 \urefcatcodes
 %
 \global\def\urefcode{\begingroup
   \setupmarkupstyle{code}%
   \urefcatcodes
   \let&\urefcodeamp
   \let.\urefcodedot
   \let#\urefcodehash
   \let?\urefcodequest
   \let/\urefcodeslash
   \codex
 }
 %
 % By default, they are just regular characters.
 \global\def&{\normalamp}
 \global\def.{\normaldot}
 \global\def#{\normalhash}
 \global\def?{\normalquest}
 \global\def/{\normalslash}
}


% we put a little stretch before and after the breakable chars, to help
% line breaking of long url's.  The unequal skips make look better in
% cmtt at least, especially for dots.
\def\urefprestretch{\urefprebreak \hskip0pt plus.13em }
\def\urefpoststretch{\urefpostbreak \hskip0pt plus.1em }
%
\def\urefcodeamp{\urefprestretch \&\urefpoststretch}
\def\urefcodedot{\urefprestretch .\urefpoststretch}
\def\urefcodehash{\urefprestretch \#\urefpoststretch}
\def\urefcodequest{\urefprestretch ?\urefpoststretch}
\def\urefcodeslash{\futurelet\next\urefcodeslashfinish}
{
```

```
\catcode`\/=\active
\global\def\urefcodeslashfinish{%
 \urefprestretch \slashChar
 % Allow line break only after the final / in a sequence of
 % slashes, to avoid line break between the slashes in http://.
 \ifx\next/\else \urefpoststretch \fi
}
}


% One more complication: by default we'll break after the special
% characters, but some people like to break before the special chars, so
% allow that.  Also allow no breaking at all, for manual control.
%
\parseargdef\urefbreakstyle{%
 \def\txiarg{#1}%
 \ifx\txiarg\wordnone
  \def\urefprebreak{\nobreak}\def\urefpostbreak{\nobreak}
 \else\ifx\txiarg\wordbefore
  \def\urefprebreak{\allowbreak}\def\urefpostbreak{\nobreak}
 \else\ifx\txiarg\wordafter
  \def\urefprebreak{\nobreak}\def\urefpostbreak{\allowbreak}
 \else
  \errhelp = \EMsimple
  \errmessage{Unknown @urefbreakstyle setting `\txiarg'}%
 \fi\fi\fi
}
\def\wordafter{after}
\def\wordbefore{before}
\def\wordnone{none}

\urefbreakstyle after

% @url synonym for @uref, since that's how everyone uses it.
%
\let\url=\uref

% rms does not like angle brackets --karl, 17may97.
% So now @email is just like @uref, unless we are pdf.
%
%\def\email#1{\angleleft{\tt #1}\angleright}
\ifpdf
 \def\email#1{\doemail#1,,\finish}
 \def\doemail#1,#2,#3\finish{\begingroup
  \unsepspaces
  \pdfurl{mailto:#1}%
  \setbox0 = \hbox{\ignorespaces #2}%
  \ifdim\wd0>0pt\unhbox0\else\code{#1}\fi
  \endlink
```

```
 \endgroup}
\else
 \let\email=\uref
\fi

% @kbdinputstyle -- arg is `distinct' (@kbd uses slanted tty font always),
%   `example' (@kbd uses ttsl only inside of @example and friends),
%   or `code' (@kbd uses normal tty font always).
\parseargdef\kbdinputstyle{%
 \def\txiarg{#1}%
 \ifx\txiarg\worddistinct
   \gdef\kbdexamplefont{\ttsl}\gdef\kbdfont{\ttsl}%
 \else\ifx\txiarg\wordexample
   \gdef\kbdexamplefont{\ttsl}\gdef\kbdfont{\tt}%
 \else\ifx\txiarg\wordcode
   \gdef\kbdexamplefont{\tt}\gdef\kbdfont{\tt}%
 \else
   \errhelp = \EMsimple
   \errmessage{Unknown @kbdinputstyle setting `\txiarg'}%
 \fi\fi\fi
}
\def\worddistinct{distinct}
\def\wordexample{example}
\def\wordcode{code}

% Default is `distinct'.
\kbdinputstyle distinct

% @kbd is like @code, except that if the argument is just one @key command,
% then @kbd has no effect.
\def\kbd#1{{\def\look{#1}\expandafter\kbdsub\look??\par}}

\def\xkey{\key}
\def\kbdsub#1#2#3\par{%
 \def\one{#1}\def\three{#3}\def\threex{??}%
 \ifx\one\xkey\ifx\threex\three \key{#2}%
 \else{\tclose{\kbdfont\setupmarkupstyle{kbd}\look}}\fi
 \else{\tclose{\kbdfont\setupmarkupstyle{kbd}\look}}\fi
}

% definition of @key that produces a lozenge.  Doesn't adjust to text size.
%\setfont\keyrm\rmshape{8}{1000}{OT1}
%\font\keysy=cmsy9
%\def\key#1{{\keyrm\textfont2=\keysy \leavevmode\hbox{%
%  \raise0.4pt\hbox{\angleleft}\kern-.08em\vtop{%
%    \vbox{\hrule\kern-0.4pt
%     \hbox{\raise0.4pt\hbox{\vphantom{\angleleft}}#1}}%
%    \kern-0.4pt\hrule}%
```

```
%  \kern-.06em\raise0.4pt\hbox{\angleright}}}}

% definition of @key with no lozenge.  If the current font is already
% monospace, don't change it; that way, we respect @kbdinputstyle.  But
% if it isn't monospace, then use \tt.
%
\def\key#1{{\setupmarkupstyle{key}%
 \nohyphenation
 \ifmonospace\else\tt\fi
 #1}\null}

% @clicksequence{File @click{} Open ...}
\def\clicksequence#1{\begingroup #1\endgroup}

% @clickstyle @arrow   (by default)
\parseargdef\clickstyle{\def\click{#1}}
\def\click{\arrow}

% Typeset a dimension, e.g., `in' or `pt'.  The only reason for the
% argument is to make the input look right: @dmn{pt} instead of @dmn{}pt.
%
\def\dmn#1{\thinspace #1}

% @l was never documented to mean ``switch to the Lisp font'',
% and it is not used as such in any manual I can find.  We need it for
% Polish suppressed-l.  --karl, 22sep96.
%\def\l#1{{\li #1}\null}

% @acronym for "FBI", "NATO", and the like.
% We print this one point size smaller, since it's intended for
% all-uppercase.
%
\def\acronym#1{\doacronym #1,,\finish}
\def\doacronym#1,#2,#3\finish{%
 {\selectfonts\lsize #1}%
 \def\temp{#2}%
 \ifx\temp\empty \else
   \space ({\unsepspaces \ignorespaces \temp \unskip})%
 \fi
 \null % reset \spacefactor=1000
}

% @abbr for "Comput. J." and the like.
% No font change, but don't do end-of-sentence spacing.
%
\def\abbr#1{\doabbr #1,,\finish}
\def\doabbr#1,#2,#3\finish{%
 {\plainfrenchspacing #1}%
```

```
\def\temp{#2}%
\ifx\temp\empty \else
  \space ({\unsepspaces \ignorespaces \temp \unskip})%
\fi
\null % reset \spacefactor=1000
}


% @asis just yields its argument.  Used with @table, for example.
%
\def\asis#1{#1}


% @math outputs its argument in math mode.
%
% One complication: _ usually means subscripts, but it could also mean
% an actual _ character, as in @math{@var{some_variable} + 1}.  So make
% _ active, and distinguish by seeing if the current family is \slfam,
% which is what @var uses.
{
\catcode`\_ = \active
\gdef\mathunderscore{%
  \catcode`\_=\active
  \def_{\ifnum\fam=\slfam \_\else\sb\fi}%
}
}
% Another complication: we want \\ (and @\) to output a math (or tt) \.
% FYI, plain.tex uses \\ as a temporary control sequence (for no
% particular reason), but this is not advertised and we don't care.
%
% The \mathchar is class=0=ordinary, family=7=ttfam, position=5C=\.
\def\mathbackslash{\ifnum\fam=\ttfam \mathchar"075C \else\backslash \fi}
%
\def\math{%
\tex
\mathunderscore
\let\\ = \mathbackslash
\mathactive
% make the texinfo accent commands work in math mode
\let\"=\ddot
\let\'=\acute
\let\==\bar
\let\^=\hat
\let\`=\grave
\let\u=\breve
\let\v=\check
\let\~=\tilde
\let\dotaccent=\dot
$\finishmath
}
```

```
\def\finishmath#1{#1$\endgroup}  % Close the group opened by \tex.


% Some active characters (such as <) are spaced differently in math.
% We have to reset their definitions in case the @math was an argument
% to a command which sets the catcodes (such as @item or @section).
%
{
\catcode`^ = \active
\catcode`< = \active
\catcode`> = \active
\catcode`+ = \active
\catcode`' = \active
\gdef\mathactive{%
  \let^ = \ptexhat
  \let< = \ptexless
  \let> = \ptexgtr
  \let+ = \ptexplus
  \let' = \ptexquoteright
}
}


% ctrl is no longer a Texinfo command, but leave this definition for fun.
\def\ctrl #1{{\tt \rawbackslash \hat}#1}


% @inlinefmt{FMTNAME,PROCESSED-TEXT} and @inlineraw{FMTNAME,RAW-TEXT}.
% Ignore unless FMTNAME == tex; then it is like @iftex and @tex,
% except specified as a normal braced arg, so no newlines to worry about.
%
\def\outfmtnametex{tex}
%
\long\def\inlinefmt#1{\doinlinefmt #1,\finish}
\long\def\doinlinefmt#1,#2,\finish{%
  \def\inlinefmtname{#1}%
  \ifx\inlinefmtname\outfmtnametex \ignorespaces #2\fi
}
% For raw, must switch into @tex before parsing the argument, to avoid
% setting catcodes prematurely.  Doing it this way means that, for
% example, @inlineraw{html, foo{bar} gets a parse error instead of being
% ignored.  But this isn't important because if people want a literal
% *right* brace they would have to use a command anyway, so they may as
% well use a command to get a left brace too.  We could re-use the
% delimiter character idea from \verb, but it seems like overkill.
%
\long\def\inlineraw{\tex \doinlineraw}
\long\def\doinlineraw#1{\doinlinerawtwo #1,\finish}
\def\doinlinerawtwo#1,#2,\finish{%
  \def\inlinerawname{#1}%
  \ifx\inlinerawname\outfmtnametex \ignorespaces #2\fi
```

```
\endgroup % close group opened by \tex.
}


\message{glyphs,}
% and logos.

% @@ prints an @, as does @atchar{}.
\def\@{\char64 }
\let\atchar=\@

% @{ @} @lbracechar{} @rbracechar{} all generate brace characters.
% Unless we're in typewriter, use \ecfont because the CM text fonts do
% not have braces, and we don't want to switch into math.
\def\mylbrace{{\ifmonospace\else\ecfont\fi \char123}}
\def\myrbrace{{\ifmonospace\else\ecfont\fi \char125}}
\let\{=\mylbrace \let\lbracechar=\{
\let\}=\myrbrace \let\rbracechar=\}
\begingroup
 % Definitions to produce \{ and \} commands for indices,
 % and @{ and @} for the aux/toc files.
 \catcode`\{ = \other \catcode`\} = \other
 \catcode`\[ = 1 \catcode`\] = 2
 \catcode`\! = 0 \catcode`\\ = \other
 !gdef!lbracecmd[\{]%
 !gdef!rbracecmd[\}]%
 !gdef!lbraceatcmd[@{]%
 !gdef!rbraceatcmd[@}]%
!endgroup

% @comma{} to avoid , parsing problems.
\let\comma = ,

% Accents: @, @dotaccent @ringaccent @ubaraccent @udotaccent
% Others are defined by plain TeX: @` @' @" @^ @~ @= @u @v @H.
\let\, = \ptexc
\let\dotaccent = \ptexdot
\def\ringaccent#1{{\accent23 #1}}
\let\tieaccent = \ptext
\let\ubaraccent = \ptexb
\let\udotaccent = \d

% Other special characters: @questiondown @exclamdown @ordf @ordm
% Plain TeX defines: @AA @AE @O @OE @L (plus lowercase versions) @ss.
\def\questiondown{?`}
\def\exclamdown{!`}
\def\ordf{\leavevmode\raise1ex\hbox{\selectfonts\lllsize \underbar{a}}}
\def\ordm{\leavevmode\raise1ex\hbox{\selectfonts\lllsize \underbar{o}}}
```

```
% Dotless i and dotless j, used for accents.
\def\imacro{i}
\def\jmacro{j}
\def\dotless#1{%
 \def\temp{#1}%
 \ifx\temp\imacro \ifmmode\imath \else\ptexi \fi
 \else\ifx\temp\jmacro \ifmmode\jmath \else\j \fi
 \else \errmessage{@dotless can be used only with i or j}%
 \fi\fi
}

% The \TeX{} logo, as in plain, but resetting the spacing so that a
% period following counts as ending a sentence.  (Idea found in latex.)
%
\edef\TeX{\TeX \spacefactor=1000 }

% @LaTeX{} logo.  Not quite the same results as the definition in
% latex.ltx, since we use a different font for the raised A; it's most
% convenient for us to use an explicitly smaller font, rather than using
% the \scriptstyle font (since we don't reset \scriptstyle and
% \scriptscriptstyle).
%
\def\LaTeX{%
 L\kern-.36em
 {\setbox0=\hbox{T}%
 \vbox to \ht0{\hbox{%
   \ifx\textnominalsize\xwordpt
     % for 10pt running text, \lllsize (8pt) is too small for the A in LaTeX.
     % Revert to plain's \scriptsize, which is 7pt.
     \count255=\the\fam $\fam\count255 \scriptstyle A$%
   \else
     % For 11pt, we can use our lllsize.
     \selectfonts\lllsize A%
   \fi
   }%
   \vss
}}%
\kern-.15em
\TeX
}

% Some math mode symbols.
\def\bullet{$\ptexbullet$}
\def\geq{\ifmmode \ge\else $\ge$\fi}
\def\leq{\ifmmode \le\else $\le$\fi}
\def\minus{\ifmmode -\else $-$\fi}
```

```
% @dots{} outputs an ellipsis using the current font.
% We do .5em per period so that it has the same spacing in the cm
% typewriter fonts as three actual period characters; on the other hand,
% in other typewriter fonts three periods are wider than 1.5em.  So do
% whichever is larger.
%
\def\dots{%
 \leavevmode
 \setbox0=\hbox{...}% get width of three periods
 \ifdim\wd0 > 1.5em
   \dimen0 = \wd0
 \else
   \dimen0 = 1.5em
 \fi
 \hbox to \dimen0{%
   \hskip 0pt plus.25fil
   .\hskip 0pt plus1fil
   .\hskip 0pt plus1fil
   .\hskip 0pt plus.5fil
 }%
}

% @enddots{} is an end-of-sentence ellipsis.
%
\def\enddots{%
 \dots
 \spacefactor=\endofsentencespacefactor
}

% @point{}, @result{}, @expansion{}, @print{}, @equiv{}.
%
% Since these characters are used in examples, they should be an even number of
% \tt widths. Each \tt character is 1en, so two makes it 1em.
%
\def\point{$\star$}
\def\arrow{\leavevmode\raise.05ex\hbox to 1em{\hfil$\rightarrow$\hfil}}
\def\result{\leavevmode\raise.05ex\hbox to 1em{\hfil$\Rightarrow$\hfil}}
\def\expansion{\leavevmode\hbox to 1em{\hfil$\mapsto$\hfil}}
\def\print{\leavevmode\lower.1ex\hbox to 1em{\hfil$\dashv$\hfil}}
\def\equiv{\leavevmode\hbox to 1em{\hfil$\ptexequiv$\hfil}}

% The @error{} command.
% Adapted from the TeXbook's \boxit.
%
\newbox\errorbox
%
{\tentt \global\dimen0 = 3em}% Width of the box.
\dimen2 = .55pt % Thickness of rules
```

% The text. (`r' is open on the right, `e' somewhat less so on the left.)
\setbox0 = \hbox{\kern-.75pt \reducedsf \putworderror\kern-1.5pt}
%
\setbox\errorbox=\hbox to \dimen0{\hfil
 \hsize = \dimen0 \advance\hsize by -5.8pt % Space to left+right.
 \advance\hsize by -2\dimen2 % Rules.
 \vbox{%
   \hrule height\dimen2
   \hbox{\vrule width\dimen2 \kern3pt   % Space to left of text.
     \vtop{\kern2.4pt \box0 \kern2.4pt}% Space above/below.
     \kern3pt\vrule width\dimen2}% Space to right.
   \hrule height\dimen2}
 \hfil}
%
\def\error{\leavevmode\lower.7ex\copy\errorbox}

% @pounds{} is a sterling sign, which Knuth put in the CM italic font.
%
\def\pounds{{\it\$}}

% @euro{} comes from a separate font, depending on the current style.
% We use the free feym* fonts from the eurosym package by Henrik
% Theiling, which support regular, slanted, bold and bold slanted (and
% "outlined" (blackboard board, sort of) versions, which we don't need).
% It is available from http://www.ctan.org/tex-archive/fonts/eurosym.
%
% Although only regular is the truly official Euro symbol, we ignore
% that. The Euro is designed to be slightly taller than the regular
% font height.
%
% feymr - regular
% feymo - slanted
% feybr - bold
% feybo - bold slanted
%
% There is no good (free) typewriter version, to my knowledge.
% A feymr10 euro is ~7.3pt wide, while a normal cmtt10 char is ~5.25pt wide.
% Hmm.
%
% Also doesn't work in math. Do we need to do math with euro symbols?
% Hope not.
%
%
\def\euro{{\eurofont e}}
\def\eurofont{%
 % We set the font at each command, rather than predefining it in
 % \textfonts and the other font-switching commands, so that
 % installations which never need the symbol don't have to have the

```
% font installed.
%
% There is only one designed size (nominal 10pt), so we always scale
% that to the current nominal size.
%
% By the way, simply using "at 1em" works for cmr10 and the like, but
% does not work for cmbx10 and other extended/shrunken fonts.
%
\def\eurosize{\csname\curfontsize nominalsize\endcsname}%
%
\ifx\curfontstyle\bfstylename
  % bold:
  \font\thiseurofont = \ifusingit{feybo10}{feybr10} at \eurosize
\else
  % regular:
  \font\thiseurofont = \ifusingit{feymo10}{feymr10} at \eurosize
\fi
\thiseurofont
}


% Glyphs from the EC fonts.  We don't use \let for the aliases, because
% sometimes we redefine the original macro, and the alias should reflect
% the redefinition.
%
% Use LaTeX names for the Icelandic letters.
\def\DH{{\ecfont \char"D0}} % Eth
\def\dh{{\ecfont \char"F0}} % eth
\def\TH{{\ecfont \char"DE}} % Thorn
\def\th{{\ecfont \char"FE}} % thorn
%
\def\guillemetleft{{\ecfont \char"13}}
\def\guillemotleft{\guillemetleft}
\def\guillemetright{{\ecfont \char"14}}
\def\guillemotright{\guillemetright}
\def\guilsinglleft{{\ecfont \char"0E}}
\def\guilsinglright{{\ecfont \char"0F}}
\def\quotedblbase{{\ecfont \char"12}}
\def\quotesinglbase{{\ecfont \char"0D}}
%
% This positioning is not perfect (see the ogonek LaTeX package), but
% we have the precomposed glyphs for the most common cases.  We put the
% tests to use those glyphs in the single \ogonek macro so we have fewer
% dummy definitions to worry about for index entries, etc.
%
% ogonek is also used with other letters in Lithuanian (IOU), but using
% the precomposed glyphs for those is not so easy since they aren't in
% the same EC font.
\def\ogonek#1{{%
```

```
\def\temp{#1}%
\ifx\temp\macrocharA\Aogonek
\else\ifx\temp\macrochara\aogonek
\else\ifx\temp\macrocharE\Eogonek
\else\ifx\temp\macrochare\eogonek
\else
  \ecfont \setbox0=\hbox{#1}%
  \ifdim\ht0=1ex\accent"0C #1%
  \else\ooalign{\unhbox0\crcr\hidewidth\char"0C \hidewidth}%
  \fi
\fi\fi\fi\fi
 }%
}
\def\Aogonek{{\ecfont \char"81}}\def\macrocharA{A}
\def\aogonek{{\ecfont \char"A1}}\def\macrochara{a}
\def\Eogonek{{\ecfont \char"86}}\def\macrocharE{E}
\def\eogonek{{\ecfont \char"A6}}\def\macrochare{e}
%
% Use the ec* fonts (cm-super in outline format) for non-CM glyphs.
\def\ecfont{%
 % We can't distinguish serif/sans and italic/slanted, but this
 % is used for crude hacks anyway (like adding French and German
 % quotes to documents typeset with CM, where we lose kerning), so
 % hopefully nobody will notice/care.
\edef\ecsize{\csname\curfontsize ecsize\endcsname}%
\edef\nominalsize{\csname\curfontsize nominalsize\endcsname}%
\ifmonospace
  % typewriter:
  \font\thisecfont = ectt\ecsize \space at \nominalsize
\else
 \ifx\curfontstyle\bfstylename
   % bold:
   \font\thisecfont = ecb\ifusingit{i}{x}\ecsize \space at \nominalsize
  \else
   % regular:
   \font\thisecfont = ec\ifusingit{ti}{rm}\ecsize \space at \nominalsize
  \fi
\fi
\thisecfont
}

% @registeredsymbol - R in a circle.  The font for the R should really
% be smaller yet, but lllsize is the best we can do for now.
% Adapted from the plain.tex definition of \copyright.
%
\def\registeredsymbol{%
 $^{{\ooalign{\hfil\raise.07ex\hbox{\selectfonts\lllsize R}%
        \hfil\crcr\Orb}}%
```

```
    }$%
}

% @textdegree - the normal degrees sign.
%
\def\textdegree{$^\circ$}

% Laurent Siebenmann reports \Orb undefined with:
%  Textures 1.7.7 (preloaded format=plain 93.10.14) (68K) 16 APR 2004 02:38
% so we'll define it if necessary.
%
\ifx\Orb\thisisundefined
\def\Orb{\mathhexbox20D}
\fi

% Quotes.
\chardef\quotedblleft="5C
\chardef\quotedblright=`\"
\chardef\quoteleft=`\`
\chardef\quoteright=`\'


\message{page headings,}

\newskip\titlepagetopglue \titlepagetopglue = 1.5in
\newskip\titlepagebottomglue \titlepagebottomglue = 2pc

% First the title page.  Must do @settitle before @titlepage.
\newif\ifseenauthor
\newif\iffinishedtitlepage

% Do an implicit @contents or @shortcontents after @end titlepage if the
% user says @setcontentsaftertitlepage or @setshortcontentsaftertitlepage.
%
\newif\ifsetcontentsaftertitlepage
\let\setcontentsaftertitlepage = \setcontentsaftertitlepagetrue
\newif\ifsetshortcontentsaftertitlepage
\let\setshortcontentsaftertitlepage = \setshortcontentsaftertitlepagetrue

\parseargdef\shorttitlepage{%
 \begingroup \hbox{}\vskip 1.5in \chaprm \centerline{#1}%
 \endgroup\page\hbox{}\page}

\envdef\titlepage{%
 % Open one extra group, as we want to close it in the middle of \Etitlepage.
 \begingroup
   \parindent=0pt \textfonts
   % Leave some space at the very top of the page.
```

```
  \vglue\titlepagetopglue
  % No rule at page bottom unless we print one at the top with @title.
  \finishedtitlepagetrue
  %
  % Most title ``pages'' are actually two pages long, with space
  % at the top of the second.  We don't want the ragged left on the second.
  \let\oldpage = \page
  \def\page{%
    \iffinishedtitlepage\else
  \finishtitlepage
    \fi
    \let\page = \oldpage
    \page
    \null
  }%
}

\def\Etitlepage{%
  \iffinishedtitlepage\else
 \finishtitlepage
  \fi
  % It is important to do the page break before ending the group,
  % because the headline and footline are only empty inside the group.
  % If we use the new definition of \page, we always get a blank page
  % after the title page, which we certainly don't want.
  \oldpage
\endgroup
%
% Need this before the \...aftertitlepage checks so that if they are
% in effect the toc pages will come out with page numbers.
\HEADINGSon
%
% If they want short, they certainly want long too.
\ifsetshortcontentsaftertitlepage
  \shortcontents
  \contents
  \global\let\shortcontents = \relax
  \global\let\contents = \relax
\fi
%
\ifsetcontentsaftertitlepage
  \contents
  \global\let\contents = \relax
  \global\let\shortcontents = \relax
\fi
}

\def\finishtitlepage{%
```

```
\vskip4pt \hrule height 2pt width \hsize
\vskip\titlepagebottomglue
\finishedtitlepagetrue
}

% Settings used for typesetting titles: no hyphenation, no indentation,
% don't worry much about spacing, ragged right.  This should be used
% inside a \vbox, and fonts need to be set appropriately first.  Because
% it is always used for titles, nothing else, we call \rmisbold.  \par
% should be specified before the end of the \vbox, since a vbox is a group.
%
\def\raggedtitlesettings{%
 \rmisbold
 \hyphenpenalty=10000
 \parindent=0pt
 \tolerance=5000
 \ptexraggedright
}

% Macros to be used within @titlepage:

\let\subtitlerm=\tenrm
\def\subtitlefont{\subtitlerm \normalbaselineskip = 13pt \normalbaselines}

\parseargdef\title{%
 \checkenv\titlepage
 \vbox{\titlefonts \raggedtitlesettings #1\par}%
 % print a rule at the page bottom also.
 \finishedtitlepagefalse
 \vskip4pt \hrule height 4pt width \hsize \vskip4pt
}

\parseargdef\subtitle{%
 \checkenv\titlepage
 {\subtitlefont \rightline{#1}}%
}

% @author should come last, but may come many times.
% It can also be used inside @quotation.
%
\parseargdef\author{%
 \def\temp{\quotation}%
 \ifx\thisenv\temp
  \def\quotationauthor{#1}% printed in \Equotation.
 \else
  \checkenv\titlepage
  \ifseenauthor\else \vskip 0pt plus 1filll \seenauthortrue \fi
  {\secfonts\rmisbold \leftline{#1}}%
```

```
\fi
}


% Set up page headings and footings.

\let\thispage=\folio

\newtoks\evenheadline    % headline on even pages
\newtoks\oddheadline     % headline on odd pages
\newtoks\evenfootline    % footline on even pages
\newtoks\oddfootline     % footline on odd pages

% Now make TeX use those variables
\headline={{\textfonts\rm \ifodd\pageno \the\oddheadline
                \else \the\evenheadline \fi}}
\footline={{\textfonts\rm \ifodd\pageno \the\oddfootline
                \else \the\evenfootline \fi}\HEADINGShook}
\let\HEADINGShook=\relax

% Commands to set those variables.
% For example, this is what  @headings on  does
% @evenheading @thistitle|@thispage|@thischapter
% @oddheading @thischapter|@thispage|@thistitle
% @evenfooting @thisfile||
% @oddfooting ||@thisfile


\def\evenheading{\parsearg\evenheadingxxx}
\def\evenheadingxxx #1{\evenheadingyyy #1\|\|\|\|\finish}
\def\evenheadingyyy #1\|#2\|#3\|#4\finish{%
\global\evenheadline={\rlap{\centerline{#2}}\line{#1\hfil#3}}}

\def\oddheading{\parsearg\oddheadingxxx}
\def\oddheadingxxx #1{\oddheadingyyy #1\|\|\|\|\finish}
\def\oddheadingyyy #1\|#2\|#3\|#4\finish{%
\global\oddheadline={\rlap{\centerline{#2}}\line{#1\hfil#3}}}

\parseargdef\everyheading{\oddheadingxxx{#1}\evenheadingxxx{#1}}%

\def\evenfooting{\parsearg\evenfootingxxx}
\def\evenfootingxxx #1{\evenfootingyyy #1\|\|\|\|\finish}
\def\evenfootingyyy #1\|#2\|#3\|#4\finish{%
\global\evenfootline={\rlap{\centerline{#2}}\line{#1\hfil#3}}}

\def\oddfooting{\parsearg\oddfootingxxx}
\def\oddfootingxxx #1{\oddfootingyyy #1\|\|\|\|\finish}
\def\oddfootingyyy #1\|#2\|#3\|#4\finish{%
```

```
\global\oddfootline = {\rlap{\centerline{#2}}\line{#1\hfil#3}}%
%
% Leave some space for the footline.  Hopefully ok to assume
% @evenfooting will not be used by itself.
\global\advance\pageheight by -12pt
\global\advance\vsize by -12pt
}


\parseargdef\everyfooting{\oddfootingxxx{#1}\evenfootingxxx{#1}}


% @evenheadingmarks top     \thischapter <- chapter at the top of a page
% @evenheadingmarks bottom  \thischapter <- chapter at the bottom of a page
%
% The same set of arguments for:
%
% @oddheadingmarks
% @evenfootingmarks
% @oddfootingmarks
% @everyheadingmarks
% @everyfootingmarks


\def\evenheadingmarks{\headingmarks{even}{heading}}
\def\oddheadingmarks{\headingmarks{odd}{heading}}
\def\evenfootingmarks{\headingmarks{even}{footing}}
\def\oddfootingmarks{\headingmarks{odd}{footing}}
\def\everyheadingmarks#1 {\headingmarks{even}{heading}{#1}
               \headingmarks{odd}{heading}{#1} }
\def\everyfootingmarks#1 {\headingmarks{even}{footing}{#1}
               \headingmarks{odd}{footing}{#1} }
% #1 = even/odd, #2 = heading/footing, #3 = top/bottom.
\def\headingmarks#1#2#3 {%
 \expandafter\let\expandafter\temp \csname get#3headingmarks\endcsname
 \global\expandafter\let\csname get#1#2marks\endcsname \temp
}


\everyheadingmarks bottom
\everyfootingmarks bottom


% @headings double     turns headings on for double-sided printing.
% @headings single     turns headings on for single-sided printing.
% @headings off        turns them off.
% @headings on         same as @headings double, retained for compatibility.
% @headings after      turns on double-sided headings after this page.
% @headings doubleafter turns on double-sided headings after this page.
% @headings singleafter turns on single-sided headings after this page.
% By default, they are off at the start of a document,
% and turned `on' after @end titlepage.
```

```
\def\headings #1 {\csname HEADINGS#1\endcsname}

\def\headingsoff{% non-global headings elimination
 \evenheadline={\hfil}\evenfootline={\hfil}%
  \oddheadline={\hfil}\oddfootline={\hfil}%
}

\def\HEADINGSoff{{\globaldefs=1 \headingsoff}} % global setting
\HEADINGSoff  % it's the default

% When we turn headings on, set the page number to 1.
% For double-sided printing, put current file name in lower left corner,
% chapter name on inside top of right hand pages, document
% title on inside top of left hand pages, and page numbers on outside top
% edge of all pages.
\def\HEADINGSdouble{%
\global\pageno=1
\global\evenfootline={\hfil}
\global\oddfootline={\hfil}
\global\evenheadline={\line{\folio\hfil\thistitle}}
\global\oddheadline={\line{\thischapter\hfil\folio}}
\global\let\contentsalignmacro = \chapoddpage
}
\let\contentsalignmacro = \chappager

% For single-sided printing, chapter title goes across top left of page,
% page number on top right.
\def\HEADINGSsingle{%
\global\pageno=1
\global\evenfootline={\hfil}
\global\oddfootline={\hfil}
\global\evenheadline={\line{\thischapter\hfil\folio}}
\global\oddheadline={\line{\thischapter\hfil\folio}}
\global\let\contentsalignmacro = \chappager
}
\def\HEADINGSon{\HEADINGSdouble}

\def\HEADINGSafter{\let\HEADINGShook=\HEADINGSdoublex}
\let\HEADINGSdoubleafter=\HEADINGSafter
\def\HEADINGSdoublex{%
\global\evenfootline={\hfil}
\global\oddfootline={\hfil}
\global\evenheadline={\line{\folio\hfil\thistitle}}
\global\oddheadline={\line{\thischapter\hfil\folio}}
\global\let\contentsalignmacro = \chapoddpage
}

\def\HEADINGSsingleafter{\let\HEADINGShook=\HEADINGSsinglex}
```

```
\def\HEADINGSsinglex{%
\global\evenfootline={\hfil}
\global\oddfootline={\hfil}
\global\evenheadline={\line{\thischapter\hfil\folio}}
\global\oddheadline={\line{\thischapter\hfil\folio}}
\global\let\contentsalignmacro = \chappager
}

% Subroutines used in generating headings
% This produces Day Month Year style of output.
% Only define if not already defined, in case a txi-??.tex file has set
% up a different format (e.g., txi-cs.tex does this).
\ifx\today\thisisundefined
\def\today{%
 \number\day\space
 \ifcase\month
 \or\putwordMJan\or\putwordMFeb\or\putwordMMar\or\putwordMApr
 \or\putwordMMay\or\putwordMJun\or\putwordMJul\or\putwordMAug
 \or\putwordMSep\or\putwordMOct\or\putwordMNov\or\putwordMDec
 \fi
 \space\number\year}
\fi

% @settitle line...  specifies the title of the document, for headings.
% It generates no output of its own.
\def\thistitle{\putwordNoTitle}
\def\settitle{\parsearg{\gdef\thistitle}}


\message{tables,}
% Tables -- @table, @ftable, @vtable, @item(x).

% default indentation of table text
\newdimen\tableindent \tableindent=.8in
% default indentation of @itemize and @enumerate text
\newdimen\itemindent  \itemindent=.3in
% margin between end of table item and start of table text.
\newdimen\itemmargin  \itemmargin=.1in

% used internally for \itemindent minus \itemmargin
\newdimen\itemmax

% Note @table, @ftable, and @vtable define @item, @itemx, etc., with
% these defs.
% They also define \itemindex
% to index the item name in whatever manner is desired (perhaps none).

\newif\ifitemxneedsnegativevskip
```

```
\def\itemxpar{\par\ifitemxneedsnegativevskip\nobreak\vskip-\parskip\nobreak\fi}

\def\internalBitem{\smallbreak \parsearg\itemzzz}
\def\internalBitemx{\itemxpar \parsearg\itemzzz}

\def\itemzzz #1{\begingroup %
 \advance\hsize by -\rightskip
 \advance\hsize by -\tableindent
 \setbox0=\hbox{\itemindicate{#1}}%
 \itemindex{#1}%
 \nobreak % This prevents a break before @itemx.
 %
 % If the item text does not fit in the space we have, put it on a line
 % by itself, and do not allow a page break either before or after that
 % line.  We do not start a paragraph here because then if the next
 % command is, e.g., @kindex, the whatsit would get put into the
 % horizontal list on a line by itself, resulting in extra blank space.
 \ifdim \wd0>\itemmax
  %
  % Make this a paragraph so we get the \parskip glue and wrapping,
  % but leave it ragged-right.
  \begingroup
   \advance\leftskip by-\tableindent
   \advance\hsize by\tableindent
   \advance\rightskip by0pt plus1fil\relax
   \leavevmode\unhbox0\par
  \endgroup
  %
  % We're going to be starting a paragraph, but we don't want the
  % \parskip glue -- logically it's part of the @item we just started.
  \nobreak \vskip-\parskip
  %
  % Stop a page break at the \parskip glue coming up.  However, if
  % what follows is an environment such as @example, there will be no
  % \parskip glue; then the negative vskip we just inserted would
  % cause the example and the item to crash together.  So we use this
  % bizarre value of 10001 as a signal to \aboveenvbreak to insert
  % \parskip glue after all.  Section titles are handled this way also.
  %
  \penalty 10001
  \endgroup
  \itemxneedsnegativevskipfalse
 \else
  % The item text fits into the space.  Start a paragraph, so that the
  % following text (if any) will end up on the same line.
  \noindent
  % Do this with kerns and \unhbox so that if there is a footnote in
```

```
  % the item text, it can migrate to the main vertical list and
  % eventually be printed.
  \nobreak\kern-\tableindent
  \dimen0 = \itemmax  \advance\dimen0 by \itemmargin \advance\dimen0 by -\wd0
  \unhbox0
  \nobreak\kern\dimen0
  \endgroup
  \itemxneedsnegativevskiptrue
 \fi
}

\def\item{\errmessage{@item while not in a list environment}}
\def\itemx{\errmessage{@itemx while not in a list environment}}

% @table, @ftable, @vtable.
\envdef\table{%
 \let\itemindex\gobble
 \tablecheck{table}%
}
\envdef\ftable{%
 \def\itemindex ##1{\doind {fn}{\code{##1}}}%
 \tablecheck{ftable}%
}
\envdef\vtable{%
 \def\itemindex ##1{\doind {vr}{\code{##1}}}%
 \tablecheck{vtable}%
}
\def\tablecheck#1{%
 \ifnum \the\catcode`\^^M=\active
  \endgroup
  \errmessage{This command won't work in this context; perhaps the problem is
    that we are \inenvironment\thisenv}%
  \def\next{\doignore{#1}}%
 \else
  \let\next\tablex
 \fi
 \next
}
\def\tablex#1{%
 \def\itemindicate{#1}%
 \parsearg\tabley
}
\def\tabley#1{%
 {%
  \makevalueexpandable
  \edef\temp{\noexpand\tablez #1\space\space\space}%
  \expandafter
 }\temp \endtablez
```

```
}
\def\tablez #1 #2 #3 #4\endtablez{%
\aboveenvbreak
\ifnum 0#1>0 \advance \leftskip by #1\mil \fi
\ifnum 0#2>0 \tableindent=#2\mil \fi
\ifnum 0#3>0 \advance \rightskip by #3\mil \fi
\itemmax=\tableindent
\advance \itemmax by -\itemmargin
\advance \leftskip by \tableindent
\exdentamount=\tableindent
\parindent = 0pt
\parskip = \smallskipamount
\ifdim \parskip=0pt \parskip=2pt \fi
\let\item = \internalBitem
\let\itemx = \internalBitemx
}
\def\Etable{\endgraf\afterenvbreak}
\let\Eftable\Etable
\let\Evtable\Etable
\let\Eitemize\Etable
\let\Eenumerate\Etable

% This is the counter used by @enumerate, which is really @itemize

\newcount \itemno

\envdef\itemize{\parsearg\doitemize}

\def\doitemize#1{%
\aboveenvbreak
\itemmax=\itemindent
\advance\itemmax by -\itemmargin
\advance\leftskip by \itemindent
\exdentamount=\itemindent
\parindent=0pt
\parskip=\smallskipamount
\ifdim\parskip=0pt \parskip=2pt \fi
%
% Try typesetting the item mark that if the document erroneously says
% something like @itemize @samp (intending @table), there's an error
% right away at the @itemize.  It's not the best error message in the
% world, but it's better than leaving it to the @item.  This means if
% the user wants an empty mark, they have to say @w{} not just @w.
\def\itemcontents{#1}%
\setbox0 = \hbox{\itemcontents}%
%
% @itemize with no arg is equivalent to @itemize @bullet.
\ifx\itemcontents\empty\def\itemcontents{\bullet}\fi
```

```
%
\let\item=\itemizeitem
}

% Definition of @item while inside @itemize and @enumerate.
%
\def\itemizeitem{%
 \advance\itemno by 1  % for enumerations
 {\let\par=\endgraf \smallbreak}% reasonable place to break
 {%
  % If the document has an @itemize directly after a section title, a
  % \nobreak will be last on the list, and \sectionheading will have
  % done a \vskip-\parskip.  In that case, we don't want to zero
  % parskip, or the item text will crash with the heading.  On the
  % other hand, when there is normal text preceding the item (as there
  % usually is), we do want to zero parskip, or there would be too much
  % space.  In that case, we won't have a \nobreak before.  At least
  % that's the theory.
  \ifnum\lastpenalty<10000 \parskip=0in \fi
  \noindent
  \hbox to 0pt{\hss \itemcontents \kern\itemmargin}%
  %
  \vadjust{\penalty 1200}}% not good to break after first line of item.
 \flushcr
}

% \splitoff TOKENS\endmark defines \first to be the first token in
% TOKENS, and \rest to be the remainder.
%
\def\splitoff#1#2\endmark{\def\first{#1}\def\rest{#2}}%

% Allow an optional argument of an uppercase letter, lowercase letter,
% or number, to specify the first label in the enumerated list.  No
% argument is the same as `1'.
%
\envparseargdef\enumerate{\enumeratey #1  \endenumeratey}
\def\enumeratey #1 #2\endenumeratey{%
 % If we were given no argument, pretend we were given `1'.
 \def\thearg{#1}%
 \ifx\thearg\empty \def\thearg{1}\fi
 %
 % Detect if the argument is a single token.  If so, it might be a
 % letter.  Otherwise, the only valid thing it can be is a number.
 % (We will always have one token, because of the test we just made.
 % This is a good thing, since \splitoff doesn't work given nothing at
 % all -- the first parameter is undelimited.)
 \expandafter\splitoff\thearg\endmark
 \ifx\rest\empty
```

```
  % Only one token in the argument.  It could still be anything.
  % A ``lowercase letter'' is one whose \lccode is nonzero.
  % An ``uppercase letter'' is one whose \lccode is both nonzero, and
  %   not equal to itself.
  % Otherwise, we assume it's a number.
  %
  % We need the \relax at the end of the \ifnum lines to stop TeX from
  % continuing to look for a <number>.
  %
  \ifnum\lccode\expandafter`\thearg=0\relax
    \numericenumerate % a number (we hope)
  \else
    % It's a letter.
    \ifnum\lccode\expandafter`\thearg=\expandafter`\thearg\relax
      \lowercaseenumerate % lowercase letter
    \else
      \uppercaseenumerate % uppercase letter
    \fi
  \fi
\else
  % Multiple tokens in the argument.  We hope it's a number.
  \numericenumerate
\fi
}


% An @enumerate whose labels are integers.  The starting integer is
% given in \thearg.
%
\def\numericenumerate{%
 \itemno = \thearg
 \startenumeration{\the\itemno}%
}


% The starting (lowercase) letter is in \thearg.
\def\lowercaseenumerate{%
 \itemno = \expandafter`\thearg
 \startenumeration{%
   % Be sure we're not beyond the end of the alphabet.
   \ifnum\itemno=0
     \errmessage{No more lowercase letters in @enumerate; get a bigger
            alphabet}%
   \fi
   \char\lccode\itemno
 }%
}


% The starting (uppercase) letter is in \thearg.
\def\uppercaseenumerate{%
```

```
\itemno = \expandafter`\thearg
\startenumeration{%
  % Be sure we're not beyond the end of the alphabet.
  \ifnum\itemno=0
    \errmessage{No more uppercase letters in @enumerate; get a bigger
          alphabet}
  \fi
  \char\uccode\itemno
}%
}


% Call \doitemize, adding a period to the first argument and supplying the
% common last two arguments.  Also subtract one from the initial value in
% \itemno, since @item increments \itemno.
%
\def\startenumeration#1{%
 \advance\itemno by -1
 \doitemize{#1.}\flushcr
}


% @alphaenumerate and @capsenumerate are abbreviations for giving an arg
% to @enumerate.
%
\def\alphaenumerate{\enumerate{a}}
\def\capsenumerate{\enumerate{A}}
\def\Ealphaenumerate{\Eenumerate}
\def\Ecapsenumerate{\Eenumerate}




% @multitable macros
% Amy Hendrickson, 8/18/94, 3/6/96
%
% @multitable ... @end multitable will make as many columns as desired.
% Contents of each column will wrap at width given in preamble.  Width
% can be specified either with sample text given in a template line,
% or in percent of \hsize, the current width of text on page.

% Table can continue over pages but will only break between lines.

% To make preamble:
%
% Either define widths of columns in terms of percent of \hsize:
%    @multitable @columnfractions .25 .3 .45
%    @item ...
%
%    Numbers following @columnfractions are the percent of the total
%    current hsize to be used for each column. You may use as many
%    columns as desired.
```

% Or use a template:
% @multitable {Column 1 template} {Column 2 template} {Column 3 template}
% @item ...
% using the widest term desired in each column.

% Each new table line starts with @item, each subsequent new column
% starts with @tab. Empty columns may be produced by supplying @tab's
% with nothing between them for as many times as empty columns are needed,
% ie, @tab@tab@tab will produce two empty columns.

% @item, @tab do not need to be on their own lines, but it will not hurt
% if they are.

% Sample multitable:

% @multitable {Column 1 template} {Column 2 template} {Column 3 template}
% @item first col stuff @tab second col stuff @tab third col
% @item
% first col stuff
% @tab
% second col stuff
% @tab
% third col
% @item first col stuff @tab second col stuff
% @tab Many paragraphs of text may be used in any column.
%
%   They will wrap at the width determined by the template.
% @item@tab@tab This will be in third column.
% @end multitable

% Default dimensions may be reset by user.
% @multitableparskip is vertical space between paragraphs in table.
% @multitableparindent is paragraph indent in table.
% @multitablecolmargin is horizontal space to be left between columns.
% @multitablelinespace is space to leave between table items, baseline
%   to baseline.
% 0pt means it depends on current normal line spacing.
%
\newskip\multitableparskip
\newskip\multitableparindent
\newdimen\multitablecolspace
\newskip\multitablelinespace
\multitableparskip=0pt
\multitableparindent=6pt
\multitablecolspace=12pt
\multitablelinespace=0pt

```
% Macros used to set up halign preamble:
%
\let\endsetuptable\relax
\def\xendsetuptable{\endsetuptable}
\let\columnfractions\relax
\def\xcolumnfractions{\columnfractions}
\newif\ifsetpercent

% #1 is the @columnfraction, usually a decimal number like .5, but might
% be just 1.  We just use it, whatever it is.
%
\def\pickupwholefraction#1 {%
 \global\advance\colcount by 1
 \expandafter\xdef\csname col\the\colcount\endcsname{#1\hsize}%
 \setuptable
}

\newcount\colcount
\def\setuptable#1{%
 \def\firstarg{#1}%
 \ifx\firstarg\xendsetuptable
  \let\go = \relax
 \else
  \ifx\firstarg\xcolumnfractions
   \global\setpercenttrue
  \else
   \ifsetpercent
     \let\go\pickupwholefraction
   \else
     \global\advance\colcount by 1
     \setbox0=\hbox{#1\unskip\space}% Add a normal word space as a
          % separator; typically that is always in the input, anyway.
     \expandafter\xdef\csname col\the\colcount\endcsname{\the\wd0}%
   \fi
  \fi
  \ifx\go\pickupwholefraction
   % Put the argument back for the \pickupwholefraction call, so
   % we'll always have a period there to be parsed.
   \def\go{\pickupwholefraction#1}%
  \else
   \let\go = \setuptable
  \fi%
 \fi
 \go
}

% multitable-only commands.
```

```
%
% @headitem starts a heading row, which we typeset in bold.
% Assignments have to be global since we are inside the implicit group
% of an alignment entry.  \everycr resets \everytab so we don't have to
% undo it ourselves.
\def\headitemfont{\b}% for people to use in the template row; not changeable
\def\headitem{%
 \checkenv\multitable
 \crcr
 \global\everytab={\bf}% can't use \headitemfont since the parsing differs
 \the\everytab % for the first item
}%
%
% A \tab used to include \hskip1sp.  But then the space in a template
% line is not enough.  That is bad.  So let's go back to just `&' until
% we again encounter the problem the 1sp was intended to solve.
%     --karl, nathan@acm.org, 20apr99.
\def\tab{\checkenv\multitable &\the\everytab}%

% @multitable ... @end multitable definitions:
%
\newtoks\everytab  % insert after every tab.
%
\envdef\multitable{%
 \vskip\parskip
 \startsavinginserts
 %
 % @item within a multitable starts a normal row.
 % We use \def instead of \let so that if one of the multitable entries
 % contains an @itemize, we don't choke on the \item (seen as \crcr aka
 % \endtemplate) expanding \doitemize.
 \def\item{\crcr}%
 %
 \tolerance=9500
 \hbadness=9500
 \setmultitablespacing
 \parskip=\multitableparskip
 \parindent=\multitableparindent
 \overfullrule=0pt
 \global\colcount=0
 %
 \everycr = {%
  \noalign{%
    \global\everytab={}%
    \global\colcount=0 % Reset the column counter.
    % Check for saved footnotes, etc.
    \checkinserts
    % Keeps underfull box messages off when table breaks over pages.
```

```
    %\filbreak
% Maybe so, but it also creates really weird page breaks when the
% table breaks over pages. Wouldn't \vfil be better?  Wait until the
% problem manifests itself, so it can be fixed for real --karl.
  }%
 }%
%
\parsearg\domultitable
}
\def\domultitable#1{%
% To parse everything between @multitable and @item:
\setuptable#1 \endsetuptable
%
% This preamble sets up a generic column definition, which will
% be used as many times as user calls for columns.
% \vtop will set a single line and will also let text wrap and
% continue for many paragraphs if desired.
\halign\bgroup &%
 \global\advance\colcount by 1
 \multistrut
 \vtop{%
   % Use the current \colcount to find the correct column width:
   \hsize=\expandafter\csname col\the\colcount\endcsname
   %
   % In order to keep entries from bumping into each other
   % we will add a \leftskip of \multitablecolspace to all columns after
   % the first one.
   %
   % If a template has been used, we will add \multitablecolspace
   % to the width of each template entry.
   %
   % If the user has set preamble in terms of percent of \hsize we will
   % use that dimension as the width of the column, and the \leftskip
   % will keep entries from bumping into each other.  Table will start at
   % left margin and final column will justify at right margin.
   %
   % Make sure we don't inherit \rightskip from the outer environment.
   \rightskip=0pt
   \ifnum\colcount=1
% The first column will be indented with the surrounding text.
\advance\hsize by\leftskip
   \else
\ifsetpercent \else
 % If user has not set preamble in terms of percent of \hsize
 % we will advance \hsize by \multitablecolspace.
 \advance\hsize by \multitablecolspace
\fi
   % In either case we will make \leftskip=\multitablecolspace:
```

```
    \leftskip=\multitablecolspace
    \fi
    % Ignoring space at the beginning and end avoids an occasional spurious
    % blank line, when TeX decides to break the line at the space before the
    % box from the multistrut, so the strut ends up on a line by itself.
    % For example:
    % @multitable @columnfractions .11 .89
    % @item @code{#}
    % @tab Legal holiday which is valid in major parts of the whole country.
    % Is automatically provided with highlighting sequences respectively
    % marking characters.
    \noindent\ignorespaces##\unskip\multistrut
  }\cr
}
\def\Emultitable{%
 \crcr
 \egroup % end the \halign
 \global\setpercentfalse
}


\def\setmultitablespacing{%
 \def\multistrut{\strut}% just use the standard line spacing
 %
 % Compute \multitablelinespace (if not defined by user) for use in
 % \multitableparskip calculation.  We used define \multistrut based on
 % this, but (ironically) that caused the spacing to be off.
 % See bug-texinfo report from Werner Lemberg, 31 Oct 2004 12:52:20 +0100.
\ifdim\multitablelinespace=0pt
\setbox0=\vbox{X}\global\multitablelinespace=\the\baselineskip
\global\advance\multitablelinespace by-\ht0
\fi
% Test to see if parskip is larger than space between lines of
% table. If not, do nothing.
%        If so, set to same dimension as multitablelinespace.
\ifdim\multitableparskip>\multitablelinespace
\global\multitableparskip=\multitablelinespace
\global\advance\multitableparskip-7pt % to keep parskip somewhat smaller
                        % than skip between lines in the table.
\fi%
\ifdim\multitableparskip=0pt
\global\multitableparskip=\multitablelinespace
\global\advance\multitableparskip-7pt % to keep parskip somewhat smaller
                        % than skip between lines in the table.
\fi}


\message{conditionals,}
```

% @iftex, @ifnotdocbook, @ifnothtml, @ifnotinfo, @ifnotplaintext,
% @ifnotxml always succeed. They currently do nothing; we don't
% attempt to check whether the conditionals are properly nested. But we
% have to remember that they are conditionals, so that @end doesn't
% attempt to close an environment group.
%
\def\makecond#1{%
 \expandafter\let\csname #1\endcsname = \relax
 \expandafter\let\csname iscond.#1\endcsname = 1
}
\makecond{iftex}
\makecond{ifnotdocbook}
\makecond{ifnothtml}
\makecond{ifnotinfo}
\makecond{ifnotplaintext}
\makecond{ifnotxml}

% Ignore @ignore, @ifhtml, @ifinfo, and the like.
%
\def\direntry{\doignore{direntry}}
\def\documentdescription{\doignore{documentdescription}}
\def\docbook{\doignore{docbook}}
\def\html{\doignore{html}}
\def\ifdocbook{\doignore{ifdocbook}}
\def\ifhtml{\doignore{ifhtml}}
\def\ifinfo{\doignore{ifinfo}}
\def\ifnottex{\doignore{ifnottex}}
\def\ifplaintext{\doignore{ifplaintext}}
\def\ifxml{\doignore{ifxml}}
\def\ignore{\doignore{ignore}}
\def\menu{\doignore{menu}}
\def\xml{\doignore{xml}}

% Ignore text until a line `@end #1', keeping track of nested conditionals.
%
% A count to remember the depth of nesting.
\newcount\doignorecount

\def\doignore#1{\begingroup
 % Scan in ``verbatim'' mode:
 \obeylines
 \catcode`\@ = \other
 \catcode`\{ = \other
 \catcode`\} = \other
 %
 % Make sure that spaces turn into tokens that match what \doignoretext wants.
 \spaceisspace
 %

```
% Count number of #1's that we've seen.
\doignorecount = 0
%
% Swallow text until we reach the matching `@end #1'.
\dodoignore{#1}%
}

{ \catcode`\_=11 % We want to use \_STOP_ which cannot appear in texinfo source.
\obeylines %
%
\gdef\dodoignore#1{%
  % #1 contains the command name as a string, e.g., `ifinfo'.
  %
  % Define a command to find the next `@end #1'.
  \long\def\doignoretext##1^^M@end #1{%
    \doignoretextyyy##1^^M@#1\_STOP_}%
  %
  % And this command to find another #1 command, at the beginning of a
  % line.  (Otherwise, we would consider a line `@c @ifset', for
  % example, to count as an @ifset for nesting.)
  \long\def\doignoretextyyy##1^^M@#1##2\_STOP_{\doignoreyyy{##2}\_STOP_}%
  %
  % And now expand that command.
  \doignoretext ^^M%
}%
}

\def\doignoreyyy#1{%
\def\temp{#1}%
\ifx\temp\empty   % Nothing found.
  \let\next\doignoretextzzz
\else     % Found a nested condition, ...
  \advance\doignorecount by 1
  \let\next\doignoretextyyy  % ..., look for another.
  % If we're here, #1 ends with ^^M\ifinfo (for example).
\fi
\next #1% the token \_STOP_ is present just after this macro.
}

% We have to swallow the remaining "\_STOP_".
%
\def\doignoretextzzz#1{%
\ifnum\doignorecount = 0 % We have just found the outermost @end.
  \let\next\enddoignore
\else    % Still inside a nested condition.
  \advance\doignorecount by -1
  \let\next\doignoretext     % Look for the next @end.
\fi
```

```
  \next
}


% Finish off ignored text.
{ \obeylines%
 % Ignore anything after the last `@end #1'; this matters in verbatim
 % environments, where otherwise the newline after an ignored conditional
 % would result in a blank line in the output.
 \gdef\enddoignore#1^^M{\endgroup\ignorespaces}%
}



% @set VAR sets the variable VAR to an empty value.
% @set VAR REST-OF-LINE sets VAR to the value REST-OF-LINE.
%
% Since we want to separate VAR from REST-OF-LINE (which might be
% empty), we can't just use \parsearg; we have to insert a space of our
% own to delimit the rest of the line, and then take it out again if we
% didn't need it.
% We rely on the fact that \parsearg sets \catcode`\ =10.
%
\parseargdef\set{\setyyy#1 \endsetyyy}
\def\setyyy#1 #2\endsetyyy{%
 {%
  \makevalueexpandable
  \def\temp{#2}%
  \edef\next{\gdef\makecsname{SET#1}}%
  \ifx\temp\empty
   \next{}%
  \else
   \setzzz#2\endsetzzz
  \fi
 }%
}
% Remove the trailing space \setxxx inserted.
\def\setzzz#1 \endsetzzz{\next{#1}}


% @clear VAR clears (i.e., unsets) the variable VAR.
%
\parseargdef\clear{%
 {%
  \makevalueexpandable
  \global\expandafter\let\csname SET#1\endcsname=\relax
 }%
}


% @value{foo} gets the text saved in variable foo.
\def\value{\begingroup\makevalueexpandable\valuexxx}
```

```
\def\valuexxx#1{\expandablevalue{#1}\endgroup}
{
 \catcode`\- = \active \catcode`\_ = \active
 %
 \gdef\makevalueexpandable{%
   \let\value = \expandablevalue
   % We don't want these characters active, ...
   \catcode`\-=\other \catcode`\_=\other
   % ..., but we might end up with active ones in the argument if
   % we're called from @code, as @code{@value{foo-bar_}}, though.
   % So \let them to their normal equivalents.
   \let-\normaldash \let_\normalunderscore
 }
}


% We have this subroutine so that we can handle at least some @value's
% properly in indexes (we call \makevalueexpandable in \indexdummies).
% The command has to be fully expandable (if the variable is set), since
% the result winds up in the index file.  This means that if the
% variable's value contains other Texinfo commands, it's almost certain
% it will fail (although perhaps we could fix that with sufficient work
% to do a one-level expansion on the result, instead of complete).
%
\def\expandablevalue#1{%
 \expandafter\ifx\csname SET#1\endcsname\relax
   {[No value for ``#1'']}%
   \message{Variable `#1', used in @value, is not set.}%
 \else
   \csname SET#1\endcsname
 \fi
}


% @ifset VAR ... @end ifset reads the `...' iff VAR has been defined
% with @set.
%
% To get special treatment of `@end ifset,' call \makeond and the redefine.
%
\makecond{ifset}
\def\ifset{\parsearg{\doifset{\let\next=\ifsetfail}}}
\def\doifset#1#2{%
 {%
   \makevalueexpandable
   \let\next=\empty
   \expandafter\ifx\csname SET#2\endcsname\relax
     #1% If not set, redefine \next.
   \fi
   \expandafter
 }\next
```

```
}
\def\ifsetfail{\doignore{ifset}}

% @ifclear VAR ... @end executes the `...' iff VAR has never been
% defined with @set, or has been undefined with @clear.
%
% The `\else' inside the `\doifset' parameter is a trick to reuse the
% above code: if the variable is not set, do nothing, if it is set,
% then redefine \next to \ifclearfail.
%
\makecond{ifclear}
\def\ifclear{\parsearg{\doifset{\else \let\next=\ifclearfail}}}
\def\ifclearfail{\doignore{ifclear}}

% @ifcommandisdefined CMD ... @end executes the `...' if CMD (written
% without the @) is in fact defined.  We can only feasibly check at the
% TeX level, so something like `mathcode' is going to considered
% defined even though it is not a Texinfo command.
%
\makecond{ifcommanddefined}
\def\ifcommanddefined{\parsearg{\doifcmddefined{\let\next=\ifcmddefinedfail}}}
%
\def\doifcmddefined#1#2{{%
  \makevalueexpandable
  \let\next=\empty
  \expandafter\ifx\csname #2\endcsname\relax
    #1% If not defined, \let\next as above.
  \fi
  \expandafter
 }\next
}
\def\ifcmddefinedfail{\doignore{ifcommanddefined}}

% @ifcommandnotdefined CMD ... handled similar to @ifclear above.
\makecond{ifcommandnotdefined}
\def\ifcommandnotdefined{%
 \parsearg{\doifcmddefined{\else \let\next=\ifcmdnotdefinedfail}}}
\def\ifcmdnotdefinedfail{\doignore{ifcommandnotdefined}}

% Set the `txicommandconditionals' variable, so documents have a way to
% test if the @ifcommand...defined conditionals are available.
\set txicommandconditionals

% @dircategory CATEGORY  -- specify a category of the dir file
% which this file should belong to.  Ignore this in TeX.
\let\dircategory=\comment

% @defininfoenclose.
```

```
\let\definfoenclose=\comment


\message{indexing,}
% Index generation facilities

% Define \newwrite to be identical to plain tex's \newwrite
% except not \outer, so it can be used within macros and \if's.
\edef\newwrite{\makecsname{ptexnewwrite}}

% \newindex {foo} defines an index named foo.
% It automatically defines \fooindex such that
% \fooindex ...rest of line... puts an entry in the index foo.
% It also defines \fooindfile to be the number of the output channel for
% the file that accumulates this index.  The file's extension is foo.
% The name of an index should be no more than 2 characters long
% for the sake of vms.
%
\def\newindex#1{%
 \iflinks
   \expandafter\newwrite \csname#1indfile\endcsname
   \openout \csname#1indfile\endcsname \jobname.#1 % Open the file
 \fi
 \expandafter\xdef\csname#1index\endcsname{%     % Define @#1index
   \noexpand\doindex{#1}}
}

% @defindex foo  ==  \newindex{foo}
%
\def\defindex{\parsearg\newindex}

% Define @defcodeindex, like @defindex except put all entries in @code.
%
\def\defcodeindex{\parsearg\newcodeindex}
%
\def\newcodeindex#1{%
 \iflinks
   \expandafter\newwrite \csname#1indfile\endcsname
   \openout \csname#1indfile\endcsname \jobname.#1
 \fi
 \expandafter\xdef\csname#1index\endcsname{%
   \noexpand\docodeindex{#1}}%
}


% @synindex foo bar    makes index foo feed into index bar.
% Do this instead of @defindex foo if you don't want it as a separate index.
%
```

```
% @syncodeindex foo bar   similar, but put all entries made for index foo
% inside @code.
%
\def\synindex#1 #2 {\dosynindex\doindex{#1}{#2}}
\def\syncodeindex#1 #2 {\dosynindex\docodeindex{#1}{#2}}


% #1 is \doindex or \docodeindex, #2 the index getting redefined (foo),
% #3 the target index (bar).
\def\dosynindex#1#2#3{%
 % Only do \closeout if we haven't already done it, else we'll end up
 % closing the target index.
 \expandafter \ifx\csname donesynindex#2\endcsname \relax
   % The \closeout helps reduce unnecessary open files; the limit on the
   % Acorn RISC OS is a mere 16 files.
   \expandafter\closeout\csname#2indfile\endcsname
   \expandafter\let\csname donesynindex#2\endcsname = 1
\fi
% redefine \fooindfile:
\expandafter\let\expandafter\temp\expandafter=\csname#3indfile\endcsname
\expandafter\let\csname#2indfile\endcsname=\temp
% redefine \fooindex:
\expandafter\xdef\csname#2index\endcsname{\noexpand#1{#3}}%
}


% Define \doindex, the driver for all \fooindex macros.
% Argument #1 is generated by the calling \fooindex macro,
%  and it is "foo", the name of the index.


% \doindex just uses \parsearg; it calls \doind for the actual work.
% This is because \doind is more useful to call from other macros.


% There is also \dosubind {index}{topic}{subtopic}
% which makes an entry in a two-level index such as the operation index.

\def\doindex#1{\edef\indexname{#1}\parsearg\singleindexer}
\def\singleindexer #1{\doind{\indexname}{#1}}


% like the previous two, but they put @code around the argument.
\def\docodeindex#1{\edef\indexname{#1}\parsearg\singlecodeindexer}
\def\singlecodeindexer #1{\doind{\indexname}{\code{#1}}}


% Take care of Texinfo commands that can appear in an index entry.
% Since there are some commands we want to expand, and others we don't,
% we have to laboriously prevent expansion for those that we don't.
%
\def\indexdummies{%
 \escapechar = `\\    % use backslash in output files.
 \def\@{@}% change to @@ when we switch to @ as escape char in index files.
```

```
\def\ {\realbackslash\space }%
%
% Need these unexpandable (because we define \tt as a dummy)
% definitions when @{ or @} appear in index entry text.  Also, more
% complicated, when \tex is in effect and \{ is a \delimiter again.
% We can't use \lbracecmd and \rbracecmd because texindex assumes
% braces and backslashes are used only as delimiters.  Perhaps we
% should define @lbrace and @rbrace commands a la @comma.
\def\{{{\tt\char123}}%
\def\}{{\tt\char125}}%
%
% I don't entirely understand this, but when an index entry is
% generated from a macro call, the \endinput which \scanmacro inserts
% causes processing to be prematurely terminated.  This is,
% apparently, because \indexsorttmp is fully expanded, and \endinput
% is an expandable command.  The redefinition below makes \endinput
% disappear altogether for that purpose -- although logging shows that
% processing continues to some further point.  On the other hand, it
% seems \endinput does not hurt in the printed index arg, since that
% is still getting written without apparent harm.
%
% Sample source (mac-idx3.tex, reported by Graham Percival to
% help-texinfo, 22may06):
% @macro funindex {WORD}
% @findex xyz
% @end macro
% ...
% @funindex commtest
%
% The above is not enough to reproduce the bug, but it gives the flavor.
%
% Sample whatsit resulting:
% .@write3{\entry{xyz}{@folio }{@code {xyz@endinput }}}
%
% So:
\let\endinput = \empty
%
% Do the redefinitions.
\commondummies
}


% For the aux and toc files, @ is the escape character.  So we want to
% redefine everything using @ as the escape character (instead of
% \realbackslash, still used for index files).  When everything uses @,
% this will be simpler.
%
\def\atdummies{%
\def\@{@@}%
```

```
\def\ {@ }%
\let\{ = \lbraceatcmd
\let\} = \rbraceatcmd
%
% Do the redefinitions.
\commondummies
\otherbackslash
}


% Called from \indexdummies and \atdummies.
%
\def\commondummies{%
 %
 % \definedummyword defines \#1 as \string\#1\space, thus effectively
 % preventing its expansion.  This is used only for control words,
 % not control letters, because the \space would be incorrect for
 % control characters, but is needed to separate the control word
 % from whatever follows.
 %
 % For control letters, we have \definedummyletter, which omits the
 % space.
 %
 % These can be used both for control words that take an argument and
 % those that do not.  If it is followed by {arg} in the input, then
 % that will dutifully get written to the index (or wherever).
 %
 \def\definedummyword  ##1{\def##1{\string##1\space}}%
 \def\definedummyletter##1{\def##1{\string##1}}%
 \let\definedummyaccent\definedummyletter
 %
 \commondummiesnofonts
 %
 \definedummyletter\_%
 \definedummyletter\-%
 %
 % Non-English letters.
 \definedummyword\AA
 \definedummyword\AE
 \definedummyword\DH
 \definedummyword\L
 \definedummyword\O
 \definedummyword\OE
 \definedummyword\TH
 \definedummyword\aa
 \definedummyword\ae
 \definedummyword\dh
 \definedummyword\exclamdown
 \definedummyword\l
```

```
\definedummyword\o
\definedummyword\oe
\definedummyword\ordf
\definedummyword\ordm
\definedummyword\questiondown
\definedummyword\ss
\definedummyword\th
%
% Although these internal commands shouldn't show up, sometimes they do.
\definedummyword\bf
\definedummyword\gtr
\definedummyword\hat
\definedummyword\less
\definedummyword\sf
\definedummyword\sl
\definedummyword\tclose
\definedummyword\tt
%
\definedummyword\LaTeX
\definedummyword\TeX
%
% Assorted special characters.
\definedummyword\arrow
\definedummyword\bullet
\definedummyword\comma
\definedummyword\copyright
\definedummyword\registeredsymbol
\definedummyword\dots
\definedummyword\enddots
\definedummyword\entrybreak
\definedummyword\equiv
\definedummyword\error
\definedummyword\euro
\definedummyword\expansion
\definedummyword\geq
\definedummyword\guillemetleft
\definedummyword\guillemetright
\definedummyword\guilsinglleft
\definedummyword\guilsinglright
\definedummyword\lbracechar
\definedummyword\leq
\definedummyword\minus
\definedummyword\ogonek
\definedummyword\pounds
\definedummyword\point
\definedummyword\print
\definedummyword\quotedblbase
\definedummyword\quotedblleft
```

```
\definedummyword\quotedblright
\definedummyword\quoteleft
\definedummyword\quoteright
\definedummyword\quotesinglbase
\definedummyword\rbracechar
\definedummyword\result
\definedummyword\textdegree
%
% We want to disable all macros so that they are not expanded by \write.
\macrolist
%
\normalturnoffactive
%
% Handle some cases of @value -- where it does not contain any
% (non-fully-expandable) commands.
\makevalueexpandable
}

% \commondummiesnofonts: common to \commondummies and \indexnofonts.
%
\def\commondummiesnofonts{%
 % Control letters and accents.
 \definedummyletter\!%
 \definedummyaccent\"%
 \definedummyaccent\'%
 \definedummyletter\*%
 \definedummyaccent\,%
 \definedummyletter\.%
 \definedummyletter\/%
 \definedummyletter\:%
 \definedummyaccent\=%
 \definedummyletter\?%
 \definedummyaccent\^%
 \definedummyaccent\`%
 \definedummyaccent\~%
 \definedummyword\u
 \definedummyword\v
 \definedummyword\H
 \definedummyword\dotaccent
 \definedummyword\ogonek
 \definedummyword\ringaccent
 \definedummyword\tieaccent
 \definedummyword\ubaraccent
 \definedummyword\udotaccent
 \definedummyword\dotless
 %
 % Texinfo font commands.
 \definedummyword\b
```

```
\definedummyword\i
\definedummyword\r
\definedummyword\sansserif
\definedummyword\sc
\definedummyword\slanted
\definedummyword\t
%
% Commands that take arguments.
\definedummyword\abbr
\definedummyword\acronym
\definedummyword\anchor
\definedummyword\cite
\definedummyword\code
\definedummyword\command
\definedummyword\dfn
\definedummyword\dmn
\definedummyword\email
\definedummyword\emph
\definedummyword\env
\definedummyword\file
\definedummyword\image
\definedummyword\indicateurl
\definedummyword\inforef
\definedummyword\kbd
\definedummyword\key
\definedummyword\math
\definedummyword\option
\definedummyword\pxref
\definedummyword\ref
\definedummyword\samp
\definedummyword\strong
\definedummyword\tie
\definedummyword\uref
\definedummyword\url
\definedummyword\var
\definedummyword\verb
\definedummyword\w
\definedummyword\xref
}

% \indexnofonts is used when outputting the strings to sort the index
% by, and when constructing control sequence names.  It eliminates all
% control sequences and just writes whatever the best ASCII sort string
% would be for a given command (usually its argument).
%
\def\indexnofonts{%
 % Accent commands should become @asis.
 \def\definedummyaccent##1{\let##1\asis}%
```

```
% We can just ignore other control letters.
\def\definedummyletter##1{\let##1\empty}%
% All control words become @asis by default; overrides below.
\let\definedummyword\definedummyaccent
%
\commondummiesnofonts
%
% Don't no-op \tt, since it isn't a user-level command
% and is used in the definitions of the active chars like <, >, |, etc.
% Likewise with the other plain tex font commands.
%\let\tt=\asis
%
\def\ { }%
\def\@{@}%
\def\_{\normalunderscore}%
\def\-{}% @- shouldn't affect sorting
%
% Unfortunately, texindex is not prepared to handle braces in the
% content at all.  So for index sorting, we map @{ and @} to strings
% starting with |, since that ASCII character is between ASCII { and }.
\def\{{|a}%
\def\lbracechar{|a}%
%
\def\}{|b}%
\def\rbracechar{|b}%
%
% Non-English letters.
\def\AA{AA}%
\def\AE{AE}%
\def\DH{DZZ}%
\def\L{L}%
\def\OE{OE}%
\def\O{O}%
\def\TH{ZZZ}%
\def\aa{aa}%
\def\ae{ae}%
\def\dh{dzz}%
\def\exclamdown{!}%
\def\l{l}%
\def\oe{oe}%
\def\ordf{a}%
\def\ordm{o}%
\def\o{o}%
\def\questiondown{?}%
\def\ss{ss}%
\def\th{zzz}%
%
\def\LaTeX{LaTeX}%
```

```
\def\TeX{TeX}%
%
% Assorted special characters.
% (The following {} will end up in the sort string, but that's ok.)
\def\arrow{->}%
\def\bullet{bullet}%
\def\comma{,}%
\def\copyright{copyright}%
\def\dots{...}%
\def\enddots{...}%
\def\equiv{==}%
\def\error{error}%
\def\euro{euro}%
\def\expansion{==>}%
\def\geq{>=}%
\def\guillemetleft{<<}%
\def\guillemetright{>>}%
\def\guilsinglleft{<}%
\def\guilsinglright{>}%
\def\leq{<=}%
\def\minus{-}%
\def\point{.}%
\def\pounds{pounds}%
\def\print{-|}%
\def\quotedblbase{"}%
\def\quotedblleft{"}%
\def\quotedblright{"}%
\def\quoteleft{`}%
\def\quoteright{'}%
\def\quotesinglbase{,}%
\def\registeredsymbol{R}%
\def\result{=>}%
\def\textdegree{o}%
%
\expandafter\ifx\csname SETtxiindexlquoteignore\endcsname\relax
\else \indexlquoteignore \fi
%
% We need to get rid of all macros, leaving only the arguments (if present).
% Of course this is not nearly correct, but it is the best we can do for now.
% makeinfo does not expand macros in the argument to @deffn, which ends up
% writing an index entry, and texindex isn't prepared for an index sort entry
% that starts with \.
%
% Since macro invocations are followed by braces, we can just redefine them
% to take a single TeX argument.  The case of a macro invocation that
% goes to end-of-line is not handled.
%
\macrolist
```

```
}

% Undocumented (for FSFS 2nd ed.): @set txiindexlquoteignore makes us
% ignore left quotes in the sort term.
{\catcode`\`=\active
\gdef\indexlquoteignore{\let`=\empty}}

\let\indexbackslash=0  %overridden during \printindex.
\let\SETmarginindex=\relax % put index entries in margin (undocumented)?

% Most index entries go through here, but \dosubind is the general case.
% #1 is the index name, #2 is the entry text.
\def\doind#1#2{\dosubind{#1}{#2}{}}

% Workhorse for all \fooindexes.
% #1 is name of index, #2 is stuff to put there, #3 is subentry --
% empty if called from \doind, as we usually are (the main exception
% is with most defuns, which call us directly).
%
\def\dosubind#1#2#3{%
 \iflinks
 {%
  % Store the main index entry text (including the third arg).
  \toks0 = {#2}%
  % If third arg is present, precede it with a space.
  \def\thirdarg{#3}%
  \ifx\thirdarg\empty \else
   \toks0 = \expandafter{\the\toks0 \space #3}%
  \fi
  %
  \edef\writeto{\csname#1indfile\endcsname}%
  %
  \safewhatsit\dosubindwrite
 }%
 \fi
}

% Write the entry in \toks0 to the index file:
%
\def\dosubindwrite{%
 % Put the index entry in the margin if desired.
 \ifx\SETmarginindex\relax\else
  \insert\margin{\hbox{\vrule height8pt depth3pt width0pt \the\toks0}}%
 \fi
 %
 % Remember, we are within a group.
 \indexdummies % Must do this here, since \bf, etc expand at this stage
 \def\backslashcurfont{\indexbackslash}% \indexbackslash isn't defined now
```

```
    % so it will be output as is; and it will print as backslash.
%
% Process the index entry with all font commands turned off, to
% get the string to sort by.
{\indexnofonts
 \edef\temp{\the\toks0}% need full expansion
 \xdef\indexsorttmp{\temp}%
}%
%
% Set up the complete index entry, with both the sort key and
% the original text, including any font commands.  We write
% three arguments to \entry to the .?? file (four in the
% subentry case), texindex reduces to two when writing the .??s
% sorted result.
\edef\temp{%
  \write\writeto{%
    \string\entry{\indexsorttmp}{\noexpand\folio}{\the\toks0}}%
}%
\temp
}


% Take care of unwanted page breaks/skips around a whatsit:
%
% If a skip is the last thing on the list now, preserve it
% by backing up by \lastskip, doing the \write, then inserting
% the skip again.  Otherwise, the whatsit generated by the
% \write or \pdfdest will make \lastskip zero.  The result is that
% sequences like this:
% @end defun
% @tindex whatever
% @defun ...
% will have extra space inserted, because the \medbreak in the
% start of the @defun won't see the skip inserted by the @end of
% the previous defun.
%
% But don't do any of this if we're not in vertical mode.  We
% don't want to do a \vskip and prematurely end a paragraph.
%
% Avoid page breaks due to these extra skips, too.
%
% But wait, there is a catch there:
% We'll have to check whether \lastskip is zero skip.  \ifdim is not
% sufficient for this purpose, as it ignores stretch and shrink parts
% of the skip.  The only way seems to be to check the textual
% representation of the skip.
%
% The following is almost like \def\zeroskipmacro{0.0pt} except that
% the ``p'' and ``t'' characters have catcode \other, not 11 (letter).
```

```
%
\edef\zeroskipmacro{\expandafter\the\csname z@skip\endcsname}
%
\newskip\whatsitskip
\newcount\whatsitpenalty
%
% ..., ready, GO:
%
\def\safewhatsit#1{\ifhmode
 #1%
\else
 % \lastskip and \lastpenalty cannot both be nonzero simultaneously.
 \whatsitskip = \lastskip
 \edef\lastskipmacro{\the\lastskip}%
 \whatsitpenalty = \lastpenalty
 %
 % If \lastskip is nonzero, that means the last item was a
 % skip.  And since a skip is discardable, that means this
 % -\whatsitskip glue we're inserting is preceded by a
 % non-discardable item, therefore it is not a potential
 % breakpoint, therefore no \nobreak needed.
\ifx\lastskipmacro\zeroskipmacro
\else
  \vskip-\whatsitskip
\fi
%
#1%
%
\ifx\lastskipmacro\zeroskipmacro
  % If \lastskip was zero, perhaps the last item was a penalty, and
  % perhaps it was >=10000, e.g., a \nobreak.  In that case, we want
  % to re-insert the same penalty (values >10000 are used for various
  % signals); since we just inserted a non-discardable item, any
  % following glue (such as a \parskip) would be a breakpoint.  For example:
  %   @deffn deffn-whatever
  %   @vindex index-whatever
  %   Description.
  % would allow a break between the index-whatever whatsit
  % and the "Description." paragraph.
  \ifnum\whatsitpenalty>9999 \penalty\whatsitpenalty \fi
\else
  % On the other hand, if we had a nonzero \lastskip,
  % this make-up glue would be preceded by a non-discardable item
  % (the whatsit from the \write), so we must insert a \nobreak.
  \nobreak\vskip\whatsitskip
\fi
\fi}
```

% The index entry written in the file actually looks like
% \entry {sortstring}{page}{topic}
% or
% \entry {sortstring}{page}{topic}{subtopic}
% The texindex program reads in these files and writes files
% containing these kinds of lines:
% \initial {c}
%   before the first topic whose initial is c
% \entry {topic}{pagelist}
%   for a topic that is used without subtopics
% \primary {topic}
%   for the beginning of a topic that is used with subtopics
% \secondary {subtopic}{pagelist}
%   for each subtopic.

% Define the user-accessible indexing commands
% @findex, @vindex, @kindex, @cindex.

\def\findex {\fnindex}
\def\kindex {\kyindex}
\def\cindex {\cpindex}
\def\vindex {\vrindex}
\def\tindex {\tpindex}
\def\pindex {\pgindex}

\def\cindexsub {\begingroup\obeylines\cindexsub}
{\obeylines %
\gdef\cindexsub "#1" #2^^M{\endgroup %
\dosubind{cp}{#2}{#1}}}

% Define the macros used in formatting output of the sorted index material.

% @printindex causes a particular index (the ??s file) to get printed.
% It does not print any chapter heading (usually an @unnumbered).
%
\parseargdef\printindex{\begingroup
 \dobreak \chapheadingskip{10000}%
 %
\smallfonts \rm
\tolerance = 9500
\plainfrenchspacing
\everypar = {}% don't want the \kern\-parindent from indentation suppression.
%
% See if the index file exists and is nonempty.
% Change catcode of @ here so that if the index file contains
% \initial {@}
% as its first line, TeX doesn't complain about mismatched braces
% (because it thinks @} is a control sequence).

```
\catcode`\@ = 11
\openin 1 \jobname.#1s
\ifeof 1
  % \enddoublecolumns gets confused if there is no text in the index,
  % and it loses the chapter title and the aux file entries for the
  % index.  The easiest way to prevent this problem is to make sure
  % there is some text.
  \putwordIndexNonexistent
\else
  %
  % If the index file exists but is empty, then \openin leaves \ifeof
  % false.  We have to make TeX try to read something from the file, so
  % it can discover if there is anything in it.
  \read 1 to \temp
  \ifeof 1
    \putwordIndexIsEmpty
  \else
    % Index files are almost Texinfo source, but we use \ as the escape
    % character.  It would be better to use @, but that's too big a change
    % to make right now.
    \def\indexbackslash{\backslashcurfont}%
    \catcode`\\ = 0
    \escapechar = `\\
    \begindoublecolumns
    \input \jobname.#1s
    \enddoublecolumns
  \fi
\fi
\closein 1
\endgroup}


% These macros are used by the sorted index file itself.
% Change them to control the appearance of the index.

\def\initial#1{{%
% Some minor font changes for the special characters.
\let\tentt=\sectt \let\tt=\sectt \let\sf=\sectt
%
% Remove any glue we may have, we'll be inserting our own.
\removelastskip
%
% We like breaks before the index initials, so insert a bonus.
\nobreak
\vskip 0pt plus 3\baselineskip
\penalty 0
\vskip 0pt plus -3\baselineskip
%
% Typeset the initial.  Making this add up to a whole number of
```

```
% baselineskips increases the chance of the dots lining up from column
% to column.  It still won't often be perfect, because of the stretch
% we need before each entry, but it's better.
%
% No shrink because it confuses \balancecolumns.
\vskip 1.67\baselineskip plus .5\baselineskip
\leftline{\secbf #1}%
% Do our best not to break after the initial.
\nobreak
\vskip .33\baselineskip plus .1\baselineskip
}}


% \entry typesets a paragraph consisting of the text (#1), dot leaders, and
% then page number (#2) flushed to the right margin.  It is used for index
% and table of contents entries.  The paragraph is indented by \leftskip.
%
% A straightforward implementation would start like this:
% \def\entry#1#2{...
% But this freezes the catcodes in the argument, and can cause problems to
% @code, which sets - active.  This problem was fixed by a kludge---
% ``-'' was active throughout whole index, but this isn't really right.
% The right solution is to prevent \entry from swallowing the whole text.
%                           --kasal, 21nov03
\def\entry{%
 \begingroup
   %
   % Start a new paragraph if necessary, so our assignments below can't
   % affect previous text.
   \par
   %
   % Do not fill out the last line with white space.
   \parfillskip = 0in
   %
   % No extra space above this paragraph.
   \parskip = 0in
   %
   % Do not prefer a separate line ending with a hyphen to fewer lines.
   \finalhyphendemerits = 0
   %
   % \hangindent is only relevant when the entry text and page number
   % don't both fit on one line.  In that case, bob suggests starting the
   % dots pretty far over on the line.  Unfortunately, a large
   % indentation looks wrong when the entry text itself is broken across
   % lines.  So we use a small indentation and put up with long leaders.
   %
   % \hangafter is reset to 1 (which is the value we want) at the start
   % of each paragraph, so we need not do anything with that.
   \hangindent = 2em
```

```
  %
  % When the entry text needs to be broken, just fill out the first line
  % with blank space.
  \rightskip = 0pt plus1fil
  %
  % A bit of stretch before each entry for the benefit of balancing
  % columns.
  \vskip 0pt plus1pt
  %
  % When reading the text of entry, convert explicit line breaks
  % from @* into spaces.  The user might give these in long section
  % titles, for instance.
  \def\*{\unskip\space\ignorespaces}%
  \def\entrybreak{\hfil\break}%
  %
  % Swallow the left brace of the text (first parameter):
  \afterassignment\doentry
  \let\temp =
}
\def\entrybreak{\unskip\space\ignorespaces}%
\def\doentry{%
  \bgroup % Instead of the swallowed brace.
    \noindent
    \aftergroup\finishentry
    % And now comes the text of the entry.
}
\def\finishentry#1{%
  % #1 is the page number.
  %
  % The following is kludged to not output a line of dots in the index if
  % there are no page numbers.  The next person who breaks this will be
  % cursed by a Unix daemon.
  \setbox\boxA = \hbox{#1}%
  \ifdim\wd\boxA = 0pt
    \ %
  \else
    %
    % If we must, put the page number on a line of its own, and fill out
    % this line with blank space.  (The \hfil is overwhelmed with the
    % fill leaders glue in \indexdotfill if the page number does fit.)
    \hfil\penalty50
    \null\nobreak\indexdotfill % Have leaders before the page number.
    %
    % The `\ ' here is removed by the implicit \unskip that TeX does as
    % part of (the primitive) \par.  Without it, a spurious underfull
    % \hbox ensues.
    \ifpdf
\pdfgettoks#1.%
```

```
\ \the\toksA
  \else
\ #1%
  \fi
 \fi
 \par
\endgroup
}

% Like plain.tex's \dotfill, except uses up at least 1 em.
\def\indexdotfill{\cleaders
 \hbox{$\mathsurround=0pt \mkern1.5mu.\mkern1.5mu$}\hskip 1em plus 1fill}

\def\primary #1{\line{#1\hfil}}

\newskip\secondaryindent \secondaryindent=0.5cm
\def\secondary#1#2{{%
\parfillskip=0in
\parskip=0in
\hangindent=1in
\hangafter=1
\noindent\hskip\secondaryindent\hbox{#1}\indexdotfill
\ifpdf
  \pdfgettoks#2.\ \the\toksA % The page number ends the paragraph.
\else
  #2
\fi
\par
}}

% Define two-column mode, which we use to typeset indexes.
% Adapted from the TeXbook, page 416, which is to say,
% the manmac.tex format used to print the TeXbook itself.
\catcode`\@=11

\newbox\partialpage
\newdimen\doublecolumnhsize

\def\begindoublecolumns{\begingroup % ended by \enddoublecolumns
 % Grab any single-column material above us.
 \output = {%
  %
  % Here is a possibility not foreseen in manmac: if we accumulate a
  % whole lot of material, we might end up calling this \output
  % routine twice in a row (see the doublecol-lose test, which is
  % essentially a couple of indexes with @setchapternewpage off).  In
  % that case we just ship out what is in \partialpage with the normal
  % output routine.  Generally, \partialpage will be empty when this
```

```
    % runs and this will be a no-op.  See the indexspread.tex test case.
    \ifvoid\partialpage \else
      \onepageout{\pagecontents\partialpage}%
    \fi
    %
    \global\setbox\partialpage = \vbox{%
      % Unvbox the main output page.
      \unvbox\PAGE
      \kern-\topskip \kern\baselineskip
    }%
  }%
}%
\eject % run that output routine to set \partialpage
%
% Use the double-column output routine for subsequent pages.
\output = {\doublecolumnout}%
%
% Change the page size parameters.  We could do this once outside this
% routine, in each of @smallbook, @afourpaper, and the default 8.5x11
% format, but then we repeat the same computation.  Repeating a couple
% of assignments once per index is clearly meaningless for the
% execution time, so we may as well do it in one place.
%
% First we halve the line length, less a little for the gutter between
% the columns.  We compute the gutter based on the line length, so it
% changes automatically with the paper format.  The magic constant
% below is chosen so that the gutter has the same value (well, +-<1pt)
% as it did when we hard-coded it.
%
% We put the result in a separate register, \doublecolumhsize, so we
% can restore it in \pagesofar, after \hsize itself has (potentially)
% been clobbered.
%
\doublecolumnhsize = \hsize
  \advance\doublecolumnhsize by -.04154\hsize
  \divide\doublecolumnhsize by 2
\hsize = \doublecolumnhsize
%
% Double the \vsize as well.  (We don't need a separate register here,
% since nobody clobbers \vsize.)
\vsize = 2\vsize
}

% The double-column output routine for all double-column pages except
% the last.
%
\def\doublecolumnout{%
  \splittopskip=\topskip \splitmaxdepth=\maxdepth
  % Get the available space for the double columns -- the normal
```

% (undoubled) page height minus any material left over from the
% previous page.
\dimen@ = \vsize
\divide\dimen@ by 2
\advance\dimen@ by -\ht\partialpage
%
% box0 will be the left-hand column, box2 the right.
\setbox0=\vsplit255 to\dimen@ \setbox2=\vsplit255 to\dimen@
\onepageout\pagesofar
\unvbox255
\penalty\outputpenalty
}
%
% Re-output the contents of the output page -- any previous material,
% followed by the two boxes we just split, in box0 and box2.
\def\pagesofar{%
 \unvbox\partialpage
 %
 \hsize = \doublecolumnhsize
 \wd0=\hsize \wd2=\hsize
 \hbox to\pagewidth{\box0\hfil\box2}%
}
%
% All done with double columns.
\def\enddoublecolumns{%
 % The following penalty ensures that the page builder is exercised
 % _before_ we change the output routine. This is necessary in the
 % following situation:
 %
 % The last section of the index consists only of a single entry.
 % Before this section, \pagetotal is less than \pagegoal, so no
 % break occurs before the last section starts. However, the last
 % section, consisting of \initial and the single \entry, does not
 % fit on the page and has to be broken off. Without the following
 % penalty the page builder will not be exercised until \eject
 % below, and by that time we'll already have changed the output
 % routine to the \balancecolumns version, so the next-to-last
 % double-column page will be processed with \balancecolumns, which
 % is wrong: The two columns will go to the main vertical list, with
 % the broken-off section in the recent contributions. As soon as
 % the output routine finishes, TeX starts reconsidering the page
 % break. The two columns and the broken-off section both fit on the
 % page, because the two columns now take up only half of the page
 % goal. When TeX sees \eject from below which follows the final
 % section, it invokes the new output routine that we've set after
 % \balancecolumns below; \onepageout will try to fit the two columns
 % and the final section into the vbox of \pageheight (see
 % \pagebody), causing an overfull box.

```
%
% Note that glue won't work here, because glue does not exercise the
% page builder, unlike penalties (see The TeXbook, pp. 280-281).
\penalty0
%
\output = {%
  % Split the last of the double-column material.  Leave it on the
  % current page, no automatic page break.
  \balancecolumns
  %
  % If we end up splitting too much material for the current page,
  % though, there will be another page break right after this \output
  % invocation ends.  Having called \balancecolumns once, we do not
  % want to call it again.  Therefore, reset \output to its normal
  % definition right away.  (We hope \balancecolumns will never be
  % called on to balance too much material, but if it is, this makes
  % the output somewhat more palatable.)
  \global\output = {\onepageout{\pagecontents\PAGE}}%
}%
\eject
\endgroup % started in \begindoublecolumns
%
% \pagegoal was set to the doubled \vsize above, since we restarted
% the current page.  We're now back to normal single-column
% typesetting, so reset \pagegoal to the normal \vsize (after the
% \endgroup where \vsize got restored).
\pagegoal = \vsize
}
%
% Called at the end of the double column material.
\def\balancecolumns{%
\setbox0 = \vbox{\unvbox255}% like \box255 but more efficient, see p.120.
\dimen@ = \ht0
\advance\dimen@ by \topskip
\advance\dimen@ by-\baselineskip
\divide\dimen@ by 2 % target to split to
%debug\message{final 2-column material height=\the\ht0, target=\the\dimen@.}%
\splittopskip = \topskip
% Loop until we get a decent breakpoint.
{%
 \vbadness = 10000
 \loop
   \global\setbox3 = \copy0
   \global\setbox1 = \vsplit3 to \dimen@
 \ifdim\ht3>\dimen@
   \global\advance\dimen@ by 1pt
 \repeat
}%
}%
```

```
%debug\message{split to \the\dimen@, column heights: \the\ht1, \the\ht3.}%
\setbox0=\vbox to\dimen@{\unvbox1}%
\setbox2=\vbox to\dimen@{\unvbox3}%
%
\pagesofar
}
\catcode`\@ = \other


\message{sectioning,}
% Chapters, sections, etc.

% Let's start with @part.
\outer\parseargdef\part{\partzzz{#1}}
\def\partzzz#1{%
 \chapoddpage
 \null
 \vskip.3\vsize  % move it down on the page a bit
 \begingroup
  \noindent \titlefonts\rmisbold #1\par % the text
  \let\lastnode=\empty       % no node to associate with
  \writetocentry{part}{#1}{}% but put it in the toc
  \headingsoff           % no headline or footline on the part page
  \chapoddpage
 \endgroup
}


% \unnumberedno is an oxymoron.  But we count the unnumbered
% sections so that we can refer to them unambiguously in the pdf
% outlines by their "section number".  We avoid collisions with chapter
% numbers by starting them at 10000.  (If a document ever has 10000
% chapters, we're in trouble anyway, I'm sure.)
\newcount\unnumberedno \unnumberedno = 10000
\newcount\chapno
\newcount\secno        \secno=0
\newcount\subsecno     \subsecno=0
\newcount\subsubsecno  \subsubsecno=0

% This counter is funny since it counts through charcodes of letters A, B, ...
\newcount\appendixno  \appendixno = `\@
%
% \def\appendixletter{\char\the\appendixno}
% We do the following ugly conditional instead of the above simple
% construct for the sake of pdftex, which needs the actual
% letter in the expansion, not just typeset.
%
\def\appendixletter{%
 \ifnum\appendixno=`A A%
```

```
\else\ifnum\appendixno=`B B%
\else\ifnum\appendixno=`C C%
\else\ifnum\appendixno=`D D%
\else\ifnum\appendixno=`E E%
\else\ifnum\appendixno=`F F%
\else\ifnum\appendixno=`G G%
\else\ifnum\appendixno=`H H%
\else\ifnum\appendixno=`I I%
\else\ifnum\appendixno=`J J%
\else\ifnum\appendixno=`K K%
\else\ifnum\appendixno=`L L%
\else\ifnum\appendixno=`M M%
\else\ifnum\appendixno=`N N%
\else\ifnum\appendixno=`O O%
\else\ifnum\appendixno=`P P%
\else\ifnum\appendixno=`Q Q%
\else\ifnum\appendixno=`R R%
\else\ifnum\appendixno=`S S%
\else\ifnum\appendixno=`T T%
\else\ifnum\appendixno=`U U%
\else\ifnum\appendixno=`V V%
\else\ifnum\appendixno=`W W%
\else\ifnum\appendixno=`X X%
\else\ifnum\appendixno=`Y Y%
\else\ifnum\appendixno=`Z Z%
% The \the is necessary, despite appearances, because \appendixletter is
% expanded while writing the .toc file.  \char\appendixno is not
% expandable, thus it is written literally, thus all appendixes come out
% with the same letter (or @) in the toc without it.
\else\char\the\appendixno
\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi
\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi}

% Each @chapter defines these (using marks) as the number+name, number
% and name of the chapter.  Page headings and footings can use
% these.  @section does likewise.
\def\thischapter{}
\def\thischapternum{}
\def\thischaptername{}
\def\thissection{}
\def\thissectionnum{}
\def\thissectionname{}

\newcount\absseclevel % used to calculate proper heading level
\newcount\secbase\secbase=0 % @raisesections/@lowersections modify this count

% @raisesections: treat @section as chapter, @subsection as section, etc.
\def\raisesections{\global\advance\secbase by -1}
```

```
\let\up=\raisesections % original BFox name

% @lowersections: treat @chapter as section, @section as subsection, etc.
\def\lowersections{\global\advance\secbase by 1}
\let\down=\lowersections % original BFox name

% we only have subsub.
\chardef\maxseclevel = 3
%
% A numbered section within an unnumbered changes to unnumbered too.
% To achieve this, remember the "biggest" unnum. sec. we are currently in:
\chardef\unnlevel = \maxseclevel
%
% Trace whether the current chapter is an appendix or not:
% \chapheadtype is "N" or "A", unnumbered chapters are ignored.
\def\chapheadtype{N}

% Choose a heading macro
% #1 is heading type
% #2 is heading level
% #3 is text for heading
\def\genhead#1#2#3{%
 % Compute the abs. sec. level:
 \absseclevel=#2
 \advance\absseclevel by \secbase
 % Make sure \absseclevel doesn't fall outside the range:
 \ifnum \absseclevel < 0
   \absseclevel = 0
 \else
   \ifnum \absseclevel > 3
     \absseclevel = 3
   \fi
 \fi
 % The heading type:
 \def\headtype{#1}%
 \if \headtype U%
   \ifnum \absseclevel < \unnlevel
     \chardef\unnlevel = \absseclevel
   \fi
 \else
   % Check for appendix sections:
   \ifnum \absseclevel = 0
     \edef\chapheadtype{\headtype}%
   \else
     \if \headtype A\if \chapheadtype N%
\errmessage{@appendix... within a non-appendix chapter}%
     \fi\fi
   \fi
```

```
  % Check for numbered within unnumbered:
  \ifnum \absseclevel > \unnlevel
    \def\headtype{U}%
  \else
    \chardef\unnlevel = 3
  \fi
\fi
% Now print the heading:
\if \headtype U%
  \ifcase\absseclevel
\unnumberedzzz{#3}%
  \or \unnumberedseczzz{#3}%
  \or \unnumberedsubseczzz{#3}%
  \or \unnumberedsubsubseczzz{#3}%
  \fi
\else
  \if \headtype A%
    \ifcase\absseclevel
  \appendixzzz{#3}%
    \or \appendixsectionzzz{#3}%
    \or \appendixsubseczzz{#3}%
    \or \appendixsubsubseczzz{#3}%
    \fi
  \else
    \ifcase\absseclevel
  \chapterzzz{#3}%
    \or \seczzz{#3}%
    \or \numberedsubseczzz{#3}%
    \or \numberedsubsubseczzz{#3}%
    \fi
  \fi
\fi
\suppressfirstparagraphindent
}

% an interface:
\def\numhead{\genhead N}
\def\apphead{\genhead A}
\def\unnmhead{\genhead U}

% @chapter, @appendix, @unnumbered.  Increment top-level counter, reset
% all lower-level sectioning counters to zero.
%
% Also set \chaplevelprefix, which we prepend to @float sequence numbers
% (e.g., figures), q.v.  By default (before any chapter), that is empty.
\let\chaplevelprefix = \empty
%
\outer\parseargdef\chapter{\numhead0{#1}} % normally numhead0 calls chapterzzz
```

```
\def\chapterzzz#1{%
% section resetting is \global in case the chapter is in a group, such
% as an @include file.
\global\secno=0 \global\subsecno=0 \global\subsubsecno=0
  \global\advance\chapno by 1
%
% Used for \float.
\gdef\chaplevelprefix{\the\chapno.}%
\resetallfloatnos
%
% \putwordChapter can contain complex things in translations.
\toks0=\expandafter{\putwordChapter}%
\message{\the\toks0 \space \the\chapno}%
%
% Write the actual heading.
\chapmacro{#1}{Ynumbered}{\the\chapno}%
%
% So @section and the like are numbered underneath this chapter.
\global\let\section = \numberedsec
\global\let\subsection = \numberedsubsec
\global\let\subsubsection = \numberedsubsubsec
}


\outer\parseargdef\appendix{\apphead0{#1}} % normally calls appendixzzz
%
\def\appendixzzz#1{%
\global\secno=0 \global\subsecno=0 \global\subsubsecno=0
  \global\advance\appendixno by 1
\gdef\chaplevelprefix{\appendixletter.}%
\resetallfloatnos
%
% \putwordAppendix can contain complex things in translations.
\toks0=\expandafter{\putwordAppendix}%
\message{\the\toks0 \space \appendixletter}%
%
\chapmacro{#1}{Yappendix}{\appendixletter}%
%
\global\let\section = \appendixsec
\global\let\subsection = \appendixsubsec
\global\let\subsubsection = \appendixsubsubsec
}


% normally unnmhead0 calls unnumberedzzz:
\outer\parseargdef\unnumbered{\unnmhead0{#1}}
\def\unnumberedzzz#1{%
\global\secno=0 \global\subsecno=0 \global\subsubsecno=0
  \global\advance\unnumberedno by 1
%
```

```
% Since an unnumbered has no number, no prefix for figures.
\global\let\chaplevelprefix = \empty
\resetallfloatnos
%
% This used to be simply \message{#1}, but TeX fully expands the
% argument to \message.  Therefore, if #1 contained @-commands, TeX
% expanded them.  For example, in `@unnumbered The @cite{Book}', TeX
% expanded @cite (which turns out to cause errors because \cite is meant
% to be executed, not expanded).
%
% Anyway, we don't want the fully-expanded definition of @cite to appear
% as a result of the \message, we just want `@cite' itself.  We use
% \the<toks register> to achieve this: TeX expands \the<toks> only once,
% simply yielding the contents of <toks register>.  (We also do this for
% the toc entries.)
\toks0 = {#1}%
\message{(\the\toks0)}%
%
\chapmacro{#1}{Ynothing}{\the\unnumberedno}%
%
\global\let\section = \unnumberedsec
\global\let\subsection = \unnumberedsubsec
\global\let\subsubsection = \unnumberedsubsubsec
}


% @centerchap is like @unnumbered, but the heading is centered.
\outer\parseargdef\centerchap{%
 % Well, we could do the following in a group, but that would break
 % an assumption that \chapmacro is called at the outermost level.
 % Thus we are safer this way:  --kasal, 24feb04
\let\centerparametersmaybe = \centerparameters
\unnmhead0{#1}%
\let\centerparametersmaybe = \relax
}


% @top is like @unnumbered.
\let\top\unnumbered

% Sections.
%
\outer\parseargdef\numberedsec{\numhead1{#1}} % normally calls seczzz
\def\seczzz#1{%
\global\subsecno=0 \global\subsubsecno=0  \global\advance\secno by 1
\sectionheading{#1}{sec}{Ynumbered}{\the\chapno.\the\secno}%
}

% normally calls appendixsectionzzz:
\outer\parseargdef\appendixsection{\apphead1{#1}}
```

```
\def\appendixsectionzzz#1{%
 \global\subsecno=0 \global\subsubsecno=0 \global\advance\secno by 1
 \sectionheading{#1}{sec}{Yappendix}{\appendixletter.\the\secno}%
}
\let\appendixsec\appendixsection

% normally calls unnumberedseczzz:
\outer\parseargdef\unnumberedsec{\unnmhead1{#1}}
\def\unnumberedseczzz#1{%
 \global\subsecno=0 \global\subsubsecno=0 \global\advance\secno by 1
 \sectionheading{#1}{sec}{Ynothing}{\the\unnumberedno.\the\secno}%
}

% Subsections.
%
% normally calls numberedsubseczzz:
\outer\parseargdef\numberedsubsec{\numhead2{#1}}
\def\numberedsubseczzz#1{%
 \global\subsubsecno=0 \global\advance\subsecno by 1
 \sectionheading{#1}{subsec}{Ynumbered}{\the\chapno.\the\secno.\the\subsecno}%
}

% normally calls appendixsubseczzz:
\outer\parseargdef\appendixsubsec{\apphead2{#1}}
\def\appendixsubseczzz#1{%
 \global\subsubsecno=0 \global\advance\subsecno by 1
 \sectionheading{#1}{subsec}{Yappendix}%
          {\appendixletter.\the\secno.\the\subsecno}%
}

% normally calls unnumberedsubseczzz:
\outer\parseargdef\unnumberedsubsec{\unnmhead2{#1}}
\def\unnumberedsubseczzz#1{%
 \global\subsubsecno=0 \global\advance\subsecno by 1
 \sectionheading{#1}{subsec}{Ynothing}%
          {\the\unnumberedno.\the\secno.\the\subsecno}%
}

% Subsubsections.
%
% normally numberedsubsubseczzz:
\outer\parseargdef\numberedsubsubsec{\numhead3{#1}}
\def\numberedsubsubseczzz#1{%
 \global\advance\subsubsecno by 1
 \sectionheading{#1}{subsubsec}{Ynumbered}%
          {\the\chapno.\the\secno.\the\subsecno.\the\subsubsecno}%
}
```

```
% normally appendixsubsubseczzz:
\outer\parseargdef\appendixsubsubsec{\apphead3{#1}}
\def\appendixsubsubseczzz#1{%
 \global\advance\subsubsecno by 1
 \sectionheading{#1}{subsubsec}{Yappendix}%
          {\appendixletter.\the\secno.\the\subsecno.\the\subsubsecno}%
}


% normally unnumberedsubsubseczzz:
\outer\parseargdef\unnumberedsubsubsec{\unnmhead3{#1}}
\def\unnumberedsubsubseczzz#1{%
 \global\advance\subsubsecno by 1
 \sectionheading{#1}{subsubsec}{Ynothing}%
          {\the\unnumberedno.\the\secno.\the\subsecno.\the\subsubsecno}%
}


% These macros control what the section commands do, according
% to what kind of chapter we are in (ordinary, appendix, or unnumbered).
% Define them by default for a numbered chapter.
\let\section = \numberedsec
\let\subsection = \numberedsubsec
\let\subsubsection = \numberedsubsubsec


% Define @majorheading, @heading and @subheading

\def\majorheading{%
 {\advance\chapheadingskip by 10pt \chapbreak }%
 \parsearg\chapheadingzzz
}

\def\chapheading{\chapbreak \parsearg\chapheadingzzz}
\def\chapheadingzzz#1{%
 \vbox{\chapfonts \raggedtitlesettings #1\par}%
 \nobreak\bigskip \nobreak
 \suppressfirstparagraphindent
}

% @heading, @subheading, @subsubheading.
\parseargdef\heading{\sectionheading{#1}{sec}{Yomitfromtoc}{}
 \suppressfirstparagraphindent}
\parseargdef\subheading{\sectionheading{#1}{subsec}{Yomitfromtoc}{}
 \suppressfirstparagraphindent}
\parseargdef\subsubheading{\sectionheading{#1}{subsubsec}{Yomitfromtoc}{}
 \suppressfirstparagraphindent}


% These macros generate a chapter, section, etc. heading only
% (including whitespace, linebreaking, etc. around it),
% given all the information in convenient, parsed form.
```

```
% Args are the skip and penalty (usually negative)
\def\dobreak#1#2{\par\ifdim\lastskip<#1\removelastskip\penalty#2\vskip#1\fi}


% Parameter controlling skip before chapter headings (if needed)
\newskip\chapheadingskip


% Define plain chapter starts, and page on/off switching for it.
\def\chapbreak{\dobreak \chapheadingskip {-4000}}
\def\chappager{\par\vfill\supereject}
% Because \domark is called before \chapoddpage, the filler page will
% get the headings for the next chapter, which is wrong.  But we don't
% care -- we just disable all headings on the filler page.
\def\chapoddpage{%
 \chappager
 \ifodd\pageno \else
   \begingroup
     \headingsoff
     \null
     \chappager
   \endgroup
 \fi
}


\def\setchapternewpage #1 {\csname CHAPPAG#1\endcsname}


\def\CHAPPAGoff{%
\global\let\contentsalignmacro = \chappager
\global\let\pchapsepmacro=\chapbreak
\global\let\pagealignmacro=\chappager}


\def\CHAPPAGon{%
\global\let\contentsalignmacro = \chappager
\global\let\pchapsepmacro=\chappager
\global\let\pagealignmacro=\chappager
\global\def\HEADINGSon{\HEADINGSsingle}}


\def\CHAPPAGodd{%
\global\let\contentsalignmacro = \chapoddpage
\global\let\pchapsepmacro=\chapoddpage
\global\let\pagealignmacro=\chapoddpage
\global\def\HEADINGSon{\HEADINGSdouble}}


\CHAPPAGon


% Chapter opening.
%
% #1 is the text, #2 is the section type (Ynumbered, Ynothing,
```

```
% Yappendix, Yomitfromtoc), #3 the chapter number.
%
% To test against our argument.
\def\Ynothingkeyword{Ynothing}
\def\Yomitfromtockeyword{Yomitfromtoc}
\def\Yappendixkeyword{Yappendix}
%
\def\chapmacro#1#2#3{%
% Insert the first mark before the heading break (see notes for \domark).
\let\prevchapterdefs=\lastchapterdefs
\let\prevsectiondefs=\lastsectiondefs
\gdef\lastsectiondefs{\gdef\thissectionname{}\gdef\thissectionnum{}%
            \gdef\thissection{}}%
%
\def\temptype{#2}%
\ifx\temptype\Ynothingkeyword
  \gdef\lastchapterdefs{\gdef\thischaptername{#1}\gdef\thischapternum{}%
              \gdef\thischapter{\thischaptername}}%
\else\ifx\temptype\Yomitfromtockeyword
  \gdef\lastchapterdefs{\gdef\thischaptername{#1}\gdef\thischapternum{}%
              \gdef\thischapter{}}%
\else\ifx\temptype\Yappendixkeyword
 \toks0={#1}%
 \xdef\lastchapterdefs{%
   \gdef\noexpand\thischaptername{\the\toks0}%
   \gdef\noexpand\thischapternum{\appendixletter}%
   % \noexpand\putwordAppendix avoids expanding indigestible
   % commands in some of the translations.
   \gdef\noexpand\thischapter{\noexpand\putwordAppendix{}
               \noexpand\thischapternum:
               \noexpand\thischaptername}%
  }%
\else
 \toks0={#1}%
 \xdef\lastchapterdefs{%
   \gdef\noexpand\thischaptername{\the\toks0}%
   \gdef\noexpand\thischapternum{\the\chapno}%
   % \noexpand\putwordChapter avoids expanding indigestible
   % commands in some of the translations.
   \gdef\noexpand\thischapter{\noexpand\putwordChapter{}
               \noexpand\thischapternum:
               \noexpand\thischaptername}%
  }%
\fi\fi\fi
%
% Output the mark.  Pass it through \safewhatsit, to take care of
% the preceding space.
\safewhatsit\domark
```

```
%
% Insert the chapter heading break.
\pchapsepmacro
%
% Now the second mark, after the heading break.  No break points
% between here and the heading.
\let\prevchapterdefs=\lastchapterdefs
\let\prevsectiondefs=\lastsectiondefs
\domark
%
{%
 \chapfonts \rmisbold
 %
 % Have to define \lastsection before calling \donoderef, because the
 % xref code eventually uses it.  On the other hand, it has to be called
 % after \pchapsepmacro, or the headline will change too soon.
 \gdef\lastsection{#1}%
 %
 % Only insert the separating space if we have a chapter/appendix
 % number, and don't print the unnumbered ``number''.
 \ifx\temptype\Ynothingkeyword
   \setbox0 = \hbox{}%
   \def\toctype{unnchap}%
 \else\ifx\temptype\Yomitfromtockeyword
   \setbox0 = \hbox{}% contents like unnumbered, but no toc entry
   \def\toctype{omit}%
 \else\ifx\temptype\Yappendixkeyword
   \setbox0 = \hbox{\putwordAppendix{} #3\enspace}%
   \def\toctype{app}%
 \else
   \setbox0 = \hbox{#3\enspace}%
   \def\toctype{numchap}%
 \fi\fi\fi
 %
 % Write the toc entry for this chapter.  Must come before the
 % \donoderef, because we include the current node name in the toc
 % entry, and \donoderef resets it to empty.
 \writetocentry{\toctype}{#1}{#3}%
 %
 % For pdftex, we have to write out the node definition (aka, make
 % the pdfdest) after any page break, but before the actual text has
 % been typeset.  If the destination for the pdf outline is after the
 % text, then jumping from the outline may wind up with the text not
 % being visible, for instance under high magnification.
 \donoderef{#2}%
 %
 % Typeset the actual heading.
 \nobreak % Avoid page breaks at the interline glue.
```

```
  \vbox{\raggedtitlesettings \hangindent=\wd0 \centerparametersmaybe
      \unhbox0 #1\par}%
 }%
 \nobreak\bigskip % no page break after a chapter title
 \nobreak
 }


 % @centerchap -- centered and unnumbered.
 \let\centerparametersmaybe = \relax
 \def\centerparameters{%
  \advance\rightskip by 3\rightskip
  \leftskip = \rightskip
  \parfillskip = 0pt
 }



 % I don't think this chapter style is supported any more, so I'm not
 % updating it with the new noderef stuff.  We'll see.  --karl, 11aug03.
 %
 \def\setchapterstyle #1 {\csname CHAPF#1\endcsname}
 %
 \def\unnchfopen #1{%
  \chapoddpage
  \vbox{\chapfonts \raggedtitlesettings #1\par}%
  \nobreak\bigskip\nobreak
 }
 \def\chfopen #1#2{\chapoddpage {\chapfonts
 \vbox to 3in{\vfil \hbox to\hsize{\hfil #2} \hbox to\hsize{\hfil #1} \vfil}}%
 \par\penalty 5000 %
 }
 \def\centerchfopen #1{%
  \chapoddpage
  \vbox{\chapfonts \raggedtitlesettings \hfill #1\hfill}%
  \nobreak\bigskip \nobreak
 }
 \def\CHAPFopen{%
  \global\let\chapmacro=\chfopen
  \global\let\centerchapmacro=\centerchfopen}



 % Section titles.  These macros combine the section number parts and
 % call the generic \sectionheading to do the printing.
 %
 \newskip\secheadingskip
 \def\secheadingbreak{\dobreak \secheadingskip{-1000}}


 % Subsection titles.
 \newskip\subsecheadingskip
```

```
\def\subsecheadingbreak{\dobreak \subsecheadingskip{-500}}


% Subsubsection titles.
\def\subsubsecheadingskip{\subsecheadingskip}
\def\subsubsecheadingbreak{\subsecheadingbreak}



% Print any size, any type, section title.
%
% #1 is the text, #2 is the section level (sec/subsec/subsubsec), #3 is
% the section type for xrefs (Ynumbered, Ynothing, Yappendix), #4 is the
% section number.
%
\def\seckeyword{sec}
%
\def\sectionheading#1#2#3#4{%
 {%
  \checkenv{}% should not be in an environment.
  %
  % Switch to the right set of fonts.
  \csname #2fonts\endcsname \rmisbold
  %
  \def\sectionlevel{#2}%
  \def\temptype{#3}%
  %
  % Insert first mark before the heading break (see notes for \domark).
  \let\prevsectiondefs=\lastsectiondefs
  \ifx\temptype\Ynothingkeyword
    \ifx\sectionlevel\seckeyword
      \gdef\lastsectiondefs{\gdef\thissectionname{#1}\gdef\thissectionnum{}%
                 \gdef\thissection{\thissectionname}}%
    \fi
  \else\ifx\temptype\Yomitfromtockeyword
    % Don't redefine \thissection.
  \else\ifx\temptype\Yappendixkeyword
    \ifx\sectionlevel\seckeyword
    \toks0={#1}%
    \xdef\lastsectiondefs{%
      \gdef\noexpand\thissectionname{\the\toks0}%
      \gdef\noexpand\thissectionnum{#4}%
      % \noexpand\putwordSection avoids expanding indigestible
      % commands in some of the translations.
      \gdef\noexpand\thissection{\noexpand\putwordSection{}
                 \noexpand\thissectionnum:
                 \noexpand\thissectionname}%
    }%
   \fi
  \else
```

```
  \ifx\sectionlevel\seckeyword
    \toks0={#1}%
    \xdef\lastsectiondefs{%
      \gdef\noexpand\thissectionname{\the\toks0}%
      \gdef\noexpand\thissectionnum{#4}%
      % \noexpand\putwordSection avoids expanding indigestible
      % commands in some of the translations.
      \gdef\noexpand\thissection{\noexpand\putwordSection{}
                    \noexpand\thissectionnum:
                    \noexpand\thissectionname}%
    }%
  \fi
\fi\fi\fi
%
% Go into vertical mode.  Usually we'll already be there, but we
% don't want the following whatsit to end up in a preceding paragraph
% if the document didn't happen to have a blank line.
\par
%
% Output the mark.  Pass it through \safewhatsit, to take care of
% the preceding space.
\safewhatsit\domark
%
% Insert space above the heading.
\csname #2headingbreak\endcsname
%
% Now the second mark, after the heading break.  No break points
% between here and the heading.
\let\prevsectiondefs=\lastsectiondefs
\domark
%
% Only insert the space after the number if we have a section number.
\ifx\temptype\Ynothingkeyword
  \setbox0 = \hbox{}%
  \def\toctype{unn}%
  \gdef\lastsection{#1}%
\else\ifx\temptype\Yomitfromtockeyword
  % for @headings -- no section number, don't include in toc,
  % and don't redefine \lastsection.
  \setbox0 = \hbox{}%
  \def\toctype{omit}%
  \let\sectionlevel=\empty
\else\ifx\temptype\Yappendixkeyword
  \setbox0 = \hbox{#4\enspace}%
  \def\toctype{app}%
  \gdef\lastsection{#1}%
\else
  \setbox0 = \hbox{#4\enspace}%
```

```
  \def\toctype{num}%
  \gdef\lastsection{#1}%
\fi\fi\fi
%
% Write the toc entry (before \donoderef).  See comments in \chapmacro.
\writetocentry{\toctype\sectionlevel}{#1}{#4}%
%
% Write the node reference (= pdf destination for pdftex).
% Again, see comments in \chapmacro.
\donoderef{#3}%
%
% Interline glue will be inserted when the vbox is completed.
% That glue will be a valid breakpoint for the page, since it'll be
% preceded by a whatsit (usually from the \donoderef, or from the
% \writetocentry if there was no node).  We don't want to allow that
% break, since then the whatsits could end up on page n while the
% section is on page n+1, thus toc/etc. are wrong.  Debian bug 276000.
\nobreak
%
% Output the actual section heading.
\vbox{\hyphenpenalty=10000 \tolerance=5000 \parindent=0pt \ptexraggedright
    \hangindent=\wd0  % zero if no section number
    \unhbox0 #1}%
}%
% Add extra space after the heading -- half of whatever came above it.
% Don't allow stretch, though.
\kern .5 \csname #2headingskip\endcsname
%
% Do not let the kern be a potential breakpoint, as it would be if it
% was followed by glue.
\nobreak
%
% We'll almost certainly start a paragraph next, so don't let that
% glue accumulate.  (Not a breakpoint because it's preceded by a
% discardable item.)  However, when a paragraph is not started next
% (\startdefun, \cartouche, \center, etc.), this needs to be wiped out
% or the negative glue will cause weirdly wrong output, typically
% obscuring the section heading with something else.
\vskip-\parskip
%
% This is so the last item on the main vertical list is a known
% \penalty > 10000, so \startdefun, etc., can recognize the situation
% and do the needful.
\penalty 10001
}


\message{toc,}
```

```
% Table of contents.
\newwrite\tocfile


% Write an entry to the toc file, opening it if necessary.
% Called from @chapter, etc.
%
% Example usage: \writetocentry{sec}{Section Name}{\the\chapno.\the\secno}
% We append the current node name (if any) and page number as additional
% arguments for the \{chap,sec,...}entry macros which will eventually
% read this.  The node name is used in the pdf outlines as the
% destination to jump to.
%
% We open the .toc file for writing here instead of at @setfilename (or
% any other fixed time) so that @contents can be anywhere in the document.
% But if #1 is `omit', then we don't do anything.  This is used for the
% table of contents chapter openings themselves.
%
\newif\iftocfileopened
\def\omitkeyword{omit}%
%
\def\writetocentry#1#2#3{%
 \edef\writetoctype{#1}%
 \ifx\writetoctype\omitkeyword \else
  \iftocfileopened\else
   \immediate\openout\tocfile = \jobname.toc
   \global\tocfileopenedtrue
  \fi
  %
  \iflinks
   {\atdummies
   \edef\temp{%
     \write\tocfile{@#1entry{#2}{#3}{\lastnode}{\noexpand\folio}}}%
   \temp
   }%
  \fi
 \fi
 %
 % Tell \shipout to create a pdf destination on each page, if we're
 % writing pdf.  These are used in the table of contents.  We can't
 % just write one on every page because the title pages are numbered
 % 1 and 2 (the page numbers aren't printed), and so are the first
 % two pages of the document.  Thus, we'd have two destinations named
 % `1', and two named `2'.
 \ifpdf \global\pdfmakepagedesttrue \fi
}


% These characters do not print properly in the Computer Modern roman
```

```
% fonts, so we must take special care.  This is more or less redundant
% with the Texinfo input format setup at the end of this file.
%
\def\activecatcodes{%
 \catcode`\"=\active
 \catcode`\$=\active
 \catcode`\<=\active
 \catcode`\>=\active
 \catcode`\\=\active
 \catcode`\^=\active
 \catcode`\_=\active
 \catcode`\|=\active
 \catcode`\~=\active
}


% Read the toc file, which is essentially Texinfo input.
\def\readtocfile{%
 \setupdatafile
 \activecatcodes
 \input \tocreadfilename
}


\newskip\contentsrightmargin \contentsrightmargin=1in
\newcount\savepageno
\newcount\lastnegativepageno \lastnegativepageno = -1


% Prepare to read what we've written to \tocfile.
%
\def\startcontents#1{%
 % If @setchapternewpage on, and @headings double, the contents should
 % start on an odd page, unlike chapters.  Thus, we maintain
 % \contentsalignmacro in parallel with \pagealignmacro.
 % From: Torbjorn Granlund <tege@matematik.su.se>
 \contentsalignmacro
 \immediate\closeout\tocfile
 %
 % Don't need to put `Contents' or `Short Contents' in the headline.
 % It is abundantly clear what they are.
 \chapmacro{#1}{Yomitfromtoc}{}%
 %
 \savepageno = \pageno
 \begingroup                  % Set up to handle contents files properly.
  \raggedbottom               % Worry more about breakpoints than the bottom.
  \advance\hsize by -\contentsrightmargin % Don't use the full line length.
  %
  % Roman numerals for page numbers.
  \ifnum \pageno>0 \global\pageno = \lastnegativepageno \fi
```

```
}

% redefined for the two-volume lispref.  We always output on
% \jobname.toc even if this is redefined.
%
\def\tocreadfilename{\jobname.toc}

% Normal (long) toc.
%
\def\contents{%
 \startcontents{\putwordTOC}%
   \openin 1 \tocreadfilename\space
   \ifeof 1 \else
     \readtocfile
   \fi
   \vfill \eject
   \contentsalignmacro % in case @setchapternewpage odd is in effect
   \ifeof 1 \else
     \pdfmakeoutlines
   \fi
   \closein 1
 \endgroup
 \lastnegativepageno = \pageno
 \global\pageno = \savepageno
}

% And just the chapters.
\def\summarycontents{%
 \startcontents{\putwordShortTOC}%
   %
   \let\partentry = \shortpartentry
   \let\numchapentry = \shortchapentry
   \let\appentry = \shortchapentry
   \let\unnchapentry = \shortunnchapentry
   % We want a true roman here for the page numbers.
   \secfonts
   \let\rm=\shortcontrm \let\bf=\shortcontbf
   \let\sl=\shortcontsl \let\tt=\shortconttt
   \rm
   \hyphenpenalty = 10000
   \advance\baselineskip by 1pt % Open it up a little.
   \def\numsecentry##1##2##3##4{}
   \let\appsecentry = \numsecentry
   \let\unnsecentry = \numsecentry
   \let\numsubsecentry = \numsecentry
   \let\appsubsecentry = \numsecentry
   \let\unnsubsecentry = \numsecentry
   \let\numsubsubsecentry = \numsecentry
```

```
  \let\appsubsubsecentry = \numsecentry
  \let\unnsubsubsecentry = \numsecentry
  \openin 1 \tocreadfilename\space
  \ifeof 1 \else
    \readtocfile
  \fi
  \closein 1
  \vfill \eject
  \contentsalignmacro % in case @setchapternewpage odd is in effect
 \endgroup
 \lastnegativepageno = \pageno
 \global\pageno = \savepageno
 }
\let\shortcontents = \summarycontents


% Typeset the label for a chapter or appendix for the short contents.
% The arg is, e.g., `A' for an appendix, or `3' for a chapter.
%
\def\shortchaplabel#1{%
  % This space should be enough, since a single number is .5em, and the
  % widest letter (M) is 1em, at least in the Computer Modern fonts.
  % But use \hss just in case.
  % (This space doesn't include the extra space that gets added after
  % the label; that gets put in by \shortchapentry above.)
  %
  % We'd like to right-justify chapter numbers, but that looks strange
  % with appendix letters.  And right-justifying numbers and
  % left-justifying letters looks strange when there is less than 10
  % chapters.  Have to read the whole toc once to know how many chapters
  % there are before deciding ...
  \hbox to 1em{#1\hss}%
}


% These macros generate individual entries in the table of contents.
% The first argument is the chapter or section name.
% The last argument is the page number.
% The arguments in between are the chapter number, section number, ...


% Parts, in the main contents.  Replace the part number, which doesn't
% exist, with an empty box.  Let's hope all the numbers have the same width.
% Also ignore the page number, which is conventionally not printed.
\def\numeralbox{\setbox0=\hbox{8}\hbox to \wd0{\hfil}}
\def\partentry#1#2#3#4{\dochapentry{\numeralbox\labelspace#1}{}}
%
% Parts, in the short toc.
\def\shortpartentry#1#2#3#4{%
 \penalty-300
 \vskip.5\baselineskip plus.15\baselineskip minus.1\baselineskip
```

```
\shortchapentry{{\bf #1}}{\numeralbox}{}{}%
}

% Chapters, in the main contents.
\def\numchapentry#1#2#3#4{\dochapentry{#2\labelspace#1}{#4}}
%
% Chapters, in the short toc.
% See comments in \dochapentry re vbox and related settings.
\def\shortchapentry#1#2#3#4{%
 \tocentry{\shortchaplabel{#2}\labelspace #1}{\doshortpageno\bgroup#4\egroup}%
}

% Appendices, in the main contents.
% Need the word Appendix, and a fixed-size box.
%
\def\appendixbox#1{%
 % We use M since it's probably the widest letter.
 \setbox0 = \hbox{\putwordAppendix{} M}%
 \hbox to \wd0{\putwordAppendix{} #1\hss}}
%
\def\appentry#1#2#3#4{\dochapentry{\appendixbox{#2}\labelspace#1}{#4}}

% Unnumbered chapters.
\def\unnchapentry#1#2#3#4{\dochapentry{#1}{#4}}
\def\shortunnchapentry#1#2#3#4{\tocentry{#1}{\doshortpageno\bgroup#4\egroup}}

% Sections.
\def\numsecentry#1#2#3#4{\dosecentry{#2\labelspace#1}{#4}}
\let\appsecentry=\numsecentry
\def\unnsecentry#1#2#3#4{\dosecentry{#1}{#4}}

% Subsections.
\def\numsubsecentry#1#2#3#4{\dosubsecentry{#2\labelspace#1}{#4}}
\let\appsubsecentry=\numsubsecentry
\def\unnsubsecentry#1#2#3#4{\dosubsecentry{#1}{#4}}

% And subsubsections.
\def\numsubsubsecentry#1#2#3#4{\dosubsubsecentry{#2\labelspace#1}{#4}}
\let\appsubsubsecentry=\numsubsubsecentry
\def\unnsubsubsecentry#1#2#3#4{\dosubsubsecentry{#1}{#4}}

% This parameter controls the indentation of the various levels.
% Same as \defaultparindent.
\newdimen\tocindent \tocindent = 15pt

% Now for the actual typesetting. In all these, #1 is the text and #2 is the
% page number.
%
```

```
% If the toc has to be broken over pages, we want it to be at chapters
% if at all possible; hence the \penalty.
\def\dochapentry#1#2{%
 \penalty-300 \vskip1\baselineskip plus.33\baselineskip minus.25\baselineskip
 \begingroup
   \chapentryfonts
   \tocentry{#1}{\dopageno\bgroup#2\egroup}%
 \endgroup
 \nobreak\vskip .25\baselineskip plus.1\baselineskip
}

\def\dosecentry#1#2{\begingroup
 \secentryfonts \leftskip=\tocindent
 \tocentry{#1}{\dopageno\bgroup#2\egroup}%
\endgroup}

\def\dosubsecentry#1#2{\begingroup
 \subsecentryfonts \leftskip=2\tocindent
 \tocentry{#1}{\dopageno\bgroup#2\egroup}%
\endgroup}

\def\dosubsubsecentry#1#2{\begingroup
 \subsubsecentryfonts \leftskip=3\tocindent
 \tocentry{#1}{\dopageno\bgroup#2\egroup}%
\endgroup}

% We use the same \entry macro as for the index entries.
\let\tocentry = \entry

% Space between chapter (or whatever) number and the title.
\def\labelspace{\hskip1em \relax}

\def\dopageno#1{{\rm #1}}
\def\doshortpageno#1{{\rm #1}}

\def\chapentryfonts{\secfonts \rm}
\def\secentryfonts{\textfonts}
\def\subsecentryfonts{\textfonts}
\def\subsubsecentryfonts{\textfonts}


\message{environments,}
% @foo ... @end foo.

% @tex ... @end tex    escapes into raw TeX temporarily.
% One exception: @ is still an escape character, so that @end tex works.
% But \@ or @@ will get a plain @ character.
```

```
\envdef\tex{%
\setupmarkupstyle{tex}%
\catcode `\\=0 \catcode `\{=1 \catcode `\}=2
\catcode `\$=3 \catcode `\&=4 \catcode `\#=6
\catcode `\^=7 \catcode `\_=8 \catcode `\~=\active \let~=\tie
\catcode `\%=14
\catcode `\+=\other
\catcode `\"=\other
\catcode `\|=\other
\catcode `\<=\other
\catcode `\>=\other
\catcode`\`=\other
\catcode`\'=\other
\escapechar=`\\
%
% ' is active in math mode (mathcode"8000).  So reset it, and all our
% other math active characters (just in case), to plain's definitions.
\mathactive
%
\let\b=\ptexb
\let\bullet=\ptexbullet
\let\c=\ptexc
\let\,=\ptexcomma
\let\.=\ptexdot
\let\dots=\ptexdots
\let\equiv=\ptexequiv
\let\!=\ptexexclam
\let\i=\ptexi
\let\indent=\ptexindent
\let\noindent=\ptexnoindent
\let\{=\ptexlbrace
\let\+=\tabalign
\let\}=\ptexrbrace
\let\/=\ptexslash
\let\*=\ptexstar
\let\t=\ptext
\expandafter \let\csname top\endcsname=\ptextop  % outer
\let\frenchspacing=\plainfrenchspacing
%
\def\endldots{\mathinner{\ldots\ldots\ldots\ldots}}%
\def\enddots{\relax\ifmmode\endldots\else$\mathsurround=0pt \endldots\,$\fi}%
\def\@{@}%
}
% There is no need to define \Etex.

% Define @lisp ... @end lisp.
% @lisp environment forms a group so it can rebind things,
% including the definition of @end lisp (which normally is erroneous).
```

```
% Amount to narrow the margins by for @lisp.
\newskip\lispnarrowing \lispnarrowing=0.4in

% This is the definition that ^^M gets inside @lisp, @example, and other
% such environments.  \null is better than a space, since it doesn't
% have any width.
\def\lisppar{\null\endgraf}

% This space is always present above and below environments.
\newskip\envskipamount \envskipamount = 0pt

% Make spacing and below environment symmetrical.  We use \parskip here
% to help in doing that, since in @example-like environments \parskip
% is reset to zero; thus the \afterenvbreak inserts no space -- but the
% start of the next paragraph will insert \parskip.
%
\def\aboveenvbreak{{%
 % =10000 instead of <10000 because of a special case in \itemzzz and
 % \sectionheading, q.v.
 \ifnum \lastpenalty=10000 \else
   \advance\envskipamount by \parskip
   \endgraf
   \ifdim\lastskip<\envskipamount
     \removelastskip
     % it's not a good place to break if the last penalty was \nobreak
     % or better ...
     \ifnum\lastpenalty<10000 \penalty-50 \fi
     \vskip\envskipamount
   \fi
 \fi
}}

\let\afterenvbreak = \aboveenvbreak

% \nonarrowing is a flag.  If "set", @lisp etc don't narrow margins; it will
% also clear it, so that its embedded environments do the narrowing again.
\let\nonarrowing=\relax

% @cartouche ... @end cartouche: draw rectangle w/rounded corners around
% environment contents.
\font\circle=lcircle10
\newdimen\circthick
\newdimen\cartouter\newdimen\cartinner
\newskip\normbskip\newskip\normpskip\newskip\normlskip
\circthick=\fontdimen8\circle
%
\def\ctl{{\circle\char'013\hskip -6pt}}% 6pt from pl file: 1/2charwidth
```

```
\def\ctr{{\hskip 6pt\circle\char'010}}
\def\cbl{{\circle\char'012\hskip -6pt}}
\def\cbr{{\hskip 6pt\circle\char'011}}
\def\carttop{\hbox to \cartouter{\hskip\lskip
    \ctl\leaders\hrule height\circthick\hfil\ctr
    \hskip\rskip}}
\def\cartbot{\hbox to \cartouter{\hskip\lskip
    \cbl\leaders\hrule height\circthick\hfil\cbr
    \hskip\rskip}}
%
\newskip\lskip\newskip\rskip

\envdef\cartouche{%
 \ifhmode\par\fi  % can't be in the midst of a paragraph.
 \startsavinginserts
 \lskip=\leftskip \rskip=\rightskip
 \leftskip=0pt\rightskip=0pt % we want these *outside*.
 \cartinner=\hsize \advance\cartinner by-\lskip
 \advance\cartinner by-\rskip
 \cartouter=\hsize
 \advance\cartouter by 18.4pt % allow for 3pt kerns on either
    % side, and for 6pt waste from
    % each corner char, and rule thickness
 \normbskip=\baselineskip \normpskip=\parskip \normlskip=\lineskip
 % Flag to tell @lisp, etc., not to narrow margin.
 \let\nonarrowing = t%
 %
 % If this cartouche directly follows a sectioning command, we need the
 % \parskip glue (backspaced over by default) or the cartouche can
 % collide with the section heading.
 \ifnum\lastpenalty>10000 \vskip\parskip \penalty\lastpenalty \fi
 %
 \vbox\bgroup
    \baselineskip=0pt\parskip=0pt\lineskip=0pt
    \carttop
    \hbox\bgroup
  \hskip\lskip
  \vrule\kern3pt
  \vbox\bgroup
    \kern3pt
    \hsize=\cartinner
    \baselineskip=\normbskip
    \lineskip=\normlskip
    \parskip=\normpskip
    \vskip -\parskip
    \comment % For explanation, see the end of def\group.
}
\def\Ecartouche{%
```

```
        \ifhmode\par\fi
      \kern3pt
   \egroup
   \kern3pt\vrule
   \hskip\rskip
      \egroup
      \cartbot
  \egroup
  \checkinserts
}
```

% This macro is called at the beginning of all the @example variants,
% inside a group.
\newdimen\nonfillparindent
\def\nonfillstart{%
  \aboveenvbreak
  \hfuzz = 12pt % Don't be fussy
  \sepspaces % Make spaces be word-separators rather than space tokens.
  \let\par = \lisppar % don't ignore blank lines
  \obeylines % each line of input is a line of output
  \parskip = 0pt
  % Turn off paragraph indentation but redefine \indent to emulate
  % the normal \indent.
  \nonfillparindent=\parindent
  \parindent = 0pt
  \let\indent\nonfillindent
  %
  \emergencystretch = 0pt % don't try to avoid overfull boxes
  \ifx\nonarrowing\relax
    \advance \leftskip by \lispnarrowing
    \exdentamount=\lispnarrowing
  \else
    \let\nonarrowing = \relax
  \fi
  \let\exdent=\nofillexdent
}

\begingroup
\obeyspaces
% We want to swallow spaces (but not other tokens) after the fake
% @indent in our nonfill-environments, where spaces are normally
% active and set to @tie, resulting in them not being ignored after
% @indent.
\gdef\nonfillindent{\futurelet\temp\nonfillindentcheck}%
\gdef\nonfillindentcheck{%
\ifx\temp %
\expandafter\nonfillindentgobble%

```
\else%
\leavevmode\nonfillindentbox%
\fi%
}%
\endgroup
\def\nonfillindentgobble#1{\nonfillindent}
\def\nonfillindentbox{\hbox to \nonfillparindent{\hss}}


% If you want all examples etc. small: @set dispenvsize small.
% If you want even small examples the full size: @set dispenvsize nosmall.
% This affects the following displayed environments:
%    @example, @display, @format, @lisp
%
\def\smallword{small}
\def\nosmallword{nosmall}
\let\SETdispenvsize\relax
\def\setnormaldispenv{%
 \ifx\SETdispenvsize\smallword
   % end paragraph for sake of leading, in case document has no blank
   % line.  This is redundant with what happens in \aboveenvbreak, but
   % we need to do it before changing the fonts, and it's inconvenient
   % to change the fonts afterward.
   \ifnum \lastpenalty=10000 \else \endgraf \fi
   \smallexamplefonts \rm
 \fi
}
\def\setsmalldispenv{%
 \ifx\SETdispenvsize\nosmallword
 \else
   \ifnum \lastpenalty=10000 \else \endgraf \fi
   \smallexamplefonts \rm
 \fi
}


% We often define two environments, @foo and @smallfoo.
% Let's do it in one command.  #1 is the env name, #2 the definition.
\def\makedispenvdef#1#2{%
 \expandafter\envdef\csname#1\endcsname {\setnormaldispenv #2}%
 \expandafter\envdef\csname small#1\endcsname {\setsmalldispenv #2}%
 \expandafter\let\csname E#1\endcsname \afterenvbreak
 \expandafter\let\csname Esmall#1\endcsname \afterenvbreak
}


% Define two environment synonyms (#1 and #2) for an environment.
\def\maketwodispenvdef#1#2#3{%
 \makedispenvdef{#1}{#3}%
 \makedispenvdef{#2}{#3}%
}
```

```
%
% @lisp: indented, narrowed, typewriter font;
% @example: same as @lisp.
%
% @smallexample and @smalllisp: use smaller fonts.
% Originally contributed by Pavel@xerox.
%
\maketwodispenvdef{lisp}{example}{%
 \nonfillstart
 \tt\setupmarkupstyle{example}%
 \let\kbdfont = \kbdexamplefont % Allow @kbd to do something special.
 \gobble % eat return
}
% @display/@smalldisplay: same as @lisp except keep current font.
%
\makedispenvdef{display}{%
 \nonfillstart
 \gobble
}

% @format/@smallformat: same as @display except don't narrow margins.
%
\makedispenvdef{format}{%
 \let\nonarrowing = t%
 \nonfillstart
 \gobble
}

% @flushleft: same as @format, but doesn't obey \SETdispenvsize.
\envdef\flushleft{%
 \let\nonarrowing = t%
 \nonfillstart
 \gobble
}
\let\Eflushleft = \afterenvbreak

% @flushright.
%
\envdef\flushright{%
 \let\nonarrowing = t%
 \nonfillstart
 \advance\leftskip by 0pt plus 1fill\relax
 \gobble
}
\let\Eflushright = \afterenvbreak


% @raggedright does more-or-less normal line breaking but no right
```

```
% justification.  From plain.tex.
\envdef\raggedright{%
 \rightskip0pt plus2em \spaceskip.3333em \xspaceskip.5em\relax
}
\let\Eraggedright\par

\envdef\raggedleft{%
 \parindent=0pt \leftskip0pt plus2em
 \spaceskip.3333em \xspaceskip.5em \parfillskip=0pt
 \hbadness=10000 % Last line will usually be underfull, so turn off
         % badness reporting.
}
\let\Eraggedleft\par

\envdef\raggedcenter{%
 \parindent=0pt \rightskip0pt plus1em \leftskip0pt plus1em
 \spaceskip.3333em \xspaceskip.5em \parfillskip=0pt
 \hbadness=10000 % Last line will usually be underfull, so turn off
          % badness reporting.
}
\let\Eraggedcenter\par


% @quotation does normal linebreaking (hence we can't use \nonfillstart)
% and narrows the margins.  We keep \parskip nonzero in general, since
% we're doing normal filling.  So, when using \aboveenvbreak and
% \afterenvbreak, temporarily make \parskip 0.
%
\makedispenvdef{quotation}{\quotationstart}
%
\def\quotationstart{%
 \indentedblockstart % same as \indentedblock, but increase right margin too.
 \ifx\nonarrowing\relax
   \advance\rightskip by \lispnarrowing
 \fi
 \parsearg\quotationlabel
}

% We have retained a nonzero parskip for the environment, since we're
% doing normal filling.
%
\def\Equotation{%
 \par
 \ifx\quotationauthor\thisisundefined\else
   % indent a bit.
   \leftline{\kern 2\leftskip \sl ---\quotationauthor}%
 \fi
 {\parskip=0pt \afterenvbreak}%
```

```
}
\def\Esmallquotation{\Equotation}

% If we're given an argument, typeset it in bold with a colon after.
\def\quotationlabel#1{%
 \def\temp{#1}%
 \ifx\temp\empty \else
   {\bf #1: }%
 \fi
}


% @indentedblock is like @quotation, but indents only on the left and
% has no optional argument.
%
\makedispenvdef{indentedblock}{\indentedblockstart}
%
\def\indentedblockstart{%
 {\parskip=0pt \aboveenvbreak}% because \aboveenvbreak inserts \parskip
 \parindent=0pt
 %
 % @cartouche defines \nonarrowing to inhibit narrowing at next level down.
 \ifx\nonarrowing\relax
   \advance\leftskip by \lispnarrowing
   \exdentamount = \lispnarrowing
 \else
   \let\nonarrowing = \relax
 \fi
}


% Keep a nonzero parskip for the environment, since we're doing normal filling.
%
\def\Eindentedblock{%
 \par
 {\parskip=0pt \afterenvbreak}%
}
\def\Esmallindentedblock{\Eindentedblock}



% LaTeX-like @verbatim...@end verbatim and @verb{<char>...<char>}
% If we want to allow any <char> as delimiter,
% we need the curly braces so that makeinfo sees the @verb command, eg:
% `@verbx...x' would look like the '@verbx' command.  --janneke@gnu.org
%
% [Knuth]: Donald Ervin Knuth, 1996.  The TeXbook.
%
% [Knuth] p.344; only we need to do the other characters Texinfo sets
% active too.  Otherwise, they get lost as the first character on a
% verbatim line.
```

```
\def\dospecials{%
 \do\ \do\\\do\{\do\}\do\$\do\&%
 \do\#\do\^\do\^^K\do\_\do\^^A\do\%\do\~%
 \do\<\do\>\do\|\do\@\do+\do\"%
 % Don't do the quotes -- if we do, @set txicodequoteundirected and
 % @set txicodequotebacktick will not have effect on @verb and
 % @verbatim, and ?` and !` ligatures won't get disabled.
 %\do\`\do\'%
}
%
% [Knuth] p. 380
\def\uncatcodespecials{%
 \def\do##1{\catcode`##1=\other}\dospecials}
%
% Setup for the @verb command.
%
% Eight spaces for a tab
\begingroup
 \catcode`\^^I=\active
 \gdef\tabeightspaces{\catcode`\^^I=\active\def^^I{\ \ \ \ \ \ \ \ }}
\endgroup
%
\def\setupverb{%
 \tt  % easiest (and conventionally used) font for verbatim
 \def\par{\leavevmode\endgraf}%
 \setupmarkupstyle{verb}%
 \tabeightspaces
 % Respect line breaks,
 % print special symbols as themselves, and
 % make each space count
 % must do in this order:
 \obeylines \uncatcodespecials \sepspaces
}


% Setup for the @verbatim environment
%
% Real tab expansion.
\newdimen\tabw \setbox0=\hbox{\tt\space} \tabw=8\wd0 % tab amount
%
% We typeset each line of the verbatim in an \hbox, so we can handle
% tabs.  The \global is in case the verbatim line starts with an accent,
% or some other command that starts with a begin-group.  Otherwise, the
% entire \verbbox would disappear at the corresponding end-group, before
% it is typeset.  Meanwhile, we can't have nested verbatim commands
% (can we?), so the \global won't be overwriting itself.
\newbox\verbbox
\def\starttabbox{\global\setbox\verbbox=\hbox\bgroup}
%
```

```
\begingroup
 \catcode`\^^I=\active
 \gdef\tabexpand{%
  \catcode`\^^I=\active
  \def^^I{\leavevmode\egroup
   \dimen\verbbox=\wd\verbbox % the width so far, or since the previous tab
   \divide\dimen\verbbox by\tabw
   \multiply\dimen\verbbox by\tabw % compute previous multiple of \tabw
   \advance\dimen\verbbox by\tabw  % advance to next multiple of \tabw
   \wd\verbbox=\dimen\verbbox \box\verbbox \starttabbox
  }%
 }
\endgroup

% start the verbatim environment.
\def\setupverbatim{%
 \let\nonarrowing = t%
 \nonfillstart
 \tt % easiest (and conventionally used) font for verbatim
 % The \leavevmode here is for blank lines.  Otherwise, we would
 % never \starttabox and the \egroup would end verbatim mode.
 \def\par{\leavevmode\egroup\box\verbbox\endgraf}%
 \tabexpand
 \setupmarkupstyle{verbatim}%
 % Respect line breaks,
 % print special symbols as themselves, and
 % make each space count.
 % Must do in this order:
 \obeylines \uncatcodespecials \sepspaces
 \everypar{\starttabbox}%
}

% Do the @verb magic: verbatim text is quoted by unique
% delimiter characters.  Before first delimiter expect a
% right brace, after last delimiter expect closing brace:
%
%   \def\doverb'{'<char>#1<char>'}'{#1}
%
% [Knuth] p. 382; only eat outer {}
\begingroup
 \catcode`\[=1\catcode`\]=2\catcode`\{=\other\catcode`\}=\other
 \gdef\doverb{#1[\def\next##1#1}[##1\endgroup]\next]
\endgroup
%
\def\verb{\begingroup\setupverb\doverb}
%
%
% Do the @verbatim magic: define the macro \doverbatim so that
```

```
% the (first) argument ends when '@end verbatim' is reached, ie:
%
%     \def\doverbatim#1@end verbatim{#1}
%
% For Texinfo it's a lot easier than for LaTeX,
% because texinfo's \verbatim doesn't stop at '\end{verbatim}':
% we need not redefine '\', '{' and '}'.
%
% Inspired by LaTeX's verbatim command set [latex.ltx]
%
\begingroup
 \catcode`\ =\active
 \obeylines %
 % ignore everything up to the first ^^M, that's the newline at the end
 % of the @verbatim input line itself.  Otherwise we get an extra blank
 % line in the output.
 \xdef\doverbatim#1^^M#2@end verbatim{#2\noexpand\end\gobble verbatim}%
 % We really want {...\end verbatim} in the body of the macro, but
 % without the active space; thus we have to use \xdef and \gobble.
\endgroup
%
\envdef\verbatim{%
  \setupverbatim\doverbatim
}
\let\Everbatim = \afterenvbreak


% @verbatiminclude FILE - insert text of file in verbatim environment.
%
\def\verbatiminclude{\parseargusing\filenamecatcodes\doverbatiminclude}
%
\def\doverbatiminclude#1{%
 {%
  \makevalueexpandable
  \setupverbatim
  \indexnofonts      % Allow `@@' and other weird things in file names.
  \wlog{texinfo.tex: doing @verbatiminclude of #1^^J}%
  \input #1
  \afterenvbreak
 }%
}

% @copying ... @end copying.
% Save the text away for @insertcopying later.
%
% We save the uninterpreted tokens, rather than creating a box.
% Saving the text in a box would be much easier, but then all the
% typesetting commands (@smallbook, font changes, etc.) have to be done
```

% beforehand -- and a) we want @copying to be done first in the source
% file; b) letting users define the frontmatter in as flexible order as
% possible is very desirable.
%
\def\copying{\checkenv{}\begingroup\scanargctxt\docopying}
\def\docopying#1@end copying{\endgroup\def\copyingtext{#1}}
%
\def\insertcopying{%
 \begingroup
   \parindent = 0pt % paragraph indentation looks wrong on title page
   \scanexp\copyingtext
 \endgroup
}

\message{defuns,}
% @defun etc.

\newskip\defbodyindent \defbodyindent=.4in
\newskip\defargsindent \defargsindent=50pt
\newskip\deflastargmargin \deflastargmargin=18pt
\newcount\defunpenalty

% Start the processing of @deffn:
\def\startdefun{%
 \ifnum\lastpenalty<10000
   \medbreak
   \defunpenalty=10003 % Will keep this @deffn together with the
                  % following @def command, see below.
 \else
   % If there are two @def commands in a row, we'll have a \nobreak,
   % which is there to keep the function description together with its
   % header. But if there's nothing but headers, we need to allow a
   % break somewhere. Check specifically for penalty 10002, inserted
   % by \printdefunline, instead of 10000, since the sectioning
   % commands also insert a nobreak penalty, and we don't want to allow
   % a break between a section heading and a defun.
   %
   % As a further refinement, we avoid "club" headers by signalling
   % with penalty of 10003 after the very first @deffn in the
   % sequence (see above), and penalty of 10002 after any following
   % @def command.
   \ifnum\lastpenalty=10002 \penalty2000 \else \defunpenalty=10002 \fi
   %
   % Similarly, after a section heading, do not allow a break.
   % But do insert the glue.
   \medskip % preceded by discardable penalty, so not a breakpoint
 \fi

```
%
\parindent=0in
\advance\leftskip by \defbodyindent
\exdentamount=\defbodyindent
}

\def\dodefunx#1{%
  % First, check whether we are in the right environment:
  \checkenv#1%
  %
  % As above, allow line break if we have multiple x headers in a row.
  % It's not a great place, though.
  \ifnum\lastpenalty=10002 \penalty3000 \else \defunpenalty=10002 \fi
  %
  % And now, it's time to reuse the body of the original defun:
  \expandafter\gobbledefun#1%
}
\def\gobbledefun#1\startdefun{}

% \printdefunline \deffnheader{text}
%
\def\printdefunline#1#2{%
  \begingroup
    % call \deffnheader:
    #1#2 \endheader
    % common ending:
    \interlinepenalty = 10000
    \advance\rightskip by 0pt plus 1fil\relax
    \endgraf
    \nobreak\vskip -\parskip
    \penalty\defunpenalty  % signal to \startdefun and \dodefunx
    % Some of the @defun-type tags do not enable magic parentheses,
    % rendering the following check redundant.  But we don't optimize.
    \checkparencounts
  \endgroup
}

\def\Edefun{\endgraf\medbreak}

% \makedefun{deffn} creates \deffn, \deffnx and \Edeffn;
% the only thing remaining is to define \deffnheader.
%
\def\makedefun#1{%
  \expandafter\let\csname E#1\endcsname = \Edefun
  \edef\temp{\noexpand\domakedefun
    \makecsname{#1}\makecsname{#1x}\makecsname{#1header}}%
  \temp
}
```

```
% \domakedefun \deffn \deffnx \deffnheader
%
% Define \deffn and \deffnx, without parameters.
% \deffnheader has to be defined explicitly.
%
\def\domakedefun#1#2#3{%
 \envdef#1{%
   \startdefun
   \doingtypefnfalse    % distinguish typed functions from all else
   \parseargusing\activeparens{\printdefunline#3}%
 }%
 \def#2{\dodefunx#1}%
 \def#3%
}

\newif\ifdoingtypefn      % doing typed function?
\newif\ifrettypeownline    % typeset return type on its own line?

% @deftypefnnewline on|off says whether the return type of typed functions
% are printed on their own line.  This affects @deftypefn, @deftypefun,
% @deftypeop, and @deftypemethod.
%
\parseargdef\deftypefnnewline{%
 \def\temp{#1}%
 \ifx\temp\onword
   \expandafter\let\csname SETtxideftypefnnl\endcsname
     = \empty
 \else\ifx\temp\offword
   \expandafter\let\csname SETtxideftypefnnl\endcsname
     = \relax
 \else
   \errhelp = \EMsimple
   \errmessage{Unknown @txideftypefnnl value `\temp',
         must be on|off}%
 \fi\fi
}

% Untyped functions:

% @deffn category name args
\makedefun{deffn}{\deffngeneral{}}

% @deffn category class name args
\makedefun{defop}#1 {\defopon{#1\ \putwordon}}

% \defopon {category on}class name args
\def\defopon#1#2 {\deffngeneral{\putwordon\ \code{#2}}{#1\ \code{#2}} }
```

```
% \deffngeneral {subind}category name args
%
\def\deffngeneral#1#2 #3 #4\endheader{%
  % Remember that \dosubind{fn}{foo}{} is equivalent to \doind{fn}{foo}.
  \dosubind{fn}{\code{#3}}{#1}%
  \defname{#2}{}{#3}\magicamp\defunargs{#4\unskip}%
}

% Typed functions:

% @deftypefn category type name args
\makedefun{deftypefn}{\deftypefngeneral{}}

% @deftypeop category class type name args
\makedefun{deftypeop}#1 {\deftypeopon{#1\ \putwordon}}

% \deftypeopon {category on}class type name args
\def\deftypeopon#1#2 {\deftypefngeneral{\putwordon\ \code{#2}}{#1\ \code{#2}} }

% \deftypefngeneral {subind}category type name args
%
\def\deftypefngeneral#1#2 #3 #4 #5\endheader{%
  \dosubind{fn}{\code{#4}}{#1}%
  \doingtypefntrue
  \defname{#2}{#3}{#4}\defunargs{#5\unskip}%
}

% Typed variables:

% @deftypevr category type var args
\makedefun{deftypevr}{\deftypecvgeneral{}}

% @deftypecv category class type var args
\makedefun{deftypecv}#1 {\deftypecvof{#1\ \putwordof}}

% \deftypecvof {category of}class type var args
\def\deftypecvof#1#2 {\deftypecvgeneral{\putwordof\ \code{#2}}{#1\ \code{#2}} }

% \deftypecvgeneral {subind}category type var args
%
\def\deftypecvgeneral#1#2 #3 #4 #5\endheader{%
  \dosubind{vr}{\code{#4}}{#1}%
  \defname{#2}{#3}{#4}\defunargs{#5\unskip}%
}

% Untyped variables:
```

```
% @defvr category var args
\makedefun{defvr}#1 {\deftypevrheader{#1} {} }

% @defcv category class var args
\makedefun{defcv}#1 {\defcvof{#1\ \putwordof}}

% \defcvof {category of}class var args
\def\defcvof#1#2 {\deftypecvof{#1}#2 {} }

% Types:

% @deftp category name args
\makedefun{deftp}#1 #2 #3\endheader{%
 \doind{tp}{\code{#2}}%
 \defname{#1}{}{#2}\defunargs{#3\unskip}%
}

% Remaining @defun-like shortcuts:
\makedefun{defun}{\deffnheader{\putwordDeffunc} }
\makedefun{defmac}{\deffnheader{\putwordDefmac} }
\makedefun{defspec}{\deffnheader{\putwordDefspec} }
\makedefun{deftypefun}{\deftypefnheader{\putwordDeffunc} }
\makedefun{defvar}{\defvrheader{\putwordDefvar} }
\makedefun{defopt}{\defvrheader{\putwordDefopt} }
\makedefun{deftypevar}{\deftypevrheader{\putwordDefvar} }
\makedefun{defmethod}{\defopon\putwordMethodon}
\makedefun{deftypemethod}{\deftypeopon\putwordMethodon}
\makedefun{defivar}{\defcvof\putwordInstanceVariableof}
\makedefun{deftypeivar}{\deftypecvof\putwordInstanceVariableof}

% \defname, which formats the name of the @def (not the args).
% #1 is the category, such as "Function".
% #2 is the return type, if any.
% #3 is the function name.
%
% We are followed by (but not passed) the arguments, if any.
%
\def\defname#1#2#3{%
 \par
 % Get the values of \leftskip and \rightskip as they were outside the @def...
 \advance\leftskip by -\defbodyindent
 %
 % Determine if we are typesetting the return type of a typed function
 % on a line by itself.
 \rettypeownlinefalse
 \ifdoingtypefn  % doing a typed function specifically?
   % then check user option for putting return type on its own line:
   \expandafter\ifx\csname SETtxideftypefnnl\endcsname\relax \else
```

```
    \rettypeownlinetrue
  \fi
\fi
%
% How we'll format the category name.  Putting it in brackets helps
% distinguish it from the body text that may end up on the next line
% just below it.
\def\temp{#1}%
\setbox0=\hbox{\kern\deflastargmargin \ifx\temp\empty\else [\rm\temp]\fi}
%
% Figure out line sizes for the paragraph shape.  We'll always have at
% least two.
\tempnum = 2
%
% The first line needs space for \box0; but if \rightskip is nonzero,
% we need only space for the part of \box0 which exceeds it:
\dimen0=\hsize  \advance\dimen0 by -\wd0  \advance\dimen0 by \rightskip
%
% If doing a return type on its own line, we'll have another line.
\ifrettypeownline
  \advance\tempnum by 1
  \def\maybeshapeline{0in \hsize}%
\else
  \def\maybeshapeline{}%
\fi
%
% The continuations:
\dimen2=\hsize  \advance\dimen2 by -\defargsindent
%
% The final paragraph shape:
\parshape \tempnum  0in \dimen0  \maybeshapeline  \defargsindent \dimen2
%
% Put the category name at the right margin.
\noindent
\hbox to 0pt{%
  \hfil\box0 \kern-\hsize
  % \hsize has to be shortened this way:
  \kern\leftskip
  % Intentionally do not respect \rightskip, since we need the space.
}%
%
% Allow all lines to be underfull without complaint:
\tolerance=10000 \hbadness=10000
\exdentamount=\defbodyindent
{%
  % defun fonts. We use typewriter by default (used to be bold) because:
  % . we're printing identifiers, they should be in tt in principle.
  % . in languages with many accents, such as Czech or French, it's
```

```
%   common to leave accents off identifiers.  The result looks ok in
%   tt, but exceedingly strange in rm.
% . we don't want -- and --- to be treated as ligatures.
% . this still does not fix the ?` and !` ligatures, but so far no
%   one has made identifiers using them :).
\df \tt
\def\temp{#2}% text of the return type
\ifx\temp\empty\else
  \tclose{\temp}% typeset the return type
  \ifrettypeownline
    % put return type on its own line; prohibit line break following:
    \hfil\vadjust{\nobreak}\break
  \else
    \space  % type on same line, so just followed by a space
  \fi
 \fi        % no return type
 #3% output function name
}%
{\rm\enskip}% hskip 0.5 em of \tenrm
%
\boldbrax
% arguments will be output next, if any.
}

% Print arguments in slanted roman (not ttsl), inconsistently with using
% tt for the name.  This is because literal text is sometimes needed in
% the argument list (groff manual), and ttsl and tt are not very
% distinguishable.  Prevent hyphenation at `-' chars.
%
\def\defunargs#1{%
 % use sl by default (not ttsl),
 % tt for the names.
 \df \sl \hyphenchar\font=0
 %
 % On the other hand, if an argument has two dashes (for instance), we
 % want a way to get ttsl.  We used to recommend @var for that, so
 % leave the code in, but it's strange for @var to lead to typewriter.
 % Nowadays we recommend @code, since the difference between a ttsl hyphen
 % and a tt hyphen is pretty tiny.  @code also disables ?` !`.
 \def\var##1{{\setupmarkupstyle{var}\ttslanted{##1}}}%
 #1%
 \sl\hyphenchar\font=45
}

% We want ()&[] to print specially on the defun line.
%
\def\activeparens{%
 \catcode`\(=\active \catcode`\)=\active
```

```
  \catcode`\[=\active \catcode`\]=\active
 \catcode`\&=\active
}

% Make control sequences which act like normal parenthesis chars.
\let\lparen = ( \let\rparen = )

% Be sure that we always have a definition for `(', etc.  For example,
% if the fn name has parens in it, \boldbrax will not be in effect yet,
% so TeX would otherwise complain about undefined control sequence.
{
 \activeparens
 \global\let(=\lparen \global\let)=\rparen
 \global\let[=\lbrack \global\let]=\rbrack
 \global\let& = \&

 \gdef\boldbrax{\let(=\opnr\let)=\clnr\let[=\lbrb\let]=\rbrb}
 \gdef\magicamp{\let&=\amprm}
}

\newcount\parencount

% If we encounter &foo, then turn on ()-hacking afterwards
\newif\ifampseen
\def\amprm#1 {\ampseentrue{\bf\&#1 }}

\def\parenfont{%
 \ifampseen
   % At the first level, print parens in roman,
   % otherwise use the default font.
   \ifnum \parencount=1 \rm \fi
 \else
   % The \sf parens (in \boldbrax) actually are a little bolder than
   % the contained text.  This is especially needed for [ and ] .
   \sf
 \fi
}
\def\infirstlevel#1{%
 \ifampseen
  \ifnum\parencount=1
    #1%
  \fi
 \fi
}
\def\bfafterword#1 {#1 \bf}

\def\opnr{%
 \global\advance\parencount by 1
```

```
{\parenfont(}%
\infirstlevel \bfafterword
}
\def\clnr{%
{\parenfont)}%
\infirstlevel \sl
\global\advance\parencount by -1
}

\newcount\brackcount
\def\lbrb{%
\global\advance\brackcount by 1
{\bf[}%
}
\def\rbrb{%
{\bf]}%
\global\advance\brackcount by -1
}

\def\checkparencounts{%
\ifnum\parencount=0 \else \badparencount \fi
\ifnum\brackcount=0 \else \badbrackcount \fi
}
% these should not use \errmessage; the glibc manual, at least, actually
% has such constructs (when documenting function pointers).
\def\badparencount{%
\message{Warning: unbalanced parentheses in @def...}%
\global\parencount=0
}
\def\badbrackcount{%
\message{Warning: unbalanced square brackets in @def...}%
\global\brackcount=0
}


\message{macros,}
% @macro.

% To do this right we need a feature of e-TeX, \scantokens,
% which we arrange to emulate with a temporary file in ordinary TeX.
\ifx\eTeXversion\thisisundefined
\newwrite\macscribble
\def\scantokens#1{%
\toks0={#1}%
\immediate\openout\macscribble=\jobname.tmp
\immediate\write\macscribble{\the\toks0}%
\immediate\closeout\macscribble
\input \jobname.tmp
```

```
  }
\fi

\def\scanmacro#1{\begingroup
\newlinechar`\^^M
\let\xeatspaces\eatspaces
%
% Undo catcode changes of \startcontents and \doprintindex
% When called from @insertcopying or (short)caption, we need active
% backslash to get it printed correctly.  Previously, we had
% \catcode`\\=\other instead.  We'll see whether a problem appears
% with macro expansion.    --kasal, 19aug04
\catcode`\@=0 \catcode`\\=\active \escapechar=`\@
%
% ... and for \example:
\spaceisspace
%
% The \empty here causes a following catcode 5 newline to be eaten as
% part of reading whitespace after a control sequence.  It does not
% eat a catcode 13 newline.  There's no good way to handle the two
% cases (untried: maybe e-TeX's \everyeof could help, though plain TeX
% would then have different behavior).  See the Macro Details node in
% the manual for the workaround we recommend for macros and
% line-oriented commands.
%
\scantokens{#1\empty}%
\endgroup}

\def\scanexp#1{%
\edef\temp{\noexpand\scanmacro{#1}}%
\temp
}

\newcount\paramno   % Count of parameters
\newtoks\macname    % Macro name
\newif\ifrecursive  % Is it recursive?

% List of all defined macros in the form
%    \definedummyword\macro1\definedummyword\macro2...
% Currently is also contains all @aliases; the list can be split
% if there is a need.
\def\macrolist{}

% Add the macro to \macrolist
\def\addtomacrolist#1{\expandafter \addtomacrolistxxx \csname#1\endcsname}
\def\addtomacrolistxxx#1{%
   \toks0 = \expandafter{\macrolist\definedummyword#1}%
   \xdef\macrolist{\the\toks0}%
```

```
}

% Utility routines.
% This does \let #1 = #2, with \csnames; that is,
%   \let \csname#1\endcsname = \csname#2\endcsname
% (except of course we have to play expansion games).
%
\def\cslet#1#2{%
 \expandafter\let
 \csname#1\expandafter\endcsname
 \csname#2\endcsname
}


% Trim leading and trailing spaces off a string.
% Concepts from aro-bend problem 15 (see CTAN).
{\catcode`\@=11
\gdef\eatspaces #1{\expandafter\trim@\expandafter{#1 }}
\gdef\trim@ #1{\trim@@ @#1 @ #1 @ @@}
\gdef\trim@@ #1@ #2@ #3@@{\trim@@@\empty #2 @}
\def\unbrace#1{#1}
\unbrace{\gdef\trim@@@ #1 } #2@{#1}
}


% Trim a single trailing ^^M off a string.
{\catcode`\^^M=\other \catcode`\Q=3%
\gdef\eatcr #1{\eatcra #1Q^^MQ}%
\gdef\eatcra#1^^MQ{\eatcrb#1Q}%
\gdef\eatcrb#1Q#2Q{#1}%
}


% Macro bodies are absorbed as an argument in a context where
% all characters are catcode 10, 11 or 12, except \ which is active
% (as in normal texinfo). It is necessary to change the definition of \
% to recognize macro arguments; this is the job of \mbodybackslash.
%
% Non-ASCII encodings make 8-bit characters active, so un-activate
% them to avoid their expansion.  Must do this non-globally, to
% confine the change to the current group.
%
% It's necessary to have hard CRs when the macro is executed. This is
% done by making ^^M (\endlinechar) catcode 12 when reading the macro
% body, and then making it the \newlinechar in \scanmacro.
%
\def\scanctxt{% used as subroutine
 \catcode`\"=\other
 \catcode`\+=\other
 \catcode`\<=\other
 \catcode`\>=\other
```

```
\catcode`\@=\other
\catcode`\^=\other
\catcode`\_=\other
\catcode`\|=\other
\catcode`\~=\other
\ifx\declaredencoding\ascii \else \setnonasciicharscatcodenonglobal\other \fi
}

\def\scanargctxt{% used for copying and captions, not macros.
 \scanctxt
 \catcode`\\=\other
 \catcode`\^^M=\other
}

\def\macrobodyctxt{% used for @macro definitions
 \scanctxt
 \catcode`\{=\other
 \catcode`\}=\other
 \catcode`\^^M=\other
 \usembodybackslash
}

\def\macroargctxt{% used when scanning invocations
 \scanctxt
 \catcode`\\=0
}
% why catcode 0 for \ in the above?  To recognize \\ \{ \} as "escapes"
% for the single characters \ { }.  Thus, we end up with the "commands"
% that would be written @\ @{ @} in a Texinfo document.
%
% We already have @{ and @}.  For @\, we define it here, and only for
% this purpose, to produce a typewriter backslash (so, the @\ that we
% define for @math can't be used with @macro calls):
%
\def\\{\normalbackslash}%
%
% We would like to do this for \, too, since that is what makeinfo does.
% But it is not possible, because Texinfo already has a command @, for a
% cedilla accent.  Documents must use @comma{} instead.
%
% \anythingelse will almost certainly be an error of some kind.



% \mbodybackslash is the definition of \ in @macro bodies.
% It maps \foo\ => \csname macarg.foo\endcsname => #N
% where N is the macro parameter number.
% We define \csname macarg.\endcsname to be \realbackslash, so
% \\ in macro replacement text gets you a backslash.
```

```
%
{\catcode`@=0 @catcode`@\=@active
@gdef@usembodybackslash{@let\=@mbodybackslash}
@gdef@mbodybackslash#1\{@csname macarg.#1@endcsname}
}
\expandafter\def\csname macarg.\endcsname{\realbackslash}

\def\margbackslash#1{\char`\#1 }

\def\macro{\recursivefalse\parsearg\macroxxx}
\def\rmacro{\recursivetrue\parsearg\macroxxx}

\def\macroxxx#1{%
\getargs{#1}% now \macname is the macname and \argl the arglist
\ifx\argl\empty       % no arguments
  \paramno=0\relax
\else
  \expandafter\parsemargdef \argl;%
  \if\paramno>256\relax
   \ifx\eTeXversion\thisisundefined
    \errhelp = \EMsimple
    \errmessage{You need eTeX to compile a file with macros with more than 256 arguments}
   \fi
  \fi
\fi
\if1\csname ismacro.\the\macname\endcsname
  \message{Warning: redefining \the\macname}%
\else
  \expandafter\ifx\csname \the\macname\endcsname \relax
  \else \errmessage{Macro name \the\macname\space already defined}\fi
  \global\cslet{macsave.\the\macname}{\the\macname}%
  \global\expandafter\let\csname ismacro.\the\macname\endcsname=1%
  \addtomacrolist{\the\macname}%
\fi
\begingroup \macrobodyctxt
\ifrecursive \expandafter\parsermacbody
\else \expandafter\parsemacbody
\fi}

\parseargdef\unmacro{%
\if1\csname ismacro.#1\endcsname
  \global\cslet{#1}{macsave.#1}%
  \global\expandafter\let \csname ismacro.#1\endcsname=0%
  % Remove the macro name from \macrolist:
  \begingroup
   \expandafter\let\csname#1\endcsname \relax
   \let\definedummyword\unmacrodo
   \xdef\macrolist{\macrolist}%
```

```
   \endgroup
 \else
   \errmessage{Macro #1 not defined}%
 \fi
}


% Called by \do from \dounmacro on each macro.  The idea is to omit any
% macro definitions that have been changed to \relax.
%
\def\unmacrodo#1{%
 \ifx #1\relax
   % remove this
 \else
   \noexpand\definedummyword \noexpand#1%
 \fi
}


% This makes use of the obscure feature that if the last token of a
% <parameter list> is #, then the preceding argument is delimited by
% an opening brace, and that opening brace is not consumed.
\def\getargs#1{\getargsxxx#1{}}
\def\getargsxxx#1#{\getmacname #1 \relax\getmacargs}
\def\getmacname#1 #2\relax{\macname={#1}}
\def\getmacargs#1{\def\argl{#1}}


% For macro processing make @ a letter so that we can make Texinfo private macro names.
\edef\texiatcatcode{\the\catcode`\@}
\catcode `@=11\relax


% Parse the optional {params} list.  Set up \paramno and \paramlist
% so \defmacro knows what to do.  Define \macarg.BLAH for each BLAH
% in the params list to some hook where the argument si to be expanded.  If
% there are less than 10 arguments that hook is to be replaced by ##N where N
% is the position in that list, that is to say the macro arguments are to be
% defined `a la TeX in the macro body.
%
% That gets used by \mbodybackslash (above).
%
% We need to get `macro parameter char #' into several definitions.
% The technique used is stolen from LaTeX: let \hash be something
% unexpandable, insert that wherever you need a #, and then redefine
% it to # just before using the token list produced.
%
% The same technique is used to protect \eatspaces till just before
% the macro is used.
%
% If there are 10 or more arguments, a different technique is used, where the
% hook remains in the body, and when macro is to be expanded the body is
```

% processed again to replace the arguments.
%
% In that case, the hook is \the\toks N-1, and we simply set \toks N-1 to the
% argument N value and then \edef the body (nothing else will expand because of
% the catcode regime underwhich the body was input).
%
% If you compile with TeX (not eTeX), and you have macros with 10 or more
% arguments, you need that no macro has more than 256 arguments, otherwise an
% error is produced.
\def\parsemargdef#1;{%
 \paramno=0\def\paramlist{}%
 \let\hash\relax
 \let\xeatspaces\relax
 \parsemargdefxxx#1,;,%
 % In case that there are 10 or more arguments we parse again the arguments
 % list to set new definitions for the \macarg.BLAH macros corresponding to
 % each BLAH argument. It was anyhow needed to parse already once this list
 % in order to count the arguments, and as macros with at most 9 arguments
 % are by far more frequent than macro with 10 or more arguments, defining
 % twice the \macarg.BLAH macros does not cost too much processing power.
 \ifnum\paramno<10\relax\else
   \paramno0\relax
   \parsemmanyargdef@@#1,;,% 10 or more arguments
 \fi
}
\def\parsemargdefxxx#1,{%
 \if#1;\let\next=\relax
 \else \let\next=\parsemargdefxxx
   \advance\paramno by 1
   \expandafter\edef\csname macarg.\eatspaces{#1}\endcsname
       {\xeatspaces{\hash\the\paramno}}%
   \edef\paramlist{\paramlist\hash\the\paramno,}%
 \fi\next}

\def\parsemmanyargdef@@#1,{%
 \if#1;\let\next=\relax
 \else
   \let\next=\parsemmanyargdef@@
   \edef\tempb{\eatspaces{#1}}%
   \expandafter\def\expandafter\tempa
     \expandafter{\csname macarg.\tempb\endcsname}%
   % Note that we need some extra \noexpand\noexpand, this is because we
   % don't want \the to be expanded in the \parsermacbody as it uses an
   % \xdef .
   \expandafter\edef\tempa
     {\noexpand\noexpand\noexpand\the\toks\the\paramno}%
   \advance\paramno by 1\relax
 \fi\next}

% These two commands read recursive and nonrecursive macro bodies.
% (They're different since rec and nonrec macros end differently.)
%

```
\catcode `\@\texiatcatcode
\long\def\parsemacbody#1@end macro%
{\xdef\temp{\eatcr{#1}}\endgroup\defmacro}%
\long\def\parsermacbody#1@end rmacro%
{\xdef\temp{\eatcr{#1}}\endgroup\defmacro}%
\catcode `\@=11\relax

\let\endargs@\relax
\let\nil@\relax
\def\nilm@{\nil@}%
\long\def\nillm@{\nil@}%
```

% This macro is expanded during the Texinfo macro expansion, not during its
% definition. It gets all the arguments values and assigns them to macros
% macarg.ARGNAME
%
% #1 is the macro name
% #2 is the list of argument names
% #3 is the list of argument values

```
\def\getargvals@#1#2#3{%
 \def\macargdeflist@{}%
 \def\saveparamlist@{#2}% Need to keep a copy for parameter expansion.
 \def\paramlist{#2,\nil@}%
 \def\macroname{#1}%
 \begingroup
 \macroargctxt
 \def\argvaluelist{#3,\nil@}%
 \def\@tempa{#3}%
 \ifx\@tempa\empty
   \setemptyargvalues@
 \else
   \getargvals@@
 \fi
}

%
\def\getargvals@@{%
 \ifx\paramlist\nilm@
    % Some sanity check needed here that \argvaluelist is also empty.
    \ifx\argvaluelist\nillm@
    \else
     \errhelp = \EMsimple
     \errmessage{Too many arguments in macro `\macroname'!}%
```

```
    \fi
    \let\next\macargexpandinbody@
 \else
  \ifx\argvaluelist\nillm@
    % No more arguments values passed to macro.  Set remaining named-arg
    % macros to empty.
    \let\next\setemptyargvalues@
  \else
    % pop current arg name into \@tempb
   \def\@tempa##1{\pop@{\@tempb}{\paramlist}##1\endargs@}%
   \expandafter\@tempa\expandafter{\paramlist}%
    % pop current argument value into \@tempc
   \def\@tempa##1{\longpop@{\@tempc}{\argvaluelist}##1\endargs@}%
   \expandafter\@tempa\expandafter{\argvaluelist}%
    % Here \@tempb is the current arg name and \@tempc is the current arg value.
    % First place the new argument macro definition into \@tempd
   \expandafter\macname\expandafter{\@tempc}%
   \expandafter\let\csname macarg.\@tempb\endcsname\relax
   \expandafter\def\expandafter\@tempe\expandafter{%
     \csname macarg.\@tempb\endcsname}%
   \edef\@tempd{\long\def\@tempe{\the\macname}}%
   \push@\@tempd\macargdeflist@
   \let\next\getargvals@@
  \fi
 \fi
 \next
}

\def\push@#1#2{%
\expandafter\expandafter\expandafter\def
\expandafter\expandafter\expandafter#2%
\expandafter\expandafter\expandafter{%
\expandafter#1#2}%
}

% Replace arguments by their values in the macro body, and place the result
% in macro \@tempa
\def\macvalstoargs@{%
 %  To do this we use the property that token registers that are \the'ed
 % within an \edef  expand only once. So we are going to place all argument
 % values into respective token registers.
 %
 % First we save the token context, and initialize argument numbering.
 \begingroup
  \paramno0\relax
  % Then, for each argument number #N, we place the corresponding argument
  % value into a new token list register \toks#N
  \expandafter\putargsintotokens@\saveparamlist@,;,%
```

```
  % Then, we expand the body so that argument are replaced by their
  % values. The trick for values not to be expanded themselves is that they
  % are within tokens and that tokens expand only once in an \edef .
  \edef\@tempc{\csname mac.\macroname .body\endcsname}%
  % Now we restore the token stack pointer to free the token list registers
  % which we have used, but we make sure that expanded body is saved after
  % group.
  \expandafter
\endgroup
\expandafter\def\expandafter\@tempa\expandafter{\@tempc}%
}

\def\macargexpandinbody@{%
%% Define the named-macro outside of this group and then close this group.
\expandafter
\endgroup
\macargdeflist@
% First the replace in body the macro arguments by their values, the result
% is in \@tempa .
\macvalstoargs@
% Then we point at the \norecurse or \gobble (for recursive) macro value
% with \@tempb .
\expandafter\let\expandafter\@tempb\csname mac.\macroname .recurse\endcsname
% Depending on whether it is recursive or not, we need some tailing
% \egroup .
\ifx\@tempb\gobble
  \let\@tempc\relax
\else
  \let\@tempc\egroup
\fi
% And now we do the real job:
\edef\@tempd{\noexpand\@tempb{\macroname}\noexpand\scanmacro{\@tempa}\@tempc}%
\@tempd
}

\def\putargsintokens@#1,{%
\if#1;\let\next\relax
\else
  \let\next\putargsintokens@
  % First we allocate the new token list register, and give it a temporary
  % alias \@tempb .
  \toksdef\@tempb\the\paramno
  % Then we place the argument value into that token list register.
  \expandafter\let\expandafter\@tempa\csname macarg.#1\endcsname
  \expandafter\@tempb\expandafter{\@tempa}%
  \advance\paramno by 1\relax
\fi
\next
```

```
}

% Save the token stack pointer into macro #1
\def\texisavetoksstackpoint#1{\edef#1{\the\@cclvi}}
% Restore the token stack pointer from number in macro #1
\def\texirestoretoksstackpoint#1{\expandafter\mathchardef\expandafter\@cclvi#1\relax}
% newtoks that can be used non \outer .
\def\texinonouternewtoks{\alloc@ 5\toks \toksdef \@cclvi}


% Tailing missing arguments are set to empty
\def\setemptyargvalues@{%
 \ifx\paramlist\nilm@
   \let\next\macargexpandinbody@
 \else
   \expandafter\setemptyargvaluesparser@\paramlist\endargs@
   \let\next\setemptyargvalues@
 \fi
 \next
}

\def\setemptyargvaluesparser@#1,#2\endargs@{%
 \expandafter\def\expandafter\@tempa\expandafter{%
   \expandafter\def\csname macarg.#1\endcsname{}}%
 \push@\@tempa\macargdeflist@
 \def\paramlist{#2}%
}


% #1 is the element target macro
% #2 is the list macro
% #3,#4\endargs@ is the list value
\def\pop@#1#2#3,#4\endargs@{%
 \def#1{#3}%
 \def#2{#4}%
}
\long\def\longpop@#1#2#3,#4\endargs@{%
 \long\def#1{#3}%
 \long\def#2{#4}%
}


% This defines a Texinfo @macro. There are eight cases: recursive and
% nonrecursive macros of zero, one, up to nine, and many arguments.
% Much magic with \expandafter here.
% \xdef is used so that macro definitions will survive the file
% they're defined in; @include reads the file inside a group.
%
\def\defmacro{%
 \let\hash=##% convert placeholders to macro parameter chars
 \ifrecursive
```

```
\ifcase\paramno
% 0
  \expandafter\xdef\csname\the\macname\endcsname{%
    \noexpand\scanmacro{\temp}}%
\or % 1
  \expandafter\xdef\csname\the\macname\endcsname{%
    \bgroup\noexpand\macroargctxt
    \noexpand\braceorline
    \expandafter\noexpand\csname\the\macname xxx\endcsname}%
  \expandafter\xdef\csname\the\macname xxx\endcsname##1{%
    \egroup\noexpand\scanmacro{\temp}}%
\else
  \ifnum\paramno<10\relax % at most 9
    \expandafter\xdef\csname\the\macname\endcsname{%
      \bgroup\noexpand\macroargctxt
      \noexpand\csname\the\macname xx\endcsname}%
    \expandafter\xdef\csname\the\macname xx\endcsname##1{%
      \expandafter\noexpand\csname\the\macname xxx\endcsname ##1,}%
    \expandafter\expandafter
    \expandafter\xdef
    \expandafter\expandafter
      \csname\the\macname xxx\endcsname
        \paramlist{\egroup\noexpand\scanmacro{\temp}}%
  \else % 10 or more
    \expandafter\xdef\csname\the\macname\endcsname{%
      \noexpand\getargvals@{\the\macname}{\argl}%
    }%
    \global\expandafter\let\csname mac.\the\macname .body\endcsname\temp
    \global\expandafter\let\csname mac.\the\macname .recurse\endcsname\gobble
  \fi
\fi
\else
 \ifcase\paramno
% 0
  \expandafter\xdef\csname\the\macname\endcsname{%
    \noexpand\norecurse{\the\macname}%
    \noexpand\scanmacro{\temp}\egroup}%
\or % 1
  \expandafter\xdef\csname\the\macname\endcsname{%
    \bgroup\noexpand\macroargctxt
    \noexpand\braceorline
    \expandafter\noexpand\csname\the\macname xxx\endcsname}%
  \expandafter\xdef\csname\the\macname xxx\endcsname##1{%
    \egroup
    \noexpand\norecurse{\the\macname}%
    \noexpand\scanmacro{\temp}\egroup}%
\else % at most 9
  \ifnum\paramno<10\relax
```

```
      \expandafter\xdef\csname\the\macname\endcsname{%
        \bgroup\noexpand\macroargctxt
        \expandafter\noexpand\csname\the\macname xx\endcsname}%
      \expandafter\xdef\csname\the\macname xx\endcsname##1{%
        \expandafter\noexpand\csname\the\macname xxx\endcsname ##1,}%
      \expandafter\expandafter
      \expandafter\xdef
      \expandafter\expandafter
      \csname\the\macname xxx\endcsname
      \paramlist{%
        \egroup
        \noexpand\norecurse{\the\macname}%
        \noexpand\scanmacro{\temp}\egroup}%
    \else % 10 or more:
      \expandafter\xdef\csname\the\macname\endcsname{%
        \noexpand\getargvals@{\the\macname}{\argl}%
      }%
      \global\expandafter\let\csname mac.\the\macname .body\endcsname\temp
      \global\expandafter\let\csname mac.\the\macname .recurse\endcsname\norecurse
    \fi
  \fi
\fi}

\catcode `\@\texiatcatcode\relax

\def\norecurse#1{\bgroup\cslet{#1}{macsave.#1}}

% \braceorline decides whether the next nonwhitespace character is a
% {.  If so it reads up to the closing }, if not, it reads the whole
% line.  Whatever was read is then fed to the next control sequence
% as an argument (by \parsebrace or \parsearg).
%
\def\braceorline#1{\let\macnamexxx=#1\futurelet\nchar\braceorlinexxx}
\def\braceorlinexxx{%
 \ifx\nchar\bgroup\else
   \expandafter\parsearg
 \fi \macnamexxx}


% @alias.
% We need some trickery to remove the optional spaces around the equal
% sign.  Make them active and then expand them all to nothing.
%
\def\alias{\parseargusing\obeyspaces\aliasxxx}
\def\aliasxxx #1{\aliasyyy#1\relax}
\def\aliasyyy #1=#2\relax{%
 {%
   \expandafter\let\obeyedspace=\empty
```

```
  \addtomacrolist{#1}%
  \xdef\next{\global\let\makecsname{#1}=\makecsname{#2}}%
 }%
 \next
}


\message{cross references,}

\newwrite\auxfile
\newif\ifhavexrefs    % True if xref values are known.
\newif\ifwarnedxrefs  % True if we warned once that they aren't known.

% @inforef is relatively simple.
\def\inforef #1{\inforefzzz #1,,,,**}
\def\inforefzzz #1,#2,#3,#4**{%
 \putwordSee{} \putwordInfo{} \putwordfile{} \file{\ignorespaces #3{}},
 node \samp{\ignorespaces#1{}}}

% @node's only job in TeX is to define \lastnode, which is used in
% cross-references.  The @node line might or might not have commas, and
% might or might not have spaces before the first comma, like:
% @node foo , bar , ...
% We don't want such trailing spaces in the node name.
%
\parseargdef\node{\checkenv{}\donode #1 ,\finishnodeparse}
%
% also remove a trailing comma, in case of something like this:
% @node Help-Cross,  ,  , Cross-refs
\def\donode#1 ,#2\finishnodeparse{\dodonode #1,\finishnodeparse}
\def\dodonode#1,#2\finishnodeparse{\gdef\lastnode{#1}}

\let\nwnode=\node
\let\lastnode=\empty

% Write a cross-reference definition for the current node.  #1 is the
% type (Ynumbered, Yappendix, Ynothing).
%
\def\donoderef#1{%
 \ifx\lastnode\empty\else
  \setref{\lastnode}{#1}%
  \global\let\lastnode=\empty
 \fi
}

% @anchor{NAME} -- define xref target at arbitrary point.
%
\newcount\savesfregister
```

```
%
\def\savesf{\relax \ifhmode \savesfregister=\spacefactor \fi}
\def\restoresf{\relax \ifhmode \spacefactor=\savesfregister \fi}
\def\anchor#1{\savesf \setref{#1}{Ynothing}\restoresf \ignorespaces}

% \setref{NAME}{SNT} defines a cross-reference point NAME (a node or an
% anchor), which consists of three parts:
% 1) NAME-title - the current sectioning name taken from \lastsection,
%            or the anchor name.
% 2) NAME-snt   - section number and type, passed as the SNT arg, or
%            empty for anchors.
% 3) NAME-pg    - the page number.
%
% This is called from \donoderef, \anchor, and \dofloat.  In the case of
% floats, there is an additional part, which is not written here:
% 4) NAME-lof   - the text as it should appear in a @listoffloats.
%
\def\setref#1#2{%
 \pdfmkdest{#1}%
 \iflinks
   {%
    \atdummies  % preserve commands, but don't expand them
    \edef\writexrdef##1##2{%
\write\auxfile{@xrdef{#1-% #1 of \setref, expanded by the \edef
  ##1}{##2}}% these are parameters of \writexrdef
    }%
    \toks0 = \expandafter{\lastsection}%
    \immediate \writexrdef{title}{\the\toks0 }%
    \immediate \writexrdef{snt}{\csname #2\endcsname}% \Ynumbered etc.
    \safewhatsit{\writexrdef{pg}{\folio}}% will be written later, at \shipout
   }%
 \fi
}

% @xrefautosectiontitle on|off says whether @section(ing) names are used
% automatically in xrefs, if the third arg is not explicitly specified.
% This was provided as a "secret" @set xref-automatic-section-title
% variable, now it's official.
%
\parseargdef\xrefautomaticsectiontitle{%
 \def\temp{#1}%
 \ifx\temp\onword
   \expandafter\let\csname SETxref-automatic-section-title\endcsname
     = \empty
 \else\ifx\temp\offword
   \expandafter\let\csname SETxref-automatic-section-title\endcsname
     = \relax
 \else
```

```
  \errhelp = \EMsimple
  \errmessage{Unknown @xrefautomaticsectiontitle value `\temp',
          must be on|off}%
 \fi\fi
}


%
% @xref, @pxref, and @ref generate cross-references.  For \xrefX, #1 is
% the node name, #2 the name of the Info cross-reference, #3 the printed
% node name, #4 the name of the Info file, #5 the name of the printed
% manual.  All but the node name can be omitted.
%
\def\pxref#1{\putwordsee{} \xrefX[#1,,,,,,,]}
\def\xref#1{\putwordSee{} \xrefX[#1,,,,,,,]}
\def\ref#1{\xrefX[#1,,,,,,,]}
%
\newbox\toprefbox
\newbox\printedrefnamebox
\newbox\infofilenamebox
\newbox\printedmanualbox
%
\def\xrefX[#1,#2,#3,#4,#5,#6]{\begingroup
 \unsepspaces
 %
 % Get args without leading/trailing spaces.
 \def\printedrefname{\ignorespaces #3}%
 \setbox\printedrefnamebox = \hbox{\printedrefname\unskip}%
 %
 \def\infofilename{\ignorespaces #4}%
 \setbox\infofilenamebox = \hbox{\infofilename\unskip}%
 %
 \def\printedmanual{\ignorespaces #5}%
 \setbox\printedmanualbox  = \hbox{\printedmanual\unskip}%
 %
 % If the printed reference name (arg #3) was not explicitly given in
 % the @xref, figure out what we want to use.
 \ifdim \wd\printedrefnamebox = 0pt
   % No printed node name was explicitly given.
   \expandafter\ifx\csname SETxref-automatic-section-title\endcsname \relax
     % Not auto section-title: use node name inside the square brackets.
     \def\printedrefname{\ignorespaces #1}%
   \else
     % Auto section-title: use chapter/section title inside
     % the square brackets if we have it.
     \ifdim \wd\printedmanualbox > 0pt
       % It is in another manual, so we don't have it; use node name.
       \def\printedrefname{\ignorespaces #1}%
     \else
```

```
      \ifhavexrefs
        % We (should) know the real title if we have the xref values.
        \def\printedrefname{\refx{#1-title}{}}%
      \else
        % Otherwise just copy the Info node name.
        \def\printedrefname{\ignorespaces #1}%
      \fi%
    \fi
  \fi
\fi
%
% Make link in pdf output.
\ifpdf
  {\indexnofonts
  \turnoffactive
  \makevalueexpandable
  % This expands tokens, so do it after making catcode changes, so _
  % etc. don't get their TeX definitions.  This ignores all spaces in
  % #4, including (wrongly) those in the middle of the filename.
  \getfilename{#4}%
  %
  % This (wrongly) does not take account of leading or trailing
  % spaces in #1, which should be ignored.
  \edef\pdfxrefdest{#1}%
  \ifx\pdfxrefdest\empty
    \def\pdfxrefdest{Top}% no empty targets
  \else
    \txiescapepdf\pdfxrefdest  % escape PDF special chars
  \fi
  %
  \leavevmode
  \startlink attr{/Border [0 0 0]}%
  \ifnum\filenamelength>0
    goto file{\the\filename.pdf} name{\pdfxrefdest}%
  \else
    goto name{\pdfmkpgn{\pdfxrefdest}}%
  \fi
  }%
  \setcolor{\linkcolor}%
\fi
%
% Float references are printed completely differently: "Figure 1.2"
% instead of "[somenode], p.3".  We distinguish them by the
% LABEL-title being set to a magic string.
{%
  % Have to otherify everything special to allow the \csname to
  % include an _ in the xref name, etc.
  \indexnofonts
```

```
  \turnoffactive
  \expandafter\global\expandafter\let\expandafter\Xthisreftitle
   \csname XR#1-title\endcsname
}%
\iffloat\Xthisreftitle
  % If the user specified the print name (third arg) to the ref,
  % print it instead of our usual "Figure 1.2".
  \ifdim\wd\printedrefnamebox = 0pt
   \refx{#1-snt}{}%
  \else
   \printedrefname
  \fi
  %
  % If the user also gave the printed manual name (fifth arg), append
  % "in MANUALNAME".
  \ifdim \wd\printedmanualbox > 0pt
   \space \putwordin{} \cite{\printedmanual}%
  \fi
\else
  % node/anchor (non-float) references.
  %
  % If we use \unhbox to print the node names, TeX does not insert
  % empty discretionaries after hyphens, which means that it will not
  % find a line break at a hyphen in a node names.  Since some manuals
  % are best written with fairly long node names, containing hyphens,
  % this is a loss.  Therefore, we give the text of the node name
  % again, so it is as if TeX is seeing it for the first time.
  %
  \ifdim \wd\printedmanualbox > 0pt
   % Cross-manual reference with a printed manual name.
   %
   \crossmanualxref{\cite{\printedmanual\unskip}}%
  %
  \else\ifdim \wd\infofilenamebox > 0pt
   % Cross-manual reference with only an info filename (arg 4), no
   % printed manual name (arg 5).  This is essentially the same as
   % the case above; we output the filename, since we have nothing else.
   %
   \crossmanualxref{\code{\infofilename\unskip}}%
  %
  \else
   % Reference within this manual.
   %
   % _ (for example) has to be the character _ for the purposes of the
   % control sequence corresponding to the node, but it has to expand
   % into the usual \leavevmode...\vrule stuff for purposes of
   % printing. So we \turnoffactive for the \refx-snt, back on for the
   % printing, back off for the \refx-pg.
```

```
  {\turnoffactive
   % Only output a following space if the -snt ref is nonempty; for
   % @unnumbered and @anchor, it won't be.
   \setbox2 = \hbox{\ignorespaces \refx{#1-snt}{}}%
   \ifdim \wd2 > 0pt \refx{#1-snt}\space\fi
   }%
   % output the `[mynode]' via the macro below so it can be overridden.
   \xrefprintnodename\printedrefname
   %
   % But we always want a comma and a space:
   ,\space
   %
   % output the `page 3'.
   \turnoffactive \putwordpage\tie\refx{#1-pg}{}%
  \fi\fi
 \fi
 \endlink
\endgroup}


% Output a cross-manual xref to #1.  Used just above (twice).
%
% Only include the text "Section ``foo'' in" if the foo is neither
% missing or Top.  Thus, @xref{,,,foo,The Foo Manual} outputs simply
% "see The Foo Manual", the idea being to refer to the whole manual.
%
% But, this being TeX, we can't easily compare our node name against the
% string "Top" while ignoring the possible spaces before and after in
% the input.  By adding the arbitrary 7sp below, we make it much less
% likely that a real node name would have the same width as "Top" (e.g.,
% in a monospaced font).  Hopefully it will never happen in practice.
%
% For the same basic reason, we retypeset the "Top" at every
% reference, since the current font is indeterminate.
%
\def\crossmanualxref#1{%
 \setbox\toprefbox = \hbox{Top\kern7sp}%
 \setbox2 = \hbox{\ignorespaces \printedrefname \unskip \kern7sp}%
 \ifdim \wd2 > 7sp  % nonempty?
  \ifdim \wd2 = \wd\toprefbox \else  % same as Top?
   \putwordSection{} ``\printedrefname'' \putwordin{}\space
  \fi
 \fi
 #1%
}


% This macro is called from \xrefX for the `[nodename]' part of xref
% output. It's a separate macro only so it can be changed more easily,
% since square brackets don't work well in some documents. Particularly
```

```
% one that Bob is working on :).
%
\def\xrefprintnodename#1{[#1]}


% Things referred to by \setref.
%
\def\Ynothing{}
\def\Yomitfromtoc{}
\def\Ynumbered{%
 \ifnum\secno=0
   \putwordChapter@tie \the\chapno
 \else \ifnum\subsecno=0
   \putwordSection@tie \the\chapno.\the\secno
 \else \ifnum\subsubsecno=0
   \putwordSection@tie \the\chapno.\the\secno.\the\subsecno
 \else
   \putwordSection@tie \the\chapno.\the\secno.\the\subsecno.\the\subsubsecno
 \fi\fi\fi
}
\def\Yappendix{%
 \ifnum\secno=0
   \putwordAppendix@tie @char\the\appendixno{}%
 \else \ifnum\subsecno=0
   \putwordSection@tie @char\the\appendixno.\the\secno
 \else \ifnum\subsubsecno=0
   \putwordSection@tie @char\the\appendixno.\the\secno.\the\subsecno
 \else
   \putwordSection@tie
     @char\the\appendixno.\the\secno.\the\subsecno.\the\subsubsecno
 \fi\fi\fi
}


% Define \refx{NAME}{SUFFIX} to reference a cross-reference string named NAME.
% If its value is nonempty, SUFFIX is output afterward.
%
\def\refx#1#2{%
 {%
   \indexnofonts
   \otherbackslash
   \expandafter\global\expandafter\let\expandafter\thisrefX
     \csname XR#1\endcsname
 }%
 \ifx\thisrefX\relax
   % If not defined, say something at least.
   \angleleft un\-de\-fined\angleright
   \iflinks
     \ifhavexrefs
       {\toks0 = {#1}% avoid expansion of possibly-complex value
```

```
        \message{\linenumber Undefined cross reference `\the\toks0'.}}%
      \else
        \ifwarnedxrefs\else
          \global\warnedxrefstrue
          \message{Cross reference values unknown; you must run TeX again.}%
        \fi
      \fi
    \fi
  \else
    % It's defined, so just use it.
    \thisrefX
  \fi
  #2% Output the suffix in any case.
}


% This is the macro invoked by entries in the aux file.  Usually it's
% just a \def (we prepend XR to the control sequence name to avoid
% collisions).  But if this is a float type, we have more work to do.
%
\def\xrdef#1#2{%
  {% The node name might contain 8-bit characters, which in our current
   % implementation are changed to commands like @'e.  Don't let these
   % mess up the control sequence name.
    \indexnofonts
    \turnoffactive
    \xdef\safexrefname{#1}%
  }%
  %
  \expandafter\gdef\csname XR\safexrefname\endcsname{#2}% remember this xref
  %
  % Was that xref control sequence that we just defined for a float?
  \expandafter\iffloat\csname XR\safexrefname\endcsname
    % it was a float, and we have the (safe) float type in \iffloattype.
    \expandafter\let\expandafter\floatlist
      \csname floatlist\iffloattype\endcsname
    %
    % Is this the first time we've seen this float type?
    \expandafter\ifx\floatlist\relax
      \toks0 = {\do}% yes, so just \do
    \else
      % had it before, so preserve previous elements in list.
      \toks0 = \expandafter{\floatlist\do}%
    \fi
    %
    % Remember this xref in the control sequence \floatlistFLOATTYPE,
    % for later use in \listoffloats.
    \expandafter\xdef\csname floatlist\iffloattype\endcsname{\the\toks0
      {\safexrefname}}%
```

```
  \fi
}

% Read the last existing aux file, if any.  No error if none exists.
%
\def\tryauxfile{%
 \openin 1 \jobname.aux
 \ifeof 1 \else
   \readdatafile{aux}%
   \global\havexrefstrue
 \fi
 \closein 1
}

\def\setupdatafile{%
\catcode`\^^@=\other
\catcode`\^^A=\other
\catcode`\^^B=\other
\catcode`\^^C=\other
\catcode`\^^D=\other
\catcode`\^^E=\other
\catcode`\^^F=\other
\catcode`\^^G=\other
\catcode`\^^H=\other
\catcode`\^^K=\other
\catcode`\^^L=\other
\catcode`\^^N=\other
\catcode`\^^P=\other
\catcode`\^^Q=\other
\catcode`\^^R=\other
\catcode`\^^S=\other
\catcode`\^^T=\other
\catcode`\^^U=\other
\catcode`\^^V=\other
\catcode`\^^W=\other
\catcode`\^^X=\other
\catcode`\^^Z=\other
\catcode`\^^[=\other
\catcode`\^^\=\other
\catcode`\^^]=\other
\catcode`\^^^=\other
\catcode`\^^_=\other
% It was suggested to set the catcode of ^ to 7, which would allow ^^e4 etc.
% in xref tags, i.e., node names.  But since ^^e4 notation isn't
% supported in the main text, it doesn't seem desirable.  Furthermore,
% that is not enough: for node names that actually contain a ^
% character, we would end up writing a line like this: 'xrdef {'hat
% b-title}{'hat b} and \xrdef does a \csname...\endcsname on the first
```

% argument, and \hat is not an expandable control sequence. It could
% all be worked out, but why? Either we support ^^ or we don't.
%
% The other change necessary for this was to define \auxhat:
% \def\auxhat{\def^{'hat }}% extra space so ok if followed by letter
% and then to call \auxhat in \setq.
%
\catcode`\^=\other
%
% Special characters. Should be turned off anyway, but...
\catcode`\~=\other
\catcode`\[=\other
\catcode`\]=\other
\catcode`\"=\other
\catcode`_=\other
\catcode`\|=\other
\catcode`\<=\other
\catcode`\>=\other
\catcode`\$=\other
\catcode`\#=\other
\catcode`\&=\other
\catcode`\%=\other
\catcode`+=\other % avoid \+ for paranoia even though we've turned it off
%
% This is to support \ in node names and titles, since the \
% characters end up in a \csname. It's easier than
% leaving it active and making its active definition an actual \
% character. What I don't understand is why it works in the *value*
% of the xrdef. Seems like it should be a catcode12 \, and that
% should not typeset properly. But it works, so I'm moving on for
% now. --karl, 15jan04.
\catcode`\\=\other
%
% Make the characters 128-255 be printing characters.
{%
  \count1=128
  \def\loop{%
    \catcode\count1=\other
    \advance\count1 by 1
    \ifnum \count1<256 \loop \fi
  }%
}%
%
% @ is our escape character in .aux files, and we need braces.
\catcode`\{=1
\catcode`\}=2
\catcode`\@=0
}

```
\def\readdatafile#1{%
\begingroup
 \setupdatafile
 \input\jobname.#1
\endgroup}


\message{insertions,}
% including footnotes.

\newcount \footnoteno

% The trailing space in the following definition for supereject is
% vital for proper filling; pages come out unaligned when you do a
% pagealignmacro call if that space before the closing brace is
% removed. (Generally, numeric constants should always be followed by a
% space to prevent strange expansion errors.)
\def\supereject{\par\penalty -20000\footnoteno =0 }

% @footnotestyle is meaningful for Info output only.
\let\footnotestyle=\comment

{\catcode `\@=11
%
% Auto-number footnotes.  Otherwise like plain.
\gdef\footnote{%
 \let\indent=\ptexindent
 \let\noindent=\ptexnoindent
 \global\advance\footnoteno by \@ne
 \edef\thisfootno{$^{\the\footnoteno}$}%
%
% In case the footnote comes at the end of a sentence, preserve the
% extra spacing after we do the footnote number.
\let\@sf\empty
\ifhmode\edef\@sf{\spacefactor\the\spacefactor}\ptexslash\fi
%
% Remove inadvertent blank space before typesetting the footnote number.
\unskip
\thisfootno\@sf
\dofootnote
}%

% Don't bother with the trickery in plain.tex to not require the
% footnote text as a parameter.  Our footnotes don't need to be so general.
%
% Oh yes, they do; otherwise, @ifset (and anything else that uses
% \parseargline) fails inside footnotes because the tokens are fixed when
```

```
% the footnote is read.  --karl, 16nov96.
%
\gdef\dofootnote{%
\insert\footins\bgroup
% We want to typeset this text as a normal paragraph, even if the
% footnote reference occurs in (for example) a display environment.
% So reset some parameters.
\hsize=\pagewidth
\interlinepenalty\interfootnotelinepenalty
\splittopskip\ht\strutbox % top baseline for broken footnotes
\splitmaxdepth\dp\strutbox
\floatingpenalty\@MM
\leftskip\z@skip
\rightskip\z@skip
\spaceskip\z@skip
\xspaceskip\z@skip
\parindent\defaultparindent
%
\smallfonts \rm
%
% Because we use hanging indentation in footnotes, a @noindent appears
% to exdent this text, so make it be a no-op.  makeinfo does not use
% hanging indentation so @noindent can still be needed within footnote
% text after an @example or the like (not that this is good style).
\let\noindent = \relax
%
% Hang the footnote text off the number.  Use \everypar in case the
% footnote extends for more than one paragraph.
\everypar = {\hang}%
\textindent{\thisfootno}%
%
% Don't crash into the line above the footnote text.  Since this
% expands into a box, it must come within the paragraph, lest it
% provide a place where TeX can split the footnote.
\footstrut
%
% Invoke rest of plain TeX footnote routine.
\futurelet\next\fo@t
}
}%end \catcode `\@=11


% In case a @footnote appears in a vbox, save the footnote text and create
% the real \insert just after the vbox finished.  Otherwise, the insertion
% would be lost.
% Similarly, if a @footnote appears inside an alignment, save the footnote
% text to a box and make the \insert when a row of the table is finished.
% And the same can be done for other insert classes.  --kasal, 16nov03.
```

```
% Replace the \insert primitive by a cheating macro.
% Deeper inside, just make sure that the saved insertions are not spilled
% out prematurely.
%
\def\startsavinginserts{%
 \ifx \insert\ptexinsert
   \let\insert\saveinsert
 \else
   \let\checkinserts\relax
 \fi
}

% This \insert replacement works for both \insert\footins{foo} and
% \insert\footins\bgroup foo\egroup, but it doesn't work for \insert27{foo}.
%
\def\saveinsert#1{%
 \edef\next{\noexpand\savetobox \makeSAVEname#1}%
 \afterassignment\next
 % swallow the left brace
 \let\temp =
}
\def\makeSAVEname#1{\makecsname{SAVE\expandafter\gobble\string#1}}
\def\savetobox#1{\global\setbox#1 = \vbox\bgroup \unvbox#1}

\def\checksaveins#1{\ifvoid#1\else \placesaveins#1\fi}

\def\placesaveins#1{%
 \ptexinsert \csname\expandafter\gobblesave\string#1\endcsname
   {\box#1}%
}

% eat @SAVE -- beware, all of them have catcode \other:
{
\def\dospecials{\do S\do A\do V\do E} \uncatcodespecials  %  ;-)
\gdef\gobblesave @SAVE{}
}

% initialization:
\def\newsaveins #1{%
 \edef\next{\noexpand\newsaveinsX \makeSAVEname#1}%
 \next
}
\def\newsaveinsX #1{%
 \csname newbox\endcsname #1%
 \expandafter\def\expandafter\checkinserts\expandafter{\checkinserts
   \checksaveins #1}%
}
```

```
% initialize:
\let\checkinserts\empty
\newsaveins\footins
\newsaveins\margin


% @image.  We use the macros from epsf.tex to support this.
% If epsf.tex is not installed and @image is used, we complain.
%
% Check for and read epsf.tex up front.  If we read it only at @image
% time, we might be inside a group, and then its definitions would get
% undone and the next image would fail.
\openin 1 = epsf.tex
\ifeof 1 \else
 % Do not bother showing banner with epsf.tex v2.7k (available in
 % doc/epsf.tex and on ctan).
 \def\epsfannounce{\toks0 = }%
 \input epsf.tex
\fi
\closein 1
%
% We will only complain once about lack of epsf.tex.
\newif\ifwarnednoepsf
\newhelp\noepsfhelp{epsf.tex must be installed for images to
 work.  It is also included in the Texinfo distribution, or you can get
 it from ftp://tug.org/tex/epsf.tex.}
%
\def\image#1{%
 \ifx\epsfbox\thisisundefined
  \ifwarnednoepsf \else
   \errhelp = \noepsfhelp
   \errmessage{epsf.tex not found, images will be ignored}%
   \global\warnednoepsftrue
  \fi
 \else
  \imagexxx #1,,,,,\finish
 \fi
}
%
% Arguments to @image:
% #1 is (mandatory) image filename; we tack on .eps extension.
% #2 is (optional) width, #3 is (optional) height.
% #4 is (ignored optional) html alt text.
% #5 is (ignored optional) extension.
% #6 is just the usual extra ignored arg for parsing stuff.
\newif\ifimagevmode
\def\imagexxx#1,#2,#3,#4,#5,#6\finish{\begingroup
 \catcode`\^^M = 5     % in case we're inside an example
```

```
\normalturnoffactive  % allow _ et al. in names
% If the image is by itself, center it.
\ifvmode
  \imagevmodetrue
\else \ifx\centersub\centerV
  % for @center @image, we need a vbox so we can have our vertical space
  \imagevmodetrue
  \vbox\bgroup % vbox has better behavior than vtop herev
\fi\fi
%
\ifimagevmode
  \nobreak\medskip
  % Usually we'll have text after the image which will insert
  % \parskip glue, so insert it here too to equalize the space
  % above and below.
  \nobreak\vskip\parskip
  \nobreak
\fi
%
% Leave vertical mode so that indentation from an enclosing
%  environment such as @quotation is respected.
% However, if we're at the top level, we don't want the
%  normal paragraph indentation.
% On the other hand, if we are in the case of @center @image, we don't
%  want to start a paragraph, which will create a hsize-width box and
%  eradicate the centering.
\ifx\centersub\centerV\else \noindent \fi
%
% Output the image.
\ifpdf
  \dopdfimage{#1}{#2}{#3}%
\else
  % \epsfbox itself resets \epsf?size at each figure.
  \setbox0 = \hbox{\ignorespaces #2}\ifdim\wd0 > 0pt \epsfxsize=#2\relax \fi
  \setbox0 = \hbox{\ignorespaces #3}\ifdim\wd0 > 0pt \epsfysize=#3\relax \fi
  \epsfbox{#1.eps}%
\fi
%
\ifimagevmode
  \medskip  % space after a standalone image
\fi
\ifx\centersub\centerV \egroup \fi
\endgroup}


% @float FLOATTYPE,LABEL,LOC ... @end float for displayed figures, tables,
% etc.  We don't actually implement floating yet, we always include the
% float "here".  But it seemed the best name for the future.
```

```
%
\envparseargdef\float{\eatcommaspace\eatcommaspace\dofloat#1, , ,\finish}

% There may be a space before second and/or third parameter; delete it.
\def\eatcommaspace#1, {#1,}

% #1 is the optional FLOATTYPE, the text label for this float, typically
% "Figure", "Table", "Example", etc.  Can't contain commas.  If omitted,
% this float will not be numbered and cannot be referred to.
%
% #2 is the optional xref label.  Also must be present for the float to
% be referable.
%
% #3 is the optional positioning argument; for now, it is ignored.  It
% will somehow specify the positions allowed to float to (here, top, bottom).
%
% We keep a separate counter for each FLOATTYPE, which we reset at each
% chapter-level command.
\let\resetallfloatnos=\empty
%
\def\dofloat#1,#2,#3,#4\finish{%
 \let\thiscaption=\empty
 \let\thisshortcaption=\empty
 %
 % don't lose footnotes inside @float.
 %
 % BEWARE: when the floats start float, we have to issue warning whenever an
 % insert appears inside a float which could possibly float. --kasal, 26may04
 %
 \startsavinginserts
 %
 % We can't be used inside a paragraph.
 \par
 %
 \vtop\bgroup
   \def\floattype{#1}%
   \def\floatlabel{#2}%
   \def\floatloc{#3}% we do nothing with this yet.
   %
   \ifx\floattype\empty
     \let\safefloattype=\empty
   \else
     {%
       % the floattype might have accents or other special characters,
       % but we need to use it in a control sequence name.
       \indexnofonts
       \turnoffactive
       \xdef\safefloattype{\floattype}%
```

```
    }%
  \fi
  %
  % If label is given but no type, we handle that as the empty type.
  \ifx\floatlabel\empty \else
    % We want each FLOATTYPE to be numbered separately (Figure 1,
    % Table 1, Figure 2, ...).  (And if no label, no number.)
    %
    \expandafter\getfloatno\csname\safefloattype floatno\endcsname
    \global\advance\floatno by 1
    %
    {%
      % This magic value for \lastsection is output by \setref as the
      % XREFLABEL-title value.  \xrefX uses it to distinguish float
      % labels (which have a completely different output format) from
      % node and anchor labels.  And \xrdef uses it to construct the
      % lists of floats.
      %
      \edef\lastsection{\floatmagic=\safefloattype}%
      \setref{\floatlabel}{Yfloat}%
    }%
  \fi
  %
  % start with \parskip glue, I guess.
  \vskip\parskip
  %
  % Don't suppress indentation if a float happens to start a section.
  \restorefirstparagraphindent
}


% we have these possibilities:
% @float Foo,lbl & @caption{Cap}: Foo 1.1: Cap
% @float Foo,lbl & no caption:    Foo 1.1
% @float Foo & @caption{Cap}:     Foo: Cap
% @float Foo & no caption:        Foo
% @float ,lbl & Caption{Cap}:     1.1: Cap
% @float ,lbl & no caption:       1.1
% @float & @caption{Cap}:         Cap
% @float & no caption:
%
\def\Efloat{%
  \let\floatident = \empty
  %
  % In all cases, if we have a float type, it comes first.
  \ifx\floattype\empty \else \def\floatident{\floattype}\fi
  %
  % If we have an xref label, the number comes next.
  \ifx\floatlabel\empty \else
```

```
  \ifx\floattype\empty \else % if also had float type, need tie first.
    \appendtomacro\floatident{\tie}%
  \fi
  % the number.
  \appendtomacro\floatident{\chaplevelprefix\the\floatno}%
 \fi
 %
 % Start the printed caption with what we've constructed in
 % \floatident, but keep it separate; we need \floatident again.
 \let\captionline = \floatident
 %
 \ifx\thiscaption\empty \else
   \ifx\floatident\empty \else
\appendtomacro\captionline{: }% had ident, so need a colon between
   \fi
   %
   % caption text.
   \appendtomacro\captionline{\scanexp\thiscaption}%
 \fi
 %
 % If we have anything to print, print it, with space before.
 % Eventually this needs to become an \insert.
 \ifx\captionline\empty \else
   \vskip.5\parskip
   \captionline
   %
   % Space below caption.
   \vskip\parskip
 \fi
 %
 % If have an xref label, write the list of floats info.  Do this
 % after the caption, to avoid chance of it being a breakpoint.
 \ifx\floatlabel\empty \else
   % Write the text that goes in the lof to the aux file as
   % \floatlabel-lof.  Besides \floatident, we include the short
   % caption if specified, else the full caption if specified, else nothing.
   {%
    \atdummies
    %
    % since we read the caption text in the macro world, where ^^M
    % is turned into a normal character, we have to scan it back, so
    % we don't write the literal three characters "^^M" into the aux file.
\scanexp{%
 \xdef\noexpand\gtemp{%
  \ifx\thisshortcaption\empty
   \thiscaption
  \else
   \thisshortcaption
```

```
    \fi
  }%
}%
    \immediate\write\auxfile{@xrdef{\floatlabel-lof}{\floatident
  \ifx\gtemp\empty \else : \gtemp \fi}}%
    }%
  \fi
\egroup  % end of \vtop
%
% place the captured inserts
%
% BEWARE: when the floats start floating, we have to issue warning
% whenever an insert appears inside a float which could possibly
% float. --kasal, 26may04
%
\checkinserts
}


% Append the tokens #2 to the definition of macro #1, not expanding either.
%
\def\appendtomacro#1#2{%
 \expandafter\def\expandafter#1\expandafter{#1#2}%
}


% @caption, @shortcaption
%
\def\caption{\docaption\thiscaption}
\def\shortcaption{\docaption\thisshortcaption}
\def\docaption{\checkenv\float \bgroup\scanargctxt\defcaption}
\def\defcaption#1#2{\egroup \def#1{#2}}


% The parameter is the control sequence identifying the counter we are
% going to use.  Create it if it doesn't exist and assign it to \floatno.
\def\getfloatno#1{%
 \ifx#1\relax
    % Haven't seen this figure type before.
    \csname newcount\endcsname #1%
    %
    % Remember to reset this floatno at the next chap.
    \expandafter\gdef\expandafter\resetallfloatnos
      \expandafter{\resetallfloatnos #1=0 }%
 \fi
 \let\floatno#1%
}


% \setref calls this to get the XREFLABEL-snt value.  We want an @xref
% to the FLOATLABEL to expand to "Figure 3.1".  We call \setref when we
% first read the @float command.
```

```
%
\def\Yfloat{\floattype@tie \chaplevelprefix\the\floatno}%

% Magic string used for the XREFLABEL-title value, so \xrefX can
% distinguish floats from other xref types.
\def\floatmagic{!!float!!}

% #1 is the control sequence we are passed; we expand into a conditional
% which is true if #1 represents a float ref.  That is, the magic
% \lastsection value which we \setref above.
%
\def\iffloat#1{\expandafter\doiffloat#1==\finish}
%
% #1 is (maybe) the \floatmagic string.  If so, #2 will be the
% (safe) float type for this float.  We set \iffloattype to #2.
%
\def\doiffloat#1=#2=#3\finish{%
 \def\temp{#1}%
 \def\iffloattype{#2}%
 \ifx\temp\floatmagic
}

% @listoffloats FLOATTYPE - print a list of floats like a table of contents.
%
\parseargdef\listoffloats{%
 \def\floattype{#1}% floattype
 {%
   % the floattype might have accents or other special characters,
   % but we need to use it in a control sequence name.
   \indexnofonts
   \turnoffactive
   \xdef\safefloattype{\floattype}%
 }%
 %
 % \xrdef saves the floats as a \do-list in \floatlistSAFEFLOATTYPE.
 \expandafter\ifx\csname floatlist\safefloattype\endcsname \relax
   \ifhavexrefs
     % if the user said @listoffloats foo but never @float foo.
     \message{\linenumber No `\safefloattype' floats to list.}%
   \fi
 \else
   \begingroup
     \leftskip=\tocindent  % indent these entries like a toc
     \let\do=\listoffloatsdo
     \csname floatlist\safefloattype\endcsname
   \endgroup
 \fi
}
```

```
% This is called on each entry in a list of floats.  We're passed the
% xref label, in the form LABEL-title, which is how we save it in the
% aux file.  We strip off the -title and look up \XRLABEL-lof, which
% has the text we're supposed to typeset here.
%
% Figures without xref labels will not be included in the list (since
% they won't appear in the aux file).
%
\def\listoffloatsdo#1{\listoffloatsdoentry#1\finish}
\def\listoffloatsdoentry#1-title\finish{{%
 % Can't fully expand XR#1-lof because it can contain anything.  Just
 % pass the control sequence.  On the other hand, XR#1-pg is just the
 % page number, and we want to fully expand that so we can get a link
 % in pdf output.
\toksA = \expandafter{\csname XR#1-lof\endcsname}%
%
 % use the same \entry macro we use to generate the TOC and index.
\edef\writeentry{\noexpand\entry{\the\toksA}{\csname XR#1-pg\endcsname}}%
 \writeentry
}}


\message{localization,}

% For single-language documents, @documentlanguage is usually given very
% early, just after @documentencoding.  Single argument is the language
% (de) or locale (de_DE) abbreviation.
%
{
\catcode`\_ = \active
\globaldefs=1
\parseargdef\documentlanguage{\begingroup
\let_=\normalunderscore  % normal _ character for filenames
\tex % read txi-??.tex file in plain TeX.
  % Read the file by the name they passed if it exists.
  \openin 1 txi-#1.tex
  \ifeof 1
    \documentlanguagetrywithoutunderscore{#1_\finish}%
  \else
    \globaldefs = 1  % everything in the txi-LL files needs to persist
    \input txi-#1.tex
  \fi
  \closein 1
 \endgroup % end raw TeX
\endgroup}
%
% If they passed de_DE, and txi-de_DE.tex doesn't exist,
```

```
% try txi-de.tex.
%
\gdef\documentlanguagetrywithoutunderscore#1_#2\finish{%
 \openin 1 txi-#1.tex
 \ifeof 1
   \errhelp = \nolanghelp
   \errmessage{Cannot read language file txi-#1.tex}%
 \else
   \globaldefs = 1  % everything in the txi-LL files needs to persist
   \input txi-#1.tex
 \fi
 \closein 1
}
}% end of special _ catcode
%
\newhelp\nolanghelp{The given language definition file cannot be found or
is empty.  Maybe you need to install it?  Putting it in the current
directory should work if nowhere else does.}

% This macro is called from txi-??.tex files; the first argument is the
% \language name to set (without the "\lang@" prefix), the second and
% third args are \{left,right}hyphenmin.
%
% The language names to pass are determined when the format is built.
% See the etex.log file created at that time, e.g.,
% /usr/local/texlive/2008/texmf-var/web2c/pdftex/etex.log.
%
% With TeX Live 2008, etex now includes hyphenation patterns for all
% available languages.  This means we can support hyphenation in
% Texinfo, at least to some extent.  (This still doesn't solve the
% accented characters problem.)
%
\catcode`\@=11
\def\txisetlanguage#1#2#3{%
 % do not set the language if the name is undefined in the current TeX.
 \expandafter\ifx\csname lang@#1\endcsname \relax
   \message{no patterns for #1}%
 \else
   \global\language = \csname lang@#1\endcsname
 \fi
 % but there is no harm in adjusting the hyphenmin values regardless.
 \global\lefthyphenmin = #2\relax
 \global\righthyphenmin = #3\relax
}

% Helpers for encodings.
% Set the catcode of characters 128 through 255 to the specified number.
%
```

```
\def\setnonasciicharscatcode#1{%
 \count255=128
 \loop\ifnum\count255<256
   \global\catcode\count255=#1\relax
   \advance\count255 by 1
 \repeat
}

\def\setnonasciicharscatcodenonglobal#1{%
 \count255=128
 \loop\ifnum\count255<256
   \catcode\count255=#1\relax
   \advance\count255 by 1
 \repeat
}

% @documentencoding sets the definition of non-ASCII characters
% according to the specified encoding.
%
\parseargdef\documentencoding{%
 % Encoding being declared for the document.
 \def\declaredencoding{\csname #1.enc\endcsname}%
 %
 % Supported encodings: names converted to tokens in order to be able
 % to compare them with \ifx.
 \def\ascii{\csname US-ASCII.enc\endcsname}%
 \def\latnine{\csname ISO-8859-15.enc\endcsname}%
 \def\latone{\csname ISO-8859-1.enc\endcsname}%
 \def\lattwo{\csname ISO-8859-2.enc\endcsname}%
 \def\utfeight{\csname UTF-8.enc\endcsname}%
 %
 \ifx \declaredencoding \ascii
   \asciichardefs
 %
 \else \ifx \declaredencoding \lattwo
   \setnonasciicharscatcode\active
   \lattwochardefs
 %
 \else \ifx \declaredencoding \latone
   \setnonasciicharscatcode\active
   \latonechardefs
 %
 \else \ifx \declaredencoding \latnine
   \setnonasciicharscatcode\active
   \latninechardefs
 %
 \else \ifx \declaredencoding \utfeight
   \setnonasciicharscatcode\active
```

```
  \utfeightchardefs
%
\else
  \message{Unknown document encoding #1, ignoring.}%
%
\fi % utfeight
\fi % latnine
\fi % latone
\fi % lattwo
\fi % ascii
}

% A message to be logged when using a character that isn't available
% the default font encoding (OT1).
%
\def\missingcharmsg#1{\message{Character missing in OT1 encoding: #1.}}

% Take account of \c (plain) vs. \, (Texinfo) difference.
\def\cedilla#1{\ifx\c\ptexc\c{#1}\else\,{#1}\fi}

% First, make active non-ASCII characters in order for them to be
% correctly categorized when TeX reads the replacement text of
% macros containing the character definitions.
\setnonasciicharscatcode\active
%
% Latin1 (ISO-8859-1) character definitions.
\def\latonechardefs{%
\gdef^^a0{\tie}
\gdef^^a1{\exclamdown}
\gdef^^a2{\missingcharmsg{CENT SIGN}}
\gdef^^a3{{\pounds}}
\gdef^^a4{\missingcharmsg{CURRENCY SIGN}}
\gdef^^a5{\missingcharmsg{YEN SIGN}}
\gdef^^a6{\missingcharmsg{BROKEN BAR}}
\gdef^^a7{\S}
\gdef^^a8{\"{}}
\gdef^^a9{\copyright}
\gdef^^aa{\ordf}
\gdef^^ab{\guillemetleft}
\gdef^^ac{$\lnot$}
\gdef^^ad{\-}
\gdef^^ae{\registeredsymbol}
\gdef^^af{\={}}
%
\gdef^^b0{\textdegree}
\gdef^^b1{$\pm$}
\gdef^^b2{$^2$}
\gdef^^b3{$^3$}
```

```
\gdef^^b4{\'{}}
\gdef^^b5{$\mu$}
\gdef^^b6{\P}
%
\gdef^^b7{$^.$}
\gdef^^b8{\cedilla\ }
\gdef^^b9{$^1$}
\gdef^^ba{\ordm}
%
\gdef^^bb{\guillemetright}
\gdef^^bc{$1\over4$}
\gdef^^bd{$1\over2$}
\gdef^^be{$3\over4$}
\gdef^^bf{\questiondown}
%
\gdef^^c0{\`A}
\gdef^^c1{\'A}
\gdef^^c2{\^A}
\gdef^^c3{\~A}
\gdef^^c4{\"A}
\gdef^^c5{\ringaccent A}
\gdef^^c6{\AE}
\gdef^^c7{\cedilla C}
\gdef^^c8{\`E}
\gdef^^c9{\'E}
\gdef^^ca{\^E}
\gdef^^cb{\"E}
\gdef^^cc{\`I}
\gdef^^cd{\'I}
\gdef^^ce{\^I}
\gdef^^cf{\"I}
%
\gdef^^d0{\DH}
\gdef^^d1{\~N}
\gdef^^d2{\`O}
\gdef^^d3{\'O}
\gdef^^d4{\^O}
\gdef^^d5{\~O}
\gdef^^d6{\"O}
\gdef^^d7{$\times$}
\gdef^^d8{\O}
\gdef^^d9{\`U}
\gdef^^da{\'U}
\gdef^^db{\^U}
\gdef^^dc{\"U}
\gdef^^dd{\'Y}
\gdef^^de{\TH}
\gdef^^df{\ss}
```

```
%
\gdef^^e0{\`a}
\gdef^^e1{\'a}
\gdef^^e2{\^a}
\gdef^^e3{\~a}
\gdef^^e4{\"a}
\gdef^^e5{\ringaccent a}
\gdef^^e6{\ae}
\gdef^^e7{\cedilla c}
\gdef^^e8{\`e}
\gdef^^e9{\'e}
\gdef^^ea{\^e}
\gdef^^eb{\"e}
\gdef^^ec{\`{\dotless i}}
\gdef^^ed{\'{\dotless i}}
\gdef^^ee{\^{\dotless i}}
\gdef^^ef{\"{\dotless i}}
%
\gdef^^f0{\dh}
\gdef^^f1{\~n}
\gdef^^f2{\`o}
\gdef^^f3{\'o}
\gdef^^f4{\^o}
\gdef^^f5{\~o}
\gdef^^f6{\"o}
\gdef^^f7{$\div$}
\gdef^^f8{\o}
\gdef^^f9{\`u}
\gdef^^fa{\'u}
\gdef^^fb{\^u}
\gdef^^fc{\"u}
\gdef^^fd{\'y}
\gdef^^fe{\th}
\gdef^^ff{\"y}
}

% Latin9 (ISO-8859-15) encoding character definitions.
\def\latninechardefs{%
% Encoding is almost identical to Latin1.
\latonechardefs
%
\gdef^^a4{\euro}
\gdef^^a6{\v S}
\gdef^^a8{\v s}
\gdef^^b4{\v Z}
\gdef^^b8{\v z}
\gdef^^bc{\OE}
\gdef^^bd{\oe}
```

```
\gdef^^be{\"Y}
}

% Latin2 (ISO-8859-2) character definitions.
\def\lattwochardefs{%
\gdef^^a0{\tie}
\gdef^^a1{\ogonek{A}}
\gdef^^a2{\u{}}
\gdef^^a3{\L}
\gdef^^a4{\missingcharmsg{CURRENCY SIGN}}
\gdef^^a5{\v L}
\gdef^^a6{\'S}
\gdef^^a7{\S}
\gdef^^a8{\"{}}
\gdef^^a9{\v S}
\gdef^^aa{\cedilla S}
\gdef^^ab{\v T}
\gdef^^ac{\'Z}
\gdef^^ad{\-}
\gdef^^ae{\v Z}
\gdef^^af{\dotaccent Z}
%
\gdef^^b0{\textdegree}
\gdef^^b1{\ogonek{a}}
\gdef^^b2{\ogonek{ }}
\gdef^^b3{\l}
\gdef^^b4{\'{}}
\gdef^^b5{\v l}
\gdef^^b6{\'s}
\gdef^^b7{\v{}}
\gdef^^b8{\cedilla\ }
\gdef^^b9{\v s}
\gdef^^ba{\cedilla s}
\gdef^^bb{\v t}
\gdef^^bc{\'z}
\gdef^^bd{\H{}}
\gdef^^be{\v z}
\gdef^^bf{\dotaccent z}
%
\gdef^^c0{\'R}
\gdef^^c1{\'A}
\gdef^^c2{\^A}
\gdef^^c3{\u A}
\gdef^^c4{\"A}
\gdef^^c5{\'L}
\gdef^^c6{\'C}
\gdef^^c7{\cedilla C}
\gdef^^c8{\v C}
```

```
\gdef^^c9{\'E}
\gdef^^ca{\ogonek{E}}
\gdef^^cb{\"E}
\gdef^^cc{\v E}
\gdef^^cd{\'I}
\gdef^^ce{\^I}
\gdef^^cf{\v D}
%
\gdef^^d0{\DH}
\gdef^^d1{\'N}
\gdef^^d2{\v N}
\gdef^^d3{\'O}
\gdef^^d4{\^O}
\gdef^^d5{\H O}
\gdef^^d6{\"O}
\gdef^^d7{$\times$}
\gdef^^d8{\v R}
\gdef^^d9{\ringaccent U}
\gdef^^da{\'U}
\gdef^^db{\H U}
\gdef^^dc{\"U}
\gdef^^dd{\'Y}
\gdef^^de{\cedilla T}
\gdef^^df{\ss}
%
\gdef^^e0{\'r}
\gdef^^e1{\'a}
\gdef^^e2{\^a}
\gdef^^e3{\u a}
\gdef^^e4{\"a}
\gdef^^e5{\'l}
\gdef^^e6{\'c}
\gdef^^e7{\cedilla c}
\gdef^^e8{\v c}
\gdef^^e9{\'e}
\gdef^^ea{\ogonek{e}}
\gdef^^eb{\"e}
\gdef^^ec{\v e}
\gdef^^ed{\'{\dotless{i}}}
\gdef^^ee{\^{\dotless{i}}}
\gdef^^ef{\v d}
%
\gdef^^f0{\dh}
\gdef^^f1{\'n}
\gdef^^f2{\v n}
\gdef^^f3{\'o}
\gdef^^f4{\^o}
\gdef^^f5{\H o}
```

```
\gdef^^f6{\"o}
\gdef^^f7{$\div$}
\gdef^^f8{\v r}
\gdef^^f9{\ringaccent u}
\gdef^^fa{\'u}
\gdef^^fb{\H u}
\gdef^^fc{\"u}
\gdef^^fd{\'y}
\gdef^^fe{\cedilla t}
\gdef^^ff{\dotaccent{}}
}

% UTF-8 character definitions.
%
% This code to support UTF-8 is based on LaTeX's utf8.def, with some
% changes for Texinfo conventions.  It is included here under the GPL by
% permission from Frank Mittelbach and the LaTeX team.
%
\newcount\countUTFx
\newcount\countUTFy
\newcount\countUTFz

\gdef\UTFviiiTwoOctets#1#2{\expandafter
  \UTFviiiDefined\csname u8:#1\string #2\endcsname}
%
\gdef\UTFviiiThreeOctets#1#2#3{\expandafter
  \UTFviiiDefined\csname u8:#1\string #2\string #3\endcsname}
%
\gdef\UTFviiiFourOctets#1#2#3#4{\expandafter
  \UTFviiiDefined\csname u8:#1\string #2\string #3\string #4\endcsname}

\gdef\UTFviiiDefined#1{%
\ifx #1\relax
  \message{\linenumber Unicode char \string #1 not defined for Texinfo}%
\else
  \expandafter #1%
\fi
}

\begingroup
\catcode`\~13
\catcode`\"12

\def\UTFviiiLoop{%
  \global\catcode\countUTFx\active
  \uccode`\~\countUTFx
  \uppercase\expandafter{\UTFviiiTmp}%
  \advance\countUTFx by 1
```

```
  \ifnum\countUTFx < \countUTFy
    \expandafter\UTFviiiLoop
  \fi}

\countUTFx = "C2
\countUTFy = "E0
\def\UTFviiiTmp{%
  \xdef~{\noexpand\UTFviiiTwoOctets\string~}}
\UTFviiiLoop

\countUTFx = "E0
\countUTFy = "F0
\def\UTFviiiTmp{%
  \xdef~{\noexpand\UTFviiiThreeOctets\string~}}
\UTFviiiLoop

\countUTFx = "F0
\countUTFy = "F4
\def\UTFviiiTmp{%
  \xdef~{\noexpand\UTFviiiFourOctets\string~}}
\UTFviiiLoop
\endgroup

\begingroup
\catcode`\"=12
\catcode`\<=12
\catcode`\.=12
\catcode`\,=12
\catcode`\;=12
\catcode`\!=12
\catcode`\~=13

\gdef\DeclareUnicodeCharacter#1#2{%
  \countUTFz = "#1\relax
  %\wlog{\space\space defining Unicode char U+#1 (decimal \the\countUTFz)}%
  \begingroup
    \parseXMLCharref
    \def\UTFviiiTwoOctets##1##2{%
      \csname u8:##1\string ##2\endcsname}%
    \def\UTFviiiThreeOctets##1##2##3{%
      \csname u8:##1\string ##2\string ##3\endcsname}%
    \def\UTFviiiFourOctets##1##2##3##4{%
      \csname u8:##1\string ##2\string ##3\string ##4\endcsname}%
    \expandafter\expandafter\expandafter\expandafter
     \expandafter\expandafter\expandafter
    \gdef\UTFviiiTmp{#2}%
  \endgroup}
```

```
\gdef\parseXMLCharref{%
 \ifnum\countUTFz < "A0\relax
   \errhelp = \EMsimple
   \errmessage{Cannot define Unicode char value < 00A0}%
 \else\ifnum\countUTFz < "800\relax
   \parseUTFviiiA,%
   \parseUTFviiiB C\UTFviiiTwoOctets.,%
 \else\ifnum\countUTFz < "10000\relax
   \parseUTFviiiA;%
   \parseUTFviiiA,%
   \parseUTFviiiB E\UTFviiiThreeOctets.{,;}%
 \else
   \parseUTFviiiA;%
   \parseUTFviiiA,%
   \parseUTFviiiA!%
   \parseUTFviiiB F\UTFviiiFourOctets.{!,;}%
 \fi\fi\fi
}

\gdef\parseUTFviiiA#1{%
 \countUTFx = \countUTFz
 \divide\countUTFz by 64
 \countUTFy = \countUTFz
 \multiply\countUTFz by 64
 \advance\countUTFx by -\countUTFz
 \advance\countUTFx by 128
 \uccode `#1\countUTFx
 \countUTFz = \countUTFy}

\gdef\parseUTFviiiB#1#2#3#4{%
 \advance\countUTFz by "#10\relax
 \uccode `#3\countUTFz
 \uppercase{\gdef\UTFviiiTmp{#2#3#4}}}
\endgroup

\def\utfeightchardefs{%
\DeclareUnicodeCharacter{00A0}{\tie}
\DeclareUnicodeCharacter{00A1}{\exclamdown}
\DeclareUnicodeCharacter{00A3}{\pounds}
\DeclareUnicodeCharacter{00A8}{\"{ }}
\DeclareUnicodeCharacter{00A9}{\copyright}
\DeclareUnicodeCharacter{00AA}{\ordf}
\DeclareUnicodeCharacter{00AB}{\guillemetleft}
\DeclareUnicodeCharacter{00AD}{\-}
\DeclareUnicodeCharacter{00AE}{\registeredsymbol}
\DeclareUnicodeCharacter{00AF}{\={ }}

\DeclareUnicodeCharacter{00B0}{\ringaccent{ }}
```

```
\DeclareUnicodeCharacter{00B4}{\'{ }}
\DeclareUnicodeCharacter{00B8}{\cedilla{ }}
\DeclareUnicodeCharacter{00BA}{\ordm}
\DeclareUnicodeCharacter{00BB}{\guillemetright}
\DeclareUnicodeCharacter{00BF}{\questiondown}

\DeclareUnicodeCharacter{00C0}{\`A}
\DeclareUnicodeCharacter{00C1}{\'A}
\DeclareUnicodeCharacter{00C2}{\^A}
\DeclareUnicodeCharacter{00C3}{\~A}
\DeclareUnicodeCharacter{00C4}{\"A}
\DeclareUnicodeCharacter{00C5}{\AA}
\DeclareUnicodeCharacter{00C6}{\AE}
\DeclareUnicodeCharacter{00C7}{\cedilla{C}}
\DeclareUnicodeCharacter{00C8}{\`E}
\DeclareUnicodeCharacter{00C9}{\'E}
\DeclareUnicodeCharacter{00CA}{\^E}
\DeclareUnicodeCharacter{00CB}{\"E}
\DeclareUnicodeCharacter{00CC}{\`I}
\DeclareUnicodeCharacter{00CD}{\'I}
\DeclareUnicodeCharacter{00CE}{\^I}
\DeclareUnicodeCharacter{00CF}{\"I}

\DeclareUnicodeCharacter{00D0}{\DH}
\DeclareUnicodeCharacter{00D1}{\~N}
\DeclareUnicodeCharacter{00D2}{\`O}
\DeclareUnicodeCharacter{00D3}{\'O}
\DeclareUnicodeCharacter{00D4}{\^O}
\DeclareUnicodeCharacter{00D5}{\~O}
\DeclareUnicodeCharacter{00D6}{\"O}
\DeclareUnicodeCharacter{00D8}{\O}
\DeclareUnicodeCharacter{00D9}{\`U}
\DeclareUnicodeCharacter{00DA}{\'U}
\DeclareUnicodeCharacter{00DB}{\^U}
\DeclareUnicodeCharacter{00DC}{\"U}
\DeclareUnicodeCharacter{00DD}{\'Y}
\DeclareUnicodeCharacter{00DE}{\TH}
\DeclareUnicodeCharacter{00DF}{\ss}

\DeclareUnicodeCharacter{00E0}{\`a}
\DeclareUnicodeCharacter{00E1}{\'a}
\DeclareUnicodeCharacter{00E2}{\^a}
\DeclareUnicodeCharacter{00E3}{\~a}
\DeclareUnicodeCharacter{00E4}{\"a}
\DeclareUnicodeCharacter{00E5}{\aa}
\DeclareUnicodeCharacter{00E6}{\ae}
\DeclareUnicodeCharacter{00E7}{\cedilla{c}}
\DeclareUnicodeCharacter{00E8}{\`e}
```

\DeclareUnicodeCharacter{00E9}{\'e}
\DeclareUnicodeCharacter{00EA}{\^e}
\DeclareUnicodeCharacter{00EB}{\"e}
\DeclareUnicodeCharacter{00EC}{\`{\dotless{i}}}
\DeclareUnicodeCharacter{00ED}{\'{\dotless{i}}}
\DeclareUnicodeCharacter{00EE}{\^{\dotless{i}}}
\DeclareUnicodeCharacter{00EF}{\"{\dotless{i}}}

\DeclareUnicodeCharacter{00F0}{\dh}
\DeclareUnicodeCharacter{00F1}{\~n}
\DeclareUnicodeCharacter{00F2}{\`o}
\DeclareUnicodeCharacter{00F3}{\'o}
\DeclareUnicodeCharacter{00F4}{\^o}
\DeclareUnicodeCharacter{00F5}{\~o}
\DeclareUnicodeCharacter{00F6}{\"o}
\DeclareUnicodeCharacter{00F8}{\o}
\DeclareUnicodeCharacter{00F9}{\`u}
\DeclareUnicodeCharacter{00FA}{\'u}
\DeclareUnicodeCharacter{00FB}{\^u}
\DeclareUnicodeCharacter{00FC}{\"u}
\DeclareUnicodeCharacter{00FD}{\'y}
\DeclareUnicodeCharacter{00FE}{\th}
\DeclareUnicodeCharacter{00FF}{\"y}

\DeclareUnicodeCharacter{0100}{\=A}
\DeclareUnicodeCharacter{0101}{\=a}
\DeclareUnicodeCharacter{0102}{\u{A}}
\DeclareUnicodeCharacter{0103}{\u{a}}
\DeclareUnicodeCharacter{0104}{\ogonek{A}}
\DeclareUnicodeCharacter{0105}{\ogonek{a}}
\DeclareUnicodeCharacter{0106}{\'C}
\DeclareUnicodeCharacter{0107}{\'c}
\DeclareUnicodeCharacter{0108}{\^C}
\DeclareUnicodeCharacter{0109}{\^c}
\DeclareUnicodeCharacter{0118}{\ogonek{E}}
\DeclareUnicodeCharacter{0119}{\ogonek{e}}
\DeclareUnicodeCharacter{010A}{\dotaccent{C}}
\DeclareUnicodeCharacter{010B}{\dotaccent{c}}
\DeclareUnicodeCharacter{010C}{\v{C}}
\DeclareUnicodeCharacter{010D}{\v{c}}
\DeclareUnicodeCharacter{010E}{\v{D}}

\DeclareUnicodeCharacter{0112}{\=E}
\DeclareUnicodeCharacter{0113}{\=e}
\DeclareUnicodeCharacter{0114}{\u{E}}
\DeclareUnicodeCharacter{0115}{\u{e}}
\DeclareUnicodeCharacter{0116}{\dotaccent{E}}
\DeclareUnicodeCharacter{0117}{\dotaccent{e}}

```
\DeclareUnicodeCharacter{011A}{\v{E}}
\DeclareUnicodeCharacter{011B}{\v{e}}
\DeclareUnicodeCharacter{011C}{\^G}
\DeclareUnicodeCharacter{011D}{\^g}
\DeclareUnicodeCharacter{011E}{\u{G}}
\DeclareUnicodeCharacter{011F}{\u{g}}

\DeclareUnicodeCharacter{0120}{\dotaccent{G}}
\DeclareUnicodeCharacter{0121}{\dotaccent{g}}
\DeclareUnicodeCharacter{0124}{\^H}
\DeclareUnicodeCharacter{0125}{\^h}
\DeclareUnicodeCharacter{0128}{\~I}
\DeclareUnicodeCharacter{0129}{\~{\dotless{i}}}
\DeclareUnicodeCharacter{012A}{\=I}
\DeclareUnicodeCharacter{012B}{\={\dotless{i}}}
\DeclareUnicodeCharacter{012C}{\u{I}}
\DeclareUnicodeCharacter{012D}{\u{\dotless{i}}}

\DeclareUnicodeCharacter{0130}{\dotaccent{I}}
\DeclareUnicodeCharacter{0131}{\dotless{i}}
\DeclareUnicodeCharacter{0132}{IJ}
\DeclareUnicodeCharacter{0133}{ij}
\DeclareUnicodeCharacter{0134}{\^J}
\DeclareUnicodeCharacter{0135}{\^{\dotless{j}}}
\DeclareUnicodeCharacter{0139}{\'L}
\DeclareUnicodeCharacter{013A}{\'l}

\DeclareUnicodeCharacter{0141}{\L}
\DeclareUnicodeCharacter{0142}{\l}
\DeclareUnicodeCharacter{0143}{\'N}
\DeclareUnicodeCharacter{0144}{\'n}
\DeclareUnicodeCharacter{0147}{\v{N}}
\DeclareUnicodeCharacter{0148}{\v{n}}
\DeclareUnicodeCharacter{014C}{\=O}
\DeclareUnicodeCharacter{014D}{\=o}
\DeclareUnicodeCharacter{014E}{\u{O}}
\DeclareUnicodeCharacter{014F}{\u{o}}

\DeclareUnicodeCharacter{0150}{\H{O}}
\DeclareUnicodeCharacter{0151}{\H{o}}
\DeclareUnicodeCharacter{0152}{\OE}
\DeclareUnicodeCharacter{0153}{\oe}
\DeclareUnicodeCharacter{0154}{\'R}
\DeclareUnicodeCharacter{0155}{\'r}
\DeclareUnicodeCharacter{0158}{\v{R}}
\DeclareUnicodeCharacter{0159}{\v{r}}
\DeclareUnicodeCharacter{015A}{\'S}
\DeclareUnicodeCharacter{015B}{\'s}
```

```
\DeclareUnicodeCharacter{015C}{\^S}
\DeclareUnicodeCharacter{015D}{\^s}
\DeclareUnicodeCharacter{015E}{\cedilla{S}}
\DeclareUnicodeCharacter{015F}{\cedilla{s}}

\DeclareUnicodeCharacter{0160}{\v{S}}
\DeclareUnicodeCharacter{0161}{\v{s}}
\DeclareUnicodeCharacter{0162}{\cedilla{t}}
\DeclareUnicodeCharacter{0163}{\cedilla{T}}
\DeclareUnicodeCharacter{0164}{\v{T}}

\DeclareUnicodeCharacter{0168}{\~U}
\DeclareUnicodeCharacter{0169}{\~u}
\DeclareUnicodeCharacter{016A}{\=U}
\DeclareUnicodeCharacter{016B}{\=u}
\DeclareUnicodeCharacter{016C}{\u{U}}
\DeclareUnicodeCharacter{016D}{\u{u}}
\DeclareUnicodeCharacter{016E}{\ringaccent{U}}
\DeclareUnicodeCharacter{016F}{\ringaccent{u}}

\DeclareUnicodeCharacter{0170}{\H{U}}
\DeclareUnicodeCharacter{0171}{\H{u}}
\DeclareUnicodeCharacter{0174}{\^W}
\DeclareUnicodeCharacter{0175}{\^w}
\DeclareUnicodeCharacter{0176}{\^Y}
\DeclareUnicodeCharacter{0177}{\^y}
\DeclareUnicodeCharacter{0178}{\"Y}
\DeclareUnicodeCharacter{0179}{\'Z}
\DeclareUnicodeCharacter{017A}{\'z}
\DeclareUnicodeCharacter{017B}{\dotaccent{Z}}
\DeclareUnicodeCharacter{017C}{\dotaccent{z}}
\DeclareUnicodeCharacter{017D}{\v{Z}}
\DeclareUnicodeCharacter{017E}{\v{z}}

\DeclareUnicodeCharacter{01C4}{D\v{Z}}
\DeclareUnicodeCharacter{01C5}{D\v{z}}
\DeclareUnicodeCharacter{01C6}{d\v{z}}
\DeclareUnicodeCharacter{01C7}{LJ}
\DeclareUnicodeCharacter{01C8}{Lj}
\DeclareUnicodeCharacter{01C9}{lj}
\DeclareUnicodeCharacter{01CA}{NJ}
\DeclareUnicodeCharacter{01CB}{Nj}
\DeclareUnicodeCharacter{01CC}{nj}
\DeclareUnicodeCharacter{01CD}{\v{A}}
\DeclareUnicodeCharacter{01CE}{\v{a}}
\DeclareUnicodeCharacter{01CF}{\v{I}}

\DeclareUnicodeCharacter{01D0}{\v{\dotless{i}}}
```

```
\DeclareUnicodeCharacter{01D1}{\v{O}}
\DeclareUnicodeCharacter{01D2}{\v{o}}
\DeclareUnicodeCharacter{01D3}{\v{U}}
\DeclareUnicodeCharacter{01D4}{\v{u}}

\DeclareUnicodeCharacter{01E2}{\={\AE}}
\DeclareUnicodeCharacter{01E3}{\={\ae}}
\DeclareUnicodeCharacter{01E6}{\v{G}}
\DeclareUnicodeCharacter{01E7}{\v{g}}
\DeclareUnicodeCharacter{01E8}{\v{K}}
\DeclareUnicodeCharacter{01E9}{\v{k}}

\DeclareUnicodeCharacter{01F0}{\v{\dotless{j}}}
\DeclareUnicodeCharacter{01F1}{DZ}
\DeclareUnicodeCharacter{01F2}{Dz}
\DeclareUnicodeCharacter{01F3}{dz}
\DeclareUnicodeCharacter{01F4}{\'G}
\DeclareUnicodeCharacter{01F5}{\'g}
\DeclareUnicodeCharacter{01F8}{\`N}
\DeclareUnicodeCharacter{01F9}{\`n}
\DeclareUnicodeCharacter{01FC}{\'{\AE}}
\DeclareUnicodeCharacter{01FD}{\'{\ae}}
\DeclareUnicodeCharacter{01FE}{\'{\O}}
\DeclareUnicodeCharacter{01FF}{\'{\o}}

\DeclareUnicodeCharacter{021E}{\v{H}}
\DeclareUnicodeCharacter{021F}{\v{h}}

\DeclareUnicodeCharacter{0226}{\dotaccent{A}}
\DeclareUnicodeCharacter{0227}{\dotaccent{a}}
\DeclareUnicodeCharacter{0228}{\cedilla{E}}
\DeclareUnicodeCharacter{0229}{\cedilla{e}}
\DeclareUnicodeCharacter{022E}{\dotaccent{O}}
\DeclareUnicodeCharacter{022F}{\dotaccent{o}}

\DeclareUnicodeCharacter{0232}{\=Y}
\DeclareUnicodeCharacter{0233}{\=y}
\DeclareUnicodeCharacter{0237}{\dotless{j}}

\DeclareUnicodeCharacter{02DB}{\ogonek{ }}

\DeclareUnicodeCharacter{1E02}{\dotaccent{B}}
\DeclareUnicodeCharacter{1E03}{\dotaccent{b}}
\DeclareUnicodeCharacter{1E04}{\udotaccent{B}}
\DeclareUnicodeCharacter{1E05}{\udotaccent{b}}
\DeclareUnicodeCharacter{1E06}{\ubaraccent{B}}
\DeclareUnicodeCharacter{1E07}{\ubaraccent{b}}
\DeclareUnicodeCharacter{1E0A}{\dotaccent{D}}
```

```
\DeclareUnicodeCharacter{1E0B}{\dotaccent{d}}
\DeclareUnicodeCharacter{1E0C}{\udotaccent{D}}
\DeclareUnicodeCharacter{1E0D}{\udotaccent{d}}
\DeclareUnicodeCharacter{1E0E}{\ubaraccent{D}}
\DeclareUnicodeCharacter{1E0F}{\ubaraccent{d}}

\DeclareUnicodeCharacter{1E1E}{\dotaccent{F}}
\DeclareUnicodeCharacter{1E1F}{\dotaccent{f}}

\DeclareUnicodeCharacter{1E20}{\=G}
\DeclareUnicodeCharacter{1E21}{\=g}
\DeclareUnicodeCharacter{1E22}{\dotaccent{H}}
\DeclareUnicodeCharacter{1E23}{\dotaccent{h}}
\DeclareUnicodeCharacter{1E24}{\udotaccent{H}}
\DeclareUnicodeCharacter{1E25}{\udotaccent{h}}
\DeclareUnicodeCharacter{1E26}{\"H}
\DeclareUnicodeCharacter{1E27}{\"h}

\DeclareUnicodeCharacter{1E30}{\'K}
\DeclareUnicodeCharacter{1E31}{\'k}
\DeclareUnicodeCharacter{1E32}{\udotaccent{K}}
\DeclareUnicodeCharacter{1E33}{\udotaccent{k}}
\DeclareUnicodeCharacter{1E34}{\ubaraccent{K}}
\DeclareUnicodeCharacter{1E35}{\ubaraccent{k}}
\DeclareUnicodeCharacter{1E36}{\udotaccent{L}}
\DeclareUnicodeCharacter{1E37}{\udotaccent{l}}
\DeclareUnicodeCharacter{1E3A}{\ubaraccent{L}}
\DeclareUnicodeCharacter{1E3B}{\ubaraccent{l}}
\DeclareUnicodeCharacter{1E3E}{\'M}
\DeclareUnicodeCharacter{1E3F}{\'m}

\DeclareUnicodeCharacter{1E40}{\dotaccent{M}}
\DeclareUnicodeCharacter{1E41}{\dotaccent{m}}
\DeclareUnicodeCharacter{1E42}{\udotaccent{M}}
\DeclareUnicodeCharacter{1E43}{\udotaccent{m}}
\DeclareUnicodeCharacter{1E44}{\dotaccent{N}}
\DeclareUnicodeCharacter{1E45}{\dotaccent{n}}
\DeclareUnicodeCharacter{1E46}{\udotaccent{N}}
\DeclareUnicodeCharacter{1E47}{\udotaccent{n}}
\DeclareUnicodeCharacter{1E48}{\ubaraccent{N}}
\DeclareUnicodeCharacter{1E49}{\ubaraccent{n}}

\DeclareUnicodeCharacter{1E54}{\'P}
\DeclareUnicodeCharacter{1E55}{\'p}
\DeclareUnicodeCharacter{1E56}{\dotaccent{P}}
\DeclareUnicodeCharacter{1E57}{\dotaccent{p}}
\DeclareUnicodeCharacter{1E58}{\dotaccent{R}}
\DeclareUnicodeCharacter{1E59}{\dotaccent{r}}
```

\DeclareUnicodeCharacter{1E5A}{\udotaccent{R}}
\DeclareUnicodeCharacter{1E5B}{\udotaccent{r}}
\DeclareUnicodeCharacter{1E5E}{\ubaraccent{R}}
\DeclareUnicodeCharacter{1E5F}{\ubaraccent{r}}

\DeclareUnicodeCharacter{1E60}{\dotaccent{S}}
\DeclareUnicodeCharacter{1E61}{\dotaccent{s}}
\DeclareUnicodeCharacter{1E62}{\udotaccent{S}}
\DeclareUnicodeCharacter{1E63}{\udotaccent{s}}
\DeclareUnicodeCharacter{1E6A}{\dotaccent{T}}
\DeclareUnicodeCharacter{1E6B}{\dotaccent{t}}
\DeclareUnicodeCharacter{1E6C}{\udotaccent{T}}
\DeclareUnicodeCharacter{1E6D}{\udotaccent{t}}
\DeclareUnicodeCharacter{1E6E}{\ubaraccent{T}}
\DeclareUnicodeCharacter{1E6F}{\ubaraccent{t}}

\DeclareUnicodeCharacter{1E7C}{\~V}
\DeclareUnicodeCharacter{1E7D}{\~v}
\DeclareUnicodeCharacter{1E7E}{\udotaccent{V}}
\DeclareUnicodeCharacter{1E7F}{\udotaccent{v}}

\DeclareUnicodeCharacter{1E80}{\`W}
\DeclareUnicodeCharacter{1E81}{\`w}
\DeclareUnicodeCharacter{1E82}{\'W}
\DeclareUnicodeCharacter{1E83}{\'w}
\DeclareUnicodeCharacter{1E84}{\"W}
\DeclareUnicodeCharacter{1E85}{\"w}
\DeclareUnicodeCharacter{1E86}{\dotaccent{W}}
\DeclareUnicodeCharacter{1E87}{\dotaccent{w}}
\DeclareUnicodeCharacter{1E88}{\udotaccent{W}}
\DeclareUnicodeCharacter{1E89}{\udotaccent{w}}
\DeclareUnicodeCharacter{1E8A}{\dotaccent{X}}
\DeclareUnicodeCharacter{1E8B}{\dotaccent{x}}
\DeclareUnicodeCharacter{1E8C}{\"X}
\DeclareUnicodeCharacter{1E8D}{\"x}
\DeclareUnicodeCharacter{1E8E}{\dotaccent{Y}}
\DeclareUnicodeCharacter{1E8F}{\dotaccent{y}}

\DeclareUnicodeCharacter{1E90}{\^Z}
\DeclareUnicodeCharacter{1E91}{\^z}
\DeclareUnicodeCharacter{1E92}{\udotaccent{Z}}
\DeclareUnicodeCharacter{1E93}{\udotaccent{z}}
\DeclareUnicodeCharacter{1E94}{\ubaraccent{Z}}
\DeclareUnicodeCharacter{1E95}{\ubaraccent{z}}
\DeclareUnicodeCharacter{1E96}{\ubaraccent{h}}
\DeclareUnicodeCharacter{1E97}{\"t}
\DeclareUnicodeCharacter{1E98}{\ringaccent{w}}
\DeclareUnicodeCharacter{1E99}{\ringaccent{y}}

```
\DeclareUnicodeCharacter{1EA0}{\udotaccent{A}}
\DeclareUnicodeCharacter{1EA1}{\udotaccent{a}}

\DeclareUnicodeCharacter{1EB8}{\udotaccent{E}}
\DeclareUnicodeCharacter{1EB9}{\udotaccent{e}}
\DeclareUnicodeCharacter{1EBC}{\~E}
\DeclareUnicodeCharacter{1EBD}{\~e}

\DeclareUnicodeCharacter{1ECA}{\udotaccent{I}}
\DeclareUnicodeCharacter{1ECB}{\udotaccent{i}}
\DeclareUnicodeCharacter{1ECC}{\udotaccent{O}}
\DeclareUnicodeCharacter{1ECD}{\udotaccent{o}}

\DeclareUnicodeCharacter{1EE4}{\udotaccent{U}}
\DeclareUnicodeCharacter{1EE5}{\udotaccent{u}}

\DeclareUnicodeCharacter{1EF2}{\`Y}
\DeclareUnicodeCharacter{1EF3}{\`y}
\DeclareUnicodeCharacter{1EF4}{\udotaccent{Y}}

\DeclareUnicodeCharacter{1EF8}{\~Y}
\DeclareUnicodeCharacter{1EF9}{\~y}

\DeclareUnicodeCharacter{2013}{--}
\DeclareUnicodeCharacter{2014}{---}
\DeclareUnicodeCharacter{2018}{\quoteleft}
\DeclareUnicodeCharacter{2019}{\quoteright}
\DeclareUnicodeCharacter{201A}{\quotesinglbase}
\DeclareUnicodeCharacter{201C}{\quotedblleft}
\DeclareUnicodeCharacter{201D}{\quotedblright}
\DeclareUnicodeCharacter{201E}{\quotedblbase}
\DeclareUnicodeCharacter{2022}{\bullet}
\DeclareUnicodeCharacter{2026}{\dots}
\DeclareUnicodeCharacter{2039}{\guilsinglleft}
\DeclareUnicodeCharacter{203A}{\guilsinglright}
\DeclareUnicodeCharacter{20AC}{\euro}

\DeclareUnicodeCharacter{2192}{\expansion}
\DeclareUnicodeCharacter{21D2}{\result}

\DeclareUnicodeCharacter{2212}{\minus}
\DeclareUnicodeCharacter{2217}{\point}
\DeclareUnicodeCharacter{2261}{\equiv}
}% end of \utfeightchardefs


% US-ASCII character definitions.
```

```
\def\asciichardefs{% nothing need be done
 \relax
}


% Make non-ASCII characters printable again for compatibility with
% existing Texinfo documents that may use them, even without declaring a
% document encoding.
%
\setnonasciicharscatcode \other


\message{formatting,}

\newdimen\defaultparindent \defaultparindent = 15pt

\chapheadingskip = 15pt plus 4pt minus 2pt
\secheadingskip = 12pt plus 3pt minus 2pt
\subsecheadingskip = 9pt plus 2pt minus 2pt

% Prevent underfull vbox error messages.
\vbadness = 10000

% Don't be very finicky about underfull hboxes, either.
\hbadness = 6666

% Following George Bush, get rid of widows and orphans.
\widowpenalty=10000
\clubpenalty=10000

% Use TeX 3.0's \emergencystretch to help line breaking, but if we're
% using an old version of TeX, don't do anything.  We want the amount of
% stretch added to depend on the line length, hence the dependence on
% \hsize.  We call this whenever the paper size is set.
%
\def\setemergencystretch{%
 \ifx\emergencystretch\thisisundefined
   % Allow us to assign to \emergencystretch anyway.
   \def\emergencystretch{\dimen0}%
 \else
   \emergencystretch = .15\hsize
 \fi
}

% Parameters in order: 1) textheight; 2) textwidth;
% 3) voffset; 4) hoffset; 5) binding offset; 6) topskip;
% 7) physical page height; 8) physical page width.
%
% We also call \setleading{\textleading}, so the caller should define
```

```
% \textleading.  The caller should also set \parskip.
%
\def\internalpagesizes#1#2#3#4#5#6#7#8{%
 \voffset = #3\relax
 \topskip = #6\relax
 \splittopskip = \topskip
 %
 \vsize = #1\relax
 \advance\vsize by \topskip
 \outervsize = \vsize
 \advance\outervsize by 2\topandbottommargin
 \pageheight = \vsize
 %
 \hsize = #2\relax
 \outerhsize = \hsize
 \advance\outerhsize by 0.5in
 \pagewidth = \hsize
 %
 \normaloffset = #4\relax
 \bindingoffset = #5\relax
 %
 \ifpdf
   \pdfpageheight #7\relax
   \pdfpagewidth #8\relax
   % if we don't reset these, they will remain at "1 true in" of
   % whatever layout pdftex was dumped with.
   \pdfhorigin = 1 true in
   \pdfvorigin = 1 true in
 \fi
 %
 \setleading{\textleading}
 %
 \parindent = \defaultparindent
 \setemergencystretch
}

% @letterpaper (the default).
\def\letterpaper{{\globaldefs = 1
 \parskip = 3pt plus 2pt minus 1pt
 \textleading = 13.2pt
 %
 % If page is nothing but text, make it come out even.
 \internalpagesizes{607.2pt}{6in}% that's 46 lines
           {\voffset}{.25in}%
           {\bindingoffset}{36pt}%
           {11in}{8.5in}%
}}
```

```
% Use @smallbook to reset parameters for 7x9.25 trim size.
\def\smallbook{{\globaldefs = 1
 \parskip = 2pt plus 1pt
 \textleading = 12pt
 %
 \internalpagesizes{7.5in}{5in}%
            {-.2in}{0in}%
            {\bindingoffset}{16pt}%
            {9.25in}{7in}%
 %
 \lispnarrowing = 0.3in
 \tolerance = 700
 \hfuzz = 1pt
 \contentsrightmargin = 0pt
 \defbodyindent = .5cm
}}

% Use @smallerbook to reset parameters for 6x9 trim size.
% (Just testing, parameters still in flux.)
\def\smallerbook{{\globaldefs = 1
 \parskip = 1.5pt plus 1pt
 \textleading = 12pt
 %
 \internalpagesizes{7.4in}{4.8in}%
            {-.2in}{-.4in}%
            {0pt}{14pt}%
            {9in}{6in}%
 %
 \lispnarrowing = 0.25in
 \tolerance = 700
 \hfuzz = 1pt
 \contentsrightmargin = 0pt
 \defbodyindent = .4cm
}}

% Use @afourpaper to print on European A4 paper.
\def\afourpaper{{\globaldefs = 1
 \parskip = 3pt plus 2pt minus 1pt
 \textleading = 13.2pt
 %
 % Double-side printing via postscript on Laserjet 4050
 % prints double-sided nicely when \bindingoffset=10mm and \hoffset=-6mm.
 % To change the settings for a different printer or situation, adjust
 % \normaloffset until the front-side and back-side texts align.  Then
 % do the same for \bindingoffset.  You can set these for testing in
 % your texinfo source file like this:
 % @tex
 % \global\normaloffset = -6mm
```

```
% \global\bindingoffset = 10mm
% @end tex
\internalpagesizes{673.2pt}{160mm}% that's 51 lines
           {\voffset}{\hoffset}%
           {\bindingoffset}{44pt}%
           {297mm}{210mm}%
%
\tolerance = 700
\hfuzz = 1pt
\contentsrightmargin = 0pt
\defbodyindent = 5mm
}}

% Use @afivepaper to print on European A5 paper.
% From romildo@urano.iceb.ufop.br, 2 July 2000.
% He also recommends making @example and @lisp be small.
\def\afivepaper{{\globaldefs = 1
\parskip = 2pt plus 1pt minus 0.1pt
\textleading = 12.5pt
%
\internalpagesizes{160mm}{120mm}%
           {\voffset}{\hoffset}%
           {\bindingoffset}{8pt}%
           {210mm}{148mm}%
%
\lispnarrowing = 0.2in
\tolerance = 800
\hfuzz = 1.2pt
\contentsrightmargin = 0pt
\defbodyindent = 2mm
\tableindent = 12mm
}}

% A specific text layout, 24x15cm overall, intended for A4 paper.
\def\afourlatex{{\globaldefs = 1
\afourpaper
\internalpagesizes{237mm}{150mm}%
           {\voffset}{4.6mm}%
           {\bindingoffset}{7mm}%
           {297mm}{210mm}%
%
% Must explicitly reset to 0 because we call \afourpaper.
\globaldefs = 0
}}

% Use @afourwide to print on A4 paper in landscape format.
\def\afourwide{{\globaldefs = 1
\afourpaper
```

```
\internalpagesizes{241mm}{165mm}%
              {\voffset}{-2.95mm}%
              {\bindingoffset}{7mm}%
              {297mm}{210mm}%
 \globaldefs = 0
}}


% @pagesizes TEXTHEIGHT[,TEXTWIDTH]
% Perhaps we should allow setting the margins, \topskip, \parskip,
% and/or leading, also. Or perhaps we should compute them somehow.
%
\parseargdef\pagesizes{\pagesizesyyy #1,,\finish}
\def\pagesizesyyy#1,#2,#3\finish{{%
\setbox0 = \hbox{\ignorespaces #2}\ifdim\wd0 > 0pt \hsize=#2\relax \fi
\globaldefs = 1
%
\parskip = 3pt plus 2pt minus 1pt
\setleading{\textleading}%
%
\dimen0 = #1\relax
\advance\dimen0 by \voffset
%
\dimen2 = \hsize
\advance\dimen2 by \normaloffset
%
\internalpagesizes{#1}{\hsize}%
              {\voffset}{\normaloffset}%
              {\bindingoffset}{44pt}%
              {\dimen0}{\dimen2}%
}}


% Set default to letter.
%
\letterpaper



\message{and turning on texinfo input format.}

\def^^L{\par} % remove \outer, so ^L can appear in an @comment

% DEL is a comment character, in case @c does not suffice.
\catcode`\^^? = 14


% Define macros to output various characters with catcode for normal text.
\catcode`\"=\other \def\normaldoublequote{"}
\catcode`\$=\other \def\normaldollar{$}%$ font-lock fix
\catcode`\+=\other \def\normalplus{+}
\catcode`\<=\other \def\normalless{<}
```

```
\catcode`\>=\other \def\normalgreater{>}
\catcode`\^=\other \def\normalcaret{^}
\catcode`\_=\other \def\normalunderscore{_}
\catcode`\|=\other \def\normalverticalbar{|}
\catcode`\~=\other \def\normaltilde{~}


% This macro is used to make a character print one way in \tt
% (where it can probably be output as-is), and another way in other fonts,
% where something hairier probably needs to be done.
%
% #1 is what to print if we are indeed using \tt; #2 is what to print
% otherwise.  Since all the Computer Modern typewriter fonts have zero
% interword stretch (and shrink), and it is reasonable to expect all
% typewriter fonts to have this, we can check that font parameter.
%
\def\ifusingtt#1#2{\ifdim \fontdimen3\font=0pt #1\else #2\fi}


% Same as above, but check for italic font.  Actually this also catches
% non-italic slanted fonts since it is impossible to distinguish them from
% italic fonts.  But since this is only used by $ and it uses \sl anyway
% this is not a problem.
\def\ifusingit#1#2{\ifdim \fontdimen1\font>0pt #1\else #2\fi}


% Turn off all special characters except @
% (and those which the user can use as if they were ordinary).
% Most of these we simply print from the \tt font, but for some, we can
% use math or other variants that look better in normal text.


\catcode`\"=\active
\def\activedoublequote{{\tt\char34}}
\let"=\activedoublequote
\catcode`\~=\active
\def~{{\tt\char126}}
\chardef\hat=`\^
\catcode`\^=\active
\def^{{\tt \hat}}


\catcode`\_=\active
\def_{\ifusingtt\normalunderscore\_}
\let\realunder=_
% Subroutine for the previous macro.
\def\_{\leavevmode \kern.07em \vbox{\hrule width.3em height.1ex}\kern .07em }


\catcode`\|=\active
\def|{{\tt\char124}}
\chardef \less=`\<
\catcode`\<=\active
\def<{{\tt \less}}
```

```
\chardef \gtr=`\>
\catcode`\>=\active
\def>{{\tt \gtr}}
\catcode`\+=\active
\def+{{\tt \char 43}}
\catcode`\$=\active
\def${\ifusingit{{\sl\$}}\normaldollar}%$ font-lock fix


% If a .fmt file is being used, characters that might appear in a file
% name cannot be active until we have parsed the command line.
% So turn them off again, and have \everyjob (or @setfilename) turn them on.
% \otherifyactive is called near the end of this file.
\def\otherifyactive{\catcode`+=\other \catcode`\_=\other}


% Used sometimes to turn off (effectively) the active characters even after
% parsing them.
\def\turnoffactive{%
 \normalturnoffactive
 \otherbackslash
}


\catcode`\@=0


% \backslashcurfont outputs one backslash character in current font,
% as in \char`\\.
\global\chardef\backslashcurfont=`\\
\global\let\rawbackslashxx=\backslashcurfont  % let existing .??s files work


% \realbackslash is an actual character `\' with catcode other, and
% \doublebackslash is two of them (for the pdf outlines).
{\catcode`\\=\other @gdef@realbackslash{\} @gdef@doublebackslash{\\}}


% In texinfo, backslash is an active character; it prints the backslash
% in fixed width font.
\catcode`\\=\active  % @ for escape char from now on.


% The story here is that in math mode, the \char of \backslashcurfont
% ends up printing the roman \ from the math symbol font (because \char
% in math mode uses the \mathcode, and plain.tex sets
% \mathcode`\\="026E).  It seems better for @backslashchar{} to always
% print a typewriter backslash, hence we use an explicit \mathchar,
% which is the decimal equivalent of "715c (class 7, e.g., use \fam;
% ignored family value; char position "5C).  We can't use " for the
% usual hex value because it has already been made active.
@def@normalbackslash{{@tt @ifmmode @mathchar29020 @else @backslashcurfont @fi}}
@let@backslashchar = @normalbackslash % @backslashchar{} is for user documents.


% On startup, @fixbackslash assigns:
```

```
%   @let \ = @normalbackslash
% \rawbackslash defines an active \ to do \backslashcurfont.
% \otherbackslash defines an active \ to be a literal `\' character with
% catcode other.  We switch back and forth between these.
@gdef@rawbackslash{@let\=@backslashcurfont}
@gdef@otherbackslash{@let\=@realbackslash}


% Same as @turnoffactive except outputs \ as {\tt\char`\\} instead of
% the literal character `\'.  Also revert - to its normal character, in
% case the active - from code has slipped in.
%
{@catcode`- = @active
@gdef@normalturnoffactive{%
 @let-=@normaldash
 @let"=@normaldoublequote
 @let$=@normaldollar %$ font-lock fix
 @let+=@normalplus
 @let<=@normalless
 @let>=@normalgreater
 @let\=@normalbackslash
 @let^=@normalcaret
 @let_=@normalunderscore
 @let|=@normalverticalbar
 @let~=@normaltilde
 @markupsetuplqdefault
 @markupsetuprqdefault
 @unsepspaces
}
}


% Make _ and + \other characters, temporarily.
% This is canceled by @fixbackslash.
@otherifyactive


% If a .fmt file is being used, we don't want the `\input texinfo' to show up.
% That is what \eatinput is for; after that, the `\' should revert to printing
% a backslash.
%
@gdef@eatinput input texinfo{@fixbackslash}
@global@let\ = @eatinput


% On the other hand, perhaps the file did not have a `\input texinfo'. Then
% the first `\' in the file would cause an error. This macro tries to fix
% that, assuming it is called before the first `\' could plausibly occur.
% Also turn back on active characters that might appear in the input
% file name, in case not using a pre-dumped format.
%
@gdef@fixbackslash{%
```

```
@ifx\@eatinput @let\ = @normalbackslash @fi
@catcode`+=@active
@catcode`@_=@active
}

% Say @foo, not \foo, in error messages.
@escapechar = `@@

% These (along with & and #) are made active for url-breaking, so need
% active definitions as the normal characters.
@def@normaldot{.}
@def@normalquest{?}
@def@normalslash{/}

% These look ok in all fonts, so just make them not special.
% @hashchar{} gets its own user-level command, because of #line.
@catcode`@& = @other @def@normalamp{&}
@catcode`@# = @other @def@normalhash{#}
@catcode`@% = @other @def@normalpercent{%}

@let @hashchar = @normalhash

@c Finally, make ` and ' active, so that txicodequoteundirected and
@c txicodequotebacktick work right in, e.g., @w{@code{`foo'}}.  If we
@c don't make ` and ' active, @code will not get them as active chars.
@c Do this last of all since we use ` in the previous @catcode assignments.
@catcode`@'=@active
@catcode`@`=@active
@markupsetuplqdefault
@markupsetuprqdefault

@c Local variables:
@c eval: (add-hook 'write-file-hooks 'time-stamp)
@c page-delimiter: "^\\\\message"
@c time-stamp-start: "def\\\\texinfoversion{"
@c time-stamp-format: "%:y-%02m-%02d.%02H"
@c time-stamp-end: "}"
@c End:

@c vim:sw=2:

@ignore
 arch-tag: e1b36e32-c96e-4135-a41a-0b2efa2ea115
@end ignore
```

1.60 libffi/doc 3.2.1

1.60.1 Available under license :

```
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#
# GCC-compatible wrapper for cl.exe and ml.exe. Arguments are given in GCC
# format and translated into something sensible for cl or ml.
#
```

```
args_orig=$@
args="-nologo -W3"
static_crt=
debug_crt=
cl="cl"
ml="ml"
safeseh="-safeseh"
output=

while [ $# -gt 0 ]
do
 case $1
 in
  -fexceptions)
    # Don't enable exceptions for now.
    #args="$args -EHac"
    shift 1
  ;;
  -m32)
    shift 1
  ;;
  -m64)
    ml="ml64" # "$MSVC/x86_amd64/ml64"
    safeseh=
    shift 1
  ;;
  -clang-cl)
    cl="clang-cl"
    safeseh=
    shift 1
  ;;
  -O0)
    args="$args -Od"
    shift 1
  ;;
  -O*)
    # Runtime error checks (enabled by setting -RTC1 in the -DFFI_DEBUG
    # case below) are not compatible with optimization flags and will
    # cause the build to fail. Therefore, drop the optimization flag if
    # -DFFI_DEBUG is also set.
    case $args_orig in
      *-DFFI_DEBUG*)
        args="$args"
      ;;
      *)
        # The ax_cc_maxopt.m4 macro from the upstream autoconf-archive
        # project doesn't support MSVC and therefore ends up trying to
        # use -O3. Use the equivalent "max optimization" flag for MSVC
```

```
      # instead of erroring out.
      case $1 in
        -O3)
          args="$args -O2"
        ;;
        *)
          args="$args $1"
        ;;
      esac
      opt="true"
    ;;
  esac
  shift 1
;;
-g)
  # Enable debug symbol generation.
  args="$args -Zi"
  shift 1
;;
-DFFI_DEBUG)
  # Enable runtime error checks.
  args="$args -RTC1"
  defines="$defines $1"
  shift 1
;;
-DUSE_STATIC_RTL)
  # Link against static CRT.
  static_crt=1
  shift 1
;;
-DUSE_DEBUG_RTL)
  # Link against debug CRT.
  debug_crt=1
  shift 1
;;
-c)
  args="$args -c"
  args="$(echo $args | sed 's%/Fe%/Fo%g')"
  single="-c"
  shift 1
;;
-D*=*)
  name="$(echo $1|sed 's/-D\([^=][^=]*\)=.*/\1/g')"
  value="$(echo $1|sed 's/-D[^=][^=]*=//g')"
  args="$args -D${name}='$value'"
  defines="$defines -D${name}='$value'"
  shift 1
;;
```

```
-D*)
  args="$args $1"
  defines="$defines $1"
  shift 1
  ;;
-I)
  args="$args -I$2"
  includes="$includes -I$2"
  shift 2
  ;;
-I*)
  args="$args $1"
  includes="$includes $1"
  shift 1
  ;;
-W|-Wextra)
  # TODO map extra warnings
  shift 1
  ;;
-Wall)
  # -Wall on MSVC is overzealous, and we already build with -W3. Nothing
  # to do here.
  shift 1
  ;;
-pedantic)
  # libffi tests -pedantic with -Wall, so drop it also.
  shift 1
  ;;
-Werror)
  args="$args -WX"
  shift 1
  ;;
-W*)
  # TODO map specific warnings
  shift 1
  ;;
-S)
  args="$args -FAs"
  shift 1
  ;;
-o)
  outdir="$(dirname $2)"
  base="$(basename $2|sed 's/\.[^.]*//g')"
  if [ -n "$single" ]; then
    output="-Fo$2"
  else
    output="-Fe$2"
  fi
```

```
          if [ -n "$assembly" ]; then
            args="$args $output"
          else
            args="$args $output -Fd$outdir/$base -Fp$outdir/$base -Fa$outdir/$base"
          fi
          shift 2
        ;;
        *.S)
          src=$1
          assembly="true"
          shift 1
        ;;
        *.c)
          args="$args $1"
          shift 1
        ;;
        *)
          # Assume it's an MSVC argument, and pass it through.
          args="$args $1"
          shift 1
        ;;
    esac
done

# If -Zi is specified, certain optimizations are implicitly disabled
# by MSVC. Add back those optimizations if this is an optimized build.
# NOTE: These arguments must come after all others.
if [ -n "$opt" ]; then
  args="$args -link -OPT:REF -OPT:ICF -INCREMENTAL:NO"
fi

if [ -n "$static_crt" ]; then
  md=-MT
else
  md=-MD
fi

if [ -n "$debug_crt" ]; then
  md="${md}d"
fi

if [ -n "$assembly" ]; then
  if [ -z "$outdir" ]; then
    outdir="."
  fi
  ppsrc="$outdir/$(basename $src|sed 's/.S$/.asm/g')"
  echo "$cl -nologo -EP $includes $defines $src > $ppsrc"
  "$cl" -nologo -EP $includes $defines $src > $ppsrc || exit $?
```

```
    output="$(echo $output | sed 's%/F[dpa][^ ]*%%g')"
    args="-nologo $safeseh $single $output $ppsrc"

    echo "$ml $args"
    eval "\"$ml\" $args"
    result=$?

    # required to fix ml64 broken output?
    #mv *.obj $outdir
else
  args="$md $args"
  echo "$cl $args"
  # Return an error code of 1 if an invalid command line parameter is passed
  # instead of just ignoring it.
  eval "(\"$cl\" $args 2>&1 1>&3 | \
      awk '{print \$0} /D9002/ {error=1} END{exit error}' >&2) 3>&1"
  result=$?
fi

exit $result
```

% texinfo.tex -- TeX macros to handle Texinfo files.
%
% Load plain if necessary, i.e., if running under initex.
\expandafter\ifx\csname fmtname\endcsname\relax\input plain\fi
%
\def\texinfoversion{2013-02-01.11}
%
% Copyright 1985, 1986, 1988, 1990, 1991, 1992, 1993, 1994, 1995,
% 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006,
% 2007, 2008, 2009, 2010, 2011, 2012, 2013 Free Software Foundation, Inc.
%
% This texinfo.tex file is free software: you can redistribute it and/or
% modify it under the terms of the GNU General Public License as
% published by the Free Software Foundation, either version 3 of the
% License, or (at your option) any later version.
%
% This texinfo.tex file is distributed in the hope that it will be
% useful, but WITHOUT ANY WARRANTY; without even the implied warranty
% of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU
% General Public License for more details.
%
% You should have received a copy of the GNU General Public License
% along with this program. If not, see <http://www.gnu.org/licenses/>.
%
% As a special exception, when this file is read by TeX when processing
% a Texinfo source document, you may use the result without
% restriction. This Exception is an additional permission under section 7

```
% of the GNU General Public License, version 3 ("GPLv3").
%
% Please try the latest version of texinfo.tex before submitting bug
% reports; you can get the latest version from:
%   http://ftp.gnu.org/gnu/texinfo/ (the Texinfo release area), or
%   http://ftpmirror.gnu.org/texinfo/ (same, via a mirror), or
%   http://www.gnu.org/software/texinfo/ (the Texinfo home page)
% The texinfo.tex in any given distribution could well be out
% of date, so if that's what you're using, please check.
%
% Send bug reports to bug-texinfo@gnu.org.  Please include including a
% complete document in each bug report with which we can reproduce the
% problem.  Patches are, of course, greatly appreciated.
%
% To process a Texinfo manual with TeX, it's most reliable to use the
% texi2dvi shell script that comes with the distribution.  For a simple
% manual foo.texi, however, you can get away with this:
%   tex foo.texi
%   texindex foo.??
%   tex foo.texi
%   tex foo.texi
%   dvips foo.dvi -o  # or whatever; this makes foo.ps.
% The extra TeX runs get the cross-reference information correct.
% Sometimes one run after texindex suffices, and sometimes you need more
% than two; texi2dvi does it as many times as necessary.
%
% It is possible to adapt texinfo.tex for other languages, to some
% extent.  You can get the existing language-specific files from the
% full Texinfo distribution.
%
% The GNU Texinfo home page is http://www.gnu.org/software/texinfo.


\message{Loading texinfo [version \texinfoversion]:}

% If in a .fmt file, print the version number
% and turn on active characters that we couldn't do earlier because
% they might have appeared in the input file name.
\everyjob{\message{[Texinfo version \texinfoversion]}%
 \catcode`+=\active \catcode`\_=\active}

\chardef\other=12

% We never want plain's \outer definition of \+ in Texinfo.
% For @tex, we can use \tabalign.
\let\+ = \relax

% Save some plain tex macros whose names we will redefine.
```

```
\let\ptexb=\b
\let\ptexbullet=\bullet
\let\ptexc=\c
\let\ptexcomma=\,
\let\ptexdot=\.
\let\ptexdots=\dots
\let\ptexend=\end
\let\ptexequiv=\equiv
\let\ptexexclam=\!
\let\ptexfootnote=\footnote
\let\ptexgtr=>
\let\ptexhat=^
\let\ptexi=\i
\let\ptexindent=\indent
\let\ptexinsert=\insert
\let\ptexlbrace=\{
\let\ptexless=<
\let\ptexnewwrite\newwrite
\let\ptexnoindent=\noindent
\let\ptexplus=+
\let\ptexraggedright=\raggedright
\let\ptexrbrace=\}
\let\ptexslash=\/
\let\ptexstar=\*
\let\ptext=\t
\let\ptextop=\top
{\catcode`\'=\active \global\let\ptexquoteright'}% active in plain's math mode

% If this character appears in an error message or help string, it
% starts a new line in the output.
\newlinechar = `^^J

% Use TeX 3.0's \inputlineno to get the line number, for better error
% messages, but if we're using an old version of TeX, don't do anything.
%
\ifx\inputlineno\thisisundefined
 \let\linenumber = \empty % Pre-3.0.
\else
 \def\linenumber{l.\the\inputlineno:\space}
\fi

% Set up fixed words for English if not already set.
\ifx\putwordAppendix\undefined  \gdef\putwordAppendix{Appendix}\fi
\ifx\putwordChapter\undefined  \gdef\putwordChapter{Chapter}\fi
\ifx\putworderror\undefined    \gdef\putworderror{error}\fi
\ifx\putwordfile\undefined     \gdef\putwordfile{file}\fi
\ifx\putwordin\undefined       \gdef\putwordin{in}\fi
\ifx\putwordIndexIsEmpty\undefined      \gdef\putwordIndexIsEmpty{(Index is empty)}\fi
```

```
\ifx\putwordIndexNonexistent\undefined  \gdef\putwordIndexNonexistent{(Index is nonexistent)}\fi
\ifx\putwordInfo\undefined        \gdef\putwordInfo{Info}\fi
\ifx\putwordInstanceVariableof\undefined \gdef\putwordInstanceVariableof{Instance Variable of}\fi
\ifx\putwordMethodon\undefined \gdef\putwordMethodon{Method on}\fi
\ifx\putwordNoTitle\undefined  \gdef\putwordNoTitle{No Title}\fi
\ifx\putwordof\undefined        \gdef\putwordof{of}\fi
\ifx\putwordon\undefined        \gdef\putwordon{on}\fi
\ifx\putwordpage\undefined      \gdef\putwordpage{page}\fi
\ifx\putwordsection\undefined   \gdef\putwordsection{section}\fi
\ifx\putwordSection\undefined   \gdef\putwordSection{Section}\fi
\ifx\putwordsee\undefined       \gdef\putwordsee{see}\fi
\ifx\putwordSee\undefined       \gdef\putwordSee{See}\fi
\ifx\putwordShortTOC\undefined  \gdef\putwordShortTOC{Short Contents}\fi
\ifx\putwordTOC\undefined       \gdef\putwordTOC{Table of Contents}\fi
%
\ifx\putwordMJan\undefined \gdef\putwordMJan{January}\fi
\ifx\putwordMFeb\undefined \gdef\putwordMFeb{February}\fi
\ifx\putwordMMar\undefined \gdef\putwordMMar{March}\fi
\ifx\putwordMApr\undefined \gdef\putwordMApr{April}\fi
\ifx\putwordMMay\undefined \gdef\putwordMMay{May}\fi
\ifx\putwordMJun\undefined \gdef\putwordMJun{June}\fi
\ifx\putwordMJul\undefined \gdef\putwordMJul{July}\fi
\ifx\putwordMAug\undefined \gdef\putwordMAug{August}\fi
\ifx\putwordMSep\undefined \gdef\putwordMSep{September}\fi
\ifx\putwordMOct\undefined \gdef\putwordMOct{October}\fi
\ifx\putwordMNov\undefined \gdef\putwordMNov{November}\fi
\ifx\putwordMDec\undefined \gdef\putwordMDec{December}\fi
%
\ifx\putwordDefmac\undefined    \gdef\putwordDefmac{Macro}\fi
\ifx\putwordDefspec\undefined   \gdef\putwordDefspec{Special Form}\fi
\ifx\putwordDefvar\undefined    \gdef\putwordDefvar{Variable}\fi
\ifx\putwordDefopt\undefined    \gdef\putwordDefopt{User Option}\fi
\ifx\putwordDeffunc\undefined   \gdef\putwordDeffunc{Function}\fi

% Since the category of space is not known, we have to be careful.
\chardef\spacecat = 10
\def\spaceisspace{\catcode`\ =\spacecat}

% sometimes characters are active, so we need control sequences.
\chardef\ampChar   = `\&
\chardef\colonChar = `\:
\chardef\commaChar = `\,
\chardef\dashChar  = `\-
\chardef\dotChar   = `\.
\chardef\exclamChar= `\!
\chardef\hashChar  = `\#
\chardef\lquoteChar= `\`
\chardef\questChar = `\?
```

```
\chardef\rquoteChar= `\'
\chardef\semiChar  = `\;
\chardef\slashChar = `\/
\chardef\underChar = `\_

% Ignore a token.
%
\def\gobble#1{}

% The following is used inside several \edef's.
\def\makecsname#1{\expandafter\noexpand\csname#1\endcsname}

% Hyphenation fixes.
\hyphenation{
 Flor-i-da Ghost-script Ghost-view Mac-OS Post-Script
 ap-pen-dix bit-map bit-maps
 data-base data-bases eshell fall-ing half-way long-est man-u-script
 man-u-scripts mini-buf-fer mini-buf-fers over-view par-a-digm
 par-a-digms rath-er rec-tan-gu-lar ro-bot-ics se-vere-ly set-up spa-ces
 spell-ing spell-ings
 stand-alone strong-est time-stamp time-stamps which-ever white-space
 wide-spread wrap-around
}

% Margin to add to right of even pages, to left of odd pages.
\newdimen\bindingoffset
\newdimen\normaloffset
\newdimen\pagewidth \newdimen\pageheight

% For a final copy, take out the rectangles
% that mark overfull boxes (in case you have decided
% that the text looks ok even though it passes the margin).
%
\def\finalout{\overfullrule=0pt }

% Sometimes it is convenient to have everything in the transcript file
% and nothing on the terminal.  We don't just call \tracingall here,
% since that produces some useless output on the terminal.  We also make
% some effort to order the tracing commands to reduce output in the log
% file; cf. trace.sty in LaTeX.
%
\def\gloggingall{\begingroup \globaldefs = 1 \loggingall \endgroup}%
\def\loggingall{%
 \tracingstats2
 \tracingpages1
 \tracinglostchars2  % 2 gives us more in etex
 \tracingparagraphs1
 \tracingoutput1
```

```
  \tracingmacros2
  \tracingrestores1
  \showboxbreadth\maxdimen \showboxdepth\maxdimen
  \ifx\eTeXversion\thisisundefined\else % etex gives us more logging
    \tracingscantokens1
    \tracingifs1
    \tracinggroups1
    \tracingnesting2
    \tracingassigns1
  \fi
  \tracingcommands3  % 3 gives us more in etex
  \errorcontextlines16
}%

% @errormsg{MSG}.  Do the index-like expansions on MSG, but if things
% aren't perfect, it's not the end of the world, being an error message,
% after all.
%
\def\errormsg{\begingroup \indexnofonts \doerrormsg}
\def\doerrormsg#1{\errmessage{#1}}

% add check for \lastpenalty to plain's definitions.  If the last thing
% we did was a \nobreak, we don't want to insert more space.
%
\def\smallbreak{\ifnum\lastpenalty<10000\par\ifdim\lastskip<\smallskipamount
  \removelastskip\penalty-50\smallskip\fi\fi}
\def\medbreak{\ifnum\lastpenalty<10000\par\ifdim\lastskip<\medskipamount
  \removelastskip\penalty-100\medskip\fi\fi}
\def\bigbreak{\ifnum\lastpenalty<10000\par\ifdim\lastskip<\bigskipamount
  \removelastskip\penalty-200\bigskip\fi\fi}

% Do @cropmarks to get crop marks.
%
\newif\ifcropmarks
\let\cropmarks = \cropmarkstrue
%
% Dimensions to add cropmarks at corners.
% Added by P. A. MacKay, 12 Nov. 1986
%
\newdimen\outerhsize \newdimen\outervsize % set by the paper size routines
\newdimen\cornerlong  \cornerlong=1pc
\newdimen\cornerthick \cornerthick=.3pt
\newdimen\topandbottommargin \topandbottommargin=.75in

% Output a mark which sets \thischapter, \thissection and \thiscolor.
% We dump everything together because we only have one kind of mark.
% This works because we only use \botmark / \topmark, not \firstmark.
%
```

% A mark contains a subexpression of the \ifcase ... \fi construct.
% \get*marks macros below extract the needed part using \ifcase.
%
% Another complication is to let the user choose whether \thischapter
% (\thissection) refers to the chapter (section) in effect at the top
% of a page, or that at the bottom of a page. The solution is
% described on page 260 of The TeXbook. It involves outputting two
% marks for the sectioning macros, one before the section break, and
% one after. I won't pretend I can describe this better than DEK...
\def\domark{%
 \toks0=\expandafter{\lastchapterdefs}%
 \toks2=\expandafter{\lastsectiondefs}%
 \toks4=\expandafter{\prevchapterdefs}%
 \toks6=\expandafter{\prevsectiondefs}%
 \toks8=\expandafter{\lastcolordefs}%
 \mark{%
           \the\toks0 \the\toks2
    \noexpand\or \the\toks4 \the\toks6
   \noexpand\else \the\toks8
 }%
}
% \topmark doesn't work for the very first chapter (after the title
% page or the contents), so we use \firstmark there -- this gets us
% the mark with the chapter defs, unless the user sneaks in, e.g.,
% @setcolor (or @url, or @link, etc.) between @contents and the very
% first @chapter.
\def\gettopheadingmarks{%
 \ifcase0\topmark\fi
 \ifx\thischapter\empty \ifcase0\firstmark\fi \fi
}
\def\getbottomheadingmarks{\ifcase1\botmark\fi}
\def\getcolormarks{\ifcase2\topmark\fi}

% Avoid "undefined control sequence" errors.
\def\lastchapterdefs{ }
\def\lastsectiondefs{ }
\def\prevchapterdefs{ }
\def\prevsectiondefs{ }
\def\lastcolordefs{ }

% Main output routine.
\chardef\PAGE = 255
\output = {\onepageout{\pagecontents\PAGE}}

\newbox\headlinebox
\newbox\footlinebox

% \onepageout takes a vbox as an argument. Note that \pagecontents

```
% does insertions, but you have to call it yourself.
\def\onepageout#1{%
 \ifcropmarks \hoffset=0pt \else \hoffset=\normaloffset \fi
 %
 \ifodd\pageno  \advance\hoffset by \bindingoffset
 \else \advance\hoffset by -\bindingoffset\fi
 %
 % Do this outside of the \shipout so @code etc. will be expanded in
 % the headline as they should be, not taken literally (outputting "code).
 \ifodd\pageno \getoddheadingmarks \else \getevenheadingmarks \fi
 \setbox\headlinebox = \vbox{\let\hsize=\pagewidth \makeheadline}%
 \ifodd\pageno \getoddfootingmarks \else \getevenfootingmarks \fi
 \setbox\footlinebox = \vbox{\let\hsize=\pagewidth \makefootline}%
 %
 {%
  % Have to do this stuff outside the \shipout because we want it to
  % take effect in \write's, yet the group defined by the \vbox ends
  % before the \shipout runs.
  %
  \indexdummies         % don't expand commands in the output.
  \normalturnoffactive  % \ in index entries must not stay \, e.g., if
          % the page break happens to be in the middle of an example.
          % We don't want .vr (or whatever) entries like this:
          % \entry{{\tt \indexbackslash }acronym}{32}{\code {\acronym}}
          % "\acronym" won't work when it's read back in;
          % it needs to be
          % {\code {{\tt \backslashcurfont }acronym}
  \shipout\vbox{%
    % Do this early so pdf references go to the beginning of the page.
    \ifpdfmakepagedest \pdfdest name{\the\pageno} xyz\fi
    %
    \ifcropmarks \vbox to \outervsize\bgroup
      \hsize = \outerhsize
      \vskip-\topandbottommargin
      \vtop to0pt{%
        \line{\ewtop\hfil\ewtop}%
        \nointerlineskip
        \line{%
          \vbox{\moveleft\cornerthick\nstop}%
          \hfill
          \vbox{\moveright\cornerthick\nstop}%
        }%
        \vss}%
      \vskip\topandbottommargin
      \line\bgroup
        \hfil % center the page within the outer (page) hsize.
        \ifodd\pageno\hskip\bindingoffset\fi
        \vbox\bgroup
```

```
  \fi
  %
  \unvbox\headlinebox
  \pagebody{#1}%
  \ifdim\ht\footlinebox > 0pt
    % Only leave this space if the footline is nonempty.
    % (We lessened \vsize for it in \oddfootingyyy.)
    % The \baselineskip=24pt in plain's \makefootline has no effect.
    \vskip 24pt
    \unvbox\footlinebox
  \fi
  %
  \ifcropmarks
     \egroup % end of \vbox\bgroup
    \hfil\egroup % end of (centering) \line\bgroup
    \vskip\topandbottommargin plus1fill minus1fill
    \boxmaxdepth = \cornerthick
    \vbox to0pt{\vss
      \line{%
       \vbox{\moveleft\cornerthick\nsbot}%
       \hfill
       \vbox{\moveright\cornerthick\nsbot}%
      }%
      \nointerlineskip
      \line{\ewbot\hfil\ewbot}%
     }%
   \egroup % \vbox from first cropmarks clause
   \fi
  }% end of \shipout\vbox
}% end of group with \indexdummies
\advancepageno
\ifnum\outputpenalty>-20000 \else\dosupereject\fi
}

\newinsert\margin \dimen\margin=\maxdimen

\def\pagebody#1{\vbox to\pageheight{\boxmaxdepth=\maxdepth #1}}
{\catcode`\@ =11
\gdef\pagecontents#1{\ifvoid\topins\else\unvbox\topins\fi
% marginal hacks, juha@viisa.uucp (Juha Takala)
\ifvoid\margin\else % marginal info is present
 \rlap{\kern\hsize\vbox to\z@{\kern1pt\box\margin \vss}}\fi
\dimen@=\dp#1\relax \unvbox#1\relax
\ifvoid\footins\else\vskip\skip\footins\footnoterule \unvbox\footins\fi
\ifr@ggedbottom \kern-\dimen@ \vfil \fi}
}

% Here are the rules for the cropmarks.  Note that they are
```

% offset so that the space between them is truly \outerhsize or \outervsize
% (P. A. MacKay, 12 November, 1986)
%
\def\ewtop{\vrule height\cornerthick depth0pt width\cornerlong}
\def\nstop{\vbox
 {\hrule height\cornerthick depth\cornerlong width\cornerthick}}
\def\ewbot{\vrule height0pt depth\cornerthick width\cornerlong}
\def\nsbot{\vbox
 {\hrule height\cornerlong depth\cornerthick width\cornerthick}}

% Parse an argument, then pass it to #1. The argument is the rest of
% the input line (except we remove a trailing comment). #1 should be a
% macro which expects an ordinary undelimited TeX argument.
%
\def\parsearg{\parseargusing{}}
\def\parseargusing#1#2{%
 \def\argtorun{#2}%
 \begingroup
   \obeylines
   \spaceisspace
   #1%
   \parseargline\empty% Insert the \empty token, see \finishparsearg below.
}

{\obeylines %
 \gdef\parseargline#1^^M{%
   \endgroup % End of the group started in \parsearg.
   \argremovecomment #1\comment\ArgTerm%
 }%
}

% First remove any @comment, then any @c comment.
\def\argremovecomment#1\comment#2\ArgTerm{\argremovec #1\c\ArgTerm}
\def\argremovec#1\c#2\ArgTerm{\argcheckspaces#1\^^M\ArgTerm}

% Each occurrence of `\^^M' or `<space>\^^M' is replaced by a single space.
%
% \argremovec might leave us with trailing space, e.g.,
%   @end itemize @c foo
% This space token undergoes the same procedure and is eventually removed
% by \finishparsearg.
%
\def\argcheckspaces#1\^^M{\argcheckspacesX#1\^^M \^^M}
\def\argcheckspacesX#1 \^^M{\argcheckspacesY#1\^^M}
\def\argcheckspacesY#1\^^M#2\^^M#3\ArgTerm{%
 \def\temp{#3}%
 \ifx\temp\empty
   % Do not use \next, perhaps the caller of \parsearg uses it; reuse \temp:

```
  \let\temp\finishparsearg
\else
  \let\temp\argcheckspaces
\fi
% Put the space token in:
\temp#1 #3\ArgTerm
}


% If a _delimited_ argument is enclosed in braces, they get stripped; so
% to get _exactly_ the rest of the line, we had to prevent such situation.
% We prepended an \empty token at the very beginning and we expand it now,
% just before passing the control to \argtorun.
% (Similarly, we have to think about #3 of \argcheckspacesY above: it is
% either the null string, or it ends with \^^M---thus there is no danger
% that a pair of braces would be stripped.
%
% But first, we have to remove the trailing space token.
%
\def\finishparsearg#1 \ArgTerm{\expandafter\argtorun\expandafter{#1}}


% \parseargdef\foo{...}
% is roughly equivalent to
% \def\foo{\parsearg\Xfoo}
% \def\Xfoo#1{...}
%
% Actually, I use \csname\string\foo\endcsname, ie. \\foo, as it is my
% favourite TeX trick.  --kasal, 16nov03

\def\parseargdef#1{%
 \expandafter \doparseargdef \csname\string#1\endcsname #1%
}
\def\doparseargdef#1#2{%
 \def#2{\parsearg#1}%
 \def#1##1%
}


% Several utility definitions with active space:
{
\obeyspaces
\gdef\obeyedspace{ }

% Make each space character in the input produce a normal interword
% space in the output.  Don't allow a line break at this space, as this
% is used only in environments like @example, where each line of input
% should produce a line of output anyway.
%
\gdef\sepspaces{\obeyspaces\let =\tie}
```

% If an index command is used in an @example environment, any spaces
% therein should become regular spaces in the raw index file, not the
% expansion of \tie (\leavevmode \penalty \@M \ ).
\gdef\unsepspaces{\let =\space}
}

\def\flushcr{\ifx\par\lisppar \def\next##1{ }\else \let\next=\relax \fi \next}

% Define the framework for environments in texinfo.tex. It's used like this:
%
%   \envdef\foo{...}
%   \def\Efoo{...}
%
% It's the responsibility of \envdef to insert \begingroup before the
% actual body; @end closes the group after calling \Efoo. \envdef also
% defines \thisenv, so the current environment is known; @end checks
% whether the environment name matches. The \checkenv macro can also be
% used to check whether the current environment is the one expected.
%
% Non-false conditionals (@iftex, @ifset) don't fit into this, so they
% are not treated as environments; they don't open a group. (The
% implementation of @end takes care not to call \endgroup in this
% special case.)

% At run-time, environments start with this:
\def\startenvironment#1{\begingroup\def\thisenv{#1}}
% initialize
\let\thisenv\empty

% ... but they get defined via ``\envdef\foo{...}'':
\long\def\envdef#1#2{\def#1{\startenvironment#1#2}}
\def\envparseargdef#1#2{\parseargdef#1{\startenvironment#1#2}}

% Check whether we're in the right environment:
\def\checkenv#1{%
 \def\temp{#1}%
 \ifx\thisenv\temp
 \else
   \badenverr
 \fi
}

% Environment mismatch, #1 expected:
\def\badenverr{%
 \errhelp = \EMsimple
 \errmessage{This command can appear only \inenvironment\temp,

```
   not \inenvironment\thisenv}%
}
\def\inenvironment#1{%
 \ifx#1\empty
   outside of any environment%
 \else
   in environment \expandafter\string#1%
 \fi
}

% @end foo executes the definition of \Efoo.
% But first, it executes a specialized version of \checkenv
%
\parseargdef\end{%
 \if 1\csname iscond.#1\endcsname
 \else
   % The general wording of \badenverr may not be ideal.
   \expandafter\checkenv\csname#1\endcsname
   \csname E#1\endcsname
   \endgroup
 \fi
}

\newhelp\EMsimple{Press RETURN to continue.}


% Be sure we're in horizontal mode when doing a tie, since we make space
% equivalent to this in @example-like environments. Otherwise, a space
% at the beginning of a line will start with \penalty -- and
% since \penalty is valid in vertical mode, we'd end up putting the
% penalty on the vertical list instead of in the new paragraph.
{\catcode`@ = 11
% Avoid using \@M directly, because that causes trouble
% if the definition is written into an index file.
\global\let\tiepenalty = \@M
\gdef\tie{\leavevmode\penalty\tiepenalty\ }
}

% @: forces normal size whitespace following.
\def\:{\spacefactor=1000 }

% @* forces a line break.
\def\*{\unskip\hfil\break\hbox{}\ignorespaces}

% @/ allows a line break.
\let\/=\allowbreak

% @. is an end-of-sentence period.
```

```
\def\.{.\spacefactor=\endofsentencespacefactor\space}

% @! is an end-of-sentence bang.
\def\!{!\spacefactor=\endofsentencespacefactor\space}

% @? is an end-of-sentence query.
\def\?{?\spacefactor=\endofsentencespacefactor\space}

% @frenchspacing on|off  says whether to put extra space after punctuation.
%
\def\onword{on}
\def\offword{off}
%
\parseargdef\frenchspacing{%
 \def\temp{#1}%
 \ifx\temp\onword \plainfrenchspacing
 \else\ifx\temp\offword \plainnonfrenchspacing
 \else
   \errhelp = \EMsimple
   \errmessage{Unknown @frenchspacing option `\temp', must be on|off}%
 \fi\fi
}

% @w prevents a word break.  Without the \leavevmode, @w at the
% beginning of a paragraph, when TeX is still in vertical mode, would
% produce a whole line of output instead of starting the paragraph.
\def\w#1{\leavevmode\hbox{#1}}

% @group ... @end group forces ... to be all on one page, by enclosing
% it in a TeX vbox.  We use \vtop instead of \vbox to construct the box
% to keep its height that of a normal line.  According to the rules for
% \topskip (p.114 of the TeXbook), the glue inserted is
% max (\topskip - \ht (first item), 0).  If that height is large,
% therefore, no glue is inserted, and the space between the headline and
% the text is small, which looks bad.
%
% Another complication is that the group might be very large.  This can
% cause the glue on the previous page to be unduly stretched, because it
% does not have much material.  In this case, it's better to add an
% explicit \vfill so that the extra space is at the bottom.  The
% threshold for doing this is if the group is more than \vfilllimit
% percent of a page (\vfilllimit can be changed inside of @tex).
%
\newbox\groupbox
\def\vfilllimit{0.7}
%
\envdef\group{%
 \ifnum\catcode`\^^M=\active \else
```

```
  \errhelp = \groupinvalidhelp
  \errmessage{@group invalid in context where filling is enabled}%
\fi
\startsavinginserts
%
\setbox\groupbox = \vtop\bgroup
  % Do @comment since we are called inside an environment such as
  % @example, where each end-of-line in the input causes an
  % end-of-line in the output.  We don't want the end-of-line after
  % the `@group' to put extra space in the output.  Since @group
  % should appear on a line by itself (according to the Texinfo
  % manual), we don't worry about eating any user text.
  \comment
}
%
% The \vtop produces a box with normal height and large depth; thus, TeX puts
% \baselineskip glue before it, and (when the next line of text is done)
% \lineskip glue after it.  Thus, space below is not quite equal to space
% above.  But it's pretty close.
\def\Egroup{%
  % To get correct interline space between the last line of the group
  % and the first line afterwards, we have to propagate \prevdepth.
  \endgraf % Not \par, as it may have been set to \lisppar.
  \global\dimen1 = \prevdepth
\egroup          % End the \vtop.
% \dimen0 is the vertical size of the group's box.
\dimen0 = \ht\groupbox  \advance\dimen0 by \dp\groupbox
% \dimen2 is how much space is left on the page (more or less).
\dimen2 = \pageheight   \advance\dimen2 by -\pagetotal
% if the group doesn't fit on the current page, and it's a big big
% group, force a page break.
\ifdim \dimen0 > \dimen2
  \ifdim \pagetotal < \vfilllimit\pageheight
    \page
  \fi
\fi
\box\groupbox
\prevdepth = \dimen1
\checkinserts
}
%
% TeX puts in an \escapechar (i.e., `@') at the beginning of the help
% message, so this ends up printing `@group can only ...'.
%
\newhelp\groupinvalidhelp{%
group can only be used in environments such as @example,^^J%
where each line of input produces a line of output.}
```

% @need space-in-mils
% forces a page break if there is not space-in-mils remaining.

\newdimen\mil \mil=0.001in

\parseargdef\need{%
 % Ensure vertical mode, so we don't make a big box in the middle of a
 % paragraph.
\par
%
% If the @need value is less than one line space, it's useless.
\dimen0 = #1\mil
\dimen2 = \ht\strutbox
\advance\dimen2 by \dp\strutbox
\ifdim\dimen0 > \dimen2
 %
 % Do a \strut just to make the height of this box be normal, so the
 % normal leading is inserted relative to the preceding line.
 % And a page break here is fine.
 \vtop to #1\mil{\strut\vfil}%
 %
 % TeX does not even consider page breaks if a penalty added to the
 % main vertical list is 10000 or more. But in order to see if the
 % empty box we just added fits on the page, we must make it consider
 % page breaks. On the other hand, we don't want to actually break the
 % page after the empty box. So we use a penalty of 9999.
 %
 % There is an extremely small chance that TeX will actually break the
 % page at this \penalty, if there are no other feasible breakpoints in
 % sight. (If the user is using lots of big @group commands, which
 % almost-but-not-quite fill up a page, TeX will have a hard time doing
 % good page breaking, for example.) However, I could not construct an
 % example where a page broke at this \penalty; if it happens in a real
 % document, then we can reconsider our strategy.
 \penalty9999
 %
 % Back up by the size of the box, whether we did a page break or not.
 \kern -#1\mil
 %
 % Do not allow a page break right after this kern.
 \nobreak
\fi
}

% @br   forces paragraph break (and is undocumented).

\let\br = \par

```
% @page forces the start of a new page.
%
\def\page{\par\vfill\supereject}


% @exdent text....
% outputs text on separate line in roman font, starting at standard page margin


% This records the amount of indent in the innermost environment.
% That's how much \exdent should take out.
\newskip\exdentamount


% This defn is used inside fill environments such as @defun.
\parseargdef\exdent{\hfil\break\hbox{\kern -\exdentamount{\rm#1}}\hfil\break}


% This defn is used inside nofill environments such as @example.
\parseargdef\nofillexdent{{\advance \leftskip by -\exdentamount
 \leftline{\hskip\leftskip{\rm#1}}}}}


% @inmargin{WHICH}{TEXT} puts TEXT in the WHICH margin next to the current
% paragraph.  For more general purposes, use the \margin insertion
% class.  WHICH is `l' or `r'.  Not documented, written for gawk manual.
%
\newskip\inmarginspacing \inmarginspacing=1cm
\def\strutdepth{\dp\strutbox}
%
\def\doinmargin#1#2{\strut\vadjust{%
 \nobreak
 \kern-\strutdepth
 \vtop to \strutdepth{%
  \baselineskip=\strutdepth
  \vss
  % if you have multiple lines of stuff to put here, you'll need to
  % make the vbox yourself of the appropriate size.
  \ifx#1l%
   \llap{\ignorespaces #2\hskip\inmarginspacing}%
  \else
   \rlap{\hskip\hsize \hskip\inmarginspacing \ignorespaces #2}%
  \fi
  \null
 }%
}}
\def\inleftmargin{\doinmargin l}
\def\inrightmargin{\doinmargin r}
%
% @inmargin{TEXT [, RIGHT-TEXT]}
% (if RIGHT-TEXT is given, use TEXT for left page, RIGHT-TEXT for right;
% else use TEXT for both).
%
```

```
\def\inmargin#1{\parseinmargin #1,,\finish}
\def\parseinmargin#1,#2,#3\finish{% not perfect, but better than nothing.
 \setbox0 = \hbox{\ignorespaces #2}%
\ifdim\wd0 > 0pt
  \def\lefttext{#1}%  have both texts
  \def\righttext{#2}%
\else
  \def\lefttext{#1}%  have only one text
  \def\righttext{#1}%
\fi
%
\ifodd\pageno
  \def\temp{\inrightmargin\righttext}% odd page -> outside is right margin
\else
  \def\temp{\inleftmargin\lefttext}%
\fi
 \temp
}


% @| inserts a changebar to the left of the current line.  It should
% surround any changed text.  This approach does *not* work if the
% change spans more than two lines of output.  To handle that, we would
% have adopt a much more difficult approach (putting marks into the main
% vertical list for the beginning and end of each change).  This command
% is not documented, not supported, and doesn't work.
%
\def\|{%
 % \vadjust can only be used in horizontal mode.
 \leavevmode
 %
 % Append this vertical mode material after the current line in the output.
 \vadjust{%
  % We want to insert a rule with the height and depth of the current
  % leading; that is exactly what \strutbox is supposed to record.
  \vskip-\baselineskip
  %
  % \vadjust-items are inserted at the left edge of the type.  So
  % the \llap here moves out into the left-hand margin.
  \llap{%
   %
   % For a thicker or thinner bar, change the `1pt'.
   \vrule height\baselineskip width1pt
   %
   % This is the space between the bar and the text.
   \hskip 12pt
  }%
 }%
}
```

```
% @include FILE -- \input text of FILE.
%
\def\include{\parseargusing\filenamecatcodes\includezzz}
\def\includezzz#1{%
 \pushthisfilestack
 \def\thisfile{#1}%
 {%
  \makevalueexpandable  % we want to expand any @value in FILE.
  \turnoffactive        % and allow special characters in the expansion
  \indexnofonts         % Allow `@@' and other weird things in file names.
  \wlog{texinfo.tex: doing @include of #1^^J}%
  \edef\temp{\noexpand\input #1 }%
  %
  % This trickery is to read FILE outside of a group, in case it makes
  % definitions, etc.
  \expandafter
 }\temp
 \popthisfilestack
}
\def\filenamecatcodes{%
 \catcode`\\=\other
 \catcode`~=\other
 \catcode`^=\other
 \catcode`_=\other
 \catcode`|=\other
 \catcode`<=\other
 \catcode`>=\other
 \catcode`+=\other
 \catcode`-=\other
 \catcode`\`=\other
 \catcode`\'=\other
}

\def\pushthisfilestack{%
 \expandafter\pushthisfilestackX\popthisfilestack\StackTerm
}
\def\pushthisfilestackX{%
 \expandafter\pushthisfilestackY\thisfile\StackTerm
}
\def\pushthisfilestackY #1\StackTerm #2\StackTerm {%
 \gdef\popthisfilestack{\gdef\thisfile{#1}\gdef\popthisfilestack{#2}}%
}

\def\popthisfilestack{\errthisfilestackempty}
\def\errthisfilestackempty{\errmessage{Internal error:
 the stack of filenames is empty.}}
%
```

```
\def\thisfile{}

% @center line
% outputs that line, centered.
%
\parseargdef\center{%
 \ifhmode
   \let\centersub\centerH
 \else
   \let\centersub\centerV
 \fi
 \centersub{\hfil \ignorespaces#1\unskip \hfil}%
 \let\centersub\relax % don't let the definition persist, just in case
}
\def\centerH#1{{%
 \hfil\break
 \advance\hsize by -\leftskip
 \advance\hsize by -\rightskip
 \line{#1}%
 \break
}}
%
\newcount\centerpenalty
\def\centerV#1{%
 % The idea here is the same as in \startdefun, \cartouche, etc.: if
 % @center is the first thing after a section heading, we need to wipe
 % out the negative parskip inserted by \sectionheading, but still
 % prevent a page break here.
 \centerpenalty = \lastpenalty
 \ifnum\centerpenalty>10000 \vskip\parskip \fi
 \ifnum\centerpenalty>9999 \penalty\centerpenalty \fi
 \line{\kern\leftskip #1\kern\rightskip}%
}

% @sp n   outputs n lines of vertical space
%
\parseargdef\sp{\vskip #1\baselineskip}

% @comment ...line which is ignored...
% @c is the same as @comment
% @ignore ... @end ignore  is another way to write a comment
%
\def\comment{\begingroup \catcode`\^^M=\other%
\catcode`\@=\other \catcode`\{=\other \catcode`\}=\other%
\commentxxx}
{\catcode`\^^M=\other \gdef\commentxxx#1^^M{\endgroup}}
%
\let\c=\comment
```

```
% @paragraphindent NCHARS
% We'll use ems for NCHARS, close enough.
% NCHARS can also be the word `asis' or `none'.
% We cannot feasibly implement @paragraphindent asis, though.
%
\def\asisword{asis} % no translation, these are keywords
\def\noneword{none}
%
\parseargdef\paragraphindent{%
 \def\temp{#1}%
 \ifx\temp\asisword
 \else
  \ifx\temp\noneword
    \defaultparindent = 0pt
  \else
    \defaultparindent = #1em
  \fi
 \fi
 \parindent = \defaultparindent
}


% @exampleindent NCHARS
% We'll use ems for NCHARS like @paragraphindent.
% It seems @exampleindent asis isn't necessary, but
% I preserve it to make it similar to @paragraphindent.
\parseargdef\exampleindent{%
 \def\temp{#1}%
 \ifx\temp\asisword
 \else
  \ifx\temp\noneword
    \lispnarrowing = 0pt
  \else
    \lispnarrowing = #1em
  \fi
 \fi
}


% @firstparagraphindent WORD
% If WORD is `none', then suppress indentation of the first paragraph
% after a section heading.  If WORD is `insert', then do indent at such
% paragraphs.
%
% The paragraph indentation is suppressed or not by calling
% \suppressfirstparagraphindent, which the sectioning commands do.
% We switch the definition of this back and forth according to WORD.
% By default, we suppress indentation.
%
```

```
\def\suppressfirstparagraphindent{\dosuppressfirstparagraphindent}
\def\insertword{insert}
%
\parseargdef\firstparagraphindent{%
 \def\temp{#1}%
 \ifx\temp\noneword
   \let\suppressfirstparagraphindent = \dosuppressfirstparagraphindent
 \else\ifx\temp\insertword
   \let\suppressfirstparagraphindent = \relax
 \else
   \errhelp = \EMsimple
   \errmessage{Unknown @firstparagraphindent option `\temp'}%
 \fi\fi
}

% Here is how we actually suppress indentation.  Redefine \everypar to
% \kern backwards by \parindent, and then reset itself to empty.
%
% We also make \indent itself not actually do anything until the next
% paragraph.
%
\gdef\dosuppressfirstparagraphindent{%
 \gdef\indent{%
   \restorefirstparagraphindent
   \indent
 }%
 \gdef\noindent{%
   \restorefirstparagraphindent
   \noindent
 }%
 \global\everypar = {%
   \kern -\parindent
   \restorefirstparagraphindent
 }%
}

\gdef\restorefirstparagraphindent{%
 \global \let \indent = \ptexindent
 \global \let \noindent = \ptexnoindent
 \global \everypar = {}%
}


% @refill is a no-op.
\let\refill=\relax

% If working on a large document in chapters, it is convenient to
% be able to disable indexing, cross-referencing, and contents, for test runs.
```

```
% This is done with @novalidate (before @setfilename).
%
\newif\iflinks \linkstrue % by default we want the aux files.
\let\novalidate = \linksfalse

% @setfilename is done at the beginning of every texinfo file.
% So open here the files we need to have open while reading the input.
% This makes it possible to make a .fmt file for texinfo.
\def\setfilename{%
 \fixbackslash  % Turn off hack to swallow `\input texinfo'.
 \iflinks
   \tryauxfile
   % Open the new aux file.  TeX will close it automatically at exit.
   \immediate\openout\auxfile=\jobname.aux
 \fi % \openindices needs to do some work in any case.
 \openindices
 \let\setfilename=\comment % Ignore extra @setfilename cmds.
 %
 % If texinfo.cnf is present on the system, read it.
 % Useful for site-wide @afourpaper, etc.
 \openin 1 texinfo.cnf
 \ifeof 1 \else \input texinfo.cnf \fi
 \closein 1
 %
 \comment % Ignore the actual filename.
}

% Called from \setfilename.
%
\def\openindices{%
 \newindex{cp}%
 \newcodeindex{fn}%
 \newcodeindex{vr}%
 \newcodeindex{tp}%
 \newcodeindex{ky}%
 \newcodeindex{pg}%
}

% @bye.
\outer\def\bye{\pagealignmacro\tracingstats=1\ptexend}



\message{pdf,}
% adobe `portable' document format
\newcount\tempnum
\newcount\lnkcount
\newtoks\filename
\newcount\filenamelength
```

```
\newcount\pgn
\newtoks\toksA
\newtoks\toksB
\newtoks\toksC
\newtoks\toksD
\newbox\boxA
\newcount\countA
\newif\ifpdf
\newif\ifpdfmakepagedest

% when pdftex is run in dvi mode, \pdfoutput is defined (so \pdfoutput=1
% can be set).  So we test for \relax and 0 as well as being undefined.
\ifx\pdfoutput\thisisundefined
\else
 \ifx\pdfoutput\relax
 \else
  \ifcase\pdfoutput
  \else
    \pdftrue
  \fi
 \fi
\fi

% PDF uses PostScript string constants for the names of xref targets,
% for display in the outlines, and in other places.  Thus, we have to
% double any backslashes.  Otherwise, a name like "\node" will be
% interpreted as a newline (\n), followed by o, d, e.  Not good.
%
% See http://www.ntg.nl/pipermail/ntg-pdftex/2004-July/000654.html and
% related messages.  The final outcome is that it is up to the TeX user
% to double the backslashes and otherwise make the string valid, so
% that's what we do.  pdftex 1.30.0 (ca.2005) introduced a primitive to
% do this reliably, so we use it.

% #1 is a control sequence in which to do the replacements,
% which we \xdef.
\def\txiescapepdf#1{%
 \ifx\pdfescapestring\thisisundefined
   % No primitive available; should we give a warning or log?
   % Many times it won't matter.
 \else
   % The expandable \pdfescapestring primitive escapes parentheses,
   % backslashes, and other special chars.
   \xdef#1{\pdfescapestring{#1}}%
 \fi
}

\newhelp\nopdfimagehelp{Texinfo supports .png, .jpg, .jpeg, and .pdf images
```

with PDF output, and none of those formats could be found. (.eps cannot
be supported due to the design of the PDF format; use regular TeX (DVI
output) for that.)}

\ifpdf
%
% Color manipulation macros based on pdfcolor.tex,
% except using rgb instead of cmyk; the latter is said to render as a
% very dark gray on-screen and a very dark halftone in print, instead
% of actual black.
\def\rgbDarkRed{0.50 0.09 0.12}
\def\rgbBlack{0 0 0}
%
% k sets the color for filling (usual text, etc.);
% K sets the color for stroking (thin rules, e.g., normal _'s).
\def\pdfsetcolor#1{\pdfliteral{#1 rg #1 RG}}
%
% Set color, and create a mark which defines \thiscolor accordingly,
% so that \makeheadline knows which color to restore.
\def\setcolor#1{%
 \xdef\lastcolordefs{\gdef\noexpand\thiscolor{#1}}%
 \domark
 \pdfsetcolor{#1}%
}
%
\def\maincolor{\rgbBlack}
\pdfsetcolor{\maincolor}
\edef\thiscolor{\maincolor}
\def\lastcolordefs{}
%
\def\makefootline{%
 \baselineskip24pt
 \line{\pdfsetcolor{\maincolor}\the\footline}%
}
%
\def\makeheadline{%
 \vbox to 0pt{%
  \vskip-22.5pt
  \line{%
   \vbox to8.5pt{}%
   % Extract \thiscolor definition from the marks.
   \getcolormarks
   % Typeset the headline with \maincolor, then restore the color.
   \pdfsetcolor{\maincolor}\the\headline\pdfsetcolor{\thiscolor}%
  }%
  \vss
 }%
 \nointerlineskip

```
}
%
%
\pdfcatalog{/PageMode /UseOutlines}
%
% #1 is image name, #2 width (might be empty/whitespace), #3 height (ditto).
\def\dopdfimage#1#2#3{%
 \def\pdfimagewidth{#2}\setbox0 = \hbox{\ignorespaces #2}%
 \def\pdfimageheight{#3}\setbox2 = \hbox{\ignorespaces #3}%
 %
 % pdftex (and the PDF format) support .pdf, .png, .jpg (among
 % others).  Let's try in that order, PDF first since if
 % someone has a scalable image, presumably better to use that than a
 % bitmap.
 \let\pdfimgext=\empty
 \begingroup
  \openin 1 #1.pdf \ifeof 1
   \openin 1 #1.PDF \ifeof 1
    \openin 1 #1.png \ifeof 1
     \openin 1 #1.jpg \ifeof 1
      \openin 1 #1.jpeg \ifeof 1
       \openin 1 #1.JPG \ifeof 1
        \errhelp = \nopdfimagehelp
        \errmessage{Could not find image file #1 for pdf}%
       \else \gdef\pdfimgext{JPG}%
       \fi
      \else \gdef\pdfimgext{jpeg}%
      \fi
     \else \gdef\pdfimgext{jpg}%
     \fi
    \else \gdef\pdfimgext{png}%
    \fi
   \else \gdef\pdfimgext{PDF}%
   \fi
  \else \gdef\pdfimgext{pdf}%
  \fi
  \closein 1
 \endgroup
 %
 % without \immediate, ancient pdftex seg faults when the same image is
 % included twice.  (Version 3.14159-pre-1.0-unofficial-20010704.)
 \ifnum\pdftexversion < 14
  \immediate\pdfimage
 \else
  \immediate\pdfximage
 \fi
  \ifdim \wd0 >0pt width \pdfimagewidth \fi
  \ifdim \wd2 >0pt height \pdfimageheight \fi
```

```
  \ifnum\pdftexversion<13
    #1.\pdfimgext
  \else
    {#1.\pdfimgext}%
  \fi
 \ifnum\pdftexversion < 14 \else
  \pdfrefximage \pdflastximage
 \fi}
%
\def\pdfmkdest#1{{%
  % We have to set dummies so commands such as @code, and characters
  % such as \, aren't expanded when present in a section title.
  \indexnofonts
  \turnoffactive
  \makevalueexpandable
  \def\pdfdestname{#1}%
  \txiescapepdf\pdfdestname
  \safewhatsit{\pdfdest name{\pdfdestname} xyz}%
}}
%
% used to mark target names; must be expandable.
\def\pdfmkpgn#1{#1}
%
% by default, use a color that is dark enough to print on paper as
% nearly black, but still distinguishable for online viewing.
\def\urlcolor{\rgbDarkRed}
\def\linkcolor{\rgbDarkRed}
\def\endlink{\setcolor{\maincolor}\pdfendlink}
%
% Adding outlines to PDF; macros for calculating structure of outlines
% come from Petr Olsak
\def\expnumber#1{\expandafter\ifx\csname#1\endcsname\relax 0%
  \else \csname#1\endcsname \fi}
\def\advancenumber#1{\tempnum=\expnumber{#1}\relax
  \advance\tempnum by 1
  \expandafter\xdef\csname#1\endcsname{\the\tempnum}}
%
% #1 is the section text, which is what will be displayed in the
% outline by the pdf viewer.  #2 is the pdf expression for the number
% of subentries (or empty, for subsubsections).  #3 is the node text,
% which might be empty if this toc entry had no corresponding node.
% #4 is the page number
%
\def\dopdfoutline#1#2#3#4{%
  % Generate a link to the node text if that exists; else, use the
  % page number.  We could generate a destination for the section
  % text in the case where a section has no node, but it doesn't
  % seem worth the trouble, since most documents are normally structured.
```

```
\edef\pdfoutlinedest{#3}%
\ifx\pdfoutlinedest\empty
  \def\pdfoutlinedest{#4}%
\else
  \txiescapepdf\pdfoutlinedest
\fi
%
% Also escape PDF chars in the display string.
\edef\pdfoutlinetext{#1}%
\txiescapepdf\pdfoutlinetext
%
\pdfoutline goto name{\pdfmkpgn{\pdfoutlinedest}}#2{\pdfoutlinetext}%
}
%
\def\pdfmakeoutlines{%
 \begingroup
   % Read toc silently, to get counts of subentries for \pdfoutline.
   \def\partentry##1##2##3##4{}% ignore parts in the outlines
   \def\numchapentry##1##2##3##4{%
\def\thischapnum{##2}%
\def\thissecnum{0}%
\def\thissubsecnum{0}%
   }%
   \def\numsecentry##1##2##3##4{%
\advancenumber{chap\thischapnum}%
\def\thissecnum{##2}%
\def\thissubsecnum{0}%
   }%
   \def\numsubsecentry##1##2##3##4{%
\advancenumber{sec\thissecnum}%
\def\thissubsecnum{##2}%
   }%
   \def\numsubsubsecentry##1##2##3##4{%
\advancenumber{subsec\thissubsecnum}%
   }%
   \def\thischapnum{0}%
   \def\thissecnum{0}%
   \def\thissubsecnum{0}%
   %
   % use \def rather than \let here because we redefine \chapentry et
   % al. a second time, below.
   \def\appentry{\numchapentry}%
   \def\appsecentry{\numsecentry}%
   \def\appsubsecentry{\numsubsecentry}%
   \def\appsubsubsecentry{\numsubsubsecentry}%
   \def\unnchapentry{\numchapentry}%
   \def\unnsecentry{\numsecentry}%
   \def\unnsubsecentry{\numsubsecentry}%
```

```
\def\unnsubsubsecentry{\numsubsubsecentry}%
\readdatafile{toc}%
%
% Read toc second time, this time actually producing the outlines.
% The `-' means take the \expnumber as the absolute number of
% subentries, which we calculated on our first read of the .toc above.
%
% We use the node names as the destinations.
\def\numchapentry##1##2##3##4{%
  \dopdfoutline{##1}{count-\expnumber{chap##2}}{##3}{##4}}%
\def\numsecentry##1##2##3##4{%
  \dopdfoutline{##1}{count-\expnumber{sec##2}}{##3}{##4}}%
\def\numsubsecentry##1##2##3##4{%
  \dopdfoutline{##1}{count-\expnumber{subsec##2}}{##3}{##4}}%
\def\numsubsubsecentry##1##2##3##4{% count is always zero
  \dopdfoutline{##1}{}{##3}{##4}}%
%
% PDF outlines are displayed using system fonts, instead of
% document fonts.  Therefore we cannot use special characters,
% since the encoding is unknown.  For example, the eogonek from
% Latin 2 (0xea) gets translated to a | character.  Info from
% Staszek Wawrykiewicz, 19 Jan 2004 04:09:24 +0100.
%
% TODO this right, we have to translate 8-bit characters to
% their "best" equivalent, based on the @documentencoding.  Too
% much work for too little return.  Just use the ASCII equivalents
% we use for the index sort strings.
%
\indexnofonts
\setupdatafile
% We can have normal brace characters in the PDF outlines, unlike
% Texinfo index files.  So set that up.
\def\{{\lbracecharliteral}%
\def\}{\rbracecharliteral}%
\catcode`\\=\active \otherbackslash
\input \tocreadfilename
 \endgroup
}
{\catcode`[=1 \catcode`]=2
\catcode`{=\other \catcode`}=\other
\gdef\lbracecharliteral[{]%
\gdef\rbracecharliteral[}]%
]
%
\def\skipspaces#1{\def\PP{#1}\def\D{|}%
 \ifx\PP\D\let\nextsp\relax
 \else\let\nextsp\skipspaces
  \addtokens{\filename}{\PP}%
```

```
    \advance\filenamelength by 1
  \fi
  \nextsp}
\def\getfilename#1{%
  \filenamelength=0
  % If we don't expand the argument now, \skipspaces will get
  % snagged on things like "@value{foo}".
  \edef\temp{#1}%
  \expandafter\skipspaces\temp|\relax
}
\ifnum\pdftexversion < 14
  \let \startlink \pdfannotlink
\else
  \let \startlink \pdfstartlink
\fi
% make a live url in pdf output.
\def\pdfurl#1{%
  \begingroup
    % it seems we really need yet another set of dummies; have not
    % tried to figure out what each command should do in the context
    % of @url.  for now, just make @/ a no-op, that's the only one
    % people have actually reported a problem with.
    %
    \normalturnoffactive
    \def\@{@}%
    \let\/=\empty
    \makevalueexpandable
    % do we want to go so far as to use \indexnofonts instead of just
    % special-casing \var here?
    \def\var##1{##1}%
    %
    \leavevmode\setcolor{\urlcolor}%
    \startlink attr{/Border [0 0 0]}%
      user{/Subtype /Link /A << /S /URI /URI (#1) >>}%
  \endgroup}
\def\pdfgettoks#1.{\setbox\boxA=\hbox{\toksA={#1.}\toksB={}\maketoks}}
\def\addtokens#1#2{\edef\addtoks{\noexpand#1={\the#1#2}}\addtoks}
\def\adn#1{\addtokens{\toksC}{#1}\global\countA=1\let\next=\maketoks}
\def\poptoks#1#2|ENDTOKS|{\let\first=#1\toksD={#1}\toksA={#2}}
\def\maketoks{%
  \expandafter\poptoks\the\toksA|ENDTOKS|\relax
  \ifx\first0\adn0
  \else\ifx\first1\adn1 \else\ifx\first2\adn2 \else\ifx\first3\adn3
  \else\ifx\first4\adn4 \else\ifx\first5\adn5 \else\ifx\first6\adn6
  \else\ifx\first7\adn7 \else\ifx\first8\adn8 \else\ifx\first9\adn9
  \else
    \ifnum0=\countA\else\makelink\fi
    \ifx\first.\let\next=\done\else
```

```
      \let\next=\maketoks
      \addtokens{\toksB}{\the\toksD}
      \ifx\first,\addtokens{\toksB}{\space}\fi
    \fi
  \fi\fi\fi\fi\fi\fi\fi\fi\fi
  \next}
\def\makelink{\addtokens{\toksB}%
  {\noexpand\pdflink{\the\toksC}}\toksC={}\global\countA=0}
\def\pdflink#1{%
  \startlink attr{/Border [0 0 0]} goto name{\pdfmkpgn{#1}}
  \setcolor{\linkcolor}#1\endlink}
\def\done{\edef\st{\global\noexpand\toksA={\the\toksB}}\st}
\else
 % non-pdf mode
 \let\pdfmkdest = \gobble
 \let\pdfurl = \gobble
 \let\endlink = \relax
 \let\setcolor = \gobble
 \let\pdfsetcolor = \gobble
 \let\pdfmakeoutlines = \relax
\fi  % \ifx\pdfoutput


\message{fonts,}

% Change the current font style to #1, remembering it in \curfontstyle.
% For now, we do not accumulate font styles: @b{@i{foo}} prints foo in
% italics, not bold italics.
%
\def\setfontstyle#1{%
 \def\curfontstyle{#1}% not as a control sequence, because we are \edef'd.
 \csname ten#1\endcsname  % change the current font
}

% Select #1 fonts with the current style.
%
\def\selectfonts#1{\csname #1fonts\endcsname \csname\curfontstyle\endcsname}

\def\rm{\fam=0 \setfontstyle{rm}}
\def\it{\fam=\itfam \setfontstyle{it}}
\def\sl{\fam=\slfam \setfontstyle{sl}}
\def\bf{\fam=\bffam \setfontstyle{bf}}\def\bfstylename{bf}
\def\tt{\fam=\ttfam \setfontstyle{tt}}

% Unfortunately, we have to override this for titles and the like, since
% in those cases "rm" is bold.  Sigh.
\def\rmisbold{\rm\def\curfontstyle{bf}}
```

```
% Texinfo sort of supports the sans serif font style, which plain TeX does not.
% So we set up a \sf.
\newfam\sffam
\def\sf{\fam=\sffam \setfontstyle{sf}}
\let\li = \sf % Sometimes we call it \li, not \sf.


% We don't need math for this font style.
\def\ttsl{\setfontstyle{ttsl}}



% Set the baselineskip to #1, and the lineskip and strut size
% correspondingly.  There is no deep meaning behind these magic numbers
% used as factors; they just match (closely enough) what Knuth defined.
%
\def\lineskipfactor{.08333}
\def\strutheightpercent{.70833}
\def\strutdepthpercent {.29167}
%
% can get a sort of poor man's double spacing by redefining this.
\def\baselinefactor{1}
%
\newdimen\textleading
\def\setleading#1{%
 \dimen0 = #1\relax
 \normalbaselineskip = \baselinefactor\dimen0
 \normallineskip = \lineskipfactor\normalbaselineskip
 \normalbaselines
 \setbox\strutbox =\hbox{%
   \vrule width0pt height\strutheightpercent\baselineskip
           depth \strutdepthpercent \baselineskip
 }%
}


% PDF CMaps.  See also LaTeX's t1.cmap.
%
% do nothing with this by default.
\expandafter\let\csname cmapOT1\endcsname\gobble
\expandafter\let\csname cmapOT1IT\endcsname\gobble
\expandafter\let\csname cmapOT1TT\endcsname\gobble


% if we are producing pdf, and we have \pdffontattr, then define cmaps.
% (\pdffontattr was introduced many years ago, but people still run
% older pdftex's; it's easy to conditionalize, so we do.)
\ifpdf \ifx\pdffontattr\thisisundefined \else
 \begingroup
   \catcode`\^^M=\active \def^^M{^^J}% Output line endings as the ^^J char.
   \catcode`\%=12 \immediate\pdfobj stream {%!PS-Adobe-3.0 Resource-CMap
%%DocumentNeededResources: ProcSet (CIDInit)
```

```
%%IncludeResource: ProcSet (CIDInit)
%%BeginResource: CMap (TeX-OT1-0)
%%Title: (TeX-OT1-0 TeX OT1 0)
%%Version: 1.000
%%EndComments
/CIDInit /ProcSet findresource begin
12 dict begin
begincmap
/CIDSystemInfo
<< /Registry (TeX)
/Ordering (OT1)
/Supplement 0
>> def
/CMapName /TeX-OT1-0 def
/CMapType 2 def
1 begincodespacerange
<00> <7F>
endcodespacerange
8 beginbfrange
<00> <01> <0393>
<09> <0A> <03A8>
<23> <26> <0023>
<28> <3B> <0028>
<3F> <5B> <003F>
<5D> <5E> <005D>
<61> <7A> <0061>
<7B> <7C> <2013>
endbfrange
40 beginbfchar
<02> <0398>
<03> <039B>
<04> <039E>
<05> <03A0>
<06> <03A3>
<07> <03D2>
<08> <03A6>
<0B> <00660066>
<0C> <00660069>
<0D> <0066006C>
<0E> <006600660069>
<0F> <00660066006C>
<10> <0131>
<11> <0237>
<12> <0060>
<13> <00B4>
<14> <02C7>
<15> <02D8>
<16> <00AF>
```

```
<17> <02DA>
<18> <00B8>
<19> <00DF>
<1A> <00E6>
<1B> <0153>
<1C> <00F8>
<1D> <00C6>
<1E> <0152>
<1F> <00D8>
<21> <0021>
<22> <201D>
<27> <2019>
<3C> <00A1>
<3D> <003D>
<3E> <00BF>
<5C> <201C>
<5F> <02D9>
<60> <2018>
<7D> <02DD>
<7E> <007E>
<7F> <00A8>
endbfchar
endcmap
CMapName currentdict /CMap defineresource pop
end
end
%%EndResource
%%EOF
  }\endgroup
 \expandafter\edef\csname cmapOT1\endcsname#1{%
  \pdffontattr#1{/ToUnicode \the\pdflastobj\space 0 R}%
 }%
%
% \cmapOT1IT
 \begingroup
  \catcode`\^^M=\active \def^^M{^^J}% Output line endings as the ^^J char.
  \catcode`\%=12 \immediate\pdfobj stream {%!PS-Adobe-3.0 Resource-CMap
%%DocumentNeededResources: ProcSet (CIDInit)
%%IncludeResource: ProcSet (CIDInit)
%%BeginResource: CMap (TeX-OT1IT-0)
%%Title: (TeX-OT1IT-0 TeX OT1IT 0)
%%Version: 1.000
%%EndComments
/CIDInit /ProcSet findresource begin
12 dict begin
begincmap
/CIDSystemInfo
<< /Registry (TeX)
```

/Ordering (OT1IT)
/Supplement 0
>> def
/CMapName /TeX-OT1IT-0 def
/CMapType 2 def
1 begincodespacerange
<00> <7F>
endcodespacerange
8 beginbfrange
<00> <01> <0393>
<09> <0A> <03A8>
<25> <26> <0025>
<28> <3B> <0028>
<3F> <5B> <003F>
<5D> <5E> <005D>
<61> <7A> <0061>
<7B> <7C> <2013>
endbfrange
42 beginbfchar
<02> <0398>
<03> <039B>
<04> <039E>
<05> <03A0>
<06> <03A3>
<07> <03D2>
<08> <03A6>
<0B> <00660066>
<0C> <00660069>
<0D> <0066006C>
<0E> <006600660069>
<0F> <00660066006C>
<10> <0131>
<11> <0237>
<12> <0060>
<13> <00B4>
<14> <02C7>
<15> <02D8>
<16> <00AF>
<17> <02DA>
<18> <00B8>
<19> <00DF>
<1A> <00E6>
<1B> <0153>
<1C> <00F8>
<1D> <00C6>
<1E> <0152>
<1F> <00D8>
<21> <0021>

```
<22> <201D>
<23> <0023>
<24> <00A3>
<27> <2019>
<3C> <00A1>
<3D> <003D>
<3E> <00BF>
<5C> <201C>
<5F> <02D9>
<60> <2018>
<7D> <02DD>
<7E> <007E>
<7F> <00A8>
endbfchar
endcmap
CMapName currentdict /CMap defineresource pop
end
end
%%EndResource
%%EOF
  }\endgroup
 \expandafter\edef\csname cmapOT1IT\endcsname#1{%
  \pdffontattr#1{/ToUnicode \the\pdflastobj\space 0 R}%
 }%
%
% \cmapOT1TT
 \begingroup
  \catcode`\^^M=\active \def^^M{^^J}% Output line endings as the ^^J char.
  \catcode`\%=12 \immediate\pdfobj stream {%!PS-Adobe-3.0 Resource-CMap
%%DocumentNeededResources: ProcSet (CIDInit)
%%IncludeResource: ProcSet (CIDInit)
%%BeginResource: CMap (TeX-OT1TT-0)
%%Title: (TeX-OT1TT-0 TeX OT1TT 0)
%%Version: 1.000
%%EndComments
/CIDInit /ProcSet findresource begin
12 dict begin
begincmap
/CIDSystemInfo
<< /Registry (TeX)
/Ordering (OT1TT)
/Supplement 0
>> def
/CMapName /TeX-OT1TT-0 def
/CMapType 2 def
1 begincodespacerange
<00> <7F>
endcodespacerange
```

```
5 beginbfrange
<00> <01> <0393>
<09> <0A> <03A8>
<21> <26> <0021>
<28> <5F> <0028>
<61> <7E> <0061>
endbfrange
32 beginbfchar
<02> <0398>
<03> <039B>
<04> <039E>
<05> <03A0>
<06> <03A3>
<07> <03D2>
<08> <03A6>
<0B> <2191>
<0C> <2193>
<0D> <0027>
<0E> <00A1>
<0F> <00BF>
<10> <0131>
<11> <0237>
<12> <0060>
<13> <00B4>
<14> <02C7>
<15> <02D8>
<16> <00AF>
<17> <02DA>
<18> <00B8>
<19> <00DF>
<1A> <00E6>
<1B> <0153>
<1C> <00F8>
<1D> <00C6>
<1E> <0152>
<1F> <00D8>
<20> <2423>
<27> <2019>
<60> <2018>
<7F> <00A8>
endbfchar
endcmap
CMapName currentdict /CMap defineresource pop
end
end
%%EndResource
%%EOF
  }\endgroup
```

```
\expandafter\edef\csname cmapOT1TT\endcsname#1{%
  \pdffontattr#1{/ToUnicode \the\pdflastobj\space 0 R}%
 }%
\fi\fi


% Set the font macro #1 to the font named \fontprefix#2.
% #3 is the font's design size, #4 is a scale factor, #5 is the CMap
% encoding (only OT1, OT1IT and OT1TT are allowed, or empty to omit).
% Example:
% #1 = \textrm
% #2 = \rmshape
% #3 = 10
% #4 = \mainmagstep
% #5 = OT1
%
\def\setfont#1#2#3#4#5{%
 \font#1=\fontprefix#2#3 scaled #4
 \csname cmap#5\endcsname#1%
}
% This is what gets called when #5 of \setfont is empty.
\let\cmap\gobble
%
% (end of cmaps)


% Use cm as the default font prefix.
% To specify the font prefix, you must define \fontprefix
% before you read in texinfo.tex.
\ifx\fontprefix\thisisundefined
\def\fontprefix{cm}
\fi
% Support font families that don't use the same naming scheme as CM.
\def\rmshape{r}
\def\rmbshape{bx}             % where the normal face is bold
\def\bfshape{b}
\def\bxshape{bx}
\def\ttshape{tt}
\def\ttbshape{tt}
\def\ttslshape{sltt}
\def\itshape{ti}
\def\itbshape{bxti}
\def\slshape{sl}
\def\slbshape{bxsl}
\def\sfshape{ss}
\def\sfbshape{ss}
\def\scshape{csc}
\def\scbshape{csc}
```

% Definitions for a main text size of 11pt. (The default in Texinfo.)
%
\def\definetextfontsizexi{%
% Text fonts (11.2pt, magstep1).
\def\textnominalsize{11pt}
\edef\mainmagstep{\magstephalf}
\setfont\textrm\rmshape{10}{\mainmagstep}{OT1}
\setfont\texttt\ttshape{10}{\mainmagstep}{OT1TT}
\setfont\textbf\bfshape{10}{\mainmagstep}{OT1}
\setfont\textit\itshape{10}{\mainmagstep}{OT1IT}
\setfont\textsl\slshape{10}{\mainmagstep}{OT1}
\setfont\textsf\sfshape{10}{\mainmagstep}{OT1}
\setfont\textsc\scshape{10}{\mainmagstep}{OT1}
\setfont\textttsl\ttslshape{10}{\mainmagstep}{OT1TT}
\font\texti=cmmi10 scaled \mainmagstep
\font\textsy=cmsy10 scaled \mainmagstep
\def\textecsize{1095}

% A few fonts for @defun names and args.
\setfont\defbf\bfshape{10}{\magstep1}{OT1}
\setfont\deftt\ttshape{10}{\magstep1}{OT1TT}
\setfont\defttsl\ttslshape{10}{\magstep1}{OT1TT}
\def\df{\let\tentt=\deftt \let\tenbf = \defbf \let\tenttsl=\defttsl \bf}

% Fonts for indices, footnotes, small examples (9pt).
\def\smallnominalsize{9pt}
\setfont\smallrm\rmshape{9}{1000}{OT1}
\setfont\smalltt\ttshape{9}{1000}{OT1TT}
\setfont\smallbf\bfshape{10}{900}{OT1}
\setfont\smallit\itshape{9}{1000}{OT1IT}
\setfont\smallsl\slshape{9}{1000}{OT1}
\setfont\smallsf\sfshape{9}{1000}{OT1}
\setfont\smallsc\scshape{10}{900}{OT1}
\setfont\smallttsl\ttslshape{10}{900}{OT1TT}
\font\smalli=cmmi9
\font\smallsy=cmsy9
\def\smallecsize{0900}

% Fonts for small examples (8pt).
\def\smallernominalsize{8pt}
\setfont\smallerrm\rmshape{8}{1000}{OT1}
\setfont\smallertt\ttshape{8}{1000}{OT1TT}
\setfont\smallerbf\bfshape{10}{800}{OT1}
\setfont\smallerit\itshape{8}{1000}{OT1IT}
\setfont\smallersl\slshape{8}{1000}{OT1}
\setfont\smallersf\sfshape{8}{1000}{OT1}
\setfont\smallersc\scshape{10}{800}{OT1}
\setfont\smallerttsl\ttslshape{10}{800}{OT1TT}

```
\font\smalleri=cmmi8
\font\smallersy=cmsy8
\def\smallerecsize{0800}

% Fonts for title page (20.4pt):
\def\titlenominalsize{20pt}
\setfont\titlerm\rmbshape{12}{\magstep3}{OT1}
\setfont\titleit\itbshape{10}{\magstep4}{OT1IT}
\setfont\titlesl\slbshape{10}{\magstep4}{OT1}
\setfont\titlett\ttbshape{12}{\magstep3}{OT1TT}
\setfont\titlettsl\ttslshape{10}{\magstep4}{OT1TT}
\setfont\titlesf\sfbshape{17}{\magstep1}{OT1}
\let\titlebf=\titlerm
\setfont\titlesc\scbshape{10}{\magstep4}{OT1}
\font\titlei=cmmi12 scaled \magstep3
\font\titlesy=cmsy10 scaled \magstep4
\def\titleecsize{2074}

% Chapter (and unnumbered) fonts (17.28pt).
\def\chapnominalsize{17pt}
\setfont\chaprm\rmbshape{12}{\magstep2}{OT1}
\setfont\chapit\itbshape{10}{\magstep3}{OT1IT}
\setfont\chapsl\slbshape{10}{\magstep3}{OT1}
\setfont\chaptt\ttbshape{12}{\magstep2}{OT1TT}
\setfont\chapttsl\ttslshape{10}{\magstep3}{OT1TT}
\setfont\chapsf\sfbshape{17}{1000}{OT1}
\let\chapbf=\chaprm
\setfont\chapsc\scbshape{10}{\magstep3}{OT1}
\font\chapi=cmmi12 scaled \magstep2
\font\chapsy=cmsy10 scaled \magstep3
\def\chapecsize{1728}

% Section fonts (14.4pt).
\def\secnominalsize{14pt}
\setfont\secrm\rmbshape{12}{\magstep1}{OT1}
\setfont\secit\itbshape{10}{\magstep2}{OT1IT}
\setfont\secsl\slbshape{10}{\magstep2}{OT1}
\setfont\sectt\ttbshape{12}{\magstep1}{OT1TT}
\setfont\secttsl\ttslshape{10}{\magstep2}{OT1TT}
\setfont\secsf\sfbshape{12}{\magstep1}{OT1}
\let\secbf\secrm
\setfont\secsc\scbshape{10}{\magstep2}{OT1}
\font\seci=cmmi12 scaled \magstep1
\font\secsy=cmsy10 scaled \magstep2
\def\sececsize{1440}

% Subsection fonts (13.15pt).
\def\ssecnominalsize{13pt}
```

```
\setfont\ssecrm\rmbshape{12}{\magstephalf}{OT1}
\setfont\ssecit\itbshape{10}{1315}{OT1IT}
\setfont\ssecsl\slbshape{10}{1315}{OT1}
\setfont\ssectt\ttbshape{12}{\magstephalf}{OT1TT}
\setfont\ssecttsl\ttslshape{10}{1315}{OT1TT}
\setfont\ssecsf\sfbshape{12}{\magstephalf}{OT1}
\let\ssecbf\ssecrm
\setfont\ssecsc\scbshape{10}{1315}{OT1}
\font\sseci=cmmi12 scaled \magstephalf
\font\ssecsy=cmsy10 scaled 1315
\def\ssececsize{1200}

% Reduced fonts for @acro in text (10pt).
\def\reducednominalsize{10pt}
\setfont\reducedrm\rmshape{10}{1000}{OT1}
\setfont\reducedtt\ttshape{10}{1000}{OT1TT}
\setfont\reducedbf\bfshape{10}{1000}{OT1}
\setfont\reducedit\itshape{10}{1000}{OT1IT}
\setfont\reducedsl\slshape{10}{1000}{OT1}
\setfont\reducedsf\sfshape{10}{1000}{OT1}
\setfont\reducedsc\scshape{10}{1000}{OT1}
\setfont\reducedttsl\ttslshape{10}{1000}{OT1TT}
\font\reducedi=cmmi10
\font\reducedsy=cmsy10
\def\reducedecsize{1000}

\textleading = 13.2pt % line spacing for 11pt CM
\textfonts          % reset the current fonts
\rm
} % end of 11pt text font size definitions, \definetextfontsizexi


% Definitions to make the main text be 10pt Computer Modern, with
% section, chapter, etc., sizes following suit.  This is for the GNU
% Press printing of the Emacs 22 manual.  Maybe other manuals in the
% future.  Used with @smallbook, which sets the leading to 12pt.
%
\def\definetextfontsizex{%
% Text fonts (10pt).
\def\textnominalsize{10pt}
\edef\mainmagstep{1000}
\setfont\textrm\rmshape{10}{\mainmagstep}{OT1}
\setfont\texttt\ttshape{10}{\mainmagstep}{OT1TT}
\setfont\textbf\bfshape{10}{\mainmagstep}{OT1}
\setfont\textit\itshape{10}{\mainmagstep}{OT1IT}
\setfont\textsl\slshape{10}{\mainmagstep}{OT1}
\setfont\textsf\sfshape{10}{\mainmagstep}{OT1}
\setfont\textsc\scshape{10}{\mainmagstep}{OT1}
```

```
\setfont\textttsl\ttslshape{10}{\mainmagstep}{OT1TT}
\font\texti=cmmi10 scaled \mainmagstep
\font\textsy=cmsy10 scaled \mainmagstep
\def\textecsize{1000}


% A few fonts for @defun names and args.
\setfont\defbf\bfshape{10}{\magstephalf}{OT1}
\setfont\deftt\ttshape{10}{\magstephalf}{OT1TT}
\setfont\defttsl\ttslshape{10}{\magstephalf}{OT1TT}
\def\df{\let\tentt=\deftt \let\tenbf = \defbf \let\tenttsl=\defttsl \bf}


% Fonts for indices, footnotes, small examples (9pt).
\def\smallnominalsize{9pt}
\setfont\smallrm\rmshape{9}{1000}{OT1}
\setfont\smalltt\ttshape{9}{1000}{OT1TT}
\setfont\smallbf\bfshape{10}{900}{OT1}
\setfont\smallit\itshape{9}{1000}{OT1IT}
\setfont\smallsl\slshape{9}{1000}{OT1}
\setfont\smallsf\sfshape{9}{1000}{OT1}
\setfont\smallsc\scshape{10}{900}{OT1}
\setfont\smallttsl\ttslshape{10}{900}{OT1TT}
\font\smalli=cmmi9
\font\smallsy=cmsy9
\def\smallecsize{0900}


% Fonts for small examples (8pt).
\def\smallernominalsize{8pt}
\setfont\smallerrm\rmshape{8}{1000}{OT1}
\setfont\smallertt\ttshape{8}{1000}{OT1TT}
\setfont\smallerbf\bfshape{10}{800}{OT1}
\setfont\smallerit\itshape{8}{1000}{OT1IT}
\setfont\smallersl\slshape{8}{1000}{OT1}
\setfont\smallersf\sfshape{8}{1000}{OT1}
\setfont\smallersc\scshape{10}{800}{OT1}
\setfont\smallerttsl\ttslshape{10}{800}{OT1TT}
\font\smalleri=cmmi8
\font\smallersy=cmsy8
\def\smallerecsize{0800}


% Fonts for title page (20.4pt):
\def\titlenominalsize{20pt}
\setfont\titlerm\rmbshape{12}{\magstep3}{OT1}
\setfont\titleit\itbshape{10}{\magstep4}{OT1IT}
\setfont\titlesl\slbshape{10}{\magstep4}{OT1}
\setfont\titlett\ttbshape{12}{\magstep3}{OT1TT}
\setfont\titlettsl\ttslshape{10}{\magstep4}{OT1TT}
\setfont\titlesf\sfbshape{17}{\magstep1}{OT1}
\let\titlebf=\titlerm
```

```
\setfont\titlesc\scbshape{10}{\magstep4}{OT1}
\font\titlei=cmmi12 scaled \magstep3
\font\titlesy=cmsy10 scaled \magstep4
\def\titleecsize{2074}

% Chapter fonts (14.4pt).
\def\chapnominalsize{14pt}
\setfont\chaprm\rmbshape{12}{\magstep1}{OT1}
\setfont\chapit\itbshape{10}{\magstep2}{OT1IT}
\setfont\chapsl\slbshape{10}{\magstep2}{OT1}
\setfont\chaptt\ttbshape{12}{\magstep1}{OT1TT}
\setfont\chapttsl\ttslshape{10}{\magstep2}{OT1TT}
\setfont\chapsf\sfbshape{12}{\magstep1}{OT1}
\let\chapbf\chaprm
\setfont\chapsc\scbshape{10}{\magstep2}{OT1}
\font\chapi=cmmi12 scaled \magstep1
\font\chapsy=cmsy10 scaled \magstep2
\def\chapecsize{1440}

% Section fonts (12pt).
\def\secnominalsize{12pt}
\setfont\secrm\rmbshape{12}{1000}{OT1}
\setfont\secit\itbshape{10}{\magstep1}{OT1IT}
\setfont\secsl\slbshape{10}{\magstep1}{OT1}
\setfont\sectt\ttbshape{12}{1000}{OT1TT}
\setfont\secttsl\ttslshape{10}{\magstep1}{OT1TT}
\setfont\secsf\sfbshape{12}{1000}{OT1}
\let\secbf\secrm
\setfont\secsc\scbshape{10}{\magstep1}{OT1}
\font\seci=cmmi12
\font\secsy=cmsy10 scaled \magstep1
\def\sececsize{1200}

% Subsection fonts (10pt).
\def\ssecnominalsize{10pt}
\setfont\ssecrm\rmbshape{10}{1000}{OT1}
\setfont\ssecit\itbshape{10}{1000}{OT1IT}
\setfont\ssecsl\slbshape{10}{1000}{OT1}
\setfont\ssectt\ttbshape{10}{1000}{OT1TT}
\setfont\ssecttsl\ttslshape{10}{1000}{OT1TT}
\setfont\ssecsf\sfbshape{10}{1000}{OT1}
\let\ssecbf\ssecrm
\setfont\ssecsc\scbshape{10}{1000}{OT1}
\font\sseci=cmmi10
\font\ssecsy=cmsy10
\def\ssececsize{1000}

% Reduced fonts for @acro in text (9pt).
```

```
\def\reducednominalsize{9pt}
\setfont\reducedrm\rmshape{9}{1000}{OT1}
\setfont\reducedtt\ttshape{9}{1000}{OT1TT}
\setfont\reducedbf\bfshape{10}{900}{OT1}
\setfont\reducedit\itshape{9}{1000}{OT1IT}
\setfont\reducedsl\slshape{9}{1000}{OT1}
\setfont\reducedsf\sfshape{9}{1000}{OT1}
\setfont\reducedsc\scshape{10}{900}{OT1}
\setfont\reducedttsl\ttslshape{10}{900}{OT1TT}
\font\reducedi=cmmi9
\font\reducedsy=cmsy9
\def\reducedecsize{0900}

\divide\parskip by 2  % reduce space between paragraphs
\textleading = 12pt   % line spacing for 10pt CM
\textfonts          % reset the current fonts
\rm
} % end of 10pt text font size definitions, \definetextfontsizex



% We provide the user-level command
%   @fonttextsize 10
% (or 11) to redefine the text font size.  pt is assumed.
%
\def\xiword{11}
\def\xword{10}
\def\xwordpt{10pt}
%
\parseargdef\fonttextsize{%
 \def\textsizearg{#1}%
 %\wlog{doing @fonttextsize \textsizearg}%
 %
 % Set \globaldefs so that documents can use this inside @tex, since
 % makeinfo 4.8 does not support it, but we need it nonetheless.
 %
\begingroup \globaldefs=1
 \ifx\textsizearg\xword \definetextfontsizex
 \else \ifx\textsizearg\xiword \definetextfontsizexi
 \else
   \errhelp=\EMsimple
   \errmessage{@fonttextsize only supports `10' or `11', not `\textsizearg'}
 \fi\fi
\endgroup
}


% In order for the font changes to affect most math symbols and letters,
% we have to define the \textfont of the standard families.  Since
```

```
% texinfo doesn't allow for producing subscripts and superscripts except
% in the main text, we don't bother to reset \scriptfont and
% \scriptscriptfont (which would also require loading a lot more fonts).
%
\def\resetmathfonts{%
 \textfont0=\tenrm \textfont1=\teni \textfont2=\tensy
 \textfont\itfam=\tenit \textfont\slfam=\tensl \textfont\bffam=\tenbf
 \textfont\ttfam=\tentt \textfont\sffam=\tensf
}

% The font-changing commands redefine the meanings of \tenSTYLE, instead
% of just \STYLE.  We do this because \STYLE needs to also set the
% current \fam for math mode.  Our \STYLE (e.g., \rm) commands hardwire
% \tenSTYLE to set the current font.
%
% Each font-changing command also sets the names \lsize (one size lower)
% and \lllsize (three sizes lower).  These relative commands are used in
% the LaTeX logo and acronyms.
%
% This all needs generalizing, badly.
%
\def\textfonts{%
 \let\tenrm=\textrm \let\tenit=\textit \let\tensl=\textsl
 \let\tenbf=\textbf \let\tentt=\texttt \let\smallcaps=\textsc
 \let\tensf=\textsf \let\teni=\texti \let\tensy=\textsy
 \let\tenttsl=\textttsl
 \def\curfontsize{text}%
 \def\lsize{reduced}\def\lllsize{smaller}%
 \resetmathfonts \setleading{\textleading}}
\def\titlefonts{%
 \let\tenrm=\titlerm \let\tenit=\titleit \let\tensl=\titlesl
 \let\tenbf=\titlebf \let\tentt=\titlett \let\smallcaps=\titlesc
 \let\tensf=\titlesf \let\teni=\titlei \let\tensy=\titlesy
 \let\tenttsl=\titlettsl
 \def\curfontsize{title}%
 \def\lsize{chap}\def\lllsize{subsec}%
 \resetmathfonts \setleading{27pt}}
\def\titlefont#1{{\titlefonts\rmisbold #1}}
\def\chapfonts{%
 \let\tenrm=\chaprm \let\tenit=\chapit \let\tensl=\chapsl
 \let\tenbf=\chapbf \let\tentt=\chaptt \let\smallcaps=\chapsc
 \let\tensf=\chapsf \let\teni=\chapi \let\tensy=\chapsy
 \let\tenttsl=\chapttsl
 \def\curfontsize{chap}%
 \def\lsize{sec}\def\lllsize{text}%
 \resetmathfonts \setleading{19pt}}
\def\secfonts{%
 \let\tenrm=\secrm \let\tenit=\secit \let\tensl=\secsl
```

```
\let\tenbf=\secbf \let\tentt=\sectt \let\smallcaps=\secsc
\let\tensf=\secsf \let\teni=\seci \let\tensy=\secsy
\let\tenttsl=\secttsl
\def\curfontsize{sec}%
\def\lsize{subsec}\def\lllsize{reduced}%
\resetmathfonts \setleading{16pt}}
\def\subsecfonts{%
\let\tenrm=\ssecrm \let\tenit=\ssecit \let\tensl=\ssecsl
\let\tenbf=\ssecbf \let\tentt=\ssectt \let\smallcaps=\ssecsc
\let\tensf=\ssecsf \let\teni=\sseci \let\tensy=\ssecsy
\let\tenttsl=\ssecttsl
\def\curfontsize{ssec}%
\def\lsize{text}\def\lllsize{small}%
\resetmathfonts \setleading{15pt}}
\let\subsubsecfonts = \subsecfonts
\def\reducedfonts{%
\let\tenrm=\reducedrm \let\tenit=\reducedit \let\tensl=\reducedsl
\let\tenbf=\reducedbf \let\tentt=\reducedtt \let\reducedcaps=\reducedsc
\let\tensf=\reducedsf \let\teni=\reducedi \let\tensy=\reducedsy
\let\tenttsl=\reducedttsl
\def\curfontsize{reduced}%
\def\lsize{small}\def\lllsize{smaller}%
\resetmathfonts \setleading{10.5pt}}
\def\smallfonts{%
\let\tenrm=\smallrm \let\tenit=\smallit \let\tensl=\smallsl
\let\tenbf=\smallbf \let\tentt=\smalltt \let\smallcaps=\smallsc
\let\tensf=\smallsf \let\teni=\smalli \let\tensy=\smallsy
\let\tenttsl=\smallttsl
\def\curfontsize{small}%
\def\lsize{smaller}\def\lllsize{smaller}%
\resetmathfonts \setleading{10.5pt}}
\def\smallerfonts{%
\let\tenrm=\smallerrm \let\tenit=\smallerit \let\tensl=\smallersl
\let\tenbf=\smallerbf \let\tentt=\smallertt \let\smallcaps=\smallersc
\let\tensf=\smallersf \let\teni=\smalleri \let\tensy=\smallersy
\let\tenttsl=\smallerttsl
\def\curfontsize{smaller}%
\def\lsize{smaller}\def\lllsize{smaller}%
\resetmathfonts \setleading{9.5pt}}

% Fonts for short table of contents.
\setfont\shortcontrm\rmshape{12}{1000}{OT1}
\setfont\shortcontbf\bfshape{10}{\magstep1}{OT1}  % no cmb12
\setfont\shortcontsl\slshape{12}{1000}{OT1}
\setfont\shortconttt\ttshape{12}{1000}{OT1TT}

% Define these just so they can be easily changed for other fonts.
\def\angleleft{$\langle$}
```

```
\def\angleright{$\rangle$}

% Set the fonts to use with the @small... environments.
\let\smallexamplefonts = \smallfonts

% About \smallexamplefonts.  If we use \smallfonts (9pt), @smallexample
% can fit this many characters:
%   8.5x11=86  smallbook=72  a4=90  a5=69
% If we use \scriptfonts (8pt), then we can fit this many characters:
%   8.5x11=90+  smallbook=80  a4=90+  a5=77
% For me, subjectively, the few extra characters that fit aren't worth
% the additional smallness of 8pt.  So I'm making the default 9pt.
%
% By the way, for comparison, here's what fits with @example (10pt):
%   8.5x11=71  smallbook=60  a4=75  a5=58
% --karl, 24jan03.

% Set up the default fonts, so we can use them for creating boxes.
%
\definetextfontsizexi


\message{markup,}

% Check if we are currently using a typewriter font.  Since all the
% Computer Modern typewriter fonts have zero interword stretch (and
% shrink), and it is reasonable to expect all typewriter fonts to have
% this property, we can check that font parameter.
%
\def\ifmonospace{\ifdim\fontdimen3\font=0pt }

% Markup style infrastructure.  \defmarkupstylesetup\INITMACRO will
% define and register \INITMACRO to be called on markup style changes.
% \INITMACRO can check \currentmarkupstyle for the innermost
% style and the set of \ifmarkupSTYLE switches for all styles
% currently in effect.
\newif\ifmarkupvar
\newif\ifmarkupsamp
\newif\ifmarkupkey
%\newif\ifmarkupfile % @file == @samp.
%\newif\ifmarkupoption % @option == @samp.
\newif\ifmarkupcode
\newif\ifmarkupkbd
%\newif\ifmarkupenv % @env == @code.
%\newif\ifmarkupcommand % @command == @code.
\newif\ifmarkuptex % @tex (and part of @math, for now).
\newif\ifmarkupexample
\newif\ifmarkupverb
```

```
\newif\ifmarkupverbatim

\let\currentmarkupstyle\empty

\def\setupmarkupstyle#1{%
 \csname markup#1true\endcsname
 \def\currentmarkupstyle{#1}%
 \markupstylesetup
}

\let\markupstylesetup\empty

\def\defmarkupstylesetup#1{%
 \expandafter\def\expandafter\markupstylesetup
   \expandafter{\markupstylesetup #1}%
 \def#1%
}

% Markup style setup for left and right quotes.
\defmarkupstylesetup\markupsetuplq{%
 \expandafter\let\expandafter \temp
   \csname markupsetuplq\currentmarkupstyle\endcsname
 \ifx\temp\relax \markupsetuplqdefault \else \temp \fi
}

\defmarkupstylesetup\markupsetuprq{%
 \expandafter\let\expandafter \temp
   \csname markupsetuprq\currentmarkupstyle\endcsname
 \ifx\temp\relax \markupsetuprqdefault \else \temp \fi
}

{
\catcode`\'=\active
\catcode`\`=\active

\gdef\markupsetuplqdefault{\let`\lq}
\gdef\markupsetuprqdefault{\let'\rq}

\gdef\markupsetcodequoteleft{\let`\codequoteleft}
\gdef\markupsetcodequoteright{\let'\codequoteright}
}

\let\markupsetuplqcode \markupsetcodequoteleft
\let\markupsetuprqcode \markupsetcodequoteright
%
\let\markupsetuplqexample \markupsetcodequoteleft
\let\markupsetuprqexample \markupsetcodequoteright
%
```

```
\let\markupsetuplqkbd     \markupsetcodequoteleft
\let\markupsetuprqkbd     \markupsetcodequoteright
%
\let\markupsetuplqsamp \markupsetcodequoteleft
\let\markupsetuprqsamp \markupsetcodequoteright
%
\let\markupsetuplqverb \markupsetcodequoteleft
\let\markupsetuprqverb \markupsetcodequoteright
%
\let\markupsetuplqverbatim \markupsetcodequoteleft
\let\markupsetuprqverbatim \markupsetcodequoteright

% Allow an option to not use regular directed right quote/apostrophe
% (char 0x27), but instead the undirected quote from cmtt (char 0x0d).
% The undirected quote is ugly, so don't make it the default, but it
% works for pasting with more pdf viewers (at least evince), the
% lilypond developers report.  xpdf does work with the regular 0x27.
%
\def\codequoteright{%
 \expandafter\ifx\csname SETtxicodequoteundirected\endcsname\relax
   \expandafter\ifx\csname SETcodequoteundirected\endcsname\relax
     '%
   \else \char'15 \fi
 \else \char'15 \fi
}
%
% and a similar option for the left quote char vs. a grave accent.
% Modern fonts display ASCII 0x60 as a grave accent, so some people like
% the code environments to do likewise.
%
\def\codequoteleft{%
 \expandafter\ifx\csname SETtxicodequotebacktick\endcsname\relax
   \expandafter\ifx\csname SETcodequotebacktick\endcsname\relax
     % [Knuth] pp. 380,381,391
     % \relax disables Spanish ligatures ?` and !` of \tt font.
     \relax`%
   \else \char'22 \fi
 \else \char'22 \fi
}

% Commands to set the quote options.
%
\parseargdef\codequoteundirected{%
 \def\temp{#1}%
 \ifx\temp\onword
   \expandafter\let\csname SETtxicodequoteundirected\endcsname
     = t%
 \else\ifx\temp\offword
```

```
    \expandafter\let\csname SETtxicodequoteundirected\endcsname
      = \relax
  \else
    \errhelp = \EMsimple
    \errmessage{Unknown @codequoteundirected value `\temp', must be on|off}%
  \fi\fi
}
%
\parseargdef\codequotebacktick{%
  \def\temp{#1}%
  \ifx\temp\onword
    \expandafter\let\csname SETtxicodequotebacktick\endcsname
      = t%
  \else\ifx\temp\offword
    \expandafter\let\csname SETtxicodequotebacktick\endcsname
      = \relax
  \else
    \errhelp = \EMsimple
    \errmessage{Unknown @codequotebacktick value `\temp', must be on|off}%
  \fi\fi
}

% [Knuth] pp. 380,381,391, disable Spanish ligatures ?` and !` of \tt font.
\def\noligaturesquoteleft{\relax\lq}

% Count depth in font-changes, for error checks
\newcount\fontdepth \fontdepth=0

% Font commands.

% #1 is the font command (\sl or \it), #2 is the text to slant.
% If we are in a monospaced environment, however, 1) always use \ttsl,
% and 2) do not add an italic correction.
\def\dosmartslant#1#2{%
  \ifusingtt
    {{\ttsl #2}\let\next=\relax}%
    {\def\next{{#1#2}\futurelet\next\smartitaliccorrection}}%
  \next
}
\def\smartslanted{\dosmartslant\sl}
\def\smartitalic{\dosmartslant\it}

% Output an italic correction unless \next (presumed to be the following
% character) is such as not to need one.
\def\smartitaliccorrection{%
  \ifx\next,%
  \else\ifx\next-%
  \else\ifx\next.%
```

```
  \else\ptexslash
  \fi\fi\fi
  \aftersmartic
}

% Unconditional use \ttsl, and no ic.  @var is set to this for defuns.
\def\ttslanted#1{{\ttsl #1}}

% @cite is like \smartslanted except unconditionally use \sl.  We never want
% ttsl for book titles, do we?
\def\cite#1{{\sl #1}\futurelet\next\smartitaliccorrection}

\def\aftersmartic{}
\def\var#1{%
  \let\saveaftersmartic = \aftersmartic
  \def\aftersmartic{\null\let\aftersmartic=\saveaftersmartic}%
  \smartslanted{#1}%
}

\let\i=\smartitalic
\let\slanted=\smartslanted
\let\dfn=\smartslanted
\let\emph=\smartitalic

% Explicit font changes: @r, @sc, undocumented @ii.
\def\r#1{{\rm #1}}          % roman font
\def\sc#1{{\smallcaps#1}}      % smallcaps font
\def\ii#1{{\it #1}}          % italic font

% @b, explicit bold.  Also @strong.
\def\b#1{{\bf #1}}
\let\strong=\b

% @sansserif, explicit sans.
\def\sansserif#1{{\sf #1}}

% We can't just use \exhyphenpenalty, because that only has effect at
% the end of a paragraph.  Restore normal hyphenation at the end of the
% group within which \nohyphenation is presumably called.
%
\def\nohyphenation{\hyphenchar\font = -1  \aftergroup\restorehyphenation}
\def\restorehyphenation{\hyphenchar\font = `- }

% Set sfcode to normal for the chars that usually have another value.
% Can't use plain's \frenchspacing because it uses the `\x notation, and
% sometimes \x has an active definition that messes things up.
%
\catcode`@=11
```

```
\def\plainfrenchspacing{%
 \sfcode\dotChar  =\@m \sfcode\questChar=\@m \sfcode\exclamChar=\@m
 \sfcode\colonChar=\@m \sfcode\semiChar =\@m \sfcode\commaChar =\@m
 \def\endofsentencespacefactor{1000}% for @. and friends
}
\def\plainnonfrenchspacing{%
 \sfcode`\.3000\sfcode`\?3000\sfcode`\!3000
 \sfcode`\:2000\sfcode`\;1500\sfcode`\,1250
 \def\endofsentencespacefactor{3000}% for @. and friends
}
\catcode`\@=\other
\def\endofsentencespacefactor{3000}% default

% @t, explicit typewriter.
\def\t#1{%
 {\tt \rawbackslash \plainfrenchspacing #1}%
 \null
}

% @samp.
\def\samp#1{{\setupmarkupstyle{samp}\lq\tclose{#1}\rq\null}}

% @indicateurl is \samp, that is, with quotes.
\let\indicateurl=\samp

% @code (and similar) prints in typewriter, but with spaces the same
% size as normal in the surrounding text, without hyphenation, etc.
% This is a subroutine for that.
\def\tclose#1{%
 {%
  % Change normal interword space to be same as for the current font.
  \spaceskip = \fontdimen2\font
  %
  % Switch to typewriter.
  \tt
  %
  % But `\ ' produces the large typewriter interword space.
  \def\ {{\spaceskip = 0pt{} }}%
  %
  % Turn off hyphenation.
  \nohyphenation
  %
  \rawbackslash
  \plainfrenchspacing
  #1%
 }%
 \null % reset spacefactor to 1000
}
```

% We *must* turn on hyphenation at `-' and `_' in @code.
% Otherwise, it is too hard to avoid overfull hboxes
% in the Emacs manual, the Library manual, etc.
%
% Unfortunately, TeX uses one parameter (\hyphenchar) to control
% both hyphenation at - and hyphenation within words.
% We must therefore turn them both off (\tclose does that)
% and arrange explicitly to hyphenate at a dash.
% -- rms.
{
\catcode`\-=\active \catcode`_=\active
\catcode`\'=\active \catcode`\`=\active
\global\let'=\rq \global\let`=\lq % default definitions
%
\global\def\code{\begingroup
  \setupmarkupstyle{code}%
  % The following should really be moved into \setupmarkupstyle handlers.
  \catcode\dashChar=\active \catcode\underChar=\active
  \ifallowcodebreaks
   \let-\codedash
   \let_\codeunder
  \else
   \let-\normaldash
   \let_\realunder
  \fi
  \codex
 }
}

\def\codex #1{\tclose{#1}\endgroup}

\def\normaldash{-}
\def\codedash{-\discretionary{}{}{}}
\def\codeunder{%
 % this is all so @math{@code{var_name}+1} can work. In math mode, _
 % is "active" (mathcode"8000) and \normalunderscore (or \char95, etc.)
 % will therefore expand the active definition of _, which is us
 % (inside @code that is), therefore an endless loop.
 \ifusingtt{\ifmmode
       \mathchar"075F % class 0=ordinary, family 7=ttfam, pos 0x5F=_.
      \else\normalunderscore \fi
      \discretionary{}{}{}}%
     {_}%
}

% An additional complication: the above will allow breaks after, e.g.,
% each of the four underscores in __typeof__. This is bad.

```
% @allowcodebreaks provides a document-level way to turn breaking at -
% and _ on and off.
%
\newif\ifallowcodebreaks  \allowcodebreakstrue

\def\keywordtrue{true}
\def\keywordfalse{false}

\parseargdef\allowcodebreaks{%
 \def\txiarg{#1}%
 \ifx\txiarg\keywordtrue
   \allowcodebreakstrue
 \else\ifx\txiarg\keywordfalse
   \allowcodebreaksfalse
 \else
   \errhelp = \EMsimple
   \errmessage{Unknown @allowcodebreaks option `\txiarg', must be true|false}%
 \fi\fi
}

% For @command, @env, @file, @option quotes seem unnecessary,
% so use \code rather than \samp.
\let\command=\code
\let\env=\code
\let\file=\code
\let\option=\code

% @uref (abbreviation for `urlref') takes an optional (comma-separated)
% second argument specifying the text to display and an optional third
% arg as text to display instead of (rather than in addition to) the url
% itself.  First (mandatory) arg is the url.
% (This \urefnobreak definition isn't used now, leaving it for a while
% for comparison.)
\def\urefnobreak#1{\dourefnobreak #1,,,\finish}
\def\dourefnobreak#1,#2,#3,#4\finish{\begingroup
 \unsepspaces
 \pdfurl{#1}%
 \setbox0 = \hbox{\ignorespaces #3}%
 \ifdim\wd0 > 0pt
   \unhbox0 % third arg given, show only that
 \else
   \setbox0 = \hbox{\ignorespaces #2}%
   \ifdim\wd0 > 0pt
     \ifpdf
       \unhbox0         % PDF: 2nd arg given, show only it
     \else
       \unhbox0\ (\code{#1})% DVI: 2nd arg given, show both it and url
     \fi
```

```
   \else
     \code{#1}% only url given, so show it
   \fi
  \fi
 \endlink
\endgroup}


% This \urefbreak definition is the active one.
\def\urefbreak{\begingroup \urefcatcodes \dourefbreak}
\let\uref=\urefbreak
\def\dourefbreak#1{\urefbreakfinish #1,,,\finish}
\def\urefbreakfinish#1,#2,#3,#4\finish{% doesn't work in @example
 \unsepspaces
 \pdfurl{#1}%
 \setbox0 = \hbox{\ignorespaces #3}%
 \ifdim\wd0 > 0pt
   \unhbox0 % third arg given, show only that
 \else
   \setbox0 = \hbox{\ignorespaces #2}%
   \ifdim\wd0 > 0pt
     \ifpdf
       \unhbox0          % PDF: 2nd arg given, show only it
     \else
       \unhbox0\ (\urefcode{#1})% DVI: 2nd arg given, show both it and url
     \fi
   \else
     \urefcode{#1}% only url given, so show it
   \fi
  \fi
 \endlink
\endgroup}


% Allow line breaks around only a few characters (only).
\def\urefcatcodes{%
 \catcode\ampChar=\active   \catcode\dotChar=\active
 \catcode\hashChar=\active  \catcode\questChar=\active
 \catcode\slashChar=\active
}
{
\urefcatcodes
%
\global\def\urefcode{\begingroup
  \setupmarkupstyle{code}%
  \urefcatcodes
  \let&\urefcodeamp
  \let.\urefcodedot
  \let#\urefcodehash
  \let?\urefcodequest
```

```
  \let/\urefcodeslash
  \codex
}
%
% By default, they are just regular characters.
\global\def&{\normalamp}
\global\def.{\normaldot}
\global\def#{\normalhash}
\global\def?{\normalquest}
\global\def/{\normalslash}
}


% we put a little stretch before and after the breakable chars, to help
% line breaking of long url's.  The unequal skips make look better in
% cmtt at least, especially for dots.
\def\urefprestretch{\urefprebreak \hskip0pt plus.13em }
\def\urefpoststretch{\urefpostbreak \hskip0pt plus.1em }
%
\def\urefcodeamp{\urefprestretch \&\urefpoststretch}
\def\urefcodedot{\urefprestretch .\urefpoststretch}
\def\urefcodehash{\urefprestretch \#\urefpoststretch}
\def\urefcodequest{\urefprestretch ?\urefpoststretch}
\def\urefcodeslash{\futurelet\next\urefcodeslashfinish}
{
\catcode`\/=\active
\global\def\urefcodeslashfinish{%
  \urefprestretch \slashChar
  % Allow line break only after the final / in a sequence of
  % slashes, to avoid line break between the slashes in http://.
  \ifx\next/\else \urefpoststretch \fi
}
}


% One more complication: by default we'll break after the special
% characters, but some people like to break before the special chars, so
% allow that.  Also allow no breaking at all, for manual control.
%
\parseargdef\urefbreakstyle{%
\def\txiarg{#1}%
\ifx\txiarg\wordnone
  \def\urefprebreak{\nobreak}\def\urefpostbreak{\nobreak}
\else\ifx\txiarg\wordbefore
  \def\urefprebreak{\allowbreak}\def\urefpostbreak{\nobreak}
\else\ifx\txiarg\wordafter
  \def\urefprebreak{\nobreak}\def\urefpostbreak{\allowbreak}
\else
  \errhelp = \EMsimple
  \errmessage{Unknown @urefbreakstyle setting `\txiarg'}%
```

```
  \fi\fi\fi
  }
\def\wordafter{after}
\def\wordbefore{before}
\def\wordnone{none}

\urefbreakstyle after

% @url synonym for @uref, since that's how everyone uses it.
%
\let\url=\uref

% rms does not like angle brackets --karl, 17may97.
% So now @email is just like @uref, unless we are pdf.
%
%\def\email#1{\angleleft{\tt #1}\angleright}
\ifpdf
 \def\email#1{\doemail#1,,\finish}
 \def\doemail#1,#2,#3\finish{\begingroup
  \unsepspaces
  \pdfurl{mailto:#1}%
  \setbox0 = \hbox{\ignorespaces #2}%
  \ifdim\wd0>0pt\unhbox0\else\code{#1}\fi
  \endlink
 \endgroup}
\else
 \let\email=\uref
\fi

% @kbdinputstyle -- arg is `distinct' (@kbd uses slanted tty font always),
%  `example' (@kbd uses ttsl only inside of @example and friends),
%  or `code' (@kbd uses normal tty font always).
\parseargdef\kbdinputstyle{%
 \def\txiarg{#1}%
 \ifx\txiarg\worddistinct
  \gdef\kbdexamplefont{\ttsl}\gdef\kbdfont{\ttsl}%
 \else\ifx\txiarg\wordexample
  \gdef\kbdexamplefont{\ttsl}\gdef\kbdfont{\tt}%
 \else\ifx\txiarg\wordcode
  \gdef\kbdexamplefont{\tt}\gdef\kbdfont{\tt}%
 \else
  \errhelp = \EMsimple
  \errmessage{Unknown @kbdinputstyle setting `\txiarg'}%
 \fi\fi\fi
 }
\def\worddistinct{distinct}
\def\wordexample{example}
\def\wordcode{code}
```

% Default is `distinct'.
\kbdinputstyle distinct

% @kbd is like @code, except that if the argument is just one @key command,
% then @kbd has no effect.
\def\kbd#1{{\def\look{#1}\expandafter\kbdsub\look??\par}}

\def\xkey{\key}
\def\kbdsub#1#2#3\par{%
 \def\one{#1}\def\three{#3}\def\threex{??}%
 \ifx\one\xkey\ifx\threex\three \key{#2}%
 \else{\tclose{\kbdfont\setupmarkupstyle{kbd}\look}}\fi
 \else{\tclose{\kbdfont\setupmarkupstyle{kbd}\look}}\fi
}

% definition of @key that produces a lozenge. Doesn't adjust to text size.
%\setfont\keyrm\rmshape{8}{1000}{OT1}
%\font\keysy=cmsy9
%\def\key#1{{\keyrm\textfont2=\keysy \leavevmode\hbox{%
% \raise0.4pt\hbox{\angleleft}\kern-.08em\vtop{%
%   \vbox{\hrule\kern-0.4pt
%   \hbox{\raise0.4pt\hbox{\vphantom{\angleleft}}#1}}%
%   \kern-0.4pt\hrule}%
% \kern-.06em\raise0.4pt\hbox{\angleright}}}}

% definition of @key with no lozenge. If the current font is already
% monospace, don't change it; that way, we respect @kbdinputstyle. But
% if it isn't monospace, then use \tt.
%
\def\key#1{{\setupmarkupstyle{key}%
 \nohyphenation
 \ifmonospace\else\tt\fi
 #1}\null}

% @clicksequence{File @click{} Open ...}
\def\clicksequence#1{\begingroup #1\endgroup}

% @clickstyle @arrow   (by default)
\parseargdef\clickstyle{\def\click{#1}}
\def\click{\arrow}

% Typeset a dimension, e.g., `in' or `pt'. The only reason for the
% argument is to make the input look right: @dmn{pt} instead of @dmn{}pt.
%
\def\dmn#1{\thinspace #1}

% @l was never documented to mean ``switch to the Lisp font'',

```
% and it is not used as such in any manual I can find.  We need it for
% Polish suppressed-l.  --karl, 22sep96.
%\def\l#1{{\li #1}\null}


% @acronym for "FBI", "NATO", and the like.
% We print this one point size smaller, since it's intended for
% all-uppercase.
%
\def\acronym#1{\doacronym #1,,\finish}
\def\doacronym#1,#2,#3\finish{%
 {\selectfonts\lsize #1}%
 \def\temp{#2}%
 \ifx\temp\empty \else
   \space ({\unsepspaces \ignorespaces \temp \unskip})%
 \fi
 \null % reset \spacefactor=1000
}


% @abbr for "Comput. J." and the like.
% No font change, but don't do end-of-sentence spacing.
%
\def\abbr#1{\doabbr #1,,\finish}
\def\doabbr#1,#2,#3\finish{%
 {\plainfrenchspacing #1}%
 \def\temp{#2}%
 \ifx\temp\empty \else
   \space ({\unsepspaces \ignorespaces \temp \unskip})%
 \fi
 \null % reset \spacefactor=1000
}


% @asis just yields its argument.  Used with @table, for example.
%
\def\asis#1{#1}


% @math outputs its argument in math mode.
%
% One complication: _ usually means subscripts, but it could also mean
% an actual _ character, as in @math{@var{some_variable} + 1}.  So make
% _ active, and distinguish by seeing if the current family is \slfam,
% which is what @var uses.
{
\catcode`\_ = \active
\gdef\mathunderscore{%
  \catcode`\_=\active
  \def_{\ifnum\fam=\slfam \_\else\sb\fi}%
 }
}
```

```
% Another complication: we want \\ (and @\) to output a math (or tt) \.
% FYI, plain.tex uses \\ as a temporary control sequence (for no
% particular reason), but this is not advertised and we don't care.
%
% The \mathchar is class=0=ordinary, family=7=ttfam, position=5C=\.
\def\mathbackslash{\ifnum\fam=\ttfam \mathchar"075C \else\backslash \fi}
%
\def\math{%
 \tex
 \mathunderscore
 \let\\ = \mathbackslash
 \mathactive
 % make the texinfo accent commands work in math mode
 \let\"=\ddot
 \let\'=\acute
 \let\==\bar
 \let\^=\hat
 \let\`=\grave
 \let\u=\breve
 \let\v=\check
 \let\~=\tilde
 \let\dotaccent=\dot
 $\finishmath
}
\def\finishmath#1{#1$\endgroup}  % Close the group opened by \tex.


% Some active characters (such as <) are spaced differently in math.
% We have to reset their definitions in case the @math was an argument
% to a command which sets the catcodes (such as @item or @section).
%
{
\catcode`^ = \active
\catcode`< = \active
\catcode`> = \active
\catcode`+ = \active
\catcode`' = \active
\gdef\mathactive{%
  \let^ = \ptexhat
  \let< = \ptexless
  \let> = \ptexgtr
  \let+ = \ptexplus
  \let' = \ptexquoteright
 }
}


% ctrl is no longer a Texinfo command, but leave this definition for fun.
\def\ctrl #1{{\tt \rawbackslash \hat}#1}
```

```
% @inlinefmt{FMTNAME,PROCESSED-TEXT} and @inlineraw{FMTNAME,RAW-TEXT}.
% Ignore unless FMTNAME == tex; then it is like @iftex and @tex,
% except specified as a normal braced arg, so no newlines to worry about.
%
\def\outfmtnametex{tex}
%
\long\def\inlinefmt#1{\doinlinefmt #1,\finish}
\long\def\doinlinefmt#1,#2,\finish{%
 \def\inlinefmtname{#1}%
 \ifx\inlinefmtname\outfmtnametex \ignorespaces #2\fi
}
% For raw, must switch into @tex before parsing the argument, to avoid
% setting catcodes prematurely.  Doing it this way means that, for
% example, @inlineraw{html, foo{bar} gets a parse error instead of being
% ignored.  But this isn't important because if people want a literal
% *right* brace they would have to use a command anyway, so they may as
% well use a command to get a left brace too.  We could re-use the
% delimiter character idea from \verb, but it seems like overkill.
%
\long\def\inlineraw{\tex \doinlineraw}
\long\def\doinlineraw#1{\doinlinerawtwo #1,\finish}
\def\doinlinerawtwo#1,#2,\finish{%
 \def\inlinerawname{#1}%
 \ifx\inlinerawname\outfmtnametex \ignorespaces #2\fi
 \endgroup % close group opened by \tex.
}


\message{glyphs,}
% and logos.

% @@ prints an @, as does @atchar{}.
\def\@{\char64 }
\let\atchar=\@

% @{ @} @lbracechar{} @rbracechar{} all generate brace characters.
% Unless we're in typewriter, use \ecfont because the CM text fonts do
% not have braces, and we don't want to switch into math.
\def\mylbrace{{\ifmonospace\else\ecfont\fi \char123}}
\def\myrbrace{{\ifmonospace\else\ecfont\fi \char125}}
\let\{=\mylbrace \let\lbracechar=\{
\let\}=\myrbrace \let\rbracechar=\}
\begingroup
 % Definitions to produce \{ and \} commands for indices,
 % and @{ and @} for the aux/toc files.
 \catcode`\{ = \other \catcode`\} = \other
 \catcode`\[ = 1 \catcode`\] = 2
 \catcode`\! = 0 \catcode`\\ = \other
```

```
!gdef!lbracecmd[\{]%
!gdef!rbracecmd[\}]%
!gdef!lbraceatcmd[@{]%
!gdef!rbraceatcmd[@}]%
!endgroup

% @comma{} to avoid , parsing problems.
\let\comma = ,

% Accents: @, @dotaccent @ringaccent @ubaraccent @udotaccent
% Others are defined by plain TeX: @` @' @" @^ @~ @= @u @v @H.
\let\, = \ptexc
\let\dotaccent = \ptexdot
\def\ringaccent#1{{\accent23 #1}}
\let\tieaccent = \ptext
\let\ubaraccent = \ptexb
\let\udotaccent = \d

% Other special characters: @questiondown @exclamdown @ordf @ordm
% Plain TeX defines: @AA @AE @O @OE @L (plus lowercase versions) @ss.
\def\questiondown{?`}
\def\exclamdown{!`}
\def\ordf{\leavevmode\raise1ex\hbox{\selectfonts\lllsize \underbar{a}}}
\def\ordm{\leavevmode\raise1ex\hbox{\selectfonts\lllsize \underbar{o}}}

% Dotless i and dotless j, used for accents.
\def\imacro{i}
\def\jmacro{j}
\def\dotless#1{%
 \def\temp{#1}%
 \ifx\temp\imacro \ifmmode\imath \else\ptexi \fi
 \else\ifx\temp\jmacro \ifmmode\jmath \else\j \fi
 \else \errmessage{@dotless can be used only with i or j}%
 \fi\fi
}

% The \TeX{} logo, as in plain, but resetting the spacing so that a
% period following counts as ending a sentence.  (Idea found in latex.)
%
\edef\TeX{\TeX \spacefactor=1000 }

% @LaTeX{} logo.  Not quite the same results as the definition in
% latex.ltx, since we use a different font for the raised A; it's most
% convenient for us to use an explicitly smaller font, rather than using
% the \scriptstyle font (since we don't reset \scriptstyle and
% \scriptscriptstyle).
%
\def\LaTeX{%
```

```
    L\kern-.36em
   {\setbox0=\hbox{T}%
    \vbox to \ht0{\hbox{%
      \ifx\textnominalsize\xwordpt
        % for 10pt running text, \lllsize (8pt) is too small for the A in LaTeX.
        % Revert to plain's \scriptsize, which is 7pt.
        \count255=\the\fam $\fam\count255 \scriptstyle A$%
      \else
        % For 11pt, we can use our lllsize.
        \selectfonts\lllsize A%
      \fi
      }%
      \vss
   }}%
    \kern-.15em
    \TeX
   }


   % Some math mode symbols.
   \def\bullet{$\ptexbullet$}
   \def\geq{\ifmmode \ge\else $\ge$\fi}
   \def\leq{\ifmmode \le\else $\le$\fi}
   \def\minus{\ifmmode -\else $-$\fi}


   % @dots{} outputs an ellipsis using the current font.
   % We do .5em per period so that it has the same spacing in the cm
   % typewriter fonts as three actual period characters; on the other hand,
   % in other typewriter fonts three periods are wider than 1.5em.  So do
   % whichever is larger.
   %
   \def\dots{%
    \leavevmode
    \setbox0=\hbox{...}% get width of three periods
    \ifdim\wd0 > 1.5em
      \dimen0 = \wd0
    \else
      \dimen0 = 1.5em
    \fi
    \hbox to \dimen0{%
     \hskip 0pt plus.25fil
     .\hskip 0pt plus1fil
     .\hskip 0pt plus1fil
     .\hskip 0pt plus.5fil
    }%
   }


   % @enddots{} is an end-of-sentence ellipsis.
   %
```

```
\def\enddots{%
 \dots
 \spacefactor=\endofsentencespacefactor
}

% @point{}, @result{}, @expansion{}, @print{}, @equiv{}.
%
% Since these characters are used in examples, they should be an even number of
% \tt widths. Each \tt character is 1en, so two makes it 1em.
%
\def\point{$\star$}
\def\arrow{\leavevmode\raise.05ex\hbox to 1em{\hfil$\rightarrow$\hfil}}
\def\result{\leavevmode\raise.05ex\hbox to 1em{\hfil$\Rightarrow$\hfil}}
\def\expansion{\leavevmode\hbox to 1em{\hfil$\mapsto$\hfil}}
\def\print{\leavevmode\lower.1ex\hbox to 1em{\hfil$\dashv$\hfil}}
\def\equiv{\leavevmode\hbox to 1em{\hfil$\ptexequiv$\hfil}}

% The @error{} command.
% Adapted from the TeXbook's \boxit.
%
\newbox\errorbox
%
{\tentt \global\dimen0 = 3em}% Width of the box.
\dimen2 = .55pt % Thickness of rules
% The text. (`r' is open on the right, `e' somewhat less so on the left.)
\setbox0 = \hbox{\kern-.75pt \reducedsf \putworderror\kern-1.5pt}
%
\setbox\errorbox=\hbox to \dimen0{\hfil
  \hsize = \dimen0 \advance\hsize by -5.8pt % Space to left+right.
  \advance\hsize by -2\dimen2 % Rules.
  \vbox{%
    \hrule height\dimen2
    \hbox{\vrule width\dimen2 \kern3pt        % Space to left of text.
      \vtop{\kern2.4pt \box0 \kern2.4pt}% Space above/below.
      \kern3pt\vrule width\dimen2}% Space to right.
    \hrule height\dimen2}
  \hfil}
%
\def\error{\leavevmode\lower.7ex\copy\errorbox}

% @pounds{} is a sterling sign, which Knuth put in the CM italic font.
%
\def\pounds{{\it\$}}

% @euro{} comes from a separate font, depending on the current style.
% We use the free feym* fonts from the eurosym package by Henrik
% Theiling, which support regular, slanted, bold and bold slanted (and
% "outlined" (blackboard board, sort of) versions, which we don't need).
```

% It is available from http://www.ctan.org/tex-archive/fonts/eurosym.
%
% Although only regular is the truly official Euro symbol, we ignore
% that. The Euro is designed to be slightly taller than the regular
% font height.
%
% feymr - regular
% feymo - slanted
% feybr - bold
% feybo - bold slanted
%
% There is no good (free) typewriter version, to my knowledge.
% A feymr10 euro is ~7.3pt wide, while a normal cmtt10 char is ~5.25pt wide.
% Hmm.
%
% Also doesn't work in math. Do we need to do math with euro symbols?
% Hope not.
%
%
\def\euro{{\eurofont e}}
\def\eurofont{%
 % We set the font at each command, rather than predefining it in
 % \textfonts and the other font-switching commands, so that
 % installations which never need the symbol don't have to have the
 % font installed.
 %
 % There is only one designed size (nominal 10pt), so we always scale
 % that to the current nominal size.
 %
 % By the way, simply using "at 1em" works for cmr10 and the like, but
 % does not work for cmbx10 and other extended/shrunken fonts.
 %
\def\eurosize{\csname\curfontsize nominalsize\endcsname}%
 %
\ifx\curfontstyle\bfstylename
  % bold:
  \font\thiseurofont = \ifusingit{feybo10}{feybr10} at \eurosize
\else
  % regular:
  \font\thiseurofont = \ifusingit{feymo10}{feymr10} at \eurosize
\fi
\thiseurofont
}

% Glyphs from the EC fonts. We don't use \let for the aliases, because
% sometimes we redefine the original macro, and the alias should reflect
% the redefinition.
%

% Use LaTeX names for the Icelandic letters.
\def\DH{{\ecfont \char"D0}} % Eth
\def\dh{{\ecfont \char"F0}} % eth
\def\TH{{\ecfont \char"DE}} % Thorn
\def\th{{\ecfont \char"FE}} % thorn
%
\def\guillemetleft{{\ecfont \char"13}}
\def\guillemotleft{\guillemetleft}
\def\guillemetright{{\ecfont \char"14}}
\def\guillemotright{\guillemetright}
\def\guilsinglleft{{\ecfont \char"0E}}
\def\guilsinglright{{\ecfont \char"0F}}
\def\quotedblbase{{\ecfont \char"12}}
\def\quotesinglbase{{\ecfont \char"0D}}
%
% This positioning is not perfect (see the ogonek LaTeX package), but
% we have the precomposed glyphs for the most common cases. We put the
% tests to use those glyphs in the single \ogonek macro so we have fewer
% dummy definitions to worry about for index entries, etc.
%
% ogonek is also used with other letters in Lithuanian (IOU), but using
% the precomposed glyphs for those is not so easy since they aren't in
% the same EC font.
\def\ogonek#1{{%
 \def\temp{#1}%
 \ifx\temp\macrocharA\Aogonek
 \else\ifx\temp\macrochara\aogonek
 \else\ifx\temp\macrocharE\Eogonek
 \else\ifx\temp\macrochare\eogonek
 \else
  \ecfont \setbox0=\hbox{#1}%
  \ifdim\ht0=1ex\accent"0C #1%
  \else\ooalign{\unhbox0\crcr\hidewidth\char"0C \hidewidth}%
  \fi
 \fi\fi\fi\fi
 }%
}
\def\Aogonek{{\ecfont \char"81}}\def\macrocharA{A}
\def\aogonek{{\ecfont \char"A1}}\def\macrochara{a}
\def\Eogonek{{\ecfont \char"86}}\def\macrocharE{E}
\def\eogonek{{\ecfont \char"A6}}\def\macrochare{e}
%
% Use the ec* fonts (cm-super in outline format) for non-CM glyphs.
\def\ecfont{%
 % We can't distinguish serif/sans and italic/slanted, but this
 % is used for crude hacks anyway (like adding French and German
 % quotes to documents typeset with CM, where we lose kerning), so
 % hopefully nobody will notice/care.

```
\edef\ecsize{\csname\curfontsize ecsize\endcsname}%
\edef\nominalsize{\csname\curfontsize nominalsize\endcsname}%
\ifmonospace
  % typewriter:
  \font\thisecfont = ectt\ecsize \space at \nominalsize
\else
  \ifx\curfontstyle\bfstylename
    % bold:
    \font\thisecfont = ecb\ifusingit{i}{x}\ecsize \space at \nominalsize
  \else
    % regular:
    \font\thisecfont = ec\ifusingit{ti}{rm}\ecsize \space at \nominalsize
  \fi
\fi
\thisecfont
}


% @registeredsymbol - R in a circle.  The font for the R should really
% be smaller yet, but lllsize is the best we can do for now.
% Adapted from the plain.tex definition of \copyright.
%
\def\registeredsymbol{%
 $^{{\ooalign{\hfil\raise.07ex\hbox{\selectfonts\lllsize R}%
          \hfil\crcr\Orb}}%
   }$%
}


% @textdegree - the normal degrees sign.
%
\def\textdegree{$^\circ$}


% Laurent Siebenmann reports \Orb undefined with:
%  Textures 1.7.7 (preloaded format=plain 93.10.14)  (68K)  16 APR 2004 02:38
% so we'll define it if necessary.
%
\ifx\Orb\thisisundefined
\def\Orb{\mathhexbox20D}
\fi


% Quotes.
\chardef\quotedblleft="5C
\chardef\quotedblright=`\"
\chardef\quoteleft=`\`
\chardef\quoteright=`\'



\message{page headings,}
```

```
\newskip\titlepagetopglue \titlepagetopglue = 1.5in
\newskip\titlepagebottomglue \titlepagebottomglue = 2pc

% First the title page.  Must do @settitle before @titlepage.
\newif\ifseenauthor
\newif\iffinishedtitlepage

% Do an implicit @contents or @shortcontents after @end titlepage if the
% user says @setcontentsaftertitlepage or @setshortcontentsaftertitlepage.
%
\newif\ifsetcontentsaftertitlepage
\let\setcontentsaftertitlepage = \setcontentsaftertitlepagetrue
\newif\ifsetshortcontentsaftertitlepage
\let\setshortcontentsaftertitlepage = \setshortcontentsaftertitlepagetrue

\parseargdef\shorttitlepage{%
 \begingroup \hbox{}\vskip 1.5in \chaprm \centerline{#1}%
 \endgroup\page\hbox{}\page}

\envdef\titlepage{%
 % Open one extra group, as we want to close it in the middle of \Etitlepage.
 \begingroup
   \parindent=0pt \textfonts
   % Leave some space at the very top of the page.
   \vglue\titlepagetopglue
   % No rule at page bottom unless we print one at the top with @title.
   \finishedtitlepagetrue
   %
   % Most title ``pages'' are actually two pages long, with space
   % at the top of the second.  We don't want the ragged left on the second.
   \let\oldpage = \page
   \def\page{%
     \iffinishedtitlepage\else
 \finishtitlepage
     \fi
     \let\page = \oldpage
     \page
     \null
   }%
}

\def\Etitlepage{%
  \iffinishedtitlepage\else
 \finishtitlepage
  \fi
   % It is important to do the page break before ending the group,
   % because the headline and footline are only empty inside the group.
   % If we use the new definition of \page, we always get a blank page
```

```
  % after the title page, which we certainly don't want.
  \oldpage
\endgroup
%
% Need this before the \...aftertitlepage checks so that if they are
% in effect the toc pages will come out with page numbers.
\HEADINGSon
%
% If they want short, they certainly want long too.
\ifsetshortcontentsaftertitlepage
  \shortcontents
  \contents
  \global\let\shortcontents = \relax
  \global\let\contents = \relax
\fi
%
\ifsetcontentsaftertitlepage
  \contents
  \global\let\contents = \relax
  \global\let\shortcontents = \relax
\fi
}


\def\finishtitlepage{%
\vskip4pt \hrule height 2pt width \hsize
\vskip\titlepagebottomglue
\finishedtitlepagetrue
}


% Settings used for typesetting titles: no hyphenation, no indentation,
% don't worry much about spacing, ragged right.  This should be used
% inside a \vbox, and fonts need to be set appropriately first.  Because
% it is always used for titles, nothing else, we call \rmisbold.  \par
% should be specified before the end of the \vbox, since a vbox is a group.
%
\def\raggedtitlesettings{%
\rmisbold
\hyphenpenalty=10000
\parindent=0pt
\tolerance=5000
\ptexraggedright
}


% Macros to be used within @titlepage:

\let\subtitlerm=\tenrm
\def\subtitlefont{\subtitlerm \normalbaselineskip = 13pt \normalbaselines}
```

```
\parseargdef\title{%
\checkenv\titlepage
\vbox{\titlefonts \raggedtitlesettings #1\par}%
% print a rule at the page bottom also.
\finishedtitlepagefalse
\vskip4pt \hrule height 4pt width \hsize \vskip4pt
}

\parseargdef\subtitle{%
\checkenv\titlepage
{\subtitlefont \rightline{#1}}%
}

% @author should come last, but may come many times.
% It can also be used inside @quotation.
%
\parseargdef\author{%
\def\temp{\quotation}%
\ifx\thisenv\temp
  \def\quotationauthor{#1}% printed in \Equotation.
\else
  \checkenv\titlepage
  \ifseenauthor\else \vskip 0pt plus 1filll \seenauthortrue \fi
  {\secfonts\rmisbold \leftline{#1}}%
\fi
}


% Set up page headings and footings.

\let\thispage=\folio

\newtoks\evenheadline    % headline on even pages
\newtoks\oddheadline     % headline on odd pages
\newtoks\evenfootline    % footline on even pages
\newtoks\oddfootline     % footline on odd pages

% Now make TeX use those variables
\headline={{\textfonts\rm \ifodd\pageno \the\oddheadline
                \else \the\evenheadline \fi}}
\footline={{\textfonts\rm \ifodd\pageno \the\oddfootline
                \else \the\evenfootline \fi}\HEADINGShook}
\let\HEADINGShook=\relax

% Commands to set those variables.
% For example, this is what  @headings on  does
% @evenheading @thistitle|@thispage|@thischapter
% @oddheading @thischapter|@thispage|@thistitle
```

```
% @evenfooting @thisfile||
% @oddfooting ||@thisfile


\def\evenheading{\parsearg\evenheadingxxx}
\def\evenheadingxxx #1{\evenheadingyyy #1\|\|\|\|\finish}
\def\evenheadingyyy #1\|#2\|#3\|#4\finish{%
\global\evenheadline={\rlap{\centerline{#2}}\line{#1\hfil#3}}}

\def\oddheading{\parsearg\oddheadingxxx}
\def\oddheadingxxx #1{\oddheadingyyy #1\|\|\|\|\finish}
\def\oddheadingyyy #1\|#2\|#3\|#4\finish{%
\global\oddheadline={\rlap{\centerline{#2}}\line{#1\hfil#3}}}

\parseargdef\everyheading{\oddheadingxxx{#1}\evenheadingxxx{#1}}%


\def\evenfooting{\parsearg\evenfootingxxx}
\def\evenfootingxxx #1{\evenfootingyyy #1\|\|\|\|\finish}
\def\evenfootingyyy #1\|#2\|#3\|#4\finish{%
\global\evenfootline={\rlap{\centerline{#2}}\line{#1\hfil#3}}}

\def\oddfooting{\parsearg\oddfootingxxx}
\def\oddfootingxxx #1{\oddfootingyyy #1\|\|\|\|\finish}
\def\oddfootingyyy #1\|#2\|#3\|#4\finish{%
\global\oddfootline = {\rlap{\centerline{#2}}\line{#1\hfil#3}}%
%
% Leave some space for the footline.  Hopefully ok to assume
% @evenfooting will not be used by itself.
\global\advance\pageheight by -12pt
\global\advance\vsize by -12pt
}

\parseargdef\everyfooting{\oddfootingxxx{#1}\evenfootingxxx{#1}}

% @evenheadingmarks top     \thischapter <- chapter at the top of a page
% @evenheadingmarks bottom  \thischapter <- chapter at the bottom of a page
%
% The same set of arguments for:
%
% @oddheadingmarks
% @evenfootingmarks
% @oddfootingmarks
% @everyheadingmarks
% @everyfootingmarks

\def\evenheadingmarks{\headingmarks{even}{heading}}
\def\oddheadingmarks{\headingmarks{odd}{heading}}
\def\evenfootingmarks{\headingmarks{even}{footing}}
```

```
\def\oddfootingmarks{\headingmarks{odd}{footing}}
\def\everyheadingmarks#1 {\headingmarks{even}{heading}{#1}
              \headingmarks{odd}{heading}{#1} }
\def\everyfootingmarks#1 {\headingmarks{even}{footing}{#1}
              \headingmarks{odd}{footing}{#1} }
% #1 = even/odd, #2 = heading/footing, #3 = top/bottom.
\def\headingmarks#1#2#3 {%
 \expandafter\let\expandafter\temp \csname get#3headingmarks\endcsname
 \global\expandafter\let\csname get#1#2marks\endcsname \temp
}

\everyheadingmarks bottom
\everyfootingmarks bottom

% @headings double     turns headings on for double-sided printing.
% @headings single     turns headings on for single-sided printing.
% @headings off        turns them off.
% @headings on         same as @headings double, retained for compatibility.
% @headings after      turns on double-sided headings after this page.
% @headings doubleafter turns on double-sided headings after this page.
% @headings singleafter turns on single-sided headings after this page.
% By default, they are off at the start of a document,
% and turned `on' after @end titlepage.

\def\headings #1 {\csname HEADINGS#1\endcsname}

\def\headingsoff{% non-global headings elimination
 \evenheadline={\hfil}\evenfootline={\hfil}%
 \oddheadline={\hfil}\oddfootline={\hfil}%
}

\def\HEADINGSoff{{\globaldefs=1 \headingsoff}} % global setting
\HEADINGSoff  % it's the default

% When we turn headings on, set the page number to 1.
% For double-sided printing, put current file name in lower left corner,
% chapter name on inside top of right hand pages, document
% title on inside top of left hand pages, and page numbers on outside top
% edge of all pages.
\def\HEADINGSdouble{%
\global\pageno=1
\global\evenfootline={\hfil}
\global\oddfootline={\hfil}
\global\evenheadline={\line{\folio\hfil\thistitle}}
\global\oddheadline={\line{\thischapter\hfil\folio}}
\global\let\contentsalignmacro = \chapoddpage
}
\let\contentsalignmacro = \chappager
```

```
% For single-sided printing, chapter title goes across top left of page,
% page number on top right.
\def\HEADINGSsingle{%
\global\pageno=1
\global\evenfootline={\hfil}
\global\oddfootline={\hfil}
\global\evenheadline={\line{\thischapter\hfil\folio}}
\global\oddheadline={\line{\thischapter\hfil\folio}}
\global\let\contentsalignmacro = \chappager
}
\def\HEADINGSon{\HEADINGSdouble}

\def\HEADINGSafter{\let\HEADINGShook=\HEADINGSdoublex}
\let\HEADINGSdoubleafter=\HEADINGSafter
\def\HEADINGSdoublex{%
\global\evenfootline={\hfil}
\global\oddfootline={\hfil}
\global\evenheadline={\line{\folio\hfil\thistitle}}
\global\oddheadline={\line{\thischapter\hfil\folio}}
\global\let\contentsalignmacro = \chapoddpage
}

\def\HEADINGSsingleafter{\let\HEADINGShook=\HEADINGSsinglex}
\def\HEADINGSsinglex{%
\global\evenfootline={\hfil}
\global\oddfootline={\hfil}
\global\evenheadline={\line{\thischapter\hfil\folio}}
\global\oddheadline={\line{\thischapter\hfil\folio}}
\global\let\contentsalignmacro = \chappager
}

% Subroutines used in generating headings
% This produces Day Month Year style of output.
% Only define if not already defined, in case a txi-??.tex file has set
% up a different format (e.g., txi-cs.tex does this).
\ifx\today\thisisundefined
\def\today{%
 \number\day\space
 \ifcase\month
 \or\putwordMJan\or\putwordMFeb\or\putwordMMar\or\putwordMApr
 \or\putwordMMay\or\putwordMJun\or\putwordMJul\or\putwordMAug
 \or\putwordMSep\or\putwordMOct\or\putwordMNov\or\putwordMDec
 \fi
 \space\number\year}
\fi

% @settitle line...  specifies the title of the document, for headings.
```

% It generates no output of its own.
\def\thistitle{\putwordNoTitle}
\def\settitle{\parsearg{\gdef\thistitle}}

\message{tables,}
% Tables -- @table, @ftable, @vtable, @item(x).

% default indentation of table text
\newdimen\tableindent \tableindent=.8in
% default indentation of @itemize and @enumerate text
\newdimen\itemindent \itemindent=.3in
% margin between end of table item and start of table text.
\newdimen\itemmargin \itemmargin=.1in

% used internally for \itemindent minus \itemmargin
\newdimen\itemmax

% Note @table, @ftable, and @vtable define @item, @itemx, etc., with
% these defs.
% They also define \itemindex
% to index the item name in whatever manner is desired (perhaps none).

\newif\ifitemxneedsnegativevskip

\def\itemxpar{\par\ifitemxneedsnegativevskip\nobreak\vskip-\parskip\nobreak\fi}

\def\internalBitem{\smallbreak \parsearg\itemzzz}
\def\internalBitemx{\itemxpar \parsearg\itemzzz}

\def\itemzzz #1{\begingroup %
 \advance\hsize by -\rightskip
 \advance\hsize by -\tableindent
 \setbox0=\hbox{\itemindicate{#1}}%
 \itemindex{#1}%
 \nobreak % This prevents a break before @itemx.
 %
 % If the item text does not fit in the space we have, put it on a line
 % by itself, and do not allow a page break either before or after that
 % line. We do not start a paragraph here because then if the next
 % command is, e.g., @kindex, the whatsit would get put into the
 % horizontal list on a line by itself, resulting in extra blank space.
 \ifdim \wd0>\itemmax
  %
  % Make this a paragraph so we get the \parskip glue and wrapping,
  % but leave it ragged-right.
  \begingroup
    \advance\leftskip by-\tableindent

```
  \advance\hsize by\tableindent
  \advance\rightskip by0pt plus1fil\relax
  \leavevmode\unhbox0\par
\endgroup
%
% We're going to be starting a paragraph, but we don't want the
% \parskip glue -- logically it's part of the @item we just started.
\nobreak \vskip-\parskip
%
% Stop a page break at the \parskip glue coming up.  However, if
% what follows is an environment such as @example, there will be no
% \parskip glue; then the negative vskip we just inserted would
% cause the example and the item to crash together.  So we use this
% bizarre value of 10001 as a signal to \aboveenvbreak to insert
% \parskip glue after all.  Section titles are handled this way also.
%
\penalty 10001
\endgroup
\itemxneedsnegativevskipfalse
\else
% The item text fits into the space.  Start a paragraph, so that the
% following text (if any) will end up on the same line.
\noindent
% Do this with kerns and \unhbox so that if there is a footnote in
% the item text, it can migrate to the main vertical list and
% eventually be printed.
\nobreak\kern-\tableindent
\dimen0 = \itemmax  \advance\dimen0 by \itemmargin \advance\dimen0 by -\wd0
\unhbox0
\nobreak\kern\dimen0
\endgroup
\itemxneedsnegativevskiptrue
\fi
}

\def\item{\errmessage{@item while not in a list environment}}
\def\itemx{\errmessage{@itemx while not in a list environment}}

% @table, @ftable, @vtable.
\envdef\table{%
\let\itemindex\gobble
\tablecheck{table}%
}
\envdef\ftable{%
\def\itemindex ##1{\doind {fn}{\code{##1}}}%
\tablecheck{ftable}%
}
\envdef\vtable{%
```

```
\def\itemindex ##1{\doind {vr}{\code{##1}}}%
\tablecheck{vtable}%
}
\def\tablecheck#1{%
 \ifnum \the\catcode`\^^M=\active
   \endgroup
   \errmessage{This command won't work in this context; perhaps the problem is
     that we are \inenvironment\thisenv}%
   \def\next{\doignore{#1}}%
 \else
   \let\next\tablex
 \fi
 \next
}
\def\tablex#1{%
 \def\itemindicate{#1}%
 \parsearg\tabley
}
\def\tabley#1{%
 {%
   \makevalueexpandable
   \edef\temp{\noexpand\tablez #1\space\space\space}%
   \expandafter
 }\temp \endtablez
}
\def\tablez #1 #2 #3 #4\endtablez{%
 \aboveenvbreak
 \ifnum 0#1>0 \advance \leftskip by #1\mil \fi
 \ifnum 0#2>0 \tableindent=#2\mil \fi
 \ifnum 0#3>0 \advance \rightskip by #3\mil \fi
 \itemmax=\tableindent
 \advance \itemmax by -\itemmargin
 \advance \leftskip by \tableindent
 \exdentamount=\tableindent
 \parindent = 0pt
 \parskip = \smallskipamount
 \ifdim \parskip=0pt \parskip=2pt \fi
 \let\item = \internalBitem
 \let\itemx = \internalBitemx
}
\def\Etable{\endgraf\afterenvbreak}
\let\Eftable\Etable
\let\Evtable\Etable
\let\Eitemize\Etable
\let\Eenumerate\Etable

% This is the counter used by @enumerate, which is really @itemize
```

```
\newcount \itemno

\envdef\itemize{\parsearg\doitemize}

\def\doitemize#1{%
 \aboveenvbreak
 \itemmax=\itemindent
 \advance\itemmax by -\itemmargin
 \advance\leftskip by \itemindent
 \exdentamount=\itemindent
 \parindent=0pt
 \parskip=\smallskipamount
 \ifdim\parskip=0pt \parskip=2pt \fi
 %
 % Try typesetting the item mark that if the document erroneously says
 % something like @itemize @samp (intending @table), there's an error
 % right away at the @itemize.  It's not the best error message in the
 % world, but it's better than leaving it to the @item.  This means if
 % the user wants an empty mark, they have to say @w{ } not just @w.
 \def\itemcontents{#1}%
 \setbox0 = \hbox{\itemcontents}%
 %
 % @itemize with no arg is equivalent to @itemize @bullet.
 \ifx\itemcontents\empty\def\itemcontents{\bullet}\fi
 %
 \let\item=\itemizeitem
 }

% Definition of @item while inside @itemize and @enumerate.
%
\def\itemizeitem{%
 \advance\itemno by 1  % for enumerations
 {\let\par=\endgraf \smallbreak}% reasonable place to break
 {%
  % If the document has an @itemize directly after a section title, a
  % \nobreak will be last on the list, and \sectionheading will have
  % done a \vskip-\parskip.  In that case, we don't want to zero
  % parskip, or the item text will crash with the heading.  On the
  % other hand, when there is normal text preceding the item (as there
  % usually is), we do want to zero parskip, or there would be too much
  % space.  In that case, we won't have a \nobreak before.  At least
  % that's the theory.
  \ifnum\lastpenalty<10000 \parskip=0in \fi
  \noindent
  \hbox to 0pt{\hss \itemcontents \kern\itemmargin}%
  %
  \vadjust{\penalty 1200}}% not good to break after first line of item.
 \flushcr
```

```
}

% \splitoff TOKENS\endmark defines \first to be the first token in
% TOKENS, and \rest to be the remainder.
%
\def\splitoff#1#2\endmark{\def\first{#1}\def\rest{#2}}%

% Allow an optional argument of an uppercase letter, lowercase letter,
% or number, to specify the first label in the enumerated list.  No
% argument is the same as `1'.
%
\envparseargdef\enumerate{\enumeratey #1  \endenumeratey}
\def\enumeratey #1 #2\endenumeratey{%
 % If we were given no argument, pretend we were given `1'.
 \def\thearg{#1}%
 \ifx\thearg\empty \def\thearg{1}\fi
 %
 % Detect if the argument is a single token.  If so, it might be a
 % letter.  Otherwise, the only valid thing it can be is a number.
 % (We will always have one token, because of the test we just made.
 % This is a good thing, since \splitoff doesn't work given nothing at
 % all -- the first parameter is undelimited.)
 \expandafter\splitoff\thearg\endmark
 \ifx\rest\empty
  % Only one token in the argument.  It could still be anything.
  % A ``lowercase letter'' is one whose \lccode is nonzero.
  % An ``uppercase letter'' is one whose \lccode is both nonzero, and
  %   not equal to itself.
  % Otherwise, we assume it's a number.
  %
  % We need the \relax at the end of the \ifnum lines to stop TeX from
  % continuing to look for a <number>.
  %
  \ifnum\lccode\expandafter`\thearg=0\relax
   \numericenumerate % a number (we hope)
  \else
   % It's a letter.
   \ifnum\lccode\expandafter`\thearg=\expandafter`\thearg\relax
    \lowercaseenumerate % lowercase letter
   \else
    \uppercaseenumerate % uppercase letter
   \fi
  \fi
 \else
  % Multiple tokens in the argument.  We hope it's a number.
  \numericenumerate
 \fi
}
```

```
% An @enumerate whose labels are integers.  The starting integer is
% given in \thearg.
%
\def\numericenumerate{%
 \itemno = \thearg
 \startenumeration{\the\itemno}%
}


% The starting (lowercase) letter is in \thearg.
\def\lowercaseenumerate{%
 \itemno = \expandafter`\thearg
 \startenumeration{%
   % Be sure we're not beyond the end of the alphabet.
   \ifnum\itemno=0
     \errmessage{No more lowercase letters in @enumerate; get a bigger
           alphabet}%
   \fi
   \char\lccode\itemno
 }%
}


% The starting (uppercase) letter is in \thearg.
\def\uppercaseenumerate{%
 \itemno = \expandafter`\thearg
 \startenumeration{%
   % Be sure we're not beyond the end of the alphabet.
   \ifnum\itemno=0
     \errmessage{No more uppercase letters in @enumerate; get a bigger
           alphabet}
   \fi
   \char\uccode\itemno
 }%
}


% Call \doitemize, adding a period to the first argument and supplying the
% common last two arguments.  Also subtract one from the initial value in
% \itemno, since @item increments \itemno.
%
\def\startenumeration#1{%
 \advance\itemno by -1
 \doitemize{#1.}\flushcr
}


% @alphaenumerate and @capsenumerate are abbreviations for giving an arg
% to @enumerate.
%
\def\alphaenumerate{\enumerate{a}}
```

\def\capsenumerate{\enumerate{A}}
\def\Ealphaenumerate{\Eenumerate}
\def\Ecapsenumerate{\Eenumerate}

% @multitable macros
% Amy Hendrickson, 8/18/94, 3/6/96
%
% @multitable ... @end multitable will make as many columns as desired.
% Contents of each column will wrap at width given in preamble. Width
% can be specified either with sample text given in a template line,
% or in percent of \hsize, the current width of text on page.

% Table can continue over pages but will only break between lines.

% To make preamble:
%
% Either define widths of columns in terms of percent of \hsize:
%   @multitable @columnfractions .25 .3 .45
%   @item ...
%
%   Numbers following @columnfractions are the percent of the total
%   current hsize to be used for each column. You may use as many
%   columns as desired.

% Or use a template:
%   @multitable {Column 1 template} {Column 2 template} {Column 3 template}
%   @item ...
%   using the widest term desired in each column.

% Each new table line starts with @item, each subsequent new column
% starts with @tab. Empty columns may be produced by supplying @tab's
% with nothing between them for as many times as empty columns are needed,
% ie, @tab@tab@tab will produce two empty columns.

% @item, @tab do not need to be on their own lines, but it will not hurt
% if they are.

% Sample multitable:

%   @multitable {Column 1 template} {Column 2 template} {Column 3 template}
%   @item first col stuff @tab second col stuff @tab third col
%   @item
%   first col stuff
%   @tab
%   second col stuff
%   @tab

```
%   third col
%   @item first col stuff @tab second col stuff
%   @tab Many paragraphs of text may be used in any column.
%
%        They will wrap at the width determined by the template.
%   @item@tab@tab This will be in third column.
%   @end multitable

% Default dimensions may be reset by user.
% @multitableparskip is vertical space between paragraphs in table.
% @multitableparindent is paragraph indent in table.
% @multitablecolmargin is horizontal space to be left between columns.
% @multitablelinespace is space to leave between table items, baseline
%                                            to baseline.
%   0pt means it depends on current normal line spacing.
%
\newskip\multitableparskip
\newskip\multitableparindent
\newdimen\multitablecolspace
\newskip\multitablelinespace
\multitableparskip=0pt
\multitableparindent=6pt
\multitablecolspace=12pt
\multitablelinespace=0pt

% Macros used to set up halign preamble:
%
\let\endsetuptable\relax
\def\xendsetuptable{\endsetuptable}
\let\columnfractions\relax
\def\xcolumnfractions{\columnfractions}
\newif\ifsetpercent

% #1 is the @columnfraction, usually a decimal number like .5, but might
% be just 1.  We just use it, whatever it is.
%
\def\pickupwholefraction#1 {%
 \global\advance\colcount by 1
 \expandafter\xdef\csname col\the\colcount\endcsname{#1\hsize}%
 \setuptable
}

\newcount\colcount
\def\setuptable#1{%
 \def\firstarg{#1}%
 \ifx\firstarg\xendsetuptable
  \let\go = \relax
 \else
```

```
  \ifx\firstarg\xcolumnfractions
    \global\setpercenttrue
  \else
    \ifsetpercent
      \let\go\pickupwholefraction
    \else
      \global\advance\colcount by 1
      \setbox0=\hbox{#1\unskip\space}% Add a normal word space as a
             % separator; typically that is always in the input, anyway.
      \expandafter\xdef\csname col\the\colcount\endcsname{\the\wd0}%
    \fi
  \fi
  \ifx\go\pickupwholefraction
    % Put the argument back for the \pickupwholefraction call, so
    % we'll always have a period there to be parsed.
    \def\go{\pickupwholefraction#1}%
  \else
    \let\go = \setuptable
  \fi%
 \fi
 \go
}


% multitable-only commands.
%
% @headitem starts a heading row, which we typeset in bold.
% Assignments have to be global since we are inside the implicit group
% of an alignment entry.  \everycr resets \everytab so we don't have to
% undo it ourselves.
\def\headitemfont{\b}% for people to use in the template row; not changeable
\def\headitem{%
 \checkenv\multitable
 \crcr
 \global\everytab={\bf}% can't use \headitemfont since the parsing differs
 \the\everytab % for the first item
}%
%
% A \tab used to include \hskip1sp.  But then the space in a template
% line is not enough.  That is bad.  So let's go back to just `&' until
% we again encounter the problem the 1sp was intended to solve.
%     --karl, nathan@acm.org, 20apr99.
\def\tab{\checkenv\multitable &\the\everytab}%

% @multitable ... @end multitable definitions:
%
\newtoks\everytab  % insert after every tab.
%
\envdef\multitable{%
```

```
\vskip\parskip
\startsavinginserts
%
% @item within a multitable starts a normal row.
% We use \def instead of \let so that if one of the multitable entries
% contains an @itemize, we don't choke on the \item (seen as \crcr aka
% \endtemplate) expanding \doitemize.
\def\item{\crcr}%
%
\tolerance=9500
\hbadness=9500
\setmultitablespacing
\parskip=\multitableparskip
\parindent=\multitableparindent
\overfullrule=0pt
\global\colcount=0
%
\everycr = {%
  \noalign{%
    \global\everytab={}%
    \global\colcount=0 % Reset the column counter.
    % Check for saved footnotes, etc.
    \checkinserts
    % Keeps underfull box messages off when table breaks over pages.
    %\filbreak
% Maybe so, but it also creates really weird page breaks when the
% table breaks over pages. Wouldn't \vfil be better?  Wait until the
% problem manifests itself, so it can be fixed for real --karl.
    }%
  }%
%
\parsearg\domultitable
}
\def\domultitable#1{%
% To parse everything between @multitable and @item:
\setuptable#1 \endsetuptable
%
% This preamble sets up a generic column definition, which will
% be used as many times as user calls for columns.
% \vtop will set a single line and will also let text wrap and
% continue for many paragraphs if desired.
\halign\bgroup &%
  \global\advance\colcount by 1
  \multistrut
  \vtop{%
    % Use the current \colcount to find the correct column width:
    \hsize=\expandafter\csname col\the\colcount\endcsname
    %
```

```
% In order to keep entries from bumping into each other
% we will add a \leftskip of \multitablecolspace to all columns after
% the first one.
%
% If a template has been used, we will add \multitablecolspace
% to the width of each template entry.
%
% If the user has set preamble in terms of percent of \hsize we will
% use that dimension as the width of the column, and the \leftskip
% will keep entries from bumping into each other.  Table will start at
% left margin and final column will justify at right margin.
%
% Make sure we don't inherit \rightskip from the outer environment.
\rightskip=0pt
\ifnum\colcount=1
% The first column will be indented with the surrounding text.
\advance\hsize by\leftskip
   \else
\ifsetpercent \else
  % If user has not set preamble in terms of percent of \hsize
  % we will advance \hsize by \multitablecolspace.
  \advance\hsize by \multitablecolspace
\fi
    % In either case we will make \leftskip=\multitablecolspace:
   \leftskip=\multitablecolspace
   \fi
   % Ignoring space at the beginning and end avoids an occasional spurious
   % blank line, when TeX decides to break the line at the space before the
   % box from the multistrut, so the strut ends up on a line by itself.
   % For example:
   % @multitable @columnfractions .11 .89
   % @item @code{#}
   % @tab Legal holiday which is valid in major parts of the whole country.
   % Is automatically provided with highlighting sequences respectively
   % marking characters.
   \noindent\ignorespaces##\unskip\multistrut
  }\cr
}
\def\Emultitable{%
\crcr
\egroup % end the \halign
\global\setpercentfalse
}

\def\setmultitablespacing{%
\def\multistrut{\strut}% just use the standard line spacing
%
% Compute \multitablelinespace (if not defined by user) for use in
```

```
% \multitableparskip calculation.  We used define \multistrut based on
% this, but (ironically) that caused the spacing to be off.
% See bug-texinfo report from Werner Lemberg, 31 Oct 2004 12:52:20 +0100.
\ifdim\multitablelinespace=0pt
\setbox0=\vbox{X}\global\multitablelinespace=\the\baselineskip
\global\advance\multitablelinespace by-\ht0
\fi
% Test to see if parskip is larger than space between lines of
% table. If not, do nothing.
%        If so, set to same dimension as multitablelinespace.
\ifdim\multitableparskip>\multitablelinespace
\global\multitableparskip=\multitablelinespace
\global\advance\multitableparskip-7pt % to keep parskip somewhat smaller
                        % than skip between lines in the table.
\fi%
\ifdim\multitableparskip=0pt
\global\multitableparskip=\multitablelinespace
\global\advance\multitableparskip-7pt % to keep parskip somewhat smaller
                        % than skip between lines in the table.
\fi}


\message{conditionals,}

% @iftex, @ifnotdocbook, @ifnothtml, @ifnotinfo, @ifnotplaintext,
% @ifnotxml always succeed.  They currently do nothing; we don't
% attempt to check whether the conditionals are properly nested.  But we
% have to remember that they are conditionals, so that @end doesn't
% attempt to close an environment group.
%
\def\makecond#1{%
 \expandafter\let\csname #1\endcsname = \relax
 \expandafter\let\csname iscond.#1\endcsname = 1
}
\makecond{iftex}
\makecond{ifnotdocbook}
\makecond{ifnothtml}
\makecond{ifnotinfo}
\makecond{ifnotplaintext}
\makecond{ifnotxml}

% Ignore @ignore, @ifhtml, @ifinfo, and the like.
%
\def\direntry{\doignore{direntry}}
\def\documentdescription{\doignore{documentdescription}}
\def\docbook{\doignore{docbook}}
\def\html{\doignore{html}}
\def\ifdocbook{\doignore{ifdocbook}}
```

```
\def\ifhtml{\doignore{ifhtml}}
\def\ifinfo{\doignore{ifinfo}}
\def\ifnottex{\doignore{ifnottex}}
\def\ifplaintext{\doignore{ifplaintext}}
\def\ifxml{\doignore{ifxml}}
\def\ignore{\doignore{ignore}}
\def\menu{\doignore{menu}}
\def\xml{\doignore{xml}}

% Ignore text until a line `@end #1', keeping track of nested conditionals.
%
% A count to remember the depth of nesting.
\newcount\doignorecount

\def\doignore#1{\begingroup
 % Scan in ``verbatim'' mode:
 \obeylines
 \catcode`\@ = \other
 \catcode`\{ = \other
 \catcode`\} = \other
 %
 % Make sure that spaces turn into tokens that match what \doignoretext wants.
 \spaceisspace
 %
 % Count number of #1's that we've seen.
 \doignorecount = 0
 %
 % Swallow text until we reach the matching `@end #1'.
 \dodoignore{#1}%
}

{ \catcode`\_=11 % We want to use \_STOP_ which cannot appear in texinfo source.
\obeylines %
%
\gdef\dodoignore#1{%
  % #1 contains the command name as a string, e.g., `ifinfo'.
  %
  % Define a command to find the next `@end #1'.
  \long\def\doignoretext##1^^M@end #1{%
    \doignoretextyyy##1^^M@#1\_STOP_}%
  %
  % And this command to find another #1 command, at the beginning of a
  % line.  (Otherwise, we would consider a line `@c @ifset', for
  % example, to count as an @ifset for nesting.)
  \long\def\doignoretextyyy##1^^M@#1##2\_STOP_{\doignoreyyy{##2}\_STOP_}%
  %
  % And now expand that command.
  \doignoretext ^^M%
```

```
}%
}

\def\doignoreyyy#1{%
 \def\temp{#1}%
 \ifx\temp\empty   % Nothing found.
   \let\next\doignoretextzzz
 \else    % Found a nested condition, ...
   \advance\doignorecount by 1
   \let\next\doignoretextyyy  % ..., look for another.
     % If we're here, #1 ends with ^^M\ifinfo (for example).
 \fi
 \next #1% the token \_STOP_ is present just after this macro.
}

% We have to swallow the remaining "\_STOP_".
%
\def\doignoretextzzz#1{%
 \ifnum\doignorecount = 0 % We have just found the outermost @end.
   \let\next\enddoignore
 \else    % Still inside a nested condition.
   \advance\doignorecount by -1
   \let\next\doignoretext     % Look for the next @end.
 \fi
 \next
}

% Finish off ignored text.
{ \obeylines%
 % Ignore anything after the last `@end #1'; this matters in verbatim
 % environments, where otherwise the newline after an ignored conditional
 % would result in a blank line in the output.
 \gdef\enddoignore#1^^M{\endgroup\ignorespaces}%
}


% @set VAR sets the variable VAR to an empty value.
% @set VAR REST-OF-LINE sets VAR to the value REST-OF-LINE.
%
% Since we want to separate VAR from REST-OF-LINE (which might be
% empty), we can't just use \parsearg; we have to insert a space of our
% own to delimit the rest of the line, and then take it out again if we
% didn't need it.
% We rely on the fact that \parsearg sets \catcode`\ =10.
%
\parseargdef\set{\setyyy#1 \endsetyyy}
\def\setyyy#1 #2\endsetyyy{%
 {%
```

```
  \makevalueexpandable
  \def\temp{#2}%
  \edef\next{\gdef\makecsname{SET#1}}%
  \ifx\temp\empty
    \next{}%
  \else
    \setzzz#2\endsetzzz
  \fi
 }%
}
% Remove the trailing space \setxxx inserted.
\def\setzzz#1 \endsetzzz{\next{#1}}


% @clear VAR clears (i.e., unsets) the variable VAR.
%
\parseargdef\clear{%
 {%
  \makevalueexpandable
  \global\expandafter\let\csname SET#1\endcsname=\relax
 }%
}


% @value{foo} gets the text saved in variable foo.
\def\value{\begingroup\makevalueexpandable\valuexxx}
\def\valuexxx#1{\expandablevalue{#1}\endgroup}
{
\catcode`\- = \active \catcode`\_ = \active
%
\gdef\makevalueexpandable{%
  \let\value = \expandablevalue
  % We don't want these characters active, ...
  \catcode`\-=\other \catcode`\_=\other
  % ..., but we might end up with active ones in the argument if
  % we're called from @code, as @code{@value{foo-bar_}}, though.
  % So \let them to their normal equivalents.
  \let-\normaldash \let_\normalunderscore
}
}


% We have this subroutine so that we can handle at least some @value's
% properly in indexes (we call \makevalueexpandable in \indexdummies).
% The command has to be fully expandable (if the variable is set), since
% the result winds up in the index file.  This means that if the
% variable's value contains other Texinfo commands, it's almost certain
% it will fail (although perhaps we could fix that with sufficient work
% to do a one-level expansion on the result, instead of complete).
%
\def\expandablevalue#1{%
```

```
\expandafter\ifx\csname SET#1\endcsname\relax
  {[No value for ``#1'']}%
  \message{Variable `#1', used in @value, is not set.}%
\else
  \csname SET#1\endcsname
\fi
}


% @ifset VAR ... @end ifset reads the `...' iff VAR has been defined
% with @set.
%
% To get special treatment of `@end ifset,' call \makeond and the redefine.
%
\makecond{ifset}
\def\ifset{\parsearg{\doifset{\let\next=\ifsetfail}}}
\def\doifset#1#2{%
 {%
  \makevalueexpandable
  \let\next=\empty
  \expandafter\ifx\csname SET#2\endcsname\relax
    #1% If not set, redefine \next.
  \fi
  \expandafter
 }\next
}
\def\ifsetfail{\doignore{ifset}}


% @ifclear VAR ... @end executes the `...' iff VAR has never been
% defined with @set, or has been undefined with @clear.
%
% The `\else' inside the `\doifset' parameter is a trick to reuse the
% above code: if the variable is not set, do nothing, if it is set,
% then redefine \next to \ifclearfail.
%
\makecond{ifclear}
\def\ifclear{\parsearg{\doifset{\else \let\next=\ifclearfail}}}
\def\ifclearfail{\doignore{ifclear}}


% @ifcommandisdefined CMD ... @end executes the `...' if CMD (written
% without the @) is in fact defined.  We can only feasibly check at the
% TeX level, so something like `mathcode' is going to considered
% defined even though it is not a Texinfo command.
%
\makecond{ifcommanddefined}
\def\ifcommanddefined{\parsearg{\doifcmddefined{\let\next=\ifcmddefinedfail}}}
%
\def\doifcmddefined#1#2{{%
  \makevalueexpandable
```

```
    \let\next=\empty
    \expandafter\ifx\csname #2\endcsname\relax
      #1% If not defined, \let\next as above.
    \fi
    \expandafter
  }\next
}
\def\ifcmddefinedfail{\doignore{ifcommanddefined}}

% @ifcommandnotdefined CMD ... handled similar to @ifclear above.
\makecond{ifcommandnotdefined}
\def\ifcommandnotdefined{%
 \parsearg{\doifcmddefined{\else \let\next=\ifcmdnotdefinedfail}}}
\def\ifcmdnotdefinedfail{\doignore{ifcommandnotdefined}}

% Set the `txicommandconditionals' variable, so documents have a way to
% test if the @ifcommand...defined conditionals are available.
\set txicommandconditionals

% @dircategory CATEGORY  -- specify a category of the dir file
% which this file should belong to.  Ignore this in TeX.
\let\dircategory=\comment

% @defininfoenclose.
\let\definfoenclose=\comment


\message{indexing,}
% Index generation facilities

% Define \newwrite to be identical to plain tex's \newwrite
% except not \outer, so it can be used within macros and \if's.
\edef\newwrite{\makecsname{ptexnewwrite}}

% \newindex {foo} defines an index named foo.
% It automatically defines \fooindex such that
% \fooindex ...rest of line... puts an entry in the index foo.
% It also defines \fooindfile to be the number of the output channel for
% the file that accumulates this index.  The file's extension is foo.
% The name of an index should be no more than 2 characters long
% for the sake of vms.
%
\def\newindex#1{%
 \iflinks
   \expandafter\newwrite \csname#1indfile\endcsname
   \openout \csname#1indfile\endcsname \jobname.#1 % Open the file
 \fi
 \expandafter\xdef\csname#1index\endcsname{%     % Define @#1index
```

```
   \noexpand\doindex{#1}}
}

% @defindex foo  ==  \newindex{foo}
%
\def\defindex{\parsearg\newindex}

% Define @defcodeindex, like @defindex except put all entries in @code.
%
\def\defcodeindex{\parsearg\newcodeindex}
%
\def\newcodeindex#1{%
 \iflinks
   \expandafter\newwrite \csname#1indfile\endcsname
   \openout \csname#1indfile\endcsname \jobname.#1
 \fi
 \expandafter\xdef\csname#1index\endcsname{%
   \noexpand\docodeindex{#1}}%
}


% @synindex foo bar    makes index foo feed into index bar.
% Do this instead of @defindex foo if you don't want it as a separate index.
%
% @syncodeindex foo bar   similar, but put all entries made for index foo
% inside @code.
%
\def\synindex#1 #2 {\dosynindex\doindex{#1}{#2}}
\def\syncodeindex#1 #2 {\dosynindex\docodeindex{#1}{#2}}

% #1 is \doindex or \docodeindex, #2 the index getting redefined (foo),
% #3 the target index (bar).
\def\dosynindex#1#2#3{%
 % Only do \closeout if we haven't already done it, else we'll end up
 % closing the target index.
 \expandafter \ifx\csname donesynindex#2\endcsname \relax
   % The \closeout helps reduce unnecessary open files; the limit on the
   % Acorn RISC OS is a mere 16 files.
   \expandafter\closeout\csname#2indfile\endcsname
   \expandafter\let\csname donesynindex#2\endcsname = 1
 \fi
 % redefine \fooindfile:
 \expandafter\let\expandafter\temp\expandafter=\csname#3indfile\endcsname
 \expandafter\let\csname#2indfile\endcsname=\temp
 % redefine \fooindex:
 \expandafter\xdef\csname#2index\endcsname{\noexpand#1{#3}}%
}
```

% Define \doindex, the driver for all \fooindex macros.

% Argument #1 is generated by the calling \fooindex macro,

% and it is "foo", the name of the index.

% \doindex just uses \parsearg; it calls \doind for the actual work.

% This is because \doind is more useful to call from other macros.

% There is also \dosubind {index}{topic}{subtopic}

% which makes an entry in a two-level index such as the operation index.

\def\doindex#1{\edef\indexname{#1}\parsearg\singleindexer}

\def\singleindexer #1{\doind{\indexname}{#1}}

% like the previous two, but they put @code around the argument.

\def\docodeindex#1{\edef\indexname{#1}\parsearg\singlecodeindexer}

\def\singlecodeindexer #1{\doind{\indexname}{\code{#1}}}

% Take care of Texinfo commands that can appear in an index entry.

% Since there are some commands we want to expand, and others we don't,

% we have to laboriously prevent expansion for those that we don't.

%

\def\indexdummies{%

\escapechar = `\\   % use backslash in output files.

\def\@{@}% change to @@ when we switch to @ as escape char in index files.

\def\ {\realbackslash\space }%

%

% Need these unexpandable (because we define \tt as a dummy)

% definitions when @{ or @} appear in index entry text. Also, more

% complicated, when \tex is in effect and \{ is a \delimiter again.

% We can't use \lbracecmd and \rbracecmd because texindex assumes

% braces and backslashes are used only as delimiters. Perhaps we

% should define @lbrace and @rbrace commands a la @comma.

\def\{{{\tt\char123}}%

\def\}{{\tt\char125}}%

%

% I don't entirely understand this, but when an index entry is

% generated from a macro call, the \endinput which \scanmacro inserts

% causes processing to be prematurely terminated. This is,

% apparently, because \indexsorttmp is fully expanded, and \endinput

% is an expandable command. The redefinition below makes \endinput

% disappear altogether for that purpose -- although logging shows that

% processing continues to some further point. On the other hand, it

% seems \endinput does not hurt in the printed index arg, since that

% is still getting written without apparent harm.

%

% Sample source (mac-idx3.tex, reported by Graham Percival to

% help-texinfo, 22may06):

% @macro funindex {WORD}

```
% @findex xyz
% @end macro
% ...
% @funindex commtest
%
% The above is not enough to reproduce the bug, but it gives the flavor.
%
% Sample whatsit resulting:
% .@write3{\entry{xyz}{@folio }{@code {xyz@endinput }}}
%
% So:
\let\endinput = \empty
%
% Do the redefinitions.
\commondummies
}


% For the aux and toc files, @ is the escape character.  So we want to
% redefine everything using @ as the escape character (instead of
% \realbackslash, still used for index files).  When everything uses @,
% this will be simpler.
%
\def\atdummies{%
 \def\@{@@}%
 \def\ {@ }%
 \let\{ = \lbraceatcmd
 \let\} = \rbraceatcmd
 %
 % Do the redefinitions.
 \commondummies
 \otherbackslash
}


% Called from \indexdummies and \atdummies.
%
\def\commondummies{%
 %
 % \definedummyword defines \#1 as \string\#1\space, thus effectively
 % preventing its expansion.  This is used only for control words,
 % not control letters, because the \space would be incorrect for
 % control characters, but is needed to separate the control word
 % from whatever follows.
 %
 % For control letters, we have \definedummyletter, which omits the
 % space.
 %
 % These can be used both for control words that take an argument and
 % those that do not.  If it is followed by {arg} in the input, then
```

% that will dutifully get written to the index (or wherever).
%
\def\definedummyword ##1{\def##1{\string##1\space}}%
\def\definedummyletter##1{\def##1{\string##1}}%
\let\definedummyaccent\definedummyletter
%
\commondummiesnofonts
%
\definedummyletter_%
\definedummyletter\-%
%
% Non-English letters.
\definedummyword\AA
\definedummyword\AE
\definedummyword\DH
\definedummyword\L
\definedummyword\O
\definedummyword\OE
\definedummyword\TH
\definedummyword\aa
\definedummyword\ae
\definedummyword\dh
\definedummyword\exclamdown
\definedummyword\l
\definedummyword\o
\definedummyword\oe
\definedummyword\ordf
\definedummyword\ordm
\definedummyword\questiondown
\definedummyword\ss
\definedummyword\th
%
% Although these internal commands shouldn't show up, sometimes they do.
\definedummyword\bf
\definedummyword\gtr
\definedummyword\hat
\definedummyword\less
\definedummyword\sf
\definedummyword\sl
\definedummyword\tclose
\definedummyword\tt
%
\definedummyword\LaTeX
\definedummyword\TeX
%
% Assorted special characters.
\definedummyword\arrow
\definedummyword\bullet

```
\definedummyword\comma
\definedummyword\copyright
\definedummyword\registeredsymbol
\definedummyword\dots
\definedummyword\enddots
\definedummyword\entrybreak
\definedummyword\equiv
\definedummyword\error
\definedummyword\euro
\definedummyword\expansion
\definedummyword\geq
\definedummyword\guillemetleft
\definedummyword\guillemetright
\definedummyword\guilsinglleft
\definedummyword\guilsinglright
\definedummyword\lbracechar
\definedummyword\leq
\definedummyword\minus
\definedummyword\ogonek
\definedummyword\pounds
\definedummyword\point
\definedummyword\print
\definedummyword\quotedblbase
\definedummyword\quotedblleft
\definedummyword\quotedblright
\definedummyword\quoteleft
\definedummyword\quoteright
\definedummyword\quotesinglbase
\definedummyword\rbracechar
\definedummyword\result
\definedummyword\textdegree
%
% We want to disable all macros so that they are not expanded by \write.
\macrolist
%
\normalturnoffactive
%
% Handle some cases of @value -- where it does not contain any
% (non-fully-expandable) commands.
\makevalueexpandable
}

% \commondummiesnofonts: common to \commondummies and \indexnofonts.
%
\def\commondummiesnofonts{%
% Control letters and accents.
\definedummyletter\!%
\definedummyaccent\"%
```

```
\definedummyaccent\'%
\definedummyletter\*%
\definedummyaccent\,%
\definedummyletter\.%
\definedummyletter\/%
\definedummyletter\:%
\definedummyaccent\=%
\definedummyletter\?%
\definedummyaccent\^%
\definedummyaccent\`%
\definedummyaccent\~%
\definedummyword\u
\definedummyword\v
\definedummyword\H
\definedummyword\dotaccent
\definedummyword\ogonek
\definedummyword\ringaccent
\definedummyword\tieaccent
\definedummyword\ubaraccent
\definedummyword\udotaccent
\definedummyword\dotless
%
% Texinfo font commands.
\definedummyword\b
\definedummyword\i
\definedummyword\r
\definedummyword\sansserif
\definedummyword\sc
\definedummyword\slanted
\definedummyword\t
%
% Commands that take arguments.
\definedummyword\abbr
\definedummyword\acronym
\definedummyword\anchor
\definedummyword\cite
\definedummyword\code
\definedummyword\command
\definedummyword\dfn
\definedummyword\dmn
\definedummyword\email
\definedummyword\emph
\definedummyword\env
\definedummyword\file
\definedummyword\image
\definedummyword\indicateurl
\definedummyword\inforef
\definedummyword\kbd
```

```
\definedummyword\key
\definedummyword\math
\definedummyword\option
\definedummyword\pxref
\definedummyword\ref
\definedummyword\samp
\definedummyword\strong
\definedummyword\tie
\definedummyword\uref
\definedummyword\url
\definedummyword\var
\definedummyword\verb
\definedummyword\w
\definedummyword\xref
}

% \indexnofonts is used when outputting the strings to sort the index
% by, and when constructing control sequence names.  It eliminates all
% control sequences and just writes whatever the best ASCII sort string
% would be for a given command (usually its argument).
%
\def\indexnofonts{%
% Accent commands should become @asis.
\def\definedummyaccent##1{\let##1\asis}%
% We can just ignore other control letters.
\def\definedummyletter##1{\let##1\empty}%
% All control words become @asis by default; overrides below.
\let\definedummyword\definedummyaccent
%
\commondummiesnofonts
%
% Don't no-op \tt, since it isn't a user-level command
% and is used in the definitions of the active chars like <, >, |, etc.
% Likewise with the other plain tex font commands.
%\let\tt=\asis
%
\def\ { }%
\def\@{@}%
\def\_{\normalunderscore}%
\def\-{}% @- shouldn't affect sorting
%
% Unfortunately, texindex is not prepared to handle braces in the
% content at all.  So for index sorting, we map @{ and @} to strings
% starting with |, since that ASCII character is between ASCII { and }.
\def\{{|a}%
\def\lbracechar{|a}%
%
\def\}{|b}%
```

```
\def\rbracechar{|b}%
%
% Non-English letters.
\def\AA{AA}%
\def\AE{AE}%
\def\DH{DZZ}%
\def\L{L}%
\def\OE{OE}%
\def\O{O}%
\def\TH{ZZZ}%
\def\aa{aa}%
\def\ae{ae}%
\def\dh{dzz}%
\def\exclamdown{!}%
\def\l{l}%
\def\oe{oe}%
\def\ordf{a}%
\def\ordm{o}%
\def\o{o}%
\def\questiondown{?}%
\def\ss{ss}%
\def\th{zzz}%
%
\def\LaTeX{LaTeX}%
\def\TeX{TeX}%
%
% Assorted special characters.
% (The following {} will end up in the sort string, but that's ok.)
\def\arrow{->}%
\def\bullet{bullet}%
\def\comma{,}%
\def\copyright{copyright}%
\def\dots{...}%
\def\enddots{...}%
\def\equiv{==}%
\def\error{error}%
\def\euro{euro}%
\def\expansion{==>}%
\def\geq{>=}%
\def\guillemetleft{<<}%
\def\guillemetright{>>}%
\def\guilsinglleft{<}%
\def\guilsinglright{>}%
\def\leq{<=}%
\def\minus{-}%
\def\point{.}%
\def\pounds{pounds}%
\def\print{-|}%
```

```
\def\quotedblbase{"}%
\def\quotedblleft{"}%
\def\quotedblright{"}%
\def\quoteleft{`}%
\def\quoteright{'}%
\def\quotesinglbase{,}%
\def\registeredsymbol{R}%
\def\result{=>}%
\def\textdegree{o}%
%
\expandafter\ifx\csname SETtxiindexlquoteignore\endcsname\relax
\else \indexlquoteignore \fi
%
% We need to get rid of all macros, leaving only the arguments (if present).
% Of course this is not nearly correct, but it is the best we can do for now.
% makeinfo does not expand macros in the argument to @deffn, which ends up
% writing an index entry, and texindex isn't prepared for an index sort entry
% that starts with \.
%
% Since macro invocations are followed by braces, we can just redefine them
% to take a single TeX argument.  The case of a macro invocation that
% goes to end-of-line is not handled.
%
\macrolist
}


% Undocumented (for FSFS 2nd ed.): @set txiindexlquoteignore makes us
% ignore left quotes in the sort term.
{\catcode`\`=\active
\gdef\indexlquoteignore{\let`=\empty}}


\let\indexbackslash=0  %overridden during \printindex.
\let\SETmarginindex=\relax % put index entries in margin (undocumented)?


% Most index entries go through here, but \dosubind is the general case.
% #1 is the index name, #2 is the entry text.
\def\doind#1#2{\dosubind{#1}{#2}{}}


% Workhorse for all \fooindexes.
% #1 is name of index, #2 is stuff to put there, #3 is subentry --
% empty if called from \doind, as we usually are (the main exception
% is with most defuns, which call us directly).
%
\def\dosubind#1#2#3{%
\iflinks
{%
  % Store the main index entry text (including the third arg).
  \toks0 = {#2}%
```

```
  % If third arg is present, precede it with a space.
  \def\thirdarg{#3}%
  \ifx\thirdarg\empty \else
    \toks0 = \expandafter{\the\toks0 \space #3}%
  \fi
  %
  \edef\writeto{\csname#1indfile\endcsname}%
  %
  \safewhatsit\dosubindwrite
 }%
\fi
}


% Write the entry in \toks0 to the index file:
%
\def\dosubindwrite{%
 % Put the index entry in the margin if desired.
 \ifx\SETmarginindex\relax\else
   \insert\margin{\hbox{\vrule height8pt depth3pt width0pt \the\toks0}}%
 \fi
 %
 % Remember, we are within a group.
 \indexdummies % Must do this here, since \bf, etc expand at this stage
 \def\backslashcurfont{\indexbackslash}% \indexbackslash isn't defined now
    % so it will be output as is; and it will print as backslash.
 %
 % Process the index entry with all font commands turned off, to
 % get the string to sort by.
 {\indexnofonts
  \edef\temp{\the\toks0}% need full expansion
  \xdef\indexsorttmp{\temp}%
 }%
 %
 % Set up the complete index entry, with both the sort key and
 % the original text, including any font commands.  We write
 % three arguments to \entry to the .?? file (four in the
 % subentry case), texindex reduces to two when writing the .??s
 % sorted result.
 \edef\temp{%
  \write\writeto{%
    \string\entry{\indexsorttmp}{\noexpand\folio}{\the\toks0}}%
 }%
 \temp
}


% Take care of unwanted page breaks/skips around a whatsit:
%
% If a skip is the last thing on the list now, preserve it
```

% by backing up by \lastskip, doing the \write, then inserting
% the skip again. Otherwise, the whatsit generated by the
% \write or \pdfdest will make \lastskip zero. The result is that
% sequences like this:
% @end defun
% @tindex whatever
% @defun ...
% will have extra space inserted, because the \medbreak in the
% start of the @defun won't see the skip inserted by the @end of
% the previous defun.
%
% But don't do any of this if we're not in vertical mode. We
% don't want to do a \vskip and prematurely end a paragraph.
%
% Avoid page breaks due to these extra skips, too.
%
% But wait, there is a catch there:
% We'll have to check whether \lastskip is zero skip. \ifdim is not
% sufficient for this purpose, as it ignores stretch and shrink parts
% of the skip. The only way seems to be to check the textual
% representation of the skip.
%
% The following is almost like \def\zeroskipmacro{0.0pt} except that
% the ``p'' and ``t'' characters have catcode \other, not 11 (letter).
%
\edef\zeroskipmacro{\expandafter\the\csname z@skip\endcsname}
%
\newskip\whatsitskip
\newcount\whatsitpenalty
%
% ..., ready, GO:
%
\def\safewhatsit#1{\ifhmode
 #1%
\else
 % \lastskip and \lastpenalty cannot both be nonzero simultaneously.
 \whatsitskip = \lastskip
 \edef\lastskipmacro{\the\lastskip}%
 \whatsitpenalty = \lastpenalty
 %
 % If \lastskip is nonzero, that means the last item was a
 % skip. And since a skip is discardable, that means this
 % -\whatsitskip glue we're inserting is preceded by a
 % non-discardable item, therefore it is not a potential
 % breakpoint, therefore no \nobreak needed.
 \ifx\lastskipmacro\zeroskipmacro
 \else
   \vskip-\whatsitskip

```
\fi
%
#1%
%
\ifx\lastskipmacro\zeroskipmacro
  % If \lastskip was zero, perhaps the last item was a penalty, and
  % perhaps it was >=10000, e.g., a \nobreak.  In that case, we want
  % to re-insert the same penalty (values >10000 are used for various
  % signals); since we just inserted a non-discardable item, any
  % following glue (such as a \parskip) would be a breakpoint.  For example:
  %   @deffn deffn-whatever
  %   @vindex index-whatever
  %   Description.
  % would allow a break between the index-whatever whatsit
  % and the "Description." paragraph.
  \ifnum\whatsitpenalty>9999 \penalty\whatsitpenalty \fi
\else
  % On the other hand, if we had a nonzero \lastskip,
  % this make-up glue would be preceded by a non-discardable item
  % (the whatsit from the \write), so we must insert a \nobreak.
  \nobreak\vskip\whatsitskip
\fi
\fi}

% The index entry written in the file actually looks like
% \entry {sortstring}{page}{topic}
% or
% \entry {sortstring}{page}{topic}{subtopic}
% The texindex program reads in these files and writes files
% containing these kinds of lines:
% \initial {c}
%    before the first topic whose initial is c
% \entry {topic}{pagelist}
%    for a topic that is used without subtopics
% \primary {topic}
%    for the beginning of a topic that is used with subtopics
% \secondary {subtopic}{pagelist}
%    for each subtopic.

% Define the user-accessible indexing commands
% @findex, @vindex, @kindex, @cindex.

\def\findex {\fnindex}
\def\kindex {\kyindex}
\def\cindex {\cpindex}
\def\vindex {\vrindex}
\def\tindex {\tpindex}
\def\pindex {\pgindex}
```

```
\def\cindexsub {\begingroup\obeylines\cindexsub}
{\obeylines %
\gdef\cindexsub "#1" #2^^M{\endgroup %
\dosubind{cp}{#2}{#1}}}


% Define the macros used in formatting output of the sorted index material.


% @printindex causes a particular index (the ??s file) to get printed.
% It does not print any chapter heading (usually an @unnumbered).
%
\parseargdef\printindex{\begingroup
 \dobreak \chapheadingskip{10000}%
%
\smallfonts \rm
\tolerance = 9500
\plainfrenchspacing
\everypar = {}% don't want the \kern\-parindent from indentation suppression.
%
% See if the index file exists and is nonempty.
% Change catcode of @ here so that if the index file contains
% \initial {@}
% as its first line, TeX doesn't complain about mismatched braces
% (because it thinks @} is a control sequence).
\catcode`\@ = 11
\openin 1 \jobname.#1s
\ifeof 1
  % \enddoublecolumns gets confused if there is no text in the index,
  % and it loses the chapter title and the aux file entries for the
  % index.  The easiest way to prevent this problem is to make sure
  % there is some text.
  \putwordIndexNonexistent
\else
  %
  % If the index file exists but is empty, then \openin leaves \ifeof
  % false.  We have to make TeX try to read something from the file, so
  % it can discover if there is anything in it.
  \read 1 to \temp
  \ifeof 1
    \putwordIndexIsEmpty
  \else
    % Index files are almost Texinfo source, but we use \ as the escape
    % character.  It would be better to use @, but that's too big a change
    % to make right now.
    \def\indexbackslash{\backslashcurfont}%
    \catcode`\\ = 0
    \escapechar = `\\
    \begindoublecolumns
```

```
    \input \jobname.#1s
    \enddoublecolumns
  \fi
\fi
\closein 1
\endgroup}


% These macros are used by the sorted index file itself.
% Change them to control the appearance of the index.


\def\initial#1{{%
 % Some minor font changes for the special characters.
 \let\tentt=\sectt \let\tt=\sectt \let\sf=\sectt
 %
 % Remove any glue we may have, we'll be inserting our own.
 \removelastskip
 %
 % We like breaks before the index initials, so insert a bonus.
 \nobreak
 \vskip 0pt plus 3\baselineskip
 \penalty 0
 \vskip 0pt plus -3\baselineskip
 %
 % Typeset the initial.  Making this add up to a whole number of
 % baselineskips increases the chance of the dots lining up from column
 % to column.  It still won't often be perfect, because of the stretch
 % we need before each entry, but it's better.
 %
 % No shrink because it confuses \balancecolumns.
 \vskip 1.67\baselineskip plus .5\baselineskip
 \leftline{\secbf #1}%
 % Do our best not to break after the initial.
 \nobreak
 \vskip .33\baselineskip plus .1\baselineskip
}}


% \entry typesets a paragraph consisting of the text (#1), dot leaders, and
% then page number (#2) flushed to the right margin.  It is used for index
% and table of contents entries.  The paragraph is indented by \leftskip.
%
% A straightforward implementation would start like this:
% \def\entry#1#2{...
% But this freezes the catcodes in the argument, and can cause problems to
% @code, which sets - active.  This problem was fixed by a kludge---
% ``-'' was active throughout whole index, but this isn't really right.
% The right solution is to prevent \entry from swallowing the whole text.
%                    --kasal, 21nov03
\def\entry{%
```

```
\begingroup
  %
  % Start a new paragraph if necessary, so our assignments below can't
  % affect previous text.
  \par
  %
  % Do not fill out the last line with white space.
  \parfillskip = 0in
  %
  % No extra space above this paragraph.
  \parskip = 0in
  %
  % Do not prefer a separate line ending with a hyphen to fewer lines.
  \finalhyphendemerits = 0
  %
  % \hangindent is only relevant when the entry text and page number
  % don't both fit on one line.  In that case, bob suggests starting the
  % dots pretty far over on the line.  Unfortunately, a large
  % indentation looks wrong when the entry text itself is broken across
  % lines.  So we use a small indentation and put up with long leaders.
  %
  % \hangafter is reset to 1 (which is the value we want) at the start
  % of each paragraph, so we need not do anything with that.
  \hangindent = 2em
  %
  % When the entry text needs to be broken, just fill out the first line
  % with blank space.
  \rightskip = 0pt plus1fil
  %
  % A bit of stretch before each entry for the benefit of balancing
  % columns.
  \vskip 0pt plus1pt
  %
  % When reading the text of entry, convert explicit line breaks
  % from @* into spaces.  The user might give these in long section
  % titles, for instance.
  \def\*{\unskip\space\ignorespaces}%
  \def\entrybreak{\hfil\break}%
  %
  % Swallow the left brace of the text (first parameter):
  \afterassignment\doentry
  \let\temp =
}
\def\entrybreak{\unskip\space\ignorespaces}%
\def\doentry{%
  \bgroup % Instead of the swallowed brace.
    \noindent
    \aftergroup\finishentry
```

```
  % And now comes the text of the entry.
}
\def\finishentry#1{%
  % #1 is the page number.
  %
  % The following is kludged to not output a line of dots in the index if
  % there are no page numbers.  The next person who breaks this will be
  % cursed by a Unix daemon.
  \setbox\boxA = \hbox{#1}%
  \ifdim\wd\boxA = 0pt
    \ %
  \else
    %
    % If we must, put the page number on a line of its own, and fill out
    % this line with blank space.  (The \hfil is overwhelmed with the
    % fill leaders glue in \indexdotfill if the page number does fit.)
    \hfil\penalty50
    \null\nobreak\indexdotfill % Have leaders before the page number.
    %
    % The `\ ' here is removed by the implicit \unskip that TeX does as
    % part of (the primitive) \par.  Without it, a spurious underfull
    % \hbox ensues.
    \ifpdf
\pdfgettoks#1.%
\ \the\toksA
    \else
\ #1%
    \fi
  \fi
  \par
\endgroup
}

% Like plain.tex's \dotfill, except uses up at least 1 em.
\def\indexdotfill{\cleaders
 \hbox{$\mathsurround=0pt \mkern1.5mu.\mkern1.5mu$}\hskip 1em plus 1fill}

\def\primary #1{\line{#1\hfil}}

\newskip\secondaryindent \secondaryindent=0.5cm
\def\secondary#1#2{{%
 \parfillskip=0in
 \parskip=0in
 \hangindent=1in
 \hangafter=1
 \noindent\hskip\secondaryindent\hbox{#1}\indexdotfill
 \ifpdf
  \pdfgettoks#2.\ \the\toksA % The page number ends the paragraph.
```

```
\else
  #2
\fi
\par
}}

% Define two-column mode, which we use to typeset indexes.
% Adapted from the TeXbook, page 416, which is to say,
% the manmac.tex format used to print the TeXbook itself.
\catcode`\@=11

\newbox\partialpage
\newdimen\doublecolumnhsize

\def\begindoublecolumns{\begingroup % ended by \enddoublecolumns
 % Grab any single-column material above us.
 \output = {%
   %
   % Here is a possibility not foreseen in manmac: if we accumulate a
   % whole lot of material, we might end up calling this \output
   % routine twice in a row (see the doublecol-lose test, which is
   % essentially a couple of indexes with @setchapternewpage off).  In
   % that case we just ship out what is in \partialpage with the normal
   % output routine.  Generally, \partialpage will be empty when this
   % runs and this will be a no-op.  See the indexspread.tex test case.
   \ifvoid\partialpage \else
     \onepageout{\pagecontents\partialpage}%
   \fi
   %
   \global\setbox\partialpage = \vbox{%
     % Unvbox the main output page.
     \unvbox\PAGE
     \kern-\topskip \kern\baselineskip
   }%
 }%
 \eject % run that output routine to set \partialpage
 %
 % Use the double-column output routine for subsequent pages.
 \output = {\doublecolumnout}%
 %
 % Change the page size parameters.  We could do this once outside this
 % routine, in each of @smallbook, @afourpaper, and the default 8.5x11
 % format, but then we repeat the same computation.  Repeating a couple
 % of assignments once per index is clearly meaningless for the
 % execution time, so we may as well do it in one place.
 %
 % First we halve the line length, less a little for the gutter between
 % the columns.  We compute the gutter based on the line length, so it
```

% changes automatically with the paper format. The magic constant
% below is chosen so that the gutter has the same value (well, +-<1pt)
% as it did when we hard-coded it.
%
% We put the result in a separate register, \doublecolumhsize, so we
% can restore it in \pagesofar, after \hsize itself has (potentially)
% been clobbered.
%
\doublecolumnhsize = \hsize
  \advance\doublecolumnhsize by -.04154\hsize
  \divide\doublecolumnhsize by 2
\hsize = \doublecolumnhsize
%
% Double the \vsize as well. (We don't need a separate register here,
% since nobody clobbers \vsize.)
\vsize = 2\vsize
}

% The double-column output routine for all double-column pages except
% the last.
%
\def\doublecolumnout{%
\splittopskip=\topskip \splitmaxdepth=\maxdepth
% Get the available space for the double columns -- the normal
% (undoubled) page height minus any material left over from the
% previous page.
\dimen@ = \vsize
\divide\dimen@ by 2
\advance\dimen@ by -\ht\partialpage
%
% box0 will be the left-hand column, box2 the right.
\setbox0=\vsplit255 to\dimen@ \setbox2=\vsplit255 to\dimen@
\onepageout\pagesofar
\unvbox255
\penalty\outputpenalty
}
%
% Re-output the contents of the output page -- any previous material,
% followed by the two boxes we just split, in box0 and box2.
\def\pagesofar{%
\unvbox\partialpage
%
\hsize = \doublecolumnhsize
\wd0=\hsize \wd2=\hsize
\hbox to\pagewidth{\box0\hfil\box2}%
}
%
% All done with double columns.

\def\enddoublecolumns{%
% The following penalty ensures that the page builder is exercised
% _before_ we change the output routine. This is necessary in the
% following situation:
%
% The last section of the index consists only of a single entry.
% Before this section, \pagetotal is less than \pagegoal, so no
% break occurs before the last section starts. However, the last
% section, consisting of \initial and the single \entry, does not
% fit on the page and has to be broken off. Without the following
% penalty the page builder will not be exercised until \eject
% below, and by that time we'll already have changed the output
% routine to the \balancecolumns version, so the next-to-last
% double-column page will be processed with \balancecolumns, which
% is wrong: The two columns will go to the main vertical list, with
% the broken-off section in the recent contributions. As soon as
% the output routine finishes, TeX starts reconsidering the page
% break. The two columns and the broken-off section both fit on the
% page, because the two columns now take up only half of the page
% goal. When TeX sees \eject from below which follows the final
% section, it invokes the new output routine that we've set after
% \balancecolumns below; \onepageout will try to fit the two columns
% and the final section into the vbox of \pageheight (see
% \pagebody), causing an overfull box.
%
% Note that glue won't work here, because glue does not exercise the
% page builder, unlike penalties (see The TeXbook, pp. 280-281).
\penalty0
%
\output = {%
  % Split the last of the double-column material. Leave it on the
  % current page, no automatic page break.
  \balancecolumns
  %
  % If we end up splitting too much material for the current page,
  % though, there will be another page break right after this \output
  % invocation ends. Having called \balancecolumns once, we do not
  % want to call it again. Therefore, reset \output to its normal
  % definition right away. (We hope \balancecolumns will never be
  % called on to balance too much material, but if it is, this makes
  % the output somewhat more palatable.)
  \global\output = {\onepageout{\pagecontents\PAGE}}%
}%
\eject
\endgroup % started in \begindoublecolumns
%
% \pagegoal was set to the doubled \vsize above, since we restarted
% the current page. We're now back to normal single-column

```
    % typesetting, so reset \pagegoal to the normal \vsize (after the
    % \endgroup where \vsize got restored).
   \pagegoal = \vsize
   }
%
% Called at the end of the double column material.
\def\balancecolumns{%
 \setbox0 = \vbox{\unvbox255}% like \box255 but more efficient, see p.120.
 \dimen@ = \ht0
 \advance\dimen@ by \topskip
 \advance\dimen@ by-\baselineskip
 \divide\dimen@ by 2 % target to split to
%debug\message{final 2-column material height=\the\ht0, target=\the\dimen@.}%
 \splittopskip = \topskip
 % Loop until we get a decent breakpoint.
 {%
  \vbadness = 10000
  \loop
    \global\setbox3 = \copy0
    \global\setbox1 = \vsplit3 to \dimen@
  \ifdim\ht3>\dimen@
    \global\advance\dimen@ by 1pt
  \repeat
 }%
%debug\message{split to \the\dimen@, column heights: \the\ht1, \the\ht3.}%
 \setbox0=\vbox to\dimen@{\unvbox1}%
 \setbox2=\vbox to\dimen@{\unvbox3}%
 %
 \pagesofar
 }
\catcode`\@ = \other


\message{sectioning,}
% Chapters, sections, etc.


% Let's start with @part.
\outer\parseargdef\part{\partzzz{#1}}
\def\partzzz#1{%
 \chapoddpage
 \null
 \vskip.3\vsize  % move it down on the page a bit
 \begingroup
   \noindent \titlefonts\rmisbold #1\par % the text
   \let\lastnode=\empty     % no node to associate with
   \writetocentry{part}{#1}{}% but put it in the toc
   \headingsoff          % no headline or footline on the part page
   \chapoddpage
```

```
\endgroup
}

% \unnumberedno is an oxymoron.  But we count the unnumbered
% sections so that we can refer to them unambiguously in the pdf
% outlines by their "section number".  We avoid collisions with chapter
% numbers by starting them at 10000.  (If a document ever has 10000
% chapters, we're in trouble anyway, I'm sure.)
\newcount\unnumberedno \unnumberedno = 10000
\newcount\chapno
\newcount\secno        \secno=0
\newcount\subsecno     \subsecno=0
\newcount\subsubsecno  \subsubsecno=0

% This counter is funny since it counts through charcodes of letters A, B, ...
\newcount\appendixno  \appendixno = `\@
%
% \def\appendixletter{\char\the\appendixno}
% We do the following ugly conditional instead of the above simple
% construct for the sake of pdftex, which needs the actual
% letter in the expansion, not just typeset.
%
\def\appendixletter{%
 \ifnum\appendixno=`A A%
 \else\ifnum\appendixno=`B B%
 \else\ifnum\appendixno=`C C%
 \else\ifnum\appendixno=`D D%
 \else\ifnum\appendixno=`E E%
 \else\ifnum\appendixno=`F F%
 \else\ifnum\appendixno=`G G%
 \else\ifnum\appendixno=`H H%
 \else\ifnum\appendixno=`I I%
 \else\ifnum\appendixno=`J J%
 \else\ifnum\appendixno=`K K%
 \else\ifnum\appendixno=`L L%
 \else\ifnum\appendixno=`M M%
 \else\ifnum\appendixno=`N N%
 \else\ifnum\appendixno=`O O%
 \else\ifnum\appendixno=`P P%
 \else\ifnum\appendixno=`Q Q%
 \else\ifnum\appendixno=`R R%
 \else\ifnum\appendixno=`S S%
 \else\ifnum\appendixno=`T T%
 \else\ifnum\appendixno=`U U%
 \else\ifnum\appendixno=`V V%
 \else\ifnum\appendixno=`W W%
 \else\ifnum\appendixno=`X X%
 \else\ifnum\appendixno=`Y Y%
```

```
\else\ifnum\appendixno=`Z Z%
% The \the is necessary, despite appearances, because \appendixletter is
% expanded while writing the .toc file.  \char\appendixno is not
% expandable, thus it is written literally, thus all appendixes come out
% with the same letter (or @) in the toc without it.
\else\char\the\appendixno
\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi
\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi}


% Each @chapter defines these (using marks) as the number+name, number
% and name of the chapter.  Page headings and footings can use
% these.  @section does likewise.
\def\thischapter{}
\def\thischapternum{}
\def\thischaptername{}
\def\thissection{}
\def\thissectionnum{}
\def\thissectionname{}


\newcount\absseclevel % used to calculate proper heading level
\newcount\secbase\secbase=0 % @raisesections/@lowersections modify this count


% @raisesections: treat @section as chapter, @subsection as section, etc.
\def\raisesections{\global\advance\secbase by -1}
\let\up=\raisesections % original BFox name


% @lowersections: treat @chapter as section, @section as subsection, etc.
\def\lowersections{\global\advance\secbase by 1}
\let\down=\lowersections % original BFox name


% we only have subsub.
\chardef\maxseclevel = 3
%
% A numbered section within an unnumbered changes to unnumbered too.
% To achieve this, remember the "biggest" unnum. sec. we are currently in:
\chardef\unnlevel = \maxseclevel
%
% Trace whether the current chapter is an appendix or not:
% \chapheadtype is "N" or "A", unnumbered chapters are ignored.
\def\chapheadtype{N}


% Choose a heading macro
% #1 is heading type
% #2 is heading level
% #3 is text for heading
\def\genhead#1#2#3{%
% Compute the abs. sec. level:
\absseclevel=#2
```

```
\advance\absseclevel by \secbase
% Make sure \absseclevel doesn't fall outside the range:
\ifnum \absseclevel < 0
 \absseclevel = 0
\else
 \ifnum \absseclevel > 3
   \absseclevel = 3
 \fi
\fi
% The heading type:
\def\headtype{#1}%
\if \headtype U%
 \ifnum \absseclevel < \unnlevel
   \chardef\unnlevel = \absseclevel
 \fi
\else
 % Check for appendix sections:
 \ifnum \absseclevel = 0
   \edef\chapheadtype{\headtype}%
 \else
   \if \headtype A\if \chapheadtype N%
\errmessage{@appendix... within a non-appendix chapter}%
   \fi\fi
 \fi
 % Check for numbered within unnumbered:
 \ifnum \absseclevel > \unnlevel
   \def\headtype{U}%
 \else
   \chardef\unnlevel = 3
 \fi
\fi
% Now print the heading:
\if \headtype U%
 \ifcase\absseclevel
\unnumberedzzz{#3}%
 \or \unnumberedseczzz{#3}%
 \or \unnumberedsubseczzz{#3}%
 \or \unnumberedsubsubseczzz{#3}%
 \fi
\else
 \if \headtype A%
   \ifcase\absseclevel
 \appendixzzz{#3}%
   \or \appendixsectionzzz{#3}%
   \or \appendixsubseczzz{#3}%
   \or \appendixsubsubseczzz{#3}%
   \fi
 \else
```

```
   \ifcase\absseclevel
  \chapterzzz{#3}%
   \or \seczzz{#3}%
   \or \numberedsubseczzz{#3}%
   \or \numberedsubsubseczzz{#3}%
   \fi
  \fi
 \fi
 \suppressfirstparagraphindent
}


% an interface:
\def\numhead{\genhead N}
\def\apphead{\genhead A}
\def\unnmhead{\genhead U}


% @chapter, @appendix, @unnumbered.  Increment top-level counter, reset
% all lower-level sectioning counters to zero.
%
% Also set \chaplevelprefix, which we prepend to @float sequence numbers
% (e.g., figures), q.v.  By default (before any chapter), that is empty.
\let\chaplevelprefix = \empty
%
\outer\parseargdef\chapter{\numhead0{#1}} % normally numhead0 calls chapterzzz
\def\chapterzzz#1{%
 % section resetting is \global in case the chapter is in a group, such
 % as an @include file.
 \global\secno=0 \global\subsecno=0 \global\subsubsecno=0
   \global\advance\chapno by 1
 %
 % Used for \float.
 \gdef\chaplevelprefix{\the\chapno.}%
 \resetallfloatnos
 %
 % \putwordChapter can contain complex things in translations.
 \toks0=\expandafter{\putwordChapter}%
 \message{\the\toks0 \space \the\chapno}%
 %
 % Write the actual heading.
 \chapmacro{#1}{Ynumbered}{\the\chapno}%
 %
 % So @section and the like are numbered underneath this chapter.
 \global\let\section = \numberedsec
 \global\let\subsection = \numberedsubsec
 \global\let\subsubsection = \numberedsubsubsec
}

\outer\parseargdef\appendix{\apphead0{#1}} % normally calls appendixzzz
```

```
%
\def\appendixzzz#1{%
 \global\secno=0 \global\subsecno=0 \global\subsubsecno=0
   \global\advance\appendixno by 1
 \gdef\chaplevelprefix{\appendixletter.}%
 \resetallfloatnos
 %
 % \putwordAppendix can contain complex things in translations.
 \toks0=\expandafter{\putwordAppendix}%
 \message{\the\toks0 \space \appendixletter}%
 %
 \chapmacro{#1}{Yappendix}{\appendixletter}%
 %
 \global\let\section = \appendixsec
 \global\let\subsection = \appendixsubsec
 \global\let\subsubsection = \appendixsubsubsec
}


% normally unnmhead0 calls unnumberedzzz:
\outer\parseargdef\unnumbered{\unnmhead0{#1}}
\def\unnumberedzzz#1{%
 \global\secno=0 \global\subsecno=0 \global\subsubsecno=0
   \global\advance\unnumberedno by 1
 %
 % Since an unnumbered has no number, no prefix for figures.
 \global\let\chaplevelprefix = \empty
 \resetallfloatnos
 %
 % This used to be simply \message{#1}, but TeX fully expands the
 % argument to \message.  Therefore, if #1 contained @-commands, TeX
 % expanded them.  For example, in `@unnumbered The @cite{Book}', TeX
 % expanded @cite (which turns out to cause errors because \cite is meant
 % to be executed, not expanded).
 %
 % Anyway, we don't want the fully-expanded definition of @cite to appear
 % as a result of the \message, we just want `@cite' itself.  We use
 % \the<toks register> to achieve this: TeX expands \the<toks> only once,
 % simply yielding the contents of <toks register>.  (We also do this for
 % the toc entries.)
 \toks0 = {#1}%
 \message{(\the\toks0)}%
 %
 \chapmacro{#1}{Ynothing}{\the\unnumberedno}%
 %
 \global\let\section = \unnumberedsec
 \global\let\subsection = \unnumberedsubsec
 \global\let\subsubsection = \unnumberedsubsubsec
}
```

% @centerchap is like @unnumbered, but the heading is centered.
\outer\parseargdef\centerchap{%
 % Well, we could do the following in a group, but that would break
 % an assumption that \chapmacro is called at the outermost level.
 % Thus we are safer this way: --kasal, 24feb04
 \let\centerparametersmaybe = \centerparameters
 \unnmhead0{#1}%
 \let\centerparametersmaybe = \relax
}

% @top is like @unnumbered.
\let\top\unnumbered

% Sections.
%
\outer\parseargdef\numberedsec{\numhead1{#1}} % normally calls seczzz
\def\seczzz#1{%
 \global\subsecno=0 \global\subsubsecno=0 \global\advance\secno by 1
 \sectionheading{#1}{sec}{Ynumbered}{\the\chapno.\the\secno}%
}

% normally calls appendixsectionzzz:
\outer\parseargdef\appendixsection{\apphead1{#1}}
\def\appendixsectionzzz#1{%
 \global\subsecno=0 \global\subsubsecno=0 \global\advance\secno by 1
 \sectionheading{#1}{sec}{Yappendix}{\appendixletter.\the\secno}%
}
\let\appendixsec\appendixsection

% normally calls unnumberedseczzz:
\outer\parseargdef\unnumberedsec{\unnmhead1{#1}}
\def\unnumberedseczzz#1{%
 \global\subsecno=0 \global\subsubsecno=0 \global\advance\secno by 1
 \sectionheading{#1}{sec}{Ynothing}{\the\unnumberedno.\the\secno}%
}

% Subsections.
%
% normally calls numberedsubseczzz:
\outer\parseargdef\numberedsubsec{\numhead2{#1}}
\def\numberedsubseczzz#1{%
 \global\subsubsecno=0 \global\advance\subsecno by 1
 \sectionheading{#1}{subsec}{Ynumbered}{\the\chapno.\the\secno.\the\subsecno}%
}

% normally calls appendixsubseczzz:
\outer\parseargdef\appendixsubsec{\apphead2{#1}}

```
\def\appendixsubseczzz#1{%
 \global\subsubsecno=0  \global\advance\subsecno by 1
 \sectionheading{#1}{subsec}{Yappendix}%
            {\appendixletter.\the\secno.\the\subsecno}%
}

% normally calls unnumberedsubseczzz:
\outer\parseargdef\unnumberedsubsec{\unnmhead2{#1}}
\def\unnumberedsubseczzz#1{%
 \global\subsubsecno=0  \global\advance\subsecno by 1
 \sectionheading{#1}{subsec}{Ynothing}%
            {\the\unnumberedno.\the\secno.\the\subsecno}%
}

% Subsubsections.
%
% normally numberedsubsubseczzz:
\outer\parseargdef\numberedsubsubsec{\numhead3{#1}}
\def\numberedsubsubseczzz#1{%
 \global\advance\subsubsecno by 1
 \sectionheading{#1}{subsubsec}{Ynumbered}%
            {\the\chapno.\the\secno.\the\subsecno.\the\subsubsecno}%
}

% normally appendixsubsubseczzz:
\outer\parseargdef\appendixsubsubsec{\apphead3{#1}}
\def\appendixsubsubseczzz#1{%
 \global\advance\subsubsecno by 1
 \sectionheading{#1}{subsubsec}{Yappendix}%
            {\appendixletter.\the\secno.\the\subsecno.\the\subsubsecno}%
}

% normally unnumberedsubsubseczzz:
\outer\parseargdef\unnumberedsubsubsec{\unnmhead3{#1}}
\def\unnumberedsubsubseczzz#1{%
 \global\advance\subsubsecno by 1
 \sectionheading{#1}{subsubsec}{Ynothing}%
            {\the\unnumberedno.\the\secno.\the\subsecno.\the\subsubsecno}%
}

% These macros control what the section commands do, according
% to what kind of chapter we are in (ordinary, appendix, or unnumbered).
% Define them by default for a numbered chapter.
\let\section = \numberedsec
\let\subsection = \numberedsubsec
\let\subsubsection = \numberedsubsubsec

% Define @majorheading, @heading and @subheading
```

```
\def\majorheading{%
 {\advance\chapheadingskip by 10pt \chapbreak }%
 \parsearg\chapheadingzzz
}

\def\chapheading{\chapbreak \parsearg\chapheadingzzz}
\def\chapheadingzzz#1{%
 \vbox{\chapfonts \raggedtitlesettings #1\par}%
 \nobreak\bigskip \nobreak
 \suppressfirstparagraphindent
}

% @heading, @subheading, @subsubheading.
\parseargdef\heading{\sectionheading{#1}{sec}{Yomitfromtoc}{}
 \suppressfirstparagraphindent}
\parseargdef\subheading{\sectionheading{#1}{subsec}{Yomitfromtoc}{}
 \suppressfirstparagraphindent}
\parseargdef\subsubheading{\sectionheading{#1}{subsubsec}{Yomitfromtoc}{}
 \suppressfirstparagraphindent}

% These macros generate a chapter, section, etc. heading only
% (including whitespace, linebreaking, etc. around it),
% given all the information in convenient, parsed form.

% Args are the skip and penalty (usually negative)
\def\dobreak#1#2{\par\ifdim\lastskip<#1\removelastskip\penalty#2\vskip#1\fi}

% Parameter controlling skip before chapter headings (if needed)
\newskip\chapheadingskip

% Define plain chapter starts, and page on/off switching for it.
\def\chapbreak{\dobreak \chapheadingskip {-4000}}
\def\chappager{\par\vfill\supereject}
% Because \domark is called before \chapoddpage, the filler page will
% get the headings for the next chapter, which is wrong.  But we don't
% care -- we just disable all headings on the filler page.
\def\chapoddpage{%
 \chappager
 \ifodd\pageno \else
   \begingroup
     \headingsoff
     \null
     \chappager
   \endgroup
 \fi
}
```

```
\def\setchapternewpage #1 {\csname CHAPPAG#1\endcsname}

\def\CHAPPAGoff{%
\global\let\contentsalignmacro = \chappager
\global\let\pchapsepmacro=\chapbreak
\global\let\pagealignmacro=\chappager}

\def\CHAPPAGon{%
\global\let\contentsalignmacro = \chappager
\global\let\pchapsepmacro=\chappager
\global\let\pagealignmacro=\chappager
\global\def\HEADINGSon{\HEADINGSsingle}}

\def\CHAPPAGodd{%
\global\let\contentsalignmacro = \chapoddpage
\global\let\pchapsepmacro=\chapoddpage
\global\let\pagealignmacro=\chapoddpage
\global\def\HEADINGSon{\HEADINGSdouble}}

\CHAPPAGon

% Chapter opening.
%
% #1 is the text, #2 is the section type (Ynumbered, Ynothing,
% Yappendix, Yomitfromtoc), #3 the chapter number.
%
% To test against our argument.
\def\Ynothingkeyword{Ynothing}
\def\Yomitfromtockeyword{Yomitfromtoc}
\def\Yappendixkeyword{Yappendix}
%
\def\chapmacro#1#2#3{%
% Insert the first mark before the heading break (see notes for \domark).
\let\prevchapterdefs=\lastchapterdefs
\let\prevsectiondefs=\lastsectiondefs
\gdef\lastsectiondefs{\gdef\thissectionname{}\gdef\thissectionnum{}%
            \gdef\thissection{}}%
%
\def\temptype{#2}%
\ifx\temptype\Ynothingkeyword
  \gdef\lastchapterdefs{\gdef\thischaptername{#1}\gdef\thischapternum{}%
            \gdef\thischapter{\thischaptername}}%
\else\ifx\temptype\Yomitfromtockeyword
  \gdef\lastchapterdefs{\gdef\thischaptername{#1}\gdef\thischapternum{}%
            \gdef\thischapter{}}%
\else\ifx\temptype\Yappendixkeyword
  \toks0={#1}%
  \xdef\lastchapterdefs{%
```

```
      \gdef\noexpand\thischaptername{\the\toks0}%
      \gdef\noexpand\thischapternum{\appendixletter}%
      % \noexpand\putwordAppendix avoids expanding indigestible
      % commands in some of the translations.
      \gdef\noexpand\thischapter{\noexpand\putwordAppendix{ }
                      \noexpand\thischapternum:
                      \noexpand\thischaptername}%
    }%
  \else
   \toks0={#1}%
   \xdef\lastchapterdefs{%
     \gdef\noexpand\thischaptername{\the\toks0}%
     \gdef\noexpand\thischapternum{\the\chapno}%
     % \noexpand\putwordChapter avoids expanding indigestible
     % commands in some of the translations.
     \gdef\noexpand\thischapter{\noexpand\putwordChapter{ }
                      \noexpand\thischapternum:
                      \noexpand\thischaptername}%
    }%
\fi\fi\fi
%
% Output the mark.  Pass it through \safewhatsit, to take care of
% the preceding space.
\safewhatsit\domark
%
% Insert the chapter heading break.
\pchapsepmacro
%
% Now the second mark, after the heading break.  No break points
% between here and the heading.
\let\prevchapterdefs=\lastchapterdefs
\let\prevsectiondefs=\lastsectiondefs
\domark
%
{%
 \chapfonts \rmisbold
 %
 % Have to define \lastsection before calling \donoderef, because the
 % xref code eventually uses it.  On the other hand, it has to be called
 % after \pchapsepmacro, or the headline will change too soon.
 \gdef\lastsection{#1}%
 %
 % Only insert the separating space if we have a chapter/appendix
 % number, and don't print the unnumbered ``number''.
 \ifx\temptype\Ynothingkeyword
   \setbox0 = \hbox{ }%
   \def\toctype{unnchap}%
 \else\ifx\temptype\Yomitfromtockeyword
```

```
  \setbox0 = \hbox{ }% contents like unnumbered, but no toc entry
  \def\toctype{omit}%
\else\ifx\temptype\Yappendixkeyword
  \setbox0 = \hbox{\putwordAppendix{} #3\enspace}%
  \def\toctype{app}%
\else
  \setbox0 = \hbox{#3\enspace}%
  \def\toctype{numchap}%
\fi\fi\fi
%
% Write the toc entry for this chapter.  Must come before the
% \donoderef, because we include the current node name in the toc
% entry, and \donoderef resets it to empty.
\writetocentry{\toctype}{#1}{#3}%
%
% For pdftex, we have to write out the node definition (aka, make
% the pdfdest) after any page break, but before the actual text has
% been typeset.  If the destination for the pdf outline is after the
% text, then jumping from the outline may wind up with the text not
% being visible, for instance under high magnification.
\donoderef{#2}%
%
% Typeset the actual heading.
\nobreak % Avoid page breaks at the interline glue.
\vbox{\raggedtitlesettings \hangindent=\wd0 \centerparametersmaybe
    \unhbox0 #1\par}%
}%
\nobreak\bigskip % no page break after a chapter title
\nobreak
}


% @centerchap -- centered and unnumbered.
\let\centerparametersmaybe = \relax
\def\centerparameters{%
\advance\rightskip by 3\rightskip
\leftskip = \rightskip
\parfillskip = 0pt
}



% I don't think this chapter style is supported any more, so I'm not
% updating it with the new noderef stuff.  We'll see. --karl, 11aug03.
%
\def\setchapterstyle #1 {\csname CHAPF#1\endcsname}
%
\def\unnchfopen #1{%
\chapoddpage
\vbox{\chapfonts \raggedtitlesettings #1\par}%
```

```
 \nobreak\bigskip\nobreak
}
\def\chfopen #1#2{\chapoddpage {\chapfonts
\vbox to 3in{\vfil \hbox to\hsize{\hfil #2} \hbox to\hsize{\hfil #1} \vfil}}%
\par\penalty 5000 %
}
\def\centerchfopen #1{%
 \chapoddpage
 \vbox{\chapfonts \raggedtitlesettings \hfill #1\hfill}%
 \nobreak\bigskip \nobreak
}
\def\CHAPFopen{%
 \global\let\chapmacro=\chfopen
 \global\let\centerchapmacro=\centerchfopen}


% Section titles.  These macros combine the section number parts and
% call the generic \sectionheading to do the printing.
%
\newskip\secheadingskip
\def\secheadingbreak{\dobreak \secheadingskip{-1000}}

% Subsection titles.
\newskip\subsecheadingskip
\def\subsecheadingbreak{\dobreak \subsecheadingskip{-500}}

% Subsubsection titles.
\def\subsubsecheadingskip{\subsecheadingskip}
\def\subsubsecheadingbreak{\subsecheadingbreak}


% Print any size, any type, section title.
%
% #1 is the text, #2 is the section level (sec/subsec/subsubsec), #3 is
% the section type for xrefs (Ynumbered, Ynothing, Yappendix), #4 is the
% section number.
%
\def\seckeyword{sec}
%
\def\sectionheading#1#2#3#4{%
 {%
  \checkenv{}% should not be in an environment.
  %
  % Switch to the right set of fonts.
  \csname #2fonts\endcsname \rmisbold
  %
  \def\sectionlevel{#2}%
  \def\temptype{#3}%
```

```
%
% Insert first mark before the heading break (see notes for \domark).
\let\prevsectiondefs=\lastsectiondefs
\ifx\temptype\Ynothingkeyword
  \ifx\sectionlevel\seckeyword
    \gdef\lastsectiondefs{\gdef\thissectionname{#1}\gdef\thissectionnum{}%
              \gdef\thissection{\thissectionname}}%
  \fi
\else\ifx\temptype\Yomitfromtockeyword
  % Don't redefine \thissection.
\else\ifx\temptype\Yappendixkeyword
  \ifx\sectionlevel\seckeyword
   \toks0={#1}%
   \xdef\lastsectiondefs{%
     \gdef\noexpand\thissectionname{\the\toks0}%
     \gdef\noexpand\thissectionnum{#4}%
     % \noexpand\putwordSection avoids expanding indigestible
     % commands in some of the translations.
     \gdef\noexpand\thissection{\noexpand\putwordSection{}
              \noexpand\thissectionnum:
              \noexpand\thissectionname}%
   }%
  \fi
\else
  \ifx\sectionlevel\seckeyword
   \toks0={#1}%
   \xdef\lastsectiondefs{%
     \gdef\noexpand\thissectionname{\the\toks0}%
     \gdef\noexpand\thissectionnum{#4}%
     % \noexpand\putwordSection avoids expanding indigestible
     % commands in some of the translations.
     \gdef\noexpand\thissection{\noexpand\putwordSection{}
              \noexpand\thissectionnum:
              \noexpand\thissectionname}%
   }%
  \fi
\fi\fi\fi
%
% Go into vertical mode.  Usually we'll already be there, but we
% don't want the following whatsit to end up in a preceding paragraph
% if the document didn't happen to have a blank line.
\par
%
% Output the mark.  Pass it through \safewhatsit, to take care of
% the preceding space.
\safewhatsit\domark
%
% Insert space above the heading.
```

```
\csname #2headingbreak\endcsname
%
% Now the second mark, after the heading break.  No break points
% between here and the heading.
\let\prevsectiondefs=\lastsectiondefs
\domark
%
% Only insert the space after the number if we have a section number.
\ifx\temptype\Ynothingkeyword
  \setbox0 = \hbox{ }%
  \def\toctype{unn}%
  \gdef\lastsection{#1}%
\else\ifx\temptype\Yomitfromtockeyword
  % for @headings -- no section number, don't include in toc,
  % and don't redefine \lastsection.
  \setbox0 = \hbox{ }%
  \def\toctype{omit}%
  \let\sectionlevel=\empty
\else\ifx\temptype\Yappendixkeyword
  \setbox0 = \hbox{#4\enspace}%
  \def\toctype{app}%
  \gdef\lastsection{#1}%
\else
  \setbox0 = \hbox{#4\enspace}%
  \def\toctype{num}%
  \gdef\lastsection{#1}%
\fi\fi\fi
%
% Write the toc entry (before \donoderef).  See comments in \chapmacro.
\writetocentry{\toctype\sectionlevel}{#1}{#4}%
%
% Write the node reference (= pdf destination for pdftex).
% Again, see comments in \chapmacro.
\donoderef{#3}%
%
% Interline glue will be inserted when the vbox is completed.
% That glue will be a valid breakpoint for the page, since it'll be
% preceded by a whatsit (usually from the \donoderef, or from the
% \writetocentry if there was no node).  We don't want to allow that
% break, since then the whatsits could end up on page n while the
% section is on page n+1, thus toc/etc. are wrong.  Debian bug 276000.
\nobreak
%
% Output the actual section heading.
\vbox{\hyphenpenalty=10000 \tolerance=5000 \parindent=0pt \ptexraggedright
    \hangindent=\wd0  % zero if no section number
    \unhbox0 #1}%
}%
```

```
% Add extra space after the heading -- half of whatever came above it.
% Don't allow stretch, though.
\kern .5 \csname #2headingskip\endcsname
%
% Do not let the kern be a potential breakpoint, as it would be if it
% was followed by glue.
\nobreak
%
% We'll almost certainly start a paragraph next, so don't let that
% glue accumulate.  (Not a breakpoint because it's preceded by a
% discardable item.)  However, when a paragraph is not started next
% (\startdefun, \cartouche, \center, etc.), this needs to be wiped out
% or the negative glue will cause weirdly wrong output, typically
% obscuring the section heading with something else.
\vskip-\parskip
%
% This is so the last item on the main vertical list is a known
% \penalty > 10000, so \startdefun, etc., can recognize the situation
% and do the needful.
\penalty 10001
}


\message{toc,}
% Table of contents.
\newwrite\tocfile

% Write an entry to the toc file, opening it if necessary.
% Called from @chapter, etc.
%
% Example usage: \writetocentry{sec}{Section Name}{\the\chapno.\the\secno}
% We append the current node name (if any) and page number as additional
% arguments for the \{chap,sec,...}entry macros which will eventually
% read this.  The node name is used in the pdf outlines as the
% destination to jump to.
%
% We open the .toc file for writing here instead of at @setfilename (or
% any other fixed time) so that @contents can be anywhere in the document.
% But if #1 is `omit', then we don't do anything.  This is used for the
% table of contents chapter openings themselves.
%
\newif\iftocfileopened
\def\omitkeyword{omit}%
%
\def\writetocentry#1#2#3{%
 \edef\writetoctype{#1}%
 \ifx\writetoctype\omitkeyword \else
   \iftocfileopened\else
```

```
  \immediate\openout\tocfile = \jobname.toc
  \global\tocfileopenedtrue
 \fi
 %
 \iflinks
  {\atdummies
  \edef\temp{%
    \write\tocfile{@#1entry{#2}{#3}{\lastnode}{\noexpand\folio}}}%
  \temp
  }%
 \fi
\fi
%
% Tell \shipout to create a pdf destination on each page, if we're
% writing pdf.  These are used in the table of contents.  We can't
% just write one on every page because the title pages are numbered
% 1 and 2 (the page numbers aren't printed), and so are the first
% two pages of the document.  Thus, we'd have two destinations named
% `1', and two named `2'.
\ifpdf \global\pdfmakepagedesttrue \fi
}


% These characters do not print properly in the Computer Modern roman
% fonts, so we must take special care.  This is more or less redundant
% with the Texinfo input format setup at the end of this file.
%
\def\activecatcodes{%
 \catcode`\"=\active
 \catcode`\$=\active
 \catcode`\<=\active
 \catcode`\>=\active
 \catcode`\\=\active
 \catcode`\^=\active
 \catcode`\_=\active
 \catcode`\|=\active
 \catcode`\~=\active
}


% Read the toc file, which is essentially Texinfo input.
\def\readtocfile{%
 \setupdatafile
 \activecatcodes
 \input \tocreadfilename
}

\newskip\contentsrightmargin \contentsrightmargin=1in
```

```
\newcount\savepageno
\newcount\lastnegativepageno \lastnegativepageno = -1

% Prepare to read what we've written to \tocfile.
%
\def\startcontents#1{%
 % If @setchapternewpage on, and @headings double, the contents should
 % start on an odd page, unlike chapters.  Thus, we maintain
 % \contentsalignmacro in parallel with \pagealignmacro.
 % From: Torbjorn Granlund <tege@matematik.su.se>
 \contentsalignmacro
 \immediate\closeout\tocfile
 %
 % Don't need to put `Contents' or `Short Contents' in the headline.
 % It is abundantly clear what they are.
 \chapmacro{#1}{Yomitfromtoc}{}%
 %
 \savepageno = \pageno
 \begingroup               % Set up to handle contents files properly.
  \raggedbottom            % Worry more about breakpoints than the bottom.
  \advance\hsize by -\contentsrightmargin % Don't use the full line length.
  %
  % Roman numerals for page numbers.
  \ifnum \pageno>0 \global\pageno = \lastnegativepageno \fi
}

% redefined for the two-volume lispref.  We always output on
% \jobname.toc even if this is redefined.
%
\def\tocreadfilename{\jobname.toc}

% Normal (long) toc.
%
\def\contents{%
 \startcontents{\putwordTOC}%
  \openin 1 \tocreadfilename\space
  \ifeof 1 \else
   \readtocfile
  \fi
  \vfill \eject
  \contentsalignmacro % in case @setchapternewpage odd is in effect
  \ifeof 1 \else
   \pdfmakeoutlines
  \fi
  \closein 1
 \endgroup
 \lastnegativepageno = \pageno
 \global\pageno = \savepageno
```

```
}

% And just the chapters.
\def\summarycontents{%
\startcontents{\putwordShortTOC}%
  %
  \let\partentry = \shortpartentry
  \let\numchapentry = \shortchapentry
  \let\appentry = \shortchapentry
  \let\unnchapentry = \shortunnchapentry
  % We want a true roman here for the page numbers.
  \secfonts
  \let\rm=\shortcontrm \let\bf=\shortcontbf
  \let\sl=\shortcontsl \let\tt=\shortconttt
  \rm
  \hyphenpenalty = 10000
  \advance\baselineskip by 1pt % Open it up a little.
  \def\numsecentry##1##2##3##4{}
  \let\appsecentry = \numsecentry
  \let\unnsecentry = \numsecentry
  \let\numsubsecentry = \numsecentry
  \let\appsubsecentry = \numsecentry
  \let\unnsubsecentry = \numsecentry
  \let\numsubsubsecentry = \numsecentry
  \let\appsubsubsecentry = \numsecentry
  \let\unnsubsubsecentry = \numsecentry
  \openin 1 \tocreadfilename\space
  \ifeof 1 \else
    \readtocfile
  \fi
  \closein 1
  \vfill \eject
  \contentsalignmacro % in case @setchapternewpage odd is in effect
\endgroup
\lastnegativepageno = \pageno
\global\pageno = \savepageno
}
\let\shortcontents = \summarycontents


% Typeset the label for a chapter or appendix for the short contents.
% The arg is, e.g., `A' for an appendix, or `3' for a chapter.
%
\def\shortchaplabel#1{%
 % This space should be enough, since a single number is .5em, and the
 % widest letter (M) is 1em, at least in the Computer Modern fonts.
 % But use \hss just in case.
 % (This space doesn't include the extra space that gets added after
 % the label; that gets put in by \shortchapentry above.)
```

```
%
% We'd like to right-justify chapter numbers, but that looks strange
% with appendix letters.  And right-justifying numbers and
% left-justifying letters looks strange when there is less than 10
% chapters.  Have to read the whole toc once to know how many chapters
% there are before deciding ...
\hbox to 1em{#1\hss}%
}


% These macros generate individual entries in the table of contents.
% The first argument is the chapter or section name.
% The last argument is the page number.
% The arguments in between are the chapter number, section number, ...


% Parts, in the main contents.  Replace the part number, which doesn't
% exist, with an empty box.  Let's hope all the numbers have the same width.
% Also ignore the page number, which is conventionally not printed.
\def\numeralbox{\setbox0=\hbox{8}\hbox to \wd0{\hfil}}
\def\partentry#1#2#3#4{\dochapentry{\numeralbox\labelspace#1}{}}
%
% Parts, in the short toc.
\def\shortpartentry#1#2#3#4{%
 \penalty-300
 \vskip.5\baselineskip plus.15\baselineskip minus.1\baselineskip
 \shortchapentry{{\bf #1}}{\numeralbox}{}{}%
}


% Chapters, in the main contents.
\def\numchapentry#1#2#3#4{\dochapentry{#2\labelspace#1}{#4}}
%
% Chapters, in the short toc.
% See comments in \dochapentry re vbox and related settings.
\def\shortchapentry#1#2#3#4{%
 \tocentry{\shortchaplabel{#2}\labelspace #1}{\doshortpageno\bgroup#4\egroup}%
}


% Appendices, in the main contents.
% Need the word Appendix, and a fixed-size box.
%
\def\appendixbox#1{%
 % We use M since it's probably the widest letter.
 \setbox0 = \hbox{\putwordAppendix{} M}%
 \hbox to \wd0{\putwordAppendix{} #1\hss}}
%
\def\appentry#1#2#3#4{\dochapentry{\appendixbox{#2}\labelspace#1}{#4}}


% Unnumbered chapters.
\def\unnchapentry#1#2#3#4{\dochapentry{#1}{#4}}
```

```
\def\shortunnchapentry#1#2#3#4{\tocentry{#1}{\doshortpageno\bgroup#4\egroup}}


% Sections.
\def\numsecentry#1#2#3#4{\dosecentry{#2\labelspace#1}{#4}}
\let\appsecentry=\numsecentry
\def\unnsecentry#1#2#3#4{\dosecentry{#1}{#4}}


% Subsections.
\def\numsubsecentry#1#2#3#4{\dosubsecentry{#2\labelspace#1}{#4}}
\let\appsubsecentry=\numsubsecentry
\def\unnsubsecentry#1#2#3#4{\dosubsecentry{#1}{#4}}


% And subsubsections.
\def\numsubsubsecentry#1#2#3#4{\dosubsubsecentry{#2\labelspace#1}{#4}}
\let\appsubsubsecentry=\numsubsubsecentry
\def\unnsubsubsecentry#1#2#3#4{\dosubsubsecentry{#1}{#4}}


% This parameter controls the indentation of the various levels.
% Same as \defaultparindent.
\newdimen\tocindent \tocindent = 15pt


% Now for the actual typesetting. In all these, #1 is the text and #2 is the
% page number.
%
% If the toc has to be broken over pages, we want it to be at chapters
% if at all possible; hence the \penalty.
\def\dochapentry#1#2{%
 \penalty-300 \vskip1\baselineskip plus.33\baselineskip minus.25\baselineskip
 \begingroup
   \chapentryfonts
   \tocentry{#1}{\dopageno\bgroup#2\egroup}%
 \endgroup
 \nobreak\vskip .25\baselineskip plus.1\baselineskip
}

\def\dosecentry#1#2{\begingroup
 \secentryfonts \leftskip=\tocindent
 \tocentry{#1}{\dopageno\bgroup#2\egroup}%
\endgroup}

\def\dosubsecentry#1#2{\begingroup
 \subsecentryfonts \leftskip=2\tocindent
 \tocentry{#1}{\dopageno\bgroup#2\egroup}%
\endgroup}

\def\dosubsubsecentry#1#2{\begingroup
 \subsubsecentryfonts \leftskip=3\tocindent
 \tocentry{#1}{\dopageno\bgroup#2\egroup}%
```

```
\endgroup}

% We use the same \entry macro as for the index entries.
\let\tocentry = \entry

% Space between chapter (or whatever) number and the title.
\def\labelspace{\hskip1em \relax}

\def\dopageno#1{{\rm #1}}
\def\doshortpageno#1{{\rm #1}}

\def\chapentryfonts{\secfonts \rm}
\def\secentryfonts{\textfonts}
\def\subsecentryfonts{\textfonts}
\def\subsubsecentryfonts{\textfonts}


\message{environments,}
% @foo ... @end foo.

% @tex ... @end tex    escapes into raw TeX temporarily.
% One exception: @ is still an escape character, so that @end tex works.
% But \@ or @@ will get a plain @ character.

\envdef\tex{%
 \setupmarkupstyle{tex}%
 \catcode `\\=0 \catcode `\{=1 \catcode `\}=2
 \catcode `\$=3 \catcode `\&=4 \catcode `\#=6
 \catcode `\^=7 \catcode `\_=8 \catcode `\~=\active \let~=\tie
 \catcode `\%=14
 \catcode `\+=\other
 \catcode `\"=\other
 \catcode `\|=\other
 \catcode `\<=\other
 \catcode `\>=\other
 \catcode`\`=\other
 \catcode`\'=\other
 \escapechar=`\\
 %
 % ' is active in math mode (mathcode"8000).  So reset it, and all our
 % other math active characters (just in case), to plain's definitions.
 \mathactive
 %
 \let\b=\ptexb
 \let\bullet=\ptexbullet
 \let\c=\ptexc
 \let\,=\ptexcomma
 \let\.=\ptexdot
```

```
\let\dots=\ptexdots
\let\equiv=\ptexequiv
\let\!=\ptexexclam
\let\i=\ptexi
\let\indent=\ptexindent
\let\noindent=\ptexnoindent
\let\{=\ptexlbrace
\let\+=\tabalign
\let\}=\ptexrbrace
\let\/=\ptexslash
\let\*=\ptexstar
\let\t=\ptext
\expandafter \let\csname top\endcsname=\ptextop  % outer
\let\frenchspacing=\plainfrenchspacing
%
\def\endldots{\mathinner{\ldots\ldots\ldots\ldots}}%
\def\enddots{\relax\ifmmode\endldots\else$\mathsurround=0pt \endldots\,$\fi}%
\def\@{ @}%
}
% There is no need to define \Etex.

% Define @lisp ... @end lisp.
% @lisp environment forms a group so it can rebind things,
% including the definition of @end lisp (which normally is erroneous).

% Amount to narrow the margins by for @lisp.
\newskip\lispnarrowing \lispnarrowing=0.4in

% This is the definition that ^^M gets inside @lisp, @example, and other
% such environments.  \null is better than a space, since it doesn't
% have any width.
\def\lisppar{\null\endgraf}

% This space is always present above and below environments.
\newskip\envskipamount \envskipamount = 0pt

% Make spacing and below environment symmetrical.  We use \parskip here
% to help in doing that, since in @example-like environments \parskip
% is reset to zero; thus the \afterenvbreak inserts no space -- but the
% start of the next paragraph will insert \parskip.
%
\def\aboveenvbreak{{%
 % =10000 instead of <10000 because of a special case in \itemzzz and
 % \sectionheading, q.v.
 \ifnum \lastpenalty=10000 \else
  \advance\envskipamount by \parskip
  \endgraf
  \ifdim\lastskip<\envskipamount
```

```
  \removelastskip
  % it's not a good place to break if the last penalty was \nobreak
  % or better ...
  \ifnum\lastpenalty<10000 \penalty-50 \fi
  \vskip\envskipamount
 \fi
\fi
}}

\let\afterenvbreak = \aboveenvbreak


% \nonarrowing is a flag.  If "set", @lisp etc don't narrow margins; it will
% also clear it, so that its embedded environments do the narrowing again.
\let\nonarrowing=\relax


% @cartouche ... @end cartouche: draw rectangle w/rounded corners around
% environment contents.
\font\circle=lcircle10
\newdimen\circthick
\newdimen\cartouter\newdimen\cartinner
\newskip\normbskip\newskip\normpskip\newskip\normlskip
\circthick=\fontdimen8\circle
%
\def\ctl{{\circle\char'013\hskip -6pt}}% 6pt from pl file: 1/2charwidth
\def\ctr{{\hskip 6pt\circle\char'010}}
\def\cbl{{\circle\char'012\hskip -6pt}}
\def\cbr{{\hskip 6pt\circle\char'011}}
\def\carttop{\hbox to \cartouter{\hskip\lskip
    \ctl\leaders\hrule height\circthick\hfil\ctr
    \hskip\rskip}}
\def\cartbot{\hbox to \cartouter{\hskip\lskip
    \cbl\leaders\hrule height\circthick\hfil\cbr
    \hskip\rskip}}
%
\newskip\lskip\newskip\rskip

\envdef\cartouche{%
 \ifhmode\par\fi  % can't be in the midst of a paragraph.
 \startsavinginserts
 \lskip=\leftskip \rskip=\rightskip
 \leftskip=0pt\rightskip=0pt % we want these *outside*.
 \cartinner=\hsize \advance\cartinner by-\lskip
 \advance\cartinner by-\rskip
 \cartouter=\hsize
 \advance\cartouter by 18.4pt % allow for 3pt kerns on either
   % side, and for 6pt waste from
   % each corner char, and rule thickness
 \normbskip=\baselineskip \normpskip=\parskip \normlskip=\lineskip
```

```
% Flag to tell @lisp, etc., not to narrow margin.
\let\nonarrowing = t%
%
% If this cartouche directly follows a sectioning command, we need the
% \parskip glue (backspaced over by default) or the cartouche can
% collide with the section heading.
\ifnum\lastpenalty>10000 \vskip\parskip \penalty\lastpenalty \fi
%
\vbox\bgroup
    \baselineskip=0pt\parskip=0pt\lineskip=0pt
    \carttop
    \hbox\bgroup
  \hskip\lskip
  \vrule\kern3pt
  \vbox\bgroup
    \kern3pt
    \hsize=\cartinner
    \baselineskip=\normbskip
    \lineskip=\normlskip
    \parskip=\normpskip
    \vskip -\parskip
    \comment % For explanation, see the end of def\group.
}
\def\Ecartouche{%
        \ifhmode\par\fi
    \kern3pt
  \egroup
  \kern3pt\vrule
  \hskip\rskip
   \egroup
   \cartbot
 \egroup
 \checkinserts
}


% This macro is called at the beginning of all the @example variants,
% inside a group.
\newdimen\nonfillparindent
\def\nonfillstart{%
\aboveenvbreak
\hfuzz = 12pt % Don't be fussy
\sepspaces % Make spaces be word-separators rather than space tokens.
\let\par = \lisppar % don't ignore blank lines
\obeylines % each line of input is a line of output
\parskip = 0pt
% Turn off paragraph indentation but redefine \indent to emulate
% the normal \indent.
```

```
\nonfillparindent=\parindent
\parindent = 0pt
\let\indent\nonfillindent
%
\emergencystretch = 0pt % don't try to avoid overfull boxes
\ifx\nonarrowing\relax
  \advance \leftskip by \lispnarrowing
  \exdentamount=\lispnarrowing
\else
  \let\nonarrowing = \relax
\fi
\let\exdent=\nofillexdent
}


\begingroup
\obeyspaces
% We want to swallow spaces (but not other tokens) after the fake
% @indent in our nonfill-environments, where spaces are normally
% active and set to @tie, resulting in them not being ignored after
% @indent.
\gdef\nonfillindent{\futurelet\temp\nonfillindentcheck}%
\gdef\nonfillindentcheck{%
\ifx\temp %
\expandafter\nonfillindentgobble%
\else%
\leavevmode\nonfillindentbox%
\fi%
}%
\endgroup
\def\nonfillindentgobble#1{\nonfillindent}
\def\nonfillindentbox{\hbox to \nonfillparindent{\hss}}


% If you want all examples etc. small: @set dispenvsize small.
% If you want even small examples the full size: @set dispenvsize nosmall.
% This affects the following displayed environments:
%    @example, @display, @format, @lisp
%
\def\smallword{small}
\def\nosmallword{nosmall}
\let\SETdispenvsize\relax
\def\setnormaldispenv{%
\ifx\SETdispenvsize\smallword
  % end paragraph for sake of leading, in case document has no blank
  % line.  This is redundant with what happens in \aboveenvbreak, but
  % we need to do it before changing the fonts, and it's inconvenient
  % to change the fonts afterward.
  \ifnum \lastpenalty=10000 \else \endgraf \fi
  \smallexamplefonts \rm
```

```
 \fi
}
\def\setsmalldispenv{%
 \ifx\SETdispenvsize\nosmallword
 \else
   \ifnum \lastpenalty=10000 \else \endgraf \fi
   \smallexamplefonts \rm
 \fi
}

% We often define two environments, @foo and @smallfoo.
% Let's do it in one command.  #1 is the env name, #2 the definition.
\def\makedispenvdef#1#2{%
 \expandafter\envdef\csname#1\endcsname {\setnormaldispenv #2}%
 \expandafter\envdef\csname small#1\endcsname {\setsmalldispenv #2}%
 \expandafter\let\csname E#1\endcsname \afterenvbreak
 \expandafter\let\csname Esmall#1\endcsname \afterenvbreak
}

% Define two environment synonyms (#1 and #2) for an environment.
\def\maketwodispenvdef#1#2#3{%
 \makedispenvdef{#1}{#3}%
 \makedispenvdef{#2}{#3}%
}
%
% @lisp: indented, narrowed, typewriter font;
% @example: same as @lisp.
%
% @smallexample and @smalllisp: use smaller fonts.
% Originally contributed by Pavel@xerox.
%
\maketwodispenvdef{lisp}{example}{%
 \nonfillstart
 \tt\setupmarkupstyle{example}%
 \let\kbdfont = \kbdexamplefont % Allow @kbd to do something special.
 \gobble % eat return
}
% @display/@smalldisplay: same as @lisp except keep current font.
%
\makedispenvdef{display}{%
 \nonfillstart
 \gobble
}

% @format/@smallformat: same as @display except don't narrow margins.
%
\makedispenvdef{format}{%
 \let\nonarrowing = t%
```

```
\nonfillstart
\gobble
}

% @flushleft: same as @format, but doesn't obey \SETdispenvsize.
\envdef\flushleft{%
\let\nonarrowing = t%
\nonfillstart
\gobble
}
\let\Eflushleft = \afterenvbreak

% @flushright.
%
\envdef\flushright{%
\let\nonarrowing = t%
\nonfillstart
\advance\leftskip by 0pt plus 1fill\relax
\gobble
}
\let\Eflushright = \afterenvbreak


% @raggedright does more-or-less normal line breaking but no right
% justification.  From plain.tex.
\envdef\raggedright{%
\rightskip0pt plus2em \spaceskip.3333em \xspaceskip.5em\relax
}
\let\Eraggedright\par

\envdef\raggedleft{%
\parindent=0pt \leftskip0pt plus2em
\spaceskip.3333em \xspaceskip.5em \parfillskip=0pt
\hbadness=10000 % Last line will usually be underfull, so turn off
        % badness reporting.
}
\let\Eraggedleft\par

\envdef\raggedcenter{%
\parindent=0pt \rightskip0pt plus1em \leftskip0pt plus1em
\spaceskip.3333em \xspaceskip.5em \parfillskip=0pt
\hbadness=10000 % Last line will usually be underfull, so turn off
        % badness reporting.
}
\let\Eraggedcenter\par


% @quotation does normal linebreaking (hence we can't use \nonfillstart)
```

```
% and narrows the margins.  We keep \parskip nonzero in general, since
% we're doing normal filling.  So, when using \aboveenvbreak and
% \afterenvbreak, temporarily make \parskip 0.
%
\makedispenvdef{quotation}{\quotationstart}
%
\def\quotationstart{%
 \indentedblockstart % same as \indentedblock, but increase right margin too.
 \ifx\nonarrowing\relax
   \advance\rightskip by \lispnarrowing
 \fi
 \parsearg\quotationlabel
}

% We have retained a nonzero parskip for the environment, since we're
% doing normal filling.
%
\def\Equotation{%
 \par
 \ifx\quotationauthor\thisisundefined\else
   % indent a bit.
   \leftline{\kern 2\leftskip \sl ---\quotationauthor}%
 \fi
 {\parskip=0pt \afterenvbreak}%
}
\def\Esmallquotation{\Equotation}

% If we're given an argument, typeset it in bold with a colon after.
\def\quotationlabel#1{%
 \def\temp{#1}%
 \ifx\temp\empty \else
   {\bf #1: }%
 \fi
}

% @indentedblock is like @quotation, but indents only on the left and
% has no optional argument.
%
\makedispenvdef{indentedblock}{\indentedblockstart}
%
\def\indentedblockstart{%
 {\parskip=0pt \aboveenvbreak}% because \aboveenvbreak inserts \parskip
 \parindent=0pt
 %
 % @cartouche defines \nonarrowing to inhibit narrowing at next level down.
 \ifx\nonarrowing\relax
   \advance\leftskip by \lispnarrowing
   \exdentamount = \lispnarrowing
```

```
\else
  \let\nonarrowing = \relax
\fi
}

% Keep a nonzero parskip for the environment, since we're doing normal filling.
%
\def\Eindentedblock{%
 \par
 {\parskip=0pt \afterenvbreak}%
}
\def\Esmallindentedblock{\Eindentedblock}


% LaTeX-like @verbatim...@end verbatim and @verb{<char>...<char>}
% If we want to allow any <char> as delimiter,
% we need the curly braces so that makeinfo sees the @verb command, eg:
% `@verbx...x' would look like the '@verbx' command.  --janneke@gnu.org
%
% [Knuth]: Donald Ervin Knuth, 1996.  The TeXbook.
%
% [Knuth] p.344; only we need to do the other characters Texinfo sets
% active too.  Otherwise, they get lost as the first character on a
% verbatim line.
\def\dospecials{%
 \do\ \do\\\do\{\do\}\do\$\do\&%
 \do\#\do\^\do\^^K\do\_\do\^^A\do\%\do\~%
 \do\<\do\>\do\|\do\@\do+\do\"%
 % Don't do the quotes -- if we do, @set txicodequoteundirected and
 % @set txicodequotebacktick will not have effect on @verb and
 % @verbatim, and ?` and !` ligatures won't get disabled.
 %\do\`\do\'%
}
%
% [Knuth] p. 380
\def\uncatcodespecials{%
 \def\do##1{\catcode`##1=\other}\dospecials}
%
% Setup for the @verb command.
%
% Eight spaces for a tab
\begingroup
 \catcode`\^^I=\active
 \gdef\tabeightspaces{\catcode`\^^I=\active\def^^I{\ \ \ \ \ \ \ \ }}
\endgroup
%
\def\setupverb{%
 \tt  % easiest (and conventionally used) font for verbatim
```

```
\def\par{\leavevmode\endgraf}%
\setupmarkupstyle{verb}%
\tabeightspaces
% Respect line breaks,
% print special symbols as themselves, and
% make each space count
% must do in this order:
\obeylines \uncatcodespecials \sepspaces
}

% Setup for the @verbatim environment
%
% Real tab expansion.
\newdimen\tabw \setbox0=\hbox{\tt\space} \tabw=8\wd0 % tab amount
%
% We typeset each line of the verbatim in an \hbox, so we can handle
% tabs.  The \global is in case the verbatim line starts with an accent,
% or some other command that starts with a begin-group.  Otherwise, the
% entire \verbbox would disappear at the corresponding end-group, before
% it is typeset.  Meanwhile, we can't have nested verbatim commands
% (can we?), so the \global won't be overwriting itself.
\newbox\verbbox
\def\starttabbox{\global\setbox\verbbox=\hbox\bgroup}
%
\begingroup
 \catcode`\^^I=\active
 \gdef\tabexpand{%
  \catcode`\^^I=\active
  \def^^I{\leavevmode\egroup
   \dimen\verbbox=\wd\verbbox % the width so far, or since the previous tab
   \divide\dimen\verbbox by\tabw
   \multiply\dimen\verbbox by\tabw % compute previous multiple of \tabw
   \advance\dimen\verbbox by\tabw  % advance to next multiple of \tabw
   \wd\verbbox=\dimen\verbbox \box\verbbox \starttabbox
  }%
 }
\endgroup

% start the verbatim environment.
\def\setupverbatim{%
\let\nonarrowing = t%
\nonfillstart
\tt % easiest (and conventionally used) font for verbatim
% The \leavevmode here is for blank lines.  Otherwise, we would
% never \starttabox and the \egroup would end verbatim mode.
\def\par{\leavevmode\egroup\box\verbbox\endgraf}%
\tabexpand
\setupmarkupstyle{verbatim}%
```

```
% Respect line breaks,
% print special symbols as themselves, and
% make each space count.
% Must do in this order:
\obeylines \uncatcodespecials \sepspaces
\everypar{\starttabbox}%
}


% Do the @verb magic: verbatim text is quoted by unique
% delimiter characters.  Before first delimiter expect a
% right brace, after last delimiter expect closing brace:
%
%   \def\doverb'{'<char>#1<char>'}'{#1}
%
% [Knuth] p. 382; only eat outer {}
\begingroup
 \catcode`\[=1\catcode`\]=2\catcode`\{=\other\catcode`\}=\other
 \gdef\doverb{#1[\def\next##1#1}[##1\endgroup]\next]
\endgroup
%
\def\verb{\begingroup\setupverb\doverb}
%
%
% Do the @verbatim magic: define the macro \doverbatim so that
% the (first) argument ends when '@end verbatim' is reached, ie:
%
%   \def\doverbatim#1@end verbatim{#1}
%
% For Texinfo it's a lot easier than for LaTeX,
% because texinfo's \verbatim doesn't stop at '\end{verbatim}':
% we need not redefine '\', '{' and '}'.
%
% Inspired by LaTeX's verbatim command set [latex.ltx]
%
\begingroup
 \catcode`\ =\active
 \obeylines %
 % ignore everything up to the first ^^M, that's the newline at the end
 % of the @verbatim input line itself.  Otherwise we get an extra blank
 % line in the output.
 \xdef\doverbatim#1^^M#2@end verbatim{#2\noexpand\end\gobble verbatim}%
 % We really want {...\end verbatim} in the body of the macro, but
 % without the active space; thus we have to use \xdef and \gobble.
\endgroup
%
\envdef\verbatim{%
  \setupverbatim\doverbatim
}
```

```
\let\Everbatim = \afterenvbreak


% @verbatiminclude FILE - insert text of file in verbatim environment.
%
\def\verbatiminclude{\parseargusing\filenamecatcodes\doverbatiminclude}
%
\def\doverbatiminclude#1{%
 {%
  \makevalueexpandable
  \setupverbatim
  \indexnofonts       % Allow `@@' and other weird things in file names.
  \wlog{texinfo.tex: doing @verbatiminclude of #1^^J}%
  \input #1
  \afterenvbreak
 }%
}


% @copying ... @end copying.
% Save the text away for @insertcopying later.
%
% We save the uninterpreted tokens, rather than creating a box.
% Saving the text in a box would be much easier, but then all the
% typesetting commands (@smallbook, font changes, etc.) have to be done
% beforehand -- and a) we want @copying to be done first in the source
% file; b) letting users define the frontmatter in as flexible order as
% possible is very desirable.
%
\def\copying{\checkenv{}\begingroup\scanargctxt\docopying}
\def\docopying#1@end copying{\endgroup\def\copyingtext{#1}}
%
\def\insertcopying{%
 \begingroup
  \parindent = 0pt  % paragraph indentation looks wrong on title page
  \scanexp\copyingtext
 \endgroup
}


\message{defuns,}
% @defun etc.

\newskip\defbodyindent \defbodyindent=.4in
\newskip\defargsindent \defargsindent=50pt
\newskip\deflastargmargin \deflastargmargin=18pt
\newcount\defunpenalty

% Start the processing of @deffn:
```

```
\def\startdefun{%
\ifnum\lastpenalty<10000
  \medbreak
  \defunpenalty=10003 % Will keep this @deffn together with the
                % following @def command, see below.
\else
  % If there are two @def commands in a row, we'll have a \nobreak,
  % which is there to keep the function description together with its
  % header.  But if there's nothing but headers, we need to allow a
  % break somewhere.  Check specifically for penalty 10002, inserted
  % by \printdefunline, instead of 10000, since the sectioning
  % commands also insert a nobreak penalty, and we don't want to allow
  % a break between a section heading and a defun.
  %
  % As a further refinement, we avoid "club" headers by signalling
  % with penalty of 10003 after the very first @deffn in the
  % sequence (see above), and penalty of 10002 after any following
  % @def command.
  \ifnum\lastpenalty=10002 \penalty2000 \else \defunpenalty=10002 \fi
  %
  % Similarly, after a section heading, do not allow a break.
  % But do insert the glue.
  \medskip  % preceded by discardable penalty, so not a breakpoint
\fi
%
\parindent=0in
\advance\leftskip by \defbodyindent
\exdentamount=\defbodyindent
}

\def\dodefunx#1{%
% First, check whether we are in the right environment:
\checkenv#1%
%
% As above, allow line break if we have multiple x headers in a row.
% It's not a great place, though.
\ifnum\lastpenalty=10002 \penalty3000 \else \defunpenalty=10002 \fi
%
% And now, it's time to reuse the body of the original defun:
\expandafter\gobbledefun#1%
}
\def\gobbledefun#1\startdefun{}

% \printdefunline \deffnheader{text}
%
\def\printdefunline#1#2{%
\begingroup
  % call \deffnheader:
```

```
  #1#2 \endheader
  % common ending:
  \interlinepenalty = 10000
  \advance\rightskip by 0pt plus 1fil\relax
  \endgraf
  \nobreak\vskip -\parskip
  \penalty\defunpenalty  % signal to \startdefun and \dodefunx
  % Some of the @defun-type tags do not enable magic parentheses,
  % rendering the following check redundant.  But we don't optimize.
  \checkparencounts
 \endgroup
}

\def\Edefun{\endgraf\medbreak}

% \makedefun{deffn} creates \deffn, \deffnx and \Edeffn;
% the only thing remaining is to define \deffnheader.
%
\def\makedefun#1{%
 \expandafter\let\csname E#1\endcsname = \Edefun
 \edef\temp{\noexpand\domakedefun
   \makecsname{#1}\makecsname{#1x}\makecsname{#1header}}%
 \temp
}

% \domakedefun \deffn \deffnx \deffnheader
%
% Define \deffn and \deffnx, without parameters.
% \deffnheader has to be defined explicitly.
%
\def\domakedefun#1#2#3{%
 \envdef#1{%
  \startdefun
  \doingtypefnfalse    % distinguish typed functions from all else
  \parseargusing\activeparens{\printdefunline#3}%
 }%
 \def#2{\dodefunx#1}%
 \def#3%
}

\newif\ifdoingtypefn      % doing typed function?
\newif\ifrettypeownline    % typeset return type on its own line?

% @deftypefnnewline on|off says whether the return type of typed functions
% are printed on their own line.  This affects @deftypefn, @deftypefun,
% @deftypeop, and @deftypemethod.
%
\parseargdef\deftypefnnewline{%
```

```
    \def\temp{#1}%
  \ifx\temp\onword
    \expandafter\let\csname SETtxideftypefnnl\endcsname
      = \empty
  \else\ifx\temp\offword
    \expandafter\let\csname SETtxideftypefnnl\endcsname
      = \relax
  \else
    \errhelp = \EMsimple
    \errmessage{Unknown @txideftypefnnl value `\temp',
          must be on|off}%
  \fi\fi
}

% Untyped functions:

% @deffn category name args
\makedefun{deffn}{\deffngeneral{}}

% @deffn category class name args
\makedefun{defop}#1 {\defopon{#1\ \putwordon}}

% \defopon {category on}class name args
\def\defopon#1#2 {\deffngeneral{\putwordon\ \code{#2}}{#1\ \code{#2}} }

% \deffngeneral {subind}category name args
%
\def\deffngeneral#1#2 #3 #4\endheader{%
 % Remember that \dosubind{fn}{foo}{} is equivalent to \doind{fn}{foo}.
 \dosubind{fn}{\code{#3}}{#1}%
 \defname{#2}{}{#3}\magicamp\defunargs{#4\unskip}%
}

% Typed functions:

% @deftypefn category type name args
\makedefun{deftypefn}{\deftypefngeneral{}}

% @deftypeop category class type name args
\makedefun{deftypeop}#1 {\deftypeopon{#1\ \putwordon}}

% \deftypeopon {category on}class type name args
\def\deftypeopon#1#2 {\deftypefngeneral{\putwordon\ \code{#2}}{#1\ \code{#2}} }

% \deftypefngeneral {subind}category type name args
%
\def\deftypefngeneral#1#2 #3 #4 #5\endheader{%
 \dosubind{fn}{\code{#4}}{#1}%
```

```
\doingtypefntrue
\defname{#2}{#3}{#4}\defunargs{#5\unskip}%
}

% Typed variables:

% @deftypevr category type var args
\makedefun{deftypevr}{\deftypecvgeneral{}}

% @deftypecv category class type var args
\makedefun{deftypecv}#1 {\deftypecvof{#1\ \putwordof}}

% \deftypecvof {category of}class type var args
\def\deftypecvof#1#2 {\deftypecvgeneral{\putwordof\ \code{#2}}{#1\ \code{#2}} }

% \deftypecvgeneral {subind}category type var args
%
\def\deftypecvgeneral#1#2 #3 #4 #5\endheader{%
 \dosubind{vr}{\code{#4}}{#1}%
 \defname{#2}{#3}{#4}\defunargs{#5\unskip}%
}

% Untyped variables:

% @defvr category var args
\makedefun{defvr}#1 {\deftypevrheader{#1} {} }

% @defcv category class var args
\makedefun{defcv}#1 {\defcvof{#1\ \putwordof}}

% \defcvof {category of}class var args
\def\defcvof#1#2 {\deftypecvof{#1}#2 {} }

% Types:

% @deftp category name args
\makedefun{deftp}#1 #2 #3\endheader{%
 \doind{tp}{\code{#2}}%
 \defname{#1}{}{#2}\defunargs{#3\unskip}%
}

% Remaining @defun-like shortcuts:
\makedefun{defun}{\deffnheader{\putwordDeffunc} }
\makedefun{defmac}{\deffnheader{\putwordDefmac} }
\makedefun{defspec}{\deffnheader{\putwordDefspec} }
\makedefun{deftypefun}{\deftypefnheader{\putwordDeffunc} }
\makedefun{defvar}{\defvrheader{\putwordDefvar} }
\makedefun{defopt}{\defvrheader{\putwordDefopt} }
```

```
\makedefun{deftypevar}{\deftypevrheader{\putwordDefvar} }
\makedefun{defmethod}{\defopon\putwordMethodon}
\makedefun{deftypemethod}{\deftypeopon\putwordMethodon}
\makedefun{defivar}{\defcvof\putwordInstanceVariableof}
\makedefun{deftypeivar}{\deftypecvof\putwordInstanceVariableof}


% \defname, which formats the name of the @def (not the args).
% #1 is the category, such as "Function".
% #2 is the return type, if any.
% #3 is the function name.
%
% We are followed by (but not passed) the arguments, if any.
%
\def\defname#1#2#3{%
 \par
 % Get the values of \leftskip and \rightskip as they were outside the @def...
 \advance\leftskip by -\defbodyindent
 %
 % Determine if we are typesetting the return type of a typed function
 % on a line by itself.
 \rettypeownlinefalse
 \ifdoingtypefn  % doing a typed function specifically?
   % then check user option for putting return type on its own line:
   \expandafter\ifx\csname SETtxideftypefnnl\endcsname\relax \else
     \rettypeownlinetrue
   \fi
 \fi
 %
 % How we'll format the category name.  Putting it in brackets helps
 % distinguish it from the body text that may end up on the next line
 % just below it.
 \def\temp{#1}%
 \setbox0=\hbox{\kern\deflastargmargin \ifx\temp\empty\else [\rm\temp]\fi}
 %
 % Figure out line sizes for the paragraph shape.  We'll always have at
 % least two.
 \tempnum = 2
 %
 % The first line needs space for \box0; but if \rightskip is nonzero,
 % we need only space for the part of \box0 which exceeds it:
 \dimen0=\hsize  \advance\dimen0 by -\wd0  \advance\dimen0 by \rightskip
 %
 % If doing a return type on its own line, we'll have another line.
 \ifrettypeownline
   \advance\tempnum by 1
   \def\maybeshapeline{0in \hsize}%
 \else
   \def\maybeshapeline{}%
```

```
\fi
%
% The continuations:
\dimen2=\hsize  \advance\dimen2 by -\defargsindent
%
% The final paragraph shape:
\parshape \tempnum  0in \dimen0  \maybeshapeline  \defargsindent \dimen2
%
% Put the category name at the right margin.
\noindent
\hbox to 0pt{%
 \hfil\box0 \kern-\hsize
 % \hsize has to be shortened this way:
 \kern\leftskip
 % Intentionally do not respect \rightskip, since we need the space.
}%
%
% Allow all lines to be underfull without complaint:
\tolerance=10000 \hbadness=10000
\exdentamount=\defbodyindent
{%
 % defun fonts. We use typewriter by default (used to be bold) because:
 % . we're printing identifiers, they should be in tt in principle.
 % . in languages with many accents, such as Czech or French, it's
 %   common to leave accents off identifiers.  The result looks ok in
 %   tt, but exceedingly strange in rm.
 % . we don't want -- and --- to be treated as ligatures.
 % . this still does not fix the ?` and !` ligatures, but so far no
 %   one has made identifiers using them :).
 \df \tt
 \def\temp{#2}% text of the return type
 \ifx\temp\empty\else
  \tclose{\temp}% typeset the return type
  \ifrettypeownline
    % put return type on its own line; prohibit line break following:
    \hfil\vadjust{\nobreak}\break
  \else
    \space  % type on same line, so just followed by a space
  \fi
 \fi          % no return type
 #3% output function name
}%
{\rm\enskip}% hskip 0.5 em of \tenrm
%
\boldbrax
% arguments will be output next, if any.
}
```

```
% Print arguments in slanted roman (not ttsl), inconsistently with using
% tt for the name.  This is because literal text is sometimes needed in
% the argument list (groff manual), and ttsl and tt are not very
% distinguishable.  Prevent hyphenation at `-' chars.
%
\def\defunargs#1{%
 % use sl by default (not ttsl),
 % tt for the names.
 \df \sl \hyphenchar\font=0
 %
 % On the other hand, if an argument has two dashes (for instance), we
 % want a way to get ttsl.  We used to recommend @var for that, so
 % leave the code in, but it's strange for @var to lead to typewriter.
 % Nowadays we recommend @code, since the difference between a ttsl hyphen
 % and a tt hyphen is pretty tiny.  @code also disables ?` !`.
 \def\var##1{{\setupmarkupstyle{var}\ttslanted{##1}}}%
 #1%
 \sl\hyphenchar\font=45
}

% We want ()&[] to print specially on the defun line.
%
\def\activeparens{%
 \catcode`\(=\active \catcode`\)=\active
 \catcode`\[=\active \catcode`\]=\active
 \catcode`\&=\active
}

% Make control sequences which act like normal parenthesis chars.
\let\lparen = ( \let\rparen = )

% Be sure that we always have a definition for `(', etc.  For example,
% if the fn name has parens in it, \boldbrax will not be in effect yet,
% so TeX would otherwise complain about undefined control sequence.
{
\activeparens
\global\let(=\lparen \global\let)=\rparen
\global\let[=\lbrack \global\let]=\rbrack
\global\let& = \&

\gdef\boldbrax{\let(=\opnr\let)=\clnr\let[=\lbrb\let]=\rbrb}
\gdef\magicamp{\let&=\amprm}
}

\newcount\parencount

% If we encounter &foo, then turn on ()-hacking afterwards
\newif\ifampseen
```

```
\def\amprm#1 {\ampseentrue{\bf\&#1 }}

\def\parenfont{%
 \ifampseen
   % At the first level, print parens in roman,
   % otherwise use the default font.
   \ifnum \parencount=1 \rm \fi
 \else
   % The \sf parens (in \boldbrax) actually are a little bolder than
   % the contained text.  This is especially needed for [ and ] .
   \sf
 \fi
}
\def\infirstlevel#1{%
 \ifampseen
   \ifnum\parencount=1
     #1%
   \fi
 \fi
}
\def\bfafterword#1 {#1 \bf}

\def\opnr{%
 \global\advance\parencount by 1
 {\parenfont(}%
 \infirstlevel \bfafterword
}
\def\clnr{%
 {\parenfont)}%
 \infirstlevel \sl
 \global\advance\parencount by -1
}

\newcount\brackcount
\def\lbrb{%
 \global\advance\brackcount by 1
 {\bf[}%
}
\def\rbrb{%
 {\bf]}%
 \global\advance\brackcount by -1
}

\def\checkparencounts{%
 \ifnum\parencount=0 \else \badparencount \fi
 \ifnum\brackcount=0 \else \badbrackcount \fi
}
% these should not use \errmessage; the glibc manual, at least, actually
```

```
% has such constructs (when documenting function pointers).
\def\badparencount{%
 \message{Warning: unbalanced parentheses in @def...}%
 \global\parencount=0
}
\def\badbrackcount{%
 \message{Warning: unbalanced square brackets in @def...}%
 \global\brackcount=0
}


\message{macros,}
% @macro.


% To do this right we need a feature of e-TeX, \scantokens,
% which we arrange to emulate with a temporary file in ordinary TeX.
\ifx\eTeXversion\thisisundefined
 \newwrite\macscribble
 \def\scantokens#1{%
  \toks0={#1}%
  \immediate\openout\macscribble=\jobname.tmp
  \immediate\write\macscribble{\the\toks0}%
  \immediate\closeout\macscribble
  \input \jobname.tmp
 }
\fi


\def\scanmacro#1{\begingroup
 \newlinechar`\^^M
 \let\xeatspaces\eatspaces
 %
 % Undo catcode changes of \startcontents and \doprintindex
 % When called from @insertcopying or (short)caption, we need active
 % backslash to get it printed correctly.  Previously, we had
 % \catcode`\\=\other instead.  We'll see whether a problem appears
 % with macro expansion.    --kasal, 19aug04
 \catcode`\@=0 \catcode`\\=\active \escapechar=`\@
 %
 % ... and for \example:
 \spaceisspace
 %
 % The \empty here causes a following catcode 5 newline to be eaten as
 % part of reading whitespace after a control sequence.  It does not
 % eat a catcode 13 newline.  There's no good way to handle the two
 % cases (untried: maybe e-TeX's \everyeof could help, though plain TeX
 % would then have different behavior).  See the Macro Details node in
 % the manual for the workaround we recommend for macros and
 % line-oriented commands.
```

```
   %
   \scantokens{#1\empty}%
\endgroup}

\def\scanexp#1{%
 \edef\temp{\noexpand\scanmacro{#1}}%
 \temp
}

\newcount\paramno   % Count of parameters
\newtoks\macname     % Macro name
\newif\ifrecursive  % Is it recursive?

% List of all defined macros in the form
%    \definedummyword\macro1\definedummyword\macro2...
% Currently is also contains all @aliases; the list can be split
% if there is a need.
\def\macrolist{}

% Add the macro to \macrolist
\def\addtomacrolist#1{\expandafter \addtomacrolistxxx \csname#1\endcsname}
\def\addtomacrolistxxx#1{%
    \toks0 = \expandafter{\macrolist\definedummyword#1}%
    \xdef\macrolist{\the\toks0}%
}

% Utility routines.
% This does \let #1 = #2, with \csnames; that is,
%   \let \csname#1\endcsname = \csname#2\endcsname
% (except of course we have to play expansion games).
%
\def\cslet#1#2{%
 \expandafter\let
 \csname#1\expandafter\endcsname
 \csname#2\endcsname
}

% Trim leading and trailing spaces off a string.
% Concepts from aro-bend problem 15 (see CTAN).
{\catcode`\@=11
\gdef\eatspaces #1{\expandafter\trim@\expandafter{#1 }}
\gdef\trim@ #1{\trim@@ @#1 @ #1 @ @@}
\gdef\trim@@ #1@ #2@ #3@@{\trim@@@\empty #2 @}
\def\unbrace#1{#1}
\unbrace{\gdef\trim@@@ #1 } #2@{#1}
}

% Trim a single trailing ^^M off a string.
```

```
{\catcode`\^^M=\other \catcode`\Q=3%
\gdef\eatcr #1{\eatcra #1Q^^MQ}%
\gdef\eatcra#1^^MQ{\eatcrb#1Q}%
\gdef\eatcrb#1Q#2Q{#1}%
}


% Macro bodies are absorbed as an argument in a context where
% all characters are catcode 10, 11 or 12, except \ which is active
% (as in normal texinfo). It is necessary to change the definition of \
% to recognize macro arguments; this is the job of \mbodybackslash.
%
% Non-ASCII encodings make 8-bit characters active, so un-activate
% them to avoid their expansion.  Must do this non-globally, to
% confine the change to the current group.
%
% It's necessary to have hard CRs when the macro is executed. This is
% done by making ^^M (\endlinechar) catcode 12 when reading the macro
% body, and then making it the \newlinechar in \scanmacro.
%
\def\scanctxt{% used as subroutine
 \catcode`\"=\other
 \catcode`\+=\other
 \catcode`\<=\other
 \catcode`\>=\other
 \catcode`\@=\other
 \catcode`\^=\other
 \catcode`\_=\other
 \catcode`\|=\other
 \catcode`\~=\other
 \ifx\declaredencoding\ascii \else \setnonasciicharscatcodenonglobal\other \fi
}

\def\scanargctxt{% used for copying and captions, not macros.
 \scanctxt
 \catcode`\\=\other
 \catcode`\^^M=\other
}

\def\macrobodyctxt{% used for @macro definitions
 \scanctxt
 \catcode`\{=\other
 \catcode`\}=\other
 \catcode`\^^M=\other
 \usembodybackslash
}

\def\macroargctxt{% used when scanning invocations
 \scanctxt
```

```
  \catcode`\\=0
}
% why catcode 0 for \ in the above?  To recognize \\ \{ \} as "escapes"
% for the single characters \ { }.  Thus, we end up with the "commands"
% that would be written @\ @{ @} in a Texinfo document.
%
% We already have @{ and @}.  For @\, we define it here, and only for
% this purpose, to produce a typewriter backslash (so, the @\ that we
% define for @math can't be used with @macro calls):
%
\def\\{\normalbackslash}%
%
% We would like to do this for \, too, since that is what makeinfo does.
% But it is not possible, because Texinfo already has a command @, for a
% cedilla accent.  Documents must use @comma{} instead.
%
% \anythingelse will almost certainly be an error of some kind.


% \mbodybackslash is the definition of \ in @macro bodies.
% It maps \foo\ => \csname macarg.foo\endcsname => #N
% where N is the macro parameter number.
% We define \csname macarg.\endcsname to be \realbackslash, so
% \\ in macro replacement text gets you a backslash.
%
{\catcode`@=0 @catcode`@\=@active
@gdef@usembodybackslash{@let\=@mbodybackslash}
@gdef@mbodybackslash#1\{@csname macarg.#1@endcsname}
}
\expandafter\def\csname macarg.\endcsname{\realbackslash}

\def\margbackslash#1{\char`\#1 }

\def\macro{\recursivefalse\parsearg\macroxxx}
\def\rmacro{\recursivetrue\parsearg\macroxxx}

\def\macroxxx#1{%
\getargs{#1}% now \macname is the macname and \argl the arglist
\ifx\argl\empty       % no arguments
  \paramno=0\relax
\else
  \expandafter\parsemargdef \argl;%
  \if\paramno>256\relax
   \ifx\eTeXversion\thisisundefined
    \errhelp = \EMsimple
    \errmessage{You need eTeX to compile a file with macros with more than 256 arguments}
   \fi
  \fi
```

```
\fi
\if1\csname ismacro.\the\macname\endcsname
  \message{Warning: redefining \the\macname}%
\else
  \expandafter\ifx\csname \the\macname\endcsname \relax
  \else \errmessage{Macro name \the\macname\space already defined}\fi
  \global\cslet{macsave.\the\macname}{\the\macname}%
  \global\expandafter\let\csname ismacro.\the\macname\endcsname=1%
  \addtomacrolist{\the\macname}%
\fi
\begingroup \macrobodyctxt
\ifrecursive \expandafter\parsermacbody
\else \expandafter\parsemacbody
\fi}


\parseargdef\unmacro{%
\if1\csname ismacro.#1\endcsname
  \global\cslet{#1}{macsave.#1}%
  \global\expandafter\let \csname ismacro.#1\endcsname=0%
  % Remove the macro name from \macrolist:
  \begingroup
    \expandafter\let\csname#1\endcsname \relax
    \let\definedummyword\unmacrodo
    \xdef\macrolist{\macrolist}%
  \endgroup
\else
  \errmessage{Macro #1 not defined}%
\fi
}


% Called by \do from \dounmacro on each macro.  The idea is to omit any
% macro definitions that have been changed to \relax.
%
\def\unmacrodo#1{%
\ifx #1\relax
  % remove this
\else
  \noexpand\definedummyword \noexpand#1%
\fi
}


% This makes use of the obscure feature that if the last token of a
% <parameter list> is #, then the preceding argument is delimited by
% an opening brace, and that opening brace is not consumed.
\def\getargs#1{\getargsxxx#1{}}
\def\getargsxxx#1#{\getmacname #1 \relax\getmacargs}
\def\getmacname#1 #2\relax{\macname={#1}}
\def\getmacargs#1{\def\argl{#1}}
```

% For macro processing make @ a letter so that we can make Texinfo private macro names.
\edef\texiatcatcode{\the\catcode`\@ }
\catcode `@=11\relax

% Parse the optional {params} list. Set up \paramno and \paramlist
% so \defmacro knows what to do. Define \macarg.BLAH for each BLAH
% in the params list to some hook where the argument si to be expanded. If
% there are less than 10 arguments that hook is to be replaced by ##N where N
% is the position in that list, that is to say the macro arguments are to be
% defined `a la TeX in the macro body.
%
% That gets used by \mbodybackslash (above).
%
% We need to get `macro parameter char #' into several definitions.
% The technique used is stolen from LaTeX: let \hash be something
% unexpandable, insert that wherever you need a #, and then redefine
% it to # just before using the token list produced.
%
% The same technique is used to protect \eatspaces till just before
% the macro is used.
%
% If there are 10 or more arguments, a different technique is used, where the
% hook remains in the body, and when macro is to be expanded the body is
% processed again to replace the arguments.
%
% In that case, the hook is \the\toks N-1, and we simply set \toks N-1 to the
% argument N value and then \edef the body (nothing else will expand because of
% the catcode regime underwhich the body was input).
%
% If you compile with TeX (not eTeX), and you have macros with 10 or more
% arguments, you need that no macro has more than 256 arguments, otherwise an
% error is produced.
\def\parsemargdef#1;{%
 \paramno=0\def\paramlist{ }%
 \let\hash\relax
 \let\xeatspaces\relax
 \parsemargdefxxx#1,;,%
% In case that there are 10 or more arguments we parse again the arguments
% list to set new definitions for the \macarg.BLAH macros corresponding to
% each BLAH argument. It was anyhow needed to parse already once this list
% in order to count the arguments, and as macros with at most 9 arguments
% are by far more frequent than macro with 10 or more arguments, defining
% twice the \macarg.BLAH macros does not cost too much processing power.
\ifnum\paramno<10\relax\else
  \paramno0\relax
  \parsemmanyargdef@ @#1,;,% 10 or more arguments
 \fi

```
}
\def\parsemargdefxxx#1,{%
 \if#1;\let\next=\relax
 \else \let\next=\parsemargdefxxx
  \advance\paramno by 1
  \expandafter\edef\csname macarg.\eatspaces{#1}\endcsname
     {\xeatspaces{\hash\the\paramno}}%
  \edef\paramlist{\paramlist\hash\the\paramno,}%
 \fi\next}

\def\parsemmanyargdef@@#1,{%
 \if#1;\let\next=\relax
 \else
  \let\next=\parsemmanyargdef@@
  \edef\tempb{\eatspaces{#1}}%
  \expandafter\def\expandafter\tempa
    \expandafter{\csname macarg.\tempb\endcsname}%
  % Note that we need some extra \noexpand\noexpand, this is because we
  % don't want \the  to be expanded in the \parsermacbody  as it uses an
  % \xdef .
  \expandafter\edef\tempa
    {\noexpand\noexpand\noexpand\the\toks\the\paramno}%
  \advance\paramno by 1\relax
 \fi\next}

% These two commands read recursive and nonrecursive macro bodies.
% (They're different since rec and nonrec macros end differently.)
%

\catcode `\@\texiatcatcode
\long\def\parsemacbody#1@end macro%
{\xdef\temp{\eatcr{#1}}\endgroup\defmacro}%
\long\def\parsermacbody#1@end rmacro%
{\xdef\temp{\eatcr{#1}}\endgroup\defmacro}%
\catcode `\@=11\relax

\let\endargs@\relax
\let\nil@\relax
\def\nilm@{\nil@}%
\long\def\nillm@{\nil@}%

% This macro is expanded during the Texinfo macro expansion, not during its
% definition.  It gets all the arguments values and assigns them to macros
% macarg.ARGNAME
%
% #1 is the macro name
% #2 is the list of argument names
% #3 is the list of argument values
```

```
\def\getargvals@#1#2#3{%
\def\macargdeflist@{}%
\def\saveparamlist@{#2}% Need to keep a copy for parameter expansion.
\def\paramlist{#2,\nil@}%
\def\macroname{#1}%
\begingroup
\macroargctxt
\def\argvaluelist{#3,\nil@}%
\def\@tempa{#3}%
\ifx\@tempa\empty
  \setemptyargvalues@
\else
  \getargvals@@
\fi
}


%
\def\getargvals@@{%
\ifx\paramlist\nilm@
    % Some sanity check needed here that \argvaluelist is also empty.
    \ifx\argvaluelist\nillm@
    \else
     \errhelp = \EMsimple
     \errmessage{Too many arguments in macro `\macroname'!}%
    \fi
    \let\next\macargexpandinbody@
\else
  \ifx\argvaluelist\nillm@
    % No more arguments values passed to macro.  Set remaining named-arg
    % macros to empty.
    \let\next\setemptyargvalues@
  \else
    % pop current arg name into \@tempb
    \def\@tempa##1{\pop@{\@tempb}{\paramlist}##1\endargs@}%
    \expandafter\@tempa\expandafter{\paramlist}%
    % pop current argument value into \@tempc
    \def\@tempa##1{\longpop@{\@tempc}{\argvaluelist}##1\endargs@}%
    \expandafter\@tempa\expandafter{\argvaluelist}%
    % Here \@tempb is the current arg name and \@tempc is the current arg value.
    % First place the new argument macro definition into \@tempd
    \expandafter\macname\expandafter{\@tempc}%
    \expandafter\let\csname macarg.\@tempb\endcsname\relax
    \expandafter\def\expandafter\@tempe\expandafter{%
      \csname macarg.\@tempb\endcsname}%
    \edef\@tempd{\long\def\@tempe{\the\macname}}%
    \push@\@tempd\macargdeflist@
    \let\next\getargvals@@
  \fi
```

```
\fi
\next
}

\def\push@#1#2{%
 \expandafter\expandafter\expandafter\def
 \expandafter\expandafter\expandafter#2%
 \expandafter\expandafter\expandafter{%
 \expandafter#1#2}%
}

% Replace arguments by their values in the macro body, and place the result
% in macro \@tempa
\def\macvalstoargs@{%
 % To do this we use the property that token registers that are \the'ed
 % within an \edef  expand only once. So we are going to place all argument
 % values into respective token registers.
 %
 % First we save the token context, and initialize argument numbering.
 \begingroup
  \paramno0\relax
  % Then, for each argument number #N, we place the corresponding argument
  % value into a new token list register \toks#N
  \expandafter\putargsintokens@\saveparamlist@,;,%
  % Then, we expand the body so that argument are replaced by their
  % values. The trick for values not to be expanded themselves is that they
  % are within tokens and that tokens expand only once in an \edef .
  \edef\@tempc{\csname mac.\macroname .body\endcsname}%
  % Now we restore the token stack pointer to free the token list registers
  % which we have used, but we make sure that expanded body is saved after
  % group.
  \expandafter
 \endgroup
 \expandafter\def\expandafter\@tempa\expandafter{\@tempc}%
}

\def\macargexpandinbody@{%
 %% Define the named-macro outside of this group and then close this group.
 \expandafter
 \endgroup
 \macargdeflist@
 % First the replace in body the macro arguments by their values, the result
 % is in \@tempa .
 \macvalstoargs@
 % Then we point at the \norecurse or \gobble (for recursive) macro value
 % with \@tempb .
 \expandafter\let\expandafter\@tempb\csname mac.\macroname .recurse\endcsname
 % Depending on whether it is recursive or not, we need some tailing
```

```
% \egroup .
\ifx\@tempb\gobble
   \let\@tempc\relax
\else
   \let\@tempc\egroup
\fi
% And now we do the real job:
\edef\@tempd{\noexpand\@tempb{\macroname}\noexpand\scanmacro{\@tempa}\@tempc}%
\@tempd
}


\def\putargsintokens@#1,{%
\if#1;\let\next\relax
\else
   \let\next\putargsintokens@
   % First we allocate the new token list register, and give it a temporary
   % alias \@tempb .
   \toksdef\@tempb\the\paramno
   % Then we place the argument value into that token list register.
   \expandafter\let\expandafter\@tempa\csname macarg.#1\endcsname
   \expandafter\@tempb\expandafter{\@tempa}%
   \advance\paramno by 1\relax
\fi
\next
}


% Save the token stack pointer into macro #1
\def\texisavetoksstackpoint#1{\edef#1{\the\@cclvi}}
% Restore the token stack pointer from number in macro #1
\def\texirestoretoksstackpoint#1{\expandafter\mathchardef\expandafter\@cclvi#1\relax}
% newtoks that can be used non \outer .
\def\texinonouternewtoks{\alloc@ 5\toks \toksdef \@cclvi}


% Tailing missing arguments are set to empty
\def\setemptyargvalues@{%
\ifx\paramlist\nilm@
   \let\next\macargexpandinbody@
\else
   \expandafter\setemptyargvaluesparser@\paramlist\endargs@
   \let\next\setemptyargvalues@
\fi
\next
}


\def\setemptyargvaluesparser@#1,#2\endargs@{%
\expandafter\def\expandafter\@tempa\expandafter{%
   \expandafter\def\csname macarg.#1\endcsname{}}%
\push@\@tempa\macargdeflist@
```

```
  \def\paramlist{#2}%
}

% #1 is the element target macro
% #2 is the list macro
% #3,#4\endargs@ is the list value
\def\pop@#1#2#3,#4\endargs@{%
 \def#1{#3}%
 \def#2{#4}%
}
\long\def\longpop@#1#2#3,#4\endargs@{%
 \long\def#1{#3}%
 \long\def#2{#4}%
}

% This defines a Texinfo @macro. There are eight cases: recursive and
% nonrecursive macros of zero, one, up to nine, and many arguments.
% Much magic with \expandafter here.
% \xdef is used so that macro definitions will survive the file
% they're defined in; @include reads the file inside a group.
%
\def\defmacro{%
 \let\hash=##% convert placeholders to macro parameter chars
 \ifrecursive
  \ifcase\paramno
  % 0
    \expandafter\xdef\csname\the\macname\endcsname{%
      \noexpand\scanmacro{\temp}}%
  \or % 1
    \expandafter\xdef\csname\the\macname\endcsname{%
      \bgroup\noexpand\macroargctxt
      \noexpand\braceorline
      \expandafter\noexpand\csname\the\macname xxx\endcsname}%
    \expandafter\xdef\csname\the\macname xxx\endcsname##1{%
      \egroup\noexpand\scanmacro{\temp}}%
  \else
    \ifnum\paramno<10\relax % at most 9
      \expandafter\xdef\csname\the\macname\endcsname{%
        \bgroup\noexpand\macroargctxt
        \noexpand\csname\the\macname xx\endcsname}%
      \expandafter\xdef\csname\the\macname xx\endcsname##1{%
        \expandafter\noexpand\csname\the\macname xxx\endcsname ##1,}%
      \expandafter\expandafter
      \expandafter\xdef
      \expandafter\expandafter
       \csname\the\macname xxx\endcsname
        \paramlist{\egroup\noexpand\scanmacro{\temp}}%
    \else % 10 or more
```

```
    \expandafter\xdef\csname\the\macname\endcsname{%
      \noexpand\getargvals@{\the\macname}{\argl}%
    }%
    \global\expandafter\let\csname mac.\the\macname .body\endcsname\temp
    \global\expandafter\let\csname mac.\the\macname .recurse\endcsname\gobble
   \fi
  \fi
\else
 \ifcase\paramno
 % 0
   \expandafter\xdef\csname\the\macname\endcsname{%
     \noexpand\norecurse{\the\macname}%
     \noexpand\scanmacro{\temp}\egroup}%
 \or % 1
   \expandafter\xdef\csname\the\macname\endcsname{%
     \bgroup\noexpand\macroargctxt
     \noexpand\braceorline
     \expandafter\noexpand\csname\the\macname xxx\endcsname}%
   \expandafter\xdef\csname\the\macname xxx\endcsname##1{%
    \egroup
    \noexpand\norecurse{\the\macname}%
    \noexpand\scanmacro{\temp}\egroup}%
 \else % at most 9
  \ifnum\paramno<10\relax
   \expandafter\xdef\csname\the\macname\endcsname{%
     \bgroup\noexpand\macroargctxt
     \expandafter\noexpand\csname\the\macname xx\endcsname}%
   \expandafter\xdef\csname\the\macname xx\endcsname##1{%
     \expandafter\noexpand\csname\the\macname xxx\endcsname ##1,}%
   \expandafter\expandafter
   \expandafter\xdef
   \expandafter\expandafter
   \csname\the\macname xxx\endcsname
   \paramlist{%
     \egroup
     \noexpand\norecurse{\the\macname}%
     \noexpand\scanmacro{\temp}\egroup}%
  \else % 10 or more:
   \expandafter\xdef\csname\the\macname\endcsname{%
    \noexpand\getargvals@{\the\macname}{\argl}%
   }%
   \global\expandafter\let\csname mac.\the\macname .body\endcsname\temp
   \global\expandafter\let\csname mac.\the\macname .recurse\endcsname\norecurse
  \fi
 \fi
\fi}

\catcode `\@\texiatcatcode\relax
```

```
\def\norecurse#1{\bgroup\cslet{#1}{macsave.#1}}

% \braceorline decides whether the next nonwhitespace character is a
% {.  If so it reads up to the closing }, if not, it reads the whole
% line.  Whatever was read is then fed to the next control sequence
% as an argument (by \parsebrace or \parsearg).
%
\def\braceorline#1{\let\macnamexxx=#1\futurelet\nchar\braceorlinexxx}
\def\braceorlinexxx{%
 \ifx\nchar\bgroup\else
   \expandafter\parsearg
 \fi \macnamexxx}



% @alias.
% We need some trickery to remove the optional spaces around the equal
% sign.  Make them active and then expand them all to nothing.
%
\def\alias{\parseargusing\obeyspaces\aliasxxx}
\def\aliasxxx #1{\aliasyyy#1\relax}
\def\aliasyyy #1=#2\relax{%
 {%
   \expandafter\let\obeyedspace=\empty
   \addtomacrolist{#1}%
   \xdef\next{\global\let\makecsname{#1}=\makecsname{#2}}%
 }%
 \next
}



\message{cross references,}

\newwrite\auxfile
\newif\ifhavexrefs    % True if xref values are known.
\newif\ifwarnedxrefs  % True if we warned once that they aren't known.

% @inforef is relatively simple.
\def\inforef #1{\inforefzzz #1,,,,**}
\def\inforefzzz #1,#2,#3,#4**{%
 \putwordSee{} \putwordInfo{} \putwordfile{} \file{\ignorespaces #3{}},
 node \samp{\ignorespaces#1{}}}

% @node's only job in TeX is to define \lastnode, which is used in
% cross-references.  The @node line might or might not have commas, and
% might or might not have spaces before the first comma, like:
% @node foo , bar , ...
% We don't want such trailing spaces in the node name.
```

```
%
\parseargdef\node{\checkenv{}\donode #1 ,\finishnodeparse}
%
% also remove a trailing comma, in case of something like this:
% @node Help-Cross,  ,  , Cross-refs
\def\donode#1 ,#2\finishnodeparse{\dodonode #1,\finishnodeparse}
\def\dodonode#1,#2\finishnodeparse{\gdef\lastnode{#1}}


\let\nwnode=\node
\let\lastnode=\empty

% Write a cross-reference definition for the current node.  #1 is the
% type (Ynumbered, Yappendix, Ynothing).
%
\def\donoderef#1{%
 \ifx\lastnode\empty\else
  \setref{\lastnode}{#1}%
  \global\let\lastnode=\empty
 \fi
}

% @anchor{NAME} -- define xref target at arbitrary point.
%
\newcount\savesfregister
%
\def\savesf{\relax \ifhmode \savesfregister=\spacefactor \fi}
\def\restoresf{\relax \ifhmode \spacefactor=\savesfregister \fi}
\def\anchor#1{\savesf \setref{#1}{Ynothing}\restoresf \ignorespaces}

% \setref{NAME}{SNT} defines a cross-reference point NAME (a node or an
% anchor), which consists of three parts:
% 1) NAME-title - the current sectioning name taken from \lastsection,
%           or the anchor name.
% 2) NAME-snt   - section number and type, passed as the SNT arg, or
%           empty for anchors.
% 3) NAME-pg    - the page number.
%
% This is called from \donoderef, \anchor, and \dofloat.  In the case of
% floats, there is an additional part, which is not written here:
% 4) NAME-lof   - the text as it should appear in a @listoffloats.
%
\def\setref#1#2{%
 \pdfmkdest{#1}%
 \iflinks
   {%
    \atdummies  % preserve commands, but don't expand them
    \edef\writexrdef##1##2{%
 \write\auxfile{@xrdef{#1-% #1 of \setref, expanded by the \edef
```

```
    ##1}{##2}}% these are parameters of \writexrdef
      }%
      \toks0 = \expandafter{\lastsection}%
      \immediate \writexrdef{title}{\the\toks0 }%
      \immediate \writexrdef{snt}{\csname #2\endcsname}% \Ynumbered etc.
      \safewhatsit{\writexrdef{pg}{\folio}}% will be written later, at \shipout
    }%
  \fi
}


% @xrefautosectiontitle on|off says whether @section(ing) names are used
% automatically in xrefs, if the third arg is not explicitly specified.
% This was provided as a "secret" @set xref-automatic-section-title
% variable, now it's official.
%
\parseargdef\xrefautomaticsectiontitle{%
 \def\temp{#1}%
 \ifx\temp\onword
   \expandafter\let\csname SETxref-automatic-section-title\endcsname
     = \empty
 \else\ifx\temp\offword
   \expandafter\let\csname SETxref-automatic-section-title\endcsname
     = \relax
 \else
   \errhelp = \EMsimple
   \errmessage{Unknown @xrefautomaticsectiontitle value `\temp',
         must be on|off}%
 \fi\fi
}


%
% @xref, @pxref, and @ref generate cross-references.  For \xrefX, #1 is
% the node name, #2 the name of the Info cross-reference, #3 the printed
% node name, #4 the name of the Info file, #5 the name of the printed
% manual.  All but the node name can be omitted.
%
\def\pxref#1{\putwordsee{} \xrefX[#1,,,,,,,]}
\def\xref#1{\putwordSee{} \xrefX[#1,,,,,,,]}
\def\ref#1{\xrefX[#1,,,,,,,]}
%
\newbox\toprefbox
\newbox\printedrefnamebox
\newbox\infofilenamebox
\newbox\printedmanualbox
%
\def\xrefX[#1,#2,#3,#4,#5,#6]{\begingroup
 \unsepspaces
 %
```

```
% Get args without leading/trailing spaces.
\def\printedrefname{\ignorespaces #3}%
\setbox\printedrefnamebox = \hbox{\printedrefname\unskip}%
%
\def\infofilename{\ignorespaces #4}%
\setbox\infofilenamebox = \hbox{\infofilename\unskip}%
%
\def\printedmanual{\ignorespaces #5}%
\setbox\printedmanualbox  = \hbox{\printedmanual\unskip}%
%
% If the printed reference name (arg #3) was not explicitly given in
% the @xref, figure out what we want to use.
\ifdim \wd\printedrefnamebox = 0pt
  % No printed node name was explicitly given.
  \expandafter\ifx\csname SETxref-automatic-section-title\endcsname \relax
    % Not auto section-title: use node name inside the square brackets.
    \def\printedrefname{\ignorespaces #1}%
  \else
    % Auto section-title: use chapter/section title inside
    % the square brackets if we have it.
    \ifdim \wd\printedmanualbox > 0pt
      % It is in another manual, so we don't have it; use node name.
      \def\printedrefname{\ignorespaces #1}%
    \else
      \ifhavexrefs
        % We (should) know the real title if we have the xref values.
        \def\printedrefname{\refx{#1-title}{}}%
      \else
        % Otherwise just copy the Info node name.
        \def\printedrefname{\ignorespaces #1}%
      \fi%
    \fi
  \fi
\fi
%
% Make link in pdf output.
\ifpdf
  {\indexnofonts
   \turnoffactive
   \makevalueexpandable
   % This expands tokens, so do it after making catcode changes, so _
   % etc. don't get their TeX definitions.  This ignores all spaces in
   % #4, including (wrongly) those in the middle of the filename.
   \getfilename{#4}%
   %
   % This (wrongly) does not take account of leading or trailing
   % spaces in #1, which should be ignored.
   \edef\pdfxrefdest{#1}%
```

```
  \ifx\pdfxrefdest\empty
    \def\pdfxrefdest{Top}% no empty targets
  \else
    \txiescapepdf\pdfxrefdest  % escape PDF special chars
  \fi
  %
  \leavevmode
  \startlink attr{/Border [0 0 0]}%
  \ifnum\filenamelength>0
    goto file{\the\filename.pdf} name{\pdfxrefdest}%
  \else
    goto name{\pdfmkpgn{\pdfxrefdest}}%
  \fi
  }%
  \setcolor{\linkcolor}%
\fi
%
% Float references are printed completely differently: "Figure 1.2"
% instead of "[somenode], p.3".  We distinguish them by the
% LABEL-title being set to a magic string.
{%
  % Have to otherify everything special to allow the \csname to
  % include an _ in the xref name, etc.
  \indexnofonts
  \turnoffactive
  \expandafter\global\expandafter\let\expandafter\Xthisreftitle
    \csname XR#1-title\endcsname
}%
\iffloat\Xthisreftitle
  % If the user specified the print name (third arg) to the ref,
  % print it instead of our usual "Figure 1.2".
  \ifdim\wd\printedrefnamebox = 0pt
    \refx{#1-snt}{}%
  \else
    \printedrefname
  \fi
  %
  % If the user also gave the printed manual name (fifth arg), append
  % "in MANUALNAME".
  \ifdim \wd\printedmanualbox > 0pt
    \space \putwordin{} \cite{\printedmanual}%
  \fi
\else
  % node/anchor (non-float) references.
  %
  % If we use \unhbox to print the node names, TeX does not insert
  % empty discretionaries after hyphens, which means that it will not
  % find a line break at a hyphen in a node names.  Since some manuals
```

% are best written with fairly long node names, containing hyphens,
% this is a loss. Therefore, we give the text of the node name
% again, so it is as if TeX is seeing it for the first time.
%
\ifdim \wd\printedmanualbox > 0pt
  % Cross-manual reference with a printed manual name.
  %
  \crossmanualxref{\cite{\printedmanual\unskip}}%
%
\else\ifdim \wd\infofilenamebox > 0pt
  % Cross-manual reference with only an info filename (arg 4), no
  % printed manual name (arg 5). This is essentially the same as
  % the case above; we output the filename, since we have nothing else.
  %
  \crossmanualxref{\code{\infofilename\unskip}}%
%
\else
  % Reference within this manual.
  %
  % _ (for example) has to be the character _ for the purposes of the
  % control sequence corresponding to the node, but it has to expand
  % into the usual \leavevmode...\vrule stuff for purposes of
  % printing. So we \turnoffactive for the \refx-snt, back on for the
  % printing, back off for the \refx-pg.
  {\turnoffactive
   % Only output a following space if the -snt ref is nonempty; for
   % @unnumbered and @anchor, it won't be.
   \setbox2 = \hbox{\ignorespaces \refx{#1-snt}{}}%
   \ifdim \wd2 > 0pt \refx{#1-snt}\space\fi
   }%
   % output the `[mynode]' via the macro below so it can be overridden.
   \xrefprintnodename\printedrefname
   %
   % But we always want a comma and a space:
   ,\space
   %
   % output the `page 3'.
   \turnoffactive \putwordpage\tie\refx{#1-pg}{}%
  \fi\fi
\fi
\endlink
\endgroup}

% Output a cross-manual xref to #1. Used just above (twice).
%
% Only include the text "Section ``foo'' in" if the foo is neither
% missing or Top. Thus, @xref{,,,foo,The Foo Manual} outputs simply
% "see The Foo Manual", the idea being to refer to the whole manual.

```
%
% But, this being TeX, we can't easily compare our node name against the
% string "Top" while ignoring the possible spaces before and after in
% the input.  By adding the arbitrary 7sp below, we make it much less
% likely that a real node name would have the same width as "Top" (e.g.,
% in a monospaced font).  Hopefully it will never happen in practice.
%
% For the same basic reason, we retypeset the "Top" at every
% reference, since the current font is indeterminate.
%
\def\crossmanualxref#1{%
 \setbox\toprefbox = \hbox{Top\kern7sp}%
 \setbox2 = \hbox{\ignorespaces \printedrefname \unskip \kern7sp}%
 \ifdim \wd2 > 7sp  % nonempty?
   \ifdim \wd2 = \wd\toprefbox \else  % same as Top?
     \putwordSection{} ``\printedrefname" \putwordin{}\space
   \fi
 \fi
 #1%
}


% This macro is called from \xrefX for the `[nodename]' part of xref
% output. It's a separate macro only so it can be changed more easily,
% since square brackets don't work well in some documents.  Particularly
% one that Bob is working on :).
%
\def\xrefprintnodename#1{[#1]}


% Things referred to by \setref.
%
\def\Ynothing{}
\def\Yomitfromtoc{}
\def\Ynumbered{%
 \ifnum\secno=0
   \putwordChapter@tie \the\chapno
 \else \ifnum\subsecno=0
   \putwordSection@tie \the\chapno.\the\secno
 \else \ifnum\subsubsecno=0
   \putwordSection@tie \the\chapno.\the\secno.\the\subsecno
 \else
   \putwordSection@tie \the\chapno.\the\secno.\the\subsecno.\the\subsubsecno
 \fi\fi\fi
}
\def\Yappendix{%
 \ifnum\secno=0
   \putwordAppendix@tie @char\the\appendixno{}%
 \else \ifnum\subsecno=0
   \putwordSection@tie @char\the\appendixno.\the\secno
```

```
\else \ifnum\subsubsecno=0
  \putwordSection@tie @char\the\appendixno.\the\secno.\the\subsecno
\else
  \putwordSection@tie
    @char\the\appendixno.\the\secno.\the\subsecno.\the\subsubsecno
\fi\fi\fi
}


% Define \refx{NAME}{SUFFIX} to reference a cross-reference string named NAME.
% If its value is nonempty, SUFFIX is output afterward.
%
\def\refx#1#2{%
 {%
  \indexnofonts
  \otherbackslash
  \expandafter\global\expandafter\let\expandafter\thisrefX
    \csname XR#1\endcsname
 }%
\ifx\thisrefX\relax
  % If not defined, say something at least.
  \angleleft un\-de\-fined\angleright
  \iflinks
   \ifhavexrefs
     {\toks0 = {#1}% avoid expansion of possibly-complex value
     \message{\linenumber Undefined cross reference `\the\toks0'.}}%
   \else
    \ifwarnedxrefs\else
      \global\warnedxrefstrue
      \message{Cross reference values unknown; you must run TeX again.}%
    \fi
   \fi
  \fi
\else
  % It's defined, so just use it.
  \thisrefX
\fi
#2% Output the suffix in any case.
}


% This is the macro invoked by entries in the aux file.  Usually it's
% just a \def (we prepend XR to the control sequence name to avoid
% collisions).  But if this is a float type, we have more work to do.
%
\def\xrdef#1#2{%
 {% The node name might contain 8-bit characters, which in our current
  % implementation are changed to commands like @'e.  Don't let these
  % mess up the control sequence name.
  \indexnofonts
```

```
  \turnoffactive
  \xdef\safexrefname{#1}%
}%
%
\expandafter\gdef\csname XR\safexrefname\endcsname{#2}% remember this xref
%
% Was that xref control sequence that we just defined for a float?
\expandafter\iffloat\csname XR\safexrefname\endcsname
  % it was a float, and we have the (safe) float type in \iffloattype.
  \expandafter\let\expandafter\floatlist
    \csname floatlist\iffloattype\endcsname
  %
  % Is this the first time we've seen this float type?
  \expandafter\ifx\floatlist\relax
    \toks0 = {\do}% yes, so just \do
  \else
    % had it before, so preserve previous elements in list.
    \toks0 = \expandafter{\floatlist\do}%
  \fi
  %
  % Remember this xref in the control sequence \floatlistFLOATTYPE,
  % for later use in \listoffloats.
  \expandafter\xdef\csname floatlist\iffloattype\endcsname{\the\toks0
    {\safexrefname}}%
\fi
}


% Read the last existing aux file, if any.  No error if none exists.
%
\def\tryauxfile{%
 \openin 1 \jobname.aux
 \ifeof 1 \else
  \readdatafile{aux}%
  \global\havexrefstrue
 \fi
 \closein 1
}

\def\setupdatafile{%
\catcode`\^^@=\other
\catcode`\^^A=\other
\catcode`\^^B=\other
\catcode`\^^C=\other
\catcode`\^^D=\other
\catcode`\^^E=\other
\catcode`\^^F=\other
\catcode`\^^G=\other
\catcode`\^^H=\other
```

```
\catcode`\^^K=\other
\catcode`\^^L=\other
\catcode`\^^N=\other
\catcode`\^^P=\other
\catcode`\^^Q=\other
\catcode`\^^R=\other
\catcode`\^^S=\other
\catcode`\^^T=\other
\catcode`\^^U=\other
\catcode`\^^V=\other
\catcode`\^^W=\other
\catcode`\^^X=\other
\catcode`\^^Z=\other
\catcode`\^^[=\other
\catcode`\^^\=\other
\catcode`\^^]=\other
\catcode`\^^^=\other
\catcode`\^^_=\other
% It was suggested to set the catcode of ^ to 7, which would allow ^^e4 etc.
% in xref tags, i.e., node names.  But since ^^e4 notation isn't
% supported in the main text, it doesn't seem desirable.  Furthermore,
% that is not enough: for node names that actually contain a ^
% character, we would end up writing a line like this: 'xrdef {'hat
% b-title}{'hat b} and \xrdef does a \csname...\endcsname on the first
% argument, and \hat is not an expandable control sequence.  It could
% all be worked out, but why?  Either we support ^^ or we don't.
%
% The other change necessary for this was to define \auxhat:
% \def\auxhat{\def^{'hat }}% extra space so ok if followed by letter
% and then to call \auxhat in \setq.
%
\catcode`\^=\other
%
% Special characters.  Should be turned off anyway, but...
\catcode`\~=\other
\catcode`\[=\other
\catcode`\]=\other
\catcode`\"=\other
\catcode`\_=\other
\catcode`\|=\other
\catcode`\<=\other
\catcode`\>=\other
\catcode`\$=\other
\catcode`\#=\other
\catcode`\&=\other
\catcode`\%=\other
\catcode`+=\other % avoid \+ for paranoia even though we've turned it off
%
```

```
% This is to support \ in node names and titles, since the \
% characters end up in a \csname.  It's easier than
% leaving it active and making its active definition an actual \
% character.  What I don't understand is why it works in the *value*
% of the xrdef.  Seems like it should be a catcode12 \, and that
% should not typeset properly.  But it works, so I'm moving on for
% now.  --karl, 15jan04.
\catcode`\\=\other
%
% Make the characters 128-255 be printing characters.
{%
 \count1=128
 \def\loop{%
   \catcode\count1=\other
   \advance\count1 by 1
   \ifnum \count1<256 \loop \fi
 }%
}%
%
% @ is our escape character in .aux files, and we need braces.
\catcode`\{=1
\catcode`\}=2
\catcode`\@=0
}

\def\readdatafile#1{%
\begingroup
 \setupdatafile
 \input\jobname.#1
\endgroup}


\message{insertions,}
% including footnotes.

\newcount \footnoteno

% The trailing space in the following definition for supereject is
% vital for proper filling; pages come out unaligned when you do a
% pagealignmacro call if that space before the closing brace is
% removed. (Generally, numeric constants should always be followed by a
% space to prevent strange expansion errors.)
\def\supereject{\par\penalty -20000\footnoteno =0 }

% @footnotestyle is meaningful for Info output only.
\let\footnotestyle=\comment

{\catcode `\@=11
```

```
%
% Auto-number footnotes.  Otherwise like plain.
\gdef\footnote{%
\let\indent=\ptexindent
\let\noindent=\ptexnoindent
\global\advance\footnoteno by \@ne
\edef\thisfootno{$^{\the\footnoteno}$}%
%
% In case the footnote comes at the end of a sentence, preserve the
% extra spacing after we do the footnote number.
\let\@sf\empty
\ifhmode\edef\@sf{\spacefactor\the\spacefactor}\ptexslash\fi
%
% Remove inadvertent blank space before typesetting the footnote number.
\unskip
\thisfootno\@sf
\dofootnote
}%

% Don't bother with the trickery in plain.tex to not require the
% footnote text as a parameter.  Our footnotes don't need to be so general.
%
% Oh yes, they do; otherwise, @ifset (and anything else that uses
% \parseargline) fails inside footnotes because the tokens are fixed when
% the footnote is read.  --karl, 16nov96.
%
\gdef\dofootnote{%
\insert\footins\bgroup
% We want to typeset this text as a normal paragraph, even if the
% footnote reference occurs in (for example) a display environment.
% So reset some parameters.
\hsize=\pagewidth
\interlinepenalty\interfootnotelinepenalty
\splittopskip\ht\strutbox % top baseline for broken footnotes
\splitmaxdepth\dp\strutbox
\floatingpenalty\@MM
\leftskip\z@skip
\rightskip\z@skip
\spaceskip\z@skip
\xspaceskip\z@skip
\parindent\defaultparindent
%
\smallfonts \rm
%
% Because we use hanging indentation in footnotes, a @noindent appears
% to exdent this text, so make it be a no-op.  makeinfo does not use
% hanging indentation so @noindent can still be needed within footnote
% text after an @example or the like (not that this is good style).
```

```
\let\noindent = \relax
%
% Hang the footnote text off the number.  Use \everypar in case the
% footnote extends for more than one paragraph.
\everypar = {\hang}%
\textindent{\thisfootno}%
%
% Don't crash into the line above the footnote text.  Since this
% expands into a box, it must come within the paragraph, lest it
% provide a place where TeX can split the footnote.
\footstrut
%
% Invoke rest of plain TeX footnote routine.
\futurelet\next\fo@t
}
}%end \catcode `\@=11

% In case a @footnote appears in a vbox, save the footnote text and create
% the real \insert just after the vbox finished.  Otherwise, the insertion
% would be lost.
% Similarly, if a @footnote appears inside an alignment, save the footnote
% text to a box and make the \insert when a row of the table is finished.
% And the same can be done for other insert classes.  --kasal, 16nov03.

% Replace the \insert primitive by a cheating macro.
% Deeper inside, just make sure that the saved insertions are not spilled
% out prematurely.
%
\def\startsavinginserts{%
 \ifx \insert\ptexinsert
   \let\insert\saveinsert
 \else
   \let\checkinserts\relax
 \fi
}

% This \insert replacement works for both \insert\footins{foo} and
% \insert\footins\bgroup foo\egroup, but it doesn't work for \insert27{foo}.
%
\def\saveinsert#1{%
 \edef\next{\noexpand\savetobox \makeSAVEname#1}%
 \afterassignment\next
 % swallow the left brace
 \let\temp =
}
\def\makeSAVEname#1{\makecsname{SAVE\expandafter\gobble\string#1}}
\def\savetobox#1{\global\setbox#1 = \vbox\bgroup \unvbox#1}
```

```
\def\checksaveins#1{\ifvoid#1\else \placesaveins#1\fi}

\def\placesaveins#1{%
 \ptexinsert \csname\expandafter\gobblesave\string#1\endcsname
   {\box#1}%
}

% eat @SAVE -- beware, all of them have catcode \other:
{
 \def\dospecials{\do S\do A\do V\do E} \uncatcodespecials  %  ;-)
 \gdef\gobblesave @SAVE{}
}

% initialization:
\def\newsaveins #1{%
 \edef\next{\noexpand\newsaveinsX \makeSAVEname#1}%
 \next
}
\def\newsaveinsX #1{%
 \csname newbox\endcsname #1%
 \expandafter\def\expandafter\checkinserts\expandafter{\checkinserts
   \checksaveins #1}%
}

% initialize:
\let\checkinserts\empty
\newsaveins\footins
\newsaveins\margin


% @image.  We use the macros from epsf.tex to support this.
% If epsf.tex is not installed and @image is used, we complain.
%
% Check for and read epsf.tex up front.  If we read it only at @image
% time, we might be inside a group, and then its definitions would get
% undone and the next image would fail.
\openin 1 = epsf.tex
\ifeof 1 \else
 % Do not bother showing banner with epsf.tex v2.7k (available in
 % doc/epsf.tex and on ctan).
 \def\epsfannounce{\toks0 = }%
 \input epsf.tex
\fi
\closein 1
%
% We will only complain once about lack of epsf.tex.
\newif\ifwarnednoepsf
\newhelp\noepsfhelp{epsf.tex must be installed for images to
```

work. It is also included in the Texinfo distribution, or you can get

it from ftp://tug.org/tex/epsf.tex.}

%

\def\image#1{%

\ifx\epsfbox\thisisundefined

  \ifwarnednoepsf \else

   \errhelp = \noepsfhelp

   \errmessage{epsf.tex not found, images will be ignored}%

   \global\warnednoepsftrue

  \fi

\else

  \imagexxx #1,,,,,\finish

\fi

}

%

% Arguments to @image:

% #1 is (mandatory) image filename; we tack on .eps extension.

% #2 is (optional) width, #3 is (optional) height.

% #4 is (ignored optional) html alt text.

% #5 is (ignored optional) extension.

% #6 is just the usual extra ignored arg for parsing stuff.

\newif\ifimagevmode

\def\imagexxx#1,#2,#3,#4,#5,#6\finish{\begingroup

\catcode`\^^M = 5   % in case we're inside an example

\normalturnoffactive % allow _ et al. in names

% If the image is by itself, center it.

\ifvmode

  \imagevmodetrue

\else \ifx\centersub\centerV

  % for @center @image, we need a vbox so we can have our vertical space

  \imagevmodetrue

  \vbox\bgroup % vbox has better behavior than vtop herev

\fi\fi

%

\ifimagevmode

  \nobreak\medskip

  % Usually we'll have text after the image which will insert

  % \parskip glue, so insert it here too to equalize the space

  % above and below.

  \nobreak\vskip\parskip

  \nobreak

\fi

%

% Leave vertical mode so that indentation from an enclosing

% environment such as @quotation is respected.

% However, if we're at the top level, we don't want the

% normal paragraph indentation.

% On the other hand, if we are in the case of @center @image, we don't

```
%  want to start a paragraph, which will create a hsize-width box and
%  eradicate the centering.
\ifx\centersub\centerV\else \noindent \fi
%
% Output the image.
\ifpdf
  \dopdfimage{#1}{#2}{#3}%
\else
  % \epsfbox itself resets \epsf?size at each figure.
  \setbox0 = \hbox{\ignorespaces #2}\ifdim\wd0 > 0pt \epsfxsize=#2\relax \fi
  \setbox0 = \hbox{\ignorespaces #3}\ifdim\wd0 > 0pt \epsfysize=#3\relax \fi
  \epsfbox{#1.eps}%
\fi
%
\ifimagevmode
  \medskip  % space after a standalone image
\fi
\ifx\centersub\centerV \egroup \fi
\endgroup}


% @float FLOATTYPE,LABEL,LOC ... @end float for displayed figures, tables,
% etc.  We don't actually implement floating yet, we always include the
% float "here".  But it seemed the best name for the future.
%
\envparseargdef\float{\eatcommaspace\eatcommaspace\dofloat#1, , ,\finish}


% There may be a space before second and/or third parameter; delete it.
\def\eatcommaspace#1, {#1,}


% #1 is the optional FLOATTYPE, the text label for this float, typically
% "Figure", "Table", "Example", etc.  Can't contain commas.  If omitted,
% this float will not be numbered and cannot be referred to.
%
% #2 is the optional xref label.  Also must be present for the float to
% be referable.
%
% #3 is the optional positioning argument; for now, it is ignored.  It
% will somehow specify the positions allowed to float to (here, top, bottom).
%
% We keep a separate counter for each FLOATTYPE, which we reset at each
% chapter-level command.
\let\resetallfloatnos=\empty
%
\def\dofloat#1,#2,#3,#4\finish{%
\let\thiscaption=\empty
\let\thisshortcaption=\empty
%
```

```
% don't lose footnotes inside @float.
%
% BEWARE: when the floats start float, we have to issue warning whenever an
% insert appears inside a float which could possibly float. --kasal, 26may04
%
\startsavinginserts
%
% We can't be used inside a paragraph.
\par
%
\vtop\bgroup
  \def\floattype{#1}%
  \def\floatlabel{#2}%
  \def\floatloc{#3}% we do nothing with this yet.
  %
  \ifx\floattype\empty
    \let\safefloattype=\empty
  \else
    {%
      % the floattype might have accents or other special characters,
      % but we need to use it in a control sequence name.
      \indexnofonts
      \turnoffactive
      \xdef\safefloattype{\floattype}%
    }%
  \fi
  %
  % If label is given but no type, we handle that as the empty type.
  \ifx\floatlabel\empty \else
    % We want each FLOATTYPE to be numbered separately (Figure 1,
    % Table 1, Figure 2, ...).  (And if no label, no number.)
    %
    \expandafter\getfloatno\csname\safefloattype floatno\endcsname
    \global\advance\floatno by 1
    %
    {%
      % This magic value for \lastsection is output by \setref as the
      % XREFLABEL-title value.  \xrefX uses it to distinguish float
      % labels (which have a completely different output format) from
      % node and anchor labels.  And \xrdef uses it to construct the
      % lists of floats.
      %
      \edef\lastsection{\floatmagic=\safefloattype}%
      \setref{\floatlabel}{Yfloat}%
    }%
  \fi
  %
  % start with \parskip glue, I guess.
```

```
  \vskip\parskip
  %
  % Don't suppress indentation if a float happens to start a section.
  \restorefirstparagraphindent
}

% we have these possibilities:
% @float Foo,lbl & @caption{Cap}: Foo 1.1: Cap
% @float Foo,lbl & no caption:   Foo 1.1
% @float Foo & @caption{Cap}:    Foo: Cap
% @float Foo & no caption:       Foo
% @float ,lbl & Caption{Cap}:    1.1: Cap
% @float ,lbl & no caption:      1.1
% @float & @caption{Cap}:        Cap
% @float & no caption:
%
\def\Efloat{%
  \let\floatident = \empty
  %
  % In all cases, if we have a float type, it comes first.
  \ifx\floattype\empty \else \def\floatident{\floattype}\fi
  %
  % If we have an xref label, the number comes next.
  \ifx\floatlabel\empty \else
    \ifx\floattype\empty \else % if also had float type, need tie first.
      \appendtomacro\floatident{\tie}%
    \fi
    % the number.
    \appendtomacro\floatident{\chaplevelprefix\the\floatno}%
  \fi
  %
  % Start the printed caption with what we've constructed in
  % \floatident, but keep it separate; we need \floatident again.
  \let\captionline = \floatident
  %
  \ifx\thiscaption\empty \else
    \ifx\floatident\empty \else
\appendtomacro\captionline{: }% had ident, so need a colon between
    \fi
    %
    % caption text.
    \appendtomacro\captionline{\scanexp\thiscaption}%
  \fi
  %
  % If we have anything to print, print it, with space before.
  % Eventually this needs to become an \insert.
  \ifx\captionline\empty \else
    \vskip.5\parskip
```

```
    \captionline
    %
    % Space below caption.
    \vskip\parskip
  \fi
  %
  % If have an xref label, write the list of floats info. Do this
  % after the caption, to avoid chance of it being a breakpoint.
  \ifx\floatlabel\empty \else
    % Write the text that goes in the lof to the aux file as
    % \floatlabel-lof. Besides \floatident, we include the short
    % caption if specified, else the full caption if specified, else nothing.
    {%
     \atdummies
     %
     % since we read the caption text in the macro world, where ^^M
     % is turned into a normal character, we have to scan it back, so
     % we don't write the literal three characters "^^M" into the aux file.
\scanexp{%
  \xdef\noexpand\gtemp{%
   \ifx\thisshortcaption\empty
    \thiscaption
   \else
    \thisshortcaption
   \fi
  }%
}%
     \immediate\write\auxfile{@xrdef{\floatlabel-lof}{\floatident
  \ifx\gtemp\empty \else : \gtemp \fi}}%
    }%
  \fi
\egroup  % end of \vtop
%
% place the captured inserts
%
% BEWARE: when the floats start floating, we have to issue warning
% whenever an insert appears inside a float which could possibly
% float. --kasal, 26may04
%
\checkinserts
}


% Append the tokens #2 to the definition of macro #1, not expanding either.
%
\def\appendtomacro#1#2{%
 \expandafter\def\expandafter#1\expandafter{#1#2}%
}
```

```
% @caption, @shortcaption
%
\def\caption{\docaption\thiscaption}
\def\shortcaption{\docaption\thisshortcaption}
\def\docaption{\checkenv\float \bgroup\scanargctxt\defcaption}
\def\defcaption#1#2{\egroup \def#1{#2}}


% The parameter is the control sequence identifying the counter we are
% going to use.  Create it if it doesn't exist and assign it to \floatno.
\def\getfloatno#1{%
 \ifx#1\relax
    % Haven't seen this figure type before.
    \csname newcount\endcsname #1%
    %
    % Remember to reset this floatno at the next chap.
    \expandafter\gdef\expandafter\resetallfloatnos
      \expandafter{\resetallfloatnos #1=0 }%
 \fi
 \let\floatno#1%
}


% \setref calls this to get the XREFLABEL-snt value.  We want an @xref
% to the FLOATLABEL to expand to "Figure 3.1".  We call \setref when we
% first read the @float command.
%
\def\Yfloat{\floattype@tie \chaplevelprefix\the\floatno}%


% Magic string used for the XREFLABEL-title value, so \xrefX can
% distinguish floats from other xref types.
\def\floatmagic{!!float!!}


% #1 is the control sequence we are passed; we expand into a conditional
% which is true if #1 represents a float ref.  That is, the magic
% \lastsection value which we \setref above.
%
\def\iffloat#1{\expandafter\doiffloat#1==\finish}
%
% #1 is (maybe) the \floatmagic string.  If so, #2 will be the
% (safe) float type for this float.  We set \iffloattype to #2.
%
\def\doiffloat#1=#2=#3\finish{%
 \def\temp{#1}%
 \def\iffloattype{#2}%
 \ifx\temp\floatmagic
}


% @listoffloats FLOATTYPE - print a list of floats like a table of contents.
%
```

```
\parseargdef\listoffloats{%
 \def\floattype{#1}% floattype
 {%
   % the floattype might have accents or other special characters,
   % but we need to use it in a control sequence name.
   \indexnofonts
   \turnoffactive
   \xdef\safefloattype{\floattype}%
 }%
 %
 % \xrdef saves the floats as a \do-list in \floatlistSAFEFLOATTYPE.
 \expandafter\ifx\csname floatlist\safefloattype\endcsname \relax
   \ifhavexrefs
     % if the user said @listoffloats foo but never @float foo.
     \message{\linenumber No `\safefloattype' floats to list.}%
   \fi
 \else
   \begingroup
     \leftskip=\tocindent  % indent these entries like a toc
     \let\do=\listoffloatsdo
     \csname floatlist\safefloattype\endcsname
   \endgroup
 \fi
}


% This is called on each entry in a list of floats.  We're passed the
% xref label, in the form LABEL-title, which is how we save it in the
% aux file.  We strip off the -title and look up \XRLABEL-lof, which
% has the text we're supposed to typeset here.
%
% Figures without xref labels will not be included in the list (since
% they won't appear in the aux file).
%
\def\listoffloatsdo#1{\listoffloatsdoentry#1\finish}
\def\listoffloatsdoentry#1-title\finish{{%
 % Can't fully expand XR#1-lof because it can contain anything.  Just
 % pass the control sequence.  On the other hand, XR#1-pg is just the
 % page number, and we want to fully expand that so we can get a link
 % in pdf output.
 \toksA = \expandafter{\csname XR#1-lof\endcsname}%
 %
 % use the same \entry macro we use to generate the TOC and index.
 \edef\writeentry{\noexpand\entry{\the\toksA}{\csname XR#1-pg\endcsname}}%
 \writeentry
}}


\message{localization,}
```

```
% For single-language documents, @documentlanguage is usually given very
% early, just after @documentencoding.  Single argument is the language
% (de) or locale (de_DE) abbreviation.
%
{
 \catcode`\_ = \active
 \globaldefs=1
\parseargdef\documentlanguage{\begingroup
 \let_=\normalunderscore  % normal _ character for filenames
 \tex % read txi-??.tex file in plain TeX.
   % Read the file by the name they passed if it exists.
   \openin 1 txi-#1.tex
   \ifeof 1
     \documentlanguagetrywithoutunderscore{#1_\finish}%
   \else
     \globaldefs = 1  % everything in the txi-LL files needs to persist
     \input txi-#1.tex
   \fi
   \closein 1
 \endgroup % end raw TeX
\endgroup}
%
% If they passed de_DE, and txi-de_DE.tex doesn't exist,
% try txi-de.tex.
%
\gdef\documentlanguagetrywithoutunderscore#1_#2\finish{%
 \openin 1 txi-#1.tex
 \ifeof 1
   \errhelp = \nolanghelp
   \errmessage{Cannot read language file txi-#1.tex}%
 \else
   \globaldefs = 1  % everything in the txi-LL files needs to persist
   \input txi-#1.tex
 \fi
 \closein 1
}
}% end of special _ catcode
%
\newhelp\nolanghelp{The given language definition file cannot be found or
is empty.  Maybe you need to install it?  Putting it in the current
directory should work if nowhere else does.}

% This macro is called from txi-??.tex files; the first argument is the
% \language name to set (without the "\lang@" prefix), the second and
% third args are \{left,right}hyphenmin.
%
% The language names to pass are determined when the format is built.
```

```
% See the etex.log file created at that time, e.g.,
% /usr/local/texlive/2008/texmf-var/web2c/pdftex/etex.log.
%
% With TeX Live 2008, etex now includes hyphenation patterns for all
% available languages.  This means we can support hyphenation in
% Texinfo, at least to some extent.  (This still doesn't solve the
% accented characters problem.)
%
\catcode`@=11
\def\txisetlanguage#1#2#3{%
 % do not set the language if the name is undefined in the current TeX.
 \expandafter\ifx\csname lang@#1\endcsname \relax
   \message{no patterns for #1}%
 \else
   \global\language = \csname lang@#1\endcsname
 \fi
 % but there is no harm in adjusting the hyphenmin values regardless.
 \global\lefthyphenmin = #2\relax
 \global\righthyphenmin = #3\relax
}


% Helpers for encodings.
% Set the catcode of characters 128 through 255 to the specified number.
%
\def\setnonasciicharscatcode#1{%
 \count255=128
 \loop\ifnum\count255<256
   \global\catcode\count255=#1\relax
   \advance\count255 by 1
 \repeat
}


\def\setnonasciicharscatcodenonglobal#1{%
 \count255=128
 \loop\ifnum\count255<256
   \catcode\count255=#1\relax
   \advance\count255 by 1
 \repeat
}


% @documentencoding sets the definition of non-ASCII characters
% according to the specified encoding.
%
\parseargdef\documentencoding{%
 % Encoding being declared for the document.
 \def\declaredencoding{\csname #1.enc\endcsname}%
 %
 % Supported encodings: names converted to tokens in order to be able
```

```
% to compare them with \ifx.
\def\ascii{\csname US-ASCII.enc\endcsname}%
\def\latnine{\csname ISO-8859-15.enc\endcsname}%
\def\latone{\csname ISO-8859-1.enc\endcsname}%
\def\lattwo{\csname ISO-8859-2.enc\endcsname}%
\def\utfeight{\csname UTF-8.enc\endcsname}%
%
\ifx \declaredencoding \ascii
  \asciichardefs
%
\else \ifx \declaredencoding \lattwo
  \setnonasciicharscatcode\active
  \lattwochardefs
%
\else \ifx \declaredencoding \latone
  \setnonasciicharscatcode\active
  \latonechardefs
%
\else \ifx \declaredencoding \latnine
  \setnonasciicharscatcode\active
  \latninechardefs
%
\else \ifx \declaredencoding \utfeight
  \setnonasciicharscatcode\active
  \utfeightchardefs
%
\else
  \message{Unknown document encoding #1, ignoring.}%
%
\fi % utfeight
\fi % latnine
\fi % latone
\fi % lattwo
\fi % ascii
}

% A message to be logged when using a character that isn't available
% the default font encoding (OT1).
%
\def\missingcharmsg#1{\message{Character missing in OT1 encoding: #1.}}

% Take account of \c (plain) vs. \, (Texinfo) difference.
\def\cedilla#1{\ifx\c\ptexc\c{#1}\else\,{#1}\fi}

% First, make active non-ASCII characters in order for them to be
% correctly categorized when TeX reads the replacement text of
% macros containing the character definitions.
\setnonasciicharscatcode\active
```

```
%
% Latin1 (ISO-8859-1) character definitions.
\def\latonechardefs{%
\gdef^^a0{\tie}
\gdef^^a1{\exclamdown}
\gdef^^a2{\missingcharmsg{CENT SIGN}}
\gdef^^a3{{\pounds}}
\gdef^^a4{\missingcharmsg{CURRENCY SIGN}}
\gdef^^a5{\missingcharmsg{YEN SIGN}}
\gdef^^a6{\missingcharmsg{BROKEN BAR}}
\gdef^^a7{\S}
\gdef^^a8{\"{}}
\gdef^^a9{\copyright}
\gdef^^aa{\ordf}
\gdef^^ab{\guillemetleft}
\gdef^^ac{$\lnot$}
\gdef^^ad{\-}
\gdef^^ae{\registeredsymbol}
\gdef^^af{\={}}
%
\gdef^^b0{\textdegree}
\gdef^^b1{$\pm$}
\gdef^^b2{$^2$}
\gdef^^b3{$^3$}
\gdef^^b4{\'{}}
\gdef^^b5{$\mu$}
\gdef^^b6{\P}
%
\gdef^^b7{$^.$}
\gdef^^b8{\cedilla\ }
\gdef^^b9{$^1$}
\gdef^^ba{\ordm}
%
\gdef^^bb{\guillemetright}
\gdef^^bc{$1\over4$}
\gdef^^bd{$1\over2$}
\gdef^^be{$3\over4$}
\gdef^^bf{\questiondown}
%
\gdef^^c0{\`A}
\gdef^^c1{\'A}
\gdef^^c2{\^A}
\gdef^^c3{\~A}
\gdef^^c4{\"A}
\gdef^^c5{\ringaccent A}
\gdef^^c6{\AE}
\gdef^^c7{\cedilla C}
\gdef^^c8{\`E}
```

```
\gdef^^c9{\'E}
\gdef^^ca{\^E}
\gdef^^cb{\"E}
\gdef^^cc{\`I}
\gdef^^cd{\'I}
\gdef^^ce{\^I}
\gdef^^cf{\"I}
%
\gdef^^d0{\DH}
\gdef^^d1{\~N}
\gdef^^d2{\`O}
\gdef^^d3{\'O}
\gdef^^d4{\^O}
\gdef^^d5{\~O}
\gdef^^d6{\"O}
\gdef^^d7{$\times$}
\gdef^^d8{\O}
\gdef^^d9{\`U}
\gdef^^da{\'U}
\gdef^^db{\^U}
\gdef^^dc{\"U}
\gdef^^dd{\'Y}
\gdef^^de{\TH}
\gdef^^df{\ss}
%
\gdef^^e0{\`a}
\gdef^^e1{\'a}
\gdef^^e2{\^a}
\gdef^^e3{\~a}
\gdef^^e4{\"a}
\gdef^^e5{\ringaccent a}
\gdef^^e6{\ae}
\gdef^^e7{\cedilla c}
\gdef^^e8{\`e}
\gdef^^e9{\'e}
\gdef^^ea{\^e}
\gdef^^eb{\"e}
\gdef^^ec{\`{\dotless i}}
\gdef^^ed{\'{\dotless i}}
\gdef^^ee{\^{\dotless i}}
\gdef^^ef{\"{\dotless i}}
%
\gdef^^f0{\dh}
\gdef^^f1{\~n}
\gdef^^f2{\`o}
\gdef^^f3{\'o}
\gdef^^f4{\^o}
\gdef^^f5{\~o}
```

```
\gdef^^f6{\"o}
\gdef^^f7{$\div$}
\gdef^^f8{\o}
\gdef^^f9{\`u}
\gdef^^fa{\'u}
\gdef^^fb{\^u}
\gdef^^fc{\"u}
\gdef^^fd{\'y}
\gdef^^fe{\th}
\gdef^^ff{\"y}
}

% Latin9 (ISO-8859-15) encoding character definitions.
\def\latninechardefs{%
% Encoding is almost identical to Latin1.
\latonechardefs
%
\gdef^^a4{\euro}
\gdef^^a6{\v S}
\gdef^^a8{\v s}
\gdef^^b4{\v Z}
\gdef^^b8{\v z}
\gdef^^bc{\OE}
\gdef^^bd{\oe}
\gdef^^be{\"Y}
}

% Latin2 (ISO-8859-2) character definitions.
\def\lattwochardefs{%
\gdef^^a0{\tie}
\gdef^^a1{\ogonek{A}}
\gdef^^a2{\u{}}
\gdef^^a3{\L}
\gdef^^a4{\missingcharmsg{CURRENCY SIGN}}
\gdef^^a5{\v L}
\gdef^^a6{\'S}
\gdef^^a7{\S}
\gdef^^a8{\"{}}
\gdef^^a9{\v S}
\gdef^^aa{\cedilla S}
\gdef^^ab{\v T}
\gdef^^ac{\'Z}
\gdef^^ad{\-}
\gdef^^ae{\v Z}
\gdef^^af{\dotaccent Z}
%
\gdef^^b0{\textdegree}
\gdef^^b1{\ogonek{a}}
```

```
\gdef^^b2{\ogonek{ }}
\gdef^^b3{\l}
\gdef^^b4{\'{}}
\gdef^^b5{\v l}
\gdef^^b6{\'s}
\gdef^^b7{\v{}}
\gdef^^b8{\cedilla\ }
\gdef^^b9{\v s}
\gdef^^ba{\cedilla s}
\gdef^^bb{\v t}
\gdef^^bc{\'z}
\gdef^^bd{\H{}}
\gdef^^be{\v z}
\gdef^^bf{\dotaccent z}
%
\gdef^^c0{\'R}
\gdef^^c1{\'A}
\gdef^^c2{\^A}
\gdef^^c3{\u A}
\gdef^^c4{\"A}
\gdef^^c5{\'L}
\gdef^^c6{\'C}
\gdef^^c7{\cedilla C}
\gdef^^c8{\v C}
\gdef^^c9{\'E}
\gdef^^ca{\ogonek{E}}
\gdef^^cb{\"E}
\gdef^^cc{\v E}
\gdef^^cd{\'I}
\gdef^^ce{\^I}
\gdef^^cf{\v D}
%
\gdef^^d0{\DH}
\gdef^^d1{\'N}
\gdef^^d2{\v N}
\gdef^^d3{\'O}
\gdef^^d4{\^O}
\gdef^^d5{\H O}
\gdef^^d6{\"O}
\gdef^^d7{$\times$}
\gdef^^d8{\v R}
\gdef^^d9{\ringaccent U}
\gdef^^da{\'U}
\gdef^^db{\H U}
\gdef^^dc{\"U}
\gdef^^dd{\'Y}
\gdef^^de{\cedilla T}
\gdef^^df{\ss}
```

```
%
\gdef^^e0{\'r}
\gdef^^e1{\'a}
\gdef^^e2{\^a}
\gdef^^e3{\u a}
\gdef^^e4{\"a}
\gdef^^e5{\'l}
\gdef^^e6{\'c}
\gdef^^e7{\cedilla c}
\gdef^^e8{\v c}
\gdef^^e9{\'e}
\gdef^^ea{\ogonek{e}}
\gdef^^eb{\"e}
\gdef^^ec{\v e}
\gdef^^ed{\'{\dotless{i}}}
\gdef^^ee{\^{\dotless{i}}}
\gdef^^ef{\v d}
%
\gdef^^f0{\dh}
\gdef^^f1{\'n}
\gdef^^f2{\v n}
\gdef^^f3{\'o}
\gdef^^f4{\^o}
\gdef^^f5{\H o}
\gdef^^f6{\"o}
\gdef^^f7{$\div$}
\gdef^^f8{\v r}
\gdef^^f9{\ringaccent u}
\gdef^^fa{\'u}
\gdef^^fb{\H u}
\gdef^^fc{\"u}
\gdef^^fd{\'y}
\gdef^^fe{\cedilla t}
\gdef^^ff{\dotaccent{}}
}

% UTF-8 character definitions.
%
% This code to support UTF-8 is based on LaTeX's utf8.def, with some
% changes for Texinfo conventions.  It is included here under the GPL by
% permission from Frank Mittelbach and the LaTeX team.
%
\newcount\countUTFx
\newcount\countUTFy
\newcount\countUTFz

\gdef\UTFviiiTwoOctets#1#2{\expandafter
  \UTFviiiDefined\csname u8:#1\string #2\endcsname}
```

```
%
\gdef\UTFviiiThreeOctets#1#2#3{\expandafter
 \UTFviiiDefined\csname u8:#1\string #2\string #3\endcsname}
%
\gdef\UTFviiiFourOctets#1#2#3#4{\expandafter
 \UTFviiiDefined\csname u8:#1\string #2\string #3\string #4\endcsname}

\gdef\UTFviiiDefined#1{%
\ifx #1\relax
  \message{\linenumber Unicode char \string #1 not defined for Texinfo}%
\else
  \expandafter #1%
\fi
}

\begingroup
\catcode`\~13
\catcode`\"12

\def\UTFviiiLoop{%
 \global\catcode\countUTFx\active
 \uccode`\~\countUTFx
 \uppercase\expandafter{\UTFviiiTmp}%
 \advance\countUTFx by 1
 \ifnum\countUTFx < \countUTFy
  \expandafter\UTFviiiLoop
 \fi}

\countUTFx = "C2
\countUTFy = "E0
\def\UTFviiiTmp{%
 \xdef~{\noexpand\UTFviiiTwoOctets\string~}}
\UTFviiiLoop

\countUTFx = "E0
\countUTFy = "F0
\def\UTFviiiTmp{%
 \xdef~{\noexpand\UTFviiiThreeOctets\string~}}
\UTFviiiLoop

\countUTFx = "F0
\countUTFy = "F4
\def\UTFviiiTmp{%
 \xdef~{\noexpand\UTFviiiFourOctets\string~}}
\UTFviiiLoop
\endgroup

\begingroup
```

```
\catcode`\"=12
\catcode`\<=12
\catcode`\.=12
\catcode`\,=12
\catcode`\;=12
\catcode`\!=12
\catcode`\~=13

\gdef\DeclareUnicodeCharacter#1#2{%
 \countUTFz = "#1\relax
 %\wlog{\space\space defining Unicode char U+#1 (decimal \the\countUTFz)}%
 \begingroup
  \parseXMLCharref
  \def\UTFviiiTwoOctets##1##2{%
   \csname u8:##1\string ##2\endcsname}%
  \def\UTFviiiThreeOctets##1##2##3{%
   \csname u8:##1\string ##2\string ##3\endcsname}%
  \def\UTFviiiFourOctets##1##2##3##4{%
   \csname u8:##1\string ##2\string ##3\string ##4\endcsname}%
  \expandafter\expandafter\expandafter\expandafter
  \expandafter\expandafter\expandafter
  \gdef\UTFviiiTmp{#2}%
 \endgroup}

\gdef\parseXMLCharref{%
 \ifnum\countUTFz < "A0\relax
  \errhelp = \EMsimple
  \errmessage{Cannot define Unicode char value < 00A0}%
 \else\ifnum\countUTFz < "800\relax
  \parseUTFviiiA,%
  \parseUTFviiiB C\UTFviiiTwoOctets.,%
 \else\ifnum\countUTFz < "10000\relax
  \parseUTFviiiA;%
  \parseUTFviiiA,%
  \parseUTFviiiB E\UTFviiiThreeOctets.{,;}%
 \else
  \parseUTFviiiA;%
  \parseUTFviiiA,%
  \parseUTFviiiA!%
  \parseUTFviiiB F\UTFviiiFourOctets.{!,;}%
 \fi\fi\fi
}

\gdef\parseUTFviiiA#1{%
 \countUTFx = \countUTFz
 \divide\countUTFz by 64
 \countUTFy = \countUTFz
 \multiply\countUTFz by 64
```

```
  \advance\countUTFx by -\countUTFz
  \advance\countUTFx by 128
  \uccode `#1\countUTFx
  \countUTFz = \countUTFy}

 \gdef\parseUTFviiiB#1#2#3#4{%
  \advance\countUTFz by "#10\relax
  \uccode `#3\countUTFz
  \uppercase{\gdef\UTFviiiTmp{#2#3#4}}}
\endgroup

\def\utfeightchardefs{%
\DeclareUnicodeCharacter{00A0}{\tie}
\DeclareUnicodeCharacter{00A1}{\exclamdown}
\DeclareUnicodeCharacter{00A3}{\pounds}
\DeclareUnicodeCharacter{00A8}{\"{ }}
\DeclareUnicodeCharacter{00A9}{\copyright}
\DeclareUnicodeCharacter{00AA}{\ordf}
\DeclareUnicodeCharacter{00AB}{\guillemetleft}
\DeclareUnicodeCharacter{00AD}{\-}
\DeclareUnicodeCharacter{00AE}{\registeredsymbol}
\DeclareUnicodeCharacter{00AF}{\={ }}

\DeclareUnicodeCharacter{00B0}{\ringaccent{ }}
\DeclareUnicodeCharacter{00B4}{\'{ }}
\DeclareUnicodeCharacter{00B8}{\cedilla{ }}
\DeclareUnicodeCharacter{00BA}{\ordm}
\DeclareUnicodeCharacter{00BB}{\guillemetright}
\DeclareUnicodeCharacter{00BF}{\questiondown}

\DeclareUnicodeCharacter{00C0}{\`A}
\DeclareUnicodeCharacter{00C1}{\'A}
\DeclareUnicodeCharacter{00C2}{\^A}
\DeclareUnicodeCharacter{00C3}{\~A}
\DeclareUnicodeCharacter{00C4}{\"A}
\DeclareUnicodeCharacter{00C5}{\AA}
\DeclareUnicodeCharacter{00C6}{\AE}
\DeclareUnicodeCharacter{00C7}{\cedilla{C}}
\DeclareUnicodeCharacter{00C8}{\`E}
\DeclareUnicodeCharacter{00C9}{\'E}
\DeclareUnicodeCharacter{00CA}{\^E}
\DeclareUnicodeCharacter{00CB}{\"E}
\DeclareUnicodeCharacter{00CC}{\`I}
\DeclareUnicodeCharacter{00CD}{\'I}
\DeclareUnicodeCharacter{00CE}{\^I}
\DeclareUnicodeCharacter{00CF}{\"I}

\DeclareUnicodeCharacter{00D0}{\DH}
```

\DeclareUnicodeCharacter{00D1}{\~N}
\DeclareUnicodeCharacter{00D2}{\`O}
\DeclareUnicodeCharacter{00D3}{\'O}
\DeclareUnicodeCharacter{00D4}{\^O}
\DeclareUnicodeCharacter{00D5}{\~O}
\DeclareUnicodeCharacter{00D6}{\"O}
\DeclareUnicodeCharacter{00D8}{\O}
\DeclareUnicodeCharacter{00D9}{\`U}
\DeclareUnicodeCharacter{00DA}{\'U}
\DeclareUnicodeCharacter{00DB}{\^U}
\DeclareUnicodeCharacter{00DC}{\"U}
\DeclareUnicodeCharacter{00DD}{\'Y}
\DeclareUnicodeCharacter{00DE}{\TH}
\DeclareUnicodeCharacter{00DF}{\ss}

\DeclareUnicodeCharacter{00E0}{\`a}
\DeclareUnicodeCharacter{00E1}{\'a}
\DeclareUnicodeCharacter{00E2}{\^a}
\DeclareUnicodeCharacter{00E3}{\~a}
\DeclareUnicodeCharacter{00E4}{\"a}
\DeclareUnicodeCharacter{00E5}{\aa}
\DeclareUnicodeCharacter{00E6}{\ae}
\DeclareUnicodeCharacter{00E7}{\cedilla{c}}
\DeclareUnicodeCharacter{00E8}{\`e}
\DeclareUnicodeCharacter{00E9}{\'e}
\DeclareUnicodeCharacter{00EA}{\^e}
\DeclareUnicodeCharacter{00EB}{\"e}
\DeclareUnicodeCharacter{00EC}{\`{\dotless{i}}}
\DeclareUnicodeCharacter{00ED}{\'{\dotless{i}}}
\DeclareUnicodeCharacter{00EE}{\^{\dotless{i}}}
\DeclareUnicodeCharacter{00EF}{\"{\dotless{i}}}

\DeclareUnicodeCharacter{00F0}{\dh}
\DeclareUnicodeCharacter{00F1}{\~n}
\DeclareUnicodeCharacter{00F2}{\`o}
\DeclareUnicodeCharacter{00F3}{\'o}
\DeclareUnicodeCharacter{00F4}{\^o}
\DeclareUnicodeCharacter{00F5}{\~o}
\DeclareUnicodeCharacter{00F6}{\"o}
\DeclareUnicodeCharacter{00F8}{\o}
\DeclareUnicodeCharacter{00F9}{\`u}
\DeclareUnicodeCharacter{00FA}{\'u}
\DeclareUnicodeCharacter{00FB}{\^u}
\DeclareUnicodeCharacter{00FC}{\"u}
\DeclareUnicodeCharacter{00FD}{\'y}
\DeclareUnicodeCharacter{00FE}{\th}
\DeclareUnicodeCharacter{00FF}{\"y}

```
\DeclareUnicodeCharacter{0100}{\=A}
\DeclareUnicodeCharacter{0101}{\=a}
\DeclareUnicodeCharacter{0102}{\u{A}}
\DeclareUnicodeCharacter{0103}{\u{a}}
\DeclareUnicodeCharacter{0104}{\ogonek{A}}
\DeclareUnicodeCharacter{0105}{\ogonek{a}}
\DeclareUnicodeCharacter{0106}{\'C}
\DeclareUnicodeCharacter{0107}{\'c}
\DeclareUnicodeCharacter{0108}{\^C}
\DeclareUnicodeCharacter{0109}{\^c}
\DeclareUnicodeCharacter{0118}{\ogonek{E}}
\DeclareUnicodeCharacter{0119}{\ogonek{e}}
\DeclareUnicodeCharacter{010A}{\dotaccent{C}}
\DeclareUnicodeCharacter{010B}{\dotaccent{c}}
\DeclareUnicodeCharacter{010C}{\v{C}}
\DeclareUnicodeCharacter{010D}{\v{c}}
\DeclareUnicodeCharacter{010E}{\v{D}}

\DeclareUnicodeCharacter{0112}{\=E}
\DeclareUnicodeCharacter{0113}{\=e}
\DeclareUnicodeCharacter{0114}{\u{E}}
\DeclareUnicodeCharacter{0115}{\u{e}}
\DeclareUnicodeCharacter{0116}{\dotaccent{E}}
\DeclareUnicodeCharacter{0117}{\dotaccent{e}}
\DeclareUnicodeCharacter{011A}{\v{E}}
\DeclareUnicodeCharacter{011B}{\v{e}}
\DeclareUnicodeCharacter{011C}{\^G}
\DeclareUnicodeCharacter{011D}{\^g}
\DeclareUnicodeCharacter{011E}{\u{G}}
\DeclareUnicodeCharacter{011F}{\u{g}}

\DeclareUnicodeCharacter{0120}{\dotaccent{G}}
\DeclareUnicodeCharacter{0121}{\dotaccent{g}}
\DeclareUnicodeCharacter{0124}{\^H}
\DeclareUnicodeCharacter{0125}{\^h}
\DeclareUnicodeCharacter{0128}{\~I}
\DeclareUnicodeCharacter{0129}{\~{\dotless{i}}}
\DeclareUnicodeCharacter{012A}{\=I}
\DeclareUnicodeCharacter{012B}{\={\dotless{i}}}
\DeclareUnicodeCharacter{012C}{\u{I}}
\DeclareUnicodeCharacter{012D}{\u{\dotless{i}}}

\DeclareUnicodeCharacter{0130}{\dotaccent{I}}
\DeclareUnicodeCharacter{0131}{\dotless{i}}
\DeclareUnicodeCharacter{0132}{IJ}
\DeclareUnicodeCharacter{0133}{ij}
\DeclareUnicodeCharacter{0134}{\^J}
\DeclareUnicodeCharacter{0135}{\^{\dotless{j}}}
```

```
\DeclareUnicodeCharacter{0139}{\'L}
\DeclareUnicodeCharacter{013A}{\'l}

\DeclareUnicodeCharacter{0141}{\L}
\DeclareUnicodeCharacter{0142}{\l}
\DeclareUnicodeCharacter{0143}{\'N}
\DeclareUnicodeCharacter{0144}{\'n}
\DeclareUnicodeCharacter{0147}{\v{N}}
\DeclareUnicodeCharacter{0148}{\v{n}}
\DeclareUnicodeCharacter{014C}{\=O}
\DeclareUnicodeCharacter{014D}{\=o}
\DeclareUnicodeCharacter{014E}{\u{O}}
\DeclareUnicodeCharacter{014F}{\u{o}}

\DeclareUnicodeCharacter{0150}{\H{O}}
\DeclareUnicodeCharacter{0151}{\H{o}}
\DeclareUnicodeCharacter{0152}{\OE}
\DeclareUnicodeCharacter{0153}{\oe}
\DeclareUnicodeCharacter{0154}{\'R}
\DeclareUnicodeCharacter{0155}{\'r}
\DeclareUnicodeCharacter{0158}{\v{R}}
\DeclareUnicodeCharacter{0159}{\v{r}}
\DeclareUnicodeCharacter{015A}{\'S}
\DeclareUnicodeCharacter{015B}{\'s}
\DeclareUnicodeCharacter{015C}{\^S}
\DeclareUnicodeCharacter{015D}{\^s}
\DeclareUnicodeCharacter{015E}{\cedilla{S}}
\DeclareUnicodeCharacter{015F}{\cedilla{s}}

\DeclareUnicodeCharacter{0160}{\v{S}}
\DeclareUnicodeCharacter{0161}{\v{s}}
\DeclareUnicodeCharacter{0162}{\cedilla{t}}
\DeclareUnicodeCharacter{0163}{\cedilla{T}}
\DeclareUnicodeCharacter{0164}{\v{T}}

\DeclareUnicodeCharacter{0168}{\~U}
\DeclareUnicodeCharacter{0169}{\~u}
\DeclareUnicodeCharacter{016A}{\=U}
\DeclareUnicodeCharacter{016B}{\=u}
\DeclareUnicodeCharacter{016C}{\u{U}}
\DeclareUnicodeCharacter{016D}{\u{u}}
\DeclareUnicodeCharacter{016E}{\ringaccent{U}}
\DeclareUnicodeCharacter{016F}{\ringaccent{u}}

\DeclareUnicodeCharacter{0170}{\H{U}}
\DeclareUnicodeCharacter{0171}{\H{u}}
\DeclareUnicodeCharacter{0174}{\^W}
\DeclareUnicodeCharacter{0175}{\^w}
```

```
\DeclareUnicodeCharacter{0176}{\^Y}
\DeclareUnicodeCharacter{0177}{\^y}
\DeclareUnicodeCharacter{0178}{\"Y}
\DeclareUnicodeCharacter{0179}{\'Z}
\DeclareUnicodeCharacter{017A}{\'z}
\DeclareUnicodeCharacter{017B}{\dotaccent{Z}}
\DeclareUnicodeCharacter{017C}{\dotaccent{z}}
\DeclareUnicodeCharacter{017D}{\v{Z}}
\DeclareUnicodeCharacter{017E}{\v{z}}

\DeclareUnicodeCharacter{01C4}{D\v{Z}}
\DeclareUnicodeCharacter{01C5}{D\v{z}}
\DeclareUnicodeCharacter{01C6}{d\v{z}}
\DeclareUnicodeCharacter{01C7}{LJ}
\DeclareUnicodeCharacter{01C8}{Lj}
\DeclareUnicodeCharacter{01C9}{lj}
\DeclareUnicodeCharacter{01CA}{NJ}
\DeclareUnicodeCharacter{01CB}{Nj}
\DeclareUnicodeCharacter{01CC}{nj}
\DeclareUnicodeCharacter{01CD}{\v{A}}
\DeclareUnicodeCharacter{01CE}{\v{a}}
\DeclareUnicodeCharacter{01CF}{\v{I}}

\DeclareUnicodeCharacter{01D0}{\v{\dotless{i}}}
\DeclareUnicodeCharacter{01D1}{\v{O}}
\DeclareUnicodeCharacter{01D2}{\v{o}}
\DeclareUnicodeCharacter{01D3}{\v{U}}
\DeclareUnicodeCharacter{01D4}{\v{u}}

\DeclareUnicodeCharacter{01E2}{\={\AE}}
\DeclareUnicodeCharacter{01E3}{\={\ae}}
\DeclareUnicodeCharacter{01E6}{\v{G}}
\DeclareUnicodeCharacter{01E7}{\v{g}}
\DeclareUnicodeCharacter{01E8}{\v{K}}
\DeclareUnicodeCharacter{01E9}{\v{k}}

\DeclareUnicodeCharacter{01F0}{\v{\dotless{j}}}
\DeclareUnicodeCharacter{01F1}{DZ}
\DeclareUnicodeCharacter{01F2}{Dz}
\DeclareUnicodeCharacter{01F3}{dz}
\DeclareUnicodeCharacter{01F4}{\'G}
\DeclareUnicodeCharacter{01F5}{\'g}
\DeclareUnicodeCharacter{01F8}{\`N}
\DeclareUnicodeCharacter{01F9}{\`n}
\DeclareUnicodeCharacter{01FC}{\'{\AE}}
\DeclareUnicodeCharacter{01FD}{\'{\ae}}
\DeclareUnicodeCharacter{01FE}{\'{\O}}
\DeclareUnicodeCharacter{01FF}{\'{\o}}
```

\DeclareUnicodeCharacter{021E}{\v{H}}
\DeclareUnicodeCharacter{021F}{\v{h}}

\DeclareUnicodeCharacter{0226}{\dotaccent{A}}
\DeclareUnicodeCharacter{0227}{\dotaccent{a}}
\DeclareUnicodeCharacter{0228}{\cedilla{E}}
\DeclareUnicodeCharacter{0229}{\cedilla{e}}
\DeclareUnicodeCharacter{022E}{\dotaccent{O}}
\DeclareUnicodeCharacter{022F}{\dotaccent{o}}

\DeclareUnicodeCharacter{0232}{\=Y}
\DeclareUnicodeCharacter{0233}{\=y}
\DeclareUnicodeCharacter{0237}{\dotless{j}}

\DeclareUnicodeCharacter{02DB}{\ogonek{ }}

\DeclareUnicodeCharacter{1E02}{\dotaccent{B}}
\DeclareUnicodeCharacter{1E03}{\dotaccent{b}}
\DeclareUnicodeCharacter{1E04}{\udotaccent{B}}
\DeclareUnicodeCharacter{1E05}{\udotaccent{b}}
\DeclareUnicodeCharacter{1E06}{\ubaraccent{B}}
\DeclareUnicodeCharacter{1E07}{\ubaraccent{b}}
\DeclareUnicodeCharacter{1E0A}{\dotaccent{D}}
\DeclareUnicodeCharacter{1E0B}{\dotaccent{d}}
\DeclareUnicodeCharacter{1E0C}{\udotaccent{D}}
\DeclareUnicodeCharacter{1E0D}{\udotaccent{d}}
\DeclareUnicodeCharacter{1E0E}{\ubaraccent{D}}
\DeclareUnicodeCharacter{1E0F}{\ubaraccent{d}}

\DeclareUnicodeCharacter{1E1E}{\dotaccent{F}}
\DeclareUnicodeCharacter{1E1F}{\dotaccent{f}}

\DeclareUnicodeCharacter{1E20}{\=G}
\DeclareUnicodeCharacter{1E21}{\=g}
\DeclareUnicodeCharacter{1E22}{\dotaccent{H}}
\DeclareUnicodeCharacter{1E23}{\dotaccent{h}}
\DeclareUnicodeCharacter{1E24}{\udotaccent{H}}
\DeclareUnicodeCharacter{1E25}{\udotaccent{h}}
\DeclareUnicodeCharacter{1E26}{\"H}
\DeclareUnicodeCharacter{1E27}{\"h}

\DeclareUnicodeCharacter{1E30}{\'K}
\DeclareUnicodeCharacter{1E31}{\'k}
\DeclareUnicodeCharacter{1E32}{\udotaccent{K}}
\DeclareUnicodeCharacter{1E33}{\udotaccent{k}}
\DeclareUnicodeCharacter{1E34}{\ubaraccent{K}}
\DeclareUnicodeCharacter{1E35}{\ubaraccent{k}}

\DeclareUnicodeCharacter{1E36}{\udotaccent{L}}
\DeclareUnicodeCharacter{1E37}{\udotaccent{l}}
\DeclareUnicodeCharacter{1E3A}{\ubaraccent{L}}
\DeclareUnicodeCharacter{1E3B}{\ubaraccent{l}}
\DeclareUnicodeCharacter{1E3E}{\'M}
\DeclareUnicodeCharacter{1E3F}{\'m}

\DeclareUnicodeCharacter{1E40}{\dotaccent{M}}
\DeclareUnicodeCharacter{1E41}{\dotaccent{m}}
\DeclareUnicodeCharacter{1E42}{\udotaccent{M}}
\DeclareUnicodeCharacter{1E43}{\udotaccent{m}}
\DeclareUnicodeCharacter{1E44}{\dotaccent{N}}
\DeclareUnicodeCharacter{1E45}{\dotaccent{n}}
\DeclareUnicodeCharacter{1E46}{\udotaccent{N}}
\DeclareUnicodeCharacter{1E47}{\udotaccent{n}}
\DeclareUnicodeCharacter{1E48}{\ubaraccent{N}}
\DeclareUnicodeCharacter{1E49}{\ubaraccent{n}}

\DeclareUnicodeCharacter{1E54}{\'P}
\DeclareUnicodeCharacter{1E55}{\'p}
\DeclareUnicodeCharacter{1E56}{\dotaccent{P}}
\DeclareUnicodeCharacter{1E57}{\dotaccent{p}}
\DeclareUnicodeCharacter{1E58}{\dotaccent{R}}
\DeclareUnicodeCharacter{1E59}{\dotaccent{r}}
\DeclareUnicodeCharacter{1E5A}{\udotaccent{R}}
\DeclareUnicodeCharacter{1E5B}{\udotaccent{r}}
\DeclareUnicodeCharacter{1E5E}{\ubaraccent{R}}
\DeclareUnicodeCharacter{1E5F}{\ubaraccent{r}}

\DeclareUnicodeCharacter{1E60}{\dotaccent{S}}
\DeclareUnicodeCharacter{1E61}{\dotaccent{s}}
\DeclareUnicodeCharacter{1E62}{\udotaccent{S}}
\DeclareUnicodeCharacter{1E63}{\udotaccent{s}}
\DeclareUnicodeCharacter{1E6A}{\dotaccent{T}}
\DeclareUnicodeCharacter{1E6B}{\dotaccent{t}}
\DeclareUnicodeCharacter{1E6C}{\udotaccent{T}}
\DeclareUnicodeCharacter{1E6D}{\udotaccent{t}}
\DeclareUnicodeCharacter{1E6E}{\ubaraccent{T}}
\DeclareUnicodeCharacter{1E6F}{\ubaraccent{t}}

\DeclareUnicodeCharacter{1E7C}{\~V}
\DeclareUnicodeCharacter{1E7D}{\~v}
\DeclareUnicodeCharacter{1E7E}{\udotaccent{V}}
\DeclareUnicodeCharacter{1E7F}{\udotaccent{v}}

\DeclareUnicodeCharacter{1E80}{\`W}
\DeclareUnicodeCharacter{1E81}{\`w}
\DeclareUnicodeCharacter{1E82}{\'W}

```
\DeclareUnicodeCharacter{1E83}{\'w}
\DeclareUnicodeCharacter{1E84}{\"W}
\DeclareUnicodeCharacter{1E85}{\"w}
\DeclareUnicodeCharacter{1E86}{\dotaccent{W}}
\DeclareUnicodeCharacter{1E87}{\dotaccent{w}}
\DeclareUnicodeCharacter{1E88}{\udotaccent{W}}
\DeclareUnicodeCharacter{1E89}{\udotaccent{w}}
\DeclareUnicodeCharacter{1E8A}{\dotaccent{X}}
\DeclareUnicodeCharacter{1E8B}{\dotaccent{x}}
\DeclareUnicodeCharacter{1E8C}{\"X}
\DeclareUnicodeCharacter{1E8D}{\"x}
\DeclareUnicodeCharacter{1E8E}{\dotaccent{Y}}
\DeclareUnicodeCharacter{1E8F}{\dotaccent{y}}

\DeclareUnicodeCharacter{1E90}{\^Z}
\DeclareUnicodeCharacter{1E91}{\^z}
\DeclareUnicodeCharacter{1E92}{\udotaccent{Z}}
\DeclareUnicodeCharacter{1E93}{\udotaccent{z}}
\DeclareUnicodeCharacter{1E94}{\ubaraccent{Z}}
\DeclareUnicodeCharacter{1E95}{\ubaraccent{z}}
\DeclareUnicodeCharacter{1E96}{\ubaraccent{h}}
\DeclareUnicodeCharacter{1E97}{\"t}
\DeclareUnicodeCharacter{1E98}{\ringaccent{w}}
\DeclareUnicodeCharacter{1E99}{\ringaccent{y}}

\DeclareUnicodeCharacter{1EA0}{\udotaccent{A}}
\DeclareUnicodeCharacter{1EA1}{\udotaccent{a}}

\DeclareUnicodeCharacter{1EB8}{\udotaccent{E}}
\DeclareUnicodeCharacter{1EB9}{\udotaccent{e}}
\DeclareUnicodeCharacter{1EBC}{\~E}
\DeclareUnicodeCharacter{1EBD}{\~e}

\DeclareUnicodeCharacter{1ECA}{\udotaccent{I}}
\DeclareUnicodeCharacter{1ECB}{\udotaccent{i}}
\DeclareUnicodeCharacter{1ECC}{\udotaccent{O}}
\DeclareUnicodeCharacter{1ECD}{\udotaccent{o}}

\DeclareUnicodeCharacter{1EE4}{\udotaccent{U}}
\DeclareUnicodeCharacter{1EE5}{\udotaccent{u}}

\DeclareUnicodeCharacter{1EF2}{\`Y}
\DeclareUnicodeCharacter{1EF3}{\`y}
\DeclareUnicodeCharacter{1EF4}{\udotaccent{Y}}

\DeclareUnicodeCharacter{1EF8}{\~Y}
\DeclareUnicodeCharacter{1EF9}{\~y}
```

```
\DeclareUnicodeCharacter{2013}{--}
\DeclareUnicodeCharacter{2014}{---}
\DeclareUnicodeCharacter{2018}{\quoteleft}
\DeclareUnicodeCharacter{2019}{\quoteright}
\DeclareUnicodeCharacter{201A}{\quotesinglbase}
\DeclareUnicodeCharacter{201C}{\quotedblleft}
\DeclareUnicodeCharacter{201D}{\quotedblright}
\DeclareUnicodeCharacter{201E}{\quotedblbase}
\DeclareUnicodeCharacter{2022}{\bullet}
\DeclareUnicodeCharacter{2026}{\dots}
\DeclareUnicodeCharacter{2039}{\guilsinglleft}
\DeclareUnicodeCharacter{203A}{\guilsinglright}
\DeclareUnicodeCharacter{20AC}{\euro}

\DeclareUnicodeCharacter{2192}{\expansion}
\DeclareUnicodeCharacter{21D2}{\result}

\DeclareUnicodeCharacter{2212}{\minus}
\DeclareUnicodeCharacter{2217}{\point}
\DeclareUnicodeCharacter{2261}{\equiv}
}% end of \utfeightchardefs


% US-ASCII character definitions.
\def\asciichardefs{% nothing need be done
 \relax
}

% Make non-ASCII characters printable again for compatibility with
% existing Texinfo documents that may use them, even without declaring a
% document encoding.
%
\setnonasciicharscatcode \other


\message{formatting,}

\newdimen\defaultparindent \defaultparindent = 15pt

\chapheadingskip = 15pt plus 4pt minus 2pt
\secheadingskip = 12pt plus 3pt minus 2pt
\subsecheadingskip = 9pt plus 2pt minus 2pt

% Prevent underfull vbox error messages.
\vbadness = 10000

% Don't be very finicky about underfull hboxes, either.
\hbadness = 6666
```

% Following George Bush, get rid of widows and orphans.
\widowpenalty=10000
\clubpenalty=10000

% Use TeX 3.0's \emergencystretch to help line breaking, but if we're
% using an old version of TeX, don't do anything. We want the amount of
% stretch added to depend on the line length, hence the dependence on
% \hsize. We call this whenever the paper size is set.
%
\def\setemergencystretch{%
 \ifx\emergencystretch\thisisundefined
   % Allow us to assign to \emergencystretch anyway.
   \def\emergencystretch{\dimen0}%
 \else
   \emergencystretch = .15\hsize
 \fi
}

% Parameters in order: 1) textheight; 2) textwidth;
% 3) voffset; 4) hoffset; 5) binding offset; 6) topskip;
% 7) physical page height; 8) physical page width.
%
% We also call \setleading{\textleading}, so the caller should define
% \textleading. The caller should also set \parskip.
%
\def\internalpagesizes#1#2#3#4#5#6#7#8{%
 \voffset = #3\relax
 \topskip = #6\relax
 \splittopskip = \topskip
 %
 \vsize = #1\relax
 \advance\vsize by \topskip
 \outervsize = \vsize
 \advance\outervsize by 2\topandbottommargin
 \pageheight = \vsize
 %
 \hsize = #2\relax
 \outerhsize = \hsize
 \advance\outerhsize by 0.5in
 \pagewidth = \hsize
 %
 \normaloffset = #4\relax
 \bindingoffset = #5\relax
 %
 \ifpdf
   \pdfpageheight #7\relax
   \pdfpagewidth #8\relax

```
  % if we don't reset these, they will remain at "1 true in" of
  % whatever layout pdftex was dumped with.
  \pdfhorigin = 1 true in
  \pdfvorigin = 1 true in
\fi
%
\setleading{\textleading}
%
\parindent = \defaultparindent
\setemergencystretch
}


% @letterpaper (the default).
\def\letterpaper{{\globaldefs = 1
 \parskip = 3pt plus 2pt minus 1pt
 \textleading = 13.2pt
 %
 % If page is nothing but text, make it come out even.
 \internalpagesizes{607.2pt}{6in}% that's 46 lines
               {\voffset}{.25in}%
               {\bindingoffset}{36pt}%
               {11in}{8.5in}%
}}


% Use @smallbook to reset parameters for 7x9.25 trim size.
\def\smallbook{{\globaldefs = 1
 \parskip = 2pt plus 1pt
 \textleading = 12pt
 %
 \internalpagesizes{7.5in}{5in}%
               {-.2in}{0in}%
               {\bindingoffset}{16pt}%
               {9.25in}{7in}%
 %
 \lispnarrowing = 0.3in
 \tolerance = 700
 \hfuzz = 1pt
 \contentsrightmargin = 0pt
 \defbodyindent = .5cm
}}


% Use @smallerbook to reset parameters for 6x9 trim size.
% (Just testing, parameters still in flux.)
\def\smallerbook{{\globaldefs = 1
 \parskip = 1.5pt plus 1pt
 \textleading = 12pt
 %
 \internalpagesizes{7.4in}{4.8in}%
```

```
                    {-.2in}{-.4in}%
                    {0pt}{14pt}%
                    {9in}{6in}%
    %
    \lispnarrowing = 0.25in
    \tolerance = 700
    \hfuzz = 1pt
    \contentsrightmargin = 0pt
    \defbodyindent = .4cm
}}

    % Use @afourpaper to print on European A4 paper.
    \def\afourpaper{{\globaldefs = 1
    \parskip = 3pt plus 2pt minus 1pt
    \textleading = 13.2pt
    %
    % Double-side printing via postscript on Laserjet 4050
    % prints double-sided nicely when \bindingoffset=10mm and \hoffset=-6mm.
    % To change the settings for a different printer or situation, adjust
    % \normaloffset until the front-side and back-side texts align.  Then
    % do the same for \bindingoffset.  You can set these for testing in
    % your texinfo source file like this:
    % @tex
    % \global\normaloffset = -6mm
    % \global\bindingoffset = 10mm
    % @end tex
    \internalpagesizes{673.2pt}{160mm}% that's 51 lines
                    {\voffset}{\hoffset}%
                    {\bindingoffset}{44pt}%
                    {297mm}{210mm}%
    %
    \tolerance = 700
    \hfuzz = 1pt
    \contentsrightmargin = 0pt
    \defbodyindent = 5mm
}}

    % Use @afivepaper to print on European A5 paper.
    % From romildo@urano.iceb.ufop.br, 2 July 2000.
    % He also recommends making @example and @lisp be small.
    \def\afivepaper{{\globaldefs = 1
    \parskip = 2pt plus 1pt minus 0.1pt
    \textleading = 12.5pt
    %
    \internalpagesizes{160mm}{120mm}%
                    {\voffset}{\hoffset}%
                    {\bindingoffset}{8pt}%
                    {210mm}{148mm}%
```

```
%
\lispnarrowing = 0.2in
\tolerance = 800
\hfuzz = 1.2pt
\contentsrightmargin = 0pt
\defbodyindent = 2mm
\tableindent = 12mm
}}

% A specific text layout, 24x15cm overall, intended for A4 paper.
\def\afourlatex{{\globaldefs = 1
 \afourpaper
\internalpagesizes{237mm}{150mm}%
            {\voffset}{4.6mm}%
            {\bindingoffset}{7mm}%
            {297mm}{210mm}%
%
 % Must explicitly reset to 0 because we call \afourpaper.
 \globaldefs = 0
}}

% Use @afourwide to print on A4 paper in landscape format.
\def\afourwide{{\globaldefs = 1
 \afourpaper
\internalpagesizes{241mm}{165mm}%
            {\voffset}{-2.95mm}%
            {\bindingoffset}{7mm}%
            {297mm}{210mm}%
 \globaldefs = 0
}}

% @pagesizes TEXTHEIGHT[,TEXTWIDTH]
% Perhaps we should allow setting the margins, \topskip, \parskip,
% and/or leading, also. Or perhaps we should compute them somehow.
%
\parseargdef\pagesizes{\pagesizesyyy #1,,\finish}
\def\pagesizesyyy#1,#2,#3\finish{{%
\setbox0 = \hbox{\ignorespaces #2}\ifdim\wd0 > 0pt \hsize=#2\relax \fi
\globaldefs = 1
%
\parskip = 3pt plus 2pt minus 1pt
\setleading{\textleading}%
%
\dimen0 = #1\relax
\advance\dimen0 by \voffset
%
\dimen2 = \hsize
\advance\dimen2 by \normaloffset
```

```
  %
  \internalpagesizes{#1}{\hsize}%
            {\voffset}{\normaloffset}%
            {\bindingoffset}{44pt}%
            {\dimen0}{\dimen2}%
}}

% Set default to letter.
%
\letterpaper


\message{and turning on texinfo input format.}

\def^^L{\par} % remove \outer, so ^L can appear in an @comment

% DEL is a comment character, in case @c does not suffice.
\catcode`\^^? = 14

% Define macros to output various characters with catcode for normal text.
\catcode`\"=\other \def\normaldoublequote{"}
\catcode`\$=\other \def\normaldollar{$}%$ font-lock fix
\catcode`\+=\other \def\normalplus{+}
\catcode`\<=\other \def\normalless{<}
\catcode`\>=\other \def\normalgreater{>}
\catcode`\^=\other \def\normalcaret{^}
\catcode`\_=\other \def\normalunderscore{_}
\catcode`\|=\other \def\normalverticalbar{|}
\catcode`\~=\other \def\normaltilde{~}

% This macro is used to make a character print one way in \tt
% (where it can probably be output as-is), and another way in other fonts,
% where something hairier probably needs to be done.
%
% #1 is what to print if we are indeed using \tt; #2 is what to print
% otherwise.  Since all the Computer Modern typewriter fonts have zero
% interword stretch (and shrink), and it is reasonable to expect all
% typewriter fonts to have this, we can check that font parameter.
%
\def\ifusingtt#1#2{\ifdim \fontdimen3\font=0pt #1\else #2\fi}

% Same as above, but check for italic font.  Actually this also catches
% non-italic slanted fonts since it is impossible to distinguish them from
% italic fonts.  But since this is only used by $ and it uses \sl anyway
% this is not a problem.
\def\ifusingit#1#2{\ifdim \fontdimen1\font>0pt #1\else #2\fi}

% Turn off all special characters except @
```

% (and those which the user can use as if they were ordinary).
% Most of these we simply print from the \tt font, but for some, we can
% use math or other variants that look better in normal text.

\catcode`\"=\active
\def\activedoublequote{{\tt\char34}}
\let"=\activedoublequote
\catcode`\~=\active
\def~{{\tt\char126}}
\chardef\hat=`\^
\catcode`\^=\active
\def^{{\tt \hat}}

\catcode`_=\active
\def_{\ifusingtt\normalunderscore_}
\let\realunder=_
% Subroutine for the previous macro.
\def_{\leavevmode \kern.07em \vbox{\hrule width.3em height.1ex}\kern .07em }

\catcode`\|=\active
\def|{{\tt\char124}}
\chardef \less=`\<
\catcode`\<=\active
\def<{{\tt \less}}
\chardef \gtr=`\>
\catcode`\>=\active
\def>{{\tt \gtr}}
\catcode`\+=\active
\def+{{\tt \char 43}}
\catcode`\$=\active
\def${\ifusingit{{\sl\$}}\normaldollar}%$ font-lock fix

% If a .fmt file is being used, characters that might appear in a file
% name cannot be active until we have parsed the command line.
% So turn them off again, and have \everyjob (or @setfilename) turn them on.
% \otherifyactive is called near the end of this file.
\def\otherifyactive{\catcode`+=\other \catcode`_=\other}

% Used sometimes to turn off (effectively) the active characters even after
% parsing them.
\def\turnoffactive{%
 \normalturnoffactive
 \otherbackslash
}

\catcode`\@=0

% \backslashcurfont outputs one backslash character in current font,

% as in \char`\\.
\global\chardef\backslashcurfont=`\\
\global\let\rawbackslashxx=\backslashcurfont % let existing .??s files work

% \realbackslash is an actual character `\' with catcode other, and
% \doublebackslash is two of them (for the pdf outlines).
{\catcode`\\=\other @gdef@realbackslash{\} @gdef@doublebackslash{\\}}

% In texinfo, backslash is an active character; it prints the backslash
% in fixed width font.
\catcode`\\=\active % @ for escape char from now on.

% The story here is that in math mode, the \char of \backslashcurfont
% ends up printing the roman \ from the math symbol font (because \char
% in math mode uses the \mathcode, and plain.tex sets
% \mathcode`\\="026E). It seems better for @backslashchar{} to always
% print a typewriter backslash, hence we use an explicit \mathchar,
% which is the decimal equivalent of "715c (class 7, e.g., use \fam;
% ignored family value; char position "5C). We can't use " for the
% usual hex value because it has already been made active.
@def@normalbackslash{{@tt @ifmmode @mathchar29020 @else @backslashcurfont @fi}}
@let@backslashchar = @normalbackslash % @backslashchar{} is for user documents.

% On startup, @fixbackslash assigns:
% @let \ = @normalbackslash
% \rawbackslash defines an active \ to do \backslashcurfont.
% \otherbackslash defines an active \ to be a literal `\' character with
% catcode other. We switch back and forth between these.
@gdef@rawbackslash{@let\=@backslashcurfont}
@gdef@otherbackslash{@let\=@realbackslash}

% Same as @turnoffactive except outputs \ as {\tt\char`\\} instead of
% the literal character `\'. Also revert - to its normal character, in
% case the active - from code has slipped in.
%
{@catcode`- = @active
@gdef@normalturnoffactive{%
 @let-=@normaldash
 @let"=@normaldoublequote
 @let$=@normaldollar %$ font-lock fix
 @let+=@normalplus
 @let<=@normalless
 @let>=@normalgreater
 @let\=@normalbackslash
 @let^=@normalcaret
 @let_=@normalunderscore
 @let|=@normalverticalbar
 @let~=@normaltilde

```
  @markupsetuplqdefault
  @markupsetuprqdefault
  @unsepspaces
}
}

% Make _ and + \other characters, temporarily.
% This is canceled by @fixbackslash.
@otherifyactive

% If a .fmt file is being used, we don't want the `\input texinfo' to show up.
% That is what \eatinput is for; after that, the `\' should revert to printing
% a backslash.
%
@gdef@eatinput input texinfo{@fixbackslash}
@global@let\ = @eatinput

% On the other hand, perhaps the file did not have a `\input texinfo'. Then
% the first `\' in the file would cause an error. This macro tries to fix
% that, assuming it is called before the first `\' could plausibly occur.
% Also turn back on active characters that might appear in the input
% file name, in case not using a pre-dumped format.
%
@gdef@fixbackslash{%
 @ifx\@eatinput @let\ = @normalbackslash @fi
 @catcode`+=@active
 @catcode`@_=@active
}

% Say @foo, not \foo, in error messages.
@escapechar = `@@

% These (along with & and #) are made active for url-breaking, so need
% active definitions as the normal characters.
@def@normaldot{.}
@def@normalquest{?}
@def@normalslash{/}

% These look ok in all fonts, so just make them not special.
% @hashchar{} gets its own user-level command, because of #line.
@catcode`@& = @other @def@normalamp{&}
@catcode`@# = @other @def@normalhash{#}
@catcode`@% = @other @def@normalpercent{%}

@let @hashchar = @normalhash

@c Finally, make ` and ' active, so that txicodequoteundirected and
@c txicodequotebacktick work right in, e.g., @w{@code{`foo'}}.  If we
```

@c don't make ` and ' active, @code will not get them as active chars.

@c Do this last of all since we use ` in the previous @catcode assignments.

@catcode`@'=@active

@catcode`@`=@active

@markupsetuplqdefault

@markupsetuprqdefault

@c Local variables:

@c eval: (add-hook 'write-file-hooks 'time-stamp)

@c page-delimiter: "^\\\\\message"

@c time-stamp-start: "def\\\\\texinfoversion{"

@c time-stamp-format: "%:y-%02m-%02d.%02H"

@c time-stamp-end: "}"

@c End:

@c vim:sw=2:

@ignore

  arch-tag: e1b36e32-c96e-4135-a41a-0b2efa2ea115

@end ignore

1.61 libffi/msvcc.sh 3.2.1

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October 23, 2014

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*
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*   The following table summarizes matters since version 0.89c, which was
*   the first widely used release:
*
*    source              png.h png.h shared-lib
*    version             string  int  version
*    -------             ------ ----- ----------
*    0.89c "1.0 beta 3"    0.89    89  1.0.89
*    0.90  "1.0 beta 4"    0.90    90  0.90  [should have been 2.0.90]
*    0.95  "1.0 beta 5"    0.95    95  0.95  [should have been 2.0.95]
*    0.96  "1.0 beta 6"    0.96    96  0.96  [should have been 2.0.96]
*    0.97b "1.00.97 beta 7" 1.00.97  97  1.0.1 [should have been 2.0.97]
*    0.97c               0.97    97  2.0.97
*    0.98                0.98    98  2.0.98
*    0.99                0.99    98  2.0.99
*    0.99a-m             0.99    99  2.0.99
*    1.00                1.00   100  2.1.0 [100 should be 10000]
*    1.0.0    (from here on, the  100  2.1.0 [100 should be 10000]
*    1.0.1      png.h string is  10001  2.1.0
*    1.0.1a-e  identical to the  10002  from here on, the shared library
*    1.0.2      source version)  10002  is 2.V where V is the source code
*    1.0.2a-b                    10003  version, except as noted.
*    1.0.3                       10003
*    1.0.3a-d                    10004
*    1.0.4                       10004
*    1.0.4a-f                    10005
*    1.0.5 (+ 2 patches)         10005
*    1.0.5a-d                    10006
*    1.0.5e-r                    10100 (not source compatible)
*    1.0.5s-v                    10006 (not binary compatible)
*    1.0.6 (+ 3 patches)         10006 (still binary incompatible)
*    1.0.6d-f                    10007 (still binary incompatible)
*    1.0.6g                      10007
*    1.0.6h                      10007 10.6h (testing xy.z so-numbering)
*    1.0.6i                      10007 10.6i
```

* 1.0.6j   10007 2.1.0.6j (incompatible with 1.0.0)
* 1.0.7beta11-14   DLLNUM 10007 2.1.0.7beta11-14 (binary compatible)
* 1.0.7beta15-18   1   10007 2.1.0.7beta15-18 (binary compatible)
* 1.0.7rc1-2   1   10007 2.1.0.7rc1-2 (binary compatible)
* 1.0.7   1   10007 (still compatible)
* 1.0.8beta1-4   1   10008 2.1.0.8beta1-4
* 1.0.8rc1   1   10008 2.1.0.8rc1
* 1.0.8   1   10008 2.1.0.8
* 1.0.9beta1-6   1   10009 2.1.0.9beta1-6
* 1.0.9rc1   1   10009 2.1.0.9rc1
* 1.0.9beta7-10   1   10009 2.1.0.9beta7-10
* 1.0.9rc2   1   10009 2.1.0.9rc2
* 1.0.9   1   10009 2.1.0.9
* 1.0.10beta1   1   10010 2.1.0.10beta1
* 1.0.10rc1   1   10010 2.1.0.10rc1
* 1.0.10   1   10010 2.1.0.10
* 1.0.11beta1-3   1   10011 2.1.0.11beta1-3
* 1.0.11rc1   1   10011 2.1.0.11rc1
* 1.0.11   1   10011 2.1.0.11
* 1.0.12beta1-2   2   10012 2.1.0.12beta1-2
* 1.0.12rc1   2   10012 2.1.0.12rc1
* 1.0.12   2   10012 2.1.0.12
* 1.1.0a-f   -   10100 2.1.1.0a-f (branch abandoned)
* 1.2.0beta1-2   2   10200 2.1.2.0beta1-2
* 1.2.0beta3-5   3   10200 3.1.2.0beta3-5
* 1.2.0rc1   3   10200 3.1.2.0rc1
* 1.2.0   3   10200 3.1.2.0
* 1.2.1beta1-4   3   10201 3.1.2.1beta1-4
* 1.2.1rc1-2   3   10201 3.1.2.1rc1-2
* 1.2.1   3   10201 3.1.2.1
* 1.2.2beta1-6   12 10202 12.so.0.1.2.2beta1-6
* 1.0.13beta1   10 10013 10.so.0.1.0.13beta1
* 1.0.13rc1   10 10013 10.so.0.1.0.13rc1
* 1.2.2rc1   12 10202 12.so.0.1.2.2rc1
* 1.0.13   10 10013 10.so.0.1.0.13
* 1.2.2   12 10202 12.so.0.1.2.2
* 1.2.3rc1-6   12 10203 12.so.0.1.2.3rc1-6
* 1.2.3   12 10203 12.so.0.1.2.3
* 1.2.4beta1-3   13 10204 12.so.0.1.2.4beta1-3
* 1.0.14rc1   13 10014 10.so.0.1.0.14rc1
* 1.2.4rc1   13 10204 12.so.0.1.2.4rc1
* 1.0.14   10 10014 10.so.0.1.0.14
* 1.2.4   13 10204 12.so.0.1.2.4
* 1.2.5beta1-2   13 10205 12.so.0.1.2.5beta1-2
* 1.0.15rc1-3   10 10015 10.so.0.1.0.15rc1-3
* 1.2.5rc1-3   13 10205 12.so.0.1.2.5rc1-3
* 1.0.15   10 10015 10.so.0.1.0.15
* 1.2.5   13 10205 12.so.0.1.2.5

* 1.2.6beta1-4   13   10206 12.so.0.1.2.6beta1-4
* 1.0.16   10   10016 10.so.0.1.0.16
* 1.2.6   13   10206 12.so.0.1.2.6
* 1.2.7beta1-2   13   10207 12.so.0.1.2.7beta1-2
* 1.0.17rc1   10   10017 12.so.0.1.0.17rc1
* 1.2.7rc1   13   10207 12.so.0.1.2.7rc1
* 1.0.17   10   10017 12.so.0.1.0.17
* 1.2.7   13   10207 12.so.0.1.2.7
* 1.2.8beta1-5   13   10208 12.so.0.1.2.8beta1-5
* 1.0.18rc1-5   10   10018 12.so.0.1.0.18rc1-5
* 1.2.8rc1-5   13   10208 12.so.0.1.2.8rc1-5
* 1.0.18   10   10018 12.so.0.1.0.18
* 1.2.8   13   10208 12.so.0.1.2.8
* 1.2.9beta1-3   13   10209 12.so.0.1.2.9beta1-3
* 1.2.9beta4-11   13   10209 12.so.0.9[.0]
* 1.2.9rc1   13   10209 12.so.0.9[.0]
* 1.2.9   13   10209 12.so.0.9[.0]
* 1.2.10beta1-7   13   10210 12.so.0.10[.0]
* 1.2.10rc1-2   13   10210 12.so.0.10[.0]
* 1.2.10   13   10210 12.so.0.10[.0]
* 1.4.0beta1-5   14   10400 14.so.0.0[.0]
* 1.2.11beta1-4   13   10211 12.so.0.11[.0]
* 1.4.0beta7-8   14   10400 14.so.0.0[.0]
* 1.2.11   13   10211 12.so.0.11[.0]
* 1.2.12   13   10212 12.so.0.12[.0]
* 1.4.0beta9-14   14   10400 14.so.0.0[.0]
* 1.2.13   13   10213 12.so.0.13[.0]
* 1.4.0beta15-36   14   10400 14.so.0.0[.0]
* 1.4.0beta37-87   14   10400 14.so.14.0[.0]
* 1.4.0rc01   14   10400 14.so.14.0[.0]
* 1.4.0beta88-109   14   10400 14.so.14.0[.0]
* 1.4.0rc02-08   14   10400 14.so.14.0[.0]
* 1.4.0   14   10400 14.so.14.0[.0]
* 1.4.1beta01-03   14   10401 14.so.14.1[.0]
* 1.4.1rc01   14   10401 14.so.14.1[.0]
* 1.4.1beta04-12   14   10401 14.so.14.1[.0]
* 1.4.1   14   10401 14.so.14.1[.0]
* 1.4.2   14   10402 14.so.14.2[.0]
* 1.4.3   14   10403 14.so.14.3[.0]
* 1.4.4   14   10404 14.so.14.4[.0]
* 1.5.0beta01-58   15   10500 15.so.15.0[.0]
* 1.5.0rc01-07   15   10500 15.so.15.0[.0]
* 1.5.0   15   10500 15.so.15.0[.0]
* 1.5.1beta01-11   15   10501 15.so.15.1[.0]
* 1.5.1rc01-02   15   10501 15.so.15.1[.0]
* 1.5.1   15   10501 15.so.15.1[.0]
* 1.5.2beta01-03   15   10502 15.so.15.2[.0]
* 1.5.2rc01-03   15   10502 15.so.15.2[.0]

* 1.5.2   15   10502 15.so.15.2[.0]
* 1.5.3beta01-10   15   10503 15.so.15.3[.0]
* 1.5.3rc01-02   15   10503 15.so.15.3[.0]
* 1.5.3beta11   15   10503 15.so.15.3[.0]
* 1.5.3 [omitted]
* 1.5.4beta01-08   15   10504 15.so.15.4[.0]
* 1.5.4rc01   15   10504 15.so.15.4[.0]
* 1.5.4   15   10504 15.so.15.4[.0]
* 1.5.5beta01-08   15   10505 15.so.15.5[.0]
* 1.5.5rc01   15   10505 15.so.15.5[.0]
* 1.5.5   15   10505 15.so.15.5[.0]
* 1.5.6beta01-07   15   10506 15.so.15.6[.0]
* 1.5.6rc01-03   15   10506 15.so.15.6[.0]
* 1.5.6   15   10506 15.so.15.6[.0]
* 1.5.7beta01-05   15   10507 15.so.15.7[.0]
* 1.5.7rc01-03   15   10507 15.so.15.7[.0]
* 1.5.7   15   10507 15.so.15.7[.0]
* 1.6.0beta01-40   16   10600 16.so.16.0[.0]
* 1.6.0rc01-08   16   10600 16.so.16.0[.0]
* 1.6.0   16   10600 16.so.16.0[.0]
* 1.6.1beta01-09   16   10601 16.so.16.1[.0]
* 1.6.1rc01   16   10601 16.so.16.1[.0]
* 1.6.1   16   10601 16.so.16.1[.0]
* 1.6.2beta01   16   10602 16.so.16.2[.0]
* 1.6.2rc01-06   16   10602 16.so.16.2[.0]
* 1.6.2   16   10602 16.so.16.2[.0]
* 1.6.3beta01-11   16   10603 16.so.16.3[.0]
* 1.6.3rc01   16   10603 16.so.16.3[.0]
* 1.6.3   16   10603 16.so.16.3[.0]
* 1.6.4beta01-02   16   10604 16.so.16.4[.0]
* 1.6.4rc01   16   10604 16.so.16.4[.0]
* 1.6.4   16   10604 16.so.16.4[.0]
* 1.6.5   16   10605 16.so.16.5[.0]
* 1.6.6   16   10606 16.so.16.6[.0]
* 1.6.7beta01-04   16   10607 16.so.16.7[.0]
* 1.6.7rc01-03   16   10607 16.so.16.7[.0]
* 1.6.7   16   10607 16.so.16.7[.0]
* 1.6.8beta01-02   16   10608 16.so.16.8[.0]
* 1.6.8rc01-02   16   10608 16.so.16.8[.0]
* 1.6.8   16   10608 16.so.16.8[.0]
* 1.6.9beta01-04   16   10609 16.so.16.9[.0]
* 1.6.9rc01-02   16   10609 16.so.16.9[.0]
* 1.6.9   16   10609 16.so.16.9[.0]
* 1.6.10beta01-03   16   10610 16.so.16.10[.0]
* 1.6.10rc01-03   16   10610 16.so.16.10[.0]
* 1.6.10   16   10610 16.so.16.10[.0]
* 1.6.11beta01-06   16   10611 16.so.16.11[.0]
* 1.6.11rc01-02   16   10611 16.so.16.11[.0]

```
*    1.6.11           16   10611  16.so.16.11[.0]
*    1.6.12rc01-03    16   10612  16.so.16.12[.0]
*    1.6.12           16   10612  16.so.16.12[.0]
*    1.6.13beta01-04  16   10613  16.so.16.13[.0]
*    1.6.13rc01-02    16   10613  16.so.16.13[.0]
*    1.6.13           16   10613  16.so.16.13[.0]
*    1.6.14beta01-07  16   10614  16.so.16.14[.0]
*    1.6.14rc01-02    16   10614  16.so.16.14[.0]
*    1.6.14           16   10614  16.so.16.14[.0]
*
*   Henceforth the source version will match the shared-library major
*   and minor numbers; the shared-library major version number will be
*   used for changes in backward compatibility, as it is intended.  The
*   PNG_LIBPNG_VER macro, which is not used within libpng but is available
*   for applications, is an unsigned integer of the form xyyzz corresponding
*   to the source version x.y.z (leading zeros in y and z).  Beta versions
*   were given the previous public release number plus a letter, until
*   version 1.0.6j; from then on they were given the upcoming public
*   release number plus "betaNN" or "rcNN".
*
*   Binary incompatibility exists only when applications make direct access
*   to the info_ptr or png_ptr members through png.h, and the compiled
*   application is loaded with a different version of the library.
*
*   DLLNUM will change each time there are forward or backward changes
*   in binary compatibility (e.g., when a new feature is added).
*
* See libpng-manual.txt or libpng.3 for more information.  The PNG
* specification is available as a W3C Recommendation and as an ISO
* Specification, <http://www.w3.org/TR/2003/REC-PNG-20031110/
*/

/*
* COPYRIGHT NOTICE, DISCLAIMER, and LICENSE:
*
* If you modify libpng you may insert additional notices immediately following
* this sentence.
*
* This code is released under the libpng license.
*
* libpng versions 1.2.6, August 15, 2004, through 1.6.14, October 23, 2014, are
* Copyright (c) 2004, 2006-2014 Glenn Randers-Pehrson, and are
* distributed according to the same disclaimer and license as libpng-1.2.5
* with the following individual added to the list of Contributing Authors:
*
*    Cosmin Truta
*
* libpng versions 1.0.7, July 1, 2000, through 1.2.5, October 3, 2002, are
```

```
 *
 * Thanks to Frank J. T. Wojcik for helping with the documentation.
 */


/*
 * Y2K compliance in libpng:
 * =========================
 *
 *    October 23, 2014
 *
 *    Since the PNG Development group is an ad-hoc body, we can't make
 *    an official declaration.
 *
 *    This is your unofficial assurance that libpng from version 0.71 and
 *    upward through 1.6.14 are Y2K compliant.  It is my belief that
 *    earlier versions were also Y2K compliant.
 *
 *    Libpng only has two year fields.  One is a 2-byte unsigned integer
 *    that will hold years up to 65535.  The other, which is deprecated,
 *    holds the date in text format, and will hold years up to 9999.
 *
 *    The integer is
 *        "png_uint_16 year" in png_time_struct.
 *
 *    The string is
 *        "char time_buffer[29]" in png_struct.  This is no longer used
 *    in libpng-1.6.x and will be removed from libpng-1.7.0.
 *
 *    There are seven time-related functions:
 *        png.c: png_convert_to_rfc_1123_buffer() in png.c
 *          (formerly png_convert_to_rfc_1123() prior to libpng-1.5.x and
 *          png_convert_to_rfc_1152() in error prior to libpng-0.98)
 *        png_convert_from_struct_tm() in pngwrite.c, called in pngwrite.c
 *        png_convert_from_time_t() in pngwrite.c
 *        png_get_tIME() in pngget.c
 *        png_handle_tIME() in pngrutil.c, called in pngread.c
 *        png_set_tIME() in pngset.c
 *        png_write_tIME() in pngwutil.c, called in pngwrite.c
 *
 *    All handle dates properly in a Y2K environment.  The
 *    png_convert_from_time_t() function calls gmtime() to convert from system
 *    clock time, which returns (year - 1900), which we properly convert to
 *    the full 4-digit year.  There is a possibility that libpng applications
 *    are not passing 4-digit years into the png_convert_to_rfc_1123_buffer()
 *    function, or that they are incorrectly passing only a 2-digit year
 *    instead of "year - 1900" into the png_convert_from_struct_tm() function,
 *    but this is not under our control.  The libpng documentation has always
 *    stated that it works with 4-digit years, and the APIs have been
```

```
 *    documented as such.
 *
 *    The tIME chunk itself is also Y2K compliant.  It uses a 2-byte unsigned
 *    integer to hold the year, and can hold years as large as 65535.
 *
 *    zlib, upon which libpng depends, is also Y2K compliant.  It contains
 *    no date-related code.
 *
 *      Glenn Randers-Pehrson
 *      libpng maintainer
 *      PNG Development Group
 */

#ifndef PNG_H
#define PNG_H

/* This is not the place to learn how to use libpng. The file libpng-manual.txt
 * describes how to use libpng, and the file example.c summarizes it
 * with some code on which to build.  This file is useful for looking
 * at the actual function definitions and structure components.  If that
 * file has been stripped from your copy of libpng, you can find it at
 * <http://www.libpng.org/pub/png/libpng-manual.txt>
 *
 * If you just need to read a PNG file and don't want to read the documentation
 * skip to the end of this file and read the section entitled 'simplified API'.
 */

/* Version information for png.h - this should match the version in png.c */
#define PNG_LIBPNG_VER_STRING "1.6.14"
#define PNG_HEADER_VERSION_STRING \
    " libpng version 1.6.14 - October 23, 2014\n"

#define PNG_LIBPNG_VER_SONUM   16
#define PNG_LIBPNG_VER_DLLNUM  16

/* These should match the first 3 components of PNG_LIBPNG_VER_STRING: */
#define PNG_LIBPNG_VER_MAJOR   1
#define PNG_LIBPNG_VER_MINOR   6
#define PNG_LIBPNG_VER_RELEASE 14

/* This should match the numeric part of the final component of
 * PNG_LIBPNG_VER_STRING, omitting any leading zero:
 */

#define PNG_LIBPNG_VER_BUILD  0

/* Release Status */
#define PNG_LIBPNG_BUILD_ALPHA    1
```

```
#define PNG_LIBPNG_BUILD_BETA    2
#define PNG_LIBPNG_BUILD_RC      3
#define PNG_LIBPNG_BUILD_STABLE   4
#define PNG_LIBPNG_BUILD_RELEASE_STATUS_MASK 7


/* Release-Specific Flags */
#define PNG_LIBPNG_BUILD_PATCH    8 /* Can be OR'ed with
                      PNG_LIBPNG_BUILD_STABLE only */
#define PNG_LIBPNG_BUILD_PRIVATE 16 /* Cannot be OR'ed with
                      PNG_LIBPNG_BUILD_SPECIAL */
#define PNG_LIBPNG_BUILD_SPECIAL 32 /* Cannot be OR'ed with
                      PNG_LIBPNG_BUILD_PRIVATE */


#define PNG_LIBPNG_BUILD_BASE_TYPE PNG_LIBPNG_BUILD_STABLE


/* Careful here.  At one time, Guy wanted to use 082, but that would be octal.
 * We must not include leading zeros.
 * Versions 0.7 through 1.0.0 were in the range 0 to 100 here (only
 * version 1.0.0 was mis-numbered 100 instead of 10000).  From
 * version 1.0.1 it's    xxyyzz, where x=major, y=minor, z=release
 */
#define PNG_LIBPNG_VER 10614 /* 1.6.14 */


/* Library configuration: these options cannot be changed after
 * the library has been built.
 */
#ifndef PNGLCONF_H
   /* If pnglibconf.h is missing, you can
    * copy scripts/pnglibconf.h.prebuilt to pnglibconf.h
    */
#   include "pnglibconf.h"
#endif


#ifndef PNG_VERSION_INFO_ONLY
  /* Machine specific configuration. */
#  include "pngconf.h"
#endif


/*
 * Added at libpng-1.2.8
 *
 * Ref MSDN: Private as priority over Special
 * VS_FF_PRIVATEBUILD File *was not* built using standard release
 * procedures. If this value is given, the StringFileInfo block must
 * contain a PrivateBuild string.
 *
 * VS_FF_SPECIALBUILD File *was* built by the original company using
 * standard release procedures but is a variation of the standard
```

* file of the same version number. If this value is given, the
* StringFileInfo block must contain a SpecialBuild string.
*/

#ifdef PNG_USER_PRIVATEBUILD /* From pnglibconf.h */
define PNG_LIBPNG_BUILD_TYPE \
    (PNG_LIBPNG_BUILD_BASE_TYPE | PNG_LIBPNG_BUILD_PRIVATE)
#else
ifdef PNG_LIBPNG_SPECIALBUILD
define PNG_LIBPNG_BUILD_TYPE \
      (PNG_LIBPNG_BUILD_BASE_TYPE | PNG_LIBPNG_BUILD_SPECIAL)
else
define PNG_LIBPNG_BUILD_TYPE (PNG_LIBPNG_BUILD_BASE_TYPE)
endif
#endif

#ifndef PNG_VERSION_INFO_ONLY

/* Inhibit C++ name-mangling for libpng functions but not for system calls. */
#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/* Version information for C files, stored in png.c. This had better match
* the version above.
*/
#define png_libpng_ver png_get_header_ver(NULL)

/* This file is arranged in several sections:
*
* 1. Any configuration options that can be specified by for the application
*   code when it is built. (Build time configuration is in pnglibconf.h)
* 2. Type definitions (base types are defined in pngconf.h), structure
*   definitions.
* 3. Exported library functions.
* 4. Simplified API.
*
* The library source code has additional files (principally pngpriv.h) that
* allow configuration of the library.
*/
/* Section 1: run time configuration
* See pnglibconf.h for build time configuration
*
* Run time configuration allows the application to choose between
* implementations of certain arithmetic APIs. The default is set
* at build time and recorded in pnglibconf.h, but it is safe to
* override these (and only these) settings. Note that this won't
* change what the library does, only application code, and the

```
* settings can (and probably should) be made on a per-file basis
* by setting the #defines before including png.h
*
* Use macros to read integers from PNG data or use the exported
* functions?
*   PNG_USE_READ_MACROS: use the macros (see below)  Note that
*     the macros evaluate their argument multiple times.
*   PNG_NO_USE_READ_MACROS: call the relevant library function.
*
* Use the alternative algorithm for compositing alpha samples that
* does not use division?
*   PNG_READ_COMPOSITE_NODIV_SUPPORTED: use the 'no division'
*     algorithm.
*   PNG_NO_READ_COMPOSITE_NODIV: use the 'division' algorithm.
*
* How to handle benign errors if PNG_ALLOW_BENIGN_ERRORS is
* false?
*   PNG_ALLOW_BENIGN_ERRORS: map calls to the benign error
*     APIs to png_warning.
* Otherwise the calls are mapped to png_error.
*/

/* Section 2: type definitions, including structures and compile time
* constants.
* See pngconf.h for base types that vary by machine/system
*/

/* This triggers a compiler error in png.c, if png.c and png.h
* do not agree upon the version number.
*/
typedef char* png_libpng_version_1_6_14;

/* Basic control structions.  Read libpng-manual.txt or libpng.3 for more info.
*
* png_struct is the cache of information used while reading or writing a single
* PNG file.  One of these is always required, although the simplified API
* (below) hides the creation and destruction of it.
*/
typedef struct png_struct_def png_struct;
typedef const png_struct * png_const_structp;
typedef png_struct * png_structp;
typedef png_struct * * png_structpp;

/* png_info contains information read from or to be written to a PNG file.  One
* or more of these must exist while reading or creating a PNG file.  The
* information is not used by libpng during read but is used to control what
* gets written when a PNG file is created.  "png_get_" function calls read
* information during read and "png_set_" functions calls write information
```

```c
 * when creating a PNG.
 * been moved into a separate header file that is not accessible to
 * applications.  Read libpng-manual.txt or libpng.3 for more info.
 */
typedef struct png_info_def png_info;
typedef png_info * png_infop;
typedef const png_info * png_const_infop;
typedef png_info * * png_infopp;

/* Types with names ending 'p' are pointer types.  The corresponding types with
 * names ending 'rp' are identical pointer types except that the pointer is
 * marked 'restrict', which means that it is the only pointer to the object
 * passed to the function.  Applications should not use the 'restrict' types;
 * it is always valid to pass 'p' to a pointer with a function argument of the
 * corresponding 'rp' type.  Different compilers have different rules with
 * regard to type matching in the presence of 'restrict'.  For backward
 * compatibility libpng callbacks never have 'restrict' in their parameters and,
 * consequentially, writing portable application code is extremely difficult if
 * an attempt is made to use 'restrict'.
 */
typedef png_struct * PNG_RESTRICT png_structrp;
typedef const png_struct * PNG_RESTRICT png_const_structrp;
typedef png_info * PNG_RESTRICT png_inforp;
typedef const png_info * PNG_RESTRICT png_const_inforp;

/* Three color definitions.  The order of the red, green, and blue, (and the
 * exact size) is not important, although the size of the fields need to
 * be png_byte or png_uint_16 (as defined below).
 */
typedef struct png_color_struct
{
  png_byte red;
  png_byte green;
  png_byte blue;
} png_color;
typedef png_color * png_colorp;
typedef const png_color * png_const_colorp;
typedef png_color * * png_colorpp;

typedef struct png_color_16_struct
{
  png_byte index;    /* used for palette files */
  png_uint_16 red;   /* for use in red green blue files */
  png_uint_16 green;
  png_uint_16 blue;
  png_uint_16 gray;  /* for use in grayscale files */
} png_color_16;
typedef png_color_16 * png_color_16p;
```

```c
typedef const png_color_16 * png_const_color_16p;
typedef png_color_16 * * png_color_16pp;

typedef struct png_color_8_struct
{
  png_byte red;   /* for use in red green blue files */
  png_byte green;
  png_byte blue;
  png_byte gray;  /* for use in grayscale files */
  png_byte alpha; /* for alpha channel files */
} png_color_8;
typedef png_color_8 * png_color_8p;
typedef const png_color_8 * png_const_color_8p;
typedef png_color_8 * * png_color_8pp;

/*
 * The following two structures are used for the in-core representation
 * of sPLT chunks.
 */
typedef struct png_sPLT_entry_struct
{
  png_uint_16 red;
  png_uint_16 green;
  png_uint_16 blue;
  png_uint_16 alpha;
  png_uint_16 frequency;
} png_sPLT_entry;
typedef png_sPLT_entry * png_sPLT_entryp;
typedef const png_sPLT_entry * png_const_sPLT_entryp;
typedef png_sPLT_entry * * png_sPLT_entrypp;

/*  When the depth of the sPLT palette is 8 bits, the color and alpha samples
 *  occupy the LSB of their respective members, and the MSB of each member
 *  is zero-filled.  The frequency member always occupies the full 16 bits.
 */

typedef struct png_sPLT_struct
{
  png_charp name;          /* palette name */
  png_byte depth;          /* depth of palette samples */
  png_sPLT_entryp entries; /* palette entries */
  png_int_32 nentries;     /* number of palette entries */
} png_sPLT_t;
typedef png_sPLT_t * png_sPLT_tp;
typedef const png_sPLT_t * png_const_sPLT_tp;
typedef png_sPLT_t * * png_sPLT_tpp;

#ifdef PNG_TEXT_SUPPORTED
```

```c
/* png_text holds the contents of a text/ztxt/itxt chunk in a PNG file,
 * and whether that contents is compressed or not.  The "key" field
 * points to a regular zero-terminated C string.  The "text" fields can be a
 * regular C string, an empty string, or a NULL pointer.
 * However, the structure returned by png_get_text() will always contain
 * the "text" field as a regular zero-terminated C string (possibly
 * empty), never a NULL pointer, so it can be safely used in printf() and
 * other string-handling functions.  Note that the "itxt_length", "lang", and
 * "lang_key" members of the structure only exist when the library is built
 * with iTXt chunk support.  Prior to libpng-1.4.0 the library was built by
 * default without iTXt support. Also note that when iTXt *is* supported,
 * the "lang" and "lang_key" fields contain NULL pointers when the
 * "compression" field contains * PNG_TEXT_COMPRESSION_NONE or
 * PNG_TEXT_COMPRESSION_zTXt. Note that the "compression value" is not the
 * same as what appears in the PNG tEXt/zTXt/iTXt chunk's "compression flag"
 * which is always 0 or 1, or its "compression method" which is always 0.
 */
typedef struct png_text_struct
{
   int  compression;     /* compression value:
                            -1: tEXt, none
                             0: zTXt, deflate
                             1: iTXt, none
                             2: iTXt, deflate  */
   png_charp key;        /* keyword, 1-79 character description of "text" */
   png_charp text;       /* comment, may be an empty string (ie "")
                            or a NULL pointer */
   png_size_t text_length; /* length of the text string */
   png_size_t itxt_length; /* length of the itxt string */
   png_charp lang;       /* language code, 0-79 characters
                            or a NULL pointer */
   png_charp lang_key;    /* keyword translated UTF-8 string, 0 or more
                            chars or a NULL pointer */
} png_text;
typedef png_text * png_textp;
typedef const png_text * png_const_textp;
typedef png_text * * png_textpp;
#endif


/* Supported compression types for text in PNG files (tEXt, and zTXt).
 * The values of the PNG_TEXT_COMPRESSION_ defines should NOT be changed. */
#define PNG_TEXT_COMPRESSION_NONE_WR -3
#define PNG_TEXT_COMPRESSION_zTXt_WR -2
#define PNG_TEXT_COMPRESSION_NONE   -1
#define PNG_TEXT_COMPRESSION_zTXt    0
#define PNG_ITXT_COMPRESSION_NONE    1
#define PNG_ITXT_COMPRESSION_zTXt    2
#define PNG_TEXT_COMPRESSION_LAST    3 /* Not a valid value */
```

```
/* png_time is a way to hold the time in an machine independent way.
 * Two conversions are provided, both from time_t and struct tm.  There
 * is no portable way to convert to either of these structures, as far
 * as I know.  If you know of a portable way, send it to me.  As a side
 * note - PNG has always been Year 2000 compliant!
 */
typedef struct png_time_struct
{
  png_uint_16 year; /* full year, as in, 1995 */
  png_byte month;   /* month of year, 1 - 12 */
  png_byte day;     /* day of month, 1 - 31 */
  png_byte hour;    /* hour of day, 0 - 23 */
  png_byte minute;  /* minute of hour, 0 - 59 */
  png_byte second;  /* second of minute, 0 - 60 (for leap seconds) */
} png_time;
typedef png_time * png_timep;
typedef const png_time * png_const_timep;
typedef png_time * * png_timepp;


#if defined(PNG_STORE_UNKNOWN_CHUNKS_SUPPORTED) ||\
  defined(PNG_USER_CHUNKS_SUPPORTED)
/* png_unknown_chunk is a structure to hold queued chunks for which there is
 * no specific support.  The idea is that we can use this to queue
 * up private chunks for output even though the library doesn't actually
 * know about their semantics.
 *
 * The data in the structure is set by libpng on read and used on write.
 */
typedef struct png_unknown_chunk_t
{
  png_byte name[5]; /* Textual chunk name with '\0' terminator */
  png_byte *data;   /* Data, should not be modified on read! */
  png_size_t size;

  /* On write 'location' must be set using the flag values listed below.
   * Notice that on read it is set by libpng however the values stored have
   * more bits set than are listed below.  Always treat the value as a
   * bitmask.  On write set only one bit - setting multiple bits may cause the
   * chunk to be written in multiple places.
   */
  png_byte location; /* mode of operation at read time */
}
png_unknown_chunk;

typedef png_unknown_chunk * png_unknown_chunkp;
typedef const png_unknown_chunk * png_const_unknown_chunkp;
typedef png_unknown_chunk * * png_unknown_chunkpp;
```

```
#endif

/* Flag values for the unknown chunk location byte. */
#define PNG_HAVE_IHDR  0x01
#define PNG_HAVE_PLTE  0x02
#define PNG_AFTER_IDAT 0x08

/* Maximum positive integer used in PNG is (2^31)-1 */
#define PNG_UINT_31_MAX ((png_uint_32)0x7fffffffL)
#define PNG_UINT_32_MAX ((png_uint_32)(-1))
#define PNG_SIZE_MAX ((png_size_t)(-1))

/* These are constants for fixed point values encoded in the
 * PNG specification manner (x100000)
 */
#define PNG_FP_1    100000
#define PNG_FP_HALF  50000
#define PNG_FP_MAX  ((png_fixed_point)0x7fffffffL)
#define PNG_FP_MIN  (-PNG_FP_MAX)

/* These describe the color_type field in png_info. */
/* color type masks */
#define PNG_COLOR_MASK_PALETTE    1
#define PNG_COLOR_MASK_COLOR      2
#define PNG_COLOR_MASK_ALPHA      4

/* color types.  Note that not all combinations are legal */
#define PNG_COLOR_TYPE_GRAY 0
#define PNG_COLOR_TYPE_PALETTE  (PNG_COLOR_MASK_COLOR | PNG_COLOR_MASK_PALETTE)
#define PNG_COLOR_TYPE_RGB      (PNG_COLOR_MASK_COLOR)
#define PNG_COLOR_TYPE_RGB_ALPHA (PNG_COLOR_MASK_COLOR | PNG_COLOR_MASK_ALPHA)
#define PNG_COLOR_TYPE_GRAY_ALPHA (PNG_COLOR_MASK_ALPHA)
/* aliases */
#define PNG_COLOR_TYPE_RGBA  PNG_COLOR_TYPE_RGB_ALPHA
#define PNG_COLOR_TYPE_GA  PNG_COLOR_TYPE_GRAY_ALPHA

/* This is for compression type. PNG 1.0-1.2 only define the single type. */
#define PNG_COMPRESSION_TYPE_BASE 0 /* Deflate method 8, 32K window */
#define PNG_COMPRESSION_TYPE_DEFAULT PNG_COMPRESSION_TYPE_BASE

/* This is for filter type. PNG 1.0-1.2 only define the single type. */
#define PNG_FILTER_TYPE_BASE      0 /* Single row per-byte filtering */
#define PNG_INTRAPIXEL_DIFFERENCING 64 /* Used only in MNG datastreams */
#define PNG_FILTER_TYPE_DEFAULT   PNG_FILTER_TYPE_BASE

/* These are for the interlacing type.  These values should NOT be changed. */
#define PNG_INTERLACE_NONE        0 /* Non-interlaced image */
#define PNG_INTERLACE_ADAM7       1 /* Adam7 interlacing */
```

```
#define PNG_INTERLACE_LAST      2 /* Not a valid value */


/* These are for the oFFs chunk.  These values should NOT be changed. */
#define PNG_OFFSET_PIXEL        0 /* Offset in pixels */
#define PNG_OFFSET_MICROMETER   1 /* Offset in micrometers (1/10^6 meter) */
#define PNG_OFFSET_LAST         2 /* Not a valid value */


/* These are for the pCAL chunk.  These values should NOT be changed. */
#define PNG_EQUATION_LINEAR     0 /* Linear transformation */
#define PNG_EQUATION_BASE_E     1 /* Exponential base e transform */
#define PNG_EQUATION_ARBITRARY  2 /* Arbitrary base exponential transform */
#define PNG_EQUATION_HYPERBOLIC 3 /* Hyperbolic sine transformation */
#define PNG_EQUATION_LAST       4 /* Not a valid value */


/* These are for the sCAL chunk.  These values should NOT be changed. */
#define PNG_SCALE_UNKNOWN       0 /* unknown unit (image scale) */
#define PNG_SCALE_METER         1 /* meters per pixel */
#define PNG_SCALE_RADIAN        2 /* radians per pixel */
#define PNG_SCALE_LAST          3 /* Not a valid value */


/* These are for the pHYs chunk.  These values should NOT be changed. */
#define PNG_RESOLUTION_UNKNOWN  0 /* pixels/unknown unit (aspect ratio) */
#define PNG_RESOLUTION_METER    1 /* pixels/meter */
#define PNG_RESOLUTION_LAST     2 /* Not a valid value */


/* These are for the sRGB chunk.  These values should NOT be changed. */
#define PNG_sRGB_INTENT_PERCEPTUAL 0
#define PNG_sRGB_INTENT_RELATIVE   1
#define PNG_sRGB_INTENT_SATURATION 2
#define PNG_sRGB_INTENT_ABSOLUTE   3
#define PNG_sRGB_INTENT_LAST       4 /* Not a valid value */


/* This is for text chunks */
#define PNG_KEYWORD_MAX_LENGTH   79


/* Maximum number of entries in PLTE/sPLT/tRNS arrays */
#define PNG_MAX_PALETTE_LENGTH   256


/* These determine if an ancillary chunk's data has been successfully read
 * from the PNG header, or if the application has filled in the corresponding
 * data in the info_struct to be written into the output file.  The values
 * of the PNG_INFO_<chunk> defines should NOT be changed.
 */
#define PNG_INFO_gAMA 0x0001
#define PNG_INFO_sBIT 0x0002
#define PNG_INFO_cHRM 0x0004
#define PNG_INFO_PLTE 0x0008
#define PNG_INFO_tRNS 0x0010
```

```
#define PNG_INFO_bKGD 0x0020
#define PNG_INFO_hIST 0x0040
#define PNG_INFO_pHYs 0x0080
#define PNG_INFO_oFFs 0x0100
#define PNG_INFO_tIME 0x0200
#define PNG_INFO_pCAL 0x0400
#define PNG_INFO_sRGB 0x0800   /* GR-P, 0.96a */
#define PNG_INFO_iCCP 0x1000   /* ESR, 1.0.6 */
#define PNG_INFO_sPLT 0x2000   /* ESR, 1.0.6 */
#define PNG_INFO_sCAL 0x4000   /* ESR, 1.0.6 */
#define PNG_INFO_IDAT 0x8000   /* ESR, 1.0.6 */


/* This is used for the transformation routines, as some of them
 * change these values for the row.  It also should enable using
 * the routines for other purposes.
 */
typedef struct png_row_info_struct
{
  png_uint_32 width;   /* width of row */
  png_size_t rowbytes; /* number of bytes in row */
  png_byte color_type; /* color type of row */
  png_byte bit_depth;  /* bit depth of row */
  png_byte channels;   /* number of channels (1, 2, 3, or 4) */
  png_byte pixel_depth; /* bits per pixel (depth * channels) */
} png_row_info;


typedef png_row_info * png_row_infop;
typedef png_row_info * * png_row_infopp;


/* These are the function types for the I/O functions and for the functions
 * that allow the user to override the default I/O functions with his or her
 * own.  The png_error_ptr type should match that of user-supplied warning
 * and error functions, while the png_rw_ptr type should match that of the
 * user read/write data functions.  Note that the 'write' function must not
 * modify the buffer it is passed. The 'read' function, on the other hand, is
 * expected to return the read data in the buffer.
 */
typedef PNG_CALLBACK(void, *png_error_ptr, (png_structp, png_const_charp));
typedef PNG_CALLBACK(void, *png_rw_ptr, (png_structp, png_bytep, png_size_t));
typedef PNG_CALLBACK(void, *png_flush_ptr, (png_structp));
typedef PNG_CALLBACK(void, *png_read_status_ptr, (png_structp, png_uint_32,
   int));
typedef PNG_CALLBACK(void, *png_write_status_ptr, (png_structp, png_uint_32,
   int));


#ifdef PNG_PROGRESSIVE_READ_SUPPORTED
typedef PNG_CALLBACK(void, *png_progressive_info_ptr, (png_structp, png_infop));
typedef PNG_CALLBACK(void, *png_progressive_end_ptr, (png_structp, png_infop));
```

```
/* The following callback receives png_uint_32 row_number, int pass for the
 * png_bytep data of the row.  When transforming an interlaced image the
 * row number is the row number within the sub-image of the interlace pass, so
 * the value will increase to the height of the sub-image (not the full image)
 * then reset to 0 for the next pass.
 *
 * Use PNG_ROW_FROM_PASS_ROW(row, pass) and PNG_COL_FROM_PASS_COL(col, pass) to
 * find the output pixel (x,y) given an interlaced sub-image pixel
 * (row,col,pass).  (See below for these macros.)
 */
typedef PNG_CALLBACK(void, *png_progressive_row_ptr, (png_structp, png_bytep,
   png_uint_32, int));
#endif

#if defined(PNG_READ_USER_TRANSFORM_SUPPORTED) || \
   defined(PNG_WRITE_USER_TRANSFORM_SUPPORTED)
typedef PNG_CALLBACK(void, *png_user_transform_ptr, (png_structp, png_row_infop,
   png_bytep));
#endif

#ifdef PNG_USER_CHUNKS_SUPPORTED
typedef PNG_CALLBACK(int, *png_user_chunk_ptr, (png_structp,
   png_unknown_chunkp));
#endif
#ifdef PNG_UNKNOWN_CHUNKS_SUPPORTED
/* not used anywhere */
/* typedef PNG_CALLBACK(void, *png_unknown_chunk_ptr, (png_structp)); */
#endif

#ifdef PNG_SETJMP_SUPPORTED
/* This must match the function definition in <setjmp.h>, and the application
 * must include this before png.h to obtain the definition of jmp_buf.  The
 * function is required to be PNG_NORETURN, but this is not checked.  If the
 * function does return the application will crash via an abort() or similar
 * system level call.
 *
 * If you get a warning here while building the library you may need to make
 * changes to ensure that pnglibconf.h records the calling convention used by
 * your compiler.  This may be very difficult - try using a different compiler
 * to build the library!
 */
PNG_FUNCTION(void, (PNGCAPI *png_longjmp_ptr), PNGARG((jmp_buf, int)), typedef);
#endif

/* Transform masks for the high-level interface */
#define PNG_TRANSFORM_IDENTITY      0x0000   /* read and write */
#define PNG_TRANSFORM_STRIP_16      0x0001   /* read only */
```

```
#define PNG_TRANSFORM_STRIP_ALPHA   0x0002    /* read only */
#define PNG_TRANSFORM_PACKING       0x0004    /* read and write */
#define PNG_TRANSFORM_PACKSWAP      0x0008    /* read and write */
#define PNG_TRANSFORM_EXPAND        0x0010    /* read only */
#define PNG_TRANSFORM_INVERT_MONO   0x0020    /* read and write */
#define PNG_TRANSFORM_SHIFT         0x0040    /* read and write */
#define PNG_TRANSFORM_BGR           0x0080    /* read and write */
#define PNG_TRANSFORM_SWAP_ALPHA    0x0100    /* read and write */
#define PNG_TRANSFORM_SWAP_ENDIAN   0x0200    /* read and write */
#define PNG_TRANSFORM_INVERT_ALPHA  0x0400    /* read and write */
#define PNG_TRANSFORM_STRIP_FILLER  0x0800    /* write only */
/* Added to libpng-1.2.34 */
#define PNG_TRANSFORM_STRIP_FILLER_BEFORE PNG_TRANSFORM_STRIP_FILLER
#define PNG_TRANSFORM_STRIP_FILLER_AFTER 0x1000 /* write only */
/* Added to libpng-1.4.0 */
#define PNG_TRANSFORM_GRAY_TO_RGB   0x2000     /* read only */
/* Added to libpng-1.5.4 */
#define PNG_TRANSFORM_EXPAND_16     0x4000     /* read only */
#define PNG_TRANSFORM_SCALE_16      0x8000     /* read only */


/* Flags for MNG supported features */
#define PNG_FLAG_MNG_EMPTY_PLTE     0x01
#define PNG_FLAG_MNG_FILTER_64      0x04
#define PNG_ALL_MNG_FEATURES        0x05


/* NOTE: prior to 1.5 these functions had no 'API' style declaration,
 * this allowed the zlib default functions to be used on Windows
 * platforms.  In 1.5 the zlib default malloc (which just calls malloc and
 * ignores the first argument) should be completely compatible with the
 * following.
 */
typedef PNG_CALLBACK(png_voidp, *png_malloc_ptr, (png_structp,
   png_alloc_size_t));
typedef PNG_CALLBACK(void, *png_free_ptr, (png_structp, png_voidp));


/* Section 3: exported functions
 * Here are the function definitions most commonly used.  This is not
 * the place to find out how to use libpng.  See libpng-manual.txt for the
 * full explanation, see example.c for the summary.  This just provides
 * a simple one line description of the use of each function.
 *
 * The PNG_EXPORT() and PNG_EXPORTA() macros used below are defined in
 * pngconf.h and in the *.dfn files in the scripts directory.
 *
 *   PNG_EXPORT(ordinal, type, name, (args));
 *
 *     ordinal:    ordinal that is used while building
 *                 *.def files. The ordinal value is only
```

```
 *            relevant when preprocessing png.h with
 *            the *.dfn files for building symbol table
 *            entries, and are removed by pngconf.h.
 * type:      return type of the function
 * name:      function name
 * args:      function arguments, with types
 *
 * When we wish to append attributes to a function prototype we use
 * the PNG_EXPORTA() macro instead.
 *
 *   PNG_EXPORTA(ordinal, type, name, (args), attributes);
 *
 *     ordinal, type, name, and args: same as in PNG_EXPORT().
 *     attributes: function attributes
 */


/* Returns the version number of the library */
PNG_EXPORT(1, png_uint_32, png_access_version_number, (void));

/* Tell lib we have already handled the first <num_bytes> magic bytes.
 * Handling more than 8 bytes from the beginning of the file is an error.
 */
PNG_EXPORT(2, void, png_set_sig_bytes, (png_structrp png_ptr, int num_bytes));

/* Check sig[start] through sig[start + num_to_check - 1] to see if it's a
 * PNG file.  Returns zero if the supplied bytes match the 8-byte PNG
 * signature, and non-zero otherwise.  Having num_to_check == 0 or
 * start > 7 will always fail (ie return non-zero).
 */
PNG_EXPORT(3, int, png_sig_cmp, (png_const_bytep sig, png_size_t start,
    png_size_t num_to_check));

/* Simple signature checking function.  This is the same as calling
 * png_check_sig(sig, n) := !png_sig_cmp(sig, 0, n).
 */
#define png_check_sig(sig, n) !png_sig_cmp((sig), 0, (n))

/* Allocate and initialize png_ptr struct for reading, and any other memory. */
PNG_EXPORTA(4, png_structp, png_create_read_struct,
    (png_const_charp user_png_ver, png_voidp error_ptr,
    png_error_ptr error_fn, png_error_ptr warn_fn),
    PNG_ALLOCATED);

/* Allocate and initialize png_ptr struct for writing, and any other memory */
PNG_EXPORTA(5, png_structp, png_create_write_struct,
    (png_const_charp user_png_ver, png_voidp error_ptr, png_error_ptr error_fn,
    png_error_ptr warn_fn),
    PNG_ALLOCATED);
```

```
PNG_EXPORT(6, png_size_t, png_get_compression_buffer_size,
   (png_const_structrp png_ptr));

PNG_EXPORT(7, void, png_set_compression_buffer_size, (png_structrp png_ptr,
   png_size_t size));

/* Moved from pngconf.h in 1.4.0 and modified to ensure setjmp/longjmp
 * match up.
 */
#ifdef PNG_SETJMP_SUPPORTED
/* This function returns the jmp_buf built in to *png_ptr.  It must be
 * supplied with an appropriate 'longjmp' function to use on that jmp_buf
 * unless the default error function is overridden in which case NULL is
 * acceptable.  The size of the jmp_buf is checked against the actual size
 * allocated by the library - the call will return NULL on a mismatch
 * indicating an ABI mismatch.
 */
PNG_EXPORT(8, jmp_buf*, png_set_longjmp_fn, (png_structrp png_ptr,
   png_longjmp_ptr longjmp_fn, size_t jmp_buf_size));
#  define png_jmpbuf(png_ptr) \
     (*png_set_longjmp_fn((png_ptr), longjmp, (sizeof (jmp_buf))))
#else
#  define png_jmpbuf(png_ptr) \
     (LIBPNG_WAS_COMPILED_WITH__PNG_NO_SETJMP)
#endif
/* This function should be used by libpng applications in place of
 * longjmp(png_ptr->jmpbuf, val).  If longjmp_fn() has been set, it
 * will use it; otherwise it will call PNG_ABORT().  This function was
 * added in libpng-1.5.0.
 */
PNG_EXPORTA(9, void, png_longjmp, (png_const_structrp png_ptr, int val),
   PNG_NORETURN);

#ifdef PNG_READ_SUPPORTED
/* Reset the compression stream */
PNG_EXPORTA(10, int, png_reset_zstream, (png_structrp png_ptr), PNG_DEPRECATED);
#endif

/* New functions added in libpng-1.0.2 (not enabled by default until 1.2.0) */
#ifdef PNG_USER_MEM_SUPPORTED
PNG_EXPORTA(11, png_structp, png_create_read_struct_2,
   (png_const_charp user_png_ver, png_voidp error_ptr, png_error_ptr error_fn,
   png_error_ptr warn_fn,
   png_voidp mem_ptr, png_malloc_ptr malloc_fn, png_free_ptr free_fn),
   PNG_ALLOCATED);
PNG_EXPORTA(12, png_structp, png_create_write_struct_2,
   (png_const_charp user_png_ver, png_voidp error_ptr, png_error_ptr error_fn,
```

```
     png_error_ptr warn_fn,
     png_voidp mem_ptr, png_malloc_ptr malloc_fn, png_free_ptr free_fn),
     PNG_ALLOCATED);
#endif

/* Write the PNG file signature. */
PNG_EXPORT(13, void, png_write_sig, (png_structrp png_ptr));

/* Write a PNG chunk - size, type, (optional) data, CRC. */
PNG_EXPORT(14, void, png_write_chunk, (png_structrp png_ptr, png_const_bytep
   chunk_name, png_const_bytep data, png_size_t length));

/* Write the start of a PNG chunk - length and chunk name. */
PNG_EXPORT(15, void, png_write_chunk_start, (png_structrp png_ptr,
   png_const_bytep chunk_name, png_uint_32 length));

/* Write the data of a PNG chunk started with png_write_chunk_start(). */
PNG_EXPORT(16, void, png_write_chunk_data, (png_structrp png_ptr,
   png_const_bytep data, png_size_t length));

/* Finish a chunk started with png_write_chunk_start() (includes CRC). */
PNG_EXPORT(17, void, png_write_chunk_end, (png_structrp png_ptr));

/* Allocate and initialize the info structure */
PNG_EXPORTA(18, png_infop, png_create_info_struct, (png_const_structrp png_ptr),
   PNG_ALLOCATED);

/* DEPRECATED: this function allowed init structures to be created using the
 * default allocation method (typically malloc).  Use is deprecated in 1.6.0 and
 * the API will be removed in the future.
 */
PNG_EXPORTA(19, void, png_info_init_3, (png_infopp info_ptr,
   png_size_t png_info_struct_size), PNG_DEPRECATED);

/* Writes all the PNG information before the image. */
PNG_EXPORT(20, void, png_write_info_before_PLTE,
   (png_structrp png_ptr, png_const_inforp info_ptr));
PNG_EXPORT(21, void, png_write_info,
   (png_structrp png_ptr, png_const_inforp info_ptr));

#ifdef PNG_SEQUENTIAL_READ_SUPPORTED
/* Read the information before the actual image data. */
PNG_EXPORT(22, void, png_read_info,
   (png_structrp png_ptr, png_inforp info_ptr));
#endif

#ifdef PNG_TIME_RFC1123_SUPPORTED
  /* Convert to a US string format: there is no localization support in this
```

```
     * routine.  The original implementation used a 29 character buffer in
     * png_struct, this will be removed in future versions.
     */
#if PNG_LIBPNG_VER < 10700
/* To do: remove this from libpng17 (and from libpng17/png.c and pngstruct.h) */
PNG_EXPORTA(23, png_const_charp, png_convert_to_rfc1123, (png_structrp png_ptr,
   png_const_timep ptime),PNG_DEPRECATED);
#endif
PNG_EXPORT(241, int, png_convert_to_rfc1123_buffer, (char out[29],
   png_const_timep ptime));
#endif

#ifdef PNG_CONVERT_tIME_SUPPORTED
/* Convert from a struct tm to png_time */
PNG_EXPORT(24, void, png_convert_from_struct_tm, (png_timep ptime,
   const struct tm * ttime));

/* Convert from time_t to png_time.  Uses gmtime() */
PNG_EXPORT(25, void, png_convert_from_time_t, (png_timep ptime, time_t ttime));
#endif /* PNG_CONVERT_tIME_SUPPORTED */

#ifdef PNG_READ_EXPAND_SUPPORTED
/* Expand data to 24-bit RGB, or 8-bit grayscale, with alpha if available. */
PNG_EXPORT(26, void, png_set_expand, (png_structrp png_ptr));
PNG_EXPORT(27, void, png_set_expand_gray_1_2_4_to_8, (png_structrp png_ptr));
PNG_EXPORT(28, void, png_set_palette_to_rgb, (png_structrp png_ptr));
PNG_EXPORT(29, void, png_set_tRNS_to_alpha, (png_structrp png_ptr));
#endif

#ifdef PNG_READ_EXPAND_16_SUPPORTED
/* Expand to 16-bit channels, forces conversion of palette to RGB and expansion
 * of a tRNS chunk if present.
 */
PNG_EXPORT(221, void, png_set_expand_16, (png_structrp png_ptr));
#endif

#if defined(PNG_READ_BGR_SUPPORTED) || defined(PNG_WRITE_BGR_SUPPORTED)
/* Use blue, green, red order for pixels. */
PNG_EXPORT(30, void, png_set_bgr, (png_structrp png_ptr));
#endif

#ifdef PNG_READ_GRAY_TO_RGB_SUPPORTED
/* Expand the grayscale to 24-bit RGB if necessary. */
PNG_EXPORT(31, void, png_set_gray_to_rgb, (png_structrp png_ptr));
#endif

#ifdef PNG_READ_RGB_TO_GRAY_SUPPORTED
/* Reduce RGB to grayscale. */
```

```
#define PNG_ERROR_ACTION_NONE  1
#define PNG_ERROR_ACTION_WARN  2
#define PNG_ERROR_ACTION_ERROR 3
#define PNG_RGB_TO_GRAY_DEFAULT (-1)/*for red/green coefficients*/

PNG_FP_EXPORT(32, void, png_set_rgb_to_gray, (png_structrp png_ptr,
   int error_action, double red, double green))
PNG_FIXED_EXPORT(33, void, png_set_rgb_to_gray_fixed, (png_structrp png_ptr,
   int error_action, png_fixed_point red, png_fixed_point green))

PNG_EXPORT(34, png_byte, png_get_rgb_to_gray_status, (png_const_structrp
   png_ptr));
#endif

#ifdef PNG_BUILD_GRAYSCALE_PALETTE_SUPPORTED
PNG_EXPORT(35, void, png_build_grayscale_palette, (int bit_depth,
   png_colorp palette));
#endif

#ifdef PNG_READ_ALPHA_MODE_SUPPORTED
/* How the alpha channel is interpreted - this affects how the color channels
 * of a PNG file are returned to the calling application when an alpha channel,
 * or a tRNS chunk in a palette file, is present.
 *
 * This has no effect on the way pixels are written into a PNG output
 * datastream. The color samples in a PNG datastream are never premultiplied
 * with the alpha samples.
 *
 * The default is to return data according to the PNG specification: the alpha
 * channel is a linear measure of the contribution of the pixel to the
 * corresponding composited pixel, and the color channels are unassociated
 * (not premultiplied).  The gamma encoded color channels must be scaled
 * according to the contribution and to do this it is necessary to undo
 * the encoding, scale the color values, perform the composition and reencode
 * the values.  This is the 'PNG' mode.
 *
 * The alternative is to 'associate' the alpha with the color information by
 * storing color channel values that have been scaled by the alpha.
 * image.  These are the 'STANDARD', 'ASSOCIATED' or 'PREMULTIPLIED' modes
 * (the latter being the two common names for associated alpha color channels).
 *
 * For the 'OPTIMIZED' mode, a pixel is treated as opaque only if the alpha
 * value is equal to the maximum value.
 *
 * The final choice is to gamma encode the alpha channel as well.  This is
 * broken because, in practice, no implementation that uses this choice
 * correctly undoes the encoding before handling alpha composition.  Use this
 * choice only if other serious errors in the software or hardware you use
```

* mandate it; the typical serious error is for dark halos to appear around
* opaque areas of the composited PNG image because of arithmetic overflow.
*
* The API function png_set_alpha_mode specifies which of these choices to use
* with an enumerated 'mode' value and the gamma of the required output:
*/
#define PNG_ALPHA_PNG   0 /* according to the PNG standard */
#define PNG_ALPHA_STANDARD   1 /* according to Porter/Duff */
#define PNG_ALPHA_ASSOCIATED   1 /* as above; this is the normal practice */
#define PNG_ALPHA_PREMULTIPLIED 1 /* as above */
#define PNG_ALPHA_OPTIMIZED   2 /* 'PNG' for opaque pixels, else 'STANDARD' */
#define PNG_ALPHA_BROKEN   3 /* the alpha channel is gamma encoded */

PNG_FP_EXPORT(227, void, png_set_alpha_mode, (png_structrp png_ptr, int mode,
   double output_gamma))
PNG_FIXED_EXPORT(228, void, png_set_alpha_mode_fixed, (png_structrp png_ptr,
   int mode, png_fixed_point output_gamma))
#endif

#if defined(PNG_GAMMA_SUPPORTED) || defined(PNG_READ_ALPHA_MODE_SUPPORTED)
/* The output_gamma value is a screen gamma in libpng terminology: it expresses
* how to decode the output values, not how they are encoded.
*/
#define PNG_DEFAULT_sRGB -1   /* sRGB gamma and color space */
#define PNG_GAMMA_MAC_18 -2   /* Old Mac '1.8' gamma and color space */
#define PNG_GAMMA_sRGB   220000   /* Television standards--matches sRGB gamma */
#define PNG_GAMMA_LINEAR PNG_FP_1 /* Linear */
#endif

/* The following are examples of calls to png_set_alpha_mode to achieve the
* required overall gamma correction and, where necessary, alpha
* premultiplication.
*
* png_set_alpha_mode(pp, PNG_ALPHA_PNG, PNG_DEFAULT_sRGB);
*   This is the default libpng handling of the alpha channel - it is not
*   pre-multiplied into the color components. In addition the call states
*   that the output is for a sRGB system and causes all PNG files without gAMA
*   chunks to be assumed to be encoded using sRGB.
*
* png_set_alpha_mode(pp, PNG_ALPHA_PNG, PNG_GAMMA_MAC);
*   In this case the output is assumed to be something like an sRGB conformant
*   display preceeded by a power-law lookup table of power 1.45. This is how
*   early Mac systems behaved.
*
* png_set_alpha_mode(pp, PNG_ALPHA_STANDARD, PNG_GAMMA_LINEAR);
*   This is the classic Jim Blinn approach and will work in academic
*   environments where everything is done by the book. It has the shortcoming
*   of assuming that input PNG data with no gamma information is linear - this

```
 *   is unlikely to be correct unless the PNG files where generated locally.
 *   Most of the time the output precision will be so low as to show
 *   significant banding in dark areas of the image.
 *
 * png_set_expand_16(pp);
 * png_set_alpha_mode(pp, PNG_ALPHA_STANDARD, PNG_DEFAULT_sRGB);
 *   This is a somewhat more realistic Jim Blinn inspired approach.  PNG files
 *   are assumed to have the sRGB encoding if not marked with a gamma value and
 *   the output is always 16 bits per component.  This permits accurate scaling
 *   and processing of the data.  If you know that your input PNG files were
 *   generated locally you might need to replace PNG_DEFAULT_sRGB with the
 *   correct value for your system.
 *
 * png_set_alpha_mode(pp, PNG_ALPHA_OPTIMIZED, PNG_DEFAULT_sRGB);
 *   If you just need to composite the PNG image onto an existing background
 *   and if you control the code that does this you can use the optimization
 *   setting.  In this case you just copy completely opaque pixels to the
 *   output.  For pixels that are not completely transparent (you just skip
 *   those) you do the composition math using png_composite or png_composite_16
 *   below then encode the resultant 8-bit or 16-bit values to match the output
 *   encoding.
 *
 * Other cases
 *   If neither the PNG nor the standard linear encoding work for you because
 *   of the software or hardware you use then you have a big problem.  The PNG
 *   case will probably result in halos around the image.  The linear encoding
 *   will probably result in a washed out, too bright, image (it's actually too
 *   contrasty.)  Try the ALPHA_OPTIMIZED mode above - this will probably
 *   substantially reduce the halos.  Alternatively try:
 *
 * png_set_alpha_mode(pp, PNG_ALPHA_BROKEN, PNG_DEFAULT_sRGB);
 *   This option will also reduce the halos, but there will be slight dark
 *   halos round the opaque parts of the image where the background is light.
 *   In the OPTIMIZED mode the halos will be light halos where the background
 *   is dark.  Take your pick - the halos are unavoidable unless you can get
 *   your hardware/software fixed!  (The OPTIMIZED approach is slightly
 *   faster.)
 *
 * When the default gamma of PNG files doesn't match the output gamma.
 *   If you have PNG files with no gamma information png_set_alpha_mode allows
 *   you to provide a default gamma, but it also sets the ouput gamma to the
 *   matching value.  If you know your PNG files have a gamma that doesn't
 *   match the output you can take advantage of the fact that
 *   png_set_alpha_mode always sets the output gamma but only sets the PNG
 *   default if it is not already set:
 *
 * png_set_alpha_mode(pp, PNG_ALPHA_PNG, PNG_DEFAULT_sRGB);
 * png_set_alpha_mode(pp, PNG_ALPHA_PNG, PNG_GAMMA_MAC);
```

```
 *    The first call sets both the default and the output gamma values, the
 *    second call overrides the output gamma without changing the default.  This
 *    is easier than achieving the same effect with png_set_gamma.  You must use
 *    PNG_ALPHA_PNG for the first call - internal checking in png_set_alpha will
 *    fire if more than one call to png_set_alpha_mode and png_set_background is
 *    made in the same read operation, however multiple calls with PNG_ALPHA_PNG
 *    are ignored.
 */

#ifdef PNG_READ_STRIP_ALPHA_SUPPORTED
PNG_EXPORT(36, void, png_set_strip_alpha, (png_structrp png_ptr));
#endif

#if defined(PNG_READ_SWAP_ALPHA_SUPPORTED) || \
   defined(PNG_WRITE_SWAP_ALPHA_SUPPORTED)
PNG_EXPORT(37, void, png_set_swap_alpha, (png_structrp png_ptr));
#endif

#if defined(PNG_READ_INVERT_ALPHA_SUPPORTED) || \
   defined(PNG_WRITE_INVERT_ALPHA_SUPPORTED)
PNG_EXPORT(38, void, png_set_invert_alpha, (png_structrp png_ptr));
#endif

#if defined(PNG_READ_FILLER_SUPPORTED) || defined(PNG_WRITE_FILLER_SUPPORTED)
/* Add a filler byte to 8-bit Gray or 24-bit RGB images. */
PNG_EXPORT(39, void, png_set_filler, (png_structrp png_ptr, png_uint_32 filler,
   int flags));
/* The values of the PNG_FILLER_ defines should NOT be changed */
#  define PNG_FILLER_BEFORE 0
#  define PNG_FILLER_AFTER 1
/* Add an alpha byte to 8-bit Gray or 24-bit RGB images. */
PNG_EXPORT(40, void, png_set_add_alpha, (png_structrp png_ptr,
   png_uint_32 filler, int flags));
#endif /* PNG_READ_FILLER_SUPPORTED || PNG_WRITE_FILLER_SUPPORTED */

#if defined(PNG_READ_SWAP_SUPPORTED) || defined(PNG_WRITE_SWAP_SUPPORTED)
/* Swap bytes in 16-bit depth files. */
PNG_EXPORT(41, void, png_set_swap, (png_structrp png_ptr));
#endif

#if defined(PNG_READ_PACK_SUPPORTED) || defined(PNG_WRITE_PACK_SUPPORTED)
/* Use 1 byte per pixel in 1, 2, or 4-bit depth files. */
PNG_EXPORT(42, void, png_set_packing, (png_structrp png_ptr));
#endif

#if defined(PNG_READ_PACKSWAP_SUPPORTED) || \
   defined(PNG_WRITE_PACKSWAP_SUPPORTED)
/* Swap packing order of pixels in bytes. */
```

```
PNG_EXPORT(43, void, png_set_packswap, (png_structrp png_ptr));
#endif

#if defined(PNG_READ_SHIFT_SUPPORTED) || defined(PNG_WRITE_SHIFT_SUPPORTED)
/* Converts files to legal bit depths. */
PNG_EXPORT(44, void, png_set_shift, (png_structrp png_ptr, png_const_color_8p
   true_bits));
#endif

#if defined(PNG_READ_INTERLACING_SUPPORTED) || \
   defined(PNG_WRITE_INTERLACING_SUPPORTED)
/* Have the code handle the interlacing.  Returns the number of passes.
 * MUST be called before png_read_update_info or png_start_read_image,
 * otherwise it will not have the desired effect.  Note that it is still
 * necessary to call png_read_row or png_read_rows png_get_image_height
 * times for each pass.
 */
PNG_EXPORT(45, int, png_set_interlace_handling, (png_structrp png_ptr));
#endif

#if defined(PNG_READ_INVERT_SUPPORTED) || defined(PNG_WRITE_INVERT_SUPPORTED)
/* Invert monochrome files */
PNG_EXPORT(46, void, png_set_invert_mono, (png_structrp png_ptr));
#endif

#ifdef PNG_READ_BACKGROUND_SUPPORTED
/* Handle alpha and tRNS by replacing with a background color.  Prior to
 * libpng-1.5.4 this API must not be called before the PNG file header has been
 * read.  Doing so will result in unexpected behavior and possible warnings or
 * errors if the PNG file contains a bKGD chunk.
 */
PNG_FP_EXPORT(47, void, png_set_background, (png_structrp png_ptr,
   png_const_color_16p background_color, int background_gamma_code,
   int need_expand, double background_gamma))
PNG_FIXED_EXPORT(215, void, png_set_background_fixed, (png_structrp png_ptr,
   png_const_color_16p background_color, int background_gamma_code,
   int need_expand, png_fixed_point background_gamma))
#endif
#ifdef PNG_READ_BACKGROUND_SUPPORTED
#  define PNG_BACKGROUND_GAMMA_UNKNOWN 0
#  define PNG_BACKGROUND_GAMMA_SCREEN  1
#  define PNG_BACKGROUND_GAMMA_FILE    2
#  define PNG_BACKGROUND_GAMMA_UNIQUE  3
#endif

#ifdef PNG_READ_SCALE_16_TO_8_SUPPORTED
/* Scale a 16-bit depth file down to 8-bit, accurately. */
PNG_EXPORT(229, void, png_set_scale_16, (png_structrp png_ptr));
```

#endif

#ifdef PNG_READ_STRIP_16_TO_8_SUPPORTED
#define PNG_READ_16_TO_8 SUPPORTED /* Name prior to 1.5.4 */
/* Strip the second byte of information from a 16-bit depth file. */
PNG_EXPORT(48, void, png_set_strip_16, (png_structrp png_ptr));
#endif

#ifdef PNG_READ_QUANTIZE_SUPPORTED
/* Turn on quantizing, and reduce the palette to the number of colors
 * available.
 */
PNG_EXPORT(49, void, png_set_quantize, (png_structrp png_ptr,
   png_colorp palette, int num_palette, int maximum_colors,
   png_const_uint_16p histogram, int full_quantize));
#endif

#ifdef PNG_READ_GAMMA_SUPPORTED
/* The threshold on gamma processing is configurable but hard-wired into the
 * library. The following is the floating point variant.
 */
#define PNG_GAMMA_THRESHOLD (PNG_GAMMA_THRESHOLD_FIXED*.00001)

/* Handle gamma correction. Screen_gamma=(display_exponent).
 * NOTE: this API simply sets the screen and file gamma values. It will
 * therefore override the value for gamma in a PNG file if it is called after
 * the file header has been read - use with care - call before reading the PNG
 * file for best results!
 *
 * These routines accept the same gamma values as png_set_alpha_mode (described
 * above). The PNG_GAMMA_ defines and PNG_DEFAULT_sRGB can be passed to either
 * API (floating point or fixed.) Notice, however, that the 'file_gamma' value
 * is the inverse of a 'screen gamma' value.
 */
PNG_FP_EXPORT(50, void, png_set_gamma, (png_structrp png_ptr,
   double screen_gamma, double override_file_gamma))
PNG_FIXED_EXPORT(208, void, png_set_gamma_fixed, (png_structrp png_ptr,
   png_fixed_point screen_gamma, png_fixed_point override_file_gamma))
#endif

#ifdef PNG_WRITE_FLUSH_SUPPORTED
/* Set how many lines between output flushes - 0 for no flushing */
PNG_EXPORT(51, void, png_set_flush, (png_structrp png_ptr, int nrows));
/* Flush the current PNG output buffer */
PNG_EXPORT(52, void, png_write_flush, (png_structrp png_ptr));
#endif

/* Optional update palette with requested transformations */

```
PNG_EXPORT(53, void, png_start_read_image, (png_structrp png_ptr));

/* Optional call to update the users info structure */
PNG_EXPORT(54, void, png_read_update_info, (png_structrp png_ptr,
   png_inforp info_ptr));

#ifdef PNG_SEQUENTIAL_READ_SUPPORTED
/* Read one or more rows of image data. */
PNG_EXPORT(55, void, png_read_rows, (png_structrp png_ptr, png_bytepp row,
   png_bytepp display_row, png_uint_32 num_rows));
#endif

#ifdef PNG_SEQUENTIAL_READ_SUPPORTED
/* Read a row of data. */
PNG_EXPORT(56, void, png_read_row, (png_structrp png_ptr, png_bytep row,
   png_bytep display_row));
#endif

#ifdef PNG_SEQUENTIAL_READ_SUPPORTED
/* Read the whole image into memory at once. */
PNG_EXPORT(57, void, png_read_image, (png_structrp png_ptr, png_bytepp image));
#endif

/* Write a row of image data */
PNG_EXPORT(58, void, png_write_row, (png_structrp png_ptr,
   png_const_bytep row));

/* Write a few rows of image data: (*row) is not written; however, the type
 * is declared as writeable to maintain compatibility with previous versions
 * of libpng and to allow the 'display_row' array from read_rows to be passed
 * unchanged to write_rows.
 */
PNG_EXPORT(59, void, png_write_rows, (png_structrp png_ptr, png_bytepp row,
   png_uint_32 num_rows));

/* Write the image data */
PNG_EXPORT(60, void, png_write_image, (png_structrp png_ptr, png_bytepp image));

/* Write the end of the PNG file. */
PNG_EXPORT(61, void, png_write_end, (png_structrp png_ptr,
   png_inforp info_ptr));

#ifdef PNG_SEQUENTIAL_READ_SUPPORTED
/* Read the end of the PNG file. */
PNG_EXPORT(62, void, png_read_end, (png_structrp png_ptr, png_inforp info_ptr));
#endif

/* Free any memory associated with the png_info_struct */
```

```
PNG_EXPORT(63, void, png_destroy_info_struct, (png_const_structrp png_ptr,
   png_infopp info_ptr_ptr));

/* Free any memory associated with the png_struct and the png_info_structs */
PNG_EXPORT(64, void, png_destroy_read_struct, (png_structpp png_ptr_ptr,
   png_infopp info_ptr_ptr, png_infopp end_info_ptr_ptr));

/* Free any memory associated with the png_struct and the png_info_structs */
PNG_EXPORT(65, void, png_destroy_write_struct, (png_structpp png_ptr_ptr,
   png_infopp info_ptr_ptr));

/* Set the libpng method of handling chunk CRC errors */
PNG_EXPORT(66, void, png_set_crc_action, (png_structrp png_ptr, int crit_action,
   int ancil_action));

/* Values for png_set_crc_action() say how to handle CRC errors in
 * ancillary and critical chunks, and whether to use the data contained
 * therein.  Note that it is impossible to "discard" data in a critical
 * chunk.  For versions prior to 0.90, the action was always error/quit,
 * whereas in version 0.90 and later, the action for CRC errors in ancillary
 * chunks is warn/discard.  These values should NOT be changed.
 *
 *      value                   action:critical     action:ancillary
 */
#define PNG_CRC_DEFAULT       0  /* error/quit        warn/discard data */
#define PNG_CRC_ERROR_QUIT    1  /* error/quit        error/quit        */
#define PNG_CRC_WARN_DISCARD  2  /* (INVALID)         warn/discard data */
#define PNG_CRC_WARN_USE      3  /* warn/use data     warn/use data     */
#define PNG_CRC_QUIET_USE     4  /* quiet/use data    quiet/use data    */
#define PNG_CRC_NO_CHANGE     5  /* use current value use current value */

/* These functions give the user control over the scan-line filtering in
 * libpng and the compression methods used by zlib.  These functions are
 * mainly useful for testing, as the defaults should work with most users.
 * Those users who are tight on memory or want faster performance at the
 * expense of compression can modify them.  See the compression library
 * header file (zlib.h) for an explination of the compression functions.
 */

/* Set the filtering method(s) used by libpng.  Currently, the only valid
 * value for "method" is 0.
 */
PNG_EXPORT(67, void, png_set_filter, (png_structrp png_ptr, int method,
   int filters));

/* Flags for png_set_filter() to say which filters to use.  The flags
 * are chosen so that they don't conflict with real filter types
 * below, in case they are supplied instead of the #defined constants.
```

```
* These values should NOT be changed.
*/
#define PNG_NO_FILTERS     0x00
#define PNG_FILTER_NONE    0x08
#define PNG_FILTER_SUB     0x10
#define PNG_FILTER_UP      0x20
#define PNG_FILTER_AVG     0x40
#define PNG_FILTER_PAETH   0x80
#define PNG_ALL_FILTERS (PNG_FILTER_NONE | PNG_FILTER_SUB | PNG_FILTER_UP | \
                 PNG_FILTER_AVG | PNG_FILTER_PAETH)


/* Filter values (not flags) - used in pngwrite.c, pngwutil.c for now.
 * These defines should NOT be changed.
 */
#define PNG_FILTER_VALUE_NONE  0
#define PNG_FILTER_VALUE_SUB   1
#define PNG_FILTER_VALUE_UP    2
#define PNG_FILTER_VALUE_AVG   3
#define PNG_FILTER_VALUE_PAETH 4
#define PNG_FILTER_VALUE_LAST  5


#ifdef PNG_WRITE_WEIGHTED_FILTER_SUPPORTED /* EXPERIMENTAL */
/* The "heuristic_method" is given by one of the PNG_FILTER_HEURISTIC_
 * defines, either the default (minimum-sum-of-absolute-differences), or
 * the experimental method (weighted-minimum-sum-of-absolute-differences).
 *
 * Weights are factors >= 1.0, indicating how important it is to keep the
 * filter type consistent between rows.  Larger numbers mean the current
 * filter is that many times as likely to be the same as the "num_weights"
 * previous filters.  This is cumulative for each previous row with a weight.
 * There needs to be "num_weights" values in "filter_weights", or it can be
 * NULL if the weights aren't being specified.  Weights have no influence on
 * the selection of the first row filter.  Well chosen weights can (in theory)
 * improve the compression for a given image.
 *
 * Costs are factors >= 1.0 indicating the relative decoding costs of a
 * filter type.  Higher costs indicate more decoding expense, and are
 * therefore less likely to be selected over a filter with lower computational
 * costs.  There needs to be a value in "filter_costs" for each valid filter
 * type (given by PNG_FILTER_VALUE_LAST), or it can be NULL if you aren't
 * setting the costs.  Costs try to improve the speed of decompression without
 * unduly increasing the compressed image size.
 *
 * A negative weight or cost indicates the default value is to be used, and
 * values in the range [0.0, 1.0) indicate the value is to remain unchanged.
 * The default values for both weights and costs are currently 1.0, but may
 * change if good general weighting/cost heuristics can be found.  If both
 * the weights and costs are set to 1.0, this degenerates the WEIGHTED method
```

```
 * to the UNWEIGHTED method, but with added encoding time/computation.
 */
PNG_FP_EXPORT(68, void, png_set_filter_heuristics, (png_structrp png_ptr,
   int heuristic_method, int num_weights, png_const_doublep filter_weights,
   png_const_doublep filter_costs))
PNG_FIXED_EXPORT(209, void, png_set_filter_heuristics_fixed,
   (png_structrp png_ptr, int heuristic_method, int num_weights,
   png_const_fixed_point_p filter_weights,
   png_const_fixed_point_p filter_costs))
#endif /*  PNG_WRITE_WEIGHTED_FILTER_SUPPORTED */

/* Heuristic used for row filter selection.  These defines should NOT be
 * changed.
 */
#define PNG_FILTER_HEURISTIC_DEFAULT    0  /* Currently "UNWEIGHTED" */
#define PNG_FILTER_HEURISTIC_UNWEIGHTED 1  /* Used by libpng < 0.95 */
#define PNG_FILTER_HEURISTIC_WEIGHTED   2  /* Experimental feature */
#define PNG_FILTER_HEURISTIC_LAST       3  /* Not a valid value */

#ifdef PNG_WRITE_SUPPORTED
/* Set the library compression level.  Currently, valid values range from
 * 0 - 9, corresponding directly to the zlib compression levels 0 - 9
 * (0 - no compression, 9 - "maximal" compression).  Note that tests have
 * shown that zlib compression levels 3-6 usually perform as well as level 9
 * for PNG images, and do considerably fewer caclulations.  In the future,
 * these values may not correspond directly to the zlib compression levels.
 */
PNG_EXPORT(69, void, png_set_compression_level, (png_structrp png_ptr,
   int level));

PNG_EXPORT(70, void, png_set_compression_mem_level, (png_structrp png_ptr,
   int mem_level));

PNG_EXPORT(71, void, png_set_compression_strategy, (png_structrp png_ptr,
   int strategy));

/* If PNG_WRITE_OPTIMIZE_CMF_SUPPORTED is defined, libpng will use a
 * smaller value of window_bits if it can do so safely.
 */
PNG_EXPORT(72, void, png_set_compression_window_bits, (png_structrp png_ptr,
   int window_bits));

PNG_EXPORT(73, void, png_set_compression_method, (png_structrp png_ptr,
   int method));
#endif

#ifdef PNG_WRITE_CUSTOMIZE_ZTXT_COMPRESSION_SUPPORTED
/* Also set zlib parameters for compressing non-IDAT chunks */
```

PNG_EXPORT(222, void, png_set_text_compression_level, (png_structrp png_ptr,
    int level));

PNG_EXPORT(223, void, png_set_text_compression_mem_level, (png_structrp png_ptr,
    int mem_level));

PNG_EXPORT(224, void, png_set_text_compression_strategy, (png_structrp png_ptr,
    int strategy));

/* If PNG_WRITE_OPTIMIZE_CMF_SUPPORTED is defined, libpng will use a
 * smaller value of window_bits if it can do so safely.
 */
PNG_EXPORT(225, void, png_set_text_compression_window_bits,
    (png_structrp png_ptr, int window_bits));

PNG_EXPORT(226, void, png_set_text_compression_method, (png_structrp png_ptr,
    int method));
#endif /* PNG_WRITE_CUSTOMIZE_ZTXT_COMPRESSION_SUPPORTED */

/* These next functions are called for input/output, memory, and error
 * handling. They are in the file pngrio.c, pngwio.c, and pngerror.c,
 * and call standard C I/O routines such as fread(), fwrite(), and
 * fprintf(). These functions can be made to use other I/O routines
 * at run time for those applications that need to handle I/O in a
 * different manner by calling png_set_???_fn(). See libpng-manual.txt for
 * more information.
 */

#ifdef PNG_STDIO_SUPPORTED
/* Initialize the input/output for the PNG file to the default functions. */
PNG_EXPORT(74, void, png_init_io, (png_structrp png_ptr, png_FILE_p fp));
#endif

/* Replace the (error and abort), and warning functions with user
 * supplied functions. If no messages are to be printed you must still
 * write and use replacement functions. The replacement error_fn should
 * still do a longjmp to the last setjmp location if you are using this
 * method of error handling. If error_fn or warning_fn is NULL, the
 * default function will be used.
 */

PNG_EXPORT(75, void, png_set_error_fn, (png_structrp png_ptr,
    png_voidp error_ptr, png_error_ptr error_fn, png_error_ptr warning_fn));

/* Return the user pointer associated with the error functions */
PNG_EXPORT(76, png_voidp, png_get_error_ptr, (png_const_structrp png_ptr));

/* Replace the default data output functions with a user supplied one(s).

```
 * If buffered output is not used, then output_flush_fn can be set to NULL.
 * If PNG_WRITE_FLUSH_SUPPORTED is not defined at libpng compile time
 * output_flush_fn will be ignored (and thus can be NULL).
 * It is probably a mistake to use NULL for output_flush_fn if
 * write_data_fn is not also NULL unless you have built libpng with
 * PNG_WRITE_FLUSH_SUPPORTED undefined, because in this case libpng's
 * default flush function, which uses the standard *FILE structure, will
 * be used.
 */
PNG_EXPORT(77, void, png_set_write_fn, (png_structrp png_ptr, png_voidp io_ptr,
    png_rw_ptr write_data_fn, png_flush_ptr output_flush_fn));

/* Replace the default data input function with a user supplied one. */
PNG_EXPORT(78, void, png_set_read_fn, (png_structrp png_ptr, png_voidp io_ptr,
    png_rw_ptr read_data_fn));

/* Return the user pointer associated with the I/O functions */
PNG_EXPORT(79, png_voidp, png_get_io_ptr, (png_const_structrp png_ptr));

PNG_EXPORT(80, void, png_set_read_status_fn, (png_structrp png_ptr,
    png_read_status_ptr read_row_fn));

PNG_EXPORT(81, void, png_set_write_status_fn, (png_structrp png_ptr,
    png_write_status_ptr write_row_fn));

#ifdef PNG_USER_MEM_SUPPORTED
/* Replace the default memory allocation functions with user supplied one(s). */
PNG_EXPORT(82, void, png_set_mem_fn, (png_structrp png_ptr, png_voidp mem_ptr,
    png_malloc_ptr malloc_fn, png_free_ptr free_fn));
/* Return the user pointer associated with the memory functions */
PNG_EXPORT(83, png_voidp, png_get_mem_ptr, (png_const_structrp png_ptr));
#endif

#ifdef PNG_READ_USER_TRANSFORM_SUPPORTED
PNG_EXPORT(84, void, png_set_read_user_transform_fn, (png_structrp png_ptr,
    png_user_transform_ptr read_user_transform_fn));
#endif

#ifdef PNG_WRITE_USER_TRANSFORM_SUPPORTED
PNG_EXPORT(85, void, png_set_write_user_transform_fn, (png_structrp png_ptr,
    png_user_transform_ptr write_user_transform_fn));
#endif

#ifdef PNG_USER_TRANSFORM_PTR_SUPPORTED
PNG_EXPORT(86, void, png_set_user_transform_info, (png_structrp png_ptr,
    png_voidp user_transform_ptr, int user_transform_depth,
    int user_transform_channels));
/* Return the user pointer associated with the user transform functions */
```

```
PNG_EXPORT(87, png_voidp, png_get_user_transform_ptr,
   (png_const_structrp png_ptr));
#endif

#ifdef PNG_USER_TRANSFORM_INFO_SUPPORTED
/* Return information about the row currently being processed.  Note that these
 * APIs do not fail but will return unexpected results if called outside a user
 * transform callback.  Also note that when transforming an interlaced image the
 * row number is the row number within the sub-image of the interlace pass, so
 * the value will increase to the height of the sub-image (not the full image)
 * then reset to 0 for the next pass.
 *
 * Use PNG_ROW_FROM_PASS_ROW(row, pass) and PNG_COL_FROM_PASS_COL(col, pass) to
 * find the output pixel (x,y) given an interlaced sub-image pixel
 * (row,col,pass).  (See below for these macros.)
 */
PNG_EXPORT(217, png_uint_32, png_get_current_row_number, (png_const_structrp));
PNG_EXPORT(218, png_byte, png_get_current_pass_number, (png_const_structrp));
#endif

#ifdef PNG_READ_USER_CHUNKS_SUPPORTED
/* This callback is called only for *unknown* chunks.  If
 * PNG_HANDLE_AS_UNKNOWN_SUPPORTED is set then it is possible to set known
 * chunks to be treated as unknown, however in this case the callback must do
 * any processing required by the chunk (e.g. by calling the appropriate
 * png_set_ APIs.)
 *
 * There is no write support - on write, by default, all the chunks in the
 * 'unknown' list are written in the specified position.
 *
 * The integer return from the callback function is interpreted thus:
 *
 * negative: An error occured, png_chunk_error will be called.
 *    zero: The chunk was not handled, the chunk will be saved. A critical
 *         chunk will cause an error at this point unless it is to be saved.
 * positive: The chunk was handled, libpng will ignore/discard it.
 *
 * See "INTERACTION WTIH USER CHUNK CALLBACKS" below for important notes about
 * how this behavior will change in libpng 1.7
 */
PNG_EXPORT(88, void, png_set_read_user_chunk_fn, (png_structrp png_ptr,
   png_voidp user_chunk_ptr, png_user_chunk_ptr read_user_chunk_fn));
#endif

#ifdef PNG_USER_CHUNKS_SUPPORTED
PNG_EXPORT(89, png_voidp, png_get_user_chunk_ptr, (png_const_structrp png_ptr));
#endif
```

```
#ifdef PNG_PROGRESSIVE_READ_SUPPORTED
/* Sets the function callbacks for the push reader, and a pointer to a
 * user-defined structure available to the callback functions.
 */
PNG_EXPORT(90, void, png_set_progressive_read_fn, (png_structrp png_ptr,
    png_voidp progressive_ptr, png_progressive_info_ptr info_fn,
    png_progressive_row_ptr row_fn, png_progressive_end_ptr end_fn));

/* Returns the user pointer associated with the push read functions */
PNG_EXPORT(91, png_voidp, png_get_progressive_ptr,
    (png_const_structrp png_ptr));

/* Function to be called when data becomes available */
PNG_EXPORT(92, void, png_process_data, (png_structrp png_ptr,
    png_inforp info_ptr, png_bytep buffer, png_size_t buffer_size));

/* A function which may be called *only* within png_process_data to stop the
 * processing of any more data.  The function returns the number of bytes
 * remaining, excluding any that libpng has cached internally.  A subsequent
 * call to png_process_data must supply these bytes again.  If the argument
 * 'save' is set to true the routine will first save all the pending data and
 * will always return 0.
 */
PNG_EXPORT(219, png_size_t, png_process_data_pause, (png_structrp, int save));

/* A function which may be called *only* outside (after) a call to
 * png_process_data.  It returns the number of bytes of data to skip in the
 * input.  Normally it will return 0, but if it returns a non-zero value the
 * application must skip than number of bytes of input data and pass the
 * following data to the next call to png_process_data.
 */
PNG_EXPORT(220, png_uint_32, png_process_data_skip, (png_structrp));

/* Function that combines rows.  'new_row' is a flag that should come from
 * the callback and be non-NULL if anything needs to be done; the library
 * stores its own version of the new data internally and ignores the passed
 * in value.
 */
PNG_EXPORT(93, void, png_progressive_combine_row, (png_const_structrp png_ptr,
    png_bytep old_row, png_const_bytep new_row));
#endif /* PNG_PROGRESSIVE_READ_SUPPORTED */

PNG_EXPORTA(94, png_voidp, png_malloc, (png_const_structrp png_ptr,
    png_alloc_size_t size), PNG_ALLOCATED);
/* Added at libpng version 1.4.0 */
PNG_EXPORTA(95, png_voidp, png_calloc, (png_const_structrp png_ptr,
    png_alloc_size_t size), PNG_ALLOCATED);
```

```c
/* Added at libpng version 1.2.4 */
PNG_EXPORTA(96, png_voidp, png_malloc_warn, (png_const_structrp png_ptr,
    png_alloc_size_t size), PNG_ALLOCATED);


/* Frees a pointer allocated by png_malloc() */
PNG_EXPORT(97, void, png_free, (png_const_structrp png_ptr, png_voidp ptr));


/* Free data that was allocated internally */
PNG_EXPORT(98, void, png_free_data, (png_const_structrp png_ptr,
    png_inforp info_ptr, png_uint_32 free_me, int num));


/* Reassign responsibility for freeing existing data, whether allocated
 * by libpng or by the application; this works on the png_info structure passed
 * in, it does not change the state for other png_info structures.
 *
 * It is unlikely that this function works correctly as of 1.6.0 and using it
 * may result either in memory leaks or double free of allocated data.
 */
PNG_EXPORT(99, void, png_data_freer, (png_const_structrp png_ptr,
    png_inforp info_ptr, int freer, png_uint_32 mask));


/* Assignments for png_data_freer */
#define PNG_DESTROY_WILL_FREE_DATA 1
#define PNG_SET_WILL_FREE_DATA 1
#define PNG_USER_WILL_FREE_DATA 2
/* Flags for png_ptr->free_me and info_ptr->free_me */
#define PNG_FREE_HIST 0x0008
#define PNG_FREE_ICCP 0x0010
#define PNG_FREE_SPLT 0x0020
#define PNG_FREE_ROWS 0x0040
#define PNG_FREE_PCAL 0x0080
#define PNG_FREE_SCAL 0x0100
#ifdef PNG_STORE_UNKNOWN_CHUNKS_SUPPORTED
#  define PNG_FREE_UNKN 0x0200
#endif
/*      PNG_FREE_LIST 0x0400    removed in 1.6.0 because it is ignored */
#define PNG_FREE_PLTE 0x1000
#define PNG_FREE_TRNS 0x2000
#define PNG_FREE_TEXT 0x4000
#define PNG_FREE_ALL  0x7fff
#define PNG_FREE_MUL  0x4220 /* PNG_FREE_SPLT|PNG_FREE_TEXT|PNG_FREE_UNKN */


#ifdef PNG_USER_MEM_SUPPORTED
PNG_EXPORTA(100, png_voidp, png_malloc_default, (png_const_structrp png_ptr,
    png_alloc_size_t size), PNG_ALLOCATED PNG_DEPRECATED);
PNG_EXPORTA(101, void, png_free_default, (png_const_structrp png_ptr,
    png_voidp ptr), PNG_DEPRECATED);
#endif
```

```
#ifdef PNG_ERROR_TEXT_SUPPORTED
/* Fatal error in PNG image of libpng - can't continue */
PNG_EXPORTA(102, void, png_error, (png_const_structrp png_ptr,
  png_const_charp error_message), PNG_NORETURN);

/* The same, but the chunk name is prepended to the error string. */
PNG_EXPORTA(103, void, png_chunk_error, (png_const_structrp png_ptr,
  png_const_charp error_message), PNG_NORETURN);

#else
/* Fatal error in PNG image of libpng - can't continue */
PNG_EXPORTA(104, void, png_err, (png_const_structrp png_ptr), PNG_NORETURN);
#  define png_error(s1,s2) png_err(s1)
#  define png_chunk_error(s1,s2) png_err(s1)
#endif

#ifdef PNG_WARNINGS_SUPPORTED
/* Non-fatal error in libpng.  Can continue, but may have a problem. */
PNG_EXPORT(105, void, png_warning, (png_const_structrp png_ptr,
  png_const_charp warning_message));

/* Non-fatal error in libpng, chunk name is prepended to message. */
PNG_EXPORT(106, void, png_chunk_warning, (png_const_structrp png_ptr,
  png_const_charp warning_message));
#else
#  define png_warning(s1,s2) ((void)(s1))
#  define png_chunk_warning(s1,s2) ((void)(s1))
#endif

#ifdef PNG_BENIGN_ERRORS_SUPPORTED
/* Benign error in libpng.  Can continue, but may have a problem.
* User can choose whether to handle as a fatal error or as a warning. */
PNG_EXPORT(107, void, png_benign_error, (png_const_structrp png_ptr,
  png_const_charp warning_message));

#ifdef PNG_READ_SUPPORTED
/* Same, chunk name is prepended to message (only during read) */
PNG_EXPORT(108, void, png_chunk_benign_error, (png_const_structrp png_ptr,
  png_const_charp warning_message));
#endif

PNG_EXPORT(109, void, png_set_benign_errors,
  (png_structrp png_ptr, int allowed));
#else
#  ifdef PNG_ALLOW_BENIGN_ERRORS
#    define png_benign_error png_warning
#    define png_chunk_benign_error png_chunk_warning
```

```
# else
#    define png_benign_error png_error
#    define png_chunk_benign_error png_chunk_error
# endif
#endif


/* The png_set_<chunk> functions are for storing values in the png_info_struct.
 * Similarly, the png_get_<chunk> calls are used to read values from the
 * png_info_struct, either storing the parameters in the passed variables, or
 * setting pointers into the png_info_struct where the data is stored.  The
 * png_get_<chunk> functions return a non-zero value if the data was available
 * in info_ptr, or return zero and do not change any of the parameters if the
 * data was not available.
 *
 * These functions should be used instead of directly accessing png_info
 * to avoid problems with future changes in the size and internal layout of
 * png_info_struct.
 */
/* Returns "flag" if chunk data is valid in info_ptr. */
PNG_EXPORT(110, png_uint_32, png_get_valid, (png_const_structrp png_ptr,
   png_const_inforp info_ptr, png_uint_32 flag));


/* Returns number of bytes needed to hold a transformed row. */
PNG_EXPORT(111, png_size_t, png_get_rowbytes, (png_const_structrp png_ptr,
   png_const_inforp info_ptr));


#ifdef PNG_INFO_IMAGE_SUPPORTED
/* Returns row_pointers, which is an array of pointers to scanlines that was
 * returned from png_read_png().
 */
PNG_EXPORT(112, png_bytepp, png_get_rows, (png_const_structrp png_ptr,
   png_const_inforp info_ptr));


/* Set row_pointers, which is an array of pointers to scanlines for use
 * by png_write_png().
 */
PNG_EXPORT(113, void, png_set_rows, (png_const_structrp png_ptr,
   png_inforp info_ptr, png_bytepp row_pointers));
#endif


/* Returns number of color channels in image. */
PNG_EXPORT(114, png_byte, png_get_channels, (png_const_structrp png_ptr,
   png_const_inforp info_ptr));


#ifdef PNG_EASY_ACCESS_SUPPORTED
/* Returns image width in pixels. */
PNG_EXPORT(115, png_uint_32, png_get_image_width, (png_const_structrp png_ptr,
   png_const_inforp info_ptr));
```

```
/* Returns image height in pixels. */
PNG_EXPORT(116, png_uint_32, png_get_image_height, (png_const_structrp png_ptr,
   png_const_inforp info_ptr));


/* Returns image bit_depth. */
PNG_EXPORT(117, png_byte, png_get_bit_depth, (png_const_structrp png_ptr,
   png_const_inforp info_ptr));


/* Returns image color_type. */
PNG_EXPORT(118, png_byte, png_get_color_type, (png_const_structrp png_ptr,
   png_const_inforp info_ptr));


/* Returns image filter_type. */
PNG_EXPORT(119, png_byte, png_get_filter_type, (png_const_structrp png_ptr,
   png_const_inforp info_ptr));


/* Returns image interlace_type. */
PNG_EXPORT(120, png_byte, png_get_interlace_type, (png_const_structrp png_ptr,
   png_const_inforp info_ptr));


/* Returns image compression_type. */
PNG_EXPORT(121, png_byte, png_get_compression_type, (png_const_structrp png_ptr,
   png_const_inforp info_ptr));


/* Returns image resolution in pixels per meter, from pHYs chunk data. */
PNG_EXPORT(122, png_uint_32, png_get_pixels_per_meter,
   (png_const_structrp png_ptr, png_const_inforp info_ptr));
PNG_EXPORT(123, png_uint_32, png_get_x_pixels_per_meter,
   (png_const_structrp png_ptr, png_const_inforp info_ptr));
PNG_EXPORT(124, png_uint_32, png_get_y_pixels_per_meter,
   (png_const_structrp png_ptr, png_const_inforp info_ptr));


/* Returns pixel aspect ratio, computed from pHYs chunk data.  */
PNG_FP_EXPORT(125, float, png_get_pixel_aspect_ratio,
   (png_const_structrp png_ptr, png_const_inforp info_ptr))
PNG_FIXED_EXPORT(210, png_fixed_point, png_get_pixel_aspect_ratio_fixed,
   (png_const_structrp png_ptr, png_const_inforp info_ptr))


/* Returns image x, y offset in pixels or microns, from oFFs chunk data. */
PNG_EXPORT(126, png_int_32, png_get_x_offset_pixels,
   (png_const_structrp png_ptr, png_const_inforp info_ptr));
PNG_EXPORT(127, png_int_32, png_get_y_offset_pixels,
   (png_const_structrp png_ptr, png_const_inforp info_ptr));
PNG_EXPORT(128, png_int_32, png_get_x_offset_microns,
   (png_const_structrp png_ptr, png_const_inforp info_ptr));
PNG_EXPORT(129, png_int_32, png_get_y_offset_microns,
   (png_const_structrp png_ptr, png_const_inforp info_ptr));
```

```
#endif /* PNG_EASY_ACCESS_SUPPORTED */

#ifdef PNG_READ_SUPPORTED
/* Returns pointer to signature string read from PNG header */
PNG_EXPORT(130, png_const_bytep, png_get_signature, (png_const_structrp png_ptr,
   png_const_inforp info_ptr));
#endif

#ifdef PNG_bKGD_SUPPORTED
PNG_EXPORT(131, png_uint_32, png_get_bKGD, (png_const_structrp png_ptr,
   png_inforp info_ptr, png_color_16p *background));
#endif

#ifdef PNG_bKGD_SUPPORTED
PNG_EXPORT(132, void, png_set_bKGD, (png_const_structrp png_ptr,
   png_inforp info_ptr, png_const_color_16p background));
#endif

#ifdef PNG_cHRM_SUPPORTED
PNG_FP_EXPORT(133, png_uint_32, png_get_cHRM, (png_const_structrp png_ptr,
   png_const_inforp info_ptr, double *white_x, double *white_y, double *red_x,
   double *red_y, double *green_x, double *green_y, double *blue_x,
   double *blue_y))
PNG_FP_EXPORT(230, png_uint_32, png_get_cHRM_XYZ, (png_const_structrp png_ptr,
   png_const_inforp info_ptr, double *red_X, double *red_Y, double *red_Z,
   double *green_X, double *green_Y, double *green_Z, double *blue_X,
   double *blue_Y, double *blue_Z))
PNG_FIXED_EXPORT(134, png_uint_32, png_get_cHRM_fixed,
   (png_const_structrp png_ptr, png_const_inforp info_ptr,
   png_fixed_point *int_white_x, png_fixed_point *int_white_y,
   png_fixed_point *int_red_x, png_fixed_point *int_red_y,
   png_fixed_point *int_green_x, png_fixed_point *int_green_y,
   png_fixed_point *int_blue_x, png_fixed_point *int_blue_y))
PNG_FIXED_EXPORT(231, png_uint_32, png_get_cHRM_XYZ_fixed,
   (png_const_structrp png_ptr, png_const_inforp info_ptr,
   png_fixed_point *int_red_X, png_fixed_point *int_red_Y,
   png_fixed_point *int_red_Z, png_fixed_point *int_green_X,
   png_fixed_point *int_green_Y, png_fixed_point *int_green_Z,
   png_fixed_point *int_blue_X, png_fixed_point *int_blue_Y,
   png_fixed_point *int_blue_Z))
#endif

#ifdef PNG_cHRM_SUPPORTED
PNG_FP_EXPORT(135, void, png_set_cHRM, (png_const_structrp png_ptr,
   png_inforp info_ptr,
   double white_x, double white_y, double red_x, double red_y, double green_x,
   double green_y, double blue_x, double blue_y))
```

```
PNG_FP_EXPORT(232, void, png_set_cHRM_XYZ, (png_const_structrp png_ptr,
    png_inforp info_ptr, double red_X, double red_Y, double red_Z,
    double green_X, double green_Y, double green_Z, double blue_X,
    double blue_Y, double blue_Z))
PNG_FIXED_EXPORT(136, void, png_set_cHRM_fixed, (png_const_structrp png_ptr,
    png_inforp info_ptr, png_fixed_point int_white_x,
    png_fixed_point int_white_y, png_fixed_point int_red_x,
    png_fixed_point int_red_y, png_fixed_point int_green_x,
    png_fixed_point int_green_y, png_fixed_point int_blue_x,
    png_fixed_point int_blue_y))
PNG_FIXED_EXPORT(233, void, png_set_cHRM_XYZ_fixed, (png_const_structrp png_ptr,
    png_inforp info_ptr, png_fixed_point int_red_X, png_fixed_point int_red_Y,
    png_fixed_point int_red_Z, png_fixed_point int_green_X,
    png_fixed_point int_green_Y, png_fixed_point int_green_Z,
    png_fixed_point int_blue_X, png_fixed_point int_blue_Y,
    png_fixed_point int_blue_Z))
#endif

#ifdef PNG_gAMA_SUPPORTED
PNG_FP_EXPORT(137, png_uint_32, png_get_gAMA, (png_const_structrp png_ptr,
    png_const_inforp info_ptr, double *file_gamma))
PNG_FIXED_EXPORT(138, png_uint_32, png_get_gAMA_fixed,
    (png_const_structrp png_ptr, png_const_inforp info_ptr,
    png_fixed_point *int_file_gamma))
#endif

#ifdef PNG_gAMA_SUPPORTED
PNG_FP_EXPORT(139, void, png_set_gAMA, (png_const_structrp png_ptr,
    png_inforp info_ptr, double file_gamma))
PNG_FIXED_EXPORT(140, void, png_set_gAMA_fixed, (png_const_structrp png_ptr,
    png_inforp info_ptr, png_fixed_point int_file_gamma))
#endif

#ifdef PNG_hIST_SUPPORTED
PNG_EXPORT(141, png_uint_32, png_get_hIST, (png_const_structrp png_ptr,
    png_inforp info_ptr, png_uint_16p *hist));
#endif

#ifdef PNG_hIST_SUPPORTED
PNG_EXPORT(142, void, png_set_hIST, (png_const_structrp png_ptr,
    png_inforp info_ptr, png_const_uint_16p hist));
#endif

PNG_EXPORT(143, png_uint_32, png_get_IHDR, (png_const_structrp png_ptr,
    png_const_inforp info_ptr, png_uint_32 *width, png_uint_32 *height,
    int *bit_depth, int *color_type, int *interlace_method,
    int *compression_method, int *filter_method));
```

```c
PNG_EXPORT(144, void, png_set_IHDR, (png_const_structrp png_ptr,
    png_inforp info_ptr, png_uint_32 width, png_uint_32 height, int bit_depth,
    int color_type, int interlace_method, int compression_method,
    int filter_method));

#ifdef PNG_oFFs_SUPPORTED
PNG_EXPORT(145, png_uint_32, png_get_oFFs, (png_const_structrp png_ptr,
    png_const_inforp info_ptr, png_int_32 *offset_x, png_int_32 *offset_y,
    int *unit_type));
#endif

#ifdef PNG_oFFs_SUPPORTED
PNG_EXPORT(146, void, png_set_oFFs, (png_const_structrp png_ptr,
    png_inforp info_ptr, png_int_32 offset_x, png_int_32 offset_y,
    int unit_type));
#endif

#ifdef PNG_pCAL_SUPPORTED
PNG_EXPORT(147, png_uint_32, png_get_pCAL, (png_const_structrp png_ptr,
    png_inforp info_ptr, png_charp *purpose, png_int_32 *X0,
    png_int_32 *X1, int *type, int *nparams, png_charp *units,
    png_charpp *params));
#endif

#ifdef PNG_pCAL_SUPPORTED
PNG_EXPORT(148, void, png_set_pCAL, (png_const_structrp png_ptr,
    png_inforp info_ptr, png_const_charp purpose, png_int_32 X0, png_int_32 X1,
    int type, int nparams, png_const_charp units, png_charpp params));
#endif

#ifdef PNG_pHYs_SUPPORTED
PNG_EXPORT(149, png_uint_32, png_get_pHYs, (png_const_structrp png_ptr,
    png_const_inforp info_ptr, png_uint_32 *res_x, png_uint_32 *res_y,
    int *unit_type));
#endif

#ifdef PNG_pHYs_SUPPORTED
PNG_EXPORT(150, void, png_set_pHYs, (png_const_structrp png_ptr,
    png_inforp info_ptr, png_uint_32 res_x, png_uint_32 res_y, int unit_type));
#endif

PNG_EXPORT(151, png_uint_32, png_get_PLTE, (png_const_structrp png_ptr,
    png_inforp info_ptr, png_colorp *palette, int *num_palette));

PNG_EXPORT(152, void, png_set_PLTE, (png_structrp png_ptr,
    png_inforp info_ptr, png_const_colorp palette, int num_palette));

#ifdef PNG_sBIT_SUPPORTED
```

```
PNG_EXPORT(153, png_uint_32, png_get_sBIT, (png_const_structrp png_ptr,
   png_inforp info_ptr, png_color_8p *sig_bit));
#endif

#ifdef PNG_sBIT_SUPPORTED
PNG_EXPORT(154, void, png_set_sBIT, (png_const_structrp png_ptr,
   png_inforp info_ptr, png_const_color_8p sig_bit));
#endif

#ifdef PNG_sRGB_SUPPORTED
PNG_EXPORT(155, png_uint_32, png_get_sRGB, (png_const_structrp png_ptr,
   png_const_inforp info_ptr, int *file_srgb_intent));
#endif

#ifdef PNG_sRGB_SUPPORTED
PNG_EXPORT(156, void, png_set_sRGB, (png_const_structrp png_ptr,
   png_inforp info_ptr, int srgb_intent));
PNG_EXPORT(157, void, png_set_sRGB_gAMA_and_cHRM, (png_const_structrp png_ptr,
   png_inforp info_ptr, int srgb_intent));
#endif

#ifdef PNG_iCCP_SUPPORTED
PNG_EXPORT(158, png_uint_32, png_get_iCCP, (png_const_structrp png_ptr,
   png_inforp info_ptr, png_charpp name, int *compression_type,
   png_bytepp profile, png_uint_32 *proflen));
#endif

#ifdef PNG_iCCP_SUPPORTED
PNG_EXPORT(159, void, png_set_iCCP, (png_const_structrp png_ptr,
   png_inforp info_ptr, png_const_charp name, int compression_type,
   png_const_bytep profile, png_uint_32 proflen));
#endif

#ifdef PNG_sPLT_SUPPORTED
PNG_EXPORT(160, int, png_get_sPLT, (png_const_structrp png_ptr,
   png_inforp info_ptr, png_sPLT_tpp entries));
#endif

#ifdef PNG_sPLT_SUPPORTED
PNG_EXPORT(161, void, png_set_sPLT, (png_const_structrp png_ptr,
   png_inforp info_ptr, png_const_sPLT_tp entries, int nentries));
#endif

#ifdef PNG_TEXT_SUPPORTED
/* png_get_text also returns the number of text chunks in *num_text */
PNG_EXPORT(162, int, png_get_text, (png_const_structrp png_ptr,
   png_inforp info_ptr, png_textp *text_ptr, int *num_text));
#endif
```

```
/* Note while png_set_text() will accept a structure whose text,
 * language, and  translated keywords are NULL pointers, the structure
 * returned by png_get_text will always contain regular
 * zero-terminated C strings.  They might be empty strings but
 * they will never be NULL pointers.
 */

#ifdef PNG_TEXT_SUPPORTED
PNG_EXPORT(163, void, png_set_text, (png_const_structrp png_ptr,
   png_inforp info_ptr, png_const_textp text_ptr, int num_text));
#endif

#ifdef PNG_tIME_SUPPORTED
PNG_EXPORT(164, png_uint_32, png_get_tIME, (png_const_structrp png_ptr,
   png_inforp info_ptr, png_timep *mod_time));
#endif

#ifdef PNG_tIME_SUPPORTED
PNG_EXPORT(165, void, png_set_tIME, (png_const_structrp png_ptr,
   png_inforp info_ptr, png_const_timep mod_time));
#endif

#ifdef PNG_tRNS_SUPPORTED
PNG_EXPORT(166, png_uint_32, png_get_tRNS, (png_const_structrp png_ptr,
   png_inforp info_ptr, png_bytep *trans_alpha, int *num_trans,
   png_color_16p *trans_color));
#endif

#ifdef PNG_tRNS_SUPPORTED
PNG_EXPORT(167, void, png_set_tRNS, (png_structrp png_ptr,
   png_inforp info_ptr, png_const_bytep trans_alpha, int num_trans,
   png_const_color_16p trans_color));
#endif

#ifdef PNG_sCAL_SUPPORTED
PNG_FP_EXPORT(168, png_uint_32, png_get_sCAL, (png_const_structrp png_ptr,
   png_const_inforp info_ptr, int *unit, double *width, double *height))
#if defined(PNG_FLOATING_ARITHMETIC_SUPPORTED) || \
 defined(PNG_FLOATING_POINT_SUPPORTED)
/* NOTE: this API is currently implemented using floating point arithmetic,
 * consequently it can only be used on systems with floating point support.
 * In any case the range of values supported by png_fixed_point is small and it
 * is highly recommended that png_get_sCAL_s be used instead.
 */
PNG_FIXED_EXPORT(214, png_uint_32, png_get_sCAL_fixed,
   (png_const_structrp png_ptr, png_const_inforp info_ptr, int *unit,
   png_fixed_point *width, png_fixed_point *height))
```

```
#endif
PNG_EXPORT(169, png_uint_32, png_get_sCAL_s,
  (png_const_structrp png_ptr, png_const_inforp info_ptr, int *unit,
  png_charpp swidth, png_charpp sheight));

PNG_FP_EXPORT(170, void, png_set_sCAL, (png_const_structrp png_ptr,
  png_inforp info_ptr, int unit, double width, double height))
PNG_FIXED_EXPORT(213, void, png_set_sCAL_fixed, (png_const_structrp png_ptr,
  png_inforp info_ptr, int unit, png_fixed_point width,
  png_fixed_point height))
PNG_EXPORT(171, void, png_set_sCAL_s, (png_const_structrp png_ptr,
  png_inforp info_ptr, int unit,
  png_const_charp swidth, png_const_charp sheight));
#endif /* PNG_sCAL_SUPPORTED */

#ifdef PNG_SET_UNKNOWN_CHUNKS_SUPPORTED
/* Provide the default handling for all unknown chunks or, optionally, for
 * specific unknown chunks.
 *
 * NOTE: prior to 1.6.0 the handling specified for particular chunks on read was
 * ignored and the default was used, the per-chunk setting only had an effect on
 * write.  If you wish to have chunk-specific handling on read in code that must
 * work on earlier versions you must use a user chunk callback to specify the
 * desired handling (keep or discard.)
 *
 * The 'keep' parameter is a PNG_HANDLE_CHUNK_ value as listed below.  The
 * parameter is interpreted as follows:
 *
 * READ:
 *   PNG_HANDLE_CHUNK_AS_DEFAULT:
 *     Known chunks: do normal libpng processing, do not keep the chunk (but
 *       see the comments below about PNG_HANDLE_AS_UNKNOWN_SUPPORTED)
 *     Unknown chunks: for a specific chunk use the global default, when used
 *       as the default discard the chunk data.
 *   PNG_HANDLE_CHUNK_NEVER:
 *     Discard the chunk data.
 *   PNG_HANDLE_CHUNK_IF_SAFE:
 *     Keep the chunk data if the chunk is not critical else raise a chunk
 *     error.
 *   PNG_HANDLE_CHUNK_ALWAYS:
 *     Keep the chunk data.
 *
 * If the chunk data is saved it can be retrieved using png_get_unknown_chunks,
 * below.  Notice that specifying "AS_DEFAULT" as a global default is equivalent
 * to specifying "NEVER", however when "AS_DEFAULT" is used for specific chunks
 * it simply resets the behavior to the libpng default.
 *
 * INTERACTION WTIH USER CHUNK CALLBACKS:
```

* The per-chunk handling is always used when there is a png_user_chunk_ptr
* callback and the callback returns 0; the chunk is then always stored *unless*
* it is critical and the per-chunk setting is other than ALWAYS. Notice that
* the global default is *not* used in this case. (In effect the per-chunk
* value is incremented to at least IF_SAFE.)
*
* IMPORTANT NOTE: this behavior will change in libpng 1.7 - the global and
* per-chunk defaults will be honored. If you want to preserve the current
* behavior when your callback returns 0 you must set PNG_HANDLE_CHUNK_IF_SAFE
* as the default - if you don't do this libpng 1.6 will issue a warning.
*
* If you want unhandled unknown chunks to be discarded in libpng 1.6 and
* earlier simply return '1' (handled).
*
* PNG_HANDLE_AS_UNKNOWN_SUPPORTED:
*   If this is *not* set known chunks will always be handled by libpng and
*   will never be stored in the unknown chunk list. Known chunks listed to
*   png_set_keep_unknown_chunks will have no effect. If it is set then known
*   chunks listed with a keep other than AS_DEFAULT will *never* be processed
*   by libpng, in addition critical chunks must either be processed by the
*   callback or saved.
*
*   The IHDR and IEND chunks must not be listed. Because this turns off the
*   default handling for chunks that would otherwise be recognized the
*   behavior of libpng transformations may well become incorrect!
*
* WRITE:
*   When writing chunks the options only apply to the chunks specified by
*   png_set_unknown_chunks (below), libpng will *always* write known chunks
*   required by png_set_ calls and will always write the core critical chunks
*   (as required for PLTE).
*
*   Each chunk in the png_set_unknown_chunks list is looked up in the
*   png_set_keep_unknown_chunks list to find the keep setting, this is then
*   interpreted as follows:
*
*   PNG_HANDLE_CHUNK_AS_DEFAULT:
*   Write safe-to-copy chunks and write other chunks if the global
*   default is set to _ALWAYS, otherwise don't write this chunk.
*   PNG_HANDLE_CHUNK_NEVER:
*   Do not write the chunk.
*   PNG_HANDLE_CHUNK_IF_SAFE:
*   Write the chunk if it is safe-to-copy, otherwise do not write it.
*   PNG_HANDLE_CHUNK_ALWAYS:
*   Write the chunk.
*
* Note that the default behavior is effectively the opposite of the read case -
* in read unknown chunks are not stored by default, in write they are written

* by default. Also the behavior of PNG_HANDLE_CHUNK_IF_SAFE is very different
* - on write the safe-to-copy bit is checked, on read the critical bit is
* checked and on read if the chunk is critical an error will be raised.
*
* num_chunks:
* ===========
*   If num_chunks is positive, then the "keep" parameter specifies the manner
*   for handling only those chunks appearing in the chunk_list array,
*   otherwise the chunk list array is ignored.
*
*   If num_chunks is 0 the "keep" parameter specifies the default behavior for
*   unknown chunks, as described above.
*
*   If num_chunks is negative, then the "keep" parameter specifies the manner
*   for handling all unknown chunks plus all chunks recognized by libpng
*   except for the IHDR, PLTE, tRNS, IDAT, and IEND chunks (which continue to
*   be processed by libpng.
*/
PNG_EXPORT(172, void, png_set_keep_unknown_chunks, (png_structrp png_ptr,
    int keep, png_const_bytep chunk_list, int num_chunks));

/* The "keep" PNG_HANDLE_CHUNK_ parameter for the specified chunk is returned;
* the result is therefore true (non-zero) if special handling is required,
* false for the default handling.
*/
PNG_EXPORT(173, int, png_handle_as_unknown, (png_const_structrp png_ptr,
    png_const_bytep chunk_name));
#endif

#ifdef PNG_STORE_UNKNOWN_CHUNKS_SUPPORTED
PNG_EXPORT(174, void, png_set_unknown_chunks, (png_const_structrp png_ptr,
    png_inforp info_ptr, png_const_unknown_chunkp unknowns,
    int num_unknowns));
   /* NOTE: prior to 1.6.0 this routine set the 'location' field of the added
    * unknowns to the location currently stored in the png_struct. This is
    * invariably the wrong value on write. To fix this call the following API
    * for each chunk in the list with the correct location. If you know your
    * code won't be compiled on earlier versions you can rely on
    * png_set_unknown_chunks(write-ptr, png_get_unknown_chunks(read-ptr)) doing
    * the correct thing.
    */

PNG_EXPORT(175, void, png_set_unknown_chunk_location,
    (png_const_structrp png_ptr, png_inforp info_ptr, int chunk, int location));

PNG_EXPORT(176, int, png_get_unknown_chunks, (png_const_structrp png_ptr,
    png_inforp info_ptr, png_unknown_chunkpp entries));
#endif

```c
/* Png_free_data() will turn off the "valid" flag for anything it frees.
 * If you need to turn it off for a chunk that your application has freed,
 * you can use png_set_invalid(png_ptr, info_ptr, PNG_INFO_CHNK);
 */
PNG_EXPORT(177, void, png_set_invalid, (png_const_structrp png_ptr,
    png_inforp info_ptr, int mask));


#ifdef PNG_INFO_IMAGE_SUPPORTED
/* The "params" pointer is currently not used and is for future expansion. */
#ifdef PNG_SEQUENTIAL_READ_SUPPORTED
PNG_EXPORT(178, void, png_read_png, (png_structrp png_ptr, png_inforp info_ptr,
    int transforms, png_voidp params));
#endif
#ifdef PNG_WRITE_SUPPORTED
PNG_EXPORT(179, void, png_write_png, (png_structrp png_ptr, png_inforp info_ptr,
    int transforms, png_voidp params));
#endif
#endif


PNG_EXPORT(180, png_const_charp, png_get_copyright,
    (png_const_structrp png_ptr));
PNG_EXPORT(181, png_const_charp, png_get_header_ver,
    (png_const_structrp png_ptr));
PNG_EXPORT(182, png_const_charp, png_get_header_version,
    (png_const_structrp png_ptr));
PNG_EXPORT(183, png_const_charp, png_get_libpng_ver,
    (png_const_structrp png_ptr));


#ifdef PNG_MNG_FEATURES_SUPPORTED
PNG_EXPORT(184, png_uint_32, png_permit_mng_features, (png_structrp png_ptr,
    png_uint_32 mng_features_permitted));
#endif


/* For use in png_set_keep_unknown, added to version 1.2.6 */
#define PNG_HANDLE_CHUNK_AS_DEFAULT   0
#define PNG_HANDLE_CHUNK_NEVER        1
#define PNG_HANDLE_CHUNK_IF_SAFE      2
#define PNG_HANDLE_CHUNK_ALWAYS       3
#define PNG_HANDLE_CHUNK_LAST         4


/* Strip the prepended error numbers ("#nnn ") from error and warning
 * messages before passing them to the error or warning handler.
 */
#ifdef PNG_ERROR_NUMBERS_SUPPORTED
PNG_EXPORT(185, void, png_set_strip_error_numbers, (png_structrp png_ptr,
    png_uint_32 strip_mode));
#endif
```

```
/* Added in libpng-1.2.6 */
#ifdef PNG_SET_USER_LIMITS_SUPPORTED
PNG_EXPORT(186, void, png_set_user_limits, (png_structrp png_ptr,
    png_uint_32 user_width_max, png_uint_32 user_height_max));
PNG_EXPORT(187, png_uint_32, png_get_user_width_max,
    (png_const_structrp png_ptr));
PNG_EXPORT(188, png_uint_32, png_get_user_height_max,
    (png_const_structrp png_ptr));
/* Added in libpng-1.4.0 */
PNG_EXPORT(189, void, png_set_chunk_cache_max, (png_structrp png_ptr,
    png_uint_32 user_chunk_cache_max));
PNG_EXPORT(190, png_uint_32, png_get_chunk_cache_max,
    (png_const_structrp png_ptr));
/* Added in libpng-1.4.1 */
PNG_EXPORT(191, void, png_set_chunk_malloc_max, (png_structrp png_ptr,
    png_alloc_size_t user_chunk_cache_max));
PNG_EXPORT(192, png_alloc_size_t, png_get_chunk_malloc_max,
    (png_const_structrp png_ptr));
#endif

#if defined(PNG_INCH_CONVERSIONS_SUPPORTED)
PNG_EXPORT(193, png_uint_32, png_get_pixels_per_inch,
    (png_const_structrp png_ptr, png_const_inforp info_ptr));

PNG_EXPORT(194, png_uint_32, png_get_x_pixels_per_inch,
    (png_const_structrp png_ptr, png_const_inforp info_ptr));

PNG_EXPORT(195, png_uint_32, png_get_y_pixels_per_inch,
    (png_const_structrp png_ptr, png_const_inforp info_ptr));

PNG_FP_EXPORT(196, float, png_get_x_offset_inches,
    (png_const_structrp png_ptr, png_const_inforp info_ptr))
#ifdef PNG_FIXED_POINT_SUPPORTED /* otherwise not implemented. */
PNG_FIXED_EXPORT(211, png_fixed_point, png_get_x_offset_inches_fixed,
    (png_const_structrp png_ptr, png_const_inforp info_ptr))
#endif

PNG_FP_EXPORT(197, float, png_get_y_offset_inches, (png_const_structrp png_ptr,
    png_const_inforp info_ptr))
#ifdef PNG_FIXED_POINT_SUPPORTED /* otherwise not implemented. */
PNG_FIXED_EXPORT(212, png_fixed_point, png_get_y_offset_inches_fixed,
    (png_const_structrp png_ptr, png_const_inforp info_ptr))
#endif

# ifdef PNG_pHYs_SUPPORTED
PNG_EXPORT(198, png_uint_32, png_get_pHYs_dpi, (png_const_structrp png_ptr,
    png_const_inforp info_ptr, png_uint_32 *res_x, png_uint_32 *res_y,
```

```
     int *unit_type));
#  endif /* PNG_pHYs_SUPPORTED */
#endif  /* PNG_INCH_CONVERSIONS_SUPPORTED */


/* Added in libpng-1.4.0 */
#ifdef PNG_IO_STATE_SUPPORTED
PNG_EXPORT(199, png_uint_32, png_get_io_state, (png_const_structrp png_ptr));


/* Removed from libpng 1.6; use png_get_io_chunk_type. */
PNG_REMOVED(200, png_const_bytep, png_get_io_chunk_name, (png_structrp png_ptr),
   PNG_DEPRECATED)


PNG_EXPORT(216, png_uint_32, png_get_io_chunk_type,
   (png_const_structrp png_ptr));


/* The flags returned by png_get_io_state() are the following: */
#  define PNG_IO_NONE        0x0000   /* no I/O at this moment */
#  define PNG_IO_READING     0x0001   /* currently reading */
#  define PNG_IO_WRITING     0x0002   /* currently writing */
#  define PNG_IO_SIGNATURE   0x0010   /* currently at the file signature */
#  define PNG_IO_CHUNK_HDR   0x0020   /* currently at the chunk header */
#  define PNG_IO_CHUNK_DATA  0x0040   /* currently at the chunk data */
#  define PNG_IO_CHUNK_CRC   0x0080   /* currently at the chunk crc */
#  define PNG_IO_MASK_OP     0x000f   /* current operation: reading/writing */
#  define PNG_IO_MASK_LOC    0x00f0   /* current location: sig/hdr/data/crc */
#endif /* ?PNG_IO_STATE_SUPPORTED */


/* Interlace support.  The following macros are always defined so that if
 * libpng interlace handling is turned off the macros may be used to handle
 * interlaced images within the application.
 */
#define PNG_INTERLACE_ADAM7_PASSES 7


/* Two macros to return the first row and first column of the original,
 * full, image which appears in a given pass.  'pass' is in the range 0
 * to 6 and the result is in the range 0 to 7.
 */
#define PNG_PASS_START_ROW(pass) (((1&~(pass))<<(3-((pass)>>1)))&7)
#define PNG_PASS_START_COL(pass) (((1& (pass))<<(3-(((pass)+1)>>1)))&7)


/* A macro to return the offset between pixels in the output row for a pair of
 * pixels in the input - effectively the inverse of the 'COL_SHIFT' macro that
 * follows.  Note that ROW_OFFSET is the offset from one row to the next whereas
 * COL_OFFSET is from one column to the next, within a row.
 */
#define PNG_PASS_ROW_OFFSET(pass) ((pass)>2?(8>>(((pass)-1)>>1)):8)
#define PNG_PASS_COL_OFFSET(pass) (1<<((7-(pass))>>1))
```

```
/* Two macros to help evaluate the number of rows or columns in each
 * pass.  This is expressed as a shift - effectively log2 of the number or
 * rows or columns in each 8x8 tile of the original image.
 */
#define PNG_PASS_ROW_SHIFT(pass) ((pass)>2?(8-(pass))>>1:3)
#define PNG_PASS_COL_SHIFT(pass) ((pass)>1?(7-(pass))>>1:3)

/* Hence two macros to determine the number of rows or columns in a given
 * pass of an image given its height or width.  In fact these macros may
 * return non-zero even though the sub-image is empty, because the other
 * dimension may be empty for a small image.
 */
#define PNG_PASS_ROWS(height, pass) (((height)+(((1<<PNG_PASS_ROW_SHIFT(pass))\
   -1)-PNG_PASS_START_ROW(pass)))>>PNG_PASS_ROW_SHIFT(pass))
#define PNG_PASS_COLS(width, pass) (((width)+(((1<<PNG_PASS_COL_SHIFT(pass))\
   -1)-PNG_PASS_START_COL(pass)))>>PNG_PASS_COL_SHIFT(pass))

/* For the reader row callbacks (both progressive and sequential) it is
 * necessary to find the row in the output image given a row in an interlaced
 * image, so two more macros:
 */
#define PNG_ROW_FROM_PASS_ROW(y_in, pass) \
   (((y_in)<<PNG_PASS_ROW_SHIFT(pass))+PNG_PASS_START_ROW(pass))
#define PNG_COL_FROM_PASS_COL(x_in, pass) \
   (((x_in)<<PNG_PASS_COL_SHIFT(pass))+PNG_PASS_START_COL(pass))

/* Two macros which return a boolean (0 or 1) saying whether the given row
 * or column is in a particular pass.  These use a common utility macro that
 * returns a mask for a given pass - the offset 'off' selects the row or
 * column version.  The mask has the appropriate bit set for each column in
 * the tile.
 */
#define PNG_PASS_MASK(pass,off) ( \
   ((0x110145AF>>(((7-(off))-(pass))<<2)) & 0xF) | \
   ((0x01145AF0>>(((7-(off))-(pass))<<2)) & 0xF0))

#define PNG_ROW_IN_INTERLACE_PASS(y, pass) \
   ((PNG_PASS_MASK(pass,0) >> ((y)&7)) & 1)
#define PNG_COL_IN_INTERLACE_PASS(x, pass) \
   ((PNG_PASS_MASK(pass,1) >> ((x)&7)) & 1)

#ifdef PNG_READ_COMPOSITE_NODIV_SUPPORTED
/* With these routines we avoid an integer divide, which will be slower on
 * most machines.  However, it does take more operations than the corresponding
 * divide method, so it may be slower on a few RISC systems.  There are two
 * shifts (by 8 or 16 bits) and an addition, versus a single integer divide.
 *
 * Note that the rounding factors are NOT supposed to be the same!  128 and
```

```
 * 32768 are correct for the NODIV code; 127 and 32767 are correct for the
 * standard method.
 *
 * [Optimized code by Greg Roelofs and Mark Adler...blame us for bugs. :-) ]
 */

/* fg and bg should be in `gamma 1.0' space; alpha is the opacity */

# define png_composite(composite, fg, alpha, bg)        \
   { png_uint_16 temp = (png_uint_16)((png_uint_16)(fg) \
       * (png_uint_16)(alpha)                  \
       + (png_uint_16)(bg)*(png_uint_16)(255        \
       - (png_uint_16)(alpha)) + 128);              \
    (composite) = (png_byte)((temp + (temp >> 8)) >> 8); }

# define png_composite_16(composite, fg, alpha, bg)      \
   { png_uint_32 temp = (png_uint_32)((png_uint_32)(fg) \
       * (png_uint_32)(alpha)                  \
       + (png_uint_32)(bg)*(65535                \
       - (png_uint_32)(alpha)) + 32768);            \
    (composite) = (png_uint_16)((temp + (temp >> 16)) >> 16); }

#else  /* Standard method using integer division */

# define png_composite(composite, fg, alpha, bg)                  \
   (composite) = (png_byte)(((png_uint_16)(fg) * (png_uint_16)(alpha) + \
   (png_uint_16)(bg) * (png_uint_16)(255 - (png_uint_16)(alpha)) +      \
   127) / 255)

# define png_composite_16(composite, fg, alpha, bg)                  \
   (composite) = (png_uint_16)(((png_uint_32)(fg) * (png_uint_32)(alpha) + \
   (png_uint_32)(bg)*(png_uint_32)(65535 - (png_uint_32)(alpha)) +       \
   32767) / 65535)
#endif /* PNG_READ_COMPOSITE_NODIV_SUPPORTED */

#ifdef PNG_READ_INT_FUNCTIONS_SUPPORTED
PNG_EXPORT(201, png_uint_32, png_get_uint_32, (png_const_bytep buf));
PNG_EXPORT(202, png_uint_16, png_get_uint_16, (png_const_bytep buf));
PNG_EXPORT(203, png_int_32, png_get_int_32, (png_const_bytep buf));
#endif

PNG_EXPORT(204, png_uint_32, png_get_uint_31, (png_const_structrp png_ptr,
   png_const_bytep buf));
/* No png_get_int_16 -- may be added if there's a real need for it. */

/* Place a 32-bit number into a buffer in PNG byte order (big-endian). */
#ifdef PNG_WRITE_INT_FUNCTIONS_SUPPORTED
PNG_EXPORT(205, void, png_save_uint_32, (png_bytep buf, png_uint_32 i));
```

```
#endif
#ifdef PNG_SAVE_INT_32_SUPPORTED
PNG_EXPORT(206, void, png_save_int_32, (png_bytep buf, png_int_32 i));
#endif

/* Place a 16-bit number into a buffer in PNG byte order.
 * The parameter is declared unsigned int, not png_uint_16,
 * just to avoid potential problems on pre-ANSI C compilers.
 */
#ifdef PNG_WRITE_INT_FUNCTIONS_SUPPORTED
PNG_EXPORT(207, void, png_save_uint_16, (png_bytep buf, unsigned int i));
/* No png_save_int_16 -- may be added if there's a real need for it. */
#endif

#ifdef PNG_USE_READ_MACROS
/* Inline macros to do direct reads of bytes from the input buffer.
 * The png_get_int_32() routine assumes we are using two's complement
 * format for negative values, which is almost certainly true.
 */
#  define PNG_get_uint_32(buf) \
   (((png_uint_32)(*(buf)) << 24) + \
   ((png_uint_32)(*((buf) + 1)) << 16) + \
   ((png_uint_32)(*((buf) + 2)) << 8) + \
   ((png_uint_32)(*((buf) + 3))))

  /* From libpng-1.4.0 until 1.4.4, the png_get_uint_16 macro (but not the
   * function) incorrectly returned a value of type png_uint_32.
   */
#  define PNG_get_uint_16(buf) \
   ((png_uint_16) \
   (((unsigned int)(*(buf)) << 8) + \
    ((unsigned int)(*((buf) + 1)))))

#  define PNG_get_int_32(buf) \
   ((png_int_32)((*(buf) & 0x80) \
    ? -((png_int_32)((png_get_uint_32(buf) ^ 0xffffffffL) + 1)) \
    : (png_int_32)png_get_uint_32(buf)))

  /* If PNG_PREFIX is defined the same thing as below happens in pnglibconf.h,
   * but defining a macro name prefixed with PNG_PREFIX.
   */
#  ifndef PNG_PREFIX
#    define png_get_uint_32(buf) PNG_get_uint_32(buf)
#    define png_get_uint_16(buf) PNG_get_uint_16(buf)
#    define png_get_int_32(buf)  PNG_get_int_32(buf)
#  endif
#else
#  ifdef PNG_PREFIX
```

```
    /* No macros; revert to the (redefined) function */
#    define PNG_get_uint_32 (png_get_uint_32)
#    define PNG_get_uint_16 (png_get_uint_16)
#    define PNG_get_int_32  (png_get_int_32)
#  endif
#endif

#if defined(PNG_SIMPLIFIED_READ_SUPPORTED) || \
    defined(PNG_SIMPLIFIED_WRITE_SUPPORTED)
/******************************************************************************
 *  SIMPLIFIED API
 ******************************************************************************
 *
 * Please read the documentation in libpng-manual.txt (TODO: write said
 * documentation) if you don't understand what follows.
 *
 * The simplified API hides the details of both libpng and the PNG file format
 * itself.  It allows PNG files to be read into a very limited number of
 * in-memory bitmap formats or to be written from the same formats.  If these
 * formats do not accomodate your needs then you can, and should, use the more
 * sophisticated APIs above - these support a wide variety of in-memory formats
 * and a wide variety of sophisticated transformations to those formats as well
 * as a wide variety of APIs to manipulate ancillary information.
 *
 * To read a PNG file using the simplified API:
 *
 * 1) Declare a 'png_image' structure (see below) on the stack and set the
 *    version field to PNG_IMAGE_VERSION.
 * 2) Call the appropriate png_image_begin_read... function.
 * 3) Set the png_image 'format' member to the required sample format.
 * 4) Allocate a buffer for the image and, if required, the color-map.
 * 5) Call png_image_finish_read to read the image and, if required, the
 *    color-map into your buffers.
 *
 * There are no restrictions on the format of the PNG input itself; all valid
 * color types, bit depths, and interlace methods are acceptable, and the
 * input image is transformed as necessary to the requested in-memory format
 * during the png_image_finish_read() step.  The only caveat is that if you
 * request a color-mapped image from a PNG that is full-color or makes
 * complex use of an alpha channel the transformation is extremely lossy and the
 * result may look terrible.
 *
 * To write a PNG file using the simplified API:
 *
 * 1) Declare a 'png_image' structure on the stack and memset() it to all zero.
 * 2) Initialize the members of the structure that describe the image, setting
 *    the 'format' member to the format of the image samples.
 * 3) Call the appropriate png_image_write... function with a pointer to the
```

```
 *    image and, if necessary, the color-map to write the PNG data.
 *
 * png_image is a structure that describes the in-memory format of an image
 * when it is being read or defines the in-memory format of an image that you
 * need to write:
 */
#define PNG_IMAGE_VERSION 1

typedef struct png_control *png_controlp;
typedef struct
{
  png_controlp opaque;    /* Initialize to NULL, free with png_image_free */
  png_uint_32  version;  /* Set to PNG_IMAGE_VERSION */
  png_uint_32  width;    /* Image width in pixels (columns) */
  png_uint_32  height;   /* Image height in pixels (rows) */
  png_uint_32  format;   /* Image format as defined below */
  png_uint_32  flags;    /* A bit mask containing informational flags */
  png_uint_32  colormap_entries;
                 /* Number of entries in the color-map */


  /* In the event of an error or warning the following field will be set to a
   * non-zero value and the 'message' field will contain a '\0' terminated
   * string with the libpng error or warning message.  If both warnings and
   * an error were encountered, only the error is recorded.  If there
   * are multiple warnings, only the first one is recorded.
   *
   * The upper 30 bits of this value are reserved, the low two bits contain
   * a value as follows:
   */
#  define PNG_IMAGE_WARNING 1
#  define PNG_IMAGE_ERROR 2
  /*
   * The result is a two-bit code such that a value more than 1 indicates
   * a failure in the API just called:
   *
   *    0 - no warning or error
   *    1 - warning
   *    2 - error
   *    3 - error preceded by warning
   */
#  define PNG_IMAGE_FAILED(png_cntrl) ((((png_cntrl).warning_or_error)&0x03)>1)

  png_uint_32  warning_or_error;

  char         message[64];
} png_image, *png_imagep;

/* The samples of the image have one to four channels whose components have
```

* original values in the range 0 to 1.0:
*
* 1: A single gray or luminance channel (G).
* 2: A gray/luminance channel and an alpha channel (GA).
* 3: Three red, green, blue color channels (RGB).
* 4: Three color channels and an alpha channel (RGBA).
*
* The components are encoded in one of two ways:
*
* a) As a small integer, value 0..255, contained in a single byte. For the
* alpha channel the original value is simply value/255. For the color or
* luminance channels the value is encoded according to the sRGB specification
* and matches the 8-bit format expected by typical display devices.
*
* The color/gray channels are not scaled (pre-multiplied) by the alpha
* channel and are suitable for passing to color management software.
*
* b) As a value in the range 0..65535, contained in a 2-byte integer. All
* channels can be converted to the original value by dividing by 65535; all
* channels are linear. Color channels use the RGB encoding (RGB end-points) of
* the sRGB specification. This encoding is identified by the
* PNG_FORMAT_FLAG_LINEAR flag below.
*
* When the simplified API needs to convert between sRGB and linear colorspaces,
* the actual sRGB transfer curve defined in the sRGB specification (see the
* article at http://en.wikipedia.org/wiki/SRGB) is used, not the gamma=1/2.2
* approximation used elsewhere in libpng.
*
* When an alpha channel is present it is expected to denote pixel coverage
* of the color or luminance channels and is returned as an associated alpha
* channel: the color/gray channels are scaled (pre-multiplied) by the alpha
* value.
*
* The samples are either contained directly in the image data, between 1 and 8
* bytes per pixel according to the encoding, or are held in a color-map indexed
* by bytes in the image data. In the case of a color-map the color-map entries
* are individual samples, encoded as above, and the image data has one byte per
* pixel to select the relevant sample from the color-map.
*/

/* PNG_FORMAT_*
*
* #defines to be used in png_image::format. Each #define identifies a
* particular layout of sample data and, if present, alpha values. There are
* separate defines for each of the two component encodings.
*
* A format is built up using single bit flag values. All combinations are
* valid. Formats can be built up from the flag values or you can use one of

```
 * the predefined values below.  When testing formats always use the FORMAT_FLAG
 * macros to test for individual features - future versions of the library may
 * add new flags.
 *
 * When reading or writing color-mapped images the format should be set to the
 * format of the entries in the color-map then png_image_{read,write}_colormap
 * called to read or write the color-map and set the format correctly for the
 * image data.  Do not set the PNG_FORMAT_FLAG_COLORMAP bit directly!
 *
 * NOTE: libpng can be built with particular features disabled, if you see
 * compiler errors because the definition of one of the following flags has been
 * compiled out it is because libpng does not have the required support.  It is
 * possible, however, for the libpng configuration to enable the format on just
 * read or just write; in that case you may see an error at run time.  You can
 * guard against this by checking for the definition of the appropriate
 * "_SUPPORTED" macro, one of:
 *
 *   PNG_SIMPLIFIED_{READ,WRITE}_{BGR,AFIRST}_SUPPORTED
 */
#define PNG_FORMAT_FLAG_ALPHA    0x01U /* format with an alpha channel */
#define PNG_FORMAT_FLAG_COLOR    0x02U /* color format: otherwise grayscale */
#define PNG_FORMAT_FLAG_LINEAR   0x04U /* 2 byte channels else 1 byte */
#define PNG_FORMAT_FLAG_COLORMAP 0x08U /* image data is color-mapped */

#ifdef PNG_FORMAT_BGR_SUPPORTED
#  define PNG_FORMAT_FLAG_BGR    0x10U /* BGR colors, else order is RGB */
#endif

#ifdef PNG_FORMAT_AFIRST_SUPPORTED
#  define PNG_FORMAT_FLAG_AFIRST 0x20U /* alpha channel comes first */
#endif

/* Commonly used formats have predefined macros.
 *
 * First the single byte (sRGB) formats:
 */
#define PNG_FORMAT_GRAY 0
#define PNG_FORMAT_GA   PNG_FORMAT_FLAG_ALPHA
#define PNG_FORMAT_AG   (PNG_FORMAT_GA|PNG_FORMAT_FLAG_AFIRST)
#define PNG_FORMAT_RGB  PNG_FORMAT_FLAG_COLOR
#define PNG_FORMAT_BGR  (PNG_FORMAT_FLAG_COLOR|PNG_FORMAT_FLAG_BGR)
#define PNG_FORMAT_RGBA (PNG_FORMAT_RGB|PNG_FORMAT_FLAG_ALPHA)
#define PNG_FORMAT_ARGB (PNG_FORMAT_RGBA|PNG_FORMAT_FLAG_AFIRST)
#define PNG_FORMAT_BGRA (PNG_FORMAT_BGR|PNG_FORMAT_FLAG_ALPHA)
#define PNG_FORMAT_ABGR (PNG_FORMAT_BGRA|PNG_FORMAT_FLAG_AFIRST)

/* Then the linear 2-byte formats.  When naming these "Y" is used to
 * indicate a luminance (gray) channel.
```

```
*/
#define PNG_FORMAT_LINEAR_Y PNG_FORMAT_FLAG_LINEAR
#define PNG_FORMAT_LINEAR_Y_ALPHA
(PNG_FORMAT_FLAG_LINEAR|PNG_FORMAT_FLAG_ALPHA)
#define PNG_FORMAT_LINEAR_RGB (PNG_FORMAT_FLAG_LINEAR|PNG_FORMAT_FLAG_COLOR)
#define PNG_FORMAT_LINEAR_RGB_ALPHA \
  (PNG_FORMAT_FLAG_LINEAR|PNG_FORMAT_FLAG_COLOR|PNG_FORMAT_FLAG_ALPHA)

/* With color-mapped formats the image data is one byte for each pixel, the byte
 * is an index into the color-map which is formatted as above.  To obtain a
 * color-mapped format it is sufficient just to add the PNG_FOMAT_FLAG_COLORMAP
 * to one of the above definitions, or you can use one of the definitions below.
 */
#define PNG_FORMAT_RGB_COLORMAP  (PNG_FORMAT_RGB|PNG_FORMAT_FLAG_COLORMAP)
#define PNG_FORMAT_BGR_COLORMAP  (PNG_FORMAT_BGR|PNG_FORMAT_FLAG_COLORMAP)
#define PNG_FORMAT_RGBA_COLORMAP (PNG_FORMAT_RGBA|PNG_FORMAT_FLAG_COLORMAP)
#define PNG_FORMAT_ARGB_COLORMAP (PNG_FORMAT_ARGB|PNG_FORMAT_FLAG_COLORMAP)
#define PNG_FORMAT_BGRA_COLORMAP (PNG_FORMAT_BGRA|PNG_FORMAT_FLAG_COLORMAP)
#define PNG_FORMAT_ABGR_COLORMAP (PNG_FORMAT_ABGR|PNG_FORMAT_FLAG_COLORMAP)

/* PNG_IMAGE macros
 *
 * These are convenience macros to derive information from a png_image
 * structure.  The PNG_IMAGE_SAMPLE_ macros return values appropriate to the
 * actual image sample values - either the entries in the color-map or the
 * pixels in the image.  The PNG_IMAGE_PIXEL_ macros return corresponding values
 * for the pixels and will always return 1 for color-mapped formats.  The
 * remaining macros return information about the rows in the image and the
 * complete image.
 *
 * NOTE: All the macros that take a png_image::format parameter are compile time
 * constants if the format parameter is, itself, a constant.  Therefore these
 * macros can be used in array declarations and case labels where required.
 * Similarly the macros are also pre-processor constants (sizeof is not used) so
 * they can be used in #if tests.
 *
 * First the information about the samples.
 */
#define PNG_IMAGE_SAMPLE_CHANNELS(fmt)\
  (((fmt)&(PNG_FORMAT_FLAG_COLOR|PNG_FORMAT_FLAG_ALPHA))+1)
  /* Return the total number of channels in a given format: 1..4 */

#define PNG_IMAGE_SAMPLE_COMPONENT_SIZE(fmt)\
  ((((fmt) & PNG_FORMAT_FLAG_LINEAR) >> 2)+1)
  /* Return the size in bytes of a single component of a pixel or color-map
   * entry (as appropriate) in the image: 1 or 2.
   */
```

```
#define PNG_IMAGE_SAMPLE_SIZE(fmt)\
   (PNG_IMAGE_SAMPLE_CHANNELS(fmt) * PNG_IMAGE_SAMPLE_COMPONENT_SIZE(fmt))
   /* This is the size of the sample data for one sample.  If the image is
    * color-mapped it is the size of one color-map entry (and image pixels are
    * one byte in size), otherwise it is the size of one image pixel.
    */

#define PNG_IMAGE_MAXIMUM_COLORMAP_COMPONENTS(fmt)\
   (PNG_IMAGE_SAMPLE_CHANNELS(fmt) * 256)
   /* The maximum size of the color-map required by the format expressed in a
    * count of components.  This can be used to compile-time allocate a
    * color-map:
    *
    * png_uint_16 colormap[PNG_IMAGE_MAXIMUM_COLORMAP_COMPONENTS(linear_fmt)];
    *
    * png_byte colormap[PNG_IMAGE_MAXIMUM_COLORMAP_COMPONENTS(sRGB_fmt)];
    *
    * Alternatively use the PNG_IMAGE_COLORMAP_SIZE macro below to use the
    * information from one of the png_image_begin_read_ APIs and dynamically
    * allocate the required memory.
    */

/* Corresponding information about the pixels */
#define PNG_IMAGE_PIXEL_(test,fmt)\
   (((fmt)&PNG_FORMAT_FLAG_COLORMAP)?1:test(fmt))

#define PNG_IMAGE_PIXEL_CHANNELS(fmt)\
   PNG_IMAGE_PIXEL_(PNG_IMAGE_SAMPLE_CHANNELS,fmt)
   /* The number of separate channels (components) in a pixel; 1 for a
    * color-mapped image.
    */

#define PNG_IMAGE_PIXEL_COMPONENT_SIZE(fmt)\
   PNG_IMAGE_PIXEL_(PNG_IMAGE_SAMPLE_COMPONENT_SIZE,fmt)
   /* The size, in bytes, of each component in a pixel; 1 for a color-mapped
    * image.
    */

#define PNG_IMAGE_PIXEL_SIZE(fmt) PNG_IMAGE_PIXEL_(PNG_IMAGE_SAMPLE_SIZE,fmt)
   /* The size, in bytes, of a complete pixel; 1 for a color-mapped image. */

/* Information about the whole row, or whole image */
#define PNG_IMAGE_ROW_STRIDE(image)\
   (PNG_IMAGE_PIXEL_CHANNELS((image).format) * (image).width)
   /* Return the total number of components in a single row of the image; this
    * is the minimum 'row stride', the minimum count of components between each
    * row.  For a color-mapped image this is the minimum number of bytes in a
    * row.
```

```
   */

#define PNG_IMAGE_BUFFER_SIZE(image, row_stride)\
  (PNG_IMAGE_PIXEL_COMPONENT_SIZE((image).format)*(image).height*(row_stride))
  /* Return the size, in bytes, of an image buffer given a png_image and a row
   * stride - the number of components to leave space for in each row.
   */

#define PNG_IMAGE_SIZE(image)\
  PNG_IMAGE_BUFFER_SIZE(image, PNG_IMAGE_ROW_STRIDE(image))
  /* Return the size, in bytes, of the image in memory given just a png_image;
   * the row stride is the minimum stride required for the image.
   */

#define PNG_IMAGE_COLORMAP_SIZE(image)\
  (PNG_IMAGE_SAMPLE_SIZE((image).format) * (image).colormap_entries)
  /* Return the size, in bytes, of the color-map of this image.  If the image
   * format is not a color-map format this will return a size sufficient for
   * 256 entries in the given format; check PNG_FORMAT_FLAG_COLORMAP if
   * you don't want to allocate a color-map in this case.
   */

/* PNG_IMAGE_FLAG_*
 *
 * Flags containing additional information about the image are held in the
 * 'flags' field of png_image.
 */
#define PNG_IMAGE_FLAG_COLORSPACE_NOT_sRGB 0x01
  /* This indicates the the RGB values of the in-memory bitmap do not
   * correspond to the red, green and blue end-points defined by sRGB.
   */

#define PNG_IMAGE_FLAG_FAST 0x02
  /* On write emphasise speed over compression; the resultant PNG file will be
   * larger but will be produced significantly faster, particular for large
   * images.  Do not use this option for images which will be distributed, only
   * used it when producing intermediate files that will be read back in
   * repeatedly.  For a typical 24-bit image the option will double the read
   * speed at the cost of increasing the image size by 25%, however for many
   * more compressible images the PNG file can be 10 times larger with only a
   * slight speed gain.
   */

#define PNG_IMAGE_FLAG_16BIT_sRGB 0x04
  /* On read if the image is a 16-bit per component image and there is no gAMA
   * or sRGB chunk assume that the components are sRGB encoded.  Notice that
   * images output by the simplified API always have gamma information; setting
   * this flag only affects the interpretation of 16-bit images from an
```

* external source. It is recommended that the application expose this flag
 * to the user; the user can normally easily recognize the difference between
 * linear and sRGB encoding. This flag has no effect on write - the data
 * passed to the write APIs must have the correct encoding (as defined
 * above.)
 *
 * If the flag is not set (the default) input 16-bit per component data is
 * assumed to be linear.
 *
 * NOTE: the flag can only be set after the png_image_begin_read_ call,
 * because that call initializes the 'flags' field.
 */

#ifdef PNG_SIMPLIFIED_READ_SUPPORTED
/* READ APIs
 * ---------
 *
 * The png_image passed to the read APIs must have been initialized by setting
 * the png_controlp field 'opaque' to NULL (or, safer, memset the whole thing.)
 */
#ifdef PNG_STDIO_SUPPORTED
PNG_EXPORT(234, int, png_image_begin_read_from_file, (png_imagep image,
  const char *file_name));
  /* The named file is opened for read and the image header is filled in
   * from the PNG header in the file.
   */

PNG_EXPORT(235, int, png_image_begin_read_from_stdio, (png_imagep image,
  FILE* file));
  /* The PNG header is read from the stdio FILE object. */
#endif /* PNG_STDIO_SUPPORTED */

PNG_EXPORT(236, int, png_image_begin_read_from_memory, (png_imagep image,
  png_const_voidp memory, png_size_t size));
  /* The PNG header is read from the given memory buffer. */

PNG_EXPORT(237, int, png_image_finish_read, (png_imagep image,
  png_const_colorp background, void *buffer, png_int_32 row_stride,
  void *colormap));
  /* Finish reading the image into the supplied buffer and clean up the
   * png_image structure.
   *
   * row_stride is the step, in byte or 2-byte units as appropriate,
   * between adjacent rows. A positive stride indicates that the top-most row
   * is first in the buffer - the normal top-down arrangement. A negative
   * stride indicates that the bottom-most row is first in the buffer.
   *
   * background need only be supplied if an alpha channel must be removed from

```
 * a png_byte format and the removal is to be done by compositing on a solid
 * color; otherwise it may be NULL and any composition will be done directly
 * onto the buffer.  The value is an sRGB color to use for the background,
 * for grayscale output the green channel is used.
 *
 * background must be supplied when an alpha channel must be removed from a
 * single byte color-mapped output format, in other words if:
 *
 * 1) The original format from png_image_begin_read_from_* had
 *    PNG_FORMAT_FLAG_ALPHA set.
 * 2) The format set by the application does not.
 * 3) The format set by the application has PNG_FORMAT_FLAG_COLORMAP set and
 *    PNG_FORMAT_FLAG_LINEAR *not* set.
 *
 * For linear output removing the alpha channel is always done by compositing
 * on black and background is ignored.
 *
 * colormap must be supplied when PNG_FORMAT_FLAG_COLORMAP is set.  It must
 * be at least the size (in bytes) returned by PNG_IMAGE_COLORMAP_SIZE.
 * image->colormap_entries will be updated to the actual number of entries
 * written to the colormap; this may be less than the original value.
 */


PNG_EXPORT(238, void, png_image_free, (png_imagep image));
  /* Free any data allocated by libpng in image->opaque, setting the pointer to
   * NULL.  May be called at any time after the structure is initialized.
   */
#endif /* PNG_SIMPLIFIED_READ_SUPPORTED */

#ifdef PNG_SIMPLIFIED_WRITE_SUPPORTED
#ifdef PNG_STDIO_SUPPORTED
/* WRITE APIS
 * ----------
 * For write you must initialize a png_image structure to describe the image to
 * be written.  To do this use memset to set the whole structure to 0 then
 * initialize fields describing your image.
 *
 * version: must be set to PNG_IMAGE_VERSION
 * opaque: must be initialized to NULL
 * width: image width in pixels
 * height: image height in rows
 * format: the format of the data (image and color-map) you wish to write
 * flags: set to 0 unless one of the defined flags applies; set
 *    PNG_IMAGE_FLAG_COLORSPACE_NOT_sRGB for color format images where the RGB
 *    values do not correspond to the colors in sRGB.
 * colormap_entries: set to the number of entries in the color-map (0 to 256)
 */
PNG_EXPORT(239, int, png_image_write_to_file, (png_imagep image,
```

```
   const char *file, int convert_to_8bit, const void *buffer,
   png_int_32 row_stride, const void *colormap));
   /* Write the image to the named file. */

PNG_EXPORT(240, int, png_image_write_to_stdio, (png_imagep image, FILE *file,
   int convert_to_8_bit, const void *buffer, png_int_32 row_stride,
   const void *colormap));
   /* Write the image to the given (FILE*). */

/* With both write APIs if image is in one of the linear formats with 16-bit
 * data then setting convert_to_8_bit will cause the output to be an 8-bit PNG
 * gamma encoded according to the sRGB specification, otherwise a 16-bit linear
 * encoded PNG file is written.
 *
 * With color-mapped data formats the colormap parameter point to a color-map
 * with at least image->colormap_entries encoded in the specified format.  If
 * the format is linear the written PNG color-map will be converted to sRGB
 * regardless of the convert_to_8_bit flag.
 *
 * With all APIs row_stride is handled as in the read APIs - it is the spacing
 * from one row to the next in component sized units (1 or 2 bytes) and if
 * negative indicates a bottom-up row layout in the buffer.
 *
 * Note that the write API does not support interlacing or sub-8-bit pixels.
 */
#endif /* PNG_STDIO_SUPPORTED */
#endif /* PNG_SIMPLIFIED_WRITE_SUPPORTED */
/******************************************************************************
 *  END OF SIMPLIFIED API
 ******************************************************************************/
#endif /* PNG_SIMPLIFIED_{READ|WRITE}_SUPPORTED */

#ifdef PNG_CHECK_FOR_INVALID_INDEX_SUPPORTED
PNG_EXPORT(242, void, png_set_check_for_invalid_index,
   (png_structrp png_ptr, int allowed));
# ifdef PNG_GET_PALETTE_MAX_SUPPORTED
PNG_EXPORT(243, int, png_get_palette_max, (png_const_structp png_ptr,
   png_const_infop info_ptr));
# endif
#endif /* CHECK_FOR_INVALID_INDEX */

/******************************************************************************
 *  IMPLEMENTATION OPTIONS
 ******************************************************************************
 *
 * Support for arbitrary implementation-specific optimizations.  The API allows
 * particular options to be turned on or off.  'Option' is the number of the
 * option and 'onoff' is 0 (off) or non-0 (on).  The value returned is given
```

```
* by the PNG_OPTION_ defines below.
*
* HARDWARE: normally hardware capabilites, such as the Intel SSE instructions,
*       are detected at run time, however sometimes it may be impossible
*       to do this in user mode, in which case it is necessary to discover
*       the capabilities in an OS specific way.  Such capabilities are
*       listed here when libpng has support for them and must be turned
*       ON by the application if present.
*
* SOFTWARE: sometimes software optimizations actually result in performance
*       decrease on some architectures or systems, or with some sets of
*       PNG images.  'Software' options allow such optimizations to be
*       selected at run time.
*/
#ifdef PNG_SET_OPTION_SUPPORTED
#ifdef PNG_ARM_NEON_API_SUPPORTED
#  define PNG_ARM_NEON   0 /* HARDWARE: ARM Neon SIMD instructions supported */
#endif
#define PNG_MAXIMUM_INFLATE_WINDOW 2 /* SOFTWARE: force maximum window */
#define PNG_SKIP_sRGB_CHECK_PROFILE 4 /* SOFTWARE: Check ICC profile for sRGB */
#define PNG_OPTION_NEXT  6 /* Next option - numbers must be even */

/* Return values: NOTE: there are four values and 'off' is *not* zero */
#define PNG_OPTION_UNSET   0 /* Unset - defaults to off */
#define PNG_OPTION_INVALID 1 /* Option number out of range */
#define PNG_OPTION_OFF     2
#define PNG_OPTION_ON      3

PNG_EXPORT(244, int, png_set_option, (png_structrp png_ptr, int option,
  int onoff));
#endif /* PNG_SET_OPTION_SUPPORTED */

/*****************************************************************************
*  END OF HARDWARE AND SOFTWARE OPTIONS
*****************************************************************************/

/* Maintainer: Put new public prototypes here ^, in libpng.3, in project
* defs, and in scripts/symbols.def.
*/

/* The last ordinal number (this is the *last* one already used; the next
* one to use is one more than this.)
*/
#ifdef PNG_EXPORT_LAST_ORDINAL
 PNG_EXPORT_LAST_ORDINAL(244);
#endif

#ifdef __cplusplus
```

```
    }
#endif

#endif /* PNG_VERSION_INFO_ONLY */
/* Do not put anything past this line */
#endif /* PNG_H */
```

1.65 libpng/contrib 1.6.14

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October 23, 2014

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1.67 librsvg/tests 2.40.5

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

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1.68 libxml2 2.9.2

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1.76 MooseX::FollowPBP 0.05

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1.77 MooseX::Getopt 0.68

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1.79 MooseX::Role::Parameterized 1.08

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1.80 MooseX::Singleton 0.29

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1.83 MooX::Types::MooseLike 0.28

1.84 Mozilla::CA 20160104

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1.85 namespace::autoclean 0.24

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```

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```
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Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the
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commands you use may be called something other than `show w' and `show
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school, if any, to sign a "copyright disclaimer" for the program, if
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program `Gnomovision' (a program to direct compilers to make passes
at assemblers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

That's all there is to it!

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1.86 namespace::clean 0.23

1.87 Number-Compare 0.03

1.87.1 Available under license :

from /lib/Number/Compare.pm

<snip>

=head1 AUTHOR

Richard Clamp <richardc@unixbeard.net>

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=head1 SEE ALSO

http://physics.nist.gov/cuu/Units/binary.html

=cut
from META.yml

--- #YAML:1.0
name: Number-Compare
version: 0.03
abstract: ~
author: []
license: unknown
distribution_type: module
configure_requires:
  ExtUtils::MakeMaker: 0
build_requires:
  ExtUtils::MakeMaker: 0
requires:
  Test::More: 0
no_index:
  directory:
    - t
    - inc
generated_by: ExtUtils::MakeMaker version 6.57_05
meta-spec:
  url: http://module-build.sourceforge.net/META-spec-v1.4.html
  version: 1.4
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1.88 Package::DeprecationManager 0.13

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1.89 Package::Stash 0.33

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Source code for a work means the preferred form of the work for making
modifications to it. For an executable file, complete source code means
all the source code for all modules it contains; but, as a special
exception, it need not include source code for modules which are standard
libraries that accompany the operating system on which the executable
file runs, or for standard header files or definitions files that
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Appendix: How to Apply These Terms to Your New Programs

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You should also get your employer (if you work as a programmer) or your
school, if any, to sign a "copyright disclaimer" for the program, if
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 program `Gnomovision' (a program to direct compilers to make passes
 at assemblers) written by James Hacker.

 <signature of Ty Coon>, 1 April 1989
 Ty Coon, President of Vice

That's all there is to it!

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The End

1.92 pango 1.36.8

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1.93 Pango (perl) 1.226

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bzip2/libbzip2 version 1.0.6 of 6 September 2010

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1.106 Text-Glob 0.09

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---
abstract: 'match globbing patterns against text'
author:
 - 'Richard Clamp <richardc@unixbeard.net>'
build_requires:
 Test::More: 0
configure_requires:
 Module::Build: 0.36
generated_by: 'Module::Build version 0.3603'
license: perl
meta-spec:
 url: http://module-build.sourceforge.net/META-spec-v1.4.html
 version: 1.4
name: Text-Glob
provides:
 Text::Glob:
   file: lib/Text/Glob.pm
   version: 0.09
resources:
 license: http://dev.perl.org/licenses/
version: 0.09

From Glob.pm
================

=head1 AUTHOR

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=head1 SEE ALSO

L<File::Glob>, glob(3)

=cut
Freom META.yml

---
abstract: 'match globbing patterns against text'
author:
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build_requires:
 Test::More: 0
configure_requires:
 Module::Build: 0.36
generated_by: 'Module::Build version 0.3603'
license: perl
meta-spec:
 url: http://module-build.sourceforge.net/META-spec-v1.4.html
 version: 1.4
name: Text-Glob
provides:
 Text::Glob:
   file: lib/Text/Glob.pm
   version: 0.09
resources:
 license: http://dev.perl.org/licenses/
version: 0.09
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1.115 zlib 1.2.8

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 version 1.2.8, April 28th, 2013

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 Jean-loup Gailly   Mark Adler
 jloup@gzip.org   madler@alumni.caltech.edu

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